ThinkSystem SC750 V4 Neptune node product overview

Product description and front, rear, and inside views

Lenovo

SC750 V4 Neptune node product overview

The ThinkSystem SC750 V4 Neptune node (machine type: 7DDJ) is a next-generation high-performance server based on the sixth-generation Lenovo Neptune® direct water-cooling platform.

This direct water-cooling system is designed to use warm water, up to 45°C (113°F), and chillers are not needed for most customers.

Two SC750 V4 nodes are installed in a tray, and eight trays are housed in the ThinkSystem N1380 Neptune enclosure, a 13U rack mount unit that fits in a standard 19-inch rack.
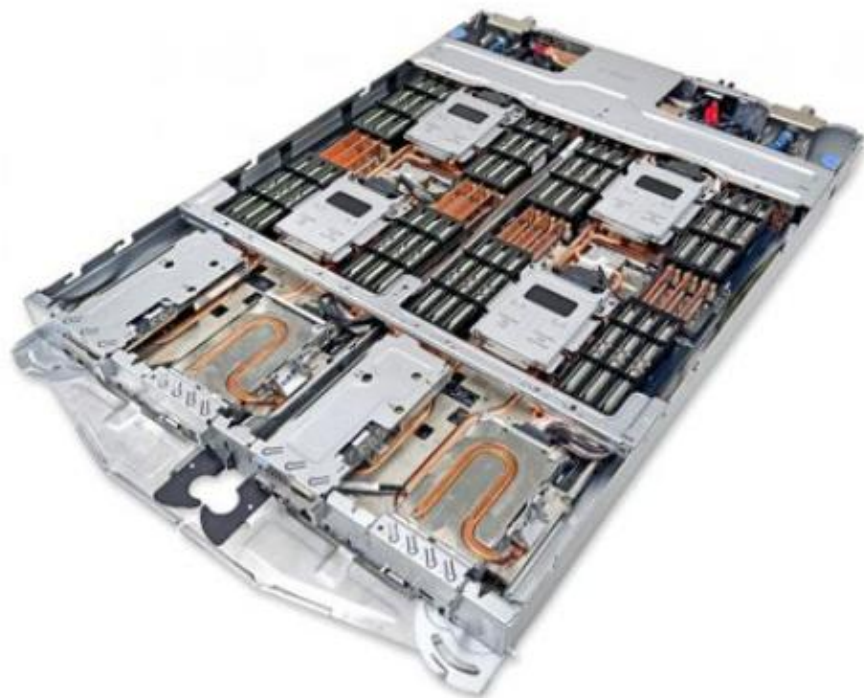
Attention: For your safety, use a lift tool to remove or install SC750 V4 trays.
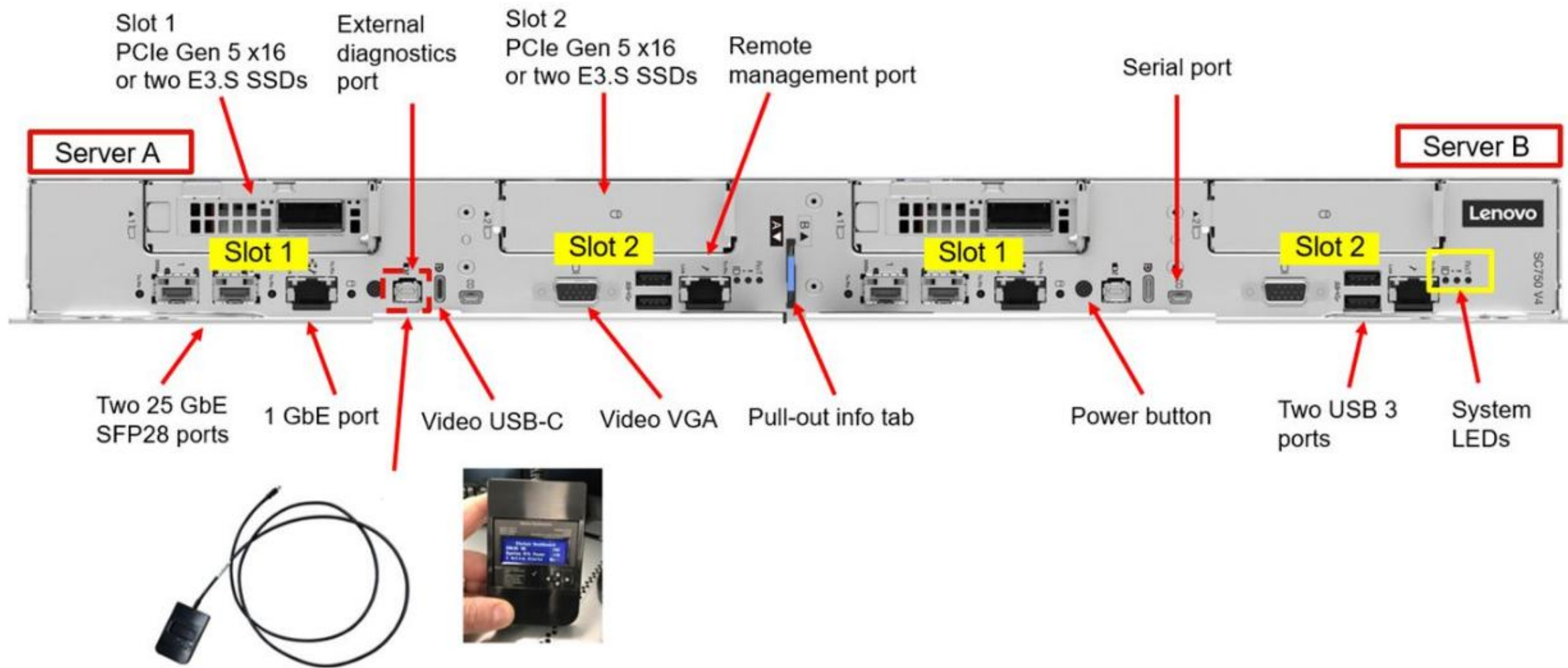
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Features and specifications

Features	Descriptions
Form factor	Two independent two-socket nodes mounted on a water-cooled server tray, installed vertically in an enclosure
Enclosure support	ThinkSystem N1380 enclosure
CPU	Two Intel Xeon 6900 Series processors (code name: Granite Rapids AP) per node
GPU	No support
Storage	Each node supports up to six EDSFF E3.S NVMe SSDs: • Two E3.S 1 T drives or one E3.S 2 T drive mounted in a bay in front slot 1 (in place of a PCIe slot) • Two E3.S 1 T drives or one E3.S 2 T drive mounted in a bay in front slot 2 (in place of a PCIe slot) • One E3.S 1 T drive mounted on top of CPU 1 • One E3.S 1 T drive mounted on top of CPU 2 • Front slots 1 and 2 can hold either E3.S drives or a PCIe low profile adapter • Up to 92.16 TB using six 15.36 TB E3.S NVMe SSDs • The storage controller uses onboard NVMe ports (RAID using Intel VROC)
DIMM	• 24 DIMM slots with two processors (12 DIMM slots per processor) per node

Note: For the latest specifications, refer to the SC750 V4 product guide on Lenovo Press

Features and specifications

Features	Descriptions
DIMM	• 24 DIMM slots with two processors (12 DIMM slots per processor) per node • Each processor has 12 memory channels, with 1 DIMM per channel (1DPC) • Support for Lenovo TruDDR5 RDIMMs at 6400 MHz and MRDIMMs at 8800 MHz • Up to 3 TB per node with 24 128 GB RDIMMs
Networking	• Each node: Two 25 Gb Ethernet SFP28 onboard connectors based on the Broadcom 57414 controller (support for 10/25 Gb) • One 1 Gb Ethernet RJ45 onboard connector based on the Intel I210 controller • Onboard 1 Gb port and 25 Gb Port 1 can optionally be shared with the XCC3 management processor for Wake-on-LAN and NC-SI support
PCIe slots	Each node: One or two PCIe Gen 5 x16 slots with a low-profile form factor (each slot is mutually exclusive with E3.S drives installed in that bay)
Management interface	• XCC3 embedded management based on the ASPEED AST2600 baseboard management controller (BMC) • Optional external diagnostics handset with an LCD display • The SMM3 in the N1380 enclosure provides additional systems management functions from power monitoring to liquid leakage detection for chassis, trays, and power conversion stations

