

# User Guide

Ultrastar<sup>®</sup> Serv60+8

Regulatory Model: H4060-S

December 2018

Rev. 1.3

1ET1110

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## Revision History

Date	Revision	Comment
June 2018	Revision 1.0	Initial Release
July 2018	Revision 1.1	<p>Added the following sections:</p> <ul style="list-style-type: none"> <li>• <a href="#">DIMM Replacement</a> on page 72</li> <li>• <a href="#">CPU and Heat Sink Module Replacement</a> on page 99</li> <li>• <a href="#">Heat Sink Replacement</a> on page 128</li> <li>• <a href="#">M.2 Replacement</a> on page 161</li> <li>• <a href="#">Add-in Card Replacement</a> on page 178</li> </ul>
August 2018	Revision 1.2	<p>Updated the following sections:</p> <ul style="list-style-type: none"> <li>• <a href="#">List of Customer Replaceable Units (CRUs)</a> on page 17</li> <li>• <a href="#">CPU and Heat Sink Module Replacement</a> on page 99</li> <li>• <a href="#">Heat Sink Replacement</a> on page 128</li> <li>• <a href="#">Storage Subsystem Firmware Upgrade</a> on page 277</li> </ul>
December 2018	Revision 1.3	<p>Updated the following sections:</p> <ul style="list-style-type: none"> <li>• <a href="#">List of Customer Replaceable Units (CRUs)</a> on page 17</li> <li>• <a href="#">List of Compatible Drives</a> on page 24</li> <li>• <a href="#">LEDs</a> on page 20</li> </ul> <p>Added the following sections:</p> <ul style="list-style-type: none"> <li>• <a href="#">BIOS Firmware Update</a> on page 286</li> <li>• <a href="#">Updating the Server BMC Firmware Using Redfish OOBM</a> on page 329</li> </ul>

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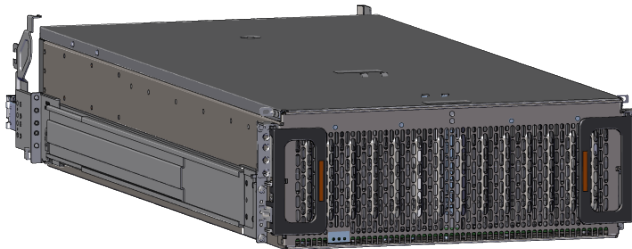


## 1 Overview

This section provides a high level overview of the features of the Ultrastar Serv60+8.

### 1.1 Ultrastar® Serv60+8 Description

**Figure 1: Ultrastar Serv60+8**



The Ultrastar® Serv60+8 is a 4U form factor, high density, rack-mounted storage enclosure that is capable of hosting up to 60 HDD SAS or SATA drives. The maximum data storage capacity of the Ultrastar Serv60+8 is 720TB using 12TB HGST Ultrastar® He12 HDDs plus an additional 61.44 TB using HGST Ultrastar® SS300 SSDs in the system SSD slots. (For a full list of compatible drives and total storage capacities, see the [List of Compatible Drives](#) on page 24.) The Ultrastar Serv60+8 also integrates an Intel Skylake based server front end. The server is built around an Intel Sawtooth Pass S2600ST motherboard and supports 2 LGA3647-0 (Socket P) processor sockets CPUs, 16 (8 per CPU) slots of DDR4 ECC DIMM memory, and leverages an AST2500 BMC for out-of-band management of the server subsystem. The enclosure runs on an input voltage of 200 - 240 VAC and consumes ~1800W of power under typical conditions. It requires a maximum of ~2000W at full load.

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**Note:** Max and Typical Power Consumption values represent the output power to the system. Input power will vary depending on the PSU efficiency and load sharing between PSUs

---

The system contains three externally facing Half-Height, Half-Length (HHHL) PCIe x16 slots, and 3 externally facing HHHL PCIe x8 slots.

It is designed to fit within a 4U rack space and requires 1200 mm (47.24in.) of usable rack space, frame to frame. A fully loaded system will add 95.25 kg / 210 lbs. of static load when fully loaded with drives.

- 4U Storage Server
- Supports up to 60 HDD Drives
- Can support 3.5" drives and 2.5" SSD drives (2.5" requires an adapter) in the 60 available drive bays. Supports an additional 8 2.5" drives in the system SSD slots located in the center channel
- Up to 12W per drive slot for the 60 HDD data storage drives (Cannot exceed 85A on the 5V rail) and 25W per slot for the 8 system SSD slots
- House and control six (6) N+1 redundant 80mm fans
- Powered by two (2) redundant 2000W PSUs
- Toolless replacement of all Customer Replaceable Units (CRUs)
- Fits within a standard EIA-310 rack including all necessary cable management
- Supports Highline Input Power

- Dual Skylake LGA3647 Socket Processors
- 16 DDR4 ECC DIMM slots
- ASPEED AST2500 BMC
- Lewisburg PCH C624 Chipset

## 1.2 System Architecture Overview

### Storage Subsystem Overview

The Ultrastar Serv60+8 IOM uses a cascaded expander design to allow for connection to all 60 HDD drives. The minimum configuration comes with two of the six PCIe slots pre-populated with a combination of internal SAS HBAs and RAID adapters that act as an interconnect between the server subsystem and the storage subsystem by connecting to the system SSDs and the IOM. The exact configuration of the PCIe slots may vary depending the specific version of the Ultrastar Serv60+8. The eight system SSDs are connected via one of these SAS HBAs.

The storage subsystem out-of-band management microprocessor provides an Ethernet connection using a Redfish/RESTful API to access the various enclosure services. All the SES enclosure information can be obtained through the out-of-band management port. Major use cases for this feature include obtaining storage subsystem health information, locating enclosure components using the IDENT LEDs, and updating expander and storage OOBM firmware.

The system FPGAs control and report the states of the four storage subsystem fans, drive LEDs, and T10 drive power disable signals on the 60 HDD data storage drives.

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**Note:** To use T10 power disable, the drives installed must also support this feature.

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The I<sup>2</sup>C architecture is designed to support only one single master on any given bus. The primary expander will be the master on each I<sup>2</sup>C bus. There are eight I<sup>2</sup>C buses used in the Ultrastar Serv60+8 enclosure. The number of devices on each bus are balanced to allow communication to peripheral devices and not overload any one bus. The devices connected on the I<sup>2</sup>C buses include the enclosure VPDs, temp sensors, baseboard FPGAs, and SAS connectors among others.

Four of the six total fans are controlled by the storage subsystem. Status and control for these four fans is handled by the in-band SES management interface called the SEP and the Redfish OOBM.

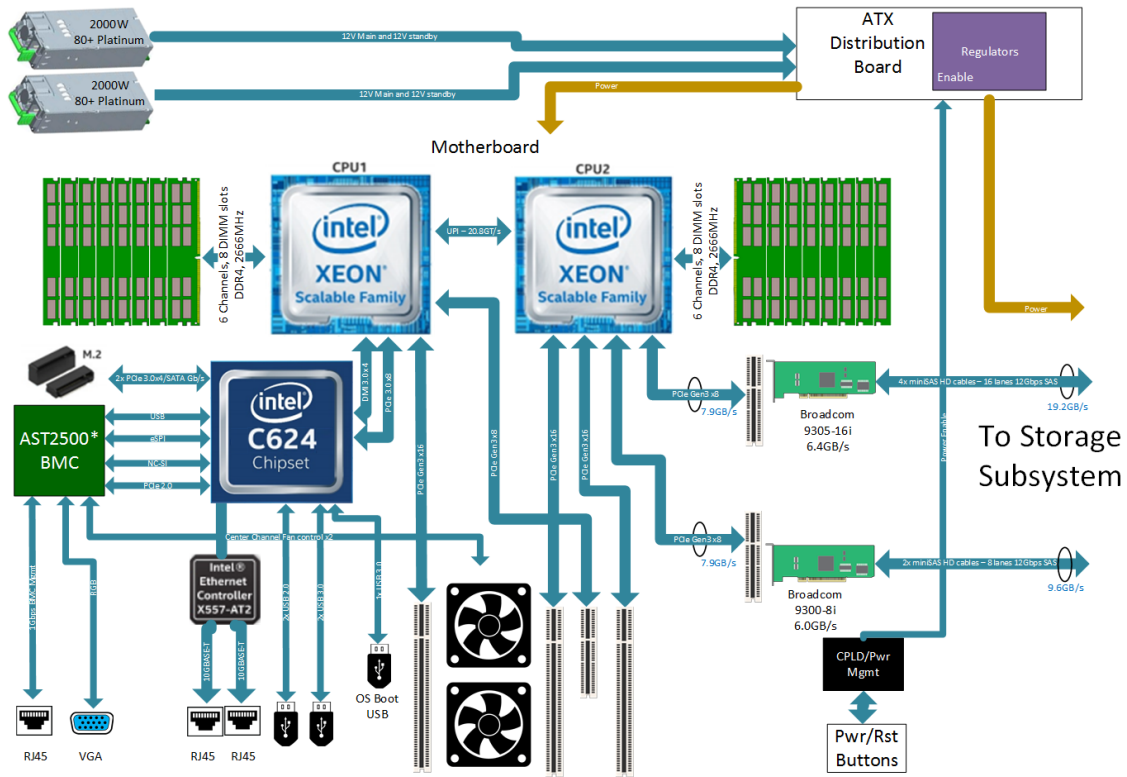
### Server Subsystem Overview

The server subsystem is situated in an individual compartment at the rear of the unit. It is comprised of a dual socket Intel Sawtooth Pass S2600ST that supports LGA3647 socket Intel Xeon processors. The Ultrastar Serv60+8 has 16 DDR4 ECC DIMM slots for memory that support a clock speed of 2666 MHz, and it leverages the Intel C624 chipset. The motherboard also hosts an ASPEED AST2500 BMC for out-of-band management of the server components. The server motherboard has a total of six PCIe slots that support PCIe 3.0, two M.2 ports that can host compatible SSDs for the system OS.

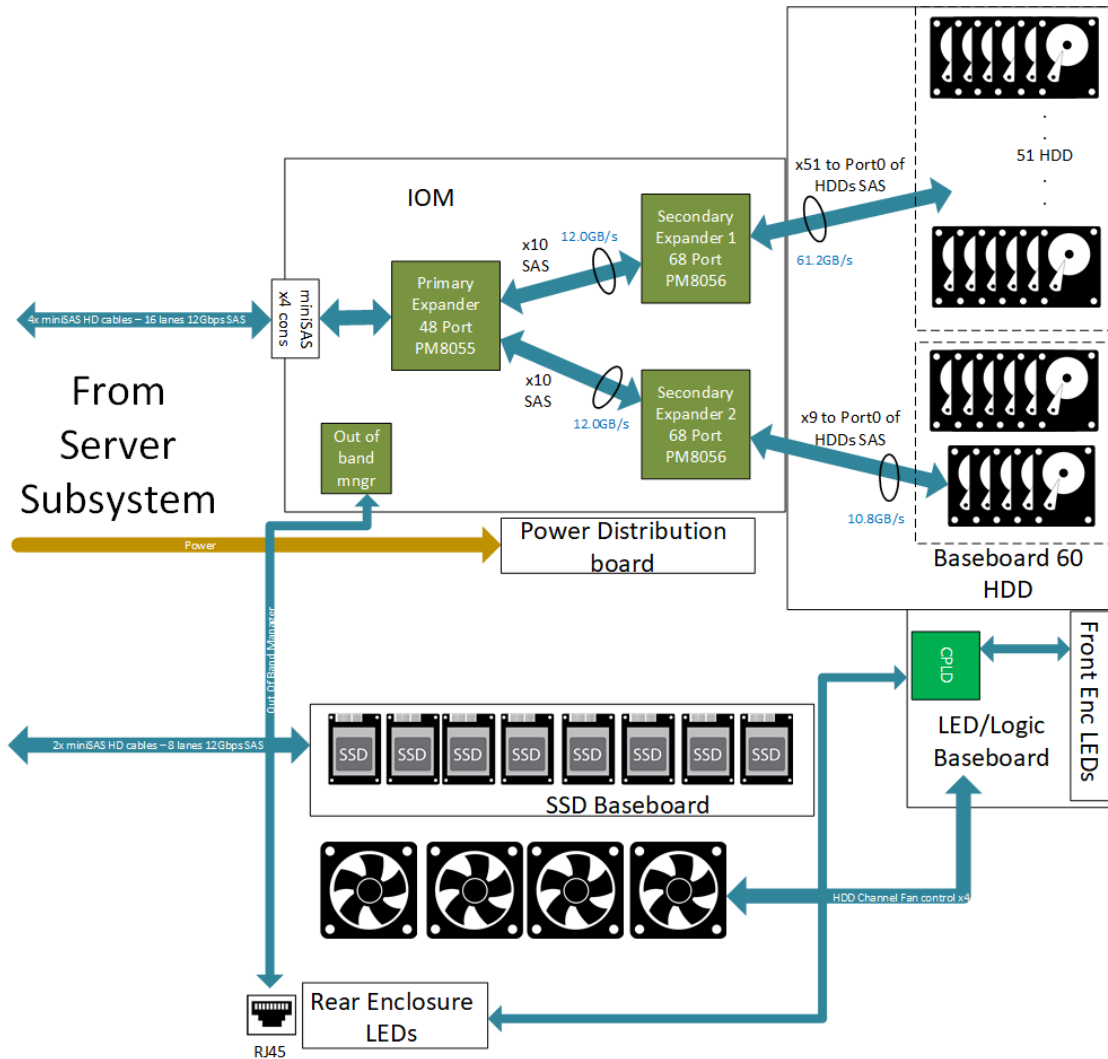
### 1.3 System Level Block Diagram

The following image shows the system block diagram for the Ultrastar Serv60+8. The block diagram is split into two, one for the storage subsystem and one for the server subsystem.

**Figure 2: System Block Diagram for the Storage Subsystem**



**Figure 3: System Block Diagram for the Server Subsystem**



## 1.4 Ultrastar Serv60+8 Specification Summary

**Table 1: Environmental Specification Summary**

Specification	Non-Operational	Operational
Temperature	-40°C to 70°C	5°C to 35°C
Temperature Gradient	30°C per hour maximum	20°C per hour maximum
Temperature De-rating	1°C per 300m above 3000m	1°C per 300m above 900m
Relative Humidity	8-90% Non-Condensing	8-90% Non-Condensing
Relative Humidity Gradient	30% per hour maximum	30% per hour maximum

Specification	Non-Operational	Operational
Altitude	-300m to 12,000m / -984 ft. to 39,370 ft	-300m to 3048m / -984 ft. to 10,000 ft.

**Table 2: Electrical Specifications**

Specification	Value
Max Power Consumption	~2000W
Typical Power Consumption	~1800W
<p><b>Note:</b> Max and Typical Power Consumption values represent the output power to the system. Input power will vary depending on the PSU efficiency and load sharing between PSUs</p>	
Input Voltage	200 - 240 VAC
PSU Connector Type	C14
PSU Efficiency	80 PLUS Platinum
Inrush Current Maximum (per PSU)	AC line inrush current shall not exceed 35A peak measured per IPC-9592B(L) Appendix C-4.1.
Typical Inrush Current (per PSU)	15A

**Caution:** The Ultrastar Serv60+8 can only be plugged into highline. If the unit is plugged into lowline, the PSU will report a "Critical" state when status pages are queried using SES. In this case, the enclosure will power up, but the drives will not.

**Table 3: Mechanical Specifications**

Specification	Non-Operational	Operational
Shock	10G, 0 - peak, 11ms half sine; 3 positive and 3 negative pulses in each axis shock	5G, 0 - peak, 11ms half sine; 3 positive and 3 negative pulses in each axis- minimum 6 seconds between shocks to allow for write/read recovery
Vibration	0.75G, 0 - peak swept sine; 5 -500Hz; 1 complete sweep @ 1/2 octave per minute	0.10G, 0 - peak swept sine; 5 -500Hz; 1 complete sweep @ 1/2 octave per minute
Weight	95.25 kg / 210 lbs.	
Dimensions with CMA	<b>W:</b> 447mm x <b>L:</b> 1197 mm x <b>H:</b> 175mm / <b>W:</b> 17.6in. x <b>L:</b> 47.13in. x <b>H:</b> 6.89in.	
Length without CMA	1026 mm / 40.39in.	

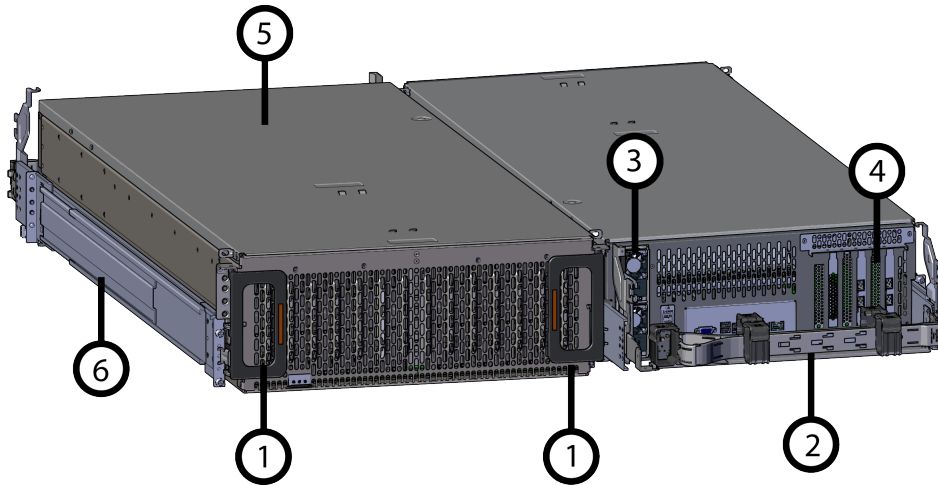
Specification	Non-Operational	Operational
Required Rack Width	450mm with (17.72in.) with 465mm (18.31in.) $\pm$ 1.5mm nominal hole spacing. See EIA-310 Rack Standard	
Required Rack Depth	1200 mm (47.24in.) of usable rack space, frame to frame	
Rack Units (U)	4U	
Vertical Rack Rail Spacing	32 in. - 36 in.	

**Table 4: Performance Specifications**

Specification	Value
Mother Board	Intel Sawtooth Pass S2600ST
Processor Type	Intel Skylake
Socket	LGA3647-0 (Socket P) processor sockets
Number of Processors	2
Chipset	Lewisburg PCH C624 Chipset
Memory Type	DDR4 ECC DIMM
Number of Memory Slots	16 (8 per CPU)
Graphics	Integrated
Sever BMC Chip	AST2500
Number of Drive Slots	60 HDD / 8 SSD
Data Transfer Rates	12Gbps SAS / 6Gbps SATA
Max Raw Data Storage Capacity	720TB using 12TB HGST Ultrastar <sup>®</sup> He12 HDDs / 61.44 TB using HGST Ultrastar <sup>®</sup> SS300 SSDs

## 1.5 Ultrastar Serv60+8 Layout

**Figure 4: Front and Rear Product Layout**

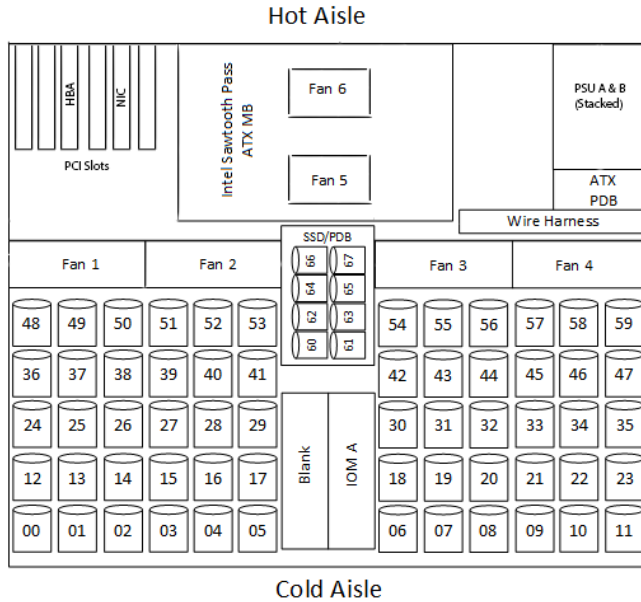


**Table 5: Front and Rear Component Identification**

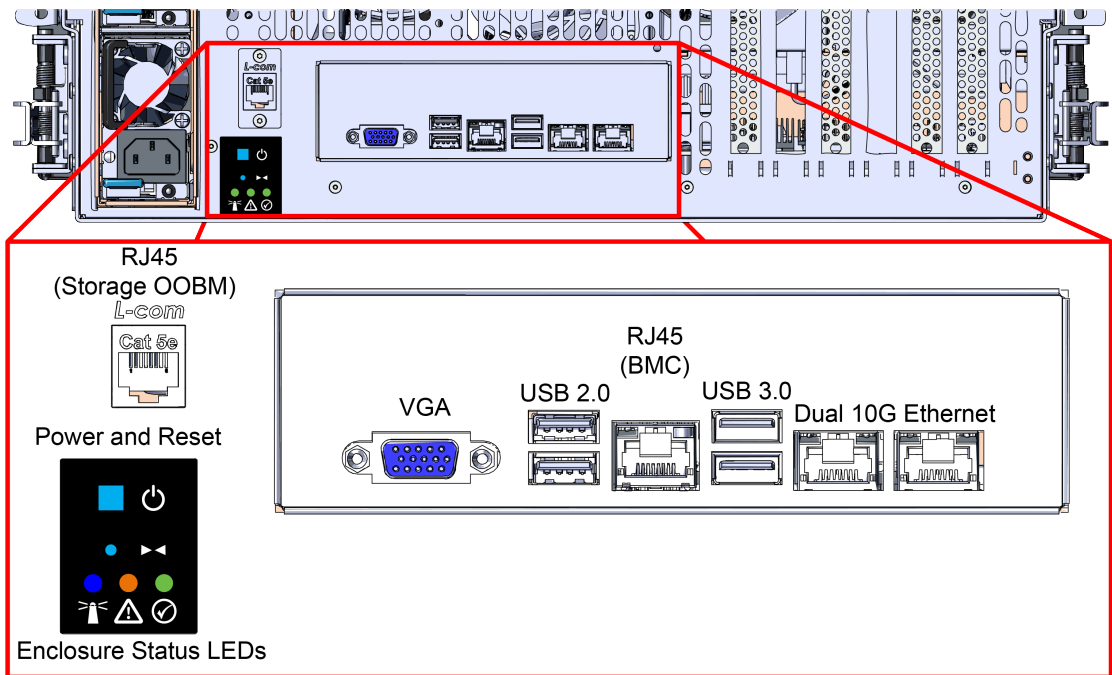
Number	Component
1	Enclosure Handles
2	CMA
3	PSUs
4	Rear IO Ports
5	Chassis Cover
6	Rails

The following is an image of the layout of the major system components inside the Ultrastar Serv60+8.

