

Oracle® Enterprise Manager

Oracle Exadata Database Machine Getting Started Guide

Release 13.1.0.1.0

E56534-01

December 2015

Copyright © 2015, Oracle and/or its affiliates. All rights reserved.

This software and related documentation are provided under a license agreement containing restrictions on use and disclosure and are protected by intellectual property laws. Except as expressly permitted in your license agreement or allowed by law, you may not use, copy, reproduce, translate, broadcast, modify, license, transmit, distribute, exhibit, perform, publish, or display any part, in any form, or by any means. Reverse engineering, disassembly, or decompilation of this software, unless required by law for interoperability, is prohibited.

The information contained herein is subject to change without notice and is not warranted to be error-free. If you find any errors, please report them to us in writing.

If this is software or related documentation that is delivered to the U.S. Government or anyone licensing it on behalf of the U.S. Government, then the following notice is applicable:

U.S. GOVERNMENT END USERS: Oracle programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, delivered to U.S. Government end users are "commercial computer software" pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, use, duplication, disclosure, modification, and adaptation of the programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, shall be subject to license terms and license restrictions applicable to the programs. No other rights are granted to the U.S. Government.

This software or hardware is developed for general use in a variety of information management applications. It is not developed or intended for use in any inherently dangerous applications, including applications that may create a risk of personal injury. If you use this software or hardware in dangerous applications, then you shall be responsible to take all appropriate fail-safe, backup, redundancy, and other measures to ensure its safe use. Oracle Corporation and its affiliates disclaim any liability for any damages caused by use of this software or hardware in dangerous applications.

Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Xeon are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Opteron, the AMD logo, and the AMD Opteron logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group.

This software or hardware and documentation may provide access to or information about content, products, and services from third parties. Oracle Corporation and its affiliates are not responsible for and expressly disclaim all warranties of any kind with respect to third-party content, products, and services unless otherwise set forth in an applicable agreement between you and Oracle. Oracle Corporation and its affiliates will not be responsible for any loss, costs, or damages incurred due to your access to or use of third-party content, products, or services, except as set forth in an applicable agreement between you and Oracle.

Contents

Preface	ix
Audience	ix
Documentation Accessibility	ix
Conventions	ix
What's Changed	x
What's New	xi
New Features and Enhancements for Oracle Exadata Plug-in 13.1.0.1.0	xi
1 Introduction to the Plug-in	
1.1 Oracle Exadata Plug-in Features	1-1
1.1.1 Monitoring and Notification Features	1-1
1.1.2 Hardware Support Features	1-2
1.1.3 Exadata Software Support	1-3
1.1.4 Target Discovery Features	1-3
1.1.5 Exadata Storage Server Grid Home Page and Server Home Page Features	1-4
1.1.6 Exadata Performance Page Features	1-4
1.1.7 Exadata Metrics Features	1-4
1.2 Oracle Exadata Database Machine Supported Hardware and Software	1-4
1.2.1 Exadata Database Machine Configuration Support	1-5
1.2.1.1 Supported Machine Type	1-5
1.2.1.2 Multi-Rack Support	1-5
1.2.1.3 Partitioned Support	1-6
1.2.2 Oracle SuperCluster Support - Exadata Plug-in Release 12.1.0.4.0 and Later	1-6
1.2.2.1 Oracle SuperCluster Known Issues	1-7
1.2.3 Supported Component Versions	1-10
1.2.4 Supported Operating Systems	1-11
1.2.5 Oracle Exadata Database Machine Hardware Not Supported	1-12
2 Installation and Deployment	
2.1 Oracle Exadata Plug-in Deployment Prerequisites	2-1
2.1.1 Create a Database Server ILOM Service Processor User	2-1
2.1.2 Verify Software Versions	2-2
2.1.2.1 Exadata Storage Server Software	2-2
2.1.2.2 ILOM ipmitool	2-3

2.1.2.3	InfiniBand Switch	2-3
2.1.2.4	PDU Firmware	2-3
2.1.2.5	KVM Application	2-3
2.1.2.6	Grid Infrastructure/DB Cluster	2-4
2.1.3	Verify Names Resolution.....	2-4
2.1.4	Verify Firewall Configuration.....	2-4
2.1.5	Oracle SuperCluster Prerequisites	2-6
2.2	User Roles.....	2-7
2.3	Install Enterprise Manager Agent	2-7
2.3.1	Agent Installation Prerequisite - Solaris 11 Only	2-7
2.3.2	Install Agents and Set Up Exadata Monitoring Using Automated Kit	2-8
2.3.3	Install Enterprise Manager Agent Using the Push Method	2-8
2.3.3.1	Installing Oracle Management Agent in Silent Mode Option	2-10
2.4	Manually Deploy Exadata Plug-in	2-10

3 Exadata Database Machine Discovery

3.1	Running the Discovery Precheck Script	3-1
3.1.1	Secure Storage for Target Monitoring Credentials	3-1
3.1.2	Download the Discovery Precheck Script.....	3-2
3.1.3	Run the Discovery Precheck Script	3-2
3.1.4	Automatic Verification.....	3-2
3.1.5	Manual Verification.....	3-4
3.2	Discovering an Exadata Database Machine.....	3-4
3.3	Discover Oracle SuperCluster as an Exadata Database Machine	3-14
3.4	Discovering Grid Infrastructure and RAC.....	3-16
3.4.1	Discover Grid Infrastructure (Cluster) Targets	3-16
3.4.2	Discover Oracle Real Application Clusters Targets	3-16
3.5	Switch from Using CellCLI to ExaCLI after Storage Server Locked Down	3-16

4 Post-Discovery Configuration and Verification

4.1	Set Up SNMP Trap Forwarding on Compute Node.....	4-1
4.1.1	Set Up Compute Node Agent - Linux	4-2
4.1.2	Set Up Compute Node Agent - Solaris.....	4-2
4.2	Configure Storage Cell SNMP for Enterprise Manager Monitoring.....	4-4
4.2.1	Using the ALTER CELL Command.....	4-4
4.2.2	Check Current SNMP Configuration.....	4-4
4.2.3	Configure SNMP Values Using cellcli.....	4-5
4.2.4	Configure SNMP Values Using dcli (optional)	4-7
4.2.5	Verify SSH Connectivity	4-7
4.2.6	Remove a Subscription	4-7
4.3	Configure and Verify SNMP for InfiniBand Switch Targets.....	4-8
4.3.1	Set Up SNMP for InfiniBand Switch Targets Using Enterprise Manager	4-9
4.4	Configure the Compute Node ILOM SNMP for Enterprise Manager Monitoring.....	4-10
4.4.1	Configure the Compute Node ILOM SNMP for Compute Nodes Running Management Server	4-11
4.4.2	Configure SNMP Values Using dbmcli.....	4-12
4.4.3	Configure SNMP for Oracle SuperCluster.....	4-12

4.5	Verify Configuration for Oracle ILOM Server.....	4-12
4.6	Set Up SNMP for Cisco Ethernet Switch Targets.....	4-13
4.6.1	Verify the Cisco Ethernet Switch SNMP Configuration	4-14
4.7	Set Up SNMP for Power Distribution Unit (PDU) Targets.....	4-14
4.7.1	Verify the PDU SNMP Configuration	4-15
4.8	Set Up SNMP for KVM Targets	4-15
4.8.1	Set Up SNMP in KVM Management Console	4-15
4.8.2	Verify the KVM SNMP Configuration (Base SNMP Configuration) - Linux	4-16
4.8.3	Verify the KVM SNMP Configuration (Base SNMP Configuration) - Solaris.....	4-17
4.8.4	Verify the KVM SNMP Configuration (SNMP Forwarding to Agent).....	4-18
4.9	Oracle Exadata Database Machine Dashboard Creation	4-18
4.9.1	Dashboard Creation for Exadata Database Machine Plug-in Release 12.1.0.3.0 and Later	4-18
4.9.2	How to Make the Report "Public"	4-19
4.9.3	Find All Database Machine Reports	4-19

5 Oracle Exadata Database Machine Administration

5.1	Creating Roles to Manage the Plug-in	5-1
5.2	View Exadata Database Machine Topology	5-2
5.2.1	Drilling Down to Individual Targets	5-3
5.2.2	Viewing Critical Hardware Information for the Database Machine.....	5-3
5.2.3	Viewing DB Machine Alerts.....	5-4
5.2.4	Viewing Metrics	5-4
5.2.5	Adding Exadata Components Manually.....	5-4
5.2.6	Removing an Exadata Database Machine Target	5-5
5.2.7	Deleting a Component of a Database Machine Target.....	5-6
5.2.8	Updating the Exadata Database Machine Schematic Diagram	5-6
5.2.8.1	Drop a Component from the Exadata Database Machine Schematic Diagram ..	5-7
5.2.8.2	Add Components to the Exadata Database Machine Schematic Diagram	5-8
5.3	Exadata Cell Metrics and Alert Settings	5-10
5.4	Exadata Storage Server Management	5-10
5.4.1	About Exadata Storage Server	5-10
5.4.2	Using Exadata As a Cloud Control Target.....	5-11
5.4.3	Viewing an Exadata Storage Server Configuration	5-11
5.4.4	Performing Administration Tasks on Exadata Storage Servers.....	5-12
5.4.5	Managing the IO Resource	5-13
5.4.5.1	Add/Update IORM Configuration	5-13
5.4.5.2	The Inter-Database Plan	5-15
5.4.6	Diagnosing Exadata Cell Alerts.....	5-16
5.4.7	Accessing Oracle Support Workbench for Exadata Storage Server	5-16
5.5	Managing the InfiniBand Network	5-16
5.5.1	InfiniBand Metrics	5-16
5.5.1.1	Aggregate Sensor.....	5-17
5.5.1.2	Response	5-17
5.5.1.3	Switch Configuration	5-17
5.5.2	Performing Administration Tasks on Infiniband Networks	5-17
5.5.3	Setting Up Alerts.....	5-18

5.6	Flash Cache Resource Monitoring	5-18
5.7	Exadata Database Machine Fault Monitoring	5-20
5.8	Monitoring Exadata Database Machine Components.....	5-21
5.8.1	Storage Cells	5-21
5.8.2	InfiniBand Switches.....	5-22
5.8.3	Cisco Switch.....	5-22
5.8.4	ILOM Targets	5-22
5.8.5	Power Distribution Units (PDUs).....	5-23
5.8.6	KVM Switch.....	5-23
5.9	Using the Conversion Wizard to Convert 12c Targets to 13c Targets.....	5-23

6 Virtualized Exadata Database Machine

6.1	Integration with Virtualization Infrastructure Plug-in	6-1
6.2	Discovering Virtualized Exadata Database Machine	6-2
6.3	Post-Discovery Configuration.....	6-8
6.4	Exadata Virtualized Provisioning	6-9
6.4.1	Creating a Database Cluster.....	6-9
6.4.2	Scaling Up a Database Cluster	6-14
6.4.3	Scaling Down a Database Cluster	6-17
6.4.4	Deleting a Database Cluster	6-17
6.5	Viewing Virtualized Exadata Database Machine.....	6-18
6.6	Resource Utilization Graphs	6-19
6.6.1	Cluster Placement	6-19
6.6.2	Database Placement.....	6-19
6.6.3	Database CPU Utilization.....	6-20
6.6.4	Database Memory Utilization	6-20

7 Exadata Metrics

7.1	Accessing Exadata Metrics	7-1
7.2	Aggregated Exadata FlashDisk and HardDisk Metric Example	7-2
7.3	Exadata Cell Metric Example	7-3

8 Troubleshooting the Exadata Plug-in

8.1	Establish SSH Connectivity	8-1
8.2	Discovery Troubleshooting	8-2
8.2.1	Hardware Availability	8-3
8.2.2	Discovery Failure Diagnosis	8-3
8.2.3	Cell is not Discovered	8-3
8.2.4	Compute Node Error Message	8-3
8.2.5	Compute Node or InfiniBand Switch is not Discovered	8-4
8.2.6	Compute Node not Managed by Enterprise Manager.....	8-4
8.2.7	Extra or Missing Components in the Newly Discovered Exadata Database Machine.....	8-5
8.2.8	InfiniBand Network Performance Page Shows No Data.....	8-5
8.2.9	ILOM, PDU, KVM, or Cisco Switch is not Discovered	8-5
8.2.10	Target Does not Appear in Selected Targets Page	8-5

8.2.11	Target is Down or Metric Collection Error After Discovery	8-6
8.2.12	Discovery Process Hangs.....	8-7
8.3	Troubleshooting the Exadata Database Machine Schematic File	8-7
8.4	Exadata Database Machine Management Troubleshooting	8-8
8.5	Exadata Derived Association Rules	8-8
8.6	InfiniBand Patch Details Missing	8-9
8.7	Oracle Auto Service Request (ASR) Issues.....	8-9
8.7.1	Oracle ASR Not Working on Exadata Storage Server.....	8-9
8.7.2	No Slots Available Error	8-9
8.8	Target Status Issues	8-9
8.9	Metric Collection Issues	8-10
8.10	Status: Pending Issues	8-10
8.10.1	Cellsys Targets	8-10
8.10.2	Database Machine Target or Any Associated Components.....	8-10

Index

Preface

Oracle Enterprise Manager provides the tools to effectively and efficiently manage your Oracle Exadata Database Machine. With a consolidated view of the Exadata Database Machine, Oracle Enterprise Manager provides a consolidated view of all the hardware components and their physical location with indications of status. Oracle Enterprise Manager also provides a software view of the databases residing on it and their resource consumption on compute node and Exadata Storage Cell.

This document provides the installation and administration instructions to set up Oracle Enterprise Manager to monitor and manage your Oracle Exadata Database Machine.

Audience

This system monitoring installation guide is for users who perform administrative and problem-resolution tasks on Oracle Exadata Database Machine.

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.

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.
monospace	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

What's Changed

This table provides a brief overview of the document changes for the latest publication of the *Oracle® Enterprise Manager Managing and Monitoring an Exadata Database Machine*:

Part Number	Change Summary
E56534-01	Updated for support of Enterprise Manager Cloud Control 13c.

What's New

The Oracle Exadata plug-in provides a consolidated view of the Exadata Database Machine within Oracle Enterprise Manager, including a consolidated view of all the hardware components and their physical location with indications of status.

This chapter highlights the significant features and enhancements provided by the Oracle Exadata plug-in in the following release summaries:

- [New Features and Enhancements for Oracle Exadata Plug-in 13.1.0.1.0](#)

New Features and Enhancements for Oracle Exadata Plug-in 13.1.0.1.0

Oracle Exadata Plug-in Release 13.1.0.1.0 includes a variety of bugs fixed and enhancements implemented for the following feature areas:

- [Newly Supported Hardware and Software Configurations](#)
- [Exadata Virtualization Provisioning](#)
- [Support for Exadata Flash Cache Features](#)
- [Enhanced Exadata Hardware Management](#)
- [Patching Automation Support of the Exadata Stack](#)
- [ORAchk/EXAchk Integration](#)
- [Auto Service Request \(ASR\) Integration: Fault Telemetry](#)

Newly Supported Hardware and Software Configurations

As Oracle releases new hardware and software, the Oracle Exadata plug-in is updated, tested, and certified to accommodate the new products. For complete hardware and software support details, see [Oracle Exadata Database Machine Supported Hardware and Software](#) in [Chapter 1](#).

Oracle Exadata Plug-in Release 13.1.0.1.0 supports the following hardware and software:

- X5-8.

Exadata Virtualization Provisioning

Provisioning involves repeatable, reliable, automated, unattended, and scheduled mass deployment of a RAC Cluster including virtual machines (VMs), Oracle Database (DB), Grid Infrastructure, and ASM on Virtualized Exadata.

With the Exadata plug-in's virtualization provisioning functionality, you can:

- Create and delete a RAC Cluster including VMs, Oracle Database (DB), Grid Infrastructure, and ASM.
- Scale up and scale down a RAC Cluster by adding or removing VMs including DB, Grid Infrastructure, and ASM.

See [Exadata Virtualized Provisioning](#) for the details.

Support for Exadata Flash Cache Features

The Exadata plug-in provides the following features in support of Exadata Flash Cache:

- Monitor X5 "Extreme Flash" configurations, including:
 - Enhanced Database Machine schematic diagram.
 - Enhanced incident details page for disk failure.
 - Enhanced capacity reporting, I/O Resource Management (IORM), and performance charts.
- Flash I/O Resource Monitoring and Management, including:
 - Flash Cache space usage monitoring.
 - Administration of flash IORM.
 - New charts on Cell and Grid home page and Performance page.
 - I/O Resource consumption and performance monitoring for Flash.

Enhanced Exadata Hardware Management

The Exadata plug-in has been enhanced to provide improved monitoring details for all Exadata Database Machine components. These details include:

- ILOM overview details and health status.
- Updated the schematic diagram to enhanced views into your Exadata Database Machine, including:
 - Photo-realistic hardware view. From this view, administrators have visibility into hardware and can correlate errors across tools (like an intermittent error with Exadata performance).
 - Logical view, which shows additional CPU details and status.
 - Energy view.
 - Network connectivity.
 - Service processor (SP) configuration.
- Added a new Systems Infrastructure Server target type.

Patching Automation Support of the Exadata Stack

The Exadata plug-in support additional patching features in support of the entire Exadata stack, including:

- Compute nodes: Firmware and operating system (OS).
- Exadata Storage Server cells: Firmware and cell software.
- InfiniBand network: Switch firmware.

- Quarterly Full Stack Patch Download (QFSDP) is released every quarter. Primary components are:
 - Database (Database, Clusterware).
 - Infrastructure includes Exadata Storage Server, InfiniBand Switch, and PDU.
- Exadata systems patching includes:
 - Comprehensive overview of the maintenance status and needs.
 - Proactive patch recommendations for the quarterly full stack patches.
 - Supports auto patch download, ability to patch either in rolling or non-rolling modes.
 - Ability to schedule runs.
 - Proactive notification of the status updates.
 - Granular step-level status tracking with real-time updates.
 - Log monitoring and aggregation, supporting quick filing of support issues with pre-packaged log dumps.

For more details, see the following documents:

- *The Updating Exadata Storage Servers and Updating Exadata InfiniBand Switches* sections of the *Oracle® Enterprise Manager Lifecycle Management Administrator's Guide*.
- *Exadata Database Machine and Exadata Storage Server Supported Versions* (Doc ID 888828.1) in My Oracle Support:

<https://support.oracle.com/rs?type=doc&id=888828.1>

ORAchk/EXAchk Integration

The ORAchk/EXAchk utility proactively scans for the most significant problems across the various layers within Oracle Database and Exadata Database Machine. The Exadata plug-in integrates the ORAchk/EXAchk utility and provides the following features through Enterprise Manager Cloud Control:

- Install, set up, upgrade, and schedule the ORAchk utility within Enterprise Manager.
- View all ORAchk/EXAchk results as Enterprise Manager Compliance Standard violations.
- Allows you to review and implement ORAchk/EXAchk best practices.

The ORAchk/EXAchk utility provides a comprehensive list of checks and alerts, including:

<ul style="list-style-type: none"> ■ Verify Disk Cache Policy on Database Server ■ Verify Database Server disk controllers use writeback cache ■ Verify RAID Controller Battery Condition (Database Server) ■ Verify RAID Controller Battery Temperature (Database Server) ■ Verify Database Server Virtual Drive Configuration ■ Verify Database Server Physical Drive Configuration ■ Imageinfo version comparison across database and storage servers 	<ul style="list-style-type: none"> ■ Verify Hardware and Firmware on Database and Storage Servers (CheckHWnFWProfile) (Database Server) ■ Verify Software on Storage Servers (CheckSWProfile.sh) ■ NFS Mount Point - Attribute Caching ■ Verify /conf/configvalid File ■ Backend Check ■ ORAchk not running ■ Results and Exception file(s) missing ■ Metric Parsing Failed
---	---

For details about the ORAchk plug-in, see the *ORAchk Healthchecks User's Guide*.

Auto Service Request (ASR) Integration: Fault Telemetry

Oracle Auto Service Request (ASR) provides auto-case generation when common hardware component faults occur. ASR is designed to enable faster problem resolution by eliminating the need to initiate contact with Oracle Support Services for common hardware component failures, reducing both the number of phone calls needed and overall phone time required.

The Exadata plug-in integrates with Oracle ASR to provide the following benefits:

- Enables ASR capability for Exadata Database Machine. Creates a Service Request (SR) automatically and updates the SR number to Enterprise Manager.
- Installs and deploys quickly with the `emcli` command.
- Includes ASR Incidents for viewing within the Enterprise Manager Incident Manager.
- Works for all Engineered Systems that are certified for ASR.

Enterprise Manager recognizes the following three fault telemetry types:

- Integrated Lights Out Manager (ILOM): Provides fault information, power and environmental, CPU, and memory fault information from the service processor (SP).
- Exadata-detected Events (HALRT): Provides fault coverage for disks, flash, and PCI cards within Oracle Exadata Database Machine.
- Fault Management Architecture (FMA): Provides CPU and memory fault information from the host.

For more details about using Oracle ASR with Enterprise Manager, see *Managing and Monitoring Oracle Auto Service Request (ASR) Assets User's Guide*.

For product details about Oracle ASR, see <http://oracle.com/asr>.

Introduction to the Plug-in

This chapter provides a general overview of the Oracle Exadata plug-in, including supported hardware and software. The following topics are discussed:

- [Oracle Exadata Plug-in Features](#)
- [Oracle Exadata Database Machine Supported Hardware and Software](#)

1.1 Oracle Exadata Plug-in Features

Highlights of the Oracle Exadata plug-in release 13.1.0.0.0 include the following features:

- [Monitoring and Notification Features](#)
- [Hardware Support Features](#)
- [Exadata Software Support](#)
- [Target Discovery Features](#)
- [Exadata Storage Server Grid Home Page and Server Home Page Features](#)
- [Exadata Performance Page Features](#)
- [Exadata Metrics Features](#)

1.1.1 Monitoring and Notification Features

With the Oracle Exadata plug-in, you can monitor Exadata targets through Enterprise Manager Cloud Control 13c. The plug-in provides seamless integration with supported Exadata software so that you can receive notification on any Exadata target. Features include:

- Monitoring of the Exadata Database Machine as an Enterprise Manager target.
- Monitoring of the Exadata target, including the Exadata Cell, within Enterprise Manager's I/O Resource Management (IORM) feature.
- Support SNMP notification for Exadata cell.
- Support dashboard report creation from Enterprise Manager Cloud Control, including a simplified configuration of the service dashboard.
- Support of client network hostnames for compute nodes.
- Enhanced InfiniBand network fault detection and InfiniBand schematic port state reporting.

- Modification of Enterprise Manager monitoring agents as needed for all Exadata Database Machine components.
- IORM for multi-tenancy database (CDB/PDB) environment:
 - CDB-level I/O Workload Summary with PDB-level details breakdown.
 - I/O Resource Management for Oracle Database 12c.
 - Exadata Database Machine-level physical visualization of I/O Utilization for CDB and PDB on each Exadata Storage Server.
 - Integration link to Database Resource Management UI.
- Support discovery of locked down storage servers.

1.1.2 Hardware Support Features

You can use the Oracle Exadata plug-in to optimize the performance of a wide variety of Exadata targets, including:

- Oracle SuperCluster, including:
 - Versions: SuperCluster V1.1, V1.0.0 + October Quarterly Maintenance Update (QMU)
 - Configurations:
 - * LDOM: Control domain, IO/guest domain
 - * Zone: Global, non-global
 - Discover, monitor, and manage Exadata Database Machine-related components residing on SuperCluster Engineering System
 - See [Oracle SuperCluster Support - Exadata Plug-in Release 12.1.0.4.0 and Later](#) for more details.
- Multi-Rack support:
 - Supports discovery use cases: Initial discovery, add a rack
 - Side-by-side rack schematic
- Support for Storage Expansion Rack hardware.
- Full partition support:
 - Logical splitting of an Exadata Database Machine Rack into multiple Database Machines.
 - Each partition is defined through a single OneCommand deployment.
 - Compute nodes are not shared between partitions.
 - Multiple partitions connected through the same InfiniBand network.
 - Compute nodes in same partition share the same Cluster.
 - Ability to specify a customized DBM name during discovery of the target.
 - User can confirm and select individual components for each DBM.
 - Flexibility to select "small-p" targets for individual partitions.
 - Flexibility to select some or all of the InfiniBand switch as part of monitored network, including the ability to add switches post discovery.

- Flexibility to select some or all of the Cells to be shared among Exadata Database Machines.
- Support for the increasing types of Exadata Database Machine targets. See [Oracle Exadata Database Machine Supported Hardware and Software](#) for a complete list of supported hardware.
- InfiniBand Switch Sensor fault detection, including power supply unit sensors and fan presence sensors.
- Support for on-demand refresh of InfiniBand schematic.

1.1.3 Exadata Software Support

Through the Oracle Enterprise Manager Cloud Control interface, you can use the Oracle Exadata plug-in to access Exadata Storage Software functionality to efficiently manage your Exadata hardware. Support includes:

- Integration with Exadata Storage Software.
- Support for the latest Exadata Server Version: 11.2.3.3.0 and 12.1.1.1.0.

1.1.4 Target Discovery Features

The target discovery process is streamlined and simplified with the Oracle Exadata plug-in. Features include:

- Automatically push the Exadata plug-in to agent during discovery.
- Discovery prerequisite checks updates, including:
 - Check for critical configuration requirements.
 - Check to ensure either `databasemachine.xml` or `catalog.xml` files exist and are readable.
 - Prevent discovered targets from being rediscovered.
- Credential validation and named credential support.
- Ability to apply a custom name to the Exadata target.
- Support enabled for discovery using the client access network.
- Automate SNMP notification setup for Exadata Storage Server and InfiniBand Switches.
- Support discovery of compute nodes with client network host names.
- Support discovery using the new `catalog.xml` file generated from the OEDA Java-based Configurator.
- Additional credential validation and named credential support.
- Support customization of Exadata Database Machine name.
- Support discovery of locked down storage servers.

Note: Exadata Database Machine targets are configured with OOB default thresholds for the metrics. No additional template is provided by Oracle.

1.1.5 Exadata Storage Server Grid Home Page and Server Home Page Features

The Exadata Storage Server Grid home page and Server home page provides the following features:

- Provides a fine-grained performance summary for flash and hard disk.
- Provides new usage statistics to highlight flash cache and Smart Scan efficiency.
- Provides a new, detailed summary of flash space usage.
- Provides new metrics for:
 - I/O time distribution by flash and hard disk.
 - IORM wait per database.

1.1.6 Exadata Performance Page Features

The Performance home page provides the following features:

- Side-by-side comparison of flash and hard disk performance.
- Performance comparison between multiple Exadata Storage Servers.
- Performance utilization for flash and hard disk to identify workload reaching hardware limit.
- Provides Exadata Storage Server performance charts to help with diagnosing performance issues when I/O reaching hardware limits.

1.1.7 Exadata Metrics Features

Metrics reports are critical to manage your Oracle Exadata Database Machine effectively. With the metrics, you can determine where additional resources are needed, when peak usage times occur, and so forth.

- Enhanced metric scalability in large environment to reduce time out by reducing `cellcli` calls.
- Reduce metric collection error for the Exadata HCA metric. Improvements to combine the HCA port data collection in a single `cellcli` call to reduce chances of time out.
- Reduced metric collection error from Exadata IORM Status metric. The metric was removed, and the user interface now uses the available configuration data.

1.2 Oracle Exadata Database Machine Supported Hardware and Software

The following sections describe the supported hardware and software by the Oracle Exadata plug-in:

- [Exadata Database Machine Configuration Support](#)
- [Oracle SuperCluster Support - Exadata Plug-in Release 12.1.0.4.0 and Later](#)
- [Supported Component Versions](#)
- [Supported Operating Systems](#)
- [Oracle Exadata Database Machine Hardware Not Supported](#)

1.2.1 Exadata Database Machine Configuration Support

Enterprise Manager Cloud Control 13c is supported on the following Exadata Database Machine configurations:

- [Supported Machine Type](#)
- [Multi-Rack Support](#)
- [Partitioned Support](#)

Note: Unless otherwise noted, support is provided for all versions of Oracle Exadata plug-in Release 13.1.

1.2.1.1 Supported Machine Type

The following Exadata Database Machine Types are supported:

- V2

Note: V2 machines discovered in Enterprise Manager Cloud Control 12c are still supported in 13c. However, discovery of V2 machines in Enterprise Manager Cloud Control 13c is not supported.

- X2
 - X2-2: Full rack, half rack, and quarter rack
 - X2-8: Full rack
- X3
 - X3-2: Full rack, half rack, quarter rack, and eighth rack (requires release 12.1.0.3 or higher)
 - X3-8: Full rack
- X4
 - X4-2
- X5
 - X5-8
- Oracle SuperCluster, including (requires release 12.1.0.4 or higher):
 - Support for Oracle SuperCluster V1.1 on LDOM and Zone (Global & Non-Global)
 - Support for Oracle SuperCluster V1.0.1 with October QMU on LDOM and Zone

1.2.1.2 Multi-Rack Support

Enterprise Manager supports managing multiple connected racks of Oracle Database Machine of the supported machine types listed above ([Supported Machine Type](#)). Also, the following two racks can be monitored in a multi-rack as these cannot exist as a standalone single rack:

- Storage Expansion Rack (requires release 12.1.0.4 or higher)
- Compute Node Expansion Rack (requires release 12.1.0.4 or higher)

1.2.1.3 Partitioned Support

The following partitioned configurations are supported:

- Partitioned Exadata Database Machine - the logical splitting of a Database Machine Rack into multiple Database Machines. The partitioned Exadata Database Machine configuration must meet the following conditions to be fully supported by Enterprise Manager Cloud Control 13c:
 - Each partition is defined through a single OneCommand deployment.
 - Cells and compute nodes are not shared between partitions.
 - Multiple partitions are connected through the same InfiniBand network.
 - Compute nodes in same partition share the same Cluster.

The expected behavior of a partitioned Exadata Database Machine includes:

For Oracle Exadata plug-in Release **12.1.0.3.0 and later**:

- The target names for the Exadata Database Machine, Exadata Grid, and InfiniBand Network will be generated automatically during discovery (for example, Database Machine dbm1.mydomain.com, Database Machine dbm1.mydomain.com_2, Database Machine dbm1.mydomain.com_3, etc.). **However, users can change these target names at the last step of discovery.**
- All InfiniBand switches in the Exadata Database Machine must be selected during discovery of the first Database Machine partition. They will be included in all subsequent Database Machine targets of the other partitions. The KVM, PDU, and Cisco switches can be individually selected for the DB Machine target of each partition.
- User can confirm and select individual components for each Database Machine.

For Oracle Exadata plug-in Release **12.1.0.2.0 and earlier**:

- The target names for the Exadata Database Machine, Exadata Grid, and InfiniBand Network will be generated automatically during discovery (for example, Database Machine dbm1.mydomain.com, Database Machine dbm1.mydomain.com_2, Database Machine dbm1.mydomain.com_3, etc.). **Users cannot specify these target names.**
- All shared components (such as, KVM, PDU, Cisco switch, and InfiniBand switches) must be selected during discovery of the first Database Machine partition. They will be included in all subsequent Database Machine targets of the other partitions.
- User can confirm and select individual components for each Database Machine.

1.2.2 Oracle SuperCluster Support - Exadata Plug-in Release 12.1.0.4.0 and Later

Only Oracle SuperCluster with software Version 1.1 with DB Domain on Control LDOM-only environments are supported. Earlier versions of Oracle SuperCluster can be made compatible if you update to the October 2012 QMU release. You can confirm this requirement by looking at the version of the `compmon` pkg installed on the system (using either `pkg info compmon` or `pkg list compmon` commands to check). You must have the following minimum version of `compmon` installed:

```
pkg://exa-family/system/platform/exadata/compmon@0.5.11,5.11-0.1.0.11:20120726T024158Z
```

The following **hardware configurations** are supported:

- Oracle SuperCluster:
 - T5-8 server
 - T4-4 server

The following **software configurations** are supported:

- LDOM
 - Control Domain
 - IO/Guest Domain
- Zone
 - Global
 - Non-Global

The following **software versions** are supported:

- Oracle SuperCluster V1.1
- Oracle SuperCluster V1.0.1 + October QMU

The following issues have been fixed for the 12.1.0.4.0 release of the Oracle Exadata plug-in:

- **Exadata Storage Server monitoring:** If multiple DB clusters share the same Exadata Storage Server, in one Enterprise Manager management server environment, you can discover and monitor the first DB Machine target and all its components. Also, for additional DB Machine targets sharing the same Exadata Storage Server, the Oracle Exadata Storage Server Grid system and the Oracle Database Exadata Storage Server System will now show all Exadata Storage Server members.

This issue reported in the plug-in's 12.1.0.3.0 release has been fixed in 12.1.0.4.0.

- **HCA port error monitoring:** If the `perfquery` command installed in the Oracle SuperCluster has version 1.5.8 or later, a bug (ID 15919339) was reported where most columns in the HCA Port Errors metric in the host targets for the compute nodes will be blank.

If there are errors occurring on the HCA ports, it is now reported in Enterprise Manager.

To check your version, run the following command:

```
$ perfquery -V
```

This issue reported in the plug-in's 12.1.0.3.0 release has been fixed in 12.1.0.4.0.

