QuantaPlex Series
T22HF-1U

Empowering Multi-Node Server

Service Guide

Version : 1.0

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Conventions

Several different typographic conventions are used throughout this manual. Refer to the following examples for common usage.

Bold type face denotes menu items, buttons and application names.

Italic type face denotes references to other sections, and the names of the folders, menus, programs, and files.

<Enter> type face denotes keyboard keys.

WARNING!
Warning information appears before the text it references and should not be ignored as the content may prevent damage to the device.

CAUTION!
CAUTIONS APPEAR BEFORE THE TEXT IT REFERENCES, SIMILAR TO NOTES AND WARNINGS. CAUTIONS, HOWEVER, APPEAR IN CAPITAL LETTERS AND CONTAIN VITAL HEALTH AND SAFETY INFORMATION.

Note:
Highlights general or useful information and tips.

Precautionary Measures

Read all caution and safety statements in this document before performing any of the instructions. To reduce the risk of bodily injury, electrical shock, fire, and equipment damage, read and observe all warnings and precautions in this chapter before installing or maintaining your system. To avoid personal injury or property damage, before you begin installing the product, read, observe, and adhere to all of the following instructions and information. The following symbols may be used throughout this guide and may be marked on the product and / or the product packaging.

Safety Instructions about your system

In the event of a conflict between the information in this guide and information provided with the product or on the website for a particular product, the product documentation takes precedence.

Your system should be integrated and serviced only by technically qualified persons.

You must adhere to the guidelines in this guide and the assembly instructions in related chapters to ensure and maintain compliance with existing product certifications and approvals. Use only the described, regulated components specified in this guide. Use of other products / components will void the UL Listing and other regulatory approvals of the product, and may result in noncompliance with product regulations in the region(s) in which the product is sold.

Table 1: Warning and Cautions

CAUTION	Indicates the presence of a hazard that may cause minor personal injury or property damage if the CAUTION is ignored.
WARNING	Indicates the presence of a hazard that may result in serious personal injury if the WARNING is ignored.
	Indicates potential hazard if indicated information is ignored.
	Indicates shock hazards that result in serious injury or death if safety instructions are not followed.
	Indicates hot components or surfaces.
	Indicates do not touch fan blades, may result in injury.
	Remove the system from the rack to disconnect power system.

Table 1: Warning and Cautions (Continued)

	The enclosure is designed to carry only the weight of the system sled. Do not use this equipment as a workspace. Do not place additional load onto any equipment in this system.
WARNING: Safe handling of this system requires TWO people.	Indicates two people are required to safely handle the system.
	Restricted Access Location: The system is intended for installation only in a Server Room or Computer Room where both these conditions apply: ● access can only be gained by SERVICE PERSONS or by USERS who have been instructed about the reasons for the restrictions applied to the location and about any precautions that shall be taken; and ● access is through the use of a TOOL or lock and key, or other means of security, and is controlled by the authority responsible for the location.

Intended Application Uses

This product was evaluated as Information Technology Equipment (ITE), which may be installed in offices, schools, computer rooms, and similar commercial type locations. The suitability of this product for other product categories and environments (such as medical, industrial, residential, alarm systems, and test equipment), other than an ITE application, may require further evaluation.

Site Selection

The system is designed to operate in a typical office environment. Choose a site that is:

● Clean, dry, and free of airborne particles (other than normal room dust).

● Well-ventilated and away from sources of heat including direct sunlight and radiators.

● Away from sources of vibration or physical shock.

● Isolated from strong electromagnetic fields produced by electrical devices.

● In regions that are susceptible to electrical storms, we recommend you plug your system into a surge suppressor and disconnect telecommunication lines to your modem during an electrical storm.

● Provided with a properly grounded wall outlet.

● Provided with sufficient space to access the power system, because they serve as the product's main power disconnect.

● Provided with either two independent DC power system or two independent phases from a single power system.

Equipment Handling Practices

Reduce the risk of personal injury or equipment damage:

- Conform to local occupational health and safety requirements when moving and lifting equipment.

- Use mechanical assistance or other suitable assistance when moving and lifting equipment.

- To reduce the weight for easier handling, remove any easily detachable components.

- Never lift or move your system solely by the handle on the component.

Power and Electrical Warnings

CAUTION!
MAKE SURE THE SYSTEM IS REMOVED FROM THE RACK BEFORE SERVICING ANY NON-HOT PLUG COMPONENTS. THE BUS BAR CLIPS MUST BE DISCONNECTED FROM THE POWER SYSTEM INORDER TO FULLY SEPARATE THE SYSTEM FROM THE POWER SOURCE.

CAUTION!
TO AVOID RISK OF ELECTRIC SHOCK, DISCONNECT ALL CABLING FROM THE SYSTEM AND REMOVE THE SYSTEM FROM THE RACK.

System Access Warnings

CAUTION!
TO AVOID PERSONAL INJURY OR PROPERTY DAMAGE, THE FOLLOWING SAFETY INSTRUCTIONS APPLY WHENEVER ACCESSING THE INSIDE OF THE PRODUCT:

- Disconnect from the power source by removing the system from the rack.
- Disconnect all cabling running into the system.
- Retain all screws or other fasteners when servicing. Upon completion servicing, secure with original screws or fasteners.

CAUTION!
IF THE SERVER HAS BEEN RUNNING, ANY INSTALLED HDD MODULES MAY BE HOT.

CAUTION!
UNLESS YOU ARE ADDING OR REMOVING A HOT-PLUG COMPONENT, ALLOW THE SYSTEM TO COOL BEFORE SERVICING.

CAUTION!
TO AVOID INJURY DO NOT CONTACT MOVING FAN BLADES. IF YOUR SYSTEM IS SUPPLIED WITH A GUARD OVER THE FAN, DO NOT OPERATE THE SYSTEM WITHOUT THE FAN GUARD IN PLACE.

Rack Mount Warnings

The following installation guidelines are required by UL for maintaining safety compliance when installing your system into a rack.

The equipment rack must be anchored to an unmovable support to prevent it from tipping when your system or piece of equipment is extended from it. The equipment rack must be installed according to the rack manufacturer's instructions.

Install equipment in the rack from the bottom up, with the heaviest equipment at the bottom of the rack.

Extend only one piece of equipment from the rack at a time.

You are responsible for installing a main power disconnect for the entire rack unit. This main disconnect must be readily accessible, and it must be labeled as controlling power to the entire unit, not just to the system(s).

To avoid risk of potential electric shock, a proper safety ground must be implemented for the rack and each piece of equipment installed in it.

Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.

Reduced Air Flow - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.

Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.

Circuit Overloading - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on over-current protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

Reliable Earthing - Reliable earthing of rack-mounted equipment should be maintained.

Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

Electrostatic Discharge (ESD)

CAUTION!

ESD CAN DAMAGE DRIVES, BOARDS, AND OTHER PARTS. WE RECOMMEND THAT YOU PERFORM ALL PROCEDURES AT AN ESD WORKSTATION. IF ONE IS NOT AVAILABLE, PROVIDE SOME ESD PROTECTION BY WEARING AN ANTI-STATIC WRIST STRAP ATTACHED TO CHASSIS GROUND -- ANY UNPAINTED METAL SURFACE -- ON YOUR SERVER WHEN HANDLING PARTS.

Always handle boards carefully. They can be extremely sensitive to ESD. Hold boards only by their edges without any component and pin touching. After removing a board from its protective wrapper or from the system, place the board component side up on a grounded, static free surface. Use a conductive foam pad if available but not the board wrapper. Do not slide board over any surface.

Cooling and Airflow

CAUTION!

CAREFULLY ROUTE CABLES AS DIRECTED TO MINIMIZE AIRFLOW BLOCKAGE AND COOLING PROBLEMS. FOR PROPER COOLING AND AIRFLOW, OPERATE THE SYSTEM ONLY WITH THE CHASSIS COVERS* / AIR DUCT INSTALLED. OPERATING THE SYSTEM WITHOUT THE COVERS / AIR DUCT IN PLACE CAN DAMAGE SYSTEM PARTS . TO INSTALL THE COVERS* / AIR DUCT:

- Check first to make sure you have not left loose tools or parts inside the system.
- Check that cables, add-in cards, and other components are properly installed.

Attach the covers* / air duct to the chassis according to the product instructions.

* May not apply to all systems.

Please be aware that slots and openings on the front and rear side of the chassis are designed for ventilation; to make sure reliable operation of your system and to protect it from overheating, these openings must not be covered or blocked. The openings should never be covered or blocked by placing the product on a bed, sofa, rug, or other similar surface. This product should never be placed near or over a radiator or heat register, or in a built-in installation unless proper ventilation is provided.

Laser Peripherals or Devices

CAUTION!

TO AVOID RISK OF RADIATION EXPOSURE AND / OR PERSONAL INJURY:

- Do not open the enclosure of any laser peripheral or device.
- Laser peripherals or devices are not serviceable.
- Return to manufacturer for servicing.

Use certified and rated Laser Class I for Optical Transceiver product.

Heed safety instructions: Before working with the system, whether using this manual or any other resource as a reference, pay close attention to the safety instructions. Adhere to the assembly instructions in this manual to ensure and maintain compliance with existing product certifications and approvals. Use only the described, regulated components spec-

ified in this manual. Use of other products / components will void the UL listing and other regulatory approvals of the product and will most likely result in non-compliance with product regulations in the region(s) in which the product is sold.

System power on/off: To remove power from system, you must remove the system from rack. Make sure the system is removed from the rack before opening the chassis, adding, or removing any non hot-plug components.

Hazardous conditions, devices and cables: Hazardous electrical conditions may be present on power, telephone, and communication cables. Turn off the system and disconnect the cables attached to the system before opening it. Otherwise, personal injury or equipment damage can result.

Electrostatic discharge (ESD) and ESD protection: ESD can damage drives, boards, and other parts. We recommend that you perform all procedures in this chapter only at an ESD workstation. If one is not available, provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground any unpainted metal surface on the server when handling parts.

ESD and handling boards: Always handle boards carefully. They can be extremely sensitive to electrostatic discharge (ESD). Hold boards only by their edges. After removing a board from its protective wrapper or from the server, place the board component side up on a grounded, static free surface. Use a conductive foam pad if available but not the board wrapper. Do not slide board over any surface.

Installing or removing jumpers: A jumper is a small plastic encased conductor that slips over two jumper pins. Some jumpers have a small tab on top that can be gripped with fingertips or with a pair of fine needle nosed pliers. If the jumpers do not have such a tab, take care when using needle nosed pliers to remove or install a jumper; grip the narrow sides of the jumper with the pliers, never the wide sides. Gripping the wide sides can damage the contacts inside the jumper, causing intermittent problems with the function controlled by that jumper. Take care to grip with, but not squeeze, the pliers or other tool used to remove a jumper, or the pins on the board may bend or break.
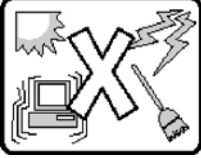
General Information

Before servicing this system, it is recommended to read this guide completely to be aware of any safety issues or requirements involved in the servicing of this system.

Assembly Safety Guidelines
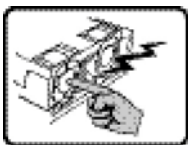
The power system in this product contains no user-serviceable parts.
Refer servicing only to qualified personnel.

	The system is designed to operate in a typical office environment. Choose a site that is: ● Clean and free of airborne particles (other than normal room dust). ● Well ventilated and away from sources of heat including direct sunlight. ● Away from sources of vibration or physical shock. ● Isolated from strong electromagnetic fields produced by electrical devices. ● In regions that are susceptible to electrical storms, we recommend you plug your system into a surge suppressor and disconnect telecommunication lines to your modem during an electrical storm. ● Provided with a properly grounded wall outlet. ● Provided with sufficient space to access the power system, because they serve as the product's main power disconnect.
	WARNING! The system is safety certified as rack-mounted equipment for use in a server room or computer room, using an approved customer rack. The enclosure is designed to carry only the weight of the system sled. Do not place additional load onto any equipment.
	Heavy object. Indicates two people are required to safely handle the system.

Structure of this guide

- Chapter 1: About the System

  "This section introduces the system, its different configuration(s) and the main features."

- Chapter 2: Installing Hardware

  "This section provides guidance information to properly service components in the system."

- Chapter 3: BIOS

  "This section provides information regarding the BIOS architecture, BIOS update utility, server management, checkpoints, and error handling found in the system."

- Chapter 4: BMC

  "This section provides information and key features of BMC (Baseboard Management Controller)."

- Chapter 5: Connectors

  "This section provides guidance information for the position and configuration of connectors."

- Chapter 6: Troubleshooting

  "This section provides a guidance for the troubleshooting of system errors and hardware failure notification."

- Chapter 7: Regulatory and Compliance Information

  "This section provides regulatory and compliance information applicable to this system."

About the System

Chapter 1

This section introduces the system, its different configuration(s) and the main features.

1.1 Introduction

This document provides an overview of the hardware features of the chassis, troubleshooting information, and instructions on how to add and replace components of the server.

For the latest version of this manual, see www.qct.io.

System Features

The system comprises a 1U/34.1" long chassis. Major features include:

- **Chipset**: Integrated
- **Processors** : AMD EPYC™ processor family
- **PCIe slots**:
  - (1) PCIe gen3 x16 OCP 2.0 mezzanine card per node
  - (1) PCIe gen3 x16 FHHL slot per node
  - (1) PCIe gen3 x16 HHHL slot per node
- **Memory:** Up to 16 DIMM slots are available; ECC DDR4 2666 MHz RDIMM/LRDIMM memory
- **Network*:**
  - Dedicated GbE management NIC port from PHY RTL8211 to BMC
  - QCT GbE/10GbE RJ45 dual/quad port OCP mezzanine card or
  - QCT 10G/25Gb SFP+ dual/quad port OCP mezzanine card or
  - QCT 40G/56G/100G QSFP+ single/dual port OCP mezzanine card

*Visit www.qct.io for the latest Network support listings.

> **Note:**
> The system supports:
> 1200W PSU: 100-120/200-240Vac, 50/60Hz, 14A/8A or 240Vdc, 5.9A

Specifications

Table 1.1: System Specifications

SPECIFICATIONS	DESCRIPTION
Form factor	1U rack mount
Chassis dimensions (W x H x D)	444mm x 43.2 mm x 900 mm 17.5" x 1.7" x 34.1"

Table 1.1: System Specifications (Continued)

SPECIFICATIONS	DESCRIPTION
Mainboard form factor (Wx L), half-width	• 210mm x 402.6mm / 8.27" x 15.85" • Up to 2 indenpendent mainboard sleds (6) 2.5" fixed SSD per node
Processor	**Processor type:** AMD EPYC™ processor family per node **Max. TDP support:** 180W, support AMD SVID 2.0 **Number of processors:** 1
Chipset	Integrated
Memory	**Total slots:** 16 **Memory type:** DDR4 2666 MHz RDIMM/LRDIMM **Memory size:** 8GB, 16GB, 32 GB* *More options refer to the AVL
Storage controller	**Onboard:** (1) SATA/PCIe M.2 2280/22110 per node
Networking	• Dedicated GbE management NIC port from PHY RTL8211 to BMC • QCT GbE/10GbE RJ45 dual/quad port OCP mezzanine card or • QCT 10G/25Gb SFP+ dual/quad port OCP mezzanine card or • QCT 40G/56G/100G QSFP+ single/dual port OCP mezzanine card *More options refer to the AVL
Expansion slots	(1) PCIe gen3 x16 OCP 2.0 mezzanine card per node (1) PCIe gen3 x16 FHHL slot per node (1) PCIe gen3 x16 HHHL slot per node
Storage	(1) SATA/PCIe M.2 2280/22110 per node (6) 2.5" fixed SSD per node
Video	Integrated Aspeed AST2500 with 16MB DDR4 video memory
Front I/O (per node)	(2) USB 3.0 ports (1) VGA port (BMC AST2500 supported) (1) Micro USB connector transfering in serial singal (1) Power button/ID button (1) Power LED/Status LED (1) ID LED (1) GbE RJ45 management port
TPM	Yes (optional, SPI mode)
ACPI	ACPI compliance, S0, S5 support
Power supply option	(2) 1200W 86mm Platinum 1+1 PSU, 200-240VAC 50/60Hz ### Note: This is conditional supported with 1+1 PSU; with 2 * PSU, system can fully run with no limitation. But during one PSU failed, system would execute the power management to decrease the power consumption for PSU limitation.
System rating	100-120/200-240Vac, 50/60Hz, 10A/8A or 240Vdc, 5A (per PSU inlet)
Fan	(6) hot-swap dual-rotor fan modules

Table 1.1: System Specifications (Continued)

SPECIFICATIONS	DESCRIPTION
System management	IPMI v2.0 Compliant, on board "KVM over IP" support
Operating environment	• Operating temperature: 5°C to 35°C (41°F to 95°F) • Non-operating temperature: -40°C to 70°C (-40°F to 158°F) • Operating relative humidity: 20% to 85%RH • Non-operating relative humidity: 10% to 95%RH

1.2 A Tour of the System

The following illustrations describe the major components of the system.

System Front View

The system front consists of two mainboard sleds.
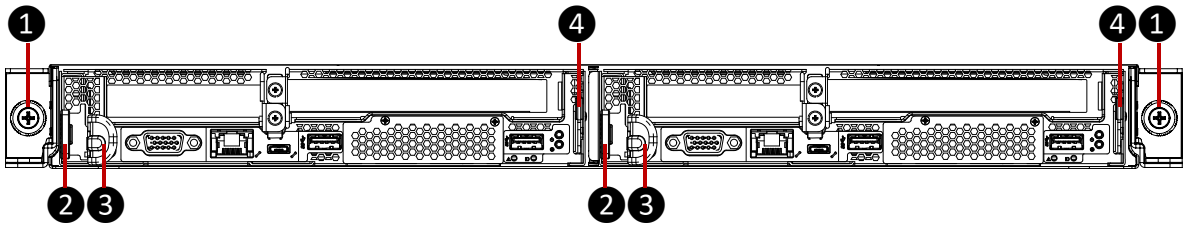
Figure 1-1.   System Front View

Table 2: System Front View

No	Feature	Description
1	Thumb screw	Secure the system to the rack frame
2	Latch	Press to release the latch and hold the handle to remove the sled from the system chassis
3	Handle	Hold the handle while pressing the latch and remove the sled from the chassis
4	Asset tag	Record serial number or other important information

Front I/O Ports
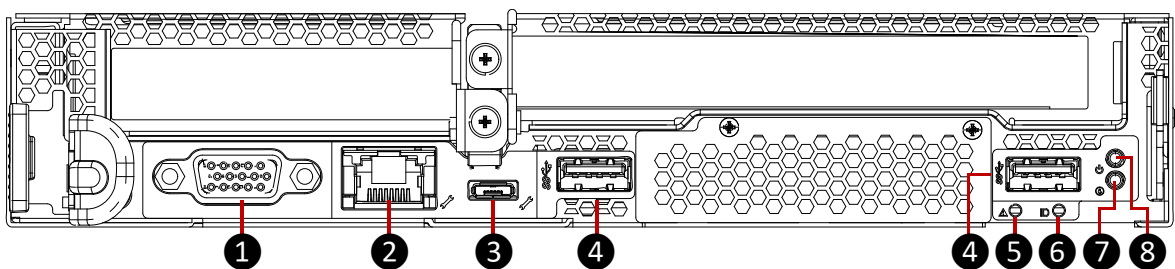
Figure 1-2.   Front I/O Ports

Table 3: Rear I/O Ports

No	Feature	Description
1	VGA port	Standard VGA compatible, 15-pin connector supporting up to 1920 x 1200 32bpp@60Hz resolution. Connect to display device
2	Management port	Dedicated BMC LAN port (RJ45) for remote control / management
3	Micro-USB port	Connect to USB port on terminal device with serial signal

Table 3: Rear I/O Ports (Continued)

No	Feature	Description
4	USB 3.0 ports	Connect to USB device
5	Sled Power/Status LED	Blue: Power on S0, mainboard sled is in normal status Amber: Mainboard sled is in fault status
6	ID LED	Blue: Identify the mainboard sled
7	ID button	Press to toggle the ID LED on/off
8	Power button	Press and hold more than four seconds to turn off the mainboard

Note:

The USB connector must be:

No bigger than 17mm/ 0.67" (W) x 8 mm / 0.31" (H) to avoid interference with the other ports.

Sled Top View and HDD Mapping
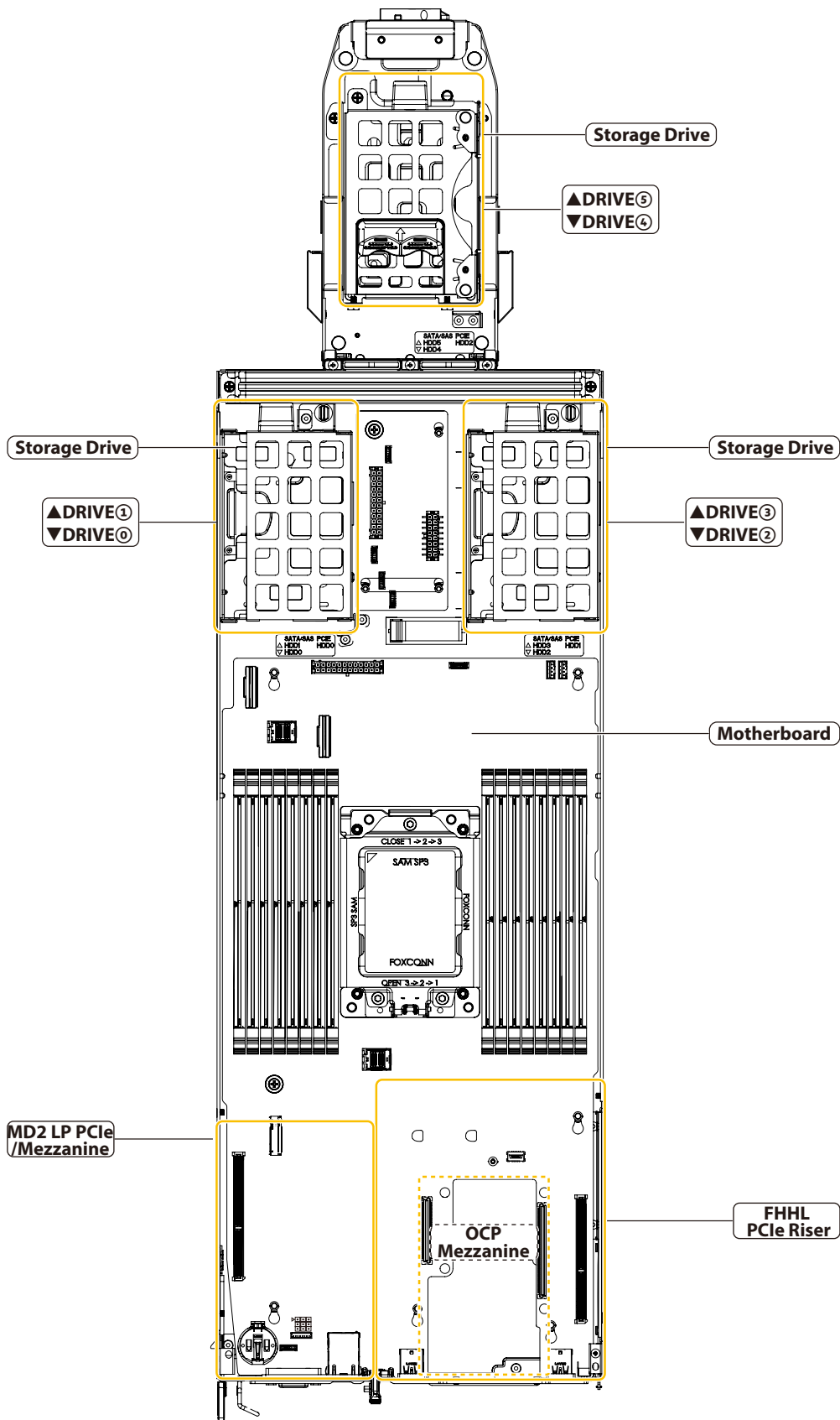
Figure 1-3.   Sled Top View

Rear View

The system rear consists of three fan modules per node and two power supply units.

