Oracle® Server X6-2 Service Manual

ORACLE®

Oracle Server X6-2 Service Manual

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Contents

Using This Documentation

- **Overview** – This service manual explains how to remove and replace parts in the Oracle Server X6-2, and how to troubleshoot and maintain the system.
- **Audience** – This guide is intended for trained technicians and authorized service personnel who have been instructed on the hazards within the equipment and qualified to remove and replace hardware.
- **Required knowledge** – Advanced experience troubleshooting and replacing hardware.

Product Documentation Library

Documentation and resources for this product and related products are available at `https://www.oracle.com/goto/x6-2/docs`.

Feedback

Provide feedback about this documentation at `https://www.oracle.com/goto/docfeedback`.

About the Oracle Server X6-2

These sections describe the controls, connectors, status indicators, system components, and replaceable components of the server.

Note - Always update the server with the latest firmware, drivers, and other hardware-related software by downloading the latest software release package when you first receive the server, and for every new software release. For information about the software release packages and how to download the software, refer to "Getting Firmware and Software Updates" in *Oracle Server X6-2 Installation Guide*.

Description	Links
Review the product description.	"Product Description" on page 15
Learn about server controls and connectors.	"About Controls and Connectors" on page 16
Learn about system components.	"About System Components" on page 19

Product Description

The Oracle Server X6-2 is an enterprise-class, one rack unit (1U) server. It supports the following components:

- Up to two Intel processors. Processors with the following capabilities are supported:
  - 22-core, 2.2 GHz, 145W processors
  - 14-core, 2.6 GHz, 135W processors
  - 10-core, 2.2 GHz, 85W processors
  - 6-core, 3.4 GHz, 135W processors
- Up to 12 DIMMs per processor for a maximum of 24 DDR4 DIMMs and a maximum of 1.5 TB of memory are supported in dual-processor systems. A maximum of 12 DDR4 DIMMs and a maximum of 768 GB of memory are supported in single-processor systems. RDIMMs (16 GB and 32 GB) and LRDIMMs (64 GB) are supported.
- Four PCIe Gen3 slots in dual-processor systems: one slot, slot 4, is dedicated to the internal HBA. PCIe slot 1 is nonfunctional in single-processor systems.

- Four Ethernet ports (NET0, NET1, NET2, and NET3 located on the rear of the server) are supported on dual-processor systems.

Note - Ethernet ports NET2 and NET3 are nonfunctional on single-processor systems.

- Storage drive configurations include a DVD drive (optional) and up to eight hard disk drives (HDDs) or solid state drives (SSDs), with optional support for up to four PCIe-based NVMe (non-volatile memory express) SSD drives.
- Two hot-pluggable, redundant power supplies.
- An on-board Oracle Integrated Lights Out Manager (Oracle ILOM) service processor (SP) based on the Emulex Pilot3 chip.

About Controls and Connectors

The following sections describe the controls, indicators, connectors, and drives located on the front and rear panels.

- "Front Panel Controls and Indicators" on page 16
- "Server Back Panel View" on page 18

Related Information

- "About System Components" on page 19
- "Illustrated Parts Breakdown" on page 20

Front Panel Controls and Indicators

The following figure shows the controls, status indicators (LEDs), connectors, and drives on the front panel of the Oracle Server X6-2.
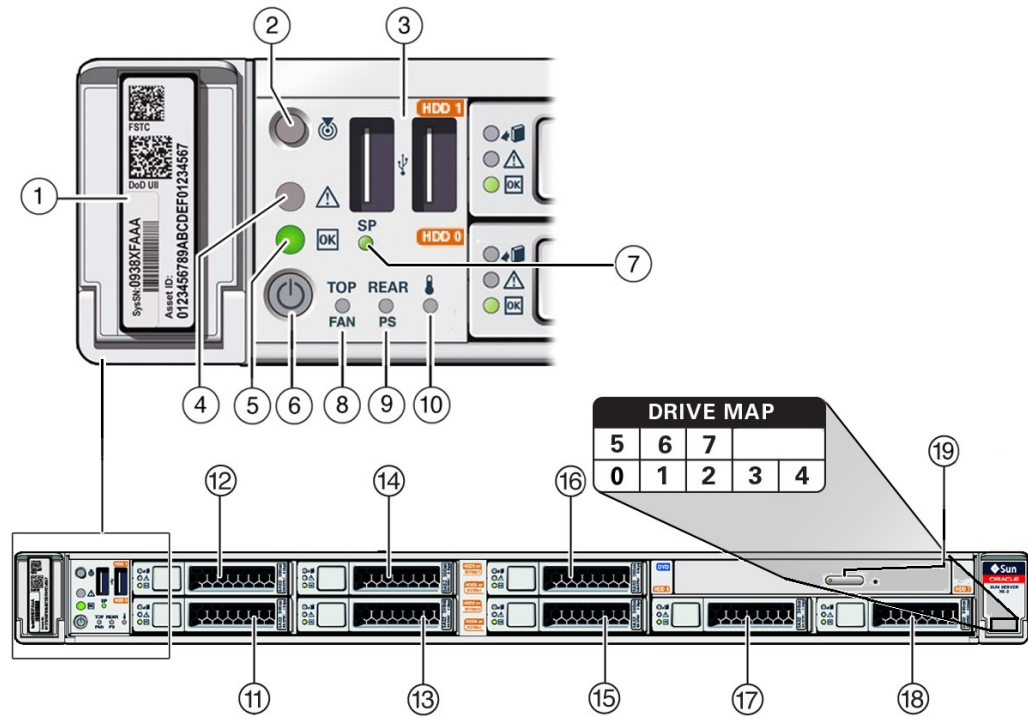
Call Out	Description
1	Product Serial Number (PSN) label and Radio Frequency Identification (RFID) tag
2	Locator LED/Locator button: white
3	USB 2.0 connectors (2)
4	Service Required LED: amber
5	Power/OK LED: green
6	Power button
7	SP OK LED: green
8	Top Fan Fault LED: amber
9	Rear Power Supply (PS) Fault LED: amber
10	System Over Temperature Warning LED: amber
11	Storage drive 0 (HDD/SSD)
12	Storage drive 1(HDD/SSD)
13	Storage drive 2 (HDD/SSD/NVMe)
14	Storage drive 3 (HDD/SSD/NVMe)
15	Storage drive 4 (HDD/SSD/NVMe)

Call Out	Description
16	Storage drive 5 (HDD/SSD/NVMe)
17	Storage drive 6 (HDD/SSD)
18	Storage drive 7 (HDD/SSD)
19	(Optional) DVD drive

Related Information

- "Server Back Panel View" on page 18
- "About System Components" on page 19

Server Back Panel View

The following figure shows the Oracle Server X6-2 back panel and the location of power supplies, status indicators (LEDs), connectors, and PCIe slots.
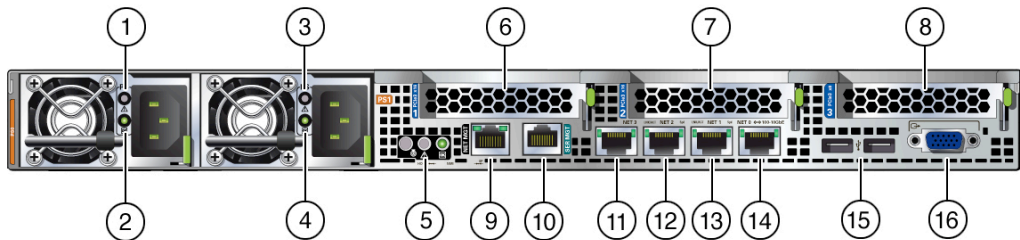
Call Out	Description
1	Power Supply (PS) 0
2	Power Supply (PS) 0 status indicators: Service Required LED: amber, AC OK LED: green
3	Power Supply (PS) 1
4	Power Supply (PS) 1 status indicators: Service Required LED: amber, AC OK LED: green
5	System status indicators: Locator LED: white, Service Required LED: amber, Power/OK LED: green

Call Out	Description
6	PCIe card slot 1 (This slot is for a standard PCIe card or the optional Oracle PCIe NVMe switch card. This slot is nonfunctional in single-processor systems.)
7	PCIe card slot 2
8	PCIe card slots 3 and 4 (Slot 4 is for the internal host bus adapter [HBA] card. Slot 4 is internal and is not visible from the rear of the server.)
9	Oracle Integrated Lights Out Manager (ILOM) service processor (SP) network management 10/100/1000BASE-T port (NET MGT)
10	Serial management (SER MGT)/RJ-45 serial port
11	Network (NET) 100/1000/10000 port: NET 3 (Nonfunctional in single-processor systems.)
12	Network (NET) 100/1000/10000 port: NET 2 (Nonfunctional in single-processor systems.)
13	Network (NET) 100/1000/10000 port: NET 1
14	Network (NET) 100/1000/10000 port: NET 0
15	USB 2.0 connectors (2)
16	DB-15 video connector

Note - All of the PCIe slots comply with the PCI Express 3.0 specification and can accommodate 25 watt PCIe3 cards.

Related Information

- "Front Panel Controls and Indicators" on page 16
- "About System Components" on page 19

About System Components

These sections describe the components of the server:

- "Illustrated Parts Breakdown" on page 20
- "Customer-Replaceable Units" on page 22
- "Field-Replaceable Units" on page 23
- "Server Internal Cables" on page 24

Related Information

- "Servicing CRUs That Do Not Require Server Power-Off" on page 69

Illustrated Parts Breakdown

The following figure identifies the major components of the server.

FIGURE 1   Server Illustrated Parts Breakdown
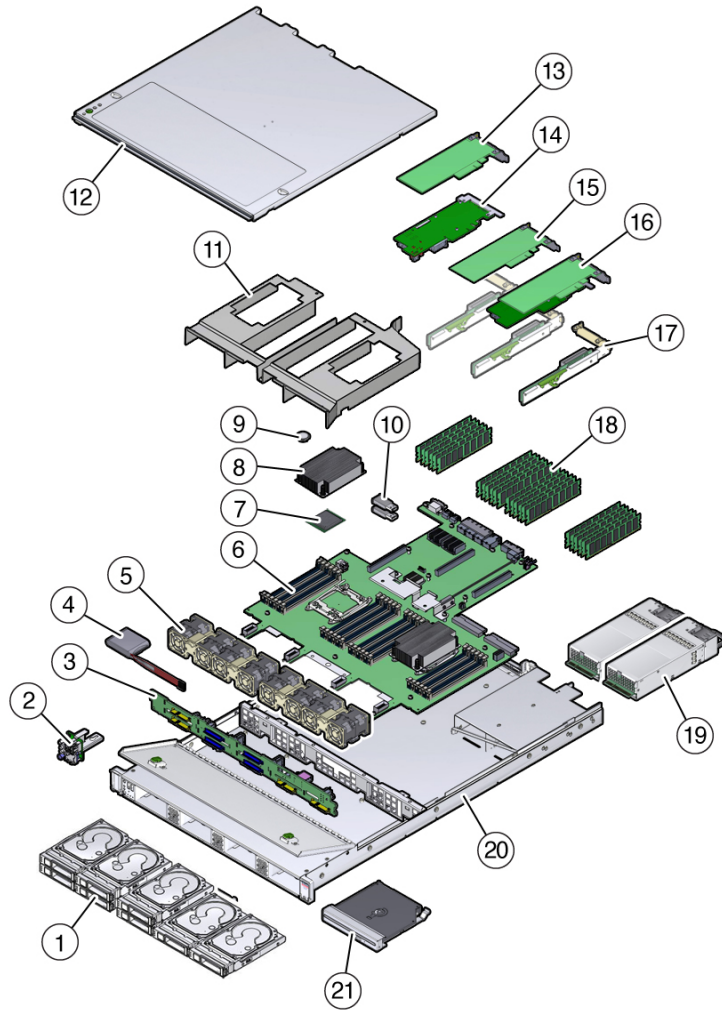
Callout	Description
1	Storage drives
2	Front indicator module (FIM)

Callout	Description
3	Disk backplane
4	Super capacitor (Energy storage module for the Oracle Storage 12 Gb/s SAS PCIe RAID HBA in PCIe slot 4.)
5	Fan modules
6	Motherboard
7	Processors **Note -** In single-processor systems, neither a heatsink nor a processor socket filler are installed in the processor socket 1 (P1). To protect the delicate processor socket pins, the cover that comes on the motherboard from manufacturing is left in place.
8	Heatsinks
9	Battery
10	USB flash drives
11	Air baffle
12	Top cover
13	(Optional) PCIe card in slot 3
14	Oracle Storage 12 Gb/s SAS PCIe RAID HBA card in PCIe slot 4
15	(Optional) PCIe card in slot 2
16	(Optional) Oracle PCIe NVMe switch card or standard PCIe card in slot 1 **Note -** PCIe slot 1 is nonfunctional in single-processor systems.
17	PCIe risers (3)
18	DIMMs **Note -** A maximum of 12 DIMMs are supported in single-processor systems and the DIMMs must be installed in sockets associated with processor 0 (P0). No DIMM filler panels are required in vacant DIMM sockets associated with processors 0 (P0) or 1 (P1).
19	Power supplies
20	Server chassis
21	(Optional) DVD drive

Customer-Replaceable Units

The following table lists the customer-replaceable units (CRUs) in the server and directs you to the replacement instructions.

CRU	Description	Replacement Instructions
Battery	Lithium coin-cell battery that powers the CMOS BIOS and real-time clock.	"Servicing the Battery (CRU)" on page 126
DIMMs	Add or replace memory modules in the system.	"Servicing the DIMMs (CRU)" on page 93

CRU	Description	Replacement Instructions
Storage drives	Supports SAS hard-disk drives (HHDs), SATA solid-state drives (SSDs), and NVMe SSDs.	"Servicing Storage Drives (CRU)" on page 69
Internal USB flash drives	Supports two internal USB flash drives.	"Servicing the Internal USB Flash Drives (CRU)" on page 123
Fan modules	Four fan modules for cooling the motherboard assembly and installed components.	"Servicing Fan Modules (CRU)" on page 82
PCIe cards	Optional add-on PCIe cards that can expand the functionality of the server. **Note -** The Oracle Storage 12 Gb/s SAS PCIe RAID HBA card and the optional Oracle PCIe NVMe switch card are field replaceable units (FRUs) and should only be serviced by authorized Oracle Service personnel.	"Servicing PCIe Cards (CRU)" on page 118
PCIe risers	Houses and connects the PCIe cards.	"Servicing PCIe Risers (CRU)" on page 106
Power supplies	Two fully redundant AC power supplies.	"Servicing Power Supplies (CRU)" on page 87

Related Information

- "Field-Replaceable Units" on page 23
- "Illustrated Parts Breakdown" on page 20
- "Servicing CRUs That Do Not Require Server Power-Off" on page 69
- "Servicing CRUs That Require Server Power-Off" on page 93
- "Server Internal Cables" on page 24

Field-Replaceable Units

The following table lists the field-replaceable units (FRUs) in the server and directs you to the replacement instructions.

FRU	Description	Replacement Instructions
Processor and heatsink	Carries out the instructions of the system.	"Servicing Processors (FRU)" on page 130
Oracle Storage 12 Gb/s SAS PCIe RAID HBA card	HDD and SSD storage drives controller	"Servicing the Internal HBA Card (FRU)" on page 147
Oracle PCIe NVMe switch card	NVMe storage drives controller	"Servicing the Oracle PCIe NVMe Switch Card (FRU)" on page 143
Disk backplane	Serves as the interface between storage drives and the internal host bus adapter (HBA) card and Oracle PCIe NVMe switch card.	"Servicing the Disk Backplane (FRU)" on page 156
DVD drive	DVD drive	"Servicing the DVD Drive (FRU)" on page 163

FRU	Description	Replacement Instructions
Front indicator module (FIM)	Contains the front panel controls, indicators, and USB ports.	"Servicing the Front Indicator Module (FRU)" on page 166
Motherboard assembly	Provides connectors for the fans, DIMMs, processors, PCIe risers, internal USB ports, and power supplies.	"Servicing the Motherboard (FRU)" on page 170
SAS cables	Provide signals and backup power between the disk backplane and the super capacitor and the Oracle Storage 12 Gb/s SAS PCIe RAID HBA.	"Servicing the Internal HBA SAS Cable assembly" on page 183
NVMe cable	Provide signals between the disk backplane and the Oracle PCIe NVMe switch card.	"Servicing the NVMe Cables" on page 187

Related Information

- "Customer-Replaceable Units" on page 22
- "Illustrated Parts Breakdown" on page 20
- "Servicing FRUs" on page 129
- "Server Internal Cables" on page 24

Server Internal Cables

The following table lists the cables used in the server and directs you to the replacement instructions.

Cable Name	Part Number	Description	Removal/Replacement Instructions
Internal HBA SAS cable assembly	7076125	Eight-disk, SAS, combo cable assembly that connects the internal host bus adapter (HBA) card to the disk backplane and the super capacitor.	See "Servicing the Internal HBA SAS Cable assembly" on page 183
Oracle PCIe NVMe switch card cable assembly	7089783	Eight-disk backplane, combo cable assembly that connects the Oracle PCIe NVMe switch card to the disk backplane.	See "Servicing the NVMe Cables" on page 187
Power cable	7064125	Connects the disk backplane to the motherboard. Provides power from the motherboard to the disk backplane.	See "Servicing the Power, FIM, Disk Backplane Data, and DVD Cables" on page 191
FIM cable	7064123	Ribbon cable that provides a signal and power connection between the motherboard to the Front Module Indicator (FIM)	See "Servicing the Power, FIM, Disk Backplane Data, and DVD Cables" on page 191

Cable Name	Part Number	Description	Removal/Replacement Instructions
Disk backplane data cable	7064127	Ribbon cable that connects the disk backplane to the motherboard. Provides a data connection between the two components.	See "Servicing the Power, FIM, Disk Backplane Data, and DVD Cables" on page 191
DVD data/power cable	7064128	Combo cable that connects the DVD drive to the motherboard. Provides a data connection between the two components and provides power from the motherboard to the DVD drive.	See "Servicing the Power, FIM, Disk Backplane Data, and DVD Cables" on page 191

Related Information

- "Customer-Replaceable Units" on page 22
- "Illustrated Parts Breakdown" on page 20
- "Servicing FRUs" on page 129

Troubleshooting and Diagnostics

This section includes information about troubleshooting hardware component faults for the Oracle Server X6-2. It contains the following topics.

Description	Link
Maintenance-related information and procedures that you can use to troubleshoot and repair server hardware issues.	"Troubleshooting Server Component Hardware Faults" on page 27
Information about software and firmware diagnostic tools that you can use to isolate problems, monitor the server, and exercise the server subsystems.	"Troubleshooting With Diagnostic Tools" on page 42
Information about attaching devices to the server to perform troubleshooting.	"Attaching Devices to the Server" on page 45
Information about contacting Oracle support.	"Getting Help" on page 51

Troubleshooting Server Component Hardware Faults

This section contains maintenance-related information and procedures that you can use to troubleshoot and repair server hardware issues. The following topics are covered.

Description	Section Links
Troubleshooting overview information and procedure.	"Troubleshooting Server Hardware Faults" on page 28
Resources for troubleshooting and diagnostic information.	"Troubleshooting and Diagnostic Information" on page 31
Discerning the server state using the front panel indicators.	"Troubleshooting Using the Server Front and Rear Panel Status Indicators" on page 32
Causes, actions, and preventative measures for problems related to the cooling subsystem.	"Troubleshooting System Cooling Issues" on page 38
Causes, actions, and preventative measures for problems related to the power subsystem.	"Troubleshooting Power Issues" on page 40

Troubleshooting Server Hardware Faults

When a server hardware fault event occurs the system lights the Service Required LED and captures the event in the system event log (SEL). If you have set up notifications through Oracle ILOM, you also receive an alert through the notification method you chose. When you become aware of a hardware fault, you should address it immediately.

To investigate a hardware fault, see the following:

- "Basic Troubleshooting Process" on page 28
- "Troubleshoot Hardware Faults Using the Oracle ILOM Web Interface" on page 29

Basic Troubleshooting Process

Use the following process to address a hardware fault (for the step-by-step procedure, see "Troubleshoot Hardware Faults Using the Oracle ILOM Web Interface" on page 29).

1. **Identify the server subsystem containing the fault**.

   You can use Oracle ILOM to identify the failed component.

2. **Review the** *Oracle Server X6-2 Product Notes*.

   Once you have identified the hardware issue, review the *Oracle Server X6-2 Product Notes*. This document contains up-to-date information about the server, including hardware-related issues.

3. **Prepare the server for service using Oracle ILOM**.

   If you have determined that the hardware fault requires service (physical access to the server), use Oracle ILOM to take the server offline, activate the Locate LED, and power off the server.

4. **Prepare the service work space**.

   Before servicing the server, prepare the work space, ensuring electrostatic discharge (ESD) protection for the server and components.

   For handling instructions for devices sensitive to ESD, see "Electrostatic Discharge Safety" on page 54.

5. **Service components**.

   To service the components, see the removal, installation, and replacement procedures in this document.

Note - A component designated as FRU must only be replaced by authorized Oracle Service personnel. Contact Oracle Services.

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6. **Clear the fault in Oracle ILOM**.

    Depending on the component, you might need to clear the fault in Oracle ILOM. Generally, components that have a FRU ID clear the fault automatically.

Related Information:

- See "Troubleshoot Hardware Faults Using the Oracle ILOM Web Interface" on page 29

▼ Troubleshoot Hardware Faults Using the Oracle ILOM Web Interface

Note - The screens shown in this procedure might differ from those for your server.

This procedure uses the basic troubleshooting steps described in "Basic Troubleshooting Process" on page 28.

Use this procedure to troubleshoot hardware faults with the Oracle ILOM web interface and, if necessary, prepare the server for service.

Note - This procedure provides one basic approach to troubleshooting hardware faults. It uses a combination of the Oracle ILOM web interface and the command-line interface (CLI). This procedure can be performed using only the Oracle ILOM CLI interface. For more information about the Oracle ILOM web interface and CLI, refer to `https://www.oracle.com/goto/ilom/docs`.

Before You Begin
- Obtain the latest version of the *Oracle Server X6-2 Product Notes* at `https://www.oracle.com/goto/x6-2/docs`.

1. **Log in to the server SP Oracle ILOM web interface.**

    Open a browser and direct it using the IP address of the server SP. At the login screen, type a user name (with administrator privileges) and password at the log-in screen. The Summary Information screen appears.

    The Status section of the Summary Information screen provides information about the server subsystems, including:

    - Processors
    - Memory
    - Power
    - Cooling
    - Storage

- Networking

2. **In the Status section of the Oracle ILOM Summary Information screen, identify the server subsystem that requires service.**

In the above example, the Status screen shows that the Processor subsystem requires service. This indicates that a hardware component within the subsystem is in a fault state.

3. **To identify the component, click on Processors in the Status section.**

The Oracle ILOM Processors screen appears.
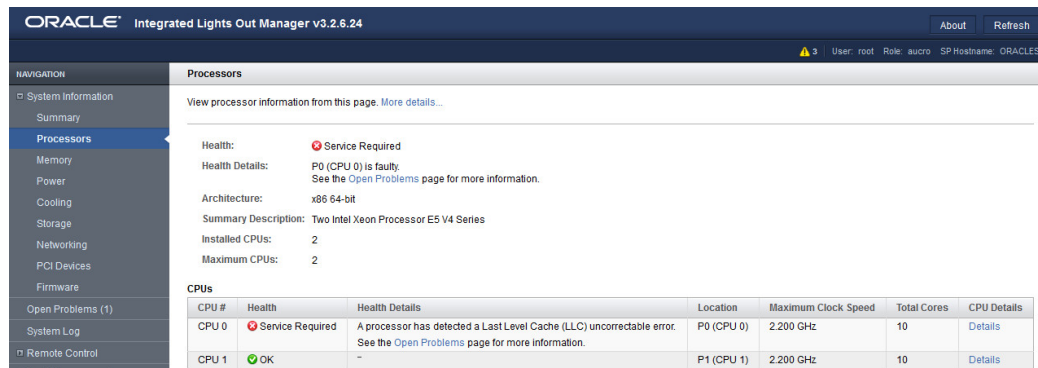
The above example shows the Processors subsystem screen and indicates that CPU 0 has a fault.

4. **To get more information, click one of the Open Problems links.**
The Open Problems screen provides detailed information, such as the time the event occurred, the component and subsystem name, and a description of the issue. It also includes a link to an Oracle KnowledgeBase article.

> **Tip -** The System Log provides a chronological list of all the system events and faults that have occurred since the log was last reset and includes additional information, such as severity levels and error counts. The System Log also includes information on device not reported in the Subsystem Summary screen. To access the System Log, in the left panel, click System Log.

In this example, the hardware fault with CPU 0 requires local/physical access to the server.

5. **Before accessing the physical server, review the *Oracle X6-2 Server Product Notes* for information related to the issue or the component.**
The product notes contain up-to-date information about the server, including hardware-related issues.

6. **To prepare the server for service, see "Preparing for Service" on page 53.**

7. **Service the component.**
After servicing the component, you might need to clear the fault in Oracle ILOM. For more information, refer the service procedures for the component.

Troubleshooting and Diagnostic Information

The following table lists diagnostic- and troubleshooting-related procedures and references that can assist you with resolving server issues.

Description	Link
Diagnostic information for the x86 servers, including procedures for performing runtime and firmware-based tests, using Oracle ILOM, and running U-Boot and UEFI Diagnostics tests to exercise the system and isolate subtle and intermittent hardware-related problems.	Oracle x86 Servers Diagnostics, Applications, and Utilities Guide for Servers with Oracle ILOM 3.1 and Oracle ILOM 3.2
Administrative information for the Oracle X-6 series servers, including information about how to use the Oracle ILOM system event log (SEL) to identify a problem's possible source.	Oracle X6 Series Servers Administration Guide

Description	Link
Information about troubleshooting front and rear panel status indicators.	"Troubleshooting Using the Server Front and Rear Panel Status Indicators" on page 32
Information about how to manage server hardware faults using the Oracle ILOM Fault Management Shell.	"Managing Server Hardware Faults Through the Oracle ILOM Fault Management Shell" on page 42

Troubleshooting Using the Server Front and Rear Panel Status Indicators

The following sections describe the operation of the server status indicators.

- "Server Boot Process and Normal Operating State Indicators" on page 32
- "Server System-Level Status Indicators" on page 33
- "Server Fan Status Indicators" on page 35
- "Storage Drive Status Indicators" on page 35
- "Power Supply Status Indicators" on page 35
- "Network Management Port Status Indicators" on page 36
- "Ethernet Ports Status Indicators" on page 36
- "Motherboard Status Indicators" on page 37

Related Information

- "Front Panel Controls and Indicators" on page 16
- "Server Back Panel View" on page 18

Server Boot Process and Normal Operating State Indicators

A normal server boot process involves two indicators, the service processor (SP) OK/Fault LED indicator and the Power/OK LED indicator.

When AC power is connected to the server, the server boots into standby power mode:

1. The SP OK LED blinks slowly (0.5 seconds on, 0.5 seconds off) while the SP is starting, and the main Power/OK LED remains off until the SP is ready.
2. After a few minutes, the main Power/OK LED flashes the standby blink pattern (0.1 seconds on, 2.9 seconds off), indicating that the SP (and Oracle ILOM) is ready for use. In standby power mode, the server is not initialized or fully powered on at this point.

When powering on the server (either by the Power button or Oracle ILOM), the server boots to full power mode:

1. The Power/OK LED blinks slowly (0.5 seconds on, 0.5 seconds off), and the SP OK LED remains lit (no blinking).
2. When the server has successfully booted, the Power/OK LED remains lit. When the Power/OK LED and the SP OK/Fault LED indicators remain lit, the server is in full power mode.

Note - The green Power/OK LED indicator and the green SP OK/Fault indicator remain lit (no blinking) when the server is in a normal operating state.

Server System-Level Status Indicators

There are seven, system-level status indicators (LEDs), some of which are located on both the server front panel and the server back panel. The following table describes these indicators.

TABLE 1   Server System-Level status Indicators

Status Indicator Name	Icon	Colors	State and Meaning
Locator LED and button	◎	White	Indicates the location of the servers. ■ OFF – Server is operating normally. ■ FAST BLINK – Use Oracle ILOM to activate this LED to enable you to locate a particular system quickly and easily. ■ Pressing the Locate button will toggle the LED fast blink on or off.
Service Required	⚠	Amber	Indicates the fault state of the server. ■ OFF – The server is operating normally. ■ STEADY ON – A fault is present on the server. This LED indicator ■ Lights whenever a fault indicator lights for a replaceable component on the server. **Note -** When this indicator is lit, a system console message might appear that includes a recommended service action.
Power/OK	OK	Green	Indicates the operational state of the chassis. ■ OFF – AC power is not present or the Oracle ILOM boot is not complete. ■ Standby BLINK – Standby power is on, but the chassis power is off and the Oracle ILOM SP is running.

Status Indicator Name	Icon	Colors	State and Meaning
SP OK	**SP**	Green	■ SLOW BLINK – Startup sequence has been initiated on the host. This pattern should begin soon after you power on the server. This status indicates either: Power-on self-test (POST) code checkpoint tests are running on the server host system, or the host is transitioning from the powered-on state to the standby state on shutdown. ■ STEADY ON – The server is powered on, and all host POST code checkpoint tests are complete. The server is in one of the following states: the server host is booting the operating system (OS), or the server host is running the OS. Indicates the state of the service processor. ■ OFF – Service processor (SP) is not running. ■ SLOW BLINK – SP is booting. ■ STEADY ON – SP is fully operational.
Top Fan	TOP	Amber	Indicates that one or more of the internal fan modules have failed. ■ OFF – Indicates steady state; no service is required. ■ STEADY ON – Indicates service required.
Rear Power Supply Fault	REAR	Amber	Indicates that one of the server power supplies has failed. ■ OFF – Indicates steady state; no service is required. ■ STEADY ON – Indicates service required; service the power supply.
System Over Temperature Warning		Amber	Indicates a warning for an over temperature condition. ■ OFF – Normal operation; no service is required. ■ STEADY ON – The system is experiencing an overtemperature warning condition. **Note -** This is a warning indication, not a fatal overtemperature. Failure to correct this might

Status Indicator Name	Icon	Colors	State and Meaning
			result in the system overheating and shutting down unexpectedly.

Server Fan Status Indicators

Each fan module has one status indicator (LED). The LEDs are located on the chassis mid-wall adjacent to and aligned with the fan modules and are visible when the top cover fan door is open.

TABLE 2   Server Fan Status Indicators

Status Indicator Name	Icon	Color	State and Meaning
Fan Status	⚠	Amber	■ Off – The fan module is correctly installed and operating within specification. ■ Amber – The fan module is faulty. The front TOP FAN LED and the front and rear panel Service Required LEDs are also lit if the system detects a fan module fault.

Storage Drive Status Indicators

There are three status indicators (LEDs) on each drive.

TABLE 3   Server Front Storage Drive Indicators

Status Indicator Name	Icon	Color	State and Meaning
OK/Activity	OK	Green	■ OFF – Power is off or the installed drive is not recognized by the system. ■ STEADY ON – The drive is engaged and is receiving power. ■ Random BLINK – There is disk activity. The indicator blinks on and off to indicate activity.
Service Required	⚠	Amber	■ OFF – The storage drive is operating normally. ■ STEADY ON – The system has detected a fault with the storage drive.
OK to Remove	◂▯	Blue	■ STEADY ON – The storage drive can be removed safely during a hot-plug operation. ■ OFF – The storage drive has not been prepared for removal.

Power Supply Status Indicators

There are two status indicators (LEDs) on each power supply. These indicators are visible from the rear of the server.

TABLE 4   Server Power Supply Indicators

Status Indicator Name	Icon	Color	State and Meaning
AC OK/DC OK	OK	Green	■ OFF – No AC power is present. ■ SLOW BLINK – Normal operation. Input power is within specification. DC output voltage is not enabled. ■ STEADY ON – Normal operation. Input AC power and DC output voltage are within specification.
Service Required	⚠	Amber	■ OFF – Normal operation. No service action is required. ■ STEADY ON – The power supply (PS) has detected a PS fan failure, PS overtemperature, PS over current, or PS over or under voltage.

Network Management Port Status Indicators

The server has one 10/100/1000 BASE-T Ethernet management domain interface, labeled NET MGT. There are two status indicators (LEDs) on this port. These indicators are visible from the rear of the server.

TABLE 5   Network Management Port Status Indicators

Status Indicator Name	Location	Color	State and Meaning
Activity	Top right	Green	■ ON – Link up. ■ OFF – No link or down link. ■ FLASHING – Packet activity.
Link speed	Top left	Green	■ Green ON – 1000BASE-T link. ■ OFF – 10/100BASE-T link.

Ethernet Ports Status Indicators

The server has four Gigabit Ethernet ports (NET 3, NET 2, NET 1, and NET 0). There are two status indicators (LEDs) on each port. These indicators are visible from the rear of the server.

Note - Ethernet ports NET 2 and NET 3 are nonfunctional in single-processor systems.

TABLE 6   Gigabit Ethernet Port Status Indicators

Status Indicator Name	Location	Color	State and Meaning
Activity	Top left	Green	■ ON – No function.

Status Indicator Name	Location	Color	State and Meaning
Link speed	Top right	Bicolored: Amber/ Green	■ OFF– No activity. ■ FLASHING – Packet activity. ■ OFF – 100BASE-T link. ■ Amber ON – 1000BASE-T link. ■ Green ON – 10GBBASE-T link. ■ FLASHING – No function.

Motherboard Status Indicators

The motherboard contains the following status indicators (LEDs).

- **DIMM Fault Status Indicators** - Each of the 24 DIMM sockets on the motherboard has an amber fault status indicator (LED) associated with it. If Oracle ILOM determines that a DIMM is faulty, pressing the Fault Remind button on the motherboard signals the service processor to light the fault LED associated with the failed DIMM. For more information on DIMM fault status indicators and the location of the Fault Remind Button, see "Servicing the DIMMs (CRU)" on page 93.

- **Processor Fault Status Indicators:** The motherboard includes a fault status indicator (LED) adjacent to each of the two processor sockets. These LEDs indicate when a processor fails. Pressing the Fault Remind button on the motherboard signals the service processor to light the fault status indicators associated with the failed processors. For more information on processor fault status indicators and the location of the Fault Remind Button, see "Servicing Processors (FRU)" on page 130.

- **Fault Remind Status Indicator:** This status indicator (LED) is located next to the Fault Remind button and is powered from the super capacitor that powers the fault LEDs on the motherboard. This LED lights to indicate that the fault remind circuitry is working properly in cases where no components have failed and, as a result, none of the component fault LEDs illuminate. For more information on the fault remind status indicator and the location of the Fault Remind Button, see "Using the Server Fault Remind Button" on page 101.

- **STBY PWRGD Status Indicator** - This green status indicator (LED) is labeled STBY PWRGD and is located on the rear of the server near PCIe slot 2. This LED lights to inform the service technician that the motherboard is receiving standby power from at least one of the power supplies. This LED is provided to help prevent service actions on the server internal components while the AC power cords are installed and power is being supplied to the server.

Note - If a PCIe card is installed in PCIe slot 2, this LED might not be visible.

> **Note -** The service instructions for all server internal components require that all AC power be removed from the power supplies prior to removing the server top cover.

Troubleshooting System Cooling Issues

Maintaining the proper internal operating temperature of the server is crucial to the health of the server. To prevent server shutdown and damage to components, address over temperature- and hardware-related issues as soon as they occur. If your server has a temperature-related fault, the cause of the problem might be:

- "External Ambient Temperature Too High" on page 38
- "Airflow Blockage" on page 38
- "Cooling Areas Compromised" on page 39
- "Hardware Component Failure" on page 39

External Ambient Temperature Too High

Server component cooling relies on the movement of cool air through the server. The cool air is pulled into the server from its external environment. If the ambient temperature of the server's external environment is too high, cooling does not occur, and the internal temperature of the server and its components increases. This can cause poor server performance or a failure of one or more components.

Action: Check the ambient temperature of the server space against the environmental specifications for the server. If the temperature is not within the required operating range, remedy the situation immediately.

Prevention: Periodically check the ambient temperature of the server space to ensure that it is within the required range, especially if you have made any changes to the server space (for example, added additional servers). The temperature must be consistent and stable.

Airflow Blockage

The server cooling system uses fans to pull cool air in from the server front intake vents and exhaust warm air out the server back panel vents. If the front or back vents are blocked, the airflow through the server is disrupted and the cooling system fails to function properly causing the server internal temperature to rise.

Action: Inspect the server front and back panel vents for blockage from dust or debris. Additionally, inspect the server interior for improperly installed components or cables that can block the flow of air through the server.

Prevention: Periodically inspect and clean the server vents using an ESD certified vacuum cleaner. Ensure that all components, such as cards, cable, fans, air baffles and dividers are properly installed. Never operate the server without the top cover installed.

Cooling Areas Compromised

To function properly, the server has cooling areas that are maintained by an air baffle, component filler panels, and the server top cover. These server components need to be in place for the server to function as a sealed system. If internal cooling areas are compromised, the server cooling system, which relies on the movement of cool air through the server, cannot function properly, and the airflow inside the server becomes chaotic and non-directional.

Action: Inspect the server interior to ensure that the air baffle is properly installed. Ensure that all external-facing slots (storage drive, DVD, PCIe) are occupied with either a component or a component filler panel. Ensure that the server top cover is in place and sits flat and snug on top of the server.

Prevention: When servicing the server, ensure that the air baffle is installed correctly and that the server has no unoccupied external-facing slots. Never operate the server without the top cover installed.

Hardware Component Failure

Components, such as power supplies and fan modules, are an integral part of the server cooling system. When one of these components fails, the server internal temperature can rise. This rise in temperature can cause other components to enter into an over-temperature state. Additionally, some components, such as processors, might overheat when they are failing, which can also generate an over-temperature event.

To reduce the risk related to component failure, power supplies and fan modules are installed in pairs to provide redundancy. Redundancy ensures that if one component in the pair fails, the other functioning component can continue to maintain the subsystem. For example, power supplies serve a dual function; they provide both power and airflow. If one power supply fails, the other functioning power supply can maintain both the power and the cooling subsystems.

Action: Investigate the cause of the over-temperature event, and replace failed components *immediately*. For hardware troubleshooting information, see "Troubleshooting Server Hardware Faults" on page 28.

Prevention: Component redundancy is provided to allow for component failure in critical subsystems, such as the cooling subsystem. However, once a component in a redundant system fails, the redundancy no longer exists, and the risk for server shutdown and component failures increases. Therefore, it is important to maintain redundant systems and replace failed components *immediately*.

Troubleshooting Power Issues

If your server does not power on, the cause of the problem might be:

- "AC Power Connection" on page 40
- "Power Supplies (PSUs)" on page 40
- "Top Cover" on page 42

AC Power Connection

The AC power cords are the direct connection between the server power supplies and the power sources. The server power supplies need separate stable AC circuits. Insufficient voltage levels or fluctuations in power can cause server power problems. The power supplies are designed to operate at a particular voltage and within an acceptable range of voltage fluctuations (refer to "Electrical Power Requirements" in *Oracle Server X6-2 Installation Guide*).

Action: Check that both AC power cords are connected to the server. Check that the correct power is present at the outlets and monitor the power to verify that it is within the acceptable range. You can verify proper connection and operation by checking the PSU indicator panels, which are located at the back of the server on the PSUs. Lit green AC OK and DC OK indicators show a properly functioning PSU. An amber AC OK indicator indicates that the AC power to the PSU is insufficient.

Prevention: Use the AC power cord reclosable retaining straps and position the cords to minimize the risk of accidental disconnection. Ensure that the AC circuits that supply power to the server are stable and not overburdened. For more information on the reclosable retaining straps, see "Power Supplies (PSUs)" on page 40.

Power Supplies (PSUs)

The server power supplies (PSUs) provide the necessary server voltages from the AC power outlets. If the PSUs are inoperable, unplugged, or disengaged from the internal connectors, the server cannot power on.

Note - The reclosable retaining straps shown in the following figure should be used to secure the power cord connectors to the rear of the power supplies. The re-closeable retaining straps minimize the risk of accidental disconnection.
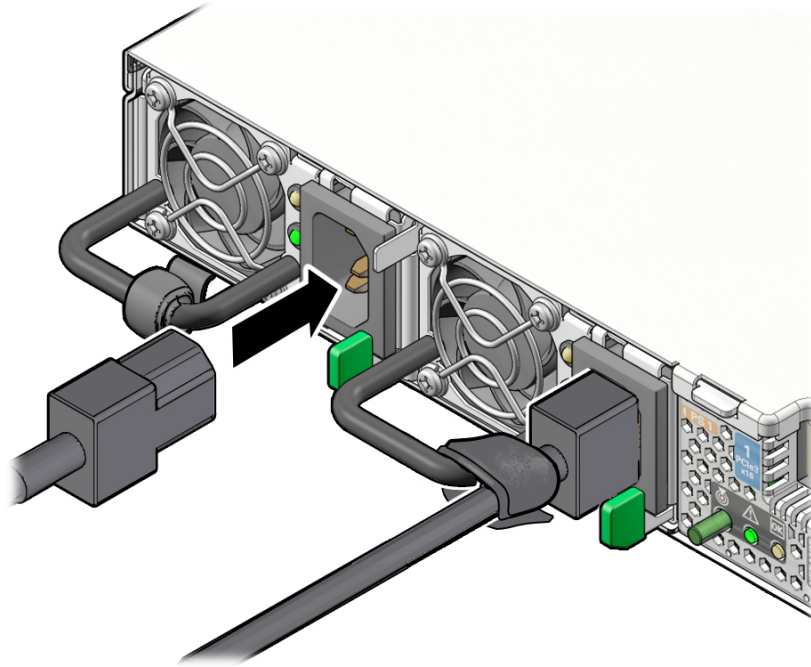
Action: Check that the AC cables are connected to both PSUs. Check that the PSUs are operational (the PSU indicator panel should have a lit green AC OK indicator). Ensure that the PSU is properly installed. A PSU that is not fully engaged with its internal connector does not have power applied and does not have a lit green AC OK indicator.

Prevention: When a power supply fails, replace it immediately. To ensure redundancy, the server has two PSUs. This redundant configuration prevents server downtime, or an unexpected shutdown, due to a failed PSU. The redundancy allows the server to continue to operate if one of the PSUs fails. However, when a server is being powered by a single PSU, the redundancy no longer exists, and the risk for downtime or an unexpected shutdown increases. When installing a power supply, ensure that it is fully seated and engaged with its connector inside the drive bay. A properly installed PSU has a lit green AC OK indicator.

Top Cover

The server top cover is an important component for a properly functioning server. The top cover is vital to the server cooling subsystem because it helps to maintain the pressure areas within the server, and the top cover also protects against accidental exposure to hazardous voltages and damage to internal components. For these reasons, the server top cover is interlocked to the server power. The interlock is created by a switch that is mounted inside the server on the metal bracket just behind the DIMMs. The switch engages when the cover is installed, allowing power to be applied to the server. When the cover is not installed, the server cannot power on. If the server is powered on when the cover is removed, power is *immediately* switched off.

Action: If the server does not power on, check that the switch is intact and properly aligned. Ensure that the server top cover is in place and sits flat and snug on top of the server. Ensure that the interlock switch components have not been damaged, removed, or misaligned. For instructions for properly installing the top cover, see "Install the Server Top Cover" on page 198.

Prevention: After removing the top cover, take care that it does not get bent. When servicing the server, take care that the internally mounted interlock switch component does not get damaged or misaligned. Never operate the server without the top cover installed.

Managing Server Hardware Faults Through the Oracle ILOM Fault Management Shell

The Oracle ILOM Fault Management Shell enables you to view and manage fault activity on a managed servers and other types of devices.

For more information about how to use the Oracle ILOM Fault Management Shell, refer to the *Oracle ILOM User's Guide for System Monitoring and Diagnostics Firmware Release 5.0.x* in the Oracle Integrated Lights Out Manager (ILOM) 5.0 Documentation Library at: `https://www.oracle.com/goto/ilom/docs`

Troubleshooting With Diagnostic Tools

The server and its accompanying software and firmware contain diagnostic tools and features that can help you isolate component problems, monitor the status of a functioning system, and exercise one or more subsystem to disclose more subtle or intermittent hardware-related problems.

Each diagnostic tool has its own specific strength and application. Review the tools listed in this section and determine which tool might be best to use for your situation. Once you have determined the tool to use, you can access it locally, while at the server, or remotely.

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Diagnostic Tools

The selection of diagnostic tools available for your server range in complexity from a comprehensive validation test suite (Oracle VTS) to a chronological event log (Oracle ILOM System Log). The selection of diagnostic tools also include standalone software packages, firmware-based tests, and hardware-based LED indicators.

The following table summarizes the diagnostic tools that you can use when troubleshooting or monitoring your server.

Diagnostic Tool	Type	What It Does	Accessibility	Remote Capability
Oracle ILOM	SP firmware	Monitors environmental condition and component functionality sensors, generates alerts, performs fault isolation, and provides remote access.	Can function on either standby power mode or full power mode and is not OS dependent.	Designed for remote and local access.
Preboot Menu	SP firmware	Enables you to restore some Oracle ILOM default settings when Oracle ILOM is not accessible.	Can function on standby power and when operating system is not running.	Local, but remote serial access is possible if the SP serial port is connected to a network-accessible terminal server.
Hardware-based LED indicators	Hardware and SP firmware	Indicates status of overall system and particular components.	Available when system power is available.	Local, but sensor and indicators are accessible from Oracle ILOM web interface or command-line interface (CLI).
Power-On Self-Test (POST)	Host firmware	Tests core components of system: CPUs, memory, and motherboard I/O bridge integrated circuits.	Runs on startup. Available when the operating system is not running.	Local, but can be accessed through Oracle ILOM Remote System Console Plus.
U-Boot	SP firmware	Initializes and test aspects of the service processor (SP) prior to booting the Oracle ILOM SP and operating system. Tests SP memory, SP, network devices and I/O devices.	Can function on standby power and when operating system is not running.	Local, but remote serial access is possible if the SP serial port is connected to a network-accessible terminal server.

Diagnostic Tool	Type	What It Does	Accessibility	Remote Capability
UEFI Diagnostics	SP firmware	The UEFI diagnostics can test and detect problems on all processor, memory, disk drives, and network ports. It is used on new Oracle systems, such as the Oracle Server X6.2.	You can use either the Oracle ILOM web interface or the command-line interface (CLI) to run UEFI diagnostics.	Remote access through Oracle ILOM Remote System Console Plus.
Oracle Solaris commands	Operating system software	Displays various kinds of system information.	Requires operating system.	Local, and over network.
Oracle Linux commands	Operating system software	Displays various kinds of system information.	Requires operating system.	Local, and over network.
Oracle VTS	Diagnostic tool standalone software	Exercises and stresses the system, running tests in parallel.	Requires Oracle Solaris operating system. Install Oracle VTS software separately.	View and control over network.

Diagnostic Tool Documentation

The following table identifies where you can find more information about diagnostic tools.

Diagnostic Tool	Documentation	Location
Oracle ILOM	Oracle Integrated Lights Out Manager 5.0 Documentation Library	https://www.oracle.com/goto/ilom/docs
Preboot Menu	*Oracle x86 Servers Diagnostics Guide*	https://www.oracle.com/goto/x86admindiag/docs
System indicators and sensors	This document	"Troubleshooting Using the Server Front and Rear Panel Status Indicators" on page 32
U-Boot or UEFI Diagnostics	*Oracle x86 Servers Diagnostics Guide*	https://www.oracle.com/goto/x86admindiag/docs
Oracle VTS	Oracle VTS software and documentation	https://docs.oracle.com/cd/E19719-01/index.html

Attaching Devices to the Server

Th following sections contain procedural information for attaching devices to the server so you can access diagnostic tools when troubleshooting and servicing the server:

▼ Attach Devices to the Rear of the Server

This procedure explains how to connect devices to the server (remotely and locally), so that you can interact with the service processor (SP) and the server console.

1. **Connect an Ethernet cable to the Gigabit Ethernet (NET) connectors as needed for OS support.**

   See .

2. **To connect to the service processor's Oracle ILOM over the network, connect an Ethernet cable to the Ethernet port labeled NET MGT.**

   See .

3. **To access the Oracle ILOM command-line interface (CLI) locally using the management port, connect a serial null modem cable to the RJ-45 serial port labeled SER MGT.**

   See .

4. **To interact with the system console locally, connect a mouse and keyboard to the server front panel USB connectors and a monitor to the server front panel DB-15 video connector.**

   See .

Rear Panel Connector Locations

The following illustration shows and describes the locations of the back panel connectors. Use this information to set up the server, so that you can access diagnostic tools and manage the server during service.

No.	Cable Port or Expansion Slot	Description
1	Power supply 0 input power	The server has two power supply connectors, one for each power supply.
	Power supply 1 input power	Do not attach power cables to the power supplies until you have finished connecting the data cables to the server. The server goes into standby power mode, and the Oracle ILOM service processor initializes when the AC power cables are connected to the power source. System messages might be lost after 60 seconds if the server is not connected to a terminal, PC, or workstation. **Note -** Oracle ILOM will signal a fault on any installed power supply that is not connected to an AC power source, since it might indicate a loss of redundancy.
2	Network management port (NET MGT)	The service processor NET MGT port is the optional connection to the Oracle ILOM service processor. The NET MGT port is configured by default to use Dynamic Host Configuration Protocol (DHCP). The service processor NET MGT port uses an RJ-45 cable for a 10/100/1000BASE-T connection.
3	Serial management port (SER MGT)	The service processor SER MGT port uses an RJ-45 cable and is the default connection to the Oracle ILOM service processor. This port supports local connections to the server and only recognizes Oracle ILOM command-line interface (CLI) commands. Typically you connect a terminal or terminal emulator to this port.

No.	Cable Port or Expansion Slot	Description
		Note - This port does not support network connections.
4	Ethernet ports (NET 3, NET 2, NET 1, NET 0)	The four 10-Gigabit Ethernet ports enable you to connect the system to the network. **Note -** Ethernet ports NET2 and NET3 are nonfunctional in single-processor systems.
5, 6	USB ports (USB 0, USB 1)	The two USB ports support hot-plugging. You can connect and disconnect USB cables and peripheral devices while the server is running without affecting system operations.
7	Video port (VGA)	Use a 15-pin video cable to connect a VGA video device to the server. Optionally, you can connect to the VGA port when installing the operating system.

Configuring Serial Port Sharing

By default, the SP console (SER MGT) port sends serial port output from the server. Using Oracle ILOM, you can specify that the host console (COM1) be assigned as owner of the server serial port output. This feature is useful for Windows kernel debugging, as it enables you to view non-ASCII character traffic from the host console.

You should set up the network on the SP before attempting to change the serial port owner to the host server. If the network is not set up, and you switch the serial port owner to the host server, you will be unable to connect using the CLI or web interface to change the serial port owner back to the SP. To return the serial port owner setting to the SP, you need to restore access to the serial port on the server. For more details about restoring access to the server port on your server, see the Oracle Integrated Lights Out Manager (ILOM) 5.0 Documentation Library at `https://www.oracle.com/goto/ilom/docs`.

You can assign serial port output using either the Oracle ILOM web interface or the command-line interface (CLI). For instructions, see the following procedures:

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-

▼ Assign Serial Port Output Using the CLI

1. Open an SSH session and at the command line log in to the SP Oracle ILOM CLI.

Log in as a user with root or administrator privileges. For example:

`ssh root@`*ipadress*

Where *ipadress* is the IP address of the server module SP.

For more information, refer to "Accessing Oracle ILOM" in the Oracle X5 Series Servers Administration Guide.
The Oracle ILOM CLI prompt (->) appears.

2. To set the serial port owner, type:

`-> set /SP/serial/portsharing /owner=host`

Note - The serial port sharing value by default is `owner=SP`.

3. Connect a serial host to the server.

▼ Assign Serial Port Output Using the Web Interface

1. Log in to the SP Oracle ILOM web interface.
To log in, open a web browser and direct it using the IP address of the server SP. Log in as root or a user with administrator privileges. Refer to "Accessing Oracle ILOM" in the Oracle X6 Series Servers Administration Guide.
The Summary Information screen appears.

2. In the Oracle ILOM web interface, select ILOM Administration --> Connectivity from the navigation menu on the left side of the screen.

3. Select the Serial Port tab.
The Serial Port Settings page appears.

Note - The serial port sharing setting by default is `Service Processor`.

4. In the Serial Port Settings page, select `Host Server` as the serial port owner.

5. Click `Save` for the changes to take effect.

6. Connect a serial host to the server.

Server Operating System Names for the NVMe Storage Drives

If the optional NVMe storage drives are installed in the server's front panel, they are labeled NVMe0, NVMe1, NVMe2, and NVMe3. However, the server operating systems assign these

storage drives different names. For the corresponding names assigned by the operating systems, see the following table.

TABLE 7   Operating System NVMe Storage Drive Nomenclature

Storage Drive Labels	Names Assigned by the Server Operating Systems
NVMe0	PCI-Express Slot 10
NVMe1	PCI-Express Slot 11
NVMe2	PCI-Express Slot 12
NVMe3	PCI-Express Slot 13

Ethernet Port Boot Order and Device Naming

This section contains information about the boot order and device naming for the four 10-Gigabit Ethernet ports on the rear panel of the server (see "Rear Panel Connector Locations" on page 46). From right to left, the ports are numbered NET 0 to NET 3.

Ethernet Port Boot Order

The order in which the BIOS detects the Ethernet ports during server boot is listed below.

Note - You can change the boot priority using the Boot Device Priority screen available in the Boot menu of the BIOS Setup Utility.

1. NET 0
2. NET 1
3. NET 2
4. NET 3

Ethernet Port Device Naming

Note - Naming used by the interfaces might vary from that listed below depending on which devices are installed in the system.

The device naming for the Ethernet interfaces is reported differently by different interfaces and operating systems. The following table shows BIOS (physical) and operating system (logical) naming conventions used for each interface. These naming conventions might vary depending on conventions of your operating system and which devices are installed in the server.

Port	BIOS	Solaris	Linux	Windows (example default names, see note below)
Net 0	3A00	ixgbe 0	eth0	Ethernet
Net 1	3A01	ixgbe 1	eth1	Ethernet 2
Net 2	8200	ixgbe 2	eth2	Ethernet 3
Net 3	8201	ixgbe 3	eth3	Ethernet 4

Note - For Windows, port names like Ethernet, Ethernet 2, Ethernet 3, and Ethernet 4 are used by default. However, actual port naming is based on the order of enumeration, typically during operating system installation. Additionally, Windows allows you to rename the ports to meet application-specific needs.

Rear Panel Pinhole Switches

This section shows the location of the rear panel pinhole switches and describes the function of each switch.

Callout	Description
1	Host Warm Reset
2	NMI (non-maskable interrupt) (For use by authorized Oracle Service personnel only.)

Callout	Description
3	SP Reset

Getting Help

The following sections describe how to get additional help to resolve server-related problems.

- "Contacting Support" on page 51
- "Locating the Chassis Serial Number" on page 52

Contacting Support

If the troubleshooting procedures in this chapter fail to solve your problem, use the following table to collect information that you might need to communicate to support personnel.

System Configuration Information Needed	Your Information
Service contract number	
System model	
Operating environment	
System serial number	
Peripherals attached to the system	
Email address and phone number for you and a secondary contact	
Street address where the system is located	
Superuser password	
Summary of the problem and the work being done when the problem occurred	
Other Useful Information	
IP address	
Server name (system host name)	
Network or internet domain name	
Proxy server configuration	

Related Information

- "Locating the Chassis Serial Number" on page 52

Locating the Chassis Serial Number

You might need to have your server serial number when you ask for service on your system. Record this number for future use. Use one of the following resources or methods to locate your server serial number.

- The serial number is located on the Radio-frequency identification (RFID) label on the left side of the front panel bezel, next to the general status indicators. For illustrations of the server front panel, see "About Controls and Connectors" on page 16.
- The serial number is recorded on the system information label that is attached to the top of the system in the front, left corner.
- The serial number is recorded on the yellow Customer Information Sheet (CIS) attached to your server packaging. This sheet includes the serial number.
- Using Oracle ILOM:
  - From the command-line interface (CLI), type the command: `show/SYS`.
  - From the web interface, view the serial number on the System Information screen.

