Lenovo

Enterprise Services Education

Servicing the Lenovo System x3850 X6 and x3950 X6 Types 3837/3839

January 2016
Study guide

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Preface

Servicing the Lenovo System x3850 X6 and x3950 X6 Types 3837/3839

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Objectives

After completing this course, you will be able to:

1. Provide an overview of the Lenovo System x3850 X6 and x3950 X6.
2. Describe the product specifications and the new technology of Lenovo System x3850 X6 and x3950 X6.
3. Identify the differences between the Lenovo System x3850 X5 and the Lenovo System x3850 X6.
4. Explain how to perform problem determination activities and describe how to troubleshoot the Lenovo System x3850 X6 and x3950 X6.
5. Explain how to scale from System x3850 X6 to x3950 X6.

Servicing the Lenovo System x3850 X6 and x3950 X6

Overview

The Lenovo System x3850 X6 and x3950 X6 Types 3837 and 3839 server is a rack model, modular design server for virtualization, database, and computational intensive computing. With the modular design, users can upgrade from a four-socket (4U high) to an eight-socket (8U high) server, using the same building blocks that are used for the four-socket server. It is a server based on the Intel Xeon™ EX E7-4xxx v2 and E7-8xxx v2 processor technology. This scalable server is suited for enterprise environments that require I/O flexibility. **Figure 1** shows the Lenovo System x3850 X6.

Figure 1: System x3850 X6

System x3850 front view

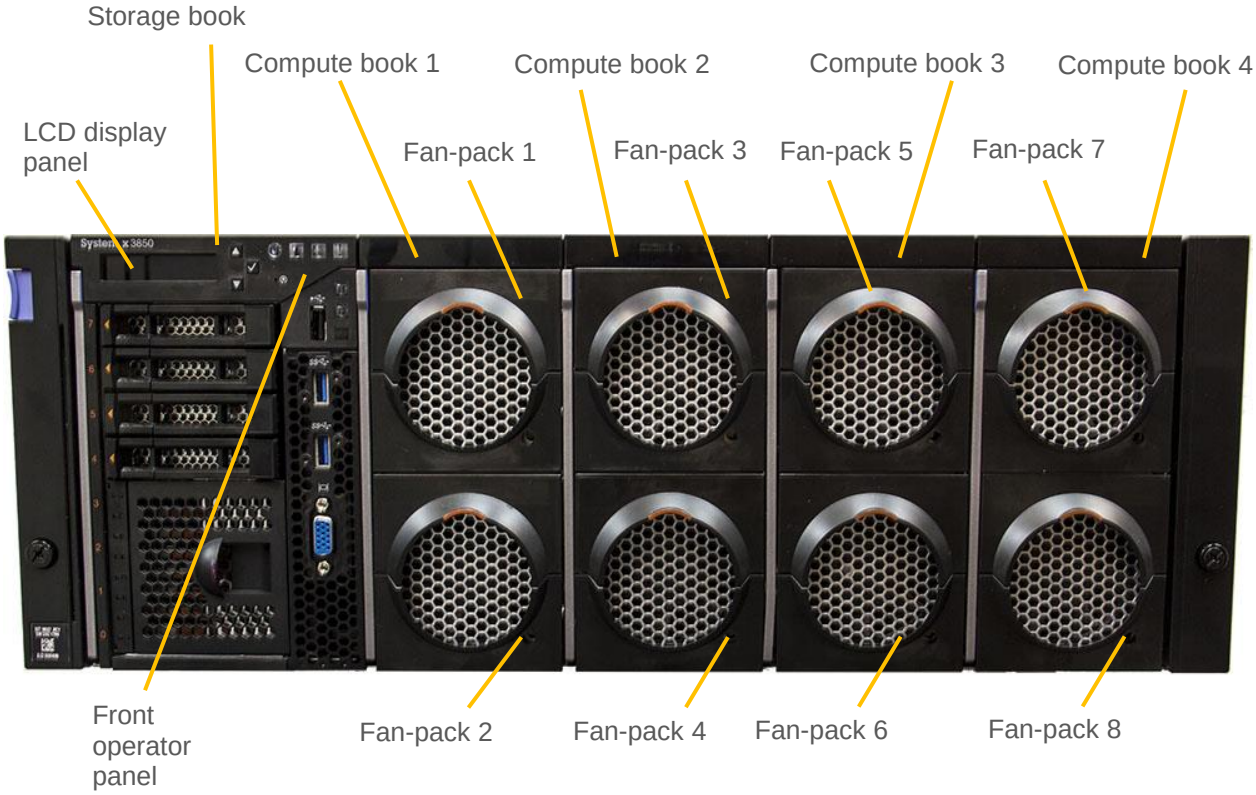

Figure 2: System x3850 X6 front view

System x3850 inside view

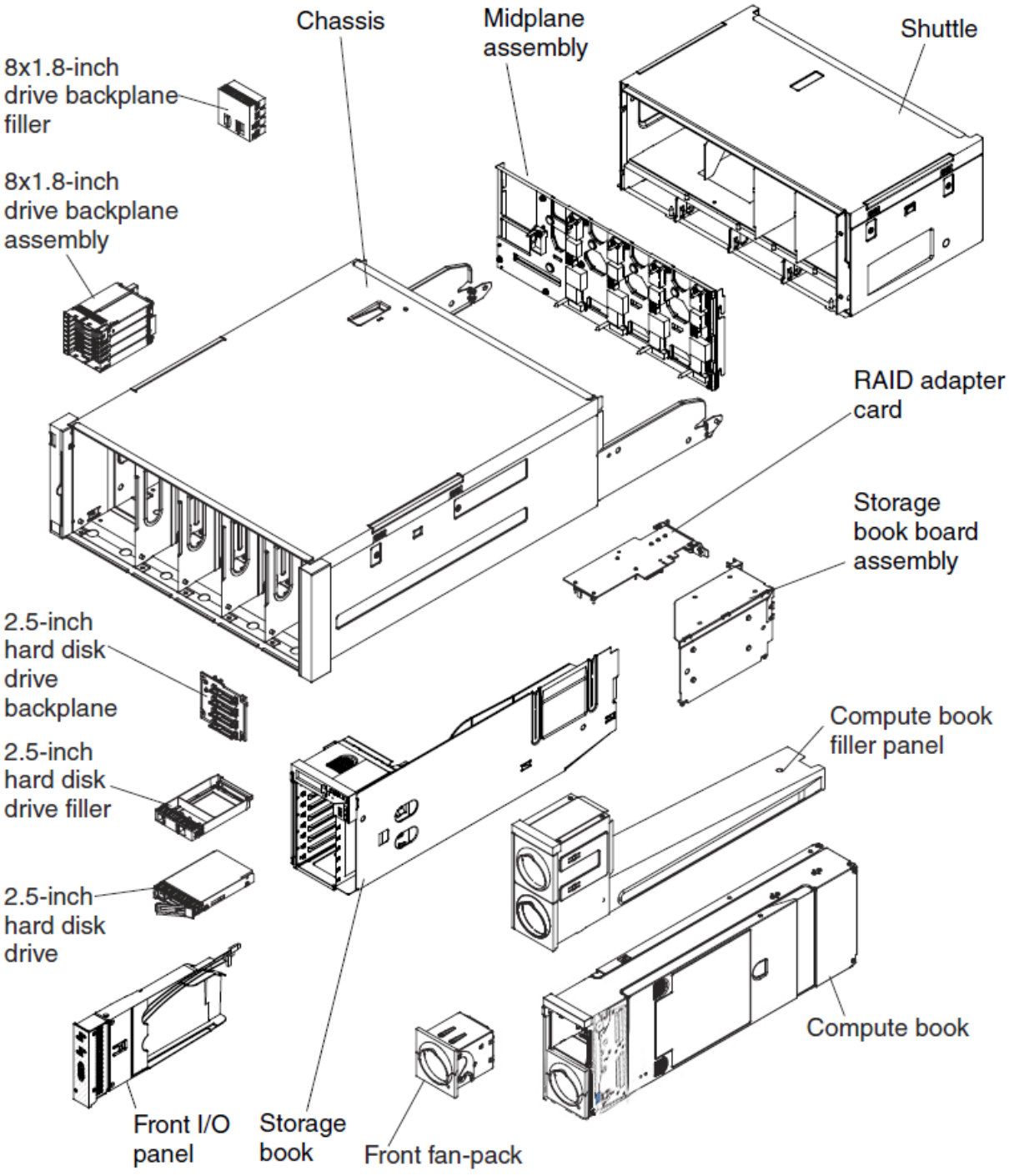

Figure 3: System x3850 X6 front inside view

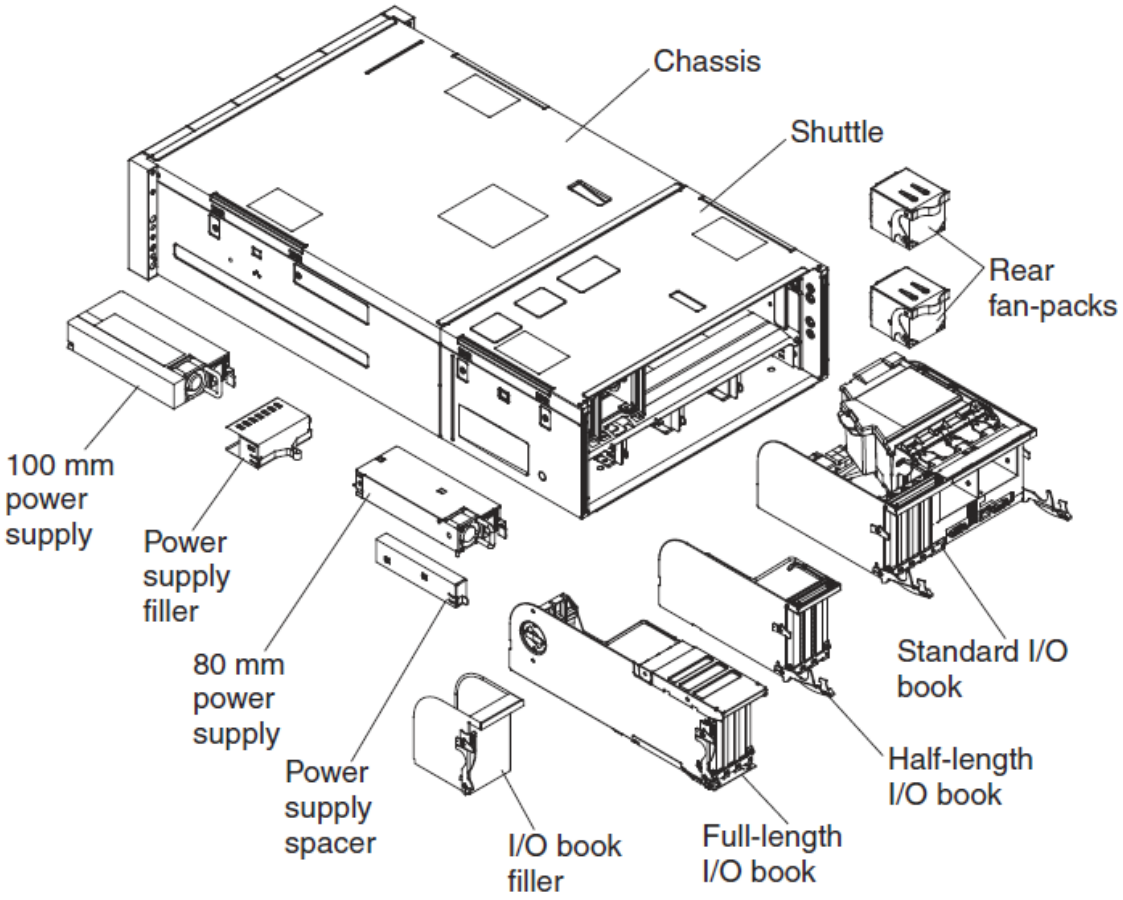

Figure 4: System x3850 X6 rear inside view

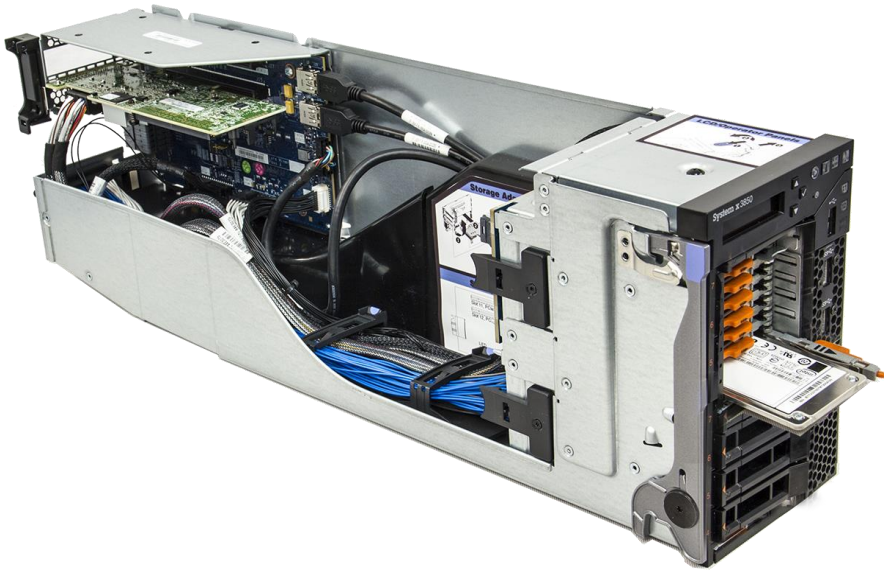

Figure 5: Storage book inside view

Figure 6: Compute book inside view

System x3850 X6 rear view

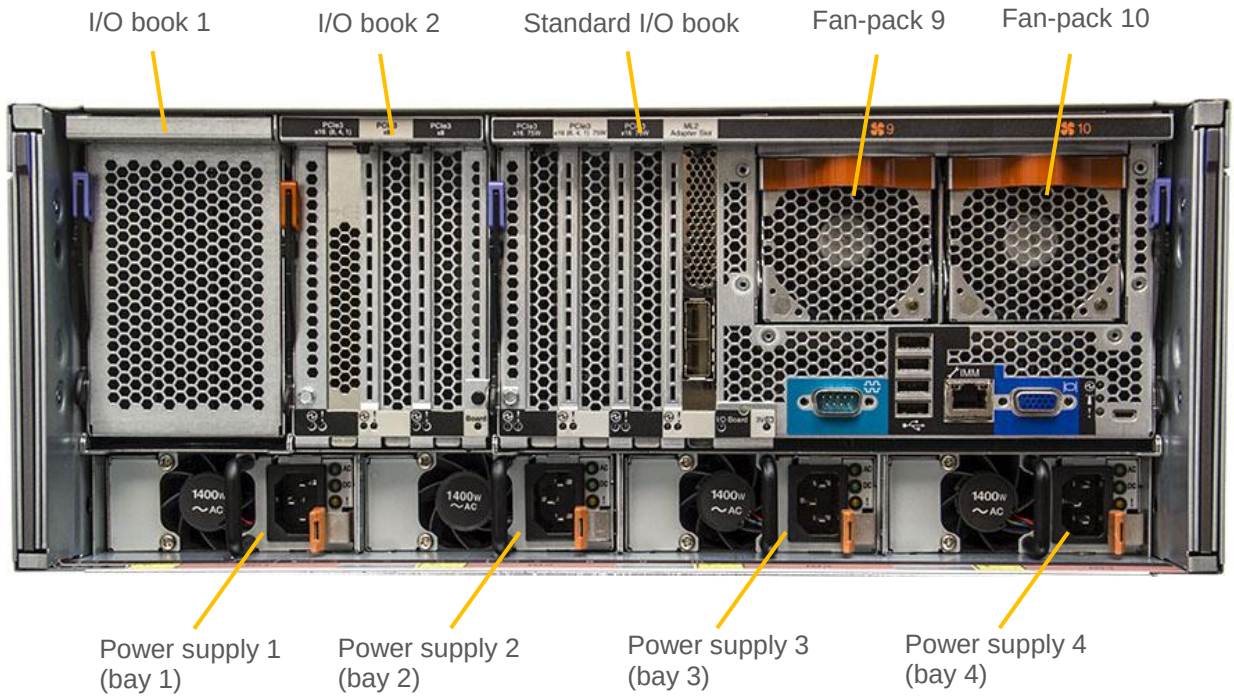

Figure 7: System x3850 X6 rear view

Product description

System x3850 X6 is the newly designed four-socket x86 rack platform.

It has the following key features:

- Enabled by EXA Technology
- Supports Intel Xeon E7 processors
- Four socket, 96 DIMMs rack server scalable to eight socket, 192 DIMMs
- Hot-swap, modular I/O design, supporting full-length, full-height PCIe and high-power PCIe
- Features Flash technologies, eXFlash, and PCIe Flash
- Built-in advanced core recovery and advanced PFA to mission-critical RAS
- Advancements in systems and firmware management and system modularity

Lenovo System x3850 X6 features and specifications

The following information provides the features and specifications of the server. Depending on the model, some features might not be available, or some specifications might not apply.

Microprocessors

- The server supports up to four Intel Xeon EX versions of the E7-48xx v2 and E7-88xx v2 Series microprocessors with the following:
  - Twelve to 15-core Turbo 2.0 with up to 37.5 MB cache shared among cores.
  - Ten to 12-core Turbo 2.0 with up to 24 MB cache shared among cores.
  - Eight-core with up to 16 MB cache shared among cores.
- Three QPI links per microprocessor (depending on the microprocessor).
  - Operating speeds of up to 8 GT/s.
  - Two 20-lane point-to-point data links (one in each direction) per QPI link.
- Four Scalable Memory Interconnect 2 (SMI2) links per microprocessor at up to 6.4 GT/s.
- Each microprocessor has four memory channels, each memory channel has two DDR channels, and each DDR channel supports three DIMM.
- Intel EX microprocessor + C600 series chipset (PCH)
- HyperThreading Technology
- Up to 32 PCIe Gen3 lanes per processor

Memory

- DIMM connectors: 96
  - Minimum: 8 GB (two 4-GB DIMMs)
  - Maximum: 6 TBs (when using 64-GB DIMMs)
- Type: PC3-12800R 1600 MHz, PC3L-10600R-999 1333 MHz, or PC3L-10600 1333 MHz LR single-rank, double-rank, or quad-rank, ECC, 240 pin, DDR3 registered SDRAM DIMMs only.
- Supports standard 4-GB, 8-GB, and 16-GB RDIMMs and 1- GB, 32-GB, and 64-GB LR-DIMMs.

Drive expansion bays

Figure 8: Drive expansion bays

The server supports up to 16 drives (depending on the drive backplane configuration). The following types of drives are supported:

- 1.8-inch eXflash drives
- 1.8-inch hot-swap SAS (SSDs
- 2.5-inch hot-swap SAS Express drives
- 2.5-inch hot-swap SAS HDDs and SSDs

PCI expansion slots

The server provides up to 12 adapter slots (with two I/O books installed; nine PCIe slots, one xLOM, and two SAS adapters) as follows:

- The base system provides:

- Two x16 full-height slots, Gen3, 16 lanes wired (PCIe Gen3, x16)
- One x16 full-height slot, Gen3, eight lanes wired (PCIe Gen3, x16 (8, 4, 1)
- Two x16 low-profile host bus adapter slots in the Storage book, Gen3, eight lanes wired each (PCIe Gen3, x16 (8, 4, 1)
- One x8 Gen3 dedicated ML adapter slot, eight lanes wired (non-standard PCIe connector)

- The optional half-length I/O book provides:
  - One x16 full-height slot, Gen3, 16 lanes wired (PCIe Gen3, x16)
  - Two x8 full-height slots, Gen3, eight lanes wired each (PCIe Gen3, x8)
- The optional full-length I/O book provides:
  - Two x16 full-height slots, Gen3, 16 lanes wired each (PCI3 Gen3, x16)
  - One x8 full-height slot, Gen2, four lanes wired (PCIe Gen3, x8 (4, 1)

Power supply

Figure 9: Power supply

The server supports up to four of the following power supplies:

- 1400-watt ac input power supplies
- 900-watt ac input power supplies

- 750-watt -48 V to -60 V dc input power supplies

In addition, consider the following:

- The base model comes standard with one 900-watt or one 1400-watt power supply (depending on the model).
- A maximum of four 900-watt (110 or 220 V ac auto-sensing) or four 1400-watt ac (110 or 220 V ac auto-sensing) hot-swap power supplies are available for power supply configurations.
- Four 1400-watt hot-swap power supplies fed from a 220 V ac input source and provides N+N redundancy support for a full configuration.
- Four 750-watt hot-swap power supplies fed from a -48 V to -60 V dc input source and provide N+N redundancy support for limited configurations.

Note: When using 750-watt dc supplies, all four must be installed.

- Four 900-watt or four 1400-watt hot-swap power supplies fed from a 110 V input source and provides N+N redundancy support for limited configurations.

RAID controllers

The following RAID adapter options are available for the server:

- ServeRAID M5120 SAS/SATA Controller for Lenovo System x
- ServeRAID M5210 SAS/SATA Controller for Lenovo System x

Table 1 shows the main system comparisons between x3850 X5 and x3850 X6.

Table 1: Main system comparisons between x3850 X5 and 3850 X6

	System x3850 X5	System x3850 X6
Sockets	4x Socket LGA1567	4x Socket R1 LGA2011-1
Processor	Westmere EX	Ivy Bridge EX
Core/thread count	10 cores/20 threads	15 cores/30 threads
DIMM quantity	64 total 16 DIMMs per CPU	96 total 24 DIMMs per CPU
Total system memory capacity	2 TB/3 TB with MAX 5	6 TB
PCIe slots	Seven slots of PCIe Gen 2	Varies with configuration:

	• One x16 slot • One x4 slot Five x8 slots	With two half-length I/O books Nine slots of PCIe Gen 3 • Four x16 slots • Five x8 Slots With two full-length I/O books Seven slots of PCIe Gen 3 • Six x16 slots • One x8 slot Two slots of PCIe Gen 2 • Two x4 slots
Storage (drives)	Eight 2.5-inch SAS HDD and SSD Sixteen 1.8-inch SAS SSD	Eight 2.5-inch SAS HDD and SSD Four 2.5-inch PCIe SSD Sixteen 1.8-inch SAS SSD Sixty-four Flash DIMMs
Operator panel	Light path	LCD display
Power	1+1 Redundant Two 1975-watt power supplies	N+N Redundant (N = 1 or 2) Four CFF power supplies • 1400-watt • 900-watt Four 750-watt power supplies fed from a -48 V to -60 V dc input

System configurations and diagrams

FPGA

A fully popular four-socket system contains five FPGAs. The standard (primary) I/O board contains the master FPGA, and each CPU card contains a slave FPGA. **Figure 10** shows how FPGA works.

