Oracle® Exadata Storage Server X6-2 High Capacity Service Manual

Part No: E63692-04
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Contents

Using This Documentation

- **Overview** – This service manual explains how to remove and replace parts in the Oracle Exadata Storage Server X6-2 High Capacity, and how to maintain and troubleshoot 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 http://www.oracle.com/goto/x6-2l/docs.

Feedback

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

About the Oracle Exadata Storage Server X6-2 High Capacity

These sections describe the controls, connectors, LEDs, 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.

Description	Links
Review the product description.	"Product Description" on page 13
Review the controls and connectors on the server.	"About Controls and Connectors" on page 14
Review system components.	"About System Components" on page 16

Product Description

The Oracle Exadata Storage Server X6-2 High Capacity is an enterprise-class, two rack unit (2U) server. It supports the following components:

- Two Intel E5-2630 v4, 10-core, 2.2 GHz, 85W processors.
- Four 16-GB DIMMs per processor for a maximum of 8 DDR4 DIMMs and a maximum of 128 GB memory.
- Six PCIe Gen3 slots. PCIe slots 1, 2, 4, and 5 contain Oracle Flash Accelerator F320 NVMe PCIe cards. PCIe slot 3 contains an InfiniBand QDR-CX3 PCIe HCA card. PCIe slot 6 contains an Oracle Storage 12 Gb SAS PCIe RAID HBA card.
- Twelve 3.5-inch hot-pluggable SAS HDDs on the front panel.
- Two hot-pluggable, redundant 1000W power supplies.
- An on-board Oracle Integrated Lights Out Manager (Oracle ILOM) service processor (SP).

About Controls and Connectors

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

- “Front Panel Components” on page 14
- “Rear Panel Components and Cable Connections” on page 15

Related Information

- “About System Components” on page 16
- “Illustrated Parts Breakdown” on page 16
- “Troubleshooting Using the Server Front and Rear Panel Status Indicators” on page 26

Front Panel Components

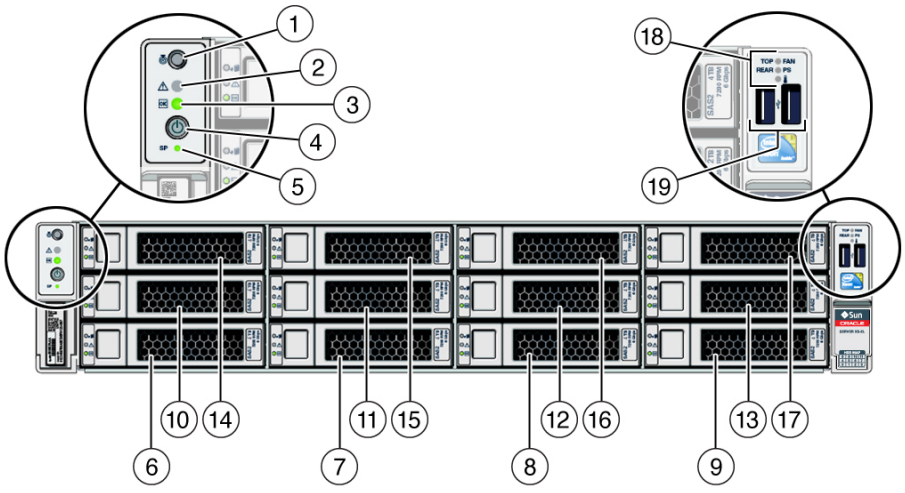

Figure Legend	Description
1	Locator LED/Locator button: white

Figure Legend	Description
2	Service Action Required LED: amber
3	Power/OK LED: green
4	Power button
5	SP OK LED: green
6 - 17	Storage drive 0 (HDD) through storage drive 11 (HDD)
18	Top Fan Fault LED: amber; Power Supply (PS) Fault LED: amber; System Over Temperature Warning LED: amber
19	USB 2.0 connectors (2)

Related Information

- “Troubleshooting Using the Server Front and Rear Panel Status Indicators” on page 26

Rear Panel Components and Cable Connections

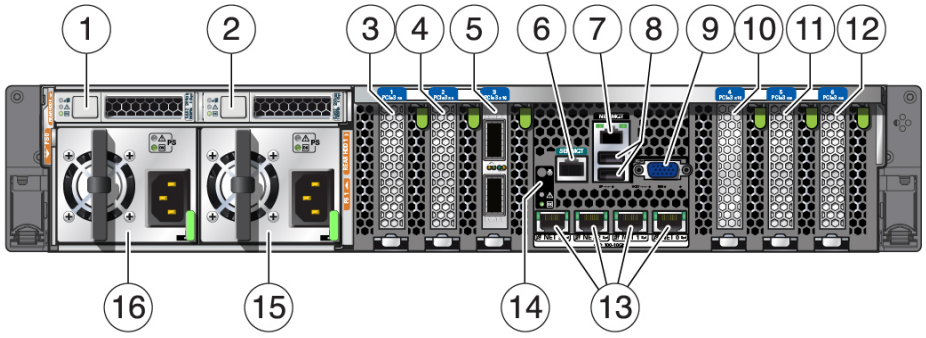

Figure Legend	Description
1 - 2	Rear storage drive 0 (HDD/SSD) and storage drive 1 (HDD/SSD)
3, 4, 10, 11	PCIe slots 1, 2, 4, 5 (These slots contain the Oracle Flash Accelerator F320 NVMe PCIe Add In Card.)
5	PCIe slot 3 (This slot contains the Sun Dual Port QDR InfiniBand Host Channel Adapter for PCIExpress Gen 3.)
6	Serial management (SER MGT)/RJ-45 serial port

Figure Legend	Description
7	Oracle Integrated Lights Out Manager (ILOM) service processor (SP) network management 10/100/1000BASE-T port (NET MGT)
8	USB 2.0 ports (2)
9	DB-15 video connector
12	PCIe slot 6 (This slot contains the Oracle Storage 12 Gb SAS PCIe RAID HBA.)
13	Network (NET) 100/1000/10000 ports (NET3 - NET0)
14	System status LEDs: Locator/Button: white; Service Required: amber; Power/OK: green
15 - 16	Power supply unit 1 (PS1) and power supply unit 0 (PS0)

Related Information

- “Troubleshooting Using the Server Front and Rear Panel Status Indicators” on page 26
- “Disconnect Cables From the Server” on page 54
- “Reconnect Power and Data Cables” on page 167
- “Identifying the Server Ports” on page 169

About System Components

These sections describe the components of the server:

- “Illustrated Parts Breakdown” on page 16
- “Field-Replaceable Units” on page 18
- “Field-Replaceable Units” on page 18

Related Information

- “Servicing Components That Do Not Require Server Power-Off” on page 61
- “Servicing Components That Require Server Power-Off” on page 77

Illustrated Parts Breakdown

The following figure identifies the major components of the server.

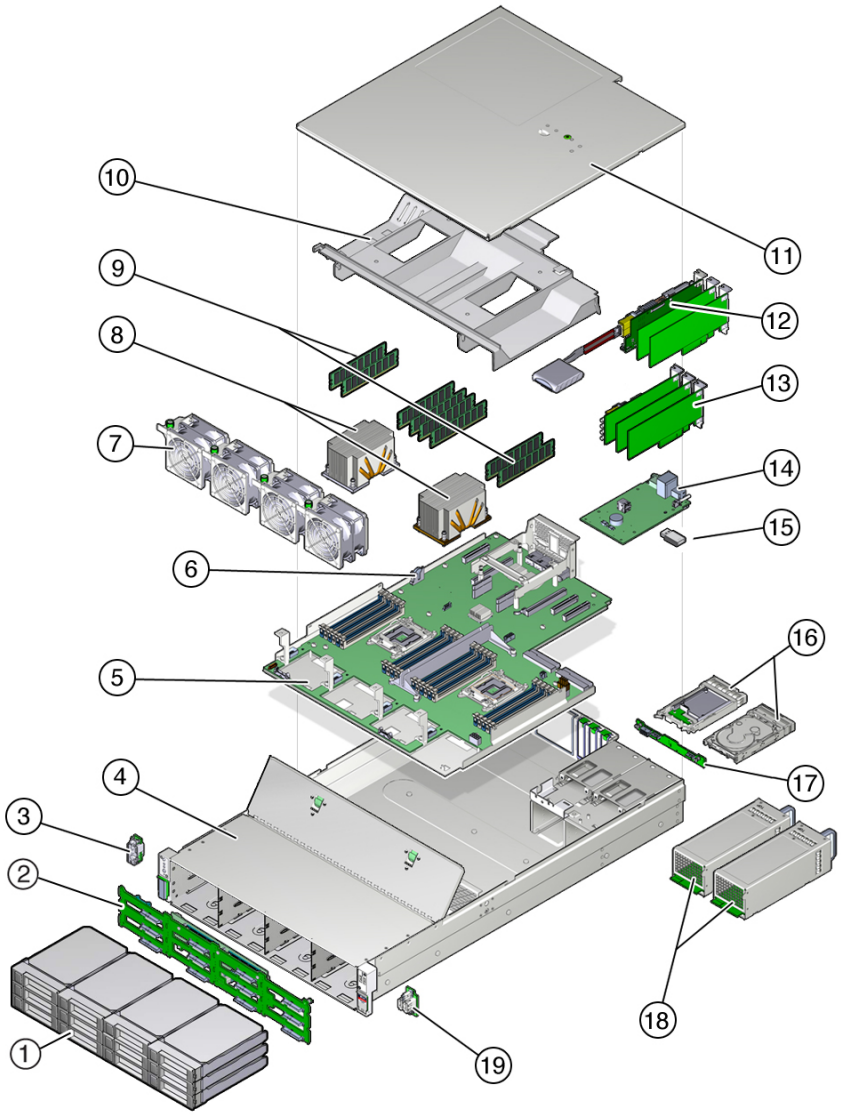

Figure Legend	Description
1	Twelve 3.5-inch storage drives
2	Front disk backplane for twelve 3.5-inch drives
3	Left LED indicator module

Figure Legend	Description
4	System chassis
5	Motherboard assembly
6	System battery
7	Fan modules
8	Processors and heatsinks
9	DIMMs
10	Air baffle
11	Top cover
12	Oracle Storage 12 Gb/s SAS PCIe RAID HBA and super capacitor
13	PCIe cards
14	I/O and internal USB card
15	Internal USB drive
16	Rear-mounted storage drives
17	Rear storage drive backplane
18	Power supplies
19	Right LED indicator module

Field-Replaceable Units

The following table lists the field-replaceable units 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” on page 96
DIMMs	Add or replace memory in the system.	“Servicing the DIMMs” on page 77
Storage drives	Replace one of the twelve 3.5-inch hot-pluggable SAS HDDs.	“Servicing Storage Drives and Rear Drives” on page 61
Fan modules	Contains four fan modules for cooling the server components.	“Servicing Fan Modules” on page 66
PCIe cards	Add-in cards.	“Servicing PCIe Cards” on page 86
Power supply unit (PSU)	Two fully redundant AC-powered power supplies.	“Servicing Power Supplies” on page 71
Processor and heatsink	The processor that carries out the instructions of the system.	“Servicing Processors” on page 99

CRU	Description	Replacement Instructions
Disk backplanes	Provide power and communications connectors for storage drives.	“Servicing the Storage Drive Backplanes” on page 112
SAS cables	Provide signals between the front disk backplane and the Oracle Storage 12 Gb SAS PCIe RAID HBA, and from the front disk backplane to the rear disk backplane.	“Servicing SAS Cables” on page 118
Oracle Storage 12 Gb SAS PCIe RAID HBA	Located in PCIe slot 6, the Sun Storage 12 Gb SAS PCIe RAID HBA manages SAS storage drives.	“Servicing the Oracle Storage 12 Gb/s SAS PCIe RAID HBA Card” on page 123
Front LED/USB indicator modules	Contain the push-button circuitry and LEDs that are displayed on the bezel of the chassis.	“Servicing the Front LED/USB Indicator Modules” on page 130
Motherboard assembly	Provides connectors for the DIMMs, processors, PCIe risers, and other components.	“Servicing the Motherboard Assembly” on page 145

Related Information

- “Illustrated Parts Breakdown” on page 16
- “Servicing Components That Do Not Require Server Power-Off” on page 61
- “Servicing Components That Require Server Power-Off” on page 77

Troubleshooting and Diagnostics

This section includes information about troubleshooting hardware component faults for the Oracle Exadata Storage Server X6-2 High Capacity. 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 21
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 36
Information about attaching devices to the server to perform troubleshooting.	“Attaching Devices to the Server” on page 38
Information about contacting Oracle support.	“Getting Help” on page 44

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 22
Resources for troubleshooting and diagnostic information.	“Troubleshooting and Diagnostic Information” on page 26
Discerning the server state using the front and rear panel indicators.	“Troubleshooting Using the Server Front and Rear Panel Status Indicators” on page 26
Causes, actions, and preventative measures for problems related to the cooling subsystem.	“Troubleshooting System Cooling Issues” on page 31
Causes, actions, and preventative measures for problems related to the power subsystem.	“Troubleshooting Power Issues” on page 33

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 22
- "Troubleshoot Hardware Faults Using the Oracle ILOM Web Interface" on page 23

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 23):

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

   You can use Oracle ILOM to identify the failed component.
2. **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 power off the server, activate the Locate LED, and take the server offline.
3. **Prepare the service work space**.

   Before servicing the server, prepare the work space, ensuring ESD protection for the server and components.

   See "Preparing for Service" on page 47.
4. **Service components**.

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

   Note - A component designated as a field-replaceable unit (FRU) must be replaced by Oracle Service personnel. Contact Oracle Service.

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5. **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 23

▼ 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 22.

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 command-line interface (CLI). However, the procedure can be performed using only the Oracle ILOM CLI interface. For more information about the Oracle ILOM web interface and CLI, refer to the Oracle ILOM documentation.

Before beginning this procedure, obtain the latest version of the system product notes.

1. **On a system with network access to the server, open a browser window.**

2. **In the web browser address bar, type the IP address or host name of the service processor (SP), and then press Enter.**

   The Oracle ILOM login page appears.

3. **Log in to the Oracle ILOM web interface.**

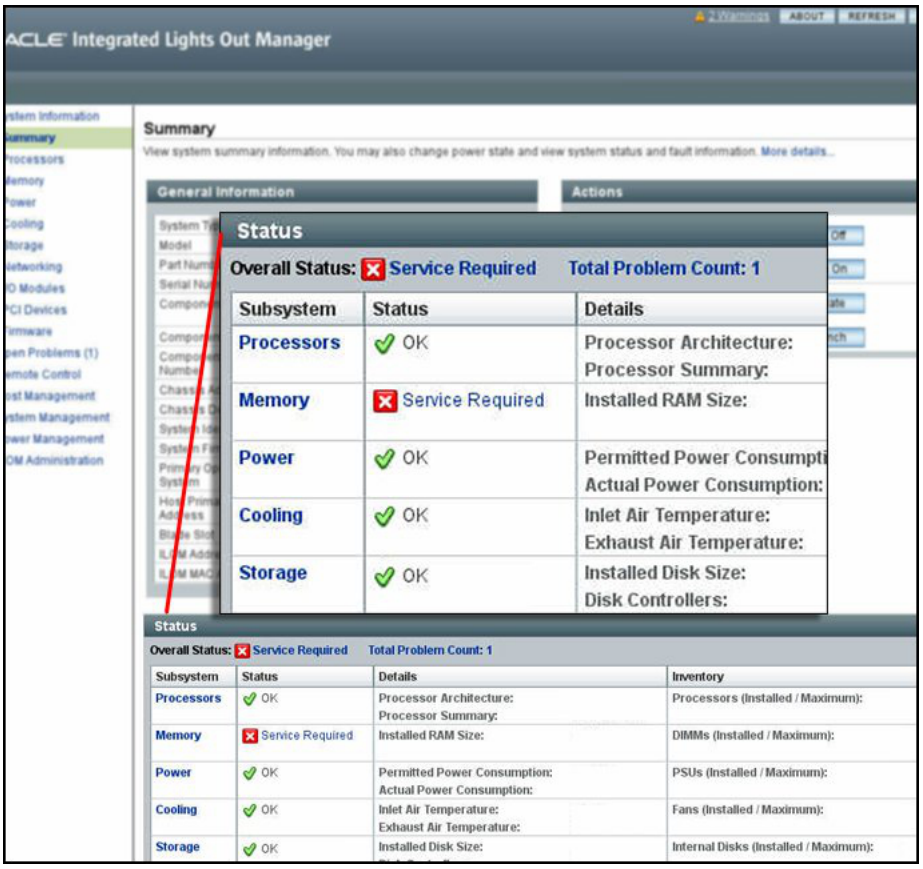
   Enter a user name (with administrator privileges) and password at the log-in screen. The Oracle ILOM Summary Information page appears.

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

   - **Processors**
   - **Memory**
   - **Power**
   - **Cooling**

- **Storage**
- **Networking**

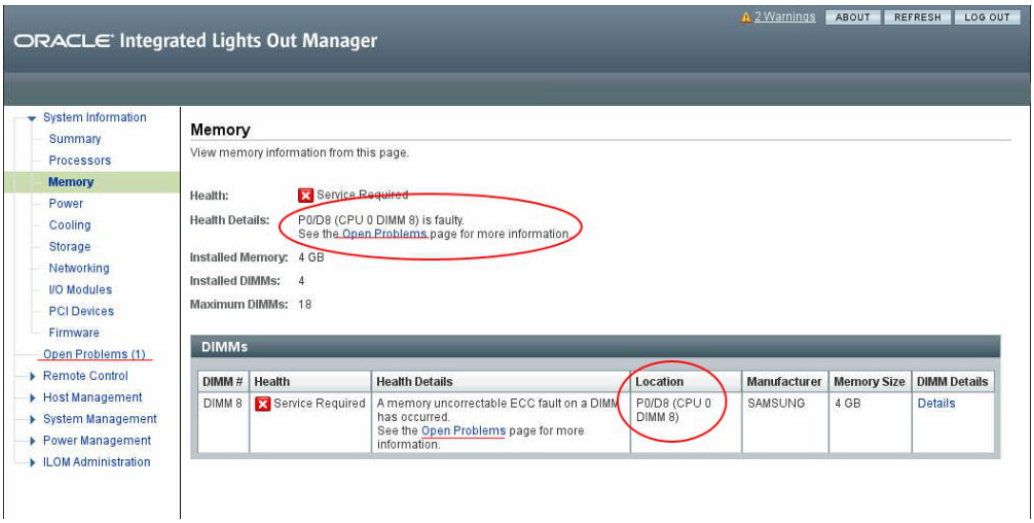
4. **In the Status section of the Summary Information screen, identify the server subsystem that requires service.**



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

5. **To identify the component, click on Memory in the Status section.**

The Memory screen appears.



The above example shows the Memory subsystem screen and indicates that DIMM 8 on CPU 0 has an uncorrectable ECC fault.

6. **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 devices not reported in the Subsystem Summary screen. To access the System Log, click the System Log link.

   In this example, the hardware fault with DIMM 8 of CPU 0 requires local/physical access to the server.

7. **To prepare the server for service, see "Preparing for Service" on page 47.**

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

8. **Service 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.	http://www.oracle.com/goto/x86admindiag/docs
Administrative information for the Oracle Server X5 series servers, including information about how to use the Oracle ILOM system event log (SEL) to identify a problem's possible source.	http://www.oracle.com/goto/x86admindiag/docs
Information about troubleshooting front and rear panel status indicators.	“Troubleshooting Using the Server Front and Rear Panel Status Indicators” on page 26
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 36

Troubleshooting Using the Server Front and Rear Panel Status Indicators

These sections describe the status indicators (LEDs) located on the front and rear of the server, including those found on components and ports. This section includes the following topics:

Related Information

- “Front Panel Components” on page 14
- “Rear Panel Components and Cable Connections” on page 15

Server Boot Process and Normal Operating State Indicators

A normal server boot process involves two indicators, the service processor SP OK 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 slowly 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 LED indicators remain lit, the server is in full power mode.

Note - The green Power/OK LED indicator and the green SP OK 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	Color	State and Meaning
Locator LED and button		White	Indicates the location of the server. ■ OFF – Server is operating normally. ■ FAST BLINK – Use Oracle ILOM to activate this LED indicator to enable you to locate a particular system quickly and easily. ■ Pressing the Locate button will toggle the LED indicator fast blink on or off.
Service Required	⚠	Amber	Indicates the fault state of the server.

Status Indicator Name	Icon	Color	State and Meaning
			■ 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 LED 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. ■ 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.
SP OK	SP	Green	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 overtemperature 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 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	None	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 and Boot Drive Indicators

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

TABLE 3 Server Front Storage and Boot Disk Drive Indicators

Status Indicator Name	Icon	Color	State and Meaning
OK/Activity	OK	Green	■ OFF – Power is off or installed drive is not recognized by the system.† ■ STEADY ON – The drive is engaged and is receiving power. ■ RANDOM BLINKING – There is disk activity. Status indicator LED 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.

†If a rear backplane hard disk's OK/Activity LED shuts off, it may also indicate that a rear hard disk has spun down into a temporary "suspend" mode, in which case the disk would again spin up when coming out of suspend mode.

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.

Status Indicator Name	Icon	Color	State and Meaning
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 10/100/1000BASE-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 on each port. These indicators (LEDs) are visible from the rear of the server.

TABLE 6 Gigabit Ethernet Port Status Indicators

Status Indicator Name	Location	Color	State and Meaning
Activity	Top left	Green	■ ON – No function. ■ OFF – No activity. ■ FLASHING – Packet activity.
Link speed	Top right	Bicolored: Amber/ Green	■ 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 I/O card 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" on page 77.
- **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 I/O card 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" on page 99.
- **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 Storage Server Fault Remind Button" on page 80.
- **STBY PWRGD Status Indicator:** This green status indicator (LED) is labeled STBY PWRGD and is located on the motherboard near the rear of the server. This LED lights to inform a 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 - The service instructions for all internal components require that all AC power be removed from the power supplies prior to the server top cover being removed.

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

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 a 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 22.

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 34

- "Power Supplies (PSUs)" on page 34
- "Top Cover" on page 35

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).

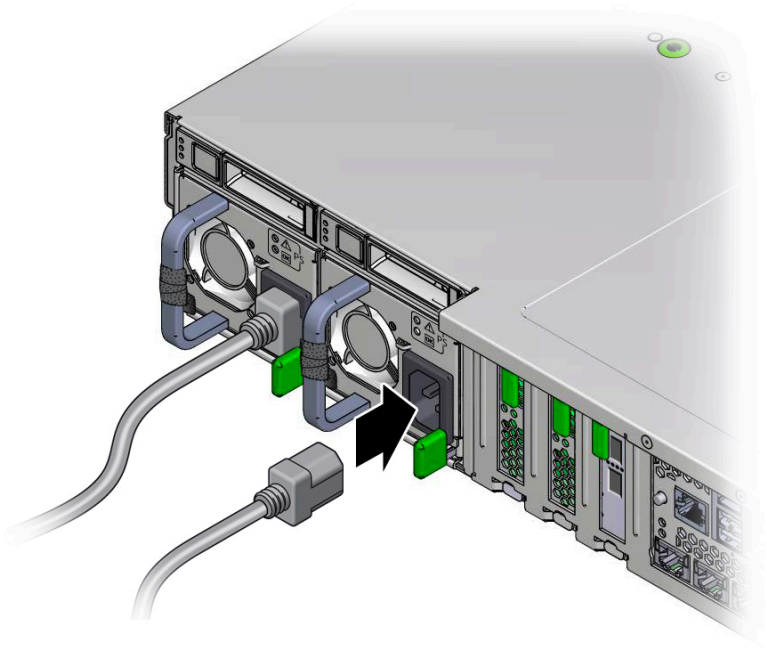
Action: Check that both AC power cords are connected to the server. Check that the correct power is present at the outlets and monitor the power to verify that it is within the acceptable range. You can verify proper connection and operation by checking the power supply (PS) indicator panels, which are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

Prevention: Use the AC power cord Velcro retaining clips 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.

Power Supplies (PSUs)

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

Note - The Velcro straps shown in the following figure should be used to secure the power cord connectors to the rear of the power supplies. The Velcro retaining straps minimize the risk of accidental disconnection.



Action: Check that the AC cables are connected to both power supplies. Check that the power supplies are operational (the PSU indicator panel should have a lit green AC OK indicator). Ensure that the power supply is properly installed. A power supply 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 power supplies. This redundant configuration prevents server downtime, or an unexpected shutdown, due to a failed power supply. The redundancy allows the server to continue to operate if one of the power supplies fails. However, when a server is being powered by a single power supply, 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 power supply 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 housing for the power supply. 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 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 161.

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 3.2.x* in the Oracle Integrated Lights Out Manager (ILOM) 3.2 Documentation Library at `http://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.

- "Diagnostic Tools" on page 37

■ “Diagnostic Tool Documentation” on page 38

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 includes 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.
UEFI Diagnostics	SP firmware	The UEFI diagnostics can test and detect problems on	You can use either the Oracle ILOM	Remote access through Oracle

Diagnostic Tool	Type	What It Does	Accessibility	Remote Capability
		all processors, memory, disk drives, and network ports.	web interface or the command-line interface (CLI) to run UEFI diagnostics.	ILOM Remote System Console Plus.
Oracle Linux commands	Operating system software	Displays various kinds of system information.	Requires operating system.	Local, and 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 3.2 Documentation Library	http://www.oracle.com/goto/ilom/docs
Preboot Menu	*Oracle x86 Servers Diagnostics Guide*	http://www.oracle.com/goto/x86admindiag/docs
System indicators and sensors	This document	"Troubleshooting Using the Server Front and Rear Panel Status Indicators" on page 26
U-Boot or UEFI Diags	*Oracle x86 Servers Diagnostics Guide*	http://www.oracle.com/goto/x86admindiag/docs
Oracle VTS	Oracle VTS software and documentation	http://docs.oracle.com/cd/E19719-01/index.html

Attaching Devices to the Server

The 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 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 “Rear Panel Connector Locations” on page 39.

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 “Rear Panel Connector Locations” on page 39.

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.**

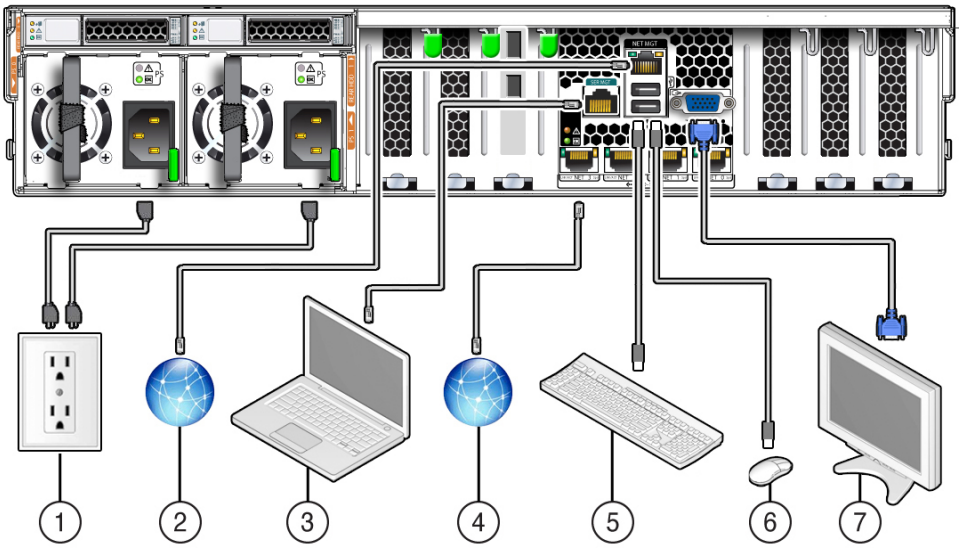
   See “Rear Panel Connector Locations” on page 39.

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

   See “Rear Panel Connector Locations” on page 39.

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. **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.
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.

No.	Cable Port or Expansion Slot	Description
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.

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) 3.2 Documentation Library at `http://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 sections:

- “Assign Serial Port Output Using the CLI” on page 41
- “Assign Serial Port Output Using the Web Interface” on page 42

▼ 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@`*`ipaddress`*

   Where *ipaddress* is the IP address of the server SP.

   For more information, see “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. See "Accessing Oracle ILOM" in the *Oracle X5 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.**

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. For location information, see "Rear Panel Connector Locations" on page 39. 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	eth 0	Ethernet
NET 1	3A01	ixgbe 1	eth 1	Ethernet 2
NET 2	8200	ixgbe 2	eth 2	Ethernet 3
NET 3	8201	ixgbe 3	eth 3	Ethernet 4

Rear Panel Pinhole Switches

This section shows the location of the rear panel pinhole switches.

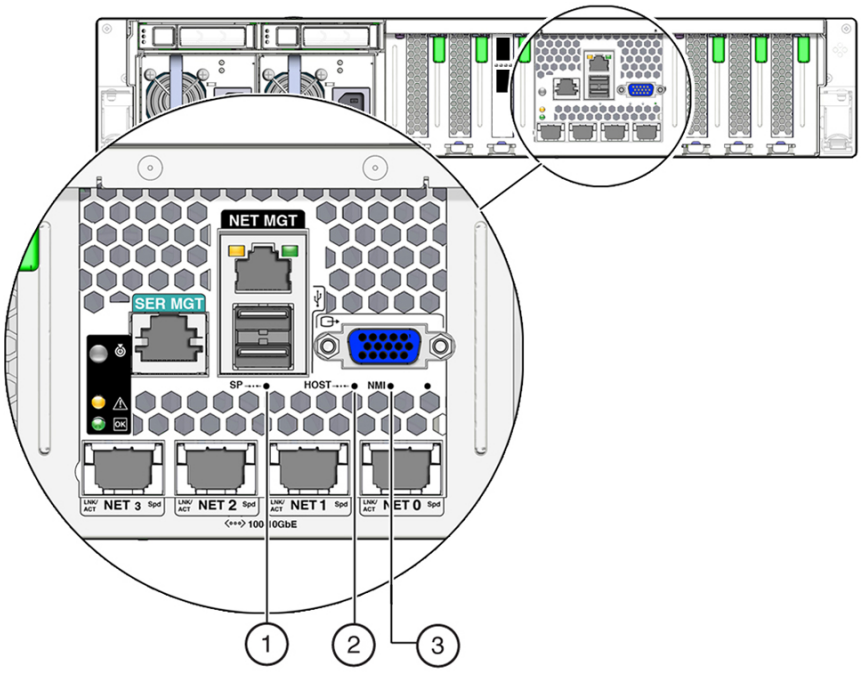


Figure Legend	Description
1	SP Reset
2	Host Warm Reset
3	Non-maskable interrupt (NMI)†

†Oracle Service use only.

Getting Help

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

- "Contacting Support" on page 45
- "Locating the Chassis Serial Number" on page 45

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 45

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 bottom left side of the front panel bezel, below the general status LEDs.

  For illustrations of the storage server front panel, see "About Controls and Connectors" on page 14.
- The serial number is recorded on the service label that is attached to the top cover of the system.
- The serial number is recorded on the yellow Customer Information Sheet (CIS) that is attached to your storage server packaging.
- Using Oracle ILOM:
  - From the command-line interface (CLI), type the command: `show/System`.
  - 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 about replacing 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 47 "Safety Symbols" on page 48 "Electrostatic Discharge Safety" on page 48
Understand the key identity properties auto-update feature.	"FRU Key Identity Properties (KIP) Automated Update" on page 49
Assemble the required tools.	"Required Tools" on page 50
Before working with components within the server, power down the server and prepare for servicing.	"Preparing the Server for Component Replacement" on page 50

Related Information

- "Returning the Server to Operation" on page 161

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 *Oracle Exadata Storage Server X6-2 High Capacity Safety and Compliance Guide* and *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 electrical rating label.
- Follow the electrostatic discharge safety practices as described in "Electrostatic Discharge Safety" on page 48.
- Disconnect both power supply cords before servicing components.

Related Information

- “Safety Symbols” on page 48
- “Electrostatic Discharge Safety” on page 48

Safety Symbols

The following symbols might appear in this document. 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 47
- “Electrostatic Discharge Safety” on page 48

Electrostatic Discharge Safety

Devices that are sensitive to electrostatic discharge (ESD), such as the motherboard, PCIe cards, drives, processors, and memory DIMMs 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 Accessory 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 board (PCB) cards 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 47
- “Safety Symbols” on page 48
- “Preparing the Server for Component Replacement” on page 50
- “Returning the Server to Operation” on page 161

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” on page 71
- “Servicing the Storage Drive Backplanes” on page 112
- “Servicing the Motherboard Assembly” on page 145

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 47
- “Servicing Components That Do Not Require Server Power-Off” on page 61
- “Servicing Components That Require Server Power-Off” on page 77

Preparing the Server for Component Replacement

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

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

- "Powering Down the Server" on page 51
- "Disconnect Cables From the Server" on page 54
- "Extend the Server to the Maintenance Position" on page 55
- "Remove the Server From the Rack" on page 56
- "Take Antistatic Measures" on page 57
- "Remove the Server Top Cover" on page 58
- "Remove the Fan Assembly Door From the Server" on page 59

Related Information

- "Returning the Server to Operation" on page 161

Powering Down the Server

Determine how you want to power down the server by reviewing the options in the following table.

Description	Link
If the server is not responding, or you must shut down the server quickly, perform an immediate shutdown.	■ "Power Down the Server for Immediate Shutdown Using the Power Button" on page 52 ■ "Power Down the Server for Immediate Shutdown Using the Oracle CLI" on page 52 ■ "Power Down the Server for Immediate Shutdown Using the Oracle ILOM Web Interface" on page 53

Related Information

- "Power On the Server" on page 167

▼ Power Down the Server for Immediate Shutdown Using the Power Button

Caution - This procedure quickly forces the server main power off. You might corrupt your system data during an immediate power-down, so use this procedure to power down the server only 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 begins flashing, indicating that the server is in standby power mode. See "Server System-Level Status Indicators" on page 27.

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

   See "Disconnect Cables From the Server" on page 54.

Caution - When you power down the server using the Power button, the server enters 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

- "Server System-Level Status Indicators" on page 27
- "Power On the Server" on page 167

▼ Power Down the Server for Immediate Shutdown Using the Oracle CLI

Caution - This procedure quickly forces the server main power off. You might corrupt your system data during an immediate power-down, so use this procedure to power down the server only 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 54.

Caution - When you power down the server using Oracle ILOM, the server enters 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

- "Power Down the Server for Immediate Shutdown Using the Power Button" on page 52
- "Power Down the Server for Immediate Shutdown Using the Oracle ILOM Web Interface" on page 53
- "Power On the Server" on page 167

▼ Power Down the Server for Immediate Shutdown Using the Oracle ILOM Web Interface

Caution - This procedure quickly forces the server main power off. You might corrupt your system data during an immediate power-down, so use this procedure to power down the server only 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 → Summary Information page appears.

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

3. **Click Save, and 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 54.

Caution - When you power down the server using Oracle ILOM, the server enters 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

- "Power Down the Server for Immediate Shutdown Using the Power Button" on page 52
- "Power Down the Server for Immediate Shutdown Using the Oracle CLI" on page 52
- "Power On the Server" on page 167

Disconnect Cables From the Server

Caution - The system supplies standby power to the circuit boards even when the system is powered off.

1. **Depending on the components that you are servicing, either extend the server to the maintenance position, or remove the server from the rack.**
2. **Power down the server.**

   See "Powering Down the Server" on page 51.
3. **Disconnect the power cords from the rear of the server.**
4. **Disconnect all data cables from the rear of the server.**
5. **Detach and remove cables from the cable management device.**

Related Information

- "Rear Panel Components and Cable Connections" on page 15
- "Powering Down the Server" on page 51
- "Extend the Server to the Maintenance Position" on page 55
- "Remove the Server From the Rack" on page 56
- "Reconnect Power and Data Cables" on page 167

▼ 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
- DDR4 DIMMs
- PCIe cards and cables
- SAS cables
- NVMe cables
- Internal USB drives
- System battery
- Processors
- Disk backplanes
- Front indicator modules
- Motherboard

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

   For instructions for stabilizing the rack, refer to "Stabilize the Rack for Installation" in *Oracle Exadata Storage Server X6-2 High Capacity Installation Guide*.