Note: For the latest specifications, refer to the SC750 V4 product guide on Lenovo Press

Front view

Slot 1
PCIe Gen 5 x16
or two E3.S SSDs

External
diagnostics
port

Slot 2
PCIe Gen 5 x16
or two E3.S SSDs

Remote
management port

Serial port

Server A

Server B

Slot 1

Slot 2

Slot 1

Slot 2

Two 25 GbE
SFP28 ports

1 GbE port

Video USB-C

Video VGA

Pull-out info tab

Power button

Two USB 3
ports

System
LEDs

Front configurations

One PCIe and one SSD

All PCIe adapters

All SDD drives

Note: SC750 V4 SSD drives are not hot swappable. Before replacing a drive, power off the node, remove the trays from the enclosure, and remove the top cover.
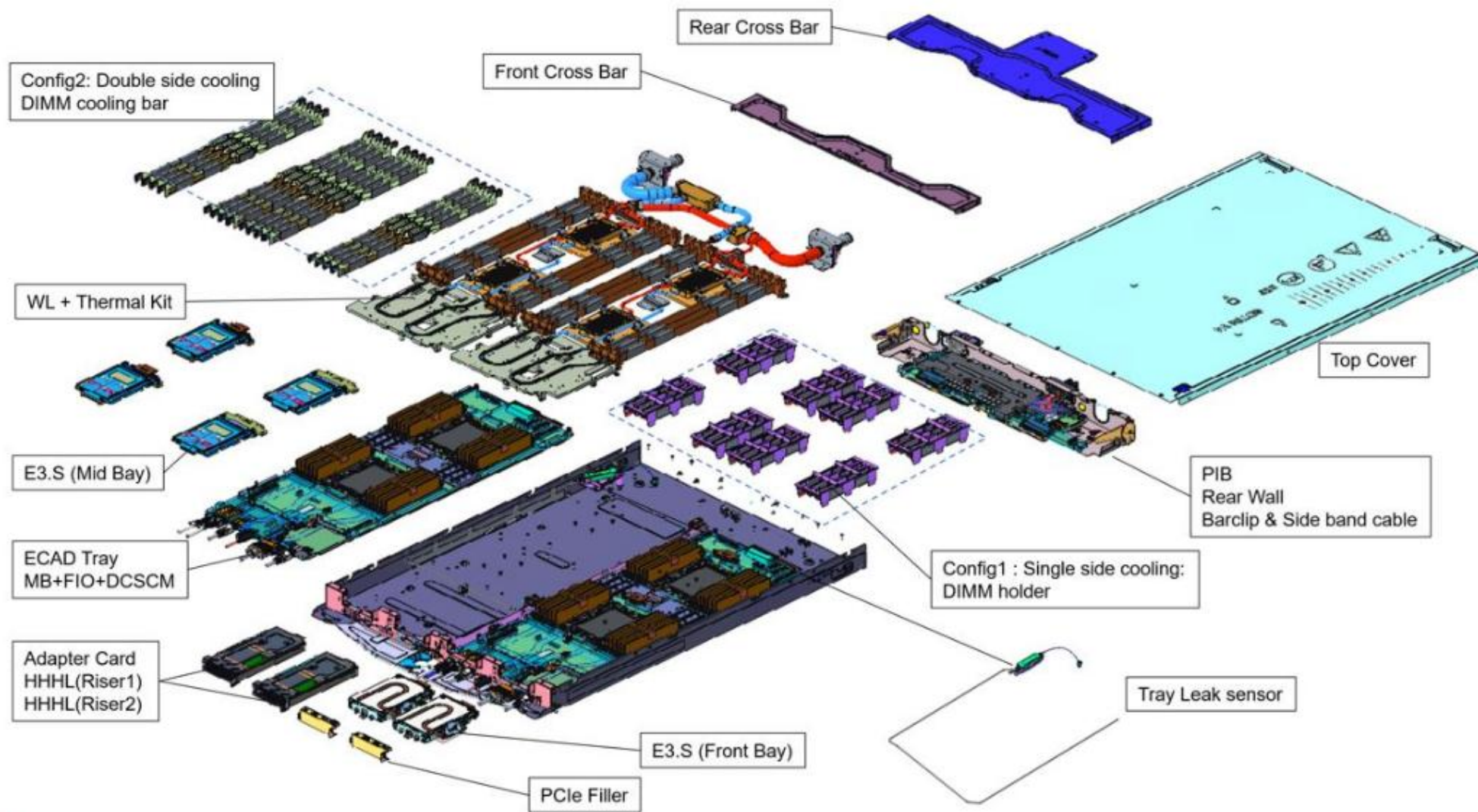
Inside view

E3.S drive mounted on each CPU
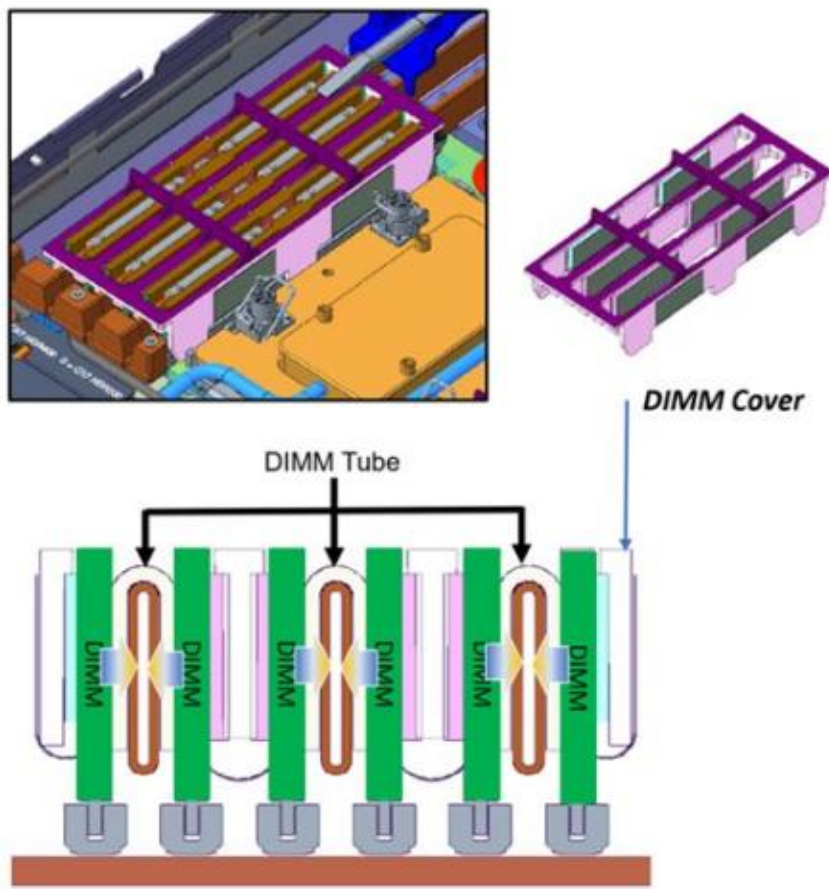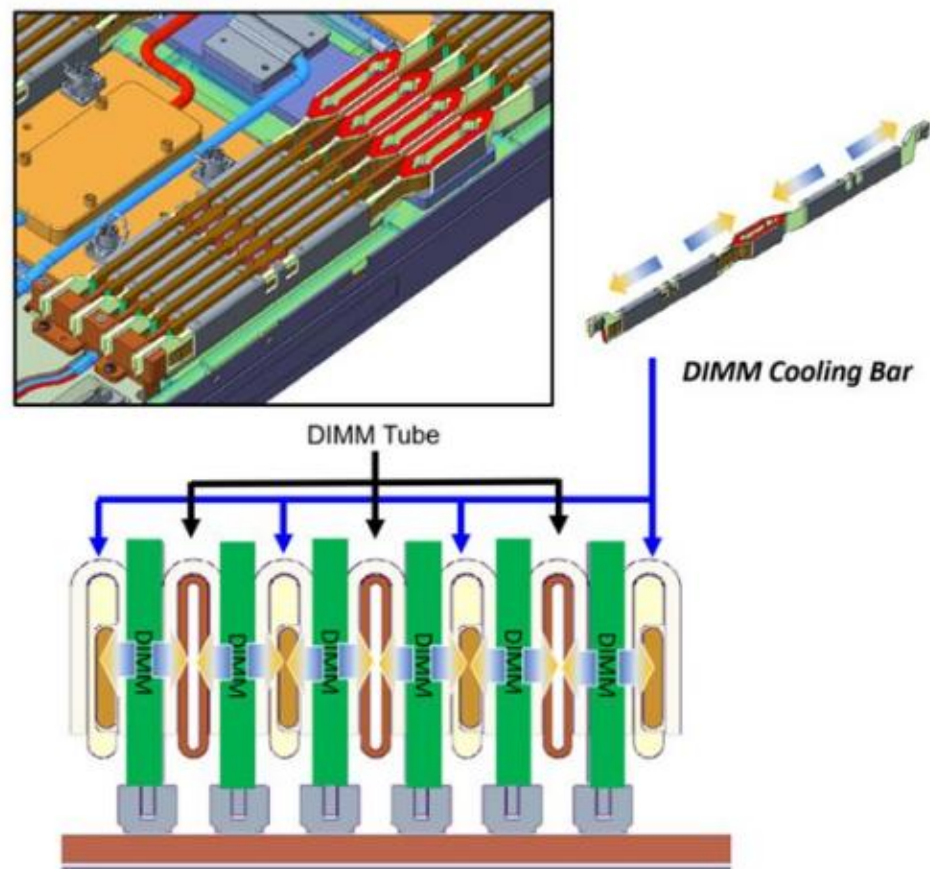
Leakage sensor

