

Oracle® Enterprise Manager
Exadata Management Getting Started Guide
Release 12.1.0.6.0
E27442-13

August 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, the following notice is applicable:

U.S. GOVERNMENT RIGHTS Programs, software, databases, and related documentation and technical data delivered to U.S. Government customers are "commercial computer software" or "commercial technical data" pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, the use, duplication, disclosure, modification, and adaptation shall be subject to the restrictions and license terms set forth in the applicable Government contract, and, to the extent applicable by the terms of the Government contract, the additional rights set forth in FAR 52.227-19, Commercial Computer Software License (December 2007). Oracle America, Inc., 500 Oracle Parkway, Redwood City, CA 94065.

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 is a registered trademark of Oracle Corporation and/or its affiliates. Other names may be trademarks of their respective owners.

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	vii
Audience	vii
Documentation Accessibility	vii
Conventions	vii
What's Changed	viii
What's New	ix
New Features and Enhancements for Oracle Exadata Plug-in 12.1.0.6.0.....	ix
Features and Enhancements for Oracle Exadata Plug-in 12.1.0.5.0	xiii
Features and Enhancements for Oracle Exadata Plug-in 12.1.0.4.0	xv
Features and Enhancements for Oracle Exadata Plug-in 12.1.0.3.0	xvi
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.....	1-2
1.1.4 Target Discovery Features.....	1-3
1.2 Oracle Exadata Database Machine Supported Hardware and Software.....	1-3
1.2.1 Exadata Database Machine Configuration Support	1-4
1.2.2 Oracle SuperCluster Support.....	1-5
1.2.2.1 Oracle SuperCluster Known Issues	1-6
1.2.3 Supported Component Versions	1-9
1.2.4 Supported Operating Systems	1-11
1.2.5 Certified Exadata Plug-in Versions.....	1-11
1.2.6 Oracle Exadata Database Machine Hardware Not Supported	1-11
2 Oracle Exadata Plug-in 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	2-4
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.....	2-6
2.3	Install Enterprise Manager Agent	2-6
2.3.1	Agent Installation Prerequisite - Solaris 11 Only	2-7
2.3.2	Install Agents and Set Up Exadata Monitoring Using Automated Kit	2-7
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	2-9
2.4	Manually Deploy Exadata Plug-in	2-10

3 Exadata Database Machine Discovery

3.1	Prerequisites for Guided Discovery	3-1
3.1.1	Secure Storage for Target Monitoring Credentials	3-1
3.1.2	Discovery Precheck Script	3-2
3.1.2.1	Download the Discovery Precheck Script.....	3-2
3.1.2.2	Run the Discovery Precheck Script.....	3-2
3.1.3	Manual Verification.....	3-4
3.2	Discovering an Exadata Database Machine	3-4
3.3	Discovering the Oracle SuperCluster as an Exadata Database Machine.....	3-9
3.4	Discovering Grid Infrastructure and RAC	3-10
3.4.1	Discover Grid Infrastructure (Cluster) Targets	3-10
3.4.2	Discover Oracle Real Application Clusters (RAC) Targets	3-11

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	Check Current SNMP Configuration.....	4-4
4.2.2	Configure SNMP Values Using cellcli.....	4-5
4.2.3	Configure SNMP Values Using dcli (optional)	4-6
4.2.4	Verify SSH Connectivity	4-6
4.2.5	Remove a Subscription	4-6
4.3	Configure and Verify SNMP for InfiniBand Switch Targets.....	4-7
4.3.1	Set Up SNMP for InfiniBand Switch Targets Using Enterprise Manager	4-8
4.4	Configure the Compute Node ILOM SNMP for Enterprise Manager Monitoring.....	4-9
4.4.1	Configure the Compute Node ILOM SNMP for Compute Nodes Running Management Server	4-10
4.4.2	Configure SNMP Values Using dbmcli.....	4-11
4.4.3	Configure SNMP for Oracle SuperCluster.....	4-11
4.5	Verify Configuration for Oracle ILOM Server.....	4-11
4.6	Set Up SNMP for Cisco Ethernet Switch Targets	4-12
4.6.1	Verify the Cisco Ethernet Switch SNMP Configuration	4-13
4.7	Set Up SNMP for Power Distribution Unit (PDU) Targets.....	4-13

4.7.1	Verify the PDU SNMP Configuration	4-14
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	4-15
4.8.3	Verify the KVM SNMP Configuration (Base SNMP Configuration) - Solaris.....	4-16
4.8.4	Verify the KVM SNMP Configuration (SNMP Forwarding to Agent).....	4-17
4.9	Oracle Exadata Database Machine Dashboard Creation	4-17
4.9.1	Creating a Dashboard for Exadata Database Machine Plug-in Release 12.1.0.3.0 and Later 4-18	
4.9.2	Making the Dashboard Report "Public"	4-18
4.9.3	Finding All Exadata Database Machine Reports	4-18

5 Oracle Exadata Database Machine Administration

5.1	Creating Roles to Manage the Plug-in	5-1
5.2	Viewing 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 Exadata Database Machine Alerts.....	5-4
5.2.4	Viewing Exadata Database Machine 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.....	5-5
5.2.8	Updating the Exadata Database Machine Schematic Diagram	5-5
5.2.8.1	Drop a Component from the Exadata Database Machine Schematic Diagram ..	5-6
5.2.8.2	Add Components to the Exadata Database Machine Schematic Diagram	5-7
5.3	Exadata Storage Server Management	5-9
5.3.1	About Exadata Storage Server	5-9
5.3.2	Using Exadata As a Cloud Control Target.....	5-9
5.3.3	Viewing an Exadata Storage Server Configuration	5-10
5.3.4	Performing Administration Tasks on Exadata Storage Servers.....	5-10
5.3.5	Managing the IO Resource	5-11
5.3.5.1	Modify the Disk I/O Objective.....	5-12
5.3.5.2	The Inter-Database Plan	5-13
5.3.6	Diagnosing Exadata Cell Alerts.....	5-14
5.3.7	Accessing Oracle Support Workbench for Exadata Storage Server	5-14
5.4	Accessing Exadata Cell Metrics and Alert Settings	5-15
5.5	Managing the InfiniBand Network	5-15
5.5.1	InfiniBand Metric Types	5-15
5.5.2	Performing Administration Tasks on Infiniband Networks	5-16
5.5.3	Setting Up InfiniBand Switch Alerts.....	5-16
5.6	Exadata Database Machine Fault Monitoring	5-17

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	Viewing Virtualized Exadata Database Machine.....	6-7

6.4	Resource Utilization Graphs	6-7
6.4.1	Cluster Placement	6-7
6.4.2	Database Placement	6-8
6.4.3	Database CPU Utilization	6-8
6.4.4	Database Memory Utilization	6-9

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

8.1	Establish SSH Connectivity	8-1
8.2	Discovery Troubleshooting	8-2
8.2.1	Hardware Availability	8-2
8.2.2	Compute Node Error Message	8-2
8.2.3	Cell is not Discovered	8-3
8.2.4	Compute Node or InfiniBand Switch is not Discovered	8-3
8.2.5	InfiniBand Network Performance Page Shows No Data	8-4
8.2.6	ILOM, PDU, KVM, or Cisco Switch is not Discovered	8-4
8.2.7	Target Does not Appear in Selected Targets Page	8-4
8.2.8	Target is Down or Metric Collection Error After Discovery	8-4
8.2.9	Troubleshooting the Exadata Database Machine Schematic File	8-5
8.3	Exadata Database Machine Management Troubleshooting	8-6
8.4	Exadata Derived Association Rules	8-6
8.5	Enhanced MIB Incompatibility	8-7

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 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 Exadata Management Getting Started Guide*:

Part Number	Change Summary
E27442-13	Updated supported Exadata Storage Server software versions. See New Features and Enhancements for Oracle Exadata Plug-in 12.1.0.6.0 . Added a new Certified Exadata Plug-in Versions section. Added a new Enhanced MIB Incompatibility section.
E27442-12	Corrected the command to set the <code>snmpSubscriber</code> value in Configure SNMP Values Using dbmcli . Updated the ILOM user ID test step for the Exadata X5-2 in Create a Database Server ILOM Service Processor User .
E27442-11	Updated the "SPARC SuperCluster" product name to be "Oracle SuperCluster." Added content for support of Virtualized Exadata Database Machine . Added information about Exadata Metrics collected for the Oracle Exadata Database Machine. The 12.1.0.6.0 includes additional Exadata hardware and software support. See New Features and Enhancements for Oracle Exadata Plug-in 12.1.0.6.0 .

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 12.1.0.6.0](#)
- [Features and Enhancements for Oracle Exadata Plug-in 12.1.0.5.0](#)
- [Features and Enhancements for Oracle Exadata Plug-in 12.1.0.4.0](#)
- [Features and Enhancements for Oracle Exadata Plug-in 12.1.0.3.0](#)

New Features and Enhancements for Oracle Exadata Plug-in 12.1.0.6.0

Oracle Exadata plug-in Release 12.1.0.6.0 includes a variety of bugs fixed and enhancements implemented for the following feature areas:

- [Newly Supported Hardware and Software Configurations](#)
- [I/O Resource Monitoring \(IORM\) for Multi-Tenancy Database \(CDB/PDB\) Environment](#)
- [Exadata Storage Server Grid Home Page and Exadata Storage Server Home Page Improvements](#)
- [Performance Page Improvements](#)
- [Full Partition Support in Release 12.1.0.6.0](#)
- [Support for Virtualization](#)
- [Support for Oracle Database](#)
- [Support for Exakit 12.1.0.5](#)
- [Support for Oracle SuperCluster v2.0](#)

Check the list of patches required along with the Oracle Exadata plug-in release 12.1.0.6.0. For patch details, see *Enterprise Manager 12c Support For ORACLE EXADATA DATABASE MACHINE X5-2* (Doc ID 1967701.1), available in My Oracle Support (<https://support.oracle.com>):

<https://support.oracle.com/rs?type=doc&id=1967701.1>

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 12.1.0.6.0 supports the following hardware and software:

- Oracle Exadata Server versions:
 - 11.2.3.3.1 or earlier.
 - 12.1.1.1.0, includes support for Oracle Database 12c.
 - 12.1.2.1.0
 - 12.1.2.1.1
 - 12.1.2.1.1 release and patch 2024004. See Doc ID 1959143.1 in My Oracle Support:
<https://support.oracle.com/rs?type=doc&id=1954819.1>
 - 12.1.1.1.2
 - 12.1.1.1.2 release and patch 20699031. See Doc ID 1995937.1 in My Oracle Support:
<https://support.oracle.com/rs?type=doc&id=195937.1>

- Exadata hardware:

- X4-2, X4-8

Note: For the Exadata X4-2 and X4-8, Enhanced PDU monitoring and management support is provided. However, to monitor and manage an Enhanced PDU, you must set the set the SNMP MIB option to **Original-MIB** on the PDU. See [Enhanced MIB Incompatibility](#) for details.

