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SGI® Rackable™ H2106-G7
System User's Guide

Record of Revision

Version	Description
001	October 2010
	First release
002	October 2011
	Processor updates

Contents

Figures

Tables

About This Guide

This guide provides an overview of the installation, architecture, general operation, and descriptions of the major components in the SGI® Rackable™ H2106-G7 server. It also provides basic troubleshooting and maintenance information, BIOS information, and important safety and regulatory specifications.

Audience

This guide is written for users of SGI Rackable H2106-G7 server systems. It is written with the assumption that the reader has a good working knowledge of computers and computer systems. This guide may be useful to installers and system administrators looking for overview information on the server.

Chapter Descriptions

The following topics are covered in this guide:

- Chapter 1, "Introduction"
  Provides an overview of the server's components.

- Chapter 2, "Server Installation"
  Provides a quick setup checklist to get the server operational.

- Chapter 3, "System Interface"
  Describes several LEDs on the control panel as well as others on the SATA drive carriers that keep you constantly informed of the overall status of the system as well as the activity and health of specific components.

- Chapter 4, "System Safety"
  Provides general system safety information.

- Chapter 5, "System Severboard Information"

Provides best practice procedures to work with a node board in the H2106-G7 chassis, install memory DIMMs, PCIe expansion cards and hard disk drives.

- Chapter 6, "Basic Troubleshooting and Chassis Service"
Describes some basic steps required to troubleshoot your system. Additional sections in this chapter are intended to guide you through basic component remove and replace procedures.

- Chapter 7, "BIOS"
Describes the AMI BIOS Setup Utility for the system severboard.

- Appendix A, "BIOS Error Codes,"
Provides a brief listing of BIOS error code information.

- Appendix B, "System Specifications,"
Describes system component environmental specifications and compliance.

Related Publications

The following SGI and LSI documents may be relevant to the use of your server:

- *MegaRAID SAS Software User's Guide*, publication number, 860-0488-00*x*

- *LSI Integrated SAS for RAID User's Guide*, publication number 860-0476-00*x*

- *SGI Performance Suite* series documentation

- *SGI InfiniteStorage* series documentation

- Man pages (online)

You can obtain SGI documentation (as well as the pertinent LSI books), release notes, or man pages in the following ways:

- Refer to the SGI Technical Publications Library at http://docs.sgi.com. Various formats are available. This library contains the most recent and most comprehensive set of online books, release notes, man pages, and other information.

- You can also view man pages by typing **man** <*title*> on a command line.

SGI systems include a set of Linux® man pages, formatted in the standard UNIX® "man page" style. Important system configuration files and commands are documented on man pages. These are found online on the internal system disk (or DVD-CD) and are displayed using the man command. For additional information about displaying man pages using the man command, see man(1).

In addition, the apropos command locates man pages based on keywords. For example, to display a list of man pages that describe disks, type the following on a command line:

apropos disk

For information about setting up and using apropos, see apropos(1).

Conventions

The following conventions are used throughout this document:

Convention	Meaning
Command	This fixed-space font denotes literal items such as commands, files, routines, path names, signals, messages, and programming language structures.
variable	The italic typeface denotes variable entries and words or concepts being defined. Italic typeface is also used for book titles.
user input	This bold fixed-space font denotes literal items that the user enters in interactive sessions. Output is shown in nonbold, fixed-space font.
[ ]	Brackets enclose optional portions of a command or directive line.
...	Ellipses indicate that a preceding element can be repeated.
man page(*x*)	Man page section identifiers appear in parentheses after man page names.
GUI element	This font denotes the names of graphical user interface (GUI) elements such as windows, screens, dialog boxes, menus, toolbars, icons, buttons, boxes, fields, and lists.

Product Support

SGI provides a comprehensive product support and maintenance program for its products. SGI also offers services to implement and integrate Linux applications in your environment.

- Refer to http://www.sgi.com/support/

- If you are in North America, contact the Technical Assistance Center at +1 800 800 4SGI or contact your authorized service provider.

- If you are outside North America, contact the SGI subsidiary or authorized distributor in your country.

Reader Comments

If you have comments about the technical accuracy, content, or organization of this document, contact SGI. Be sure to include the title and document number of the manual with your comments. (Online, the document number is located in the front matter of the manual. In printed manuals, the document number is located at the bottom of each page.)

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Fremont, CA 94538

SGI values your comments and will respond to them promptly.

Introduction

Important: SGI Rackable server systems may sometimes require driver versions that are not included in the original operating system release. When required, SGI provides these drivers on an SGI Driver CD, which may ship with the system, or on the system disk (pre-installed in the factory). For more information on this topic check with your sales or service representative.

The Rackable H2106-G7 server is a 2U rackmount system (see).

In addition to the serverboard and chassis, various hardware components have been included with the system, as listed:

- One slim DVD-ROM drive (optional)

- Six 8-cm chassis fans

- Four passive heatsinks

- One air shroud

- SATA or SAS Accessories

- One or two power supplies

- One rackmount kit

- One CD containing drivers and utilities
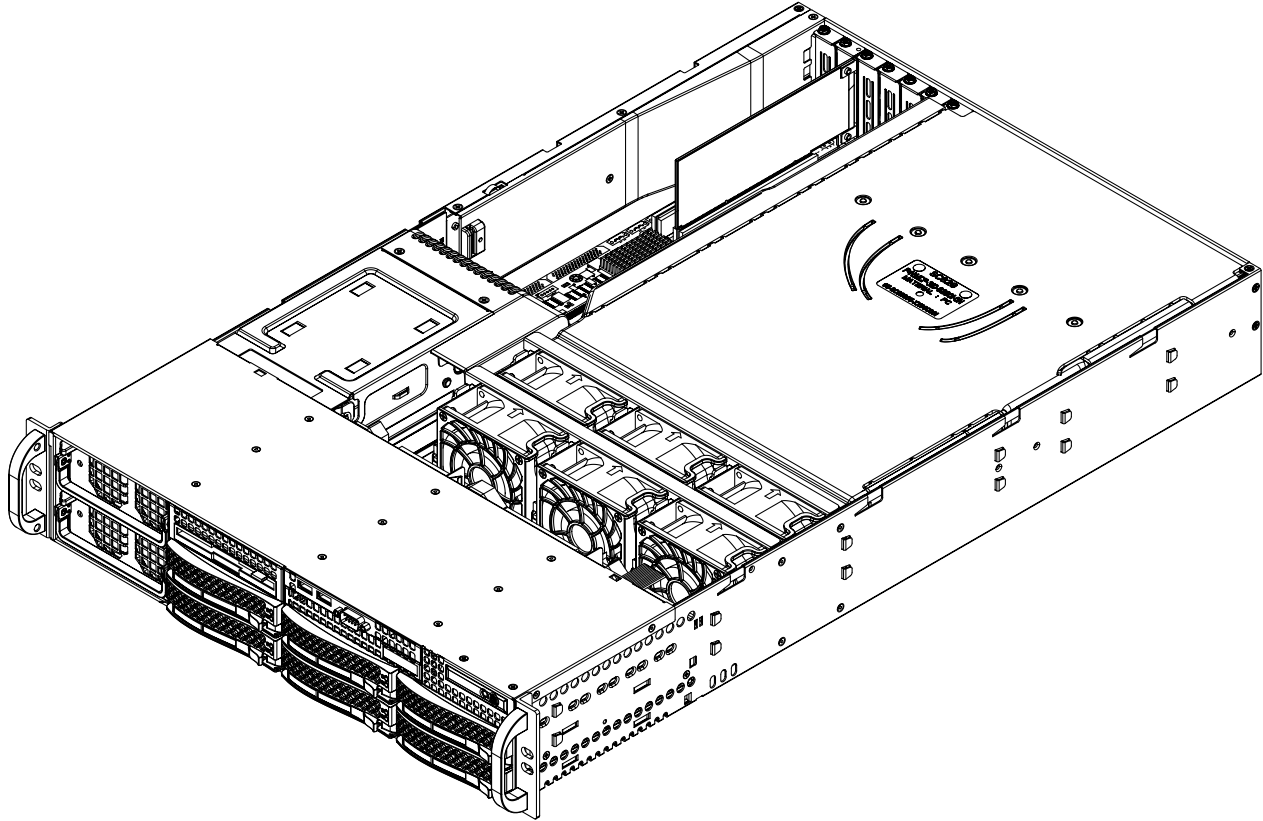
Figure 1-1   Rackable H2106-G7 Server (Top Removed)

Server Board Features

At the heart of the system is a four processor serverboard based on the AMD Opteron chipset and designed to provide maximum performance. Below are the main features of the serverboard.

Processors

The serverboard supports four AMD 6000 series Opteron processors. Each processor sits in a 1944-pin "G34" socket and is interconnected via HyperTransport (HT) 3.0 link support, see the next subsection for more information.

HyperTransport Interconnect

The HT link is a packet-based link implemented on two unidirectional sets of signals. The link is nominally point-to-point, and connects exactly two devices. Devices can have multiple HT links to allow the construction of larger HT fabrics.

The HT link consists of a point to point x16 link (16 bits) that supports 6.4 GT/s per link in each direction. The HT link is designed to deliver a scalable, high-performance interconnect between CPUs and CPU to I/O devices.

Memory

The serverboard has 32 DIMM slots (eight per processor) that support DDR3-1600/1333/1066/800 MHz DDR3 registered ECC SDRAM (see "Installing Memory" on page 37).

Serial ATA

A Serial ATA controller ASIC (AMD SP5100) is integrated into the system serverboard to provide a six-port 3 Gb/s SATA subsystem. The hot-swappable SATA drives are connected to a backplane that provides power, bus termination and configuration settings. RAID 0, 1, and 10 are supported. Note that your operating system must have RAID support enabled to accommodate hot swaping of disk drives. Check with your sales or service representative to obtain information on set-up procedures if your system did not come pre-configured with SATA RAID.

Optional SAS RAID Support

An LSI 2008 (SAS2) Serial Attached SCSI controller-equipped system serverboard with on-board RAID control is optionally available with your system. It provides an eight-port 6Gb/s SAS subsystem, which supports RAID 0, 1, and 10. Software RAID (SR) and Intitiator Target (IR) modes are supported. When raided, the SAS drives are hot-swappable units.

Note: Your operating system must have RAID support to enable the hot-swap option. The system does not support integrated RAID mode (IR mode) or integrated mirroring (IM RAID).

PCI Expansion Slots

The dual processor serverboard has two low-profile PCI Express 2.0 x16 slots and two low-profile PCI Express 2.0 x8 slots. The x8 PCIe bus in slot 1 is shared with the system's UIO slot. See the following subsection and also the section for more information on these topics.

UIO

The serverboard is a specially-designed serverboard that features Universal I/O (UIO) technology. The UIO slot on the serverboard supports specific UIO option cards.

Note: The UIO slot shares the x8 PCIe bus used for slot 1, you can either populate the UIO slot or PCIe slot 1, but not both slots.

The system does not automatically come with a UIO card pre-installed. Future options may include RAID, Ethernet or InfiniBand HBAs, contact your sales or service representative for more information on available product options.

Onboard Controllers/Ports

One onboard ATA/100 connector, which supports IDE hard drives or ATAPI devices. The color-coded I/O ports include one COM port (an additional COM header is located on the serverboard), a VGA (monitor) port, two USB 2.0 ports (two additional USB headers and one Type A port are included on the serverboard), PS/2 mouse and keyboard ports and two gigabit Ethernet ports.

Onboard Graphics Controller

The four-processor serverboard features an integrated Matrox G200 video controller providing a 16MB DDR2 graphics interface through the system VGA connector. The Matrox video controller in the 2U server features low power consumption, high reliability and superior longevity.

Other Features

Other onboard features that promote system health include onboard voltage monitors, a chassis intrusion header, auto-switching voltage regulators, chassis and CPU overheat sensors, virus protection and BIOS rescue.

Server Chassis Features

The following subsections provide a general outline of the main features of the Rackable H2106-G7 server chassis.

System Power

The Rackable H2106-G7 2U server chassis features an optional redundant power supply composed of two separate power modules. This power redundancy feature allows you to replace a failed power supply without shutting down the system. Note that each power supply provides up to 1400 Watts of power to the system.

Serial ATA and SAS Subsystems

The server chassis optionally supports up to six 3 Gb/s Serial ATA drives or six 6 GB/s SAS drives. RAID drives are hot-swappable units and are connected to a backplane that provides power and control. Note that the operating system you have installed must support RAID to enable the hot-swap capability of RAID drives.

Front Control Panel

The control panel on the H2106-G7 server provides you with system monitoring and control. LEDs that indicate system power, HDD activity, network activity, system overheat and power supply failure. A main power button and a system reset button are also included. In addition, two

USB ports and one serial port have been incorporated into the control panel to provide front side USB and COM port access.

Serverboard

The H2106-G7 server chassis is an ATX form factor chassis designed to be used in a 2U rackmount configuration. The serverboard provides one UIO slot, four low-profile PCIe expansion slots, one DB-9 COM port, a VGA port, two USB 2.0 ports, PS/2 mouse and keyboard ports and two Gigabit LAN ports. A dedicated RJ-45 IPMI LAN port is also supported. Figure 1-2 on page 7 shows a general block diagram of the H2106-G7 processor and I/O chipset.