PCIe Gen 5 x16 or two E3.S SSDs

Water inlet

Sideband connector

Server A

Water loop through major components

Busbar connector

Water outlet

CPU 2

CPU 1

Server B

Each server: CPU 2 with 12 DIMMs

Each server: CPU 1 with 12 DIMMs

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Rear view

Water outlet   Bus bar connector   Sideband connector   Water inlet

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Exploded view

Rear Cross Bar

Front Cross Bar

Config2: Double side cooling
DIMM cooling bar

WL + Thermal Kit

Top Cover

E3.S (Mid Bay)

PIB
Rear Wall
Barclip & Side band cable

ECAD Tray
MB+FIO+DCSCM

Config1 : Single side cooling:
DIMM holder

Adapter Card
HHHL(Riser1)
HHHL(Riser2)

Tray Leak sensor

E3.S (Front Bay)

PCIe Filler

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Block diagram

Thermal-mechanical design

DIMM covers are used with low power consumption memory (single-side memory).

DIMM cooling bars are used with high power consumption memory (double-side memory).

DIMM Cover

DIMM Tube

DIMM Cooling Bar

DIMM Tube

DIMM cooling design

Front

DIMM Tube

CPU CP

Front CP

EPDM Hose
(3/8" ID)

Quick connect

CPU CP

Collector

CPU CP

CPU CP

Warm water return

Distributor

CPU CP

PIB Conduction
plate (CP)
(pre-assemble
with Rear Tray)

Rear CP

MB Mid CP
(Pre-assemble with MB)

Cold Water Supply

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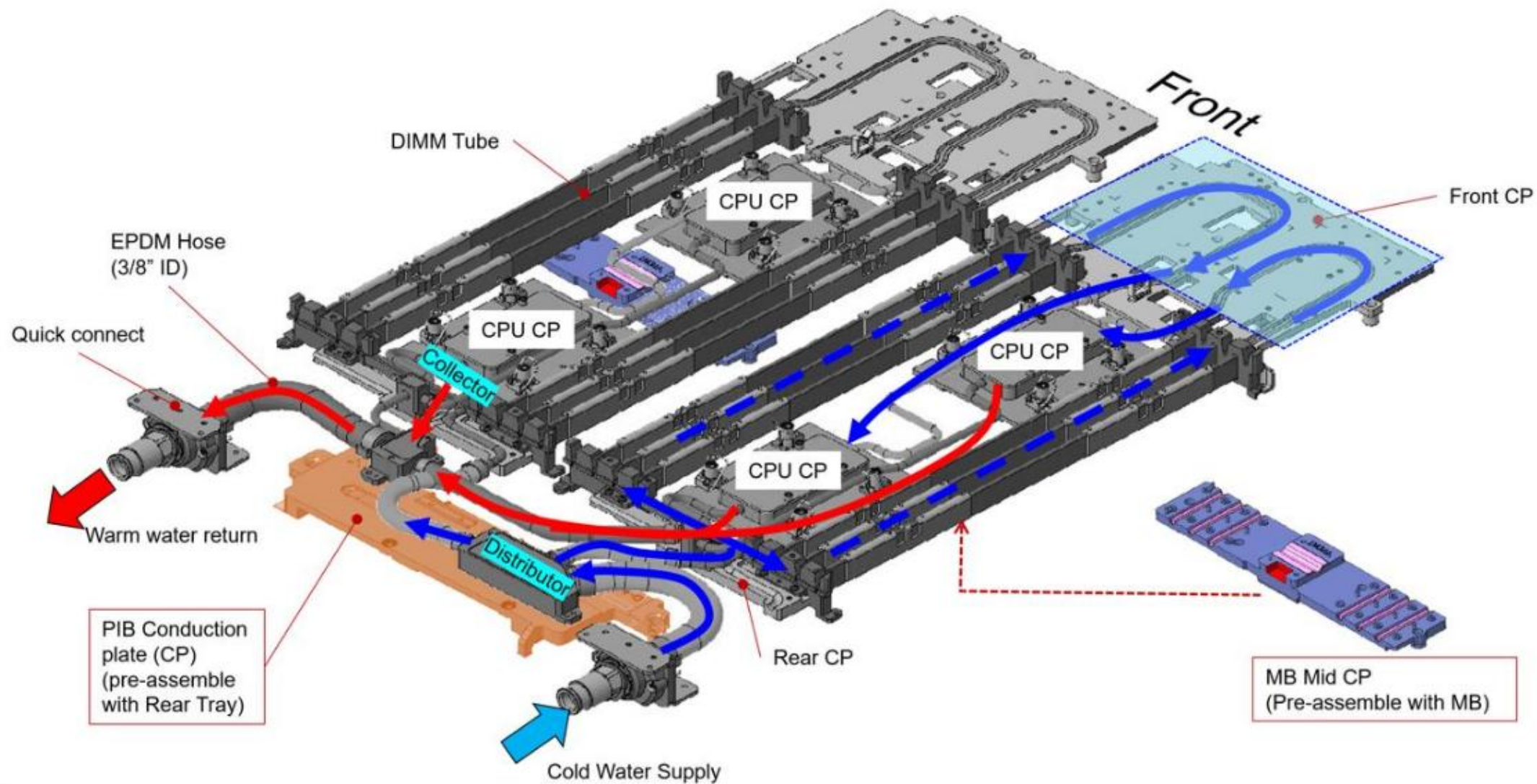
Leakage sensor

In the SC750 V4, the leakage sensor cable is stuck on the tray and routed from the bottom node to the upper node.

