Oracle® Enterprise Manager

Oracle Exadata Database Machine Getting Started Guide

13c Release 3

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Oracle Enterprise Manager Oracle Exadata Database Machine Getting Started Guide, 13c Release 3

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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 nodes and Exadata Storage Servers.

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

Audience

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

Documentation Accessibility

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

Access to Oracle Support

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

Conventions

The following text conventions are used in this document:

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

What's Changed

This table provides a brief overview of the document changes for the latest publication of the *Oracle® Exadata Database Machine Getting Started Guide*:

Part Number	Change Summary
F19101-02	Updated to remove obsolete content and to reflect latest features.

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:

- Features and Enhancements for Oracle Exadata Plug-in

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 Introduction to the Plug-in .

Features and Enhancements for Oracle Exadata Plug-in

Oracle Exadata Plug-in releases include a variety of enhancements and bug fixes.

New features in Enterprise Manager 13.3.1

- **Support for SNMP AES Encryption**
  (SNMP) v3 is supported on Oracle Exadata Storage Servers and Oracle Exadata Database Servers starting with Oracle Exadata System Software release 12.1.2.1.0.. Exadata Oracle Enterprise Manager Exadata plug-in 13.3.1 offers an option to choose AES encryption while adding SNMP subscription to Exadata components. For more details, see Exadata Database Machine Discovery.

New features in Enterprise Manager 13.3.2

- **Exadata vCPU Consumption Report**
  On virtual Exadata, administrators can choose to license a subset of cores on the compute nodes, depending on usage requirements and budget constraints. The number of licensed cores can be increased or decreased as per the customer's needs. Oracle Enterprise Manager offers an Exadata vCPU Consumption Report, built on top of the Business Intelligence (BI) reporting system to show the high watermark of total daily vCPU consumption on the Exadata Database Machine.

- **Support for Cluster-based IORM**
  The Exadata plug-in now supports specifying the Cluster name in addition to the Database name while defining I/O Resource Management plans. This is especially useful when different clusters on the same Exadata Storage Servers have databases with the same name. For more details, see Managing the I/O Resource.

- **Pro-active incidents on password expiry on Exadata Storage Server**

As a security enhancement, Oracle Exadata Storage Server 19.1 allows administrators to set up a policy to expire a user's password in a pre-defined period of time. To allow these Exadata Storage Servers to be monitored seamlessly with Oracle Enterprise Manager, users are expected to either reset their credentials in Enterprise Manager, or ensure that the Named Credentials are updated. If you have a policy to expire passwords on Exadata Storage Servers at predefined intervals, you can now choose to get pro-active events or incidents in Oracle Enterprise Manager to get a heads up on maintenance tasks related to password expiry.

> **Note:**
>
> This will impact the monitoring and administration of Exadata Storage Servers monitored by Oracle Enterprise Manager using ExaCLI/RESTful API. There is no impact for Exadata Storage Servers monitored using CellCLI, as the automatic password expiration policy will not affect OS users.

- **Support for monitoring Exadata Storage Servers through RESTful API**
  Oracle Exadata Storage Server release 19.1.0 and above can be accessed through the RESTful service via HTTPs. As an alternative to managing Exadata Storage Servers through CellCLI, you can choose to monitor them through RESTful API by choosing the appropriate options during the Exadata discovery flow in Oracle Enterprise Manager. Refer to Verify SNMP Subscription of the Oracle Management Agent to Exadata Storage Server for more details.

- **Support for monitoring Extended (XT) Storage Servers**
  Oracle Exadata Storage Servers (XT) offer a lower cost storage option that can be used for infrequently accessed, older or regulatory data. See Using Extended (XT) Storage Servers in the *Oracle® Exadata Database Machine Maintenance Guide* for more information. You can use the Exadata plug-in 13.3.2 to monitor and manage these servers, in the same way as for regular Oracle Exadata Storage Servers.

- **Support for monitoring ILOM 5.0**
  The Exadata plug-in supports monitoring and management of the Integrated Lights Out Manager (ILOM) 5.0. You can use the same discovery process as for ILOM 4.

1

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

Oracle Exadata Plug-in Features

Highlights of the Oracle Exadata plug-in release 13.3.2.0.0 include the following features:

- Monitoring and Notification Features
- Hardware Support Features
- Target Discovery Features
- Exadata Storage Server Grid Home Page and Server Home Page Features
- Exadata Performance Page Features
- Exadata Metrics Features

Monitoring and Notification Features

With the Oracle Exadata plug-in, and related Systems Infrastructure and Virtual Infrastructure plug-ins, you can monitor Exadata targets through Enterprise Manager Cloud Control 13*c*. These plug-ins provide seamless integration with supported Exadata hardware and software so that you can receive notifications 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 Storage Server's I/O Resource Management feature within Enterprise Manager.
- Support SNMP notification for Exadata Database Machine components.
- Support dashboard report creation from Enterprise Manager Cloud Control, including a simplified configuration of the service dashboard.
- Support of client network hostnames for compute nodes.
- Enhanced InfiniBand network fault detection and InfiniBand schematic port state reporting.
- Modification of Enterprise Manager monitoring agents as needed for all Exadata Database Machine components.
- IORM for multi-tenancy database (CDB/PDB) environment:
    - CDB-level I/O Workload Summary with PDB-level details breakdown.
    - I/O Resource Management for Oracle Database 12*c* and above.

- – Exadata Database Machine-level physical visualization of I/O Utilization for CDB and PDB on each Exadata Storage Server.

  – Integration link to Database Resource Management UI.

- Support discovery of locked down storage servers.

- Since the release of EM 13*c*, the Exadata Plug-in is able to leverage the enhanced hardware monitoring features offered by the newly introduced *Oracle Systems Infrastructure Plug-in*. Users can view a photo-realistic schematic of the various hardware (including rack) and monitor the faults on individual hardware components.

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:

  – Configurations:

    * LDOM: Control domain, IO/guest domain

    * Zone: Global, non-global

  – Discover, monitor, and manage Exadata Database Machine-related components residing on SuperCluster Engineered 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 none, some, or all of the InfiniBand switch as part of monitored network, including the ability to add switches post discovery.

  – Flexibility to select some or all of the Cells to be shared among Exadata Database Machines.

- Support for the increasing types of Exadata Database Machine targets. See Oracle Exadata Database Machine Supported Hardware and Software for a complete list of supported hardware.

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

Target Discovery Features

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

- Automatically push the Exadata plug-in to agent during discovery.
- Discovery prerequisite checks updates, including:
  - Check for critical configuration requirements.
  - Check to ensure either `databasemachine.xml` or `catalog.xml` files exist and are readable.
  - Prevent discovered targets from being rediscovered.
- Credential validation and named credential support.
- Ability to apply a custom name to the Exadata target.
- Support discovery using the client access network.
- Automate SNMP notification setup for Database Machine components.
- 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.
- Support discovery of locked down storage servers.
- Enterprise Manager Cloud Control Exadata Discovery Wizard lets you discover Exadata Database Machine targets using 13*c*.
- An existing Exadata Database Machine target with *12c target types* can be converted to *13c target types*. For more information, see Convert Database Machine Targets with 12*c* Target Types to 13*c* for more information.

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

Exadata Storage Server Grid Home Page and Server Home Page Features

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

- Provides a fine-grained performance summary for flash and hard disk.
- Provides usage statistics to highlight flash cache and Smart Scan efficiency.
- Provides a detailed summary of flash space usage.
- Provides metrics for:

- I/O time distribution by flash and hard disk.
- IORM wait per database.

Exadata Performance Page Features

The Performance home page provides the following features:

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

Exadata Metrics Features

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

- Enhanced metric scalability in large environment to reduce time out by reducing calls.
- Reduce metric collection error for the Exadata HCA metric. Improvements to combine the HCA port data collection in a single 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.

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

Exadata Database Machine Configuration Support

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

- Exadata Hardware and Software Support
- Multi-Rack Support

- Partitioned Support

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

Exadata Hardware and Software Support

For information on Enterprise Manager Plug-in requirements for supported Exadata Database Machine hardware and software, see *Exadata Storage Software Versions Supported by the Oracle Enterprise Manager Exadata Plug-in* (Doc ID 1626579.1).

Multi-Rack Support

Enterprise Manager supports managing multiple connected racks of Oracle Database Machine of the supported machine types listed above (Exadata Hardware and Software Support). Also, the following two racks can be monitored in a multi-rack as these cannot exist as a standalone single rack:

- Storage Expansion Rack
- Compute Node Expansion Rack

Partitioned Support

The following partitioned configurations are supported:

- Partitioned Exadata Database Machine - the logical splitting of a Database Machine Rack into multiple Database Machines. The partitioned Exadata Database Machine configuration must meet the following conditions to be fully supported by Enterprise Manager Cloud Control 13*c*:

  – 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:

  – 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 need to be selected as part of the Exadata Database Machine targets for every partition. Inifiniband Switches will not be added automatically to subsequent Exadata Database Machine targets of other partitions. The KVM, PDU, and Cisco switches can be individually selected for the Database Machine target of each partition.

— User can confirm and select individual components for each Database Machine.

Oracle SuperCluster Support

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:
    - T4-4
    - T5-8
    - M6-32
    - M7
    - M8

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

Oracle SuperCluster Known Issues

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

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

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

    ```
    <PAGE13>
      <RACKS>
        <RACK ID="0">
          <MACHINE TYPE="203"/>
          <ITEM ID="1">
    ```

```
        <TYPE>ibs</TYPE>
        <ULOC>1</ULOC>
        <HEIGHT>1</HEIGHT>
    </ITEM>
    <ITEM ID="2">
        <TYPE>cell</TYPE>
        <ULOC>2</ULOC>
        <HEIGHT>2</HEIGHT>
    </ITEM>
    <ITEM ID="3">
        <TYPE>cell</TYPE>
        <ULOC>4</ULOC>
        <HEIGHT>2</HEIGHT>
    </ITEM>
    <ITEM ID="4">
        <TYPE>cell</TYPE>
        <ULOC>6</ULOC>
        <HEIGHT>2</HEIGHT>
    </ITEM>
    <ITEM ID="5">
        <TYPE>cell</TYPE>
        <ULOC>8</ULOC>
        <HEIGHT>2</HEIGHT>
    </ITEM>
    <ITEM ID="6">
        <TYPE>comp</TYPE>
        <ULOC>10</ULOC>
        <HEIGHT>8</HEIGHT>
    </ITEM>
    <ITEM ID="7">
        <TYPE>ibl</TYPE>
        <ULOC>18</ULOC>
        <HEIGHT>1</HEIGHT>
    </ITEM>
    <ITEM ID="8">
        <TYPE>cisco</TYPE>
        <ULOC>19</ULOC>
        <HEIGHT>1</HEIGHT>
    </ITEM>
    <ITEM ID="9">
        <TYPE>zfs</TYPE>
        <ULOC>20</ULOC>
        <HEIGHT>4</HEIGHT>
    </ITEM>
    <ITEM ID="10">
        <TYPE>ibl</TYPE>
        <ULOC>24</ULOC>
        <HEIGHT>1</HEIGHT>
    </ITEM>
    <ITEM ID="11">
        <TYPE>head</TYPE>
        <ULOC>25</ULOC>
        <HEIGHT>1</HEIGHT>
    </ITEM>
    <ITEM ID="12">
        <TYPE>head</TYPE>
        <ULOC>26</ULOC>
        <HEIGHT>1</HEIGHT>
    </ITEM>
    <ITEM ID="13">
        <TYPE>comp</TYPE>
```

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

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

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

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

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

  (Bug 17582197)

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

- Enterprise Manager will not report hard disk predictive failure on compute node in an Oracle SuperCluster environment.

- The pre-requisite check script `exadataDiscoveryPreCheck.pl` that is bundled in Exadata plug-in 12.1.0.3.0 does not support the `catalog.xml` file. Please download the latest `exadataDiscoveryPreCheck.pl` file from My Oracle Support.

  You can obtain the script in one of the following ways:

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

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

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

  – Download the script from Prerequisite script for Exadata Discovery in Oracle Enterprise Manager Cloud Control 12c and 13c (Doc ID 1473912.1) in My Oracle Support:

    `https://support.oracle.com/rs?type=doc&id=1473912.1`

- 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 /ect/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.
```

Supported Component Versions

For information on supported component versions of Exadata, refer to the following notes on My Oracle Support:

- Exadata Storage Software Versions Supported by the Oracle Enterprise Manager Exadata Plug-in (Doc ID 1626579.1)

- Required Enterprise Manager versions for Exadata Cisco Catalyst switches (Doc ID 2449150.1)

- Exadata Database Machine and Exadata Storage Server Supported Versions (Doc ID 888828.1)

Supported Operating Systems

The following operating systems (where OMS and agent is installed on) are supported by the Oracle Exadata plug-in 13.3.2:

- 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-ins for Exadata and Supercluster

  - Exadata Plug-in + SI plug-in + VI Plug-in for Exadata

  - Exadata Plug-in + SI Plug-in for SSC

  - Linux x86-64

  - Oracle Solaris on x86-64 (64-bit)

  - Oracle Solaris on SPARC (64-bit)

Oracle Exadata Database Machine Hardware Not Supported

The following Oracle Exadata Database Machine hardware configurations are **not** supported for Enterprise Manager Cloud Control Exadata plug-in 13.x:

- V1 hardware

- V2 hardware

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

2

Prerequisites

This chapter provides the prerequisites for Exadata Database Machine discovery. The following topics are discussed:

- Create a Database Server ILOM Service Processor User
- Create an ExaCLI User
- Verify Software Versions
- Verify Names Resolution
- Verify Firewall Configuration
- Enable Support for IPv6 Environments
- Oracle SuperCluster Prerequisites
- User Roles
- Install Oracle Management Agent
- Manually Deploy Exadata and Related Plug-ins

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 <oemuser password> -L
    USER sel list last
            10\
    ```

    *   For Exadata X5 and above (requires the `-I lanplus` command option):

    ```
    # ipmitool -I lanplus -H <ilom_hostname> -U oemuser -P <oemuser password> -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.

Create an ExaCLI User

Enterprise Manager can monitor Exadata Storage Servers using `cellcli`, `exacli`, or the `RESTful` API. In order to make use of *exacli* or the *RESTful* API, a user must be created. The same user can be used for either `exacli` or `RESTful` API. For more information, see Creating Users for Use with ExaCLI in the *Oracle Exadata Database Machine Maintenance Guide*.

Create SNMPv3 Users

If SNMPv3 will be used for Exadata monitoring, ensure that the necessary SNMPv3 users are created on the components prior to discovering the Exadata to fully leverage monitoring through Enterprise Manager.

*   Create SNMPv3 Users on Compute Nodes and Storage Servers
*   Create SNMPv3 Users on Cisco Ethernet Switches
*   Create an SNMPv3 User in IB Switches
*   Enable SNMPv3 on PDUs
*   Create an SNMPv3 user on PDUs

Create SNMPv3 Users on Compute Nodes and Storage Servers

The commands required to create SNMPv3 users on compute nodes and storage servers are similar, but make use of different command line interfaces and object names. In the following examples, run `cellcli` to get to the interactive prompt if on a storage server, and run `dbmcli` to get to the interactive prompt on a compute node.

Specify the appropriate object name, cell for storage server and dbserver for compute node. The instructions differ between Exadata System Software releases. Please see the details for the respective Exadata System Software version in the sections below.

> **Note:**
>
> For additional information on these commands, please see the following references:
>
> - For information on CellCLI and the `alter cell` command, see Using the CellCLI Utility in the *Oracle Exadata System Software User's Guide*.
>
> - For information on DBMCLI and the `alter dbserver` command, see Using the DBMCLI Utility in the *Oracle Exadata Database Machine Maintenance Guide*.

Create Individual SNMPv3 Users on Exadata 19.3 and Above

Exadata System Software version 19.3 and above supports maintaining SNMPv3 users individually. Use the following command to create an SNMPv3 user.

```
CLI> alter <cell|dbserver> snmpuser.<username>
=(authprotocol=SHA,authpassword=<password>,privprotocol=AES,privpassword=<p
assword>)
```

Create All SNMPv3 Users on Exadata 19.2. and Below

Exadata System Software versions 19.2 and below require maintenance of SNMPv3 users as a complete set. Use the following command to create an SNMPv3 user.

> **Note:**
>
> Be sure to include the details of all SNMPv3 users as the set will be replaced with this command.

```
CLI> alter <cell|dbserver> snmpUser=((name=<username>, authProtocol=SHA,
authPassword=<password>, privProtocol=AES, privPassword=<password>)
[,<repeat_with_details_as_necessary_for_additional_users>])
```

Create SNMPv3 Users on Cisco Ethernet Switches

The below commands configure an SNMP user with authentication and privacy parameters on the Cisco Ethernet switches running NX-OS including the admin switch, and if this is a RoCE Exadata, the RoCE switches.

The passphrase can be any case-sensitive, alphanumeric string up to 64 characters.

```
switch# configure terminal
switch(config)#
```

```
switch(config)# snmp-server user <username> auth sha <passphrase> priv
aes-128 passphrase
```

The below command displays information about one or more SNMP users.

```
switch(config)# show snmp user
```

Once all the configuration changes are done, the below command will save the
configuration in persistent memory .

```
switch(config)# copy running-config startup-config
```

Create an SNMPv3 User in IB Switches

If the Exadata to be discovered is an IB Exadata, follow the below commands to create
an SNMPv3 user on the IB switches.

Log in to the ILOM console of the switch as user *ilom-admin*.

Create the SNMPv3 user. This is the start of your topic.

```
> create /SP/services/snmp/users/<username> privacyprotocol=AES
authenticationprotocol=SHA privacypassword=<password>
authenticationpassword=<password>
```

Follow the below steps to display information about one or more SNMP users.