Preparing for Service

These sections describe safety considerations and provide prerequisite procedures and information to replace components within the server.

Description	Links
Understand the safety precautions, understand the safety symbols, and take ESD precautions prior to removing or installing parts in the server.	"Safety Precautions" on page 53
	"Safety Symbols" on page 54
	"Electrostatic Discharge Safety" on page 54
Understand the key identity properties auto-update feature.	"FRU Key Identity Properties (KIP) Automated Update" on page 55
Assemble the required tools.	"Required Tools" on page 56
Before working with components within the server, power down the server and prepare for servicing.	"Preparing the Server for Component Replacement" on page 56

Related Information

- "Returning the Server to Operation" on page 197

Safety Precautions

For your protection, observe the following safety precautions when setting up your equipment:

- Follow all standard cautions, warnings, and instructions marked on the equipment and described in the online *Oracle Server X6-2 Safety and Compliance Guide* and in the printed *Important Safety Information for Oracle's Hardware Systems*.
- Ensure that the voltage and frequency of your power source match the voltage and frequency inscribed on the equipment's electrical rating label.
- Follow the electrostatic discharge safety practices as described in "Electrostatic Discharge Safety" on page 54.
- Disconnect both power supply cords before servicing components.

Related Information

- "Safety Symbols" on page 54
- "Electrostatic Discharge Safety" on page 54

Safety Symbols

The following symbols might appear in this book. Note their meanings.

Caution - Risk of personal injury or equipment damage. To avoid personal injury or equipment damage, follow the instructions.

Caution - Hot surface. Avoid contact. Surfaces are hot and might cause personal injury if touched.

Caution - Hazardous voltages are present. To reduce the risk of electric shock and danger to personal health, follow the instructions.

Related Information

- "Safety Precautions" on page 53
- "Electrostatic Discharge Safety" on page 54

Electrostatic Discharge Safety

Devices that are sensitive to electrostatic discharge (ESD), such as the motherboard, PCIe cards, drives, processors, and memory cards require special handling.

Caution - The boards and drives contain electronic components that are extremely sensitive to static electricity. Ordinary amounts of static electricity from clothing or the work environment can destroy components. Do not touch the components along their connector edges.

Do the following when handling ESD-sensitive components:

- Use an antistatic wrist strap.

  Wear an antistatic wrist strap and use an antistatic mat when handling components such as drive assemblies, boards, or cards. When servicing or removing server components, attach

an antistatic strap to your wrist and then to a metal area on the chassis. Then disconnect the power cords from the server. Following this practice equalizes the electrical potentials between you and the server.

Note - An antistatic wrist strap is not included in the Ship Kit for the server. However, antistatic wrist straps are included with options and components.

- Use an antistatic mat.

  Place ESD-sensitive components such as the motherboard, memory DIMMs, and other printed circuit boards on an antistatic mat. The following items can be used as an antistatic mat:

  - An antistatic bag used to wrap an Oracle replacement part
  - An Oracle ESD mat (orderable item)
  - A disposable ESD mat (shipped with some replacement parts or optional system components)

Related Information

- "Safety Precautions" on page 53
- "Safety Symbols" on page 54
- "Preparing the Server for Component Replacement" on page 56
- "Returning the Server to Operation" on page 197

FRU Key Identity Properties (KIP) Automated Update

Oracle ILOM includes a key identity properties (KIP) auto-update feature that ensures product information that is used for service entitlement and warranty coverage is accurately maintained by the server at all times, including during hardware replacement activities.

The KIP includes the server product name, product part number (PPN), and product serial number (PSN). The KIP are stored in the FRUID (field-replaceable unit identifiers) container of the three server FRUs that are designated quorum members.

The quorum members include:

- Disk backplane (DBP), designated as a primary quorum member.
- Motherboard (MB), designated as a backup quorum member.
- Power supply (PS), designated as a backup quorum member.

When a server FRU that contains the KIP is removed and a replacement component is installed, the KIP of the replacement component is programmed by Oracle ILOM to contain the same KIP as the other two components.

Note - Only one of the quorum members can be replaced at a time. Automated updates can only be completed when two of the three quorum members contain matching key identity properties.

Related Information

- "Servicing Power Supplies (CRU)" on page 87
- "Servicing the Disk Backplane (FRU)" on page 156
- "Servicing the Motherboard (FRU)" on page 170

Required Tools

The server can be serviced with the following tools:

- Antistatic wrist strap
- Antistatic mat
- No. 2 Phillips screwdriver

Related Information

- "Preparing for Service" on page 53
- "Servicing CRUs That Do Not Require Server Power-Off" on page 69
- "Servicing CRUs That Require Server Power-Off" on page 93
- "Servicing FRUs" on page 129

Preparing the Server for Component Replacement

Before you can remove and install components that are inside the server, you must perform the procedures in the following tasks:

Note - When replacing the storage drives or power supplies, not all of these procedures are necessary. See the replacement tasks for those components for more information.

- "Powering Down the Server" on page 57
- "Disconnect Cables From the Server" on page 62
- "Extend the Server to the Maintenance Position" on page 63
- "Remove the Server From the Rack" on page 65
- "Take Antistatic Measures" on page 65
- "Remove the Server Top Cover" on page 67

Related Information

- "Returning the Server to Operation" on page 197

Powering Down the Server

To determine how you want to power off the server, view the options in the following table:

Description	Link
Power down the server gracefully to save all data and to prevent data from being corrupted. Performing a graceful shutdown ensures that the system is ready for restart.	■ "Power Down Server Gracefully Using the Oracle ILOM CLI" on page 57 ■ "Power Down Server Gracefully Using the Oracle ILOM Web Interface" on page 58 ■ "Power Down Server Gracefully Using the Power Button" on page 59
If the server is not responding, or you must shut down the server quickly, perform an immediate shutdown.	■ "Use the Power Button for Immediate Shutdown" on page 60 ■ "Use the Oracle ILOM CLI for Immediate Shutdown" on page 61 ■ "Use the Oracle ILOM Web Interface for Immediate Shutdown" on page 61

Related Information

- "Power On the Server" on page 205

▼ Power Down Server Gracefully Using the Oracle ILOM CLI

Performing a graceful shut down ensures that all of your data is saved and the system is ready for restart.

1. **Log in to the server as superuser or equivalent.**

   Depending on the nature of the problem, you might want to view the system status or the log files or run diagnostics before you shut down the system. For more information, see the Oracle ILOM 5.0 Documentation Library at `https://www.oracle.com/goto/ilom/docs`.

2. **Notify affected users that the server will be powered down.**

3. **Save any open files, and quit all running applications.**

   Refer to your application documentation for specific information on these processes.

4. **Log in to the Oracle ILOM command-line interface (CLI) using an Administrator account.**

   For instructions, refer to "Logging In to or Out of Oracle ILOM" in *Oracle Server X6-2 Installation Guide*.

5. **At the Oracle ILOM prompt, shut down the operating system:**

   ```
   -> stop /System
   ```

   If the system is running the Oracle Solaris OS, refer to the Oracle Solaris system administration documentation for additional information.

6. **Disconnect the power cords and data cables from the server.**

   See "Disconnect Cables From the Server" on page 62.

   Related Information

   - "Power Down Server Gracefully Using the Oracle ILOM Web Interface" on page 58
   - "Power Down Server Gracefully Using the Power Button" on page 59
   - "Use the Power Button for Immediate Shutdown" on page 60
   - "Power On the Server" on page 205

▼ Power Down Server Gracefully Using the Oracle ILOM Web Interface

1. **Log in to the server as superuser or equivalent.**

   Depending on the nature of the problem, you might want to view the system status or the log files or run diagnostics before you shut down the system. For more information, see the Oracle ILOM 5.0 Documentation Library at `https://www.oracle.com/goto/ilom/docs`.

2. **Notify affected users that the server will be powered down.**

3. **Save any open files and quit all running applications.**

   Refer to your application documentation for specific information about these processes.

4. **Log in to the Oracle ILOM web interface using an Administrator account.**

   For instructions, see the "Logging In to or Out of Oracle ILOM" in *Oracle Server X6-2 Installation Guide*.

   The Oracle ILOM web interface System Information → Summary Information page appears.

5. **In the left pane, click Host Management → Power Control, and select Graceful Shutdown and Power Off from the Action list.**

6. **Click Save and then click OK.**

   The host server performs an orderly power shutdown.

7. **Disconnect the power cords an data cables from the server.**

   See "Disconnect Cables From the Server" on page 62.

   ### Related Information

   - "Power Down Server Gracefully Using the Oracle ILOM CLI" on page 57
   - "Power Down Server Gracefully Using the Power Button" on page 59
   - "Use the Power Button for Immediate Shutdown" on page 60
   - "Power On the Server" on page 205

▼ Power Down Server Gracefully Using the Power Button

1. **Press and quickly release the Power button on the front panel.**

   This action causes ACPI-enabled operating systems to perform an orderly shutdown of the operating system. Servers not running ACPI-enabled operating systems shut down to standby power mode immediately.

   When main power is off, the Power/OK LED on the front panel will begin flashing, indicating that the server is in standby power mode. See "Server System-Level Status Indicators" on page 33.

2. **Disconnect the power cords and data cables from the server.**

   See "Disconnect Cables From the Server" on page 62.

Caution - When you press the Power button to enter standby power mode, power is still directed to the service processor remote management subsystem and power supply fans. To completely power off the server, you must disconnect the power cords from the power supplies.

Related Information

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-
-

▼ Use the Power Button for Immediate Shutdown

Caution - An immediate power down might corrupt system data, therefore, only use this procedure to power down the server after attempting the graceful power down procedure.

1. **Press and hold the Power button for four seconds to force the main power off and to enter standby power mode.**

   When main power is off, the Power/OK LED on the front panel will begin flashing, indicating that the server is in standby power mode. See .

2. **Disconnect the power and data cables from the server.**

   See .

Caution - When you press the Power button to enter standby power mode, power is still directed to the service processor remote management subsystem and power supply fans. To completely power off the server, you must disconnect the power cords from the power supplies.

Related Information

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- "Use the Oracle ILOM Web Interface for Immediate Shutdown" on page 61
- "Power On the Server" on page 205

▼ Use the Oracle ILOM CLI for Immediate Shutdown

Caution - An immediate power down might corrupt system data, therefore, only use this procedure to power down the server after attempting the graceful power down procedure.

1. Log in to the Oracle ILOM command-line interface (CLI) using an Administrator account.

Oracle ILOM displays the default command prompt (->), indicating that you have successfully logged in to Oracle ILOM.

2. From the CLI prompt, type the following command:

-> `stop -f /System`

The server powers down immediately.

3. Disconnect the power and data cables from the server.

See "Disconnect Cables From the Server" on page 62.

Caution - When the server is powered down, it enters standby power mode In standby power mode, power is still directed to the service processor remote management subsystem and power supply fans. To completely power off the server, you must disconnect the power cords from the power supplies.

Related Information

- "Use the Power Button for Immediate Shutdown" on page 60
- "Use the Oracle ILOM Web Interface for Immediate Shutdown" on page 61

▼ Use the Oracle ILOM Web Interface for Immediate Shutdown

Caution - An immediate power down might corrupt system data, so only use this procedure to power down the server after attempting the graceful power down procedure.

1. Log in to the Oracle ILOM web interface using an Administrator account.

The Oracle ILOM web interface System Information page appears.

2. **In the left pane, click Host Management → Power Control, and select Immediate Power Off in the Select Action list.**

3. **Click Save, then click OK.**

   The server powers down immediately.

4. **Disconnect the power and data cables from the server.**

   See "Disconnect Cables From the Server" on page 62.

⚠ **Caution -** When the server is powered down, it enters standby power mode In standby power mode, power is still directed to the service processor remote management subsystem and power supply fans. To completely power off the server, you must disconnect the power cords from the power supplies.

Related Information

- "Use the Power Button for Immediate Shutdown" on page 60
- "Power Down Server Gracefully Using the Oracle ILOM CLI" on page 57
- "Power On the Server" on page 205

▼ Disconnect Cables From the Server

⚠ **Caution -** The system supplies standby power to the circuit boards when the power cords are connected even when the system is powered off.

1. **Label all cables connected to the server.**

2. **Power down the server.**

   See "Powering Down the Server" on page 57.

3. **Disconnect the power cords from the rear of the server.**

4. **Disconnect all data cables from the rear of the server.**

   ### Related Information

   - "Server Back Panel View" on page 18

- "Powering Down the Server" on page 57
- "Remove the Server From the Rack" on page 65
- "Reconnect Data Cables and Power Cords" on page 203

▼ Extend the Server to the Maintenance Position

The following components can be serviced with the server in the maintenance position:

- Storage drives
- Fan modules
- Power supplies
- DVD drive module
- PCIe risers
- PCIe cards and cables
- SAS cables
- NVMe cables
- DIMMs
- Internal USB flash drives
- Motherboard battery
- Processors
- Disk backplane
- FIM (front indicator module)
- Motherboard

If the server is installed in a rack with extendable slide-rails, use this procedure to extend the server to the maintenance position.

1. **To prevent the rack from tipping forward when the server is extended, extend all rack anti-tilt devices.**

⚠️ **Caution -** To reduce the risk of personal injury, stabilize the expansion rack cabinet and extend all anti-tilt devices before extending the server from the rack.

For instructions for stabilizing the rack, see the "Stabilize the Rack for Installation" in *Oracle Server X6-2 Installation Guide*.

2. **Verify that no cables will be damaged or will interfere when the server is extended.**

Although the cable management arm (CMA) that is supplied with the server is hinged to accommodate extending the server, you should ensure that all cables and cords are capable of extending.

3. **From the front of the server, open and hold the left and right release latch covers in the open position.**

When in an open position, the release latch covers engage the slide-rail release latches [frame 1].
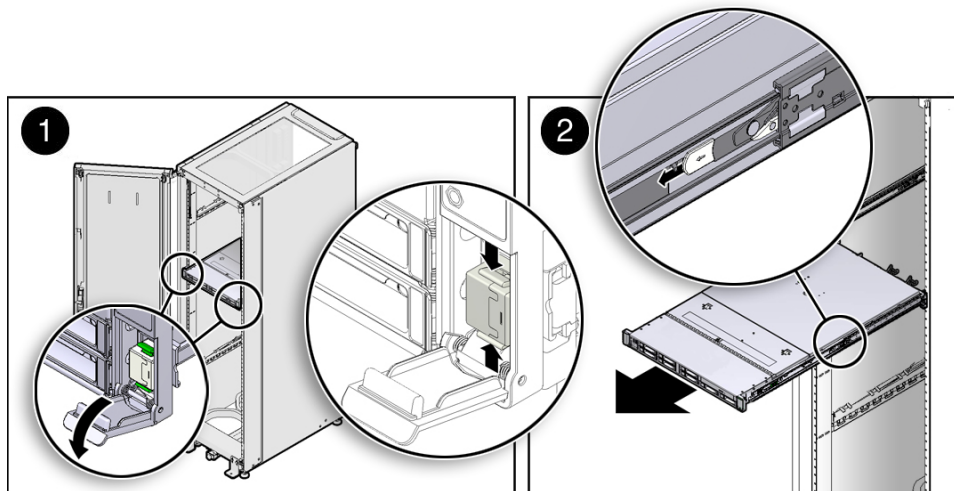
4. **While the release latch covers are in the open position, slowly pull the server forward until the slide-rails latch into a locked position [2].**

The server is now in the extended maintenance position. .

Related Information

- "Disconnect Cables From the Server" on page 62
- "Remove the Server From the Rack" on page 65
- "Reinstall the Server Into the Rack" on page 200

▼ Remove the Server From the Rack

⚠ **Caution -** The server weighs approximately 18.1 kg (40.0 lbs). Two people are required to dismount and carry the chassis.

1. **Disconnect all the cables and power cords from the server.**

2. **Remove the cable management arm (CMA).**

   For instructions for removing the CMA, see the "Remove the Cable Management Arm" in *Oracle Server X6-2 Installation Guide*.

3. **Extend the server to the maintenance position.**

   For instructions, see "Extend the Server to the Maintenance Position" on page 63.

4. **From the front of the server, pull the green slide-rail release tabs toward the front of the server, and pull the server out of the rack until it is free of the rack rails.**

   A slide-rail release tab is located on each slide-rail.

   Note - To pull the green slide-rail release tab, place your finger in the center of the tab, not on the end, and apply pressure as you pull the tab toward the front of the server.

5. **Set the server on a sturdy work surface.**

   Related Information

   - "Disconnect Cables From the Server" on page 62
   - "Take Antistatic Measures" on page 65
   - "Extend the Server to the Maintenance Position" on page 63
   - "Reinstall the Server Into the Rack" on page 200

▼ Take Antistatic Measures

1. **Prepare an antistatic surface on which to set parts during removal and installation.**

   Place electrostatic discharge (ESD)-sensitive components such as the printed circuit boards on an antistatic mat. The following items can be used as an antistatic mat:

   - An antistatic bag used to wrap a replacement part

- An Oracle ESD mat (orderable item)
- A disposable ESD mat (shipped with some replacement parts or optional system components)

2. Attach an antistatic wrist strap.

When servicing or removing server components, attach an antistatic strap to your wrist and then to a metal area on the chassis. Then disconnect the power cords from the server.

Note - An antistatic wrist strap is not included in the Ship Kit for the server. However, antistatic wrist straps are still included with options and components.

Related Information

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▼ Open the Server Fan Door

Servicing the server fan modules and other components located in the front of the server, such as the front indication module, the DVD drive, and disk backplanes, requires that the fan door be opened. It is also easier to remove the server top cover if you open the fan door first.

● **To open the server fan door, slide the fan door latches to the front of the server and swing the door up to the open position.**
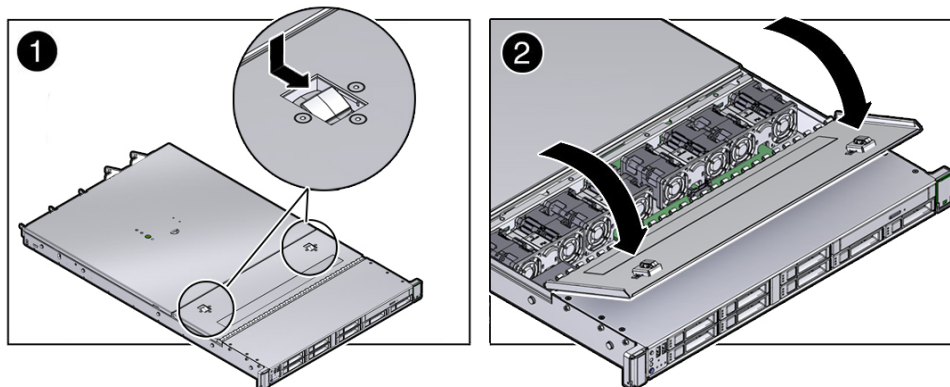
Related Information

-
-

▼ Remove the Server Top Cover

Servicing most of the server components requires that the top cover be removed.

⚠ **Caution -** If the top cover is removed without first removing the AC power cords, the server host shuts down immediately and an event is logged to indicate that the chassis top cover has been removed.

1. **Ensure that the AC power cords are disconnected from the server power supplies.**

2. **Open the server fan door.**

   See .

3. **To open the server top cover, press and hold down the top cover release button and use the recessed area to slide the top cover toward the rear of the server about 0.5 inches (12.7 mm) [1].**
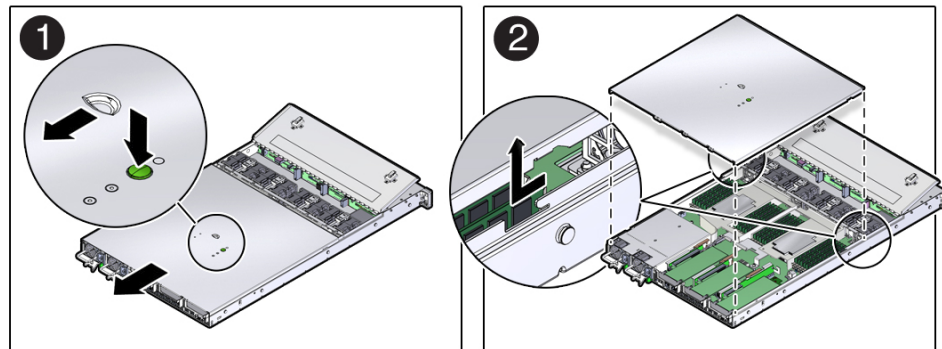
4. **Lift the cover off the chassis and set it aside [2].**

Related Information

Servicing CRUs That Do Not Require Server Power-Off

These sections describe how to service customer-replaceable units (CRUs) that do not require you to power off the server. For more information about CRUs, see "Illustrated Parts Breakdown" on page 20 and "Customer-Replaceable Units" on page 22.

Description	Links
Service the storage drives.	"Servicing Storage Drives (CRU)" on page 69
Service the fan modules.	"Servicing Fan Modules (CRU)" on page 82
Service the power supplies.	"Servicing Power Supplies (CRU)" on page 87

Related Information

- "Servicing CRUs That Require Server Power-Off" on page 93
- "Servicing FRUs" on page 129

Servicing Storage Drives (CRU)

These sections describe how to remove and install storage drives:

- "Storage Drives Hot-Plug Conditions" on page 70
- "Storage Drive Failure and RAID" on page 70
- "Storage Drive Locations and Numbering" on page 70
- "Storage Drive Status Indicators" on page 71
- "Removing and Replacing a HDD or SSD Storage Drive" on page 72
- "Removing and Replacing an NVMe Storage Drive Using Oracle Solaris" on page 75
- "Removing and Replacing an NVMe Storage Drive Using Oracle Linux" on page 78

Related Information

- "Removing and Installing Server Filler Panels " on page 197

Storage Drives Hot-Plug Conditions

The hard-disk drives (HDDs), solid-state drives (SSDs), and NVMe SSD drives installed in the server are hot-pluggable, but this capability depends on how the drives are configured. To hot-plug a drive you must be able to take the drive offline before you can remove it. When you take the drive offline, you prevent any application from accessing the drive and remove the logical software links to the drive.

The following conditions inhibit the ability to perform hot-plugging of a drive:

- The drive provides the operating system, and the operating system is not mirrored on another drive.
- The drive cannot be logically isolated from the online operations of the server.

If either of the above drive restrictions is true, then you must shut down the system before you replace the drive. See "Powering Down the Server" on page 57.

Note - Replacing a storage drive does not require removing the server from a rack.

Storage Drive Failure and RAID

A single storage drive failure does not cause a data failure if the storage drives are configured as a mirrored RAID 1 volume (optional). The storage drive can be removed, and when a new storage drive is inserted, the contents are automatically rebuilt from the rest of the array with no need to reconfigure the RAID parameters. If the replaced storage drive was configured as a hot-spare, the new storage drive is automatically configured as a new hot-spare.

For instructions for configuring RAID on the server, refer to "Configuring Storage Drives for Operating System Installation" in *Oracle Server X6-2 Installation Guide*.

Storage Drive Locations and Numbering

The following illustration and table show the locations of the HDD, SSD, and optional NVMe SSD drives.

FIGURE   2   Server Storage Drives

TABLE 8   Server Storage Drive Locations and Numbering

Drive 1 (HDD/SSD)	Drive 3 (HDD/SSD/ NVMe1)	Drive 5 (HDD/SSD/ NVMe3)	DVD	
Drive 0 (HDD/SSD)	Drive 2 (HDD/SSD/ NVMe0)	Drive 4 (HDD/SSD/ NVMe2)	Drive 6 (HDD/SSD)	Drive 7 (HDD/SSD)

Note - If the optional Oracle PCIe NVMe switch card is installed in the server, the associated NVMe storage drives are installed in drive locations 2, 3, 4, and 5, as shown in the above table.

Note - The NVMe storage drives are labeled NVMe0, NVMe1, NVMe2, and NVMe3; however, operating systems installed on the server assign different names to the NVMe storage drives. For the corresponding names assigned to the NVMe storage drives by server operating systems, see "Server Operating System Names for the NVMe Storage Drives" on page 48.

Storage Drive Status Indicators

The following figure and table describe the storage drive status indicators (LEDs).

FIGURE   3   Storage Drive Status Indicators
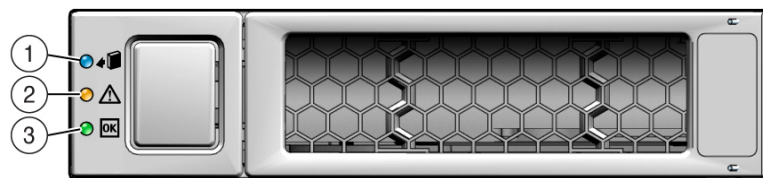
TABLE 9   Storage Drive Status Indicators

Legend	LED	Color	State and Meaning
1	OK to Remove	Blue	■ STEADY ON – The storage drive can be removed safely during a hot-plug operation. ■ OFF – The storage drive has not been prepared for removal.
2	Service Required	Amber	■ OFF – The storage drive is operating normally. ■ STEADY ON – The system has detected a fault with the storage drive.
3	OK/Activity	Green	■ OFF – Power is off or the installed drive is not recognized by the system. ■ STEADY ON – The drive is engaged and is receiving power. ■ STEADY BLINK – There is disk activity. The LED blinks on and off to show activity.

Removing and Replacing a HDD or SSD Storage Drive

This section describes how to remove and replace HDD and SSD drives.

▼ Remove a HDD or SSD Storage Drive

1. **Prepare the system for the drive removal.**

   See "Take Antistatic Measures" on page 65.

2. **Identify the location of the drive that you want to remove.**

   For storage drive locations, see "Storage Drive Locations and Numbering" on page 70.

3. **If you are removing a HDD or SSD storage drive, type the operating system commands required to stop the server from using the drive; otherwise, proceed to the next step.**

   Note - The blue OK to Remove LED on the storage drive might not light, as support for this varies depending on the operating system in use.

   The exact commands required depend on the configuration of your drives. Unmount file systems or issue RAID commands as needed.

4.   On the drive you plan to remove, push the latch release button to open the drive latch.
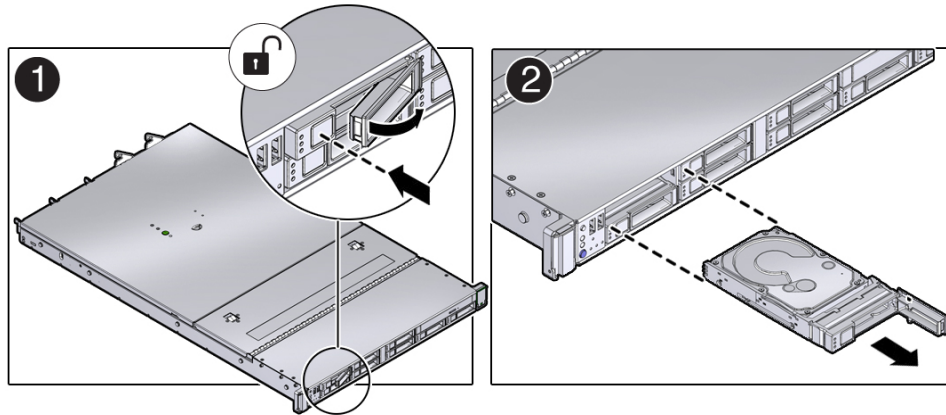
> ⚠️ **Caution -** The latch is not an ejector. Do not open the latch too far to the right. Doing so can damage the latch.

5.   Grasp the latch and pull the drive out of the drive slot.

6.   Consider your next steps:

- If you are replacing the drive, continue to "Install a HDD or SSD Storage Drive" on page 74.
- If you are not replacing the drive, install a filler panel in the empty drive slot to maintain proper airflow and perform administrative tasks to configure the server to operate without the drive.

  For information on how to install a storage drive filler panel, see "Removing and Installing Server Filler Panels " on page 197.

Related Information

- "Storage Drive Status Indicators" on page 71
- "Storage Drives Hot-Plug Conditions" on page 70
- "Storage Drive Failure and RAID" on page 70
- "Install a HDD or SSD Storage Drive" on page 74

▼ Install a HDD or SSD Storage Drive

1. **Remove the replacement drive from its packaging and place the drive on an antistatic mat.**

2. **If necessary, remove the drive filler panel.**

3. **Align the replacement drive with the drive slot.**

   The drive is physically addressed according to the slot in which it is installed. It is important to install a replacement drive in the same slot as the drive that was removed.

4. **Slide the drive into the slot until the drive is fully seated [1].**
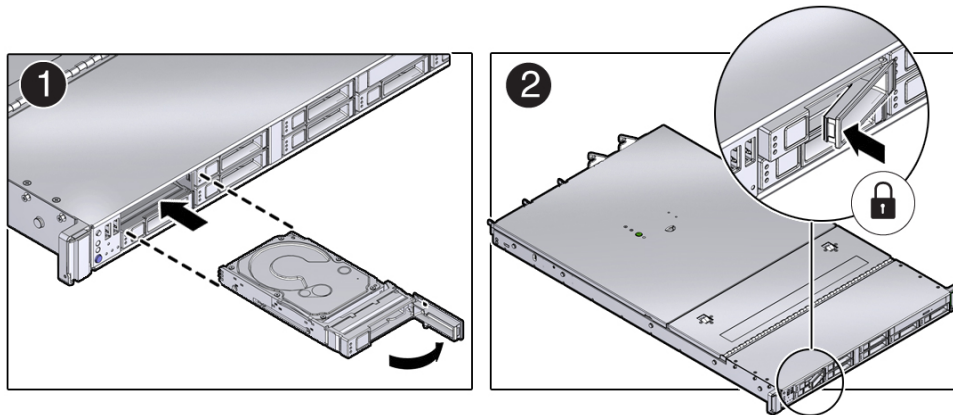
5. **Close the drive latch to lock the drive in place [2].**

6. **Perform administrative tasks to reconfigure the drive.**

   The procedures that you perform at this point depend on how your data is configured. You might need to partition the drive, create file systems, load data from backups, or have the drive updated from a RAID configuration.

   ### Related Information

   - "Storage Drive Status Indicators" on page 71
   - "Storage Drives Hot-Plug Conditions" on page 70
   - "Storage Drive Failure and RAID" on page 70
   - "Remove a HDD or SSD Storage Drive" on page 72

Removing and Replacing an NVMe Storage Drive Using Oracle Solaris

Note - NVMe storage drives are supported only on servers that are running the Oracle Solaris or Oracle Linux operating system. Servers that are running Oracle VM, Windows Server, or Red Hat Enterprise Linux do not support NVMe drives.

The following sections describe how to remove and replace an NVMe storage drive on a server that is running the Oracle Solaris operating system.

- "Unmount an NVMe Storage Drive" on page 75
- "Remove an NVMe Storage Drive From the Server" on page 76
- "Verify Removal of an NVMe Storage Drive" on page 76
- "Install an NVMe Storage Drive in the Server" on page 77
- "Power On an NVMe Storage Drive and Attach a Device Driver" on page 77

▼ Unmount an NVMe Storage Drive

1. **Log in to Oracle Solaris that is running on the server.**

2. **To find the NVMe drive slot number, type:**

    # **hotplug list –lc**

    This command produces output similar to the following for each of the NVMe drives installed in the server:

    ```
    # hotplug list –lc
    Connection  State    Description
    Path
    -------------------------------------------------------------------
    pcie13     ENABLED  PCIe-Native /pci@7a,0/pci8086,2f08@3/pci111d,80b5@4
    ```

3. **To prepare the NVMe drive for removal, that is, detach the device driver and power off the drive slot, type the following commands:**

    # **hotplug poweroff pcie13**

    # **hotplug list –lc**

    The following output appears for the NVMe drive that has been unmounted:

    ```
    # hotplug list –lc
    Connection  State    Description
    Path
    ```

```
--------------------------------------------------------------------
pcie13     PRESENT  PCIe-Native /pci@7a,0/pci8086,2f08@3/pci111d,80b5@4
```

4. **Verify that the OK to Remove indicator (LED) on the NVMe storage drive is lit.**

▼ Remove an NVMe Storage Drive From the Server

Perform this procedure to physically remove an NVMe storage drive from the server.

1. **Identify the physical location of the NVMe drive that you want to remove.**

    For storage drive locations, see "Storage Drive Locations and Numbering" on page 70.

2. **Verify that the OK to Remove indicator (LED) on the NVMe storage drive is lit.**

3. **On the drive you plan to remove, push the latch release button to open the drive latch.**

4. **Grasp the latch and pull the drive out of the drive slot.**

    See "Remove a HDD or SSD Storage Drive" on page 72.

5. **Consider your next steps:**

    *   If you are replacing the drive, continue to "Install an NVMe Storage Drive in the Server" on page 77.
    *   If you are not replacing the drive, install a filler panel in the empty drive slot to maintain proper airflow and perform administrative tasks to configure the server to operate without the drive.

        For information on how to install a storage drive filler panel, see "Removing and Installing Server Filler Panels " on page 197.

▼ Verify Removal of an NVMe Storage Drive

● **To verify that the NVMe drive has been removed, type:**

    # **hotplug list –lc**

    The following output appears for the NVMe drive that you removed:

```
# hotplug list –lc
Connection  State    Description
Path
--------------------------------------------------------------------
pcie13      EMPTY    PCIe-Native /pci@7a,0/pci8086,2f08@3/pci111d,80b5@4
```

▼ Install an NVMe Storage Drive in the Server

Perform this procedure to physically install an NVMe storage drive into the server.

> **Note -** After you physically remove an NVMe storage drive from the server, wait at least 10 seconds before installing a replacement drive.

1. **Remove the replacement drive from its packaging and place the drive on an antistatic mat.**

2. **If necessary, remove the drive filler panel.**

3. **Align the replacement drive with the drive slot.**
   The drive is physically addressed according to the slot in which it is installed. It is important to install a replacement drive in the same slot as the drive that was removed.

4. **Slide the drive into the slot until the drive is fully seated.**
   See "Install a HDD or SSD Storage Drive" on page 74.

5. **Close the drive latch to lock the drive in place.**
   See "Install a HDD or SSD Storage Drive" on page 74.

▼ Power On an NVMe Storage Drive and Attach a Device Driver

1. **Type:** # `hotplug enable pcie13`

2. **Type:** # `hotplug list –lc`
   The following status is displayed for the NVMe storage drive.

   ```
   # hotplug list –lc
   Connection  State    Description
   Path
   ------------------------------------------------------------------
   pcie13      Enabled  PCIe-Native /pci@7a,0/pci8086,2f08@3/pci111d,80b5@4
   ```

3. **To check the NVMe drive health, firmware level, temperature, get error log, SMART data, security erase, low level format, etc., type:**
   # `nvmeadm list`

   ### Related Information

   - "Storage Drive Status Indicators" on page 71

- "Storage Drives Hot-Plug Conditions" on page 70
- "Storage Drive Failure and RAID" on page 70
- "Storage Drive Locations and Numbering" on page 70

Removing and Replacing an NVMe Storage Drive Using Oracle Linux

Note - NVMe storage drives are supported only on servers that are running the Oracle Solaris or Oracle Linux operating system. Servers that are running Oracle VM, Windows Server, or Red Hat Enterprise Linux do not support NVMe drives.

The following sections describe how to remove and replace an NVMe storage drive on a server that is running the Oracle Linux operating system.

- "Unmount an NVMe Storage Drive " on page 78
- "Remove an NVMe Storage Drive" on page 80
- "Verify Removal of an NVMe Storage Drive" on page 80
- "Install an NVMe Storage Drive In the Server" on page 81
- "Power On an NVMe Storage Drive and Attach a Device Driver" on page 81
- "Verify Operation of an NVMe Storage Drive" on page 82

▼ Unmount an NVMe Storage Drive

1. **Log in to Oracle Linux that is running on the server.**

2. **Remove the NVMe storage device path.**

   a. **To find the PCIe addresses (Bus Device Function), type:**

      # **find /sys/devices |egrep 'nvme[0-9][0-9]?$'**

      This commands returns output similar to the following:

      ```
      /sys/devices/pci0000:80/0000:80:03.0/0000:b0:00.0/0000:b1:04.0/0000:b2:00.0/misc/
      nvme0
      /sys/devices/pci0000:80/0000:80:03.0/0000:b0:00.0/0000:b1:05.0/0000:b4:00.0/misc/
      nvme1
      ```

      In the above listing the PCIe addresses are highlighted in bold text.

b. To obtain the slot number (APIC ID) for the bus address, type the following command to list all of the PCIe slot numbers and the corresponding bus addresses:

`egrep —H '.*' /sys/bus/pci/slots/*/address`

This commands returns output similar to the following:

```
    /sys/bus/pci/slots/10/address:0000:b8:00
    /sys/bus/pci/slots/11/address:0000:b6:00
    /sys/bus/pci/slots/12/address:0000:b2:00 (instance nvme0, pcie slot 12, drive
 label nvme2)
    /sys/bus/pci/slots/13/address:0000:b4:00 (instance nvme1, pcie slot 13, drive
 label nvme3)
```

In the above output, the bus addresses for the corresponding NVMe instances are highlighted in bold text.

Note - In the above output, notice that the instance names for the NVMe drives does not correspond to the NVMe drive labels on the front of the server, that is, pci/slots/12/address: 0000:b2:00 corresponds to instance nvme0; however, on the front of the server, this drive is labeled NVMe2. For a table that shows the relationship between the pci/slot# and the NVMe storage drive label on the front of the server, see "Server Operating System Names for the NVMe Storage Drives" on page 48 .

---

c. Disconnect all users of the NVMe drive and back up the NVMe drive data as needed.

i. Use the `umount` command to unmount any file systems that are mounted on the device.

ii. Remove the device from any multiple device (md) and Logical Volume Manager (LVM) volume using it.

If the device is a member of an LVM Volume group, then it may be necessary to move data off the device using the `pvmove` command, then use the `vgreduce` command to remove the physical volume, and (optionally) `pvremove` to remove the LVM meta data from the disk.

iii. If the device uses multipathing, run `multipath -l` and note all the paths to the device. Then, remove the multipathed device using the `multipath -f device` command.

iv. Run the `blockdev --flushbufs device` command to flush any outstanding I/O to all paths to the device.

3. **To prepare the NVMe drive for removal, that is, detach the NVMe device driver and power off the NVMe drive slot, type:**

   \# `echo 0 > /sys/bus/pci/slots/`*$slot*`/power`

   Where *$slot* is the slot number obtained in step Step 2b above.

4. **Verify that the OK to Remove indicator (LED) on the NVMe drive is lit.**

▼ Remove an NVMe Storage Drive

Perform this procedure to physically remove an NVMe storage drive from the server.

1. **Identify the location of the NVMe drive that you want to remove.**

   For storage drive locations, see "Storage Drive Locations and Numbering" on page 70.

2. **Verify that the OK to Remove indicator (LED) on the NVMe drive is lit.**

3. **On the NVMe drive you plan to remove, push the latch release button to open the drive latch.**

4. **Grasp the latch and pull the drive out of the drive slot.**

   See "Remove a HDD or SSD Storage Drive" on page 72.

5. **Consider your next steps:**

   - If you are replacing the drive, continue to "Verify Removal of an NVMe Storage Drive" on page 80.
   - If you are not replacing the drive, install a filler panel in the empty drive slot to maintain proper airflow and perform administrative tasks to configure the server to operate without the drive.

     For information on how to install a storage drive filler panel, see "Removing and Installing Server Filler Panels " on page 197.

▼ Verify Removal of an NVMe Storage Drive

1. **To check the NVMe drive enumeration to verify that the NVMe drive has been removed, type:**

```
# lspci -nnd :0953
```

2. **View the command output and verify that the entry for the slot number that was disabled no longer appears.**

   This commands returns output similar to the following:

   ```
   b2:00.0 Non-Volatile memory controller [0108]: Intel Corporation Device  [8086:0953]
    (rev 01)
   b6:00.0 Non-Volatile memory controller [0108]: Intel Corporation Device  [8086:0953]
    (rev 01)
   b8:00.0 Non-Volatile memory controller [0108]: Intel Corporation Device  [8086:0953]
    (rev 01)
   ```

▼ Install an NVMe Storage Drive In the Server

Perform this procedure to physically install an NVMe storage drive into the server.

After you physically remove an NVMe drive from the server, wait at least 10 seconds before installing a replacement drive.

1. **Remove the replacement drive from its packaging and place the drive on an antistatic mat.**

2. **If necessary, remove the drive filler panel.**

3. **Align the replacement drive with the drive slot.**

   The drive is physically addressed according to the slot in which it is installed. It is important to install a replacement drive in the same slot as the drive that was removed.

4. **Slide the drive into the slot until the drive is fully seated.**

   See "Install a HDD or SSD Storage Drive" on page 74.

5. **Close the drive latch to lock the drive in place [2].**

   See "Install a HDD or SSD Storage Drive" on page 74.

▼ Power On an NVMe Storage Drive and Attach a Device Driver

● **To power on the slot and attach the device driver, type:**

   ```
   # echo 1 /sys/bus/pci/slots/$slot/power
   ```

   Where *$slot* is the slot number for the NVMe storage drive.

▼ Verify Operation of an NVMe Storage Drive

● **To verify that an NVMe drive is operating properly, do one of the following:**

- Check the `/var/log/messages` log file.
- Type: # `ls -l /dev/nvme*`.

Related Information

- "Storage Drive Status Indicators" on page 71
- "Storage Drives Hot-Plug Conditions" on page 70
- "Storage Drive Failure and RAID" on page 70
- "Storage Drive Locations and Numbering" on page 70

Servicing Fan Modules (CRU)

The fan modules are located in the front of the server. See the following procedures:

- "Remove a Fan Module" on page 82
- "Install a Fan Module" on page 86

Related Information

- "Open the Server Fan Door" on page 66

▼ Remove a Fan Module

You do not have to power off the server to service the fan modules.

You should not begin this procedure unless you have a replacement fan and you are ready to install it right away.

> **Caution -** When removing and replacing a fan module in the Oracle Server X6-2, you must complete the entire procedure within 20 seconds to maintain adequate cooling within the system. Remove and replace only one fan module at a time. Ensure that you have obtained the replacement fan module and that is it is ready for installation before starting the replacement procedure. Each fan module contains two fans, with two fan motors per fan. The four fan motors provide separate tachometer signals so that the fan module reports four tach signals to Oracle ILOM. Even if only one fan motor is faulted within the fan module, the Oracle ILOM service processor detects that four fan motors have failed to spin while the fan module is removed. If the fan module is not replaced within 20 seconds of removal, Oracle ILOM will take the protective action to shut down the system to prevent thermal damage to the system.

1. **Extend the server to the maintenance position.**

   See "Extend the Server to the Maintenance Position" on page 63.

2. **To access the fan modules, open the server fan door.**

   See "Open the Server Fan Door" on page 66.

> **Caution -** Close the server fan door within 60 seconds to maintain adequate airflow to properly cool the server. Leaving the door open for more than 60 seconds, while the server is running, might cause the server to overheat and shut down.

3. **Identify the faulty fan module.**

Each fan module has a status indicator (LED). If the LED is off, the fan is good. If the LED is lit amber, the fan has failed. The LEDs are located on the chassis mid-wall adjacent to and aligned with the fan modules, as shown in the following figure.
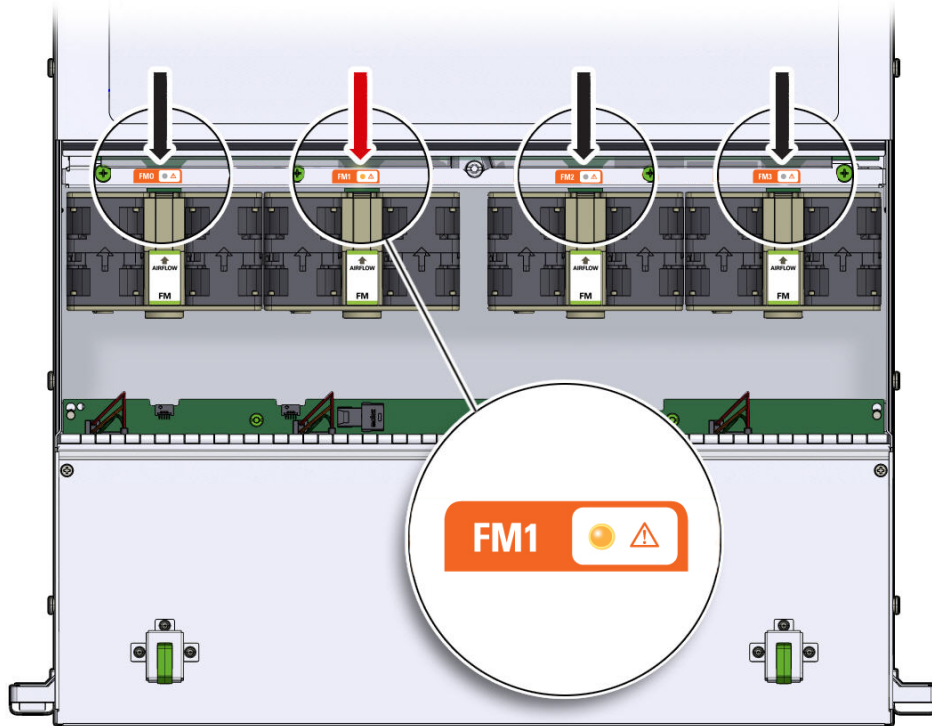
Status Indicator Name	Color	State Meaning
Fan Module Status	Off/Amber	■ Off – The fan module is correctly installed and operating within specification. ■ Amber – The fan module is faulty. The front TOP FAN LED and the front and rear panel Service Required LEDs are also lit if the system detects a fan module fault.

4. Remove the faulty fan module.

a. **Using your thumb and forefinger, grasp the fan module in the finger recesses located in the plastic between the fans.**

b. **Lift the fan module straight up and out of the chassis.**

> ⚠️ **Caution -** When removing a fan module, do not rock it back and forth. Rocking a fan module can cause damage to the motherboard connectors.
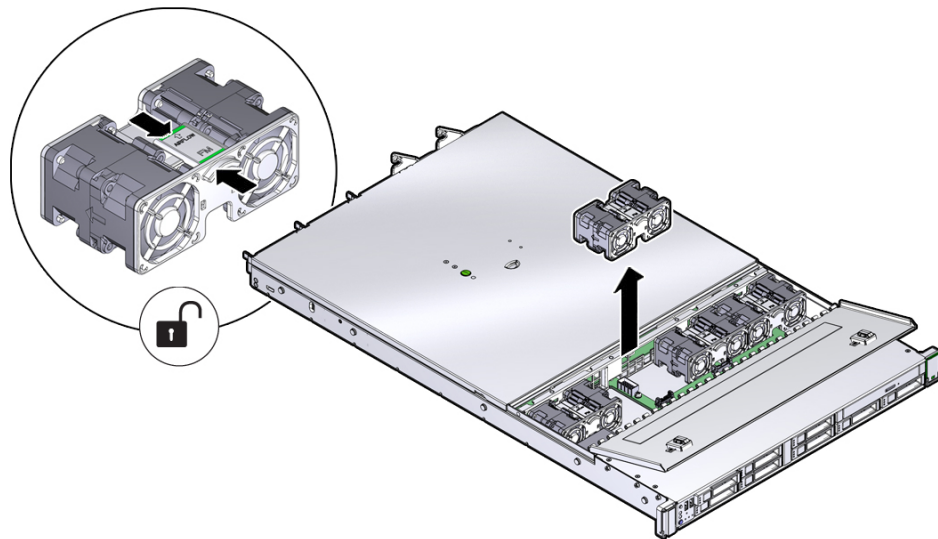
5. **Set the fan module aside.**

> ⚠️ **Caution -** Do not service any other components in the fan compartment unless the system is shut down and the power cords are removed.

6. **Consider your next step:**

- If you removed the fan assembly as part of another procedure, return to that procedure.
- Otherwise, continue to "Install a Fan Module" on page 86.

Related Information

-

▼ Install a Fan Module

1. **Remove the replacement fan module from its packaging and place it on an antistatic mat.**

2. **With the fan door open, position the replacement fan module into the server.**

   The fan modules are keyed to ensure that they are installed in the correct orientation.
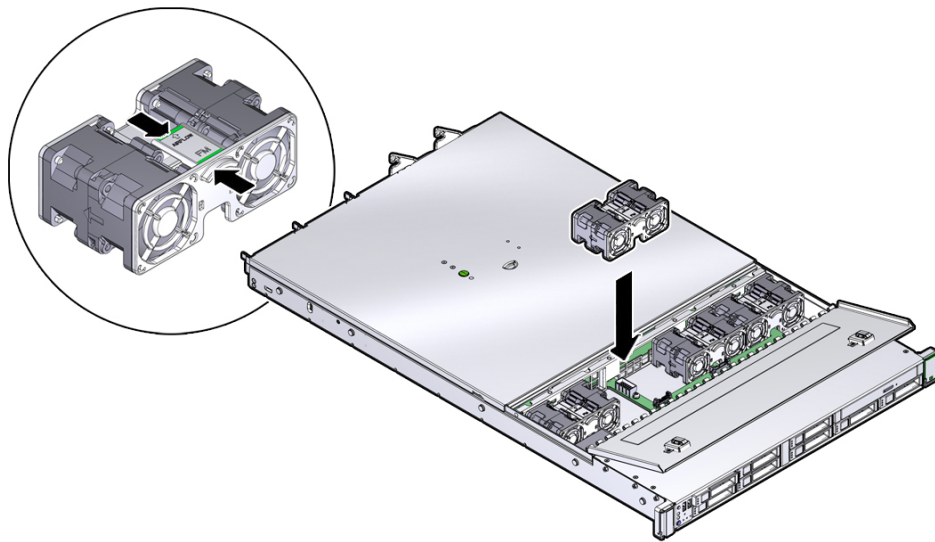
3. **Press down on the fan module and apply firm pressure to fully seat the fan module.**

4. **Verify that the fan module status indicator (LED) that aligns with the replaced fan module is extinguished.**

5. **Close the fan door.**

6. **Verify that the Top Fan Fault LED on the front of the server and the Service Required LEDs on the front and rear of the server are extinguished.**

   See "Troubleshooting Using the Server Front and Rear Panel Status Indicators" on page 32 for more information about identifying and interpreting system indicators.

7. **Consider your next step:**

   - If you installed the fan module as part of another procedure, return to that procedure.
   - Otherwise, return the server to operation. See "Returning the Server to Operation" on page 197.

   Related Information

   - "Remove a Fan Module" on page 82

Servicing Power Supplies (CRU)

The redundant power supplies on the server support concurrent maintenance, which enables you to remove and replace a power supply without shutting down the server, provided that the other power supply is online and working.

The server supports model A256 (600 watt) power supplies. The A256 power supply unit (PSU) provides conversion from the AC lines to the system, accepting ranges from 100-240 volts AC (VAC). These PSUs are designed to be hot-swappable, and in most cases will provide fully redundant "1+1" power, allowing the system to suffer the loss of a PSU or an AC feed with no loss to system availability.

In maximally configured systems, it is possible that the worst-case power consumption of the system could exceed the capacity of a single PSU. The PSUs provide an over-subscription mode, which allows the system to operate with fault-tolerance even with modest excursions beyond the rated capacity of a single PSU. This over-subscription support is accomplished using hardware signaling between the PSU and motherboard circuitry, which can force the system to throttle maximally CPU and memory power in the event that a PSU is lost. The resulting power savings will be enough to allow the system to continue to run (in a lower-performance state) until the power problem is resolved.

The following indicators (LEDs) are lit when a power supply fault is detected:

- Front and rear Service Required LEDs
- Amber Service Required LED on the faulty power supply
- Rear Power Supply Fault LED located on the server front panel (see "Front Panel Controls and Indicators" on page 16)

If a power supply fails and you do not have a replacement available, leave the failed power supply installed to ensure proper airflow in the server.

For more information, refer to the following topic and procedures:

- "Power Supply Status Indicators" on page 88
- "Remove a Power Supply" on page 89
- "Install a Power Supply" on page 90

Related Information

- "Troubleshooting Using the Server Front and Rear Panel Status Indicators" on page 32
- "Powering Down the Server" on page 57

Power Supply Status Indicators

Each power supply contains two status indicators (LEDs) on the back panel. The following figure and table provide a description of the power supply status indicators.

FIGURE 4 Power Supply Status Indicators
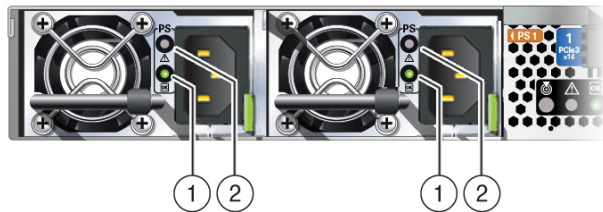
TABLE 10 Server Power Supply Indicators

Legend	Status Indicator Name	Icon	Color	State Meaning
1	AC OK/DC OK	OK	Green	■ OFF – No AC power is present. ■ SLOW BLINK – Normal operating. Input power is within specification. DC output voltage is not enabled.

Legend	Status Indicator Name	Icon	Color	State Meaning
2	Service Required	⚠	Amber	■ STEADY ON – Normal operation. Input AC power and DC output voltage are within specification. ■ OFF – Normal operation; no service required. ■ STEADY ON – The power supply (PS) has detected a PS fan failure, PS overtemperature, PS over current, or PS over/under voltage.

▼ Remove a Power Supply

1. **Identify which power supply requires replacement.**

   A lit amber Service Required LED on a power supply indicates that a failure was detected. You can also use the Oracle ILOM `show faulty` command at the Oracle ILOM command line prompt (->) to identify a power supply failure.

   Alternatively, to list all known faults in the server, log into the Oracle Solaris OS and issue the `fmadm faulty` command, or log into the Oracle ILOM service processor from the Oracle ILOM Fault Management Shell and issue the `fmadm faulty` command. For more information about how to use the Oracle ILOM Fault Management Shell and supported commands, see the *Oracle ILOM User's Guide for System Monitoring and Diagnostics Firmware Release 5.0.x* in the Oracle Integrated Lights Out Manager (ILOM) 5.0 Documentation Library at `https://www.oracle.com/goto/ilom/docs`.

   Note - The fans of a failed power supply might still be spinning when the system is powered on. You can remove a power supply while the fans are still spinning.

2. **Gain access to the rear of the server where the faulty power supply is located.**

3. **If the cable management arm (CMA) is installed, disconnect both CMA left-side connectors and move the CMA out of the way.**

   For instructions for disconnecting the CMA left-side connectors, refer to "Remove the Cable Management Arm" in *Oracle Server X6-2 Installation Guide*.

   Caution - When disconnecting the CMA left-side connectors, use your arm to support the CMA so that it does not hang down under its own weight and stress the right-side connectors; otherwise, the CMA might be damaged. You must continue to support the CMA until you have reconnected both of the left-side connectors.

4. **Disconnect the power cord from the faulty power supply.**

5.   Grasp the power supply handle and push the power supply latch to the left [1].
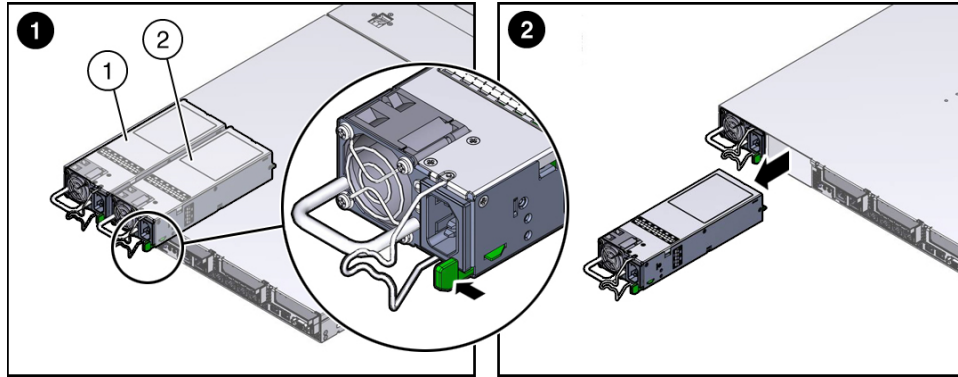
Callout	Description
1	Power Supply 0 (PS0)
2	Power Supply 1 (PS1)

6.   Pull the power supply out of the chassis [2].

⚠ **Caution -** Whenever you remove a power supply, you should replace it with another power supply; otherwise, the server might overheat due to improper airflow.