- X5-2
- Extreme Flash storage servers

- Oracle SuperCluster hardware:

- T5-8
- M6-32

Note: For details about support for the Oracle SuperCluster M6-32 server, see *Oracle Enterprise Manager Exadata plug-in Support for SuperCluster M6* (Doc ID 1920159.1), available in My Oracle Support:

<https://support.oracle.com/rs?type=doc&id=1920159.1>

- Oracle SuperCluster v2.0 software:

- Extends virtualization capabilities and introduces new and enhanced tools like Oracle VM Server for SPARC 3.1.1 support, IO Domain Creation Tool, OVM Templates, and so forth.
- Elastic Configuration

I/O Resource Monitoring (IORM) for Multi-Tenancy Database (CDB/PDB) Environment

Oracle Exadata Plug-in Release 12.1.0.6.0 supports the following IORM for multi-tenancy database (CDB/PDB) environment enhancements:

- 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.

Exadata Storage Server Grid Home Page and Exadata Storage Server Home Page Improvements

Oracle Exadata Plug-in Release 12.1.0.6.0 supports the following updates to the Exadata Storage Server and Storage Server Grid home pages:

- Reorganized home page UI to address customer use cases.
- Provides a fine-grained performance summary for flash and hard disk.
- Provides new usage statistics to highlight flash cache and Smart Scan efficiency.
- Provides new metrics for:
 - I/O time distribution by flash and hard disk.
 - IORM wait per database.

Performance Page Improvements

Oracle Exadata Plug-in Release 12.1.0.6.0 supports the following updates to the Performance page:

- New UI look and organization.
- Side-by-side comparison of flash and hard disk performance charts in a single page.
- Performance comparison between multiple Exadata Storage Servers.
- Performance utilization for flash and hard disk to identify workload reaching hardware limit.

Full Partition Support in Release 12.1.0.6.0

- Logical splitting of an Exadata Database Machine Rack into multiple Database Machines.
- Supported configuration:
 - Each partition is defined through a single One Command 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.
- Expected behavior:
 - Ability to specify a customized Exadata Database Machine name.
 - User can confirm and select individual components for each Exadata Database Machine.
 - 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 Virtualization

The Exadata plug-in discovers, manages, and monitors virtualized Exadata Database Machine in conjunction with the Virtualization Infrastructure plug-in. See [Virtualized Exadata Database Machine](#) for more information.

Support for Oracle Database

Enterprise Manager includes support for Oracle Database through the Database plug-in. The Exadata plug-in leverages the features of the Database plug-in to allow access for additional functionality such as:

- Support for Snap Clone on Exadata:

Available through the Cloud Management Pack for Oracle Database features of Enterprise Manager, you can create test masters on an Exadata system and create time- and space-efficient multitenant database and Database clones on Exadata.

For a summary of Database plug-in, see:

http://docs.oracle.com/cd/E24628_01/doc.121/e25353/whats_new.htm#CHDDCBAI

See the following video for an overview of the Database Snap Clone on Exadata feature:

<https://www.youtube.com/watch?v=nvEmp6Z65Bg>

Features of Snap Clone include:

- Fast space-efficient Snapshot database creation with the ability to create a snapshot database or snapshot multitenant database that reads from the base read-only copy of the database and writes to sparse diskgroup.
- Integration with multitenant database enables creation of the database snapshot with *single click* (rapid database snapshots using sparse technology).
- All Exadata features work on Snapshots (smart scans, smart flash cache, resource management, and so forth).
- Code deployed on Exadata Storage Cells allocates on first write.
- Built on `clonedb` code, which is database-centric rather than file-centric.
- Leverages "sparse files" to reduce storage footprint.
- Snapshot source is called a "Test Master" and must be read-only:
 - No snapshot of prod database

- Enables Smart Scan and other Exadata-specific features for your development and test environment.
- Initiated by using other Database snapshot integration features:
 - `SNAPSHOT COPY` (for multitenant databases).
 - `CLONEDB` (for non-container databases).

Support for Exakit 12.1.0.5

The automation kit deploys the Enterprise Manager Cloud Control 12c Release 5 agents on Exadata to enable monitoring of Exadata via Enterprise Manager and (optionally) to setup Database as a Service (DBaaS) on Exadata.

Support for Oracle SuperCluster v2.0

The Exadata plug-in Release 12.1.0.6.0 now provides the following support for the Oracle SuperCluster v2.0:

- **Rapid Setup Kit:** Set up Database as a Service (DBaaS) in minutes.
 - The DBaaS Rapid Start Kit is integrated with the Setup Automation kit for both Exadata and SuperCluster. This kit extends your experience of managing the SuperCluster to setup the cloud within minutes thereby increasing the ROI on SuperCluster.
 - The Rapid Start Kit provides a single command solution to set up Cloud for DBaaS. You can use this command to create all the Cloud artifacts, such as Roles, Administrators, Named Credentials, PaaS Infrastructure Zone, Database Pools and Service Templates. Once the Rapid Start Kit has been successfully executed, requests can be made to provision dedicated databases from the self-service console.
- **Setup Automation Kit:** Support on-boarding and monitoring.
 - The kit deploys the Management Agent on *all* the clusters and discovers multiple Real Application Clusters (RACs) that are part of Oracle SuperCluster v2.0 in Enterprise Manager.

Features and Enhancements for Oracle Exadata Plug-in 12.1.0.5.0

Oracle Exadata Plug-in Release 12.1.0.5.0 includes a variety of bugs fixed and enhancements implemented for the following feature areas:

- [Supported Hardware and Software Configurations](#)
- [Database Machine Management Improvements](#)
- [Exadata Storage Server Improvements](#)
- [InfiniBand Network and Switch Improvements](#)
- [Metrics Improvements](#)

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 12.1.0.5.0 supports the following hardware and software:

- Certified and supported for the Exadata X4-2 with Exadata Server version 11.2.3.3 when the following Enterprise Manager patch is applied:
 - Patch 17965602: Platform patch based on Enterprise Manager Cloud Control 12c Release 3 (12.1.0.3), which is required for compute node monitoring.
 - Patch 17861041: Plug-in patch for the Oracle Exadata Plug-in Release 12.1.0.5.0, which is required for Exadata Storage Server monitoring.

The above patches also include fixes for issues in the Exadata Software version 11.2.3.3, which is installed with the Exadata X4-2 server. For details about these and other patches, see *Exadata Storage software versions supported by the Oracle Enterprise Manager Exadata plug-in* (Doc ID 1626579.1), available in My Oracle Support (<https://support.oracle.com>):

<https://support.oracle.com/rs?type=doc&id=1626579.1>

- Certified for Oracle Database 12.1.0.1 June Release on Exadata 11.2.3.2.1 + patch.

Note: To successfully generate the `databasemachine.xml` file using OneCommand, you must first upgrade to the latest OneCommand on MOS and confirm your OneCommand Deployment Configuration Assistance is at BP 18 (11.2.0.3.18) or later.

See the "OneCommand" section of *Database Machine and Exadata Storage Server 11g Release 2 (11.2) Supported Versions* (Doc ID 888828.1) for a complete list of patches available for download in My Oracle Support:

<https://support.oracle.com>

Database Machine Management Improvements

The Oracle Exadata plug-in allows you to manage your Oracle Exadata Database Machine through Enterprise Manager Cloud Control.

The Oracle Exadata Plug-in Release 12.1.0.5.0 includes the following features for managing your Database Machine:

- Database Machine target now supports Software and Hardware Inventory feature.
- Database Machine navigation tree also displays databases residing on the Database Machine.
- Database Machine Home page has additional tab to show key software components, including databases, ASM, and Clusters residing on Database Machine.
- Database Machine Discovery Summary Page provides optional link to Database Discovery.

Exadata Storage Server Improvements

With the Oracle Exadata plug-in, you can maximize the performance of your Exadata Storage Server.

The Oracle Exadata Plug-in Release 12.1.0.5.0 includes the following features for managing your Exadata Storage Server:

- I/O Resource Management (IORM.) configurations metric now supports display of Category plan data.

Note: The above is for display purposes only. The IORM user interface still does not allow the IORM Category plan to be set.

InfiniBand Network and Switch Improvements

Through the Oracle Exadata plug-in, you can use Enterprise Manager Cloud Control to manage the individual components of your Exadata Database Machine, including the InfiniBand Network and Switch.

The Oracle Exadata Plug-in Release 12.1.0.5.0 includes the following features for managing your InfiniBand Network and Switch:

- Additional InfiniBand Switch Sensor fault detection, including power supply unit sensors and fan presence sensors.

Metrics Improvements

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, etc.

The Oracle Exadata Plug-in Release 12.1.0.5.0 includes the following metrics enhancements:

- 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.