1.2.2.1 Oracle SuperCluster Known Issues

The following known issues have been reported for the Oracle SuperCluster:

- PAGE13 is empty in the `/opt/oracle.SupportTools/onecommand/catalog.xml` file. This issue prevents Enterprise Manager from displaying the schematic diagram on the Database Machine home page. (Bug 16719172)

Workaround: Manually replace the PAGE13 section by the one listed below:

```
<PAGE13>
  <RACKS>
    <RACK ID="0">
```

```
<MACHINE TYPE="203"/>
<ITEM ID="1">
  <TYPE>ibs</TYPE>
  <ULOC>1</ULOC>
  <HEIGHT>1</HEIGHT>
</ITEM>
<ITEM ID="2">
  <TYPE>cell</TYPE>
  <ULOC>2</ULOC>
  <HEIGHT>2</HEIGHT>
</ITEM>
<ITEM ID="3">
  <TYPE>cell</TYPE>
  <ULOC>4</ULOC>
  <HEIGHT>2</HEIGHT>
</ITEM>
<ITEM ID="4">
  <TYPE>cell</TYPE>
  <ULOC>6</ULOC>
  <HEIGHT>2</HEIGHT>
</ITEM>
<ITEM ID="5">
  <TYPE>cell</TYPE>
  <ULOC>8</ULOC>
  <HEIGHT>2</HEIGHT>
</ITEM>
<ITEM ID="6">
  <TYPE>comp</TYPE>
  <ULOC>10</ULOC>
  <HEIGHT>8</HEIGHT>
</ITEM>
<ITEM ID="7">
  <TYPE>ibl</TYPE>
  <ULOC>18</ULOC>
  <HEIGHT>1</HEIGHT>
</ITEM>
<ITEM ID="8">
  <TYPE>cisco</TYPE>
  <ULOC>19</ULOC>
  <HEIGHT>1</HEIGHT>
</ITEM>
<ITEM ID="9">
  <TYPE>zfs</TYPE>
  <ULOC>20</ULOC>
  <HEIGHT>4</HEIGHT>
</ITEM>
<ITEM ID="10">
  <TYPE>ibl</TYPE>
  <ULOC>24</ULOC>
  <HEIGHT>1</HEIGHT>
</ITEM>
<ITEM ID="11">
  <TYPE>head</TYPE>
  <ULOC>25</ULOC>
  <HEIGHT>1</HEIGHT>
</ITEM>
<ITEM ID="12">
  <TYPE>head</TYPE>
  <ULOC>26</ULOC>
  <HEIGHT>1</HEIGHT>
```

```

</ITEM>
<ITEM ID="13">
  <TYPE>comp</TYPE>
  <ULOC>27</ULOC>
  <HEIGHT>8</HEIGHT>
</ITEM>
<ITEM ID="14">
  <TYPE>cell</TYPE>
  <ULOC>35</ULOC>
  <HEIGHT>2</HEIGHT>
</ITEM>
<ITEM ID="15">
  <TYPE>cell</TYPE>
  <ULOC>37</ULOC>
  <HEIGHT>2</HEIGHT>
</ITEM>
<ITEM ID="16">
  <TYPE>cell</TYPE>
  <ULOC>39</ULOC>
  <HEIGHT>2</HEIGHT>
</ITEM>
<ITEM ID="17">
  <TYPE>cell</TYPE>
  <ULOC>41</ULOC>
  <HEIGHT>2</HEIGHT>
</ITEM>
<ITEM ID="18">
  <TYPE>pdu</TYPE>
  <ULOC>0</ULOC>
  <HEIGHT>0</HEIGHT>
</ITEM>
<ITEM ID="19">
  <TYPE>pdu</TYPE>
  <ULOC>0</ULOC>
  <HEIGHT>0</HEIGHT>
</ITEM>
</RACK>
</RACKS>
</PAGE13>

```

- The Assert OK power sensor raises a critical alert in Enterprise Manager. (Bug 17445054)

Note: This bug does not apply to X3-2 and X4-2 machines.

- Wrong machine names in the databasemachine.xml file. When the database is installed in a local zone on a Oracle SuperCluster T5-8, the databasemachine.xml file ends up with the machine name of the global zone rather than that of the local zone that the database is installed into.

Workaround: Manually edit the file to change the hostnames for the database nodes to those of the zone name.

(Bug 17582197)

- In Enterprise Manager, the Schematic & Resource Utilization report will display only one LDOM per server.

- Enterprise Manager will not report hard disk predictive failure on compute node in an Oracle SuperCluster environment.
- The pre-requisite check script `exadataDiscoveryPreCheck.pl` that is bundled in Exadata plug-in 12.1.0.3.0 does not support the `catalog.xml` file. Please download the latest `exadataDiscoveryPreCheck.pl` file from My Oracle Support as described in [Download the Discovery Precheck Script](#).
- On the Oracle SuperCluster Zone while deploying the Management Agent, the agent prerequisite check may fail with the following error:

Note: The error can be ignored and you can continue to proceed with installation of the Management Agent.

```
@ During the agent install, the prereq check failed:
@
@ Performing check for CheckHostName
@ Is the host name valid?
@ Expected result: Should be a Valid Host Name.
@ Actual Result: abc12345678
@ Check complete. The overall result of this check is: Failed <<<<
@
@ Check complete: Failed <<<<
@ Problem: The host name specified for the installation or retrieved from the
@ system is incorrect.
@ Recommendation: Ensure that your host name meets the following conditions:
@ (1) Does NOT contain localhost.localdomain.
@ (2) Does NOT contain any IP address.
@ (3) Ensure that the /etc/hosts file has the host details in the following
@ format.
@ <IP address> <host.domain> <short hostname>
@
@ If you do not have the permission to edit the /etc/hosts file,
@ then while invoking the installer pass the host name using the
@ argument
@ ORACLE_HOSTNAME.
```

1.2.3 Supported Component Versions

[Table 1–1](#) shows the component versions supported by the Oracle Exadata plug-in Release 12.1:

Table 1–1 Supported Component Versions

Component	Firmware/Software Versions	Exadata Plug-in Version Support
Storage Server	11.2.3.3.0	12.1.0.6.0 and later
	12.1.1.1.0	12.1.0.5.0 with following patches applied (not cell related): <ul style="list-style-type: none"> Agent platform: Patch ID 17872949 OMS plug-in: Patch ID 17861041 Agent plug-in: Patch ID 17965602
	11.2.3.2.1.130109	12.1.0.4.0 and later
	11.2.3.2.0.120713	12.1.0.3.0 and later
	11.2.2.3.0	All versions
	11.2.2.3.2	
	11.2.2.3.5	
	11.2.2.4	
	11.2.3.1.0	
	11.2.3.1.1	
InfiniBand Switch	2.1.3-4	12.1.0.4.0 and later
	2.0.6-1 (for SuperCluster)	
	1.1.3-2	All versions
	1.3.3-2	
Integrated Lights Out Manager (ILOM)	v3.0.16.15.a r73751 or later (v2)	12.1.0.4.0 and later
	v3.0.16.10.d or later (X2)	
	v3.0.16.20.b or later (X2-8)	
	v3.0.16.20.b or later (X3-8)	
	v3.1.2.10 r74387 or later (X3-2)	
	v3.0.9.19.c r63792	All versions
ILOM ipmitool	Linux: 1.8.10.3 or later	All versions
	Oracle Solaris: 1.8.10.4 or later	
Power Distribution Unit (PDU)	1.05	12.1.0.4.0 and later
	1.06	
	1.01	All versions
	1.02 (default version after reimage)	
	1.04	
Avocent MergePoint Unity KVM Switch	Application: 1.2.8.14896 Boot: 1.4.14359	All versions
Cisco Switch	15.1(2)SG2	12.1.0.6.0 and later
	12.2(31)SGA9	All versions

1.2.4 Supported Operating Systems

The following operating systems (where OMS and agent is installed on) are supported by the Oracle Exadata plug-in 13.1:

- Management Server plug-in (all OMS-certified platforms):
 - IBM AIX on POWER Systems (64-bit)
 - HP-UX Itanium
 - Linux x86 and x86-64

- Microsoft Windows x64 (64-bit)
- Oracle Solaris on SPARC (64-bit)
- Oracle Solaris on x86-64 (64-bit)
- Agent plug-in:
 - Linux x86-64
 - Oracle Solaris on x86-64 (64-bit)
 - Oracle Solaris on SPARC (64-bit)

1.2.5 Oracle Exadata Database Machine Hardware Not Supported

The following Oracle Exadata Database Machine hardware configurations are **not** supported for Enterprise Manager Cloud Control Exadata plug-in 13.1:

- V1 hardware
- V2 hardware

Note: V2 machines discovered in Enterprise Manager Cloud Control 12c are still supported in 13c. However, discovery of V2 machines in Enterprise Manager Cloud Control 13c is not supported.

Installation and Deployment

This chapter provides the instructions for deployment of the Oracle Exadata plug-in. The following topics are discussed:

- [Oracle Exadata Plug-in Deployment Prerequisites](#)
- [User Roles](#)
- [Install Enterprise Manager Agent](#)
- [Manually Deploy Exadata Plug-in](#)

2.1 Oracle Exadata Plug-in Deployment Prerequisites

Before deploying the Oracle Exadata plug-in, make sure the following prerequisites are met:

- [Create a Database Server ILOM Service Processor User](#)
- [Verify Software Versions](#)
- [Verify Names Resolution](#)
- [Verify Firewall Configuration](#)
- [Oracle SuperCluster Prerequisites](#)

2.1.1 Create a Database Server ILOM Service Processor User

For the Enterprise Manager agent to communicate with an ILOM service processor, there must be a specific user ID established on the ILOM service processor.

Note: Adding the specific user ID requires administrator level privilege on the ILOM service processor.

The specific ILOM user ID can be added in the ILOM service processor web interface, ILOM CLI, or with the `ipmitool` command. This example uses ILOM CLI.

For security reasons, the password to the ILOM service processor root user ID does not appear in the ILOM CLI commands in this example.

1. Log in to the Service Processor as root:

```
# ssh root@[Service Processor IP]  
Password:
```

2. Change to the `users` directory:

```
# cd /SP/users
```

3. Create the oemuser user and password:

```
# create oemuser
```

```
Creating user...
```

```
Enter new password: *****
```

```
Enter new password again: *****
```

```
Created /SP/users/oemuser
```

4. Change to the new user's directory and set the role:

```
# cd oemuser
```

```
/SP/users/oemuser
```

```
set role='cro'
```

```
Set 'role' to 'cro'
```

5. Test the ILOM user ID created in step 3 by listing the last 10 system events:

■ For Exadata X2 through X4:

```
# ipmitool -I lan -H <ilom_hostname> -U oemuser -P oempasswd -L USER sel  
list last 10
```

■ For Exadata X5-2 (requires the -I lanplus command option):

```
# ipmitool -I lanplus -H <ilom_hostname> -U oemuser -P oempasswd -L USER  
sel list last 10
```

6. Repeat steps 1 through 5 for the rest of the compute node ILOM service processors in your Oracle Database Machine.

2.1.2 Verify Software Versions

Verify the following software versions:

- [Exadata Storage Server Software](#)
- [ILOM ipmitool](#)
- [InfiniBand Switch](#)
- [PDU Firmware](#)
- [KVM Application](#)
- [Grid Infrastructure/DB Cluster](#)

2.1.2.1 Exadata Storage Server Software

The supported version is Exadata Storage Server Software 11g Release 2 (see [Exadata Software Support](#) for specific release version details). To verify the cell software version on the Exadata cell, ssh to the Exadata cell as the root, celladmin, or cellmonitor user. Run:

```
# cellcli -e 'list cell detail'
```

Look for "releaseVersion" in the output.

2.1.2.2 ILOM ipmitool

Enterprise Manager requires a minimal ipmitool software version of 1.8.10.4 or later for Oracle Solaris and 1.8.10.3 for Oracle Linux. To view the software version:

- For Oracle Linux, run the following command as the root user on one of the database servers in the cluster:

```
# dcli -g ~/dbs_group -l root ipmitool -V
```

Note: The `dbs_group` file contains the list of compute node hostnames, one on each line. If the file does not exist, you can create it before running the `dcli` command.

- For Oracle Solaris, run the following command on each of the database servers in the cluster:

```
# /opt/ipmitool/bin/ipmitool -V
```

2.1.2.3 InfiniBand Switch

To verify the version of the InfiniBand switch firmware in your environment:

1. Log on to the management interface for the InfiniBand Switch (using ssh).
2. Run the following command:

```
# nm2version
```

The output should be similar to this:

```
# nm2version
Sun DCS 36p version: 1.1.3-2
```

This example shows a supported configuration for deploying the plug-in to monitor.

3. If the `nm2version` command returns output similar to this:

```
# nm2version
NM2-36p version: 1.0.1-1
```

Then you must upgrade your InfiniBand switch firmware. Follow the instructions listed in My Oracle Support (MOS) Document 888828.1:

<https://support.oracle.com/CSP/main/article?cmd=show&type=NOT&doctype=REFERENCE&id=88882>

2.1.2.4 PDU Firmware

The PDU firmware version must be 1.04 or later. The current version can be obtained by logging into the web interface of the PDU. On the left side of the screen, click **Module Info** to view the PDU firmware version.

Software updates for the PDU are available at:

https://updates.oracle.com/Orion/PatchDetails/process_form?patch_num=12871297

2.1.2.5 KVM Application

The KVM Application software version must be 1.2.8 or later. The current version can be obtained by logging into the web interface of the KVM. On the left side of the

screen under Unit View, Appliance, Appliance Settings, click **Versions** to view the Application software version.

Software updates for KVM are available at:

http://www.avocent.com/Support_Firmware/MergePoint_Unity/MergePoint_Unity_Switch.aspx

2.1.2.6 Grid Infrastructure/DB Cluster

Grid Infrastructure/DB Cluster is required to be up and running before discovery.

2.1.3 Verify Names Resolution

The Enterprise Manager OMS server(s) require direct network access to each of the compute nodes. If the names of the compute nodes are not registered in the OMS nodes' DNS, then they will have to be manually entered in the `/etc/hosts` file for each OMS.

Each compute node should be verified to be able to resolve the hostnames of the ILOM servers, PDU's, storage cell nodes, and InfiniBand and Cisco switches. Again, if the names of those components are not registered in DNS, then entries can be added to the `/etc/hosts` file of each compute node.

To manage the Exadata Database Machine components from Enterprise Manager Cloud Control 13c, it is necessary for your local machine to be able to resolve the host name of Cloud Control 13c.

To access any of the Exadata Database Machine components directly from your local machine, it is also necessary for your local machine to be able to resolve the names of those components.

2.1.4 Verify Firewall Configuration

To verify the firewall configuration:

1. Allow ping

In many secure network environments, it is normal for the `ping` service to be disabled. Enterprise Manager uses `ping` to establish the basic availability and status of the Exadata Database Machine components.

- The compute nodes need to have the `ping` service and port enabled from the OMS Server(s).
- All other Exadata Database Machine components (ILOM servers, PDU's, storage cell nodes, InfiniBand switches, and Cisco switch) need to have the `ping` service and port enabled from the compute nodes (where the agents are running).

Note: The `ping` traffic overhead is minimal. The agent pings the targets every five minutes.

2. Open Database Ports

The database listener ports must be opened for the Enterprise Manager OMS server(s). Note that Exadata Database Machine databases will use SCAN listeners; so, ports will need to be opened for the base compute node, the compute node virtual IP, and scan listeners addresses.

For example, if an Exadata Database Machine quarter rack has been configured with two compute nodes - `exadbnod1.example.com` and `exadbnod2.example.com` - and the listeners are using port 1521, then port 1521 will have to be opened to the Enterprise Manager Server for the following addresses:

- The compute node hostnames - `exadbnod1.example.com` and `exadbnod2.example.com`
- The virtual IPs for each compute node - `exadbnod1-vip.example.com` and `exadbnod2-vip.example.com`
- The scan listener hostname - `scan-exadatadb`

3. Open Enterprise Manager Upload Port

The Enterprise Manager Cloud Control 13c agents require access to the Enterprise Manager Servers upload service, normally configured on port 4889 for HTTP uploads and 4900 for HTTPS. To verify the ports assigned, run the following command on the OMS server command line.

```
$ emctl status oms -details
```

These ports will need to be opened for each of the compute nodes.

4. Open Agent Ports

The OMS server(s) will need to be able to connect to the Enterprise Manager Cloud Control 13c Agent HTTP/HTTPS port on each compute node. The Agent port defaults to 3872. If port 3872 is not available, the next available port starting from port 1830 is used.

To identify the port used:

- Run the following command on the compute node command line:

```
$ emctl status agent
```
- Alternatively, you can look for the value of the `EMD_URL` property in the `emd.properties` file the following directory:

```
<AGENT_HOME>/agent_inst/sysman/config
```

5. Open SSH Ports (port 22)

The Enterprise Manager Cloud Control 13c Agents require `ssh` access to the Exadata Database Machine components they monitor. As the Agents will run on the compute nodes the `ssh` ports, 22, on each of the storage cells, ILOMs, PDUs, KVMs, InfiniBand switches, and Cisco switch will need to be opened for each of the compute nodes.

Note: The `emkit` configures `ssh` access but still requires the ports to be opened first.

6. Allow UDP Traffic (SNMP Ports) (Port 162)

All Exadata Database Machine components need to be able to send SNMP traps to the Agents running on the compute nodes. SNMP uses the UDP protocol so the Agent port and port 162 need to be opened for UDP traffic between the Storage Cells, ILOMs, InfiniBand Switches, Cisco Switch, and the Agent.

Table 2–1 Firewall Ports

Component	Ping service and port	SNMP*	SSH (port 22)	Notes
PDU	From remote agent	Yes	Yes	
Compute node ILOM	From remote agent	Yes	Yes	<ol style="list-style-type: none"> 1. Remote agent needs to be able to SSH to dom0. 2. Needs to access ipmitool. 3. Need SNMP port open on dom0.
dom0	From EM OMS server	Yes	Yes	
Cell	From remote agent	Yes	Yes	
InfiniBand Switch	From remote agent	Yes	Yes	
Cisco Switch	From remote agent	Yes	Yes	
KVM	From remote agent		Yes	May not be required, if X5 does not have KVM
OMS			Yes	Upload http/https port - usually 3872
Agent				The OMS server(s) will need to be able to connect to the Enterprise Manager Cloud Control 12c Agent HTTP/HTTPS port on each compute node. The Agent port defaults to 3872. If port 3872 is not available, the next available port starting from port 1830 is used.

* SNMP uses the UDP protocol; so, the Agent port and port 162 need to be opened for UDP traffic

2.1.5 Oracle SuperCluster Prerequisites

Table 2–2 shows the required versions of OneCommand and Config-O-Matic (COM) supported by the Oracle SuperCluster hardware configurations.

Table 2–2 Oracle SuperCluster Prerequisites

Hardware Configuration	OneCommand Version	Config-O-Matic Version
M6-32 databasemachine.xml <i>only</i>	14.063 and later	1.6.4 and later
T5-8 databasemachine.xml	14.042 and later	1.5.8 COM and later
T5-8 catalog.xml (non-Java OneCommand)	n/a	1.5.4 COM and earlier
T4-4 catalog.xml <i>only</i> Note: Because the T4-4 Oracle SuperCluster is at its "end of life," this entry is <i>only</i> for existing systems.	n/a	1.1.6 COM and earlier

2.2 User Roles

To manage the Exadata Storage Server, you need to create roles and then assign roles to administrators. Creating these roles restricts the privileges that each user has, for example in deleting the plug-in or accessing reports. See [Chapter 5, "Oracle Exadata Database Machine Administration."](#)

2.3 Install Enterprise Manager Agent

Note: Enterprise Manager Exadata discovery supports the use of either management network hostname or client network hostname for the compute nodes. When installing the Enterprise Manager agent on the compute nodes, you should use the same hostname as used in Oracle Clusterware.

You can identify the hostname of the nodes in the cluster by running the `olsnodes` command on one of the compute nodes. It is recommended that a fully qualified hostname, including the domain name, be used when specifying an Enterprise Manager agent hostname.

There are two methods for installing the Enterprise Manager Agent. Chose the one that works best for your environment:

- [Install Agents and Set Up Exadata Monitoring Using Automated Kit](#)
- [Install Enterprise Manager Agent Using the Push Method](#)

Notes:

- Make sure any prerequisites are met. See [Agent Installation Prerequisite - Solaris 11 Only](#).
 - The Enterprise Manager agent must be deployed to all compute nodes of the Database Machine. The host target name of the compute node must be the fully qualified host name, for example, `dbm1db01.mydomain.com`.
 - Non-fully qualified hostname (for example, `dbm1db01`) or IP address must **not** be used for the host target name of the compute node.
 - The same version of the Enterprise Manager agent and the same version of the Exadata plug-ins should be deployed on all compute nodes within the same Database Machine.
-
-

2.3.1 Agent Installation Prerequisite - Solaris 11 Only

If you are running Exadata Storage Server Software Release 11g Release 2 (11.2.3.1) on Oracle Solaris, follow the steps below before installing the agent.

1. Log in to the compute node host as agent user and execute the `ppriv $$` command. This command displays the **E** (Effective), **P** (Permitted), **I** (Inherited), and **L** (Limited) privileges.

Generally, **E**, **P**, and **I** have the same set of basic privileges and for any normal user.

2. Assuming that output of the above command shows basic privileges, add the `priv_sys_net_config` privilege to the agent user so that InfiniBand commands can be executed.

Log in as root and run:

```
# usermod -K defaultpriv=basic,priv_sys_net_config <agent_user>
```

This command adds `sys_net_config` to the agent user.

3. Log in as the agent user again and run the `ppriv $$` command to verify if the privileges are set. The output will show the `sys_net_config` privilege along with the existing (basic) set of privileges.

2.3.2 Install Agents and Set Up Exadata Monitoring Using Automated Kit

The Oracle Enterprise Manager Cloud Control 13c Setup Automation kit is available for download from My Oracle Support as a patch. The kit simplifies the process of deploying the agents on each of the compute nodes considerably, allowing agents to be deployed to all of the compute nodes, in one go, from one of the compute nodes, using one simple command. Instructions for using the kit to deploy agents on the compute nodes are provided in the patch `README.txt`.

To download the Automation kit for your platform, see Doc ID 1440951.1 in My Oracle Support:

<https://support.oracle.com>

Oracle Enterprise Manager Cloud Control 13c uses a holistic approach to manage the Exadata Database Machine and provides comprehensive lifecycle management from monitoring to management and ongoing maintenance for the entire engineered system.

The patch `README` provides instructions for how to install Management Agents on an Oracle Exadata Database Machine and point them to an existing Cloud Control environment or install a new stand alone Enterprise Manager environment and deploy the Management Agents pointing to this new environment. This standalone environment can be used when you do not want to take the corporate environment offline to apply the patches needed to monitor Oracle Exadata Database Machine.

The following procedures described in the `README` can be performed at any time, such as during initial configuration of Oracle Exadata Database Machine, or later:

- Preparing a corporate Oracle Enterprise Manager Cloud Control server to monitor Oracle Exadata Database Machine
- Installing Oracle Enterprise Manager Cloud Control 13c on a standalone server to monitor Oracle Exadata Database Machine
- Installing Oracle Enterprise Manager Cloud Control 13c Management Agents on Oracle Exadata Database Machine
- Removing Oracle Enterprise Manager Cloud Control 13c Management Agents from Oracle Exadata Database Machine when using a standalone server
- Removing Oracle Enterprise Manager Cloud Control 13c from a standalone server

2.3.3 Install Enterprise Manager Agent Using the Push Method

The installation instructions were captured on a Quarter Rack configuration (for example, 2 compute nodes, 3 cells).

1. Add the Exadata Database Machine compute nodes as host targets to Oracle Enterprise Manager Cloud Control 13c. From the Enterprise Manager home page, click the **Setup** menu (upper right corner), **Add Target**, then **Add Targets Manually**.
2. On the *Add Host Targets: Host and Platform* screen, specify a session name. Then identify the fully qualified hostnames and select the platform.

Note: If the Agent software is not available for your platform, go to the Extensibility page and download it first.

Figure 2–1 shows how the selection should look for the Linux x86-64 platform.

Figure 2–1 Add Host Targets

* Session Name

+ Add X Remove Load from File Add Discovered Hosts Platform: Different for Each Host ▼

Host	Platform
hostname1.mycompany.com	Linux x86-64 ▼
hostname2.mycompany.com	Linux x86-64 ▼

3. Click **Next** to add the details for the host.
4. On the *Installation Details* screen, provide the following information:
 - Installation Base Directory
 - Instance Directory
 - Named Credential
 - For Port, leave this field blank. As part of the installation process, an available port will be selected automatically.
5. Click **Next** to review the details about the host.
6. Click **Deploy Agent** to start the agent deployment process.
7. As the deployment process continues, remote prerequisite checks are automatically checked. If there are no issues, you will be presented with an Agent Deployment Summary with an indication that the agent deployment has passed. Figure 2–2 shows an example of a successful agent deployment.

Figure 2–2 Agent Deployment Summary

✔ Agent Deployment Passed Done

Agent Deployment Summary : **My_Host_Session**

Platform	Host	Initialization	Remote Prerequisite Check	Agent Deployment
Linux x86-64	hostname1.mycompany.com	✔	⚠	✔
Linux x86-64	hostname2.mycompany.com	✔	⚠	✔

Agent Deployment Details : **hostname1.mycompany.com**

▶ Initialization Details
 ▶ Remote Prerequisite Check Details
 ▼ Agent Deployment Details
 OMS Log Location : /etc/mylog/location/or/scratch/directory
☐ Show only warnings and failures

Deployment Phase Name	Status	Error	Cause	Recommendation
Installation and Configuration	✔			
Secure Agent	✔			
Root.sh	ⓘ	The root.sh script was not run because sudo binary did not exist on the remote host.		Manually run the following script(s) on the remote host as a root user • /script/location/root.sh
Collect Log	✔			
Clean up	✔			

Important: If the `root.sh` was not executed during deployment, then make sure to execute it on all compute nodes.

2.3.3.1 Installing Oracle Management Agent in Silent Mode Option

You can install Oracle Management Agent in silent mode as an alternative to installing it using the Add Host Target Wizard. Silent mode requires you to use a response file for providing the installation details and a deployment script for silently installing the Management Agent using the information supplied in the response file.

See the *Installing Oracle Management Agent in Silent Mode* chapter in the *Oracle Enterprise Manager Cloud Control Advanced Installation and Configuration Guide* for more information:

http://docs.oracle.com/cd/E24628_01/install.121/e24089/install_agent_usng_rsp.htm#CEGGACJE

2.4 Manually Deploy Exadata Plug-in

Under the following conditions, you may need to manually deploy the Exadata plug-in on each of the compute nodes:

- For a new or fresh installation: Deploy the plug-in manually if you did **not** deploy the agent using Automation kit or push the latest version of the agent through OMS.
- For an upgrade to an existing installation: Deploy the Exadata plug-in manually if an older version of the Exadata plug-in has been deployed to the agent already and you would like to upgrade to the latest version of the Exadata plug-in.

To determine if the Exadata plug-in is deployed on each compute node and what version it is, you have two options:

- From a terminal window, run the following command:

```
emctl listplugins agent
```

Note: The `emctl listplugins agent` command must be run on the compute node using the `emctl` in the agent installation directory.

- From Enterprise Manager Cloud Control, click the **Setup** menu (upper right corner), **Extensibility**, and then **Plug-ins**.

To manually deploy the Exadata plug-in:

1. From the Enterprise Manager home page, click the **Setup** menu (upper right corner), **Extensibility**, and then **Plug-ins**.
2. On the *Plug-ins* page, select Oracle Exadata from the Name list.

Note: The selected version should be for Release 12.1.0.1.0, 12.1.0.2.0, or 12.1.0.3.0. Oracle recommends that you deploy the latest version of the Exadata and Database plug-ins to the agent.

3. With Oracle Exadata selected, click **Deploy On**, then **Management Agent**.
4. On the *Deploy Plug-in on Management Agent* pop-up, click **Add**. A search pop-up will appear to allow you to search for targets to add. In the Target Type drop-down, select **Agent**, then click **Search**.
Select a Target name from the results list and click **Select**. Repeat for each agent target.
5. After you have added the agents, click **Next** on the *Deploy Plug-in on Management Agent* screen to review and verify the agent information.
6. Click **Deploy** to deploy the plug-in to the agents.
7. Once the agent has deployed to all the agents, a confirmation screen will appear. Click **OK** to dismiss the pop-up or **Show Status** to display the status of the agent in the Enterprise Manager *Deployment Activities* screen.

Exadata Database Machine Discovery

This chapter provides instructions for discovery of the Oracle Exadata Database Machine through Enterprise Manager Cloud Control 13c.

The following sections describe how to discover the Exadata Database Machine and other supported targets:

1. [Running the Discovery Precheck Script](#)
2. [Discovering an Exadata Database Machine](#)
3. [Discover Oracle SuperCluster as an Exadata Database Machine](#)
4. [Discovering Grid Infrastructure and RAC](#)
5. [Switch from Using CellCLI to ExaCLI after Storage Server Locked Down](#)

3.1 Running the Discovery Precheck Script

Before you begin the guided discovery process, there are several checks you should perform to ensure a smooth discovery. A discovery precheck script is available to automatically verify many of the common problem areas prior to discovery.

Some Exadata discoveries in Oracle Enterprise Manager 13c may run into issues because of various configuration mismatches in software setup. This discovery precheck script helps to resolve the most common configuration problems. Run the script before all Database Machine discovery and examine the output thoroughly before proceeding with [Discovering an Exadata Database Machine](#).

Follow the steps below to run the discovery precheck script:

1. [Secure Storage for Target Monitoring Credentials.](#)
2. [Download the Discovery Precheck Script.](#)
3. [Run the Discovery Precheck Script.](#)
4. [Automatic Verification.](#)
5. [Manual Verification.](#)

3.1.1 Secure Storage for Target Monitoring Credentials

As you begin the discovery process, cell monitoring requires log in and password credentials to be entered. These credentials are handled in the following manner:

- For the `cellmonitor` user: SSH equivalence is set up for between the `cellmonitor` user and the `agent` user. The root credentials being prompted for during discovery

are not needed for metric collection afterward. You can optionally choose to store the cell root password as a named credential in the Enterprise Manager repository.

- For the cell ILOM user (oemuser): This monitoring credential is encrypted and stored in the Enterprise Manager repository and in the `targets.xml` file on the agent.
- For the InfiniBand Switch user (nm2user): SSH equivalence is set up for between the nm2user user and the agent user. The nm2user credentials being prompted for during discovery are not needed for metric collection afterward. You can optionally choose to store the nm2user password as a named credential in the Enterprise Manager repository.

3.1.2 Download the Discovery Precheck Script

You can obtain the script in one of the following ways

- Access the script as part of Exadata plug-in 13.1.0.0.0 after the plug-in is deployed to the agent:

```
<agent installation directory>/plugins/oracle.sysman.xa.discovery.plugin_12.1.0.3.0/discover/dbmPreReqCheck/exadataDiscoveryPreCheck.pl
```

Note: The Exadata plug-in includes an additional script that enables enhanced monitoring through Enterprise Manager Cloud Control 13c.

- Download the script from *Prerequisite script for Exadata Discovery in Oracle Enterprise Manager Cloud Control 12c* (Doc ID 1473912.1) in My Oracle Support:
<https://support.oracle.com/rs?type=doc&id=1473912.1>
- Access the script as described in *Obtaining the Oracle Enterprise Manager Setup Automation kit for Exadata* (Doc ID 1440951.1) in My Oracle Support for more information on the kit:

<https://support.oracle.com/rs?type=doc&id=1440951.1>

3.1.3 Run the Discovery Precheck Script

To run the script:

```
$ <agent installation directory>/plugins/oracle.sysman.xa.discovery.plugin_<plugin version>/discover/dbmPreReqCheck/  
$ $ORACLE_HOME/perl/bin/perl ./exadataDiscoveryPreCheck.pl
```

As the script runs, you will be prompted for various inputs. It will execute all the built-in checks and will display all messages on standard output along with an execution log.

3.1.4 Automatic Verification

The discovery precheck script checks for the following information:

- Verifies that the user who is running the Enterprise Manager agent has read and execute permissions on at least one of the 11.2 (or later) Database Oracle home directory `<ORACLE_HOME>/bin/kfod` binaries.

- Verifies the management server and cell server is up and running on the Exadata cell. You can verify the status by running:


```
$ cellcli -e 'list cell attributes cellsrvStatus,msStatus'
```
- Verifies log in credentials. These credentials are required to complete the discovery process. **Make sure you have the information of the following credentials before starting the discovery process:**
 - Agent host credentials: the username and password of the user running the agents on the compute nodes
 - Monitoring credentials:
 - * Cell Root Password
 - * InfiniBand Switch Nm2user Password
 - * ILOM username and password
 - InfiniBand Switch root credentials: Username and Password
- Verifies the Database Machine schematic file requirements for Exadata Release 11.2.3.1, 11.2.3.2, and later, including:
 - That the schematic file should exist on the agent host selected for discovering the Exadata Database Machine at:


```
/opt/oracle.SupportTools/onecommand/databasemachine.xml
```
 - That the schematic file has the world-readable privilege so that it is readable by the agent user.
 - That the version is **503** or later. The schematic file version is in the header of the file.
 - That the values of <ADMINNAME> and <ADMINIP> in the schematic file should be the current host names and management IP addresses of the compute nodes, Exadata cells, InfiniBand switches, KVM, PDU, and Cisco switch.
- Verifies the Database Machine schematic file requirements for Exadata Release 11.2.3.2 and later:
 - Verifies that the schematic file exists on the agent host selected for discovering the Exadata Database Machine at:


```
/opt/oracle.SupportTools/onecommand/catalog.xml
```
 - Verifies that the schematic file has the world-readable privilege so that it is readable by the agent user.
 - Verifies that the schematic file version is **868** or later. The schematic file version is in the header of the file.
 - In addition, the values of <ADMINNAME> and <ADMINIP> in the schematic file should be the current host names and management IP addresses of the compute nodes, Exadata cells, InfiniBand switches, KVM, PDU, and Cisco switch.

Client network naming is *only* supported in Exadata plug-in Release 12.1.0.3.0 and later.

Note: If the Database Machine schematic file does not exist or its version does not meet the requirement, open a Service Request with Oracle Support to get the latest version of the schematic file.

3.1.5 Manual Verification

After running the discovery precheck script, you will still need to perform the following checks manually:

- Use the 11.2 (or later) Database Oracle home directory when prompted for in [Discovering an Exadata Database Machine](#).
- Pre-requirements for platform and Database Machine version.
- Compute node needs to be first discovered as Enterprise Manager host targets by installing the Enterprise Manager agents on these hosts.
 - The Enterprise Manager agent must be deployed to all compute nodes of the Exadata Database Machine. The host target name of the compute node must be the fully qualified host name (for example, dbm1db01.mydomain.com). Non-fully qualified hostnames (for example, dbm1db01) or IP addresses must not be used for the host target name of the compute node.
 - If you are using Exadata plug-in Release 12.1.0.1.0 or 12.1.0.2.0, the target name of the compute node host target should be the host name in the management network, not the client network.
 - If you are using Exadata plug-in Release 12.1.0.3.0 or later, the target name of the compute node host target can be the host name in the management network or the client network.
- The host names of the compute nodes and Exadata cells in each individual Database Machine should have a unique prefix. In other words, Exadata Database Machine racks that are not connected by the same InfiniBand network to form one DB Machine should not share the same prefix for the host names.
- For users of Oracle Enterprise Manager Cloud Control 12c Release 12.1.0.1.0 or if the installed version has been upgraded to Release 12.1.0.2.0 from 12.1.0.1.0 of the plug-in, you must manually push the Exadata plug-in to the agent.

3.2 Discovering an Exadata Database Machine

To discover a Database Machine target, follow these steps:

1. From the Enterprise Manager home page, select the **Setup** menu (upper right corner), **Add Target**, and then **Add Targets Manually**.
2. On the Add Targets Manually page ([Figure 3–1](#)), click **Add Targets Using Guided Process**. From Add Using Guided Process window, select **Oracle Exadata Database Machine** from the list and click **Add** ([Figure 3–2](#)).