MB Sled1   MB Sled0

Fan2   Fan1   Fan0   PSU1   PSU0   Fan2   Fan1   Fan0
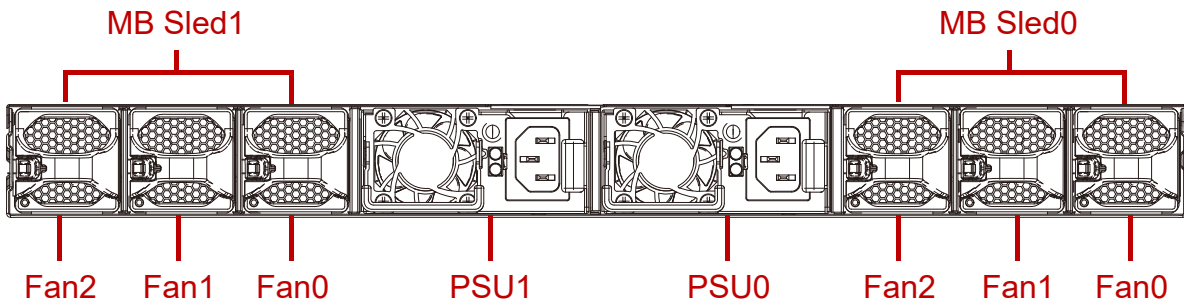
Figure 1-4.   System Rear View

Power Sub-System

A system has two modular Power Supply Units (PSU). Both PSUs are directly connected to the Power Distribution Boards (PDBs), allowing each PSU to individually provide power for all mainboards.

The power supply units supported: 2 x 1200W redundant PSU: 100-120/200-240Vac, 50/60Hz, 14A/8A or 240Vdc, 5.9A.

PSU LED
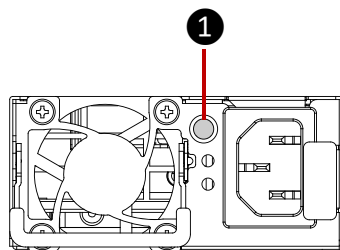
Figure 1-5.   PSU LED

Table 4: PSU LED Description

STATUS	DESCRIPTION
Green	Normal operation
Amber: blinking	Main power fault and stop DC output
Green: blinking@0.5Hz	AC present and only standby power on
Green: blinking@2Hz	Sleep in smart redundant and offline mode

Cooling Sub-System

Fans may spin for some time after the system has been powered off. Allow time for the fans to stop rotating before handling system components.

LED
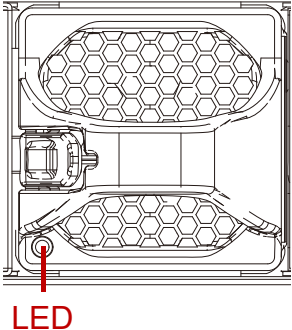
Figure 1-6.   Cooling Sub System

Table 5: Fan LED Description

STATUS	DESCRIPTION
Red	Fan failed
Off	Normal operation

Installing Hardware

Chapter 2

This section provides guidance information to properly service components in the system.

2.1 Safety Measures

WARNING!

Always ask for assistance to move or lift the system.

WARNING!

Only perform troubleshooting as authorized by the product documentation, or as directed by a service and support team. Repairs not authorized by warranty may void the warranty and damage the system.

WARNING!

Always make sure to disconnect the system from the power source. Powering down the system DOES NOT ensure there is no electrical activity in the system.

WARNING!

Server components and circuit boards are easily damaged by discharges of static electricity. Working on servers that are connected to a power system can be extremely dangerous. Follow the guidelines below to avoid personal injury or damage to the server.

WARNING!

Always disconnect the system from the power source whenever you are working inside the server case.

WARNING!

Wear a grounded wrist strap. If none are available, discharge any personal static electricity by touching the bare metal chassis of the server case, or the bare metal body of any other grounded device.

WARNING!

Humid environments tend to have less static electricity than dry environments. A grounding strap is warranted whenever danger of static electricity exists.

WARNING!

Do not touch the components on the unless it is necessary to do so. Do not flex or stress circuit boards.

WARNING!

Leave all replacement components inside their static-proof packaging until you are ready to use them.

2.2 Fan Module Assembly

The system includes six (6) fan modules. See the following for specific installation and connection information.

See the following image for fan module identification.
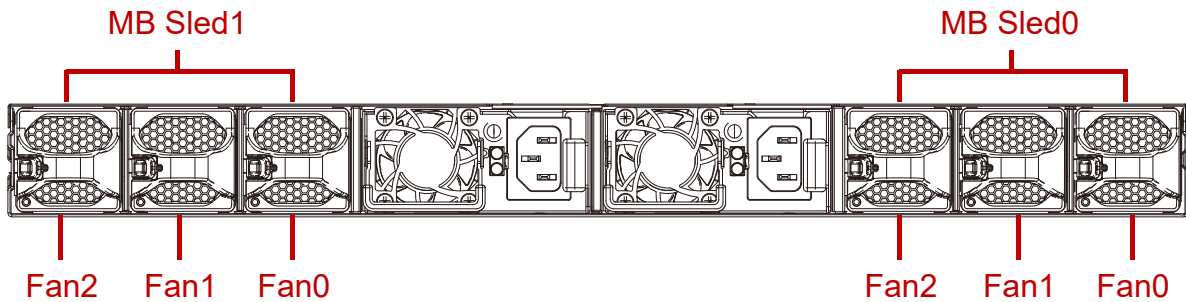
Figure 2-1.   Fan Module Identification

Removing a Fan Module

> **CAUTION!**
> ENSURE THE FAN MODULE IS REPLACED IN SHORT TIME.

1. Locate the fan module on the rear chassis.

2. Press and hold the latch to release the fan module from system.
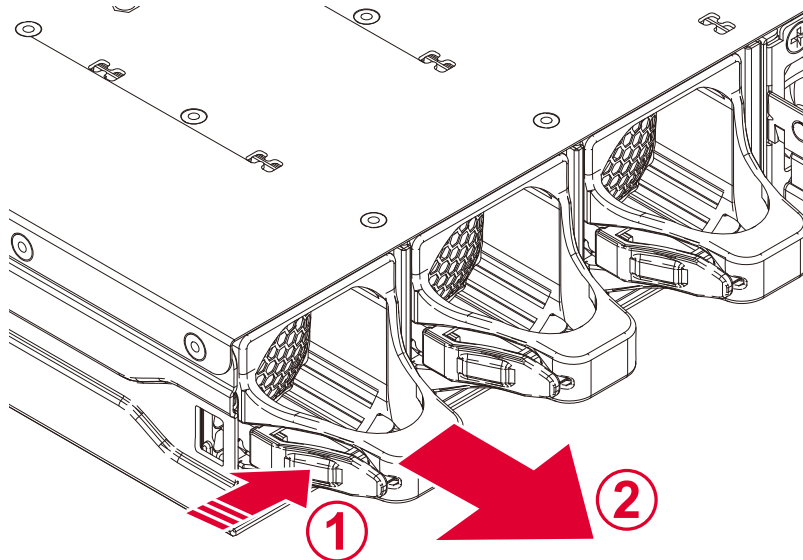
Figure 2-2.   Releasing the Fan Module Latch

3. Grasp the handle and remove the fan module from the rear chassis.

4. Replace the fan module.

Installing a Fan Module

CAUTION!
POSITION AND CONNECT THE FAN MODULE CORRECTLY, TO AVOID SEVERE SYSTEM OVERHEATING.

1. Remove the new fan module from its packaging.

2. Align the fan module with the system cage. Gently insert to seat it correctly.
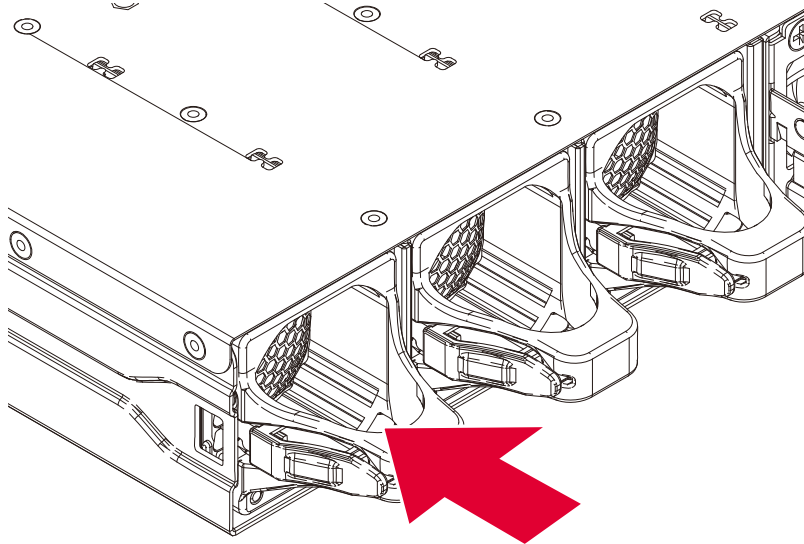
Figure 2-3.   Installing the Fan Module

3. Replace the system in the rack.

2.3 Power Supply Unit

WARNING!

Mainboard combinations other than the system are not supported

Note:

Partial Redundancy: Partial redundancy is supported if the mainboard is designed with a throttling feature to downgrade its power consumption when on and a PSU is faulty or has been removed. If partial redundancy is supported, a single faulty PSU can be removed and a new one can be inserted without the system shutting itself down.

Removing a Power Supply Unit

CAUTION!

ENSURE ALL POWER IS DISCONNECTED FROM THE SYSTEM BEFORE PROCEEDING.

1. Pull the PSU handle up to the open position.

2. Press and hold the locking latch.

3. Pull the PSU from the system.
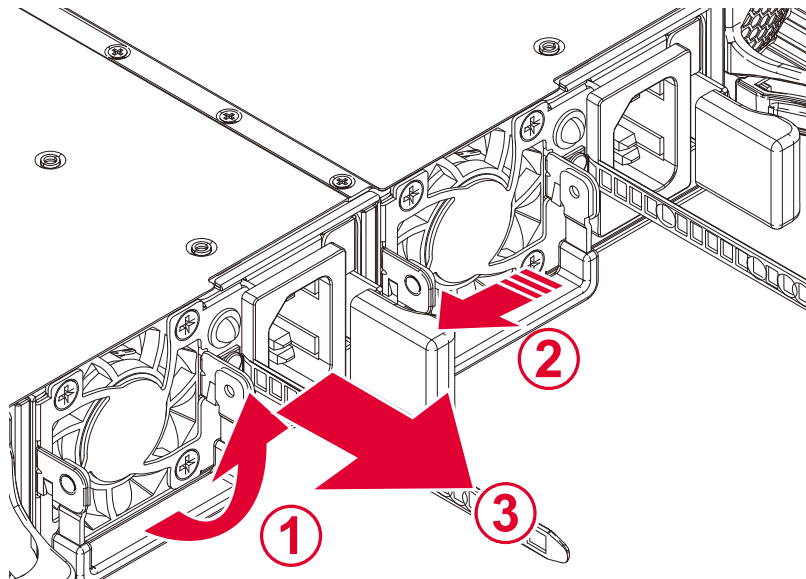
Figure 2-4.   Releasing the PSU Handle

Installing a Power Supply Unit

Insert the power supply unit (PSU) into the system. Make sure the PSU is flush with the system and the side latch is locked in place.
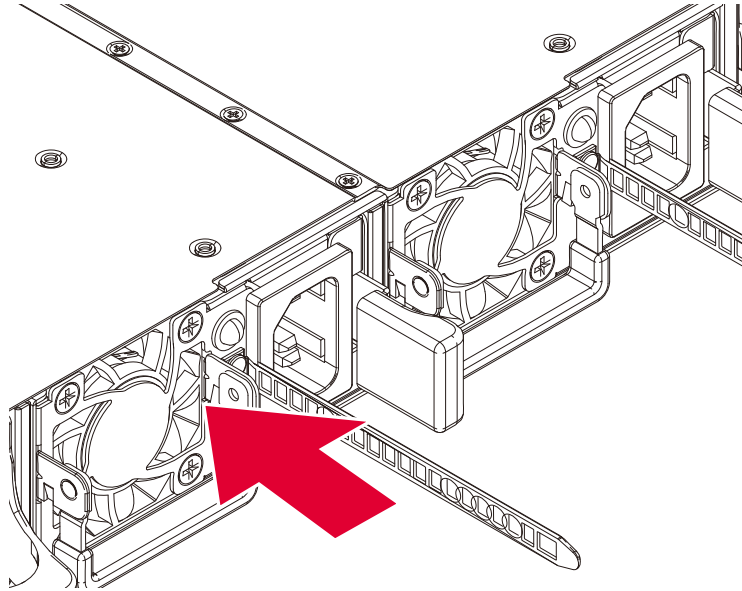
Figure 2-5.   Installing a PSU

2.4 Mainboard Sled

Population Rules

⚠️ **WARNING!**

Mainboard combinations other than the system are not supported

⚠️ **WARNING!**

Do not run the system with empty mainboard sled bay(s). Mainboard sled may be removed while the system is operational but must be replaced immediately with another mainboard sled or dummy sled.

⚠️ **CAUTION!**

ENSURE ALL POWER IS DISCONNECTED FROM THE SYSTEM BEFORE PROCEEDING.

The dual-node server system can be populated with up to two nodes. Each mainboard sled supports one AMD EPYC processors. The node configuration is defined as shown in the following illustration.

MB Sled0   MB Sled1
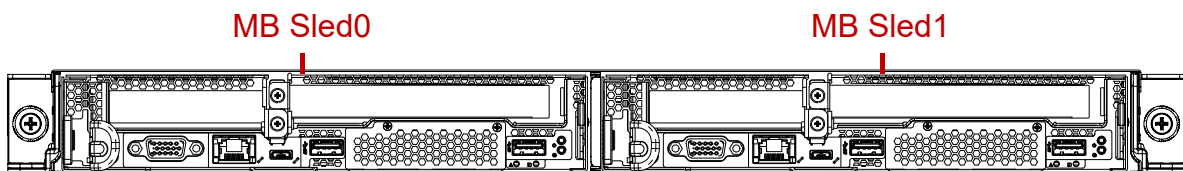
Figure 2-6.   Mainboard Sled Bay Configuration

Note:

The first mainboard sled inserted into MB1 defines the default node type for the system.

Another bay may be populatedwith either mainboard sled or dummy sled.

Mixed sled types with different mainboards are not supported.

For further information on mainboard bays and node configuration, see "Power Sub-System" on page 1-7.

Removing a Mainboard Sled

⚠️ **CAUTION!**

ENSURE ALL POWER IS DISCONNECTED FROM THE SYSTEM BEFORE PROCEEDING.

WARNING!

There are no restraining latches on the sleds. When removing a sled make sure to support the sled from underneath as it is removed. Serious hazard warning.

1. Press and hold the release latch.

2. Hold the latch handle and pull the sled partially from the system.

3. Place a hand underneath the sled to support the weight.

4. Continue removing remove the sled.
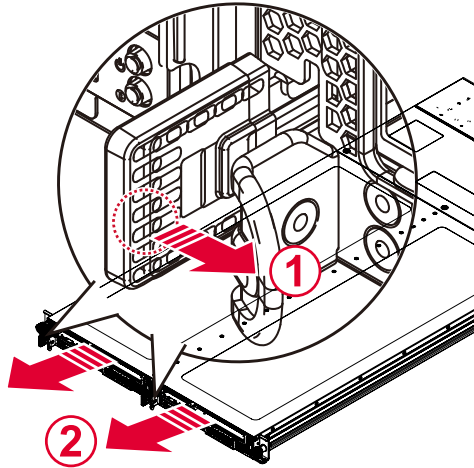
Figure 2-7.   Removing a Mainboard Sled

Installing a Mainboard Sled

WARNING!

Mainboard combinations other than the system are not supported

1. Align the mainboard sled with the chassis.

2. Slide the sled into the system until sled is flush with the system front and the side latch is locked in place.
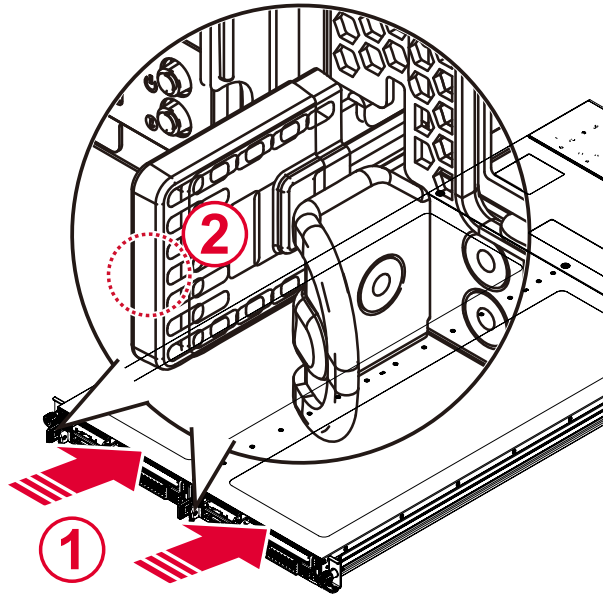
Figure 2-8.   Installing a Mainboard Sled

CAUTION!

IF A MAINBOARD SLED IS NOT PROVIDED, A DUMMY SLED MUST BE INSTALLED, TO ALLOW PROPER COOLING OF THE SYSTEM.

2.5 2.5″ Storage Drives

CAUTION!

ENSURE ALL POWER IS DISCONNECTED FROM THE SYSTEM BEFORE PROCEEDING.

The mainboard includes six (6) 2.5″ storage drives. See the following for specific installation and connection information.

See the following image for storage drive identification.
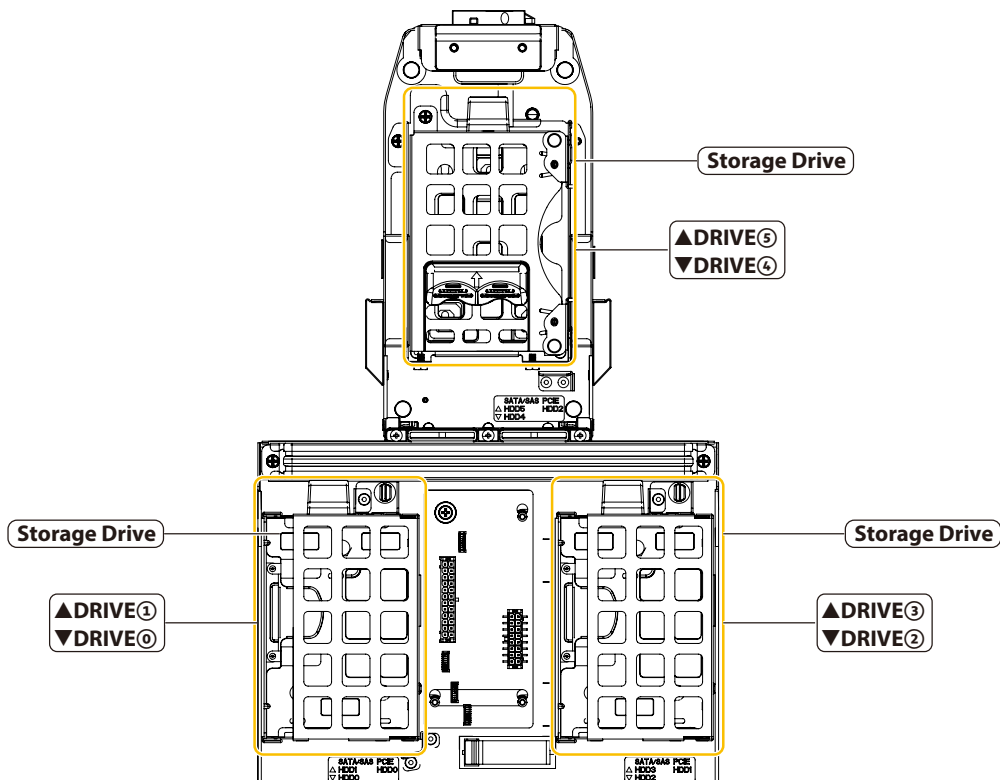
Figure 2-9.   Storage Drive Identification

Removing a 2.5″ Storage Drive Carrier

1. Remove the MB sled from the system. See *Removing a Mainboard Sled* on page 2-6

2. Locate the storage drive carrier for removal.

3. Rotate the latch to the open position.

WARNING!

Make sure the storage drive carrier is in the fully unlocked position before attempting to slide the carrier out of the MB sled. Damage may occur if the carrier is not fully unlocked.

