Oracle® Exadata Storage Server X7-2 EF and HC Service Manual

Part No: E72479-10
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ORACLE

Oracle Exadata Storage Server X7-2 EF and HC Service Manual

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Référence: E72479-10

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Contents

Using This Documentation

- **Overview** – Describes how to troubleshoot and maintain Oracle Exadata Storage Server X7-2.
- **Audience** – Technicians, system administrators, authorized service providers, and trained hardware service personnel who have been instructed on the hazards within the equipment and are qualified to remove and replace hardware.
- **Required knowledge** – Advanced experience troubleshooting and replacing hardware.

Product Documentation Library

Documentation and resources for this product and related products are available at https://www.oracle.com/goto/x7-2l/docs.

Feedback

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

About the Oracle Exadata Storage Server X7-2

These sections describe the controls, connectors, LEDs, system components, and replaceable components of the server:

Note - All system firmware and software for Exadata storage servers is automatically maintained by the Exadata update process. Do not manually update firmware or software unless directed by Oracle Support.

Product Description

The Oracle Exadata Storage Server X7-2 is an enterprise-class, two rack unit (2U) server that is available in two configurations: Extreme Flash (EF) and High Capacity (HC). They both use the same server but they are provisioned differently, as described in the following table.

System Components
Two Intel Xeon 4114, 10-core, 2.2 GHz, 85W processors
Twelve 16 GB 2666 MT/sec DDR4 DIMMs (192 GB) Optionally, customers can expand system memory by upgrading to twelve 64 GB DDR4 DIMMs (768 GB) or twenty-four 64 GB DDR4 DIMMs (1.5 TB)
Eleven PCIe Gen3 slots ■ Eight Oracle Flash Accelerator F640 PCIe cards: 6.4 TB, NVMe PCIe 3.0 (EF only) ■ Four Oracle Flash Accelerator F640 PCIe cards: 6.4 TB, NVMe PCIe 3.0 (HC only)
Twelve storage drive slots ■ Twelve drive slot fillers (EF only) ■ Twelve 3.5-inch 10 TB HDDs (HC only)

System Components
Oracle Storage 12Gb SAS PCIe RAID HBA, Internal Card (HC only)
Two internal SATA M.2 flash SSDs (used for system boot and rescue functions)
Oracle Dual Port QDR InfiniBand Adapter M4
Two hot-pluggable, redundant 1200 W power supplies
On-board Oracle Integrated Lights Out Manager (Oracle ILOM) service processor (SP) based on the ASPEED Pilot 4 chip

Front and Back Panel Components

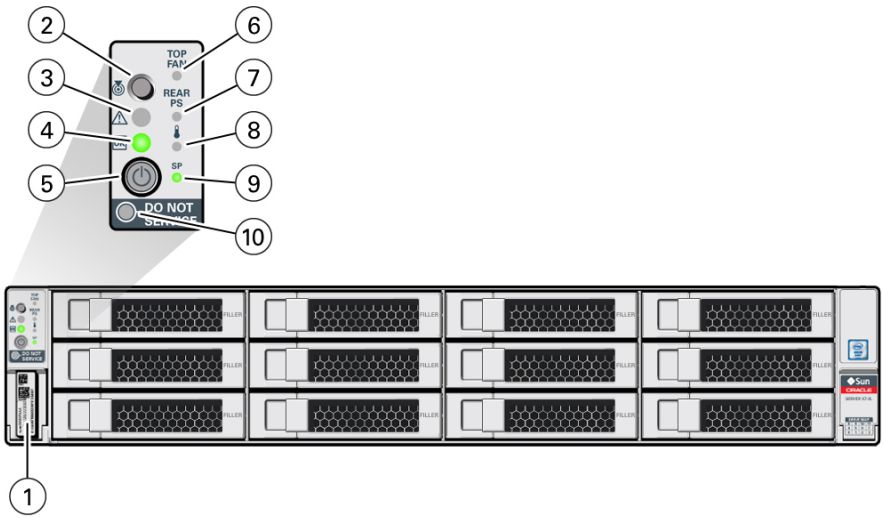
The following sections describe the controls, indicators, connectors, and drives located on the front and back panels.

- "EF Front Panel Components" on page 17
- "EF Back Panel Components and Cable Connections" on page 18
- "HC Front Panel Components" on page 19
- "HC Back Panel Components and Cable Connections" on page 20

Related Information

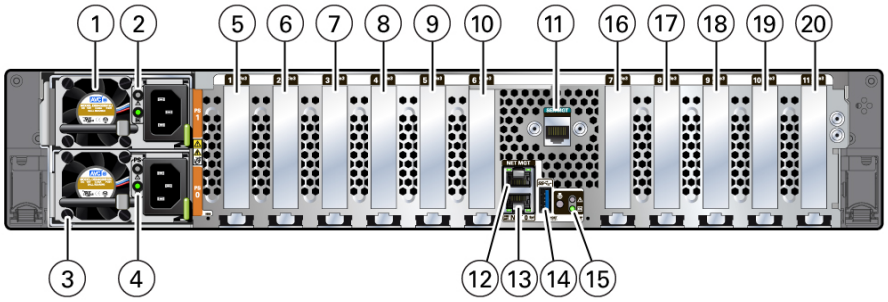
- "System Components" on page 21
- "Illustrated Parts Breakdown" on page 22
- "Troubleshooting Using the Server Front and Back Panel Status Indicators" on page 30

EF Front Panel Components



Callout	Description
1	Product Serial Number (PSN) label and Radio Frequency Identification (RFID) tag
2	Locate Button/LED: white
3	Fault-Service Action Required LED: amber
4	System OK LED: green
5	On/Standby button
6	Fault-Service Required LED: Top: Fan Module (amber)
7	Fault-Service Required LED: Rear: Power Supply (amber)
8	Fault-Service Required LED: Overtemp Icon: System Over Temperature Warning (amber)
9	SP OK LED: green
10	DO NOT SERVICE LED: white

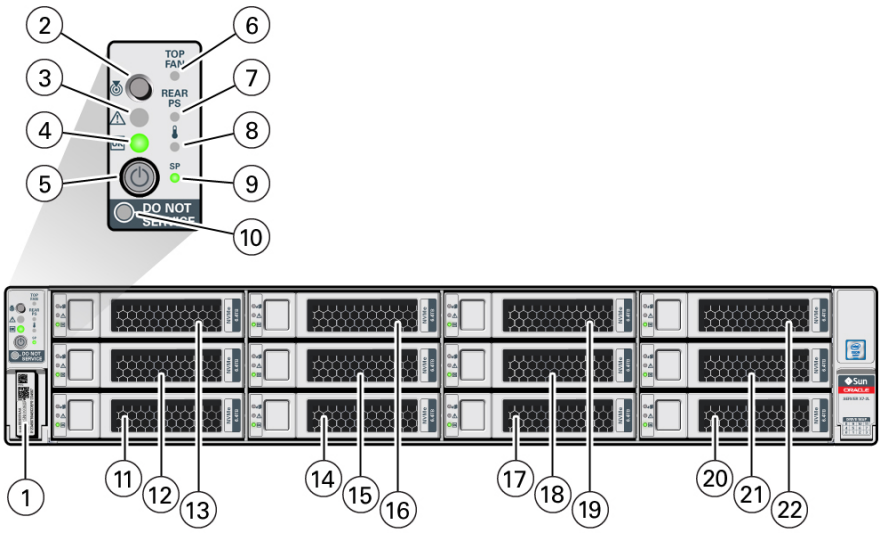
EF Back Panel Components and Cable Connections



Callout	Description
1	Power supply (PS 1)
2	PS 1 status indicators: Fault-Service Required LED: amber; AC OK LED: green
3	Power supply (PS 0)
4	PS 0 status indicators: Fault-Service Required LED: amber; AC OK LED: green
5	PCIe slot 1
6	PCIe slot 2 (Oracle Flash Accelerator F640)
7	PCIe slot 3 (Oracle Flash Accelerator F640)
8	PCIe slot 4 (Oracle Flash Accelerator F640)
9	PCIe slot 5 (Oracle Flash Accelerator F640)
10	PCIe slot 6 (Oracle Flash Accelerator F640)
11	Serial management (SER MGT) RJ-45 serial port
12	Oracle Integrated Lights Out Manager (ILOM) service processor (SP) network management (NET MGT) RJ-45 10/100/1000BASE-T port
13	Network (NET) 100/1000BASE-T RJ-45 Gigabit Ethernet (GbE) port: NET 0
14	USB 3.0 connector
15	System status LEDs: Locate Button/LED: white; Fault-Service Required: amber; System OK: green
16	PCIe slot 7 (Oracle Dual Port QDR InfiniBand Adapter M4)
17	PCIe slot 8 (Oracle Flash Accelerator F640)
18	PCIe slot 9 (Oracle Flash Accelerator F640)

Callout	Description
19	PCIe slot 10 (Oracle Flash Accelerator F640)
20	PCIe slot 11

HC Front Panel Components



Callout	Description
1	Product Serial Number (PSN) label and Radio Frequency Identification (RFID) tag
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5	On/Standby button
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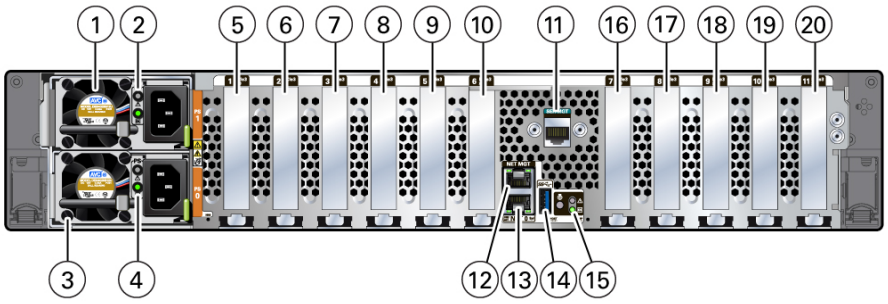
7	Fault-Service Required LED: Rear: Power Supply (amber)
8	Fault-Service Required LED: Overtemp Icon: System Over Temperature Warning (amber)
9	SP OK LED: green
10	DO NOT SERVICE LED: white
11	Storage drive 0 HDD

Callout	Description
12	Storage drive 1 HDD
13	Storage drive 2 HDD
14	Storage drive 3 HDD
15	Storage drive 4 HDD
16	Storage drive 5 HDD
17	Storage drive 6 HDD
18	Storage drive 7 HDD
19	Storage drive 8 HDD
20	Storage drive 9 HDD
21	Storage drive 10 HDD
22	Storage drive 11 HDD

HC Back Panel Components and Cable Connections



Callout	Description
1	Power supply (PS 1)
2	PS 1 status indicators: Fault-Service Required LED: amber; AC OK LED: green
3	Power supply (PS 0)
4	PS 0 status indicators: Fault-Service Required LED: amber; AC OK LED: green
5	PCIe slot 1
6	PCIe slot 2

Callout	Description
7	PCIe slot 3
8	PCIe slot 4 (Oracle Flash Accelerator F640)
9	PCIe slot 5 (Oracle Flash Accelerator F640)
10	PCIe slot 6 (Oracle Flash Accelerator F640)
11	Serial management (SER MGT) RJ-45 serial port
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17	PCIe slot 8
18	PCIe slot 9
19	PCIe slot 10 (Oracle Flash Accelerator F640)
20	PCIe slot 11 (Oracle Storage 12 Gb SAS PCIe RAID HBA, Internal card)

Related Information

- “Back Panel Connector Locations” on page 42
- “Back Panel Pinhole Switches” on page 45
- “Troubleshooting Using the Server Front and Back Panel Status Indicators” on page 30
- “Disconnect Cables From the Server” on page 59
- “Reconnect Power and Data Cables” on page 194
- “Identifying the Server Ports” on page 197

System Components

These sections describe the components of the server:

- “Illustrated Parts Breakdown” on page 22
- “Replaceable Units” on page 23

Illustrated Parts Breakdown

The following figure identifies the major components of the server.

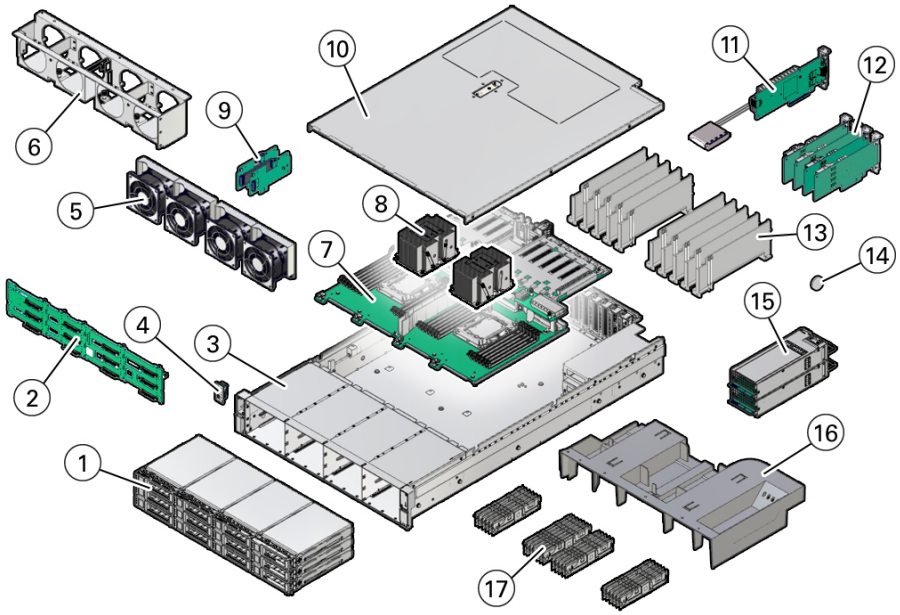


Figure Legend	Description
1	Twelve 3.5-inch storage drives (HC only); slots with filler panels (EF only)
2	Disk backplane
3	System chassis
4	Front LED indicator module
5	Fan modules
6	Fan tray
7	Motherboard assembly
8	Processors and heatsinks
9	Internal M.2 flash SSDs
10	Top cover
11	(Optional) Oracle Storage 12 Gb SAS PCIe RAID HBA, Internal card and super capacitor (HC only)

Figure Legend	Description
12	PCIe cards
13	PCIe plastic walls
14	System battery
15	Power supplies
16	Air baffle
17	DIMMs

Replaceable Units

The following table lists the replaceable units in the server and directs you to the replacement instructions.

Note - You can remove and replace hot-serviceable components while the server module is operating in Main power mode. Service cold-service components when the server module is powered off and, in most cases, when you remove them from the server.

Replaceable Unit	Description	Replacement Instructions
Battery	Lithium coin-cell battery that powers the CMOS BIOS and real-time clock.	“Servicing the Battery” on page 121
Air baffle	Aids in the cooling the system components.	“Servicing the Air Baffle” on page 97
DIMMs	Add or replace memory modules in the system.	“Servicing the DIMMs” on page 103
Storage drives (HC only, hot service)	Storage drive configuration supports up to twelve 3.5-inch hot-pluggable 10 TB HDDs.	“Servicing Storage Drives” on page 67
Internal M.2 flash SSDs	Supports up to two internal M.2 flash SSDs.	“Servicing the Internal M.2 Flash SSDs” on page 87
Fan modules (hot service)	Four fan modules for cooling the server components.	“Servicing Fan Modules” on page 73
PCIe cards (hot service)	Add-on cards that can expand the functionality of the server.	“Servicing PCIe Cards” on page 113
Power supply units (PSUs, hot service)	Two fully redundant AC-powered power supplies.	“Servicing Power Supplies” on page 81
Processor and heatsink (cold service)	Carries out the instructions of the system.	“Servicing Processors” on page 125
Disk backplane	Provides power and communications connectors for storage drives.	“Servicing the Disk Backplane” on page 139

Replaceable Unit	Description	Replacement Instructions
SAS cables (HC only)	Provide signals between the front disk backplane and the Oracle Storage 12 Gb SAS PCIe RAID HBA, Internal card (HC only).	“Servicing SAS Cables” on page 169
Oracle Storage 12 Gb SAS PCIe RAID HBA, Internal card (HC only)	Located in PCIe slot 11, the Oracle Storage 12 Gb SAS PCIe RAID HBA, Internal card manages SAS storage drives (HC only).	“Servicing the Internal HBA Card and HBA Super Capacitor” on page 161
Front LED indicator module	Contains the push-button circuitry and LEDs that are displayed on the bezel of the chassis.	“Servicing the Front LED Indicator Module” on page 147
Motherboard assembly	Provides connectors for the DIMMs, processors, PCIe risers, and other components.	“Servicing the Motherboard Assembly” on page 175

Troubleshooting and Diagnostics

This section includes information about troubleshooting hardware component faults for the Oracle Exadata Storage Server X7-2. It contains the following topics:

For more information about server troubleshooting and diagnostics, refer to the *Diagnostics and Troubleshooting Guide for Oracle x86 Servers with Oracle ILOM 4.0* at `http://www.oracle.com/goto/x86admindiag/docs`.

Troubleshooting Server Component Hardware Faults

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

Troubleshooting Server Hardware Faults

When a server hardware fault event occurs, the system lights the Fault-Service Required LED and captures the event in the Oracle ILOM event log. If you 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, address it immediately.

To investigate a hardware fault, see the following:

- “Basic Troubleshooting Process” on page 26
- “Troubleshoot Hardware Faults Using the Oracle ILOM Web Interface” on page 27

▼ 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 27.

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

   You can use Oracle ILOM to identify the failed component.

2. **Review the *Oracle Server X7-2 Product Notes* and the *Oracle Exadata Database Machine Release Notes* at `https://docs.oracle.com/cd/E80920_01/index.htm`.**

   The release notes contain up-to-date information about the server, including hardware-related issues.

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

   - Prepare for hot service if the component supports it.

     To hot service components (such as storage drives, fan modules, and power supplies), see the removal, installation, and replacement procedures in this document.
   - Prepare for cold service if hot service is not supported for the component.
     - Use Oracle to power off the system or server module.
     - Use Oracle ILOM to set the OK to Remove status for a server module that you must remove. This prevents any power or update processes from being initiated before you can remove the server module from the chassis.

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

   Before servicing the server, prepare the work space, ensuring Electrostatic Discharge Safety (ESD) protection for the server and components.

   See “Preparing for Service” on page 49.

5. **Service the components.**

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

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

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

Related Information

- "Troubleshoot Hardware Faults Using the Oracle ILOM Web Interface" on page 27

▼ 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 26.

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

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

   a. **Open a browser and direct it using the IP address of the server SP.**

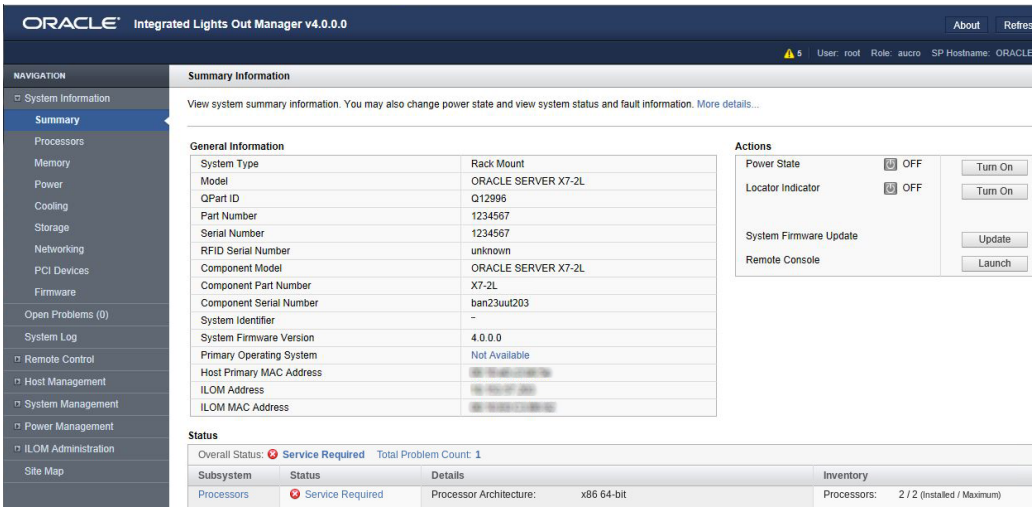
   b. **At the Login screen, enter a user name (with administrator privileges) and password.**

      The Summary Information page appears. The Status section of the Summary Information page provides information about the server subsystems, including:

      - Processors
      - Memory
      - Power
      - Cooling
      - Storage
      - Networking

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

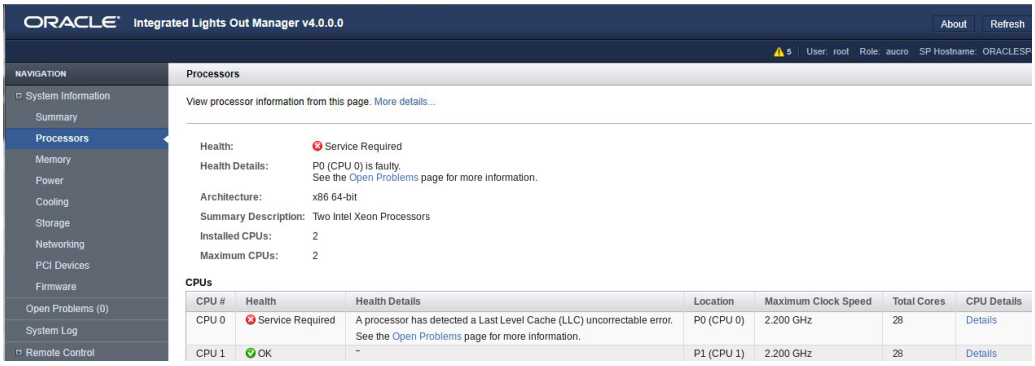
   In the following example, the Status page shows that the Processor subsystem requires service, which indicates that a hardware component in the subsystem is in a fault state.



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

   The Oracle ILOM Processors page appears.

   The following example shows the Processors subsystem section, which indicates that CPU 0 has a fault.



4. **To get more information, click the Open Problems link.**
   The Open Problems page provides detailed information, such as the time the event occurred, component and subsystem name, and description of the issue. It also includes a link to an Oracle Knowledge Base article.
   In this example, the hardware fault with CPU 0 requires local/physical access to the server.

   Tip - The System Log provides a chronological list of all system events and faults that 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 the devices not reported in the Status section. To access the System Log, in the left panel, click System Log.

5. **Before going to the server, review the *Oracle Server X7-2L Product Notes* for information related to the issue or the component. To access the Product Notes, go to `http://www.oracle.com/goto/x7-2l/docs`.**
   The Product Notes contain up-to-date information about the server, including hardware-related issues.

6. **To prepare the server for service, see "Preparing for Service" on page 49.**
   After servicing the component, you might need to clear the fault in Oracle ILOM. For more information, refer to the service procedure for the component.

7. **Service the component.**

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 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 4.0.x* in the Oracle Integrated Lights Out Manager (ILOM) 4.0 Documentation Library at `http://www.oracle.com/goto/ilom/docs`.

Troubleshooting and Diagnostic Information

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

- *Diagnostics and Troubleshooting Guide for Oracle x86 Servers with Oracle ILOM 4.0.x* at `http://www.oracle.com/goto/x86admindiag/docs`
- *Oracle X7 Series Servers Administration Guide*
- “Troubleshooting Using the Server Front and Back Panel Status Indicators” on page 30
- “Managing Server Hardware Faults Using the Oracle ILOM Fault Management Shell” on page 39

Troubleshooting Using the Server Front and Back Panel Status Indicators

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

Related Information

- “EF Front Panel Components” on page 17
- “EF Back Panel Components and Cable Connections” on page 18
- “HC Front Panel Components” on page 19
- “HC Back Panel Components and Cable Connections” on page 20

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 System OK LED indicator.

When you connect AC power 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 System OK LED remains off until the SP is ready.

2. After a few minutes, the main System OK LED slowly flashes the standby blink pattern (0.1 seconds on, 2.9 seconds off), indicating that the SP 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 On/Standby button or Oracle ILOM), the server boots to Main power mode:

1. The System 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 successfully boots, the System OK LED remains lit. When the System OK LED and the SP OK LED indicators remain lit, the server is in Main power mode.

Note - The green System 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 back panel. For the location of the status indicators, see "Front and Back Panel Components" on page 16. The following table describes these indicators.

Status Indicator Name	Icon	Color	State and Meaning
Locate Button/ LED		White	Indicates the location of the server. ■ OFF – Server is operating normally. ■ FAST BLINK (250 ms) – Use Oracle ILOM to activate this LED indicator to enable you to locate a particular system quickly and easily. ■ Pressing the Locate button toggles the LED indicator fast blink on or off.
Fault-Service Required		Amber	Indicates the fault state of the server. ■ OFF – The server is operating normally. ■ STEADY ON – A fault is present on the server. This LED indicator lights whenever a fault indicator lights for a replaceable component on the server. **Note -** When this LED indicator is lit, a system console message might appear that includes a recommended service action.
System OK		Green	Indicates the operational state of the chassis.

Status Indicator Name	Icon	Color	State and Meaning
			■ OFF – AC power is not present or the Oracle ILOM boot is not complete. ■ STANDBY BLINK (on for 100 ms, off for 2900 ms) – Standby power is on, but the chassis power is off and the Oracle ILOM SP is running. ■ SLOW BLINK (1000 ms) – Startup sequence was initiated on the host. This pattern begins 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 FAN	Amber	Indicates that one or more of the internal fan modules failed. ■ OFF – Indicates steady state; no service is required. ■ STEADY ON – Indicates service required.
Back Power Supply Fault	REAR PS Back	Amber	Indicates that one of the server power supplies 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.
DO NOT SERVICE		White	Indicates that the system is not ready to service. ■ OFF – Normal operation. ■ STEADY ON – The system is not ready for service.

Status Indicator Name	Icon	Color	State and Meaning
			Note - The DO NOT SERVICE indicator is application specific. This indicator is illuminated only on demand by the Host application.

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 server top cover is removed.

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

Storage Drive Status Indicators

There are three status indicators (LEDs) on each drive, which applies to only the HC server.

Status Indicator Name	Icon	Color	State and Meaning
OK/Activity		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 BLINK – There is disk activity. Status indicator LED blinks on and off to indicate activity.
Fault-Service Required		Amber	■ OFF – The storage drive is operating normally. ■ STEADY ON – The system 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 was not prepared for removal.

Power Supply Status Indicators

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

Status Indicator Name	Icon	Color	State and Meaning
AC OK/ DC 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.
Fault-Service Required		Amber	■ OFF – Normal operation. No service action is required. ■ STEADY ON – The power supply (PS) 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 back of the server.

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

Ethernet Port Status Indicators

The server has one Gigabit Ethernet port (NET 0). There are two status indicators (LEDs) that are visible from the back of the server.

Status Indicator Name	Location	Color	State and Meaning
Activity	Top left	Green	■ ON – Link up. ■ OFF – No activity. ■ BLINKING – Packet activity.
Link speed	Top right	Bi-colored: Amber/Green	■ OFF – 100BASE-T link (if link up). ■ Green ON – 1000BASE-T link.

Motherboard Status Indicators

The motherboard contains the following status indicators (LEDs).

Status Indicator	Description
DIMM Fault Status Indicators	■ Each 24 DIMM socket 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 103.
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 125.
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 failed and, as a result, none of the component fault LEDs illuminate. ■ For more information on the fault remind status indicator and the location of the Fault Remind button, see “Using the Server Fault Remind Button” on page 106.
STBY PWRGD Status Indicator	■ This green status indicator (LED) is labeled STBY PWRGD and is located on the motherboard near the back 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 helps prevent service actions on the server internal components while the AC power cords are installed and power is supplied to the server.
PCIe Hot-Plug Status Indicators	■ Each PCIe card on the motherboard has a green power indicator and an amber attention status indicator (LED) associated with it. ■ If the green power LED is on and the amber attention LED is off, then the SSD is operating properly.

Status Indicator	Description
	■ If the amber attention LED is on, verify the state of the SSD in the Oracle Exadata Storage Server Cell Software to determine if the PCIe card is faulty and needs replacement.

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, use the information in the following table to troubleshoot the issue.

Cooling Issue	Description	Action	Prevention
External Ambient Temperature Too High	The server fans pull cool air into the server from its external environment. If the ambient temperature is too high, the internal temperature of the server and its components increases. This can cause poor performance and component failure.	Verify 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.	Periodically verify the ambient temperature of the server space to ensure that it is within the required range, especially if you 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.	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.	Periodically inspect and clean the server vents using an ESD certified vacuum cleaner. Ensure that all components, such as cards, cables, fans, air baffles and dividers are properly installed. Never operate the server without the top cover installed.
Cooling Areas Compromised	The air baffle, component filler panels, and server top cover maintain and direct the flow of cool air through the server. These server components must be in place for the server to function as a sealed system. If these components are not installed correctly, the airflow inside the server can become chaotic and non-directional, which can cause	Inspect the server interior to ensure that the air baffle is properly installed. Ensure that all external-facing slots (storage drive, 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.	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.

Cooling Issue	Description	Action	Prevention
	server components to overheat and fail.		
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.	Investigate the cause of the overtemperature event, and replace failed components *immediately*. For hardware troubleshooting information, see "Troubleshooting Server Hardware Faults" on page 25.	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, use the information in the following table to troubleshoot the issue.

Power Issue	Description	Action	Prevention
AC Power Connection	The AC power cords are the direct connection between the server power supplies and the power sources. The server power supplies need separate stable AC circuits. Insufficient voltage levels or fluctuations in power can cause server power problems. The power supplies are designed to operate at a particular voltage and within an acceptable range of voltage fluctuations (refer to "Electrical Requirements" in *Oracle Servers X7-2 and X7-2L Installation GuideOracle Exadata Storage Server X7-2 EF and HC Installation Guide*).	Verify that both AC power cords are connected to the server. Verify 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 verifying 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.	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 supply units (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 -** Use the Velcro straps on the back of the server to secure the power cord connectors to the back of the power supplies. The Velcro retaining straps minimize the risk of accidental disconnection.	Verify that the AC cables are connected to both power supplies. Verify that the power supplies are operational (the PSU indicator panel must 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.	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 maintains the air pressures inside the server, prevents accidental exposure to hazardous voltages, and protects internal components from physical and environmental damage.	Do not operate the server without the top cover installed unless you are hot-plugging a fan module, and then ensure that you complete the operation and replace the cover within 20 seconds. For instructions for properly replacing fan	Be careful to avoid bending or otherwise warping the top cover.

Power Issue	Description	Action	Prevention
		modules, see “Servicing Fan Modules” on page 73. For instructions for installing the server top cover, see “Install the Server Top Cover” on page 191.	

Managing Server Hardware Faults Using the Oracle ILOM Fault Management Shell

The Oracle ILOM Fault Management Shell enables you to view and manage fault activity on 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 4.0.x* in the Oracle Integrated Lights Out Manager (ILOM) 4.0 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 subsystems to disclose more subtle or intermittent hardware-related problems.

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

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 Main power mode and is not OS dependent.	Designed for remote and local access.
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.
UEFI Diagnostics	SP firmware	UEFI diagnostics can test and detect problems on all processors, memory, disk drives, and network ports.	You can use either the Oracle ILOM web interface or the command-line interface (CLI) to run UEFI diagnostics.	Remote access through Oracle ILOM Remote System Console Plus.
HWdiag	SP firmware	The HWdiag utility checks the status of a system and its components. You run the HWdiag utility within the Oracle ILOM Diag shell.	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.
Oracle Solaris commands	Operating system software	Displays various kinds of system information.	Requires operating system.	Local, and over network.
Oracle Linux commands	Operating system software	Displays various kinds of system information.	Requires operating system.	Local, and over network.
Oracle VTS	Diagnostic tool standalone software	Exercises and stresses the system, running tests in parallel.	Requires the Solaris operating system. Install Oracle VTS software separately.	View and control over network.

Diagnostic Tool Documentation

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

Diagnostic Tool	Documentation	Location
Oracle ILOM	Oracle Integrated Lights Out Manager 4.0 Documentation Library	http://www.oracle.com/goto/ilom/docs
System indicators and sensors	This document	"Troubleshooting Using the Server Front and Back Panel Status Indicators" on page 30
UEFI Diags	*Diagnostics and Troubleshooting Guide for Oracle x86 Servers with Oracle ILOM 4.0*	http://www.oracle.com/goto/x86admindiag/docs
Oracle VTS	Oracle VTS software and documentation	https://docs.oracle.com/cd/E83848_01/

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" on page 41
- "Back Panel Connector Locations" on page 42
- "Configuring Serial Port Sharing" on page 43
- "Ethernet Device Naming" on page 45
- "Back Panel Pinhole Switches" on page 45

▼ 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) connector as needed for OS support.**

   See "Back Panel Connector Locations" on page 42.

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

   See “Back Panel Connector Locations” on page 42.

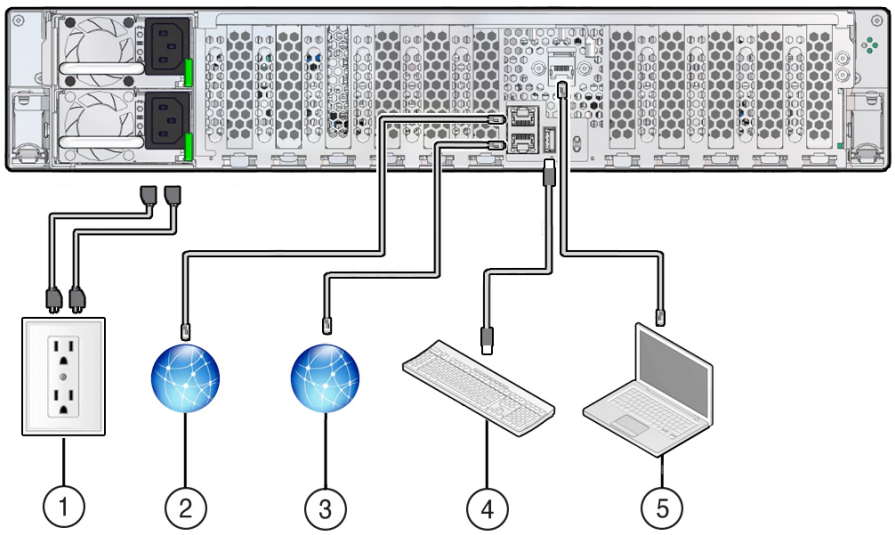
3. **To access the Oracle ILOM command-line interface (CLI) locally, connect a serial null modem cable to the RJ-45 serial port labeled SER MGT.**

   To access the system console, connect the RJ-45 cable to a terminal or terminal emulator, log on to Oracle ILOM, and type `start /HOST/console`.

   See “Back Panel Connector Locations” on page 42.

Back Panel Connector Locations

The following illustration shows and describes the locations of the back panel connectors. Use this information to set up the server, 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.

No.	Cable Port or Expansion Slot	Description
	Power supply 1 input power	Do not attach power cables to the power supplies until you finish 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 signals 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	Ethernet port (NET 0)	The Ethernet port enables you to connect the system to the network. The Ethernet port uses an RJ-45 cable for a 100/1000BASE-T connection.
4	USB port	The USB port supports hot-plugging. You can connect and disconnect a USB cable or a peripheral device while the server is running without affecting system operations.
5	Serial management port (SER MGT)	The service processor SER MGT port uses an RJ-45 cable and terminal (or emulator) to provide access to the Oracle ILOM command-line interface (CLI). Using Oracle ILOM, you can configure it to connect to the system console. **Note -** This port does not support network connections.

Configuring Serial Port Sharing

By default, the service processor (SP) controls the serial management (SER MGT) port and uses it to redirect the host serial console output. Using Oracle ILOM, you can assign the host console (COM1) as owner of the SER MGT port output, which allows the host console to output information directly to the SER MGT port. Serial port sharing is useful for Windows kernel debugging because you can view non-ASCII character traffic output from the host console.

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 first, and you switch the serial port owner to the host server, you cannot 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, restore access to the serial port on the server. For details, refer to the Oracle Integrated Lights Out Manager (ILOM) 4.0 Documentation Library at `http://www.oracle.com/goto/ilom/docs`.

If you accidentally lose access to Oracle ILOM, contact Oracle Service and follow the process to return the serial port ownership back to the SP.

You can assign serial port output using either Oracle ILOM CLI or web interface, as described in the following sections:

- “Assign Serial Port Output Using the Oracle ILOM CLI” on page 44

- "Assign Serial Port Output Using the Oracle ILOM Web Interface" on page 44

▼ Assign Serial Port Output Using the Oracle ILOM 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*

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

   For more information, refer to "Accessing Oracle ILOM" in the *Oracle X7 Series Servers Administration Guide*.

   The Oracle ILOM CLI prompt (`->`) appears.

2. **To set the serial port owner, type:**

   `->` **`set /System/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 Oracle ILOM Web Interface

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

   Open a web browser and direct it using the IP address of the server SP. Log in as root or a user with administrator privileges. Refer to "Accessing Oracle ILOM" in the *Oracle X7 Series Servers Administration Guide*.

   The Summary Information page appears.

2. **In the Oracle ILOM web interface, on the navigation menu on the left side of the screen, select ILOM Administration → Connectivity.**

3. **Click 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 Device Naming

This section contains information about the device naming for the one 10-Gigabit Ethernet port (labeled NET 0) on the back panel of the server. For location information, see "Back Panel Connector Locations" on page 42.

Ethernet Port Device Naming

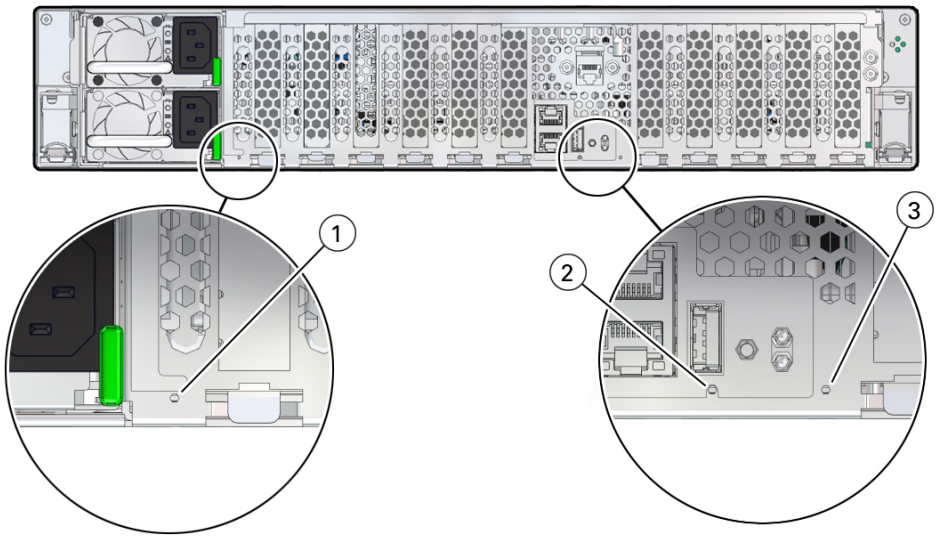
The device naming for the Ethernet interface is reported differently by different interfaces and operating systems. The following table shows the BIOS (physical) and operating system (logical) naming convention for the interface. This naming convention might vary depending on the conventions of your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

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

Port	Solaris	Linux	Windows
NET 0	igb0	■ Linux 6 - eth0 ■ Linux 7 - enp1	Ethernet **Note -** For Windows, port naming such as Ethernet is used by default. Windows allows you to rename the ports to meet application-specific needs.

Back Panel Pinhole Switches

Oracle Service personnel might instruct you to use the back panel pinhole switches to reset the NMI, Host Warm Reset, or SP, as shown in the following figure.



Callout	Icon	Description
1	NMI	Non-maskable interrupt (NMI)†
2	HOST	Host Warm Reset
3	SP	SP Reset

†Oracle Service use only.

Getting Help

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

- “Contacting Support” on page 47
- “Locating the System Serial Number” on page 47
- “Locating the Exadata Database Machine Rack Serial Numbers and JobID Label” on page 48

Contacting Support

If the troubleshooting procedures in this chapter do not 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 System Serial Number” on page 47

Locating the System Serial Number

When you ask for service on your system, you might need to have your server serial number. Record this number for future use. Use one of the following methods to locate your server serial number:

- On the front panel of the server, look to the left side of the chassis and below the status LEDs.

- Locate the Customer Information Sheet (CIS) attached to your server packaging. This sheet includes the serial number.
- From the Oracle ILOM web interface, go to the `System Information → Summary Information` page in the Oracle ILOM web interface.
- From the Oracle ILOM CLI, type `show /System`.

Locating the Exadata Database Machine Rack Serial Numbers and JobID Label

During a service call, you might need the serial numbers and the JobID label from the Exadata Database Machine rack. Record these numbers for future use. You can find the system serial numbers and JobID label in the following physical locations:

- Look for the Large System Serial Number label and JobID label on the front of the rack, inside the door, on the left vertical strut starting at rack unit 23 (U23) and going down.
- Look for the Small System Serial Number label on the top left portion of the cabinet from the rear above the power distribution unit (PDU).

Related Information

- “EF Front Panel Components” on page 17
- “HC Front Panel Components” on page 19

Preparing for Service

These sections describe safety considerations and provide prerequisite procedures and information about replacing components in the server:

Related Information

- "Returning the Server to Operation" on page 189

Safety Precautions

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

- Follow all standard cautions, warnings, and instructions marked on the equipment and described in the *Oracle Engineered System Safety and Compliance Guide, Compliance Model No.: ESY27* 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 50.
- Disconnect both power supply cords (if necessary) before servicing components.

Related Information

- "Safety Symbols" on page 50

- “Electrostatic Discharge Safety” on page 50

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 49
- “Electrostatic Discharge Safety” on page 50

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. See “Contacting Support” on page 47

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 when handling components such as drive assemblies, boards, or cards. When servicing or removing server components, disconnect the power cords from

the server, and 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 components.

- Use an antistatic mat.