**Figure 5: Component Layout**



**Figure 6: Rear IO Ports**





## 1.6 List of Customer Replaceable Units (CRUs)

The following table lists the replaceable components and their part numbers.

**Table 6: List of Replaceable Components**

Component	Part Number
Ultrastar Serv60+8 Chassis with Single IOM and PSUs	1EX1801
IOM	1EX1828
IOM Blank	1EX0431
PSU 2000W	1EX1171
System Fan	1EX1173
Rails	1EX0435
CMA	1EX1174
Bracket PCIe Cache Vault Mount	1EX1800
Heat Sink	1EX1464
Intel® Xeon® Silver 4110 CPU w/ Heat Sink	1EX1563
Intel® Xeon® Silver 4114 CPU w/ Heat Sink	1EX1322
Intel® Xeon® Gold 5118 CPU w/ Heat Sink	1EX1323
Intel® Xeon® Gold 5120 CPU w/ Heat Sink	1EX1564
Intel® Xeon® Gold 6132 CPU w/ Heat Sink	1EX1565
Intel® Xeon® Gold 6138 CPU w/ Heat Sink	1EX1566
Intel® Xeon® Gold 6140 CPU w/ Heat Sink	1EX1324
Intel® Xeon® Gold 6150 CPU w/ Heat Sink	1EX1567
Intel® Xeon® Gold 6152 CPU w/ Heat Sink	1EX1568
Intel® Xeon® Platinum 8160 CPU w/ Heat Sink	1EX1775
Samsung® 64GB LRDIMM (DDR4 4R 2666MHz)	1EX1325
Samsung® 16GB RDIMM (DDR4 1R 2666MHz)	1EX1328
Samsung® 32GB RDIMM (DDR4 2R 2666MHz)	1EX1142
Samsung® 64GB RDIMM (DDR4 4R 2666MHz)	1EX1329
Samsung® 128GB RDIMM (DDR4 8R 2666MHz)	1EX1330
Micron® 16GB RDIMM (DDR4 2R 2666MHz)	1EX1332
Micron® 32GB RDIMM (DDR4 2R 2666MHz)	1EX1335
Micron® 64GB LRDIMM (DDR4 4R 2666MHz)	1EX1337
Intel® I350-T2V2 NIC	1EX1769

Component	Part Number
Intel® I350-T4V2 NIC	1EX1770
Intel® X520-DA2 NIC	1EX1267
Intel® X520-SR2 NIC	1EX1772
Intel® X540-T2 NIC	1EX1270
Intel® X710-DA2 NIC	1EX1268
Intel® X710-DA4 NIC	1EX1771
QLogic QLE2692 NIC	1EX1774
QLogic QLE2694 NIC	1EX1773
Chelsio T6225-CR NIC	1EX1161
Mellanox® ConnectX-4 Lx (MCX4121A-ACAT)	1EX1271
Broadcom® 9300-8e	1EX1261
Broadcom® 9300-8i	1EX1168
Broadcom® 9300-16i	1EX1355
Broadcom® 9305-16e	1EX1259
Broadcom® 9305-16i	1EX1169
Broadcom® MegaRAID 9361-8i RAID card without Cache	1EX1263
Broadcom® MegaRAID 9361-16i RAID card without Cache	1EX1262
Broadcom® MegaRAID 9361-24i RAID card without Cache	1EX1264
Broadcom® cache protection module kit for 9361-8i	1EX1470
Broadcom® cache protection module kit for 9361-16i and 9361-24i	1EX1467
3.5 in. Drive Carrier, Qty=1	1EX0438
2.5 in. Drive Carrier for center channel, Qty=1	1EX1473
3.5 in. Drive Blank, Qty=1	1EX0429
2.5 in. Drive Blank for center channel, Qty=1	1EX1459
Power Cable for PDU, C13-C14, 18AWG, 2m, Qty=1	1EX1529
HD Mini-SAS to HD Mini-SAS, 2m, Qty=2	1EX1531
HD Mini-SAS to HD Mini-SAS, 3m, Qty=2	1EX1533

## 1.7 Supported Operating Systems

**Table 7: Compatible Operating Systems**

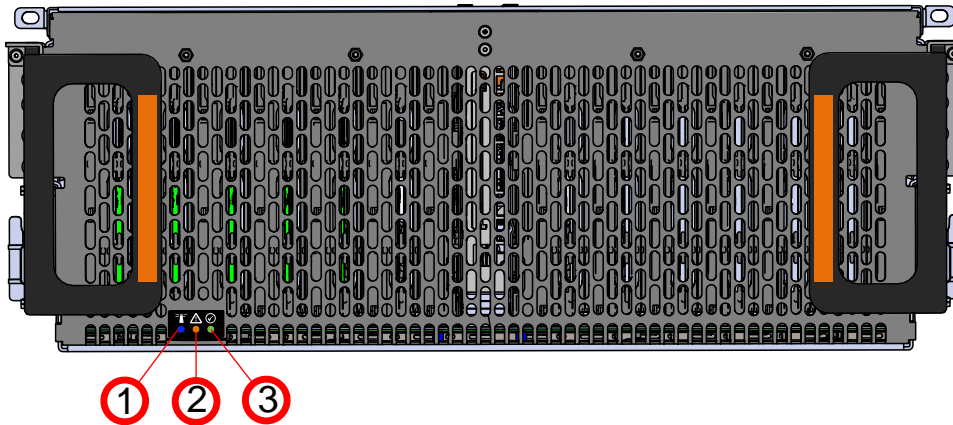
Operating System
Microsoft® Windows Server 2012 R2 x64
Microsoft® Windows Server 2016 R1 x64
RedHat® Red Hat Enterprise Linux (x86_64) 7.4
RedHat® Red Hat Enterprise Linux (x86_64) 7.3
RedHat® Red Hat Enterprise Linux (x86_64) 7.2
Ubuntu® Ubuntu Server 16.04 Kernel 4.4

## 1.8 LEDs

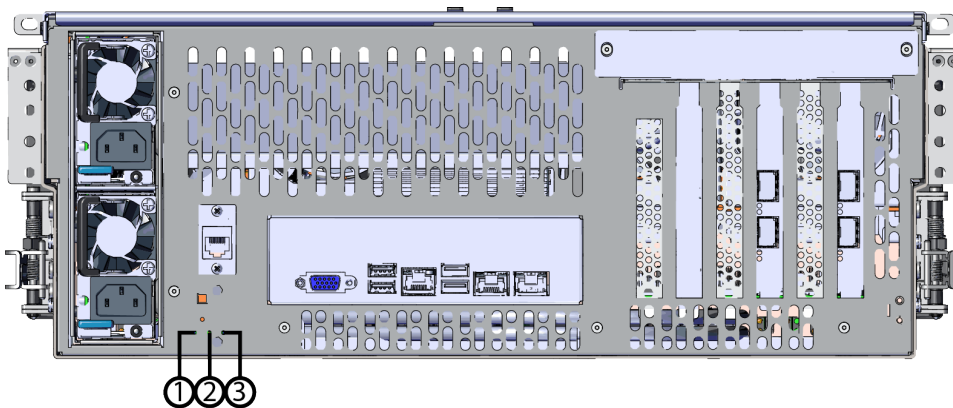
### 1.8.1 Front and Rear IO LEDs

The Ultrastar Serv60+8 has three LEDs on the front and three on the rear that mirror each other and provide general status. This allows the status of the enclosure to be visible from either side of the rack.

**Figure 7: Front LEDs**



**Figure 8: Rear IO LEDs**



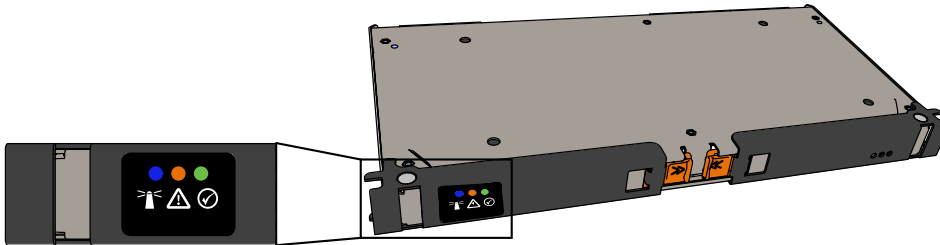
**Table 8: Front and Rear LED Identification**

Number	LED Name	Color	Behavior
1	Identification	Blue	Blink @ 1 Hz – Blinks only when Identification has been activated.
2	Fault	Amber	Blink @ 1 Hz - Enclosure has a fault Off - Enclosure is functioning properly
3	Power	Green	Solid - Powered On

### 1.8.2 IOM LEDs

The IOM has three LEDs, one each for power, fault, and identification.

**Figure 9: IOM LEDs**



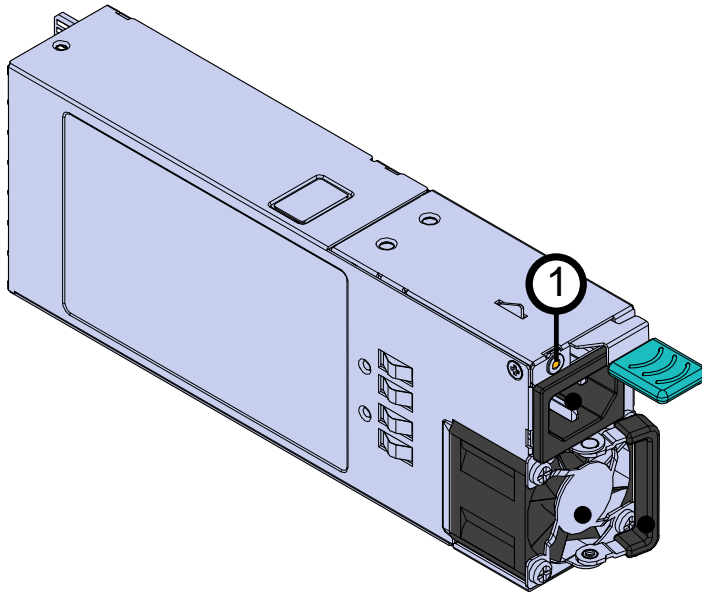
**Table 9: IOM LED Identification**

LED Name	Color	Behavior
IOM Identification	Blue	Blink @ 1 Hz – Blinks only when IOM Identification has been activated. Off - Not being identified
IOM Fault	Amber	Solid - IOM has Fault Off - IOM is functioning normally
IOM Power	Green	Solid - IOM is on Off - IOM is off

### 1.8.3 PSU LED

The PSU has a single multi-function LED. See the table below for a detailed functional description.

**Figure 10: PSU LEDs**



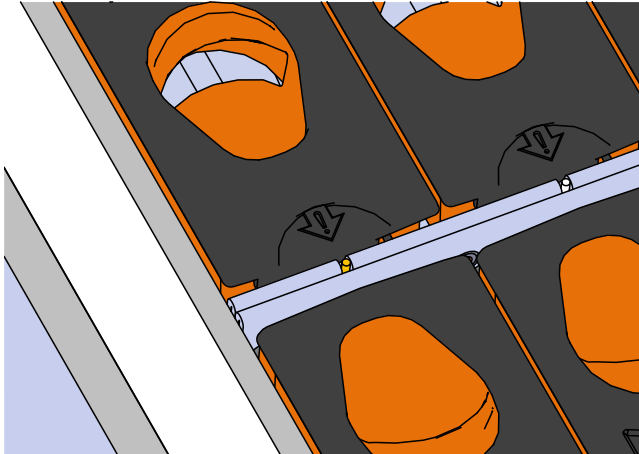
**Table 10: PSU LED Identification**

LED Name	Color	Behavior
PSU Multi-function LED	Green	Solid – PSU is on and reporting no faults Blinking @ 0.5Hz – PSU is functioning in Smart Redundant state Blinking @ 2Hz – PSU in firmware update mode Off – PSU is disconnected from power
	Amber	Solid – PSU is disconnected from power or critical fault causing a shutdown failure Blinking @ 0.5Hz – PSU reporting warnings Off – PSU is reporting no faults

### 1.8.4 Drive Assembly LED

The HDD drive assemblies themselves do not contain an LED. However, there is an amber multi-function LED located on the drive carrier that has three distinct states, one for a fault condition, one for identification, and off.

**Figure 11: HDD Assembly LED**

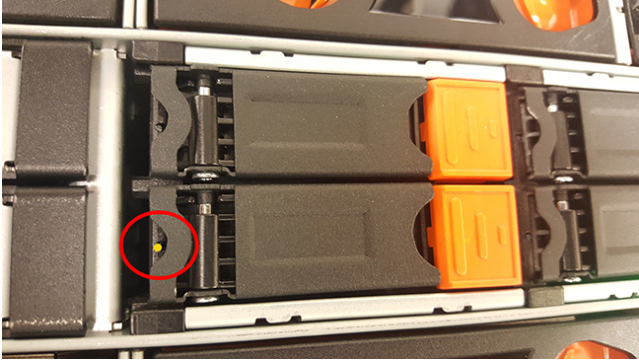


**Table 11: HDD LED Identification**

LED Name	Color	Behavior
Drive Multi-function LED	Amber	Solid – Drive Fault Blinking @ 1 Hz – Drive Identify Off – Drive has no faults

The SSD drive assemblies also have a multifunction LED.

**Figure 12: SSD Assembly LED**



**Table 12: SSD LED Identification**

LED Name	Color	Behavior
Drive Multi-function LED	Amber	Solid – Drive Fault Blinking @ 1 Hz – Drive Identify Off – Drive has no faults

## 1.9 List of Compatible Drives

**Table 13: HDDs**

Drive	Type	Interface	Sector Size	Encryption	Volume	Part Number
HGST Ultrastar® DC HC310 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	SE	6TB	1EX1183
HGST Ultrastar® DC HC310 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG	6TB	1EX1182
HGST Ultrastar® DC HC310 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	SE	6TB	1EX1185
HGST Ultrastar® DC HC310 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG	6TB	1EX1184
HGST Ultrastar® DC HC310 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	SE	6TB	1EX1187
HGST Ultrastar® DC HC310 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	TCG	6TB	1EX1186
HGST Ultrastar® DC HC310 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SE	6TB	1EX1189



Drive	Type	Interface	Sector Size	Encryption	Volume	Part Number
HGST Ultrastar® DC HC310 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	TCG	6TB	1EX1188
HGST Ultrastar® DC HC320 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	SE	8TB	1EX1221
HGST Ultrastar® DC HC320 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG	8TB	1EX1220
HGST Ultrastar® DC HC320 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG-FIPS	8TB	1EX1342
HGST Ultrastar® DC HC320 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	SE	8TB	1EX1223
HGST Ultrastar® DC HC320 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG	8TB	1EX1222
HGST Ultrastar® DC HC320 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG-FIPS	8TB	1EX1343
HGST Ultrastar® DC HC320 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	SE	8TB	1EX1225
HGST Ultrastar® DC HC320 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	TCG	8TB	1EX1224
HGST Ultrastar® DC HC320 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SE	8TB	1EX1227
HGST Ultrastar® DC HC320 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SED	8TB	1EX1226
HGST Ultrastar® He10 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	ISE	10TB	1EX0482
HGST Ultrastar® He10 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	SE	10TB	1EX0484
HGST Ultrastar® He10 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG	10TB	1EX0483
HGST Ultrastar® He10 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG-FIPS	10TB	1EX1340
HGST Ultrastar® He10 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	ISE	10TB	1EX0485
HGST Ultrastar® He10 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	SE	10TB	1EX0487

Drive	Type	Interface	Sector Size	Encryption	Volume	Part Number
HGST Ultrastar® He10 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG	10TB	1EX0486
HGST Ultrastar® He10 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG-FIPS	10TB	1EX1341
HGST Ultrastar® He10 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	ISE	10TB	1EX0494
HGST Ultrastar® He10 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	SE	10TB	1EX0496
HGST Ultrastar® He10 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	SED	10TB	1EX0495
HGST Ultrastar® He10 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	ISE	10TB	1EX0497
HGST Ultrastar® He10 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SE	10TB	1EX0499
HGST Ultrastar® He10 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SED	10TB	1EX0498
HGST Ultrastar® He12 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	ISE	12TB	1EX1004
HGST Ultrastar® He12 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	SE	12TB	1EX1006
HGST Ultrastar® He12 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG	12TB	1EX1005
HGST Ultrastar® He12 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG-FIPS	12TB	1EX1339
HGST Ultrastar® He12 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	ISE	12TB	1EX1007
HGST Ultrastar® He12 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	SE	12TB	1EX1009
HGST Ultrastar® He12 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG	12TB	1EX1008
HGST Ultrastar® He12 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG-FIPS	12TB	1EX1338
HGST Ultrastar® He12 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	ISE	12TB	1EX1010

Drive	Type	Interface	Sector Size	Encryption	Volume	Part Number
HGST Ultrastar® He12 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	SE	12TB	1EX1012
HGST Ultrastar® He12 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	SED	12TB	1EX1011
HGST Ultrastar® He12 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	ISE	12TB	1EX1013
HGST Ultrastar® He12 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SE	12TB	1EX1015
HGST Ultrastar® He12 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SED	12TB	1EX1014
HGST Ultrastar® HC530 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	SE	14TB	1EX1788
HGST Ultrastar® HC530 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG	14TB	1EX1789
HGST Ultrastar® HC530 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	SE	14TB	1EX1791
HGST Ultrastar® HC530 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG	14TB	1EX1792
HGST Ultrastar® HC530 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	SE	14TB	1EX1790
HGST Ultrastar® HC530 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SE	14TB	1EX1793

**Table 14: SSDs w/ 2.5 in. drive carrier**

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
HGST Ultrastar® SS200 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	400GB	1EX1276
HGST Ultrastar® SS200 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	400GB	1EX1278
HGST Ultrastar® SS200 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	400GB	1EX1353
HGST Ultrastar® SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	400GB	1EX1273

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
HGST Ultrastar® SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	400GB	1EX1159
HGST Ultrastar® SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	400GB	1EX1346
HGST Ultrastar® SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG-FIPS	400GB	1EX1347
HGST Ultrastar® SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	400GB	1EX1282
HGST Ultrastar® SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	400GB	1EX1284
HGST Ultrastar® SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	400GB	1EX1350
HGST Ultrastar® SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	400GB	1EX1351
Sandisk® Cloudspeed Ultra Gen. II w/ 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-1.8DW/D	SE	400GB	1EX1279
HGST Ultrastar® SS200 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	800GB	1EX1275
HGST Ultrastar® SS200 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	800GB	1EX1277
HGST Ultrastar® SS200 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	800GB	1EX1352
HGST Ultrastar® SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	800GB	1EX1272
HGST Ultrastar® SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	800GB	1EX1274
HGST Ultrastar® SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	800GB	1EX1344
HGST Ultrastar® SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG-FIPS	800GB	1EX1345
HGST Ultrastar® SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	800GB	1EX1281
HGST Ultrastar® SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	800GB	1EX1283

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
HGST Ultrastar® SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	800GB	1EX1348
HGST Ultrastar® SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	800GB	1EX1349
Sandisk® Cloudspeed Ultra Gen. II w/ 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-1.8DW/D	SE	800GB	1EX1280
HGST Ultrastar® SS200 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	1.6TB	1EX1782