7.   Continue to “Install a Power Supply” on page 90.

Related Information

■   “Server Back Panel View” on page 18
■   “Power Supply Status Indicators” on page 88
■   “Install a Power Supply” on page 90

▼ Install a Power Supply

⚠ **Caution -** Always replace a faulty power supply with a power supply of the same type (model).

1. **Remove the replacement power supply from its packaging and place it on an antistatic mat.**

2. **Align the replacement power supply with the empty power supply slot [1].**

3. **Slide the power supply into the bay until it is fully seated [2].**

   You will hear an audible click when the power supply fully seats.
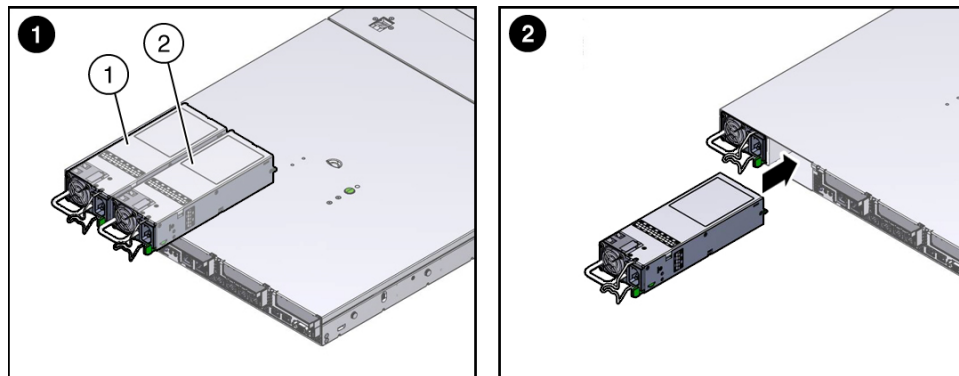
4. **Reconnect the power cord to the power supply.**

5. **Verify that the amber LED on the replaced power supply and the Service Required LEDs on the front and rear panels of the server are not lit.**

   Note - After you have replaced Power Supply 0, you must reset the Oracle ILOM service processor (SP) to propagate the key identity properties (KIP) data to the new power supply. For instructions on resetting the SP, see the *Oracle Integrated Lights Out Manager (ILOM) 5.0 Configuration and Maintenance Guide* at `https://www.oracle.com/goto/ilom/docs`. Power Supply 1 does not contain KIP data, and therefore does not require an SP reset after replacement.

6. **If you disconnected the two CMA left-side connectors, reconnect the connectors.**

   For instructions for reconnecting the CMA left-side connectors, refer to "Install the Cable Management Arm" in *Oracle Server X6-2 Installation Guide*.

   Related Information

   - "Server Back Panel View" on page 18

-
-

Servicing CRUs That Require Server Power-Off

These sections describe how to service customer-replaceable units (CRUs) that require you to power off the server. For more information about CRUs, see "Illustrated Parts Breakdown" on page 20 and "Customer-Replaceable Units" on page 22.

Description	Use
Service the DIMMs.	"Servicing the DIMMs (CRU)" on page 93
Service the PCIe Risers.	"Servicing PCIe Risers (CRU)" on page 106
Service the PCIe cards.	"Servicing PCIe Cards (CRU)" on page 118
Service the internal USB flash drives.	"Servicing the Internal USB Flash Drives (CRU)" on page 123
Service the battery.	"Servicing the Battery (CRU)" on page 126

Related Information

- "Servicing CRUs That Do Not Require Server Power-Off" on page 69
- "Servicing FRUs" on page 129

Servicing the DIMMs (CRU)

The Oracle Server X6-2 supports a variety of DDR4 DIMM configurations that can include quad-rank (QR) and dual-rank (DR) DDR4 DIMMs.

Caution - These procedures require that you handle components that are sensitive to electrostatic discharge. This sensitivity can cause the components to fail. To avoid damage, ensure that you follow antistatic practices as described in "Take Antistatic Measures" on page 65.

Caution - Ensure that all power is removed from the server before removing or installing DDR4 DIMMs, or damage to the DDR4 DIMMs might occur. You must disconnect all power cables from the system before performing these procedures.

The following topics and procedures provide information to assist you when replacing a DIMM or upgrading DIMMs:

- "DIMM and Processor Physical Layout" on page 94
- "DIMM Population Scenarios" on page 95
- "DIMM Population Rules" on page 96
- "Populating DIMMs for Optimal System Performance" on page 96
- "DIMM Operating Speeds" on page 100
- "DIMM Rank Classification Labels" on page 100
- "Inconsistencies Between DIMM Fault Indicators and the BIOS Isolation of Failed DIMMs" on page 100
- "Using the Server Fault Remind Button" on page 101
- "Identify and Remove the Failed DIMM" on page 102
- "Install a DIMM" on page 104

Related Information

- "Servicing CRUs That Do Not Require Server Power-Off" on page 69
- "Servicing FRUs" on page 129

DIMM and Processor Physical Layout

The physical layout of the DIMMs and processor(s) is shown in the following figure. When viewing the server from the front, processor 0 (P0) is on the left. Notice that each processor, P0 and P1, has four memory channels that are labeled, from left to right, Ch C, Ch D, Ch B, and Ch A.

FIGURE 5 DIMM and Processor Physical Layout
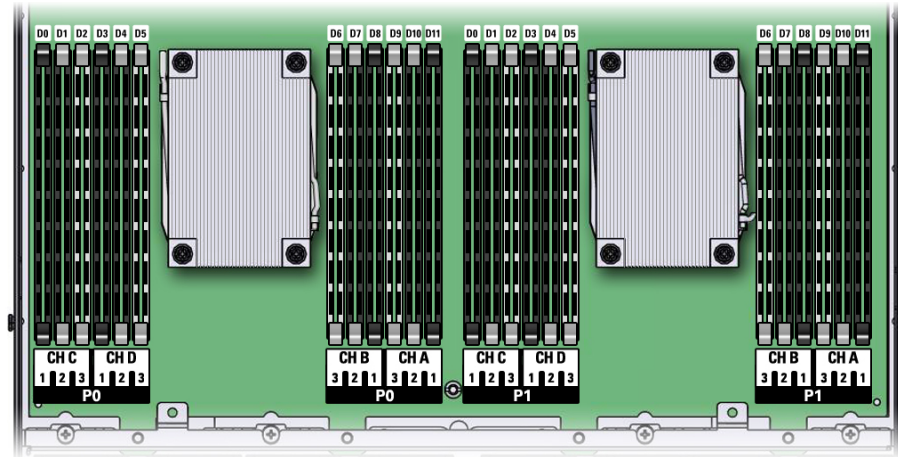
Note - In single-processor systems, the DIMM sockets associated with the processor 1 (P1) are nonfunctional and should not be populated with DIMMs. A maximum of 12 DIMMs are supported in single-processor systems and the DIMMs must be installed in DIMM sockets associated with the P0 processor socket.

Related Information

- "DIMM Population Scenarios" on page 95
- "DIMM Population Rules" on page 96
- "Populating DIMMs for Optimal System Performance" on page 96
- "DIMM Operating Speeds" on page 100
- "DIMM Rank Classification Labels" on page 100
- "Inconsistencies Between DIMM Fault Indicators and the BIOS Isolation of Failed DIMMs" on page 100

DIMM Population Scenarios

There are two scenarios in which you are required to populate DIMMs:

- A DIMM fails and needs to be replaced.

  In this scenario, you can use the Fault Remind button to determine the failed DIMM, then remove the failed DIMM and replace it. To ensure that system performance is maintained, you must replace the failed DIMM with a DIMM of the same size (in gigabytes) and type (quad-rank or dual-rank). In this scenario, you should not change the DIMM configuration.

- You have purchased new DIMMs and you want to use them to upgrade the server's memory.

  In this scenario, you should adhere to DIMM population rules and follow the recommended DIMM population order for optimal system performance.

Related Information

-
-
-

DIMM Population Rules

The population rules for adding DIMMs to the server are as follows:

- The server supports 64-GB quad-rank (QR) Load-Reduced DIMMs (LRDIMMs) and 32-GB dual-rank (DR) and 16-GB DR Registered DIMMs (RDIMMs).
- Do not mix 64-GB LRDIMMs and 16-GB or 32-GB RDIMMs in the same server. If the server has 64-GB LRDIMMs installed, you cannot install 16-GB or 32-GB RDIMMs and vice versa.
- Within a memory channel, DIMMs must be populated in the black sockets first, then in the black sockets with white tabs, and then in the white sockets.
- If you are installing a mix of RDIMM sizes (for example, 16-GB and 32-GB), install the larger size RDIMMs first, then the smaller RDIMMs, until all of the RDIMMs are installed.
- The server will operate properly with a minimum of one DIMM installed per processor.

Populating DIMMs for Optimal System Performance

Optimal performance is achieved by populating the DIMMs so that the memory is symmetrical, or balanced. Symmetry is achieved by adhering to the following guidelines:

- In single-processor systems, populate DIMMs of the same size in multiples of four.
- In dual-processor systems, populate DIMMs of the same size in multiples of eight.

■ Populate the DIMM sockets in the order described in the following sections.

The following sections provide an example of how to populate the DIMM sockets to achieve optimal system performance.

Note - Not all possible configurations are shown here.

■ "Populating DIMMs in Single-Processor Systems for Optimal System Performance" on page 97
■ "Populating DIMMs in Dual-Processor Systems for Optimal System Performance" on page 98

Populating DIMMs in Single-Processor Systems for Optimal System Performance

In single-processor systems, install DIMMs only into DIMM sockets associated with processor 0 (P0). Starting with socket P0 D0. Fill the black sockets first, then the black sockets with white tabs, and then the white sockets, as shown in the following figure. Notice that the order of populating the black sockets is Ch C first, Ch A second, Ch D third, and Ch B last. Repeat the same population sequence for the black sockets with white tabs, and finally for the white sockets.

FIGURE   6   DIMM Population Order for Single-Processor Systems
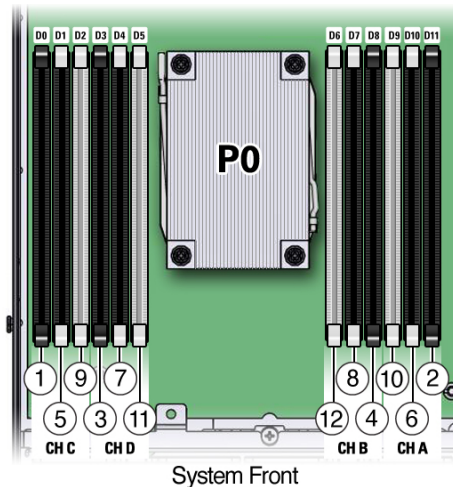
The following table describes the proper order in which to populate DIMMs in a single-processor system using the numbered callouts in the above figure, the memory channel labels (Ch A through Ch D), and the DIMM socket labels (D0 through D11).

TABLE 11   DIMM Population Order for Single-Processor Systems

Population Order	DIMMs Sockets for Processor 0 (P0)	Memory Channels
Fill the black sockets first		
First	D0	Ch C
Second	D11	Ch A
Third	D3	Ch D
Fourth	D8	Ch B
Then fill the black sockets with white tabs		
Fifth	D1	Ch C
Sixth	D10	Ch A
Seventh	D4	Ch D
Eighth	D7	Ch B
Then fill the white sockets		
Ninth	D2	Ch C
Tenth	D9	Ch A
Eleventh	D5	Ch D
Twelfth	D6	Ch B

Populating DIMMs in Dual-Processor Systems for Optimal System Performance

In dual-processor systems, populate DIMMs into DIMM sockets starting with processor 0 (P0) D0, then, alternating between sockets associated with processor 0 (P0) and matching sockets for processor 1 (P1). Fill the black sockets first, then the black sockets with white tabs, and then the white sockets, as shown in the following figure. Notice that the order of populating the black DIMM sockets is Ch C first, Ch A second, Ch D third, and Ch B last. Repeat the same population sequence for the black sockets with white tabs, and finally, for the white sockets.

FIGURE 7   DIMM Population Order for Dual-Processor Systems
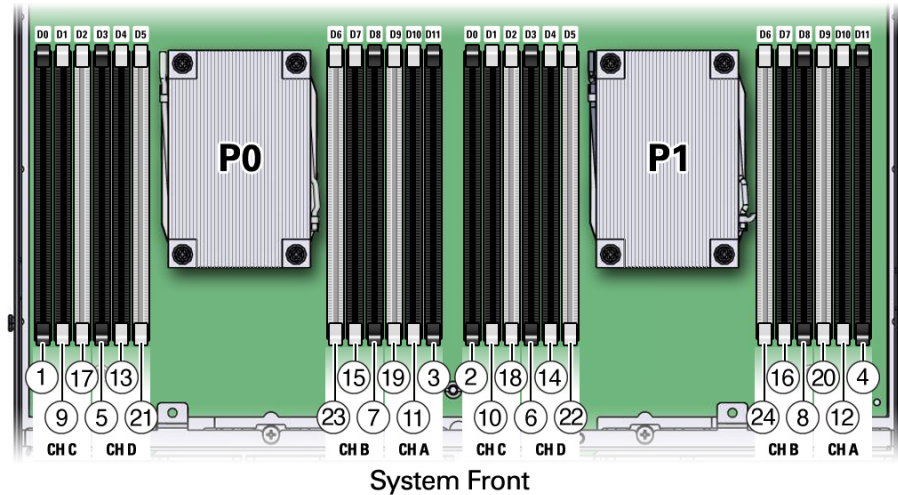
The following table describes the proper order in which to install DIMMs in a dual-processor system using the numbered callouts in the above figure, the memory channels labels (Ch A through Ch D), and the DIMM socket labels (D0 through D11).

TABLE 12   DIMM Population Order for Dual-Processor Systems

Population Order	DIMM Sockets for Processor 0 (P0)	DIMM Sockets for Processor 1 (P1)	Memory Channels
Fill the black sockets first (alternating between processor 0 and processor 1)			
First	Fill D0 first	Then fill D0	Ch C
Second	Fill D11 first	Then fill D11	Ch A
Third	Fill D3 first	Then fill D3	Ch D
Fourth	Fill D8 first	Then fill D8	Ch B
Then fill the black sockets with white tabs (alternating between processor 0 and processor 1)			
Fifth	Fill D1 first	Then fill D1	Ch C
Sixth	Fill D10 first	Then fill D10	Ch A
Seventh	Fill D4 first	Then fill D4	Ch D
Eighth	Fill D7 first	Then fill D7	Ch B
Then fill the white sockets (alternating between processor 0 and processor 1)			
Ninth	Fill D2 first	Then fill D2	Ch C

Population Order	DIMM Sockets for Processor 0 (P0)	DIMM Sockets for Processor 1 (P1)	Memory Channels
Tenth	Fill D9 first	Then fill D9	Ch A
Eleventh	Fill D5 first	Then fill D5	Ch D
Twelfth	Fill D6 first	Then fill D6	Ch B

DIMM Operating Speeds

The maximum supported memory speed is 2400 MT/s. However, not all system configurations will support operation at this speed. The maximum attainable memory speed will be limited by the maximum speed supported by the specific type of processor and the specific memory population. All memory installed in the system will operate at the same speed, or frequency.

DIMM Rank Classification Labels

DIMMs come in a variety of ranks: dual or quad. Each DIMM is shipped with a label identifying its rank classification. The following table identifies the label corresponding to each DIMM rank classification.

TABLE 13   DIMM Rank Classifications Labels

Rank Classification	Label
Quad-rank LRDIMM	4Rx4
Dual-rank RDIMM	2Rx4

Inconsistencies Between DIMM Fault Indicators and the BIOS Isolation of Failed DIMMs

When a single DIMM is marked as failed by Oracle ILOM (for example, `fault.memory. intel.dimm.training-failed` is listed in the service processor Event Log), BIOS might disable the entire memory channel that contains the failed DIMM, up to three DIMMs. As a result, none of the memory installed in the disabled channel will be available to the operating system. However, when the Fault Remind button is pressed, only the fault status indicator (LED) associated with the failed DIMM lights. The fault LEDs for the other DIMMs in the memory channel remain off. Therefore, you can correctly identify the failed DIMM using the lit LED.

Using the Server Fault Remind Button

When the Fault Remind button is pressed, an LED located next to the Fault Remind button lights green to indicate that there is sufficient voltage present in the fault remind circuit to light any fault LEDs that were lit due to a component failure. If this LED does not light when you press the Fault Remind button, it is likely that the capacitor powering the fault remind circuit has lost its charge. This can happen if the Fault Remind button is pressed for several minutes with fault LEDs lit or if power has been removed from the server for more than 15 minutes.

The following figure shows the location of the Fault Remind button.

FIGURE   8   Fault Remind Button Location
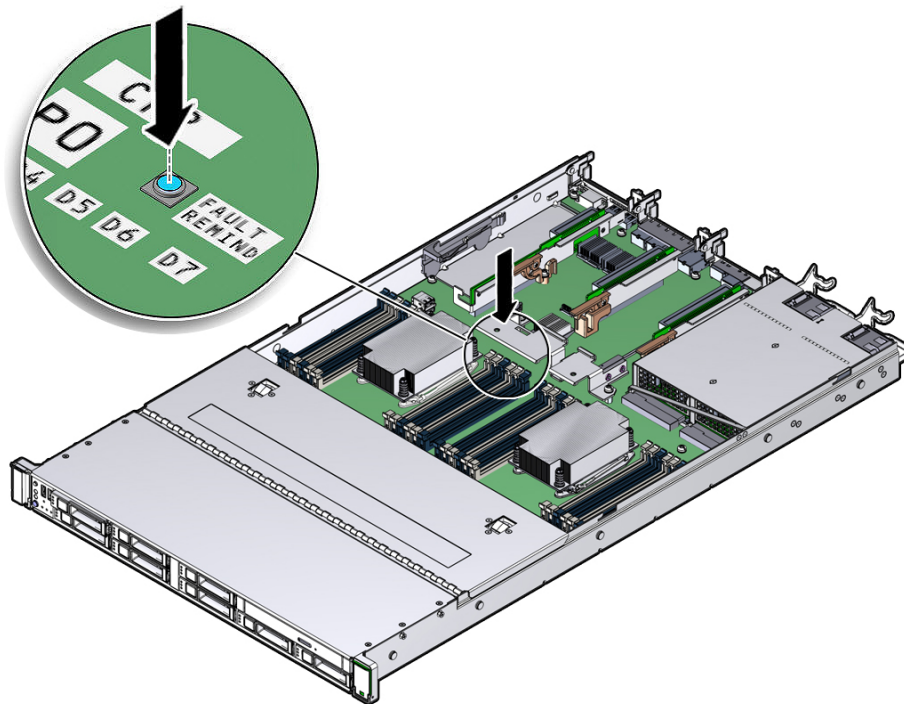
▼ Identify and Remove the Failed DIMM

1. **Prepare the server for service.**

   a. **Power off the server, and disconnect the power cords from the power supplies.**

      See "Powering Down the Server" on page 57

   b. **Extend the server to the maintenance position.**

      See "Extend the Server to the Maintenance Position" on page 63.

   c. **Attach an antistatic wrist strap to your wrist and then to a metal area on the chassis.**

      See "Take Antistatic Measures" on page 65.

   d. **Remove the server top cover.**

      See "Remove the Server Top Cover" on page 67.

2. **Identify and note the location of the failed DDR4 DIMM by pressing the Fault Remind button on the motherboard (see "Using the Server Fault Remind Button" on page 101).**

   Failed DDR4 DIMMs are identified with a corresponding amber LED on the motherboard.

   - If the DIMM fault LED is off, the DIMM is operating properly.

- If the DIMM fault LED is on (amber), then the DIMM has failed and should be replaced.
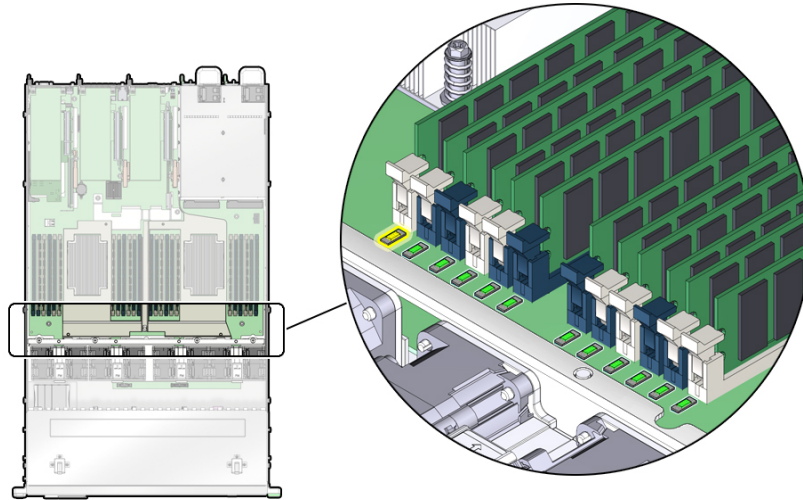
3. **To remove the failed DIMM do the following:**

   a. **Rotate both DIMM socket ejectors outward as far as they will go.**

      The DIMM is partially ejected from the socket.
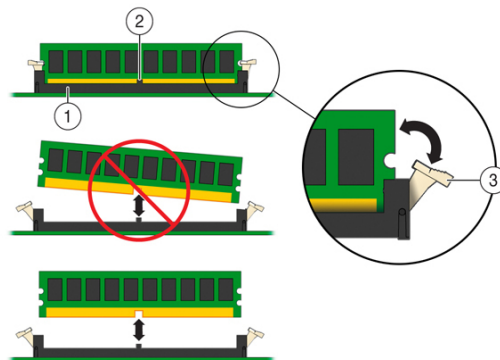
Callout	Description
1	DIMM connector socket
2	DIMM connector key
3	DIMM ejector lever

b. Carefully lift the DIMM straight up to remove it from the socket.

4. Replace each failed DIMM with either another DIMM of the same rank size (quad rank or dual rank) or leave the socket empty.

For DIMM replacement instructions, see "Install a DIMM" on page 104.

Related Information

- "DIMM and Processor Physical Layout" on page 94
- "Install a DIMM" on page 104

▼ Install a DIMM

1. Unpack the replacement DDR4 DIMM and place it on an antistatic mat.

2. Ensure that the replacement DDR4 DIMM matches the size of the DIMM it is replacing.

You must not replace a dual-rank DIMM with a quad-rank DIMM and vice versa. If you violate this rule, the performance of the server might be adversely affected. For DIMM socket population rules, see "DIMM Population Rules" on page 96.

3. Install a DIMM.

a. Ensure that the ejector tabs are in the open position.

b. Align the notch in the replacement DIMM with the connector key in the connector socket.

The notch ensures that the DIMM is oriented correctly.

c. Push the DDR4 DIMM into the connector until the ejector tabs lock the DIMM in place.

If the DIMM does not easily seat into the connector socket, verify that the notch in the DIMM is aligned with the connector key in the connector socket. If the notch is not aligned, damage to the DIMM might occur.

Note - If you want to move a faulty DDR4 DIMM to a new DIMM socket or re-seat a DIMM for troubleshooting, you must first manually clear the associated DIMM fault. Otherwise, the DIMM fault might follow the DIMM to the new socket location or reoccur on the current socket location, possibly causing a false DIMM fault condition.

4. **Repeat Step 3 until all replacement DDR4 DIMMs are installed.**

5. **Return the server to operation.**

   a. **Install the server top cover.**

      See "Install the Server Top Cover" on page 198.

   b. **Close the fan door.**

   c. **Return the server to the normal rack position.**

      See "Return the Server to the Normal Rack Position" on page 201.

   d. **Reconnect the power cords to the server power supplies and reconnect the data cables.**

      See "Reconnect Data Cables and Power Cords" on page 203.

   e. **Power on the server.**

      See "Power On the Server" on page 205.

      Verify that the Power/OK status indicator is steady on.

6. **(Optional) Use Oracle ILOM to clear server DDR4 DIMM faults.**

   DDR4 DIMM faults are automatically cleared after a new DIMM has been installed. If you need to manually clear DDR4 DIMM faults, refer to the Oracle Integrated Lights Out Manager (ILOM) 5.0 Documentation Library at `https://www.oracle.com/goto/ilom/docs`.

   Note - If you want to move a faulty DDR4 DIMM to a new DIMM socket or re-seat a DIMM for troubleshooting, you must first manually clear the associated DIMM fault. Otherwise, the DIMM fault might follow the DIMM to the new socket location or reoccur on the current socket location, causing a false DIMM fault condition.

Related Information

- "DIMM and Processor Physical Layout" on page 94
- "DIMM Population Scenarios" on page 95
- "DIMM Population Rules" on page 96
- "Populating DIMMs for Optimal System Performance" on page 96
- "DIMM Rank Classification Labels" on page 100
- "Identify and Remove the Failed DIMM" on page 102

Servicing PCIe Risers (CRU)

PCIe cards in all slots are installed on vertical risers. You must remove the relevant riser to remove and replace a PCIe card. You must remove all three PCIe risers when replacing the motherboard.

Caution - These procedures require that you handle components that are sensitive to electrostatic discharge. This sensitivity can cause the components to fail. To avoid damage, ensure that you follow antistatic practices as described in "Take Antistatic Measures" on page 65.

Caution - Ensure that all power is removed from the server before removing or installing PCIe risers, or damage to the PCIe cards installed in the risers might occur. You must disconnect all power cables from the system before performing these procedures.

The following sections provide information to assist you in servicing PCIe risers:

- "PCIe Riser Location and Differences" on page 107
- "Remove a PCIe Riser From PCIe Slot 1 or 2" on page 108
- "Install a PCIe Riser Into PCIe Slot 1 or 2" on page 110
- "Remove the PCIe Riser From PCIe Slots 3 and 4" on page 112
- "Install the PCIe Riser Into PCIe Slots 3 and 4" on page 115

Related Information

- "Servicing PCIe Cards (CRU)" on page 118

PCIe Riser Location and Differences

The PCIe riser that installs in PCIe slots 3 and 4 is different than the risers in PCIe slots 1 and 2. The riser for slots 3 and 4 supports two cards: a standard PCIe card and the internal HBA card. Do not attempt to install the PCIe riser for PCIe slots 3 and 4 in slots 1 or 2, and vice versa.
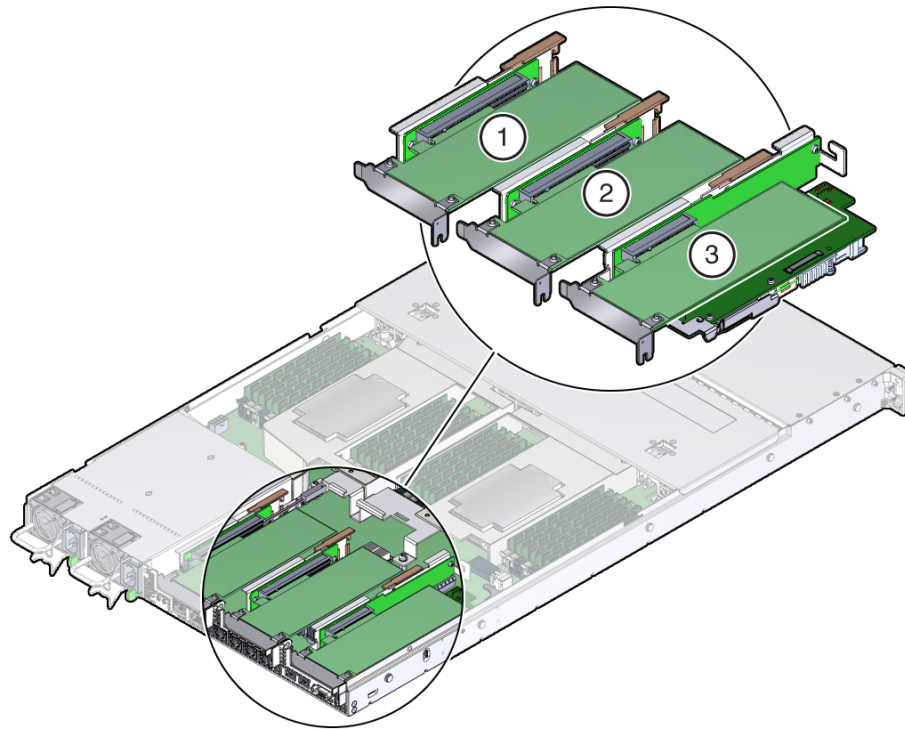
Callout	Description
1	PCIe riser and installed PCIe card or the optional Oracle PCIe NVMe switch card in slot 1 (This slot is nonfunctional in single-processor systems.)
2	PCIe riser and installed PCIe card in slot 2
3	PCIe riser and installed cards (2) in slots 3 and 4

Callout	Description
	(the internal HBA card is installed slot 4 of this riser.) **Note:** This riser is different from the risers in slots 1 and 2.

Related Information

- "PCIe Slot Characteristics" on page 119

▼ Remove a PCIe Riser From PCIe Slot 1 or 2

Note - Either a standard PCIe card (CRU) or the optional PCIe NVMe switch card can be installed in the PCIe riser for slot 1. The PCIe NVMe switch card is a field replaceable unit (FRU) and, therefore, must be removed and replaced only by authorized Oracle Services personnel. For instructions for servicing the PCIe NVMe switch card, see "Servicing the Oracle PCIe NVMe Switch Card (FRU)" on page 143.

Note - PCIe slot 1 is nonfunctional in single-processor systems.

1. **Prepare the server for service.**

   a. **Power off the server and disconnect the power cords from the power supplies.**

      See "Powering Down the Server" on page 57.

   b. **Extend the server to the maintenance position.**

      See "Extend the Server to the Maintenance Position" on page 63.

   c. **Attach an antistatic wrist strap to your wrist and then to a metal area on the chassis.**

      See "Take Antistatic Measures" on page 65.

   d. **Remove the server top cover.**

      See "Remove the Server Top Cover" on page 67.

2. **Select the PCIe riser that you want to remove.**

See .

3. **If a PCIe card is installed in the riser, disconnect any external cables from the card.**

4. **Lift the green-tabbed latch on the rear of the server chassis next to the applicable PCIe slot to release the rear bracket on the PCIe card [1].**
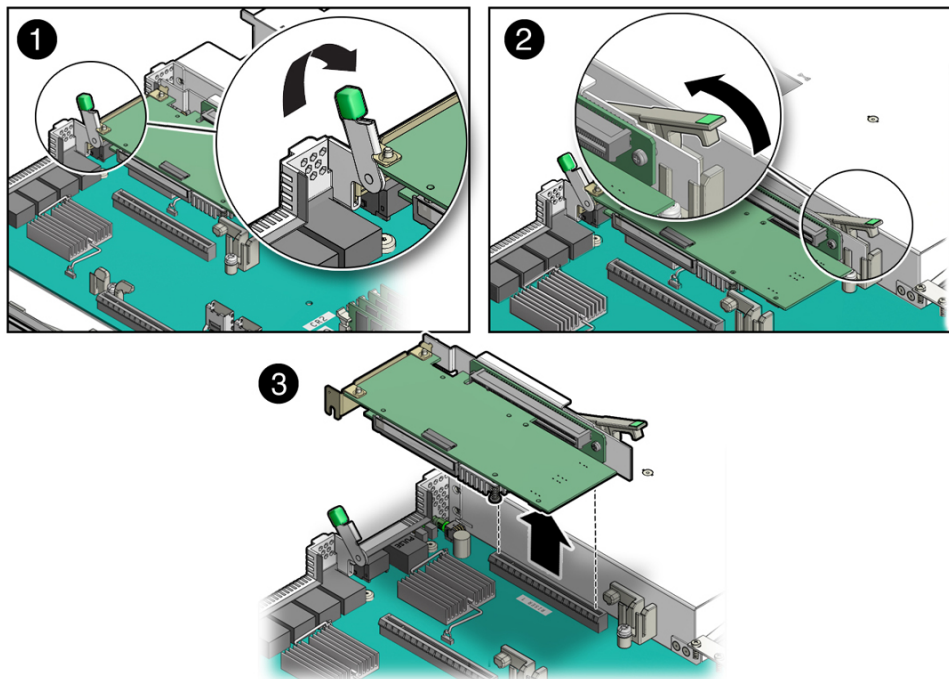
Note - If the riser does not have a PCIe card installed, then lift the latch to release the PCIe slot filler panel.

5. **Lift the green-tabbed riser release lever on the PCIe riser with one hand and use your other hand to remove the riser from the motherboard connector [2, 3].**

6. **If there is a PCIe card installed in the riser, place the riser on an antistatic mat and note the slot in which the PCIe riser was originally installed; otherwise, set the PCIe riser aside.**

Related Information

- "Install a PCIe Riser Into PCIe Slot 1 or 2" on page 110

▼ Install a PCIe Riser Into PCIe Slot 1 or 2

Note - PCIe slot 1 is nonfunctional in single-processor systems.

Note - The PCIe riser in slots 3 and 4 is different than the PCIe risers in slots 1 and 2. Do not attempt to install a PCIe riser from slot 1 or 2 into PCIe slots 3 and 4 and vice versa.

1. **Determine into which slot you will install the PCIe riser.**

2. **Retrieve the PCIe riser and any PCIe cards attached to it.**

3. **Raise the green-tabbed release lever on the PCIe riser to the open (up) position [1].**

4. **Gently press the riser into the motherboard connector until it is seated, and then press the green-tabbed release lever on the PCIe riser to the closed (down) position [2].**
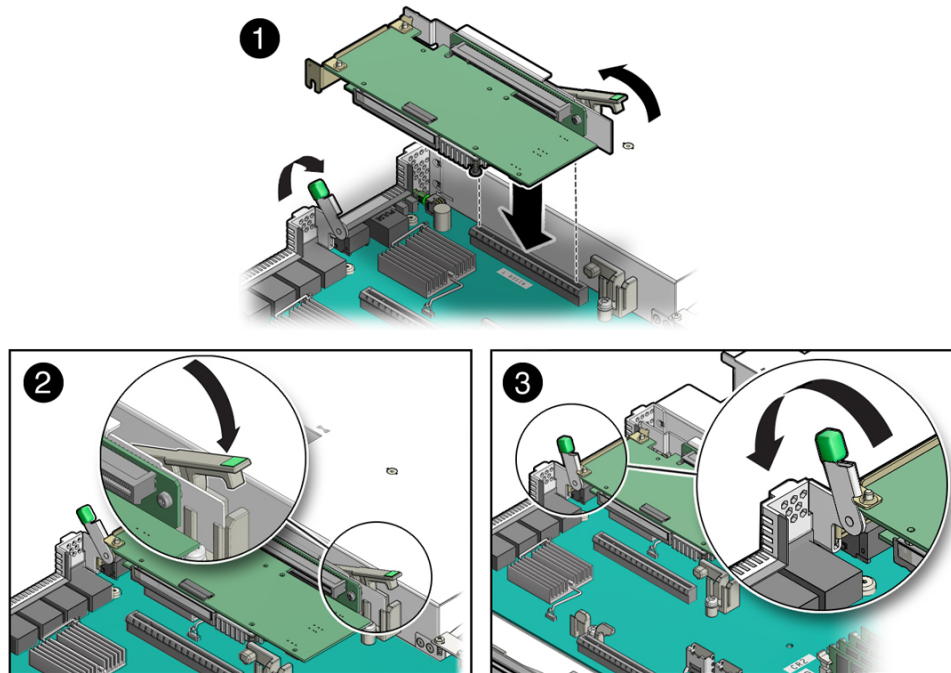
5. **Close the green-tabbed latch on the rear of the server chassis next to the applicable PCIe slot to secure the rear bracket on the PCIe card to the server chassis [3].**

   Note - If the riser does not have a PCIe card installed, install a PCIe slot filler panel and close the green-tabbed latch to secure the filler panel.

6. **If there were any external cables connected to the PCIe card, reconnect them.**

7. **Return the server to operation.**

   a. **Install the server top cover.**

      See "Install the Server Top Cover" on page 198.

  b. Return the server to the normal rack position.

   See "Return the Server to the Normal Rack Position" on page 201.

  c. Reconnect the power cords to the server power supplies and reconnect the data cables.

   See "Reconnect Data Cables and Power Cords" on page 203.

  d. Power on the server.

   See "Power On the Server" on page 205.

   Verify that the Power/OK status indicator is steady on.

8. Use Oracle ILOM to clear the server PCIe riser fault.

If the PCIe riser fault message in Oracle ILOM is not cleared under Open Problems, you must manually clear the fault in Oracle ILOM. For instructions for manually clearing a PCIe riser fault, see the procedure "Clear Faults for Undetected Replaced or Repaired Hardware Components" in the *Oracle ILOM User's Guide for System Monitoring and Diagnostics Firmware Release 5.0.x* in the Oracle Integrated Lights Out Manager (ILOM) 5.0 Documentation Library at `https://www.oracle.com/goto/ilom/docs`.

Related Information

- "Remove a PCIe Riser From PCIe Slot 1 or 2" on page 108

▼ Remove the PCIe Riser From PCIe Slots 3 and 4

Note - This PCIe riser is actually installed in PCIe slot 3, but it supports up to two PCIe cards. The upper slot, referred to as slot 3, can be used for any supported PCIe card, and, therefore, is optionally populated. The lower slot, referred to as slot 4, is dedicated to the internal HBA card, and, therefore is always populated. The internal HBA card is a field replaceable unit (FRU). For instructions for servicing the internal HBA card, see "Servicing the Internal HBA Card (FRU)" on page 147.

---

1. Prepare the server for service.

  a. Power off the server and disconnect the power cords from the power supplies.

   See "Powering Down the Server" on page 57

    b. Extend the server to the maintenance position.

    See "Extend the Server to the Maintenance Position" on page 63.

    c. Attach an antistatic wrist strap to your wrist and then to a metal area on the chassis.

    See "Take Antistatic Measures" on page 65.

    d. Remove the server top cover.

    See "Remove the Server Top Cover" on page 67.

2. If there is a PCIe card installed in the riser, disconnect any external or internal cables.

Note - Do not disconnect the SAS cable from the internal host bus adapter card until after you have removed the riser from the server.

3. Open the green-tabbed latch located on the rear of the server chassis next to PCIe slot 3 to release the rear bracket on the PCIe card [1].
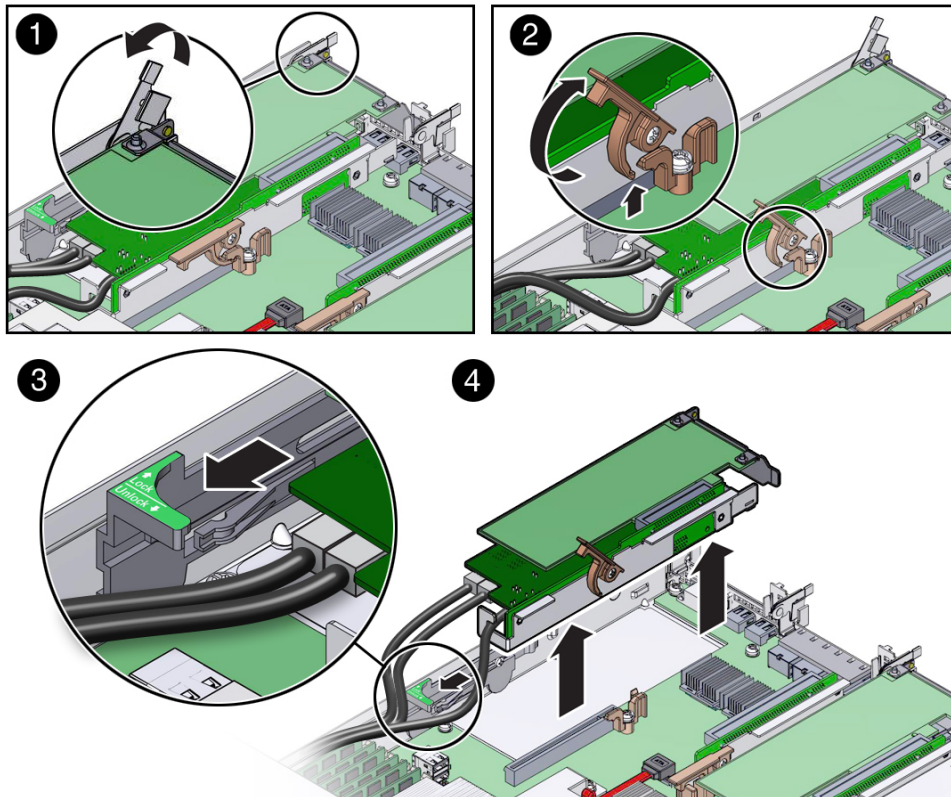
Note - If the riser does not have a PCIe card installed in slot 3, then lift the latch to release the PCIe slot 3 filler panel.

4. To release the riser from the motherboard connector, lift the green-tabbed release lever on the PCIe riser to the open position [2].

5. Slide the plastic PCIe card retainer, which is mounted on the side of the chassis, toward the front of the server to release the card(s) installed in the riser [3].

6. Grasp the riser with both hands and remove it from the server [4].

7. **Disconnect the SAS storage drive (HDD) cables from the internal HBA card installed in PCIe slot 4.**

8. **Disconnect the super capacitor cable from the internal HBA card in slot 4.**

9. **Place the riser on an antistatic mat.**

   Related Information

   -

▼ Install the PCIe Riser Into PCIe Slots 3 and 4

Note - The PCIe riser in slots 3 and 4 is different than the PCIe risers in slots 1 and 2. Do not attempt to install a PCIe riser from slot 1 or 2 into PCIe slots 3 and 4 and vice versa.

1. **Retrieve the PCIe riser and any PCIe cards attached to it.**

2. **Reconnect the SAS cables to the internal host bus adapter card.**

Be sure to connect the SAS cable for storage drives 0 through 3 (HDDs 0-3) to the connector that is farthest from the riser in which the HBA card is installed; otherwise, the server will incorrectly identify the storage drives when it is powered on.
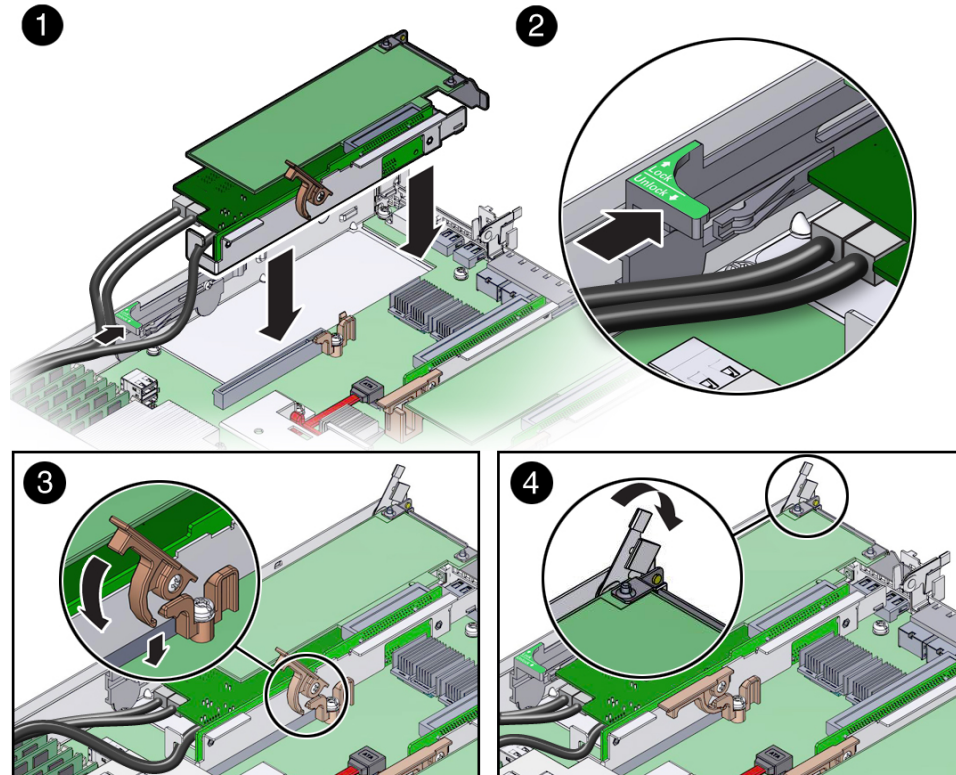
3. **Reconnect the super capacitor cable to the internal HBA card in slot 4.**

4. **Raise the green-tabbed release lever on the PCIe riser to the open (up) position, and then gently press the riser into the motherboard connector until it is seated [1].**

5. **Ensure that the rear bracket on the internal HBA card in PCIe slot 4 is connected to the slot in the server chassis side wall.**

   If the bracket is not connected, remove the riser and reposition it so that the rear bracket connects to the side wall, and then gently press the riser into the motherboard connector.

6. **Slide the plastic PCIe card retainer, which is mounted on the side of the chassis, toward the back of the server to secure the card(s) installed in the riser [2].**

7. **Press the green-tabbed release lever on the PCIe riser to the closed (down) position [3].**

8. **To secure the rear bracket on the PCIe card to the server, close the green-tabbed latch on the rear of the server chassis [4].**

   Note - If the riser does not have a PCIe card installed in slot 3, install a PCIe slot filler panel and close the green-tabbed latch to secure the PCIe slot filler panel.

9. **If there is a PCIe card installed in slot 3 of the riser, reconnect any external or internal cables to the card.**

10. **Return the server to operation.**

    a. **Install the server top cover.**
       See "Install the Server Top Cover" on page 198.

    b. **Return the server to the normal rack position.**
       See "Return the Server to the Normal Rack Position" on page 201.

    c. **Reconnect the power cord to the server power supply and the data cables.**
       See "Reconnect Data Cables and Power Cords" on page 203.

    d. **Power on the server.**
       See "Power On the Server" on page 205.
       Verify that the Power/OK status indicator is steady on.

11. **Use Oracle ILOM to clear the server PCIe riser fault.**
    If the PCIe riser fault message in Oracle ILOM is not cleared under Open Problems, you must manually clear the fault in Oracle ILOM. For instructions for manually clearing a PCIe riser fault, see the procedure "Clear Faults for Undetected Replaced or Repaired Hardware Components" in the *Oracle ILOM User's Guide for System Monitoring and Diagnostics Firmware Release 5.0.x* in the Oracle Integrated Lights Out Manager (ILOM) 5.0 Documentation Library at `https://www.oracle.com/goto/ilom/docs`.

    Related Information

    - "Remove the PCIe Riser From PCIe Slots 3 and 4" on page 112

Servicing PCIe Cards (CRU)

These sections describe how to service PCIe cards. Refer to your PCIe card documentation for complete software and cabling information about your card.

Caution - The procedures in this section should not be used to service the internal HBA card (Oracle Storage 12 Gb/s SAS PCIe RAID HBA card) that is located in PCIe slot 4 or the optional Oracle PCIe NVMe switch card that is located in PCIe slot 1. The internal HBA card and the Oracle PCIe NVMe switch card are Field Replaceable Units (FRUs) and should not be serviced by customers. These cards should be serviced only by qualified Oracle Services personnel.

Caution - These procedures require that you handle components that are sensitive to electrostatic discharge. This sensitivity can cause the components to fail. To avoid damage, ensure that you follow antistatic practices as described in "Take Antistatic Measures" on page 65.

Caution - Ensure that all power is removed from the server before removing or installing PCIe cards. You must disconnect all power cables from the system before performing these procedures.

Note - For a complete list of supported PCIe cards, refer to the *Oracle Server X6-2 Product Notes* at `https://www.oracle.com/goto/x6-2/docs`.

This section the following topics and procedures:

- "PCIe Slot Characteristics" on page 119
- "Remove a PCIe Card From PCIe Slot 1 or 2" on page 119
- "Install a PCIe Card in PCIe Slot 1 or 2" on page 120
- "Remove a PCIe Card From PCIe Slot 3" on page 121
- "Install a PCIe Card in PCIe Slot 3" on page 122

Related Information

- "Servicing PCIe Risers (CRU)" on page 106

PCIe Slot Characteristics

There are three external and one internal PCIe slots available in the Oracle Server X6-2. The external slots support optional, standard PCIe cards and are numbered 1, 2, and 3 from left to right when you view the server from the rear. The internal slot, which installs on the riser in PCIe slots 3 and 4, supports a required internal SAS controller HBA card. For a view of the rear panel that shows PCIe slot numbering, see "Server Back Panel View" on page 18.

Note - PCIe slot 1 is nonfunctional in single-processor systems.

Note - All of the PCIe slots comply with the PCI Express 3.0 specification and can accommodate 25 watt PCIe cards.

The following table lists the characteristics and requirements of the PCIe slots.

Slot Number	Supported PCIe Card Types	Supported PCIe Specifications	Slot Connector Width/PCI Express Lanes
1	Low-profile cards only	PCIe 1.0, PCIe 2.0, PCIe 3.0	x16 mechanical/x16 electrical
2	Low-profile cards only	PCIe 1.0, PCIe 2.0, PCIe 3.0	x16 mechanical/x16 electrical
3 and 4	Low-profile cards only	PCIe 1.0, PCIe 2.0, PCIe 3.0	x8 mechanical/x8 electrical

Related Information

- "Server Back Panel View" on page 18

▼ Remove a PCIe Card From PCIe Slot 1 or 2

Note - Either a standard PCIe card (CRU) or the optional PCIe NVMe switch card can be installed in the PCIe riser for slot 1. The PCIe NVMe switch card is a field replaceable unit (FRU) and, therefore, must be removed and replaced only by authorized Oracle Services personnel. For instructions for servicing the PCIe NVMe switch card, see "Servicing the Oracle PCIe NVMe Switch Card (FRU)" on page 143.

Note - PCIe slot 1 is nonfunctional in single-processor systems.

1. **Remove the PCIe riser from the server.**

   For instructions, see "Remove a PCIe Riser From PCIe Slot 1 or 2" on page 108.

2.   Remove the PCIe card from the PCIe riser.

    a. Hold the riser in one hand and use your other hand to carefully pull the PCIe card connector out of the riser.

    b. Disconnect the rear bracket that is attached to the PCIe card from the rear of the PCIe riser.
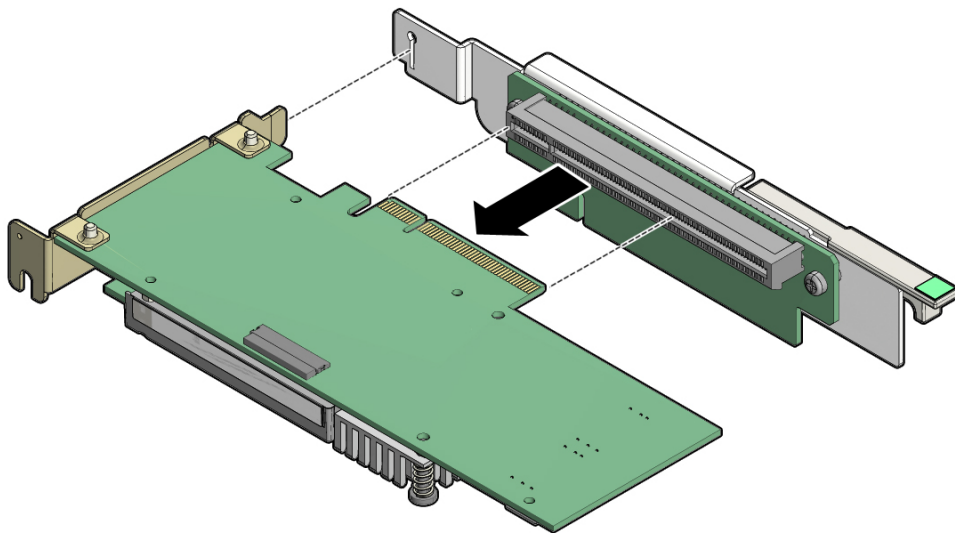
3.   Place the PCIe card on an antistatic mat.

Caution - Whenever you remove a PCIe card, you should replace it with another PCIe card or a PCIe filler panel. Installing PCIe filler panels in vacant PCIe slots helps reduce the level of electromagnetic interference (EMI) emitted by the server. For instructions for installing a PCIe filler panel, see "Removing and Installing Server Filler Panels " on page 197.

▼ Install a PCIe Card in PCIe Slot 1 or 2

Note - PCIe slot 1 is nonfunctional in single-processor systems.

1. **Retrieve the PCIe card and riser you want to install.**

2. **Insert the rear bracket that is attached to the PCIe card into the PCIe riser.**

3. **Hold the riser in one hand and use your other hand to carefully insert the PCIe card connector into the Riser.**
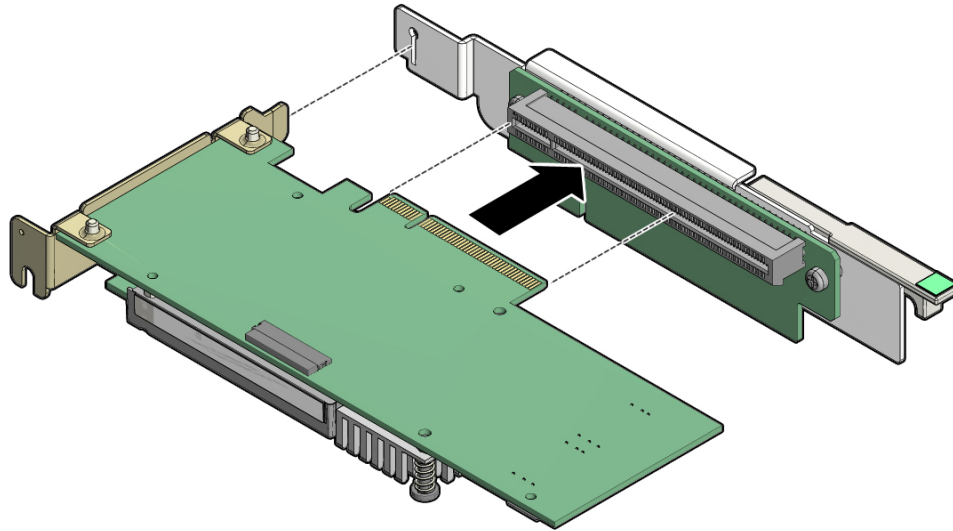
4. **Install the PCIe riser into the server.**

    For instructions, see "Install a PCIe Riser Into PCIe Slot 1 or 2" on page 110.

▼ Remove a PCIe Card From PCIe Slot 3

1. **Remove the PCIe riser from the server.**

    For instructions, see "Remove the PCIe Riser From PCIe Slots 3 and 4" on page 112.

2. **Remove the PCIe card from the riser.**

    a. **Hold the riser in one hand and use your other hand to carefully remove the PCIe card connector from the riser.**

b. Disconnect the rear bracket attached to the PCIe card from the rear of the PCIe riser.
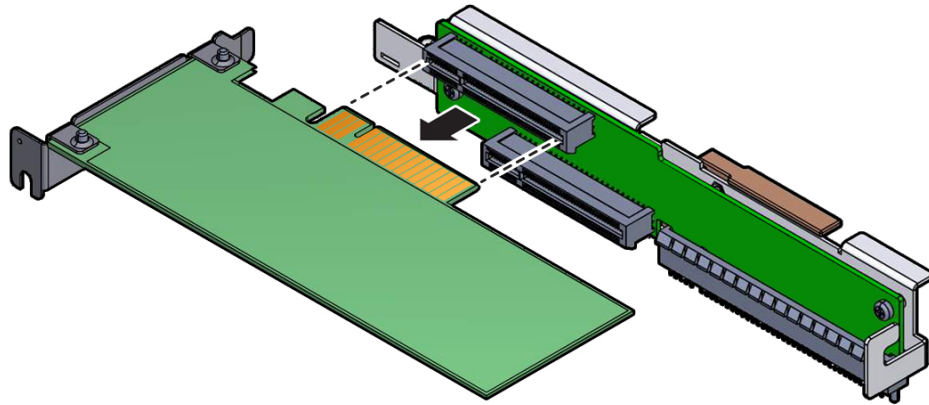
3. Place the PCIe card on an antistatic mat.

⚠️ **Caution -** Whenever you remove a PCIe card, you should replace it with another PCIe card or a PCIe filler panel. Installing PCIe filler panels in vacant PCIe slots helps reduce the level of electromagnetic interference (EMI) emitted by the server. For instructions for installing PCIe filler panels, see "Removing and Installing Server Filler Panels" on page 197.