  Place ESD-sensitive components such as the motherboard, DIMMS (memory modules), and other printed circuit board (PCB) cards on an antistatic mat. You can use the following items 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 49
- “Safety Symbols” on page 50
- “Preparing the Server for Component Replacement” on page 52
- “Returning the Server to Operation” on page 189

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 is stored in the replaceable unit identifiers) container of the three server replaceable units 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 you remove and replace a server FRU that contains the KIP, Oracle ILOM programs the KIP of the replacement component to contain the same KIP as the other two components.

Note - Replace only one quorum member at a time. Automated updates are completed only when two of the three quorum members contain matching key identity properties.

Related Information

- “Servicing Power Supplies” on page 81
- “Servicing the Disk Backplane” on page 139
- “Servicing the Motherboard Assembly” on page 175

Required Tools

The server can be serviced with the following tools:

- Antistatic wrist strap
- Antistatic mat
- No. 2 Phillips screwdriver
- Torx (6 lobe) T15, T25, and T30 screwdrivers
- 12.0 in-lbs/ft (inch-pounds/foot) torque driver

Related Information

- “Preparing for Service” on page 49

Preparing the Server for Component Replacement

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

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 53
- "Disconnect Cables From the Server" on page 59
- "Extend the Server to the Maintenance Position" on page 60
- "Remove the Server From the Rack" on page 62
- "Take Antistatic Measures" on page 63
- "Remove the Server Top Cover" on page 64

Related Information

- "Returning the Server to Operation" on page 189

Powering Down the Server

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

Note - Some server components are hot-pluggable, such as storage drives, power supplies, fan modules, and M.2 flash SSDs. Components that are hot-pluggable do not require the server to be powered down when performing service procedures.

Description	Link
Power down the server gracefully to prevent data from being corrupted. Performing a graceful shutdown ensures that the system is ready for restart.	■ "Power Down the Server Gracefully Using the Oracle ILOM CLI" on page 54 ■ "Power Down the Server Gracefully Using the Oracle ILOM Web Interface" on page 55 ■ "Power Down the Server Gracefully Using the On/Standby Button" on page 56
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 Oracle ILOM CLI" on page 57 ■ "Power Down the Server for Immediate Shutdown Using the Oracle ILOM Web Interface" on page 58 ■ "Power Down the Server for Immediate Shutdown Using the On/Standby Button" on page 59

Related Information

- "Power On the Server" on page 195

▼ Power Down the Server Gracefully Using the Oracle ILOM CLI

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

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

   Depending on the nature of the problem, you might want to view the system status or the log files or run diagnostics before you shut down the system. For log file information, refer to the Oracle Integrated Lights Out Manager (ILOM) 4.0 Documentation Collection at `http://www.oracle.com/goto/ilom/docs`.

2. **Notify affected users that the server is going to be powered down.**

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

   For specific information about these processes, refer to your application documentation.

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

   For instructions, refer to the *Oracle Exadata Database Machine Installation and Configuration Guide* at `https://docs.oracle.com/cd/E80920_01/index.htm`.

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

```
-> stop /System
```

Note - The `stop /System` command does not guarantee a system shutdown. This command is only a request to the host operating system (OS) to perform a system shutdown. To ensure a system shutdown, see "Power Down the Server for Immediate Shutdown Using the Oracle ILOM CLI" on page 57.

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

The host server performs an orderly power shutdown to Standby power mode, and the System OK LED on the front panel begins blinking. See "Server System-Level Status Indicators" on page 31.

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

   See "Disconnect Cables From the Server" on page 59.

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, disconnect the power cords from the power supplies.

Related Information

- "Power Down the Server Gracefully Using the Oracle ILOM Web Interface" on page 55
- "Power Down the Server Gracefully Using the On/Standby Button" on page 56
- "Power Down the Server for Immediate Shutdown Using the On/Standby Button" on page 59
- "Power On the Server" on page 195

▼ Power Down the Server Gracefully Using the Oracle ILOM Web Interface

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

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

   Depending on the nature of the problem, you might want to view the system status or the log files or run diagnostics before you shut down the system. For log file information, refer to the Oracle Integrated Lights Out Manager (ILOM) 4.0 Documentation Collection at `http://www.oracle.com/goto/ilom/docs`.

2. **Notify affected users that the server is going to be powered down.**

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

   For specific information about these processes, refer to your application documentation.

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

   For instructions, refer to the *Oracle Exadata Database Machine Installation and Configuration Guide* at `https://docs.oracle.com/cd/E80920_01/index.htm`.

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

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

The host server performs an orderly power shutdown to Standby power mode, and the System OK LED on the front panel begins blinking. See "Server System-Level Status Indicators" on page 31.

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

   See "Disconnect Cables From the Server" on page 59.

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, disconnect the power cords from the power supplies.

Related Information

- "Power Down the Server Gracefully Using the Oracle ILOM CLI" on page 54
- "Power Down the Server Gracefully Using the On/Standby Button" on page 56
- "Power Down the Server for Immediate Shutdown Using the On/Standby Button" on page 59
- "Power On the Server" on page 195

▼ Power Down the Server Gracefully Using the On/Standby Button

1. **Press and quickly release the On/Standby button on the front panel.**

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

   When Main power is off, the System OK LED on the front panel begins blinking, indicating that the server is in Standby power mode. See "Server System-Level Status Indicators" on page 31.

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

   See "Disconnect Cables From the Server" on page 59.

Caution - When you power down the server using the On/Standby 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, disconnect the power cords from the power supplies.

Related Information

- “Server System-Level Status Indicators” on page 31
- “Power Down the Server Gracefully Using the Oracle ILOM CLI” on page 54
- “Power Down the Server Gracefully Using the Oracle ILOM Web Interface” on page 55
- “Power On the Server” on page 195

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

Caution - This procedure quickly forces the server Main power off. An immediate power-off might corrupt the system data. Therefore, 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 to Standby power mode, and the System OK LED on the front panel begins blinking. See “Server System-Level Status Indicators” on page 31.

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

   See “Disconnect Cables From the Server” on page 59.

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 On/Standby Button” on page 59
- “Power Down the Server for Immediate Shutdown Using the Oracle ILOM Web Interface” on page 58

- “Power On the Server” on page 195

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

Caution - This procedure quickly forces the server Main power off. An immediate power-off might corrupt the system data. Therefore, 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 in the Select Action list, click Immediate Power Off.**

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

   The server powers down immediately to Standby power mode, and the System OK LED on the front panel begins blinking. See “Server System-Level Status Indicators” on page 31.

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

   See “Disconnect Cables From the Server” on page 59.

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 On/Standby Button” on page 59
- “Power Down the Server for Immediate Shutdown Using the Oracle ILOM CLI” on page 57
- “Power On the Server” on page 195

▼ Power Down the Server for Immediate Shutdown Using the On/Standby Button

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.

1. **Press and hold the On/Standby button for four seconds to force the Main power off and to enter Standby power mode.**

   When Main power is off, the System OK LED on the front panel begins blinking, indicating that the server is in Standby power mode. See "Server System-Level Status Indicators" on page 31.

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

   See "Disconnect Cables From the Server" on page 59.

Caution - When you power down the server using the On/Standby 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 31
- "Power Down the Server for Immediate Shutdown Using the Oracle ILOM CLI" on page 57
- "Power Down the Server for Immediate Shutdown Using the Oracle ILOM Web Interface" on page 58
- "Power On the Server" on page 195

▼ Disconnect Cables From the Server

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

1. **Label all cables connected to the server.**
2. **Power down the server.**
   See “Powering Down the Server” on page 53.
3. **Disconnect the power cords from the back of the server.**
4. **Disconnect all data cables from the back of the server.**
5. **If your rackmount kit includes a cable management device, remove the cables from it.**
6. **Depending on the components that you are servicing, either extend the server to the maintenance position, or remove the server from the rack.**

Related Information

- “EF Back Panel Components and Cable Connections” on page 18
- “Powering Down the Server” on page 53
- “Extend the Server to the Maintenance Position” on page 60
- “Remove the Server From the Rack” on page 62
- “Reconnect Power and Data Cables” on page 194

▼ Extend the Server to the Maintenance Position

You can service the following components with the server in the maintenance position:

- Storage drives
- Fan modules
- Power supplies
- DDR4 DIMMs
- PCIe cards and cables
- SAS cables
- M.2 Flash drives
- System battery
- Processors
- Disk backplane
- Front indicator module
- Motherboard

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

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

   For instructions for stabilizing the rack, refer to "Stabilize the Rack" in *Oracle Exadata Storage Server X7-2 EF and HC Installation Guide*. Also refer to the *Oracle Rack Cabinet User's Guide* at `https://docs.oracle.com/cd/E85660_01/index.html`.

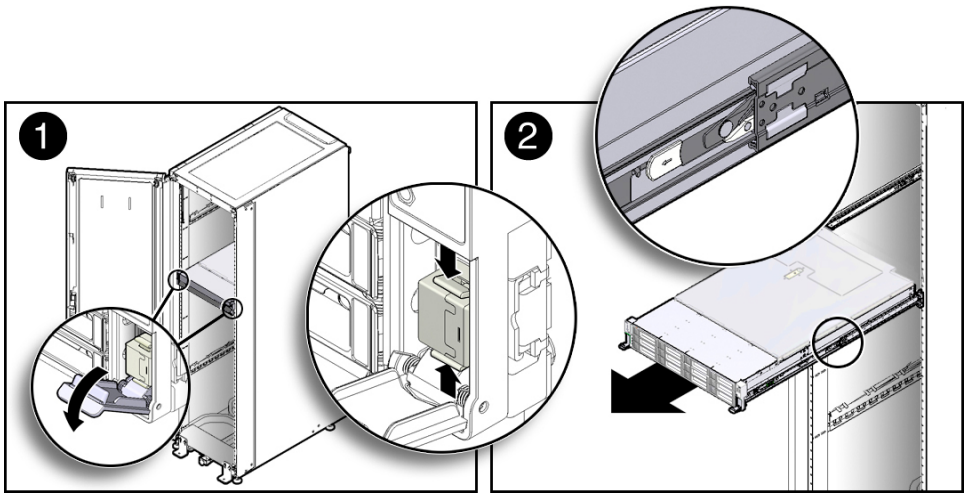
2. **Verify that no cables are damaged or are going to interfere when the server is extended.**

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

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

   When in an open position, the release latch covers engage the slide-rail release latches [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 59
- "Remove the Server From the Rack" on page 62
- "Reinstall the Server Into the Rack" on page 192

▼ Remove the Server From the Rack

Caution - The EF server weighs approximately 22.8 kg (50.2 lb). The HC server weighs approximately 30.5 kg (67.1 lb). 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).**

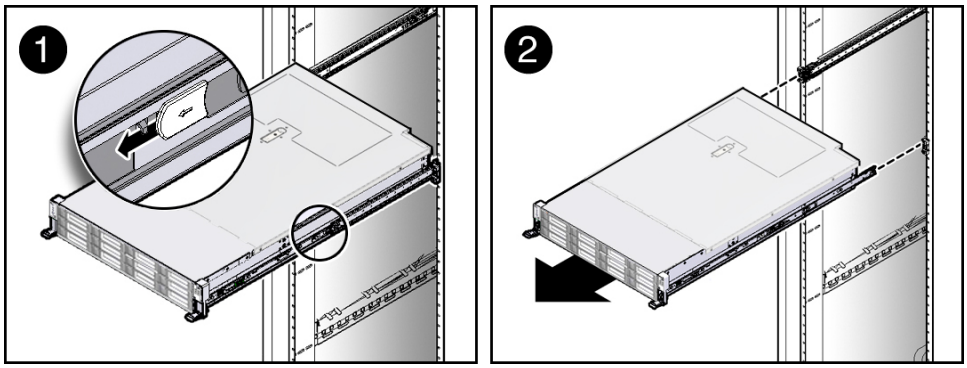
   For instructions for removing the CMA, see the "Remove the Cable Management Arm" in *Oracle Exadata Storage Server X7-2 EF and HC Installation Guide*.

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

   See "Extend the Server to the Maintenance Position" on page 60.

4. **From the front of the server, pull the green slide-rail release tabs toward the front of the server, and pull the server out of the rack until it is free of the rack rails [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 59
- “Extend the Server to the Maintenance Position” on page 60
- “Reinstall the Server Into the Rack” on page 192

▼ 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. You can use the following items 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 the procedures for servicing the server.

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

Related Information

- “Extend the Server to the Maintenance Position” on page 60
- “Remove the Server From the Rack” on page 62
- “Remove the Server Top Cover” on page 64
- “Remove Antistatic Measures” on page 192

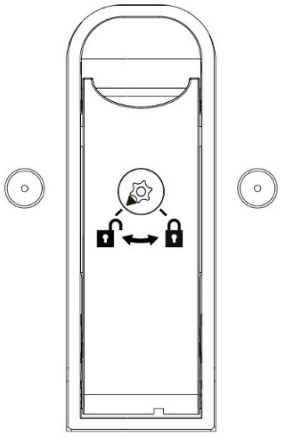
▼ Remove the Server Top Cover

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

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

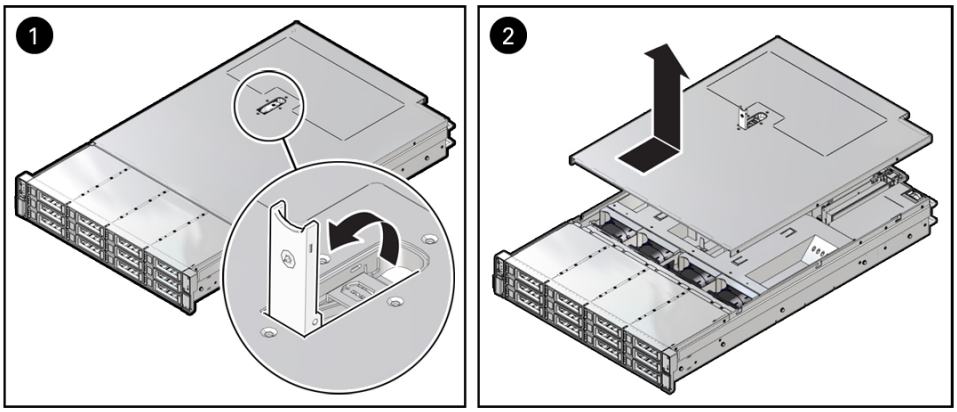
Note - Fan modules and M.2 flash SSDs are hot-pluggable and do not require AC power cables to be disconnected from the server power supplies.

2. **If the release button latch is in the locked position, use a Torx T15 screwdriver to turn the release button latch clockwise to the unlocked position.**



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

   Lift up on the release button on top of the server cover. Lifting the release button causes the server cover to slide toward the rear of the chassis for easy removal.



4. **Lift up and remove the top cover [2].**

Related Information

- “Take Antistatic Measures” on page 63
- “Install the Server Top Cover” on page 191

Servicing Storage Drives

This section describes how to service storage drives only in the HC server. The EF server does not support storage drives. The storage drive slots in the EF server contain filler panels. Storage drives are replaceable units that do not require you to power off the server. For more information about replaceable units, see “Illustrated Parts Breakdown” on page 22 and “Replaceable Units” on page 23.

Related Information

- “Servicing SAS Cables” on page 169

Storage Drives Hot-Plug Conditions

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

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

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

If either of the disk drive conditions applies, shut down the system before you replace the drive. See “Powering Down the Server” on page 53.

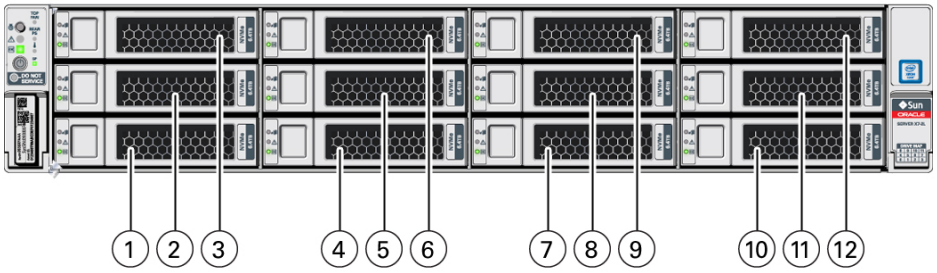
Note - Replacing a drive does not require removing the server from a rack.

Related Information

- “Storage Drive Status Indicators” on page 33
- “Removing and Replacing a Storage Drive” on page 69

Storage Drive Locations and Numbering

The following illustration shows the location of the drives and the internal system software designations for the drives. For information on storage drive status indicators (LEDs), see “Storage Drive Status Indicators” on page 33.



Callout	Description
1	Storage drive 0 HDD
2	Storage drive 4 HDD
3	Storage drive 8 HDD
4	Storage drive 1 HDD
5	Storage drive 5 HDD
6	Storage drive 9 HDD
7	Storage drive 2 HDD
8	Storage drive 6 HDD
9	Storage drive 10 HDD
10	Storage drive 3 HDD

Callout	Description
11	Storage drive 7 HDD
12	Storage drive 11 HDD

Removing and Replacing a Storage Drive

The following sections describe how to remove and replace an HDD storage drive.

▼ Remove a Storage Drive

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

   Refer to "Take Antistatic Measures" on page 63.

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

   For storage drive locations, see "Storage Drive Locations and Numbering" on page 68.

3. **Remove the storage drive.**

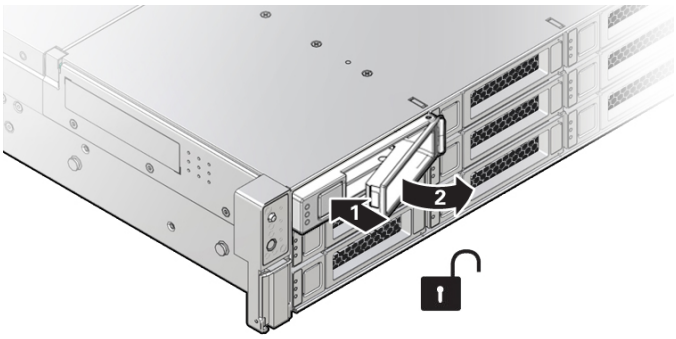
   If you are removing an HDD storage drive, type the required operating system commands to stop the server from using the drive; otherwise, proceed to the next step.

   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 might not light, as support for this varies depending on the operating system in use. For information on storage drive status indicators (LEDs), refer to "Storage Drive Status Indicators" on page 33.

---

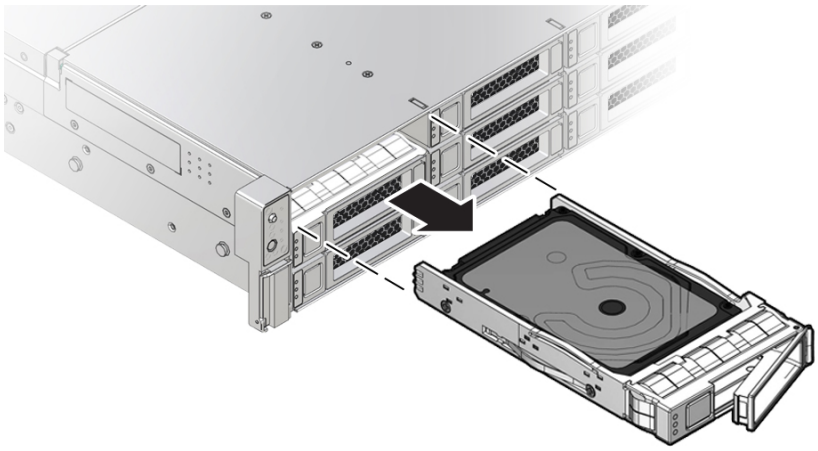
4. **Push the latch release button to open the drive latch [1, 2].**



Callout	Description
1	Pressing the latch release button.
2	Opening the latch.

Caution - The latch is not an ejector. Do not open the latch too far to the right. Doing so can damage the latch.

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



6. **Consider your next steps:**

   - If you are replacing the drive, continue to “Install a Storage Drive” on page 71.
   - If you are not replacing the drive, install a drive slot filler in the empty drive slot to maintain proper airflow, and perform administrative tasks to configure the server to operate without the drive.

     For information on how to install a storage drive filler panel, see “Remove and Install Filler Panels” on page 189.

Related Information

- “Storage Drive Status Indicators” on page 33
- “Storage Drives Hot-Plug Conditions” on page 67
- “Install a Storage Drive” on page 71

▼ Install a Storage Drive

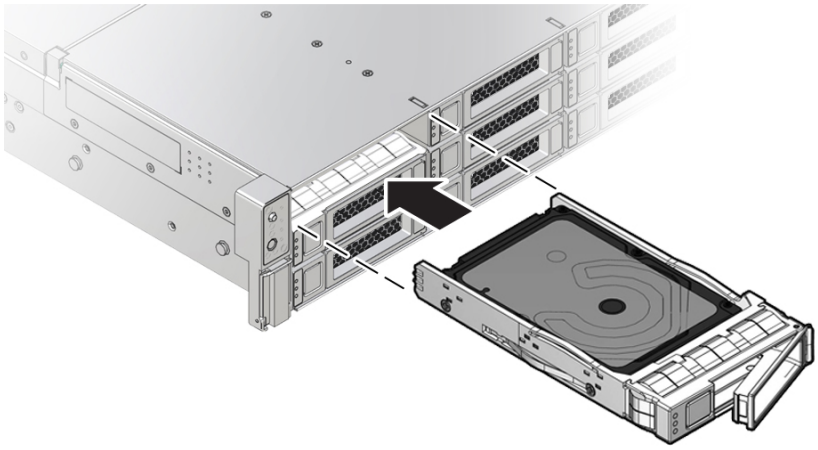
1. **Remove the replacement drive from its packaging, and place the drive on an antistatic mat.**

2. **If necessary, remove the drive filler panel. See "Remove and Install Filler Panels" on page 189.**

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.**

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

Related Information

- "Storage Drive Status Indicators" on page 33
- "Storage Drives Hot-Plug Conditions" on page 67
- "Remove a Storage Drive" on page 69

Servicing Fan Modules

This section describes how to service fan modules. Fan modules are replaceable units that do not require you to power off the server. For more information about replaceable units, see “Illustrated Parts Breakdown” on page 22 and “Replaceable Units” on page 23.

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

- “Remove a Fan Module” on page 73
- “Install a Fan Module” on page 75
- “Remove the Fan Tray” on page 77
- “Install the Fan Tray” on page 78

Related Information

- “Remove the Server Top Cover” on page 64

▼ Remove a Fan Module

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

Do 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 Oracle Exadata Storage Server X7-2, complete the entire procedure within 60 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 one fan motor per fan. The two fan motors provide separate tachometer signals so that the fan module reports two tach signals to Oracle ILOM. Even if only one fan motor is faulted within the fan module, the Oracle ILOM service processor detects that two fan motors have failed to spin while the fan module is removed. If you do not replace the fan module within 20 seconds of removal, Oracle ILOM takes the protective action to shut down the system to prevent thermal damage to the system.

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

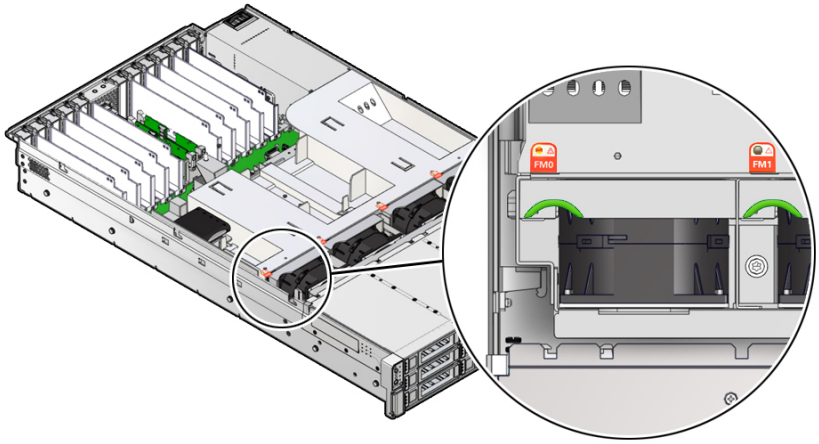
   See “Extend the Server to the Maintenance Position” on page 60.

2. **To access the fan modules, remove the server top cover.**

   See “Remove the Server Top Cover” on page 64.

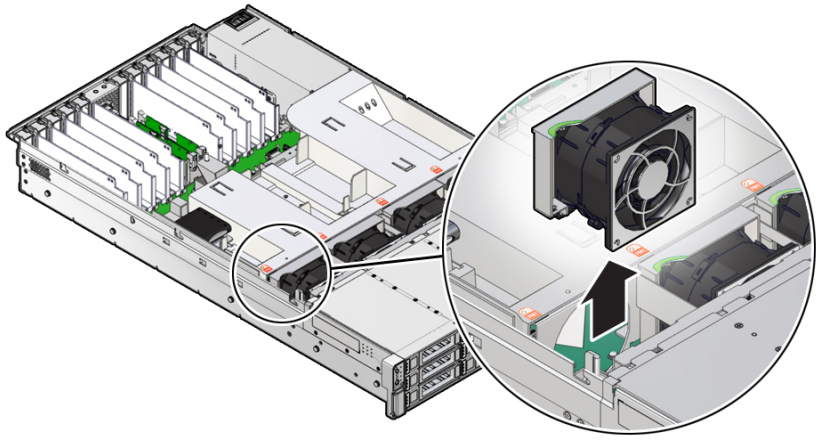
3. **Identify the faulty fan module.**

   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.



LED Color and State Meaning
Amber – The fan module is faulty. The front Top Fan LED and the front and back panel Fault-Service Required LEDs also are lit if the system detects a fan module fault.

4. **Using your forefinger and thumb, lift the fan module straight up and out of the chassis and set it aside on an antistatic mat.**



5. **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 75.

Related Information

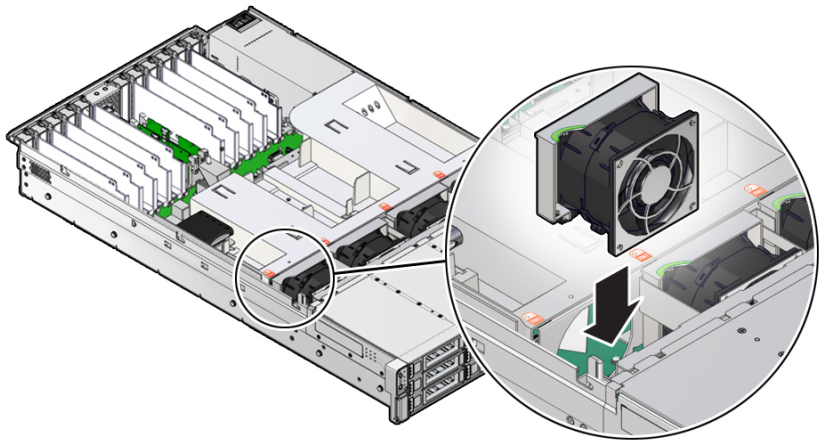
- "Install a Fan Module" on page 75

▼ Install a Fan Module

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

2. **With the server top cover removed, install the replacement fan module into the server.**

The fan modules are keyed to ensure that they are installed in the correct orientation.



3. **Press down on the fan module to fully seat the fan module.**

4. **Verify that the fan module status indicator (LED) on the replacement fan module is not illuminated.**

5. **Install the server top cover.**

   See “Install the Server Top Cover” on page 191.

6. **Verify that the Top Fan Fault LED on the front of the server and the Fault-Service Required LEDs on the front and back of the server are off.**

   See “Server System-Level Status Indicators” on page 31 for more information about identifying and interpreting system status indicators.

7. **Consider your next step:**

   - If you installed the fan module as part of another procedure, return to that procedure.
   - Otherwise, if you powered off the server, return the server to operation. See “Returning the Server to Operation” on page 189.

Related Information

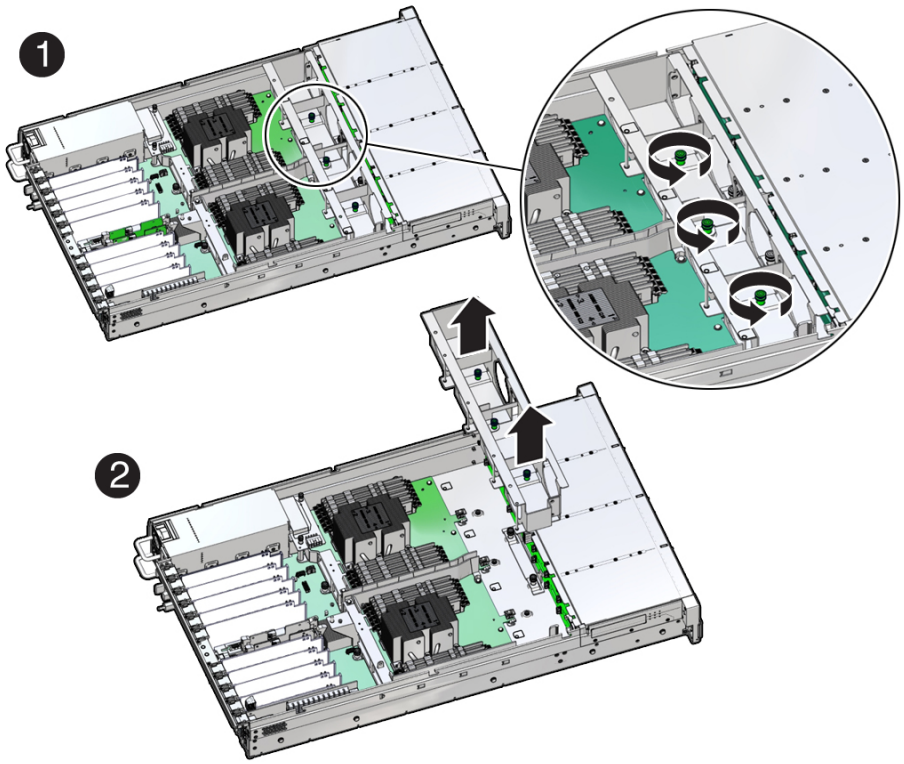
- “Remove a Fan Module” on page 73

Remove the Fan Tray

Perform this procedure only when servicing the following replaceable units:

- Disk backplane
- SAS cables
- Motherboard assembly

1. **Using a Torx T25 screwdriver, loosen the three spring-mounted screws that secure the fan tray to the server chassis [1].**



2. **Lift the fan tray from the server [2].**

3. **Continue with the next step in the service procedure.**

Related Information

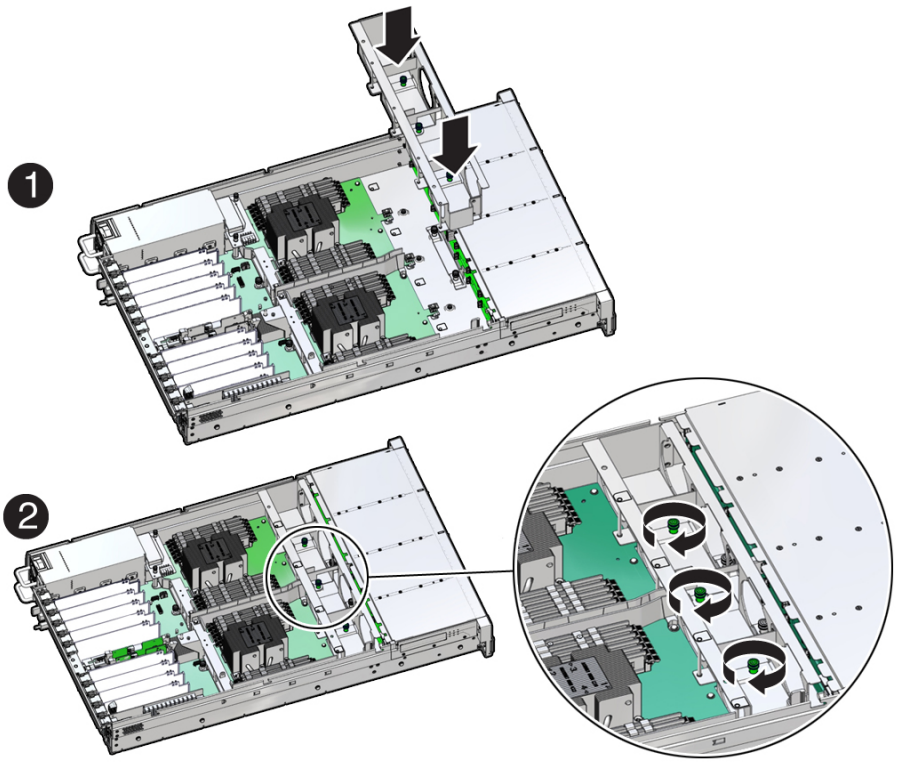
- “Remove a Fan Module” on page 73
- “Servicing the Disk Backplane” on page 139
- “Servicing SAS Cables” on page 169
- “Servicing the Motherboard Assembly” on page 175

Install the Fan Tray

Perform this procedure only when servicing the following replaceable units:

- Disk backplane
- SAS cables
- Motherboard assembly

1. **Lower the fan tray into the server [1].**



2. **Using a Torx T25 screwdriver, tighten the three spring-mounted screws that secure the fan tray to the server chassis [2].**

3. **Continue with the next step in the service procedure.**

Related Information

- “Install a Fan Module” on page 75
- “Servicing the Disk Backplane” on page 139
- “Servicing SAS Cables” on page 169
- “Servicing the Motherboard Assembly” on page 175

Servicing Power Supplies

This section describes how to service power supplies. Power supplies are replaceable units that do not require you to power off the server. For more information about replaceable units, see “Illustrated Parts Breakdown” on page 22 and “Replaceable Units” on page 23.

The power supplies are located at the back of the server. See the following procedures:

Power Supply Overview

The server redundant power supplies support concurrent maintenance, which allows 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 A266 (1200 watt) power supplies. The A266 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-pluggable, and in most cases, 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 processor (CPU) and memory power in the event that a PSU is lost. The resulting power savings is 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 back Fault-Service Required LEDs
- Amber Fault-Service Required LED on the faulty power supply
- Back Power Supply Fault-Service Required LED located on the server front panel

For more information, see “Power Supply Status Indicators” on page 34.

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.

Related Information

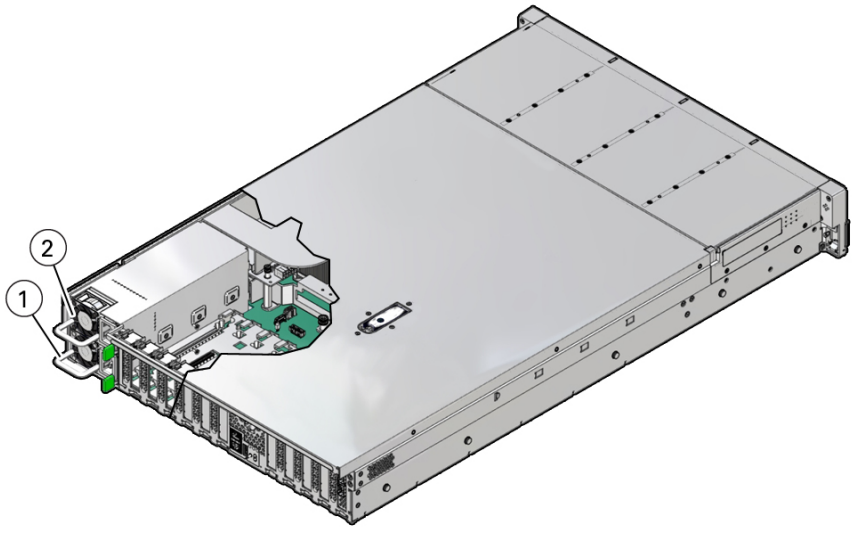
- “Troubleshooting Using the Server Front and Back Panel Status Indicators” on page 30

▼ Remove a Power Supply

1. **Prepare the system for power supply removal.**

   Refer to “Take Antistatic Measures” on page 63.

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



Callout	Description
1	Power supply 0
2	Power supply 1

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

Alternatively, to list all known faults in the server, log in to Oracle Solaris and issue the `fmadm faulty` command, or log in to the Oracle ILOM service processor from the Oracle ILOM Fault Management Shell and issue the `fmadm faulty` command. For more information about how to use the Oracle ILOM Fault Management Shell and supported commands, refer to the *Oracle ILOM User's Guide for System Monitoring and Diagnostics Firmware Release 4.0.x* in the Oracle Integrated Lights Out Manager (ILOM) 4.0 Documentation Library at `http://www.oracle.com/goto/ilom/docs`.

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

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

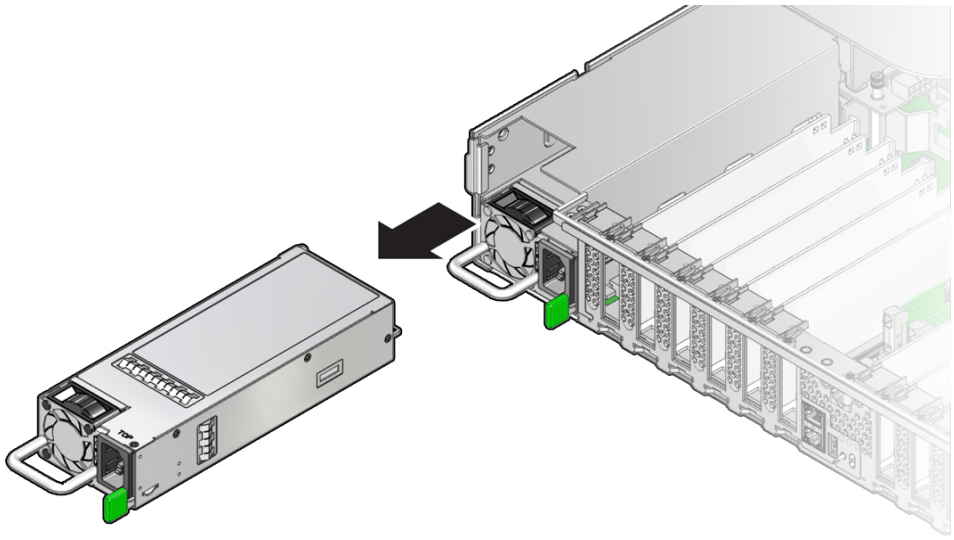
4. **If the cable management arm (CMA) is installed, disconnect both CMA left-side connectors, and move the CMA out of the way.**

   For instructions for disconnecting the CMA left-side connectors, refer to "Remove the Cable Management Arm" in *Oracle Exadata Storage Server X7-2 EF and HC 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.

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

6. **Grasp the power supply handle and push the power supply latch to the left.**



7. **Pull the power supply out of the chassis.**

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

8. **Continue to "Install a Power Supply" on page 84.**

Related Information

- "EF Back Panel Components and Cable Connections" on page 18
- "Power Supply Status Indicators" on page 34
- "Install a Power Supply" on page 84

Install a Power Supply

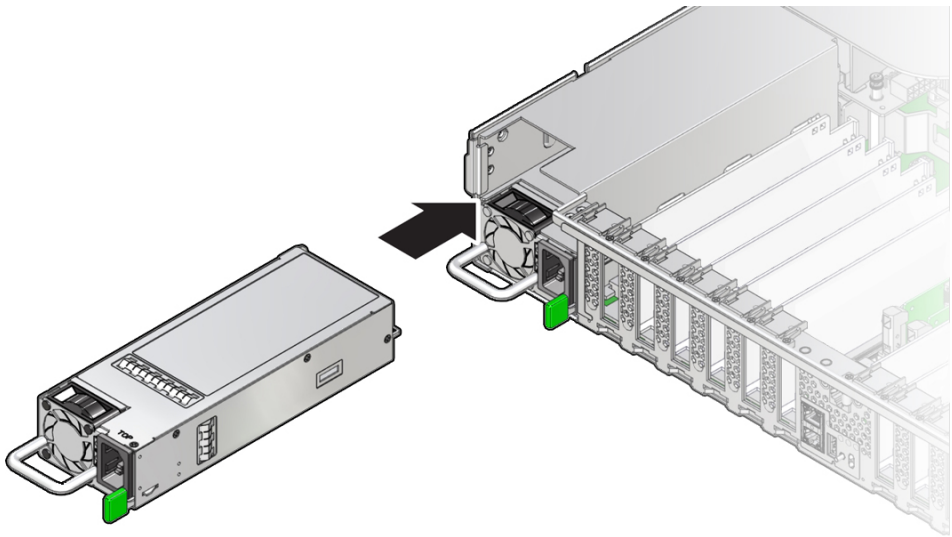
Caution - Always replace the failed power supply with the same type model of power supply.

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 hear an audible click when the power supply fully seats.



4. **Reconnect the power cord to the power supply.**

5. **Verify that the amber Fault-Service Required LED on the replaced power supply and the Fault-Service Required LEDs are not lit on the front and back panels.**

Note - After you replace Power Supply 0, you might need to reset the Oracle ILOM service processor (SP) to propagate the key identity properties (KIP) data to the new power supply. For instructions on resetting the SP, refer to the *Oracle Integrated Lights Out Manager (ILOM) 4.0 Configuration and Maintenance Guide Firmware Release 4.0.x* at `http://www.oracle.com/goto/ilom/docs`. Power Supply 1 does not contain KIP data, and therefore does not require an SP reset after replacement.

---

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

For instructions for reconnecting the CMA left-side connectors, refer to "Install the Cable Management Arm (Optional)" in *Oracle Exadata Storage Server X7-2 EF and HC Installation Guide*.

Related Information

- "EF Back Panel Components and Cable Connections" on page 18
- "Power Supply Status Indicators" on page 34
- "Remove a Power Supply" on page 82

Servicing the Internal M.2 Flash SSDs

This section describes how to service M.2 flash solid-state drives (SSDs). M.2 flash SSDs are replaceable units that do not require you to power off the server. For more information about replaceable units, see “Illustrated Parts Breakdown” on page 22 and “Replaceable Units” on page 23.

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 63.

This section covers the following procedures:

- “Remove a Flash Riser Board” on page 87
- “Install a Flash Riser Board” on page 89
- “Identify and Remove an M.2 Flash SSD” on page 91
- “Install an M.2 Flash SSD” on page 93

Related Information

- “Servicing Storage Drives” on page 67

▼ Remove a Flash Riser Board

The server can be equipped with up to two hot-pluggable flash riser boards. Each flash riser board contains an M.2 flash SSD.