**Table 15: SSDs w/ 3.5 in to 2.5 in drive carrier**

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
HGST Ultrastar® SS200 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	400GB	1EX1291
HGST Ultrastar® SS200 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	400GB	1EX1293
HGST Ultrastar® SS200 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	400GB	1EX1315
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	400GB	1EX1287
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	400GB	1EX1289
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	400GB	1EX1312
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG-FIPS	400GB	1EX1479
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	400GB	1EX1296
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	400GB	1EX1298
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	400GB	1EX1309
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	400GB	1EX1481

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Sandisk® Cloudspeed Ultra Gen. II w/ 3.5 in to 2.5 in drive carrier	SSD	SATA 6Gb/s	RI-1.8DW/D	SE	400GB	1EX1294
HGST Ultrastar® SS200 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	480GB	1EX1318
HGST Ultrastar® SS200 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	800GB	1EX1290
HGST Ultrastar® SS200 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	800GB	1EX1292
HGST Ultrastar® SS200 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	800GB	1EX1314
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	800GB	1EX1295
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	800GB	1EX1297
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	800GB	1EX1308
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	800GB	1EX1480
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	800GB	1EX1286
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	800GB	1EX1288
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	800GB	1EX1311
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG-FIPS	800GB	1EX1478
Sandisk® Cloudspeed Ultra Gen. II w/ 3.5 in to 2.5 in drive carrier	SSD	SATA 6Gb/s	RI-1.8DW/D	SE	800GB	1EX1305
HGST Ultrastar® SS200 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	960GB	1EX1317
HGST Ultrastar® SS200 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	1.6TB	1EX1303
HGST Ultrastar® SS200 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	1.6TB	1EX1783

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
HGST Ultrastar® SS200 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	1.6TB	1EX1304
HGST Ultrastar® SS200 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	1.6TB	1EX1784
HGST Ultrastar® SS200 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	1.6TB	1EX1313
HGST Ultrastar® SS200 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	1.6TB	1EX1785
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	1.6TB	1EX1299
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	1.6TB	1EX1779
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	1.6TB	1EX1768
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	1.6TB	1EX1300
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	1.6TB	1EX1780
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	1.6TB	1EX1776
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	1.6TB	1EX1307
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	1.6TB	1EX1781
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	1.6TB	1EX1777
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	1.6TB	1EX1787
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	1.6TB	1EX1782
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-10DW/D	ISE	1.6TB	1EX1301
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-10DW/D	SE	1.6TB	1EX1302

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-10DW/D	TCG	1.6TB	1EX1310
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG-FIPS	1.6TB	1EX1786
Sandisk® Cloudspeed Ultra Gen. II w/ 3.5 in to 2.5 in drive carrier	SSD	SATA 6Gb/s	RI-1.8DW/D	SE	1.6TB	1EX1319
HGST Ultrastar® SS200 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	1.92TB	1EX1316
HGST Ultrastar® SS200 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	3.2TB	1EX0578
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	3.2TB	1EX1285
HGST Ultrastar® SS300 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	3.2TB	1EX1306
HGST Ultrastar® SS200 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	3.84TB	1EX0579
HGST Ultrastar® SS200 w/ 3.5 in to 2.5 in drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	7.68TB	1EX0580

**Table 16: M.2s**

Drive	Type	Form Factor	Interface	Encryption	Volume	Part Number
HGST Ultrastar® SA210	SSD	M.2 2280	SATA 6Gb/s	SED	120GB	1EX1143
SanDisk® X600	SSD	M.2 2280	SATA 6Gb/s	N/A	128GB	1EX1569
SanDisk® X600	SSD	M.2 2280	SATA 6Gb/s	SED	128GB	1EX1574
HGST Ultrastar® SA210	SSD	M.2 2280	SATA 6Gb/s	SED	240GB	1EX1354
SanDisk® X600	SSD	M.2 2280	SATA 6Gb/s	N/A	256GB	1EX1570
SanDisk® X600	SSD	M.2 2280	SATA 6Gb/s	SED	256GB	1EX1575
HGST Ultrastar® SA210	SSD	M.2 2280	SATA 6Gb/s	SED	480GB	1EX1579
SanDisk® X600	SSD	M.2 2280	SATA 6Gb/s	N/A	512GB	1EX1571
SanDisk® X600	SSD	M.2 2280	SATA 6Gb/s	SED	512GB	1EX1576
HGST Ultrastar® SA210	SSD	M.2 2280	SATA 6Gb/s	SED	960GB	1EX1580
SanDisk® X600	SSD	M.2 2280	SATA 6Gb/s	N/A	1TB	1EX1572



Drive	Type	Form Factor	Interface	Encryption	Volume	Part Number
SanDisk® X600	SSD	M.2 2280	SATA 6Gb/s	SED	1TB	1EX1577
HGST Ultrastar® SA210	SSD	M.2 2280	SATA 6Gb/s	SED	1.92TB	1EX1581
SanDisk® X600	SSD	M.2 2280	SATA 6Gb/s	N/A	2TB	1EX1573
SanDisk® X600	SSD	M.2 2280	SATA 6Gb/s	SED	2TB	1EX1578

## 2 System Management Overview

This chapter provides an overview of the system management features available in the Ultrastar Serv60+8 through the in-band SAS connections using SG3\_utils software, and out-of-band using a REST interface over HTTPS to access HGST's implementation of the DMTF Redfish API.

There are also two out-of-band interfaces that can be accessed through BMC that are integrated into the system via the RJ45 port on the Ultrastar Serv60+8. The interface is a GUI that is accessible via the BMC management port on the rear of the enclosure. The BMC is also accessible using IPMI and using the Redfish RESTful interface. For more information visit the Insyde website for BMC documentation, or the Intel website for server BIOS documentation.

### 2.1 Storage Subsystem Firmware Features Overview

The enclosure services functionality is compatible with the SES-3 (SES3r14) standard. The enclosure implements the Standalone Enclosure Services Process model described in the SES standard. The logical enclosure services process is called the SEP.

The primary expander in the IOM is the only expander that presents a SCSI target, and it is the main device for gathering information from the system for presentation to hosts. The SEP services SES control page operations. All control operations follow a synchronous completion model, i.e. the SEP will send SCSI status only when the requested operation has completed, or to notify the host that the requested operation cannot be performed. Typical SES control operations include:

- Requesting LED flash patterns
- Recording predicted or known component failures
- Requesting power cycle of one or more drives
- Perform a code download. All firmware in programmable components in the storage subsystem may be updated via SES.

#### SES Status

The SEP services SES status pages. All status operations follow a non-blocking completion model, i.e. the SEP returns the last known status, rather than blocking the completion of the SCSI operation while doing an immediate polling operation. The SES status is updated every 0.5s. Typical SES status operations include:

- FRU and drive presence, health information, and entity names
- SAS topology maps
- Report sensor readings: temperatures, fan speeds, voltages, currents, etc.

#### Autonomous Behavior

The SEP autonomously manages enclosure power and thermal characteristics. This is done dynamically as needed to stay within the allowed operational envelope of power consumption, thermal heating, and ambient temperature in the data center. This management can include the use of one or more mitigating actions:

- Raise and lower the cooling fans.
- Enable or disable activity safeguards which limit enclosure activity to reduce power consumption or heat generation.
- Enter a self-healing thermal offline state in which some or all enclosure components are powered off.

The enclosure operates visual indicators. These indicators can be set or cleared via host request, or autonomously by the enclosure if it detects fault conditions. The enclosure provides non-volatile memory that

records enclosure serialization and branding information. The SEP records event log entries to non-volatile memory.

## 2.2 OOBM Management Overview

The Ultrastar Serv60+8 uses an implementation of DMTF Redfish for out-of-band system management. All the SES enclosure information can be obtained through the out-of-band management port using RESTful API calls to the management port over HTTPS.

## 2.3 SCSI Enclosure Services Page 02

The SCSI `Send Diagnostic` and `Receive Diagnostic Results` commands can be addressed to a specific SES element in the enclosure. There are many different element codes, such as Page 02, defined to cover a wide range of devices. Page 02 refers to the control and status of the enclosures PSUs, HDDs, ESMs, and sensors.

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**Note:** Refer to the SES Firmware Management Interface Specification for more information on SES Page 02.

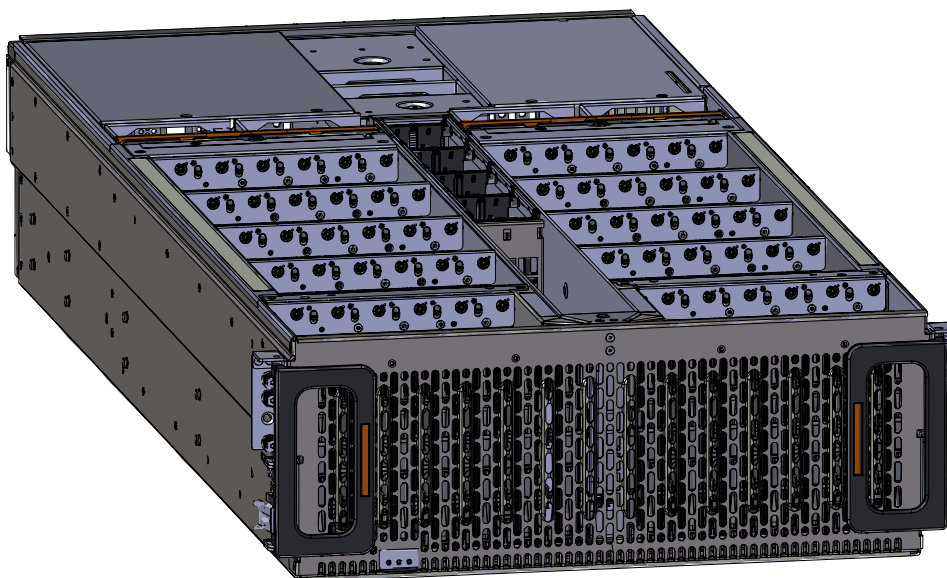
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### 3 Component Overviews

This section is intended to give an overview of all of the major components contained within the Ultrastar Serv60+8. Each section includes specifications, descriptions, and images that explain the features of each component.

#### 3.1 Chassis Description

*Figure 13: Overview Image*



The chassis is the primary housing that contains and connects all of the system components that comprise the Ultrastar Serv60+8. The chassis is comprised of the drive bay that contains all of the system data storage drives and a number of other bays that contain the major system components such as the PSUs and IOM. Other system components are attached to the exterior of the chassis such as the rails to provide rackmounting capability. The chassis also houses the baseboard which is mounted in the bottom of the chassis' tub and is the primary data pathway that connects the HDDs to the IOM. The chassis has internal backflow preventers to prevent hot air from re-entering the drives bays.

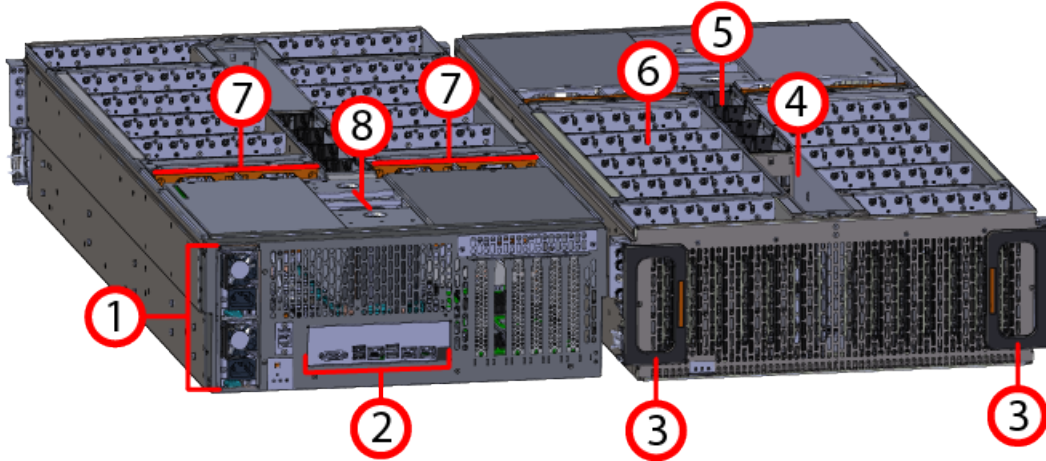
##### 3.1.1 Chassis Specifications

**Table 17: Specification Summary**

Specification	Value
Dimensions	450 mm x 1026 mm x 172.7 mm / 17.72 in. x 40.39 in. x 6.8 in.
Part Number	1EX0506 (L6 part number)
Hot Swappable?	No
Weight	40.82 kg / 90 lbs

### 3.1.2 Chassis Layout

**Figure 14: Layout**



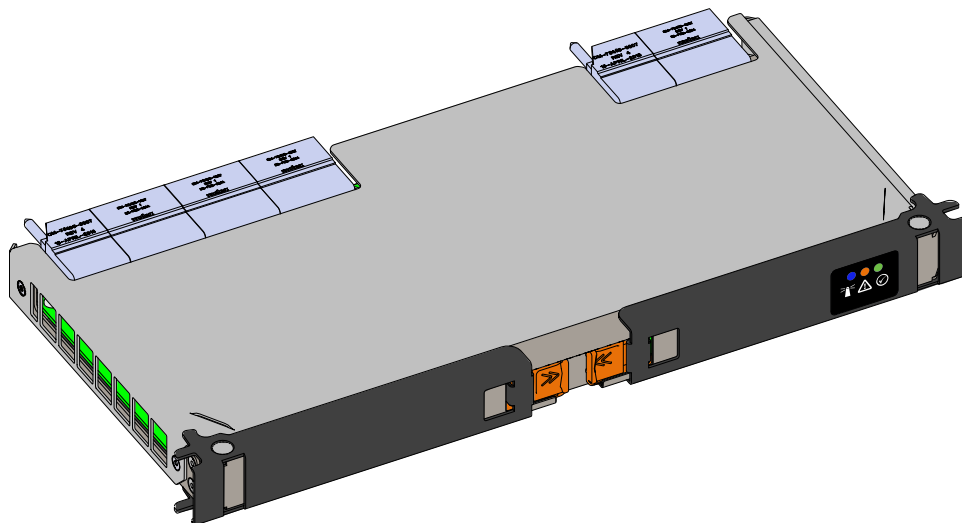
**Table 18: Exterior Components**

Number	Feature
1	PSU Bays • Top bay: PSU A • Bottom bay: PSU B
2	Server IO
3	Chassis Handles
4	IOM Bay
5	SSD Drive Bays
6	HDD Drive Bays
7	System Fan Slots
8	System Fan Slots (center channel)

The chassis has a removable cover that encloses the internal system components and ensures proper airflow. The drive bays are comprised of sections that isolate the data storage drives from transmitting vibration to one another. There is a long central bay that contains the enclosure’s IOM and the system SSDs. There is a large compartment at the back that houses the server motherboard, the internal cooling fans and the PSUs. The front of the chassis has a metal mesh cover and two handles that swing out from the chassis that are used to extend the enclosure out of the rack when pulled. There are two rack ears at the front of the enclosure that are used to secure the enclosure to the rack for shipping purposes.

## 3.2 IOM Description

Figure 15: Overview Image



The IOM provides system data connectivity through 4 Mini-SAS HD ports each capable of four 12Gbps SAS connections. The IOM is installed into the central bay from the top of the Chassis and connect to the drive board. The baseboard completes the connection to the Mini-SAS HD ports

The IOM contains a primary and two secondary SAS expander chips, and an out-of-band management (OOBM) chip that connects to the management port on the rear of the enclosure.

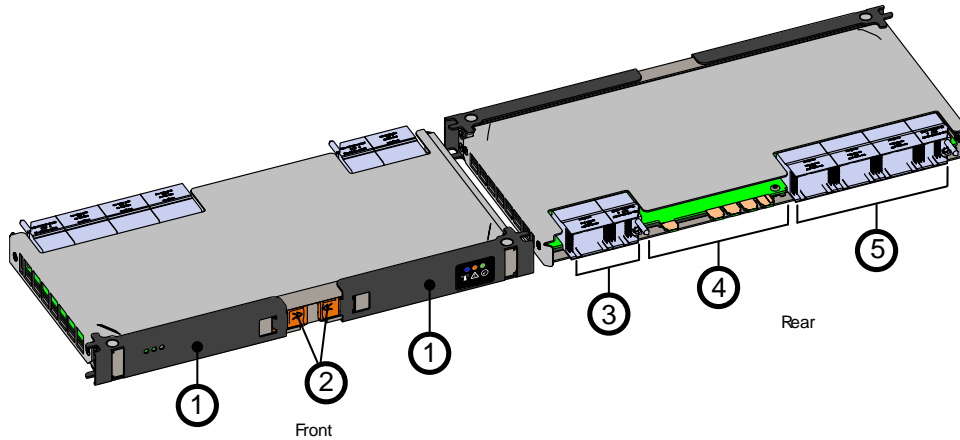
### 3.2.1 IOM Specifications

Table 19: Specification Summary

Specification	Value
Connector Type	x4 HD Mini-SAS (connected externally at the rear of the enclosure)
Number per Enclosure	1
Part Number	1EX1828
Hot Swappable?	No
FRU or CRU?	CRU
Weight	1.27 kg / 2.8 lbs

### 3.2.2 IOM Layout

**Figure 16: Layout**

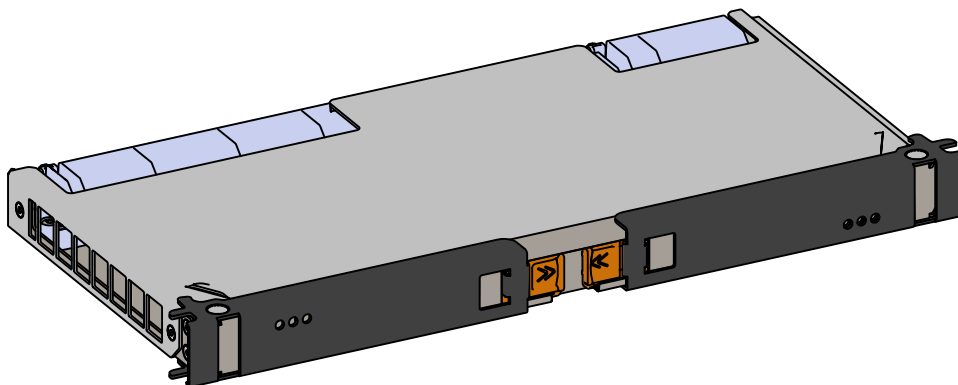


**Table 20: Exterior Components**

Number	Feature
1	IOM Handle
2	Latch Release
3	Internal IO Connector
4	Card Edge Power Receptacle
5	Internal IO Connector

### 3.2.3 IOM Blank Description

**Figure 17: Overview Image**

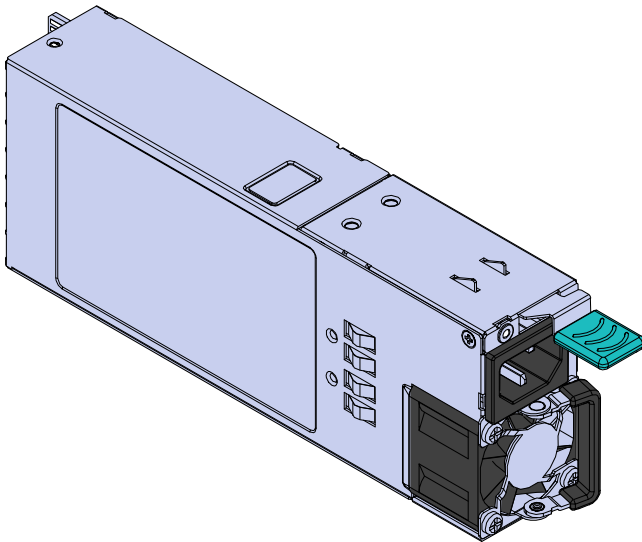


The IOM Blank is a placeholder component that is used to fill the unused IOM slot. The IOM Blank may only be installed into IOM slot B under all circumstances. When at the front of the enclosure, Slot B is the left-hand slot. It is necessary to have a blank installed in this unused slot in order to ensure the proper airflow dynamics

that are within operational parameters designed for the enclosure, but has no functional component beyond this feature.

### 3.3 PSU Description

**Figure 18: Overview Image**



Ultrastar Serv60+8 contains redundant 2000W Power Supply Units (PSU). Each PSU requires an input voltage of between 200 - 240 VAC. The PSUs are 80 PLUS Platinum certified, and utilize C14 power cable receptacles.

#### 3.3.1 PSU Specifications

**Table 21: Specification Summary**

Specification	Value
Power Output	2000W
80 PLUS Standard	Platinum
Input Voltage	200 - 240 VAC
Connector Type	C14
Number per Enclosure	2
Part Number	1EX1171
Hot Swappable?	Yes
FRU or CRU?	CRU
Weight	1 kg / 2.2 lbs.