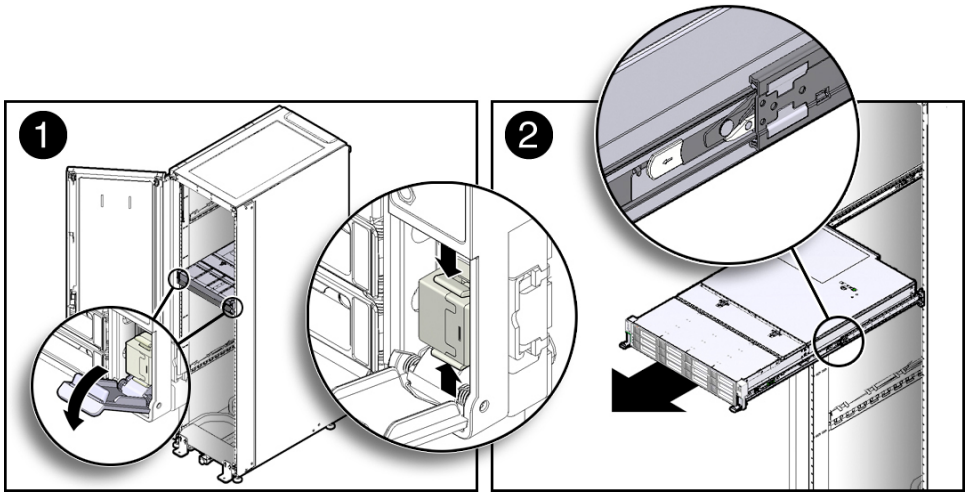
2. **Verify that no cables will be damaged or will interfere when the server is extended.**

   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 free from obstruction by other devices.

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 [1].

Caution - Deploy any rack anti-tilt mechanism before releasing the slide-rail release latches.



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 54
- “Remove the Server From the Rack” on page 56
- “Reinstall the Server in the Rack” on page 164

▼ Remove the Server From the Rack

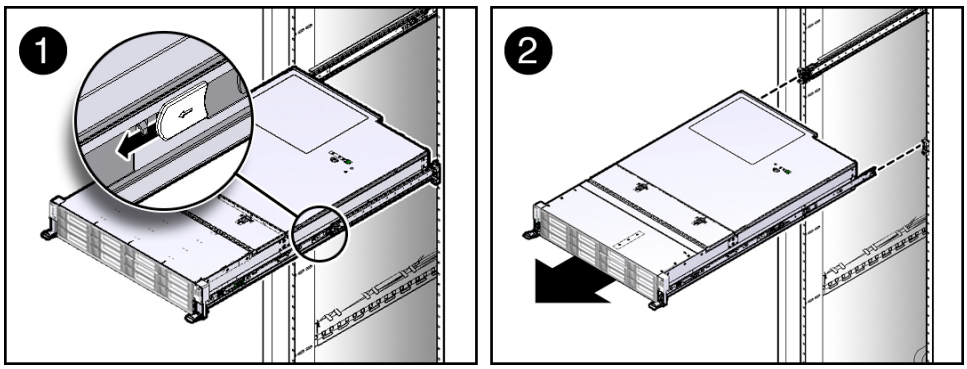
Caution - The server weighs approximately 63 pounds (28.5 kg). Two people are required to unmount and carry the chassis.

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 Exadata Storage Server X6-2 High Capacity Installation Guide*.

3. **Extend the server to the maintenance position.**
   See "Extend the Server to the Maintenance Position" on page 55.

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 is free of the rack rails [1 and 2].**
   A slide-rail release tab is located on each slide-rail.



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

Related Information

- "Disconnect Cables From the Server" on page 54
- "Extend the Server to the Maintenance Position" on page 55
- "Reinstall the Server in the Rack" on page 164

▼ Take Antistatic Measures

1. **Prepare an antistatic surface on which to set parts during removal and installation.**
   Place electrostatic discharge (ESD-sensitive components 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 perform procedures for servicing the server.

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

Related Information

- “Extend the Server to the Maintenance Position” on page 55
- “Remove the Server From the Rack” on page 56
- “Remove the Server Top Cover” on page 58
- “Remove the Fan Assembly Door From the Server” on page 59
- “Remove Antistatic Measures” on page 164

▼ Remove the Server Top Cover

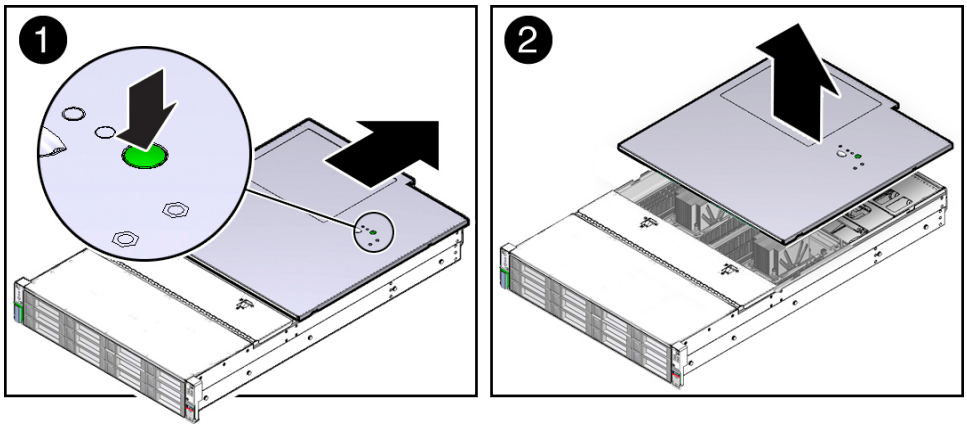
Caution - If you remove the top cover without first removing the AC power cords, then not only will the server host shut down, but also this condition will be flagged as a system fault (that is, the fault LEDs will light).

Note - Servicing some components requires that the top cover be removed.

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

2. **Unlatch the top cover [1].**

Press the green release button on the top of the server cover.



3. **While pressing the top cover release button, slide the cover toward the rear of the server [2].**
4. **If necessary, open the fan assembly door.**
5. **Lift up and remove the top cover [2].**

Related Information

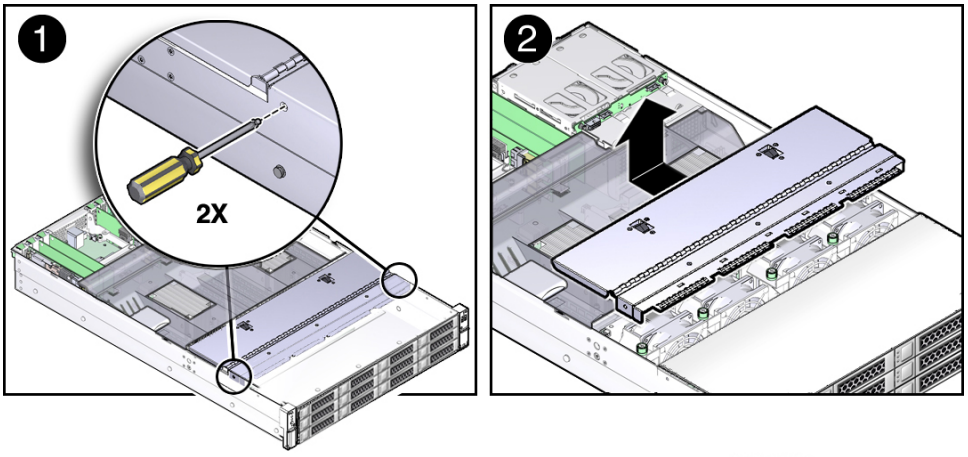
- “Take Antistatic Measures” on page 57
- “Remove the Fan Assembly Door From the Server” on page 59
- “Install the Server Top Cover” on page 161

▼ Remove the Fan Assembly Door From the Server

Before you service the server's storage drive backplane, you should first remove the server's front fan assembly door.

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

2. **Use a No. 2 Phillips screwdriver to remove the two screws on each side of the chassis and the three screws on top of the chassis. [1].**



3. **Slide the fan assembly door toward the rear of the server, and lift and remove the door from the chassis [2].**

Related Information

- “Take Antistatic Measures” on page 57
- “Remove the Server Top Cover” on page 58
- “Install the Server Top Cover” on page 161
- “Install the Fan Assembly Door” on page 163

Servicing Components That Do Not Require Server Power-Off

These sections describe how to service components that do not require you to power off the server. For more information about server components, see “Illustrated Parts Breakdown” on page 16.

Description	Links
Service storage and boot drives.	“Servicing Storage Drives and Rear Drives” on page 61
Service fan modules.	“Servicing Fan Modules” on page 66
Service power supplies.	“Servicing Power Supplies” on page 71

Related Information

- “Servicing Components That Require Server Power-Off” on page 77

Servicing Storage Drives and Rear Drives

These sections describe how to remove and install storage drives.

- “Storage Drives Hot-Plug Conditions” on page 62
- “Remove a Storage Drive” on page 62
- “Install a Storage Drive” on page 65

Related Information

- “Servicing SAS Cables” on page 118

Storage Drives Hot-Plug Conditions

The hard disk drives (HDDs) 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.

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

Related Information

- “Storage and Boot Drive Indicators” on page 29
- “Remove a Storage Drive” on page 62
- “Install a Storage Drive” on page 65

▼ Remove a Storage Drive

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

   Refer to “Take Antistatic Measures” on page 57.

2. **Type the operating system commands required to stop the server from using the drive.**

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

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

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

The following illustrations show the location of the drives and the internal system software designations for the drives. For information on storage drive status indicators (LEDs), refer to "Storage and Boot Drive Indicators" on page 29.

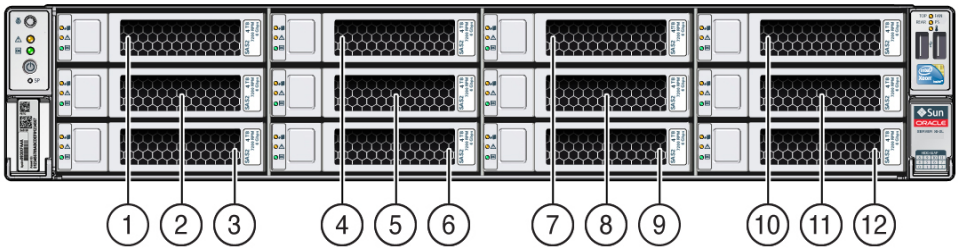
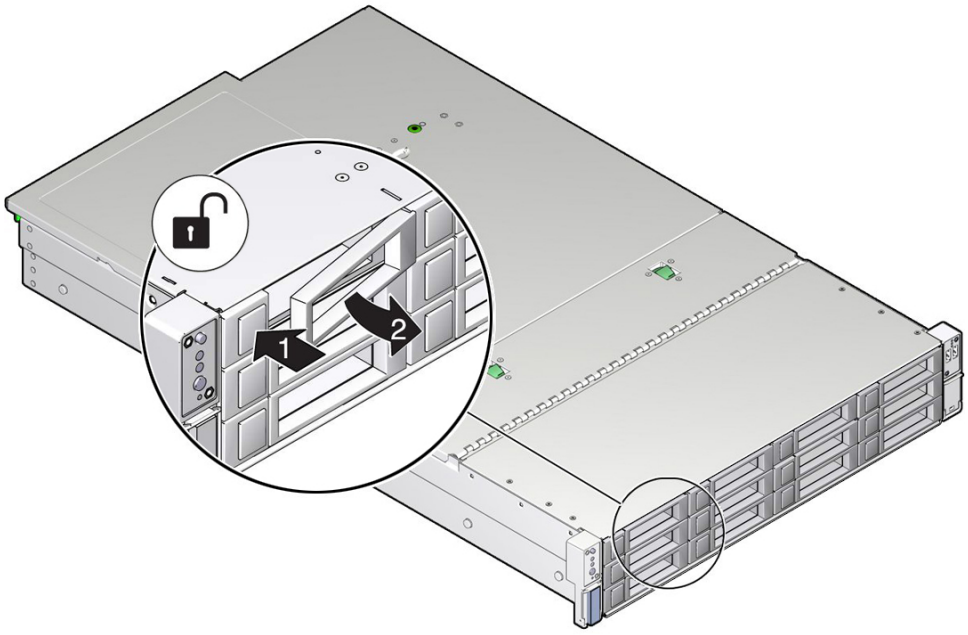


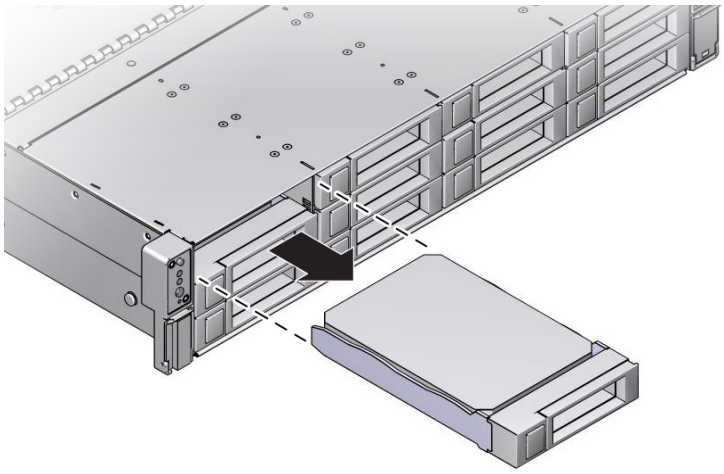
Figure Legend	Description	Figure Legend	Description
1	Storage drive 8 (HDD)	**7**	Storage drive 10 (HDD)
2	Storage drive 4 (HDD)	**8**	Storage drive 6 (HDD)
3	Storage drive 0 (HDD)	**9**	Storage drive 2 (HDD)
4	Storage drive 9 (HDD)	**10**	Storage drive 11 (HDD)
5	Storage drive 5 (HDD)	**11**	Storage drive 7 (HDD)
6	Storage drive 1 (HDD)	**12**	Storage drive 3 (HDD)

4. **On the drive you plan to remove, push the latch release button [1] to open the drive latch [2].**



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 Storage Drive” on page 65.

Caution - Whenever you remove a storage drive, you should replace it with another storage drive; otherwise, the server might overheat due to improper airflow.

Related Information

- “Storage and Boot Drive Indicators” on page 29
- “Storage Drives Hot-Plug Conditions” on page 62
- “Install a Storage Drive” on page 65

▼ Install a Storage Drive

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

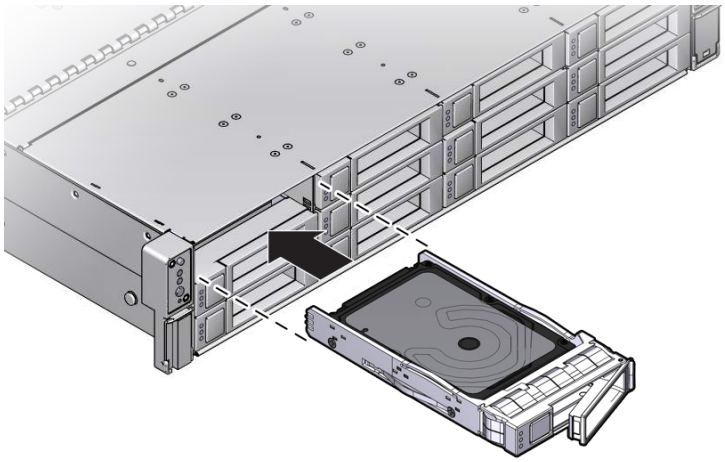
2. **If necessary, remove the drive filler panel.**

The system might have filler panels covering unoccupied drive slots.

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.**



5. **Close the drive latch to lock the drive in place.**

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

Related Information

- “Storage and Boot Drive Indicators” on page 29
- “Storage Drives Hot-Plug Conditions” on page 62
- “Remove a Storage Drive” on page 62

Servicing Fan Modules

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

- “Remove a Fan Module” on page 67
- “Install a Fan Module” on page 70

Related Information

- “Remove the Server Top Cover” on page 58

▼ Remove a Fan Module

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

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

Caution - When removing and replacing a fan module in the system, 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.**

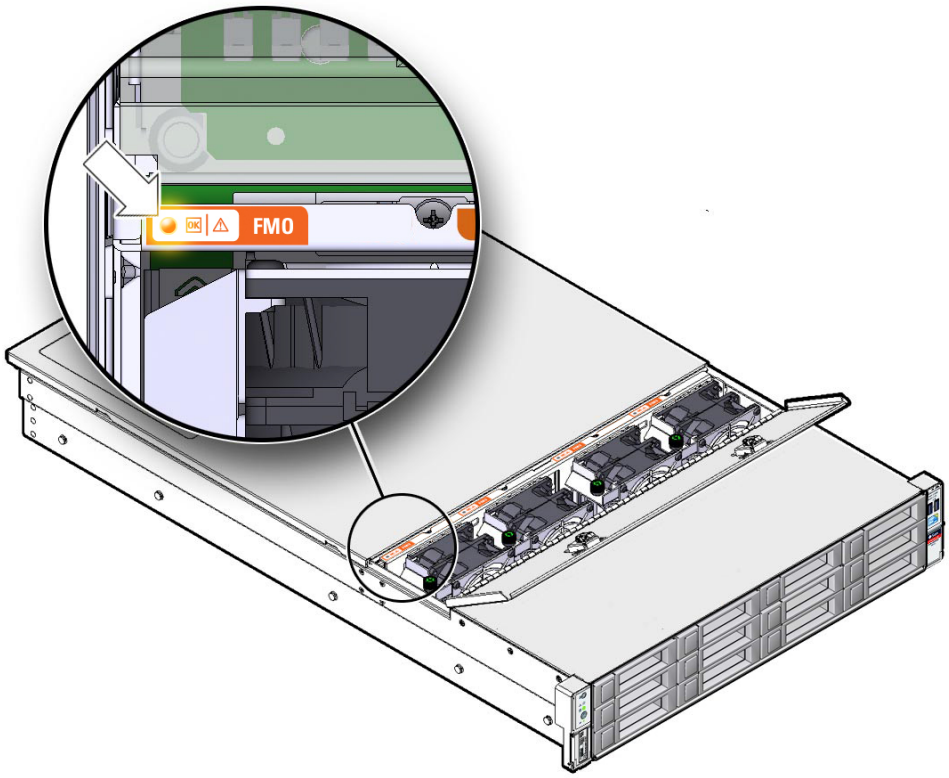
   See “Extend the Server to the Maintenance Position” on page 55.

2. **To access the fan modules, open the top cover fan assembly door.**

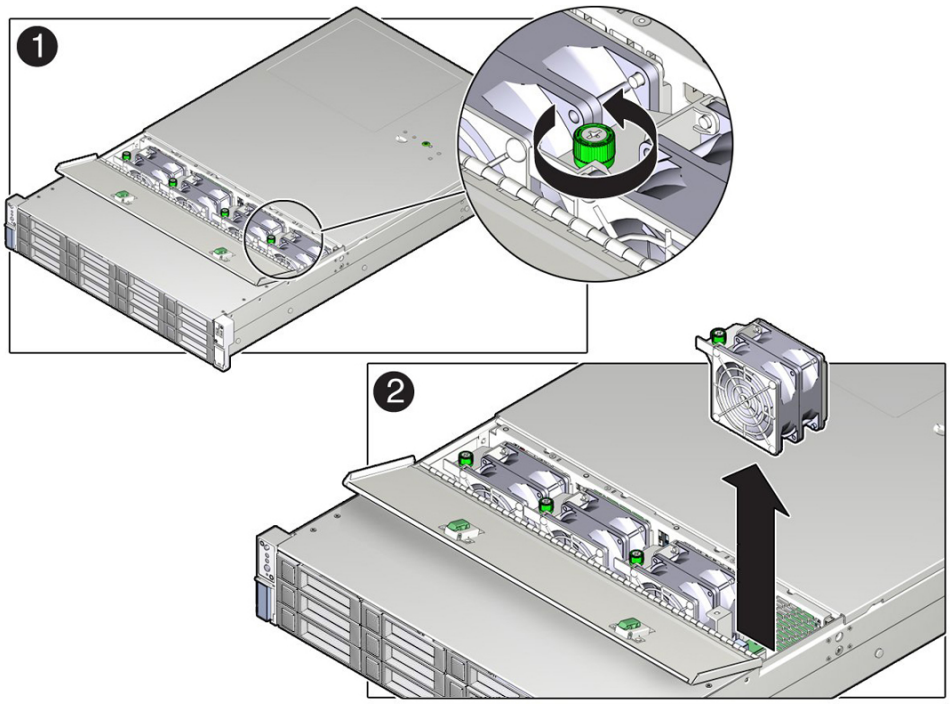
Caution - Close the top cover fan assembly door within 60 seconds to maintain adequate airflow to properly cool the server. Leaving the door open for more than 60 seconds, while the server is running, will cause the server to automatically shut down.

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

Each fan module has a fan status indicator (LED) that is located next to the module. If the LED is amber, the fan has failed. The location of the fan status LED is shown in the following figure.



4. **Use a No. 2 Phillips screwdriver to loosen the captive screw that secures the faulty fan module in the chassis [1].**



5. **Grasp both the captive screw and the opposite end of the module and lift the fan module straight up and out of the chassis, and set it aside on an antistatic mat [2].**

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

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:**

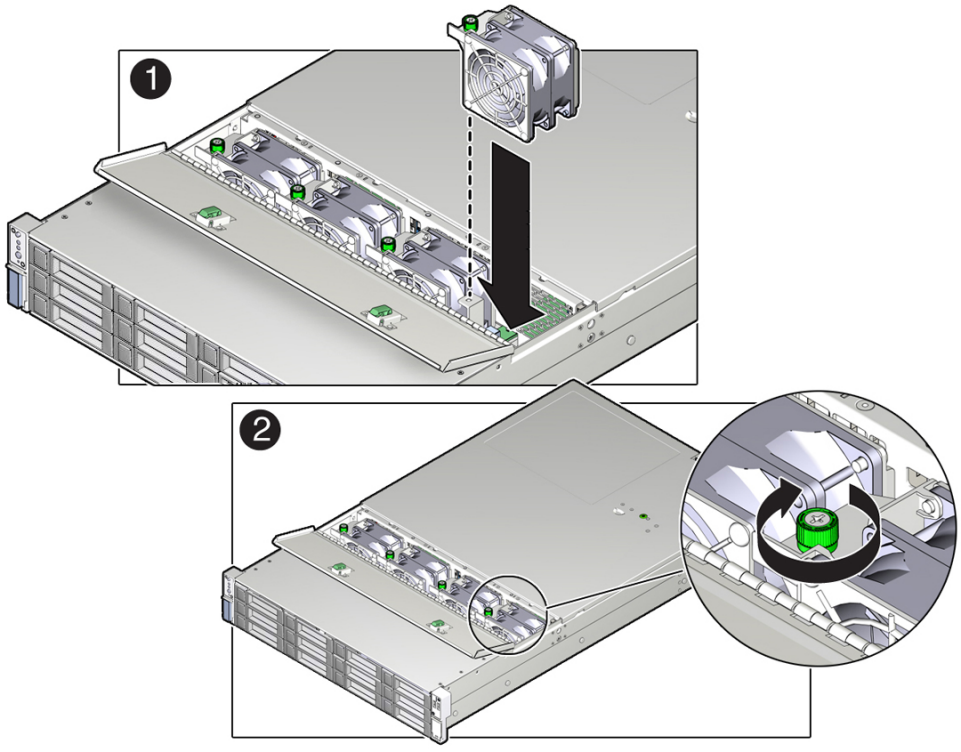
- If you removed the fan assembly as part of another procedure, return to that procedure.
- Otherwise, continue to “Install a Fan Module” on page 70.

Related Information

- “Install a Fan Module” on page 70

▼ Install a Fan Module

1. **Remove the replacement fan module from its packaging, and place it on an antistatic mat.**
2. **With the top cover fan assembly door open, install the replacement fan module into the server [1].**
   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 LED on the replacement fan module is lit green.**

5. **Using your thumb and forefinger, tighten the captive screw to secure the fan module to the chassis. Then use a No. 2 Phillips screwdriver to tighten the screw an additional 1/4 turn to secure the fan module to the chassis [2].**

6. **Close the top cover fan assembly door.**

7. **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 “Server System-Level Status Indicators” on page 27 for more information about identifying and interpreting system status indicators.

8. **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 161.

Related Information

- “Remove a Fan Module” on page 67

Servicing Power Supplies

The server's redundant power supplies 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 A258 (1000 watt) power supplies. The A258 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 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 status 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

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 sections:

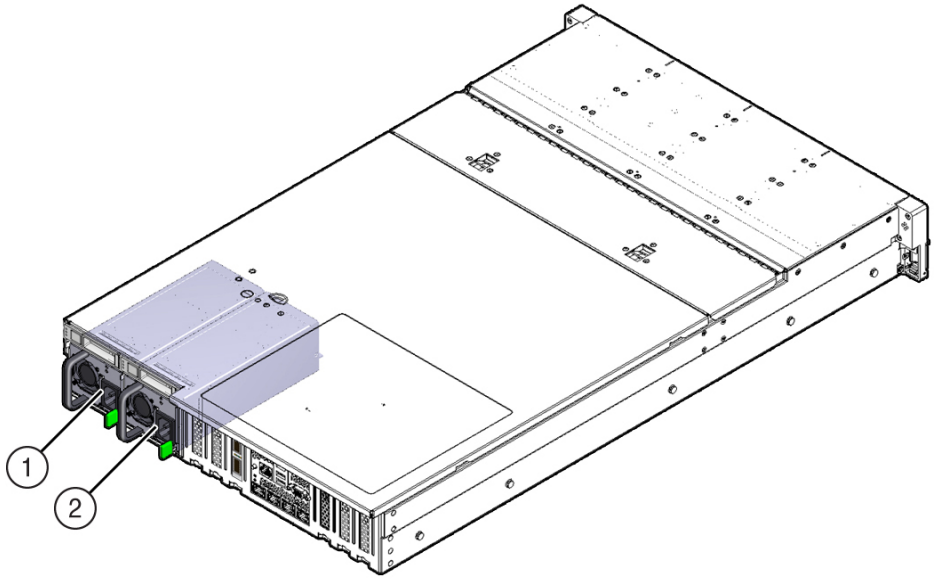
- “Power Supply Status Indicators” on page 29
- “Remove a Power Supply” on page 73
- “Install a Power Supply” on page 75

Related Information

- “Troubleshooting Using the Server Front and Rear Panel Status Indicators” on page 26
- “Powering Down the Server” on page 51

▼ Remove a Power Supply

1. **Identify which power supply requires replacement; either PS0 [1] or PSU1 [2].**



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 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.

Note - The fans of a failed power supply might still be spinning when the system is powered on. The fans will stop spinning when you disconnect the power cords.

---

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

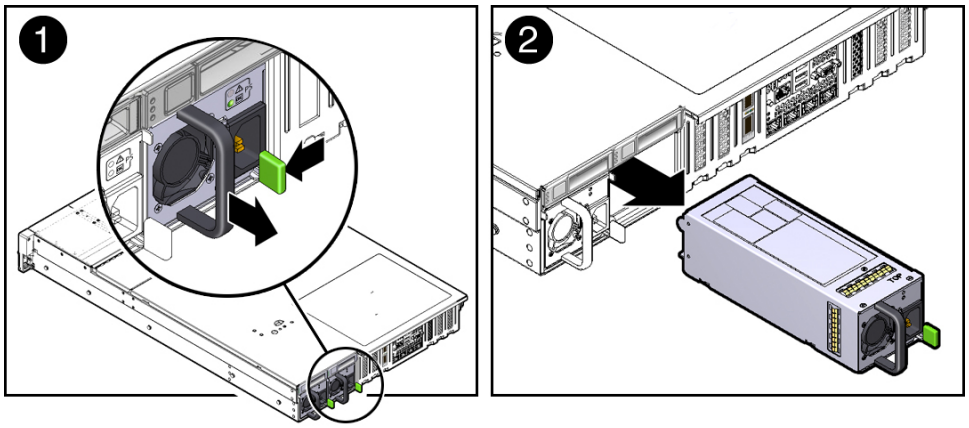
3. **Disconnect both cable management arm (CMA) left-side connectors and move the CMA out of the way.**

For instructions for disconnecting the CMA left-side connectors, see "Remove the Cable Management Arm" in *Oracle Exadata Storage Server X6-2 High Capacity Installation Guide*.

Caution - When disconnecting the CMA left-side connectors, be sure to 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].**



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 75.**

Related Information

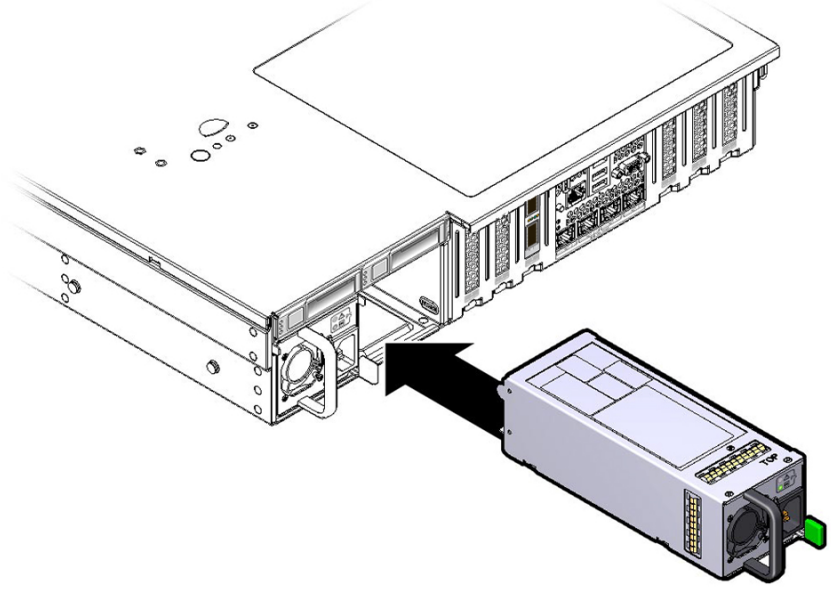
- "Rear Panel Components and Cable Connections" on page 15
- "Power Supply Status Indicators" on page 29
- "Install a Power Supply" on page 75

Install a Power Supply

Caution - Always replace the failed power supply with the same type of power supply.

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.**
3. **Slide the power supply into the slot until it is fully seated.**

   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 Service Required LED on the replaced power supply and the Service Required LEDs are not lit on the front and rear panels.**

Note - After you have replaced Power Supply 0, you must reset the ILOM service processor (SP) to propagate the FRU top-level indicator (TLI) data to the new power supply. For instructions on resetting the SP, see the *Oracle Integrated Lights Out Manager (ILOM) 3.2 Configuration and Maintenance Guide* at `http://www.oracle.com/goto/ilom/docs`. Power Supply 1 does not contain FRU TLI data, and therefore does not require an SP reset after replacement.

6. **Reconnect the two CMA left-side connectors.**

   For instructions for reconnecting the CMA left-side connectors, see "Install the Cable Management Arm" in *Oracle Exadata Storage Server X6-2 High Capacity Installation Guide*.

Related Information

- "Rear Panel Components and Cable Connections" on page 15
- "Power Supply Status Indicators" on page 29
- "Remove a Power Supply" on page 73

Servicing Components That Require Server Power-Off

These sections describe how to service components that require you to power off the server. For more information about server components, refer to “Illustrated Parts Breakdown” on page 16.

Description	Links
Service the DIMMs.	“Servicing the DIMMs” on page 77
Service the PCIe cards.	“Servicing PCIe Cards” on page 86
Service the internal USB flash drives.	“Servicing the Internal USB Flash Drive” on page 92
Service the battery.	“Servicing the Battery” on page 96
Service the processors.	“Servicing Processors” on page 99
Service the front and rear storage drive backplanes.	“Servicing the Storage Drive Backplanes” on page 112
Service SAS cables.	“Servicing SAS Cables” on page 118
Service the Sun Storage 12 Gb SAS PCIe RAID HBA card and super capacitor.	“Servicing the Oracle Storage 12 Gb/s SAS PCIe RAID HBA Card” on page 123
Service the front indicator LED/USB modules.	“Servicing the Front LED/USB Indicator Modules” on page 130
Service the motherboard assembly.	“Servicing the Motherboard Assembly” on page 145

Related Information

- “Servicing Components That Do Not Require Server Power-Off” on page 61

Servicing the DIMMs

The Oracle Exadata Storage Server X6-2 High Capacity supports 16-GB dual-rank (DR) RDIMMs.

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 48.

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

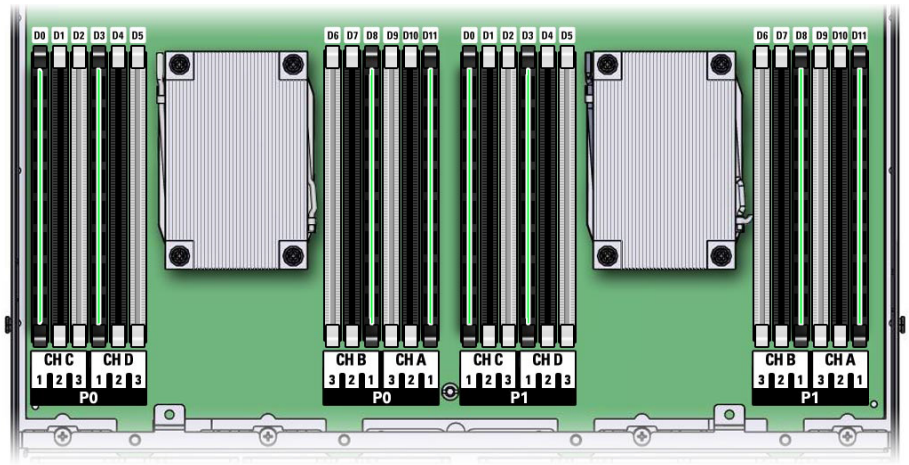
The following sections provide information to assist you when replacing a DIMM or upgrading DIMMs:

Related Information

- “Servicing Processors” on page 99

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, have four memory channels that are labeled, from left to right, Ch C, Ch D, Ch B, and Ch A.



Related Information

- "DIMM Population Rules" on page 79
- "Inconsistencies Between DIMM Fault Indicators and the BIOS Isolation of Faulty DIMMs" on page 79

DIMM Population Rules

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

- The storage server supports only 16-GB dual-rank (DR) Registered DIMMs (RDIMMs), labeled 2Rx4. Do not attempt to install any other DIMM sizes in the storage server.
- Within each memory channel (four per processor), populate only the black DIMM socket with a DIMM.
- Each processor supports four 16-GB DIMMs, for a maximum of 128 GB of memory.

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

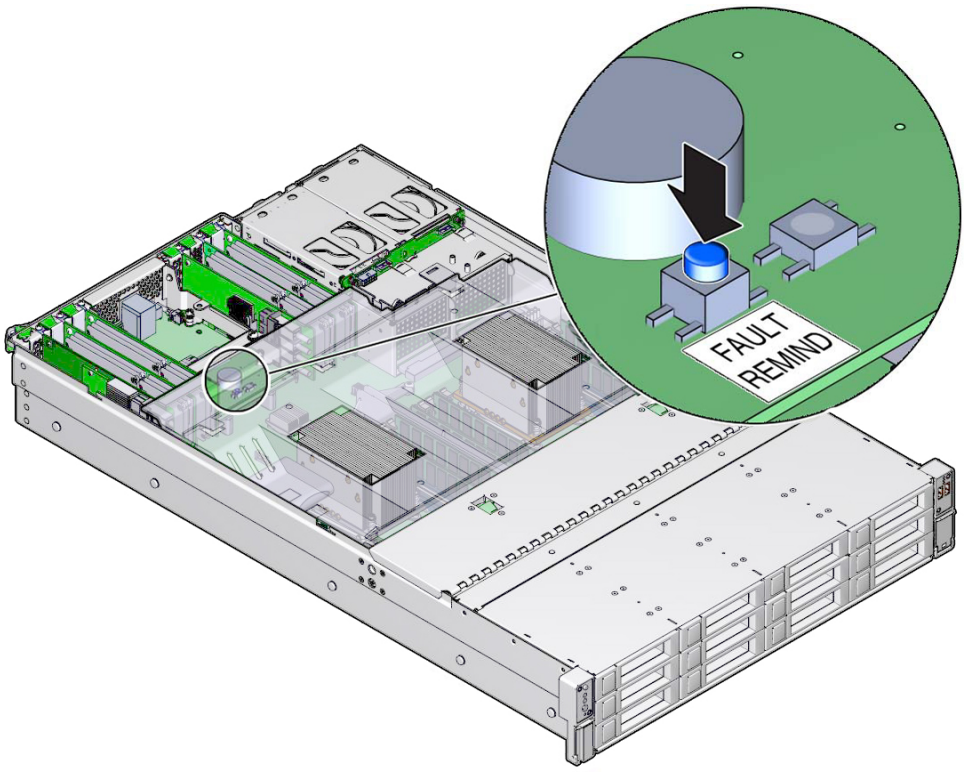
When a single DIMM is marked as failed by Oracle ILOM (for example, `fault.memory.intel.dimm.training-failed` is listed in the SP Event Log), BIOS might disable the entire

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 Storage Server Fault Remind Button

When the server 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 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.