```
> cd /SP/services/snmp/users
> show -d properties <username>
```

Enable SNMPv3 on PDUs

Follow the below steps to enable SNMPv3 on the PDUs.

1. Access the PDU metering unit from a system on the network.

2. Click on the **Net Configuration** link and log in as an admin user.

3. Select the **SNMP-Access** tab**.**

4. Click the **SNMP v3 Enable** checkbox to enable SNMP v3.

5. Click **Submit**.

Create an SNMPv3 user on PDUs

Follow the below steps to create an SNMPv3 user on the PDUs.

1. Access the PDU metering unit from a system on the network.

2. Click on the **Net Configuration** link and log in as an admin user.

3. Select the **SNMP-Access** tab**.**

4. In the SNMPv3 table, perform the following

a. Enter the SNMPv3 UserName.

b. Select the **Security Level** auth / priv.

c. Select **SHA** as the Auth Algorithm.

d. Enter the **Auth Password**.

e. Select **AES** as the **Privacy Algorithm**.

f. Enter the **Privacy Password**.

g. Select **Enable**.

5. Click **Submit**.

Verify Software Versions

Verify the following software versions:

- Exadata Storage Server Software
- InfiniBand Switch
- PDU Firmware
- Grid Infrastructure/DB Cluster

Exadata Storage Server Software

See Oracle Exadata Database Machine Supported Hardware and Software for specific supported Exadata Software releases. To verify the cell software version on the Exadata Storage Server, `ssh` to the Exadata Storage Server as the `root`, `celladmin`, or `cellmonitor` user. Run:

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

Look for *releaseVersion* in the output.

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: 2.2.13-2
```