Figure 3–1 Add Targets Manually

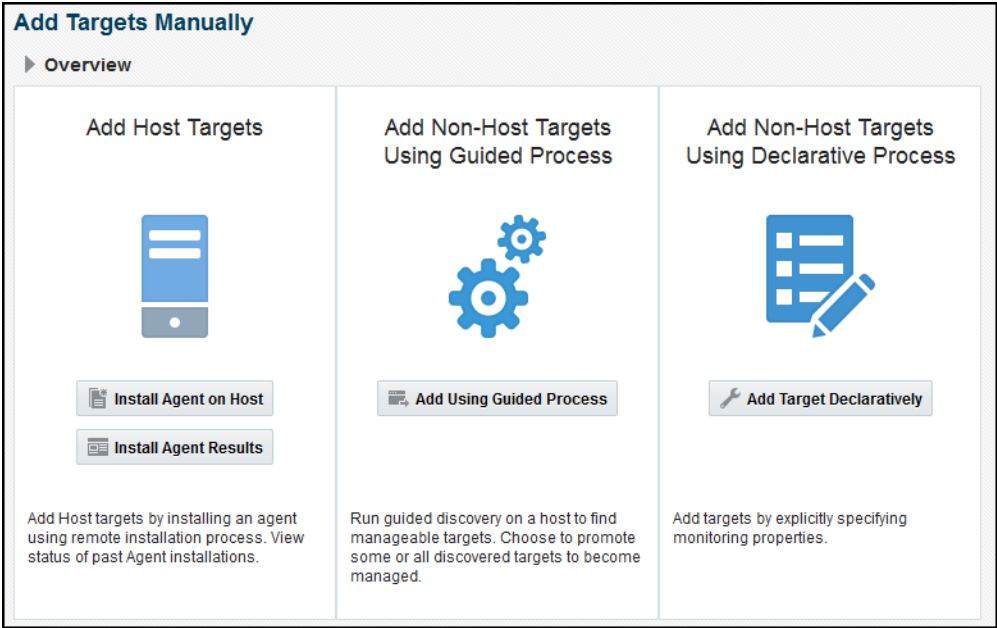
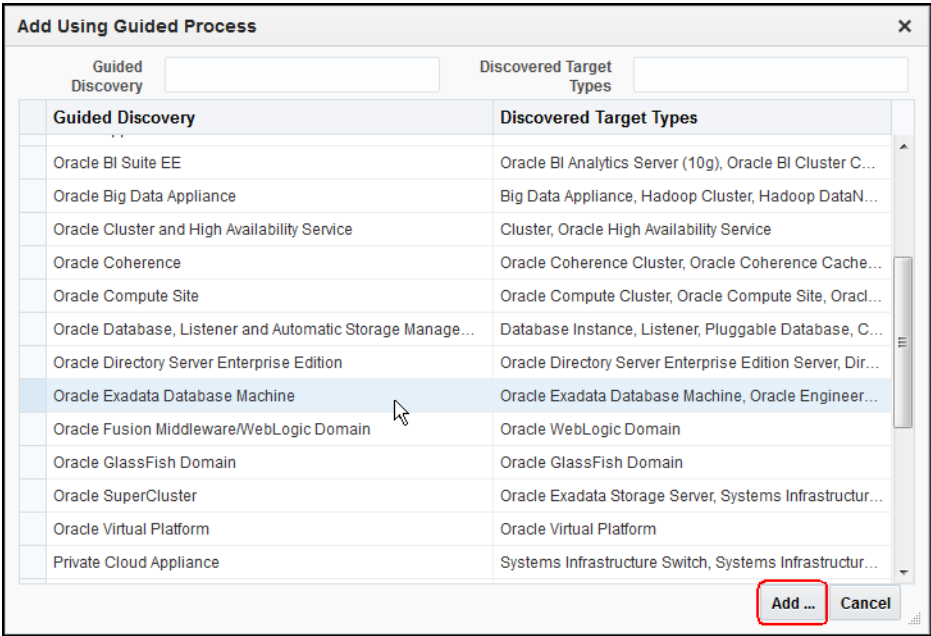


Figure 3–2 Select Oracle Exadata Database Machine



3. On the Oracle Exadata Database Machine Discovery page (Figure 3–3), select one of the following tasks:
 - Discover a new Database Machine and its hardware components as targets. With this selection, choose one of the following monitoring options:
 - **13c target type.** With this target type, enhanced monitoring is available through Enterprise Manager Cloud Control 13c (additional credentials are required).

Enhanced monitoring of the 13c target type allows the Exadata plug-in to monitor the Exadata Storage Server and KVM, and the Enterprise Man-

ager Systems Infrastructure (EMSI) plug-in monitors of all other hardware targets with the Exadata rack. The EMSI plug-in is included with your installation of Enterprise Manager.

– **12c target type.**

After you select the monitoring type, the table will update to show the target types and the credentials required for discovery.

- Discover newly added hardware components in an existing Database Machine as targets. Select a Database Machine from the drop-down menu. The table will update to show the target types and the credentials required for discovery.

Figure 3–3 Oracle Exadata Database Machine Discovery Page

Oracle Exadata Database Machine Discovery

This process allows you to add hardware components (such as Oracle Exadata Storage Servers, Infiniband Switches, Ethernet Switches, KVM, PDUs and Racks) in the Oracle Exadata Database Machine as managed targets. Compute Nodes should have been added as Server targets already and will be added as members of the Database Machine System target after this discovery process. Monitoring of the compute node servers through their ILOM will also be enabled as part of the discovery process.

Select one of the following tasks:

- ☒ Discover a new Database Machine and its hardware components as targets
- ☐ Discover newly added hardware components in an existing Database Machine as targets

Hardware Component Monitoring Options

What target type would you like to use for monitoring hardware components?

- ☒ 13c target types with enhanced hardware monitoring, requiring additional credentials
- ☐ 12c target types

Credentials required for 13C target discovery

Target Type	Credentials
Host	Agent Host User Credentials
Oracle Exadata Storage Server	Root Credentials, SNMP Community String
Systems Infrastructure CISCO Switch	Cisco Switch IOS Credentials, SNMP Credentials
Systems Infrastructure Infiniband Switch	ILOM Monitoring Credentials, ILOM Administration Credentials, SNMP Credentials
Systems Infrastructure PDU	SNMP Credentials, HTTP Monitoring Credentials
Systems Infrastructure Server	ILOM Monitoring Credentials

Discover Targets Cancel

Click **Discover Targets**. The Exadata Discovery Wizard begins.

4. On the Discovery Inputs page (Figure 3–4), enter the following information:
 - For the Discovery Agents section:
 - **Agent URL:** The Agent deployed on compute node. Click the search icon to select from available URLs.
 - For the Schematic Files section:
 - Once you have specified the Agent URL, a new row (hostname and schematic file information) is automatically added. The default schematic file, `databasemachine.xml`, describes the hardware components of the Exadata Database Machine.
 - Click **Set Credential** to set the credentials for the host.
 - Check/modify the schematic file location.
 - Select the schematic file name from drop-down menu.

Note: You only need to customize the Schematic file location if one of the following is true:

- The Schematic file is not in the default location.
 - The Database Machine contains a Storage Expansion Rack.
 - The hardware components are specified in multiple schematic files.
-

Figure 3–4 Database Machine Discovery: Discovery Inputs

Oracle Exadata Database Machine Discovery

Discovery Inputs InfiniBand Discovery Prerequisite Check Components Monitoring Agents Credentials Review

Database Machine Discovery: Discovery Inputs Back Step 1 of 7 Next Cancel

Discovery Agent

☐ Use remote agent for discovery and monitoring

Agent URL:

Schematic Files

The hardware components will be dynamically discovered based on your environment and the default is schematic file.

You only need to customize the Schematic file location if one of the following is true:

- ☐ The Schematic file is not at the default location (/opt/oracle.SupportTools/onecommand/databasemachine.xml on the agent compute node)
- ☐ The Database Machine contains a Storage Expansion Rack (exadatabase-machine.xml).
- ☐ The hardware components are specified in multiple schematic files. (Only needed when an older version of Oracle Exadata Deployment Assistant is used to configure the environment.)

Customize Schematic File Locations

Add Remove Set Credential ▼

Host Name	Credential	File Location	Schematic File
<input type="text" value="host1.example.com"/>	Not Defined	/opt/oracle.SupportTools/onecommand/	databasemachine.xml

Click Next.

5. On the InfiniBand Discovery page (Figure 3–5), enter the following information:
 - **IB Switch Host Name:** The InfiniBand switch host name. The IB Switch host name is usually pre-populated.
 - **InfiniBand Switch ILOM host credential:** The user name (usually ilom-admin or ilom-operator) and password for the InfiniBand switch ILOM host.

Figure 3–5 Database Machine Discovery: InfiniBand Discovery

Click **Next**.

- On the Prerequisite Check page (Figure 3–6), Enterprise Manager will try to discover hardware components dynamically based on your environment. If any critical issues are encountered, then you can click **Back** to resolve them. Enterprise Manager will show the problem and its severity (Info, Warning, or Critical).

Any warning issues or informational messages may also be displayed. These do not interfere with the discovery process.

Figure 3–6 Database Machine Discovery: Prerequisite Check

Severity	Problem
Warning	EXM-0018: Client hostname slct1502 for compute node slct15db02 was collected from static data.
Warning	EXM-0018: Client hostname slct1501 for compute node slct15db01 was collected from static data.
Warning	EXM-0009: Using static data for Cisco switch as Examian dynamic discovery found 2 Cisco switches: cisco-switch1, cisco-switch2
Warning	EXM-0010: IP switch ip-switch1.example.com was discovered using engineered system static data.
Info	EXM-4017: Discovery was done using the DYNAMIC_DISCOVERY method.

Click **Next**.

- On the Components page (Figure 3–7), the components below are pre-selected. You can deselect any unwanted component. Components include, but are not limited to, the following:
 - Compute Node:** Select the hosts that are compute nodes in the Oracle Exadata Database Machine.

- **Oracle Exadata Storage Server:** Select the Oracle Exadata Storage Servers that are part of this Oracle Exadata Database Machine target.
- **InfiniBand Switch:** Select the InfiniBand Switches that are part of the Oracle Exadata Database Machine. These also will be added as managed targets.
- **Ethernet Switch:** Select the Ethernet switches that are part of the Oracle Exadata Database Machine. The Ethernet switches will be added as managed targets.
- **Compute Node ILOM:** Select the Integrated Lights Out Managers (ILOM) of the compute nodes that are part of this Oracle Exadata Database Machine. These ILOMs will be added as managed targets.
- **KVM:** Select the KVM switches that are part of the Oracle Exadata Database Machine. The KVM switches will be added as managed targets.

Note: A partitioned rack can list other components that should be deselected manually (for example, compute nodes).

Figure 3–7 Database Machine Discovery: Components

ORACLE® Enterprise Manager Cloud Control 13c

Oracle Exadata Database Machine Discovery

Discovery Inputs InfiniBand Discovery Prerequisite Check **Components** Monitoring Agents Credentials Review

Database Machine Discovery: Components Set Target Properties Back Step 4 of 7 Next Cancel

Below are the new components that are discovered by examining the network topology and configuration files. Select the different types of components that are part of Database Machine. Note that all components are pre-selected by default the first time you visit the page.

Compute Nodes/Servers

Select the servers that are Compute Nodes in the Oracle Exadata Database Machine. These servers must be added as managed targets before the Oracle Exadata Database Machine target creation can proceed. Monitoring of the selected Compute Node Servers through their ILOM will also be enabled as part of the discovery process.

Server Name
host1.example.com
host2.example.com
host3.example.com
host4.example.com/server
host5.example.com
host6.example.com
host7.example.com
host8.example.com

Oracle Exadata Storage Server

Select the Oracle Exadata Storage Servers that are part of this Oracle Exadata Database Machine target.

Exadata Storage Server Name	Management IP
host1.example.com	10.20.30.101
host2.example.com	10.20.30.102
host3.example.com	10.20.30.103
host4.example.com	10.20.30.104

Click **Next**.

8. On the Monitoring Agents page (Figure 3–8), select an agent for the Monitoring Agent, and then one for the Backup Monitoring Agent from the drop-down selection.

Note: A Warning will be thrown if only one agent is used as monitoring and backup agents. Click **Select Agents** to add more agents, if available.

Figure 3–8 Database Machine Discovery: Monitoring Agents

ORACLE® Enterprise Manager Cloud Control 13c

Oracle Exadata Database Machine Discovery

Discovery Inputs Infiniband Discovery Prerequisite Check Components **Monitoring Agents** Credentials Review

Database Machine Discovery: Monitoring Agents Back Step 5 of 7 Next Cancel

DB Machine guided discovery has automatically assigned agents to your targets. You can choose to override the monitoring agents. Click reset button to return all targets to automatic assignment.

Select Agents Reset

Target Name	Monitoring Agent		Backup Monitoring Agent	
DB Machine host1.example.com	https://host1.example.com:40001/emd/main/	▼	https://host1-b.example.com:40001/emd/main/	▼

Exadata Storage Server Name	Monitoring Agent		Backup Monitoring Agent	
exahost1.example.com	https://exahost1.example.com:40001/emd/main/	▼	https://exahost1-b.example.com:40001/emd/main/	▼
exahost2.example.com	https://exahost2.example.com:40001/emd/main/	▼	https://exahost2-b.example.com:40001/emd/main/	▼
exahost3.example.com	https://exahost3.example.com:40001/emd/main/	▼	https://exahost3-b.example.com:40001/emd/main/	▼

Click **Next**.

9. On the Agent Credential page, set the credentials for all components within the Exadata Database Machine (for example, the Storage Server, PDU, InfiniBand Switch, and so forth).

Click **Set Credential** to set the credential for the component. If the users and passwords are the same, choose **Same for all** and enter the user and password combination.

Select **Set up ASR subscription** option for receiving Oracle Auto Service Request (ASR)-oriented traps in Enterprise Manager. This option is needed if you are using Enterprise Manager to raise a Service Request (SR) instead of using ASR Manager on the cell.

Depending on the component, you may need to provide additional information. For example, in the Exadata Storage Server Credentials window, you must enter the SNMP Credentials as well as the Root Credentials (Figure 3–9):

Figure 3–9 Example: Set Oracle Exadata Storage Server Credentials

Oracle Exadata Storage Server Credentials

Root Credentials

Root Credentials are needed to set up SSH user equivalence between the agents and the Exadata Storage Server targets monitored by the agents and to set up SNMP alert notification. Saving these credentials is optional.

Credential ☐ Named ☒ New

* Username

* Password

☐ Save As

SNMP Credentials

☒ Set up SNMP subscription for Oracle Exadata Storage Servers automatically.

☐ Set up ASR subscription

SNMP monitoring credentials are needed to monitor hardware and software issues. Exadata Storage Server of version less than 12.1.2.1.0 supports only SNMP V1. Exadata Storage Server of version 12.1.2.1.0 and later versions supports SNMP V3 also for enhanced network security. Specify the credentials based on Exadata Storage Server Version. Only SNMP V3 credentials will be saved as monitoring credentials.

Credential type

* Community String

* Confirm Community String

Click **OK** and set the credentials for all other components. Once all credentials are set, the Set Credentials page will update to show the credentials set (as shown in [Figure 3–10](#)):

Figure 3–10 Database Machine Discovery: Credentials

ORACLE[®] Enterprise Manager Cloud Control 13c

Oracle Exadata Database Machine Discovery

Discovery Inputs

Infiniband Discovery

Prerequisite Check

Components

Monitoring Agents

Credentials

Review

Database Machine Discovery: Credentials

Back

Step 6 of 7

Next

Cancel

Agent

Specify the agent host users and passwords for all agents. The agent users and passwords are needed to set up SSH user equivalence between the agents and the Exadata Storage Server targets monitored by the agents and to configure the targets. They will not be saved in Enterprise Manager unless you save them as named credentials.

Set Credential

Agent URL

https://agent-host1.example.com:40001/emd/main

*Credential

oracle*****

Oracle Exadata Storage Server

Specify the Exadata Storage Server root credentials for all Exadata Storage Servers. The Exadata Storage Server credentials are needed to set up SSH user equivalence between agent and the Exadata Storage Server targets monitored by the agents and to set up SNMP alert notification to Enterprise Manager. They will not be saved in Enterprise Manager unless save them as named credentials

Set Credential

Exadata Storage Server Name

server1.example.com

*Credential

root*****

server2.example.com

root*****

server3.example.com

root*****

Infiniband Switch

Specify the Integrated Lights Out Manager (ILOM) credentials and SNMP credentials for all Infiniband switches. They will be saved in Enterprise Manager as monitoring credentials and preferred credentials for administration tasks.

Set Credential

Infiniband Switch Name

ib-switch1.example.com

*Credential

ilom-operator*****

ib-switch2.example.com

ilom-operator*****

Compute Node Server ILOM

Specify credentials for all the Compute Node Server Integrated Lights Out Managers (ILOM). They will be saved in Enterprise Manager as monitoring credentials.

Set Credential

ILOM Name

compute-node1.example.com

*Credential

root*****

compute-node2.example.com

root*****

PDU

Specify the HTTP credentials and SNMP credentials for all PDUs. They will be saved in Enterprise Manager as monitoring credentials.

Set Credential

PDU Name

pdu1.example.com

*Credential

root*****

pdu2.example.com

root*****

Ethernet Switch

Specify the Cisco IOS and SNMP credentials for all the Ethernet switches. They will be saved in Enterprise Manager as monitoring credentials.

Set Credential

Ethernet Switch Name

ethernet-switch1.example.com

*Credential

admin*****

Click Next.

10. On the Review page, verify each section is correct. [Figure 3–11](#) shows an example of an accurate review.

Figure 3–11 Database Machine Discovery: Review

ORACLE[®] Enterprise Manager Cloud Control 13c

Oracle Exadata Database Machine Discovery

Discovery Inputs

Infiniband Discovery

Prerequisite Check

Components

Monitoring Agents

Credentials

Review

Back

Step 7 of 7

Next

Submit

Cancel

Database Machine Discovery: Review

Verify the following information. You can click Back to revise the inputs or click Submit to complete the discovery process.

System Target

The following system targets will be added in Enterprise Manager. You can keep the pre-filled system target names or specify your own system target names. If you choose to use your own system target names, make sure that 1) the system target names are unique in Enterprise Manager and 2) you use similar target names for the systems so that you can easily identify systems that are in the same DB Machine.

Target Name	Target Type	Monitoring Agent	Backup Monitoring Agent
DB Machine: host1.example.com	Oracle Exadata Database Machine	https://host1.example.com:40001/emd/main/	https://host1-a.example.com:40001/emd/main/
Exadata Grid grid1.example.com	Oracle Exadata Storage Server Grid	Agent not needed for repository target	Agent not needed for repository target

Rack

The following racks will be added as members of the Database Machine target.

Target Name
DB Machine: stc15 Rack AK00018783#1

Compute Nodes/Servers

The following compute nodes will be added as members of the Exadata Database Machine target.

Server Name	ILOM Name	Monitoring Agent	Backup Monitoring Agent
node1.example.com	node1-ilm.example.com	https://node1-ilm.example.com:40001/emd/main/	https://node1-ilm-a.example.com:40001/emd/main/
node2.example.com	node2-ilm.example.com	https://node2-ilm.example.com:40001/emd/main/	https://node2-ilm-a.example.com:40001/emd/main/

Oracle Exadata Storage Server

The following Exadata Storage Servers will be added as members of the Database Machine target.
SNMP will be set up automatically on Exadata Storage Servers.

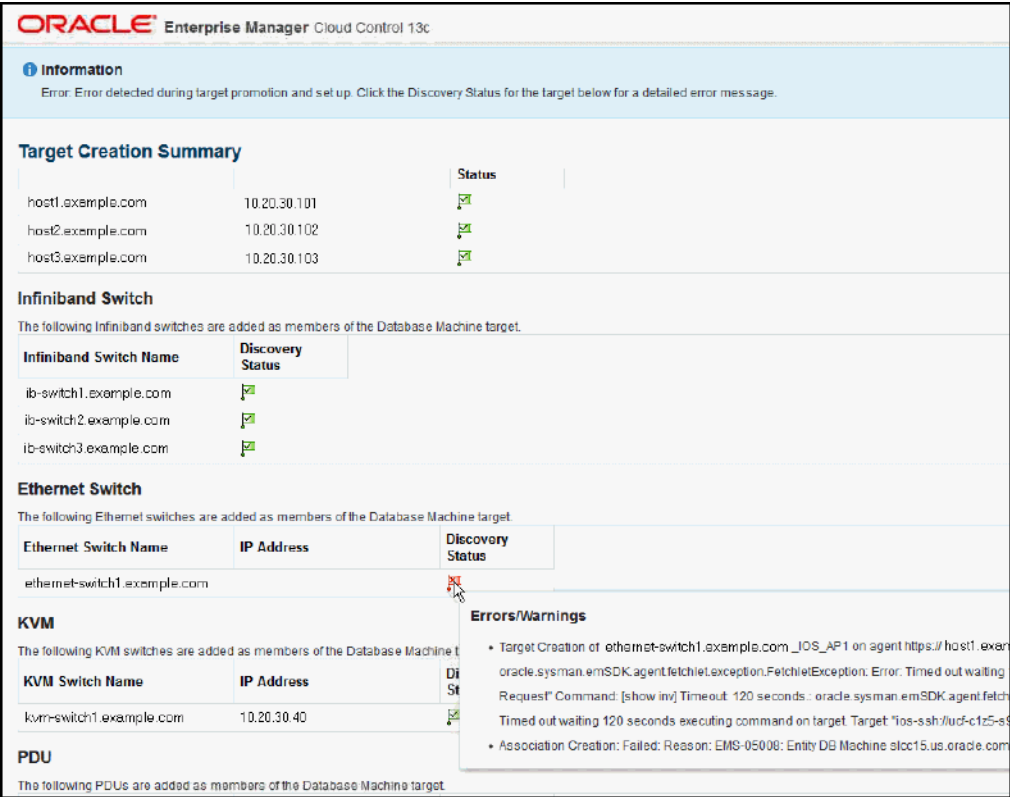
Exadata Storage Server Name	Management IP	Monitoring Agent	Backup Monitoring Agent
server1.example.com	10.20.30.101	https://server1.example.com:40001/emd/main/	https://server1-a.example.com:40001/emd/main/
server2.example.com	10.20.30.102	https://server2.example.com:40001/emd/main/	https://server2-a.example.com:40001/emd/main/
server3.example.com	10.20.30.103	https://server3.example.com:40001/emd/main/	https://server3-a.example.com:40001/emd/main/

Infiniband Switch

Click **Submit**.

11. After the Database Machine components are promoted, a Target Creation Summary page displays to show all discovered targets and components. If there are any errors, the Status column will display a red flag. Place your cursor over the flag for a pop-up window for additional information about the error (Figure 3–12):

Figure 3–12 Database Machine Discovery: Target Creation Summary



The discovery of the Oracle Exadata Database Machine is complete.

3.3 Discover Oracle SuperCluster as an Exadata Database Machine

You can use the Exadata plug-in to discover and monitor an Oracle SuperCluster system. You can monitor *only* the Database and Exadata components of the Oracle SuperCluster installed on LDOM and Zones. To monitor specific LDOM or virtualization configurations at the operating system level, please use Oracle Enterprise Manager Ops Center 12c.

To discover the Oracle SuperCluster as an Exadata Database Machine:

1. See the *Discovering and Promoting Oracle Solaris Zones in the Oracle® Enterprise Manager Cloud Control Administrator's Guide* for completing the prerequisite of pushing the agent to the control domain and zones.
2. Open a Service Request (SR) and upload the following files from your first 11gR2 LDOM:

```
/opt/oracle.SupportTools/onecommand/onecommand.params
/opt/oracle.SupportTools/onecommand/config.dat
```

Important: Make a backup of your
/opt/oracle.SupportTools/onecommand directory as you will
overwrite it with the new configurations.

3. Oracle Support will provide you the file(s) generated based on the information provided in your configuration files. Copy all files into your `/opt/oracle.SupportTools/onecommand` directory.
4. Ensure that READ permissions are open for all files in this directory as well as in the `/opt/oracle.SupportTools/em` directory. The agent must be able to read these files during discovery.
5. Run Self Update from Enterprise Manager to download the Solaris SPARC agent software on the OMS. Apply that download to the OMS to make it available for deployment:
 - a. From Enterprise Manager, click **Setup**, then **Extensibility**, and finally **Self Update**. Click **Agent Software**.
 - b. Select **Oracle Solaris on SPARC (64-bit)**.
 - c. If the status is Available, then click **Download** from the Actions menu.
 - d. Once downloaded, you must Apply it to the OMS from the same Self Update page.

For more details on Self Update in Online or Offline mode, see the *Updating Cloud Control* chapter in the *Oracle® Enterprise Manager Cloud Control Administrator's Guide*.

6. Install an agent on each of the Database nodes of the Oracle SuperCluster:
 - a. From Enterprise Manager, select **Setup**, then **Add Target**, and finally **Add Targets Manually**.
 - b. Select **Add Host Targets** (selected by default) and click **Add Host**.
 - c. Continue with the installation wizard and ensure that you run `root.sh` on *each* node once installation is completed.

Note: You may run into a known issue where you have to edit the Ciphers entry in `/etc/ssh/sshd_config` and restart ssh (see bug 13822068 for details). See *SSHD Connection Errors After Upgrading To Exadata Version 11.2.3.1.0* (Doc ID 1437596.1) in My Oracle Support:

<https://support.oracle.com>

7. Configure the database nodes for Database Machine discovery.

This step is needed to set descriptions of each DB node by updating the DB node IP address, Host Channel Adapter ID, and management hostname in the InfiniBand configurations using `set_nodedesc.sh`. Enterprise Manager Agents look for this information when discovering the Database Machine.

Run:

```
# ibnetdiscover | grep your_db_nodes
```

If no output is not returned, then run the following command to set the node descriptions from all database nodes:

```
# /bin/ib_set_node_desc_ssc.sh
```

8. Discover Exadata Database Machine from Enterprise Manager using Manual Discovery wizard. This discovery process is the same as any other Exadata DBM target. See [Discovering an Exadata Database Machine](#).

9. Discover the HA RAC Cluster and the cluster databases and configure each target as usual.

3.4 Discovering Grid Infrastructure and RAC

The following sections provide instructions for discovering Grid Infrastructure and Oracle Real Application Clusters targets:

- [Discover Grid Infrastructure \(Cluster\) Targets](#)
- [Discover Oracle Real Application Clusters Targets](#)

3.4.1 Discover Grid Infrastructure (Cluster) Targets

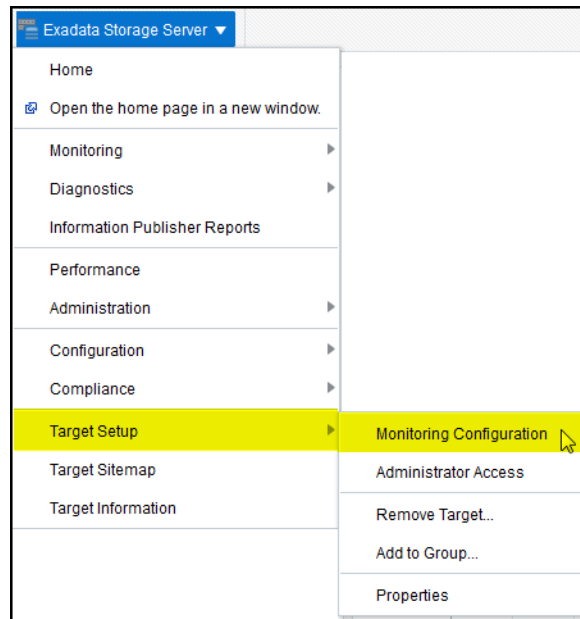
1. From the Setup menu, select **Add Targets**, then **Add Targets Manually**.
2. In the Add Targets Manually page, select **Add Non-Host Targets Using Guided Process (Also Adds Related Targets)** and **Target Type as Oracle Cluster and High Availability Services**.
3. Click **Add Using Guided Discovery** and follow the wizard.
4. On the Add Cluster Target: Specify Host page, select the first database node and click **Continue**.
5. The cluster home details are displayed. Ensure that all database nodes are shown in Selected Hosts section.
6. Click **Add**.

3.4.2 Discover Oracle Real Application Clusters Targets

1. From the Setup menu, select **Add Targets**, then **Add Targets Manually**.
2. In the Add Targets Manually page, select **Add Non-Host Targets Using Guided Process (Also Adds Related Targets)** and **Target Type as Oracle Database, Listener and Automatic Storage Management**.
3. Click **Add Using Guided Discovery** and follow the wizard.
4. In the wizard pages, configure Cluster Databases (db snmp password required) and Cluster ASM (asm snmp password required).

3.5 Switch from Using CellCLI to ExaCLI after Storage Server Locked Down

You can at any time lock down an Exadata Storage Server and switch to ExaCLI for monitoring/administration. From the Exadata Storage Server menu, select Target Setup, then select Monitoring Configuration, as shown in [Figure 3-13](#):

Figure 3–13 Monitoring Credentials Menu Item

On the Monitoring Configuration page, set the **Support ExaCLI** value to **1** (the default is 0), as shown in [Figure 3–14](#):

Figure 3–14 Monitoring Configuration: Set to Monitor Using ExaCLI

Monitoring Configuration

OK Cancel

* Cell Name

storage-server1

ILOM IP Address

10.20.30.44

ILOM SNMP Port (Default: 161)

161

* Management IP Address

10.20.30.55

SNMP Engine ID

<SNMP Engine ID>

Support ExaCLI (Default: 0)

1

Monitoring

Oracle has automatically enabled monitoring for this target's availability and performance, so no further monitoring configuration is necessary. You can edit the metric thresholds from the target's homepage.

Post-Discovery Configuration and Verification

Once the Oracle Exadata Database Machine has been discovered through Enterprise Manager Cloud Control 13c, you must complete post-discovery configuration on the following targets:

- [Set Up SNMP Trap Forwarding on Compute Node](#)
- [Configure Storage Cell SNMP for Enterprise Manager Monitoring](#)
- [Configure and Verify SNMP for InfiniBand Switch Targets](#)
- [Configure the Compute Node ILOM SNMP for Enterprise Manager Monitoring](#)
- [Verify Configuration for Oracle ILOM Server](#)
- [Set Up SNMP for Cisco Ethernet Switch Targets](#)
- [Set Up SNMP for Power Distribution Unit \(PDU\) Targets](#)
- [Set Up SNMP for KVM Targets](#)
- [Oracle Exadata Database Machine Dashboard Creation](#)

Remember: You must remove the SNMP notification on the cell, InfiniBand switch, ILOM, Cisco switch, PDU, and KVM **manually** if you remove these targets from Enterprise Manager.

Starting with Exadata plug-in Release 12.1.0.3.0, when the Exadata Database Machine target is deleted through Enterprise Manager Cloud Control, there is an option to remove the SNMP notification from the cells and InfiniBand switches.

Note: View a video of how to monitor your Exadata environment:

https://apex.oracle.com/pls/apex/f?p=44785:24:0::NO:24:P24_CONTENT_ID,P24_PREV_PAGE:5664,1

4.1 Set Up SNMP Trap Forwarding on Compute Node

Note: If you do not need to monitor KVM, then you can skip this section.

The traps from the KVM will be sent to UDP port 162 on the monitoring agent host. For the Enterprise Manager Agent to receive traps from the KVM, SNMP trap

forwarding must be set up on the host where the Enterprise Manager Agent is running so that the `snmptrapd` daemon can receive traps using port **162** and forward the trap to the agent receivelet's listening port.

Ideally, you should perform the steps on all compute nodes in preparation for a scenario when monitoring is moved to a compute node that was not previously being used to monitor the KVM targets.

- [Set Up Compute Node Agent - Linux](#)
- [Set Up Compute Node Agent - Solaris](#)

4.1.1 Set Up Compute Node Agent - Linux

The following commands must be run as `root` user:

1. Get the port value from `EMD_URL` property in the `<AGENT_INST>/sysman/config/emd.properties` file. This is the port at which receivelet will listen over UDP for traps (for this example, the port value is **3872**).
2. Confirm that the receivelet is listening on this port over UDP. An entry should be seen in the below command's output:

```
# netstat -an | grep 3872 | grep udp
```

3. Run the following command to stop the SNMP trap daemon:

```
# service snmptrapd stop
```

Typically, the `service` command will be located in the `/sbin` directory.

4. Add the following entry to the `/etc/snmp/snmptrapd.conf` configuration file:

```
authcommunity log,execute,net <community string>
forward default udp:localhost:3872
```

Note: If the `/etc/snmp/snmptrapd.conf` file does not exist, create one and add the lines as described above.

5. Edit the `/etc/hosts.allow` file to add the following line:

```
snmptrapd : ALL
```

6. Run the following command:

```
# chkconfig snmptrapd on
```

7. Run the following command to start the SNMP trap daemon:

```
# service snmptrapd start
```

4.1.2 Set Up Compute Node Agent - Solaris

The following commands must be run as `root` user:

1. Get the port value from `EMD_URL` property in the `<AGENT_INST>/sysman/config/emd.properties` file. This is the port at which receivelet will listen over UDP for traps (for this example, the port value is **3872**).
2. Confirm that the receivelet is listening on this port over UDP. An entry should be seen in the below command's output:

```
# netstat -an | grep 3872 | grep udp
```

3. Run the following command to stop the SNMP trap daemon:

```
# svcadm disable snmptrapd
```

You may see the following message. If so, then you can ignore it:

```
svcadm: Pattern 'snmptrapd' doesn't match any instances
```

Typically, the `svcadm` command will be located in the `/usr/sbin` directory.

4. Add the following entry to the `/etc/net-snmp/snmp/snmptrapd.conf` configuration file:

```
authcommunity log,execute,net <community string>
forward default udp:localhost:3872
```

Note: If the `/etc/net-snmp/snmp/snmptrapd.conf` file does not exist, create one and add the lines as described above.

5. Create a `/tmp/snmptrapd.xml` file with the following content:

```
<?xml version="1.0"?>
<!DOCTYPE service_bundle SYSTEM
"/usr/share/lib/xml/dtd/service_bundle.dtd.1">
<service_bundle type='manifest' name='snmptrapd'>
  <service name='application/management/snmptrapd' type='service' version='1'>
    <create_default_instance enabled='true' />
    <single_instance />
    <dependency name='network' grouping='require_all' restart_on='none'
type='service'>
      <service_fmri value='svc:/milestone/network:default' />
    </dependency>
    <exec_method type='method' name='start' exec="/usr/sbin/snmptrapd -Lsd -p
/var/run/snmptrapd.pid" timeout_seconds='60' />
    <exec_method type='method' name='stop' exec=':kill' timeout_seconds='60' />
    <stability value='Evolving' />
    <template>
      <common_name>
        <loctext xml:lang='C'>net-snmp SNMP trap daemon</loctext>
      </common_name>
    </template>
  </service>
</service_bundle>
```

6. Validate the `/tmp/snmptrapd.xml` file you have just created in step 5:

```
# svccfg validate /tmp/snmptrapd.xml
```

7. Import the `/tmp/snmptrapd.xml` file:

```
# svccfg import snmptrapd.xml
```

8. Make sure that the `snmptrapd` daemon is running:

```
# svcs snmptrapd
```

An example of the output is:

```
STATE      STIME      FMRI
online     16:20:00  svc:/application/management/snmptrapd:default
```

9. If needed, you can start the `snmptrapd` daemon with the following command:

```
# svcadm enable snmptrapd
```

4.2 Configure Storage Cell SNMP for Enterprise Manager Monitoring

Exadata Storage Cell SNMP configuration is performed using the `cellcli` command and can be run in batch using `dcli` from a compute node.