▼ Identify and Remove a Faulty DIMM

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

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

      See “Powering Down the Server” on page 51.

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

      See “Extend the Server to the Maintenance Position” on page 55.

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

      See “Electrostatic Discharge Safety” on page 48.

d. Remove the server top cover.

See "Remove the Server Top Cover" on page 58.

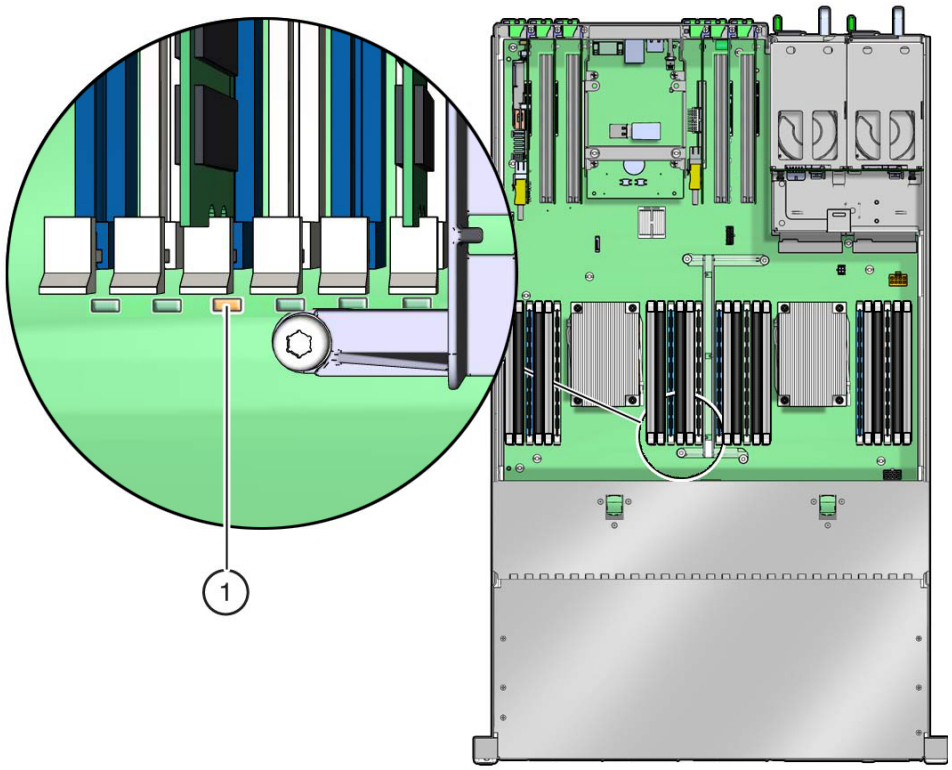
e. Swivel the air baffle into the upright position to allow access to DIMMs.

2. Identify and note the location of the faulty DDR4 DIMM by pressing the Fault Remind button on the motherboard I/O card.

See "Using the Storage Server Fault Remind Button" on page 80.

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

- If the DIMM fault LED is off, then the DIMM is operating properly.
- If the DIMM fault LED is on (amber), then the DIMM is faulty and should be replaced [1].

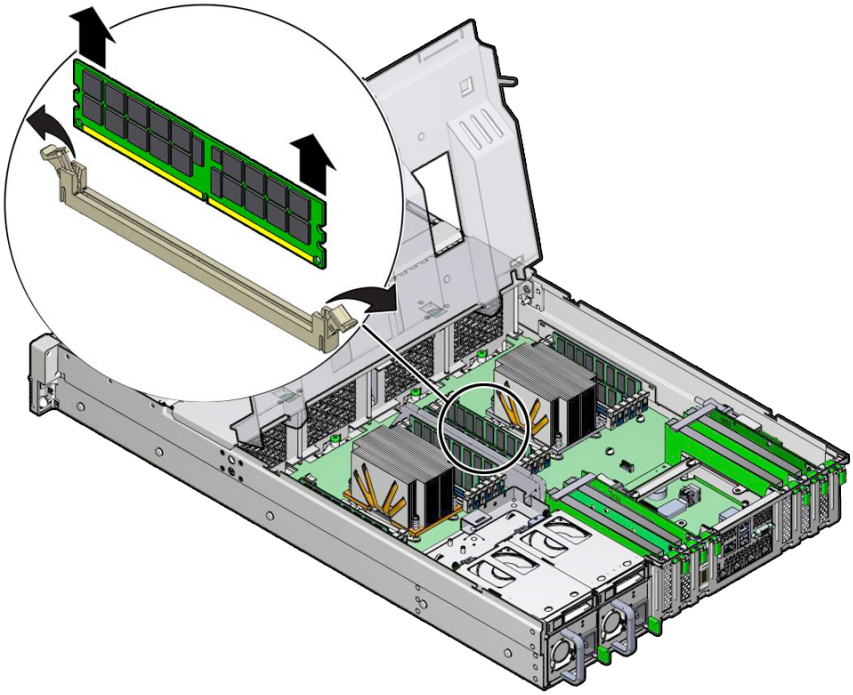


3. To remove the faulty DIMM, do the following:

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

   The DIMM is partially ejected from the socket.

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



4. **Replace each faulty DIMM with either another DIMM of the same rank size (dual-rank or single-rank) or leave the socket empty.**

   For DIMM replacement instructions, see "Install a DIMM" on page 84.

Related Information

- "DIMM and Processor Physical Layout" on page 78
- "DIMM Population Rules" on page 79
- "Install a DIMM" on page 84

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.**

   For DIMM socket population rules, see "DIMM Population Rules" on page 79.

3. **Install a DIMM.**

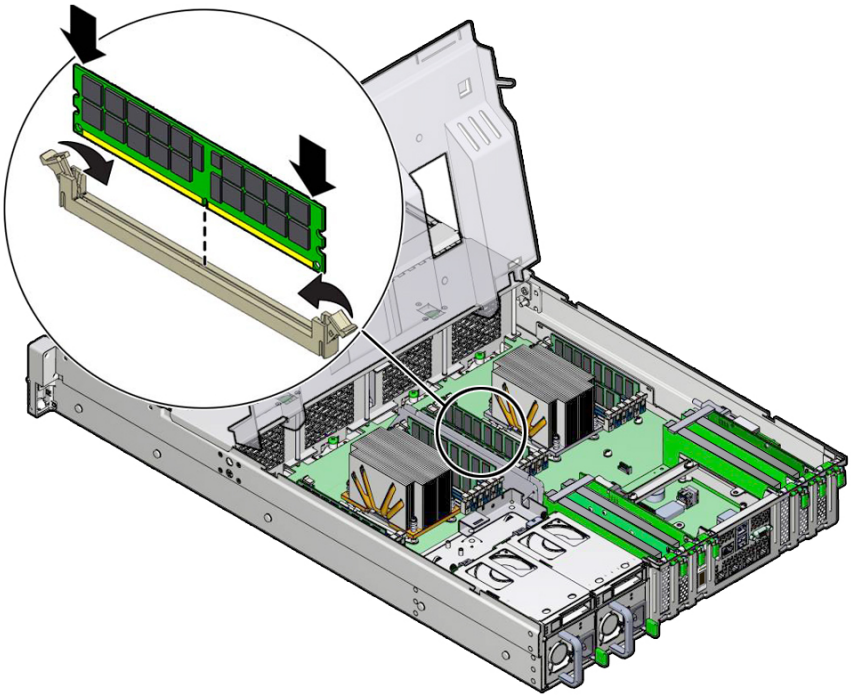
   a. **Ensure that the ejector tabs are in the open position.**

   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 socket 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.



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

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

   a. **Reconnect the power cords and data cables to the server.**

      See “Reconnect Power and Data Cables” on page 167.

   b. **Power on the server.**

      See “Power On the Server” on page 167.

      Verify that the AC OK LED is lit.

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

DDR4 DIMM faults are automatically cleared after a new memory DIMM has been installed. If you need to manually clear DDR4 DIMM faults, refer to the Oracle Integrated Lights Out Manager (ILOM) 3.2 Documentation Library at: `http://www.oracle.com/goto/ilom/docs`.

Related Information

- “DIMM and Processor Physical Layout” on page 78
- “DIMM Population Rules” on page 79
- “Identify and Remove a Faulty DIMM” on page 81

Servicing PCIe Cards

These sections describe how to service and install 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 Oracle Storage 12 Gb SAS PCIe RAID HBA card that is located in PCIe slot 6.

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 57.

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.

This section covers the following topics:

- “PCIe Slot Locations” on page 87
- “Remove a PCIe Card” on page 87
- “Install a PCIe Card” on page 90

Related Information

- “Servicing the Oracle Storage 12 Gb/s SAS PCIe RAID HBA Card” on page 123

PCIe Slot Locations

There are six PCIe slots available for optional PCIe cards. The following figure shows the PCIe slot numbering.

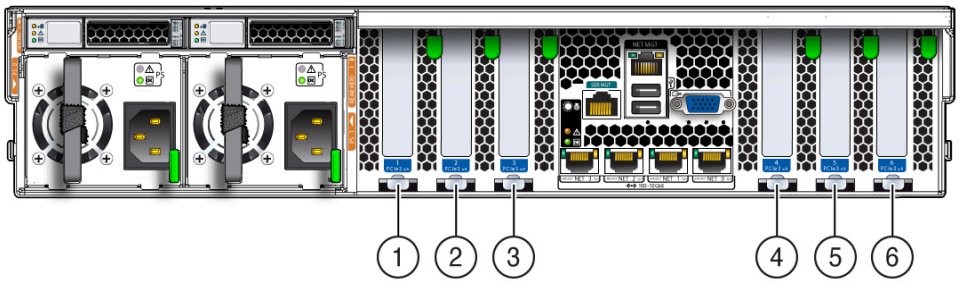


Figure Legend	Description
1	PCIe slot 1 (Contains the Oracle Flash Accelerator F320 NVMe PCIe Add In Card.)
2	PCIe slot 2 (Contains the Oracle Flash Accelerator F320 NVMe PCIe Add In Card.)
3	PCIe slot 3 (Contains the Sun Dual Port QDR InfiniBand Host Channel Adapter for PCIExpress Gen 3.)
4	PCIe slot 4 (Contains the Oracle Flash Accelerator F320 NVMe PCIe Add In Card.)
5	PCIe slot 5 (Contains the Oracle Flash Accelerator F320 NVMe PCIe Add In Card.)
6	PCIe slot 6 (Contains the Oracle Storage 12 Gb/s SAS PCIe RAID HBA card)

Related Information

- “Remove a PCIe Card” on page 87
- “Install a PCIe Card” on page 90

▼ Remove a PCIe Card

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 51.

b. **Extend the server to the maintenance position.**
See “Extend the Server to the Maintenance Position” on page 55.

c. **Attach an antistatic wrist strap.**
See “Electrostatic Discharge Safety” on page 48.

d. **Remove the server top cover.**
See “Remove the Server Top Cover” on page 58.

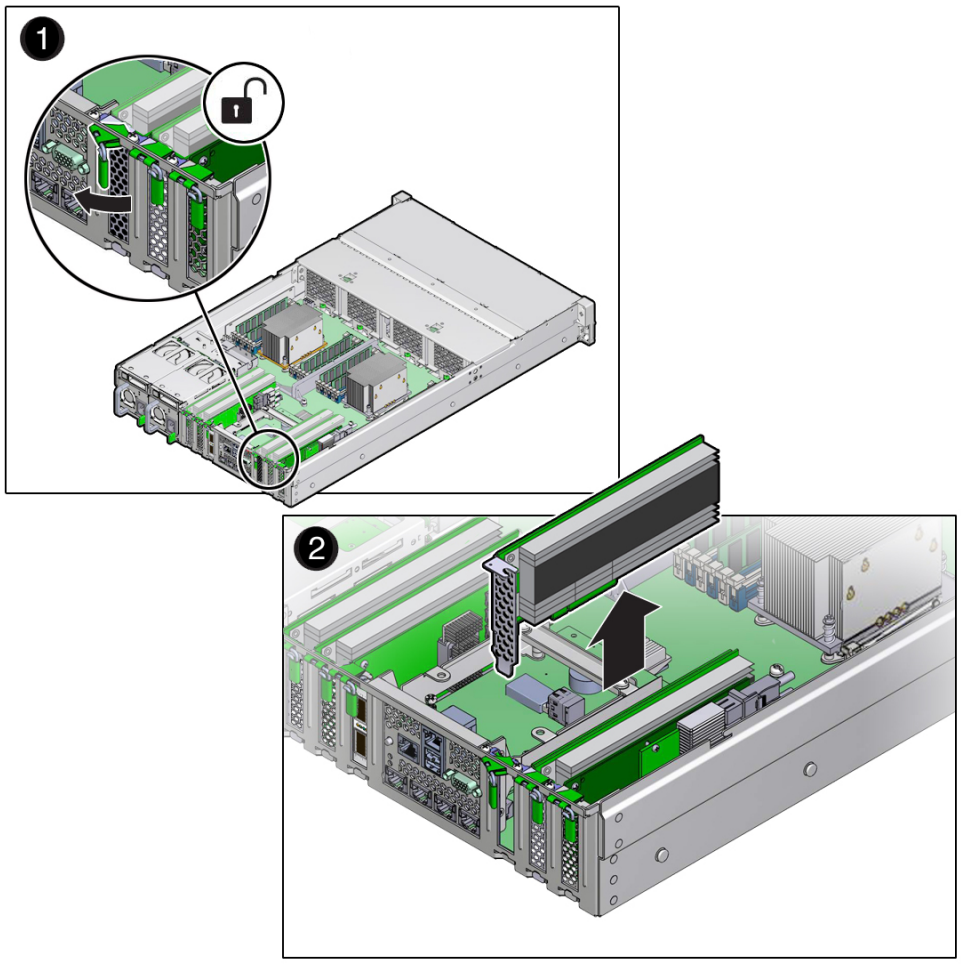
e. **Swivel the air baffle into the upright position to allow access to PCIe cards.**

2. **Locate the PCIe card that you want to remove.**
See “PCIe Slot Locations” on page 87.

3. **If necessary, make a note of where the PCIe cards are installed.**

4. **Unplug all data cables from the PCIe card [1].**

5. **Rotate the PCIe card locking mechanism [1], and then lift up on the PCIe card to disengage it from the motherboard connectors [2].**



6. **Place the PCIe card on an antistatic mat.**

Related Information

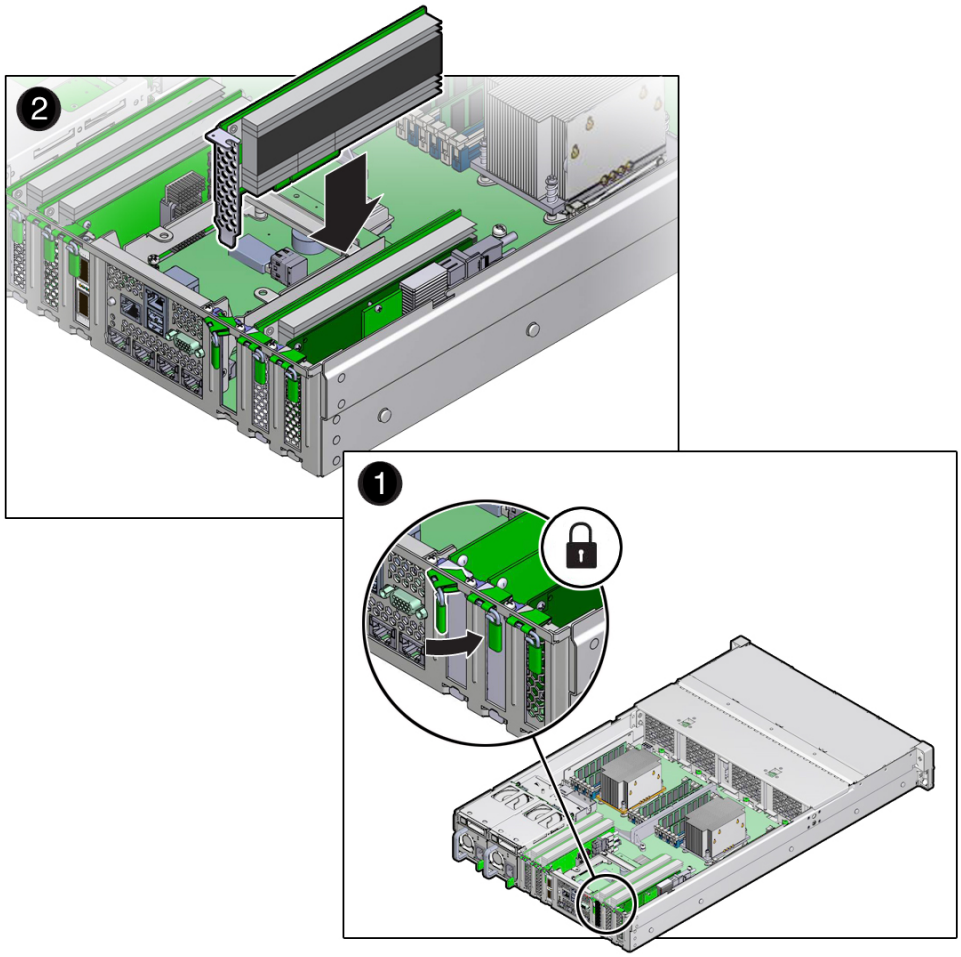
- “PCIe Slot Locations” on page 87
- “Install a PCIe Card” on page 90

Install a PCIe Card

1. **Unpack the replacement PCIe card, and place it on an antistatic mat.**
2. **Locate the proper PCIe slot for the card you are replacing.**
3. **If necessary, remove the PCIe filler panel from the slot.**

Note - Save this filler panel in case you ever need to remove the PCIe card from the system.

4. **Insert the PCIe card into the correct slot [1], and rotate the PCIe locking mechanism to secure the PCIe card in place [2].**



5. **Reconnect the cables to the PCIe card that you unplugged during the removal procedure [2].**

6. **Return the server to operation.**

   a. **Lower the air baffle to the installed position.**

b. **Install the top cover.**

See “Install the Server Top Cover” on page 161.

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

See “Return the Server to the Normal Rack Position” on page 165.

d. **Connect any required data cables to the PCIe card.**

Route data cables through the cable management arm.

e. **Reconnect the power cords to the power supplies and power on the server.**

See “Reconnect Power and Data Cables” on page 167 and “Power On the Server” on page 167. Verify that the AC OK LED is lit.

7. **Use Oracle ILOM to clear any server PCIe card faults.**

You can use the Oracle ILOM web interface or the command-line interface (CLI) to manually clear faults. For information on how to use the Oracle ILOM web interface or the CLI to clear server faults, see the Oracle Integrated Lights Out Manager (ILOM) 3.2 Documentation Library at:

`http://www.oracle.com/goto/ilom/docs`.

8. **To determine whether additional steps are required to complete the installation of the PCIe card, refer to the storage server product notes for the type of PCIe card you installed.**

Related Information

- “PCIe Slot Locations” on page 87
- “Remove a PCIe Card” on page 87

Servicing the Internal USB Flash Drive

Caution - These procedures require that you handle components that are sensitive to electrostatic 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 57.

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 topics:

Related Information

- "USB Ports" on page 174

▼ Remove the Internal USB Flash Drive

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

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

      See "Powering Down the Server" on page 51.

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

      See "Extend the Server to the Maintenance Position" on page 55.

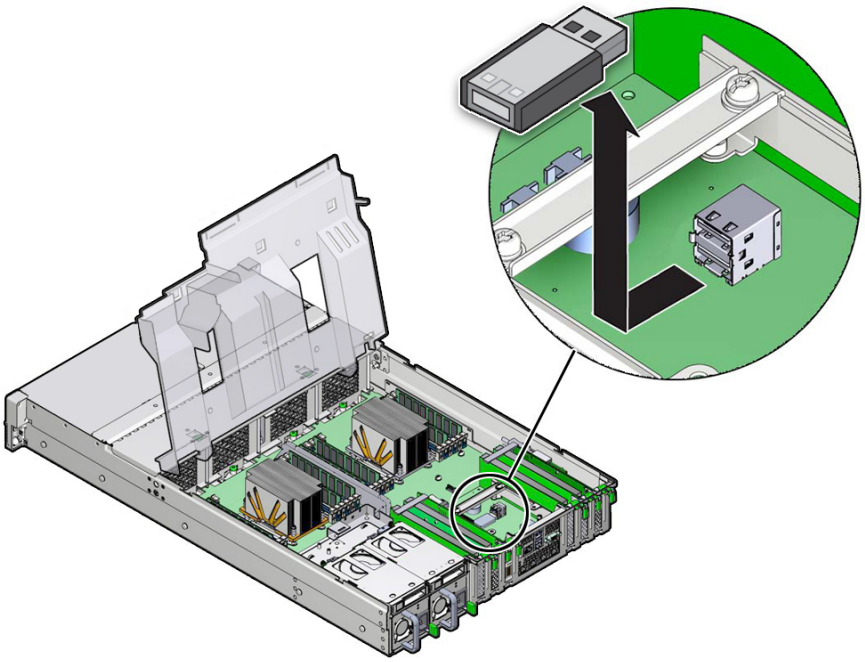
   c. **Attach an antistatic wrist strap to your wrist, and then to a metal area on the chassis.**

      See "Electrostatic Discharge Safety" on page 48.

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

      See "Remove the Server Top Cover" on page 58.

2. **To remove the USB flash drive, grasp the flash drive and pull it from the slot.**



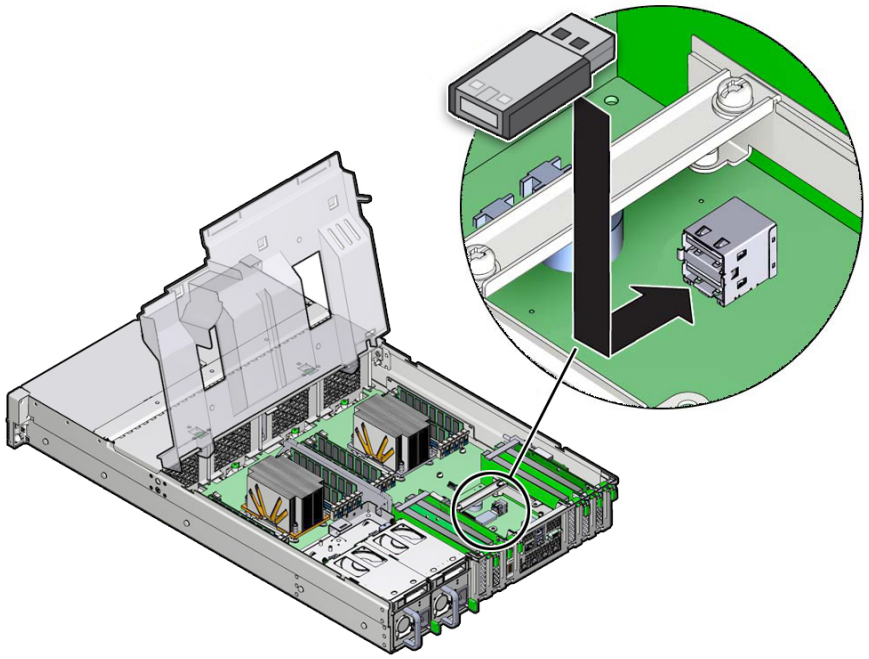
Related Information

- “Install the Internal USB Flash Drive” on page 94

▼ Install the Internal USB Flash Drive

1. **Unpack the replacement USB flash drive.**

2. **Insert the flash drive into the USB slot.**



3. **Return the server to operation.**

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

      See “Install the Server Top Cover” on page 161.

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

      See “Return the Server to the Normal Rack Position” on page 165.

   c. **Reconnect the power cords to the server power supplies and power on the server.**

      See “Reconnect Power and Data Cables” on page 167 and “Power On the Server” on page 167. Verify that the AC OK LED is lit.

Related Information

- “Remove the Internal USB Flash Drive” on page 93

Servicing the Battery

The real-time clock (RTC) 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 system 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 this procedure.

This section covers the following topics:

Remove the Battery

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

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

      See "Powering Down the Server" on page 51.

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

      See "Extend the Server to the Maintenance Position" on page 55.

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

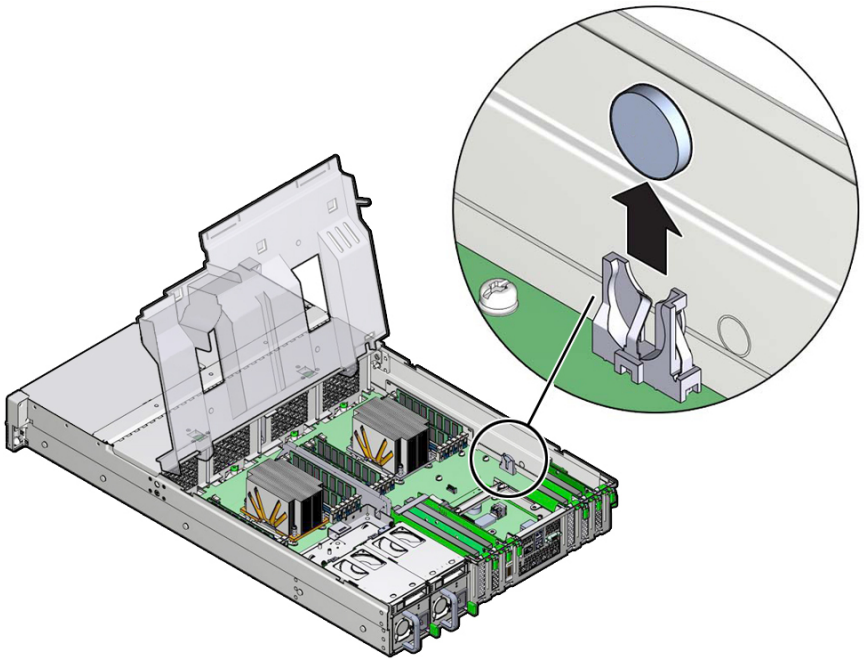
      See "Electrostatic Discharge Safety" on page 48.

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

      See "Remove the Server Top Cover" on page 58.

   e. **Swivel the air baffle into the upright position to allow access to the battery.**

2. **To dislodge the battery from its retainer, gently push the top edge of the battery away from the retainer.**



3. **Lift the battery up and out of its retainer.**

Related Information

- “Install the Battery” on page 97

▼ Install the Battery

1. **Unpack the replacement battery.**

2. **Press the new battery into the battery retainer with the negative side facing inside the server chassis.**

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

3. **If the service processor is not configured to use NTP, you must do one of the following:**

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

     For instructions, refer to the Oracle Integrated Lights Out Manager (ILOM) 3.2 Documentation Library at: `http://www.oracle.com/goto/ilom/docs`.
   - Use the BIOS Setup Utility to reprogram the host clock.

     For the BIOS Main menu that supports this procedure, refer to the *Oracle X5 Series Servers Administration Guide* at `http://www.oracle.com/goto/x86admindiag/docs`.

4. **Return the server to operation.**

   a. **Lower the air baffle to the installed position.**

   b. **Install the server top cover.**

      See "Install the Server Top Cover" on page 161.

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

      See "Return the Server to the Normal Rack Position" on page 165.

   d. **Reconnect the power cords to the server power supplies, and power on the server.**

      See "Reconnect Power and Data Cables" on page 167 and "Power On the Server" on page 167. Verify that the AC OK LED is lit.

Related Information

- "Remove the Battery" on page 96

Servicing Processors

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

Caution - This procedure requires that you handle components that are sensitive to electrostatic discharge. This sensitivity can cause the component to fail. To avoid damage, ensure that you follow electrostatic discharge safety measures and antistatic practices. See "Electrostatic Discharge Safety" on page 48.

This section covers the following topics:

Related Information

- "Servicing the DIMMs" on page 77

Processor Removal and Replacement Tool

Caution - The correct color-coded 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.

The Oracle Exadata Storage Server X6-2 High Capacity uses two Intel E5-2630, 10-core, 2.2 GHz, 85W processors. When replacing the processor, you must use the specifically designed green color-coded processor removal and replacement tool.

Note - The green processor removal and replacement tool is included in the box with the 10-core replacement processor. Additionally, the correct removal and replacement tool ships with replacement motherboards.

Remove a Processor

Caution - The green color-coded processor removal and replacement tool (part number G29477-002 or later) must be used to remove the 10-core processor; otherwise, the processor or the processor socket might be damaged.

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/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 51.

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

      See “Take Antistatic Measures” on page 57.

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

      See “Extend the Server to the Maintenance Position” on page 55

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

      See “Remove the Server Top Cover” on page 58.

   e. **Swivel the air baffle into the upright position to allow access to the processors.**

2. **Identify the location of the faulty processor by pressing the Fault Remind button on the motherboard I/O card.**

Note - 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 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 LED for the faulty processor lights. The processor Fault LEDs are located next to the processors:

- 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 faulty and should be replaced.

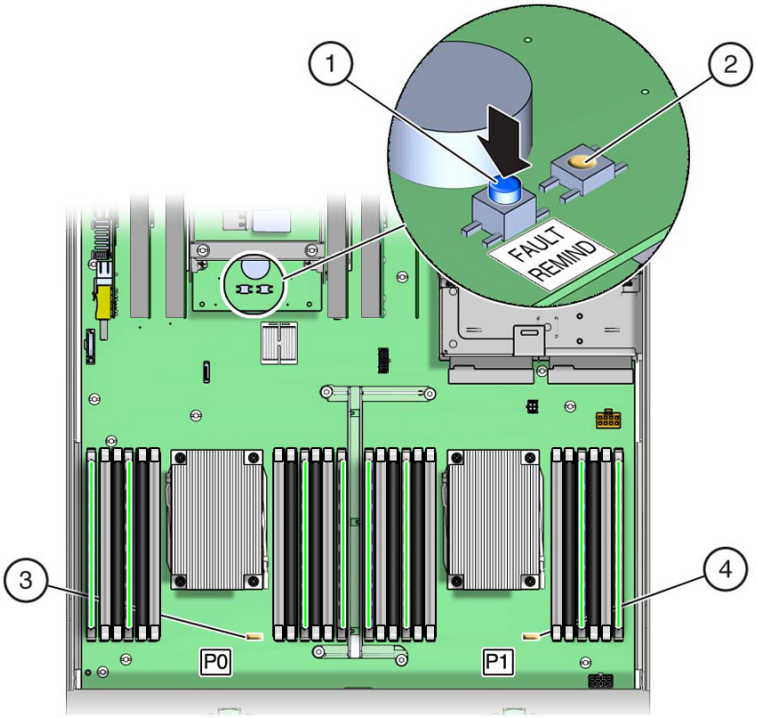
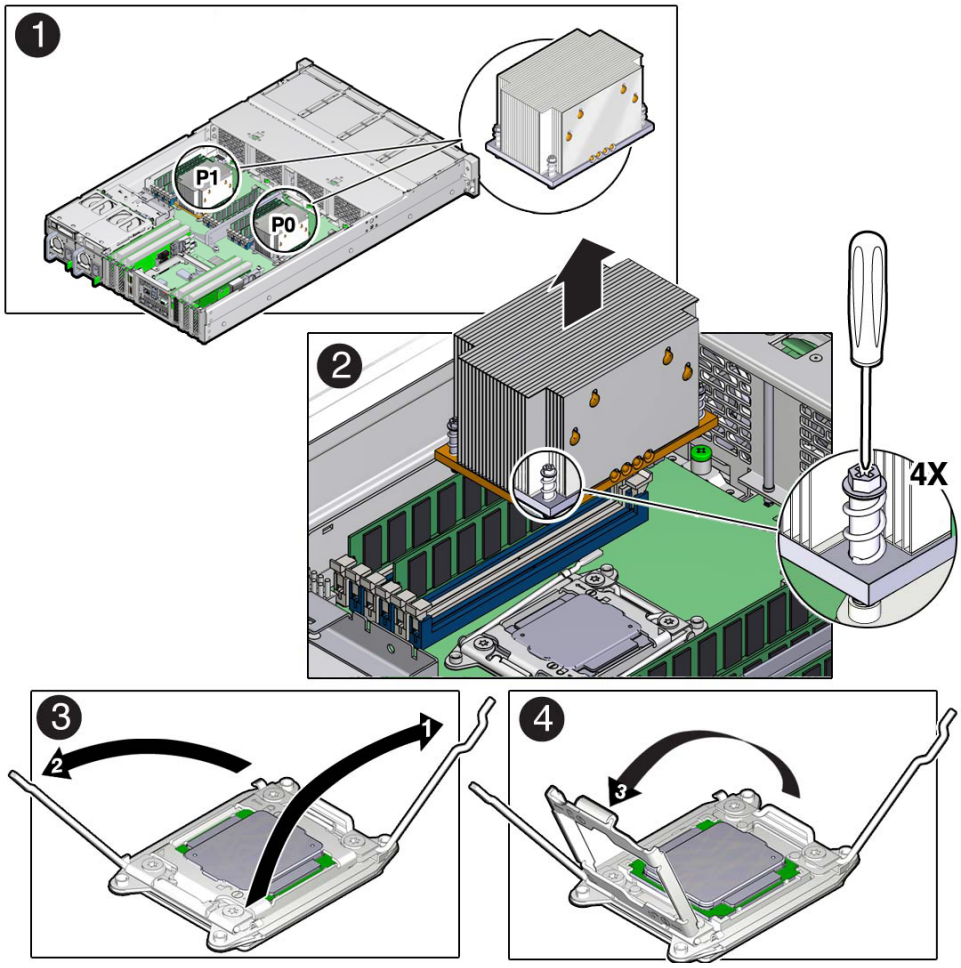


Figure Legend	Description
1	Fault Remind button
2	Fault Remind LED
3	Processor 0 LED
4	Processor 1 LED

3. **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 using a No. 2 Phillips screwdriver [2].**

   Turn the screws counterclockwise alternately one and one-half turns until they are fully released.



4. **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.**

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.

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

   Be 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.

6. **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 [3].**

7. **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 [3].**

8. **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 [4].**

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 "Install a Processor" on page 106.

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

Caution - Before removing the processor, ensure that you are using the correct color-coded processor removal/replacement tool. For information on how to select the correct processor removal/replacement tool, see "Processor Removal and Replacement Tool" on page 99.

   a. **Locate the button in the center of the top of the processor removal 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 processor tool to release the center button and engage the processor [3].

An audible click indicates that the processor is engaged.

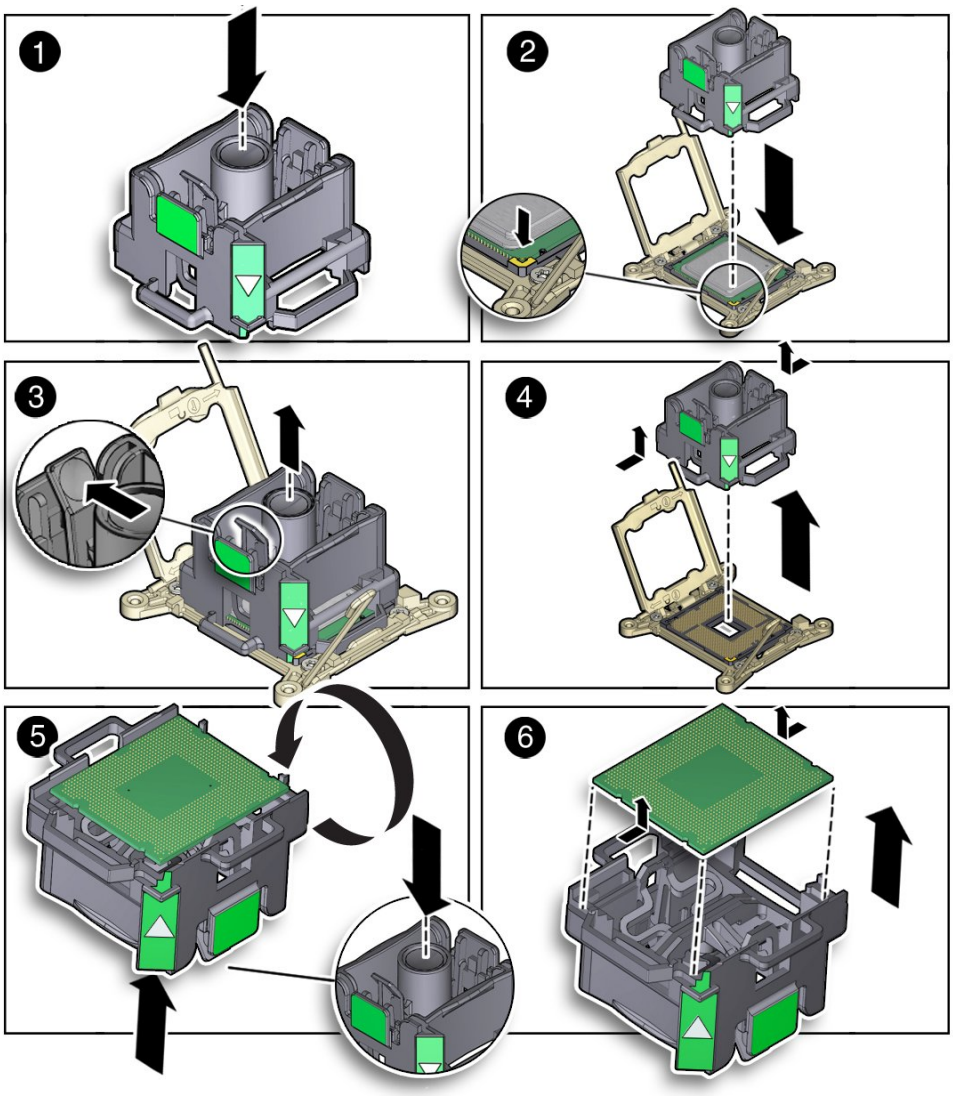
d. Grasp the tool by the sides and remove it from the server [4].