Leak sensor cable (yellow line)
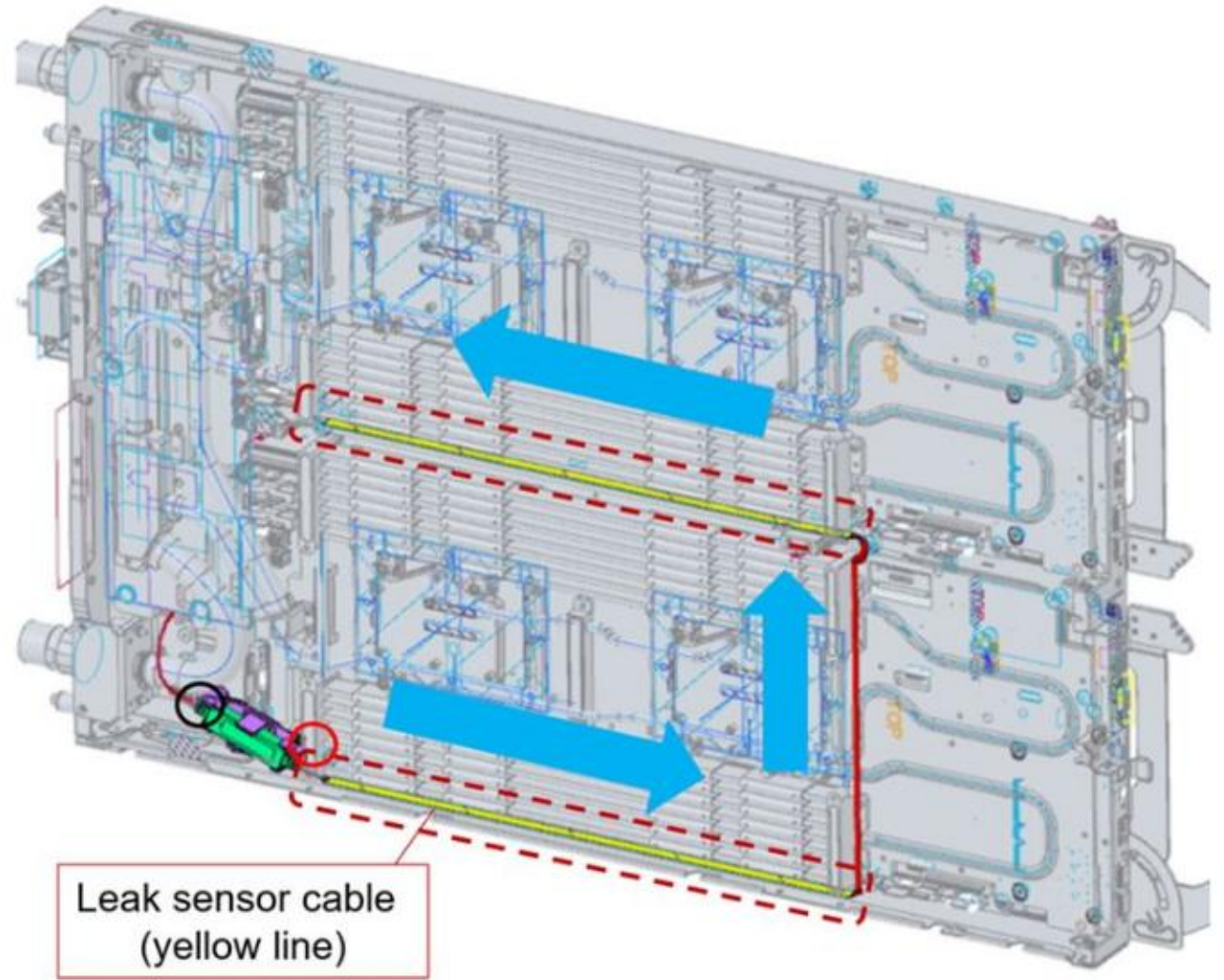
System-board assembly

The SC750 V4 system-board assembly has the following components:
- Front I/O board (FIO)
- System I/O board (DC-SCM)
- Processor board
- ECAD tray

These three boards are pre-assembled on an ECAD tray and bridge using card-edge connectors, a COM port cable, and an FPC cable.

COM port cable

FPC cable

Processor board

ECAD Tray

Front I/O board

System I/O board (DC-SCM)
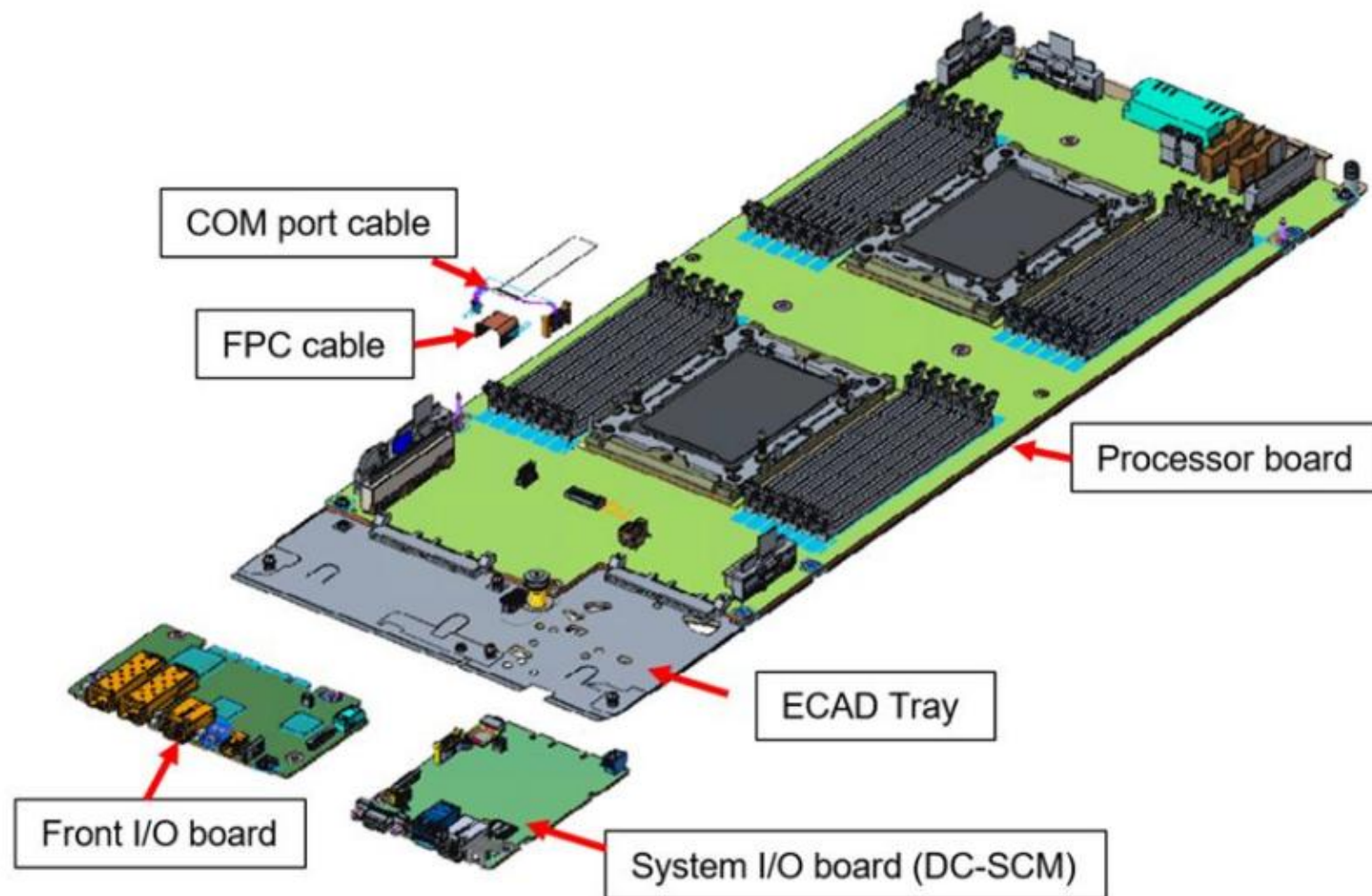
FIO connector

1. Two 25 Gb SFP28 ports
   - BCM57414, ethernet controller
   - Either of the ports (maximum of one) supports shared NIC
2. One 1 Gb RJ45
   - Intel i210
   - Shared NIC
3. Drive LED
   - Internal storage indication
4. Power button with LED
5. Pong
   - Lenovo External Diagnostics Handset
6. Type C display port (DP)
   - Display Port over type C Alt Mode
7. Mini USB
   - Serial log only
8+9. Management network from XCC to SMM