4. Slide the storage drive carrier and remove from the MB sled.
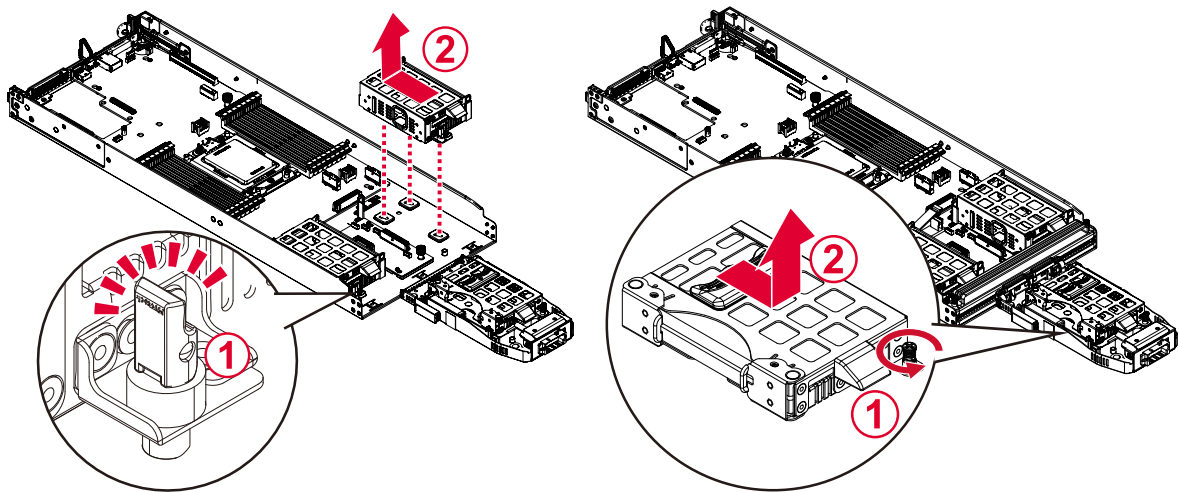
Figure 2-10.   Removing a 2.5" Storage Drive Carrier

Installing a 2.5" Storage Drive Carrier

WARNING!

Do not force the tray handle closed. If resistance is encountered, check the hard drive is properly inserted and the hard drives on either side are properly inserted.

1. Install the storage drive to the storage drive carrier.

2. Align the storage drive carrier in the MB sled.

3. Insert the storage drive carrier into the MB sled. Slide the carrier until it is fully inserted.

4. Secure the storage drive carrier.
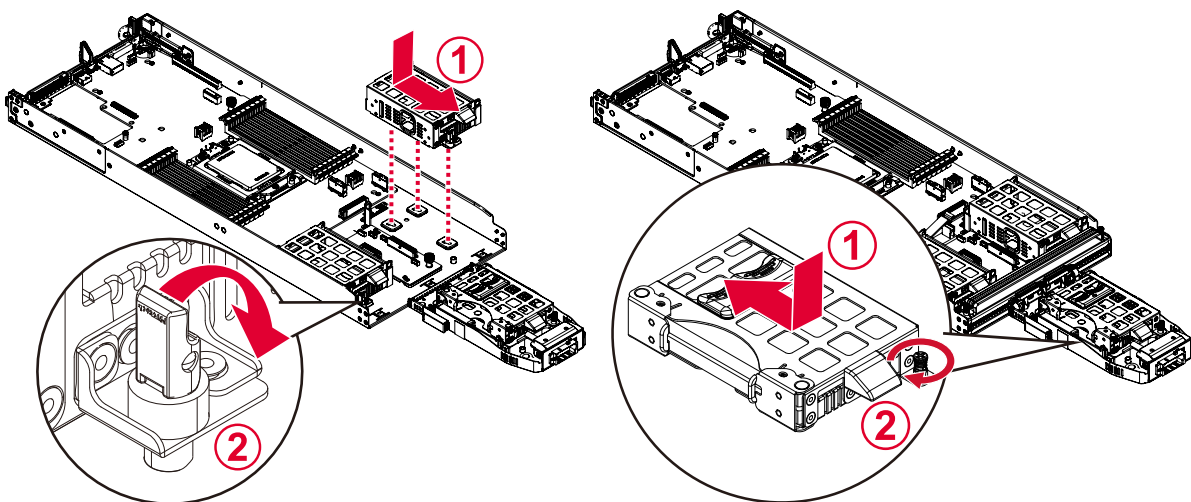
Figure 2-11.   Installing a 2.5" Storage Drive Carrier

Removing the 2.5″ storage drive from a storage drive carrier

1. Remove the storage drive carrier. See *Removing a 2.5″ Storage Drive Carrier* on page 2-9.

2. Rotate the securing cover to the open position.
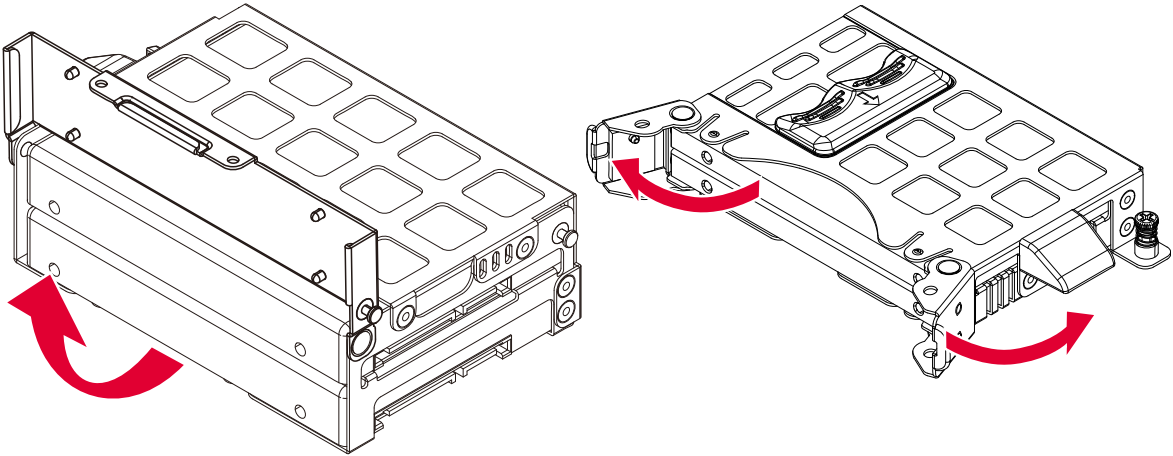
Figure 2-12.   Rotating the Securing Cover to the Open Position

3. Remove the storage drive from the carrier.
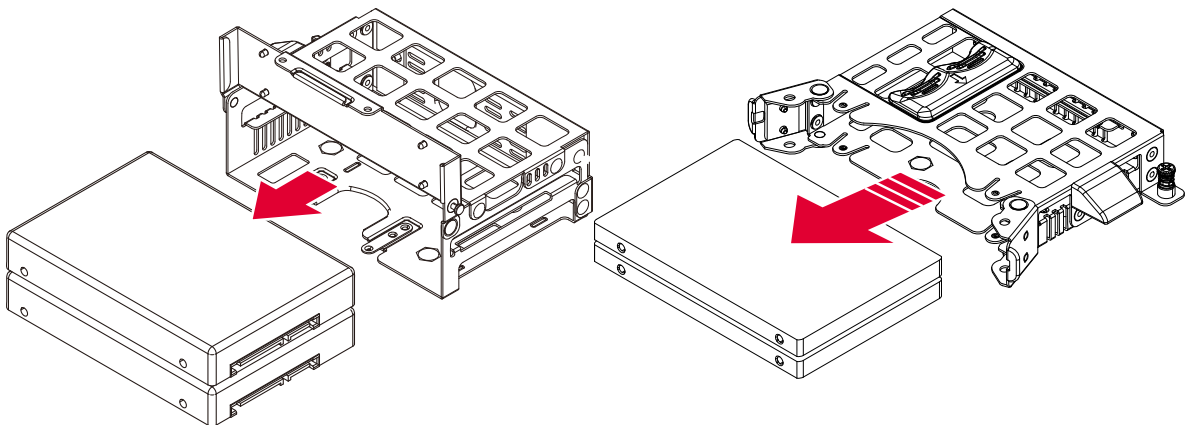
Figure 2-13.   Removing the 2.5″ Storage Drive from a Carrier

Installing the 2.5″ Storage Drive into a Storage Drive Carrier

1. Align the connectors on the storage drive in the carrier. The connectors must face the carrier as shown. Install the storage drive into the carrier. Adjust the storage drive if it is necessary.
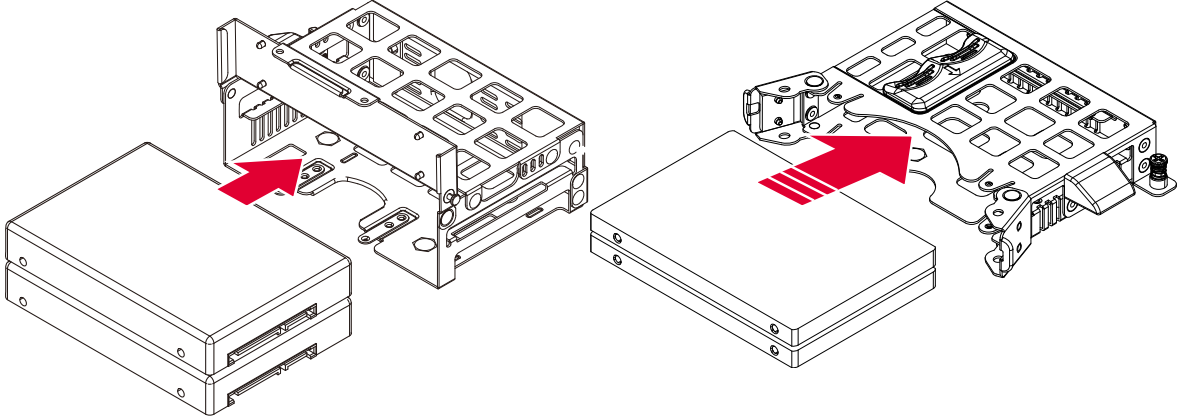
Figure 2-14.   Installing the 2.5″ Storage Drive in a Carrier

2.   Secure with the side cover.
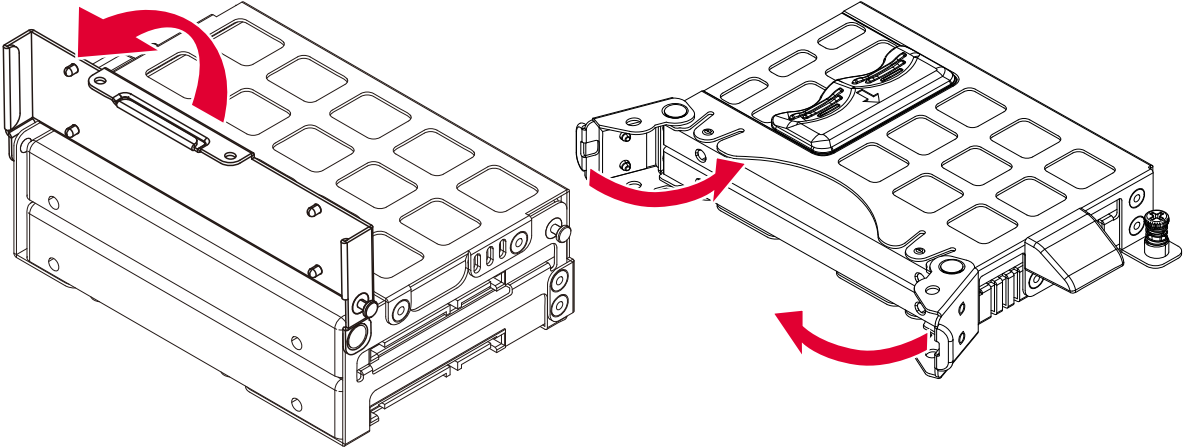
Figure 2-15.   Securing with Side Cover

2.6 Air Deflector

Note:

Make sure the locking latches on the DIMM slots are locked in place before installing the air deflector.

Removing an Air Deflector

1. Remove the MB sled from the chassis. See *Removing a Mainboard Sled* on page 2-6.

2. Grasp the edge of air deflector and rotate upwards to release the air deflector from the DIMM locking latches. Remove the air duct from the system.
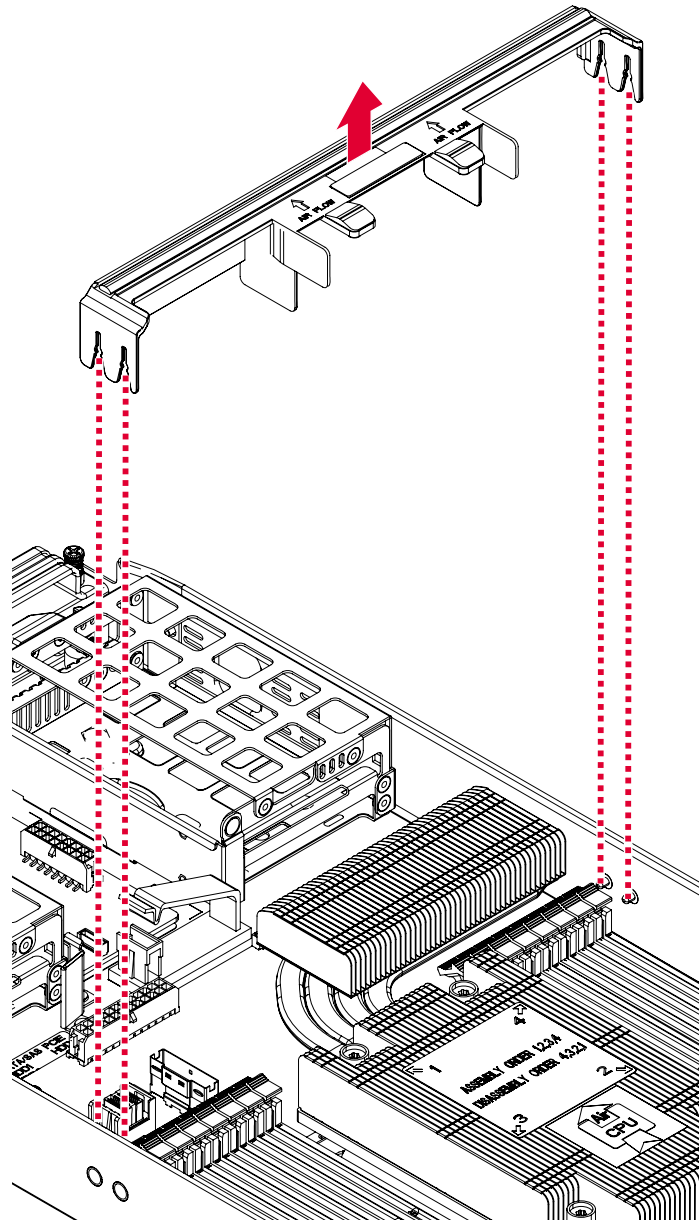
Figure 2-16.   Removing an Air Deflector

Installing an Air Deflector

> **WARNING!**
> Air deflector is needed for the proper cooling of the system. To prevent damage to the system, when installing the air deflector, make sure the arrow on top of the air duct is directing to the rear of the mainboard sled.

1. Make sure the locking latches on the DIMM sockets are in the closed position.

2. Align the air deflector with the mainboard and DIMM sockets. Make sure the Air Flow labeling is oriented correctly.

3. Angle the air deflector down to fit in position.

4. Once in position, tilt the air duct forward to lock it in place over the DIMM modules.
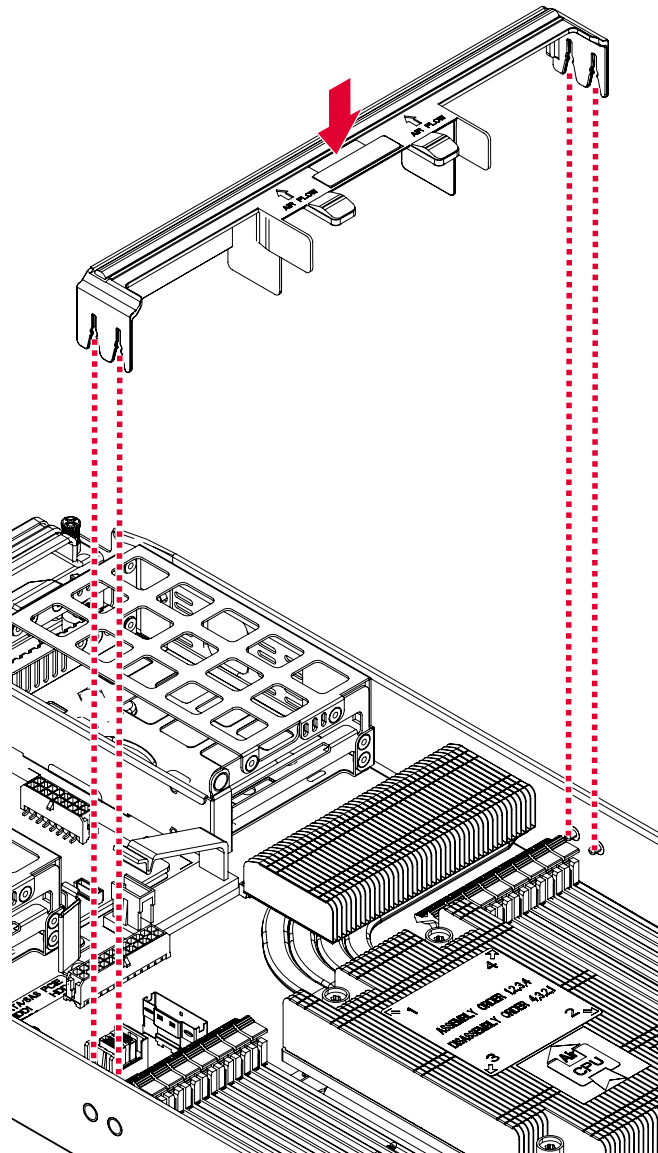
Figure 2-17.   Installing an Air Deflector

5. Install the MB sled in the chassis. See *Installing a Mainboard Sled* on page 2-7.

2.7 Processor Heat Sink

Note:

All the instructions and images in this section are for illustration purposes only and may not reflect the actual product.

Removing a Processor Heat Sink

⚠ **WARNING!**

The heatsink remains hot after the system has been powered down. Allow sufficient time to cool before handling system components.

1. Remove the mainboard sled. See *Removing a Mainboard Sled* on page 2-6.

2. Remove the air deflector. See *Removing an Air Deflector* on page 2-13.

3. Loosen the captive screws securing the heat sink in a sequential order.
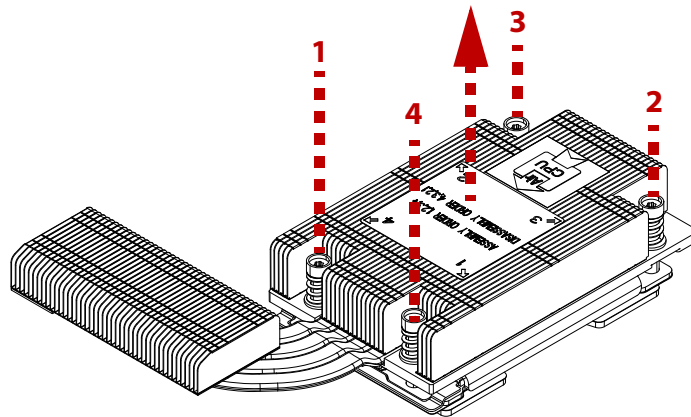
Figure 2-18.   Removing the Heat Sink

4. Remove the heat sink.

Installing a Processor Heat Sink

1. Remove the mainboard sled. See *Removing a Mainboard Sled* on page 2-6.

2. Remove the air deflector. See *Removing an Air Deflector* on page 2-13.

3. Align the heat sink over the processor plate.

4. Install the heat sink. Make sure the screw(s) are inserted into the screw wells.
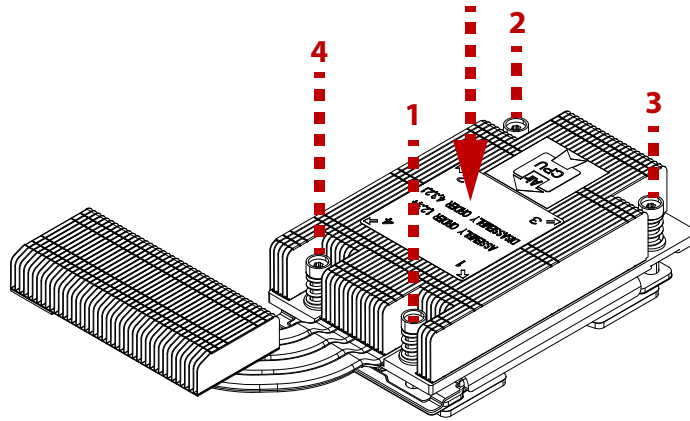
Figure 2-19.   Installing the Heat Sink

5. Tighten the screw(s) in the order shown.

6. Install the air duct. See *Installing an Air Deflector* on page 2-14.

7. Install the mainboard sled. See *Installing a Mainboard Sled* on page 2-7.

2.8 Processor

Note:
All the instructions and images in this section are for illustration purposes only and may not reflect the actual product.

CAUTION!
ENSURE ALL POWER IS DISCONNECTED FROM THE SYSTEM BEFORE PROCEEDING.

WARNING!
The processor remains hot after the system has been powered down. Allow sufficient time to cool before handling system components.