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

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

      See “Extend the Server to the Maintenance Position” on page 60.

b. **Attach an antistatic wrist strap to your wrist, and then to a metal area on the chassis. See "Take Antistatic Measures" on page 63.**

c. **Remove the server top cover. See "Remove the Server Top Cover" on page 64.**

2. **To remove the flash riser board, do the following:**

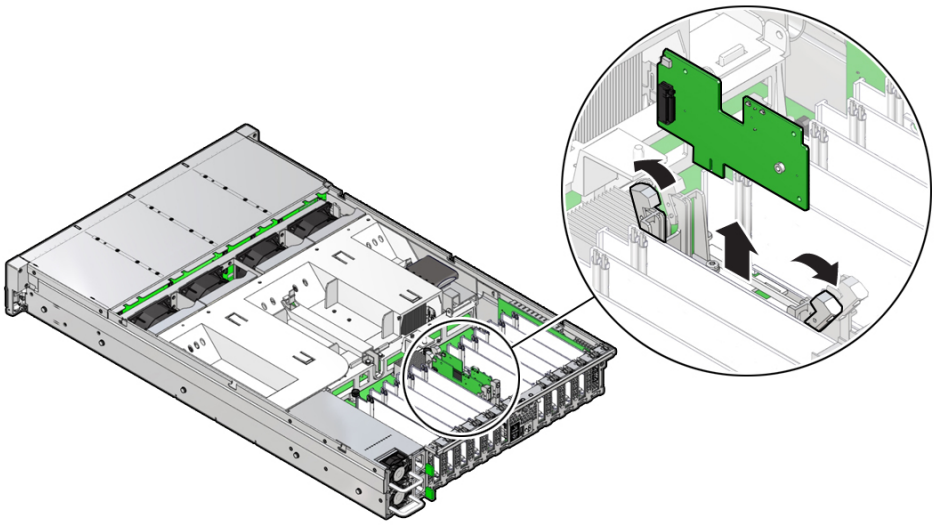
a. **Rotate both riser board socket levers outward as far as they go.**

Note - The green power LED on the riser board is extinguished when you open the socket levers.

---

b. **Carefully lift the riser board straight up to remove it from the sockets.**

Place the riser board on an antistatic mat. If required, perform the procedures for removing the M.2 flash SSD from the flash riser board. For instructions, see "Identify and Remove an M.2 Flash SSD" on page 91.



Related Information

- "Install a Flash Riser Board" on page 89

Install a Flash Riser Board

The system motherboard provides two slots (labeled **0 M.2** and **1 M.2**) for flash riser boards. When installing flash riser boards, install the first riser board into slot **0 M.2** and then into **1 M.2**.

1. **Unpack the replacement flash riser board and place it on an antistatic mat.**

   If required, ensure that you installed an M.2 flash SSD onto the riser board before installing the riser board into the server. For instructions, see “Install an M.2 Flash SSD” on page 93.

2. **Install the flash riser board.**

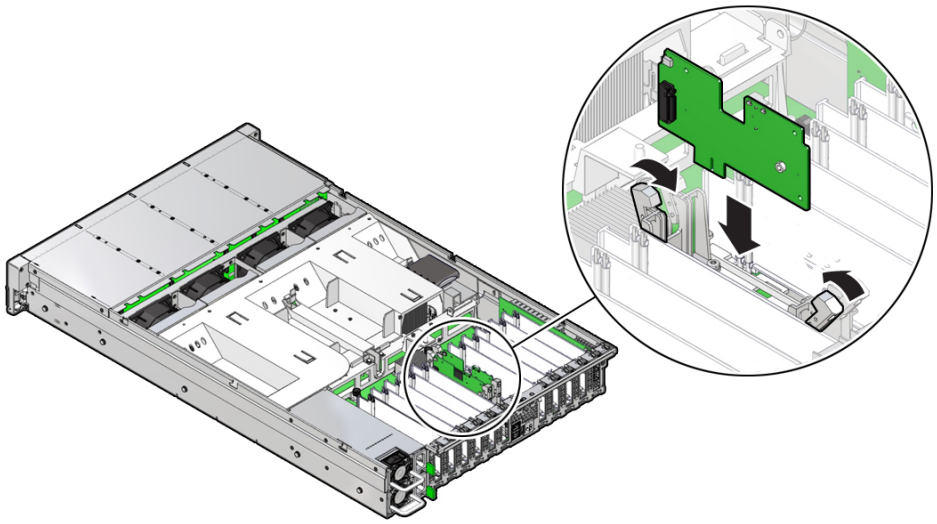
   a. **Ensure that the riser board socket levers are in the open position.**

   b. **Align the notch in the replacement riser board with the connector key in the connector socket.**

      The notch ensures that the riser board is oriented correctly.

   c. **Push the riser board into the connector socket until the riser board is securely seated in the socket.**

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



d. **Rotate the riser board socket levers inward until the riser board is secured in place.**

3. **(Optional) Repeat Step 2 to install a second flash riser board into the server.**

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

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

      See “Install the Server Top Cover” on page 191.

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

      See “Return the Server to the Normal Rack Position” on page 193.

Related Information

- “Remove a Flash Riser Board” on page 87

Identify and Remove an M.2 Flash SSD

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

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

      See “Extend the Server to the Maintenance Position” on page 60.

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

      See “Take Antistatic Measures” on page 63.

   c. **Remove the server top cover.**

      See “Remove the Server Top Cover” on page 64.

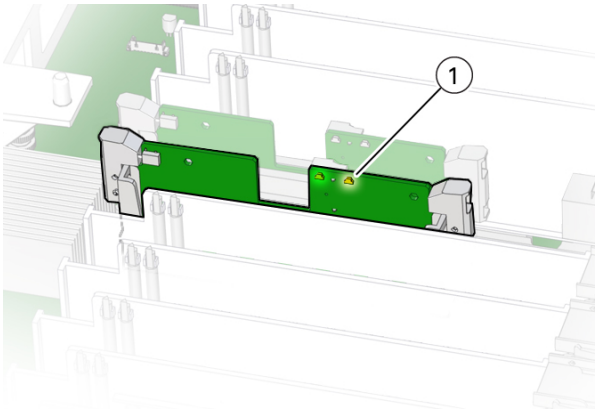
2. **Identify and note the location of the faulty M.2 flash SSD by pressing the Fault Remind button on the motherboard.**

   See “Using the Server Fault Remind Button” on page 106.

   Faulty SSDs are identified with a corresponding amber LED on the flash riser board.

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

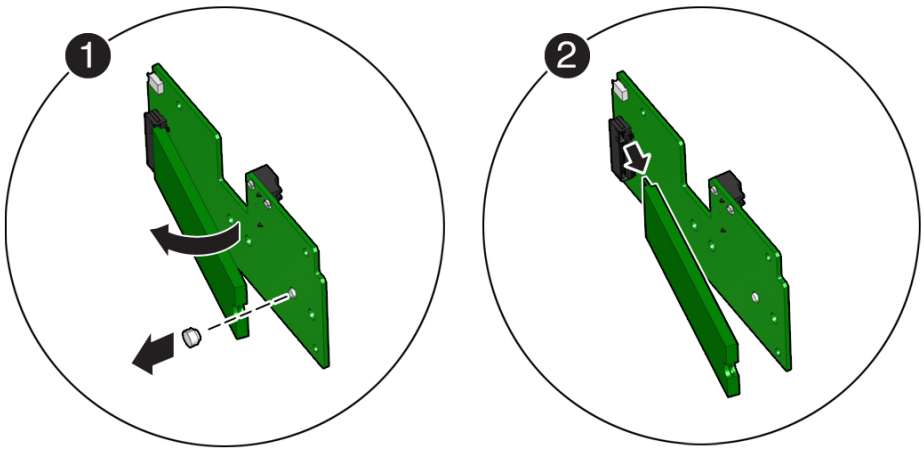
Note - The green Power LED indicator is illuminated when power is being applied to the system. The green Power LED indicator is extinguished when you open the riser board socket levers.



3. **Perform the steps to remove the flash riser board containing the M.2 flash SSD from the server.**

   For instructions, see “Remove a Flash Riser Board” on page 87. Place the riser board on an antistatic mat.

4. **Using your fingers, push the plastic retainer clip through the flash riser board to release the M.2 flash SSD from the riser board. [1].**



5. **Remove the plastic retainer clip from the M.2 flash SSD.**

6. **Remove the M.2 flash SSD from the riser board [2].**

   a. **Lift up on the end of the M.2 flash SSD where the plastic retainer clip was removed by one-half to one inch.**

   b. **Gently slide the M.2 flash SSD card toward the back of the riser board and out of the connector to disengage the SSD contacts from the riser board socket.**

      Place the M.2 flash SSD on an antistatic mat.

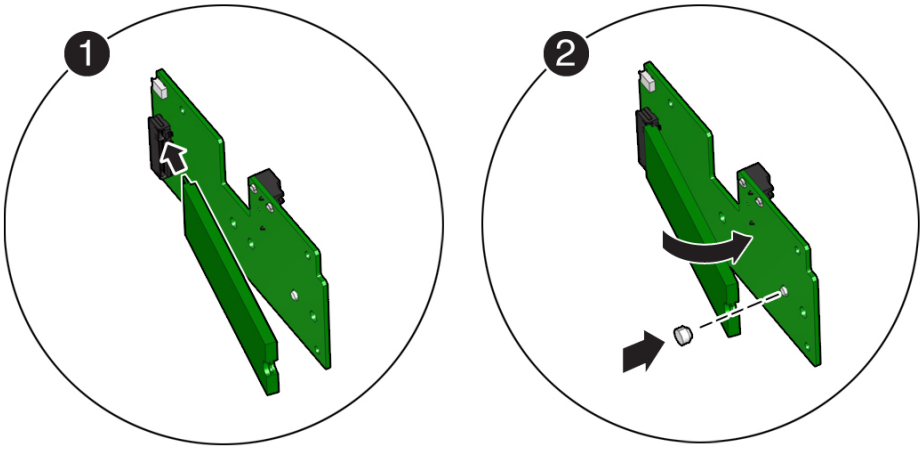
Related Information

- "Install an M.2 Flash SSD" on page 93

▼ Install an M.2 Flash SSD

Note - Install the M.2 flash SSD only in the socket labeled SSD0.

1. **Unpack the replacement M.2 flash SSD.**
2. **Install the M.2 flash SSD.**
   a. **Align and then insert the plastic retainer clip into the slot on the M.2 flash SSD.**
   b. **Hold the M. 2 flash SSD so that the end of the card containing the plastic retainer clip is approximately one-half to one inch above the riser board and the other end is adjacent to the riser SSD socket [1].**



   c. **Gently slide the M.2 flash SSD forward and into the connector to engage the flash SSD contacts with the riser board socket [2].**
   d. **Using your fingers, push down on the end of the card containing the plastic retainer clip until the M.2 flash SSD snaps into place on the riser board [2].**
      You hear an audible click when the M.2 flash SSD is secured to the flash riser board.
3. **Perform the steps to install the M.2 flash riser board with the replacement flash SSD into the server.**
   For instructions, see "Install a Flash Riser Board" on page 89.
4. **Return the server to operation.**
   a. **Install the server top cover.**

See “Install the Server Top Cover” on page 191.

b. Return the server to the normal rack position.

See “Return the Server to the Normal Rack Position” on page 193.

Related Information

- “Identify and Remove an M.2 Flash SSD” on page 91

Servicing the Air Baffle

This section describes how to service the air baffle. The air baffle is a replaceable unit that requires you to power off the server. For more information about replaceable units, see “Illustrated Parts Breakdown” on page 22 and “Replaceable Units” on page 23.

Caution - To prevent the system from overheating, ensure that the air baffle is correctly installed before powering on the system.

Caution - You must disconnect all power cables from the system before performing these procedures.

This section covers the following procedures:

- “Remove the Air Baffle” on page 97
- “Install the Air Baffle” on page 99

Related Information

- “Servicing the DIMMs” on page 103
- “Servicing Processors” on page 125

▼ Remove the Air Baffle

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

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

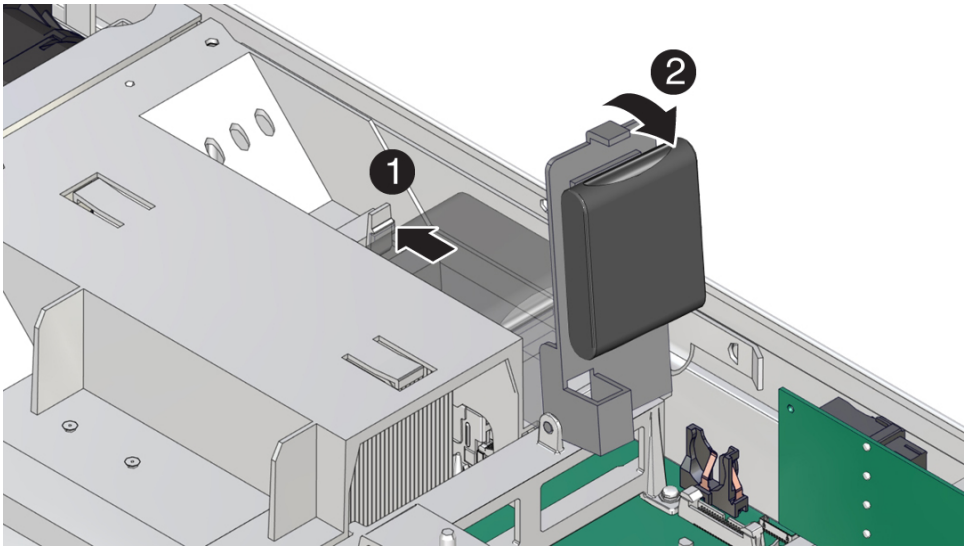
      See “Powering Down the Server” on page 53.

   b. **Extend the server into the maintenance position. See “Take Antistatic Measures” on page 63.**

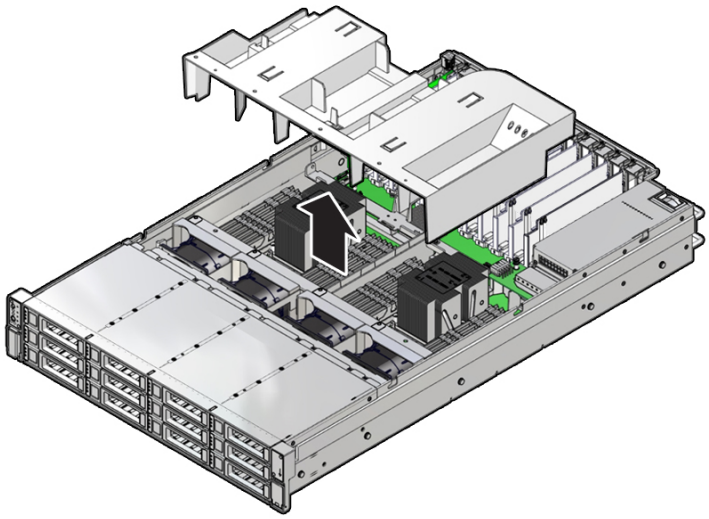
c. **Attach an antistatic wrist strap to your wrist, and then to a metal area on the chassis. See “Take Antistatic Measures” on page 63**

d. **Remove the server top cover. See “Remove the Server Top Cover” on page 64.**

2. **Release the latch for the host bus adapter (HBA) super capacitor tray and rotate the tray [1] in to the upright position [2].**



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



4. **Set aside the air baffle.**

5. **Consider your next step:**

   - If you removed the air baffle as part of another procedure, return to that procedure.
   - Otherwise, continue to "Install the Air Baffle" on page 99.

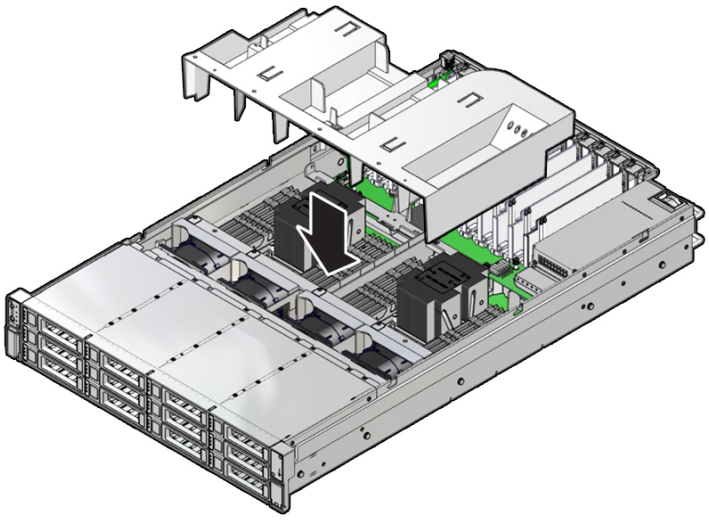
Related Information

- "Install the Air Baffle" on page 99

▼ Install the Air Baffle

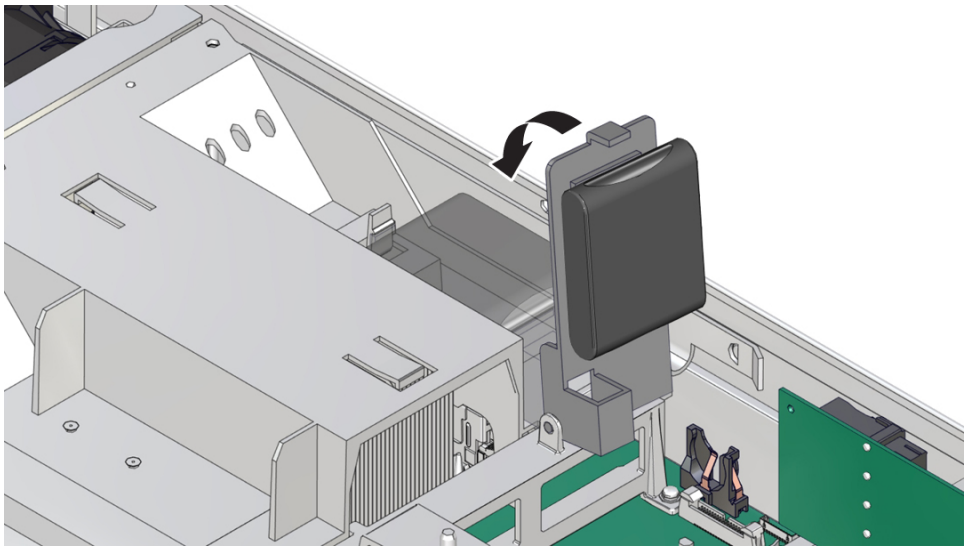
1. **Remove the replacement air baffle from its packaging.**

2. **Install the air baffle by placing it into the server and lowering it to its inserted position.**



3. **Rotate the HBA super capacitor tray down and in to its closed position.**

You hear an audible click when the tray is properly secured to the air baffle.



4. **Consider your next step:**

   - If you removed the air baffle as part of another procedure, return to that procedure.
   - Otherwise, continue to with this procedure.

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

   a. **Install the server top cover.**
   See “Install the Server Top Cover” on page 191.

   b. **Return the server to the normal rack position.**
   See “Return the Server to the Normal Rack Position” on page 193.

   c. **Reconnect the power cords and data cables to the server.**
   See “Reconnect Power and Data Cables” on page 194.

   d. **Power on the server.**
   See “Power On the Server” on page 195.
   Verify that the power supply AC OK LED is lit.

Related Information

- “Remove the Air Baffle” on page 97

Servicing the DIMMs

This section describes how to service memory modules (DIMMs). DIMMs are replaceable units that require you to power off the server. For more information about replaceable units, see “Illustrated Parts Breakdown” on page 22 and “Replaceable Units” on page 23.

The Oracle Exadata Storage Server X7-2 supports a fixed base configuration of twelve 16 GB quad-rank (LR) DDR4 DIMMs. Optionally, customers can expand system memory by upgrading to twelve or twenty-four 64 GB DDR4 DIMMs.

Caution - These procedures require that you handle components that are sensitive to electrostatic discharge. This sensitivity can cause the components to fail. To avoid damage, ensure that you follow antistatic practices as described in “Take Antistatic Measures” on page 63.

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

Related Information

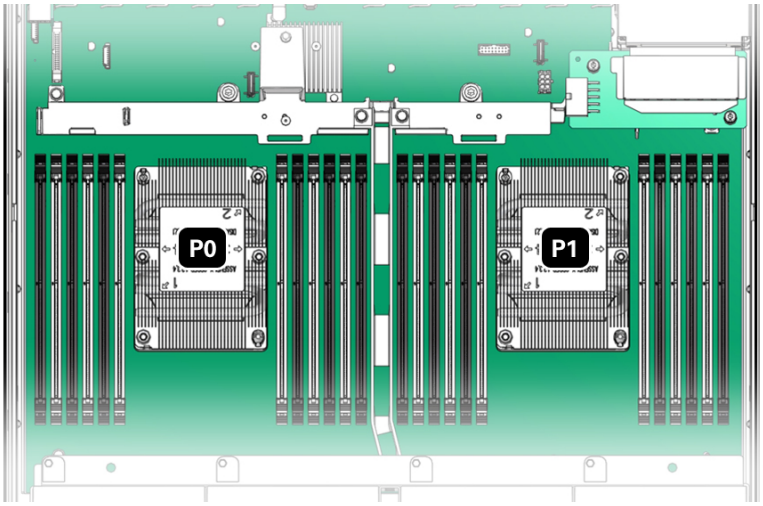
- “Servicing Processors” on page 125

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.

Each processor, P0 and P1, has twelve DIMM slots organized into six memory channels. Each channel contains two DIMM slots: a white DIMM slot (channel slot 0) and a black DIMM slot (channel slot 1).

Memory Channels	DIMM Slot 0 (White)	DIMM Slot 1 (Black)
A	D6	D7
B	D8	D9
C	D10	D11
D	D5	D4
E	D3	D2
F	D1	D0



Related Information

- “DIMM Population Scenarios” on page 105
- “DIMM Population Rules” on page 105
- “DIMM Operating Speeds” on page 106
- “Inconsistencies Between DIMM Fault Indicators and the BIOS Isolation of Faulty DIMMs” on page 106

DIMM Population Scenarios

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

- A DIMM fails and needs to be replaced.

  In this scenario, you can use the Fault Remind button to determine the failed DIMM, and remove the failed DIMM and replace it. To ensure that system performance is maintained, you must replace the failed DIMM with a DIMM of the same size (in gigabytes) and type (quad-rank). In this scenario, do not change the DIMM configuration.
- You purchased new DIMMs and you want to use them to upgrade the server's memory.

  In this scenario, adhere to DIMM population rules. See “DIMM Population Rules” on page 105.

Related information

- “DIMM Population Rules” on page 105
- “Using the Server Fault Remind Button” on page 106
- “Identify and Remove a DIMM” on page 107
- “Install a DIMM” on page 109

DIMM Population Rules

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

- If your memory configuration uses only twelve DIMM slots, populate only the black DIMM slot (channel slot 0) within each memory channel

- The Oracle Exadata Storage Server X7-2 uses a fixed base configuration of twelve 16 GB DDR4 DIMMs (192 GB). Do not attempt to install any other DIMM sizes in the server unless you are upgrading the memory with an Exadata memory expansion kit
  - If you are upgrading the memory to twelve 64 GB DDR4 DIMMs (768 GB), remove the existing 16 GB DIMMs and repopulate DIMM slots with 64 GB DIMMs
  - If you are upgrading the memory to twenty-four 64 GB DDR4 DIMMs (1.5 TB), remove the existing 16 GB DIMMs and repopulate all twenty-four DIMM slots with 64 GB DIMMs

DIMM Operating Speeds

The maximum supported memory speed is 2666 MT/s. However, not all system configurations support operation at this speed. The maximum attainable memory speed is limited by the maximum speed supported by the specific type of processor. All memory installed in the system operates at the same speed, or frequency.

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

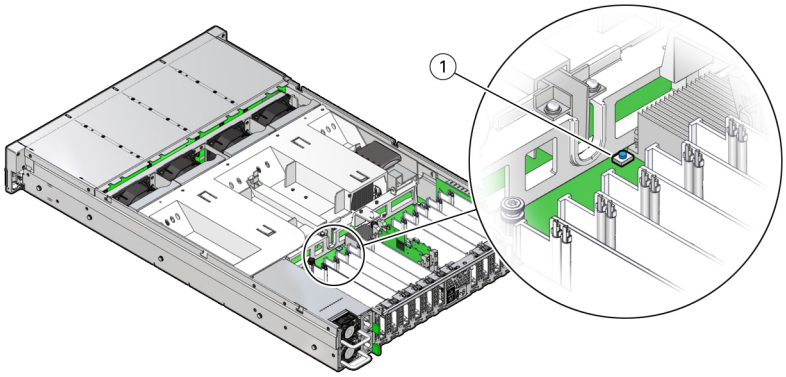
When a single DIMM is marked as failed by Oracle ILOM (for example, `fault.memory.intel.dimm.training-failed` is listed in the service processor Event Log), BIOS might disable the entire memory channel that contains the failed DIMM, up to two DIMMs. As a result, none of the memory installed in the disabled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

Using the Server Fault Remind Button

When the 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 component failure. If this LED does not light when

you press the Fault Remind button, it is likely that the capacitor powering the fault remind circuit lost its charge. This can happen if the Fault Remind button is pressed for several minutes with fault LEDs lit or if power is removed from the server for more than 15 minutes.

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



▼ Identify and Remove a 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 53.

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

      See “Extend the Server to the Maintenance Position” on page 60.

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

      See “Take Antistatic Measures” on page 63.

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

      See “Remove the Server Top Cover” on page 64.

e. **Remove the air baffle.**

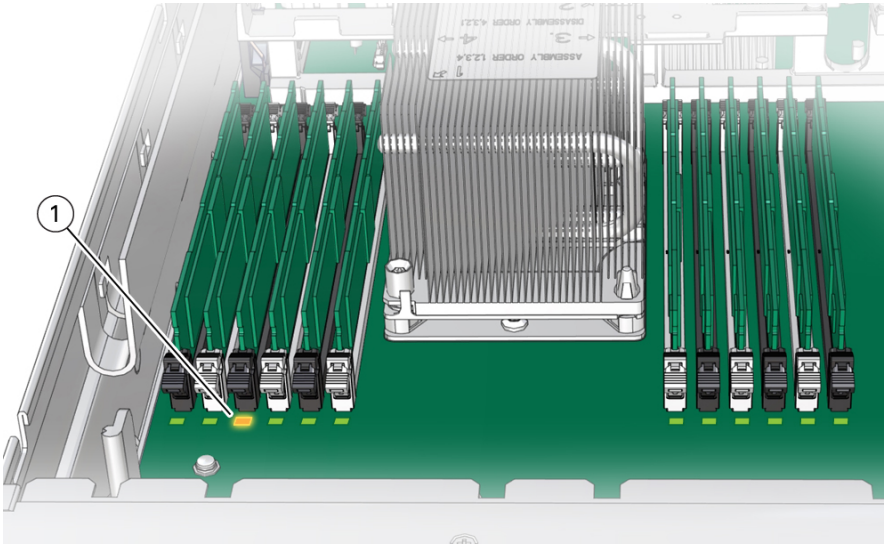
See “Remove the Air Baffle” on page 97.

2. **Identify and note the location of the faulty DIMM by pressing the Fault Remind button on the motherboard.**

See “Using the Server Fault Remind Button” on page 106.

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 must be replaced [1].

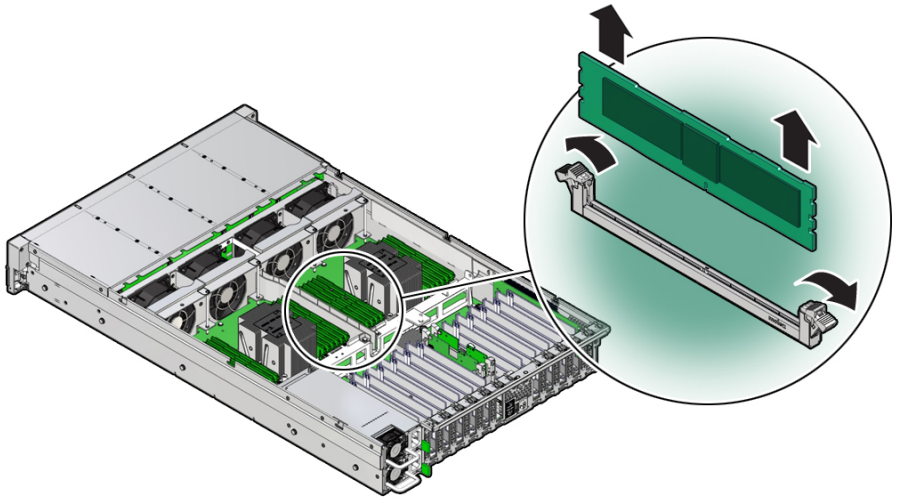


3. **To remove the faulty DIMM, do the following:**

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

The DIMM is partially ejected from the slot.

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



4. **Replace each faulty DIMM with another DIMM of the same size and type.**
   For DIMM replacement instructions, see "Install a DIMM" on page 109.

Related Information

- "DIMM and Processor Physical Layout" on page 104
- "DIMM Population Rules" on page 105
- "Install a DIMM" on page 109

▼ Install a DIMM

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

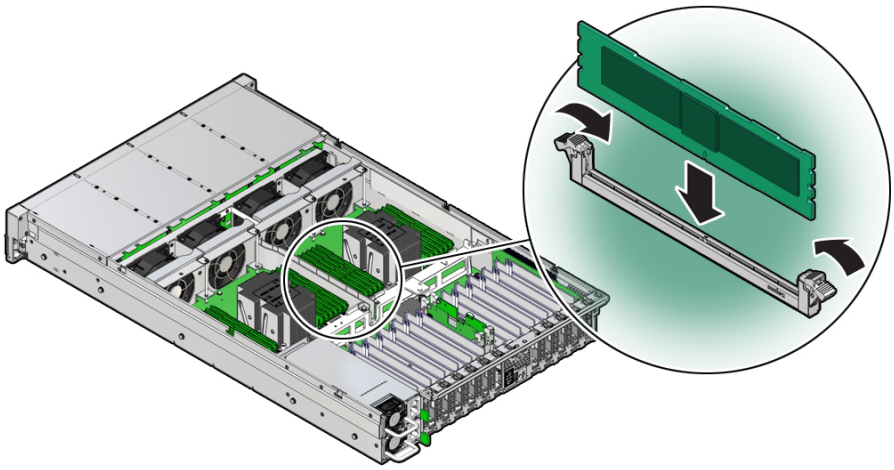
2. **Ensure that the replacement DIMM matches the size, type, and rank of the DIMM it is replacing.**
   You must not replace a quad-rank DIMM with a dual-rank DIMM and vice versa. If you violate this rule, the performance of the server might be adversely affected. For DIMM slot population rules, see "DIMM Population Rules" on page 105.

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 slot.**
   The notch ensures that the DIMM is oriented correctly.

   c. **Push the DIMM into the connector slot until the ejector tabs lock the DIMM in place.**
   If the DIMM does not easily seat into the connector slot, verify that the notch in the DIMM is aligned with the connector key in the connector slot. 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. **Install the air baffle.**
   See “Install the Air Baffle” on page 99.

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

See “Install the Server Top Cover” on page 191.

c. Return the server to the normal rack position.

See “Return the Server to the Normal Rack Position” on page 193.

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

See “Reconnect Power and Data Cables” on page 194.

e. Power on the server.

See “Power On the Server” on page 195.

Verify that the power supply AC OK LED is lit.

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

DIMM faults are automatically cleared after a new DIMM is installed. If you need to manually clear DIMM faults, refer to the Oracle Integrated Lights Out Manager (ILOM) 4.0 Documentation Library at `http://www.oracle.com/goto/ilom/docs`.

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

Related Information

- “DIMM and Processor Physical Layout” on page 104
- “DIMM Population Rules” on page 105
- “Identify and Remove a DIMM” on page 107

Servicing PCIe Cards

This section describes how to service PCIe cards. PCIe cards are replaceable, hot-pluggable units that do not require you to power off the server. For more information about replaceable units, see “Illustrated Parts Breakdown” on page 22 and “Replaceable Units” on page 23.

Refer to your PCIe card documentation for complete software and cabling information about your card.

Caution - Customers must not use the procedures in this section to service the Oracle Storage 12 Gb SAS PCIe RAID HBA, Internal card that is located in PCIe slot 11 or the Oracle Flash Accelerator F640 6.4 TB add-in SSD cards (HC only). These cards must be serviced only by authorized Oracle Service personnel.

Caution - These procedures require that you handle components that are sensitive to electrostatic discharge. This sensitivity can cause the components to fail. To avoid damage, ensure that you follow antistatic practices as described in “Take Antistatic Measures” on page 63.

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. The Oracle Dual Port QDR InfiniBand Adapter M4 card is not hot-pluggable and therefore you need to power off the server before you remove the card.

Note - For a complete list of supported PCIe cards, refer to the *Oracle Server X7-2L Product Notes* at `http://www.oracle.com/goto/x7-2l/docs`.

This section covers the following procedures:

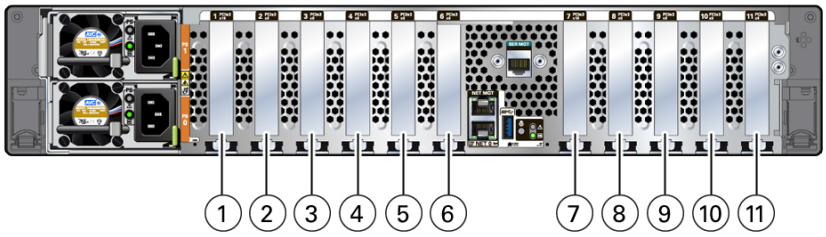
- “PCIe Slot Locations” on page 114
- “Remove a PCIe Card” on page 115
- “Install a PCIe Card” on page 117

Related Information

- “Servicing the Internal HBA Card and HBA Super Capacitor” on page 161

PCIe Slot Locations

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



Call Out	Description
1	PCIe slot 1 (EF and HC servers)
2	PCIe slot 2 (Oracle Flash Accelerator F640, EF server only)
3	PCIe slot 3 (Oracle Flash Accelerator F640, EF server only)
4	PCIe slot 4 (Oracle Flash Accelerator F640, EF and HC servers)
5	PCIe slot 5 (Oracle Flash Accelerator F640, EF and HC servers)
6	PCIe slot 6 (Oracle Flash Accelerator F640, EF and HC servers)
7	PCIe slot 7 (Oracle Dual Port QDR InfiniBand Adapter M4, EF and HC servers)
8	PCIe slot 8 (Oracle Flash Accelerator F640, EF server only)
9	PCIe slot 9 (Oracle Flash Accelerator F640, EF server only)
10	PCIe slot 10 (Oracle Flash Accelerator F640, EF and HC servers)
11	PCIe slot 11 (Oracle Storage 12 Gb SAS PCIe RAID HBA, Internal card, HC server only)

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

Related Information

- “Remove a PCIe Card” on page 115
- “Install a PCIe Card” on page 117

▼ Remove a PCIe Card

Note - Before replacing or installing a PCIe card, refer to the card documentation for specific installation and cabling instructions.

Note - The Oracle Flash Accelerator F640 cards in the EF and HC servers are hot-pluggable and you do not need to power down the server.

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

   a. **If you are removing an Oracle Dual Port QDR InfiniBand Adapter M4 card, power off the server, and disconnect the power cords from the server power supplies. Otherwise, skip to Step 1b.**

      See “Powering Down the Server” on page 53.

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

      See “Extend the Server to the Maintenance Position” on page 60.

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

      See “Take Antistatic Measures” on page 63.

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

      See “Remove the Server Top Cover” on page 64.

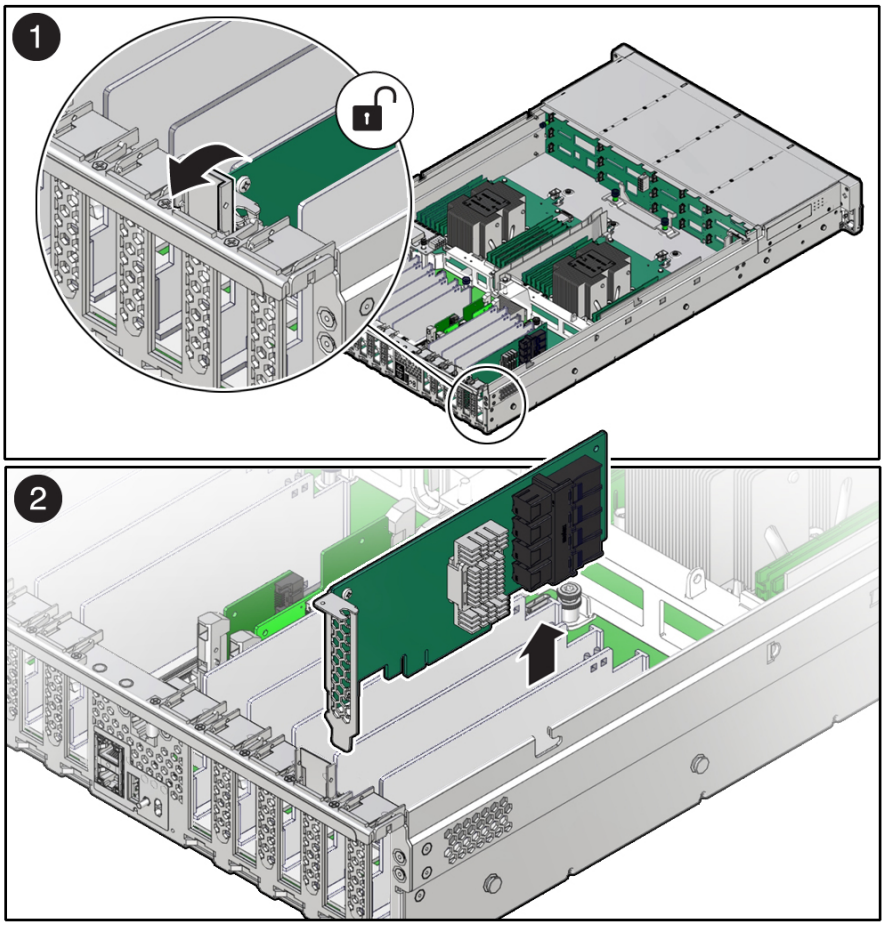
Caution - If you are removing a hot-pluggable PCIe card, remove the PCIe card only when the green power LED is off. If you remove a card when the power is on, unexpected system operation can occur.

2. **Verify that the Do Not Service LED indicator light is off.**

3. **Locate the PCIe card that you want to remove.**
   See "PCIe Slot Locations" on page 114.

4. **If necessary, record where the PCIe cards are installed.**

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



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

Caution - If you are not immediately inserting a replacement PCIe card into the empty slot, insert a PCIe filler panel in the slot to reduce the possibility of radiated electromagnetic interference (EMI). For instructions for installing a PCIe filler panel, see "Remove and Install Filler Panels" on page 189.

Related Information

- "PCIe Slot Locations" on page 114
- "Install a PCIe Card" on page 117

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.**

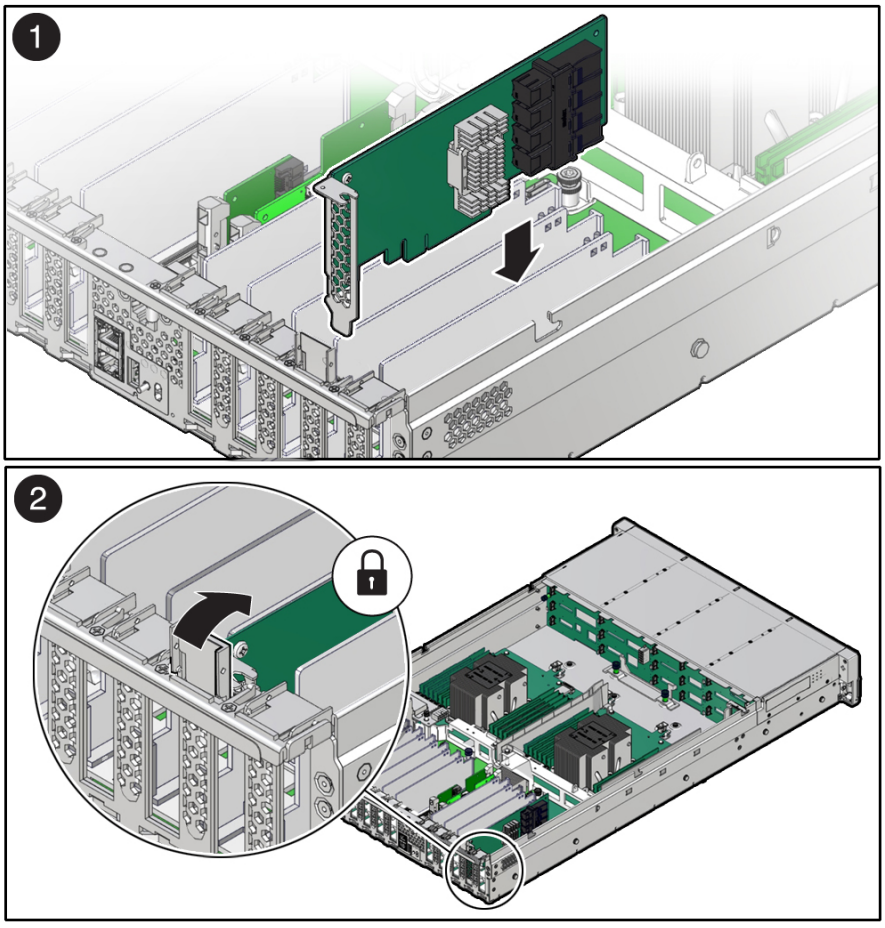
   - For the EF server, PCIe slots 2, 3, 4, 5, 6, 8, 9, and 10 are the primary slots for Oracle Flash Accelerator F640 cards.
   - For the HC server, PCIe slots 4, 5, 6, and 10 are the primary slots for Oracle Flash Accelerator F640 cards.