Notes:

- For Enterprise Manager Cloud Control 12c Bundle Pack 1 (BP1):
The SNMP trap setup for Exadata Storage Cells is done automatically after finishing the guided discovery process.
 - For Exadata plug-in Release 12.1.0.2.0 and later:
During the discovery process, you can optionally provide the necessary root credentials to set up SNMP trap for Exadata Storage Cells. If you have done so, then you can skip the remaining steps of this section and proceed with [Configure and Verify SNMP for InfiniBand Switch Targets](#).
 - While the `public` string is used for the SNMP examples in the following sections, it is supported to use any valid SNMP community string.
-
-

4.2.1 Using the ALTER CELL Command

While using the `ALTER CELL` command, all existing subscribers should be specified along with the new subscriber being added. Similarly, you can also modify the `notificationPolicy` or `notificationMethod` attributes.

While using the `ALTER CELL` command, the `host=` and `community=` attribute values should be quoted, and `type=` is NOT quoted.

If you are using the DCLI utility to set up SNMP alerting, then any command containing punctuation, which will be interpreted by the local shell, must be enclosed with double quotation marks. If the command includes the following characters, then outer quotation marks and escape characters are required:

\$ (dollar sign)
' (quotation mark)
< (less than)
> (greater than)
() (parentheses)

The backslash (\) is the escape character that allows the characters to be passed to the CellCLI utility without being interpreted by the remote shell.

4.2.2 Check Current SNMP Configuration

Check the current SNMP configuration using the following `cellcli` commands:

1. To list the current subscribers for SNMP:

```
# cellcli -e list cell attributes snmpSubscriber
```

When correctly configured, this command should list the primary and backup agents for the cell target, for example:

```
# cellcli -e list cell attributes snmpSubscriber
((host=[hostname.mycompany.com],port=3872,community=public),
(host=[hostname2.mycompany.com],port=3872,community=public))
```

2. To list the currently configured notification methods:

```
# cellcli -e list cell attributes notificationMethod
```

Possible values are **snmp**, **mail** and **snmp,mail**. When correctly configured, this command should return either **snmp** or **snmp,mail**, for example:

```
# cellcli -e list cell attributes notificationMethod
snmp,mail
```

3. To list the currently configured notification policy for SNMP:

```
# cellcli -e list cell attributes notificationPolicy
```

Possible values are any or all of **Critical**, **Warning**, and **Clear**. When correctly configured, this command should return **Critical**, **Warning**, **Clear**, for example:

```
# cellcli -e list cell attributes notificationPolicy
Critical,Warning,Clear
```

4.2.3 Configure SNMP Values Using `cellcli`

To set the values of `snmpSubscriber`, `notificationMethod` and `notificationPolicy`:

1. Set the `snmpSubscriber` value:

- **SNMP V1**

```
# cellcli -e "alter cell snmpSubscriber=((host='[host
name]',port=[port]),(host='[host name]',port=[port]))"
```

Where `[host name]` and `[port]` values are Agents monitoring your cell targets.

- **SNMP V3**

The process is same as above, but along with the host and port, an SNMP V3 user and type must be provided:

```
ALTER CELL snmpSubscriber=((host='host1.example.com',port=[port],
snmpUser='[v3user]', type=V3))
```

Before you run the command, make sure that a `v3user` is a valid SNMP user on the cell. You can check by running following command:

```
cellcli -e "list cell attributes snmpUser"
```

If there is no valid SNMP user on the cell, then add a V3 user with the following command:

```
ALTER CELL snmpUser=((name='[v3user]', authProtocol='MD5',
authPassword='[passwd]', privProtocol='DES', privPassword='[passwd]'))
```

Note: The Enterprise Manager Agent supports only DES and MD5/SHA combination as of now. AES is not supported.

- **Oracle Auto Service Request (ASR) subscription**

The above two steps describe the process of adding an SNMP subscription for cell traps in MS MIB format. If you want to subscribe for SNMP traps in the Oracle Auto Service Request (ASR) format as well, then along with the entries mentioned above you must add another entry with `type=ASR` (for V3, it is `type=V3ASR`).

For example, for SNMP V1:

```
ALTER CELL
snmpSubscriber=((host='host1.example.com',port=[port],community=' [community
string] '),
(host='host1.example.com',port=[port],community=' [community] ',type=ASR))
```

For example, for SNMP V3:

```
ALTER CELL
snmpSubscriber=((host='host1.example.com',port=[port],community=' [communit
y string] '), (host='host1.example.com',port=[port], snmpUser=' [v3user] ',
type=V3ASR))
```

Note: Take special care not to overwrite existing settings for `snmpSubscriber`. If there are existing subscribers, then append the agent subscriptions. For example, if the `cellcli -e list cell attributes snmpSubscriber` command returned:

```
# cellcli -e list cell attributes snmpSubscriber
((host=ilm-asr1.example.com,port=162,community=public,type=asr))
```

Then you must append the Agent subscriptions:

```
#cellcli -e "alter cell
snmpSubscriber=( (host='ilm-asr1.example.com',port=162,
community=public,type=asr), (host=' [host
name] ',port=[port]), (host=' [host name] ',port=[port])) "
```

2. For SNMP V3, update the following in Enterprise Manager:

- Ensure that the V3 monitoring credentials are set up on the cell target in Enterprise Manager which match the v3 user on the cell:
 - Log in to Enterprise Manager.
 - From the **Setup** menu, select **Security**, then select **Monitoring Credentials**.
 - Select the **Exadata Storage Server** type and click **Manage Monitoring Credentials**.
 - Select the cell and set the V3 credentials.
- Ensure that the `snmpengineid` property is set up on the target in Enterprise Manager:
 - Log in to Enterprise Manager.
 - Go to the Exadata Storage Server home page.
 - From the Exadata Storage Server menu, select **Monitoring Configuration**.
 - If the `snmpengineid` property is not set, then set it manually in Enterprise Manager. You can obtain it from the cell with the following command

```
list cell attributes snmpengineidhex
```

All of these steps are automatically taken care of if the `asr` subscription option is selected during Exadata Database Machine target discovery.

3. Set the `notificationMethod` value:

```
# cellcli -e "alter cell notificationMethod='snmp,mail'"
```

4. Set the `notificationPolicy` value:

```
# cellcli -e "alter cell notificationPolicy='Critical,Warning,Clear'"
```

4.2.4 Configure SNMP Values Using `dcli` (optional)

The SNMP configuration commands can be run using `dcli` to perform the configuration in batch on all storage cells:

1. Set the `snmpSubscriber` value:

```
$ dcli -g cell_group -l root "cellcli -e \"alter cell
snmpSubscriber=((host='[host name]',port=[port]),(host='[host
name]',port=[port]))\""
```

Where `[host name]` and `[port]` values are Agents monitoring your cell targets.

2. Set the `notificationMethod` value:

```
$ dcli -g cell_group -l root "cellcli -e \"alter cell
notificationMethod='snmp,mail'\""
```

3. Set the `notificationPolicy` value:

```
$ dcli -g cell_group -l root "cellcli -e \"alter cell
notificationPolicy='Critical,Warning,Clear'\""
```

4.2.5 Verify SSH Connectivity

Open a new terminal and verify whether the SSH connectivity was successfully established:

```
$ ssh -l cellmonitor <cell_ipaddress> cellcli -e 'list cell detail'
```

- If you are not prompted for any password, then you can assume that the connectivity is established.
- If you are asked to confirm whether you want to continue connecting, specify **Yes**.

4.2.6 Remove a Subscription

To remove the subscription, use the `ALTER CELL` command again by excluding the host name that you want to remove from the `snmpsubscriber` list.

Notes: The SNMP receivelet listens on a single address and port for all monitored targets. The port is the UDP port with the same number as the TCP port used in the `EMD_URL`.

By default, the SNMP receivelet listens on all addresses; if the property `SmpRecvletListenNIC` is set in the `emd.properties` file, the receivelet will attempt to resolve the value as either a name or IP address, and listen on only that address.

This parameter is independent of `AgentListenOnAllNICs` and `EMD_URL` because in some installations, the Agent may need to communicate with the OMS and with managed targets on different networks.

4.3 Configure and Verify SNMP for InfiniBand Switch Targets

The SNMP configuration for Enterprise Manager monitoring of InfiniBand Switches is done automatically as part of the Enterprise Manager guided discovery process. It is good practice, however, to verify that SNMP configuration has been successful.

Notes:

- For Enterprise Manager Cloud Control 12c Bundle Pack 1 (BP1):

The SNMP trap setup for Exadata Storage Cells is done automatically after finishing the guided discovery process.

- For Exadata plug-in Release 12.1.0.2.0 and later:

During the discovery process, you can optionally provide the necessary root credentials to set up SNMP trap for the InfiniBand Switch. If you have done so, then you can skip the remaining steps of this section and proceed with [Configure the Compute Node ILOM SNMP for Enterprise Manager Monitoring](#).

To configure (if necessary) and verify the SNMP configuration for an InfiniBand Switch:

1. Log in to the InfiniBand Switch ILOM web interface using the URL `https://<ib_switch_hostname>` as root.

Note: Try using Internet Explorer if the console does not display all fields/values in your browser of choice.

2. Click **Configuration**, then **System Management Access**, and finally **SNMP**.
3. Ensure the following values are set:

```
State=Enabled
Port=161
Protocols=v1,v2c,v3
```

If you need to make changes, make sure you click **Save**.

4. Click **Alert Management**.

5. If not already listed, for each Agent that monitors the InfiniBand Switch target, select an empty alert (one that has the Destination Summary 0.0.0.0, snmp v1, community 'public') and click **Edit**. Provide the following values:

```
Level = Minor
Type = SNMP Trap
Address = [agent compute node hostname]
Destination Port = [agent port]
SNMP Version = v1
Community Name = public
```

Click **Save**.

6. Verify the InfiniBand Switch SNMP configuration for Enterprise Manager monitoring:

```
snmpget -v 1 -c <community_string> <hostname_of_IB_switch>
1.3.6.1.4.1.42.2.70.101.1.1.9.1.1.5
```

For example:

```
$ snmpget -v 1 -c public my_IB_switch.my_company.com
1.3.6.1.4.1.42.2.70.101.1.1.9.1.1.5
SNMPv2-SMI::enterprises.42.2.70.101.1.1.9.1.1.5 = INTEGER: 1
```

Note: If the Timeout message is displayed as a output for the above command, then it means that the InfiniBand Switch is not yet configured for SNMP.

Note: To remove the subscription, follow steps 1 to 5 above (step 3 is not needed). In step 5, set the Agent compute node host name to 0.0.0.0 and the port to 0.

4.3.1 Set Up SNMP for InfiniBand Switch Targets Using Enterprise Manager

You can set up SNMP for InfiniBand Switch targets using the Enterprise Manager Cloud Control console:

1. Navigate to the IB Network target (not the individual switches) and select Administration.
2. Select the **IB Switch** target type, then one of the IB Switch targets.
3. Select the **Setup SNMP Subscription** command, then select the management agent URL that monitors the InfiniBand switch target from the Agent URL list. Click **Next**.
4. Provide credentials for the InfiniBand switch. Click **Next**.
5. Review the details you provided. If there are no further changes, then click **Submit**.

Perform steps 1-5 for both the Monitoring Agent and Backup Monitoring Agent of the InfiniBand switch target.

4.4 Configure the Compute Node ILOM SNMP for Enterprise Manager Monitoring

Note: These instructions apply only for the Exadata Database Machine and are not applicable to the Oracle SuperCluster.

The compute node ILOM targets are responsible for displaying a number of disk failure alerts for their respective compute node that are received as SNMP traps. For Enterprise Manager to receive those traps, the

/opt/oracle.cellos/compmon/exadata_mon_hw_asr.pl script must be run to configure SNMP subscriptions for the agents (both primary and backup agents) that have been configured to monitor the compute node ILOM targets. This step is applicable to Exadata plug-in Release 12.1.0.2.0 and later.

The exadata_mon_hw_asr.pl script is run as the root user with the -set_snmp_subscribers parameter to add SNMP subscribers. For example:

```
# /opt/oracle.cellos/compmon/exadata_mon_hw_asr.pl -set_snmp_subscribers
" (host=hostname1.mycompany.com,port=3872,community=public,type=asr,fromip=11.222.33.444), (host=hostname2.mycompany.com,port=3872,community=public,type=asr,fromip=12.345.67.890) "
Try to add ASR destination Host - hostname1.mycompany.com IP - 11.222.33.44 Port - 3872 Community - public From IP - 22.333.44.555
Try to add ASR destination Host - hostname2.com IP - 11.111.11.111 Port - 3872 Community - public From IP - 22.333.44.555
```

The script needs to be run on each compute node:

- The host values should be the hostnames of the agents configured to monitor the compute node ILOM target associated with the compute node.
- The fromip values should be the IP address of the compute node that the compute node ILOM target is associated with.

For example, if you have an X2-2 machine with compute node targets edbm01db01 through edbm01db08 and associated compute node ILOM targets edbm01db01-c through edbm01db08-c, then you would need to run the script once on each compute node - therefore, the script would be run eight times in total.

- On compute node edbm01db01, the host and port values would be the hostnames and ports of the agents monitoring compute node ILOM target edbm01db01-c and the fromip value would be the IP address of the compute node itself, edbm01db01.
- On compute node edbm01db02, the host and port values would be the hostnames and ports of the agents monitoring compute node ILOM target edbm01db02-c and the 'fromip' value would be the IP address of the compute node itself, edbm01db02, ... and so on.

This is a good example of where Manual selection of Management Agents for targets is useful. If the first two compute nodes are always the Monitoring Agent and Backup Monitoring Agent, then it is easy to work out the values needed for -set_snmp_subscribers parameters, the host and port values would be the same for all compute nodes.

Important Note: The `exadata_mon_hw_asr.pl` script, overwrites any existing SNMP subscriptions. While setting the SNMP subscribers, make sure that current subscribers are included in the new list of subscribers.

It is possible to use the `exadata_mon_hw_asr.pl` script to get the current set of subscribers using the `-get_snmp_subscribers` parameter.

For example:

```
# /opt/oracle.cellos/compmon/exadata_mon_hw_asr.pl -get_snmp_subscribers -type=asr
```

Suppose the current list is:

```
(host=hostname1.mycompany.com,port=162,community=public,type=asr,fromip=11.222.33.444),
(host=hostname2.mycompany.com,port=162,community=public,type=asr,fromip=11.222.33.444)
```

Then new subscriptions can be added using the following command:

```
# /opt/oracle.cellos/compmon/exadata_mon_hw_asr.pl -set_snmp_subscribers

"(host=asrhostname1.mycompany.com,port=162,community=public,type=asr,fromip=11.222.33.444),
(host=asrhostname2.mycompany.com,port=162,community=public,type=asr,fromip=11.222.33.444),
(host=hostname1.mycompany.com,port=3872,community=public,type=asr,fromip=11.222.33.444),
(host=hostname2.mycompany.com,port=3872,community=public,type=asr,fromip=11.222.33.444)"
```

After adding the new subscribers, run the command `exadata_mon_hw_asr.pl` script with the `-get_snmp_subscribers` parameter to get the list of SNMP subscribers and verify the new SNMP subscriptions were added successfully. For example:

```
# /opt/oracle.cellos/compmon/exadata_mon_hw_asr.pl -get_snmp_subscribers -type=asr
(host=asrhostname1.mycompany.com,port=162,community=public,type=asr,fromip=10.10.10.226),
(host=asrhostname2.mycompany.com,port=162,community=public,type=asr,fromip=10.10.10.226),
(host=hostname1.mycompany.com,port=3872,community=public,type=asr,fromip=10.10.10.226),
(host=hostname2.mycompany.com,port=3872,community=public,type=asr,fromip=10.10.10.226)
```

4.4.1 Configure the Compute Node ILOM SNMP for Compute Nodes Running Management Server

For compute nodes running Management Server, the call to the `exadata_mon_hw_asr.pl` script is replaced with `dbmCLI` commands, which are similar to `cellCLI` commands on the Storage Cells.

Oracle Exadata Database Machine X5-2 runs the Management Server on compute nodes.

4.4.2 Configure SNMP Values Using dbmcli

1. Set the snmpSubscriber value:

```
# dbmcli -e "ALTER DBSERVER snmpSubscriber=((host=[agent1_
hostname],port=[agent1_port],community=public,type=asr),(host='agent2_
hostname',port=<agent's port>,type=asr))"
```

Where [host name] maps to the Enterprise Manager agents monitoring your compute node target.

2. Set the notificationMethod value:

```
# dbmcli -e "ALTER DBSERVER notificationMethod="mail,snmp",
notificationPolicy="critical,warning,clear", smtpFrom="admin",
smtpFromAddr=[sender email address], smtpPort=[port], smtpServer=[smtp server],
smtpToAddr=[recipient email address], smtpUseSSL=TRUE"
```

3. Verify the updates by executing:

```
# dbmcli -e "LIST DBSERVER attributes snmpSubscriber"
```

For Virtualized Exadata, these commands need to be executed in Dom0.

4.4.3 Configure SNMP for Oracle SuperCluster

1. Log in to the Oracle SuperCluster ILOM web interface, which is accessible via a browser using the url `http://<ilom_hostname>` and the root credentials.
2. Select **Configuration**, then **Alert Management**.
3. Add a row for each agent.
4. Select an empty slot and click **Edit**.
5. Specify the following information:
 - Level: **Minor**
 - Type: **SNMP Trap**
 - Address: IP Address of the Agent
 - Destination Port: Uncheck **Autoselect**, then specify Agent port manually
 - SNMP Version: **v1**
 - Community Name: {your chosen community name}
6. Click **Save**.

4.5 Verify Configuration for Oracle ILOM Server

To verify that Alerts can be successfully raised and cleared for the Oracle ILOM Server targets, perform the following steps:

1. Log in to the Enterprise Manager Cloud Control console as an administrator.
2. Click **Targets** and select **Exadata**. Select one of the Oracle ILOM Server targets using the Target Navigation pane.

The ILOM target page will be displayed, showing the current status of that target as well as any incidents that have been raised for it.

3. Raise an alert manually from the ILOM Server being validated. Run following command as root on the first database server in the cluster:

```
# ipmitool -I lan -H sclczdb01-c -U oemuser -P oempasswd -L OPERATOR event
PS0/VINOK deassert
```

The output will be similar to:

```
Finding sensor PS0/VINOK... ok
0 | Pre-Init Time-stamp | Power Supply #0x65 | State Deasserted
```

After running the above command, wait a few minutes then refresh the ILOM target page. An incident should appear in the Incidents section.

4. Clear the alert raised in step 3. Run the following command as root on the first database server in the cluster:

```
# ipmitool -I lan -H sclczdb01-c -U oemuser -P oempasswd -L OPERATOR event
PS0/VINOK assert
```

The output will be similar to:

```
Finding sensor PS0/VINOK... ok
0 | Pre-Init Time-stamp | Power Supply #0x65 | State Asserted
```

After running the above command, wait a few minutes then refresh the ILOM target page. The incident that was raised in step 3 should show as cleared in the Incidents section.

Note: Do not forget to clear the alert raised in step 3, as it was raised for testing only and did not reflect a true fault condition!

5. Repeat for the remaining configured ILOM service processors in your Oracle Database Machine.

4.6 Set Up SNMP for Cisco Ethernet Switch Targets

The Cisco Ethernet Switch must be configured to allow the Agents that monitor it to be able to both poll the switch and to receive SNMP alerts from the switch. To allow this, perform the following steps (swapping the example switch name `dm01sw-ip` with the name of the Cisco Ethernet Switch target being configured):

1. Log in to the Cisco switch and enter Configure mode:

```
# ssh cisco-switch-host -l <admin user>
User Access Verification Password:
dm01sw-ip> enable
Password:
dm01sw-ip# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
dm01sw-ip(config)#
```

2. Enable access to allow the Agents monitoring Cisco Switch target to poll the switch.

In the command, `[EMagentIPAddr]` is the IP address of the server where the Enterprise Manager Agent is running. The SNMP community specified must match the value provided when configuring the Cisco Switch target:

```
dm01sw-ip(config)# access-list 1 permit [EMagentIPAddr]
dm01sw-ip(config)# snmp-server community <community_string> ro 1
```

3. Set the monitoring Agent as the location where SNMP traps are delivered. The SNMP community specified must match the value provided during Enterprise Manager Cisco Switch Management Plug-In setup:

```
dm01sw-ip(config)# snmp-server host <EMagentIPAddr> version 1 <community string> udp-port [EMagentRecvltListenPort]
```

Where [EMagentRecvltListenPort] is the EMD_URL port of the emagent or SnmpRecvletListenNIC property value if it is enabled.

4. Configure the Cisco Switch to send only environmental monitor SNMP traps:

```
dm01sw-ip(config)# snmp-server enable traps envmon
```

5. Verify settings and save the configuration:

```
dm01sw-ip(config)# end
dm01sw-ip# show running-config
dm01sw-ip# copy running-config startup-config
```

4.6.1 Verify the Cisco Ethernet Switch SNMP Configuration

Run the `snmpwalk` command line utility or equivalent tool to verify the Cisco Switch configuration.

Run the following commands to fetch and display the data from the Cisco switch:

```
$ snmpget -v 1 -c <community_string> <hostname_of_cisco_switch>
1.3.6.1.4.1.9.2.1.56.0
$ snmpget -v 2c -c <community_string> <hostname_of_cisco_switch>
1.3.6.1.4.1.9.2.1.56.0
```

Note: If a timeout message is displayed as an output for the above command, then it means that the Cisco Switch is not yet configured correctly.

4.7 Set Up SNMP for Power Distribution Unit (PDU) Targets

To enable Enterprise Manager to collect metric data and raise events for the PDU target, you must configure the PDU to accept SNMP queries from the Agents that monitor the PDU target. Also, appropriate threshold values for different phase values needs to be set on the PDU.

This section assumes that this is a first time configuration of the PDU. SNMP must be enabled and the trap section completed. Granting SNMP access to a different monitoring Agent IP address is an example where only the "Trap Host Setup" section needs to be changed.

1. Log in to the PDU network interface through a browser at `http://<pdu-name>`, for example: `http://edbm01-pdu1.example.com`
2. Click **Net Configuration**, then log in again.
3. Scroll down until you reach the SNMP section of the frame.

Note: The network interface for the PDU is a frame within a window. In order to scroll down on this page, you must see the scroll bar for the PDU frame as well as the outside scroll bar for the browser in which you accessed the PDU.

4. If your PDU is not SNMP-enabled, select the **SNMP Enable** check box, then click **Submit**.
5. Scroll to the NMS region of the frame.
6. Enter the following in Row 1 under NMS:
 - IP: Enter the **IP address** of the first monitoring Agent
 - Community: Enter **"public"**
7. Click **Submit**.

For details on configuring the PDU thresholds settings, see the "Configuring Oracle Exadata Database Machine" chapter in your *Exadata Database Machine Owner's Guide*. This guide is pre-loaded along with other Exadata user documentation onto your Oracle Exadata Database Machine.

4.7.1 Verify the PDU SNMP Configuration

Use the `snmpwalk` command line utility or equivalent tool to verify the PDU configuration.

Run the following command to fetch and display the data from PDU:

```
snmpget -v 1 -c <community_string> <hostname_of_pdu>
1.3.6.1.4.1.2769.1.2.3.1.1.1.0
```

Note: If a timeout message is displayed as an output for the above command, then it means that the PDU is not yet configured correctly.

4.8 Set Up SNMP for KVM Targets

The KVM needs to be configured to send SNMP traps to the Agents that monitor it. See the following sections to set up SNMP for KVM targets:

- [Set Up SNMP in KVM Management Console](#)
- [Verify the KVM SNMP Configuration \(Base SNMP Configuration\) - Linux](#)
- [Verify the KVM SNMP Configuration \(Base SNMP Configuration\) - Solaris](#)
- [Verify the KVM SNMP Configuration \(SNMP Forwarding to Agent\)](#)

Note: The SNMP forwarder setup described in [Set Up SNMP Trap Forwarding on Compute Node](#) is required on the compute node agent that monitors the KVM target. If the SNMP forwarder is not set up, the agent will not receive traps from the KVM device.

4.8.1 Set Up SNMP in KVM Management Console

Configure the KVM to send traps to the monitoring agent host:

1. Log in to the KVM management console through a browser at:

`https://<kvm-name>`

For example:

`https://edbm01sw-kvm.example.com`

2. Click **SNMP** under Target Devices in the left-hand navigation bar.
3. Select the **Enable SNMP** check box and enter the appropriate community name in the Read, Write, and Trap fields (for example, enter "**public**").
4. Click **Save**.
5. Click **Destinations** under SNMP in the left-hand navigation bar.
6. Enter the IP address of the Agent monitoring the KVM target.
7. Click **Save**.

The traps from the KVM device will be sent to UDP port 162 on the monitoring agent host. Refer to [Set Up SNMP Trap Forwarding on Compute Node](#) for details to set up the trap forwarder to forward traps received on port 162 to the Enterprise Manager agent receivelet port.

4.8.2 Verify the KVM SNMP Configuration (Base SNMP Configuration) - Linux

Run the `snmptrapd` command line utility to verify the KVM configuration. Make sure that the steps outlined in [Set Up SNMP Trap Forwarding on Compute Node](#) has been performed.

Follow the steps below on the monitoring agent host for the KVM target:

1. Log in as root.
2. Run the following command:

```
# service snmptrapd stop
# /usr/sbin/snmptrapd -d -Lsd -p /var/run/snmptrapd.pid
```
3. Reboot the KVM to generate SNMP traps. To reboot the KVM:
 - a. Log in to the KVM.
 - b. Click **Overview** on the left side of the screen under Unit View, Appliance.
 - c. Click **Reboot**.
 - d. In the confirmation window, click **OK** to confirm KVM reboot.
4. Check that `snmptrapd` logs messages in the `/var/log/messages` file from the IP address of the KVM. The following example shows the messages for the KVM's IP address (10.1.1.240):

```
Jul 30 14:51:05 dbmlb02 snmptrapd[65800]: Received 72 bytes from UDP:
[10.1.1.240]:32768
.
Jul 30 14:51:05 dbmlb02 snmptrapd[65800]: 0000: 30 82 00 44 02 01 00 04 06
70 75 62 6C 69 63 A4 0..D....public.
.
Jul 30 14:51:05 dbmlb02 snmptrapd[65800]: 0016: 82 00 35 06 09 2B 06 01 04
01 D1 32 12 01 40 04 ..5..+.....2..@.
.
Jul 30 14:51:05 dbmlb02 snmptrapd[65800]: 0032: 0A F5 13 F0 02 01 06 02 01
02 43 03 6D 19 4C 30 .....C.m.L0
.
Jul 30 14:51:05 dbmlb02 snmptrapd[65800]: 0048: 82 00 15 30 13 06 0B 2B 06
01 04 01 D1 32 12 02 ...0...+.....2..
.
Jul 30 14:51:05 dbmlb02 snmptrapd[65800]: 0064: 06 01 04 04 72 6F 6F 74
....root
.
```



```
Jul 30 14:51:05 dbmldb02 snmptrapd[65800]:
```

5. If step 4 is confirmed, the KVM has been configured correctly. Run the following commands:

```
# service snmptrapd stop
# service snmptrapd start
```

4.8.3 Verify the KVM SNMP Configuration (Base SNMP Configuration) - Solaris

Run the `snmptrapd` command line utility to verify the KVM configuration. Make sure that the steps outlined in [Set Up Compute Node Agent - Solaris](#) have been performed.

Follow the steps below on the monitoring agent host for the KVM target:

1. Log in as root and run the following command:

```
# svcadm disable snmptrapd
# /usr/sbin/snmptrapd -d -Lsd -p /var/run/snmptrapd.pid
```

2. Reboot the KVM to generate SNMP traps. To reboot the KVM:

- a. Log in to the KVM.
- b. Click **Overview** on the left side of the screen under Unit View, Appliance.
- c. Click **Reboot**.
- d. In the confirmation window, click **OK** to confirm KVM reboot.

3. Check that the `snmptrapd` daemon logs messages in the `/var/log/messages` file from the IP address of the KVM. The following example shows the messages for the KVM's IP address (10.1.1.240):

```
Jul 30 14:51:05 dbmldb02 snmptrapd[65800]: Received 72 bytes from UDP:
[10.1.1.240]:32768
```

```
Jul 30 14:51:05 dbmldb02 snmptrapd[65800]: 0000: 30 82 00 44 02 01 00 04 06 70
75 62 6C 69 63 A4 0..D.....public.
```

```
Jul 30 14:51:05 dbmldb02 snmptrapd[65800]: 0016: 82 00 35 06 09 2B 06 01 04 01
D1 32 12 01 40 04 ..5..+.....2..@.
```

```
Jul 30 14:51:05 dbmldb02 snmptrapd[65800]: 0032: 0A F5 13 F0 02 01 06 02 01 02
43 03 6D 19 4C 30 .....C.m.L0
```

```
Jul 30 14:51:05 dbmldb02 snmptrapd[65800]: 0048: 82 00 15 30 13 06 0B 2B 06 01
04 01 D1 32 12 02 ...0...+.....2..
```

```
Jul 30 14:51:05 dbmldb02 snmptrapd[65800]: 0064: 06 01 04 04 72 6F 6F 74
....root
```

```
Jul 30 14:51:05 dbmldb02 snmptrapd[65800]:
```

4. If step 3 is confirmed, the KVM has been configured correctly. Stop the `snmptrapd` process currently running:

```
# ps -ef | grep snmptrapd
# kill -9 <snmptrapd process ID>
```

5. Start the `snmptrapd` daemon:

```
# svcadm enable snmptrapd
```

4.8.4 Verify the KVM SNMP Configuration (SNMP Forwarding to Agent)

After performing the steps in [Verify the KVM SNMP Configuration \(Base SNMP Configuration\) - Linux](#) or [Verify the KVM SNMP Configuration \(Base SNMP Configuration\) - Solaris](#), follow the steps below to validate that the monitoring Agent can receive the SNMP traps generated by the KVM and convert the received traps to Enterprise Manager events.

1. In the Enterprise Manager Cloud Control console, go to the KVM target page.
2. In the Targets menu, select **Monitoring**, then **Alert History**.
You should see an entry for *Reboot Started Status* in the Alert History table.
3. In the Alert History table, click **Reboot Started Status**. You should see the following warning alert with the message:

The appliance is rebooting. Command issued by user root.

4.9 Oracle Exadata Database Machine Dashboard Creation

You can create a Database Machine dashboard to monitor the performance and usage metrics of the Database Machine system, its sub-components, as well as all the database system components residing on the Database Machine.

- [Dashboard Creation for Exadata Database Machine Plug-in Release 12.1.0.3.0 and Later](#)
- [How to Make the Report "Public"](#)
- [Find All Database Machine Reports](#)

4.9.1 Dashboard Creation for Exadata Database Machine Plug-in Release 12.1.0.3.0 and Later

For Exadata Database Machine plug-in Release 12.1.0.3.0 and later, create the Database Machine Dashboard:

1. Log in to Enterprise Manager.
2. From the Enterprise Manager home page, click the **Enterprise** menu. Select the **Job** submenu, then **Activity**.
3. Select **Database Machine Services Dashboard** from the drop-down menu next to the Create Job option.
4. Click **Go**.
5. Enter a name of the job (for example, `CREATE_DBM_JOB_1`).
6. Click **Add** and select the **DBMachine** target. After adding, make sure the target is selected by clicking on the check box next to it.
7. Click the **Parameters** tab.

Three options are provided through the drop-down:

- Select **Create** if it is a new report.
 - Select **Update** for updating an existing report with new components.
 - Select **Cleanup** to remove services created by the Create job executed earlier.
8. Finally, click **Submit** to perform the operation.

A message `CREATE_DBM_JOB_1 submitted successfully` should display.

You can monitor the job by clicking on the link corresponding to the job.

4.9.2 How to Make the Report "Public"

The generated report is accessible only by the Enterprise Manager user who creates it. To make the report public:

1. Select the dashboard report from the list of reports shown after following the steps mentioned above.
2. Click **Edit**.
3. Select the **Run report using target privileges of the report owner** option under Privileges section in General tab.
4. Click the **Access** tab.
5. Select the **Allow viewing without logging in to Enterprise Manager** option.
6. Click **OK**.

4.9.3 Find All Database Machine Reports

To find all Database Machine reports:

1. Log in to Enterprise Manager.
2. From the Enterprise Manager home page, click the **Enterprise** menu. Select **Reports**, then **Information Publisher Reports**.
3. Search for the report name. Dashboard report names, one for each Database Machine, are displayed in the following format:
`[DBMachine Name]_DASHBOARD_REPORT`
4. Click on the report to view the dashboard report.

Oracle Exadata Database Machine Administration

This chapter provides the information needed to administer your Oracle Exadata Database Machine through Oracle Enterprise Manager Cloud Control 13c. The following topics are discussed:

- [Creating Roles to Manage the Plug-in](#)
- [View Exadata Database Machine Topology](#)
- [Exadata Cell Metrics and Alert Settings](#)
- [Exadata Storage Server Management](#)
- [Managing the InfiniBand Network](#)
- [Flash Cache Resource Monitoring](#)
- [Exadata Database Machine Fault Monitoring](#)
- [Monitoring Exadata Database Machine Components](#)
- [Using the Conversion Wizard to Convert 12c Targets to 13c Targets](#)

5.1 Creating Roles to Manage the Plug-in

To manage the plug-in, you need to create roles and administrators, and then assign roles to administrators. This restricts the privileges that each user has, for example in deleting the plug-in or accessing reports.

Note: For security reasons, Oracle recommends that the `SYSMAN` account be used only as a template to create other accounts, and not used directly.

To create roles to provide management rights to users:

1. Log in to the Enterprise Manager Cloud Control as the super administrator user.
2. Click **Setup**, then **Security**.
3. Select **Roles**.

On the Security page, a list of predefined roles is provided. These roles can serve as basis to define custom roles to suite specific site level requirements.

Note: The predefined roles provided cannot be edited or deleted.

4. Select a role that closely matches the role you wish to create. Click **Create Like**.
5. On the Properties page, enter a name for the role you wish to create. You can optionally add a description.
Click **Next**.
6. On the Roles page, select the roles from the list of Available Roles. Click **Move** to add the role to Selected Roles.
Click **Next**.
7. On the Target Privileges page, select the privilege you want to grant to the new role.
Click **Next**.
8. On the Resource Privileges page, you can edit specific privileges to be explicitly granted. Click the **Manage Privilege Grant** edit icon to make the changes.
Click **Next**.
9. On the Administrators page, select the administrators from the list of Available Administrators that you want to grant the new role to. Click **Move** to add the administrator to Selected Administrators.
Click **Next**.
10. On the Review page, a complete summary of the new role you have created is displayed. Click **Back** to go to previous screens to make changes. Click **Finish** to complete the role creation.

When the newly created administrator logs in, unlike `SYSMAN`, the administrator is restricted by the privileges set.

Note: For more information and details, see the *Working with Systems Infrastructure Targets* chapter of the *Oracle® Enterprise Manager Cloud Control Administrator's Guide*.

5.2 View Exadata Database Machine Topology

Database Machine management simplifies monitoring and managing tasks by integrating all hardware and software components into one entity. You do not need to monitor each target individually, but instead you can view the whole Exadata Database Machine as a single target. You can view all critical issues in the system, monitor performance, and drill down to individual targets from the Database Machine target home page.