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

f. While holding the processor tool upside 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” on page 106

Install a Processor

Caution - The green color-coded processor removal and replacement tool (part number G29477-002 or later) must be used to install the 10-core processor; otherwise, the processor or the processor socket might be damaged.

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/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 57.

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.**
   For a description of the processors that are supported by the server, see "Storage Server Features and Components" in *Oracle Exadata Storage Server X6-2 High Capacity Installation Guide*.

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 6 through Step 8 of "Remove a Processor" on page 100.

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

   Caution - Before installing the processor, ensure that you are using the correct color-coded processor removal/replacement tool. For information on how to select the correct processor removal/replacement tool, see "Processor Removal and Replacement Tool" on page 99.

   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 and 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/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].

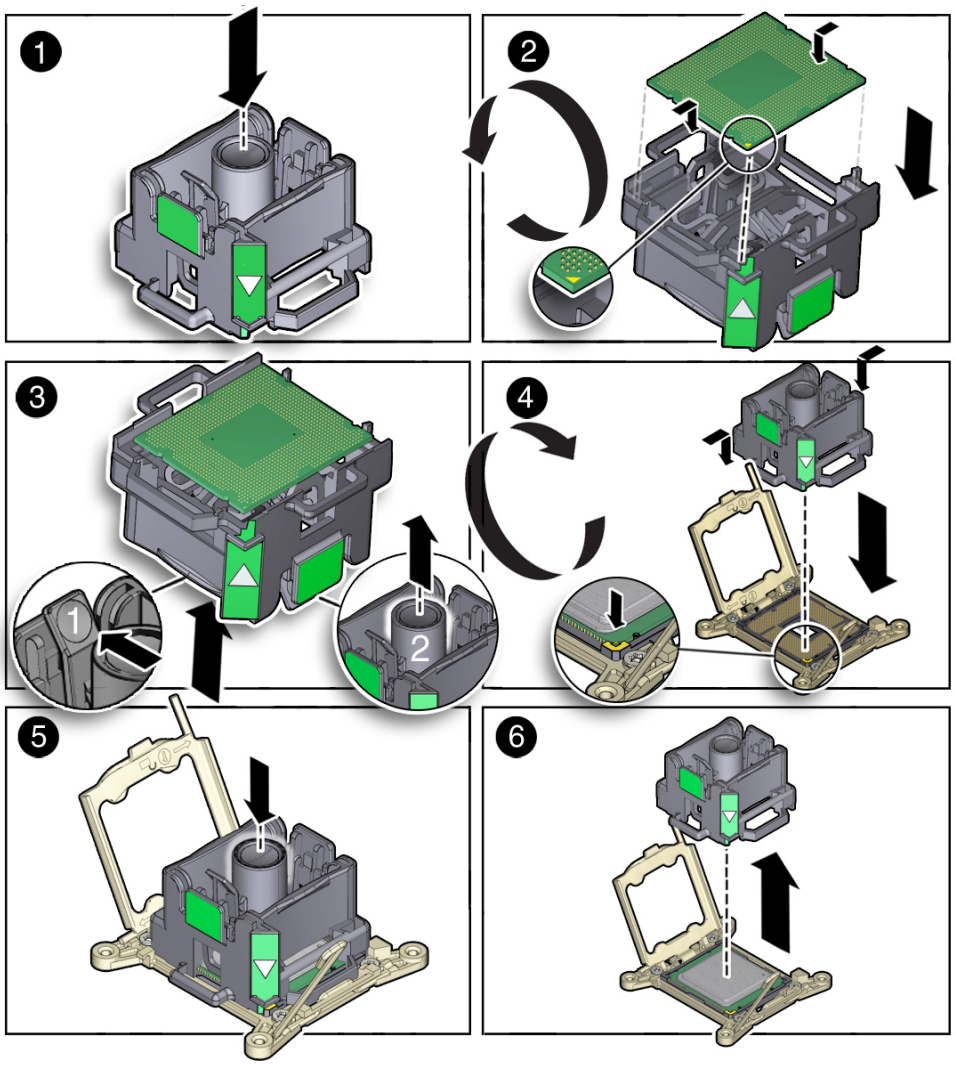
An audible click indicates that the processor is locked into place.

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 on the tool down to release the processor so that it is installed in the socket [5].

f. **Remove the processor removal/replacement tool [6].**



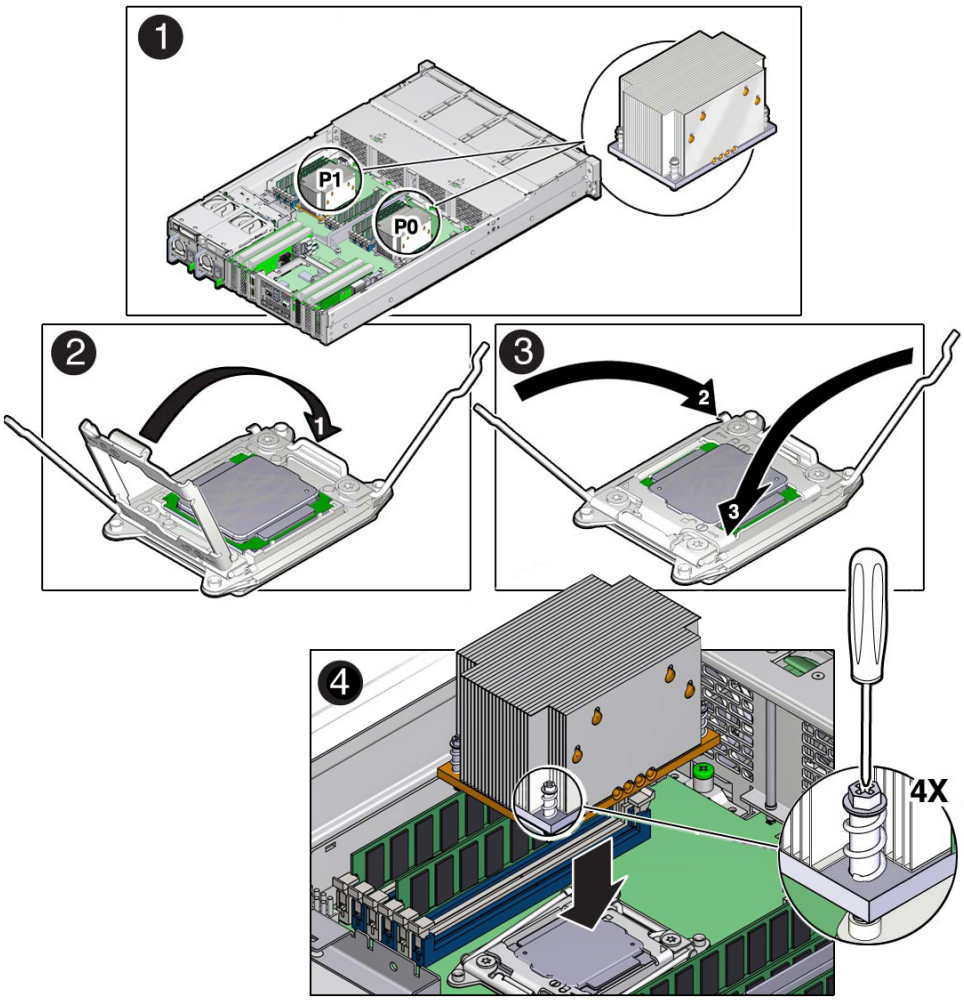
6. **Visually check the alignment of the processor in the socket.**

   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 [2].**

   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 [3].**

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 [3].**

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 it for you when you install it.

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 posts [4].**

    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 [4].**

    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. **Use a No. 2 Phillips screwdriver to tighten the screws alternately one-half turns until fully seated [4].**

15. **Return the server to operation.**

    a. **Lower the air baffle to the installed position.**

    b. **Install the server top cover.**

       See “Install the Server Top Cover” on page 161.

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

       See “Return the Server to the Normal Rack Position” on page 165.

d. Reconnect the power cords to the power supplies, and power on the server.

See “Reconnect Power and Data Cables” on page 167 and “Power On the Server” on page 167. Verify that the AC OK LED is lit.

16. Use Oracle ILOM to clear server processor faults.

Refer to the Oracle Integrated Lights Out Manager (ILOM) 3.2 Documentation Library 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 server:

```
-> show /SP/faultmgmt
```