Features and Enhancements for Oracle Exadata Plug-in 12.1.0.4.0

Oracle Exadata Plug-in Release 12.1.0.4.0 includes a variety of bugs fixed and enhancements implemented for the following feature areas:

- [Supported Hardware and Software Configurations](#)
- [Database Machine Improvements](#)
- [InfiniBand Monitoring Enhancements](#)
- [Support for Exadata Storage Server IORM Management](#)
- [Exadata Storage Server Management Improvements](#)
- [Licensing Enhancements](#)

Supported Hardware and Software Configurations

- Oracle SuperCluster Engineered System.
- 1/8 Rack and Multi-Rack Database Machine.
- Storage and Compute Node Expansion Rack Database Machine.
- Exadata Server Version: 11.2.3.2.1.
- Additional hardware/fault monitoring on compute node ILOM, including:

- Fault detection for ILOM CPU, memory, and PCI error on Exadata Linux and Oracle Solaris.

Database Machine Improvements

- SNMP subscription supports non-public community string.

InfiniBand Monitoring Enhancements

- Support for on-demand refresh of InfiniBand schematic.
- Enhanced performance of InfiniBand pages.

Support for Exadata Storage Server IORM Management

- Version 11.2.3.2.0 *IORM Lite* new features:
 - IORM Status is "Active" by default and cannot be modified.
 - IORM default disk objective is "Basic" which enables I/O throttling using IORM out of box.
- Version 11.2.3.1.0 new features:
 - Share-based plans.

Exadata Storage Server Management Improvements

- Enhanced Exadata Storage Server performance charts to help with diagnosing performance issues when I/O reaching hardware limits.
- Enhanced guided resolution for "cell down" incident.
- Provided Configuration Data SDK views.
- Scalability enhancements for Cell Performance Monitoring metrics.

Licensing Enhancements

- Supports licensing on regions of Cell, Grid, IB switch, and IB Network Home pages.

Features and Enhancements for Oracle Exadata Plug-in 12.1.0.3.0

Oracle Exadata plug-in Release 12.1.0.3.0 includes over 228 *bug fixes and enhancement requests*. Highlights of the Oracle Exadata plug-in include features and enhancements implemented for the following feature areas:

- [Supported Hardware and Software Configurations](#)
- [Database Machine Discovery Enhancements](#)
- [Full Partition Support](#)
- [Dashboard Support](#)
- [InfiniBand Fault Detection Support](#)
- [Other Plug-in Support](#)

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

Supported Hardware and Software Configurations

- Exadata Database Machine X3-2 and X3-8.
- Oracle SuperCluster software:
 - Oracle SuperCluster V1.1
 - Oracle SuperCluster V1.0.1 + October QMU
- Oracle SuperCluster hardware:
 - LDOM.
 - Control domain.
 - IO/Guest domain.
- Newly certified Exadata Server versions: 11.2.3.2.1 and 11.2.3.2.2.

Database Machine Discovery Enhancements

- 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.
- Automatically push Exadata plug-in to agent during discovery.
- Additional credential validation and named credential support.
- Support customization of Exadata Database Machine name.
- Discovery prerequisite checks:
 - Checks for critical configuration requirements.
 - Check to ensure `databasemachine.xml` and `catalog.xml` files exist and are readable.
 - Check to ensure that required discovery software (KFOD) is available.
 - Prevent discovered targets to be rediscovered again.
- Support enabled for discovery using the client access network.

Full Partition Support

- Logical splitting of an Exadata Database Machine Rack into multiple Database Machines.
- Supported configuration:
 - Each partition is defined through a single One Command deployment.
 - Cells and Compute nodes are not shared between partitions. (See [Full Partition Support in Release 12.1.0.6.0](#) for updates to supported configuration.)
 - Multiple partitions connected through the same InfiniBand network.
 - Compute nodes in same partition share the same Cluster.
- Expected behavior:
 - Ability to specify a customized DBM name.
 - 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.

Dashboard Support

- Support dashboard report creation from Enterprise Manager Cloud Control:
 - A new dashboard creation script is included.
 - Simplifies the configuration of the service dashboard.

InfiniBand Fault Detection Support

- Enhanced InfiniBand network fault detection and InfiniBand schematic port state reporting.

Other Plug-in Support

- Performance improvements for Exadata Storage Server and IORM pages.
- Support of client network hostnames for compute nodes.
- Enterprise Manager monitoring agents can now be modified for all Exadata Database Machine components.
- Credential validation and named credential support.
- SNMP notification setup for Exadata Storage Server and InfiniBand Switch.

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 12.1.0.6.0 include the following features:

- [Monitoring and Notification Features](#)
- [Hardware Support Features](#)
- [Exadata Software Support](#)
- [Target Discovery Features](#)

1.1.1 Monitoring and Notification Features

With the Oracle Exadata plug-in, you can monitor Exadata targets through Enterprise Manager Cloud Control 12c. 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.
- Monitoring support for virtualized Exadata Database Machines.

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](#) 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.

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 versions:
 - 11.2.3.3.1 or earlier.

- 12.1.1.1.0, includes support for Oracle Database 12c.
- 12.1.2.1.0
- 12.1.2.1.1
- 12.1.2.1.1 release and patch 2024004. See Doc ID 1959143.1 in My Oracle Support:
<https://support.oracle.com/rs?type=doc&id=1954819.1>
- 12.1.1.1.2
- 12.1.1.1.2 release and patch 20699031. See Doc ID 1995937.1 in My Oracle Support:
<https://support.oracle.com/rs?type=doc&id=195937.1>

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.

Note: The `databasemachine.xml` file is used on all newer Exadata Database Machines and other Engineered Systems.

- 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.
- Support for discovery of virtualized Exadata Database Machines.

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

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](#)
- [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 12c is supported on the following Exadata Database Machine configurations:

Note: Unless otherwise noted, support is provided for all versions of Oracle Exadata plug-in Release 12.1.

- Multi-rack support:
 - V2
 - X2-2: Full rack, half rack, and quarter rack
 - X2-8: Full rack
 - X3-2: Full rack, half rack, quarter rack, and eighth rack (requires release 12.1.0.3 or higher)
 - X3-8: Full rack
 - X4-2, X4-8

Note: For the Exadata X4-2 and X4-8, Enhanced PDU monitoring and management support is provided. However, to monitor and manage an Enhanced PDU, you must set the set the SNMP MIB option to **Original-MIB** on the PDU. See [Enhanced MIB Incompatibility](#) for details.

- X5-2
- Storage Expansion Rack (requires release 12.1.0.4 or higher)
- Compute Node Expansion rack (requires release 12.1.0.4 or higher)
- 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
- 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 12c:
 - 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

Support for Oracle 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
 - M6-32 server

Note: For details about support for the Oracle SuperCluster M6-32 server, see *Oracle Enterprise Manager Exadata plug-in Support for SuperCluster M6* (Doc ID 1920159.1), available in My Oracle Support:

<https://support.oracle.com/rs?type=doc&id=1920159.1>

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)

Note: This known issue does not apply to the M6-32, which uses the `databasemachine.xml` data file and not the `catalog.xml` data file.

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, X4-2, and X5-2 machines.

- Wrong machine names in the `datasemachin.xml` file. When the database is installed in a local zone on an Oracle SuperCluster T5-8, the `datasemachin.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 [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	12.1.2.1.0	12.1.0.6.0 with the patches described in <i>Enterprise Manager 12c Support For ORACLE EXADATA DATABASE MACHINE X5-2</i> (Doc ID 1967701.1), available in My Oracle Support (https://support.oracle.com): https://support.oracle.com/rs?type=doc&id=1967701.1
	11.2.3.3.0	12.1.0.6.0 and later
	12.1.1.1.0	
	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	12.1.0.6.0 and later
	1.3.3-2	12.1.0.4.0 and later
	2.0.6-1 (for SuperCluster)	
	1.1.3-2	All versions
Integrated Lights Out Manager (ILOM)	v3.0.16.15.a r73751 or later (v2) 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)	12.1.0.4.0 and later
	v3.0.9.19.c r63792	All versions
ILOM ipmitool	Linux: 1.8.10.3 or later Oracle Solaris: 1.8.10.4 or later	All versions
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 12.1:

- 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 Certified Exadata Plug-in Versions

The following Exadata plug-in versions have been certified:

Table 1–2 Certified Exadata Plug-in Versions

Plug-in Version	Certified with Enterprise Manager Base Platform - OMS	Enterprise Manager Base Platform - Agent	Certified With Target Product	Target product version
Enterprise Manager for Exadata				
12.1.0.6.0	12.1.0.5.0	12.1.0.5.0	Oracle Exadata Storage Server	12.1.1.1.1 - 12.1.2.1.2
	12.1.0.4.0	12.1.0.4.0		11.2.1.2.0 - 11.2.3.3.0
12.1.0.5.0	12.1.0.3.0	12.1.0.3.0	Oracle Exadata Storage Server	12.1.1.1.0 11.2.1.2.3 - 11.2.3.3.0
12.1.0.4.0	12.1.0.3.0	12.1.0.3.0	Oracle Exadata Storage Server	11.2.1.2.0 - 11.2.3.3.0
12.1.0.3.0	12.1.0.2.0	12.1.0.2.0	Oracle Exadata Storage Server	11.2.1.2.0 - 11.2.3.2.0
12.1.0.2.0	12.1.0.2.0	12.1.0.2.0	Oracle Exadata Storage Server	11.2.1.2.0 - 11.2.3.1.0
Enterprise Manager for Oracle Engineered Systems				
12.1.0.6.0	12.1.0.5.0	12.1.0.5.0	Oracle Exadata Storage Server	12.1.1.1.1 - 12.1.2.1.2
	12.1.0.4.0	12.1.0.4.0		11.2.1.2.0 - 11.2.3.3.0
12.1.0.5.0	12.1.0.3.0	12.1.0.3.0	Oracle Exadata Storage Server	12.1.1.1.0 11.2.1.2.3 - 11.2.3.3.0
12.1.0.4.0	12.1.0.3.0	12.1.0.3.0	Oracle Exadata Storage Server	11.2.1.2.0 - 11.2.3.3.0
12.1.0.3.0	12.1.0.2.0	12.1.0.2.0	Oracle Exadata Storage Server	11.2.1.2.0 - 11.2.3.2.0
12.1.0.2.0	12.1.0.2.0	12.1.0.2.0	Oracle Exadata Storage Server	11.2.1.2.0 - 11.2.3.1.0

1.2.6 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 12.1:

- V1 hardware

Oracle Exadata Plug-in 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

Before proceeding to [Exadata Database Machine Discovery](#), you should verify that the following software, hardware, and tool versions are installed and current:

- [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 12c, it is necessary for your local machine to be able to resolve the host name of Cloud Control 12c.