3. **If necessary, remove the PCIe filler panel from the slot.**

   Note - Save this filler panel in case you 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 downward to secure the PCIe card in place [2].**

You hear an audible click when the PCIe card is secured into the slot.



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

   a. **Install the top cover.**

      See “Install the Server Top Cover” on page 191.

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

      See “Return the Server to the Normal Rack Position” on page 193.

c. **If you installed an Oracle Dual Port QDR InfiniBand Adapter M4 card, reconnect the power cords and data cables to the server. Proceed to Step 5d. Otherwise, skip to Step 5e.**

   See “Reconnect Power and Data Cables” on page 194.

d. **Power on the server.**

   See “Power On the Server” on page 195.

e. **Verify that the System OK LED is lit.**

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

   If a PCIe card fault message in Oracle ILOM is not cleared under Open Problems, you must manually clear the fault using Oracle ILOM. For instructions for manually clearing a PCIe card fault, see the procedure "Clear Faults for Undetected Replaced or Repaired Hardware Components" in the *Oracle ILOM User's Guide for System Monitoring and Diagnostics Firmware Release 4.0.x* in the Oracle Integrated Lights Out Manager (ILOM) 4.0 Documentation Library at `http://www.oracle.com/goto/ilom/docs`.

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

   For a complete listing of the PCIe host bus adapter (HBA) cards supported by the server, refer to the *Oracle Server X7-2L Product Notes* at `http://www.oracle.com/goto/x7-2l/docs`.

Related Information

- “PCIe Slot Locations” on page 114
- “Remove a PCIe Card” on page 115

Servicing the Battery

This section describes how to service the system battery. The system battery is a replaceable unit that requires you to power off the server. For more information about replaceable units, see “Illustrated Parts Breakdown” on page 22 and “Replaceable Units” on page 23.

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 procedures:

- “Remove the Battery” on page 121
- “Install the Battery” on page 123

Related Information

- “Extend the Server to the Maintenance Position” on page 60
- “Remove the Server Top Cover” on page 64

▼ 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 53.

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

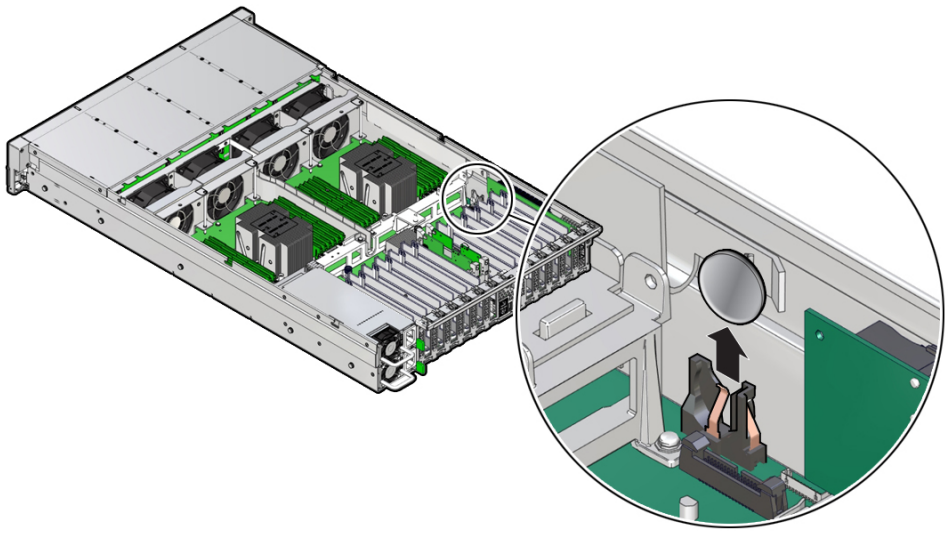
See “Extend the Server to the Maintenance Position” on page 60.

c. **Attach an antistatic wrist strap to your wrist, and then to a metal area on the chassis.**
See “Take Antistatic Measures” on page 63.

d. **Remove the server top cover.**
See “Remove the Server Top Cover” on page 64.

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

Note - To gain access to the battery, you might need to disconnect and move aside the auxiliary signal cable to the disk backplane and the SAS cables to the Internal HBA. For more information, see “Servicing the Disk Backplane” on page 139 and “Servicing SAS Cables” on page 169.



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

Related Information

- “Install the Battery” on page 123

Install the Battery

1. **Unpack the replacement battery.**

2. **Press the new battery into the battery retainer.**

Note - If disconnected during battery removal, reconnect the auxiliary signal cable to the disk backplane and the SAS cables to the Internal HBA. For more information, see "Servicing the Disk Backplane" on page 139 and "Servicing SAS Cables" on page 169.

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

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

      See "Install the Server Top Cover" on page 191.

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

      See "Return the Server to the Normal Rack Position" on page 193.

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

      See "Reconnect Power and Data Cables" on page 194 and "Power On the Server" on page 195.

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 is reset as soon as the server is powered on and connected to the network; otherwise, proceed to the next step.

   d. **Verify that the System OK LED is lit.**

4. **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) 4.0 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 X7 Series Servers Administration Guide* at `http://www.oracle.com/goto/x86admindiag/docs`.

Related Information

- “Remove the Battery” on page 121

Servicing Processors

The following section describes how to service processors. Processors are replaceable units. For more information about replaceable units, see “Illustrated Parts Breakdown” on page 22 and “Replaceable Units” on page 23.

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

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 electrostatic discharge safety measures and antistatic practices. See “Electrostatic Discharge Safety” on page 50.

This section covers the following topics:

Related Information

- “Servicing the DIMMs” on page 103

▼ Identify and Remove a Processor

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.

Caution - Whenever you remove a processor, replace it with another processor and reinstall the processor heatsink; otherwise, the server might overheat due to improper airflow. See "Install a Processor" on page 132.

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 53.

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

      See "Take Antistatic Measures" on page 63.

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

      See "Extend the Server to the Maintenance Position" on page 60.

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

      See "Remove the Server Top Cover" on page 64.

   e. **Remove the air baffle.**

      See "Remove the Air Baffle" on page 97.

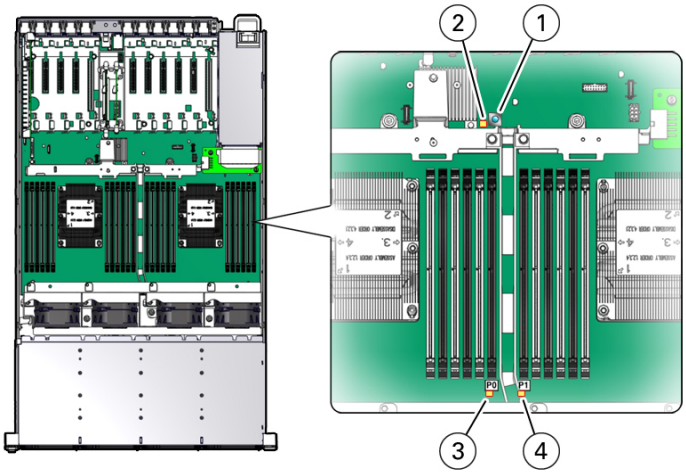
2. **Identify the location of the failed processor by pressing the Fault Remind button on the motherboard.**

Note - When you press the Fault Remind button, an LED located next to the Fault Remind button lights green, indicating that there is sufficient voltage 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 lost its charge. This can happen if you press the Fault Remind button for a long time with fault LEDs lit, or if power was removed from the server for more than 15 minutes.

The processor fault LED for the failed processor lights. The processor fault LEDs are located next to the processors. See "Motherboard Status Indicators" on page 35.

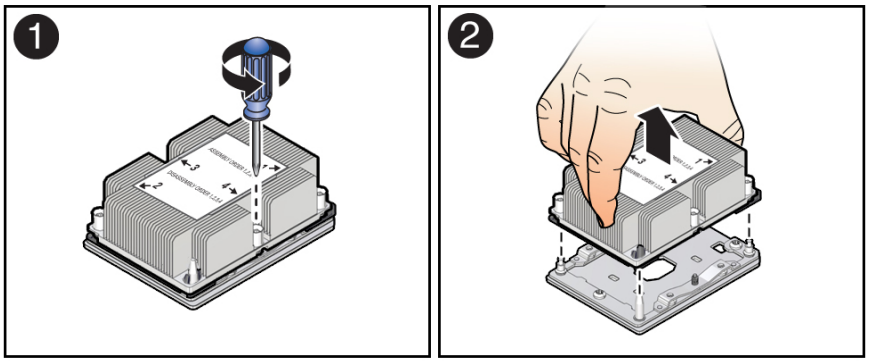
- If the processor fault LED is off, the processor is operating properly.

- If the processor fault LED is on (amber), the processor failed and you must replace it.



Callout	Description
1	Fault Remind button
2	Fault Remind LED
3	Processor 0 fault LED
4	Processor 1 fault LED

3. **Using a Torx T30 screwdriver, loosen the four captive nuts that secure the processor-heatsink module to the socket: fully loosen nut 4, then 3, then 2, then 1 [1].**

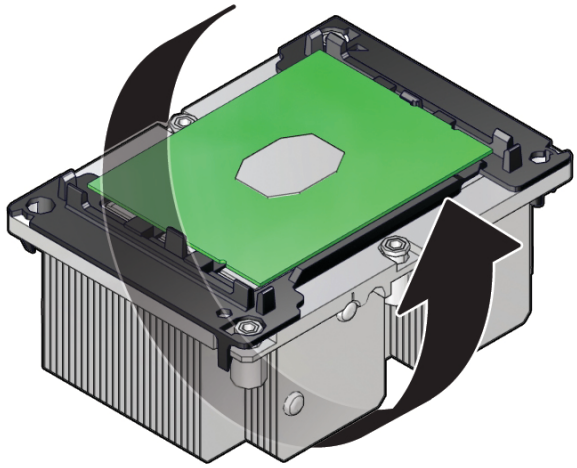


4. **Lift the processor-heatsink module from the socket [2].**

   Always hold the processor-heatsink module along the axis of the fins to prevent damage.

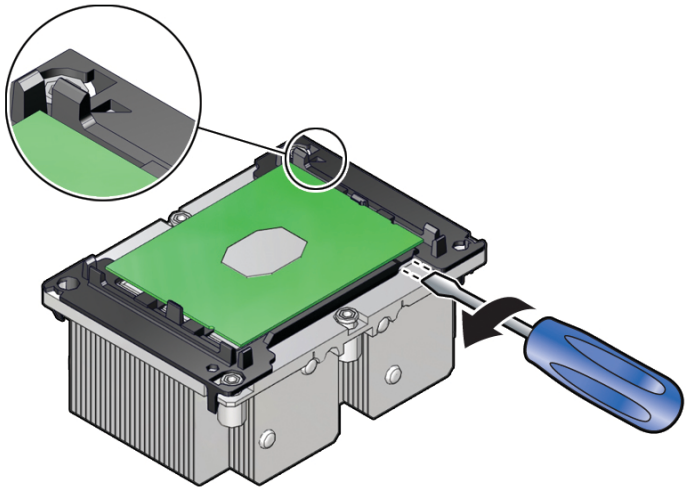
5. **Separate the processor from the heatsink.**

a. **Flip over the processor-heatsink module, place it on a flat surface, and locate the thermal interface material (TIM) breaker slot.**



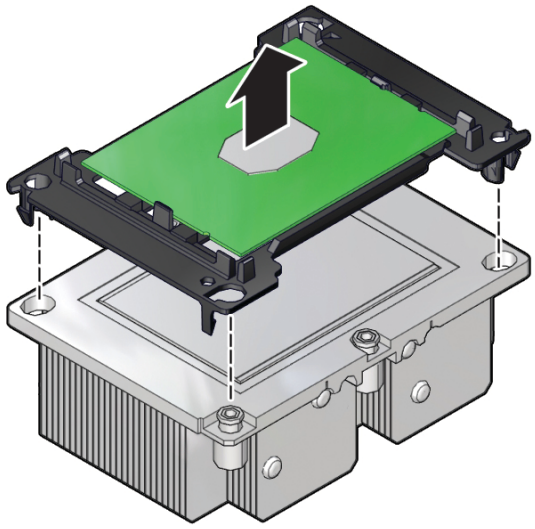
b. **While holding down the processor-heatsink modules by the edges, insert a flat blade screwdriver into the TIM breaker slot.**

The blade of the screwdriver goes into the slot between the heatsink and processor carrier, not between the processor and processor carrier.



c. Use a rocking motion to gently pry the corner of the processor carrier away from the heatsink.

d. **Remove the processor carrier (with the processor still attached) from the heatsink by prying or pinching the plastic latch tabs that attach the processor to the heatsink.**



Caution - A thin layer of thermal grease separates the heatsink and the processor. This grease acts as an adhesive. Do not allow the thermal grease to contaminate the work space or other components.

6. **If you plan on reusing either the heatsink or processor, use an alcohol pad to clean the thermal grease on the underside of the heatsink and on the top of the processor. If reusing a processor, do not remove it from the processor carrier.**

Caution - Failure to clean thermal grease from the heatsink 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.

Related Information

- “Install a Processor” on page 132

Install a Processor

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.

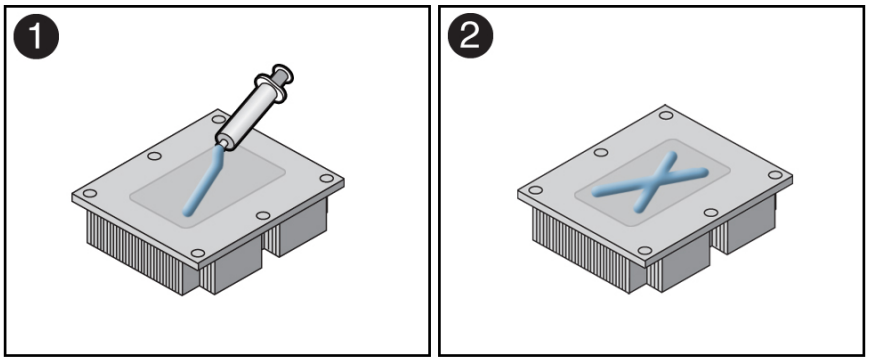
1. **Attach an antistatic wrist strap to your wrist, and then to a metal area on the chassis.**

   See "Take Antistatic Measures" on page 63.

2. **Ensure that the replacement processor is identical to the failed processor that you removed.**

   For a description of the processors that are supported by the server, see "Product Description" on page 15.

3. **Use the syringe supplied with the new or replacement processor [1] to apply 0.3 cc of thermal interface material (TIM) in an "X" pattern to the processor contact area of the heatsink [2].**



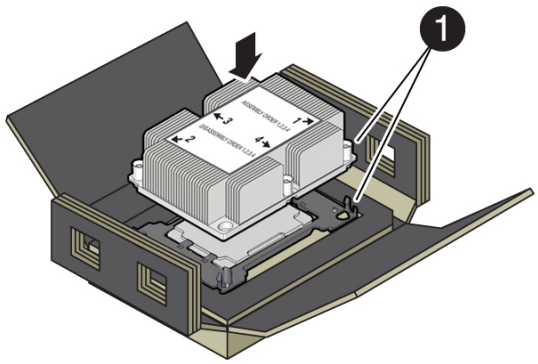
Note - Do not distribute the TIM; the pressure of the heatsink will do so for you when you install the heatsink.

4. **Install the new processor.**

   a. **Open the box that contains the new processor but do not remove it from its packaging tray.**

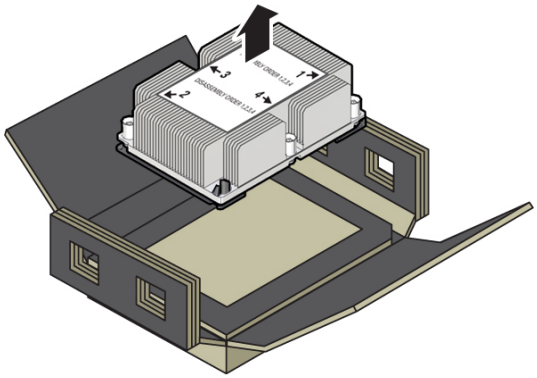
b. Align the pin 1 indicators between the heatsink and processor carrier in the packaging tray [1], and place the heatsink (thermal grease side down) onto the processor carrier until it snaps in place and lies flat.

Note - The processor carrier has latching posts at each corner: two that insert into heatsink holes and two that attach to the edge of the heatsink.



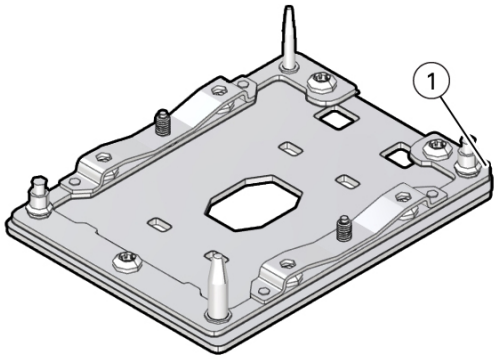
Callout	Description
1	Pin 1 indicator

c. Lift the processor-heatsink module out of the packaging tray.



d. Align the processor-heatsink module to the processor socket bolster plate on the motherboard, matching the pin 1 location [1].

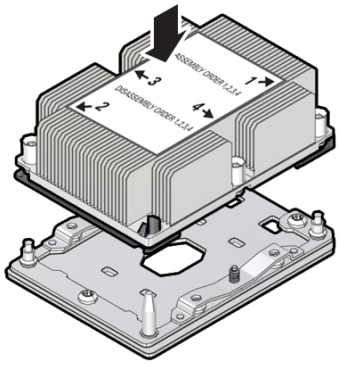
A small pin 1 indicator (triangle) is near the beveled corner of the socket.



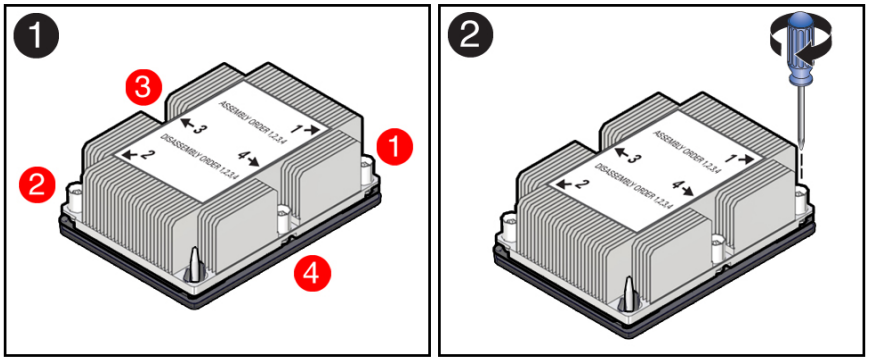
Callout	Description
1	Pin 1 indicator

e. Place the processor-heatsink module on the socket on the motherboard.

The socket bolster plate has alignment pins that go into holes on the processor-heatsink module to help center the module during installation.



f. Ensure that the processor-heatsink module lies evenly on the bolster plate and that the captive screws align with the threaded socket posts [1].



g. Using a 12.0 in-lbs (inch-pounds) torque driver with a Torx T30 bit, tighten the processor-heatsink module to the socket. First, fully tighten captive nuts 1 and 2. Then fully tighten nuts 3 and 4 [2]

As you tighten nuts 3 and 4, some resistance occurs as the bolster leaf spring rises and comes in contact with the heatsink.

Caution - Using an incorrect torque setting or driver bit can damage a processor-heatsink module.

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

   a. **Install the air baffle.**

      See “Install the Air Baffle” on page 99.

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

      See “Install the Server Top Cover” on page 191.

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

      See “Return the Server to the Normal Rack Position” on page 193.

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

      See “Reconnect Power and Data Cables” on page 194 and “Power On the Server” on page 195.

   e. **Verify that the power supply AC OK LED is lit.**

6. **Use Oracle ILOM to clear server processor faults.**

   Refer to the Oracle Integrated Lights Out Manager (ILOM) 4.0 Documentation Library at `http://www.oracle.com/goto/ilom/docs` for more information about the following steps.

   a. **To show server faults: log in to the server as `root` using the Oracle ILOM CLI, and type the following command to list all known faults on the 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 in to the Oracle Solaris OS and issue the `fmadm faulty` command or log in to the Oracle ILOM service processor from the Oracle ILOM Fault Management Shell and issue the `fmadm faulty` command. For more information about how to use the Oracle ILOM Fault Management Shell and supported commands, see the *Oracle ILOM User's Guide for System Monitoring and Diagnostics Firmware Release 4.0.x* in the Oracle Integrated Lights Out Manager (ILOM) 4.0 Documentation Library at `http://www.oracle.com/goto/ilom/docs`.

b. To clear the fault identified in Step 6a, type the following command:

```
-> set /SYS/MB/P0 clear_fault_action=true
```

For example:

```
-> set /SYS/MB/P0 clear_fault_action=true
Are you sure you want to clear /SYS/MB/P0 (y/n)? y
Set 'clear_fault_action' to 'true'
```

Alternatively, to clear all known faults in the server, log in to the Oracle Solaris OS and issue the `fmadm repair` command or log in to the Oracle ILOM service processor from the Oracle ILOM Fault Management Shell and issue the `fmadm repair` command. For more information about how to use the Oracle ILOM Fault Management Shell and supported commands, see the *Oracle ILOM User's Guide for System Monitoring and Diagnostics Firmware Release 4.0.x* in the Oracle Integrated Lights Out Manager (ILOM) 4.0 Documentation Library at `http://www.oracle.com/goto/ilom/docs`.

Related Information

- "Identify and Remove a Processor" on page 125

Servicing the Disk Backplane

The following section describes how to service the disk backplane. The disk backplane is a replaceable unit. For more information about replaceable units, see “Illustrated Parts Breakdown” on page 22 and “Replaceable Units” on page 23.

Caution - The disk backplane must be removed and replaced only by authorized Oracle Service personnel.

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

To remove and install the disk backplane, follow these procedures:

- “Remove the Disk Backplane” on page 139
- “Install the Disk Backplane” on page 143

Related Information

- “Servicing Storage Drives” on page 67
- “Servicing SAS Cables” on page 169

▼ Remove the Disk 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 53.

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

See “Extend the Server to the Maintenance Position” on page 60.

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

See “Take Antistatic Measures” on page 63.

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

See “Remove the Server Top Cover” on page 64.

e. **Remove the air baffle.**

See “Remove the Air Baffle” on page 97.

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

See “Remove a Fan Module” on page 73.

g. **Remove the fan tray from the server.**

See “Remove the Fan Tray” on page 77.

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

See “Remove a Storage Drive” on page 69.

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 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.

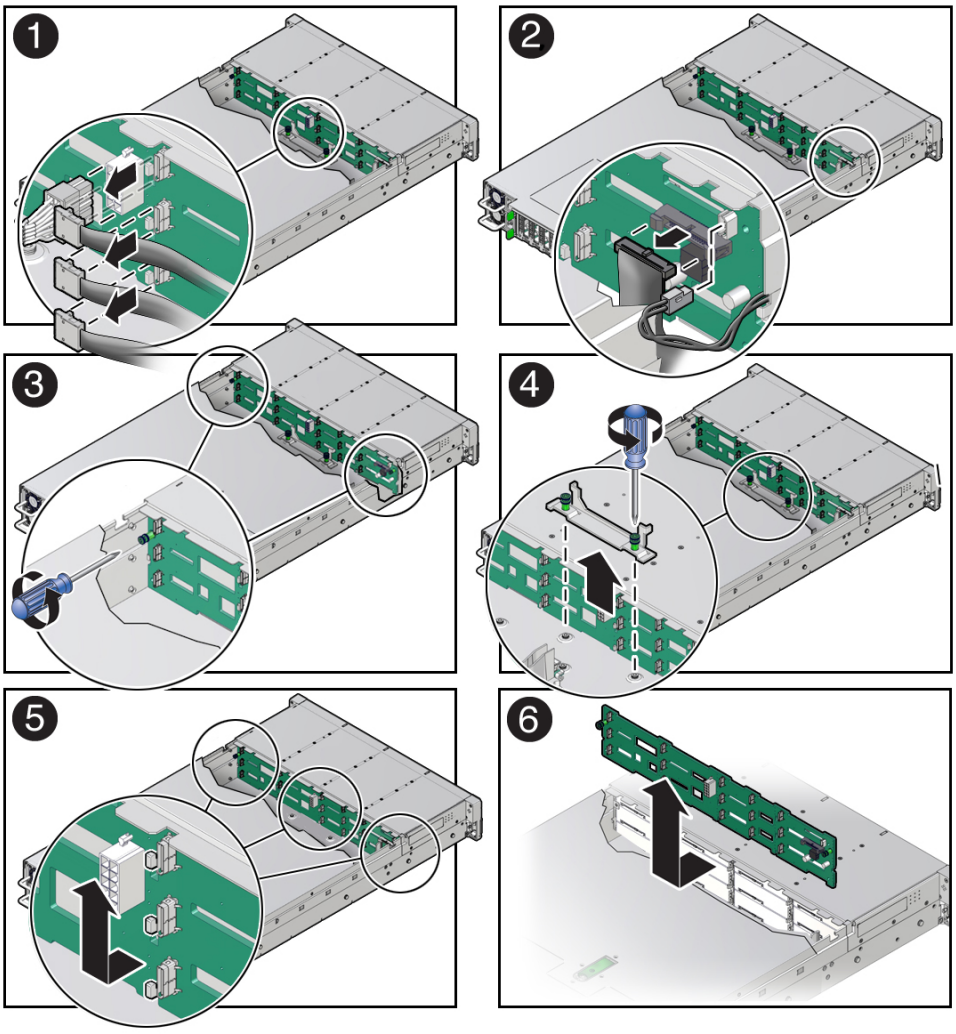
---

3. **Disconnect the cables from the disk backplane.**

a. **Disconnect the power cable from the disk backplane [1].**

b. **Disconnect the three SAS cables from the disk backplane [1].**

Press the green button on the connector while gently pulling the connector from the disk backplane. Note the cable connections in order to ease proper reconnection of the cables.



c. Disconnect the temperature sensor cable from the disk backplane [2].

d. Disconnect the auxiliary signal cable from the disk backplane [2].

4. **Using a Torx T15 screwdriver, loosen the right-side and left-side spring-mounted screws that secure the disk backplane to the chassis [3].**

5. **Using a Torx T25 screwdriver, loosen the spring-mounted screws that secure the backplane bracket to the chassis, and lift the bracket from the server [4].**

6. **Lift the disk backplane up to release it from the standoff hooks and out of the chassis [5 and 6].**

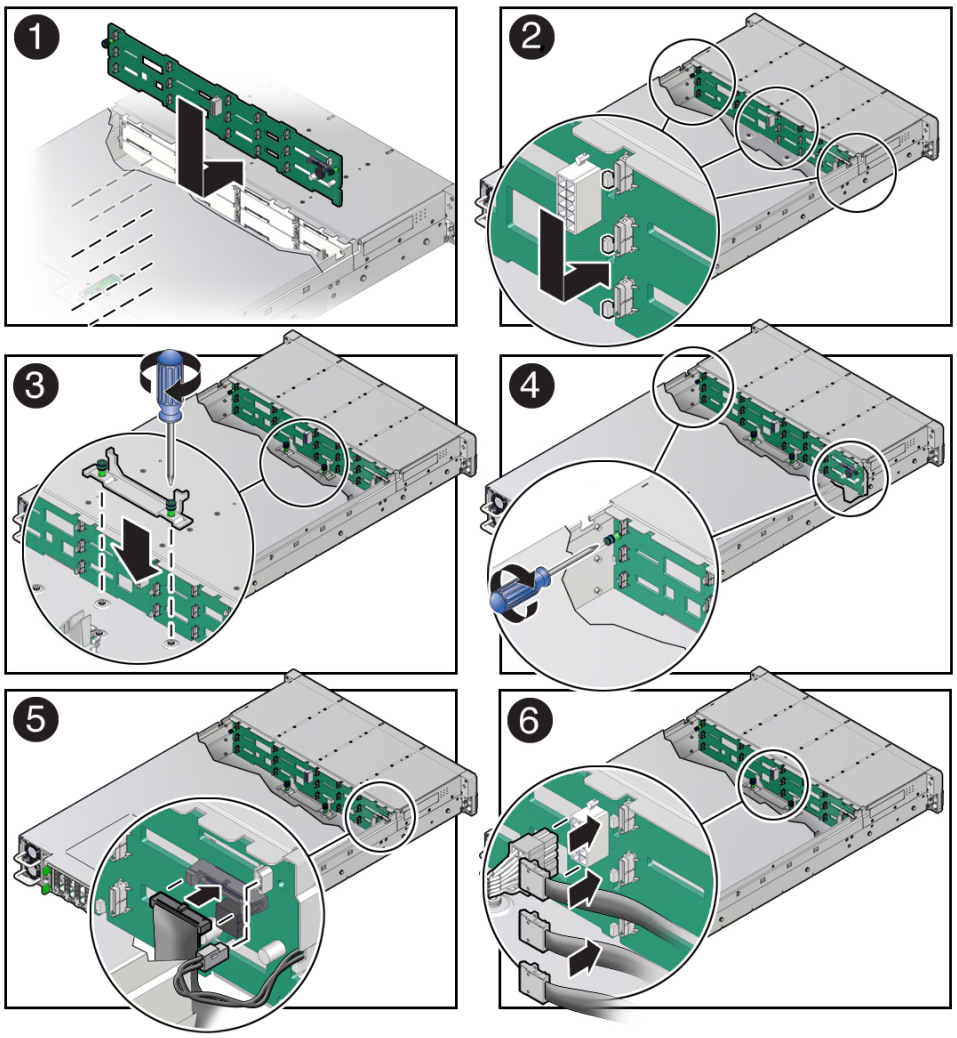
7. **Place the disk backplane on an antistatic mat.**

Related Information

- “Install the Disk Backplane” on page 143

Install the Disk Backplane

1. **Lower the disk backplane into the server, and position it to engage the standoff hooks [1 and 2].**



2. **Lower the backplane bracket into the server, and using a Torx T25 screwdriver, tighten the spring-mounted screws to secure the bracket to the chassis [3].**

3. **Using a Torx T15 screwdriver, tighten the right-side and left-side spring-mounted screws to secure the disk backplane to the chassis [4].**

4. **Reconnect the cables to the disk backplane.**

   a. **Reconnect the auxiliary signal cable to the disk backplane [5].**

   b. **Reconnect the temperature signal cable to the disk backplane [5].**

   c. **Reconnect the three SAS cables to the disk backplane [6].**

      To ensure proper SAS cable connections, see "Install SAS Storage Drive Cables" on page 172.

   d. **Reconnect the power cable to the disk backplane [6].**

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

   a. **Install the fan tray.**

      See "Install the Fan Tray" on page 78.

   b. **Install the fan modules.**

      See "Install a Fan Module" on page 75.

   c. **Install the air baffle.**

      See "Install the Air Baffle" on page 99.

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

      See "Install the Server Top Cover" on page 191.

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

      See "Install a Storage Drive" on page 71.

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

      See "Return the Server to the Normal Rack Position" on page 193.

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

      See "Reconnect Power and Data Cables" on page 194 and "Power On the Server" on page 195.

h. Verify that the power supply AC OK LED is lit.

Note - IMPORTANT: When the disk backplane is replaced, the key identity properties (KIP) of the backplane is programmed by Oracle ILOM to contain the same KIP as the other quorum member components. If you removed other quorum member components, you might need to manually program the product serial number (PSN) into the new backplane. For more information, refer to "Key Identity Properties (KIP) Automated Update" on page 51.

Related Information

- "Remove the Disk Backplane" on page 139

Servicing the Front LED Indicator Module

The following section describes how to service the front LED indicator module. The front LED indicator module is a replaceable unit. For more information about replaceable units, see “Illustrated Parts Breakdown” on page 22 and “Replaceable Units” on page 23.

Caution - The front LED indicator modules must be removed and replaced only by authorized Oracle Service personnel.

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

This section covers the following procedures:

- “Remove the Front LED Indicator Module” on page 147
- “Install the Front LED Indicator Module” on page 150

Related Information

- “Troubleshooting Using the Server Front and Back Panel Status Indicators” on page 30

▼ Remove the Front 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 53.

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

      See “Extend the Server to the Maintenance Position” on page 60.

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

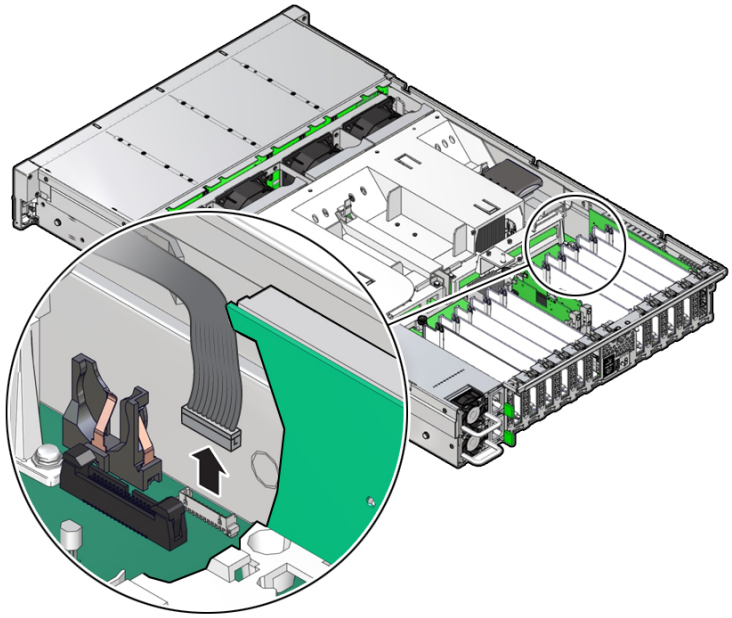
   See “Take Antistatic Measures” on page 63.

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

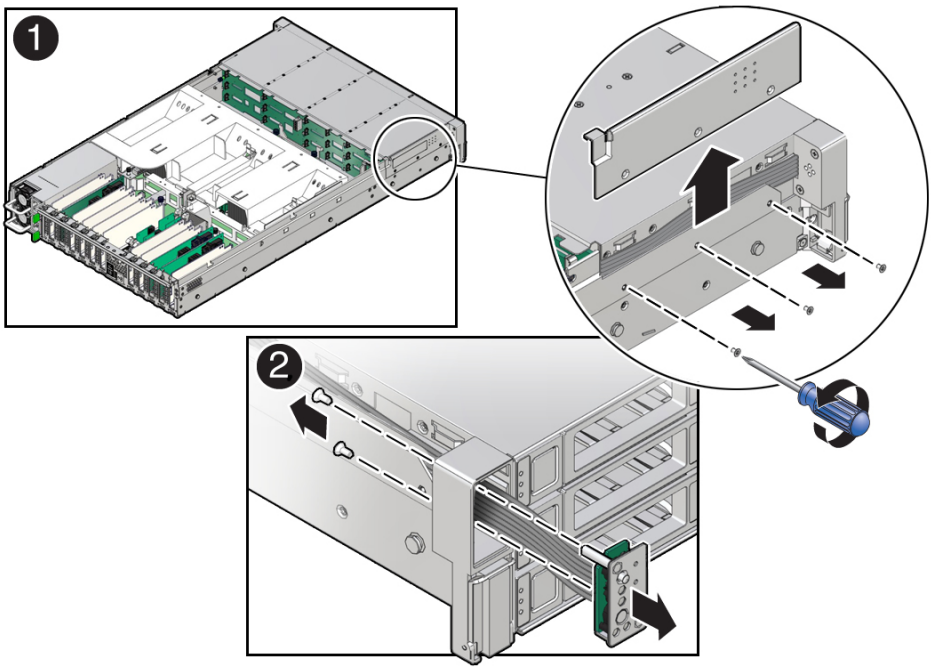
   See “Remove the Server Top Cover” on page 64.

2. **Disconnect the LED indicator module cable from the motherboard.**

Note - On the HC server, you might need to disconnect the SAS cable connections from the Oracle Storage 12 Gb SAS PCIe RAID HBA, Internal card in PCIe slot 11 to access the LED indicator module motherboard cable connection. To ease removal of the LED indicator module cable, slightly lift the SAS cable bundles from the cable trough along the left side of the chassis. See “Servicing SAS Cables” on page 169.



3. **Remove the three No. 2 Phillips screws that secure the FIM cable and Temp Sensor Access cover to the chassis [1].**



4. **Lift up and remove the FIM cable and Temp Sensor Access cover from the FIM cable and Temp Sensor Access cover slot [1].**

   Set aside the FIM cable and Temp Sensor Access cover.

5. **Remove the front LED indicator module [2].**

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

   b. **Remove the LED indicator module and cable from the server front panel.**

      Remove the LED indicator module cable by carefully pulling the cable through the cable trough along the left side of the chassis.

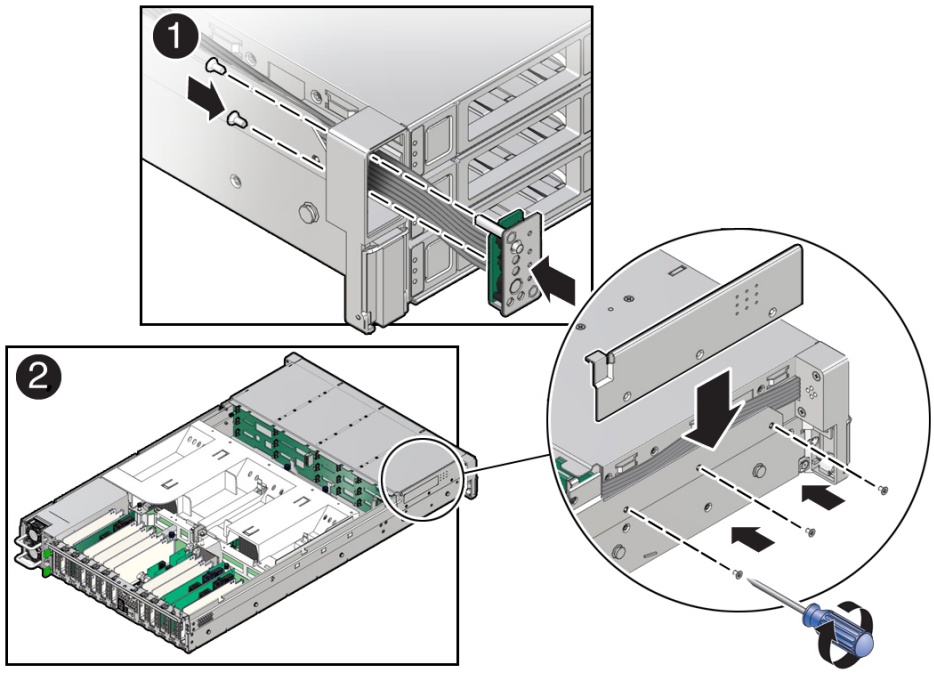
Related Information

- “Server System-Level Status Indicators” on page 31
- “Install the Front LED Indicator Module” on page 150

▼ Install the Front LED Indicator Module

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

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



   b. **Install the LED indicator module cable by carefully pulling the cable through the cable trough along the left side of the chassis.**

Note - To ease installation of the LED indicator module cable, slightly lift the SAS cable bundles from the cable trough along the left side of the chassis.

Note -Cable part number 7315469 is required for the LED indicator module.

c. **Insert and tighten the two No. 2 Phillips screws to secure the LED indicator module to the server front panel [1].**

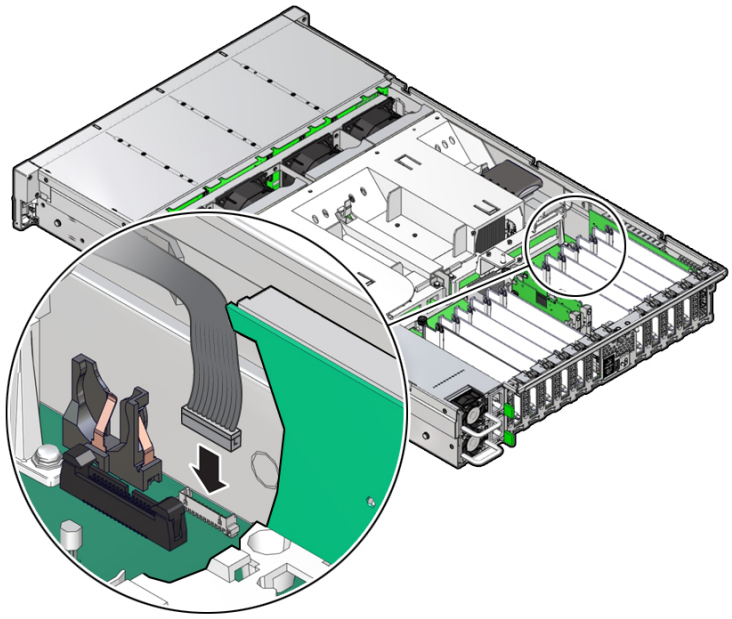
d. **Install the FIM cable and Temp Sensor Access cover to the chassis by inserting it into the FIM cable and Temp Sensor Access cover slot [2].**

Caution - Be careful not to damage the temperature sensor when installing the FIM cable and Temp Sensor Access cover to the chassis.

e. **Install the three No. 2 Phillips screws to secure the FIM cable and Temp Sensor Access cover to the chassis [2].**

2. **Reconnect the LED indicator module cable to the motherboard.**

Note - On the HC server, you might need to disconnect the SAS cable connections from the Oracle Storage 12 Gb SAS PCIe RAID HBA, Internal card in PCIe slot 11 to access the LED indicator module motherboard cable connection. See "Servicing SAS Cables" on page 169.



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

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

      See "Install the Server Top Cover" on page 191.

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

      See "Return the Server to the Normal Rack Position" on page 193.