The server lists all known faults, for example:

```
-> show /SP/faultmgmt
  Targets:
      shell
      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.

b. To clear the fault identified in Step 16a, 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 9y/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.

Related Information

- “Remove a Processor” on page 100

Servicing the Storage Drive Backplanes

To remove and install the storage drive backplanes, follow the procedures in these sections.

Caution - Ensure that all power is removed from the server before removing or installing the storage drive backplane. You must disconnect the power cables before performing this procedure.

- “Remove the Storage Drive Backplane” on page 112
- “Install the Storage Drive Backplane” on page 116

Related Information

- “Servicing Storage Drives and Rear Drives” on page 61
- “Servicing SAS Cables” on page 118

▼ Remove the Storage Drive Backplane

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 51.

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

      See “Extend the Server to the Maintenance Position” on page 55.

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

      See “Take Antistatic Measures” on page 57.

d. **Open the server fan assembly door, and remove the fan modules from the server.**

   See “Remove a Fan Module” on page 67.

e. **Remove the fan assembly door from the server.**

   See “Remove the Fan Assembly Door From the Server” on page 59.

2. **Pull each storage drive out far enough to disengage if from the disk backplane.**

   See “Remove a Storage Drive” on page 62.

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, make a note of their locations so that you can reinstall them in the same locations.

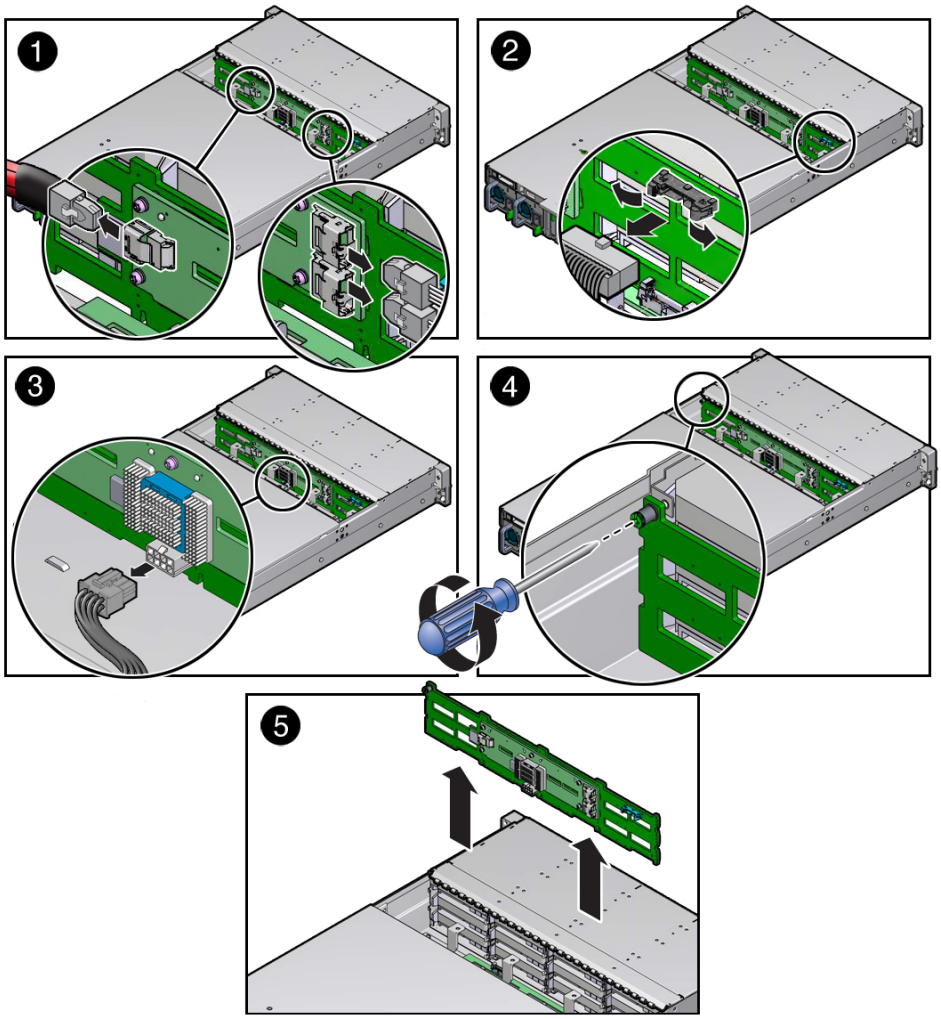
---

3. **Disconnect the cables from the storage drive backplane.**

   a. **Disconnect the SAS cable from the storage drive backplane to the rear-mounted storage drives, and the two SAS cables from the storage drive backplane to the Sun Storage 12 Gb SAS PCIe RAID HBA [1].**

      Note the cable connections in order to ease proper reconnection of the cables.

b. **Disconnect the auxiliary signal cable and the power cable from the storage drive backplane [2].**



4. **Using a No. 2 Phillips screwdriver, loosen the right-side spring-mounted screw that secures the storage drive backplane to the chassis [3].**

5. **Lift the storage drive backplane up to release it from the standoff hooks [4].**

6. **Pull the storage drive backplane away from the standoff hooks and out of the chassis [5].**

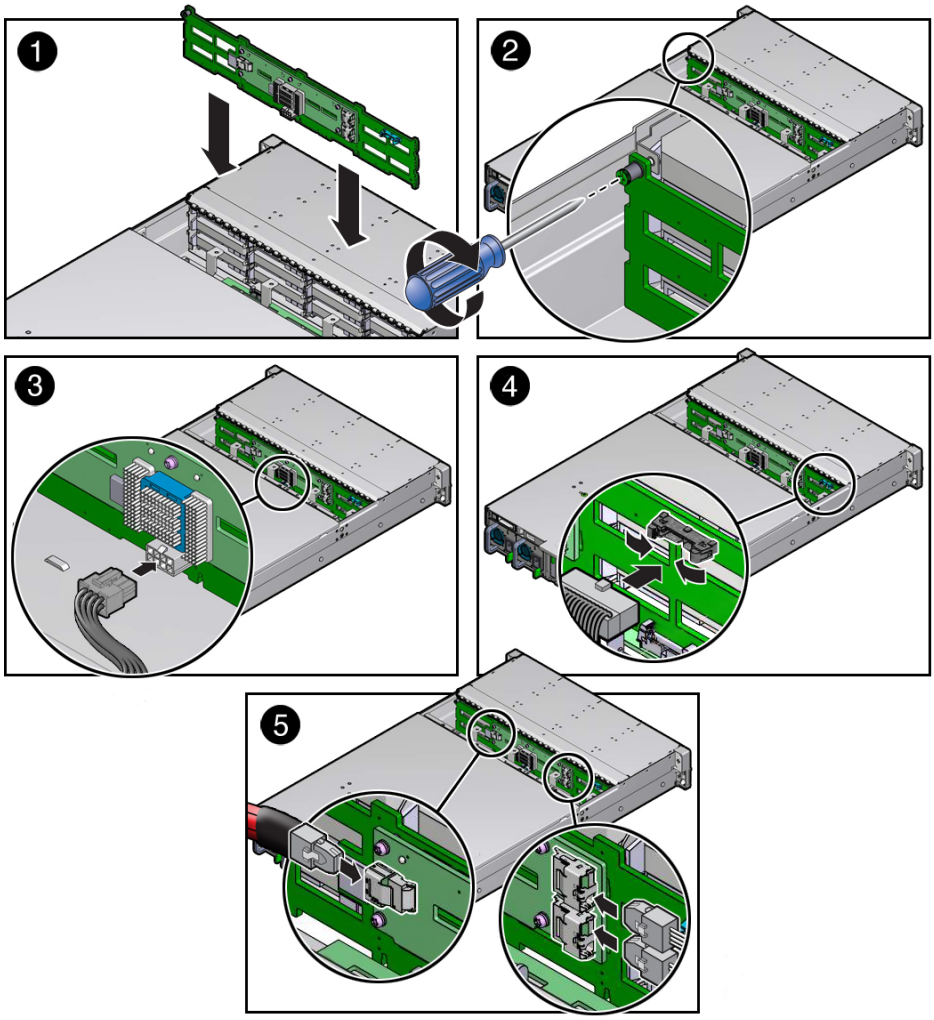
7. **Place the storage drive backplane on an antistatic mat.**

Related Information

- “Install the Storage Drive Backplane” on page 116

▼ Install the Storage Drive Backplane

1. **Lower the storage drive backplane into the server, and position it to engage the standoff hooks [1].**



2. **Using a No. 2 Phillips screwdriver, install and tighten the right-side spring-mounted screw to secure the storage drive backplane to the chassis [2].**

3. **Reconnect the cables to the storage drive backplane.**

   a. **Reconnect the auxiliary signal cable and the power cable to the storage drive backplane [3].**

      Use the following cable part number table to ensure proper cable connections:

Cable Part Number	Description
7079291	Auxiliary signal cable
7086654	Power cable

   b. **Reconnect the SAS cable to the storage drive backplane from the rear-mounted storage drives, and the two SAS cables to the storage drive backplane from the Sun Storage 12 Gb SAS PCIe RAID HBA [4].**

      To ensure proper SAS cable connections, see “Install SAS Storage Drive Cables” on page 121.

4. **Return the server to operation.**

   a. **Install the fan assembly door top cover.**

      See “Install the Fan Assembly Door” on page 163.

   b. **Install the fan modules and close the fan assembly door.**

      See “Install a Fan Module” on page 70.

   c. **Install all storage drives into the storage drive cage.**

      See “Install a Storage Drive” on page 65.

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

      See “Return the Server to the Normal Rack Position” on page 165.

   e. **Reconnect the power cords to the power supplies, and power on the server.**

      See “Reconnect Power and Data Cables” on page 167 and “Power On the Server” on page 167. Verify that the AC OK LED is lit.

Note - IMPORTANT: When the disk backplane is replaced, the key identity properties (KIP) of the disk backplane is programmed by Oracle ILOM to contain the same KIP as the other quorum member components. If you have removed other quorum member components, you might need to manually program the product serial number (PSN) into the new disk backplane. For more information, refer to "FRU Key Identity Properties (KIP) Automated Update" on page 49.

Related Information

- "Remove the Storage Drive Backplane" on page 112

Servicing SAS Cables

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 topics:

- "Remove SAS Storage Drive Cables" on page 118
- "Install SAS Storage Drive Cables" on page 121

Related Information

- "Servicing Storage Drives and Rear Drives" on page 61
- "Servicing the Storage Drive Backplanes" on page 112

▼ Remove SAS Storage Drive Cables

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 51.

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

   See “Extend the Server to the Maintenance Position” on page 55.

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

   See “Electrostatic Discharge Safety” on page 48.

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

   See “Remove the Server Top Cover” on page 58.

e. **Remove fan modules.**

   See “Remove a Fan Module” on page 67.

f. **Swivel the air baffle into the upright position to allow access to the SAS storage drive cables.**

g. **Remove the server's front fan assembly door cover.**

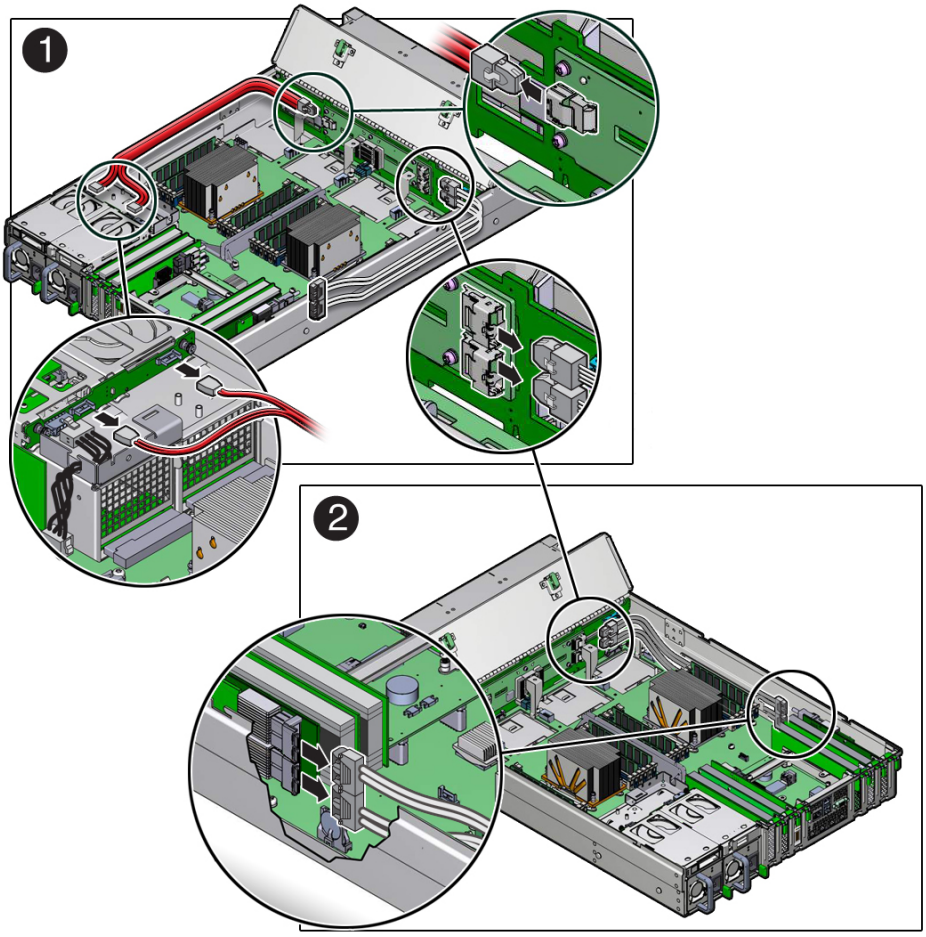
   See “Remove the Fan Assembly Door From the Server” on page 59.

2. **Disconnect the SAS cables.**

   a. **To disconnect the SAS cables between the Oracle Storage 12 Gb/s SAS PCIe RAID HBA card in PCIe slot 6 and the front storage drive backplane, press each latch, and then pull out to disengage the cable from each SAS connector [1 and 2].**

      See also “Remove the Sun Storage 12 Gb/s SAS PCIe RAID HBA Card” on page 124.

b. **(Optional) To disconnect the SAS cables between the rear storage drive backplane and front storage drive backplane, press each latch, and then pull out to disengage the cable from each SAS connector [1].**



3. **Remove the SAS cables from the server.**

   Carefully remove the SAS cable bundles from the chassis mid-wall. Be careful not to snag the cables on the server components.

Related Information

- “Remove the Sun Storage 12 Gb/s SAS PCIe RAID HBA Card” on page 124
- “Install SAS Storage Drive Cables” on page 121

▼ Install SAS Storage Drive Cables

1. **Install SAS storage drive cables.**

   a. **Install the SAS cables between the front storage drive backplane and the Oracle Storage 12 Gb/s SAS PCIe RAID HBA card in PCIe slot 6 [1].**

      Route the SAS cable bundle through the chassis mid-wall and along the left side of the chassis.

   b. **(Optional) Install the cables between the front storage drive backplane and the rear-mounted storage drive backplane [2].**

      Route the SAS cable bundle through the chassis mid-wall and along the right side of the chassis.

2. **Reconnect the SAS cables.**

   a. **To reconnect the SAS cables between the front storage drive backplane and the Oracle Storage 12 Gb/s SAS PCIe RAID HBA card, plug each cable into its SAS connector until you hear an audible click [1].**

      See also “Install the Oracle Storage 12 Gb/s SAS PCIe RAID HBA Card” on page 127.

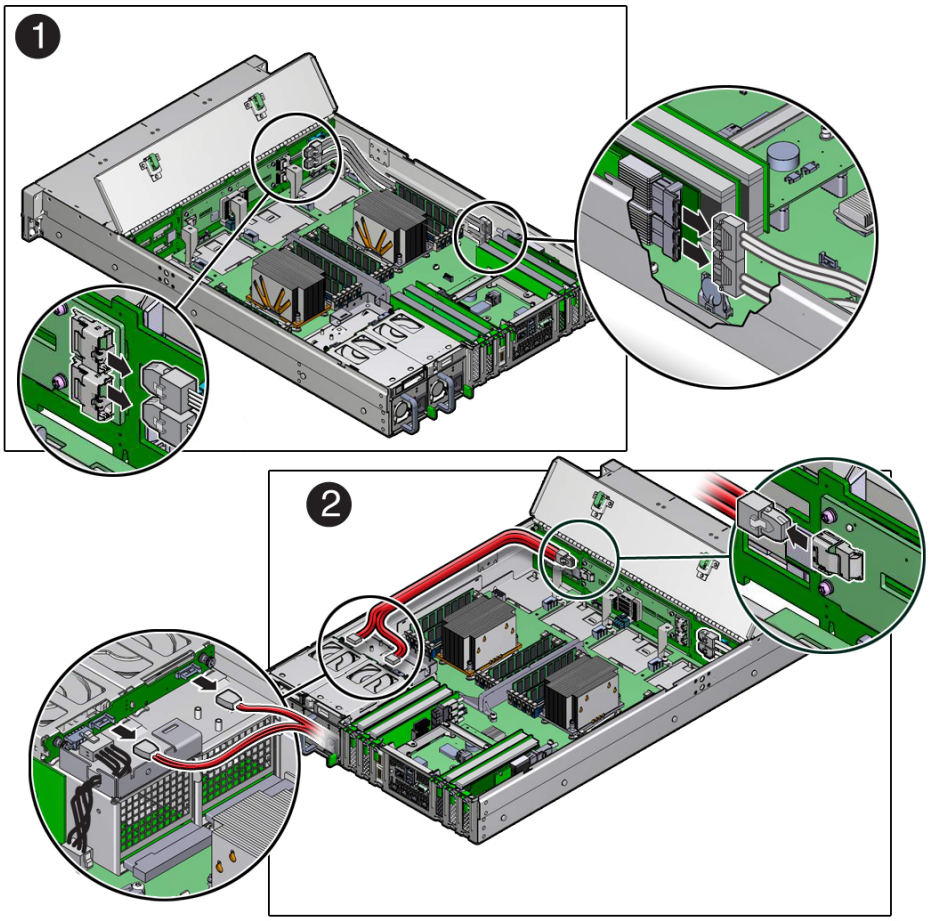
      Use the following table to ensure proper SAS cable connections:

System Disk Configuration	Disk Backplane Ports	HBA Port	Cable Part Number
Twelve storage drives	J302 (Upper)	J5A1	7091185
	J301 (Lower)		

   b. **(Optional) To reconnect the SAS cables between the front storage drive backplane and the rear storage drive backplane, plug each cable into its SAS connector until you hear an audible click [2].**

      Attach the SAS cable to connector (J300) on the front storage drive backplane and to SAS connectors (RHDD0 and RHDD1) on the rear storage drive backplane.

Note - Cable part number 7064129 is required for SAS connections between the front storage drive backplane and rear storage drive backplane.



3. **Return the server to operation.**

   a. **Install the server's front fan assembly door cover.**
   See "Install the Fan Assembly Door" on page 163.

   b. **Lower the air baffle to the installed position.**

c. **Install fan modules.**

   See “Install a Fan Module” on page 70.

d. **Install the server top cover.**

   See “Install the Server Top Cover” on page 161.

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

   See “Return the Server to the Normal Rack Position” on page 165.

f. **Reconnect the power cords to the power supplies, and power on the server.**

   See “Reconnect Power and Data Cables” on page 167 and “Power On the Server” on page 167. Verify that the AC OK LED is lit.

Related Information

- “Install the Oracle Storage 12 Gb/s SAS PCIe RAID HBA Card” on page 127
- “Remove SAS Storage Drive Cables” on page 118

Servicing the Oracle Storage 12 Gb/s SAS PCIe RAID HBA Card

These sections describe how to service and install the Oracle Storage 12 Gb/s SAS PCIe RAID 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 57.

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.

Caution - The Oracle Storage 12 Gb/s SAS PCIe RAID HBA card should be replaced only by an Oracle qualified service technician.

This section covers the following topics:

Related Information

- "Servicing SAS Cables" on page 118

▼ Remove the Sun Storage 12 Gb/s SAS PCIe RAID HBA Card

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 51.

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

      See "Extend the Server to the Maintenance Position" on page 55.

   c. **Attach an antistatic wrist strap.**

      See "Electrostatic Discharge Safety" on page 48.

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

      See "Remove the Server Top Cover" on page 58.

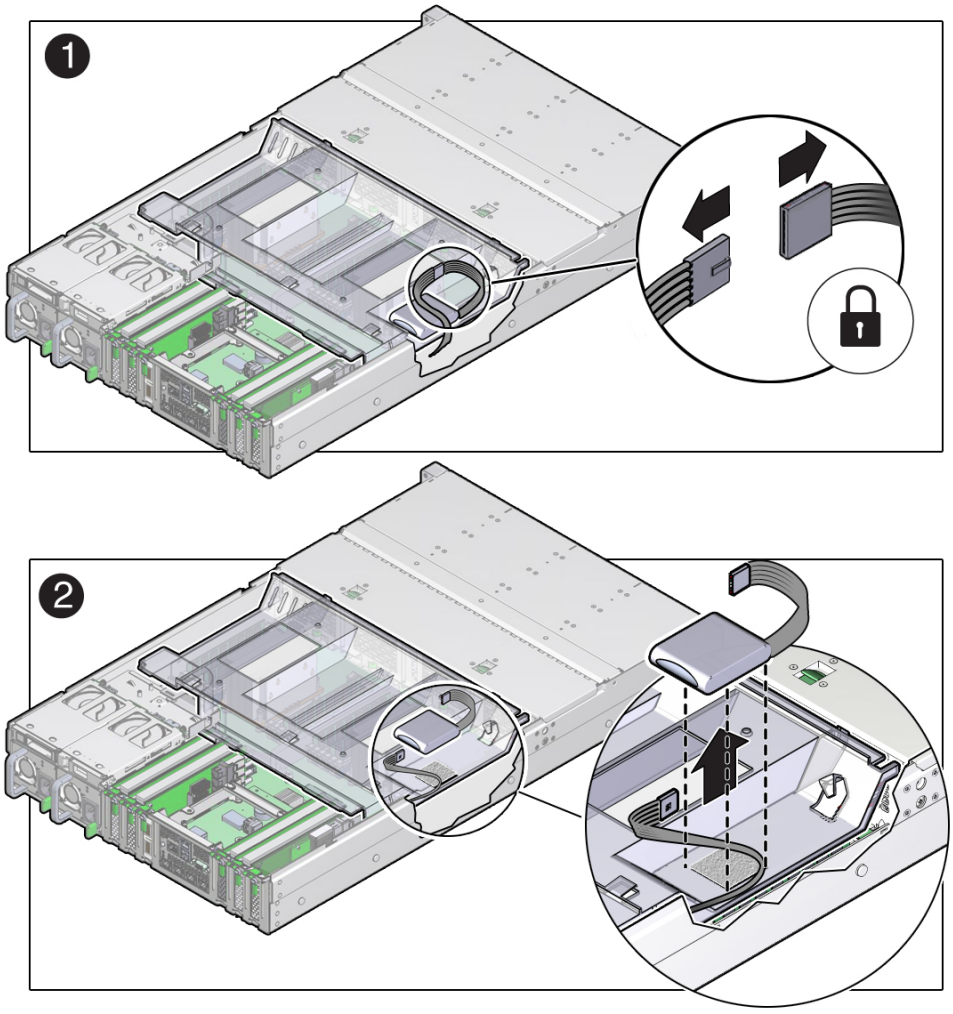
2. **Remove the super capacitor from the chassis.**

   a. **Grasp both ends of the cable connector, press in on the release latch, and then unplug the connector [1].**

      The HBA super capacitor is secured to the air baffle by a reclosable fastener, which allows it to be easily removed and replaced.

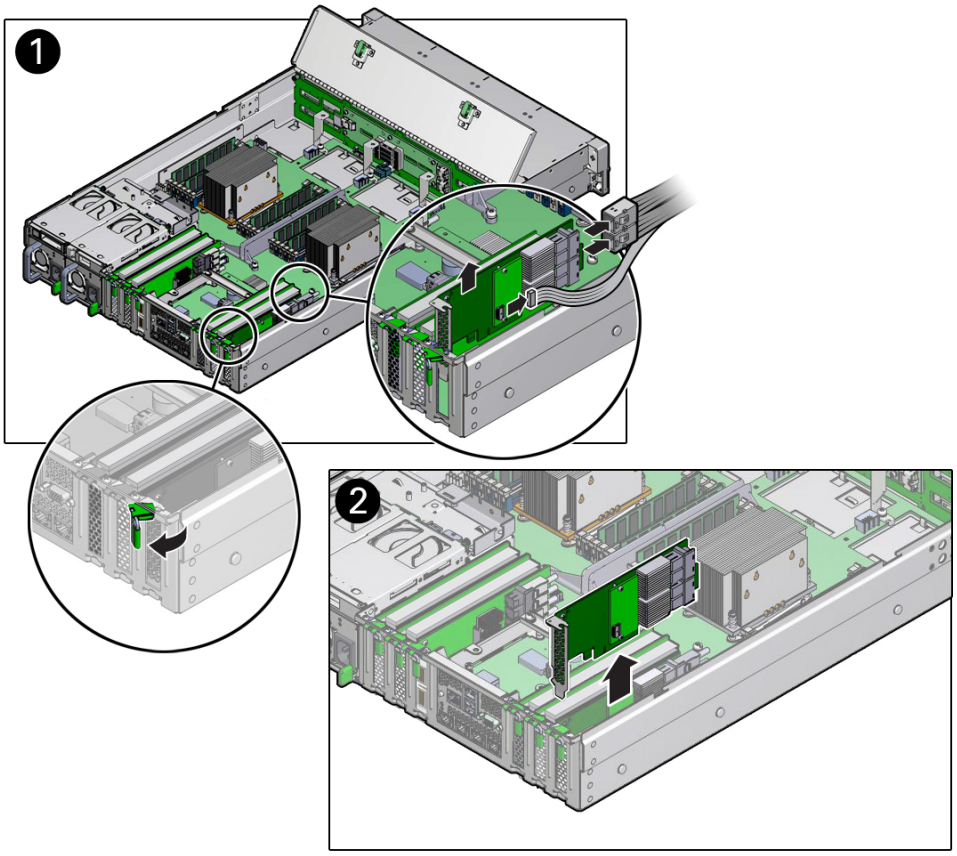
   b. **To separate the HBA super capacitor from the air baffle, place your finger under the rear of the super capacitor and lift up [2].**

Place the super capacitor on an antistatic mat.



3. **Swivel the air baffle into the upright position to allow access to the super capacitor cable and the Oracle Storage 12 Gb/s SAS PCIe RAID HBA card.**

4. **Rotate the PCIe card locking mechanism, and then lift up on the PCIe HBA card to disengage it from the motherboard connectors [1].**



5. **Disconnect the super capacitor cable and the SAS cables from the Oracle Storage 12 Gb/s SAS PCIe RAID HBA card [2].**

   See also "Remove SAS Storage Drive Cables" on page 118.

6. **Lift and remove the Oracle Storage 12 Gb/s SAS PCIe RAID HBA card and super capacitor cable from the chassis.**

7. **Place the Oracle Storage 12 Gb/s SAS PCIe RAID HBA card and super capacitor cable on an antistatic mat.**

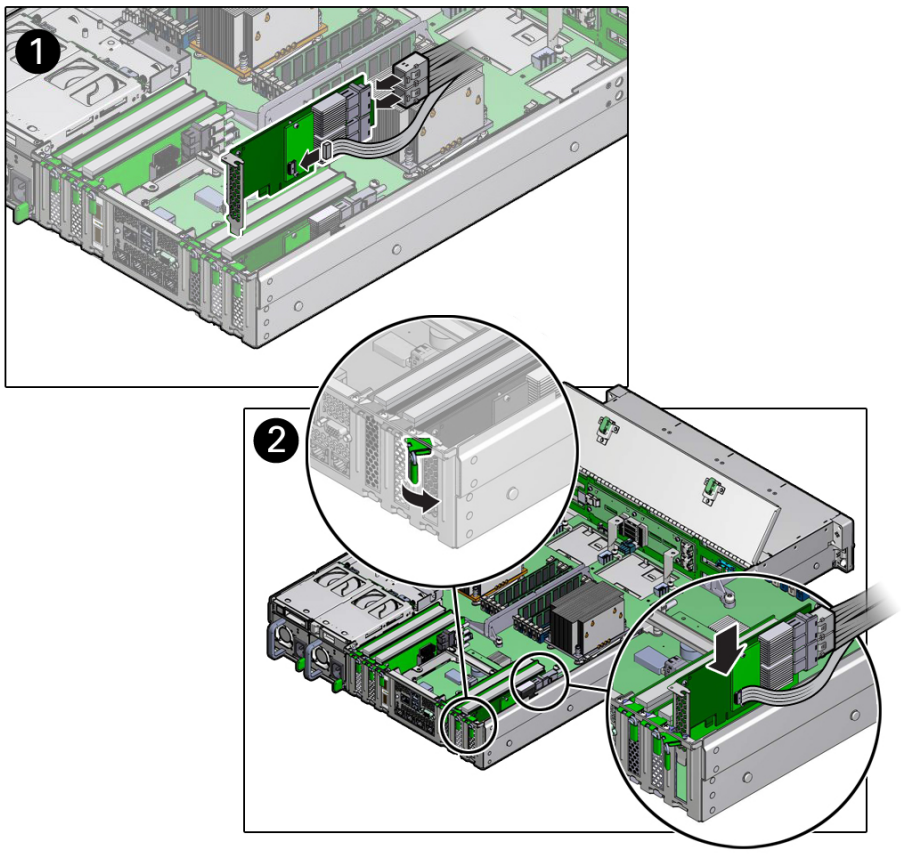
Related Information

- “Install the Oracle Storage 12 Gb/s SAS PCIe RAID HBA Card” on page 127

▼ Install the Oracle Storage 12 Gb/s SAS PCIe RAID HBA Card

1. **Unpack the replacement Oracle Storage 12 Gb/s SAS PCIe RAID HBA card and super capacitor, and place them on an antistatic mat.**
2. **Swivel the air baffle into the upright position and install the super capacitor cable along the left sidewall of the chassis.**
3. **Connect the super capacitor cable to the Oracle Storage 12 Gb/s SAS PCIe RAID HBA, and then reconnect the SAS cables that you unplugged during the removal procedure [1].**

To ensure proper SAS cable connections, see "Install SAS Storage Drive Cables" on page 121.



4. **Insert the Oracle Storage 12 Gb/s SAS PCIe RAID HBA card into slot 6, and rotate the PCIe locking mechanism to secure the PCIe HBA card in place [2].**

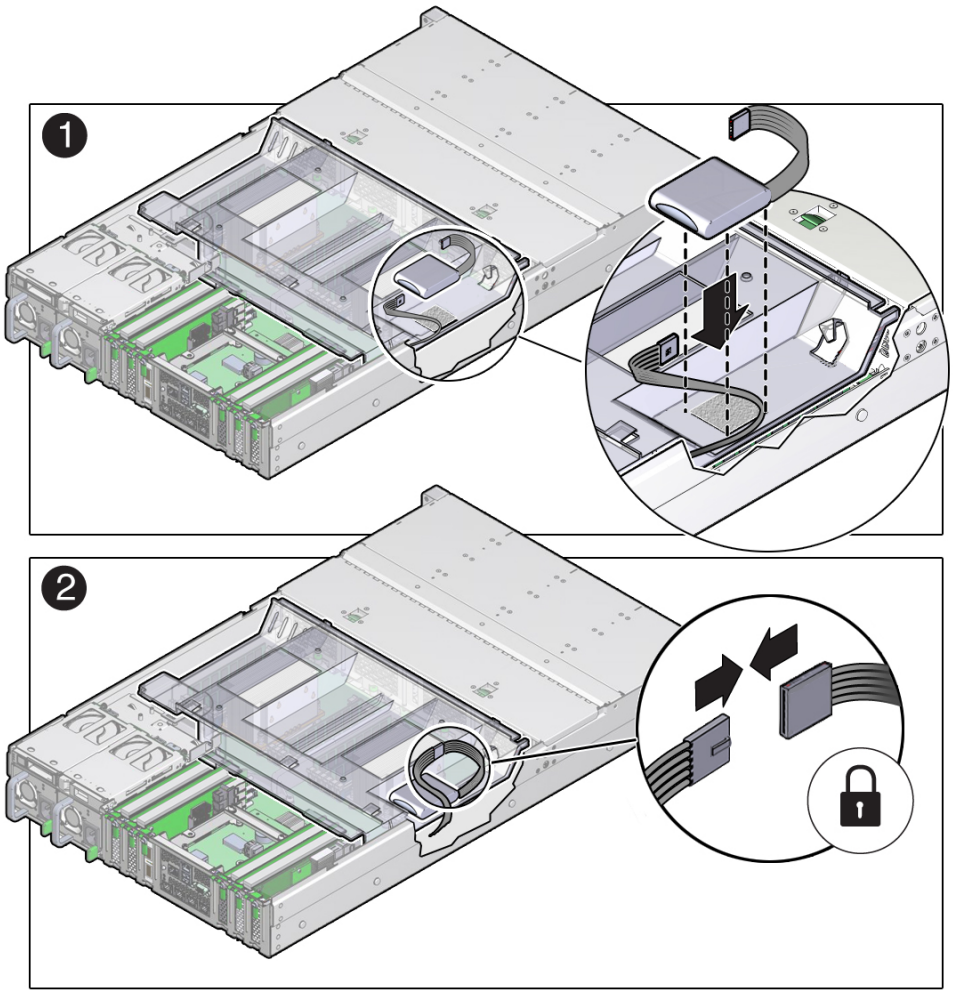
Note - PCIe slot 6 is the primary slot for the Oracle Storage 12 Gb/s SAS PCIe RAID HBA card. The card is required for controlling and managing the SAS storage drives.

5. **Install the super capacitor in the chassis.**

   a. **Lower the air baffle to the installed position.**

b. Apply a reclosable fastener to the underside of the super capacitor.

c. Align the reclosable fastener on the super capacitor with the reclosable fastener on the air baffle and press down [1].



d. Connect the super capacitor's cable [2].

6. **Return the server to operation.**

   a. **Install the top cover.**

      See “Install the Server Top Cover” on page 161.

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

      See “Return the Server to the Normal Rack Position” on page 165.

   c. **Connect any required data cables to the PCIe card.**

      Route data cables through the cable management arm.

   d. **Reconnect the power cords to the power supplies and power on the server.**

      See “Reconnect Power and Data Cables” on page 167 and “Power On the Server” on page 167. Verify that the AC OK LED is lit.

7. **Use Oracle ILOM to clear any server PCIe card faults.**

   You can use the Oracle ILOM web interface or the command-line interface (CLI) to manually clear faults. For information on how to use the Oracle ILOM web interface or the CLI to clear server faults, see the Oracle Integrated Lights Out Manager (ILOM) 3.2 Documentation Library at:

   `http://www.oracle.com/goto/ilom/docs`.

Related Information

- “Remove the Sun Storage 12 Gb/s SAS PCIe RAID HBA Card” on page 124

Servicing the Front LED/USB Indicator Modules

Caution - Ensure that all power is removed from the server before removing or installing a front LED/USB indicator module. You must disconnect the power cables before performing this procedure.

This section covers the following topics:

- “Remove the Right LED/USB Indicator Module” on page 138
- “Install the Right LED/USB Indicator Module” on page 141

Related Information

- “Troubleshooting Using the Server Front and Rear Panel Status Indicators” on page 26

▼ Remove the Left LED Indicator Module

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 51.

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

      See “Extend the Server to the Maintenance Position” on page 55.

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

      See “Take Antistatic Measures” on page 57.

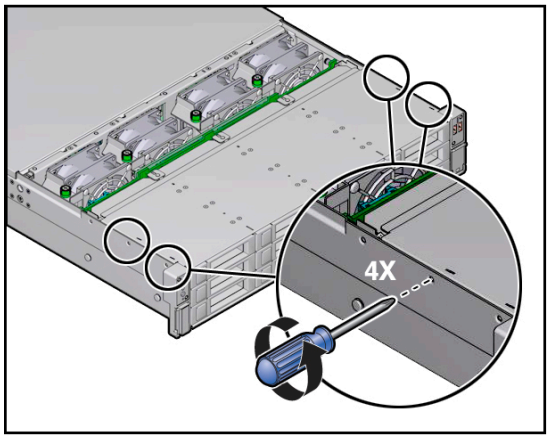
   d. **Remove the server top cover.**

      See “Remove the Server Top Cover” on page 58.

2. **Remove the server fan assembly door.**

   See “Remove the Fan Assembly Door From the Server” on page 59.

3. **Remove the four remaining No. 2 Phillips screws (two on each side of the chassis) that secure the disk cage assembly to the server chassis.**



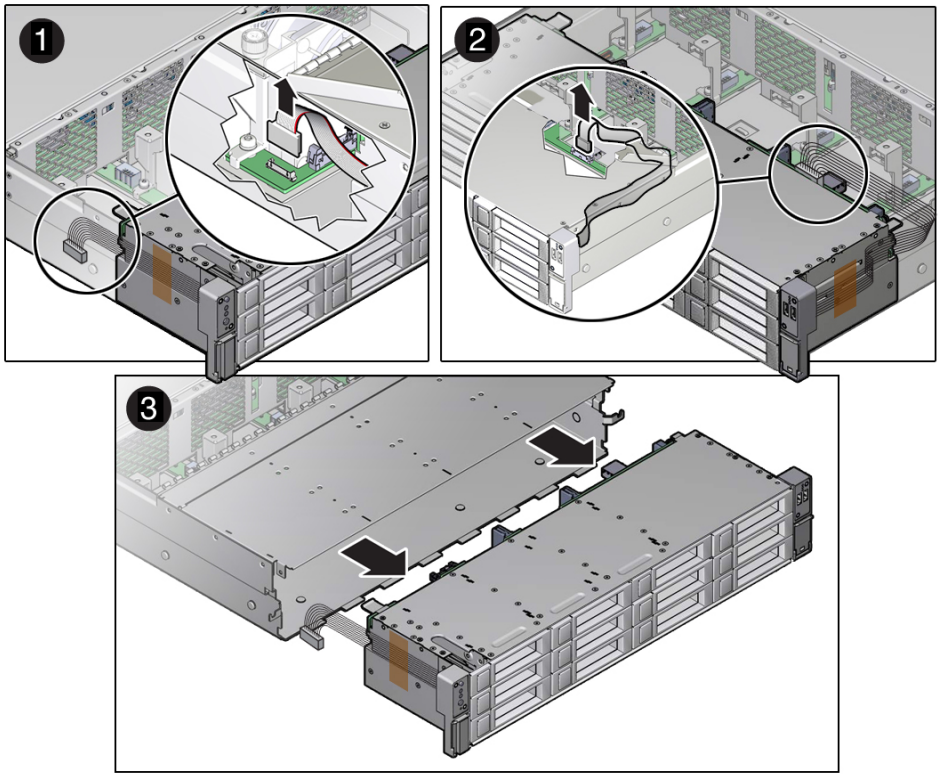
4. **Remove the fan modules from the server.**

   See “Remove a Fan Module” on page 67.

5. **Disconnect all cables from the front storage drive backplane.**

   See the procedures for your storage drive configuration in “Servicing the Storage Drive Backplanes” on page 112.

6. **Disconnect the left LED indicator module cable and the right LED/USB indicator module cable from the motherboard [1 and 2].**



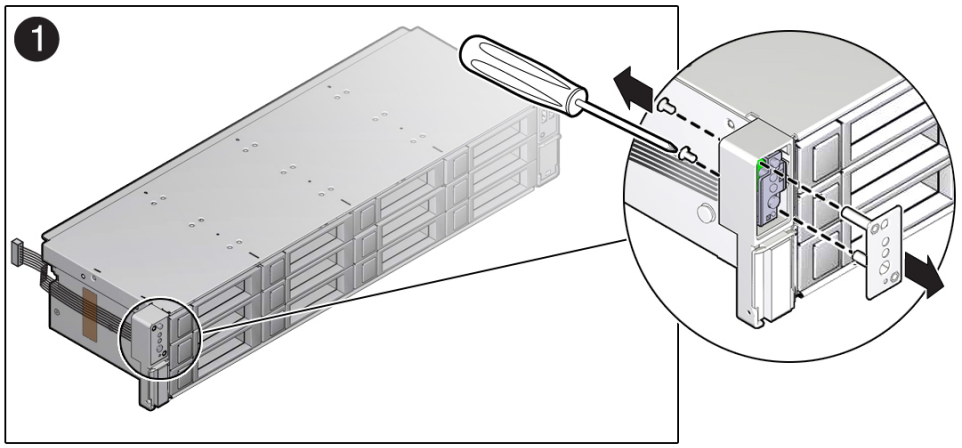
7. **Slide the disk cage assembly forward, and then gently lift the disk cage assembly from the chassis [3].**

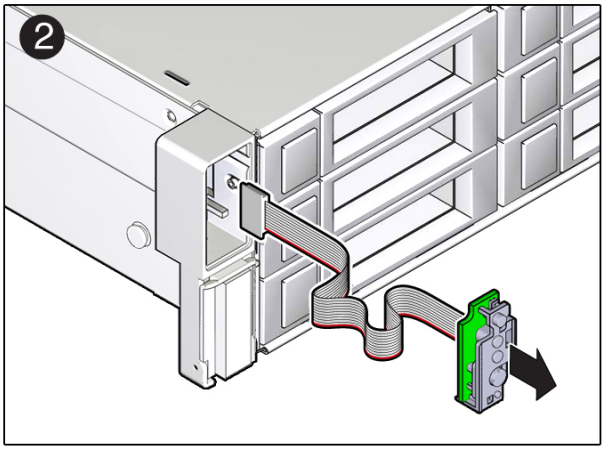
   Set the disk cage assembly on an anti-static mat.

8. **Remove the left LED indicator module.**

   a. **Remove the two No. 2 Phillips screws that secure the LED indicator module to the server front panel [1].**

If present, remove the capping tape that secures the cable to the side of the disk cage assembly.





b. Remove the LED indicator module from the server front panel [2].

Related Information

- “Server System-Level Status Indicators” on page 27
- “Install the Left LED Indicator Module” on page 135

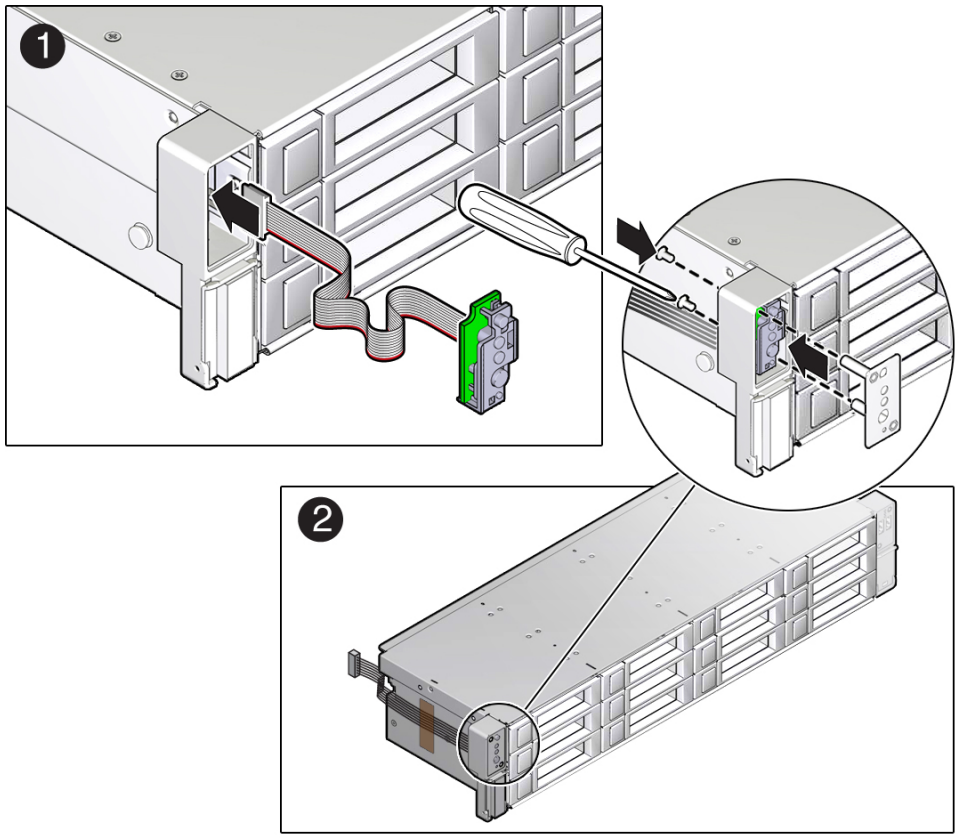
▼ Install the Left LED Indicator Module

1. **Install the left LED indicator module.**

   a. **Push the LED indicator module and cable through the left LED housing on the server front panel [1].**

      If necessary, use a piece of capping tape to secure the cable to the side of the disk cage assembly.

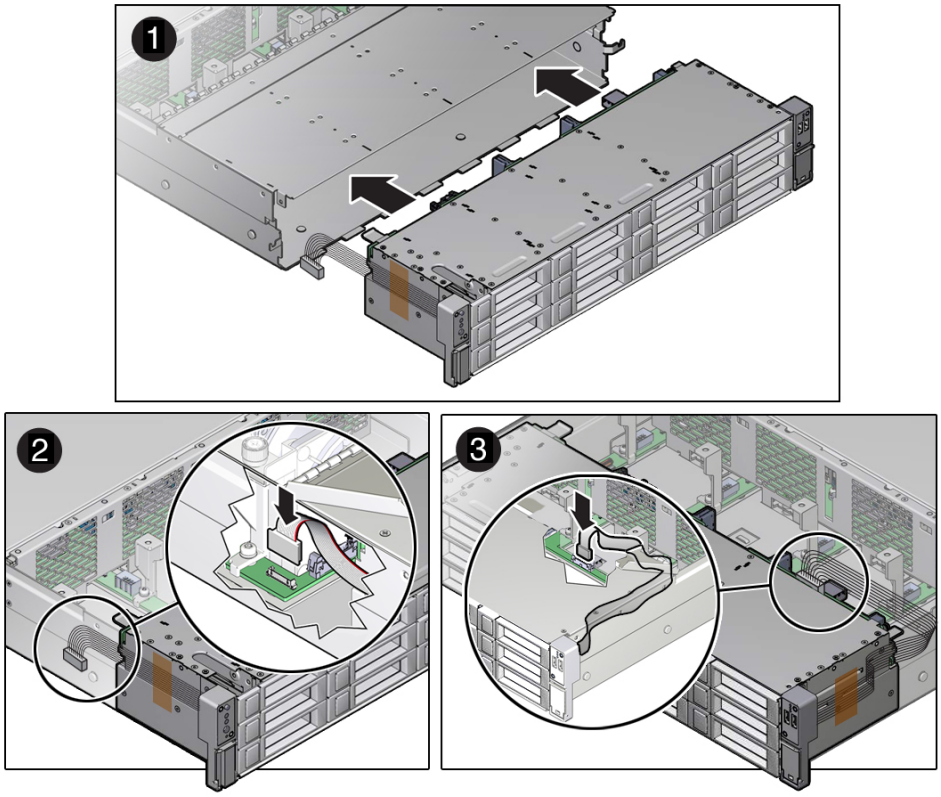
Note - Cable part number 7064122 is required for the left LED indicator module.



b. **Insert and tighten the two No. 2 Phillips screws to secure the LED indicator module to the server front panel [2].**

2. **Gently lift the disk cage assembly and set it into the server chassis [1].**

   Slightly push the disk cage assembly into the server chassis to ensure that the disk cage screw holes are correctly aligned with the server chassis.



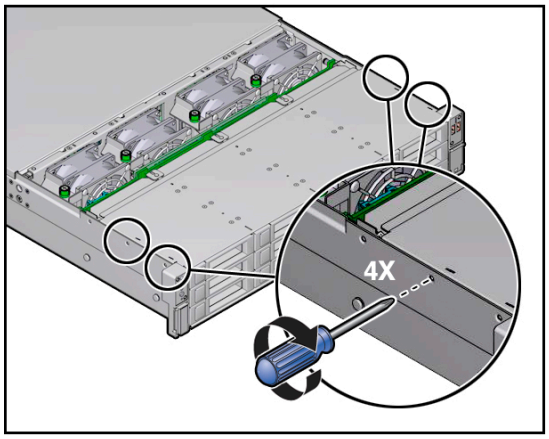
3. **Reconnect the left LED indicator module cable and the right LED/USB indicator module cable to the motherboard [2 and 3].**

4. **Reconnect all cables to the front storage drive backplane.**

   See the procedures for your storage drive configuration in "Servicing the Storage Drive Backplanes" on page 112.

5. **Install the fan modules in the server.**
   See “Install a Fan Module” on page 70.

6. **Install the four No. 2 Phillips screws (two on each side of the chassis) that secure the disk cage assembly to the server chassis.**



7. **Install the server fan assembly door.**
   See “Install the Fan Assembly Door” on page 163.

8. **Return the server to operation.**

   a. **Install the server top cover.**
      See “Install the Server Top Cover” on page 161.

   b. **Return the server to the normal rack position.**
      See “Return the Server to the Normal Rack Position” on page 165.

   c. **Reconnect the power cords to the power supplies, and power on the server.**
      See “Reconnect Power and Data Cables” on page 167 and “Power On the Server” on page 167. Verify that the power supply AC OK LED is lit.

Related Information

- “Server System-Level Status Indicators” on page 27
- “Remove the Left LED Indicator Module” on page 131

▼ Remove the Right LED/USB Indicator Module

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 51.

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

      See “Extend the Server to the Maintenance Position” on page 55.

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

      See “Take Antistatic Measures” on page 57.

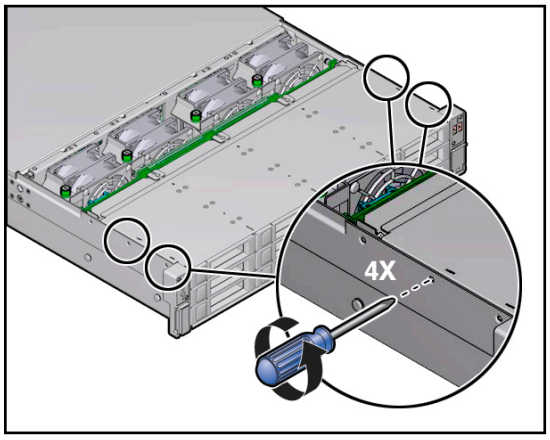