Cooling System

The 2U server chassis has an innovative cooling design that includes six 8-cm hot-plug system cooling fans located in the middle section of the chassis. An air shroud channels the airflow from the system fans to efficiently cool the processor area of the system. Each power supply module also includes a cooling fan.
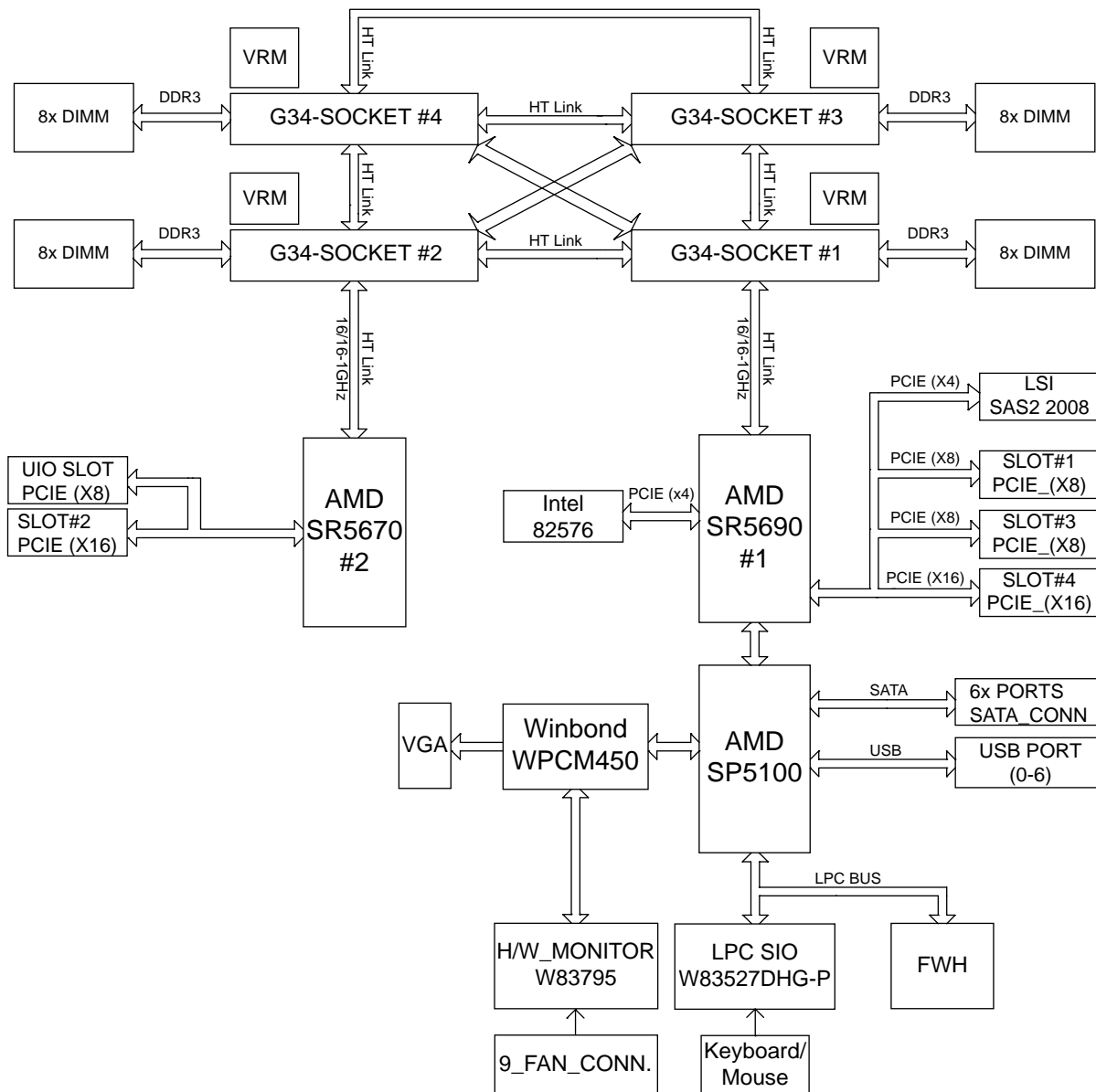
Figure 1-2   Processor and I/O Chipset System Block Diagram

Server Installation

This chapter provides a quick setup checklist to get the H2106-G7 operational.

Unpack the System

Inspect the shipping container that the H2106-G7 was shipped in and note if it was damaged in any way. If the server shows damage, file a damage claim with the carrier who delivered it.

Decide on a suitable location for the rack that supports the weight, power requirements, and environmental requirements of the H2106-G7 server. It should be situated in a clean, dust-free environment that is well ventilated. Avoid areas where heat, electrical noise, and electromagnetic fields are generated. Place the server rack near a grounded power outlet. Refer to "Warnings and Precautions" on page 10.

Prepare for Setup

The shipping container should include two sets of rail assemblies, two rail mounting brackets and the mounting screws that you will use to install the system into a rack.

Read this section in its entirety before you begin the installation procedure.

Choose a Setup Location

Leave enough clearance in front of the rack to enable you to open the front door completely (~25 inches) and approximately 30 inches of clearance in the back of the rack to allow for sufficient airflow and ease in servicing.

Warnings and Precautions

Rack Precautions

⚠ **Warning:** The SGI Rackable H2106-G7 server weighs up to 69 lbs (27.2 kg). Always use proper lifting techniques when you move the server. Always get the assistance of another qualified person when you install the sever in a location above your shoulders. Failure to do so may result in serious personal injury or damage to the equipment.

⚠ **Warning:** Extend the leveling jacks on the bottom of the rack to the floor with the full weight of the rack resting on them. Failure to do so can result in serious injury or death.

⚠ **Warning:** Attach stabilizers to the rack in single rack installations. Failure to do so can result in serious injury or death.

⚠ **Warning:** Couple racks together in multiple rack installations. Failure to do so can result in serious injury or death.

⚠ **Warning:** Be sure the rack is stable before extending a component from the rack. Failure to do so can result in serious injury or death.

⚠ **Warning:** Extend only one component at a time. Extending two or more components simultaneously may cause the rack to tip over and result in serious injury or death.

Server Precautions

- Review the electrical and general safety precautions.

- Determine the placement of each component in the rack before you install the rails.

- Install the heaviest server components in the bottom of the rack first, and then work up.

- Use a regulating uninterruptible power supply (UPS) to protect the server from power surges and voltage spikes and to keep your system operating in case of a power failure.

- Allow the hot-pluggable SAS/SATA drives and power supply modules to cool before touching them.

- Always keep the rack's front door and all panels and components on the servers closed when not servicing to maintain proper cooling.

Rack Mounting Considerations

Ambient Operating Temperature

If installed in a closed or multi-unit rack assembly, the ambient operating temperature of the rack environment may be greater than the ambient temperature of the room. Therefore, consideration should be given to installing the equipment in an environment compatible with the manufacturer's maximum rated ambient temperature (35º C or 95º F).

Reduced Airflow

Equipment should be mounted into a rack so that the amount of airflow required for safe operation is not compromised.

Mechanical Loading

Equipment should be mounted into a rack so that a hazardous condition does not arise due to uneven mechanical loading.

Circuit Overloading

Consideration should be given to the connection of the equipment to the power supply circuitry and the effect that any possible overloading of circuits might have on overcurrent protection and power supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

Reliable Ground

A reliable ground must be maintained at all times. To ensure this, the rack itself should be grounded. Particular attention should be given to power supply connections other than the direct connections to the branch circuit (for example, the use of power strips, and so on).

Install the System into a Rack

This section provides information on installing the H2106-G7 into a rack. If the system has already been mounted into a rack, refer to "Check the Node Board Setup" on page 16. There are a variety of rack units on the market, which may mean the assembly procedure will differ slightly. You should also refer to the installation instructions that came with the rack unit you are using.

Note: This rail will fit a rack between 26 inches and 33.5 inches deep.

Separate the Sections of the Rack Rails

The chassis package includes two rail assemblies in the rack mounting kit. Each assembly consists of two sections: an inner fixed chassis rail that secures directly to the server chassis and an outer fixed rack rail that secures directly to the rack itself.

To separate the inner and outer rails, perform the following steps:

1. Locate the rail assembly in the chassis packaging as shown in Figure 2-1.
2. Extend the rail assembly by pulling it outward.
3. Press the quick-release tab

4. Separate the inner rail from the outer rail assembly if applicable; SGI normally pre-attaches the inner rails to the server chassis.
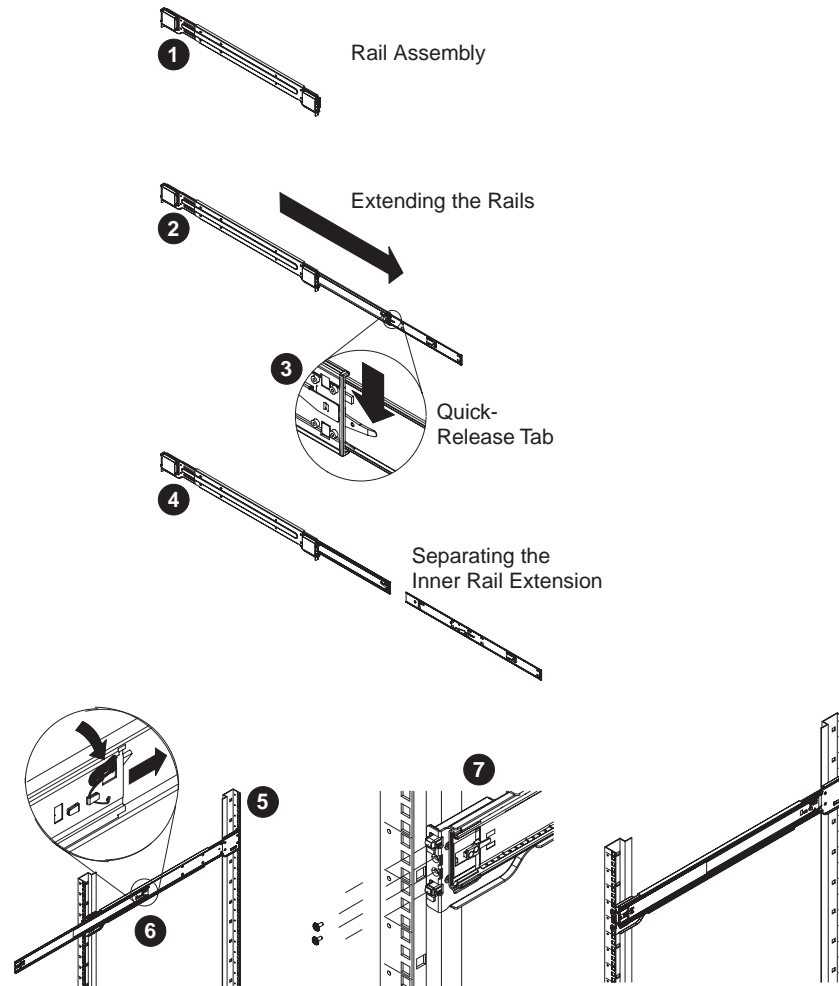
Figure 2-1   Separating and Installing the Rack Rails

Outer Rack Rails

Outer rails attach to the rack and hold the chassis in place. The outer rails for the chassis extend between 30 inches and 33 inches.

Install the Outer Rails to the Rack

1. Measure the depth of the rack (distance from the front rail to the rear rail) to ensure it complies with the limitations listed in the previous subsections.

2. Attach a short bracket to the front side of the right outer rail and a long bracket to the rear side of the right outer rail (see Figure 2-1 on page 13).

3. Adjust both the short and long brackets to the proper distance so that the rail can fit snugly into the rack.

4. Secure the short bracket to the front side of the outer rail with two M4 screws and the long bracket to the rear side of the outer rail with three M4 screws.

5. Repeat the previous steps to properly install the left outer rail.

The Inner Rail Extension

The chassis includes a set of factory-installed inner rails in two sections: inner rails and inner rail extensions. The inner rails are pre-attached to the chassis, and do not interfere with normal use of the chassis if you decide not to use a server rack. The inner rail extension is attached to the inner rail to mount the chassis in the rack.

Using the Rail Locking Tabs

Both chassis rails have a locking tab, which serves two functions:

- The tabs can lock the server into place when installed and pushed fully into the rack, (its normal operating position).

- The tabs also lock the server in place when fully extended from the rack. This prevents the server from coming completely out of the rack when pulled out for servicing.

Depress both tabs at the same time to fully remove the server from its rail mounting and extract it from the rack.

Install the Server in a Rack

⚠ **Warning:** **The SGI Rackable H2106-G7 server weighs up to 69 lbs (27.2 kg) Always use proper lifting techniques when your move the server. Always get the assistance of another qualified person when you install the sever in a location above your shoulders. Failure to do so may result in serious personal injury or damage to the equipment.**

You should now have rails attached to both the server chassis and the rack unit. The next step is to install the server into the rack (refer to Figure 2-2).

1. Extend the outer rails as shown in Figure 2-2.

2. Align the inner rails of the chassis with the outer rails on the rack.

3. Slide the inner rails into the outer rails, keeping the pressure even on both sides. When the chassis has been pushed completely into the rack, it should click into the locked position.

4. Screws are recommended to secure and hold the front of the chassis to the rack.
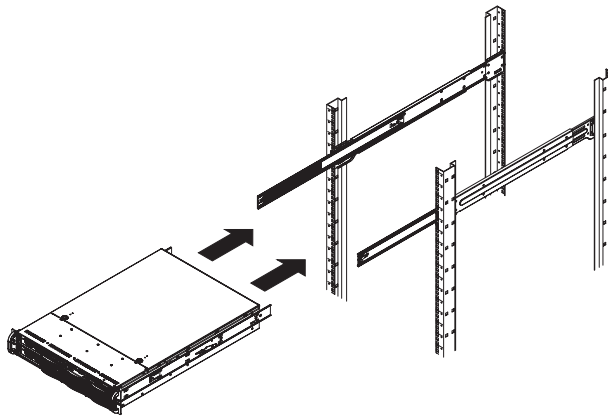
Figure 2-2   Installing the Server in a Rack

Check the Node Board Setup

Use the following sections to open the top cover and check that each node board is properly installed and all the connections have been made.