Cable to SMM

Cable to DCSCM
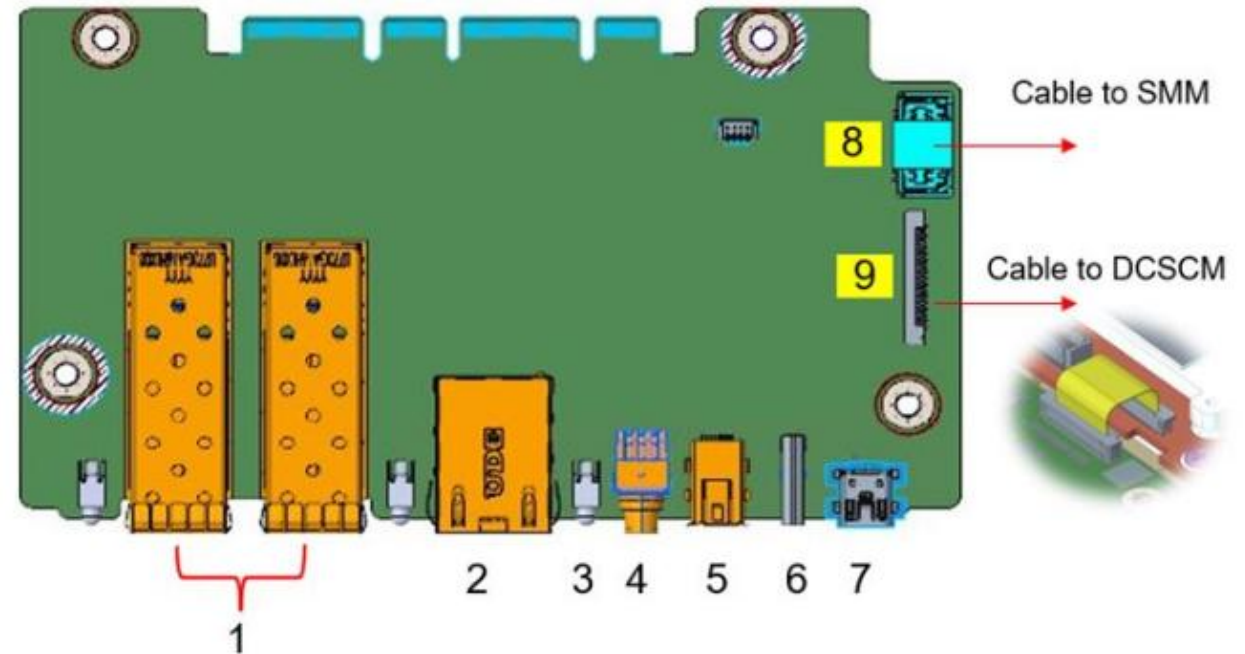
DC-SCM

The DC-SCM card on SC750 V4 has the following components:

- One 1 Gb RJ45 XCC management port
  - Based on the ASPEED AST2600 baseboard management controller (BMC)
- Two USB 3.0 ports
- One VGA port
- One internal Micro SD flash socket
- TPM module (PRC only)

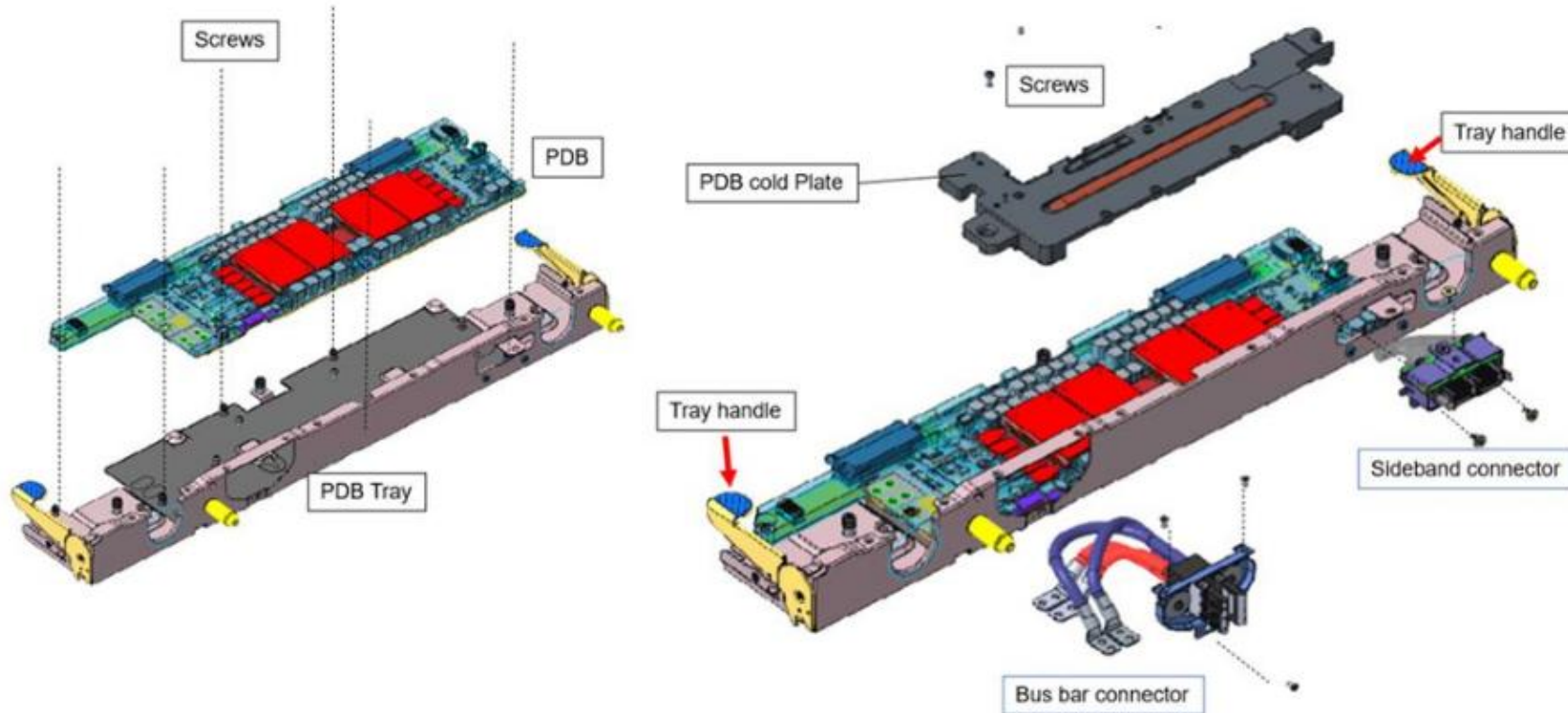The card also supports PFR (Platform Firmware Resiliency)

TPM module

Micro SD socket

VGA   Two   VGA
       USB 3.0
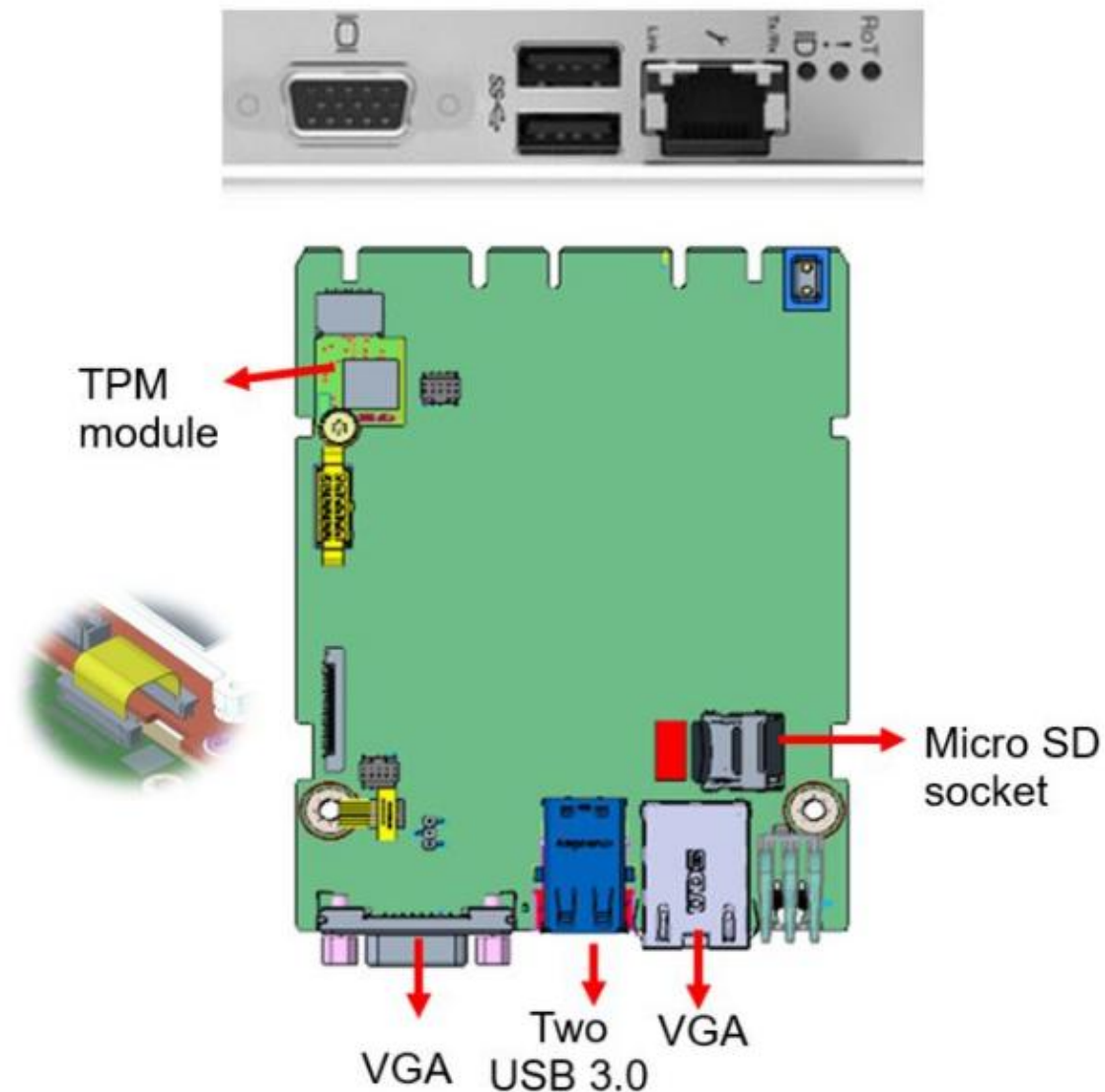
PDB assembly