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

      See "Reconnect Power and Data Cables" on page 194 and "Power On the Server" on page 195.

   d. **Verify that the power supply AC OK LED is lit.**

Related Information

- “Server System-Level Status Indicators” on page 31
- “Remove the Front LED Indicator Module” on page 147

Servicing the Temperature Sensor

The following section describes how to service the temperature sensor. The temperature sensor is a replaceable unit. For more information about replaceable units, see “Illustrated Parts Breakdown” on page 22 and “Replaceable Units” on page 23.

Caution - The temperature sensor must be removed and replaced only by authorized Oracle Service personnel.

Caution - Before removing or installing the temperature sensor, disconnect the power cables to remove all power from the server.

This section covers the following procedures:

- “Remove the Temperature Sensor” on page 155
- “Install the Temperature Sensor” on page 158

Related Information

- “Troubleshooting Using the Server Front and Back Panel Status Indicators” on page 30

▼ Remove the Temperature Sensor

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 53.

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

      See “Extend the Server to the Maintenance Position” on page 60.

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

   See “Take Antistatic Measures” on page 63.

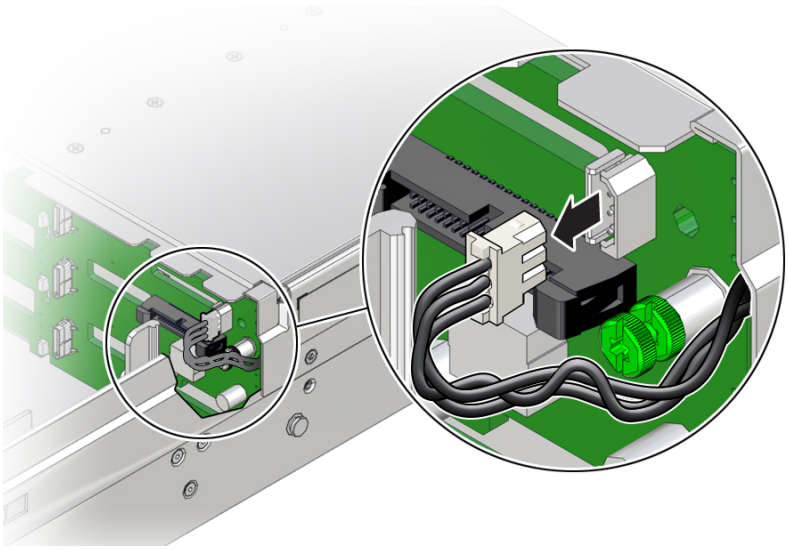
d. **Remove the server top cover.**

   See “Remove the Server Top Cover” on page 64.

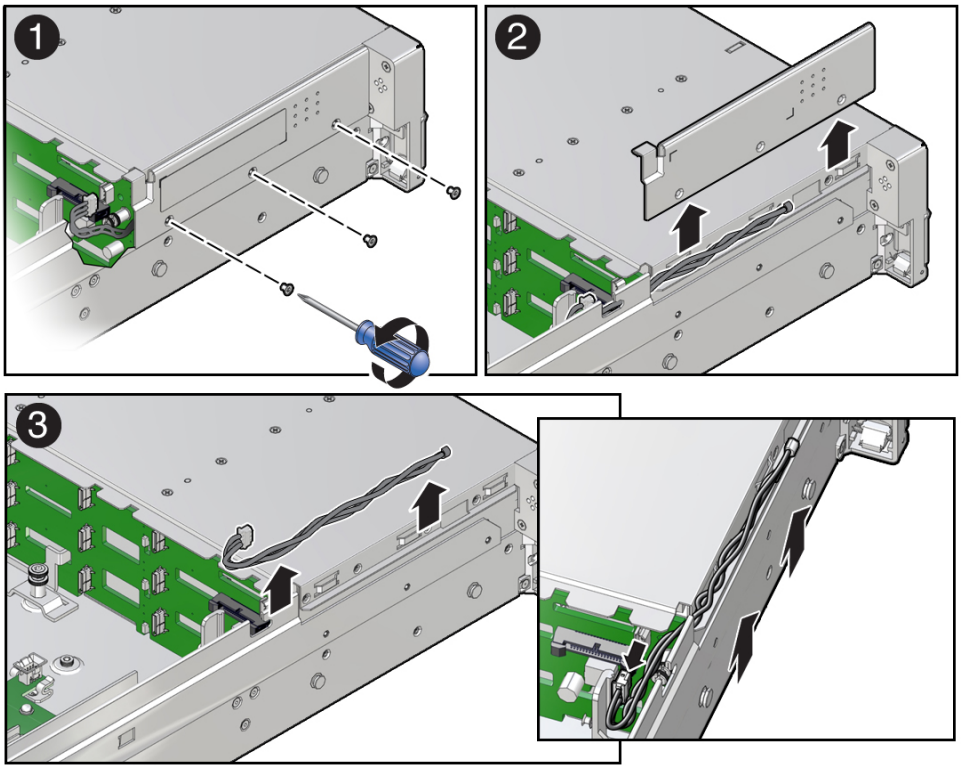
2. **Remove the fan modules and the fan tray.**

   See “Remove a Fan Module” on page 73 and “Remove the Fan Tray” on page 77.

3. **Disconnect the temperature sensor cable from the disk backplane.**



4. **Remove the three No. 2 Phillips screws that secure the FIM cable and Temp Sensor Access cover to the chassis [1].**



5. **Lift up and remove the FIM cable and Temp Sensor Access cover from the FIM cable and Temp Sensor Access cover slot [2].**

6. **Set aside the FIM cable and Temp Sensor Access cover.**

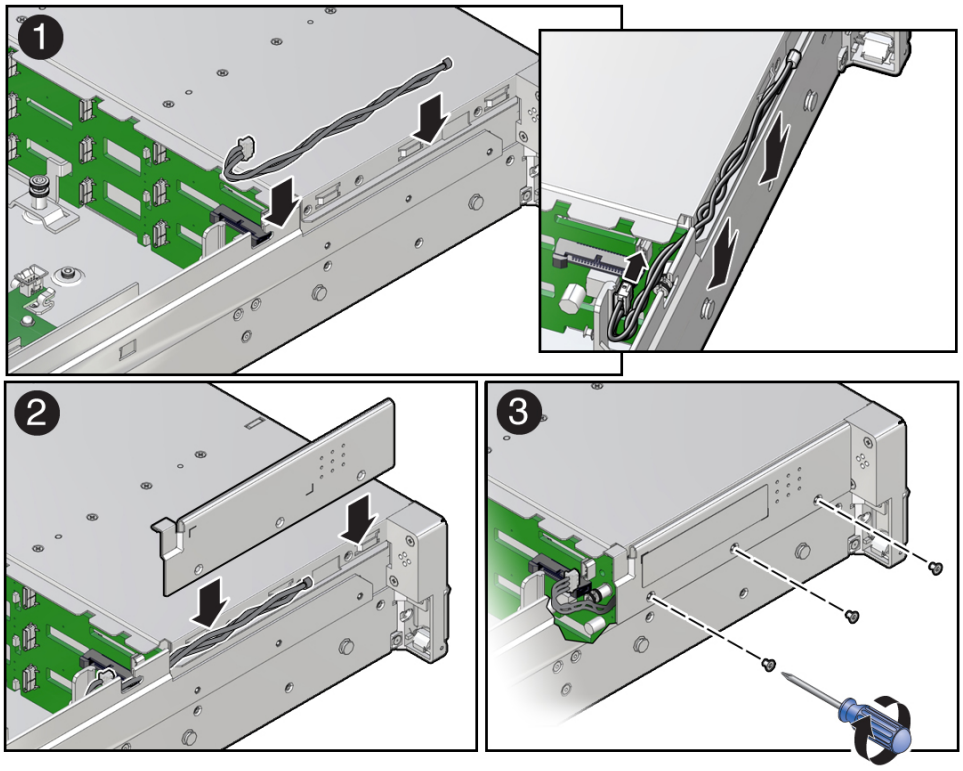
7. **Remove the temperature sensor by carefully pulling the sensor cable rearward and through the cable trough along the left side of the chassis. Then lift the temperature sensor from the chassis [3].**

Related Information

- “Install the Temperature Sensor” on page 158

Install the Temperature Sensor

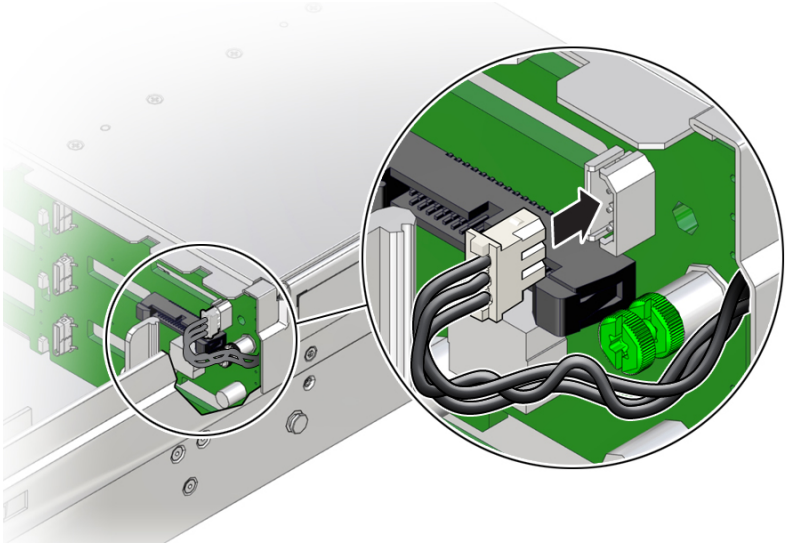
1. **Install the temperature sensor by carefully inserting the sensor-end of the cable through the back opening of the cable trough. Then pull the cable through the opening and install it into the cable trough along the left side of the chassis [1].**



2. **Install the FIM cable and Temp Sensor Access cover to the chassis by inserting it into the FIM cable and Temp Sensor Access cover slot [2].**

3. **Install the three No. 2 Phillips screws to secure the FIM cable and Temp Sensor Access cover to the chassis [3].**

4. **Reconnect the temperature sensor cable to the disk backplane.**



5. **Install the fan tray and fan modules.**
   See “Install the Fan Tray” on page 78 and “Install a Fan Module” on page 75.

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

   a. **Install the server top cover.**
      See “Install the Server Top Cover” on page 191.

   b. **Return the server to the normal rack position.**
      See “Return the Server to the Normal Rack Position” on page 193.

   c. **Reconnect the power cords to the power supplies, and power on the server.**
      See “Reconnect Power and Data Cables” on page 194 and “Power On the Server” on page 195.

   d. **Verify that the power supply AC OK LED is lit.**

Related Information

- “Remove the Temperature Sensor” on page 155

Servicing the Internal HBA Card and HBA Super Capacitor

The following section describes how to service and install the Oracle Storage 12 Gb SAS PCIe RAID HBA, Internal card on the HC server. The internal host bus adapter card and HBA super capacitor are replaceable units. For more information about replaceable units, see “Illustrated Parts Breakdown” on page 22 and “Replaceable Units” on page 23.

For more information about the internal HBA card, refer to the *Oracle Storage 12 Gb SAS PCIe RAID HBA Internal: 16 Port and 2 GB Memory Installation Guide For HBA Model 7116970* at `http://docs.oracle.com/cd/E87591_01/index.html`.

Caution - Ensure that all power is removed from the server before removing or installing the internal HBA card and super capacitor. You must disconnect all power cables from the system before performing these procedures.

Caution - These procedures require that you handle components that are sensitive to electrostatic discharge. This sensitivity can cause the components to fail. To avoid damage, ensure that you follow antistatic practices.

This section covers the following procedures:

- “Remove the Internal HBA Card and HBA Super Capacitor” on page 161
- “Install the Internal HBA Card and HBA Super Capacitor” on page 165

Related Information

- “Servicing SAS Cables” on page 169

▼ Remove the Internal HBA Card and HBA Super Capacitor

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 53.

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

   See “Extend the Server to the Maintenance Position” on page 60.

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

   See “Take Antistatic Measures” on page 63.

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

   See “Remove the Server Top Cover” on page 64.

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

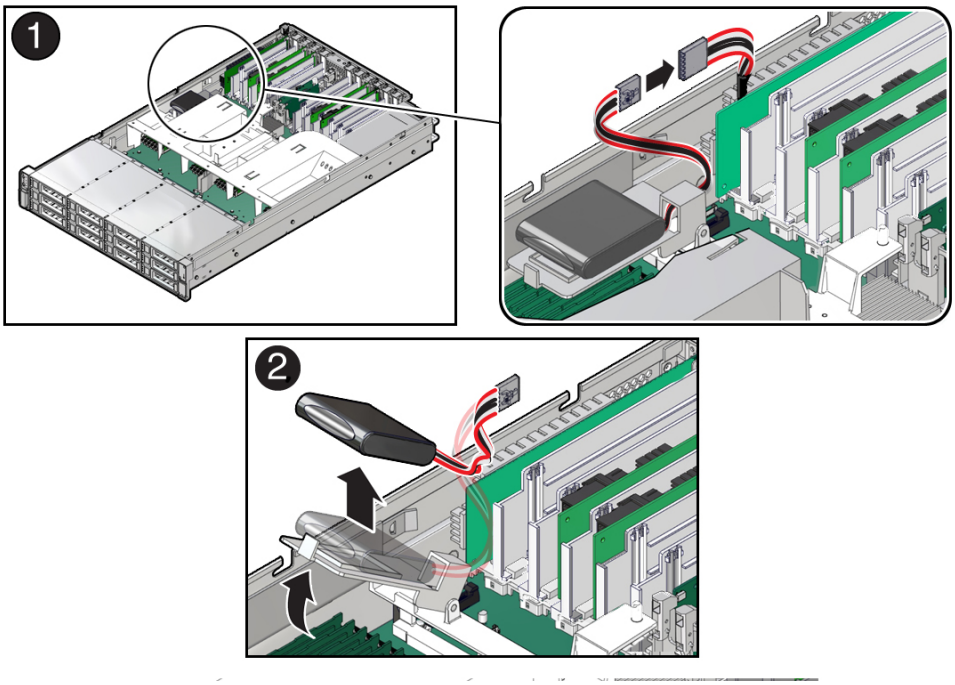
Note - If you are removing and replacing only the internal HBA card, you do not need to remove the HBA super capacitor. You can disconnect the HBA super capacitor cable from the internal HBA card and then remove the internal HBA card from the system.

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

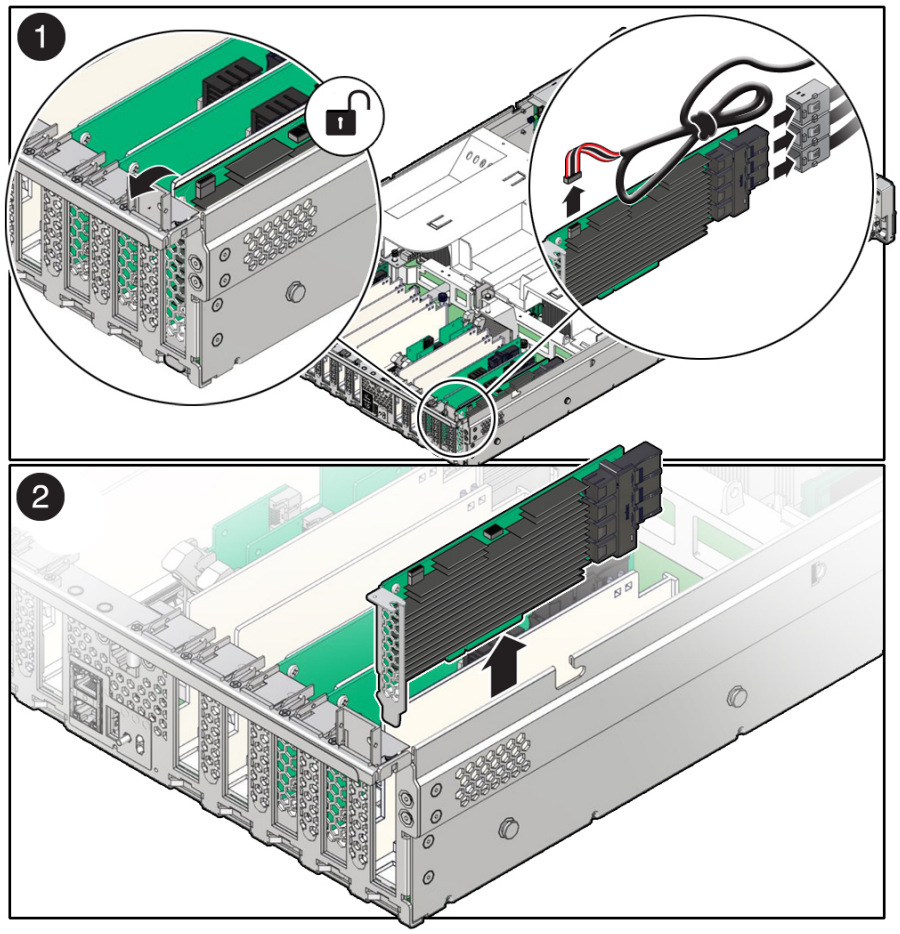
   The HBA super capacitor is secured to the HBA super capacitor tray by a recloseable fastener, which allows it to be easily removed and replaced.

b. **To separate the HBA super capacitor from the tray, place your fingers under the super capacitor and lift up [2].**

When removing the super capacitor, by careful not to snag the cable on the tray wire guide. Place the super capacitor on an antistatic mat.



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



4. **Disconnect the super capacitor cable and the SAS cables from the Oracle Storage 12Gb SAS PCIe RAID HBA, Internal card [1].**

   See also "Remove SAS Storage Drive Cables" on page 169.

5. **Lift and remove the internal HBA card and super capacitor cable from the chassis [2].**

6. **Place the internal HBA card and super capacitor cable on an antistatic mat.**

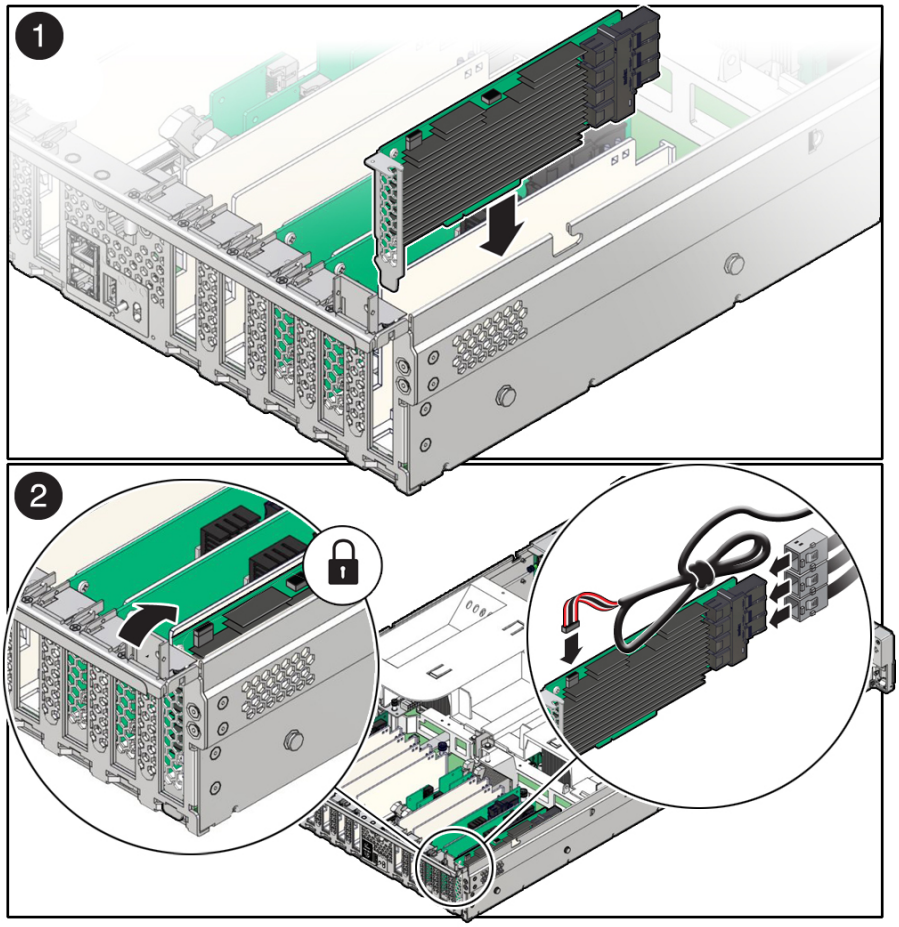
Related Information

- “Install the Internal HBA Card and HBA Super Capacitor” on page 165

▼ Install the Internal HBA Card and HBA Super Capacitor

1. **Unpack the replacement internal HBA card and super capacitor, and place them on an antistatic mat.**
2. **Insert the internal HBA card into PCIe slot 11, and rotate the PCIe locking mechanism to secure the PCIe HBA card in place [1 and 2].**

Note - PCIe slot 11 is the primary slot for the internal HBA card on the HC server. The card is required for controlling and managing the SAS storage drives.



3. **Connect the super capacitor cable to the internal HBA card, and reconnect the SAS cables that you unplugged during the removal procedure [2].**

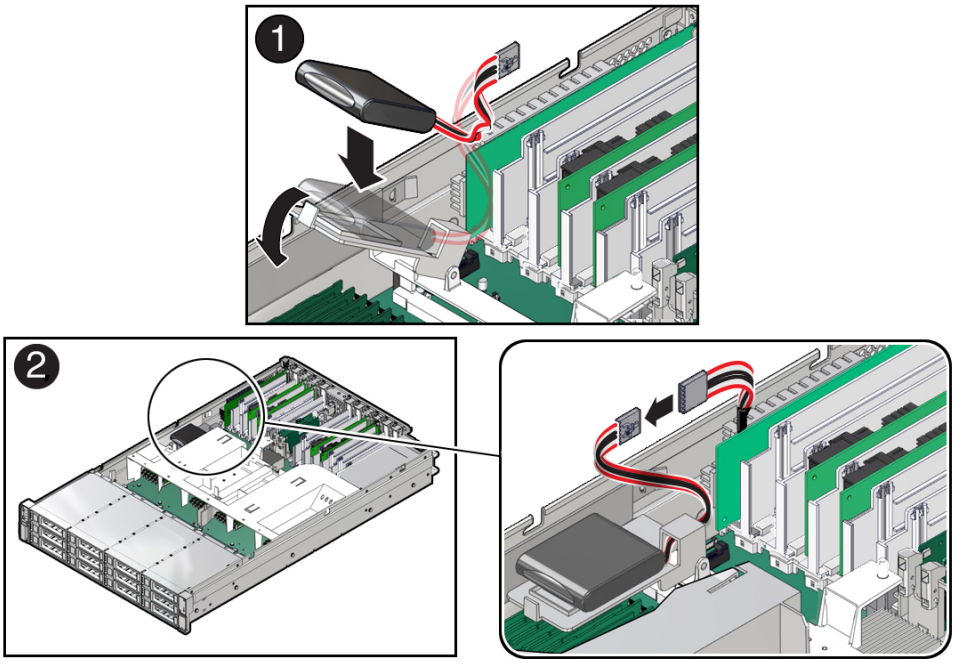
   To ensure proper SAS cable connections, see "Install SAS Storage Drive Cables" on page 172.

4. **Install the HBA super capacitor in the chassis.**

Note - If you did not remove the HBA super capacitor when removing the internal HBA card, reconnect the HBA super capacitor cable to the internal HBA card.

a. **Apply a recloseable fastener to the underside of the super capacitor.**

b. **Align the recloseable fastener on the super capacitor with the recloseable fastener on the HBA super capacitor tray and press down [1].**



c. **Route the super capacitor cable through the tray wire guide on the HBA super capacitor tray and connect the super capacitor cable [2].**

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

a. **Install the top cover.**

See “Install the Server Top Cover” on page 191.

b. Return the server to the normal rack position.

See “Return the Server to the Normal Rack Position” on page 193.

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

See “Reconnect Power and Data Cables” on page 194 and “Power On the Server” on page 195.

d. Verify that the power supply AC OK LED is lit.

6. Use Oracle ILOM to clear any server PCI card faults.

If a PCIe card fault message in Oracle ILOM is not cleared under Open Problems, you must manually clear the fault using Oracle ILOM. For instructions for manually clearing a PCIe card fault, see the procedure "Clear Faults for Undetected Replaced or Repaired Hardware Components" in the *Oracle ILOM User's Guide for System Monitoring and Diagnostics Firmware Release 4.0.x* in the Oracle Integrated Lights Out Manager (ILOM) 4.0 Documentation Library at `http://www.oracle.com/goto/ilom/docs`.

Related Information

- “Remove the Internal HBA Card and HBA Super Capacitor” on page 161

Servicing SAS Cables

The following section describes how to service SAS cables in the HC server. SAS cables are replaceable units. For more information about replaceable units, see “Illustrated Parts Breakdown” on page 22 and “Replaceable Units” on page 23.

Caution - SAS cables must be removed and replaced only by authorized Oracle Service personnel.

Caution - The system supplies power to the cables even when the server is powered off. To avoid personal injury or damage to the server, you must disconnect power cords before servicing the cables.

This section covers the following procedures:

Related Information

- “Servicing Storage Drives” on page 67
- “Servicing the Disk Backplane” on page 139

▼ 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 53.

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

See “Extend the Server to the Maintenance Position” on page 60.

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

See “Take Antistatic Measures” on page 63.

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

See “Remove the Server Top Cover” on page 64.

e. **Remove the air baffle.**

See “Remove the Air Baffle” on page 97.

f. **Remove fan modules.**

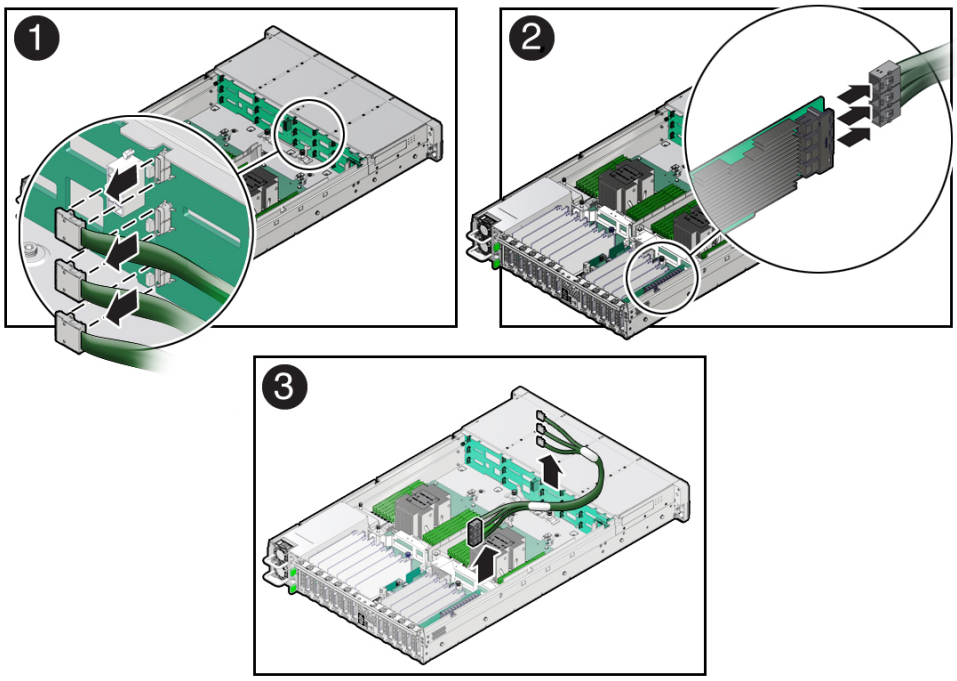
See “Remove a Fan Module” on page 73.

g. **Remove the fan tray from the server.**

See “Remove the Fan Tray” on page 77.

2. **Disconnect the SAS cables from the disk backplane [1].**

Press the green button on the connector while gently pulling the connector from the disk backplane.



3. **Disconnect the SAS cables from the Oracle Storage 12Gb SAS PCIe RAID HBA, Internal card in PCIe slot 11 [2].**

   Press each latch, and then pull out to disengage the cable from each connector. See also “Remove the Internal HBA Card and HBA Super Capacitor” on page 161.

4. **Remove the SAS cables from the server [3].**

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

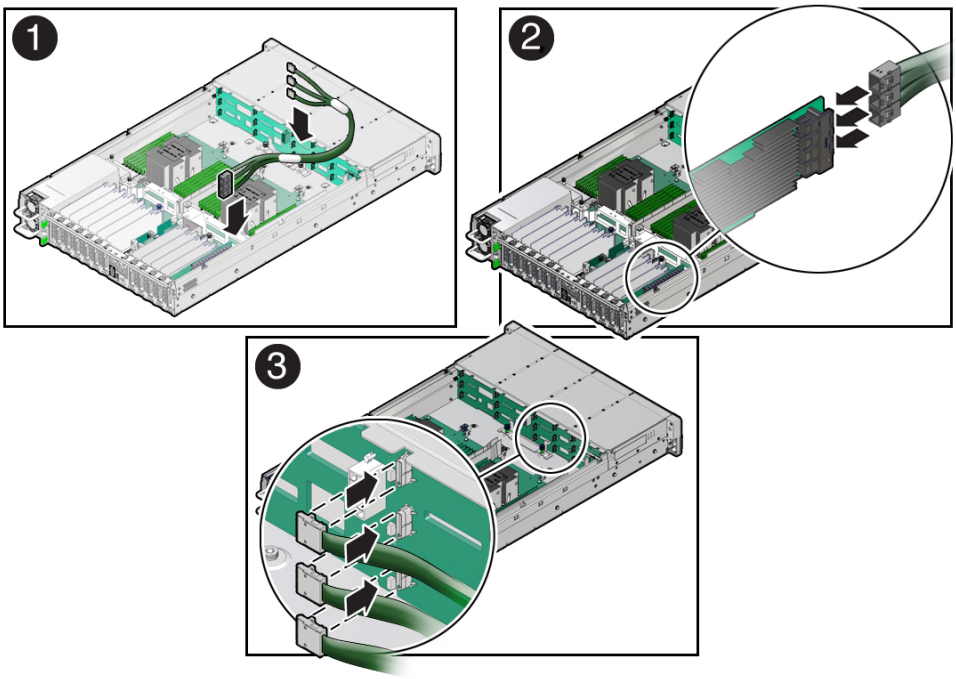
Related Information

- “Remove the Internal HBA Card and HBA Super Capacitor” on page 161
- “Install SAS Storage Drive Cables” on page 172

Install SAS Storage Drive Cables

1. **Install the SAS cables between the disk backplane and the rear PCIe slots [1].**

   Route the SAS cable bundle through the cable trough along the left side of the chassis.



2. **Reconnect the SAS cables to the Oracle Storage 12Gb SAS PCIe RAID HBA, Internal card in PCIe slot 11 [2].**

   Plug each cable into its SAS connector until you hear an audible click. To ensure proper connections, see the SAS cable connections table in Step 3. See also "Install the Internal HBA Card and HBA Super Capacitor" on page 165.

   Note -SAS cable kit, part number 7117126 is required to connect the SAS Host Bus Adapter (HBA) card to the disk backplane.

3. **Reconnect the SAS cables to the disk backplane [3].**

   Plug each cable into its SAS connector until you hear an audible click.

When attaching SAS cables, ensure that you match the numbers on the SAS cables with the SAS connectors on the disk backplane and on the HBA card. Use the following table to ensure proper SAS connections between the storage drive backplane and the HBA card.

HBA Card	PCIe Slot Location	HBA Connector	Disk Backplane Connector	Storage Drives (HC only)
Oracle Storage 12 Gb SAS PCIe RAID HBA, Internal	11	1	1	0, 1, 2, 3
		2	2	4, 5, 6, 7
		3	3	8, 9, 10, 11

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

   a. **Install the fan tray.**

      See “Install the Fan Tray” on page 78.

   b. **Install the fan modules.**

      See “Install a Fan Module” on page 75.

   c. **Install the air baffle.**

      See “Install the Air Baffle” on page 99.

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

      See “Install the Server Top Cover” on page 191.

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

      See “Return the Server to the Normal Rack Position” on page 193.

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

      See “Reconnect Power and Data Cables” on page 194 and “Power On the Server” on page 195.

   g. **Verify that the power supply AC OK LED is lit.**

Related Information

- “Install the Internal HBA Card and HBA Super Capacitor” on page 165
- “Remove SAS Storage Drive Cables” on page 169

Servicing the Motherboard Assembly

The following section describes how to service the motherboard assembly. The motherboard assembly is a replaceable unit. For more information about replaceable units, see “Illustrated Parts Breakdown” on page 22 and “Replaceable Units” on page 23.

Caution - The motherboard assembly must be removed and replaced only by authorized Oracle Service personnel.

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.

This section covers the following procedures:

- “Remove the Motherboard Assembly” on page 175
- “Install the Motherboard Assembly” on page 183

Related Information

- “System Components” on page 21

▼ Remove the Motherboard Assembly

Caution - Use the Oracle ILOM backup utility prior to removing the motherboard. This utility backs up the Oracle ILOM configuration of the service processor. For more information, see the Oracle ILOM 4.0 Documentation Library at `https://www.oracle.com/goto/ilom/docs`.

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

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

   See “Powering Down the Server” on page 53.

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

   See “Extend the Server to the Maintenance Position” on page 60.

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

   See “Take Antistatic Measures” on page 63.

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

   See “Remove the Server Top Cover” on page 64.

2. **If present on the HC server, remove the Oracle Storage 12 Gb SAS PCIe RAID HBA, Internal card and its super capacitor.**

   See “Remove the Internal HBA Card and HBA Super Capacitor” on page 161.

Note - After you remove the HBA super capacitor, remove the HBA super capacitor tray by squeezing the plastic hinges together and lifting the tray from the chassis.

3. **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 is not expired. For more information on KIP, see “Key Identity Properties (KIP) Automated Update” on page 51.

- Fan modules

  See “Remove a Fan Module” on page 73.
- Fan tray

  See “Remove the Fan Tray” on page 77.
- Air baffle

  See “Remove the Air Baffle” on page 97.
- PCIe cards

See “Remove a PCIe Card” on page 115.

- SAS storage drive cables (if present)

  See “Remove SAS Storage Drive Cables” on page 169.
- Power supplies

  See “Remove a Power Supply” on page 82.

4. **Disconnect the following cables from the motherboard:**

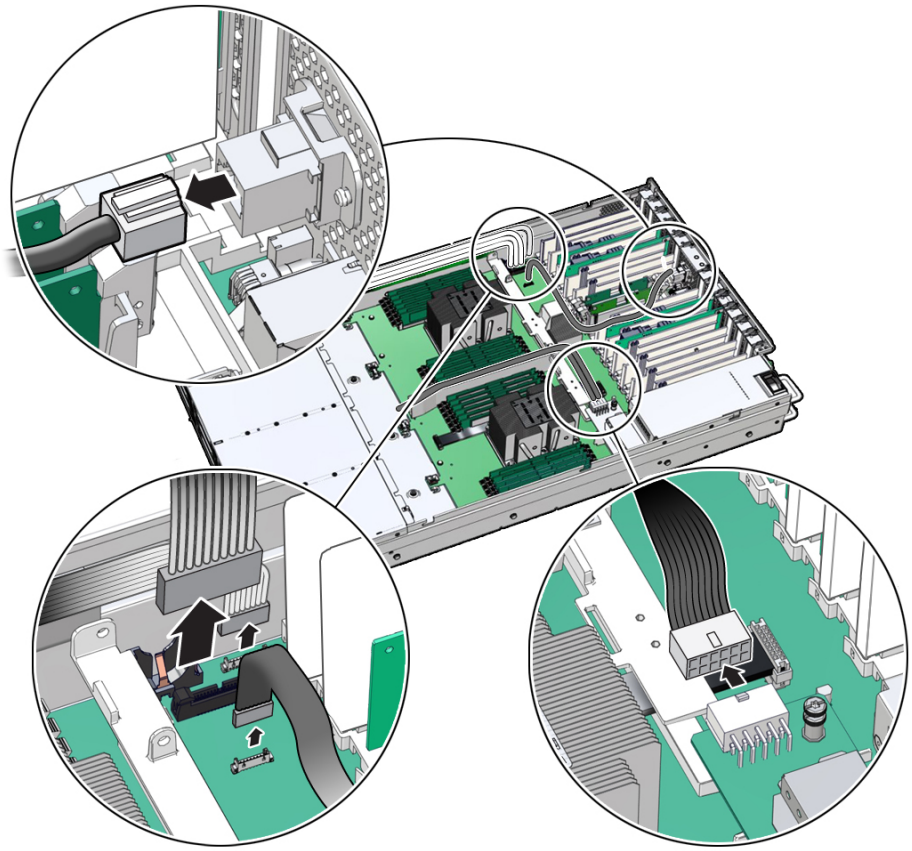
   - Front LED indicator module ribbon cable

     See “Servicing the Front LED Indicator Module” on page 147.
   - Disk backplane auxiliary signal cable

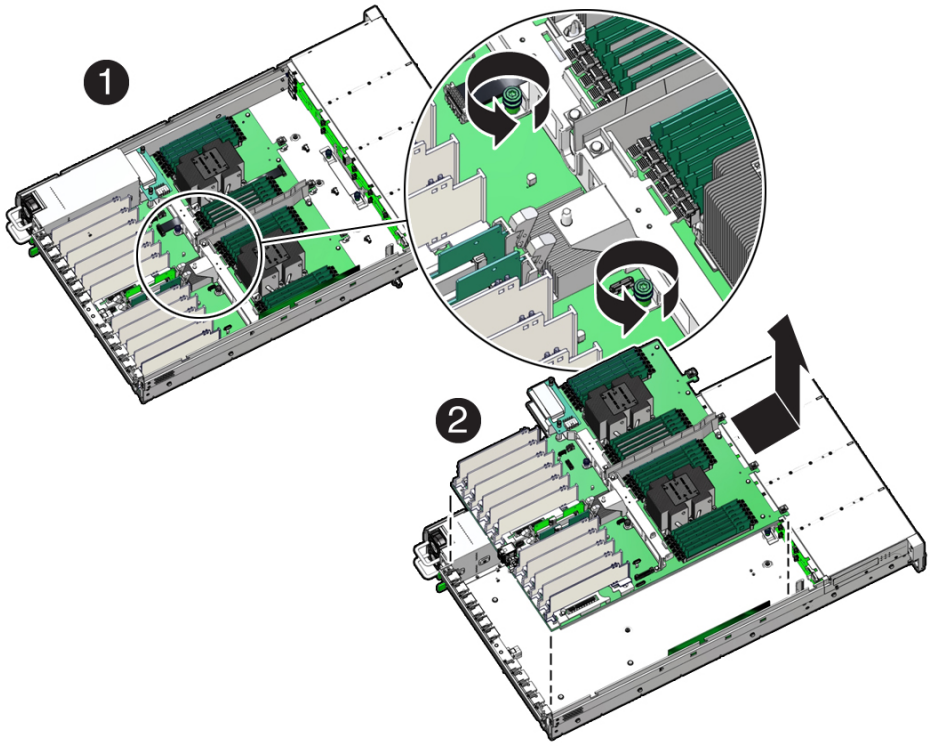
     See “Servicing the Disk Backplane” on page 139.
   - Disk backplane power cable

     See “Servicing the Disk Backplane” on page 139.
   - SER MGT RJ-45 serial cable

Disconnect and remove the SER MGT RJ-45 cable between the motherboard and back panel.



5. **Using a Torx T25 screwdriver, loosen the two captive screws that secure the motherboard mid-wall to the chassis [1].**



6. **With the server in the extended maintenance position, remove the motherboard from the server with all reusable components that populate the motherboard in place [2].**

   a. **Carefully slide the motherboard forward, and while holding the motherboard mid-wall, lift it out of the chassis.**

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

7. **Remove the following reusable components from the motherboard and install them onto the replacement motherboard.**

- DIMMs

  See “Identify and Remove a DIMM” on page 107 and “Install a DIMM” on page 109.

  Note - Install the 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 are not 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.

- M.2 flash riser SSDs

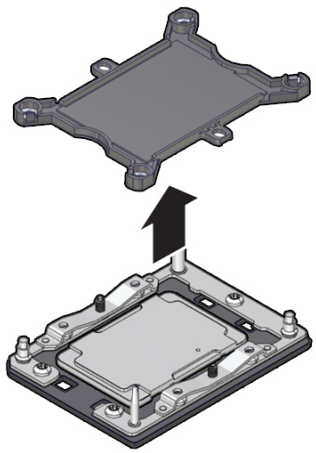
  See “Remove a Flash Riser Board” on page 87 and “Install a Flash Riser Board” on page 89.

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

   See “Identify and Remove a Processor” on page 125.

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

   a. **Grasp the processor socket cover finger grips (labeled REMOVE) and lift the socket cover up and off the processor socket.**



b. **Install a processor into the socket from which you removed the processor socket cover.**

   See “Install a Processor” on page 132.

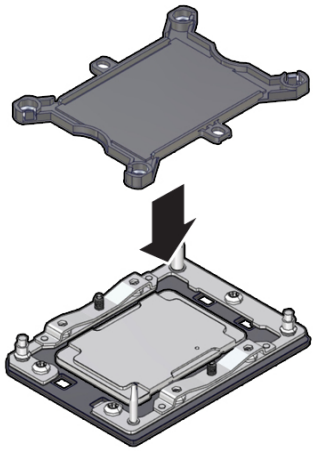
c. **Repeat Step 9a and Step 9b to remove the second processor socket cover from the replacement motherboard and install the second processor.**

10. **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.

a. **Align the processor socket cover over the processor socket alignment posts. Install the processor socket cover by firmly pressing down on all four corners (labeled INSTALL) on the socket cover.**

   You hear an audible click when the processor socket cover is securely attached to the processor socket.



b. **Repeat Step 10a to install the second processor socket cover on the faulty motherboard.**

11. **Check to see if the replacement motherboard has a locate light pipe installed.**

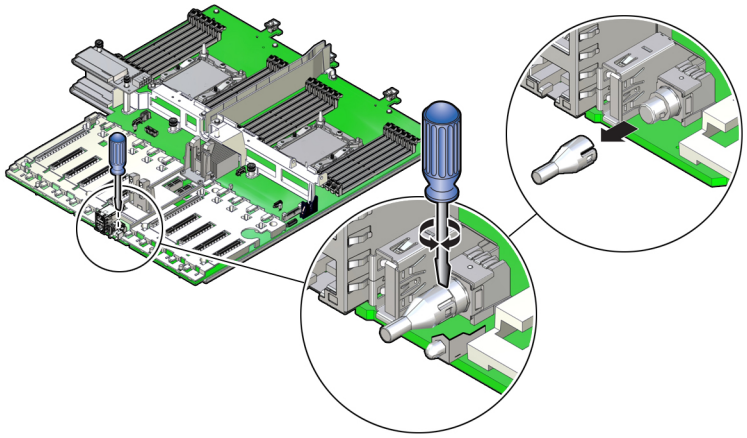
- If it does, no action is necessary.
- If it does not, perform the following steps.

a. Check to see if the replacement motherboard came with a light pipe. It should be in a separate plastic bag.