### 3.3.2 PSU Layout

Figure 19: Layout

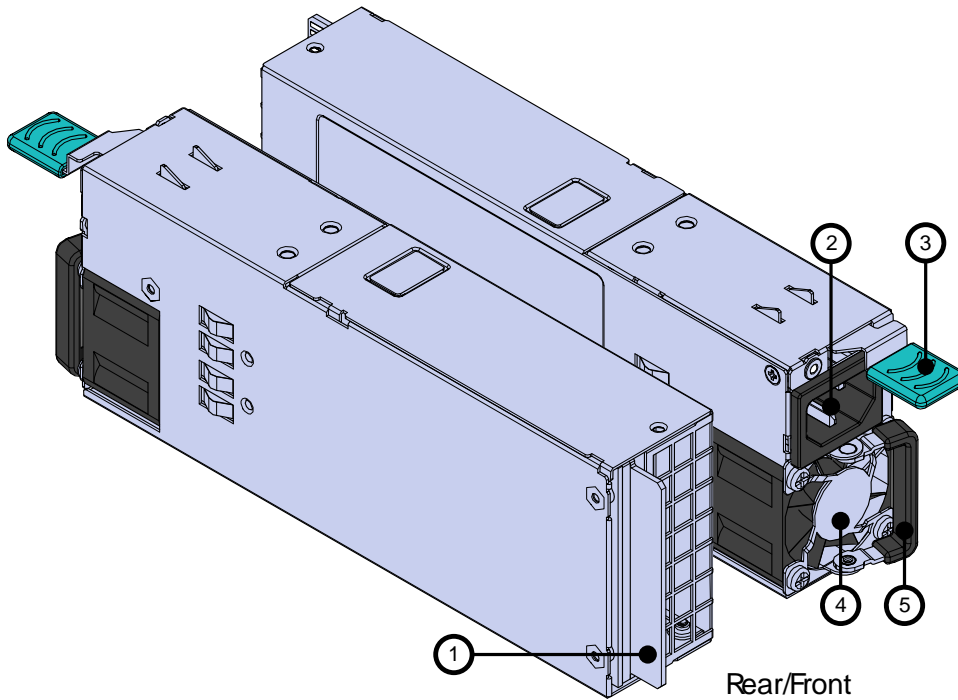
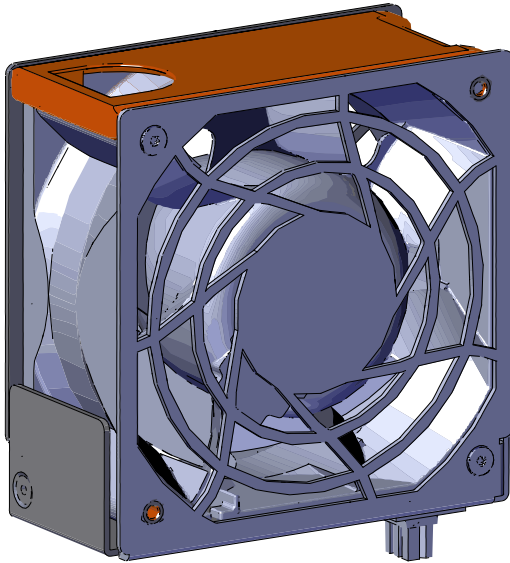


Table 22: Exterior Components

Number	Feature
1	Internal Connector
2	C14 Power Receptacle
3	Latch Release Lever
4	Fan
5	Handle

### 3.4 System Fan Description

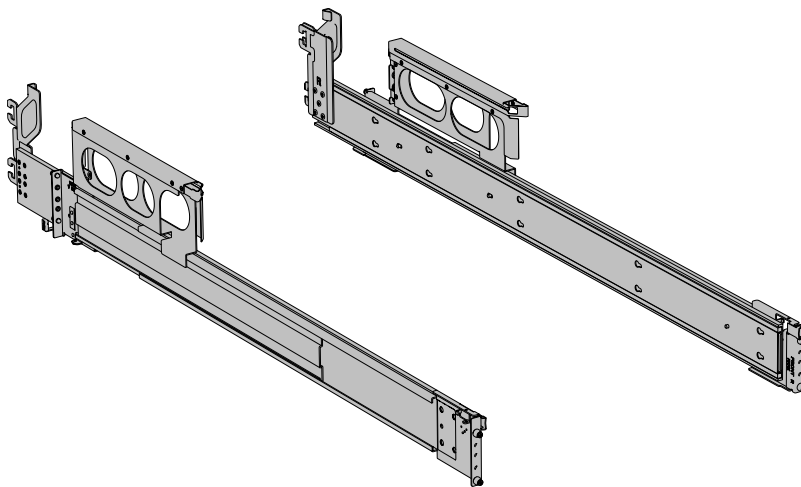
*Figure 20: Overview Image*



The System Fans are toolless fan modules that provide the primary system cooling for the Ultrastar Serv60+8. They are located internally behind the drive bays and over the motherboard.

### 3.5 Rails Description

*Figure 21: Overview Image*



The Ultrastar Serv60+8 is installed into a rack using a toolless-attach rail system. The rails are a two-piece system with one rail that attaches directly to the chassis called the inner rail and the other that attaches to the rack. The inner rail comes nested inside the outer rail and can be accessed by sliding it out of the outer rail. The outer rails attach to the rack and receive the chassis to support it inside the rack. The outer rails attach

to vertical rack rails that should be set between 32 in.-36 in. The toolless design means that an installer can attach these rails to a rack without any tools which simplifies installation. Once they are attached, they can be secured with the included M5 screws and washers.

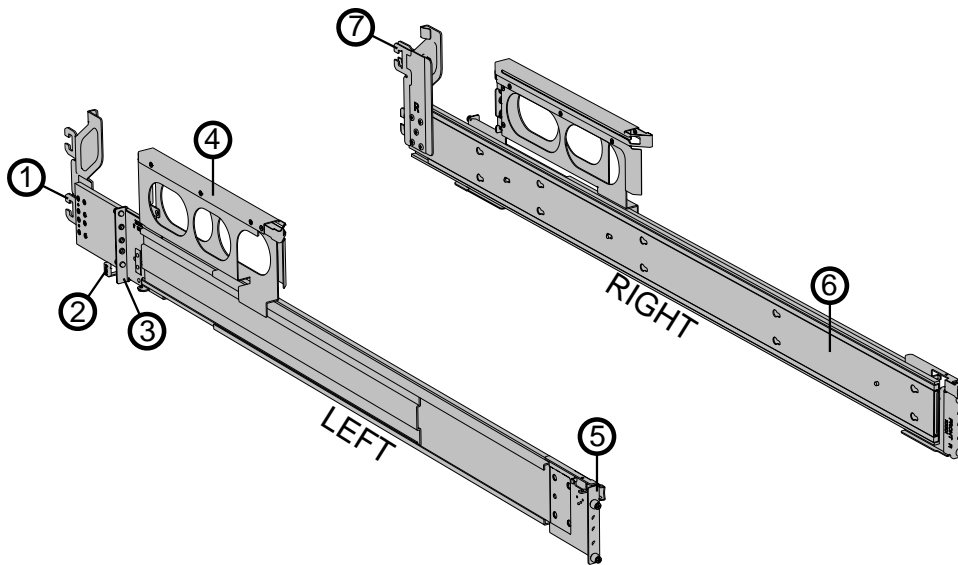
### 3.5.1 Rails Specifications

**Table 23: Specification Summary**

Specification	Value
Length	1028.7 mm/40.5 in.
Part Number	1EX0435
Hot Swappable?	No
FRU or CRU?	CRU
Weight	7.89 kg total, 3.95 kg/rail / 17.4 lbs. total, 8.7/rail

### 3.5.2 Rails Layout

**Figure 22: Layout**



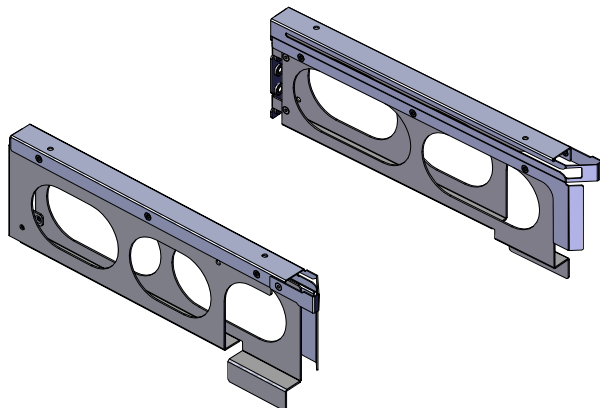
**Table 24: Exterior Components**

Number	Features
1	Lower CMA Connectors
2	Rear Latch Release
3	Rear Rack Mounting Bracket
4	Rear Cover Alignment Bracket
5	Front Rack Mounting Bracket and Latch Release
6	Front Rack Mounting Bracket and Latch Release
7	Front Rack Mounting Bracket and Latch Release

Number	Features
6	Inner Rail
7	Upper CMA Connectors

### 3.5.3 Rear Cover Alignment Bracket Description

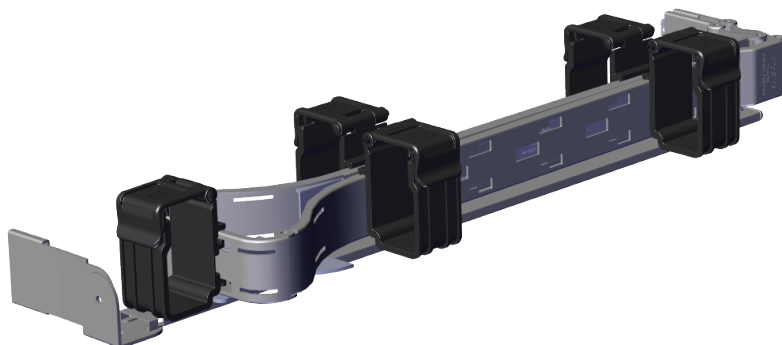
**Figure 23: Overview Image**



The rear cover alignment brackets are designed to keep the top cover of the chassis in the rack while extending the Ultrastar Serv60+8 out of the rack for servicing. The rear cover alignment brackets will attach to the rear vertical rack rails and rest on top of the toolless rail system.

## 3.6 CMA Description

**Figure 24: Overview Image**



The cable management assembly (CMA) provides a number of benefits to protect and manage the cables connected to the PSU ports, SAS ports, and Ethernet ports. It prevents damage to the port connectors and the cables throughout the full travel of the enclosure as it is pulled out of the rack for servicing. This motion

ensures that the cables contained by the CMA arm do not snag or get pulled out of the ports as the enclosure moves.

The design of the Ultrastar Serv60+8 CMA is a single-arm design that supports all of the cabling used in the enclosure. The cables are secured to the arm by plastic clips called baskets that can be opened at the top to adjust, add, or remove cables. The arm can also be moved into a service position by unclipping it from the elbow end of the arm and swinging away from the enclosure when the enclosure is fully inserted in a rack. This provides access to connections and components at the rear of the system without having to remove the CMA or disconnect any of the cabling.

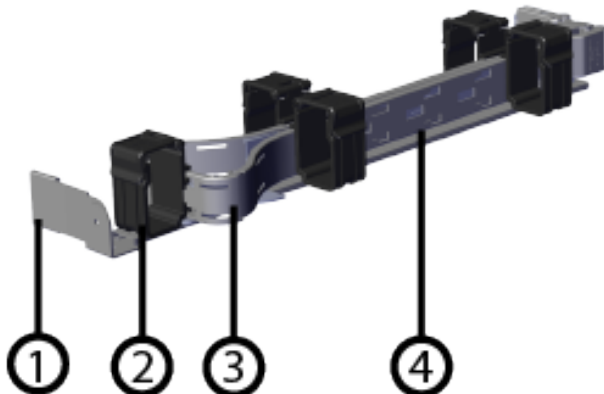
### 3.6.1 CMA Specifications

**Table 25: Specification Summary**

Specification	Value
Extension Range	0 - 36 in.
Part Number	1EX1174
Hot Swappable?	No
FRU or CRU?	CRU
Weight	1.54 kg, 0.77/arm / 3.4 lbs., 1.7/arm

### 3.6.2 CMA Layout

**Figure 25: Layout**

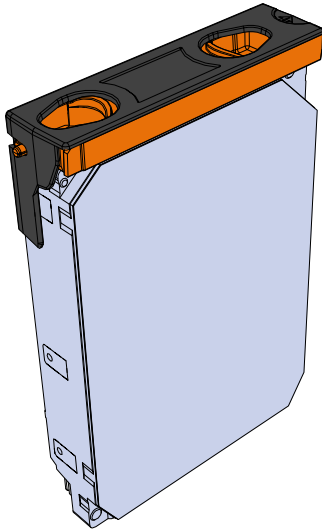


**Table 26: Exterior Components**

Number	Feature
1	Rail and Rack Connectors
2	Baskets (retains cables)
3	Elbow
4	Arm

## 3.7 Drive Assembly Description

**Figure 26: Overview Image**



The Drive Assembly is comprised of two parts: the storage drive and the drive carrier. The carrier attaches to the exterior of the data storage drive and caddies the drive into the enclosure. It stabilizes the motion of the drive into the drive bay so that the drive properly mounts onto the drive board.

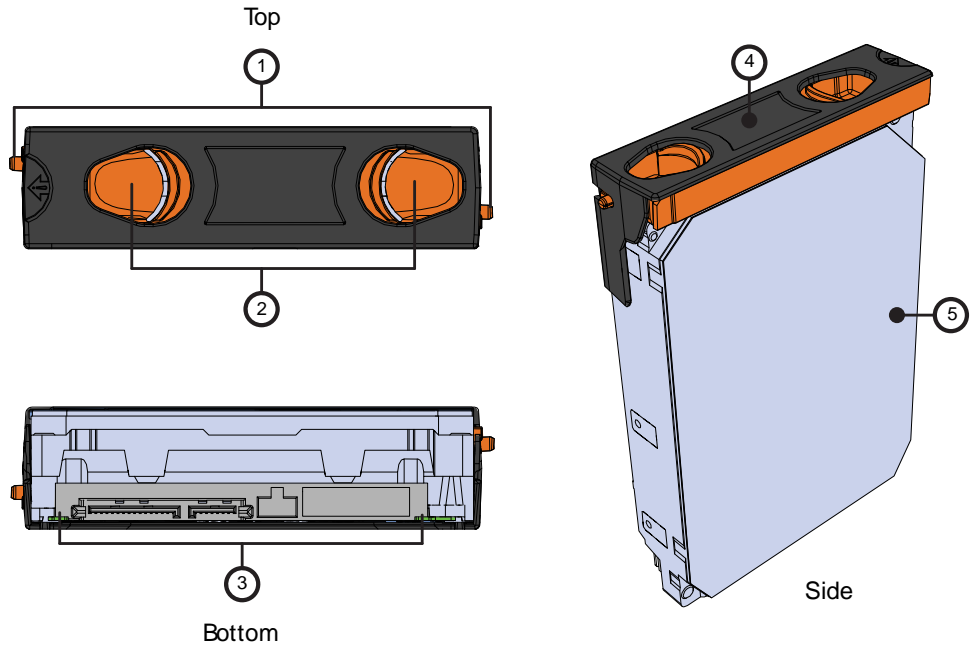
### 3.7.1 Drive Assembly Specifications

**Table 27: Specification Summary**

Specification	Value
Number per Enclosure	up to 60 drives
Part Number	See the <a href="#">List of Compatible Drives</a> on page 24 to find the specific part number required.
Hot Swappable?	Yes
Weight	.68 kg / 1.5 lbs.

### 3.7.2 Drive Assembly Layout

**Figure 27: Layout**

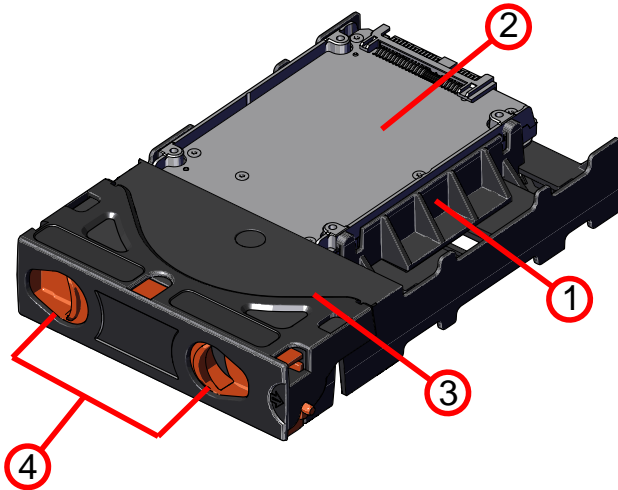


**Table 28: Exterior Components**

Number	Feature
1	Latches
2	Latch Release
3	IO and Power Connectors
4	Drive Carrier
5	Disk Drive

### 3.7.3 2.5" Drive Carrier Description

**Figure 28: Overview Image**



The 2.5" carrier assembly is used to adapt a 2.5" form factor data storage drive to the 3.5" drive slots in the Ultrastar Serv60+8 drive bays. This allows the enclosure to accommodate high speed SSD drives as its primary data storage medium. The carrier operates by utilizing an innovative clamping mechanism. The 2.5" drive is seated in the orientation shown the overview image. Then the clamp is inserted to apply pressure to the SSD and secure it in place.

**Table 29: SSD Features**

Number	Feature
1	Drive Holder Clamp
2	SSD
3	Carrier Shell
4	Drive Latch Release

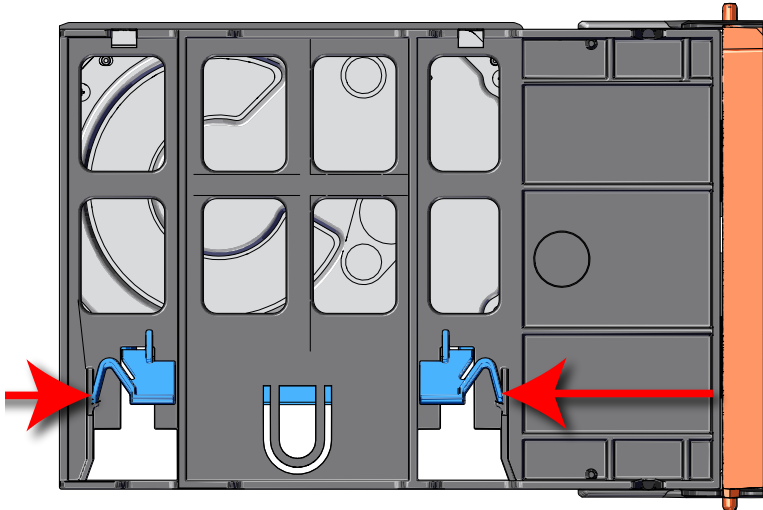
#### 3.7.3.1 Operating the 2.5" Drive Carrier

Follow these steps to operate the clamping mechanism and install a 2.5" drive in the carrier.



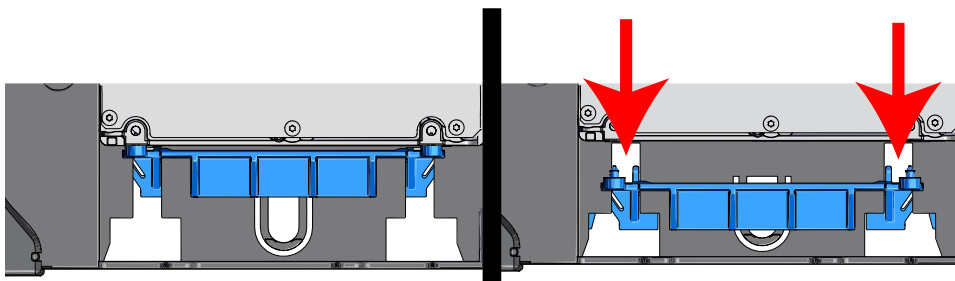
1. Locate the release clips on the rear and press them inward to release the clamp.

**Figure 29: Clamp Release (clamp shown in blue for visual clarity)**



2. Slide the clamp in the direction shown in the following image to loosen it from the drive. Be sure not to slide too far as this will allow the clamp to fall from the carrier body and it will have to be reinstalled.

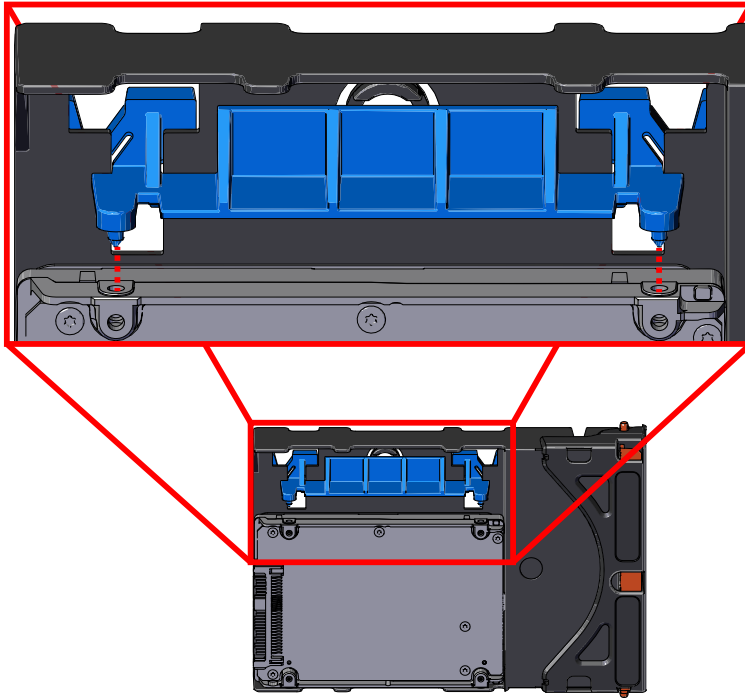
**Figure 30: Clamp Slide (clamp shown in blue for visual clarity)**



3. Insert the 2.5" drive into the drive slot so that it is snug into the corner.

4. Slide the clamp back toward the drive making sure that the two plastic pins on the side of the drive properly install into the drive screwholes. If these pins are not seated properly, unlatch the clamp and retry.