Access the Inside of the Chassis

1. Grasp the two handles on either side and pull the unit straight out until it locks (you will hear a "click").

2. Depress the two buttons on the top of the chassis to release the top cover as shown in Figure 2-3.

3. Lift the top cover from the chassis.

Note: To remove the system from the rack completely, depress the locking tabs on the chassis rails (push the right-side tab down and the left-side tab up) to continue to pull the system out past the locked position.
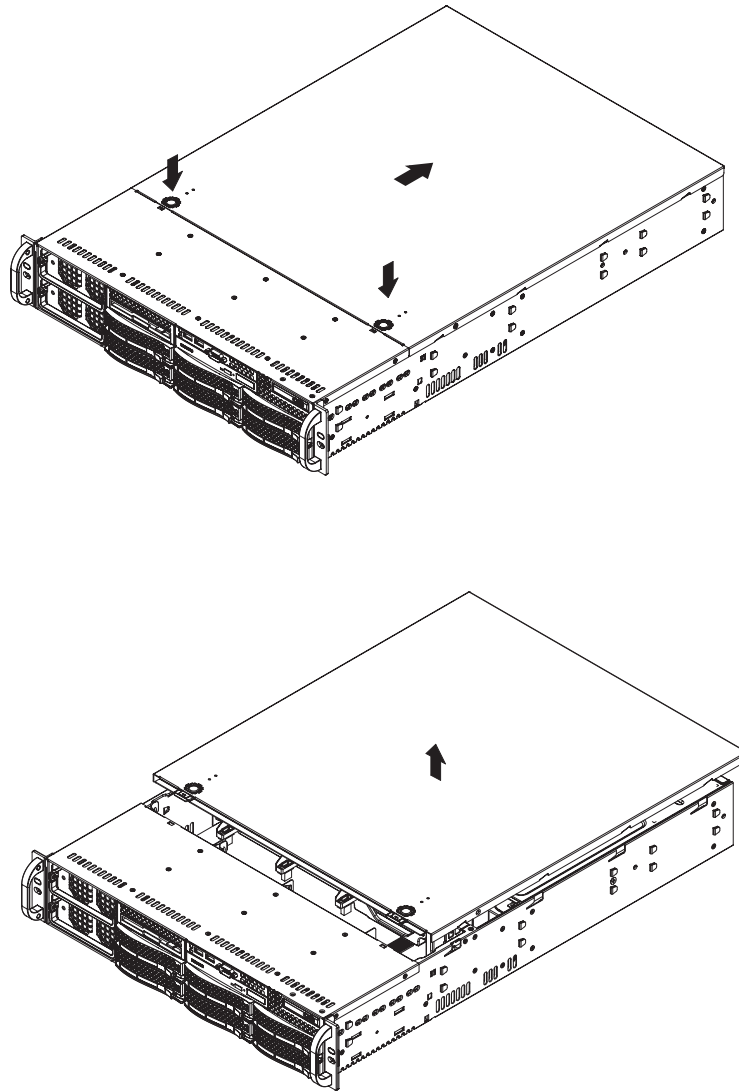
Figure 2-3   Accessing the Inside of the System

Check the CPUs (processors)

Standard factory systems ship with four processors installed into the serverboard. Each processor needs its own heatsink.

Check the System Memory

Your server system is shipped with system memory installed. Make sure all DIMMs are fully seated in their slots. For details on adding system memory, refer to Chapter 3.

Install Expansion PCIe Cards

You can install expansion PCIe cards in the system. Refer to Chapter 3 for information on installing PCIe expansion cards.

Check all Cable Connections and Airflow

Make sure all power and data cables are properly connected and not blocking the chassis airflow. Refer to Chapter 3 for details on cable connections.

Check the Drive Bay Setup

Next, you should check to make sure the system disk drives and disk drive backplane have been properly installed and all connections have been made.

Check the System Disk Drives

All drives are accessible from the front of the server. For servicing the DVD-ROM, you will need to remove the top chassis cover. The hard drives can be installed and removed from the front of the chassis without removing the top chassis cover. Depending upon your system configuration, your system may have one or more drives installed. For detailed information about how to install disk drives, see "Hard Disk Drives (H2106-G7 Chassis)" on page 40.

If you have more than 4TB of storage, you must create multiple volumes to fully utilize your RAID disks.

A slim DVD-ROM may be pre installed in your server. Refer to Chapter 6 if you need to install a DVD-ROM disk drive to the system.

Depending upon your system's configuration, your system may have one or more drives already installed. If you need to install hard drives, please refer to Chapter 6.

Check the Airflow

Airflow is provided by eight hot-swappable 8-cm chassis cooling fans. The system component layout was carefully designed to direct sufficient cooling airflow to the components that generate the most heat.

Note: Make sure that all power and data cables have been routed in such a way that they do not block the airflow generated by the fans.

Supply Power to the System

If necessary, install the system in a rack (refer to "Install the System into a Rack" on page 12), and connect the power cords from the power supply modules into a power strip or power distribution unit (PDU). An optionally available uninterruptible power supply (UPS) can ensure power availability if primary power fails.

System Interface

Overview

There are several LEDs on the control panel as well as others on the drive carriers and power supplies to keep you constantly informed of the overall status of the system, see Figure 3-1.
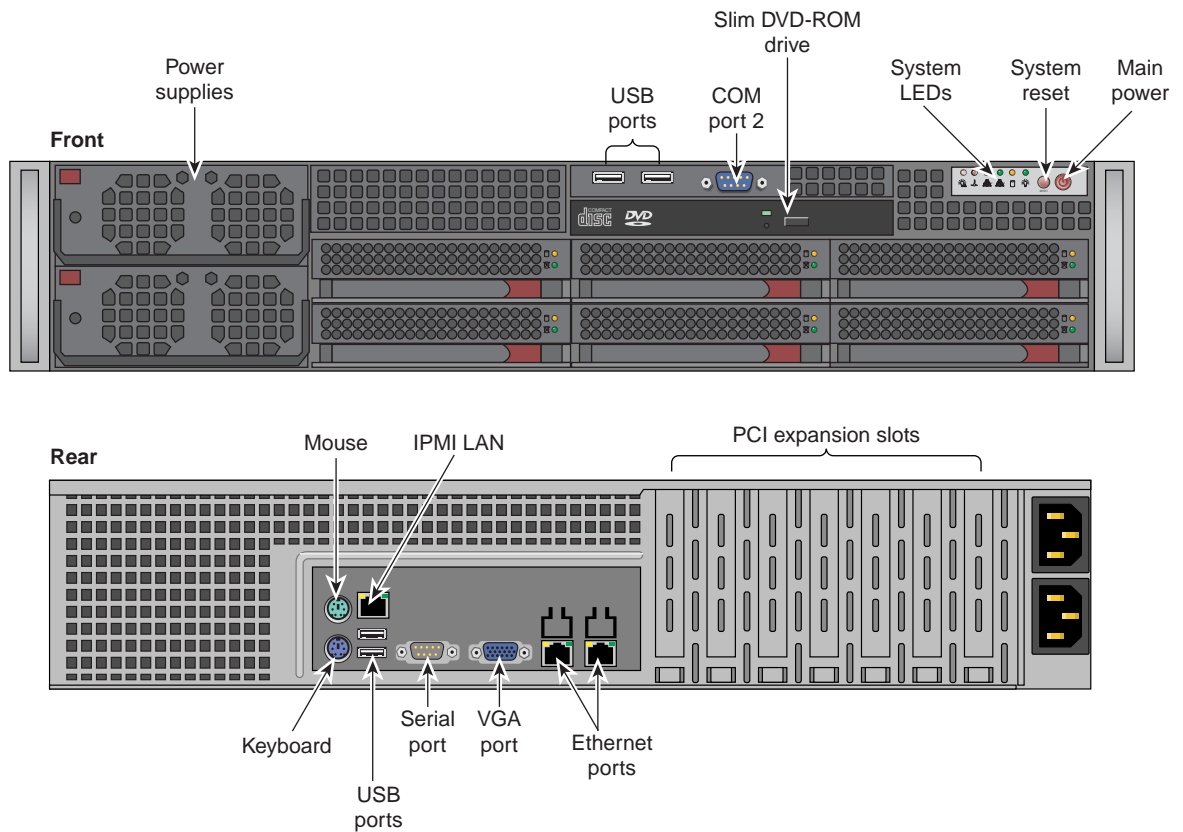
Figure 3-1   System Front and Rear Interface Components

Control Panel Buttons

In addition to monitoring the activity and health of specific components using LEDs, the system uses two buttons located on the front of the chassis: a reset button and a power on/off button. Use the reset button to reboot the system as shown in Figure 3-2.
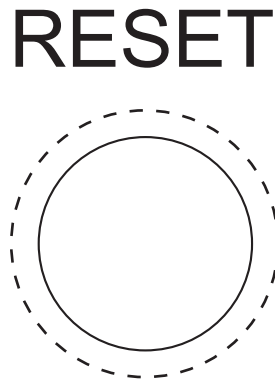
RESET

Figure 3-2   System Reset Button

Figure 3-3 shows the main power button, which is used to apply or turn off the main system power. Turning off system power with this button removes the main power but keeps standby power supplied to the system.
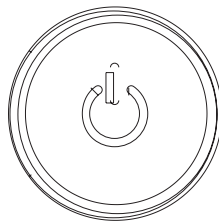
Figure 3-3   System Power On Button

Control Panel LEDs

The control panel located on the front of the chassis has several LEDs. These LEDs provide you with critical information related to different parts of the system. This section explains what each LED indicates when illuminated and any corrective action you may need to take.

Power Fail

The power fail LED indicates a power supply module has failed as shown in Figure 3-4. The (optionally available) second power supply module will take the load and keep the system running but the failed module will need to be replaced. Refer to Chapter 6 for details on replacing the power supply. This LED should be off when the system is operating normally.

Figure 3-4   Power Fail LED

Overheat/Fan Fail

When the red overheat/fan LED flashes (shown in Figure 3-5), it indicates a fan failure. When on continuously it indicates an overheat condition, which may be caused by cables obstructing the airflow in the system or the ambient room temperature being too warm.

Check the routing of the cables and make sure all fans are present and operating normally. You should also check to make sure that the chassis covers are installed. This LED will remain flashing or on as long as the indicated condition exists.

Figure 3-5   Overheat/Fan Fail LED

NIC1

When flashing, the NIC1 LED indicates network activity on the LAN1 port (see Figure 3-6).

Figure 3-6   LAN1 Network Activity NIC1 LED

NIC2

When flashing, the NIC2 LED indicates network activity on the LAN2 port (see Figure 3-7).

Figure 3-7   LAN2 Network Activity NIC2 LED

HDD

The HDD LED indicates hard drive activity when flashing (see Figure 3-8).

Figure 3-8   Hard Drive Activity LED

Power

The power LED indicates power is being supplied to the system's power supply unit(s) is shown in Figure 3-9. This LED should normally be illuminated when the system is operating.

Figure 3-9   Power On LED

Drive Carrier LEDs

Each hard disk drive carrier has two LEDs, as follows:

- Green: When illuminated, the green LED on the drive carrier indicates drive activity. A connection to the drive backplane enables this LED to blink on and off when that particular drive is being accessed. Please refer to Chapter 6 for instructions on replacing failed drives.

- Red: The red LED indicates a drive failure. If one of the drives fails, you should be notified by your system management software. Please refer to Chapter 6 for instructions on replacing failed drives.

System Safety

This chapter describes basic safety precautions.

Electrical Safety Precautions

Basic electrical safety precautions should be followed to protect yourself from harm and the Rackable H2106-G7 system from damage, as follows:

- Be aware of the locations of the power on/off switch on the chassis as well as the room's emergency power-off switch, disconnection switch or electrical outlet. If an electrical accident occurs, you can then quickly remove power from the system.

- Do not work alone when working with high voltage components.

- Power should always be disconnected from the system when removing or installing main system components, such as the memory modules and disk drives. When disconnecting power, you should first power down the operating system and then unplug the power cords. The unit can have more than one power supply cord. Disconnect two power supply cords before servicing to avoid electrical shock.

- When working around exposed electrical circuits, another person who is familiar with the power-off controls should be nearby to switch off the power if necessary.

- Use only one hand when working with powered-on electrical equipment. This is to avoid making a complete circuit, which will cause electrical shock. Use extreme caution when using metal tools, which can easily damage any electrical components or circuit boards they come into contact with.

- Do not use mats designed to decrease static electrical discharge as protection from electrical shock. Instead, use rubber mats that have been specifically designed as electrical insulators.

- The power supply power cords must include a grounding plug and must be plugged into grounded electrical outlets or power distribution unit (PDUs).

Serverboard Battery

⚠ **Caution:** There is a danger of explosion if the onboard battery is installed upside down, which will reverse its polarities (see Figure 4-1). This battery must be replaced only with the same or an equivalent type recommended by the manufacturer. Check with your service representative if you have any questions. Dispose of used batteries according to the manufacturer's instructions.

Lithium battery

Battery holder
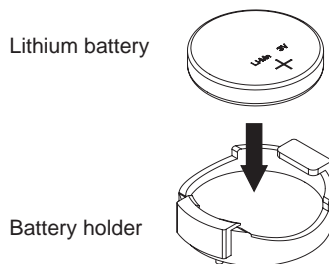
Figure 4-1   Installing the Onboard Battery

DVD-ROM Laser

⚠ **Caution:** This server may have come equipped with a DVD drive. To prevent direct exposure to the laser beam and hazardous radiation exposure, do not open the drive enclosure or use the unit in any unconventional way.

Mainboard Replaceable Soldered-in Fuses

Important: If your system comes with self-resetting PTC (Positive Temperature Coefficient) fuses on the serverboard, they must be replaced by trained service technicians only. The new fuse must be the same or equivalent as the one replaced. Contact your technical support organization for details and support.

General Safety Precautions

Follow these rules to ensure general safety:

- Keep the area around the Rackable H2106-G7 system clean and free of clutter.

- The Rackable H2106-G7 system weighs approximately 69 lbs (27.2 kg.) when fully loaded. When lifting the system, two people at either end should lift slowly with their feet spread out to distribute the weight. Always keep your back straight and lift with your legs.

- Place the chassis top cover and any system components that have been removed away from the system or on a table so that they won't accidentally be stepped on.

- While working on the system, do not wear loose clothing such as neckties and unbuttoned shirt sleeves, which can come into contact with electrical circuits or be pulled into a cooling fan.

- Remove any jewelry or metal objects from your body, which are excellent metal conductors that can create short circuits and harm you if they come into contact with printed circuit boards or areas where power is present.

- After accessing the inside of the system, close the system back up and secure it to the rack unit with the retention screws after ensuring that all connections have been made.

ESD Precautions

⚠ **Caution:** Electrostatic discharge (ESD) is generated by two objects with different electrical charges coming into contact with each other. An electrical discharge is created to neutralize this difference, which can damage electronic components and printed circuit boards.

The following measures are generally sufficient to neutralize this difference before contact is made to protect your equipment from ESD:

- Use a grounded wrist strap designed to prevent static discharge.

- Keep all components and printed circuit boards (PCBs) in their antistatic bags until ready for use.

- Touch a grounded metal object before removing the board from the antistatic bag.

- Do not let components or PCBs come into contact with your clothing, which may retain a charge even if you are wearing a wrist strap.

- Handle a board by its edges only; do not touch its components, peripheral chips, memory modules or contacts.

- When handling chips or modules, avoid touching their pins.

- Put the serverboard and peripherals back into their antistatic bags when not in use.

- For grounding purposes, make sure your computer chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the serverboard.

System Serverboard Information

This chapter includes best practice procedures to work with a node board in the H2106-G7 chassis, install memory DIMMs, PCIe expansion cards and hard disk drives.