The following topology topics are presented in this section:

- [Drilling Down to Individual Targets](#)
- [Viewing Critical Hardware Information for the Database Machine](#)
- [Viewing DB Machine Alerts](#)
- [Viewing Metrics](#)
- [Adding Exadata Components Manually](#)
- [Removing an Exadata Database Machine Target](#)
- [Deleting a Component of a Database Machine Target](#)
- [Updating the Exadata Database Machine Schematic Diagram](#)

Use the Topology page of Database Machine to view the topology of the system by Cluster or by Database. Clusters are a complete software system starting with a RAC database, the underlying ASM, and CRS. Clusters define one logical entity that is interconnected. The Database Machine could include several clusters, one cluster, or could just be a number of individual databases. While cabinets define the hardware topology of the Database Machine, clusters define the logical or system topology of the Database Machine.

You can view the Topology by Cluster or Database. Click an element in the Topology and view alert data associated with the element.

You can monitor all components of the Database Machine. Database Machine monitors all subcomponent targets, whether hardware or software. This includes the database, ASM, CRS, hosts, Exadata and the InfiniBand network.

To view the topology of an existing Database Machine target:

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

Enterprise Manager displays the Oracle Exadata Database Machines page showing all the available Database Machine targets. From this page, you can add hardware components (such as Oracle Exadata Storage Servers, InfiniBand switches, Ethernet Switches, KVM switches, PDU, and compute node ILOM) in the Oracle Database Machine as managed targets.

2. From the Oracle Exadata Database Machines page, select the Oracle Database Machine target whose topology you want to view.
3. From the Oracle Database Machine Home page, click the **Database Machine** menu, then select **Members Topology** from the drop-down menu.

Enterprise Manager Cloud Control displays the Configuration Topology page.

5.2.1 Drilling Down to Individual Targets

You can drill down immediately to a subcomponent target of the Database Machine (such as RAC, a database instance, or an Exadata cell).

To drill down to individual targets:

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

Enterprise Manager displays the Oracle Exadata Database Machines page showing all the available Database Machine targets.

2. From the Oracle Exadata Database Machines page, select the Oracle Database Machine target whose components you want to view.

Enterprise Manager displays the Oracle Database Machine Home page showing an Overview, Schematic, and Incident section for the selected Database Machine.

3. From the Oracle Database Machine Home page, use the left navigation panel to expand the list of available targets that comprise the Database Machine.
4. Click the target to which you want to drill down.

5.2.2 Viewing Critical Hardware Information for the Database Machine

You can view critical metrics for all the hardware subcomponents of the Database Machine such as DB hosts, Exadata Storage Servers, InfiniBand switches and so on. These metrics vary for different component targets. For example, database server nodes and Exadata servers include the CPU, I/O, and storage metrics.

To view critical hardware-centric information for the entire Database machine:

1. From the **Targets** menu, select **Exadata**.
Enterprise Manager displays the Oracle Exadata Database Machines page showing all the available DB Machine targets.
2. From the Oracle Exadata Database Machines page, select the Oracle Database Machine target whose hardware information you want to view.
3. From the Oracle Database Machine Home page, view the hardware schematic of the Database Machine.

5.2.3 Viewing DB Machine Alerts

You can view alerts on the Database Machine and drill down to details about each alert. These alerts may be performance/configuration metrics or hardware faults.

To view Database Machine alerts:

1. From the **Targets** menu, select **Exadata**.
Enterprise Manager displays the Oracle Exadata Database Machines page showing all the available DB Machine targets.
2. From the Oracle Exadata Database Machines page, select the Oracle Database Machine target whose machine configuration information you want to view.
Enterprise Manager displays the Oracle Database Machine home page on which you can see all alerts associated with the current DB Machine.

5.2.4 Viewing Metrics

To view the Exadata metrics:

1. Navigate to the Exadata Cell home page by choosing the Exadata target from the All Targets page of Enterprise Manager.
Enterprise Manager displays the Exadata Cell Home page for the target you selected.
2. From the Exadata Storage Server drop-down menu, choose **Monitoring** and then **All Metrics**.

The All Metrics page appears where you can a wide variety of Exadata metrics. For a complete description of the Exadata metrics available, see the "Oracle Exadata" chapter of the *Oracle® Enterprise Manager Oracle Database and Database-Related Metric Reference Manual*:

http://docs.oracle.com/cd/E24628_01/em.121/e25160/oracle_exadata.htm

5.2.5 Adding Exadata Components Manually

You can add Exadata components manually using the following steps:

1. From the **Setup** menu, select **Add Target**, then select **Add Targets Manually**.
Enterprise Manager displays the Add Targets Manually page where you can choose the type of target you want to add.
2. From the Add Targets Manually section, choose **Add Non-Host Targets by Specifying Target Monitoring Properties**.

3. In the **Target Type** combo box, choose the appropriate target type, for example, KVM for kvm, PDU for pdu, Cisco switch for Cisco, and Oracle ILOM Server for ilom plug-in).
4. Choose the monitoring agent using the search option.
5. Click **Add Manually** and provide the required properties

5.2.6 Removing an Exadata Database Machine Target

To delete an Exadata Database Machine target, you have the choice to:

- Remove all members of the Oracle Exadata Database Machine. If the member target is shared with another Database Machine target, then the member target will not be deleted and will continue to be monitored. In other words, the member targets will be deleted if they are associated with only this Database Machine target.
- Remove only system members of the Oracle Exadata Database Machine. The other member targets will not be deleted and will continue to be monitored. They can be associated to another Oracle Exadata Database Machine, if required.

To remove an Exadata Database Machine target:

1. From the Database Machine target menu, select **Target Setup**, then select **Remove Target**.
2. On the Remove page, select whether to remove all members or to remove only the system members.

If you choose to remove all members, then you also have an additional option to unsubscribe SNMP subscriptions for member Exadata Storage Servers and Infiniband Switches. Specify the appropriate user credentials to unsubscribe the SNMP subscriptions.

3. Click **Yes** to initiate the remove job.

Note: Host targets for the compute nodes and any targets that are also member targets of another Oracle Exadata Database Machine target will not be removed. System and non-system targets include:

System Targets:

- Oracle Exadata Database Machine
- Oracle Infiniband Network (*Enterprise Manager 12c target*)
- Oracle Exadata Storage Server Grid

Non-System Targets:

- Oracle Exadata Storage Server
 - Oracle Exadata KVM
 - Systems Infrastructure Switch
 - Systems Infrastructure PDU
 - Systems Infrastructure Rack
 - Oracle Infiniband Switch (*Enterprise Manager 12c target*)
 - Oracle Engineered System Cisco Switch (*Enterprise Manager 12c target*)
 - Oracle Engineered System PDU (*Enterprise Manager 12c target*)
 - Oracle Engineered System ILOM Server (*Enterprise Manager 12c target*)
-

5.2.7 Deleting a Component of a Database Machine Target

If you need to remove a component of an Exadata Database Machine target, you can perform this task within Enterprise Manager Cloud Control 13c:

1. From the DB Machine home page's Target Navigation pane, right-click on the target item you wish to remove. You may need to expand the Exadata Grid item to view all of the available cells.
2. Select **Target Setup**, then **Remove Target**.
3. A warning page will display to confirm the target deletion. Click **Yes** to continue.

5.2.8 Updating the Exadata Database Machine Schematic Diagram

In some cases, the Exadata Database Machine schematic diagram is not displaying the components correctly. For example:

- You may have successfully discovered the Exadata Database Machine, but some components are not displaying correctly in the Exadata schematic diagram. Instead, an empty slot is shown in place of the component.
- The Exadata Database Machine schematic diagram shows the status of the component as "red/down" where as individual components would really show that they are up and running fine.
- You want to re-locate or rearrange the order of the components in the slots of Exadata Database Machine schematic diagram.

To accomplish these tasks, you will need to drop a component from the schematic diagram and add the correct one:

- [Drop a Component from the Exadata Database Machine Schematic Diagram](#)
- [Add Components to the Exadata Database Machine Schematic Diagram](#)

5.2.8.1 Drop a Component from the Exadata Database Machine Schematic Diagram

To drop a component from the Exadata Database Machine schematic diagram:

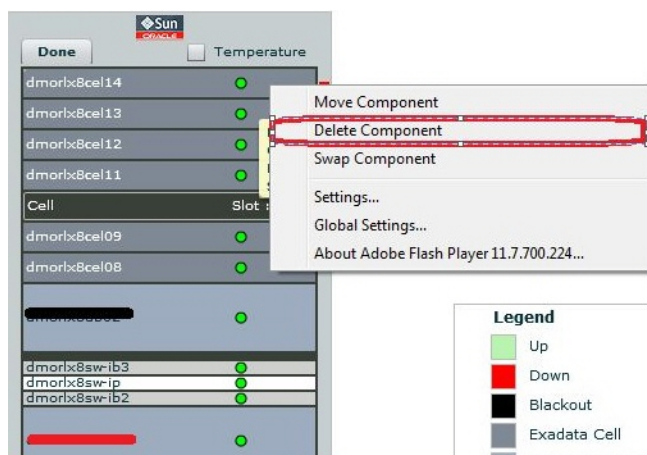
1. From the Targets menu, select **Exadata**.
2. On the Exadata Database Machine schematic diagram, click **Edit** as shown in [Figure 5-1](#):

Figure 5-1 Schematic Diagram Edit Button

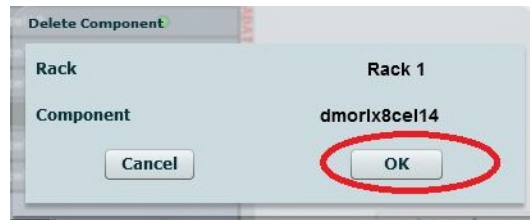


3. Right-click on the component you want to drop. In the pop-up window, select **Delete Component** as shown in [Figure 5-2](#):

Figure 5-2 Delete Component



4. Ensure you have selected the correct component in pop-up shown and click OK as shown in [Figure 5-3](#):

Figure 5–3 Confirm Delete

5. The Exadata Database Machine schematic diagram will refresh to show the empty slot, as shown in [Figure 5–4](#):

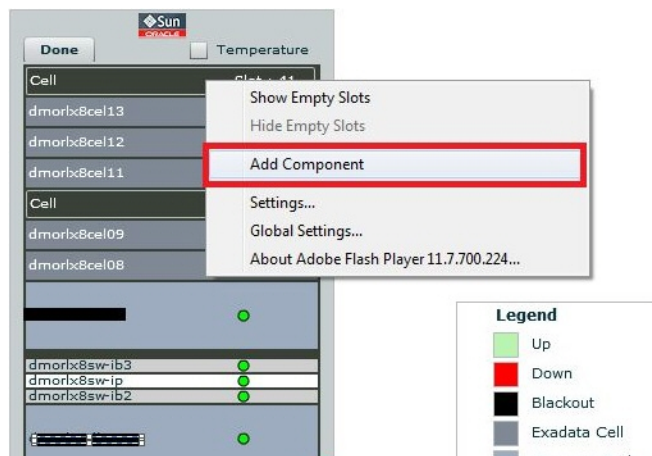
Figure 5–4 Refreshed Schematic Diagram with Empty Slot

6. Once you see the component deleted in the slot you specify, click **Done** on the Exadata Database Machine schematic diagram.

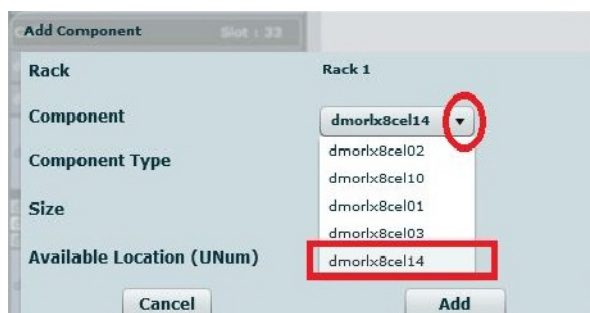
5.2.8.2 Add Components to the Exadata Database Machine Schematic Diagram

To add a component from the Exadata Database Machine schematic diagram:

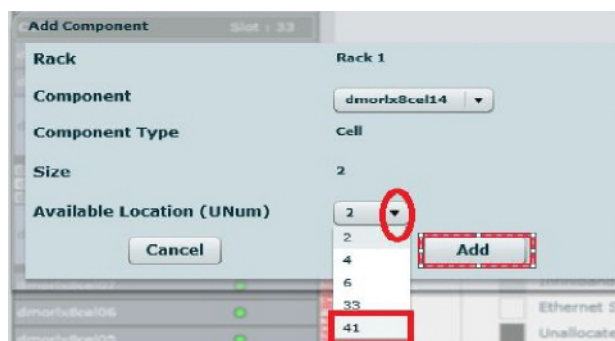
1. From the Targets menu, select **Exadata**.
2. On the Exadata Database Machine schematic diagram, click **Edit**.
3. Right-click on the empty slot for the component you want to add. In the pop-up window, select **Add Component** as shown in [Figure 5–5](#):

Figure 5-5 Add Component

4. If there are multiple components to be added to schematic diagram, select the correct component from the **Component** drop-down menu, as shown in [Figure 5-6](#):

Figure 5-6 Add Multiple Components

Also select the correct slot number in **Available Location (Unum)** drop-down menu, as shown in [Figure 5-7](#):


Figure 5-7 Available Location

Click **Add**.

5. Once you see the component added in the slot you specify, click **Done** on the Exadata Database Machine schematic diagram.

5.3 Exadata Cell Metrics and Alert Settings

To access the settings for Exadata Cell metrics/alert:

1. From the Enterprise Manager home page, select **Targets**, then **Exadata**. Select an Exadata Storage Server from the list.
2. From the Exadata Storage Server menu, click **Monitoring**, then **All Metrics** to display all editable metric alert setting.
3. To change a setting, click **Monitoring**, then **Metric and Collection Settings** from the Exadata Storage Server menu. The default View option "Metrics with thresholds" is displayed. You can modify the following parameters:
 - Warning Threshold
 - Collection Schedule - click the link to set a collection schedule.
 - Click the Edit icon  for advanced settings.
4. Click **OK** to save any changes.

5.4 Exadata Storage Server Management

This section provides introductory instructions for managing Exadata Storage Servers. The following topics are presented:

- [About Exadata Storage Server](#)
- [Using Exadata As a Cloud Control Target](#)
- [Viewing an Exadata Storage Server Configuration](#)
- [Performing Administration Tasks on Exadata Storage Servers](#)
- [Managing the IO Resource](#)
- [Diagnosing Exadata Cell Alerts](#)
- [Accessing Oracle Support Workbench for Exadata Storage Server](#)
- [Deleting a Component of a Database Machine Target](#)

5.4.1 About Exadata Storage Server

An Exadata Storage Server is a network-accessible storage array with Exadata software installed on it. Use the Exadata Home page to manage and monitor the Oracle Exadata Storage Server (also known as Exadata cell) by managing it as an Enterprise Manager Cloud Control target. You can discover and consolidate management, monitoring and administration of a single or a group of Oracle Exadata Storage Servers in a datacenter using Enterprise Manager.

Exadata Storage Servers can be discovered automatically or manually. Once discovered, you can add them as Enterprise Manager targets. The individual Exadata Storage Server is monitored and managed as an Enterprise Manager target and provides the exception, configuration and performance information.

Grouping of Exadata Storage Servers is used for easy management and monitoring of the set of Storage Servers. You can group them both manually and automatically. The grouping function provides an aggregation of exceptions, configuration and performance information of the group of cells.

You can view performance analysis by linking Exadata performance both at a cell level and group level to ASM and database performance. You can drill down to Exadata configuration and performance issues from both the database and ASM targets.

Storage Grid (for example, multiple database/ASM instances sharing the same Exadata Storage Server) is supported to the same extent as dedicated storage.

5.4.2 Using Exadata As a Cloud Control Target

Use Oracle Exadata to manage and monitor the Oracle Exadata Storage Server (also known as Exadata cell) by managing the Exadata cells as Enterprise Manager Cloud Control targets. You can discover and consolidate management, monitoring and administration of a single or a group of Oracle Exadata Storage Servers in a datacenter using Enterprise Manager.

Exadata cells can be discovered automatically or manually. Once discovered, you can add the Exadata cells as Enterprise Manager targets.

The individual Exadata cell is monitored and managed as an Enterprise Manager target and provides the exception, configuration and performance information.

Grouping of Exadata cells is used for easy management and monitoring of the set of Exadata cells. You can group Exadata cells both manually and automatically. The grouping function provides an aggregation of exceptions, configuration and performance information of the group of cells.

You can view performance analysis by linking Exadata performance both at a cell level and group level to ASM and database performance. You can drill down to Exadata configuration and performance issues from both the database and ASM targets.

5.4.3 Viewing an Exadata Storage Server Configuration

You can view the configuration of an Oracle Exadata Storage Server target by following the steps below:

1. Navigate to the Exadata Storage Server home page by choosing the Exadata target for which you want to view the IORM Performance page from the All Targets page.

Enterprise Manager displays the Exadata Storage Server Home page for the target you selected.

2. From the Target menu, choose **Configuration** and then **Topology**.

Enterprise Manager displays the Configuration Topology page for the selected Exadata Storage Server. The topology page provides a visual layout of a the target's relationships with other targets. From this page you can:

- Do a target search filtered by target status/events/target type)
- Select from a set of relationships to represent in the graph
- Select annotations to display in the graph, such as alerts and link labels
- Select from a set of options: view navigator, expand or collapse all, toggle graph layout, reload topology
- Print
- Zoom via the slide control
- Pan via the navigator control
- Toggle the presentation from graph to table

When you hover over a node or group member, a popup displays detailed information about the entity. A link can appear in the popup to more detailed information such as customer documentation.

5.4.4 Performing Administration Tasks on Exadata Storage Servers

To perform an administration operation on an Exadata Storage Server, such as executing a cell command, follow these steps:

1. Navigate to the Exadata Storage Server home page by choosing the Exadata target for which you want to perform an administrative task from the All Targets page.

Enterprise Manager displays the Exadata Storage Server Home page for the target you selected.

2. Click **Target**, then select **Administration**.

From this menu you can choose either **Execute Cell Command**, **Support Workbench**, or **Manage IO Resource**.

3. Click **Execute Cell Command**.

The Command page of the Exadata Storage Server Administration wizard appears. Enter a CELLCLI command as the administrative command to be executed on the cell. You must read the Command Instructions before you enter a command. Only a single CELLCLI command is allowed to execute. You must enter the command without the `cellcli -e` prefix, which is automatically appended when you submit the command. Finally, you cannot use the following characters: `; / ' < > / | .`

4. Click **Next** to continue.

Enterprise Manager displays the Admin Credentials page. Select or enter the Administration credentials to execute the command. The credentials you enter are used when submitting the operation. You can choose between Preferred Credentials, Named Credentials, and New Credentials. You can also click **More Details** to view information about Credential Type, Last modified, Credential Name, Credential Owner, Last Modified Date, Last Modified By, and Preferred Credentials Set At.

5. Click **Next**.

Enterprise Manager displays the Schedule page. Use the Schedule page to schedule the administration task. Enter the Job Name and the Job Description, then provide the job information in the Schedule the Administration Job section. You can choose to begin the job immediately or enter the time you want the job to begin.

6. Click **Next** to continue.

The Summary page displays. Use the Summary page to ensure you have entered the correct values and then submit the command. The Summary page lists the Job Name, Description, Command to Execute, when the job is Scheduled, and the Selected Cell.

7. Click **Submit Command** to submit the job.

The Job Status page displays. Use the Job Status page to link to the Job Detail page of the administration task.

5.4.5 Managing the IO Resource

Oracle Exadata Database Machine Cells are added as targets during the database machine discovery workflow (see [Chapter 3, "Exadata Database Machine Discovery"](#)) and are grouped automatically under the group **Exadata Storage Server Grid**.

To access the IORM Performance page:

1. Select an Exadata Storage Server cell. One way to select the cell:
 - a. From the Targets menu, select **Exadata**.
 - b. Select a DB Machine from the list of Target Names.
 - c. In the Target Navigation pane, expand the Exadata Grid item and click one of the cells.
2. Once you have selected an Exadata Storage Server cell, click the **Exadata Storage Server** menu, select **Administration**, then **Manage IO Resource**.

Once you have accessed the IORM page, you can make the following modifications:

- [Add/Update IORM Configuration](#)
- [The Inter-Database Plan](#)

The IORM Monitoring section of the page provides a view of the performance statistics of Disk IO (Wait, IOPS, MBPS, Utilization, Latency, and Objective charts). These statistics help to identify which databases and consumer groups are using the available resources. They also help to adjust the IORM configuration (using IORM Settings section on the same page) as needed.

For further details on managing I/O resources, refer to the *Managing I/O Resources* chapter in the *Oracle® Exadata Storage Server Software User's Guide*.

5.4.5.1 Add/Update IORM Configuration

To update the I/O Resource Manager (IORM) settings (for Exadata Storage Server software release 12.1.2.1.0 and later):

1. Navigate to the IORM Performance page as described above. [Figure 5–8](#) shows the I/O Resource Manager (IORM) Settings pane.

Figure 5–8 I/O Resource Manager (IORM) Settings

I/O Resource Manager (IORM) Settings
I/O Resource Manager controls how databases utilize the disks and flash cache, based on the settings specified here.

Status: Active Disk I/O Objective: Basic

☒ Share based Inter-Database Plan: ☐ Percentage based Basic Plan

Inter-database plan is not configured on the cell

Directives:

Database Name	Hard Disk I/O Utilization Limit	Database I/O Share	Flash Cache	
			Min Size (MB)	Max Size (MB)
asm				

☒ Database I/O share among the database applies to both hard disk and flash cache usage.

Note: You can also update a single cell. Expand the Exadata Grid group to view all cells associated with the group. Click the cell you want to update.

The steps to update the IORM settings is the same for a single cell or group of cells.

2. From the Database Name column, select a database from the drop-down menu.
3. Enter a value for the Hard Disk I/O Utilization Limit column.
4. Enter a value for the Database I/O Share column.
5. Enter minimum and maximum values (in MB) for the Flash Cache column.
6. In the Disk I/O Objective drop-down menu, select an objective from the list (**Auto** is the default):
 - **Low Latency** - Use this setting for critical OLTP workloads that require extremely good disk latency. This setting provides the lowest possible latency by significantly limiting disk utilization.
 - **Balanced** - Use this setting for critical OLTP and DSS workloads. This setting balances low disk latency and high throughput. This setting limits disk utilization of large I/Os to a lesser extent than Low Latency to achieve a balance between good latency and good throughput.
 - **High Throughput** - Use this setting for critical DSS workloads that require high throughput.
 - **Auto** - Use this setting to have IORM determine the optimization objective. IORM continuously and dynamically determines the optimization objective, based on the workloads observed, and resource plans enabled.
 - **Basic** - Use this setting to disable I/O prioritization and limit the maximum small I/O latency.

Click **Update**. The Exadata Cell Administration Wizard will appear prompting you for the information necessary to complete the Disk I/O Objective configuration:

- a. On the Command page, the Cell Control Command-Line Interface (CellCLI) value should be:

```
# alter iormplan objective = 'auto'
```

Click **Next**.

- b. On the Admin Credentials page, enter the username and password for the selected cells.

Click **Next**.

- c. On the Schedule page, enter a job name (required) and job description (optional). Select an option to start **Immediately** or **Later**. If you select the Later option, enter the time you want the job to run.

Click **Next**.

- d. On the Review page, verify the settings are correct. If there are no changes, click **Submit Command**.

- e. Once the job is successfully submitted, the Job Status page will display.

Click **Return** to return to the I/O Resource Manager (IORM) Settings pane.

7. Click **Get Latest** to refresh the page, which will include your Disk I/O Objective selection.
8. Confirm the IORM objective settings. From the command line, run the following command:

```
# dcli -g cell_group cellcli -e "list iormplan attributes objective"
```

Output should show a value of **auto**:

```
cell01: auto
cell02: auto
cell03: auto
.
.
.
cell14: auto
```

5.4.5.2 The Inter-Database Plan

An inter-database plan specifies how resources are allocated by *percentage* or *share* among multiple databases for each cell. The directives in an inter-database plan specify allocations to databases, rather than consumer groups. The inter-database plan is configured and enabled with the CellCLI utility at each cell.

The inter-database plan is similar to a database resource plan, in that each directive consists of an allocation amount and a level from 1 to 8. For a given plan, the total allocations at any level must be less than or equal to 100 percent. An inter-database plan differs from a database resource plan in that it cannot contain subplans and only contains I/O resource directives. Only one inter-database plan can be active on a cell at any given time.

You can view the current configured inter-database plan and update an existing Percentage/Share based inter-database plan and a new Percentage/Share based plan can be configured using the Add/Remove options.

You can also view Share, Percentage Radio buttons and a drop down with Basic, Advance options.

Note: If the Exadata plug-in version is 12.1.0.3.0 and earlier or if the Exadata Storage Server version is 11.2.3.1.0 or earlier, the Share, Percentage based inter-database plan radio buttons are not available. You can view only Percentage-based options (that is, the drop-down only displays the Basic, Advance options).

When considering an inter-database plan:

- If Oracle Exadata Storage Server is only hosting one database, then an inter-database plan is not needed.
- If an inter-database plan is not specified, then all databases receive an equal allocation.

For further details on the inter-database plan, refer to the *About Interdatabase Resource Management* section in the *Oracle® Exadata Storage Server Software User's Guide*.

5.4.6 Diagnosing Exadata Cell Alerts

Enterprise Manager listens for Exadata Cell alerts sent from the Exadata Cell Management Server; so, any hardware failure or cell error will be reported in Enterprise Manager. For detailed cell error code and its interpretation, refer to the *Hardware Alert Messages* section in Appendix B, "Alerts and Error Messages" of the *Oracle® Exadata Storage Server Software User's Guide*.

5.4.7 Accessing Oracle Support Workbench for Exadata Storage Server

You can access the Oracle Support Workbench for the current Exadata Storage Server to access diagnostic data for problems and incidents related to the cell.

To access the Support Workbench for a single Exadata cell, follow these steps:

1. From the **Target** menu of the Exadata Storage Server for which you want to access the Oracle Support Workbench, choose **Administration**.
2. From the **Administration** menu, select **Support Workbench**.

The Login to Support Workbench page displays where you can enter the credentials required to access the Workbench.

3. Choose the type of cell administration credential you want to use from the Credential section.

You can choose **Preferred Credential**, **Named Credential**, or **New Credentials**.

4. Depending on what you chose in Step 3, enter the Credential Details (**Username** and **Password**) in the appropriate fields. You can turn on the More Details Option to see more details about the credentials.
5. Click **Continue** to display the Oracle Support Workbench.

5.5 Managing the InfiniBand Network

All InfiniBand Switches are discovered automatically during the database machine discovery workflow (see [Chapter 3, "Exadata Database Machine Discovery"](#)) and are grouped automatically under the group **IB Network**.

1. From the Enterprise Manager home page, select **Targets**, then **Oracle Exadata Database Machine**.
2. In the Target Navigation pane, select **IB Network** from the list.
3. In the IB Network pane, you can view an overview and activity summary for all InfiniBand Switches.
4. Click **Refresh** for an On Demand refresh of the InfiniBand schematic. Updates reflect the real-time data.

The following topics address managing your InfiniBand network:

- [InfiniBand Metrics](#)
- [Performing Administration Tasks on Infiniband Networks](#)
- [Setting Up Alerts](#)

5.5.1 InfiniBand Metrics

The following metrics are available for your InfiniBand Network:

- [Aggregate Sensor](#)

- [Response](#)
- [Switch Configuration](#)

5.5.1.1 Aggregate Sensor

The Aggregate Sensor takes input from multiple sensors and aggregates the data to identify problems with the switch that require attention. Whenever the sensor trips into an "Asserted" state (indicating a problem) or "Deasserted" (indicating that the problem is cleared) for a component on the switch, associated Enterprise Manager events will be generated.

5.5.1.2 Response

This is the main metric indicating availability of the InfiniBand switch. It is collected every 60 seconds by default through the management interface of the switch.

5.5.1.3 Switch Configuration

This metric captures the switch configuration. The information collected is valuable only to Oracle Support, which will use it to assist in debugging situations.

5.5.2 Performing Administration Tasks on Infiniband Networks

To perform an administration operation on an Infiniband Network, follow these steps:

1. Navigate to the DB Machine home page of the Infiniband Network by choosing the DB Machine for which you want to perform an administrative task from the All Targets page.

Enterprise Manager displays the DB Machine Home page for the target you selected.

2. Select the IB Network for which you want to perform an administrative task.
3. From the Target menu item, choose **Administration**.

The Target & Command page of the Infiniband Network Administration wizard appears.

4. Choose the **Target Type** and then select the target on which you want to perform the administrative task from the Target drop-down list. Enter the administrative command you want to execute. The available operations from which you can select are dependent on the target type and target you selected. Once you choose the operation, you may need to select a value that will appear after choosing the operation.
5. Click **Next** to continue.

Enterprise Manager displays the Credentials & Schedule page. Select or enter the credentials to execute the command. The credentials you enter are used when submitting the operation. You can choose between Preferred Credentials, Named Credentials, and New Credentials. Schedule the administration task. Provide the job information in the **Administration Job Schedule** section. You can choose to begin the job immediately or enter the time you want the job to begin

6. Click **Next** to continue.

The Review page appears. Use the Review page to ensure you have entered the correct values and then submit the command. The Review page lists the Job Name, Description, Command to Execute, when the job is Scheduled, the Target Type, and the Selected Target.

- Click **Submit Command** to submit the job.

When you click Submit Command, a popup is shown if the job is successful. You can go to the Job Detail Page or back to the page from where this wizard was launched.

5.5.3 Setting Up Alerts

After configuring the InfiniBand Switch targets to send SNMP alerts, set up alerts in Enterprise Manager Cloud Control.

- Log in to Enterprise Manager Cloud Control.
- Click **Targets**, then **All Targets**. All discovered targets will display.
- In the *All Targets* page, click **Oracle Exadata InfiniBand Switch**.
- Click the target you are interested in. The target home page appears.
- In the drop-down menu for the Oracle Exadata InfiniBand Switch, select **Metric and Collection Settings**.
- In the *Metric and Collection Settings* page, you can modify metric threshold values, edit monitoring settings for specific metrics, change metric collection schedules, and disable collection of a metric.

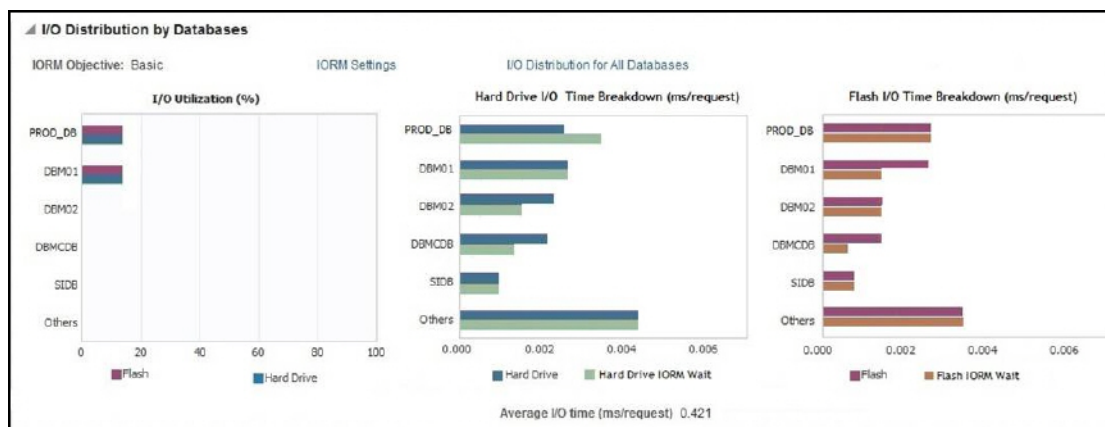
You can modify the thresholds directly in the table or click the edit icon (pencil icon) to access the Edit Advanced Settings page. For more information on the fields displayed in this page and how the thresholds can be modified, click **Help** from the top-right corner of this page.

5.6 Flash Cache Resource Monitoring

The Oracle Exadata plug-in release 13.1.0.1.0 and above provides flash cache resource monitoring for Oracle Exadata Storage Servers. From the Storage Server home page or from the IO Distribution Detail page, Cloud Control provides a high-level overview of flash cache resources (Figure 5–9). Details include:

- I/O Utilization (as a percentage).
- Hard Drive I/O Time Breakdown (in milliseconds per request).
- Flash I/O Time Breakdown (in milliseconds per request).

Figure 5–9 I/O Distribution by Databases



From the IO Distribution Details page, which provides a view of all available databases statistics, select **Table View** (the default is Graph View) to view the data as a table (Figure 5–10):

Figure 5–10 I/O Distribution by Databases - Table View

I/O Distribution for All Databases						
Average I/O time (ms/request): 0.514 IORM Objective: Basic Last Collected at: Feb 27, 2015 2:15:00 PM GMT						
Graphic View Table View						
Database	I/O Utilization (%)		Hard Drive I/O Time Breakdown (ms/request)		Flash I/O Time Breakdown (ms/request)	
	Hard Drive	Flash	Latency	IORM Wait Time	Latency	IORM Wait Time
ASM	0	0	0.001	0.003	0	0
DBM01	0	0	0.001	0.008	0.001	0
DBM03	0	0	0.001	0.003	0.001	0
DBMCDB	0	0	0.001	0.004	0.001	0
Others	0	0	0.001	0.007	0.001	0.006

The IORM Performance Page (Figure 5–11) provides detailed metrics, such as Average Throttle Time for Disk I/Os for both hard drives and flash drives. Select Flash Cache Space Usage (Figure 5–12) for detailed performance about flash cache space.