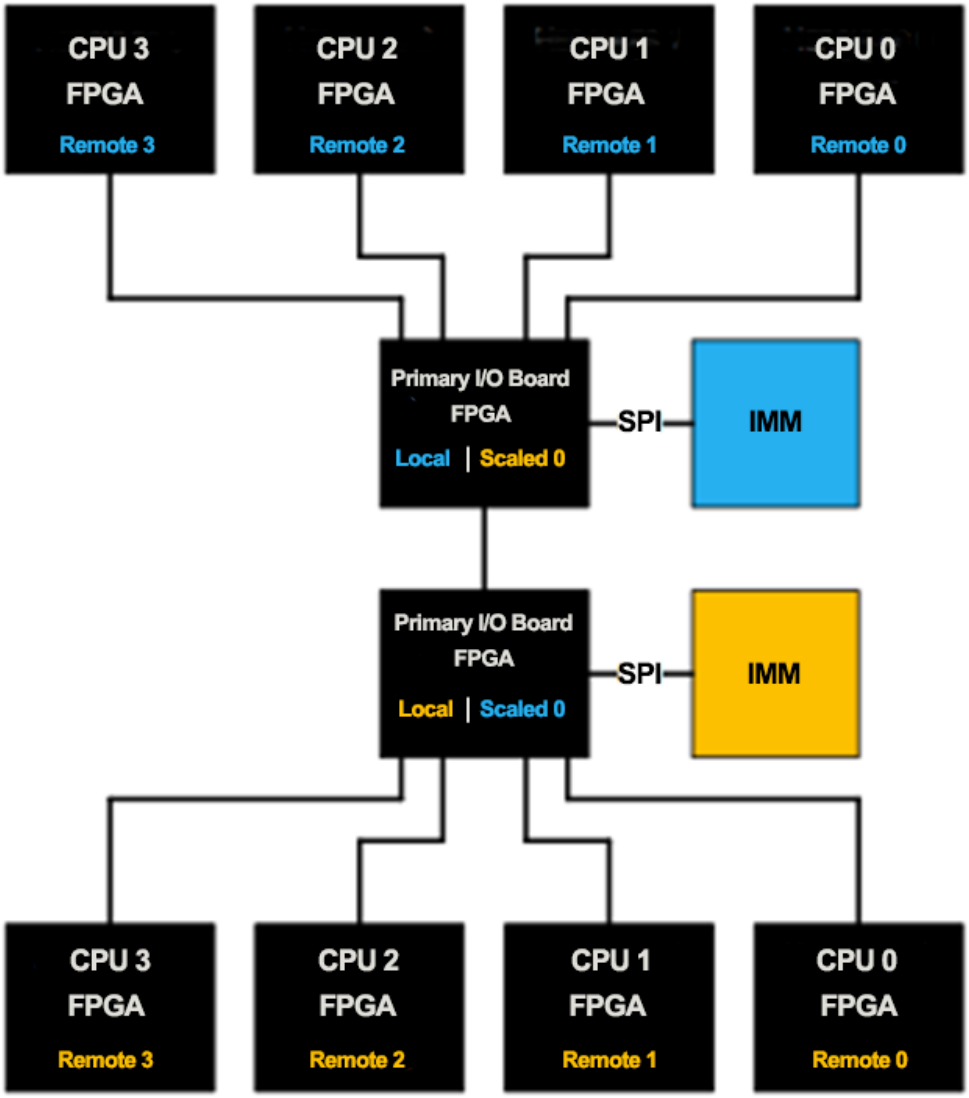

Figure 10: FPGA diagram

FPGA Flashing is no longer a separate step as in the System x3850 X5. With the IMMv2, the FPGA image is folded into the IMM firmware image and users do not have

to manage both the IMM update and the FPGA update. Therefore, no more firmware mismatches occur.

Note: There is a short period when the FPGA can be running a different level of code than what the IMM has. For the FPGA to activate the new code, the host has to go through a dc cycle.

Scenario: When UXSPI completes, the IMM is at a new firmware level. The FPGA is in a staging area where the IMM has the new code, and the FPGA is still running the old code. The IMM tells the customers that they need to restart the host to complete the activation. Therefore, the mismatch happens only after IMM is updated and before restarting the host.

CPU cards do not have local storage for their images, and they are programmed by the standard I/O board. When the new CPU card is inserted, users do not have to worry about what code is flashing on the CPU board because there is no code on the CPU card. The FPGA on the standard I/O board will automatically configure it with the same level of code that is on another CPU card.

The FPGA firmware level is not displayed in the IMM, and it can be obtained through First Failure Data Capture (FFDC). The reason why the FPGAs are not displayed in the IMM is to prevent customers from trying to update the FPGA firmware separately, which is not applicable because the FPGA code is updated along with the IMM.

Update component VPD

The VPD of the midplane, LCD, front panel display, and front I/O panel is not stored locally. The VPD of these parts is stored on the standard I/O board that is adjacent to the System VPD. In the field, replacing these parts requires using the Advanced Setting Utilities (ASU) for updating the VPD.

Attention: This procedure is critical because if not updated appropriately, the service technicians might not be able to get the correct information when they replace parts.

Note: The 4S midplane, 8S midplane, LCD front panel display, and front I/O panel VPD also need to be updated if the standard I/O board is FRU replaced.

To update the component VPD:

1. Gather the VPD data of existing FRUs or the old standard I/O board.
   a. When standard I/O board is bad and you cannot access it at all:
      i. Look at the standard I/O card itself and find the numbers on the card.
   b. When you can still access and talk to standard I/O board and IMM:
      i. Run ASU to pull out the information: `asu show VPD`
2. Assemble the system with the new FRU parts.

3. Run ASU to inject the data back:

```
asu set VPD.CompVPD_PartNumber.#  <p/n>
asu set VPD.CompVPD_FRUNumber.#  <fru num>
asu set VPD.CompVPD_SerialNumber.#  <s/n>
asu set VPD.CompVPD_PrefixSerialNumber.# <prefix s/n>
asu set VPD.CompVPD_ManufacturingID.# <mfg id>
asu set VPD.CompVPD_HW_Rev.#  <hw rev>
```

Note: Here is the description for the #

1: X6 4S midplane

2: X6 8S midplane

3: Power button panel (front I/O panel)

4: LCD front panel display

The following are examples for fields programmed by Boxline. The user should make sure the connection parameters (host, user, password) are accurate.

Machine Type / Model Number

```
./asu64 set SYSTEM_PROD_DATA.SysInfoProdName 3837xyz --user USERID --password
PASSW0RD --host 192.168.70.125
```

Machine Serial Number

```
./asu64 set SYSTEM_PROD_DATA.SysInfoSerialNum 23Z5524 --user USERID --
password PASSW0RD --host 192.168.70.125
```

UUID

```
./asu64 set SYSTEM_PROD_DATA.SysInfoUUID C6FFB7EE5DE611E3BD4F000AF7256698 --
user USERID --password PASSW0RD --host 192.168.70.125
```

Product Description for 4S

```
./asu64 set SYSTEM_PROD_DATA.SysInfoProdIdentifier "x3850 X6" --user USERID -
-password PASSW0RD --host 192.168.70.125
```

Product Description for 8S

```
./asu64 set SYSTEM_PROD_DATA.SysInfoProdIdentifier "x3950 X6" --user USERID -
-password PASSW0RD --host 192.168.70.125
```

DDR3 compute book

The DDR3 compute book component is in the front of the server. A minimum of two DDR3 compute books must be installed in the server. Each DDR3 compute book must have a minimum of one microprocessor and one DIMM installed. It provides the following connectors and slots:

- One microprocessor socket
- Twenty-four DDR3 DIMM connectors
- Two 60 mm counter-rotating fan slots

Note: The server supports a two or four DDR3 compute books configuration in the server. These are the only configurations supported. The DDR3 compute books are installed from left to right (facing the front of the server).

There are no QPI cables in the System X3850 X6. Instead, use the four-socket midplane to configure the system. **Figure 11** shows the four-socket midplane

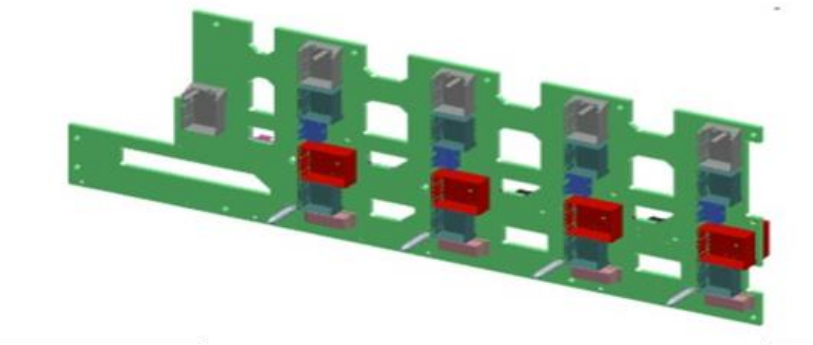

Figure 11: Four-socket midplane

The DDR3 compute book also provides a light path button. Press this button to light the LEDs on the board when the power source is removed from the server. **Figure 12** shows the front view of the DDR3 compute book.

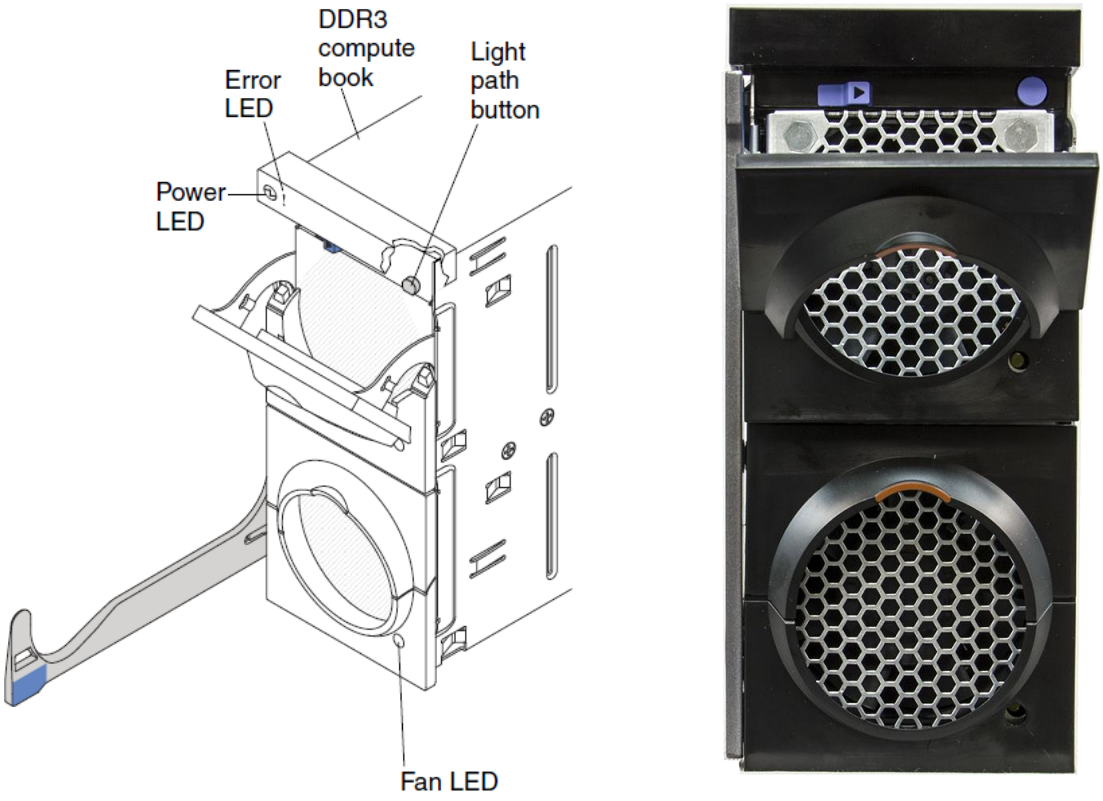

Figure 12: DDR3 compute book front view

Figure 13 and **Figure 14** show the location of the microprocessor and DIMM connectors on the microprocessor side of the DDR3 compute book board.

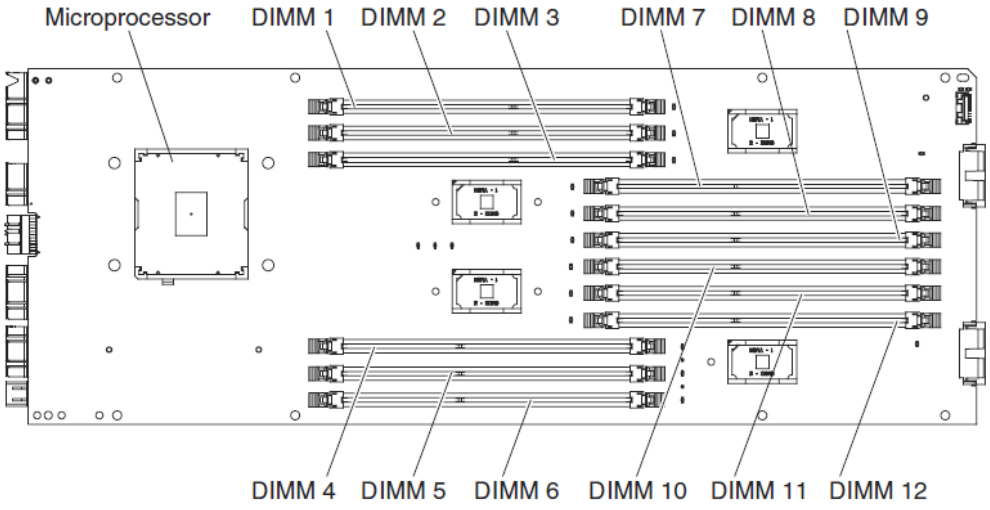

Figure 13: Front (left side) of board

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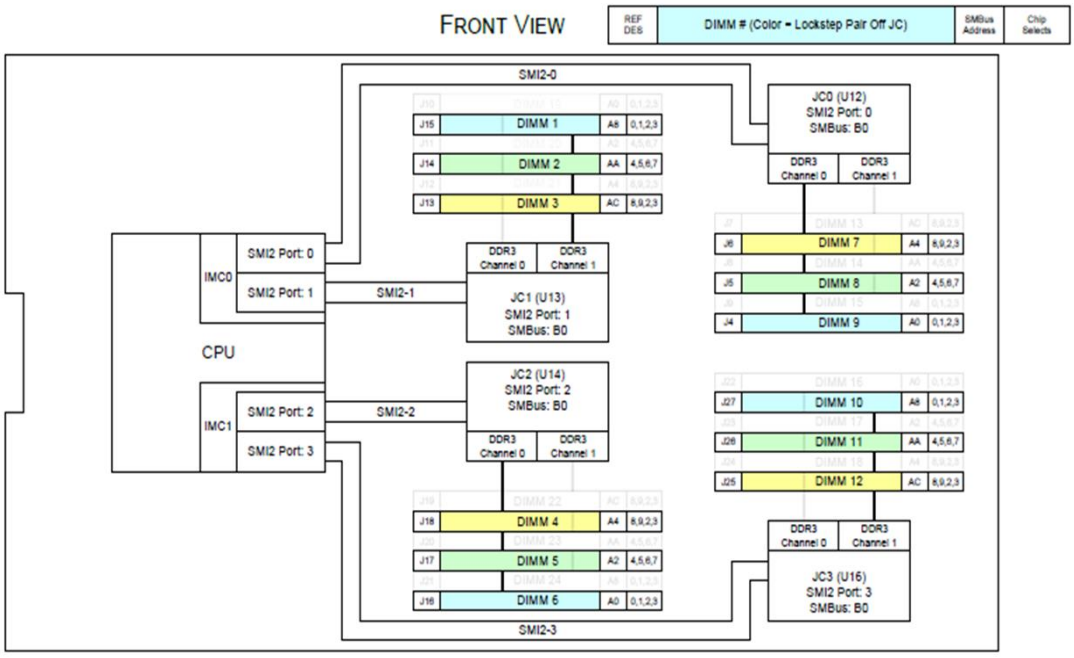

Figure 14: Front (left side) of board diagram

Figure 15 and **Figure 16** show the location of the DIMM connectors on the non-microprocessor side of the DDR3 compute book board.

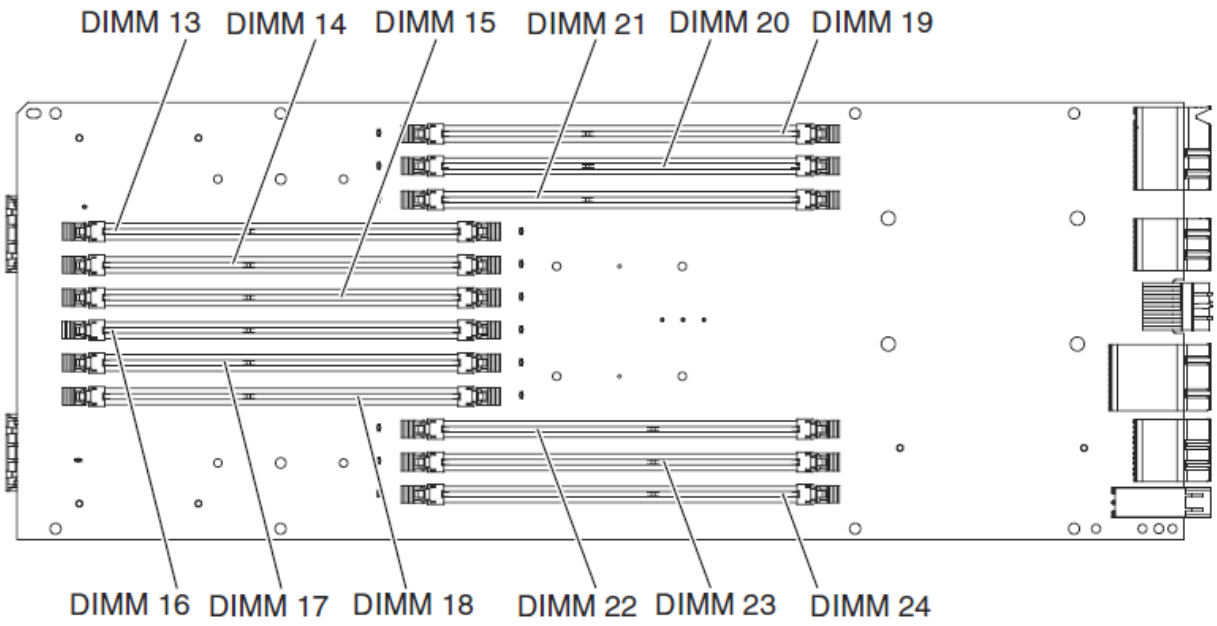

Figure 15: Rear (right side) of board

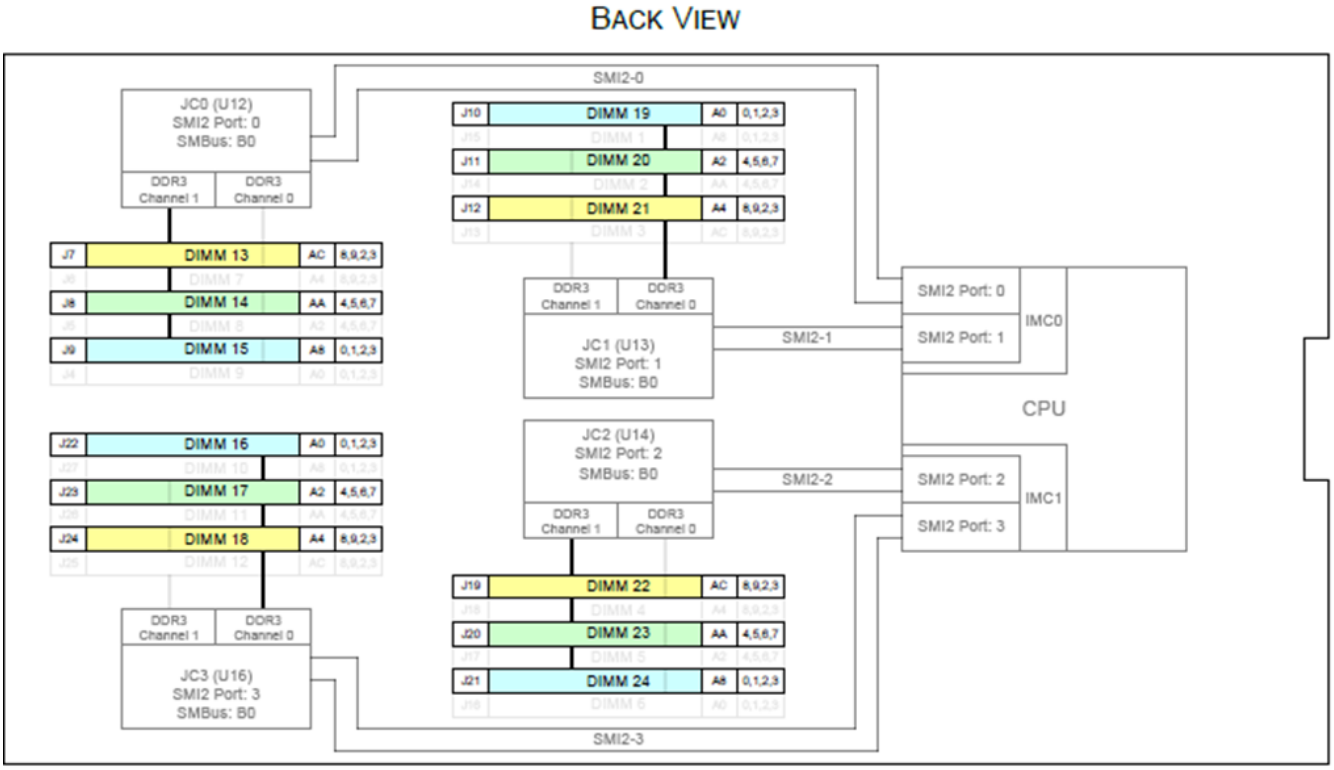

Figure 16: Rear (right side) of board diagram

Memory

Each microprocessor has four memory channels, eight DDR channels (two DDR channels per memory channel), and each DDR channel supports three DIMMs as shown in **Figure 17**.