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

PDU Firmware

The PDU firmware version must be 2.10 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
```

Grid Infrastructure/DB Cluster

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

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, Exadata Storage Servers, 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 13*c*, it is necessary for your local machine to be able to resolve the host name of Cloud Control 13*c*.

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.

Verify Firewall Configuration

To verify the firewall configuration:

1. Enable `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, Exadata Storage Servers, 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 - `exadbnode1.example.com` and `exadbnode2.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 - `exadbnode1.example.com` and `exadbnode2.example.com`

   - The virtual IPs for each compute node - `exadbnode1-vip.example.com` and `exadbnode1-vip.example.com`

   - The scan listener hostname - `scan-exadatadb`

3. Open Enterprise Manager Upload Port

   The Enterprise Manager Cloud Control 13*c* 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 13*c* Agent HTTP/HTTPS port on each compute node. The Agent port defaults to 3872. If port 3872 is not available, the next available port starting from port 1830 is used.

   To identify the port used:

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

     ```
     $ emctl status agent
     ```

   - Alternatively, you can look for the value of the `EMD_URL` property in the `emd.properties` file the following directory: `<AGENT_HOME>/agent_inst/sysman/config`

5. Open SSH Ports (port **22**)

   The Enterprise Manager Cloud Control 13*c* 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 Exadata Storage Servers, ILOMs, PDUs, InfiniBand switches, and Cisco switch will need to be opened for each of the compute nodes.

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

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

Table 2-1   Firewall Ports

Component	Ping service and port	SNMP*	SSH (port 22)	Notes
PDU	From remote agent	Yes	Yes	
Compute node ILOM	From remote agent	Yes	Yes	**1.** Remote agent needs to be able to SSH to dom0. **2.** Need SNMP port open on dom0.
dom0	From EM OMS server	Yes	Yes	
Cell	From remote agent	Yes	Yes	
InfiniBand Switch	From remote agent	Yes	Yes	
Cisco Switch	From remote agent	Yes	Yes	
KVM	From remote agent		Yes	May not be required, if X5 does not have KVM
OMS			Yes	Upload http/https port - usually 3872
Agent				The OMS server(s) will need to be able to connect to the Enterprise Manager Cloud Control 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.

Enable Support for IPv6 Environments

> **Note:**
>
> Internet Protocol version 6 (IPv6) is the most recent version of the Internet Protocol (IP), the communications protocol that provides an identification and location system for computers on networks and routes traffic across the Internet.

To perform an Exadata Database Machine discovery on IPv6-based client or management network, you must deploy agents on a host that supports dual stack (IPV4 and IPV6).

If the compute node hosts are pure IPv6-based hosts, then deploy the agent on a remote host that supports both IPV4 and IPV6 and perform "remote agent" based discovery.

This agent deployment is needed for monitoring those components in Exadata Database Machine that do not yet support IPV6 (for example, Infiniband Switch and PDU. For more details, see IPv6 support status on Exadata Database Machine (Doc ID 2056895.1), available in My Oracle Support.

Oracle SuperCluster Prerequisites

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

Table 2-2   Oracle SuperCluster Prerequisites

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

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 Oracle Exadata Database Machine Administration .

Install Oracle Management Agent

Enterprise Manager Exadata discovery supports the use of either management network hostname or client network hostname for the compute nodes. When installing the Oracle Management 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 Oracle Management Agent hostname.

Oracle Management Agents need to be installed on each compute node and must not be installed on any other Exadata Database Machine components. For physical Exadata, the agents should be installed on each compute node. For virtual Exadata, the agents should be installed on each domU (virtual machine), and not on the dom0 (hypervisor).

For information on installing agents refer to the Oracle Enterprise Manager Cloud Control Online Documentation Library, Release *13.3* (Installing Oracle Management Agents in **Cloud Control Basic Installation Guide**).

Manually Deploy Exadata and Related Plug-ins

The Exadata and related plug-ins are automatically deployed to the agent as part of discovery.

You may need to manually deploy the Exadata and related plug-ins to the agents on each of the compute nodes when upgrading an existing agent plug-in installation. Deploy the Exadata, Systems Infrastructure, and for virtual Exadata the Virtual Infrastructure plug-ins manually if an older version of the plug-in(s) has been deployed to the agent already and you would like to upgrade to the latest version of the plug-in(s) deployed on the OMS.

To determine if the Exadata, Systems Infrastructure, and Virtual Infrastructure plug-ins are deployed on each compute node and what versions they are, 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 and related plug-ins:

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 the plug-in of choice from the Name list.

> **✎ Note:**
>
> Please check *Exadata Storage Software Versions Supported by the Oracle Enterprise Manager Exadata Plug-in* (Doc ID 1626579.1) on My Oracle Support for the latest supported plug-ins. Oracle recommends that you deploy the latest version of the Exadata and related plug-ins to the agent.

3. With the plug-in 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 plug-in has been deployed to all 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.

3

Exadata Database Machine Discovery

This chapter provides instructions for discovery of the Oracle Exadata Database Machine through Enterprise Manager Cloud Control 13*c*.
The following sections describe how to discover the Exadata Database Machine and other supported targets:

1. Discovering an Exadata Database Machine
2. Discover Oracle SuperCluster as an Exadata Database Machine
3. Discovering Grid Infrastructure and RAC
4. Switch from Using CellCLI to ExaCLI after Storage Server Locked Down

Discovering an Exadata Database Machine

This section describes various discovery flows that are supported in Enterprise Manager 13*c*.

- Fresh Discovery of Exadata Database Machine Target
- Fresh Discovery of Exadata Database Machine on Supercluster Systems
- Convert Database Machine Targets with 12*c* Target Types to 13*c*

Fresh Discovery of Exadata Database Machine Target

This discovery flow shows the steps involved in discovering Database Machine targets. This flow is the recommended option for discovering Database Machine targets afresh.

An Exadata Database Machine can be deployed in a physical or virtual configuration. Enterprise Manager supports both of these configurations. There are additional steps required in order to discover a virtual Exadata Database Machine. These additional steps are addressed inline as necessary.

Discovering the Oracle Virtual Platform

If discovering a virtual Exadata, the Oracle Virtual Platform target must be discovered before discovering the Oracle Exadata Database Machine target. The steps below detail the discovery of the Oracle Virtual Platform target.
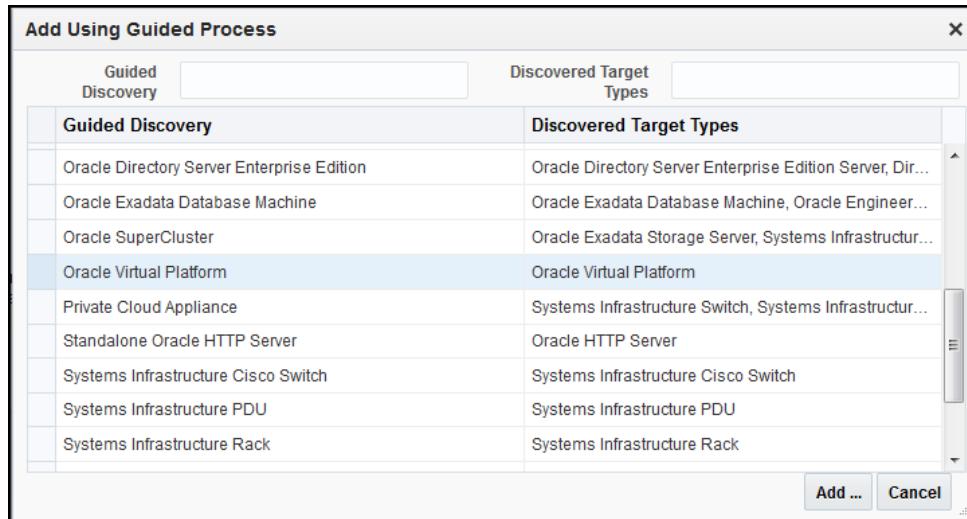
1. From the Enterprise Manager home page, select the **Setup** menu (upper right corner), **Add Target**, and then **Add Targets Manually**.
2. On the Add Targets Manually page, click **Add Targets Using Guided Process**.

Figure 3-1   Add Targets Manually
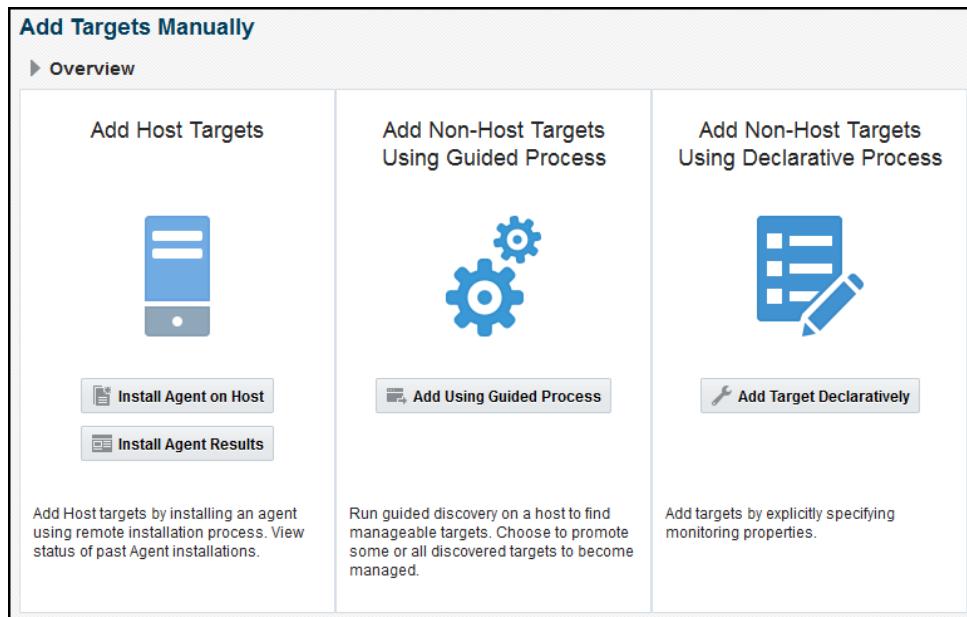
3. Under the Guided Discovery column, select Oracle Virtual Platform and click **Add**.

Figure 3-2   Select Oracle Virtual Platform

4. On the Discover Oracle Virtual Platforms screen, do the following:

    a. Select the agent installed on the first compute node domU (virtual machine) for the Monitoring Agent and select any other compute node *domU* (virtual machine) agent for the *Failover Monitoring Agent.*

    b. For the *Credential Properties*, enter root as the username and provide the root password.

    c. In the *Hostname and IP Address* section, click on the **Add** button and type in the fully qualified hostname for the *dom0* servers (one per line) and click **Add**.

    d. Click **Submit**.

Figure 3-3   Discover Oracle Virtual Platforms

5. After the discovery of the Oracle Virtual Platform target is complete, follow the steps in the next section to discover the Oracle Exadata Database Machine target.
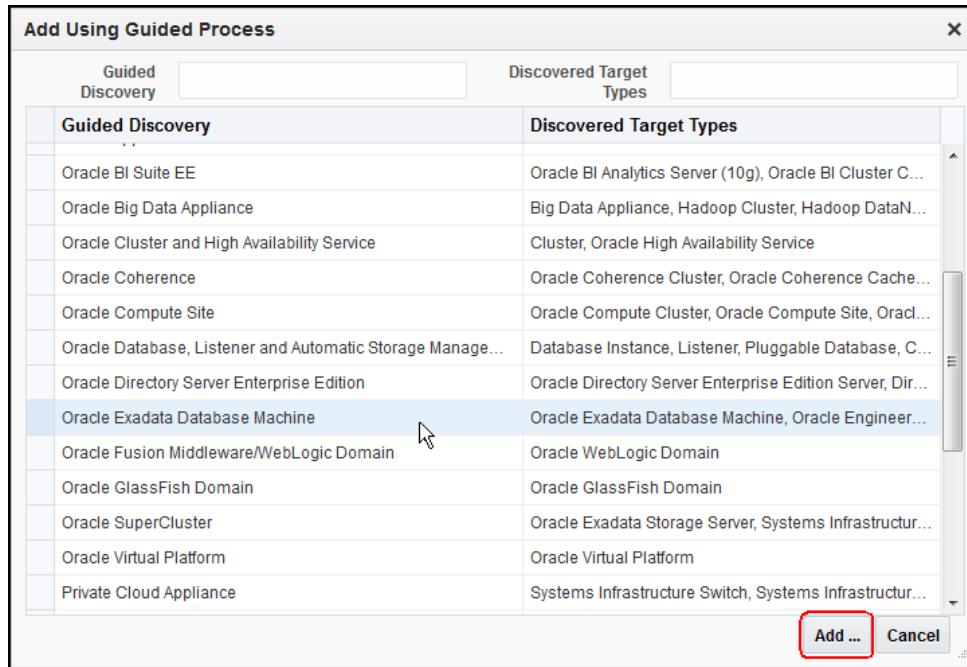
Discovering the Oracle Exadata Database Machine

1. From the Enterprise Manager home page, select the **Setup** menu (upper right corner), **Add Target**, and then **Add Targets Manually**.

2. On the Add Targets Manually page, click **Add Targets Using Guided Process**.

Figure 3-4   Add Targets Manually

3. From the Add Using Guided Process window, select **Oracle Exadata Database Machine** from the list and click **Add**.

Figure 3-5   Add Using Guided Process: Add Oracle Exadata Database Machine

4. On the Oracle Exadata Database Machine Discovery page, the following two options are presented. This document details the steps for discovering a new Exadata Database machine and components:

   • Discover a new Database Machine and its hardware components as targets. The table will update to show the target types and the credentials required for discovery.

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

Figure 3-6   Oracle Exadata Database Machine Discovery

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

5. On the Discovery Inputs page, enter the following information:

- For the Discovery Agents section:
  - **Agent URL:** Select an agent deployed on a physical compute node or if virtual Exadata on a domU (virtual machine) compute node. Click the search icon to select from available URLs.

- For the Schematic Files section:
  - Once you have specified the Agent URL, a new row (hostname and schematic file information) is automatically added. The default schematic file, databasemachine.xml, describes the hardware components of the Exadata Database Machine.
  - Click **Set Credential** to set the credentials for the host.
  - Check and modify if necessary the schematic file location.
  - Select the schematic file name from drop-down menu.

> **✎ Note:**
>
> You only need to customize the Schematic file location if one of the following is true:
>
> – The Schematic file is not in the default location.
>
> – The Database Machine contains a Storage Expansion Rack.
>
> – The hardware components are specified in multiple schematic files.

Figure 3-7   Database Machine Discovery: Discovery Inputs
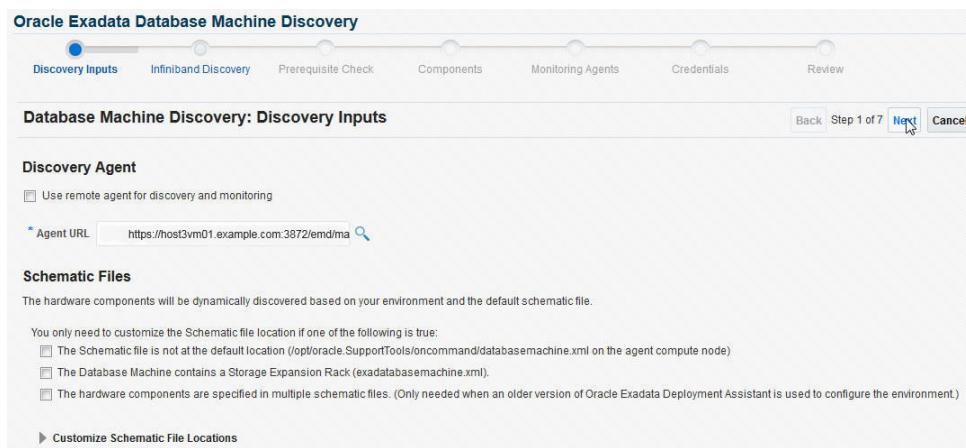
Click **Next**.

6. The InfiniBand Discovery page looks different depending on whether the Exadata has been identified as having an InfiniBand (IB) or RDMA over Converged Ethernet (RoCE) storage network. Screenshots and the details for each option are shown below.
   If this is an IB Exadata, the following information is required,

- **IB Switch Host Name:** The host name for one of the IB switches for the Exadata. The IB Switch hostname is usually pre-populated.
- **InfiniBand Switch ILOM host credential:** The root user name and password for the InfiniBand switch ILOM host.
  Click **Next**.

Figure 3-8   Database Machine Discovery: InfiniBand Discovery

If this is a RoCE Exadata, no credentials are required at this point in the discovery flow. The InfiniBand Discovery page will display a message that the Database Machine to be discovered contains RoCE switches and no additional inputs are needed.

Figure 3-9   Database Machine Discovery: InfiniBand Discovery (RoCE)

Click **Next**.

> **Note:**
>
> If this is a RoCE Exadata, but the form displayed requests InfiniBand information as depicted in Figure 3-8a , it likely means there was an issue accessing the databasemachine.xml file specified in the previous step. Navigate back and correct this issue. Ensure the proper location and credentials are specified for the databasemachine.xml file and that the file exists.

7. On the Prerequisite Check page, Enterprise Manager will try to discover hardware components dynamically based on your environment. If any critical issues are encountered, then you can click **Back** to resolve them. Enterprise Manager will show the problem and its severity (Info, Warning, or Critical).
   Any warning issues or informational messages may also be displayed. These do not interfere with the discovery process.

**Figure 3-10   Database Machine Discovery: Prerequisite Check**
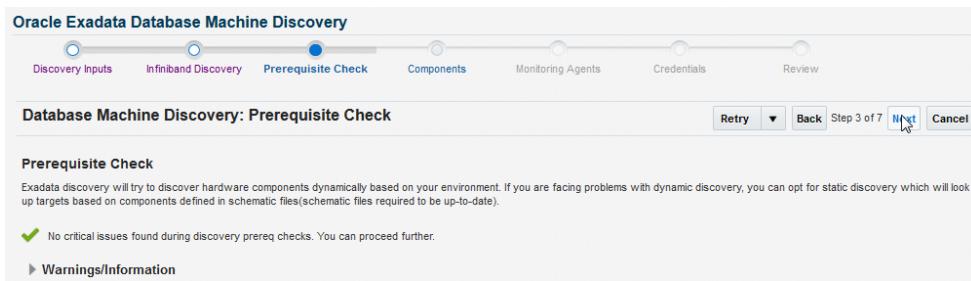
Click **Next**.

8. On the Components page, the components below are pre-selected. You can deselect any unwanted component. Components include, but are not limited to, the following:

   • **Compute Node:** Select the hosts that are compute nodes in the OracleExadata Database Machine.

   • **Oracle Exadata Storage Server:** Select the Oracle Exadata Storage Servers that are part of this Oracle Exadata Database Machine target.

   • **InfiniBand Switch:** Displayed if this is an IB Exadata. 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. If this is an IB Exadata, select the admin switch. If this is a RoCE Exadata, select the admin and RoCE switches. The Ethernet switches will be added as managed targets.

   • **Compute Node ILOM:** Select the Integrated Lights Out Managers (ILOMs) of the compute nodes that are part of this Oracle Exadata Database Machine. These ILOMs will be added as managed targets.

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

Figure 3-11   Database Machine Discovery: Components
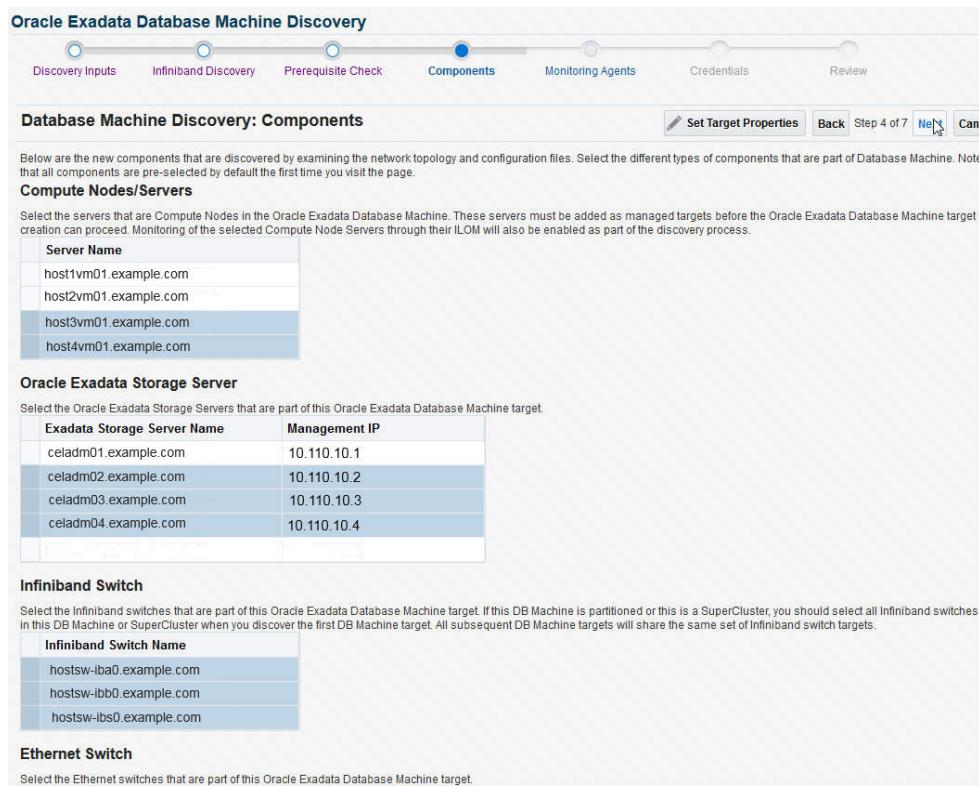
Click **Next**.

9. On the Monitoring Agents page, select an agent for the Monitoring Agent, and then one for the Backup Monitoring Agent from the drop-down selection.

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

Figure 3-12   Database Machine Discovery: Monitoring Agents

Click **Next**.

10. On the Credentials page, set the credentials for all components within the Exadata Database Machine (for example, the Storage Server, PDU, InfiniBand Switch, and so forth). Click **Set Credential** to set the credential for the component. If the users and passwords are the same for all components of the type, choose **Same for all** and enter the user and password combination.

    • Depending on the component, you may need to provide additional information. For example, in the Exadata Storage Server Credentials window, you must enter the SNMP Credentials as well as the monitoring Credentials.

    • The recommended monitoring mechanism for the Oracle Exadata Storage Servers is RESTful API. For details on how to create the necessary ExaCLI user, refer to Creating Users for Use with ExaCLI in the *Oracle Exadata Database Machine Maintenance Guide*.

    • The recommendation for SNMP subscriptions is to use SNMP v3 for all subscriptions. For IPv6 environments, only SNMPV3 credentials are supported.

    • The SNMP community string is like a password. It is sent along with each SNMP Get-Request, and allows or denies access to the device. Please check with your network administrator to get the appropriate community string details for your environment.

    The table below provides sample guidance on the recommended values for the credentials.

Table 3-1   Credential Details

Component	Credential	Monitoring Mechanism	SNMP Subscription	Notes
Agent	oracle (or the user who owns the agent installation)	.	.	.
Oracle Exadata Storage Server	celladministrator	RESTful API	SNMP V3	.
Infiniband Switch	ilom-admin	.	SNMP V3	This component will not be present when discovering RoCE based systems
Compute Node Server ILOM	root	.	SNMP V3	.
PDU	admin	.	SNMP V3	.
Ethernet Switch	admin	.	SNMP V3	In a RoCE based system, these credentials will be used for the Management switch discovery as well as the RoCE switch discovery. If the passwords are different between the Management and RoCE switches, passwords can be specified by switch.

Figure 3-13   Database Machine Discovery: Credentials

Click **Next**.

11. On the Review page, verify each section is correct. The following figure shows an example of an accurate review.

Figure 3-14   Database Machine Discovery: Review

Click **Submit**.

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

Fresh Discovery of Exadata Database Machine on Supercluster Systems

You can use the Exadata plug-in to discover and monitor an Oracle SuperCluster system.

You can monitor only the Database and Exadata components of the Oracle SuperCluster installed on LDOM and Zones. To monitor specific LDOM or virtualization configurations at the operating system level, please use Oracle Enterprise Systems Infrastructure Plugin 13c.

The Supercluster discovery wizard provided by "Systems Infrastructure Plug-in" is mainly responsible for discovery of the Supercluster Hardware targets including ZFS server (For details please refer supercluster discovery document from emsi plugin). It is recommended that the users should go through this flow first and then perform the Exadata Database Machine Discovery.

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

See Discover Oracle SuperCluster as an Exadata Database Machine.

Convert Database Machine Targets with 12*c* Target Types to 13*c*

To convert an Exadata Database Machine discovered by Enterprise Manager 12*c* or by Enterprise Manager 13c with 12c target types to be monitored by Enterprise Manager 13*c*:

1. From the Database Machine menu, select **Convert 12c Member Targets**.

Figure 3-15   Convert 12c Member Target Menu
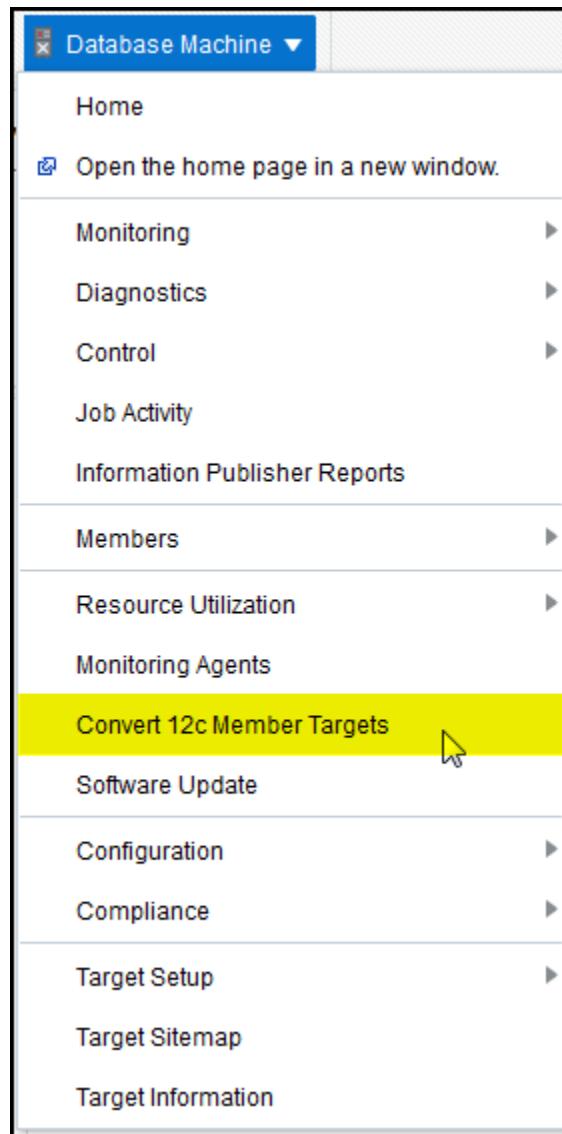
2. Select a **Conversion Option**.

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

   • Retain 12*c* targets and their historical data. This option preserves the historical data for legacy targets.

Figure 3-16   Database Machine Conversion: Conversion Option

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

3. Set the **Credentials**. For the conversion, you must set the credentials for the Exadata Database Machine components to be converted. These are a subset of the components that comprise the Exadata. For further details on recommended settings, see the table Table 3-1 and the related details in the corresponding step in Discovering the Oracle Exadata Database Machine.

Figure 3-17   Database Machine Conversion: Credentials

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

4. **Review** the components to be converted in the following three sections.

   • **Summary**: This section summarizes the number of targets to be converted and if any targets will have additional monitoring information available to you after the conversion.

   • **Targets to be Converted**: This table shows all Enterprise Manager 12*c* targets to be converted to 13*c* target types for monitoring by Enterprise Manager 13*c* and provides the new target name information.

   • **Targets Not Impacted by Conversion**: All components of the Exadata Database Machine do not need to be converted to be monitored by Enterprise Manager 13*c*. This list identifies those components that to not need to be converted. These components are already monitored by Enterprise Manager 13*c* using 13*c* target types.

Figure 3-18   Database Machine Conversion: Review

Click **Submit** to begin the conversion.

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

   Do not close this window until the processing is complete!

Figure 3-19   Processing Targets
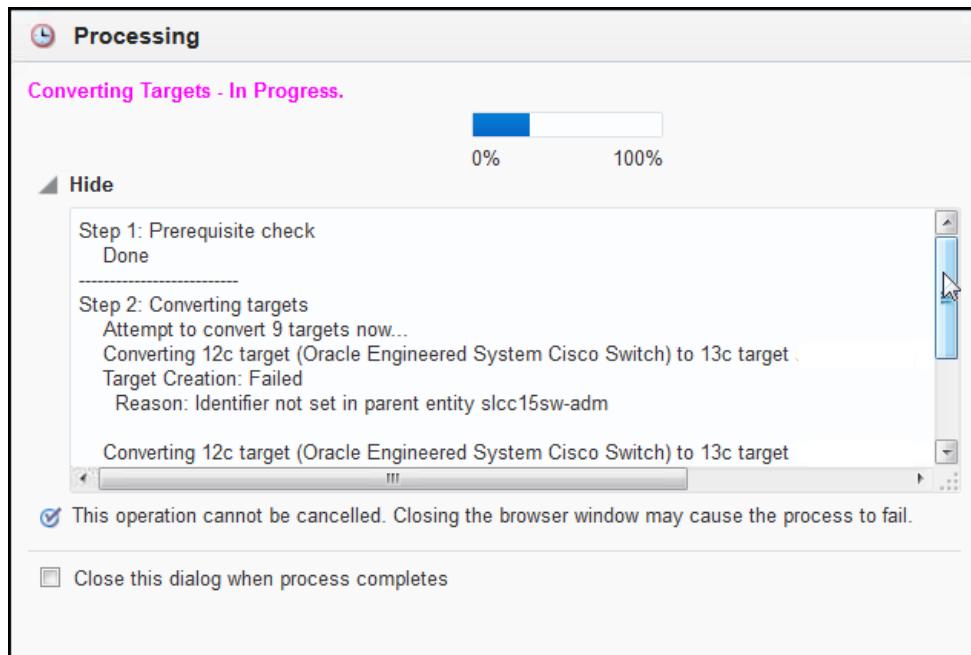
You can select the option to close the window after the processing is complete, or click **Done**.

6. Once processing is complete, a **Conversion Results** page provides a summary of the components converted and details of each component that succeeded or failed to be converted:

Figure 3-20   Database Machine Conversion: Conversion Result

From this page, click **Convert Remaining 12c Targets** to repeat the conversion process for those components that failed to be converted. Click **Launch New Database Machine Home Page** to view the updated home page with all converted components monitored by Enterprise Manager 13*c*.

Discover Oracle SuperCluster as an Exadata Database Machine

To discover the Oracle SuperCluster as an Exadata Database Machine:

1. See *Discovering and Promoting Oracle Solaris Zones* in *Oracle® Enterprise Manager Cloud Control Administrator's Guide* for completing the prerequisite of pushing the agent to the control domain and zones.

2. Open a Service Request (SR) and upload the following files from your first 11gR2 LDOM:

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

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

3. Oracle Support will provide you the file(s) generated based on the information provided in your configuration files. Copy all files into your `/opt/oracle.SupportTools/onecommand` directory.

4. Ensure that READ permissions are open for all files in this directory as well as in the `/opt/oracle.SupportTools/em` directory. The agent must be able to read these files during discovery.

5. Run Self Update from Enterprise Manager to download the Solaris SPARC agent software on the OMS. Apply that download to the OMS to make it available for deployment:

   a. From Enterprise Manager, click **Setup**, then **Extensibility**, and finally **Self Update**. Click **Agent Software**.

   b. Select **Oracle Solaris on SPARC (64-bit)**.

   c. If the status is Available, then click **Download** from the Actions menu.

   d. Once downloaded, you must Apply it to the OMS from the same Self Update page.

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

6. Install an agent on each of the Database nodes of the Oracle SuperCluster:

   a. From Enterprise Manager, select **Setup**, then **Add Target**, and finally **Add Targets Manually**.

   b. Select **Add Host Targets** (selected by default) and click **Add Host**.

  c. Continue with the installation wizard and ensure that you run `root.sh` on *each* node once installation is completed.

7. Configure the database nodes for Database Machine discovery.

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

   Run:

   ```
   # ibnetdiscover | grep your_db_nodes
   ```

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

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

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

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

Discovering Grid Infrastructure and RAC

The process for discovering Grid Infrastructure (Cluster) and Real Application Cluster (RAC) related targets including Oracle High Availability Service and Cluster targets as well as ASM, database, listener, and related targets on Exadata is the same as on other platforms. See Discovering and Adding Database Targets in the *Oracle Enterprise Manager Cloud Control Administrator's Guide* for more information.

Switch from Using CellCLI to ExaCLI after Storage Server Locked Down

You can at any time lock down an Exadata Storage Server and switch to ExaCLI for monitoring/administration (See Exadata Storage Server User Guide to know more about ExaCLI). From the Exadata Storage Server menu, select Target Setup, then select Monitoring Configuration, as shown in Figure 3-21:

Figure 3-21   Monitoring Credentials Menu Item
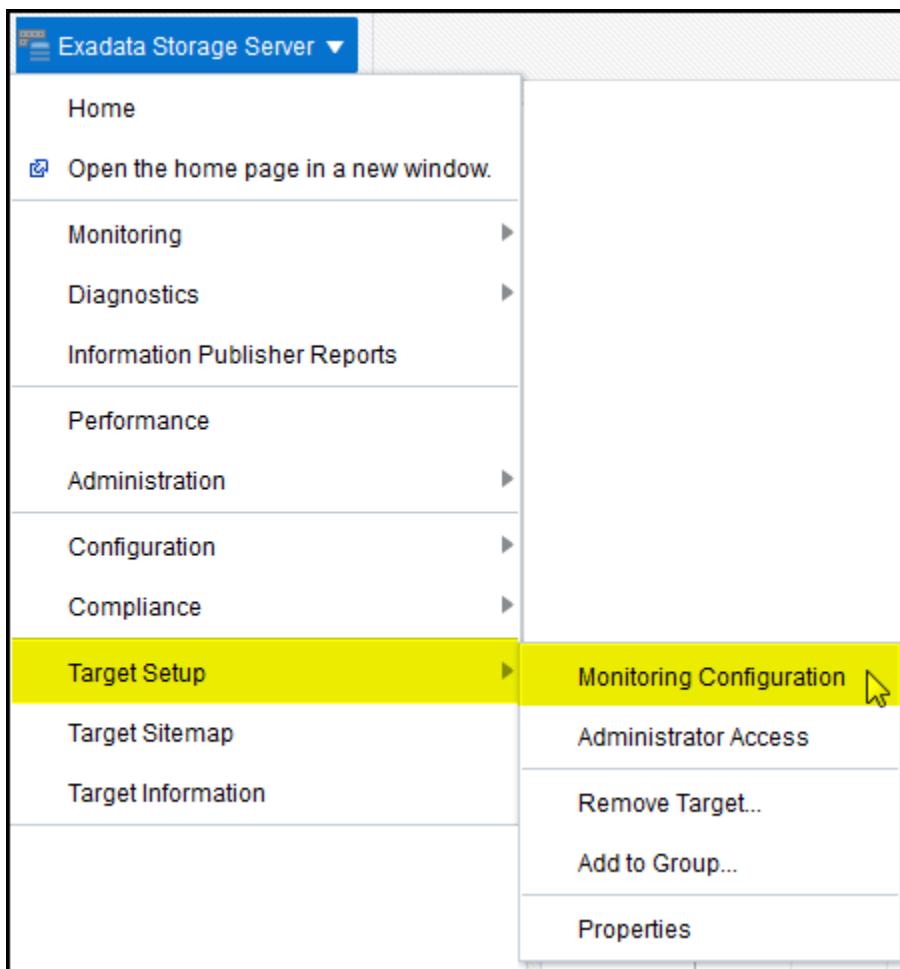
On the Monitoring Configuration page, set the **Support ExaCLI** value to **1** (the default is 0), as shown in Figure 3-22, and click **OK**.

Figure 3-22   Monitoring Configuration: Set to Monitor Using ExaCLI

4
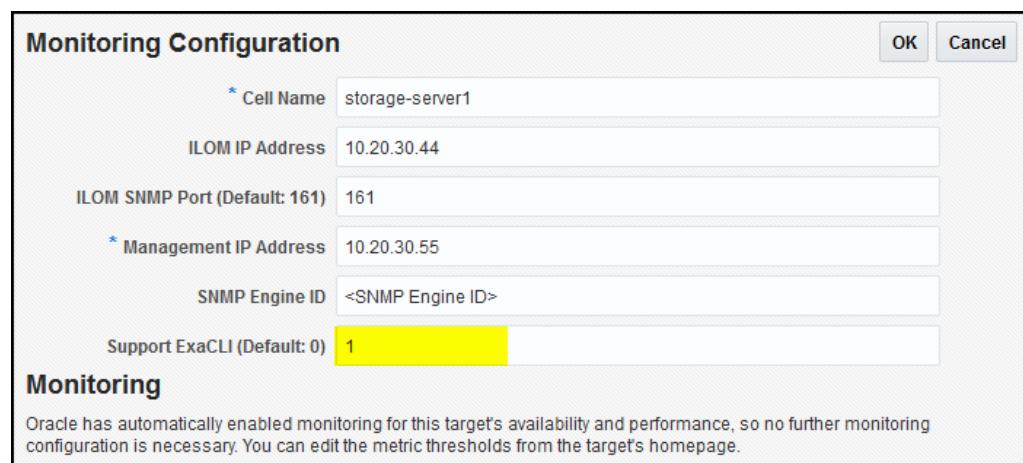
Post-Discovery Configuration and Verification

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

- Verify SNMP Subscription of the Oracle Management Agent to Exadata Storage Server
- Configure and Verify SNMP for InfiniBand Switch Targets
- Configure the Compute Node ILOM SNMP for Enterprise Manager Monitoring
- Set Up SNMP for Cisco Ethernet Switch Targets
- Set Up SNMP for Power Distribution Unit (PDU) Targets
- Accessing Oracle Support Workbench for Exadata Storage Server
- Oracle Exadata Database Machine Dashboard Creation

> **Note:**
>
> You must remove the SNMP notification on the cell, InfiniBand switch, ILOM, Cisco switch, and PDU **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.

Verify SNMP Subscription of the Oracle Management Agent to Exadata Storage Server

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

> **Note:**
>
> - During the discovery process, you can optionally provide the necessary `root` credentials to subscribe for SNMP traps from Exadata Storage Servers. 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.
>
> - Use SNMP V3 subscriptions for IPv6-based Exadata Storage Server targets because of limitations in the SNMP V1 protocol.

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.

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
```