Figure 5–11 IORM Performance Page

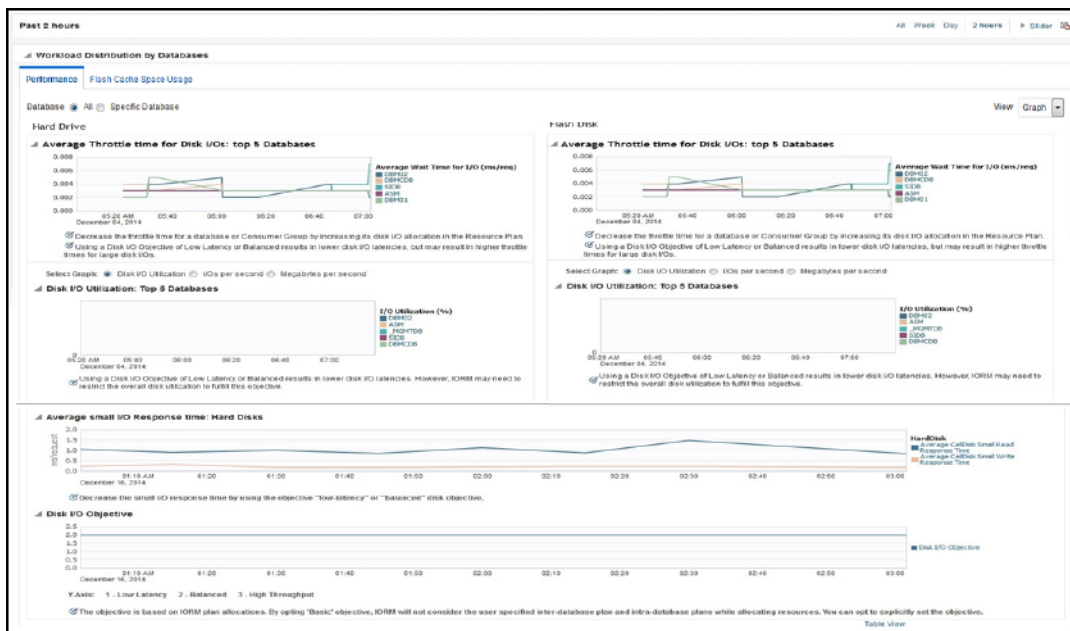
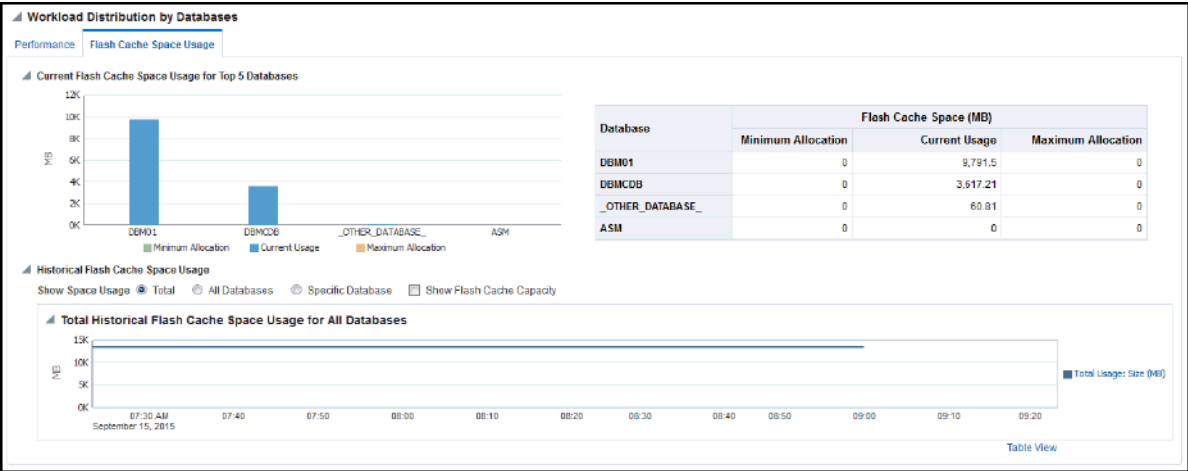


Figure 5–12 IORM Performance - Flash Cache Space Usage



5.7 Exadata Database Machine Fault Monitoring

Oracle Enterprise Manager Cloud Control provides hardware fault monitoring for Oracle Exadata Database Machine. Table 5–1 shows the fault monitoring for the Exadata Storage Server. Table 5–2 shows the fault monitoring for the compute nodes.

Note: The fault monitoring information in the following tables, while comprehensive, may not always be complete. As new fault monitoring functionality is added, these tables will be updated accordingly.

Table 5–1 Exadata Storage Server Fault Monitoring

Area	Fault Monitoring
Access	Cell cannot be accessed (e.g. ping failure).
Memory	Memory Controller Error Memory DIMM Error Memory Channel Error Memory DIMM Temperature Sensor Error Memory Correctable ECC Error
CPU	Internal Processor Error Intel 5500 Chipset Core Error Data Cache Error Cache Error Instruction Cache Error
ESM	ESM Battery Charge Error ESM Battery Life Error
Hard Disk	SCSI Error for Media, Device Disk Temperature Threshold Excess Physical Disk Not Present Block Corruption
Flash Disk	Flash Disk Failure Flash Disk Predictive Failure Flash Disk not Present

Table 5–1 (Cont.) Exadata Storage Server Fault Monitoring

Area	Fault Monitoring
Miscellaneous	Chassis or Power Supply Fan Error
	PCI-E Internal Error
	Power Supply Voltage Excess Error
	Temperature Excess Error
	Network Port Disconnection and Fault

Table 5–2 Compute Node Fault Monitoring

Area	Fault Monitoring
Memory	Memory Controller Error
	Memory DIMM Error
	Memory Channel Error
	Memory DIMM Temperature Sensor Error
	Memory Correctable ECC Error
CPU	Internal Processor Error
	Intel 5500 Chipset Core Error
	Data Cache Error
	Cache Error
	Instruction Cache Error
Disk	SCSI Error for Media, Device
	Disk Temperature Threshold Excess
	Block Corruption
Miscellaneous	Chassis or Power Supply Fan Error
	Non-fatal PCI-E Internal Error
	Power Supply Voltage Excess Error
	Temperature Excess Error
	Network Port Disconnection and Fault

5.8 Monitoring Exadata Database Machine Components

Enterprise Manager collects details for the following components:

- [Storage Cells](#)
- [InfiniBand Switches](#)
- [Cisco Switch](#)
- [ILOM Targets](#)
- [Power Distribution Units \(PDUs\)](#)
- [KVM Switch](#)

5.8.1 Storage Cells

An Enterprise Manager Agent runs the `cellcli` command via `ssh` to collect Storage Cell metrics. SNMP traps are sent to the Enterprise Manager Agent for subscribed alert conditions.

Monitoring requires the `cellmonitor` `ssh` `eq` setup with an Agent user.

ASM targets and disk groups are associated.

On the home page, rich storage data is collected, including:

- Aggregate storage metrics.
- Cell alerts via SNMP (PUSH).
- Capacities.
- IORM consumer and Database-level metrics.

5.8.2 InfiniBand Switches

An Enterprise Manager Agent runs remote `ssh` calls to the InfiniBand switch to collect metrics. The InfiniBand Switch sends SNMP traps (PUSH) for all alerts.

Monitoring requires `ssh` `eq.` for the `nm2user` for metric collections such as:

- Response
- Various sensor status
 - Fan
 - Voltage
 - Temperature
- Port performance data
- Port administration

5.8.3 Cisco Switch

An Enterprise Manager Agent runs a remote SNMP `get` call to collect metric data for the Cisco switch, including details on:

- Status / Availability
- Port status
- Vital signs: CPU, Memory, Power, Temperature
- Network interface various data
 - Incoming traffic errors, traffic kb/s and %
 - Outgoing traffic errors, traffic kb/s and %
 - Administration and Operational bandwidth Mb/s

5.8.4 ILOM Targets

An Enterprise Manager Agent runs remote `ipmitool` calls to each Compute Node ILOM target. Monitoring requires the `nm2user` user credentials to run `ipmitool`.

The following details are collected:

- Response – availability
- Sensor alerts
 - Temperature
 - Voltage
 - Fan speeds

- Configuration Data: Firmware version, serial number, and so forth.

5.8.5 Power Distribution Units (PDUs)

An Enterprise Manager Agent runs remote SNMP get calls and receives SNMP traps (PUSH) from each PDU. Collected details include:

- Response and ping status.
- Phase values.

5.8.6 KVM Switch

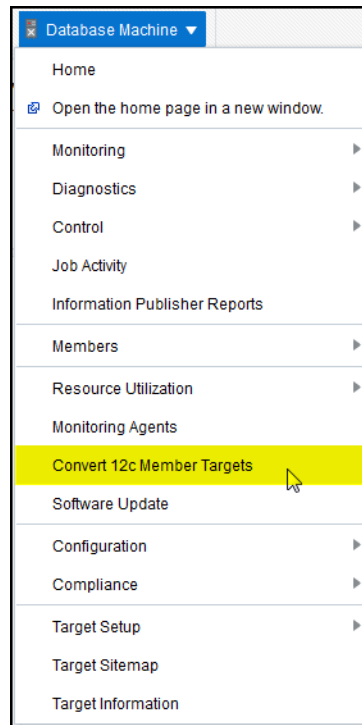
An Enterprise Manager Agent runs remote SNMP get calls and receives SNMP traps (PUSH) from the KVM switch. Collected details include:

- Status and response.
- Reboot events.
- Temperature.
- Fan status.
- Power state.
- Factory settings.

5.9 Using the Conversion Wizard to Convert 12c Targets to 13c Targets

To convert an Exadata Database Machine discovered by Enterprise Manager 12c to be monitored by Enterprise Manager 13c:

1. From the Database Machine menu, select **Convert 12c Member Targets** (Figure 5–13):

Figure 5–13 Convert 12c Member Target Menu

2. Select a **Conversion Option** (Figure 5–14):

- (Default) Delete 12c targets and their historical data. This option halts all monitoring of legacy targets and deletes the historical data. This options allows for a clean start for all Enterprise Manager 13c target monitoring.
- Retain 12c targets and their historical data. This option preserves the historical data for legacy targets.

Figure 5–14 Database Machine Conversion: Conversion Option

Database Machine Conversion: Conversion Option Back Step 1 of 3 Next

Starting from EM 13c, monitoring mechanism for the following Database Machine member targets has changed and would require conversion to pick up patch and PDU. Additional Monitoring credentials are needed before the conversion.
All historical data of the 12c Database Machine Member Targets will remain available with the existing 12c Targets. After the completion of the conversion, Database Machine Member Targets will be converted to 13c targets.

Database Machine

Database Machine : DB Machine: MyExadata.example.com

☒ Retain 12c targets for viewing historical data only
This is the recommended option, since you will be able access historical metric data for the converted targets

☐ Delete 12c targets and their historical data
Choose this option, if you want to completely stop monitoring the legacy targets, and don't have a need to access historical data

Required Credentials

Please obtain the following credentials that are needed as part of the conversion process before continuing.

12c Target Type	Required Credentials
Oracle Engineered System Cisco Switch	Cisco OS Credentials, SNMP Credentials
Oracle Engineered System PDU	HTTP Monitoring Credentials, SNMP Credentials
Oracle Infiniband Switch	ILOM Monitoring Credentials, ILOM Administrator Credentials, SNMP Credentials
Oracle Server	SNMP Credentials

Once you have selected a conversion option, click **Next**.

3. Set the **Credentials** (Figure 5–15). For the conversion, you must set the credentials for the Exadata Database Machine components to be converted.

Figure 5–15 Database Machine Conversion: Credentials

Database Machine Conversion: Credentials [Back] [Step 2 of 3] [Next]

Infiniband Switch
Specify the Integrated Lights Out Manager (ILOM) user names and passwords and SNMP V3 credentials for all Infiniband switches. They will be saved in EM as monitoring credentials and preferred credentials for administration tasks.

Set Credential ▼

Infiniband Switch Name	Credential
InfiniBand-switch1.example.com	Not Available
InfiniBand-switch2.example.com	Not Available
InfiniBand-switch3.example.com	Not Available

Compute Node Server ILOM
Specify credentials for all the Compute Node Server Integrated Lights Out Managers (ILOM). They will be saved in EM as monitoring credentials.

Set Credential ▼

ILOM Name	Credential
ilom1.example.com	Not Available
ilom2.example.com	Not Available

PDU
Specify the HTTP user names and passwords and SNMP v1/v3 credentials for all PDU. They will be saved in EM as monitoring credentials.

Set Credential ▼

PDU Name	Credential
pdu1.example.com	Not Available
pdu2.example.com	Not Available

Ethernet Switch
Specify the Cisco IOS and SNMP V3 credentials for all the Ethernet switches. They will be saved in EM as monitoring credentials.

Set Credential ▼

Ethernet Switch Name	Credential
Ethernet1	Not Available
Ethernet2	Not Available

From the **Set Credential** menu, you can set the credentials for a single component or for the entire component types:

- InfiniBand Switch (Figure 5–16)

Enter the username and password for the InfiniBand Switch's ILOM administration.

In the SNMP Credentials section:

If you select **SNMP V1** from the Credential type drop-down, then enter **public** for the Community String.

If you select **SNMP V3** credentials for the Credential Type, then enter a username and authorization password, select an authorization protocol, and enter a privacy password, as shown in Figure 5–17:

Figure 5–16 InfiniBand Switch Credentials

Infiniband Switch Credentials

ILOM Monitoring Credentials
ILOM Monitoring credentials will be saved as monitoring credentials. **Test Connection**

Credential ☐ Named ☒ New

* Username
 ^ Password
 ^ Confirm Password

✓ Save As

SNMP Credentials
SNMP V3 credentials will be saved as monitoring credentials. **Test Connection**

Credential type

* Community String
 ^ Confirm Community String

ILOM Administrator Credential **Test Connection**

These credentials are needed for administration tasks, and would be saved as Preferred credentials.

Credential ☒ Named ☐ New

There are no named credentials defined.

Figure 5–17 InfiniBand Switch SNMP V3 Credentials

SNMP V3 Credentials
SNMP V3 credentials will be saved as monitoring credentials. **Test Connection**

Credential type

* Username

Authorization Password
 Confirm Authorization Password

Authorization Protocol

Privacy Password
 Confirm Privacy Password

Click **Test Connection** for any credential to verify the connection. Click **OK**.

- Compute Node Server ILOM

To set the Compute Node Server ILOM, select **New** and enter a username and password, as shown in [Figure 5–18](#):

Figure 5–18 Compute Node Server ILOM Credentials

Click **Test Connection** for any credential to verify the connection. Click **OK**.

- Ethernet Switch (Figure 5–19)

To set the Ethernet Switch credentials, enter the Cisco IOS username, password, and privileged EXEC password. For the SNMP V3 credentials, enter a username and authorization password, select an authorization protocol, and enter a privacy password.

Figure 5–19 Ethernet Switch Credentials

Click **Test Connection** for any credential to verify the connection. Click **OK**.

- PDU

To set the HTTP monitoring credentials, select **New** and enter a username and password. For the SNMP V3 credentials, enter a username and authorization password, select an authorization protocol, and enter a privacy password.

Figure 5–20 PDU Credentials

PDU Credentials

HTTP Monitoring Credentials

HTTP Monitoring credentials will be saved as monitoring credentials. Test Connection

Credential ☐ Named ☒ New

* Username

* Password

* Confirm Password

☒ Save As

SNMP Credentials

SNMP credentials will be saved as monitoring credentials. Test Connection

Credential type

* Community String

* Confirm Community String

OK Cancel

Click **Test Connection** for any credential to verify the connection. Click **OK**.

Once you have set the credentials, the Credentials page will update to show the credentials set for all components to be converted. Click **Next**.

4. **Review** the components to be converted in the following three sections (Figure 5–21):
 - **Summary:** This section summarizes the number of targets to be converted and if any targets will have additional monitoring information available to you after the conversion.
 - **Targets to be Converted:** This table shows all Enterprise Manager 12c targets to be converted for monitoring by Enterprise Manager 13c and provides the new target name information.
 - **Targets Not Impacted by Conversion:** All components of the Exadata Database Machine do not need to be converted to be monitored by Enterprise Manager 13c. This list identifies those components that do not need to be converted. These components are already monitored by Enterprise Manager 13c.

Figure 5–21 Database Machine Conversion: Review

Database Machine Conversion: Review

Back Step 3 of 3 Next Submit

Summary

- 8 New Targets will be created
- 2 Targets will have additional monitoring mechanism
- IB Network: ib-network.example.com will be monitored as IB Fabric.

Targets to be Converted

12c Target Name	12c Target Type	New Target Name	New Target Type	Delete Target After Conversion	Comments
Ethernet1	Oracle Engineered System Cisco ...	Ethernet1	Systems Infrastructure Switch	No	
Ethernet2	Oracle Engineered System Cisco ...	Ethernet2	Systems Infrastructure Switch	No	
ilom1.example.com	Oracle Engineered System ILOM S...	ilom1.example.com	Systems Infrastructure Server	No	Starting 13c, the ILOM will not be a separate target. It will be monitored as part of the
ilom2.example.com	Oracle Engineered System ILOM S...	ilom2.example.com	Systems Infrastructure Server	No	Starting 13c, the ILOM will not be a separate target. It will be monitored as part of the
pdu1.example.com	Oracle Engineered System PDU	pdu1.example.com	Systems Infrastructure PDU	No	
pdu2.example.com	Oracle Engineered System PDU	pdu2.example.com	Systems Infrastructure PDU	No	
ib-switch1.example.com	Oracle Infiniband Switch	ib-switch1.example.com	Systems Infrastructure Switch	No	
ib-switch2.example.com	Oracle Infiniband Switch	ib-switch2.example.com	Systems Infrastructure Switch	No	
ib-switch3.example.com	Oracle Infiniband Switch	ib-switch3.example.com	Systems Infrastructure Switch	No	

Targets Not Impacted by Conversion

Click **Submit** to begin the conversion.

5. A **Processing** pop-up window will appear (Figure 5–22), which shows you the status of the conversion and a summary of the success or failure of the components to be converted.

Do not close this window until the processing is complete!

Figure 5–22 Processing Targets

Processing

Converting Targets - In Progress.

0% 100%

Hide

Step 1: Prerequisite check
Done

Step 2: Converting targets
Attempt to convert 9 targets now...

Converting 12c target (Oracle Engineered System Cisco Switch) to 13c target :
Target Creation: Failed
Reason: Identifier not set in parent entity slcc15sw-adm

Converting 12c target (Oracle Engineered System Cisco Switch) to 13c target

☒ This operation cannot be cancelled. Closing the browser window may cause the process to fail.

☐ Close this dialog when process completes

You can select the option to close the window after the processing is complete, or click **Done**.

6. Once processing is complete, a **Conversion Results** page (Figure 5–23) provides a summary of the components converted and details of each component that succeeded or failed to be converted:

Figure 5–23 Database Machine Conversion: Conversion Result

DB Machine MyExadata.example.com Conversion Result																																																																					
Summary <ul style="list-style-type: none"> Number of targets that have been converted successfully: 6 Number of targets that failed to convert: 3 2 Targets will have additional monitoring mechanism IB Network: ib-network.example.com will be monitored as IB Fabric. 																																																																					
Details <table> <tr> <th>Conversion Status</th><th>12c Target Name</th><th>12c Target Type</th><th>New Target Name</th><th>New Target Type</th><th>Delete Target After Conversion</th><th>Comments</th></tr> <tr> <td>✗</td><td>Ethernet1</td><td>Oracle Engineer...</td><td>Ethernet1</td><td>Systems Infrastr...</td><td>No</td><td>Target Creation: Failed Reason: Identifier not set</td></tr> <tr> <td>✗</td><td>Ethernet2</td><td>Oracle Engineer...</td><td>Ethernet2</td><td>Systems Infrastr...</td><td>No</td><td>Target Creation: Failed Reason: Identifier not set</td></tr> <tr> <td>✓</td><td>ilom1.example.com</td><td>Oracle Engineer...</td><td>ilom1.example.com</td><td>Systems Infrastr...</td><td>No</td><td>Conversion succeeded.</td></tr> <tr> <td>✓</td><td>ilom2.example.com</td><td>Oracle Engineer...</td><td>ilom2.example.com</td><td>Systems Infrastr...</td><td>No</td><td>Conversion succeeded.</td></tr> <tr> <td>✗</td><td>pdu1.example.com</td><td>Oracle Engineer...</td><td>pdu1.example.com</td><td>Systems Infrastr...</td><td>No</td><td>Target Creation: Failed Reason: Identifier not set</td></tr> <tr> <td>✓</td><td>pdu2.example.com</td><td>Oracle Engineer...</td><td>pdu2.example.com</td><td>Systems Infrastr...</td><td>No</td><td>Conversion succeeded.</td></tr> <tr> <td>✓</td><td>ib-switch1.example.com</td><td>Oracle Infiniband...</td><td>ib-switch1.example.com</td><td>Systems Infrastr...</td><td>No</td><td>Conversion succeeded.</td></tr> <tr> <td>✓</td><td>ib-switch2.example.com</td><td>Oracle Infiniband...</td><td>ib-switch2.example.com</td><td>Systems Infrastr...</td><td>No</td><td>Conversion succeeded.</td></tr> </table>							Conversion Status	12c Target Name	12c Target Type	New Target Name	New Target Type	Delete Target After Conversion	Comments	✗	Ethernet1	Oracle Engineer...	Ethernet1	Systems Infrastr...	No	Target Creation: Failed Reason: Identifier not set	✗	Ethernet2	Oracle Engineer...	Ethernet2	Systems Infrastr...	No	Target Creation: Failed Reason: Identifier not set	✓	ilom1.example.com	Oracle Engineer...	ilom1.example.com	Systems Infrastr...	No	Conversion succeeded.	✓	ilom2.example.com	Oracle Engineer...	ilom2.example.com	Systems Infrastr...	No	Conversion succeeded.	✗	pdu1.example.com	Oracle Engineer...	pdu1.example.com	Systems Infrastr...	No	Target Creation: Failed Reason: Identifier not set	✓	pdu2.example.com	Oracle Engineer...	pdu2.example.com	Systems Infrastr...	No	Conversion succeeded.	✓	ib-switch1.example.com	Oracle Infiniband...	ib-switch1.example.com	Systems Infrastr...	No	Conversion succeeded.	✓	ib-switch2.example.com	Oracle Infiniband...	ib-switch2.example.com	Systems Infrastr...	No	Conversion succeeded.
Conversion Status	12c Target Name	12c Target Type	New Target Name	New Target Type	Delete Target After Conversion	Comments																																																															
✗	Ethernet1	Oracle Engineer...	Ethernet1	Systems Infrastr...	No	Target Creation: Failed Reason: Identifier not set																																																															
✗	Ethernet2	Oracle Engineer...	Ethernet2	Systems Infrastr...	No	Target Creation: Failed Reason: Identifier not set																																																															
✓	ilom1.example.com	Oracle Engineer...	ilom1.example.com	Systems Infrastr...	No	Conversion succeeded.																																																															
✓	ilom2.example.com	Oracle Engineer...	ilom2.example.com	Systems Infrastr...	No	Conversion succeeded.																																																															
✗	pdu1.example.com	Oracle Engineer...	pdu1.example.com	Systems Infrastr...	No	Target Creation: Failed Reason: Identifier not set																																																															
✓	pdu2.example.com	Oracle Engineer...	pdu2.example.com	Systems Infrastr...	No	Conversion succeeded.																																																															
✓	ib-switch1.example.com	Oracle Infiniband...	ib-switch1.example.com	Systems Infrastr...	No	Conversion succeeded.																																																															
✓	ib-switch2.example.com	Oracle Infiniband...	ib-switch2.example.com	Systems Infrastr...	No	Conversion succeeded.																																																															
Recommendations: Launch the conversion UI again to fix the conversion error. Convert Remaining 12c Targets <ul style="list-style-type: none"> Launch New Database Machine Home Page 																																																																					

From this page, click **Convert Remaining 12c Targets** to repeat the conversion process for those components that failed to be converted. Click **Launch New Database Machine Home Page** to view the updated home page with all converted components monitored by Enterprise Manager 13c.

Virtualized Exadata Database Machine

This chapter describes how to manage and monitor a virtualized Oracle Exadata Database Machine with DB clusters using Oracle Virtual Machine (OVM) for x86 and Oracle Exadata Storage Servers in Exadata plug-in 12.1.0.6 and later.

The Exadata plug-in discovers, manages, and monitors virtualized Exadata Database Machine in conjunction with the Virtualization Infrastructure plug-in. For details about this plug-in, see the "Direct Monitoring of Xen Based Systems" chapter of the *Oracle® Enterprise Manager Cloud Administration Guide*:

http://docs.oracle.com/cd/E24628_01/doc.121/e28814/direct_monitor_cs.htm#EMCL0531

The following sections describe how to discover a virtualized Exadata Database Machine and other supported targets:

- [Integration with Virtualization Infrastructure Plug-in](#)
- [Discovering Virtualized Exadata Database Machine](#)
- [Post-Discovery Configuration](#)
- [Exadata Virtualized Provisioning](#)
- [Viewing Virtualized Exadata Database Machine](#)
- [Resource Utilization Graphs](#)

Once you have completed the discovery of a virtualized Exadata Database Machine, continue with the configuration steps outlined in [Post-Discovery Configuration and Verification](#).

6.1 Integration with Virtualization Infrastructure Plug-in

The physical server (physical Oracle Server target), Dom0 (Virtual Platform target), and DomU (virtual Oracle Server target) are discovered and monitored by the Virtualization Infrastructure (VI) plug-in.

The Exadata discovery can work with the VI plug-in by the physical server, Dom0, and DomU are discovered using the VI plug-in before Exadata Database Machine discovery. During Exadata discovery, the discovery code looks up the existing Virtual Platform target that corresponds to the Dom0 of the compute node.

The Exadata discovery flow with VI plug-in integration includes the following checks:

1. Check whether the Exadata Database Machine is virtualized based on the configuration metric of the host target of the discovery agent.

2. Check whether the VI plug-in is deployed. If not, you will be prompted to deploy it as described in the "Direct Monitoring of Xen Based Systems" chapter of the *Oracle® Enterprise Manager Cloud Administration Guide*:

http://docs.oracle.com/cd/E24628_01/doc.121/e28814/direct_monitor_cs.htm#EMCLO531

6.2 Discovering Virtualized Exadata Database Machine

With virtualized Exadata, one Exadata Database Machine target will be created for each physical Database Machine instead of one DB Machine target for each DB cluster deployed through OEDA. Compute nodes, Exadata Storage Servers, InfiniBand switches, compute node ILOM, PDU, KVM, and Cisco switches targets are discovered by the Exadata plug-in.

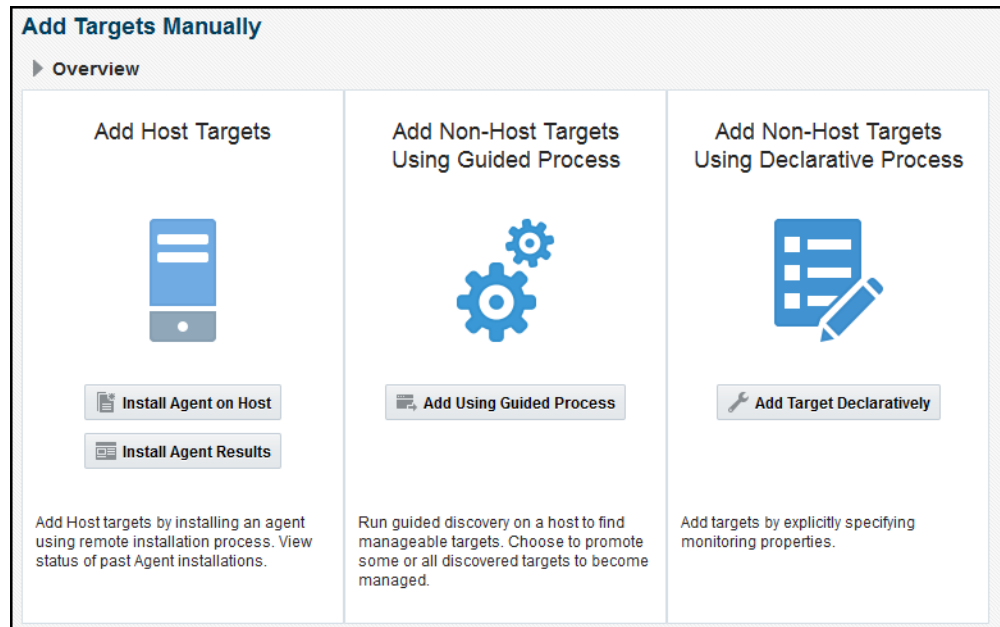
With only the compute nodes virtualized, the physical servers, Dom0 and DomU, are monitored by the Virtualization Infrastructure (VI) plug-in. The Exadata plug-in integrates with the VI plug-in for discovery and target management as discussed below.

The hardware targets in virtualized Exadata are discovered in almost the same way as physical Exadata (see [Discovering an Exadata Database Machine](#)) except as noted below:

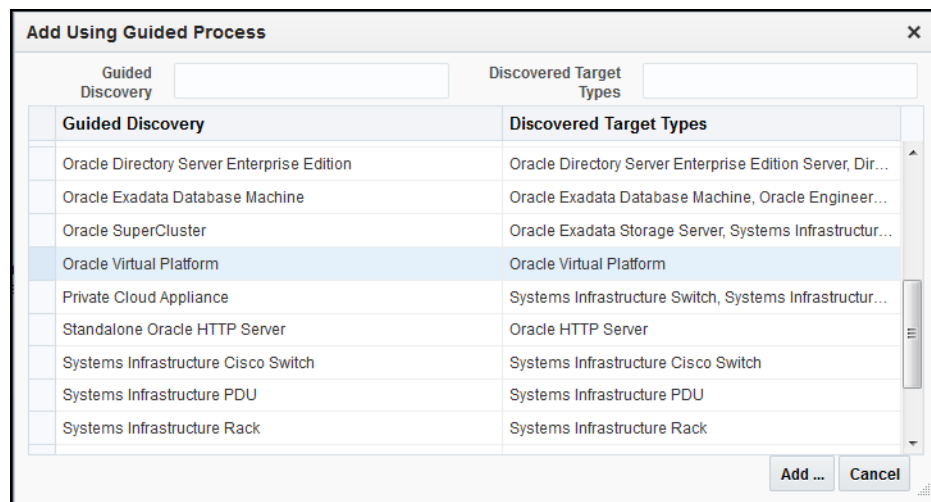
- The Dom0 of the compute nodes are discovered using `ibnetdiscover`. Compute node ILOM to compute node mapping and VM hierarchy are obtained from the VI plug-in.
- Exadata Storage Servers are discovered using `ibnetdiscover` instead of `kfod`. Therefore, there is no need to specify the Database Oracle Home during discovery.
- InfiniBand switches are discovered using `ibnetdiscover`.
- Compute node ILOM, PDU, and Cisco switch are discovered based on the `databasemachine.xml` schematic file.
- Cluster and Database Target Discovery
 - The cluster and database target discovery is similar to the physical Exadata case (see [Discovering Grid Infrastructure and RAC](#)). The only difference is that the Enterprise Manager agents needed to be deployed on the DomU of the Database cluster before the cluster, ASM, and database targets can be discovered using the DB plug-in.
- Agent Placement
 - The primary and backup Enterprise Manager agents monitoring the Exadata hardware targets should be deployed in two dedicated DomU that will not be suspended or shut down, and are ideally on different physical servers to ensure high availability.
 - For static virtual machine configurations, the Enterprise Manager agents that are used to monitor the Database clusters can be used to monitor the Exadata hardware.

To discover a virtualized Exadata Database Machine:

1. From the Setup menu, select **Add Target** then **Add Targets Manually**.
2. On the Add Targets Manually page, select **Add Using Guided Process** ([Figure 6-1](#)):

Figure 6–1 Add Targets Manually


3. In the Add Using Guided Process pop-up window, select **Oracle Virtual Platform** and click **Add** (Figure 6–2):

Figure 6–2 Add Oracle Virtual Platform

Note: This option will be available only if the Virtualization Infrastructure (VI) plug-in has been deployed.

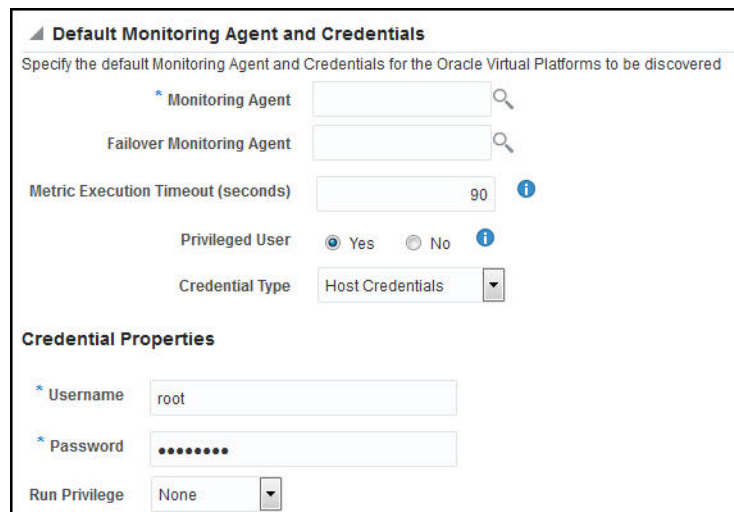
If the plug-in is not deployed, then the Oracle Virtual Platform option will not appear. Deploy the VI plug-in as described in the "Direct Monitoring of Xen Based Systems" chapter of the *Oracle® Enterprise Manager Cloud Administration Guide*:

http://docs.oracle.com/cd/E24628_01/doc.121/e28814/direct_monitor_cs.htm#EMCLO531

4. On the Discover Oracle Virtual Platforms page, register Oracle Virtual Platforms with Enterprise Manager. Target credentials and/or monitoring agent can be specified for each target. If set, these override the defaults for that target.
 - Set the Default Monitoring Agent and Credentials (Figure 6-3). Click the magnifying glass icon  to search for the monitoring agent location. For the Credential Properties, enter `root` for the Username and provide the host's root password.

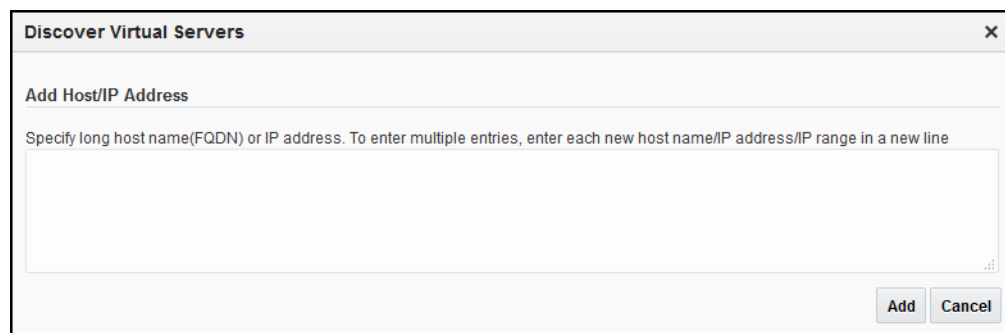
Note: A non-root user with `sudo` privilege can also be used. Refer to the VI plug-in documentation for the necessary setup steps.

Figure 6-3 Default Monitoring Agent and Credentials



- Add a Host Name or IP address. Click **Add** and enter the fully qualified domain name (FQDN) or IP address for the host in the pop-up window (Figure 6-4). If you have more than one, each entry *must* appear on a separate line.

Figure 6-4 Discover Virtual Servers: Add Host/IP Address



Click **Add** to close the pop-up window.