**Figure 31: Clamp Pins (clamp shown in blue for visual clarity)**

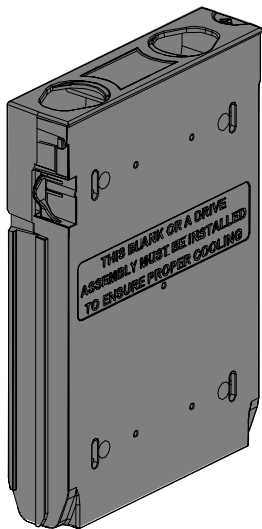


#### 3.7.4 Drive Blank Description

The drive blank is a placeholder component that is used to fill empty drive slots in the chassis when a Ultrastar Serv60+8 enclosure is partially populated with drives. The purpose of the drive blank is to maintain proper airflow and cooling of the enclosure and the components within the enclosure. For more information on requirements for a partially populated enclosure, see: [Partially Populated Enclosures](#) on page 335.

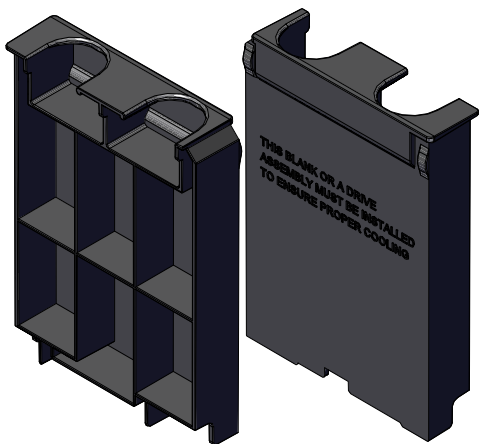
When the number of drives that are used in a row is less than the total that are necessary to fill that row, the 3.5" drive blank is used to fill out the row in place of actual drives.

**Figure 32: 3.5" Drive Blank Overview Image**



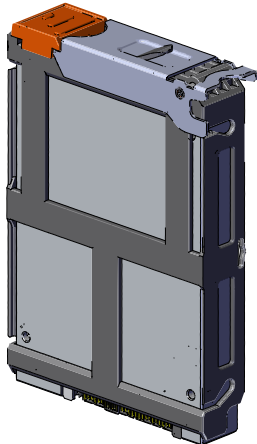
Empty drive slots in the center channel must be populated with 2.5" drive blanks.

**Figure 33: 3.5" Drive Blank Overview Image**



## 3.8 System SSD Description

**Figure 34: Overview Image**



The system SSD drives are located in the center channel inside the enclosure. These drives can be used in the same fashion as the 3.5" drives populating the major data storage bays in the Ultrastar Serv60+8. They are accessible via the storage subsystem architecture through SES or through the Redfish OOBM.

### 3.8.1 System SSD Specifications

**Table 30: Specification Summary**

Specification	Value
Number per Enclosure	up to 8
Part Number	See the <a href="#">List of Compatible Drives</a> on page 24 to find the specific part number required.
Hot Swappable?	Yes
Weight	.14 kg / .31 lbs.

## 4 Part Replacement

### 4.1 Part Replacement Service Window

The following table contains a time required and a replacement window related to each hot swappable replacement part within the enclosure. The time required for replacement is the expected amount of time it requires to replace the part. The replacement window is the amount of time that the enclosure can be open for servicing. If the enclosure cover is open for a period lasting longer than the replacement window, the enclosure may reduce access to drives and other components to reduce the occurrence of thermal issues.

**Table 31: Replacement Service Window**

Part	Time Required	Replacement Window
IOM	60s	5 Minutes
PSU	60s	5 Minutes
System Fan	60s	5 Minutes
Drive Assembly	60s	5 Minutes
System SSD	60s	5 Minutes

**Attention:** In the case of multiple part failures, failed fan should **always** be replaced before any other part is replaced. Once the enclosure cover is open, the failed fan **must** be removed within a minute. The remainder of the replacement of a failed fan should be completed within the 5 minute replacement windows.

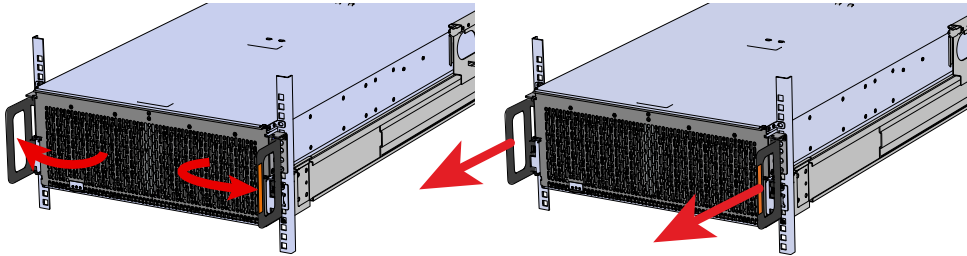
### 4.2 IOM Replacement

**Table 32: Replacement Procedure Info**

Required Tools	# of People Required	Time Required	Replacement Window
None	1	60s	5 Minutes

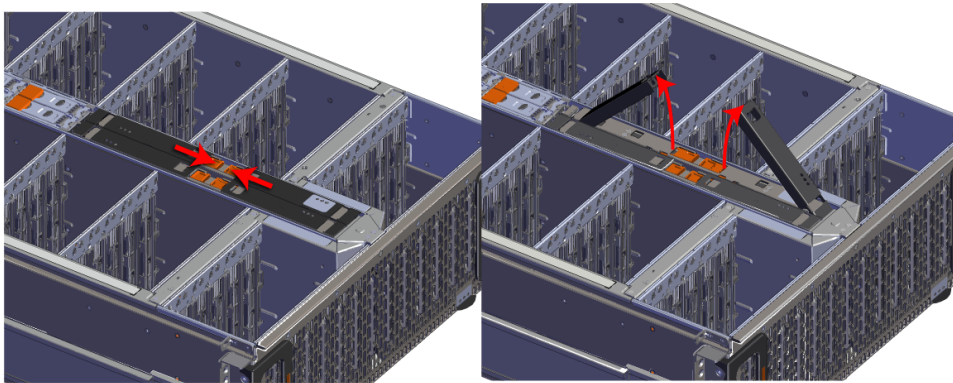
1. Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

**Figure 35: Chassis Handle Operation**



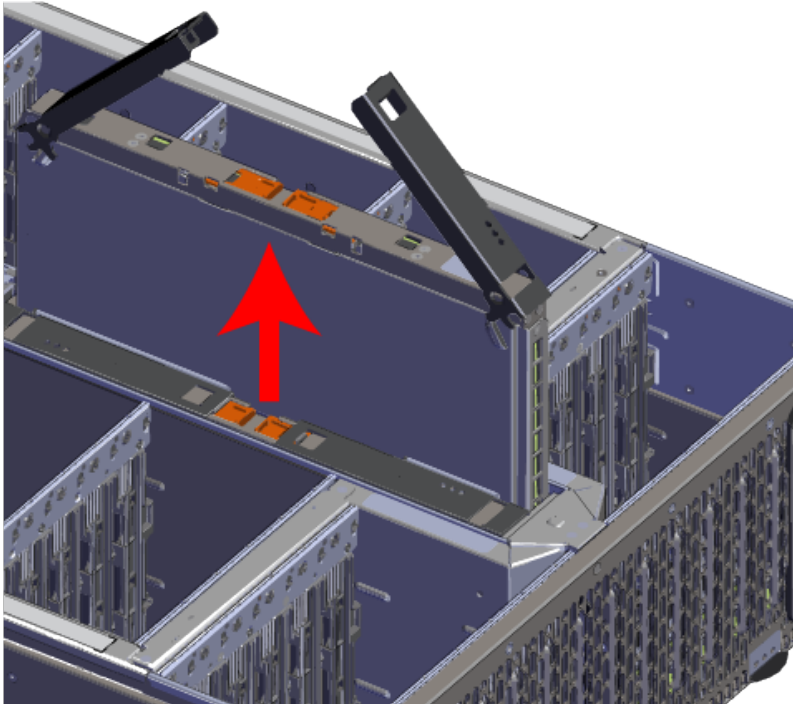
2. Locate the faulty IOM by the amber LED that will be lit on top if there is a fault or by activating the identify LED on the IOM being replaced.
3. Uninstall the IOM.
  - a) Locate the latch release on the IOM and press it in the direction shown in the following image.

**Figure 36: Unlatching the IOM**




- b) Grasp both handles, one handle in each hand, and lift evenly with both hands to ensure the IOM comes out straight. This will prevent any damage to the pins on the internal connectors.

**Figure 37: Removing IOM**

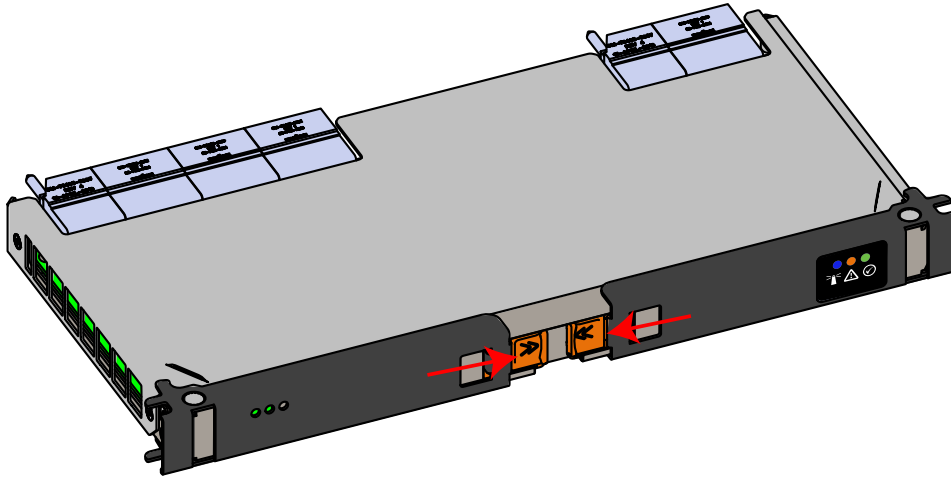


4. Remove the new IOM from its packaging.
5. Install the IOM.
  - a)

**Caution:**  If a pin on the IOM's internal connectors is bent or damaged, the IOM will have to be replaced. For this reason it is imperative that the IOM is not forced into position, that it is inserted straight, and that the directions for installing the IOM are followed exactly.

- b) Ensure that the handles on the IOM are not latched. To unlatch them, press the latch release in the direction shown in the following image.

**Figure 38: Unlatching IOM Handles**

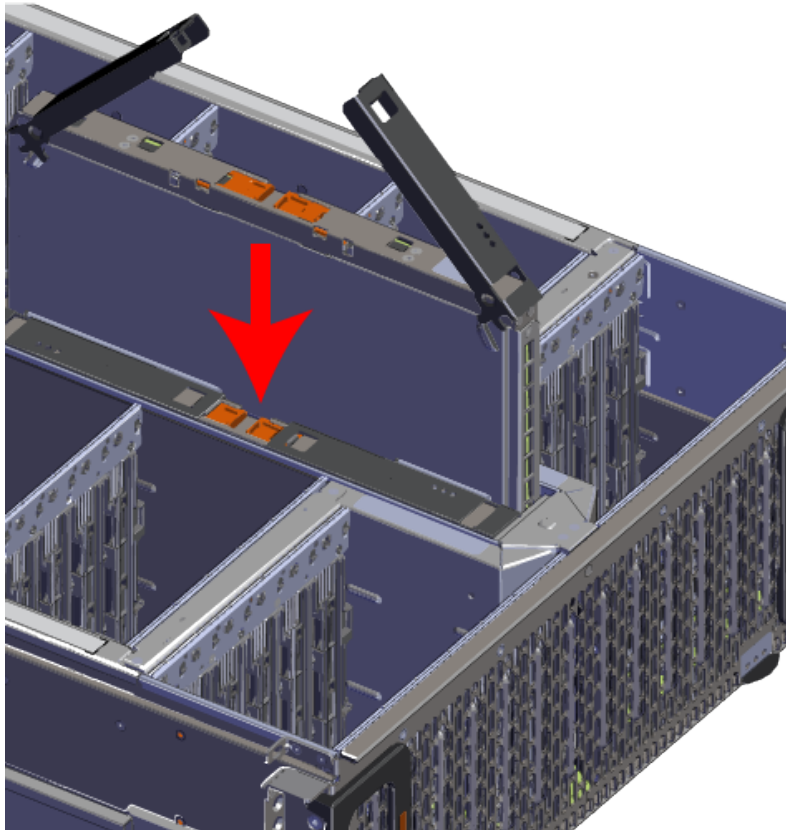


- c) Align the IOM with the empty slot on the top of the chassis so that the arrow on the IOM latch release is facing toward the side shown in the following image.



- d) Slowly lower the IOM into the empty slot while being careful to keep it level. Do not to force it.

**Figure 39: Installing the IOM**



- e) When the IOM is lowered fully, apply light pressure with both hands evenly on the IOM body, not the handles, to seat the IOM in the connector. If the IOM won't seat correctly, **DO NOT FORCE IT**. Instead, back the IOM out, check the pins to make sure none are damaged, and try again.
  - f) Once the IOM is seated properly in the slot, close the handles until they latch closed.
6. Push the chassis back into the rack. Verify that the fan have slowed to their regular RPM. This ensures that the enclosure is back to its proper cooling settings.

### 4.3 PSU Replacement

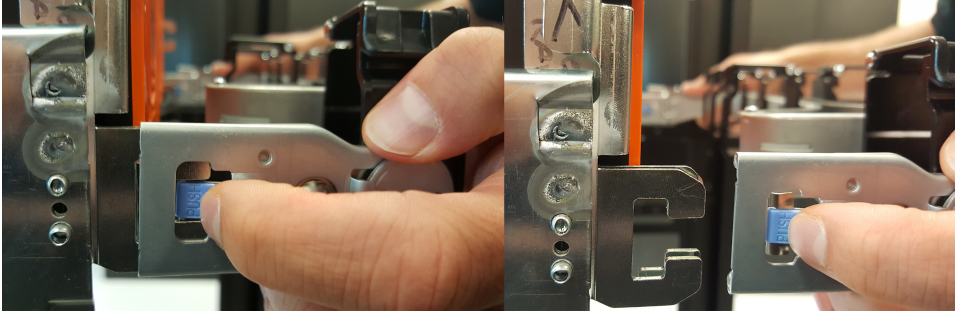
**Table 33: Replacement Procedure Info**

Required Tools	# of People Required	Time Required	Replacement Window
None	1	60s	5 Minutes

- 1. Place the CMA into service position.

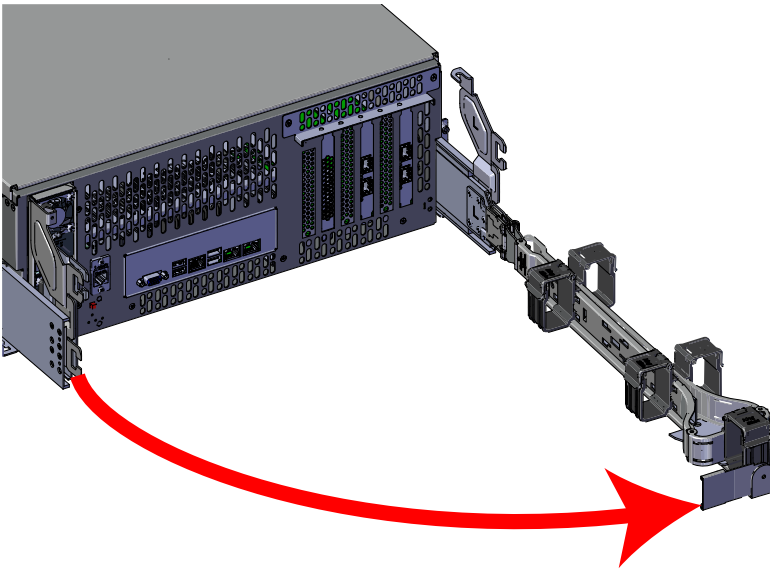
- a) Unlatch the CMA at the elbow connector by pressing the blue release button to unlatch the connector from the rail.

**Figure 40: Unlatching a CMA Connector**



- b) Swing the CMA away from the enclosure.
- c) The arm should be extended away from the enclosure as shown in the following example.

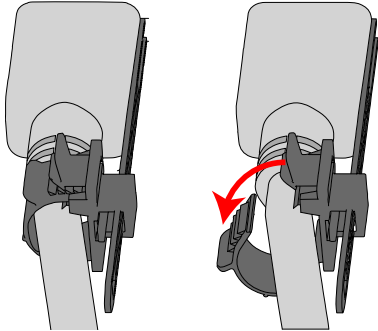
**Figure 41: CMAs in service position (Cables not shown)**



2. Locate the faulty PSU by finding the amber LED lit at the rear of the enclosure.

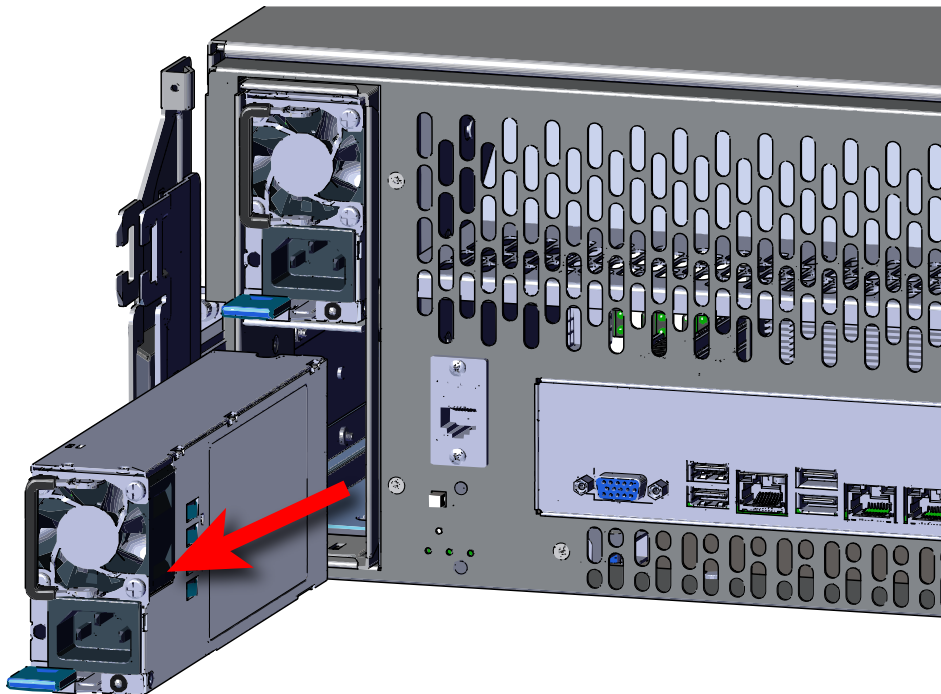
3. Detach the retention clip from the PSU cable.

**Figure 42: Cable Retention Mechanism**



4. Remove the power cable from the faulty PSU.
5. Uninstall the PSU.
  - a) Grasp the release lever and the metal handle in a downward pinching motion to release the latching mechanism.