The SC750 V4 PDB assembly has the following components:
- Pre-assembled PDB, PDB tray, and cold plate
- PDB tray with a tray handle design
- Bus bar connector and sideband connector mounted on the PDB tray

Riser assemblies

Two riser assemblies are available for the SC750 V4 to support different deployment locations:
- Riser 1: Gold finger card edge
- Riser 2: Cable riser
- Half-height half-length (HHHL) cards are supported
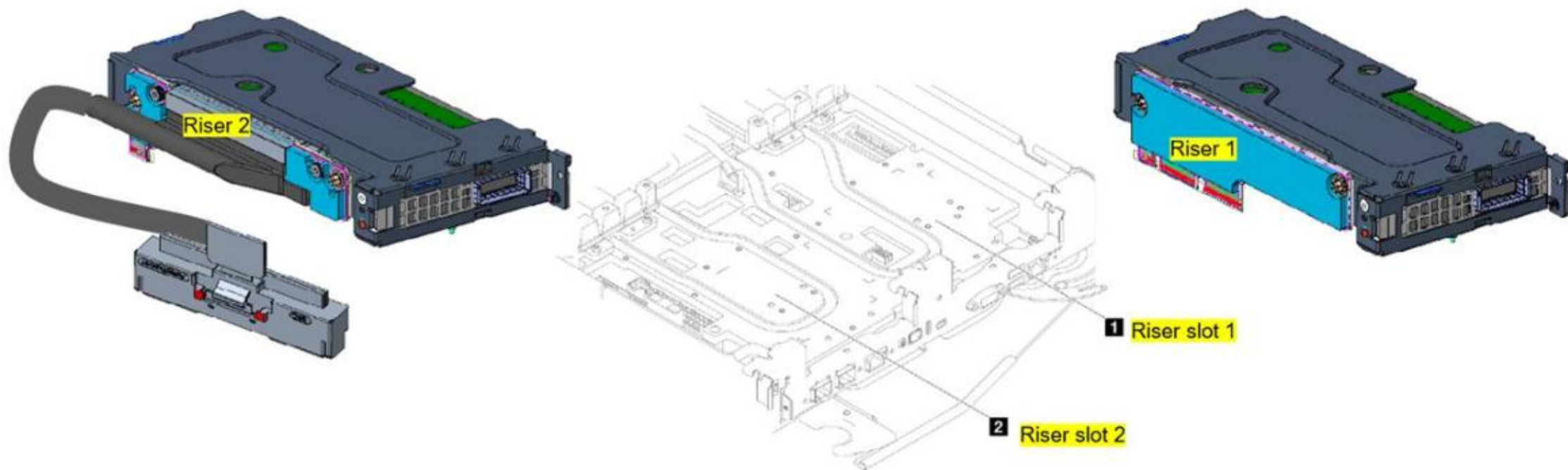
Adapters and riser assemblies

Use screws to secure the adapter to the riser cage and interface plate. Note that the NDR200 and NDR400 adapters have different screw locations.

Clamp bracket

NVIDIA CX7 NDR200

Interface plate

NVIDIA CX7 NDR400

Interface plate
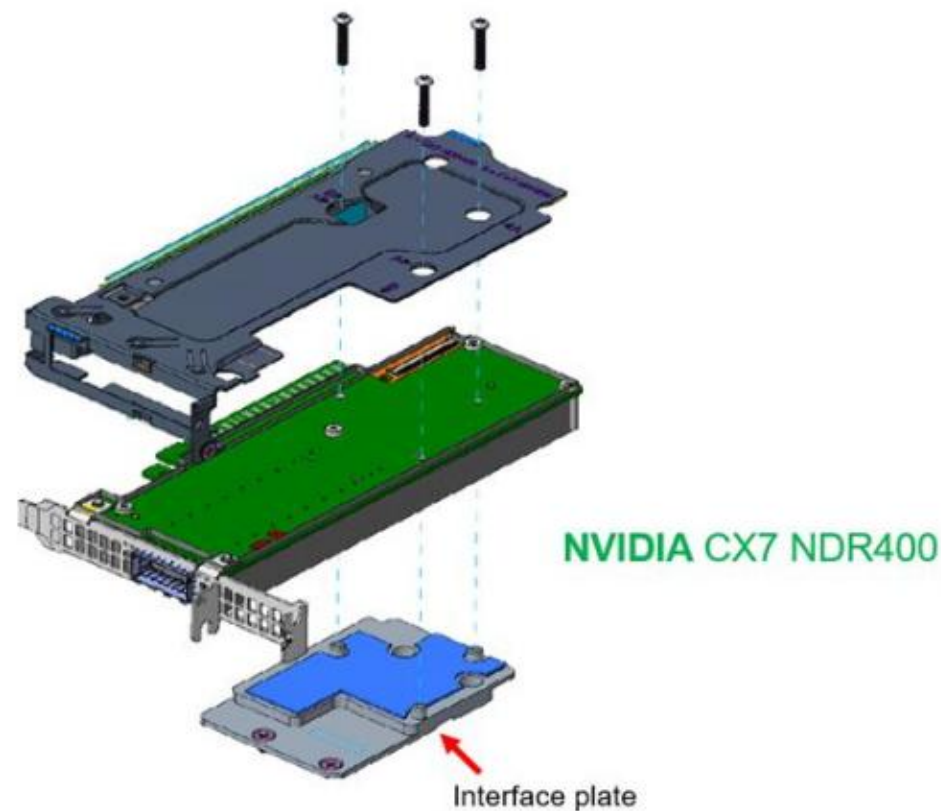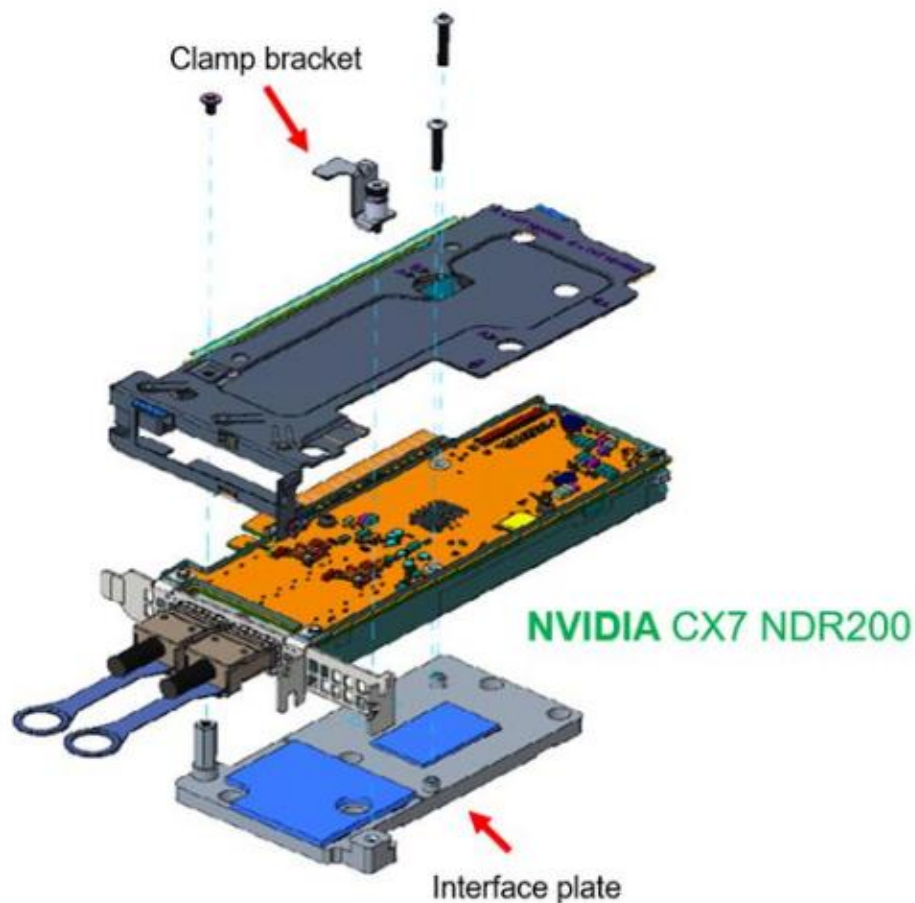
Front slot configurations