Once added, the Hostname and IP address fields will update as shown in Figure 6-5:

Figure 6–5 Enter Hostname or IP Address

Hostname and IP Address			
Specify the hostname or IP address for the Oracle VM servers that need to be discovered.			
<input type="button" value="Add"/> <input type="button" value="Override"/> <input type="button" value="Default"/> <input type="button" value="Remove"/>			
Host/IP Address	Agent & Credentials	Monitoring Agent	Username
host1.example.com	Default		
10.20.30.40	Default		




- Click **Submit**. A job is submitted to register the Oracle Virtual Platform, which creates the virtual targets. Approximately five (5) minutes is required to complete the job. Click **Job Details** to check the status, or click **Close** to close the window (Figure 6–6):

Figure 6–6 Submit Oracle Virtual Platform Registration Job

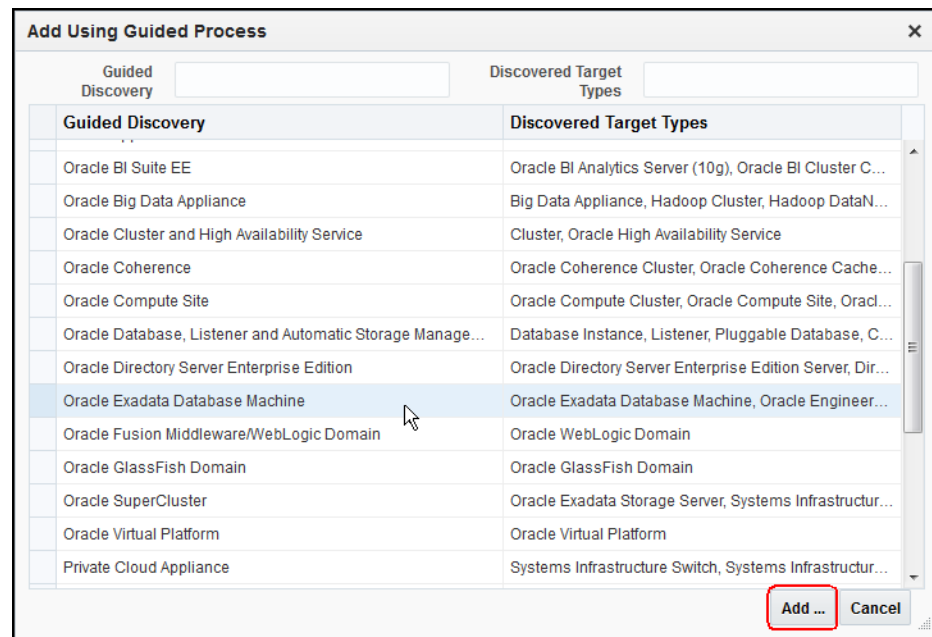
Confirmation	
Job to register Oracle Virtual Platform(s) has been submitted successfully.	
<input type="button" value="Job Details..."/>	<input type="button" value="Close"/>


- Once the job completes, then discover the Exadata Database Machine. From the Setup menu, select **Add Target** then **Add Targets Manually**.
- On the Add Targets Manually page, select **Add Using Guided Process** (Figure 6–7):

Figure 6–7 Add Targets Manually

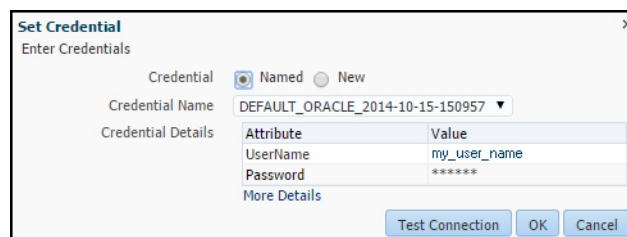
Add Targets Manually		
► Overview		
<p>Add Host Targets</p>  <p> <input type="button" value="Install Agent on Host"/> <input type="button" value="Install Agent Results"/> </p> <p>Add Host targets by installing an agent using remote installation process. View status of past Agent installations.</p>	<p>Add Non-Host Targets Using Guided Process</p>  <p> <input type="button" value="Add Using Guided Process"/> </p> <p>Run guided discovery on a host to find manageable targets. Choose to promote some or all discovered targets to become managed.</p>	<p>Add Non-Host Targets Using Declarative Process</p>  <p> <input type="button" value="Add Target Declaratively"/> </p> <p>Add targets by explicitly specifying monitoring properties.</p>

- For the Target Types drop-down menu, select **Oracle Exadata Database Machine** (Figure 6–8):

Figure 6–8 Add Using Guided Process: Add Oracle Exadata Database Machine

8. On the Oracle Exadata Database Machine Discovery page, select the **Discover a new Database Machine and its hardware components as targets** option and click **Discover Targets**.
9. On the Discovery Inputs page, click the magnifying glass icon  to search for an agent in a DomU that resides in the DB Machine to be discovered. Do not search for a virtual platform (Dom0) because you cannot install an Enterprise Manager Agent in Dom0. Just like the physical Exadata case, you are specifying a host on which the schematic file can be read. Usually, it will be the same host as the discovery agent. It will not be the Dom0

In the Schematic Files section, select a host on which the schematic file can be read, and set the host credential that can read the schematic file. Click **Set Credential** to set the log in and password (Figure 6–9) for the host you registered in the previous steps. Click **OK**.

Figure 6–9 Set Credential

Click **Next**.

10. On the InfiniBand Discovery page, set the nm2user credential. Select the New option and enter **nm2user** for the Username field and provide a password as shown in Figure 6–10:

Figure 6–10 Set InfiniBand Credentials

Click **Next**.

Note: A known issue about missing CLIENTNAME and CLIENTIP information will cause an Error pop-up message. Click **OK** to dismiss the pop-up and to continue with the guided discovery.

11. On the Prerequisite Check page, verify the Status is successful, then click **Next**.
12. On the Components page, review the Exadata components that were discovered, then click **Next**.
13. On the Monitoring Agents page, review the names, locations, and backup locations of the Monitoring Agents. Click **Next**.
14. On the Agent Credential page, if the credentials are the same for all agents, then you can enter a new username and password or accept the default. Click **Next**.
If the credentials are different for all agents, then select the **Different for all agents** option and enter usernames and passwords for all hosts. Click **Next**.
15. On the Monitoring Credentials page, verify or enter the credentials for the following components:
 - Oracle Exadata Storage Server
 - InfiniBand Switch
 - ILOM

Click **Test Connection** for each component to verify the connection. If the credentials are different for each component, then provide the appropriate username and password.

Click **Next**.
16. On the SNMP Subscription page, enter the SNMP Community String (default is **public**) value for both Oracle Exadata Storage Server and InfiniBand Switch areas. For the InfiniBand Switch, provide the root credentials (Figure 6–11). Click **Next**.

Figure 6–11 Enter InfiniBand Switch Root Credential

17. On the Component Properties page, enter **public** for both Ethernet and PDU components (Figure 6–12). Click **Next**.

Figure 6–12 Enter 'public' for Ethernet Switch and PDUs

Database Machine Discovery: Component Properties
Please specify the target properties of the different components.

Oracle Exadata Storage Server

Cell Name	ILOM IP Address
host1cell1.example.com	10.20.30.101
host1cell2.example.com	10.20.30.102
host1cell3.example.com	10.20.30.103

Ethernet Switch

Ethernet Switch Name	SNMP Timeout (seconds)	SNMP Community String
host1ethernet1.example.com	10	public

PDU

PDU Name	PDU Module	SNMP Port	SNMP Timeout (seconds)	SNMP Community String
host1pdu.a.example.com	Module1	161	10	public
host1pdu.b.example.com	Module1	161	10	public

ILOM

ILOM Name	Compute Node Host Name
host1ilom.example.com	host1
host2ilom.example.com	host2

18. On the Review page, review the details of the following components:

- System Target
- Compute Node
- Oracle Exadata Storage Server
- InfiniBand Switch
- Ethernet Switch
- Compute Node ILOM
- KVM
- PDU

Click **Submit** to promote all targets. Allow for approximately five (5) minutes to process. Once complete, all targets will now be monitored by Oracle Enterprise Manager Cloud Control.

Note: The VI plug-in regularly checks whether a VM is added or deleted. The Oracle VM instance targets are auto-promoted once they are detected by the VI plug-in. If you want to monitor the OS, ASM, and DB in the VM, you need to push the Enterprise Manager agent to the VM.

6.3 Post-Discovery Configuration

Since agents run inside DomU nodes and remotely monitor cells, ILOMs, switches, and PDUs, ensure that Primary and Backup agents are on physically different DomU hosts. In case of a Dom0 outage, Enterprise Manager can continue to monitor such targets using an agent that is running on an active DomU hosted by a different Dom0 that is still running. This will achieve continuous monitoring in case of a complete Dom0 outage.

For details on how agents monitor Exadata targets remotely, refer to [Chapter 4, "Post-Discovery Configuration and Verification,"](#) for details.

6.4 Exadata Virtualized Provisioning

Provisioning involves repeatable, reliable, automated, unattended, and scheduled mass deployment of a RAC Cluster including virtual machines (VMs), Oracle Database (DB), Grid Infrastructure, and ASM on Virtualized Exadata.

With the Exadata plug-in's virtualization provisioning functionality, you can:

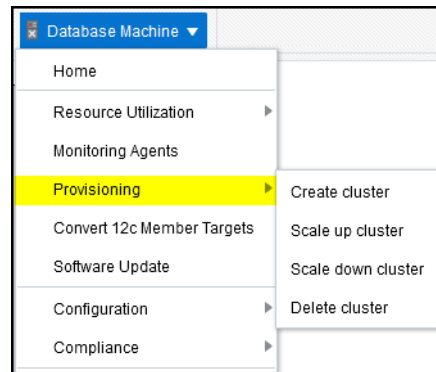
- [Creating a Database Cluster](#)
- [Scaling Up a Database Cluster](#)
- [Deleting a Database Cluster](#)

6.4.1 Creating a Database Cluster

To create a database cluster:

1. From the Database Machine target menu, select **Provisioning**, then select **Create Cluster** ([Figure 6-13](#)):

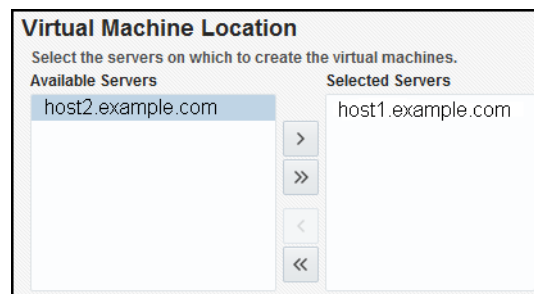
Figure 6-13 Provisioning Menu



The Exadata Provisioning Wizard will display.

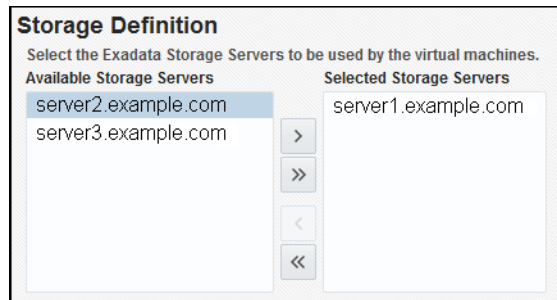
2. On the Exadata Provisioning: Cluster page, provide the information for:
 - **Cluster Definition:** Create a cluster name. Click **Show existing clusters** to display a list of database clusters already provisioned.
 - **Virtual Machine Location:** Select the servers on which you want to create the virtual machines. Select one or more from the **Available Servers** pane, then click the move button to move the selected server to the **Selected Servers** pane ([Figure 6-14](#)):

Figure 6-14 Select Virtual Machine Location



- **Storage Definition:** Select the Exadata Storage Servers to be used by the virtual machines. Select one or more from the **Available Storage Servers** pane, then click the move button to move the selected server to the **Selected Storage Servers** pane:

Figure 6–15 Select Exadata Storage Servers



Storage Definition
Select the Exadata Storage Servers to be used by the virtual machines.

Available Storage Servers	Selected Storage Servers
server2.example.com	server1.example.com
server3.example.com	

Buttons: > >> < <<

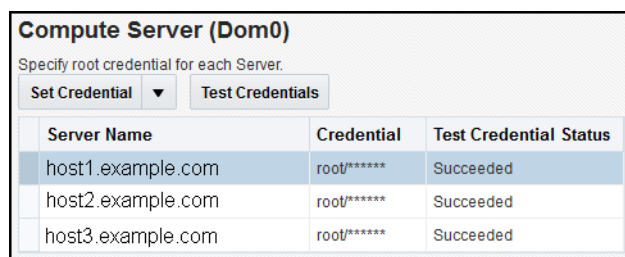
Click **Next**.

- On the Credentials page, set the credentials for:
 - **Compute Server:** Set the credentials for the root user. From the Set Credentials drop-down, select **All** to apply the settings to all servers, or select one or more servers from the list and select **Selected** to apply the settings to only the selected servers.

In the Set Server Credential pop-up window, select an existing named credential or select **New** to create a new one.

Click **Test Connection** to verify that the credentials are properly set. If successful, the Test Credential Status will update to show Succeeded (Figure 6–16):

Figure 6–16 Set Compute Server Credentials



Compute Server (Dom0)
Specify root credential for each Server.

Buttons: Set Credential ▼ Test Credentials

Server Name	Credential	Test Credential Status
host1.example.com	root/*****	Succeeded
host2.example.com	root/*****	Succeeded
host3.example.com	root/*****	Succeeded

- **Exadata Storage Server:** Set the credentials for the cell administrator.

In the Set Server Credential pop-up window, select an existing named credential or select **New** to create a new one.

Click **Test Connection** to verify that the credentials are properly set. If successful, the Test Credential Status will update to show Succeeded (Figure 6–17):

Figure 6–17 Set Exadata Storage Server Credentials

Exadata Storage Server
Specify cell administrator credential for each Exadata Storage Server.

Set Credential ▼ Test Credentials

Cell Name	Credential	Test Credential Status
server1.example.com	celladmin/*****	Succeeded
server2.example.com	celladmin/*****	Succeeded

Click **Next** to define the Virtual Machines.

- On the Virtual Machines (VMs) page, provide the following information:

Note: When available, the Exadata Provisioning Wizard will pre-populate the fields with the appropriate defaults. You can change this information to suit your environment.

- Virtual Machine Definition:** In this region (Figure 6–18), provide the details to define the VM:
 - Virtual Machine Size: Select Small, Medium, or Large. Click Customize to adjust the number of CPU cores and available memory.
 - Root password: Create a password in the two password fields.
 - Verify the Prefix, DNS, and NTP fields.
 - Time Zone: select the appropriate time zone from the drop-down list.

Figure 6–18 Exadata Provisioning: Virtual Machine Definition

Virtual Machine Definition

Virtual Machine Size: Small ▼ CPU cores: 2 Memory: 16GB Customize...

Available resources: CPU cores: 12 Memory: 41GB Show details...

* Root password:

* Confirm root password:

Prefix: slcm02

DNS	11.22.33.444	11.22.33.555	11.22.33.666
NTP	10.200.3.4	10.200.3.5	10.200.3.6

* Time Zone: (UTC-07:00) Denver - Mountain Time (MT) ▼

- Software Locations:** When available, the Exadata Provisioning Wizard will pre-populate the fields (Figure 6–19); otherwise, provide the following information:
 - Inventory Location
 - Grid Infrastructure Home
 - Database Home Location
 - Agent Installation Base Directory
 - Agent Port (optional)
 - Software Language (optional)

Figure 6–19 Exadata Provisioning: Software Locations

Software Locations

- * Inventory Location: /u01/app/orainventory
- * Grid Infrastructure Home: 11.2.0.4 BP13 (dropdown) /u01/app/11.2.0.4/grid
- * Database Home Location: 11.2.0.4 BP13 (dropdown) /u01/app/oracle/product/11.2.0.4/dbhome_1
- * Agent Installation Base Directory: /u01/app/oracle/agent
- Agent Port: 3872
- Software Language: en

- **Operating System Users and Groups:** Like the Software Location region, the Exadata Provisioning Wizard will pre-populate the fields except for the password fields (Figure 6–20). Otherwise, provide the following information:
 - User name: including the ID, password, and home directory.
 - DBA group name and ID.
 - OINSTALL group name and ID.

Figure 6–20 Exadata Provisioning: Operating System Users and Groups

Operating System Users and Groups

- * User name: oracle
- * ID: 1001
- * Password:
- * Confirm Password:
- * Home directory: /home/oracle
- * DBA Group Name: dba
- * ID: 1002
- * OINSTALL Group Name: oinstall
- * ID: 1003

Click **Next** to provide the Network details.

- On the Network page, specify the IP address, name and domain used for the Admin, Client and Private network. Provide the details for the following information:
 - **Gateway and Domain Details:** The domain and subnet mask details should already be supplied by the Exadata Provisioning Wizard. Enter a valid IP address for the Admin and Client gateway (Figure 6–21):

Figure 6–21 Exadata Provisioning: Network Gateway and Domain Details

Gateway and Domain Details

- * Admin Network Domain: example.com
- * Admin Subnet Mask: 255.255.248.0 (dropdown)
- * Admin Network Gateway IP: 255.255.248.0
- * Client Network Domain: example.com
- ☒ Bonded
- * Client Subnet Mask: 255.255.248.0 (dropdown)
- * Client Network Gateway IP: 255.255.248.0
- * Private Network Domain: example.com
- * Private Subnet Mask: 255.255.248.0 (dropdown)
- Default Gateway: ☐ Admin ☒ Client

- **Virtual Machine 1 (Figure 6–22):** For the first virtual machine in the cluster, the Exadata Provisioning Wizard will auto-complete the Prefix and Start ID field. You can enter an optional Suffix. Enter a valid IP address.

Figure 6–22 Exadata Provisioning: Virtual Machine 1

	Prefix	Start ID	Suffix	
Admin Network Name	slcm02	01		IP
Client Network Name	slcm02	03		IP
VIP Name	slcm02	05		IP
Private Network Name	slcm02	07		IP

- **Generated Virtual Machine Name and IP (Figure 6–23):** After you have entered the information for the first VM, click **Generate** to create the information for the other VMs in the cluster. You can always enter the details manually.

Figure 6–23 Exadata Provisioning: Generated Virtual Machine Name and IP

Generated Virtual Machine Name and IP	
Virtual Machine 1 From slcm02db06.us.oracle.com	
Admin Network Name	slcm0202.example.com IP 255.0.0.1
Client Network Name	slcm0204.example.com IP 255.0.0.3
VIP Name	slcm0206.example.com IP 255.0.0.5
Private Network Name	slcm0208.example.com IP 255.0.0.7

Once you have entered all the necessary information, click **Validate IP** at the top of the page to verify the IP addresses. Click **Next** to continue to enter the details for Grid Infrastructure and to create the Initial Database.

- On the Grid Infrastructure and Initial Database page, enter the details for:
 - **Grid Infrastructure (Figure 6–24):** Enter the details for the Cluster (SCAN name and port) and verify the Disk Group information. The Exadata Provisioning Wizard will pre-populate the details, but you can adjust them as needed.

Figure 6–24 Exadata Provisioning: Grid Infrastructure

Grid Infrastructure Cluster		Disk Group										
* SCAN Name	<input type="text"/> Check Availability	+ Add X Remove Validate										
* SCAN Port	1521											
ASM Password The same password will be used for ASM3NMP and SYS users * Password <input type="text"/> * Confirm Password <input type="text"/>		<table border="1"> <thead> <tr> <th>Disk group Name</th> <th>Redundancy</th> <th>Size(GB)</th> </tr> </thead> <tbody> <tr> <td>DATA</td> <td>NORMAL</td> <td>10</td> </tr> <tr> <td>RECO</td> <td>NORMAL</td> <td>10</td> </tr> </tbody> </table>		Disk group Name	Redundancy	Size(GB)	DATA	NORMAL	10	RECO	NORMAL	10
Disk group Name	Redundancy	Size(GB)										
DATA	NORMAL	10										
RECO	NORMAL	10										

- **Initial Database:** Click the check box to create the initial database. Additional information for Database Identification and Administrator Credentials will be required as shown in [Figure 6–25](#):

Figure 6–25 Exadata Provisioning: Initial Database

Initial Database

☒ Create Initial Database

Database Identification

Database Type: ☒ Transaction Processing ☐ Data Warehouse

* Global Database Name: * SID:

Block Size: 8192

Administrator Credentials

Specify passwords for the administrative users(SYS,SYSTEM and DBSNMP) in the new database.

☒ Use the same password

* Password: * Confirm Password:

☐ Use different passwords

User name	Password	Confirm Password
SYS	<input type="text"/>	<input type="text"/>
SYSTEM	<input type="text"/>	<input type="text"/>
DBSNMP	<input type="text"/>	<input type="text"/>

Click **Advanced** to expand the region for additional details for Memory Parameters, Processes, and Character Sets as shown in [Figure 6–26](#):

Figure 6–26 Exadata Provisioning: Initial Database Advanced Details

Advanced

Memory Parameters

Memory Management: Automatic Shared Memory Management

☒ Specify Memory Settings as Percentage of Available Memory

Percentage of Available Memory: 40%

Total Physical Memory(MB): 16384

Total SGA(MB): 4914

Total PGA(MB): 1538

Processes

Specify processes parameters.

Processes: 150

Character Sets

Database Character Set: Use Default - The default character setting based on the language setting of the operating system

National Character Set: AL16UTF16 - Unicode UTF-16 Universal Character Set

Click **Next** to set the schedule.

7. On the Schedule page, the Exadata Provisioning Wizard will create the Deployment Instance value. Select a schedule start and notification options:
 - **Schedule:** Select to initiate the creation immediately or later. If you select later, then you will be prompted to select a date and time.
 - **Notification:** Select the notification statuses for which you will be notified.

Click **Review** to review the settings and initiate the job.

8. On the Review page, review the selection in the summary displayed. To change any section, return to the previous page and edit the selection.

Click **Submit** to begin the creation job.

6.4.2 Scaling Up a Database Cluster

To scale up a database cluster:

1. From the Database Machine target menu, select **Provisioning**, then select **Scale Up Cluster**.

The Exadata Provisioning Wizard will display.

2. On the Cluster page, enter the cluster name or click the Search icon to select a cluster from the list.

Select one or more from the **Available Servers** pane, then click the move button to move the selected server to the **Selected Servers** pane.

Click **Next** to set the credentials.

3. On the Credentials page, set the credentials for:

- **Compute Server:** Set the credentials for the `root` user. From the Set Credentials drop-down, select **All** to apply the settings to all servers, or select one or more servers from the list and select **Selected** to apply the settings to only the selected servers.

In the Set Server Credential pop-up window, select an existing named credential or select **New** to create a new one.

Click **Test Connection** to verify that the credentials are properly set. If successful, the Test Credential Status will update to show Succeeded (Figure 6–27):

Figure 6–27 Set Compute Server Credentials

Compute Server (Dom0)		
Specify root credential for each Server.		
Set Credential ▼	Test Credentials	
Server Name	Credential	Test Credential Status
host1.example.com	root/*****	Succeeded
host2.example.com	root/*****	Succeeded
host3.example.com	root/*****	Succeeded

- **Virtual Machines (Figure 6–28):** Set the credentials for the DomU Host and Root and for the Cluster ASM and Database.

You have the option to use preferred credentials or to override the preferred credentials.

Click **Test Connection** to verify that the credentials are properly set.

Figure 6–28 Scale Up Cluster: Virtual Machines Credentials

Virtual Machines (DomUs)

DomU Host Credential

☐ Use Preferred Credentials
 ☒ Override Preferred Credentials

Oracle Home	Named Credential
Grid (/u01/app/12.1.0.2/grid)	W1:SYSMAN +
Oracle Database (/u01/app/oracle/product/...)	W1:SYSMAN +
Agent (/u01/app/oracle/product/uehou_qls...	W1:SYSMAN +

Cluster ASM Credentials

The asm credential is used for adding instances to the existing cluster

☐ Use Preferred Credentials
 ☒ Override Preferred Credentials

Named Credential: NC_OSM_CLUS_2015-10-12-162153:SYSMAN +

DomU Root Credential

☐ Use Preferred Credentials
 ☒ Override Preferred Credentials

Named Credential: VIRTUALROOT:SYSMAN +

Cluster Database Credentials

The database credential is used for adding instances to the existing cluster

☐ Use Preferred Credentials
 ☒ Override Preferred Credentials

Named Credential: NC_ORACLE_D_2015-10-12-162225:SYSMAN +

Click **Next**.

4. On the Virtual Machines page, click **Next**.

5. On the Network page, specify the IP address, name and domain used for the Admin, Client and Private network. Provide the details for the following information:
- **Gateway and Domain Details:** The domain and subnet mask details should already be supplied by the Exadata Provisioning Wizard. Enter a valid IP address for the Admin and Client gateway (Figure 6–29):

Figure 6–29 Scale Up: Network Gateway and Domain Details

Gateway and Domain Details					
* Admin Network Domain	example.com	* Admin Subnet Mask	255.255.248.0		
* Client Network Domain	example.com	<input checked="" type="checkbox"/> Bonded	* Client Subnet Mask	255.255.248.0	
* Private Network Domain	example.com	* Private Subnet Mask	255.255.248.0		
		* Admin Network Gateway IP		255.255.248.0	
		* Client Network Gateway IP		255.255.248.0	
				Default Gateway	<input type="radio"/> Admin <input checked="" type="radio"/> Client

- **Virtual Machine 1 (Figure 6–30):** For the first virtual machine in the cluster, the Exadata Provisioning Wizard will auto-complete the Prefix and Start ID field. You can enter an optional Suffix. Enter a valid IP address.

Figure 6–30 Scale Up: Virtual Machine 1

Virtual Machine 1				
	Prefix	Start ID	Suffix	
Admin Network Name	slcm02	01		IP
Client Network Name	slcm02	03		IP
VIP Name	slcm02	05		IP
Private Network Name	slcm02	07		IP

- **Generated Virtual Machine Name and IP (Figure 6–29):** After you have entered the information for the first VM, click **Generate** to create the information for the other VMs in the cluster. You can always enter the details manually.

Figure 6–31 Scale Up: Generated Virtual Machine Name and IP

Generated Virtual Machine Name and IP		
Virtual Machine 1 From slcm02db06.us.oracle.com		
Admin Network Name	slcm0202.example.com	IP 255.0.0.1
Client Network Name	slcm0204.example.com	IP 255.0.0.3
VIP Name	slcm0206.example.com	IP 255.0.0.5
Private Network Name	slcm0208.example.com	IP 255.0.0.7

Once you have entered all the necessary information, click **Validate IP** at the top of the page to verify the IP addresses.

Click **Next** to continue to schedule the scale up.

Note: The step for Grid Infrastructure and Initial Database are skipped because they do not need to be set up again.

6. On the Schedule page, the Exadata Provisioning Wizard will create the Deployment Instance value. Select a schedule start and notification options:
 - **Schedule:** Select to initiate the scale up immediately or later. If you select later, then you will be prompted to select a date and time.
 - **Notification:** Select the notification statuses for which you will be notified.
 Click **Review** to review the settings and initiate the scale up.
7. On the Review page, review the selection in the summary displayed. To change any section, return to the previous page and edit the selection.

Click **Submit** to begin the scale up.

6.4.3 Scaling Down a Database Cluster

To scale down a database cluster, the Virtual Machine is removed from the cluster:

1. From the Database Machine target menu, select **Provisioning**, then select **Scale Down Cluster**.

The Exadata Provisioning Wizard will display.

2. Enter the cluster name you want to scale down or click the Search icon to select an available cluster.

Once you have selected a cluster, you will be prompted to:

- Select nodes to delete.
- Verify or enter new named credentials for DomU (host, root, and Exadata Server) and for the Exadata Storage Server. Click **Test Credentials** to verify the credentials have been selected properly.

Click **Next** to schedule the scale-down job.

3. On the Schedule page, the Exadata Provisioning Wizard will create the Deployment Instance value. Select a schedule start and notification options:
 - **Schedule:** Select to initiate the scale down immediately or later. If you select later, then you will be prompted to select a date and time.
 - **Notification:** Select the notification statuses for which you will be notified.
 Click **Review** to review the settings and initiate the scale down.
4. On the Review page, review the selection in the summary displayed. To change any section, return to the previous page and edit the selection.

Click **Submit** to begin the scale down.

6.4.4 Deleting a Database Cluster

To delete an existing cluster:

1. From the Database Machine target menu, select **Provisioning**, then select **Delete Cluster**.

The Exadata Provisioning Wizard will display.

2. On the Cluster page, enter the cluster name you want to delete or click the Search icon to select an available cluster.

The page will update to show the nodes to be deleted

Verify or enter new named credentials for DomU (host, root, and Exadata Server) and for the Exadata Storage Server. Click **Test Credentials** to verify the credentials have been selected properly.

Click **Next** to schedule the delete job.

3. On the Schedule page, the Exadata Provisioning Wizard will create the Deployment Instance value. Select a schedule start and notification options:
 - **Schedule:** Select to initiate the scale down immediately or later. If you select later, then you will be prompted to select a date and time.
 - **Notification:** Select the notification statuses for which you will be notified.

Click **Review** to review the settings and initiate the delete job.

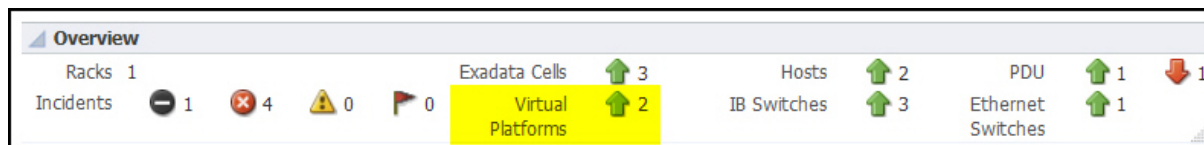
4. On the Review page, review the selection in the summary displayed. To change any section, return to the previous page and edit the selection.

Click **Submit** to begin the delete job.

6.5 Viewing Virtualized Exadata Database Machine

Once discovered, the Exadata plug-in shows the virtual machines monitored by Enterprise Manager Cloud Control 12c, as shown in [Figure 6-32](#):

Figure 6-32 Virtual Machines Monitored



Note: The schematic diagram in the Database Machine home page is based on the content of the `databasemachine.xml` file found during discovery. The **virtual platforms** (Dom0) are displayed as compute nodes in the rack in the schematic diagram.

The Database Machine Software topology diagram will not display the physical Oracle Server, virtual Oracle Server targets (DomU), and Virtual Platform target (Dom0) targets. However, it will continue to show the host targets which are running in DomU.

The Software tab for the Exadata Database Machine target shows all clusters, ASM, and Database targets in the whole physical Database Machine grouped by clusters as described in [Figure 6-33](#):

Figure 6–33 Exadata Database Machine Software Tab

HardwareSoftware

View ▾

Target Name	Target Type	Status	Target Version
DB Machine	Oracle Exadata Database Machine	↑	
cluster1	Cluster	↑	11.2.0.3.0
cluster1.host1	Host	↑	Enterprise Linux Serv
cluster1.host2	Host	↑	Enterprise Linux Serv
cluster.ASM1	Cluster ASM	↑	
cluster.asm1.manager1	Automatic Storage Management	↑	11.2.0.3.0
cluster.asm1.manager2	Automatic Storage Management	↑	11.2.0.3.0
cluster.DB1	Cluster Database	↑	11.2.0.3.0
cluster.DB1.instance1	Database Instance	↑	11.2.0.3.0
cluster.DB1.instance2	Database Instance	↑	11.2.0.3.0
cluster1	Cluster	↑	11.2.0.3.0
cluster1.host	Host	↑	Oracle Linux Server

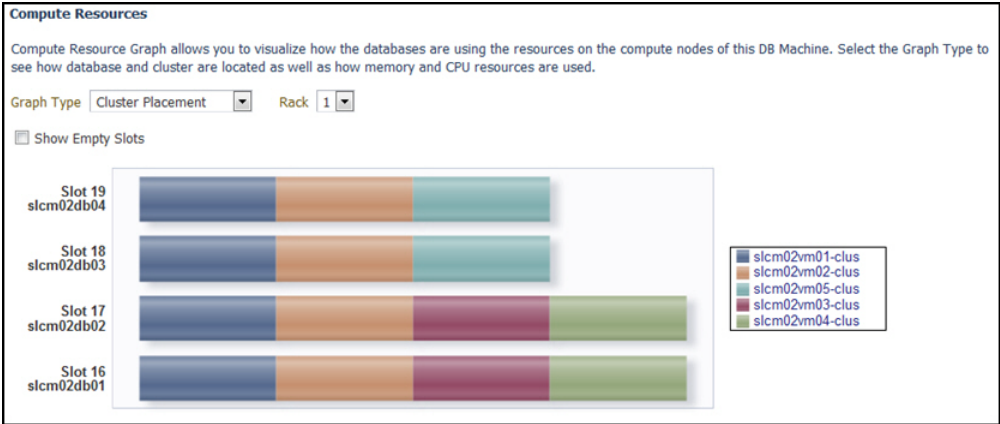
6.6 Resource Utilization Graphs

The following compute resource allocation graphs are available in virtualized Exadata. These graphs are dependent on the virtual machine hierarchy and metric data from the VI plug-in:

6.6.1 Cluster Placement

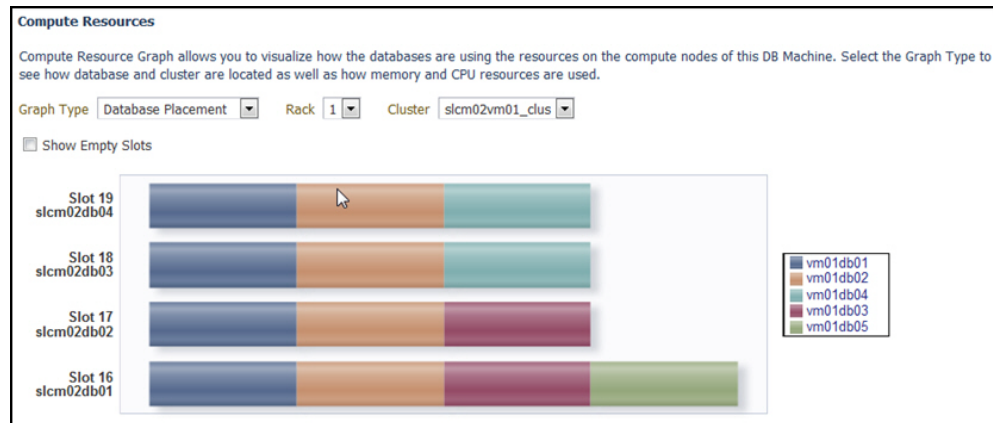
This graph (Figure 6–34) shows the ClusterWare cluster placement on physical servers in a particular Exadata Database Machine rack. Since this is a placement graph, the widths of the data series reflect the number of clusters on the physical server that has the most number of clusters.

Figure 6–34 Resource Utilization: Cluster Placement



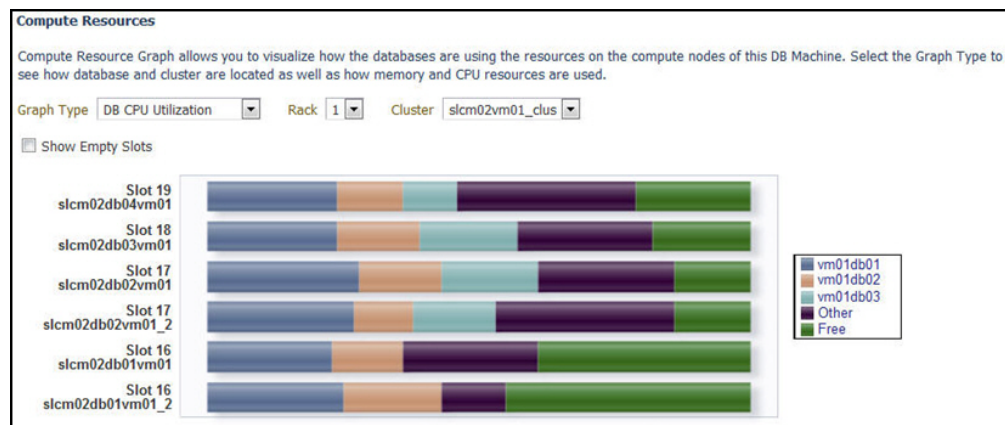
6.6.2 Database Placement

This graph (Figure 6–35) shows the database placement on physical servers in a particular Exadata Database Machine rack for a particular DB cluster. Since this is a placement graph, the widths of the data series reflect the number of DB on the physical server that has the most number of databases for a particular DB cluster.