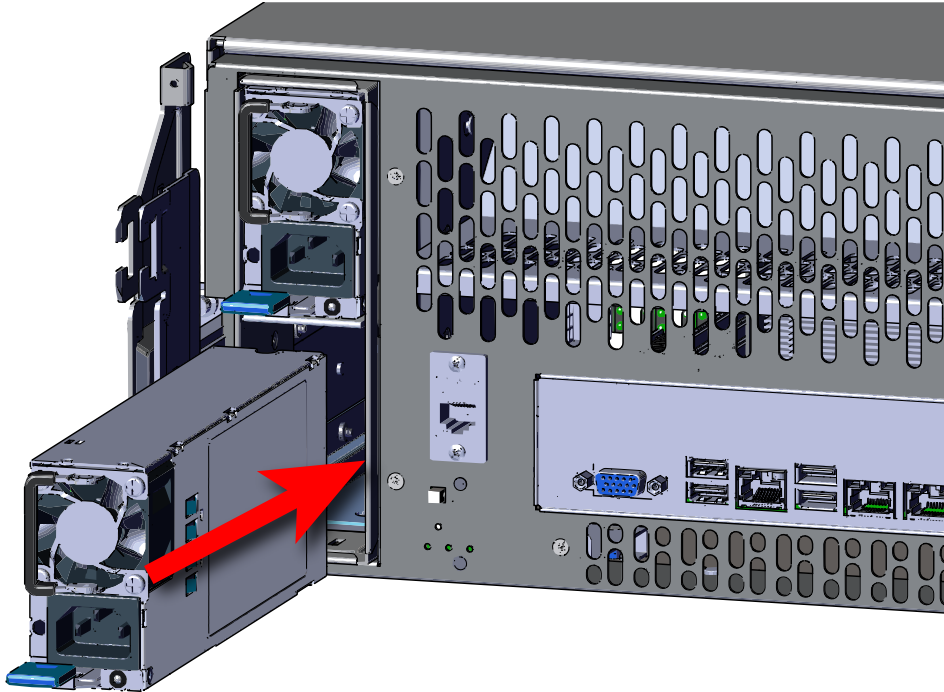
**Figure 43: Uninstalling PSU**



- b) Pull the PSU straight out with even pressure.
6. Remove the new PSU from its packaging.
  7. Install the PSU.
    - a) Align the PSU in the orientation shown in the following image.

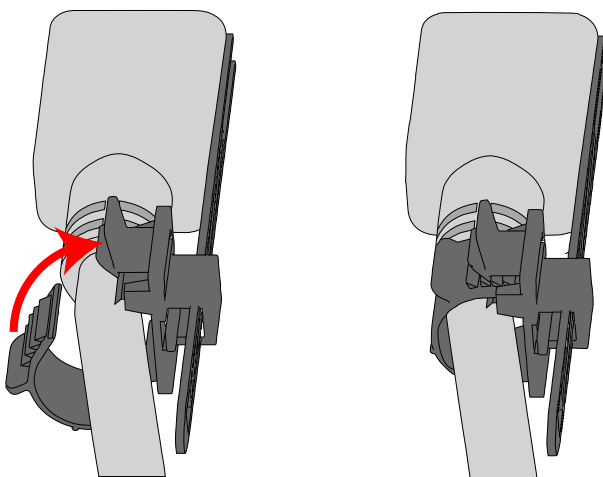
- b) Slide the PSU into the slot until it seats fully into the chassis.

**Figure 44: Installing the PSU**



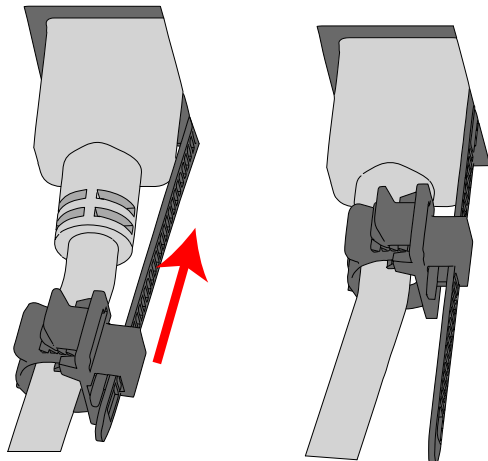
- c) Plug the power cable into the receptacle at the back of the PSU.  
d) Loop the retention clip on the PSU cables around the cable and pinch it until the clip catches and locks in place.

**Figure 45: Cable Retention Mechanism**



- e) Slide the retention clip forward until it stops near the cable connector. Doing this will ensure that the retention clip functions properly in the event the cable is pulled on for some reason.

**Figure 46: Cinching Cable Retention Clip**



- 8. Make sure the CMA is in operational position by folding the arm in toward the enclosure and attaching the elbow end of the CMA to the connector that is attached to the rail. Verify that all of the cabling is in functional order and does not bind or catch.

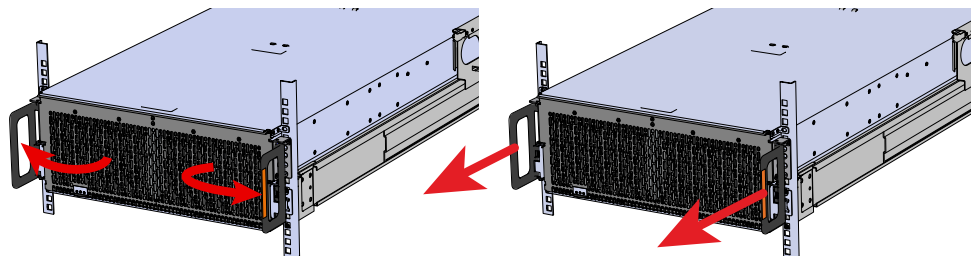
## 4.4 System Fan Replacement

**Table 34: Replacement Procedure Info**

Required Tools	# of People Required	Time Required	Replacement Window
None	1	60s	5 Minutes

- 1. Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

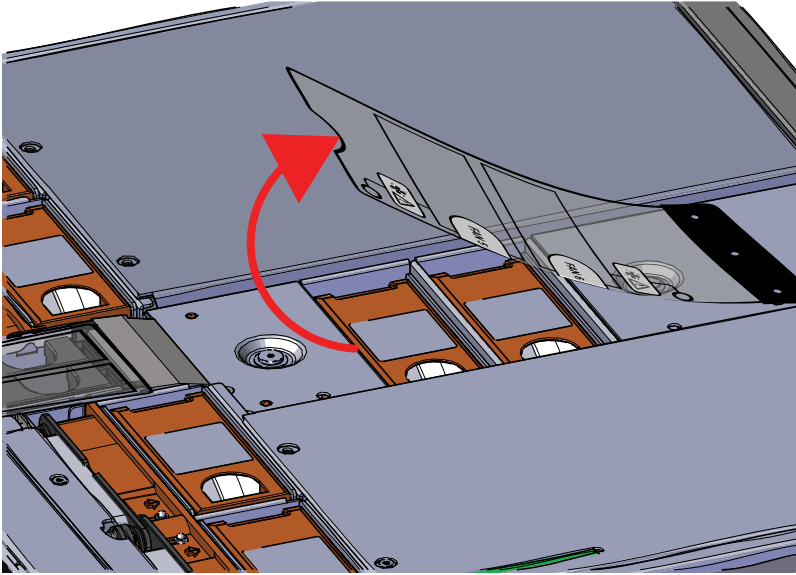
**Figure 47: Chassis Handle Operation**



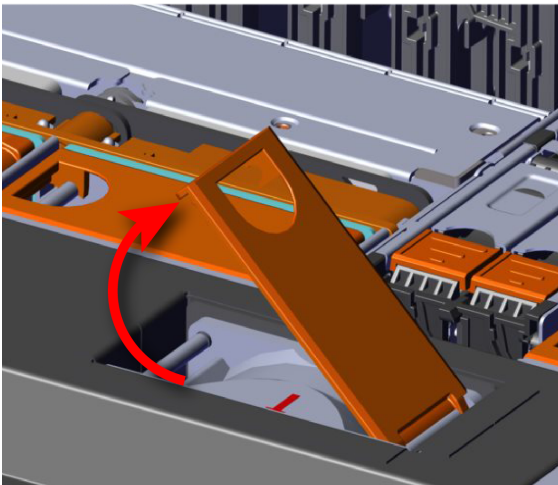
- 2. Locate the faulty System Fan by the flashing amber LED near the rear of the drive bay and the center channel that will be lit on top if there is a fault or by activating the identify LED on the System Fan being replaced.
- 3. Remove the new System Fan from its packaging.

4. Uninstall the internal System Fan.
  - a) Lift the System Fan flap and insert a finger into the service hole on the top of the System Fan and pull up to release the latch.

**Figure 48: Lift the System Fan Flap**

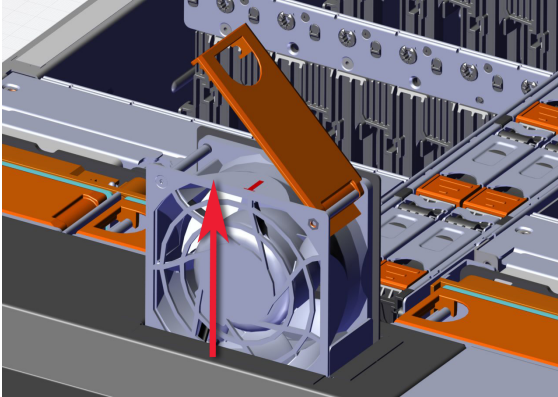


**Figure 49: Unlatching System Fan**



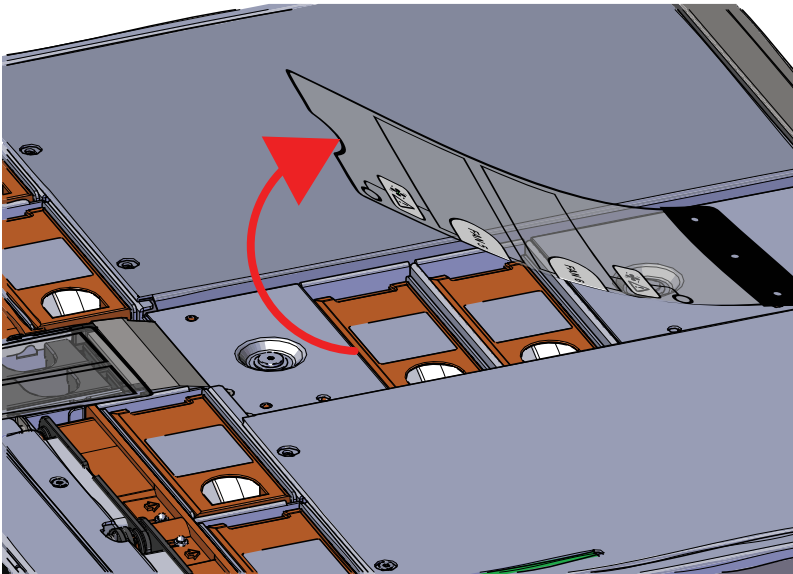
- b) Use the handle to pull evenly on the component to remove it from the enclosure.

**Figure 50: Removing System Fans**



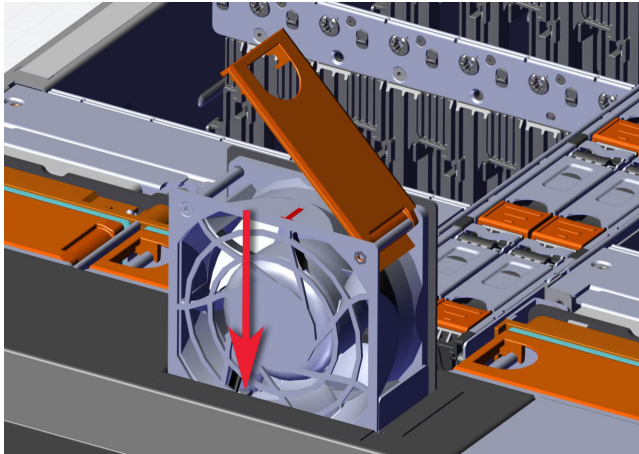
5. Remove the new System Fan from its packaging.
6. Install the System Fan.
  - a) Lift the System Fan flap and look inside the empty slot that will receive the System Fan and orient the System Fan so that the connector on the bottom of the fan is on the proper side.

**Figure 51: Lift the System Fan Flap**



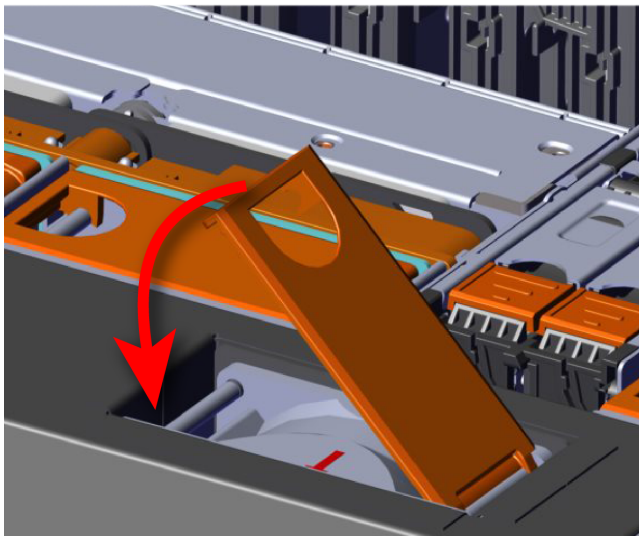
- b) Lower the fan down into the empty slot. Do not force it.

**Figure 52: Installing a System Fan**



- c) When the fan is fully inserted and the connectors are mated properly, close the housing cover clip as shown in the following image.

**Figure 53: Latching the Fan Housing Closed**



- 7. Push the chassis back into the rack. Verify that the fan have slowed to their regular RPM. This ensures that the enclosure is back to its proper cooling settings.

## 4.5 Drive Assembly Replacement

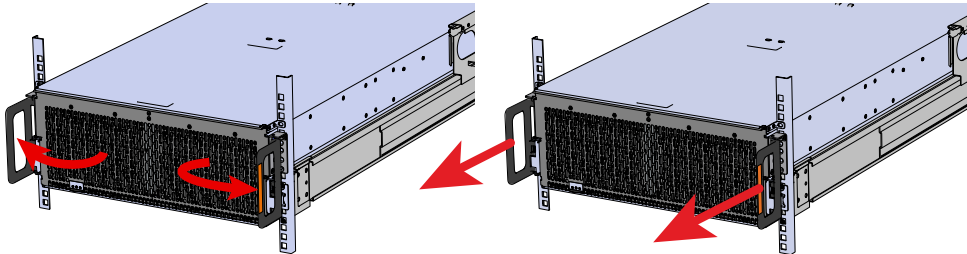
**Table 35: Replacement Procedure Info**

Required Tools	# of People Required	Time Required	Replacement Window
None	1	60s	5 Minutes



1. Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

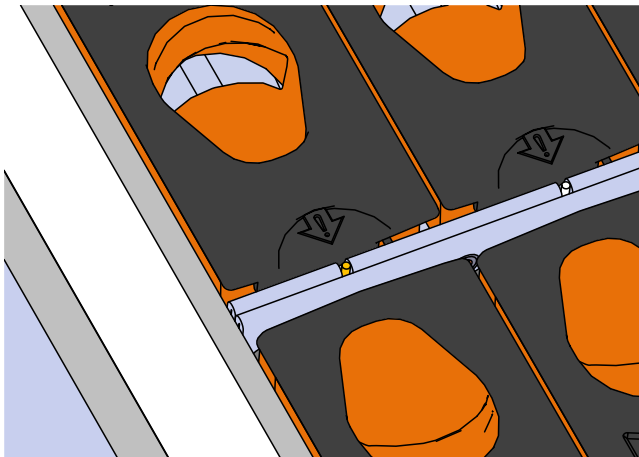
**Figure 54: Chassis Handle Operation**



Only extend the enclosure out of the rack as far as is needed to reach the drive being replaced.

2. Locate the faulty Drive Assembly by finding the illuminated amber LED or by activating the identification LED for the drive to be replaced.

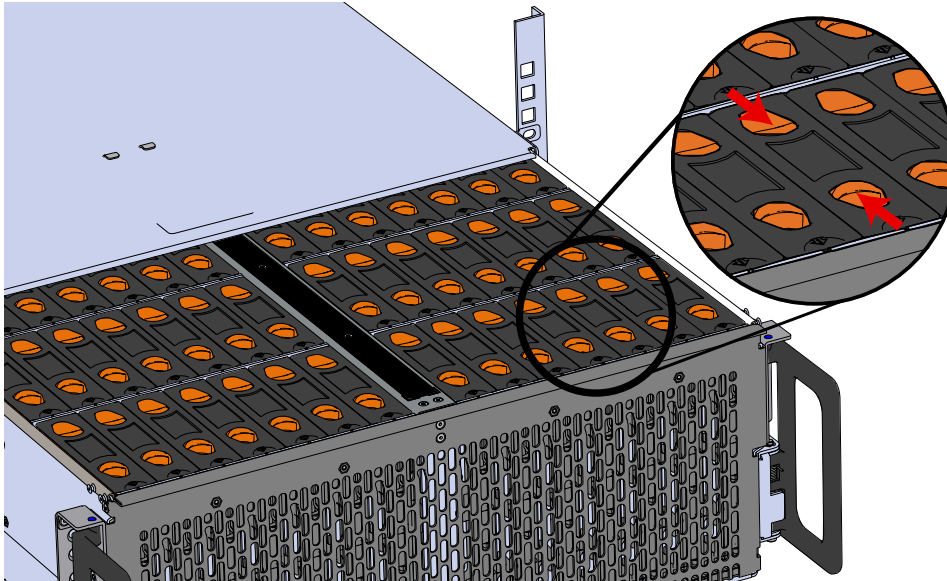
**Figure 55: HDD Assembly LED**



3. Follow these steps to remove a Drive Assembly.
  - a) Find the latch release mechanism on the Drive Assembly being removed.

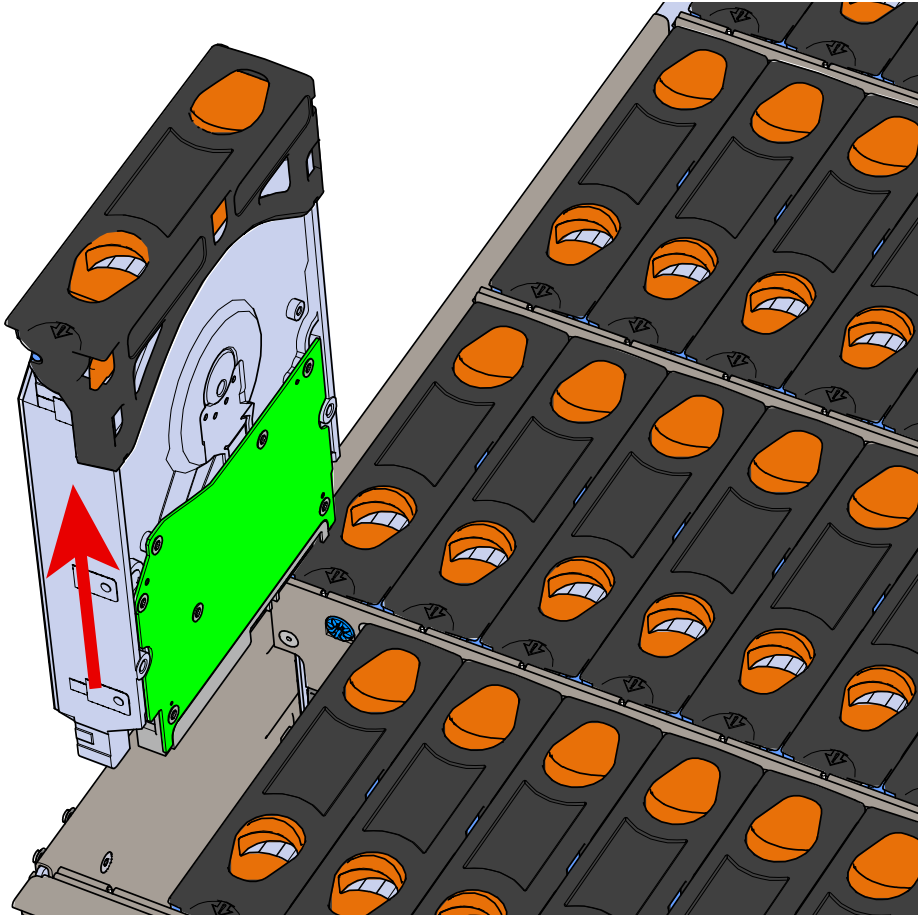
- b) Insert a finger and a thumb into the latch release and pinch to unlatch the Drive Assembly.

**Figure 56: Unlatch Drive Carrier (IOM Not Shown)**



- c) Lift the Drive Assembly free from the enclosure.