The SC750 V4 supports the following front slot configurations:
- Standalone: Each node has two PCIe slots or one PCIe slot and one drive bay
  - Support for the CX7 NDR200 or NDR400 adapters
- Shared I/O: Each node has one drive bay and shares a network adapter
  - Support for the CX7 NDR200 plus AUX cable or NDR400 adapter plus AUX cable
  - **Note**: The NDR400 cards used with the shared I/O and standalone configurations have different PNs
- Socket direct: Each node has one network adapter connected to both slots
 - Support for the CX7 NDR400 adapter plus AUX cable

Node A   Node B

Each node has 2x PCIe slots

Each node has 1x PCIe slot + 1x drive bay

Aux cable

Shared I/O: Each node has 1x drive bay and shares a network adapter

Aux cable   Aux cable

Socket Direct: Each node has 1x network adapter connected to both slots
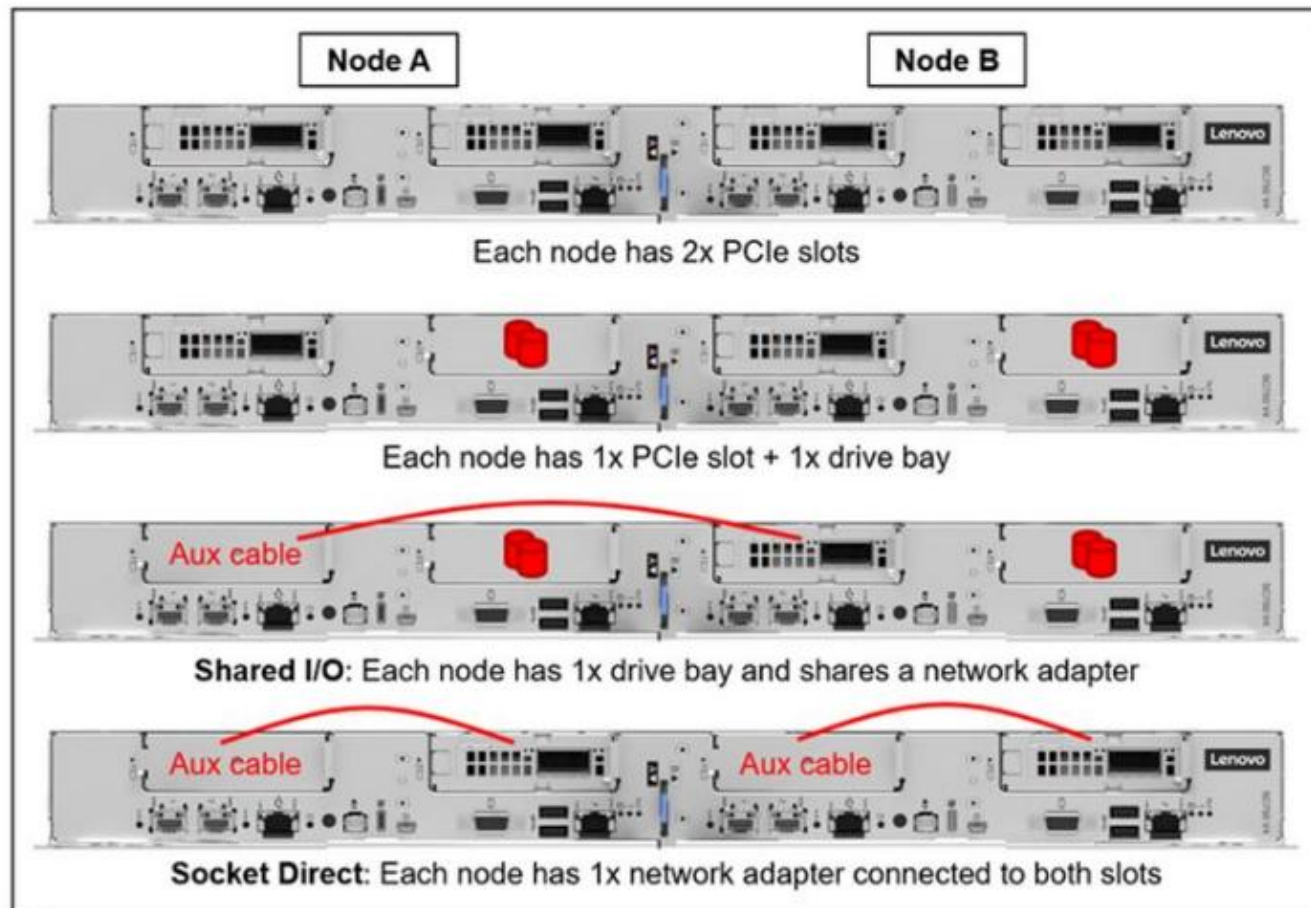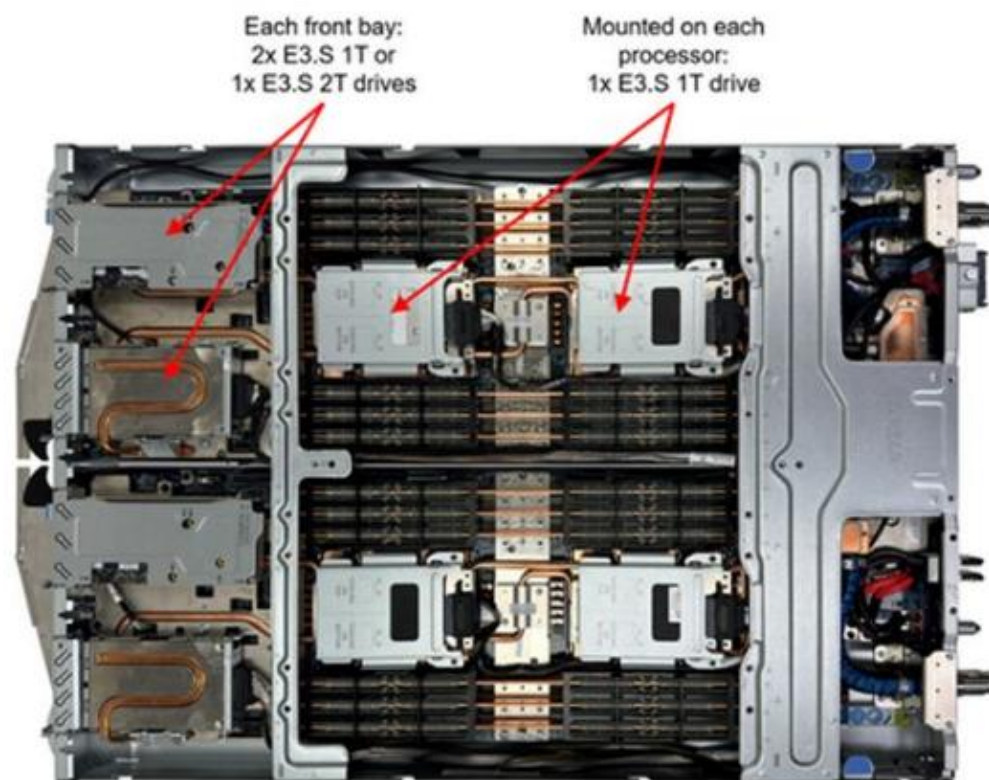
Internal storage configurations

Each SC750 V4 node supports up to six E3.S SSDs. They are non-hot-swap internal drives and are not accessible from the front.

