Oracle Exalytics

In-Memory Machine Installation and Administration Guide for Linux

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Oracle Exalytics In-Memory Machine Installation and Administration Guide for Linux, Exalytics Software Release 2.0.0.1.0 for Exalytics X2-4, X3-4, X4-4, X5-4, and X6-4

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Contents

3 Upgrading to Oracle Exalytics Release 2.1 (2.2.0.0.0.ovs-3.3.3) on Virtual Deployments

4 Installing and Configuring Oracle Exalytics Release 2.1 Non-Virtual Base Images on an Exalytics Machine

5   Configuring Exalytics Machine for Virtualization

Part II   System Management

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12   Disaster Recovery

A   Manual Procedures for Installing and Configuring Software on an Exalytics Machine

Index

List of Figures

List of Tables

Preface

The Oracle Business Intelligence Foundation Suite is a complete, open, and integrated solution for all enterprise business intelligence needs, including reporting, ad hoc queries, OLAP, dashboards, scorecards, and what-if analysis. The Oracle Business Intelligence Foundation Suite includes Oracle Business Intelligence Enterprise Edition.

Oracle Business Intelligence Enterprise Edition (Oracle BI EE) is a comprehensive set of enterprise business intelligence tools and infrastructure, including a scalable and efficient query and analysis server, an ad-hoc query and analysis tool, interactive dashboards, proactive intelligence and alerts, and an enterprise reporting engine.

The components of Oracle BI EE share a common service-oriented architecture, data access services, analytic and calculation infrastructure, metadata management services, semantic business model, security model and user preferences, and administration tools. Oracle BI EE provides scalability and performance with data-source specific optimized request generation, optimized data access, advanced calculation, intelligent caching services, and clustering.

This guide contains information about installing and administering the Oracle Exalytics In-Memory Machine. The guide includes topics on installing, upgrading, and maintaining the Exalytics Machine.

This guide applies to the Oracle Exalytics X2-4, X3-4, X4-4, X5-4, and X6-4 Release 2 (2.0.0.1.0).

- Audience
- Documentation Accessibility
- Related Documentation and Other Resources
- Conventions

Audience

This document is intended for installation engineers and middle-tier administrators who are responsible for managing Oracle Business Intelligence processes, upgrading, and installing.

Documentation Accessibility

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

Access to Oracle Support

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

Related Documentation and Other Resources

See the Oracle Business Intelligence library for a list of related Oracle Business Intelligence documents.

In addition, go to the Oracle Learning Library for Oracle Business Intelligence-related online training resources.

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.

New Features in Oracle Exalytics Release 2.1 (2.0.0.1.0)

This section describes the new features and certifications for the components in Oracle Exalytics Release 2.1 (2.0.0.1.0).

The Oracle Exalytics Release 2.1 (2.0.0.1.0) includes additional certifications and new capabilities for the components that are described in the following sections:

- Oracle Enterprise Linux 6.7 Operating Systems
- New Base Images for Release 2, Upgrade Utility, and Hardening Script
- Virtual Deployments
- Exalytics Domain Management Utility Supports Oracle Database In-Memory
- Application Software Components

Oracle Enterprise Linux 6.7 Operating Systems

Oracle Exalytics Release 2.1 includes the updated Oracle Enterprise Linux 6.7 Operating System, specifically optimized and built for analytical workload.

New Base Images for Release 2, Upgrade Utility, and Hardening Script

Oracle Exalytics Release 2.1 includes the following enhancements for non-virtualized deployments:

- New Base Images: Includes the following base images for Linux 6:
    - Base Image Version 2.0.0.1.el6: Release 2, EL6 Base Image for Linux 6

      Kernel: EL6 - 2.6.39-400.277.1.el6uek.x86_64
    - Both the base images and utilities are compatible on Oracle Exalytics Release 2.1 for X2-4, X3-4, and X4-4 models
    - Base Image Version 2.0.0.1.el6 is compatible on Oracle Exalytics Release 2.1 for X5-4 and X6-4 models
- Release 2.1 Upgrade Utility: Existing customers on Oracle Exalytics Release 1 Patchset 5 or Oracle Exalytics Release 2.0 (Base Image 2.0.0.0.el6) can use the utility to upgrade to Release 2.1 (Base Image Version 2.0.0.1.el6)
- Exalytics Hardening script for increased security on bare metal machines to comply with the Security Technical Implementation Guides (STIGs) standards. See Hardening an Exalytics Machine

Virtual Deployments

Oracle Exalytics Release 2.1 includes the following enhancements for virtual deployments:

- Oracle VM Server 3.3.3 Base Image (2.2.0.0.0.ovs-3.3.3)

  Kernel: 2.6.39-400.215.9.el5uek.x86_64

- Oracle VM Guest EL5 upgrade patch (2.2.0.0.0.el5)

  My Oracle Support Patch number: 20618011

- Oracle VM Guest Template EL5 (2.2.0.0.0.el5)

  Kernel: EL5 - 2.6.39-400.277.1.el5uek.x86_64

- Oracle VM Guest Template EL6 (2.2.0.0.0.el6)

  Kernel: EL6 - 2.6.39-400.277.1.el6uek.x86_64

- Compatible on all Exalytics X2, X3, X4-4, X5-4, and X6-4 models

Exalytics Domain Management Utility Supports Oracle Database In-Memory

The Exalytics Domain Management Utility can now install Oracle Database In-Memory.

For instructions on how to use the Exalytics Domain Management Utility to install and configure Oracle Database In-Memory on an Exalytics Machine, see Installing Oracle Database In-Memory Using the Exalytics Domain Management Utility

Application Software Components

> **Note:**
>
> OBIEE 12c is a certified component for Linux 6 operating system servers and need to be installed manually.

For the latest application software component certifications on Exalytics, see the *Oracle Exalytics Certification Matrix* at the following location:

```
http://www.oracle.com/technetwork/middleware/ias/downloads/fusion-
certification-100350.html
```

The following application software components are certified to run on Oracle Exalytics Release 2.1.

- Oracle Business Intelligence Enterprise Edition 11.1.1.7.x and 11.1.1.9.0
- Oracle TimesTen for Exalytics
- Oracle Endeca

- Oracle BI Applications
- Oracle Enterprise Performance (EPM) Applications

Oracle Business Intelligence Enterprise Edition 11.1.1.7.*x* and 11.1.1.9.0

Both Oracle Business Intelligence Enterprise Edition 11.1.1.7.*x* and 11.1.1.9.0 are certified to run on the Exalytics Machine.

Oracle Business Intelligence Enterprise Edition 11.1.1.7.150120 and 11.1.1.9.160419 includes a number of bug fixes for the components that comprise Oracle Exalytics. These bug fixes are described in the component-specific ReadMe files.

The links to the Oracle Business Intelligence Enterprise Edition Releases 11.1.1.7 and 11.1.1.9 documentation are available from the Oracle Exalytics Documentation library.

Oracle TimesTen for Exalytics

For the latest Oracle TimesTen certifications on Exalytics, see the *Oracle Exalytics Certification Matrix* at the following location:

http://www.oracle.com/technetwork/middleware/ias/downloads/fusion-certification-100350.html

For information, see the "Oracle TimesTen In-Memory Database" documentation at the following link:

https://docs.oracle.com/cd/E21901_01/index.html

The link to the "Oracle TimesTen In-Memory Database" documentation is also available from the Oracle Exalytics Documentation library.

Oracle Endeca

Both Oracle Endeca Information Discovery (3.0 and 3.1) and Oracle Endeca Server (7.5.1 and 7.6.0) are certified to run on the Exalytics Machine. Key parts of Oracle's extensive range of business analytics products and solutions, these components are designed to help customers make smarter and faster decisions. For more information, see Oracle Exalytics Certification Matrix at the following location:

http://www.oracle.com/technetwork/middleware/ias/downloads/fusion-certification-100350.html

Also see Oracle Endeca Information Discovery documentation, the link to which is available from the Oracle Exalytics Documentation Library.

Oracle BI Applications

For the latest Oracle BI application software component certifications on Exalytics, see the *Oracle Exalytics Certification Matrix* at the following location:

http://www.oracle.com/technetwork/middleware/ias/downloads/fusion-certification-100350.html

For information on using new Oracle BI Applications features see "Oracle Business Intelligence Applications" documentation, the link to which is available from the Oracle Exalytics Documentation Library.

Oracle Enterprise Performance (EPM) Applications

For the latest EPM application component certifications on Exalytics, see the *Oracle Exalytics Certification Matrix* at the following location:

http://www.oracle.com/technetwork/middleware/ias/downloads/fusion-certification-100350.html

For information on using Oracle EPM Applications, see "Oracle Enterprise Performance Management" documentation, the link to which is available for the Oracle Exalytics Documentation library.

Part I
Installation

This part describes how to install. It contains the following chapters:

- Installation Overview
- Upgrading to Oracle Exalytics Release 2.1 on Non-Virtual Deployments
- Upgrading to Oracle Exalytics Release 2.1 (2.2.0.0.0.ovs-3.3.3) on Virtual Deployments
- Installing and Configuring Oracle Exalytics Release 2.1 Non-Virtual Base Images on an Exalytics Machine
- Configuring Exalytics Machine for Virtualization
- Installing Software on an Exalytics Machine

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1

Installation Overview

This chapter provides an overview of installing software on the Oracle Exalytics In-Memory Machine. The Exalytics Machine is an engineered solution that includes a memory-centric hardware platform, proven in-memory technology from Oracle TimesTen, and an optimized version of Oracle Business Intelligence Foundation Suite functionality.
Oracle Business Intelligence applications, Oracle Enterprise Performance Management applications, and Oracle Endeca can be installed on an Exalytics Machine to provide greater value to Exalytics customers.

The Exalytics Machine enables Oracle Business Intelligence software users to gain quick insight, make better decisions, and take immediate actions. For system administrators, the pre-engineered system simplifies the process of configuring and maintaining an enterprise-level, high-performance Oracle Business Intelligence implementation. It eliminates the risks associated with procuring, deploying, maintaining, and tuning the system infrastructure from multiple vendors. Oracle's technology is designed to scale seamlessly from small workgroup installations to large scale enterprise Business Intelligence deployments.

The term "Oracle Business Intelligence" is used throughout this guide to collectively refer to Oracle BI Enterprise Edition and Oracle BI Publisher. In cases where a description or instruction specifically applies to one of these products, the individual product's name is used instead.

This chapter includes the following sections:

- Existing Installations
- New Installations
- Installable Components
- Oracle Exalytics Architecture
- System Requirements and Certification

1.1 Existing Installations

If you are an existing customer running Oracle Exalytics Release 2.0 (Base Image 2.0.0.0.el5 or 2.0.0.0.el6), you must upgrade to Oracle Exalytics Release 2.1. See Upgrading to Oracle Exalytics Release 2.1 on Non-Virtual Deployments If you are an Exalytics customer running PS5 with OVM, you must upgrade as described in Upgrading to Oracle Exalytics Release 2.1 (2.2.0.0.0.ovs-3.3.3) on Virtual Deployments

To access documentation for prior releases:

The Oracle Exalytics Release 2 documentation *Oracle Exalytics In-Memory Machine Installation and Administration Guide for Linux* is located at:

`http://docs.oracle.com/cd/E62968_01/bi.1/e62967/toc.htm`

The Oracle Exalytics Release 1 documentation *Oracle Exalytics In-Memory Machine Installation and Administration Guide for Linux* is located at:

http://docs.oracle.com/cd/E56045_01/bi.1/e57263/toc.htm

1.2 New Installations

If you are a new customer, perform the following actions:

- If you plan to install and configure the software on an Exalytics Machine configured for virtualization, see Configuring Exalytics Machine for Virtualization

- If you plan to install and configure the software on an Exalytics Machine, see Installing Software on an Exalytics Machine

1.3 Installable Components

Oracle Exalytics Release 2.1 comprises the following system components that are installed on an Exalytics Machine to work together in an optimized manner:

- System Components
- Application Software Components

1.3.1 System Components

The system components include the following:

- Exalytics Base Images for Linux x86-64 for Linux 6 operating systems.

  Base Images for Linux 6 (x86-64) are based on Oracle Enterprise Linux specifically optimized and built for analytical workload. Exalytics base images also includes additional utilities like Flash storage configuration utilities, network utilities, Auto Service Request utilities, and other system configuration utilities.

- Exalytics Oracle VM Templates for and Linux 6 operating systems.

  Oracle Exalytics Oracle VM template is a customized Oracle VM template for analytics use cases on Exalytics.

1.3.2 Application Software Components

The application software components include the following:

- Oracle Business Intelligence Foundation Suite
- Oracle Enterprise Performance Management Applications
- Oracle TimesTen In-Memory Database for Exalytics
- Oracle Database In-Memory
- Oracle Business Intelligence Applications
- Oracle Endeca

In addition, note the following:

- This guide does not provide information on installing Essbase on the Exalytics Machine using the Oracle Hyperion Enterprise Performance Management System

Installer. For information about using the EPM System Installer to install Essbase, see *Oracle Hyperion Enterprise Performance Management System Installation and Configuration Guide*.

For detailed information about supported products on each component, see the Oracle Exalytics Certification Matrix at the following location:

http://www.oracle.com/technetwork/middleware/ias/downloads/fusion-
certification-100350.html

1.4 Oracle Exalytics Architecture

Figure 1-1 contains a diagram of the architecture for the Exalytics Machine. The Exalytics Machine includes software for the Oracle TimesTen In-Memory Database or Oracle Database In-Memory, Oracle Business Intelligence, and the Administration Server and Managed Server for Oracle WebLogic Server. The Exalytics Machine is connected to a client computer on which the Oracle BI Administration Tool runs, including the Summary Advisor wizard. Another computer holds the database on which schemas that are created with the Repository Creation Utility reside, including usage tracking summary statistics.

Figure 1-1   Oracle Exalytics Architecture
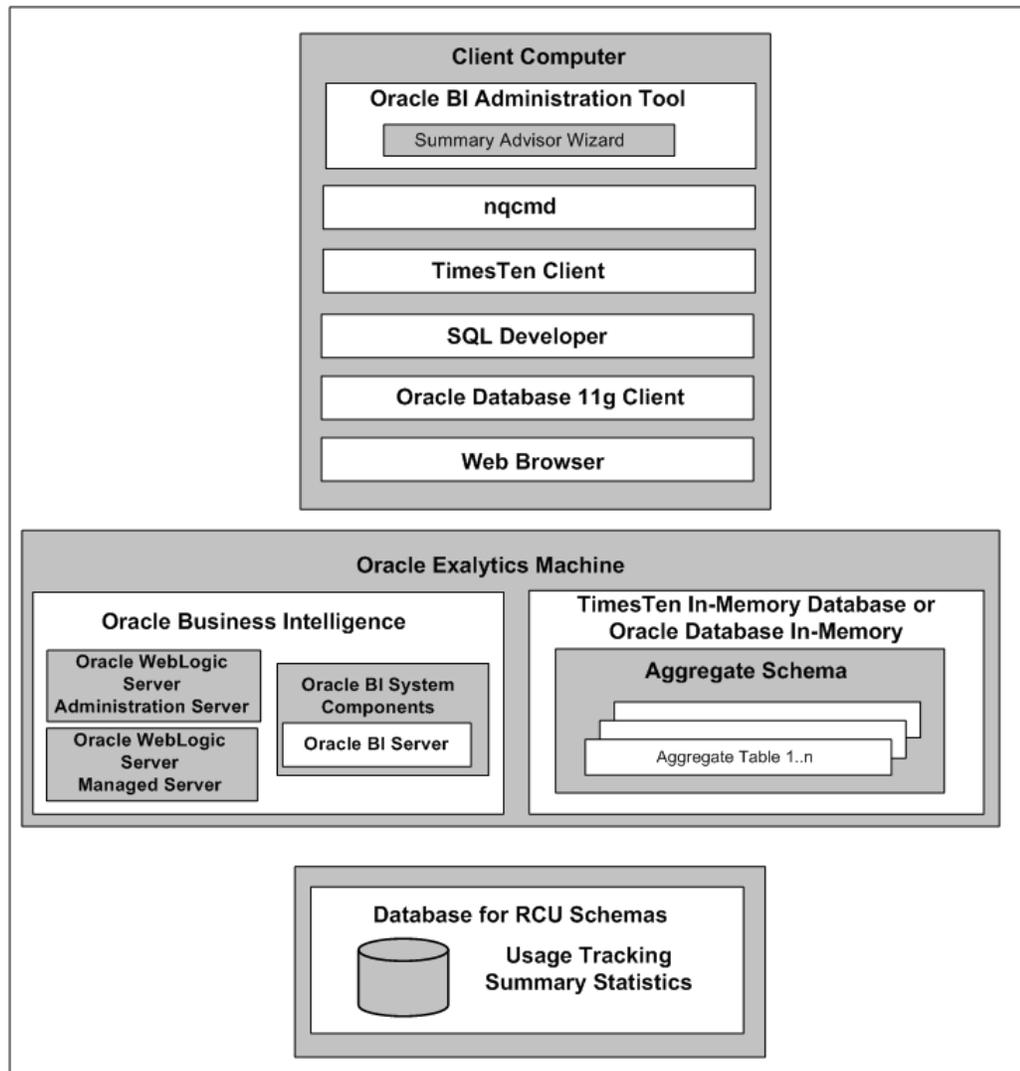
1.5 System Requirements and Certification

This guide provides specific information about system requirements and software versions that the Exalytics Machine uses. For information about the client computer that you use with the Exalytics Machine, refer to the system requirements and certification documentation for information about hardware and software requirements, platforms, databases, and other information. Both of these documents are available on Oracle Technology Network (OTN).

- The system requirements document covers information such as hardware and software requirements, minimum disk space and memory requirements, and required system libraries, packages, or patches:

  http://www.oracle.com/technetwork/middleware/ias/downloads/fusion-requirements-100147.html

- The certification document covers supported installation types, platforms, operating systems, databases, JDKs, and third-party products:

http://www.oracle.com/technetwork/middleware/ias/downloads/fusion-certification-100350.html

2

Upgrading to Oracle Exalytics Release 2.1 on Non-Virtual Deployments

This chapter provides information on upgrading to Oracle Exalytics Release 2.1 on non-virtual deployments. For information on upgrading to Oracle Exalytics Release 2.1 on virtual deployments, seeUpgrading to Oracle Exalytics Release 2.1 (2.2.0.0.0.ovs-3.3.3) on Virtual Deployments

> ✎ **Note:**
>
> - Oracle Exalytics Release 2.1 can only be applied on an Oracle Exalytics Release 2 (Oracle Exalytics Base Image 2.0.0.0.el6).
>
> - If you are currently on Oracle Exalytics Release 2.0 (Base Image 2.0.0.0.el5) and want to upgrade to Oracle Exalytics Release 2.1 (Base Image 2.0.0.1.el6), then backup the current system running Oracle Exalytics Release 2.0 (Base Image 2.0.0.0.el5), complete the full ISO installation of Oracle Exalytics Release 2.1 (Base Image 2.0.0.1.el6), and restore the backup.

This chapter includes the following sections:

- About Oracle Exalytics Release 2.1 on Non-Virtual Deployments
- Guidelines for Upgrading to Oracle Exalytics Release 2.1 on Non-Virtual Deployments
- Upgrading to Oracle Exalytics Release 2.1
- Configuring Flash and Replacing a Defective Flash Card on a Non-Virtual Exalytics Machine

2.1 About Oracle Exalytics Release 2.1 on Non-Virtual Deployments

Oracle Exalytics Release 2.1 for X2-4, X3-4, X4-4, X5-4, and X6-4 Exalytics Machines on non-virtual deployments, consists of the following system software components:

- Exalytics Base Image for Linux 6 x86-64 (2.0.0.1.el6) is compatible on Oracle Exalytics Release 2.1 for X2-4, X3-4, X4-4, X5-4, and X6-4 models.

Oracle Business Intelligence, Oracle Enterprise Performance Management, Oracle TimesTen for Exalytics, Oracle Database In-Memory, and Oracle Endeca software releases are certified on Exalytics Release 2.1. These software updates may contain new capabilities built for Exalytics only. Customers are advised to update the application software stack with the latest Exalytics certified version.

For detailed information on system components and supported application product components, see *Oracle Exalytics Certification Matrix* at `http://www.oracle.com/technetwork/middleware/ias/downloads/fusion-certification-100350.html`

2.2 Guidelines for Upgrading to Oracle Exalytics Release 2.1 on Non-Virtual Deployments

Review the following guidelines before upgrading to Oracle Exalytics Release 2.1:

- Ensure that you are currently on Oracle Exalytics Release 2 (Oracle Exalytics Base Image 2.0.0.0.el6).
- Before upgrading, ensure that you back up your current installation, configuration files, and any user-specific artifacts, and stop all applicable services
- If you have installed Oracle Enterprise Performance Management components on the Exalytics Machine, stop all Enterprise Performance Management services before upgrading. Also, ensure that you start all services after upgrading. For more information, see "Chapter 12, Starting and Stopping EPM System Products" in *Oracle Enterprise Performance Management System Installation and Configuration Guide Release 11.1.2.3* at the following location:

  `http://docs.oracle.com/cd/E40248_01/epm.1112/epm_install.pdf`

- When upgrading from Oracle Exalytics Oracle Exalytics Release 2.0, delete aggregates in Oracle TimesTen using the nqcmd utility. For more information, see "Creating and Persisting Aggregates for Oracle BI Server Queries" in *Metadata Repository Builder's Guide for Oracle Business Intelligence Enterprise Edition*.
- For late-breaking information, see Oracle Exalytics In-Memory Machine Release Notes for Linux.

2.3 Upgrading to Oracle Exalytics Release 2.1

This section consists of the following topics:

- About Oracle Exalytics Release 2.1 on Non-Virtual Deployments
- Upgrading to Oracle Exalytics Release 2.1 on Non-Virtual Deployments
- Post installation Instructions for Upgrading or Patching Oracle Business Intelligence Software
- Deinstallation Instructions for the Oracle Exalytics Release 2.1

2.3.1 About Oracle Exalytics Release 2.1 on Non-Virtual Deployments

The Oracle Exalytics Release 2.1 comprises of updates to the system components that are listed in listed in Table 2-1.

Table 2-1   System Components and Supported Versions in Oracle Exalytics Release 2.1

System Component	Version in Release 2	Kernel Version
Oracle Exalytics Base Image for Linux 6	2.0.0.1.el6	2.6.39-400.277.1.el6uek.x86_64

For the latest information on the supported Application Software Components, see *Oracle Exalytics Certification Matrix* at the following location:

http://www.oracle.com/technetwork/middleware/ias/downloads/fusion-certification-100350.html

2.3.2 Upgrading to Oracle Exalytics Release 2.1 on Non-Virtual Deployments

This section contains the following topics:

- Who Should Upgrade to Oracle Exalytics Release 2.1?
- Upgrading to Oracle Exalytics Release 2.1
- Upgrading or Patching Application Software Components

2.3.2.1 Who Should Upgrade to Oracle Exalytics Release 2.1?

The upgrade is available for all Oracle Exalytics customers who are currently on Oracle Exalytics Release 2.0 (Base Image 2.0.0.0.el6).

If you are currently on Oracle Exalytics Release 2.0 (Base Image 2.0.0.0.el5) and want to upgrade to Oracle Exalytics Release 2.1 (Base Image 2.0.0.1.el6), then backup the current system running Oracle Exalytics Release 2.0 (Base Image 2.0.0.0.el5), complete the full ISO installation of Oracle Exalytics Release 2.1 (Base Image 2.0.0.1.el6), and restore the backup.

> **Note:**
>
> If you are on a release prior to Oracle Exalytics Release 2.0, you must upgrade to Oracle Exalytics Release 2.0 (Base Image 2.0.0.0.el6) before you can upgrade to Release 2.1. For information on applying Oracle Exalytics Release 2.0, see "Chapter 2 Patching" in *Oracle Exalytics In-Memory Machine Installation and Administration Guide for Linux* available at the following location:
>
> http://docs.oracle.com/cd/E56045_01/bi.1/e57263/toc.htm

2.3.2.2 Upgrading to Oracle Exalytics Release 2.1

To upgrade to Oracle Exalytics Release 2.1 from Oracle Exalytics Release 2.0, perform the following steps:

- • [Step 1: Run the Oracle Exalytics Base Image Release 2.1 Upgrade Script](#)
- • [Step 2: (Optional) Configure ASR](#)
- • [Step 3: (Optional) Configure Exalytics Host for Enterprise Manager Cloud Control Discovery](#)

Step 1: Run the Oracle Exalytics Base Image Release 2.1 Upgrade Script

Run the upgrade script to upgrade Oracle Exalytics base image to 2.0.0.1.el6

> **Note:**
>
> If you are upgrading to Oracle Exalytics Release 2.1 from Oracle Exalytics Release 2.0 (Base Image 2.0.0.0.el6), the script installs new rpms without affecting your existing installation.

To run the Oracle Exalytics Base Image Upgrade Script:

1. Stop and backup all Oracle Business Intelligence, Oracle TimesTen, and (if installed) Enterprise Performance Management services.

   For information on stopping Oracle Business Intelligence services, see "Starting and Stopping Oracle Business Intelligence" in *System Administrator's Guide for Oracle Business Intelligence Enterprise Edition*.

   For information on starting and stopping Oracle TimesTen services, see "Working with the TimesTen Data Manager Daemon" in *.*

   For more information on starting and stopping Enterprise Performance Management services, see "Chapter 12, Starting and Stopping EPM System Products" in *Oracle Enterprise Performance Management System Installation and Configuration Guide* at the following locations:

   Oracle Enterprise Performance Management System Installation and Configuration Guide Release 11.1.2.3 at `http://docs.oracle.com/cd/E40248_01/epm.1112/epm_install.pdf`.

   Oracle Enterprise Performance Management System Installation and Configuration Guide Release 11.1.2.4 at `http://docs.oracle.com/cd/E57185_01/EPMIS/toc.htm`.

2. Navigate to My Oracle Support and download the required patch number:

   Patchset Upgrade Utility for Exalytics Base Image 2.0.0.1.el6 for Linux x86-64: Patch number 23322047. The patch contains the p23322047_20010_Linux-x86-64.zip file.

3. Unzip the patch file into a temporary (/tmp) directory.

4. Navigate to the temporary directory.

   The zipped file contains the nodeupdate.sh located in the directory with the patch ID for upgrade and the bug number for compute node (For the release 2.0.0.1.0 it is /tmp/2332047/23332931/).

5. To validate the patch for the Exalytics Machine, enter the following command:

   ```
   # ./nodeupdate.sh -v
   ```

6. To apply the patch and upgrade the Oracle Exalytics base image, enter the following command:

```
# ./nodeupdate.sh -a
```

After the patch is successfully applied, restart the Exalytics Machine using Oracle Integrated Lights Out Manager (ILOM).

7. **Optional:** View the log files at */var/log/exalytics/update-2.1.0.0.log* and */var/log/exalytics/exalytics.log*.

8. Restart the Oracle Business Intelligence, Oracle TimesTen, and Enterprise Performance Management services.

9. To confirm the base image, enter the following command as a root user:

```
# /opt/exalytics/bin/exalytics_imageinfo
```

The output looks similar to the following:

```
Image version : 2.0.0.1_el6
Creation timestamp : Day Date Month YEAR HOUR:MIN:SEC
Kernel version : 2.6.39-400.277.1.el6uek

RPM versions:
kernel-uek-2.6.39-400.277.1.el6uek
kernel-2.6.18-404.0.0.0.1.el6
exalytics-container-bm-2.0.0.1-2_el6
exalytics-scripts-2.0.0.1-9_el6
exalytics-flash-2.0.0.1-2_el6
exalytics-domain-configure-2.0.0.1-4_el6
exalytics-deps-exact-2.0.0.1-2_el6
exalytics-deps-minimum-2.0.0.1-2_el6
```

> **Note:**
>
> Even though the build numbers may be different than the ones listed above, ensure that the updated kernel version is the same as the one displayed above.

Step 2: (Optional) Configure ASR

To configure ASR:

- If you upgrade to Oracle Exalytics Release 2.1 on a new machine, then configure ASR as follows:

  1. Follow instructions detailed in "Installing Auto Service Request (ASR)" in *Oracle Exalytics In-Memory Machine Owner's Guide Exalytics X2-4, X3-4, X4-4, X5-4, and X6-4*, but change the following steps:

  2. Replace Step 5 in "Section 9.3 Before You Begin" with the following steps:

     a. Navigate to the /opt/exalytics/asr directory and add the following line to the /etc/inittab file

        emh1:345:respawn:/opt/exalytics/asr/bda_mon_hw_asr.pl -server

     b. At the command line, enter the following command to initialize and start the bda_mon server

        ```
        init q
        ```

3. Replace the commands in Step 2 in "Section 9.7 Configuring Telemetry Sources" with the following commands:

```
# cd /opt/exalytics/asr
```

```
# ./setup_asr_ilom.pl -host <hostname OR ip>
```

- If you upgraded to Oracle Exalytics Release 2.1 from Oracle Exalytics Release 2.0 and ASR is already configured, complete the following step to verify that ASR is running:

  – Execute the `ps -ef | grep bda` command to ensure that bda_mon_hw_asr_pl is running.

    For more information, see "Installing Auto Service Request Software" in *Oracle Exalytics In-Memory Machine Owner's Guide Exalytics X2-4, X3-4, X4-4, X5-4, and X6-4.*

Step 3: (Optional) Configure Exalytics Host for Enterprise Manager Cloud Control Discovery

To configure Exalytics Host for Enterprise Manager Cloud Control Discovery:

- If you installed Oracle Exalytics Release 2.1 on a new machine with Enterprise Manager Cloud Control (EMCC) deployed, then perform the following steps to configure EMCC to identify the Exalytics host.

  1. Confirm that a SP System Identifier is set for the Exalytics Machine by performing the following steps:

     – Log on to Oracle Integrated Lights Out Manager (ILOM).

     – Expand **System Information**.

     – Select **Summary**.

     Confirm that a SP System Identifier is displayed.

  2. Log on to ILOM and in the left pane of the ILOM, expand **ILOM Administration**, then select **Identification**. Ensure that the SP System Identifier value is populated with a unique value, such as "Oracle Exalytics AK00026925".

  3. Log on to the Exalytics Machine.

  4. Execute the command `chmod +x exalytics_configure_for_emcc.sh` to grant execute permissions.

  5. Execute the following command as a root user to create the file:

     ```
     ./exalytics_configure_for_emcc.sh
     ```

  6. Review the output and ensure that the contents of the /var/exalytics/info/em-context.info file correctly displays the system identifier for the Oracle Exalytics machine. The system identifier should be identical to the system identifier you saw in Step (b) of this procedure.

- If you upgraded to Oracle Exalytics Release 2.1 from Oracle Exalytics Release 2.0 with Enterprise Manager Cloud Control (EMCC) deployed, then complete the following step to verify that EMCC identifies the Exalytics host:

  – Review the contents of the */var/exalytics/info/em-context.info* file and ensure that it correctly displays the system identifier for the Oracle Exalytics machine.

> The system identifier should be identical to the system identifier displayed in the Oracle Integrated Lights Out Manager (ILOM) in Step (a) above.

2.3.2.3 Upgrading or Patching Application Software Components

Depending on your deployment upgrade or patch the newly certified application software components for this release.

> **Note:**
>
> This section is for existing Exalytics customers that are already running application software components. New Exalytics customers, proceed to Installing Software on an Exalytics Machine

Before you upgrade or patch the application software components, ensure you are installing the latest Exalytics certified application software versions. See *Oracle Exalytics Certification Matrix* for the latest certifications. The *Oracle Exalytics Certification Matrix* is located at:

http://www.oracle.com/technetwork/middleware/ias/downloads/fusion-certification-100350.html

This section includes the following topics:

- "Download and Install Oracle BI EE 11.1.1.7.*x* or 11.1.1.9.0"
- Download and Install Oracle Timesten
- Download and Install Oracle BI Applications
- Download and Install Oracle Endeca

Download and Install Oracle BI EE 11.1.1.7.*x* or 11.1.1.9.0

To apply the latest Oracle BI EE 11.1.1.7.*x* Patchset to Oracle BI EE 11.1.1.7.0 installation, see the instructions in the top-level patch of the Oracle BI EE 11.1.1.7.150120 Patchset.

To apply the latest Oracle BI EE 11.1.1.9 Patchset to Oracle BI EE 11.1.1.9.0 installation, see the instructions in the top-level patch of the Oracle BI EE 11.1.1.9.160419 Patchset.

To upgrade an Oracle BI EE 11.1.1.7.*x* installation to Oracle BI EE 11.1.1.9.0, see *"Chapter 3, Applying the Latest Oracle Fusion Middleware Patch Set"* in *Oracle Fusion Middleware Patching Guide*.

> **Note:**
>
> If you are installing Oracle Exalytics for the first time, you can install Oracle BI EE 11.1.1.9.0. For information, see Installing Software on an Exalytics Machine See also, *Installing and Configuring Oracle Business Intelligence*.

If you are running an Oracle BI EE 11.1.1.6.*x* installation, you must upgrade to an Oracle BI EE 11.1.1.7.0, see *Oracle Fusion Middleware Upgrade Guide for Oracle Business Intelligence.*

> **Note:**
>
> You cannot use the Exalytics Domain Management Utility to install or manage an Oracle BI EE 11.1.1.6.*x* installation. You must first upgrade the Oracle BI EE 11.1.1.6.*x* installation to Oracle BI EE 11.1.1.7.0 and then register the installation as an existing primary domain using the Exalytics Domain Management Utility.

Download and Install Oracle Timesten

Before you download and install Oracle TimesTen, ensure you are installing the latest Exalytics certified Oracle TimesTen version. See *Oracle Exalytics Certification Matrix* for the latest certifications. The *Oracle Exalytics Certification Matrix* is located at:

http://www.oracle.com/technetwork/middleware/ias/downloads/fusion-certification-100350.html

To download and install Oracle TimesTen:

1. Navigate to My Oracle Support.

2. Search for and download the latest Exalytics certified version of Oracle TimesTen.

> **Note:**
>
> If you are installing Oracle Exalytics for the first time, you can install the latest Oracle TimesTen certified version instead of applying patches to previous Oracle TimesTen versions.

During the installation of Oracle TimesTen, answer "Yes" to the question: Would you like to upgrade this instance?

Also, ensure that you do not delete existing files. For example, during the installation, answer "No" to the following questions:

- Would you also like to remove all files in <installation_directory>/TimesTen/tt1122/network/admin/samples?

- Would you like to replace the existing cluster.oracle.ini file?

- Would you like to replace the existing <installation_directory>/TimesTen/tt1122/info/sys.odbc.ini file?

- Would you also like to remove all files in <installation_directory>/TimesTen/tt1122/info?

For more information, see "Performing an in-place database upgrade" and "Performing an offline upgrade" in *Oracle TimesTen In-Memory Database Installation Guide*.

> **Note:**
>
> If required, you can install Oracle Database In-Memory for Oracle Exalytics. For instructions on installing Oracle Database In-Memory for Oracle Exalytics, see Installing Oracle Database In-Memory for Oracle Exalytics

Download and Install Oracle BI Applications

If deploying Oracle BI Applications, install Oracle BI Applications. For information, see Installing and Configuring Oracle BI Applications on an Exalytics Machine

To ensure you are installing the latest Exalytics certified Oracle BI Applications version, see *Oracle Exalytics Certification Matrix* for the latest certifications. The *Oracle Exalytics Certification Matrix* is located at:

```
http://www.oracle.com/technetwork/middleware/ias/downloads/fusion-
certification-100350.html
```

Download and Install Oracle Endeca

To install Oracle Endeca, see "Oracle Endeca Information Discovery" documentation, the link to which is available from the Oracle Exalytics Documentation Library.

To ensure you are installing the latest Exalytics certified Oracle Endeca version, see *Oracle Exalytics Certification Matrix* for the latest certifications. The *Oracle Exalytics Certification Matrix* is located at:

```
http://www.oracle.com/technetwork/middleware/ias/downloads/fusion-
certification-100350.html
```

2.3.3 Post installation Instructions for Upgrading or Patching Oracle Business Intelligence Software

> **Note:**
>
> This section is for existing customers that are upgrading or patching Oracle Business Intelligence software. New customers, proceed to Installing Software on an Exalytics Machine

To ensure that Oracle Business Intelligence Enterprise Edition and Oracle TimesTen data type mapping and other optimizations are consistent and can be leveraged, you must complete post installation steps for the following Oracle Exalytics components:

• Oracle TimesTen In-Memory Database
• Oracle Business Intelligence Enterprise Edition

2.3.3.1 Oracle TimesTen In-Memory Database

This section contains the following topics:

- Configure Oracle TimesTen Checkpoint Frequency
- Other Postinstallation Steps

2.3.3.1.1 Configure Oracle TimesTen Checkpoint Frequency

To ensure Oracle Business Intelligence Enterprise Edition sets the Oracle TimesTen checkpoint frequency, perform the following configuration steps after upgrading Oracle TimesTen In-Memory Database. Failure to perform this configuration may adversely affect Oracle TimesTen performance.

To configure Oracle TimesTen checkpoint frequency:

1. Open the timesten-install-dir/info/sys.odbc.ini file.
2. Find the DSN entry for the schema used for Aggregate Persistence.
3. Do one of the following:

   - If you are loading data in Oracle TimesTen database using aggregate persistence, edit the three parameters as follows:
     - CkptFrequency=-1
     - CkptLogVolume=0
     - CkptRate=0
   - If you are loading data in Oracle TimesTen database without using aggregate persistence, use a different server DSN and edit the three parameters as follows:
     - CkptFrequency=30
     - CkptLogVolume=0
     - CkptRate=0

2.3.3.1.2 Other Postinstallation Steps

To complete other postinstallation steps in Oracle TimesTen:

1. Re-create existing datastores for Oracle TimesTen.
2. If you are installing Oracle Exalytics Release 2.1 on Oracle Exalytics Release 2.0, then rebuild aggregates using the nqcmd utility. For more information, see "Creating and Persisting Aggregates for Oracle BI Server Queries" in *Metadata Repository Builder's Guide for Oracle Business Intelligence Enterprise Edition*.

2.3.3.2 Oracle Business Intelligence Enterprise Edition

This section contains the following topics:

- Edit the opmn.xml File
- Reinstall Oracle Business Intelligence Client Installer

2.3.3.2.1 Edit the opmn.xml File

For faster aggregation and better performance, Oracle recommends that you edit the opmn.xml file to include the appropriate elements. Ensure that you edit the opmn.xml

file on each Exalytics Machine that is configured in a highly available clustered environment.

To edit the opmn.xml file to improve aggregation and performance:

1. Open the opmn.xml file (which is located in MW_HOME/instances/instance1/config/OPMN/opmn).

2. Insert the following child elements under `<ias-component id="coreapplication_obis1" inherit-environment="true"><environment>`:

   a. `<variable id="ORACLE_BI_TT_DISABLE_REDO_LOGGING" value="1"/>`

      Creates faster aggregation.

   b. `<variable id="ORACLE_BI_TT_PARALLEL_INDEX_CREATION" value="1"/>`

      Creates indexes in parallel, thereby creating faster aggregation.

   c. `<variable id="ORACLE_BI_TT_BACKGROUND_CHECKPOINT_INTERVAL" value="6"/>`

      This BI Server controlled parameter determines the frequency of Oracle TimesTen datastores that are stored to disk (datastore persistence). The default value is every 10 seconds. The smaller the number of the "value", the more often Oracle TimesTen stores datastores to disk.

3. Stop and start the Notification Server.

   a. Go to the following directory that contains the OPMN command-line tool:

      MW_HOME/instances/instance1/bin

   b. Enter the following command:

      `./opmnctl stopall`

      Stops OPMN and all Oracle Business Intelligence system components.

   c. Enter the following command:

      `./opmnctl startall`

      Starts OPMN and all Oracle Business Intelligence system components.

2.3.3.2.2 Reinstall Oracle Business Intelligence Client Installer

For information about installing Oracle Business Intelligence Client Tools, see "Installing and Uninstalling Oracle Business Intelligence Client Tools" in *Installing and Configuring Oracle Business Intelligence*.

2.3.4 Deinstallation Instructions for the Oracle Exalytics Release 2.1

If you experience any problems after upgrading, then Oracle recommends that you roll back all Oracle Exalytics component patches. Do not rollback one or two individual component patches. Instructions for rollback are included in the component-specific ReadMe files.

If you encounter any issues while applying the upgrade, then contact Oracle Support.

2.4 Configuring Flash and Replacing a Defective Flash Card on a Non-Virtual Exalytics Machine

This section contains the following topics:

- License to Receive Open Source Code
- Prerequisites for Configuring Flash
- Configuring Flash
- Replacing a Defective Flash Card

2.4.1 License to Receive Open Source Code

The license for each component is located in the documentation, which may be delivered with the Oracle Linux programs or accessed online at http://oss.oracle.com/linux/legal/oracle-list.html and/or in the component's source code.

For technology in binary form that is licensed under an open source license that gives you the right to receive the source code for that binary, you may be able to obtain a copy of the applicable source code at these site(s):

https://edelivery.oracle.com/linux

If the source code for such technology was not provided to you with the binary, you can also receive a copy of the source code on physical media by submitting a written request to:

Oracle America, Inc.

Attn: Oracle Linux Source Code Requests

Development and Engineering Legal

500 Oracle Parkway, 10th Floor

Redwood Shores, CA 94065

Your request should include:

- The name of the component or binary file(s) for which you are requesting the source code
- The name and version number of the Oracle Software
- The date you received the Oracle Software
- Your name
- Your company name (if applicable)
- Your return mailing address and email
- A telephone number in the event we need to reach you.

We may charge you a fee to cover the cost of physical media and processing. Your request must be sent (i) within three (3) years of the date you received technology that included the component or binary file(s) that are the subject of your request, or (ii) in

the case of code licensed under the GPL v3, for as long as Oracle offers spare parts or customer support for that Software model.

2.4.2 Prerequisites for Configuring Flash

The following prerequisites must be met before configuring Flash on the Exalytics Machine:

- You are running Exalytics Base Image 2.0.0.1.el6.
- Oracle Field Services engineers have installed and configured six Flash cards (on an X2-4 or X3-4 Exalytics Machine) or have configured three Flash cards (on an X4-4, X5-4, or X6-4 Exalytics Machine).

2.4.3 Configuring Flash

When you upgrade to Oracle Exalytics Release 2.1, Flash drivers are included in the Oracle Exalytics Base Image 2.0.0.1.el6. To improve the performance and storage capacity of the Exalytics Machine you must configure Flash.

> **Note:**
>
> The installed Flash drives use software RAID.

Oracle supports two types of RAID configurations:

- RAID10: Is usually referred to as stripe of mirrors and is the most common RAID configuration. RAID10 duplicates and stripes data from one drive on a second drive so that if either drive fails, no data is lost. This is useful when reliability is more important than data storage capacity.
- RAID05: In RAID05 all drives are combined to work as a single drive. Data is transferred to disks by independent read and write operations. You need at least three disks for a RAID05 array.

This section consists of the following topics:

- Configuring Flash on an X2-4 or X3-4 Exalytics Machine
- Configuring Flash on an X4-4 Exalytics Machine
- Configuring Flash on an X6-4 and X5-4 Exalytics Machine

2.4.3.1 Configuring Flash on an X2-4 or X3-4 Exalytics Machine

> **Note:**
>
> This section is for users who want to configure new Flash, or re-configure existing Flash configuration. If you do not want to re-configure an existing Flash configuration, you can skip this section. Note that reconfiguring Flash will delete all existing data on the Flash cards.

An X2-4 or X3-4 Exalytics Machine is configured with six Flash cards. Each Flash card has four 100 GB drives.

Depending on your requirements, you can configure Flash for the following combinations:

• RAID10

> **Note:**
>
> Oracle recommends that you do not configure RAID05 on an X2-4 or X3-4 Exalytics Machine.

• EXT3 or EXT4 file system

> **Note:**
>
> Oracle recommends you configure Flash on the EXT4 file system.

To configure Flash:

1. Restart the Exalytics Machine using ILOM.

   a. Log on to the ILOM web-based interface.

   b. In the left pane of the ILOM, expand **Host Management**, then click **Power Control**. In the **Select Action** list, select **Power Cycle**, then click **Save**.

   The Exalytics Machine restarts.

2. Enter the following command as a root user:

   ```
   # /opt/exalytics/bin/configure_flash.sh --<RAID_TYPE> --<FS_TYPE>
   ```

   For example:

   • To configure Flash for a RAID10 configuration, enter the following command:

     ```
     # /opt/exalytics/bin/configure_flash.sh --RAID10 --EXT4
     ```

> **Note:**
>
> The following procedure assumes configuring Flash for a RAID10 configuration.

The following warning, applicable only for software RAID, is displayed: "This flash configuration script will remove any existing RAID arrays, as well as remove any partitions on any flash drives and will create a new RAID array across all these flash drives. This will result in ALL DATA BEING LOST from these drives. Do you still want to proceed with this flash configuration script? (yes/no)"

3. Enter Yes at the prompt to continue running the script.

   The script performs the following tasks:

- Erases all existing RAID configuration on the Flash cards.

- Distributes multiple RAID1 disks so that two parts of the RAID belong to different cards.

- Stripes all Flash RAID1 drives into a single RAID0.

4. To verify that Flash has been configured correctly, enter the following command:

```
# df -h
```

The output should look similar to the following:

```
Filesystem  Size    Used    Avail Use%        Mounted on /dev/mapper/VolGroup00-
LogVol00
            718G      4.4G    677G   1%   //dev/sda1
            99M    15M     79M   16%  /boottmpfs
            1010G   0     1010G   0%  /dev/shm/dev/md0
            1.1T  199M    1.1T   1%  /u02
```

Flash is configured as shown in Figure 2-1.

- Each Flash card (F1, F2, F3, and so on) has four 100 GB drives. Each drive maps to a device, such as /dev/sdg, /dev/sdh, /dev/sdi, /dev/sdj, and so on.

- Two Flash drives are configured on RAID1 /dev/md1, two Flash drives are configured on RAID1 /dev/md2, two Flash drives are configured on RAID1 /dev/md3, and so on, for a total of twelve RAID1s.

- The twelve RAID1s are configured on the parent RAID0 /dev/md0.

Figure 2-1   Flash Configuration on RAID10 for an X2-4 and X3-4 Exalytics Machine
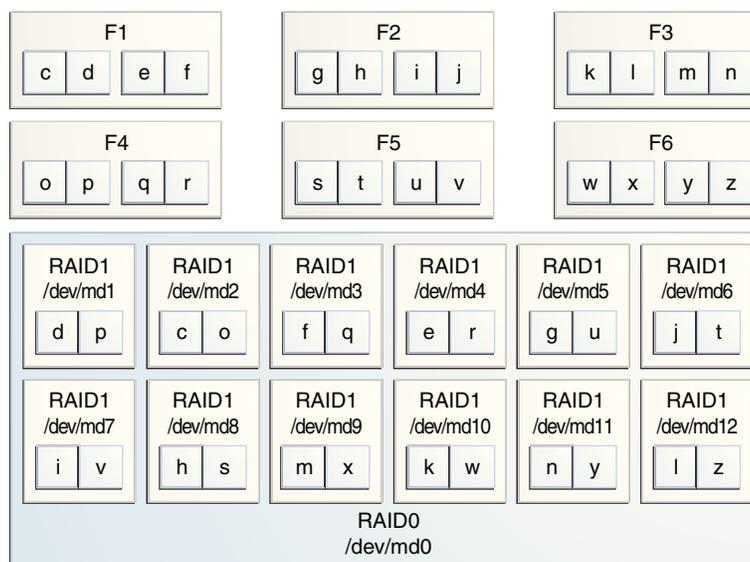
5. To verify the status of Flash cards, enter the following command:

```
# /opt/exalytics/bin/exalytics_CheckFlash.sh
```

The output for all the six Flash cards should look similar to the following:

```
Fetching some info on installed flash drives ....
Driver version :   01.250.41.04 (2012.06.04)

Supported number of flash drives detected (6)
```

```
Flash card 1 :
Overall health status : GOOD
Size (in MB) : 381468
Capacity (in bytes) : 400000000000
Firmware Version : 108.05.00.00
Devices:  /dev/sdd /dev/sdc /dev/sdf /dev/sde

Flash card 2 :
Overall health status : GOOD
Size (in MB) : 381468
Capacity (in bytes) : 400000000000
Firmware Version : 108.05.00.00
Devices:  /dev/sdg /dev/sdj /dev/sdi /dev/sdh

Flash card 3 :
Overall health status : GOOD
Size (in MB) : 381468
Capacity (in bytes) : 400000000000
Firmware Version : 108.05.00.00
Devices:  /dev/sdm /dev/sdk /dev/sdn /dev/sdl

Flash card 4 :
Overall health status : GOOD
Size (in MB) : 381468
Capacity (in bytes) : 400000000000
Firmware Version : 108.05.00.00
Devices:  /dev/sdp /dev/sdo /dev/sdq /dev/sdr

Flash card 5 :
Overall health status : GOOD
Size (in MB) : 381468
Capacity (in bytes) : 400000000000
Firmware Version : 108.05.00.00
Devices:  /dev/sdu /dev/sdt /dev/sdv /dev/sds

Flash card 6 :
Overall health status : GOOD
Size (in MB) : 381468
Capacity (in bytes) : 400000000000
Firmware Version : 108.05.00.00
Devices:  /dev/sdx /dev/sdw /dev/sdy /dev/sdz
```

2.4.3.2 Configuring Flash on an X4-4 Exalytics Machine

An X4-4 Exalytics Machine is configured with three Flash cards. Each Flash card has four 200 GB drives.

Depending on your requirements, you can configure Flash for the following combinations:

- RAID10 or RAID05
- EXT3 or EXT4 file system

> **Note:**
>
> Oracle recommends you configure Flash on the EXT4 file system.

To configure Flash:

1. Restart the Exalytics Machine using ILOM.

    a. Log on to the ILOM web-based interface.

    b. In the left pane of the ILOM, expand **Host Management**, then click **Power Control**. In the **Select Action** list, select **Power Cycle**, then click **Save**.

    The Exalytics Machine restarts.

2. Enter the following command as a root user:

    ```
    # /opt/exalytics/bin/configure_flash.sh --<RAID_TYPE> --<FS_TYPE>
    ```

    For example:

    • To configure Flash for a RAID10 configuration, enter the following command:

    ```
    # /opt/exalytics/bin/configure_flash.sh --RAID10 --EXT4
    ```

    • To configure Flash for a RAID05 configuration, enter the following command:

    ```
    # /opt/exalytics/bin/configure_flash.sh --RAID05 --EXT4
    ```

    Flash is configured for a RAID05 configuration as shown in Figure 2-3.

    > **Note:**
    >
    > The following procedure assumes configuring Flash for a RAID10 configuration on an X4-4 Exalytics Machine.

    The following warning, applicable only for software RAID, is displayed: "This flash configuration script will remove any existing RAID arrays, as well as remove any partitions on any flash drives and will create a new RAID array across all these flash drives. This will result in ALL DATA BEING LOST from these drives. Do you still want to proceed with this flash configuration script? (yes/no)"

3. Enter Yes at the prompt to continue running the script.

    The script performs the following tasks:

    • Erases all existing RAID configuration on the Flash cards.

    • Distributes multiple RAID1 disks so that two parts of the RAID belong to different cards.

    • Stripes all Flash RAID1 drives into a single RAID0.

4. To verify that Flash has been configured correctly, enter the following command:

    ```
    # df -h
    ```

    The output should look similar to the following:

    ```
    Filesystem Size   Used Avail Use% Mounted on/dev/mapper/VolGroup00-LogVol00
              989G   23G  915G   3%   //dev/mapper/VolGroup01-LogVol00
              3.2T   13G  3.0T   1%   /u01/dev/sda1
              99M    25M   70M  27%   /boottmpfs
              1010G   0   1010G  0%   /dev/shm/dev/md0
              1.1T  199M  1.1T   1%   /u02
    ```

    Flash is configured as shown in Figure 2-2.

- Each Flash card (F1, F2, and F3) has four 200 GB drives. Each drive maps to a device, such as /dev/sdg, /dev/sdh, /dev/sdi, /dev/sdj, and so on.

- Two Flash drives are configured on RAID1 /dev/md1, two Flash drives are configured on RAID1 /dev/md2, two Flash drives are configured on RAID1 /dev/md3, and so on, for a total of six RAID1s.

- The six RAID1s are configured on the parent RAID0 /dev/md0.

Figure 2-2   Flash Configuration on RAID10 for an X4-4 Exalytics Machine
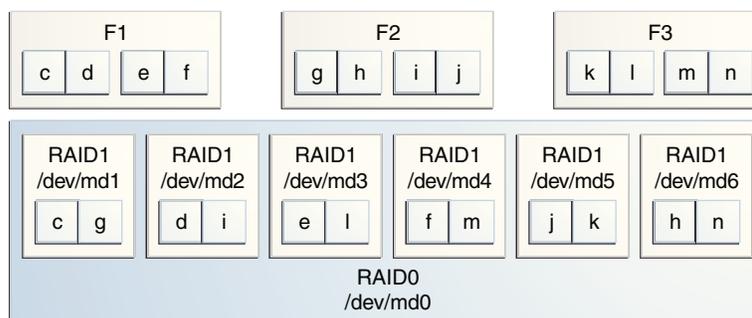
5. To verify the status of Flash cards, enter the following command:

```
# /opt/exalytics/bin/exalytics_CheckFlash.sh
```

The output for all the three Flash cards should look similar to the following:

```
Checking Exalytics Flash Drive Status

Fetching some info on installed flash drives ....
Driver version :   01.250.41.04 (2012.06.04)

Supported number of flash drives detected (3)

Flash card 1 :
Overall health status : GOOD
Size (in MB) : 762936
Capacity (in bytes) : 800000000000
Firmware Version : 109.05.26.00
Devices:  /dev/sdc /dev/sdd /dev/sde /dev/sdf

Flash card 2 :
Overall health status : GOOD
Size (in MB) : 762936
Capacity (in bytes) : 800000000000
Firmware Version : 109.05.26.00
Devices:  /dev/sdj /dev/sdh /dev/sdg /dev/sdi

Flash card 3 :
Overall health status : GOOD
Size (in MB) : 762936
Capacity (in bytes) : 800000000000
Firmware Version : 109.05.26.00
Devices:  /dev/sdl /dev/sdm /dev/sdk /dev/sdn

Summary:
Healthy flash drives : 3
Broken flash drives  : 0
Pass : Flash card health check passed
```

You can similarly configure Flash on RAID05. Flash is configured on RAID05 as shown Figure 2-3.

Figure 2-3   Flash Configuration on RAID05 for an X4-4 Exalytics Machine
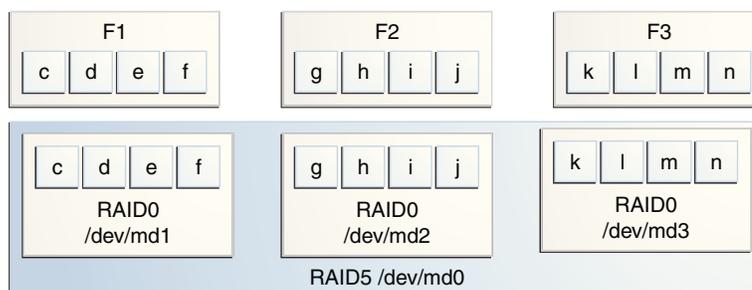
2.4.3.3 Configuring Flash on an X6-4 and X5-4 Exalytics Machine

An X6-4 Exalytics Machine is configured with three 3.2TB Flash cards for a total of 9.6TB. An X5-4 Exalytics Machine is configured with three 1.6TB Flash cards for a total of 4.8TB.

Depending on your requirements, you can configure Flash for the following combinations:

- RAID10 or RAID05
- EXT3 or EXT4 file system

> **Note:**
>
> Oracle recommends you configure Flash on the EXT4 file system.

To configure Flash:

1. Enter the following command as a root user:

    ```
    # /opt/exalytics/bin/configure_flash.sh --<RAID_TYPE> --<FS_TYPE>
    ```

    For example:

    - To configure Flash for a RAID10 configuration, enter the following command:

        ```
        # /opt/exalytics/bin/configure_flash.sh --RAID10 --EXT4
        ```

    - To configure Flash for a RAID05 configuration, enter the following command:

        ```
        # /opt/exalytics/bin/configure_flash.sh --RAID05 --EXT4
        ```

> **Note:**
>
> The following procedure assumes configuring Flash for a RAID05 configuration on an X6-4 and X5-4 Exalytics Machine.

The following warning, applicable only for software RAID, is displayed: "This flash configuration script will remove any existing RAID arrays, as well as remove any

partitions on any flash drives and will create a new RAID array across all these flash drives. This will result in ALL DATA BEING LOST from these drives. Do you still want to proceed with this flash configuration script? (yes/no)"

2. Enter Yes at the prompt to continue running the script.

   The script performs the following tasks:

   • Erases all existing RAID configuration on the Flash cards.

   • Configures RAID05 on the three Flash cards.

3. To verify that Flash has been configured correctly, enter the following command:

   ```
   # df -h
   ```

   Flash is configured as follows:

   • Each Flash card (F1, F2, and F3) has four 400 GB drives. Each drive maps to a device, such as /dev/nvme0n1p1, /dev/nvme0n1p3, /dev/nvme0n1p2, /dev/nvme0n1p4, and so on.

   • Four Flash drives are configured on RAID05 /dev/md1, four Flash drives are configured on RAID05 /dev/md2, and four Flash drives are configured on RAID5 /dev/md3, for a total of three RAID5s.