A layout and quick reference chart is included in this chapter for your reference. See "Installing Memory" on page 37.

Note: Some software products are protected with software license keys derived from the Media Access Control (MAC) Ethernet address. If your system requires the replacement of a node board, the MAC Ethernet address changes. If you are using such a product, you must request a new license key after replacing the node board. Contact your local customer support office:

http://www.sgi.com/support/supportcenters.html

⚠ **Caution:** Install the chassis cover after you have completed accessing the components inside the server to maintain proper airflow and cooling for the system.

Handling the Node Board

⚠ **Caution:** Electrostatic discharge (ESD) can damage electrostatic-sensitive devices inside the H2106-G7 server. Use the ESD precautions described below when you handle printed circuit boards or other components in the system. The following measures are generally sufficient to protect your equipment from electric static discharge.

ESD Precautions

- Use a grounded wrist strap designed to prevent electrostatic discharge.

- Touch a grounded metal object before removing any board from its antistatic bag.

- Handle each printed circuit board (PCB) by the edges; do not touch the components, peripheral chips, memory modules, or gold contacts on the PCB.

- When handling chips or modules, avoid touching the pins.

- Place the node board, expansion PCI cards, or other boards and components into antistatic bags when not in use.

- Make sure your computer chassis provides a conductive path between the power supply, the case, the mounting fasteners, and the node board to chassis ground.

Unpacking

Caution: The node board is shipped in antistatic packaging to avoid electrostatic discharge damage. Be sure to use ESD precautions when you unpack replacement components for the H2106-G7 server. Failure to do so can result in damage to the equipment.

Connecting the Control Panel

JF1 contains header pins for various front control panel connectors. See Figure 5-1 for the pin locations of the various front control panel buttons and LED indicators.

All JF1 wires have been bundled into a single cable to simplify this connection. Make sure the red wire plugs into pin 1 as marked on the board. The other end connects to the Control Panel PCB board, located just behind the system status LEDs on the chassis.

20 19

Ground   NMI
x (Key)   x (Key)
Power On LED   Vcc
HDD LED   Vcc
NIC1 LED   Vcc
NIC2 LED   Vcc
OH/Fan Fail LED   Vcc
Power Fail LED   Vcc
Ground   Reset (Button)
Ground   Power (Button)

2 1
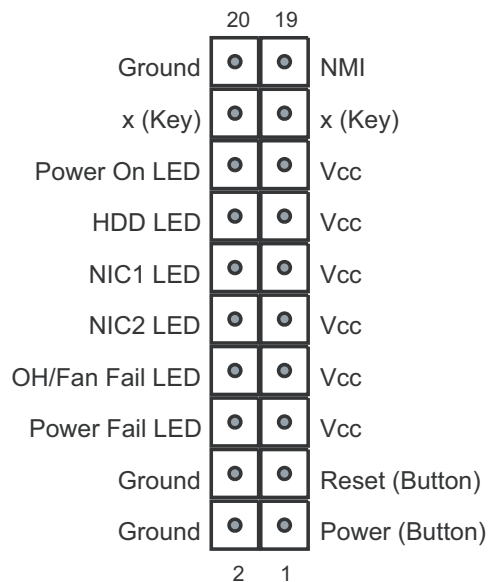
Figure 5-1   Control Panel Header Pins

Serverboard I/O Ports

The I/O ports are color coded in conformance with the PC 99 specification. See Figure 5-2 below for the colors and locations of the various I/O ports.
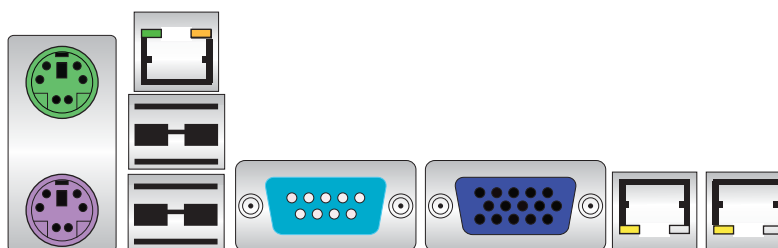
Figure 5-2   I/O Ports Locations

Serverboard Details

The 2U H2106-G7 system chassis has one node board. The H2106-G7 serverboard is configured with up to four processors. When properly configured with four processors, the following rules apply:

- All processor sockets must have identical revisions, core voltage, and bus/core speed.

- The stepping between the processors on the board must be identical.

- See Figure 5-3 for CPU locations on the serverboard - note that the drawing is not to scale.

CPUs

- Quad AMD Opteron 6100/6200 series (Socket G34 type) processors

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Note: A minimum of four processors must be installed for full functions to be supported.

Memory

- Thirty-Two (32) single/dual/tri/quad channel DIMM slots supporting up to 512 GB of DDR3-1600/1333/1066/800 registered ECC or 128GB of DDR3 Unbuffered ECC/non-ECC SDRAM

Note: Refer to the memory installation information in this guide before installing new memory. Check with your authorized sales/service representative for approved DIMM types.

Chipsets

- One AMD SR5690 plus one SR5670 and one SP5100 Southbridge chipset

Expansion Slots

- Two (2) PCI-Express x16 Gen. 2

- Two (2) PCI-Express x8 Gen. 2

- One (1) UIO BIOS

- 16 Mb AMIBIOS® SPI Flash ROM

- APM 1.2, DMI 2.3, PCI 2.2, ACPI 1.0 (ACPI 2.0 is BIOS supported), SMBIOS 2.3, Real Time Clock Wakeup, Plug and Play (PnP), BIOS resume hot keys

PC Health Monitoring

- Onboard voltage monitors

- Fan status monitor with firmware/software on/off and speed control

- Watch Dog

- Environmental temperature monitoring via BIOS

- Power-up mode control for recovery from AC power loss

- System resource alert (via included utility program)

- Auto-switching voltage regulator for the CPU core

- CPU thermal trip support

- I2C temperature sensing logic

- Chassis intrusion detection

ACPI Features

- Microsoft OnNow available

- Slow blinking LED for suspend state indicator

- BIOS support for USB keyboard

- Wake-On-LAN (WOL)

- Internal/external modem ring-on

- Hardware BIOS Virus protection

Onboard I/O

- Six (6) SATA ports supported by an on-chip SATA controller (RAID 0, 1, 10 supported)

- Eight (8) SAS ports supported by an LSI 2008 SAS2 controller (RAID 0, 1, 10 supported; Raid 5 Optional) (SAS only) See

- Two (2) Fast UART 16550 compatible serial ports (one header and one port)

- Seven (7) USB (Universal Serial Bus 2.0) ports (2x rear [external], 4x header,1x type A)

- Two (2) LAN ports supported by an onboard Intel® 82576 dual port Ethernet controller for 10/100/1000Base-T

- One (1) dedicated IPMI LAN port

• One (1) VGA port supported by an onboard Matrox® G200 graphics controller (with 16 MB DDR2 memory)

Serverboard Dimensions

Proprietary format: 16.48" x 13" (418 mm x 330 mm)
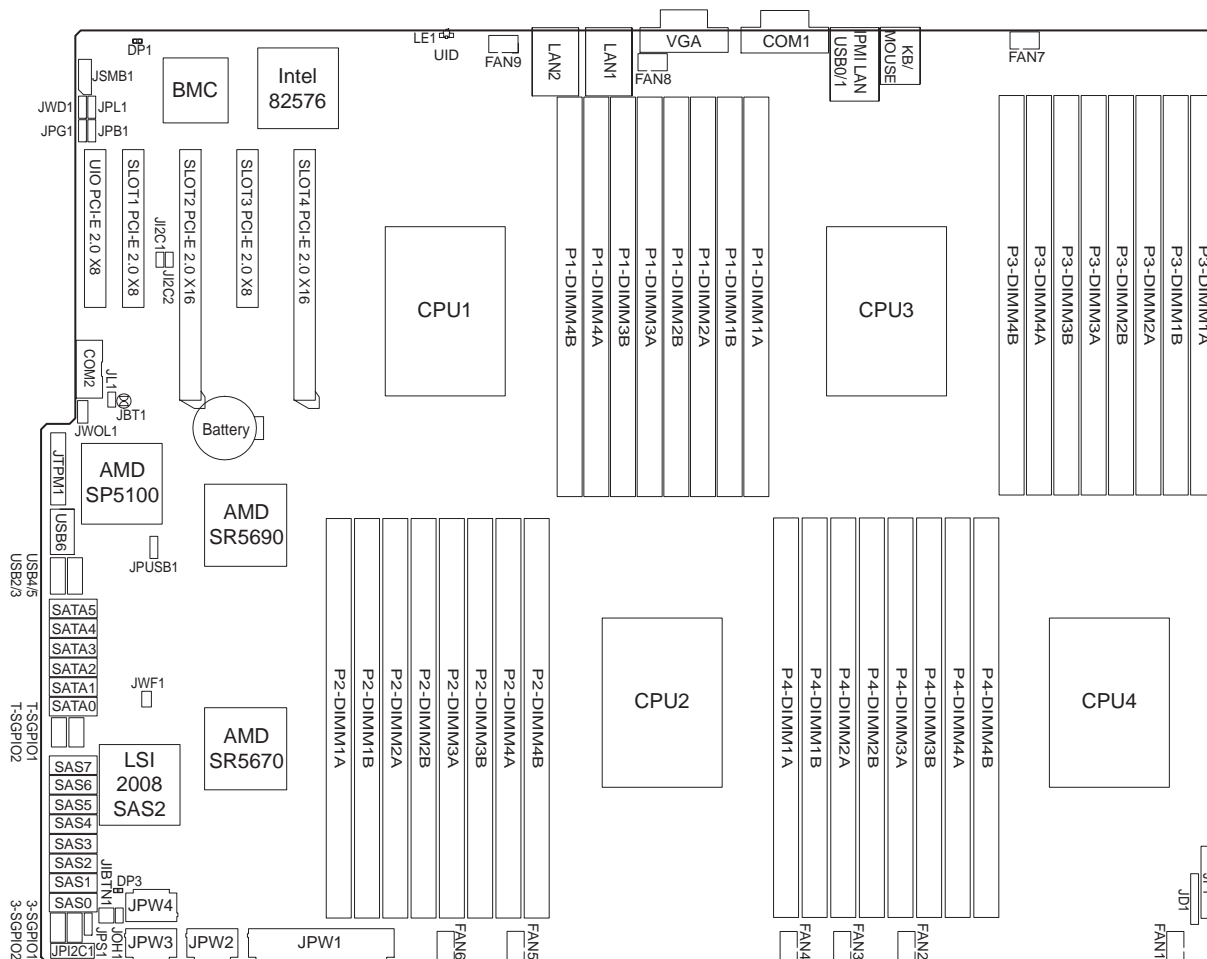
Figure 5-3   Node Board Features

Installing Memory

⚠ **Caution:** Exercise extreme care when installing or removing DIMM modules to prevent any possible damage.

The H2106-G7 serverboard supports up to 32 DIMM slots. Three-way interleaved memory is supported. For optimal memory performance always use memory modules of the same type and speed. See the following table for memory installation.

Install DIMMs

Perform the following steps to install memory modules, as follows:

1. Insert the DIMM module vertically and press down into its slot until it snaps into place. Pay attention to the alignment notch at the bottom of the module to avoid installing incorrectly (see Figure 5-4). Insert the desired number of DIMMs into the memory slots, beginning with DIMM #1A and DIMM #2A, then DIMM #3A and DIMM #4A, etc. (see Table 5-1 on page 38 for 16-DIMM placement). Always spread DIMMs across all banks for each CPU. Gently press down on the DIMM module until it snaps into place in the slot. Repeat for all modules.

2. Install to slots CPU1/DIMM1A, CPU1/DIMM2A, CPU1/DIMM3A and CPU1/DIMM4A, etc. Always install in groups of four and in the numerical order of the DIMM slots. See support information below.

3. Gently press down on the memory module until it snaps into place.

4. With four CPUs installed, repeat step 2 to populate each of the four CPU DIMM slots. See Table 5-2 on page 39 for 32-DIMM application on a serverboard.

For the most efficient operation, always install four or eight DIMMs to support each CPU.

Note: 1 GB, 2 GB, 4 GB, 8 GB and 16 GB memory modules are supported. It is highly recommended that you remove the power cord from the system before installing or changing memory modules. Check with your sales or service representative for memory that has been tested and approved for the serverboard.

Memory Support

The serverboard supports single/dual/tri/quad-channel, DDR3-1600/1333/1066/800 registered ECC/Unbuffered ECC/non-ECC SDRAM. Only interleaved memory is supported, so you must populate four DIMM slots at a time (see procedure above).

Populating four adjacent slots at a time with memory modules of the same size and type will result in interleaved (128-bit) memory, which is faster than non-interleaved (64-bit) memory.

5. To remove a DIMM module, use your thumbs to gently push the release tabs near both ends of the module (see Figure 5-4). This should release it from the slot.
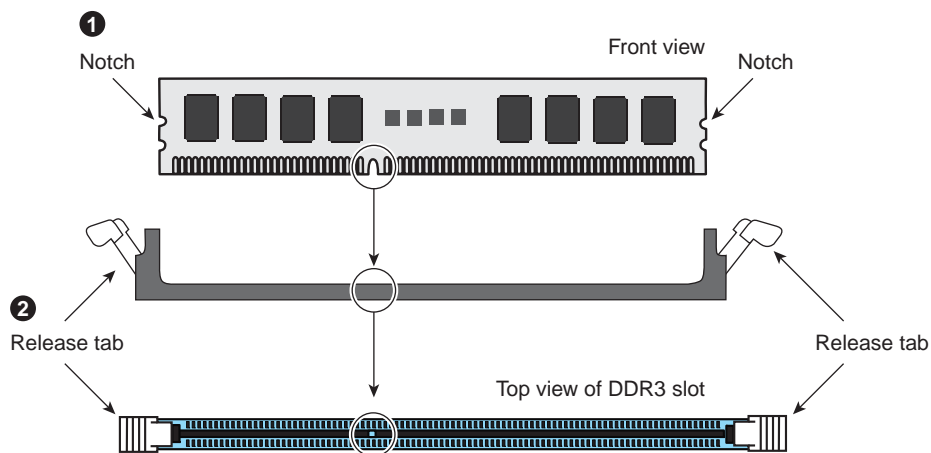
Figure 5-4   DIMM Installation Example

Table 5-1   Serverboard 16-DIMM Configuration (Four Per CPU)

#DIMMs	CPU	Channel 1	Channel 2	Channel 3	Channel 4
16 DIMMs	CPU1	P1-1A	P1-2A	P1-3A	P1-4A
	CPU2	P2-1A	P2-2A	P2-3A	P2-4A
	CPU3	P3-1A	P3-2A	P3-3A	P3-4A
	CPU4	P4-1A	P4-2A	P4-3A	P4-4A

Table 5-2   32-DIMM Configuration (8 per CPU)

#DIMMs	CPU	Channel 1	Channel 2	Channel 3	Channel 4
32 DIMMs	CPU1	P1-1A & P1-1B	P1-2A & P1-2B	P1-3A & P1-3B	P1-4A & P1-4B
	CPU2	P2-1A & P2-1B	P2-2A & P2-2B	P2-3A & P2-3B	P2-4A & P2-4B
	CPU3	P3-1A & P3-1B	P3-2A & P3-2B	P3-3A & P3-3B	P3-4A & P3-4B
	CPU4	P4-1A & P4-1B	P4-2A & P4-2B	P4-3A & P3-3B	P4-4A & P4-4B

Memory DIMM Layout

The H2106-G7 memory bus is a quad-channel controller intended for use with four processor configurations. Note that memory DIMM slots should be populated equally in adjacent memory banks on each channel.