The locations of these drives are as shown below:
- Two E3.S 1T drives or one E3.S 2T drive mounted in a bay in front slot 1
- Two E3.S 1T drives or one E3.S 2T drive mounted in a bay in front slot 2
- One E3.S 1T drive mounted on top of CPU 1
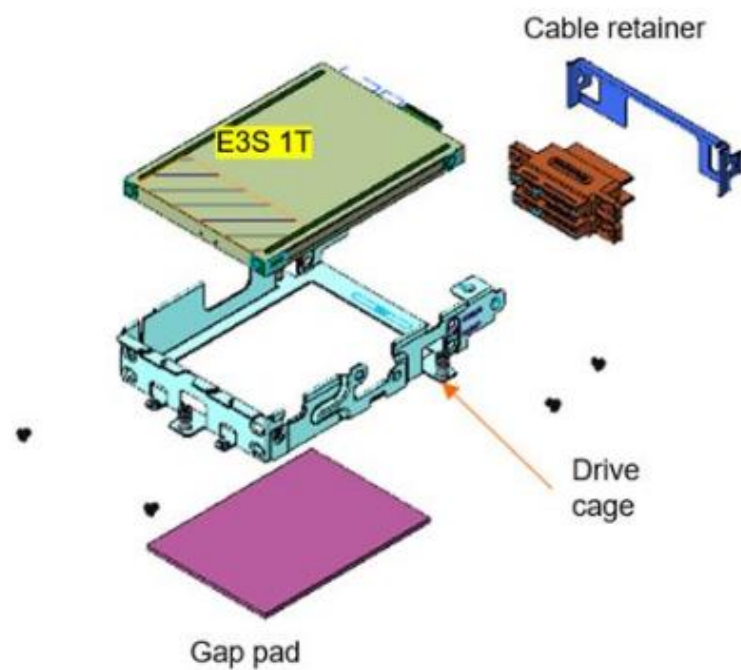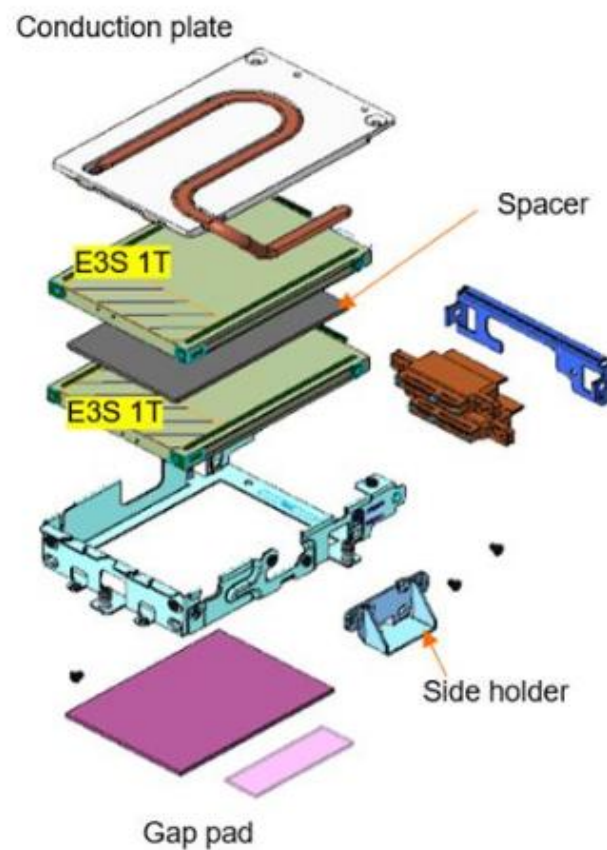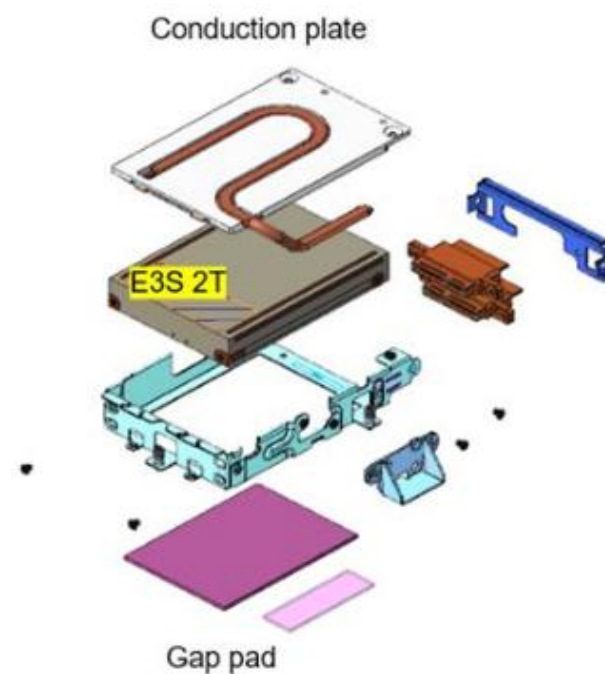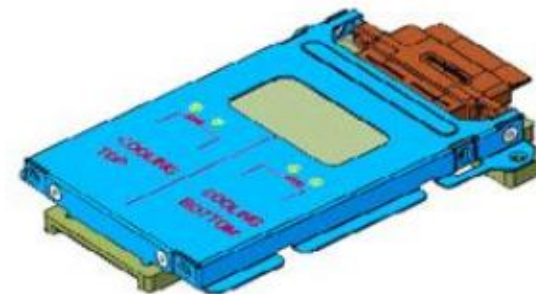- One E3.S 1T drive mounted on top of CPU 2
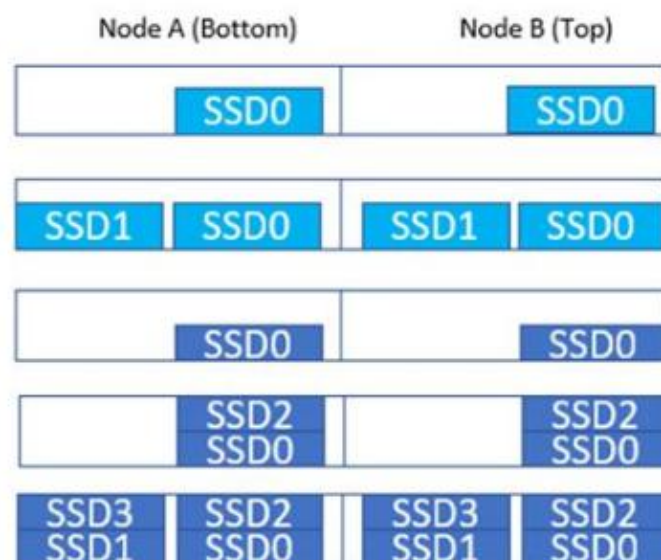
Front drive cage assembly

Middle drive cage assembly

The middle drive cage assembly supports E3.S 1T drives mounted on top of CPU 1 and CPU 2, one drive per CPU.

SC750 V4 storage configuration notes:
- The node only supports NVMe drives.
- The drives are connected to onboard controllers. RAID functionality is provided using Intel VROC.
- NVMe drives are connected to the CPUs as follows:
  - Drives in front bay 1 connect to CPU 1
  - Drives in front bay 2 connect to CPU 2
  - Drives mounted on the CPUs both connect to CPU 2