Configure SNMP Values Using `cellcli`

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

1. Set the `snmpSubscriber` value:

   • **SNMP V1**

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

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

   • **SNMP V3**

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

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

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

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

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

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

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

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

   For example, for SNMP V1:

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

For example, for SNMP V3:

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

> **Note:**
>
> Take special care not to overwrite existing settings for `snmpSubsriber`. If there are existing subscribers, then append the agent subscriptions. For example, if the `cellcli -e list cell attributes snmpSubscriber` command returned:
>
> ```
> # cellcli -e list cell attributes snmpSubscriber
>   ((host=ilm-asr1.example.com,port=162,community=public,type=asr))
> ```
>
> Then you must append the Agent subscriptions:
>
> ```
> #cellcli -e "alter cell snmpSubscriber=((host='ilm-
> asr1.example.com',port=162,
> community=public,type=asr),(host='[host name]',port=[port]),
> (host='[host name]',port=[port]))"
> ```

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

   • Ensure that the SNMP V3 monitoring credentials are set up on the cell target in Enterprise Manager which match the SNMP V3 user on the cell:

     – Log in to Enterprise Manager.

     – From the **Setup** menu, select **Security**, then select **Monitoring Credentials**.

     – Select the **Exadata Storage Server** type and click **Manage Monitoring Credentials**.

     – Select the cell and set the SNMP V3 credentials.

   • Ensure that the `snmpengineid` property is set up on the target in Enterprise Manager:

     – Log in to Enterprise Manager.

     – Go to the Exadata Storage Server home page.

     – From the Exadata Storge Server menu, select **Monitoring Configuration**.

     – If the `snmpengineid` property is not set, then set it manually in Enterprise Manager. You can obtain it from the cell with the following command

       ```
       list cell attributes snmpengineidhex
       ```

       All of the above steps are automatically taken care of it SNMP V3 subscription along with ASR option are selected during Exadata Database Machine discovery.

3. Set the `notificationMethod` value:

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

4. Set the `notificationPolicy` value:

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

Configure SNMP Values Using `dcli` (optional)

The SNMP configuration commands can be run using `dcli` to perform the configuration in batch on alll Exadata Storage Servers:

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'\""
   ```

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**.

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.

> **Note:**
>
> 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.

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.

> **Note:**
>
> - 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.
>
> - `ilom-admin` is the preferred user when discovering an InfiniBand Switch target for full monitoring. If the switch is discovered using root or `ilom-admin` user, the community string provided during discovery is added to the switch, if it doesnt exist already.
>
> - During SNMP V3 discovery, the V3 user added by the (discovery) user during discovery is added to the switch if the discovery is perfomred using root or the `ilom-admin` user.

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.

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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**.

Configure the Compute Node ILOM SNMP for Enterprise Manager Monitoring

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

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

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`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.

> **✎ Note:**
>
> • While configuring the SNMP traps for the ILOM telemetry source, if discovery is done using the root user, the entry is automatically added to the SNMP subscription table, provided there are free slots available. *IF* discovery is performed using a non-root user, the user will need to manually update this table from ILOM console.
>
> • During SNMP V3 discovery, the SNMP V3 user added by the user during discovery is added to the ILOM, if the discovery is done using root user. For discovery using a non-root user, the administrator will need to manually create the SNMP V3 user in the ILOM console.

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=11.222.33.4
44),
(host=hostname2.mycompany.com,port=3872,community=public,type=asr,fromip=12.345.67.89
0)"
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.

> **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=10.10.10.2
26),
(host=asrhostname2.mycompany.com,port=162,community=public,type=asr,fromip=10.10.10.2
26),
(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
)
```

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 Exadata Storage Servers.

Configure SNMP Values Using dbmcli

1. Set the `snmpSubscriber` value:

    ```
    # dbmcli -e "ALTER DBSERVER
    snmpSubscriber=((host=[agent1_hostname],port=[agent1_port],community=public,type=
    asr,fromIP=eth0_IP_ADDR),(host='agent2_hostname',port=<agent's
    port>,type=asr,fromIP=eth0_IP_ADDR))"
    ```

    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`.

Configure SNMP for Oracle SuperCluster (If root is not used for discovery)

> **Note:**
>
> *   This section is applicable only if ILOM target discovery is performed as a non-root user. If discovery is done using a root user, the entry is automatically added to the table, provided there are free slots available.
> *   During SNMP V3 discovery, the SNMP V3 user added by the user during discovery is added to the switch, if the discovery is performed as a root user. For discovery using a non-root user, the administrator has to manually create the SNMP V3 user in the ILOM console.

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**.

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):

> **Note:**
>
> This procedure is valid for SI targets if the monitoring of the switch is performed with a non-administrator user. If Enterprise Manager monitors the switch with an administrator user, the following procedure is automatically performed as part of the discovery process.

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)# 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. Verify settings and save the configuration:

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

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.

Set Up SNMP for Power Distribution Unit (PDU) Targets

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

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

1. Log in to the PDU network interface through a browser at `https://<pdu-name>`, for example: `https://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.

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.

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 Storage Server, follow these steps:

1. From the **Target** menu of the Exadata Storage Server for which you want to access the Oracle Support Workbench, select **Diagnostics**, then select **Support Workbench** as shown in Accessing Oracle Support Workbench for Exadata Storage Server:

Figure 4-1   Support Workbench Menu
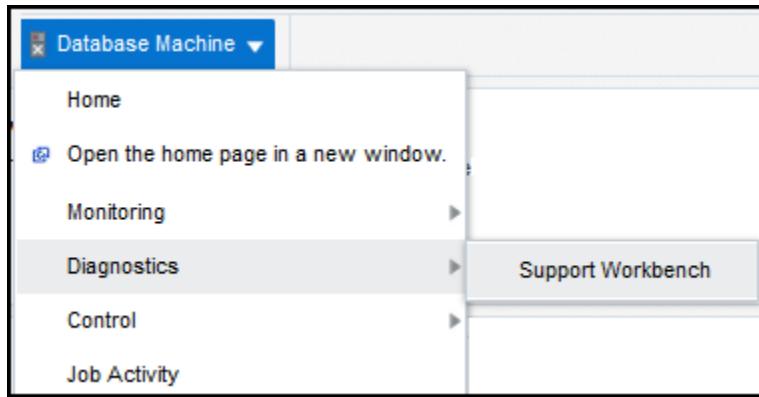
2. If you are logging in to the Support Workbench for the first time, you must first initialize the Support Workbench properties. For first-time log in, the Initialize Support Workbench Properties window will be displayed as shown in Figure 4-2:

Figure 4-2   Initialize Support Workbench Properties
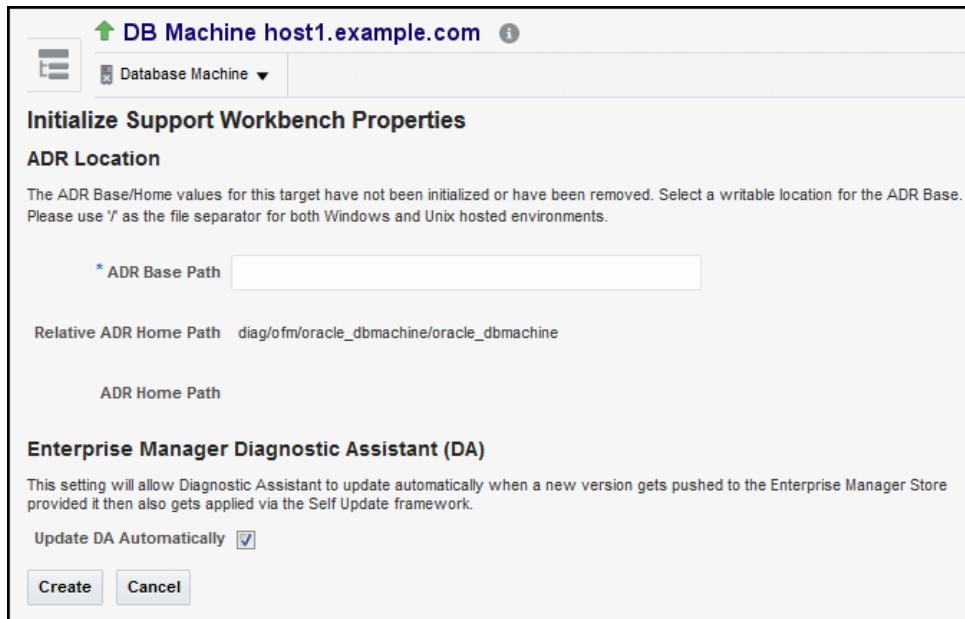
Enter the Automatic Diagnostic Repository (ADR) Base Path. A typical looks like this (Figure 4-3):

Figure 4-3   ADR Base Path

The ADR Home Path is a target-specific, writable path on the agent where the generated package is to be stored. During initializing, it is not editable as it is generated automatically once the ADR base path is specified.

Click **Create**.

3. Once the Support Workbench properties have been initialized, the Support Workbench page displays showing a list of any problems for the Database Machine (Figure 4-4):

Figure 4-4   Support Workbench Page

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.

- Exadata Database Machine Dashboard Creation
- How to Make the Report "Public"
- Find All Database Machine Reports

Exadata Database Machine Dashboard Creation

1. Log in to Enterprise Manager.

2. From the Enterprise Manager home page, click the **Enterprise** menu. Select the **Job** submenu, then **Library**.

3. Select **Database Machine Services Dashboard** from the drop-down menu next to the Create Library 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. Note that you can select more than one DBMachine and that a dashboard report will be created for each one.

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 **Save to Library** to save the job.

   A message indicating the job was created successfully should display along with a link to the running job.

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

9. To run the job, from the Job Library page, select the newly created job and click **Submit**. This will open the job to allow you to select the Targets to run against. Select the correct targets and click **Submit**.

How to Make the Report "Public"

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

1. Select the dashboard report from the list of reports shown after following the steps mentioned above.

2. Click **Edit**.

3. Select the **Run report using target privileges of the report owner** option under Privileges section in General tab.

4. Click the **Access** tab.

5. Select the **Allow viewing without logging in to Enterprise Manager** option.

6. Click **OK**.

Find All Database Machine Reports

To find all Database Machine reports:

1. Log in to Enterprise Manager.

2. From the Enterprise Manager home page, click the **Enterprise** menu. Select **Reports**, then **Information Publisher Reports**.

3. Search for the report name. Dashboard report names, one for each Database Machine, are displayed in the following format:

   `[DBMachine Name]_DASHBOARD_REPORT`

4. Click on the report to view the dashboard report.

5

Oracle Exadata Database Machine Administration

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

- Creating Roles to Manage the Plug-in
- View Exadata Database Machine Topology
- Exadata Storage Server Metrics and Alert Settings
- Exadata Storage Server Management
- Managing the InfiniBand Network
- Flash Cache Resource Monitoring
- Exadata Database Machine Fault Monitoring
- Monitoring Exadata Database Machine Components

> **Note:**
>
> View a video of how to manage and monitor your Oracle Exadata Database Machine using Oracle Enterprise Manager Cloud Control 13*c*:
>
> https://youtu.be/5S0mIx6cegE

Creating Roles to Manage the Plug-in

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

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

To create roles to provide management rights to users:

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

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

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

4. Select a role that closely matches the role you wish to create. Click **Create Like**.

5. On the Properties page, enter a name for the role you wish to create. You can optionally add a description.

   Click **Next**.

6. On the Roles page, select the roles from the list of Available Roles. Click **Move** to add the role to Selected Roles.

   Click **Next**.

7. On the Target Privileges page, select the privilege you want to grant to the new role.

   Click **Next**.

8. On the Resource Privileges page, you can edit specific privileges to be explicitly granted. Click the **Manage Privilege Grant** edit icon to make the changes.

   Click **Next**.

9. On the Administrators page, select the administrators from the list of Available Administrators that you want to grant the new role to. Click **Move** to add the administrator to Selected Administrators.

   Click **Next**.

10. On the Review page, a complete summary of the new role you have created is displayed. Click **Back** to go to previous screens to make changes. Click **Finish** to complete the role creation.

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

> **Note:**
>
> See *Working with Systems Infrastructure Targets* in *Oracle® Enterprise Manager Cloud Control Administrator's Guide*.

View Exadata Database Machine Topology

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

The following topology topics are presented in this section:

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

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

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

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

To view the topology of an existing Database Machine target:

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

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

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

3. From the Oracle Database Machine Home page, click the **Database Machine** menu, then select **Members** and then **Topology** from the drop-down menu.

   Enterprise Manager Cloud Control displays the Configuration Topology page.

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 Storage Server).

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.

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.

Viewing DB Machine Alerts

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

To view Database Machine alerts:

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

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

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

   Enterprise Manager displays the Oracle Database Machine home page on which you can see all alerts associated with the current DB Machine.

Viewing Metrics

To view the Exadata metrics:

1. Navigate to the Oracle Exadata Storage Server home page by choosing the Oracle Exadata Storage Server target type from the All Targets page of Enterprise Manager.

   Enterprise Manager displays the Exadata Storage Server 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 allows you to view a wide variety of Exadata metrics. For a complete description of the Exadata metrics available, see the *Oracle® Enterprise Manager Oracle Database and Database-Related Metric Reference Manual*.

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 Using Guided Process**.

3. From the Add Using Guided Process box, choose **Oracle Exadata Database Machine** and click **Add**.

4. From the Oracle Exadata Database Machine Discovery page, click on the option **Discover newly added hardware components in an existing Database machine as targets**. From the Select a Database Machine drop down list, select the Database Machine that has the new components and then click **Discover Targets**.

5. Choose the monitoring agent using the search option.

6. Provide the proper Infiniband Switch Credentials and click **Next**.

7. A prerequisite check is run. Click **Next**.

8. A list of available components for this Database Machine will be displayed. Select the new component(s) that need to be added and click **Next**.

9. Select the monitoring agent and backup monitoring agent for the new component(s).

10. On the Credentials page, set the credentials for the new components and click **Next**.

11. On the Review page, review all of the information and then click **Submit**.

Removing an Exadata Database Machine Target

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

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

- Remove only system members of the Oracle Exadata Database Machine. The other member targets will not be deleted and will continue to be monitored. They can be associated to another Oracle Exadata Database Machine, if required.

To remove an Exadata Database Machine target:

1. From the Database Machine target menu, select **Target Setup**, then select **Remove Target**.

2. On the Remove page, select whether to remove all members or to remove only the system members.

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

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

> **Note:**
>
> Host targets for the compute nodes and any targets that are also member targets of another Oracle Exadata Database Machine target will not be removed. System and non-system targets include:
>
> **System Targets**:
>
> - Oracle Exadata Database Machine
> - Oracle Infiniband Network (*Enterprise Manager 13c target*)
> - Oracle Exadata Storage Server Grid
>
> **Non-System Targets**:
>
> - Oracle Exadata Storage Server
> - Oracle Exadata KVM
> - Systems Infrastructure Switch
> - Systems Infrastructure PDU
> - Systems Infrastructure Rack
> - Oracle Infiniband Switch (*Enterprise Manager 13c target*)
> - Oracle Engineered System Cisco Switch (*Enterprise Manager 13c target*)
> - Oracle Engineered System PDU (*Enterprise Manager 13c target*)
> - Oracle Engineered System ILOM Server (*Enterprise Manager 13c target*)

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 13*c*:

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.