- If you find a replacement light pipe, skip to Step 11b.
- If you do not find a replacement light pipe, perform the following steps to remove the light pipe from the faulty motherboard.

i. Insert a flat tool such as a screwdriver or penknife blade between the light pipe housing and the light pipe.

Caution - Equipment damage. The light pipe is fragile. Handle it carefully.

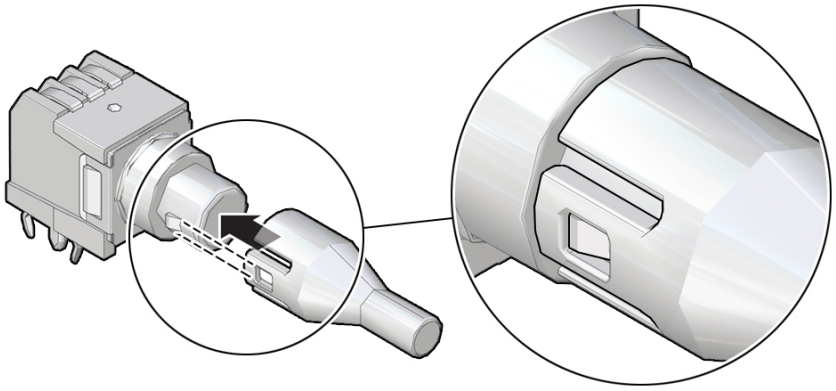


ii. Twist the tool back and forth to release the light pipe from the housing.

iii. Pull the light pipe away from the housing.

b. Install the light pipe on the replacement motherboard.

i. **Match the rectangular holes on the outside of the light pipe with the retaining clips on the housing.**



ii. **Push the light pipe onto the housing until the clips latch in the holes.**

Related Information

- “System Components” on page 21
- “Replaceable Units” on page 23
- “Replaceable Units” on page 23
- “Install the Motherboard Assembly” on page 183

▼ Install the Motherboard Assembly

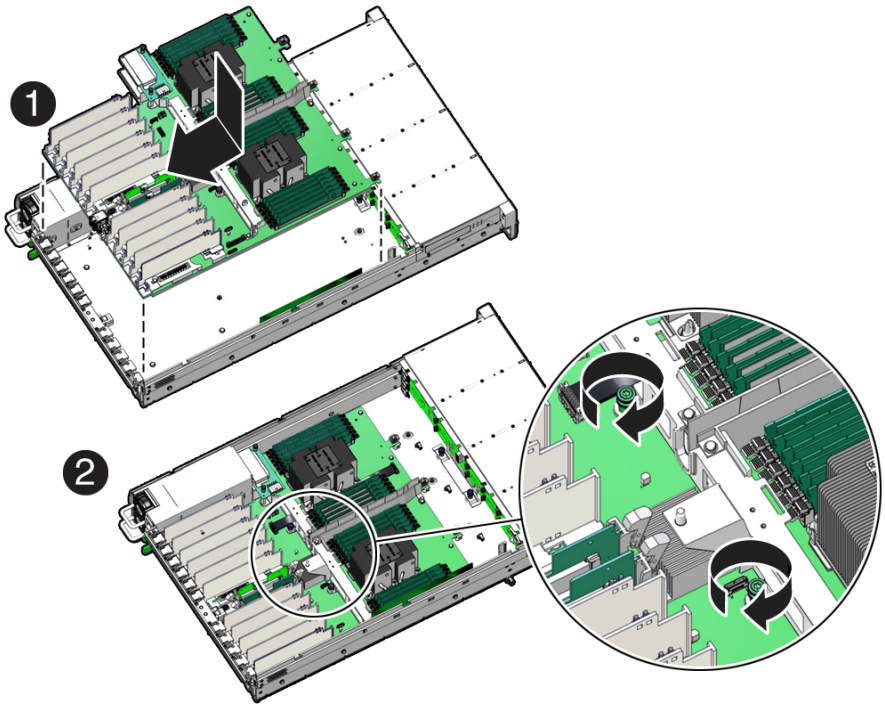
1. **Attach an antistatic wrist strap to your wrist, and then to a metal area on the chassis.**

   See “Take Antistatic Measures” on page 63.

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

While holding the motherboard mid-wall, tilt the motherboard to the right side to fit it under the power supply assembly, then level the motherboard and place it into the server chassis. Slide the motherboard to the back of the server to engage the raised standoffs.

Caution - Be careful not to damage the rear Locate Button/LED when placing the motherboard into the chassis.



3. **Using a Torx T25 screwdriver, tighten the two captive screws to secure the motherboard mid-wall to the chassis [2].**

4. **Reconnect the following cables to the motherboard:**

   - SER MGT RJ-45 serial cable

     Reinstall and reconnect the SER MGT RJ-45 cable between the motherboard and back panel.
   - Disk backplane power cable

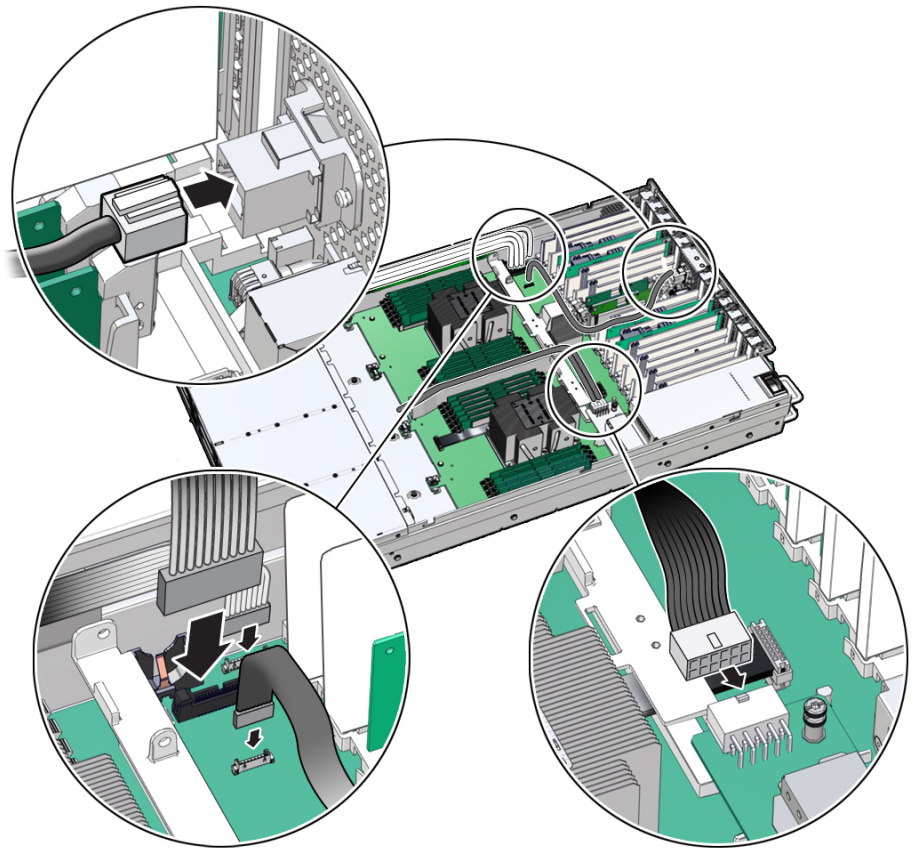
See “Servicing the Disk Backplane” on page 139.

- Disk backplane auxiliary signal cable

  See “Servicing the Disk Backplane” on page 139.

- Front LED indicator module ribbon cable

  See “Servicing the Front LED Indicator Module” on page 147.



5. 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 is not expired. For more information on KIP, see "Key Identity Properties (KIP) Automated Update" on page 51.

- Power supplies

  See "Install a Power Supply" on page 84.
- PCIe cards

  See "Install a PCIe Card" on page 117.
- SAS storage drive cables (if present)

  See "Install SAS Storage Drive Cables" on page 172.
- Fan tray

  See "Install the Fan Tray" on page 78.
- Fan modules

  See "Install a Fan Module" on page 75.
- Air baffle

  See "Install the Air Baffle" on page 99.

6. **If present on the HC server, install the Oracle Storage 12 Gb SAS PCIe RAID HBA, Internal card and its associated super capacitor.**

   See "Install the Internal HBA Card and HBA Super Capacitor" on page 165.

Note - Before you install the HBA super capacitor, install the HBA super capacitor tray by squeezing the plastic hinges together and inserting the tray into the chassis.

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

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

      See "Install the Server Top Cover" on page 191.

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

      See "Return the Server to the Normal Rack Position" on page 193.

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

      See "Reconnect Power and Data Cables" on page 194 and "Power On the Server" on page 195.

d. Verify that the power supply AC OK LED is lit.

Note - IMPORTANT: After replacing the motherboard, you might need to manually program the product serial number (PSN) into the new motherboard. See “Key Identity Properties (KIP) Automated Update” on page 51. This is necessary because the motherboard is a secondary member of a select group (or quorum) of components for maintaining the PSN for service entitlement, and if you replace more than one of the quorum members during any given service procedure, a secondary quorum member might need to be programmed with the PSN.

Related Information

- “System Components” on page 21
- “Replaceable Units” on page 23
- “Replaceable Units” on page 23
- “Remove the Motherboard Assembly” on page 175

Returning the Server to Operation

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

Server Filler Panel Requirements

The server might be shipped with module-replacement filler panels for storage drives and PCIe cards. These filler panels are installed at the factory and must remain in the server until you replace them with a purchased option.

Before you can install an optional server component into the server, remove the filler panel from the location into which you intend to install the component. When you remove a storage drive or a PCIe card from the server, install either a replacement for the component removed or a filler panel.

Related Information

- "Preparing for Service" on page 49

▼ Remove and Install Filler Panels

- **See the procedures in the following table to remove and install filler panels for storage drives and PCIe cards.**

Filler Panel Type	Removal Procedure	Installation Procedure
Storage drive (EF only)	1. Locate the storage drive filler panel you want to remove from the server. 2. To unlatch the storage drive filler panel, pull the release lever, and tilt the lever out into a fully opened position. 3. To remove the filler panel from the slot, hold the opened release lever, and gently slide the filler panel toward you.	1. Locate the vacant storage drive module slot in the server, and ensure that the release lever on the filler panel is fully opened. 2. Slide the filler panel into the vacant slot by pressing the middle of the filler panel faceplate with your thumb or finger. The release lever goes in as it makes contact with the chassis. Do not slide the filler panel in all the way. Leave the filler panel out approximately 0.25 to 0.50 inch (6 to 12 mm) from the opening. 3. Using your thumb or finger, press on the middle of the filler panel faceplate until the release lever engages with the chassis. 4. Close the release lever until it clicks into place and is flush with the front of the server.
PCIe slot	1. Remove the server top cover. 2. To remove the PCIe slot filler panel, rotate the PCIe locking mechanism to an upright position, and lift and remove the PCIe slot filler panel from the location into which you intend to install the PCIe card.	1. Remove the server top cover. 2. To install the PCIe slot filler panel, press the PCIe filler panel into the vacant PCIe slot, and rotate the PCIe locking mechanism downward to secure the PCIe slot filler panel. You hear an audible click when the PCIe filler panel is secured into the slot.

Install the Server Top Cover

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

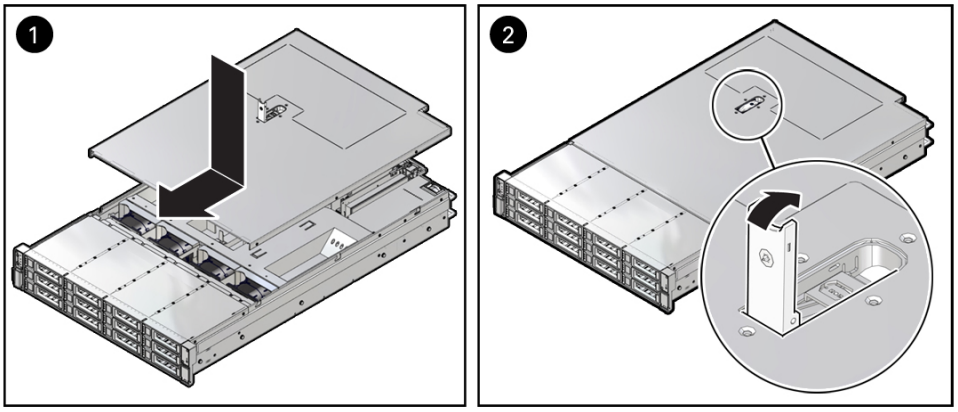
   Set the cover down so that it hangs over the back of the server by about 1 inch (25 mm) and the side latches align with the cutouts in the chassis.

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 back of the chassis to position the cover in the correct position.

3. **Gently slide the cover toward the front of the chassis until it latches into place (with an audible click) [2].**

   As you slide the cover toward the front of the server, the release button on the top of the server automatically rotates downward to the closed position. Latch the top cover by pushing down on the button until it is flush with the cover and you hear an audible click. An audible click indicates that the cover is latched.



4. **Use a Torx T15 screwdriver to turn the release button latch counter-clockwise to the locked position.**

Related Information

- “Remove the Server Top Cover” on page 64

Remove Antistatic Measures

- **Remove any antistatic straps or conductors from the server chassis.**

Related Information

- “Take Antistatic Measures” on page 63

Reinstall the Server Into the Rack

After servicing the system, reinstall it into the rack.

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

Caution - The EF server weighs approximately 22.8 kg (50.2 lb). The HC server weighs approximately 30.5 kg (67.1 lb). Two people are required to unmount and carry the chassis.

1. **Lift the server from the antistatic mat, and reinstall the server into the rack.**
   For installation instructions for your rackmount kit, refer to “Installing the Storage Server Into a Rack” in *Oracle Exadata Storage Server X7-2 EF and HC Installation Guide*.
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 (Optional)” in *Oracle Exadata Storage Server X7-2 EF and HC Installation Guide*.
3. **If the cables are disconnected from the back 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 back of the server, see “Reconnect Power and Data Cables” on page 194.**
   - **For details on connecting cables to the back of the server, see “Back Panel Connector Locations” on page 42.**

Related Information

- “Remove the Server From the Rack” on page 62

- “Reconnect Power and Data Cables” on page 194

Return the Server to the Normal Rack Position

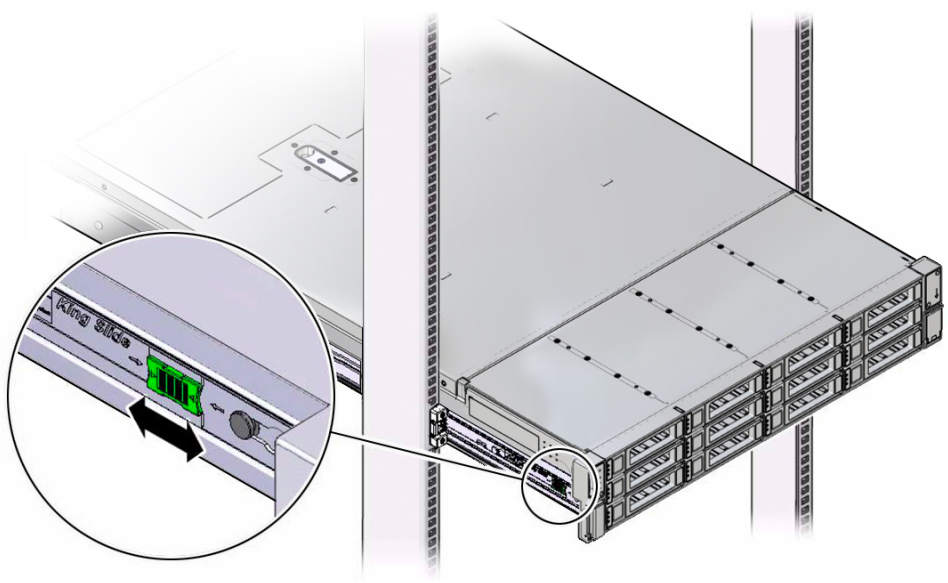
If the server is in the extended maintenance position, use this procedure to return the server to the normal rack position.

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 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 (Optional)" in *Oracle Exadata Storage Server X7-2 EF and HC Installation Guide*.

3. **If the cables are disconnected from the back 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 back of the server, see "Reconnect Power and Data Cables" on page 194.
   - For details on connecting cables to the back of the server, see "Back Panel Connector Locations" on page 42.

Related Information

- "Reconnect Power and Data Cables" on page 194

▼ Reconnect Power and Data Cables

1. **Reconnect the data cables to the back of the server.**

   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 195.

Related Information

- "Disconnect Cables From the Server" on page 59
- "Reinstall the Server Into the Rack" on page 192

- "Return the Server to the Normal Rack Position" on page 193
- "Power On the Server" on page 195

Power On the Server

As soon as you connect the power cords, Standby power is applied. In Standby power mode:

- The System OK LED on the server front panel blinks slowly.
- The SP OK LED indicator is steady on.
- The AC Power Supply indicator lights are steady on.

  Depending on the firmware configuration, the system might boot. If it does not boot, perform the following procedure.

- **Power on the server to Main power mode by performing one of the following actions:**

  - **Press the On/Standby button on the front bezel.**
  - **Log in to the Oracle ILOM web interface, click Host Management → Power Control, and from the Select Action list, select Power On.**
  - **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 to Main power mode and the power-on self-test (POST) code checkpoint tests are complete, the green System OK LED status indicator on the front panel of the server lights and remains lit.

Related Information

- "Powering Down the Server" on page 53
- "Reconnect Power and Data Cables" on page 194

Identifying the Server Ports

These sections describe the pinouts of the server connectors:

Related Information

- "About the Oracle Exadata Storage Server X7-2" on page 15

Gigabit Ethernet Port

The server has one auto-negotiating 100/1000BASE-T Gigabit Ethernet (GbE) system domain port that uses a standard RJ-45 connector. The transfer rates are shown in the following table.

TABLE 1 Ethernet Port Transfer Rates

Connection Type	IEEE Terminology	Transfer Rate
Fast Ethernet	100BASE-T	100 Mbps
Gigabit Ethernet	1000BASE-T	1,000 Mbps

The following figure and table describe the GbE port pin signals.

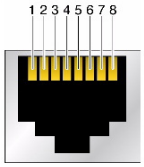


TABLE 2 One GbE Port Signals

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

- “EF Back Panel Components and Cable Connections” on page 18
- “HC Back Panel Components and Cable Connections” on page 20
- “Server System-Level Status Indicators” on page 31
- “Disconnect Cables From the Server” on page 59
- “Reconnect Power and Data Cables” on page 194

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

TABLE 3 Network Management 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

- “EF Back Panel Components and Cable Connections” on page 18
- “HC Back Panel Components and Cable Connections” on page 20
- “Server System-Level Status Indicators” on page 31
- “Disconnect Cables From the Server” on page 59
- “Reconnect Power and Data Cables” on page 194

Serial Management Port

The serial management connector, labeled SER MGT, is an RJ-45 connector that can be accessed from the back panel. This port is the default connection to the server Oracle ILOM SP. Use this port *only* for server management.

TABLE 4 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 5 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 6 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 7 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

Serial Port (RJ-45 Connector)		DB-25 Adapter	
Pin	**Signal Description**	**Pin**	**Signal Description**
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

- “EF Back Panel Components and Cable Connections” on page 18
- “HC Back Panel Components and Cable Connections” on page 20
- “Disconnect Cables From the Server” on page 59
- “Reconnect Power and Data Cables” on page 194

USB Ports

The server has two USB ports for attaching supported USB 3.0–compliant devices. One USB port is on the back panel and one USB port is located on the motherboard.

The following figure and table describe the USB port pin signals.

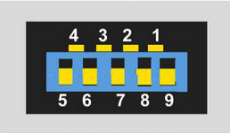


TABLE 8 USB Port Signals

Pin	Signal Description
1	+5 V
2	USB 2.0 DAT-
3	USB 2.0 DAT+
4	Ground

Pin	Signal Description
5	USB 3.0 RX-
6	USB 3.0 RX+
7	Ground
8	USB 3.0 TX-
9	USB 3.0 TX+

Related Information

- “EF Back Panel Components and Cable Connections” on page 18
- “HC Back Panel Components and Cable Connections” on page 20
- “Disconnect Cables From the Server” on page 59
- “Reconnect Power and Data Cables” on page 194

Setting Up BIOS Configuration Parameters

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

Related Information

- "BIOS Setup Utility Menu Options" on page 233

Manage 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 4.0* in the Oracle Integrated Lights Out Manager (ILOM) 4.0 Documentation Library at `http://www.oracle.com/goto/ilom/docs`.
- **BIOS Setup Utility** – "Common BIOS Setup Utility Tasks" on page 209

Accessing the BIOS Setup Utility

The BIOS Setup Utility provides five main menus that you can use to view product information, and to configure, enable, and disable, or manage system components.

This section provides the following information:

BIOS Setup Utility Menus

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

TABLE 9 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.
IO	Manage configuration settings for I/O devices, such as I/O virtualization settings, and enable and disable Option ROMs.
Boot	Configure the boot device priority.
Save & 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 233 for examples of each of these screens.

Related Information

- "Navigate BIOS Setup Utility Menus" on page 206

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 10 Function Key to Control Key Sequence Mapping

Function Key	Control Key Sequence	BIOS Setup Function
F1	Ctrl+Q	Activate the Setup Utility Help menu.
F2	Ctrl+E	Enter the BIOS Setup Utility while the system is performing the power-on self-test (POST).
F8	Ctrl+P	Activate the BIOS Boot Menu.
F10	Ctrl+S	Save and Exit changes.
F12	Ctrl+N	Activate Network boot.

Related Information

- “Access BIOS Setup Utility Menus” on page 205
- “Navigate BIOS Setup Utility Menus” on page 206

▼ Access BIOS Setup Utility Menus

You can access the BIOS Setup Utility screens from the following interfaces:

- 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.

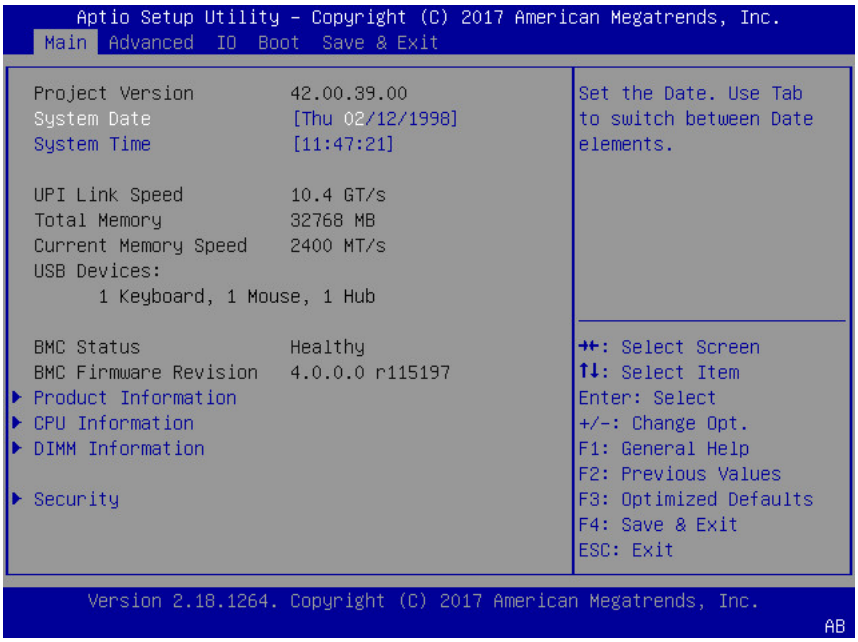
1. **Reset or power on the server.**

   For example, to reset the server:

   - **From the local server**, press the On/Standby button on the front panel of the server to power off the server, and press the On/Standby 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. Click Save, and click OK.
   - **From the Oracle ILOM CLI**, type `reset /System`

2. **After the server resets, 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 204
- “BIOS Key Mappings” on page 204
- “BIOS Setup Utility Menu Options” on page 233

▼ 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 205.

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 - (plus or minus) keys or by pressing Enter and selecting the desired option from the pop-up menus.**

5. **Press the Esc key to return from a sub-menu screen to the previous menu screen.**

   Pressing Esc from a top-level menu is equivalent to selecting the Discard Changes and Exit option from the Save & Exit Menu.

6. **Modify parameters as needed.**

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

   Alternatively, you can select the Save & Exit menu, and then select Save Changes and exit to save your changes and exit the BIOS Setup Utility.

Note - After modifying any BIOS settings, 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 204
- “BIOS Key Mappings” on page 204
- “BIOS Setup Utility Menu Options” on page 233

Using UEFI BIOS

Oracle Exadata Storage Server X7-2 is equipped with a Unified Extensible Firmware Interface (UEFI)-compatible BIOS, which runs with all operating systems that are supported on the server. The BIOS firmware controls the system from power-on until an operating system is booted and allows you to configure, enable, disable, or manage system components.

This section includes the following information:

Configuration Utilities for Add-In Cards

In UEFI BIOS, the configuration screens for the add-in cards 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 SAS PCIe RAID HBA, Internal card is installed in the HC server, the configuration utility for the HBA appears as a menu selection.

Configure and Manage BIOS Using Oracle ILOM

Oracle Integrated Lights Out Manager (ILOM) includes BIOS configuration and management tools. You can perform the following BIOS configuration tasks using Oracle ILOM:

- View the BIOS configuration synchronization status and synchronize the configuration parameters
- Reset the factory defaults for the service processor (SP) and Oracle ILOM BIOS
- Backup or restore the BIOS configuration
- Enable UEFI diagnostics to run at system boot

For more information about Oracle ILOM BIOS configuration and management tools, refer to the Oracle Integrated Lights Out Manager (ILOM) 4.0 Documentation Library at: `http://www.oracle.com/goto/ilom/docs`.

UEFI Secure Boot

Oracle Exadata Storage Server X7-2 UEFI BIOS supports UEFI Secure Boot. UEFI Secure Boot defines how platform firmware can authenticate a digitally signed UEFI image, such as an operating system loader or a UEFI driver.

When enabled, UEFI Secure Boot provides a policy-based invocation of various UEFI executable images, using cryptographic signatures to identify the software publishers. UEFI Secure Boot also requires all third-party UEFI drivers and operating system boot loaders to be signed by Microsoft or with Key Exchange Key (KEK) by using BIOS setup.

UEFI Secure Boot is disabled by default. For configuration information, see "Configure UEFI Secure Boot" on page 220.

Trusted Execution Technology

Oracle Exadata Storage Server X7-2 uses Trusted Execution Technology (TXT), which provides authenticity of a platform and its operating system.

When enabled, TXT ensures that the operating system (OS) starts in a trusted environment, and provides the OS with additional security capabilities not available to an untrusted OS. Using cryptographic techniques, TXT provides measurements of software and platform components so that system software as well as local and remote management applications may use those measurements to make trust decisions. Trusted Execution Technology defends against software-based attacks aimed at stealing sensitive information by corrupting system or BIOS code, or modifying a platform's configuration.

Trusted Execution Technology is disabled by default. For configuration information, see "Configure Trusted Execution Technology" on page 229.

Common BIOS Setup Utility Tasks

This section presents the procedures for some of the BIOS setup tasks that you typically perform when setting up and managing the server.

For additional information about BIOS setup tasks, refer to refer to the *Oracle X7 Series Server Administrator Guide* at `https://www.oracle.com/goto/x86admindiag/docs`.

- "Verify BIOS Factory Default Settings" on page 210
- "Select a Temporary Boot Device" on page 211

- "Configure TPM Support" on page 212
- "Configure UEFI Driver Settings" on page 214
- "Configure I/O Resource Allocation" on page 217
- "Configure UEFI Secure Boot" on page 220
- "Configure Trusted Execution Technology" on page 229
- "Exit BIOS Setup Utility" on page 231

▼ 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 a console connection is established to the server.

1. **Reset or power on the server.**

   For example, to reset the server:

   - **From the local server**, press the On/Standby button on the front panel of the server to power off the server, and press the On/Standby 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. Click Save, and click OK.
   - **From the Oracle ILOM CLI**, type `reset /System`

2. **After the server resets and begins the initialization process, 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.**

   b. **In response to the confirmation message to continue, highlight OK, and press Enter.**

4. **On the BIOS Setup Utility screen, press the F10 key to save the changes and exit the BIOS Setup Utility.**

Related Information

- "Access BIOS Setup Utility Menus" on page 205

- “BIOS Setup Utility Menus” on page 204
- “BIOS Key Mappings” on page 204
- “Exit BIOS Setup Utility” on page 231

▼ Select a Temporary Boot Device

The Boot Options Priority list displays the boot device candidates for the system.

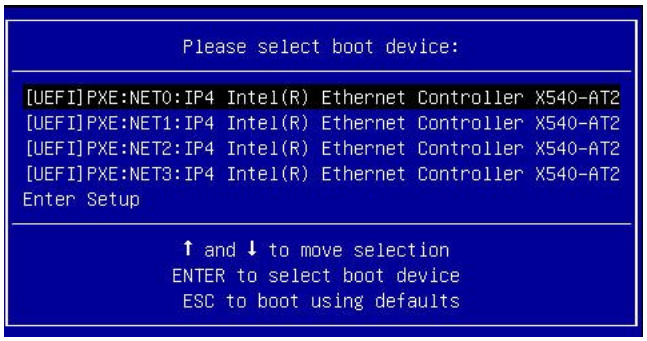
In addition to using the F2 key to view or edit the system BIOS settings, you can use the F8 key during the BIOS startup to specify a temporary boot device. This selected boot device is in effect only for the current system boot. The permanent boot device specified using the F2 key is in effect after booting from the temporary boot device.

1. **Reset or power on the server.**

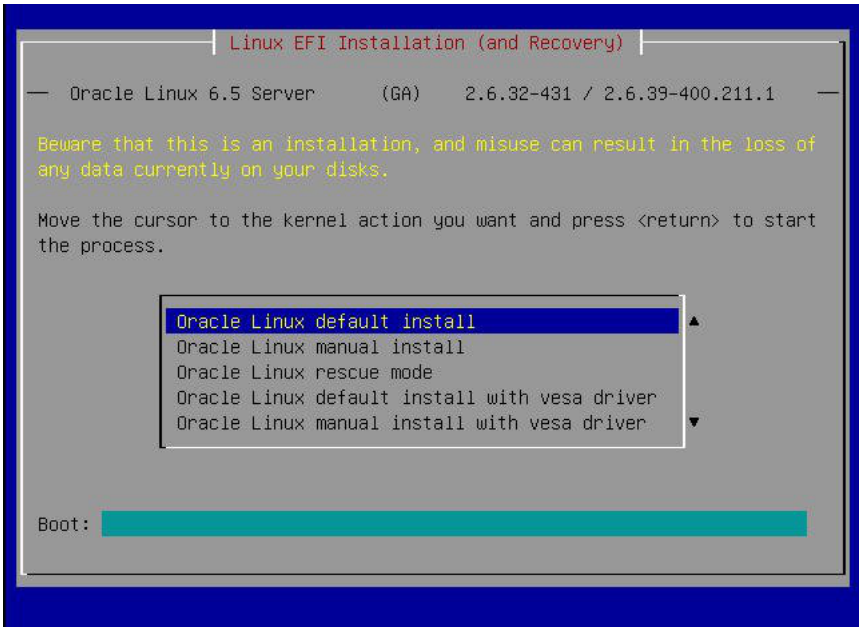
   For example, to reset the server:

   - **From the local server**, press the On/Standby button on the front panel of the server to power off the server, and press the On/Standby 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. Click Save, and click OK
   - **From the Oracle ILOM CLI**, type `reset /System`

2. **After the server resets and begins the initialization process, press the F8 key (or Ctrl+P from a serial connection) when prompted while the UEFI BIOS is running the power-on self-test (POST) to access the boot device popup menu.**



3. **In the Please Select Boot Device dialog box, select the boot device according to the operating system you elected to use, and press Enter.**



4. **Follow the on-screen instructions to install the operating system from the selected boot device.**

Related Information

- “Access BIOS Setup Utility Menus” on page 205
- “BIOS Setup Utility Menus” on page 204
- “BIOS Key Mappings” on page 204
- “Exit BIOS Setup Utility” on page 231

▼ Configure TPM Support

If you intend to use the Trusted Platform Module (TPM) feature set, you must configure the server to support this feature. TPM support is enabled by default on Oracle Exadata Storage Server X7-2. Perform the procedure in this section to disable or enable TPM support.

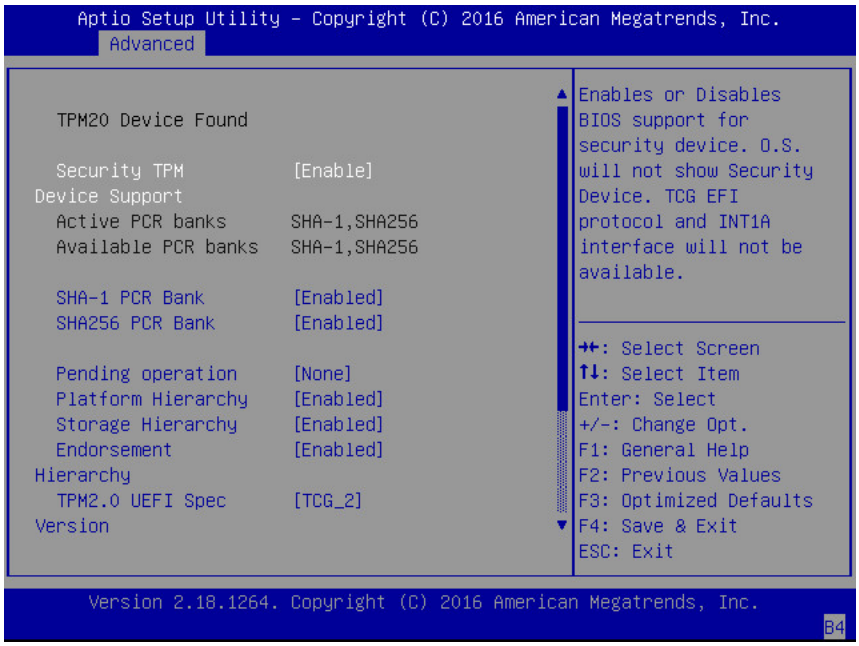
Note - TPM enables you to administer the TPM security hardware in your server. For additional information about implementing this feature, refer to the Windows Trusted Platform Module Management documentation provided by your operating system or third-party software vendor.

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

   See “Access BIOS Setup Utility Menus” on page 205.

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

3. **On the Advanced Menu screen, select `Trusted Computing 2.0`.**



4. **On the Trusted Computing 2.0 Configuration screen, select `Security TPM Device Support`, and press Enter. Do one of the following:**

   - **Select `Disable` to disable Security TPM Device Support.**
   - **Select `Enable` to enable Security TPM Device Support.**

5. **On the updated Trusted Computing 2.0 Configuration screen, press the F10 key to save the changes, and exit the BIOS Setup Utility.**

Related Information

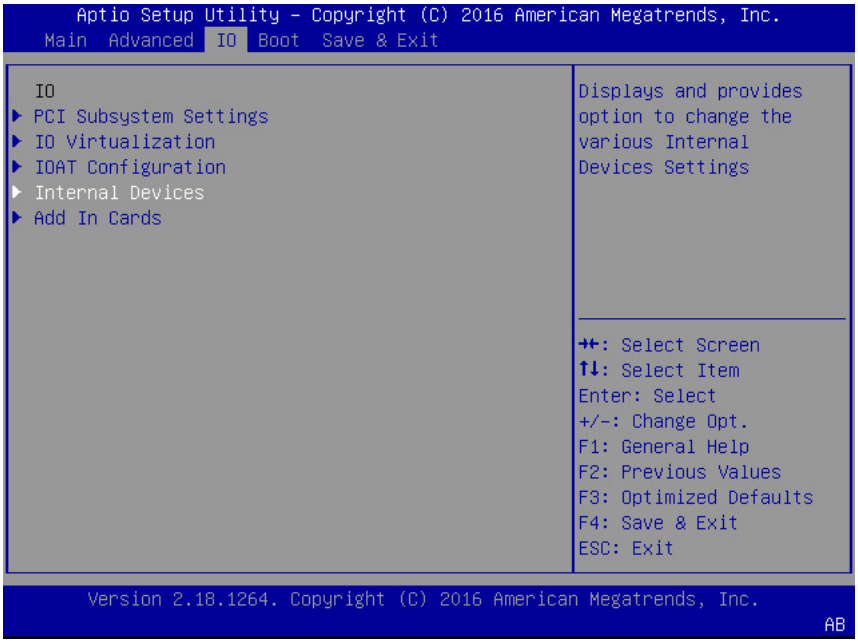
- “Access BIOS Setup Utility Menus” on page 205
- “BIOS Setup Utility Menus” on page 204
- “Exit BIOS Setup Utility” on page 231
- Microsoft Windows Trusted Platform Module Management documentation

▼ Configure UEFI Driver Settings

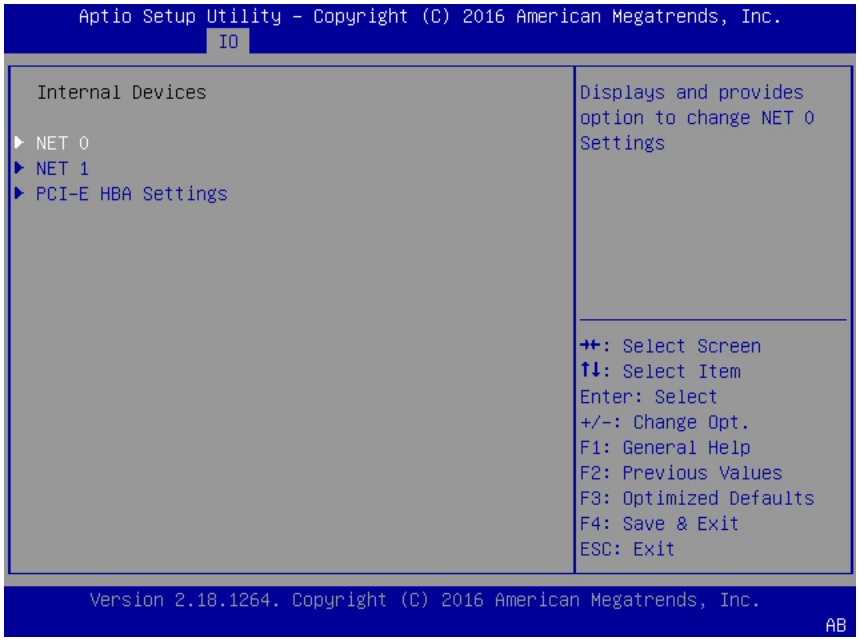
1. **Access the BIOS Setup Utility menus.**

   See “Access BIOS Setup Utility Menus” on page 205.