   • The three RAID5s are configured on the parent RAID0 /dev/md0.

4. To verify the status of Flash cards, enter the following command:

   ```
   # /opt/exalytics/bin/exalytics_CheckFlash.sh
   ```

   The output for all the three Flash cards should look similar to the following:

   ```
   Checking Exalytics Flash Drive Status

   cardindex=0
   cIndex=0
   cIndex=0
   allFlashCardDevices=
   Driver version :   01.250.41.04 (2012.06.04)

   Supported number of flash drives detected (3)

   Flash card 1 :
   Slot number: 0
   Overall health status : GOOD
   Capacity (in bytes) :   3125627568
   Firmware Version : SUNW-NVME-1 PCI Vendor ID: 8086 Serial Number:
   CVMD4215000N1P6DGN Model Number: INTEL SSDPEDME016T4 Firmware Revision: 8DV10054
   Number of Name
   cardindex=1
   cIndex=1
   cIndex=1
   allFlashCardDevices=nvme0n1p1
   Devices:  /dev/nvme0n1p1 /dev/nvme0n1p3 /dev/nvme0n1p2 /dev/nvme0n1p4

   Flash card 2 :
   Slot number: 0
   Overall health status : GOOD
   Capacity (in bytes) :   3125627568
   Firmware Version : SUNW-NVME-2 PCI Vendor ID: 8086 Serial Number:
   CVMD421500301P6DGN Model Number: INTEL SSDPEDME016T4 Firmware Revision: 8DV10054
   Number of Name
   ```

```
cardindex=2
cIndex=2
cIndex=2
allFlashCardDevices=nvme1n1p2
Devices:  /dev/nvme1n1p2 /dev/nvme1n1p1 /dev/nvme1n1p3 /dev/nvme1n1p4

Flash card 3 :
Slot number: 0
Overall health status : GOOD
Capacity (in bytes) :   3125627568
Firmware Version : SUNW-NVME-3 PCI Vendor ID: 8086 Serial Number:
CVMD4302002S1P6DGN Model Number: INTEL SSDPEDME016T4 Firmware Revision: 8DV10054
Number of Name
cardindex=3
cIndex=3
cIndex=3
allFlashCardDevices=nvme2n1p4
Devices:  /dev/nvme2n1p4 /dev/nvme2n1p2 /dev/nvme2n1p3 /dev/nvme2n1p1

Raid Array Info (/dev/md0):
/dev/md0: 2979.58GiB raid5 3 devices, 1 spare. Use mdadm --detail for more detail.

Summary:
Healthy flash drives : 3
Broken flash drives  : 0
Pass : Flash card health check passed
```

You can similarly configure Flash on RAID10 on an X6-4 and X5-4 Exalytics Machine.

2.4.4 Replacing a Defective Flash Card

This section consists of the following topics:

- Replacing a Defective Flash Card on an X2-4 or X3-4 Exalytics Machine
- Replacing a Defective Flash Card on an X4-4, X5-4, or X6-4 Exalytics Machine

2.4.4.1 Replacing a Defective Flash Card on an X2-4 or X3-4 Exalytics Machine

An X2-4 and X3-4 Exalytics Machine is configured with six Flash cards. Each Flash card contains four devices. When one device on a Flash card fails, the entire Flash card becomes defective and has to be replaced. The following procedure assumes you have a defective device (/dev/sdb) mapped to a Flash card which is installed on the parent *RAID0 /dev/md0*, see Figure 2-1.

To replace a failed or defective Flash card on an X2-4 or X3-4 Exalytics Machine:

1. To verify the status of Flash cards, enter the following command:

   ```
   # /opt/exalytics/bin/exalytics_CheckFlash.sh
   ```

   If a defective Flash card is detected, the output displays an "Overall Health: ERROR" message, and the summary indicates the defective card and the location of the Peripheral Component Interconnect Express (PCIe) card.

   The output should look similar to the following:

```
Checking Exalytics Flash Drive Status

Fetching some info on installed flash drives ....
Driver version :   01.250.41.04 (2012.06.04)

Supported number of flash drives detected (6)

Flash card 1 :
Slot number: 1
Overall health status : ERROR. Use --detail for more info
Size (in MB) : 286101
Capacity (in bytes) : 300000000000
Firmware Version : 109.05.26.00
Devices:  /dev/sdc /dev/sdd /dev/sda

Flash card 2 :
Slot number: 2
Overall health status : GOOD
Size (in MB) : 381468
Capacity (in bytes) : 400000000000
Firmware Version : 109.05.26.00
Devices:  /dev/sdh /dev/sdg /dev/sdf /dev/sde

Flash card 3 :
Slot number: 3
Overall health status : GOOD
Size (in MB) : 381468
Capacity (in bytes) : 400000000000
Firmware Version : 109.05.26.00
Devices:  /dev/sdl /dev/sdk /dev/sdj /dev/sdi

Flash card 4 :
Slot number: 5
Overall health status : GOOD
Size (in MB) : 381468
Capacity (in bytes) : 400000000000
Firmware Version : 109.05.26.00
Devices:  /dev/sdp /dev/sdn /dev/sdo /dev/sdm

Flash card 5 :
Slot number: 7
Overall health status : GOOD
Size (in MB) : 381468
Capacity (in bytes) : 400000000000
Firmware Version : 109.05.26.00
Devices:  /dev/sdt /dev/sds /dev/sdq /dev/sdr

Flash card 6 :
Slot number: 8
Overall health status : GOOD
Size (in MB) : 381468
Capacity (in bytes) : 400000000000
Firmware Version : 109.05.26.00
Devices:  /dev/sdu /dev/sdx /dev/sdv /dev/sdw

Raid Array Info (/dev/md0):
/dev/md0:  raid0 12 devices, 0 spares. Use mdadm --detail for more detail.

Summary:
Healthy flash drives : 5
```

```
Broken flash drives  : 1
Fail : Flash card health check failed. See above for more details.
```

Note the following:

- Device /dev/sdb has failed and is no longer seen by Flash card 1. Make a note of the devices assigned to this card so you can check them later against the devices assigned to the replaced Flash card.

- Slot number is the location of the PCIe card.

> **Note:**
>
> A defective Flash card can also be identified by an amber or red LED. Check the back panel of the Exalytics Machine to confirm the location of the defective Flash card.

2. Shut down and unplug the Exalytics Machine.

3. Replace the defective Flash card.

4. Restart the Exalytics Machine.

> **Note:**
>
> You can also start the Exalytics Machine using Integrated Lights Out Manager (ILOM).

5. To confirm that all Flash cards are now working and to confirm the RAID configuration, enter the following command:

```
# /opt/exalytics/bin/exalytics_CheckFlash.sh
```

The output should look similar to the following:

```
Checking Exalytics Flash Drive Status

Fetching some info on installed flash drives ....
Driver version :   01.250.41.04 (2012.06.04)

Supported number of flash drives detected (6)

Flash card 1 :
Slot number: 1
Overall health status : GOOD
Size (in MB) : 381468
Capacity (in bytes) : 400000000000
Firmware Version : 109.05.26.00
Devices:  /dev/sdd /dev/sda /dev/sdb /dev/sdc

Flash card 2 :
Slot number: 2
Overall health status : GOOD
Size (in MB) : 381468
Capacity (in bytes) : 400000000000
Firmware Version : 109.05.26.00
Devices:  /dev/sdh /dev/sdg /dev/sdf /dev/sde
```

```
Flash card 3 :
Slot number: 3
Overall health status : GOOD
Size (in MB) : 381468
Capacity (in bytes) : 400000000000
Firmware Version : 109.05.26.00
Devices:  /dev/sdi /dev/sdk /dev/sdl /dev/sdj

Flash card 4 :
Slot number: 5
Overall health status : GOOD
Size (in MB) : 381468
Capacity (in bytes) : 400000000000
Firmware Version : 109.05.26.00
Devices:  /dev/sdm /dev/sdo /dev/sdp /dev/sdn

Flash card 5 :
Slot number: 7
Overall health status : GOOD
Size (in MB) : 381468
Capacity (in bytes) : 400000000000
Firmware Version : 109.05.26.00
Devices:  /dev/sds /dev/sdt /dev/sdr /dev/sdq

Flash card 6 :
Slot number: 8
Overall health status : GOOD
Size (in MB) : 381468
Capacity (in bytes) : 400000000000
Firmware Version : 109.05.26.00
Devices:  /dev/sdw /dev/sdx /dev/sdv /dev/sdu

Raid Array Info (/dev/md0):
/dev/md0: 1116.08GiB raid0 12 devices, 0 spares. Use mdadm --detail for more
detail.

Summary:
Healthy flash drives : 6
Broken flash drives  : 0
Pass : Flash card health check passed
```

Note the following:

- New devices mapped to Flash card 1 are displayed.

- In this example, the same devices (/dev/sdd, /dev/sda, /dev/sdb, /dev/sdc) are mapped to Flash card 1. If different devices are mapped to Flash card 1, you must use the new devices when re-assembling RAID1.

- Since the replaced Flash card contains four new flash devices, the RAID configuration shows four missing RAID1 devices (one for each flash device on the replaced Flash Card). You must re-assemble RAID1 to enable the RAID1 configuration to recognize the new devices on the replaced Flash card.

> **Note:**
>
> A working Flash card can also be identified by the green LED. Check the back panel of the Exalytics Machine to confirm that LED of the replaced Flash card is green.

6. Re-assemble RAID1, by performing the following tasks:

   a. To display all devices on the RAID1 configuration, enter the following command:

   ```
   # cat /proc/mdstat
   ```

   The output should look similar to the following:

   ```
   Personalities : [raid1] [raid0]
   md0 : active raid0 md12[11] md7[6] md1[0] md8[7] md5[4] md11[10] md10[9]
   md9[8] md3[2] md6[5] md2[1] md4[3]
         1170296832 blocks super 1.2 512k chunks

   md1 : active raid1 sdm[1]
         97590656 blocks super 1.2 [2/1] [_U]

   md2 : active raid1 sdo[1]
         97590656 blocks super 1.2 [2/1] [_U]

   md4 : active raid1 sdp[1]
         97590656 blocks super 1.2 [2/1] [_U]

   md3 : active raid1 sdn[1]
         97590656 blocks super 1.2 [2/1] [_U]

   md8 : active raid1 sdq[1] sdh[0]
         97590656 blocks super 1.2 [2/2] [UU]

   md12 : active raid1 sdw[1] sdi[0]
         97590656 blocks super 1.2 [2/2] [UU]

   md6 : active raid1 sdt[1] sdg[0]
         97590656 blocks super 1.2 [2/2] [UU]

   md9 : active raid1 sdx[1] sdk[0]
         97590656 blocks super 1.2 [2/2] [UU]

   md10 : active raid1 sdv[1] sdl[0]
         97590656 blocks super 1.2 [2/2] [UU]

   md5 : active raid1 sdr[1] sdf[0]
         97590656 blocks super 1.2 [2/2] [UU]

   md11 : active raid1 sdu[1] sdj[0]
         97590656 blocks super 1.2 [2/2] [UU]

   md7 : active raid1 sds[1] sde[0]
         97590656 blocks super 1.2 [2/2] [UU]

   unused devices: <none>
   ```

   Note the following:

- Four md devices (md1, md2, md3, and md4) have a single sd device assigned.
- The second line for these devices ends with a notation similar to [2/1] [_U].

b. To check the correct configuration of the md devices, enter the following command:

```
# cat /etc/mdadm.conf
```

The output should look similar to the following:

```
ARRAY /dev/md1 level=raid1 num-devices=2 metadata=1.2
name=localhost.localdomain:1 UUID=d1e5378a:80eb2f97:2e7dd315:c08fc304
    devices=/dev/sdc,/dev/sdm
ARRAY /dev/md2 level=raid1 num-devices=2 metadata=1.2
name=localhost.localdomain:2 UUID=8226f5c2:e79dbd57:1976a29b:46a7dce1
    devices=/dev/sdb,/dev/sdo
ARRAY /dev/md3 level=raid1 num-devices=2 metadata=1.2
name=localhost.localdomain:3 UUID=79c16c90:eb67f53b:a1bdc83c:b717ebb7
    devices=/dev/sda,/dev/sdn
ARRAY /dev/md4 level=raid1 num-devices=2 metadata=1.2
name=localhost.localdomain:4 UUID=2b1d05bf:41447b90:40c84863:99c5b4c6
    devices=/dev/sdd,/dev/sdp
ARRAY /dev/md5 level=raid1 num-devices=2 metadata=1.2
name=localhost.localdomain:5 UUID=bbf1ce46:6e494aaa:eebae242:c0a56944
    devices=/dev/sdf,/dev/sdr
ARRAY /dev/md6 level=raid1 num-devices=2 metadata=1.2
name=localhost.localdomain:6 UUID=76257b58:ff74573a:a1ffef2b:12976a80
    devices=/dev/sdg,/dev/sdt
ARRAY /dev/md7 level=raid1 num-devices=2 metadata=1.2
name=localhost.localdomain:7 UUID=fde5cab2:e6ea51bd:2d2bd481:aa834fb9
    devices=/dev/sde,/dev/sds
ARRAY /dev/md8 level=raid1 num-devices=2 metadata=1.2
name=localhost.localdomain:8 UUID=9ed9b987:b8f52cc0:580485fb:105bf381
    devices=/dev/sdh,/dev/sdq
ARRAY /dev/md9 level=raid1 num-devices=2 metadata=1.2
name=localhost.localdomain:9 UUID=2e6ec418:ab1d29f6:4434431d:01ac464f
    devices=/dev/sdk,/dev/sdx
ARRAY /dev/md10 level=raid1 num-devices=2 metadata=1.2
name=localhost.localdomain:10 UUID=01584764:aa8ea502:fd00307a:c897162e
    devices=/dev/sdl,/dev/sdv
ARRAY /dev/md11 level=raid1 num-devices=2 metadata=1.2
name=localhost.localdomain:11 UUID=67fd1bb3:348fd8ce:1a512065:906bc583
    devices=/dev/sdj,/dev/sdu
ARRAY /dev/md12 level=raid1 num-devices=2 metadata=1.2
name=localhost.localdomain:12 UUID=6bb498e0:26aca961:78029fe9:e3c8a546
    devices=/dev/sdi,/dev/sdw
ARRAY /dev/md0 level=raid0 num-devices=12 metadata=1.2
name=localhost.localdomain:0 UUID=7edc1371:e8355571:c7c2f504:8a94a70f
devices=/dev/md1,/dev/md10,/dev/md11,/dev/md12,/dev/md2,/dev/md3,/dev/
md4,/dev/md5,/dev/md6,/dev/md7,/dev/md8,/dev/md9
```

Note the correct configuration of the following devices:

- md1 device contains the /dev/sdc and /dev/sdm sd devices
- md 2 device contains the /dev/sdb and /dev/sdo sd devices
- md3 device contains the /dev/sda and /dev/sdn sd devices
- md4 device contains the /dev/sdd and /dev/sdp sd devices

c. To add the missing sd devices (/dev/sdc, /dev/sdb, /dev/sda/, and /dev/sdd) to each of the four md devices (md1, md2, md3, and md4 respectively), enter the following commands:

```
# mdadm /dev/md1 --add /dev/sdc
```

The sd device /dev/sdc is added to the md1 device. The output should look similar to the following:

```
mdadm: added /dev/sdc
```

```
# mdadm /dev/md2 --add /dev/sdb
```

The sd device /dev/sdb is added to the md2 device. The output should look similar to the following:

```
mdadm: added /dev/sdb
```

```
# mdadm /dev/md3 --add /dev/sda
```

The sd device /dev/sda is added to the md3 device. The output should look similar to the following:

```
mdadm: added /dev/sda
```

mdadm /dev/md4 --add /dev/sdd

The sd device /dev/sdd is added to the md4 device. The output should look similar to the following:

```
mdadm: added /dev/sdd
```

RAID1 starts rebuilding automatically.

d. To check the recovery progress, enter the following command:

```
# cat /proc/mdstat
```

Monitor the output and confirm that the process completes. The output should look similar to the following:

```
Personalities : [raid1] [raid0]
md0 : active raid0 md12[11] md7[6] md1[0] md8[7] md5[4] md11[10] md10[9]
md9[8] md3[2] md6[5] md2[1] md4[3]
      1170296832 blocks super 1.2 512k chunks

md1 : active raid1 sdc[2] sdm[1]
      97590656 blocks super 1.2 [2/1] [_U]
      [==>.................]  recovery = 10.4% (10244736/97590656)
finish=7.0min speed=206250K/sec

md2 : active raid1 sdb[2] sdo[1]
      97590656 blocks super 1.2 [2/1] [_U]
      [=>..................]  recovery =  8.1% (8000000/97590656)
finish=7.4min speed=200000K/sec

md4 : active raid1 sdd[2] sdp[1]
      97590656 blocks super 1.2 [2/1] [_U]
      [>...................]  recovery =  2.7% (2665728/97590656)
finish=7.7min speed=205056K/sec

md3 : active raid1 sda[2] sdn[1]
      97590656 blocks super 1.2 [2/1] [_U]
      [=>..................]  recovery =  6.3% (6200064/97590656)
```

```
            finish=7.3min speed=206668K/sec

    md8 : active raid1 sdq[1] sdh[0]
          97590656 blocks super 1.2 [2/2] [UU]

    md12 : active raid1 sdw[1] sdi[0]
          97590656 blocks super 1.2 [2/2] [UU]

    md6 : active raid1 sdt[1] sdg[0]
          97590656 blocks super 1.2 [2/2] [UU]

    md9 : active raid1 sdx[1] sdk[0]
          97590656 blocks super 1.2 [2/2] [UU]

    md10 : active raid1 sdv[1] sdl[0]
          97590656 blocks super 1.2 [2/2] [UU]

    md5 : active raid1 sdr[1] sdf[0]
          97590656 blocks super 1.2 [2/2] [UU]

    md11 : active raid1 sdu[1] sdj[0]
          97590656 blocks super 1.2 [2/2] [UU]

    md7 : active raid1 sds[1] sde[0]
          97590656 blocks super 1.2 [2/2] [UU]

    unused devices: <none>
```

2.4.4.2 Replacing a Defective Flash Card on an X4-4, X5-4, or X6-4 Exalytics Machine

Each X4-4, X5-4, or X6-4 Exalytics Machine is configured with three Flash cards. Each Flash card contains four devices. When one device on a Flash card fails, the entire Flash card becomes defective and has to be replaced. Depending on the RAID configuration, you can replace a defective Flash card on a RAID10 or RAID5 configuration.

This section consists of the following topics:

- Replacing a Defective Flash Card on a RAID10 Configuration
- Replacing a Defective Flash Card on a RAID05 Configuration

2.4.4.2.1 Replacing a Defective Flash Card on a RAID10 Configuration

For RAID10 configuration, the following procedure assumes you have a defective device (/dev/sdb) mapped to a Flash card which is installed on the parent *RAID0 /dev/md0*, see Figure 2-2.

To replace a failed or defective Flash card on a RAID10 configuration:

1. To verify the status of Flash cards, enter the following command:

    Output for X2-4, X3-4 and X4-4

    ```
    # /opt/exalytics/bin/exalytics_CheckFlash.sh
    ```

    If a defective Flash card is detected, the output displays an "Overall Health: ERROR" message, and the summary indicates the defective card and the location of the Peripheral Component Interconnect Express (PCIe) card.

The output should look similar to the following:

```
Checking Exalytics Flash Drive Status

Fetching some info on installed flash drives ....
Driver version: 01.250.41.04 (2102.06.04)

Supported number of flash drives detected (3)

Flash card 1 :
Slot number: 6
Overall health status : ERROR. Use --detail for more info
Size (in MB) : 572202
Capacity (in bytes) : 600000000000
Firmware Version : 109.05.26.00
Devices:  /dev/sde /dev/sdc /dev/sdf

Flash card 2 :
Slot number: 7
Overall health status : GOOD
Size (in MB) : 762936
Capacity (in bytes) : 800000000000
Firmware Version : 109.05.26.00
Devices:  /dev/sdh /dev/sdj /dev/sdg /dev/sdi

Flash card 3 :
Slot number: 10
Overall health status : GOOD
Size (in MB) : 762936
Capacity (in bytes) : 800000000000
Firmware Version : 109.05.26.00
Devices:  /dev/sdn /dev/sdl /dev/sdk /dev/sdm

Raid Array Info (/dev/md0):
/dev/md0: 1116.08GiB raid0 6 devices, 0 spares. Use mdadm --detail for more
detail.

Summary:
Healthy flash drives : 2
Broken flash drives  : 1
Fail : Flash card health check failed. See above for more details.

Output for X5-4 and X6-4
```

```
# /opt/exalytics/bin/exalytics_CheckFlash.sh
```

If a defective Flash card is detected, the output displays an "Overall Health: ERROR" message, and the summary indicates the defective card and the location of the Peripheral Component Interconnect Express (PCIe) card.

The output should look similar to the following:

```
Checking Exalytics Flash Drive Status

cardindex=0cIndex=0
Driver version not available

Supported number of flash drives detected (3)

Flash card 1 :
Slot number: 0
Overall health status : GOOD
```

```
Capacity (in bytes) : 819364513185792
Firmware Version : SUNW-NVME-1 PCI Vendor ID: 8086 Serial Number:
CVMD421500421P6DGN Model Number: INTEL SSDPEDME016T4 Firmware Revision: 8DV10054
Number of Namespaces: 1
cardindex=1
cIndex=1
***********************************************************************
nvme0n1p1
***********************************************************************
Devices:  /dev/nvme0n1p1 /dev/nvme0n1p2 /dev/nvme0n1p3 /dev/nvme0n1p4

Flash card 2 :
Slot number: 0
Overall health status : GOOD
Capacity (in bytes) : 819364513185792
Firmware Version : SUNW-NVME-2 PCI Vendor ID: 8086 Serial Number:
CVMD421600081P6DGN Model Number: INTEL SSDPEDME016T4 Firmware Revision: 8DV10054
Number of Namespaces: 1
cardindex=2
cIndex=2
***********************************************************************
nvme1n1p1
***********************************************************************
Devices:  /dev//dev/nvme1n1p1 /dev/nvme1n1p2 /dev/nvme1n1p3 /dev/nvme1n1p4

Flash card 3 :
Slot number: 0
Overall health status : GOOD
Capacity (in bytes) : 819364513185792
Firmware Version : SUNW-NVME-3 PCI Vendor ID: 8086 Serial Number:
CVMD421600021P6DGN Model Number: INTEL SSDPEDME016T4 Firmware Revision: 8DV10054
Number of Namespaces: 1
cardindex=3
cIndex=3
***********************************************************************
nvme2n1p1
***********************************************************************
Devices:  /dev/nvme2n1p1 /dev/nvme2n1p2 /dev/nvme2n1p3 /dev/nvme2n1p4

Raid Array Info (/dev/md0):
mdadm --cannot open /dev/md0: No such file or directory

Summary:
Healthy flash drives : 3
Broken flash drives  : 0
Pass : Flash card health check passed.
```

Note the following:

- Device /dev/sdb has failed and is no longer seen by Flash card 1. Make note of the devices assigned to this card so you can check them later against the devices assigned to the replaced Flash card.

- Slot number is the location of the PCIe card.

> **Note:**
>
> A defective Flash card can also be identified by an amber or red LED. Check the back panel of the Exalytics Machine to confirm the location of the defective Flash card.

2. Shut down and unplug the Exalytics Machine.

3. Replace the defective Flash card.

4. Restart the Exalytics Machine.

> **Note:**
>
> You can also start the Exalytics Machine using Integrated Lights Out Manager (ILOM).

5. To confirm that all Flash cards are now working and to confirm the RAID configuration, enter the following command:

Output for X2-4, X3-4 and X4-4

```
# /opt/exalytics/bin/exalytics_CheckFlash.sh
```

The output should look similar to the following:

```
Checking Exalytics Flash Drive Status

Fetching some info on installed flash drives ....
Driver version: 01.250.41.04 (2012.06.04)

Supported number of flash drives detected (3)

Flash card 1 :
Slot number: 6
Overall health status : GOOD
Size (in MB) : 762936
Capacity (in bytes) : 800000000000
Firmware Version : 109.05.26.00
Devices:  /dev/sdd /dev/sdf /dev/sdc /dev/sde

Flash card 2 :
Slot number: 7
Overall health status : GOOD
Size (in MB) : 762936
Capacity (in bytes) : 800000000000
Firmware Version : 109.05.26.00
Devices:  /dev/sdi /dev/sdj /dev/sdh /dev/sdg

Flash card 3 :
Slot number: 10
Overall health status : GOOD
Size (in MB) : 762936
Capacity (in bytes) : 800000000000
Firmware Version : 109.05.26.00
Devices:  /dev/sdn /dev/sdm /dev/sdl /dev/sdk

Raid Array Info (/dev/md0):
```

ORACLE

```
/dev/md0:  raid0 6 devices, 0 spares. Use mdadm --detail for more detail.

Summary:
Healthy flash drives : 3
Broken flash drives  : 0
Pass : Flash card health check passed
```

Output for X5-4 and X6-4

```
# /opt/exalytics/bin/exalytics_CheckFlash.sh
```

The output should look similar to the following:

```
Checking Exalytics Flash Drive Status
cardindex=0
cIndex=0

Fetching some info on installed flash drives ....
Driver version not available

Supported number of flash drives detected (3)

Flash card 1 :
Slot number: 0
Overall health status : GOOD
Capacity (in bytes) : 819364513185792
Firmware Version : SUNW-NVME-1 PCI Vendor ID: 8086 Serial Number:
CVMD421500421P6DGN Model Number: INTEL SSDPEDME016T4 Firmware Revision: 8DV10054
Number of Namespaces: 1
cardindex=1
cIndex=1
**********************************************************************
nvme0n1p1
**********************************************************************
Devices:  /dev/nvme0n1p1 /dev/nvme0n1p2 /dev/nvme0n1p3 /dev/nvme0n1p4

Flash card 2 :
Slot number: 0
Overall health status : GOOD
Capacity (in bytes) : 819364513185792
Firmware Version : SUNW-NVME-2 PCI Vendor ID: 8086 Serial Number:
CVMD421600081P6DGN Model Number: INTEL SSDPEDME016T4 Firmware Revision: 8DV10054
Number of Namespaces: 1
cardindex=2
cIndex=2
**********************************************************************
nvme1n1p1
**********************************************************************
Devices:  /dev/nvme1n1p1 /dev/nvme1n1p2 /dev/nvme1n1p3 /dev/nvme1n1p4

Flash card 3 :
Slot number: 0
Overall health status : GOOD
Capacity (in bytes) : 819364513185792
Firmware Version : SUNW-NVME-3 PCI Vendor ID: 8086 Serial Number:
CVMD421600021P6DGN Model Number: INTEL SSDPEDME016T4 Firmware Revision: 8DV10054
Number of Namespaces: 1
cardindex=3
cIndex=3
**********************************************************************
nvme2n1p1
**********************************************************************
```

```
Devices:  /dev/nvme2n1p1 /dev/nvme2n1p2 /dev/nvme2n1p3 /dev/nvme2n1p4

Raid Array Info (/dev/md0):
mdadm: cannot open /dev/md0: No such file or directory.

Summary:
Healthy flash drives : 3
Broken flash drives  : 0
Pass : Flash card health check passed
```

Note the following:

- New devices mapped to the Flash card1 are displayed.

- The RAID10 configuration shows /dev/md0 as a RAID0 with six devices. See Figure 2-2.

- In this example, new devices /dev/sdd, /dev/sdf, /dev/sdc, and /dev/sde are mapped to Flash card 1.

- Since the replaced Flash card contains four new flash devices, the RAID configuration shows four missing devices (one for each flash device on the replaced Flash Card). You must re-assemble RAID1 to enable the RAID configuration to recognize the new devices on the replaced Flash card.

> **Note:**
>
> A working Flash card can also be identified by the green LED. Check the back panel of the Exalytics Machine to confirm that LED of the replaced Flash card is green.

6. Re-assemble RAID1, by performing the following tasks:

   a. To display all devices on the RAID1 configuration, enter the following command:

   ```
   # cat /proc/mdstat
   ```

   The output should look similar to the following:

   ```
   Personalities : [raid1] [raid0]
   md3 : active (auto-read-only) raid1 sdm[1]
         195181376 blocks super 1.2 [2/1] [_U]
         bitmap: 0/2 pages [0KB], 65536KB chunk

   md4 : active (auto-read-only) raid1 sdk[1]
         195181376 blocks super 1.2 [2/1] [_U]
         bitmap: 0/2 pages [0KB], 65536KB chunk

   md2 : active (auto-read-only) raid1 sdi[1]
         195181376 blocks super 1.2 [2/1] [_U]
         bitmap: 0/2 pages [0KB], 65536KB chunk

   md6 : active raid1 sdn[1] sdj[0]
         195181376 blocks super 1.2 [2/2] [UU]
         bitmap: 0/2 pages [0KB], 65536KB chunk

   md0 : inactive md6[5] md5[4] md1[0]
         585149952 blocks super 1.2
   ```

```
md1 : active raid1 sdh[1]
      195181376 blocks super 1.2 [2/1] [_U]
      bitmap: 1/2 pages [4KB], 65536KB chunk

md5 : active raid1 sdl[1] sdg[0]
      195181376 blocks super 1.2 [2/2] [UU]
      bitmap: 0/2 pages [0KB], 65536KB chunk

unused devices: <none>
```

Note the following:

- Four md devices (md3, md4, md2, and md1) have a single sd device assigned.

- The second line for these devices ends with a notation similar to [2/1] [_U].

b. To check the correct configuration of the md devices, enter the following command:

```
# cat /etc/mdadm.conf
```

The output should look similar to the following:

```
ARRAY /dev/md1 level=raid1 num-devices=2 metadata=1.2
name=localhost.localdomain:1 UUID=2022e872:f5beb736:5a2f10a7:27b209fc
    devices=/dev/sdd,/dev/sdh
ARRAY /dev/md2 level=raid1 num-devices=2 metadata=1.2
name=localhost.localdomain:2 UUID=b4aff5bf:18d7ab45:3a9ba04e:a8a56288
    devices=/dev/sde,/dev/sdi
ARRAY /dev/md3 level=raid1 num-devices=2 metadata=1.2
name=localhost.localdomain:3 UUID=4e54d5d1:51314c65:81c00e25:030edd38
    devices=/dev/sdc,/dev/sdm
ARRAY /dev/md4 level=raid1 num-devices=2 metadata=1.2
name=localhost.localdomain:4 UUID=f8a533ed:e195f83a:9dcc86eb:0427a897
    devices=/dev/sdf,/dev/sdk
ARRAY /dev/md5 level=raid1 num-devices=2 metadata=1.2
name=localhost.localdomain:5 UUID=ec7eb621:35b9233f:049a5e1b:987e7d72
    devices=/dev/sdg,/dev/sdl
ARRAY /dev/md6 level=raid1 num-devices=2 metadata=1.2 n
```

Note the correct configuration of the following devices:

- md1 device contains the /dev/sdd and /dev/sdh sd devices

- md 2 device contains the /dev/sde and /dev/sdi sd devices

- md3 device contains the /dev/sdc and /dev/sdm sd devices

- md4 device contains the /dev/sdf and /dev/sdk sd devices

c. To add the missing sd devices (/dev/sdd, /dev/sde, /dev/sdc/, and /dev/sdf) to each of the four md devices (md1, md2, md3, and md4 respectively), enter the following commands:

```
# mdadm /dev/md1 --add /dev/sdd
```

The sd device /dev/sdd is added to the md1 device. The output should look similar to the following:

```
mdadm: added /dev/sdd

# mdadm /dev/md2 --add /dev/sde
```

The sd device /dev/sde is added to the md2 device. The output should look similar to the following:

```
mdadm: added /dev/sde
```

```
# mdadm /dev/md3 --add /dev/sdc
```

The sd device /dev/sdc is added to the md3 device. The output should look similar to the following:

```
mdadm: added /dev/sdc
```

mdadm /dev/md4 --add /dev/sdf

The sd device /dev/sdf is added to the md4 device. The output should look similar to the following:

```
mdadm: added /dev/sdf
```

RAID1 starts rebuilding automatically.

d. To check the recovery progress, enter the following command:

```
# cat /proc/mdstat
```

Monitor the output and confirm that the process completes. The output should look similar to the following:

```
Personalities : [raid1] [raid0]
md3 : active raid1 sdc[2] sdm[1]
      195181376 blocks super 1.2 [2/1] [_U]
      [>...................]  recovery =  1.8% (3656256/195181376)
finish=15.7min speed=203125K/sec
      bitmap: 0/2 pages [0KB], 65536KB chunk

md4 : active raid1 sdf[2] sdk[1]
      195181376 blocks super 1.2 [2/1] [_U]
      [>...................]  recovery =  1.2% (2400000/195181376)
finish=16.0min speed=200000K/sec
      bitmap: 0/2 pages [0KB], 65536KB chunk

md2 : active raid1 sde[2] sdi[1]
      195181376 blocks super 1.2 [2/1] [_U]
      [>...................]  recovery =  3.4% (6796736/195181376)
finish=15.2min speed=205961K/sec
      bitmap: 0/2 pages [0KB], 65536KB chunk

md6 : active raid1 sdn[1] sdj[0]
      195181376 blocks super 1.2 [2/2] [UU]
      bitmap: 0/2 pages [0KB], 65536KB chunk

md0 : inactive md6[5] md5[4] md1[0]
      585149952 blocks super 1.2

md1 : active raid1 sdd[2] sdh[1]
      195181376 blocks super 1.2 [2/1] [_U]
      [>...................]  recovery =  4.4% (8739456/195181376)
finish=15.0min speed=206062K/sec
      bitmap: 1/2 pages [4KB], 65536KB chunk

md5 : active raid1 sdl[1] sdg[0]
      195181376 blocks super 1.2 [2/2] [UU]
      bitmap: 0/2 pages [0KB], 65536KB chunk
```

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```
                          unused devices: <none>
```

2.4.4.2.2 Replacing a Defective Flash Card on a RAID05 Configuration

For RAID05 configuration, the following procedure assumes you have a defective device (/dev/sdb) mapped to a Flash card which is installed on the parent *RAID5 /dev/md0*, see Figure 2-3.

1. To verify the status of Flash cards, enter the following command:

   ```
   # /opt/exalytics/bin/exalytics_CheckFlash.sh
   ```

   If a defective Flash card is detected, the output displays an "Overall Health: ERROR" message, and the summary indicates the defective card and the location of the Peripheral Component Interconnect Express (PCIe) card.

   The output should look similar to the following:

   ```
   Checking Exalytics Flash Drive Status

   Fetching some info on installed flash drives ....
   Driver version :   01.250.41.04 (2012.06.04)

   Supported number of flash drives detected (3)

   Flash card 1 :
   Slot number: 6
   Overall health status : ERROR. Use --detail for more info
   Size (in MB) : 572202
   Capacity (in bytes) : 600000000000
   Firmware Version : 109.05.26.00
   Devices:  /dev/sdf /dev/sdc /dev/sde

   Flash card 2 :
   Slot number: 7
   Overall health status : GOOD
   Size (in MB) : 762936
   Capacity (in bytes) : 800000000000
   Firmware Version : 109.05.26.00
   Devices:  /dev/sdh /dev/sdj /dev/sdi /dev/sdg

   Flash card 3 :
   Slot number: 10
   Overall health status : GOOD
   Size (in MB) : 762936
   Capacity (in bytes) : 800000000000
   Firmware Version : 109.05.26.00
   Devices:  /dev/sdn /dev/sdk /dev/sdm /dev/sdl

   Raid Array Info (/dev/md0):
   /dev/md0: 1488.86GiB raid5 3 devices, 0 spares. Use mdadm --detail for more
   detail.

   Summary:
   Healthy flash drives : 2
   Broken flash drives  : 1
   Fail : Flash card health check failed. See above for more details.
   ```

   Note the following:

- Device /dev/sdb has failed and is no longer seen by Flash card 1. Make note of the devices assigned to this card so you can check them later against the devices assigned to the replaced Flash card.

- Slot number is the location of the PCIe card.

> **✎ Note:**
>
> A defective Flash card can also be identified by an amber or red LED. Check the back panel of the Exalytics Machine to confirm the location of the defective Flash card.

2. Shut down and unplug the Exalytics Machine.

3. Replace the defective Flash card.

4. Restart the Exalytics Machine.

> **✎ Note:**
>
> You can also start the Exalytics Machine using Integrated Lights Out Manager (ILOM).

5. To confirm that all Flash cards are now working and to confirm the RAID configuration, enter the following command:

```
# /opt/exalytics/bin/exalytics_CheckFlash.sh
```

The output should look similar to the following:

```
Checking Exalytics Flash Drive Status

Fetching some info on installed flash drives ....
Driver version :   01.250.41.04 (2012.06.04)

Supported number of flash drives detected (3)

Flash card 1 :
Slot number: 6
Overall health status : GOOD
Size (in MB) : 762936
Capacity (in bytes) : 800000000000
Firmware Version : 109.05.26.00
Devices:  /dev/sdd /dev/sdf /dev/sdc /dev/sde

Flash card 2 :
Slot number: 7
Overall health status : GOOD
Size (in MB) : 762936
Capacity (in bytes) : 800000000000
Firmware Version : 109.05.26.00
Devices:  /dev/sdg /dev/sdi /dev/sdh /dev/sdj

Flash card 3 :
Slot number: 10
Overall health status : GOOD
Size (in MB) : 762936
```

```
Capacity (in bytes) : 800000000000
Firmware Version : 109.05.26.00
Devices:  /dev/sdl /dev/sdk /dev/sdn /dev/sdm

Raid Array Info (/dev/md0):
/dev/md0: 1488.86GiB raid5 3 devices, 1 spare. Use mdadm --detail for more
detail.

Summary:
Healthy flash drives : 3
Broken flash drives  : 0
Pass : Flash card health check passed
```

Note the following:

- New devices mapped to the Flash card1 are displayed.

- The RAID05 configuration shows /dev/md0 as a RAID5 with 3 devices. See Figure 2-3.

- In this example, new devices /dev/sdd, /dev/sdf, /dev/sdc, and /dev/sde are mapped to Flash card 1.

- Since the replaced Flash card contains four new flash devices, the RAID configuration shows four missing devices (one for each flash device on the replaced Flash Card). You must re-assemble RAID05 to enable the RAID configuration to recognize the new devices on the replaced Flash card.

> **✎ Note:**
>
> A working Flash card can also be identified by the green LED. Check the back panel of the Exalytics Machine to confirm that LED of the replaced Flash card is green.

6. Re-assemble RAID05, by performing the following steps:

   a. To check the RAID05 configuration, enter the following command:

   ```
   # cat /proc/mdstat
   ```

   The output should look similar to the following:

   ```
   Personalities : [raid0] [raid6] [raid5] [raid4]
   md3 : active raid0 sdn[2] sdk[1] sdm[3] sdl[0]
         780724224 blocks super 1.2 512k chunks

   md0 : active raid5 md3[3] md2[1]
         1561186304 blocks super 1.2 level 5, 512k chunk, algorithm 2 [3/2]
   [_UU]
         bitmap: 6/6 pages [24KB], 65536KB chunk

   md2 : active raid0 sdi[1] sdh[2] sdj[3] sdg[0]
         780724224 blocks super 1.2 512k chunks

   unused devices: <none>
   ```

   Note the following:

- • Since the replaced Flash card contains four new flash devices on RAID0 /dev/md1, the configuration shows RAID5 /dev/md0 as missing md1.

- • The second line of the RAID5 configuration ends with a notation similar to [3/2] [_UU].

- • To enable RAID5 to recognize md1, you need to recreate md1.

b. To recreate md1, enter the following command:

```
# mdadm /dev/md1 --create --raid-devices=4 --level=0 /dev/sdf /dev/
sde /dev/sdc /dev/sdd
```

The output should look similar to the following:

```
mdadm: array /dev/md1 started.
```

c. After confirming that md1 created successfully, you add the newly created md1 to RAID5.

d. To add md1 to RAID5, enter the following command:

```
# mdadm /dev/md0 --add /dev/md1
```

The output should look similar to the following:

```
mdadm: added /dev/md1
```

RAID5 starts rebuilding automatically.

e. To check the recovery progress, enter the following command:

```
# cat /proc/mdstat
```

Monitor the output and confirm that the process completes. The output should look similar to the following:

```
Personalities : [raid0] [raid6] [raid5] [raid4]
md1 : active raid0 sdd[3] sdc[2] sde[1] sdf[0]
      780724224 blocks super 1.2 512k chunks

md3 : active raid0 sdn[2] sdk[1] sdm[3] sdl[0]
      780724224 blocks super 1.2 512k chunks

md0 : active raid5 md1[4] md3[3] md2[1]
      1561186304 blocks super 1.2 level 5, 512k chunk, algorithm 2 [3/2]
[_UU]
      [>....................]  recovery =  0.5% (4200064/780593152)
finish=64.6min speed=200003K/sec
      bitmap: 6/6 pages [24KB], 65536KB chunk

md2 : active raid0 sdi[1] sdh[2] sdj[3] sdg[0]
      780724224 blocks super 1.2 512k chunks

unused devices: <none>
```

f. To recreate the mdadm.conf configuration file, which ensures that RAID5 details are maintained when you restart the Exalytics Machine, enter the following command:

```
# mdadm --detail --scan --verbose > /etc/mdadm.conf
```

To confirm that the file is recreated correctly, enter the following command:

```
# cat /etc/mdadm.conf
```

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Monitor the output and confirm that the process completes. The output should look similar to the following:

```
ARRAY /dev/md2 level=raid0 num-devices=4 metadata=1.2
name=localhost.localdomain:2 UUID=d7a213a4:d3eab6de:b62bb539:7f8025f4
    devices=/dev/sdg,/dev/sdh,/dev/sdi,/dev/sdj
ARRAY /dev/md3 level=raid0 num-devices=4 metadata=1.2
name=localhost.localdomain:3 UUID=b6e6a4d9:fb740b73:370eb061:bb9ded07
    devices=/dev/sdk,/dev/sdl,/dev/sdm,/dev/sdn
ARRAY /dev/md1 level=raid0 num-devices=4 metadata=1.2
name=localhost.localdomain:1 UUID=185b52fc:ca539982:3c4af30c:5578cdfe
    devices=/dev/sdc,/dev/sdd,/dev/sde,/dev/sdf
ARRAY /dev/md0 level=raid5 num-devices=3 metadata=1.2 spares=1
name=localhost.localdomain:0 UUID=655b4442:94160b2f:0d40b860:e9eef70f
    devices=/dev/md1,/dev/md2,/dev/md3
```

> **Note:**
>
> If you have other customizations in the mdadm.conf configuration file (such as updating the list of devices that are mapped to each RAID), you must manually edit the file.

3

Upgrading to Oracle Exalytics Release 2.1 (2.2.0.0.0.ovs-3.3.3) on Virtual Deployments

This chapter provides information on upgrading to Oracle Exalytics Release 2.1 (2.2.0.0.0.ovs-3.3.3) on virtual deployments. For information on upgrading to Oracle Exalytics Release 2.1 on non-virtual deployments, see Upgrading to Oracle Exalytics Release 2.1 on Non-Virtual Deployments .

> **Note:**
>
> Oracle Exalytics Release 2.1 can only be applied on an Oracle Exalytics Release 2.0 (Oracle Exalytics Base Image 2.0.0.0.el6). If you are on an earlier patchset, you must upgrade to Oracle Exalytics Release 2.0 (Oracle Exalytics Base Image 2.0.0.0.el6) before you can upgrade to Oracle Exalytics Release 2.0.

This chapter includes the following sections:

- About Oracle Exalytics Release 2.1 on Virtual Deployments

- Guidelines for Upgrading to Oracle Exalytics Release 2.1 on Virtual Deployments

- Who Should Upgrade to Oracle Exalytics Release 2.1 on an Exalytics Machine Configured for Virtualization?

- Prerequisites for Upgrading to Oracle Exalytics Release 2.1 on an Exalytics Machine Configured for Virtualization

- Upgrading Oracle Exalytics for Oracle VM 3.0.3 or Later Version to Oracle VM 3.3.3

- Applying the Oracle Exalytics Release 2.1 Upgrade on a Virtualized Environment

- Configuring Flash on an Exalytics Machine Configured for Virtualization

- Upgrading and Patching Application Software Components on an Exalytics Machine Configured for Virtualization

- Post installation Instructions for Upgrading or Patching Oracle Business Intelligence Software

- Instructions to Uninstall the Oracle Exalytics Release 2

3.1 About Oracle Exalytics Release 2.1 on Virtual Deployments

Oracle Exalytics Release 2.1 for X2-4, X3-4, X4-4, X5-4, and X6-4 Exalytics Machines consists of the following system software components:

- Exalytics Base Image for Oracle VM x86-64 (2.2.0.0.0.ovs-3.3.3)
- Exalytics VM Template (Guest) for Linux 6 (2.2.0.0.0.el6)

The Oracle Exalytics Release 2.1 on virtual deployments comprises of updates to the system components that are listed in listed in Table 3-1.

Table 3-1   System Components and Supported Versions in Oracle Exalytics Release 2.1 on Virtual Deployments

System Component	Version in Release 2.1	Kernel Version
Oracle Exalytics Base Image for Oracle VM	2.2.0.0.0.ovs-3.3.3	2.6.39-400.215.9.el5u ek x86_64
Oracle Exalytics VM Template (Guest Linux 6)	2.2.0.0.0.el6	2.6.39-400.248.3.el6u ek x86_64

Oracle Business Intelligence, Oracle Enterprise Performance Management, Oracle TimesTen for Exalytics, Oracle Database In-Memory, and Oracle Endeca software releases are certified on Exalytics Release 2. These software updates may contain new capabilities built for Exalytics only. Customers are advised to update the application software stack with the latest Exalytics certified version.

For detailed information on system components and supported application product components, see *Oracle Exalytics Certification Matrix* at the following location:

http://www.oracle.com/technetwork/middleware/ias/downloads/fusion-certification-100350.html

3.2 Guidelines for Upgrading to Oracle Exalytics Release 2.1 on Virtual Deployments

Review the following guidelines before upgrading to Oracle Exalytics Release 2:

- Ensure that you are currently on Oracle Exalytics Release 2.0 (Oracle Exalytics Base Image 2.0.0.0.el6).
- Before upgrading, ensure that you back up your current installation, configuration files, and any user-specific artifacts, and stop all applicable services.
- If you have installed Oracle Enterprise Performance Management components on the Exalytics Machine, stop all Enterprise Performance Management services before upgrading. Also, ensure that you start all services after upgrading. For more information, see "Chapter 12, Starting and Stopping EPM System Products" in *Oracle Enterprise Performance Management System Installation and Configuration Guide* at the respective locations. *Oracle Enterprise Performance*

Management System Installation and Configuration Guide Release 11.1.2.3 at `http://docs.oracle.com/cd/E40248_01/epm.1112/epm_install.pdf`. *Oracle Enterprise Performance Management System Installation and Configuration Guide Release 11.1.2.4* at `http://docs.oracle.com/cd/E57185_01/EPMIS/toc.htm`.

- When upgrading from Oracle Exalytics Release 1 Patchset 5, delete aggregates in Oracle TimesTen using the nqcmd utility. For more information, see "Creating and Persisting Aggregates for Oracle BI Server Queries" in *Metadata Repository Builder's Guide for Oracle Business Intelligence Enterprise Edition*.

- For late-breaking information, see Oracle Exalytics Release Notes.

3.3 Who Should Upgrade to Oracle Exalytics Release 2.1 on an Exalytics Machine Configured for Virtualization?

This upgrade is available to all Exalytics virtualization customers who are running Oracle VM server 3.0.3 or later version and Oracle VM Manager 3.0.3 or later version. This upgrade is available on Exalytics X2-4, X3-4 and X-4, servers currently running OVM manager and OVM server 3.0.3 or later and Exalytics X5-4 and X6-4 servers running OVM Manager and OVM server 3.3.3.

> **Note:**
>
> Oracle recommends that all current customers running Exalytics virtualization upgrade to Oracle Exalytics Release 2.1.
>
> The X5-4 and X6-4 servers can be upgraded to Release 2.1, after upgrading to Oracle Exalytics Release 2.0. If the Oracle Exalytics is older than Release 2.0, then you must first upgrade to Oracle Exalytics Release 2.0 and then upgrade to Oracle Exalytics Release 2.1.

3.4 Prerequisites for Upgrading to Oracle Exalytics Release 2.1 on an Exalytics Machine Configured for Virtualization

The following prerequisites must be met before you can upgrade to Oracle Exalytics Release 2.1 on an Exalytics Machine configured for virtualization:

- You have one or more Exalytics Machines configured for virtualization.

- You have upgraded to Oracle VM Server 3.3.3 and Oracle VM Manager 3.3.3 or later version.

- You have added Oracle VM Server to your Oracle VM Manager environment. To add Oracle VM Servers to your Oracle VM Manager, see Discovering Oracle VM Servers.

3.5 Upgrading Oracle Exalytics for Oracle VM 3.0.3 or Later Version to Oracle VM 3.3.3

> **Note:**
>
> If you have already upgraded to Oracle VM 3.3.3, you can ignore this section and go directly to Applying the Oracle Exalytics Release 2.1 Upgrade on a Virtualized Environment.
>
> It is suggested to re-image or install OVM 3.3.3 on X5-4 and X6-4 servers to use the NVME Flash cards according to the instructions in Configuring Exalytics Machine for Virtualization .

This section consists of the following topics:

- Upgrading Oracle VM Manager 3.0.3 or Later version to Oracle VM Manager 3.3.3
- Upgrading Oracle VM Server 3.0.3 (Base Image 2.0.1.1) or Later Version to Oracle VM Server 3.3.3

3.5.1 Upgrading Oracle VM Manager 3.0.3 or Later version to Oracle VM Manager 3.3.3

To upgrade Oracle VM Manager 3.0.3 or later version to Oracle VM Manager 3.3.3, complete the following tasks:

1. Upgrading Oracle VM Manager 3.0.3 or later version to Oracle VM Manager 3.2.9

> **Note:**
>
> If you are already running Oracle VM Manager 3.2.9, see Upgrading Oracle VM Manager 3.2.9 to Oracle VM Manager 3.3.3.

2. Upgrading Oracle VM Manager 3.2.9 to Oracle VM Manager 3.3.3

- Upgrading Oracle VM Manager 3.0.3 or later version to Oracle VM Manager 3.2.9
- Upgrading Oracle VM Manager 3.2.9 to Oracle VM Manager 3.3.3

3.5.1.1 Upgrading Oracle VM Manager 3.0.3 or later version to Oracle VM Manager 3.2.9

> **Note:**
>
> If you are already running Oracle VM Manager 3.2.9, go to "Upgrading Oracle VM Manager 3.2.9 to Oracle VM Manager 3.3.3".

Oracle VM Manager provides a graphical user interface to manage Oracle VM Servers, virtual machines, and resources.

> **Note:**
>
> If you are installing Oracle VM Manager for the first time, you can install Oracle VM Manager 3.3.3 directly. For information, see Installing and Configuring Oracle VM Manager.

To upgrade Oracle VM Manager 3.0.3 or later version to 3.2.9:

1. Navigate to `http://edelivery.oracle.com/oraclevm` and perform the following steps:

   a. In the **Select a Product Pack** list, select **Oracle VM**.

   b. In the Platform list, select **x86-64 bit**.

   c. Click **Go**.

   d. Select **Oracle VM 3.2.9, x86-64 bit**, and click **Continue**.

   e. Download **Oracle VM Manager 3.2.9 - Upgrade only** (Part Number V74421-01).

2. Follow the readme instructions for upgrading Oracle VM Manager.

3.5.1.2 Upgrading Oracle VM Manager 3.2.9 to Oracle VM Manager 3.3.3

> **Note:**
>
> If you are running Oracle VM Manager 3.0.3 or a version prior to Oracle VM Server 3.2.9, go to "Upgrading Oracle VM Manager 3.0.3 or later version to Oracle VM Manager 3.2.9".

To upgrade Oracle VM Manager 3.2.9 to Oracle VM Manager 3.3.3, complete the following procedures:

Prerequisites:

1. Navigate to `http://edelivery.oracle.com/oraclevm` and perform the following steps:

    a. In the **Select a Product Pack** list, select **Oracle VM**.

    b. In the Platform list, select **x86-64 bit**.

    c. Click **Go**.

    d. Select **Oracle VM 3.3.3, x86-64 bit**, and click **Continue**.

    e. Download **Oracle VM Manager 3.3.3** (Part Number V77113-01).

2. The required passwords:

   • OVM Manager database password.

   • OVM Manager application password.

   • WebLogic domain administrator password.

To upgrade Oracle VM Manager 3.2.9 to Oracle VM Manager 3.3.3:

1. Navigate to My Oracle Support and download the OVM Manager 3.3.3 iso file. File: ovmm-3.3.3-installer-OracleLinux-b1085.iso.

2. Mount the iso file to a temporary directory, by running the following commands:

```
# mkdir /tmp/ovm-mount

# mount -o loop ovmm-3.3.3-installer-OracleLinux-b1085.iso /tmp/ovs-mount
```

3. Run the following command:

```
# /tmp/ovs-mount/runInstaller.sh
```

4. When prompted to select the installation type, type **2** to select Upgrade.

5. Enter the required password, when prompted.

6. When prompted to confirm the upgrade process, type **1** to select Continue.

3.5.2 Upgrading Oracle VM Server 3.0.3 (Base Image 2.0.1.1) or Later Version to Oracle VM Server 3.3.3

> **Note:**
>
> If you are configuring Exalytics Machine for virtualization for the first time, you can install Oracle VM Server 3.3.3 directly. For information on installing Oracle VM Server 3.3.3, see Installing and Configuring Oracle VM Server.

To upgrade Oracle VM Server 3.0.3 (Base Image 2.0.1.1) or later version to Oracle VM Server 3.3.3, complete the following tasks:

1. "Upgrading Oracle VM Server 3.0.3 (Base Image 2.0.1.1) or later version to Oracle VM Server 3.2.9"

> **Note:**
>
> If you are already running Oracle VM Server 3.2.9, see "Upgrading Oracle VM Server 3.2.9 to Oracle VM Server 3.3.3".

2. "Upgrading Oracle VM Server 3.2.9 to Oracle VM Server 3.3.3"

• Upgrading Oracle VM Server 3.0.3 (Base Image 2.0.1.1) or later version to Oracle VM Server 3.2.9

• Upgrading Oracle VM Server 3.2.9 to Oracle VM Server 3.3.3

3.5.2.1 Upgrading Oracle VM Server 3.0.3 (Base Image 2.0.1.1) or later version to Oracle VM Server 3.2.9

> **Note:**
>
> If you are already running Oracle VM Server 3.2.9, go to "Upgrading Oracle VM Server 3.2.9 to Oracle VM Server 3.3.3".

To upgrade Oracle VM Server 3.0.3 (Base Image 2.0.1.1) or later version to Oracle VM Server 3.2.9, complete the following tasks:

1. "Preupgrade Tasks"

2. "Upgrading Oracle VM Server 3.0.3 (Base Image 2.0.1.1) or Later Version to Oracle VM Server 3.2.9"

Preupgrade Tasks

This section consists of the following topics:

• "Editing the Grub Configuration File to Increase Memory"

• "Stopping and Starting Oracle VM Server"

Editing the Grub Configuration File to Increase Memory

Edit the Grub configuration file to increase the allocated memory from 2 GB to 16 GB.

To edit the Grub configuration file to increase memory:

1. Log on as the root user.

2. Open the /etc/grub.conf file in a text editor.

3. Change the allocated memory from 2 GB to 16 GB.

4. Modify the kernel /xen.gz line in grub.conf file so it displays as follows:

   kernel /xen.gz **dom0_mem=16384M** allowsuperpage dom0_vcpus_pin dom0_max_vcpus=20 **no-bootscrub**

5. Modify the module/vmlinuz line in the grub.conf file so it displays as follows:

   module /vmlinuz-2.6.39-300.32.6.el6uek ro root=UUID=5d6c3568-1894-41cd-80d9-5d190b4529f5 **no-bootscrub swiotlb=131072**

6. Stop and start Oracle VM Server. For instructions, see "Stopping and Starting Oracle VM Server".

Stopping and Starting Oracle VM Server

To stop and start Oracle VM Server:

1. To stop and start Oracle VM Server, perform the following steps:

   a. Stop all applicable processes running on the Exalytics Machine.

   b. Stop all virtual machines running on the server.

   c. Connect to Oracle VM Manager.

   d. Select the **Servers** and **VMs** tab.

   e. In the left pane, expand **Server Pools**, and then select the server pool containing the Exalytics Machine.

   f. Right-click the Exalytics Machine, and select **Restart Server**.

      The Oracle VM Server stops and starts automatically.

2. Confirm that Oracle VM Server has restarted.

Upgrading Oracle VM Server 3.0.3 (Base Image 2.0.1.1) or Later Version to Oracle VM Server 3.2.9

Before you upgrade Oracle VM Server, ensure that you have upgraded Oracle VM Manager.

To upgrade Oracle VM Server 3.0.3 (Base Image 2.0.1.1) or a later version to Oracle VM Server 3.2.9:

1. Stop Oracle VM Server, by performing the following steps:

   a. Stop all applicable processes running on the Exalytics Machine.

   b. Stop all virtual machines running on the server.

   c. Connect to Oracle VM Manager.

   d. Select the **Servers and VMs** tab.

   e. In the left pane, expand **Server Pools**, and then **exalytics_server_pool**.

   f. Right-click the Exalytics Machine, and select **Stop Server**.

   For more information, see "Section 6.10.7 Stopping Oracle VM Servers" in *Oracle VM User's Guide for Release 3.2*.

2. Navigate to the Oracle Software Delivery Cloud web site at the following link:

   http://edelivery.oracle.com

3. In the Select a Product Pack list, select **Oracle Business Intelligence**.

4. In the Platform list, select **Linux X86-64**.

5. Click **Go**.

6. Select **Oracle Exalytics Software Media Pack for Linux x86-64 (Release 2.1.0.0)**.

7. Click **Continue**.

8. Download and unzip the Oracle Exalytics Base Image 2.2.0.0.0 for Exalytics Oracle VM x86-64 file (part number V 76307-01) to a local directory.

   The zip file contains the following iso file:

- Exalytics_2.2.0.0.0_Upgrade_OVS-3.2.9-751_<DATE>.iso: You use this iso file to upgrade to Oracle VM Server 3.2.9.

9. On the Exalytics Machine, connect and log on to Oracle Integrated Lights Out Manager (ILOM).

> **Note:**
>
> If you are upgrading to Oracle VM Server 3.2.9 on an X2-4 or X3-4 Exalytics Machine, you must use ILOM 3.1.2.24.d. If you are upgrading to Oracle VM Server 3.2.9 on an X4-4, X5-4, or X6-4 Exalytics Machine, you must use ILOM version 3.2.4.18 or later version.
>
> For the latest Exalytics certified ILOM versions, see the *Oracle Exalytics Certification Matrix*. The *Oracle Exalytics Certification Matrix* is located at:
>
> http://www.oracle.com/technetwork/middleware/ias/downloads/fusion-
> certification-100350.html

10. On the Summary Information screen, under **Actions**, click **Launch** to launch the Remote Console.

    The ILOM remote console is displayed.

11. Depending on the configuration of the Exalytics Machine, perform one of the following actions:

    - For X2-4 or X3-4 Exalytics Machine, in ILOM version 3.1.2.24.d, from the menu bar, select **Devices**, then **CD-ROM Image** to link the Oracle VM Server 3.2.9 upgrade image (Exalytics_2.2.0.0.0_Upgrade_OVS-3.2.9-751_<DATE>.iso) as a remote virtual CD-ROM in ILOM.

    - For X4-4, X5-4, or X6-4 Exalytics Machine, in ILOM version 3.2.4.18, from the menu bar, select **KVMS**, then **Storage**. Click **Add** to link to the Oracle VM Server 3.2.9 upgrade image (Exalytics_2.2.0.0.0_Upgrade_OVS-3.2.9-751_<DATE>.iso) as a remote virtual CD-ROM in ILOM. Click **Connect**.

12. In the left pane of the ILOM, expand **Host Management**, then click **Host Control**. In the **Next Boot Device** list, select **CDROM**, then click **Save**.

13. Restart the machine by expanding in the left pane of the ILOM, **Host Management**, then click **Power Control**. In the **Select Action** list, select **Power Cycle**, then click **Save**.

    The Exalytics Machine restarts and the CD Found screen is displayed.

14. Press **OK** to start the media test.

    The Media Check screen is displayed.

15. Press **Test** to test the CD in the drive.

    At the conclusion of the test, the Media Check Result screen is displayed.

16. Press **OK**.

    The Media Check screen is displayed.

17. Press **Continue**.

The Keyboard Selection screen is displayed.

18. Select the model keyboard attached to the Exalytics Machine, and click **OK**.

The OVS EULA screen is displayed.

19. Press **Accept**.

The System to Upgrade screen is displayed.

20. Select the currently installed Oracle VM Server, and press **OK**.

The Upgrade Boot Loader Configuration screen is displayed.

21. Select **Skip updating boot loader configuration**, and press **OK**.

22. Press **OK**.

23. Confirm the upgrade completes successfully, and then press **Reboot**.

The Exalytics Machine restarts.

24. Perform the following steps to rediscover the upgraded Oracle VM Server:

    a. Connect to Oracle VM Manager.

    b. Select the **Servers and VMs** tab.

    c. In the left pane, expand **Server Pools**, and then **exalytics_server_pool**.

    d. Right-click the Exalytics Machine and select **Rediscover Server**.

    e. Enter the following information for the server:

    - Oracle VM Agent Port. The default port number is 8899.

    - Oracle VM Agent Password. The default password is "oracle".

    - IP Address.

    f. Click **OK**.

    For more information, see "Section 6.10.7 Stopping Oracle VM Servers" in *Oracle VM User's Guide for Release 3.2*.

25. Upgrade Oracle VM Server 3.2.9 to Oracle VM Server 3.3.3. For more information, see "Upgrading Oracle VM Server 3.2.9 to Oracle VM Server 3.3.3".

3.5.2.2 Upgrading Oracle VM Server 3.2.9 to Oracle VM Server 3.3.3

> **Note:**
>
> If you are running Oracle VM Server 3.0.3 (Base Image 2.0.1.1) or a version prior to Oracle VM Server 3.2.9, go to "Upgrading Oracle VM Server 3.0.3 (Base Image 2.0.1.1) or later version to Oracle VM Server 3.2.9".

To upgrade Oracle VM Server 3.2.9 to Oracle VM Server 3.3.3, complete the following procedures:

Prerequisites:

1. Upgraded to Oracle VM Server 3.2.9.

2. Before you upgrade Oracle VM Server, ensure that you have upgraded Oracle VM Manager.

3. If there are any RAID devices configured in OVS 3.2.9, complete the following steps to restore the RAID device after upgrade:

   a. Ensure that the RAID is configured:

      i. To check the configured devices, run the following command:

      ```
      # mdadm --detail --scan
      ```

      ii. To verify the contents of the mdamd.conf file, run the following command:

      ```
      # cat /etc/mdadm.conf
      ```

      The output looks similar to the following:

      ```
      ARRAY /dev/md2 level=raid1 num-devices=2 metadata=0.90
      UUID=ce2fa269:741add38:3862df88:521ea08a
      minimum_kernel_version=2.6.39-400.215.9.el6uek
      ```

      iii. Add the missing entries in the mdamd.conf file, if any.

   b. To backup the mdamd.conf file, run the following command:

      ```
      # cp /etc/mdadm.conf /etc/mdadm.conf_bfr_bkup
      ```

      This ensures that the mdadm.conf entry is available after the upgrade.

To upgrade Oracle VM Server 3.2.9 to Oracle VM Server 3.3.3:

1. Navigate to My Oracle Support and download the OVM Server 3.3.3 iso file: Patch number 22546910. The patch contains the Exalytics_2.2.0.0.0_X5-4_OVS3.3.3_01082016.iso file.

2. Mount the iso file to a temporary directory, by running the following commands:

   ```
   # mkdir /tmp/ovs-mount
   ```

   ```
   # mount -o loop Exalytics_2.2.0.0.0_X5-4_OVS3.3.3_01082016.iso /tmp/ovs-mount
   ```

3. Copy the mounted files to a location under the /var/www directory, by running the following commands:

   ```
   # mkdir /var/www/repos
   ```

   ```
   # cp -rp /tmp/ovs-mount/* /var/www/repos/
   ```

4. Run the following commands:

   ```
   # cd /var/www/repos/Server
   ```

   ```
   #createrepo .
   ```

5. Are there any non-native packages?

   No: Go to the step 6.

   Yes: Complete the steps in the following section.

   If you have non-native packages:

   If there are non-native packages detected then the upgrade script displays an error message. The error message looks similar to the following:

   ```
   Wed Feb 24 05:30:29 2016 INFO: Checking servers for non-native packages (those
   installed after initial server installation)
   Wed Feb 24 05:30:30 2016 INFO: Non-native package status://
   Wed Feb 24 05:30:30 2016 INFO: Non-native package Status in 3.3_ovs_repoWed Feb
   ```

```
24 05:30:30 2016 INFO: ---------------------------- ----------------------
Wed Feb 24 05:30:30 2016 INFO: Lib_Utils ERROR: Missing package!
Wed Feb 24 05:30:30 2016 INFO: MegaCli ERROR: Missing package!
Wed Feb 24 05:30:30 2016 INFO: QConvergeConsoleCLI ERROR: Missing package!
Wed Feb 24 05:30:30 2016 INFO: autofs ERROR: Missing package!
Wed Feb 24 05:30:30 2016 INFO: exalogic.tools ERROR: Missing package!
Wed Feb 24 05:30:30 2016 INFO: exalytics-flash ERROR: Missing package!
Wed Feb 24 05:30:30 2016 INFO: hesiod ERROR: Missing package!
Wed Feb 24 05:30:30 2016 INFO: infiniband-diags ERROR: Missing package!
Wed Feb 24 05:30:30 2016 INFO: ipmiflash ERROR: Missing package!
Wed Feb 24 05:30:30 2016 INFO: ipmitool ERROR: Missing package!
Wed Feb 24 05:30:30 2016 INFO: libibmad ERROR: Missing package!
Wed Feb 24 05:30:30 2016 INFO: libibumad ERROR: Missing package!
```

    a. Run the following commands to remove the additional packages:

```
# rpm -e ovsvf-config-1.0-10 exalogic.tools sas_snmp openib hesiod
Lib_Utils MegaCli QConvergeConsoleCLI autofs

# rpm -e --nodeps hesiod
```

    b. To run the update script, run the following command:

```
# /u101/app/oracle/ovm-manager-3/ovm_tools/bin/UpgradeServers.py -v
<server>
```

    Where, <server> is the server that you want to update.

    c. The script displays a confirmation message. Type **Yes** to continue with the upgrade script.

    d. Apply the patch (file: p20431965_20001_Linux-x86-64.zip) that is downloaded with the OVM Server 3.3.3 iso file: Patch number 22546910. For information about how to apply the patch, see the readme file that is provided in the OVM Server 3.3.3 iso file.

6. To go the repos directory, run the following command:

```
# cd /var/www
```

7. To start the http server, run the following command:

```
# python -m SimpleHTTPServer 80
```

8. Perform the following steps to configure the Yum repositories in OVM:

    a. Connect to Oracle VM Manager.

    b. Select **Tools and Resource** > **Click Server Update Groups**.

    c. In the left pane, click **GlobalX86ServerUpdate Configuration** and select the **+** icon to add the transitional repository.

    d. Enter the following information for the server:

       - Name: 3.3_trans_repo.

       - Repository Name: 3.3_trans_repo.

       - URL: http://example.com/repos/Transition.

       - Enabled: select the check box.

       - Package Signature Key: From the drop-down list, select **None**.

    e. Click **OK**.

The transitional repository is created.

f. In the left pane, select the **+** icon to add the update repository.

g. Enter the following information for the server:

- Name: 3.3_ovs_repo.

- Repository Name: 3.3_ovs_repo.

- URL: http://example.com/repos/Server.

- Enabled: select the check box.

- Package Signature Key: From the drop-down list, select **None**.

h. Click **OK**.

The update repository is created.

9. Start the OVM server update:

```
# /u01/app/oracle/ovm-manager-3/ovm_tools/bin/UpgradeServers.py -v <server>
```

Where, <server> is the server that you want to update.

10. When prompted to enter the OVM username, enter **admin**.

11. When prompted to enter the OVM password, enter **password**.

Post installation: If there were any RAID devices configured before the upgrade, complete the following steps to restore the RAID devices:

1. Go to the mdamd.conf file and delete the following entry:

```
DEVICE /no/device
```

2. To copy the contents of the previous setup to the current mdadm.conf file, run the following command:

```
# cat /etc/mdadm.conf_bfr_bkup >> /etc/mdadm.conf
```

3. Restart the server and ensure that the RAID devices are available with the previous partitions and data.

3.6 Applying the Oracle Exalytics Release 2.1 Upgrade on a Virtualized Environment

This section consists of the following topics:

- Upgrading Exalytics Base Image for Oracle VM to 2.2.0.0.0
- Upgrading Oracle VM Guest to 2.2.0.0.0
- Creating Oracle VM Guest 2.2.0.0.0

3.6.1 Upgrading Exalytics Base Image for Oracle VM to 2.2.0.0.0

You upgrade the Exalytics Base Image for Oracle VM 2.2.0.0.0 by applying the upgrade patch on Oracle VM Server. The patch upgrades the Base Image to 2.2.0.0.0, installs Flash drivers and utilities.

> **✎ Note:**
>
> This step is mandatory for all Exalytics virtualized servers when installing Release 2.1.0.0.0.

To upgrade Oracle Exalytics Base Image for Oracle VM to 2.2.0.0.0:

1. Navigate to My Oracle Support and download patch number 20431965: Patchset Upgrade Utility for Exalytics Base Image 2.2.0.0.0 Oracle VM for Linux x86-64. The patch contains the p20431965_20001_Linux-x86-64.zip file.

   The zipped file contains Flash drivers and Flash configuration scripts.

2. Log on to the Exalytics Machine as the root user.

3. Extract the contents of the file into an appropriate directory on the Exalytics Machine.

4. Unzip the file into a temporary (/tmp) directory.

   The following directory is created:

   exalytics_ovs_server_base_image_2.2.0.0.0.ovs-3.3.3

5. Navigate to the directory by entering the following command:

   ```
   # cd exalytics_ovs_server_base_image_2.2.0.0.0.ovs-3.3.3
   ```

6. To upgrade the Base Image to 2.2.0.0.0 and to install Flash, enter the following command:

   ```
   # /update.sh
   ```

   The output looks similar to the following:

   ```
   current_kernel_version=2.6.39-400.215.9.el6uek
   minimum_kernel_version=2.6.39-400.215.9.el6uek

   OS Version check passed..
   Update to 2.2.0.0.0.ovs-3.3.3 starting at DAY-DD-MM-YYYY HR:MIN:SEC
   Removing unnecessary packages...
   Skipping removing rpm kernel-ib-devel as it doesn't exist...

   Skipping removing rpm kernel-ib as it doesn't exist...
   Skipping removing rpm ibvf-config as it doesn't exist...
   Removing RPM OpenIPMI-tools ...
   Done

   Running new install steps...
   Preparing...              ############################################# [100%]
   exalogic.tools            ############################################# [100%]
   -------------------------------------------------------

           Successfully installed exalogic.tools


   -------------------------------------------------------
   .....[exalogic.tools] := Post Transaction called..............
   Running update...
   Applying libibumad
   Preparing...              ############################################# [100%]
   libibumad                 ############################################# [100%]
   ```

```
Preparing...               ################################################## [100%]
libibmad                   ################################################## [100%]
Preparing...               ################################################## [100%]
openib                     ################################################## [100%]
Preparing...               ################################################## [100%]
opensm-libs                ################################################## [100%]
opensm                     ################################################## [100%]
error: Failed dependencies:
infiniband-diags is needed by ovsvf-config-1.0-10.noarch

Preparing...               ################################################## [100%]
infiniband-diags           ################################################## [100%]
Preparing...               ################################################## [100%]
exalytics-flash            ################################################## [100%]
postInstall (exalytics-flash) 1 ...
[EXALYTICS_INFO:GENERAL] Updating exalytics-flash-config file to set
FLASH_INSTALL_TYPE=OVS ...
postInstall (exalytics-flash) 1; done
Preparing...               ################################################## [100%]
Installing....
Lib_Utils                  ################################################## [100%]
MegaCli                    ################################################## [100%]
Preparing...               ################################################## [100%]
hesiod                     ################################################## [100%]
autofs                     ################################################## [100%]
sas_snmp                   ################################################## [100%]
Starting snmpd
Starting snmpd: [  OK  ]

Registering Service lsi_mrdsnmpd
Starting LSI SNMP Agent
Starting LSI SNMP Agent:LSI MegaRAID SNMP Agent Ver 3.18.0.2 (Oct 30th, 2012)
Started
[  OK  ]
Preparing...               ################################################## [100%]
policycoreutils-1.33.12-14.8.el6
oracle-hmp-libs            ################################################## [100%]
oracle-hmp-hwmgmt          ################################################## [100%]
/usr/sbin/semanage: SELinux policy is not managed or store cannot be accessed.
ipmiflash                  ################################################## [100%]
ipmitool                   ################################################## [100%]

mstflint                   ################################################## [100%]
oracle-hmp-snmp            ################################################## [100%]
oracle-hmp-tools           ################################################## [100%]
oracle-hmp-tools-biosconfig################################################## [100%]
oracle-hmp-tools
ubiosconfig                ################################################## [100%]
QConvergeConsoleCLI        ################################################## [100%]
Preparing...               ################################################## [100%]
package glibc-common-2.5-123.0.1.el6_11.1.x86_64 is already installed
package glibc-2.5-123.0.1.el6_11.1.x86_64 is already installed
package glibc-2.5-123.0.1.el6_11.1.i686 is already installed
package nscd-2.5-123.0.1.el6_11.1.x86_64 is already installed

Removing bm flash scripts...
Running post install script...
Running post patch script

Setting SET_IPOIB_CM=yes
file /etc/sysconfig/network-scripts/ifcfg-bondib0 not found
```

```
/usr/lib/init-exalogic-node/init-ipoib.sh not exist in /etc/rc.local , nothing to
delete
Completed post patch script

Enabling services...
Updating dom0 memory to 16G..
Copying Exa* files...
Updating imageinfo...
Image name in imageinfo is already uptodate
finished; DAY-DD-MM-YYYY HR:MIN:SEC
finished; DAY-DD-MM-YYYY HR:MIN:SEC
```

7. To verify that the upgrade was successful, enter the following command:

```
# imageinfo
```

The output looks similar to the following:

```
Exalytics 2.2.0.0.0.ovs-3.3.3 (build:r20150409.1)

Image version : 2.2.0.0.0.ovs-3.3.3
Image build version : 20150409.1
Creation timestamp : DAY-DD-MM-YYYY HR:MIN:SEC
Kernel version : 2.6.39-400.215.9.el6uek
Image activated : DAY-DD-MM-YYYY HR:MIN:SEC
Image status : SUCCESS
```

8. To verify that Flash is installed and the number of Flash cards installed, enter the following command for X2-4, X3-4, and X4-4 configurations:

```
# ddcli
```

For an X4-4 configuration, three Flash cards are displayed. For an X2-4 or X3-4 configuration, six Flash cards are displayed. The output looks similar to the following:

```
***************************************************************************
LSI Corporation WarpDrive Management Utility
Version 107.00.00.04 (2012.06.05)
Copyright (c) 2011 LSI Corporation. All Rights Reserved.
***************************************************************************

ID    WarpDrive      Package Version    PCI Address
--    ---------      ---------------    -----------
 1    ELP-4x100-4d-n    06.05.09.00     00:11:00:00
 2    ELP-4x100-4d-n    06.05.09.00     00:21:00:00
 3    ELP-4x100-4d-n    06.05.07.00     00:31:00:00
 4    ELP-4x100-4d-n    06.05.07.00     00:a1:00:00
 5    ELP-4x100-4d-n    06.05.01.00     00:c1:00:00
 6    ELP-4x100-4d-n    06.05.01.00     00:d1:00:00
```

To view the list of Flash cards in an X5-4 or X6-4 configuration, enter the following command:

```
#nvmeadm list
```

The output appears as follows:

```
SUNW-NVME-1
SUNW-NVME-2
SUNW-NVME-3
```

3.6.2 Upgrading Oracle VM Guest to 2.2.0.0.0

You can either upgrade Oracle VM Guest to 2.2.0.0.0 or create Oracle VM Guest 2.2.0.0.0. See Creating Oracle VM Guest 2.2.0.0.0.

> **Note:**
>
> You can only upgrade Oracle VM Guest on the same Linux operating system. For example, you cannot upgrade Oracle VM Guest that is installed on a Linux 5 operating system to Oracle VM Guest 2.2.0.0.0 that is installed on a Linux 6 operating system.

You upgrade Oracle VM Guest to 2.2.0.0.0 by applying the patch on each Oracle VM Guest in your system. The patch upgrades Oracle VM Guest to 2.2.0.0.0.

> **Note:**
>
> You must apply the patch mentioned in this section on each Oracle VM Guest and not on Oracle VM Server.

To upgrade Oracle VM Guest to 2.2.0.0.0:

1. Navigate to My Oracle Support and download patch number 20618011:Upgrade Utility for Exalytics Virtualized Guest from 2.0.1.4.0 to 2.2.0.0.0 that contains the p20618011_10060_Linux-x86-64.zip file.

2. Log in to Oracle VM Guest as the root user.

3. Using FTP, navigate to a temporary (/tmp) directory on the Exalytics Oracle VM Guest.

4. Enter the following commands to navigate to the /tmp directory and unzip the zip file:

   ```
   # cd/tmp
   ```

   ```
   # unzip p20618011_10060_Linux-x86-64.zip
   ```

5. Disable all existing yum repositories (if any), by performing the following actions:

   a. Enter the following command to check for any existing repositories:

   ```
   Check /etc/yum/repos.d/ directory
   ```

   b. Set enabled=0 for each existing repository.

6. Enter the following command to run the upgrade script:

   ```
   # ./update.sh
   ```

7. Restart Oracle VM Guest from Oracle VM Manager.

8. Enter the following commands to verify the current RPM versions:

   - ```
     # uname - rm
     ```

The output looks similar to the following:

```
2.6.39-400.248.3.el6uek x86_64
```

- `# cat /etc/oracle-release`

  The output looks similar to the following:

```
Oracle Linux Server release 6.6
```

9. To verify that the upgrade was successful, enter the following command:

```
# imageinfo
```

- For the Linux 6 operating system, the output looks similar to the following:

```
Exalytics 2.2.0.0.0.el6 (build:r04102015.1)
Image version : 2.2.0.0.0.el6
Image build version : 04102015.1
Creation timestamp : DAY-DD-MM-YYYY HR:MIN:SEC
Kernel version : 2.6.39-400.248.3.el6uek
Image activated : DAY-DD-MM-YYYY HR:MIN:SEC
Image status : SUCCESS
```

3.6.3 Creating Oracle VM Guest 2.2.0.0.0

> **Note:**
>
> You can ignore this section if you have upgraded Oracle VM Guest to 2.2.0.0.0. See Upgrading Oracle VM Guest to 2.2.0.0.0.

This section consists of following topics:

- "Downloading VM Templates"
- "Importing VM Templates into Oracle VM Manager"
- "Creating Virtual Machines from VM Template"

Downloading VM Templates

To install and configure Oracle VM Guest 2.2.0.0.0, you must download the latest VM templates.

To download VM templates:

1. Navigate to the Oracle Software Delivery Cloud web site at the following link:

   http://edelivery.oracle.com

2. In the Select a Product Pack list, select **Oracle Business Intelligence**.

3. In the Platform list, select **Linux X86-64**.

4. Click **Go**.

5. Select **Oracle Exalytics Software Media Pack for Linux x86-64 (Release 2.0.0.0).**

6. Click **Continue**.

7. To install VM template on a Linux 6 operating system, download the template Oracle Exalytics Oracle VM Template 2.2.0.0.0.el6, Part Number: V76309-01.

8. Save the template on a web server.

Importing VM Templates into Oracle VM Manager

After downloading the templates, you import them into Oracle VM Manager.

To import VM templates into Oracle VM Manager:

1. Log on to Oracle VM Manager.

2. Select the **Repositories** tab.

3. In the left pane, select the Repository in which you want to store the template.

4. Select **VM Templates**.

5. In the toolbar, click **Import VM Template** to display the Import VM Template dialog.

6. Select the Oracle VM Server and enter the URL or FTP server to the VM template that you downloaded on the web server.

7. Click **OK** to import the VM template.

Creating Virtual Machines from VM Template

After importing the template in Oracle VM Manager, you use the template to create virtual machines.

Before you create virtual machines, keep the following guidelines in mind:

• Ensure that Hyperthreading is disabled on Oracle VM Server.

> **Note:**
>
> Oracle recommends that Hyperthreading be disabled when creating new virtual machines.

• Maximum number of virtual machines you can create for a non-InfiniBand configuration on an X2-4, X3-4, X4-4, X5-4, and X6-4 Exalytics Machine is ten.

• Total virtual processors (vCPUs) you can assign on Oracle VM Server for an X2-4, X3-4, X4-4, X5-4, and X6-4 Exalytics Machine is ten.

• Total memory you can allocate on Oracle VM Server for an X2-4, X3-4, X4-4, X5-4, and X6-4 Exalytics Machine is 16 GB.

• Review Table 3-2 for the total vCPUs and memory you can allocate on all virtual machines and the maximum vCPUs and memory you can allocate to each virtual machine.

Table 3-2   Total and Maximum vCPUs and Memory Allowed For Virtual Machines

System	Total vCPUs for all Virtual Machines	Maximum vCPUs for each Virtual Machine	Total RAM for all Virtual Machines	Maximum RAM for each Virtual Machine
X2-4	40	28	984 GB	800 GB
X3-4	40	28	984 GB	800 GB
X4-4	60	28	1984 GB	800 GB
X5-4	72	28	1984 GB	800 GB
X6-4	72	28	1984 GB	800 GB

> **Note:**
>
> For the X2-4 and X3-4 Exalytics Machine, total memory on Oracle VM Server (Dom0) (16 GB) and all virtual machines (984 GB) cannot exceed 1000 GB. For the X4-4, X5-4, and X6-4 Exalytics Machine, total memory on Oracle VM Server (Dom0) (16 GB) and all virtual machines (1984 GB) cannot exceed 2000 GB.

To create virtual machines from the VM template:

1. Select the **Servers and VMs** tab.

2. Log on to Oracle VM Manager.

3. In the left pane toolbar, click **Create Virtual Machine**.

   The Create Virtual Machine dialog is displayed.

4. Select **Clone from an existing VM Template**.

5. Perform the following steps:

   a. In the Clone Count list, select the number of machines you want to clone.

   b. In the Repository list, select a repository for the machine.

   c. In the VM Template list, select the VM template from which you want to create the virtual machine.

   d. Enter a name for the virtual machine.

   e. In the Server Pool list, select a server pool.

   f. Enter a description for the virtual machine.

6. Click **Finish**.

   The virtual machine is created and is ready to be configured.

   To configure and start a virtual machine, configure a network on a virtual machine, and configure SWAP on a virtual machine, see Maintaining Virtual Machines.

> **Note:**
>
> When you start the virtual machine for the first time, the virtual machine takes approximately fifteen minutes to initialize.

For more information, see "Chapter 7, Managing Virtual Machines" in *Oracle VM User's Guide for Release 3.2.*

3.7 Configuring Flash on an Exalytics Machine Configured for Virtualization

This section is applicable only for the following customers who have Flash storage:

- Customers running Exalytics X3-4, X4-4, X5-4, or X6-4 machines
- Customers running Exalytics X2-4 machines with Upgrade kits (Flash Upgrade Kit *or* Memory and Flash Upgrade Kit

> **Note:**
>
> The following customers can ignore this section:
>
> – Oracle Exalytics X2-4 customers who do not have Upgrade kits (Flash Upgrade Kit or Memory and Flash Upgrade Kit).
>
> – Oracle Exalytics X3-4 or X2-4 customers with Upgrade kits who have already configured Flash.
>
>   To verify that you have already configured Flash, navigate to Oracle VM Manager and confirm that the names of the Flash drives in Oracle VM Manager are the same as the names specified in the FlashDriveMappings file.

This section consists of the following topics:

- Configuring Flash on Oracle VM Server on X2-4, X3-4, and X4-4 Machines
- Configuring RAID1 for Flash in Oracle Virtual Machine on X2-4, X3-4, and X4-4 Machines
- Configuring RAID1 for Flash in Oracle VM Server on X5-4 and X6-4 Machines

3.7.1 Configuring Flash on Oracle VM Server on X2-4, X3-4, and X4-4 Machines

The Flash Card information for X2-4, X3-4, and X4-4 Exalytics Machine is described in the following section:

- Each X2-4 and X3-4 Exalytics Machine contains six 400 GB Flash cards. Each Flash card contains four 100 GB drives, for a total of 24 individual drives with a capacity of 2400 GB.

- Each X4-4 Exalytics Machine contains three 800 GB Flash card. Each Flash card contains four 200 GB drives, for a total of 12 individual drives with a capacity of 2400 GB.

You next configure Flash to enable names of the Flash drives on Oracle VM Server to be read by Oracle VM Manager.

> **Note:**
>
> Before Oracle Exalytics X2-4 customers with Flash Upgrade kits can configure Flash, they must have Oracle Field Services engineers install six Flash cards on the Exalytics Machine being used for virtualization.

To configure Flash on Oracle VM Server:

1. Log on to the Exalytics Machine as the root user.

2. To create a FlashDriveMappings file, enter the following command:

   ```
   # /opt/exalytics/bin/exalytics_flashovsrepos.sh -script > ~/flashDriveMappings
   ```

   The FlashDriveMappings file extracts the names of the Flash drives on Oracle VM Server into a text file.

3. Navigate to the /root directory to view the text file.

4. On Oracle VM Server, copy the FlashDriveMappings file to the */opt/exalytics/bin/exalytics_ovm_scripts/* folder and then tar the FlashDriveMappings file by entering the following commands:

   ```
   # cd /opt/exalytics/bin/
   ```

   ```
   # tar -cvf exalytics_ovm_scripts.tar exalytics_ovm_scripts/
   ```

5. Copy the tar file to the machine where Oracle VM Manager is installed.

6. Connect to machine where Oracle VM Manager is installed.

7. Navigate to the directory where you copied the scripts and the FlashDriveMappings file.

8. To untar the file, enter the following command:

   ```
   # tar -xvf exalytics_ovm_scripts.tar
   ```

9. To confirm that the "expect" package is available, enter the following command:

   ```
   # rpm -qa | grep expect
   ```

   If the "expect" package is not available, install it before proceeding to Step 10.

10. To rename the Flash drives in Oracle VM Manager, navigate to the exalytics_ovm_scripts folder and enter the following command:

    ```
    # ./exalytics_ovm_rename_flash.sh <path_to _flashmappingfile> <Oracle VM
    Manager Username> < Oracle VM Manager Password>
    <Exalytics_Machine_Configuration>
    ```

    where Exalytics_Machine_Configuration is x2-4, x3-4, x4-4, x5-4, or x6-4.

    The names of the Flash drives in Oracle VM Manager now appears the same as the names specified in the FlashDriveMappings file.

11. Attach the Flash drives to Oracle VM Manager by performing the following tasks:

    a. In Oracle VM Manager, select the **Server and VMs** tab.

    b. In the left pane, select the server pool on which the virtual machine resides.

    c. From the Perspective list, select **Virtual Machines**.

    d. In the Management pane, select a virtual machine.

    e. In the toolbar, click **Edit**.

       The Edit Virtual Machine dialog is displayed.

    f. Click the **Disks** tab.

    g. Under Disk Type, select **Physical Disk**.

    h. Under Actions, select **Select a Virtual Machine Disk**.

       Select a Physical Disk page is displayed.

    i. Select the Flash card you want to attach to Oracle VM Guest Machine, and click **OK**.

    j. Repeat the previous step to attach other Flash cards to Oracle VM Guest Machine.

12. In Oracle VM Manager, select the **Servers and VMs** tab.

13. In the left pane, expand **Server Pools**, and then select **exalytics_server_pool**.

14. From the Perspective list, select **Virtual Machines**.

15. In the Management pane, select a virtual machine.

16. Click the expand arrow to the left of the selected virtual machine.

17. Click the **Disks** tab.

18. Confirm that the Flash drives attached to Oracle VM Guest Machine are displayed.

3.7.2 Configuring RAID1 for Flash in Oracle Virtual Machine on X2-4, X3-4, and X4-4 Machines

RAID Level 1 is usually referred to as mirroring. RAID Level 1 duplicates data from one drive on a second drive so that if either drive fails, no data is lost. This is useful when reliability is more important than data storage capacity.

The following procedure assumes you have attached the Flash drives to Oracle VM Manager.

> ✏️ **Note:**
>
> In this example, RAID1 is configured for two (xvdb and xvdc) Flash drives that are on two different Flash cards. Depending on your configuration, you can configure RAID1 for a different number of Flash drives.

Prerequisite: Download and install the patch 21876196 from My Oracle Support on the OVM Server (Dom0):

1. Connect as a root user to the Oracle Virtual Machine to which you attached the Flash drives.

2. To Install the mdadm package onto the OVM Server, complete the following steps:

   a. Download p21876196_20000_Linux-x86-64.zip.

      My Oracle Support Patch number: 19405370.

   b. Copy p21876196_20000_Linux-x86-64.zip to the OVM Server temporary (/tmp) directory.

   c. Unzip the p21876196_20000_Linux-x86-64.zip file to /tmp/p21876196.

   d. Enter the following command:

      ```
      # cd /tmp/p21876196
      ```

   e. Enter the following command to install the rpms:

      ```
      # rpm -Uvh --nosignature /tmp/patch/rpms/*rpm
      ```

   f. Restart the OVM server.

To backup and remove RAID1 on the OVM guest:

1. Backup data on the existing RAID:

   a. Start the OVM Guest.

   b. Connect as a root user.

   c. Stop any running services.

   d. Stop auto start of services, if enabled. The device will not be available when the OVM Guest is started.

   e. Enter the following command:

      ```
      cd /u02
      ```

   f. To backup the data to a location other than the RAID, which has enough storage to hold all the data, enter the following command:

      ```
      tar -cvf /tmp/u02_data.tar *
      ```

2. To unmount the RAID, enter the following command:

   ```
   umount /u02
   ```

3. Remove auto mount from /etc/fstab:

   a. To backup the existing /etc/fstab, enter the following command:

      ```
      cp /etc/fstab /etc/fstab.ori
      ```

   b. In /etc/fstab, search for the line containing "/u02".

   c. Note the first column of the line, for example "/dev/md2".

   d. Delete or comment out the line containing "/u02".

   e. Save the /etc/fstab file.

4. Remove the RAID:

   a. To backup the existing /etc/mdadm.conf, enter the following command:

      ```
      cp /etc/mdadm.conf /etc/mdadm.conf.ori
      ```

   b. In the /etc/mdadm.conf file, search for the line containing "/dev/md2".

c. Delete or comment out the following lines:

```
mdadm --stop /dev/md2 mdadm --zero-superblock /dev/xvdb mdamd --zero-
superblock /dev/xvdc
```

5. Shutdown the OVM guest.

6. Remove the allocated flash drives from the OVM Guest, if allocated as physical drives:

   a. Login to the OVM manager.

   b. Edit the virtual machine.

   c. Go to the **Disk** tab.

   d. Find the physical disks that were used for the RAID and change **Disk Type** to **Empty**.

   e. Click **OK**. The changes are saved.

7. Remove the allocated flash drives from the OVM Guest, if allocated as virtual drives:

   a. Login to the OVM manager.

   b. Edit the virtual machine.

   c. Go to the **Disk** tab.

   d. Find the virtual disks that were used for the RAID and change **Disk Type** to **Empty**.

   e. Click **OK**. The changes are saved.

   f. Go to the **Repositories** tab.

   g. Highlight the repository used for the virtual drive and then delete the repository.

8. Reboot the OVM Server.

To create a RAID1 on the OVM Server and mount the RAID1 on an OVM Guest:

1. Connect as a root user to the Oracle Virtual Machine to which you attached the Flash drives.

2. Identify the Flash drives.

   For example: xvdb and xvdc

3. To configure RAID1 for the two Flash drives (xvdb and xvdc), enter the following command:

   ```
   # /sbin/mdadm --create /dev/md2 --level=1 --raid-devices=2 /dev/xvdb /dev/xvdc
   ```

4. To add the RAID1 configuration to the RAID configuration file, enter the following command:

   ```
   # mdadm --detail --scan --verbose >> /etc/mdadm.conf
   ```

   This enables the RAID configuration to be recognized when Oracle VM Manager restarts.

5. To create a file system on the new RAID1 device, enter the following command:

   ```
   # parted /dev/md2
   ```

6. Find the vm.cfg file which corresponds to the VM guest where the RAID is to be mounted:

   a. Login to the OVM manager.

   b. Select the **Repositories** tab and select the main repository for your system.

   c. Note the repository ID.

   d. Select the **Servers and VMs** tab.

   e. Edit the OVM Guest, select the configuration tab, and then note the VM ID.

   f. The vm.cfg file is located inside the directory with the repository ID number and VM ID number.

7. Add /dev/md2p1 to the vm.cfg file.

8. Start the OVM guest and mount device xvdb.

9. Add the following line to /etc/fstab on the OVM guest to remount the device when guest is restarted.

   ```
   # /dev/xvdb1 /u02 ext3 defaults 0 0
   ```

10. To restore the backup files, if a backup was created for the OVM guest, enter the following commands:

    ```
    # cd /u02 # tar -xvf /tmp/u02_data.tar
    ```

3.7.3 Configuring RAID1 for Flash in Oracle VM Server on X5-4 and X6-4 Machines

This procedure is valid only for Oracle VM Server 3.3.3 running on X5-4 and X6-4 machines.

> **Note:**
>
> - In this example, RAID1 is configured for two Flash drives that are on two different Flash cards. Depending on your configuration, you can configure RAID1 for a different number of Flash drives.
>
> - For a guest user, the OVM Manager web interface must not be used for flash configurations, like adding a virtual disk or physical disk.

Prerequisite: To create partitions on the Flash cards, if there are no existing partitions:

1. Enter the following command:

   ```
   # parted /dev/nvme0n1 mklabel gpt

   Warning: The existing disk label on /dev/nvme0n1 will be destroyed and all data
   on this disk will be lost. Do you want to continue?
   Yes/No? Yes
   Information: You may need to update /etc/fstabm.
   ```

2. Enter the following command:

```
# parted -a optimal /dev/nvme0n1 mkpart primary 0% 25% mkpart primary 25% 50%
mkpart primary 50% 75% mkpart primary 75% 100%

Information: You may need to update /etc/fstab.
```

3. To verify the created partitions, enter the following command:

```
# parted /dev/nvme0n1 print

Model: Unknown (unknown)
Disk /dev/nvme0n1: 1600GB
Sector size (logical/physical): 512B/512B
Partition Table: msdos
Number Start End Size Type File system Flags
1 1049kB 400GB 400GB primary
2 400GB 800GB 400GB primary
3 800GB 1200GB 400GB primary
4 1200GB 1600GB 400GB primary
```

4. Repeat steps 1 through 3 for all the flash drives. That is, for /dev/nvme1n1 and /dev/nvme2n1 to create four partitions on every flash drive.

To configure RAID1 for Flash in Oracle VM Server:

1. Connect as a **root** user to the Oracle VM Server to which you attached the Flash drives.

2. Identify the Flash drives.

   Select flash drives from two different flash controllers. For example, the flash cards are displayed as nvme1n1p1, nvme2n1p1. The values nvme1 and nvme2 indicate the controller. Select nvme1n1p1 and nvme2n1p1 for the RAID configuration.

3. To configure RAID1 for the two Flash drives (nvme1n1p1 and nvme2n1p1), enter the following command:

```
# /sbin/mdadm --create /dev/md1 --level=1 --raid-devices=2 /dev/
nvme1n1p1 /dev/nvme2n1p1

mdadm: /dev/nvme1n1p1 appears to be part of a raid array:
level=raid1 devices=3 ctime=Tue Nov 10 11:15:30 2015
mdadm: Note: this array has metadata at the start and
may not be suitable as a boot device. If you plan to
store '/boot' on this device please ensure that
your boot-loader understands md/v1.x metadata, or use
--metadata=0.90
mdadm: /dev/nvme2n1p1 appears to be part of a raid array:
level=raid1 devices=3 ctime=Tue Nov 10 11:15:30 2015
Continue creating array? yes
mdadm: Defaulting to version 1.2 metadata
mdadm: array /dev/md1 started.
```

4. To add the RAID1 configuration to the RAID configuration file, enter the following command:

```
# mdadm --detail --scan >> /etc/mdadm.conf
```

   This enables the RAID configuration to be recognized when Oracle VM Server restarts.

5. Edit `/etc/mdadm.conf` file and apply following changes:

   a. Remove the line with the entry: `# DEVICE /no/device`

   b. Add the following entries for `nvme` devices:

```
DEVICE /dev/nvme0n1p* /dev/nvme1n1p* /dev/nvme2n1p*
```

6. Create a partition on the new RAID1 device by entering the following command:

   ```
   # parted /dev/md1

   (parted) mklabel msdos
   (parted) mkpart primary 1MiB -1MiB
   (parted) unit s print (to validate partition was created correctly)
   (parted) quit
   ```

   The partition can range from 1 MiB to any GB value based on user needs.

   > **Note:**
   >
   > The command creates the /dev/md1p1 directory.

7. Find the `vm.cfg` file which corresponds to the VM Guest on which you want the RAID device to be mounted:

   a. Go to Oracle VM Manager.

   b. Select the **Repositories** tab and select the main repository for your system.

   c. Note the repository ID.

   d. Select the **Servers and VMs** tab.

   e. Edit the OVM Guest, select the **Configuration** tab, and note the VM ID.

      The `vm.cfg` file will be located under the directory with the repository ID number and VM ID number. It appears as `/OVS/Repositories/<repository ID number>/VirtualMachines/VM ID number/vm.cfg`.

8. Add the newly created partition `md1p1` to `vm.cfg`. This will create `/dev/xvdb` on the VM guest when the guest is started.

   > **Note:**
   >
   > Steps a through c below show a sample repository ID number and VM ID number. Your repository ID and VM ID number will be different and you will need to substitute the ID for your specific VM in the sample commands given as follows.

   a. Save the original `/OVS/Repositories/0004fb0000030000b25b4b2848c959f4/VirtualMachines/0004fb000006000043ee01db14c067f2/vm.cfg` to `vm.ori`.

   b. Edit the vm.cfg file using the following command:

      ```
      vi /OVS/Repositories/0004fb0000030000b25b4b2848c959f4/VirtualMachines/
      0004fb000006000043ee01db14c067f2/vm.cfg
      ```

   c. If a virtual disk is previously allocated, add or modify the following line (with highlighted text):

      ```
      disk = ['file:/OVS/Repositories/0004fb0000030000b25b4b2848c959f4/
      VirtualDisks/0004fb0000120000afd68c2d37f266a2.img,xvda,w', 'phy:/dev/
      md1p1,xvdb,w']
      ```

    d. If no other disk is previously allocated, add the following line:

```
disk = [ 'phy:/dev/md1p1,xvdb,w']
```

    e. Save a copy of the modified vm.cfg by entering the following command:

```
cp vm.cfg vm.cfg_PostFlash
```

9. Start the Oracle VM Guest and mount the device xvdb:

    a. Login to Oracle VM Guest as **root** user.

    b. Create a partition using the following command:

```
parted /dev/xvdb

(parted) mklabel msdos
(parted) mkpart primary 0 -1MiB
(parted) quit
```

    c. Format the partition using the following command:

```
mkfs -t ext3 /dev/xvdb1
```

    d. Create a new directory (/u02) by entering the following command, if it does not exist:

```
# mkdir -p /u02
```

    e. Mount the RAID1 on this directory by entering the following command:

```
# mount /dev/md2 /u02
```

10. Update the `/etc/fstab` on Oracle VM Guest to remount the device when guest is rebooted:

    a. Edit the `/etc/fstab` on Oracle VM Guest:

```
vi /etc/fstab
```

    b. Add the following line:

```
/dev/xvdb1/u02 ext3 defaults 0 0
```

> **Note:**
>
> • To attach another RAID device or increase the disk space for a guest user, repeat steps 1 through 10 for the different RAID devices.
>
> • For information about replacing a defective Flash Card on an X5-4 and X6-4 Exalytics Machine, see Replacing a Defective Flash Card on an X4-4, X5-4, or X6-4 Exalytics Machine..

3.8 Upgrading and Patching Application Software Components on an Exalytics Machine Configured for Virtualization

> **✎ Note:**
>
> This section is for existing Exalytics virtualization customers that are already running application software components. New Exalytics virtualization customers, proceed to Installing Software on an Exalytics Machine .

Depending on your deployment, upgrade and patch newly certified application software components for this release.

Before you upgrade and patch the application software components, ensure you are installing the latest Exalytics certified software application versions. See *Oracle Exalytics Certification Matrix* for the latest certifications. The *Oracle Exalytics Certification Matrix* is located at:

```
http://www.oracle.com/technetwork/middleware/ias/downloads/fusion-
certification-100350.html
```

The process of upgrading and patching application software components on virtual machines is similar to upgrading and patching them on the non-virtualized Exalytics Machine. For more information, see the following:

- "Download and Install Oracle BI EE 11.1.1.7.*x* or 11.1.1.9.0"
- "Download and Install Oracle Timesten"
- "Download and Install Oracle BI Applications"
- "Download and Install Oracle Endeca"

3.9 Post installation Instructions for Upgrading or Patching Oracle Business Intelligence Software

> **✎ Note:**
>
> This section is for existing customers that are upgrading or patching Oracle Business Intelligence software. New customers, proceed to Installing Software on an Exalytics Machine .

To ensure that Oracle Business Intelligence Enterprise Edition and Oracle TimesTen data type mapping and other optimizations are consistent and can be leveraged, you must complete post installation steps for the following Oracle Exalytics components:

- Oracle TimesTen In-Memory Database
- Oracle Business Intelligence Enterprise Edition

3.9.1 Oracle TimesTen In-Memory Database

This section contains the following topics:

- Configure Oracle TimesTen Checkpoint Frequency
- Other Post installation Steps

3.9.1.1 Configure Oracle TimesTen Checkpoint Frequency

To ensure Oracle Business Intelligence Enterprise Edition sets the Oracle TimesTen checkpoint frequency, perform the following configuration steps after upgrading Oracle TimesTen In-Memory Database. Failure to perform this configuration may adversely affect Oracle TimesTen performance.

To configure Oracle TimesTen checkpoint frequency:

1. Open the timesten-install-dir/info/sys.odbc.ini file.
2. Find the DSN entry for the schema used for Aggregate Persistence.
3. Do one of the following:

   - If you are loading data in Oracle TimesTen database using aggregate persistence, edit the three parameters as follows:
     – CkptFrequency=-1
     – CkptLogVolume=0
     – CkptRate=0

   - If you are loading data in Oracle TimesTen database without using aggregate persistence, use a different server DSN and edit the three parameters as follows:
     – CkptFrequency=30
     – CkptLogVolume=0
     – CkptRate=0

3.9.1.2 Other Post installation Steps

To complete other post installation steps in Oracle TimesTen:

1. Re-create existing datastores for Oracle TimesTen.
2. If you are installing Oracle Exalytics Release 2 on Oracle Exalytics Release 1 Patchset 5, then rebuild aggregates using the nqcmd utility. For more information, see "Creating and Persisting Aggregates for Oracle BI Server Queries" in *Metadata Repository Builder's Guide for Oracle Business Intelligence Enterprise Edition*.

3.9.2 Oracle Business Intelligence Enterprise Edition

This section contains the following topics:

- Edit the opmn.xml File

- Reinstall Oracle Business Intelligence Client Installer

3.9.2.1 Edit the opmn.xml File

For faster aggregation and better performance, Oracle recommends that you edit the opmn.xml file to include the appropriate elements. Ensure that you edit the opmn.xml file on each Exalytics Machine that is configured in a highly available clustered environment.

To edit the opmn.xml file to improve aggregation and performance:

1. Open the opmn.xml file (which is located in MW_HOME/instances/instance1/ config/OPMN/opmn).

2. Insert the following child elements under `<ias-component id="coreapplication_obis1" inherit-environment="true"><environment>`:

   a. `<variable id="ORACLE_BI_TT_DISABLE_REDO_LOGGING" value="1"/>`

      Creates faster aggregation.

   b. `<variable id="ORACLE_BI_TT_PARALLEL_INDEX_CREATION" value="1"/>`

      Creates indexes in parallel, thereby creating faster aggregation.

   c. `<variable id="ORACLE_BI_TT_BACKGROUND_CHECKPOINT_INTERVAL" value="6"/>`

      This BI Server controlled parameter determines the frequency of Oracle TimesTen datastores that are stored to disk (datastore persistence). The default value is every 10 seconds. The smaller the number of the "value", the more often Oracle TimesTen stores datastores to disk.

3. Stop and start the Notification Server.

   a. Go to the following directory that contains the OPMN command-line tool:

      MW_HOME/instances/instance1/bin

   b. Enter the following command:

      `./opmnctl stopall`

      Stops OPMN and all Oracle Business Intelligence system components.

   c. Enter the following command:

      `./opmnctl startall`

      Starts OPMN and all Oracle Business Intelligence system components.

3.9.2.2 Reinstall Oracle Business Intelligence Client Installer

For information about installing Oracle Business Intelligence Client Tools, see "Installing and Uninstalling Oracle Business Intelligence Client Tools" in *Installing and Configuring Oracle Business Intelligence*.

3.10 Instructions to Uninstall the Oracle Exalytics Release 2

If you experience any problems after upgrading, then Oracle recommends that you roll back all Oracle Exalytics component patches. Do not rollback one or two individual

component patches. Instructions for rollback are included in the component-specific ReadMe files.

If you encounter any issues while applying the upgrade, then contact the Oracle Support.

4

Installing and Configuring Oracle Exalytics Release 2.1 Non-Virtual Base Images on an Exalytics Machine

This chapter describes how to install and configure one of the following non-virtual base images for Oracle Exalytics Release 2.1:

- Base Image (2.0.0.1.el6) on a Linux 6 operating system

The instructions assumes you have knowledge of Linux administration, networking and Oracle Integrated Lights Out Manager (ILOM) concepts.

This chapter consists of the following sections:

- Prerequisites to Installing and Configuring Oracle Exalytics Release 2.1 Base Images (2.0.0.1.el6) on an Oracle Exalytics Machine
- Reconfiguring Existing RAID Configurations on the Exalytics Machine
- Installing Oracle Exalytics Release 2.1 Base Images (2.0.0.1.el6)
- Configuring Network on the Oracle Exalytics Release 2.1 Base Images (2.0.0.1.el6)
- Postinstallation Steps
- Installing Software on the Exalytics Machine

4.1 Prerequisites to Installing and Configuring Oracle Exalytics Release 2.1 Base Images (2.0.0.1.el6) on an Oracle Exalytics Machine

The following prerequisites must be met before you can install and configure an Oracle Exalytics Release 2.1 base image on an Exalytics Machine:

- The Exalytics Machine is configured with the base operating system at the factory.
- The Exalytics Machine has been racked and mounted in a data center.
- Network configuration is complete and the computer is accessible from the network.
- You have access to the internet from a computer (not necessarily the Exalytics Machine) to download required packages.

4.2 Reconfiguring Existing RAID Configurations on the Exalytics Machine

Depending on the configuration of the Exalytics Machine, reconfigure existing RAID configurations on the X2-4, X3-4, X4-4, X5-4 or X6-4 Exalytics Machine.

This section consists of the following topics:

- Reconfiguring Existing RAID Configurations on an X2-4 Exalytics Machine
- Reconfiguring Existing RAID Configurations on an X3-4 Exalytics Machine
- Reconfiguring Existing RAID Configuration on an X4-4 Exalytics Machine
- Reconfiguring Existing RAID Configuration on an X5-4 Exalytics Machine
- Reconfiguring Existing RAID Configuration on an X6-4 Exalytics Machine

4.2.1 Reconfiguring Existing RAID Configurations on an X2-4 Exalytics Machine

The X2-4 Exalytics Machine comprises six hard drives, each having a capacity of 600 GB. Two drives are configured as RAID1 and four drives are configured as RAID5. To optimize the use of the disk space, you must reconfigure the RAID1 and RAID5 configurations on the Exalytics Machine. Reconfigure the first two drives to create one RAID1 virtual drive and reconfigure the remaining drives to create one RAID5 virtual drive.

To reconfigure existing RAID configurations on the X2-4 Exalytics Machine:

1. Restart the Exalytics Machine using Integrated Lights Out Manager (ILOM).

2. Press **Ctrl+Y** and enter RAID CLI (Command Line Interface) as the Exalytics Machine is restarting.

> **Note:**
>
> The "Copyright LSI Logic Corporation" displays during the restart sequence when it is possible to enter the RAID CLI. Observe the screen carefully as the message displays for a very short time. This avoids restarting the machine again.

3. Enter the following MegaRAID command to delete the existing RAID configuration:

```
# -CfgLdDel -LALL -a0
```

4. Enter the following command to create a RAID1 partition of one virtual drive:

```
# -CfgLdAdd -r1[252:0, 252:1] WB Direct NoCachedBadBBU -a0
```

5. Enter the following command to create a RAID5 partition with the remaining drives:

```
# -CfgLdAdd -r5[252:2, 252:3, 252:4, 252:5] WB Direct NoCachedBadBBU -a0
```

6. In the left pane of the ILOM, expand **Host Management**, then select **Power Control**. In the **Select Action** list, select **Power Cycle**, then click **Save**.

   The Exalytics Machine restarts.

4.2.2 Reconfiguring Existing RAID Configurations on an X3-4 Exalytics Machine

The X3-4 Exalytics Machine comprises 6 hard drives, each having a capacity of 900 GB.Two drives are configured as RAID1 and four drives are configured as RAID5. To optimize the use of the disk space, you must reconfigure the RAID1 and RAID5 configurations on the Exalytics Machine. Reconfigure the first two drives to create one RAID1 virtual drive and reconfigure the remaining drives to create one RAID5 virtual drive.

To reconfigure existing RAID configurations on the X3-4 Exalytics Machine:

1. Restart the Exalytics Machine using Integrated Lights Out Manager (ILOM).

2. Press **Ctrl+Y** and enter RAID CLI (Command Line Interface) as the Exalytics Machine is restarting.

> **Note:**
>
> The "Copyright LSI Logic Corporation" displays during the restart sequence when it is possible to enter the RAID CLI. Observe the screen carefully as the message displays for a very short time. This avoids restarting the machine again.

3. Enter the following MegaRAID command to delete the existing RAID configuration:

   ```
   # -CfgLdDel -LALL -a0
   ```

4. Enter the following command to create a RAID1 partition of one virtual drive.

   ```
   # -CfgLdAdd -r1[252:0, 252:1] WB Direct NoCachedBadBBU -a0
   ```

5. Enter the following command to create a RAID5 partition with the remaining drives:

   ```
   # -CfgLdAdd -r5[252:2, 252:3, 252:4, 252:5] WB Direct NoCachedBadBBU -a0
   ```

6. In the left pane of the ILOM, expand **Host Management**, then select **Power Control**. In the **Select Action** list, select **Power Cycle**, then click **Save**.

   The Exalytics Machine restarts.

4.2.3 Reconfiguring Existing RAID Configuration on an X4-4 Exalytics Machine

The X4-4 Exalytics Machine comprises six hard drives, each having a capacity of 1.2 TB. Two drives are configured as RAID1 and four drives are configured as RAID5. To optimize the use of the disk space, you must reconfigure the RAID1 and RAID5 configurations on the Exalytics Machine. Reconfigure the first two drives to create one RAID1 virtual drive and reconfigure the remaining drives to create one RAID5 virtual drive.

To reconfigure existing RAID configurations on the X4-4 Exalytics Machine:

1. Restart the Exalytics Machine using Integrated Lights Out Manager (ILOM).

2. Press **Ctrl+Y** and enter RAID CLI (Command Line Interface) as the Exalytics Machine is restarting.

> **Note:**
>
> The "Copyright LSI Logic Corporation" displays during the restart sequence when it is possible to enter the RAID CLI. Observe the screen carefully as the message displays for a very short time. This avoids restarting the machine again.

3. Enter the following MegaRAID command to delete the existing RAID configuration:

   ```
   # -CfgLdDel -LALL -a0
   ```

4. Enter the following command to create a RAID1 partition of one virtual drive

   ```
   # -CfgLdAdd -r1[252:0, 252:1] WB Direct NoCachedBadBBU -a0
   ```

5. Enter the following command to create a RAID5 partition with the remaining drives:

   ```
   # -CfgLdAdd -r5[252:2, 252:3, 252:4, 252:5] WB Direct NoCachedBadBBU -a0
   ```

6. In the left pane of the ILOM, expand **Host Management**, then select **Power Control**. In the **Select Action** list, select **Power Cycle**, then click **Save**.

   The Exalytics Machine restarts.

4.2.4 Reconfiguring Existing RAID Configuration on an X5-4 Exalytics Machine

The X5-4 Exalytics Machine comprises six hard drives, each having a capacity of 1.2 TB. Two drives are configured as RAID1 and four drives are configured as RAID5. To optimize the use of the disk space, you must reconfigure the RAID1 and RAID5 configurations on the Exalytics Machine. Reconfigure the first two drives to create one RAID1 virtual drive and reconfigure the remaining drives to create one RAID5 virtual drive.

To reconfigure existing RAID configurations on the X5-4 Exalytics Machine:

1. Restart the Exalytics Machine using Integrated Lights Out Manager (ILOM).

2. At the prompt, *Press Ctrl><R> for WebBIOS...* , press **Ctrl+Y** to access the LSI MegaRAID utility as the Exalytics Machine is restarting.

> **Note:**
>
> Observe the screen carefully as the Press Ctrl><R> for WebBIOS... .message displays for a very short time. This avoids restarting the machine again.

The Virtual Drive Management screen is displayed.

3. Delete the existing RAID configuration, by performing the following actions:

   a. Select the first virtual drive and Press **F2**.

   b. Select **Delete VD**.

   c. At the prompt, Press **Yes**.

   d. Repeat the above steps (a to c) to delete the second drive.

4. Create a RAID1 partition of one virtual drive, by performing the following actions:

   a. On the Virtual Drive Management screen, select **LSI MegaRAID**, press **F2**, and then select **Create Virtual Drive**.

      The Create New VD screen is displayed

   b. In the RAID Level drop down field, select **RAID1**.

   c. Select the first two drives (00 and 01).

   d. Under Basic Settings, accept the default size of the configuration.

   e. Select **Advanced**.

      The Create Virtual Drive-Advanced screen is displayed.

   f. Select **Initialize**, and then select **OK**.