Memory DIMM Rules

Use the following rules when installing memory DIMMs:

The minimum memory recommended on the system is 16 GB.

- Populate the DIMMs in groups of four or eight per CPU as described in Table 5-1 on page 38 and Table 5-2 on page 39.

- A minimum of four DIMMs per processor must always be present.

- Mixing DIMM Sizes - When mixing DIMMs on a channel that has a mixed number of ranks, it is recommended to have the total number of ranks on the channel be even to avoid bandwidth degradation. Example: placing a single-rank DIMM and a dual-rank DIMM on the same channel is not desirable.

- For maximum memory performance the DIMMs within a node must be identical in:

  – Speed (for example - 1600 Mtransfer/sec)

  – Number of ranks (1 or 2)

Note: The speed of the memory controller will reduce to the lowest speed DIMM on the channel.

•   When configuring the memory for maximum performance, it is critical that the memory DIMM capacity is balanced across all memory channels.

The maximum speed of the memory controller changes based on the number of DIMMs placed on the channel and the memory channel speed supported by the processor:

•   With one or two single or dual-ranked DIMMs on the channel (of a 6100 series processor) the maximum speed supported is 1333 MT/s

•   With one or two single or dual-ranked DIMMs on the channel (of a 6200 series processor) the maximum speed supported is 1600 MT/s

The following conditions must be met to utilize a memory speed of 1600 MT/s:

•   The processor must be capable of supporting 1600 MT/s

•   The DIMMs must be capable of running at 1600 MT/s and be of equal capacity

•   One or two single-rank DIMMs are placed on each channel

•   Use of dual-rank 1600 MT/s DIMMs requires that only one be placed on each channel. Note that this restricts overall memory capacity as only one of the two available DIMM slots can be used.

Hard Disk Drives (H2106-G7 Chassis)

The 2U chassis supports a maximum of six SAS or SATA disk drives. Install the drives from left to right starting in the bottom-left bay. Disk drive bays **must** be populated with either a drive or a "drive blank" to maintain system thermals. Failure to follow this guideline may cause system overheating and thermal shutdown of the unit.
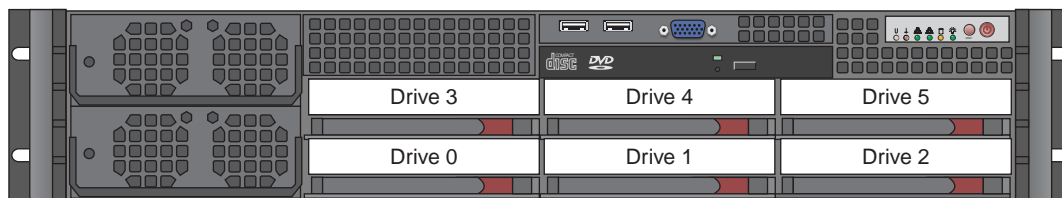
Figure 5-5   H2106-G7 Disk Drive Locations

Drive Configurations

The disk drive configurations supported in the Rackable H2106-G7 server are outlined in the paragraphs that follow. Note that some configurations are dependent on use of optional SAS drives in the system. The system must have an optional SAS enabled serverboard to use SAS drives as either Jbod or RAID.

The supported disk drive configurations are as follows:

- JBOD
  This non-RAID disk array supports any number of drives between one and six. The operating system is placed on the disk drive in location 0. All other drives are data drives.

- RAID 0
  Disk striping without parity, supports any number of drives between two and six. Note that all drives must be the same type. The operating system will be striped across all drives in the system. This configuration is **not** recommended.

- RAID 1
  Disk mirroring, supports exactly two drives. The two drives represent one RAID 1 logical drive. The operating system will be installed on the drives located in Drive 0 and 1. Note that both drives must be of the same type, speed and size.

- RAID 10
  Mirrored disk striping, the data is striped across one set of drives and then mirrored on another set of drives. A minimum of four drives of the same type are required. The total number of drives must be an even number (4 or 6). A total of four drives is a 2+2 and six drives is a 3+3,. The operating system will be striped across all drives in the primary set and then mirrored on the secondary set of drives. Note that all drives must be the same type, speed and capacity.

PCIe Expansion Cards

A riser card is used to support a standard size (full height full length) PCI expansion card.

There are three PCIe expansion slot types available with the H2106-G7 server:

- Two PCIe 2.0 x16 slots

- Two PCIe 2.0 x8 slots

- One UIO slot

Note: The UIO slot shares the x8 PCIe bus used for slot 1, you can either populate the UIO slot or PCIe slot 1, but not both slots. Select option cards can use the UIO slot, contact your sales or service representative for information on approved option cards.

Installing a PCIe Expansion Card

Confirm that you have the correct riser card for your chassis model and the add-on card includes a standard bracket.

1. Remove the chassis cover.

2. Install the riser card by sliding card into the appropriate riser card in the serverboard.

3. Choose the PCI slot shield in which to place the add-on card.

4. In that slot, open the PCI slot shield lever and slide the shield sideways.

5. From inside the chassis, remove the PCI slot shield.

6. Slide the add-on card into the riser card and attach the add-on card bracket in place of the PCI slot shield.

7. Secure the add-on card by closing the PCI slot shield lever.

8. Connect cables to the add-on card as necessary.

Power Supply Functional Rating

The H2106-G7 server default configuration is one front-installed 1200W/1400W power supply. The optional second power supply acts as a redundant power unit for the server. The supplies can operate from either 100-140V or 180-240V levels at 50 or 60Hz.

A power supply will produce 1200 Watts when supplied with a 100-140V input. A supply will produce 1400 Watts when supplied with a 180-240V input.

The supplies used have an 80 Plus Gold Certification rating.

Basic Troubleshooting and Chassis Service

Use the procedures in the first half of this chapter to troubleshoot your system. If you have followed all of the procedures below and still need assistance, check with your authorized support organization.

The subsections in the second half of this chapter starting with "Chassis Service Information" on page 47 are intended to guide you through basic component remove and replace procedures.

Basic Troubleshooting Procedures

Use the information in the following subsections to remedy basic problems you might encounter when working with the Rackable H2106-G7 server.

If the System Does Not Power Up

If the system will not power up when the front power button is pushed, use the following checklist to identify common sources for the problem:

- Make sure that both ends of each system power cable are firmly connected to the power supply and the corresponding power source(s) or power distribution unit (PDU).

- Check that the LED on each power supply is properly lit. The power supply has one status LED located on the left side of the front of the power supply. The status LED has three states as follows:

  - Dark or off - indicates no AC power present

  - Yellow - AC power is present, the server is not turned on (no DC power)

  - Green - AC power is present and the server is turned on (DC power present)

- Open the system cover, remove the air shroud and check to make sure that no obvious short circuits exist between the serverboard and chassis.

System Powers Up But Will Not Boot

If the system powers up but will not boot the Operating System, check the following:

- Check the system order document(s) - the H2106-G7 server may have been ordered with no operating system. If so, check with your system administrator for OS loading information.

- Check the system disk for drive activity and confirm that it is firmly seated in the disk bay. A red light on the front of the disk indicates a functional error. Check with your service provider or local system administrator.

No Video After System Power Up

If the system powers up and appears to be booting normally but no video is present, try the following basic solutions:

- Confirm your monitor is plugged in and switched on.

- Check all video cables and ensure they are properly connected.

- If using an optional PCIe video card check the back of the card for LED activity or a fault indicator. Try opening the system, reseating the PCI card and rebooting.

If you cannot get a video signal after trying basic solutions contact your support provider.

Memory Errors

If your system experiences memory related errors, try these basic troubleshooting steps to resolve or better identify the problem:

- Confirm that the power supply LED is not indicating an error.

- Shut the system down, remove the covers over the serverboard and make sure that all the DIMM modules are properly and fully installed.

- You should be using registered ECC DDR3 memory. Also, it is recommended that you use the same memory type and speed for all DIMMs in the system. See Chapter 5 for more memory details.

- Check for bad DIMM modules or slots by swapping modules between slots and noting the results.

Contact your administrator or support provider if the memory errors continue.

Chassis Service Information

The following sections cover the steps required to install components and perform maintenance on the H2106-G7 chassis. For component installation, follow the steps in the order given to eliminate the most common problems encountered. If some steps are unnecessary, skip ahead to the step that follows.

Important: Always disconnect the AC power cord(s) before adding, changing or installing any internal hardware components.

Tools Required: The only tool you will need to install components and perform maintenance is a Phillips screwdriver.

Static-Sensitive Devices

Electrostatic discharge (ESD) can damage electronic components. To prevent damage to any printed circuit boards (PCBs), it is important to handle them very carefully. The following measures are generally sufficient to protect your equipment from ESD damage.

Precautions

- Use a grounded wrist strap designed to prevent static discharge.

- Touch a grounded metal object before removing any board from its antistatic bag.

- Handle a board by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.

- When handling chips or modules, avoid touching their pins.

- Put the serverboard, add-on cards and peripherals back into their antistatic bags when not in use.

- For grounding purposes, make sure your computer chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the serverboard.

Unpacking

Replacement components are usually shipped in antistatic packaging to avoid static damage. When unpacking an upgrade or replacement component, make sure the person handling it is static protected.

Control Panel

The control panel (located on the front of the chassis) must be connected to the JF1 connector on the serverboard to provide you with system status indications. A ribbon cable has bundled these wires together to simplify the connection. Connect the cable from JF1 on the serverboard to the Control Panel PCB (printed circuit board). Make sure the red wire plugs into pin 1 on both connectors. Pull all excess cabling out of the airflow path. The LEDs inform you of system status. See Chapter 3 for details on the LEDs and the control panel buttons. Details on JF1 can be found in Chapter 5.

System Fans

Six 8-cm hot-swap fans provide the cooling for the system. It is very important that the chassis top cover is properly installed and making a good seal in order for the cooling air to circulate properly through the chassis and cool the components. See Figure 6-2.

System Fan Failure

Fan speed is controlled by system temperature via a BIOS setting. If a fan fails, the remaining fans will ramp up to full speed and the overheat/fan fail LED on the control panel will turn on and flash. See the section "Overheat/Fan Fail" on page 23 for additional information on the warning LED. Replace any failed fan as soon as possible with the same type and model (the system can continue to run with a failed fan). Note that you may need to remove the top chassis cover while the system is running to accurately determine which of the fans has failed.

Note: If the installation position of the server precludes identification of the failed fan, move the unit to a static-free work surface and reconnect power to identify the non-working fan. Use of a flashlight may be necessary depending on ambiant light levels and system positioning.

If you remove the server from the rack, be sure to unplug and label all data and power cables. Review the information in the sections "Install the Server in a Rack" on page 15 and "Access the Inside of the Chassis" on page 16 for reference information.

Identifying the Failed Fan

This subsection is intended to help a system administrator or authorized service provider to identify which fan in the system has failed and is causing the "Overheat/Fan Fail" LED to flash.

Troubleshooting the fan failure may be accomplished using:

- A visual inspection (see also "System Fan Failure")
- By use of the system's BMC/IPMI "Server Health" function on the IPMI main screen

Visual Identification of a Failed Fan

1. With the system power on, open the top cover. If you can see that the fan blades of a particular fan are not turning, it is likely the failed unit. Using a flashlight may help if ambient light levels are low.

2. If you cannot visually confirm that any of the fans have stopped running, you can find the failed unit by process of elimination (repeat as needed):

   – Press the "unlock" tabs on the side of a fan and pull it straight up and out.

   – The fan blades on a running unit (good fan) will continue to turn for several seconds.

   – If the blades on the extracted fan are not running, it is likely the bad fan.

BMC/IPMI Remote Console Fan Failure Identification

1. Access the "Remote Server" via console redirection using the browser.

2. Once connected to the remote server via IPMI Console Redirection, the "IPMI Log-In" screen displays.

3. Enter your username and password in the log-in screen (factory default is ADMIN/ADMIN).

4. Look for the "Server Health" button on the upper-left portion of the IPMI system information main screen. Click on this button.

5. The window should display IPMI sub-menu items; look for "Sensor Reading" and click it.

6. The status of the system fans should be displayed by the GUI and the speed of each fan should be listed.

Note: If the GUI indicates a fan fault that is not one of the main system cooling fans (1-6), then it cannot be swapped out. Power the server down and contact your service provider.