Note: A minimum of one DIMM must be installed for each microprocessor. For example, install a minimum of two DIMMs if the server has two microprocessors (one for each microprocessor). If you install four microprocessors in the server, install a minimum of four DIMMs (one DIMM for each microprocessor).

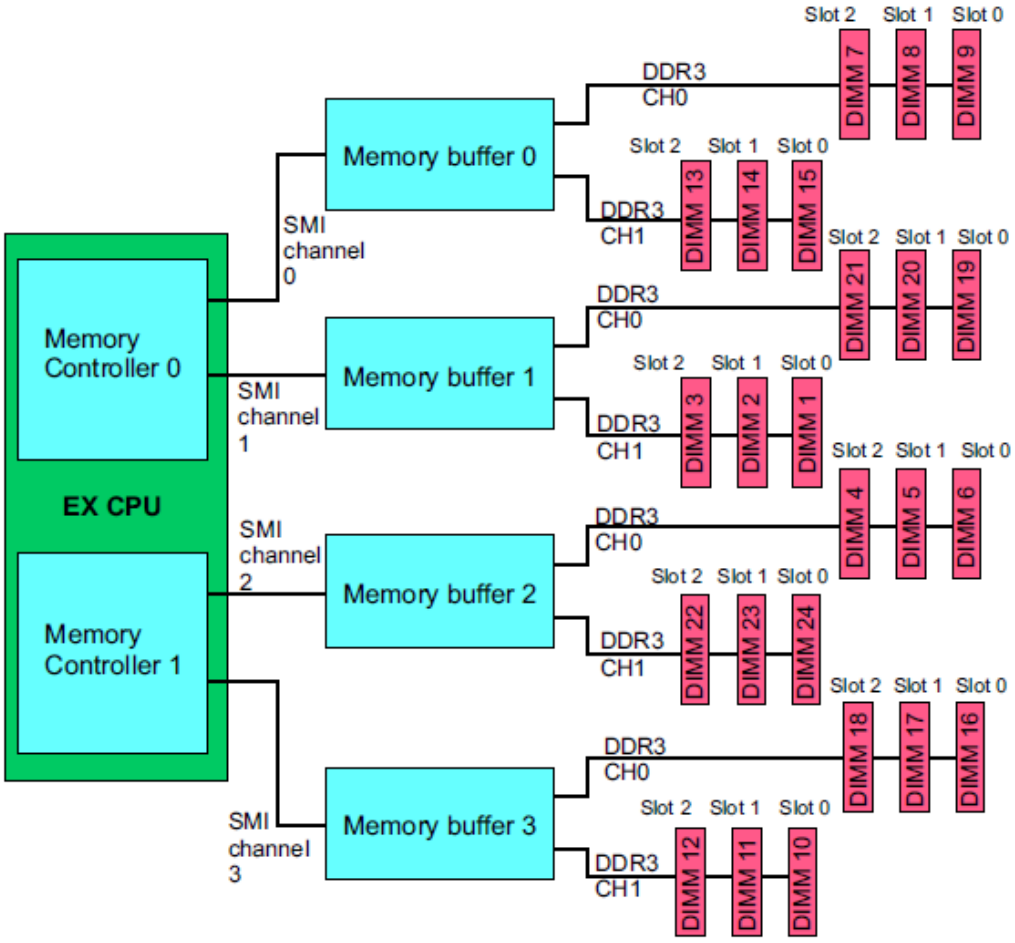

Figure 17: Memory controller

Independent mode (performance mode): Each DDR3 channel is addressed individually by burst lengths of 8 bytes. The Intel SMI2 channel operates at twice the DDR3 data rates. To have the best performance, install one DIMM per memory buffer.

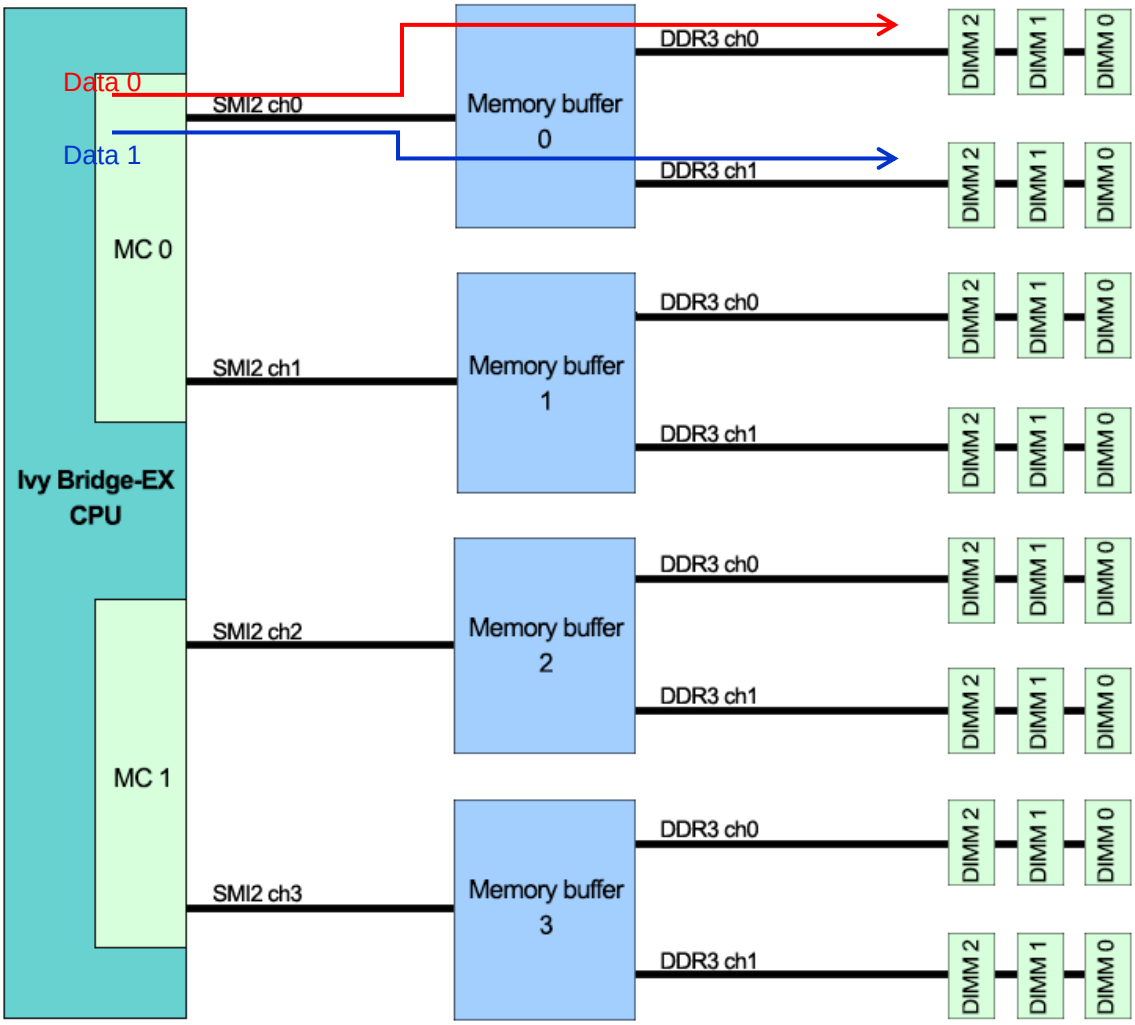

Figure 18: Independent performance mode diagram

Lockstep mode: The high RAS mode supports double-device data correction (DDDC) with x4 DRAMs. The memory controller handles all cache lines across two DDR3 channels behind one memory buffer. The Intel SMI2 channel operates at the DDR3 transfer rate. This mode requires a minimum of two DIMMs per memory buffer, and each DIMM has to be on a separate channel.

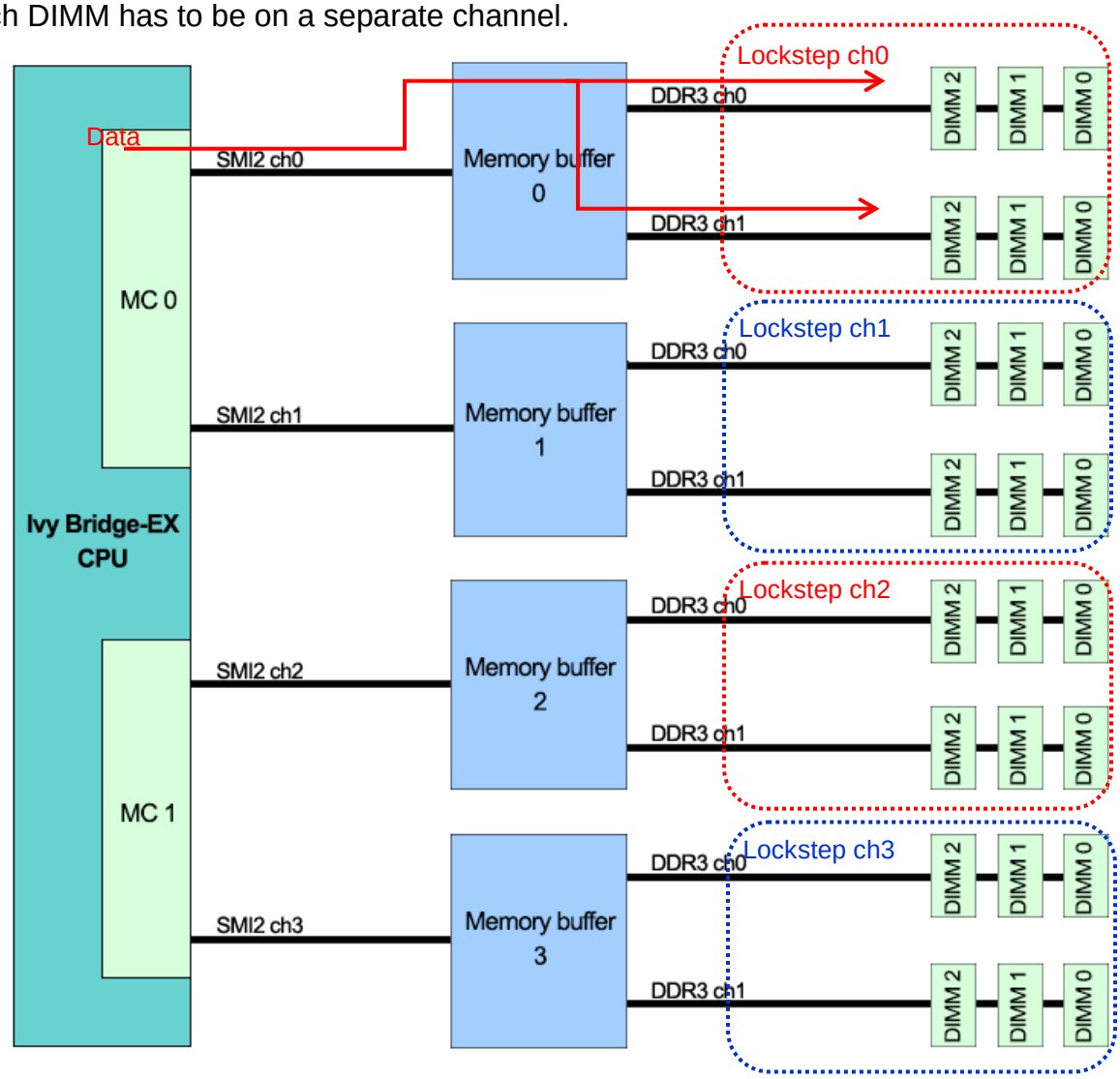

Figure 19: Lockstep RAS mode diagram

Mirrored mode: The memory contents of the system are mirrored between CPU sockets. Because of mirroring the memory, the total memory available to the system is half of the memory that is physically installed.

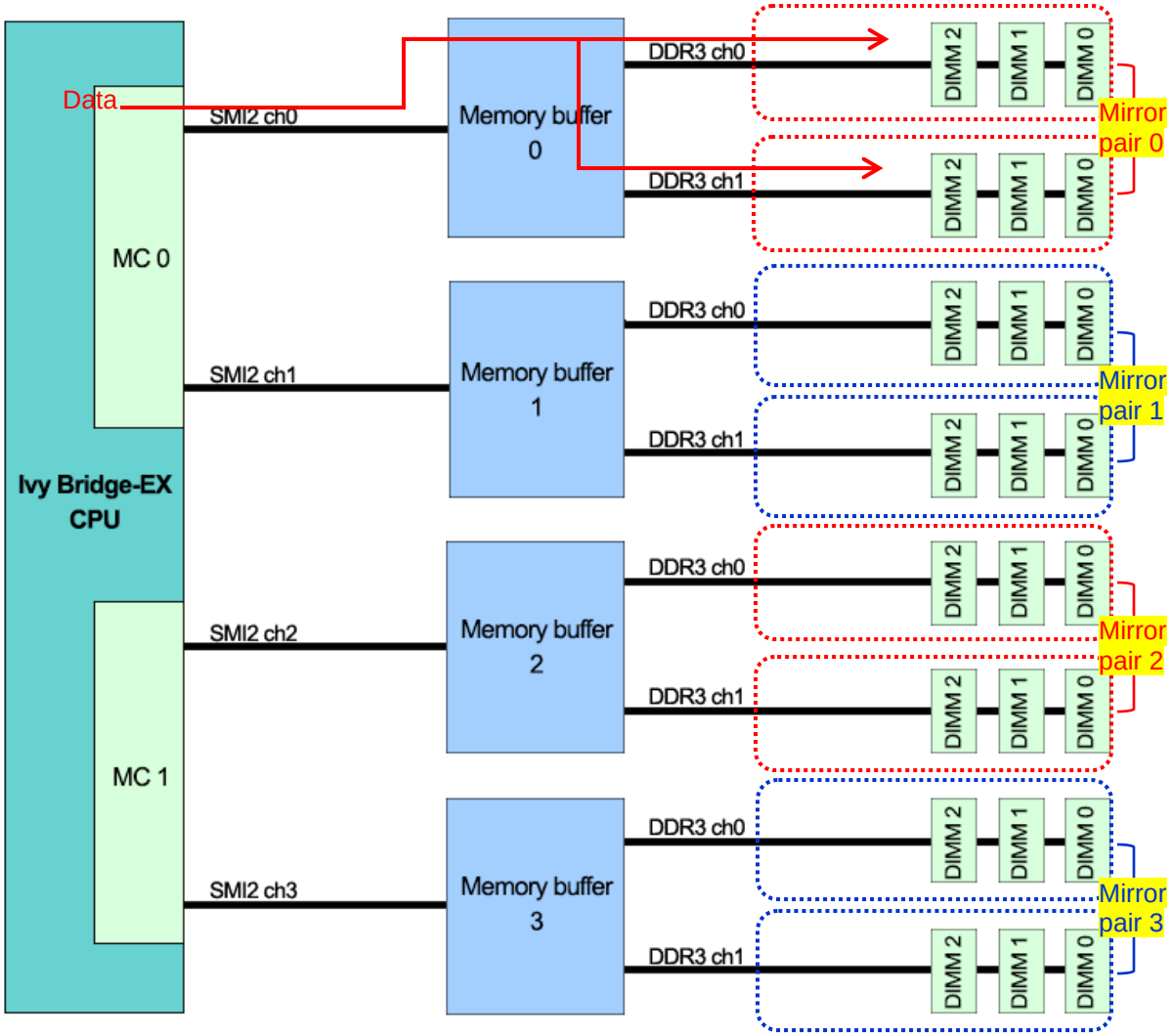

Figure 20: Mirroring with independent performance mode

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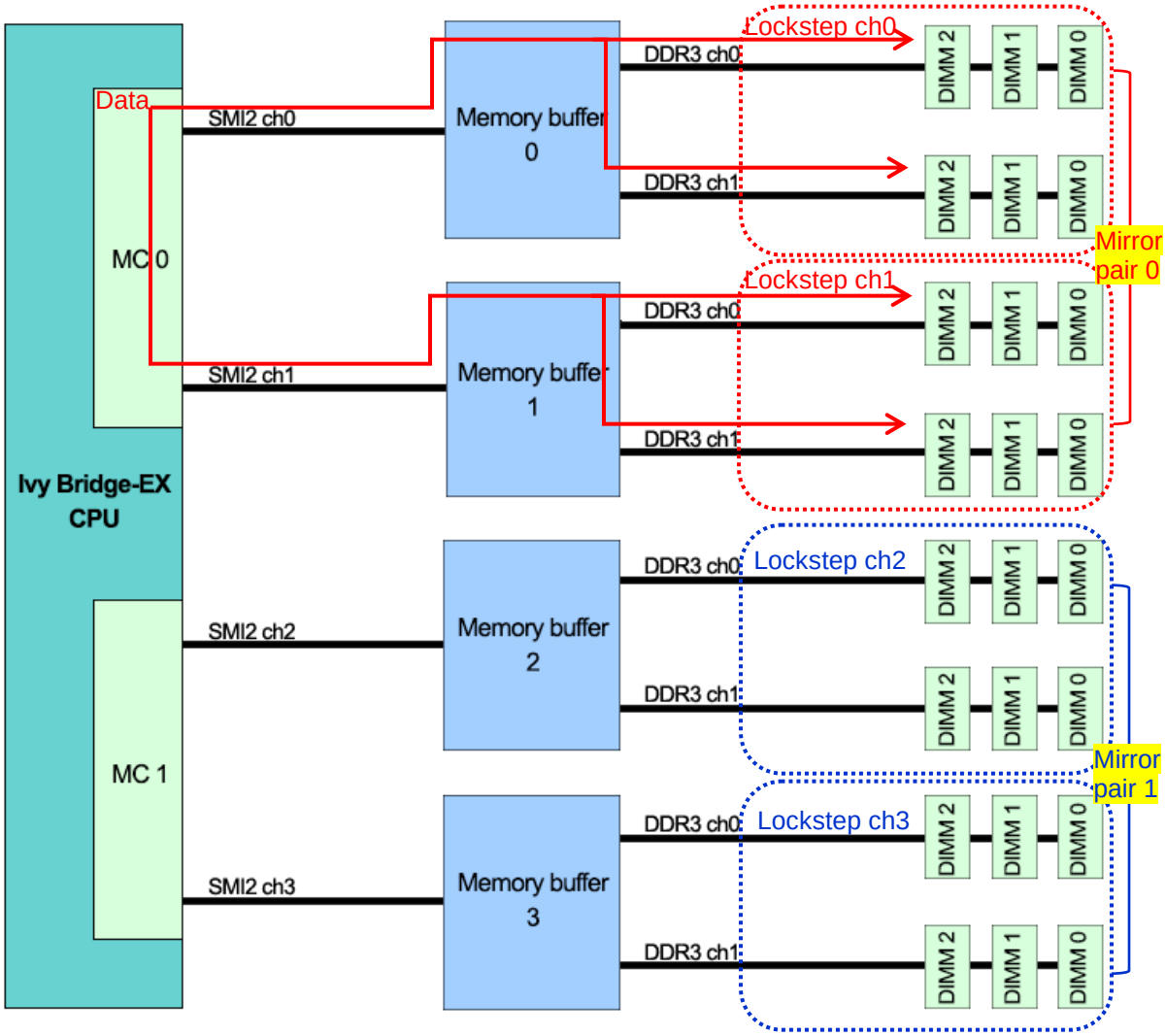


Figure 21: Mirroring with lockstep RAS mode

Rank sparing mode: One memory DIMM rank is a spare of the other ranks on the same channel. The spare rank is held in reserve and is not utilized by the system as part of its system memory.