      The "Initialization complete on VD 0" message is displayed.

   g. Select **OK**.

      The Virtual Drive Management screen displays the RAID1 partition created of the two drives.

5. Create a RAID5 partition with the remaining drives, by performing the following actions:

   a. On the Virtual Drive Management screen, select **LSI MegaRAID**, press **F2**, and then select **Create Virtual Drive**.

      The Create New VD screen is displayed.

   b. In the RAID Level drop down field, select **RAID5**.

   c. Select the four drives (02, 03, 04, 05).

   d. Under Basic Settings, accept the default size of the configuration.

   e. Select **Advanced**.

   f. Select **Initialize**, and then select **OK**.

      The "Initialization complete on VD 2" message is displayed.

   g. Select **OK**.

      The Virtual Drive Management screen displays the RAID5 partition created of four drives.

6. In the left pane of the ILOM, expand **Host Management**, then select **Power Control**. In the **Select Action** list, select **Power Cycle**, then click **Save**.

   The Exalytics Machine restarts.

4.2.5 Reconfiguring Existing RAID Configuration on an X6-4 Exalytics Machine

The X6-4 Exalytics Machine comprises six hard drives, each having a capacity of 1.2 TB. Two drives are configured as RAID1 and four drives are configured as RAID5. To optimize the use of the disk space, you must reconfigure the RAID1 and RAID5 configurations on the Exalytics Machine. Reconfigure the first two drives to create one RAID1 virtual drive and reconfigure the remaining drives to create one RAID5 virtual drive.

To reconfigure existing RAID configurations on the X6-4 Exalytics Machine:

1. Restart the Exalytics Machine using Integrated Lights Out Manager (ILOM).

2. At the prompt, *Press Ctrl><R> for WebBIOS...* , press **Ctrl+Y** to access the LSI MegaRAID utility as the Exalytics Machine is restarting.

> **Note:**
>
> Observe the screen carefully as the Press Ctrl><R> for WebBIOS... .message displays for a very short time. This avoids restarting the machine again.

The Virtual Drive Management screen is displayed.

3. Delete the existing RAID configuration, by performing the following actions:

    a. Select the first virtual drive and Press **F2**.

    b. Select **Delete VD**.

    c. At the prompt, Press **Yes**.

    d. Repeat the above steps (a to c) to delete the second drive.

4. Create a RAID1 partition of one virtual drive, by performing the following actions:

    a. On the Virtual Drive Management screen, select **LSI MegaRAID**, press **F2**, and then select **Create Virtual Drive**.

    The Create New VD screen is displayed

    b. In the RAID Level drop down field, select **RAID1**.

    c. Select the first two drives (00 and 01).

    d. Under Basic Settings, accept the default size of the configuration.

    e. Select **Advanced**.

    The Create Virtual Drive-Advanced screen is displayed.

    f. Select **Initialize**, and then select **OK**.

    The "Initialization complete on VD 0" message is displayed.

    g. Select **OK**.

    The Virtual Drive Management screen displays the RAID1 partition created of the two drives.

5. Create a RAID5 partition with the remaining drives, by performing the following actions:

   a. On the Virtual Drive Management screen, select **LSI MegaRAID**, press **F2**, and then select **Create Virtual Drive**.

      The Create New VD screen is displayed.

   b. In the RAID Level drop down field, select **RAID5**.

   c. Select the four drives (02, 03, 04, 05).

   d. Under Basic Settings, accept the default size of the configuration.

   e. Select **Advanced**.

   f. Select **Initialize**, and then select **OK**.

      The "Initialization complete on VD 2" message is displayed.

   g. Select **OK**.

      The Virtual Drive Management screen displays the RAID5 partition created of four drives.

6. In the left pane of the ILOM, expand **Host Management**, then select **Power Control**. In the **Select Action** list, select **Power Cycle**, then click **Save**.

   The Exalytics Machine restarts.

4.3 Installing Oracle Exalytics Release 2.1 Base Images (2.0.0.1.el6)

Depending on your requirements, you can install base image (2.0.0.1.el6) on a Linux 6 operating system.

To install Oracle Exalytics Release 2.1 Base Image (2.0.0.1.el6) on the Exalytics Machine, you must download the new base image (ISO file) from edelivery.

> **✎ Note:**
>
> Reinstalling the base image will delete all software and configurations on the Exalytics Machine. It is therefore recommended that you make a backup copy of all the essential files you need.

To install Oracle Exalytics base image:

1. Navigate to `https://edelivery.oracle.com`.

2. Enter Oracle Exalytics Software 2.0.0.1.0 in type ahead filed in the web page.

3. Select **Release 2.1** related to the download queue (title will be displayed).

4. Click **Continue**.

5. Choose the required part number in the available list of softwares.

6. Depending on the Linux operating system, perform one of the following actions:

- To install base image on a Linux 6 operating system, download Oracle Exalytics X2-4/ X3-4/X4-4 Base Image 2.0.0.1.el6 for Linux x86-64, Part number V789533-01.

7. On the Exalytics Machine, connect and log on to Oracle Integrated Lights Out Manager (ILOM).

8. In the left pane of the ILOM, expand **Remote Control**, then select **Redirection**, and then click **Launch Remote Console**.

9. Depending on the configuration of the Exalytics Machine and the Linux operating system, perform one of the following actions:

   - For installing the base image on a Linux 6 operating system, link the base image ISO file to a remote CD-ROM device in ILOM by performing one of the following actions:

     – For X2-4 and X3-4 machines, from the menu bar, select **Devices**, then **CD-ROM Image** to link the base image ISO file as a remote virtual CD-ROM in ILOM

     – For X4-4 machines, from the menu bar, select **KVMS**, then **Storage**. Click **Add** to link to the base image ISO file as a remote virtual CD-ROM in ILOM. Click **Connect**.

10. Restart the machine by expanding in the left pane of the ILOM, **Host Management**, then select **Power Control**. In the **Select Action** list, select **Power Cycle**, then click **Save**.

11. Set the next boot device to CD-ROM by performing the following step:

    - In the left pane of the ILOM, expand **Host Management**, then select **Host Control**. In the **Next Boot Device** list, select **CDROM**, then click **Save**.

12. Restart the machine by expanding in the left pane of the ILOM, **Host Management**, then select **Power Control**. In the **Select Action** list, select **Power Cycle**, then click **Save**.

    The Exalytics Machine restarts.

13. Press **Enter** to begin the installation.

    The Exalytics Machine uses the Exalytics ISO image in the CD-ROM to install the Exalytics Linux base image.

    The installation process detects all the components of the Exalytics Machine, formats the disk drives, and transfers the image to complete the installation.

> **✎ Note:**
>
> After the base image is installed successfully, the installation process automatically restarts the Exalytics Machine twice.

14. Confirm that the installation completes successfully, then deselect the CDROM in ILOM.

15. Restart the machine by expanding in the left pane of the ILOM, **Host Management**, then select **Power Control**. In the **Select Action** list, select **Power Cycle**, then click **Save**.

16. The Exalytics Machine displays the login prompt.

17. Log in to the Exalytics Machine with the following user name and the default password:

   • User Name: root

   • Password: welcome1

   The Exalytics Machine is now ready for network configuration.

> **Note:**
>
> After installation, download the patch p24427676_20001_Linux-x86_64.zip and unzip the patch (#unzip p24427676_20001_Linux-x86_64.zip -d /tmp). To apply the patch, complete the instructions in the /tmp/readme.txt file.

18. Because the eth0 network in the /etc/sysconfig/network-scripts/ifcfg-eth0 file is set by default to ONBOOT=Yes, you must set the eth0 network to ONBOOT=NO before you can configure network. To configure network on the Oracle Exalytics Patchset Base Image, see Configuring Network on the Oracle Exalytics Release 2.1 Base Images (2.0.0.1.el6).

4.4 Configuring Network on the Oracle Exalytics Release 2.1 Base Images (2.0.0.1.el6)

To configure network on the Oracle Exalytics Release 2.1 Base Image (2.0.0.1.el6), you run the Oracle Exalytics configuration script (exalytics-config-network.sh).

The Oracle Exalytics network script assigns machine time, time zone, machine name, domain, and Domain Name Server (DNS) on the Exalytics Machine. Additionally, you can use the network configuration script to configure Exalytics InfiniBand Interface, Exalytics 10GbE Interface, Exalytics 1GbE Interface, and QLogic cards.

> **Note:**
>
> Before you run the configuration script, ensure that a network cable is connected to the Net0 port on the Exalytics Machine.

To configure network on the Oracle Exalytics Base Image:

1. Log on as the root user.

2. Enter the following command to configure the network:

   ```
   # /opt/exalytics/bin/exalytics_configure-network.sh
   ```

3. When prompted by the Oracle Exalytics network script, depending on your configuration requirements, perform the following tasks:

   a. Choose whether you want to configure InfiniBand for Exadata connection.

   b. Choose whether you want to configure 10G network.

    c. Choose whether you want to configure Ethernet network for QLogic Ganymede cards.

    d. Choose whether you want to configure 1G network.

    e. Choose whether you want to configure bonding.

    f. If you choose to configure bonding, enter and confirm the bond2 IP address.

    g. Enter and confirm the bond2 netmask address.

    h. Choose whether you want to configure host name.

    i. If you choose to configure host name, enter and confirm the name of the host.

    j. Enter and confirm the name of the domain name.

    k. Choose whether you want to configure timezone.

    l. Choose whether you want to configure time server.

    m. Choose whether you want to configure date and time.

    n. Choose whether you want to configure DNS.

    o. If you choose to configure DNS, enter and confirm the DNS address.

    p. Choose whether you want to configure another DNS.

    q. Choose whether you want to commit changes.

If you choose to commit changes, the configuration script configures and enables the network on the Exalytics Machine.

4.5 Postinstallation Steps

This section consists of the following topics:

- Resetting Root Password
- Creating a Password on the Operating System
- Assigning User Limits to a New User
- Granting User Permissions to the /u01 Directory
- Disabling Security-Enhanced Linux (SELinux) on the 2.0.0.1.el6 Base Image
- Verifying Configuration of the Exalytics Machine

4.5.1 Resetting Root Password

The default root password for the Oracle Exalytics Release 2.1 Base Image (2.0.0.1.el6) is "welcome1".

After you have installed the Oracle Exalytics Release 2.1 Base Image and configured the network on the Exalytics Machine, you must change the root password.

To change the root password:

1. Log in to the Exalytics Machine as root user.

2. To change the password, enter the following command:

```
# passwd
```

3. Enter a new password.

4. Confirm the password when prompted.

   If the password change is successful, then the following message is displayed:

   ```
   passwd: all authentication tokens updated successfully.
   [root]#
   ```

4.5.2 Creating a Password on the Operating System

For the Oracle Exalytics Release 2.1 Base Image (2.0.0.1.el6), a user named "oracle" and a group named "oinstall" already exists. You next create a password for the user.

To create a password:

1. Log in as the root user.

2. To create a password, enter the following command:

   ```
   # passwd oracle
   ```

3. Enter the password.

4. Confirm the password when prompted.

   If the password is created successfully, then the following message is displayed:

   ```
   passwd: all authentication tokens updated successfully.
   [root]#
   ```

> **Note:**
>
> To add a different user and group, enter the following commands as root user:
>
> ```
> groupadd <name of the group>
> ```
>
> ```
> useradd -g <name of the group> <name of the user>
> ```

4.5.3 Assigning User Limits to a New User

User limit is the maximum amount of processors a user can run at the same time. When you add a new user, each user is assigned a low user limit by default. To ensure the new user can run enough processors, you must assign new user limits.

To assign user limits to a new user:

1. Log on as the root user.

2. Edit the /etc/security/limits.conf file by adding the following lines:

   <name of the user> soft nproc 131072

   <name of the user> hard nproc 131072

   <name of the user> soft nofile 131072

   <name of the user> hard nofile 131072

4.5.4 Granting User Permissions to the /u01 Directory

Ensure that the user installing the software has permissions to the /u01 drive.

If the user cannot write to the /u01 directory, then, as root user, enter the following commands to change permissions:

```
chown <name of the user>:<name of the group> /u01
```

```
chmod 775 /u01
```

For example, if the user name is "oracle" and the user group is "oinstall", enter the following commands:

```
chown oracle:oinstall /u01
```

```
chmod 775 /u01
```

4.5.5 Disabling Security-Enhanced Linux (SELinux) on the 2.0.0.1.el6 Base Image

Disable SELinux after you install Base Image (2.0.0.1.el6) on a Linux 6 operating system.

To disable SELinux

1. Navigate to and open the /etc/selinux/config file in a text editor.

2. Edit the file as follows:

   SELINUX=disabled

3. Save the file.

4.5.6 Verifying Configuration of the Exalytics Machine

Before you install software on the Exalytics Machine, you must run configuration scripts to verify the disk, software, and hardware configurations of the Exalytics Machine.

This section consists of the following topics:

- Checking Disk Configuration
- Verifying Base Image Version
- Verifying Software and Hardware Configurations on the Exalytics Machine

4.5.6.1 Checking Disk Configuration

Check the size of the /u01 disk on the Exalytics Machine. For the X2-4 Exalytics Machine, the size of the disk is approximately 1.7 TB, for the X3-4 Exalytics Machine, the size of the disk is approximately 2.4 TB, and for the X4-4 Exalytics Machine, the size of the disk is approximately 3.5 TB. For the X5-4 Exalytics Machine, the size of the disk is approximately 7.2 TB. For the X6-4 Exalytics Machine, the size of the disk is approximately 7.2 TB.

To check disk configuration:

1. Log in as root user.

2. Enter the following command:

```
# df -h
```

Depending on the configuration of the Exalytics Machine, the following output is displayed:

- For the X2-4 Exalytics Machine, disk configuration similar to the following is displayed:

```
Filesystem Size  Used Avail Use% Mounted on/dev/mapper/VolGroup00-LogVol00
           447G  4.8G  420G   2% //dev/mapper/VolGroup01-LogVol00
           1.6T  197M  1.6T   1% /u01/dev/sda1
            99M   25M   70M  27% /boot
tmpfs      505G     0  505G   0% /dev/shm

[root]#
```

- For the X3-4 Exalytics Machine, disk configuration similar to the following is displayed:

```
Filesystem  Size  Used Avail Use% Mounted on/dev/mapper/VolGroup00-LogVol00
            729G  4.2G  688G   1% //dev/mapper/VolGroup01-LogVol00
            2.5T  203M  2.3T   1% /u01/dev/sda1
                  485M   63M  397M  14% /boot
tmpfs       505G     0  505G   0% /dev/shm

 [root]#
```

- For the X4-4 Exalytics Machine, disk configuration similar to the following is displayed:

```
Filesystem  Size   Used Avail Use% Mounted on/dev/mapper/VolGroup00-LogVol00
            1004G   4.0G 949G 1% //dev/mapper/VolGroup01-LogVol00
            3.3T   198M  3.1T 1% /u01/dev/sda1
            485M    63M  397M  14% /boot
tmpfs       1010G   4.0G 1010G  1% /dev/shm

[root]#
```

4.5.6.2 Verifying Base Image Version

Next, confirm the base image on the Exalytics Machine.

To confirm the base image:

1. Log in to the Exalytics Machine as root user.

2. Enter the following command:

```
# /opt/exalytics/bin/exalytics_imageinfo

Image version : 2.0.0.1_el6
Creation timestamp : Day Date Month YEAR HOUR:MIN:SEC
Kernel version : 2.6.39-400.277.1.el6uek.x86_64

RPM versions:
kernel-uek-2.6.39-400.277.1.el6uek.x86_64
kernel-2.6.32-504.el6.x86_64
exalytics-container-bm-2.0.0.1-2_el6.x86_64
exalytics-scripts-2.0.0.1-9_el6.noarch
exalytics-flash-2.0.0.1-2_el6.x86_64
```

```
exalytics-domain-configure-2.0.0.1-4_el6.noarch
exalytics-deps-exact-2.0.0.1-2_el6.x86_64
exalytics-deps-minimum-2.0.0.1-2_el6.x86_64
```

> **✎ Note:**
>
> Even though the build numbers may be different than the ones listed above,
> ensure that the updated kernel version is the same as the one displayed
> above.

4.5.6.3 Verifying Software and Hardware Configurations on the Exalytics Machine

Finally, verify the software and hardware configurations on the Exalytics Machine.

To verify software and hardware configurations:

1. Log in to the Exalytics Machine as root user.

2. To verify the software configuration, enter the following command:

   ```
   # /opt/exalytics/bin/exalytics_CheckSWProfile
   ```

   Verify that the output displayed is similar to the following:

   ```
   [SUCCESS].......Has supported operating system
   [SUCCESS]........Has supported processor
   [SUCCESS]........Kernel is at the supported version
   [SUCCESS]........Has supported kernel architecture
   [SUCCESS]........Software is at the supported profile
   ```

3. To verify the hardware configuration, enter the following command:

   ```
   # /opt/exalytics/bin/exalytics_CheckHWnFWProfile
   ```

   Verify that the output displayed for an X4-4 configuration is similar to the following:

   ```
   Verifying Hardware...
   System product name: SUN SERVER X4-4
   System product manufacturer: Oracle Corporation
   [EXALYTICS_INFO:GENERAL] System product SUN SERVER X4-4 is supported.
   [EXALYTICS_INFO:GENERAL] Oracle Exalytics Software 2.0.0.1.0
   [EXALYTICS_INFO:GENERAL] ILOM firmware update disabled for Oracle Exalytics
   [EXALYTICS_INFO:GENERAL] ====START SERIAL NUMBERS====
   [EXALYTICS_INFO:GENERAL] ==Motherboard==
   [EXALYTICS_INFO:GENERAL] System serial: 1415NM9003
   [EXALYTICS_INFO:GENERAL] Motherboard serial: 489089M+13500W008F
   [EXALYTICS_INFO:GENERAL] Chassis serial: 1415NM9003
   [EXALYTICS_INFO:GENERAL]
   [EXALYTICS_INFO:GENERAL] ==Infiniband HCA==
   [EXALYTICS_INFO:GENERAL] ID: CX354A - ConnectX-3 QSFP
   [EXALYTICS_INFO:GENERAL] PN: 7046442
   [EXALYTICS_INFO:GENERAL] EC: XX
   [EXALYTICS_INFO:GENERAL] SN: 465774U-1402700681
   [EXALYTICS_INFO:GENERAL] V0: PCIe Gen3 x8
   [EXALYTICS_INFO:GENERAL] V1: N/A
   [EXALYTICS_INFO:GENERAL] YA: N/A
   [EXALYTICS_INFO:GENERAL] ====END SERIAL NUMBERS====
   [EXALYTICS_INFO:GENERAL]
   ```

```
ProcessorInformation:
Cores: 36
Processors: 72
Intel(R) Xeon(R) E7-8895 v2 2.80GHz
stepping : 7
Has supported CPU model

PhysicalMemory (GB) : 2068

Verifying BIOS Vendor...
BIOS Vendor: American Megatrends Inc.
BIOS is from the supported vendor

Verifying InfiniBand devices...
Has required number of Infiniband devices
Infiniband device id: d0:00.0
Infiniband device width: 8

Has supported disk controller LSI MegaRAID SAS 9261-8i
Verifying Firmware...
Supported BIOS Version: 16040102-04/18/2012
Current BIOS Version : 24030400-08/22/2014
BIOS is at the supported version

Supported ILOM Version: 3.1.2.24 r73820
Current ILOM Version : 3.2.4.18 r93492
ILOM is at the supported version.

Supported Infiniband Firmware Version: 2.7.8130
Current Infiniband Firmware Version : 2.11.1280
Infiniband Firmware is at the supported version.

Supported disk controller Version: 12.12.0-0048
Current disk controller Version : 12.12.0-0178
Disk controller is at the supported firmware version.

bios : 1
ilom : 1
ibfw : 1
dcfw : 1
```

4.6 Installing Software on the Exalytics Machine

Use the Oracle Exalytics Domain Management Utility to install software on the Exalytics Machine. For information, see Installing the Software by Using the Exalytics Domain Management Utility.

5

Configuring Exalytics Machine for Virtualization

This chapter describes the tasks to perform when configuring X2-4, X3-4, X4-4, X5-4, and X6-4 Exalytics Machines for virtualization. The tasks include deploying Oracle Virtual Machine Server (Oracle VM Server) on the Exalytics Machine, configuring Oracle VM Server with Oracle Virtual Machine Manager (Oracle VM Manager), and deploying VM templates.
This chapter includes the following sections:

- Configuring New Installations for Virtualization
- Configuring Existing Installations for Virtualization
- Upgrading Oracle VM Manager and Oracle VM Server to 3.3.3
- Upgrading to Oracle Exalytics Release 2.1 on a Virtualized Environment
- Installing and Configuring Application Software on Virtual Machines
- Maintaining Virtual Machines

5.1 Configuring New Installations for Virtualization

> **✎ Note:**
>
> The X2-4, X3-4, X4-4, X5-4, and X6-4 Exalytics Machines are certified with Oracle VM 3.3.3.

This section includes the following topics:

- Before You Virtualize an Exalytics Machine
- Configuring an Exalytics Machine for Virtualization

5.1.1 Before You Virtualize an Exalytics Machine

Before you virtualize an Exalytics Machine, review the following sections:

- Documents to Review
- Prerequisites for Configuring Exalytics Machines for Virtualization
- Removing Existing Partitions
- Reconfiguring Existing RAID Configurations on the Exalytics Machine
- Documents to Review
- Prerequisites for Configuring Exalytics Machines for Virtualization

- [Removing Existing Partitions](#)
- [Reconfiguring Existing RAID Configurations on the Exalytics Machine](#)

5.1.1.1 Documents to Review

As you prepare to virtualize an Exalytics Machine, do the following:

- Review the *Oracle VM Release Notes*, to ensure that you understand the differences between Oracle Virtual Machine and its documented functionality, and any other issues that apply to the current release.

- Review *Oracle VM Installation and Upgrade Guide for Release 3.2* and *Oracle VM User's Guide for Release 3.2* to ensure that you understand how to install and configure Oracle Virtual Machine Server, set up networking, and create virtual machines.

- Review *Oracle Exalytics In-Memory Machine Owner's Guide Exalytics X2-4, X3-4, X4-4, X5-4, and X6-4* to ensure that you have properly configured and commissioned the Exalytics Machine in your data center.

5.1.1.2 Prerequisites for Configuring Exalytics Machines for Virtualization

The following prerequisites must be met before you can virtualize an Exalytics Machine:

- The Exalytics Machine has been racked and mounted in a data center.

- Oracle Integrated Lights Out Manager (ILOM) 3.1.2.24 or later, is configured to be accessible from the network using the web interface.

- All networking information such as host name, IP address, subnet, gateway, and DNS are available.

- Spare, unassigned IP addresses are available for the server pool and for each virtual machine deployed on the Exalytics Machine.

- A Linux environment is available to install Oracle VM Manager.

- You have access to the internet from a computer (not necessarily the Exalytics Machine) to download required software.

5.1.1.3 Removing Existing Partitions

If required, remove the existing partition on /dev/sdb which is mounted to /u01 from the Exalytics Machine. You cannot create a repository on a Oracle Virtual Machine disk which contains a partition.

> **Note:**
>
> Before removing the existing partition, remember to back up all data on sdb1. If you are removing the existing partition on a new machine, you do not need to back up your data.

To remove existing partitions:

1. Log in as the root user, and enter the following command to run the disk partition utility:

```
# parted /dev/sdb
```

   The output should look similar to the following:

```
GNU Parted 1.8.1
Using /dev/sdb
Welcome to GNU Parted! Type 'help' to view a list of commands.
```

2. To display the existing partition, enter the following command:

```
# print
```

3. To remove the existing partition, enter the following command:

```
# rm 1
```

4. To confirm that the existing partition has been removed, enter the following command:

```
# print
```

   The existing partition is removed.

5.1.1.4 Reconfiguring Existing RAID Configurations on the Exalytics Machine

This section consists of the following topics.

- Reconfiguring Existing RAID Configurations on the X2-4 Exalytics Machine
- Reconfiguring Existing RAID Configurations on the X3-4 Exalytics Machine
- Reconfiguring Existing RAID Configurations on the X4-4 Exalytics Machine
- Reconfiguring Existing RAID Configuration on an X6-4 and X5-4 Exalytics Machine
- Resetting RAID Configuration (Optional)
- Reconfiguring Existing RAID Configurations on the X2-4 Exalytics Machine
- Reconfiguring Existing RAID Configurations on the X3-4 Exalytics Machine
- Reconfiguring Existing RAID Configurations on the X4-4 Exalytics Machine
- Reconfiguring Existing RAID Configuration on an X6-4 and X5-4 Exalytics Machine
- Resetting RAID Configuration (Optional)

5.1.1.4.1 Reconfiguring Existing RAID Configurations on the X2-4 Exalytics Machine

The X2-4 Exalytics Machine comprises six hard drives, each having a capacity of 600 GB. Two drives are configured as RAID1 and four drives are configured as RAID5. To optimize the use of the disk space, you must reconfigure the RAID1 and RAID5 configurations on the Exalytics Machine. Reconfigure RAID1 so that it consists of two virtual drives of 100 GB and 457 GB, and RAID5 consists of the remaining drives.

To reconfigure existing RAID configurations on the X2-4 Exalytics Machine:

1. Restart the Exalytics Machine using Integrated Lights Out Manager (ILOM).

2. Press **Ctrl+Y** and enter RAID CLI (Command Line Interface) as the Exalytics Machine is restarting.

> **Note:**
>
> The "Copyright LSI Logic Corporation" displays during the restart sequence when it is possible to enter the RAID CLI. Observe the screen carefully as the message displays for a very short time. This avoids restarting the machine again.

3. Enter the following MegaRAID command to delete the existing RAID configuration:

```
# -CfgLdDel -LALL -a0
```

4. Enter the following command to create a RAID1 partition with two virtual drives of size 100 GB and 457 GB:

```
# -CfgLdAdd -r1[252:0, 252:1] WB Direct NoCachedBadBBU -sz102400 -sz467968 -a0
```

5. Enter the following command to create a RAID5 partition with the remaining drives:

```
# -CfgLdAdd -r5[252:2, 252:3, 252:4, 252:5] WB Direct NoCachedBadBBU -a0
```

6. In the left pane of the ILOM, expand **Host Management**, then select **Power Control**. In the **Select Action** list, select **Power Cycle**, then click **Save**.

   The Exalytics Machine restarts.

5.1.1.4.2 Reconfiguring Existing RAID Configurations on the X3-4 Exalytics Machine

The X3-4 Exalytics Machine comprises 6 hard drives, each having a capacity of 900 GB.Two drives are configured as RAID1 and four drives are configured as RAID5. To optimize the use of the disk space, you must reconfigure the RAID1 and RAID5 configurations on the Exalytics Machine. Reconfigure RAID1 so that it consists of two virtual drives of 100 GB and 657 GB, and RAID5 consists of the remaining drives.

To reconfigure existing RAID configurations on the X3-4 Exalytics Machine:

1. Restart the Exalytics Machine using Integrated Lights Out Manager (ILOM).

2. Press **Ctrl+Y** and enter RAID CLI (Command Line Interface) as the Exalytics Machine is restarting.

> **Note:**
>
> The "Copyright LSI Logic Corporation" displays during the restart sequence when it is possible to enter the RAID CLI. Observe the screen carefully as the message displays for a very short time. This avoids restarting the machine again.

3. Enter the following MegaRAID command to delete the existing RAID configuration:

```
# -CfgLdDel -LALL -a0
```

4. Enter the following command to create a RAID1 partition with two virtual drives of size 100 GB and 657 GB:

```
# -CfgLdAdd -r1[252:0, 252:1] WB Direct NoCachedBadBBU -sz102400 -sz734688 -a0
```

5. Enter the following command to create a RAID5 partition with the remaining drives:

```
# -CfgLdAdd -r5[252:2, 252:3, 252:4, 252:5] WB Direct NoCachedBadBBU -a0
```

6. In the left pane of the ILOM, expand **Host Management**, then select **Power Control**. In the **Select Action** list, select **Power Cycle**, then click **Save**.

The Exalytics Machine restarts.

5.1.1.4.3 Reconfiguring Existing RAID Configurations on the X4-4 Exalytics Machine

The X4-4 Exalytics Machine comprises six hard drives, each having a capacity of 1.2 TB. Two drives are configured as RAID1 and four drives are configured as RAID5. To optimize the use of the disk space, you must reconfigure the RAID1 and RAID5 configurations on the Exalytics Machine. Reconfigure RAID1 so that it consists of two virtual drives of 100 GB and 1000 GB, and RAID5 consists of the remaining drives.

To reconfigure existing RAID configurations on the X4-4 Exalytics Machine:

1. Restart the Exalytics Machine using Integrated Lights Out Manager (ILOM).

2. Press **Ctrl+Y** and enter RAID CLI (Command Line Interface) as the Exalytics Machine is restarting.

> **Note:**
>
> The "Copyright LSI Logic Corporation" displays during the restart sequence when it is possible to enter the RAID CLI. Observe the screen carefully as the message displays for a very short time. This avoids restarting the machine again.

3. Enter the following MegaRAID command to delete the existing RAID configuration:

```
# -CfgLdDel -LALL -a0
```

4. Enter the following command to create a RAID1 partition with two virtual drives of size 100 GB and 1000 GB:

```
# -CfgLdAdd -r1[252:0, 252:1] WB Direct NoCachedBadBBU -sz102400 -sz999000 -a0
```

5. Enter the following command to create a RAID5 partition with the remaining drives:

```
# -CfgLdAdd -r5[252:2, 252:3, 252:4, 252:5] WB Direct NoCachedBadBBU -a0
```

6. In the left pane of the ILOM, expand **Host Management**, then select **Power Control**. In the **Select Action** list, select **Power Cycle**, then click **Save**.

The Exalytics Machine restarts.

5.1.1.4.4 Reconfiguring Existing RAID Configuration on an X6-4 and X5-4 Exalytics Machine

The X5-4 Exalytics Machine comprises six hard drives, each having a capacity of 1.2 TB. Two drives are configured as RAID1 and four drives are configured as RAID5. To optimize the use of the disk space, you must reconfigure the RAID1 and RAID5

configurations on the Exalytics Machine. Reconfigure RAID1 so that it consists of two virtual drives and RAID5 consists of the remaining drives.

To reconfigure existing RAID configurations on the X6-4 and X5-4 Exalytics Machine:

1. Restart the Exalytics Machine using Integrated Lights Out Manager (ILOM).

2. At the prompt, *Press Ctrl><R> for WebBIOS...* , press **Ctrl+Y** to access the LSI MegaRAID utility as the Exalytics Machine is restarting.

> **Note:**
>
> Observe the screen carefully as the Press Ctrl><R> for WebBIOS... .message displays for a very short time. This avoids restarting the machine again.

The Virtual Drive Management screen is displayed.

3. Delete the existing RAID configuration, by performing the following actions:

    a. Select the first virtual drive and Press **F2**.

    b. Select **Delete VD**.

    c. At the prompt, Press **Yes**.

    d. Repeat the above steps (a to c) to delete the second virtual drive.

4. Create a RAID1 partition of two virtual drive, by performing the following actions:

    a. On the Virtual Drive Management screen, Press **F2**.

    b. Select **Create Virtual Drive**.

        The Create New VD screen is displayed.

    c. In the RAID Level drop down field, select **RAID1**.

    d. Under Basic Settings, in the Size field, enter 100.

    e. Select **Advanced**.

        The Create Virtual Drive-Advanced screen is displayed.

    f. Select **Initialize**, and then select **OK**.

        The "Initialization complete on VD 0" message is displayed.

    g. Select **OK**.

        The Virtual Drive Management screen displays the 100 GB virtual disk created.

    h. To create the second virtual drive, select **Drive Group: 0, RAID1**, press **F2**, and then select **Add New VD**.

    i. In the RAID Level drop down field, select **RAID1**.

    j. Under Basic Settings, in the Size field, accept the default value, and select **Advanced**.

    k. Select **Initialize**, and then select **OK**.

        The "Initialization complete on VD 1" message is displayed.

l. Select **OK**.

The Virtual Drive Management screen displays the RAID1 partition created of two virtual drives.

5. Create a RAID5 partition with the remaining drives, by performing the following actions:

a. On the Virtual Drive Management screen, select **LSI MegaRAID**, press **F2**, and then select **Create Virtual Drive**.

The Create New VD screen is displayed.

b. In the RAID Level drop down field, select **RAID5**.

c. Select the four virtual drives (02, 03, 04, 05).

> **Note:**
>
> For each virtual drive, accept the default size of the drive.

d. Select **Advanced**.

e. Select **Initialize**, and then select **OK**.

The "Initialization complete on VD 2" message is displayed.

f. Select **OK**.

The Virtual Drive Management screen displays the RAID5 partition created of four four virtual drives.

6. In the left pane of the ILOM, expand **Host Management**, then select **Power Control**. In the **Select Action** list, select **Power Cycle**, then click **Save**.

The Exalytics Machine restarts.

5.1.1.4.5 Resetting RAID Configuration (Optional)

If you are on a virtual Exalytics virtualization and want to revert back to a nonvirtual Exalytics deployment, you must reset the RAID configuration by performing the following steps:

To reset RAID configuration:

1. Restart the Exalytics Machine using Integrated Lights Out Manager (ILOM).

2. Press **Ctrl+Y** and enter RAID CLI (Command Line Interface) as the Exalytics Machine is restarting.

> **Note:**
>
> The "Copyright LSI Logic Corporation" displays during the restart sequence when it is possible to enter the RAID CLI. Observe the screen carefully as the message displays for a very short time. This avoids restarting the machine again.

3. Enter the following MegaRAID command to delete the existing RAID configuration:

```
# -CfgLdDel -LALL -a0
```

4. Enter the following command to restore the RAID1 partition to an Exalytics deployment:

```
# -CfgLdAdd -r1[252:0, 252:1] WB Direct NoCachedBadBBU -a0
```

5. Enter the following command to create a RAID5 partition with the remaining drives:

```
# -CfgLdAdd -r5[252:2, 252:3, 252:4, 252:5] WB Direct NoCachedBadBBU -a0
```

6. In the left pane of the ILOM, expand **Host Management**, then select **Power Control**. In the **Select Action** list, select **Power Cycle**, then click **Save**.

   The Exalytics Machine restarts.

5.1.2 Configuring an Exalytics Machine for Virtualization

This section includes the following topics:

- Installing and Configuring Oracle VM Server
- Installing and Configuring Oracle VM Manager
- Upgrading to Oracle Exalytics Release 2.1 on a Virtualized Environment
- Creating Virtual Machines

5.1.2.1 Installing and Configuring Oracle VM Server

This section includes the following topics:

- Installing Oracle VM Server 3.3.3
- Installing Oracle VM Server 3.3.3 on X6-4 and X5-4 Machines
- Postinstallation Steps
- Upgrading Exalytics Base Image

5.1.2.1.1 Installing Oracle VM Server 3.3.3

To install Oracle VM Server 3.3.3:

1. Navigate to the Oracle Software Delivery Cloud web site at the following link:

   http://edelivery.oracle.com

2. In the Select a Product Pack list, select **Oracle Exalytics Software 2.0.0.1.0**.

3. Select **Release 2.1** related to the download queue.

4. Click **Continue**.

5. Choose the required part number in the available list of softwares.

6. Download and unzip the Oracle Exalytics Base Image 2.2.0.1.0 for Exalytics Oracle VM x86-64 (Part number V789434-01) to a local directory.

   The zip file contains the Exalytics_2.2.0.0.0_X4-4_OVS3.3.3_751_<DATE>.iso file. Use this iso file to install the Oracle VM Server 3.3.3 on an X2-4, X3-4, X4-4 or X5-4 Exalytics Machine.

7. On the Exalytics Machine, connect and log on to Oracle Integrated Lights Out Manager (ILOM).

> **Note:**
>
> If you are installing Oracle VM Server 3.2.9 on an X2-4 or X3-4 Exalytics Machine, you must use ILOM 3.1.2.24.d or later version. If you are installing Oracle VM Server 3.3.3 on an X4-4, X5-4 or X6-4 Exalytics Machine, you must use ILOM 3.2.4.18 or later version.
>
> For the latest Exalytics certified ILOM versions, see the *Oracle Exalytics Certification Matrix*. The *Oracle Exalytics Certification Matrix* is located at:
>
> `http://www.oracle.com/technetwork/middleware/ias/downloads/fusion-certification-100350.html`

8. On the Summary Information screen, under **Actions**, click **Launch** to launch the Remote Console.

   The ILOM remote console is displayed.

9. For X2-4, X3-4, X4-4, X5-4, or X6-4 machines, from the menu bar, select **KVMS**, then **Storage**.

   • Click **Add** to link to the Oracle VM Server 3.3.3 image (Exalytics_2.2.0.0.0_X4-4_OVS3.3.3_751_<DATE>.iso) as a remote virtual CD-ROM in ILOM.

   • Click **Connect**.

10. In the left pane of the ILOM, expand **Host Management**, then select **Host Control**. In the **Next Boot Device** list, select **CDROM**, then click **Save**.

11. Restart the machine by expanding in the left pane of the ILOM, **Host Management,** then select **Power Control**. In the **Select Action** list, select **Power Cycle**, then click **Save**.

    The Exalytics Machine restarts and displays the Oracle VM Server screen.

12. Press **Enter** to install Oracle VM Server.

    The Oracle VM Server is installed on the Exalytics Machine. After Oracle VM Server is installed, the Exalytics Machine restarts automatically.

5.1.2.1.2 Installing Oracle VM Server 3.3.3 on X6-4 and X5-4 Machines

To install Oracle VM Server 3.3.3:

1. Navigate to My Oracle Support (MOS) and download the patch number 22546910.

2. Download the package and unzip to a local directory.

   The downloaded zip file contains `Exalytics_2.2.0.0.0_X6-4_OVS3.3.3_<DATE>.iso` and a patch file `p20431965_20001_Linux-x86-64.zip`.

3. On the Exalytics Machine, connect and log on to Oracle Integrated Lights Out Manager (ILOM).

> **✏ Note:**
>
> For the latest Exalytics certified ILOM versions, see the *Oracle Exalytics Certification Matrix*. The *Oracle Exalytics Certification Matrix* is located at:
>
> http://www.oracle.com/technetwork/middleware/ias/downloads/fusion-certification-100350.html

4. On the Summary Information screen, under **Actions**, click **Launch** to launch the Remote Console.

   The ILOM remote console is displayed.

5. From the menu bar, select **KVMS**, then **Storage**. Click **Add** to link to the Oracle VM Server 3.3.3 image for X6-4 machine (`Exalytics_2.2.0.0.0_X6-4_OVS3.3.3<DATE>.iso`) as a remote virtual CD-ROM in ILOM. Click **Connect**.

6. In the left pane of the ILOM, expand **Host Management**, then select **Host Control**. In the **Next Boot Device** list, select **CDROM**, then click **Save**.

7. Restart the machine by expanding in the left pane of the ILOM, **Host Management,** then select **Power Control**. In the **Select Action** list, select **Power Cycle**, then click **Save**.

   The Exalytics Machine restarts and displays the Oracle VM Server screen.

8. Press **Enter** to install Oracle VM Server.

   The Oracle VM Server is installed on the Exalytics Machine. After Oracle VM Server is installed, the Exalytics Machine restarts automatically.

5.1.2.1.3 Postinstallation Steps

Perform the following postinstallation steps to configure the network on Oracle VM Server.

- "Editing the /etc/sysconfig/network File"
- "Configuring bond0 "
- "Editing the hosts File"
- "Editing the resolv.conf File"
- "Restarting the Exalytics Machine"

Editing the /etc/sysconfig/network File

You edit the /etc/sysconfig/network file to add the hostname of the machine and gateway and netmask for the network.

To edit the /etc/sysconfig/network file:

1. Navigate to and open the /etc/sysconfig/network file in a text editor.

2. Change the HOSTNAME to the name of the machine.

3. Enter the GATEWAY and NETMASK for the network.

   For example:

   NETWORKING=yes

NETWORKING_IPV6=no

GATEWAY=xx.xxx.xxx.x

NETMASK=xxx.xxx.xxx.x

HOSTNAME=*<name of the machine>*

4. Save the file.

Configuring bond0

You configure bond0 by editing the ifcfg-bond0 file.

To edit the ifcfg-bond0 file:

1. Navigate to and open the /etc/sysconfig/network-scripts/ifcfg-bond0 file in a text editor.

2. Change the BOOTPROTO to static.

   For example:

   BOOTPROTO=static

3. Add the IP Address of the machine.

   For example:

   IPADDR=xx.xxx.xx.xxx

Editing the hosts File

To edit the hosts file:

1. Navigate to and open the /etc/hosts file in a text editor.

2. Add the IP Address, host name, and alias for the host.

   For example:

   xx.xxx.xx.xxx exalyticsHost1.mycompany.com.exalytics Host1

> **Note:**
>
> Ensure the IP Address of the host is the same as the IP Address you entered in the ifcfg-bond0 file.

Editing the resolv.conf File

To edit the resolve.conf file:

1. Navigate to and open the /etc/resolve.conf file in a text editor.

2. Enter the DNS Server name and the Search base.

   For example:

   nameserver *xxx.xxx.xxx.xxx*

   search *xxx.mycompany.com*

> **Note:**
>
> You can create additional bonded ports from Oracle VM Manager after the server is registered. See Creating a New Network Channel for Virtual Machines

Restarting the Exalytics Machine

To restart the Exalytics Machine:

1. In the left pane of the ILOM, expand **Host Management**, then select **Power Control**.

2. In the **Select Action** list, select **Power Cycle**, then click **Save**.

5.1.2.1.4 Upgrading Exalytics Base Image

You upgrade the Exalytics Base Image for Oracle VM 2.2.0.1.0 by applying the patch on Oracle VM Server. The patch upgrades the Base Image to 2.2.0.1.0, installs Flash drivers and utilities.

To upgrade Oracle Exalytics Base Image for Oracle VM to 2.2.0.1.0:

1. Use the appropriate patch for the machines:

   a. For X6-4 machine using Oracle VM Server 3.3.3, use the patch file `p20431965_20001_Linux-x86-64.zip` downloaded in Installing Oracle VM Server 3.3.3 on X6-4 and X5-4 Machines.

   b. For X5-4 machine using Oracle VM Server 3.3.3, use the patch file `p20431965_20001_Linux-x86-64.zip` downloaded in Installing Oracle VM Server 3.3.3 on X6-4 and X5-4 Machines.

   c. For X4-4 and earlier machines, navigate to My Oracle Support and download patch number 20431965: Patchset Upgrade Utility for Exalytics Base Image 2.2.0.1.0 Oracle VM for Linux x86-64. The patch contains the `p2.6.39-400.248.3.el6uek x86_64.zip` file. The zipped file contains Flash drivers and Flash configurator scripts.

2. Log on to the Exalytics Machine as the `root` user.

3. Extract the contents of the file into an appropriate directory on the Exalytics Machine.

4. Unzip the file into a temporary (/tmp) directory.

   The following directory is created:

   exalytics_ovs_server_base_image_upgrade_to_2.2.0.1.0.

5. Navigate to the directory by entering the following command:

   ```
   # cd exalytics_ovs_server_base_image_upgrade_to_2.2.0.1.0
   ```

6. To upgrade the Base Image to 2.2.0.1.0 and to install Flash, enter the following command:

   ```
   # ./update.sh
   ```

   The output looks similar to the following:

```
current_kernel_version=2.6.39-400.215.9.el6uek
minimum_kernel_version=2.6.39-400.215.9.el6uek

OS Version check passed..
Update to 2.2.0.1.0.ovs-3.2.9 starting at DAY-DD-MM-YYYY HR:MIN:SEC
Removing unnecessary packages...
Skipping removing rpm kernel-ib-devel as it doesn't exist...

Skipping removing rpm kernel-ib as it doesn't exist...
Skipping removing rpm ibvf-config as it doesn't exist...
Removing RPM OpenIPMI-tools ...
Done

Running new install steps...
Preparing...              ################################################# [100%]
exalogic.tools            ################################################# [100%]
--------------------------------------------------------

        Successfully installed exalogic.tools

--------------------------------------------------------
.....[exalogic.tools] := Post Transaction called...............
Running update...
Applying libibumad
Preparing...              ################################################# [100%]
libibumad                 ################################################# [100%]
Preparing...              ################################################# [100%]
libibmad                  ################################################# [100%]
Preparing...              ################################################# [100%]
openib                    ################################################# [100%]
Preparing...              ################################################# [100%]
opensm-libs               ################################################# [100%]
opensm                    ################################################# [100%]
error: Failed dependencies:
infiniband-diags is needed by ovsvf-config-1.0-10.noarch

Preparing...              ################################################# [100%]
infiniband-diags          ################################################# [100%]
Preparing...              ################################################# [100%]
exalytics-flash           ################################################# [100%]
postInstall (exalytics-flash) 1 ...
[EXALYTICS_INFO:GENERAL] Updating exalytics-flash-config file to set
FLASH_INSTALL_TYPE=OVS ...
postInstall (exalytics-flash) 1; done
Preparing...              ################################################# [100%]
Installing....
Lib_Utils                 ################################################# [100%]
MegaCli                   ################################################# [100%]
Preparing...              ################################################# [100%]
hesiod                    ################################################# [100%]
autofs                    ################################################# [100%]
sas_snmp                  ################################################# [100%]
Starting snmpd
Starting snmpd: [  OK  ]

Registering Service lsi_mrdsnmpd
Starting LSI SNMP Agent
Starting LSI SNMP Agent:LSI MegaRAID SNMP Agent Ver 3.18.0.2 (Oct 30th, 2012)
Started
[  OK  ]
Preparing...              ################################################# [100%]
```

```
policycoreutils-1.33.12-14.8.el6
oracle-hmp-libs        ############################################ [100%]
oracle-hmp-hwmgmt      ############################################ [100%]
/usr/sbin/semanage: SELinux policy is not managed or store cannot be accessed.
ipmiflash              ############################################ [100%]
ipmitool               ############################################ [100%]

mstflint               ############################################ [100%]
oracle-hmp-snmp        ############################################ [100%]
oracle-hmp-tools       ############################################ [100%]
oracle-hmp-tools-biosconfig############################################ [100%]
oracle-hmp-tools
ubiosconfig            ############################################ [100%]
QConvergeConsoleCLI    ############################################ [100%]
Preparing...           ############################################ [100%]
package glibc-common-2.5-123.0.1.el6_11.1.x86_64 is already installed
package glibc-2.5-123.0.1.el6_11.1.x86_64 is already installed
package glibc-2.5-123.0.1.el6_11.1.i686 is already installed
package nscd-2.5-123.0.1.el6_11.1.x86_64 is already installed

Removing bm flash scripts...
Running post install script...
Running post patch script

Setting SET_IPOIB_CM=yes
file /etc/sysconfig/network-scripts/ifcfg-bondib0 not found
/usr/lib/init-exalogic-node/init-ipoib.sh not exist in /etc/rc.local , nothing
to delete
Completed post patch script

Enabling services...
Updating dom0 memory to 16G..
Copying Exa* files...
Updating imageinfo...
Image name in imageinfo is already uptodate
finished; DAY-DD-MM-YYYY HR:MIN:SEC
finished; DAY-DD-MM-YYYY HR:MIN:SEC
```

7. To verify that the upgrade was successful, enter the following command:

```
# imageinfo
```

The output looks similar to the following:

```
Exalytics 2.2.0.1.0.ovs-3.3.3 (build:r20151215.1)

Image version       : 2.2.0.1.0.ovs-3.3.3
Image build version : 20151215.1
Creation timestamp  : 2016-09-19_21-25-14
Kernel version      : 3.8.13-68.3.3.el6uek.x86_64
Image activated     : 2016-09-19_21-25-14
Image status        : SUCCESS
```

8. To verify that Flash is installed and the number of Flash cards installed, enter the following command:

```
# ddcli
```

For an X2-4 or X3-4 configuration, six Flash cards are displayed. The output looks similar to the following:

```
*************************************************************************
   LSI Corporation WarpDrive Management Utility
   Version  107.00.00.04 (2012.06.05)
```

```
        Copyright (c) 2011 LSI Corporation. All Rights Reserved.
        *************************************************************************

        ID     WarpDrive      Package Version     PCI Address
        --     ---------      ---------------     -----------
        1      ELP-4x100-4d-n    08.05.01.00         00:11:00:00
        2      ELP-4x100-4d-n    08.05.01.00         00:21:00:00
        3      ELP-4x100-4d-n    08.05.01.00         00:31:00:00
        4      ELP-4x100-4d-n    08.05.01.00         00:a1:00:00
        5      ELP-4x100-4d-n    08.05.01.00         00:c1:00:00
        6      ELP-4x100-4d-n    08.05.01.00         00:d1:00:00

        Select the WarpDrive [1-6 or 0:Quit]: 0
```

> **Note:**
>
> For an X4-4, X5-4, and X6-4 configuration, three Flash cards are displayed.

5.1.2.2 Installing and Configuring Oracle VM Manager

You install and configure Oracle VM Manager, as described in the following sections:

- Installing Oracle VM Manager 3.2.9 on Exalytics X2-4, X3-4, and X4-4 Machines
- Installing Oracle VM Manager 3.3.3 on Exalytics X6-4 and X5-4 Machines
- Discovering Oracle VM Servers
- Creating Virtual Network Interface Controllers
- Creating Server Pools and Adding a Server
- Creating an Exalytics Repository
- Creating VM Network Channel
- Installing Oracle VM Manager 3.2.9 on Exalytics X2-4, X3-4, and X4-4 Machines
- Installing Oracle VM Manager 3.3.3 on Exalytics X6-4 and X5-4 Machines
- Discovering Oracle VM Servers
- Creating Virtual Network Interface Controllers
- Creating Server Pools and Adding a Server
- Creating an Exalytics Repository
- Creating VM Network Channel

5.1.2.2.1 Installing Oracle VM Manager 3.2.9 on Exalytics X2-4, X3-4, and X4-4 Machines

Oracle recommends that you install Oracle VM Manager on a separate machine than the Exalytics Machine, preferably colocated geographically within Oracle VM Server.

To install Oracle VM Manager 3.2.9:

1. Download patch number 16410417 from the My Oracle Support web site at the following link:

   http://support.oracle.com

2. Install Oracle VM Manager 3.2.9. For instructions, see Chapter 4, "Installing Oracle VM Manager" in *Oracle VM Installation and Upgrade Guide for Release 3.2*. The guide is located at:

   http://docs.oracle.com/cd/E35328_01/E35330/html/index.html

5.1.2.2.2 Installing Oracle VM Manager 3.3.3 on Exalytics X6-4 and X5-4 Machines

Oracle recommends that you install Oracle VM Manager on a separate machine than the Exalytics machine, preferably colocated geographically within Oracle VM Server. OVM Manager 3.3.3 is supported with X6-4 and X5-4 servers due to NVMe hardware incompatibility in OVM Manager 3.2.9.

To install Oracle VM Manager 3.3.3:

1. Download the Oracle VM Manager from the following link:

   https://edelivery.oracle.com/osdc/faces/SearchSoftware

   a. In the Oracle Software Delivery Cloud home page, select the checkbox

      Linux/OVM/VMs

   b. Search by entering Oracle VM Manager 3.3.3 in the search box.

   c. Select Releases in the drop down.

   d. Click Continue. It will prompt to download

      V77113-01.iso

2. Unzip the downloaded file. It should contain the installer ISO file.

3. Mount the ISO file to a directory as the root user with the following command:

   #mkdir /OVMCD

   #mount -o loop ovmm-3.3.3-installer-OracleLinux-b1085.iso /OVMCD

4. Run the Oracle VM Manager installer using the following commands:

   #cd /OVMCD

   #./ createOracle.sh

   #./runInstaller.sh

5. Install Oracle VM Manager 3.3.3. For instructions, see "Installing Oracle VM Manager" in *Oracle VM Installation and Upgrade Guide for Release 3.2*. The guide is located at:

   http://docs.oracle.com/cd/E35328_01/E35330/html/index.html

5.1.2.2.3 Discovering Oracle VM Servers

Adding Oracle VM Servers to your Oracle VM Manager environment is known as discovering Oracle VM Servers. Discovering servers is the first step to configuring the virtualization environment.

To discover Oracle VM Servers:

1. Connect to Oracle VM Manager.

2. Select the **Servers and VMs** tab.

3. In the left pane, right-click **Server Pools**, and then select **Discover Servers**.

The Discover Dialog box is displayed.

4. Enter the following information for the server:

    a. Oracle VM Agent Port. The default port number is 8899.

    b. Oracle VM Agent Password. The default password is "oracle".

    c. IP Address.

5. Click **OK**.

Oracle VM Server and its details, including number of processors, IP address, processor speed, RAM, networking ports and configuration are discovered and added to the Unassigned Servers folder.

For more information, see "Chapter 6, Managing Server Pools and Oracle VM Servers" in *Oracle VM User's Guide for Release 3.2.*

5.1.2.2.4 Creating Virtual Network Interface Controllers

A Virtual Network Interface Controller (VNIC) is used by virtual machines as network cards. You create virtual network interfaces by defining a range of MAC addresses to use for each VNIC. Each MAC address corresponds with a single virtual Network Interface Controller (NIC), which is used by a virtual machine.

To create Virtual Network Interface Controllers:

1. Log on to Oracle VM Manager.

2. Select the **Servers and VMs** tab.

3. In the left pane, right-click **Server Pools**, and then select **Create VNICs**.

The MAC selector panel is displayed.

4. Click **Next** to retrieve the next available MAC addresses.

5. Select the number of addresses that you want to create, and click **Create**.

> ✎ **Note:**
>
> Select the number of addresses that corresponds to the number of virtual machines you are deploying.

The VNICs are created and listed in the Virtual NIC table.

6. Click **Close**.

For more information, see "Chapter 7, Managing Virtual Machines" in *Oracle VM User's Guide for Release 3.2*.

5.1.2.2.5 Creating Server Pools and Adding a Server

A server pool consists of at least one Oracle VM Server. If you find a server pool does not have sufficient resources, such as CPU or memory, to run the virtual machines, you can expand the server pool by adding more Oracle VM Servers.

Before creating a server pool, you must have:

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- An IP address for the server pool
- An IP address for each virtual machine
- The password to access the Oracle VM Agent installed on Oracle VM Server

For information on creating server pools and adding servers, see "Chapter 6, Managing Server Pools and Oracle VM Servers" in *Oracle VM User's Guide for Release 3.2.*

> **Note:**
>
> When creating a server pool, you must deselect the Activate Cluster option.

5.1.2.2.6 Creating an Exalytics Repository

A repository stores Oracle VM resources, such as virtual machines, templates for creating virtual machines, virtual machine assemblies, and so on.

> **Note:**
>
> Oracle recommends that you create a repository on each physical disk available. Use the smaller repository to store Oracle VM templates and cloned virtual machines and the larger repository to store virtual drives that are assigned to the virtual machines.

You use Oracle VM Manager to create and configure Exalytics repositories, and to present the repositories to Oracle VM Servers.

To create an Exalytics repository:

1. Log on to Oracle VM Manager.
2. Select the **Repositories** tab.
3. In the toolbar, click **Create New Repository** to display the Create a Data Repository dialog.
4. Perform the following actions:
   a. In the Repository Name field, enter the name for the repository.
   b. For Repository Location, select **Physical Disk** and click **Search**.
   c. From the drop-down list, select a local storage array and select the smaller of the two storage drives.
   d. Click **OK**.
   e. Select the server pool for the repository.
   f. Click **Next**.

      The new repository is available to be presented to Oracle VM Server. To enable your Oracle VM Server to use the repository, you must present the repository to Oracle VM Server.

5. Select and move Oracle VM Server from the *Servers* field to the *Present to Server(s)* field and click **Finish**.

   The repository is listed in the Repository tab.

For more information, see "Chapter 4, Managing Storage" in *Oracle VM User's Guide for Release 3.2.*

5.1.2.2.7 Creating VM Network Channel

You create a VM Network channel in Oracle VM Manager to enable Oracle VM Guests in the server pool to communicate with each other and also to communicate with external networks. The VM Network channel instructs Oracle VM Servers to create a Xen bridge that controls network traffic to and from Oracle VM Guests.

A Server Management Network channel that enables communication between Oracle VM Manager and Oracle VM Servers is automatically created by Oracle VM Manager. You can use this existing Server Management Network channel to communicate with virtual machines, or create a new network channel.

> **Note:**
>
> Oracle recommends that you create a new network channel for the virtual machines.

To create a VM Network Channel, follow the procedures described in *one* of the following topics:

- "Using the Existing Server Management Network Channel for Virtual Machines"
- "Creating a New Network Channel for Virtual Machines"

Using the Existing Server Management Network Channel for Virtual Machines

For simple network deployments, you can use the default Server Management Network channel to communicate with virtual machines.

To use the Existing Server Management Network channel for Virtual Machines:

1. Log on to Oracle VM Manager.

2. Select the **Networking** tab.

3. Select the Server Management Network channel address.

> **Note:**
>
> The Server Management Network channel address is similar to the Gateway address you entered except the trailing digit at the end of the address is a zero. For example, if you entered 10.244.138.1 as the Gateway address, the Server Management Network channel address is displayed as 10.244.138.0.

4. Click the **Edit** icon.

   The Edit Network screen in displayed.

5. To enable the virtual machine to connect the Server Management Network channel, select **Virtual Machine**.

6. Click **Next**.

7. Accept the default server settings, and click **Next**.

8. Accept the default port settings, and click **Next**.

9. Click **Finish**.

   The Virtual Machine column against the Server Management Network channel address displays a check mark indicating that the virtual machine is connected to the network.