7. The fan identification number for each unit's physical location is shown in Figure 6-1.

Tip: It is possible for a malfunctioning "slow" fan to cause the "Overheat/Fan Fail" LED to flash. For example, if fans one through five are turning at 5,000 RPM and fan six is turning at 1,000 RPM, it is likely the slower fan is faulty. Replace the abnormally slow fan and the fault should be corrected.
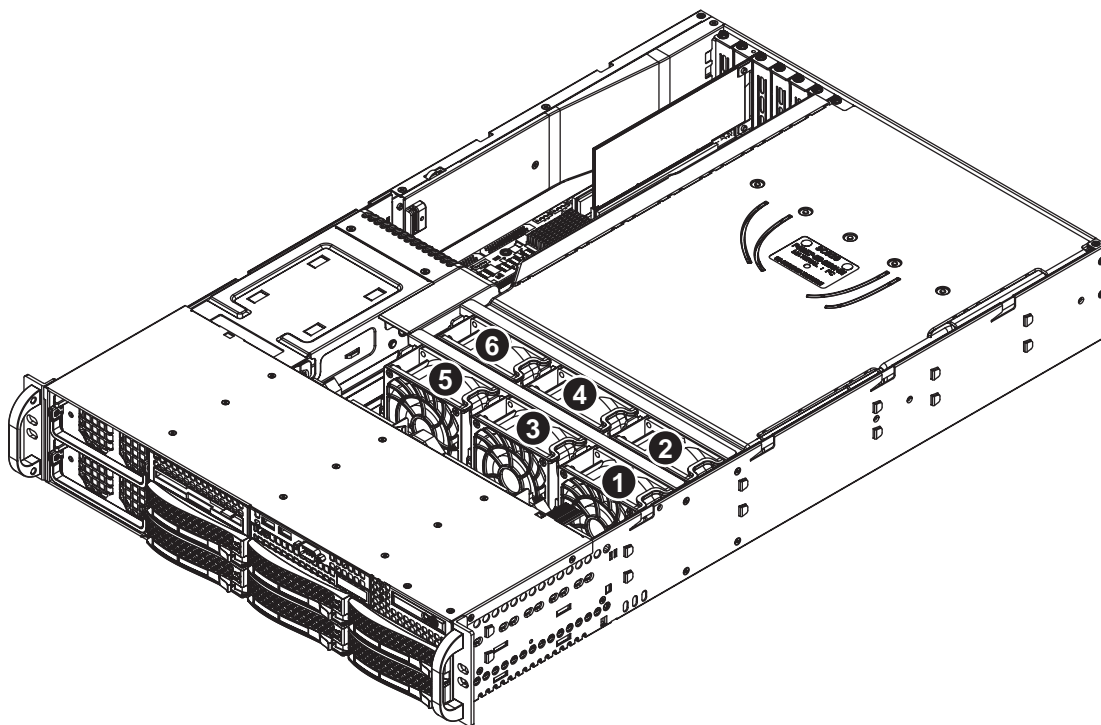
Figure 6-1   System Cooling Fan Locations

Replacing System Fans

Review all the information in the previous section "System Fan Failure" on page 48 before replacing a failed fan. The following subsections describe how to remove and replace a system fan.

Removing a Fan

1. Remove the chassis cover if you have not already done so.

2. Press the tabs on the sides of the fan to unlock and pull the failed fan straight up and out of its housing. The fan's power connections will automatically detach.

3. System power does not need to be shut down since the fans are hot-pluggable.

Installing a New Fan

1. Replace the failed fan with an identical 8-cm, 12 volt fan.

2. Position the new fan into the space vacated by the failed fan previously removed. A "click" can be heard when the fan is fully installed in place and the power connections are made.

3. If the system power is on, the hot-plug feature will cause the fan to start immediately upon being connected to its header on the serverboard.

Tip: If the Overheat/Fan Fail LED does not stop flashing after installation of the new fan, try rebooting the system.

Drive Bay Installation/Removal

This section describes drive bay installation and removal.

Accessing the Drive Bays

Drives: You do not need to access the inside of the chassis or remove power to replace or swap a RAIDed hard disk drive. Data may be lost or corrupted if you hot swap a Jbod disk drive. Removing a drive without replacing it may cause system errors. Proceed to the next section for further hard drive instructions.

Note: You must use approved standard 1" high, disk drives in the system.

DVD-ROM Drive: For installing/removing the DVD-ROM disk drive, you will need to gain access to the inside of the server by removing the top cover of the chassis. Proceed to the "DVD-ROM Drive Installation" section later in this chapter for instructions.

Disk Drive Installation

The drives are mounted in drive carriers to simplify their installation and removal from the chassis. These carriers also help promote proper airflow for the drives. For this reason, even empty carriers without hard drives installed must remain in the chassis.

Mounting a Disk Drive in a Drive Carrier

1. To add a new drive, install the drive into the carrier with the printed circuit board side facing down so that the mounting holes align with those in the carrier.

2. Secure the drive to the carrier with the side-mounting screws, see the example in Figure 6-2.
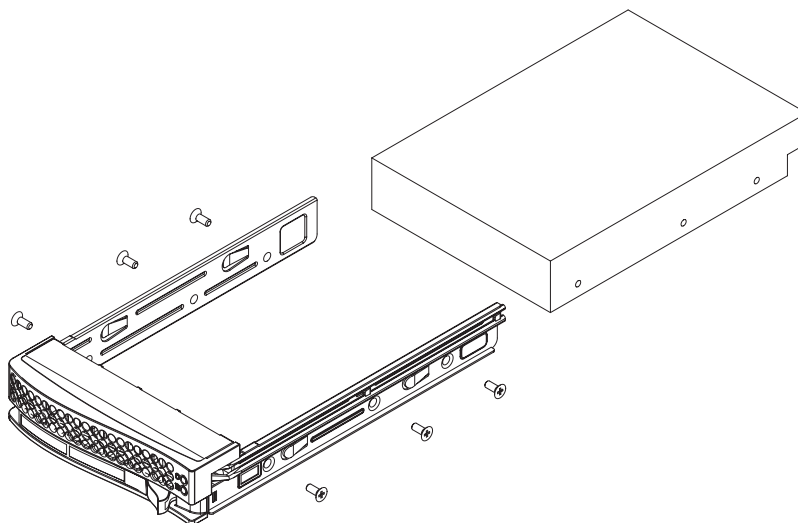
Figure 6-2   Mounting a Drive in a Carrier

Installing/Removing Hot-swap Drives

1. Push the release button located beside the drive's LEDs.

2. Swing the handle fully out and use it to pull the drive carrier straight out (see Figure 6-3).
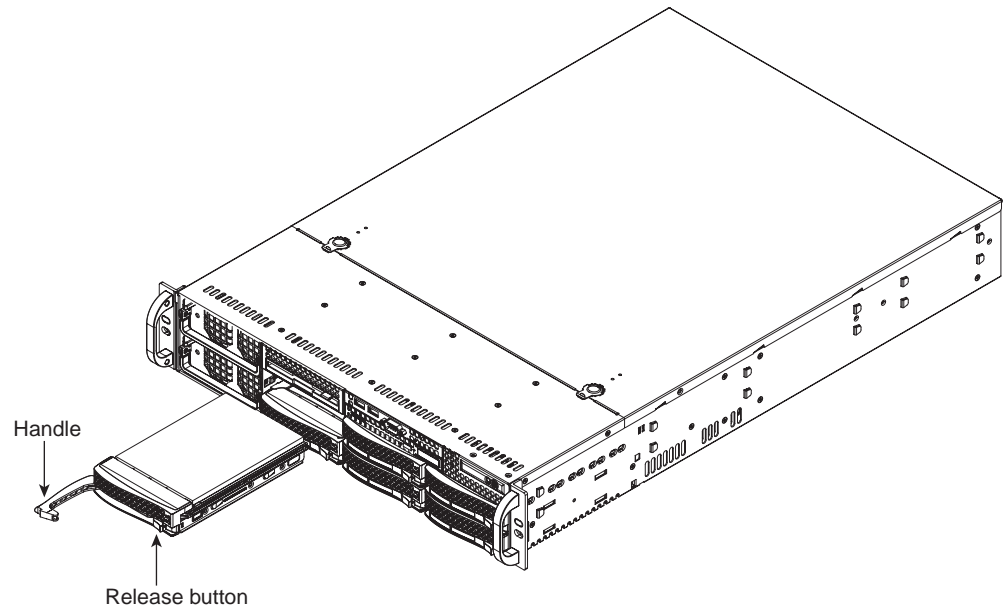
Figure 6-3   Removing a Disk Drive Carrier

Note: Your operating system must have RAID support to enable the hot-plug capability of the drives.

<div>⚠</div> **Important:** Regardless of how many hard drives are installed, all drive carriers must remain in the drive bays to maintain proper airflow.

<div>⚠</div> **Caution:** Be careful when working around the drive backplane. Do not touch the backplane with any metal objects and make sure no ribbon cables touch the backplane or obstruct the holes, which aid in proper airflow.

Hard Drive Backplane

The hard drives plug into a backplane that provides power, drive ID and bus termination. A RAID controller and/or optional RAID software can be used with the backplane to provide data security. The operating system you use must have RAID support to enable the hot-swap capability of the hard drives. The backplane is already preconfigured, so no jumper or switch configurations are required.

DVD-ROM Drive Installation

The top cover of the chassis must be opened to gain full access to the DVD-ROM drive bay. The system accommodates only slim type DVD-ROM drives. Side mounting brackets are typically needed to mount a slim DVD-ROM drive in the server.

Accessing the Inside of the Chassis

1. Grasp the two handles on either side and pull the unit straight out until it locks (you will hear a "click").

2. Next, depress the two buttons on the top of the chassis to release the top cover and at the same time, push the cover away from you until it stops. You can then lift the top cover from the chassis to gain full access to the inside of the server.

Note: You must power down the system before installing or removing IDE components.

Drives mount on rails and should "click" into place to be correctly and fully installed in their bays.

Power Supply

The system has a 1200/1400 watt redundant power supply consisting of one or (optionally) two power modules. Each power supply module has an auto-switching capability, which enables it to automatically sense and operate at a 100V - 240V input voltage.

Power Supply Failure

If your system has an optional second power supply and either of the two power supply modules fail, the other module will take the full load and allow the system to continue operation without interruption. The PWR Fail LED will illuminate and remain on until the failed unit has been replaced. The power supply units have a hot-swap capability, meaning you can replace the failed unit without powering down the system.

Removing/Replacing the Power Supply

If the server is equipped with an optional second power supply, you do not need to shut down the system to replace a power supply unit. The optional backup power supply module will keep the system up and running while you replace the failed unit. Replace with the same model.

Removing the Power Supply

1. First unplug the AC power cord from the failed power supply module.
2. Depress the locking tab on the power supply module.
3. Pull it straight out using the rounded handle.

Installing a New Power Supply

1. Replace the failed hot-swap unit with another identical power supply unit.
2. Push the new power supply unit into the power bay until you hear a click.
3. Secure the locking tab on the unit.
4. Finish by plugging the AC power cord back into the unit.

BIOS

This chapter describes the AMI BIOS Setup Utility for the severboard. The AMI ROM BIOS is stored in a Flash EEPROM and can be updated when needed. This chapter describes the basic navigation of the AMI BIOS Setup Utility setup screens.

Note: Due to periodic changes to the BIOS, some settings may have been added or deleted and might not be recorded in this manual. Contact your service representative to obtain the latest BIOS release.

Starting BIOS Setup Utility

To enter the AMI BIOS Setup Utility screens, press the <Delete> key while the system is booting up.

Note: In most cases, the <Delete> key is used to invoke the AMI BIOS setup screen. There are a few cases when other keys are used, such as <F1>, <F2>, etc.

Each main BIOS menu option is described in this manual. The Main BIOS setup menu screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured. Options in blue can be configured by the user. The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message accompanies it.

A "> " indicates a submenu. Highlighting such an item and pressing the <Enter> key will open the list of settings within that submenu.

> **Note:** The AMI BIOS has default text messages built in. These text messages my be included, omitted, or changed across BIOS releases.

The AMI BIOS Setup Utility uses a key-based navigation system called "hot keys". Most of the AMI BIOS setup utility "hot keys" can be used at any time during the setup navigation process. These keys include `<F1>`, `<F10>`, `<Enter>`, `<ESC>`, arrow keys, etc.

> **Note:** Options printed in Bold are default settings.

How To Change the Configuration Data

The configuration data that determines the system parameters may be changed by entering the AMI BIOS Setup utility. This Setup utility can be accessed by pressing <Del> at the appropriate time during system boot.

Starting the Setup Utility

Normally, the only visible Power-On Self-Test (POST) routine is the memory test. As the memory is being tested, press the <Delete> key to enter the main menu of the AMI BIOS Setup Utility. From the main menu, you can access the other setup screens. An AMI BIOS identification string is displayed at the left bottom corner of the screen below the copyright message.

⚠️ **Warning:** Do not upgrade the BIOS unless your system has a BIOS-related issue. Flashing the wrong BIOS can cause irreparable damage to the system. In no event shall the manufacturer be liable for direct, indirect, special, incidental, or consequential damages arising from a BIOS update. If you have to update the BIOS, do not shut down or reset the system while the BIOS is updating. This is to avoid possible boot failure.

Main Menu

When you first enter AMI BIOS Setup Utility, you will see the Main Menu screen. You can always return to the Main Menu by selecting the *Main* tab on the top of the screen with the arrow keys.The Main Menu screen provides you with a system overview, which includes the version, built date and ID of the AMIBIOS, the type, speed and number of the processors in the system and the amount of memory installed in the system.

System Time/System Date

You can edit this field to change the system time and date. Highlight *System Time* or *System Date* using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in DAY/MM/DD/YYYY format. The time is entered in HH:MM:SS format. Please note that time is in a 24-hour format. For example, 5:30 A.M. appears as 05:30:00 and 5:30 P.M. as 17:30:00.

CPU Configuration

This displays static information on the Module Version, AGESA Version, Physical Count and Logical Count for the system's processor(s) and clock.

CPU Information

This setting is used to select which physical CPU's information to display. Options include **Processor 0** or Processor 1. The information for the selected processor includes Processor number, Revision, Cache L1/L2/L3, Speed, NB CLK, Able to

Change Frequency and uCode Patch Level.

Note: Zero is always the "Boot Strap Processor" or main CPU with all others being "Application Processors".

GART Error Reporting

This option should remain disabled for normal operation. The driver developer may enable this option for testing purposes. Options are Enabled or **Disabled**.

Microcode Update

> This setting **Enables** or Disables microcode updating.

Secure Virtual Machine Mode

> This setting is used to **Enable** or Disable SVM.

Power Now

> This setting is used to **Enable** or Disable the AMD Power Now feature.

ACPI SRAT Table

> This option **Enables** or Disables the building of the ACPI SRAT Table.

Clock Spread Spectrum

> This option should remain **Disabled** for normal operation. The driver developer may enable it for testing purposes.

IDE Configuration

Onboard PCI IDE Controller

> This setting allows you to set the options for the PCI IDE controller. Options include Disabled, Primary, Secondary or **Both**.