   d. **Remove the server top cover.**

      See “Remove the Server Top Cover” on page 58.

2. **Remove the server fan assembly door.**

   See “Remove the Fan Assembly Door From the Server” on page 59.

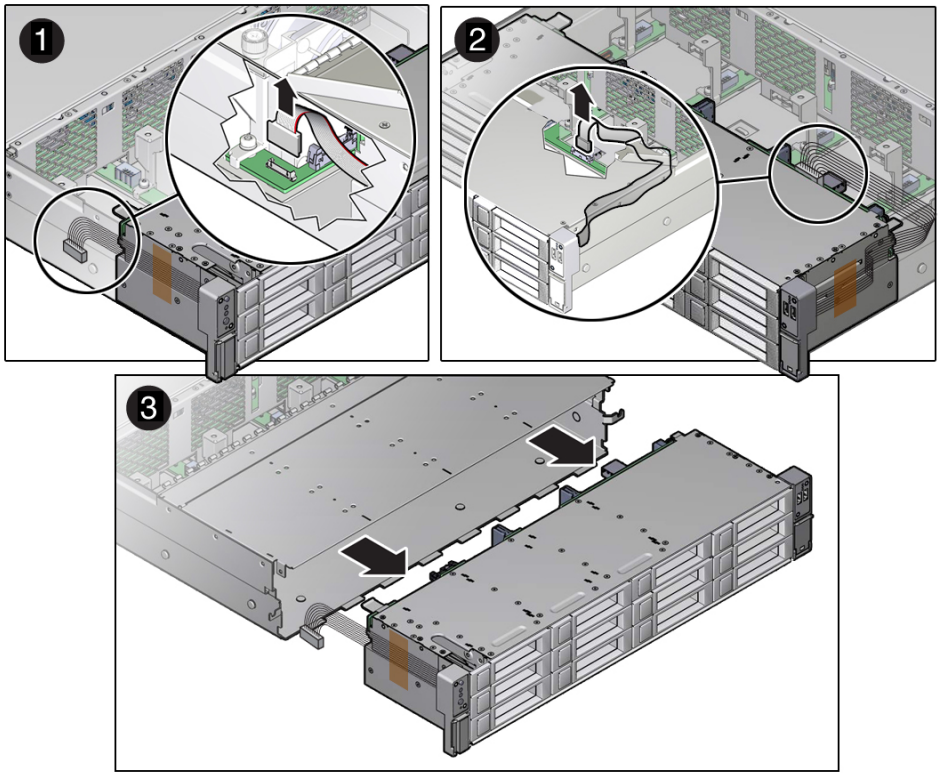
3. **Remove the four remaining No. 2 Phillips screws (two on each side of the chassis) that secure the disk cage assembly to the server chassis.**



4. **Remove the fan modules from the server.**
   See “Remove a Fan Module” on page 67.

5. **Disconnect all cables from the front storage drive backplane.**
   See the procedures for your storage drive configuration in “Servicing the Storage Drive Backplanes” on page 112.

6. **Disconnect the left LED indicator module cable and the right LED/USB indicator module cable from the motherboard [1 and 2].**

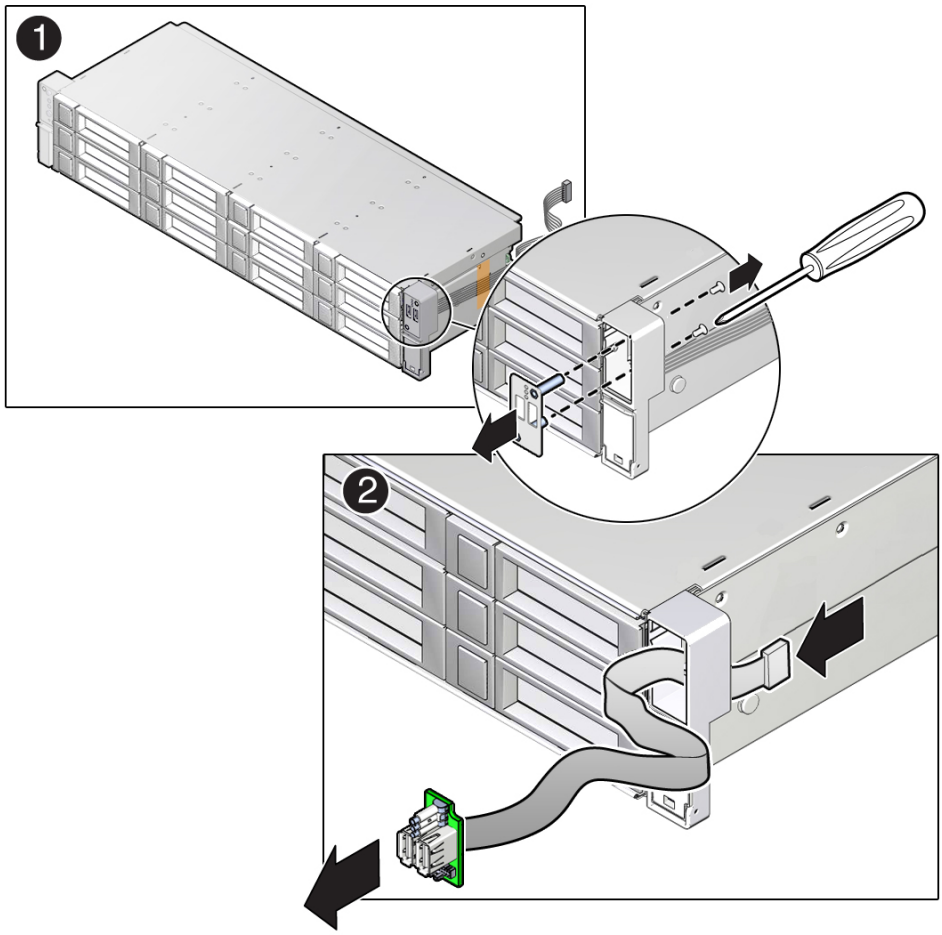


7. **Slide the disk cage assembly forward, and then gently lift the disk cage assembly from the chassis [3].**
   Set the disk cage assembly on an anti-static mat.

8. **Remove the right LED/USB indicator module.**

a. **Remove the two No. 2 Phillips screws that secure the LED/USB indicator module to the server front panel [1].**

   If present, remove the capping tape that secures the cable to the side of the disk cage assembly.



b. **Remove the LED/USB indicator module from the server front panel [2].**

Related Information

- “Server System-Level Status Indicators” on page 27
- “Install the Right LED/USB Indicator Module” on page 141

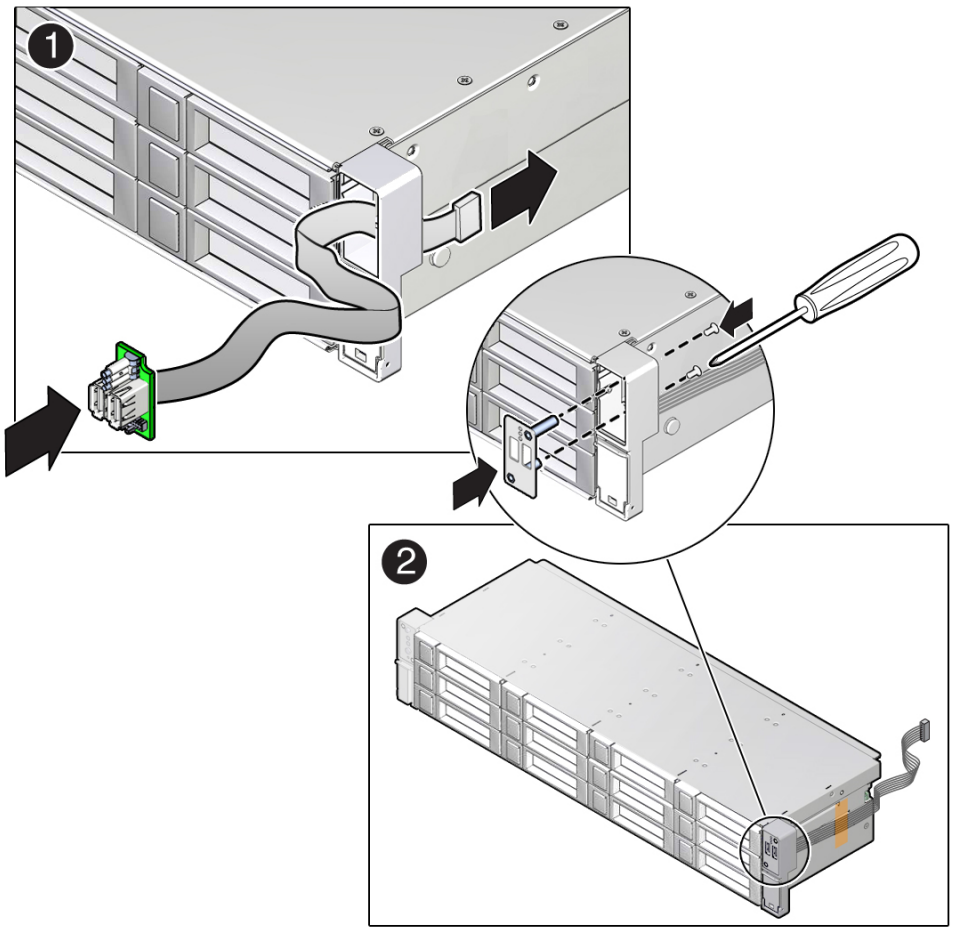
▼ Install the Right LED/USB Indicator Module

1. **Install the right LED/USB indicator module.**

   a. **Push the LED/USB indicator module and cable through the right LED housing on the server front panel [1].**

      If necessary, use a piece of capping tape to secure the cable to the side of the disk cage assembly.

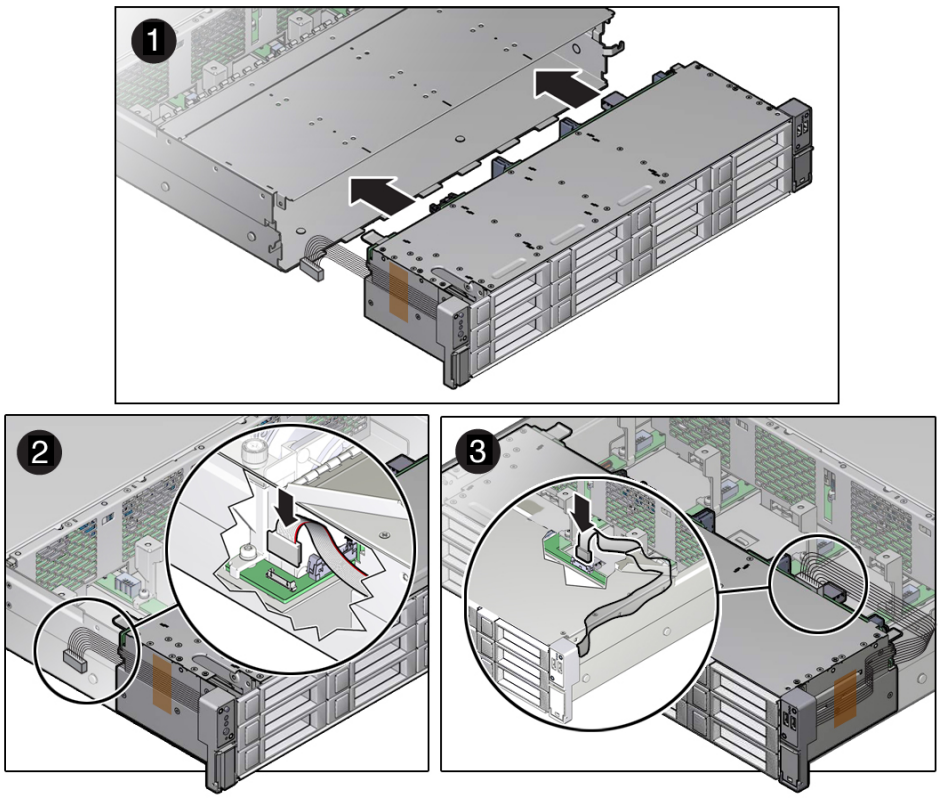
Note - Cable part number 7064124 is required for the right LED/USB indicator module.



b. **Insert and tighten the two No. 2 Phillips screws to secure the LED/USB indicator module to the server front panel [2].**

2. **Gently lift the disk cage assembly and set it into the server chassis [1].**

Slightly push the disk cage assembly into the server chassis to ensure that the disk cage screw holes are correctly aligned with the server chassis.



3. **Reconnect the left LED indicator module cable and the right LED/USB indicator module cable to the motherboard [2 and 3].**

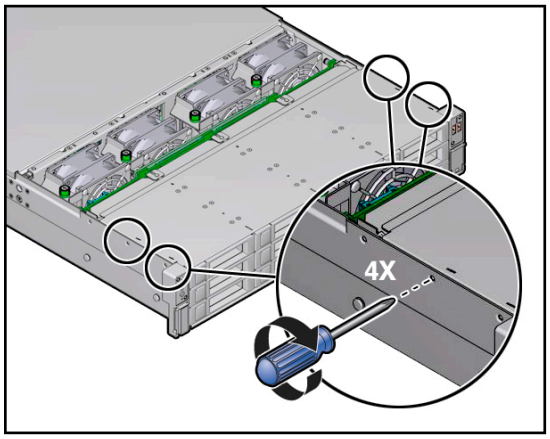
4. **Reconnect all cables to the front storage drive backplane.**

   See the procedures for your storage drive configuration in "Servicing the Storage Drive Backplanes" on page 112.

5. **Install the fan modules in the server.**

   See "Install a Fan Module" on page 70.

6. **Install the four No. 2 Phillips screws (two on each side of the chassis) that secure the disk cage assembly to the server chassis.**



7. **Install the server front fan assembly door.**

   See “Install the Fan Assembly Door” on page 163.

8. **Return the server to operation.**

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

      See “Install the Server Top Cover” on page 161.

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

      See “Return the Server to the Normal Rack Position” on page 165.

   c. **Reconnect the power cords to the power supplies, and power on the server.**

      See “Reconnect Power and Data Cables” on page 167 and “Power On the Server” on page 167. Verify that the power supply AC OK LED is lit.

Related Information

- “Server System-Level Status Indicators” on page 27
- “Remove the Right LED/USB Indicator Module” on page 138

Servicing the Motherboard Assembly

Caution - The motherboard assembly should be removed only by a qualified Oracle 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 discharge can cause server components to fail. To avoid damage, ensure that you follow the antistatic practices as described in "Electrostatic Discharge Safety" on page 48.

This section covers the following topics:

Related Information

- "About System Components" on page 16

▼ Remove the Motherboard Assembly

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 51.

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

      See "Extend the Server to the Maintenance Position" on page 55.

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

See “Take Antistatic Measures” on page 57.

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

See “Remove the Server Top Cover” on page 58.

2. **Remove the Oracle Storage 12 Gb/s SAS PCIe RAID HBA card and its associated super capacitor.**

See “Remove the Sun Storage 12 Gb/s SAS PCIe RAID HBA Card” on page 124.

3. **Remove the air baffle.**

Remove the air baffle by lifting the baffle up and out of the server.

4. **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 49.

- Fan modules

  See “Remove a Fan Module” on page 67.
- SAS storage drive cables

  See “Remove SAS Storage Drive Cables” on page 118.
- PCIe cards

  See “Remove a PCIe Card” on page 87.
- Power supplies

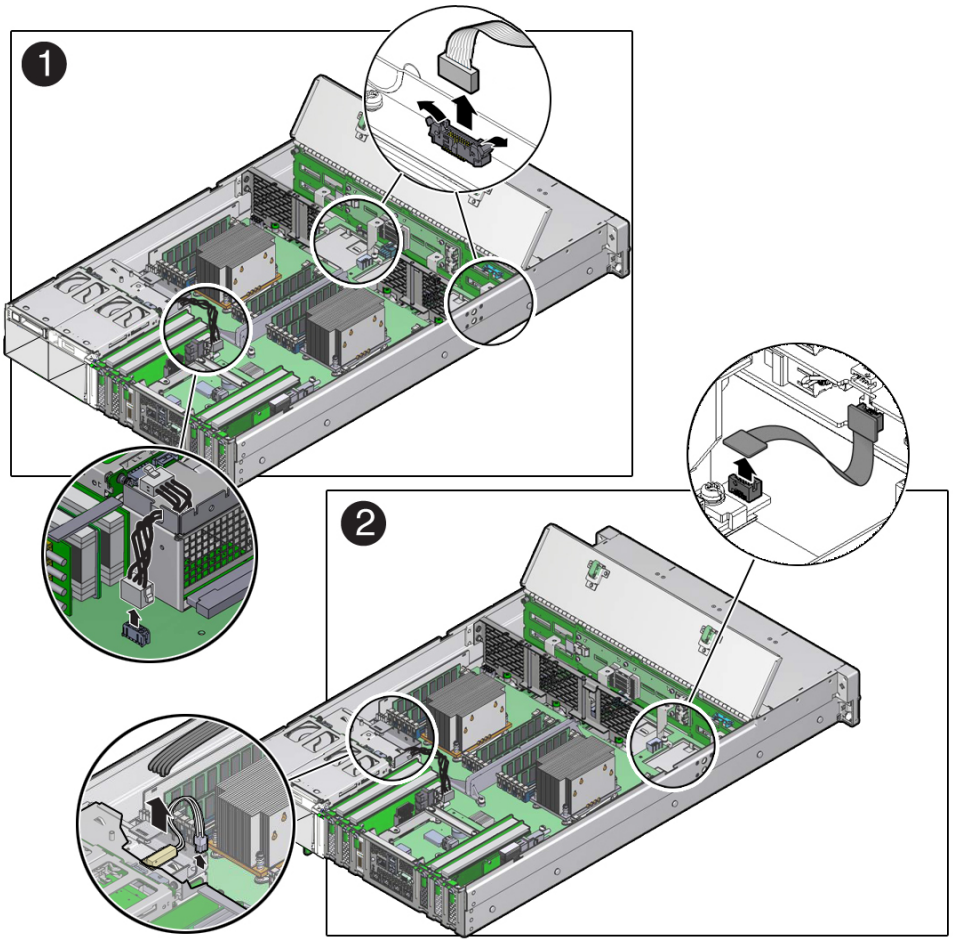
  See “Remove a Power Supply” on page 73.

5. **Disconnect the power cable from the motherboard to the rear storage drive backplane [1].**

See “Servicing the Storage Drive Backplanes” on page 112.

6. **Disconnect the ribbon cables from the left front I/O module and right front I/O modules [1].**

See “Servicing the Front LED/USB Indicator Modules” on page 130.



7. **Disconnect the auxiliary signal cable from the motherboard to the front storage drive backplane [2].**

   See “Servicing the Storage Drive Backplanes” on page 112.

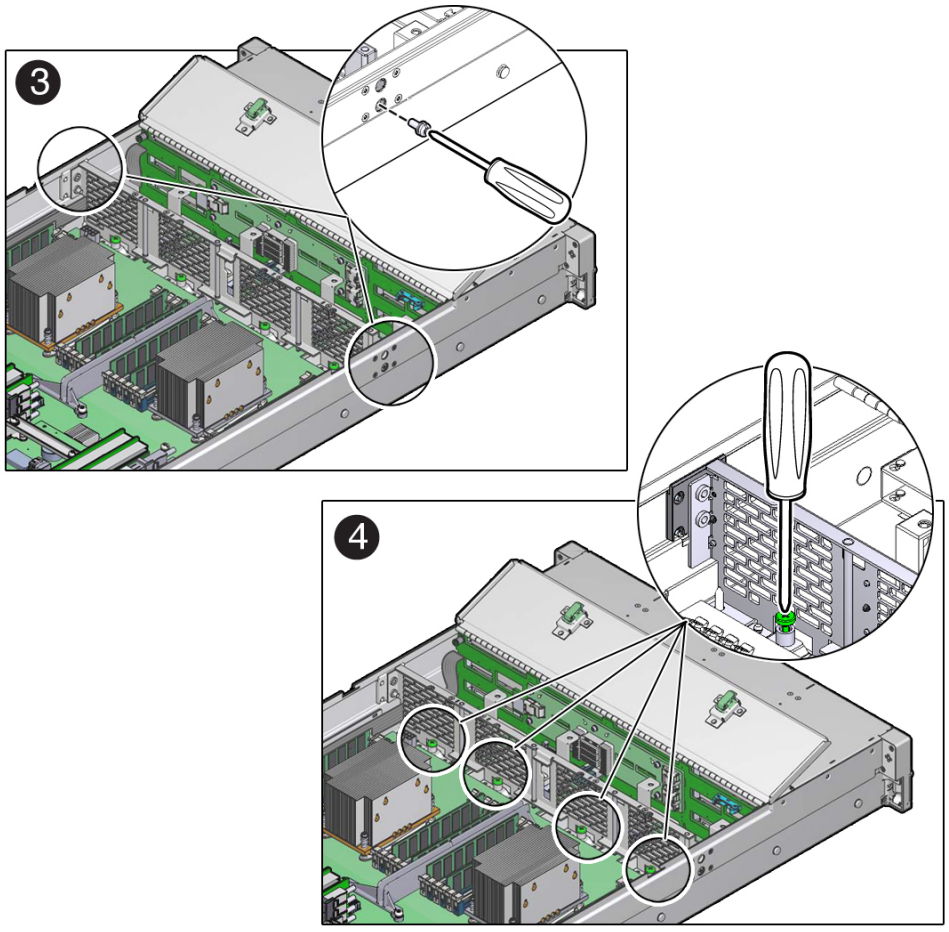
8. **Disconnect the power cable from the motherboard to the front storage drive backplane [2].**

   See “Servicing the Storage Drive Backplanes” on page 112.

9. **Disconnect the signal cable from the server intrusion switch [2].**

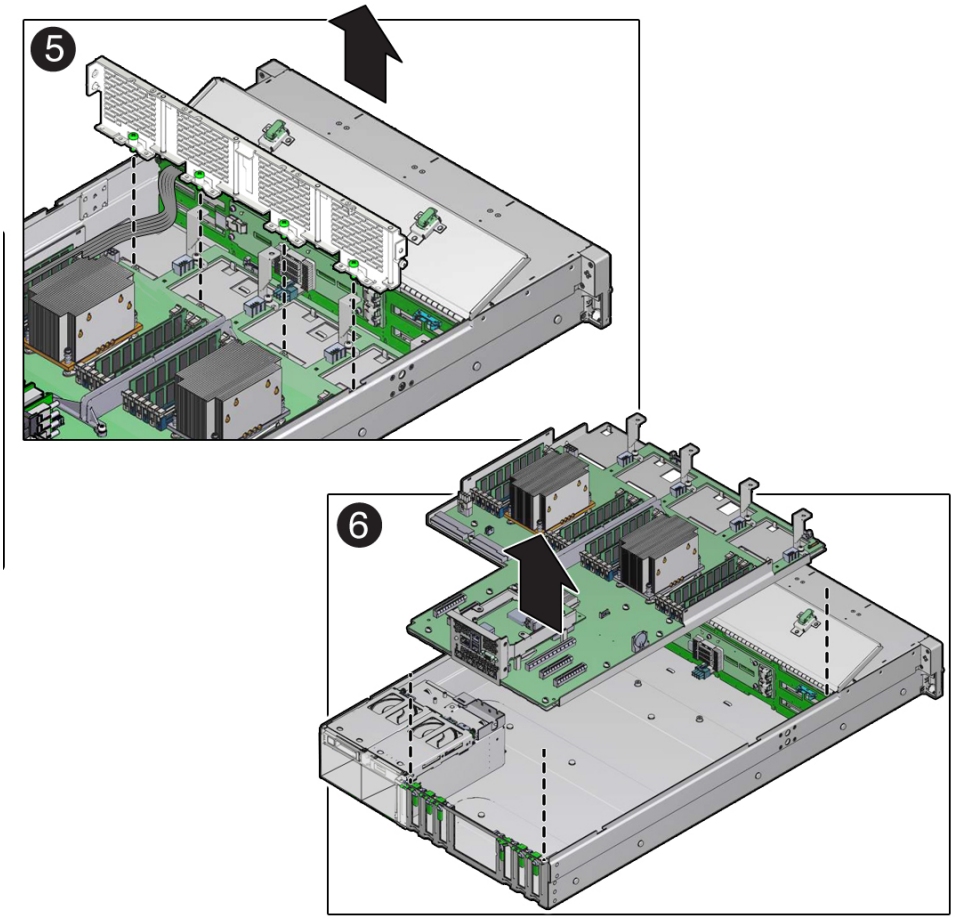
10. **Remove the mid-wall from the chassis.**

    a. **Using a No. 2 Phillips screwdriver, remove the screw on each side of the chassis that secures the mid-wall to the chassis [3].**



    b. **Using a No. 2 Phillips screwdriver, loosen the four green captive screws that secure the chassis mid-wall to the bottom of the chassis [4].**

c. **Lift the mid-wall out of the chassis [5].**



11. **With the server in the extended maintenance position, remove the motherboard from the server with all reusable components that populate the motherboard in place.**

    a. **Carefully slide the motherboard forward, and lift it out of the chassis [6].**

    b. **Place the motherboard assembly on an antistatic mat, and next to the replacement motherboard.**

12. **Remove the following reusable components from the motherboard and install them on to the replacement motherboard.**

    - DDR4 DIMMs

      See "Identify and Remove a Faulty DIMM" on page 81 and "Install a DIMM" on page 84.

    Note - Install the DDR4 DIMMs only in the slots (connectors) from which they were removed. Performing a one-to-one replacement of DIMMs significantly reduces the possibility that DIMMs will be installed in the wrong slots. If you do not reinstall the DIMMs in the same slots, server performance might be reduced and some DIMMs might not be used.

    - USB flash drives

      See "Remove the Internal USB Flash Drive" on page 93 and "Install the Internal USB Flash Drive" on page 94.

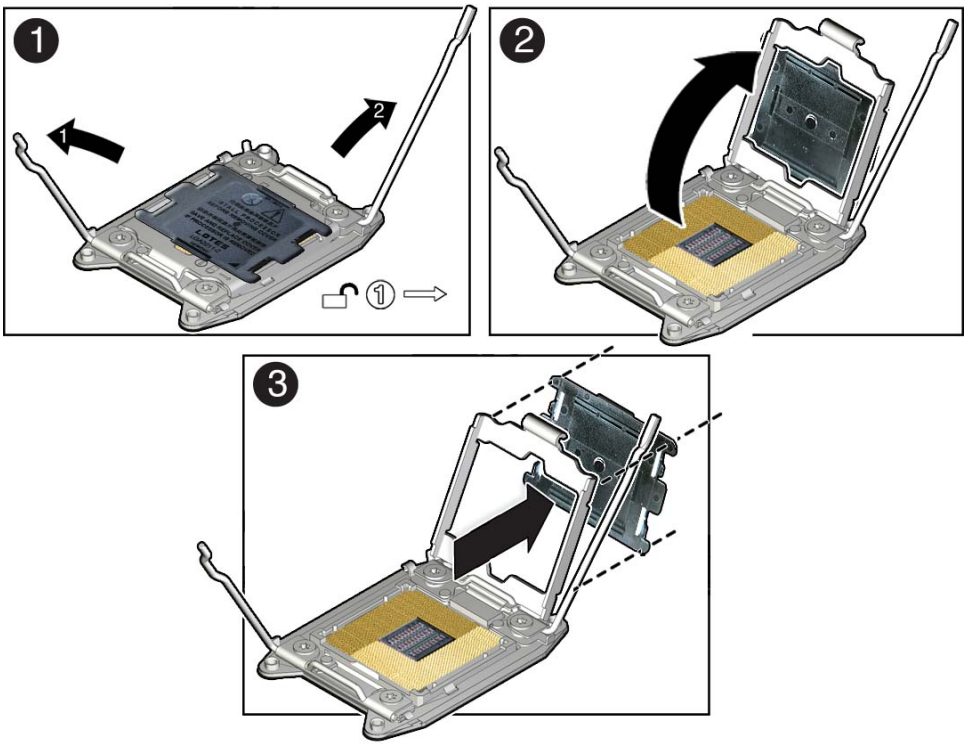
13. **Remove the processors from the failed motherboard.**

    See "Remove a Processor" on page 100.

14. **Remove the processor socket covers from the replacement motherboard and install the processors.**

    a. **Disengage the processor ILM 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 [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.**

   See "Install a Processor" on page 106.

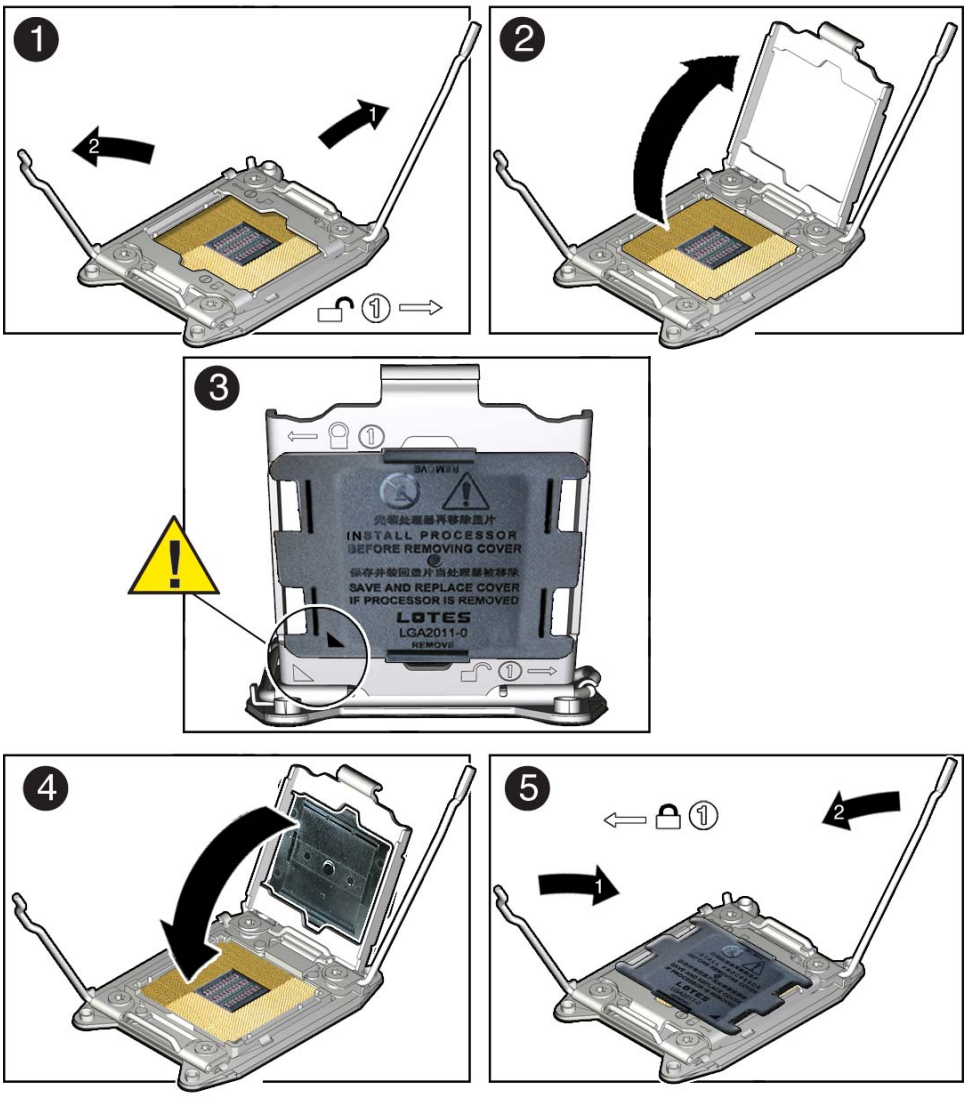
f. **Repeat Step a through Step e above to remove the second processor socket cover from the replacement motherboard and install the second processor.**

15. **Install the processor socket covers on the faulty motherboard.**

Caution - The processor socket covers must be installed on the faulty 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 faulty motherboard [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 pressure frame 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].**

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 faulty motherboard.**

Related Information

- “About System Components” on page 16
- “Field-Replaceable Units” on page 18
- “Install the Motherboard Assembly” on page 154

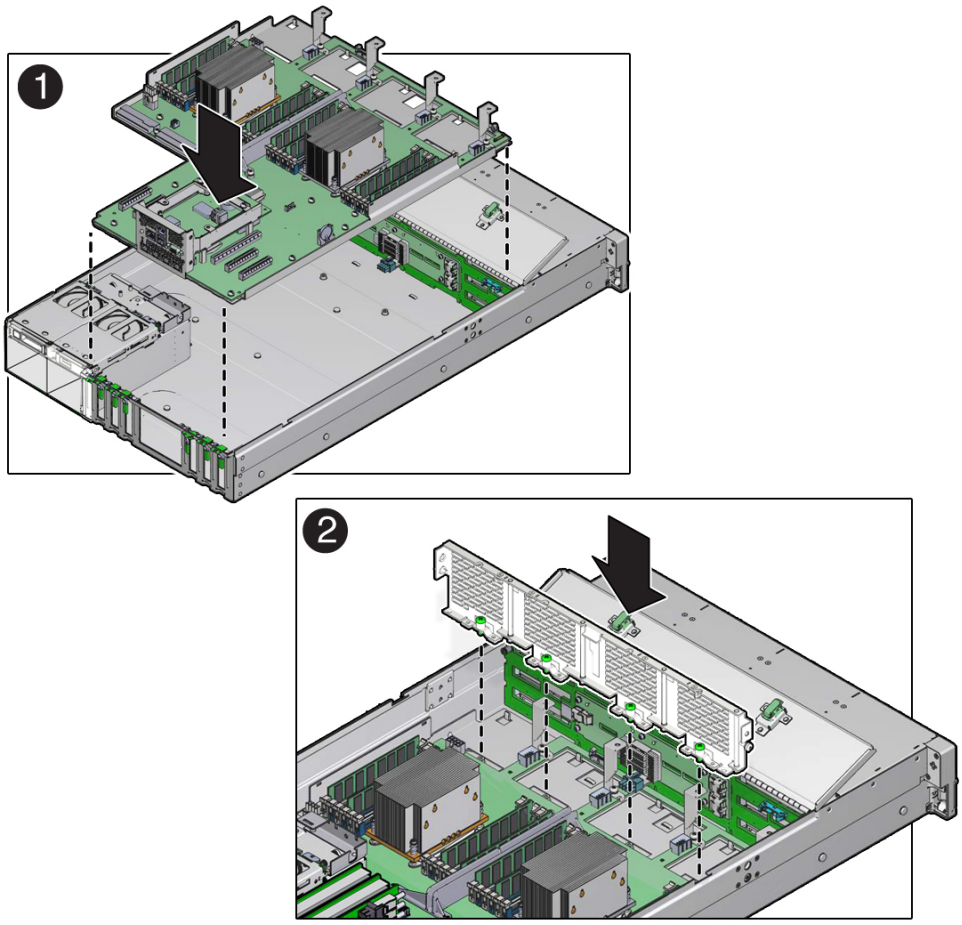
▼ Install the Motherboard Assembly

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

   See “Take Antistatic Measures” on page 57.

2. **Carefully lift and place the motherboard assembly into the chassis [1].**

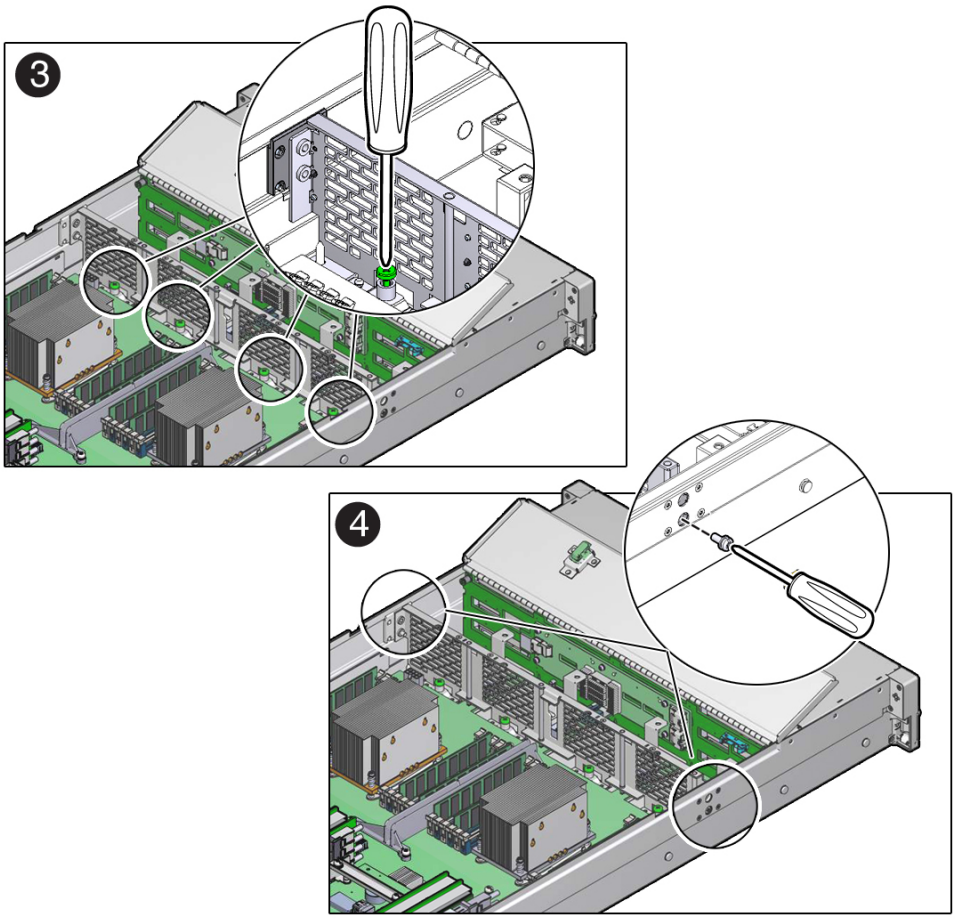
Tilt the motherboard to the right side to fit under the power supply assembly, level the motherboard and place it into the server chassis, then slide it to the rear of the server to engage the mushroom-shaped standoffs.



3. **Install the mid-wall into the chassis.**

   a. **Lift and place the mid-wall into the chassis [2].**

b. **Using a No. 2 Phillips screwdriver, tighten the four green captive screws that secure the mid-wall to the bottom of the chassis [3].**



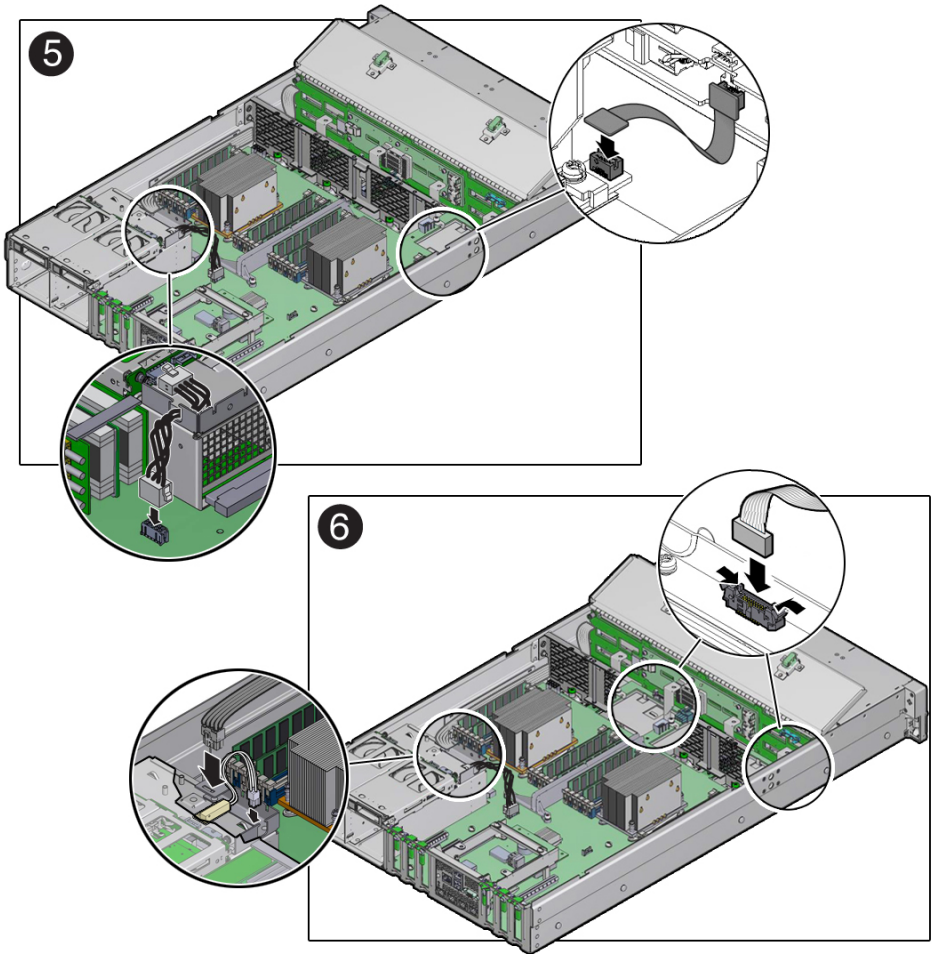
c. **Using a No. 2 Phillips screwdriver, insert and tighten the screw on each side of the chassis to secure the mid-wall in the chassis [4].**

4. **Reconnect the power cable to the motherboard from the rear storage drive backplane [5].**

See “Servicing the Storage Drive Backplanes” on page 112.

5. **Reconnect the auxiliary signal cable to the motherboard from the front storage drive backplane [5].**

   See “Servicing the Storage Drive Backplanes” on page 112.



6. **Reconnect the ribbon cables from left and right LED/USB indicator modules to the motherboard [6].**

   See “Servicing the Front LED/USB Indicator Modules” on page 130.

7. **Reconnect the power cable to the motherboard from the front storage drive backplane [6].**

See “Servicing the Storage Drive Backplanes” on page 112.

8. **Reconnect the server intrusion switch cable to the motherboard [6].**

9. **Reinstall the following components:**

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 49.

- Power supplies

  See “Install a Power Supply” on page 75.
- PCIe cards

  See “Install a PCIe Card” on page 90.
- SAS storage drive cables

  See “Install SAS Storage Drive Cables” on page 121.
- Fan modules

  See “Install a Fan Module” on page 70.

10. **Install the air baffle.**

    Install the air baffle by placing it into the server and lowering it to its installed position.

11. **Install the Oracle Storage 12 Gb/s SAS PCIe RAID HBA card and its associated super capacitor.**

    See “Install the Oracle Storage 12 Gb/s SAS PCIe RAID HBA Card” on page 127.

12. **Return the server to operation.**

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

       See “Install the Server Top Cover” on page 161.

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

       See “Return the Server to the Normal Rack Position” on page 165.

    c. **Reconnect the power cords to the power supplies, and power on the server.**

       See “Reconnect Power and Data Cables” on page 167 and “Power On the Server” on page 167. Verify that the AC OK LED is lit.

Note - IMPORTANT: When the motherboard is replaced, the key identity properties (KIP) of the motherboard is programmed by Oracle ILOM to contain the same KIP as the other quorum member components. If you have removed other quorum member components, you might need to manually program the product serial number (PSN) into the new motherboard. For more information, refer to "FRU Key Identity Properties (KIP) Automated Update" on page 49.

Related Information

- "About System Components" on page 16
- "Field-Replaceable Units" on page 18
- "Field-Replaceable Units" on page 18
- "Remove the Motherboard Assembly" on page 145

Returning the Server to Operation

After replacing components inside of the server, perform the procedures in the following sections.

Description	Links
Install the server top cover.	“Install the Server Top Cover” on page 161
Install the fan door assembly top cover.	“Install the Fan Assembly Door” on page 163
Remove any antistatic measures.	“Remove Antistatic Measures” on page 164
Reinstall the server chassis in the rack.	“Reinstall the Server in the Rack” on page 164
Return the server to the normal rack position.	“Return the Server to the Normal Rack Position” on page 165
Reconnect power and data cables.	“Reconnect Power and Data Cables” on page 167
Power on the server.	“Power On the Server” on page 167

Related Information

- “Preparing for Service” on page 47

▼ Install the Server Top Cover

1. **Place the top cover on the chassis.**

   Set the cover down so that it hangs over the rear of the server by about 1 inch (25 mm) and the side latches align with the cutouts in the chassis.

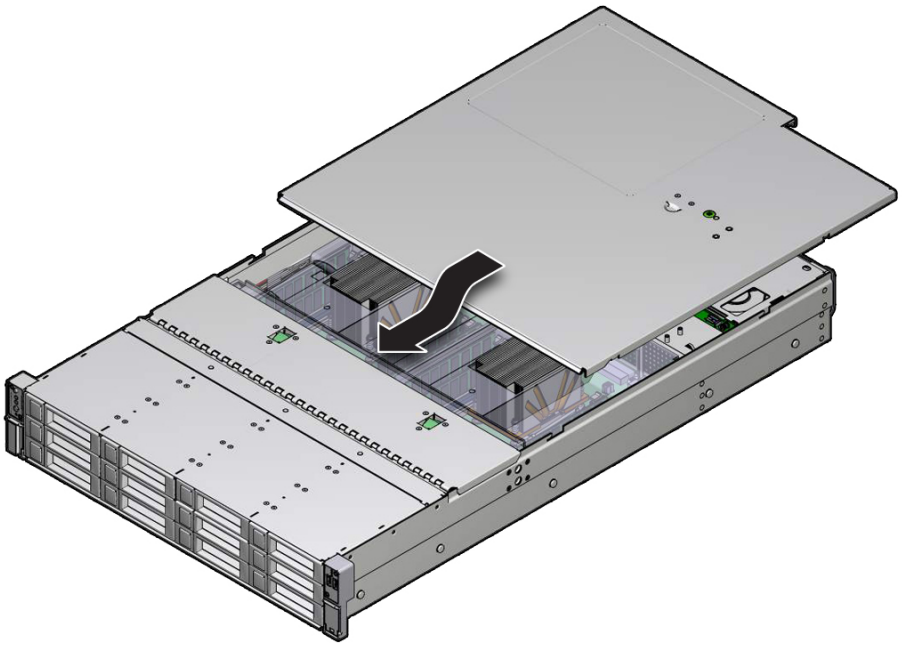
2. **Check both sides of the chassis to ensure that the top cover is fully down and flush with the chassis.**

   If the cover is not fully down and flush with the chassis, slide the cover towards the rear of the chassis to position the cover in the correct position.

Caution - If the top cover is not correctly positioned before you attempt to latch the cover, the internal latch that is located on the underside of the cover might be damaged.

3. **Gently slide the cover toward the front of the chassis until it latches into place (with an audible click).**

   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.



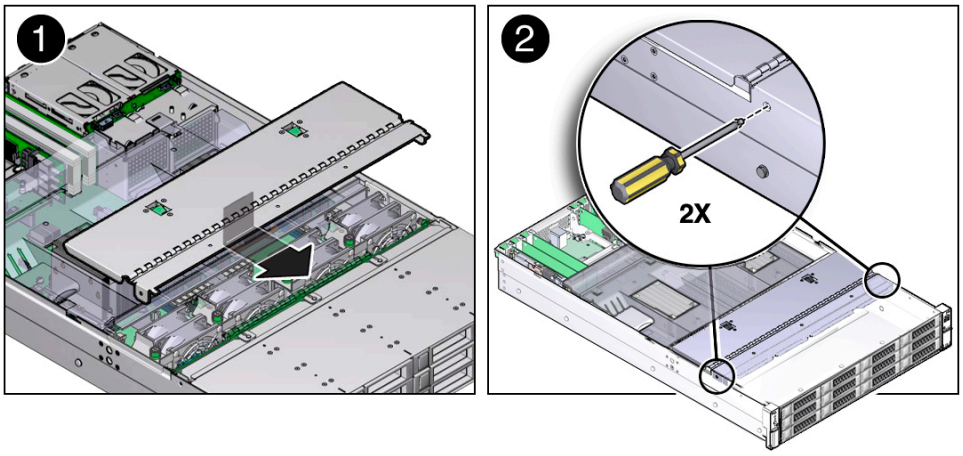
Related Information

- “Remove the Server Top Cover” on page 58

Install the Fan Assembly Door

Note - The procedures in this section should be used for systems configured with twelve 3.5-inch storage drives.

1. **Place the fan assembly door on the chassis and slightly over the fan assembly.**
2. **Slide the fan assembly door forward and under the lip of the forward top cover until it latches into place [1].**



3. **Use a No. 2 Phillips screwdriver to install and secure the fan assembly door [2].**

   - **If your system is configured with twelve 3.5-inch storage drives, install and tighten the two screws on each side of the chassis and the three screws on top of the chassis.**
   - **If your system is configured with twenty-four 2.5-inch storage drives, install and tighten the two screws on each side of the chassis.**

Related Information

- “Remove the Fan Assembly Door From the Server” on page 59
- “Remove the Server Top Cover” on page 58

Remove Antistatic Measures

1. **Remove any antistatic straps or conductors from the server chassis.**
2. **Remove the antistatic wrist strap from yourself.**

Related Information

- "Take Antistatic Measures" on page 57

Reinstall the Server in the Rack

After servicing the system, reinstall it into the rack.

Caution - Deploy any rack anti-tilt mechanism before installing the server into the rack.

Caution - The server weighs approximately 63 pounds (28.5 kg). Two people are required to carry the chassis and install it in the rack.

1. **Lift the server from the antistatic mat, and reinstall the server into the rack.**

   Refer to "Installing the Storage Server Into a Rack" in *Oracle Exadata Storage Server X6-2 High Capacity Installation Guide* for the installation instructions specific to your rackmount kit.

2. **If the cable management arm (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 Exadata Storage Server X6-2 High Capacity 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 Power and Data Cables" on page 167.**
   - **For detailed information on connecting cables to the rear of the server, refer to "Rear Cable Connections and Ports" in *Oracle Exadata Storage Server X6-2 High Capacity Installation Guide*.**

Related Information

- “Remove the Server From the Rack” on page 56
- “Reconnect Power and Data Cables” on page 167

▼ Return the Server to the Normal Rack Position

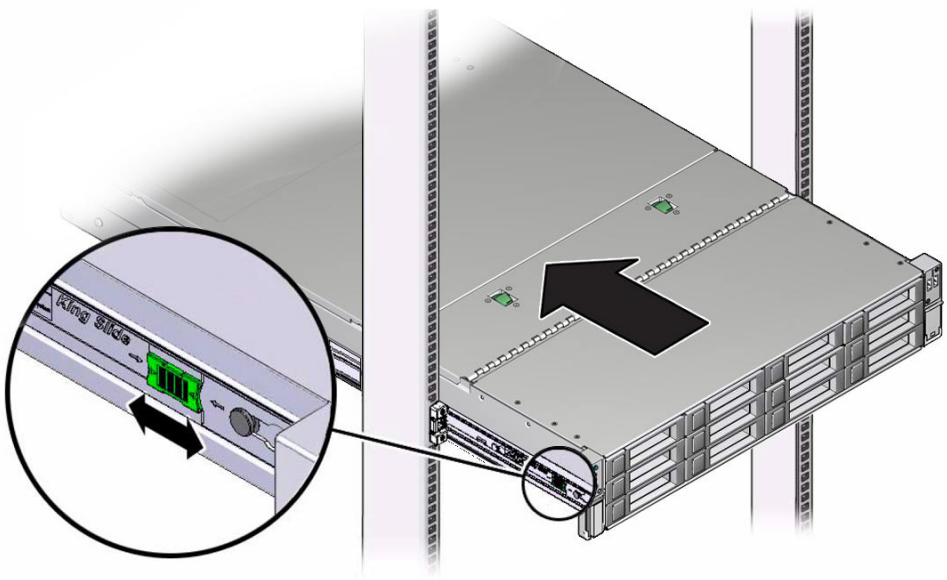
If the server is in the extended maintenance position, use this procedure to return the server to the normal rack position.

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 the 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 Exadata Storage Server X6-2 High Capacity Installation Guide*.

3. **If the cables are disconnected from the rear of the server, that is, you disconnected the cables because you extended the server out of the rack, reconnect the cables.**

   - For instructions on reconnecting cables to the rear of the server, see "Reconnect Power and Data Cables" on page 167.

- For detailed information on connecting cables to the rear of the server, refer to "Rear Cable Connections and Ports" in *Oracle Exadata Storage Server X6-2 High Capacity Installation Guide*.

Related Information

- "Reconnect Power and Data Cables" on page 167

Reconnect Power and Data Cables

1. **Reconnect the data cables to the rear of the server, as appropriate.**

   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.**

3. **If necessary, reinstall the cables into the cable management arm and secure them with Velcro straps.**

4. **Power on the server.**

   See "Power On the Server" on page 167.

Related Information

- "Disconnect Cables From the Server" on page 54
- "Reinstall the Server in the Rack" on page 164
- "Return the Server to the Normal Rack Position" on page 165
- "Power On the Server" on page 167

Power On the Server

As soon as the power cords are connected, standby power is applied. In standby power mode, the Power/OK LED on the server front panel blinks steadily. 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 actions:**

  - Press the Power button on the front bezel.

- Log in to the Oracle ILOM web interface, click Host Management → Power Control and select Power On from the Select Action list.
- 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 (LED) on the front panel of the server lights and remains lit.

Related Information

- "Powering Down the Server" on page 51
- "Reconnect Power and Data Cables" on page 167

Identifying the Server Ports

These sections describe the pinouts of the server connectors.

Description	Links
Review the Gigabit Ethernet ports.	“Gigabit Ethernet Ports” on page 169
Review the network management ports.	“Network Management Port” on page 170
Review the serial management ports.	“Serial Management Port” on page 171
Review the video connectors.	“Video Connector” on page 173
Review the USB ports.	“USB Ports” on page 174

Related Information

- “About the Oracle Exadata Storage Server X6-2 High Capacity” on page 13

Gigabit Ethernet Ports

The server has four auto-negotiating 100/1000/10GBASE-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 7 Ethernet Port Transfer Rates

Connection Type	IEEE Terminology	Transfer Rate