Creating a New Network Channel for Virtual Machines

Before you can create a new network channel you must connect additional Ethernet cable to the Gigabit Ethernet connector ports and create a new bonded port through the Oracle VM Manager user interface.

> **Note:**
>
> The following procedure describes how to create and use a bonded port for the network channel. If you need to, you can use a single ethernet port for the channel instead of a bond. Oracle recommends using a bonded port.

To create a new bonded port and network channel:

1. Log on to Oracle VM Manager.

2. Select the **Servers and VMs** tab.

3. To create a new bonded port, perform the following tasks:

   a. In the left pane, expand **Server Pools**, and then select the Exalytics Machine on which the Oracle VM Server is running.

   b. In the Perspective list, select **Bond Ports**.

   c. Click **Create Bond Port**.

      The Create Bond Port page is displayed.

   d. In the Addressing list, select **IP Address**.

   e. In the IP Address field, enter an IP address for the bond.

   f. In the Mask field, enter a Netmask for the bond.

   g. Leave the MTU field at the default number.

   h. Enter a description for the bond.

   i. In the Available Ports section, select the connected ports and move it to the Selected Ports section.

   j. Click **OK**.

4. To create a new network channel, perform the following tasks:

   a. Select the **Networking** tab.

   b. Click **Create New Network**.

The Create Network page is displayed.

c. Select **Create a network with bond/ports only**, and click **Next**.

d. In the Name field, enter a name for the network.

e. Enter a description.

f. Select **Virtual Machine**, and then click **Next**.

g. In the Available Servers section, select the server on which the Oracle VM Manager is running, move it to the Selected Servers section, and then click **Next**.

h. In the Available Ports section, select the bonded port you created in Step 3, move it to the Selected Ports section, and then click **Next**.

The Ports page is displayed.

i. Confirm the settings on the Ports page and then click **Finish**.

For more information, see "Chapter 5, Managing Networks" in *Oracle VM User's Guide for Release 3.2.*

5.1.2.3 Upgrading to Oracle Exalytics Release 2.1 on a Virtualized Environment

New customers must upgrade to Oracle Exalytics Release 2.1 (2.0.0.1.0) on the virtualized environment. For instructions, see Upgrading to Oracle Exalytics Release 2.1 (2.2.0.0.0.ovs-3.3.3) on Virtual Deployments

5.1.2.4 Creating Virtual Machines

You use virtual templates to create virtual machines. The process of creating a virtual machine from a template is known as cloning. Before you create virtual machines, ensure that you have the following resources available:

* A server pool
* An Oracle VM Server
* VM templates

The process of creating virtual machines from templates consists of the following steps:

* Downloading VM Templates
* Importing VM Templates into Oracle VM Manager
* Creating Virtual Machines from VM Templates
* Downloading VM Templates
* Importing VM Templates into Oracle VM Manager
* Creating Virtual Machines from VM Templates

5.1.2.4.1 Downloading VM Templates

To download VM templates:

1. Download and save the Exalytics Oracle Release 2 VM Template (2.2.0.0.0) for Exalytics Oracle VM x86-64, by performing the following steps:

a. Navigate to the Oracle Software Delivery Cloud web site at the following link:

   http://edelivery.oracle.com

b. In the Select a Product Pack list, select **Oracle Business Intelligence**.

c. In the Platform list, select **Linux X86-64**.

d. Click **Go**.

e. Select **Oracle Exalytics Software Media Pack for Linux x86-64 Release: 2.0.0.0**.

f. Click **Continue**.

g. To install VM template on a Linux 6 operating system, download the Oracle Exalytics Oracle VM Template 2.2.0.0.0.el6, Part Number:V76309-01.

h. Save the template on a web server.

5.1.2.4.2 Importing VM Templates into Oracle VM Manager

After downloading the templates, you import them into Oracle VM Manager.

To import VM templates into Oracle VM Manager:

1. Log on to Oracle VM Manager.

2. Select the **Repositories** tab.

3. In the left pane, select the Repository in which you want to store the template.

4. Select **VM Templates**.

5. In the toolbar, click **Import VM Template** to display the Import VM Template dialog.

6. Select the Oracle VM Server and enter the HTTP or FTP URL to the VM template that you downloaded on the web server.

7. Click **OK** to import the VM template.

5.1.2.4.3 Creating Virtual Machines from VM Templates

After importing the template in Oracle VM Manager, you use the template to create a virtual machine.

> **Note:**
>
> Oracle recommends that you use Oracle VM Manager to create virtual drives of the sizes required for your system on the larger repository. Associate these virtual drives with the virtual machines deployed on your system. These virtual drives provide enough storage for installing the Exalytics software and the various files associated with the Exalytics Machine.

Before you create virtual machines, keep the following guidelines in mind:

- Ensure that Hyperthreading is disabled on Oracle VM Server and in order to disable the hyperthreading, update the vCPUs value to 10 in the `grub.conf` file.

> **Note:**
>
> Oracle recommends that Hyperthreading be disabled when creating new virtual machines.

- Maximum number of virtual machines you can create for a non-InfiniBand configuration on an X2-4, X3-4, X4-4, X5-4, and X6-4 Exalytics Machine is ten.

- Total virtual processors (vCPUs) you can assign on Oracle VM Server for an X2-4, X3-4, X4-4, X5-4, and X6-4 Exalytics Machine is ten.

- Total memory you can allocate on Oracle VM Server for an X2-4, X3-4, X4-4, X5-4, and X6-4 Exalytics Machine is 16 GB.

- Review Table 5-1 for the total vCPUs and memory you can allocate on all virtual machines and the maximum vCPUs and memory you can allocate to each virtual machine.

Table 5-1   Total and Maximum vCPUs and Memory Allowed For Virtual Machines

System	Total vCPUs for all Virtual Machines	Maximum vCPUs for each Virtual Machine	Total RAM for all Virtual Machines	Maximum RAM for each Virtual Machine
X2-4	40	28	984 GB	800 GB
X3-4	40	28	984 GB	800 GB
X4-4	60	28	1984 GB	800 GB
X5-4	72	28	1984 GB	800 GB
X6-4	72	28	1984 GB	800 GB

> **Note:**
>
> For the X2-4 and X3-4 Exalytics Machine, total memory on Oracle VM Server (16 GB) and all virtual machines (984 GB) cannot exceed 1000 GB. For the X4-4, X5-4, and X6-4 Exalytics Machine, total memory on Oracle VM Server (16 GB) and all virtual machines (1984 GB) cannot exceed 2000 GB.

To create virtual machines from a VM template:

1. Log on to Oracle VM Manager.

2. Select the **Servers and VMs** tab.

3. In the left pane toolbar, click **Create Virtual Machine**.

   The Create Virtual Machine dialog is displayed.

4. Select **Clone from an existing VM Template**.

5. Perform the following actions:

     a. In the Clone Count list, select the number of machines you want to clone.

     b. In the Repository list, select a repository for the machine.

     c. In the VM Template list, select the VM template from which you want to create the virtual machine.

     d. Enter a name for the virtual machine.

     e. In the Server Pool list, select a server pool.

     f. Enter a description for the virtual machine.

6. Click **Finish**.

The virtual machine is created and is ready to be configured.

To configure and start a virtual machine, configure a network on a virtual machine, and configure SWAP on a virtual machine, see Maintaining Virtual Machines.

For more information, see "Chapter 7, Managing Virtual Machines" in *Oracle VM User's Guide for Release 3.2.*

5.2 Configuring Existing Installations for Virtualization

If you are an existing customer running Oracle VM 3.0.3 or a later version, you must perform the following tasks:

- Upgrade to Oracle VM Server 3.3.3 and Oracle VM Manager 3.3.3. See Upgrading Oracle VM Manager and Oracle VM Server to 3.3.3.

- Upgrade to Oracle Exalytics Release 2.1 on the virtualized environment. See Upgrading to Oracle Exalytics Release 2.1 on a Virtualized Environment.

5.3 Upgrading Oracle VM Manager and Oracle VM Server to 3.3.3

This section includes the following topics:

> **Note:**
>
> Oracle recommends that you use the same release version of Oracle VM Manager and Oracle VM Server. This section is applicable to Exalytics X2-4, X3-4 and X4-4 servers only.

- Upgrading Oracle VM Server 3.0.3 (Base Image 2.0.1.1) or Later Version to Oracle VM Server 3.3.3

- Upgrading Oracle VM Manager 3.0.3 or Later Version to Oracle VM Manager 3.3.3

5.3.1 Upgrading Oracle VM Server 3.0.3 (Base Image 2.0.1.1) or Later Version to Oracle VM Server 3.3.3

If you are a new or existing customer running Oracle VM Server 3.0.3 or later version, you must upgrade to Oracle VM Server 3.3.3. For instructions, see Upgrading Oracle VM Server 3.0.3 (Base Image 2.0.1.1) or Later Version to Oracle VM Server 3.3.3.

5.3.2 Upgrading Oracle VM Manager 3.0.3 or Later Version to Oracle VM Manager 3.3.3

> **Note:**
>
> If you have already installed Oracle VM Manager 3.3.3, you can ignore this section.

If you are an existing customer running Oracle VM Manager 3.0.3 or later version, you must upgrade to Oracle VM Manager 3.3.3. For instructions, see Upgrading Oracle VM Manager 3.0.3 or Later version to Oracle VM Manager 3.3.3.

5.4 Upgrading to Oracle Exalytics Release 2.1 on a Virtualized Environment

Both new and existing customers must upgrade to Oracle Exalytics Release 2.1 on the virtualized environment. For instructions, see Upgrading to Oracle Exalytics Release 2.1 (2.2.0.0.0.ovs-3.3.3) on Virtual Deployments

5.5 Installing and Configuring Application Software on Virtual Machines

> **Note:**
>
> If you are an existing customer and have already installed and configured software on the virtual Exalytics Machine, you can ignore this section.

The process of installing Exalytics software on virtual machines is identical to installing the software on the non-virtual Exalytics Machine, except that the virtual machines cannot access the entire Exalytics memory. Keep in mind this limitation when setting kernel parameters related to shared memory or creating hugepages.

This section consists of the following topics:

- Prerequisites to Installing and Configuring Exalytics Software on Virtual Machines

- Installing and Configuring Exalytics Software on Virtual Machines

5.5.1 Prerequisites to Installing and Configuring Exalytics Software on Virtual Machines

The following prerequisites must be met before installing the Exalytics software on the virtual machines:

- You have created a virtual machine.

- You have created a virtual disk and associated it with the virtual machine.

  For more information on creating virtual machines and virtual disks, see "Chapter 7, Managing Virtual Machines" in *Oracle VM User's Guide for Release 3.2.*

5.5.2 Installing and Configuring Exalytics Software on Virtual Machines

This section consists of the following topics:

- Creating and Mounting a /u01 Partition
- Modifying the Oracle User and Granting Permissions
- Installing Application Software Components

5.5.2.1 Creating and Mounting a /u01 Partition

Before you can install the Exalytics software, you create and mount a /u01 partition on the virtual disk.

> **Note:**
>
> The following procedure assumes the /u01 partition size of 1.6TB. Depending on your specific needs and configuration, you can use a different size for the /u01 partition.

To create and mount a /u01 partition:

After logging in as the root user, configure the /u01 directory on the virtual disk using commands such as the following ones:

1. To create a partition, enter the following commands:

```
parted /dev/xvdb

GNU Parted 1.8.1

Using /dev/xvdb

Welcome to GNU Parted! Type 'help' to view a list of commands.

(parted) mklabel msdos

(parted) mkpart primary 0 1600GB

(parted) print
```

```
Model: Xen Virtual Block Device (xvd)

Disk /dev/xvdb: 1600GB

Sector size (logical/physical): 512B/512B

Partition Table: msdos

Number Start End Size Type File system Flags
1 32.3kB 1600GB 1600GB primary

(parted) quit
```

2. To create logical volume, enter the following commands:

```
lvm pvcreate /dev/xvdb1

Physical volume "/dev/xvdb1" successfully created

lvm vgcreate VolGroup01 /dev/xvdb1

Volume group "VolGroup01" successfully created
```

3. To view free extents on VolGroup01, enter the following commands:

```
vgs -o +vg_free_count,vg_extent_count

VG #PV #LV #SN Attr VSize VFree Free Ext

VolGroup01 1 0 0 wz--n- 1.46T 1.46T 381469 381469

lvm lvcreate --extents 381469 --name LogVol00 VolGroup01

Logical volume "LogVol00" created
```

4. To create a file system, enter the following command:

```
mkfs.ext4 /dev/VolGroup01/LogVol00
```

5. Add the following line to the /etc/fstab file:

```
/dev/VolGroup01/LogVol00 /u01 ext4 defaults 0 0
```

6. To mount the directory, enter the following commands:

```
mkdir /u01

mount /u01
```

7. Verify that the partition has been created by entering the following command:

```
df -lh
```

5.5.2.2 Modifying the Oracle User and Granting Permissions

The Virtual Machine template contains "oracle" as the operating system user name. Associate the user name with the "oinstall" group and create a password for it.

The procedures throughout this section assume a user named "oracle" and a group named "oinstall".

> **✎ Note:**
>
> To add a different user and group, enter the following commands as a root user:
>
> ```
> groupadd <name of the group>
>
> useradd -g <name of the group> <name of the user>
> ```

To modify the Oracle user and grant permissions:

1. Log in as root user.

2. Enter the following commands to associate the user name "oracle" with the group "oinstall" and to create a password:

   ```
   groupadd oinstall

   usermod -g oinstall oracle

   passwd oracle
   ```

3. Enter the following commands to grant permissions to the /u01 drive where the software is to be installed:

   ```
   chown oracle:oinstall /u01

   chmod 775 /u01
   ```

4. Start the VNC Server on the virtual machine.

5.5.2.3 Installing Application Software Components

The process of installing application software components on a virtual Exalytics Machine is similar to installing them on the non-virtualized Exalytics Machine. See Installing Software on an Exalytics Machine .

5.6 Maintaining Virtual Machines

This section includes the following topics:

- Viewing Virtual Machine Information and Events
- Configuring and Starting a Virtual Machine
- Configuring a Network on a Virtual Machine
- Increasing SWAP on a Virtual Machine
- Increasing the Size of the Root Partition on a Virtual Machine

5.6.1 Viewing Virtual Machine Information and Events

You can view virtual machine details and jobs associated with the virtual machine.

To view virtual machine information details:

1. Log on to Oracle VM Manager.

2. Select the **Servers and VMs** tab.

3. In the left pane, select the server pool on which the virtual machine resides.

4. From the Perspective list, select **Virtual Machines**.

5. In the Management pane, select a virtual machine.

6. Click the expand arrow to the left of the selected virtual machine.

   The following tabs are displayed:

   - Configuration: Displays general information about the virtual machine, such as the minimum and maximum memory and processors, operating system, domain type, high availability status, and so on.

   - Networks: Displays networks and VNICs used in the virtual machine.

   - Disks: Displays virtual and physical disks attached to the virtual machine.

To view virtual machine events:

1. Log on to Oracle VM Manager.

2. Select the **Servers and VMs** tab.

3. In the left pane, select the server pool on which the virtual machine resides.

4. From the Perspective list, select **Virtual Machines**.

5. In the Management pane, select a virtual machine.

6. In the toolbar, click **Display Selected VM Events**.

   The Events dialog is displayed.

7. Review the jobs associated with the virtual machine.

For more information, see "Chapter 7, Managing Virtual Machines" in *Oracle VM User's Guide for Release 3.2.*

5.6.2 Configuring and Starting a Virtual Machine

You start a virtual machine from Oracle VM Manager.

To configure and start a virtual machine:

1. Log on to Oracle VM Manager.

2. Select the **Servers and VMs** tab.

3. In the left pane, select the server pool on which the virtual machine resides.

4. From the Perspective list, select **Virtual Machines**.

5. In the Management pane, select a virtual machine, and from the toolbar click the **Edit**.

   The Edit Virtual Machine dialog is displayed.

6. Select the **Configuration** tab.

7. Select the necessary configuration for the virtual machine, and click **OK**.

8. Select the **Networks** tab.

9. Select and assign a VNIC to the virtual machine, and click **OK**.

10. Select the **Disks** tab.

11. Select and allocate the virtual disk to the virtual machine.

12. Click **OK**.

13. From the toolbar, click **Start**.

The virtual machine starts.

> **✎ Note:**
>
> When you start the virtual machine for the first time, the virtual machine takes approximately fifteen minutes to initialize.

For more information, see "Chapter 7, Managing Virtual Machines" in *Oracle VM User's Guide for Release 3.2.*

5.6.3 Configuring a Network on a Virtual Machine

After starting a virtual machine, you then configure the network on the virtual machine to enable it to access the network.

To configure a network on the virtual machine:

1. Log on to Oracle VM Server.

2. Enter the following command:

   ```
   xm list
   ```

   The Domain-0 and UUID number for the virtual machine are displayed.

3. Execute the following command:

   ```
   xm console <UUID_NUMBER_FOR_VIRTUAL_MACHINE>
   ```

   The console of the virtual machine is displayed.

4. Log in as root user with default password "ovsroot".

5. Enter the following command:

   ```
   system-config-network
   ```

6. Edit the eth0 device by entering the following information:

   - IP addresses
   - Netmask
   - Gateway
   - DNS settings

7. Click **Save and Quit**.

8. Run the following command to reload the network configuration:

   ```
   service network reload
   ```

9. Edit the /etc/hosts file to add the machine name and IP address.

5.6.4 Increasing SWAP on a Virtual Machine

Each VM guest is created with 1 GB of default swap space. To run Oracle Database In-Memory on an Exalytics Machine, you must increase the swap space to a minimum of 16 GB.

> **✎ Note:**
>
> The following procedure describes how to increase swap space by creating a new virtual disk (/dev/xvdd) of 20 GB.

To increase SWAP on the virtual machine:

1. Add a new virtual disk for the VM guest by performing the following actions:

    a. Log on to Oracle VM Manager.

    b. Select the **Servers and VMs** tab.

    c. In the left pane, select the server pool on which the virtual machine resides.

    d. From the Perspective list, select Virtual Machines.

    e. In the toolbar, click **Stop** to stop the virtual machine.

    Confirm that the virtual machine is stopped.

    f. In the toolbar, click **Edit**.

    The Edit Virtual Machine dialog is displayed.

    g. Click the **Disks** tab.

    h. Under Disk Type, select **Virtual Disk**.

    i. Under Actions, click **Add**.

    The Create Virtual Disk dialog is displayed.

    j. In the Virtual Disk Name field, enter a name for the virtual disk, in the Size field, enter 20, and then click **OK** twice.

    k. In the toolbar, click **Start** to start the virtual machine.

2. Add logical volume and create additional swap on the VM guest by performing the following actions:

    a. Log on the Oracle VM Server.

    b. To check details of the new virtual disk, enter the following command:

    ```
    fdisk -l
    ```

    The details of the new virtual disk are displayed. For example, if the new virtual disk is /dev/xvdd, an output similar to the following is displayed:

    ```
    ....
    Disk /dev/xvdd: 21.4 GB, 21474836480 bytes
    255 heads, 63 sectors/track, 2610 cylinders
    Units = cylinders of 16065 * 512 = 8225280 bytes
    ```

c. To create the new partition /dev/xvdd1, enter the following command as the root user:

```
# fdisk /dev/xvdd
```

Output similar to the following is displayed:

```
Device contains neither a valid DOS partition table, nor Sun, SGI or OSF
disklabel
Building a new DOS disklabel. Changes will remain in memory only,
until you decide to write them. After that, of course, the previous
content won't be recoverable.
The number of cylinders for this disk is set to 2610.
There is nothing wrong with that, but this is larger than 1024,
and could in certain setups cause problems with:
1) software that runs at boot time (e.g., old versions of LILO)
2) booting and partitioning software from other OSs
   (e.g., DOS FDISK, OS/2 FDISK)
Warning: invalid flag 0x0000 of partition table 4 will be corrected by
w(rite)
```

d. At the command prompt, enter *n*. For example:

Command (m for help): n

The following output is displayed:

```
Command action
   e   extended
   p   primary partition (1-4)
p
```

e. At the Partition number prompt, enter *1*. For example:

Partition number (1-4): 1

f. At the First cylinder (1-2610, default 1) prompt, press **Enter** to use the default value.

The following output is displayed:

```
Using default value 1
```

g. At the Last cylinder or +size or +sizeM or +sizeK (1-2610, default 2610) prompt, press **Enter** to use the default value.

The following is displayed:

```
Using default value 2610
```

h. At the command prompt, enter *t*. For example:

Command (m for help): t

The following is displayed:

```
Selected partition 1
```

i. At the Hex code (type L to list codes) prompt, enter *8e*.

The following is displayed:

```
Changed system type of partition 1 to 8e (Linux LVM)
```

j. At the command prompt, enter *w*. For example:

Command (m for help): w

The following is displayed:

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```
The partition table has been altered!
Calling ioctl() to re-read partition table.
Syncing disks.
```

k. To create the physical volume for the partition /dev/xvdd1, enter the following command:

```
# pvcreate /dev/xvdd1
```

l. To add the newly formatted disk to the existing volume group, enter the following command:

```
# vgextend VolGroup00 /dev/xvdd1
```

m. To create logical volume, enter the following command:

```
# lvcreate -L 20G VolGroup00 -n LogVol03
```

n. To format the logical volume for swap use, enter the following command:

```
# mkswap /dev/VolGroup00/LogVol03
```

o. To enable swap, enter the following command:

```
swapon /dev/VolGroup00/LogVol03
```

p. To verify the updated swap space, enter the following command:

```
# cat /proc/swaps
```

Output similar to the following is displayed:

```
Filename                            Type       Size       Used
Priority
/dev/mapper/VolGroup00-LogVol01     partition  1048572    0      -1
/dev/mapper/VolGroup00-LogVol03     partition  20971516   0      -2
```

q. Add the following line to the /etc/fstab file:

/dev/VolGroup00/LogVol03 swap swap defaults 0 0

5.6.5 Increasing the Size of the Root Partition on a Virtual Machine

Each virtual machine is created by default with a 100 GB root partition. If required, you can increase the size of the default logical volume VolGroup00-LogVol00 mounted at the root "/" directory of a virtual machine.

To increase the size of the root partition on the virtual machine:

1. Log in to the virtual machine as the root user.

2. To check the current physical volumes on the virtual machine, enter the following command:

```
# cat /proc/partitions
```

Output similar to the following is displayed:

```
major              minor  #blocks    name

 202      0   10485760     xvda
 202      1     257008     xvda1
 202      2   10225372     xvda2
 252      0    7340032     dm-0
 252      1    1048576     dm-1
 252      2     102400     dm-2
```

3. Add a new virtual disk for the VM guest by performing the following actions:

> **Note:**
>
> The following procedure describes how to create a new virtual disk of 100 GB.

   a. Log on to Oracle VM Manager.

   b. Select the **Servers and VMs** tab.

   c. In the left pane, select the server pool on which the virtual machine resides.

   d. From the Perspective list, select Virtual Machines.

   e. In the toolbar, click **Stop** to stop the virtual machine.

   Confirm that the virtual machine is stopped.

   f. In the toolbar, click **Edit**.

   The Edit Virtual Machine dialog is displayed.

   g. Click the **Disks** tab.

   h. Under Disk Type, select **Virtual Disk**.

   i. Under Actions, click **Add**.

   The Create Virtual Disk dialog is displayed.

   j. In the Virtual Disk Name field, enter a name for the virtual disk, in the Size field, enter 100, and then click **OK** twice.

   k. In the toolbar, click **Start** to start the virtual machine.

4. To check the current partitioning on the virtual machine, enter the following command:

```
# df -h
```

Output similar to the following is displayed:

```
Filesystem   Size  Used Avail Use%  Mounted on /dev/mapper/VolGroup00-LogVol00
             6.8G  2.9G 3.7G   44%   /dev/xvda1
             244M  35M  197M   15%   /boottmpfs
             50G   0    50G    0%    /dev/shm/dev/mapper/VolGroup00-LogVol02
             97M   5.6M 87M    7%    /shared_agent_instance_home
```

5. To check the new available physical volumes on the virtual machine, enter the following command:

```
# cat /proc/partitions
```

Output similar to the following is displayed:

```
major      minor     #blocks        name

 202         0       10485760       xvda
 202         1       257008         xvda1
 202         2       10225372       xvda2
 202        16       104857600      xvdb
 252         0       7340032        dm-0
 252         1       1048576        dm-1
 252         2       102400         dm-2
```

> **Note:**
>
> In the above example /dev/xvdb is the newly attached disk.

6. To partition the newly attached disk, perform the following actions:

    a. Enter the following command:

    ```
    # fdisk /dev/xvdb
    ```

    Output similar to the following is displayed:

    ```
    Device contains neither a valid DOS partition table, nor Sun, SGI or OSF
    disklabel
    Building a new DOS disklabel. Changes will remain in memory only,
    until you decide to write them. After that, of course, the previous
    content won't be recoverable.
    The number of cylinders for this disk is set to 13054.
    There is nothing wrong with that, but this is larger than 1024,
    and could in certain setups cause problems with:
    1) software that runs at boot time (e.g., old versions of LILO)
    2) booting and partitioning software from other OSs
       (e.g., DOS FDISK, OS/2 FDISK)
    Warning: invalid flag 0x0000 of partition table 4 will be corrected by
    w(rite)
    ```

    b. At the command prompt, enter *p*. For example:

    Command (m for help): p

    The following output is displayed:

    ```
    Disk /dev/xvdb: 107.3 GB, 107374182400 bytes
    255 heads, 63 sectors/track, 13054 cylinders
    Units = cylinders of 16065 * 512 = 8225280 bytes

    Device Boot      Start         End      Blocks   Id  System
    ```

    c. At the command prompt, enter *n*. For example:

    Command (m for help): n

    The following output is displayed:

    ```
    Command action
       e   extended
       p   primary partition (1-4)
    p
    ```

    d. At the Partition number prompt, enter *1*. For example:

    Partition number (1-4): 1

    e. At the First cylinder (1-13054, default 1) prompt, press **Enter** to use the default value.

    The following output is displayed:

    ```
    Using default value 1
    ```

    f. At the Last cylinder or +size or +sizeM or +sizeK (1-13054, default 13054) prompt, press **Enter** to use the default value.

    The following is displayed:

```
Using default value 13054
```

g. At the command prompt, enter *t*. For example:

Command (m for help): t

The following is displayed:

```
Selected partition 1
```

h. At the Hex code (type L to list codes) prompt, enter *8e*.

The following is displayed:

```
Changed system type of partition 1 to 8e (Linux LVM)
```

i. At the command prompt, enter *p*. For example:

The following is displayed:

```
Disk /dev/xvdb: 107.3 GB, 107374182400 bytes
255 heads, 63 sectors/track, 13054 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes

Device Boot      Start       End     Blocks     Id    System
/dev/xvdb1           1     13054    104856223+   8e    Linux LVM
```

j. At the command prompt, enter *w*. For example:

Command (m for help): w

The following is displayed:

```
The partition table has been altered!
Calling ioctl() to re-read partition table.
WARNING: Re-reading the partition table failed with error 16: Device or
resource busy.
The kernel still uses the old table.
The new table will be used at the next reboot.
Syncing disks.
```

k. Restart the virtual machine by performing the following actions:

   • Connect to Oracle VM Manager.

   • Select the **Servers and VMs** tab.

   • In the left pane, expand Server Pools, and then select the server pool containing the virtual machine.

   • Right-click the virtual machine, and select **Restart**.

l. To create the physical volume, enter the following command:

```
# pvcreate /dev/xvdb1
```

Output similar to the following is displayed:

```
Writing physical volume data to disk "/dev/xvdb1"
Physical volume "/dev/xvdb1" successfully created
```

m. To extend the volume group VolGroup00 to the physical volume /dev/xvdb1, enter the following command:

```
# vgextend VolGroup00 /dev/xvdb1
```

Output similar to the following is displayed:

```
Volume group "VolGroup00" successfully extended
```

n. To extend the logical volume LogVol00, enter the following command:

```
# lvextend -l +100%FREE /dev/VolGroup00/LogVol00
```

Output similar to the following is displayed:

```
Extending logical volume LogVol00 to 105.22 GB
Logical volume LogVol00 successfully resized
```

o. To resize the file system, enter the following command:

```
# resize2fs /dev/VolGroup00/LogVol00
```

Output similar to the following is displayed:

```
resize2fs 1.39 (29-May-2006)
Filesystem at /dev/VolGroup00/LogVol00 is mounted on /; on-line resizing
required
Performing an on-line resize of /dev/VolGroup00/LogVol00 to 28481536 (4k)
blocks.
The filesystem on /dev/VolGroup00/LogVol00 is now 28481536 blocks long.
```

p. To verify the resized root partition, enter the following command:

df -h

Output similar to the following is displayed:

```
Filesystem  Size  Used Avail Use% Mounted on/dev/mapper/VolGroup00-LogVol00
            106G  2.9G  97G  3%    //dev/xvda1
            244M   35M 197M 15%    /boottmpfs
            50G     0  50G  0%     /dev/shm/dev/mapper/VolGroup00-LogVol02
            97M  5.6M  87M  7%     /shared_agent_instance_home
```

6

Installing Software on an Exalytics Machine

This chapter describes how to use the Exalytics Domain Management Utility to install, configure, and manage life cycle functions of an Exalytics domain on an Exalytics Machine (both virtual and non-virtual deployments).This chapter also describes how to install and configure Oracle BI Applications on an Exalytics Machine. Finally, this chapter also describes how to install and configure Oracle Database In-Memory for Exalytics.

Exalytics customers install or upgrade software components based on their specific needs. Typically, customers deploy one of the following applications (single instance or multi-instance) on an Exalytics machine:

- Custom built Oracle Business Intelligence application (Oracle BI EE) and Oracle TimesTen for Exalytics
- Prebuilt Oracle BI Applications
- Oracle Enterprise Performance Management applications
- Oracle Endeca

This chapter includes the following sections:

- About the Exalytics Domain Management Utility
- Documents to Review
- Installing Business Intelligence Software on New Deployments
- Existing Business Intelligence Installations: Registering a Primary Business Intelligence Software Installation on an Exalytics Domain
- Installing and Configuring Oracle BI Applications on an Exalytics Machine
- Installing Oracle Enterprise Performance Management Applications
- Installing Oracle Endeca
- Installing Oracle Database In-Memory for Oracle Exalytics

6.1 About the Exalytics Domain Management Utility

The Exalytics Domain Management Utility creates an Exalytics domain on the Exalytics Machine. Each Exalytics domain is defined as the combination of an Oracle Business Intelligence domain and Oracle TimesTen. For each domain, the Exalytics Domain Management Utility automates the installation and configuration of Oracle Business Intelligence, Oracle WebLogic Server, Oracle Essbase, and optionally Oracle TimesTen for Exalytics. Each Exalytics domain has its own middleware home deployed within a specific directory structure and tracked in a central configuration file.

> **Note:**
>
> The Exalytics Domain Management Utility installs full versions of the software (for example, Oracle Business Intelligence 11.1.1.7.0 or 11.1.1.9.0). The Exalytics Domain Management Utility does not install patches. To apply the latest software patches, refer to the respective product Readmes.

Figure 6-1 illustrates a directory structure of an Exalytics domain.

Figure 6-1   Directory Structure of an Exalytics Domain
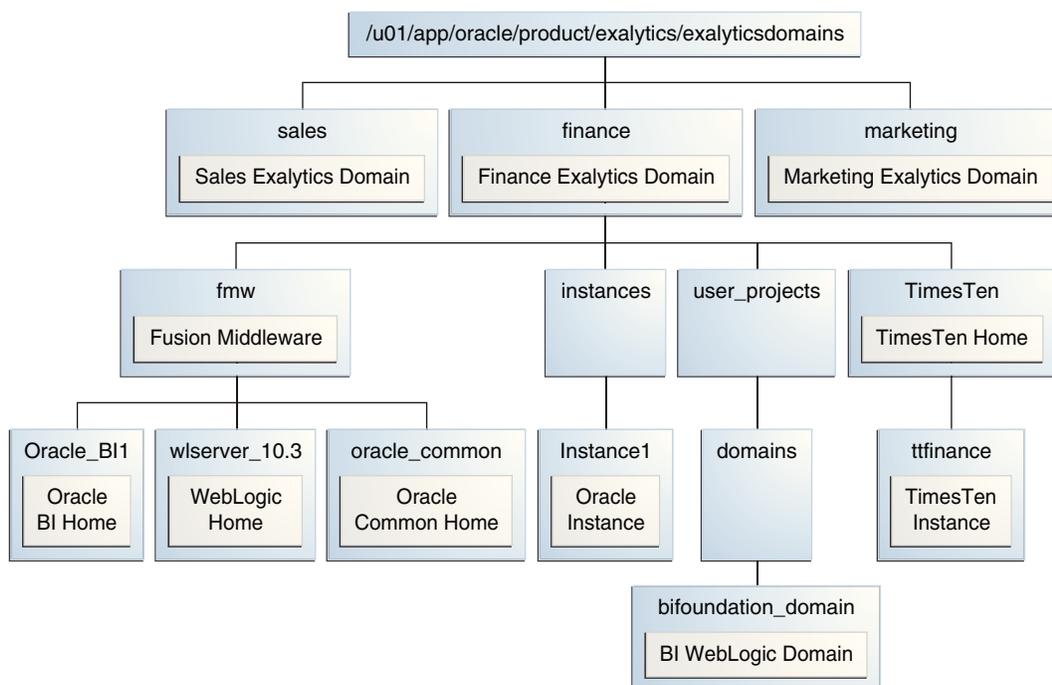
Therefore, by creating multiple domains on a single Exalytics Machine you can manage multiple installations of Oracle Business Intelligence, Oracle WebLogic Server, Oracle Essbase, and Oracle TimesTen for Exalytics.

> **Note:**
>
> Multiple Exalytics domains on a single Exalytics Machine must be created by the same operating system user.

In the above example (Figure 6-1), three Exalytics domains (Sales, Finance, and Marketing) are created on an Exalytics Machine. Each domain has its own subdirectories (fmw, instances, user_projects, and TimesTen). Also, as shown for the Finance domain, various components of the domain are located under different subdirectories.

> **Note:**
>
> The ports for each Exalytics domain are allocated in blocks of 100, starting with 12000. For example, the first domain has ports starting from 12000. The second domain has ports starting from 12100, and the third domain has ports starting from 12200, and so on.

The Exalytics Domain Management Utility also enables you to start and stop the domain, list the domains, and scaleout the Exalytics Domain software components. See Managing Exalytics Domains.

> **Note:**
>
> Oracle recommends that you use the Exalytics Domain Management Utility as the primary way to install software on the Exalytics Machine. If you need to install the software by using manual procedures, see Manual Procedures for Installing and Configuring Software on an Exalytics Machine.

6.2 Documents to Review

As you prepare to install Oracle Business Intelligence software on the Exalytics Machine, do the following:

- Review the Oracle Business Intelligence chapter in the *Oracle Fusion Middleware Release Notes*, to ensure that you understand the differences between Oracle Business Intelligence and its documented functionality, and any other issues that apply to the current release.

- Review the *Oracle TimesTen In-Memory Database Release Notes* to ensure that you understand the differences between Oracle TimesTen and its documented functionality, and any other issues that apply to the current release.

- Review Installation Overview to ensure that you understand the options and architecture related to installing software on the Exalytics Machine.

6.3 Installing Business Intelligence Software on New Deployments

This section consists of the following topics:

- Prerequisites for Installing Software on the Exalytics Machine
- Verifying Configuration of the Exalytics Machine
- Installing the Software by Using the Exalytics Domain Management Utility
- Postinstallation Tasks for Business Intelligence Software
- Managing Exalytics Domains
- Troubleshooting the Installation and Configuration Processes

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- Deinstalling Business Intelligence Software on the Exalytics Machine

6.3.1 Prerequisites for Installing Software on the Exalytics Machine

The following prerequisites must be met before installing Oracle Business Intelligence on the Exalytics Machine:

- The Exalytics Machine has been racked and mounted in a data center.

- Network configuration is complete and the computer is accessible from the network.

- If installing Oracle Business Intelligence Enterprise Edition 11.1.1.7.0, download and install JAVA 6 by performing the following steps:

  1. Navigate to `http://www.oracle.com/technetwork/java/javase/downloads/index.html`

  2. Scroll to the "Previous Releases - Java Archive" section at bottom of the page, and click **Download**.

  3. Click **Java SE6**.

  4. Click **Java SE Development Kit 6u45**.

  5. Click and download **jdk-6u45-linux-x64.rpm.bin**.

  6. To install the rpm file, enter the following command as the root user:

     ```
     # ./jdk-6u45-linux-x64.bin
     ```

  7. Set JAVA_HOME to the location where you installed JAVA 6. For example, if you installed JAVA 6 in the /usr/java/jdk1.6.0 directory, you set JAVA_HOME=/usr/java/jdk1.6.0_45.

- If installing Oracle Business Intelligence Enterprise Edition 11.1.1.9.0, download and install JAVA 7 by performing the following steps:

  1. Navigate to `http://www.oracle.com/technetwork/java/javase/downloads/index.html`

  2. Scroll to the "Previous Releases - Java Archive" section at bottom of the page, and click **Download**.

  3. Click **Java SE 7**.

  4. Click **Java SE Development Kit 7u76**.

  5. Click and download the **jdk-7u79-linux-x64.rpm**.

  6. To install the rpm file, enter the following command as the root user:

     ```
     # rpm -Uvh <rpm name>
     ```

  7. Set JAVA_HOME to the location where you installed JAVA 7. For example, if you installed JAVA 7 in the /usr/java/jdk1.7.0 directory, you set JAVA_HOME=/usr/java/jdk1.7.0_80+.

- You have installed Oracle Exalytics Release 2.1 (Oracle Exalytics Base Image 2.0.0.1.el6).

  The Exalytics Machine is configured with the base operating system at the factory.

  If you need assistance, then Oracle provides Advanced Customer Services for installing software on the Exalytics Machine.

- A supported database (For example: Oracle Database In-Memory) is available and accessible from the Exalytics Machine to host the schemas that are required by the Exalytics Domain Management Utility as part of the installation process. Ensure that the database is running during the installation and that the database is not hardened for security purposes. Installing Oracle Business Intelligence against a hardened database is not supported.

  For information about hardened databases, see *Oracle Database Vault Administrator's Guide*.

- You have access to the internet from a computer (not necessarily the Exalytics Machine) to download required packages.

6.3.2 Verifying Configuration of the Exalytics Machine

Before you install software on the Exalytics Machine, you must run configuration scripts to verify the software and network configurations of the Exalytics Machine.

This section consists of the following topics:

- Verifying Exalytics Software and Storage Configurations
- Verifying Exalytics Image Information

6.3.2.1 Verifying Exalytics Software and Storage Configurations

You run the `exalytics_CheckSWProfile` script to verify the current Exalytics software and storage configurations.

To verify Exalytics software and storage configurations:

1. Log on to the Exalytics Machine.

2. Navigate to the */opt/exalytics/bin* directory.

3. Enter the following command:

```
./exalytics_CheckSWProfile
```

4. Verify that the output displayed is similar to the following:

```
[SUCCESS].......Has supported operating system
[SUCCESS]........Has supported processor
[SUCCESS]........Kernel is at the supported version
[SUCCESS]........Has supported kernel architecture
[SUCCESS]........Software is at the supported profile
```

6.3.2.2 Verifying Exalytics Image Information

You run the `exalytics_imageinfo` script to verify the current Exalytics image and version details.

To verify the Exalytics image information:

1. Log on the Exalytics Machine as a root user.

2. Navigate to the */opt/exalytics/bin* directory.

3. Enter the following command:

```
./exalytics_imageinfo
```

4. For the Linux 6 operating system, verify the image. The output similar to the following is displayed:

- ```
  Image version : 2.0.0.1_el6
  Creation timestamp : Tue 26 May 2015 07:41:00 AM EDT
  Kernel version : 2.6.39-400.277.1.el6uek.x86_64

  RPM versions:
  kernel-uek-2.6.39-400.277.1.el6uek.x86_64
  kernel-2.6.32-504.el6.x86_64
  exalytics-container-bm-2.0.0.0-2_el6.x86_64
  exalytics-scripts-2.0.0.0-9_el6.noarch
  exalytics-flash-2.0.0.0-2_el6.x86_64
  exalytics-domain-configure-2.0.0.0-4_el6.noarch
  exalytics-deps-exact-2.0.0.0-2_el6.x86_64
  exalytics-deps-minimum-2.0.0.0-2_el6.x86_64
  [root@slck44003 bin]#
  ```

> **Note:**
>
> Even though the build numbers may be different than the ones listed above, ensure that the updated kernel version is the same as the one displayed above.

6.3.3 Installing the Software by Using the Exalytics Domain Management Utility

Installing software on an Exalytics Machine involves running the Exalytics Domain Management Utility. The Exalytics Domain Management Utility provides an automatic way of installing software on the Exalytics Machine by performing the following tasks:

- Creating the RCU BIPLATFORM and MDS database schemas (if needed)
- Installing Oracle WebLogic Server
- Performing a Software Only install of Oracle Business Intelligence
- Installing Oracle Essbase Suite (if needed)
- Creating an Oracle Business Intelligence instance
- Configuring the Oracle Business Intelligence domain

If required, the Exalytics Domain Management Utility also provides an automated way of installing Oracle TimesTen In-Memory Database and configuring communication with a software install of Oracle BI EE.

The steps in the process are:

- Creating a Password on the Operating System
- Optional: Creating the Inventory for Oracle TimesTen
- Optional: Setting Resource Limits for Oracle TimesTen
- Assigning User Limits to New Users
- Downloading the Oracle Installation Files into a Staging Directory Structure

6.3.3.1 Creating a Password on the Operating System

If you are installing the software on an Exalytics Machine with the Release 1 Patchset 3 Base Image or later, a user named "oracle" and a group named "oinstall" already exists. You next create a password for the user.

To create a password:

1. Log in as the root user.

2. To create a password, enter the following command:

   ```
   passwd oracle
   ```

3. Enter the password.

4. Confirm the password when prompted.

> **Note:**
>
> You must use the same operating system user to create multiple Exalytics domains on a single Exalytics Machine.

The procedures throughout this section assume a user named "oracle" and a group named "oinstall".

> **Note:**
>
> To add a different user and group, enter the following commands as root user:
>
> ```
> groupadd <name of the group>
> ```
>
> ```
> useradd -g <name of the group> <name of the user>
> ```

6.3.3.2 Optional: Creating the Inventory for Oracle TimesTen

If you are installing Oracle TimesTen, then create the inventory for Oracle TimesTen after you log in as the root user by entering the following commands:

```
mkdir /etc/TimesTen
chmod 770 /etc/TimesTen
chgrp oinstall /etc/TimesTen
touch /etc/TimesTen/instance_info
```

```
chmod 770 /etc/TimesTen/instance_info
chgrp oinstall /etc/TimesTen/instance_info
```

Ensure that the group who runs the script has write access to the /etc/TimesTen directory.

6.3.3.3 Optional: Setting Resource Limits for Oracle TimesTen

If you are installing Oracle TimesTen, then set resource limits for Oracle TimesTen by performing the following tasks:

To set the resource limits for Oracle TimesTen:

1. Make the following changes to the /etc/security/limits.conf file:

```
*        hard nofile 131072
*        soft nofile 131072
*        hard memlock unlimited
*        soft memlock unlimited
*        hard core unlimited
*        soft core unlimited
```

2. Make the following additions to the /etc/security/limits.conf file:

```
*     hard nproc     131072
*     soft nproc 131072
```

3. Depending on the amount of RAM in the Exalytics Machine, make the following shared memory kernel setting in the /etc/sysctl.conf file:

```
kernel.shmmax = 1099511627776 (For an Exalytics Machine with 1 TB of RAM)
kernel.shmmax = 2199023255552 (For an Exalytics Machine with 2 TB of RAM)
```

4. Add the following shared memory kernel setting in the /etc/sysctl.conf file:

```
kernel.shmmni = 4096
```

5. Add the following setting for semaphores in the /etc/sysctl.conf file:

```
kernel.sem = 2048 64000 256 128
```

6. Reboot the machine or run the following command as the root user:

```
/sbin/sysctl -p
```

6.3.3.4 Assigning User Limits to New Users

If not yet done, assign user limits to new users. User limit is the maximum amount of processors a user can run at the same time. When you add a new user, the user is assigned a low user limit by default. To ensure the new user can run enough processors, you must assign new user limits.

To assign user limits to a new user:

1. Log on as the root user.

2. Edit the /etc/security/limits.conf file by adding the following lines:

   <name of the user> soft nproc 131072

   <name of the user> hard nproc 131072

   <name of the user> soft nofile 131072

<name of the user> hard nofile 131072

6.3.3.5 Downloading the Oracle Installation Files into a Staging Directory Structure

Before installing the software you must download the required files into an organized Installers directory structure. Please note that the directory structures detailed in Step 3 below are not mandatory, but is just an example. You can choose any structure to organize the files.

For information about which version of the software to download, see the *Oracle Exalytics Certification Matrix* at the following location:

http://www.oracle.com/technetwork/middleware/ias/downloads/fusion-certification-100350.html

To download the installation files into the directory structure:

1. Log in as the user you created. See, Creating a Password on the Operating System.

2. Download the following required software installers from the Media Pack and patches for Oracle Exalytics under Oracle Business Intelligence software for Linux X86-64 on Oracle Software Delivery Cloud at the following location:

   http://edelivery.oracle.com/

   • Oracle BI Enterprise Edition Release 11*g*

   • Repository Creation Utility that corresponds with the appropriate Oracle BI EE Release

   • Oracle TimesTen Release 11*g*

   • Oracle WebLogic Server Release 10*g*

   For information about downloading and applying the latest Oracle Exalytics patch, see Upgrading to Oracle Exalytics Release 2.1 on Non-Virtual Deployments .

3. As the user who owns the installation of the Oracle Exalytics software, create an Installers directory structure such as the following for staging the software installation programs, if the user name is "oracle" and the home directory is /home/oracle:

   • /home/oracle/Installers/rcu

     Copy the Repository Creation Utility (RCU) zip file into the /home/oracle/Installers/rcu directory.

     Enter the following command to unzip the contents of the RCU zipped file into /home/oracle/Installers/rcu directory:

     ```
     unzip -q '*.zip'
     ```

   • /home/oracle/Installers/bi

     Copy the Oracle BI EE installation zip files into this directory and unzip them using the following command. The -q parameter reduces the number of lines of output that are sent to the console.

     ```
     unzip -q '*.zip'
     ```

The unzip process creates a subdirectory called bishiphome that contains subdirectories with names of Disk1 through Disk5.

- /home/oracle/Installers/timesten

    Copy the TimesTen for Exalytics distribution file into this directory and *do not* unzip it. The file has an extension such as .zip or .tar.gz. The installation scripts work with a file of either extension.

- /home/oracle/Installers/wls

    Navigate to eDelivery and obtain the zip file for Oracle WebLogic Server Oracle WebLogic Server 11gR1 (10.3.6) Generic and Coherence (Part number V29856-01) and extract the file with a name such as wls1036_generic.jar into this directory.

Figure 6-2 illustrates the Installers directory structure.

Figure 6-2   Installers Directory Structure
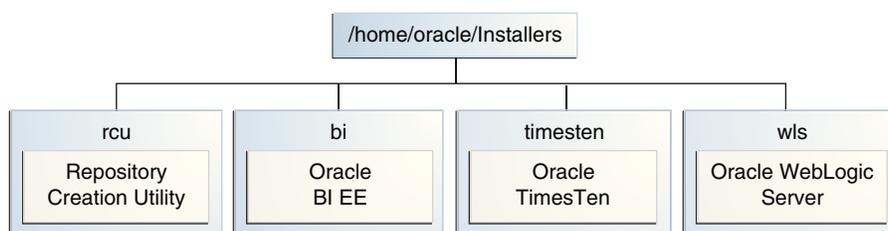
6.3.3.6 Creating an Input Properties File

You next create an input properties file. You reference the input properties file when running the command to create an Exalytics domain. The input properties file contains the following parameters:

- Location of the "Installers" directory. See Step 3 in Downloading the Oracle Installation Files into a Staging Directory Structure.

- Install group of the user performing the installation. See Creating a Password on the Operating System.

To create an input properties file:

The procedures throughout this section assume the name of the input properties file as "input.properties" and the location of the file at /home/oracle.

1. Open a text editor.

2. Add the following lines in the text editor:

    EXALYTICS_INSTALLERS_DIR=<*location of your installers directory*>

    For example: EXALYTICS_INSTALLERS_DIR=/home/oracle/Installers

    INST_GROUP=<*the install group of the user performing the install*>

    For example: INST_GROUP=oinstall

    The following is an example of an input properties file:

    EXALYTICS_INSTALLERS_DIR=/home/oracle/Installers

    INST_GROUP=oinstall

3. Save the file in a directory of your choice.

To run the Exalytics Domain Management Utility in silent mode, you must provide additional parameters in the input properties file. An example of the silent mode properties file named noprompts.exalytics.properties is located in the /opt/exalytics/ domainconfig/properties directory.

The following is an example of the silent mode input properties file:

> **✎ Note:**
>
> You can optionally exclude passwords from the response file. This prompts users to enter the required passwords when they run the input properties file in silent mode.