Primary/Secondary/Third IDE Master/Slave

LBA/Large Mode

> LBA (Logical Block Addressing) is a method of addressing data on a disk drive. The options are Disabled and **Auto**.

Block (Multi-Sector Transfer)

Block mode boosts IDE drive performance by increasing the amount of data transferred. Only 512 bytes of data can be transferred per interrupt if block mode is not used. Block mode allows transfers of up to 64 KB per interrupt. Select "Disabled" to allow the data to be transferred from and to the device one sector at a time. Select "Auto" to allows the data transfer from and to the device occur multiple sectors at a time if the device supports it. The options are **Auto** and Disabled.

PIO Mode

PIO (Programmable I/O) mode programs timing cycles between the IDE drive and the programmable IDE controller. As the PIO mode increases, the cycle time decreases. The options are **Auto**, 0, 1, 2, 3, and 4. Select Auto to allow BIOS to auto detect the PIO mode. Use this value if the IDE disk drive support cannot be determined. Select 0 to allow BIOS to use PIO mode 0, which has a data transfer rate of 3.3 MBs. Select 1 to allow BIOS to use PIO mode 1, which has a data transfer rate of 5.2 MBs. Select 2 to allow BIOS to use PIO mode 2, which has a data transfer rate of 8.3 MBs. Select 3 to allow BIOS to use PIO mode 3, which has a data transfer rate of 11.1 MBs. Select 4 to allow BIOS to use PIO mode 4, which has a data transfer rate of 16.6 MBs. This setting generally works with all hard disk drives manufactured after 1999. For other disk drives, such as IDE CD-ROM drives, check the specifications of the drive.

DMA Mode

Selects the DMA Mode. Options are **Auto**, SWDMA0, SWDMA1, SWDMA2, MWDMA0. MDWDMA1, MWDMA2, UDMA0. UDMA1, UDMA2, UDMA3, UDMA4 and UDMA5. (SWDMA=Single Word DMA, MWDMA=Multi Word DMA, UDMA=UltraDMA.)

S.M.A.R.T.

Self-Monitoring Analysis and Reporting Technology (SMART) can help predict impending drive failures. Select "Auto" to allow BIOS to auto detect hard disk drive support. Select "Disabled" to prevent AMI BIOS from using the S.M.A.R.T. Select "Enabled" to allow AMI BIOS to use the S.M.A.R.T. to support hard drive disk. The options are Disabled, Enabled, and **Auto**.

32-Bit Data Transfer

Select "Enabled" to activate the function of 32-Bit data transfer. Select "Disabled" to deactivate the function. The options are **Enabled** and Disabled.

Hard Disk Write Protect

Use this setting to Enable or **Disable** hard disk write protection for your system. This is effective only if the device is accessed through the BIOS.

IDE Detect Timeout (Sec)

Use the +/- keys to adjust and select the time out for detecting ATA/ATAPI devices. The default value is **35**.

ATA(PI) 80-Pin Cable Detection

This option selects the mechanism used for detecting the installation of an 80-pin ATA(PI) cable. Options include **Host & Device**, Host or Device.

SuperI/O Configuration

Serial 1 Address

This option specifies the base I/O port address and Interrupt Request address of serial port 1. Select "Disabled" to prevent the serial port from accessing any system resources. When this option is set to *Disabled*, the serial port physically becomes unavailable. Select "3F8/IRQ4" to allow the serial port to use 3F8 as its I/O port address and IRQ 4 for the interrupt address. Options include Disabled, **3F8/IRQ4**, 3E8/IRQ4 and 2E8/IRQ3

Serial 2 Address

This option specifies the base I/O port address and Interrupt Request address of serial port 2. Select "Disabled" to prevent the serial port from accessing any system resources. When this option is set to "Disabled", the serial port physically becomes unavailable. Select "2F8/IRQ3" to allow the serial port to use 2F8 as its I/O port address and IRQ 3 for the interrupt address. Options include Disabled, **2F8/IRQ3**, 3E8/IRQ4 and 2F8/IRQ3.

Serial Port Mode

This sets the serial port mode for your system. Options include **Normal**, IrDA and ASK IR.

Restore on AC Power Loss

This sets the action that occurs when an AC power loss occurs. Options include Power Off, Power On and **Last State**.

Watch Dog Timer

This sets the Watch Dog Timer. Options include Enabled or **Disabled**.

Advanced ACPI Configuration

ACPI Version Features

Use this setting the determine which ACPI version to use. Options are ACPIv1.0, **ACPI v2.0** and ACPI v3.0.

ACPI APIC Support

Determines whether to include the ACPI APIC table pointer in the RSDT pointer list. The available options are **Enabled** and Disabled.

AMI OEMB Table

This setting specifies whether to include the OEMB table pointer to the R(X) SOT pointer lists. Options include **Enabled** or Disabled. Headless Mode Use this setting to Enable or **Disable** headless operation mode through ACPI.

IPMI Configuration

This menu shows static information about the IPMI firmware revision and status of the BMC, as well as options for IPMI configuration.

View BMC System Event Log

Pressing the Enter key will open the following settings. Use the "+" and "-" keys to navigate through the system event log.

Clear BMC System Event Log

Selecting this and pressing the Enter key will clear the BMC system event log.

Set LAN Configuration

Use the "+" and "-" keys to choose the desired channel number. This displays Channel Number and Channel Number Status information.

IP Address

This submenu sets the IP address source as either Static or **DHCP**. Selecting Static allows you to manually set the IP Address, Subnet Mask and Gateway Address.

In the field provided here enter the IP address in the decimal form of xxx.xxx.xxx.xxx with xxx having a value of less than 256 and in decimal form only. The IP address and current IP address in the BMC are shown.

MAC Address

In the field provided here enter the MAC address in the hex form of xx.xx. xx.xx.xx.xx with xx in hex form only. The current MAC address in the BMC is shown.

Subnet Mask

In the field provided here enter the Subnet address in the decimal form of xxx.xxx.xxx.xxx with xxx having a value of less than 256 and in decimal form only. The current subnet address in the BMC is shown.

Gateway Address

In the field provided here enter the Gateway address in the decimal form of xxx.xxx.xxx.xxx with xxx having a value of less than 256 and in decimal form only. The current Gateway address in the BMC is shown.

MPS Configuration

MPS Revision

This option allows you to set the MPS revision for your system. Options include revision 1.1 and **1.4**.

PCI Express Configuration

Relaxed Ordering

Enables or Disables PCI Express Device Relaxed Ordering in the system. Options include **Auto**, Disabled or Enabled.

Extended Tag Field

When this option is enabled, it allows the device to use the 8-bit TAG field as a requester. Options include **Auto**, Disabled or Enabled.

No Snoop

This option enables or disables the PCI Express device No Snoop option. Options include **Auto**, Disabled or Enabled.

Active State Power Management

This setting allows you to Enable or **Disable** the PCI Express L0s and L1 link power states.

Extended Sync

If this option is enabled, it allows the generation of extended synchronization patterns. Options include **Auto**, Disabled or Enabled.

Remote Access Configuration

Remote Access

Use this option to **Enable** or Disable Remote Access in your system. If enabled, the settings below will appear.

Serial Port Number

Use this setting to select the serial port for console redirection. Options include COM1, COM2 or **COM3***. The displayed base address and IRQ for the serial port changes to reflect the selection you make. **Note:** Make sure the selected port is enabled.

Serial Port Mode

Selects the serial port settings to use. Options are **(115200 8, n, 1)**, (57600 8,n, 1), (38400 8, n, 1), (19200 8, n, 1) and (09600 8, n, 1).

Flow Control

Selects the flow control to be used for console redirection. Options are **None,** Hardware and Software.

Redirection After BIOS POST

Options are Disable (no redirection after BIOS POST), Boot Loader (redirection during POST and during boot loader) and **Always** (redirection always active). Note that some OS's may not work with this set to Always.

Terminal Type

Selects the type of the target terminal. Options are **ANSI**, VT100 and VTUTF8.

Sredir Memory Display Delay

Use this setting to set the delay in seconds to display memory information. Options are **No Delay**, 1 sec, 2 secs and 4 secs.

USB Configurations

This submenu displays the Module Version and lists the USB devices that are enabled as well as the following options.

Legacy USB Support

Select "Enabled" to enable the support for USB Legacy. Disable Legacy support if there are no USB devices installed in the system. "Auto" disabled Legacysupport if no USB devices are connected. The options are Disabled, **Enabled** and Auto.

USB 2.0 Controller Mode

Use this setting to configure the USB 2.0 Controller in either **Hi-Speed** (480 Mps) or Full Speed (12 Mps) mode.

BIOS EHCI Hand Off

This is a workaround for OS's without EHCI hand-off support. The EHCI ownership change should be claimed by the EHCI driver. Options are **Enabled** or Disabled.

Legacy USB1.1 HC Support

This option **Enables** or Disables support for USB1.1 HC devices.

USB Mass Storage Device Configuration

This submenu is used to configure USB mass storage class devices.

USB Mass Storage Reset Delay

Use this option to set the number of seconds POST waits for the USB mass storage device after the Start Unit command. Options include 10, **20**, 30 and 40 seconds.

Emulation Type

This sets the emulation type for USB mass storage devices. If Auto, USB devices less than 530 MB will be emulated as Floppy and remaining as Hard Disk drive. The Force FDD option can be

used to force a HDD formatted drive to boot as an FDD (example: ZIP drive*). Options include **Auto**, Floppy, Forced FDD, Hard Disk and CD-ROM.

System Health Monitor

CPU Overheat Temperature

This setting allows you to specify the type of alarm for CPU overheating. Options include The Early Alarm and **The Default Alarm**. Other items in the submenu are systems monitor displays for the following information:

CPU1 Temperature, CPU2 Temperature, CPU3 Temperature, CPU4 Temperature, System Temperature, Fan 1-9 Reading, Chipset FAN1-2, CPU1 VCore, CPU2 VCore, CPU3 VCore, CPU4 VCore, 3.3V Vcc (V), + 5Vin, +12V Vcc (V), CPU1~4 DIMM Voltage, Chipset SR56x0 Voltage, 3.3V standby, Battery Voltage

System Fan Monitor

This submenu lists the system fans and contains RPM information for them.

Fan Speed Control Modes

This submenu allows you to determine how the system will control the speed of the on-board fans. The options are Full Speed/FS (Max Cooling), Performance/ PF (Better Cooling), **Balanced/BL** (Balance between performance and energy saving), Energy Saving/ES (Lower Power and Noise).

PCI/PNP Settings Menu

Clear NVRAM

Select Yes to clear NVRAM during boot-up. The options are Yes and **No**.

Plug & Play O/S

Select Yes to allow the OS to configure Plug & Play devices. (This is not required for system boot if your system has an OS that supports Plug & Play.) Select **No** to allow AMIBIOS to configure all devices in the system.

PCI Latency Timer

This option sets the latency of all PCI devices on the PCI bus. Select a value to set the PCI latency in PCI clock cycles. Options are 32, **64**, 96, 128, 160, 192, 224 and 248.

Allocate IRQ to PCI VGA

Use this option to allocate IRQ to the PCI VGA card. Option include **Yes** and No. Selecting **Yes** assigns IRQ to PCI VGA card if the card requests IRQ. Selecting No means the system will not assign IRQ to the PCI VGA card even if the card requests IRQ.

Pallette Snooping

This option Enables or **Disables** Pallette Snooping. If enabled, the system informs the PCI devices that an ISA graphics device is installed in the system so the card will function normally.

PCI IDE Busmaster

Use this setting to **Enable** or Disable BIOS enabled uses of PCI Busmastering for reading or writing to IDE drives.

Offboard PCI/ISA IDE Card

Some PCI IDE cards may require this option to be set to the PCI slot number that is holding the card. The Auto setting works for most PCI IDE cards. Options include **Auto**, PCI Slot 1, PCI Slot 2, PCI Slot 3, PCI Slot 4, PCI Slot 5 and PCI Slot 6.

IRQ3 ~ IRQ15 Settings

These settings specify if IRQ is available to be used by PCI/PnP devices or is reserved for use by legacy ISA devices. Options are **Available** or Reserved.

DMA Channel 0 ~ DMA Channel 7 Settings

These settings specify if a DMA Channel is available to be used by PCI/PnP devices or is reserved for use by legacy ISA devices. Options are **Available** or Reserved.

Reserved Memory Size

This option specifies the size of the memory block reserved for legacy ISA devices. Options include **Disabled**, 16k, 32k or 64k.

HotPlug Reserve I/O Port Size

This option specifies the size of the I/O port block to reserve for HotPlug or CardBus devices. Options include **Auto**, 4K, 8K, 12K, 16K, 20K, 24K and 28K.

HotPlug Reserve Memory Size

This option specifies the size of the memory block to reserve for HotPlug or CardBus devices. Options include **Auto**, 8M, 16M, 32M, 65M, 128MB, 256MB or 512MB.

HotPlug Reserve PFMemory Size

This option specifies the size of the prefetchable memory block to reserve for HotPlug or CardBus devices. Options include **Auto**, 32M, 64M, 128MB, 256MB, 512MB, 1024M or 2048M.

Onboard NIC PXE Option ROM

This option **Enables** or Disables the onboard NIC PXE option ROM.

BIOS Settings Configuration

Quick Boot

If Enabled, this option will skip certain tests during POST to reduce the time needed for the system to boot up. The options are **Enabled** and Disabled.

Quiet Boot

If **Disabled**, normal POST messages will be displayed on boot-up. If Enabled, this display the OEM logo instead of POST messages.

Add On ROM Display Mode

This option sets the display mode for Option ROM. The options are **Force BIOS** or Keep Current.

Bootup Num Lock

This option selects the power-on state for the NUM lock to either **On** or Off.

PS/2 Mouse Support

Use this option to select support for the PS/2 mouse. Options are Disabled, Enabled or **Auto**.

Wait for F1 if Error

This setting controls the system response when an error is detected during the boot sequence. When enabled, BIOS will stop the boot sequence when an error is detected, at which point you will need to press the F1 button to re-enter the BIOS setup menu. The options are **Enabled** and Disabled.

Hit 'DEL' Message Display

Use this option to **Enable** or Disable the "Press DEL to run setup" message in POST.

Interrupt 19 Capture

Select Enabled to allow ROMs to trap Interrupt 19. The options are **Enabled** and Disabled.