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

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 right click on the component you wish to remove, click **Remove Target** as shown in Figure 5-1:

Figure 5-1   Schematic Diagram Edit Button
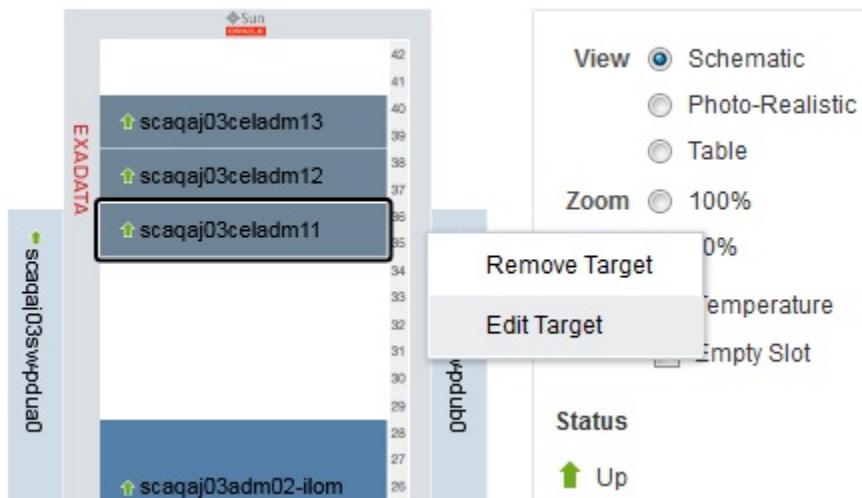
3. Ensure you have selected the correct component in pop-up shown and click OK as shown in Figure 5-2:

Figure 5-2   Confirm Delete
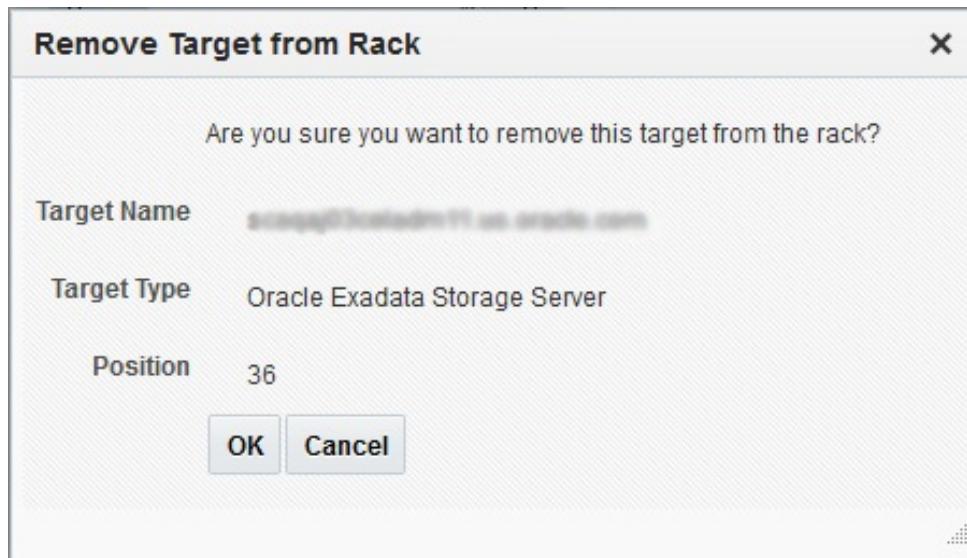
4. The Exadata Database Machine schematic diagram will refresh to show the empty slot.

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 5-3:

Figure 5-3   Add Component
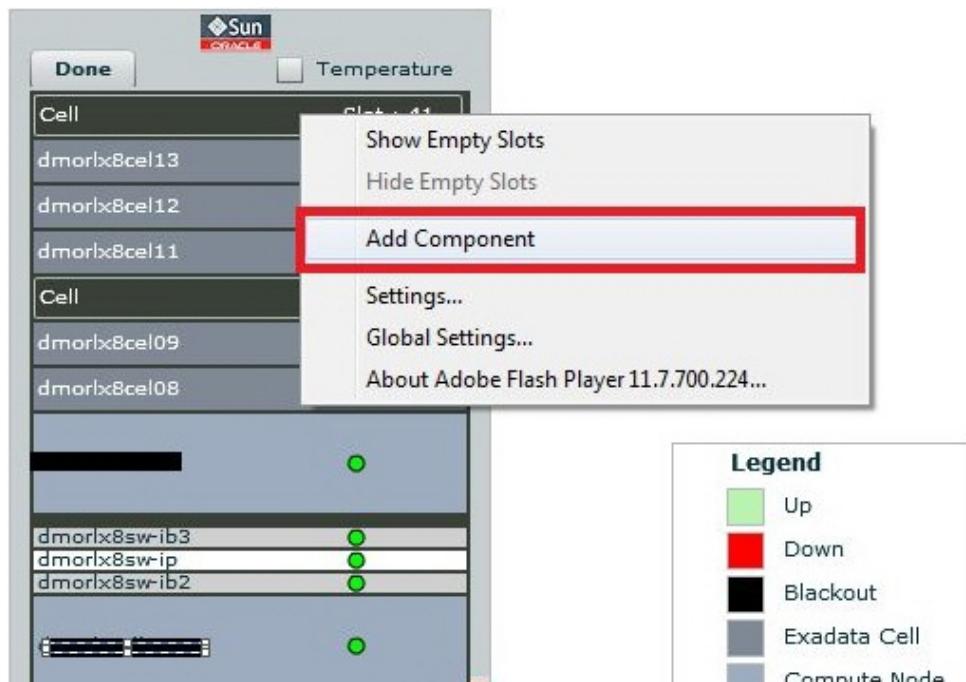
4. If there are multiple components to be added to schematic diagram, select the correct component from the **Component** drop-down menu, as shown in Figure 5-4:

Figure 5-4   Add Multiple Components
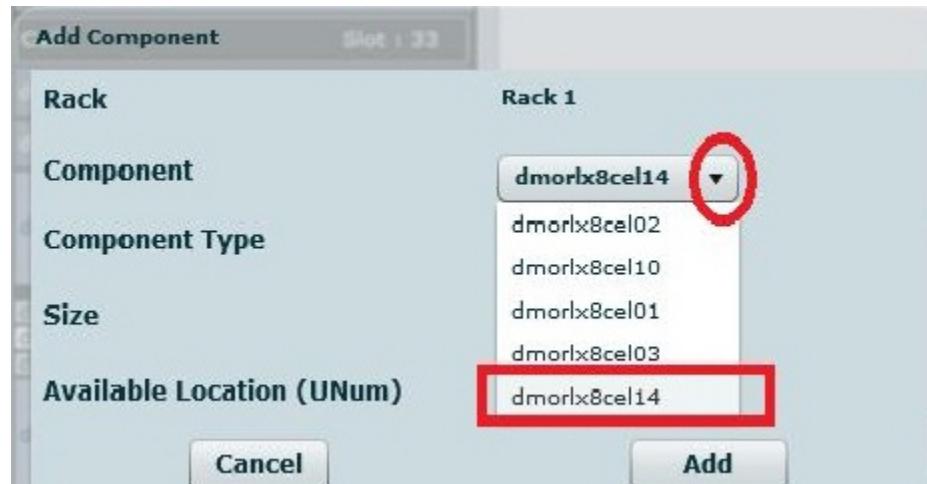
Also select the correct slot number in **Available Location (Unum)** drop-down menu, as shown in Figure 5-5:

Figure 5-5   Available Location
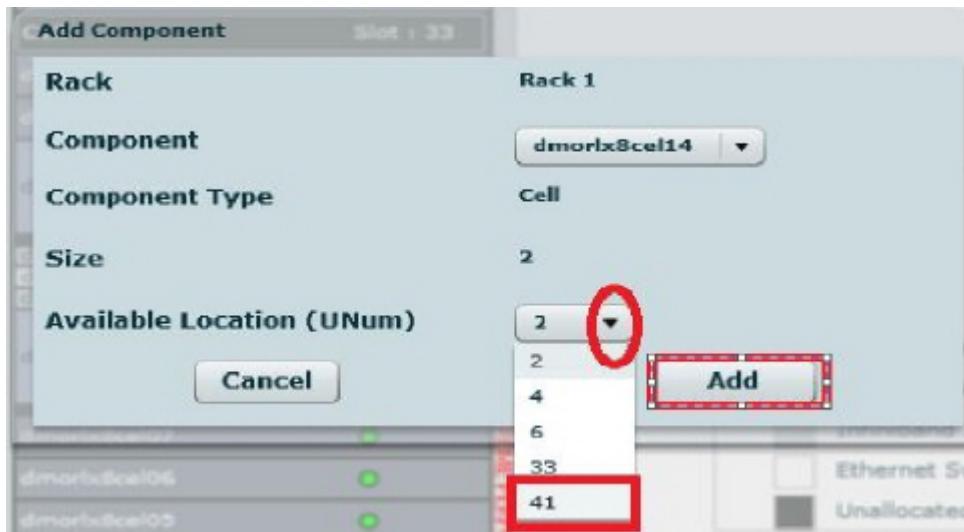
Click **Add**.

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

Exadata Storage Server Metrics and Alert Settings

To access the settings for Exadata Storage Server 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 [icon] for advanced settings.

4. Click **OK** to save any changes.

Exadata Storage Server Management

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

• About Exadata Storage Server

• Viewing an Exadata Storage Server Configuration

• Performing Administration Tasks on Exadata Storage Servers

- Managing the I/O Resource
- Diagnosing Exadata Storage Server Alerts
- Accessing Oracle Support Workbench for Exadata Storage Server
- Deleting a Component of a Database Machine Target

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 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. 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 a 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 Exadata Storage Servers.

You can view performance analysis by linking Exadata performance both at the Exadata Storage Server 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.

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 configuration.

   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 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.

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 **Exadata Storage Server**, and then select **Administration**.

   From this menu you can choose either **Execute Cell Command,** or **Manage I/O Resource**.

3. Click **Execute Cell Command**.

   The Command page of the Exadata Cells 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.

Managing the I/O Resource

Oracle Exadata Storage Servers are added as targets during the database machine discovery workflow (see 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 Exadata Storage Servers.

2. Once you have selected an Exadata Storage Server cell, click the **Exadata Storage Server** menu, select **Administration**, then **Manage I/O Resource**.

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

- Add/Update IORM Configuration
- The Inter-Database Plan

The IORM Monitoring section of the page provides a view of the performance statistics of Disk I/O (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*.

Add/Update IORM Configuration

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

1. Navigate to the IORM Performance page as described above. Figure 5-6 shows the I/O Resource Manager (IORM) Settings pane.

Figure 5-6   I/O Resource Manager (IORM) Settings
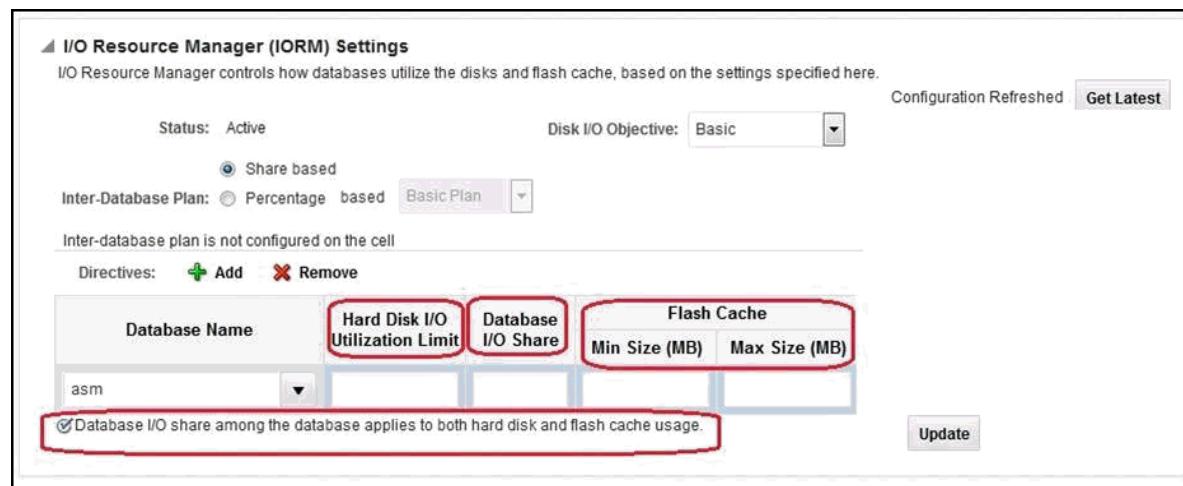
> **Note:**
>
> You can also update a single Exadata Storage Server. Expand the Exadata Grid group to view all Exadata Storage Servers associated with the group. Click the Exadata Storage Server you want to update.
>
> The steps to update the IORM settings is the same for a single Exadata Storage Server or group of Exadata Storage Servers.

2. From the Database Name column, select a database from the drop-down menu.

3. Enter a value for the Hard Disk I/O Utilization Limit column.

4. Enter a value for the Database I/O Share column.

5. Enter minimum and maximum values (in MB) for the Flash Cache column.

6. In the Disk I/O Objective drop-down menu, select an objective from the list (**Auto** is the default):

    • **Low Latency** - Use this setting for critical OLTP workloads that require extremely good disk latency. This setting provides the lowest possible latency by significantly limiting disk utilization.

    • **Balanced** - Use this setting for critical OLTP and DSS workloads. This setting balances low disk latency and high throughput. This setting limits disk utilization of large I/Os to a lesser extent than Low Latency to achieve a balance between good latency and good throughput.

    • **High Throughput** - Use this setting for critical DSS workloads that require high throughput.

    • **Auto** - Use this setting to have IORM determine the optimization objective. IORM continuously and dynamically determines the optimization objective, based on the workloads observed, and resource plans enabled.

    • **Basic** - Use this setting to disable I/O prioritization and limit the maximum small I/O latency.

> **Note:**
>
> If the *Auto* and *Balanced* objectives are not applicable (i.e., they have no impact on I/Os in Extreme Flash Cells), they will not appear in the IORM page.

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

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

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

Click **Next**.

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

Click **Next**.

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

Click **Next**.

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

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

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

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

8. Confirm the IORM objective settings. From the command line, run the following command:

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

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

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

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 select to view and/or edit a share or percentage based Inter-Database plan. Percentage based plans support basic or 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*.

Diagnosing Exadata Storage Server Alerts

Enterprise Manager listens for Exadata Storage Server alerts sent from the Exadata Storage Server 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*.

Managing the InfiniBand Network

All InfiniBand Switches are discovered automatically during the database machine discovery workflow (see 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 Fabric** from the list.

3. In the IB Fabric pane, you can view an overview and activity summary for all InfiniBand Switches.

4. Click **Refresh** for an On Demand refresh of the InfiniBand schematic. Updates reflect the real-time data.

The following topics address managing your InfiniBand network:

- InfiniBand Metrics
- Performing Administration Tasks on Infiniband Networks
- Setting Up Alerts

InfiniBand Metrics

The Enterprise Manager Agent runs a remote SSH and remote SNMP GET call to collect metric data for the InfiniBand switch. InfiniBand metrics provides operational details such as:

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

The following metrics are available for your InfiniBand Network:

- Aggregate Sensor
- Response
- Switch Configuration

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.

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.

5. Select the administrative operation you want to execute (Enable/Disable port, Clear performance/Error counters, Switch LED on/off, Set up SNMP subscription). 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.

6. 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.

7. 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.

8. 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.

Setting Up 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 **Systems Infrastructure Switch**.

4. Click the target you are interested in. The target home page appears.

5. In the drop-down menu for the Systems Infrastructure Switch, select **Monitoring** and then **Metric and Collections 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.

Flash Cache Resource Monitoring

The Oracle Exadata plug-in release 13.1.0.1.0 and later provides flash cache resource monitoring for Oracle Exadata Storage Servers. From the Storage Server home page or from the I/O Distribution Detail page, Cloud Control provides a high-level overview of flash cache resources (Figure 5-7). Details include:

- I/O Utilization (as a percentage).

- Hard Drive I/O Time Breakdown (in milliseconds per request).

- Flash I/O Time Breakdown (in milliseconds per request).