```
################################################################################
# This example input properties file allows a "silent" install without any prompts
#
# EXALYTICS_INSTALLERS_DIR - the repository containing all the shiphome installers
#
#
# Download and Copy the WebLogic Linux X64 installer from Oracle EDelivery to the
SHIPHOME_INSTALLERS_DIR/wls directory
# Download and Copy the BISHIPHOME zip files from Oracle EDelivery to the
SHIPHOME_INSTALLERS_DIR/bi directory and unzip the zips
# Download and Copy the RCU zip file from Oracle EDelivery to the
SHIPHOME_INSTALLERS_DIR/rcu directory and unzip it
#
#
# INST_GROUP - The group name of the installing user eg. oinstall
################################################################################
EXALYTICS_INSTALLERS_DIR=/home/oracle/EXALYTICS_INSTALLERS
INST_GROUP=oinstall

################################################################################
# Admin Credentials
################################################################################
ADMIN_USER_NAME=weblogic
ADMIN_PASSWORD=welcome1

################################################################################
# Schema details:
# These are only required for "add_domain" action
################################################################################

# Specify whether you want to create new schemas or use existing schemas
# Can be true or false. If you say yes, then the script will create the schemas
using RCU
DATABASE_CREATE_SCHEMAS=false

#Connection string to the database
DATABASE_CONNECTION_STRING=host:1521:orcl

#Database type
DATABASE_TYPE='Oracle Database'

#----------------------------------------------------------------------------
```

ORACLE

```
# The following properties are only required if DATABASE_CREATE_SCHEMAS=false, ie.
use existing schemas
#------------------------------------------------------------------------------
DATABASE_SCHEMA_USERNAME_BI=EXAMPLE_BIPLATFORM
DATABASE_SCHEMA_PASSWORD_BI=welcome1
DATABASE_SCHEMA_USERNAME_MDS=EXAMPLE_MDS
DATABASE_SCHEMA_PASSWORD_MDS=welcome1


#------------------------------------------------------------------------------
# The following properties are only required if DATABASE_CREATE_SCHEMAS=true, ie.
create new schemas using RCU
#------------------------------------------------------------------------------
DATABASE_SCHEMA_CREATOR_USERNAME=sys
DATABASE_SCHEMA_CREATOR_PASSWORD=welcome1
DATABASE_SCHEMA_CREATOR_ROLE=sysdba
DATABASE_SCHEMA_PREFIX=EXAMPLE
DATABASE_SCHEMA_PASSWORD_BI=welcome1
DATABASE_SCHEMA_PASSWORD_MDS=welcome1



################################################################################
####################

# These are only required for "scaleout_domain" action
################################################################################
####################
DOMAIN_HOSTNAME=myhost.example.com
DOMAIN_PORT=12000

#Other prompts
CONFIGURE_ESSBASE_SUITE=true
INSTALL_EXALYTICS_IN_MEMORY_SOFTWARE=true
```

6.3.3.7 Verifying User Permissions to the /u01 Directory

Before running the configuration script, ensure that the user who is running the script has write permissions to the /u01 directory.

If the user cannot write to the /u01 directory, then, as root user, enter the following commands to change permissions:

```
chown <name of the user>:<name of the group> /u01
```

```
chmod 775 /u01
```

For example:

```
chown oracle:oinstall /u01
```

```
chmod 775 /u01
```

6.3.3.8 Creating an Exalytics Domain

You run the Exalytics Domain Management Utility to create an Exalytics domain.

To create an Exalytics domain:

1. Log in to the Exalytics Machine as the user "oracle" or the new user you created. See Creating a Password on the Operating System.

2. To create an Exalytics domain, enter the following command:

```
/opt/exalytics/bin/exalytics-domain-management.sh --action=add_domain --
input=<location and name of the input properties file> --domain=<domain_name>
```

For example:

```
/opt/exalytics/bin/exalytics-domain-management.sh --action=add_domain --
input=/home/oracle/Installers/input.properties --domain=menlo
```

3. When prompted by the Exalytics Domain Management Utility, perform the following tasks:

   a. Enter the user name and password you want to use for the Oracle WebLogic Server administrator.

   b. Select a database type from the following list:

      Oracle Database

      Microsoft SQL Server

      IBM DB2

   c. Choose whether you want to create new schemas or use existing schemas.

   d. If you are creating new schemas, enter the following information:

      Database connect string (in the *host: port: servicename* format)

      For example: oracle.com:1521:orcl

      sys/dba user name and password

      sys/dba role

      Prefix for the schemas

      BIPLATFORM and MDS schema passwords

   e. If you are using existing schemas, enter the following information:

      Database connect string (in the *host:port:servicename* format)

      For example: oracle.com:1521:orcl

      Real Application Clusters Database (RAC DB) connect string in the *host1:port1:instance1^host2:port2:instance2@servicename* format.

      For example:

      custdbhost1:1521:custdb1^custdbhost2:1521:custdb2@orcl

      BIPLATFORM schema user name and password

      MDS schema user name and password

   f. Choose whether you want to install and configure Oracle Essbase Suite.

      If you choose this option, the Exalytics Domain Management Utility automatically installs and configures Oracle Essbase.

> **Note:**
>
> To install Oracle BI Applications on the Exalytics Machine, you must install and configure Oracle Essbase Suite. See Installing and Configuring Oracle BI Applications on an Exalytics Machine.

ORACLE

g. Choose whether you want to install Oracle Exalytics In-Memory Software.

If you choose to install Oracle Exalytics In-Memory Software, the HardwareAcceleration MBean attribute is enabled.

The Exalytics Domain Management Utility performs the following tasks:

- Creates schemas (if chosen)

- Installs and configures Oracle BI EE, Oracle WebLogic Server, Oracle Essbase Suite (if needed).

After the installation completes, the status of the domain is displayed as follows:

```
**************************************************************************

                 Status report for the Exalytics Domain: menlo
*                                                                        *
**************************************************************************


=========================================================================
OPMN Managed Processes Status
=========================================================================
OPMN status report as of Thu Nov 07 14:12:33 2013

Processes in Instance: menlo
--------------------------------+--------------------+---------+---------
ias-component                   | process-type       |     pid | status
--------------------------------+--------------------+---------+---------
essbasestudio1                  | EssbaseStudio      |   23985 | Alive
essbaseserver1                  | Essbase            |   15518 | Alive
coreapplication_obiccs1         | OracleBIClusterCo~ |   14823 | Alive
coreapplication_obisch1         | OracleBIScheduler~ |   15418 | Alive
coreapplication_obijh1          | OracleBIJavaHostC~ |   15189 | Alive
coreapplication_obips1          | OracleBIPresentat~ |   14994 | Alive
coreapplication_obis1           | OracleBIServerCom~ |   14866 | Alive



=========================================================================
WebLogic Servers Status
=========================================================================
WebLogic status report as of Thu Nov 07 14:12:33 2013

Servers in this host for WebLogic domain bifoundation_domain:
------------+------------------------+-----------+-------+---------
Server name | type                   | pid       | port  | status
------------+------------------------+-----------+-------+---------
AdminServer | WebLogic AdminServer   | 18223     | 12200 | RUNNING
bi_server1  | WebLogic Managed Server| 19585     | 12201 | RUNNING
=========================================================================
```

The script execution took 40 minutes and 13 seconds. For details, see the log file /u01/app/oracle/product/exalytics/logs/ exalytics_domain_menlo_add_domain_2013-11-07_125423.log

6.3.3.9 Installing Oracle TimesTen for Exalytics

If required, you can use the Exalytics Domain Management Utility to install Oracle TimesTen on an existing Exalytics domain.

For information on the Installers directory structure and where to download Oracle TimesTen installers, see Downloading the Oracle Installation Files into a Staging Directory Structure.

To install Oracle TimesTen:

1. Log in to the Exalytics Machine as the user "oracle" or the new user you created. See Creating a Password on the Operating System.

2. Verify the status of the existing domain. The domain should be up and running. See Viewing Status of an Exalytics Domain.

3. To install Oracle TimesTen, enter the following command:

   ```
   /opt/exalytics/bin/exalytics-domain-management.sh --action=add_timesten --
   input=<location and name of the input properties file> --domain=<name of
   existing domain>
   ```

   For example:

   ```
   /opt/exalytics/bin/exalytics-domain-management.sh --action=add_timesten --
   input=/home/oracle/Installers/input.properties --domain=menlo
   ```

The Exalytics Domain Management Utility performs the following actions:

1. Prompts you to enter the user name and password for the Oracle WebLogic Server administrator.

2. Extracts the Oracle TimesTen installer.

3. Installs and configures Oracle TimesTen.

After the installation is complete, the following message is displayed:

```
[LOGMSG] [11-12-13 11:11:10] [INFO] [menlo] [add_timesten] TimesTen Installed
Successfully
```

6.3.3.10 Installing Oracle Database In-Memory

If required, you can also use the Exalytics Domain Management Utility to install Oracle Database In-Memory on an existing Exalytics domain.

For information on the Installers directory structure and where to download Oracle TimesTen installers, see Downloading the Oracle Installation Files into a Staging Directory Structure.

6.3.3.11 Verifying the Installation

To verify that the installation was successful, you run the <list_domain> command of the Exalytics Domain Management Utility. The command displays all existing domains. If the domain is displayed, then the installation succeeded. For instructions on running the <list_domain> command, see Listing Exalytics Domains.

If the installation is successful, the output looks similar to the following:

```
                Exalytics Domain: menlo
============================================================
Node type: Primary node
Provisioning status: Completed
Middleware Home: /u01/app/oracle/product/exalytics/exalyticsdomains/menlo/fmw
BI Instance Home: /u01/app/oracle/product/exalytics/exalyticsdomains/menlo/instances/
instance1
```

```
     | Application URLs |
     -------------------
Oracle Enterprise Manager: http://<server-name>:12000/em
Oracle WebLogic Admin Console: http://<server-name>:12000/console
Oracle Business Intelligence: http://<server-name>:12001/analytics
Oracle BI Publisher : http://<server-name>:12001/xmlpserver


     ------------
     | WebLogic |
     ------------
Domain Home: /u01/app/oracle/product/exalytics/exalyticsdomains/menlo/user_projects/
domains/bifoundation_domain
Admin Server Host: <server-name>
Admin Server Port: 12000
BI Managed Server Host: <server-name>
BI Managed Server Port: 12001


     ------------
     | TimesTen |
     ------------
TimesTen enabled: Yes
Timesten Instance Name: ttmenlo
Instance Directory: /u01/app/oracle/product/exalytics/exalyticsdomains/menlo /
TimesTen/ttmenlo
Timesten Daemon Port: 12158
Timesten Server Port: 12159


     -----------------
     | Essbase Suite |
     -----------------
Essbase Suite enabled: Yes
Workspace: http://<server-name>:12001/workspace
APS: http://<server-name>:12001/aps
EAS Console: http://<server-name>:12001/easconsole
Essbase Port: 12016


===============================================================

Found 1 domain(s) in total
```

6.3.4 Postinstallation Tasks for Business Intelligence Software

The postinstallation tasks vary depending on whether you are deploying on multiple computers, as described in Deploying Oracle Exalytics for High Availability . The tasks include updating files and configuring an ODBC connection.

For a single-node installation, the Exalytics Domain Management Utility performs many of the configuration tasks. For a multiple node system, you must perform the configuration tasks manually. The sections of this chapter indicate on which computers to perform the tasks.

> **✎ Note:**
>
> If you are deploying software on a Exalytics Machine configured for virtualization, postinstallation tasks and various parameters may vary.

The section includes the following topics:

- Installing and Deinstalling Oracle Business Intelligence Client Tools
- Creating the boot.properties File
- Starting and Stopping Components on an Exalytics Machine
- Running the Daemon Configuration Scripts for Oracle TimesTen
- Configuring Memory Settings on the Server
- Instantiating the Oracle TimesTen In-Memory Database
- Configuring the ODBC Connection from Oracle Business Intelligence to Oracle TimesTen
- Mapping Instances of Oracle TimesTen into the Physical Layer of the Oracle BI Repository
- Installing and Configuring BI Composer for Oracle BI EE
- Creating a DSN for IBM DB2 or Microsoft SQL Server
- Configuring IBM DB2 to Support Multibyte Data
- Configuring Sample Reports for Oracle BI Publisher
- Changing the Default Password for SampleAppLite.rpd
- Adding the ORACLEHARDWAREACCELERATION TRUE Parameter for Essbase
- Enabling Bursting Optimization for BI Publisher
- Disabling HugePages

6.3.4.1 Installing and Deinstalling Oracle Business Intelligence Client Tools

Perform this task one time regardless of the number of computers in the cluster.

You must install the Oracle Business Intelligence Administration Tool, Oracle Business Intelligence Job Manager, and Oracle Business Intelligence Catalog Manager on a Windows computer. See "Installing and Deinstalling Oracle Business Intelligence Client Tools" in *Installing and Configuring Oracle Business Intelligence*.

6.3.4.2 Creating the boot.properties File

Perform the following steps to create a boot.properties file for the Administration Server. This file enables the Administration Server to start without prompting you for the administrator user name and password.

Perform this task on each computer in the cluster.

To create boot.properties file:

1. Go to the following directory:

   ORACLE_BASE/admin/domain_name/aserver/domain name/servers/AdminServer/security

2. In this directory, create a file called boot.properties using a text editor and enter the following lines in the file:

   username=Admin_Username

password=Admin_Password

3. Save the file and close the editor.

6.3.4.3 Starting and Stopping Components on an Exalytics Machine

After making configuration changes, you stop and start components on the Exalytics Machine to enable those changes to take effect.

You run the Exalytics Domain Management Utility to start and stop the Exalytics domain. When you start a primary or scaled-out Exalytics domain, all components on the domain start. If Oracle TimesTen is installed, the Oracle TimesTen Server starts. Similarly, when you stop a primary or scaled-out Exalytics domain, all components on the domain stop. If Oracle TimesTen is installed, the Oracle TimesTen Server stops. See Starting and Stopping an Exalytics Domain.

6.3.4.4 Running the Daemon Configuration Scripts for Oracle TimesTen

You run the daemon configuration scripts to enable Oracle TimesTen services to start each time you restart the Exalytics Machine.

Perform this task on each computer in the cluster.

Run the daemon configuration scripts for Oracle TimesTen as root, using the following command:

```
<install_location>/TimesTen/tt1122/bin/setuproot -install
```

6.3.4.5 Configuring Memory Settings on the Server

Perform this task on each computer in the cluster.

When you configure memory settings, keep the following in mind:

- If an Oracle TimesTen In-Memory Database larger than 256 GB is required, then you must configure and use large pages.

  See "Large pages" in *Oracle TimesTen In-Memory Database Installation Guide* for additional information on defining the Oracle TimesTen In-Memory Database in the DSN and on editing the limits.conf file for kernel parameters and semaphores.

- The largest recommended size for a Oracle TimesTen In-Memory Database on a single machine is a total of 800 GB for an X2-4 Exalytics Machine, and 1800 GB for an X3-4 Exalytics Machine, which includes the values for the PermSize and TempSize attributes.

> **✎ Note:**
>
> Increasing large page settings for more memory will result in other applications (Oracle BI EE, Oracle Essbase) unable to allocate memory. Exceeding more than 80% of the physical memory is not recommended. Depending on how much more PermSize memory is required, you can transfer memory from the TempSize.

- Configuring Large Pages at the Kernel Level

- Configuring Large Pages for Oracle TimesTen In-Memory Databases
- Increasing PermSize on Existing Oracle TimesTen In-Memory Databases

6.3.4.5.1 Configuring Large Pages at the Kernel Level

You can configure and activate the number of large pages by setting the nr_hugepages parameter in the /etc/sysctl.conf file. For example, for an 800 GB Oracle TimesTen In-Memory Database, you must specify greater than 410122 pages to create an 800 GB store based on the following calculation:

```
(PermSize + TempSize + LogBufMB + 20) / hugepage_size     [All in bytes]
(400*1024*1024*1024) + (400*1024*1024*1024) + (1024*1024*1024) + (20*1024*1024) =
860088172544
 860088172544 / (2 * 1024 * 1024) = 410122
```

For example, to allow for spare capacity, modify the following setting in the /etc/sysctl.conf file:

```
vm.nr_hugepages = 410200
```

then either restart the machine or run the following command as the root user:

```
/sbin/sysctl –p
```

> **Note:**
>
> The above calculations are an example for a 800 GB Oracle TimesTen database. Depending on the size of your Oracle TimesTen database deployed and the type of deployment (virtual or non-virtual), you can use different calculations.

6.3.4.5.2 Configuring Large Pages for Oracle TimesTen In-Memory Databases

You can configure large pages for the Oracle TimesTen In-Memory Database by editing the following file:

<install_location>/TimesTen/tt1122/info/ttendaemon.options

and adding the following line:

```
-linuxLargePageAlignment 2
```

6.3.4.5.3 Increasing PermSize on Existing Oracle TimesTen In-Memory Databases

After configuring large pages for the Oracle TimesTen In-Memory Database, you can increase the PermSize on existing Oracle TimesTen In-Memory Databases.

To increase PermSize on existing Oracle TimesTen In-Memory Databases:

1. Disconnect all applications, including Oracle BI EE, from the Oracle TimesTen In-Memory Database.

2. If needed, change the RAM policy from inUse to Manual.

3. Unload the RAM memory from the Oracle TimesTen In-Memory Database by executing the following command:

```
ttAdmin -ramunload <Your_TT_DSN>
```

For example:

ttAdmin -ramunload TT_AGGR_STORE

4. Modify the *timesten-install-dir/info/sys.odbc.ini* file in the Oracle TimesTen In-Memory Database to increase the PermSize.

5. Reload the RAM memory in the Oracle TimesTen In-Memory Database, by executing the following command:

```
ttAdmin -ramload <Your_TT_DSN>
```

For example:

ttAdmin -ramload TT_AGGR_STORE

6. Reconnect all applications, including Oracle BI EE, to the Oracle TimesTen In-Memory Database.

For more information, see the "Oracle TimesTen In-Memory Database". The link to "Oracle TimesTen In-Memory Database Documentation" is available on the Oracle Exalytics Documentation Library.

6.3.4.6 Instantiating the Oracle TimesTen In-Memory Database

Perform this task on each computer in the cluster. For the first computer, the Exalytics Domain Management Utility updates the sys.odbc.ini file, then you perform the rest of the task manually.

The Oracle TimesTen In-Memory Databases are defined using a DSN that is contained in the sys.odbc.ini file in the following directory:

<install_location>/TimesTen/tt1122/info

The Exalytics Domain Management Utility automatically updates the sys.odbc.ini file for Oracle TimesTen with a default configuration for the in-memory aggregate store for Oracle Exalytics, as shown in the following excerpts from a sample file on an Exalytics Machine:

```
[ODBC Data Sources]
TT_AGGR_STORE=TimesTen 11.2.2 Driver

[TT_AGGR_STORE]
Driver=/u01/app/oracle/product/TimesTen/tt1122/lib/libtten.so
DataStore=/u01/app/oracle/product/aggregate_store/tt_aggr_store
LogDir=/u01/app/oracle/product/aggregate_store/logs
DatabaseCharacterSet=AL32UTF8
ConnectionCharacterSet=AL32UTF8
LogFileSize=1024
LogBufMB=1024
LogBufParallelism=16
Preallocate=0
PermSize=25000
TempSize=25000
MemoryLock=4
CkptFrequency=30
CkptLogVolume=0
CkptRate=20
PrivateCommands=1
RecoveryThreads=40
```

This DSN supports an Oracle TimesTen In-Memory Database of 25GB with overall memory consumption of approximately 50GB. To support larger in-memory data stores, increase the settings of the PermSize and TempSize parameters. To support this DSN definition, the semi-automated installation process creates the following directories on the Exalytics Machine:

<install_location>/exalytics/exalyticsdomains/<domainname>/TimesTen/ tt<domainname>/aggregate_store/

<install_location>/exalytics/exalyticsdomains/<domainname>/TimesTen/ tt<domainname>/aggregate_store/logs

On computers other than the first one in the cluster, manually edit the sys.odbc.ini file for Oracle TimesTen to add the DSN definition. Before instantiating this DSN, remove the comment character (#) that the Exalytics Domain Management Utility included for the lines that define the DataStore and LogDir parameters in the sys.odbc.ini file.

The Oracle TimesTen In-Memory Database is instantiated when the first connection is made to the database. Navigate to the bin directory, run the ttIsql utility, and create a user (with a name such as "exalytics" and password such as "welcome1") as shown in the following sample commands:

```
cd /u01/app/oracle/product/TimesTen/tt1122/bin
./ttIsql
connect dsn=TT_AGGR_STORE;
create user exalytics identified by welcome1;
grant create session to exalytics;
grant create table to exalytics;
grant select on SYS.OBJ$ to exalytics;
```

Use the following sample commands to test the connection to the Oracle TimesTen In-Memory Database. There are no tables of data yet configured to return.

```
connect "DSN=TT_AGGR_STORE;uid=exalytics";
tables;
exit
```

You can use a tool such as SQL Developer on the client computer, if the Windows TimesTen client drivers that are installed can make a connection to the Oracle TimesTen instance that is used for aggregate storage. This tool can allow you to easily view the contents of the Oracle TimesTen In-Memory Database and to create a dummy table that facilitates the mapping of the Oracle TimesTen schema into the physical layer of the repository for Oracle Business Intelligence.

6.3.4.7 Configuring the ODBC Connection from Oracle Business Intelligence to Oracle TimesTen

Perform this task on each computer in the cluster. The Exalytics Domain Management Utility performs this task on the first computer.

The Client/Server DSN in Oracle TimesTen spans computer boundaries and the remote Oracle TimesTen server can be configured as part of the DSN. You create the DSN for the two Oracle TimesTen instances by modifying the following file:

/EXALYTICS_MWHOME/instances/instance1/bifoundation/OracleBIApplication/ coreapplication/setup/odbc.ini

On the second computer in a cluster, the directory name includes the string "instance2" for the second computer instead of "instance1".

The following provides sample modifications to the file:

```
[ODBC Data Sources]
AnalyticsWeb = Oracle BI Server
Cluster = Oracle BI Server
SSL_Sample = Oracle BI Server
TT_AGGR_STORE = TimesTen 11.2.2 Driver

[TT_AGGR_STORE]
Driver = /u01/app/oracle/product/TimesTen/tt1122/lib/libttclient.so
TTC_SERVER_DSN = TT_AGGR_STORE
TTC_SERVER = <tt_hostname>
TTC_TIMEOUT = 0
```

Define the DSN Servers for Oracle TimesTen by modifying the following file:

<install_location>/TimesTen/tt1122/info/sys.ttconnect.ini

The following provides sample modifications to the file:

```
[tt_hostname]
Description=TimesTen Server
Network_Address=example1.com
TCP_PORT=53397
```

In a multiple node cluster, you achieve high availability of in-memory aggregates by installing a Oracle TimesTen instance on each computer and ensuring that each instance is aware of the Oracle TimesTen instance on the other computer. You edit the odbc.ini file for Oracle Business Intelligence to contain references to both Oracle TimesTen instances. A two-node cluster might contain the following configuration details in the odbc.ini file on each computer:

```
[ODBC Data Sources]
AnalyticsWeb = Oracle BI Server
Cluster = Oracle BI Server
SSL_Sample = Oracle BI Server
TT_AGGR_STORE1 = TimesTen 11.2.2 Driver
TT_AGGR_STORE2 = TimesTen 11.2.2 Driver

[TT_AGGR_STORE1]
Driver = /u01/app/oracle/product/TimesTen/tt1122/lib/libttclient.so
TTC_SERVER_DSN = TT_AGGR_STORE
TTC_SERVER = <tt_hostname1>
TTC_TIMEOUT = 0

[TT_AGGR_STORE2]
Driver = /u01/app/oracle/product/TimesTen/tt1122/lib/libttclient.so
TTC_SERVER_DSN = TT_AGGR_STORE
TTC_SERVER = <tt_hostname2>
TTC_TIMEOUT = 0
```

With this configuration, edit the sys.ttconnect.ini in the <install_location>/TimesTen/tt1122/info directory to correspond to the odbc.ini file as shown in the following example:

```
[tt_hostname1]
Description=TimesTen Server
```

```
Network_Address=<fully qualified hostname>
TCP_PORT=53397

[tt_hostname2]
Description=TimesTen Server
Network_Address=<fully qualified hostname>
TCP_PORT=53397
```

6.3.4.8 Mapping Instances of Oracle TimesTen into the Physical Layer of the Oracle BI Repository

You must map all instances of Oracle TimesTen into the Physical layer of the Oracle BI repository. To map the instances, manually create the necessary database, connection pool, and physical schema objects using the Administration Tool. Then, upload the changed repository using the Repository tab of the Deployment page in Fusion Middleware Control.

When mapping an Oracle TimesTen source into the Physical layer of the Oracle BI repository, ensure that the database type and version are set correctly in the **Database** field of the General tab of the Database dialog. You must also ensure that the **Call interface** field in the General tab of the Connection Pool dialog is set correctly. For example, for Oracle TimesTen version 11.2.2., use the ODBC 3.5 call interface.

For more information, see the following:

- "Setting Up Database Objects and Connection Pools" in *Metadata Repository Builder's Guide for Oracle Business Intelligence Enterprise Edition*
- "Configuring Repositories" in *System Administrator's Guide for Oracle Business Intelligence Enterprise Edition*

6.3.4.9 Installing and Configuring BI Composer for Oracle BI EE

Perform this task on each computer in the cluster.

See "Installing and Configuring BI Composer for Oracle BI EE" in *Installing and Configuring Oracle Business Intelligence*.

6.3.4.10 Creating a DSN for IBM DB2 or Microsoft SQL Server

Perform this task one time regardless of the number of computers in the cluster if you use IBM DB2 or Microsoft SQL Server.

See "Creating a DSN for IBM DB2 or Microsoft SQL Server" in *Installing and Configuring Oracle Business Intelligence*.

6.3.4.11 Configuring IBM DB2 to Support Multibyte Data

Perform this task one time regardless of the number of computers in the cluster if you use IBM DB2.

See "Configuring IBM DB2 to Support Multibyte Data" in *Installing and Configuring Oracle Business Intelligence*.

6.3.4.12 Configuring Sample Reports for Oracle BI Publisher

Perform this task on each computer in the cluster.

See "Configuring Sample Reports for Oracle BI Publisher" in *Installing and Configuring Oracle Business Intelligence*.

6.3.4.13 Changing the Default Password for SampleAppLite.rpd

Perform this task once for the domain.

When you install Oracle Business Intelligence, the Oracle Business Intelligence installer automatically installs the SampleAppLite.rpd file with a default repository password of Admin123. If you intend to use the SampleAppLite.rpd file in a production system, then Oracle recommends that you change the default password for security reasons. For complete information on changing the password, see "Changing the Repository Password" in *Metadata Repository Builder's Guide for Oracle Business Intelligence Enterprise Edition*.

You can download the Sample Application (full version) from the following location on Oracle Technology Network:

http://www.oracle.com/technetwork/middleware/bi-foundation/obiee-samples-167534.html

6.3.4.14 Adding the ORACLEHARDWAREACCELERATION TRUE Parameter for Essbase

If Essbase is installed, you must add the ORACLEHARDWAREACCELERATION TRUE parameter to the essbase.cfg file.

To add the ORACLEHARDWAREACCELERATION TRUE parameter:

1. Open the essbase.cfg file for editing.

   The essbase.cfg file is located in:

   ORACLE_INSTANCE/Essbase/essbaseserver1/bin/essbase.cfg

2. Edit the essbase.cfg file by adding the following parameter:

   ORACLEHARDWAREACCELERATION TRUE

3. Save the file.

4. Stop and restart the Essbase server by performing the following actions:

   a. Log in to Fusion Middleware Control.

      For information, see Section 2.2.2, "Logging into Fusion Middleware Control to Manage Oracle Business Intelligence" in *System Administrator's Guide for Oracle Business Intelligence Enterprise Edition.*

   b. Select **Business Intelligence** then **coreapplication**.

   c. Display the Processes page in the Availability tab.

      For example, expand Essbase Agents and select essbaseserver1 in the Processes section.

      This enables you to start or stop just the Essbase Server process.

   d. Click **Stop Selected** to stop the selected process.

   e. Click **Start Selected** to start the selected process.

6.3.4.15 Enabling Bursting Optimization for BI Publisher

Enabling bursting optimization mode for BI Publisher significantly enhances the performance of bursting jobs run through the BI Publisher scheduler.

To enable bursting optimization:

1. Open the xmlp-server-config.xml file located at:

   DOMAIN_HOME/config/bipublisher/repository/Admin/Configuration/xmlp-server-config.xml

2. Add the following property and value setting to the file:

   <property name="OPTIMIZE_BURST" value="true" />

3. Save the xmlp-server-config.xml.

4. Restart the BI Publisher application.

To handle high volume jobs (normal scheduled jobs or bursting jobs) configure the system temporary directory and the JMS shared directory in the BI Publisher Administration pages. For best performance configure these temp directories to use RAM disk (for non-clustered environments only) or solid-state drive. For information, see "Setting the System Temporary Directory" and "Configuring the Shared Directory" in the *Administrator's Guide for Oracle Business Intelligence Publisher*.

6.3.4.16 Disabling HugePages

Disable hugepages if you have an Oracle Essbase only, or Oracle Enterprise Performance (EPM) only installs.

To disable hugepages:

1. Log on as the root user.

2. Navigate to the /etc/sysctl.conf file.

3. Delete the following line:

   vm.nr_hugepages

4. Restart the Exalytics Machine.

6.3.5 Managing Exalytics Domains

You use the Exalytics Domain Management Utility to manage Exalytics domains. You can use the Exalytics Domain Management Utility to start or stop the Exalytics domain, view current status of the domain, list all domains on the Exalytics Machine, and so on.

This section consists of the following topics:

•   Starting and Stopping an Exalytics Domain

•   Viewing Status of an Exalytics Domain

•   Listing Exalytics Domains

- Scaling Out an Oracle Business Intelligence Domain
- Removing an Exalytics Domain

6.3.5.1 Starting and Stopping an Exalytics Domain

You use the Exalytics Domain Management Utility to start and stop an Exalytics domain. Starting and stopping the Exalytics domain starts and stops all services (WebLogic Administration Server, WebLogic Managed Server, OPMN managed process, and TimesTen) of the installation on the domain.

To start an Exalytics domain:

1. Log in to the Exalytics Machine as the user "oracle" or the new user you created. See Creating a Password on the Operating System.

2. To start an Exalytics domain, enter the following command:

```
/opt/exalytics/bin/exalytics-domain-management.sh --action=start_domain --
input=<location and name of the input file> --domain=<domain_name>
```

For example:

```
/opt/exalytics/bin/exalytics-domain-management.sh --action=start_domain --
input=/home/oracle/Installers/input.properties --domain=menlo
```

The utility performs the following actions:

- Prompts you to enter the user name and password for the Oracle WebLogic Server administrator.
- Starts WebLogic Administration Server
- Starts WebLogic Managed Server
- Starts OPMN and all managed processes
- Starts TimesTen (if installed)

All services are started. If the Node Manager was stopped, it restarts.

To stop an Exalytics domain:

1. Log in to the Exalytics Machine as the user "oracle" or the new user you created. See Creating a Password on the Operating System.

2. To stop an Exalytics domain, enter the following command:

```
/opt/exalytics/bin/exalytics-domain-management.sh --action=stop_domain --
input=<location and name of the input file> --domain=<domain_name>
```

For example:

```
/opt/exalytics/bin/exalytics-domain-management.sh --action=stop_domain --
input=/home/oracle/Installers/input.properties --domain=menlo
```

The utility performs the following actions:

- Prompts you to enter the user name and password for the Oracle WebLogic Server administrator.
- Stops TimesTen (if installed)
- Stops OPMN and all managed processes
- Stops WebLogic Managed Server

- • Stops WebLogic Administration Server

All services are stopped. The Node Manager is not stopped.

6.3.5.2 Viewing Status of an Exalytics Domain

To view status of an Exalytics domain:

1. Log in to the Exalytics Machine as the user "oracle" or the new user you created. See Creating a Password on the Operating System.

2. To view status of an Exalytics domain, enter the following command:

   ```
   /opt/exalytics/bin/exalytics-domain-management.sh --action=status --
   input=<location and name of the input file> --domain=<domain_name>
   ```

   For example:

   ```
   /opt/exalytics/bin/exalytics-domain-management.sh --action=status --input=/
   home/oracle/Installers/input.properties --domain=menlo
   ```

   The utility performs the following actions:

   - • Prompts you to enter the user name and password for the Oracle WebLogic Server administrator.

   - • Displays the TimesTen (if present), OPMN Managed processes, and WebLogic Administration and Manager server statuses for the domain.

     The output looks similar to the following:

     ```
     ********************************************************************

                     Status report for the Exalytics Domain: menlo

     ***************************************************************************
     =========================================================================
     TimesTen Status
     =========================================================================
     TimesTen status report as of Wed Nov  6 13:44:26 2013

     Daemon pid 11265 port 12158 instance ttmenlo
     TimesTen server pid 11274 started on port 12159
     -------------------------------------------------------------------------
     Accessible by group oinstall
     End of report


     =========================================================================
     OPMN Managed Processes Status
     =========================================================================
     OPMN status report as of Wed Nov 06 13:44:29 2013

     Processes in Instance: menlo
     ---------------------------------+--------------------+---------+---------
     ias-component                    | process-type       |     pid | status
     ---------------------------------+--------------------+---------+---------
     essbasestudio1                   | EssbaseStudio      |   14481 | Alive
     essbaseserver1                   | Essbase            |   26528 | Alive
     coreapplication_obiccs1          | OracleBIClusterCo~ |   26527 | Alive
     coreapplication_obisch1          | OracleBIScheduler~ |   26531 | Alive
     coreapplication_obijh1           | OracleBIJavaHostC~ |   26525 | Alive
     coreapplication_obips1           | OracleBIPresentat~ |   26524 | Alive
     coreapplication_obis1            | OracleBIServerCom~ |   26530 | Alive
     ```

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```
=========================================================================
WebLogic Servers Status
=========================================================================
WebLogic status report as of Wed Nov 06 13:44:29 2013

Servers in this host for WebLogic domain bifoundation_domain:
------------+------------------------+-----------+-------+---------
Server name | type                   | pid       | port  | status
------------+------------------------+-----------+-------+---------
AdminServer | WebLogic AdminServer   | 22224     | 12000 | RUNNING
bi_server1  | WebLogic Managed Server| 22685     | 12001 | RUNNING
=========================================================================
```

6.3.5.3 Listing Exalytics Domains

You use the Exalytics Domain Management Utility to view a listing of all existing Exalytics domains on the Exalytics Machine.

To list Exalytics domains:

1. Log in to the Exalytics Machine as the user "oracle" or the new user you created. See Creating a Password on the Operating System.

2. To list existing Exalytics domains, enter the following command:

```
/opt/exalytics/bin/exalytics-domain-management.sh --action=list_domains --
input=<location and name of the input file>
```

For example:

```
/opt/exalytics/bin/exalytics-domain-management.sh --action=list_domains --
input=/home/oracle/input.properties
```

The utility performs the following actions:

- Lists all existing domains on the Exalytics Machine and displays the following information for each domain:

  Node type

  Provisioning status

  Location of Middleware Home

  Location of BI Instance Home

  Application URLs

  Host name and port number for WebLogic Administration server

  Host name and port number for BI Managed server

  Instance name, instance directory, daemon and server port numbers for Oracle TimesTen (if installed)

  URLs for Workspace, Analytical Provider Services (APS), Essbase Administration Services (EAS) console, and port number for Oracle Essbase Suite (if installed)

The output looks similar to the following:

```
            Exalytics Domain: menlo
=============================================================
Node type: Primary node
```

```
Provisioning status: Completed
Middleware Home: /u01/app/oracle/product/exalytics/exalyticsdomains/menlo/fmw
BI Instance Home: /u01/app/oracle/product/exalytics/exalyticsdomains/menlo/
instances/instance1


      | Application URLs |
      -------------------
Oracle Enterprise Manager: http://<server-name>:12000/em
Oracle WebLogic Admin Console: http://<server-name>:12000/console
Oracle Business Intelligence: http://<server-name>:12001/analytics
Oracle BI Publisher : http://<server-name>:12001/xmlpserver


      ------------
      | WebLogic |
      ------------
Domain Home: /u01/app/oracle/product/exalytics/exalyticsdomains/menlo/
user_projects/domains/bifoundation_domain
Admin Server Host: <server-name>
Admin Server Port: 12000
BI Managed Server Host: <server-name>
BI Managed Server Port: 12001


      ------------
      | TimesTen |
      ------------
TimesTen enabled: Yes
Timesten Instance Name: ttmenlo
Instance Directory: /u01/app/oracle/product/exalytics/exalyticsdomains/menlo /
TimesTen/ttmenlo
Timesten Daemon Port: 12158
Timesten Server Port: 12159


      -----------------
      | Essbase Suite |
      -----------------
Essbase Suite enabled: Yes
Workspace: http://<server-name>:12001/workspace
APS: http://<server-name>:12001/aps
EAS Console: http://<server-name>:12001/easconsole
Essbase Port: 12016


============================================================
                Exalytics Domain: greenwood
============================================================
Node type: Primary node
Provisioning status: Completed
Middleware Home: /u01/app/oracle/product/exalytics/exalyticsdomains/greenwoo d/
fmw
BI Instance Home: /u01/app/oracle/product/exalytics/exalyticsdomains/greenwo od/
instances/instance1


      -------------------
      | Application URLs |
      -------------------
Oracle Enterprise Manager: http://<server-name>:12100/em
Oracle WebLogic Admin Console: http://<server-name>:12100/console
Oracle Business Intelligence: http://<server-name>:12101/analytics
Oracle BI Publisher : http://<server-name>:12101/xmlpserver
```

```
                     ------------
                     | WebLogic |
                     ------------
          Domain Home: /u01/app/oracle/product/exalytics/exalyticsdomains/greenwood/us
          er_projects/domains/bifoundation_domain
          Admin Server Host: <server-name>
          Admin Server Port: 12100
          BI Managed Server Host: <server-name>
          BI Managed Server Port: 12101


                     ------------
                     | TimesTen |
                     ------------
          TimesTen enabled: Yes
          Timesten Instance Name: ttgreenwood
          Instance Directory: /u01/app/oracle/product/exalytics/exalyticsdomains/green
          wood/TimesTen/ttgreenwood
          Timesten Daemon Port: 12138
          Timesten Server Port: 12139


                     -----------------
                     | Essbase Suite |
                     -----------------
          Essbase Suite enabled: Yes
          Workspace: http://<server-name>:12101/workspace
          APS: http://<server-name>:12101/aps
          EAS Console: http://<server-name>:12101/easconsole
          Essbase Port: 12116


          Found 2 domain(s) in total
```

6.3.5.4 Scaling Out an Oracle Business Intelligence Domain

You can scale out an existing Oracle Business Intelligence domain for scalability and performance. For instructions on how to scale out an existing Oracle Business Intelligence domain, see Configuring for High Availability.

6.3.5.5 Removing an Exalytics Domain

When you remove the domain on an Exalytics Machine, all components of the domain are automatically removed.

> **Note:**
>
> When removing scaled-out domains, you must first remove all secondary domains before removing the primary node.

For instructions on how to remove an Exalytics domain and deinstall software, see Deinstalling Business Intelligence Software on the Exalytics Machine.

6.3.6 Troubleshooting the Installation and Configuration Processes

This section provides the following information on troubleshooting:

- • [Resolving Issues with the Installation](#)

- • [Viewing Log Files](#)

- • [Reinstalling Software on the Exalytics Machine](#)

- • [For More Information](#)

6.3.6.1 Resolving Issues with the Installation

If you have any issues installing software on the Exalytics Machine, check the following items:

- • Check the networking configuration of the machine including the /etc/hosts file.

- • If the Exalytics Domain Management Utility fails, then perform the following steps:

  1. Check the log files in the /u01/app/oracle/product/exalytics/logs directory. See Viewing Log Files.

  2. Review and fix the error. Depending on the type of error, rerun the Exalytics Domain Management Utility.

> **Note:**
>
> If the list_domains command shows the Provisioning Status of the domain as "Failed", then you must first remove the domain by running the remove_domain command.

6.3.6.2 Viewing Log Files

After installing the software, you can check log files created by the Exalytics Domain Management Utility. The utility creates a unique log file for each executed action. For example, the Exalytics Domain Management Utility creates a different log file when creating a domain and a different log file when listing domains. The format of the log file for an action is as follows:

exalytics_domain_<*domain_name*>_<*action*>_<timesstamp>.log

In addition to the "action" log files, the Exalytics Domain Management Utility also provides information about the location of the log files of the underlying process (such as Oracle BI EE installer log file). For example, there are different log files when installing and configuring Oracle Business Intelligence, and a different log file when installing Oracle TimesTen. The location of the log file for each process is displayed in the specific action log file and is prefixed by the word [LOGFILE]. The format of the log file for an underlying process is as follows:

[LOGFILE] [<*process*>] <location>

To view log files for each executed action and Oracle WebLogic Server installation:

- • Navigate to the /u01/app/oracle/product/exalytics/logs directory.

  The log file for each action is named as follows:

  exalytics_domain_<*domain_name*>_<*action*>_<*timestamp*>.log

  For example:

exalytics_domain_menlo_list_domain_2013-11-13_005822.log

The log file for Oracle WebLogic Server is named as follows:

weblogic_install_2013-11-21_162945.log

To view log files for software installation and configuration process:

1. Navigate to the /u01/app/oracle/product/exalytics/logs directory.

2. Open the log file that is created for the <add_domain> action.

   For example:

   exalytics_domain_*menlo_add_domain*_2013-10-13_005822.log

3. Search for the word [LOGFILE].

   Location of the BI Installer and BI Configuration Assistant log files are displayed.

   For example:

   [LOGFILE] [BI Installer] /u01/app/oracle/product/exalytics/oraInventory/logs/install2013-11-21_11-26-49PM.log

   [LOGFILE] [BI Config Assistant] /u01/app/oracle/product/exalytics/oraInventory/logs/install2013-11-21_04-51-20PM.log

To view log files for TimesTen installation:

1. Navigate to the /u01/app/oracle/product/exalytics/logs directory.

2. Open the log file created for the <add_timesten> action for a specific domain.

   For example:

   exalytics_domain_*menlo_add_timesten*_2013-10-14_005822.log

3. Search for the word [LOGFILE].

   Location of the TimesTen installation log file is displayed.

   For example:

   [LOGFILE] [TimesTen install] /u01/app/oracle/product/exalytics/exalyticsdomains/menlo/fmw/Oracle_BI1/bifoundation/exalytics/logs/bim-tt-install.log

6.3.6.3 Reinstalling Software on the Exalytics Machine

You might want to reinstall the software. The Exalytics Domain Management Utility does not allow reinstallation of Oracle Business Intelligence in a directory that contains another Oracle Business Intelligence installation on an Exalytics Machine.

To reinstall Oracle Business Intelligence:

1. Remove the domain as described in Deinstalling Business Intelligence Software on the Exalytics Machine.

2. Create a new Exalytics domain. See Creating an Exalytics Domain.

   If you created the BISHIPHOME and MDS schemas, then either drop the schemas or use a new prefix to create schemas.

6.3.6.4 For More Information

For additional information, see the following:

- "Troubleshooting the Installation and Configuration Processes" of *Installing and Configuring Oracle Business Intelligence*

6.3.7 Deinstalling Business Intelligence Software on the Exalytics Machine

To deinstall software on the Exalytics Machine, you use the Exalytics Domain Management Utility to remove the Exalytics domain. When you remove the Exalytics domain, all software for the domain is deinstalled.

> ✎ **Note:**
>
> To manually deinstall software on the Exalytics Machine, see Deinstalling Software on the Exalytics Machine.

To remove an Exalytics domain:

1. Log in to the Exalytics Machine as the user "oracle". See Creating a Password on the Operating System.

2. To remove an Exalytics domain, enter the following command:

   ```
   /opt/exalytics/bin/exalytics-domain-management.sh --action=remove_domain --
   input=<location and name of the input file> --domain=<Domain_name>
   ```

   For example:

   ```
   /opt/exalytics/bin/exalytics-domain-management.sh --action=remove_domain --
   input=/home/oracle/Installers/input.properties --domain=menlo
   ```

   When prompted by the Exalytics Domain Management Utility, perform the following tasks:

   - Confirm whether or not you want to remove the domain by selecting Yes or No.

   - Enter the user name and password for the Oracle WebLogic Server administrator.

   The Exalytics Domain Management Utility stops all processes, removes the Oracle Business Intelligence domain, removes Oracle TimesTen (if installed), and deinstalls all software.

6.4 Existing Business Intelligence Installations: Registering a Primary Business Intelligence Software Installation on an Exalytics Domain

If you are an existing Exalytics customer and have manually installed the software prior to the availability of the Exalytics Domain Management Utility, you can register any existing software installations by using the Exalytics Domain Management Utility. After you register an existing installation you can use the utility to manage the installation. See Managing Exalytics Domains.

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To register an existing software installation, you must have upgraded to Oracle Exalytics Release 2.

> **Note:**
>
> Before you can register an existing installation, ensure that you are running Oracle Business Intelligence 11.1.1.7.*x*.

When you run the Exalytics Domain Management Utility to list the domains on the Exalytics Machine, the registered installation is displayed as "Primary node (Registered Exalytics Domain)".

To register existing software installations on an Exalytics domain:

1. Log in to the Exalytics Machine as the user "oracle" or as the new user you created. See Creating a Password on the Operating System.

2. To register an existing installation, enter the following command:

```
/opt/exalytics/bin/exalytics-domain-management.sh --
action=register_existing_domain --input=<location and name of the input file>
--domain=<new_domain_name>
```

For example, to register an existing installation as menlo2, enter the following command:

```
/opt/exalytics/bin/exalytics-domain-management.sh --
action=register_existing_domain --input=/home/oracle/Installers/
input.properties --domain=menlo2
```

3. When prompted by the utility, perform the following actions:

   a. Enter the location of the following existing directories:

      Middleware Home

      For example:

      /u01/app/oracle/product/fmw

      Oracle BI Home

      For example:

      /u01/app/oracle/product/fmw/Oracle_BI1

      WebLogic Domain

      For example:

      /u01/app/oracle/product/fmw/user_projects/domains/bifoundation_domain

      Oracle BI Instance

      For example:

      /u01/app/oracle/product/fmw/instances/instance1

   b. Is TimesTen installed on the domain? Please enter [1-2].

      If you select 1 (Yes), enter the existing TimesTen instance name and the existing TimesTen installation directory location.

    c. Enter the user name and password for the Oracle WebLogic Server administrator.

    d. Choose whether you want to restart the domain.

       If you choose "Yes" to restart the domain, the utility stops and restarts all the processes on the new domain and registers the installation on the new domain.

4. To verify that the existing installation is listed as a domain, enter the following command:

```
/opt/exalytics/bin/exalytics-domain-management.sh --action=list_domains --
input=/home/oracle/input.properties
```

The report displays the existing installation as a registered exalytics domain on the Exalytics Machine. The output looks similar to the following:

```
============================================================
               Exalytics Domain: menlo2
============================================================
Node type: Primary node (Registered Exalytics Domain)
Provisioning status: Completed
Middleware Home: /u01/app/oracle/product/fmw
BI Instance Home: /u01/app/oracle/product/fmw/instances/instance1


       -------------------
      | Application URLs |
       -------------------
Oracle Enterprise Manager: http://<server-name>:7001/em
Oracle WebLogic Admin Console: http://<server-name>:7001/console
Oracle Business Intelligence: http://<server-name>:9704/analytics
Oracle BI Publisher : http://<server-name>:9704/xmlpserver


       ------------
      | WebLogic |
       ------------
Domain Home: /u01/app/oracle/product/fmw/user_projects/domains/bifoundation_
domain
Admin Server Host: <server-name>
Admin Server Port: 7001
BI Managed Server Host: <server-name>
BI Managed Server Port: 9704


       ------------
      | TimesTen |
       ------------
TimesTen enabled: Yes
Timesten Instance Name: tt1122
Instance Directory: /u01/app/oracle/product/TimesTen/tt1122
Timesten Daemon Port: 53396
Timesten Server Port: 53397

Found 1 domain(s) in total
```

6.5 Installing and Configuring Oracle BI Applications on an Exalytics Machine

After performing a Software Only install of Oracle Business Intelligence, you can install Oracle BI Applications.

For the latest Oracle BI Applications certifications on Exalytics, see the *Oracle Exalytics Certification Matrix* at the following location:

http://www.oracle.com/technetwork/middleware/ias/downloads/fusion-certification-100350.html

To install and configure Oracle BI Applications on an Exalytics Machine:

1. Install Oracle Business Intelligence. See Installing the Software by Using the Exalytics Domain Management Utility.

    > **Note:**
    >
    > When creating an Exalytics domain, you must choose to install and configure Oracle Essbase suite. See Step 3 (f) in Creating an Exalytics Domain.

2. Review the hardware requirements for installing Oracle BI Applications. See "Section 3.1 Hardware Requirements" in *Oracle Fusion Middleware Installation Guide for Oracle Business Intelligence Applications.*

3. Install Oracle Data Integrator (ODI). See "Section 3.2 Installing Prerequisites for Oracle BI Applications" in *Oracle Fusion Middleware Installation Guide for Oracle Business Intelligence Applications.*

    > **Note:**
    >
    > You must install ODI into the same inventory directory that you installed Oracle BI EE. To do this, run the ODI installer with the following command:
    >
    > ```
    > ./runInstaller –jreLoc <jdk location> -invPtrLoc u01/app/oracle/product/
    > exalytics/provision/execute/<domain name>/oraInst.loc
    > ```

    The other prerequisites, Oracle WebLogic Server 10.3.6, JDK or JRockit, and Oracle BI EE are installed and configured by the Exalytics Domain Management Utility when the utility creates an Exalytics domain.

4. Install and configure BI Applications. See "Section 3.3 Installing and Configuring Oracle BI Applications" in *Oracle Fusion Middleware Installation Guide for Oracle Business Intelligence Applications*.

    > **Note:**
    >
    > You must install Oracle BI Applications into the same inventory directory that you installed Oracle BI EE. To do this, run the BI Applications installer with the following command:
    >
    > ```
    > ./runInstaller –jreLoc <jdk location> -invPtrLoc u01/app/oracle/product/
    > exalytics/provision/execute/<domain name>/oraInst.loc
    > ```

    One of the tasks you perform when installing and configuring BI Applications, is to apply platform patches. Follow the instructions in "Section 3.3.4 Applying Platform

Patches" in *Oracle Fusion Middleware Installation Guide for Oracle Business Intelligence Applications*, but after downloading and extracting the zip files into a single directory, for example PATCH_HOME/patches, perform the following additional steps:

a. Remove the WebLogic folder and its contents to a location outside the PATCH_HOME/patches directory.

   The PATCH_HOME/patches directory should only contain the biappsshiphome, odi, and oracle_common folders.

b. Before applying the platform patches as described in "Section 3.3.4 Applying Platform Patches" in *Oracle Fusion Middleware Installation Guide for Oracle Business Intelligence Applications*, stop all services by using the Exalytics Domain Management Utility. See Starting and Stopping an Exalytics Domain.

c. After applying the patches, restart all services by using the Exalytics Domain Management Utility. See Starting and Stopping an Exalytics Domain.

> **Note:**
>
> You do not need to perform step "3.3.5 Configuring Oracle Business Intelligence" in *Oracle Fusion Middleware Installation Guide for Oracle Business Intelligence Applications* because the Oracle Business Intelligence domain is created by the Exalytics Domain Management Utility.

5. Perform post-installation tasks for installing Oracle BI Applications. See "Section 3.4 Performing Post-Installation System Set Up Tasks" in *Oracle Fusion Middleware Installation Guide for Oracle Business Intelligence Applications*.

For more information, see "Chapter 3 Installing and Setting Up Oracle BI Applications" in *Oracle Fusion Middleware Installation Guide for Oracle Business Intelligence Applications.*

6.6 Installing Oracle Enterprise Performance Management Applications

For the latest Oracle Enterprise Performance Management certifications on Exalytics, see the *Oracle Exalytics Certification Matrix* at the following location:

```
http://www.oracle.com/technetwork/middleware/ias/downloads/fusion-certification-100350.html
```

To install Oracle Enterprise Performance Management applications (Oracle Hyperion Planning) refer to the "Oracle Enterprise Performance Management System" documentation, the link to which is available from the Oracle Exalytics Documentation Library.

6.7 Installing Oracle Endeca

For the latest Oracle Endeca certifications on Exalytics, see the *Oracle Exalytics Certification Matrix* at the following location:

http://www.oracle.com/technetwork/middleware/ias/downloads/fusion-
certification-100350.html

To install Oracle Endeca, refer to the "Oracle Endeca Information Discovery"
documentation, the link to which is available from the Oracle Exalytics Documentation
Library.

6.8 Installing Oracle Database In-Memory for Oracle Exalytics

Oracle Database In-Memory can be installed and configured on all Exalytics Machines
running Oracle Exalytics Release 2.0 or later, and used for all analytics use cases.
Oracle Database In-Memory is easily deployed under any existing application that is
compatible with Oracle Database 12c. No application changes are required.

> **Note:**
>
> Oracle does not offer out of the box High Availability/Disaster Recovery/
> Backup, or other features, related to the management and availability of
> Oracle Database In-Memory on an Exalytics Machine. For information on
> these and other features, see the *Oracle Database 12c Release 1 (12.1)*
> documentation at the following location:
>
> https://docs.oracle.com/en/database/database.html

This section consists of the following topics:

- Supported Oracle Database In-Memory Configurations

- Supported Oracle Database In-Memory Use Cases

- Installing and Configuring Oracle Database In-Memory for Oracle Exalytics

6.8.1 Supported Oracle Database In-Memory Configurations

The following Oracle Database In-Memory configurations are certified to run on Oracle
Exalytics:

- Oracle Database 12c Enterprise Edition Release 12.1.0.2.0 - 64 bit Production
  with In-Memory Option.

- Database type of DATA_WAREHOUSE.

- Data warehouse applications. Online Transaction Processing (OLTP) applications
  are not supported.

- Storage Option of File System. Oracle Automatic Storage Management (ASM) is
  not supported.

- Single Instance of Oracle Database with In-Memory Option. Oracle Real
  Application Cluster (RAC) and Oracle Grid Infrastructure are not supported.

6.8.2 Supported Oracle Database In-Memory Use Cases

The following use cases are supported on Oracle Database In-Memory on Oracle Exalytics:

- Querying Performance Acceleration Using Aggregates
- Querying Performance Acceleration Using Datamart
- Querying Performance Acceleration Using Operational Data Store (ODS)
- Creating Enterprise Performance Management (EPM) Repository and Database Schemas

6.8.2.1 Querying Performance Acceleration Using Aggregates

You can use the following aggregates to accelerate your queries:

- OBIEE Generated or Managed Aggregates
  - You can use Summary Advisor to analyze the Business Intelligence workload and generate recommendations.
  - You can use Aggregate Persistence Wizard to define aggregates on a logical model in the RPD file.
  - You can execute the aggregate script (recommended by Summary Advisor or manually defined aggregates) using Oracle Database In-Memory on Oracle Exalytics as target.
- Database Aggregates

  You can populate your aggregates by defining and coding your aggregates using any Extract, Transform, Load (ETL) or Extract, Load, Transform (ELT) tools certified on Oracle Database In-Memory. To do so, wire the aggregate tables manually in the RPD file to leverage BI Server aggregate navigation.

6.8.2.2 Querying Performance Acceleration Using Datamart

You can choose the entire Data warehouse reporting tables or a subset of the reporting tables in Oracle Database In-Memory on Exalytics. To do so, build (code) the data using any Extract, Transform, Load (ETL) or Extract, Load, Transform (ELT) tools certified on Oracle Database In-Memory.

6.8.2.3 Querying Performance Acceleration Using Operational Data Store (ODS)

You can use Logical Standby or use GoldenGate to replicate data from your Online Transaction Processing (OLTP) database and use the database for Operational reporting.

6.8.2.4 Creating Enterprise Performance Management (EPM) Repository and Database Schemas

You can create Enterprise Performance Management (EPM) repository and create Metadata Services (MDS) and Business Intelligence Platform (BIPLATFORM) database schemas using the Repository Creation Utility (RCU).

6.8.3 Installing and Configuring Oracle Database In-Memory for Oracle Exalytics

Oracle recommends a maximum size of 830 GB for an Oracle Database installed on an X2-4 Exalytics Machine with 1 TB of RAM, and a maximum size of 1 TB for an Oracle Database installed on an X3-4, X4-4, X5-4, or X6-4 Exalytics Machine with 2 TB of RAM.

> **Note:**
>
> The following procedure assumes installing an Oracle Database In-Memory of 830 GB on an X2-4 Exalytics Machine with 1 TB of RAM.

This section consists of the following topics:

- Verifying and Setting Minimum kernel Parameters
- Installing Oracle Database In-Memory

6.8.3.1 Verifying and Setting Minimum kernel Parameters

Before you install Oracle Database In-Memory for Exalytics, verify that the kernel parameters shown in Table 6-1 are set to values greater than or equal to the minimum values shown.

> **Note:**
>
> If the current value of any parameter is higher than the value shown in Table 6-1, then do not change the value of that parameter.

Table 6-1   Minimum kernel Parameter Values

kernel parameters	Minimum Values	File
semms1	250	/proc/sys/kernel/sem
semmns	32000	/proc/sys/kernel/sem
semopm	100	/proc/sys/kernel/sem

Table 6-1   (Cont.) Minimum kernel Parameter Values

kernel parameters	Minimum Values	File
semmni	128	/proc/sys/kernel/sem
shmall	2097152	/proc/sys/kernel/shmall
shmmax	Minimum: 536870912 Maximum: A value that is 1byte less that the physical memory. Recommended: More than half the physical memory. See My Oracle Support Note 567506.1 for additional information about configuring shmmax.	/proc/sys/kernel/shmmax
shmmni	4096	/proc/sys/kernel/shmmni
file-max	6815744	/proc/sys/fs/file-max
ip_local_port range	Minimum: 9000 Maximum: 65500	/proc/sys/net/ipv4/ip_local_port_range
rmem_default	262144	/proc/sys/net/core/rmem
rmem_max	4194304	/proc/sys/net/core/rmem_max
wmem_default	262144	/proc/sys/net/core/wmem_default
wmem_max	1048576	/proc/sys/net/core/wmem_max
aio-max-nr	1048576	/proc/sys/fs/aio-max-nr

If the kernel parameters are less than the minimum values shown in Table 6-1, you must update the kernel parameters.

To update kernel parameters:

1. Edit the /etc/sysctl.conf file to update the kernel parameters.

2. After updating the kernel parameters, enter the following command to apply the updated kernel values:

   ```
   # /sbin/sysctl -p
   ```

3. Review the output from this command to verify that the updated kernel values are correct.

6.8.3.2 Installing Oracle Database In-Memory

You can install Oracle Database In-Memory manually or use the Exalytics Domain Management Utility.

This section consists of the following topics:

- • Installing Oracle Database In-Memory Using the Exalytics Domain Management Utility
- • Installing Oracle Database In-Memory Manually

6.8.3.2.1 Installing Oracle Database In-Memory Using the Exalytics Domain Management Utility

You can also install Oracle Database In-Memory using the Exalytics Domain Management Utility.

Prerequisites for Installing Oracle Database In-Memory Using the Exalytics Domain Management Utility

Before you use the Exalytics Domain Management Utility to install Oracle Database In-Memory, you must:

- • Familiarize yourself with the Exalytics Domain Management Utility. See Installing the Software by Using the Exalytics Domain Management Utility.
- • Ensure that you have upgraded to Oracle Exalytics Release 2.
- • Create a password on the operating system. See Creating a Password on the Operating System.
- • Create an input properties file. See Creating an Input Properties File.
- • Verify user permissions to the /u01 Directory. See Verifying User Permissions to the /u01 Directory.
- • Create an Installers directory structure such as the following for staging the Oracle Database In-Memory files:

  /home/oracle/Installers/oracledb

To install Oracle Database In-Memory using the Exalytics Domain Management Utility:

1. Log in to the Exalytics Machine as the user "oracle" or the new user you created. See Creating a Password on the Operating System.

2. Navigate to edelivery and download the required Oracle Database In-Memory zip files. See Installing Oracle Database In-Memory Manually.

3. Copy the Oracle Database In-Memory files into the /home/oracle/Installers/oracledb directory and unzip them.

4. To set the DISPLAY environment variable, enter the following command

   ```
   # export DISPLAY=localhost:0.0
   ```

5. To install Oracle Database In-Memory, enter the following command:

   ```
   /opt/exalytics/bin/exalytics-db-management.sh --input=/u01/<location and name
   of input properties file> --action=add_instance --instance_name=<name of
   database>
   ```

   For example:

   ```
   /opt/exalytics/bin/exalytics-db-management.sh --input=/u01/home/oracle/
   Installers/input.properties --action=add_instance --instance_name=exampledb
   ```

6. If prompted by the Exalytics Domain Management Utility, perform the following tasks:

- For DB_MEMORY_LIMIT, enter 320000.
- For DB_PASSWORD_ALL, *<specify a password>*.
- For DB_DATA_LOCATION, *<enter a location for the database data>*

> **Note:**
>
> Before entering the location, you must first manually create the directory. For example: /u01/app/oracle/oradata.

- For DB_RECOVERY_AREA_LOCATION, *<enter a recovery area location>*

> **Note:**
>
> Before entering the location, you must first manually create the directory. For example: /u01/app/oracle/recovery_area.

- For EXALYTICS_INSTALLER_DIR, enter /home/oracle.
- For INST_GROUP, enter onstall.

The Exalytics Domain Management Utility installs and configures Oracle Database In-Memory.

After the installation is complete, an output similar to the following is displayed:

```
Oracle Database Installation completed.
03/26/2015 06:48:50 AM [INFO ] [exampledb] [add_instance]
03/26/2015 06:48:50 AM [INFO ] [exampledb] [add_instance]
03/26/2015 06:48:50 AM [INFO ] [exampledb] [add_instance]
#############################################################
03/26/2015 06:48:50 AM [INFO ] [exampledb] [add_instance]
03/26/2015 06:48:50 AM [INFO ] [exampledb] [add_instance]
DATABASE DETAILS ##################################################################
Oracle SID: exampledb
Oracle Home: /u01/app/oracle/product/12.1.0/dbhome_exampledb
Listener Port: 1521
Oracle Inventory: /u01/app/oracle/product/12.1.0/oraInventory/
Oracle Total Memory Limit: 320000M
Oracle In-Memory Size: 192000M
03/26/2015 06:48:50 AM [INFO ] [exampledb] [add_instance]
#############################################################
Successfully completed action 'add_instance'
```

6.8.3.2.2 Installing Oracle Database In-Memory Manually

To manually install Oracle Database In-Memory:

1. Navigate to `https://edelivery.oracle.com.`

2. In the **Select a Product Pack** list, select **Oracle Database**.

3. In the **Platform** list, select **Linux x86-64**.

4. Click **Go**.

5. Select **Oracle Database 12c Release 1 (12.1.0.2.0) Media Pack for Linux x86-64**.

6. Download **Oracle Database 12c Release 1 Client (12.1.0.2.0) for Microsoft Windows x64 (64-bit)**.

> **Note:**
>
> Download and install the Oracle Database 12c Release 1 Client (12.1.0.2.0) for Microsoft Windows x64 (64-bit) on a Windows machine and not on the Exalytics Machine. You use the Oracle Database 12c Client for Windows to install SQL Plus, create database schemas, and so on, on a Windows machine.

7. Download **Oracle Database 12c Release 1 (12.1.0.2.0) (Part 1 of 2)** and **Oracle Database 12c Release 1 (12.1.0.2.0) (Part 2 of 2).**

   The zip files contains the following disks:

   linuxamd64_12102_database_1of 2.zip

   linuxamd64_12102_database_2of 2.zip

8. Stage the Oracle database installer disks in /home/oracle/ EXALYTICS_INSTALLERS/12cdb/.

9. Navigate to /home/oracle/EXALYTICS_INSTALLERS/12cdb/database/.

10. Enter the following command to start Oracle Universal Installer:

    ```
    $ ./runInstaller
    ```

11. On the Configure Security Updates screen, perform the following tasks:

    a. In the **Email** field, enter your e-mail address, preferably your My Oracle Support e-mail address and user name.

    b. Optional: Select **I wish to receive security updates via My Oracle Support** to receive security updates. If you choose to receive security updates via My Oracle Support, enter your My Oracle Support password in the **My Oracle Support Password** field.

    c. Click **Next**.

12. On the Select Installation Option screen, select **Create and configure a database**, then click **Next**.

13. On the System Class screen, select **Server Class**, then click **Next**.

14. On the Grid Installation Options screen, select S**ingle instance database installation**, then click **Next**.

15. On the Select Install Type screen, select **Advanced Installation**, then click **Next**.

16. On the Select Product Languages screen, select a language, then click **Next**.

17. On the Select Database Edition screen, select **Enterprise Edition (6.4 GB)**, then click **Next**.

18. On the Specify Installation Location screen, perform the following tasks:

    a. In the **Oracle base** field, enter the location of where you want to install the Oracle database.

    b. In the **Software location** field, enter the location of where you want to install the Oracle database software files.

> **Note:**
>
> Oracle recommends you install the database and database software files in the /u01 directory.

    c. Click **Next**.

19. On the Create Inventory screen, perform the following tasks:

    a. In the **Inventory Directory** field, specify the full path of the Oracle Inventory directory.

    b. In the **orainventory Group name** list, select **oinstall**.

    c. Click **Next**.

20. On the Select Configuration Type screen, select **Data Warehousing**, then click **Next**.

21. On the Specify Database Identifiers screen, perform the following actions:

    a. In the **Global database name** field, enter a unique global database name.

    b. **Oracle system identifier (SID)** field, enter a unique database identifier.

    c. Deselect **Create as Container database**.

    d. Click **Next**.