Removing the Processor

To remove the processor:

1. Remove the mainboard sled. See *Removing a Mainboard Sled* on page 2-6.

2. Remove the air deflector. See *Removing an Air Deflector* on page 2-13.

3. Remove the processor heat sink. See *Removing a Processor Heat Sink* on page 2-15.

4. Loosen the captive screws securing the processor in a sequential order.
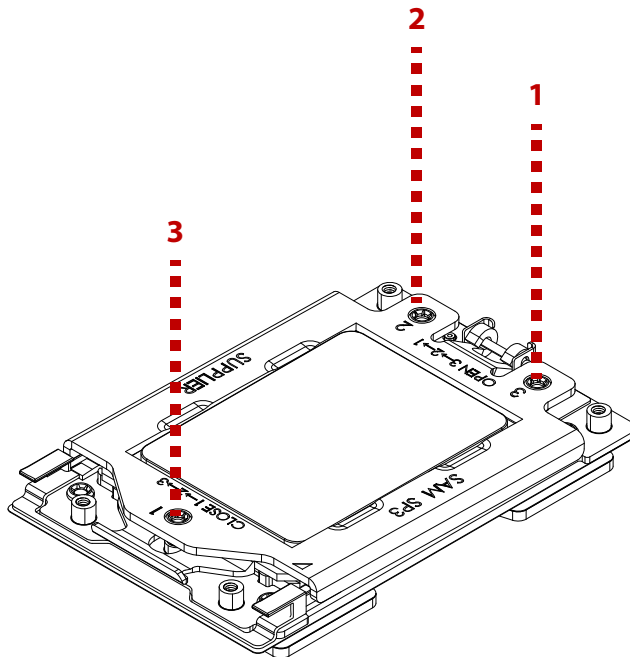
Figure 2-20.   Unlocking the Force Frame

5. Push the tab down and out to unlock the processor rail frame.
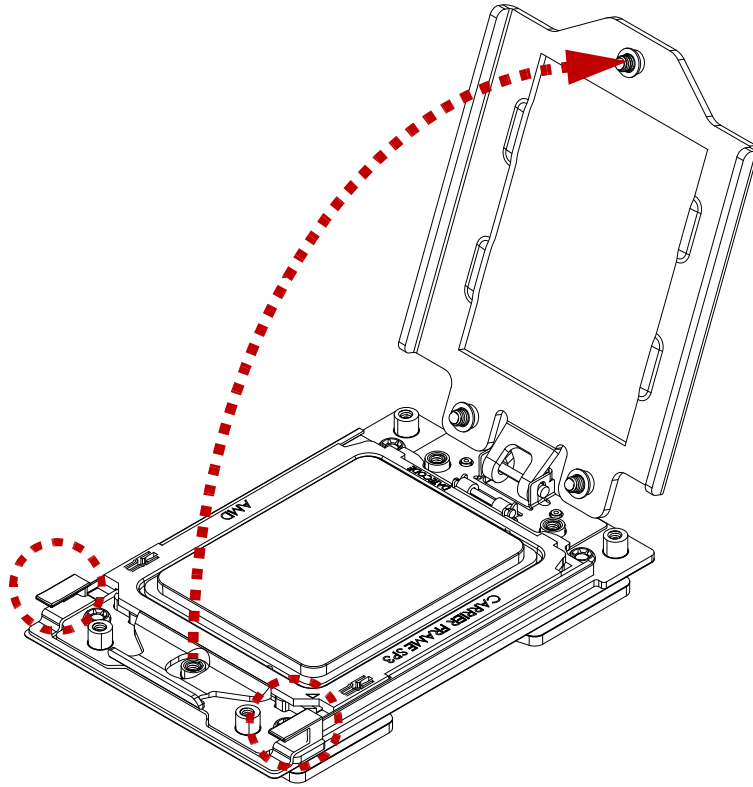
Figure 2-21.   Unlocking the processor rail frame

6. Lift the processor carrier frame from the processor rail frame.
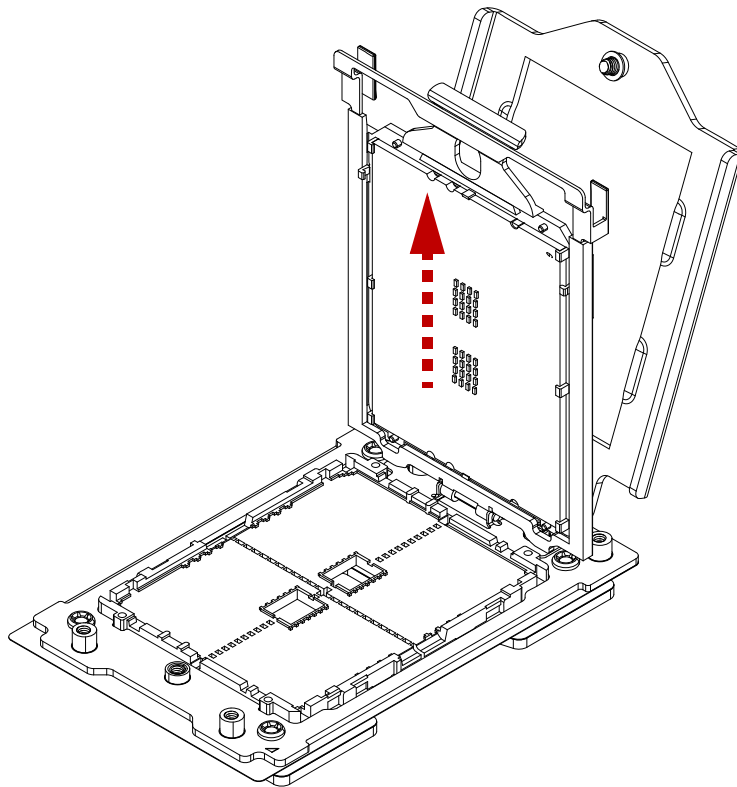
Figure 2-22.   Lifting Processor Carrier Frame

7. Remove the processor from the processor carrier frame.
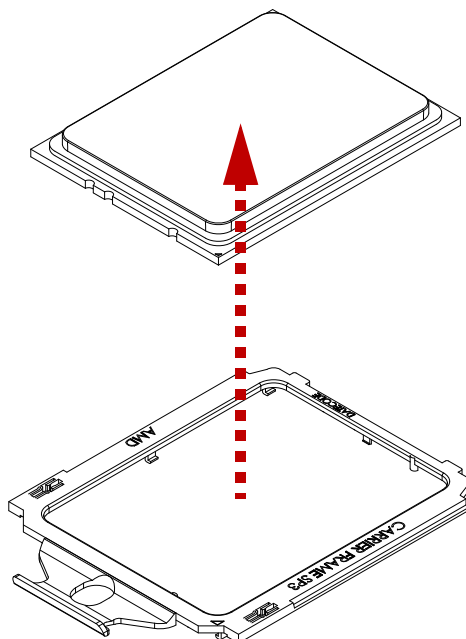
Figure 2-23.   Removing the Processor from the Processor Carrier Frame

CAUTION!
AVOID CONTACT WITH ANY THERMAL GREASE ON THE PROCESSOR.

Installing the Processor

1. Remove the mainboard sled. See *Removing a Mainboard Sled* on page 2-6.

2. Remove the air deflector. See *Removing an Air Deflector* on page 2-13.

3. Remove the processor heat sink. See *Removing a Processor Heat Sink* on page 2-15.

4. Remove the processor. See *Removing the Processor* on page 2-17.

5. Remove the new processor with the blue processor carrier frame preassembled from its packaging. Make sure to hold the processor carrier frame by the sides. Do NOT touch the underside of the processor.

6. If your processor does not assembly with the blue processor carrier frame, do the follows:

    a. Align the triangle identifying pin 1 of the processor with the triangular cutout on the processor carrier frame.

    b. Locate the pin1 (A) on processor and the pin1 (B) corner of the processor carrier frame.

    c. Locate the indents (C) on processor and corresponding tab (D) on the processor carrier frame.

d. Lower the processor into the processor carrier frame. If there is any resistance, lift the processor and re-align the processor with the processor carrier frame.
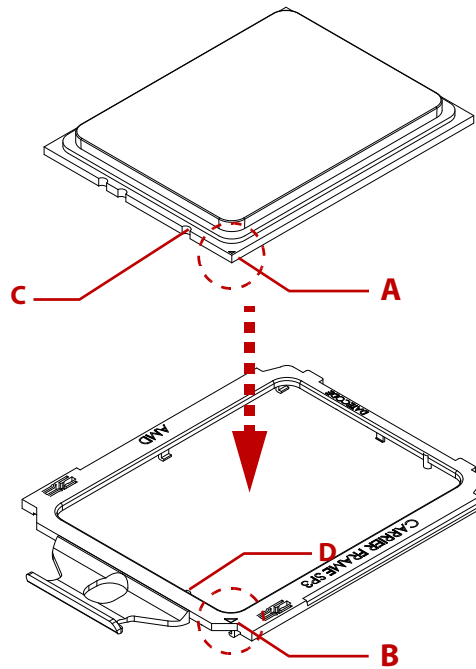
Figure 2-24.   Removing the processor from the processor carrier

7. Lower the processor carrier frame into the processor rail frame. Grip the lift tabs (E) at the top of the processor rail frame and rotate the processor rail frame with locked

processor carrier frame/processor assembly downwards onto the processor socket housing.
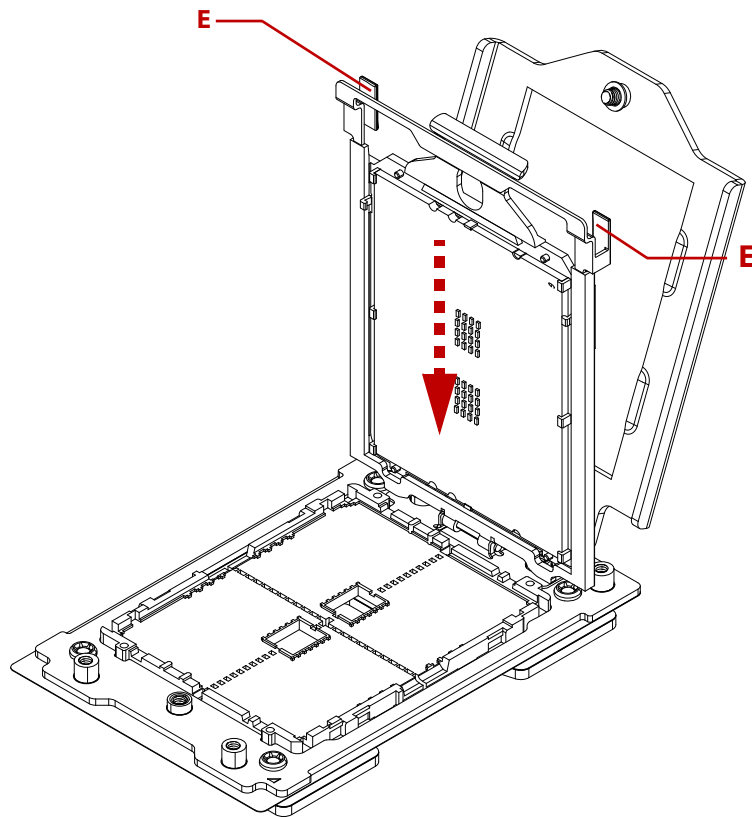
Figure 2-25.   Lower Processor Carrier Frame into Processor Rail Frame

8. Push and rotate the top of the force frame downwards over the processor seating in the socket housing.
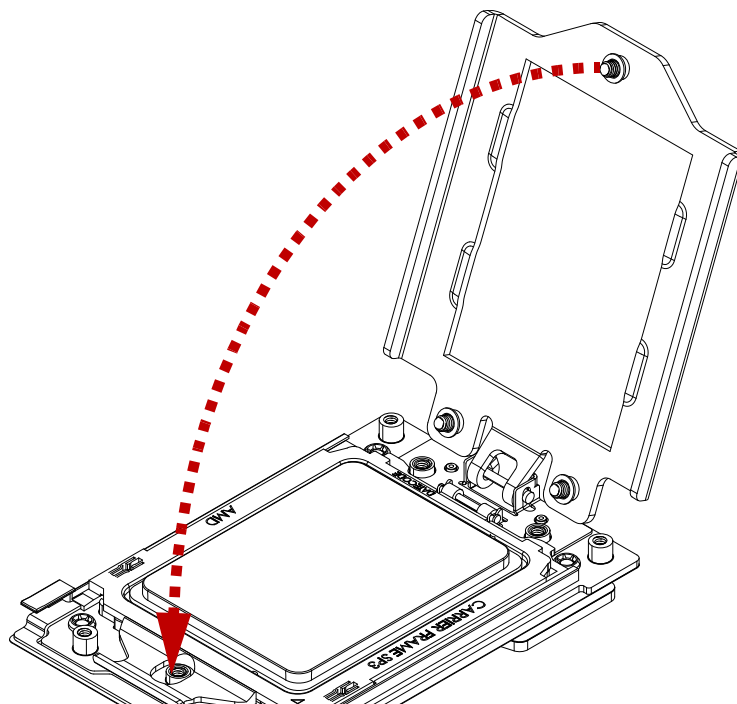
Figure 2-26.   Pushing and Rotating the Force Frame

9. Secure the force frame with three captive screws in a sequential order.
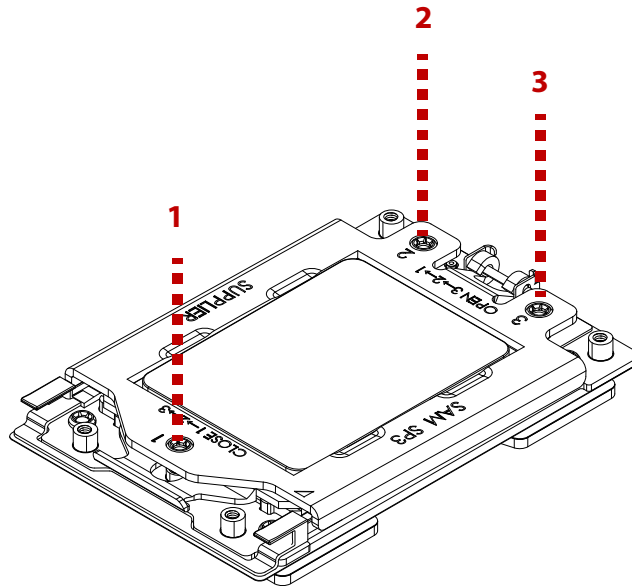
Figure 2-27.   Securing the Force Frame

10. Install the processor heat sink. See *Installing a Processor Heat Sink* on page 2-15.

11. Install the air duct. See *Installing an Air Deflector* on page 2-14.

12. Install the mainboard sled. See *Installing a Mainboard Sled* on page 2-7.

13. Replace the system in the rack.

2.9 Memory Modules

General Guidelines

All servers have specific rules for population of memory on the mainboard. Refer to the following individual server rules for information on how to populate the particular server required.

Memory Population Support

DIMMs are organized into physical slots on DDR4 memory channels that belong to processor socket. The memory channels are identified as Channel A, B, C, D, E, F, G and H.

The DIMM identifiers on the silkscreen on the board provide information about the channel, and therefore the processor, to which they belong. For example, DIMM_A0 is the first slot on Channel A of processor 0. The detailed configuration is shown as below:

D1 D0 C1 C0 B1 B0 A1 A0   **E0 E1 F0 F1 G0 G1 H0 H1**
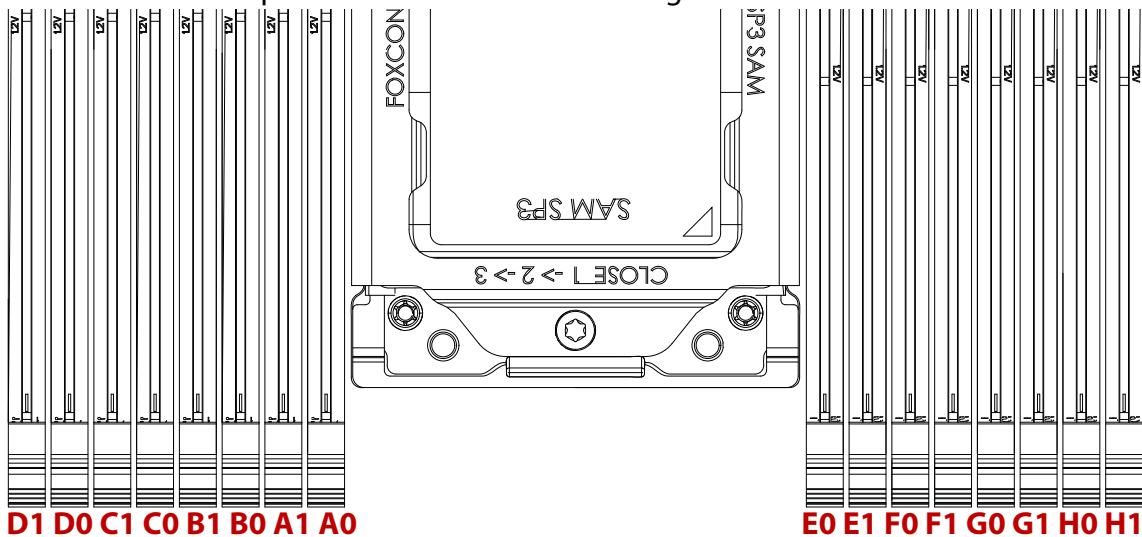
Figure 2-28.   DIMM nomenclature

Table 1: DDR4 Registered Maximum Frequency Support (per channel)

Type	Ranks Per DIMM and Data Width	DIMM Capacity (GB)		Speed (MT/s); Voltage (V); Slot Per Channel (SPC) and DIMM Per Channel (DPC)	
				2 Slots Per Channel	
				1DPC (DIMM0 installed)	2DPC (DIMM0, DIMM1 installed)
		4GB	8GB	1.2V	1.2V
RDIMM	SR x 4	8GB	16GB	2666	2666
RDIMM	SR x 8	4GB	8GB		
RDIMM	DR x 8	8GB	16GB		
RDIMM	DR x 4	16GB	32GB		

Note:

The memory population is coded in one yellow memory slot and one black memory slot for each channel (Two DIMMs Per Channel). It's suggested to install the memory modules to all the available yellow DIMM slots first then the black DIMM slots for each processor to have the better performance.

Removing a Memory Module

CAUTION!

HANDLE THE MEMORY MODULE BY THE EDGES AT ALL TIMES.

WARNING!

Memory modules remain hot after the system is powered down. Allow sufficient time for the memory modules to cool before handling system components.

1. Remove the mainboard sled. See *Removing a Mainboard Sled* on page 2-6.

2. Remove the air deflector. See *Removing an Air Deflector* on page 2-13.

3. Press down on the two ejector levers (A) at both ends of the DIMM slot. The memory module partially ejects.

4. Hold the DIMM module by the ends and remove it from the system. Place the DIMM module in an antistatic packaging.
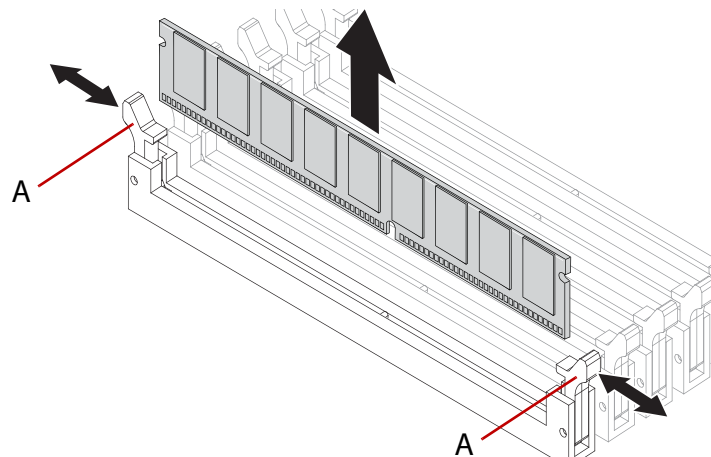
Figure 2-29.   Removing a Memory Module

Installing a Memory Module

CAUTION!

HANDLE THE MEMORY MODULE BY THE EDGES AT ALL TIMES.

1. Locate the DIMM slot to populate and open the ejector levers (A) at both ends of the DIMM slot.

2. Align the notch on the DIMM module with the protrusion on the slot.

3. Press down on both corners of the DIMM module until the ejector levers lock in place.

A

notch

protrusion

A
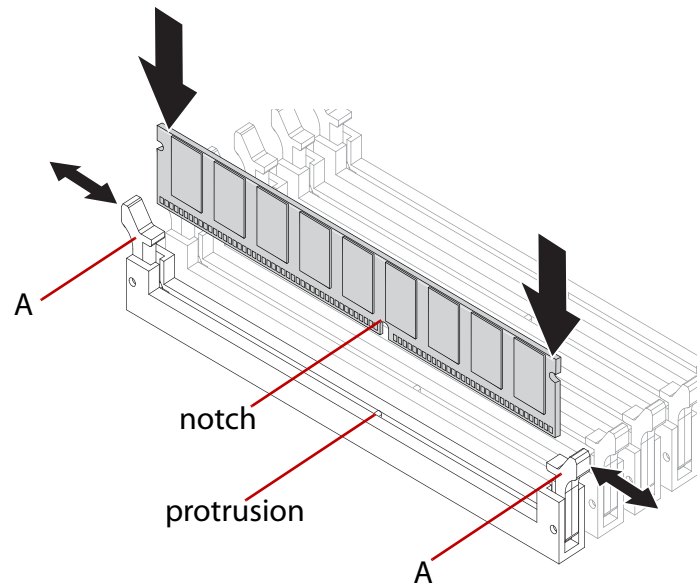
Figure 2-30.   Installing a Memory Module

4. Install the air duct. See *Installing an Air Deflector* on page 2-14.

5. Install the mainboard sled. See *Installing a Mainboard Sled* on page 2-7.

6. Replace the system in the rack.

BIOS

Chapter 3

This section provides information regarding the BIOS architecture, BIOS update utility, server management, checkpoints, and error handling found in the system.

3.1 BIOS Setup Utility

The BIOS Setup utility is provided to perform system configuration changes and to display current settings and environment information.

The BIOS Setup utility stores configuration settings in system non-volatile storage. Changes affected by BIOS Setup will not take effect until the system is rebooted. The BIOS Setup Utility can be accessed during POST by using the <**DEL**> or <**F2**> key.

The following sections describe the look and behavior for platform Setup.

Operation

BIOS Setup has the following features:

- The server board BIOS will only be available in English.

- BIOS Setup is functional via console redirection over various terminal emulation standards. This may limit some functionality for compatibility, e.g., usage of colors, some keys or key sequences, or support of pointing devices.

Setup Page Layout

The setup page layout is sectioned into functional areas. Each occupies a specific area of the screen and has dedicated functionality. The following table lists and describes each functional area.

Table 1: BIOS Setup Page Layout

FUNCTIONAL AREA	DESCRIPTION
Title Bar	The title bar is located at the top of the screen and displays the title of the form (page) the user is currently viewing. It may also display navigational information.
Setup Item List	The Setup Item List is a set of controllable and informational items. Each item in the list occupies the left column of the screen. A Setup Item may also open a new window with more options for that functionality on the board.
Item Specific Help Area	The Item Specific Help area is located on the right side of the screen and contains help text for the highlighted Setup Item. Help information may include the meaning and usage of the item, allowable values, effects of the options, etc.
Keyboard Command Bar	The Keyboard Command Bar is located at the bottom right of the screen and continuously displays help for keyboard special keys and navigation keys.

Entering BIOS Setup

BIOS Setup is started by pressing <**DEL**> or <**F2**> during boot time when the logo is displayed.

When Quiet Boot is disabled, the message "press <**DEL**> or <**F2**> to enter setup" will be displayed on the diagnostics screen.

Keyboard Commands

The bottom right portion of the Setup screen provides a list of commands that are used to navigate through the Setup utility. These commands are displayed at all times.

Each Setup menu page contains a number of features. Except those used for informative purposes, each feature is associated with a value field. This field contains user-selectable parameters. Depending on the security option chosen and in effect by the password, a menu feature's value may or may not be changeable. If a value is non-changeable, the feature's value field is inaccessible and displays as "grayed out."