Boot Device Priority

This feature allows you to prioritize the boot sequence from the list of available devices. A device that is in parenthesis has been disabled in the corresponding type menu.

Hard Disk Drives

This feature allows you to specify the boot sequence from the list of available hard disk drives. A device that is in parenthesis has been disabled in the corresponding type menu.

Removable Drives

This feature allows you to specify the boot sequence from the list of available removable drives. A device that is in parenthesis has been disabled in the corresponding type menu.

CD/DVD Drives

This feature allows you to specify the boot sequence from the list of available CD/DVD drives. A device that is in parenthesis has been disabled in the corresponding type menu.

Network Drives

This feature allows you to specify the boot sequence from the list of available network drives. A device that is in parenthesis has been disabled in the corresponding type menu.

Security Settings Menu

AMI BIOS provides a Supervisor and a User password. If you use both passwords, the Supervisor password must be set first.

Change Supervisor Password

Select this option and press <Enter> to access the sub menu, and then type in the password.

Change User Password

Select this option and press <Enter> to access the sub menu, and then type in the password.

Boot Sector Virus Protection

This option is near the bottom of the Security Setup screen. Select "Disabled" to deactivate the Boot Sector Virus Protection. Select "Enabled" to enable boot sector protection. When "Enabled", AMI BIOS displays a warning when any program (or virus) issues a Disk Format command or attempts to write to the boot sector of the hard disk drive. The options are Enabled and **Disabled**.

NorthBridge Configuration

Channel Interleaving

Selects the channel-interleaving memory scheme when this function is supported by the processor. The options are Disabled or **Auto**.

Enable Clock to All DIMMs

This option allows you to Enable or **Disable** unused clocks to DIMMs even when memory slots are not populated.

Memory Hole Remapping

When "Enabled", this feature enables hardware memory remapping around the memory hole. Options are **Enabled** and Disabled.

CS Sparing Enable

This option will reserve a spare memory rank in each node when enabled. Options are Enable and **Disable**.

Power Down Enable

This option enables or disables DDR power down mode. Options are **Auto**, Enabled and Disabled.

Power Down Mode

This sets the DDR power down mode. Options are **Auto**, Channel and Chip Select.

DRAM Parity Enable

This sets the DRAM Parity Enable to either **Auto**, Enabled and Disabled.

Bank Swizzle Mode

This sets the Bank Swizzle Mode to either **Auto**, Enabled and Disabled.

ECC Configurations

ECC Mode

This submenu sets the level of ECC protection. Options include Disabled, **Basic**, Good, Super, Max and User. Selecting User activates the other options for user setting.

Note: The "Super" ECC mode dynamically sets the DRAM scrub rate so all of memory is scrubbed in 8-hours.

DRAM ECC Enable

This setting allows hardware to report and correct memory errors automatically, maintaining system integrity. Options are **Enabled** or Disabled.

DRAM Scrub Redirect

This setting allows the system to correct DRAM ECC errors immediately when they occur, even if background scrubbing is off. Options are **Enabled** or Disabled.

4-Bit ECC Mode

Allows the user to enabled 4-bit ECC mode (also known as ECC Chipkill). Options are **Enabled** and Disabled.

DRAM BG Scrub

Corrects memory errors so later reads are correct. Options are Disabled and various times in nanoseconds and microseconds. The default is **163.8us**.

Data Cache BG Scrub

Allows L1 cache RAM to be corrected when idle. Options are Disabled and various times in nanoseconds and microseconds. The default is **2.56us**.

L2 Cache BG Scrub

Allows L2 cache RAM to be corrected when idle. Options are Disabled and various times in nanoseconds and microseconds. The default is **2.56us**.

L3 Cache BG Scrub

Allows L3 cache RAM to be corrected when idle. Options are Disabled and various times in nanoseconds and microseconds. The default is **2.56us**.

DRAM Timing Configurations

DRAM Timing Config

This setting specifies the DRAM timing configuration. Options are **Auto** and Manual.

Memory Timing Parameters

This selects which node's timing parameters to display. Options are **CPU Node 0** or CPU Node 1.

SouthBridge Configuration

A15 ECOs

This setting **Disables** or Enables A15 ECOs.

Port 0 ~ Port 5 ESP

These settings allow you to set Port 0 through Port 5 ESP help as either ESP or **ISP**.

Dis #THRMTRIP before KBRst

This setting allows you to **Enable** or Disable Dis #THRMTRIP before KBRst.

SATA-IDE Ports Auto Clk Ctrl

This option, when enabled, will shutdown the clocks for unused SATA ports in IDE mode, IDE->AHCI and IDE->AMD_AC modes. This will enable some power savings, but please note that if you shutdown the clock then the hotplug for that port will not work. Options are **Disabled** or Enabled.

SATA-AHCI Ports Auto Clk Ctrl

This option, when enabled, will shutdown the clocks for unused SATA ports in AHCI and AMD-AHCI modes. This will enable some power savings, but please note that if you shutdown the clock then the hotplug for that port will not work. Options are **Disabled** or Enabled.

SATA Port 0 ~ Port 5 Mode

This setting forces the SATA selected SATA port to run at GEN1 mode if this option is set to GEN1. Setting this option to **Auto** will leave the port to run at the default mode.

OHCI/EHCI HC Device Functions

These settings allow you to either **Enable** or Disable functions for OHCI or EHCI bus devices.

On Chip SATA Channel

This setting allows you to **Enable** or Disable the On-Chip SATA channel.

On Chip SATA Type

Use this setting to set the On Chip SATA type. Options include **Native IDE**, RAID, AHCI and Legacy IDE.

SATA IDE Combined Mode

This setting allows you to **Enable** or Disable the SATA IDE combined mode.

PATA Channel Configuration

This allows you to set PATA channel configuration. Options include **SATA as Primary** or SATA as secondary.

Power Saving Features

Use this option to Enable or **Disable** power down saving features in the Southbridge chipset. This feature should be enabled for mobile systems and disabled for desktop systems. See the *AMD SB700 Power Saving* document for more details.

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Port 02 ~ Port 13 Features

This submenu allows you to set the features for Ports 02 through 13 in the system. Each port submenu allows you to define the same settings below.

Gen 2 High Speed Mode

This setting allows you to set the Gen 2 high-speed mode. Options include **Auto**, Disabled, Software Initiated and Advertised RC.

Link ASPM

Use this setting to configure the Link ASPM. Options include **Disabled**, L0s, L1, L0s & L1, L0 Downstream and L0 Downstream + L1.

Note: For ATI GFx Card M2x use L1 only. For ATI GFx Card M5x use both L0s & L1.

Link Width

Use this setting to configure the Link Width. Options include **Auto**, x1, x2, x4, x8 and x16.

Slot Power Limit, W

Use this setting to configure the Slot Power Limit power. The user can adjust this value using the + and - keys. The default is **75**.

Compliance Mode

This setting allows you to Enable or **Disable** the Compliance Mode.

Remap Port Device Number

This setting allows you remap the Port Device number. Options include **Auto** and port numbers between 2 and 13.

L1 Immediate ACK

This setting allows you to Enable or **Disable** L1 ACK. When enabled, the L1 will be ACK'd immediately.

Lane Reversal

Use this setting to Enable or **Disable** Lane Reversal.

Hot Plug Support

Use this setting to set Hot Plug Support. Options include **Disabled** and Native.

NB-SB Port Features

NB-SB Link APSM

Use this to set the NB-SB Link ABSM. Options include **L1** and Disabled.

Link Width

This setting allows you to set the Link Width for the NB-SB port. Options include **Auto**, x1, x2 and x4.

NP NB-SB VC1 Traffic Support

Use this setting to **Disable** or Enable NP NB-SB VC1 traffic support.

Compliance Mode

Use this setting to Enable or **Disable** Compliance Mode for the NB-SB port.

GPP1 ~ GPP3b Core Settings

These submenus allow you to specify GPP core settings. Each submenu allows you to define the same settings listed below.

Core Configuration

This setting allows you to configure core configuration. Options include **Auto**, 1x16 and 2x8.

Powerdown Unused Lanes

This setting allows you to Enable or Disable the powerdown of unused lanes.

Turnoff Off PLL During L1/L23

This setting allows you to **Enable** or Disable turning off PLL during L1/L23.

TX Drive Strength

Use this setting to configure TX drive strength. Options include Auto, 26mA, 20mA, 22mA and **24mA**.

TXCLK Clock Gating in L1

Use this setting to **Enable** or Disable the TXCLK clock gating in L1.

LCLK Clock Gating in L1

Use this setting to **Enable** or Disable the LCLK clock gating in L1.

SB Core Settings

TX Drive Strength

Use this setting to configure TX drive strength. Options include **Auto**, 26mA, 20mA, 22mA and 24mA.

TXCLK Clock Gating in L1

Use this setting to **Enable** or Disable the TXCLK clock gating in L1.

LCLK Clock Gating in L1

Use this setting to **Enable** or Disable the LCLK clock gating in L1.

Debug Options

Peer to Peer Among GPP1/GPP2

Use this setting enable or disable Peer to Peer among GPP1/GPP2. Options include **Auto**, Enabled and Disabled.

Reset to Training Delay (ms)

Use the +/- keys to change the reset to training delay time setting. The default is **50**.

Receiver Detection Pooling (ms)

Use the +/- keys to change the receiver detection pooling time setting. The default is **180**.

Hide Unused PCIE P2P Bridges

Use this setting to **Enable** or Disable the hiding of unused PCIE P2P bridges.

GFX Card Workaround

This setting allows you to **Enable** or Disable the GFX Card workaround on your system.

Debug Bus Configuration

PCIE Debug Bus

This setting Enables or **Disables** PCIE debugging of the bus.

Hyper Transport Configuration

HT Extended Address

This setting allows you to Enable or Disable the HT extended address. Options include Enabled, **Disabled** and Auto.

HT3 Link Power State

This setting allows you to configure the HT3 Link power state. Options include **Auto**, LS0, LS1, LS2 and LS3.

Unit ID Clumping

Use this setting to configure Unit ID clumping. Options include **Disabled**, Auto, UnitID 2/3, UnitID B/C and UnitID 2/3 & B/C.

HT Link Tristate

This setting allows you to configure the HT Link Tristate. Options include **Auto**, Disabled, CAD/CTL and CAD/CTL/CLK.

NB Deemphesis Level

Use this to set the NB deemphesis level. Options include Disabled, 0.4 dB, 1.32 dB, -2.08dB, **3.1 dB**, 4.22 dB, 5.50 dB and 7.05 dB.

IOMMU

This setting is used to disable or set the GART size in systems without AGP. Options include AGP Present, **Disabled**, 32 MB, 64 MB, 128 MB, 256 MB, 512 MB and 1 GB.

Primary Video Controller

Use this setting to specify the primary video controller boot order. Options include **PCIE-GPP1-GPP2-GPP3a-PCI**, PCIE-GPP2-GPP1-GPP3a-PCI, PCIE-GPP3a-GPP1-GPP2-PCI or PCI-PCIE-GPP1-GPP2-GPP3a.

PCI Spread Spectrum

Use this setting to Enable or **Disable** PCI Spread Spectrum in the system.

Debug Options

Memory Decod on Sec. 6FX

Use this option to set memory decod on sector 6FX. Options are **Disabled** or Force.

IOC Peer-to-Peer Mode

Use this option to set the IOC peer-to-peer mode. Options include **Auto**, Default, Mode1 and Mode2

Northbridge Interrupt Pin

This option Enables or **Disables** the Northbridge Interrupt Pin.

Exit Menu

Select the Exit tab from AMI BIOS Setup Utility screen to enter the Exit BIOS Setup screen.

Save Changes and Exit

When you have completed the system configuration changes, select this option to leave BIOS Setup and reboot the computer, so the new system configuration parameters can take effect. Select Save Changes and Exit from the Exit menu and press <Enter>.

Discard Changes and Exit

Select this option to quit BIOS Setup without making any permanent changes to the system configuration and reboot the computer. Select Discard Changes and Exit from the Exit menu and press <Enter>.

Discard Changes

Select this option and press <Enter> to discard all the changes and return to AMI BIOS Utility Program.

Load Optimal Defaults

To set this feature, select Load Optimal Defaults from the Exit menu and press <Enter>. Then Select "OK" to allow BIOS to automatically load the Optimal Defaults as the BIOS Settings. The Optimal settings are designed for maximum system performance, but may not work best for all computer applications.

Load Fail-Safe Defaults

To set this feature, select Load Fail-Safe Defaults from the Exit menu and press <Enter>. The Fail-Safe settings are designed for maximum system stability, but not maximum performance.

BIOS Error Codes

During Power-On Self-Test (POST) routines, which are performed each time the system is powered on, errors may occur.

Non-fatal errors are those which, in most cases, allow the system to continue the boot-up process. The error messages normally appear on the screen.

Fatal errors are those which will not allow the system to continue the boot-up procedure. If a fatal error occurs, you should consult with your system manufacturer for possible repairs.

These fatal errors are usually communicated through a series of audible beeps. The numbers on the fatal error list (see Table A-1) correspond to the number of beeps for the corresponding error.

Table A-1   BIOS Error Codes

Beep Code	Error Message	Description
1 beep	Refresh	Circuits have been reset.(Ready to power up)
5 short beeps + 1 long beep	Memory error	No memory detected in the system
1 long beep +8 short beeps	Display error or memory read/write error	Video error - adapter missing or with faulty memory

System Operating and Regulatory Overview

This appendix provides basic environmental operating requirements and regulatory information for the server.

Operating Environment

Operating Temperature: 0º to 35º C (32º to 95º F)

Non-operating Temperature: -40º to 70º C (-40º to 158º F)

Operating Relative Humidity: 20% to 95% (non-condensing)

Non-operating Relative Humidity: 5 to 95% (non-condensing)

Regulatory Compliance

Electromagnetic Emissions: FCC Class A, EN 55022 Class A, EN 61000-3-2/-3-3, CISPR 22 Class A

Electromagnetic Immunity: EN 55024/CISPR 24, (EN 61000-4-2, EN 61000-4-3,

EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-11)

Safety: CSA/EN/IEC/UL 60950-1 Compliant, UL or CSA Listed (USA and Canada), CE Marking (Europe)

California Best Management Practices Regulations for Perchlorate Materials: This Perchlorate warning applies only to products containing CR (Manganese Dioxide) Lithium coin cells. "Perchlorate Material-special handling may apply. See www.dtsc.ca.gov/hazardouswaste/perchlorate"