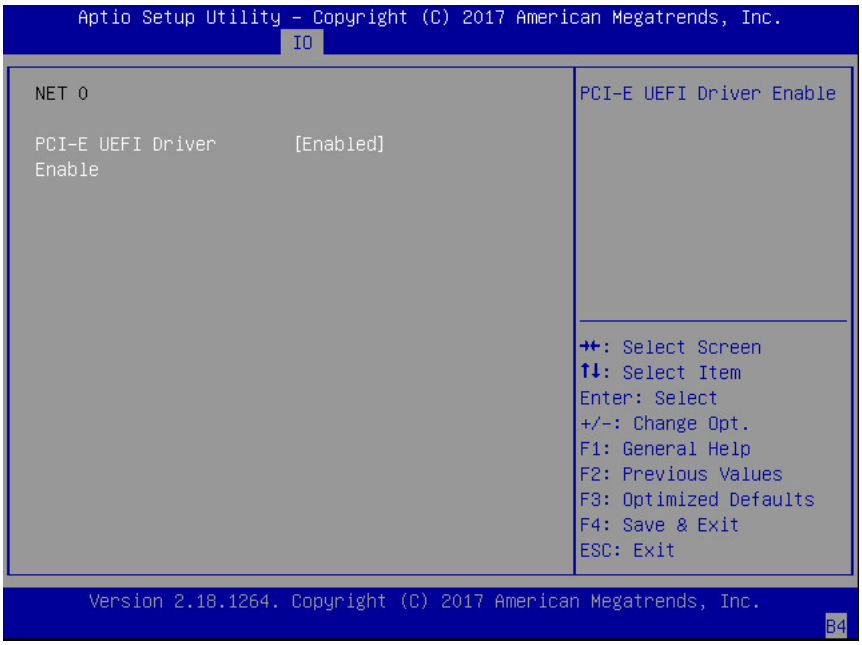
2. **In the BIOS Setup Utility menus, navigate to the IO Menu.**



3. **In the IO Menu screen, 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 the PCI-E UEFI Driver.**



4. **On the Internal Devices or Add In Cards screen, select the internal device or add In card slot that you want to configure.**



5. **On the PCI-E UEFI Driver Enable screen for that internal device or add-in card slot, select `PCI-E UEFI Driver Enable`, and press Enter. Do one of the following:**

   - **Select `Enabled` to enable the PCI-E UEFI Driver setting.**
   - **Select `Disabled` to disable the PCI-E UEFI Driver setting.**

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

Related Information

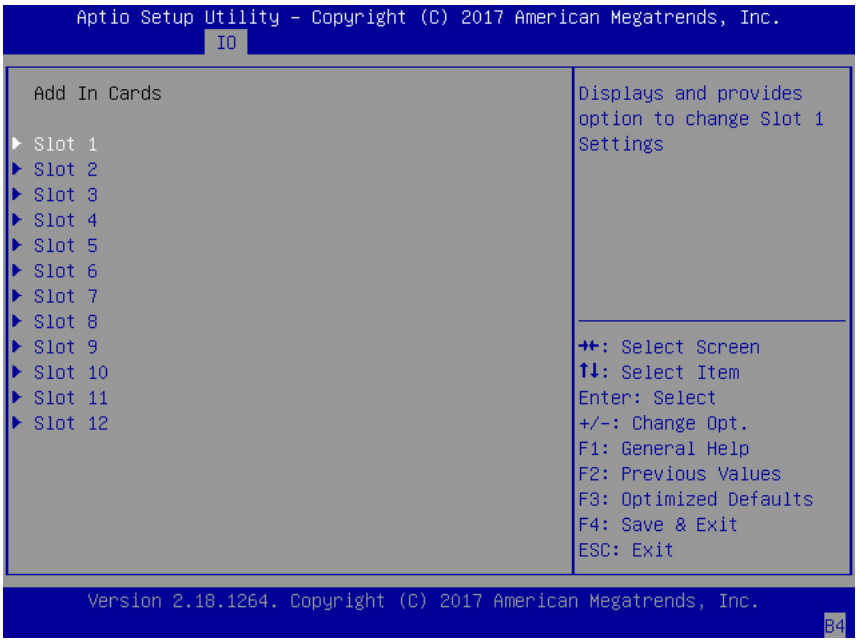
- “Access BIOS Setup Utility Menus” on page 205
- “BIOS Setup Utility Menus” on page 204
- “Exit BIOS Setup Utility” on page 231

▼ Configure I/O Resource Allocation

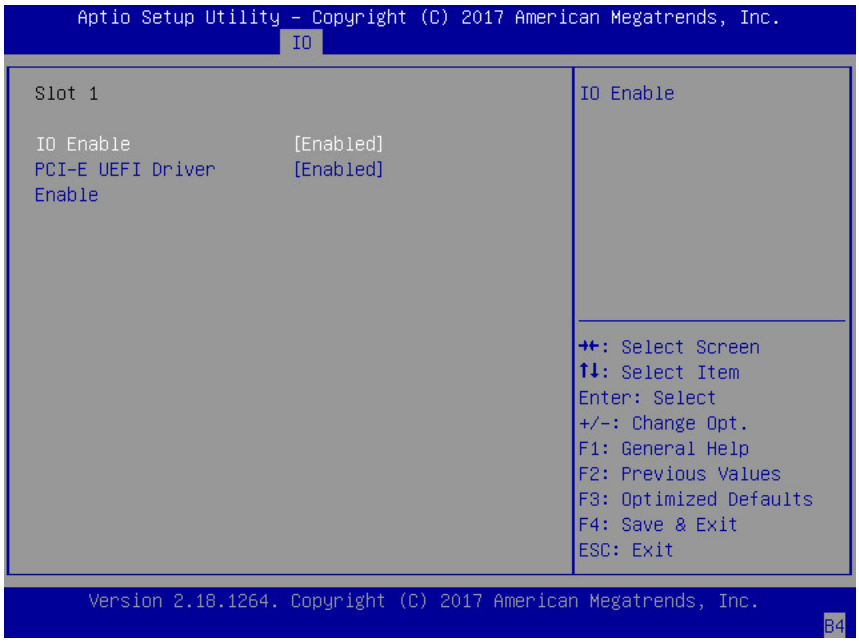
1. **Access the BIOS Setup Utility menus.**
   See “Access BIOS Setup Utility Menus” on page 205.

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

3. **On the IO Menu screen, select `Add In Cards`, and press Enter to display the add-in card slots.**



4. **On the Add In Cards screen, select the slot for which you want to configure the card, and press Enter.**



5. **On the IO resource allocation screen for that add-in card slot, select `IO Enable`, and press Enter. 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.**

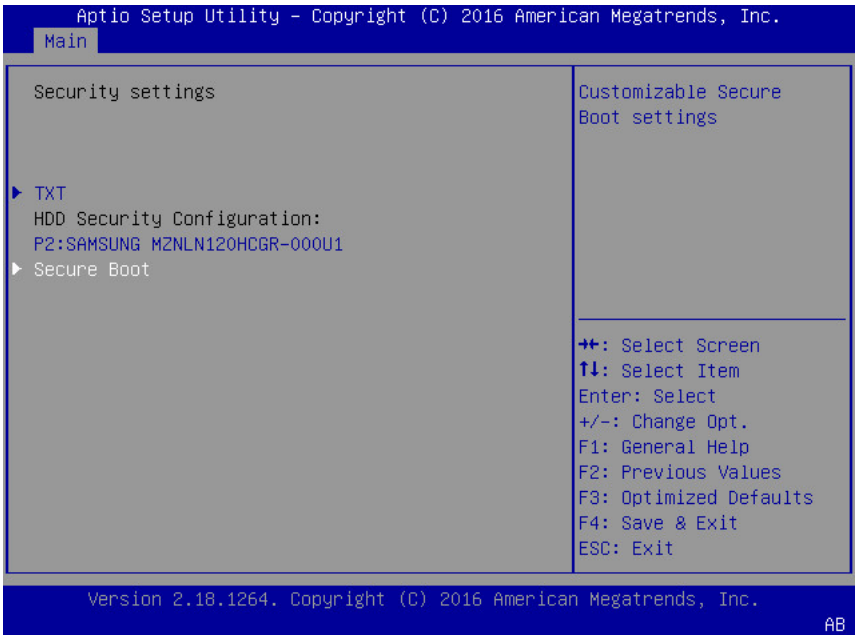
Related Information

- “Access BIOS Setup Utility Menus” on page 205
- “BIOS Setup Utility Menus” on page 204
- “Exit BIOS Setup Utility” on page 231

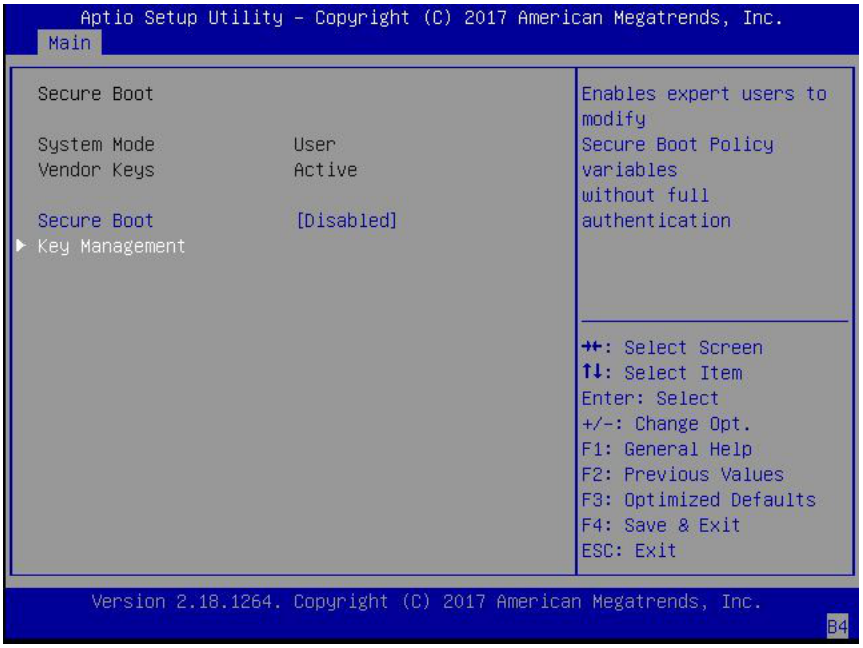
Configure UEFI Secure Boot

1. **Access the BIOS Setup Utility menus.**
   See “Access BIOS Setup Utility Menus” on page 205.

2. **On the BIOS Setup Utility Main Menu screen, select `Security`, and press Enter.**



3. **On the Security Settings screen, select `Secure Boot`, and press Enter.**



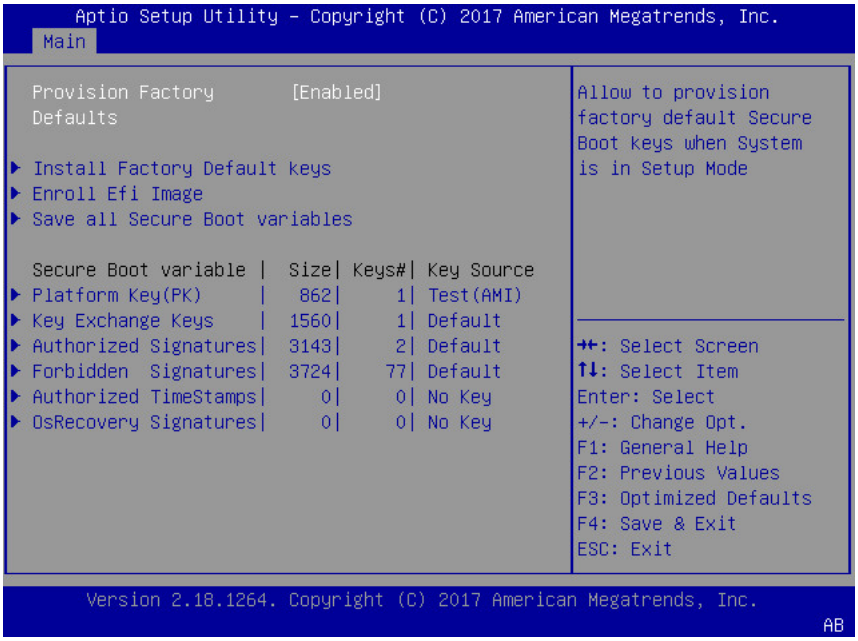
4. **On the Secure Boot screen, select `Secure Boot` and press Enter. Do one of the following:**

   - **Select `Enabled` to enable UEFI Secure Boot. Continue with the next step to manage policy variables.**

   - **Select `Disabled` to disable UEFI Secure Boot. Continue with Step 8 to save changes and exit from the BIOS Setup Utility.**

   When enabled, Secure Boot allows you to manage Secure Boot policy variables.

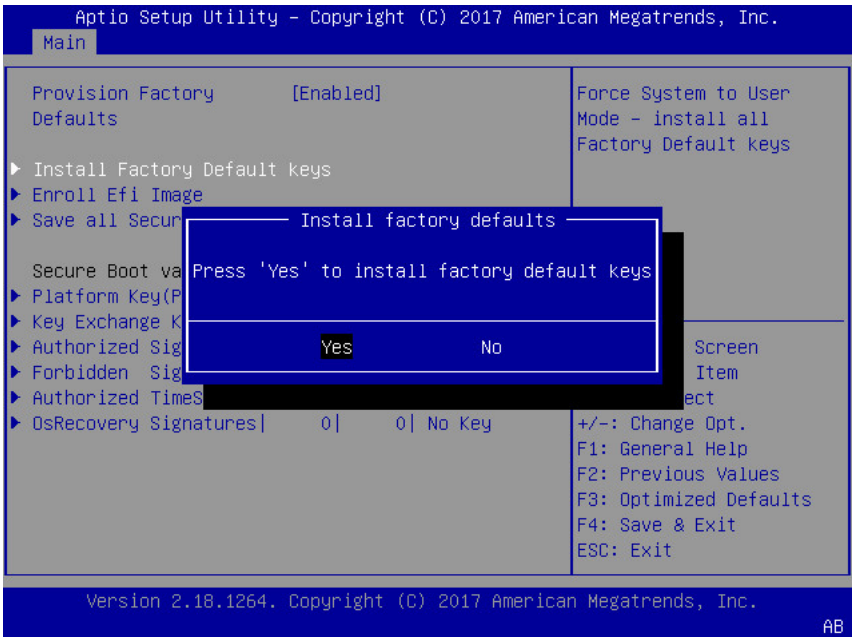
5. **To manage Secure Boot policy variables, select `Key Management` and press Enter.**



6. **If you want to provision factory default keys, on the Key Management screen, select `Provision Factory Defaults`, and press Enter. Do one of the following:**

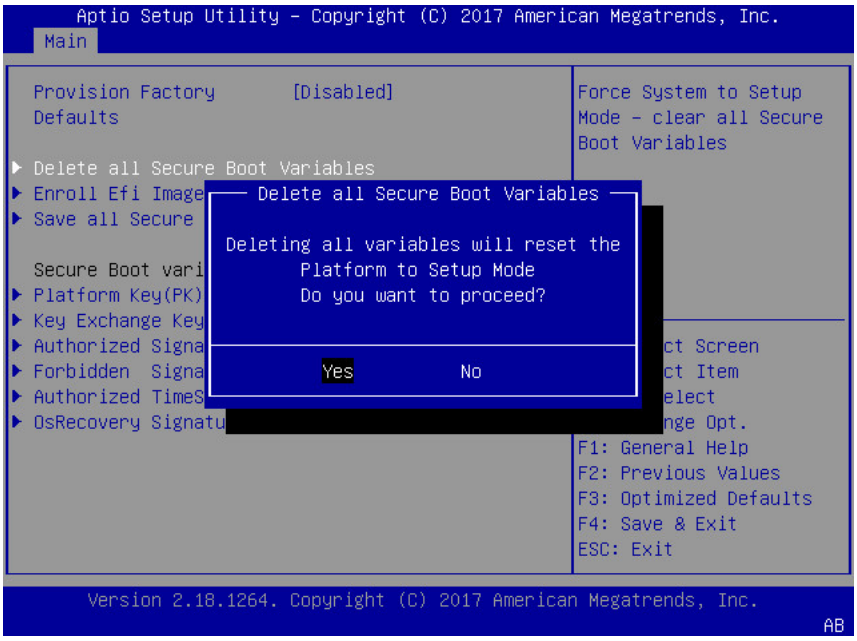
   - **Select `Enabled` to allow the provisioning of factory default Secure Boot keys when the system is in Setup Mode. When enabled, you can select `Install`**

`Factory Default Keys` to force the system to User Mode and install all the factory default Secure Boot keys.

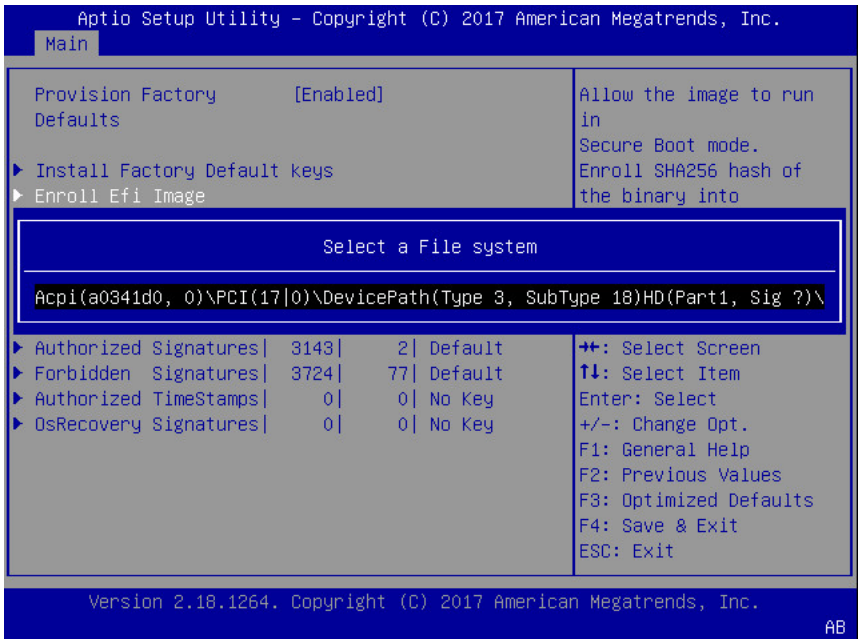


- **Select `Disabled` to disable the provisioning of factory default Secure Boot keys. When disabled, you can select `Delete all Secure Boot Variables` to**

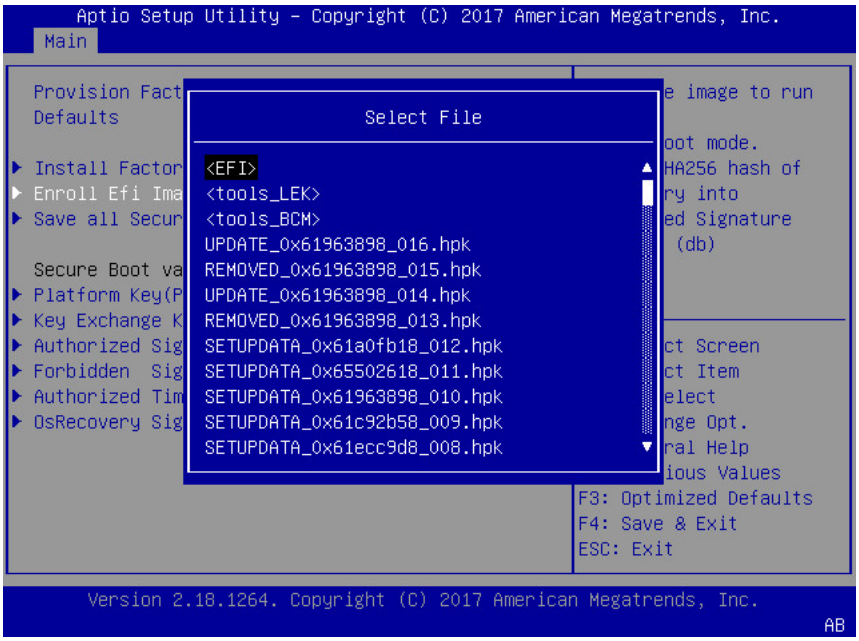
remove all Secure Boot keys from the system. Selecting this option also resets the system to Setup Mode.



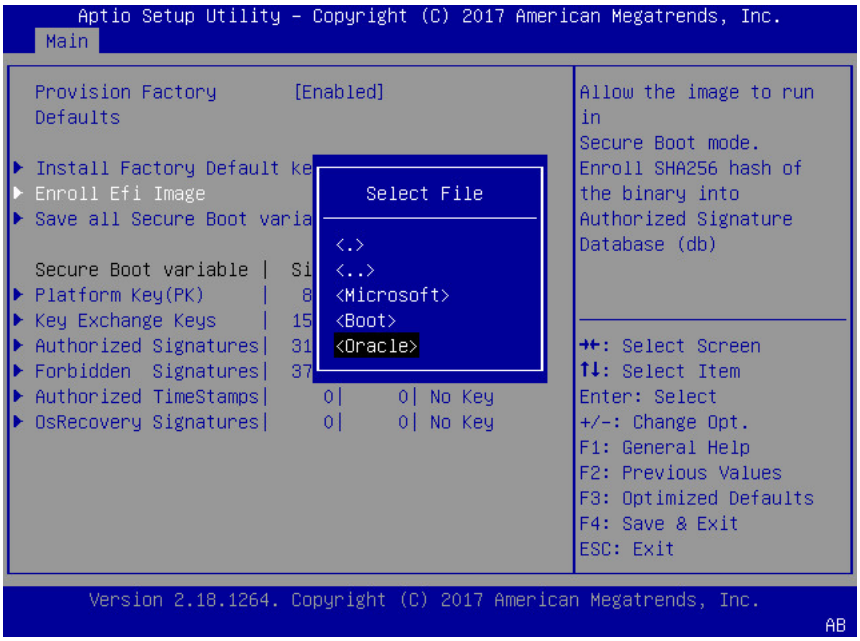
7. **If you want to enroll an EFI image, on the Key Management screen, select `Enroll Efi Image`, and press Enter.**



a. In the Select a File System dialog box, scroll through the list, select the file system that contains the EFI file, and press Enter.

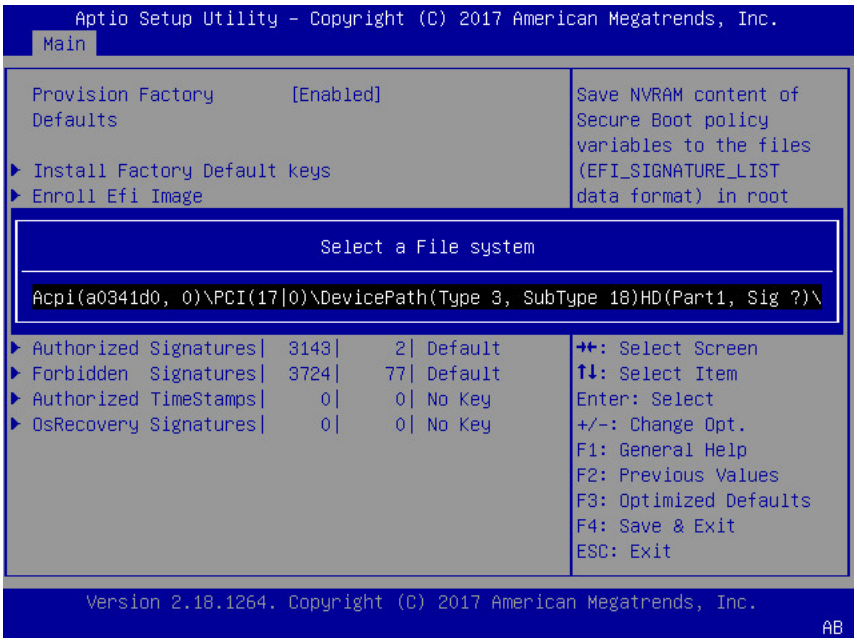


b. In the Select File dialog box, scroll through the list, select the EFI file (or another available file), and press Enter.



c. In the second Select File dialog box, scroll through the list, select the image file that you want to run in Secure Boot mode, and press Enter.

d. **To save all Secure Boot policy variables, select `Save all Secure Boot variables`, and press Enter.**



e. **In the Select a File System dialog box, select the file system where you want to save the EFI file, and press Enter.**

The Secure Boot policy variables are saved to the root folder in the target file system.

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

Related Information

- “Access BIOS Setup Utility Menus” on page 205
- “BIOS Setup Utility Menus” on page 204
- “UEFI Secure Boot” on page 209
- “Exit BIOS Setup Utility” on page 231

Configure Trusted Execution Technology

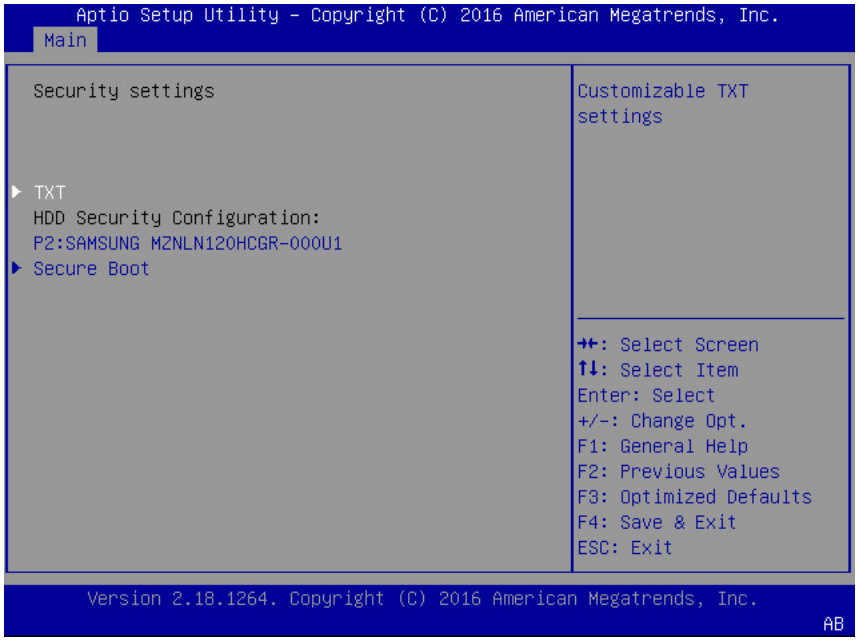
The Trusted Platform Module (TPM) feature must be enabled on your server before enabling Trusted Execution Technology (TXT). See “Configure TPM Support” on page 212.

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

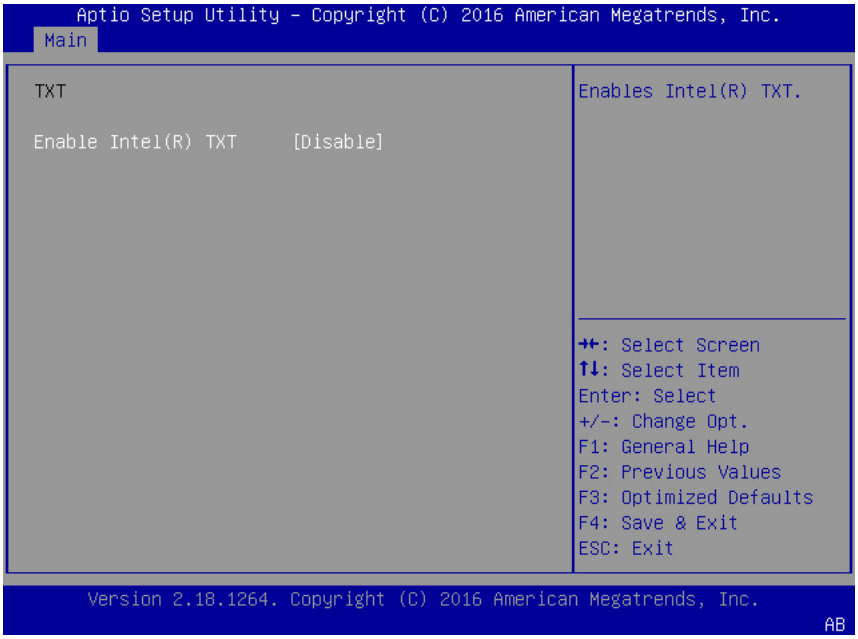
   See “Access BIOS Setup Utility Menus” on page 205.

2. **On the Main Menu screen, select `Security`, and press Enter.**

   The Security Settings screen appears.



3. **On the Security Settings screen, select `TXT`, and press Enter.**



4. **On the TXT screen, select `Enable Intel(R) TXT`, and press Enter. Do one of the following:**

   - **Select `Enabled` to enable TXT.**
   - **Select `Disabled` to disable TXT.**

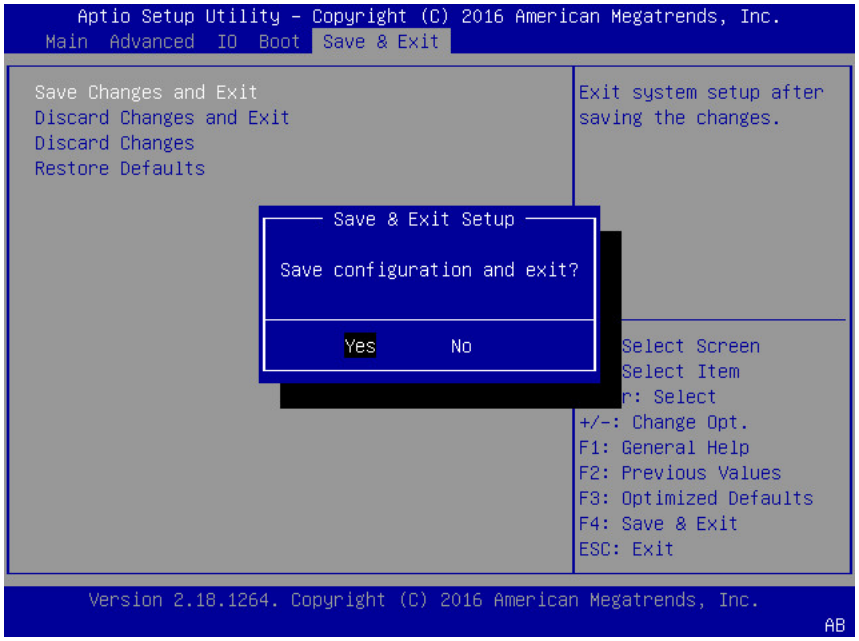
5. **Press the F10 key to save the changes and exit the BIOS Setup Utility.**

Related Information

- “Access BIOS Setup Utility Menus” on page 205
- “BIOS Setup Utility Menus” on page 204
- “Trusted Execution Technology” on page 209
- “Configure TPM Support” on page 212
- “Exit BIOS Setup Utility” on page 231

Exit BIOS Setup Utility

1. **Use the left and right arrow keys to navigate to the top-level Save & Exit Menu.**
2. **Use the up and down arrow keys to select the desired action.**
3. **Press Enter to select the option.**



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, 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 205
- “BIOS Setup Utility Menus” on page 204

BIOS Setup Utility Menu Options

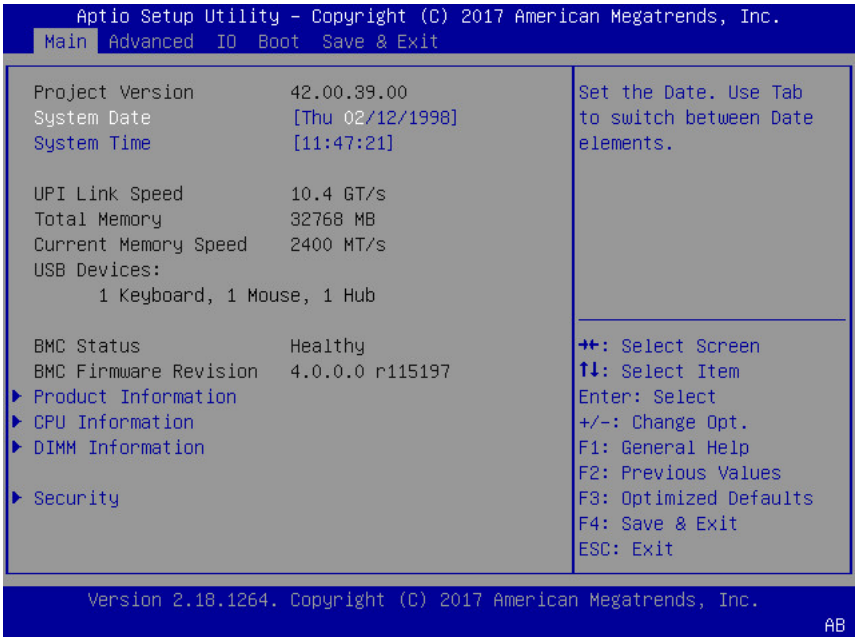
This section includes screens of the main menus in the BIOS Setup Utility for Oracle Exadata Storage Server X7-2. Following the screen for each menu is a table of the options available from that menu.

Related Information

- *Oracle X7 Series Servers Administration Guide* at: `http://www.oracle.com/goto/x86admindiag/docs`
- "Setting Up BIOS Configuration Parameters" on page 203

BIOS Main Menu Selections

This section includes a screen 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 table describes the options provided by the BIOS Main menu and sub-menus.

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: 42.01.04.01
System Date			Current date is displayed. You can change the date setting. Example: [Thu 06/20/2017]
System Time			Current time is displayed. You can change the time setting. Example: 13:38:27
UPI Link Speed (R/O)	SLOW/		Intel UltraPath Interconnect (UPI) operational speed is displayed. The

Setup Options	Options	Defaults	Description
	9.6 GT/s 10.4 GT/s		SLOW option displays as unknown in single-processor systems.
Total Memory (R/O)			Memory in gigabytes is displayed. Example: 224 GB
Current Memory Speed (R/O)			Memory speed is displayed. Example: 2400 MT/s
USB Devices (R/O)			Detected USB devices are displayed. Example: 1 Keyboard, 1 Mouse, 1 Hub
BMC Status (R/O)			Detected condition of the service processor. Example: Healthy
BMC Firmware Revision (R/O)			The service processor firmware version is displayed. Example: 4.0.0.0 r115197
PRODUCT INFORMATION (R/O)			Product information is displayed.
Product Name			Product name is displayed. Example: Oracle Server X7-2L
Product Serial Number			Product serial number is displayed. Example: 1134FML00V
Board Serial Number			Board serial number is displayed. Example: 489089M+1637E2002E
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. Example: 50654
Microcode Patch			Software update (microcode patch) information is displayed. Example: 2000009

Setup Options	Options	Defaults	Description
Max CPU Speed			Maximum non-turbo speed of the processor is displayed. Example: 2000 MHz
Min CPU Speed			Minimum speed of the processor is displayed. Example: 1000 MHz
Max Processor Cores			Number of available processor cores is displayed. Example: 26
Active 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: 32 KB x 26
L1 Code Cache			Example: 32 KB x 26
L2 Cache			Example: 1024 KB x 26
L3 Cache			Example: 36608 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.
Processor 0 DIMMs (R/O)			For D0...D11, if a DIMM is present, memory size (in gigabytes) is displayed. Otherwise, displays “Not Present.”
Processor 1 DIMMs (R/O)			Same as Processor 0.
SECURITY			Configure the security settings.
TXT	Enable Intel TXT Disable/ Enable	Disabled	Enables Intel Trusted Execution Technology (TXT).
HDD Security Configuration	Set User Password		Set an HDD user password for the selected drive.
Secure Boot			Customize Secure Boot settings.
Attempt Secure Boot	Disabled/Enabled	Disabled	Secure Boot is activated when Platform Key (PK) is enrolled, System mode is User/Deployed, and Compatibility Support Module (CSM) function is disabled.

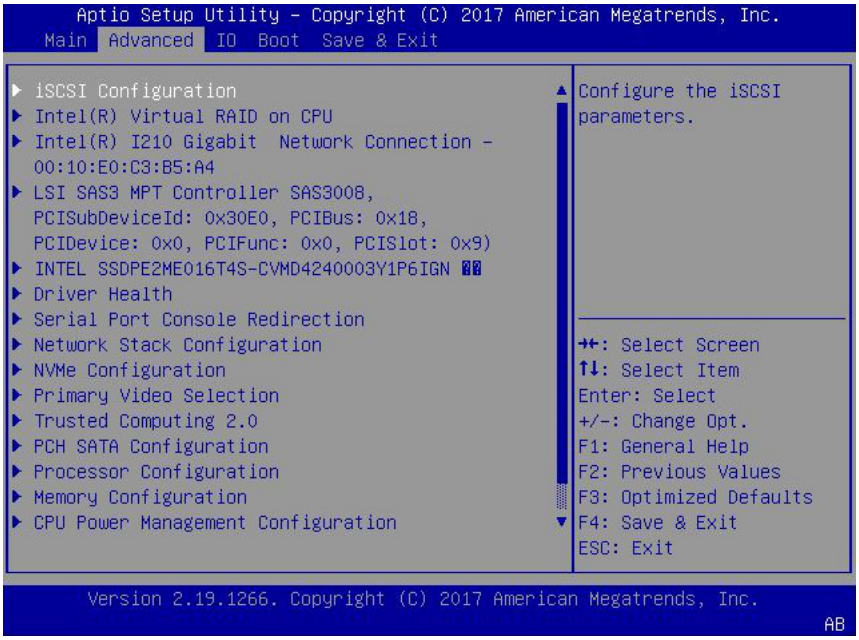
Setup Options	Options	Defaults	Description
Key Management			Enables expert users to modify Secure Boot Policy variables without full authentication.
Provision Factory Defaults	Disabled/Enabled	Disabled	Allows the provisioning of factory default Secure Boot keys when the system is in Setup Mode.
Install Factory Default keys	Yes/No		Forces system to User Mode and installs Factory Default keys. **Note -** Displays only when Provision Factory Defaults is Enabled.
Delete all Secure Boot variables	Yes/No		Removes all Secure Boot keys from the system. Also resets the system to Setup Mode. **Note -** Displays only when Provision Factory Defaults is Disabled.
Enroll Efi Image			Enrolls an EFI image to run in Secure Boot mode.
Save all Secure Boot variables			Saves all Secure Boot variables to the root folder in the chosen file system.
Platform Key (PK)	Save to File/Set New/Erase		Enrolls factory defaults or load certificates from a file.
Key Exchange Keys	Save to File/Set New/ Append/Erase		Enrolls factory defaults or load certificates from a file.
Authorized Signatures	Save to File/Set New/ Append/Erase		Enroll factory defaults or load certificates from a file.
Forbidden Signatures	Save to File/Set New/ Append/Erase		Enrolls factory defaults or load certificates from a file.
Authorized TimeStamps	Set New/Append		Enroll factory defaults or load certificates from a file.
OsRecovery Signatures	Save to File/Set New/ Append/Erase		Enrolls factory defaults or load certificates from a file.

Related Information

- “BIOS Advanced Menu Selections” on page 238
- “BIOS IO Menu Selections” on page 251
- “BIOS Boot Menu Selections” on page 255
- “BIOS Exit Menu Selections” on page 257

BIOS Advanced Menu Selections

This section includes a screen 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 iSCSI Configuration Options

The following table describes the BIOS Advanced Menu iSCSI configuration options.

Setup Options	Options	Defaults	Description
iSCSI Initiator Name	NA (must be specified)	None	The worldwide unique name of the iSCSI Initiator. Only IQN format is accepted.
Add an Attempt			
iSCSI Attempt Name	NA (must be specified)	None	The human-readable name that you assigned to this attempt.
iSCSI Mode	Disabled/Enabled/Enabled for MPIO	Disabled	Set to Enabled for multipath I/O (MPIO). MPIO can boost the performance of an application by load-balancing traffic across multiple ports.
Internet Protocol	IP4/IP6/Autoconfigure	IP4	Can be set to IP4, IP6, or Autoconfigure. The initiator IP address is assigned by the system to IP6. In Autoconfigure mode, the iSCSI driver attempts to connect to the iSCSI target using the IPv4 stack. If this fails, then the iSCSI driver attempt to connect using the IPv6 stack.
Connection Retry Count	0 to 16	0	The count range is 0 to 16. If set to 0, there are no retries.
Connection Establishing Timeout	NA	1,000	The timeout value in milliseconds. The minimum value is 100 milliseconds and the maximum is 20 seconds.
Configure ISID	Derived from the MAC address	The default value is derived from the MAC address	The OUI-format ISID is 6 bytes. The default value is derived from the MAC address. Only the last 3 bytes are configurable. Example: Update 0ABBCCDDEEFF to

Setup Options	Options	Defaults	Description
			0ABBCCF07901 by inputting F07901
Enable DHCP	Disabled/Enabled	Disabled	Enable or disable DHCP.
Initiator IP Address	NA	0.0.0.0	Set initiator IP address in dotted-decimal notation.
Initiator Subnet Mask	NA	0.0.0.0	Set initiator subnet mask IP address in dotted-decimal notation.
Gateway	NA	0.0.0.0	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	Set target IP address in dotted-decimal notation.
Target Port		3260	Change target port number.
Boot LUN		0	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	Set CHAP type to either One Way or Mutual.
CHAP Name	NA	None	Set CHAP name.
CHAP Secret	NA	None	Set the CHAP secret password. The secret length range is 12 to 16 bytes.
Delete Attempts	NA	NA	Delete one or more attempts.
Change Attempt Order	NA	NA	Change the order of attempts. Use arrow keys to select the attempt, then press plus or minus (+/-) keys to move the attempt up/down in the attempt order list.

BIOS Advanced Menu Gigabit Network Connection Options

The following table describes the BIOS Advanced Menu Gigabit network connection options.

Setup Options	Options	Defaults	Description
NIC configuration			Configure the network interface controller.
Link Speed	Auto Negotiated 10 Mbs Half 10 Mbs Full 100 Mbs Half 100 Mbs Full	NA	Specifies the port speed used for the selected boot protocol.
Wake on LAN	Disable/Enabled	NA	Enable or disable wake on LAN.
Blink LEDs	0/1/2/3	0	Identify the physical network port by blinking the associated LED.
UEFI Driver (R/O)	NA	NA	Identifies the UEFI driver.
Adapter PBA (R/O)	NA	NA	Product board adapter (PBA) number. You can use the Intel Network Adapter PBA number to search for the adapter's model number. The PBA number is a nine-digit number that is the last part of the adapter board serial number. The PBA number is presented in this format: *xxxxxxx-xxx*, for example, C80222-001.
Device Name (R/O)	NA	NA	Device name.
Chip Type (R/O)	NA	NA	Manufacturer and model number.
PCI Device ID (R/O)	NA	1533	Device identifier.
PCI Address (R/O)	NA	NA	Bus device function identifier. Example format: Bus:Device: Function
Link Status (R/O)	NA	Connected	Specifies the link status of the network port.
MAC Address (R/O)	NA	NA	Lists the MAC address of the network interface controller (NIC).

Setup Options	Options	Defaults	Description
Virtual MAC Address (R/O)	NA	NA	Lists the Virtual MAC address of the network interface controller (NIC).

BIOS Advanced Menu Driver Health Options

The following table describes the BIOS Advanced Menu driver health options.

Note - Depending on the devices that are populating your PCIe slots, you will see different entries if the devices are publishing their driver health status.

Setup Options	Options	Defaults	Description
Intel PRO/1000 PCI-E (R/O)		Healthy	Lists the health status of drivers/ controllers.
Controller Child 0 (R/O)		Healthy	
Intel I210 Gigabit Network Connection (R/O)		Healthy	
Apache Pass Driver (R/O)		Healthy	Lists the health status of drivers/ controllers.

BIOS Advanced Menu Serial Port Console Redirection Options

The following table describes the 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.