▼ Install a PCIe Card in PCIe Slot 3

1. Retrieve the PCIe card and riser you want to install.

2. Insert the rear bracket that is attached to the PCIe card into the PCIe riser.

3. Hold the riser in one hand and use your other hand to carefully insert the PCIe card connector into the riser.
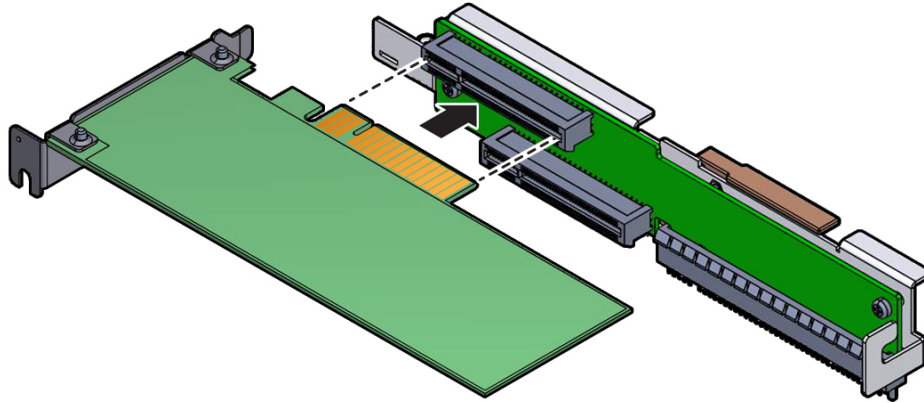
4. Install the PCIe riser.

For instructions, see "Install the PCIe Riser Into PCIe Slots 3 and 4" on page 115.

Servicing the Internal USB Flash Drives (CRU)

Caution - These procedures require that you handle components that are sensitive to static discharge. This sensitivity can cause the component to fail. To avoid damage, ensure that you follow antistatic practices as described in "Take Antistatic Measures" on page 65.

Caution - Ensure that all power is removed from the server before removing or installing a flash drive or damage to the drive might occur. You must disconnect all power cables from the system before performing these procedures.

This section covers the following procedures:

- "Remove an Internal USB Flash Drive" on page 124
- "Install an Internal USB Flash Drive" on page 125

Related Information

- "Extend the Server to the Maintenance Position" on page 63
- "Remove the Server Top Cover" on page 67

▼ Remove an Internal USB Flash Drive

The server can be equipped with up to two internal USB flash drives.

1. **Prepare the server for service.**

    a. **Power off the server and disconnect the power cords from the power supplies.**

      See "Powering Down the Server" on page 57

    b. **Extend the server to the maintenance position.**

      See "Extend the Server to the Maintenance Position" on page 63.

    c. **Attach an antistatic wrist strap to your wrist and then to a metal area on the chassis.**

      See "Take Antistatic Measures" on page 65.

    d. **Remove the server top cover.**

      See "Remove the Server Top Cover" on page 67.

2.   Grasp the USB flash drive and pull it out of the internal USB port .
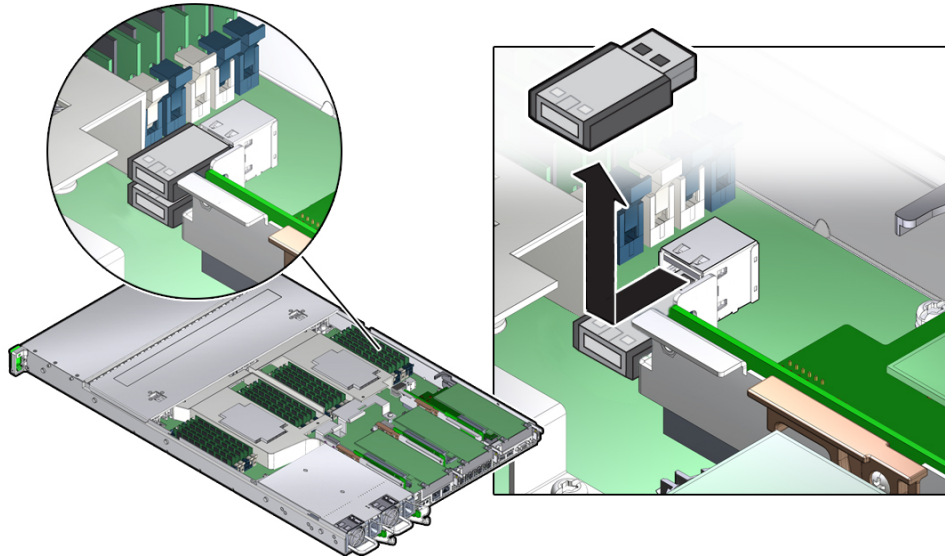
▼ Install an Internal USB Flash Drive

1.   Unpack the replacement USB flash drive.

2.   Insert the USB flash drive into the internal USB port.

3.   Return the server to operation.

    a.   Install the server top cover.

    See "Install the Server Top Cover" on page 198.

    b.   Close the fan door.

    c.   Return the server to the normal rack position.

    See "Return the Server to the Normal Rack Position" on page 201.

    d. Reconnect the power cords to the server power supplies and reconnect the data cables.

    See .

    e. Power on the server.

    See .

    Verify that the Power/OK status indicator is steady on.

Servicing the Battery (CRU)

The battery maintains system time when the server is powered off and a time server is unavailable. If the server fails to maintain the proper time when the server is powered off and not connected to a network, replace the battery.

Caution - Ensure that all power is removed from the server before removing or installing the battery. You must disconnect the power cables from the system before performing these procedures.

This section covers the following procedures:

-
-

Related Information

-
-

▼ Remove the Battery

1. Prepare the server for service.

    a. Power off the server and disconnect the power cords from the power supplies.

    See .

   b. **Extend the server to the maintenance position.**

   See "Extend the Server to the Maintenance Position" on page 63.

   c. **Attach an antistatic wrist strap to your wrist and then to a metal area on the chassis.**

   See "Take Antistatic Measures" on page 65.

   d. **Remove the server top cover.**

   See "Remove the Server Top Cover" on page 67.

2. **If there is a PCIe card installed in the PCIe riser slot 2, remove the riser and card to gain access to the battery.**

   See "Remove a PCIe Riser From PCIe Slot 1 or 2" on page 108

3. **To dislodge the battery from the retainer, place your finger under the side of the battery nearest the rear of the server [1] and gently lift the battery up and out of the retainer [2].**
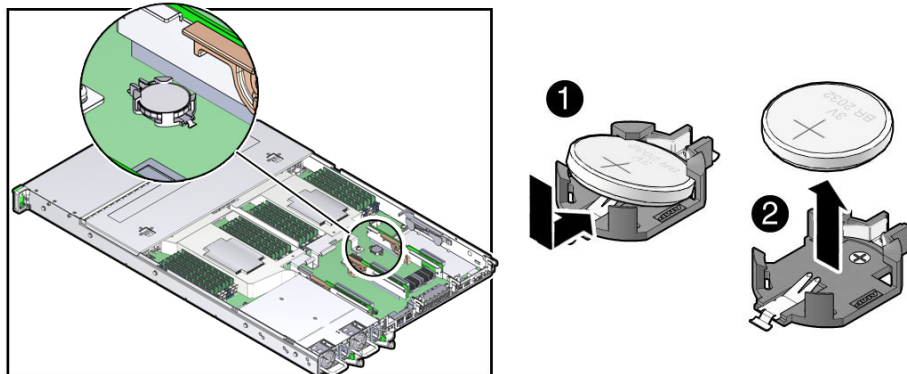
▼ Install the Battery

1. **Unpack the replacement battery.**

2. **Press the new battery into the battery retainer with the positive side (+) facing up.**

3.   If there was a PCIe card installed in the PCIe riser slot 2, reinstall it.

See

4.   Return the server to operation.

a.   Install the server top cover.

See .

b.   Close the fan door.

c.   Return the server to the normal rack position.

See .

d.   Reconnect the power cords to the server power supplies and reconnect the data cables.

See .

e.   Power on the server.

See .

Verify that the Power/OK status indicator is steady on.

Note - If the service processor is configured to synchronize with a network time server using the Network Time Protocol (NTP), the Oracle ILOM clock will be reset as soon as the server is powered on and connected to the network; otherwise, proceed to the next step.

---

5.   If the service processor is not configured to use NTP, do one of the following:

- Reset the Oracle ILOM clock using the Oracle ILOM CLI or the web interface.

  For instructions, refer to the Oracle Integrated Lights Out Manager (ILOM) 5.0 Documentation Library at `https://www.oracle.com/goto/ilom/docs`.

- Use the BIOS Setup Utility to reprogram the host clock.

  For the BIOS Main menu screen that supports this procedure, refer to the *Oracle X6 Series Servers Administration Guide* at `https://www.oracle.com/goto/x86admindiag/docs`.

Servicing FRUs

The following sections describe how to service field-replaceable units (FRUs). For more information about FRUs, see "Illustrated Parts Breakdown" on page 20 and "Field-Replaceable Units" on page 23.

You must power down the system and disconnect the AC power cords from the server before servicing any of these components.

Note - Only authorized Oracle Services personnel should service FRUs.

Description	Link
Service the processors.	"Servicing Processors (FRU)" on page 130
Service the Oracle PCIe NVMe switch card.	"Servicing the Oracle PCIe NVMe Switch Card (FRU)" on page 143
Service the internal host bus adapter (HBA)	"Servicing the Internal HBA Card (FRU)" on page 147
Service the disk backplane.	"Servicing the Disk Backplane (FRU)" on page 156
Service the DVD drive.	"Servicing the DVD Drive (FRU)" on page 163
Service the front indicator module.	"Servicing the Front Indicator Module (FRU)" on page 166
Service the motherboard.	"Servicing the Motherboard (FRU)" on page 170
Service the internal HBA cable assembly.	"Servicing the Internal HBA SAS Cable assembly" on page 183
Service the Oracle PCIe NVMe switch card cables.	"Servicing the NVMe Cables" on page 187
Service the power, FIM, disk backplane data, and DVD cables.	"Servicing the Power, FIM, Disk Backplane Data, and DVD Cables" on page 191

Related Information

- "Servicing CRUs That Do Not Require Server Power-Off" on page 69
- "Servicing CRUs That Require Server Power-Off" on page 93

Servicing Processors (FRU)

Caution - Processors should be removed and replaced only by authorized Oracle Service personnel.

Caution - Ensure that all power is removed from the server before removing or installing a processor. You must disconnect the power cables from the server before performing these procedures.

Caution - These procedures require that you handle components that are sensitive to electrostatic discharge. This sensitivity can cause the components to fail. To avoid damage, ensure that you follow antistatic practices as described in "Electrostatic Discharge Safety" on page 54.

Caution - The green processor removal and replacement tool (part number G29477-002 or later) must be used to remove and replace a processor; otherwise, the processor or the processor socket might be damaged. Additionally, do not use a tool that is designed for earlier generations of Intel processors (CPUs). If you use an earlier generation tool, the processor will only be partially held by the tool and it could fall from the tool, which could damage the processor socket.

Note - On single-processor systems, neither a heatsink nor a processor filler cover are installed in the processor socket 1 (P1). To protect the delicate processor socket pins, the cover that comes on the motherboard from manufacturing is left in place.

These procedure are provided in this section:

- "Remove a Processor" on page 131
- "Install a Processor" on page 137

Related Information

- "Disconnect Cables From the Server" on page 62
- "Take Antistatic Measures" on page 65
- "Remove the Server From the Rack" on page 65
- "Remove the Server Top Cover" on page 67

▼ Remove a Processor

⚠ **Caution -** Processor removal and replacement must be done using the green removal and replacement tool (part number G29477-002 or later) that is included with the replacement processor for the server. Using a different tool might result in damage to the processor and processor socket. Additionally, the removal and replacement tool ships with replacement motherboards.

⚠ **Caution -** Be careful not to touch the processor socket pins. The processor socket pins are very fragile. A light touch can bend the processor socket pins beyond repair. Always use the processor removal and replacement tool to remove and replace the processor.

1. **Prepare the server for service.**

   a. **Power off the server and disconnect the power cords from the power supplies.**

      See "Powering Down the Server" on page 57.

   b. **Extend the server to the maintenance position.**

      See "Extend the Server to the Maintenance Position" on page 63.

   c. **Attach an antistatic wrist strap to your wrist, and then to a metal area on the chassis.**

      See "Take Antistatic Measures" on page 65.

   d. **Remove the server top cover.**

      "Remove the Server Top Cover" on page 67.

2. **If the server has a DVD drive, disconnect the DVD cable from the disk backplane, carefully pull it through the chassis mid-wall, and move it to the side away from of the air baffle.**

   For instructions for disconnecting the DVD cable from the disk backplane, see "Servicing the Power, FIM, Disk Backplane Data, and DVD Cables" on page 191.

3. **If the server has an Oracle PCIe NVMe switch card installed, disconnect the switch card cables from the disk backplane, carefully pull them through the chassis mid-wall, and move them to side away from the air baffle.**

   For instructions for disconnecting the switch card cables from the disk backplane, see "Servicing the NVMe Cables" on page 187.

4. **Lift the air baffle up and out of the server and put it aside.**

5. **Identify the location of the failed processor by pressing the Fault Remind button on the motherboard.**

   Note - When the Fault Remind button is pressed, a LED located next to the Fault Remind button lights green to indicate that there is sufficient voltage present in the fault remind circuit to light any fault LEDs that were lit due to a failure. If this LED fails to light when you press the Fault Remind button, it is likely that the capacitor powering the fault remind circuit has lost its charge. This can happen if the Fault Remind button is pressed for a long time with fault LEDs lit or if power has been removed from the server for more than 15 minutes.

   The processor fault LEDs are located next to the processor(s).

   - If the processor fault LED is off, then the processor is operating properly.
   - If the processor fault LED is on (amber), then the processor is failed and should be replaced.
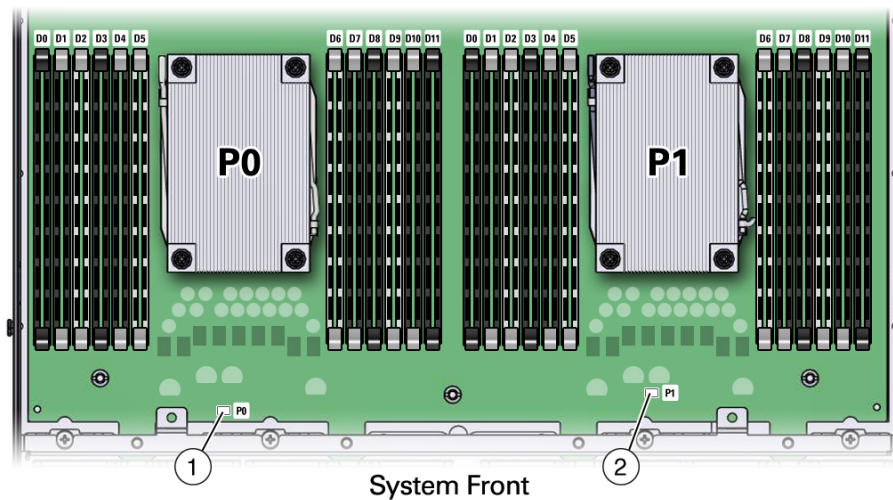
Callout	Description
1	Processor 0 (P0) fault LED
2	Processor 1 (P1) fault LED

6. **Gently press down on the top of the heatsink to counteract the pressure of the captive spring-loaded screws that secure the heatsink to the motherboard and**

loosen the four Phillips captive screws in the heatsink for the failed processor [1].
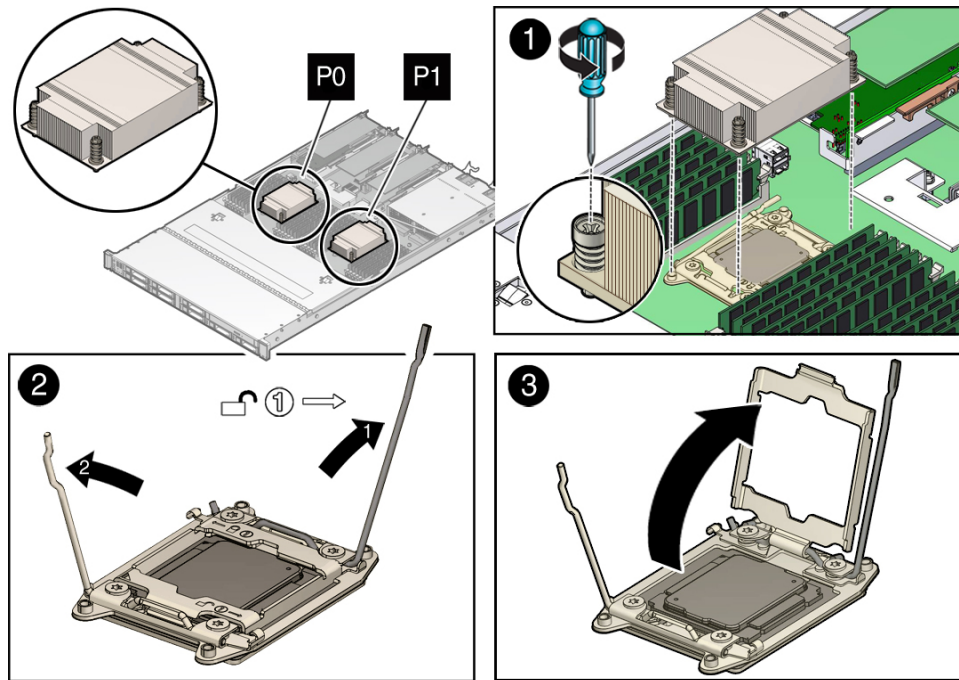
Using a No. 2 Phillips screwdriver, turn the screws counterclockwise alternately one and one half turns until they are fully removed.

7. **To separate the heatsink from the top of the processor, gently twist the heatsink left and right, while pulling upward, and then lift off the heatsink and place it upside down on a flat surface [1].**

A thin layer of thermal grease separates the heatsink and the processor. This grease acts as an adhesive.

Note - Do not allow the thermal grease to contaminate the work space or other components.

8. **Use an alcohol pad to clean the thermal grease from the underside of the heatsink.**

Be very careful not to get the thermal grease on your fingers.

> ⚠️ **Caution -** Failure to clean the heatsink prior to removing the processor could result in the accidental contamination of the processor socket or other components. Also, be careful not to get the grease on your fingers as this could result in contamination of components.

9. **Disengage the processor release lever on the right side of the processor socket (viewing the server from the front) by pushing down on the lever and moving it to the side away from the processor, and then rotating the lever upward [2].**

10. **Disengage the processor release lever on the left side of the processor socket (viewing the server from the front) by pushing down on the lever and moving it to the side away from the processor, and then rotating the lever upward [2].**

11. **To lift the ILM assembly load plate off of the processor socket, rotate the processor release lever on the right side of the processor toward the closed position (the ILM assembly load plate is lifted up as the release lever is lowered toward the closed position) and carefully swing the ILM load plate to the fully open position [3].**

> ⚠️ **Caution -** Whenever you remove a processor, you should replace it with another processor and reinstall the processor heatsink; otherwise, the server might overheat due to improper airflow. For instructions for installing a processor, see .

12. **To remove the processor from the processor socket, acquire the processor removal and replacement tool and perform the following steps:**

    a. **Locate the button in the center of the top of the processor removal and replacement tool and press it to the down position [1].**

    b. **Properly position the tool over the processor socket and lower it into place over the processor socket [2].**

       To properly position the tool over the processor socket, rotate the tool until the green triangle on the side of the tool is facing the front of the server and it is over the left side of the processor socket when viewing the server from the front.

    c. **Press the release lever on the tool to release the center button and engage the processor [3].**

       An audible click indicates that the processor is engaged.

    d. **Grasp the tool by the sides and remove it from the server [4].**

e. **Turn the tool upside down and verify that it contains the processor [5].**

f. **While holding the processor tool up side down, press the center button on the tool to release the processor [5].**

g. **Carefully grasp the processor by the front and back edges, lift it out of the tool and place it with the circuit side down (the installed orientation) into an antistatic container [6].**

h. Carefully clean the thermal grease off the top of the processor.
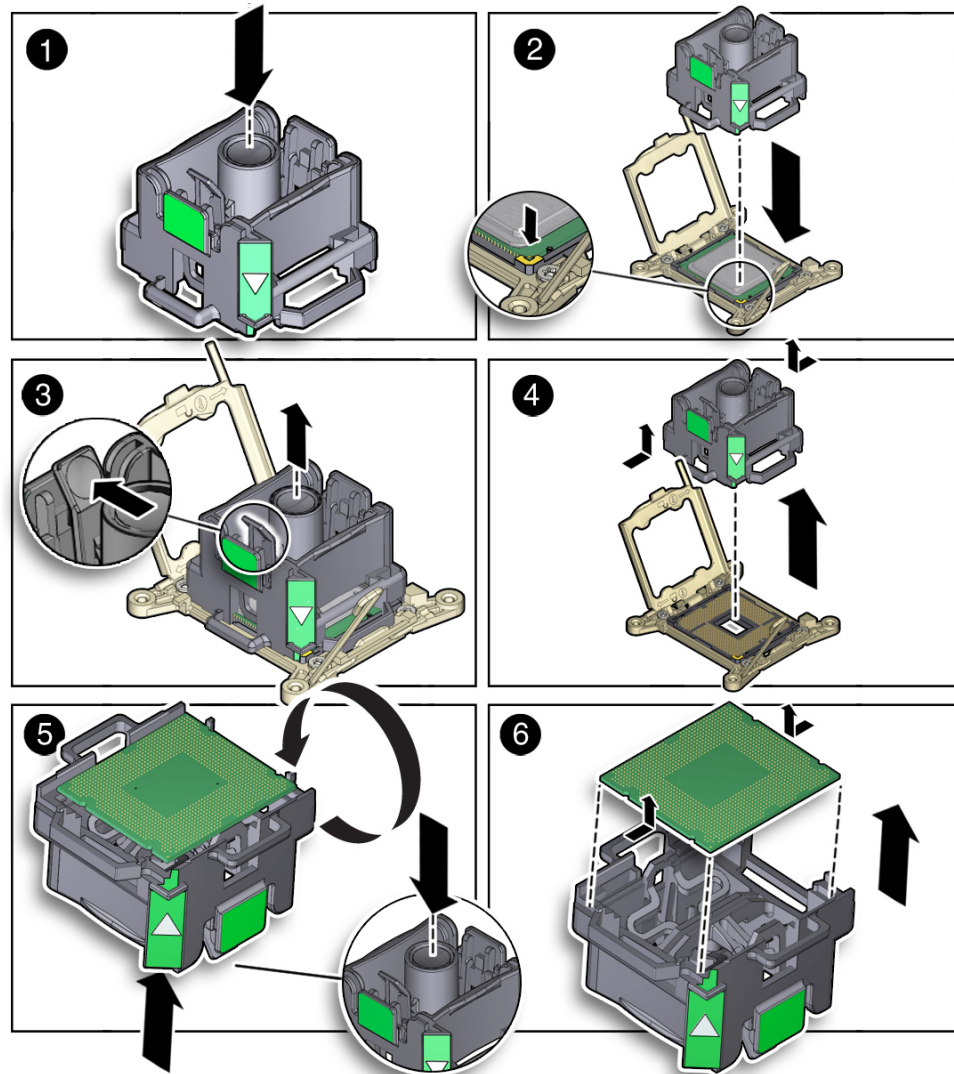
Related Information

-

▼ Install a Processor

⚠ **Caution -** Processor removal and replacement must be done using the green removal and replacement tool (part number G29477-002 or later) that is included with the replacement processor for the server. Using a different tool might result in damage to the processor and processor socket. Additionally, the removal and replacement tool ships with replacement motherboards.

⚠ **Caution -** Be careful not to touch the processor socket pins. The processor socket pins are very fragile. A light touch can bend the processor socket pins and damage the board beyond repair. Always use the processor removal and replacement tool to remove and replace the processor.

1. **Attach an antistatic wrist strap to your wrist, and then to a metal area on the chassis.**

   See "Take Antistatic Measures" on page 65.

2. **Unpack the replacement processor and place it on an antistatic mat.**

3. **Ensure that the replacement processor is identical to the failed processor that was removed.**

4. **Ensure that the two processor ILM assembly levers and the ILM assembly load plate are in the fully open position.**

   For instructions for opening the processor ILM assembly levers and the load plate, see Step 9 through Step 11 of "Remove a Processor" on page 131.

5. **To install the replacement processor into the processor removal and replacement tool, acquire the tool and perform the following steps:**

   a. **Press the button in the center of the tool to the down position [1].**

   b. **Turn the tool upside down, grasp the processor by its front an back edges and position the processor (circuit side up) in the tool so that the triangle on the corner of the processor aligns with the triangle on the side of the processor removal and replacement tool [2].**

   c. **Lower the processor into the tool and press the tool release lever to release the center button and engage the processor [3].**

   An audible click indicates that the processor is locked in place.

    d. Properly position the tool over the processor socket and lower it into place [4].

    To properly position the tool in the processor socket, rotate the tool until the green triangle on the side of the tool is facing the front of the server and it is over the left side of the processor socket (when viewing the server from the front) and lower the tool into the processor socket.

    e. Press the center button in the tool down to release the processor so that it is placed in the socket [5].

f. **Remove the processor removal and replacement tool [6].**
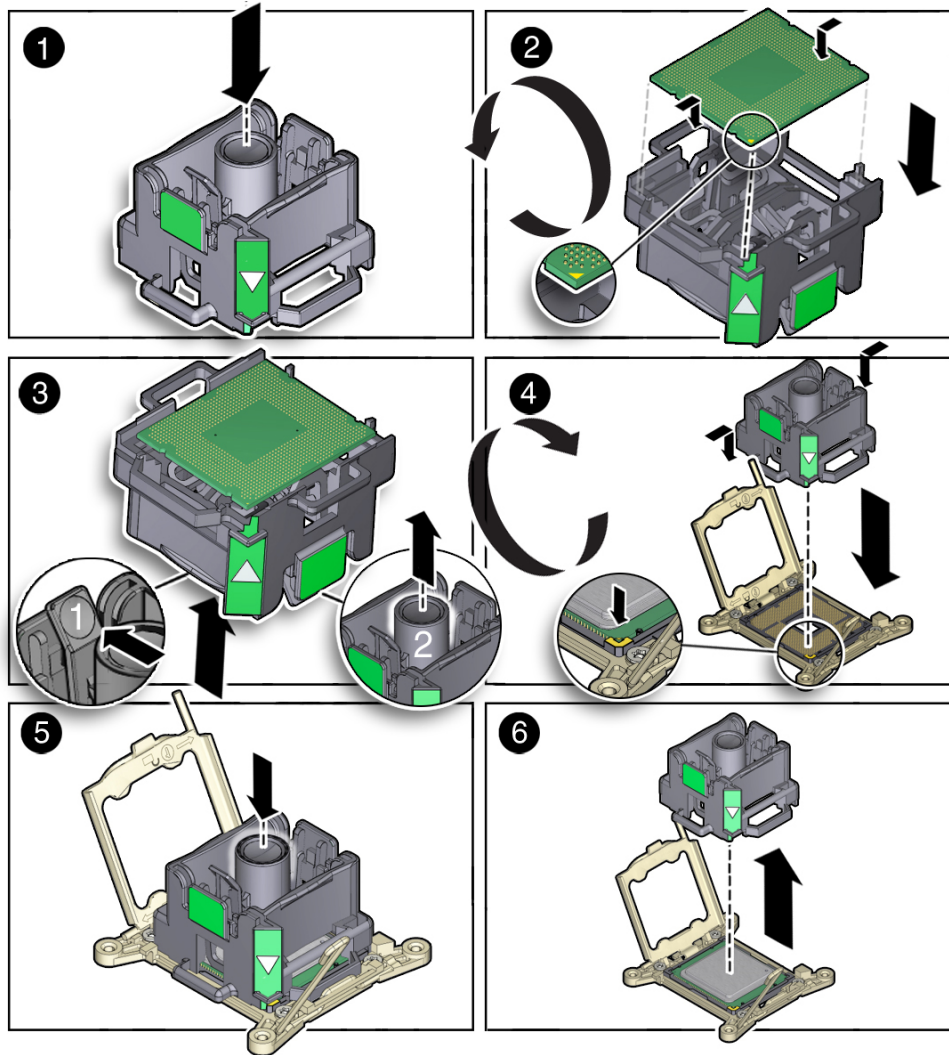
6. **Visually check the alignment of the processor in the socket.**

When properly aligned, the processor sits flat in the processor socket.

⚠️ **Caution -** Do not press down on the processor. Irreparable damage to the processor or motherboard might occur from excessive downward pressure. Do not forcibly seat the processor into the socket. Excessive downward pressure might damage the socket pins.

---

7. **Swing the processor ILM assembly load plate into the closed position [1].**

   Ensure that the load plate sits flat around the periphery of the processor.
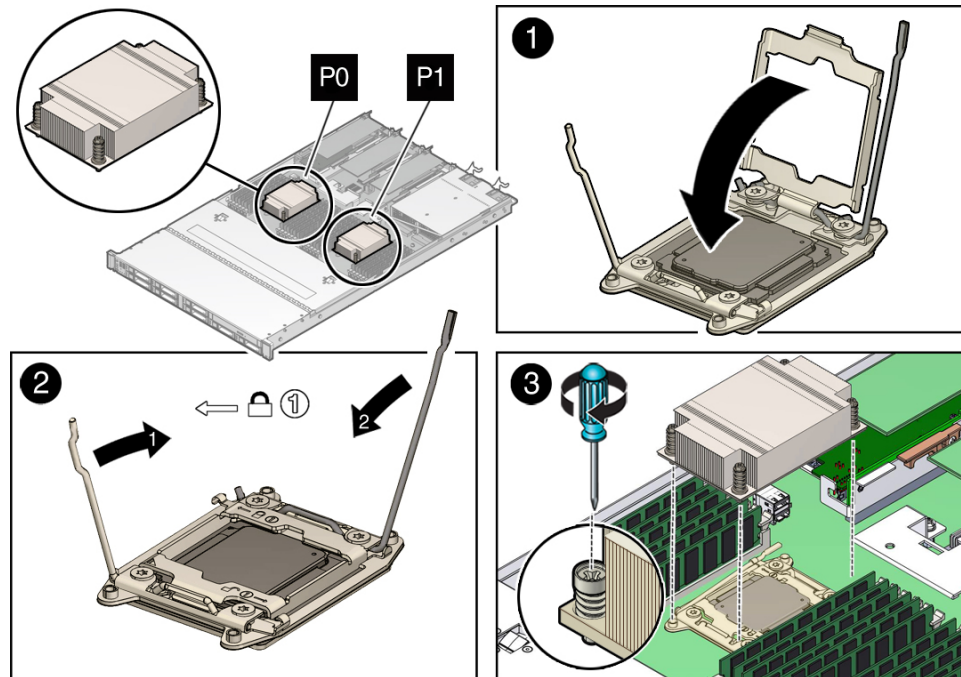
8. **Engage the socket release lever on the left side of the socket (viewing the server from the front) by rotating it downward and slipping it under the catch [2].**

9. **Engage the socket release lever on the right side of the socket (viewing the server from the front) by rotating it downward and slipping it under the catch [2].**

10. **Use the syringe (supplied with the new or replacement processor) to apply approximately 0.1 ml of thermal grease to the center of the top of the processor.**

    To measure 0.1 ml of thermal grease, use the graduated scale on the thermal grease syringe.

Note - Do not distribute the grease; the pressure of the heatsink will do so for you when you install the heatsink.

---

11. **Inspect the heatsink for dust and lint.**

    Clean the heatsink if necessary.

12. **Orient the heatsink so that the screws line up with the mounting studs [3].**

Note - The processor heatsink is not symmetrical.

---

13. **Carefully position the heatsink on the processor, aligning it with the mounting posts to reduce movement after it makes initial contact with the layer of thermal grease [3].**

⚠ **Caution -** Avoid moving the heatsink after it has contacted the top of the processor. Too much movement could disturb the layer of thermal grease, causing voids, and leading to ineffective heat dissipation and component damage.

---

14. **Tighten the Phillips screws with a No. 2 Phillips screwdriver alternately one-half turn until fully seated.**

15. **Install the air baffle.**

16. **If the server has a switch card installed, place the switch card cables in the cable troughs in the metal motherboard removal bracket and the air baffle, carefully pull the cables through the chassis mid-wall, and reconnect the cables to the disk backplane.**

    For instructions for reconnecting the switch card cables to the disk backplane, see "Servicing the NVMe Cables" on page 187.

17. **If the server has a DVD drive, place the DVD cable in the cable troughs in the metal motherboard removal bracket and the air baffle, carefully pull the cable through the chassis mid-wall, and reconnect the cable to the disk backplane.**

    For instructions for reconnecting the DVD cable to the disk backplane, see "Servicing the Power, FIM, Disk Backplane Data, and DVD Cables" on page 191.

18. **Return the server to operation.**

    a. **Install the server top cover.**

       See "Install the Server Top Cover" on page 198.

b. **Close the server fan door.**

c. **Return the server to the normal rack position.**

See "Return the Server to the Normal Rack Position" on page 201.

d. **Reconnect the data cables and reconnect the power cords to the server power supplies.**

See "Reconnect Data Cables and Power Cords" on page 203.

e. **Power on the server.**

See "Power On the Server" on page 205.

Verify that the Power/OK status indicator is steady on.

19. **Use Oracle ILOM to clear server processor faults.**

Refer to the Oracle Integrated Lights Out Manager (ILOM) 5.0 Documentation Library at `https://www.oracle.com/goto/ilom/docs` for more information about the following steps.

a. **To show server faults, log in to the server as root using the Oracle ILOM CLI, and type the following command to list all known faults on the system:**

`->` `show /SP/faultmgmt`

The server lists all known faults, for example:

```
-> show /SP/faultmgmt
Targets:
    0 (/SYS/MB/P0)Properties:
Commands:
    cd
    show
```

Alternatively, to list all known faults in the server, log into the Oracle Solaris OS and issue the `fmadm faulty` command, or log into the Oracle ILOM service processor from the Oracle ILOM Fault Management Shell and issue the `fmadm faulty` command. For more information about how to use the Oracle ILOM Fault Management Shell and supported commands, see the *Oracle ILOM User's Guide for System Monitoring and Diagnostics Firmware Release 5.0.x* in the Oracle Integrated Lights Out Manager (ILOM) 5.0 Documentation Library at: `https://www.oracle.com/goto/ilom/docs`

b. **To clear the fault, type the following command:**

```
-> set /SYS/MB/P0 clear_fault_action=true
```

For example:

```
-> set /SYS/MB/P0 clear_fault_action=true
Are you sure you want to clear /SYS/MB/P0 (y/n)? y
Set 'clear_fault_action' to 'true'
```

Alternatively, to clear all known faults in the server, log into the Oracle Solaris OS and issue the `fmadm repair` command, or log into the Oracle ILOM service processor from the Oracle ILOM Fault Management Shell and issue the `fmadm repair` command. For more information about how to use the Oracle ILOM Fault Management Shell and supported commands, see the *Oracle ILOM User's Guide for System Monitoring and Diagnostics Firmware Release 5.0.x* in the Oracle Integrated Lights Out Manager (ILOM) 5.0 Documentation Library at: https://www.oracle.com/goto/ilom/docs

Related Information

- "Remove a Processor" on page 131

Servicing the Oracle PCIe NVMe Switch Card (FRU)

Caution - The Oracle PCIe NVMe switch card should be serviced only by authorized Oracle Services personnel.

The following sections provide information to assist you when servicing the Oracle PCIe NVMe switch card.

Caution - These procedures require that you handle components that are sensitive to electrostatic discharge. This sensitivity can cause the components to fail. To avoid damage, ensure that you follow antistatic practices as described in "Take Antistatic Measures" on page 65.

Caution - Ensure that all power is removed from the server before removing or installing the Oracle PCIe NVMe switch card. You must disconnect the power cables from the server before performing these procedures.

- "Remove the Oracle PCIe NVMe Switch Card From PCIe Slot 1" on page 144
- "Install the Oracle PCIe NVMe Switch Card in PCIe Slot 1" on page 145

Related Information

- *"Disconnect Cables From the Server" on page 62*
- *"Take Antistatic Measures" on page 65*
- *"Extend the Server to the Maintenance Position" on page 63*
- *"Open the Server Fan Door" on page 66*

▼ Remove the Oracle PCIe NVMe Switch Card From PCIe Slot 1

1. **Prepare the server for service.**

   a. **Power off the server and disconnect the power cords from the power supplies.**

   See *"Powering Down the Server" on page 57*.

   b. **Extend the server to the maintenance position.**

   See *"Extend the Server to the Maintenance Position" on page 63*.

   c. **Attach an antistatic wrist strap to your wrist, and then to a metal area on the chassis.**

   See *"Take Antistatic Measures" on page 65*.

   d. **Open the server fan door to gain access to the disk backplanes.**

   See *"Open the Server Fan Door" on page 66*

   e. **Remove fan module FM0 (the left most fan viewing the server from the front).**

   See *"Remove a Fan Module" on page 82*.

2. **Remove the PCIe riser from slot 1.**

   For instructions, see *"Remove a PCIe Riser From PCIe Slot 1 or 2" on page 108*.

3. **Disconnect the internal cables that connect the switch card to the disk backplane.**
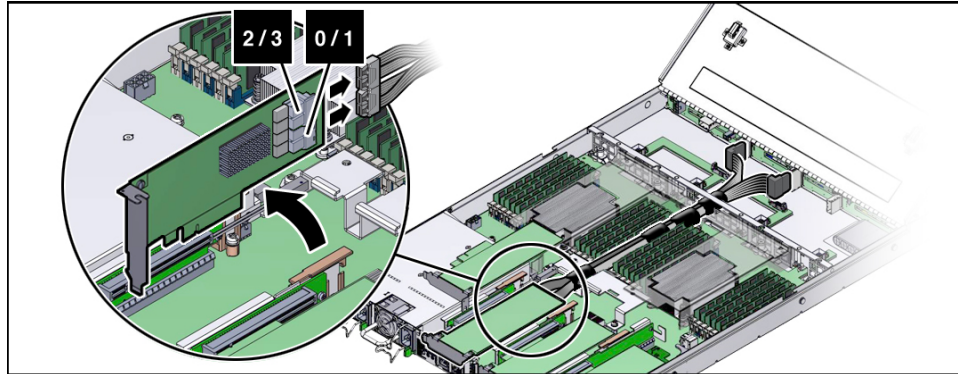
4. **Hold the riser in one hand and use your other hand to carefully remove the card from the riser.**

▼ Install the Oracle PCIe NVMe Switch Card in PCIe Slot 1

1. **Unpack the replacement PCIe NVMe switch card and retrieve the slot 1 PCIe riser.**

2. **Reconnect the cables from the disk backplane to the switch card.**

When connecting the cables, be sure to match the labels on the cables (2/3 and 0/1) with the connector labels shown in the following figure.
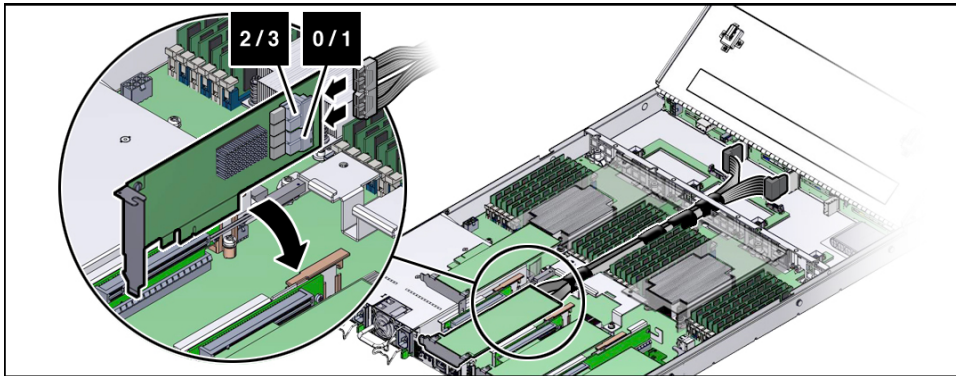
3. **Hold the riser in one hand and use your other hand to carefully insert the switch card connector into the Riser.**

4. **Install the PCIe riser into the server.**

    For instructions, see "Install a PCIe Riser Into PCIe Slot 1 or 2" on page 110.

5. **Return the server to operation.**

    a. **Close the server fan door.**

    b. **Return the server to the normal rack position.**

        See "Return the Server to the Normal Rack Position" on page 201.

    c. **Reconnect the data cables to the server and reconnect the power cords to the server power supplies.**

        See "Reconnect Data Cables and Power Cords" on page 203.

    d. **Power on the server.**

        See "Power On the Server" on page 205.

        Verify that the Power/OK status indicator is steady on.

Servicing the Internal HBA Card (FRU)

The following sections provide information to assist you when servicing the internal HBA card:

Caution - These procedures require that you handle components that are sensitive to electrostatic discharge. This sensitivity can cause the components to fail. To avoid damage, ensure that you follow antistatic practices as described in "Take Antistatic Measures" on page 65.

Caution - Ensure that all power is removed from the server before removing or installing the internal HBA. You must disconnect the power cables from the server before performing these procedures.

- "Remove the Internal HBA Card From PCIe Slot 4" on page 147
- "Install the Internal HBA Card in PCIe Slot 4" on page 151

Related Information

- "Disconnect Cables From the Server" on page 62
- "Take Antistatic Measures" on page 65
- "Extend the Server to the Maintenance Position" on page 63
- "Open the Server Fan Door" on page 66

▼ Remove the Internal HBA Card From PCIe Slot 4

1. **Prepare the server for service.**

   a. **Power off the server and disconnect the power cords from the power supplies.**

   See "Powering Down the Server" on page 57.

   b. **Extend the server to the maintenance position.**

   See "Extend the Server to the Maintenance Position" on page 63.

   c. **Attach an antistatic wrist strap to your wrist, and then to a metal area on the chassis.**

See "Take Antistatic Measures" on page 65.

d.   Open the server fan door to gain access to the disk backplanes.

See "Open the Server Fan Door" on page 66

e.   Remove fan module FM0 (the left most fan viewing the server from the front).

See "Remove a Fan Module" on page 82.

2.   Remove the PCIe riser from slots 3 and 4.

For instructions, see "Remove the PCIe Riser From PCIe Slots 3 and 4" on page 112.

3.   Remove the internal host bus adapter card from the riser.

a.   Hold the riser in one hand and use your other hand to carefully remove the card from slot 4 of the riser.

b.   Disconnect the rear bracket attached to the PCIe card from the rear of the PCIe riser.
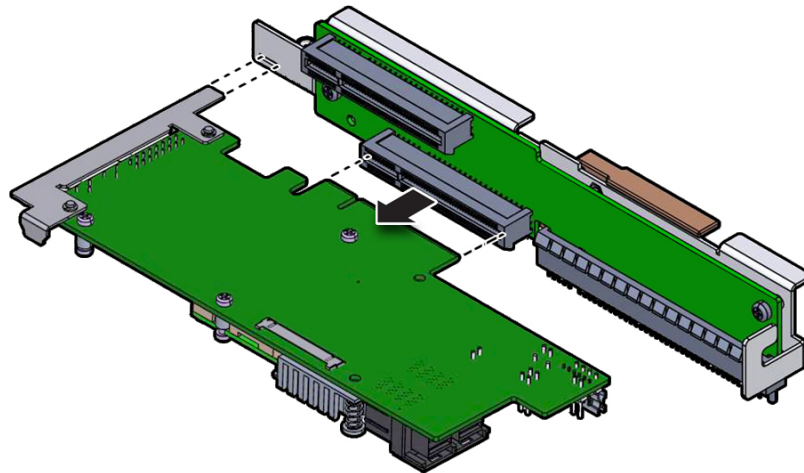
4. **Disconnect the SAS cables and the super capacitor cable from the internal HBA card and place the card on an antistatic mat.**
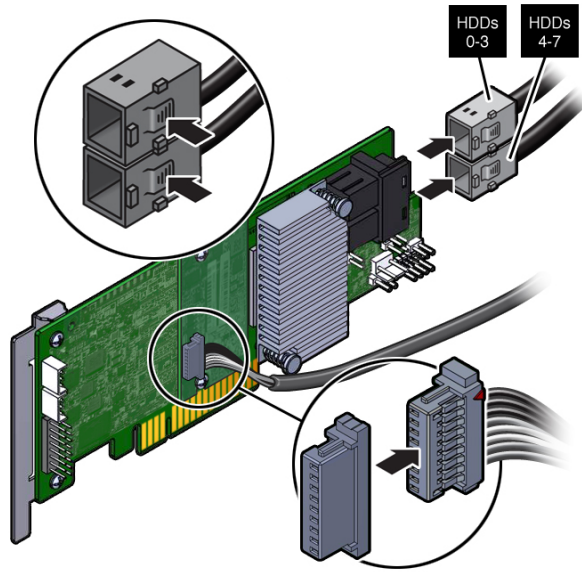
5. **If you are replacing the internal HBA card, use a No. 2 Philips screwdriver to remove the special fitted bracket from the HBA card.**

You will need to install the special fitted bracket on the replacement HBA card. Set aside the bracket until you are ready to install the replacement HBA card.
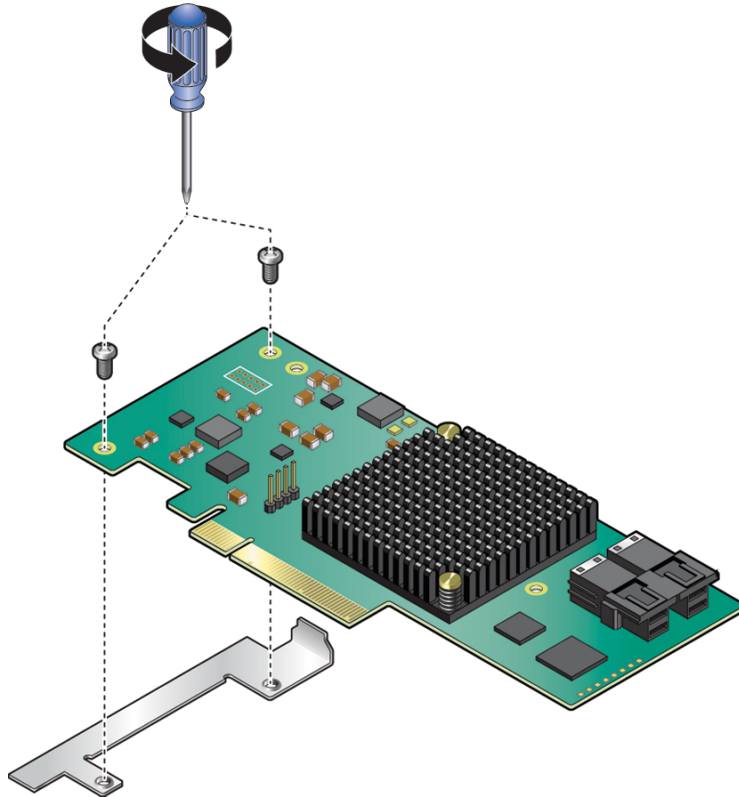
6. **Lift the super capacitor up to release the reclosable fasteners that secure it to the server's chassis [2].**
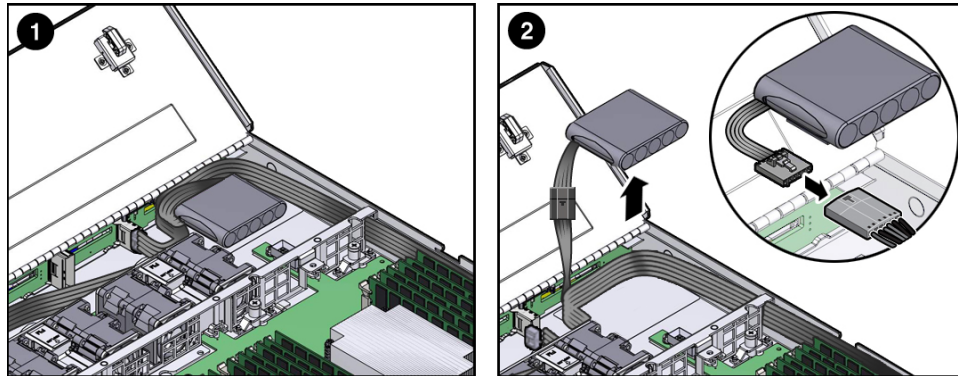
7. **Disconnect the super capacitor cable from the super capacitor and place the super capacitor on an antistatic mat [2].**

8. **Carefully slide the SAS cables and super capacitor cable through the chassis mid-wall and remove the cables from the server.**

    For instructions, see "Remove the Internal HBA SAS Cable Assembly" on page 183.

▼ Install the Internal HBA Card in PCIe Slot 4

1. **Unpack the replacement host bus adapter (HBA) card, the super capacitor, the SAS cables, and the super capacitor cable, and retrieve the PCIe riser for slot 3.**

2.   Using a No. 2 Philips screwdriver, remove the standard HBA bracket that shipped with the replacement HBA card.
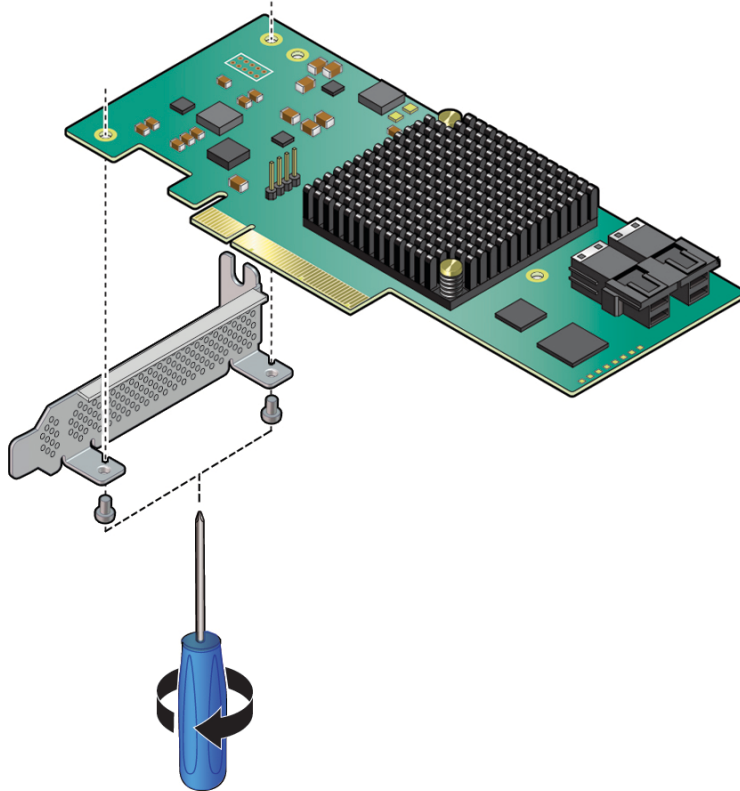
3. **Install the special fitted bracket that was removed in Step 5 in "Remove the Internal HBA Card From PCIe Slot 4" on page 147.**
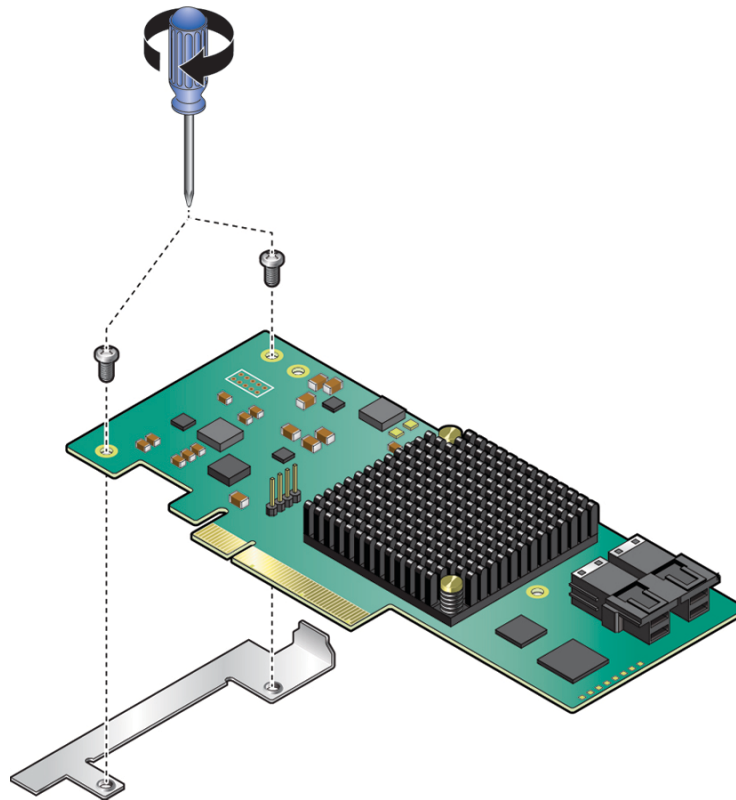
4. **Carefully guide the SAS cables and super capacitor cable that connect to the disk backplane and the super cable through the chassis mid-wall toward the front of the server.**

5. **Install the super capacitor into the server.**

   a. **Attach the reclosable fasteners supplied with the replacement super capacitor to its underside.**

   b. **Connect the super capacitor cable to the super capacitor [1].**

    c. **Press the super capacitor into the server's chassis so that it is secured to the existing reclosable fastener [1 and 2].**
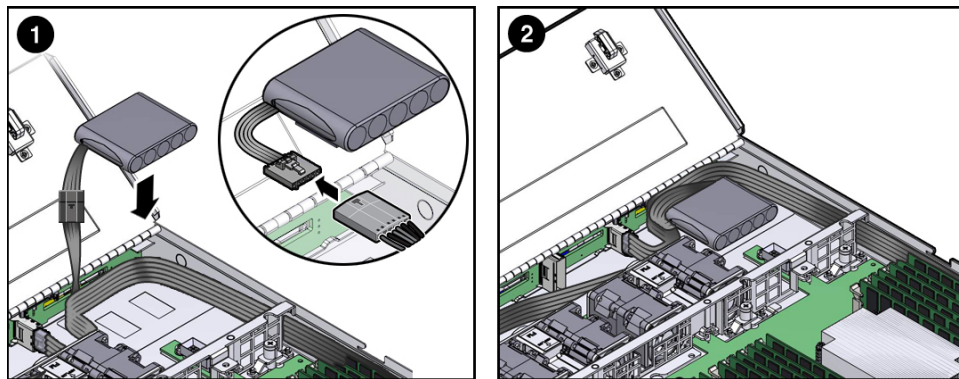
6. **Connect the SAS cables and the super capacitor cable to the internal HBA card.**
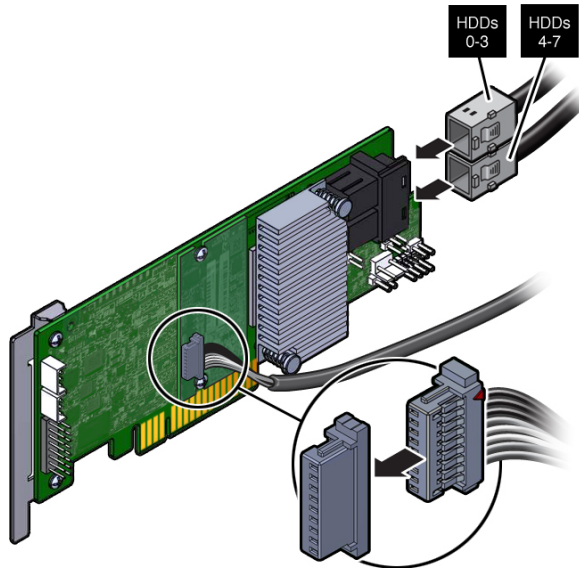
7. **Insert the rear bracket on the internal HBA card into the rear connector on the PCIe riser.**
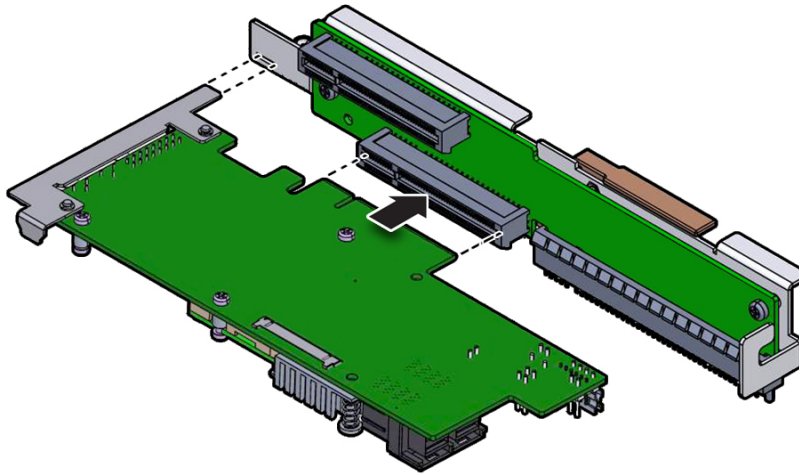
8. **Insert the internal HBA card connector into the bottom connector on the riser for PCIe slot 3 and 4 .**

9. **Install the PCIe riser.**

For instructions, see "Install the PCIe Riser Into PCIe Slots 3 and 4" on page 115.