22. On the Specify Configuration Options screen, perform the following tasks:

    a. Select the **Memory** tab, and allocate memory to the database.

> **Note:**
>
> The memory allocated to the database cannot exceed the total RAM memory of the Exalytics Machine.
>
> - For an X2-4 machine, total RAM memory is 1 TB.
> - For an X3-4, X4-4, X5-4, or X6-4 machine, total RAM memory is 2 TB.

    b. Select the **Character sets** tab, and then select **Use Unicode (AL32UTF8)**.

    c. Select the **Sample schemas** tab, and then select **Create database with sample schemas**.

    d. Click **Next**.

23. Optional: On the Specify Management Options screen, specify details of the Oracle Enterprise Manager 12c Cloud Control configuration to manage your database, then click **Next**.

24. On the Specify Recovery Options screen, perform the following tasks:

    a. Select **Enable Recovery**.

    b. Select **File System**, and in the **Recovery area location** field, enter the location from where you can, if needed, recover the database.

    c. Click **Next**.

25. On the Specify Schema Passwords screen, specify passwords for the schemas, and then click **Next**.

> **Note:**
>
> You can choose to use different passwords for each account or use a single password for all the accounts.

26. On the Privileged Operating System groups screen, select **oinstall** to grant system privileges to the "oinstall" user group for each Operating System group, and then select **Next**.

27. On the Perform Prerequisite Checks screen, confirm that all the prerequisite checks are successful, then click **Next**.

28. On the Summary screen, review the information, then click **Install**.

The Install Product screen displays the progress of the database installation.

29. On the Install Product screen, when prompted, perform the following tasks:

    a. Execute the configuration scripts as a "root" user by following the directions on the Execute Configuration scripts screen.

    b. Open the Database Configuration Assistant screen and verify the database information. When the installation process is complete, make a note of the EM Database Express URL.

> **Note:**
>
> If required, on the Database Configuration Assistant screen, click **Password Management** to unlock any accounts.

    c. Click **OK**.

30. On the Finish screen, confirm that the installation of Oracle Database was successful, then click **Close**.

For more information, see *Oracle Database Quick Installation Guide 12c Release 1 (12.1) for Linux x86-64* at the following location:

http://docs.oracle.com/database/121/LTDQI/toc.htm#CEGHFFGG

Postinstallation Tasks

Perform the following postinstallation tasks:

- "Setting Environment Variables"

- "Configuring Oracle Database In-Memory"

Setting Environment Variables

You set the ORACLE_HOME and ORACLE_SID environment variables.

To set ORACLE_HOME and ORACLE_SID environment variables:

1. Log on as a root user.

2. Enter the following commands to set ORACLE_HOME and ORACLE_SID environment variables:

   ```
   $ export ORACLE_HOME=/u01/<location of ORACLE_HOME>
   ```

   ```
   $ export ORACLE_SID=<name of the unique system identifier>
   ```

Configuring Oracle Database In-Memory

This section consists of the following topics:

- #unique_233/unique_233_Connect_42_CHDIJEJI
- "Setting the INMEMORY_SIZE Parameter"
- "Calculating and Setting the INMEMORY_SIZE Parameter"

Setting the INMEMORY_SIZE Parameter

Confirm the INMEMORY_SIZE parameter is set to zero.

To check INMEMORY_SIZE parameter:

1. Navigate to Oracle _HOME/ bin folder, by entering the following command:

   ```
   $ cd $ORACLE_HOME/bin
   ```

2. Connect to Oracle Database SQLPlus client as SYSDBA, by entering the following command:

   ```
   $ ./sqlplus sys/<password> AS SYSDBA
   ```

   The following output is displayed:

   ```
   SQL*Plus: Release 12.1.0.2.0 Production on Mon Sep 1 17:56:50 2014
   Copyright (c) 1982, 2014, Oracle. All rights reserved.
   Connected to:
   Oracle Database 12c Enterprise Edition Release 12.1.0.2.0 - 64bit Production
   With the Partitioning, OLAP, Advanced Analytics and Real Application Testing
   options

   SQL>
   ```

3. Check the INMEMORY_SIZE parameter, by entering the following command:

   ```
   SQL> show parameter INMEMORY_SIZE
   ```

   The following parameter is displayed:

   ```
   NAME                                 TYPE                             VALUE
   inmemory_size                        big integer                          0
   ```

Setting the IN_MEMORY_CLAUSE_DEFAULT Parameter

You set the IN_MEMORY_CLAUSE_DEFAULT parameter so that any tables created subsequently are automatically retained in memory.

To set the INMEMORY_CLAUSE_DEFAULT parameter:

1. Set the IN_MEMORY_CLAUSE_DEFAULT parameter, by entering the following command:

```
SQL> ALTER SYSTEM SET INMEMORY_CLAUSE_DEFAULT = 'INMEMORY MEMCOMPRESS FOR
QUERY LOW PRIORITY HIGH' scope = BOTH
```

The following output is displayed:

```
System altered.

SQL>
```

2. To enable the INMEMORY_CLAUSE_DEFAULT parameter, you must shut down and restart the database:

   a. To shutdown the database, enter the following command:

   ```
   SQL> shutdown abort
   ```

   The following output is displayed:

   ```
   ORACLE instance shut down.
   ```

   b. To restart the database, enter the following command:

   ```
   SQL> startup
   ```

   The following output is displayed:

   ```
   Total System Global Area           6.5445E+11 bytes
   Fixed Size                         7697568 bytes
   Variable Size                      2.1475E+10 bytes
   Database Buffers                   1.1704E+11 bytes
   Redo Buffers                       529170432 bytes
   In-Memory Area                     5.1540E+11 bytes
   Database mounted.
   Database opened.

   SQL>
   ```

   c. Verify that the INMEMORY_CLAUSE_DEFAULT parameter is set, by entering the following command:

   ```
   SQL> show parameter INMEMORY_CLAUSE_DEFAULT;
   ```

   The following output is displayed:

   ```
   NAME                          TYPE               VALUE
   inmemory_clause_default       string         INMEMORY MEMCOMPRESS FOR
   QUERY
                                                LOW PRIORITY HIGH
   SQL>
   ```

Calculating and Setting the INMEMORY_SIZE Parameter

Note that since the INMEMORY_SIZE parameter is set to zero, Database In-Memory is not enabled. To enable In-Memory option, you must set the INMEMORY_SIZE parameter.

You set up INMEMORY_SIZE parameter based on the size of the Oracle Database you created (830 GB). Oracle recommends that INMEMORY_SIZE parameter not be greater than 60% of the Oracle Database size.

> **Note:**
>
> When setting your INMEMORY_SIZE parameter, ensure that the SGA_TARGET parameter is 110% of the INMEMORY_SIZE parameter and the PGA_AGGREGATE parameter is 50% of the INMEMORY_SIZE parameter.
>
> For example, if you set the INMEMORY_SIZE parameter to 400 GB, ensure that the SGA_TARGET parameter is 440 GB and the PGA_AGGREGATE parameter is 200 GB.

Before setting the INMEMORY_SIZE parameter, check the SGA_TARGET and PGA_AGGREGATE_TARGET size parameters, by entering the following commands:

```
SQL> show parameter SGA_TARGET;

SQL> show parameter PGA_AGGREGATE_TARGET;
```

> **Note:**
>
> Note the value of the SGA_TARGET parameter. The INMEMORY_SIZE parameter cannot be greater than this value.

To set INMEMORY_SIZE parameter:

1. To set the INMEMORY_SIZE parameter to 480 GB (60% of 830 GB), enter the following command:

   SQL> ALTER SYSTEM SET INMEMORY_SIZE = 480G SCOPE = SPFILE;

   The following output is displayed:

   ```
   System altered.

   SQL>
   ```

2. To enable the INMEMORY_SIZE parameter, you must stop and restart the Oracle database.

   a. To stop the database, enter the following command:

   ```
   SQL> shutdown abort;
   ```

   The following output is displayed:

   ```
   ORACLE instance shut down.
   ```

   b. To restart the database, enter the following command:

   ```
   SQL> startup
   ```

   The following output is displayed:

   ```
   ORACLE instance started.

   Total System Global Area 6.5445E+11 bytes
   Fixed Size                   7697568 bytes
   ```

```
Variable Size                  2.1475E+10 bytes
Database Buffers                 1.1704E+11 bytes
Redo Buffers                   529170432 bytes
In-Memory Area                   5.1540E+11 bytes
Database mounted.
Database opened.

SQL>
```

3. To check the INMEMORY_SIZE setting, enter the following command:

```
SQL> show parameter INMEMORY_SIZE
```

The following output is displayed:

```
NAME                           TYPE                         VALUE
inmemory_size                  big integer                  480G

SQL>
```

4. To check the In-Memory Area size, enter the following command:

```
SQL> select name , value from v$sga;
```

The following output is displayed:

```
NAME                           VALUE
Fixed Size                     7697568
Variable Size                    2.1475E+10
Database Buffers               1.1704E+11
Redo Buffers                   529170432
In-Memory Area                 5.1540E+11

SQL>
```

Part II

System Management

This part describes system management. It contains the following chapters:

- System Management (Configuration, Diagnostics, and Monitoring)
- Exalytics Capacity on Demand
- Hardening an Exalytics Machine
- Deploying Oracle Exalytics for High Availability
- Backup and Recovery
- Disaster Recovery

7

System Management (Configuration, Diagnostics, and Monitoring)

This chapter provides high-level information for managing the Exalytics Machine by performing system tasks such as configuration, diagnostics, and monitoring. See the remaining chapters of this part for details on other system management tasks for the Exalytics Machine, such as patching and backup and recovery.
For information on monitoring an Exalytics Machine, see Chapter 4 Monitoring an Exalytics Target in *Oracle Enterprise Manager Cloud Control Getting Started with Oracle Fusion Middleware Management Plug-in*.

The Exalytics Machine includes hardware and software for Oracle Business Intelligence and for the Oracle TimesTen In-Memory Database. You manage these pieces as follows:

- Hardware — For information on managing the hardware, see *Oracle Enterprise Manager Ops Center User's Guide*.

- Oracle Business Intelligence — All the Oracle Business Intelligence components on the Exalytics Machine are managed through the same mechanisms as described in *System Administrator's Guide for Oracle Business Intelligence Enterprise Edition*. For example, you use Fusion Middleware Control for configuration, diagnostics, process control, and monitoring.

- Oracle TimesTen — For information on managing Oracle TimesTen, see the following guides:

  – *Oracle TimesTen In-Memory Database Operations Guide*

  – Oracle Enterprise Manager for Oracle TimesTen In-Memory Database User's Guide for Oracle Enterprise Manager Cloud Control.

8

Exalytics Capacity on Demand

This chapter describes how to use the Exalytics Capacity on Demand Utility to configure the number of active core processors on the Exalytics Machine. Each Exalytics Machine by default is shipped with all core processors enabled. Therefore, the X2-4 and X3-4 machines are shipped with 40 active core processors, the X4-4 machine is shipped with 60 active core processors, the X5-4 machine is shipped with 72 core processors, and the X6-4 machine is shipped with 72 core processors.

Depending on the requirements of the applications that you run, you can use the Exalytics Capacity on Demand Utility to configure the Oracle Exalytics operating system to change the number of active core processors on each Exalytics Machine.

This chapter consists of the following sections:

- Guidelines on Configuring the Number of Active Core Processors on an Exalytics Machine
- Generating a Key File
- Configuring Active Core Processors on an Exalytics Machine

8.1 Guidelines on Configuring the Number of Active Core Processors on an Exalytics Machine

Before you use the Exalytics Capacity on Demand Utility to configure the number of active core processors on an Exalytics Machine, keep the following guidelines in mind:

- You can use the Exalytics Capacity on Demand Utility to configure active core processors on a non-virtualized Exalytics Machine only. This utility is not available on an Exalytics Machine configured for virtualization.

- Each Exalytics Machine is shipped with all core processors enabled. Decide carefully about initially decreasing the number of active core processors on the Exalytics Machine. Once you decrease the number of active core processors on an Exalytics Machine, you can only increase them and cannot decrease them further.

  For example, if you initially decrease the number of active core processors on an X4-4 Exalytics Machine from 60 to 20, you can then only increase the number of active core processors and cannot decrease them further to 16, 12, or 8. Table 8-1 shows the configurations of active core processors on Exalytics Machines.

- You can increase the number of active core processors in increments of four only.

Table 8-1   Configurations of Active Core Processors on Exalytics Machines

System	Minimum Active Core Processors	Maximum Active Core Processors	Number of Core Processors You Can Activate	Increase or Decrease Active Core Processors
Exalytics In-Memory Machine X2-4	8	40	8, 12, 16, 20, 24, 28, 32, 36, 40	Increase Only
Exalytics In-Memory Machine X3-4	8	40	8, 12, 16, 20, 24, 28, 32, 36, 40	Increase Only
Exalytics In-Memory Machine X4-4	8	60	8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60	Increase Only
Exalytics In-Memory Machine X5-4	8	72	8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, 72	Increase Only
Exalytics In-Memory Machine X6-4	8	72	8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, 72	Increase Only

8.2 Generating a Key File

Before you can configure or change the active core processors on an Exalytics Machine, you must generate a key file. You generate a unique key file each time that you want to change the number of core processors to active. To activate more core processors later, you follow the same procedure to generate a unique key file.

To generate a key file:

1. Retrieve the serial number of the Exalytics Machine by logging on to the ILOM web interface and if not already selected, in the left pane, select **Summary**.

    Make a note of the serial number. You need it in Step 4.

2. Log in to My Oracle Support at:

    https://myoraclesupport.com

3. Select the **Settings** tab, and then select **Assets**.

4. Click the serial number of the Exalytics Machine.

    The Assets Details screen for the serial number is displayed.

5. For Core Configuration, click **Manage Key**.

    The Manage Cores Configuration Key dialog box is displayed

6. In the **Cores Per Server** list, select the number of core processors you want to activate.

> **Note:**
>
> Initially, you can select to activate any number of core processors that are less than the default active core processors. But once you activate the number of core processors that you want, you can only activate core processors greater than this amount. For example, if you initially activate 20 core processors, you cannot later activate core processors less than 20.

7. Click **Generate Key** to generate the key.

   The generated key enables you to configure only the number of active core processors you selected in Step 6.

8. Click **Copy Key to Clipboard**.

9. Create a text file and paste in the key.

10. Save the text file.

8.3 Configuring Active Core Processors on an Exalytics Machine

You use the key file that you generated to configure active core processors on an Exalytics Machine.

To configure active core processors on an Exalytics Machine:

1. Log in to the Exalytics Machine as root user.

2. Navigate to /opt/exalytics/bin directory.

3. From the /opt/exalytics/bin directory, enter the following command to configure the number of active core processors:

```
# python /opt/exalytics/bin/update_cores.py
```

   The following output is displayed:

```
Please enter the Exalytics Capacity on Demand License key file location (eg. /tmp/
file): /tmp/key_file
```

4. Enter the location and name of the key file.

   For example, if you named the key file key_20 and saved it in a tmp directory, enter the following:

```
/tmp/key_20
```

5. Restart the Exalytics Machine.

6. Verify that the number of core processors you specified are active by entering the following command as root user:

```
# echo $((`grep -c processor /proc/cpuinfo` / 2))
```

   For example, if you activated 36 core processors, the following is displayed

```
36
```

> **✎ Note:**
>
> The commands in this section are applicable when hyper-threading is enabled on the server, so the processor count is divided by two to get the true core count. These commands also provide an incorrect value if hyper-threading is not in use. A warning is displayed when hyper-threading is disabled on the server.
>
> If hyper-threading has been disabled, use the following command to validate the active cores:
>
> grep -c processor /proc/cpuinfo

9

Hardening an Exalytics Machine

This chapter describes the tasks to perform when hardening an Exalytics Machine. Each Oracle Exalytics Release 2.1 base image comes preinstalled with the Exalytics Hardening script (STIGfix).

STIGs (Security Technical Implementation Guides) are security configuration standards defined by Defense Information Systems Agency (DISA), an agency of the United States Department of Defense (DoD).

You use the STIGfix script to harden an Exalytics Machine, thereby making it compliant with STIGs standards.

This chapter consists of the following sections:

- Running the Exalytics Hardening Script
- Checking STIG Compliance
- List of Vulnerabilities Fixed
- STIG security hardening for OVM guests

9.1 Running the Exalytics Hardening Script

To run the Exalytics Hardening script:

1. Log on as the root user.
2. Enter the following command:

   ```
   # /opt/exalytics/stigfix/bin/stigfix
   ```

9.2 Checking STIG Compliance

Next, check whether the Exalytics Machine is in compliance with STIG guidelines.

To check STIG compliance:

1. Navigate to the following link:

   http://iase.disa.mil/stigs/scap/Pages/index.aspx

2. For the Linux 6 operating system, perform following actions:

   a. Under the SCAP 1.1 Content section, click **Red Hat 6 STIG Benchmark - Version 1, Release 7**, and download the U_RedHat_6_V1R7_STIG_SCAP_1-1_Benchmark.zip file.

   b. To run a scan of the system using the RHEL6 STIG policy, run the following commands:

   ```
   # export PATH=/usr/bin:/usr/sbin:$PATH
   ```

```
# oscap xccdf eval --results results-xccdf.xml --oval-results --cpe
U_RedHat_6_V1R7_STIG_SCAP_1-1_Benchmark-cpe-dictionary.xml
U_RedHat_6_V1R7_STIG_SCAP_1-1_Benchmark-xccdf.xml
```

The "oscap" command generates an output file indicating whether specific tests passed or failed.

3. To get more details, enter the following command:

```
# oscap xccdf generate report --output results-xccdf.html results-xccdf.xml
```

The Scan report is displayed.

4. Review the Scan report to confirm that specific tests passed.

The output is similar to the following:

```
Scan Report
Introduction
Test Result
Result ID      Profile      Start time      End time      Benchmark      Benchmark
version
xccdf_org.open-scap_testresult_default-profile      (Default profile)
    2015-04-10 12:16      2015-02-10 12:16      embedded      1
Target info
Targets
<name of the Exalytics Machine>

    Addresses
127.0.x.xx
10.242.xxx.xxx
0:0:0:0:0:0:0:x
2606:b400:2010:504d:210:e0ff:fe46:xxx
fe80:0:0:0:210:e0ff:fe46:xxx


        Applicable platforms
cpe:/o:redhat:enterprise_linux:6


Score
system                                          score
max            %                  bar
urn:xccdf:scoring:default           80.79              100.00      80.79%
Results overview
Rule Results Summary
pass     fixed      fail      error      not selected      not checked      not
applicable      informational      unknown      total
286     0      68      0      0      0      0      0      0      354
Title
Result
The system must require authentication upon booting into single-user and
maintenance modes.                                                    pass
The Department of Defense (DoD) login banner must be displayed immediately prior
to, or as part of, console login prompts.                             fail
The system must disable accounts after three consecutive unsuccessful login
attempts.                                                             pass
The root account must be the only account having a UID of 0.          pass
The root user's home directory must not be the root directory (/).    pass
The root account's home directory (other than /) must have mode 0700. pass
```

9.3 List of Vulnerabilities Fixed

Table 9-1 lists the vulnerabilities fixed by running the STIGfix script.

Table 9-1   List of Vulnerabilities Fixed by STIGfix Script

Vulnerability ID	Description
GEN000000_LNX00380	An Xserver must have none of the following options enabled: -ac, -core (except for debugging purposes), or -nolock.
GEN000000-LNX00440	The /etc/security/access.conf file must have mode 0640 or less permissive.
GEN000000-LNX00520	The /etc/sysctl.conf file must have mode 0600 or less permissive.
GEN000000-LNX00580	The x86 CTRL-ALT-DELETE key sequence must be disabled.
GEN000020	The system must require authentication upon booting into single-user and maintenance modes. (CCE-4241-6)
GEN000252	The time synchronization configuration file (such as /etc/ntp.conf) must have mode 0640 or less permissive.
GEN000290-2	The system must not have the unnecessary (news) account.
GEN000290-3	The system must not have the unnecessary (gopher) account.
GEN000290-4	The system must not have the unnecessary (ftp) account.
GEN000460	The system must disable accounts after three consecutive unsuccessful login attempts.
GEN000500_2	The graphical desktop environment must set the idle timeout to no more than 15 minutes. **Note:** You can ignore the Fail status on the Linux 6 operating system.
GEN000500_3	Graphical desktop environments provided by the system must have automatic lock enabled.
GEN000540	Users must not be able to change passwords more than once every 24 hours.
GEN000560	The system must not have accounts configured with blank or null passwords.
GEN000580	The system must require passwords contain a minimum of 14 characters.
GEN000590	The system must use a FIPS 140-2 approved cryptographic hashing algorithm for generating account password hashes.
GEN000600	The system must require passwords contain at least one uppercase alphabetic character.
GEN000610	The system must require passwords contain at least one lowercase alphabetic character.
GEN000620	The system must require passwords contain at least one numeric character.

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Table 9-1   (Cont.) List of Vulnerabilities Fixed by STIGfix Script

Vulnerability ID	Description
GEN000640	The system must require passwords contain at least one special character.
GEN000680	The system must require passwords contain no more than three consecutive repeating characters.
GEN000700	User passwords must be changed at least every 60 days.
GEN000750	The system must require at least four characters be changed between the old and new passwords during a password change.
GEN000800	The system must prohibit the reuse of passwords within five iterations.
GEN000920	The root account's home directory (other than /) must have mode 0700.
GEN000940	The root account's executable search path must be the vendor default and must contain only absolute paths.
GEN000980	The system must prevent the root account from directly logging in except from the system console.
GEN001120	The system must not permit root logins using remote access programs such as ssh.
GEN001720	All global initialization files must have mode 0644 or less permissive.
GEN002100	The rhosts file must not be supported in PAM.
GEN002560	The system and user default umask must be 077.
GEN003060	Default system accounts (with the exception of root) must not be listed in the cron.allow file or must be included in the cron.deny file if the cron.allow file does not exist.
GEN003080	Crontab files must have mode 0600 or less permissive and files in cron script directories must have mode 0700 or less.
GEN003080-2	Files in cron script directories must have mode 0700 or less permissive.
GEN003200	The cron.deny file must have mode 0600 or less permissive.
GEN003320	Default system accounts (with the exception of root) must not be listed in the at.allow file or must be included in the at.deny file if the at.allow file does not exist.
GEN003609	The system must ignore IPv4 Internet Control Message Protocol (ICMP) redirect messages.
GEN003610	The system must not send IPv4 Internet Control Message Protocol (ICMP) redirects.

Table 9-1   (Cont.) List of Vulnerabilities Fixed by STIGfix Script

Vulnerability ID	Description
GEN003740	The xinetd configuration files must have mode 0640 or less permissive.
GEN003810	The portmap or rpcbind service must not be running unless needed. **Note:** You can ignore the Fail status on the Linux 6 operating system.
GEN004000	The traceroute file must have mode 0700 or less permissive.
GEN004540	The SMTP service HELP command must not be enabled.
GEN004580	The system must not use forward files.
GEN005040	All FTP users must have a default umask of 077. **Note:** You can ignore the Fail status on the Linux 6 operating system.
GEN005320	The snmpd.conf file must have mode 0600 or less permissive.
GEN005390	The /etc/syslog.conf file must have mode 0640 or less permissive. **Note:** You can ignore the Fail status on the Linux 6 operating system.
GEN005501	The SSH client must be configured to only use the SSHv2 protocol.
GEN005505	The SSH daemon must be configured to only use FIPS 140-2 approved ciphers.
GEN005507	The SSH daemon must be configured to only use Message Authentication Codes (MACs) employing FIPS 140-2 approved cryptographic hash algorithms.
GEN005550	The SSH daemon must be configured with the Department of Defense (DoD) logon banner. This file contains the banner message which will be displayed to any user accessing the hardened system. Users should modify this file to add their company policy or banner message before applying STIGfix.
GEN007020	The Stream Control Transmission Protocol (SCTP) must be disabled unless required.
GEN007080	The Datagram Congestion Control Protocol (DCCP) must be disabled unless required.
GEN007480	The Reliable Datagram Sockets (RDS) protocol must be disabled or not installed unless required.
GEN007540	The Transparent Inter-Process Communication (TIPC) protocol must be disabled or uninstalled.
GEN007660	The Bluetooth protocol handler must be disabled or not installed.

Table 9-1   (Cont.) List of Vulnerabilities Fixed by STIGfix Script

Vulnerability ID	Description
GEN008040	If the system is using LDAP for authentication or account information, the system must verify that the LDAP server's certificate has not been revoked.
GEN008700	The system boot loader must require authentication.

9.4 STIG security hardening for OVM guests

Depending on the Linux operating system, perform one of the following actions:

- For **Linux 5 operating system**, perform the following actions:

  Prerequisites: Download the following installation packages:

  > **Note:**
  >
  > To download the required rpm and zip files, navigate to My Oracle Support and download the required patch (Patch number 23498419).

  – exalytics-hardening-1.0.0.8-3.noarch.rpm

  – Download the U_RedHat_5_V1R14_STIG_SCAP_1-1_Benchmark.zip file from the following location:

    http://iase.disa.mil/stigs/scap/Pages/index.aspx

  – The openscap utility can be installed by using the yum channel. To manually install the utility download the following files from the yum channel (ol5_x86_64_latest):

    * openscap-utils-1.0.8-1.el5_10.x86_64.rpm

    * openscap-1.0.8-1.el5_10.x86_64.rpm

  1. To install the exalytics hardening file, run the following command:

     ```
     # rpm -ivh exalytics-hardening-1.0.0.8-3.noarch.rpm
     ```

  2. To run the stigfix script as a root user, run the following command:

     ```
     # /opt/exalytics/stigfix/bin/stigfix
     ```

> **Note:**
>
> If you are prompted to create a non-root user, run the following commands:
>
> ```
> # useadd <User>
> ```
>
> ```
> # passwd <PWD>
> ```
>
> Where, <User> and <PWD> are the user name and password of the non-root user respectively.

3. To install the oscap utility, run the following command:

   ```
   # rpm -ivh -nosignature openscap*
   ```

> **Note:**
>
> To verify if the oscap utility is installed, run the following command:
>
> ```
> # which oscap
> ```
>
> The following output is displayed, if the oscap utility is installed:
>
> ```
> # /usr/bin/oscap
> ```

4. To unzip the U_RedHat_5_V1R14_STIG_SCAP_1-1_Benchmark file, run the following command:

   ```
   # unzip U_RedHat_5_V1R14_STIG_SCAP_1-1_Benchmark.zip
   ```

5. Run the following commands:

   ```
   # export PATH=/usr/bin:/usr/sbin:$PATH
   ```

   ```
   # oscap xccdf eval --results results-xccdf.xml --oval-results --cpe
   U_RedHat_5_V1R14_STIG_SCAP_1-1_Benchmark-cpe-dictionary.xml
   U_RedHat_5_V1R14_STIG_SCAP_1-1_Benchmark-xccdf.xml
   ```

   ```
   # oscap xccdf generate report --output results-xccdf.html results-
   xccdf.xml
   ```

You can view the generated scan report in the results-xccdf.html file.

• For **Linux 6 operating system**, perform the following actions:

  Prerequisites: Download the following installation packages:

> **Note:**
>
> To download the required rpm and zip files, navigate to My Oracle Support and download the required patch (Patch number 23498270).

  – exalytics-hardening-2.0.0.1-13_el6.noarch.rpm
  – Download the U_RedHat_6_V1R10_STIG_SCAP_1-1_Benchmark.zip file from the following location:

http://iase.disa.mil/stigs/scap/Pages/index.aspx

– The openscap utility can be installed by using the yum channel. To manually install the utility download the following files from the yum channel (ol6_x86_64_latest):

* fakeroot-1.12.2-22.2.el6.x86_64.rpm fakeroot-libs-1.12.2-22.2.el6.x86_64.rpm openscap-1.0.10-3.0.2.el6.x86_64.rpm openscap-scanner-1.0.10-3.0.2.el6.x86_64.rpmopenscap-utils-1.0.10-3.0.2.el6.x86_64.rpmrpmdevtools-7.5-2.0.1.el6.noarch.rpm

1. To install the exalytics hardening file, run the following command:

```
# rpm -ivh exalytics-hardening-2.0.0.1-13_el6.noarch.rpm
```

2. To run the stigfix script as a root user, run the following command:

```
# /opt/exalytics/stigfix/bin/stigfix
```

> **Note:**
>
> If you are prompted to create a non-root user, run the following commands:
>
> ```
> # useadd <User>
> ```
> ```
> # passwd <PWD>
> ```
>
> Where, <User> and <PWD> are the user name and password of the non-root user respectively.

3. To install the oscap utility, run the following commands:

```
# rpm -ivh –nosignature fakeroot* # rpm -ivh –nosignature rpmdevtools* # rpm -ivh –nosignature openscap*
```

> **Note:**
>
> To verify if the oscap utility is installed, run the following command:
>
> ```
> # which oscap
> ```
>
> The following output is displayed if the oscap utility is installed:
>
> ```
> # /us/bin/oscap
> ```

4. To unzip the U_RedHat_6_V1R10_STIG_SCAP_1-1_Benchmark file, run the following command:

```
# unzip U_RedHat_6_V1R10_STIG_SCAP_1-1_Benchmark.zip
```

5. Run the following commands:

```
# export PATH=/usr/bin:/usr/sbin:$PATH

# oscap xccdf eval --results results-xccdf.xml --oval-results --cpe U_RedHat_6_V1R10_STIG_SCAP_1-1_Benchmark-cpe-dictionary.xml U_RedHat_6_V1R10_STIG_SCAP_1-1_Benchmark-xccdf.xml

# oscap xccdf generate report --output results-xccdf.html results-xccdf.xml
```

You can view the generated scan report in the results-xccdf.html file.

10
Deploying Oracle Exalytics for High Availability

This chapter describes how to use the Exalytics Domain Management Utility to horizontally scale out the Exalytics Machine for scalability (high-availability) and performance (load balancing).

For additional details, see "Deploying Oracle Business Intelligence for High Availability" in *System Administrator's Guide for Oracle Business Intelligence Enterprise Edition*.

> ✎ **Note:**
>
> To use the manual steps to horizontally scale out the Exalytics Machine, see Deploying Oracle Exalytics for High Availability.

The chapter includes the following sections:

- Requirements for High Availability
- Diagram of High Availability
- Configuring for High Availability
- Troubleshooting the Highly Available Deployment

10.1 Requirements for High Availability

The following are required for a high availability configuration:

- Each computer has an independent instance of Oracle TimesTen.

- Each computer has an odbc.ini file that contains a separate DSN for each instance of Oracle TimesTen. Each Oracle TimesTen DSN uses the client/server mode of connection.

- A BI Server repository can point to one or more physical repositories, but one set of aggregates exists per physical data source. Each physical data source has its own connection pool.

10.2 Diagram of High Availability

Figure 10-1 shows a diagram of high availability for the Exalytics Machine. In certain scenarios, the system might benefit from using Oracle HTTP Server in the web tier.

Figure 10-1   HIgh-Availability for the Exalytics Machine
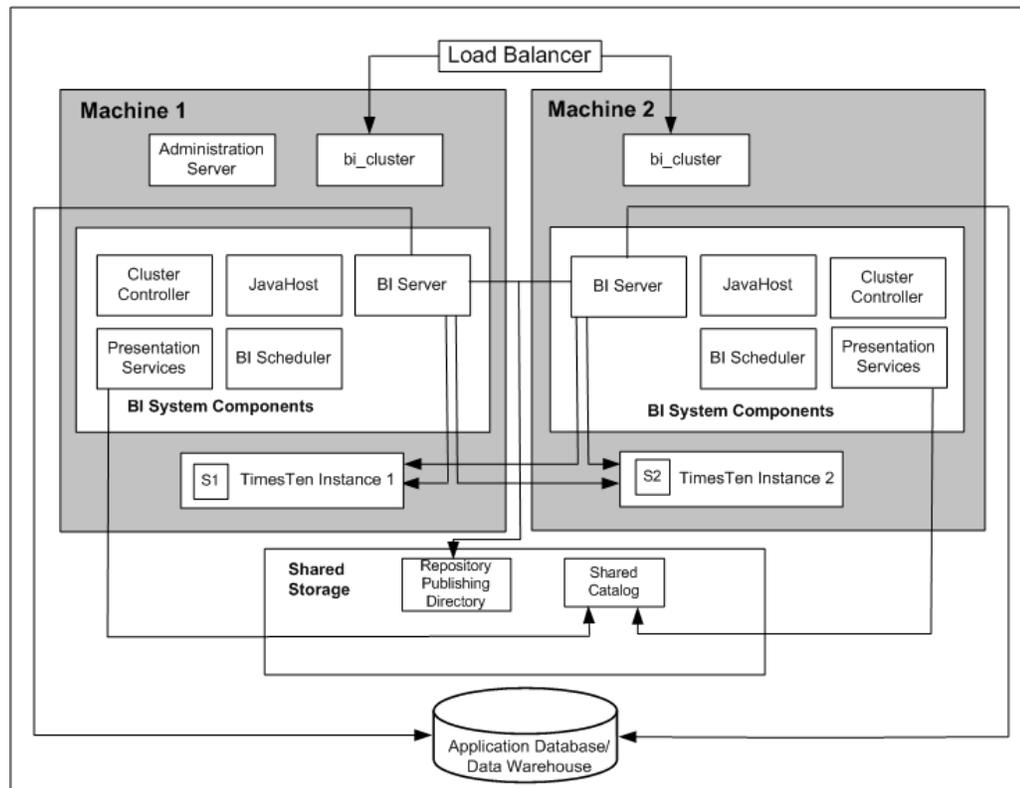
10.3 Configuring for High Availability

You use a combination of the Exalytics Domain Management Utility and manual steps to scale-out an existing Oracle Business Intelligence domain.

This section contains the following topics:

- Step 1: Preparing the First Exalytics Machine

- Step 2: Preparing the Second Exalytics Machine

- Step 3: Scaling Out the Existing BI Domain

- Step 4: Installing and Configuring Oracle TimesTen

- Step 5: Configuring Shared Storage for Persistent Stores

- Step 6: Configuring the Front-End Load Balancer

10.3.1 Step 1: Preparing the First Exalytics Machine

Install Oracle Exalytics on the first Exalytics Machine using the instructions that are provided in Installing Business Intelligence Software on New Deployments of this guide before installing on the second Exalytics Machine.

10.3.2 Step 2: Preparing the Second Exalytics Machine

To prepare the second Exalytics Machine:

1. Confirm that you have upgraded to Oracle Exalytics Release 2.0 or higher.

2. Create the user, as described in Creating a Password on the Operating System.

3. Create the inventory for Oracle TimesTen, as described in Optional: Creating the Inventory for Oracle TimesTen.

4. Download the files into an installers directory, as described in Downloading the Oracle Installation Files into a Staging Directory Structure.

5. Create an input properties file, as described in Creating an Input Properties File.

10.3.3 Step 3: Scaling Out the Existing BI Domain

You scale out the existing Oracle Business Intelligence domain by running the Exalytics Domain Management Utility.

> **Note:**
>
> The Exalytics Domain Management Utility only scales out and configures Oracle Business Intelligence. If you want to scale out and configure Oracle TimesTen, then install it manually on the second Exalytics Machine. See Step 4: Installing and Configuring Oracle TimesTen.

To scale out an Oracle Business Intelligence domain:

1. Verify that all processes are running on the existing domain. See Viewing Status of an Exalytics Domain.

   Make a note of the AdminServer port number. You need to enter the port number later when prompted by the Exalytics Domain Management Utility.

2. Log in to the second Exalytics Machine as the user that you created in Step 2 of Step 2: Preparing the Second Exalytics Machine.

3. To scale out an Oracle Business Intelligence domain, enter the following command:

   ```
   /opt/exalytics/bin/exalytics-domain-management.sh --action=scaleout_domain --
   input=<location and name of the input file> --domain=<domain_name on the first
   Exalytics Machine>
   ```

   For example, to scale out domain "menlo" from the first Exalytics Machine, enter the following command:

   ```
   /opt/exalytics/bin/exalytics-domain-management.sh --action=scaleout_domain --
   input=/home/oracle/Installers/input.properties --domain=menlo
   ```

4. When prompted by the Exalytics Domain Management Utility, perform the following tasks:

   • Enter the user name and password for the Oracle WebLogic Server administrator.

   • Enter the AdminServer host name.

   • Enter the AdminServer port number.

   The Exalytics Domain Management Utility performs the following actions on the second Exalytics Machine:

- Installs Oracle WebLogic Server

- Installs Oracle Business Intelligence

- Creates an Oracle Instance

- Scales out the Managed Server

- Scales out the existing BI domain

After the installation completes, a message is displayed that you can successfully connect to the scaled-out domain. The output looks similar to the following:

```
[LOGMSG] [11-13-13 00:54:31] [INFO] [menlo] [scaleout_domain] Success connecting
to <server-name_on_scaled_out_domain> on port: 12003
```

5. To verify that the scaled out domain is listed on the second Exalytics Machine, enter the following command on the second Exalytics Machine:

```
/opt/exalytics/bin/exalytics-domain-management.sh --action=list_domains --
input=/home/oracle/input.properties
```

The report displays the scaled out domain on the second Exalytics Machine. The Node type is displayed as "Scaled out node". The output should look similar to the following:

```
===========================================================
                   Domain: menlo
===========================================================
Node type: Scaled out node
Provisioning status: Completed
Middleware Home: /u01/app/oracle/product/exalytics/exalyticsdomains/menlo/fmw
BI Instance Home: /u01/app/oracle/product/exalytics/exalyticsdomains/menlo/
instances/instance1
    -------------------
    | Application URLs |
    -------------------
Oracle Enterprise Manager: http://<server-name>:12000/em
Oracle WebLogic Admin Console: http://<server-name>:12000/console
Oracle Business Intelligence: http://<server-name_on_scaled_out_domain>:12001/
analytics
Oracle BI Publisher : http://<server-name_on_scaled_out_domain>:12001/xmlpserver
    ------------
    | WebLogic |
    ------------
Domain Home: /u01/app/oracle/product/exalytics/exalyticsdomains/menlo/
user_projects/domains/bifoundation_domain
Admin Server Host: <server-name>
Admin Server Port: 12000
BI Managed Server Host: <server-name_on_scaled_out_domain>
BI Managed Server Port: 12001
    ------------
    | TimesTen |
    ------------
TimesTen enabled: No


Found 1 domain(s) in total
```

10.3.4 Step 4: Installing and Configuring Oracle TimesTen

To install and configure Oracle TimesTen:

1. Enter the following commands:

```
cd /home/oracle/EXALYTICS_INSTALLERS/tt
>./setup.sh
instance name tt1122 [default chosen]
install client/server and data manager [default chosen]
specify particular location for install [3]
enter location [custom location chosen /u01/app/oracle/product/TimesTen]
create daemon home - [default chosen]
daemon logs - [default chosen]
accept default port no - 53396
restrict access to TT to group oracle? - Yes
enable PL/SQL - yes [default chosen]
TNS_ADMIN - not chosen during install.
port for TT server - 53397
quickstart and doc - no [default chosen]
doc without quickstart - yes [default chosen] - location default
TT replication with clusterware - no - [default chosen]
```

2. Run the daemon configuration scripts for Oracle TimesTen as root, as described in Running the Daemon Configuration Scripts for Oracle TimesTen.

3. On the first Exalytics Machine, configure the BI Server to communicate with either instance of Oracle TimesTen by creating two DSNs for Oracle TimesTen, as described in Configuring the ODBC Connection from Oracle Business Intelligence to Oracle TimesTen.

4. On the second Exalytics Machine, perform the same procedure as in the previous step to create DSNs for Oracle TimesTen to configure the connectivity from the second BI Server to either instance of Oracle TimesTen.

5. Update the opmn.xml file on the second Exalytics Machine to point to the driver location for ODBC for Oracle TimesTen by editing the following "variable" elements. The edited text is shown in bold.

```
<variable id="LD_LIBRARY_PATH" value="$ORACLE_HOME/common/ODBC/Merant/5.3/
lib$:$ORACLE_HOME/bifoundation/server/bin$:$ORACLE_HOME/bifoundation/web/
bin$:$ORACLE_HOME/clients/epm/Essbase/EssbaseRTC/bin$:$ORACLE_HOME/bifoundation/
odbc/lib$:$ORACLE_INSTANCE$:$ORACLE_HOME/lib:/u01/app/oracle/product/TimesTen/
tt1122/lib" append="true"/>
<variable id="TIMESTEN_DLL" value="/u01/app/oracle/product/TimesTen/tt1122/lib/
libttclient.so"/>
```

The opmn.xml file is in the following directory:

/u01/app/oracle/product/fmw/instances/instance2/config/OPMN

6. Stop and start the Notification Server (OPMN).

   a. Go to the following directory that contains the OPMN command-line tool:

      /u01/app/oracle/product/fmw/instances/instance2/bin

   b. Run the following command:

      ./opmnctl stopall

      Stops OPMN and all Oracle Business Intelligence system components.

   c. Go to the following directory that contains the OPMN command-line tool:

      /u01/app/oracle/product/fmw/instances/instance2/bin

   d. Run the following command:

      ./opmnctl startall

Starts OPMN and all Oracle Business Intelligence system components.

For more information, see "Using the OPMN Command Line to Start, Stop, Restart, and View the Status of System Components" in *System Administrator's Guide for Oracle Business Intelligence Enterprise Edition*.

7. Validate that you can use a client/server DSN for Oracle TimesTen from the first Exalytics Machine by entering the following commands:

```
cd $ORACLE_INSTANCE/bifoundation/OracleBIApplication/coreapplication/setup/
. ./bi-init.sh (bash shell)
cd Times-Ten-root-dir/tt1122/bin
./ttisqlcs -connstr "uid=oracle;pwd=welcome1;dsn=bim_tt1";
```

These commands use the SQL client for Oracle TimesTen to connect to the Oracle TimesTen server on the first Exalytics Machine and validate that the BI Server can communicate with Oracle TimesTen.

8. Repeat the previous step for the client/server DSN for Oracle TimesTen from the second Exalytics Machine.

10.3.5 Step 5: Configuring Shared Storage for Persistent Stores

As part of the process of configuring the Exalytics Machine, you must configure various persistent stores to be located on a shared directory location such as a NAS (network attached storage). The following list outlines those stores and includes link for information on configuring them:

- Repository for the Oracle BI Server. Specify a shared RPD publishing directory in Fusion Middleware Control to propagate online repository changes in a cluster. The master BI Server copies its local repository to this directory when online changes are made. When slave BI Servers start, if the version in the publishing directory is newer, then each slave server copies the version in the shared directory to its local disk.

  For information, see Using Fusion Middleware Control to Upload a Repository and Set the Oracle BI Presentation Catalog Location in *System Administrator's Guide for Oracle Business Intelligence Enterprise Edition*.

- Oracle BI Presentation Catalog Location. Each Oracle BI Presentation Services instance loads the catalog from the catalog location that is specified in Fusion Middleware Control. Copy any existing catalogs to shared storage before reconfiguring this location to shared storage.

  For information, see "Using Fusion Middleware Control to Upload a Repository and Set the Oracle BI Presentation Catalog Location" in *System Administrator's Guide for Oracle Business Intelligence Enterprise Edition*.

- Global cache. The global cache resides on a shared file system and stores purging events, seeding events (which are often generated by agents), and results sets that are associated with seeding events. Each BI Server maintains its own local query cache for regular queries. The query cache for the BI Server continues to be located on the local node.

  For information, see "Using Fusion Middleware Control to Set Global Cache Parameters" in *System Administrator's Guide for Oracle Business Intelligence Enterprise Edition*.

10.3.6 Step 6: Configuring the Front-End Load Balancer

Configure a front-end load balancer, which is properly configured with the Oracle WebLogic Server Cluster Plug-in. For information, see "Configuring High Availability for Oracle Business Intelligence and EPM" in *High Availability Guide*.

10.4 Troubleshooting the Highly Available Deployment

This section contains solutions that are related to a highly available deployment:

- Connection Issues with the Oracle BI Server and Oracle TimesTen
- Client Installer Cannot Locate the Driver for Oracle TimesTen
- Oracle BI Server Does Not Fail Over to the Instance of Oracle TimesTen
- Aggregates Are Not Present in Second Instance

10.4.1 Connection Issues with the Oracle BI Server and Oracle TimesTen

You might find that the BI Server cannot connect to Oracle TimesTen on either the first or the second node. To resolve this issue, check the following:

- Verify that the DSNs for Oracle TimesTen are configured correctly in the odbc.ini and opmn.xml files, as described in the following list:

  - The odbc.ini file in the ORACLE_INSTANCE/bifoundation/OracleBIApplication/ coreapplication/setup directory has the proper DSNs defined to connect to both instances of Oracle TimesTen, as described in Configuring the ODBC Connection from Oracle Business Intelligence to Oracle TimesTen.

  - The opmn.xml file in the ORACLE_INSTANCE/config/OPMN/opmn/ directory has the LD_LIBRARY_PATH variable set correctly to point to the shared library folder for Oracle TimesTen. The TIMESTEN_DLL variable must also be defined correctly, as shown in the following example:

    ```
    <variable id="TIMESTEN_DLL" value="u01/app/oracle/product/TimesTen/
    tt1122/lib/libttclient.so"/>
    ```

- The BI Server must use the ODBC driver for Oracle TimesTen Version 3.5 for connection.

  During deployment of a repository, ensure that you use the ODBC driver for Oracle TimesTen Version 3.5 for the database connection pool. Without the use of this driver version, the BI Server cannot connect to Oracle TimesTen.

10.4.2 Client Installer Cannot Locate the Driver for Oracle TimesTen

After you use the Client Installer to install the Oracle BI Administration Tool on a Windows computer, you might notice that the Administration Tool displays an error message such as the following:

Unable to load Times Ten Driver ttclient.dll.

This error message indicates that you cannot use the ODBC drivers in Oracle TimesTen to import metadata from a physical table source for Oracle TimesTen. To resolve this issue, set the TIMESTEN_DLL environment variable to point explicitly to the driver location for Oracle TimesTen, as shown in the following example:

set TIMESTEN_DLL=C:\TimesTen\tt1122_32\bin\ttclient1122.dll

10.4.3 Oracle BI Server Does Not Fail Over to the Instance of Oracle TimesTen

If the BI Server does not fail over to the second Oracle TimesTen instance on the scaled-out node, then ensure that the logical table source (LTS) for the repository has mapped both the physical data sources for Oracle TimesTen. This mapping ensures that at the logical table source level, a mapping exists to both instances of Oracle TimesTen. If one instance of Oracle TimesTen is not available, then failover logic for the BI Server at the DSN level tries to connect to the other instance of Oracle TimesTen.

10.4.4 Aggregates Are Not Present in Second Instance

You might notice that aggregates that were created on the first instance of Oracle TimesTen are not available on the second instance of Oracle TimesTen. Keep in mind that no automatic replication exists between the Oracle TimesTen instances in the scaled-out deployment. The two instances are distinct and run on different computers but have the same deployed data stores. If you create aggregates using SQL scripts from Oracle BI Summary Advisor or the Aggregate Persistence Wizard on one instance of Oracle TimesTen, then you must manually create the same aggregates on the second instance of Oracle TimesTen. You must ensure that you keep the two instances of Oracle TimesTen synchronized. For information, see "Life Cycle Use Cases for Aggregate Persistence" in *Metadata Repository Builder's Guide for Oracle Business Intelligence Enterprise Edition*.

11

Backup and Recovery

This chapter provides high-level information to perform backup and recovery on the Exalytics Machine. Backup and recovery refers to the various strategies and procedures involved in guarding against hardware failures and data loss and in reconstructing data should loss occur.

On the Exalytics Machine, you perform backup and recovery both for Oracle Business Intelligence and Oracle TimesTen, as described in the following list:

- Backup and recovery for Oracle Business Intelligence is described in "Backup and Recovery Recommendations for Oracle Business Intelligence" in *Oracle Fusion Middleware Administrator's Guide.*.

- Backup and recovery for Oracle TimesTen is described in "Backing up and restoring a database" in *Oracle TimesTen In-Memory Database Installation Guide*.

  In addition, if data was updated since the last backup, then run the aggregate scripts again after recovering the data. For information, see "Using Oracle BI Summary Advisor to Identify Query Candidates for Aggregation" in *Metadata Repository Builder's Guide for Oracle Business Intelligence Enterprise Edition*.

12

Disaster Recovery

This chapter provides high-level information for configuring for disaster recovery on the Exalytics Machine.

You can find information about disaster recovery in the following sources:

- For Oracle Business Intelligence, see "Recommendations for Oracle Business Intelligence" in *Disaster Recovery Guide*.

  Note that disaster recovery of an Oracle Business Intelligence deployment on an Exalytics server to an Oracle Business Intelligence deployment on a non-Exalytics server (IBM, Dell, and so on) is supported. When using rsync, a file synchronization program to synchronize data between the two servers, ensure that you exclude the NQSConfig.INI and the biee-domain.xml files. Table 12-1 shows the configuration files you must exclude.

  Table 12-1   Files to Exclude When Synchronizing Data

Configuration Files
$DOMAIN_HOME/user_projects/domains/bifoundation_domain/config/fmwconfig/biee-domain.xml
instances/instance1/config/OracleBIServerComponent/coreapplication_obis1/NQSConfig.INI

- For Oracle TimesTen, you must carefully manage the way in which an Oracle BI repository and aggregates are replicated from the main site to the disaster recovery site. You must exactly mirror on the disaster recovery site system the sequence of operations that you apply on the production system for the repository and aggregates, in particular:

  – When a new repository is uploaded to the production system, then the same repository must be uploaded on the disaster recovery site system.

  – When aggregate scripts are run against the production repository and instances of Oracle TimesTen, then the same aggregate scripts must be run against the disaster recovery site system.

    For information, see "Using Oracle BI Summary Advisor to Identify Query Candidates for Aggregation" in *Metadata Repository Builder's Guide for Oracle Business Intelligence Enterprise Edition*.

A

Manual Procedures for Installing and Configuring Software on an Exalytics Machine

This appendix describes how to manually install, deinstall, and configure software on the Exalytics Machine.
This appendix consists of the following sections:

- Documents to Review

- Installing Software on Exalytics Machine

- Postinstallation Instructions

- Deinstalling Software on the Exalytics Machine

- Deploying Oracle Exalytics for High Availability

A.1 Documents to Review

As you prepare to install software on the Exalytics Machine, do the following:

- Review the Oracle Business Intelligence chapter in the *Oracle Fusion Middleware Release Notes*, to ensure that you understand the differences between Oracle Business Intelligence and its documented functionality, and any other issues that apply to the current release.

- Review the latest *Oracle Exalytics Release Notes* for any late-breaking information.

- Review the *Oracle TimesTen In-Memory Database Release Notes* to ensure that you understand the differences between Oracle TimesTen and its documented functionality, and any other issues that apply to the current release.

- Review *Oracle Exalytics In-Memory Machine Owner's Guide Exalytics X2-4, X3-4, X4-4, X5-4, and X6-4* to ensure that you have properly configured and commissioned the Exalytics Machine in your data center.

- Review Installation Overview to ensure that you understand the options and architecture related to installing software on the Exalytics Machine.

A.2 Installing Software on Exalytics Machine

This section consists of the following topics:

- Prerequisites for Installing Software on the Exalytics Machine

- Verifying Configuration of the Exalytics Machine

- Installing the Software

- Troubleshooting the Installation and Configuration Processes

A.2.1 Prerequisites for Installing Software on the Exalytics Machine

The following prerequisites must be met before installing Oracle Business Intelligence on the Exalytics Machine:

- The Oracle Exalytics Release 2.1 version of the Oracle Exalytics Base Image (2.0.0.1.el6) is running on the Exalytics Machine or later.

- The Exalytics Machine has been racked and mounted in a data center.

- The Exalytics Machine is configured with the base operating system at the factory.

  If you need assistance, then Oracle provides Advanced Customer Services for installing software on the Exalytics Machine.

- Network configuration is complete and the computer is accessible from the network.

- A supported database is available and accessible from the Exalytics Machine to host the schemas that are required by the software installation and that you create as part of the installation process. Ensure that the database is running during the installation and that the database is not hardened for security purposes. Installing Oracle Business Intelligence against a hardened database is not supported.

  For information about hardened databases, see *Oracle Database Vault Administrator's Guide*.

- You have access to the internet from a computer (not necessarily the Exalytics Machine) to download required packages.

A.2.2 Verifying Configuration of the Exalytics Machine

Before you install software on the Exalytics Machine, you must run configuration scripts to verify the software and network configurations of the Exalytics Machine.

This section consists of the following topics:

- Verifying Exalytics Software and Storage Configurations
- Verifying Exalytics Image Information

A.2.2.1 Verifying Exalytics Software and Storage Configurations

You run the `exalytics_CheckSWProfile` script to verify the current Exalytics software and storage configurations.

To verify Exalytics software and storage configurations:

1. Log on to the Exalytics Machine.

2. Navigate to the */opt/exalytics/bin* directory.

3. Enter the following command:

   ```
   ./exalytics_CheckSWProfile
   ```

4. Verify that the output displayed is similar to the following:

   ```
   [SUCCESS].......Has supported operating system
   [SUCCESS]........Has supported processor
   [SUCCESS]........Kernel is at the supported version
   ```

```
[SUCCESS]........Has supported kernel architecture
[SUCCESS]........Software is at the supported profile
```

A.2.2.2 Verifying Exalytics Image Information

You run the `exalytics_imageinfo` script to verify the current Exalytics image and version details.

To verify the Exalytics image information:

1. Log on the Exalytics Machine as a root user.

2. Navigate to the */opt/exalytics/bin* directory.

3. Enter the following command:

   ```
   ./exalytics_imageinfo
   ```

4. Verify that the output displayed is similar to the following:

   ```
   Image version       : 2.0.0.1.0
   Creation timestamp  : DAY-DD-MM-YYYY HR:MIN:SEC -0800
   Kernel version: 2.6.39-400.277.1.el6uek

   RPM versions:
   kernel-uek-2.6.39-400.277.1.el6uek
   kernel-2.6.18-308.24.1.0.1.el6
   exalytics-container-bm-2.0.0.1-2
   exalytics-scripts-2.0.0.1-18
   exalytics-flash-2.0.0.1-11
   exalytics-domain-configure-2.0.0.1-4
   exalytics-deps-exact-2.0.0.1-2
   exalytics-deps-minimum-2.0.0.1-2
   ```

> **Note:**
>
> Even though the build numbers may be different than the ones listed above, ensure that the updated kernel version is the same as the one displayed above.

A.2.3 Installing the Software

Installing software on the Exalytics Machine involves a combination of manual steps and automated scripts. The manual steps are to install Oracle WebLogic Server and Oracle BI EE while the installation script provides an automated way of installing Oracle TimesTen In-Memory Database and configuring communication with Oracle BI EE (a Software-Only Installation).

> **Note:**
>
> For information on installing Oracle Business Intelligence 11.1.1.6.*x*, see , *Exalytics X2-4 Release 1 (1.0)*.

The steps in the process are:

A.2.3.1 Creating the User, Group, and Password on the Operating System

On the operating system, create a user with a name such as "oracle" and an appropriate password and a group with a name such as "oinstall". The following are sample commands for creating this user and group:

```
groupadd oinstall
useradd -g oinstall oracle
```

The procedures throughout this section assume a user named "oracle" and a group named "oinstall".

A.2.3.2 Creating the Inventory for Oracle TimesTen

Create the inventory for Oracle TimesTen after you log in as the root user by entering the following commands:

```
mkdir /etc/TimesTen
chmod 770 /etc/TimesTen
chgrp oinstall /etc/TimesTen
touch /etc/TimesTen/instance_info
chmod 770 /etc/TimesTen/instance_info
chgrp oinstall /etc/TimesTen/instance_info
```

Ensure that the group who runs the script has write access to the /etc/TimesTen directory.

A.2.3.3 Setting Resource Limits for Oracle TimesTen

To set the resource limits for Oracle TimesTen:

1. Make the following changes to the /etc/security/limits.conf file:

```
*       hard nofile 131072
*       soft nofile 131072
```

```
    *         hard memlock unlimited
    *         soft memlock unlimited
    *         hard core unlimited
    *         soft core unlimited
```

2. Make the following additions to the /etc/security/limits.conf file:

```
    *     hard nproc         131072
    *       soft nproc 131072
```

3. Make the following shared memory kernel setting in the /etc/sysctl.conf file:

```
kernel.shmmax = 1099511627776
```

> **✎ Note:**
>
> Use this kernel setting for an Exalytics Machine with 1TB of RAM. Use a larger setting for an Exalytics Machine that contains more than 1TB of RAM.

4. Add the following shared memory kernel setting in the /etc/sysctl.conf file:

```
kernel.shmmni = 4096
```

5. Add the following setting for semaphores in the /etc/sysctl.conf file:

```
kernel.sem = 2048 64000 256 64
```

6. Reboot the machine or run the following command as the root user:

```
/sbin/sysctl -p
```

A.2.3.4 Creating and Mounting a /u01 Partition

Confirm if a /u01 partition exists on the hard disk.

- If a /u01 partition exists, you can ignore this section.

- If a /uo1 partition does not exists on the hard disk, then create and mount a /u01 partition on the machine by performing the following tasks:

> **✎ Note:**
>
> Create the partition equal to the maximum space available on the disk partition.