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 12c 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 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.

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

The Enterprise Manager Cloud Control 12c 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)

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.

2.1.5 Oracle SuperCluster Prerequisites

[Table 2–1](#) shows the required versions of OneCommand and Config-O-Matic (COM) supported by the Oracle SuperCluster hardware configurations.

Table 2–1 Oracle SuperCluster Prerequisites

Hardware Configuration	OneCommand Version	Config-O-Matic Version
M6-32 <i>databasemachine.xml only</i>	14.063 and later	1.6.4 and later
T5-8 <i>databasemachine.xml</i>	14.042 and later	1.5.8 COM and later
T5-8 <i>catalog.xml (non-Java OneCommand)</i>	n/a	1.5.4 COM and earlier
T4-4 <i>catalog.xml 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 12c 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 12c 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 12c on a standalone server to monitor Oracle Exadata Database Machine
- Installing Oracle Enterprise Manager Cloud Control 12c Management Agents on Oracle Exadata Database Machine
- Removing Oracle Enterprise Manager Cloud Control 12c Management Agents from Oracle Exadata Database Machine when using a standalone server
- Removing Oracle Enterprise Manager Cloud Control 12c 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 12c. 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

Platform

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 <ul style="list-style-type: none"> <code>/script/location/root.sh</code>
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 12c.

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

1. [Prerequisites for Guided Discovery](#)
2. [Discovering an Exadata Database Machine](#)
3. [Discovering the Oracle SuperCluster as an Exadata Database Machine](#)
4. [Discovering Grid Infrastructure and RAC](#)

Note: View a video of how to discover the components of an Oracle Exadata Database Machine:

https://apex.oracle.com/pls/apex/f?p=44785:24:114267128212806::NO:24:P24_CONTENT_ID%2CP24_PREV_PAGE:6318%2C1

3.1 Prerequisites for Guided Discovery

Before you begin the 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. You should perform the steps outlined in the following sections before proceeding with [Discovering an Exadata Database Machine](#).

1. [Discovery Precheck Script](#)
2. [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 compute node 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 Discovery Precheck Script

Some Exadata discoveries in Oracle Enterprise Manager 12c may run into issues because of various configuration mismatches in software setup. A discovery precheck script has been developed 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](#).

- [Download the Discovery Precheck Script](#)
- [Run the Discovery Precheck Script](#)

3.1.2.1 Download the Discovery Precheck Script

You can obtain the script in one of the following ways

- 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>
- Access the script as part of the Oracle Enterprise Manager Cloud Control 12c Setup Automation kit (Exakit) 12.1.0.3.0. See Doc ID 1440951.1 in My Oracle Support for more information on the kit:
<https://support.oracle.com>
- Access the script as part of Exadata plug-in 12.1.0.3.0 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
```

3.1.2.2 Run the Discovery Precheck Script

To run the script:

```
$ <agent installation directory>/plugins/oracle.sysman.xa.discovery.plugin_12.1.0.3.0/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.

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 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 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
 - * ILOM username and password
 - * InfiniBand Switch Nm2user Password

Note: For the M6-32, the nm2user user is not activated by ACS as part of the standard M6-32 installation. Use either root or ilom-admin instead. The user exists on the systems, but needs its password set to usable for the precheck script to complete successfully.

- InfiniBand Switch root credentials: Username and Password
- 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.

3.1.3 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 Targets**, and then **Add Targets Manually**. [Figure 3–1](#) shows the Add Targets Manually page.

Figure 3–1 Add Target Manually**Add Targets Manually****✓ Instruction**

Add targets is a process that allows you to choose targets to be monitored and managed by Enterprise Manager. Use the following to configure the targets to be monitored.

**Add Targets Manually**

- ☐ Add Host Targets
- ☒ Add Non-Host Targets Using Guided Process (Also Adds Related Targets)
- ☐ Add Non-Host Targets by Specifying Target Monitoring Properties

Target Types

2. Select the **Add Non-Host Targets Using Guided Process (Also Adds Related Targets)** option. From the Target Types drop-down, select **Oracle Exadata Database Machine**. Click **Add Using Guided Discovery**.

Enterprise Manager displays the Oracle Exadata Database Machine Discovery page. From here you can add the hardware components such as Exadata Storage Servers and InfiniBand Switches in the Oracle Exadata Database Machine as managed targets. You can choose to discover a new Database Machine and its hardware components as targets or instead discover newly added hardware components in an existing Database Machine as targets.

3. On the *Oracle Exadata Database Machine Discovery* page, select the **Discover a new Database Machine and its hardware components as targets** option. Click **Discover Targets**.

Enterprise Manager displays the Database Machine Discovery wizard that steps you through the process of discovering the Database Machine. The first page of the wizard, the Discovery Inputs page, appears.

4. Select an agent on one of the compute nodes that has the schematic file.

Click the search icon . In the Search and Select pop-up, enter the name of a target you have deployed (see [Install Enterprise Manager Agent Using the Push Method](#)) and click **Search**. Select a Target Name from the results list and click **Select**.

Note: If this is a partitioned Exadata Machine, be sure to pick one of the compute nodes that is part of the partition you wanted to be represented by this Database Machine target.

5. On the *Discovery Inputs* page, 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.
 - **Database Oracle Home:** The Database Oracle home directory on compute node

Note: The Agent user needs execute privileges on the \$ORACLE_HOME/bin/kfod binary of the Oracle home specified. (Oracle Database should be Release 11.2 or later.)

- 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.

Click **Next**.

6. On the *InfiniBand Discovery* page, enter the following information:
 - **IB Switch Host Name:** The InfiniBand switch host name (such as, `exa01sw-ib2.mycompany.com`)
 - **Nm2user Password:** The password for the InfiniBand switch
7. On the *Prerequisite* page, Enterprise Manager automatically performs the following checks:
 - Whether KFOD can be executed by the agent.
 - For the schematic file, if it exists, the name, location, and hostname will be displayed. For example:

```
Schematic File /opt/oracle.SupportTools/onecommand/databasemachine.xml on
<hostname>
```
8. On the *Components* page, the components below are pre-selected. You can deselect any unwanted component.
 - **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 Integrated Lights Out Managers 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).

Click **Next** to display the Monitoring Agents page.

9. On the *Monitoring Agents* page, select an agent from the drop-down selection box or click Reset to reassign. Click **Next** to display the Agent Credential page

Note: The best practice is to use the **Manually select the agents** option on the *Monitoring Agents* page (instead of the **Automatically select the agents** option) and to use the Agent on compute node 1 for the **Monitoring Agent** and the Agent on compute node 2 for the **Backup Monitoring Agent** for all targets.

This configuration is to ensure that you know which Agents to use when configuring SNMP for Exadata Storage Cell and InfiniBand switch targets (see [Configure Storage Cell SNMP for Enterprise Manager Monitoring](#) and [Configure and Verify SNMP for InfiniBand Switch Targets](#)).

10. On the *Agent Credential* page, specify whether the agent host users and passwords are the same for all agents. The agent users and passwords are required to set up password-less SSH between the agents and the cells monitored by the agents.

If the users and passwords are the same, choose **Same for all agents** and enter the user and password combination. If they are not the same for each agent, choose **Different for all agents** and enter each combination for each agent.

Click **Next** to display the Monitoring Credential page.

11. On the *Monitoring Credential* page, configure the credentials for:
 - **Oracle Exadata Storage Server:** select the **Same for all cells** option. Enter the **Cell Root Password**.
 - **Infiniband Switch:** select the **Same for all Infiniband switches** option. Enter the **Infiniband Switch Nm2user Password**.
 - **ILOM:** select the **Same for all ILOM** option. Enter the **ILOM password**.

Note: In all cases you can choose to enter the same user/password combinations for all components or you can enter the credentials separately for each occurrence.

Click **Next** to display the SNMP Subscription page.

12. On the *SNMP Subscription* page, automatically set up an SNMP subscription on the cell and InfiniBand Switch targets. [Figure 3-2](#) shows an example of the SNMP subscription options. In the SNMP Community String field, enter **public** (it should match with the community string set on Cell and InfiniBand Switch).

Figure 3–2 SNMP Subscription

Oracle Exadata Database Machine Discovery

Discovery Inputs | Infiniband Discovery | Prerequisite Check | Components | Monitoring Agents | Agent Credential | Monitoring Credential | **SNMP Subscription** | Component Properties | Review

Database Machine Discovery : SNMP Subscription Back Step 8 of 10 Next Cancel

To best monitor component hardware and software issues, it is recommended to set up EM agent to automatically receive SNMP traps from the components. Root credentials for the components are required to set up SNMP subscription.

Oracle Exadata Storage Server

Please specify whether SNMP subscription to EM is to be set up for the cells automatically. Previously entered cell Root password will be used for the setup.

☒ Set up SNMP subscription for cells automatically.