Setup Options	Options	Defaults	Description
			■ VT-UTF8: Uses UTF8 encoding to map Unicode characters onto one or more bytes. ■ ANSI: Extended ASCII character set.
Bits per Second	9600 19200 38400 57600 115200	9600	Select the serial port transmission speed. The speed must be matched on the connecting serial device. Long or noisy lines require lower speeds.
Data Bits	7/8	8	Select the data bits.
Parity	None/Even/Odd/Mark/Space	None	A parity bit can be sent with the data bits to detect some transmission errors. ■ None: No parity bits are sent. ■ Even: Parity bit is 0 if the number of 1s in the data bits is even. ■ Odd: Parity bit is 0 if the number of 1s in the data bits is odd. ■ Mark: Parity bit is always 1. ■ Space: Parity bit is always 0. Mark and Space parity do not allow for error detection. They can be used as an additional data bit.
Stop Bits	1/2	1	Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning of a serial data packet.) The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.
Flow Control	None, Hardware RTS/CTS, Software Xon/Xoff	None	Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a 'stop' signal can be sent to stop the data flow. Once the buffers are empty, a 'start' signal can be sent to restart

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

BIOS Advanced Menu Network Stack Options

The following table describes the 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 PXE Boot Option will not be created.
Ipv4 HTTP Support	Disabled/Enabled	Disabled	Enable or disable IPv4 HTTP Boot support. If disable, the IPv4 HTTP Boot Option will not be created.
Ipv6 PXE Support	Disabled/Enabled	Disabled	Enable or disable IPv6 PXE Boot support. If disable, the IPv6 PXE Boot Option will not be created.
Ipv6 HTTP Support	Disabled/Enabled	Disabled	Enable or disable IPv6 HTTP Boot support. If disable, the IPv6 HTTP Boot Option will not be created.
PXE boot wait time	0	0	Wait time to press ESC key to abort the PXE boot.
Media detect count	1	1	Number of times the presence of media will be checked.

BIOS Advanced Menu Primary Video Selection Options

The following table describes the BIOS Advanced Menu primary video selection options.

Setup Options	Options	Defaults	Description
Add-in Video Card support	Disabled/Enabled	Enabled	Enable or disable video card support.

BIOS Advanced Menu Trusted Computing 2.0 Options

The following table describes the BIOS Advanced Menu trusted computing 2.0 options.

Note - The options in this section are available only when the Security TPM Device Support option is set to Enabled.

Setup Options	Options	Defaults	Description
Security TPM Device Support	Disabled/Enabled	Disabled	Enable or disable Trusted Platform Module (TPM) support. If disabled, the OS will not show TPM. Reset of the platform is required.
Active PCR banks (R/O)	N/A	N/A	Displays active Platform Configuration Register (PCR) banks.
Available PCR banks (R/O)	N/A	N/A	Displays available Platform PCR banks.
SHA-1 PCR Bank (R/O)	N/A	N/A	Displays if the SHA-1 PCR bank is enabled/disabled.
SHA256 Bank (R/O)	N/A	N/A	Displays if the SHA256 PCR bank is enabled/disabled.
Pending Operation	None/TPM Clear	None	Schedule an operation for the security device. **Note -** Your computer reboots during restart to change the state of a security device.
Platform Hierarchy	Disabled/Enabled		Enable or disable platform hierarchy.
Storage Hierarchy	Disabled/Enabled		Enable or disable storage hierarchy.
Endorsement Hierarchy	Disabled/Enabled		Enable or disable endorsement hierarchy.
TPM 2.0 UEFI Spec Version (R/O)	N/A	N/A	Displays the TPM 2.0 UEFI spec version.
Physical Presence Spec Version	1.2/1.3	1.3	Select the physical presence spec version.

Setup Options	Options	Defaults	Description
TPM 20 InterfaceType (R/O)	N/A	N/A	Displays the TPM 20 interface type.
Device Select (R/O)	N/A	N/A	Displays the TPM device.

BIOS Advanced Menu PCH SATA Configuration Options

The following table describes the BIOS Advanced Menu PCH SATA configuration options.

Setup Options	Options	Defaults	Description
SATA Controller	Disable/Enable	Enable	Enable or disable SATA controller.
Configure SATA as	AHCI/RAID	AHCI	Configure SATA as AHCI or RAID.
SATA test mode	Disable/Enable	Disable	Enable or disable SATA test mode.
SATA RSTe Boot Info	Disable/Enable	Enable	Enable this setting to provide full int13h support for SATA controller attached devices. **Note -** This option is available only if `Configure SATA as` is set to RAID.
SATA Mode Options			Select SATA mode related options.
SATA HDD Unlock	Disable/Enable	Enable	Enable or disable SATA HDD unlock.
SATA LED Locate	Disable/Enable	Enable	Enable or disable SATA LED locate.
Support Aggressive Link Power Management	Disable/Enable	Enable	Enable or disable aggressive link power management.
Alternate Device ID on RAID	Disable/Enable	Disable	Enable or disable an alternate device ID on RAID devices. **Note -** This option is available only if `Configure SATA as` is set to RAID.
Load EFI Driver for RAID	Disable/Enable	Disable	Load EFI driver in RAID mode. **Note -** This option is available only if `Configure SATA as` is set to RAID.
NVRAM CYCLE ROUTER 0 ENABLE	Disable/Enable	Disable	Enable or disable cycle router 0 for NVRAM Remapping engine.

Setup Options	Options	Defaults	Description
NVRAM CR0 PCIE Root Port Number	PCI Express Root Port 1…20 None PCI Express Root Port		Choose a RootPort that is enabled for router cycle 0 for NVRAM engine.
NVRAM CYCLE ROUTER 1 ENABLE	Disable/Enable	Disable	Enable or disable cycle router 1 for NVRAM Remapping engine.
NVRAM CR1 PCIE Root Port Number	PCI Express Root Port 1…20 None PCI Express Root Port		Choose a RootPort that is enabled for router cycle 1 for NVRAM engine.
NVRAM CYCLE ROUTER 2 ENABLE	Disable/Enable	Disable	Enable or disable cycle router 2 for NVRAM Remapping engine.
NVRAM CR2 PCIE Root Port Number	PCI Express Root Port 1…20 None PCI Express Root Port		Use this option to choose a RootPort that is enabled for router cycle 2 for NVRAM engine.
SATA Port 0 Software Reserve			
Port 0	Disable/Enable	Enable	Enable or disable the SATA port.
Hot Plug	Disable/Enable	Disable	Designate the port as hot-pluggable.
Configure as eSATA	Disable/Enable	Disable	Use this option to configure the port as an external SATA (eSATA) device.
Mechanical Presence Switch	Disable/Enable	Enable	Use this option to enable/ disable device reporting when the device has a mechanical presence switch.
Spin Up Device	Disable/Enable	Disable	Use this option to enable/disable staggered spin up on the device.
SATA Device Type	Hard Disk Drive/Solid State Drive	Hard Disk Drive	Use this option to identify the type of drive that is connected to the SATA port.
SATA Topology	Unknown/ISATA/Direct Connect/Flex/M2	Unknown	Use this option to identify the SATA topology for the SATA port.
SATA Port 1, Port 2, Port 3, Port 4, Port 5, Port 6, and Port 7 Software Reserve			The same options as SATA Port 0 Software Reserve are displayed

BIOS Advanced Menu Processor Configuration Options

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

Setup Options	Options	Defaults	Description
Hyper-threading ALL	Disabled/Enabled	Enabled	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.
SNC	Disable/Enable/Auto	Disable	Enable, disable, or set sub-NUMA cluster (SNC) to auto.
Hardware Prefetcher	Disabled/Enabled	Enabled	Enable or disable the mid-level cache (MLC) streamer prefetcher (MSR 1A4h bit [0]).
Adjacent Cache Prefetcher	Disabled/Enabled	Enabled	Enable or disable the mid-level cache (MLC) streamer prefetcher (MSR 1A4h bit [1]).
DCU Streamer Prefetcher	Disabled/Enabled	Enabled	Enable or disable 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 (VMM) can utilize the additional hardware capabilities provided by Intel Virtualization Technology.
Stale AtoS	Disabled/Enabled/Auto	Disabled	Enable or disable stale A to S Dir optimization.
LLC dead line alloc	Disabled/Enabled/Auto	Enabled	Enable or disable to opportunistically fill dead lines in LLC.
XPT Prefetch	Disable/Enable	Enable	Enable or disable XPT Prefetch.

BIOS Advanced Menu Memory Configuration Option

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

Setup Option	Options	Defaults	Description
Numa	Enabled/Disabled	Enabled	Enable or disable Non Uniform Memory Access (NUMA).
MMIO High Granularity Size	1G/4G/16G/64G/256G/1024G	64G	Select the allocation size used to assign memory-mapped I/O (MMIO) resources. Total MMIO space can be up to 32x granularity.

BIOS Advanced Menu CPU Power Management Configuration Options

The following table describes the BIOS Advanced Menu CPU power management configuration options.

Setup Options	Options	Defaults	Description
Power Technology	Disabled/Energy Efficient/ Custom	Custom	Disable or enable the power management features.
EIST (GV3)	Disabled/Enabled	Enabled	Disable or enable 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 or disable the CPU C3 (ACPI C3) report to the operating system.
CPU C6 report	Enabled/Disabled	Enabled	Enable or disable the CPU C6 (ACPI C3) report to the operating system.
Package C State limit	Enabled/Disabled	Enabled	Enable or disable Package C State limit.
Energy Performance	Performance Balanced Performance Balanced Energy Energy Efficiency	Balanced Performance	Select the Energy Performance mode.

Setup Options	Options	Defaults	Description
Uncore Frequency Scaling	Enabled/Disabled	Disabled	Enable or disable Uncore Frequency Scaling (USF).
CPU Power Limit	Enabled/Disabled	Disabled	Enable or disable CPU power limit.

BIOS Advanced Menu USB Ports Options

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

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 or disable I/O port 60h/64h emulation support. Enable this setting for the complete USB keyboard legacy support for non-USB aware operating systems.
Rear Port	Disabled/Enabled	Enabled	Enable or disable USB Rear Port.
Internal Port #0	Disabled/Enabled	Enabled	Enable or disable USB Internal Port 0.

BIOS Advanced Menu Error Injection Settings Options

The following table describes the BIOS Advanced Menu error injection settings options.

Setup Options	Options	Defaults	Description
WHEA Error Injection Support	Disable/Enable	Disable	Enable or disable Windows Hardware Error Architecture (WHEA).

BIOS Advanced Menu Disk Freeze Lock Settings Options

The following table describes the BIOS Advanced Menu disk freeze lock settings options.

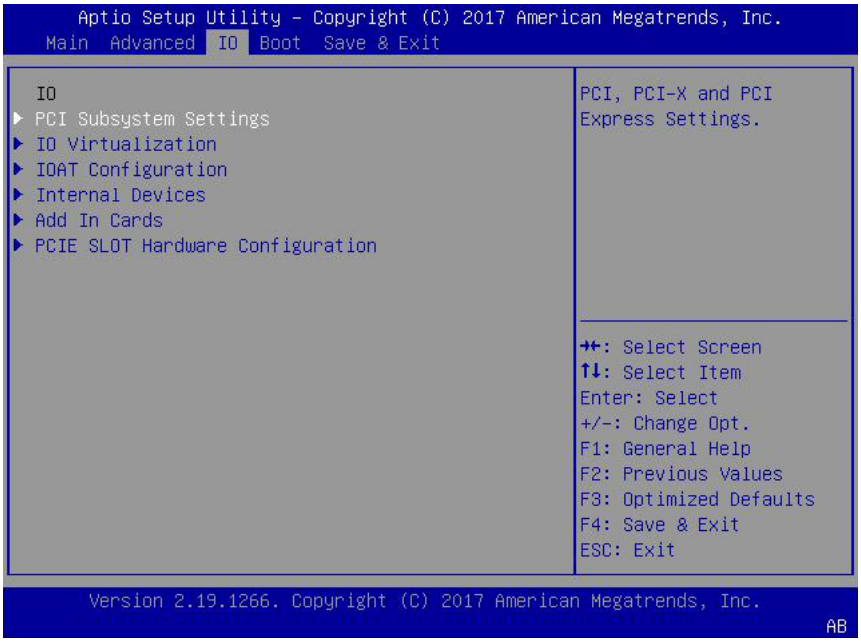
Setup Options	Options	Defaults	Description
Disk Freeze Lock	Disable/Enable	Disable	Enable or disable disk freeze lock. Enabling this setting prevents disks from being sanitized.

Related Information

- “BIOS Main Menu Selections” on page 233
- “BIOS IO Menu Selections” on page 251
- “BIOS Boot Menu Selections” on page 255
- “BIOS Exit Menu Selections” on page 257

BIOS IO Menu Selections

This section includes a screen 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 252
- "BIOS IO Menu IO Virtualization Options" on page 253
- "BIOS IO Menu IOAT Configuration Options" on page 254
- "BIOS IO Menu Internal Devices Options" on page 254
- "BIOS IO Menu Add-in Cards Options" on page 254
- "BIOS IO Menu PCIE Hardware Slot Configuration Options" on page 255

BIOS IO Menu PCI Subsystem Settings Options

The following table describes the 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.

Setup Options	Options	Defaults	Description
Maximum Payload	Auto/128 Bytes/256 Bytes/512 Bytes/1024 Bytes/2048 Bytes/4096 Bytes	Auto	Set the Maximum Payload of the PCI Express device or allow the System BIOS to select the value.
Maximum Read Request	Auto/128 Bytes/256 Bytes/512 Bytes/1024 Bytes/2048 Bytes/4096 Bytes	Auto	Set the Maximum Read Request of the PCI Express device or allow the System BIOS to select the value.

BIOS IO Menu IO Virtualization Options

The following table describes the 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 Support	Disabled/Enabled	Enabled	Enable or disable Single Root I/O Virtualization (SR-IOV) to configure devices into multiple virtual devices that can be used on virtual OS installations. If supported by the hardware and set to enabled, all devices within the system that are SR-IOV capable are configured to support SR-IOV and I/O resources are allocated to the device as normal. If set to disabled, I/O resources are not allocated to the device.
ARI	Disabled/Enabled	Enabled	If Alternate Routing ID (ARI) is supported by the hardware and set to enabled, devices are permitted to locate virtual functions (VFs) in function numbers 8 to 255 of the captured bus number, instead of normal function numbers 0 to 7.

BIOS IO Menu IOAT Configuration Options

The following table describes the BIOS IO Menu IOAT configuration options.

Setup Options	Options	Defaults	Description
Intel IOAT	Disabled/Enabled	Enabled	Enable or disable Intel I/O Acceleration Technology (IOAT) devices.
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.

Setup Options	Options	Defaults	Description
NET0			Displays and provides options to change the internal device settings.
PCI-E UEFI Driver Enable	Disabled/Enabled	Enabled	Enable or disable PCI-E UEFI Driver. If set to enabled, UEFI Driver for the card executes as normal. If set to disabled, UEFI Driver for the card is not copied into memory and the execution of the UEFI Driver is inhibited.

BIOS IO Menu Add-in Cards Options

The following table describes the 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 HBA slots.
IO Enable	Disabled/Enabled	Enabled	Disable or enable IO.
PCI-E UEFI Driver Enable	Disabled/Enabled	Enabled	Enable or disable PCI-E UEFI Driver. If set to enabled, UEFI

Setup Options	Options	Defaults	Description
			Driver for the card executes as normal. If set to disabled, UEFI Driver for the card is not copied into memory and the execution of the UEFI Driver is inhibited.
Slot 2, Slot 3, Slot 4, Slot 5, Slot 6, Slot 7, Slot 8, Slot 9, Slot 10, and Slot 11			See Slot 1 description.

BIOS IO Menu PCIE Hardware Slot Configuration Options

The following table describes the BIOS IO Menu hardware slot configuration options.

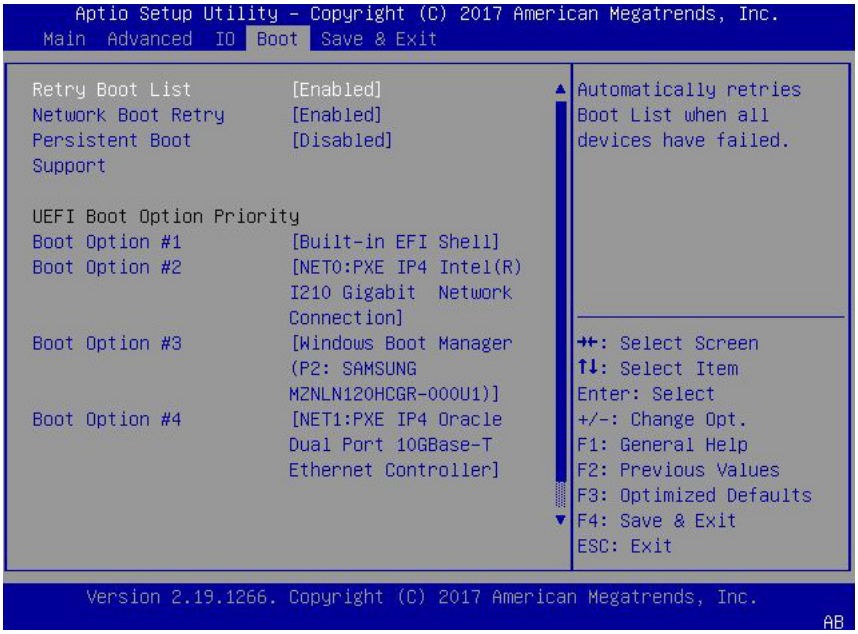
Setup Options	Options	Defaults	Description
Slot 1 Hardware Configuration			Displays and provides options to configure hot-plug functionality or FM10K bifurcation for the PCIe HBA slot.
PCIE Slot Hardware Configuration	HotPlug Disabled/HotPlug Enabled/FM_10 8x8 Bifurcation	HotPlug Disabled	Enable or disable hot-plug or FM10K bifurcation.
Slot 2, Slot 3, Slot 4, Slot 5, Slot 6, Slot 7, Slot 8, Slot 9, Slot 10, Slot 11, and Slot 12			See Slot 1 description.

Related Information

- “BIOS Main Menu Selections” on page 233
- “BIOS Advanced Menu Selections” on page 238
- “BIOS Boot Menu Selections” on page 255
- “BIOS Exit Menu Selections” on page 257

BIOS Boot Menu Selections

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



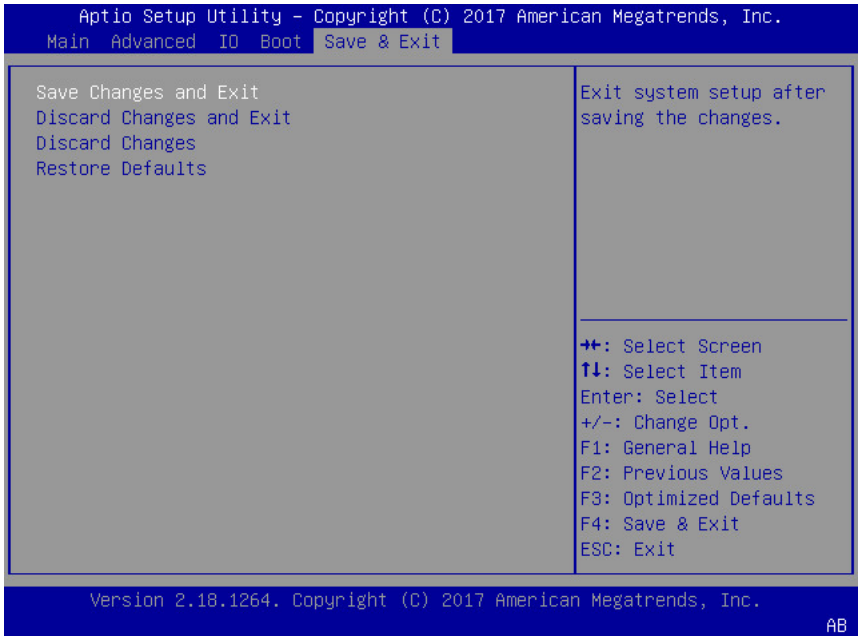
Setup Options	Options	Defaults	Description
Retry Boot List	Disabled/Enabled	Enabled	Disable or enable automatic retries of the Boot List when all devices fail.
Network Boot Retry	Disabled/Enabled/Boot List	Enabled	If enabled, BIOS automatically retries the PXE list present in the system when all PXE attempts have failed. If set to disabled, the system halts and displays the error message “Network Boot Failed” when all PXE boots fail. If set to Boot List, fail over to the main Boot Options Priority list.
Persistent Boot Support	Disabled/Enabled	Disabled	If disabled, system reverts back to the default boot handling from the next boot. If enabled, Persistent Boot Support allows you to fix the position of every physical slot, network port, and disk drive bay in the boot order list, regardless of the presence of a bootable device at each location.
UEFI Boot Option Priority			Displays and sets the system boot order.

Related Information

- “BIOS Main Menu Selections” on page 233
- “BIOS Advanced Menu Selections” on page 238
- “BIOS IO Menu Selections” on page 251
- “BIOS Exit Menu Selections” on page 257

BIOS Exit Menu Selections

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



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.

Setup Options	Description
Restore Defaults	Restore and load the optimal default values for all of the setup options.

Related Information

- “BIOS Main Menu Selections” on page 233
- “BIOS Advanced Menu Selections” on page 238
- “BIOS IO Menu Selections” on page 251
- “BIOS Boot Menu Selections” on page 255

Monitoring Components and Identifying SNMP Messages

This section includes information about monitoring components and identifying SNMP messages for the Oracle Exadata Storage Server X7-2.

Related Information

- Oracle Integrated Lights Out Manager (ILOM) 4.0 Documentation Library at: `http://www.oracle.com/goto/ilom/docs`

Monitoring Component Health and Faults Using Oracle ILOM

The Oracle ILOM 4.0 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 automatically does the following:

- Illuminate the Fault-Service Required LED status indicator 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 4.0.x in the Oracle Integrated Lights Out Manager (ILOM) 4.0 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 Oracle Exadata Storage Server X7-2.

Each section corresponds to an IPMI entity ID and lists sensors, indicators, and replaceable units 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 replaceable unit. 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 replaceable unit represented.
- **Description** – Describes the particular component name reference.
- **Values** – Defines the states of the sensor, indicator, or replaceable unit 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

The following table lists the system chassis components.

Note - An FRU is a field-replaceable unit and is referred to as a replaceable unit in this document.

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/**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
/SYS/**OK**	Indicator	System OK LED	Color: Green Location: Front and back panels Off: Power is off. Standby blink: Standby power is on; Oracle ILOM SP is running. Slow blink: Startup sequence initiated on host.

Component Name (Oracle ILOM CLI Targets)	IPMI Type	Description	Values (if applicable)
			On: Host is booting OS or running the OS.
/SYS/**SERVICE**	Indicator	Fault-Service Required LED	Color: Amber Location: Front and back panels Off: Normal On: Server requires service.
/SYS/**LOCATE**	Indicator	Locate Button/LED	Color: White Location: Front and back panels Off: Normal Fast blink: Locate function is activated; self-extinguishes after 30 minutes.
/SYS/**PS_FAULT**	Indicator	Rear Power Supply Fault LED	Color: Amber Location: Front panel Off: Normal On: General power supply fault
/SYS/**FAN_FAULT**	Indicator	Top Fan Fault LED	Color: Amber Location: Front panel Off: Normal On: General fan fault
/SYS/**DO_NOT_SERVICE**	Indicator	Do Not Service LED	Color: White Location: Front panel Off: Normal On: Do not service

Related Information

- "Cooling Unit Components" on page 263
- "Disk Backplane Components" on page 263
- "Memory Device Components" on page 265
- "Power Unit Components" on page 265
- "Processor Components" on page 266
- "System Motherboard Components" on page 267
- "System Firmware Components" on page 268

- “Hard Disk Drive Components” on page 269

Cooling Unit Components

The system has four 80-mm 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 Fault-Service Required LED	Color: Amber Location: Motherboard Off: Normal On: Fan module was diagnosed as faulty.

Related Information

- “System Chassis Components” on page 261
- “Disk Backplane Components” on page 263
- “Memory Device Components” on page 265
- “Power Unit Components” on page 265
- “Processor Components” on page 266
- “System Motherboard Components” on page 267
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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/PRSNT**	Discrete sensor	Disk backplane presence	01h-ENTITY_ABSENT 02h-ENTITY_PRESENT
/SYS/**DBP/HDD[0-*x*]**	Pseudo	Hard disk drives (HDD)	
/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	01h-FAULT_STATUS 02h-IDENTITY 04h-INSTALLED 20h-SLOT_POWER_OFF
/SYS/**DBP/HDD[0-*x*]/SERVICE**	Indicator	Fault-Service Required LED	Color: Amber Location: HDD Off: Normal On: HDD was diagnosed as failed.
/SYS/**DBP/HDD[0-*x*]/OK2RM**	Indicator	Hard disk drive OK to remove	Color: Blue Location: HDD Off: Normal On: HDD is OK to remove

Related Information

- “System Chassis Components” on page 261
- “Cooling Unit Components” on page 263
- “Memory Device Components” on page 265
- “Power Unit Components” on page 265
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- “Hard Disk Drive Components” on page 269

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 Fault-Service Required LED	Color: Amber Location: Motherboard Off: Normal On: DIMM was diagnosed as faulty.

Related Information

- “System Chassis Components” on page 261
- “Cooling Unit Components” on page 263
- “Disk Backplane Components” on page 263
- “Power Unit Components” on page 265
- “Processor Components” on page 266
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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

Component Name (Oracle ILOM CLI Targets)	IPMI Type	Description	Values (if applicable)
			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_IN**	Temperature sensor	PSU input temperature	Degrees Celsius
/SYS/**PS[0-1]/T_OUT**	Temperature sensor	PSU output temperature	Degrees Celsius

Related Information

- “System Chassis Components” on page 261
- “Cooling Unit Components” on page 263
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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 Fault-Service Required LED	Color: Amber Location: Motherboard Off: Normal On: Processor was diagnosed as faulty.

Related Information

- “System Chassis Components” on page 261
- “Cooling Unit Components” on page 263
- “Disk Backplane Components” on page 263
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System Motherboard Components

The following table lists the system motherboard components.

Component Name (Oracle ILOM CLI Targets)	IPMI Type	Description	Values (if applicable)
/SYS/**MB**	FRU	General host system motherboard FRU	
/SYS/**MB/CPLD**	FRU	Motherboard CPLD/FPGA firmware version	
/SYS/**MB/NET[0-*x*]**	FRU	Host Ethernet FRU	
/SYS/**MB/PCIE[1-*x*]**	FRU	PCIe slot	
/SYS/**MB/PCIE[1-*x*]/PRSNT**	Discrete sensor	PCIe slot is occupied	01h-ENTITY_ABSENT 02h-ENTITY_PRESENT

Component Name (Oracle ILOM CLI Targets)	IPMI Type	Description	Values (if applicable)
/SYS/**MB/T_OUT_ZONE[0-2]**	Threshold sensor	Cooling zone output temperature sensor	Degrees Celsius
/SYS/**MB/T_IN_ZONE[0-2]**	Threshold sensor	Cooling zone input temperature sensor	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	
/SYS/**MB/M2R[0-1]/**	FRU	M.2 SSD riser	
/SYS/**MB/M2R[0-1]/SSD0**	FRU	Internal M.2 SSD drives	
/SYS/**MB/M2R[0-1]/PRSNT**	Discrete sensor	M.2 riser presence	01h-ENTITY_ABSENT 02h-ENTITY_PRESENT
/SYS/**MB/M2R[0-1]/SSD0/PRSNT**	Discrete sensor	M.2 SSD drive presence	01h-ENTITY_ABSENT 02h-ENTITY_PRESENT
/SYS/**MB/M2R[0-1]/SSD0/STATE**	State sensor	M.2 SSD drive state sensor	04h-INSTALLED 20h-SLOT_POWER_OFF

Related Information

- “System Chassis Components” on page 261
- “Cooling Unit Components” on page 263
- “Disk Backplane Components” on page 263
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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	Motherboard CPLD/FPGA firmware

Related Information

- “System Chassis Components” on page 261
- “Cooling Unit Components” on page 263
- “Disk Backplane Components” on page 263
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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/**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	01h-FAULT_STATUS 02h-IDENTITY 04h-INSTALLED 20h-SLOT_POWER_OFF
/SYS/**DBP/HDD[0-*x*]/SERVICE**	Indicator	Hard disk drive Fault-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

Component Name (Oracle ILOM CLI Targets)	IPMI Type	Description	Values (if applicable)
			Location: HDD Off: Normal On: Drive is ready to remove.

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- “System Chassis Components” on page 261
- “Cooling Unit Components” on page 263
- “Disk Backplane Components” on page 263
- “Memory Device Components” on page 265
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- “System Motherboard Components” on page 267
- “System Firmware Components” on page 268

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) 4.0 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” on page 270
- “Hard Disk Drive Components” on page 269
- “Power Events” on page 273
- “Fan Events” on page 277
- “Memory Events” on page 278
- “Entity Presence Events” on page 279

Environmental Events

The following table lists environmental events.

Messages and Descriptions	Component Name
SNMP Trap: sunHwTrapTempFatalThresholdExceeded **Oracle ILOM Event Message:** Lower fatal threshold exceeded **Severity and Description:** Critical; A temperature sensor reported that its value went above an upper fatal threshold setting or below a lower fatal threshold setting. The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	/SYS/PS[0-1]/T_OUT /SYS/PS[0-1]/T_IN /SYS/MB/T_IN_ZONE[0-2] /SYS/MB/T_OUT_ZONE[0-2]
SNMP Trap: sunHwTrapTempFatalThresholdDeasserted **Oracle ILOM Event Message:** Lower fatal threshold no longer exceeded **Severity and Description:** Informational; A temperature sensor reported that its value went below an upper fatal threshold setting or above a lower fatal threshold setting. The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	/SYS/PS[0-1]/T_OUT /SYS/PS[0-1]/T_IN /SYS/MB/T_IN_ZONE[0-2] /SYS/MB/T_OUT_ZONE[0-2]
SNMP Trap: sunHwTrapTempCritThresholdExceeded **Oracle ILOM Event Message:** Upper critical threshold exceeded **Severity and Description:** Critical; A temperature sensor reported that its value went above an upper critical threshold setting or below a lower critical threshold setting. The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	/SYS/PS[0-1]/T_OUT /SYS/PS[0-1]/T_IN /SYS/MB/T_IN_ZONE[0-2] /SYS/MB/T_OUT_ZONE[0-2]
SNMP Trap: sunHwTrapTempCritThresholdDeasserted **Oracle ILOM Event Message:** Upper critical threshold no longer exceeded **Severity and Description:** Informational; A temperature sensor reported that its value went 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]/T_OUT /SYS/PS[0-1]/T_IN /SYS/MB/T_IN_ZONE[0-2] /SYS/MB/T_OUT_ZONE[0-2]
SNMP Trap: sunHwTrapTempFatalThresholdExceeded **Oracle ILOM Event Message:** Lower fatal threshold exceeded **Severity and Description:** Critical; A temperature sensor reported that its value went 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/T_AMB
SNMP Trap: sunHwTrapTempFatalThresholdDeasserted **Oracle ILOM Event Message:** Lower fatal threshold no longer exceeded **Severity and Description:** Informational; A temperature sensor reported that its value went below an upper fatal threshold setting or above a lower fatal threshold setting.	/SYS/T_AMB

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

Related Information

- “System Chassis Components” on page 261
- “Cooling Unit Components” on page 263
- “Disk Backplane Components” on page 263
- “Memory Device Components” on page 265
- “Power Unit Components” on page 265
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Hard Disk Drive Events

The following table lists hard disk drive events.

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

Related Information

- “System Chassis Components” on page 261
- “Cooling Unit Components” on page 263
- “Disk Backplane Components” on page 263
- “Memory Device Components” on page 265
- “Power Unit Components” on page 265

- "Processor Components" on page 266
- "System Motherboard Components" on page 267
- "Hard Disk Drive Components" on page 269

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 detected an error.	/SYS/PS[0-1]/STATE
SNMP Trap: sunHwTrapPowerSupplyOk **Oracle ILOM Event Message:** PS_PRESENCE DEASSERT **Severity and Description:** Major; A power supply sensor 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 detected an error.	/SYS/PS[0-1]/STATE
SNMP Trap: sunHwTrapPowerSupplyOk **Oracle ILOM Event Message:** PS_FAILURE DEASSERT **Severity and Description:** Major; A power supply sensor detected an error.	/SYS/PS[0-1]/STATE
SNMP Trap: sunHwTrapPowerSupplyError **Oracle ILOM Event Message:** PS_PREDICTIVE_FAILURE ASSERT **Severity and Description:** Major; A power supply sensor detected an error.	/SYS/PS[0-1]/STATE
SNMP Trap: sunHwTrapPowerSupplyOk **Oracle ILOM Event Message:** PS_PREDICTIVE_FAILURE DEASSERT **Severity and Description:** Major; A power supply sensor detected an error.	/SYS/PS[0-1]/STATE
SNMP Trap: sunHwTrapPowerSupplyError **Oracle ILOM Event Message:** PS_INPUT_LOST ASSERT **Severity and Description:** Major; A power supply sensor detected an error.	/SYS/PS[0-1]/STATE
SNMP Trap: sunHwTrapPowerSupplyOk	/SYS/PS[0-1]/STATE

Messages and Descriptions	Component Name
Oracle ILOM Event Message: PS_INPUT_LOST DEASSERT **Severity and Description:** Major; A power supply sensor detected an error.	
SNMP Trap: sunHwTrapPowerSupplyError **Oracle ILOM Event Message:** PS_INPUT_ERROR ASSERT **Severity and Description:** Major; A power supply sensor detected an error.	/SYS/PS[0-1]/STATE
SNMP Trap: sunHwTrapPowerSupplyOk **Oracle ILOM Event Message:** PS_INPUT_ERROR DEASSERT **Severity and Description:** Major; A power supply sensor detected an error.	/SYS/PS[0-1]/STATE
SNMP Trap: sunHwTrapPowerSupplyError **Oracle ILOM Event Message:** PS_INPUT_RANGE_ERROR ASSERT **Severity and Description:** Major; A power supply sensor detected an error.	/SYS/PS[0-1]/STATE
SNMP Trap: sunHwTrapPowerSupplyOk **Oracle ILOM Event Message:** PS_INPUT_RANGE_ERROR DEASSERT **Severity and Description:** Major; A power supply sensor detected an error.	/SYS/PS[0-1]/STATE
SNMP Trap: sunHwTrapPowerSupplyError **Oracle ILOM Event Message:** PS_CONFIG_ERROR ASSERT **Severity and Description** Major; A power supply sensor detected an error.	/SYS/PS[0-1]/STATE
SNMP Trap: sunHwTrapPowerSupplyOk **Oracle ILOM Event Message:** PS_CONFIG_ERROR DEASSERT **Severity and Description:** Major; A power supply sensor detected an error.	/SYS/PS[0-1]/STATE
SNMP Trap: sunHwTrapSensorNonCritThresholdExceeded **Oracle ILOM Event Message:** Upper noncritical threshold exceeded **Severity and Description:** Minor; A sensor reported that its value went 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.	/SYS/VPS
SNMP Trap: sunHwTrapSensorThresholdOk **Oracle ILOM Event Message:** Upper noncritical threshold no longer exceeded **Severity and Description:** Informational; A sensor 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
SNMP Trap: sunHwTrapSensorNonCritThresholdExceeded	/SYS/VPS_FANS

Messages and Descriptions	Component Name
Oracle ILOM Event Message: Upper noncritical threshold exceeded **Severity and Description:** Minor; A sensor reported that its value went above an upper noncritical threshold setting or below a lower noncritical threshold setting. This generic 'sensor' trap is generated when the SNMP agent does not recognize the component type. The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	/SYS/PS[0-1]/P_IN /SYS/PS[0-1]/P_OUT
SNMP Trap: sunHwTrapSensorThresholdOk **Oracle ILOM Event Message:** Upper noncritical threshold no longer exceeded **Severity and Description:** Informational; A sensor 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_FANS /SYS/PS[0-1]/P_IN /SYS/PS[0-1]/P_OUT
SNMP Trap: sunHwTrapSensorFatalThresholdExceeded **Oracle ILOM Event Message:** Lower fatal threshold exceeded **Severity and Description:** Critical; A power supply sensor reported that its value went 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]/P_IN /SYS/PS[0-1]/P_OUT
SNMP Trap: sunHwTrapSensorFatalThresholdDeasserted **Oracle ILOM Event Message:** Lower fatal threshold no longer exceeded **Severity and Description:** Informational; A power supply sensor reported that its value went 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]/P_IN /SYS/PS[0-1]/P_OUT
SNMP Trap: sunHwTrapSensorCritThresholdExceeded **Oracle ILOM Event Message:** Lower critical threshold exceeded **Severity and Description:** Major; A power supply sensor reported that its value went 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]/P_IN /SYS/PS[0-1]/P_OUT
SNMP Trap: sunHwTrapSensorCritThresholdDeasserted **Oracle ILOM Event Message:** Lower critical threshold no longer exceeded **Severity and Description:** Informational; A power supply sensor reported that its value went 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]/P_IN /SYS/PS[0-1]/P_OUT
SNMP Trap: sunHwTrapVoltageFatalThresholdExceeded	/SYS/PS[0-1]/V_12V

Messages and Descriptions	Component Name
Oracle ILOM Event Message: Lower fatal threshold exceeded **Severity and Description:** Critical; A voltage sensor reported that its value went 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_12V_STBY /SYS/PS[0-1]/V_IN
SNMP Trap: sunHwTrapVoltageFatalThresholdDeasserted **Oracle ILOM Event Message:** Lower fatal threshold no longer exceeded **Severity and Description:** Informational; A voltage sensor reported that its value went 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_12V /SYS/PS[0-1]/V_12V_STBY /SYS/PS[0-1]/V_IN
SNMP Trap: sunHwTrapVoltageCritThresholdExceeded **Oracle ILOM Event Message:** Upper critical threshold exceeded **Severity and Description:** Critical; A voltage sensor reported that its value went 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_12V /SYS/PS[0-1]/V_12V_STBY /SYS/PS[0-1]/V_IN
SNMP Trap: sunHwTrapVoltageCritThresholdDeasserted **Oracle ILOM Event Message:** Upper critical threshold no longer exceeded **Severity and Description:** Informational; A voltage sensor reported that its value went 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_12V /SYS/PS[0-1]/V_12V_STBY /SYS/PS[0-1]/V_IN
SNMP Trap: sunHwTrapVoltageNonCritThresholdExceeded **Oracle ILOM Event Message:** Upper noncritical threshold exceeded **Severity and Description:** Minor; A voltage sensor reported that its value went above an upper noncritical threshold setting or below a lower noncritical threshold setting. The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	/SYS/PS[0-1]/V_12V /SYS/PS[0-1]/V_12V_STBY /SYS/PS[0-1]/V_IN
SNMP Trap: sunHwTrapVoltageOk **Oracle ILOM Event Message:** Upper noncritical threshold no longer exceeded **Severity and Description:** Informational; A voltage sensor reported that its value is in the normal operating range.	/SYS/PS[0-1]/V_12V /SYS/PS[0-1]/V_12V_STBY /SYS/PS[0-1]/V_IN
SNMP Trap: sunHwTrapSensorNonCritThresholdExceeded **Oracle ILOM Event Message:** Upper noncritical threshold exceeded	/SYS/VPS_CPUS /SYS/VPS_MEMORY

Messages and Descriptions	Component Name
Severity and Description: Minor; A sensor reported that its value went above an upper noncritical threshold setting or below a lower noncritical threshold setting. This generic 'sensor' trap is generated when the SNMP agent does not recognize the component type. The sunHwTrapThresholdType object indicates whether the threshold was an upper or lower threshold.	
SNMP Trap: sunHwTrapSensorThresholdOk **Oracle ILOM Event Message:** Upper noncritical threshold no longer exceeded **Severity and Description:** Informational; A sensor reported that its value is in the normal operating range. This generic 'sensor' trap is generated when the SNMP agent does not recognize the component type.	/SYS/VPS_CPUS /SYS/VPS_MEMORY

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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 reported that its value went 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-*x*]/TACH
SNMP Trap: sunHwTrapFanSpeedCritThresholdDeasserted **Oracle ILOM Event Message:** Lower critical threshold no longer exceeded	/SYS/MB/FM[0-3]/F[0-*x*]/TACH

Messages and Descriptions	Component Name
Severity and Description: Informational; A fan speed sensor reported that its value went 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 reported that its value went 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-*x*]/TACH
SNMP Trap: sunHwTrapFanSpeedFatalThresholdDeasserted **Oracle ILOM Event Message:** Lower fatal threshold no longer exceeded **Severity and Description:** Informational; A fan speed sensor reported that its value went 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-*x*]/TACH

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Memory Events

The following table lists memory events.

Messages and Descriptions	Component Name
SNMP Trap: sunHwTrapMemoryFault	/SYS/MB

Messages and Descriptions	Component Name
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 **Oracle ILOM Event Message:** event fault.cpu.intel.quickpath.link_slow "The Quickpath Interconnect (QPI) link is operating below normal speed." **Severity and Description:** Informational; A memory component fault has been cleared.	/SYS/MB
SNMP Trap: sunHwTrapMemoryFault **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.	/SYS/MB
SNMP Trap: sunHwTrapMemoryFaultCleared **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.	/SYS/MB

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Entity Presence Events

The following table lists entity presence events.

Messages and Descriptions	Component Name
SNMP Trap: sunHwTrapProcessorError	/SYS/MB/P[0-*x*]/PRSNT

Messages and Descriptions	Component Name
Oracle ILOM Event Message: ENTITY_PRESENT ASSERT **Severity and Description:** Major; A processor sensor has detected an error. Device absent.	
SNMP Trap: sunHwTrapProcessorOk **Oracle ILOM Event Message:** ENTITY_PRESENT DEASSERT **Severity and Description:** Major; A processor sensor has returned to its normal state. Device present.	/SYS/MB/P[0-*x*]/PRSNT
SNMP Trap: sunHwTrapProcessorError **Oracle ILOM Event Message:** ENTITY_DISABLED ASSERT **Severity and Description:** Major; A processor sensor has detected an error. Device disabled.	/SYS/MB/P[0-*x*]/PRSNT
SNMP Trap: sunHwTrapProcessorOk **Oracle ILOM Event Message:** ENTITY_DISABLED DEASSERT **Severity and Description:** Major; A processor sensor has returned to its normal state. Device enabled.	/SYS/MB/P[0-*x*]/PRSNT

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