Figure 5-7   I/O Distribution by Databases
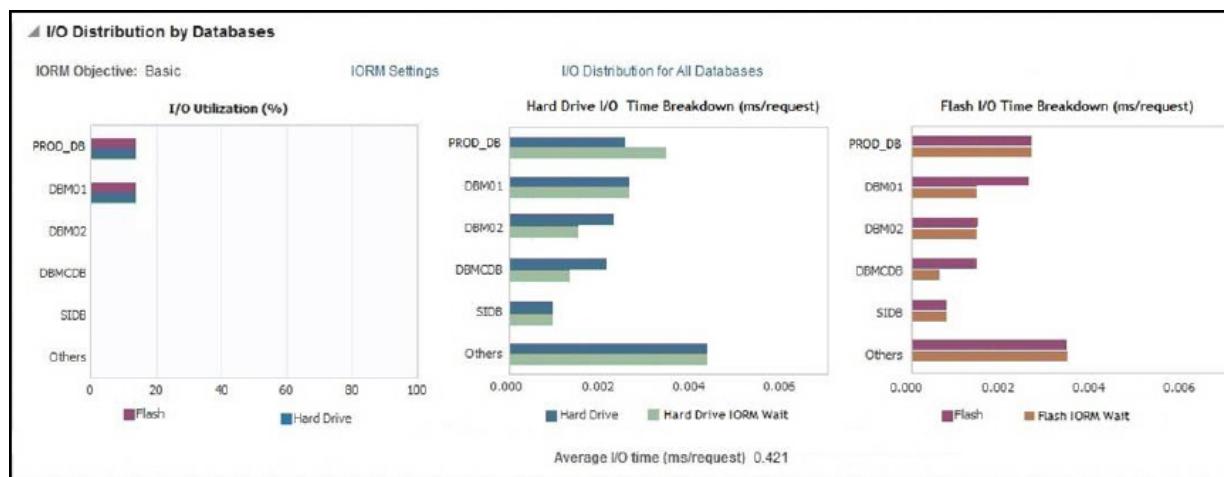
From the I/O Distribution Details page, which provides a view of all available databases statistics, select **Table View** (the default is Graph View) to view the data as a table (Figure 5-8):

Figure 5-8   I/O Distribution by Databases - Table View

I/O Distribution for All Databases

IORM Objective Basic   Last Collected at Jun 12, 2019 7:15:00 AM PDT

Graphic View   Table View

Database	I/O Utilization (%)		Hard Drive I/O Service Time (ms/request)		Flash I/O Service Time (ms/request)	
	Hard Drive	Flash	Hard Drive I/O Time	Hard Drive IORM Wait Time	Flash I/O Time	Flash IORM Wait Time
Z.SCAQAJ03	4.813	0	0.068	0.003	0.134	0
ASM	1.184	0	0.064	0.003	0	0
Others	0	0	0	0	0.047	0

The IORM Performance Page (Figure 5-9) provides detailed metrics, such as Average Throttle Time for Disk I/Os for both hard drives and flash drives. Select Flash Cache Space Usage (Figure 5-10) for detailed performance about flash cache space. Alternatively, the information in this page can be viewed in tabular format by clicking the *Table View* link located at the bottom of the page.
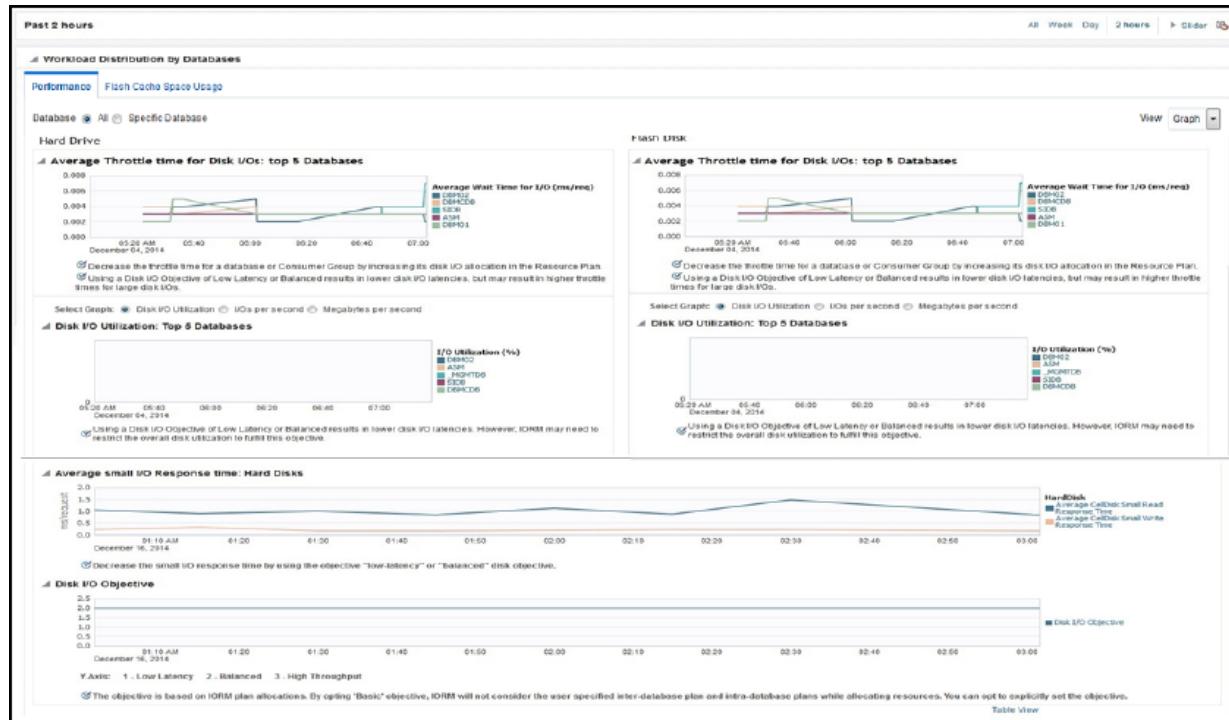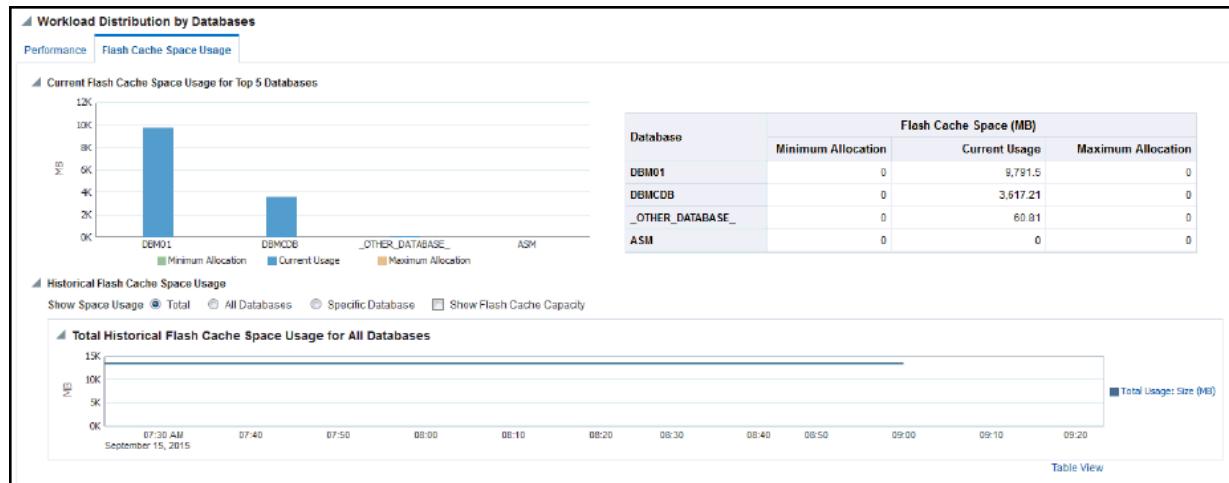
Figure 5-9   IORM Performance Page

Figure 5-10   IORM Performance - Flash Cache Space Usage

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

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Table 5-2   Compute Node Fault Monitoring

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

Monitoring Exadata Database Machine Components

Enterprise Manager collects details for the following components:

- Exadata Storage Servers
- InfiniBand Switches
- Cisco Switch
- ILOM Targets
- Power Distribution Units (PDUs)
- KVM Switch

Exadata Storage Servers

An Enterprise Manager Agent could collect Exadata Storage Server metrics through `cellcli` calls via ssh, ExaCLI or RESTful API. SNMP traps are sent to the Enterprise Manager Agent for subscribed alert conditions.

Monitoring with `cellcli` requires SSH equivalence to be set up between the agent user and the cell monitor user on each Exadata Storage Server.

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

- Aggregate storage metrics.
- Cell alerts via SNMP (PUSH).

- Capacities.
- IORM consumer and Database-level metrics.

InfiniBand Switches

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

Monitoring requires `ssh equivalence` for the `ilom-admin` for metric collections such as:

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

Cisco Switch

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

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

ILOM Targets

An Enterprise Manager Agent runs remote SSH calls to each SI server target.

The following details are collected:

- Response – availability
- Sensor alerts
  - Temperature
  - Voltage
  - Fan speeds
  - Configuration Data: Firmware version, serial number, and so forth.

Power Distribution Units (PDUs)

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

- Response and `ping` status.
- Phase values.

KVM Switch

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

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

6

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 13.3.2.0.0 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 Direct Monitoring of Xen Based Systems in *Oracle® Enterprise Manager Cloud Administration Guide*:

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

- Exadata Virtualized Provisioning
- Viewing Virtualized Exadata Database Machine
- Resource Utilization Graphs

Once you have completed the discovery of a virtualized Exadata Database Machine, continue with the configuration steps outlined in Post-Discovery Configuration and Verification.

Exadata Virtualized Provisioning

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

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

- Creating a Database Cluster
- Scaling Up a Database Cluster
- Scaling Down a Database Cluster
- Deleting a Database Cluster

Creating a Database Cluster

To create a database cluster:

1. From the Database Machine target menu, select **Provisioning**, then select **Create Cluster** (Figure 6-1):

Chapter 6
Exadata Virtualized Provisioning

Figure 6-1   Provisioning Menu
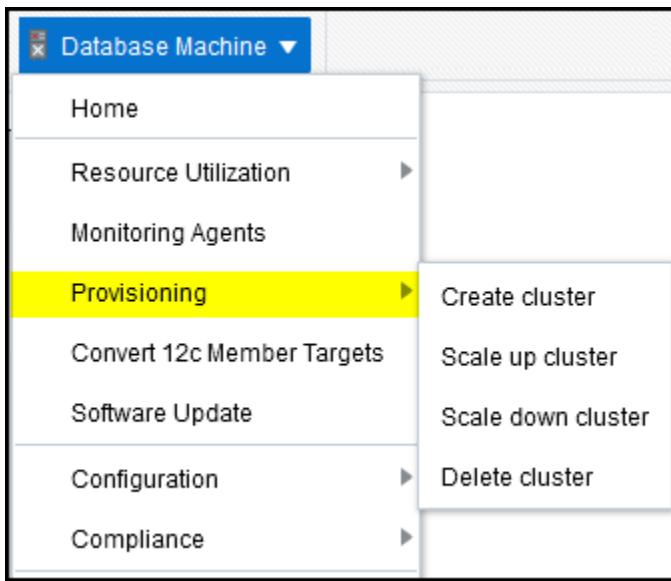


The Exadata Provisioning Wizard will display.

2. On the Exadata Provisioning: Cluster page, provide the information for:

- **Cluster Definition**: Create a cluster name. Click **Show existing clusters** to display a list of database clusters already provisioned.

- **Virtual Machine Location**: Select the servers on which you want to create the virtual machines. Select one or more from the **Available Servers** pane, then click the move button to move the selected server to the **Selected Servers** pane (Figure 6-2):

Figure 6-2   Select Virtual Machine Location
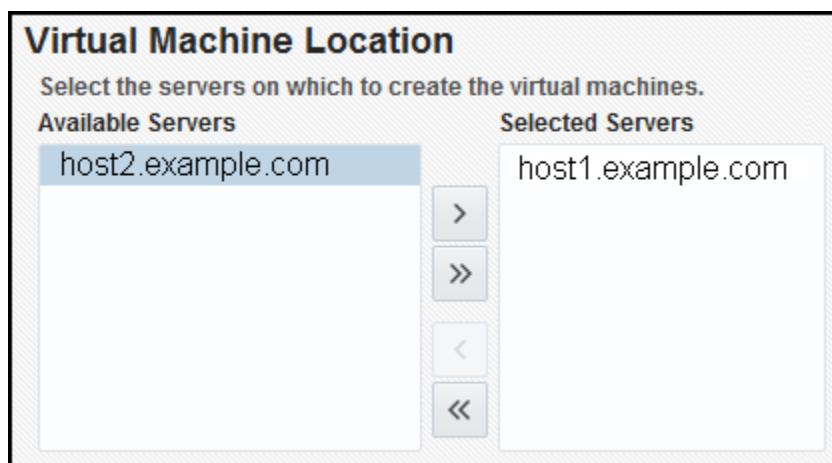
- **Storage Definition**: Select the Exadata Storage Servers to be used by the virtual machines. Select one or more from the **Available Storage Servers** pane, then click the move button to move the selected server to the **Selected Storage Servers** pane:

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6-2

Figure 6-3   Select Exadata Storage Servers
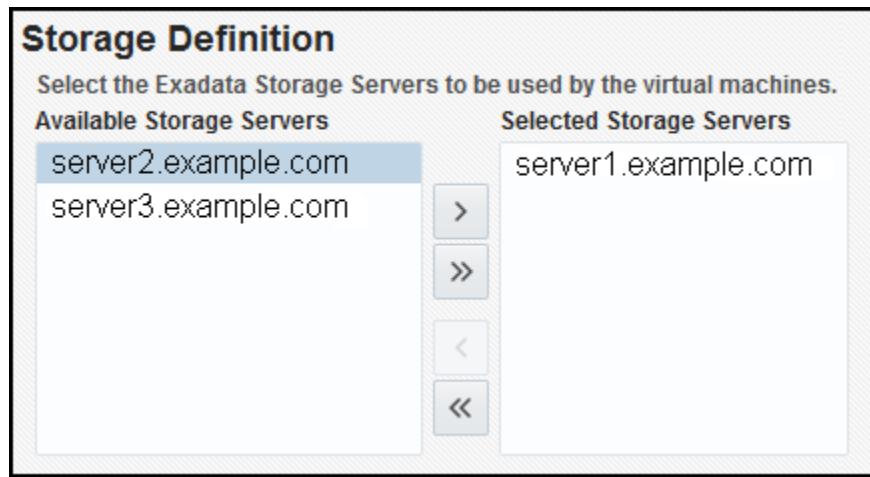
Click **Next**.

3. On the Credentials page, set the credentials for:

   • **Compute Server**: Set the credentials for the `root` user. From the Set Credentials drop-down, select **All** to apply the settings to all servers, or select one or more servers from the list and select **Selected** to apply the settings to only the selected servers.

   In the Set Server Credential pop-up window, select an existing named credential or select **New** to create a new one.

   Click **Test Connection** to verify that the credentials are properly set. If successful, the Test Credential Status will update to show Succeeded (Figure 6-4):

   Figure 6-4   Set Compute Server Credentials

   • **Exadata Storage Server**: Set the credentials for the cell administrator.

   In the Set Server Credential pop-up window, select an existing named credential or select **New** to create a new one.

   Click **Test Connection** to verify that the credentials are properly set. If successful, the Test Credential Status will update to show Succeeded (Figure 6-5):

Figure 6-5   Set Exadata Storage Server Credentials

Click **Next** to define the Virtual Machines.

4. On the Virtual Machines (VMs) page, provide the following information:

> ✏ **Note:**
>
> When available, the Exadata Provisioning Wizard will pre-populate the fields with the appropriate defaults. You can change this information to suit your environment.

- **Virtual Machine Definition**: In this region (Figure 6-6), provide the details to define the VM:
  - Virtual Machine Size: Select Small, Medium, or Large. Click Customize to adjust the number of CPU cores and available memory.
  - Root password: Create a password in the two password fields.
  - Verify the Prefix, DNS, and NTP fields.
  - Time Zone: select the appropriate time zone from the drop-down list.

Figure 6-6   Exadata Provisioning: Virtual Machine Definition

- **Software Locations**: When available, the Exadata Provisioning Wizard will pre-populate the fields (Figure 6-7); otherwise, provide the following information:

    – Inventory Location

    – Grid Infrastructure Home

    – Database Home Location

    – Agent Installation Base Directory

    – Agent Port (optional)

    – Software Language (optional)

Figure 6-7   Exadata Provisioning: Software Locations

- **Operating System Users and Groups**: Like the Software Location region, the Exadata Provisioning Wizard will pre-populate the fields except for the password fields (Figure 6-8). Otherwise, provide the following information:

    – User name: including the ID, password, and home directory.

    – DBA group name and ID.

    – OINSTALL group name and ID.

Figure 6-8   Exadata Provisioning: Operating System Users and Groups

Click **Next** to provide the Network details.

5. On the Network page, specify the IP address, name and domain used for the Admin, Client and Private network. Provide the details for the following information:

    - **Gateway and Domain Details**: The domain and subnet mask details should already be supplied by the Exadata Provisioning Wizard. Enter a valid IP address for the Admin and Client gateway (Figure 6-9):

Figure 6-9   Exadata Provisioning: Network Gateway and Domain Details

- **Virtual Machine 1** (Figure 6-10): For the first virtual machine in the cluster, the Exadata Provisioning Wizard will auto-complete the Prefix and Start ID field. You can enter an optional Suffix. Enter a valid IP address.

Figure 6-10   Exadata Provisioning: Virtual Machine 1

- **Generated Virtual Machine Name and IP** (Figure 6-11): After you have entered the information for the first VM, click **Generate** to create the information for the other VMs in the cluster. You can always enter the details manually.

Figure 6-11   Exadata Provisioning: Generated Virtual Machine Name and IP

Once you have entered all the necessary information, click **Validate IP** at the top of the page to verify the IP addresses. Click **Next** to continue to the enter the details for Grid Infrastructure and to create the Initial Database.

6. On the Grid Infrastructure and Initial Database page, enter the details for:

- **Grid Infrastructure** (Figure 6-12): Enter the details for the Cluster (SCAN name and port) and verify the Disk Group information. The Exadata Provisioning Wizard will pre-populate the details, but you can adjust them as needed.

Figure 6-12   Exadata Provisioning: Grid Infrastructure

- **Initial Database**: Click the check box to create the initial database. Additional information for Database Identification and Administrator Credentials will be required as shown in Figure 6-13:

Figure 6-13   Exadata Provisioning: Initial Database

Click **Advanced** to expand the region for additional details for Memory Parameters, Processes, and Character Sets as shown in Figure 6-14:

Figure 6-14   Exadata Provisioning: Initial Database Advanced Details

Click **Next** to set the schedule.

7. On the Schedule page, the Exadata Provisioning Wizard will create the Deployment Instance value. Select a schedule start and notification options:

- **Schedule**: Select to initiate the creation immediately or later. If you select later, then you will be prompted to select a date and time.

- **Notification**: Select the notification statuses for which you will be notified.

  Click **Review** to review the settings and initiate the job.

8. On the Review page, review the selection in the summary displayed. To change any section, return to the previous page and edit the selection.

   Click **Submit** to begin the creation job.

Scaling Up a Database Cluster

To scale up a database cluster:

1. From the Database Machine target menu, select **Provisioning**, then select **Scale Up Cluster**.

   The Exadata Provisioning Wizard will display.

2. On the Cluster page, enter the cluster name or click the Search icon to select a cluster from the list.

   Select one or more from the **Available Servers** pane, then click the move button to move the selected server to the **Selected Servers** pane.

   Click **Next** to set the credentials.

3. On the Credentials page, set the credentials for:

   - **Compute Server**: Set the credentials for the `root` user. From the Set Credentials drop-down, select **All** to apply the settings to all servers, or select one or more servers from the list and select **Selected** to apply the settings to only the selected servers.