Fast Ethernet	100BASE-T	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.

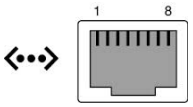


TABLE 8 10-GbE Port Signals

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

- “Rear Panel Components and Cable Connections” on page 15
- “Server System-Level Status Indicators” on page 27
- “Disconnect Cables From the Server” on page 54
- “Reconnect Power and Data Cables” on page 167

Network Management Port

The server has one auto-negotiating 10/100/1000BASE-T Ethernet management domain interface, labeled NET MGT. For information about configuring this port for managing the server with Oracle ILOM, refer to the Oracle Integrated Lights Out Manager (ILOM) 3.2 Documentation Library at `http://www.oracle.com/goto/ilom/docs`.

TABLE 9 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
4	Common Mode Termination	8	Common Mode Termination

Related Information

- “Rear Panel Components and Cable Connections” on page 15
- “Server System-Level Status Indicators” on page 27
- “Disconnect Cables From the Server” on page 54
- “Reconnect Power and Data Cables” on page 167

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 10 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 11 Serial Management Port Signals

Pin	Signal Description	Pin	Signal Description
1	Request to Send	5	Ground
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 12 RJ-45 to DB-9 Adapter Crossovers 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 13 RJ-45 to DB-25 Adapter Crossovers 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

- “Rear Panel Components and Cable Connections” on page 15
- “Disconnect Cables From the Server” on page 54
- “Reconnect Power and Data Cables” on page 167

Video Connector

The video connector is a DB-15 connector that can be accessed from the back panel.

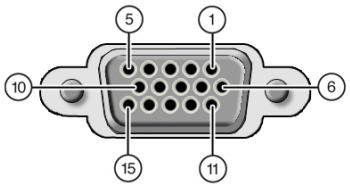


TABLE 14 Video Connector Signals

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

- “Rear Panel Components and Cable Connections” on page 15
- “Disconnect Cables From the Server” on page 54
- “Reconnect Power and Data Cables” on page 167

USB Ports

The server has six USB ports for attaching supported USB 2.0–compliant devices. Two USB ports are on the rear panel, two USB ports are on the front panel, and two USB ports are located on the motherboard.

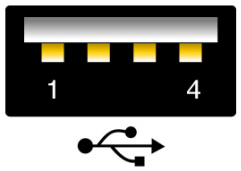


TABLE 15 USB Port Signals

Pin	Signal Description
1	+5 V
2	DAT-
3	DAT+
4	Ground

Related Information

- “Rear Panel Components and Cable Connections” on page 15
- “Disconnect Cables From the Server” on page 54
- “Reconnect Power and Data Cables” on page 167

Setting Up BIOS Configuration Parameters

This section provides an overview of BIOS configuration management, Legacy BIOS, UEFI BIOS, and the BIOS Setup Utility.

The following topics are discussed.

Description	Links
Learn about the tools available to manage the BIOS configuration.	“Managing the BIOS Configuration” on page 175
Learn how to access the BIOS Setup Utility.	“Accessing the BIOS Setup Utility” on page 176
Learn about UEFI BIOS.	“Using UEFI” on page 181
Learn how BIOS allocates Option ROM and I/O resources.	“Using BIOS for Resource Allocation” on page 184
Learn how to perform common BIOS setup procedures.	“Common BIOS Setup Utility Tasks” on page 185

Related Information

- “BIOS Setup Utility Menu Options” on page 203

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 3.2.x* in the Oracle Integrated Lights Out Manager (ILOM) 3.2 Documentation Library at `http://www.oracle.com/goto/ilom/docs`.
- **BIOS Setup Utility** – “Common BIOS Setup Utility Tasks” on page 185

Related Information

- Oracle Integrated Lights Out Manager (ILOM) 3.2 Documentation Library at: http://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" on page 176
- "BIOS Key Mappings" on page 177
- "Access BIOS Setup Utility Menus" on page 177
- "Navigate BIOS Setup Utility Menus" on page 179

BIOS Setup Utility Menus

The following table provides descriptions for the top-level BIOS Setup Utility menus.

TABLE 16 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.
Exit	Save changes and exit, discard changes and exit, discard changes, or restore the default BIOS settings.

See "BIOS Setup Utility Menu Options" on page 203 for examples of each of these screens.

Related Information

- “BIOS Setup Utility Menu Options” on page 203
- “Navigate BIOS Setup Utility Menus” on page 179

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 17 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
F9	Ctrl+O	Not applicable	Activate Load Optimal Values pop-up menu. (Not applicable to UEFI Driver Control menu)
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

- “Access BIOS Setup Utility Menus” on page 177
- “Navigate BIOS Setup Utility Menus” on page 179

▼ 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.**

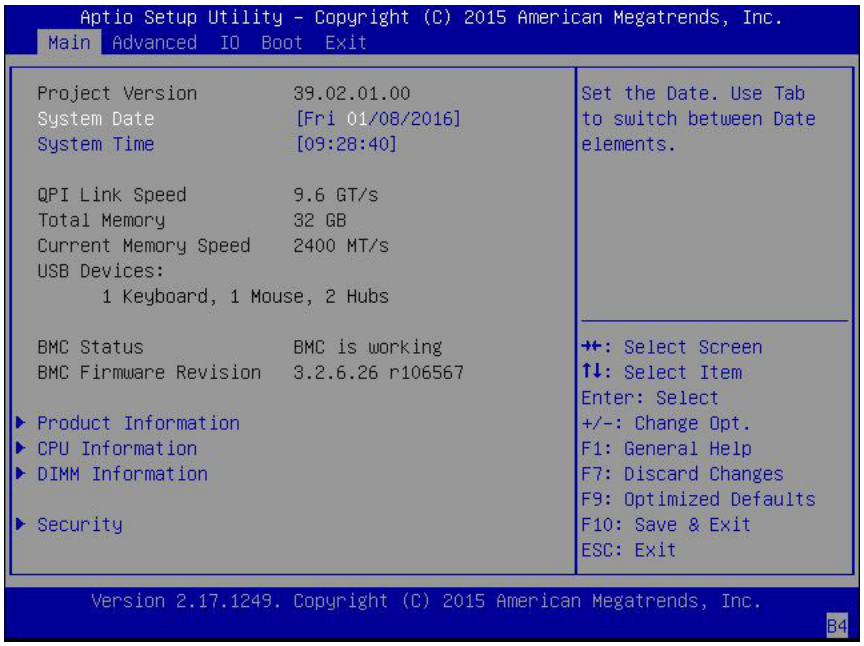
   For example, to reset the server:

   - **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.



Related Information

- “BIOS Setup Utility Menus” on page 176
- “BIOS Key Mappings” on page 177
- “BIOS Setup Utility Menu Options” on page 203

▼ 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 177.

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 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 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 176
- “BIOS Key Mappings” on page 177
- “BIOS Setup Utility Menu Options” on page 203

Using UEFI

The BIOS firmware controls the system from power-on until an operating system is booted.

The Oracle Exadata Storage Server X6-2 High Capacity contains a Unified Extensible Firmware Interface (UEFI)-compatible BIOS that can be configured to support either UEFI or Legacy BIOS modes. The BIOS can be configured to support either UEFI or Legacy BIOS modes. 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

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) 3.2 Documentation Library at `http://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 "Select Legacy BIOS or UEFI BIOS Boot Mode" on page 186.

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 182
- "UEFI Boot Mode Advantages" on page 182
- "Configuration Utilities for Add-In Cards" on page 183

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) 3.2 Documentation Library at `http://www.oracle.com/goto/ilom/docs`.

Related Information

- "Selecting Legacy BIOS or UEFI Boot Mode" on page 181
- "UEFI Boot Mode Advantages" on page 182
- "Configuration Utilities for Add-In Cards" on page 183

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 "Legacy Option ROM Allocation" on page 184.
- Supports operating system boot partitions greater than 2 terabytes (2 TB) in size. For more information about limitations for supported operating systems, refer to the *Oracle Server X6-2L Product Notes* at `http://www.oracle.com/goto/x6-2l/docs`.
- Integrates PCIe device configuration utilities within the BIOS Setup Utility menus. For more information, see "BIOS Setup Utility Menu Options" on page 203.
- 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 181
- "Select the Boot Device" on page 188

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 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 181

Using BIOS for Resource Allocation

This section explains how the BIOS allocates Option ROM and I/O resources.

Legacy Option ROM 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 177
- “Configure Option ROM Settings” on page 194

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

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.

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 Exit Menu and selecting `Save Changes and Reset`.

Related Information

- “Access BIOS Setup Utility Menus” on page 177
- “BIOS Setup Utility Menus” on page 176
- “BIOS Key Mappings” on page 177

▼ Select Legacy BIOS or UEFI BIOS Boot Mode

The BIOS firmware supports both Legacy BIOS BOOT Mode and UEFI BIOS Boot Mode. The default setting is Legacy BIOS Boot Mode. For more information about selecting the BIOS boot mode, refer to “Using UEFI” on page 181.

1. **Access the BIOS Setup Utility menus.**

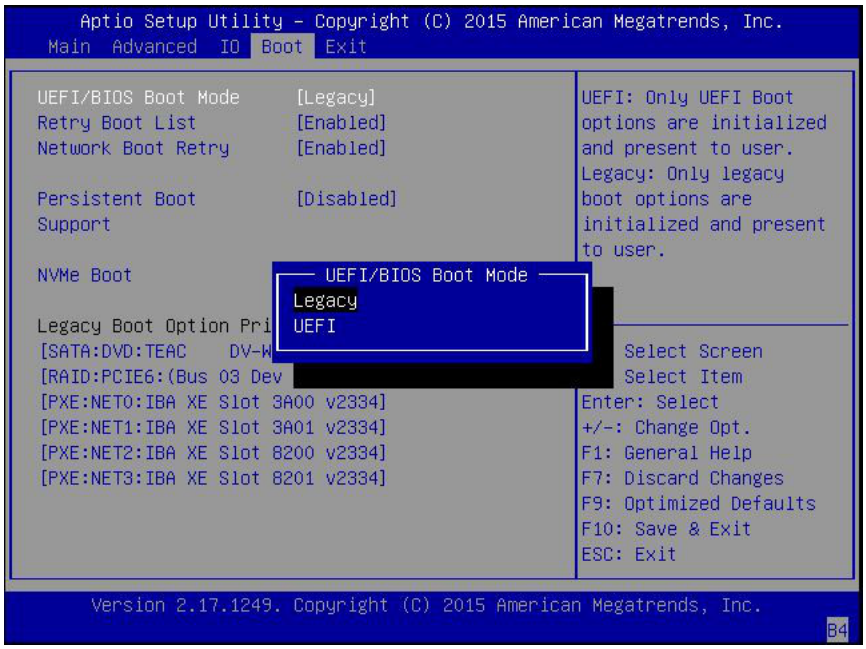
   See “Access BIOS Setup Utility Menus” on page 177.

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.



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 F10 to save the changes and exit the BIOS Setup Utility.**

Related Information

- “BIOS Setup Utility Menus” on page 176
- “BIOS Key Mappings” on page 177

Select the Boot Device

The Boot Options Priority list contents depend on which BIOS mode is selected. When UEFI BIOS Boot Mode is selected, only UEFI BIOS boot candidates will be initialized and displayed in the Boot Options Priority list. When Legacy BIOS Boot Mode 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.

2. **Press the F8 key (or Ctrl+P from a serial connection) when prompted while the BIOS is running the power-on self-test (POST).**

   The Please Select Boot Device dialog box appears.

3. **In the dialog, select the boot device option according to the operating system and BIOS mode you elected to use, and then press Enter.**

   Use the up and down arrow keys to select the boot device. 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.

4. **Press F4 to save the changes and exit the BIOS Setup Utility.**

Related Information

- “BIOS Setup Utility Menus” on page 176
- “BIOS Key Mappings” on page 177

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.**

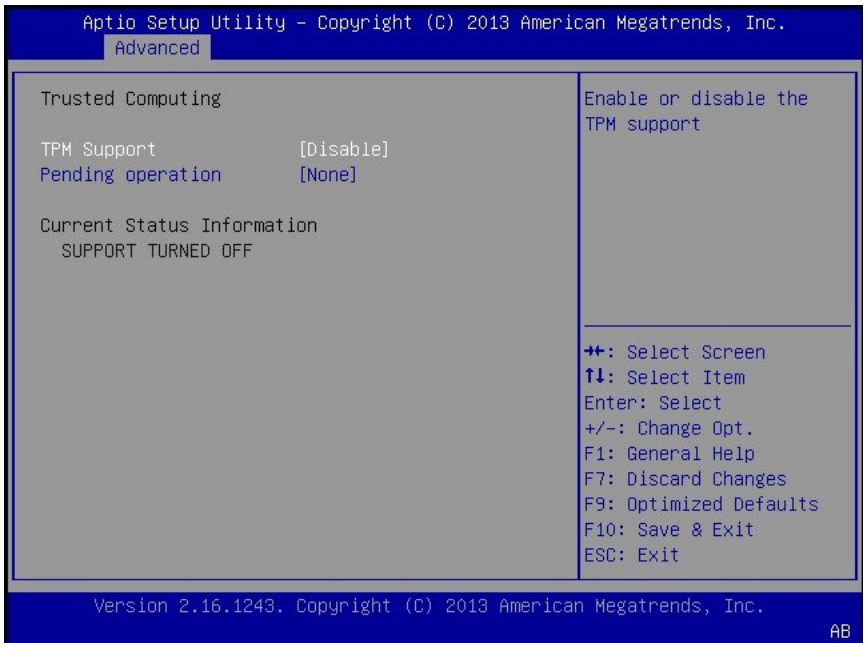
   See "Access BIOS Setup Utility Menus" on page 177.

2. **In the BIOS Setup Utility menus, navigate to the Advanced Menu.**

   The Advanced Menu screen appears.

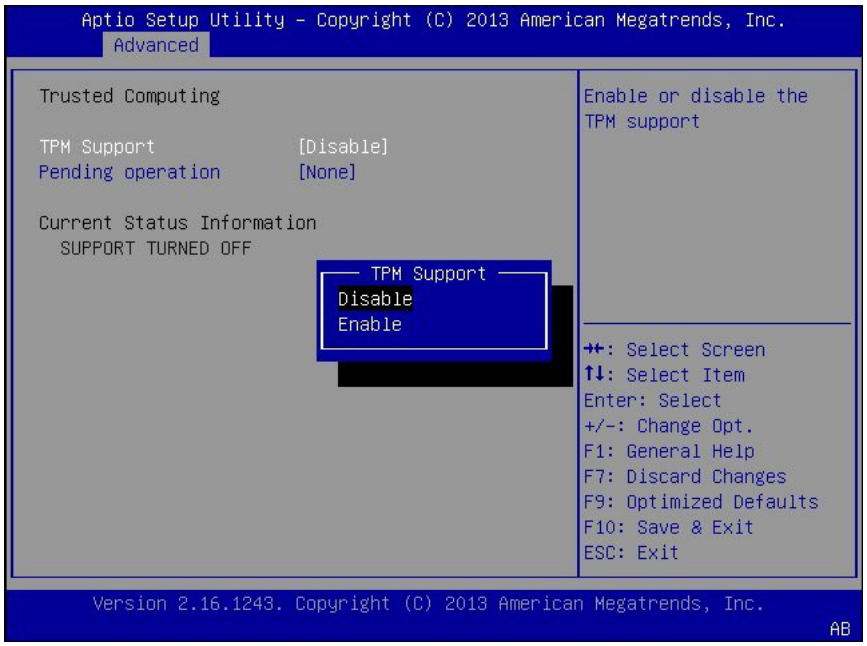
3. **In the Advanced Menu screen, select `Trusted Computing`.**

   The TPM Configuration screen appears.



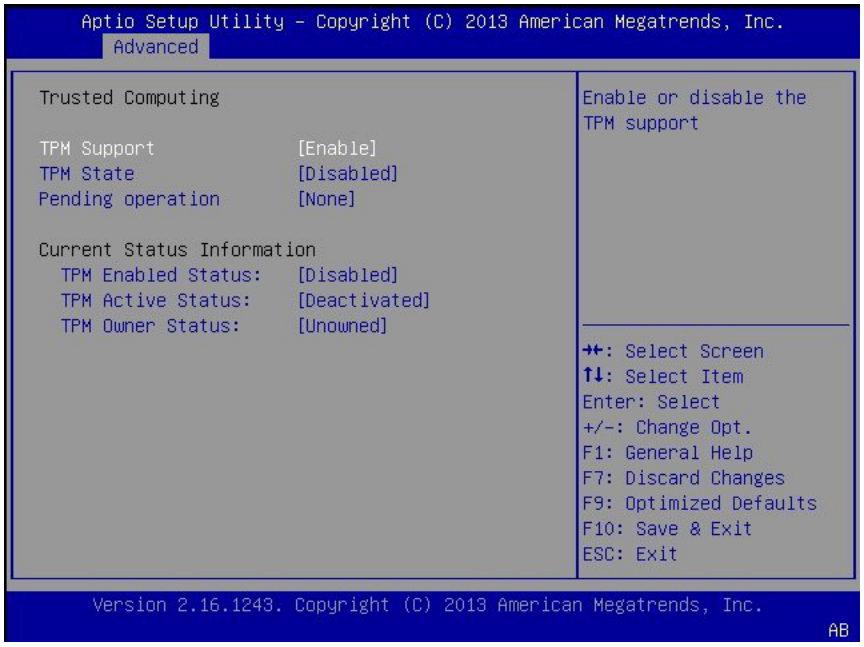
4. **TPM Support is listed as `Disabled` (it is disabled by default). Select `TPM Support` and press Enter.**

   A TPM Support dialog box appears.



5. **In the dialog box, set `TPM Support` to `Enable`, and then press Enter.**

The updated TPM Configuration screen appears.



6. **Press the F10 key to save the changes and exit the BIOS Setup Utility.**

Related Information

- "BIOS Setup Utility Menus" on page 176
- 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:

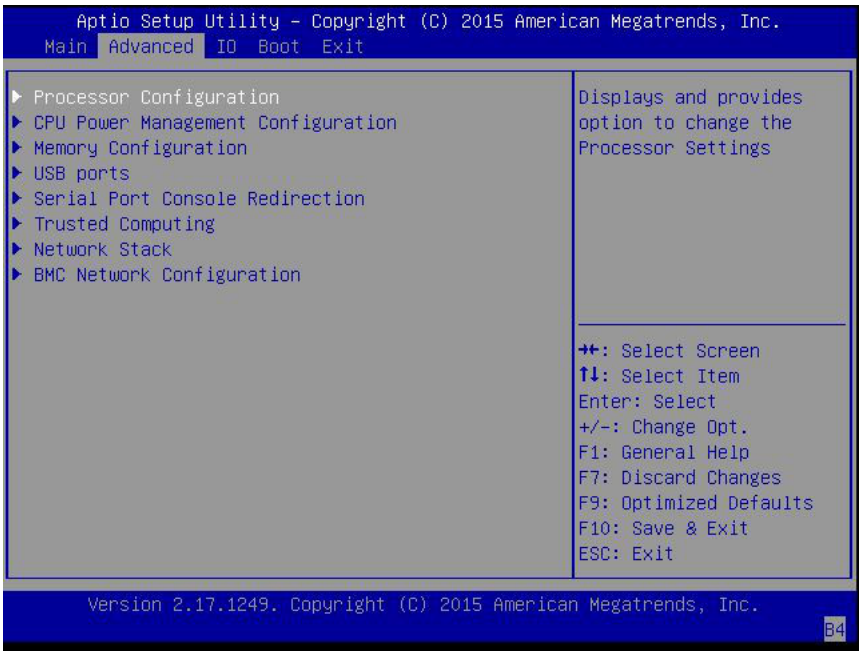
- **BIOS** – Assign the IP address for the server SP from the BIOS Setup Utility on the Advanced Menu.
- **Oracle ILOM** – For instructions on setting the IP address for the server SP using Oracle ILOM, refer to the Oracle Integrated Lights Out Manager (ILOM) 3.2 Documentation Library at `http://www.oracle.com./goto/ilom/docs`.

1. **Access the BIOS Setup Utility menus.**

   See “Access BIOS Setup Utility Menus” on page 177.

2. **In the BIOS Setup Utility menus, navigate to the Advanced Menu.**

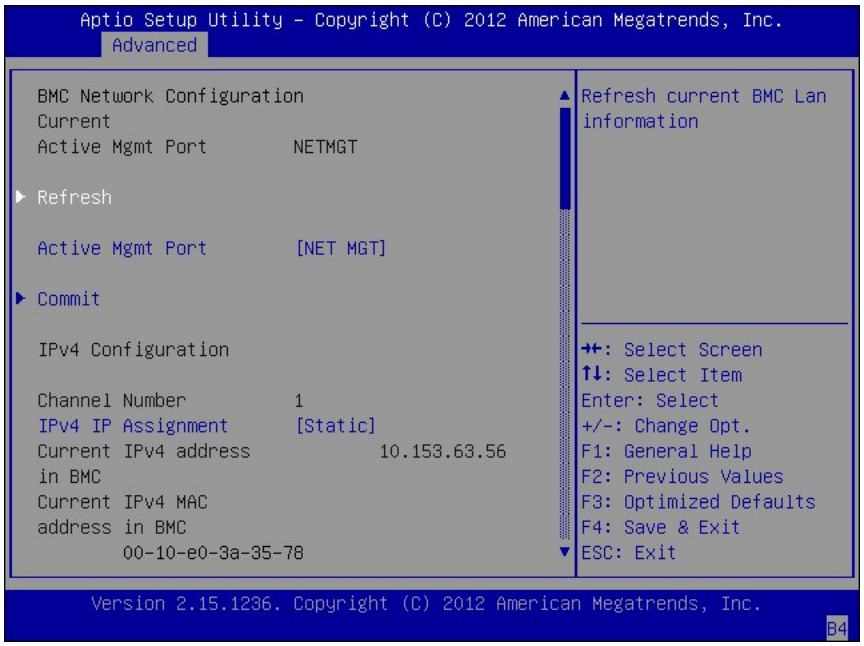
   The Advanced Menu screen appears.



3. **In the Advanced Menu, select `BMC Network Configuration`, and then press Enter.**

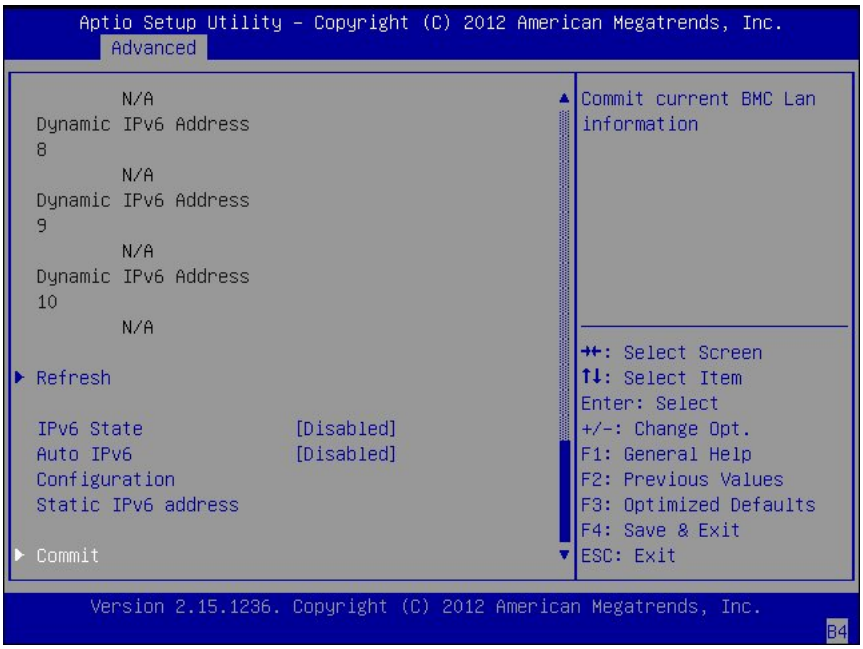
   The BMC Network Configuration screen appears.

The BMC is the Baseboard Management Controller.



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 176

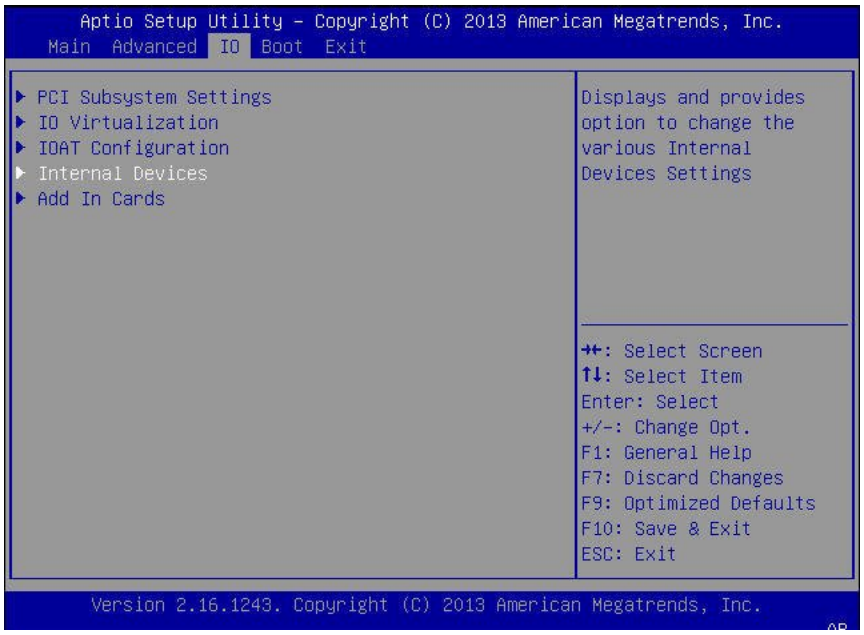
▼ Configure Option ROM Settings

1. **Access the BIOS Setup Utility menus.**

   See "Access BIOS Setup Utility Menus" on page 177.

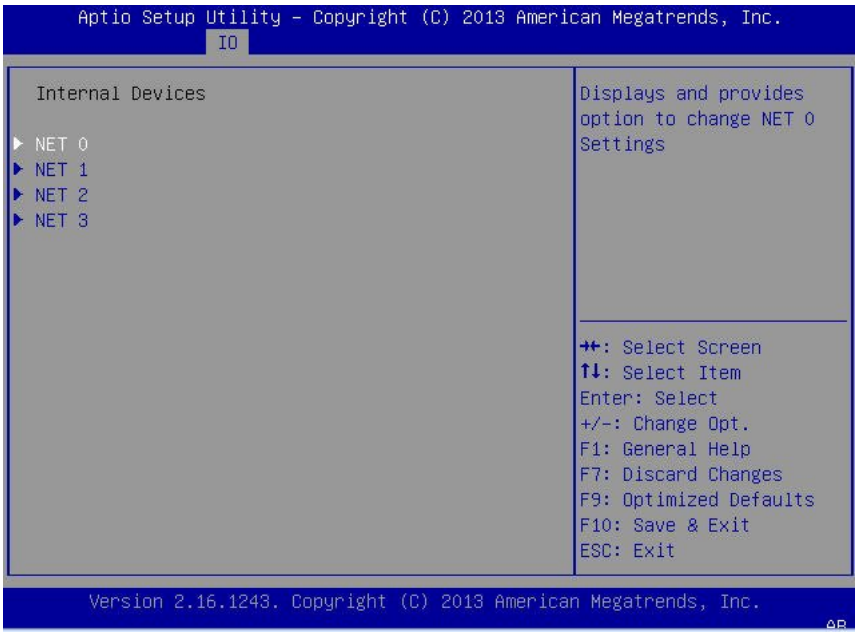
2. **In the BIOS Setup Utility menus, navigate to the IO Menu.**

The IO Menu screen appears.



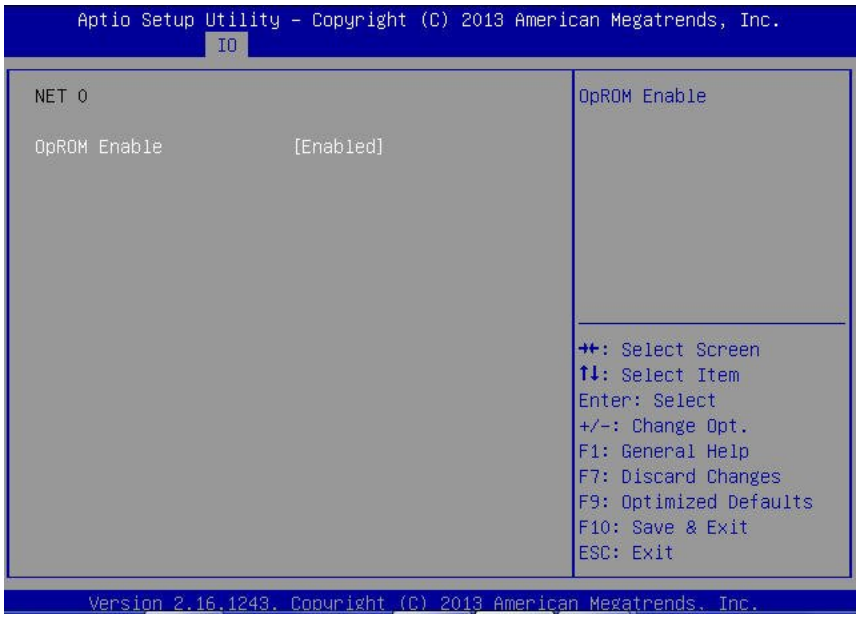
3. **In the IO Menu, select either Internal Devices or Add In Cards and press Enter to display the internal device or add-in card slot for which you want to enable or disable Option ROM.**

The Internal Devices or Add In Cards screen appears.



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.



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.**

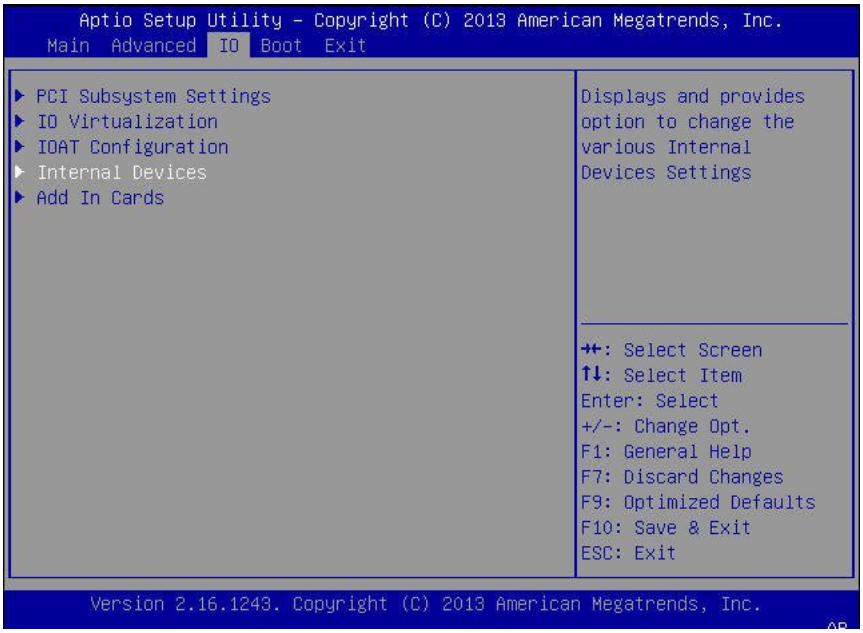
Related Information

- “Legacy Option ROM Allocation” on page 184
- “Access BIOS Setup Utility Menus” on page 177
- “BIOS Setup Utility Menus” on page 176

Configure I/O Resource Allocation

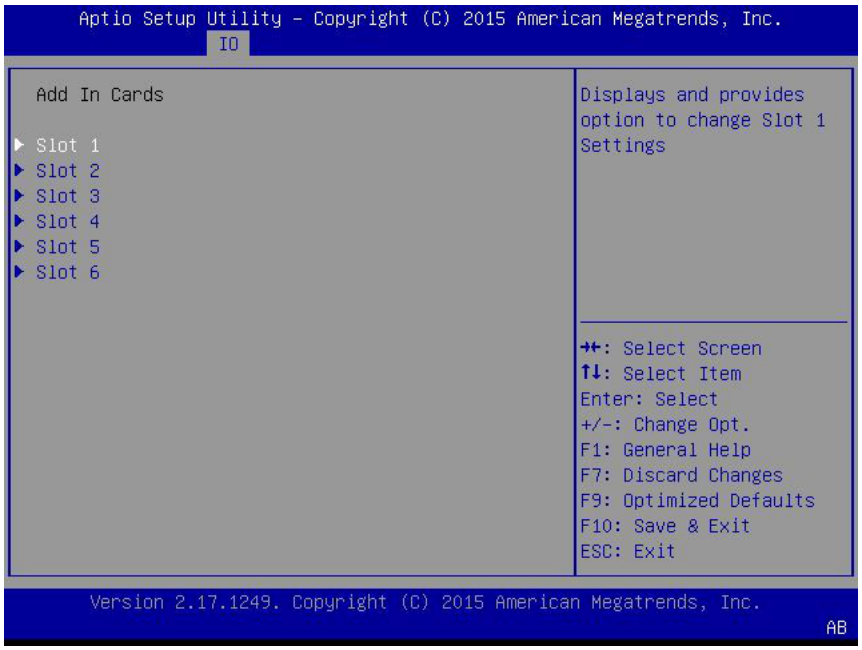
1. **Access the BIOS Setup Utility menus.**
   See “Access BIOS Setup Utility Menus” on page 177.

2. **In the BIOS Setup Utility menus, navigate to the IO Menu.**
   The IO Menu screen appears.



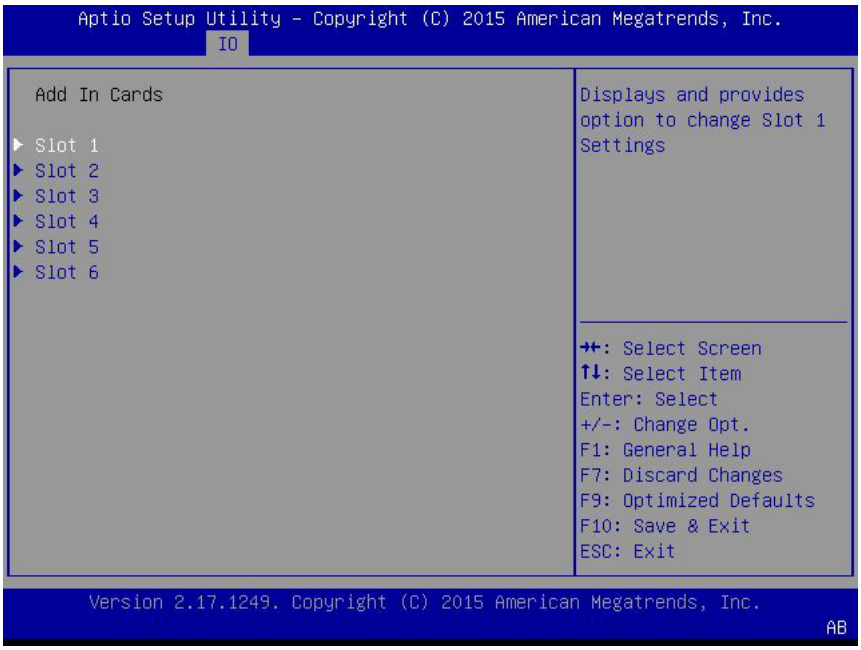
3. **Select Add In Cards and press Enter to display the add-in card slots.**

The Add In Cards screen appears.



4. **Select the slot for which you want to configure the card, and press Enter.**

The IO resource allocation screen for that add-in card slot appears.



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.**

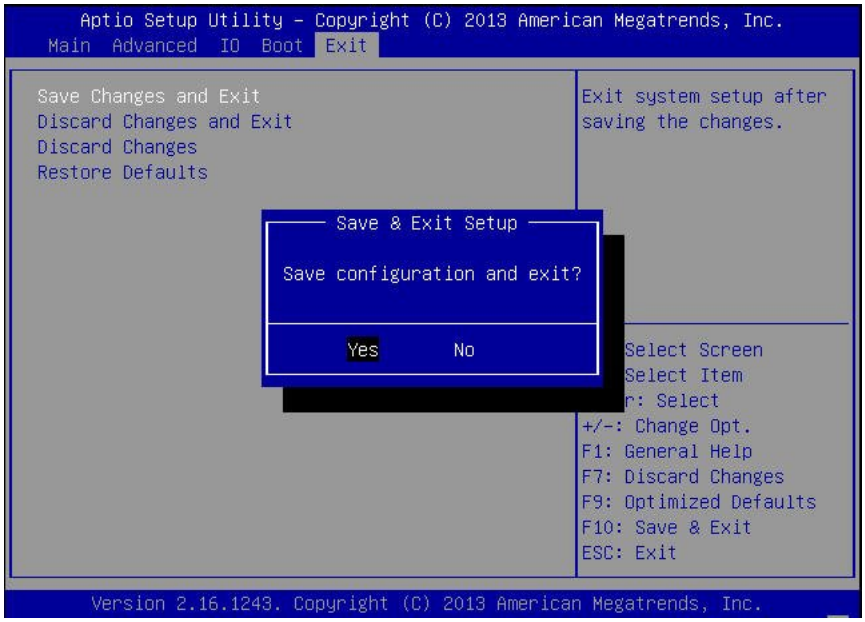
6. **Press the F10 key to save the changes and exit the BIOS Setup Utility.**

Related Information

- “Access BIOS Setup Utility Menus” on page 177
- “BIOS Setup Utility Menus” on page 176

▼ Exit BIOS Setup Utility

1. **Use the left and right arrow keys to navigate to the top-level 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 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 177

- “BIOS Setup Utility Menus” on page 176

BIOS Setup Utility Menu Options

This section includes screenshots of the main menus in the BIOS Setup Utility for the Oracle Exadata Storage Server X6-2 High Capacity. Following the screenshot for each menu is a table of the options available from that menu.

Caution - This section is for reference purposes only. Default Exadata storage server settings should not be changed.

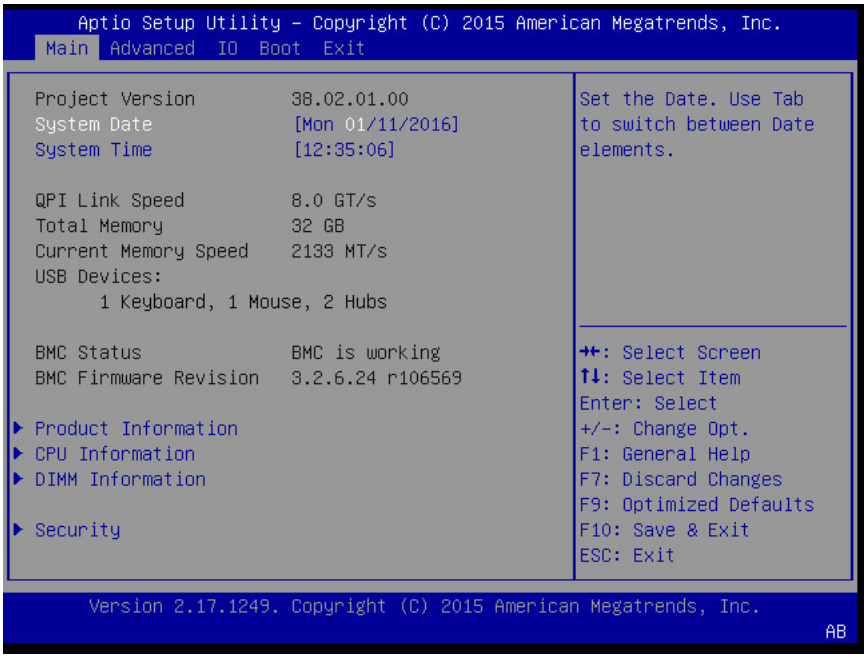
Description	Links
Review the BIOS Main Menu selections.	"BIOS Main Menu Selections" on page 203
Review the BIOS Advanced Menu selections.	"BIOS Advanced Menu Selections" on page 207
Review the BIOS IO Menu selections.	"BIOS IO Menu Selections" on page 221
Review the Boot Menu selections.	"BIOS Boot Menu Selections" on page 225
Review the BIOS Exit Menu selections.	"BIOS Exit Menu Selections" on page 226

Related Information

- *Oracle X5 Series Servers Administration Guide* at: `http://www.oracle.com/goto/x86admindiag/docs`
- "Setting Up BIOS Configuration Parameters" on page 175

BIOS Main Menu Selections

This section includes 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.



The following tables describe the options provided by the BIOS Main menu sub-menus.

TABLE 18 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 GT/s		Intel Quick Path Interconnect (QPI) operational speed is displayed.
Total Memory (R/O)			Memory in gigabytes is displayed. Example: 224 GB
Current Memory Speed (R/O)			Memory speed is displayed. Example: 1333 MHz
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 Exadata Storage Server X6-2 High Capacity
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 @ 2.6 GHz			Processor ID brand is displayed.
CPU Signature			Processor information is displayed.

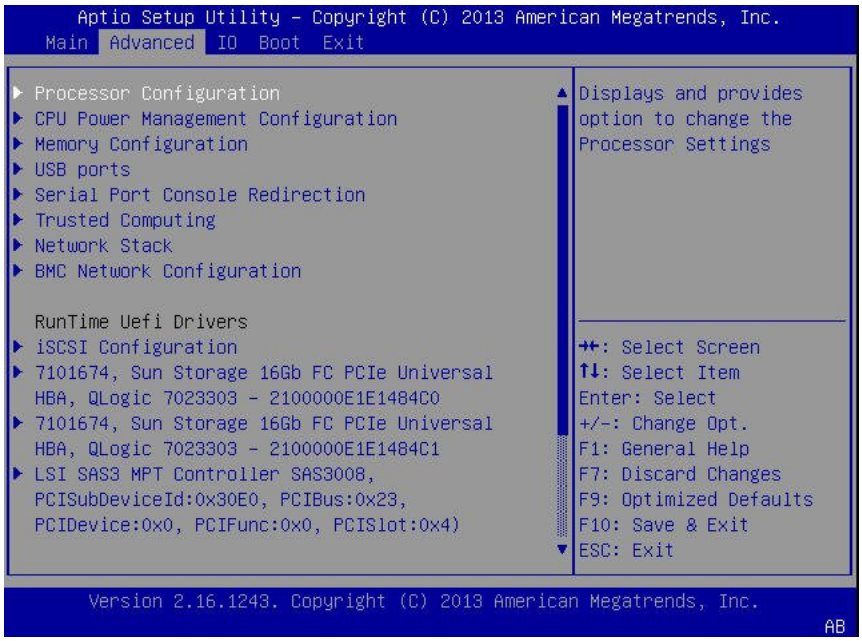
Setup Options	Options	Defaults	Description
			Example: 306F1
Microcode Patch			Software update (microcode patch) information is displayed. Example: 80000011
Max CPU Speed			Maximum non-turbo speed of the processor is displayed. Example: 2100 MHz
Min CPU Speed			Minimum speed of the processor is displayed. Example: 1200 MHz
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” on page 207

BIOS Advanced Menu Selections

This section includes a screenshot of the BIOS Advanced Menu. The options that are available from the Advanced Menu are described in the sections that follow. Options in the tables that are marked as "(R/O)" are read-only information and cannot be changed.



The following sections describe the BIOS Advanced Menu options:

BIOS Advanced Menu Processor Configuration Options

The following table describes the BIOS Advanced Menu processor configuration options:

TABLE 19 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 describes the BIOS Advanced Menu CPU power management configuration options:

TABLE 20 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)	Endabled/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	Endabled/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.

Setup Options	Options	Defaults	Description
Uncore Frequency Scaling	Endabled/Disabled	Disabled	Enable/disable Uncore Frequency Scaling (USF).

BIOS Advanced Menu Memory Configuration Option

The following table describes the BIOS Advanced Menu memory configuration option:

TABLE 21 BIOS Advanced Menu Memory Configuration Option

Setup Option	Options	Defaults	Description
Numa	Enabled/Disabled	Enabled	Enable or disable Non Uniform Memory Access (NUMA)

BIOS Advanced Menu USB Ports Options

The following table describes the BIOS Advanced Menu USB ports options:

TABLE 22 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 legacy support for non-USB aware operating systems.
EHCI Controller 1	Disabled/Enabled	Enabled	Enable or disable EHCI Controller 1.
EHCI Controller 2	Disabled/Enabled	Enabled	Enable or disable EHCI Controller 2.

Setup Options	Options	Defaults	Description
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 describes the BIOS Advanced Menu serial port console redirection options:

TABLE 23 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. ■ ANSI: Extended ASCII character set.

Setup Options	Options	Defaults	Description
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' signal can be sent to restart the flow. Hardware flow

Setup Options	Options	Defaults	Description
			control uses two wires to send start/stop signals.

BIOS Advanced Menu Trusted Computing Options

The following table describes the BIOS Advanced Menu trusted computing options:

TABLE 24 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 describes the BIOS Advanced Menu network stack options:

TABLE 25 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 describes the BIOS Advanced Menu BMC network configuration options:

TABLE 26 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 IPv4 Default 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 describes the BIOS Advanced Menu iSCSI configuration options:

TABLE 27 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 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 describes the BIOS Advanced Menu Ethernet controller options:

TABLE 28 BIOS Advanced Menu Ethernet Controller Options

Setup Options	Options	Defaults	Description
Port Configuration Menu			
NIC configuration			Use to configure the network device port.
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: *xxxxxx-xxx*, for example, C80222-001.

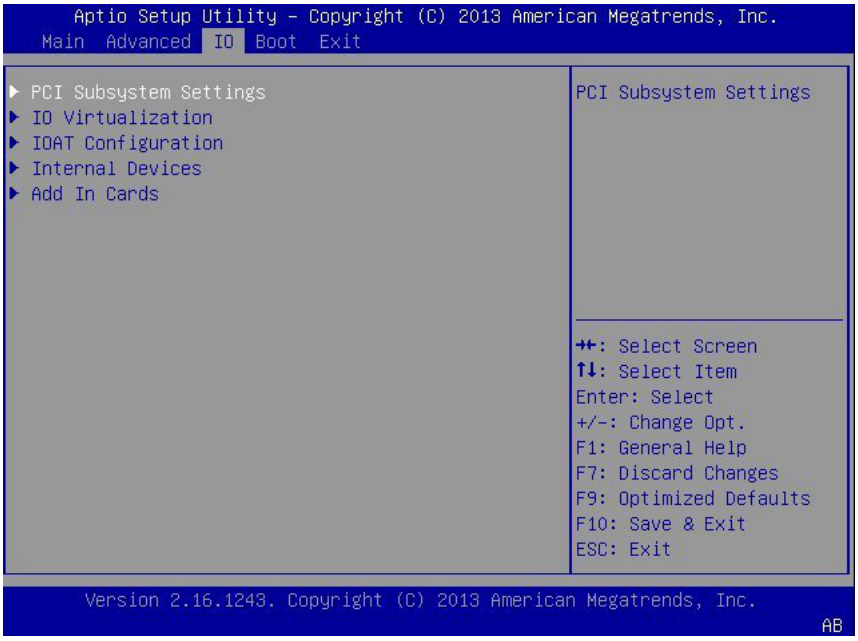
Setup Options	Options	Defaults	Description
Chip Type (R/O)	NA	NA	Manufacturer and model number
PCI Device ID (R/O)		1528	Device identifier
PCI Address (R/O)	NA	NA	Bus device function identifier Example format: Bus: Device:Function
Link Status	Connected/Disconnected	Disconnected	Specifies the link status of the network port.
MAC Address (R/O)	NA	None	Lists the MAC address of the network interface card (NIC).