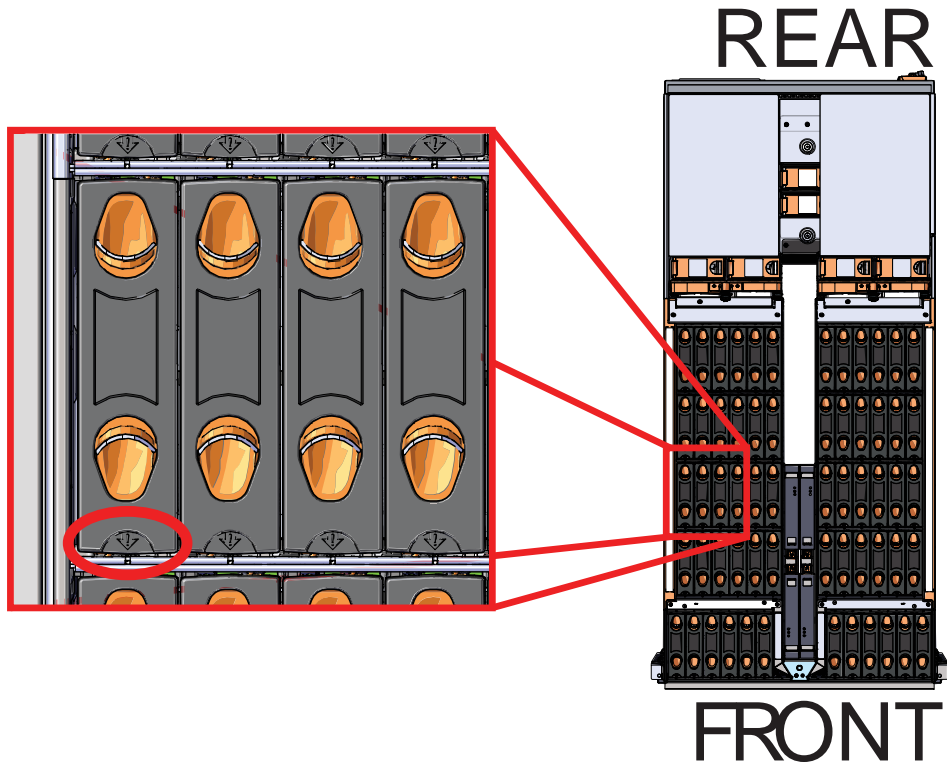
**Figure 57: Removing Drive Assembly**



4. Remove the new Drive Assembly from its packaging.
5. Install the Drive Assembly.
  - a) Ensure that the enclosure has been pulled out of the rack until the rail latches engage.

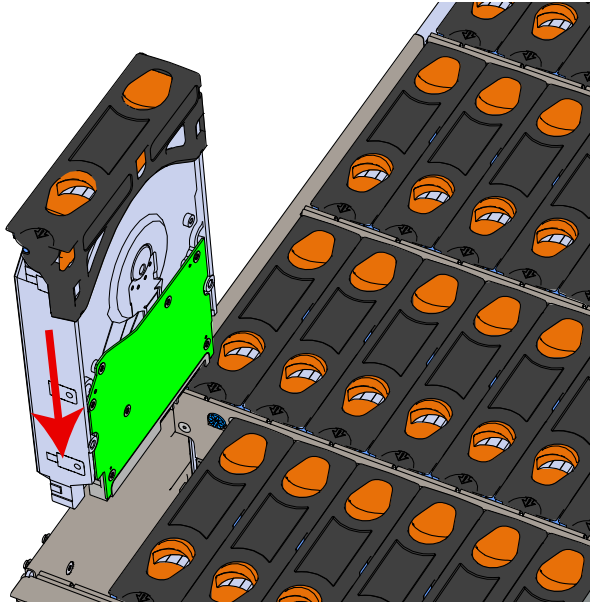
- b) Find the LED pointer on the top of the drive carrier. This pointer should point toward the front of the unit as shown in the following image.

**Figure 58: LED Pointer Orientation**



- c) Align the drive with the empty slot that will receive it. Lower it into the slot, making sure it stays level and does not snag.

**Figure 59: Installing a Drive Assembly**



- d) Pinch the latch release and carefully press downward to seat the Drive Assembly the rest of the way.
6. Push the enclosure back into the rack to ensure proper cooling.

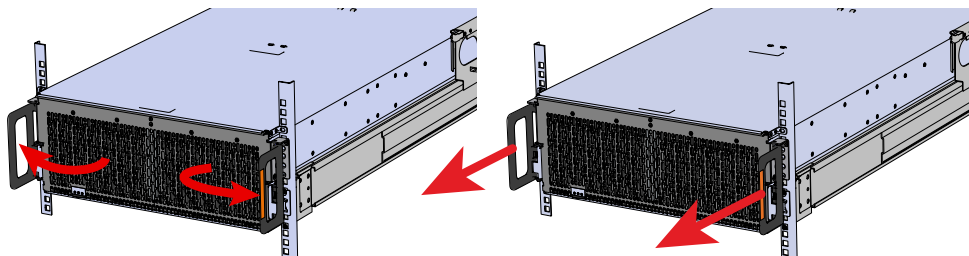
## 4.6 System SSD Replacement

**Table 36: Replacement Procedure Info**

Required Tools	# of People Required	Time Required	Replacement Window
None	1	60s	5 Minutes

1. Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

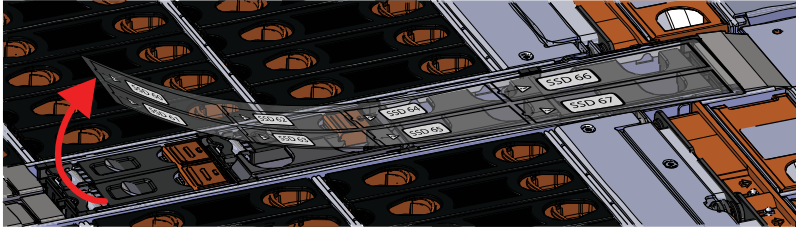
**Figure 60: Chassis Handle Operation**



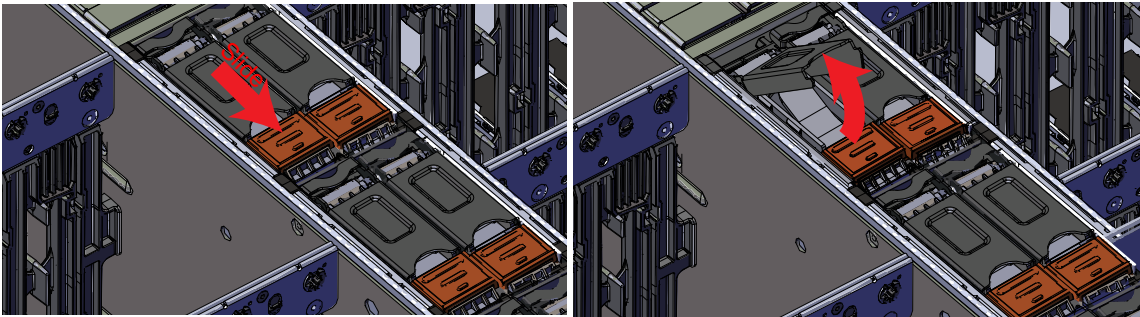
2. Identify the faulty System SSD by looking for the illuminated fault LED.

3. Uninstall the System SSD.
  - a) Lift the center channel flap and press the latch release as shown in the following image.

**Figure 61: Lift the Center Channel Flap**

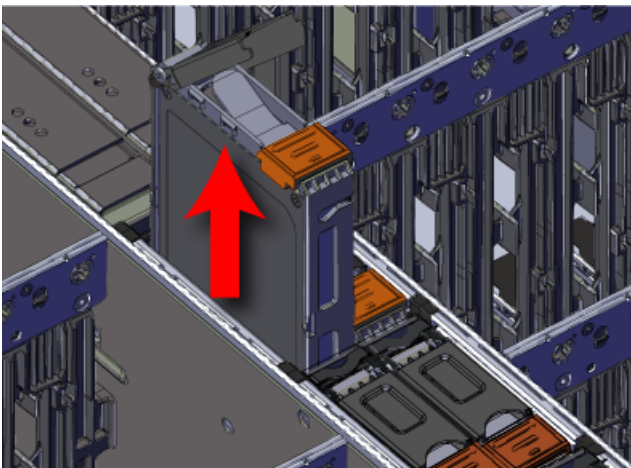


**Figure 62: Latch Release**



- b) Grasp the handle that pops up and pull evenly to remove the component.

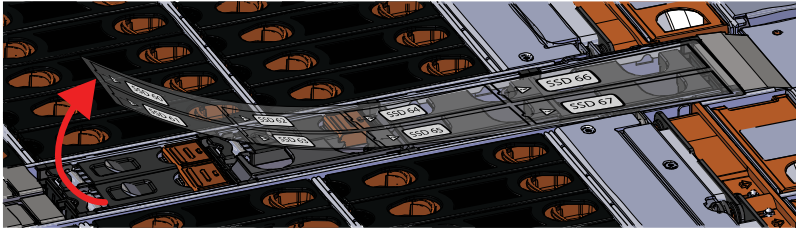
**Figure 63: System SSD Removal**



4. Remove the new System SSD from its packaging.
5. Install the System SSD.

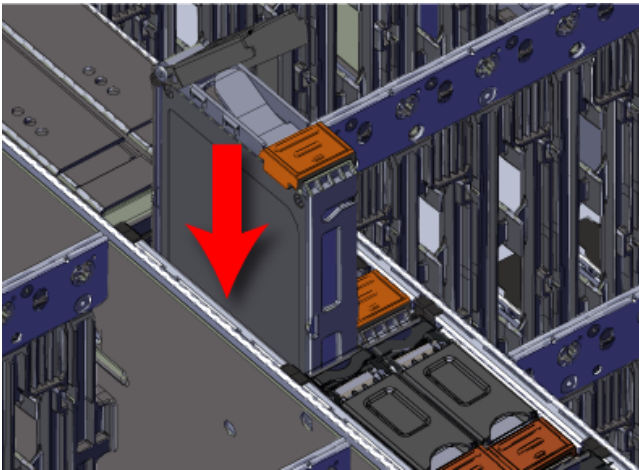
- a) Lift the center channel flap and orient the assembly so that the latch release button is facing toward the rear of the system.

**Figure 64: Lift the Center Channel Flap**



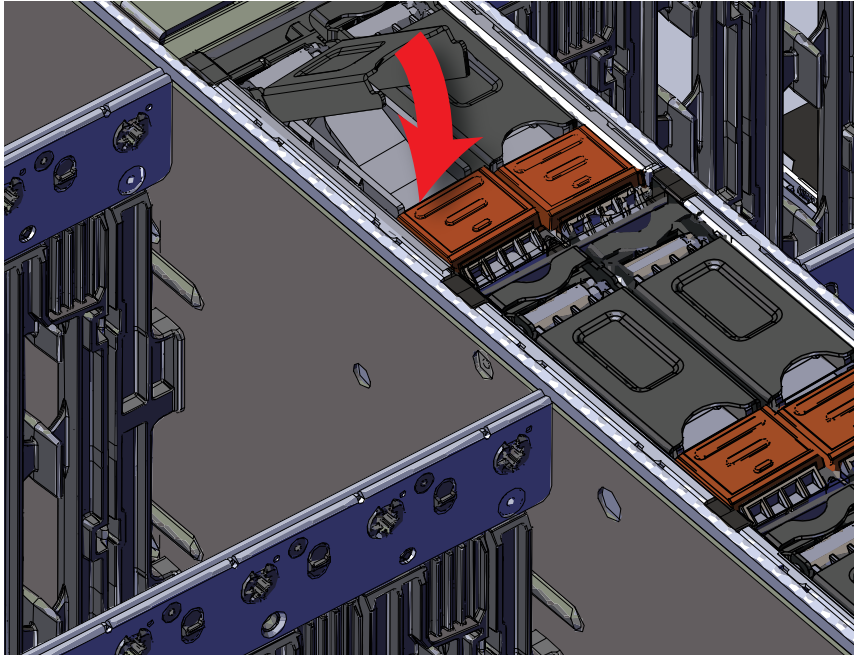
- b) Align the System SSD with the empty drive slot and lower it slowly into the slot. Do not force it.

**Figure 65: System SSD Install**



- a) Once the SSD will not lower any further, press the handle down until it clicks into place.

**Figure 66: System SSD Carrier Latching Closed**



6. Push the chassis back into the rack. Verify that the fan have slowed to their regular RPM. This ensures that the enclosure is back to its proper cooling settings.

## 4.7 DIMM Replacement

**Note:** The DIMMs are not hot swappable. The enclosure must be powered-down, disconnected from all cabling, and removed from the rack before replacing the DIMMs.

**Table 37: Procedure Info**

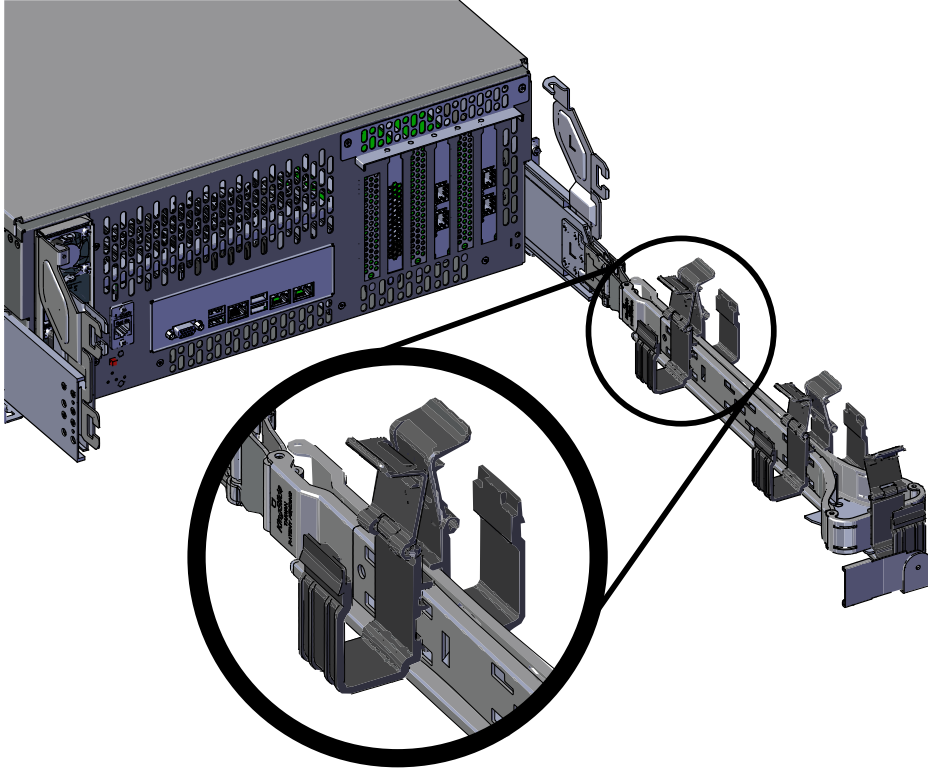
Required Tools	Required Parts	# of People Required	Time Required
<ul style="list-style-type: none"> <li>• T7 Torx Screwdriver</li> </ul>	<ul style="list-style-type: none"> <li>• T7 Torx screws</li> </ul>	3	45m

1. Uncable the CMA.



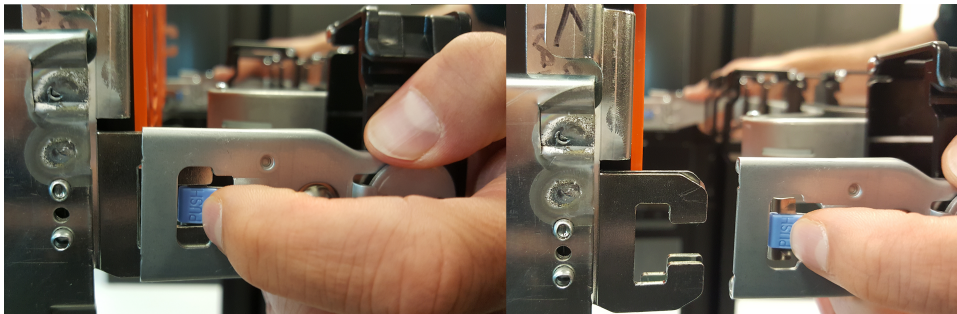
- a) Open all of the baskets on the CMA.

**Figure 67: Open Baskets**



- b) Remove one cable from the CMA at a time making sure not to put too much strain on the arm.
2. Unlatch all of the connectors that attach the CMA to the enclosure and the rail by locating the latch release button and pressing it from either side of the latch. There are three total connections that need to be removed, one at the elbow and two at the opposite end.

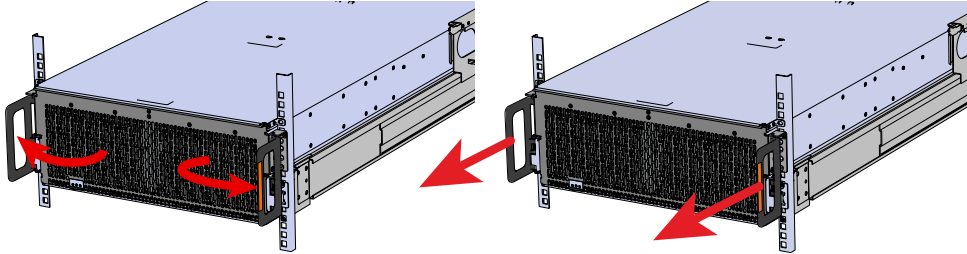
**Figure 68: Unlatching a CMA Connector**



3. Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from

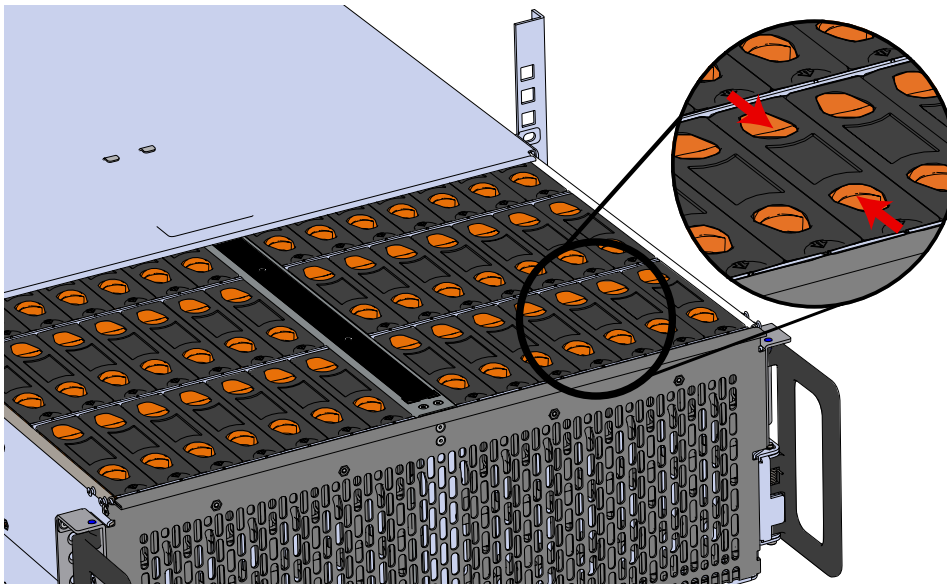
coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

**Figure 69: Chassis Handle Operation**



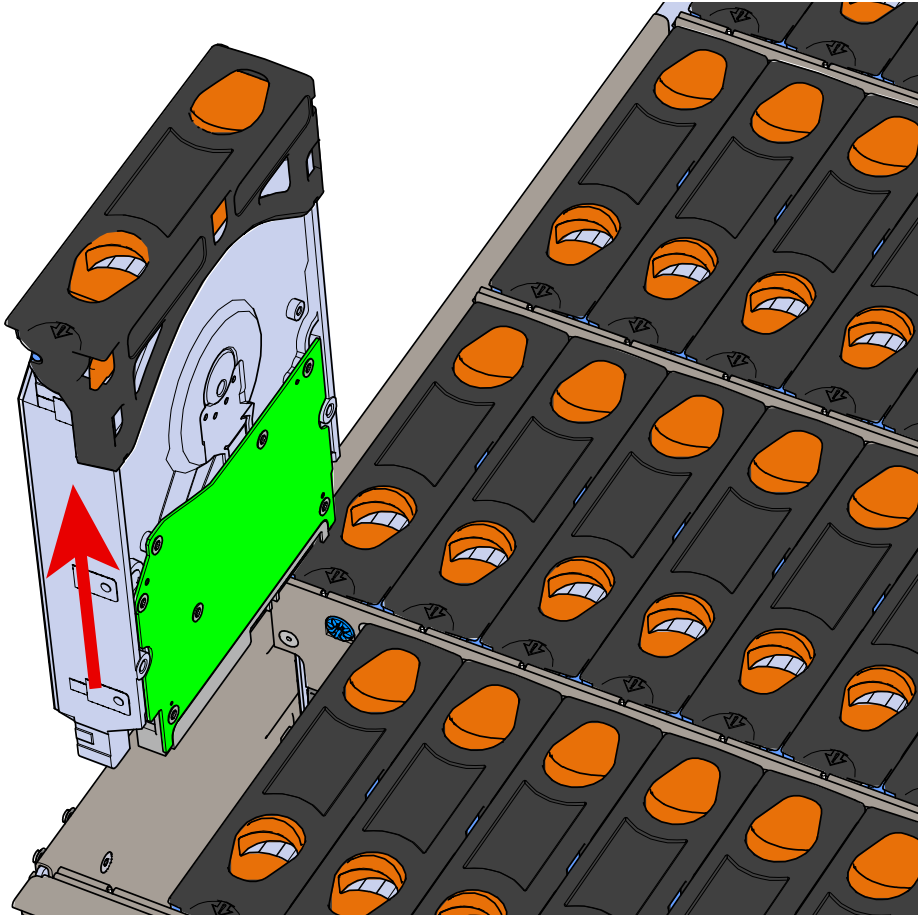
4. Remove all of the drives from the chassis before uninstalling the chassis. Be prepared to label the drives as they are removed so they can be reinstalled in the same location in the new chassis.
5. Follow these steps to remove a Drive Assembly.
  - a) Find the latch release mechanism on the Drive Assembly being removed.
  - b) Insert a finger and a thumb into the latch release and pinch to unlatch the Drive Assembly.