     In the Set Server Credential pop-up window, select an existing named credential or select **New** to create a new one.

     Click **Test Connection** to verify that the credentials are properly set. If successful, the Test Credential Status will update to show Succeeded (Figure 6-15):

     Figure 6-15   Set Compute Server Credentials

   - **Virtual Machines** (Figure 6-16): Set the credentials for the DomU Host and Root and for the Cluster ASM and Database.

     You have the option to use preferred credentials or to override the preferred credentials.

     Click **Test Connection** to verify that the credentials are properly set.

Figure 6-16   Scale Up Cluster: Virtual Machines Credentials

Click **Next**.

4. On the Virtual Machines page, click **Next**.

5. On the Network page, specify the IP address, name and domain used for the Admin, Client and Private network. Provide the details for the following information:

   • **Gateway and Domain Details**: The domain and subnet mask details should already be supplied by the Exadata Provisioning Wizard. Enter a valid IP address for the Admin and Client gateway (Figure 6-17):

Figure 6-17   Scale Up: Network Gateway and Domain Details

   • **Virtual Machine 1** (Figure 6-18): For the first virtual machine in the cluster, the Exadata Provisioning Wizard will auto-complete the Prefix and Start ID field. You can enter an optional Suffix. Enter a valid IP address.

Figure 6-18   Scale Up: Virtual Machine 1

   • **Generated Virtual Machine Name and IP** (Figure 6-17): After you have entered the information for the first VM, click **Generate** to create the information for the other VMs in the cluster. You can always enter the details manually.

Figure 6-19   Scale Up: Generated Virtual Machine Name and IP

Once you have entered all the necessary information, click **Validate IP** at the top of the page to verify the IP addresses.

Click **Next** to continue to schedule the scale up.

> **Note:**
>
> The step for Grid Infrastructure and Initial Database are skipped because they do not need to be set up again.

6. On the Schedule page, the Exadata Provisioning Wizard will create the Deployment Instance value. Select a schedule start and notification options:

   • **Schedule**: Select to initiate the scale up immediately or later. If you select later, then you will be prompted to select a date and time.

   • **Notification**: Select the notification statuses for which you will be notified.

   Click **Review** to review the settings and initiate the scale up.

7. On the Review page, review the selection in the summary displayed. To change any section, return to the previous page and edit the selection.

   Click **Submit** to begin the scale up.

Scaling Down a Database Cluster

To scale down a database cluster, the Virtual Machine is removed from the cluster:

1. From the Database Machine target menu, select **Provisioning**, then select **Scale Down Cluster**.

   The Exadata Provisioning Wizard will display.

2. Enter the cluster name you want to scale down or click the Search icon to select an available cluster.

   Once you have selected a cluster, you will be prompted to:

   • Select nodes to delete.

- Verify or enter new named credentials for DomU (host, root, and Exadata Server) and for the Exadata Storage Server. Click **Test Credentials** to verify the credentials have been selected properly.

  Click **Next** to schedule the scale-down job.

3. On the Schedule page, the Exadata Provisioning Wizard will create the Deployment Instance value. Select a schedule start and notification options:

   - **Schedule**: Select to initiate the scale down immediately or later. If you select later, then you will be prompted to select a date and time.

   - **Notification**: Select the notification statuses for which you will be notified.

   Click **Review** to review the settings and initiate the scale down.

4. On the Review page, review the selection in the summary displayed. To change any section, return to the previous page and edit the selection.

   Click **Submit** to begin the scale down.

Deleting a Database Cluster

To delete an existing cluster:

1. From the Database Machine target menu, select **Provisioning**, then select **Delete Cluster**.

   The Exadata Provisioning Wizard will display.

2. On the Cluster page, enter the cluster name you want to delete or click the Search icon to select an available cluster.

   The page will update to show the nodes to be deleted

   Verify or enter new named credentials for DomU (host, root, and Exadata Server) and for the Exadata Storage Server. Click **Test Credentials** to verify the credentials have been selected properly.

   Click **Next** to schedule the delete job.

3. On the Schedule page, the Exadata Provisioning Wizard will create the Deployment Instance value. Select a schedule start and notification options:

   - **Schedule**: Select to initiate the scale down immediately or later. If you select later, then you will be prompted to select a date and time.

   - **Notification**: Select the notification statuses for which you will be notified.

   Click **Review** to review the settings and initiate the delete job.

4. On the Review page, review the selection in the summary displayed. To change any section, return to the previous page and edit the selection.

   Click **Submit** to begin the delete job.

Viewing Virtualized Exadata Database Machine

Once discovered, the Exadata plug-in shows the virtual machines monitored by Enterprise Manager Cloud Control, as shown in Figure 6-20:

Figure 6-20   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 6-21   Exadata Database Machine Software Tab

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:

Cluster Placement

This graph (Figure 6-22) 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.
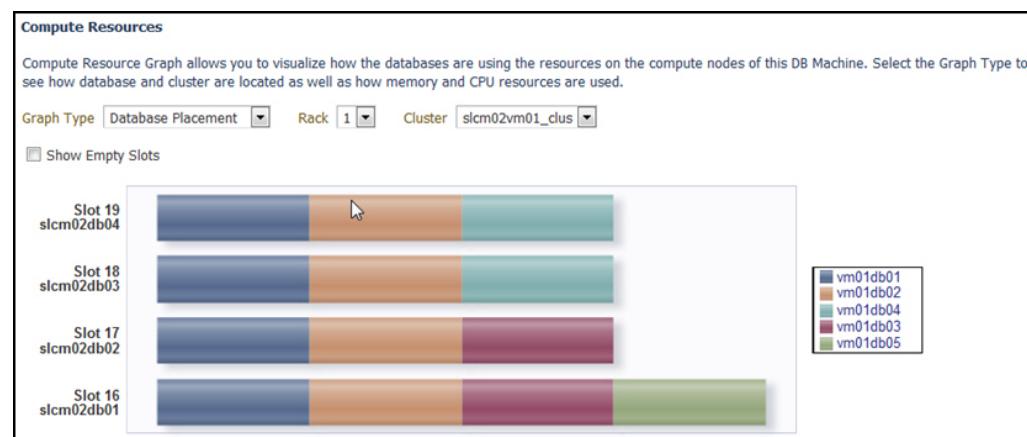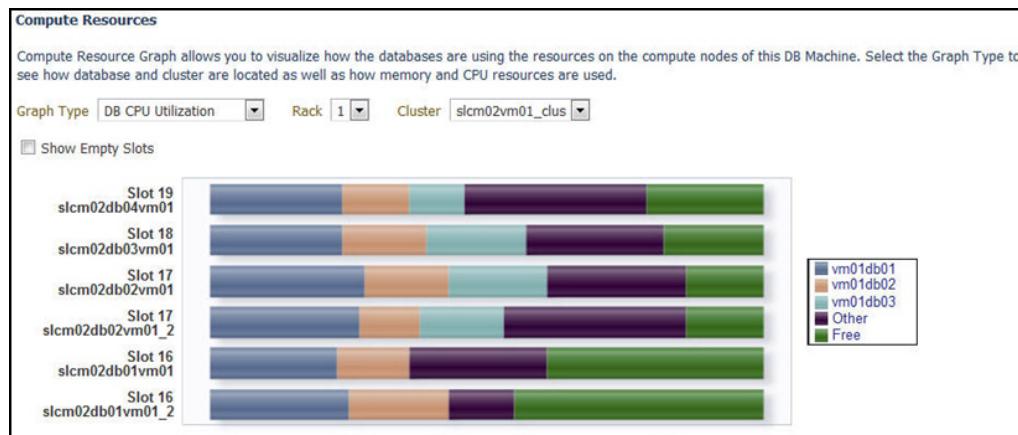
Figure 6-22   Resource Utilization: Cluster Placement
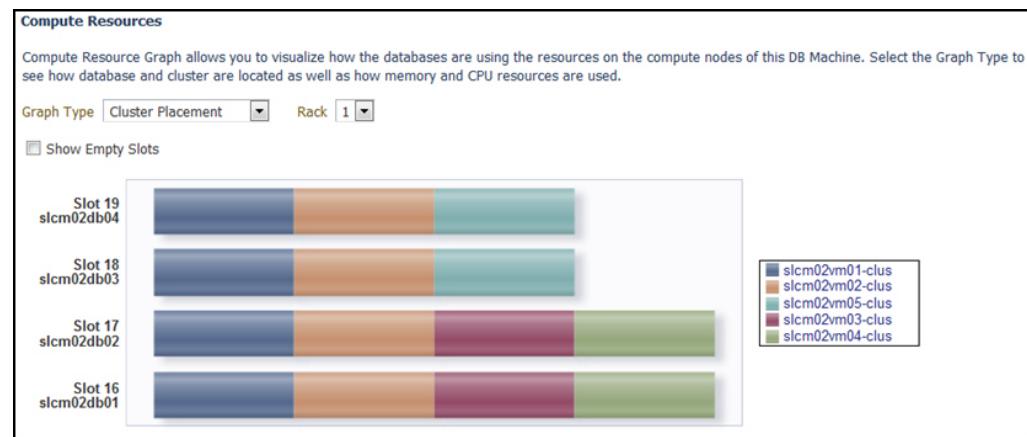
Database Placement

This graph (Figure 6-23) 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 6-23   Resource Utilization: Database Placement

Database CPU Utilization

This graph (Figure 6-24) shows the database CPU utilization per database per VM host for a particular DB cluster.

Figure 6-24   Resource Utilization: Database CPU Utilization

Database Memory Utilization

This graph (Figure 6-25) shows the database memory utilization per database per VM host for a particular DB cluster.

Figure 6-25   Resource Utilization: Database Memory Utilization

7
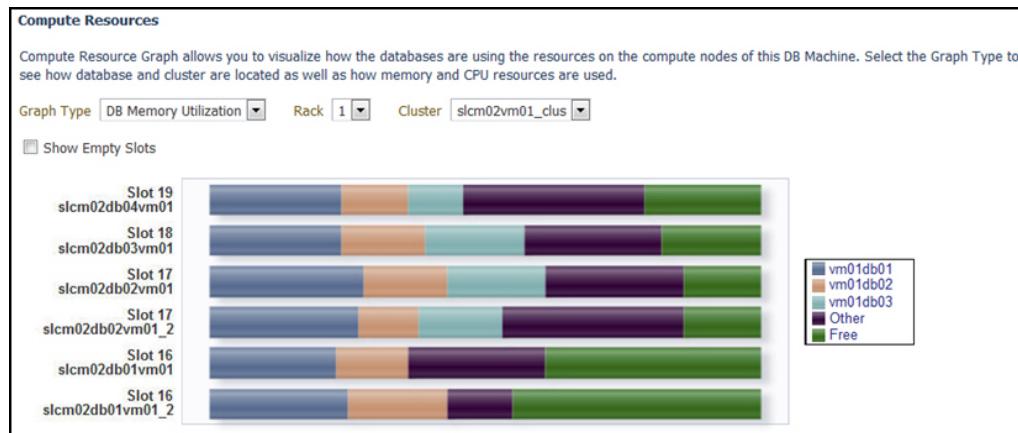
Exadata Metrics

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

Accessing Exadata Metrics

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

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
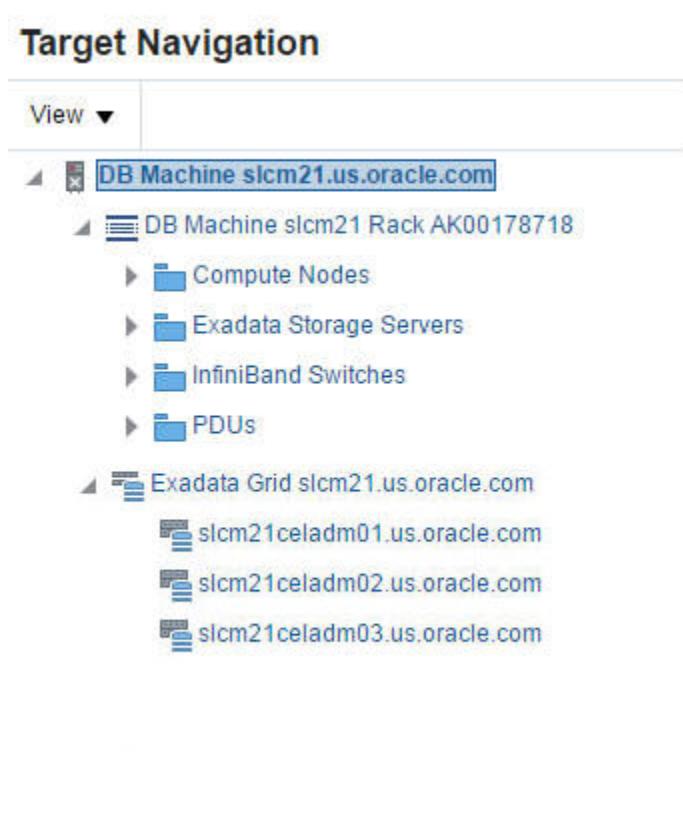
4.   On the Storage Server page, select the **Exadata Storage Server** menu and select **Monitoring** then **All Metrics** (Figure 7-3):

Figure 7-3   Exadata Storage Server Monitoring Menu
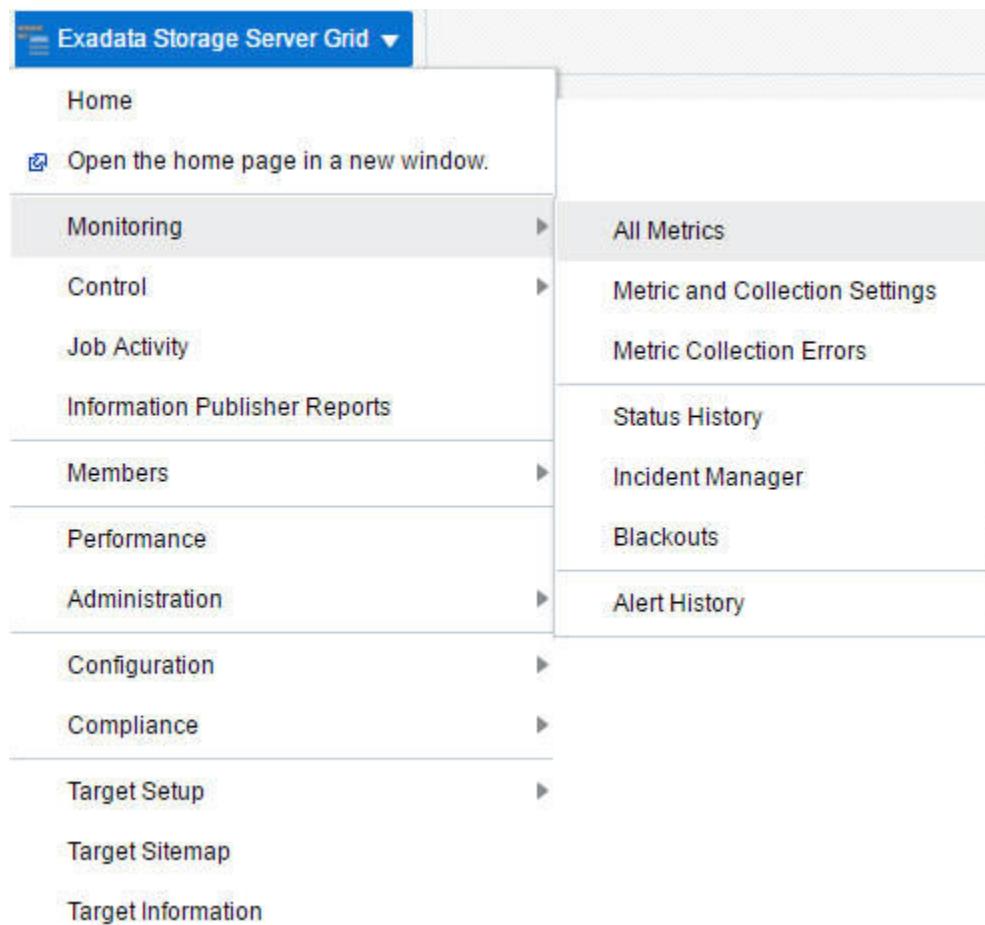
5. On the All Metrics page, a variety of metrics are available. Select a metric or click to expand available metric details.

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

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

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

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	-

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
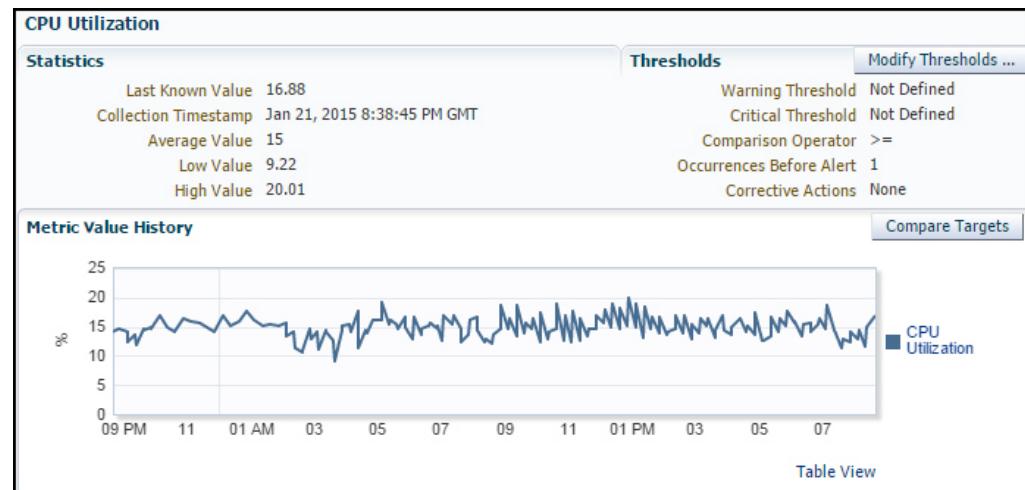
Figure 7-9   Disk I/O Objective

8
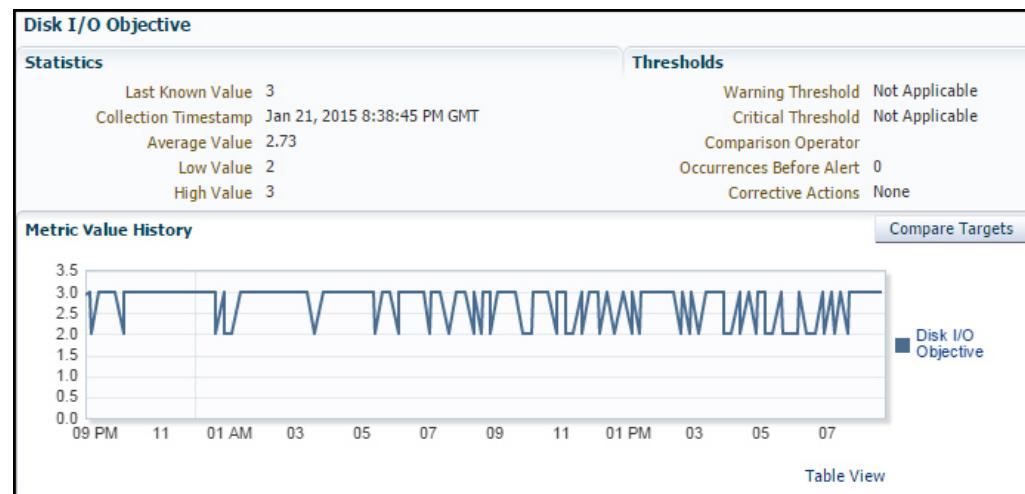
Troubleshooting the Exadata Plug-in

This chapter provides troubleshooting tips and techniques on installing, discovering, and configuring the Exadata plug-in. The following sections are provided:

- Discovery Troubleshooting
- Troubleshooting the Exadata Database Machine Schematic File
- Exadata Database Machine Management Troubleshooting
- Exadata Derived Association Rules
- Oracle Auto Service Request (ASR) Issues
- Metric Collection Issues
- Status: Pending Issues
- Monitoring Agent Not Deployed for IPv6 Environments

Discovery Troubleshooting

Very often, the error message itself will include the cause for the error. Look for error messages in the OMS and agent logs (case insensitive search for `dbmdiscovery`) or in the Discovery window itself.