Related Information

- “BIOS Main Menu Selections” on page 203
- “BIOS IO Menu Selections” on page 221
- “BIOS Boot Menu Selections” on page 225
- “BIOS Exit Menu Selections” on page 226

BIOS IO Menu Selections

This section includes a screenshot of the BIOS IO Menu. The options that are available from the IO Menu are described in the sections that follow.



The following sections describe the BIOS IO Menu options.

- "BIOS IO Menu PCI Subsystem Settings Options" on page 222
- "BIOS IO Menu IO Virtualization Options" on page 223
- "BIOS IO Menu I/OAT Configuration Options" on page 223
- "BIOS IO Menu Internal Devices Options" on page 224
- "BIOS IO Menu Add In Cards Options" on page 224

BIOS IO Menu PCI Subsystem Settings Options

The following table describes the BIOS IO Menu PCI subsystem settings options.

TABLE 29 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 30 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	Disabled	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 31 BIOS IO Menu I/OAT Configuration Options

Setup Options	Options	Defaults	Description
Intel I/OAT	Disabled/Enabled	Enabled	Enable or disable Intel I/OAT.
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 Menu internal devices options:

TABLE 32 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			See NET0 description.

BIOS IO Menu Add In Cards Options

The following table describes the BIOS IO Menu add in cards options.

TABLE 33 BIOS IO Menu Add In Cards Options

Setup Options	Options	Defaults	Description
Slot 1			Displays and provides options to change the settings of the devices in PCIe slots.
OpROM Enable	Disable/Enabled	Enabled	Enable or disable Option ROM for add-in card.

Setup Options	Options	Defaults	Description
Slot 2, Slot 3, Slot 4, Slot 5, and Slot 6			See Slot 1 description

Related Information

- “BIOS Main Menu Selections” on page 203
- “BIOS Advanced Menu Selections” on page 207
- “BIOS Boot Menu Selections” on page 225
- “BIOS Exit Menu Selections” on page 226

BIOS Boot Menu Selections

This section includes a screenshot of the BIOS Boot Menu. The options that are available from the Boot Menu are described in the table that follows.

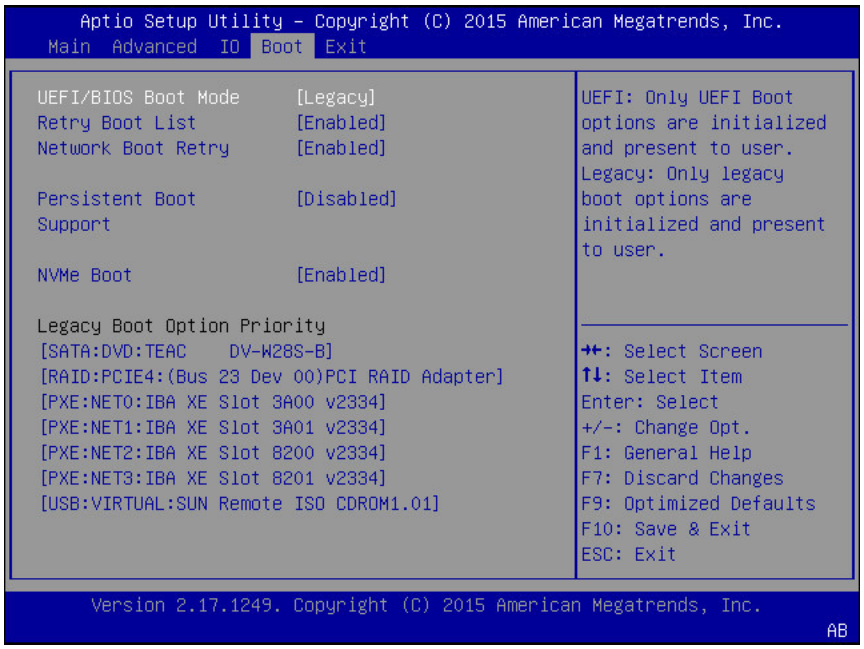


TABLE 34 BIOS Boot Menu Options

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.
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.
Legacy Boot Option Priority	UEFI/Legacy	Legacy	Displays the system boot order.

Related Information

- "BIOS Main Menu Selections" on page 203
- "BIOS Advanced Menu Selections" on page 207
- "BIOS IO Menu Selections" on page 221
- "BIOS Exit Menu Selections" on page 226

BIOS Exit Menu Selections

This section includes a screenshot of the BIOS Exit Menu. The options that are available from the Exit Menu are described in the table that follows.

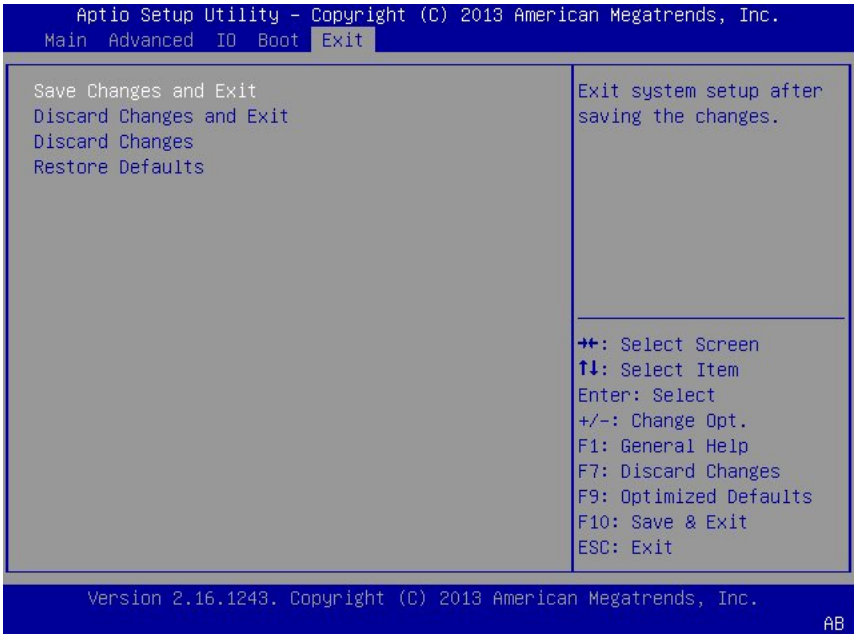


TABLE 35 BIOS Exit Menu Options

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 203
- “BIOS Advanced Menu Selections” on page 207
- “BIOS IO Menu Selections” on page 221
- “BIOS Boot Menu Selections” on page 225

Monitoring Components and Identifying SNMP Messages

This section includes information about monitoring components and identifying SNMP messages for the Oracle Exadata Storage Server X6-2 High Capacity.

Description	Links
Review how Oracle ILOM monitors component health and faults.	"Monitoring Component Health and Faults Using Oracle ILOM" on page 229
Review information about system components and nomenclature.	"Monitoring System Components" on page 230
Review SNMP traps generated by the server.	"Identifying SNMP Trap Messages" on page 241

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 Exadata Storage Server X6-2 High Capacity.

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 3.1, 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 3.1 Documentation Library at http://www.oracle.com/goto/ilom/docs.

This section includes information for the following server components:

- “System Chassis Components” on page 231
- “Cooling Unit Components” on page 233

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	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. Standby blink: Standby power is on; Oracle ILOM SP is running. Slow blink: Startup sequence initiated on host. On: Host is booting OS or 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 233

- “Disk Backplane Components” on page 234
- “Memory Device Components” on page 235
- “Power Unit Components” on page 236
- “Processor Components” on page 237
- “System Board Components” on page 237
- “System Firmware Components” on page 239
- “Hard Disk Drive Components” on page 239

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: Mainboard Off: Normal On: Fan module was diagnosed as faulty.

Related Information

- “System Chassis Components” on page 231
- “Disk Backplane Components” on page 234
- “Memory Device Components” on page 235
- “Power Unit Components” on page 236
- “Processor Components” on page 237
- “System Board Components” on page 237
- “System Firmware Components” on page 239

■ “Hard Disk Drive Components” on page 239

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/SASEXP**	FRU	SAS Expander FRU	
/SYS/**DBP/SASEXP/PRSNT**	Discrete sensor	SAS Expander board presence	01h-ENTITY_ABSENT 02h-ENTITY_PRESENT
/SYS/**DBP/SASEXP/T_CORE**	Threshold sensor	SAS Expander board temperature, reported by Expander CPLD	Degrees Celsius
/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 (HDD) Off: Normal On: HDD was diagnosed as faulty
/SYS/**DBP/HDD[0-*x*]/OK2RM**	Indicator	OK to remove	Color: Blue Location: HDD drive Off: Normal On: OK to remove HDD
/SYS/**DBP/NVME[0-*x*]**		NVMe drives	
/SYS/**DBP/NVME[0-*x*]/PRSNT**	Discrete sensor	NVMe device presence	01h-ENTITY_ABSENT 02h-ENTITY_PRESENT

Related Information

- “System Chassis Components” on page 231
- “Cooling Unit Components” on page 233
- “Memory Device Components” on page 235
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- “Hard Disk Drive Components” on page 239

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: Mainboard Off: Normal On: DIMM was diagnosed as faulty.

Related Information

- “System Chassis Components” on page 231
- “Cooling Unit Components” on page 233
- “Disk Backplane Components” on page 234
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- “Hard Disk Drive Components” on page 239

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 231
- “Cooling Unit Components” on page 233
- “Disk Backplane Components” on page 234
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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 231
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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/PCIE[1-6]**	FRU	PCIe slot	
/SYS/**MB/PCIE[1-6]/PRSNT**	Discrete sensor	Option card inserted into PCIe slot	01h-ENTITY_ABSENT 02h-ENTITY_PRESENT
/SYS/**MB/PCIE3/PCIESW**	FRU	PCIe switch for NVMe support, optional, dedicated slot	
/SYS/**MB/T_OUT_ZONE[0-2]**	Threshold sensor	Cooling zone exhaust temperature	Degrees Celsius
/SYS/**MB/T_IN_ZONE[0-2]**	Threshold sensor	Cooling zone inlet temperature	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_PS**	Threshold sensor	PSU inlet temperature	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 231
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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 231
- “Cooling Unit Components” on page 233
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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/**MB/RHDD[0-1]**	FRU	Rear hard disk drive FRU	From host
/SYS/**MB/RHDD[0-1]/PRSNT**	Discrete sensor	Rear hard disk drive presence	01h-ENTITY_PRESENT, 02h-ENTITY_ABSENT
/SYS/**MB/RHDD[0-1]/SERVICE**	Indicator	Rear hard disk drive Service Required LED	Color: Amber Location: Rear HDD Off: Normal On: Hard disk drive (HDD) was diagnosed as faulty.

Component Name (Oracle ILOM CLI Targets)	IPMI Type	Description	Values (if applicable)
/SYS/**MB/RHDD[0-1]/OK2RM**	Indicator	Rear hard disk drive OK to Remove LED	Color: Blue Location: Rear HDD Off: Normal On: OK to remove
/SYS/**MB/RHDD[0-1]/STATE**	Discrete sensor	Rear hard disk drive state	02h-DRIVE_FAULT 04h-PREDICTIVE_FAILURE 08h-HOT_SPARE
/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: HDD 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: HDD Off: Normal On: OK to remove
/SYS/**DBP/NVME[0-*x*]**	FRU	NVMe drive FRU	
/SYS/**DBP/NVME[0-*x*]/PRSNT**	Discrete sensor	PCIe NVMe drive	01h-ENTITY_PRESENT 02h-ENTITY_ABSENT

Related Information

- “System Chassis Components” on page 231
- “Cooling Unit Components” on page 233
- “Disk Backplane Components” on page 234

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	/SYS/PS[0-1]/T_OUT
Oracle ILOM Event Message: Lower fatal threshold exceeded	/SYS/MB/T_IN_ZONE0
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/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: sunHwTrapTempFatalThresholdDeasserted	/SYS/PS[0-1]/T_OUT
Oracle ILOM Event Message: Lower fatal 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 fatal threshold setting or above a lower fatal 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: sunHwTrapTempCritThresholdExceeded	/SYS/PS[0-1]/T_OUT
Oracle ILOM Event Message: Upper critical threshold exceeded	/SYS/MB/T_IN_ZONE0
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_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: 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

Messages and Descriptions	Component Name
The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	/SYS/MB/T_IN_PS
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

- "System Chassis Components" on page 231
- "Cooling Unit Components" on page 233
- "Disk Backplane Components" on page 234
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Hard Disk Drive Events

The following table lists hard disk drive events.

Messages and Descriptions	Component Name
SNMP Trap: sunHwTrapSlotOrConnectorError	/SYS/DBP/HDD[0-*x*]/STATE
Oracle ILOM Event Message: Assert	
Severity and Description: Major: A sensor associated with a slot or connector has detected an error.	

Messages and Descriptions	Component Name
SNMP Trap: 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

- "System Chassis Components" on page 231
- "Cooling Unit Components" on page 233
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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	/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 **Oracle ILOM Event Message:** PS_PREDICTIVE_FAILURE ASSERT	/SYS/PS[0-1]/STATE
Severity and Description: Major; A power supply sensor has detected an error. **SNMP Trap:** sunHwTrapPowerSupplyError **Oracle ILOM Event Message:** PS_PREDICTIVE_FAILURE DEASSERT	/SYS/PS[0-1]/STATE
Severity and Description: Major; A power supply sensor has detected an error. **SNMP Trap:** sunHwTrapPowerSupplyError **Oracle ILOM Event Message:** PS_INPUT_LOST ASSERT	/SYS/PS[0-1]/STATE
Severity and Description: Major; A power supply sensor has detected an error. **SNMP Trap:** sunHwTrapPowerSupplyError **Oracle ILOM Event Message:** PS_INPUT_LOST DEASSERT	/SYS/PS[0-1]/STATE
Severity and Description: Major; A power supply sensor has detected an error. **SNMP Trap:** sunHwTrapPowerSupplyError **Oracle ILOM Event Message:** PS_INPUT_ERROR ASSERT	/SYS/PS[0-1]/STATE
Severity and Description: Major; A power supply sensor has detected an error. **SNMP Trap:** sunHwTrapPowerSupplyError **Oracle ILOM Event Message:** PS_INPUT_ERROR DEASSERT	/SYS/PS[0-1]/STATE
Severity and Description: Major; A power supply sensor has detected an error. **SNMP Trap:** sunHwTrapPowerSupplyError **Oracle ILOM Event Message:** PS_INPUT_RANGE_ERROR ASSERT	/SYS/PS[0-1]/STATE
Severity and Description: Major; A power supply sensor has detected an error. **SNMP Trap:** sunHwTrapPowerSupplyError **Oracle ILOM Event Message:** PS_INPUT_RANGE_ERROR DEASSERT	/SYS/PS[0-1]/STATE
Severity and Description: Major; A power supply sensor has detected an error. **SNMP Trap:** sunHwTrapPowerSupplyError **Oracle ILOM Event Message:** PS_CONFIG_ERROR ASSERT	/SYS/PS[0-1]/STATE
Severity and Description Major; A power supply sensor has detected an error. **SNMP Trap:** sunHwTrapPowerSupplyError **Oracle ILOM Event Message:** PS_CONFIG_ERROR DEASSERT	/SYS/PS[0-1]/STATE
Severity and Description: Major; A power supply sensor has detected an error. **SNMP Trap:** sunHwTrapSensorNonCritThresholdExceeded	/SYS/VPS

Messages and Descriptions	Component Name
Oracle ILOM Event Message: Upper noncritical threshold exceeded **Severity and Description:** Minor; A sensor has reported that its value has gone above an upper non critical threshold setting or below a lower non critical 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 non critical threshold setting or below a lower non critical 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/PS[0-1]/P_OUT
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

Messages and Descriptions	Component Name
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
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

Messages and Descriptions	Component Name
Severity and Description: Minor; A voltage sensor has reported that its value has gone above an upper non critical threshold setting or below a lower non 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: 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

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- “Cooling Unit Components” on page 233
- “Disk Backplane Components” on page 234
- “Memory Device Components” on page 235
- “Power Unit Components” on page 236
- “Processor Components” on page 237
- “System Board Components” on page 237
- “Hard Disk Drive Components” on page 239

Fan Events

The following table lists fan events.

Messages and Descriptions	Component Name
SNMP Trap: 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: sunHwTrapFanSpeedCritThresholdDeasserted **Oracle ILOM Event Message:** Lower critical threshold no longer exceeded	/SYS/MB/FM[0-3]/F[0-1]/TACH

Messages and Descriptions	Component Name
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.	
SNMP Trap: 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: 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

- “System Chassis Components” on page 231
- “Cooling Unit Components” on page 233
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Memory Events

The following table lists memory events.

Messages and Descriptions	Component Name
SNMP Trap: sunHwTrapSensorNonCritThresholdExceeded	/SYS/VPS_CPUS

Messages and Descriptions	Component Name
Oracle ILOM Event Message: Upper noncritical threshold exceeded **Severity and Description:** Minor; A sensor has reported that its value has gone above an upper non critical threshold setting or below a lower non critical 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_MEMORY
SNMP Trap: sunHwTrapSensorThresholdOk	/SYS/VPS_CPUS
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_MEMORY
SNMP Trap: sunHwTrapMemoryFault	/SYS/MB
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.	
SNMP Trap: sunHwTrapMemoryFaultCleared	/SYS/MB
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.	
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

Messages and Descriptions	Component Name
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.quadrank-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.quadrank-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."	
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.	

Messages and Descriptions	Component Name
SNMP Trap: sunHwTrapMemoryFaultCleared **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.	/SYS/MB/P[0-*x*]/D[0-11]
SNMP Trap: sunHwTrapMemoryFault **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.	/SYS/MB/P[0-*x*]/D[0-11]
SNMP Trap: sunHwTrapMemoryFaultCleared **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.	/SYS/MB/P[0-*x*]/D[0-11]
SNMP Trap: sunHwTrapMemoryFault **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.	/SYS/MB/P[0-*x*]/D[0-11]
SNMP Trap: sunHwTrapMemoryFaultCleared **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.	/SYS/MB/P[0-*x*]/D[0-11]
SNMP Trap: sunHwTrapMemoryFault **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.	/SYS/MB/P[0-*x*]/D[0-11]
SNMP Trap: sunHwTrapMemoryFaultCleared **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.	/SYS/MB/P[0-*x*]/D[0-11]
SNMP Trap: sunHwTrapMemoryFault **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.	/SYS/MB/P[0-*x*]/D[0-11]
SNMP Trap: sunHwTrapMemoryFaultCleared **Oracle ILOM Event Message:** event fault.memory.intel.dimm.incompatible "A memory DIMM is incompatible with the memory controller."	/SYS/MB/P[0-*x*]/D[0-11]

Messages and Descriptions	Component Name
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-quadrank "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-quadrank "An invalid quad-rank memory DIMM configuration 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.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.	
SNMP Trap: sunHwTrapMemoryFaultCleared	/SYS/MB/P[0-*x*]/D[0-11]
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.	
SNMP Trap: sunHwTrapMemoryFault	/SYS/MB/P[0-*x*]/D[0-11]
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.	
SNMP Trap: sunHwTrapMemoryFaultCleared	/SYS/MB/P[0-*x*]/D[0-11]
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.	
SNMP Trap: sunHwTrapMemoryFault	/SYS/MB/P[0-*x*]/D[0-11]

Messages and Descriptions	Component Name
Oracle ILOM Event Message: event fault.memory.intel.dimm.disable-quadrank "Memory channel is populated with too many quad-rank memory DIMMs."	
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.disable-quadrank "Memory channel is populated with too many quad-rank memory DIMMs."	
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.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.	
SNMP Trap: sunHwTrapMemoryFaultCleared	/SYS/MB/P[0-*x*]/D[0-11]
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.	
SNMP Trap: sunHwTrapMemoryFault	/SYS/MB/P[0-*x*]/D[0-11]
Oracle ILOM Event Message: event fault.memory.intel.dimm.out-of-order	
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.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.	
SNMP Trap: sunHwTrapMemoryFault	/SYS/MB/P[0-*x*]/D[0-11]
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.	
SNMP Trap: sunHwTrapMemoryFaultCleared	/SYS/MB/P[0-*x*]/D[0-11]
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.	

Related Information

- “System Chassis Components” on page 231
- “Cooling Unit Components” on page 233

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 **Severity and Description:** Major; A processor sensor has detected an error. Device absent.	/SYS/MB/P[0-*x*]/PRSNT
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 Security Events

Messages and Descriptions	Component Name
SNMP Trap: sunHwTrapSecurityIntrusion **Oracle ILOM Event Message:** Assert **Severity and Description:** Major; General Chassis intrusion asserted.	/SYS/INTSW

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