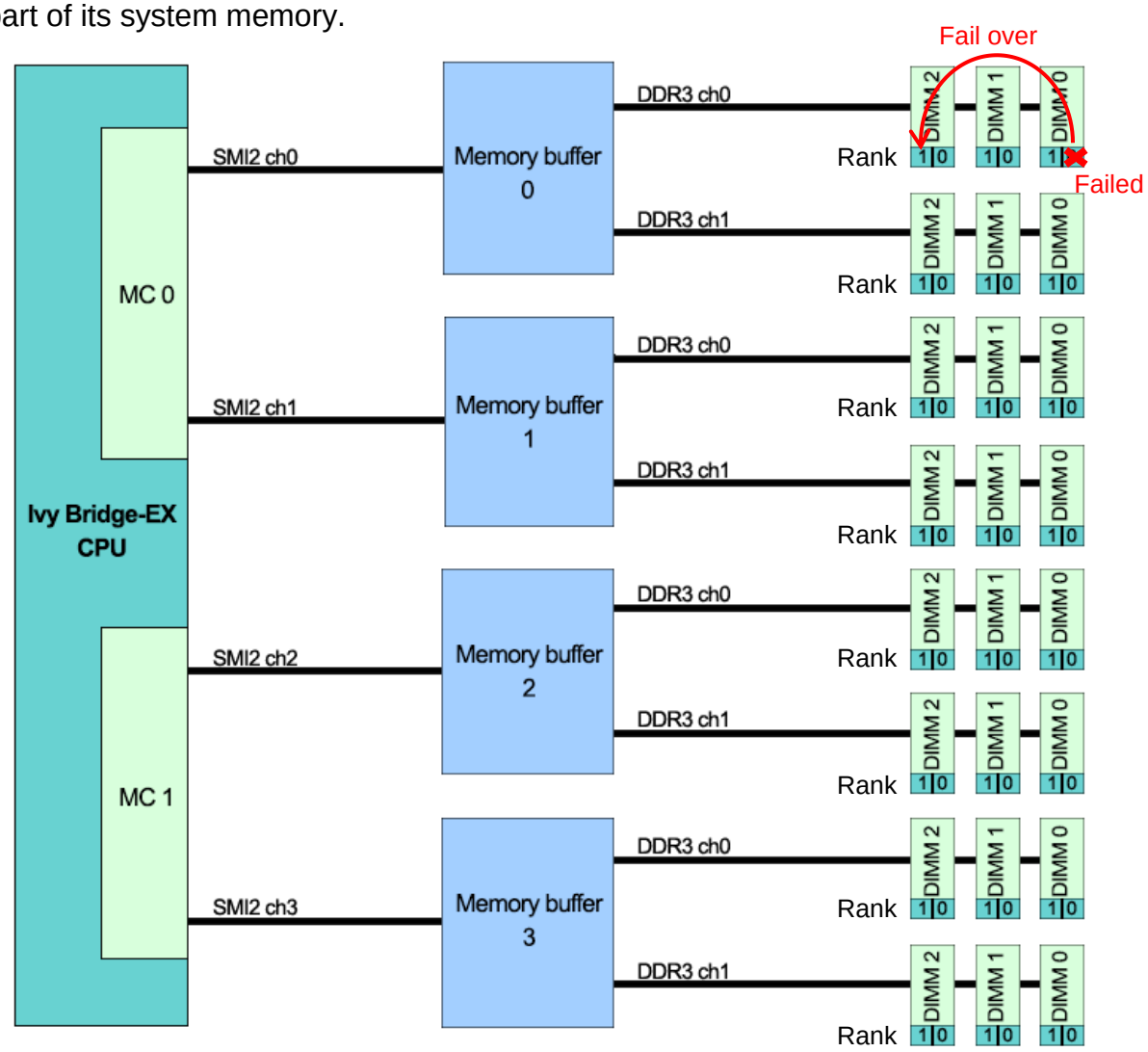


Figure 22: Rank sparing with independent performance mode

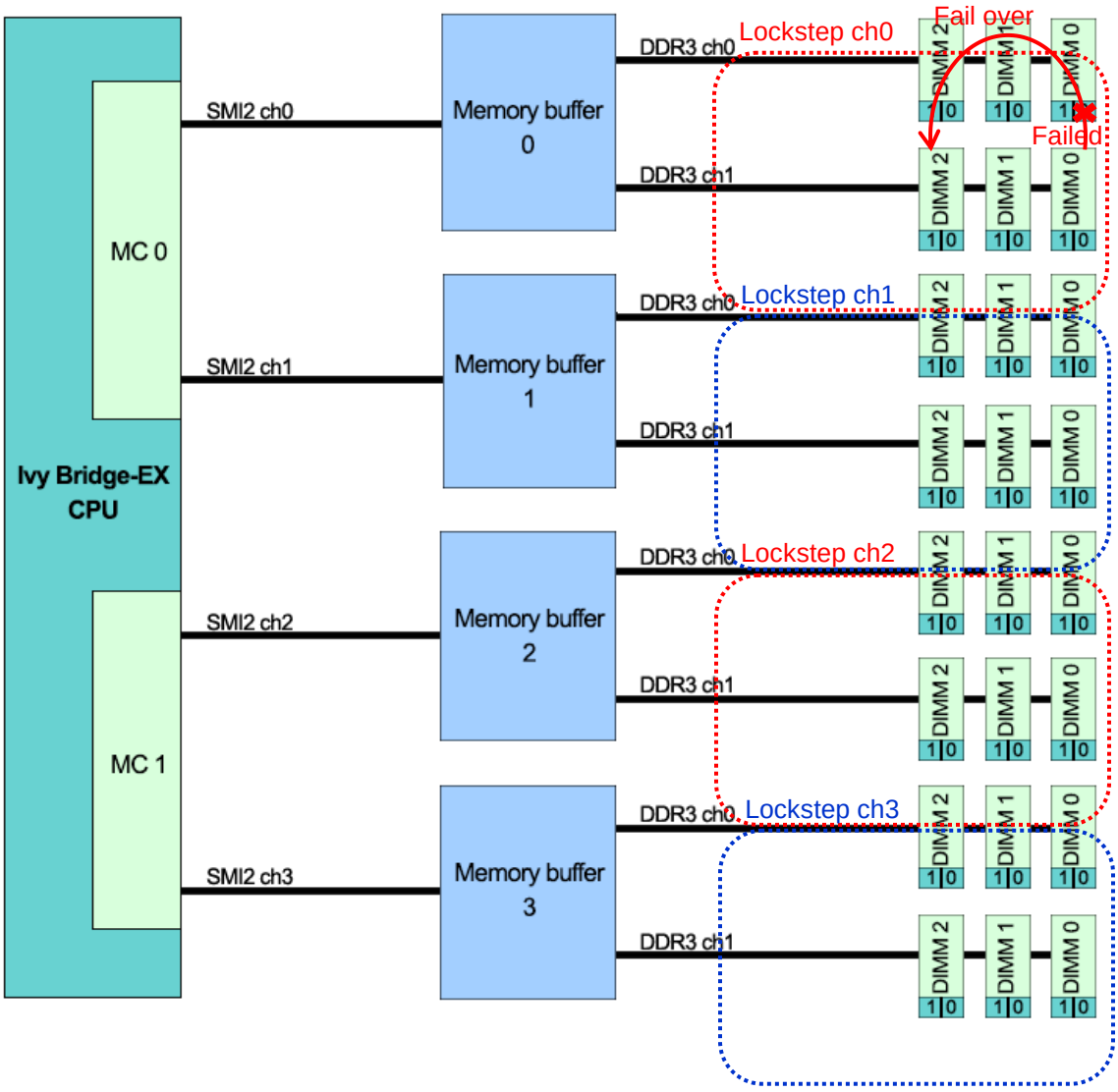


Figure 23: Rank sparing with lockstep RAS mode

To summarize:

- To increase memory in independent mode, install one DIMM at a time.
- To increase memory in lockstep mode, install two DIMMs at a time.
- To increase memory in independent mirrored mode, install two DIMMs at a time.
- To increase memory in lockstep mirrored mode, install four DIMMs at a time.

Population order

In non-mirroring mode, DIMMs can be populated in any order and there are no matching requirements. However, the DIMM population sequence (shown in **Table 2**) will provide the best performance when operating in supported memory modes, including non-mirroring (independent mode).

Table 2: DIMM population sequence for the supported memory modes

DIMM installation order	Independent mode	Independent mode mirroring mode	Lockstep mode	Lockstep mirroring mode
1	DIMM 9	DIMM 9, 19	DIMM 9, 15	DIMM 1, 9, 15, 19
2	DIMM 6	DIMM 6, 16	DIMM 6, 24	DIMM 6, 10, 16, 24
3	DIMM 1	DIMM 1, 15	DIMM 1, 19	DIMM 2, 8, 14, 20
4	DIMM 10	DIMM 10,24	DIMM 10, 16	DIMM 5, 11, 17, 23
5	DIMM 15	DIMM 8, 20	DIMM 8, 14	DIMM 3, 7. 13, 21
6	DIMM 24	DIMM 5, 17	DIMM 5, 23	DIMM 4, 12, 18, 22
7	DIMM 19	DIMM 2, 14	DIMM 2, 20	n/a
8	DIMM 16	DIMM 11, 23	DIMM 11, 17	n/a
9	DIMM 8	DIMM 7, 21	DIMM 7, 13	n/a
10	DIMM 5	DIMM 4, 18	DIMM 4, 22	n/a
11	DIMM 2	DIMM 3, 13	DIMM 3, 21	n/a
12	DIMM 11	DIMM 12,22	DIMM 12, 18	n/a
13	DIMM 14	n/a	n/a	n/a

14	DIMM 23	n/a	n/a	n/a
15	DIMM 20	n/a	n/a	n/a
16	DIMM17	n/a	n/a	n/a
17	DIMM 7	n/a	n/a	n/a
18	DIMM 4	n/a	n/a	n/a
19	DIMM 3	n/a	n/a	n/a
20	DIMM 12	n/a	n/a	n/a
21	DIMM 13	n/a	n/a	n/a
22	DIMM 22	n/a	n/a	n/a
23	DIMM 21	n/a	n/a	n/a

Note: The server does not support a configuration of one and three DDR3 compute books. The server supports only two or four DDR3 compute books.

eXFlash DIMM

eXFlash DIMM is a high-performance solid-state storage device in an industry-standard DIMM. It has the following features:

- Plugs in the DIMM socket and co-exists with regular DDR3 memory. That means no system changes are required.
- Clients can use 1 - 32 DIMM slots for eXFlash DIMM
- MLC 200 GB, and 400 GB Capacities, LP DIMM
- Clients can use eXFlash DIMMs as block storage or storage cache
- Comparable cost/GB to other flash technologies – SSD, Fusion cards, and so on
- Can be exploited by flash caching software – Flash Cache Accelerator

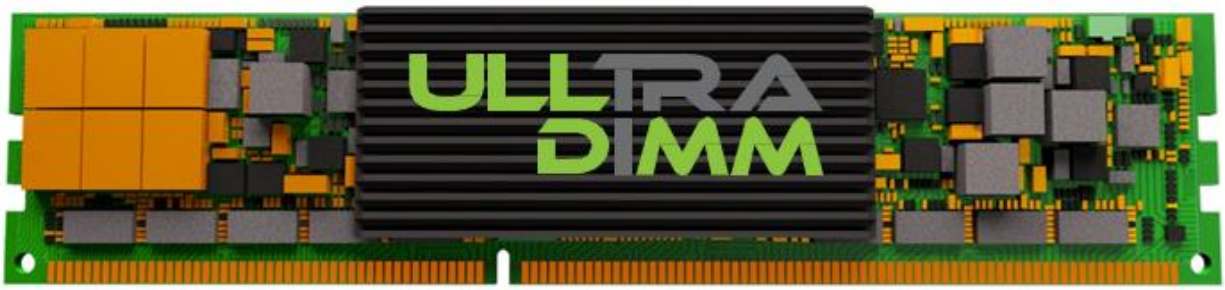


Figure 24: Flash DIMM

eXFlash DIMMs in System x3850 X6:

- eXFlash DIMMs are RDIMMs and cannot be used with 32-GB and 64-GB LRDIMMs
- eXFlash DIMMs are 12.5 watt maximum, one per DDR3 channel
- Maximum capacity is 32 x 400 GB = 12.8 TB
- eXFlash DIMMs require 2:1 performance mode: they do not support 1:1 RAS mode, memory mirroring, or rank sparing
- eXFlash DIMMs have device firmware and a device driver
- Lenovo will add enhanced market offering features over time

Note: System x3850 X6 only supports a maximum of 32 eXFlash DIMMs in the platform and only one eXFlash DIMM per channel can be installed (one channel has three DIMMs). It is recommended to populate the eXFlash DIMM farthest from the memory buffer.

Attention: eXFlash DIMM requires an OS-Agent that is made by Diablo. If there is no device driver from Diablo, the OS will recognize these eXFlash DIMMs as a regular 4 Gb DDR, and the UEFI will exclude these eXFlash DIMMs from the actual memory map. Therefore, an OS-Agent from Diablo must be installed; otherwise, these Flash DIMMs are useless.

Storage

The storage book houses the drives and drive backplanes, the front operator panel, the LCD system information display panel, and the PCIe slots for the storage host bus adapters (HBA). The server supports up to eight 2.5-inch hot-swap drives or sixteen 1.8-inch hot-swap drives, or a combination of both 2.5-inch and 1.8-inch drives, using the supported drive backplanes. It supports 2.5-inch hot-swap Serial Attached SCSI (SAS) or SATA hard disk drives, 2.5-inch hot-swap SATA SSDs, or 1.8-inch hot-swap SATA SSDs.

Note: When mixing drive backplane configurations, install all of the 1.8-inch solid-state drive backplanes above all of the 2.5-inch hard disk drives or 2.5-inch solid-state drive backplanes.

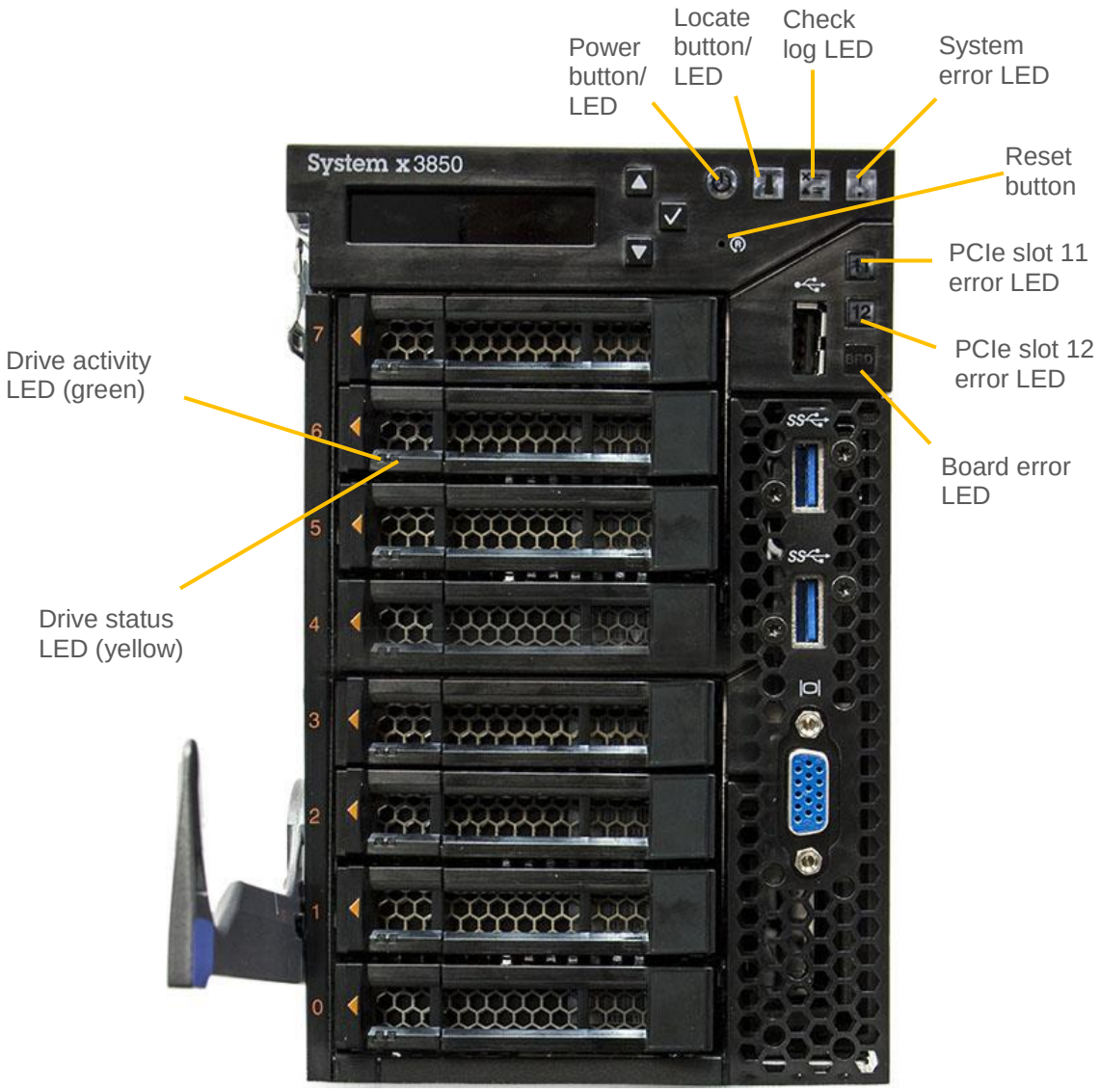


Figure 25: Storage book front view

Supported RAID adapters

Table 3 lists the supported RAID adapters.

Note: These adapters can be installed only in the PCIe slots on the storage book. The storage book is accessible from the front of the server.

Table 3: Supported RAID adapters	
RAID adapter	**Notes**

ServeRAID M5120 SAS/SATA Controller for System x	• Eight external 6 Gbps SAS/SATA ports
	• Two external mini-SAS connectors
	• Provides base RAID levels 0, 1, 5, 10, and 50 (this adapter comes with a cache card installed):
	  ○ With the ServeRAID M5100 Series RAID 6 Upgrade for System x (Features on Demand software RAID) enabled on this adapter, you also get RAID level 6 and 60 support.
	• You can also install the following RAID cache cards on this adapter for RAID levels 5 and 50 support:
	  ○ ServeRAID M5100 Series 512 MB Cache/RAID 5 Upgrade for System x
	  ○ ServeRAID M5100 Series 512 MB Flash/RAID 5 Upgrade for System x
	  ○ ServeRAID M5100 Series 1 GB Flash/RAID 5 Upgrade for System x
	Note: When any one of these three cache cards is installed on this adapter, enable the ServeRAID M5100 Series RAID 6 Upgrade for System x (Features on Demand software RAID) to get RAID levels 6 and 60 support. Optionally, the ServeRAID M5100 Series SSD Caching Enabler for System x (Features on Demand software RAID) can be enabled on this adapter to accelerate solid-state drive RAID devices and reduce processing overhead that is associated with caching.
	• A RAID cache card must be installed on this adapter to run the MegaRAID firmware.
	• The adapter supports external cabling.
	Always mount the battery remotely in the server.

ServeRAID M5210 SAS/SATA Controller for System x	• 12 Gb SAS/SATA Internal RAID adapter • Provides three Gen 3 x8 PCIe slots • Provides RAID levels 0, 1, and 10 support Seventy-two bit memory interface for DDR3 memory at 1866 MT/s

12 Gb Attached SCSI (SAS) Subsystem

- Internal RAID adapter (Flatwoods)
  - It can only plug into storage adapter slots on front I/O board
  - PCI low profile, MD2 length card outline
  - PCIe Gen 3 x8 lanes
  - RAID 0/1/10 support – no cache on base card
  - LSI SAS3108

Note: On an internal RAID adapter, when cache card option is installed, it will support RAID 5 configuration.

- External RAID adapter (Milton)
  - It can plug into any PCIe slot on standard (primary) I/O board, half-length I/O board, or full-length I/O board. It cannot plug into front I/O board.
  - PCIe Gen 3 x8 lanes
  - RAID 0/1/10 support – no Cache on base card
  - LSI SAS3108
- ServeRAID M5120 (Madison) – 6 Gb SAS RAID Adapter (External)
  - PCI low profile (half-length) – MD2 form factor
  - Eight external 6 Gbps SAS/SATA ports
  - Two external Mini-SAS connectors (SFF-8088)
  - 6 Gbps throughput per port
  - LSI SAS2208
- Low-cost non-RAID adapter
  - It can only plug into storage adapter slot on front I/O board
  - PCI low profile, MD2 length card outline
  - 8-port controller (SAS 12G / SATA 6G)
  - PCIe Gen 3 x8 lanes
  - Non-RAID HBA, SSD/JBOD focused

I/O book

Standard (primary) I/O book

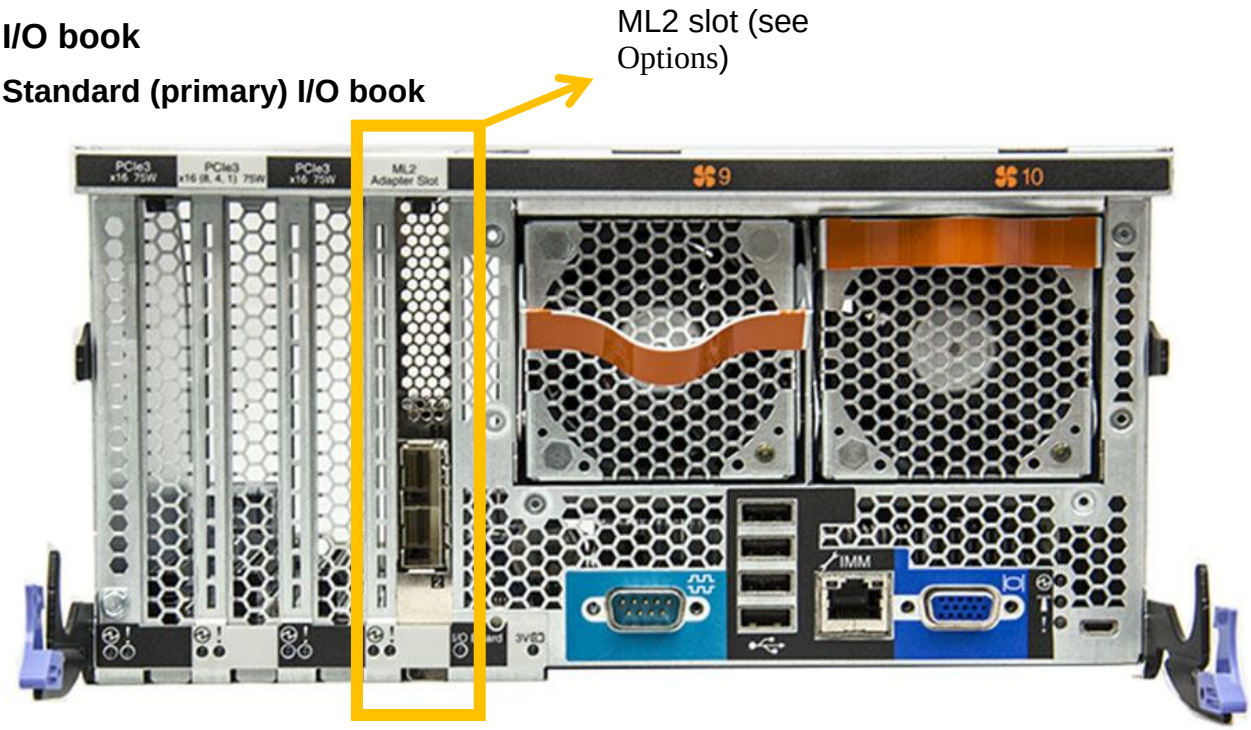


Figure 26: Standard (Primary) I/O book

Servicing the Lenovo System x3850 X6 and x3950 X6 Types 3837/3839 – System configurations and diagrams