* SNMP Community String Tip: This will overwrite any existing community string for the EM Agent subscription only.

Infiniband Switch

Please specify whether SNMP subscription to EM is to be set up for the Infiniband switches automatically.

☒ Set up SNMP subscription for Infiniband switches automatically.

* SNMP Community String Tip: This will overwrite any existing community string for the EM Agent subscription only.

Please specify whether the Infiniband switch root passwords are the same for all Infiniband switches. The Infiniband switch root passwords are needed to set up SNMP alert notification to EM.

☒ Same for all Infiniband switches

IB Switch Root Credential

Credential ☒ Named ☐ New

There are no named credentials defined.

☐ Different for all Infiniband switches

Infiniband Switch Name	Root Password
IB-switch1.mycompany.com	
IB-switch2.mycompany.com	

Click **Next** to display the Component Properties page.

13. On the *Component Properties* page, specify the target properties of the different components. For each component, enter the required information.

Click **Next** to display the Review page.

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

Figure 3–3 Database Machine Discovery Review Page

Oracle Exadata Database Machine Discovery

Discovery Inputs | Infiniband Discovery | Prerequisite Check | Components | Monitoring Agents | Agent Credential | Monitoring Credential | SNMP Subscription | Component Properties | **Review**

Database Machine Discovery : Review Back Step 10 of 10 Next Submit Cancel

Compute Node

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

Host Name
<host name-1>.mycompany.com
<host name-2>.mycompany.com

Oracle Exadata Storage Server

The following Exadata Storage Servers will be added as members of the Database Machine target. The cells have the same credential. SNMP will be setup automatically on cells.

Cell Name	Management IP	Monitoring Agent	Backup Monitoring Agent
<cell name-1>.mycompany.com	10.255.255.255	https://<monitoring agent-1>.mycompany.com:1841/emd/main/	https://<backup agent URL-1>.com:1841/emd/main/
<cell name-2>.mycompany.com	10.155.155.155	https://<monitoring agent-2>.mycompany.com:1841/emd/main/	https://<backup agent URL-2>.com:1841/emd/main/
<cell name-3>.mycompany.com	10.355.355.355	https://<monitoring agent-3>.mycompany.com:1841/emd/main/	https://<backup agent URL-3>.com:1841/emd/main/

Infiniband Switch

The following Infiniband switches will be added as members of the Database Machine target. The Infiniband switches have the same nm2user credential. SNMP will not be setup automatically on IB switches. It has to be done manually after discovery.

Infiniband Switch Name	Description	Monitoring Agent	Backup Monitoring Agent
<IB Switch name-1>.mycompany.com	SUN DCS 36P QDR	https://<monitoring agent-1>.mycompany.com:1841/emd/main/	https://<backup agent URL-1>.com:1841/emd/main/
<IB Switch name-2>.mycompany.com	SUN DCS 36P QDR	https://<monitoring agent-2>.mycompany.com:1841/emd/main/	https://<backup agent URL-2>.com:1841/emd/main/

15. If the information is correct, click **Submit**.

16. On the *Target Creation Summary* page, click **OK**.

Enterprise Manager displays the Target Promotion Summary page that displays the targets that are now managed targets.

The discovery of the Oracle Exadata Database Machine is complete.

3.3 Discovering the Oracle SuperCluster as an Exadata Database Machine

You can use the Exadata plug-in to discover and monitor an Oracle SuperCluster system with the Enterprise Manager schematic file (`databasemachine.xml` or `catalog.xml`). 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. Open a Service Request (SR) if the `databasemachine.xml` file or `catalog.xml` file is not present.

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

2. 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.
3. 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.
4. 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, please see the "Updating Cloud Control" chapter in the *Oracle® Enterprise Manager Cloud Control Administrator's Guide*:

http://docs.oracle.com/cd/E24628_01/doc.121/e24473/self_update.htm

5. 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/ssh_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>

6. 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
```

7. 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](#).
8. 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 \(RAC\) Targets](#)

3.4.1 Discover Grid Infrastructure (Cluster) Targets

To discover the Grid Infrastructure 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 (RAC) Targets

To discovery RAC 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).

Post-Discovery Configuration and Verification

This chapter described the post-discovery configuration and verification for the Oracle Exadata Database Machine.

Once the Oracle Exadata Database Machine has been discovered through Enterprise Manager Cloud Control 12c, 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

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.
-
-

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.

4.2.1 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
```

4.2.2 Configure SNMP Values Using `cellcli`

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

1. Set the `snmpSubscriber` value:

```
# 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.

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]))"
```

For example:

```
ALTER CELL
snmpSubscriber=((host=ilm-asr1.example.com,port=162,community=publi
c,type=asr),(host=host1.example.com,port=11852,community=public),(h
ost=host2.example.com,port=1838))
```

2. Set the `notificationMethod` value:

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

3. Set the notificationPolicy value:

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

4.2.3 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'\""
```

4.2.4 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**.

4.2.5 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 SnmpRecvletListenNIC 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](#).
 - See also: the "Add SNMP Service Communities" chapter of the *Sun Datacenter InfiniBand Switch 36 HTML Document Collection for Firmware Version 2.0* document:
https://docs.oracle.com/cd/E26698_01/html/E26434/ceihiibd.html#scrolltoc
-

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 **Configuration**, then **System Management Access**, then **SNMP**, and finally the **Communities** link. The page scrolls to the SNMP Communities table. In the SNMP Communities table, click **Add**.

A new window opens.

5. Type the community name into the **Community Name** field. Select the permissions from the Permission drop-down menu. Click **Save**.

The community is created, and the window closes.

6. Click **Alert Management**.

7. 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**.

8. 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 to the Exadata Database Machine and are not applicable to the Oracle SuperCluster (see [Configure SNMP for 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. Configure each compute node with all agents in the cluster. This example shows an update for two monitoring agents:

```
# dbmcli -e "ALTER DBSERVER snmpSubscriber=((host='[agent1_
hostname]','port=[agent1_port],community='[public]',type=asr), (host='[agent2_
hostname]','port=[agent2_port],community='[public]',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:

- For Exadata X5-2 server:

```
# ipmitool -I lanplus -H sclczdb01-c -U <oemuser> -P <password> -L OPERATOR
event PS0/VINOK deassert
```

- For other Exadata servers:

```
# ipmitool -I lan -H sclczdb01-c -U <oemuser> -P <password> -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:

- For Exadata X5-2 server:

```
# ipmitool -I lanplus -H sclczdb01-c -U <oemuser> -P <password> -L OPERATOR
event PS0/VINOK assert
```

- For other Exadata servers:

```
# ipmitool -I lan -H sclczdb01-c -U <oemuser> -P <password> -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.

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 PDU target. If the SNMP forwarder is not set up, the agent will not receive traps from the PDU device.

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

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

The KVM needs to be configured to send SMNP 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 dbmlb02 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. The following sections describe how to create a dashboard for Oracle Exadata Database Machine:

- [Creating a Dashboard for Exadata Database Machine Plug-in Release 12.1.0.3.0 and Later](#)
- [Making the Dashboard Report "Public"](#)
- [Finding All Exadata Database Machine Reports](#)

4.9.1 Creating a Dashboard 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 Making the Dashboard 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 Finding All Exadata Database Machine Reports

To find all Exadata 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 12c.

The following topics are discussed:

- [Creating Roles to Manage the Plug-in](#)
- [Viewing Exadata Database Machine Topology](#)
- [Accessing Exadata Cell Metrics and Alert Settings](#)
- [Exadata Storage Server Management](#)
- [Managing the InfiniBand Network](#)
- [Exadata Database Machine Fault Monitoring](#)

Note: View a video of how to manage your Oracle Exadata Database Machine using Oracle Enterprise Manager Cloud Control 12c:

https://apex.oracle.com/pls/apex/f?p=44785:24:0::NO:24:P24_CONTENT_ID,P24_PREV_PAGE:5822,1

View a video of how to monitor your Oracle Exadata Database Machine using Oracle Enterprise Manager Cloud Control 12c:

https://apex.oracle.com/pls/apex/f?p=44785:24:16232427893089::NO::P24_CONTENT_ID%2CP24_PREV_PAGE:5664%2C2

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.

5.2 Viewing 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 Exadata Database Machine Alerts](#)
- [Viewing Exadata Database Machine 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 **Target**, 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 Exadata Database Machine Alerts

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

To view Exadata 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 Exadata Database Machine Metrics

To view the Exadata Database Machine 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. See [Exadata Metrics](#) for more information and metric examples.

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

In Enterprise Manager Cloud Control 12c, deleting the Database Machine target will delete the Database Machine system as well as its hardware component targets and associated systems.