The following sections are provided:

- Hardware Availability
- Discovery Failure Diagnosis
- Cell is not Discovered
- Compute Node Error Message
- Compute Node or InfiniBand Switch is not Discovered
- Compute Node not Managed by Enterprise Manager
- Extra or Missing Components in the Newly Discovered Exadata Database Machine
- ILOM, PDU, or Cisco Switch is not Discovered
- Target Does not Appear in Selected Targets Page
- Target is Down or Metric Collection Error After Discovery
- Discovery Process Hangs

Hardware Availability

All the hardware components must be "known" and reachable; otherwise, communication failures will occur. Use the `ping` command for each hardware component of the Exadata rack to make sure all names are resolved.

The MAP targets in Enterprise Manager Cloud Control 13*c* may fail while collecting the correlation identifier. This failure can happen if the credentials are incorrect OR if a target (for example, the ILOM) is too slow in responding.

ILOM can be slow when the number of open sessions on ILOM has exceeded the limit. You can resolve this issue by temporarily closing the sessions on the ILOM.

The rack placement of targets can fail:

- If `examan` did not return valid rack position for the target.

- If there is an existing target in the same location.

Discovery Failure Diagnosis

Should discovery of your Oracle Exadata Database Machine fail, collect the following information for diagnosis:

- Any `examan-*.xml`, `examan-*.html`, `targets-*.xml`, and `examan*.log` files from the `AGENT_ROOT/agent_inst/sysman/emd/state` directory.

- Agent logs: `emagent_perl.trc` and `gcagent.log`

- OMS logs: `emoms.trc` and `emoms.log`

- Any snapshot (screen capture) of errors shown on the target summary page.

Cell is not Discovered

If the cell itself is not discovered, possible causes could be:

- The installation of RDBMS Oracle Home Release 18.2 or 19*c* (as of plugin 13.3.2.0) 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
  ```

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)

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 `ilom-admin` password is incorrect.
- The connection from the compute node to the InfiniBand switch through SSH is blocked by a firewall.
- The InfiniBand switch is down or takes too long to respond to SSH.

To resolve problems with the compute node or InfiniBand switch discovery, try:

- If the InfiniBand switch node is not discovered, the InfiniBand switch model or switch firmware may not be supported by EM Exadata. Run the `ibnetdiscover` command. Output should look like:

  ```
  Switch 36 "S-002128469f47a0a0" # "Sun DCS 36 QDR switch switch1.example.com"
  enhanced port 0 lid 1 lmc 0
  ```

- To verify discovery of the compute node, run the following command on the compute node used for discovery:

  ```
  # ssh <IB switch> -l ilom-admin ibnetdiscover
  ```

- If the compute node is not discovered, run the `ibnetdiscover` command. Output should look like:

  ```
  Ca 2 "H-00212800013e8f4a" # " xdb1db02 S 192.168.229.85 HCA-1"
  ```

Compute Node not Managed by Enterprise Manager

If you encounter an instance where the compute note is not being managed by Enterprise Manager, then check the following troubleshooting steps:

- If the Agent host name is different than the compute node host name, then run the following command as `root` to match up to agent host name:

  ```
  # ibnetdiscover
  ```

- If the wrong Agent is used for discovery, then select the compute node Agent for discovery.
- If the compute node name has been reset from the client to management or vice-versa, then run the following command:

  ```
  # /usr/sbin/set_nodedesc.sh
  ```

- If a short host name is used for agents, then reinstall the agents using fully-qualified host name `<hostname.domain>`.

Chapter 8
Discovery Troubleshooting

Extra or Missing Components in the Newly Discovered Exadata Database Machine

If you are showing extra components or if there are missing components, then check the following troubleshooting steps:

- For extra components, examine them for Exadata Database Machine membership. Deselect any extra components manually from the discovered list.

- Verify which schematic file that was used for discovery. Ensure that Enterprise Manager can read the latest `xml` file (for example, `databasemachine.xml`) on the compute node.

- For missing components, check the schematic file content.

- If you need to generate a new schematic file, then log a service request (SR) with Oracle Support and provide the details.

ILOM, PDU, or Cisco Switch is not Discovered

If the ILOM, PDU, 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.

Target Does not Appear in Selected Targets Page

Even though no error may appear during the Exadata Database Machine guided discovery, the target does not appear on the Select Components page. Possible causes and solutions include:

- Check the All Targets page to make sure that the target has not been added as an Enterprise Manager target already:
  - Log in to Enterprise Manager.
  - Select **Targets**, then **All Targets**.
  - On the All Targets page, check to see if the Oracle Exadata target appears in the list.
- A target that is added manually may not be connected to the Exadata Database Machine system target through association. To correct this problem:
  - Delete these targets before initiating the Exadata Database Machine guided discovery.
  - Alternatively, use the `emcli` command to add these targets to the appropriate system target as members.

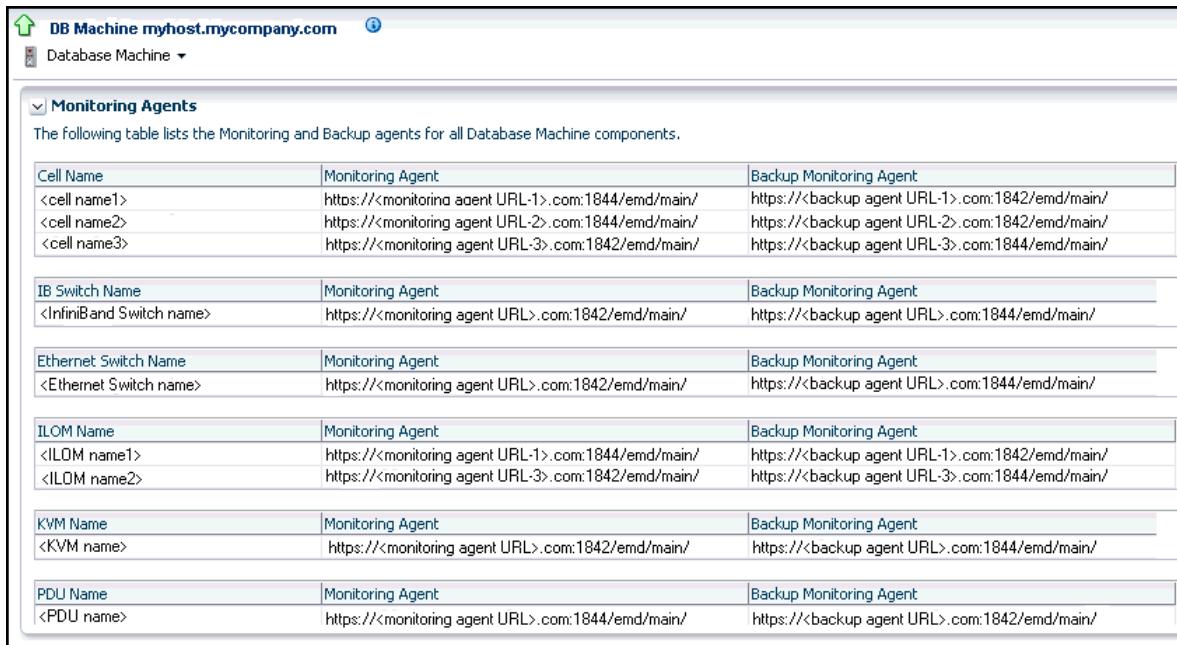# Target is Down or Metric Collection Error After Discovery

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 ilom-admin.

- 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

- For the ILOM, PDU, or Cisco switch, possible causes include:

  - The Exadata Database Machine Schematic Diagram file has the wrong IP address.

  - Monitoring Credentials is not set or incorrect. To verify:

    * Log in to Enterprise Manager.

    * Click **Setup**, then **Security**, and finally **Monitoring Credentials**.

    * On the Monitoring Credentials page, click the **Oracle Exadata** target type. Then set the monitoring credentials.

ILOM Credential Validation Fails During Discovery

ILOM Credential Validation Failure Errors

ILOM credential validation may fail while performing a 13*c* discovery. The following error may occur:

Authentication failed

Problem: Credentials provided are invalid.

Resolution: Use valid credentials.

Discovery Process Hangs

If the discovery process for the Exadata Database Machine hangs, then check the following troubleshooting steps:

- Examine your network to verify:
  - That the host name can be resolved.
  - That the Agent(s) can access the OMS.
  - That a simple job can be executed from the console.
- If the OMS reported any errors, then check the following log file:

  `$MW_HOME/gc_inst/sysman/log/emoms.log`

- For Repository issues, check the Repository database's `alert.log` file.
- For Agent issues, check the following log file:

  `$AGENT/agent_inst/sysman/log/gcagent.log`

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`

- If a `PerformOperationException` error appears, the agent NMO is not configured for `setuid-root`:
  - From the OMS log:

    ```
    2011-11-08 12:28:12,910 [[ACTIVE] ExecuteThread: '6' for queue:
    'weblogic.kernel.Default (self-tuning)']
    ERROR model.DiscoveredTarget logp.251 -
    ```

```
ERROR: NMO not setuid-root (Unix only)
oracle.sysman.emSDK.agent.client.exception.PerformOperationException:
```

- – As root, run:

    ```
    # <AGENT_INST>/root.sh
    ```

- In the `/etc/pam.d` file, `pam_ldap.so` is used instead of `pam_unix.so` on compute nodes.

    - – Even though the agent user and password are correct, this errors appears in the agent log:

        ```
        oracle.sysman.emSDK.agent.client.exception.PerformOperationException:
        ERROR: Invalid username and/or password
        ```

- Schematic file has error because of a known Exadata Database Machine configurator bug:

    - – Verify that the Exadata Database Machine configurator is version 12.0

    - – Verify that the schematic file is version 503

    - – Older versions may or may not have the bug depending on the Exadata Database Machine rack type and partitioning.

- If the schematic file is blank, then:

    - – Check your browser support and Enterprise Manager Cloud Control 13*c*.

    - – Run through discovery again and watch for messages.

    - – Check the `emoms.log` file for exceptions at the same time.

- If components are missing, then:

    - – Add manually to the schematic page (click **Edit**).

    - – Check for component presence in Enterprise Manager. Check to see if it is monitored.

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.

Exadata Derived Association Rules

Exadata derived association rules depend on Exadata and DB/ASM ECM data. This data may take up to 30 minutes to appear depending on metric collection schedule. To check for data availability:

- From the Enterprise Manager Cloud Control console:

    - – Click **Targets**, then **All Targets**.

- – On the All Targets page, click the **Oracle Exadata** target from the list.
  - – Click **Database System**, then **Configuration**, and finally **Last Collected**.
  - – On the Latest Configuration page, click **Actions**, then **Refresh**.
- • From the command line:

  ```
  # emctl control agent runCollection
  # target_name:target_type <collectionName>
  ```

Other troubleshooting tips include:

- • Verify that ECM data are collected and present in Enterprise Manager repository.
- • Verify that all data and conditions in query are met by running the query in SQL+.
- • Verify triggers by enabling debug logging to check for timing issues.

Oracle Auto Service Request (ASR) Issues

- • Oracle ASR Not Working on Exadata Storage Server
- • No Slots Available Error

Oracle ASR Not Working on Exadata Storage Server

Problem: You may encounter a problem where Oracle ASR is not working on the Exadata Storage Server.

Resolution: Ensure that there are two subscriptions on the Exadata Storage Server:

- • The type should be `ASR` **or** `V3ASR` for receiving the cell ILOM traps.
- • The type should be `default` (no type) **or** `v3` for receiving the MS MIB traps from the cell.

No Slots Available Error

The `asr` type entry on MS MIB adds a subscription to the cell ILOM automatically. If the ILOM SNMP slots are full, then the subscription command on the cell may fail with the following error:

```
CELL-02669: No slots are available for ILOM SNMP subscribers
```

There is a limit of 15 subscribers on the ILOM which might cause this failure. You will need to free up some slots on the ILOM and retry the ASR subscription:

1. Login to the ILOM console (for example: `https://XXXCELL-c.example.com`).
2. Click **ILOM Administration** and then **Notification**.
3. Choose the slot and set the subscriber to **0.0.0.0** to clear it up.

Target Status Issues

If the Target status shows DOWN inaccurately, then:

- • If you are using `cellCLI` to monitor the cell, you can check SSH equivalence (`cellmonitor` user) with the following command:

```
ssh –i /home/oracle/.ssh/id_dsa –l cellmonitor <cell name> -e cellcli list cell
```

Output should be: `<cell name>`

- For the **PDU**: Check to make sure you can access the PDU through your browser to verify that it is connected to your LAN:

  ```
  http://<pdu name>
  ```

- For the **Cisco Switch**: Check for proper SNMP subscriptions. See Set Up SNMP for Cisco Ethernet Switch Targets for details.

Metric Collection Issues

If the Target status shows a Metric Collection Error, then:

- Hover over the icon or navigate to Incident Manager.

- Read the full text of the error.

- Visit the Monitoring Configuration page and examine the settings. From the **Setup** menu, select **Monitoring Configuration**.

- Trigger a new collection: From the **Target** menu, select **Configuration**, then select **Last Collected**, then **Actions**, and finally select **Refresh**.

- Access the monitoring Agent Metric through your browser:

  ```
  https://<agent URL>/emd/browser/main
  ```

  Click **Target >>** and then click **Response** to evaluate the results. You may need to log a service request (SR) with Oracle Support.

Status: Pending Issues

For those issues where components are in a Pending status, see the following troubleshooting steps:

- Cellsys Targets
- Database Machine Target or Any Associated Components

Cellsys Targets

If the Cellsys target seems to be in a Pending status for too long, then:

- Verify that there is an association for the Cluster ASM, Database, and Exadata Storage Servers.

- Check and fix the status of the associated target database.

- Check and fix the status of the associated target ASM cluster.

- Ensure an **UP** status for all Exadata Storage Server targets.

- Delete any unassociated cellsys targets.

Database Machine Target or Any Associated Components

If the Exadata Database Machine target or any associated components are in a Pending status for too long, then:

- Check for duplicate or pending delete targets. From the **Setup** menu, select **Manage Cloud Control**, then select **Health Overview**.

- Check the target configuration. From the target's home page menu, select **Target Setup**, then select **Monitoring Configurations**.

- Search for the target name in the agent or OMS logs:

  ```
  $ grep <target name> gcagent.log or emoms.log
  ```

Monitoring Agent Not Deployed for IPv6 Environments

Problem: For IPv6 environments, the monitoring agent is not deployed.

Cause: If the IPv6 address is not included in the `/etc/hosts` file, then the agent will not be deployed.

Resolution: Edit the `/etc/hosts` of the compute node (or the VM in case of virtual Exadata) to map the OMS host name to an IPv6 address.

Not able to receive SNMP traps on cells using IPv6

For IPv6 environments, the Enterprise Manager agent needs have SNMP v3 subscription to the Exadata Storage Servers, for complete monitoring.

Prerequisites:

- SNMP V3 user created on Exadata Storage Server. See **Step 1** for instructions.

- Exadata Storage Server version must be 12.1.2.2 or later to support SNMP V3 subscription.

If the SNMP subscription was missed during Exadata discovery, you can follow these steps:

To configure SNMP v3 subscription on an Exadata Storage Server:

1. Create an SNMP V3 user on Exadata Storage Server Target.

   - Suppose you need a user called `"v3user"`. You can check whether this user is already present on the cell using this command:

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

   - If this user is not present on the Exadata Storage Server, create a new user as follows:

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

> **Note:**
>
> The Enterprise Manager Agent supports DES and AES privacy protocols in addition to MD5/SHA authentication protocols.

2. When running the discovery process ensure that the SNMPv3 monitoring credentials on the cell target in Enterprise Manager match the SNMPv3 user on the cell.

> **Note:**
>
> Make sure that an SNMP V3 user has been created before the discovery process is initiated (see **Step 1** for instructions). The SNMPv3 user gets created in the device if the target is discovered with a user having admin privileges.

3. If you need to edit the SNMP V3 monitoring credentials of the Exadata Storage Server after discovery, you can log in to Enterprise Manager and:

   • Select **Configuration**, then **Security**, then **Monitoring Credentials.**

   • Select **Exadata Storage Server** type, and click on **Manage Monitoring Credentials** button.

   • Select the **Exadata Storage Server** and set the SNMP V3 Credentials.

> **Note:**
>
> Ensure that the SNMP V3 monitoring credentials are setup on the cell target in Enterprise Manager which match the SNMP V3 user on the cell.

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