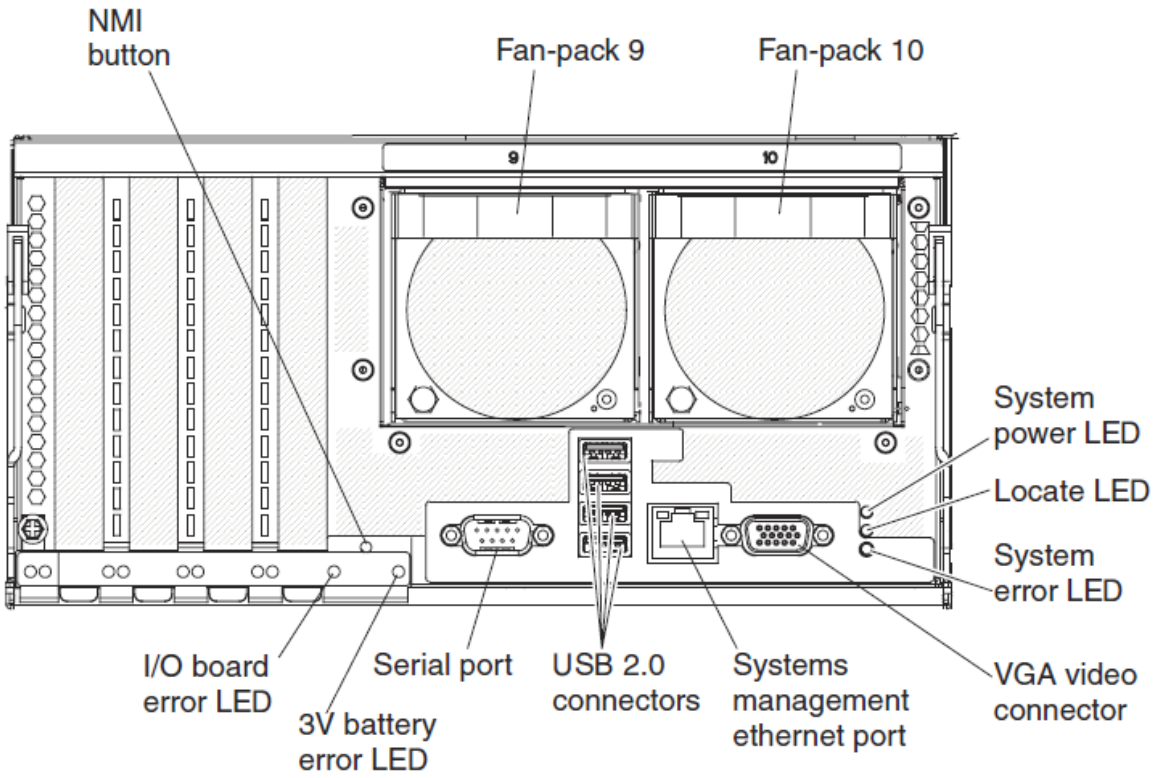


Figure 27: Standard I/O book diagram

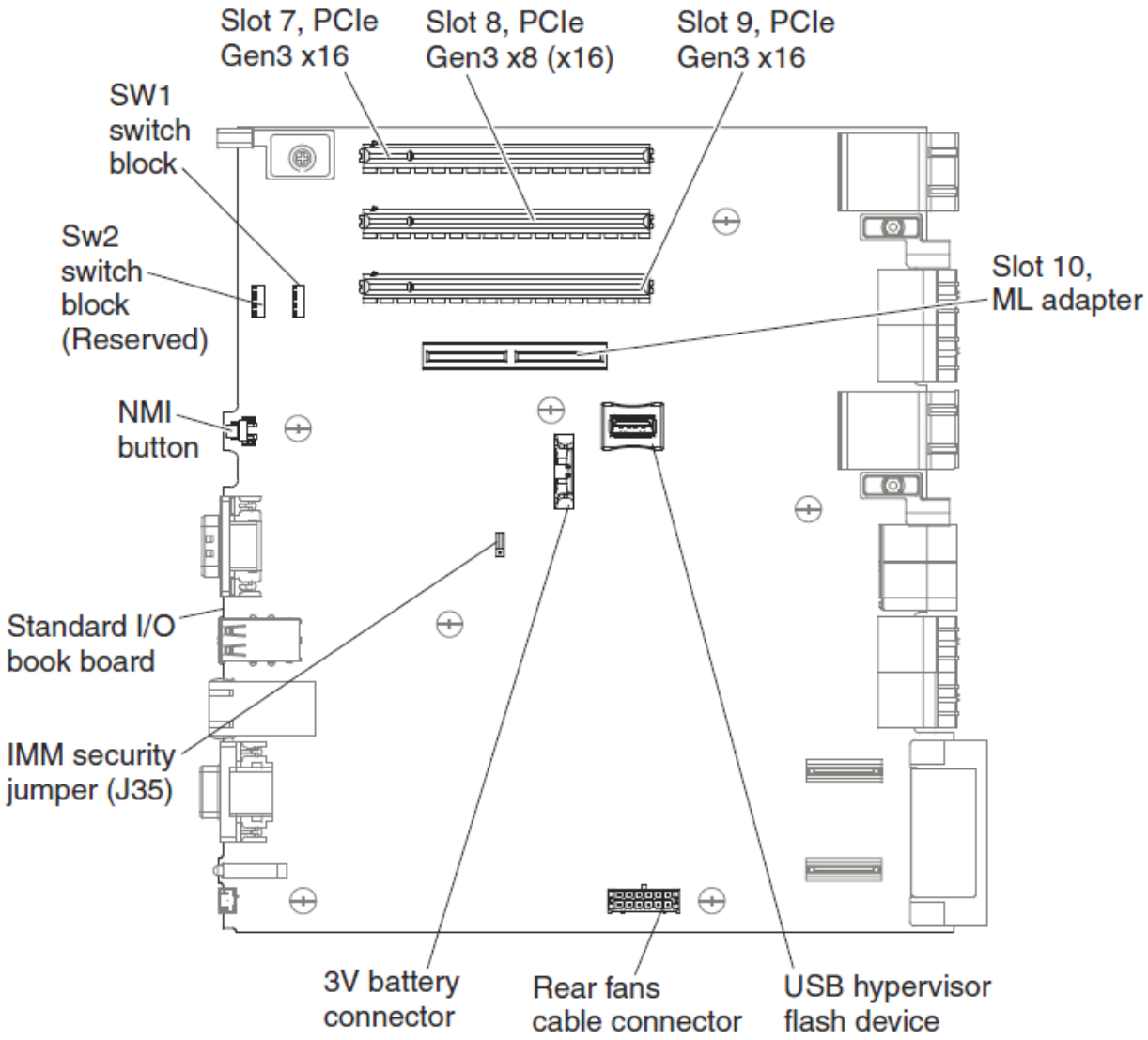
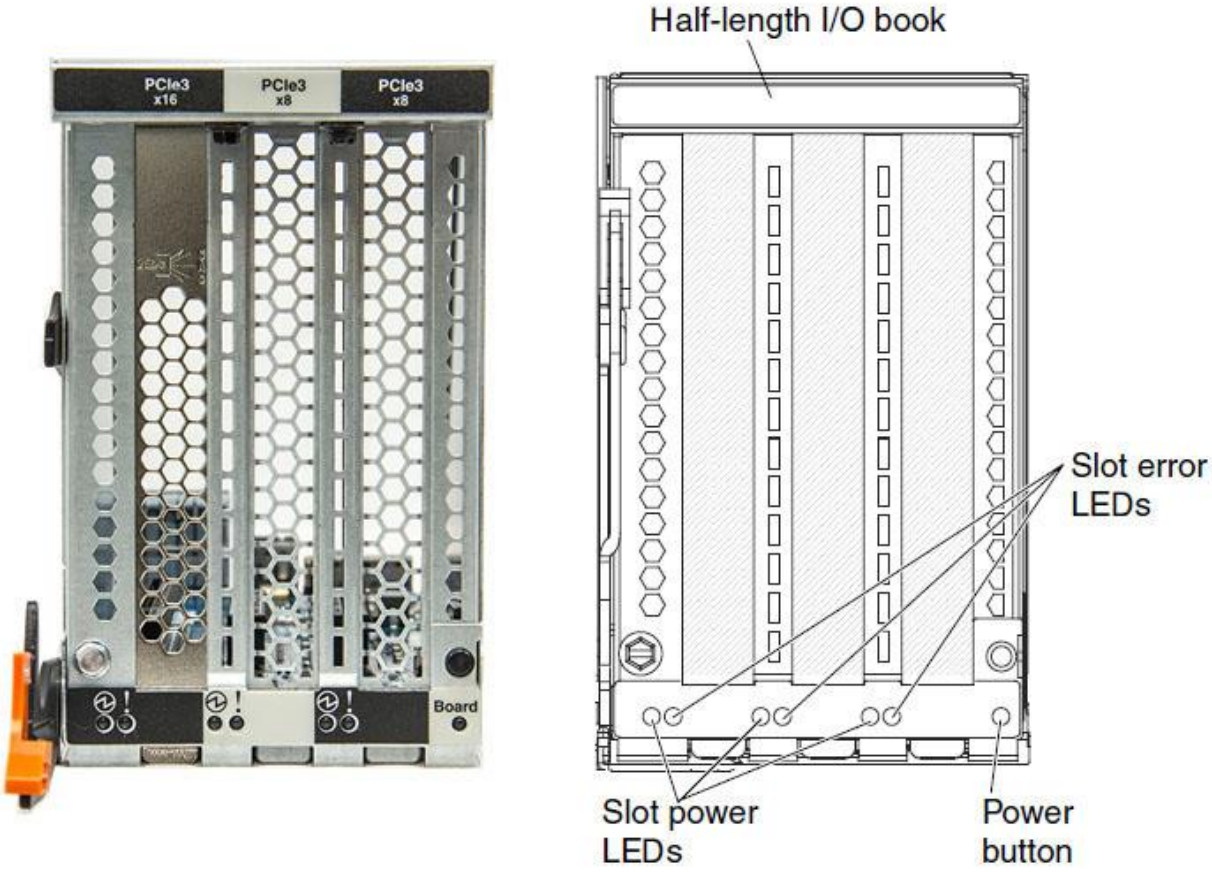


Figure 28: Standard I/O board diagram

The components in the server standard I/O book are the minimum set of I/O components to form a server. The standard I/O book is connected to microprocessors 1 and 2. The standard I/O book PCIe buses are also connected to microprocessors 1 and 2.

Note: The standard I/O book is not a hot-swap module. Power the server off before installing and removing components from the standard I/O book.

Half-length I/O book



.Figure29: Half-length I/O book

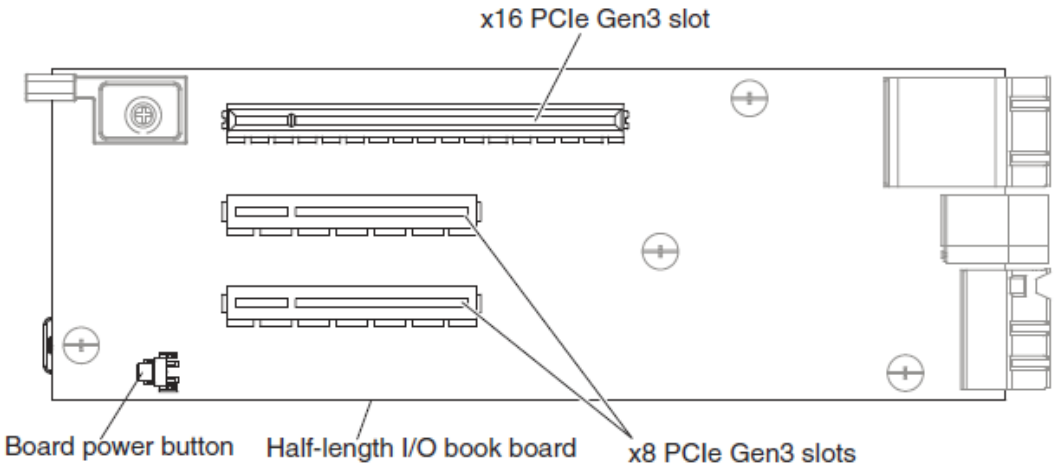


Figure 30: Half-length I/O board

The half-length I/O book installs in the rear of the server, and it provides the ability to concurrently hot-add or hot-remove PCIe adapters in this I/O book. This I/O book supports only half-length, full-height PCIe Gen3 adapters. The half-length I/O book itself is hot-swappable if no adapters are installed in the I/O book.

Note: If adapters are installed in the I/O book, you must first press the **power button** on the I/O book and power-off all three PCIe slots before you remove the I/O book from the server. The slots LED lights will be off when the slots are offline.

Up to two half-length I/O books can be installed in the server, and it also can be mixed with one half-length I/O book and one full-length I/O book.

- **Slot error LEDs:** The states of the slot error LEDs are as follows:
  - **Off:** The slot or adapter is in normal operation.
  - **On:** A slot error has occurred.
- **Slot power LEDs:** The states of the power LEDs are as follows:
  - **Off:** Input power to the slot is not present.
  - **On:** Hot-plug operation is complete and main power to the slot is present. However, you cannot remove the I/O book from the server until the power LEDs on all three slots are off.
  - **Flashing:** The slot is in the process of powering on or off. Do not remove the half-length I/O book from the server.
- **Power button:** Press this button to power the I/O book PCIe slots off or on. The power LED for each slot flashes until all of the power LEDs for the slots are on or off (not flashing).

Figure 31 shows where the half-length I/O book can be installed.

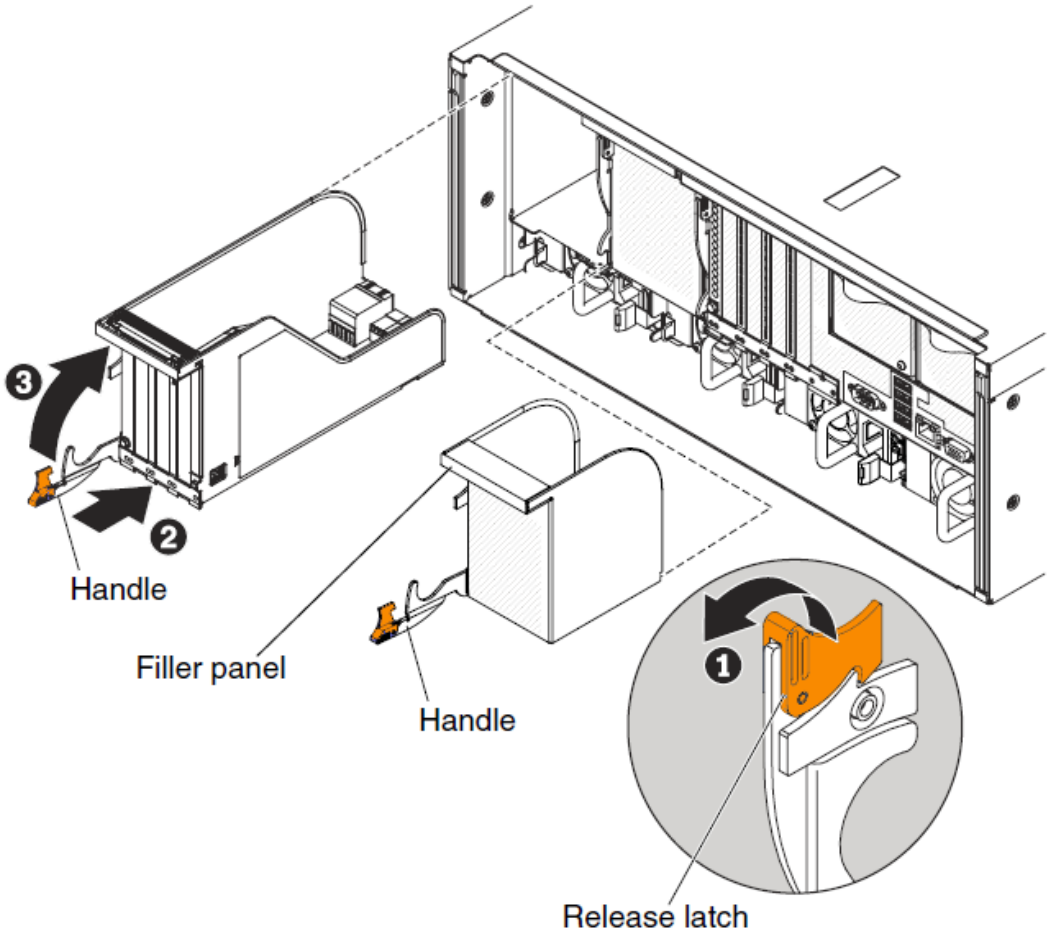


Figure 31: Installing half-length I/O book

Full-length I/O book

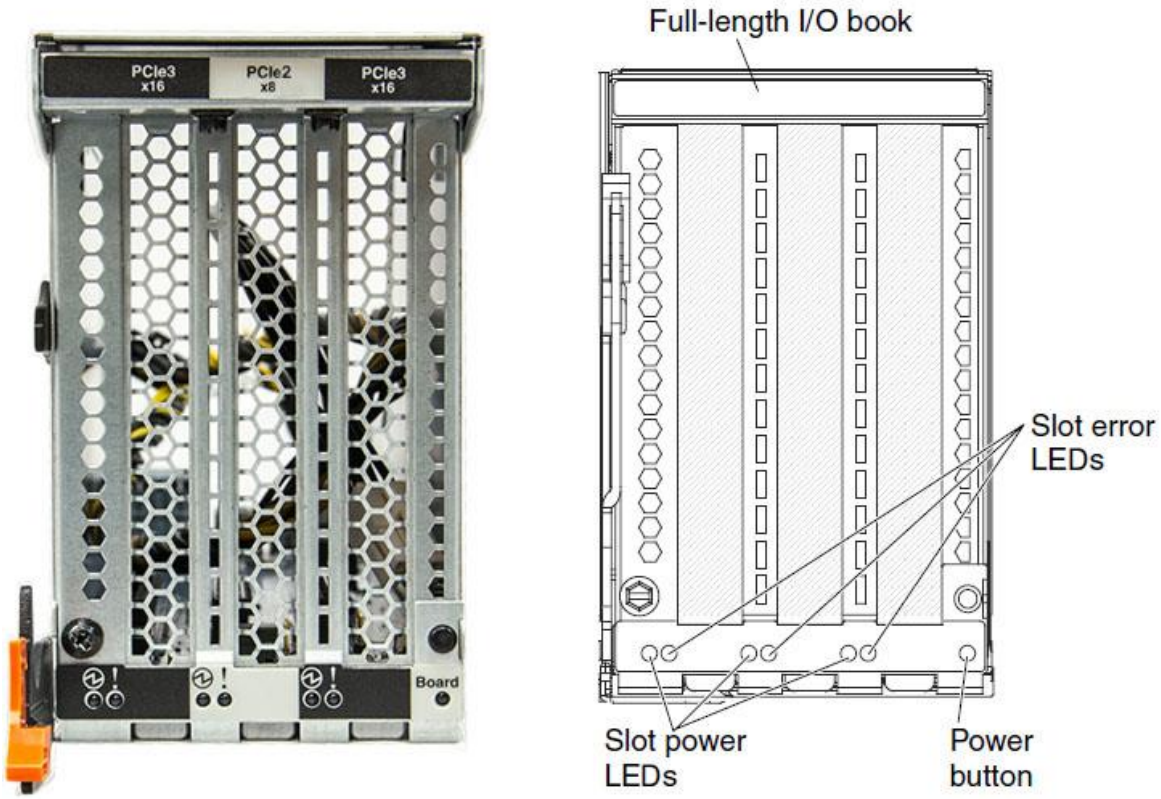


Figure 32: Full-length I/O book

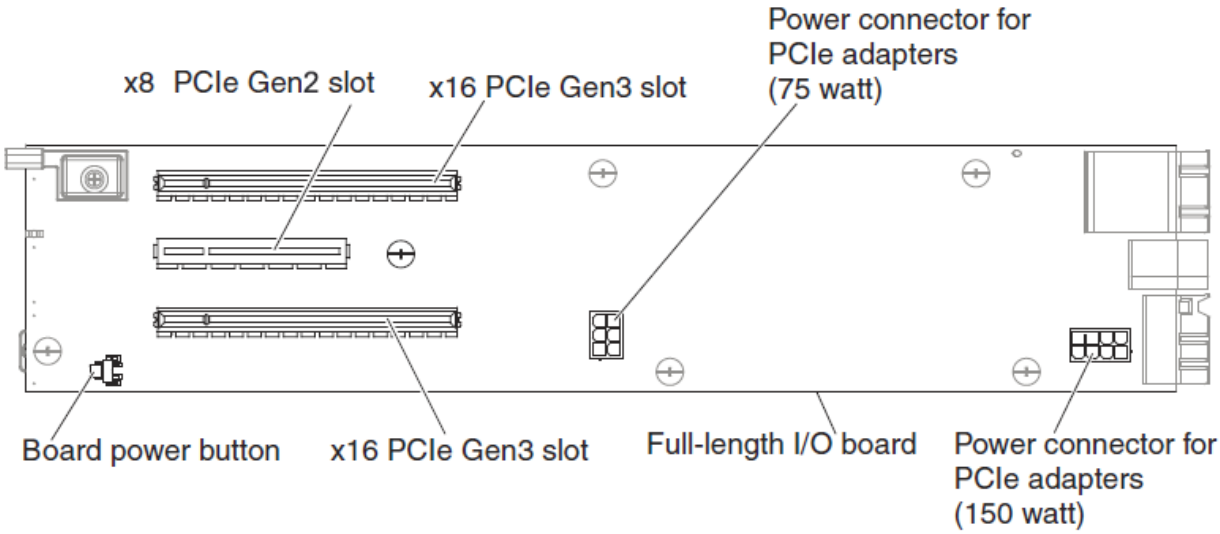


Figure 33: Full-length I/O board

The full-length I/O book installs in the rear of the server, and it provides the ability to concurrently hot-add or hot-remove PCIe adapters in this I/O book. This I/O book supports both half-length, full-height and full-length, and full-height PCIe Gen3 and Gen2 adapters.

Note: When you install a double-wide adapter in one of the x16 slots on this I/O book, the other two slots are no longer usable.

Up to two full-length I/O books can be installed in the server, and it also can be mixed with one full-length I/O book and one half-length I/O book.

The ability to hot-add the full-length I/O book is dependent on the operating system. If the operating system does not support hot-plug, the addition or removal of a full-length I/O book might cause an unrecoverable system error.

Attention: If the I/O bay is not populated with a full-length I/O book when the operating system boots or the operating system is still running, a full-length I/O book cannot be hot-added to the I/O bay due to insufficient resources.

If the I/O bay has a full-length I/O book installed when the operating system boots, you can hot-swap the full-length I/O book.

- **Slot error LEDs:** The states of the slot error LEDs are as follows:
  - **Off:** The slot or adapter is in normal operation.
  - **On:** A slot error has occurred.
- **Slot power LEDs:** The states of the power LEDs are as follows:
  - **Off:** Input power to the slot is not present.
  - **On:** Hot-plug operation is complete and main power to the slot is present. However, you cannot remove the I/O book from the server until the power LEDs on all three slots are off.
  - **Flashing:** The slot is in the process of powering on or off. Do not remove the half-length I/O book from the server.
- **Power button:** Press this button to power the I/O book PCIe slots off or on. The power LED for each slot flashes until all of the power LEDs for the slots are on or off (not flashing).

Servicing the Lenovo System x3850 X6 and x3950 X6 Types 3837/3839 – System configurations and diagrams

Figure 34 shows where the full-length I/O book can be installed.