In Enterprise Manager Cloud Control 12c, deleting the Database Machine target will only delete the Database Machine system itself, without deleting its hardware component targets and associated systems. You must manually delete each of these targets/systems:

- Hardware member targets:
 - Oracle Exadata Storage Server
 - Oracle InfiniBand Switch
 - Cisco Switch
 - PDU
 - KVM
 - Oracle ILOM Server
 - Host
- Associated systems:
 - Oracle Database Machine
 - Oracle Exadata Storage Server Grid
 - Oracle Database Exadata Storage Server System
 - Oracle InfiniBand Network

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 12c:

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

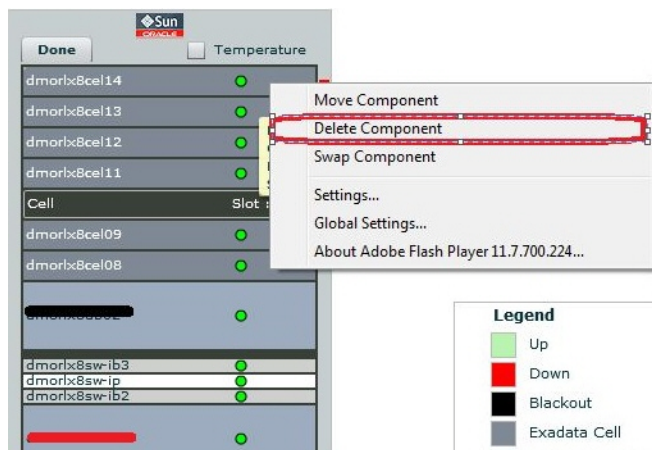
To drop a component from the Exadata Database Machine schematic diagram:

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

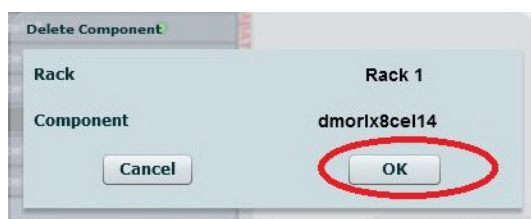
Figure 5-1 Schematic Diagram Edit Button



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

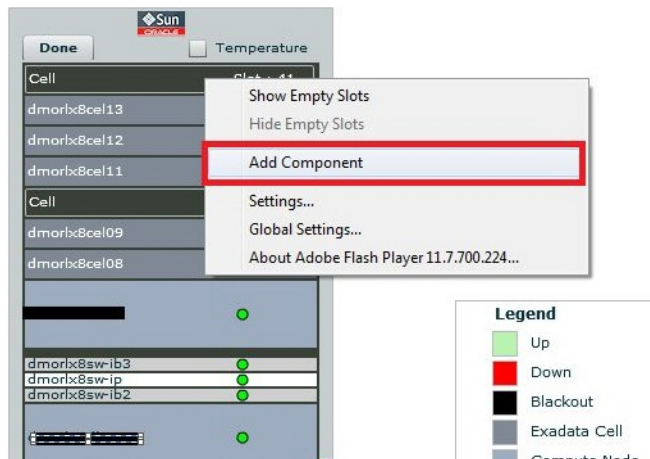
6. Once you see the component deleted in the slot you specify, click **Done** on the Exadata Database Machine schematic diagram.

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



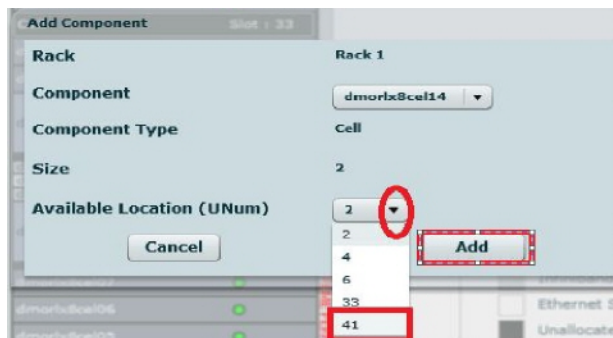
4. If there are multiple components to be added to schematic diagram, select the correct component from the **Component** drop-down menu, as shown in [Figure 5-6](#):

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 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](#)

5.3.1 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.

5.3.2 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.

5.3.3 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.

5.3.4 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.

5.3.5 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:

- [Modify the Disk I/O Objective](#)
- [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*.

5.3.5.1 Modify the Disk I/O Objective

To update the I/O Resource Manager (IORM) settings (for Exadata Storage Server software release 11.2.3.2.0 or 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:

Configuration Refreshed **Apr 24, 2013 6:34:34 AM PDT** [Get Latest](#)

I/O Resource Manager controls how databases utilize the disks and flash cache, based on the settings specified here. [Update](#)

Status: **Active** Disk I/O Objective: **Auto** ▼

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

Directives: [+ Add](#) [✖ Remove](#)

Database Name	Disk I/O Utilization Limit(%)	Disk I/O Allocation(%)	Use Flash Cache	Use Flash Log
other ▼		20	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
dbm		80	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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. 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.