To create and mount a /u01 partition:

After logging in as the root user, configure the /u01 directory on the hard disk using commands such as the following ones:

1. Depending on the configuration of the Exalytics Machine, perform one of the following actions:

   a. To create a partition on an X2-4 Exalytics Machine, enter the following commands:

   ```
   # parted /dev/sdb
   ```

```
(parted) mklabel msdos

(parted) mkpart

Primary/extended? Primary

File system type? [ext2]? ext4

Start? 0

End? 1797GB

(parted) quit
```

b. To create a partition on an X3-4 Exalytics Machine, enter the following commands:

```
# parted /dev/sdb

(parted) mklabel msdos

(parted) mkpart

Primary/extended? Primary

File system type? [ext2]? ext4

Start? 0

End? 2697GB

(parted) quit
```

2. To create logical volume, enter the following commands:

```
lvm pvcreate /dev/sdb1

lvm vgcreate VolGroup01 /dev/sdb1

lvcreate --name LogVol00 --size 2400G VolGroup01
```

3. To create a file system, enter the following command:

```
mkfs.ext4 /dev/VolGroup01/LogVol00
```

4. Add the following line to the /etc/fstab file:

```
/dev/VolGroup01/LogVol00/u01 ext4 defaults 0 0
```

5. To create and mount a /u01 directory, enter the following commands:

```
# mkdir -p /u01

mount -a
```

6. Restart the computer.

7. Verify that the partition has been created by entering the following command:

```
df -lh
```

> **Note:**
>
> Check permissions for the "oracle" user. If you cannot write to the /u01 directory, then enter the following commands to change permissions:
>
> ```
> chown oracle:oinstall /u01
> ```
>
> ```
> chmod 775 /u01
> ```

A.2.3.5 Downloading Oracle Files into the Directory Structure

Before installing the software, you must download the required files into an organized directory structure. Note that the directory structures detailed in Step 3 below and Staging the Middleware Home are not mandatory, but is just an example. You can choose any structure to organize the files.

> **Note:**
>
> You must reference the same chosen directory structure in the properties files when editing the install script.

To download files into the directory structure:

1. Log in as "oracle" user.

2. Download the following required software installers from the Media Pack and patches for Oracle Exalytics under Oracle Business Intelligence software for Linux X86-64 on Oracle Software Delivery Cloud at the following location:

   http://edelivery.oracle.com/

   • Oracle BI Enterprise Edition Release 11*g*

   • Repository Creation Utility that corresponds with the appropriate Oracle BI EE Release

   • Oracle TimesTen Release 11*g*

   • Oracle WebLogic Server Release 10*g*

   For information about downloading and applying the latest Oracle Exalytics patch, see Upgrading to Oracle Exalytics Release 2.1 on Non-Virtual Deployments .

3. As the user who owns the installation of the Oracle Exalytics software, create a directory structure such as the following for staging the software installation programs, if the user name is "oracle" and the home directory is /home/oracle:

   • /home/oracle/EXALYTICS_RCU

     Copy the rcuHome.zip file for the Repository Creation Utility (RCU) into this directory and unzip it.

   • /home/oracle/EXALYTICS_INSTALLERS/bi

     Copy the Oracle BI EE installation zip files into this directory and unzip them using the following command. The -q parameter reduces the number of lines of output that are sent to the console.

```
unzip -q '*.zip'
```

The unzip process creates a subdirectory called bishiphome that contains subdirectories with names of Disk1 through Disk5.

- /home/oracle/EXALYTICS_INSTALLERS/timesten

  Copy the TimesTen for Exalytics distribution file into this directory and do not unzip it. The file has an extension such as .zip or .tar.gz. The installation scripts work with a file of either extension.

- /home/oracle/EXALYTICS_INSTALLERS/weblogic

  Obtain the zip file for Oracle WebLogic Server on 64-bit Linux and extract the file with a name such as wls1036_generic.jar into this directory.

- /home/oracle/EXALYTICS_INSTALL_LOG

  The installation scripts use this directory for storing the log files from the installation. You use these log files for troubleshooting, as described in Troubleshooting the Installation and Configuration Processes.

- /home/oracle/EXALYTICS_INSTALL_TEMP

  The installation scripts use this directory for storing temporary files.

A.2.3.6 Staging the Middleware Home

Create a directory structure such as the following for staging the Middleware Home:

/u01/app/oracle/product/fmw

The installation scripts use this directory as the target directory for the Oracle BI EE installation, which is known as the Middleware Home. In this guide, this directory is referred to as EXALYTICS_MWHOME.

A.2.3.7 Creating the Database Schemas

Follow the instructions in the "Create Database Schemas Using the Repository Creation Utility (RCU)" section in *Installing and Configuring Oracle Business Intelligence*.

You must first create required Oracle Business Intelligence schemas in a database (note that the database must not be hardened). You use a tool called the Repository Creation Utility (RCU) to create these schemas with the appropriate permissions and data.

Before you begin using RCU, review the "Repository Creation Utility (RCU) Requirements" section in the Oracle Fusion Middleware System Requirements document:

http://docs.oracle.com/html/E18558_01/fusion_requirements.htm

This section contains important information about your system and component-specific database requirements that should be met before you run RCU.

Ensure that you record the following details, because you use them later in the installation process:

- The database connection details in the following form:

  host-name:port-number:service-name

- The names and passwords of the schemas that you create, which have names such as *prefix*_BIPLATFORM and *prefix*_MDS.

A.2.3.8 Installing Oracle WebLogic Server

If not already installed, install Oracle WebLogic Server.

To install Oracle WebLogic Server

1. Navigate to the directory where you downloaded the Oracle WebLogic Server zip file (/home/oracle/EXALYTICS_INSTALLERS/wls.)

2. Execute the following file:

   wls1036_generic.jar

3. On the Welcome screen, click **Next**.

   The Choose Middleware Home Directory is displayed.

4. Select **Create a new Middleware Home** and create a new Middleware home in the /u01/app/oracle/product/fmw directory, and click **Next.**

   The Register for Security Updates screen is displayed.

5. Specify whether you want to register for security updates, and click **Next**.

   The Choose Install screen is displayed.

6. Select **Typical**, and click **Next**.

   The Choose Product Installation Directories screen is displayed.

7. Specify the directories in which you want to install the products, and click **Next**.

   The Installation Summary screen is displayed.

8. Click **Next**.

   The Status screen is displayed.

9. When the installation is complete, click **Next**.

   The Installation Complete screen is displayed.

10. If selected, deselect **Run Quickstart**, and then click **Done**.

For more information on installing Oracle WebLogic Server, including custom installations, see *Installing and Configuring Oracle WebLogic Server and Coherence*.

A.2.3.9 Performing a Software Only Install

The Software Only Install type enables you to install Oracle Business Intelligence software binary files in an Oracle home for later configuration.

To perform a Software Only Install:

1. Navigate to the */home/oracle/EXALYTICS_INSTALLERS/bi/bishiphome/Disk1* directory.

2. Start Oracle Business Intelligence 11*g* Installer by running the following command:

   ./runInstaller

The Specify Inventory directory screen is displayed.

3. If this is your first Oracle installation, perform the following actions:

   • On the Specify Inventory directory screen, specify the location of the inventory directory and the group whose members you want to grant access to the inventory, and click **OK**.

   • Navigate to the location of the inventory directory specified in the previous step (Step 3, first sub-step) and enter the following command as root user:

   ```
   /createCentralInventory.sh
   ```

   Click **OK**.

4. On the Welcome screen, click **Next**.

5. On the Software Updates screen, specify your My Oracle Support information and software update preferences, and click **Next**.

6. On the Select Installation Type screen, select **Software Only Install**, and click **Next**.

7. On the Prerequisite Checks screen, after the prerequisite checks conclude with no errors, click **Next**.

8. On the Specify Installation Location screen, in the **Oracle Middleware Home** field, enter the path */u01/app/oracle/product/fmw* for the Middleware home directory, and click **Next**.

9. On the Application Server screen, confirm that the application server installed is Oracle WebLogic Server and click **Next**.

10. On the Security Updates screen, enter your My Oracle Support account information, and then click **Next**.

11. On the Summary screen, Click **Install**.

12. On the Installation Progress screen, monitor the progress of your installation. To stop the installation, click **Cancel**.

13. On the Installation Complete screen, click **Finish** to exit Oracle Business Intelligence 11*g* Installer.

For more information, see "Software Only Install" in *Installing and Configuring Oracle Business Intelligence*.

A.2.3.10 Creating a New Oracle BI Enterprise Edition Instance

After completing the Software Only Install, you must create an Oracle BI EE instance using the Configuration Assistant.

To create a new Oracle BI EE instance:

1. Navigate to the *EXALYTICS_MWHOME/Oracle_BI1/bin* directory.

2. Start the Oracle Business Intelligence Configuration Assistant by entering the following command:

   ```
   ./config.sh
   ```

3. On the Welcome screen, click **Next**.

4. On the Prerequisite Checks screen, after the prerequisite checks conclude with no errors, click **Next**.

5. On the Create, Scale Out, or Extend BI System screen, select **Create New BI System**, and then enter the following information:

   • The user name and password for the system administrator for the new Oracle Business Intelligence system

   • The domain name for the new Oracle Business Intelligence system

   Click **Next**.

6. On the Specify Installation Location (Enterprise) screen, review the current Middleware home and other key locations for the new installation, and click **Next**.

7. On the Configure Components screen, all products (including Oracle Essbase) are selected by default. Deselect **Real-Time Decisions**, and then click **Next**.

> **Note:**
>
> When you configure Oracle BI EE, Oracle BI Publisher is configured automatically. If you want to install Oracle Essbase, then you must select it now as it's not possible to install Oracle Essbase later.

8. On the BIPLATFORM and MDS Schema screens, specify the details of the database schemas you previously created in Creating the Database Schemas.

9. Click **Next**.

10. On the Configuration Ports screen, click **Auto Port Configuration** or **Specify Ports Using Configuration File**.

    If you select the latter option, you must specify a configuration file that contains the custom port values for the Oracle Business Intelligence installation.

> **Note:**
>
> The Oracle Business Intelligence Configuration Assistant automatically assigns the Node Manager port (default is 9556), unless you specify the Oracle Business Intelligence ports manually using a configuration file such as staticports.ini.

    Click **Next**.

11. On the Security Updates screen, enter your My Oracle Support account information, and then click **Next**.

12. On the Summary screen, click **Configure** to start the configuration process.

13. On the Configuration Progress screen, confirm the configuration completes successfully, and then click **Next**.

14. On the Complete screen, click **Finish** to exit the Oracle Business Intelligence Configuration Assistant.

For more information, see *"Configuring Oracle Business Intelligence with the Configuration Assistant"* in *Installing and Configuring Oracle Business Intelligence.*

A.2.3.11 Editing the Properties File

Edit carefully the properties file that contains values that the installation scripts use. The file is named bim-setup.properties and is stored in the following directory:

/EXALYTICS_MWHOME/Oracle_BI1/bifoundation/exalytics/properties

Keep the following points in mind as you edit the file:

- Ensure that you use proper spelling and capitalization in the lines of the file.

- The file contains comments that provide details on how to edit the values to be appropriate for your system.

The following is the contents of the properties file:

```
#######################################################
# BI Machine Properties
#######################################################

#######################################################
[Generic properties to be used across all the Oracle Products]
# [Generic properties to be used across all the Oracle Products]
#bim.tt.installer.root=The directory location where the timesten installer zips are
present
#bim.tt.install.dir=The directory location where the timesten needs to be installed
#bim.tt.daemon.port=The daemon port for timesten,if value is not provided default
value of port is used as 53396. For multiple install of timesten this property is
mandatory. The port number specified should be a number between 1024 and 65527.
#bim.tt.server.port=The server port used to configure timesten,if value is not
provided default value of port is used as 53397. For multiple install of timesten
this property is mandatory. The port number specified should be a number between
1024 and 65527.
#bim.tt.instance.name=The instance name for timesten,if value is not provided
default value used is tt1122. For multiple install of timesten this property is
mandatory.

#######################################################
bim.tt.installer.root=/home/oracle/EXALYTICS_INSTALLERS/tt
bim.tt.install.dir=/u01/TT1
bim.tt.daemon.port=53396
bim.tt.server.port=53397
bim.tt.instance.name=tt1122

#######################################################
[BI specific properties]
#bim.bi.host=The host name where BI is installed.
#bim.mw.home=This directory location BI Middleware home
#bim.bi.admin.user=The admin username of BI
#bim.bi.wls.admin.port=The port where AdminServer is running of BI
#######################################################

bim.bi.host=<hostname>
bim.mw.home=/u01/INSTANCE1
bim.bi.admin.user=biadmin
bim.bi.wls.admin.port=7001
```

A.2.3.12 Verifying the Checklist

Before running the installation script, ensure that you verify the items in the following checklist:

- TimesTen install file is present.

- You carefully edited the properties file for the script and ensured that it contains no errors.

A.2.3.13 Running the Installation Script

To run the installation script:

1. Log in to the Exalytics Machine as the user that you created in Creating the User, Group, and Password on the Operating System.

2. Change to the directory that contains the Oracle Exalytics software, such as the following one:

   /EXALYTICS_MWHOME/Oracle_BI1/bifoundation/exalytics

3. Start a shell session (such as csh), ensure that the GROUP environment variable is set to the group that the user belongs to (for example in this section, "oracle" user belongs to the "oinstall" group), then run the main installation script, which is named bim-setup.sh, using a command such as the following one:

   ```
   ./bim-setup.sh /EXALYTICS_MWHOME/Oracle_BI1/bifoundation/exalytics/properties/
   bim-setup.properties
   ```

   You can store the properties file in any directory when you update it as specified in Editing the Properties File and specify the full path name when you run the installation script.

The installation script for Oracle Exalytics performs the following tasks:

- Prompts you to enter the Oracle BI Administration password when it runs.

- Enables the HardwareAcceleration MBean attribute.

  If you must modify the attribute, then you can update it as described in Manually Setting the HardwareAcceleration MBean Attribute.

- Installs Oracle TimesTen.

- Makes configuration changes in the opmn.xml file to point to the Oracle TimesTen libraries.

- Configures the sys.odbc.ini file for Oracle TimesTen and the odbc.ini file for Oracle Business Intelligence with DSN details for Oracle TimesTen.

A.2.3.14 Verifying the Installation

To verify that the installation is successful, you open a web browser and attempt to display the following URLs. If you can display and interact with the pages at the following URLs, then the installation succeeded.

- Oracle BI Enterprise Edition:

  http://*server-name*:9704/analytics

- Oracle WebLogic Server Console:

  http://*server-name*:7001/console

- Fusion Middleware Control:

  http://*server-name*:7001/em

A.2.4 Troubleshooting the Installation and Configuration Processes

This section provides the following information on troubleshooting:

- Resolving Issues with the Installation
- Viewing Log Files
- Reinstalling Software on the Exalytics Machine
- Manually Setting the HardwareAcceleration MBean Attribute
- Configuring Exalytics Operating System to Change Capacity On Demand
- For More Information

A.2.4.1 Resolving Issues with the Installation

If you have any issues installing software on the Exalytics Machine, check the following items:

- Ensure that the database in which you ran the Repository Creation Utility to create the schemas is running.
- Check the networking configuration of the machine including the /etc/hosts file.
- Check the contents of the bim-setup.properties file to ensure that all entries are accurate with no misspellings.
- If the installation scripts fail, then perform the following steps:

  1. Deinstall the Oracle TimesTen software.
  2. Verify the contents of the bim-setup.properties file, as described in Editing the Properties File.
  3. Restart the installation process.

A.2.4.2 Viewing Log Files

After installing the software, you can check the log files for Oracle WebLogic Server, Oracle Business Intelligence, and Oracle TimesTen in the MW_HOME/Oracle_BI1/ bifoundation/exalytics/logs directories. The files have names such as tt_install.log for Oracle TimesTen.

A.2.4.3 Reinstalling Software on the Exalytics Machine

You might want to reinstall the software. The installer does not allow reinstallation of Oracle Business Intelligence in a directory that contains another Oracle Business Intelligence installation on an Exalytics Machine.

To reinstall Oracle Business Intelligence in the same directory as before:

1. Uninstall the software as described in Deinstalling Software on the Exalytics Machine.

2. Reboot the computer to ensure that if any processes are running, they are stopped.

3. If you used the Repository Creation Utility to create the BISHIPHOME and MDS schemas, then either drop the schemas or use a new prefix to create schemas.

4. To uninstall Oracle TimesTen, enter the following command:

```
/u01/app/oracle/product/fmw/../TimesTen/tt1122/bin/setup.sh -uininstall
```

5. Delete the /etc/TimesTen/* files.

6. Return to this chapter and follow the installation instructions again.

A.2.4.4 Manually Setting the HardwareAcceleration MBean Attribute

The HardwareAcceleration MBean attribute specifies whether you are using the Exalytics Machine, as described in the following procedure. This MBean attribute is turned on automatically when you run the script to install Oracle Business Intelligence on the Exalytics Machine. The MBean attribute sets the ORACLEHARDWAREACCELERATION parameter in the NQSConfig.ini file and the OracleHardwareAcceleration element in the instanceconfig.ini file.

To specify the use of the Exalytics Machine using the System MBean Browser:

1. In Fusion Middleware Control, in the Navigator window, expand the WebLogic Domain folder and the bifoundation_domain node.

2. Right-click the **AdminServer** node and select **System MBean Browser**.

3. Expand Application Defined MBeans, then expand oracle.biee.admin, then expand Domain: bifoundation_domain.

4. Lock the domain, as follows:

   a. Expand BIDomain and select the BIDomain MBean where group=Service.

   b. Display the Operations tab.

   c. Click the **lock** link.

5. Display the Attributes tab for the same MBean.

6. Ensure that the HardwareAcceleration attribute is set to **true**.

7. After applying your changes, release the lock on the domain by displaying the Operations tab and clicking one of the commit operations.

8. Restart Oracle Business Intelligence.

A.2.4.5 Configuring Exalytics Operating System to Change Capacity On Demand

Each Oracle Exalytics Machine is configured with 4 CPUs, each CPU containing 10 active core processors. This configuration provides 40 active core processors. Of these, 20% are reserved for on-demand use when additional computing processing is needed. For example, you use 32 cores most of the time and enable the other 8 cores only when needed, such as to run reports and queries at quarter end. You can then continue using 80% of the active core processors until the next quarter end.

> **Note:**
>
> When you change the number of active core processors, you do not have to restart the Exalytics Machine.

You use the exalytics_resourceControl.sh utility to configure the Oracle Exalytics operating system to change capacity on demand. Table A-1 shows the parameters for the capacity_on_demand command. The command is part of the exalytics_resourceControl.sh utility.

Table A-1   Parameters for the capacity_on_demand Command in the exalytics_resourceControl.sh Utility

Parameter	Description
Display	Displays number of active core processors currently in use.
Disable	Disables core processors that are reserved for additional on-demand processing.
Enable	Enables core processors that are reserved for additional on-demand processing.
Update	Enables any number of core processors. Can only be used in force mode.

If you do not specify any parameters, the utility displays all capacity on demand arguments. For example, if you navigate to the */opt/exalytics/bin* directory, and enter the following command:

```
./exalytics_resourceControl.sh
```

The following output is displayed:

```
Usage: ./exalytics_resourceControl.sh [-show | -capacity_on_demand args]
 -show: Displays the number of logical cores active
 -capacity_on_demand [display|disable|enable|update -cores <noOfCoresPerSocket>] [-
force]
display: displays the number of cores in use.
disable: disables the cores reserved for additional on-demand capacity.
enable: enables the cores reserved for additional on-demand capacity.
update -cores <numCoresPerSocket> -force: can be used in force mode, to enable any
number (min 2) of cores on a socket.
```

To configure the Exalytics operating system to change capacity on demand:

1. Log on the Exalytics Machine as a root user.

2. Navigate to the folder */opt/exalytics/bin* directory.

3. View the existing configuration, by entering the following command:

   ```
   ./exalytics_resourceControl.sh -capacity_on_demand display
   ```

   The following output is displayed:

   ```
   [CAPSHOW] Number of cores active per socket: All of 10
   ```

4. Disable core processors, by entering the following command:

```
./exalytics_resourceControl.sh -capacity_on_demand disable
```

2 core processors per CPU are disabled.

The following output is displayed:

```
[CAPSHOW] Number of cores active per socket: 8 of 10
```

5. Enable core processors, by entering the following command:

```
./exalytics_resourceControl.sh -capacity_on_demand enable
```

2 core processors per CPU are enabled.

The following output is displayed:

```
[CAPSHOW] Number of cores active per socket: All of 10
```

6. Enable a given number of core processors (for example, 6), by entering the following command:

```
./exalytics_resourceControl.sh -capacity_on_demand update -cores 6 -force
```

6 core processors per CPU are enabled.

The following output is displayed:

```
[CAPSHOW] Number of cores active per socket: 6 of 10
```

> **Note:**
>
> After running the utility, you can check the log and the trace files in the */var/log/oracleexa/systemconfig.log* file and the */var/log/oracleexa/resctl* directory respectively.

A.2.4.6 For More Information

For additional information, see the following:

- "Troubleshooting the Installation and Configuration Processes" of *Installing and Configuring Oracle Business Intelligence*

A.3 Postinstallation Instructions

For a single-node installation, the semi-automated installation scripts perform many of the configuration tasks. For a multiple node system, you must perform the configuration tasks manually. The sections of this chapter indicate on which computers to perform the tasks.

This section includes the following topics:

- Installing and Deinstalling Oracle Business Intelligence Client Tools
- Creating the boot.properties File
- Starting and Stopping Components on an Exalytics Machine
- Running the Daemon Configuration Scripts for Oracle TimesTen

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- Configuring Memory Settings on the Server
- Instantiating the Oracle TimesTen In-Memory Database
- Configuring the ODBC Connection from Oracle Business Intelligence to Oracle TimesTen
- Mapping Instances of Oracle TimesTen into the Physical Layer of the Oracle BI Repository
- Installing and Configuring BI Composer for Oracle BI EE
- Creating a DSN for IBM DB2 or Microsoft SQL Server
- Configuring IBM DB2 to Support Multibyte Data
- Configuring Sample Reports for Oracle BI Publisher
- Changing the Default Password for SampleAppLite.rpd
- Adding the ORACLEHARDWAREACCELERATION TRUE Parameter for Essbase
- Enabling Bursting Optimization for BI Publisher
- Disabling HugePages

A.3.1 Installing and Deinstalling Oracle Business Intelligence Client Tools

Perform this task one time regardless of the number of computers in the cluster.

You must install the Oracle Business Intelligence Administration Tool, Oracle Business Intelligence Job Manager, and Oracle Business Intelligence Catalog Manager on a Windows computer. See "Installing and Deinstalling Oracle Business Intelligence Client Tools" in *Installing and Configuring Oracle Business Intelligence*.

A.3.2 Creating the boot.properties File

Perform this task on each computer in the cluster.

For information on creating the boot.properties file, see "Creating boot.properties for the Administration Server on APPHOST1" in *Enterprise Deployment Guide for Oracle Business Intelligence*.

A.3.3 Starting and Stopping Components on an Exalytics Machine

After making configuration changes, you stop and start components on the Exalytics Machine to enable those changes to take effect

You can start and stop components on the Exalytics Machine by performing the following tasks on each computer in the cluster:

To stop components on the Exalytics Machine:

1. Log into Fusion Middleware Control and stop all Oracle Business Intelligence system components.

2. Stop Node Manager. Use the `ps` command to find the process identifier, then use the `kill` command to stop Node Manager.

3. Stop OPMN by entering the following commands:

```
cd /EXALYTICS_MWHOME/instances/instance1/bin
./opmnctl stopall
```

4. Stop the Oracle TimesTen Server. See "Running the TimesTen Server" in *Oracle TimesTen In-Memory Database Operations Guide*.

To start components on the Exalytics Machine:

1. Change to the following directory:

   /EXALYTICS_MWHOME/user_projects/domains/bifoundation_domain

2. Enter the command to start Oracle WebLogic Server:

```
nohup ./startWebLogic.sh &
```

3. Use the command line to start Node Manager and OPMN if they are not started.

4. Log into the Oracle WebLogic Server console and start the managed servers.

5. Log into Fusion Middleware Control and verify whether the Oracle Business Intelligence system components are running. If they are not running, then start them.

6. Start the Oracle TimesTen Server. See "Running the TimesTen Server" in *Oracle TimesTen In-Memory Database Operations Guide*.

A.3.4 Running the Daemon Configuration Scripts for Oracle TimesTen

Perform this task on each computer in the cluster.

Run the daemon configuration scripts for Oracle TimesTen as root, using the following command:

```
/u01/app/oracle/product/TimesTen/tt1122/bin/setuproot -install
```

A.3.5 Configuring Memory Settings on the Server

Perform this task on each computer in the cluster.

When you configure memory settings, keep the following in mind:

- If an Oracle TimesTen In-Memory Database larger than 256GB is required, then you must configure and use large pages.

  See "Large pages" in *Oracle TimesTen In-Memory Database Installation Guide* for additional information on defining the Oracle TimesTen In-Memory Database in the DSN and on editing the limits.conf file for kernel parameters and semaphores.

- The largest recommended size for a Oracle TimesTen In-Memory Database on a single machine is a total of 800 GB3 TB, which includes the values for the PermSize and TempSize attributes.

> **Note:**
>
> Increasing large page settings for more memory will result in other applications (Oracle BI EE, Oracle Essbase) unable to allocate memory. Exceeding more than 80% of the physical memory is not recommended. Depending on how much more PermSize memory is required, you can transfer memory from the TempSize.

- Configuring Large Pages at the Kernel Level
- Configuring Large Pages for Oracle TimesTen In-Memory Databases
- Increasing PermSize on Existing Oracle TimesTen In-Memory Databases

A.3.5.1 Configuring Large Pages at the Kernel Level

> **Note:**
>
> Configure large pages only if TimesTen is installed on the server.

You can configure and activate the number of large pages by setting the nr_hugepages parameter in the /etc/sysctl.conf file. For an 800GB Oracle TimesTen In-Memory Database, you must specify greater than 410122 pages to create an 800GB store based on the following calculation:

```
(PermSize + TempSize + LogBufMB + 20) / hugepage_size     [All in bytes]
(400*1024*1024*1024) + (400*1024*1024*1024) + (1024*1024*1024) + (20*1024*1024) =
860088172544
 860088172544 / (2 * 1024 * 1024) = 410122
```

For example, to allow for spare capacity, modify the following setting in the /etc/sysctl.conf file:

```
vm.nr_hugepages = 410200
```

then either restart the machine or run the following command as the root user:

```
/sbin/sysctl –p
```

A.3.5.2 Configuring Large Pages for Oracle TimesTen In-Memory Databases

You can configure large pages for the Oracle TimesTen In-Memory Database by editing the following file:

/u01/app/oracle/product/TimesTen/tt1122/info/ttendaemon.options

and adding the following line:

```
-linuxLargePageAlignment 2
```

A.3.5.3 Increasing PermSize on Existing Oracle TimesTen In-Memory Databases

After configuring large pages for the Oracle TimesTen In-Memory Database, you can increase the PermSize on existing Oracle TimesTen In-Memory Databases.

To increase PermSize on existing Oracle TimesTen In-Memory Databases:

1. Disconnect all applications, including Oracle BI EE, from the Oracle TimesTen In-Memory Database.

2. If needed, change the RAM policy from inUse to Manual.

3. Unload the RAM memory from the Oracle TimesTen In-Memory Database by executing the following command:

    `ttAdmin -ramunload` *<Your_TT_DSN>*

    For example:

    ttAdmin -ramunload TT_AGGR_STORE

4. Modify the *timesten-install-dir/info/sys.odbc.ini* file in the Oracle TimesTen In-Memory Database to increase the PermSize.

5. Reload the RAM memory in the Oracle TimesTen In-Memory Database, by executing the following command:

    `ttAdmin -ramload` *<Your_TT_DSN>*

    For example:

    ttAdmin -ramload TT_AGGR_STORE

6. Reconnect all applications, including Oracle BI EE, to the Oracle TimesTen In-Memory Database.

For more information, see the "Oracle TimesTen In-Memory Database". The link to "Oracle TimesTen In-Memory Database Documentation" is available on the Oracle Exalytics Documentation Library.

A.3.6 Instantiating the Oracle TimesTen In-Memory Database

Perform this task on each computer in the cluster. For the first computer, the installation scripts update the sys.odbc.ini file, then you perform the rest of the task manually.

The Oracle TimesTen In-Memory Databases are defined using a DSN that is contained in the sys.odbc.ini file in the following directory:

/u01/app/oracle/product/TimesTen/tt1122/info

The semi-automated installation scripts automatically update the sys.odbc.ini file for Oracle TimesTen with a default configuration for the in-memory aggregate store for Oracle Exalytics, as shown in the following excerpts from a sample file on an Exalytics Machine:

```
[ODBC Data Sources]
TT_AGGR_STORE=TimesTen 11.2.2 Driver

[TT_AGGR_STORE]
```

```
Driver=/u01/app/oracle/product/TimesTen/tt1122/lib/libtten.so
DataStore=/u01/app/oracle/product/aggregate_store/tt_aggr_store
LogDir=/u01/app/oracle/product/aggregate_store/logs
DatabaseCharacterSet=AL32UTF8
ConnectionCharacterSet=AL32UTF8
LogFileSize=1024
LogBufMB=1024
LogBufParallelism=16
Preallocate=0
PermSize=25000
TempSize=25000
MemoryLock=4
CkptFrequency=30
CkptLogVolume=0
CkptRate=20
PrivateCommands=1
RecoveryThreads=40
```

This DSN supports an Oracle TimesTen In-Memory Database of 25GB with overall memory consumption of approximately 50GB. To support larger in-memory data stores, increase the settings of the PermSize and TempSize parameters. To support this DSN definition, the semi-automated installation process creates the following directories on the Exalytics Machine:

/u01/app/oracle/product/aggregate_store
/u01/app/oracle/product/aggregate_store/logs

On computers other than the first one in the cluster, manually edit the sys.odbc.ini file for Oracle TimesTen to add the DSN definition. Before instantiating this DSN, remove the comment character (#) that the semi-automated scripts included for the lines that define the DataStore and LogDir parameters in the sys.odbc.ini file.

The Oracle TimesTen In-Memory Database is instantiated when the first connection is made to the database. Navigate to the bin directory, run the ttIsql utility, and create a user (with a name such as "exalytics" and password such as "welcome1") as shown in the following sample commands:

```
cd /u01/app/oracle/product/TimesTen/tt1122/bin
./ttIsql
connect dsn=TT_AGGR_STORE;
create user exalytics identified by welcome1;
grant create session to exalytics;
grant create table to exalytics;
grant select on SYS.OBJ$ to exalytics;
```

Use the following sample commands to test the connection to the Oracle TimesTen In-Memory Database. There are no tables of data yet configured to return.

```
connect "DSN=TT_AGGR_STORE;uid=exalytics";
tables;
exit
```

You can use a tool such as SQL Developer on the client computer, if the Windows TimesTen client drivers that are installed can make a connection to the Oracle TimesTen instance that is used for aggregate storage. This tool can allow you to easily view the contents of the Oracle TimesTen In-Memory Database and to create a dummy table that facilitates the mapping of the Oracle TimesTen schema into the physical layer of the repository for Oracle Business Intelligence.

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A.3.7 Configuring the ODBC Connection from Oracle Business Intelligence to Oracle TimesTen

Perform this task on each computer in the cluster. The semi-automatic installation scripts perform this task on the first computer.

The Client/Server DSN in Oracle TimesTen spans computer boundaries and the remote Oracle TimesTen server can be configured as part of the DSN. You create the DSN for the two Oracle TimesTen instances by modifying the following file:

/EXALYTICS_MWHOME/instances/instance1/bifoundation/OracleBIApplication/ coreapplication/setup/odbc.ini

On the second computer in a cluster, the directory name includes the string "instance2" for the second computer instead of "instance1".

The following provides sample modifications to the file:

```
[ODBC Data Sources]
AnalyticsWeb = Oracle BI Server
Cluster = Oracle BI Server
SSL_Sample = Oracle BI Server
TT_AGGR_STORE = TimesTen 11.2.2 Driver

[TT_AGGR_STORE]
Driver = /u01/app/oracle/product/TimesTen/tt1122/lib/libttclient.so
TTC_SERVER_DSN = TT_AGGR_STORE
TTC_SERVER = <tt_hostname>
TTC_TIMEOUT = 0
```

Define the DSN Servers for Oracle TimesTen by modifying the following file:

TimesTen-root-dir/tt1122/info/sys.ttconnect.ini

The following provides sample modifications to the file:

```
[tt_hostname]
Description=TimesTen Server
Network_Address=example1.com
TCP_PORT=53397
```

In a multiple node cluster, you achieve high availability of in-memory aggregates by installing a Oracle TimesTen instance on each computer and ensuring that each instance is aware of the Oracle TimesTen instance on the other computer. You edit the odbc.ini file for Oracle Business Intelligence to contain references to both Oracle TimesTen instances. A two-node cluster might contain the following configuration details in the odbc.ini file on each computer:

```
[ODBC Data Sources]
AnalyticsWeb = Oracle BI Server
Cluster = Oracle BI Server
SSL_Sample = Oracle BI Server
TT_AGGR_STORE1 = TimesTen 11.2.2 Driver
TT_AGGR_STORE2 = TimesTen 11.2.2 Driver

[TT_AGGR_STORE1]
Driver = /u01/app/oracle/product/TimesTen/tt1122/lib/libttclient.so
TTC_SERVER_DSN = TT_AGGR_STORE
```

```
TTC_SERVER = <tt_hostname1>
TTC_TIMEOUT = 0

[TT_AGGR_STORE2]
Driver = /u01/app/oracle/product/TimesTen/tt1122/lib/libttclient.so
TTC_SERVER_DSN = TT_AGGR_STORE
TTC_SERVER = <tt_hostname2>
TTC_TIMEOUT = 0
```

With this configuration, edit the sys.ttconnect.ini in the /home/oracle/TimesTen/tt1122/ info directory to correspond to the odbc.ini file as shown in the following example:

```
[tt_hostname1]
Description=TimesTen Server
Network_Address=<fully qualified hostname>
TCP_PORT=53397

[tt_hostname2]
Description=TimesTen Server
Network_Address=<fully qualified hostname>
TCP_PORT=53397
```

A.3.8 Mapping Instances of Oracle TimesTen into the Physical Layer of the Oracle BI Repository

You must map all instances of Oracle TimesTen into the Physical layer of the Oracle BI repository. To map the instances, manually create the necessary database, connection pool, and physical schema objects using the Administration Tool. Then, upload the changed repository using the Repository tab of the Deployment page in Fusion Middleware Control.

When mapping an Oracle TimesTen source into the Physical layer of the Oracle BI repository, ensure that the database type and version are set correctly in the **Database** field of the General tab of the Database dialog. You must also ensure that the **Call interface** field in the General tab of the Connection Pool dialog is set correctly. For example, for Oracle TimesTen version 11.2.2., use the ODBC 3.5 call interface.

For more information, see the following:

- "Setting Up Database Objects and Connection Pools" in *Metadata Repository Builder's Guide for Oracle Business Intelligence Enterprise Edition*

- "Configuring Repositories" in *System Administrator's Guide for Oracle Business Intelligence Enterprise Edition*

A.3.9 Installing and Configuring BI Composer for Oracle BI EE

Perform this task on each computer in the cluster.

See "Installing and Configuring BI Composer for Oracle BI EE" in *Installing and Configuring Oracle Business Intelligence*.

A.3.10 Creating a DSN for IBM DB2 or Microsoft SQL Server

Perform this task one time regardless of the number of computers in the cluster if you use IBM DB2 or Microsoft SQL Server.

See "Creating a DSN for IBM DB2 or Microsoft SQL Server" in *Installing and Configuring Oracle Business Intelligence*.

A.3.11 Configuring IBM DB2 to Support Multibyte Data

Perform this task one time regardless of the number of computers in the cluster if you use IBM DB2.

See "Configuring IBM DB2 to Support Multibyte Data" in *Installing and Configuring Oracle Business Intelligence*.

A.3.12 Configuring Sample Reports for Oracle BI Publisher

Perform this task on each computer in the cluster.

See "Configuring Sample Reports for Oracle BI Publisher" in *Installing and Configuring Oracle Business Intelligence*.

A.3.13 Changing the Default Password for SampleAppLite.rpd

Perform this task once for the domain.

When you install Oracle Business Intelligence, the Oracle Business Intelligence installer automatically installs the SampleAppLite.rpd file with a default repository password of Admin123. If you intend to use the SampleAppLite.rpd file in a production system, then Oracle recommends that you change the default password for security reasons. For complete information on changing the password, see "Changing the Repository Password" in *Metadata Repository Builder's Guide for Oracle Business Intelligence Enterprise Edition*.

You can download the Sample Application (full version) from the following location on Oracle Technology Network:

```
http://www.oracle.com/technetwork/middleware/bi-foundation/obiee-
samples-167534.html
```

A.3.14 Adding the ORACLEHARDWAREACCELERATION TRUE Parameter for Essbase

If Essbase is installed, you must add the ORACLEHARDWAREACCELERATION TRUE parameter to the essbase.cfg file.

To add the ORACLEHARDWAREACCELERATION TRUE parameter:

1. Open the essbase.cfg file for editing.

   The essbase.cfg file is located in:

   ORACLE_INSTANCE/Essbase/essbaseserver1/bin/essbase.cfg

2. Edit the essbase.cfg file by adding the following parameter:

   ORACLEHARDWAREACCELERATION TRUE

3. Save the file.

4. Stop and restart the Essbase server by performing the following actions:

    a. Log in to Fusion Middleware Control.

    For information, see Section 2.2.2, "Logging into Fusion Middleware Control to Manage Oracle Business Intelligence" in *System Administrator's Guide for Oracle Business Intelligence Enterprise Edition.*

    b. Select **Business Intelligence** then **coreapplication**.

    c. Display the Processes page in the Availability tab.

    For example, expand Essbase Agents and select essbaseserver1 in the Processes section.

    This enables you to start or stop just the Essbase Server process.

    d. Click **Stop Selected** to stop the selected process.

    e. Click **Start Selected** to start the selected process.

A.3.15 Enabling Bursting Optimization for BI Publisher

Enabling bursting optimization mode for BI Publisher significantly enhances the performance of bursting jobs run through the BI Publisher scheduler.

To enable bursting optimization:

1. Open the xmlp-server-config.xml file located at:

   DOMAIN_HOME/config/bipublisher/repository/Admin/Configuration/xmlp-server-config.xml

2. Add the following property and value setting to the file:

   <property name="OPTIMIZE_BURST" value="true" />

3. Save the xmlp-server-config.xml.

4. Restart the BI Publisher application.

To handle high volume jobs (normal scheduled jobs or bursting jobs) configure the system temporary directory and the JMS shared directory in the BI Publisher Administration pages. For best performance configure these temp directories to use RAM disk (for non-clustered environments only) or solid-state drive. For information, see "Setting the System Temporary Directory" and "Configuring the Shared Directory" in the *Administrator's Guide for Oracle Business Intelligence Publisher*.

A.3.16 Disabling HugePages

Disable hugepages if you have an Oracle Essbase only, or Oracle Enterprise Performance (EPM) only installation.

To disable hugepages:

1. Log on as the root user.

2. Navigate to the /etc/sysctl.conf file.

3. Delete the following line:

   vm.nr_hugepages

4. Restart the Exalytics Machine.

A.4 Deinstalling Software on the Exalytics Machine

On the Exalytics Machine, you perform deinstallation both for Oracle TimesTen and Oracle Business Intelligence, as described in the following list:

- Deinstallation for Oracle TimesTen is described in "Uninstalling TimesTen on UNIX systems" in *Oracle TimesTen In-Memory Database Installation Guide*.

- Deinstallation for Oracle Business Intelligence is described in "Deinstalling Oracle Business Intelligence" in *Installing and Configuring Oracle Business Intelligence*.

A.5 Deploying Oracle Exalytics for High Availability

This section describes how to horizontally scale out the Exalytics Machine for scalability (high-availability) and performance (load balancing).

For additional details, see "Deploying Oracle Business Intelligence for High Availability" in *System Administrator's Guide for Oracle Business Intelligence Enterprise Edition*.

The chapter includes the following sections:

- Requirements for High Availability

- Diagram of High Availability

- Configuring for High Availability

- Troubleshooting the Highly Available Deployment

## A.5.1 Requirements for High Availability

The following are required for a high availability configuration:

- Each computer has an independent instance of Oracle TimesTen.

- Each computer has an odbc.ini file that contains a separate DSN for each instance of Oracle TimesTen. Each Oracle TimesTen DSN uses the client/server mode of connection.

- A BI Server repository can point to one or more physical repositories, but one set of aggregates exists per physical data source. Each physical data source has its own connection pool.

A.5.2 Diagram of High Availability

Figure A-1 shows a diagram of high availability for the Exalytics Machine. In certain scenarios, the system might benefit from using Oracle HTTP Server in the web tier.

Figure A-1   Diagram of High Availability for an Exalytics Machine
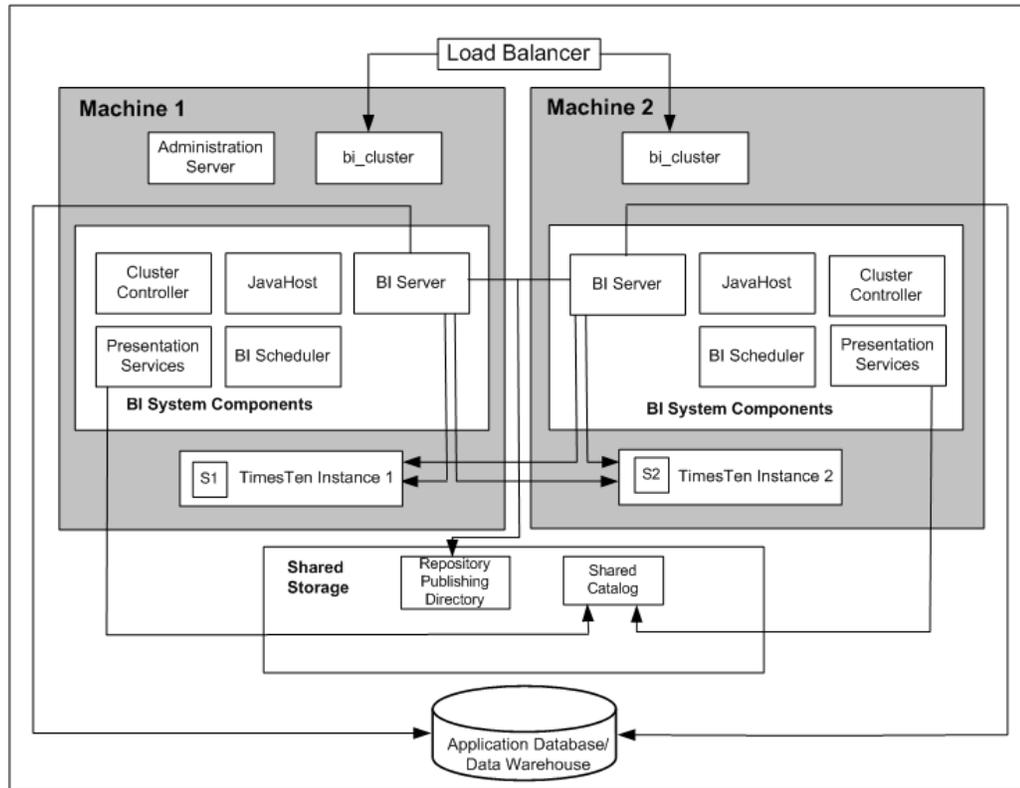
A.5.3 Configuring for High Availability

Installing Software on Exalytics Machine describes using the installation scripts for a single computer. For multiple computers (such as a two-node cluster), you use the installation scripts for the first computer, then you install the software manually on other computers, without the use of scripts. After performing the steps in this section, see Deinstalling Software on the Exalytics Machine

This section describes the steps for configuring a highly available deployment:

> 💡 **Tip:**
>
> Because the installation process for the second node involves mostly manual steps using the Oracle Universal Installer, connect to the Exalytics Machine using a tool such as RealVNC remote control software.

- Step 1: Preparing the First Exalytics Machine
- Step 2: Preparing the Second Exalytics Machine
- Step 3: Installing Oracle WebLogic Server
- Step 4: Installing Oracle Business Intelligence
- Step 5: Scaling Out the Existing BI Domain
- Step 6: Scaling Out System Components to the Second Exalytics Machine

- • Step 7: Installing and Configuring Oracle TimesTen
- • Step 8: Configuring Shared Storage for Persistent Stores
- • Step 9: Configuring the Front-End Load Balancer

A.5.3.1 Step 1: Preparing the First Exalytics Machine

Install Oracle Exalytics on the first Exalytics Machine using the instructions that are provided in Installing Software on Exalytics Machine of this appendix before installing on the second Exalytics Machine.

A.5.3.2 Step 2: Preparing the Second Exalytics Machine

To prepare the second Exalytics Machine:

1. Create the user, as described in Creating the User, Group, and Password on the Operating System.

2. Create the inventory for Oracle TimesTen, as described in Creating the Inventory for Oracle TimesTen

3. Create the following directory structure:

   - • The location of the Middleware home, which must be the same logical directory name as on the first Exalytics Machine:

     /u01/app/oracle/product/fmw

   - • The target directory for the Oracle TimesTen installation:

     /u01/app/oracle/product/TimesTen

4. Download the files into the directory structure, as described in Downloading Oracle Files into the Directory Structure You do not have to download the files for the Repository Creation Utility.

A.5.3.3 Step 3: Installing Oracle WebLogic Server

Install Oracle WebLogic Server into the following directory, which becomes the Middleware home on the second Exalytics Machine:

/u01/app/oracle/product/fmw

To install Oracle WebLogic Server on the second Exalytics Machine:

1. Run the following command:

   ```
   >./ wls1036_linux64.bin
   ```

2. Select the custom option in the wizard and deselect **Coherence**, because the component does not need to be installed.

   The wizard automatically selects JRockit as the JVM to use, so keep this option selected.

3. When the installation has completed, clear the option to run "quickstart" because this option is not required.

A.5.3.4 Step 4: Installing Oracle Business Intelligence

To perform a Software Only Install of Oracle Business Intelligence on the second Exalytics Machine:

1. Enter the following commands:

   ```
   cd /home/oracle/EXALYTICS_INSTALLERS/bi/bishiphome/disk1
   >./runInstaller
   ```

2. The first time that you install on the second Exalytics Machine, you are prompted to log in as "root" and to run a script to create the Oracle Inventory. Ensure that the location specified is /home/oracle/oraInventory.

3. Navigate through the pages of the wizard until you can select the option to perform a Software Only Install.

4. On the next page, ensure that the Oracle Middleware Home property is set to the directory where you installed Oracle WebLogic Server.

   The Oracle Home directory can be the default of Oracle_BI1.

5. Navigate through the remaining pages of the wizard until the installation is complete.

A.5.3.5 Step 5: Scaling Out the Existing BI Domain

You scale out the existing BI domain from the second Exalytics Machine.

To scale out the BI Domain:

1. Log on to the second Exalytics Machine.

2. Enter the following commands:

   ```
   cd /u01/app/oracle/product/fmw/Oracle_BI1/bin
   >./config.sh
   ```

3. Navigate through the pages of the wizard and select **Scale Out BI System**.

4. Enter details of the first Exalytics Machine and the directory locations for the installation are populated automatically.

5. Navigate through the remaining pages of the wizard until you can initiate the process by pressing **Configure**.

See "Using the Configuration Assistant to Scale Out the BI System" in *Enterprise Deployment Guide for Oracle Business Intelligence* for information on running the config.sh script.

A.5.3.6 Step 6: Scaling Out System Components to the Second Exalytics Machine

To configure the communication between Oracle Business Intelligence and Oracle TimesTen, you must scale out using Fusion Middleware Control to deploy the required Oracle Business Intelligence system component servers onto the second Exalytics Machine. This scale-out results in entries in the opmn.xml file on the second Exalytics Machine that can then be edited as needed.

To scale out system components to the second Exalytics Machine:

1. Using Fusion Middleware Control, scale out the following system components as described in *System Administrator's Guide for Oracle Business Intelligence Enterprise Edition*:

   - The Oracle BI Server

   - Oracle BI Presentation Services

   - JavaHost

   You should also scale out the following single components in the Oracle BI domain as a standby component: the the Cluster Controller and the Oracle BI Scheduler.

A.5.3.7 Step 7: Installing and Configuring Oracle TimesTen

To install and configure Oracle TimesTen:

1. Enter the following commands:

```
cd /home/oracle/EXALYTICS_INSTALLERS/tt
>./setup.sh
instance name tt1122 [default chosen]
install client/server and data manager [default chosen]
specify particular location for install [3]
enter location [custom location chosen /u01/app/oracle/product/TimesTen]
create daemon home - [default chosen]
daemon logs - [default chosen]
accept default port no - 53396
restrict access to TT to group oracle? - Yes
enable PL/SQL - yes [default chosen]
TNS_ADMIN - not chosen during install.
port for TT server - 53397
quickstart and doc - no [default chosen]
doc without quickstart - yes [default chosen] - location default
TT replication with clusterware - no - [default chosen]
```

2. Run the daemon configuration scripts for Oracle TimesTen as root, as described in Running the Daemon Configuration Scripts for Oracle TimesTen.

3. On the first Exalytics Machine, configure the BI Server to communicate with either instance of Oracle TimesTen by creating two DSNs for Oracle TimesTen, as described in Configuring the ODBC Connection from Oracle Business Intelligence to Oracle TimesTen.

4. On the second Exalytics Machine, perform the same procedure as in the previous step to create DSNs for Oracle TimesTen to configure the connectivity from the second BI Server to either instance of Oracle TimesTen.

5. Update the opmn.xml file on the second Exalytics Machine to point to the driver location for ODBC for Oracle TimesTen by editing the following "variable" elements. The edited text is shown in bold.

```
<variable id="LD_LIBRARY_PATH" value="$ORACLE_HOME/common/ODBC/Merant/5.3/
lib$:$ORACLE_HOME/bifoundation/server/bin$:$ORACLE_HOME/bifoundation/web/
bin$:$ORACLE_HOME/clients/epm/Essbase/EssbaseRTC/bin$:$ORACLE_HOME/bifoundation/
odbc/lib$:$ORACLE_INSTANCE$:$ORACLE_HOME/lib:/u01/app/oracle/product/TimesTen/
tt1122/lib" append="true"/>
<variable id="TIMESTEN_DLL" value="/u01/app/oracle/product/TimesTen/tt1122/lib/
libttclient.so"/>
```

The opmn.xml file is in the following directory:

/u01/app/oracle/product/fmw/instances/instance2/config/OPMN

6. Stop and start the Notification Server (OPMN).

   a. Go to the following directory that contains the OPMN command-line tool:

      /u01/app/oracle/product/fmw/instances/instance2/bin

   b. Run the following command:

      ./opmnctl stopall

      Stops OPMN and all Oracle Business Intelligence system components.

   c. Go to the following directory that contains the OPMN command-line tool:

      /u01/app/oracle/product/fmw/instances/instance2/bin

   d. Run the following command:

      ./opmnctl startall

      Starts OPMN and all Oracle Business Intelligence system components.

      For more information, see "Using the OPMN Command Line to Start, Stop, Restart, and View the Status of System Components" in *System Administrator's Guide for Oracle Business Intelligence Enterprise Edition*.

7. Validate that you can use a client/server DSN for Oracle TimesTen from the first Exalytics Machine by entering the following commands:

```
cd $ORACLE_INSTANCE/bifoundation/OracleBIApplication/coreapplication/setup/
. ./bi-init.sh (bash shell)
cd Times-Ten-root-dir/tt1122/bin
./ttisqlcs -connstr "uid=oracle;pwd=welcome1;dsn=bim_tt1";
```

   These commands use the SQL client for Oracle TimesTen to connect to the Oracle TimesTen server on the first Exalytics Machine and validate that the BI Server can communicate with Oracle TimesTen.

8. Repeat the previous step for the client/server DSN for Oracle TimesTen from the second Exalytics Machine.

A.5.3.8 Step 8: Configuring Shared Storage for Persistent Stores

As part of the process of configuring the Exalytics Machine, you must configure various persistent stores to be located on a shared directory location such as a NAS (network attached storage). The following list outlines those stores and includes link for information on configuring them:

- Repository for the Oracle BI Server. Specify a shared RPD publishing directory in Fusion Middleware Control to propagate online repository changes in a cluster. The master BI Server copies its local repository to this directory when online changes are made. When slave BI Servers start, if the version in the publishing directory is newer, then each slave server copies the version in the shared directory to its local disk.

  For information, see Using Fusion Middleware Control to Upload a Repository and Set the Oracle BI Presentation Catalog Locationin *System Administrator's Guide for Oracle Business Intelligence Enterprise Edition*.

- Oracle BI Presentation Catalog. Each Oracle BI Presentation Services instance loads the catalog from the catalog location that is specified in Fusion Middleware Control. Copy any existing catalogs to shared storage before reconfiguring this location to shared storage.

For information, see "Using Fusion Middleware Control to Upload a Repository and Set the Oracle BI Presentation Catalog Location" in *System Administrator's Guide for Oracle Business Intelligence Enterprise Edition*.

- Global cache. The global cache resides on a shared file system and stores purging events, seeding events (which are often generated by agents), and results sets that are associated with seeding events. Each BI Server maintains its own local query cache for regular queries. The query cache for the BI Server continues to be located on the local node.

  For information, see "Using Fusion Middleware Control to Set Global Cache Parameters" in *System Administrator's Guide for Oracle Business Intelligence Enterprise Edition*.

A.5.3.9 Step 9: Configuring the Front-End Load Balancer

Configure a front-end load balancer, which is properly configured with the Oracle WebLogic Server Cluster Plug-in. For information, see "Configuring High Availability for Oracle Business Intelligence and EPM" in *High Availability Guide*.

A.5.4 Troubleshooting the Highly Available Deployment

This section contains solutions that are related to a highly available deployment:

- Connection Issues with the Oracle BI Server and Oracle TimesTen
- Client Installer Cannot Locate the Driver for Oracle TimesTen
- Oracle BI Server Does Not Fail Over to the Instance of Oracle TimesTen
- Aggregates Are Not Present in Second Instance

A.5.4.1 Connection Issues with the Oracle BI Server and Oracle TimesTen

You might find that the BI Server cannot connect to Oracle TimesTen on either the first or the second node. To resolve this issue, check the following:

- Verify that the DSNs for Oracle TimesTen are configured correctly in the odbc.ini and opmn.xml files, as described in the following list:

  – The odbc.ini file in the ORACLE_INSTANCE/bifoundation/OracleBIApplication/coreapplication/setup directory has the proper DSNs defined to connect to both instances of Oracle TimesTen, as described in Configuring the ODBC Connection from Oracle Business Intelligence to Oracle TimesTen.

  – The opmn.xml file in the ORACLE_INSTANCE/config/OPMN/opmn/ directory has the LD_LIBRARY_PATH variable set correctly to point to the shared library folder for Oracle TimesTen. The TIMESTEN_DLL variable must also be defined correctly, as shown in the following example:

    ```
    <variable id="TIMESTEN_DLL" value="u01/app/oracle/product/TimesTen/
    tt1122/lib/libttclient.so"/>
    ```

- The BI Server must use the ODBC driver for Oracle TimesTen Version 3.5 for connection.

  During deployment of a repository, ensure that you use the ODBC driver for Oracle TimesTen Version 3.5 for the database connection pool. Without the use of this driver version, the BI Server cannot connect to Oracle TimesTen.

A.5.4.2 Client Installer Cannot Locate the Driver for Oracle TimesTen

After you use the Client Installer to install the Oracle BI Administration Tool on a Windows computer, you might notice that the Administration Tool displays an error message such as the following:

Unable to load Times Ten Driver ttclient.dll.

This error message indicates that you cannot use the ODBC drivers in Oracle TimesTen to import metadata from a physical table source for Oracle TimesTen. To resolve this issue, set the TIMESTEN_DLL environment variable to point explicitly to the driver location for Oracle TimesTen, as shown in the following example:

set TIMESTEN_DLL=C:\TimesTen\tt1122_32\bin\ttclient1122.dll

A.5.4.3 Oracle BI Server Does Not Fail Over to the Instance of Oracle TimesTen

If the BI Server does not fail over to the second Oracle TimesTen instance on the scaled-out node, then ensure that the logical table source (LTS) for the repository has mapped both the physical data sources for Oracle TimesTen. This mapping ensures that at the logical table source level, a mapping exists to both instances of Oracle TimesTen. If one instance of Oracle TimesTen is not available, then failover logic for the BI Server at the DSN level tries to connect to the other instance of Oracle TimesTen.

A.5.4.4 Aggregates Are Not Present in Second Instance

You might notice that aggregates that were created on the first instance of Oracle TimesTen are not available on the second instance of Oracle TimesTen. Keep in mind that no automatic replication exists between the Oracle TimesTen instances in the scaled-out deployment. The two instances are distinct and run on different computers but have the same deployed data stores. If you create aggregates using SQL scripts from Oracle BI Summary Advisor or the Aggregate Persistence Wizard on one instance of Oracle TimesTen, then you must manually create the same aggregates on the second instance of Oracle TimesTen. You must ensure that you keep the two instances of Oracle TimesTen synchronized. For information, see "Life Cycle Use Cases for Aggregate Persistence" in *Metadata Repository Builder's Guide for Oracle Business Intelligence Enterprise Edition*.

Index

I

installation types
    Software Only, *A-9*

N

Node Manager, *A-11*
    default port, *A-11*

P

ports

ports *(continued)*
    defaults
        Node Manager, *A-11*

S

Software Only Install type
    overview of, *A-9*
staticports.ini, *A-11*