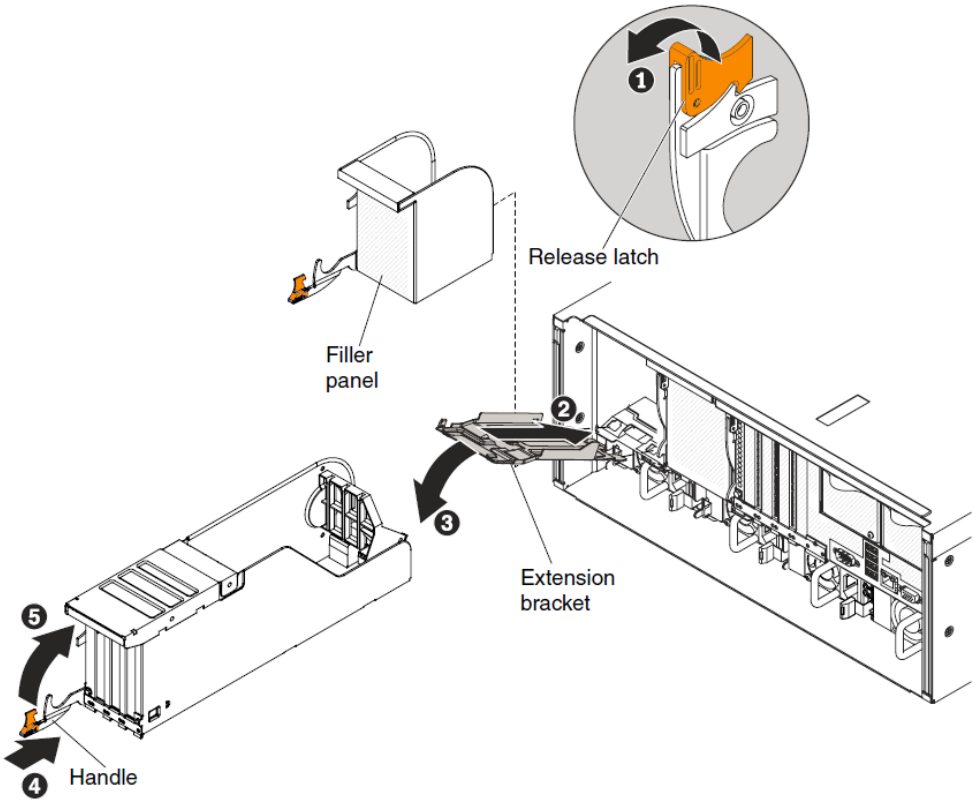


Figure 34: Installing the full-length I/O book

Figure 35 is an example of the I/O map of standard I/O book with using two half-length I/O books.

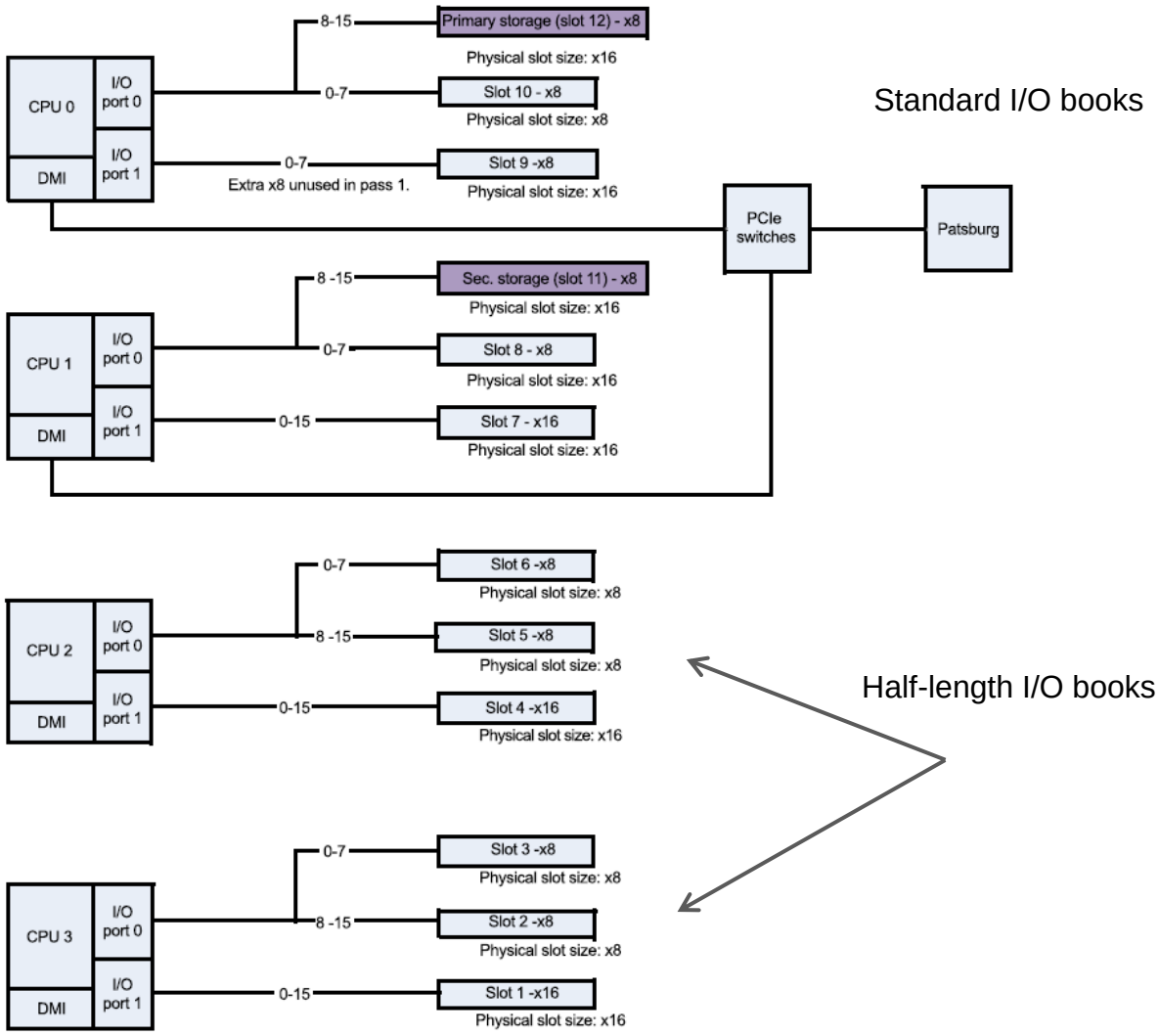


Figure 35: Example of I/O map

Installing power supplies

Figure 36: Power supply

- **ac power LED:** When the ac power LED is lit, it indicates that sufficient power is being supplied to the power supply through the power cord. During normal operation, both the ac and dc power LEDs are lit.
- **dc power LED:** When the dc power LED is lit, it indicates that the power supply is supplying adequate dc power to the system. During normal operation, both the ac and dc power LEDs are lit.
- **Power supply error LED:** When this yellow LED is lit, it indicates that a power supply error has occurred.

The server supports 900-watt ac power supplies, 1400-watt ac power supplies, and 750-watt -48 volt dc power supplies. The following describes the types of power supplies that the server supports and other information that must be considered while installing power supplies:

Note: Use the IMM2 Web interface, CIM, or the Advanced Settings Utility (ASU) to set and change the power supply policies and system power configurations. UEFI cannot be used to do these tasks. The default configuration setting for both ac and dc power supply models is non-redundant with throttling enabled.

The power supply bays are divided into two power domains. Power supply bays 1 and 3 are in power domain A and power supply bays 2 and 4 are in power domain B. The power supply bays are numbered from right to left when viewed from the rear of the chassis.

Use a power-supply spacer when installing the 750-watt -48 volt dc power supplies and the 900-watt power supplies.

Table 4 lists the population sequence for the supported power supply configurations.

Table 4: Population sequence for the supported power supply configurations	
Power supply configuration	**Notes**
1 power supply	The power supply must be installed in bay 3. This configuration does not support power supply redundancy. ac power supply filler must be installed in bay 4.
2 power supplies	The power supplies must be installed in bays 2 and 3 with each supply on separate power feeds for feed redundancy. Both power supplies must be the same type (that is, the same wattage, ac power supplies, or dc power supplies).
4 power supplies	The power supplies in bays 1 and 2 must be the same input type (that is, both ac power supplies or both dc power supplies) and the power supplies in bays 3 and 4 must be the same input type.

Note: Four 750-watt -48 volt dc power supplies is the only 750-watt -48 volt dc power supply configuration that the server supports.

Table 5 lists the supported ac power supply configurations at both 220 V ac and 110 V ac.

Table 5: Supported ac power supply configurations at both 220 V ac and 110 V ac	
Number of power supplies	Power supply wattage
One	900 watt
One	1400 watt
Two	900 watt
Two	1400 watt
Four	Two 900 watt and two 1400 watt
Four	900 watt
Four	1400 watt

When mixing 900-watt and 1400-watt power supplies in the server, the power supplies must be installed as listed in **Table 6.**

Note: Do not mix ac and dc power supplies in the server.

Table 6: Mixing power supplies location

Power supply bay numbers	Power supply wattage
Bay 1 and 4	900 watt
Bay 2 and 3	1400 watt
OR	
Bay 1 and 4	1400 watt
Bay 2 and 3	900 watt

Advanced RAS features

Xeon E7 v2 QPI and SMI2 protection

Four-socket has 6 QPI links and 16 SMI2 links

- QPI is CPU to CPU; SMI2 is CPU to Memory Buffer.
- Data packets are protected by CRC algorithms.
- CRC is calculated and sent with the data.
- When data is received, the CRC is recalculated and compared to the original CRC calculated prior to transmit.
- If the CRC check passes, data proceeds to its next destination.
- If the CRC check fails, the packet is retransmitted.
- If the check continues to fail after a retry threshold is reached, the link will retrain and try again.
- If during retraining a bad lane is discovered, the link will restart at half width and not use the bad lane.

Enhanced MCA Gen1 and X6 usage

X6 firmware converts all CMCI to SMI

- System Management Interrupt (SMI) is a firmware interrupt for correctable error handling.

- Correctable Machine Check Interrupt (CMCI) is an OS interrupt for correctable error handling.
- OS is now informed of correctable errors such as memory by the SCI Interrupt and Firmware First acPI flow.
- Converting CMCI to SMI leads to better co-ordination between the OS and firmware when reporting correctable errors.
- On past products, the OS gets CMCI on all correctable errors.
- Often the OS logging would lead to part replacement concerns prior to the proper hardware thresholds being met, which are known to the firmware, but not to the OS.
- Older Linux versions may poll the error registers directly.

Xeon E7 v2 memory modes

RAS mode (1:1) and performance mode (2:1)

- In RAS mode, memory is run in lockstep, and DIMMs are added two at a time to the same memory buffer. The SMI2 link runs at the same speed as the DDR3 buses.
- In Performance mode, the SMI2 link runs at two times the speed of the downstream DDR3 buses, and DIMMs can be individually added.
- Max speed is 1600 M/1600 M in RAS mode and 2667 M/1333 M in Performance mode, and is dependent on CPU SKU and configuration.
- Only x4 DIMMs are supported, so RAS mode is DDDC+1b, and performance mode is SDDC+1b.
- X6 firmware masks the first correctable error threshold in Performance mode and the first two thresholds in RAS mode, which results in fewer memory repair actions.

Memory rank sparing

Duplicate data copies for uncorrectable error recovery

- Xeon E7 v2 allows mirrored copies to be kept in both 1:1 RAS mode and 2:1 performance mode and affects the DIMM installation order.
- When selected, the feature is global to the server. To simplify testing, different settings per memory controller are not allowed (industry standards are not fully defined to describe locations of mixed mirrored and non-mirrored to OS/Hypervisors).
- Mirroring reduces the system memory capacity by half.
- Writes are automatically stored in two locations.
- Reads are interleaved between copies to help performance.

- Error handling is similar to 2:1 performance mode, except for uncorrectable memory errors when the spare copy is read and used.

Memory mirroring

Duplicate data copies for uncorrectable error recovery

- Xeon E7 v2 allows mirrored copies to be kept in both 1:1 RAS mode and 2:1 performance mode and affects the DIMM installation order.
- When selected, the feature is global to the server. To simplify testing, different settings per memory controller are not allowed (industry standards are not fully defined to describe locations of mixed mirrored and non-mirrored to OS/Hypervisors).
- Mirroring reduces the system memory capacity by half.
- Writes are automatically stored in two locations.
- Reads are interleaved between copies to help performance.
- Error handling is similar to 2:1 performance mode, except for uncorrectable memory errors when the spare copy is read and used.

ROM recovery and flash DIMM management

- If during ac power on, the IMM management firmware does not start properly, the system will automatically switch to the backup copy for recovery.
- If during boot, the UEFI system firmware does not start properly, the system will automatically switch to the backup copy for recovery.
- The eXFlash DIMM driver has an Out-of-band OS independent method to communicate with the Integrated Management Module. This allows the IMM to receive alerts or to send commands to the eXFlash DIMM without requiring a polling method, which simplifies managing the part.
- When an eXFlash DIMM is installed, memory mirroring, 1:1 RAS mode, and rank sparing are not available.

Live Error Recovery (LER for PCI Express devices)

- If a PCI Express port detects uncorrectable data on the PCI Express bus, LER provides a mechanism to retrain the PCI Express port linking to the device.
- Error containment is performed on the uncorrectable data.
- The OS sees an LER event as a Pseudo Surprise Hot Removal and is notified to Bus_Check.

- The OS notifies the device driver of the Pseudo Surprise Hot Removal, and the device driver activity will cease for that device.
- If the PCI Express port retrains successfully, the device will be treated as a Hot Add event.
- For LER to be successful, there are dependencies on the OS, Driver, configuration, and activity in progress when the LER event occurred.
- LER provides an additional chance for uncorrectable recovery, even if the device is not re-added.

Scaling from x3850 X6 to x3950 x6

The Lenovo System x3850 X6 and x3950 X6 server uses a direct QPI connection topology through the midplane to scale from an x3850 X6 (four-socket configuration) to an x3950 X6 (eight-socket configuration) server. **Figure 37** shows a four-socket midplane and an eight-socket midplane.

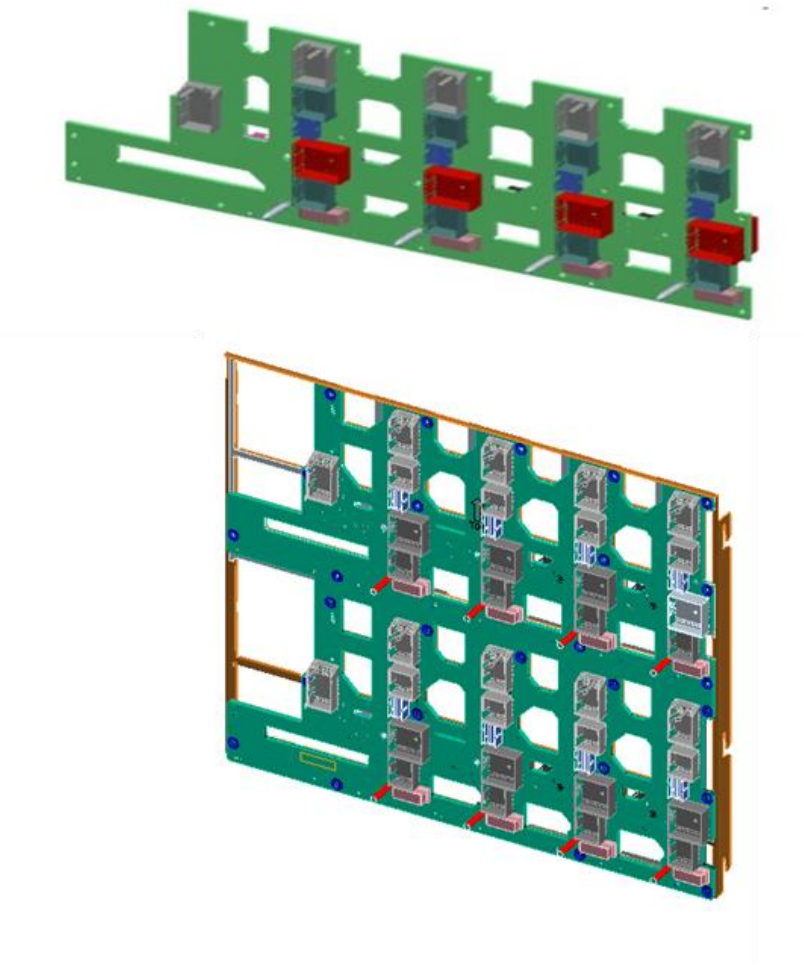


Figure 37: Four-socket midplane and eight-socket midplane

Figure 38 and 39 show four-socket and eight-socket QPI topology.

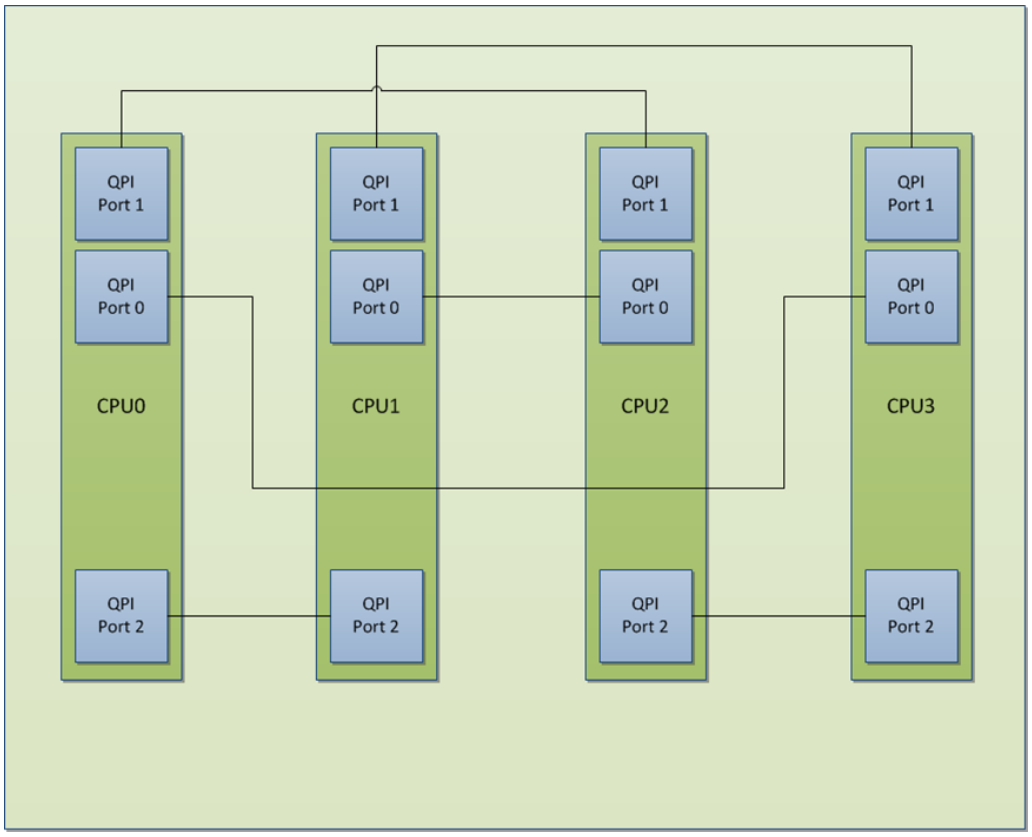


Figure 38: Four-socket QPI topology

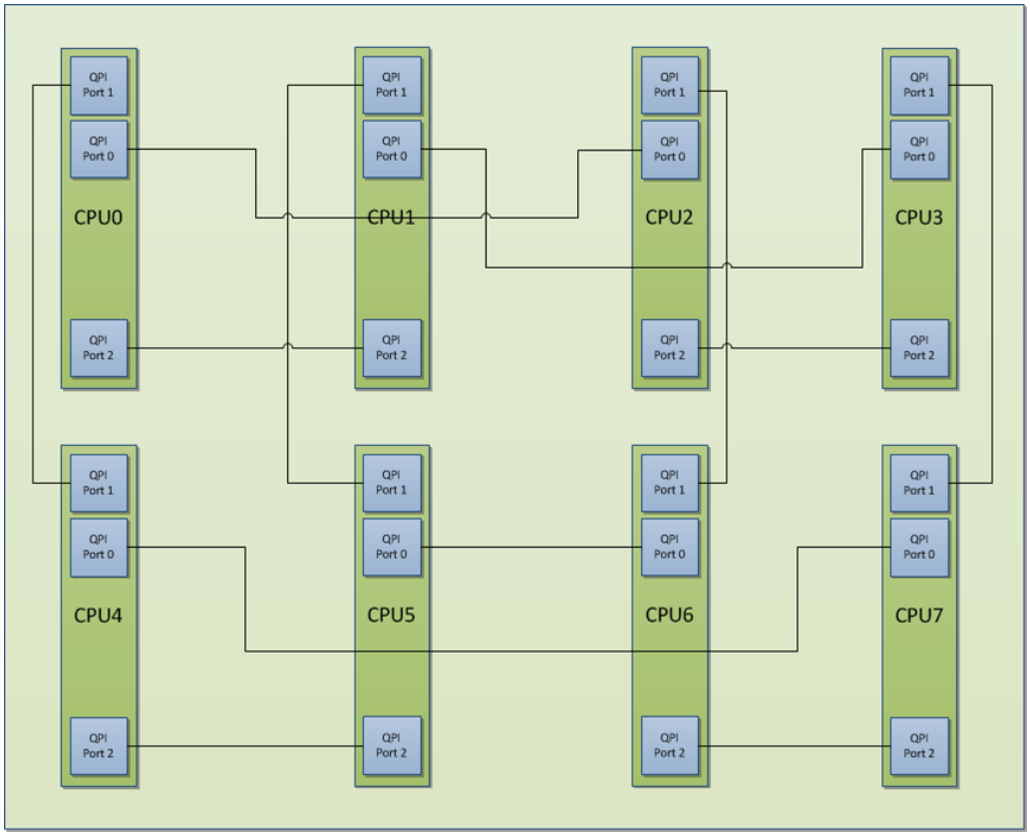


Figure39: Eight-socket QPI topology

The x3950 X6 is achieved by using the eight-socket chassis, the eight-socket midplane, and the eight-socket shuttle (which comes in the x3950 X6 four-socket to eight-socket Upgrade Kit) in addition to all of components used for the x3850 X6. All of the components are interchangeable between both the x3850 X6 and the x3950 X6 configurations, except the chassis, midplanes, shuttle, and the E7-8xxx v2 microprocessors.