3. Click **Get Latest** to refresh the page, which will include your Disk I/O Objective selection.
4. 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
```

5.3.5.2 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, Advanced 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*.

5.3.6 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*.

5.3.7 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.

5.4 Accessing 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.

5.5 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 Metric Types](#)
- [Performing Administration Tasks on Infiniband Networks](#)
- [Setting Up InfiniBand Switch Alerts](#)

5.5.1 InfiniBand Metric Types

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.

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.

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.

7. 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 InfiniBand Switch Alerts

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

1. Log in to Enterprise Manager Cloud Control.
2. Click **Targets**, then **All Targets**. All discovered targets will display.
3. In the *All Targets* page, click **Oracle Exadata InfiniBand Switch**.
4. Click the target you are interested in. The target home page appears.

5. In the drop-down menu for the Oracle Exadata InfiniBand Switch, select **Metric and Collection Settings**.
6. 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 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
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
	Disk Failure
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

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#EMCLO531

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](#)
- [Viewing Virtualized Exadata Database Machine](#)

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 Targets** then **Add Targets Manually**.
2. On the Add Targets Manually page, select **Add Targets Using Guided Process**.
3. For the Target Types drop-down menu, select **Oracle Virtual Platform** ([Figure 6-1](#)).

Figure 6–1 Select Oracle Virtual Platform Target Type


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#EMCL0531

4. Click **Add Using Guided Process**.

5. On the Discover Oracle Virtual Platforms page:

- Set the Default Monitoring Agent and Credentials (Figure 6–2). 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 6–2 Default Monitoring Agent and Credentials

- Add a Host Name or IP address. Click **Add** and enter the fully qualified domain name (FQDM) or IP address for the host in the pop-up window. If you have more than one, each entry *must* appear on a separate line.
Click **Add** to close the pop-up window.

Figure 6–3 Enter Hostname or IP Address


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 6–4 Submit Oracle Virtual Platform Registration Job

- Once the job completes, then discover the Exadata Database Machine. From the Setup menu, select **Add Targets** then **Add Targets Manually**.
- On the Add Targets Manually page, select **Add Targets Using Guided Process**.
- For the Target Types drop-down menu, select **Oracle Exadata Database Machine** (Figure 6–5):

Figure 6–5 Select Oracle Database Machine Target Type

- Click **Add Using Guided Process**.
- 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**.
- 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 6–6) for the host you registered in the previous steps. Click **OK**.

Figure 6–6 Set Credential

Click **Next**.

12. 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 6–7:

Figure 6–7 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.

13. On the Prerequisite Check page, verify the Status is successful, then click **Next**.
14. On the Components page, review the Exadata components that were discovered, then click **Next**.
15. On the Monitoring Agents page, review the names, locations, and backup locations of the Monitoring Agents. Click **Next**.
16. 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**.
17. 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**.

18. 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 6–8). Click **Next**.

Figure 6–8 Enter InfiniBand Switch Root Credential

IB Switch Root Credential

Credential

☐ Named

☒ New

* Username

root

* Password

☐ Save As

Test Connection

19. On the Component Properties page, enter **public** for both Ethernet and PDU components (Figure 6–9). Click **Next**.

Figure 6–9 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
host1pdua.example.com	Module1	161	10	public
host1pdub.example.com	Module1	161	10	public

ILOM

ILOM Name	Compute Node Host Name
host1ilom.example.com	host1
host2ilom.example.com	host2

20. On the Review page, review the details of the following components:

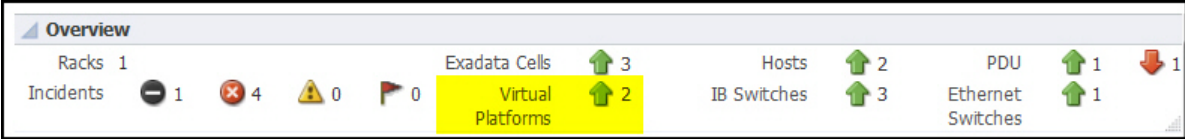
- System Target
- Compute Node
- Oracle Exadata Storage Server
- InfiniBand Switch
- Ethernet Switch
- Compute Node ILOM
- KVM
- PDU

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.

6.3 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 6-10](#):

Figure 6-10 Virtual Machines Monitored

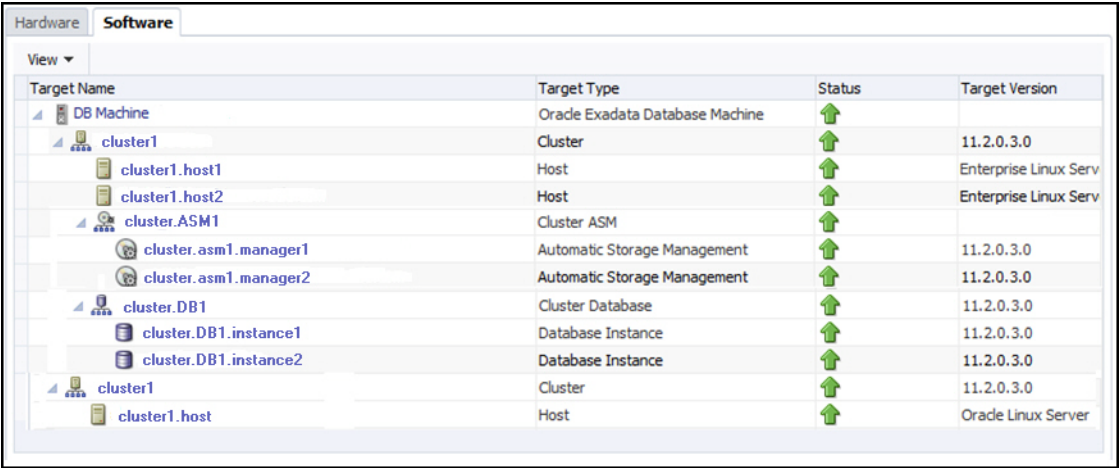


Note: The schematic diagram in the Database Machine home page is based on the content of the `databasemachine.xml` file found during discovery. The **virtual platforms** (Dom0) are displayed as compute nodes in the rack in the schematic diagram.

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 6-11](#):

Figure 6-11 Exadata Database Machine Software Tab



6.4 Resource Utilization Graphs

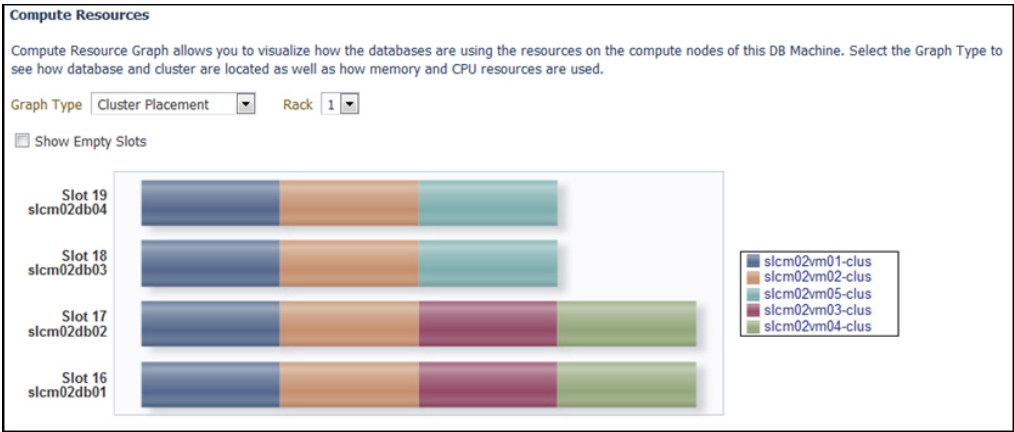
The following compute resource allocation graphs are available in virtualized Exadata. These graphs are dependent on the virtual machine hierarchy and metric data from the VI plug-in:

6.4.1 Cluster Placement

This graph ([Figure 6-12](#)) 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.

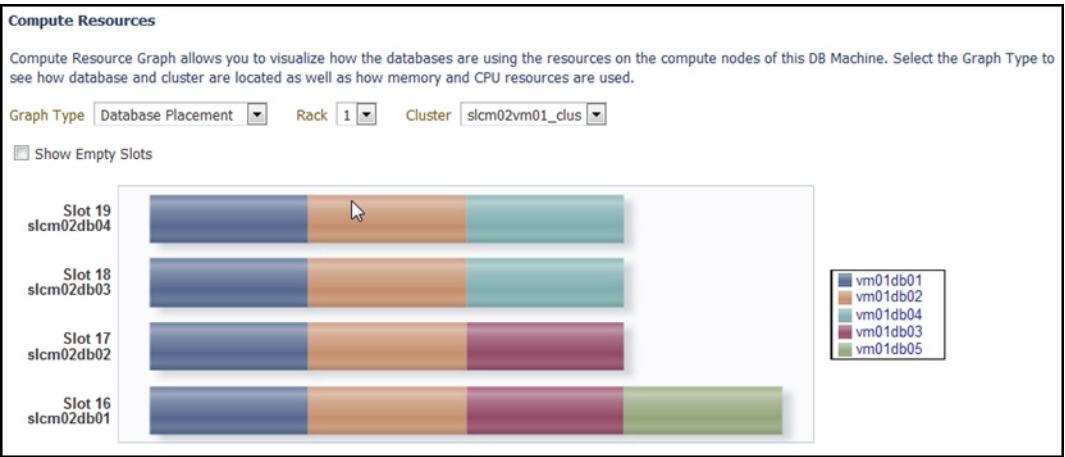
Figure 6–12 Resource Utilization: Cluster Placement



6.4.2 Database Placement

This graph (Figure 6–13) 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.

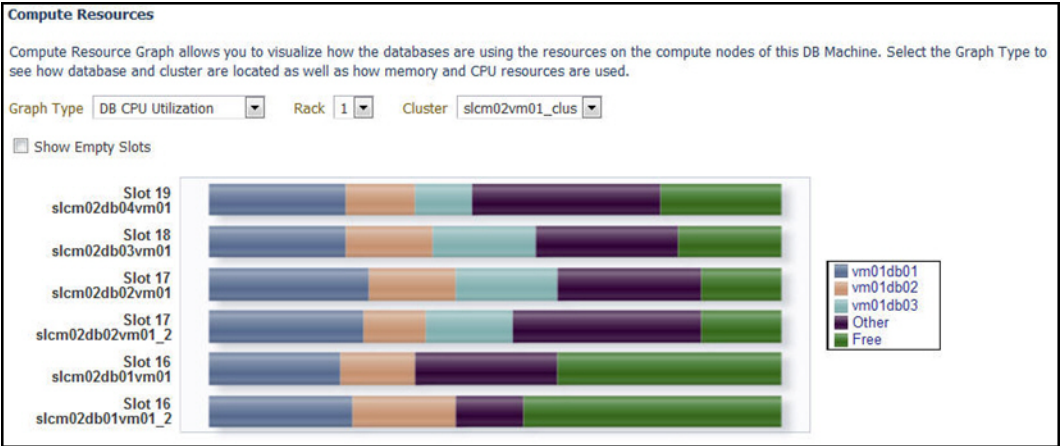
Figure 6–13 Resource Utilization: Database Placement



6.4.3 Database CPU Utilization

This graph (Figure 6–14) shows the database CPU utilization per database per VM host for a particular DB cluster.

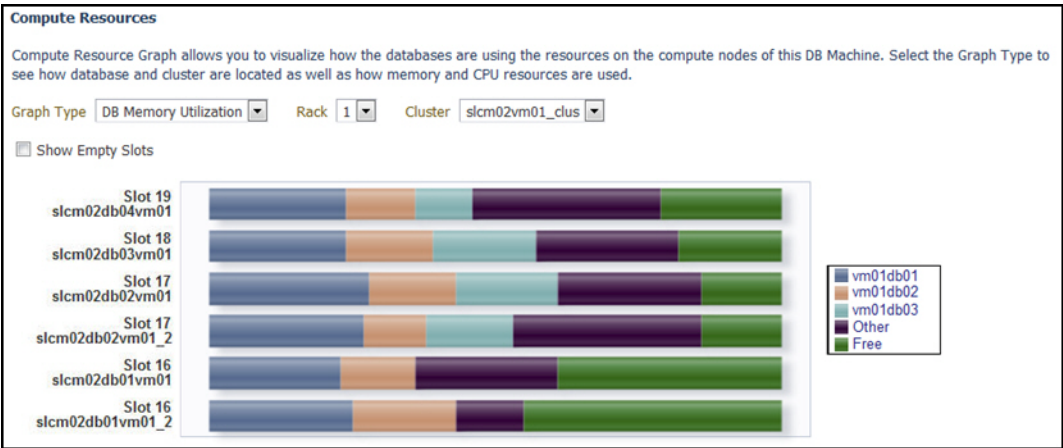
Figure 6–14 Resource Utilization: Database CPU Utilization



6.4.4 Database Memory Utilization

This graph shows the database memory utilization per database per VM host for a particular DB cluster.

Figure 6–15 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

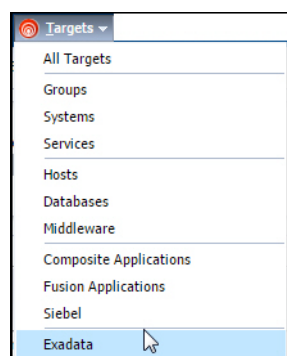
For a complete list of metrics available for the Oracle Exadata Database Machine, see the "Oracle Exadata" chapter of the *Oracle® Enterprise Manager Oracle Database Plug-in Metric Reference Manual*:

https://docs.oracle.com/cd/E24628_01/em.121/e25160/oracle_exadata.htm#BABFDHBG

To access the available Exadata Metrics:

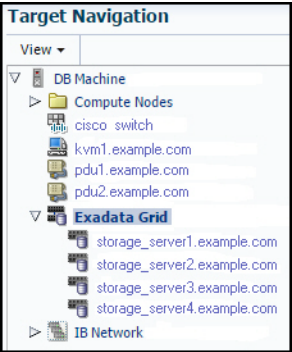
1. From the Targets menu, select **Exadata** ([Figure 7-1](#)):

Figure 7-1 Enterprise Manager Targets Menu



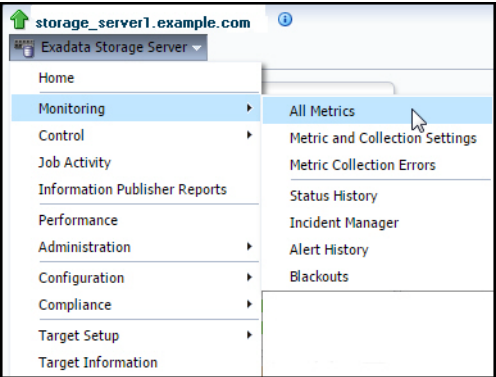
2. On the Oracle Exadata Database Machines page, select an Exadata Database Machine from the list.
3. From the Target Navigation tree, expand the **Exadata Grid** and select an Exadata Storage Server ([Figure 7-2](#)):

Figure 7-2 Expand the Exadata Grid in the Target Navigation Tree



- 4. 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



- 5. 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

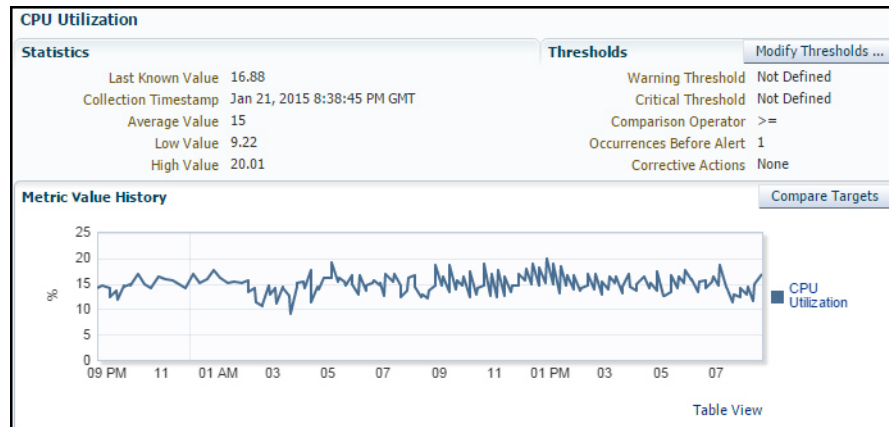
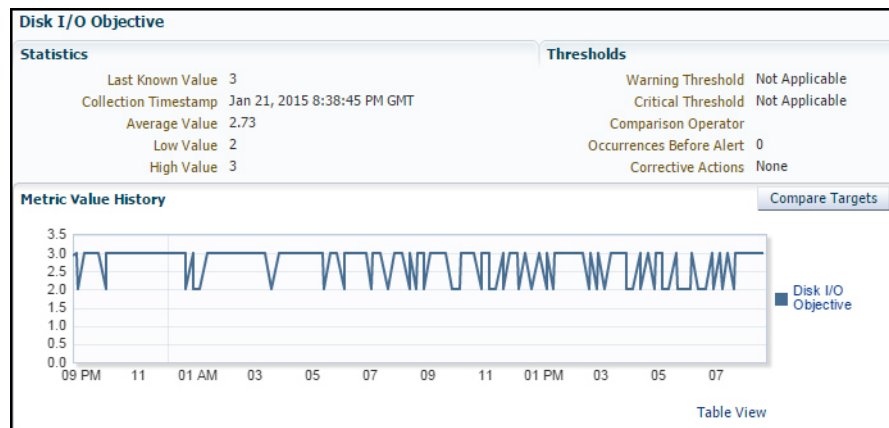
This metric category contains the performance metrics collected at the cell level for each cell, such as CPU utilization and memory utilization. Selecting this metric from the All Metrics page generates a high-level summary, as shown in [Figure 7–7](#):

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

This chapter provides troubleshooting tips and techniques for installing and configuring the Exadata Database Machine plug-in.

The following troubleshooting sections are provided:

- [Establish SSH Connectivity](#)
- [Discovery Troubleshooting](#)
- [Exadata Database Machine Management Troubleshooting](#)
- [Exadata Derived Association Rules](#)
- [Enhanced MIB Incompatibility](#)

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. Common error include:

- [Hardware Availability](#)
- [Compute Node Error Message](#)
- [Cell is not Discovered](#)
- [Compute Node or InfiniBand Switch is not Discovered](#)
- [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](#)
- [Troubleshooting the Exadata Database Machine Schematic File](#)

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.

8.2.2 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`)

8.2.3 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 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 myhost1.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" # " myhost1 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
```