Table 2: Keyboard Commands

KEY	OPTION	DESCRIPTION
<**Enter**>	Select and Execute Command	The <**Enter**> key is used to activate sub-menus when the selected feature is a sub-menu, or to display a pick list if a selected option has a value field, or to select a sub-field for multi-valued features like time and date. If a pick list is displayed, the <**Enter**> key will select the currently highlighted item, undo the pick list, and return the focus to the parent menu.
<**Esc**>	Exit	The <**Esc**> key provides a mechanism for backing out of any field. When the <**Esc**> key is pressed while editing any field or selecting features of a menu, the parent menu is re-entered. When the <**Esc**> key is pressed in any sub-menu, the parent menu is re-entered. When the <**Esc**> key is pressed in any major menu, the exit confirmation window is displayed and the user is asked whether changes can be discarded. If *No* is selected and the <**Enter**> key is pressed, or if the <**Esc**> key is pressed, the user is returned to where he/she was before <**Esc**> was pressed, without affecting any existing any settings. If *Yes* is selected and the <**Enter**> key is pressed, setup is exited and the BIOS returns to the main System Options Menu screen.
↑	Select Item	The up arrow is used to select the previous value in a pick list, or the previous option in a menu item's option list. The selected item must then be activated by pressing the <**Enter**> key.
↓	Select Item	The down arrow is used to select the next value in a menu item's option list, or a value field's pick list. The selected item must then be activated by pressing the <**Enter**> key.
←—→	Select Screen	The left and right arrow keys are used to move between the major menu pages. The keys have no affect if a sub-menu or pick list is displayed.
<**Tab**>	Select Field	The <**Tab**> key is used to move between fields. For example, <**Tab**> can be used to move from hours to minutes in the time item in the main menu.

Table 2: Keyboard Commands (Continued)

KEY	OPTION	DESCRIPTION
-	Change Value	The minus key on the keypad is used to change the value of the current item to the previous value. This key scrolls through the values in the associated pick list without displaying the full list.
+	Change Value	The plus key on the keypad is used to change the value of the current menu item to the next value. This key scrolls through the values in the associated pick list without displaying the full list. On 106-key Japanese keyboards, the plus key has a different scan code than the plus key on the other keyboard, but will have the same effect.
k	Scroll Bar	The k key is used to scroll up in the item specific help area. The scroll bar keys have no affect if help string was not longer than the maximum allocated space in item specific help area.
m	Scroll Bar	The m key is used to scroll down in the item specific help area. The scroll bar keys have no affect if help string was not longer than the maximum allocated space in item specific help area.
<**F8**>	Previous Values	Pressing <**F8**> causes the following to appear: Load Previous Values? Yes No If Yes is highlighted and <**Enter**> is pressed, all Setup fields are set to their previous values. If No is highlighted and <**Enter**> is pressed, or if the <**Esc**> key is pressed, the user is returned to where they were before <**F8**> was pressed without affecting any existing field values.
<**F9**>	Setup Defaults	Pressing <**F9**> causes the following to appear: Load Optimized Defaults? Yes No If Yes is highlighted and <**Enter**> is pressed, all Setup fields are set to their optimized values. If No is highlighted and <**Enter**> is pressed, or if the <**Esc**> key is pressed, the user is returned to where they were before <**F9**> was pressed without affecting any existing field values.
<**F10**>	Save and Reset	Pressing <**F10**> causes the following message to appear: Save configuration and reset? Yes No If Yes is highlighted and <**Enter**> is pressed, all changes are saved and system is reset. If No is highlighted and <**Enter**> is pressed, or the <**Esc**> key is pressed, the user is returned to where they were before <**F10**> was pressed without affecting any existing values.

Menu Selection Bar

The Menu Selection Bar is located at the top of the BIOS Setup Utility screen. It displays the major menu selections available to the user. By using the left and right arrow keys, the user can select the menus listed here.

Server Platform Setup Utility Screens

The sections below describe the screens available for the configuration of a server platform. In these sections, tables are used to describe the contents of each screen. These tables follow the following guidelines:

- The text and values in the Setup Item, Options, and Help columns in the tables are displayed on the BIOS Setup screens.

- **Bold text** in the Options column of the tables indicates default values. These values are not displayed in bold on the setup screen. The bold text in this document is to serve as a reference point.

- The Comments column provides additional information where it may be helpful. This information does not appear in the BIOS Setup screens.

- Information in the screen shots that is enclosed in brackets (< >) indicates text that varies, depending on the option(s) installed. For example <Current Date> is replaced by the actual current date.

- Information that is enclosed in square brackets ([ ]) in the tables indicates areas where the user needs to type in text instead of selecting from a provided option.

- Whenever information is changed (except Date and Time) the systems requires a save and reboot to take place. Pressing <**ESC**> will discard the changes and boot the system according to the boot order set from the last boot.

Main Screen

The Main screen is the screen that is first displayed when BIOS Setup is entered, unless an error has occurred.
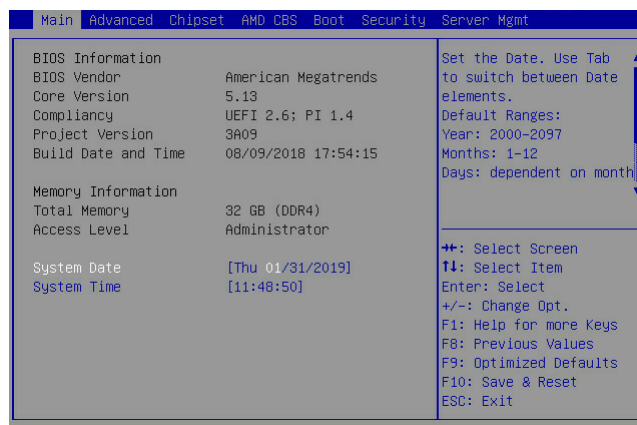
Figure 3-1.   Main Screen

Table 3: Main Screen Description

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
BIOS Vendor			Information only. Displays the BIOS Vendor.
Core Version			Information only. Displays the AMI BIOS Core version.
Compliancy			Information only. Displays the BIOS compliancy.
Project Version			Information only. Displays the Project version.
Build Date and Time			Information only. Displays the BIOS build date.
Total Memory			Information only. Displays the Total System Memory Size.
Access Level			Information only. Displays the Access Level.
System Date	[Day of week MM/DD/YYYY]	Set the Date. Use Tab to switch between date elements.	
System Time	[HH:MM:SS]	Set the Time. Use Tab to switch between time elements.	

Advanced Screen

The Advanced screen provides an access point to configure several options. On this screen, you can select the option that is to be configured. Configurations are performed on the selected screen, not directly on the Advanced screen.

Note:

Some additional pages may be created in Advanced Screen by some additional EFI Firmware. Since it is not created by BIOS, this spec will not define it.

To access this screen from the Main screen, press the right arrow until the Advanced screen is chosen.
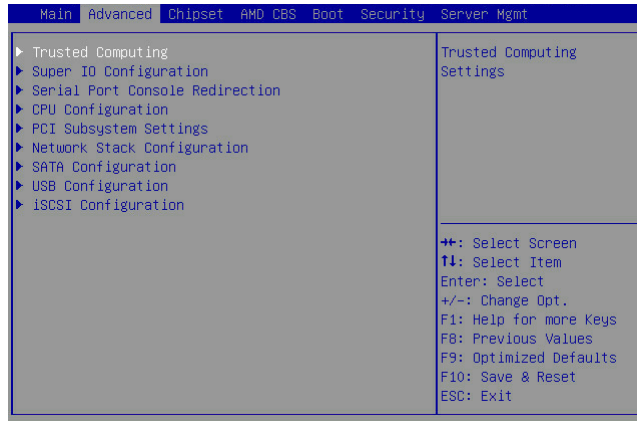
Figure 3-2.   Advanced Screen

Table 4: Advanced Screen Description

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
Trusted Computing		Trusted Computing Settings	
Super IO Configuration		System Super IO Chip Parameters.	
Serial Port Console Redirection		Serial Port Console Redirection	
CPU Configuration		CPU Configuration	
PCI Subsystem Settings		PCI, PCI-X and PCI Express Settings	
Network Stack Configuration		Network Stack Settings	
SATA Configuration		SATA Devices Configuration set.	
USB Configuration		USB Configuration Parameters	
iSCSI Configuration		Configure the iSCSI parameters.	

Chipset Screen

The Chipset screen provides an access point to configure several options. On this screen, the user selects the option that is to be configured. Configurations are performed on the selected screen, not directly on the Chipset screen.

To access this screen from the Main screen, press the right arrow until the Chipset screen is chosen.
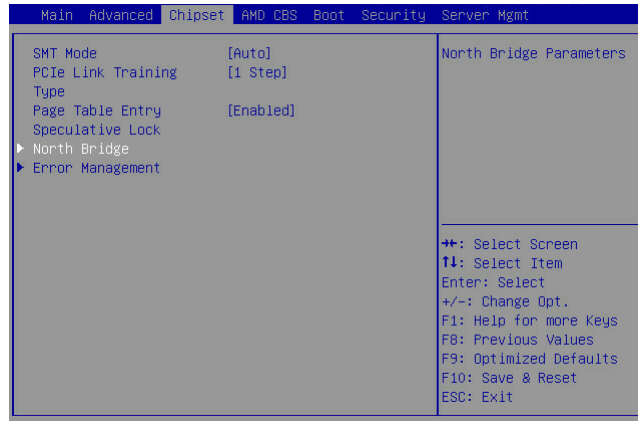
Figure 3-3.   Chipset Screen

Table 5: Chipset Screen Description

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
SMT Mode	[off] [**Auto**]	Simultaneous multithreading. OFF=1T single-thread Auto=2T two-thread if capable.	
PCIe Link Training	[**1 Step**] [2 Step]	PCIe Link training in 1 or 2 steps	
North Bridge		North Bridge Parameters	
Error Management		Error Management settings	

AMD CBS Screen

The AMD CBS screen provides an access point to configure several options. On this screen, the user selects the option that is to be configured. Configurations are performed on the selected screen, not directly on the AMD CBS screen.

To access this screen from the Main screen, press the right arrow until the AMD CBS screen is chosen.
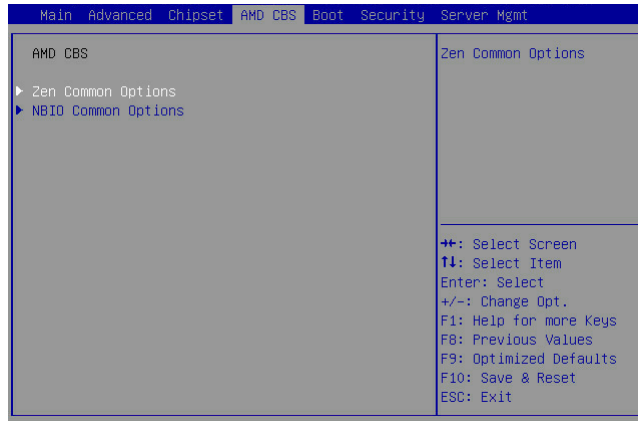
Figure 3-4.   AMD CBS Screen

Table 6: AMD CBS Screen Description

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
Zen Common Options		Zen Common Options	
NBIO Common Options		NBIO Common Options	

Boot Options Screen

The Boot Options screen displays any bootable media encountered during POST, and allows the user to configure desired boot device.

If no boot devices are available – for example, both onboard LAN are disabled and no bootable device connected when Boot Mode is set to Legacy – the system will auto boot into BIOS setup menu.

To access this screen from the Main screen, select Boot Options.
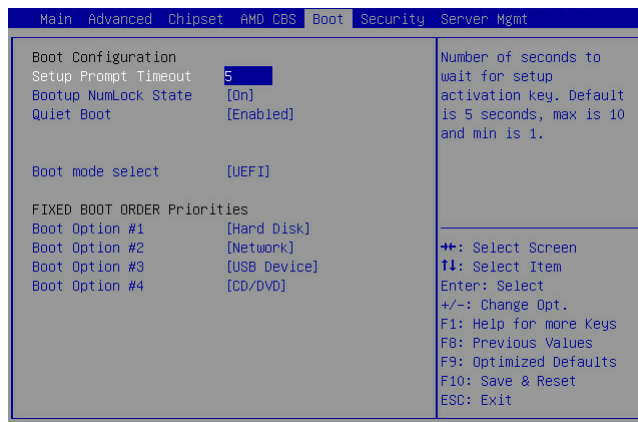
Figure 3-5.   Boot Options Screen

Table 7: Boot Options Screen Description

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
Setup Prompt Timeout	[5]	Number of seconds to wait for setup activation key. Default is 5 seconds, max is 10 and min is 1.	
Bootup Num-Lock State	[**On**] [Off]	Select the keyboard NumLock state	
Quiet Boot	[Disabled] [**Enabled**]	Enables or disables Quiet Boot option	
Boot mode select	[LEGACY] [**UEFI**]	Select boot mode LEGACY/UEFI	This item decides what devices (Legacy or UEFI) BIOS should try to boot when let the system auto boot up without manually select boot device.
Boot Option #1	[<Device String 1>] [<Device String 2>] … [Disabled]	Sets the system boot order	
Boot Option #2	[<Device String 1>] [<Device String 2>] … [Disabled]	Sets the system boot order	
Boot Option #3	[<Device String 1>] [<Device String 2>] … [Disabled]	Sets the system boot order	
Boot Option #4	[<Device String 1>] [<Device String 2>] … [Disabled]	Sets the system boot order	

Security Screen

The Security screen provides fields to enable and set the user and administrative password and to lockout the front panel buttons so they cannot be used.

To access this screen from the Main screen, select the Security option.
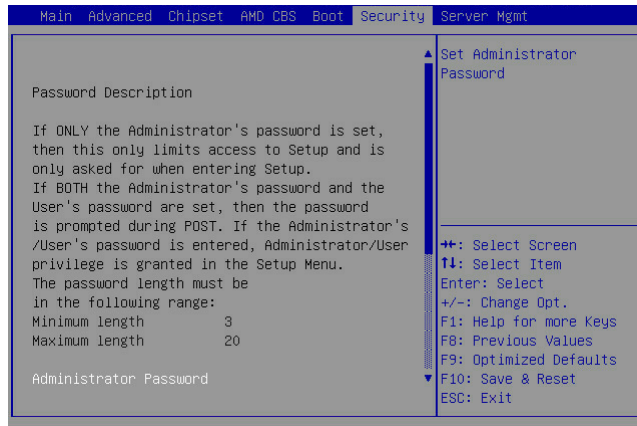
Figure 3-6.   Security Screen

Table 8: Security Screen Description

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
Administrator Password		Set Setup Administrator Password	
User Password		Set User Password	
Secure Boot menu		Customizable Secure Boot settings	

Server Management Screen

The Server Management screen displays information of the BMC, and allows the user to configure desired settings.

To access this screen from the Main screen, select Server Mgmt Options.
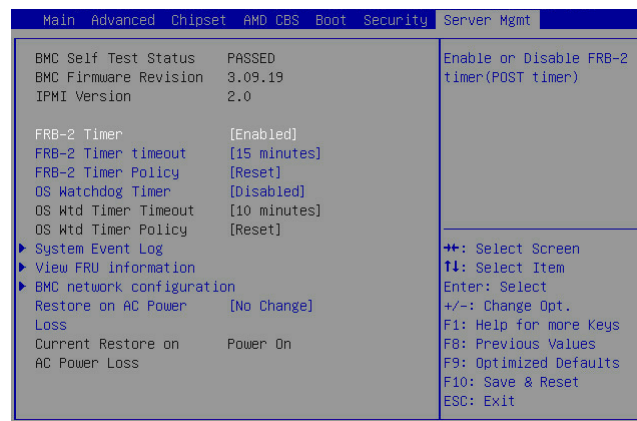
Figure 3-7.   Server Management Screen

Table 9: Server Management Screen Description

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
BMC Self Test Status			Information only. Displays the BMC Self Test Status.
BMC firmware version			Information only. Displays the BMC firmware version.
IPMI version			Information only. Displays the IPMI version.
FRB-2 Timer	[**Enabled**] [Disabled]	Enable or Disable FRB-2 timer (POST timer)	
FRB-2 Timer timeout	[3 minutes] [4 minutes] [5 minutes] [6 minutes] [**15 minutes**] [20 minutes]	Enter value Between 3 to 20 min for FRB-2 Timer Expiration value	It will be grayout if "FRB-2 Timer" disabled.
FRB-2 Timer Policy	[Do Nothing] [**Reset**] [Power Down] [Power Cycle]	Configure how the system should respond if the FRB-2 Timer expires. Not available if FRB-2 Timer is disabled.	It will be grayout if "FRB-2 Timer" disabled.
OS Watchdog Timer	[Enabled] [**Disabled**]	If enabled, it determines the success of OS load by following the Watchdog Timer policy to start a BIOS timer (only can be shut off by Management SW) after the OS loads.	
OS Wtd Timer Timeout	[5 minutes] [**10 minutes**] [15 minutes] [20 minutes]	Configure the length of the O/S Boot Watchdog Timer. Not available if O/S Boot Watchdog Timer is disabled.	It will be grayout if "OS Watchdog Timer" disabled.
OS Wtd Timer Policy	[Do Nothing] [**Reset**] [Power Down] [Power Cycle]	Configure how the system should respond if the OS Boot Watchdog Timer expires. Not available if OS Boot Watchdog Timer is disabled.	It will be grayout if "OS Watchdog Timer" disabled.
System Event Log		Press <**Enter**> to change the SEL event log configuration.	
View FRU information		Press <**Enter**> to view FRU information.	
BMC network configuration		Configure BMC network parameters	
Restore on AC Power Loss	[Power off] [Power On] [Last State] [**No Change**]	System action to take on AC power loss.	

Table 9: Server Management Screen Description (Continued)

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
Current Restore on AC Power Loss			Current system action to take on AC power loss.

Exit Screen

The Exit screen allows the user to choose to save or discard the configuration changes made on the other screens. It also provides a method to restore the server to the factory defaults or to save or restore a set of user defined default values. If Restore Defaults is selected, the default settings, noted in bold in the tables in this chapter, will be applied. If Restore User Default Values is selected, the system is restored to the default values that the user saved earlier, instead of being restored to the factory defaults. BIOS only support at most six USB boot devices.
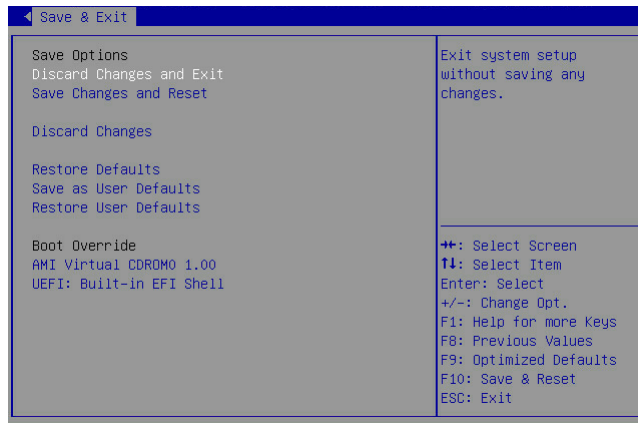
Figure 3-8.   Exit Screen

Table 10: Exit Screen Description

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
Discard Changes and Exit		Exit system setup without saving any changes.	
Save Changes and Reset		Reset the system after saving the changes.	
Discard Changes		Discards changes done so far to any of the setup options.	
Restore Defaults		Restore/Load Default values for all the setup options.	
Save as User Defaults		Save the changes done so far as User Defaults.	
Restore User Defaults		Restore the User Defaults to all the setup options.	

Table 10: Exit Screen Description (Continued)

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
[<Device String 1>]			Boot with Device <Device String 1>.
[<Device String 2>]			Boot with Device <Device String 2>.
[<Device String 3>]			Boot with Device <Device String 3>.
[<Device String 4>]			Boot with Device <Device String 4>.
[<Device String 5>]			Boot with Device <Device String 5>.
[<Device String 6>]			Boot with Device <Device String 6>.

Loading BIOS Defaults

Different mechanisms exist for resetting the system configuration to the default values. When a request to reset the system configuration is detected, the BIOS loads the default system configuration values during the next POST. The request to reset the system to the defaults can be sent in the following ways:

- A request to reset the system configuration can be generated by pressing <**F9**> from within the BIOS Setup utility
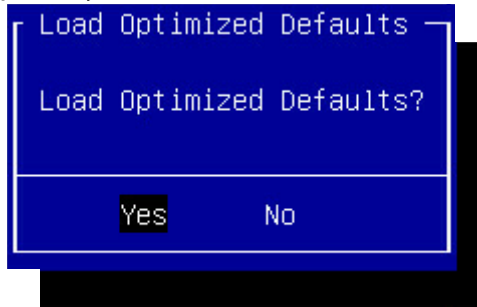
- Load BIOS defaults by jumper as follows:

  a. Power down the system.

    b. Move CMOS clear jumper from pins 1-2 to pins 2-3 for a few seconds.
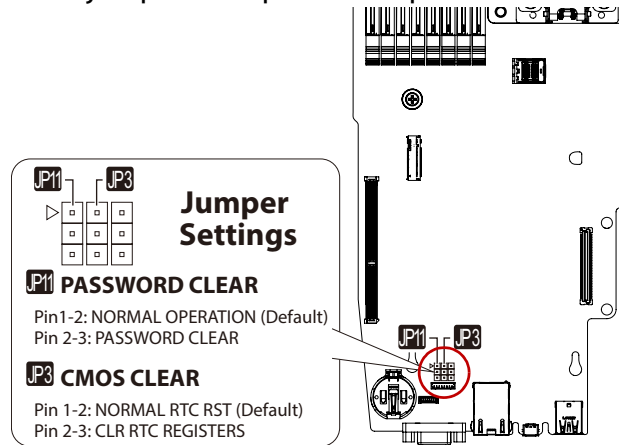
    c. Move CMOS clear jumper back to pins 1-2.

    d. Power on the system.

    e. Check BIOS defaults are loaded.

Note:

Complementary Metal-Oxide-Semiconductor (CMOS) is a technology for constructing integrated circuits. CMOS technology is used in microprocessors, microcontrollers, static RAM, and other digital logic ciruits. CMOS Clear Jumper would provide "Clear the current setting stored in the NVRAM and restore BIOS setting to Factory Default."

3.2 BIOS Update Utility

The flash ROM contains system initialization routines, the BIOS Setup Utility, and runtime support routines. The exact layout is subject to change, as determined by BIOS. The flash ROM also contains initialization code in compressed form for onboard peripherals, like SCSI, NIC and video controllers. The complete ROM is visible, starting at physical address 4 GB minus the size of the flash ROM device.

A 16-KB parameter block in the flash ROM is dedicated to storing configuration data that controls the system configuration (ESCD). Application software must use standard APIs to access these areas; application software cannot access the data directly.

BIOS Update Utility

Server platforms support EFI shell-based, Windows-based and Linux-based firmware update utilities. This utility loads a fresh copy of the BIOS into the flash ROM.

The BIOS update may affect the following items:

- The system BIOS setup utility and strings
- Onboard video BIOS and other option ROMS for the devices embedded on the server board
- Memory reference code

BIOS Setting Utility

Use AMISCE to import/export BIOS setting in OS:

1. Export BIOS setting and generate script file:

   ./SCELNX_64 /o /s NVRAM.txt

2. Import BIOS setting with script file:

   ./SCELNX_64 /i /s NVRAM.txt

Note:

> After importing the BIOS settings, it would need to do system full reset (DC cycle) to let the new BIOS settings enabled.