Figure 40 shows how these parts work when scaling from a four-socket to an eight-socket configuration.

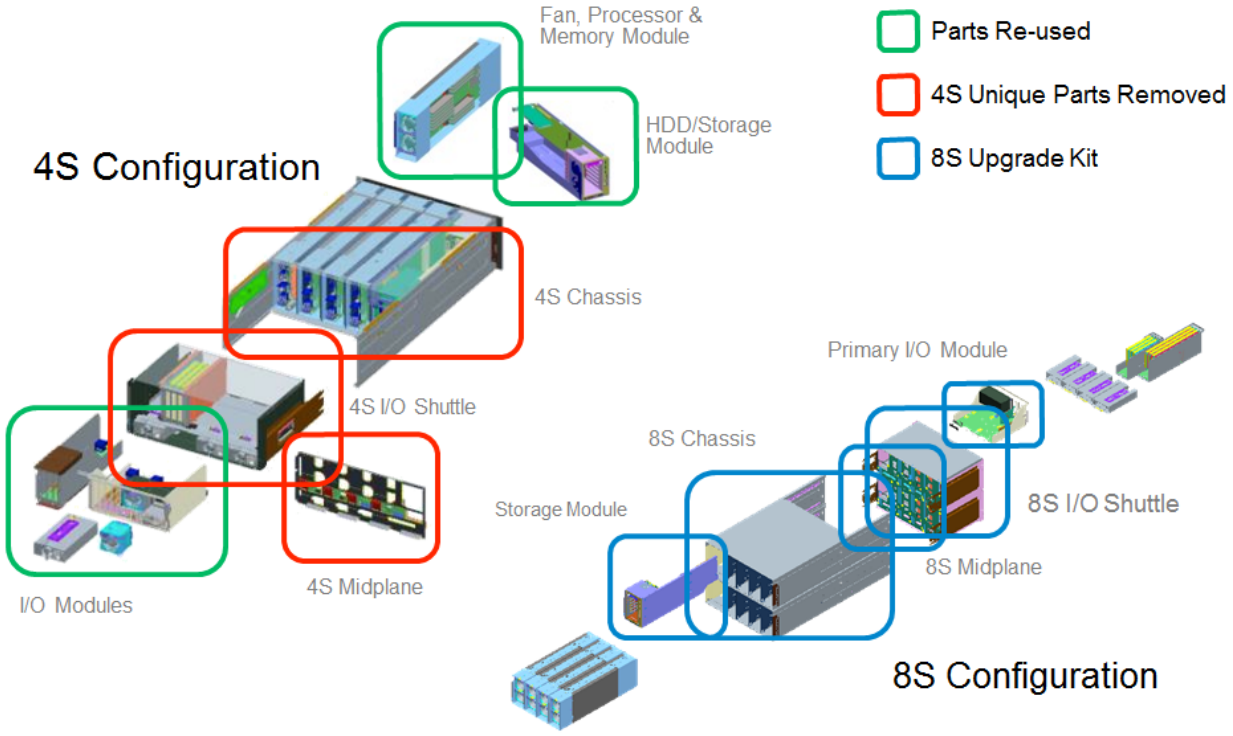


Figure 40: Parts that are used when scaling from a four-socket to an eight-socket

Note: Upgrading the server from a four-socket to an eight-socket system must be performed by a service technician.

The x3950 X6 has two nodes that have their own resources as independent servers.

The server power is distributed through the server midplane. In the x3950 X6 (eight-socket) configuration, the power subsystem is divided into two separate nodes, the top node and the bottom node.

Note: Power is not shared between the top node and the bottom node of the x3950 X6 configuration. Each node must have its own set of power supplies.

4U to 8U conversion option

To convert a four-socket configuration to an eight-socket configuration:

1. Transfer the I/O module from the 4U system to the lower position of the 8U system.

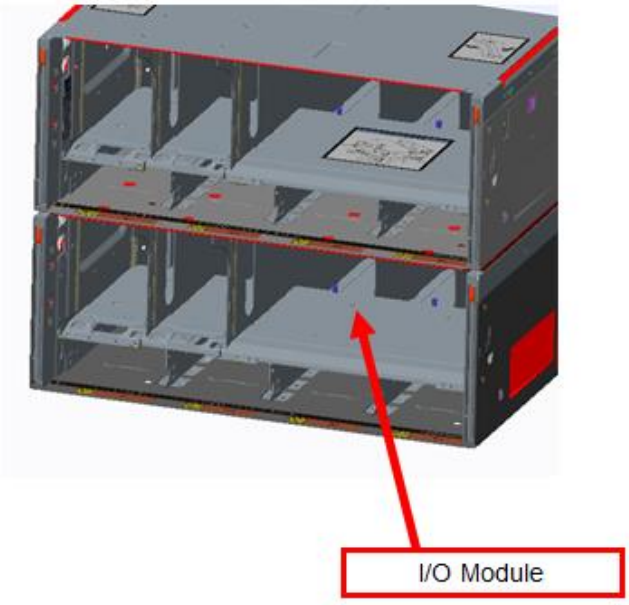


Figure 41: Lower position of the 8U system

2. Move the storage module from the 4U system to the lower position of the 8U system.
   a. Remove the storage module from the 4U system (with x3850 printed on the bezel).
   b. Remove the LCD bezel from the 4U storage module by the actuating latch, unplug the LCD and operator panel cables, and remove the LCD assembly.
   c. Remove the storage module from the lower 8U system (with blank bezel).
   d. Remove the LCD bezel from the lower 8U storage module by the actuating latch, and unplug the operator panel cable.
   e. Assemble the blank LCD bezel to the storage module from the 4U system by installing the LCD assembly, plugging the LCD and operator panel assembly, hinge, and latch.
   f. Install the configured storage module in the lower position of the 8U system.
   g. Discard the x3850 LCD bezel and the remaining parts of the storage module that was removed from the lower 8U position.
3. Assemble any HDD, HDD backplane, or RAID cards options in the upper 8U (x3950) storage module.

4. Transfer CPU modules, PCI modules, and power supplies from the 4U system to the 8U system, along with any additional options that were purchased to meet configuration requirements.
   a. Reposition CPU fillers in any unused CPU module locations.
   b. Reposition power supply fillers in any unused power supply locations.
   c. Discard any extra fillers.

Note: An 8U system requires a minimum of four CPUs and four power supplies.

The 8U system only supports four, six, or eight CPUs.

The 8U system only supports 4 or 8 power supplies.

Any customer ordering the 4U to 8U upgrade option must be aware of these requirements and also order the appropriate amount of CPU and power supply options to support the upgrade.

5. Transfer cable management brackets from the 4U system to the lower 8U positions. Assemble new cable management brackets to upper 8U positions.

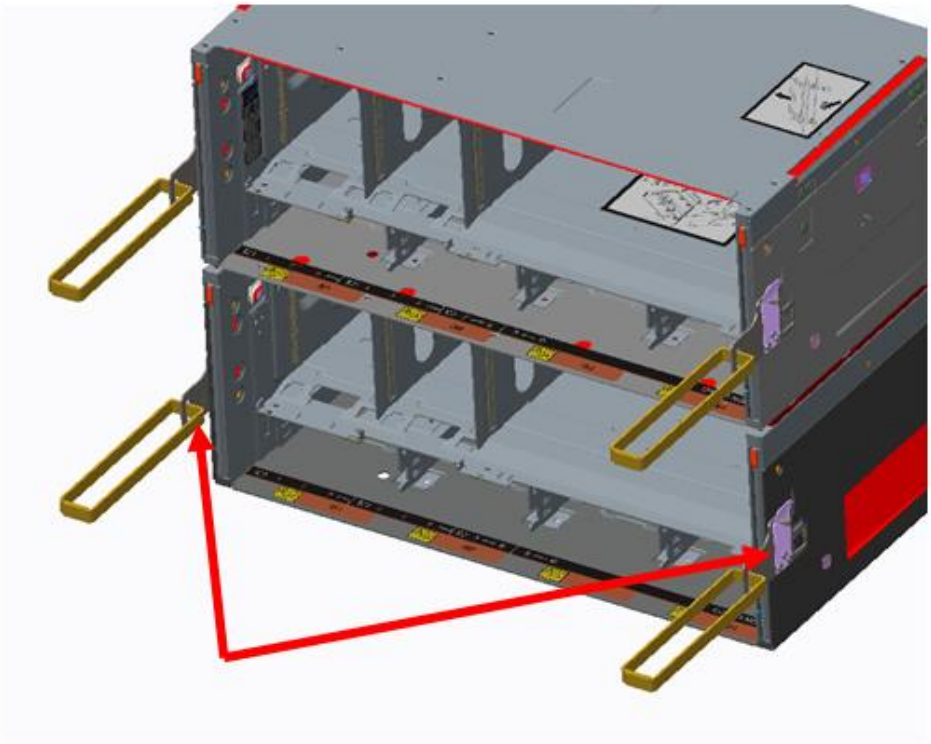


Figure 42: Cable management brackets

6. Transfer SN/MTM information from 4U to 8U.
   a. Remove the plastic insert on the left 8U EIA bezel by depressing the tab on the bottom.

b. Remove the plastic insert on the left 4U EIA bezel.

c. Apply the cover-up label to the plastic insert to apply new MTM information.

d. Assemble the plastic insert, with cover-up label, to the left 8U EIA bezel.

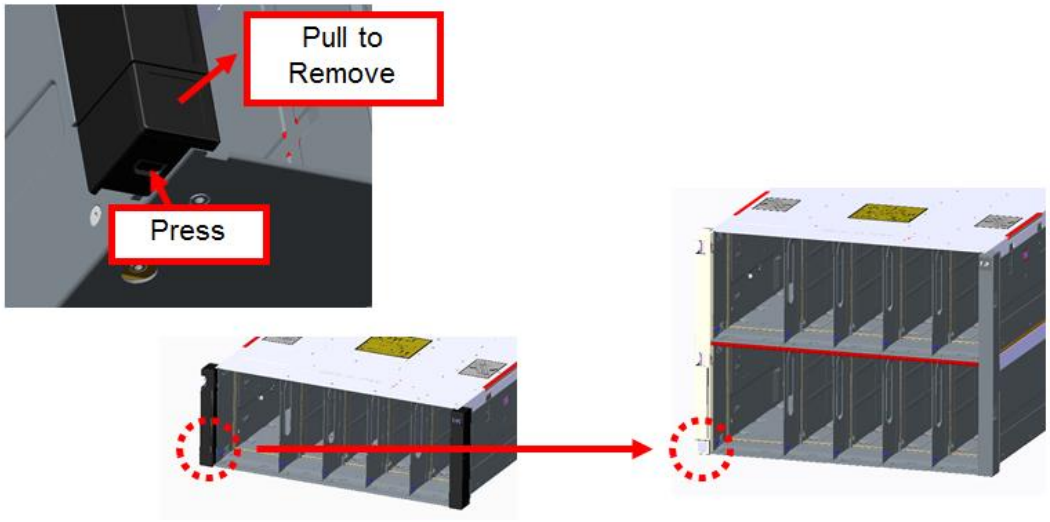


Figure 43: Location of SN/MTM

7. Complete the RID tag information and apply it to the 8U system.
8. Update the VPD information.

FlexNode support

The Lenovo System x3850 X6 and x3950 X6 server provides support for reconfiguring a multinode server into two independent, stand-alone servers, known as FlexNode support (also called Scalable Complex). When FlexNode support is enabled, each scalable partition can support its own independent operating-system installation. Each scalable partition has its own local resources as an independent server and cannot access the resources or boot the operating system of another stand-alone server while FlexNode is enabled. The default setting for the x3950 X6 (eight-socket) system is one eight-socket partition. The FlexNode (Scalable Complex) is a feature of the Integrated Management Module II (IMM2).

A multinode server can be configured into a single logical server or be partitioned into two stand-alone partitions.

As a single logical server, the server is able to use resources from all scalable partitions.

Note: If there is an ac system power failure to one of the nodes (partitions) when the server is configured as a single logical server, the remaining good node powers itself down and remains off until the failing node recovers from the ac power loss. After the power is restored, both nodes will automatically turn on and boot as a two-node partition.

In a stand-alone server, each scalable partition supports an independent operating-system installation. In addition, each scalable partition uses its own individual resources as an independent system. One stand-alone server cannot boot an operating system on another stand-alone server.

The following is a list of the minimum components that are required to support the 8U x3950 X6 configuration:

- Four DDR3 compute books (two in each node) with E7-8xxx v2 microprocessors. The microprocessors must be of the same cache size, type, and clock speed.
- The eight-socket chassis.
- Two standard I/O books.
- Two storage books.
- A minimum of four power supplies (two power supplies in each node).

Before you create a multinode system, make sure that all the nodes in the multinode configuration contain the following software and hardware:

- The current level of UEFI firmware and IMM firmware (all nodes must be at the same level)
- Microprocessors that are the same cache size, type, and clock speed

Use the IMM2 Web interface or the IMM2 telnet interface to manage scalable partitions.

Use the **Scalable Complex** option below the **Server Management** tab on the IMM2 Web user interface for managing multinode systems. The Scalable Complex option enables you to partition nodes as separate partitions or as independent nodes.

Figure 44 shows the options below the Server Management tab on IMM2 Web user interface home page.

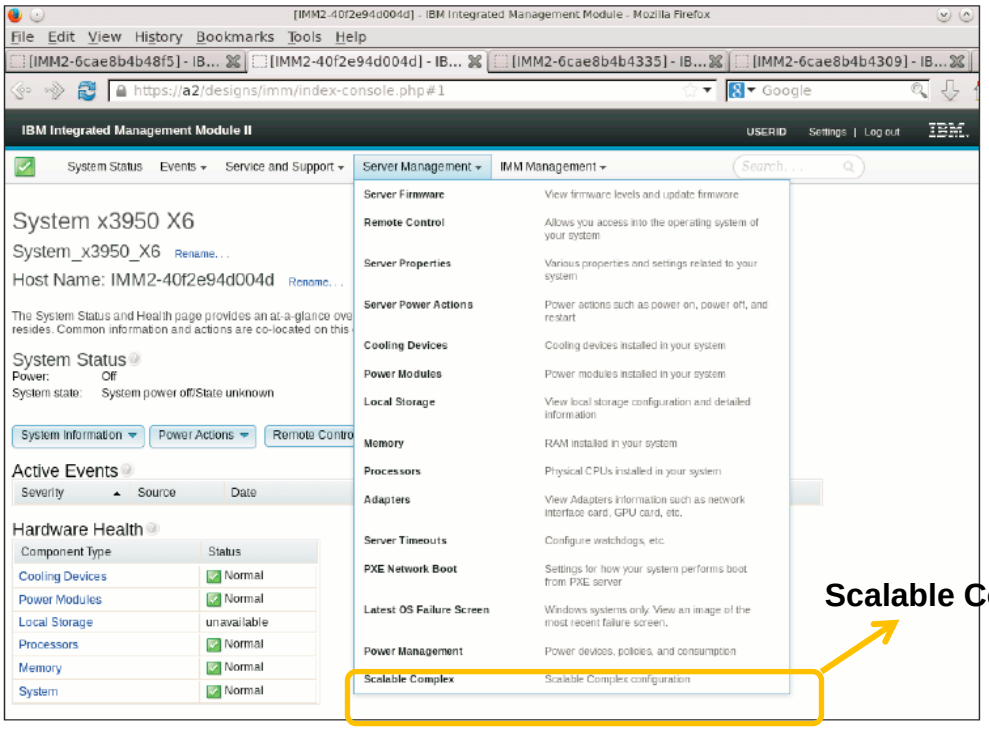


Figure 44: Server Management tab on IMM2

When you select the **Scalable Complex** option, the Scalable Complex page displays. See **Figure 45**.

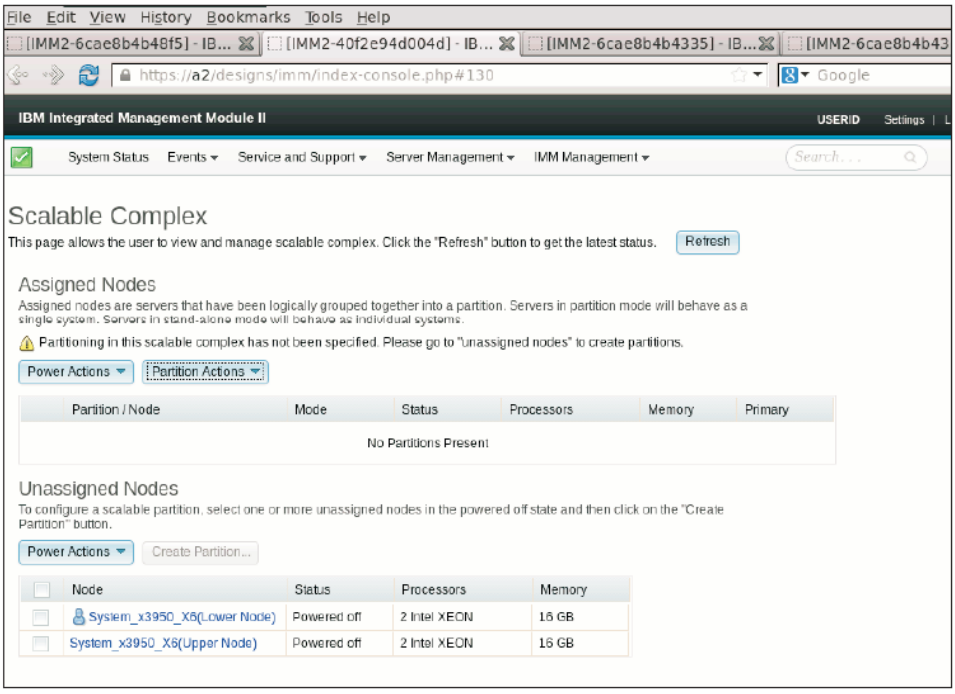


Figure 45: Scalable Complex page

UEFI difference

In the UEFI setup screens, there are changes made in the screens displayed. The two types of settings for a display for UEFI are Global settings and nodal settings.

Global settings will show the resources for the entire complex in the screen view. The absence of the choice to select a node to view is the indication that you are viewing global settings.

Nodal views are always indicated by the option to select which node to view before the UEFI screen is displayed.

Figure 46: System information

In System Information, there are three options:

- When the option **Node Detail** is selected, the user has the option to choose the System Summary detail for the selected node.
- The second option, **Product Data**, displays a global view of the system.
- The System Summary displays the global view System Summary of the multinode environment.

Figure 47: System information node detail

Selecting Node Detail allows the user to select which node to display the detail system summary data.

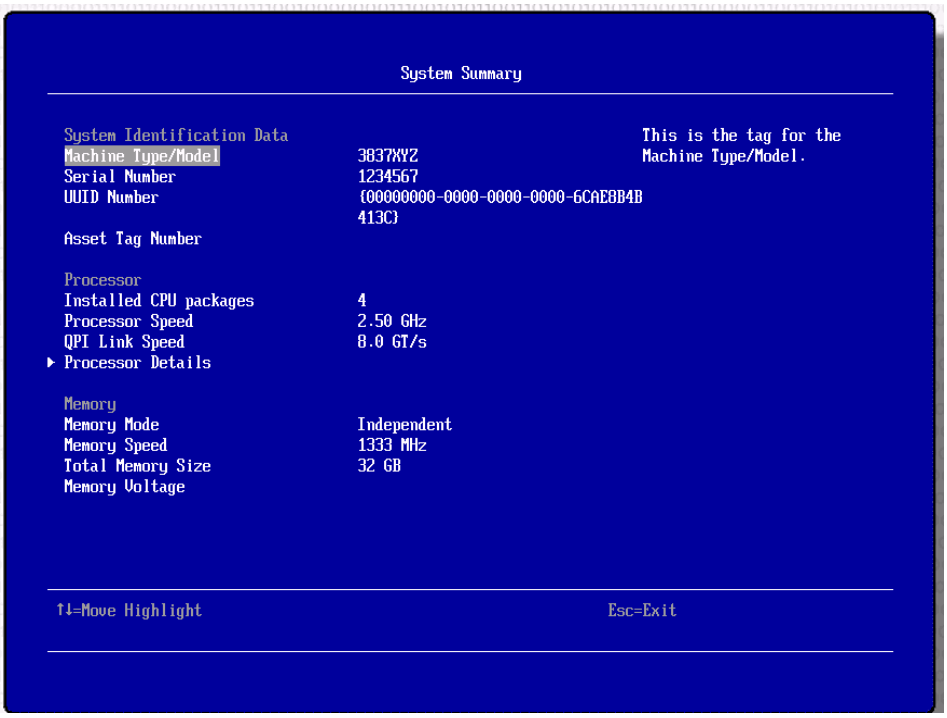


Figure 48: System summary in node detail view

This view is nodal and shows four installed CPU packages.

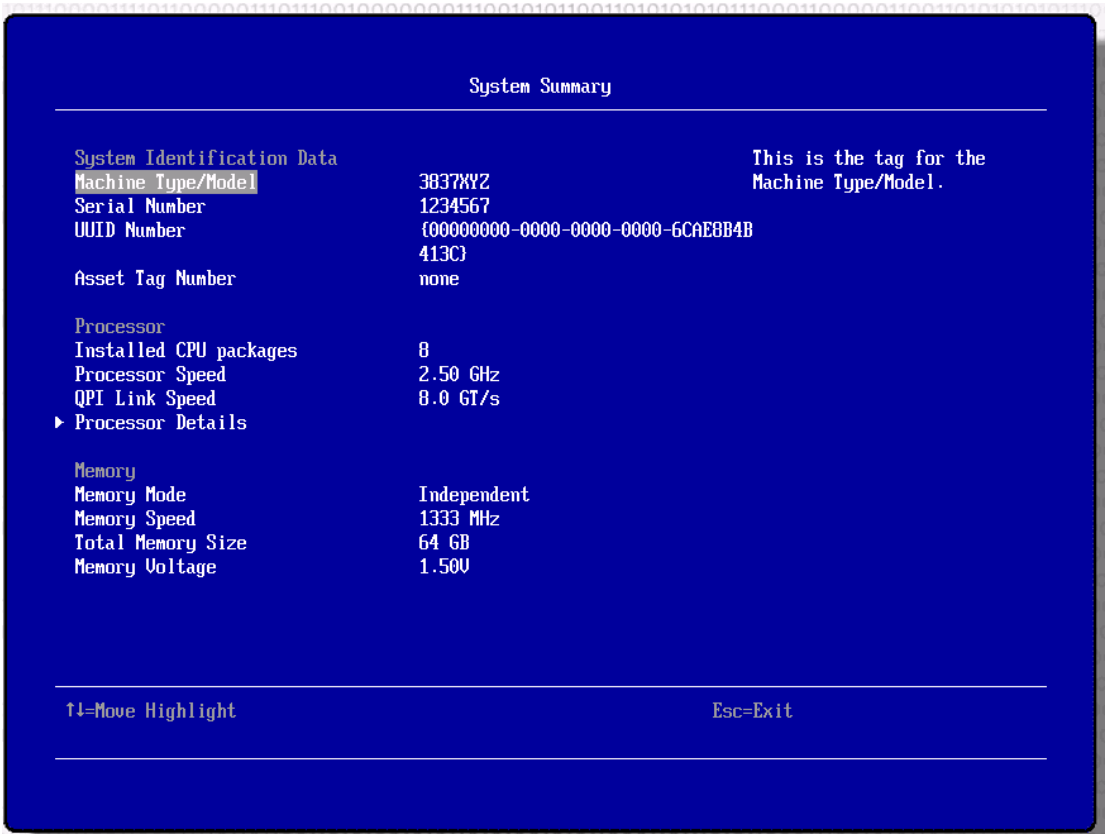


Figure 49: System summary global view

This view is global and shows eight installed CPU packages.