10. **Install fan module FM0.**

See "Install a Fan Module" on page 86.

11. **Return the server to operation.**

   a. **Close the server fan door.**

   b. **Return the server to the normal rack position.**

   See "Return the Server to the Normal Rack Position" on page 201.

   c. **Reconnect the data cables to the server and reconnect the power cords to the server power supplies.**

   See "Reconnect Data Cables and Power Cords" on page 203.

    d. **Power on the server.**

    See "Power On the Server" on page 205.

    Verify that the Power/OK status indicator is steady on.

Servicing the Disk Backplane (FRU)

⚠ **Caution -** The disk backplane should be serviced only by authorized Oracle Services personnel.

The following sections provide information to assist you when servicing the disk backplane:

⚠ **Caution -** Ensure that all power is removed from the server before removing or installing a disk backplane. You must disconnect the power cables from the server before performing these procedures.

- "Remove the Disk Backplane" on page 156
- "Install the Disk Backplane" on page 159

Related Information

- "Disconnect Cables From the Server" on page 62
- "Take Antistatic Measures" on page 65
- "Extend the Server to the Maintenance Position" on page 63
- "Open the Server Fan Door" on page 66

▼ Remove the Disk Backplane

⚠ **Caution -** The disk backplane should be removed only by authorized Oracle Services personnel.

1. **Prepare the server for service.**

    a. **Power off the server and disconnect the power cords from the power supplies.**

See "Powering Down the Server" on page 57.

b. Extend the server to the maintenance position.

See "Extend the Server to the Maintenance Position" on page 63.

c. Attach an antistatic wrist strap to your wrist, and then to a metal area on the chassis.

See "Take Antistatic Measures" on page 65.

d. Open the server fan door to gain access to the disk backplanes.

See "Open the Server Fan Door" on page 66

e. Remove all four fan modules.

See "Remove a Fan Module" on page 82.

2. Pull all storage drives out far enough to disengage them from the disk backplane.

See "Remove a HDD or SSD Storage Drive" on page 72.

Note - It is not necessary to completely remove the storage drives from the server; simply pull them out far enough to disengage them from the disk backplane. If you do remove the storage drives from the server, record their locations so that you can reinstall them in the same locations.

---

3. **Remove six Philips screws from the disk cage cover and slide toward the front of the server and lift up to remove it [frame 1].**
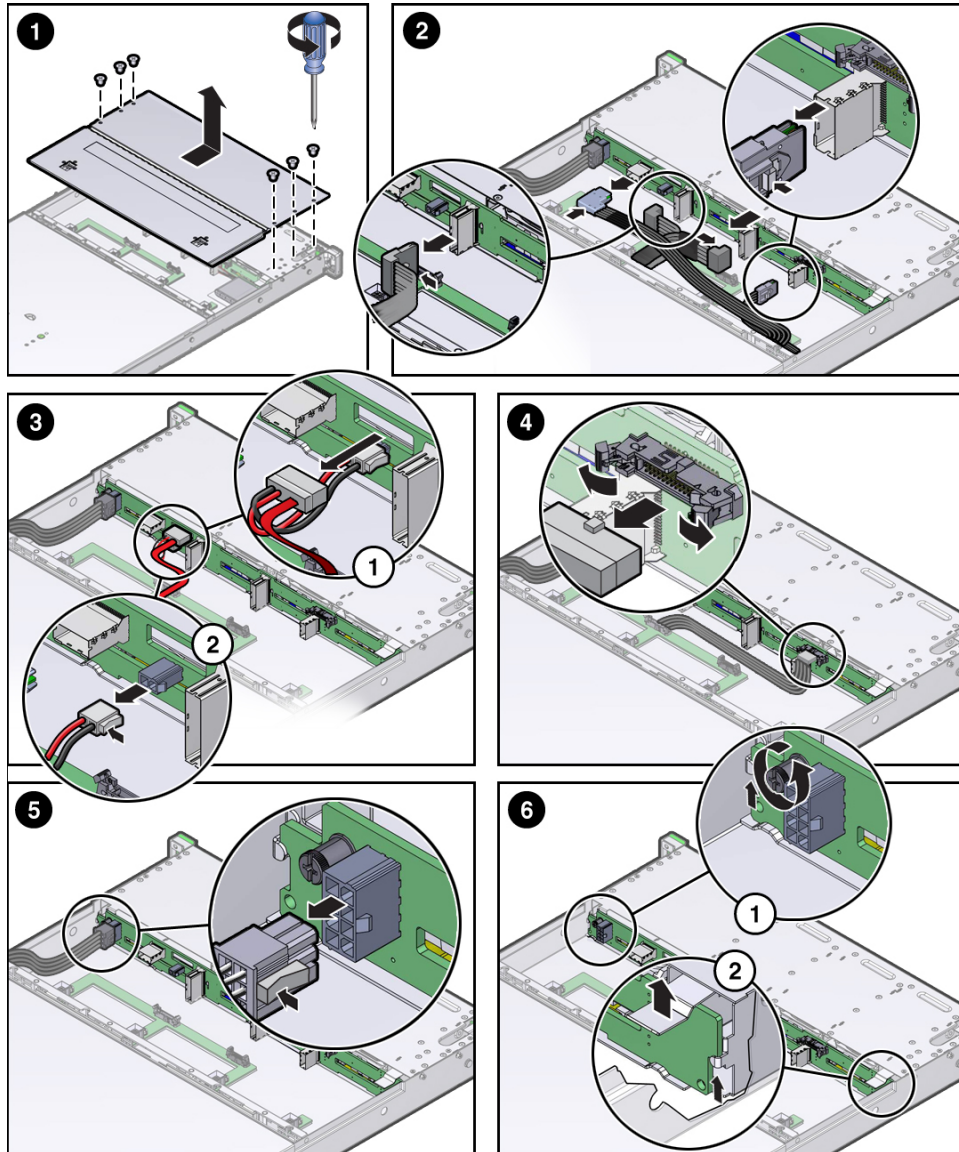
4. **Disconnect the SAS cables and the switch card cables (if present) from the disk backplane [2].**

5. **If the server has a DVD drive, do the following; otherwise proceed to the next step.**

    a. **Disconnect the DVD drive signal cable from the DVD drive and the DVD power cable from the disk backplane [3].**

    b. **Remove the DVD drive.**

        See "Remove the DVD Drive" on page 163

6. **Disconnect the disk backplane auxiliary signal cable from the disk backplane [4].**

7. **Disconnect the disk backplane power cable from the disk backplane [5].**

8. **Loosen the captive screw that secures the disk backplane to the chassis [6.1].**

9. **Lift the metal spring retainer on the right side of the disk backplane, lift the disk backplane up and tilt it toward the rear of the server to free it from the holding brackets, and lift it out of the server [6.2].**

10. **Place the disk backplane on an antistatic mat.**

    Related Information

    - "Install the Disk Backplane" on page 159

▼ Install the Disk Backplane

⚠️ **Caution -** The disk backplane should be installed only by authorized Oracle Services personnel.

1. **To place the backplane into the disk cage, do the following:**

    a. **Lift the metal spring retainer [frame 1, callout 1] and position the backplane so that it fits into the two metal brackets that are located on the chassis side walls [1, 2].**

    b. **Lower the disk backplane into the disk cage so that it engages the three metal hooks in the disk cage [1, 3]**

c. **Continue to lower the disk backplane into the disk cage until it is positioned in all six troughs that are located at the bottom of the disk cage [1, 4] .**

d. **Turn the disk backplane captive screw clockwise until the disk backplane is secure [1, 5].**
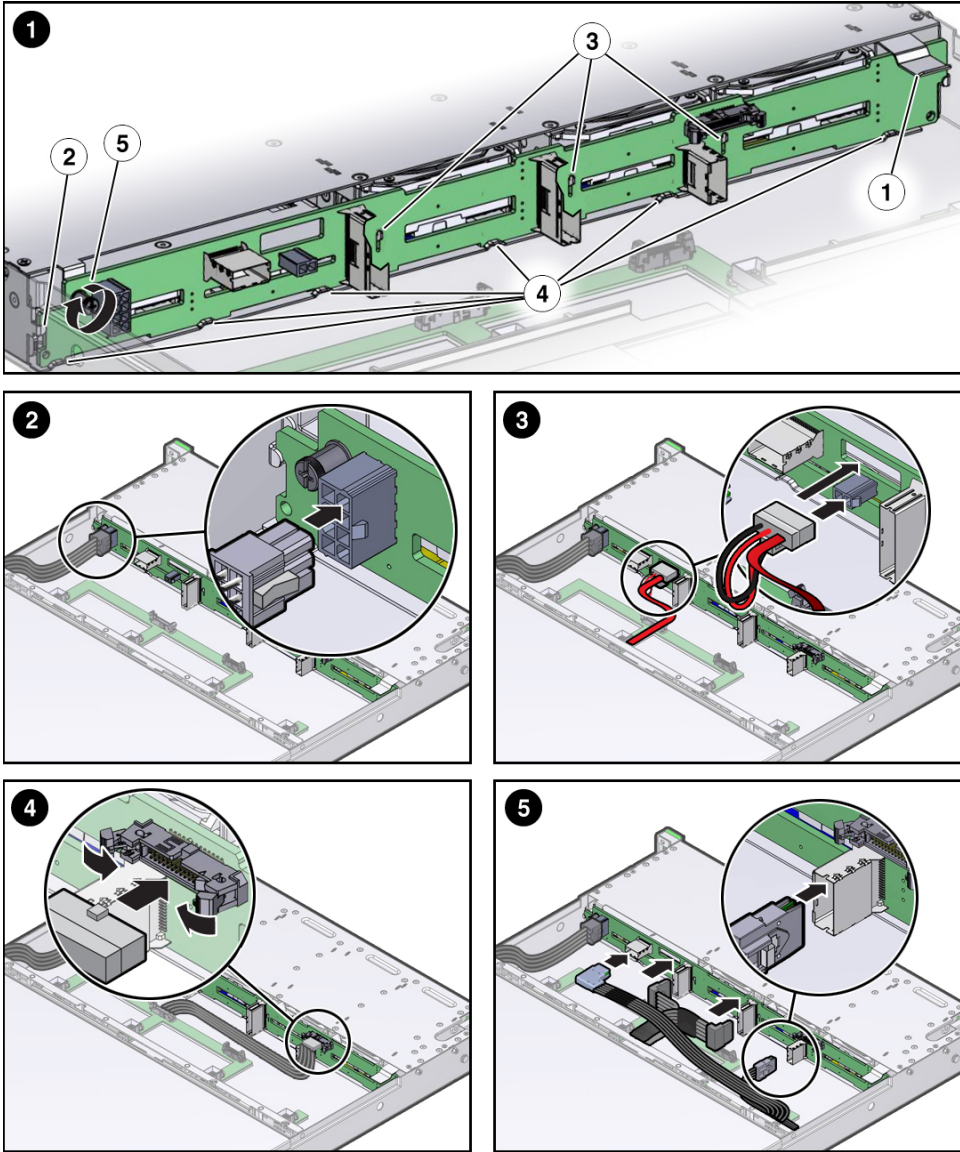
2. **Reconnect the disk backplane power cable to the disk backplane [2].**

3. **If the server has a DVD drive, perform the following steps:**

   a. **Install the DVD drive into the disk drive cage.**

      See "Install the DVD Drive" on page 166

   b. **Reconnect the DVD cable signal connector to the DVD drive [3].**

   c. **Reconnect the DVD cable power connector to the disk backplane [3].**

4. **Reconnect the disk backplane auxiliary power and signal cable to the disk backplane [4].**

5. **Reconnect the SAS cables and the switch card cables (if present) to the disk backplane [5].**

6. **Reinstall all of the storage drives into the storage drive cage.**

   See "Install a HDD or SSD Storage Drive" on page 74.

7. **Install the disk cage cover.**

8. **Install all four fan modules.**

   See "Install a Fan Module" on page 86.

9. **Return the server to operation.**

   a. **Close the server fan door.**

   b. **Return the server to the normal rack position.**

      See "Return the Server to the Normal Rack Position" on page 201.

   c. **Reconnect the data cables to the server and reconnect the power cords to the server power supplies.**

      See "Reconnect Data Cables and Power Cords" on page 203.

   d. **Power on the server.**

      See "Power On the Server" on page 205.

      Verify that the Power/OK status indicator is steady on.

Related Information

- "Remove the Disk Backplane" on page 156

Servicing the DVD Drive (FRU)

Note - The DVD drive is optional.

The DVD drive is accessible from the front panel of the system.

Caution - These procedures require that you handle components that are sensitive to electrostatic discharge. This sensitivity can cause the components to fail. To avoid damage, ensure that you follow antistatic practices as described in "Take Antistatic Measures" on page 65.

Caution - Ensure that all power is removed from the server before removing or installing the DVD drive or damage to the drive might occur. You must disconnect all power cables from the system before performing these procedures.

This section covers the following procedures:

- "Remove the DVD Drive" on page 163.
- "Install the DVD Drive" on page 166.

Related Information

- "Disconnect Cables From the Server" on page 62
- "Extend the Server to the Maintenance Position" on page 63
- "Open the Server Fan Door" on page 66

▼ Remove the DVD Drive

1. **Remove any media from the DVD drive.**

2. **Prepare the server for service.**

      a.   **Power off the server and disconnect the power cords from the power supplies.**

         See "Powering Down the Server" on page 57.

      b.   **Extend the server to the maintenance position.**

         See "Extend the Server to the Maintenance Position" on page 63.

      c.   **Attach an antistatic wrist strap to your wrist and then to a metal area on the chassis.**

         See "Take Antistatic Measures" on page 65.

      d.   **Remove the server top cover.**

         See "Remove the Server Top Cover" on page 67.

3.   **Locate the DVD drive [1].**

4.   Disconnect the cable from the rear of the DVD [2].
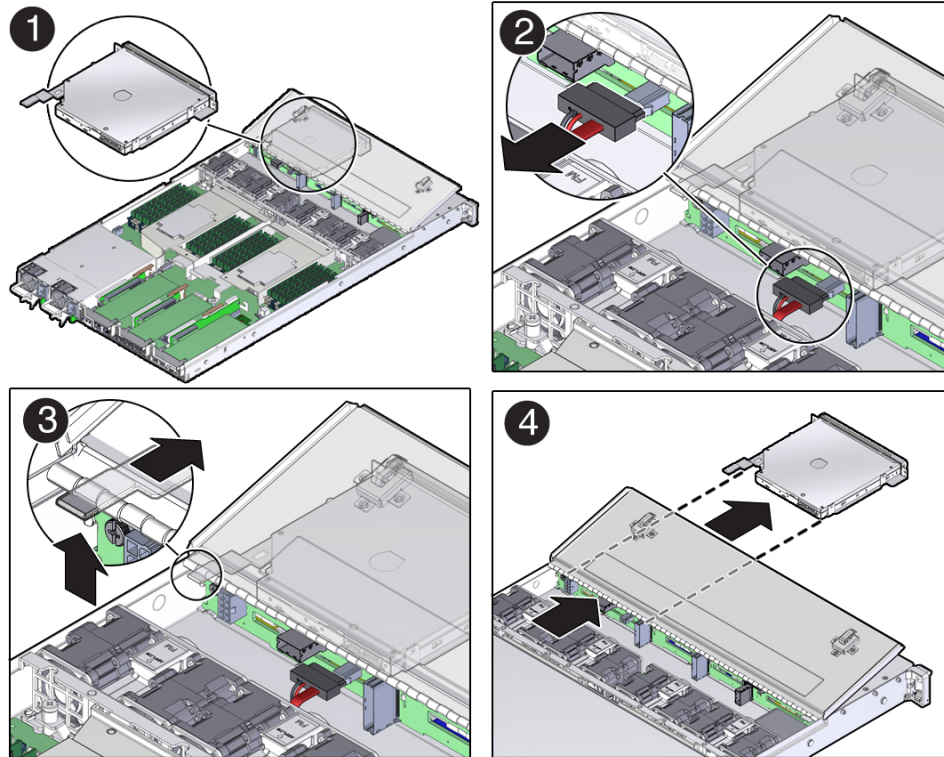
5.   To disengage the DVD drive from the chassis, press and hold the release tab on the rear of the DVD drive up slightly [3].

6.   Gently push the DVD drive toward the front of the server, slide it out of the server, and place it on an antistatic mat [4].

7.   Place the DVD drive on an antistatic mat.

Related Information

■   "Install the DVD Drive" on page 166

▼ Install the DVD Drive

1. **Push the DVD drive into the chassis until the release tab on the rear of the DVD drive engages the chassis with an audible click.**

   For reference, use the illustration provided in "Remove the DVD Drive" on page 163.

2. **Reconnect the DVD drive cable [2].**

3. **Return the server to operation.**

   a. **Install the server top cover.**

      See "Install the Server Top Cover" on page 198.

   b. **Close the fan door.**

   c. **Return the server to the normal rack position.**

      See "Return the Server to the Normal Rack Position" on page 201.

   d. **Reconnect the power cords to the server power supplies and reconnect the data cables.**

      See "Reconnect Data Cables and Power Cords" on page 203.

   e. **Power on the server.**

      See "Power On the Server" on page 205.

      Verify that the Power/OK status indicator is steady on.

   Related Information

   - "Remove the DVD Drive" on page 163

Servicing the Front Indicator Module (FRU)

⚠ **Caution -** The front indicator module should be serviced only by authorized Oracle Services personnel.

Caution - Ensure that all power is removed from the server before removing or installing a front indicator module. You must disconnect the power cables from the server before performing these procedures.

Follow these procedures to remove and install the front indicator module (FIM).

- "Remove the Front Indicator Module" on page 167
- "Install the Front Indicator Module " on page 169

Related Information

- "Disconnect Cables From the Server" on page 62
- "Remove the Server From the Rack" on page 65
- "Take Antistatic Measures" on page 65
- "Open the Server Fan Door" on page 66

▼ Remove the Front Indicator Module

Caution - The front indicator module should be removed only by authorized Oracle Services personnel.

1. **Prepare the server for service.**

   a. **Power off the server and disconnect the power cords from the power supplies.**

      See "Powering Down the Server" on page 57.

   b. **Extend the server to the maintenance position.**

      See "Extend the Server to the Maintenance Position" on page 63.

   c. **Attach an antistatic wrist strap to your wrist, and then to a metal area on the chassis.**

      See "Take Antistatic Measures" on page 65.

2. **To remove the top cover from the storage drive cage, do the following [1]:**

   a. **Remove the six Phillips screws from the top of the storage drive cage.**

There are three Phillips screws on each side of the storage drive cage.

b. **Open the server fan door.**

See "Open the Server Fan Door" on page 66.

c. **Slide the storage drive cage cover forward (toward the front of the server) and lift it up.**
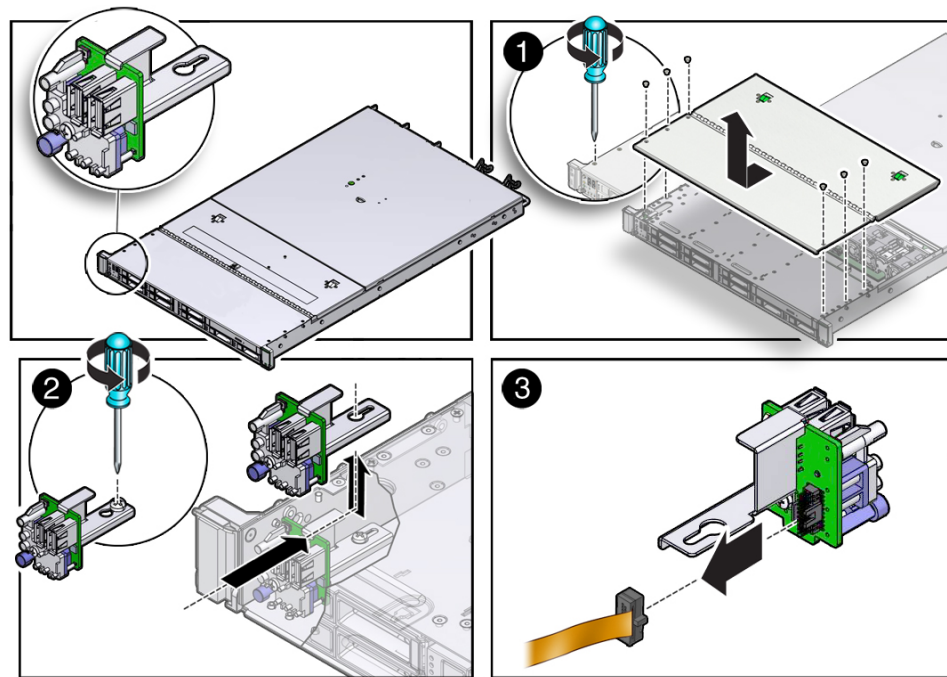
3. **Loosen the screw that secures the front indicator module (FIM) assembly to the server chassis [2].**

4. **Carefully slide the FIM assembly toward the rear of the server enough to lift it over the Phillips screw and out of the server [2].**

5. **Disconnect the FIM cable from the FIM assembly and set the assembly aside [3].**

6. **Continue to "Install the Front Indicator Module " on page 169.**

Related Information

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▼ Install the Front Indicator Module

⚠️ **Caution -** The front indicator module should be installed only by authorized Oracle Services personnel.

1. **Attach an antistatic wrist strap to your wrist, and then to a metal area on the chassis.**

   See

2. **Unpack the replacement FIM and place it on an antistatic mat.**

3. **Connect the FIM cable to the replacement FIM assembly.**

   For reference, use the illustration provided in .

4. **Carefully lower the FIM assembly into the chassis, position it over the Phillips screw in the server chassis, and slide it forward so all the LEDs, USB connectors, and Power On button fit into place on the server front panel [2].**

5. **Tighten the Phillips screw to secure the FIM assembly to the server chassis [2].**

6. **Position the storage drive cage cover over the server storage drive cage so that it over hangs the front of the disk drive cage by about 1/4 inch.**

7. **Install the six Phillips screws to secure the cover to the server [1].**

   There are three Phillips screws on each side of the storage drive cage.

8. **Close the server fan door.**

9. **Return the server to operation.**

   a. **Return the server to the normal rack position.**

      See .

   b. **Reconnect the data cables to the server and reconnect the power cords to the server power supplies.**

See .

c. **Power on the server.**

See .

Verify that the Power/OK status indicator is steady on.

Related Information

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Servicing the Motherboard (FRU)

Follow these procedures to remove and install the motherboard.

⚠️ **Caution -** The motherboard should be serviced only by an Oracle qualified service technician.

⚠️ **Caution -** Ensure that all power is removed from the server before removing or installing the motherboard. You must disconnect the power cables before performing these procedures.

⚠️ **Caution -** These procedures require that you handle components that are sensitive to electrostatic discharge. This sensitivity can cause the components to fail. To avoid damage, ensure that you follow antistatic practices as described in .

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Related Information

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▼ Remove the Motherboard

⚠️ **Caution -** The motherboard should be serviced only by an Oracle qualified service technician.

⚠️ **Caution -** Use the Oracle ILOM backup utility prior to removing the motherboard. This utility backs up the Oracle ILOM configuration of the service processor. For more information, see the Oracle ILOM 5.0 Documentation Library at `https://www.oracle.com/goto/ilom/docs`.

1. **Prepare the server for service.**

   a. **Power off the server and disconnect the power cords from the power supplies.**

      See "Powering Down the Server" on page 57.

   b. **Extend the server to the maintenance position.**

      See "Extend the Server to the Maintenance Position" on page 63.

   c. **Attach an antistatic wrist strap to your wrist, and then to a metal area on the chassis.**

      See "Take Antistatic Measures" on page 65.

   d. **Remove the server top cover.**

      See "Remove the Server Top Cover" on page 67.

2. **Remove the following reusable components:**

⚠️ **Caution -** During the motherboard removal procedure, it is important to label power supplies with the slot numbers from which they were removed (PS0, PS1). This is required because the power supplies must be reinstalled into the slots from which they were removed; otherwise, the server key identity properties (KIP) data might be lost. When a server requires service, the KIP is used by Oracle to verify that the warranty on the server has not expired. For more information on KIP, see "FRU Key Identity Properties (KIP) Automated Update" on page 55.

   a. **Fan modules**

      For instructions, see "Remove a Fan Module" on page 82.

   b. **Power supplies**

For instructions, see "Remove a Power Supply" on page 89.

c. The PCIe NVMe switch card, if it is installed in the server.

For instructions, see "Remove the Oracle PCIe NVMe Switch Card From PCIe Slot 1" on page 144.

d. PCIe risers and attached PCIe cards

For instructions, see "Servicing PCIe Risers (CRU)" on page 106.

3. **To disconnect the disk backplane power cable from the motherboard, press in on the connector latch and pull the connector out [1].**
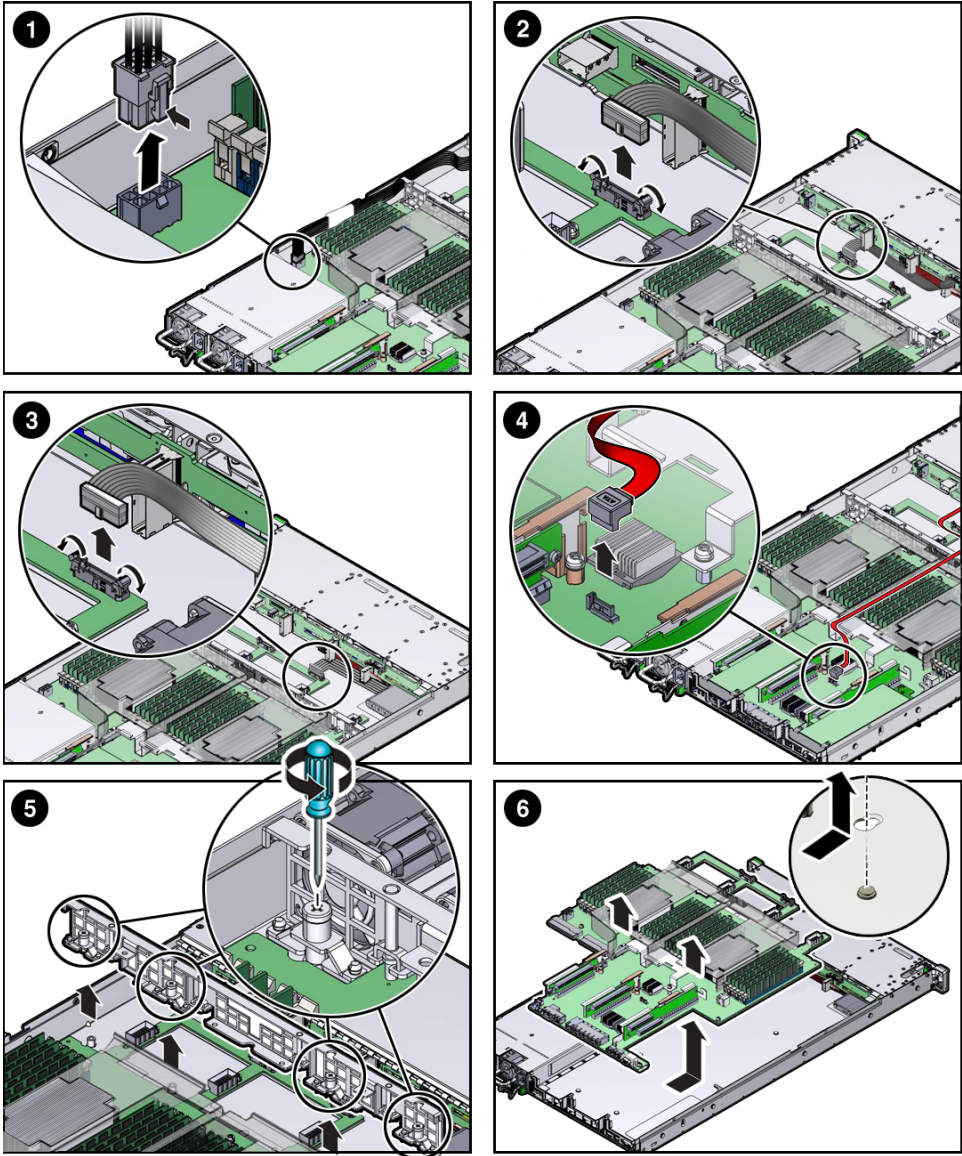
4. **To eject the disk backplane auxiliary power and signal cable connector, open both side latches [2].**

5. **To eject the FIM cable connector, open both side latches [3].**

6. **If the server has a DVD drive, do the following:**

    a. **Disconnect the DVD drive cable from the motherboard [4].**

    b. **To remove the DVD drive cable off of the motherboard, carefully guide it through the chassis mid-wall and place it on top of the disk cage so that it is away from the motherboard.**

    Note - You do not need to disconnect the DVD drive cable from the DVD drive.

    ---

7. **To remove the SAS cables and the super capacitor cable that were connected to the HBA card, carefully lift them out of the chassis and place them on top of the disk cage so that they are away from the motherboard.**

8. **To remove the cables that were connected to the switch card, carefully guide them through the chassis mid-wall and put them aside.**

9. **Remove the server mid-wall [5].**

    a. **Using a screwdriver (No. 2 Phillips or flathead), loosen the four green captive screws that secure the mid-wall to the server chassis.**

    b. **Lift up the mid-wall slightly to disengage it from the raised mushroom-shaped standoffs that are located on the server chassis sidewall (one on each end of the mid-wall), then lift it out of the server and set it aside.**

10. **Remove the motherboard from the server chassis [6].**

    a. **Grasp the metal bracket located just to the rear of the DIMM sockets and slide the motherboard toward the front of the server and lift it slightly to disengage it from the seven mushroom-shaped standoffs that are located on the server chassis under the motherboard.**

    b. **Lift the motherboard out of the server chassis and place it on an antistatic mat and next to the replacement motherboard.**

11. **Remove the air baffle from the motherboard and set it aside.**

12. **Remove the internal USB flash drives from the motherboard and install them on the replacement motherboard.**

   For instructions, see "Servicing the Internal USB Flash Drives (CRU)" on page 123.

13. **Remove the DIMMs from the motherboard and install them in the corresponding DIMM sockets on the replacement motherboard.**

   For instructions, see "Servicing the DIMMs (CRU)" on page 93.

   Note - Install the DIMMs only in the sockets (connectors) that correspond to the sockets from which they were removed. Performing a one-to-one replacement of the DIMMs significantly reduces the possibility that the DIMMs will be installed in the wrong slots. If you do not reinstall the DIMMs in the same sockets, server performance might suffer and some DIMMs might not be used by the server.

14. **Remove the processors from the failed motherboard.**

   For instructions, see "Remove a Processor" on page 131.

15. **Remove the processor socket covers from the replacement motherboard and install the processors.**

   a. **Disengage the processor ILM (independent loading mechanism) assembly hinge lever on the right side of the processor socket (viewing the server**

from the front) by pushing down on the lever and moving it to the side away from the processor, and then rotating the lever upward [Frame 1].
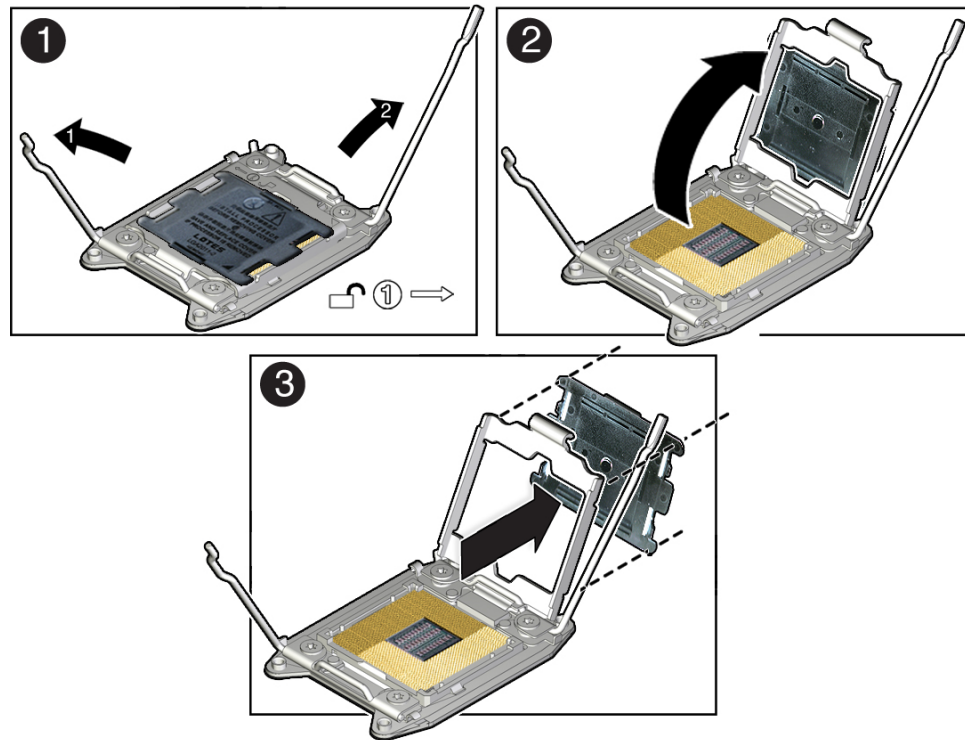
b. **Disengage the processor ILM assembly load lever on the left side of the processor socket (viewing the server from the front) by pushing down on the lever and moving it to the side away from the processor, and then rotating the lever upward [1].**

c. **To lift the processor ILM assembly load plate off of the processor socket, rotate the ILM assembly hinge lever on the right side of the processor toward the closed position (the load plate is lifted up as the hinge lever is lowered) and carefully swing the load plate to the fully open position [2].**

d. **Grasp the top and underside of the processor socket cover with one hand (place your thumb against the underside of the cover), place your other**

thumb against the underside of the cover, and carefully push the cover out of the processor ILM assembly load plate [3].

⚠️ **Caution -** Be careful not to allow the processor socket cover to fall into the processor socket as this could result in damage to the socket.

e. **Install a processor into the socket from which you removed the processor socket cover.**

For instructions for installing a processor, see "Install a Processor" on page 137.

f. **Repeat steps a through e above to remove the second processor socket cover from the replacement motherboard and install the second processor.**

16. **Install the air baffle on the replacement motherboard.**

17. **Install the processor socket covers on the failed motherboard.**

⚠️ **Caution -** The processor socket covers must be installed on the failed motherboard; otherwise, damage might result to the processor sockets during handling and shipping.

⚠️ **Caution -** Be careful not to allow the processor socket cover to fall into the processor socket as this could result in damage to the socket.

a. Open one of the processor ILM assemblies on the failed motherboard [Frames 1 and 2].
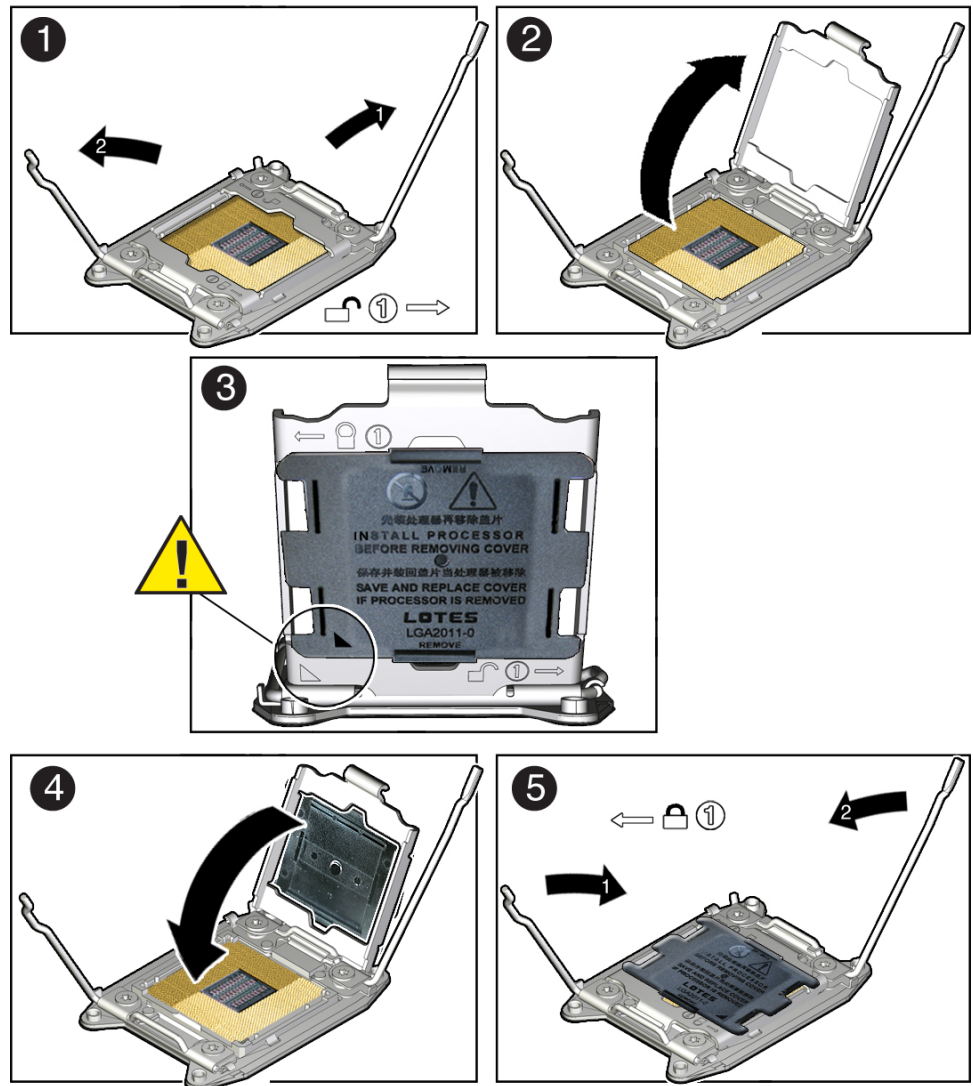
b. **Hold the processor ILM assembly load plate open with one hand and position the processor socket cover over the top of the ILM assembly load plate so that 1) the arrow on the processor socket cover is aligned with the arrow on the load plate and 2) the fasteners on one side of the cover (the fasteners are located on the underside of the cover) are inside the load plate (it does not matter which side), and use your thumb to press the other side of the processor socket cover into the load plate. [3].**

You will hear a clicking sound when the processor socket cover snaps into place.

c. **Close the processor ILM assembly load plate [4 and 5].**

d. **Repeat Step a through Step c above to install the second processor socket cover on the failed motherboard.**

Related Information

- "Install the Motherboard" on page 179

▼ Install the Motherboard

⚠ **Caution -** The motherboard should be installed only by an Oracle qualified service technician.

1. **Attach an antistatic wrist strap to your wrist, and then to a metal area on the chassis.**

   See "Take Antistatic Measures" on page 65.

2. **Insert the motherboard into the server chassis [1].**

   a. **Grasp the metal bracket located to the rear of the DIMMs and tilt the front of the motherboard up slightly and push it into the opening in the rear of the server chassis.**

   b. **Lower the motherboard into the server chassis and slide it to the rear until it engages the seven mushroom-shaped standoffs located on the server chassis under the motherboard.**

    c. **Ensure that the indicators, controls, and connectors on the rear of the motherboard fit correctly into the rear of the server chassis.**
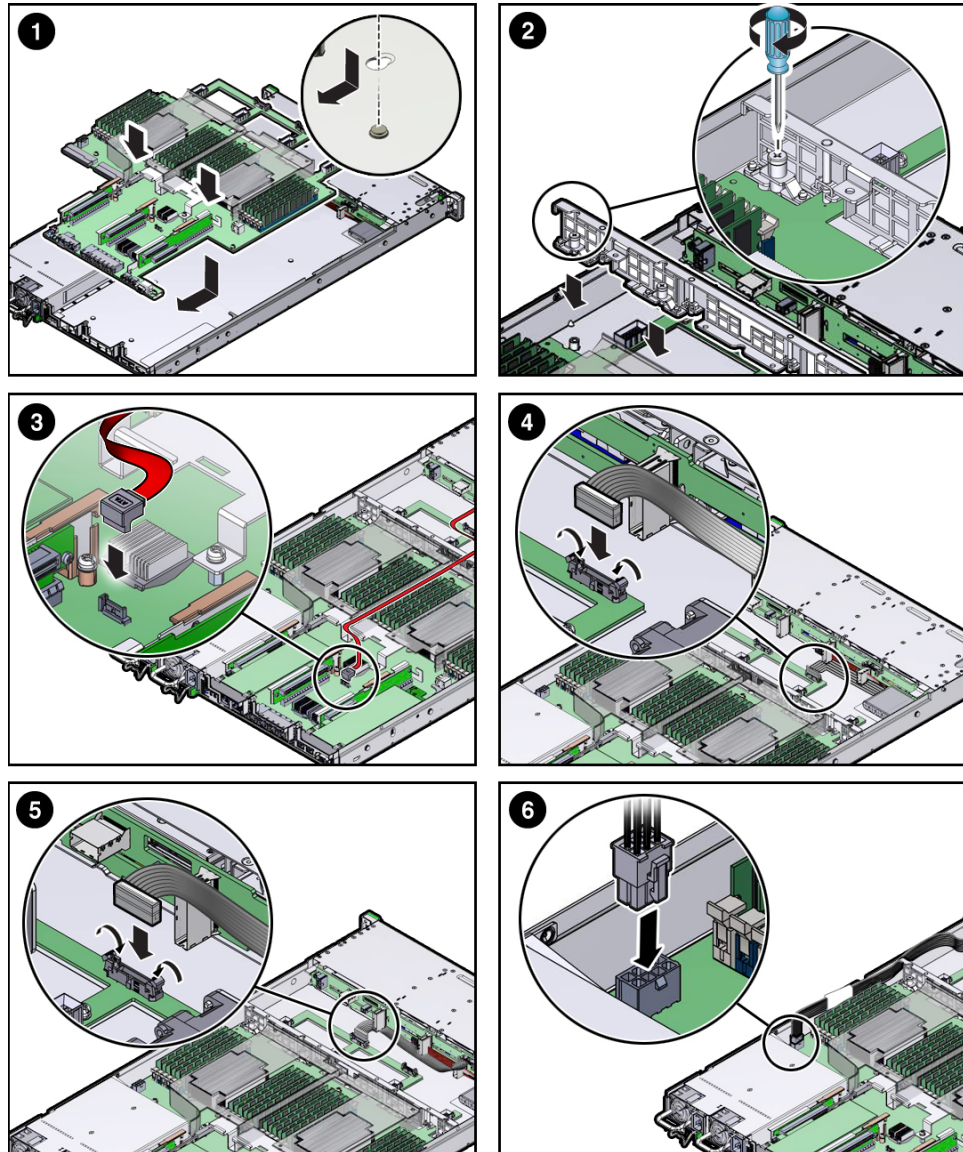
3. **Install the server mid-wall [2].**

   a. **Lay the SAS cables and super capacitor cable along the left chassis sidewall (viewing the server form the front).**
      You will connect these cables to the internal HBA card later.

   b. **Position the mid-wall over the front of the motherboard so that it engages the mushroom-shaped standoffs that are located on the server chassis sidewall (one for each end of the mid-wall).**

   c. **Ensure that SAS cables and super capacitor cable are not pinched by the mid-wall and that they run beside the mid-wall and not under it; otherwise, the cables might be damaged.**

   d. **To secure the mid-wall to the server chassis, use a screwdriver (No. 2 Phillips or flathead) to tighten the four green captive screws.**

4. **If the server has a switch card, carefully guide card cables through the chassis mid-wall.**
   You will connect these cables to the switch card later.

5. **If the server has a DVD drive, carefully guide the DVD drive cable through the mid-wall and reconnect it to the motherboard [3].**

6. **To install the front indicator module (FIM) cable, push the side latches on the motherboard connector to the open position and push the FIM cable connector in [4].**
   The side latches close, locking the connector in place.

7. **Reconnect the disk backplane Auxiliary power and signal cable to the motherboard [5].**

8. **Reconnect the disk backplane power cable to the motherboard [6].**

9. **Reinstall the following reusable components:**

   a. **If the server is equipped with the switch card, reconnect the cables to the card and install it in PCIe slot 1.**
      For instructions, see "Install the Oracle PCIe NVMe Switch Card in PCIe Slot 1" on page 145.

   b. **PCIe risers and attached PCIe cards**

For instructions, see "Servicing PCIe Risers (CRU)" on page 106.

c. Power supplies

⚠ **Caution -** When reinstalling power supplies, it is important to reinstall them into the slots from which they were removed during the motherboard removal procedure; otherwise, the server key identity properties (KIP) data might be lost. When a server requires service, the KIP is used by Oracle to verify that the warranty on the server has not expired. For more information on KIP, see "FRU Key Identity Properties (KIP) Automated Update" on page 55.

For instructions, see "Install a Power Supply" on page 90.

d. Fan modules

For instructions, see "Install a Fan Module" on page 86.

10. **Return the server to operation.**

a. Install the server top cover.

See "Install the Server Top Cover" on page 198.

b. Close the server fan door.

c. Return the server to the normal rack position.

See "Return the Server to the Normal Rack Position" on page 201.

d. Reconnect the data cables to the server and reconnect the power cords to the server power supplies.

See "Reconnect Data Cables and Power Cords" on page 203.

e. Power on the server.

See "Power On the Server" on page 205.

Verify that the Power/OK status indicator is steady on.

Note - IMPORTANT: After replacing the motherboard, you might need to manually program the product serial number (PSN) into the new motherboard. This is necessary because the motherboard is a secondary member of a select group (or quorum) of components for maintaining the PSN for service entitlement, and if you replace more than one of the quorum members during any given service procedure, a secondary quorum member might need to be programmed with the PSN.

Related Information

- "Remove the Motherboard" on page 171

Servicing the Internal HBA SAS Cable assembly

⚠️ **Caution -** The internal HBA SAS cable assembly should be serviced only by authorized Oracle Services personnel.

⚠️ **Caution -** These procedures require that you handle components that are sensitive to electrostatic discharge. This sensitivity can cause the components to fail. To avoid damage, ensure that you follow antistatic practices as described in "Take Antistatic Measures" on page 65.

⚠️ **Caution -** The system supplies power to the cables even when the server is powered off. To avoid personal injury or damage to the server, you must disconnect power cords before servicing the cables.

Tfhis section covers the following procedures:

- "Remove the Internal HBA SAS Cable Assembly" on page 183
- "Install the Internal HBA SAS Cable Assembly" on page 186

Related Information

- "Extend the Server to the Maintenance Position" on page 63
- "Take Antistatic Measures" on page 65
- "Remove the Server Top Cover" on page 67

▼ Remove the Internal HBA SAS Cable Assembly

⚠️ **Caution -** The internal HBA SAS cable assembly should be removed only by an Oracle qualified service technician.

1. Prepare the server for service.

a. **Power off the server and disconnect the power cords from the power supplies.**

See .

b. **Extend the server to the maintenance position.**

See .

c. **Attach an antistatic wrist strap to your wrist, and then to a metal area on the chassis.**

See .

d. **Remove the server top cover.**

See .

2. **Remove all of the server fan modules.**

See .

3. **Remove the PCIe riser from PCIe slots 3 and 4.**

See .

4. **To disconnect each SAS cables from the disk backplane, press the latch on the cable connectors and pull the connectors out. [1].**
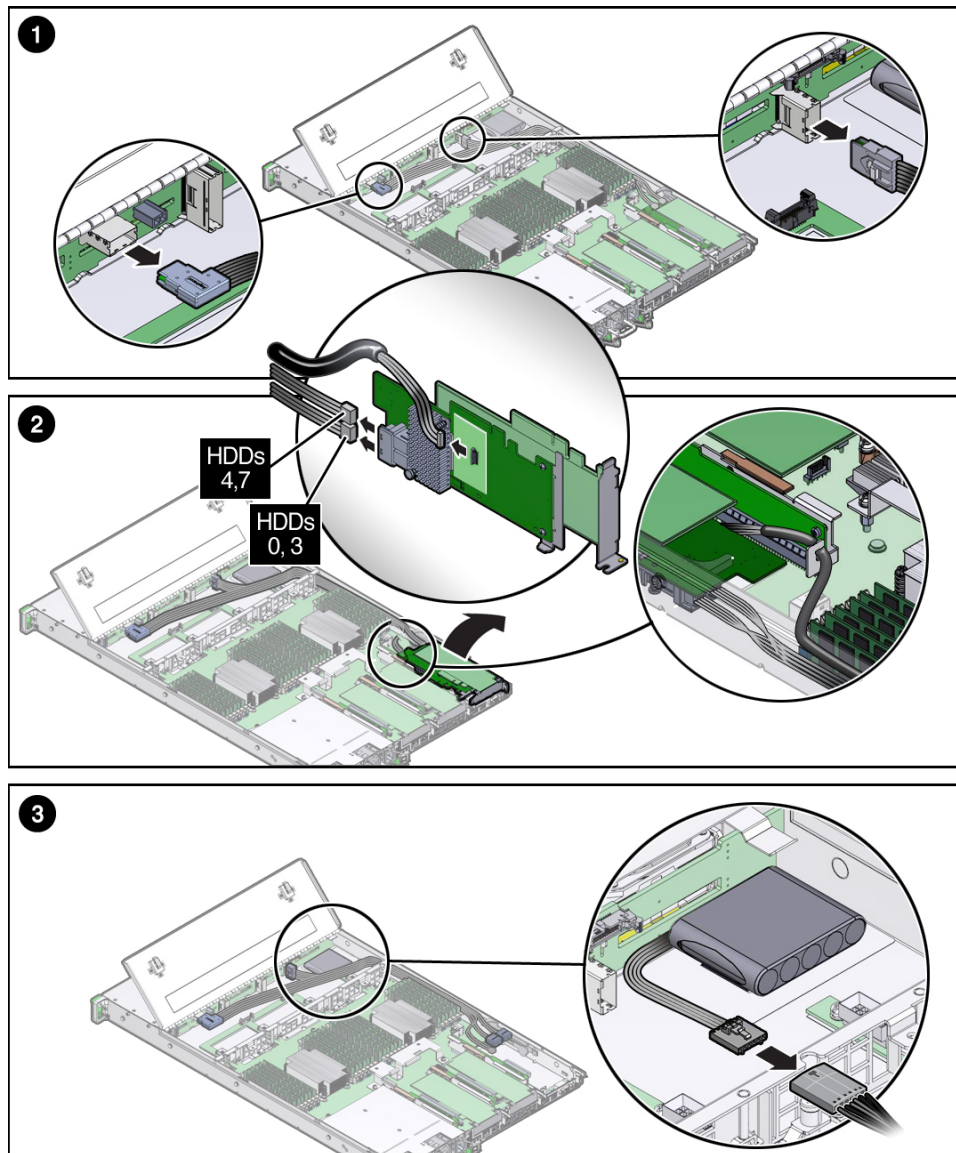
5. **Disconnect the SAS cables and the super capacitor cable from the internal host bus adapter (HBA).**

   a. **Remove the PCIe riser from PCIe slot 3 and 4.**

      See

   b. **On the under side of the HBA, card press the SAS cable connector latches and then pull out the connectors [2].**

   c. **On the under side of the HBA card, grasp the super capacitor connector and pull it out [2].**

6. **Disconnect the super capacitor cable from the super capacitor [3].**

7. **Carefully remove the SAS cables and the super capacitor cable from the server.**

   Related Information

   -

▼ Install the Internal HBA SAS Cable Assembly

⚠ **Caution -** The internal HBA SAS cable assembly should be installed only by an Oracle qualified service technician.

1. **Carefully guide SAS cables and the super capacitor cable along the side of the chassis.**

2. **Connect the super capacitor cable to the super capacitor [3].**

   For reference, use the illustration provided in .

3. **Connect the SAS cables the super capacitor cable to the internal HBA card [2].**

4. **Install the SAS cables into the disk backplane [1].**

5. **Install the PCIe riser with the internal HBA card into PCIe slot 3.**

   See .

6. **Install all of the server fan modules.**

See "Install a Fan Module" on page 86.

7. Return the server to operation.

a. Install the server top cover.

See "Install the Server Top Cover" on page 198.

b. Close the server fan door.

c. Return the server to the normal rack position.

See "Return the Server to the Normal Rack Position" on page 201.

d. Reconnect the data cables to the server and reconnect the power cords to the server power supplies.

See "Reconnect Data Cables and Power Cords" on page 203.

e. Power on the server.

See "Power On the Server" on page 205.

Verify that the Power/OK status indicator is steady on.

Related Information

- "Remove the Internal HBA SAS Cable Assembly" on page 183

Servicing the NVMe Cables

Caution - The NVMe cables should be serviced only by authorized Oracle Services personnel.

Caution - These procedures require that you handle components that are sensitive to electrostatic discharge. This sensitivity can cause the components to fail. To avoid damage, ensure that you follow antistatic practices as described in "Take Antistatic Measures" on page 65.

Caution - The system supplies power to the cables even when the server is powered off. To avoid personal injury or damage to the server, you must disconnect power cords before servicing the cables.

This section covers the following procedures:

- "Removing the NVMe Cables" on page 188
- "Install the NVMe Cables" on page 190

Related Information

- "Extend the Server to the Maintenance Position" on page 63
- "Take Antistatic Measures" on page 65
- "Remove the Server Top Cover" on page 67

▼ Removing the NVMe Cables

⚠ **Caution -** The Oracle PCIe NVMe switch card cables should be removed only by an Oracle qualified service technician.

1. **Prepare the server for service.**

   a. **Power off the server and disconnect the power cords from the power supplies.**

   See "Powering Down the Server" on page 57.

   b. **Extend the server to the maintenance position.**

   See "Extend the Server to the Maintenance Position" on page 63.

   c. **Attach an antistatic wrist strap to your wrist, and then to a metal area on the chassis.**

   See "Take Antistatic Measures" on page 65.

   d. **Remove the server top cover.**

   See "Remove the Server Top Cover" on page 67.

2. **Remove the two middle server fan modules.**

   See "Remove a Fan Module" on page 82.