Note:

> AMI Setup Control Environment (AMISCE) is a command line tool which provides an easy way to update NVRAM variables, extract variables directly from the BIOS, change settings using either a text editor or a setup program and update the BIOS. AMISCE produces a script file that lists all setup questions on the system being modified by AMISCE. The user can then modify the script fle and use it as input to change the current NVRAM setup variables. See ami.com for more information.

BIOS Revision

The BIOS revision is used to identify the BIOS image and BIOS phase.

Clear CMOS

The following steps will load the BIOS defaults by jumper:

1. Power down the system.

2. Move CMOS clear jumper from pins 1-2 to pins 2-3 for a few seconds.
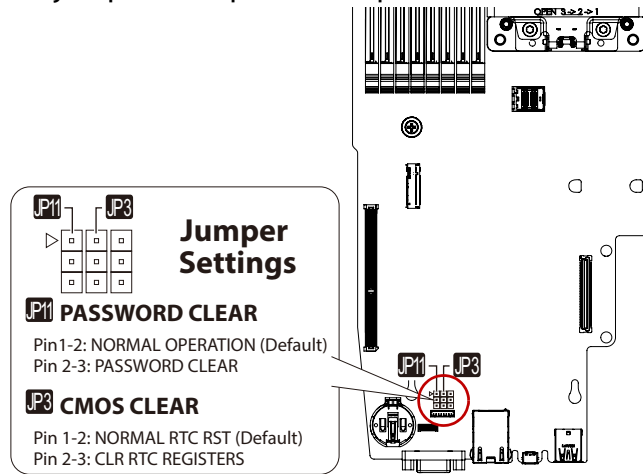
3. Move CMOS clear jumper back to pins 1-2.

4. System automatically powers on.

5. Check BIOS defaults are loaded.

Clear Password

To clear password by jumper, use the following steps:

1. Power down the system.

2. Move password clear jumper from pins 1-2 to pins 2-3.
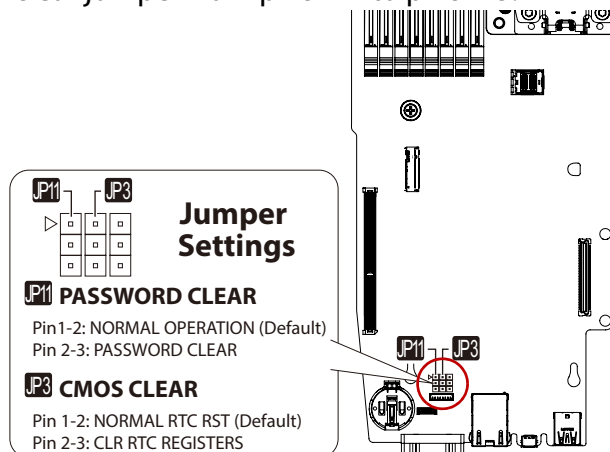
3. Power on the system.

4. Make sure password is cleared.

5. Power down the system.

6. Move password clear jumper from pins 2-3 back to pins 1-2.

7. Power on the system.

8. Set new password.

Note:

Complementary Metal-Oxide-Semiconductor (CMOS) is a technology for constructing integrated circuits. CMOS technology is used in microprocessors, micro-controllers, static RAM, and other digital logic ciruits. CMOS Clear Jumper would provide "Clear the current setting stored in the NVRAM and restore BIOS setting to Factory Default."

Firmware Update Instructions

Note:

In-band means user performs FW update on the system which has installed DOS/Windows/Linux operating system. Using the in-band update, the firmware package is readable in the platform system interface so that the user can execute update script to perform firmware update.

Note:

Out-of-band (OOB) means the FW update is perform remotely, User execute the FW update which the FW image and command will be delivered to BMC through network interface. BMC receive the command and image to perform firmware update.

Out-of-band update (via YAFUFLASH tool)

- Make sure the Server is power off and keep AC power source connected.

- Connect one end of network cable to the Server BMC NIC port and another end to remote client or server.

- Unzip the release package to a folder in the remote client or server

- Remotely update the BIOS firmware through BMC IP Address (Default static IP address = 192.168.0.120).

In Linux environment:

- Launch Terminal, change directory to the folder with release package located.

- Enter command "./ubios_oob.sh <BMC IP> XXX.bin"

In Windows environment:

- Launch Command Prompt, change directory to the folder with release package located.

- Enter command "ubios_oob.bat <BMC IP> XXX.bin"

Out-of-band update (via BMC webUI)

- Make sure the server is power off and keep AC power source connected.

- Connect one end of network cable to the Server BMC NIC port and another end to remote client or server.

- Login BMC webUI via http protocol, enter 192.168.0.120 in IE (Internet explorer)/ chrome/firefox. (default: admin/cmb9.admin; 192.168.0.120 or check with your administrator for accessing)

- Select "**Maintenance**" > "**BIOS Update**" > "**Choose**" option
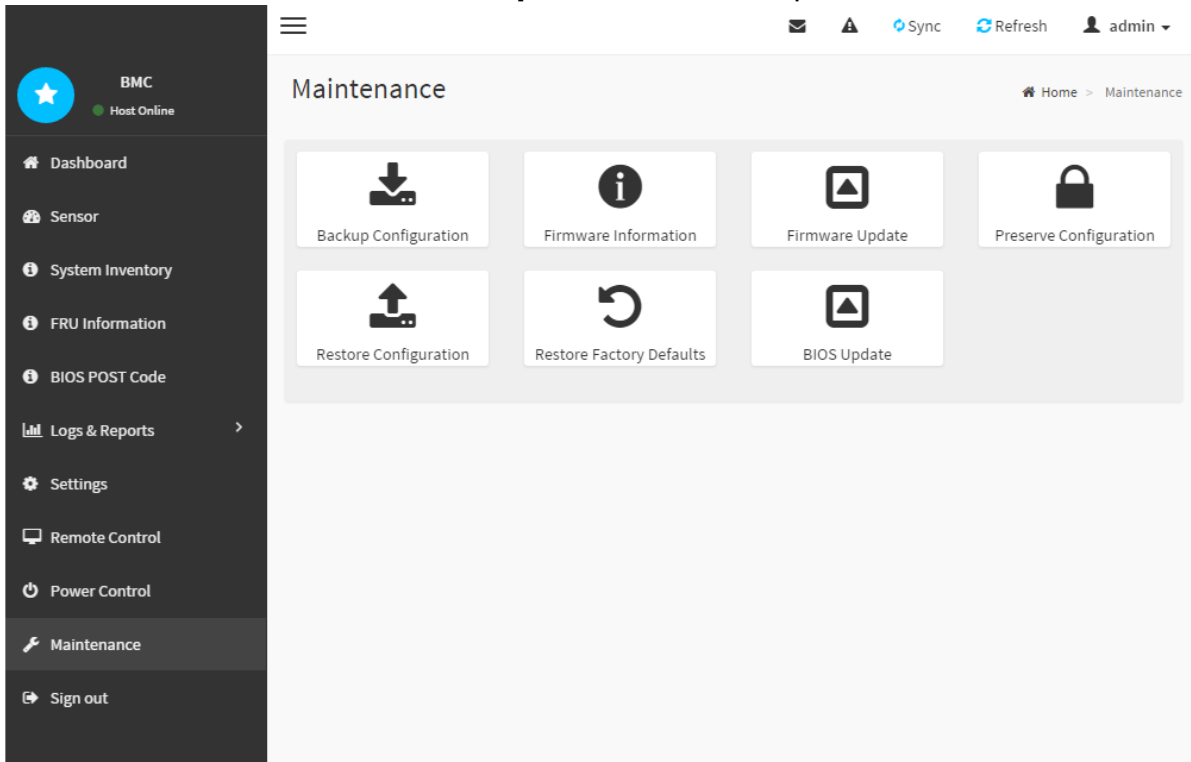
- Browse BIOS XXX.BIN file to upload and Click the Preserve BIOS NVRAM Region and Press "**Flash selected section**" option.
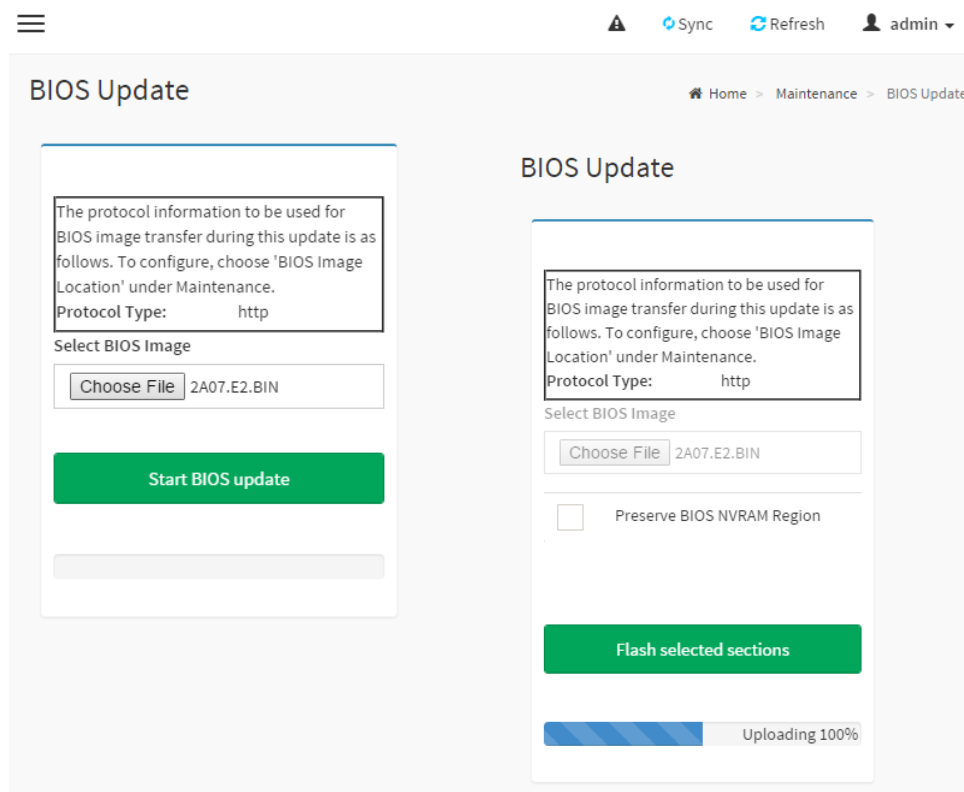
- After a period of time, you will find BIOS firmware upgrade complete with 100% done

In-band update (via AFUFLASH tool)

For EFI-Shell environment

Follow the steps shown as below to update BIOS FW:

- Unzip the release package to the USB Flash Drive.

- Power on the system and press hotkey <**F11**> and select to boot into Built-in EFI Shell.
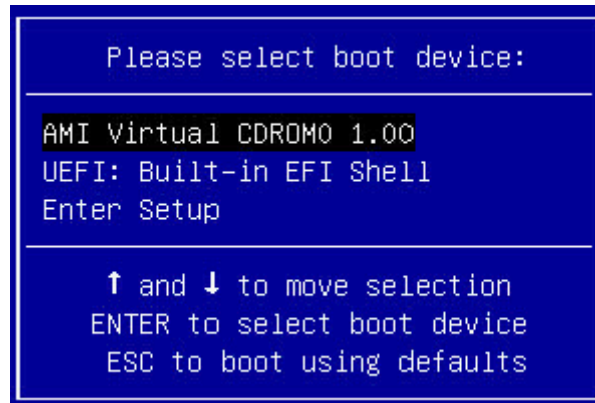
- Move to the USB file system for example **FS0:** and **CD** the BIOS release package folder.

- Execute nsh file "**BIOS_efi64.nsh**" to update BIOS.

- After the firmware update finished, perform a DC cycle, the new BIOS FW runs.

- Then, please enter setup, press <F9> to load default and save before any test run.

For x64 Windows environment

Follow the steps shown as below to update BIOS FW:

- Power on the system and boot into Windows OS.

- Unzip the release package to the same folder in the storage.

- Launch Command Prompt in the release package folder, or change to the folder with release package located.

- Execute batch file "**BIOS_win64.cmd**" to update BIOS.

- After the update finished, perform a DC cycle, the new BIOS FW runs.

- Then, please enter setup, press <F9> to load default and save before any test run.

For x64 Linux environment

Follow the steps shown as below to update both BIOS and ME FW:

- Power on the system and boot into Linux OS.

- Unzip the release package to the same folder in the storage.

- Open Terminal in the release package folder, or change to the folder with release package located.
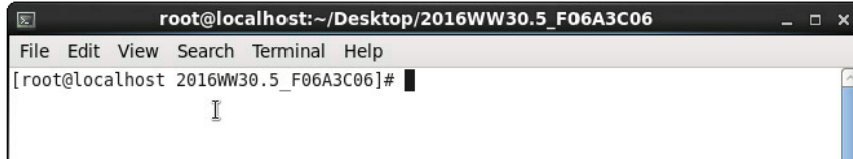
- Execute batch file "**BIOS_lnx64.sh**" to update BIOS.
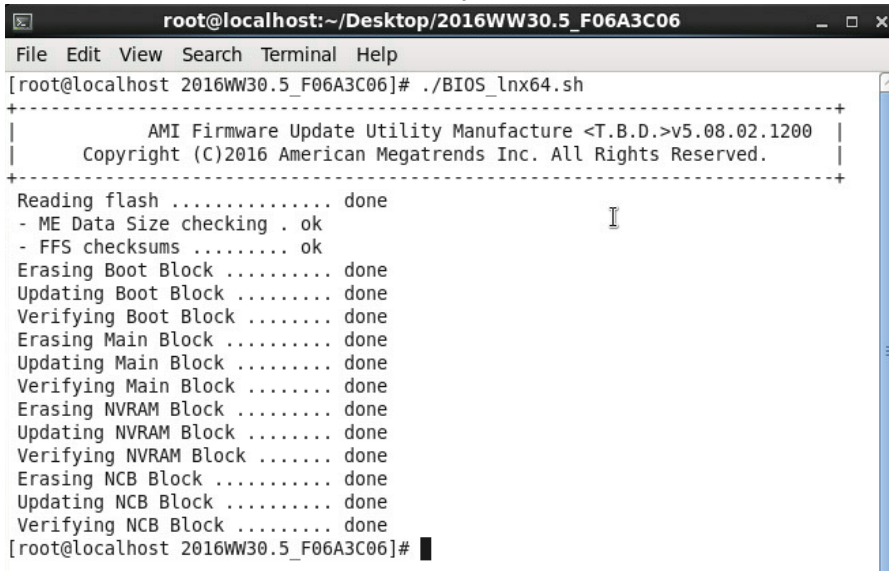
- After the update finished, perform a DC cycle, the new BIOS FW runs.

- Then, please enter setup, press <F9> to load default and save before any test run.

3.3 Server Management

The BIOS supports many standard-based server management features and several propri-
etary features. The Intelligent Platform Management Interface (IPMI) is an industry stan-
dard and defines standardized, abstracted interfaces to platform management hardware.
The BIOS implements many proprietary features that are allowed by the IPMI specification,
but these features are outside the scope of the IPMI specification. This section describes
the implementation of the standard and proprietary features.

Console Redirection

The BIOS supports redirection of both video and keyboard via a serial link (serial port).
When console redirection is enabled, the local, or host server, keyboard input and video
output are passed both to the local keyboard and video connections, and to the remote
console through the serial link. Keyboard inputs from both sources are considered valid
and video is displayed to both outputs.

As an option, the system can be operated without a host keyboard or monitor attached to
the system and run entirely via the remote console. Utilities that can be executed remotely
include BIOS Setup.

Serial Configuration Settings

The BIOS does not require that the splash logo be turned off for console redirection to
function. The BIOS supports multiple consoles, some of which are in graphics mode and
some in text mode. The graphics consoles can display the logo and the text consoles
receive the redirected text.

Keystroke Mapping

During console redirection, the remote terminal sends keystrokes to the local server. The
remote terminal can be a dumb terminal with a direct connection and running a commu-
nication program. The keystroke mapping follows VT-UTF8 format with the following
extensions.

Table 3.1: Keystroke Mappings

KEY	ANSI ESCAPE SEQUENCE	WINDOWS PLATFORM DESIGN NOTE
F1	<ESC>OP	<ESC>1
F2	<ESC>OQ	<ESC>2
F3	<ESC>OR	<ESC>3
F4	<ESC>OS	<ESC>4
F5		<ESC>5
F6		<ESC>6
F7		<ESC>7

Table 3.1: Keystroke Mappings (Continued)

KEY	ANSI ESCAPE SEQUENCE	WINDOWS PLATFORM DESIGN NOTE
F8		<ESC>8
F9		<ESC>9
F10		<ESC>0
F11		<ESC>!
F12		<ESC>@
Home	<ESC>[H	<ESC>h
End	<ESC>[K	<ESC>k
Ins		<ESC>+
Del		<ESC>-
Page Up		<ESC>?
Page Down		<ESC>/
Reset		<ESC>R<ESC>r<ESC>R

Standalone <Esc> Key for Headless Operation

The Microsoft Headless Design Guidelines describes a specific implementation for the
<**Esc**> key as a single standalone keystroke:

To complete an escape sequence, the timeout must be two seconds for entering addi-
tional characters following an escape.

- <**Esc**> followed by a two-second pause must be interpreted as a single escape.

- <**Esc**> followed within two seconds by one or more characters that do not form a
  sequence described in this specification must be interpreted as <**Esc**> plus the char-
  acter or characters, not as an escape sequence.

The escape sequence in the following table is an input sequence. This means it is sent to
the BIOS from the remote terminal.

Limitations

- BIOS Console redirection terminates after an operating system has being loaded.
  The operating system is responsible for continuing console redirection after that.

- BIOS console redirection is a text console. Graphical data, such as a logo, are not
  redirected.

Interface to Server Management (Optional)

If the BIOS determines that console redirection is enabled, it will read the current baud
rate and pass this value to the appropriate management controller via the Intelligent Plat-
form Management Bus (IPMB).

Network BIOS Support

PXE Boot

The PXE implementation on this platform is compliant with UEFI Specification 2.5, Section 21 Network Protocols - SNP, PXE and BIS. To utilize this, the user must load EFI Simple Network Protocol driver and the UNDI driver specific for the network interface card being used. The UNDI driver should be included with the network interface card. The Simple Network Protocol driver can be obtained from http://developer.intel.com/technology/framework.

The BIOS supports legacy PXE option ROMs in legacy mode and includes the necessary PXE ROMs in the BIOS image for the onboard controllers. The legacy PXE ROM is required to boot a non-EFI operating system over the network.

iSCSI Boot

The BIOS supports Internet Small Computer System Interface, an Internet Protocol (IP)-based storage networking standard for linking data storage facilities. By carrying SCSI commands over IP networks, iSCSI is used to facilitate data transfers over intranets and to manage storage over long distances.

iSCSI can be used to transmit data over local area networks (LANs), wide area networks (WANs), or the internet and can enable location-independent data storage and retrieval. The protocol allows clients (initiators) to send SCSI commands to SCSI storage devices (targets) on remote servers.

HTTP Boot

The HTTP Boot implementation on this platform is compliant with UEFI Specification 2.5, Section 23.7 HTTP Boot. To utilize this, the user must select the right LAN device from BIOS setup menu (refer to Figure 2-61) because HTTP boot has different "Architectural Types" to distinguish from PXE. With this Architectural Types, this LAN device can send the right DHCP options to DHCP server then server will respond with DHCPOFFER that includes the boot file HTTP URI for the requested processor architecture. After resolving URI server name from DNS, the Network Boot Program (NBP) will be downloaded from HTTP server via IPV6 or IPV4 HTTP protocol.HTTP boot addresses PXE issues: HTTPs addresses security,

TCP reliability and HTTP load balancing. Moreover, unlike PXE only can get NBP from DHCP server, HTTP boot has the ability to get NBP from remote HTTP server as long as right URL.


```
/----------------------------------------------+
|                                              |
|   Boot Option #1              [UEFI: IPv6 - Mellanox |
|                               Network Adapter - NIC] |
|                                              |
|   Boot Option #2              [UEFI: IPv6 - Mellanox |
|                               Network Adapter -NIC]  |
|                                              |
|   Boot Option #3              [UEFI: HTTPBOOT -      |
|                               Mellanox Network       |
|                               Adapter - NIC]         |
|                                              |
```
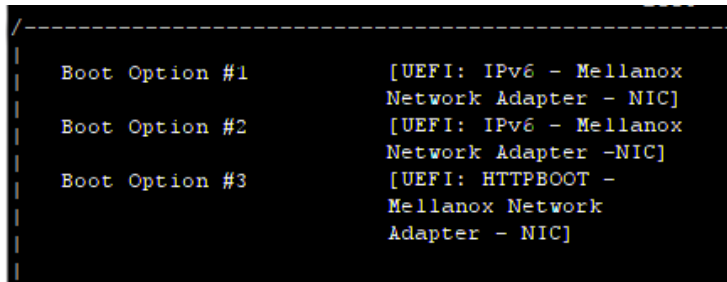
Figure 3-9.   HTTP BOOT Device in BIOS Setup Menu

Checkpoints

A checkpoint is either a byte or word value output to Debug port. The BIOS outputs checkpoints throughout bootblock and Power-On Self Test (POST) to indicate the task the system is currently executing. Checkpoints are very useful in aiding software developers or technicians in debugging problems that occur during the pre-boot process.