Figure 6–35 Resource Utilization: Database Placement

6.6.3 Database CPU Utilization

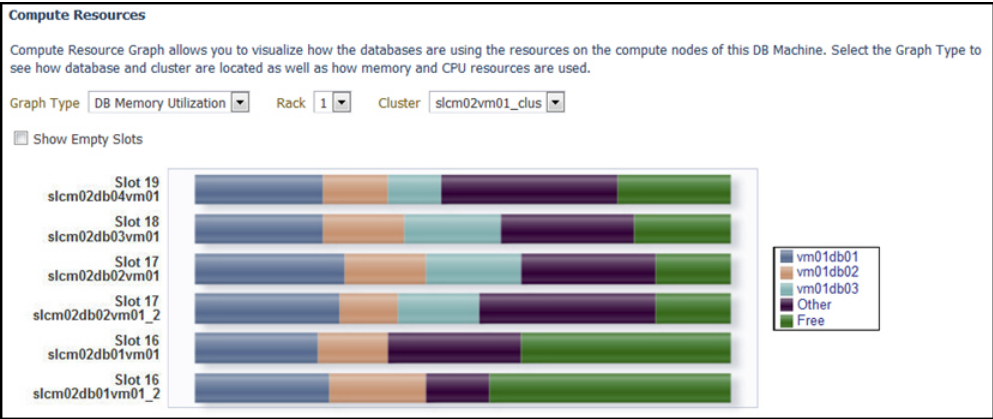
This graph (Figure 6–36) shows the database CPU utilization per database per VM host for a particular DB cluster.

Figure 6–36 Resource Utilization: Database CPU Utilization

6.6.4 Database Memory Utilization

This graph (Figure 6–37) shows the database memory utilization per database per VM host for a particular DB cluster.

Figure 6–37 Resource Utilization: Database Memory Utilization



Exadata Metrics

This chapter describes how to access the various metrics for the Oracle Exadata Database Machine and provides examples of key metrics including:

- [Accessing Exadata Metrics](#)
- [Aggregated Exadata FlashDisk and HardDisk Metric Example](#)
- [Exadata Cell Metric Example](#)

7.1 Accessing Exadata Metrics

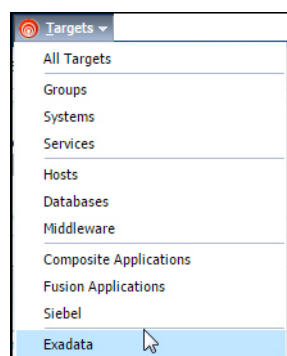
For a complete list of metrics available for the Oracle Exadata Database Machine, see the "Oracle Exadata" chapter of the *Oracle® Enterprise Manager Oracle Database Plug-in Metric Reference Manual*:

https://docs.oracle.com/cd/E24628_01/em.121/e25160/oracle_exadata.htm#BABFDHBG

To access the available Exadata Metrics:

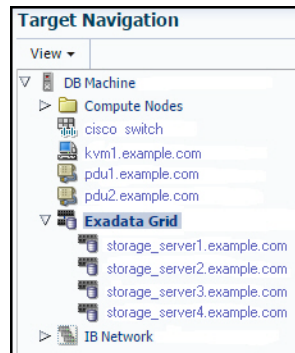
1. From the Targets menu, select **Exadata** ([Figure 7-1](#)):

Figure 7-1 Enterprise Manager Targets Menu



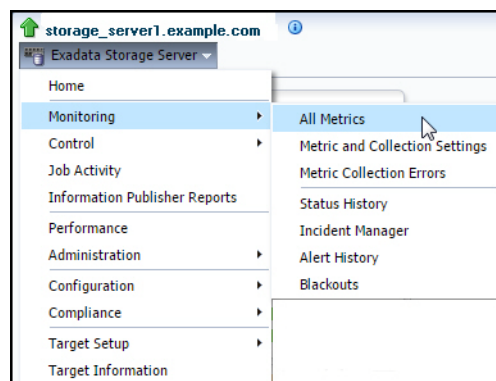
2. On the Oracle Exadata Database Machines page, select an Exadata Database Machine from the list.
3. From the Target Navigation tree, expand the **Exadata Grid** and select an Exadata Storage Server ([Figure 7-2](#)):

Figure 7–2 Expand the Exadata Grid in the Target Navigation Tree



- On the Storage Server page, select the **Exadata Storage Server** menu and select **Monitoring** then **All Metrics** (Figure 7–3):

Figure 7–3 Exadata Storage Server Monitoring Menu



- On the All Metrics page, a variety of metrics are available. Select a metric or click to expand available metric details.

7.2 Aggregated Exadata FlashDisk and HardDisk Metric Example

This metric category contains metrics that are aggregated over either the hard disks or flash disks in a cell. Selecting this metric from the All Metrics page generates a high-level summary, as shown in Figure 7–4:

Figure 7–4 Aggregated Exadata FlashDisk and HardDisk Metric

Aggregated Exadata FlashDisk and HardDisk Metric						
Collection Schedule		Every 15 Minutes	Modify			
Upload Interval		Every Collection				
Last Upload		Jan 21, 2015 8:08:53 PM GMT				
	CellDisk Type	Average CellDisk IO Load	Average CellDisk Read IOPS	Average CellDisk Read Response Time	Average CellDisk Read Throughput	Average CellDisk Small Read Response Time
>	FlashDisk	1	8.86	0.4	0.07	0.4
>	HardDisk	4.33	216.55	59.73	215.64	59.73

☒ Data shown in above table is collected in real time.

Expand the **Aggregated Exadata FlashDisk and HardDisk Metric** in the All Metrics page to show a variety of metric details, such as **Average CellDisk Read Throughput** (Figure 7–5), which gives an indication of the average number of bytes read from the cell disk, or **Total CellDisk IO Load** (Figure 7–6), which gives an indication of the total

input/output load to the celldisk.

Figure 7-5 Average CellDisk Read Throughput

View Data Last 24 Hours Auto Refresh Off						
Average CellDisk Read Throughput						
CellDisk Type	Average Value	Low Value	High Value	Last Known Value	Current Severity	Alert Triggered
FlashDisk	0.09	0.02	0.36	0.06	Not Applicable	-
HardDisk	190.36	92.54	368.79	130.37	Not Applicable	-

Figure 7-6 Total CellDisk IO Load

View Data Last 24 Hours Auto Refresh Off						
Total CellDisk IO Load						
CellDisk Type	Average Value	Low Value	High Value	Last Known Value	Current Severity	Alert Triggered
FlashDisk	16	16	16	16	Not Applicable	-
HardDisk	51.69	48	93	49	Not Applicable	-

7.3 Exadata Cell Metric Example

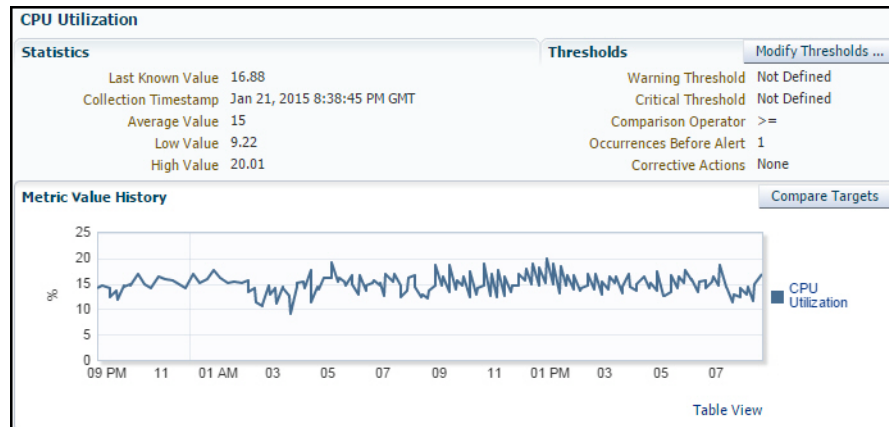
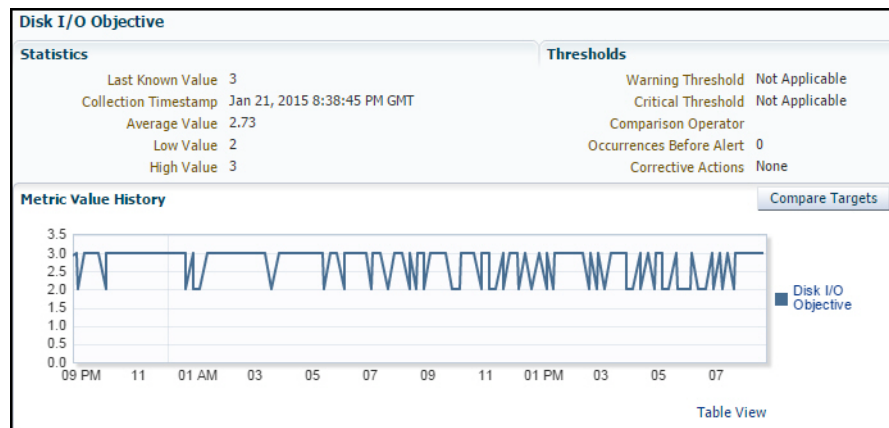
This metric category contains the performance metrics collected at the cell level for each cell, such as CPU utilization and memory utilization. Selecting this metric from the All Metrics page generates a high-level summary, as shown in [Figure 7-7](#):

Figure 7-7 Exadata Cell Metric

Exadata Cell Metric		
Collection Schedule	Every 15 Minutes	Modify
Upload Interval	Every Collection	
Last Upload	Jan 21, 2015 8:23:02 PM GMT	
Metric	Thresholds	Real Time Value
Cell Name	Not Applicable	adscx0008
CPU Utilization	Not Set	14.43
Disk I/O Objective	Not Applicable	3
Exadata Temperature Lower Threshold	Not Set	26
Exadata Temperature Reading	Not Applicable	26
Exadata Temperature Upper Threshold	Not Set	26
LED Status	Not Applicable	off
Memory Utilization	Not Set	70
Network Received	Not Applicable	0.04
Network Sent	Not Applicable	0.04

☒ Data shown in above table is collected in real time.

Expand the **Exadata Cell Metric** in the All Metrics page to show a variety of metric details, such as **CPU Utilization** ([Figure 7-8](#)), which provides information about the CPU utilization, or **Disk I/O Objective** ([Figure 7-9](#)), which provides the optimization objective which IORM is configured to achieve (for example, "Low Latency" or "Balanced" for OLTP-oriented databases, or "High Throughput" for data warehouses).

Figure 7–8 CPU Utilization**Figure 7–9 Disk I/O Objective**

Troubleshooting the Exadata Plug-in

This chapter provides troubleshooting tips and techniques on installing, discovering, and configuring the Exadata plug-in. The following sections are provided:

- [Establish SSH Connectivity](#)
- [Discovery Troubleshooting](#)
- [Troubleshooting the Exadata Database Machine Schematic File](#)
- [Exadata Database Machine Management Troubleshooting](#)
- [Exadata Derived Association Rules](#)
- [InfiniBand Patch Details Missing](#)
- [Oracle Auto Service Request \(ASR\) Issues](#)
- [Metric Collection Issues](#)
- [Status: Pending Issues](#)

8.1 Establish SSH Connectivity

For Release 12.1.0.1.0, the SSH key location is `<ORACLE_HOME>/ .ssh` where `ORACLE_HOME` is the installation directory of the Enterprise Manager agent. For example:

```
/u01/app/oracle/product/gc12/agent/core/12.1.0.1.0
```

Note: Some metric collection has a dependency on `~/ .ssh/known_hosts`.

For Release 12.1.0.2.0 or later, the SSH key location is `$HOME/ .ssh` of the agent user.

To set up SSH connectivity between the computer where Agent is running and the Oracle Exadata Storage Server, as the Agent user:

1. Log in to the computer where the Enterprise Manager Agent is running, open a terminal, and run the following commands as the Agent user to generate a pair of the SSH private/public keys if they are not present:
 - For Release 12.1.0.1.0:

```
$ cd <ORACLE_HOME>/ .ssh
$ ssh-keygen -t dsa -f id_dsa
```

Where `<ORACLE_HOME>` is the installation directory of the Enterprise Manager Agent.

- For Release 12.1.0.2.0:

```
$ cd $HOME/.ssh
$ ssh-keygen -t dsa -f id_dsa
```

Where \$HOME is the home directory of the Agent user.

2. Copy the public key (id_dsa.pub) to the /tmp directory on the storage cell:

```
$ scp id_dsa.pub root@<cell_ipaddress>:/tmp
```

3. Add the contents of the id_dsa.pub file to the authorized_keys file in the .ssh directory within the home directory of the cellmonitor user:

```
$ ssh -l root <cell_ipaddress> "cat /tmp/id_dsa.pub >>
~cellmonitor/.ssh/authorized_keys"
```

Note: If the authorized_keys file does not exist, then create one by copying the id_dsa.pub file to the .ssh directory within the home directory of the user cellmonitor:

```
$ ssh -l root <cell_ipaddress> "cp /tmp/id_dsa.pub
~cellmonitor/.ssh/authorized_keys; chown cellmonitor:cellmonitor
~cellmonitor/.ssh/authorized_keys"
```

4. Make sure that the .ssh directory and authorized_keys have the right file permission:

```
# chmod 700 ~cellmonitor/.ssh
# chmod 600 ~cellmonitor/.ssh/authorized_keys
```

8.2 Discovery Troubleshooting

Very often, the error message itself will include the cause for the error. Look for error messages in the OMS and agent logs (case insensitive search for dbmdiscovery) or in the Discovery window itself.

The following sections are provided:

- [Hardware Availability](#)
- [Discovery Failure Diagnosis](#)
- [Cell is not Discovered](#)
- [Compute Node Error Message](#)
- [Compute Node or InfiniBand Switch is not Discovered](#)
- [Compute Node not Managed by Enterprise Manager](#)
- [Extra or Missing Components in the Newly Discovered Exadata Database Machine](#)
- [InfiniBand Network Performance Page Shows No Data](#)
- [ILOM, PDU, KVM, or Cisco Switch is not Discovered](#)
- [Target Does not Appear in Selected Targets Page](#)
- [Target is Down or Metric Collection Error After Discovery](#)
- [Discovery Process Hangs](#)

8.2.1 Hardware Availability

All the hardware components must be "known" and reachable; otherwise, communication failures will occur. Use the `ping` command for each hardware component of the Exadata rack to make sure all names are resolved.

The MAP targets in Enterprise Manager Cloud Control 13c may fail while collecting the correlation identifier. This failure can happen if the credentials are incorrect OR if a target (for example, the ILOM) is too slow in responding.

ILOM can be slow when the number of open sessions on ILOM has exceeded the limit. You can resolve this issue by temporarily closing the sessions on the ILOM.

The rack placement of targets can fail:

- If `examan` did not return valid rack position for the target.
- If there is an existing target in the same location.

8.2.2 Discovery Failure Diagnosis

Should discovery of your Oracle Exadata Database Machine fail, collect the following information for diagnosis:

- Any `examan-*.xml`, `examan-*.html`, `targets-*.xml`, and `examan*.log` files from the `AGENT_ROOT/agent_inst/sysman/emd/state` directory.
- Agent logs: `emagent_perl.trc` and `gcagent.log`
- OMS logs: `emoms.trc` and `emoms.log`
- Any snapshot (screen capture) of errors shown on the target summary page.

8.2.3 Cell is not Discovered

If the cell itself is not discovered, possible causes could be:

- The installation of RDBMS Oracle Home Release 11.2 is incorrect.
- The `/etc/oracle/cell/network-config/cellip.ora` file on the compute node is missing or unreadable by the agent user or cell not listed in that file.
- The cell is not listed in the `/etc/oracle/cell/network-config/cellip.ora` file.
- Management Server (MS) or `cellsrv` is down.
- Cell management IP is changed improperly. Bouncing both `cellsrv` and MS may help.
- To check that the cell is discovered with a valid management IP, run the following command on the compute node used for discovery:

```
$ORACLE_HOME/bin/kfod op=cellconfig
```

8.2.4 Compute Node Error Message

Problems with the compute node may generate the following error:

The selected compute node is not an existing host target managed by Enterprise Manager. Please add the compute node as managed target before you continue.

Possible causes for this error include:

- The compute node was not added as an Enterprise Manager host target before the Exadata Database Machine discovery.

- The host target name for compute node is an IP address. This problem can be an `/etc/hosts` or DNS issue.
- The host target name is not fully qualified with domain name (for example, `hostname.mycompany.com`)

8.2.5 Compute Node or InfiniBand Switch is not Discovered

If there are problems with discovery of the compute node or the InfiniBand switch, possible causes could be:

- The InfiniBand switch host name or `nm2user` password is incorrect.
- The connection from the compute node to the InfiniBand switch through SSH is blocked by a firewall.
- The InfiniBand switch is down or takes too long to respond to SSH.

To resolve problems with the compute node or InfiniBand switch discovery, try:

- If the InfiniBand switch node is not discovered, the InfiniBand switch model or switch firmware may not be supported by EM Exadata. Run the `ibnetdiscover` command. Output should look like:

```
Switch 36 "S-002128469f47a0a0" # "Sun DCS 36 QDR switch switch1.example.com"
enhanced port 0 lid 1 lmc 0
```

- To verify discovery of the compute node, run the following command on the compute node used for discovery:

```
# ssh <IB switch> -l nm2user ibnetdiscover
```

- If the compute node is not discovered, run the `ibnetdiscover` command. Output should look like:

```
Ca 2 "H-00212800013e8f4a" # "xdb1db02 S 192.168.229.85 HCA-1"
```

A bug in the 11.2.2.2 compute node image shows “S” and the InfiniBand IP as missing. Output would look like:

```
Ca 2 " H-00212800013e8f4a " # "xdb1db02 HCA-1"
```

A workaround for this problem is to run the following command as root on the compute nodes:

```
# /opt/oracle.cellos/ib_set_node_desc.sh
```

8.2.6 Compute Node not Managed by Enterprise Manager

If you encounter an instance where the compute node is not being managed by Enterprise Manager, then check the following troubleshooting steps:

- If the Agent host name is different than the compute node host name, then run the following command as root to match up to agent host name:

```
# ibnetdiscover
```

- If the wrong Agent is used for discovery, then select the compute node Agent for discovery.
- If the compute node name has been reset from the client to management or vice-versa, then run the following command:

```
# /usr/sbin/set_nodedesc.sh
```


- If a short host name is used for agents, then reinstall the agents using fully-qualified host name <hostname.domain>.

8.2.7 Extra or Missing Components in the Newly Discovered Exadata Database Machine

If you are showing extra components or if there are missing components, then check the following troubleshooting steps:

- For extra components, examine them for Exadata Database Machine membership. Deselect any extra components manually from the discovered list.
- Verify which schematic file that was used for discovery. Ensure that Enterprise Manager can read the latest xml file (for example, databasemachine.xml) on the compute node.
- For missing components, check the schematic file content.
- If you need to generate a new schematic file, then log a service request (SR) with Oracle Support and provide the details.

8.2.8 InfiniBand Network Performance Page Shows No Data

If the InfiniBand network performance page does not show data, double check that the files under the `/opt/oracle.SupportTools/em/` directory on compute nodes should be publicly readable. See Oracle Bug 13255511 for more information.

8.2.9 ILOM, PDU, KVM, or Cisco Switch is not Discovered

If the ILOM, PDU, KVM, or Cisco switch is not discovered, the most likely cause is that the Exadata Database Machine Schematic file cannot be read or has incorrect data. See [Troubleshooting the Exadata Database Machine Schematic File](#).

8.2.10 Target Does not Appear in Selected Targets Page

Even though no error may appear during the Exadata Database Machine guided discovery, the target does not appear on the Select Components page. Possible causes and solutions include:

- Check the All Targets page to make sure that the target has not been added as an Enterprise Manager target already:
 - Log in to Enterprise Manager.
 - Select **Targets**, then **All Targets**.
 - On the All Targets page, check to see if the Oracle Exadata target appears in the list.
- A target that is added manually may not be connected to the Exadata Database Machine system target through association. To correct this problem:
 - Delete these targets before initiating the Exadata Database Machine guided discovery.
 - Alternatively, use the `emcli` command to add these targets to the appropriate system target as members.

8.2.11 Target is Down or Metric Collection Error After Discovery

After the Exadata Database Machine guided discovery, an error that the target is down or that there is a problem with the metric collection may display. Possible causes and recommended solutions include:

- For the cell or InfiniBand switch, the setup of SSH may not be configured properly. To troubleshoot and resolve this problem:
 - The agent's SSH public key in the <AGENT_INST>/.ssh/id_dsa.pub file is not in the authorized_keys file of \$HOME/.ssh for cellmonitor or nm2user.
 - Verify permissions. The permission settings for .ssh and authorized_keys should be:


```
drwx----- 2 cellmonitor cellmonitor 4096 Oct 13 07:06 .ssh
-rw-r--r-- 1 cellmonitor cellmonitor 441842 Nov 10 20:03 authorized_keys
```
 - Resolve a PerformOperationException error. See [Troubleshooting the Exadata Database Machine Schematic File](#) for more information.
- If the SSH setup is confirmed to be properly configured, but the target status is still down, then check to make sure there are valid monitoring and backup agents assigned to monitor the target. To confirm, click the **Database Machine** menu and select **Monitoring Agent**. [Figure 8–1](#) shows an example of the monitoring agents:

Figure 8–1 Monitoring Agents Example

Cell Name	Monitoring Agent	Backup Monitoring Agent
<cell name1>	https://<monitoring agent URL-1>.com:1844/emd/main/	https://<backup agent URL-1>.com:1842/emd/main/
<cell name2>	https://<monitoring agent URL-2>.com:1844/emd/main/	https://<backup agent URL-2>.com:1842/emd/main/
<cell name3>	https://<monitoring agent URL-3>.com:1842/emd/main/	https://<backup agent URL-3>.com:1844/emd/main/
IB Switch Name	Monitoring Agent	Backup Monitoring Agent
<InfiniBand Switch name>	https://<monitoring agent URL>.com:1842/emd/main/	https://<backup agent URL>.com:1844/emd/main/
Ethernet Switch Name	Monitoring Agent	Backup Monitoring Agent
<Ethernet Switch name>	https://<monitoring agent URL>.com:1842/emd/main/	https://<backup agent URL>.com:1844/emd/main/
ILOM Name	Monitoring Agent	Backup Monitoring Agent
<ILOM name1>	https://<monitoring agent URL-1>.com:1844/emd/main/	https://<backup agent URL-1>.com:1842/emd/main/
<ILOM name2>	https://<monitoring agent URL-3>.com:1842/emd/main/	https://<backup agent URL-3>.com:1844/emd/main/
KVM Name	Monitoring Agent	Backup Monitoring Agent
<KVM name>	https://<monitoring agent URL>.com:1842/emd/main/	https://<backup agent URL>.com:1844/emd/main/
PDU Name	Monitoring Agent	Backup Monitoring Agent
<PDU name>	https://<monitoring agent URL>.com:1844/emd/main/	https://<backup agent URL>.com:1842/emd/main/

- For the ILOM, PDU, KVM, or Cisco switch, possible causes include:
 - The Exadata Database Machine Schematic Diagram file has the wrong IP address.
 - Monitoring Credentials is not set or incorrect. To verify:
 - * Log in to Enterprise Manager.
 - * Click **Setup**, then **Security**, and finally **Monitoring Credentials**.
 - * On the Monitoring Credentials page, click the **Oracle Exadata** target type. Then set the monitoring credentials.

8.2.12 Discovery Process Hangs

If the discovery process for the Exadata Database Machine hangs, then check the following troubleshooting steps:

- Examine your network to verify:
 - That the host name can be resolved.
 - That the Agent(s) can access the OMS.
 - That a simple job can be executed from the console.
- If the OMS reported any errors, then check the following log file:


```
MW_HOME/gc_inst/sysman/log/emoms.log
```
- For Repository issues, check the Repository database's alert.log file.
- For Agent issues, check the following log file:


```
$AGENT/agent_inst/sysman/log/gcagent.log
```

8.3 Troubleshooting the Exadata Database Machine Schematic File

The Exadata Database Machine Schematic file version 503 is required as a prerequisite for guided discovery. As part of any discovery troubleshooting, possible causes and recommended resolution with the schematic file can include:

- The schematic file on the compute node is missing or is not readable by the agent user.
 - For Exadata Release 11.2.3.2 and later, the schematic file is:


```
/opt/oracle.SupportTools/onecommand/catalog.xml
```
 - For Exadata Release 11.2.3.1 and earlier, the schematic file is:


```
/opt/oracle.SupportTools/onecommand/databasemachine.xml
```
- If a `PerformOperationException` error appears, the agent NMO is not configured for `setuid-root`:
 - From the OMS log:


```
2011-11-08 12:28:12,910 [[ACTIVE] ExecuteThread: '6' for queue:
'weblogic.kernel.Default (self-tuning)']
ERROR model.DiscoveredTarget logp.251 -
ERROR: NMO not setuid-root (Unix only)
oracle.sysman.emSDK.agent.client.exception.PerformOperationException:
```
 - As root, run:


```
# <AGENT_INST>/root.sh
```
- In the `/etc/pam.d` file, `pam_ldap.so` is used instead of `pam_unix.so` on compute nodes.
 - Even though the agent user and password are correct, this errors appears in the agent log:


```
oracle.sysman.emSDK.agent.client.exception.PerformOperationException:
ERROR: Invalid username and/or password
```

- Schematic file has error because of a known Exadata Database Machine configurator bug:
 - Verify that the Exadata Database Machine configurator is version 12.0
 - Verify that the schematic file is version 503
 - Older versions may or may not have the bug depending on the Exadata Database Machine rack type and partitioning.
- If the schematic file is blank, then:
 - Check your browser support and Enterprise Manager Cloud Control 12c.
 - Run through discovery again and watch for messages.
 - Check the `emoms.log` file for exceptions at the same time.
- If components are missing, then:
 - Add manually to the schematic page (click **Edit**).
 - Check for component presence in Enterprise Manager. Check to see if it is monitored.

8.4 Exadata Database Machine Management Troubleshooting

If data is missing in Resource Utilization graphs, then run a "view object" SQL query to find out what data is missing. Common problems include:

- Schematic file is not loaded correctly.
- Cluster, Database, and ASM are not added as Enterprise Manager targets.
- Database or cell target is down or is returning metric collection errors.
- Metric is collected in the Enterprise Manager repository, but has an `IS_CURRENT != Y` setting.

8.5 Exadata Derived Association Rules

Exadata derived association rules depend on Exadata and DB/ASM ECM data. This data may take up to 30 minutes to appear depending on metric collection schedule. To check for data availability:

- From the Enterprise Manager Cloud Control console:
 - Click **Targets**, then **All Targets**.
 - On the All Targets page, click the **Oracle Exadata** target from the list.
 - Click **Database System**, then **Configuration**, and finally **Last Collected**.
 - On the Latest Configuration page, click **Actions**, then **Refresh**.
- From the command line:

```
# emctl control agent runCollection
# target_name:target_type <collectionName>
```

Other troubleshooting tips include:

- Verify that ECM data are collected and present in Enterprise Manager repository.
- Verify that all data and conditions in query are met by running the query in SQL+.
- Verify triggers by enabling debug logging to check for timing issues.

8.6 InfiniBand Patch Details Missing

Problem: If you select both InfiniBand switches in an Exadata Database Machine, the Patch Details section is empty. Installation of a patch for both InfiniBand switches are not affected - only the details of the installed patch.

Workaround: Select each InfiniBand switch individually to review the patch details.

8.7 Oracle Auto Service Request (ASR) Issues

- [Oracle ASR Not Working on Exadata Storage Server](#)
- [No Slots Available Error](#)

8.7.1 Oracle ASR Not Working on Exadata Storage Server

Problem: You may encounter a problem where Oracle ASR is not working on the Exadata Storage Server.

Resolution: Ensure that there are two subscriptions on the Exadata Storage Server:

- The type should be ASR *or* V3ASR for receiving the cell ILOM traps.
- The type should be default (no type) *or* v3 for receiving the MS MIB traps from the cell.

8.7.2 No Slots Available Error

The asr type entry on MS MIB adds a subscription to the cell ILOM automatically. If the ILOM SNMP slots are full, then the subscription command on the cell may fail with the following error:

```
CELL-02669: No slots are available for ILOM SNMP subscribers
```

There is a limit of 15 subscribers on the ILOM which might cause this failure. You will need to free up some slots on the ILOM and retry the ASR subscription:

1. Login to the ILOM console (for example: <https://XXXCELL-c.example.com>).
2. Click **ILOM Administration** and then **Notification**.
3. Choose the slot and set the subscriber to **0.0.0.0** to clear it up.

8.8 Target Status Issues

If the Target status shows DOWN inaccurately, then:

- For the **Cell**: Check ssh equivalence (cellmonitor user) with the followign command:

```
ssh -i /home/oracle/.ssh/id_dsa -l cellmonitor <cell name> -e cellcli list cell
```

Output should be: <cell name>

- For the **PDU**: Check to make sure you can access the PDU through your browser to verify that it is connected to your LAN:

```
http://<pdu name>
```

- For the **Cisco Switch**: Check for proper SNMP subscriptions. See [Set Up SNMP for Cisco Ethernet Switch Targets](#) for details.

8.9 Metric Collection Issues

If the Target status shows a Metric Collection Error, then:

- Hover over the icon or navigate to Incident Manager.
- Read the full text of the error.
- Visit the Monitoring Configuration page and examine the settings. From the **Setup** menu, select **Monitoring Configuration**.
- Trigger a new collection: From the **Target** menu, select **Configuration**, then select **Last Collected**, then **Actions**, and finally select **Refresh**.
- Access the monitoring Agent Metric through your browser:

```
https://<agent URL>/emd/browser/main
```

Click **Target >>** and then click **Response** to evaluate the results. You may need to log a service request (SR) with Oracle Support.

8.10 Status: Pending Issues

For those issues where components are in a Pending status, see the following troubleshooting steps:

- [Cellsys Targets](#)
- [Database Machine Target or Any Associated Components](#)

8.10.1 Cellsys Targets

If the Cellsys target seems to be in a Pending status for too long, then:

- Verify that there is an association for the Cluster ASM, Database, and Storage Cell.
- Check and fix the status of the associated target database.
- Check and fix the status of the associated target ASM cluster.
- Ensure an **UP** status for all cell server targets.
- Delete any unassociated cellsys targets.

8.10.2 Database Machine Target or Any Associated Components

If the Exadata Database Machine target or any associated components are in a Pending status for too long, then:

- Check for duplicate or pending delete targets. From the **Setup** menu, select **Manage Cloud Control**, then select **Health Overview**.
- Check the target configuration. From the target's home page menu, select **Target Setup**, then select **Monitoring Configurations**.
- Search for the target name in the agent or OMS logs:

```
$ grep <target name> gcagent.log or emoms.log
```

Index

A

alerts

- InfiniBand, 5-18
- ALTER CELL command, 4-4
- automated kit, 2-8

C

- Cell administration, 5-13
- Cell management, 5-10
- chapter, 1-1
- Cisco Ethernet Switch
 - SNMP configuration, 4-13
- Compute Node Agent
 - Linux setup, 4-2
 - Solaris setup, 4-2
- Compute Node ILOM
 - SNMP configuration, 4-10
- creating roles
 - user roles
 - creating, 5-1

D

- dashboard
 - public report, 4-19
- dashboard creation, 4-18
- Database Machines
 - alerts, 5-4
- delete Exadata Database Machine component, 5-6
- deploy plug-in, 2-10
- deployment prerequisites, 2-1
- derived association rules, 8-8
- discovery, 3-4
 - Grid Infrastructure, 3-16
 - post-discovery configuration and verification, 4-1
 - Real Application Clusters (RAC), 3-16
 - review page, 3-12
 - SPARC SuperCluster, 3-14
 - switch troubleshooting, 8-5
- discovery precheck script, 3-1
- Disk I/O Objective, 5-13

E

- Enterprise Manager Agent

- automated kit, 2-8
 - installation, 2-7
 - Solaris 11 only, 2-7
- Exadata Cell management, 5-10
- Exadata component
 - delete, 5-6
- Exadata Database Machine
 - configuration support, 1-5
 - dashboard, 4-18
 - remove target, 5-5
 - troubleshooting, 8-8
 - view topology, 5-2
- Exadata software support, 1-3

F

- Fault Monitoring, 5-20
- features, 1-1
 - hardware support, 1-2
 - in 13.1.0.0.0, xi
 - monitoring and notification, 1-1
 - target discovery, 1-3
- firewall configuration, 2-4

H

- hardware
 - supported hardware, 1-4
 - view critical information, 5-3
- hardware not supported, 1-12
- hardware support features, 1-2

I

- InfiniBand network management, 5-16
- InfiniBand Switch
 - configure for SNMP, 4-8
- IORM Monitoring, 5-13

K

- KVM
 - SNMP configuration, 4-15

M

manual verification, 3-4
manually, 2-10
metrics and alert settings, 5-10
monitoring and notification features, 1-1
multi-rack support, 1-5

N

names resolution, 2-4
new features, xi

O

Oracle ILOM server, 4-12
Oracle SuperCluster prerequisites
 OneCommand, 2-6
Oracle SuperCluster support, 1-6
 known issues, 1-7

P

PDU
 SNMP configuration, 4-14
prerequisites
 Exadata Storage Server software, 2-2
 firewall configuration, 2-4
 ILOM ipmtool, 2-3
 InfiniBand Switch, 2-3
 KVM application, 2-3
 PDU firmware, 2-3
 plug-in deployment, 2-1

R

remove Exadata Database Machine target, 5-5
remove SNMP subscription, 4-7

S

schematic file
 troubleshooting, 8-7
schematic files, 3-6
secure storage, 3-1
SNMP
 configure using cellcli, 4-5
 configure using dcli, 4-7
 set up in KVM management console, 4-15
 trap forwarding setup on compute node, 4-1
 verify configuration, 4-15
SNMP configuration
 Cisco Ethernet Switch, 4-13
 Compute Node ILOM, 4-10
 InfiniBand Switch, 4-8
 KVM, 4-15
 PDU, 4-14
SNMP subscription
 remove, 4-7
snmptrapd.conf configuration file, 4-2, 4-3
software support

Exadata, 1-3
SPARC SuperCluster
 discovery, 3-14
SSH connectivity, 4-7, 8-1
Storage Cell SNMP configuration, 4-4
supported component versions, 1-10
supported hardware, 1-4, 1-12
 partitioned Exadata Database Machine, 1-6
supported operating systems, 1-11

T

target discovery features, 1-3
troubleshooting
 discovery, 8-2
 Exadata Database Machine, 8-8
 schematic file, 8-7

U

user roles, 2-7

V

view topology, 5-2