3.   **To disconnect the switch card cables from the disk backplane, press the latches on the cable connectors and pull the connectors out [1].**
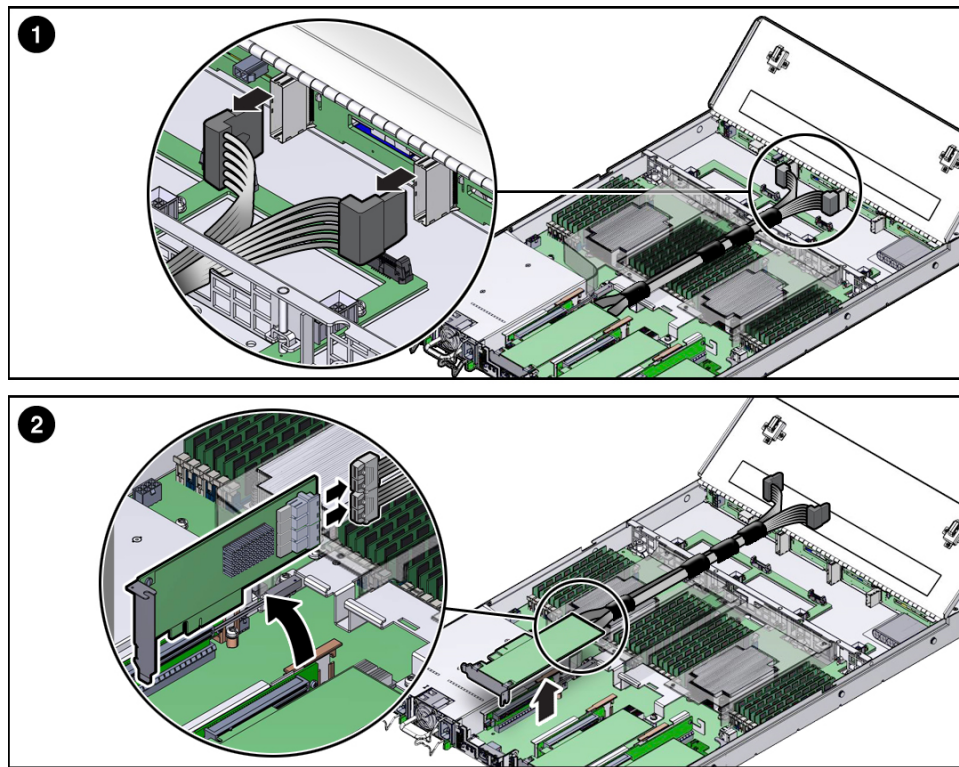
4.   **Remove the PCIe riser that contains the switch card from PCIe slot 1.**

See .

5.   **Disconnect the cables from the switch card. [2]**

6.   **Carefully pull the switch card cables through chassis mid-wall and remove them from the server.**

   Related Information

   ■

▼ **Install the NVMe Cables**

⚠️ **Caution -** The NVMe cables should be installed only by an Oracle qualified service technician.

1. **Guide the switch card cables through the chassis mid-wall and place them in cable trough in the air baffle and in the cable trough in the metal bracket just to the rear of the DIMMs [1].**
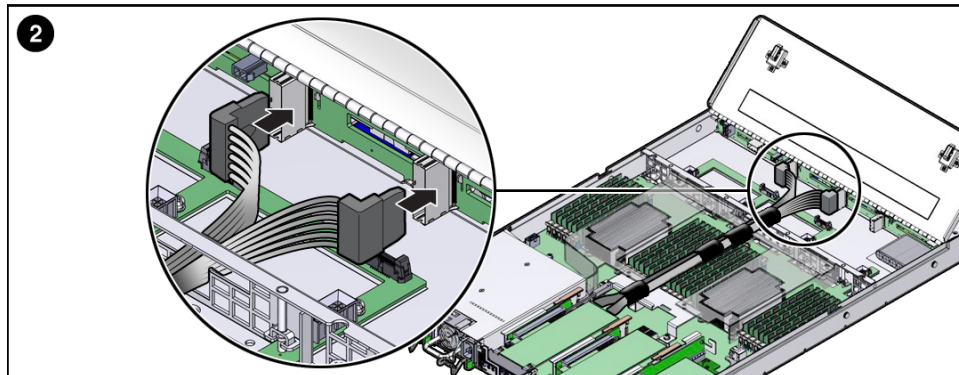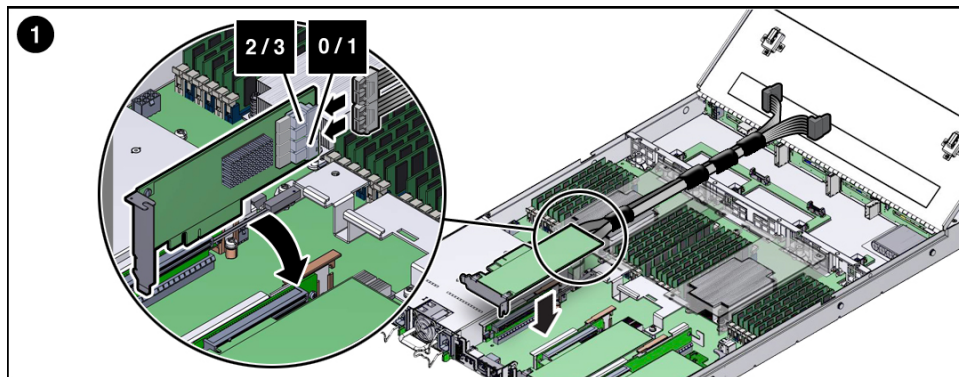
2. **Connect the cables to the switch card. [1].**

3. **Install the PCIe riser with the switch card into PCIe slot 1.**
   See .

4. **Connect the switch card cables to the disk backplane [2].**

5. **Install the two middle server fan modules.**

See "Install a Fan Module" on page 86.

6. **Return the server to operation.**

a. **Install the server top cover.**

See "Install the Server Top Cover" on page 198.

b. **Close the server fan door.**

c. **Return the server to the normal rack position.**

See "Return the Server to the Normal Rack Position" on page 201.

d. **Power on the server.**

See "Power On the Server" on page 205.

Verify that the Power/OK status indicator is steady on.

Related Information

- "Install the NVMe Cables" on page 190

Servicing the Power, FIM, Disk Backplane Data, and DVD Cables

⚠ **Caution -** The Power, front indicator module, disk backplane data, and DVD cables should be serviced only by authorized Oracle Services personnel.

⚠ **Caution -** The system supplies power to the cables even when the server is powered off. To avoid personal injury or damage to the server, you must disconnect power cords before servicing the cables.

This section covers the following procedures:

- "Remove the Internal HBA SAS Cable Assembly" on page 183
- "Install the Internal HBA SAS Cable Assembly" on page 186

Related Information

- "Extend the Server to the Maintenance Position" on page 63
- "Take Antistatic Measures" on page 65
- "Remove the Server Top Cover" on page 67

▼ Removing the Power, FIM, Disk Backplane Data, and DVD Cables

⚠ **Caution -** The Power, front indicator module, disk backplane data, and DVD cables should be removed only by authorized Oracle Services personnel.

1. **Prepare the server for service.**

   a. **Power off the server and disconnect the power cords from the power supplies.**

      See "Powering Down the Server" on page 57.

   b. **Extend the server to the maintenance position.**

      See "Extend the Server to the Maintenance Position" on page 63.

   c. **Attach an antistatic wrist strap to your wrist, and then to a metal area on the chassis.**

      See "Take Antistatic Measures" on page 65.

   d. **Remove the server top cover.**

      See "Remove the Server Top Cover" on page 67.

2. **Remove all of the server fan modules.**

   See "Remove a Fan Module" on page 82.

3. **To remove the disk backplane power cable, perform these steps:**

   a. **To disconnect the disk backplane power cable from the motherboard, press the release latches on the sides of the cable connector and pull the connector out. [1].**

b.   **To disconnect the disk backplane power cable from the disk backplane, press the release latches on the side of the cable connector and pull the connector out. [2].**
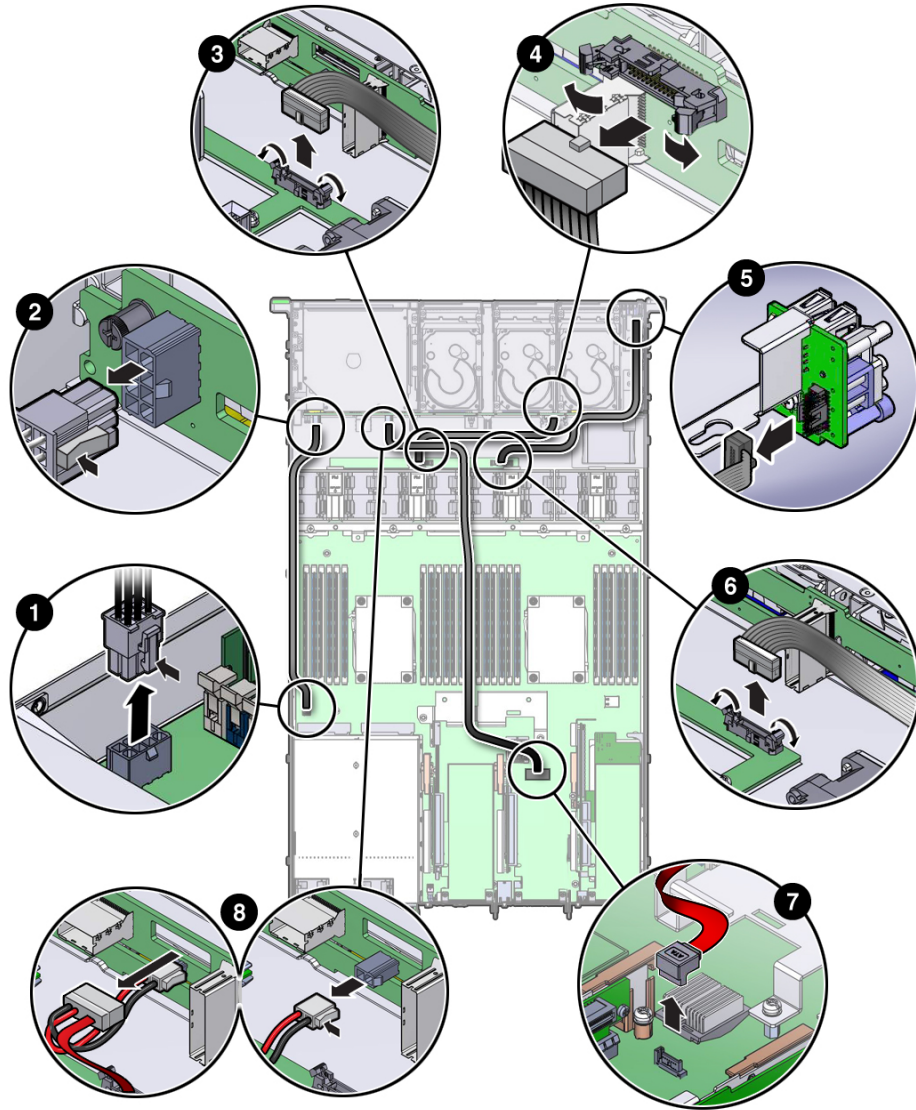
4. **To remove the Auxiliary power and signal cable, perform these steps:**

   a. **To eject the auxiliary power and signal cable from the motherboard, open the latches on the connector [3].**

   b. **To eject the auxiliary power and signal cable from the disk backplane, open the latches on the connector [4].**

5. **To remove the FIM cable, perform these steps:**

   a. **Remove the FIM from the server.**
      See "Remove the Front Indicator Module" on page 167

   b. **Disconnect the FIM cable from the FIM [5].**

   c. **To eject the FIM cable from the motherboard, open both side latches [6].**

6. **To remove the DVD cable, perform these steps:**

   a. **If there is a PCIe card installed in PCIe slot 2, remove the PCIe riser and card from PCIe slot 2.**
      See "Remove a PCIe Riser From PCIe Slot 1 or 2" on page 108

   b. **Disconnect connect the DVD cable from the motherboard [7].**

   c. **Disconnect the DVD cable connector from the rear of the DVD drive and the DVD power connector from the disk backplane [8].**

   Related Information

   - "Install the Power, FIM, Disk Backplane Data, and DVD Cables " on page 194

▼ Install the Power, FIM, Disk Backplane Data, and DVD Cables

> ⚠ **Caution -** The Power, front indicator module, disk backplane data, and DVD cables should be installed only by authorized Oracle Services personnel.

1. **Install the DVD cable.**

    a. **Connect the DVD cable to the rear of the DVD drive and the DVD power connector to the disk backplane.**

    b. **Connect connect the DVD cable to the motherboard [7].**

      For reference, use the illustration provided in "Removing the Power, FIM, Disk Backplane Data, and DVD Cables" on page 192.

    c. **If you removed a PCIe card from PCIe slot 2, install the PCIe riser and card into PCIe slot 2.**

      See "Install a PCIe Riser Into PCIe Slot 1 or 2" on page 110

2. **Install the FIM cable.**

    a. **To install the FIM cable into the motherboard, open both side latches and plug the FIM connector into motherboard connector [6].**

      The motherboard connector side latches will close, locking the FIM cable connector in place.

    b. **Connect the FIM cable to the FIM [5].**

    c. **Install the FIM into the server.**

      See "Install the Front Indicator Module " on page 169

3. **Install the Auxiliary power and signal cable.**

    a. **To install the auxiliary power and signal cable into the disk backplane, ensure that the latches on the disk backplane connector are in the open position and plug the cable connector into the disk backplane connector [4].**

      The disk backplane connector side latches will close, locking the auxiliary power and signal cable connector in place.

    b. **To install the auxiliary power and signal cable into the motherboard, ensure that the latches on the motherboard connector are in the open position and plug the cable connector into the motherboard connector [3].**

      The motherboard connector side latches will close, locking the auxiliary power and signal cable connector in place.

4. **Install the disk backplane power cable.**

    a. **To connect the disk backplane power cable to the disk backplane, plug the cable connector into the disk backplane connector. [2].**

    b. **To connect the disk backplane power cable to the motherboard, plug the cable connector into the motherboard connector. [1].**

5. **Install all of the server fan modules.**

See "Install a Fan Module" on page 86.

6. **Return the server to operation.**

    a. **Install the server top cover.**

See "Install the Server Top Cover" on page 198.

    b. **Close the server fan door.**

    c. **Return the server to the normal rack position.**

See "Return the Server to the Normal Rack Position" on page 201.

    d. **Power on the server.**

See "Power On the Server" on page 205.

Verify that the Power/OK status indicator is steady on.

Related Information

- "Removing the Power, FIM, Disk Backplane Data, and DVD Cables" on page 192

Returning the Server to Operation

After replacing components inside of the server, perform the procedures in the following sections.

Description	Links
Learn about filler panels.	"Removing and Installing Server Filler Panels" on page 197
Install the server top cover.	"Install the Server Top Cover" on page 198
Remove antistatic measures.	"Remove Antistatic Measures" on page 200
Install the server chassis into the rack.	"Reinstall the Server Into the Rack" on page 200
Return the server to the normal rack position.	"Return the Server to the Normal Rack Position" on page 201
Reconnecting data cables and power cords.	"Reconnect Data Cables and Power Cords" on page 203
Power on the server.	"Power On the Server" on page 205

Removing and Installing Server Filler Panels

Each server might be shipped with module-replacement filler panels for storage drives and PCIe cards. These filler panels are installed at the factory and must remain in the server until you replace them with a purchased option.

Before you can install an optional server component into the server, you must remove the filler panel from the location into which you intend to install the component. When you remove a storage drive or a PCIe card from the server, you must install either a replacement component or a filler panel.

See the following procedure for instructions for removing and installing the server filler panels:

- "Remove and Install Filler Panels" on page 198

Related Information

- "Servicing CRUs That Do Not Require Server Power-Off" on page 69

■ "Servicing CRUs That Require Server Power-Off" on page 93

▼ Remove and Install Filler Panels

● **See the procedures in the following table to remove and install filler panels for storage drives and PCIe cards.**

Filler Panel Type	Removal Procedure	Installation Procedure
Storage Drive	1. Locate the storage drive filler panel to be removed from the server. 2. To unlatch the storage drive filler panel, pull the release lever, and then tilt the lever out into a fully opened position. 3. To remove the filler panel from the slot, hold the opened release lever, and gently slide the filler panel toward you.	1. Locate the vacant storage drive module slot in the server, and then ensure that the release lever on the filler panel is fully opened. 2. Slide the filler panel into the vacant slot by pressing the middle of the filler panel faceplate with your thumb or finger. 3. The release lever will close as it makes contact with the chassis. Do not slide the filler panel in all the way. Leave the filler panel out approximately 0.25 to 0.50 inch (6 to 12 mm) from the opening. 4. Using your thumb or finger, press on the middle of the filler panel faceplate until the release lever engages with the chassis. 5. Close the release lever until it clicks into place and is flush with the front of the server
PCI Slot	1. Remove the server top cover. 2. To remove the PCIe slot filler panel, rotate the PCIe locking mechanism, and then lift and remove the PCIe slot filler panel from the location into which you intend to install the PCIe card. **Note:** In single-processor systems, PCIe slot 1 is nonfunctional; therefore, there is no need to remove the filler panel for slot 1	1. Remove the server top cover. 2. To install the PCIe slot filler panel, press the PCIe filler panel into the vacant PCIe slot, and then rotate the PCIe locking mechanism to secure the PCIe slot filler panel. **Note:** In single-processor systems, PCIe slot 1 is nonfunctional; therefore, the server ships with this filler panel installed.

▼ Install the Server Top Cover

1. **Open the server fan door.**
   See "Open the Server Fan Door" on page 66.

2. **Place the top cover on the chassis [1].**
   Place the cover down so that it hangs over the rear of the server by about 13 mm (0.5 inches) and the side latches align with the slots in the sides of the chassis.

> **Note -** There are three latching tabs on the sides of the cover, two on the right side and one on the left side (viewing the server from the front). There is also a latch on the underside of the cover in the front left corner.

3. **Check both sides of the chassis to ensure that the four corners of the top cover are fully down and flush with the chassis.**

   If the cover corners are not flush with the chassis, slide the cover towards the rear of the chassis until you can position the cover correctly.

> **Caution -** If the top cover is not correctly positioned before you attempt to slide the cover toward the front of the chassis, the internal latch that is located on the underside of the cover might be damaged.

4. **Gently slide the cover toward the front of the chassis until it locks into place (with an audible click) [2].**

   As you slide the cover toward the front of the server, watch the green release button. You will hear an audible click when the green release button pops up, indicating that the cover is locked.
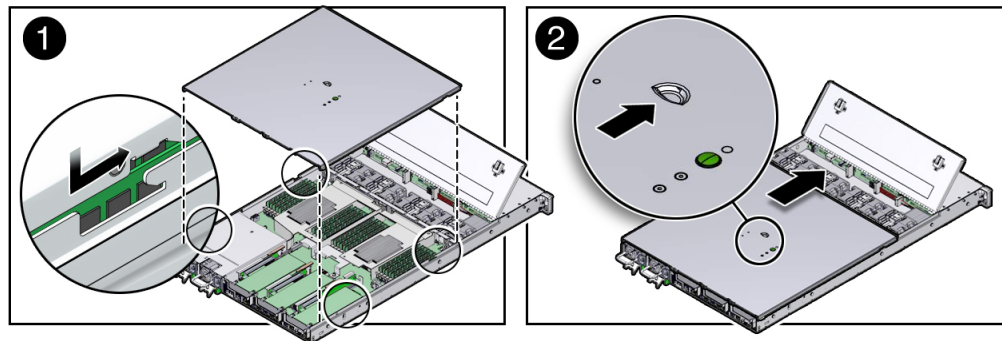
5. **Close the server fan door.**

6. **Remove the antistatic precautions.**

   See "Remove Antistatic Measures" on page 200.

   Related Information

   - "Remove the Server Top Cover" on page 67

- "Remove Antistatic Measures" on page 200

▼ Remove Antistatic Measures

1. **Remove any antistatic straps or conductors from the server chassis.**

2. **Remove the antistatic wrist strap from yourself.**

▼ Reinstall the Server Into the Rack

If you removed the server chassis from the rack, perform these steps to reinstall it.

⚠️ **Caution -** Deploy any rack anti-tilt mechanisms before installing the server into the rack.

⚠️ **Caution -** The server weighs approximately 18.1 kg (40.0 lbs). Two people are required to carry the chassis and install it into the rack.

1. **Push the slide-rails into the slide-rail assemblies in the rack as far as possible.**

2. **Raise the server so that the rear ends of the mounting brackets are aligned with the slide-rail assemblies that are mounted in the rack.**

3. **Insert the mounting brackets into the slide-rails, and then push the server into the rack until the mounting brackets encounter the slide-rail stops, approximately 30 cm (12 inches).**

The server is now in the extended maintenance position.
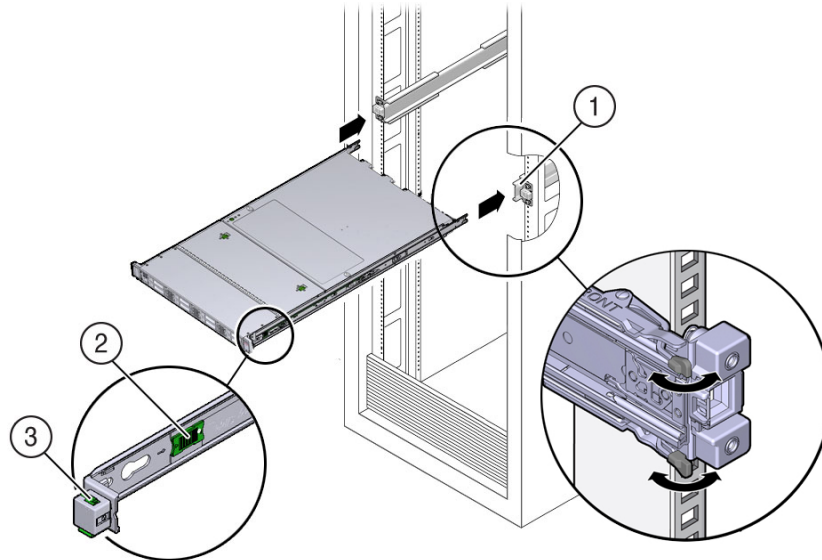
Callout	Description
1	Inserting mounting brackets into slide-rails
2	Slide-rail release tab (green)
3	Slide-rail lock

Related Information

- "Remove the Server From the Rack" on page 65
- "Remove Antistatic Measures" on page 200
- "Reconnect Data Cables and Power Cords" on page 203

▼ # Return the Server to the Normal Rack Position

If the server is in the extended maintenance position, use this procedure to return the server to the normal rack position.

1. **Push the server back into the rack, as described in the following steps.**

   a. **Simultaneously pull and hold the two green release tabs (one on each side of the slide rails on the server) toward the front of the server while you push the server into the rack.**

      As you push the server into the rack, verify that the cable management arm (CMA) retracts without binding.

      Note - To pull a green release tab, place your finger in the center of the tab, not on the end, and apply pressure as you pull the tab toward the front of the server.
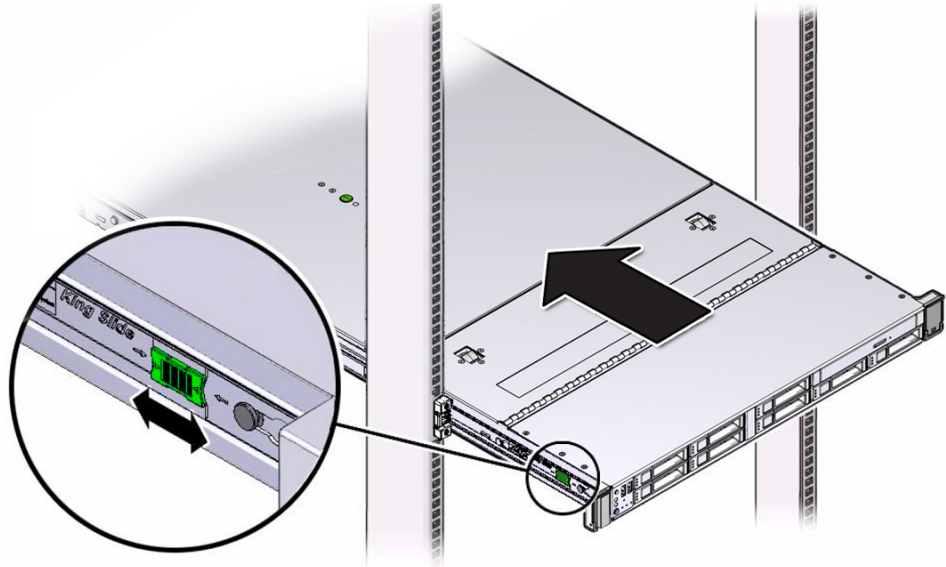
   b. **Continue pushing the server into the rack until the slide-rail locks (on the front of the server) engage the slide-rail assemblies.**

      You will hear an audible click when the server is in the normal rack position.

2. **If the CMA is not installed, that is, you removed it because you removed the server completely out of the rack, install the CMA.**

   For installation instructions for the CMA, refer to "Install the Cable Management Arm" in *Oracle Server X6-2 Installation Guide*.

3. **If the cables are disconnected from the rear of the server, that is, you disconnected the cables because you removed the server completely out of the rack, reconnect the cables.**

   - For instructions on reconnecting cables to the rear of the server, see "Reconnect Data Cables and Power Cords" on page 203.
   - For detailed information on connecting cables to the rear of the server, refer to "Rear Cable Connections and Ports" in *Oracle Server X6-2 Installation Guide*.

   Related Information

   - "Reconnect Data Cables and Power Cords" on page 203

▼ **Reconnect Data Cables and Power Cords**

1. **Reconnect the data cables to the rear of the server, as required.**

   If the cable management arm (CMA) is in the way, extend the server approximately 13 cm (5 inches) out of the front of the rack.

2. Reconnect the power cables to the power supplies and secure them with the reclosable straps as shown in the following figure.
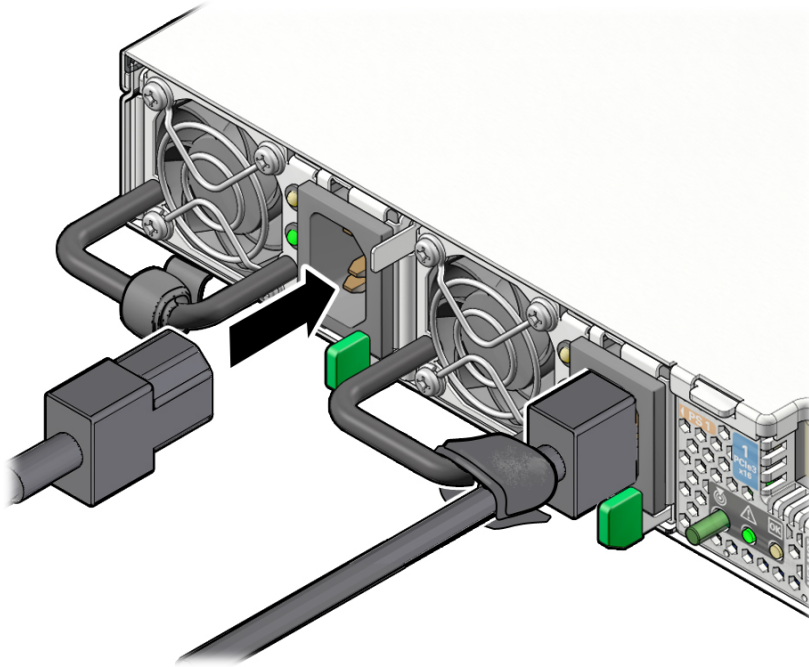
3. If necessary, reinstall the cables into the CMA and secure them with the reclosable cable straps.

4. If you pulled the server out of the rack to make it easier to connect the cables, push the server into the rack until the slide-rail locks (on the front of the server) engage the slide-rail assemblies.

You will hear an audible click when the server is in the normal rack position.

Related Information

- "Disconnect Cables From the Server" on page 62
- "Reinstall the Server Into the Rack" on page 200
- "Return the Server to the Normal Rack Position" on page 201
- "Power On the Server" on page 205

▼ Power On the Server

As soon as the power cords are connected, standby power is applied and the green Power/OK status indicator on the server front panel blinks. Depending on the configuration of the firmware, the system might boot. If it does not boot, follow this procedure.

● **Power on the server by performing one of the following:**

- Press the Power button on the server front panel.

   or
- Log in to the Oracle ILOM web interface, click Host Management → Power Control and select Power On from the Select Action list.

   or
- Log in to the Oracle ILOM command-line interface (CLI), and type the following command at the Oracle ILOM prompt:

   `-> start /System`

When the server is powered on and the power-on self-test (POST) code checkpoint tests have completed, the green Power/OK status indicator on the front panel lights and remains lit.

Related Information

- "Powering Down the Server" on page 57
- "Reconnect Data Cables and Power Cords" on page 203

Identifying the Server Ports

This section describes the pinouts of the server connectors.

Description	Links
Learn about the Gigabit Ethernet ports.	"Gigabit Ethernet Ports" on page 207
Learn about the network management port.	"Network Management Port" on page 208
Learn about the serial management port.	"Serial Management Port" on page 209
Learn about the video connector.	"Video Connector" on page 211
Learn about USB ports.	"USB Ports" on page 211

Gigabit Ethernet Ports

The server has four auto-negotiating 100/1000/10,000BASE-T gigabit Ethernet (GbE) system domain ports. All four Ethernet ports use a standard RJ-45 connector. The transfer rates are shown in the following table.

TABLE 14   Ethernet Port Transfer Rates

Connection Type	IEEE Terminology	Transfer Rate
Fast Ethernet	100BASE-TX	100 Mbps
Gigabit Ethernet	1000BASE-T	1,000 Mbps
10 Gigabit Ethernet	10GBASE-T	10,000 Mbps

The following figure and table describe the 10-GbE port pin signals.
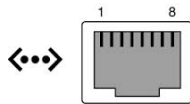
> **Note -** Ethernet ports NET 2 and NET 3 are nonfunctional in single-processor systems.

TABLE 15   10-GbE Port Signals

Pin	Signal Description	Pin	Signal Description
1	Transmit/Receive Data 0 +	5	Transmit/Receive Data 2 –
2	Transmit/Receive Data 0 –	6	Transmit/Receive Data 1 –
3	Transmit/Receive Data 1 +	7	Transmit/Receive Data 3 +
4	Transmit/Receive Data 2 +	8	Transmit/Receive Data 3 –

Related Information

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Network Management Port

The server has one 10/100/1000BASE-T Ethernet management domain interface, labeled NET MGT. For information on configuring this port for managing the server with Oracle ILOM, refer to the Oracle Integrated Lights Out Manager (ILOM) 5.0 Documentation Library at `https://www.oracle.com/goto/ilom/docs`.
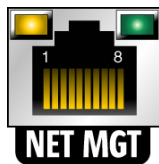
TABLE 16   Network Management Port Signals

Pin	Signal Description	Pin	Signal Description
1	Transmit Data +	5	Common Mode Termination
2	Transmit Data –	6	Receive Data –
3	Receive Data +	7	Common Mode Termination

Pin	Signal Description	Pin	Signal Description
4	Common Mode Termination	8	Common Mode Termination

Related Information

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Serial Management Port

The serial management connector (labeled SER MGT) is an RJ-45 connector that can be accessed from the rear panel. This port is the default connection to the server. Use this port *only* for server management.

TABLE 17   Default Serial Connections for Serial Port

Parameter	Setting
Connector	SER MGT
Rate	9600 baud
Parity	None
Stop bits	1
Data bits	8

The following figure and table describe the SER MGT port pin signals.

TABLE 18   Serial Management Port Signals

Pin	Signal Description	Pin	Signal Description
1	Request to Send	5	Ground

Pin	Signal Description	Pin	Signal Description
2	Data Terminal Ready	6	Receive Data
3	Transmit Data	7	Data Set Ready
4	Ground	8	Clear to Send

If you need to connect to the SER MGT port using a cable with either a DB-9 or a DB-25 connector, follow the pin descriptions in the tables to create a crossover adapter appropriate for your serial connection.

TABLE 19   RJ-45 to DB-9 Adapter Crossover Wiring Reference

Serial Port (RJ-45 Connector)		DB-9 Adapter	
Pin	Signal Description	Pin	Signal Description
1	RTS	8	CTS
2	DTR	6	DSR
3	TXD	2	RXD
4	Signal Ground	5	Signal Ground
5	Signal Ground	5	Signal Ground
6	RXD	3	TXD
7	DSR	4	DTR
8	CTS	7	RTS

TABLE 20   RJ-45 to DB-25 Adapter Crossover Wiring Reference

Serial Port (RJ-45 Connector)		DB-25 Adapter	
Pin	Signal Description	Pin	Signal Description
1	RTS	5	CTS
2	DTR	6	DSR
3	TXD	3	RXD
4	Signal Ground	7	Signal Ground
5	Signal Ground	7	Signal Ground
6	RXD	2	TXD
7	DSR	20	DTR
8	CTS	4	RTS

Related Information

- "Server Back Panel View" on page 18
- "Disconnect Cables From the Server" on page 62

■ "Reconnect Data Cables and Power Cords" on page 203

Video Connector

The video connector is a DB-15 connector that can be accessed from the back panel.
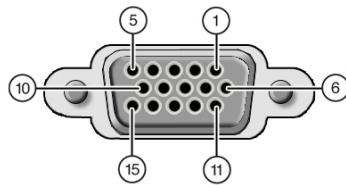
TABLE 21   Video Connector Signals

Pin	Signal Description	Pin	Signal Description
1	Red Video	9	[KEY]
2	Green Video	10	Sync Ground
3	Blue Video	11	Monitor ID - Bit 1
4	Monitor ID - Bit 2	12	Monitor ID - Bit 0
5	Ground	13	Horizontal Sync
6	Red Ground	14	Vertical Sync
7	Green Ground	15	N/C (Reserved)
8	Blue Ground		

Related Information

■ "Server Back Panel View" on page 18
■ "Disconnect Cables From the Server" on page 62
■ "Reconnect Data Cables and Power Cords" on page 203

USB Ports

The server has six USB ports for attaching supported USB 2.0-compliant devices. There are two USB ports on the server front panel, two on the rear panel, and two on the motherboard.
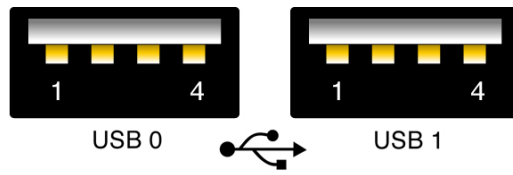
TABLE 22   USB Port Signals

Pin	Signal Description
1	+5 V
2	DAT-
3	DAT+
4	Ground

Related Information

- "Server Back Panel View" on page 18
- "Disconnect Cables From the Server" on page 62
- "Reconnect Data Cables and Power Cords" on page 203

Setting Up BIOS Configuration Parameters

This section provides an overview of BIOS configuration management, Legacy BIOS, UEFI BIOS, and the BIOS Setup Utility.

Description	Links
Learn about the tools available to manage the BIOS configuration.	"Managing the BIOS Configuration" on page 213
Learn how to access the BIOS Setup Utility.	"Accessing the BIOS Setup Utility" on page 214
Learn about Legacy BIOS and UEFI BIOS.	"Using UEFI" on page 219
Learn how BIOS allocates Option ROM resources.	"Using BIOS for Legacy Option ROM Resource Allocation" on page 222
Learn how to perform common BIOS setup procedures.	"Common BIOS Setup Utility Tasks" on page 223

Related Information

Managing the BIOS Configuration

The BIOS configuration parameters on an Oracle x86 server are manageable from the BIOS Setup Utility and Oracle ILOM. For information about using these tools to manage the BIOS configuration, refer to:

- **Oracle ILOM** – "Maintaining x86 BIOS Configuration Parameters" in the *Oracle ILOM Administrator's Guide for Configuration and Maintenance Firmware Release 5.0.x* in the Oracle Integrated Lights Out Manager (ILOM) 5.0 Documentation Library at `https://www.oracle.com/goto/ilom/docs`.
- **BIOS Setup Utility** – "Common BIOS Setup Utility Tasks" on page 223

If the PCIe riser fault message in Oracle ILOM is not cleared under Open Problems, you must manually clear the fault in Oracle ILOM. For instructions for manually clearing a

PCIe riser fault, see the procedure "Clear Faults for Undetected Replaced or Repaired Hardware Components" in the *Oracle ILOM User's Guide for System Monitoring and Diagnostics Firmware Release 5.0.x* in the Oracle Integrated Lights Out Manager (ILOM) 5.0 Documentation Library at `https://www.oracle.com/goto/ilom/docs`.

Related Information

- Oracle Integrated Lights Out Manager (ILOM) 5.0 Documentation Library at: `https://www.oracle.com/goto/ilom/docs`

Accessing the BIOS Setup Utility

The BIOS Setup Utility provides five main menus that you can use to view product information, and to configure, enable, and disable, or manage system components.

This section provides the following information:

BIOS Setup Utility Menus

The following table provides descriptions for the top-level BIOS Setup Utility menus.

TABLE 23   BIOS Setup Utility Menus Summary

Menu	Description
Main	General product information, including memory, time/date, security settings, system serial number, and CPU and DIMM information.
Advanced	Configuration information for the CPU, trusted computing, USB, and other information. Set the IP address for the server SP. **Note -** When operating in UEFI Boot Mode, Runtime UEFI driver configuration settings let you manage PCIe drivers for all configurable devices.
Boot	Set the boot mode to Legacy BIOS or UEFI BIOS, and configure the boot device priority.
IO	Manage configuration settings for I/O devices, such as I/O virtualization settings, and enable and disable Option ROMs.
Save & Exit	Save changes and exit, discard changes and exit, discard changes, or restore the default BIOS settings.

See for examples of each of these screens.

Related Information

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BIOS Key Mappings

When viewing the BIOS output from a terminal using the serial console redirection feature, some terminals do not support function keys. BIOS supports the mapping of function keys to Control key sequences when serial redirection is enabled. The following table provides a description of the function key to Control key sequence mappings.

TABLE 24   Function Key to Control Key Sequence Mapping

Function Key	Control Key Sequence	BIOS POST Function	BIOS Setup Function
F1	Ctrl+Q	Not applicable	Activate the Setup Utility Help menu.
F2	Ctrl+E	Enter BIOS Setup Utility while the system is performing the power-on self-test (POST).	Not applicable
F7	Ctrl+D	Not applicable	Discard changes. (Not applicable to UEFI Driver Control menu)
F8	Ctrl+P	Activate the BIOS Boot Menu.	Not applicable
F10	Ctrl+S	Not applicable	Activate Save and Exit pop-up menu. (Not applicable to UEFI Driver Control menu)
F12	Ctrl+N	Activate Network boot.	Not applicable

Related Information

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▼ Access BIOS Setup Utility Menus

You can access the BIOS Setup Utility screens from the following interfaces:

- Use a USB keyboard and VGA monitor connected directly to the server. (A mouse is not required to access the BIOS Setup Utility.)
- Use a terminal (or terminal emulator connected to a computer) through the serial port on the back panel of the server.
- Connect to the server using the Oracle ILOM Remote System Console Plus application.

1. **Reset or power on the server.**

   For example, to reset the server:

   - **From the local server,** press the Power button on the front panel of the server to power off the server, and then press the Power button again to power on the server.
   - **From the Oracle ILOM web interface,** click Host Management → Power Control and select Reset from the Select Action list.
   - **From the Oracle ILOM CLI,** type `reset /System`

   The power-on self-test (POST) sequence begins.

2. **To enter the BIOS Setup Utility, press the F2 key (Ctrl+E from a serial connection) when prompted and while the BIOS is running the power-on self-tests (POST).**

The BIOS Setup Utility Main Menu screen appears.

```
        Aptio Setup Utility - Copyright (C) 2015 American Megatrends, Inc.
      Main  Advanced  IO  Boot  Exit

      Project Version        38.02.01.00           Set the Date. Use Tab
      System Date            [Mon 01/11/2016]       to switch between Date
      System Time            [12:35:06]             elements.

      QPI Link Speed         8.0 GT/s
      Total Memory           32 GB
      Current Memory Speed   2133 MT/s
      USB Devices:
           1 Keyboard, 1 Mouse, 2 Hubs

      BMC Status             BMC is working        �: Select Screen
      BMC Firmware Revision  3.2.6.24 r106569      ↑↓: Select Item
                                                   Enter: Select
    ▶ Product Information                          +/-: Change Opt.
    ▶ CPU Information                              F1: General Help
    ▶ DIMM Information                             F7: Discard Changes
                                                   F9: Optimized Defaults
    ▶ Security                                     F10: Save & Exit
                                                   ESC: Exit

          Version 2.17.1249. Copyright (C) 2015 American Megatrends, Inc.
                                                                        AB
```

Related Information

- "BIOS Setup Utility Menus" on page 214
- "BIOS Key Mappings" on page 215
- "BIOS Setup Utility Menu Options" on page 239
- "Exit BIOS Setup Utility" on page 237

▼ Navigate BIOS Setup Utility Menus

To navigate the menus or options listed on a menu, use the arrow keys. The currently selected option or sub-menu is highlighted. For further instructions on how to navigate and change settings in the BIOS Setup Utility, refer to the online information provided on the menu.

1.   Access the BIOS Setup Utility.

See "Access BIOS Setup Utility Menus" on page 216.

2. **Use the left and right arrow keys to select the different primary menu options.**

   As you select each menu option, the top-level screen for that menu option appears.

3. **To navigate options presented on a top-level screen, use the up and down arrow keys.**

   Only options that can be modified are highlighted when you press the up and down arrow keys.

   - **If an option can be modified, as you select the option, user instructions for modifying the option appear in the right column of the screen.**

   - **If an option is a link to a sub-screen, a description of the sub-menu content appears in the right column.**

4. **Modify an option by pressing the + or - keys (plus or minus keys) or by pressing Enter and selecting the desired option from the pop-up menus.**

5. **Press the Esc key to return from a sub-menu screen to the previous menu screen.**

   Pressing Esc from a top-level menu is equivalent to selecting the Discard Changes and Exit option from the Save & Exit Menu.

6. **Modify parameters as needed.**

7. **Press the F10 key to save your changes and exit the BIOS Setup Utility.**

   Alternatively, you can select the Save & Exit Menu, and then select the `Save Changes and Reset` to save your changes and exit the BIOS Setup Utility.

Note - After modifying any BIOS settings and selecting `Save Changes and Reset` from the Save & Exit Menu, the subsequent reboot might take longer than a typical reboot where no settings were modified. The additional delay is required to ensure that changes to the BIOS settings are synchronized with Oracle ILOM.

Related Information

- "BIOS Setup Utility Menus" on page 214
- "BIOS Key Mappings" on page 215
- "BIOS Setup Utility Menu Options" on page 239
- "Exit BIOS Setup Utility" on page 237

Using UEFI

The BIOS firmware controls the system from power-on until an operating system is booted.

The Oracle Server X6-2 contains a Unified Extensible Firmware Interface (UEFI) that can be configured to support either UEFI or Legacy BIOS. Legacy BIOS is the default mode, and should be used with software and adapters that do not have UEFI drivers.

This section includes the following information:

- "Selecting Legacy BIOS or UEFI Boot Mode" on page 219
- "Switching Between Legacy BIOS and UEFI Boot Modes" on page 220
- "UEFI Boot Mode Advantages" on page 220
- "Configuration Utilities for Add-In Cards" on page 221

Selecting Legacy BIOS or UEFI Boot Mode

You can select either Legacy BIOS Boot Mode or UEFI Boot Mode. Legacy BIOS Boot Mode is the default.

If you change BIOS boot modes, the boot candidates from the previously selected mode are no longer available from the Boot Options Priority List in the BIOS Setup Utility. The boot candidates from the new mode appear in the Boot Options Priority List only after you select Save Changes and Reset from the BIOS Setup Utility menu. Use the Oracle ILOM BIOS Backup and Restore function to preserve the BIOS configuration in case you want to switch back to the previously selected mode. For information, refer to the Oracle Integrated Lights Out Manager (ILOM) 5.0 Documentation Library at `https://www.oracle.com/goto/ilom/docs`.

All supported operating systems can use either UEFI Boot Mode or Legacy BIOS Boot Mode. However, once you choose a boot mode and install an operating system, if you reboot the server and select a different boot mode, the installed image can only be used in the mode in which it was installed. For instructions for selecting either UEFI Boot Mode or Legacy BIOS Boot Mode, see "Selecting Legacy BIOS or UEFI Boot Mode" on page 219.

Choose Legacy BIOS Boot Mode to allow host bus adapters (HBAs) to use option ROMs, and when software or adapters do not have UEFI drivers. In Legacy BIOS Boot Mode, only boot candidates that support Legacy BIOS Boot Mode appear in the Boot Options Priority List in the BIOS Setup Utility.

Choose UEFI Boot Mode when software and adapters use UEFI drivers. You can manually select UEFI Boot Mode during system setup. In UEFI Boot Mode, only boot candidates that support UEFI Boot Mode appear in the Boot Options Priority List in the BIOS Setup Utility.

Related Information

- "Switching Between Legacy BIOS and UEFI Boot Modes" on page 220
- "UEFI Boot Mode Advantages" on page 220
- "Configuration Utilities for Add-In Cards" on page 221
- "Exit BIOS Setup Utility" on page 237

Switching Between Legacy BIOS and UEFI Boot Modes

When switching between Legacy BIOS Boot Mode and UEFI BIOS Boot Mode (either direction), BIOS settings that affect the Boot Options Priority list settings will be changed. If the boot mode is changed, the boot candidates from the previous boot mode disappear. The boot candidates for the newly changed boot mode appear after you save your changes and reset the host and in the next boot to the BIOS Setup Utility.

Because the settings for a given mode do not persist after a transition between modes, you should use the BIOS Backup and Restore feature to capture and preserve the BIOS configuration if you intend to switch back to the previous boot mode and want to retain your previous BIOS settings. For information about the BIOS Backup and Restore feature, refer to the Oracle Integrated Lights Out Manager (ILOM) 5.0 Documentation Library at `https://www.oracle.com/goto/ilom/docs`.

Related Information

- "Selecting Legacy BIOS or UEFI Boot Mode" on page 219
- "UEFI Boot Mode Advantages" on page 220
- "Configuration Utilities for Add-In Cards" on page 221
- "Exit BIOS Setup Utility" on page 237

UEFI Boot Mode Advantages

When the option is available to choose between a Legacy BIOS Boot Mode or UEFI BIOS Boot Mode operating system installation, the advantages to choosing a UEFI BIOS Boot Mode installation include the following:

- Avoids Legacy Option ROM address constraints. For more information, see "Using BIOS for Legacy Option ROM Resource Allocation" on page 222.

- Supports operating system boot partitions greater than 2 terabytes (2 TB) in size. For more information about the limitations for supported operating systems, refer to the *Oracle Server X6-2 Product Notes* at `https://www.oracle.com/goto/x6-2/docs`.

- Integrates PCIe device configuration utilities within the BIOS Setup Utility menus. For more information, see "BIOS Setup Utility Menu Options" on page 239.

- Displays bootable operating system images in the boot list as labeled entities, for example, you will see a Windows boot manager label as opposed to raw device labels.

Related Information

- "Selecting Legacy BIOS or UEFI Boot Mode" on page 219
- "Select the Boot Device" on page 226
- "Exit BIOS Setup Utility" on page 237

Configuration Utilities for Add-In Cards

The method for interacting with configuration utilities for add-in cards and (system resident) I/O adapters differs depending on whether Legacy BIOS Boot Mode or UEFI BIOS Boot Mode is used.

In Legacy BIOS Boot Mode, I/O adapter utilities are invoked during BIOS POST progression using hot keys identified by the adapter Option ROM during POST. When the hot key is pressed, the adapter specific configuration utility interface is presented. Often the interface will have a vendor-specific design.

In UEFI BIOS Boot Mode, the configuration screens for the add-in cards will appear as menu items in the BIOS Advanced Menu as part of the standard BIOS Setup Utility screens. For example, if the Oracle Storage 12 Gb/s SAS PCIe RAID host bus adapter (HBA) is installed in the server, the configuration utility for the HBA appears as a menu selection under the iSCSI menu option on the BIOS Advanced Menu.

Related Information

- "Selecting Legacy BIOS or UEFI Boot Mode" on page 219
- "Exit BIOS Setup Utility" on page 237

Using BIOS for Legacy Option ROM Resource Allocation

In Legacy BIOS Boot Mode, there are PC architecture constraints on Legacy Option ROM allocation. These constraints do not apply to UEFI Option ROMs, which are often referred to as UEFI drivers.

Choose Legacy BIOS Boot Mode to allow host bus adapters (HBAs) to use Option ROMs. Choose UEFI BIOS Boot Mode to use UEFI drivers.

The system BIOS allocates 128 KB of address space for Legacy Option ROMs. This address space is shared between on-board devices and PCIe add-in cards. This fixed address space limitation is imposed by the PC architecture and not by the BIOS itself. It is possible to exhaust the available address space when installing PCIe add-in cards. When the address space is exhausted, Oracle ILOM displays an `Option ROM Space Exhausted` message, which means that one or more devices cannot load Option ROMs.

For example, if you install a SAS PCIe card, you might encounter a message similar to the following message in the Oracle ILOM event log:

`Option ROM Space Exhausted - Device XXX Disabled`

By default, all on-board Legacy Options ROMs are enabled in the BIOS. However, you can disable most of these Option ROMs, unless they are required to support booting from the associated device or to provide some other boot-time function. For example, it is not necessary to load the Option ROM for the on-board network ports unless you want to boot from one or more network ports (even then, you can disable the Options ROMs for the remaining ports).

To minimize server boot time and reduce the likelihood of exhausting the available Option ROM address space, disable the Option ROMs for all devices that you do not intend to boot from. Enable Option ROMs only for those devices from which you intend to boot. If Option ROMs are enabled for more than one boot device, you might encounter an Option ROM space exhausted condition. If you encounter the Option ROM space exhausted condition even after disabling all devices from which you do not intend to boot, then disable additional Option ROMs. Under some circumstances it might be necessary to disable Option ROMs for all devices except for the primary boot device.

Related Information

- "Access BIOS Setup Utility Menus" on page 216
- "Configure Option ROM Settings" on page 233
- "Exit BIOS Setup Utility" on page 237

Common BIOS Setup Utility Tasks

This section presents the procedures for some of the BIOS setup tasks that you will typically perform when setting up and managing the server.

- "Verify BIOS Factory Default Settings" on page 223
- "Select Legacy BIOS or UEFI Boot Mode" on page 224
- "Select the Boot Device" on page 226
- "Configure TPM Support" on page 228
- "Configure SP Network Settings" on page 230
- "Configure Option ROM Settings" on page 233
- "Configure I/O Resource Allocation" on page 237
- "Exit BIOS Setup Utility" on page 237

▼ Verify BIOS Factory Default Settings

In the BIOS Setup Utility, you return the BIOS settings to the optimal factory default values, as well as view and edit settings as needed. Any changes that you make in the BIOS Setup Utility (using the F2 key) persist until the next time you change the settings.

Before you begin, ensure that the following requirements are met:

- A hard disk drive or solid state drive is properly installed in the server.
- A console connection is established to the server.

1. **Reset or power on the server.**

   - **From the local server,** press the Power button on the front panel of the server to power off the server, and then press the Power button again to power on the server.
   - **From the Oracle ILOM web interface,** click Host Management → Power Control and select Reset from the Select Action list.
   - **From the Oracle ILOM CLI,** type `reset /System`

   The server resets or power cycles.

2. **When prompted, press the F2 key to access the BIOS Setup Utility.**

3. **To ensure that the factory defaults are set, do the following:**

a. Press the F9 key to automatically load the optimal factory default settings.

A message appears prompting you to continue this operation by selecting OK or to cancel the operation by selecting Cancel.

b. In the message, highlight OK, and then press Enter.

The BIOS Setup Utility screen appears with the cursor highlighting the first value on the screen.

4. Press the F10 key to save the changes and exit the BIOS Setup Utility.

Alternatively, you can save the changes and exit the BIOS Setup Utility by navigating to the Save & Exit Menu and selecting `Save Changes and Reset`.

Related Information

- "Access BIOS Setup Utility Menus" on page 216
- "BIOS Setup Utility Menus" on page 214
- "BIOS Key Mappings" on page 215
- "Exit BIOS Setup Utility" on page 237

▼ Select Legacy BIOS or UEFI Boot Mode

The BIOS firmware supports both Legacy BIOS Boot Mode and UEFI Boot Mode. The default setting is Legacy BIOS Boot Mode. For more information about selecting the boot mode, refer to "Using UEFI" on page 219.

1. Access the BIOS Setup Utility menus.

See "Access BIOS Setup Utility Menus" on page 216.

2. From the BIOS Main Menu screen, select `Boot`.

The Boot Menu screen appears.

3. From the Boot Menu screen, use the up and down arrow keys to select `UEFI/ Legacy BIOS Boot Mode`, and then press Enter.

The UEFI/BIOS dialog box appears.


```
      Aptio Setup Utility - Copyright (C) 2015 American Megatrends, Inc.
   Main  Advanced  IO  Boot  Exit

 UEFI/BIOS Boot Mode      [Legacy]              UEFI: Only UEFI Boot
 Retry Boot List          [Enabled]             options are initialized
 Network Boot Retry       [Enabled]             and present to user.
                                                Legacy: Only legacy
 Persistent Boot          [Disabled]            boot options are
 Support                                        initialized and present
                                                to user.
 NVMe Boot              ── UEFI/BIOS Boot Mode ──
                        Legacy
 Legacy Boot Option Pri UEFI
  [SATA:DVD:TEAC    DV-W                         Select Screen
  [RAID:PCIE6:(Bus 03 Dev                        Select Item
  [PXE:NET0:IBA XE Slot 3A00 v2334]     Enter: Select
  [PXE:NET1:IBA XE Slot 3A01 v2334]     +/-: Change Opt.
  [PXE:NET2:IBA XE Slot 8200 v2334]     F1: General Help
  [PXE:NET3:IBA XE Slot 8201 v2334]     F7: Discard Changes
                                        F9: Optimized Defaults
                                        F10: Save & Exit
                                        ESC: Exit

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                                                                    B4
```

Note - You cannot configure the boot device priority after switching the boot mode. A system reboot is required to properly populate the Boot Options Priority list with devices that support the chosen boot mode.

4. **Use the up and down arrow keys to select the appropriate Legacy or UEFI mode, and then press Enter.**

5. **Press the F10 key to save the changes and exit the BIOS Setup Utility.**

    Related Information

    - "BIOS Setup Utility Menus" on page 214
    - "BIOS Key Mappings" on page 215
    - "Exit BIOS Setup Utility" on page 237

▼ Select the Boot Device

The Boot Options Priority list contents depend on which BIOS mode is selected. When UEFI Boot Mode is selected, only UEFI boot candidates will be initialized and displayed in the Boot Options Priority list. When Legacy BIOS is selected, only Legacy BIOS boot candidates are initialized and displayed.

In addition to using the F2 key to view or edit the system BIOS settings, you can use the F8 key during the BIOS startup to specify a temporary boot device. This selected boot device is in effect only for the current system boot. The permanent boot device specified using the F2 key will be in effect after booting from the temporary boot device.

1. **Reset or power on the server.**

   ■ **From the local server,** press the Power button on the front panel of the server to power off the server, and then press the Power button again to power on the server.
   ■ **From the Oracle ILOM web interface,** click Host Management → Power Control and select Reset from the Select Action list.
   ■ **From the Oracle ILOM CLI,** type `reset /System`

   The server resets or power cycles.

2. **Press the F8 key (or Ctrl+P from a serial connection) when prompted while the UEFI is running the power-on self-test (POST).**

   The Please Select Boot Device dialog box appears.

```
              Please select boot device:

[UEFI]PXE:NET0:IP4 Intel(R) Ethernet Controller X540-AT2
[UEFI]PXE:NET1:IP4 Intel(R) Ethernet Controller X540-AT2
[UEFI]PXE:NET2:IP4 Intel(R) Ethernet Controller X540-AT2
[UEFI]PXE:NET3:IP4 Intel(R) Ethernet Controller X540-AT2
Enter Setup

           ↑ and ↓ to move selection
           ENTER to select boot device
           ESC to boot using defaults
```
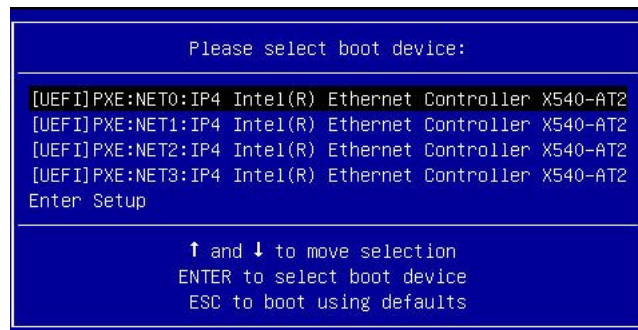
3. **In the Please Select Boot Device dialog box, select the boot device according to the operating system and UEFI Boot Mode you elected to use, and then press Enter.**

Note - Based on the boot mode you selected (UEFI BIOS Boot Mode or Legacy BIOS Boot Mode), the Please Select Boot Device dialog box displays only the applicable devices. For example, when the UEFI BIOS Boot Mode is elected, only UEFI BIOS boot devices are displayed in the dialog box.