POST LED0~3   **POST LED4~7**
Green On/Off   **Amber On/Off**
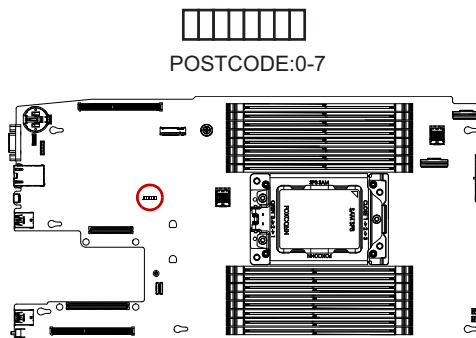
POSTCODE:0-7

Checkpoints can be defined as follow:

- Standard Checkpoint
- ACPI/ASL Checkpoint
- OEM-Reserved Checkpoint
- MRC POST Code Checkpoints

Standard Checkpoint

The Standard checkpoints are the largest set of checkpoints during the BIOS pre-boot process. The following tables describe the type of checkpoints that may occur during the POST portion of the BIOS:

Table 3.2: Checkpoint Range Description

STATUS CODE RANGE	DESCRIPTION
0x01 – 0x0B	SEC execution
0x0C – 0x0F	SEC errors
0x10 – 0x2F	PEI execution up to and including memory detection
0x30 – 0x4F	PEI execution after memory detection
0x50 – 0x5F	PEI errors
0x60 – 0x8F	DXE execution up to BDS
0x90 – 0xCF	BDS execution
0xD0 – 0xDF	DXE errors
0xE0 – 0xE8	S3 Resume (PEI)
0xE9 – 0xEF	S3 Resume errors (PEI)

SEC Phase

Table 3.3: SEC Phase

STATUS CODE	DESCRIPTION
0x00	Not used
Progress Codes	
0x01	Power on. Reset type detection (soft/hard).
0x02	AP initialization before microcode loading
0x03	North Bridge initialization before microcode loading
0x04	South Bridge initialization before microcode loading
0x05	OEM initialization before microcode loading
0x06	Microcode loading
0x07	AP initialization after microcode loading
0x08	North Bridge initialization after microcode loading
0x09	South Bridge initialization after microcode loading
0x0A	OEM initialization after microcode loading
0x0B	Cache initialization
SEC Error Codes	
0x0C – 0x0D	Reserved for future AMI SEC error codes
0x0E	Microcode not found
0x0F	Microcode not loaded

PEI Phase

Table 3.4: PEI Phase

STATUS CODE	DESCRIPTION
Progress Codes	
0x10	PEI Core is started
0x11	Pre-memory CPU initialization is started
0x12	Pre-memory CPU initialization (CPU module specific)
0x13	Pre-memory CPU initialization (CPU module specific)
0x14	Pre-memory CPU initialization (CPU module specific)
0x15	Pre-memory North Bridge initialization is started
0x16	Pre-Memory North Bridge initialization (North Bridge module specific)
0x17	Pre-Memory North Bridge initialization (North Bridge module specific)
0x18	Pre-Memory North Bridge initialization (North Bridge module specific)
0x19	Pre-memory South Bridge initialization is started
0x1A	Pre-memory South Bridge initialization (South Bridge module specific)
0x1B	Pre-memory South Bridge initialization (South Bridge module specific)
0x1C	Pre-memory South Bridge initialization (South Bridge module specific)
0x1D – 0x2A	OEM pre-memory initialization codes
0x2B	Memory initialization. Serial Presence Detect (SPD) data reading
0x2C	Memory initialization. Memory presence detection
0x2D	Memory initialization. Programming memory timing information
0x2E	Memory initialization. Configuring memory
0x2F	Memory initialization (other).
0x30	Reserved for ASL (see ASL Status Codes section below)
0x31	Memory Installed
0x32	CPU post-memory initialization is started
0x33	CPU post-memory initialization. Cache initialization
0x34	CPU post-memory initialization. Application Processor(s) (AP) initialization
0x35	CPU post-mem ory initialization. Boot Strap Processor (BSP) selection
0x36	CPU post-memory initialization. System Management Mode (SMM) initialization
0x37	Post-Memory North Bridge initialization is started
0x38	Post-Memory North Bridge initialization (North Bridge module specific)
0x39	Post-Memory North Bridge initialization (North Bridge module specific)
0x3A	Post-Memory North Bridge initialization (North Bridge module specific)
0x3B	Post-Memory South Bridge initialization is started
0x3C	Post-Memory South Bridge initialization (South Bridge module specific)
0x3D	Post-Memory South Bridge initialization (South Bridge module specific)
0x3E	Post-Memory South Bridge initialization (South Bridge module specific)

Table 3.4: PEI Phase (Continued)

Status Code	Description
0x3F – 0x4E	OEM post memory initialization codes
0x4F	DXE IPL is started
PEI Error Codes	
0x50	Memory initialization error. Invalid memory type or incompatible memory speed
0x51	Memory initialization error. SPD reading has failed
0x52	Memory initialization error. Invalid memory size or qmemory modules do not match.
0x53	Memory initialization error. No usable memory detected
0x54	Unspecified memory initialization error.
0x55	Memory not installed
0x56	Invalid CPU type or Speed
0x57	CPU mismatch
0x58	CPU self test failed or possible CPU cache error
0x59	CPU micro-code is not found or micro-code update is failed
0x5A	Internal CPU error
0x5B	reset PPI is not available
0x5C	PEI phase BMC self-test failures
0x5D – 0x5F	Reserved for future AMI error codes
S3 Resume Progress Codes	
0xE0	S3 Resume is stared (S3 Resume PPI is called by the DXE IPL)
0xE1	S3 Boot Script execution
0xE2	Video repost
0xE3	OS S3 wake vector call
0xE4 – 0xE7	Reserved for future AMI progress codes
S3 Resume Error Codes	
0xE8	S3 Resume Failed
0xE9	S3 Resume PPI not Found
0xEA	S3 Resume Boot Script Error
0xEB	S3 OS Wake Error
0xEC-0xEF	Reserved for future AMI error codes

DXE Phase

Table 3.5: DXE Phase

Status Code	Description
0x60	DXE Core is started
0x61	NVRAM initialization

Table 3.5: DXE Phase (Continued)

STATUS CODE	DESCRIPTION
0x62	Installation of the South Bridge Runtime Services
0x63	CPU DXE initialization is started
0x64	CPU DXE initialization (CPU module specific)
0x65	CPU DXE initialization (CPU module specific)
0x66	CPU DXE initialization (CPU module specific)
0x67	CPU DXE initialization (CPU module specific)
0x68	PCI host bridge initialization
0x69	North Bridge DXE initialization is started
0x6A	North Bridge DXE SMM initialization is started
0x6B	North Bridge DXE initialization (North Bridge module specific)
0x6C	North Bridge DXE initialization (North Bridge module specific)
0x6D	North Bridge DXE initialization (North Bridge module specific)
0x6E	North Bridge DXE initialization (North Bridge module specific)
0x6F	North Bridge DXE initialization (North Bridge module specific)
0x70	South Bridge DXE initialization is started
0x71	South Bridge DXE SMM initialization is started
0x72	South Bridge devices initialization
0x73	South Bridge DXE Initialization (South Bridge module specific)
0x74	South Bridge DXE Initialization (South Bridge module specific)
0x75	South Bridge DXE Initialization (South Bridge module specific)
0x76	South Bridge DXE Initialization (South Bridge module specific)
0x77	South Bridge DXE Initialization (South Bridge module specific)
0x78	ACPI module initialization
0x79	CSM initialization
0x7A – 0x7F	Reserved for future AMI DXE codes
0x80 – 0x8F	OEM DXE initialization codes
0x90	Boot Device Selection (BDS) phase is started
0x91	Driver connecting is started
0x92	PCI Bus initialization is started
0x93	PCI Bus Hot Plug Controller Initialization
0x94	PCI Bus Enumeration
0x95	PCI Bus Request Resources
0x96	PCI Bus Assign Resources
0x97	Console Output devices connect
0x98	Console input devices connect
0x99	Super IO Initialization

Table 3.5: DXE Phase (Continued)

STATUS CODE	DESCRIPTION
0x9A	USB initialization is started
0x9B	USB Reset
0x9C	USB Detect
0x9D	USB Enable
0x9E – 0x9F	Reserved for future AMI codes
0xA0	IDE initialization is started
0xA1	IDE Reset
0xA2	IDE Detect
0xA3	IDE Enable
0xA4	SCSI initialization is started
0xA5	SCSI Reset
0xA6	SCSI Detect
0xA7	SCSI Enable
0xA8	Setup Verifying Password
0xA9	Start of Setup
0xAA	Reserved for ASL (see ASL Status Codes section below)
0xAB	Setup Input Wait
0xAC	Reserved for ASL (see ASL Status Codes section below)
0xAD	Ready To Boot event
0xAE	Legacy Boot event
0xAF	Exit Boot Services event
0xB0	Runtime Set Virtual Address MAP Begin
0xB1	Runtime Set Virtual Address MAP End
0xB2	Legacy Option ROM Initialization
0xB3	System Reset
0xB4	USB hot plug
0xB5	PCI bus hot plug
0xB6	Clean-up of NVRAM
0xB7	Configuration Reset (reset of NVRAM settings)
0xB8 – 0xBF	Reserved for future AMI codes
0xC0 – 0xCF	OEM BDS initialization codes
DXE Error Codes	
0xD0	CPU initialization error
0xD1	North Bridge initialization error
0xD2	South Bridge initialization error
0xD3	Some of the Architectural Protocols are not available

Table 3.5: DXE Phase (Continued)

STATUS CODE	DESCRIPTION
0xD4	PCI resource allocation error. Out of Resources
0xD5	No Space for Legacy Option ROM
0xD6	No Console Output Devices are found
0xD7	No Console Input Devices are found
0xD8	Invalid password
0xD9	Error loading Boot Option (LoadImage returned error)
0xDA	Boot Option is failed (StartImage returned error)
0xDB	Flash update is failed
0xDC	Reset protocol is not available
0xDD	DXE phase BMC self-test failure

ACPI/ASL Checkpoints

Table 3.6: ACPI/ASL Checkpoints

STATUS CODE	DESCRIPTION
0x01	System is entering S1 sleep state
0x02	System is entering S2 sleep state
0x03	System is entering S3 sleep state
0x04	System is entering S4sleep state
0x05	System is entering S5 sleep state
0x10	System is waking up from the S1 sleep state
0x20	System is waking up from the S2 sleep state
0x30	System is waking up from the S3 sleep state
0x40	System is waking up from the S4 sleep state
0xAC	System has transitioned into ACPI mode. Interrupt controller is in PIC mode.
0xAA	System has transitioned into ACPI mode. Interrupt controller is in APIC mode.

Extra Checkpoint Ranges

Table 4: Extra Checkpoint Ranges

STATUS CODE	DESCRIPTION
0x05	SEC initialization before microcode loading
0x0A	SEC initialization after microcode loading
0x1D – 0x2A	Pre-memory initialization codes
0x3F – 0x4E	PEI post memory initialization codes
0x80 – 0x8F	DXE initialization codes
0xC0 – 0xCF	BDS initialization codes

BMC

Chapter 4

This section provides information and key features of BMC (Baseboard Management Controller).

4.1 Server Management Software

Server System Overview

In a server system, BMC is an independent system of the host server system. This independent system has its own processor and memory; the host system can be managed by the BMC system even if the host hardware or OS hangs or is unable to function.

BMC Key Features and Functions

- Support IPMI v1.5 and v2.0.

- Support SNMP agent v1,v2c and v3.

- Support SMASH.

- Support alerts such as SNMP traps in the Platform Event Trap (PET) format.

- Support alerts such as SNMP traps in the SNMP v1/v2 format.

- Out-of-band monitoring and control for server management over LAN.

- Share NIC for remote management via network.

- The FRU information report includes mainboard part number, product name, manufacturer, etc.).

- Health status/Hardware monitoring report.

- Events log, view, and clear.

- Event notification via lighting chassis LED indicator and Platform Event Trap (by SNMP trap) or Mail (by Simple Mail Transfer Protocol).

- Platform Event Filtering (PEF) to take selected actions for selected events, including NMI.

- Chassis management includes power control and status report, front panel buttons and LED control.

- Watchdog and auto server restart and recovery.

- Support multi-session users, and alert destination for LAN channel.

- Support IPMB connecter that advanced server management card can communicate with BMC.

Power System

BMC controls system power through GPIO pins and IPMI chassis commands.

Front Panel User Interface

The BMC provides control panel interface functionality including indicators (Power/Status and Identify LEDs) and buttons (Power/ID).

Power Button

The Power button allows to control the system status.

ID Button

The control panel Chassis Identify button toggles the state of the Chassis ID LED. If the ID LED is off, then a button press will turn the LED on (blinking). If the LED is on, a button press or IPMI Chassis Identify command will turn the LED off.

LEDs

The following table contains information on Power, Status, ID and Heartbeat LED's.

Table 4.1: Power LED, Status LED, ID LED, and Heartbeat LED

LEDS	COLOR	STATUS	DESCRIPTION
Power LED	Blue	On	S0 System Power On
		Off	S5 System Power Off
Status LED	Amber	Blinking	Failed
		Off	System Event Log (SEL) cleared / Good
ID LED	Blue	On	Identifier on front and rear chassis
		Off	Normal
Heartbeat LED	Green	On/Off	BMC is not Ready
		Blinking	BMC is Ready

LAN Interface

BMC LAN interface in AST2500 is assigned to its Shared NIC LAN and a dedicated NIC (Default) in the system. IPMI Specification v2.0 defines how IPMI messages, encapsulated in RMCP/RMCP+ packet format, can be sent to and from the BMC. This capability allows a remote console application to access the BMC and perform the following operations:

- Get system sensor status
- Get and Set system boot options
- Get Field Replaceable Unit (FRU) information
- Get System Event Log (SEL) entries
- Get Sensor Data Records (SDR)

- Set Platform Event Filtering (PEF)
- Set LAN configurations

Session and User

This BMC supports ten (10) user accounts. Each can have a different user name, password and privilege level. Four accounts can login simultaneously. The available user privilege levels are User, Operator, and Administrator.

RMCP+

Besides RMCP defined by DMTF, AST2500 also supports RMCP+ protocol defined in IPMI 2.0.

- Authentication Algorithm types supported:
  RAKP-none, RAKP-HMAC-SHA1, RAKP-HMAC-MD5.

- Integrity Algorithm types supported:
  none, HMAC-SHA1-96, HMAC-MD5-128, MD5-128.

- Confidentiality Algorithm types supported:
  none, AES-CBC-128.

Session Support

BMC supports 20 sessions for RMCP/RMCP+.

- Issue IPMI command through RMCP will establish RMCP sessions.
- Issue IPMI command through RMCP+ will establish RMCP+ sessions.
- Login WebUI will establish RMCP sessions.
- Activate Serial over LAN will establish one RMCP+ session, BMC only supports one SOL session at one time.

Vritaul LAN

BMC supports VLAN feature. BMC accepts the packets from LAN channel if they have 802.1q fields and their VLAN ID matched with the VLAN ID given in the LAN configuration Parameters command. The valid VLAN IDs are 2 ~ 4094.

NMI

The system supports NMI assertion, there are three possible NMI assertion sources, Chassis Control command, PEF action, and Watchdog timer pre-interrupt. It is not available at BIOS POST period.

Serial Over LAN

BMC supports 1 IPMI (Spec v2.0) specific SOL session. BMC supports redirect data from UART interface.

DHCP

In addition to support static IP, the BMC support DHCP, DNS and dynamic update in DNS (DDNS). When DHCP lease fails, BMC will use 192.168.0.120 as the default IP.

Time Sync

In BMC design, BMC does not have a local RTC to know what time it is. Each time BMC will get the current time from system PCH after BMC boot. The current time is updated periodically from the PCH. The remote console program interpret this time as pre-initial.

SEL

BMC supports IPMI 1.5/2.0 standard SEL operation. It can keep SEL log. Event happened in BIOS side will be logged by using Add SEL Entry command. BMC will store them in FLASH, the time stamp field will be filled by BMC. When SEL is full, the new SEL won't be logged but will go through PEF as usual. If AC powers off, all SELs will remain in NV.

Platform Event

Platform Event Filter

The BMC implements selectable action on an event or LAN alerting base on event. By default, no any PEF entries or actions exist, applications need to configure it to enable.

- Dedicated and Shared NIC.
- The number of Platform Event Filter Table is 40.
- The number of Alert Policy Table and Alert Destination Table is 60.
- The policy to match an event to Platform Event Filter Table entry is IPMI 1.5 standard.
- The action support Power off, Power Reset and Power Cycle.
- All Platform Event Filter Table is default disabled.
- PEF Startup Delay and Last Processed Event tracking is not supported.
- PEF table lookup isn't correlated to log SEL to SEL Repository.
- Serial Alerting is no support.

Firmware Update

The BMC will allow users to upgrade firmware image on following entities:

- BMC
- BIOS

The update capability is provided by local and remote interfaces.

WebUI Update

Remote update can be performed through the remote Web console.
(default DHCP\static IP address=192.168.0.120)

Windows/Linux Update

Local and Remote update can be performed through the Yafuflash utility

4.2 BMC Firmware Update

This section provides guidelines on BMC firmware update process in Linux and Windows systems.

Note:

> In-band means user performs firmware update on the system which has installed Windows/Linux operating system. Using the in-band update, the firmware package is readable in the platform system interface so that the user can execute update script to perform firmware update.

Note:

> Out-of-band (OOB) means the firmware update is performed remotely. User execute the firmware update which the firmware image and command will be delivered to BMC through network interface. BMC receive the command and image to perform firmware update.

In-band and Out-of-band are two different ways to update BMC firmware.

Please be aware that the way to update BMC firmware through In-band YAFUFLASH tool can't be supported for preserving BMC configurations but other YAFUFLASH and BMC WebUI through out-of-band ways can support for preserving BMC configurations.

Out-of-band update (via YAFUFLASH tool)

- Get the BMC firmware package named mf5a_v311.zip.

- Unzip package mf5a_v311.zip to \tmp\mf5a_v311 in Linux (or C:\mf5a_v311 for Windows operating system) and change directory into folder mf5a_v311.

- Setup environment: User needs to setup the environment under Linux Operating System (Windows Operating System does not require to setup the environment):

  - Change the privilege for the files so that the files have the execute permission. ./chmod -R 755 .

In Linux:

- run "linux_oob.sh <BMC IP>" (default BMC static IP address = 192.168.0.120)

In Windows:

- Launch a cmd.exe console and change directory into the folder of C:\mf5a_v311.

- run "win_oob.bat <BMC IP>" (default BMC static IP address = 192.168.0.120)

Out-of-band update (via BMC WebUI)

- Unzip the BMC firmware package to USB flash drive and rename the folder name to XXXX (XXXX that mean BMC version).

- Login BMC WEBUI via http protocol, enter 192.168.0.120 in IE (Internet Explorer)/ chrome/firefox. (default: admin/cmb9.admin; 192.168.0.120 or check wit your administrator for accessing)

- Select "**Maintenance**" > "**Firmware Update**" item to enter BMC update mode.
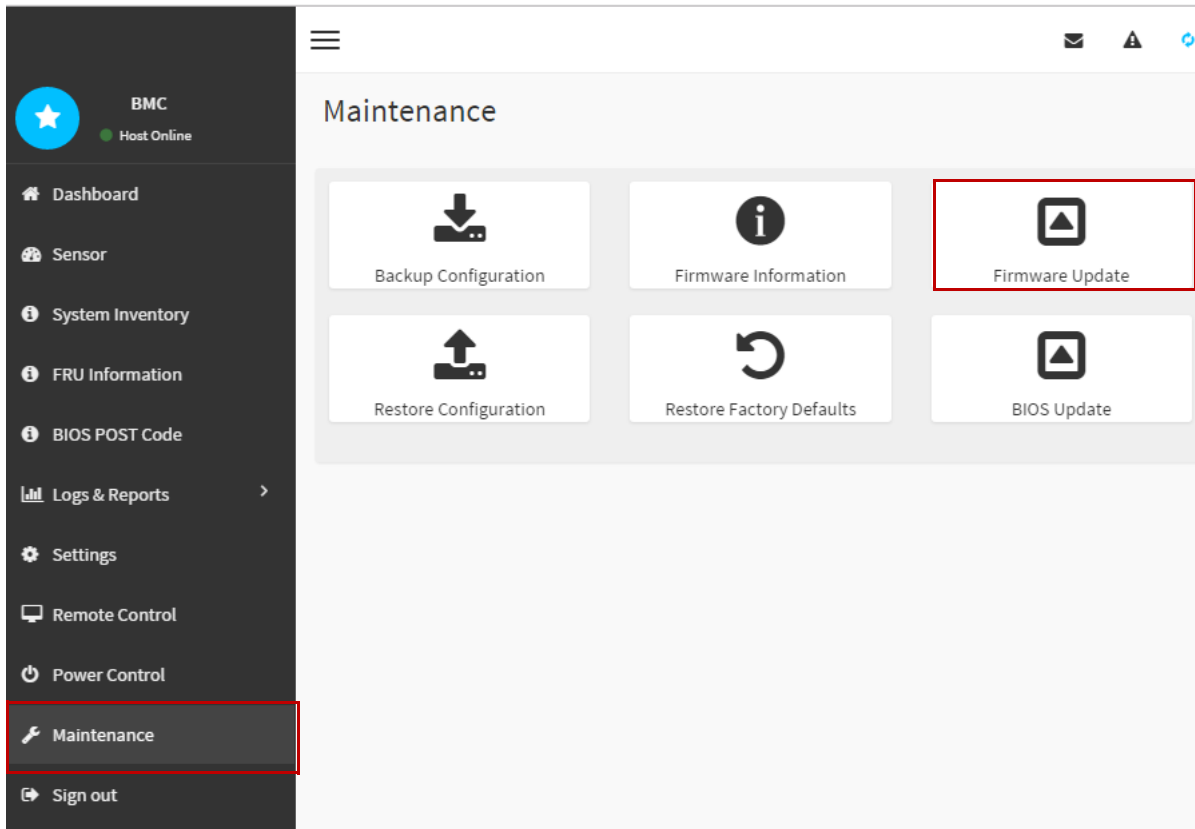
- Check ☑ Preserve all Configuration. if you would like to preserve all the BMC configuration when updating BMC firmware or click the setting Edit Preserve Configuration to check the configuration by items . Then click "Choose File" Choose File to browse the BMC firmware. Please take ROM.ima_enc file that there is "ima_enc" postfix at the end of file

string to update BMCfrimware. Click "Start firmware update" [Start firmware update] to process the firmware update.

The protocol information to be used for firmware image transfer during this update is as follows. To configure, choose 'Firmware Image Location' under Maintenance.
Protocol Type:
HTTP/HTTPS

☑ **Preserve all Configuration. This will preserve all the configuration settings during the firmware update - irrespective of the individual items marked as preserve/overwrite in the table below.**

All configuration items below will be preserved as default during the restore configuration operation. Click "Edit Preserve Configuration" to modify the Preserve status settings.

Edit Preserve Configuration

S.No	Preserve Configuration Item	Preserve Status
1	SEL	Preserve
2	IPMI	Preserve
3	NETWORK	Preserve
4	SNMP	Preserve
5	SSH	Preserve
6	KVM	Preserve
7	AUTHENTICATION	Preserve

Select Firmware Image

[Choose File] rom.ima_enc

[Start firmware update]

In-band update (via YAFUFLASH tool)

- Get the BMC firmware package named mf5a_v311.zip.

- Unzip package mf5a_v311.zip to \tmp\mf5a_v311 in Linux (or C:\mf5a_v311 for Windows operating system) and change directory into folder mf5a_v311.

- Setup environment: User need to setup the environment under Linux Operating System (Windows Operating System does not require to setup the environment):

  - Change the privilege for the files so that the files have the execute permission. ./chmod -R 755 .

In Linux:

- run "linux.sh"

In Windows:

- Launch a cmd.exe console and change directory into the folder of C:\mf5a_v311.