Problem determination and troubleshooting

Light path diagnostics

If an error occurs, view the light path diagnostics LEDs in the following order:

1. Look at the front operator panel on the front of the server. See **Figure 50.**

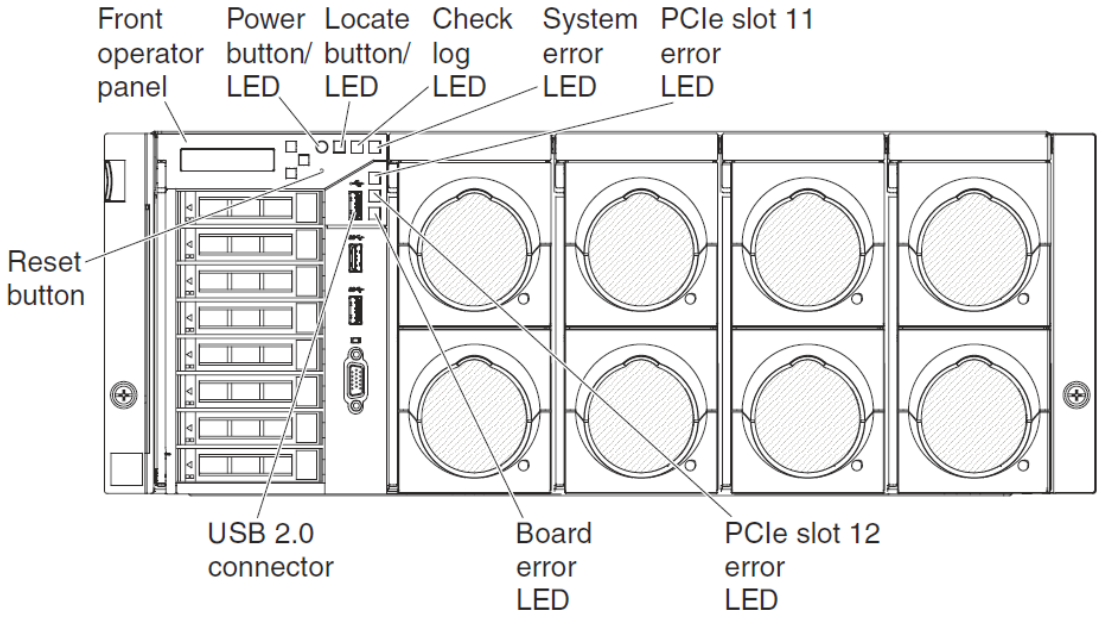


Figure 50: Front operator panel

- **Power button/LED:** Press this button to turn the server on and off manually or to wake the server from a reduced-power state. The states of the power-on LED are as follows:
  - **Off:** Input power is not present, or the power supply or the LED itself has failed.
  - **Flashing rapidly (three times per second):** The server is turned off and is not ready to be turned on. The power-on button is disabled. This lasts approximately 10 seconds after input power has been applied or restored.
  - **Flashing slowly (once per second):** The server is turned off and is ready to be turned on. You can press the power-on button to turn on the server.
  - **Lit:** The server is turned on.
- **Reset button:** Press this button to reset the server and run the power-on self-test (POST). You might have to use a pen or the end of a straightened paper clip to press the button. The Reset button is in the upper-right corner of the front operator panel.

- **Locate button/LED:** Press the locate button to visually locate the server among other servers. When you press the locate button, the LED will be lit and it will continue to be lit until you press it again to turn it off. This Locate button is also used as the physical presence for the Trusted Platform Module (TPM). You can use IBM Systems Director to light this LED remotely. This LED is controlled by the IMM2.
- **Check Log LED:** When this yellow LED is lit, it indicates that there are errors that require further diagnosis. Check the IMM event log for additional information. See Event logs for more information.
- **System-error LED:** When this yellow LED is lit, it indicates that a system error has occurred. A system-error LED is also on the rear of the server. This LED is controlled by the IMM2. Additional information can be seen on the LCD system information display panel.
- **Board error LED:** When this yellow LED is lit, it indicates that an error with the Storage book board has occurred.
- **PCIe slot 11 and 12 error LEDs:** When these LEDs are lit, it indicates that an error has occurred in PCIe slots 11 and 12 of the Storage book.

2. The modules in the server (on the front and rear) have LEDs that are lit to indicate the location of a problem.

In addition to the light path diagnostic LEDs, the server LCD system information display panel also displays a current list of errors reported by the system and other information.

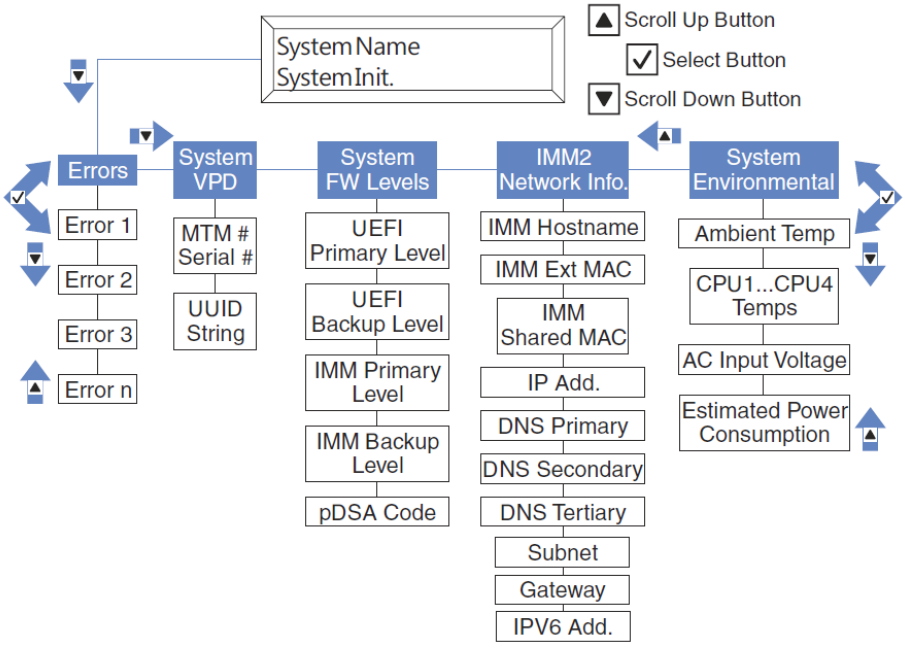


Figure 51: LCD system information display panel menu options flow

Figure 52 is an example of the information that you see on the display panel.

Tips: When the LCD display is garbled, it can be reset by pressing the up and down buttons simultaneously for three seconds.

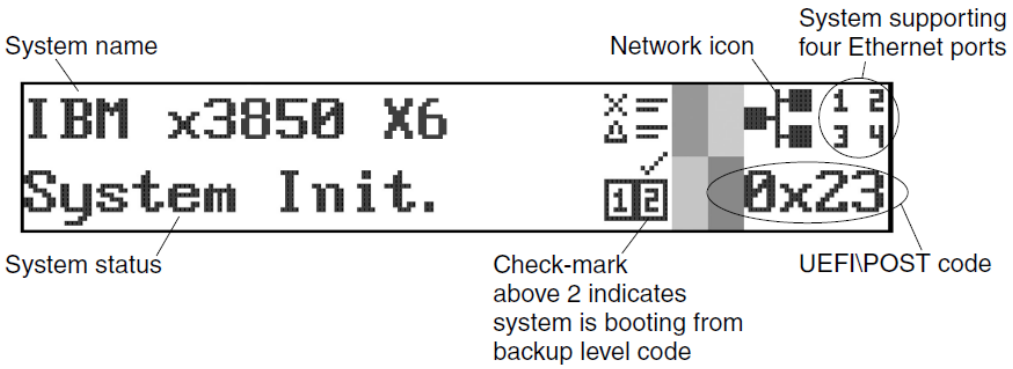


Figure 52: Example of how the information is displayed on the display panel

If only one error occurs, the LCD display panel will display that error (for the errors submenu set). If more than one error occurs, the LCD display panel displays the number of errors that have occurred.

The LCD system information display panel displays the following types of information about the server:

- IMM system error log (SEL)

Note: The Scroll Down button will function only for this menu option if errors have occurred. A list of current errors reported by the system will be displayed. To see the system error log (SEL) and get the complete list of errors, go to the IMM Web page.

- System VPD information:
  - Machine type and serial number
  - Universal Unique Identifier (UUID) string
- System firmware levels:
  - UEFI code level
  - IMM code level
  - pDSA code level
- IMM network information:
  - IMM hostname
  - IMM dedicated MAC address

Note: Only the MAC address that is currently in use is displayed (dedicated or shared).

  - IMM shared MAC address

- IP v4 information
- IP v6 address

- System environmental information:
  - Ambient temperature
  - CPU temperature
  - ac input voltage
  - Estimated power consumption

Light path error descriptions

Table 7: Light path error descriptions

LED	Description
3 VF battery error LED	When this LED is lit, it indicates that a standard I/O book battery error has occurred.
ac power LED	Each hot-swap power supply has an ac power LED and a dc power LED. When the ac power LED is lit, it indicates that sufficient power is being supplied to the power supply through the power cord. During normal operation, both the ac and dc power LEDs are lit.
Board error LED	When this yellow LED is lit, it indicates that the book board error has occurred.
Check log LED	When this LED is lit (yellow), it indicates that a noncritical event has occurred, such as the wrong I/O book inserted in a bay, or power requirements that exceed the capacity of the installed power supplies.
dc power LED	Each hot-swap power supply has a dc power LED and an ac power LED. When the dc power LED is lit, it indicates that the power supply is supplying adequate dc power to the system. During normal operation, both the ac and dc power LEDs are lit.
DIMM error LED	When this LED is lit, it indicates that an invalid memory configuration or a memory error has occurred.
Drive activity LEDs	These LEDs are on SAS or SATA hard disk drives and solid-state drives. Each hot-swap drive has an activity LED, and when this LED is flashing, it indicates that the drive is in use. When this LED is solid, it indicates that the drive is powered on but not in use.
Drive status LEDs	These LEDs are on SAS or SATA hard disk drives and

	solid-state drives. When one of these LEDs is lit, it indicates that the drive has failed. When this LED is flashing slowly (one flash per second), it indicates that the drive is being rebuilt. When the LED is flashing rapidly (three flashes per second), it indicates that the controller is identifying the drive.
Ethernet activity LED	When these LEDs are lit, they indicate that the server is transmitting to or receiving signals from the Ethernet LAN that is connected to the Ethernet port.
Ethernet link LEDs	When these LEDs are lit, they indicate that there is an active link connection on the 100BASE-TX, 1000BASE-TX, or 10GBASE-TX interface for the Ethernet port.
Fan error LED	When this LED is lit, it indicates that a fan has failed, is operating too slowly, or has been removed.
Locate button/LED	Press the locate button to visually locate the server among other servers. When you press the locate button, the LED will be lit and it will continue to be lit until you press it again to turn it off. This Locate button is also used as the physical presence for the Trusted Platform Module (TPM). You can use IBM Systems Director to light this LED remotely. This LED is controlled by the IMM2.
Microprocessor error LED	When this LED is lit, it indicates that an invalid microprocessor configuration or a microprocessor error has occurred.
PCIe slot error LED	When these LEDs are lit, they indicate that an error has occurred in PCIe slots.
Power button/LED	Press this button to turn the server on and off manually or to wake the server from a reduced-power state. The states of the power-on LED are as follows: • **Off:** Input power is not present, or the power supply or the LED itself has failed. • **Flashing rapidly (three times per second):** The server is turned off and is not ready to be turned on. The power-on button is disabled. This lasts approximately 10 seconds after input power has been applied or restored. • **Flashing slowly (once per second):** The server

	is turned off and is ready to be turned on. You can press the power-on button to turn on the server. **Lit:** The server is turned on.
Power supply error LED	When this yellow LED is lit, it indicates that a power supply error has occurred.
System error LED	When this yellow LED is lit, it indicates that a system error has occurred. A system-error LED is also on the rear of the server. This LED is controlled by the IMM2.

Options

The following adapters are supported by ML2 slot. The reason to use ML2 slot instead of the standard PCIe slot is because the ML2 connector provides superior electrical capability, and it also supports these adapters on the riser-type options. Standard PCIe slot cannot support different types of configuration without going into a unique connector.

Emulex VF A5 ML2 Dual Port 10 GbE SFP+ Adapter

Figure 53: Emulex VF A5 ML2 Dual Port 10 GbE SFP+ Adapter

- PCIe Gen 3 x8
- Dual port 10 Gb SFP+
- 50 mm (1.96 inch) wide ML2 form factor
- 2U and 3U brackets available
- FCoE and iSCSI capable
- SR-IOV capable
- TCP/IP Offload (TOE) capable
- Supports 10 Gb standard pNIC or vNIC2 modes
- NC-SI capable for IMM2 shared port access
- Accepts both SFP+ SR optical & SFP+ DAC cables
- Wake on LAN (WoL) capable
- UCM and CIM capable

Intel X540 ML2 Dual Port 10 Gb-T Adapter

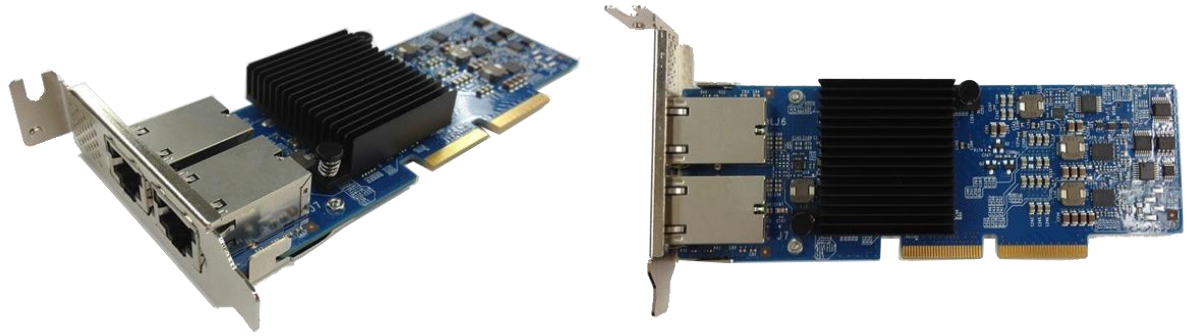


Figure 54: Intel X540 ML2 Dual Port 10 Gb-T Adapter

- PCIe Gen 2 x8
- Dual port 10 Gb-T
- 50 mm (1.96 inch) wide ML2 form factor
- 2U and 3U brackets available
- SR-IOV capable
- Supports 10 Gb standard pNIC or vNIC2 modes
- NC-SI capable for IMM2 shared port access
- Wake on LAN (WoL) capable
- UCM and CIM capable

Intel I350-T4 ML4 Quad Port GbE Adapter

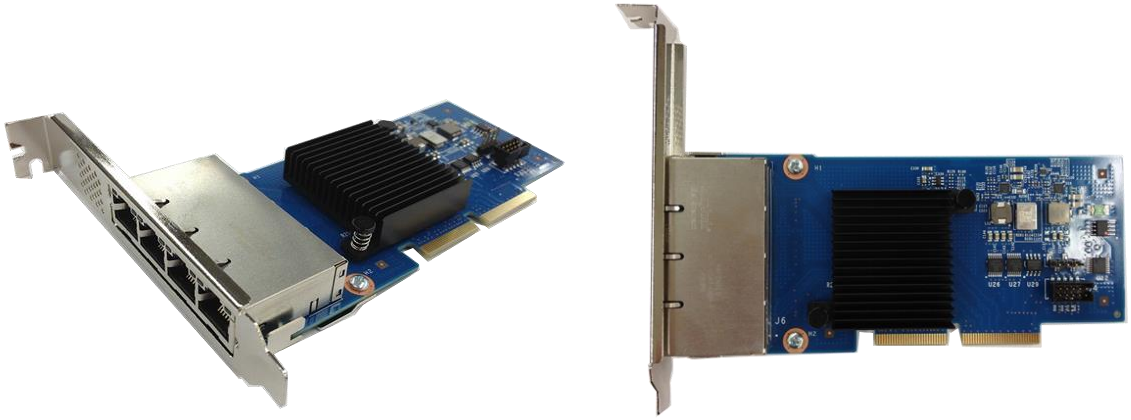


Figure 55: Intel I350-T4 ML4 Quad Port GbE Adapter

- PCIe Gen 2 x4
- Quad port 1 Gb-T

- 60 mm (2.36 inch) wide ML4 form factor
- 2U and 3U brackets available
- SR-IOV capable
- NC-SI capable for IMM2 shared port access
- Wake on LAN (WoL) capable
- UCM and CIM capable

Broadcom NetXtreme II ML2 Dual Port 10 GbE SFP+ Adapter

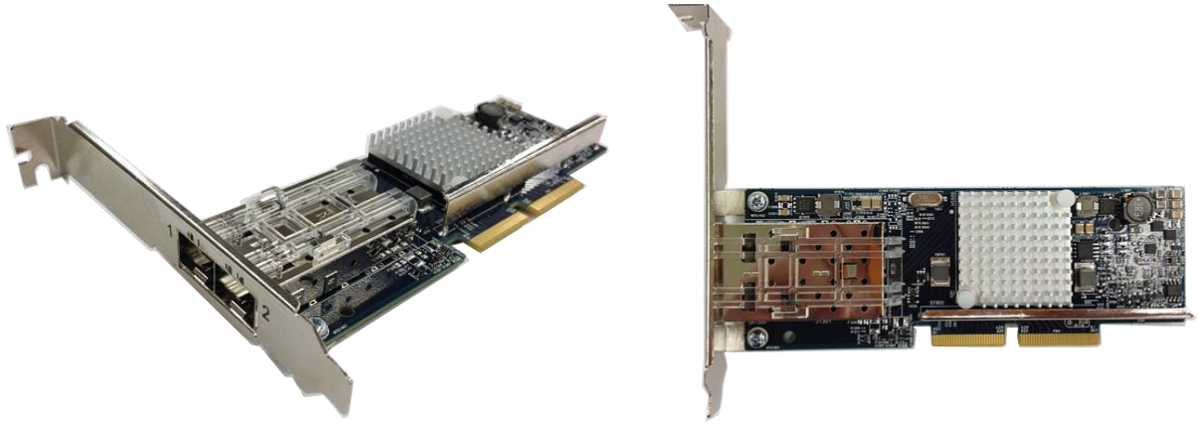


Figure 56: Broadcom NetXtreme II ML2 Dual Port 10 GbE SFP+ Adapter

- PCIe Gen 2 x8
- Dual port 10 Gb SFP+
- 50 mm (1.96 inch) wide ML2 form factor
- 2U and 3U brackets available
- iSCSI capable
- SR-IOV capable
- TCP/IP Offload (TOE) capable
- Supports 10 Gb standard pNIC or vNIC2 modes
- Accepts both SFP+ SR optical and SFP+ DAC cables
- NC-SI capable for IMM2 shared port access
- Wake on LAN (WoL) capable
- UCM and CIM capable

Broadcom NetXtreme II ML2 Dual Port 10 Gb-T Adapter

Figure 57: Broadcom NetXtreme II ML2 Dual Port 10 Gb-T Adapter

- PCIe Gen 2 x8
- Dual port 10 Gb-T
- 50 mm (1.96 inch) wide ML2 form factor
- 2U and 3U brackets available
- iSCSI capable
- SR-IOV capable
- TCP/IP Offload (TOE) capable
- Supports 10 Gb standard pNIC or vNIC2 modes
- NC-SI capable for IMM2 shared port access
- Wake on LAN (WoL) capable
- UCM and CIM capable

Table 7 shows the comparison of these adapters.

Table 7: Comparison of xLOM network adapters

Feature comparison at a glance	ML2	ML4	PCIe	Fiber	Copper	SR-IOV	FC0E	iSCSI	TOE	vNIC2	NC-SI	WOL
Emulex VF A5 ML2 Dual Port 10 GbE SFP+	X		X	X		X	X	X	X	X	X	X
Intel X540 ML2 Dual Port 10 Gb-T	X				X	X				X	X	X
Intel I350-T4 ML4 Quad Port GbE		X			X	X					X	X
Broadcom NetXtreme II ML2 Dual Port 10 GbE SFP+	X			X		X		X	X	X	X	X
Broadcom NetXtreme II ML2 Dual Port 10 Gb-T	X				X	X		X	X	X	X	X

Helpful links

Table 8: Helpful links	
Title	**Link to materials**
Servicing the Lenovo System x3850 X6 and x3950 X6 Types 3837/3839	https://www.youtube.com/channel/UCnoU_nKVTZqBfJFz81oRl2g

Summary

This course enabled you to:

1. Provide an overview of the Lenovo System x3850 X6.
2. Identify the differences between the Lenovo System x3850 X5 and the Lenovo System x3850 X6.
3. Describe the product specifications and the new technology of Lenovo System x3850 X6.
4. Explain how to perform problem determination activities and describe how to troubleshoot the Lenovo System x3850 X6 and x3950 X6.