A dialog box similar to the following appears.
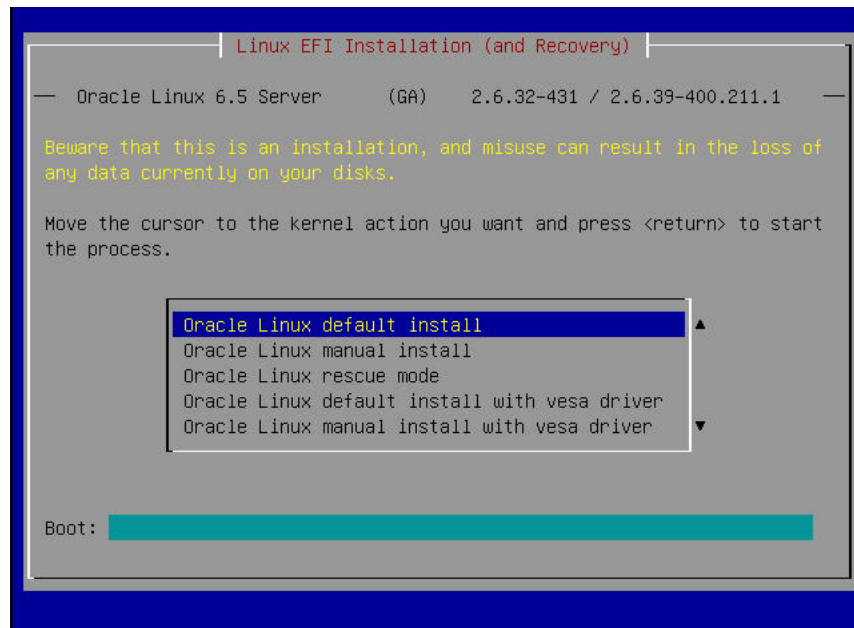
4. **Follow the on-screen instructions to install the operating system from the selected boot device.**

    Related Information

    - "BIOS Setup Utility Menus" on page 214
    - "BIOS Key Mappings" on page 215
    - "Exit BIOS Setup Utility" on page 237

▼ Configure TPM Support

If you intend to use the Trusted Platform Module (TPM) feature set, you must configure the server to support this feature.

Note - TPM enables you to administer the TPM security hardware in your server. For additional information about implementing this feature, refer to the Windows Trusted Platform Module Management documentation provided by your operating system or third-party software vendor.

1. **Access the BIOS Setup Utility menus.**

   See .

2. **In the BIOS Setup Utility menus, navigate to the Advanced Menu.**

   The Advanced Menu screen appears.

3. **In the Advanced Menu screen, select `Trusted Computing`.**

   The TPM Configuration screen appears.

```
          Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
              Advanced

   Trusted Computing                                  Enable or disable the
                                                      TPM support
   TPM Support                [Disable]
   Pending operation          [None]

   Current Status Information
     SUPPORT TURNED OFF


                                                      →←: Select Screen
                                                      ↑↓: Select Item
                                                      Enter: Select
                                                      +/-: Change Opt.
                                                      F1: General Help
                                                      F7: Discard Changes
                                                      F9: Optimized Defaults
                                                      F10: Save & Exit
                                                      ESC: Exit

          Version 2.16.1243. Copyright (C) 2013 American Megatrends, Inc.
                                                                          AB
```

4. **If TPM Support is listed as `Disabled` (it is disabled by default). Select `TPM Support` and press Enter.**

   A TPM Support dialog box appears.

```
      Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
            Advanced

     Trusted Computing                              Enable or disable the
                                                    TPM support
     TPM Support               [Disable]
     Pending operation         [None]

     Current Status Information
       SUPPORT TURNED OFF
                                ┌──── TPM Support ────┐
                                │ Disable             │
                                │ Enable              │
                                └─────────────────────┘
                                                    →←: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
                                                    +/-: Change Opt.
                                                    F1: General Help
                                                    F7: Discard Changes
                                                    F9: Optimized Defaults
                                                    F10: Save & Exit
                                                    ESC: Exit

          Version 2.16.1243. Copyright (C) 2013 American Megatrends, Inc.
                                                                      AB
```

5. **In the dialog box, set `TPM Support` to `Enable`, and then press Enter.**

The updated TPM Configuration screen appears.
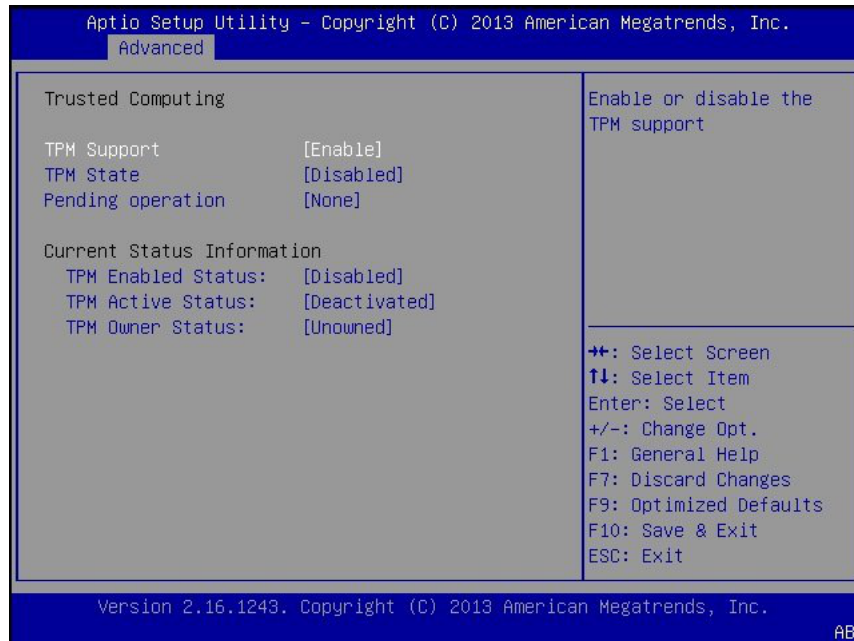
```
Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
     Advanced

 Trusted Computing                              Enable or disable the
                                                TPM support
 TPM Support              [Enable]
 TPM State                [Disabled]
 Pending operation        [None]

 Current Status Information
   TPM Enabled Status:    [Disabled]
   TPM Active Status:     [Deactivated]
   TPM Owner Status:      [Unowned]

                                                →←: Select Screen
                                                ↑↓: Select Item
                                                Enter: Select
                                                +/-: Change Opt.
                                                F1: General Help
                                                F7: Discard Changes
                                                F9: Optimized Defaults
                                                F10: Save & Exit
                                                ESC: Exit

        Version 2.16.1243. Copyright (C) 2013 American Megatrends, Inc.
                                                                    AB
```

6. Press the F10 key to save the changes and exit the BIOS Setup Utility.

Related Information

■ "BIOS Setup Utility Menus" on page 214
■ "Exit BIOS Setup Utility" on page 237
■ Microsoft's Windows Trusted Platform Module Management documentation

▼ Configure SP Network Settings

Choose one of the following methods to specify service processor (SP) network settings:

■ **BIOS** – Assign the IP address for the server SP from the BIOS Setup Utility on the Advanced Menu.

- **Oracle ILOM** – For instructions on setting the IP address for the server SP using Oracle ILOM, refer to the Oracle Integrated Lights Out Manager (ILOM) 5.0 Documentation Library at https://www.oracle.com./goto/ilom/docs.

1. **Access the BIOS Setup Utility menus.**

   See "Access BIOS Setup Utility Menus" on page 216.

2. **In the BIOS Setup Utility menus, navigate to the Advanced Menu.**

   The Advanced Menu screen appears.
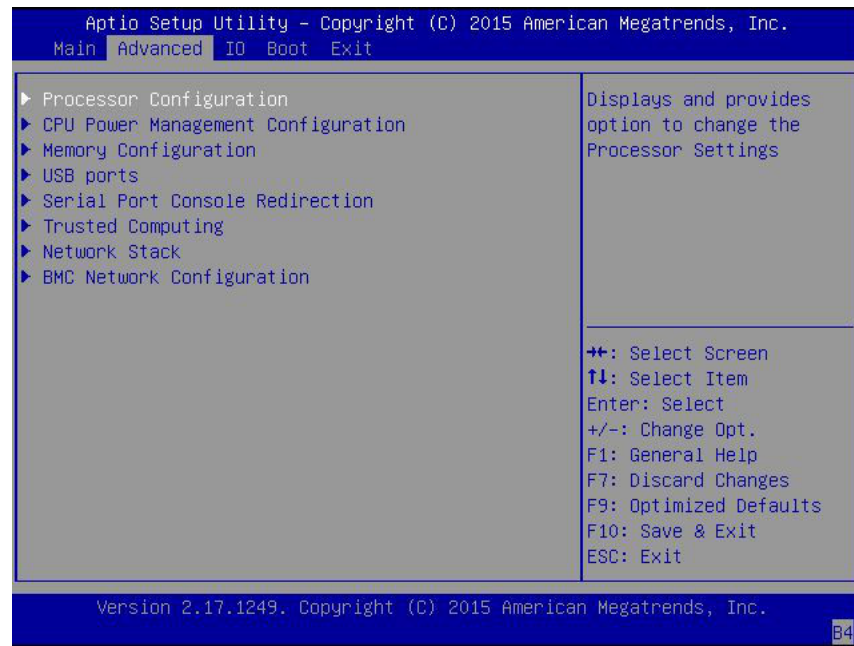
3. **In the Advanced Menu, select BMC Network Configuration, and then press Enter.**

   The BMC Network Configuration screen appears.

The BMC is the Baseboard Management Controller.

```
       Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
           Advanced

 BMC Network                              ▲ Refresh current BMC Lan
 Current                                  █ information
 Active Mgmt Port           NETMGT

 ▶ Refresh

 Active Mgmt Port           [NET MGT]

 ▶ Commit

   IPv4 Configuration                       →←: Select Screen
                                            ↑↓: Select Item
 Channel Number             1              Enter: Select
 IPv4 IP Assignment         [Static]       +/-: Change Opt.
 Current IPv4 address in    N/A            F1: General Help
 BMC                                       F7: Discard Changes
 Current IPv4 MAC                          F9: Optimized Defaults
 address in BMC                            F10: Save & Exit
         N/A                             ▼ ESC: Exit

       Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.
                                                                    AB
```

4. **Select `Refresh`, and then press Enter to display the current BMC network settings.**

The BMC Network Configuration screen refreshes. Scroll down to review BMC network settings.
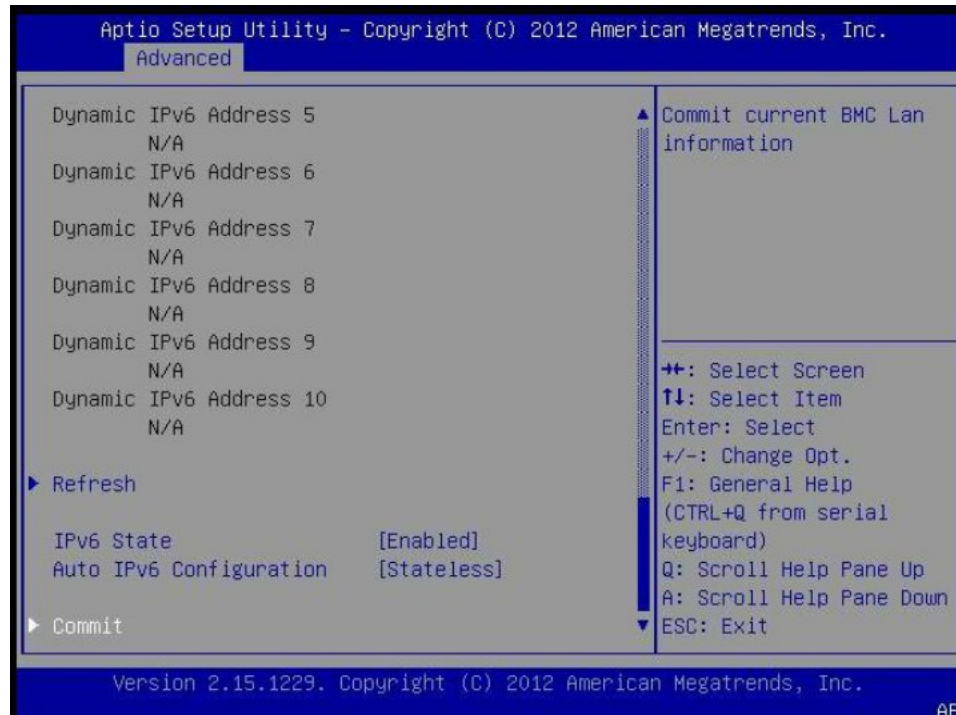
5. **Select `Commit` to update the BMC network settings with the latest values.**

6. **Press the F10 key to save the changes and exit the BIOS Setup Utility.**

   Related Information

   - "BIOS Setup Utility Menus" on page 214
   - "Exit BIOS Setup Utility" on page 237

▼ Configure Option ROM Settings

1. **Access the BIOS Setup Utility menus.**

See "Access BIOS Setup Utility Menus" on page 216.

2. In the BIOS Setup Utility menus, navigate to the IO Menu.

The IO Menu screen appears.

```
        Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
        Main  Advanced  IO  Boot  Exit

    ▶ PCI Subsystem Settings                    Displays and provides
    ▶ IO Virtualization                         option to change the
    ▶ IOAT Configuration                        various Internal
    ▶ Internal Devices                          Devices Settings
    ▶ Add In Cards




                                                ↔: Select Screen
                                                ↑↓: Select Item
                                                Enter: Select
                                                +/-: Change Opt.
                                                F1: General Help
                                                F7: Discard Changes
                                                F9: Optimized Defaults
                                                F10: Save & Exit
                                                ESC: Exit

        Version 2.16.1243. Copyright (C) 2013 American Megatrends, Inc.
```
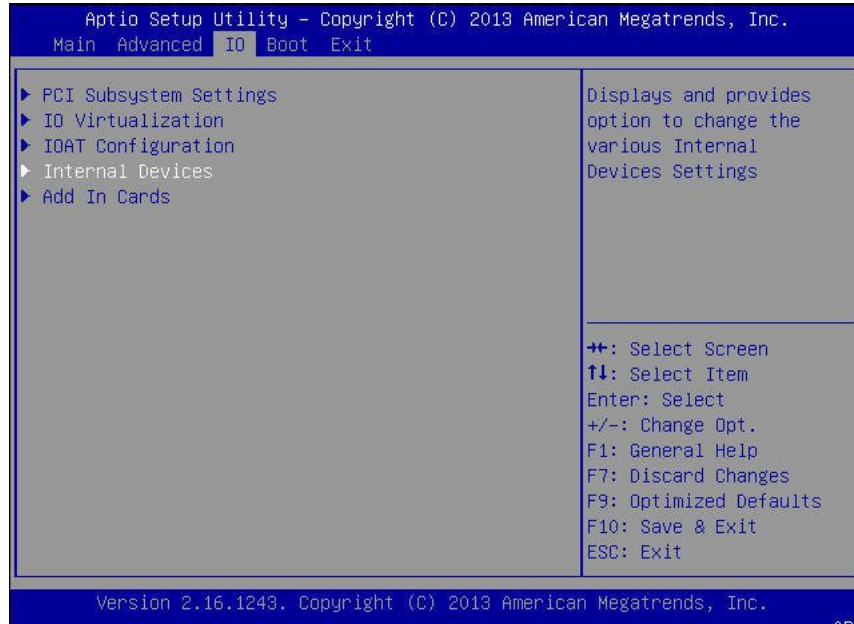
3. In the IO Menu, select either Internal Devices or Add In Cards and press Enter to display the internal device or add-in card slot for which you want to enable or disable Option ROM.

The Internal Devices or Add In Cards screen appears.

```
Aptio Setup Utility – Copyright (C) 2013 American Megatrends, Inc.
                    IO

 Internal Devices                        Displays and provides
                                         option to change NET 0
                                         Settings
▶ NET 0
▶ NET 1
▶ NET 2
▶ NET 3


                                         ↔: Select Screen
                                         ↑↓: Select Item
                                         Enter: Select
                                         +/-: Change Opt.
                                         F1: General Help
                                         F7: Discard Changes
                                         F9: Optimized Defaults
                                         F10: Save & Exit
                                         ESC: Exit

        Version 2.16.1243. Copyright (C) 2013 American Megatrends, Inc.
                                                                      AB
```
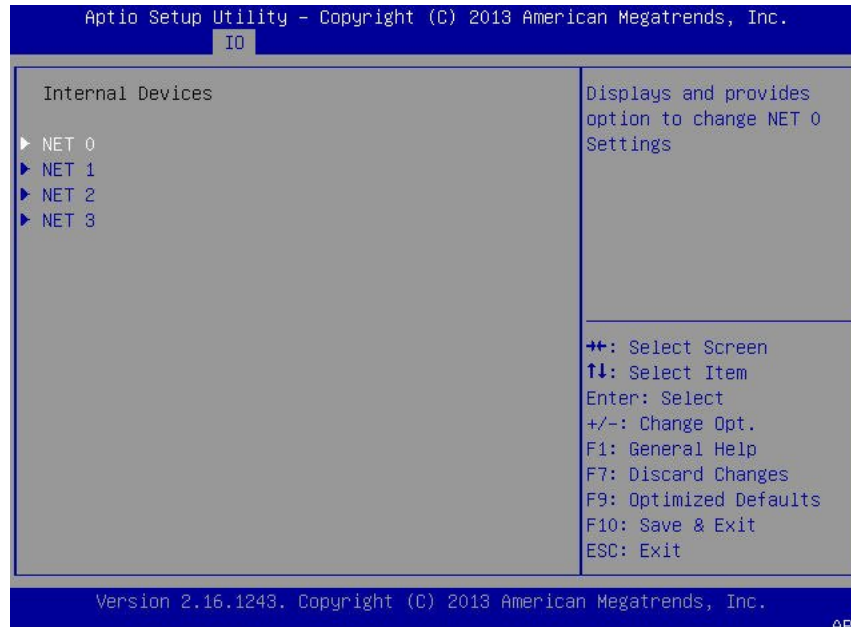
4.   **Select the internal device or add In card slot that you want to configure.**

The Option ROM screen for that internal device or add-in card slot appears.

```
Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
                IO

  NET 0                                            OpROM Enable

  OpROM Enable           [Enabled]


                                                   →←: Select Screen
                                                   ↑↓: Select Item
                                                   Enter: Select
                                                   +/-: Change Opt.
                                                   F1: General Help
                                                   F7: Discard Changes
                                                   F9: Optimized Defaults
                                                   F10: Save & Exit
                                                   ESC: Exit

        Version 2.16.1243. Copyright (C) 2013 American Megatrends, Inc.
```
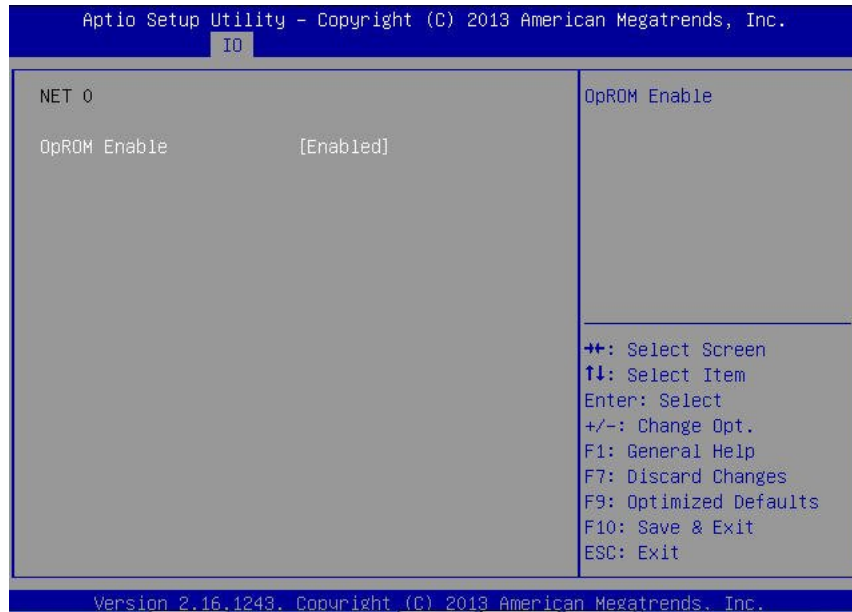
5.   Select OpROM Enable and press Enter. Do one of the following:

- **Select Enabled to enable the Option ROM setting.**

- **Select Disabled to disable the Option ROM setting.**

6.   Press the F10 key to save the changes and exit the BIOS Setup Utility.

Related Information

- "Using BIOS for Legacy Option ROM Resource Allocation" on page 222
- "Access BIOS Setup Utility Menus" on page 216
- "BIOS Setup Utility Menus" on page 214
- "Exit BIOS Setup Utility" on page 237

▼ Configure I/O Resource Allocation

1. **Access the BIOS Setup Utility menus.**

    See "Access BIOS Setup Utility Menus" on page 216.

2. **In the BIOS Setup Utility menus, navigate to the IO Menu.**

    The IO Menu screen appears.

3. **Select Add In Cards and press Enter to display the add-in card slots.**

4. **Select the slot in which you want to configure the card and press Enter.**

5. **Do one of the following:**

    - **Select `Enabled` to enable I/O resource allocation for the I/O card.**

    - **Select `Disabled` to disable I/O resource allocation for the I/O card.**

6. **Press the F10 key to save the changes and exit the BIOS Setup Utility.**

    Related Information

    - "Configure I/O Resource Allocation" on page 237
    - "Access BIOS Setup Utility Menus" on page 216
    - "BIOS Setup Utility Menus" on page 214
    - "Exit BIOS Setup Utility" on page 237

▼ Exit BIOS Setup Utility

1. **Use the left and right arrow keys to navigate to the top-level Save & Exit Menu.**

2. **Use the up and down arrow keys to select the desired action.**

3. **Press Enter to select the option.**

A confirmation dialog box appears.
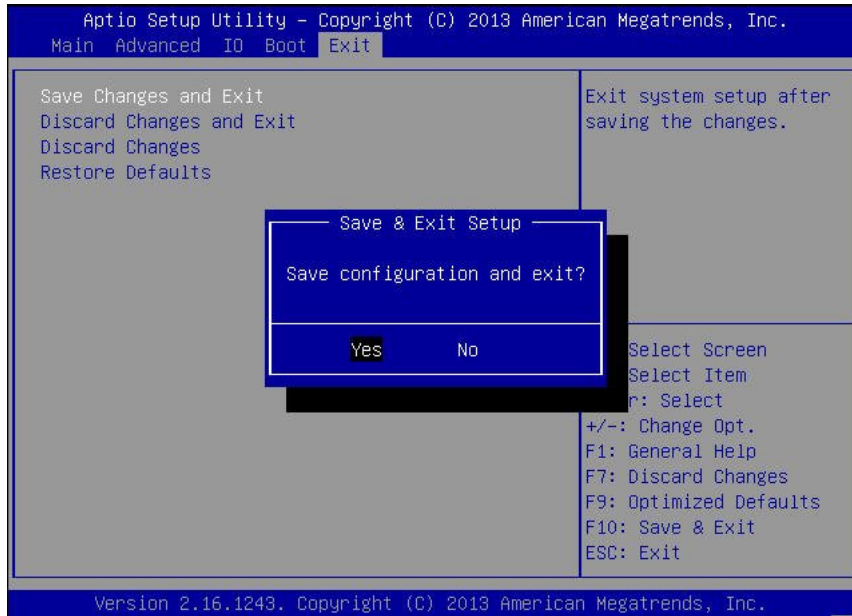
4. **In the confirmation dialog box, select Yes to proceed and exit the BIOS Setup Utility, or select No to stop the exit process.**

Note - After modifying any BIOS settings and selecting Save Changes and Exit from the Save & Exit Menu, the subsequent reboot might take longer than a typical reboot where no settings were modified. The additional delay is required to ensure that changes to the BIOS settings are synchronized with Oracle ILOM.

Related Information

- "Access BIOS Setup Utility Menus" on page 216
- "BIOS Setup Utility Menus" on page 214

BIOS Setup Utility Menu Options

This section includes searchable text-based representations and screen shots of the main menus in the BIOS Setup Utility for the Oracle Server X6-2. Following the text and screen shot for each menu is a table of the options available from that menu.

Description	Links
Review the BIOS Main Menu selections.	"BIOS Main Menu Selections" on page 239
Review the BIOS Advanced Menu selections.	"BIOS Advanced Menu Selections" on page 243
Review the BIOS IO Menu selections.	"BIOS IO Menu Selections" on page 257
Review the Boot Menu selections.	"BIOS Boot Menu Selections" on page 261
Review the BIOS Save & Exit Menu selections.	"BIOS Exit Menu Selections" on page 263

Related Information

- *Oracle X6 Series Servers Administration Guide* at: `http://www.oracle.com/goto/x86admindiag/docs`
- "Setting Up BIOS Configuration Parameters" on page 213

BIOS Main Menu Selections

This section includes a searchable text-based representation and a screenshot of the BIOS Main Menu. The options that are available from the Main Menu are described in the table that follows. Options in the table that are marked as "(R/O)" are read-only information and cannot be changed.

```
              Aptio Setup Utility - Copyright (C) 2015 American Megatrends, Inc.
              Main  Advanced  IO  Boot  Exit

       Project Version         38.02.01.00              Set the Date. Use Tab
       System Date             [Mon 01/11/2016]          to switch between Date
       System Time             [12:35:06]                elements.

       QPI Link Speed          8.0 GT/s
       Total Memory            32 GB
       Current Memory Speed    2133 MT/s
       USB Devices:
             1 Keyboard, 1 Mouse, 2 Hubs

       BMC Status              BMC is working           ←→: Select Screen
       BMC Firmware Revision   3.2.6.24 r106569         ↑↓: Select Item
                                                        Enter: Select
     ▶ Product Information                              +/-: Change Opt.
     ▶ CPU Information                                  F1: General Help
     ▶ DIMM Information                                 F7: Discard Changes
                                                        F9: Optimized Defaults
     ▶ Security                                         F10: Save & Exit
                                                        ESC: Exit

              Version 2.17.1249. Copyright (C) 2015 American Megatrends, Inc.
                                                                              AB
```

The following tables describe the options provided by the BIOS Main Menu and submenus.

TABLE 25 BIOS Main Menu Options

Setup Options	Options	Defaults	Description
Project Version (R/O)			BIOS version is displayed. This string is a unique identifier used to reference a specific BIOS release. Format is XXYYZZPP, which indicates: ■ XX - Unique project/platform code. ■ YY - BIOS major release. ■ ZZ - BIOS minor release. ■ PP - Build number. Example: 18.01.04.01
System Date			Current date is displayed. You can change the date setting. Example: [Thu 06/20/2014]
System Time			Current time is displayed. You can change the time setting. Example: [13:38:27]

Setup Options	Options	Defaults	Description
QPI Link Speed (R/O)	SLOW/ 6.4 GT/s/ 7.2 GT/s/ 8.0 GT/s 9.6 GTs		Intel Quick Path Interconnect (QPI) operational speed is displayed. The SLOW option displays as unknown in single-processor systems.
Total Memory (R/O)			Memory in gigabytes is displayed. Example: 224 GB
Current Memory Speed (R/O)			Memory speed is displayed. Example: 1333 MT/s
USB Devices (R/O)			Detected USB devices are displayed. Example: 1 Drive, 2 keyboards, 1 mouse, 3 hubs
BMC Status (R/O)			Detected condition of the service processor. Example: BMC is working
BMC Firmware Revision (R/O)			The service processor firmware version is displayed. Example: 3.2.0.0 r84011
PRODUCT INFORMATION (R/O)			Product information is displayed.
Product Name			Product name is displayed. Example: Oracle Server X6-2
Product Serial Number			Product serial number is displayed. Example: 1134FML00V
Board Serial Number			Board serial number is displayed. Example: 0328MSL-1132U900
CPU INFORMATION (R/O)			Attributes of a single processor (CPU) are defined. A separate information structure is provided for each processor supported in the system. Most of the values are dependent on the processor.
Socket 0 CPU Information (R/O)			If CPU socket 0 is populated, the following options are listed. Otherwise, displays "Not Present."
Genuine Intel CPU @ 2.10 GHz			Processor ID brand is displayed.
CPU Signature			Processor information is displayed.

Setup Options	Options	Defaults	Description
			Example: 306F1
Microcode Patch			Software update (microcode patch) information is displayed. Example: 80000011
Max CPU Speed			Maximum non-turbo speed of the processor is displayed. Example: 2100 MT/s
Min CPU Speed			Minimum speed of the processor is displayed. Example: 1200 MT/s
Processor Cores			Number of available processor cores is displayed. Example: 18
Active processor cores			Number of active processor cores is displayed.
Intel HT Technology			Indicates whether Intel Hyper Threading is supported.
Intel VT-x Technology			Indicates whether Intel Virtualization Technology is supported.
L1 Data Cache			Example: 448
L1 Code Cache			Example: 448
L2 Cache			Example: 3584 KB
L3 Cache			Example: 35840 KB
Socket 1 CPU Information (R/O)			If CPU socket 1 is populated, the same options as Socket 0 CPU Information are displayed. Otherwise, displays "Not Present."
DIMM INFORMATION (R/O)			Memory module (DIMM) presence and size information are displayed.
Socket 0 DIMMs (R/O)			For D0...D11, if a DIMM is present, memory size (in gigabytes) is displayed. Otherwise, displays "Not Present."
Socket 1 DIMMs (R/O)			Same as CPU socket 0.
SECURITY SETTING			Configure the security setting.
Administrator Password			Set the Administrator password.

Related Information

-

BIOS Advanced Menu Selections

This section includes a searchable text-based representation and a screenshot of the BIOS Advanced Menu. The options that are available from the Advanced Menu are described in the table that follows. Options in the table that are marked as "(R/O)" are read-only information and cannot be changed.

```
          Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
          Main  Advanced  IO  Boot  Exit

      ▶ Processor Configuration                    ▲  Displays and provides
      ▶ CPU Power Management Configuration            option to change the
      ▶ Memory Configuration                          Processor Settings
      ▶ USB ports
      ▶ Serial Port Console Redirection
      ▶ Trusted Computing
      ▶ Network Stack
      ▶ BMC Network Configuration

        RunTime Uefi Drivers
      ▶ iSCSI Configuration
      ▶ 7101674, Sun Storage 16Gb FC PCIe Universal   ↔: Select Screen
        HBA, QLogic 7023303 - 2100000E1E1484C0        ↑↓: Select Item
      ▶ 7101674, Sun Storage 16Gb FC PCIe Universal   Enter: Select
        HBA, QLogic 7023303 - 2100000E1E1484C1        +/-: Change Opt.
      ▶ LSI SAS3 MPT Controller SAS3008,              F1: General Help
        PCISubDeviceId:0x30E0, PCIBus:0x23,           F7: Discard Changes
        PCIDevice:0x0, PCIFunc:0x0, PCISlot:0x4)      F9: Optimized Defaults
                                                      F10: Save & Exit
                                                   ▼  ESC: Exit

          Version 2.16.1243. Copyright (C) 2013 American Megatrends, Inc.
                                                                        AB
```

The following sections describe the BIOS Advanced menu options.

BIOS Advanced Menu Processor Configuration Options

The following table lists the BIOS Advanced Menu Processor Configuration options.

TABLE 26   BIOS Advanced Menu Processor Configuration

Setup Options	Options	Defaults	Description
Hyper-threading	Disabled/Enabled	Enabled	Use to enable Hyper Threading. When enabled, two threads are available per enabled core. When disabled, only one thread per enabled core is available.
Active Processor Cores	A minimum of one up to the maximum number of cores available in the processor package.	All	The number of cores to enable in each processor package.
Execute Disable Bit	Disabled/Enabled	Enabled	When disabled, forces XD features flag to always return 0.
Hardware Prefetcher	Disabled/Enabled	Enabled	Enable the mid-level cache (MLC) streamer prefetcher (MSR 1A4h bit [0]).
Adjacent Cache Prefetch	Disabled/Enabled	Enabled	Enable the mid-level cache (MLC) streamer prefetcher (MSR 1A4h bit [1]).
DCU Streamer Prefetcher	Disabled/Enabled	Enabled	Enable DCU streamer prefetcher, which is a L1 data cache prefetcher (MSR 1A4h [2]).
DCP IP Prefetcher	Disabled/Enabled	Enabled	Enable DCU IP prefetcher, which is a L1 data cache prefetcher (MSR 1A4h [3]).
Intel Virtualization Technology	Disabled/Enabled	Enabled	When enabled, a Virtual Machine Manager

Setup Options	Options	Defaults	Description
			(VMM) can utilize the additional hardware capabilities provided by Intel Virtualization Technology.

BIOS Advanced Menu CPU Power Management Configuration Options

The following table lists the BIOS Advanced Menu Power Management Configuration options.

TABLE 27   BIOS Advanced Menu CPU Power Management Configuration

Setup Options	Options	Defaults	Description
Power Technology	Disabled/Energy Efficient/ Custom	Custom	Enables the power management features.
EIST (GV3)	Enabled/Disabled	Enabled	Enable or disable Enhanced Intel SpeedStep Technology (EIST).
Turbo Mode	Enabled/Disabled	Enabled	Enabled mode is supported only if Turbo Mode is supported in the CPU. Enabled mode also requires that Enhanced Multi Threaded Thermal Monitoring (EMTTM) be enabled on the CPU.
CPU C3 report	Enabled/Disabled	Disabled	Enable/disable the CPU C3 (ACPI C3) report to the operating system.
CPU C6 report	Enabled/Disabled	Enabled	Enable/disable the CPU C6 (ACPI C3) report to the operating system.
CPU C7 report	Enabled/Disabled	Disabled	Enable/disable the CPU C7 (ACPI C3) report to the operating system.
Package C State limit	Enabled/Disabled	Enabled	Enable/disable Package C State limit.
Energy_PERF_BIAS_CFG mode	PERF/Balanced Perf/ Balanced Power/Power	Balanced Perf	Use this option to select the Energy_PERF_BIAS_CFG mode.
Uncore Frequency Scaling	Enabled/Disabled	Disabled	Enable/disable Uncore Frequency Scaling (USF).

Setup Options	Options	Defaults	Description
Enable CPU HWPM	Disable/ HWPM Native Mode/ HWPM OOB Mode	Disable	Select HWPM modes for better CPU energy performance.
Enable CPU Autonomous Cstate	Enable/Disable	Disable	Enables CPU Autonomous C State.

BIOS Advanced Menu Memory Configuration Option

The following table lists the BIOS Advanced Menu Memory Configuration options.

TABLE 28   BIOS Advance Menu Memory Configuration Option

Setup Option	Options	Defaults	Description
Numa	Enabled/Disabled	Enabled	Enable or disable Non Uniform Memory Access (NUMA).
COD Enable	Enabled/Disabled	Disabled	Enable or disable Cluster on Die.

BIOS Advanced Menu USB Ports Options

The following table lists the BIOS Advanced Menu USB Ports options.

TABLE 29   BIOS Advanced Menu USB Ports

Setup Options	Options	Defaults	Description
EHCI Hand-off	Disabled/Enabled	Disabled	Enable or disable Enhanced Host Controller Interface (EHCI) hand-off support. This is a workaround for operating systems without EHCI hand-off support. The EHCI change of ownership should be claimed by the EHCI driver.
Port 60/64 Emulation	Disabled/Enabled	Enabled	Enable I/O port 60h/64h emulation support. Enable this setting for the complete USB keyboard

Setup Options	Options	Defaults	Description
			legacy support for non-USB aware operating systems.
Rear Port #0	Disabled/Enabled	Enabled	Enable or disable USB Rear Port 0.
Rear Port #1	Disabled/Enabled	Enabled	Enable or disable USB Rear Port 1.
Front Port #0	Disabled/Enabled	Enabled	Enable or disable USB Front Port 0.
Front Port #1	Disabled/Enabled	Enabled	Enable or disable USB Front Port 1.
Internal Port #0	Disabled/Enabled	Enabled	Enable or disable USB Internal Port 0.
Internal Port #1	Disabled/Enabled	Enabled	Enable or disable USB Internal Port 1.

BIOS Advanced Menu Serial Port Console Redirection Options

The following table lists the BIOS Advanced Menu Serial Console Redirection options.

TABLE 30   BIOS Advanced Menu Serial Port Console Redirection Options

Setup Options	Options	Defaults	Description
EMS Console Redirection	Disabled/Enabled	Disabled	Enable or disable console redirection for Windows Emergency Management Service (EMS) administration.
Console Redirection	Disabled/Enabled	Enabled	Enable or disable console redirection.
Terminal Type	VT100/VT100+/VT-UTF8/ANSI	VT100+	Select the emulation for the terminal: ■ VT100: ASCII character set. ■ VT100+: Extends VT100 to support color, function keys, etc. ■ VT-UTF8: Uses UTF8 encoding to map Unicode characters onto one or more bytes.

Setup Options	Options	Defaults	Description
			■ ANSI: Extended ASCII character set.
Bits per Second	9600 19200 38400 57600 115200	9600	Select the serial port transmission speed. The speed must be matched on the connecting serial device. Long or noisy lines require lower speeds.
Data Bits	7/8	8	Select the data bits.
Parity	None/Even/Odd/Mark/ Space	None	A parity bit can be sent with the data bits to detect some transmission errors. ■ None: No parity bits are sent. ■ Even: Parity bit is 0 if the number of 1s in the data bits is even. ■ Odd: Parity bit is 0 if the number of 1s in the data bits is odd. ■ Mark: Parity bit is always 1. ■ Space: Parity bit is always 0. Mark and Space parity do not allow for error detection. They can be used as an additional data bit.
Stop Bits	1/2	1	Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning of a serial data packet.) The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.
Flow Control	None, Hardware RTS/ CTS, Software Xon/Xoff	None	Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a 'stop' signal can be sent to stop the data flow. Once the buffers are empty, a 'start'

Setup Options	Options	Defaults	Description
			signal can be sent to restart the flow. Hardware flow control uses two wires to send start/stop signals.

BIOS Advanced Menu Trusted Computing Options

The following table lists the BIOS Advanced Menu Trusted Computing options.

TABLE 31   BIOS Advanced Menu Trusted Computing Options

Setup Options	Options	Defaults	Description
TPM Support	Disabled/Enabled	Disabled	Enable or disable Trusted Platform Module (TPM) support. Only UEFI BIOS implements this setup option. If disabled, the OS will not show TPM. Reset of the platform is required.
TPM State	Disabled/Enabled	Disabled	Displays whether TPM Support is enabled. **Note -** This option is available only if TPM Support is set to enabled.
Pending Operation	None/Enable Take Ownership/Disable Take Ownership/TPM Clear	None	Used to schedule an operation for the security device. **Note -** Your computer will reboot during restart in order to change the state of a security device.
Current Status Information			If TPM Support is disabled, Current Status Information displays SUPPORT Turned OFF."
TPM Enabled Status	Disabled/Enabled	Disabled	Use this option to provide the current capability state of the security device. **Note -** This option is available only if TPM Support is set to enabled.
TPM Active Status	Deactivated/Activated	Deactivated	Use this option to provide the current capability state of the security device.

Setup Options	Options	Defaults	Description
			Note - This option is available only if TPM Support is set to enabled.
TPM Owner Status	Owned/Unowned	Unowned	Use this option to provide the current ownership state. **Note -** This option is available only if TPM Support is set to enabled.

BIOS Advanced Menu Network Stack Options

The following table lists the BIOS Advanced Menu Network Stack options.

TABLE 32   BIOS Advanced Menu Network Stack Options

Setup Options	Options	Defaults	Description
Network Stack	Disabled/Enabled	Enabled	Enable or disable the UEFI network stack.
Ipv4 PXE Support	Disabled/Enabled	Enabled	Enable or disable IPv4 PXE Boot support. If disable, the IPv4 Boot Option will not be created.
Ipv6 PXE Support	Disabled/Enabled	Disabled	Enable or disable IPv6 PXE Boot support. If disable, the IPv6 Boot Option will not be created.

BIOS Advanced Menu BMC Network Configuration Options

The following table lists the BIOS Advanced Menu BMC Network Configuration options.

TABLE 33   BIOS Advanced Menu BMC Network Configuration Options

Setup Options	Options	Defaults	Description
Current Active Management Port (R/O)	NA	NETMGT	The currently active management port.
Refresh	NA	NA	Refresh current BMC LAN information with the latest information from the service processor.

Setup Options	Options	Defaults	Description
Active Mgmt Port	NET MGT/NET0/NET1/ NET2/NET3	NET MGT	Use to change the currently active network management port.
Commit	NA	NA	Commit the current BMC network LAN information.
IPv4 Configuration	NA	NA	Current configuration of the IPv4 settings is displayed.
Channel Number (R/O)		1	Current channel number is displayed.
Current IPv4 IP Assignment in BMC (R/O)	Static/Dynamic	Static	Set the IPV4 IP assignment to Static or Dynamic. This setting determines whether the service processor is assigned a static IPv4 address or assigned a dynamic IPv4 address using Dynamic Host Control Protocol (DHCP).
Current IPv4 address in BMC (R/O)	NA	NA	Displays the current IPv4 address in the BMC.
Current IPv4 MAC Address in BMC (R/O)	NA	NA	If IPv4 Assignment is set to Static, set the IPv4 address for the service processor. Example: 172.31.255.255
Current IPv4 Subnet Mask in BMC (R/O)	NA	NA	If the IPv4 Assignment is set to Static, set the IPv4 subnet mask. Example: 255.255.255.0
Current IPv4 Default Gateway in BMC	NA	NA	If the IPv4 Assignment is set to Static, set the IPv4 default gateway Example: 172.31.255.255
Refresh			Refresh the current BMC LAN information.
IPv4 IP Assignment	Static/Dynamic	Static	Current IPv4 assignment.
IPv4 Address	NA	NA	If set, current IPv4 address is displayed.
IPv4 Subnet Mask	NA	NA	If set, current IPv4 Subnet Mask is displayed.
IPv4 Default Gateway	NA	NA	If set, current Default IPv4 Gateway is displayed.

Setup Options	Options	Defaults	Description
Commit			Commit the current BMC LAN information.
IPv6 Configuration			Current configuration of the IPv6 settings is displayed. IPv6 addresses are written with hexadecimal digits and colon separators. For example: `2001:0db0:000:82a1:0000:0000:1234:abcd`. IPv6 addresses are composed of two parts: a 64-bit subnet prefix and a 64-bit host interface ID. To shorten the IPv6 address, you can (1) omit all leading zeros, and (2) replace one consecutive group of zeros with a double colon (::). For example: `2001:db0:0:82a1::1234:abcd`.
Channel Number (R/O)		1	Current channel number is displayed.
Current IPv6 State (R/O)	Enabled/Disabled	Enabled	Current IPv6 state is displayed.
Current IPv6 Auto Configuration (R/O)	Stateful/Stateless	Stateless	Current IPv6 autoconfiguration parameters are displayed.
Link Local IPv6 Address (R/O)			Current link local IPv6 address is displayed. Example: `fe80::214:4fff:feca:5f7e/64`
Static IPv6 Address (R/O)			Current static IPv6 address is displayed. Example: `2001:0db0:000:82a1:0000:0000:1234:abcd`
IPv6 Gateway (R/O)			Current IPv6 gateway address is displayed. Example: `fe80::211:5dff:febe:5000/128`

Setup Options	Options	Defaults	Description
Dynamic IPv6 Address 1-*n* (R/O)			Current dynamic IPv6 addresses are displayed. Example: `fec0:a:8:b7:214:4fff:feca:5f7e/64`
Refresh			Select Refresh to update to the current settings.
IPv6 State	Disabled/Enabled	Disabled	Set the IPv6 state to enabled or disabled.
Auto IPv6 Configuration	Disabled/ Stateless/ Dhcpv6_stateless/ Dhcpv6_stateful	Disabled	Autoconfiguration options are: ■ Disabled: When autoconfiguration is disabled, only the Link Local address is set. None of the autoconfiguration options to configure an IPv6 address are run. ■ Stateless: When enabled, the IPv6 Stateless autoconfiguration is run to learn the IPv6 addresses for the device. ■ Dhcpv6_stateless: When enabled, the Dhcpv6_stateless autoconfiguration is run to learn the DNS and domain information for the device. ■ Dhcpv6_stateful: When enabled, the Dhcpv6_stateful autoconfiguration is run to learn the IP addresses and DNS information for the device.
Static IPv6 Address (R/O)			Set the static IPv6 address. Example: `2001:0db0:000.82a1:0000:0000:1234:abcd`
Commit			Commit the current BMC LAN information.

BIOS Advanced Menu iSCSI Configuration Options

The following table lists the BIOS Advance Menu iSCSI Configuration options.

TABLE 34   BIOS Advanced Menu iSCSI Configuration Options

Setup Options	Options	Defaults	Description
iSCSI Initiator Name	NA (must be specified)	None	The worldwide unique name of the iSCSI Initiator. Only IQN format is accepted.
Add an Attempt			
iSCSI Attempt Name	NA (must be specified)	None	The human-readable name that you assigned to this attempt.
iSCSI Mode	Disabled/Enabled/Enabled for MPIO	Disabled	Set to Enabled for multipath I/O (MPIO). MPIO can boost the performance of an application by load balancing traffic across multiple ports.
Internet Protocol	IP4/IP6/Autoconfigure	IP4	Can be set to IP4, IP6, or Autoconfigure. The initiator IP address is assigned by the system to IP6. In Autoconfigure mode, the iSCSI driver attempts to connect to the iSCSI target using the IPv4 stack. If this fails, then the iSCSI driver attempt to connect using the IPv6 stack.
Connection Retry Count	0 to 16	0	The count range is 0 to 16. If set to 0, there are no retries.
Connection Establishing Timeout	NA	1,000	The timeout value in milliseconds. The minimum value is 100 milliseconds and the maximum is 20 seconds.
Configure ISID	Derived from the MAC address	The default value is derived from the Mac Address	The OUI-format ISID is 6 bytes. The default value is derived from the MAC address. Only the last 3 bytes are configurable.

Setup Options	Options	Defaults	Description
			Example: Update 0ABBCCDDEEFF to 0ABBCCF07901 by inputting F07901
Enable DHCP	Disabled/Enabled	Disabled	Enable or disable DHCP
Initiator IP Address	NA	0.0.0.0	Use to set initiator IP address in dotted-decimal notation.
Initiator Subnet Mask	NA	0.0.0.0	Use to set initiator subnet mask IP address in dotted-decimal notation.
Gateway	NA	0.0.0.0	Use to set initiator gateway IP address in dotted-decimal notation.
Target Name	NA	NA	The worldwide unique name of the target. Only IQN format is accepted.
Target IP address	0.0.0.0	None	Use to set target IP address in dotted-decimal notation.
Target Port		3260	Use to change target port number.
Boot LUN		0	Use to set the hexadecimal representation of the boot logical unit number (LUN). Example: 4752-3A4F-6b7e-2F99
Authentication Type	CHAP/None	CHAP	Define the Challenge-Handshake Authentication Protocol (CHAP). Available settings are CHAP, Kerberos, and None.
CHAP Type	One Way/Mutual	One Way	Use to set CHAP type to either One Way or Mutual.
CHAP Name	NA	None	Use to set CHAP name.
CHAP Secret	NA	None	Use to set the CHAP secret password. The secret length range is 12 to 16 bytes.
Delete Attempts	NA	NA	Use to delete one or more attempts.
Change Attempt Order	NA	NA	Use to change the order of attempts. Use arrow keys to select the attempt, then

Setup Options	Options	Defaults	Description
			press +/- keys to move the attempt up/down in the attempt order list.

BIOS Advanced Menu Ethernet Controller Options

The following table lists the BIOS Advance Menu Ethernet Controller options.

TABLE 35   BIOS Advanced Menu Ethernet Controller Options

Setup Options	Options	Defaults	Description
Port Configuration Menu			
NIC configuration			Use to configure the network interface controller.
Link Speed (R/O)	Supported port speeds/ Auto Negotiate	NA	Specifies the port speed used for the selected boot protocol. **Note -** This option is not supported.
Wake on LAN	Disable/Enabled	NA	Enable or disable wake on LAN. **Note -** This option is not supported.
Blink LEDs	0/1/2/3	0	Use to identify the physical network port by blinking the associated LED.
Port Configuration Information			Displays and specifies the port settings for the network device.
UEFI Driver (R/O)	NA	NA	Identifies the UEFI driver.
Adapter PBA (R/O)	NA	NA	Product board adapter (PBA) number. You can use the Intel Network Adapter PBA number to search for the adapter's model number. The PBA number is a nine digit number that is the last part of the adapter board serial number. The PBA number is presented in this format: *xxxxxxx-xxx*, for example, C80222-001.

Setup Options	Options	Defaults	Description
Chip Type (R/O)	NA	NA	Manufacturer and model number
PCI Device ID (R/O)		1528	Device identifier
PCI Address (R/O)	NA	NA	Bus device function identifier Example format: Bus: Device:Function
Link Status	Connected/Disconnected	Disconnected	Specifies the link status of the network port.
MAC Address (R/O)	NA	None	Lists the MAC address of the network interface controller (NIC).

Related Information

- "BIOS Main Menu Selections" on page 239
- "BIOS IO Menu Selections" on page 257
- "BIOS Boot Menu Selections" on page 261
- "BIOS Exit Menu Selections" on page 263

BIOS IO Menu Selections

This section includes a searchable text-based representation and a screenshot of the BIOS IO Menu. The options that are available from the IO Menu are described in the table that follows.

Note - PCIe slot 1 and Ethernet ports NET2 and NET3 are nonfunctional in single-processor systems.

```
            Aptio Setup Utility – Copyright (C) 2013 American Megatrends, Inc.
       Main  Advanced   IO   Boot   Exit

   ▶ PCI Subsystem Settings                          PCI Subsystem Settings
   ▶ IO Virtualization
   ▶ IOAT Configuration
   ▶ Internal Devices
   ▶ Add In Cards



                                                  ⯈⯇: Select Screen
                                                  ↑↓: Select Item
                                                  Enter: Select
                                                  +/-: Change Opt.
                                                  F1: General Help
                                                  F7: Discard Changes
                                                  F9: Optimized Defaults
                                                  F10: Save & Exit
                                                  ESC: Exit

            Version 2.16.1243. Copyright (C) 2013 American Megatrends, Inc.
```
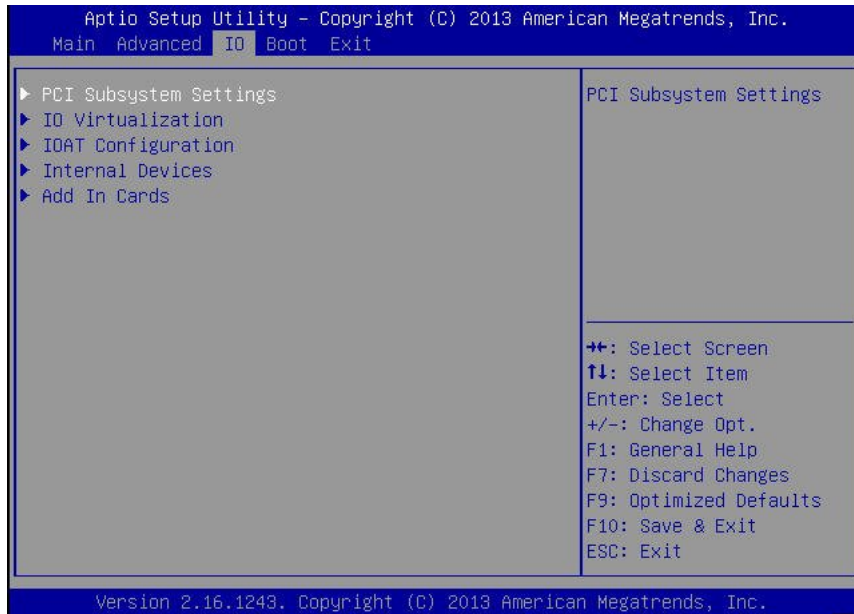
The following tables describe the BIOS IO menu options.

- "BIOS IO Menu PCI Subsystem Settings Options" on page 258
- "BIOS IO Menu IO Virtualization Options" on page 259
- "BIOS IO Menu I/OAT Configuration Options" on page 259
- "BIOS IO Menu Internal Devices Options" on page 260
- "BIOS IO Menu Add In Cards Options" on page 260

BIOS IO Menu PCI Subsystem Settings Options

The following table describes the BIOS IO Menu PCI Subsystem Settings Options.

TABLE 36 BIOS IO Menu PCI Subsystem Settings Options

Setup Options	Options	Defaults	Description
PCI 64 Bit Resources Allocation	Disabled/Enabled	Enabled	Enable or disable 64-bit capable devices to be decoded in above 4G address space. This setting is available only if the system supports 64-bit decoding.

BIOS IO Menu IO Virtualization Options

The following table describes the BIOS IO Menu IO Virtualization Options.

TABLE 37   BIOS IO Menu IO Virtualization Options

Setup Options	Options	Defaults	Description
VT-d	Disabled/Enabled	Enabled	Enable or disable Intel Virtualization Technology for directed I/O (VT-d) by reporting the I/O device assignment to VMM through DMA remapping reporting (DMAR) Advance Configuration Power Interface (ACPI) tables.
SR-IOV	Disabled/Enabled	Enabled	Single Root I/O Virtualization (SR-IOV) is used to configure devices into multiple virtual devices that can be used on virtual OS installations. If supported by the hardware and set to enabled, all devices within the system that are SR-IOV capable are configured to support SR-IOV and I/O resources are allocated to the device as normal. If set to disabled, I/O resources are not allocated to the device.
ARI	Disabled/Enabled	Enabled	If Alternate Routing ID (ARI) is supported by the hardware and set to enabled, devices are permitted to locate virtual functions (VFs) in function numbers 8 to 255 of the captured bus number, instead of normal function numbers 0 to 7.

BIOS IO Menu I/OAT Configuration Options

The following table describes the BIOS IO Menu I/OAT Configuration Options.

TABLE 38   BIOS IO Menu I/OAT Configuration Options

Setup Options	Options	Defaults	Description
Intel I/OAT	Disabled/Enabled	Enabled	Enable or disable Intel I/OATdevices.
DCA Support	Disabled/Enabled	Enabled	Enable or disable direct cache access (DCA) support.

BIOS IO Menu Internal Devices Options

The following table describes the BIOS IO Internal Devices Options.

TABLE 39   BIOS IO Menu Internal Devices Options

Setup Options	Options	Defaults	Description
NET0			Displays and provides options to change the internal device settings.
OpROM Enable	Disabled/Enabled	Enabled	Enable or disable Option ROM. If set to enabled, Option ROM for the card executes as normal. If set to disabled, Option ROM for the card is not copied into memory and the execution of the Option ROM is inhibited.
NET1, NET2, and NET3 Note - Ethernet ports NET2 and NET3 are nonfunctional in single-processor systems.			See NET0 description.

BIOS IO Menu Add In Cards Options

The following table describes the BIOS IO Menu Add In Cards Options.