8.2.5 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.

8.2.6 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](#).

8.2.7 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:
 1. Log in to Enterprise Manager.
 2. Select **Targets**, then **All Targets**.
 3. 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:
 1. Delete these targets before initiating the Exadata Database Machine guided discovery.
 2. Alternatively, use the `emcli` command to add these targets to the appropriate system target as members.

8.2.8 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

The screenshot shows the Oracle Enterprise Manager interface. The breadcrumb trail is: Enterprise > Targets > Favorites > History > Search Target Name. The selected target is 'DB Machine myhost.mycompany.com'. The 'Monitoring Agents' section is expanded, showing a table of agents for various components.

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:1844/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:
 1. Log in to Enterprise Manager.
 2. Click **Setup**, then **Security**, and finally **Monitoring Credentials**.
 3. On the Monitoring Credentials page, click the **Oracle Exadata** target type. Then set the monitoring credentials.

8.2.9 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.

8.3 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.

8.4 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:

1. Click **Targets**, then **All Targets**.

2. On the All Targets page, click the **Oracle Exadata** target from the list.
3. Click **Database System**, then **Configuration**, and finally **Last Collected**.
4. 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.

8.5 Enhanced MIB Incompatibility

With some shipments of the X4 series of Exadata and all later version of the hardware, the Exadata Database Machine contains an upgraded PDU that is running a newer version of firmware. This firmware ships with an enhanced Management Information Base (MIB) that is not compatible with the Exadata 12.1.x plug-in. In these cases, change the setting in the PDU to using the original MIB as illustrated [Figure 8-2](#):

Figure 8-2 Selecting Original MIB

ORACLE

Name: bwsopdu
Product Identifier: Exadata XS-2
Rack Serial Number: 123456
Location:

IP Settings | **PDU Information** | HTTP Access | SNMP Access | SNMP Traps | Syslog | System Time | Event Logging

Firmware Update | StartUp / Reset

SNMP

Enable SNMP v1/v2: ☒
 Enable SNMP v3: ☐
 SNMP Port: 161
 Select SNMP MIB: Enhanced-MIB ☐ **Original-MIB ☒**
 Submit

NMS (SNMP v1/v2)

Host	IP Address or Host Name	Read-Write Community	Read-Only Community	Access	Enable
1.	10.196.100.73	public		both	<input checked="" type="checkbox"/>
2.	10.196.101.121	public		both	<input checked="" type="checkbox"/>
3.	10.196.101.123	public		both	<input checked="" type="checkbox"/>
4.				read-only	<input type="checkbox"/>

Submit

Use Original MIB for monitoring with OEM 12.1.0.4

Index

A

alerts

- InfiniBand, 5-16
- ALTER CELL command, 4-4
- automated kit, 2-7

C

- Cell administration, 5-11
- Cell management, 5-9
- Cisco Ethernet Switch
 - SNMP configuration, 4-12
- Compute Node Agent
 - Linux setup, 4-2
 - Solaris setup, 4-2
- Compute Node ILOM
 - SNMP configuration, 4-9
- creating roles
 - user roles
 - creating, 5-1

D

- dashboard
 - public report, 4-18
- dashboard creation, 4-17
- Database Machines
 - alerts, 5-4
- delete Exadata Database Machine component, 5-5
- deploy plug-in, 2-10
- deployment prerequisites, 2-1
- derived association rules, 8-6
- discovery, 3-1, 3-4
 - Grid Infrastructure, 3-10
 - Grid Infrastructure and RAC, 3-10
 - Oracle SuperCluster, 3-9
 - post-discovery configuration and verification
 - post-discovery configuration, 4-1
 - RAC targets, 3-11
 - review page, 3-8
 - switch troubleshooting, 8-4
- discovery precheck script, 3-2
 - download, 3-2
 - running the script, 3-2
- Disk I/O Objective, 5-12

E

- Enterprise Manager Agent
 - automated kit, 2-7
 - installation, 2-6
 - Solaris 11 only, 2-7
- Exadata Cell management, 5-9
- Exadata component
 - delete, 5-5
- Exadata Database Machine
 - configuration support, 1-4
 - dashboard, 4-17
 - remove target, 5-5
 - troubleshooting, 8-6
 - view topology, 5-2
- Exadata metrics, 7-1
- Exadata software support, 1-2

F

- Fault Monitoring, 5-17
- features, 1-1
 - hardware support, 1-2
 - in 12.1.0.3.0, xvi
 - in 12.1.0.4.0, xv
 - in 12.1.0.5.0, xiii
 - in 12.1.0.6.0, ix
 - monitoring and notification, 1-1
 - target discovery, 1-3
- firewall configuration, 2-4

G

- Grid Infrastructure
 - discovery, 3-10
- guided discovery, 3-1

H

- hardware
 - supported hardware, 1-3
 - view critical information, 5-3
 - hardware not supported, 1-11
 - hardware support features, 1-2

I

InfiniBand network management, 5-15
InfiniBand Switch
 configure for SNMP, 4-7
IORM Monitoring, 5-12

K

KVM
 SNMP configuration, 4-15

M

manual verification, 3-4
manually, 2-10
metrics, 7-1
metrics and alert settings, 5-15
monitoring and notification features, 1-1
multi-rack support, 1-4

N

names resolution, 2-4
new features, ix

O

Oracle ILOM server, 4-11
Oracle SuperCluster
 discovery, 3-9
Oracle SuperCluster prerequisites
 OneCommand, 2-6

P

PDU
 SNMP configuration, 4-13
PDU SNMP configuration
 verify, 4-14
precheck script, 3-2
prerequisites
 Exadata Storage Server software, 2-2
 firewall configuration, 2-4
 guided discovery, 3-1
 ILOM ipmtool, 2-3
 InfiniBand Switch, 2-3
 KVM application, 2-4
 PDU firmware, 2-3
 plug-in deployment, 2-1

R

RAC
 discovery, 3-10
remove Exadata Database Machine target, 5-5
remove SNMP subscription, 4-6

S

schematic file
 troubleshooting, 8-5

schematic files, 3-6
secure storage, 3-1
SNMP
 configure using cellcli, 4-5
 configure using dcli, 4-6
 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, 4-12
 Compute Node ILOM, 4-9
 InfiniBand Switch, 4-7
 KVM, 4-15
 PDU, 4-13
SNMP subscription
 remove, 4-6
snmptrapd.conf configuration file, 4-2, 4-3
snmpwalk command, 4-14
software support
 Exadata, 1-2
SPARC SuperCluster support, 1-5
 known issues, 1-6
SSH connectivity, 4-6, 8-1
Storage Cell SNMP configuration, 4-4
supported component versions, 1-9
supported hardware, 1-3, 1-11
 multi-rack support, 1-4
 partitioned Exadata Database Machine, 1-4
supported operating systems, 1-11

T

target discovery features, 1-3
troubleshooting
 discovery, 8-2
 Exadata Database Machine, 8-6
 schematic file, 8-5

U

user roles, 2-6

V

view topology, 5-2