- run "win.bat"

4.3 SMASH

Quanta SMASH is a tool that allows you to use Secure Shell (SSH) to login in the embedded Linux of BMC from remote terminal and gather information as well as give you control over things like power resets, power off. The basic structure is shown as below:
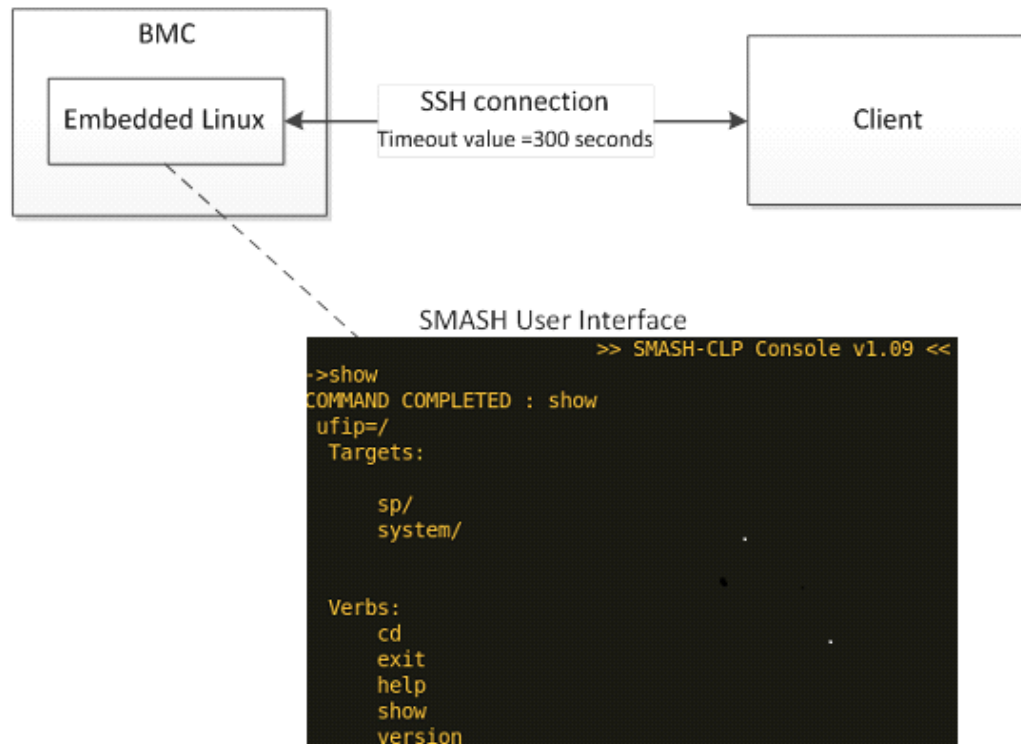
Figure 4-1.   Using SSH to login in

Here presents an activity diagram, user could use SSH to login in embedded Linux of BMC from remote terminal. After login in successfully, SMASH would be executed automatically. In this time, SMASH is running and allowing user to input commands. The connection will be terminated if the terminal console is idle more than five minutes.

Default SSH UserName / Password (User Account in Linux): **admin / cmb9.admin** (Your administrator account / password accessing BMC webUI)

Input command in Linux: **ssh sysadmin@<Server IP>**
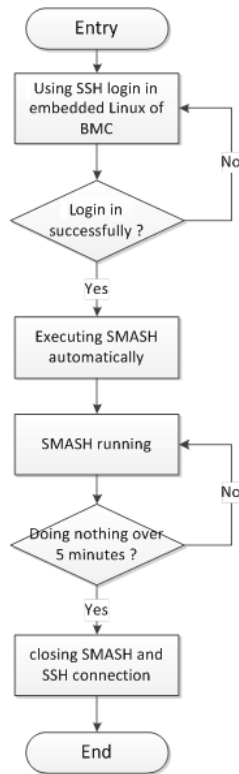
Figure 4-2.   SMASH Activity Diagram

Here provides you the commands about system level and BMC level.

System Level Commands

The system level commands provide you the information and power state control.

Table 4.2: Targets and Verbs

RELATED TARGETS	SUPPORTED VERBS										
	CD	EXIT	HELP	CREATE	DELETE	SET	SHOW	RESET	START	STOP	VERSION
/	v	v	v				v				v
/system	v	v	v				v	v	v	v	v
/system/voltage	v	v	v				v				v
/system/fan	v	v	v				v				v
/system/temp	v	v	v				v				v
/system/power	v	v	v				v				v
/system/solssh	v	v	v				v		v		v
/system/proces-sor	v	v	v				v				v

Displays information for the board

>   show /system

Power-on system

>   start /system

Power-off system

>   stop /system

Power-reset system

>   reset /system

Display all system voltage

>   show /system /voltage

Display all system fan

>   show /system /fan

Display all system temperature

>   show /system /temp

Display all system power supply

>   show /system /power

Display power supply unit fan direction

>   show /system /power

Display processor

>   show /system /processor

/system

This command provides you the hig-level status of the system chassis and main power subsystem.

Table 4.3: /system

PROPERTY NAME	VALID VALUE	ACCESS	DESCRIPTION
SystemMACx	(System MAC Address)	R	Dynamically to display system MACx address (only available for platform before Grantley)

Table 4.3: /system (Continued)

Property Name	Valid Value	Access	Description
| LOM/OCP Mezzanine/ SAS Mezzanine/PCIe | (System MAC Address) | R | Dynamically to show system MAC address by LOM/OCP/SAS/PCIe (only available for platform after Grantley)<br><br>```
/SYS
  Targets:
      voltage
      fan
      temperature
      powerSupply

  Properties:
      OCP Mezz   = 08:9E:01:93:CD:88
      OCP Mezz   = 04:7D:7B:D9:4A:1D
      Quanta Mezz  = 04:7D:7B:AC:D1:70
      Quanta Mezz  = 04:7D:7B:AC:D1:71
      ChassisStatus = powerIsOFF

  Target Commands:
      show
      cd
      start
      stop
      reset
``` |
| ChassisStatus | powerIsOFF powerIsON | R | PowerIsOFF indicates the system power is off PowerIsON indicates the system power is on. |

Q&A

Q: I tried to turn system power off by IPMI command "**power off**" when there is no response from operating system and system could not be shutdown. What is the Chassis Status?

A: The status of ChassisStatus is "**powerIsON.**"

/system/voltage

This command returns a high level version of the system voltages health status.

Table 4.4: /system/voltage

Property Name	Valid Value	Access	Description
Sensor name list of vlotage	na ok nonCritical critical	R	**na** indicates the status not available/unknown (typically because system power is OFF) **ok** indicates the monitored parameters within normal operating ranges **nonCritical** indicates the hardware outside normal operating range **critical** indicates the hardware exceeding specified ratings

*The sensor name list depends on the Server Hardware.

/system/fan

This command returns a high level version of the system fan health status.

Table 4.5: /system/fan

Property Name	Valid Value	Access	Description
Sensor name list of fan	na ok nonCritical critical	R	**na** indicates the status not available/unknown (typically because system power is OFF) **ok** indicates the monitored parameters within normal operating ranges **nonCritical** indicates the hardware outside normal operating range **critical** indicates the hardware exceeding specified ratings

*The sensor name list depends on the Server Hardware.

/system/temp

This command returns a high level version of the system temperature health status.

Table 4.6: /system/temp

Property Name	Valid Value	Access	Description
Sensor name list of temperature	na ok nonCritical critical	R	**na** indicates the status not available/unknown (typically because system power is OFF) **ok** indicates the monitored parameters within normal operating ranges **nonCritical** indicates the hardware outside normal operating range **critical** indicates the hardware exceeding specified ratings

*The sensor name list depends on the Server Hardware.

/system/power

This command provides the specification of the Sensor Type sensor-specific event.

Table 4.7: /system/power

Property Name	Valid Value	Access	Description
Sensor name list of power supply	Presence* Power Supply Failure Detected* Predictive Fail* Power Supply Input Lost(AC/DC)* AllDeasserted (*Note: Only for certain models.)	R	**Presence Detected** indicates the Power Supply Presence detected **Power Supply Failure Detected** indicates the Powser Supply Failure detected **Predictive Fail** indicates the Power Supply Predictive Failure , available from Grantley platform **Power Supply Input Lost(AC/DC)** indicates the Power Supply input lost, such as power cord not inserted **All Deasserted** indicates the power supply is not inserted
Redundancy	Fully Redundant Redundancy Lost	R	The property is provided depend on project. **Fully Redundant** Indicates the power redundancy is OK. **Redundancy Lost** Indicates the power redundancy is failed. One PSU is removed or AC lost.
PSUx_FanDir_Err	Status ID: Status ID Status: Asserted Deasserted	R	**Status ID** Status code to know the detail **Asserted** PSU fan direction is incorrect **Deasserted** PSU fan direction is correct

*The sensor name list depends on the Server Hardware.

Q&A:

Q1: My system supports two power supply slots and only one power supply unit con-
nected. What is the other power supply status?

A1: The other power supply status is " AllDeasserted ".

Q2: My system supports two power supply slots and two power supply units connected.
But only one power cord plugged. What is the other power supply status?

A2: The other power supply status shows "Presence Detected, Power Supply Input
Lost(AC/DC) ".

/system/processor

This command provides the specification of the Sensor Type sensor-specific event.

Table 4.8: /system/processor

PROPERTY NAME	VALID VALUE	ACCESS	DESCRIPTION
processor	na Processor Presence detected IERR Machine Check Exception (Uncorrectable) All Deasserted	R	**na** Indicates the is not available. **Processor Presence detected** Indicates the processor Presence detected **IERR** Indicates the processor has the IERR status. **Machine Check Exception (Uncorrectable)** Indicates the processor has the MCERR status. **All Deasserted** Indicates the processor is not inserted

*The sensor name list depends on the Server Hardware.

BMC Information

The BMC level commands provide several options to configure and display parameters of
the management agent.

Table 4.9: Targets and Verbs

RELATED TARGETS	SUPPORTED VERBS										
	CD	EXIT	HELP	CREATE	DELETE	SET	SHOW	RESET	START	STOP	VERSION
/	v	v	v				v				v
/sp	v	v	v			v	v	v			v

Displays information for the board

show /sp

Reset BMC

reset /sp

Set server identify LED to be off

set /sp ServerIdentify=off

Set server identify LED to be on

set /sp ServerIdentify=on

Set server identify LED to be blinking

set /sp ServerIdentify=blinking

/sp

Table 4.10: /sp

PROPERTY NAME	VALID VALUE	ACCESS	DESCRIPTION
BMCVersion		R	Display BMC firmware revision
BMCGUID		R	Display BMC GUID
ServerIdentify	off on blinking	R/W	Configuring server identify LED
BMCMAC		R	Display the NIC physical address used by server management agent

SOL on SSH

Turn to the console of the server on SSH:

cd /system/solssh

start

4.4 Web Graphical User Interface (GUI)

Using the Web GUI

The BMC firmware features an embedded web server enabling users to connect to the BMC using a Web browser (e.g. Microsoft Internet Explorer). The Web GUI shows system information, system events, system status of managed servers, and other system-related information.

The Web-based GUI is supported on the following browsers:

- Internet Explorer 7 and above
- Firefox 8.0 and above
- Google Chrome 2.0 and above

Login

Enter the IP address or URL (default DHCP\static IP address=192.168.0.120) into the address bar of the web browser.

Figure 4-3.   Files list in the compressed BMC firmware

When connecting to the BMC the Login screen prompts for the username and password. Please check the IPMI access account for WEBGUI and IPMITOOL information from the file "ReleaseNote.txt" packed in the BMC firmware compressed file. This authentication with SSL protection prevents unauthorized intruders from gaining access to the BMC web server.

```
login account:
        a) IPMI access account for WEBGUI and IPMITOOL.
        username: admin
        password: cmb9.admin
```

Figure 4-4.   Finding Username and Password from ReleaseNote.txt

When a user is authenticated they can manage the server according to the privilege of their role.

The OEM Proprietary, Administrator and Operator privilege levels are authorized to login to the web interface. The User and No Access privilege levels do not allow access through the BMC web GUI.

Figure 4-5.   Login Web Page

I Forgot My Password: If you forget your password, you can generate a new one using this link. Enter the username, click on Forgot Password link. This will send the newly generated password to the configured Email-ID for your account.

Table 5: Default Username and Password

FIELD	DEFAULT
Username	admin
Password	cmb9.admin

After passing authentication, the following web page appears.

> **Note:**
> The default username and password are in lowercase characters. Change the admin password once you have logged in.

The BMC GUI consists of various menu items. **Menu Bar** located at left pane displays *Dashboard*, *Sensor*, *System Inventory*, *FRU Information*, *BIOS POST Code*, *Server Identify*, *Logs &*

Reports, *Settings*, *Remote Control*, *Power Control*, *Maintenance* and *Sign out*. **Quick Button** and **Logged-in User** are located at the upper right of the main web page.

Figure 4-6.   Main Web Page

Quick Button and Logged-in User

Figure 4-7.   Quick Buttons and Logged-in User

User Information

The logged-in user information shows the logged-in user, his/her privilege and the quick buttons allowing you to perform the following functions.

admin: Click the 👤 admin ▾ icon to view the User profile and Sign Out.

Signout: Click the Sign out icon to log out of the Web GUI.

👤 **admin** ▾

admin - Administrator

Profile   Sign out

Logged-in user and its privilege level

There are four kinds of privileges.

- **User:** Only valid commands are allowed.
- **Operator:** All BMC commands are allowed except for the configuration commands that can change the behavior of the out-of-band interfaces.
- **Administrator:** All BMC commands are allowed.
- **No Access:** Login access denied.

Quick Buttons

Refresh: Click the 🔄 Refresh icon to reload the current page.

Sync: Click the 🔄 Sync icon to synchronize with Latest Sensor and Event Log updates.

Warning: Click the ⚠ icon to view any BMC notification messages.

Click the **Help** ❓ icon on the the web pages for assistance.

Table 6: Main Web Page

MENU ITEM	DESCRIPTION
Dashboard	Displays the device, network, sensor monitoring and event logs information.
Sensor	The Sensor Readings page displays all the sensor related information.
System Inventory	This page displays the server's usage information in the network that includes details such as Vendor Name, Model, and Software Version.
FRU Information	FRU Information Page displays the BMC's FRU device information. FRU page shows information like Basic Information, Chassis Information, Board Information and Product Information of the FRU device.
BIOS POST Code	BIOS POST Code can display post code during BIOS post. It can display the current and previous code.
Server Identify	Light up the ID LED.
Logs & Reports	The Logs & Reports page displays the IPMI Event Log information.
Settings	This group of pages allows you to access various configuration settings.
Remote Control	This page allows you to view and control your server.
Power Control	This page allows you to view and control the power of your server.
Maintenance	This group of pages allows you to do maintenance tasks on the device.
Sign out	Click to exit the Web GUI.

Note:

Command privilege level table defined in IPMI 2.0 Specification Appendix G – Command Assignments. According to IPMI 2.0 Specification, **Chassis Identify** command is allowed for Operator privilege. Because this command didn't change BMC configuration, just to trigger Identify LED used to display where Server is. So it is expected behavior. After checked other Operator privilege command by IPMI 2.0 Specification, **Chassis Control command** (Power On/Off) is also allowed. But in our code base, we raise **Chassis Control** command to be Administrator to protect system. So, in **Server Power Control** page, only Administrator can control server power.

Connectors

Chapter 5

This section provides guidance information for the position and configuration of connectors.

5.1 Connectors

Mainboard

Connectors

See the following figure and table for information on mainboard connectors.

1 Main power connector
2 SGPIO0/NVMe connector
3 SGPIO0 connector
4 NVMe expander connector
5 DDR4 DIMM slots (DIMM_A0/A1/B0/B1/C0/C1/D0/D1)
6 TPM header
7 Riser slot2 (PCIe x16; full height half length)
8 USB 3.0 port*
9 Power button
10 ID button
11 ID LED (Blue on: Identification; Off: normal)
12 Power/Fault LED - Blue on: DC on; Off: DC off /
              Amber blinking: BMC log critical event
13 Micro USB connector (serial signal for console only)
14 GbE RJ45 Management port
15 VGA port
16 Lithium battery holder
17 Riser slot1 (PCIe x16; half height half length)
18 DDR4 DIMM slots (DIMM_E0/E1/F0/F1/G0/G1/H0/H1)
19 Mini-SAS HD slot1 (PCIe x4)
20 Slimline slot1 (PCIe x8; NVMe 0)
21 Slimline slot2 (PCIe x8; NVMe 1, 2; SATA6G: SATA0~SATA5)
22 Processor socket
23 Mini-SAS HD slot2 (PCIe x4)
24 M.2 2280/22110 slot (SATA/PCIe x4)
25 OCP slots (PCIe x8 + PCIe x8)

ICON LEGEND

⏻ Power   SS⟵ USB3.0   ⚡ Micro-USB (Console)   ⚠

ID ID LED   ▭ VGA Port   ⚡ RJ-45 Port (BMC)   Fault LED

SYSTEM IO Ports Overview

*Note: The USB device connected must be:
No bigger than 17mm / 0.67" (W) x 8 mm / 0.31" (H)
to avoid interference with the other ports.

(USB1*) 8

9

15   14   13   8 (USB0 *)   12 11 10

Figure 5-1.   Mainboard Connectors

Troubleshooting

Chapter 6

This section provides a guidance for the troubleshooting of system errors and hardware failure notification.

6.1 Troubleshooting

Server Boot Issue Topics

System does not Boot after initial installation:

- "Power Cord Not Plugged In"
- "Mainboard Sled Configuration Issues"
- "Processor Issues"
- "Memory Issues"
- "Monitor Issues"
- "Power Supply, Chassis and Fan Issues"
- "Cable Issues"
- "Electrical Short or Overload"
- "Defective Components"

System does not boot after configuration changes:

- "Hardware Changes"
- "Software Changes"
- "BIOS Changes"
- "Installation Problems"
- "Troubleshooting External Connections"

System does not Boot after Initial Installation

Power Cord Not Plugged In

If the power supply cable is not plugged into the chassis power connector, the system cannot boot up, even though chassis front panel LEDs and the fan may be operational. Verify that the power connections are good.

Mainboard Sled Configuration Issues

Please make sure that the MB sled is inserted into the chassis. To isolate a specific MB sled as defective, boot the system with just the MB sled installed.

Processor Issues

Boot failure situations are also caused by the following:

Incompatible processor - ensure the selected processor model is correct for your server board. If the processor is compatible, try removing and reinstalling the processor to ensure it is installed correctly.

Processor overheat - the system does not boot or shuts down shortly after booting.

- Ensure that the cooling fans are correctly installed and running.
- Ensure that the correct thermal interface material or the thermal grease is applied to the processor.
- Ensure that the power supply fan is running.
- Ensure that the air intakes for the fans are unobstructed.

Memory Issues

If you have installed incompatible memory modules, the system may not boot. Verify the memory you've installed has been tested with your board (Please refer to your sales representative for details on valid memory). If the installed memory is compatible, remove and reinstall the memory modules. Defective memory modules may cause boot errors. To isolate a specific memory module as defective, boot the system with just one memory module installed at a time.

Monitor Issues

Monitor configurations can cause boot failure. Run through the following checklist to verify monitor operation:

- Ensure the monitor is plugged in and turned on.
- Ensure all cables are connected properly between the monitor and the computer.
- Check the brightness and contrast controls on the monitor are not too low.

Most monitors employ indicator LEDs showing status. Refer to the monitor's documentation to confirm operation. If the problem still persists, try replacing the monitor or test the monitor on a different AC outlet/different system.

Power Supply, Chassis and Fan Issues

- Ensure that the chassis and power supply is appropriate for system requirement. (*"Power Sub-System" on page 7*).
- Ensure all power cables and connectors are firmly connected to the power supply and the AC outlet.
- If the power supply or the AC outlet has an on/off switch, make sure that it is on and verify that the outlet is supplying current.
- Check for foreign objects inside the chassis such as screws that can short circuit connections.

- To isolate a specific PSU as defective, boot the system with just one PSU installed at a time.

- Check fan speed in WEBUI & event log to find out if there are any defective fans. If failure happens, please contact your dealer for assistance.

Cable Issues

Ensure that all cable connections, both internal and external, are attached correctly and securely.

Electrical Short or Overload

Remove non-essential items such as extra controller cards or SSD devices to check for shorts and overloads.

If the system boots correctly, there may be a short or overload associated with one of the components.

Replace each of non-essential items one at a time to isolate which one is causing the problem.

If the problem occurs even after removing the non-essential components, the problem has to be with the server board, power supply, memory, or processor.

Defective Components

Defective components, especially processor and memory, can cause system boot issues.

- Swap the memory modules with known good memory. Verify correct operation of the suspected memory in a known working system.

- Swap the processor with a known good processor. Verify correct operation of the suspected processor in a known working system.

System does not boot after Configuration Changes

Hardware Changes

If the system does not boot after making changes to hardware or adding new components, verify that the component installed is compatible with the server.

Software Changes

If you recently installed new software or new device drivers:

- Try booting into Safe Mode and uninstall the new software or driver. If you can now boot normally, there may be a compatibility issue between the new software or

driver and some component in your system. Contact the software manufacturer for assistance

BIOS Changes

Changes to some advanced BIOS settings can cause boot issues. Changes to Advanced BIOS settings should only be made by experienced users.

If the BIOS Setup Utility is accessible by pressing **F2** during boot, reset the BIOS to factory defaults by pressing **F9**. Press **F10** to save and exit the BIOS Setup.

If you cannot access the BIOS Setup Utility, clear the CMOS by performing the following steps:

1. Power down the server.

2. Remove the MB sled from the chassis.

3. Remove the air duct from the MB sled.

4. Move CMOS clear jumper from pins 1-2 to pins 2-3 for a few seconds.

5. Move CMOS clear jumper back to pins 1-2.

6. Install the air duct.

7. Install the MB sled.

8. Power up the server.

The CMOS is now cleared and can be reset by going into BIOS setup.

Please check with your sales representative for the latest BIOS firmware.

Installation Problems

Perform the following checks if you are troubleshooting an installation problem:

Check all cable and power connections (including all rack cable connections). Unplug the power cord, and wait one minute. Then reconnect the power cord and try again. If the net-

work is reporting an error, see if the server has enough memory and disk space available. Remove all added options, one at a time, and try to power up the system. If after removing an option the server works, you may find that it is a problem with the option or a configuration problem between the option and the server. Contact the option vendor for assistance.

- If the system doesn't power on, check the LED display. If the power LED is not on, you may not be receiving AC power. Check the AC power cord to make sure that it is securely connected.

Troubleshooting External Connections

Loose or improperly connected cables are the most likely source of problems for the system, monitor, and other peripherals (such as a keyboard, mouse, or other external device). Ensure that all external cables are securely attached to the external connectors on your system.

Regulatory and Compliance Information

Chapter 7

This section provides regulatory and compliance information applicable to this system.