TABLE 40   BIOS IO Menu Add In Cards

Setup Options	Options	Defaults	Description
Slot 1			Displays and provides options to change the

Setup Options	Options	Defaults	Description
Note - PCIe slot 1 is nonfunctional in single-processor systems.			settings of the devices in PCIe slots.
OpROM Enable	Disable/Enabled	Enabled	Enable or disable Option ROM for add-in card.
Slot 2, Slot 3, and Slot 4			See Slot 1 description

Related Information

- "BIOS Main Menu Selections" on page 239
- "BIOS Advanced Menu Selections" on page 243
- "BIOS Boot Menu Selections" on page 261
- "BIOS Exit Menu Selections" on page 263

BIOS Boot Menu Selections

This section includes a searchable text-based representation and a screenshot of the BIOS Boot Menu. The options that are available from the Boot Menu are described in the table that follows.
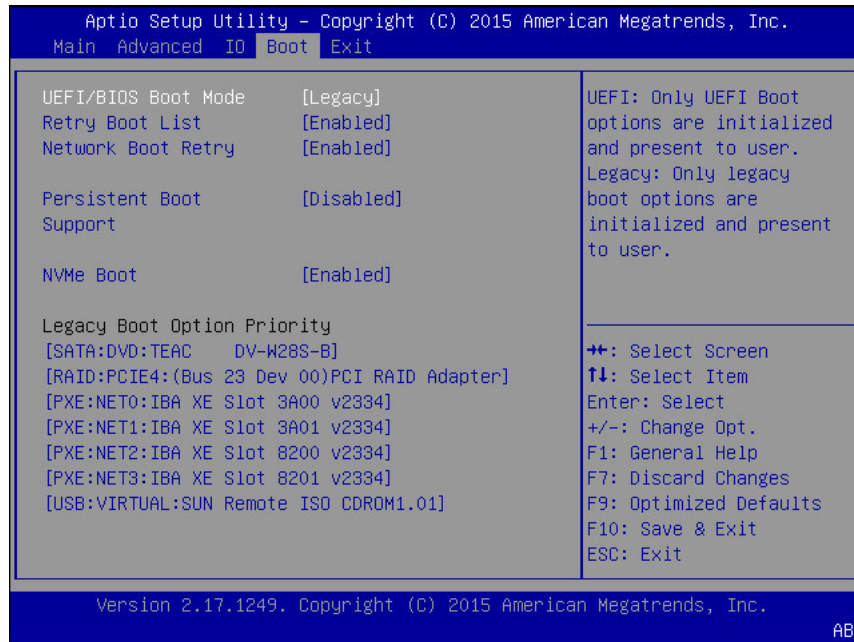
```
       Aptio Setup Utility - Copyright (C) 2015 American Megatrends, Inc.
     Main  Advanced  IO  Boot  Exit

  UEFI/BIOS Boot Mode      [Legacy]           UEFI: Only UEFI Boot
  Retry Boot List          [Enabled]          options are initialized
  Network Boot Retry       [Enabled]          and present to user.
                                              Legacy: Only legacy
  Persistent Boot          [Disabled]         boot options are
  Support                                     initialized and present
                                              to user.
  NVMe Boot                [Enabled]

  Legacy Boot Option Priority                 _____
  [SATA:DVD:TEAC    DV-W28S-B]
  [RAID:PCIE4:(Bus 23 Dev 00)PCI RAID Adapter]  ↔: Select Screen
  [PXE:NET0:IBA XE Slot 3A00 v2334]             ↑↓: Select Item
  [PXE:NET1:IBA XE Slot 3A01 v2334]             Enter: Select
  [PXE:NET2:IBA XE Slot 8200 v2334]             +/-: Change Opt.
  [PXE:NET3:IBA XE Slot 8201 v2334]             F1: General Help
  [USB:VIRTUAL:SUN Remote ISO CDROM1.01]        F7: Discard Changes
                                                F9: Optimized Defaults
                                                F10: Save & Exit
                                                ESC: Exit

       Version 2.17.1249. Copyright (C) 2015 American Megatrends, Inc.
                                                                  AB
```

TABLE 41   BIOS Boot Menu Options

Setup Options	Options	Defaults	Description
UEFI/BIOS Boot Mode	Legacy/UEFI	Legacy	Select either Legacy BIOS or UEFI as the boot mode. ■ Enable UEFI: Only UEFI BIOS boot options are initialized and presented to the user. ■ Enable Legacy BIOS: Only Legacy BIOS boot options are initialized and presented to the user.
Retry Boot List	Disabled/Enabled	Enabled	If enabled, BIOS automatically retries to boot from the top of the Boot Options Priority list when all devices have been attempted and failed.
Network Boot Retry	Disabled/Enabled/Boot List	Enabled	If enabled, BIOS automatically retries the PXE list present in the system when all PXE attempts have failed. If set to disabled, the system halts and displays the error message "Network Boot Failed" when all PXE boots failed. If set to Boot List, fail over to the main Boot Options Priority list.

Setup Options	Options	Defaults	Description
Persistent Boot Support	Disabled/Enabled	Disabled	If enabled, the Persistent Boot feature is enabled. If disabled, system reverts back to the default boot handling from the next boot.
NVMe Boot	Disabled/Enabled	Enabled	BIOS supports booting to UEFI\Legacy OS that is present in the NVMe device.
Legacy Boot Option Priority	UEFI/Legacy	Legacy	Displays the system boot order.

Related Information

BIOS Exit Menu Selections

This section includes a searchable text-based representation and a screenshot of the BIOS Exit Menu. The options that are available from the Exit Menu are described in the table that follows.
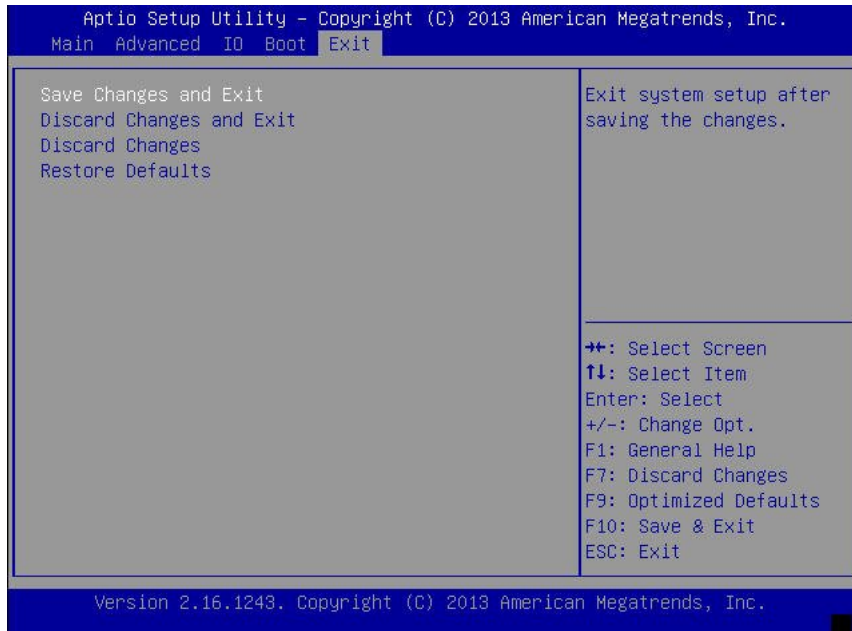
```
        Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
         Main  Advanced  IO  Boot  Exit

        Save Changes and Exit                            Exit system setup after
        Discard Changes and Exit                         saving the changes.
        Discard Changes
        Restore Defaults




                                                         →←: Select Screen
                                                         ↑↓: Select Item
                                                         Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F7: Discard Changes
                                                         F9: Optimized Defaults
                                                         F10: Save & Exit
                                                         ESC: Exit

             Version 2.16.1243. Copyright (C) 2013 American Megatrends, Inc.
```

TABLE 42   BIOS Exit Menu Options

Setup Options	Description
Save Changes and Exit	Save changes and exit the BIOS Setup Utility.
Discard Changes and Exit	Exit the BIOS Setup Utility without saving changes.
Discard Changes	Discard any changes made to the setup options.
Restore Defaults	Restore/load the optimal default values for all of the setup options.

Related Information

- "BIOS Main Menu Selections" on page 239
- "BIOS Advanced Menu Selections" on page 243
- "BIOS IO Menu Selections" on page 257
- "BIOS Boot Menu Selections" on page 261

Monitoring Components and Identifying SNMP Messages

This section includes information about monitoring components and identifying SNMP messages for the Oracle Server X6-2.

Description	Links
Review how Oracle ILOM monitors component health and faults.	"Monitoring Component Health and Faults Using Oracle ILOM" on page 265
Review information about system components and nomenclature.	"Monitoring System Components" on page 266
Review SNMP traps generated by the server.	"Identifying SNMP Trap Messages" on page 277

Related Information

- Oracle Integrated Lights Out Manager (ILOM) 3.2 Documentation Library at: `http://www.oracle.com/goto/ilom/docs`

Monitoring Component Health and Faults Using Oracle ILOM

The Oracle ILOM 3.2 interfaces provide easy-to-view information about the health status of system components. From the Oracle ILOM web interface or in the Oracle ILOM command-line interface (CLI), you can collect system-specific information about the server, determine the health state of discrete components, and view any open problems on the server. Oracle ILOM automatically detects system hardware faults and environmental conditions on the server. If a problem occurs on the server, Oracle ILOM will automatically do the following:

- Illuminate the Service Required status indicator (LED) on the server front and back panels.
- Identify the faulted component in the Open Problems table.
- Record system information about the faulted component or condition in the event log.

For further information about administering open problems that are detected and reported by Oracle ILOM, refer to "Administering Open Problems" in the *Oracle ILOM Administrator's Guide for Configuration and Maintenance Firmware Release 3.2.x* in the Oracle Integrated Lights Out Manager (ILOM) 3.2 Documentation Library at `http://www.oracle.com/goto/ilom/docs`.

Related Information

- Oracle Integrated Lights Out Manager (ILOM) 3.2 Documentation Library at: `http://www.oracle.com/goto/ilom/docs`

Monitoring System Components

The tables in this section identify the system components and describe the naming conventions applied to the components of the Oracle Server X6-2.

Each section corresponds to an IPMI entity ID and lists sensors, indicators, and field-replaceable units (FRUs) related to that entity. The tables contain the following fields:

- **Component Name** – Shows the user-visible component name used in management interfaces to refer to a specific sensor, indicator, or FRU. The IPMI name is a shortened form of the component name, and is indicated by the **boldface** portion of the component name.
- **IPMI Type** – Indicates the type of sensor, indicator, or FRU represented.
- **Description** – Describes the particular component name reference.
- **Values** – Defines the states of the sensor, indicator, or FRU entity, and any specific units or values that are expected, if applicable.

Note - Some component names are hidden in the Oracle ILOM user interfaces. These names are marked as hidden in the tables. Further, as of Oracle ILOM 3.2, the Oracle ILOM 3.0 legacy targets `/SYS` and `/STORAGE` have been replaced by `/System`. Even though these legacy targets might be hidden, you can still use them to issue commands. For information on legacy targets, see the ILOM 3.2 Documentation Library at `http://www.oracle.com/goto/ilom/docs`.

This section includes information for the following server components:

- "System Chassis Components" on page 267
- "Cooling Unit Components" on page 269
- "Disk Backplane Components" on page 270
- "Memory Device Components" on page 271

System Chassis Components

The following table lists the system chassis components.

Component Name (Oracle ILOM CLI Targets)	IPMI Type	Description	Values (if applicable)
/**SYS**	FRU	Product information only	
/SYS/**UUID**	FRU	Unique system ID	Derived from host MAC address. Used for PXE boot and licensing.
/SYS/**ACPI**	State sensor	Advanced Configuration and Power Interface	(*hidden*) 01h-ACPI_ON_WORKING 20h-ACPI_SOFT_OFF
/SYS/**VPS**	Threshold sensor	Virtual power sensor	Watts
/SYS/**VPS_CPUS**	Threshold sensor	Virtual power sensor (CPUs)	Watts
/SYS/**VPS_MEMORY**	Threshold sensor	Virtual power sensor (Memory)	Watts
/SYS/**VPS_FANS**	Threshold sensor	Virtual power sensor (Fans)	Watts
/SYS/**INTSW**	Discrete sensor	Chassis intrusion switch	01h-Deasserted 02h-Asserted
/SYS/**T_AMB**	Threshold sensor	Ambient temperature on system motherboard, located on the front indicator module (FIM).	Degrees Celsius
/SYS/**TEMP_FAULT**	Indicator	Temperature Fault LED	Color: Amber Location: Front panel Off: Normal On: Chassis overtemp fault

Component Name (Oracle ILOM CLI Targets)	IPMI Type	Description	Values (if applicable)
/SYS/**OK**	Indicator	Power/OK LED	Color: Green
			Location: Front panel
			Off: Power is off or the Oracle ILOM boot is not complete.
			Standby blink: Standby power is on, but the chassis power is off and the Oracle ILOM SP is running.
			Slow blink: Startup sequence has been initiated on the host.
			Steady on: Server is powered on and the host is booting OS or the host is running the OS.
/SYS/**SERVICE**	Indicator	Service Required LED	Color: Amber
			Location: Front panel
			Off: Normal
			On: Server requires service.
/SYS/**LOCATE**	Indicator	Locator LED	Color: White
			Location: Front and rear panels
			Off: Normal
			Fast blink: Locate function is activated; self-extinguishes after 30 minutes.
/SYS/**HOST_ERR**	Discrete sensor	Host asserted error sensor	01h-Deasserted
			02h-Asserted
/SYS/**PS_FAULT**	Indicator	Rear Power Supply Fault LED	Color: Amber
			Location: Mainboard
			Off: Normal
			On: General power supply fault
/SYS/**FAN_FAULT**	Indicator	Top Fan Fault LED	Color: Amber
			Location: Mainboard
			Off: Normal
			On: General fan fault

Related Information

- "Cooling Unit Components" on page 269
- "Disk Backplane Components" on page 270
- "Memory Device Components" on page 271
- "Power Unit Components" on page 272
- "Processor Components" on page 273
- "System Board Components" on page 273
- "System Firmware Components" on page 276
- "Hard Disk Drive Components" on page 276

Cooling Unit Components

The system has 3.5-inch fan modules with two fans in each module. The following table lists the system cooling unit components.

Component Name (Oracle ILOM CLI Targets)	IPMI Type	Description	Values (if applicable)
/SYS/**MB/FM[0-3]**	FRU	Fan module FRU	
/SYS/**MB/FM[0-3]/F[0-x]**	FRU	Individual fan	
/SYS/**MB/FM[0-3]/PRSNT**	Discrete sensor	Fan module is present.	01h-ENTITY_ABSENT 02h-ENTITY_PRESENT
/SYS/**MB/FM[0-3]/F[0-x]/ TACH**	Threshold sensor	Fan module fan speed	RPM
/SYS/**MB/FM[0-3]/SERVICE**	Indicator	Fan Service Required LED	Color: Amber Location: Motherboard Off: Normal On: Fan module was diagnosed as faulty.

Related Information

- "System Chassis Components" on page 267
- "Disk Backplane Components" on page 270
- "Memory Device Components" on page 271
- "Power Unit Components" on page 272
- "Processor Components" on page 273

Disk Backplane Components

The following table lists the disk backplane (DBP) components.

Component Name (Oracle ILOM CLI Targets)	IPMI Type	Description	Values (if applicable)
/SYS/**DBP**	FRU	Disk backplane FRU	
/SYS/**DBP/HDD[0-x]**	Pseudo	Hard disk drives	
/SYS/**DBP/HDD[0-x]/PRSNT**	Discrete sensor	Hard disk drive presence	01h-ENTITY_ABSENT 02h-ENTITY_PRESENT
/SYS/**DBP/HDD[0-x]/STATE**	State sensor	Hard disk drive state	02h-DRIVE_FAULT 04h-PREDICTIVE_FAILURE 08h-HOT_SPARE
/SYS/**DBP/HDD[0-x]/SERVICE**	Indicator	Service Required LED	Color: Amber Location: Hard disk drive Off: Normal On: Hard disk drive was diagnosed as faulty
/SYS/**DBP/HDD[0-x]/OK2RM**	Indicator	OK to remove	Color: Blue Location: Hard disk drive Off: Normal On: OK to remove hard disk drive
/SYS/**DBP/NVME[0-x]**		NVMe drives	
/SYS/**DBP/NVME[0-x]/PRSNT**	Discrete sensor	NVMe drive presence	01h-ENTITY_ABSENT 02h-ENTITY_PRESENT

Related Information

- "Cooling Unit Components" on page 269
- "Memory Device Components" on page 271
- "Power Unit Components" on page 272
- "Processor Components" on page 273
- "System Board Components" on page 273
- "System Firmware Components" on page 276
- "Hard Disk Drive Components" on page 276

Memory Device Components

The following table lists the memory device components.

Component Name (Oracle ILOM CLI Targets)	IPMI Type	Description	Values (if applicable)
/SYS/MB/**P[0-x]/D[0-11]**	FRU	Host CPU DIMM FRU	
/SYS/MB/**P[0-x]/D[0-11]/PRSNT**	Discrete sensor	Host CPU DIMM is present.	01h-ENTITY_ABSENT 02h-ENTITY_PRESENT
/SYS/MB/**P[0-x]/D[0-11]/SERVICE**	Indicator	Host CPU DIMM Service Required LED	Color: Amber Location: Main board Off: Normal On: DIMM was diagnosed as faulty.

Related Information

- "System Chassis Components" on page 267
- "Cooling Unit Components" on page 269
- "Disk Backplane Components" on page 270
- "Power Unit Components" on page 272
- "Processor Components" on page 273
- "System Board Components" on page 273
- "System Firmware Components" on page 276
- "Hard Disk Drive Components" on page 276

Power Unit Components

The following table lists the power unit components.

Component Name (Oracle ILOM CLI Targets)	IPMI Type	Description	Values (if applicable)
/SYS/**PS[0-1]**	FRU	Power supply FRU	
/SYS/**PS[0-1]/PRSNT**	Discrete sensor	Power Supply is present.	01h-ENTITY_ABSENT 02h-ENTITY_PRESENT
/SYS/**PS[0-1]/STATE**	Discrete sensor	Multistate, power supply sensor type, per IPMI	Presence detected Failure detected Predictive failure Power supply input lost Power supply input lost or out-of-range Power supply input out-of-range Configuration error
/SYS/**PS[0-1]/P_IN**	Power sensor	Input power draw	Watts
/SYS/**PS[0-1]/P_OUT**	Power sensor	Output power	Watts
/SYS/**PS[0-1]/V_IN**	Voltage sensor	Input voltage	Volts
/SYS/**PS[0-1]/V_12V**	Voltage sensor	12V output voltage	Volts
/SYS/**PS[0-1]/V_12V_STBY**	Voltage sensor	12V standby output voltage	Volts
/SYS/**PS[0-1]/T_OUT**	Temperature sensor	Ambient temperature	Degrees Celsius

Related Information

- "System Chassis Components" on page 267
- "Cooling Unit Components" on page 269
- "Disk Backplane Components" on page 270
- "Memory Device Components" on page 271
- "Processor Components" on page 273
- "System Board Components" on page 273

- "System Firmware Components" on page 276
- "Hard Disk Drive Components" on page 276

Processor Components

The following table lists the processor (CPU) components.

Component Name (Oracle ILOM CLI Targets)	IPMI Type	Description	Values (if applicable)
/SYS/**MB/P[0-x]**	FRU	Host CPU FRU	
/SYS/**MB/P[0-x]/PRSNT**	Discrete sensor	Host CPU is present.	01h-ENTITY_PRESENT 02h-ENTITY_ABSENT
/SYS/**MB/P[0-x]/SERVICE**	Indicator	Host CPU Service Required LED	Color: Amber Location: Mainboard Off: Normal On: Processor was diagnosed as faulty.
/SYS/**MB/P[0-x]/V_DIMM**	Static sensor	CPU DIMM bank operating voltage	1.2V

Related Information

- "System Chassis Components" on page 267
- "Cooling Unit Components" on page 269
- "Disk Backplane Components" on page 270
- "Memory Device Components" on page 271
- "Power Unit Components" on page 272
- "System Board Components" on page 273
- "System Firmware Components" on page 276
- "Hard Disk Drive Components" on page 276

System Board Components

The following table lists the system board components.

Component Name (Oracle ILOM CLI Targets)	IPMI Type	Description	Values (if applicable)
/SYS/**MB**	FRU	General host system board FRU	
/SYS/**MB/CPLD**	FRU	Mainboard CPLD/FPGA firmware version	
/SYS/**MB/NET[0-3]**	FRU	Host Ethernet FRU	
/SYS/MB/RISER[1-3]/PRSNT	Discrete sensor	PCIe riser inserted into PCIe slot	01h-ENTITY_ABSENT 02h-ENTITY_PRESENT
/SYS/MB/RISER1/PCIE1/PRSNT	Discrete sensor	Option card inserted into PCIe riser 1	01h-ENTITY_ABSENT 02h-ENTITY_PRESENT
/SYS/MB/RISER2/PCIE2/PRSNT	Discrete sensor	Option card inserted into PCIe riser 2	01h-ENTITY_ABSENT 02h-ENTITY_PRESENT
/SYS/MB/RISER3/PCIE3/PRSNT	Discrete sensor	Option card inserted into slot 3 of PCIe riser 3	01h-ENTITY_ABSENT 02h-ENTITY_PRESENT
/SYS/MB/RISER3/PCIE4/PRSNT	Discrete sensor	Internal HBA card inserted into slot 4 of PCIe riser 3	01h-ENTITY_ABSENT 02h-ENTITY_PRESENT
/SYS/**MB/RISER1/PCIE1/PCIESW**	FRU	Optional Oracle PCIe NVMe switch card, dedicated slot	01h-ENTITY_ABSENT 02h-ENTITY_PRESENT
/SYS/**MB/RISER1/PCIE1/PCIESW/ PRSNT**	FRU	Optional Oracle PCIe NVMe switch card inserted into slot 1 of PCIe riser 1, dedicated slot	01h-ENTITY_ABSENT 02h-ENTITY_PRESENT
/SYS/**MB/T_OUT_SLOT[1-3]**	Threshold sensor	Cooling zone chassis exhaust temperature, located behind the specified PCIe slots. ■ Slot 1 – PCIe slot 1 ■ Slot 2 – PCIe slot 2 ■ Slot 3 – PCIe slot 3	Degrees Celsius

Component Name (Oracle ILOM CLI Targets)	IPMI Type	Description	Values (if applicable)
/SYS/**MB/T_IN_SLOT[1-3]**	Threshold sensor	Cooling zone chassis inlet temperature, located in front of the specified PCIe slots. ■ Slot 1 – PCIe slot 1 ■ Slot 2 – PCIe slot 2 ■ Slot 3 – PCIe slot 3	Degrees Celsius
/SYS/**MB/T_CORE_NET01**	Threshold sensor	Gigabit Ethernet controller die temperature	CPU 0, NET 0+1 Degrees Celsius
/SYS/**MB/T_CORE_NET23**	Threshold sensor	Gigabit Ethernet controller die temperature	CPU 1, NET 2+3 Degrees Celsius
/SYS/**MB/T_IN_SLOT[1-3]**	Threshold sensor	PCIE slot input temperature	Degrees Celsius
/SYS/**MB/T_OUT_SLOT[1-3]**	Threshold sensor	PCIE slot output temperature	Degrees Celsius
/SYS/**MB/T_IN_PS**	Threshold sensor	Power supply unit (PSU) inlet temperature, located directly in front of the PSU 0 air inlet.	Degrees Celsius
/SYS/**SP**	FRU	Service processor FRU	
/SYS/**SP/OK**	Indicator	SP OK LED	Color: Green Location: Front panel On: SP is operating. Off: SP requires service.
/SYS/**SP/NET[0-1]**	FRU	SP Ethernet FRU	

Related Information

■ "System Chassis Components" on page 267
■ "Cooling Unit Components" on page 269
■ "Disk Backplane Components" on page 270
■ "Memory Device Components" on page 271
■ "Power Unit Components" on page 272
■ "Processor Components" on page 273
■ "System Firmware Components" on page 276
■ "Hard Disk Drive Components" on page 276

System Firmware Components

The following table lists the system firmware components.

Component Name (Oracle ILOM CLI Target)	IPMI Type	Description
/SYS/**MB/BIOS**	FRU	BIOS FRU
/SYS/**MB/CPLD**	FRU	Mainboard CPLD/FPGA firmware

Related Information

- "System Chassis Components" on page 267
- "Cooling Unit Components" on page 269
- "Disk Backplane Components" on page 270
- "Memory Events" on page 286
- "Power Unit Components" on page 272
- "Processor Components" on page 273
- "System Board Components" on page 273
- "Hard Disk Drive Components" on page 276

Hard Disk Drive Components

The following table lists the hard disk drive (HDD) components.

Component Name (Oracle ILOM CLI Targets)	IPMI Type	Description	Values (if applicable)
/SYS/**DBP/HDD[0-x]**	FRU	Hard disk drive FRU	From host
/SYS/**DBP/HDD[0-x]/PRSNT**	Discrete sensor	Hard disk drive presence	01h-ENTITY_ABSENT 02h-ENTITY_PRESENT
/SYS/**DBP/HDD[0-x]/STATE**	Discrete sensor	Writable multistate, slot/connector sensor type, per IPMI	02h-DRIVE_FAULT 04h-PREDICTIVE_FAILURE 08h-HOT_SPARE
/SYS/**DBP/HDD[0-x]/SERVICE**	Indicator	Hard disk drive Service Required LED	Color: Amber Location: Hard disk drive

Component Name (Oracle ILOM CLI Targets)	IPMI Type	Description	Values (if applicable)
			Off: Normal
			On: Hard disk drive was diagnosed as faulty.
/SYS/**DBP/HDD[0-x]/OK2RM**	Indicator	Hard disk drive OK to Remove LED	Color: Blue
			Location: Hard disk drive
			Off: Normal
			On: OK to remove
/SYS/**DBP/NVME[0-x]**	FRU	NVMe storage drive FRU	
/SYS/**DBP/NVME[0-x]/PRSNT**	Discrete sensor	NVMe storage drive	01h-ENTITY_PRESENT
			02h-ENTITY_ABSENT

Related Information

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Identifying SNMP Trap Messages

It is possible to configure Oracle ILOM to generate Simple Network Management Protocol (SNMP) traps when hardware problems occur. For information about how to configure SNMP alert rule destinations to start receiving these traps, refer to the Oracle Integrated Lights Out Manager (ILOM) 3.2 Documentation Library at:

http://www.oracle.com/goto/ilom/docs

The tables in these sections list the set of SNMP traps that are generated from Oracle ILOM.

-
-

Environmental Events

The following table lists environmental events.

Messages and Descriptions	Component Name
SNMP Trap: sunHwTrapTempFatalThresholdExceeded **Oracle ILOM Event Message:** Lower fatal threshold exceeded **Severity and Description:** Critical; A temperature sensor has reported that its value has gone above an upper fatal threshold setting or below a lower fatal threshold setting. The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	/SYS/PS[0-1]/T_OUT /SYS/MB/T_IN_ZONE0 /SYS/MB/T_OUT_ZONE0 /SYS/MB/T_IN_ZONE1 /SYS/MB/T_OUT_ZONE1 /SYS/MB/T_IN_ZONE2 /SYS/MB/T_OUT_ZONE2
SNMP Trap: sunHwTrapTempFatalThresholdDeasserted **Oracle ILOM Event Message:** Lower fatal threshold no longer exceeded **Severity and Description:** Informational; A temperature sensor has reported that its value has gone below an upper fatal threshold setting or above a lower fatal threshold setting. The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	/SYS/PS[0-1]/T_OUT /SYS/MB/T_IN_ZONE0 /SYS/MB/T_OUT_ZONE0 /SYS/MB/T_IN_ZONE1 /SYS/MB/T_OUT_ZONE1 /SYS/MB/T_IN_ZONE2 /SYS/MB/T_OUT_ZONE2
SNMP Trap: sunHwTrapTempCritThresholdExceeded **Oracle ILOM Event Message:** Upper critical threshold exceeded **Severity and Description:** Critical; A temperature sensor has reported that its value has gone above an upper critical threshold setting or below a lower critical threshold setting. The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	/SYS/PS[0-1]/T_OUT /SYS/MB/T_IN_ZONE0 /SYS/MB/T_OUT_ZONE0 /SYS/MB/T_IN_ZONE1 /SYS/MB/T_OUT_ZONE1 /SYS/MB/T_IN_ZONE2

Messages and Descriptions	Component Name
	/SYS/MB/T_OUT_ZONE2
SNMP Trap: sunHwTrapTempCritThresholdDeasserted	/SYS/PS[0-1]/T_OUT
Oracle ILOM Event Message: Upper critical threshold no longer exceeded	/SYS/MB/T_IN_ZONE0
Severity and Description: Informational; A temperature sensor has reported that its value has gone below an upper critical threshold setting or above a lower critical threshold setting.	/SYS/MB/T_OUT_ZONE0
	/SYS/MB/T_IN_ZONE1
The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	/SYS/MB/T_OUT_ZONE1
	/SYS/MB/T_IN_ZONE2
	/SYS/MB/T_OUT_ZONE2
SNMP Trap: sunHwTrapTempFatalThresholdExceeded	/SYS/T_AMB
Oracle ILOM Event Message: Lower fatal threshold exceeded	/SYS/MB/T_CORE_NET01
Severity and Description: Critical; A temperature sensor has reported that its value has gone above an upper fatal threshold setting or below a lower fatal threshold setting.	/SYS/MB/T_CORE_NET23
	/SYS/MB/T_IN_PS
The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	
SNMP Trap: sunHwTrapTempFatalThresholdDeasserted	/SYS/T_AMB
Oracle ILOM Event Message: Lower fatal threshold no longer exceeded	/SYS/MB/T_CORE_NET01
Severity and Description: Informational; A temperature sensor has reported that its value has gone below an upper fatal threshold setting or above a lower fatal threshold setting.	/SYS/MB/T_CORE_NET23
	/SYS/MB/T_IN_PS
The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	
SNMP Trap: sunHwTrapTempCritThresholdExceeded	/SYS/MB/T_CORE_NET01
Oracle ILOM Event Message: Upper critical threshold exceeded	/SYS/MB/T_CORE_NET23
Severity and Description: Critical; A temperature sensor has reported that its value has gone above an upper critical threshold setting or below a lower critical threshold setting.	/SYS/MB/T_IN_PS
The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	
SNMP Trap: sunHwTrapTempCritThresholdDeasserted	/SYS/MB/T_CORE_NET01
Oracle ILOM Event Message: Upper critical threshold no longer exceeded	/SYS/MB/T_CORE_NET23
Severity and Description: Informational; A temperature sensor has reported that its value has gone below an upper critical threshold setting or above a lower critical threshold setting.	/SYS/MB/T_IN_PS
The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	

Related Information

Hard Disk Drive Events

The following table lists hard disk drive events.

Messages and Descriptions	Description
SNMP Trap Message: sunHwTrapSlotOrConnectorError **Oracle ILOM Event Message:** Assert **Severity and Description:** Major: A sensor associated with a slot or connector has detected an error.	/SYS/DBP/HDD[0-x]/STATE
SNMP Trap Message: sunHwTrapSlotOrConnectorOk **Oracle ILOM Event Message:** Deassert **Severity and Description:** Informational; A sensor associated with a slot or connector has returned to its normal state.	/SYS/DBP/HDD[0-x]/STATE

Related Information

Power Events

The following table lists power events.

Messages and Descriptions	Component Name
SNMP Trap: sunHwTrapPowerSupplyError **Oracle ILOM Event Message:** PS_PRESENCE ASSERT **Severity and Description:** Major; A power supply sensor has detected an error.	/SYS/PS[0-1]/STATE
SNMP Trap: sunHwTrapPowerSupplyError **Oracle ILOM Event Message:** PS_PRESENCE DEASSERT **Severity and Description:** Major; A power supply sensor has detected an error.	/SYS/PS[0-1]/STATE
SNMP Trap: sunHwTrapPowerSupplyError **Oracle ILOM Event Message:** PS_FAILURE ASSERT **Severity and Description:** Major; A power supply sensor has detected an error.	/SYS/PS[0-1]/STATE
SNMP Trap: sunHwTrapPowerSupplyError **Oracle ILOM Event Message:** PS_FAILURE DEASSERT **Severity and Description:** Major; A power supply sensor has detected an error.	/SYS/PS[0-1]/STATE
SNMP Trap: sunHwTrapPowerSupplyError **Oracle ILOM Event Message:** PS_PREDICTIVE_FAILURE ASSERT **Severity and Description:** Major; A power supply sensor has detected an error.	/SYS/PS[0-1]/STATE
SNMP Trap: sunHwTrapPowerSupplyError **Oracle ILOM Event Message:** PS_PREDICTIVE_FAILURE DEASSERT **Severity and Description:** Major; A power supply sensor has detected an error.	/SYS/PS[0-1]/STATE
SNMP Trap: sunHwTrapPowerSupplyError **Oracle ILOM Event Message:** PS_INPUT_LOST ASSERT **Severity and Description:** Major; A power supply sensor has detected an error.	/SYS/PS[0-1]/STATE
SNMP Trap: sunHwTrapPowerSupplyError **Oracle ILOM Event Message:** PS_INPUT_LOST DEASSERT **Severity and Description:** Major; A power supply sensor has detected an error.	/SYS/PS[0-1]/STATE
SNMP Trap: sunHwTrapPowerSupplyError **Oracle ILOM Event Message:** PS_INPUT_ERROR ASSERT	/SYS/PS[0-1]/STATE

Messages and Descriptions	Component Name
Severity and Description: Major; A power supply sensor has detected an error.	
SNMP Trap: sunHwTrapPowerSupplyError	/SYS/PS[0-1]/STATE
Oracle ILOM Event Message: PS_INPUT_ERROR DEASSERT	
Severity and Description: Major; A power supply sensor has detected an error.	
SNMP Trap: sunHwTrapPowerSupplyError	/SYS/PS[0-1]/STATE
Oracle ILOM Event Message: PS_INPUT_RANGE_ERROR ASSERT	
Severity and Description: Major; A power supply sensor has detected an error.	
SNMP Trap: sunHwTrapPowerSupplyError	/SYS/PS[0-1]/STATE
Oracle ILOM Event Message: PS_INPUT_RANGE_ERROR DEASSERT	
Severity and Description: Major; A power supply sensor has detected an error.	
SNMP Trap: sunHwTrapPowerSupplyError	/SYS/PS[0-1]/STATE
Oracle ILOM Event Message: PS_CONFIG_ERROR ASSERT	
Severity and Description Major; A power supply sensor has detected an error.	
SNMP Trap: sunHwTrapPowerSupplyError	/SYS/PS[0-1]/STATE
Oracle ILOM Event Message: PS_CONFIG_ERROR DEASSERT	
Severity and Description: Major; A power supply sensor has detected an error.	
SNMP Trap: sunHwTrapSensorNonCritThresholdExceeded	/SYS/VPS
Oracle ILOM Event Message: Upper noncritical threshold exceeded	
Severity and Description: Minor; A sensor has reported that its value has gone above an upper noncritical threshold setting or below a lower noncritical threshold setting. This generic 'sensor' trap is generated when the SNMP agent does not recognize the component type.	
The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	
SNMP Trap: sunHwTrapSensorThresholdOk	/SYS/VPS
Oracle ILOM Event Message: Upper noncritical threshold no longer exceeded	
Severity and Description: Informational; A sensor has reported that its value is in the normal operating range. This generic 'sensor' trap is generated when the SNMP agent does not recognize the component type.	
SNMP Trap: sunHwTrapSensorNonCritThresholdExceeded	/SYS/VPS_FANS
Oracle ILOM Event Message: Upper noncritical threshold exceeded	/SYS/PS[0-1]/P_IN
Severity and Description: Minor; A sensor has reported that its value has gone above an upper noncritical threshold setting or below a lower noncritical threshold setting. This generic 'sensor' trap is generated when the SNMP agent does not recognize the component type.	/SYS/PS[0-1]/P_OUT
The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower.	

Messages and Descriptions	Component Name
SNMP Trap: sunHwTrapSensorThresholdOk	/SYS/VPS_FANS
Oracle ILOM Event Message: Upper noncritical threshold no longer exceeded	/SYS/PS[0-1]/P_IN
Severity and Description: Informational; A sensor has reported that its value is in the normal operating range. This generic 'sensor' trap is generated when the SNMP agent does not recognize the component type.	/SYS/PS[0-1]/P_OUT
SNMP Trap: sunHwTrapSensorFatalThresholdExceeded	/SYS/PS[0-1]/P_IN
Oracle ILOM Event Message: Lower fatal threshold exceeded	/SYS/PS[0-1]/P_OUT
Severity and Description: Critical; A power supply sensor has reported that its value has gone above an upper fatal threshold setting or below a lower fatal threshold setting. The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	
SNMP Trap: sunHwTrapSensorFatalThresholdDeasserted	/SYS/PS[0-1]/P_IN
Oracle ILOM Event Message: Lower fatal threshold no longer exceeded	/SYS/PS[0-1]/P_OUT
Severity and Description: Informational; A power supply sensor has reported that its value has gone below an upper fatal threshold setting or above a lower fatal threshold setting. The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	
SNMP Trap: sunHwTrapSensorCritThresholdExceeded	/SYS/PS[0-1]/P_IN
Oracle ILOM Event Message: Lower critical threshold exceeded	/SYS/PS[0-1]/P_OUT
Severity and Description: Major; A power supply sensor has reported that its value has gone above an upper critical threshold setting or below a lower critical threshold setting. The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	
SNMP Trap: sunHwTrapSensorCritThresholdDeasserted	/SYS/PS[0-1]/P_IN
Oracle ILOM Event Message: Lower critical threshold no longer exceeded	/SYS/PS[0-1]/P_OUT
Severity and Description: Informational; A power supply sensor has reported that its value has gone below an upper critical threshold setting or above a lower critical threshold setting. The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	
SNMP Trap: sunHwTrapVoltageFatalThresholdExceeded	/SYS/PS[0-1]/V_12V
Oracle ILOM Event Message: Lower fatal threshold exceeded	/SYS/PS[0-1]/V_12V_STBY
Severity and Description: Critical; A voltage sensor has reported that its value has gone above an upper fatal threshold setting or below a lower fatal threshold setting. The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	/SYS/PS[0-1]/V_IN /SYS/MB/P[0-x]/V_DIMM
SNMP Trap: sunHwTrapVoltageFatalThresholdDeasserted	/SYS/PS[0-1]/V_12V

Messages and Descriptions	Component Name
Oracle ILOM Event Message: Lower fatal threshold no longer exceeded	/SYS/PS[0-1]/V_12V_STBY
Severity and Description: Informational; A voltage sensor has reported that its value has gone below an upper fatal threshold setting or above a lower fatal threshold setting. The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	/SYS/PS[0-1]/V_IN /SYS/MB/P[0-x]/V_DIMM
SNMP Trap: sunHwTrapVoltageCritThresholdExceeded	/SYS/PS[0-1]/V_12V
Oracle ILOM Event Message: Upper critical threshold exceeded	/SYS/PS[0-1]/V_12V_STBY
Severity and Description: Critical; A voltage sensor has reported that its value has gone above an upper critical threshold setting or below a lower critical threshold setting. The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	/SYS/PS[0-1]/V_IN /SYS/MB/P[0-x]/V_DIMM
SNMP Trap: sunHwTrapVoltageCritThresholdDeasserted	/SYS/PS[0-1]/V_12V
Oracle ILOM Event Message: Upper critical threshold no longer exceeded	/SYS/PS[0-1]/V_12V_STBY
Severity and Description: Informational; A voltage sensor has reported that its value has gone below an upper critical threshold setting or above a lower critical threshold setting. The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	/SYS/PS[0-1]/V_IN /SYS/MB/P[0-x]/V_DIMM
SNMP Trap: sunHwTrapVoltageNonCritThresholdExceeded	/SYS/PS[0-1]/V_12V
Oracle ILOM Event Message: Upper noncritical threshold exceeded	/SYS/PS[0-1]/V_12V_STBY
Severity and Description: Minor; A voltage sensor has reported that its value has gone above an upper noncritical threshold setting or below a lower noncritical threshold setting. The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	/SYS/PS[0-1]/V_IN /SYS/MB/P[0-x]/V_DIMM
SNMP Trap: sunHwTrapVoltageOk	/SYS/PS[0-1]/V_12V
Oracle ILOM Event Message: Upper noncritical threshold no longer exceeded	/SYS/PS[0-1]/V_12V_STBY
Severity and Description: Informational; A voltage sensor has reported that its value is in the normal operating range.	/SYS/PS[0-1]/V_IN /SYS/MB/P[0-x]/V_DIMM

Related Information

- "System Chassis Components" on page 267
- "Cooling Unit Components" on page 269
- "Disk Backplane Components" on page 270
- "Memory Device Components" on page 271
- "Power Unit Components" on page 272

- "Processor Components" on page 273
- "System Board Components" on page 273
- "Hard Disk Drive Components" on page 276

Fan Events

The following table lists fan events.

Messages and Descriptions	Description
SNMP Trap Message: sunHwTrapFanSpeedCritThresholdExceeded **Oracle ILOM Event Message:** Lower critical threshold exceeded **Severity and Description:** Major; A fan speed sensor has reported that its value has gone above an upper critical threshold setting or below a lower critical threshold setting. The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	/SYS/MB/FM[0-3]/F[0-1]/TACH
SNMP Trap Message: sunHwTrapFanSpeedCritThresholdDeasserted **Oracle ILOM Event Message:** Lower critical threshold no longer exceeded **Severity and Description:** Informational; A fan speed sensor has reported that its value has gone below an upper critical threshold setting or above a lower critical threshold setting. The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	/SYS/MB/FM[0-3]/F[0-1]/TACH
SNMP Trap Message: sunHwTrapFanSpeedFatalThresholdExceeded **Oracle ILOM Event Message:** Lower fatal threshold exceeded **Severity and Description:** Critical; A fan speed sensor has reported that its value has gone above an upper fatal threshold setting or below a lower fatal threshold setting. The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	/SYS/MB/FM[0-3]/F[0-1]/TACH
SNMP Trap Message: sunHwTrapFanSpeedFatalThresholdDeasserted **Oracle ILOM Event Message:** Lower fatal threshold no longer exceeded **Severity and Description:** Informational; A fan speed sensor has reported that its value has gone below an upper fatal threshold setting or above a lower fatal threshold setting. The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	/SYS/MB/FM[0-3]/F[0-1]/TACH

Related Information

Memory Events

The following table lists memory events.

Messages and Descriptions	Component Name
SNMP Trap: sunHwTrapSensorNonCritThresholdExceeded **Oracle ILOM Event Message:** Upper noncritical threshold exceeded **Severity and Description:** Minor; A sensor has reported that its value has gone above an upper noncritical threshold setting or below a lower noncritical threshold setting. This generic 'sensor' trap is generated when the SNMP agent does not recognize the component type. The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower.	/SYS/VPS_CPUS /SYS/VPS_MEMORY
SNMP Trap: sunHwTrapSensorThresholdOk **Oracle ILOM Event Message:** Upper noncritical threshold no longer exceeded **Severity and Description:** Informational; A sensor has reported that its value is in the normal operating range. This generic 'sensor' trap is generated when the SNMP agent does not recognize the component type.	/SYS/VPS_CPUS /SYS/VPS_MEMORY
SNMP Trap: sunHwTrapMemoryFault **Oracle ILOM Event Message:** event fault.cpu.intel.quickpath.link_slow "The Quickpath Interconnect (QPI) link is operating below normal speed." **Severity and Description:** Major; A memory component is suspected of causing a fault.	/SYS/MB
SNMP Trap: sunHwTrapMemoryFaultCleared **Oracle ILOM Event Message:** event fault.cpu.intel.quickpath.link_slow "The Quickpath Interconnect (QPI) link is operating below normal speed." **Severity and Description:** Informational; A memory component fault has been cleared.	/SYS/MB

Messages and Descriptions	Component Name
SNMP Trap: sunHwTrapMemoryFault	/SYS/MB
Oracle ILOM Event Message: event fault.cpu.intel.quickpath.unknown-errcode "An unknown error code from the Quickpath Interconnect (QPI) reference code has been detected."	
Severity and Description: Major; A memory component is suspected of causing a fault.	
SNMP Trap: sunHwTrapMemoryFaultCleared	/SYS/MB
Oracle ILOM Event Message: event fault.cpu.intel.quickpath.unknown-errcode "An unknown error code from the Quickpath Interconnect (QPI) reference code has been detected."	
Severity and Description: Informational; A memory component fault has been cleared.	
SNMP Trap: sunHwTrapMemoryFault	/SYS/MB
Oracle ILOM Event Message: event fault.memory.intel.dimm.none "An invalid memory DIMM configuration has been detected."	
Severity and Description: Major; A memory component is suspected of causing a fault.	
SNMP Trap: sunHwTrapMemoryFaultCleared	/SYS/MB
Oracle ILOM Event Message: event fault.memory.intel.dimm.none "An invalid memory DIMM configuration has been detected."	
Severity and Description: Informational; A memory component fault has been cleared.	
SNMP Trap: sunHwTrapMemoryFault	/SYS/MB
Oracle ILOM Event Message: event fault.memory.intel.dimm.memtest-failed "All memory channels have been disabled due to memory test failures."	
Severity and Description: Major; A memory component is suspected of causing a fault.	
SNMP Trap: sunHwTrapMemoryFaultCleared	/SYS/MB
Oracle ILOM Event Message: event fault.memory.intel.dimm.memtest-failed "All memory channels have been disabled due to memory test failures."	
Severity and Description: Informational; A memory component fault has been cleared.	
SNMP Trap: sunHwTrapMemoryFault	/SYS/MB
Oracle ILOM Event Message: event fault.memory.intel.dimm.quad-rank-3rd-slot "A quad-rank memory DIMM has been installed in the third slot of a memory channel."	
Severity and Description: Major; A memory component is suspected of causing a fault.	
SNMP Trap: sunHwTrapMemoryFaultCleared	/SYS/MB
Oracle ILOM Event Message: event fault.memory.intel.dimm.quad-rank-3rd-slot "A quad-rank memory DIMM has been installed in the third slot of a memory channel."	
Severity and Description: Informational; A memory component fault has been cleared.	
SNMP Trap: sunHwTrapMemoryFault	/SYS/MB
Oracle ILOM Event Message: event fault.memory.intel.dimm.ddr3u-unsupported "An unsupported DDR3 ultra low voltage memory DIMM has been detected."	

Messages and Descriptions	Component Name
Severity and Description: Major; A memory component is suspected of causing a fault.	
SNMP Trap: sunHwTrapMemoryFaultCleared	/SYS/MB
Oracle ILOM Event Message: event fault.memory.intel.dimm.ddr3u-unsupported "An unsupported DDR3 ultra low voltage memory DIMM has been detected."	
Severity and Description: Informational; A memory component fault has been cleared.	
SNMP Trap: sunHwTrapMemoryFault	/SYS/MB
Oracle ILOM Event Message: event fault.memory.intel.mrc.unknown-errcode "An unknown error code from the Memory Reference Code (MRC) has been detected."	
Severity and Description: Major; A memory component is suspected of causing a fault.	
SNMP Trap: sunHwTrapMemoryFaultCleared	/SYS/MB
Oracle ILOM Event Message: event fault.memory.intel.mrc.unknown-errcode "An unknown error code from the Memory Reference Code (MRC) has been detected."	
Severity and Description: Informational; A memory component fault has been cleared.	
SNMP Trap: sunHwTrapMemoryFault	/SYS/MB/P[0-x]/D[0-11]
Oracle ILOM Event Message: event fault.memory.intel.dimm.udimm-unsupported "An unbuffered memory DIMM (UDIMM) has been detected."	
Severity and Description: Major; A memory component is suspected of causing a fault.	
SNMP Trap: sunHwTrapMemoryFaultCleared	/SYS/MB/P[0-x]/D[0-11]
Oracle ILOM Event Message: event fault.memory.intel.dimm.udimm-unsupported "An unbuffered memory DIMM (UDIMM) has been detected."	
Severity and Description: Informational; A memory component fault has been cleared.	
SNMP Trap: sunHwTrapMemoryFault	/SYS/MB/P[0-x]/D[0-11]
Oracle ILOM Event Message: event fault.memory.intel.dimm.sodimm-unsupported "An unsupported SODIMM has been detected in system."	
Severity and Description: Major; A memory component is suspected of causing a fault.	
SNMP Trap: sunHwTrapMemoryFaultCleared	/SYS/MB/P[0-x]/D[0-11]
Oracle ILOM Event Message: event fault.memory.intel.dimm.sodimm-unsupported "An unsupported SODIMM has been detected in system."	
Severity and Description: Informational; A memory component fault has been cleared.	
SNMP Trap: sunHwTrapMemoryFault	/SYS/MB/P[0-x]/D[0-11]
Oracle ILOM Event Message: event fault.memory.intel.dimm.4gb-fused "An unsupported 4-gb memory DIMM has been detected."	
Severity and Description: Major; A memory component is suspected of causing a fault.	
SNMP Trap: sunHwTrapMemoryFaultCleared	/SYS/MB/P[0-x]/D[0-11]

Messages and Descriptions	Component Name
Oracle ILOM Event Message: event fault.memory.intel.dimm.4gb-fused "An unsupported 4-gb memory DIMM has been detected." **Severity and Description:** Informational; A memory component fault has been cleared.	
SNMP Trap: sunHwTrapMemoryFault	/SYS/MB/P[0-x]/D[0-11]
Oracle ILOM Event Message: event fault.memory.intel.dimm.8gb-fused "An unsupported 8-gb memory DIMM has been detected." **Severity and Description:** Major; A memory component is suspected of causing a fault.	
SNMP Trap: sunHwTrapMemoryFaultCleared	/SYS/MB/P[0-x]/D[0-11]
Oracle ILOM Event Message: event fault.memory.intel.dimm.8gb-fused "An unsupported 8-gb memory DIMM has been detected." **Severity and Description:** Informational; A memory component fault has been cleared.	
SNMP Trap: sunHwTrapMemoryFault	/SYS/MB/P[0-x]/D[0-11]
Oracle ILOM Event Message: event fault.memory.intel.dimm.incompatible "A memory DIMM is incompatible with the memory controller." **Severity and Description:** Major; A memory component is suspected of causing a fault.	
SNMP Trap: sunHwTrapMemoryFaultCleared	/SYS/MB/P[0-x]/D[0-11]
Oracle ILOM Event Message: event fault.memory.intel.dimm.incompatible "A memory DIMM is incompatible with the memory controller." **Severity and Description:** Informational; A memory component fault has been cleared.	
SNMP Trap: sunHwTrapMemoryFault	/SYS/MB/P[0-x]/D[0-11]
Oracle ILOM Event Message: event fault.memory.intel.dimm.incompatible-maxranks "The number of ranks allowed on a memory channel has been exceeded." **Severity and Description:** Major; A memory component is suspected of causing a fault.	
SNMP Trap: sunHwTrapMemoryFaultCleared	/SYS/MB/P[0-x]/D[0-11]
Oracle ILOM Event Message: event fault.memory.intel.dimm.incompatible-maxranks "The number of ranks allowed on a memory channel has been exceeded." **Severity and Description:** Informational; A memory component fault has been cleared.	
SNMP Trap: sunHwTrapMemoryFault	/SYS/MB/P[0-x]/D[0-11]
Oracle ILOM Event Message: event fault.memory.intel.dimm.incompatible-quad-rank "An invalid quad rank memory DIMM configuration has been detected." **Severity and Description:** Major; A memory component is suspected of causing a fault.	
SNMP Trap: sunHwTrapMemoryFaultCleared	/SYS/MB/P[0-x]/D[0-11]
Oracle ILOM Event Message: event fault.memory.intel.dimm.incompatible-quad-rank "An invalid quad rank memory DIMM configuration has been detected." **Severity and Description:** Informational; A memory component fault has been cleared.	

Messages and Descriptions	Component Name
SNMP Trap: sunHwTrapMemoryFault **Oracle ILOM Event Message:** event fault.memory.intel.dimm.numranks-unsupported "A memory DIMM with an unsupported number of ranks has been detected." **Severity and Description:** Major; A memory component is suspected of causing a fault.	/SYS/MB/P[0-x]/D[0-11]
SNMP Trap: sunHwTrapMemoryFaultCleared **Oracle ILOM Event Message:** event fault.memory.intel.dimm.numranks-unsupported "A memory DIMM with an unsupported number of ranks has been detected." **Severity and Description:** Informational; A memory component fault has been cleared.	/SYS/MB/P[0-x]/D[0-11]
SNMP Trap: sunHwTrapMemoryFault **Oracle ILOM Event Message:** event fault.memory.intel.dimm.speed-slow "A memory DIMM has been detected that is unable to run at speeds required by the platform." **Severity and Description:** Major; A memory component is suspected of causing a fault.	/SYS/MB/P[0-x]/D[0-11]
SNMP Trap: sunHwTrapMemoryFaultCleared **Oracle ILOM Event Message:** event fault.memory.intel.dimm.speed-slow "A memory DIMM has been detected that is unable to run at speeds required by the platform." **Severity and Description:** Informational; A memory component fault has been cleared.	/SYS/MB/P[0-x]/D[0-11]
SNMP Trap: sunHwTrapMemoryFault **Oracle ILOM Event Message:** event fault.memory.intel.dimm.disable-quad-rank "Memory channel is populated with too many quad-rank memory DIMMs." **Severity and Description:** Major; A memory component is suspected of causing a fault.	/SYS/MB/P[0-x]/D[0-11]
SNMP Trap: sunHwTrapMemoryFaultCleared **Oracle ILOM Event Message:** event fault.memory.intel.dimm.disable-quad-rank "Memory channel is populated with too many quad-rank memory DIMMs." **Severity and Description:** Informational; A memory component fault has been cleared.	/SYS/MB/P[0-x]/D[0-11]
SNMP Trap: sunHwTrapMemoryFault **Oracle ILOM Event Message:** event fault.memory.intel.dimm.population-invalid "Memory DIMM is improperly populated or is a type that is not compatible with other DIMMs installed." **Severity and Description:** Major; A memory component is suspected of causing a fault.	/SYS/MB/P[0-x]/D[0-11]
SNMP Trap: sunHwTrapMemoryFaultCleared **Oracle ILOM Event Message:** event fault.memory.intel.dimm.population-invalid "Memory DIMM is improperly populated or is a type that is not compatible with other DIMMs installed." **Severity and Description:** Informational; A memory component fault has been cleared.	/SYS/MB/P[0-x]/D[0-11]
SNMP Trap: sunHwTrapMemoryFault **Oracle ILOM Event Message:** event fault.memory.intel.dimm.out-of-order "The memory DIMMs in a channel are not populated in sequential order."	/SYS/MB/P[0-x]/D[0-11]

Messages and Descriptions	Component Name
Severity and Description: Major; A memory component is suspected of causing a fault.	
SNMP Trap: sunHwTrapMemoryFaultCleared **Oracle ILOM Event Message:** event fault.memory.intel.dimm.out-of-order "The memory DIMMs in a channel are not populated in sequential order." **Severity and Description:** Informational; A memory component fault has been cleared.	/SYS/MB/P[0-x]/D[0-11]
SNMP Trap: sunHwTrapMemoryFault **Oracle ILOM Event Message:** event fault.memory.intel.dimm.category-unknown "Memory DIMM is of an unknown type or category." **Severity and Description:** Major; A memory component is suspected of causing a fault.	/SYS/MB/P[0-x]/D[0-11]
SNMP Trap: sunHwTrapMemoryFaultCleared **Oracle ILOM Event Message:** event fault.memory.intel.dimm.category-unknown "Memory DIMM is of an unknown type or category." **Severity and Description:** Informational; A memory component fault has been cleared.	/SYS/MB/P[0-x]/D[0-11]

Related Information

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Entity Presence Events

The following table lists entity presence events.

Messages and Descriptions	Component Name
SNMP Trap: sunHwTrapProcessorError **Oracle ILOM Event Message:** ENTITY_PRESENT ASSERT	/SYS/MB/P[0-x]/PRSNT

Messages and Descriptions	Component Name
Severity and Description: Major; A processor sensor has detected an error. Device absent.	
SNMP Trap: sunHwTrapProcessorOk **Oracle ILOM Event Message:** ENTITY_PRESENT DEASSERT **Severity and Description:** Major; A processor sensor has returned to its normal state. Device present.	/SYS/MB/P[0-x]/PRSNT
SNMP Trap: sunHwTrapProcessorError **Oracle ILOM Event Message:** ENTITY_DISABLED ASSERT **Severity and Description:** Major; A processor sensor has detected an error. Device disabled.	/SYS/MB/P[0-x]/PRSNT
SNMP Trap: sunHwTrapProcessorOk **Oracle ILOM Event Message:** ENTITY_DISABLED DEASSERT **Severity and Description:** Major; A processor sensor has returned to its normal state. Device enabled.	/SYS/MB/P[0-x]/PRSNT

Physical Presence Events

Messages and Descriptions	Sensor Name
SNMP Trap Message: sunHwTrapSecurityIntrusion **Oracle ILOM Event Message:** Assert **Severity and Description:** Major; An intrusion sensor has detected that someone may have physically tampered with the system.	/SYS/INTSW
SNMP Trap Message: sunHwTrapSecurityIntrusion **Oracle ILOM Event Message:** Deassert **Severity and Description:** Major; An intrusion sensor has detected that someone may have physically tampered with the system.	/SYS/INTSW

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