**Figure 70: Unlatch Drive Carrier (IOM Not Shown)**



- c) Lift the Drive Assembly free from the enclosure.

**Figure 71: Removing Drive Assembly**



6. Follow the previous step for each drive in the enclosure. Attach a label or mark the drives with the drive slot they were removed from in order to add them to the same slot in the future. Store the drives in an ESD safe location until the drives are ready to be installed back into an enclosure.

7. Release the safety latch on the inner rails on each side of the chassis as shown in the following image.

**Figure 72: Inner Rail Safety Latch Release**




8. Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. Make sure that the top cover comes with the chassis as it is extended out of the rack. The safety latches will prevent the enclosure from coming out of the rack completely.
9. Remove the chassis from the rack.
  - a) Be prepared to support the enclosure once it is free of the rails by having a second person or a lift to support the enclosure
  - b) Grasp both handles at the front of the enclosure and pull with even pressure until the enclosure will not extend further.
  - c) Locate the safety catches on the inner rails attached to the enclosure.

**Figure 73: Safety Latch Release**



- d) Depress the latch release lever for the safety latches on the rail and push the chassis very slightly forward. The chassis is now unsecured from the rack.
  - e) Ensure that you have the proper support mechanism to hold the chassis in position, whether that be a team lifting partner or an appropriate lift.
- 

**Warning:**  Do not lift the chassis by the Cable Tray while removing the chassis from the rack OR while installing it into a rack. This can cause serious damage to the unit or serious bodily harm to those handling the unit. Always team lift the chassis by gripping the underside of the unit, and never try to lift a chassis that is filled with drives.

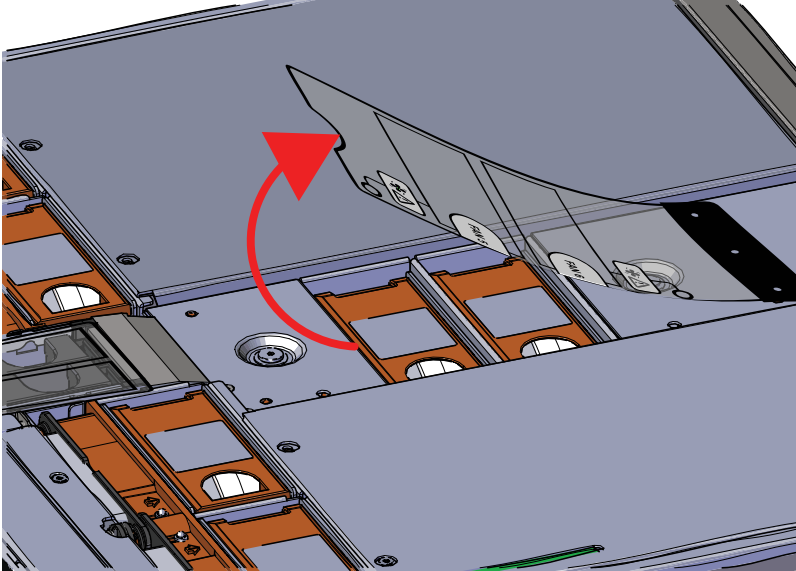
---

- f) Slide the chassis forward to free it from the rails. Place the chassis in a safe location to avoid damage.
- 10.** **Attention:** Place the enclosure on a flat ESD safe surface and ensure it is stable before continuing with the procedure.
- 

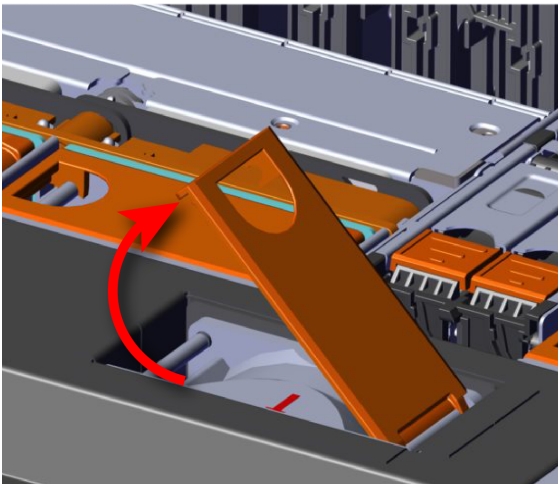
- 11.** Uninstall the internal System Fan.

- a) Lift the System Fan flap and insert a finger into the service hole on the top of the System Fan and pull up to release the latch.

**Figure 74: Lift the System Fan Flap**

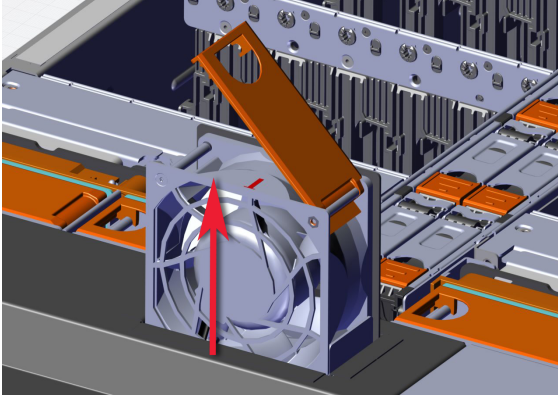


**Figure 75: Unlatching System Fan**



- b) Use the handle to pull evenly on the component to remove it from the enclosure.

**Figure 76: Removing System Fans**



12. Uninstall the rest of the system fans in the same manner as the first.
13. Uninstall server cover panel on the side of the enclosure that contains the failed DIMM.

---

**Note:** Uninstall the server cover panel on the side that requires the DIMM replacement. The same steps to uninstall the server cover panel apply to both sides of the enclosure with the exception of the number of screws that secure the server cover panel. From the rear of the enclosure, the left panel contains two screws. The panel on the right side of the enclosure contains one screw.

---

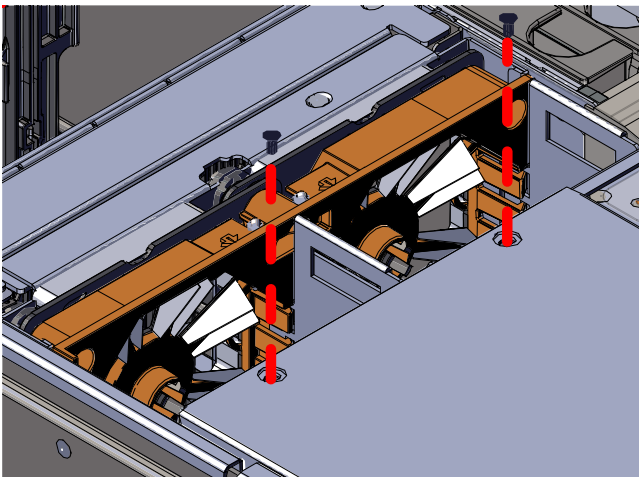
- a) Remove the screws that secure the server cover panels to the chassis using a T7 Torx screwdriver.

---

**Note:** When at the rear of the enclosure, the left server cover panel contains two T7 Torx screws. The left server cover panel contains only one T7 Torx screw.

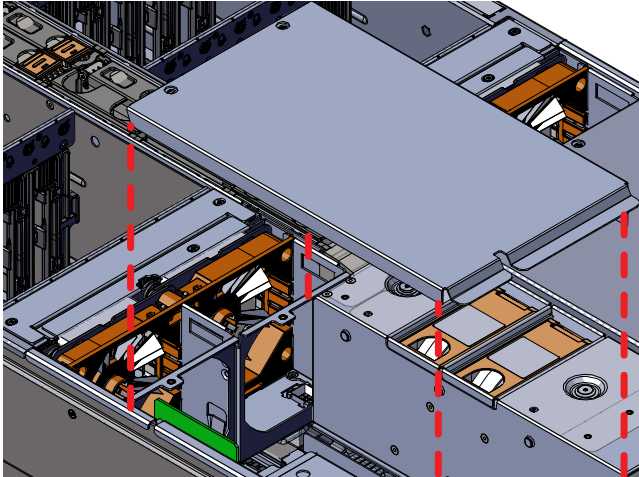
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**Figure 77: Removing the Server Cover Panel Screws**



b) Remove the server cover panel by carefully pulling on the edge where the screws were removed.

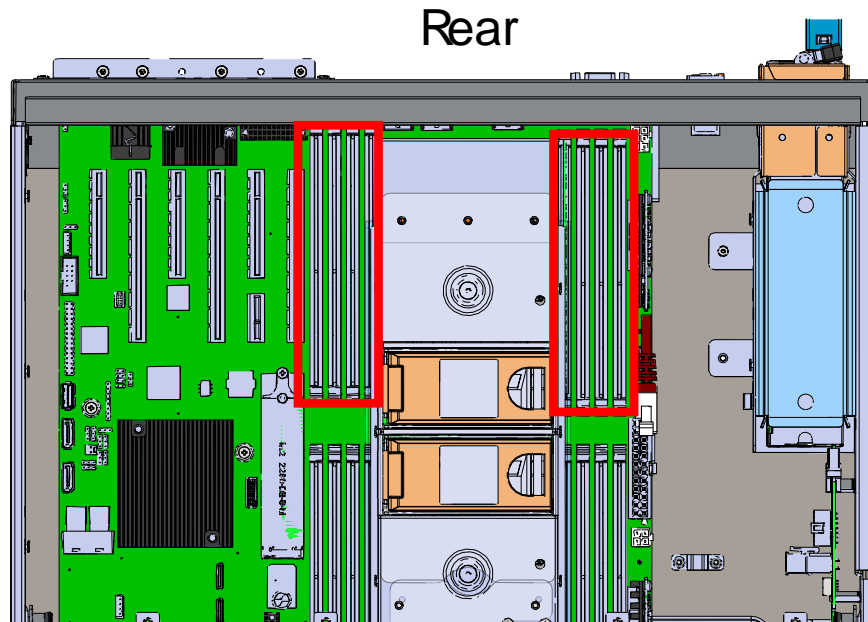
**Figure 78: Removing the Server Cover Panel**



14. Uninstall the fan bay.

**Note:** The Fan Bays must be uninstalled to gain access to the DIMMs located closest to the front of the enclosure. The DIMMs located closest to the rear of the enclosure may be replaced without removing the Fan Bays as indicated by the red boxes in the following image.

**Figure 79: Rear DIMMs Location**





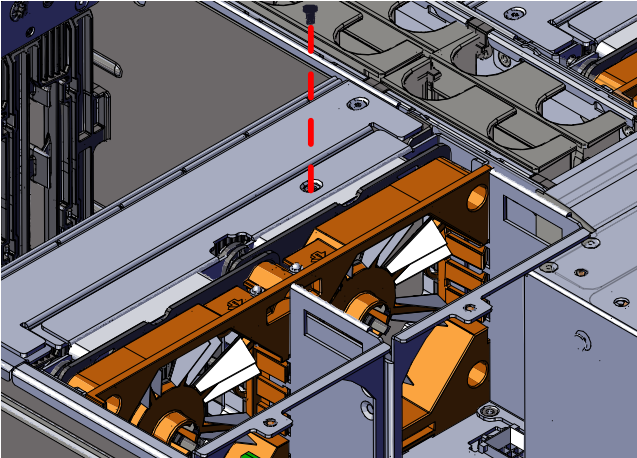
---

**Note:** Uninstall the fan bay on the side that requires the DIMM replacement.

---

- a) Remove the screw that secures the fan bay to the chassis.

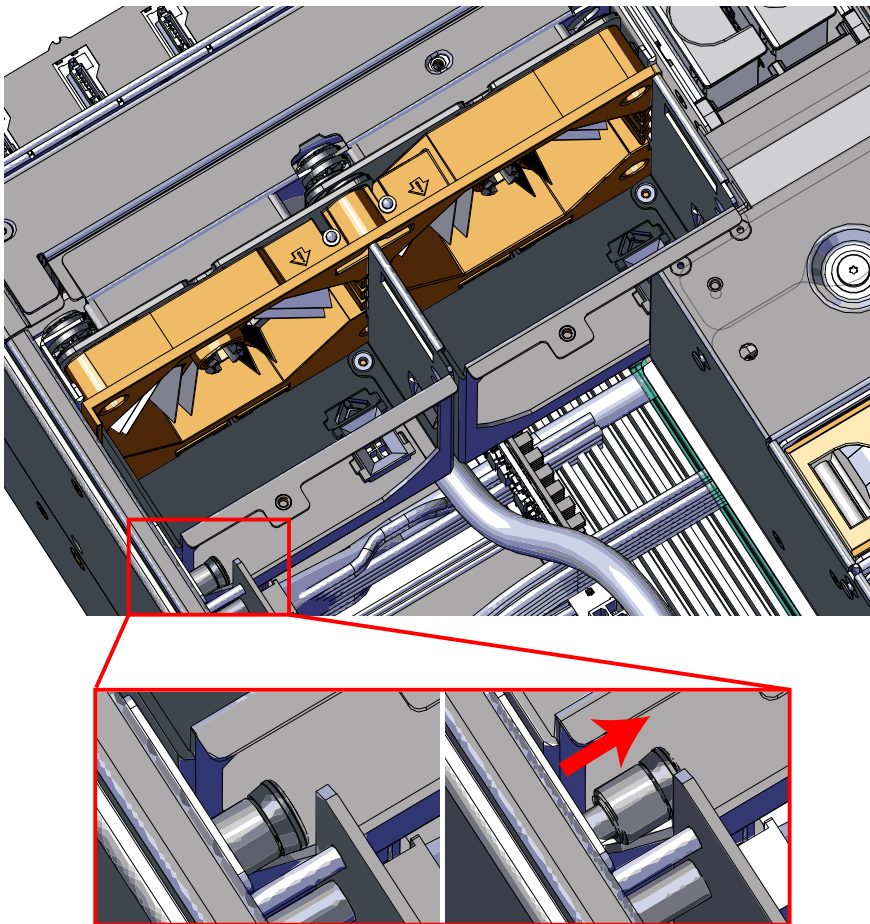
**Figure 80: Removing the Fan Bay Screw**



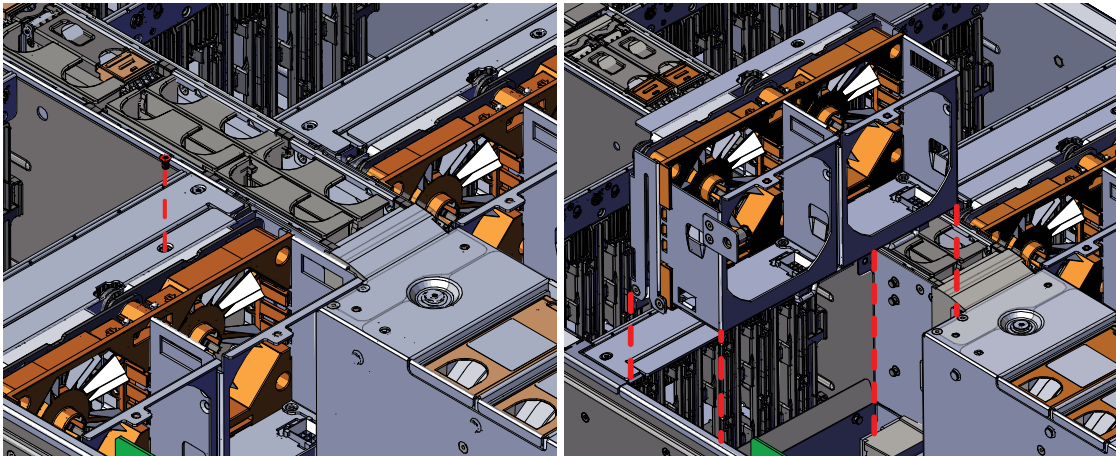
- b) Locate the pin that secures the outside of the fan bay to the chassis and pull the pin out and pull up on the fan bay until the cage is clear of the chassis.

**Note:** The fan bay is connected to the baseboard with a cable and does not need to be disconnected. When removing the fan bay to replace DIMMs, lay the assembly on the drive cage.

**Figure 81: Fan Bay Pin**

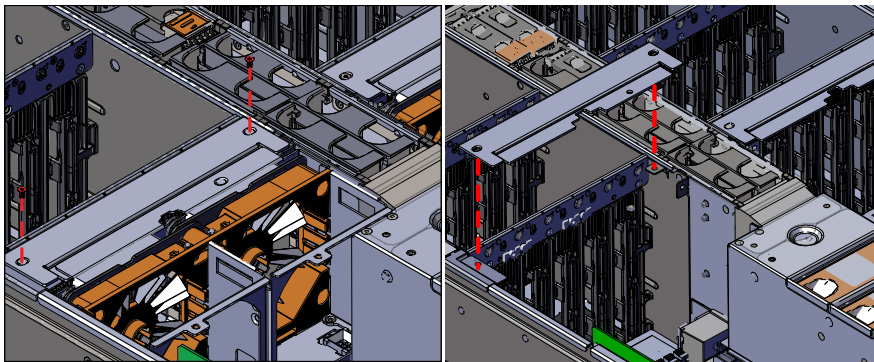


**Figure 82: Removing the Fan Bay**



- c) Remove the screws that secure the plenum in place and lift the plenum off of the chassis.

**Figure 83: Removing the Plenum**



15. Uninstall the DIMMs.  
a) Locate the DIMM in need of replacement.

**Note:** If the DIMM being removed is in the slot closest to the System Fan Bay, take special care while removing the DIMM. The DIMM in this slot can be removed and installed without

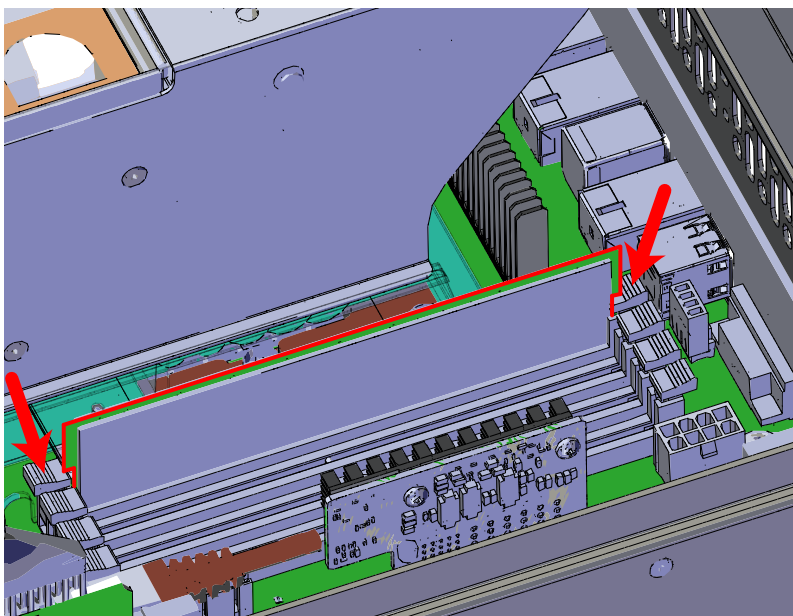
removing the System Fan Bay, but the area is very constrained due to the lip on the System Fan Bay that rests directly above the DIMMs as seen in the following image.

**Figure 84: DIMMs near the System Fan Bay**



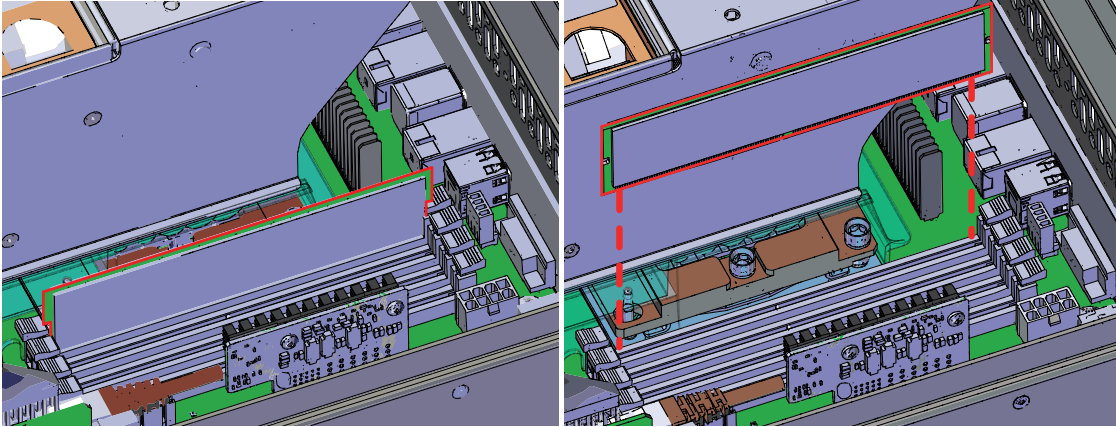
- b) Carefully push apart on the DIMM ejector tabs located on either side of the DIMM slots.

**Figure 85: DIMM Ejector Tabs**



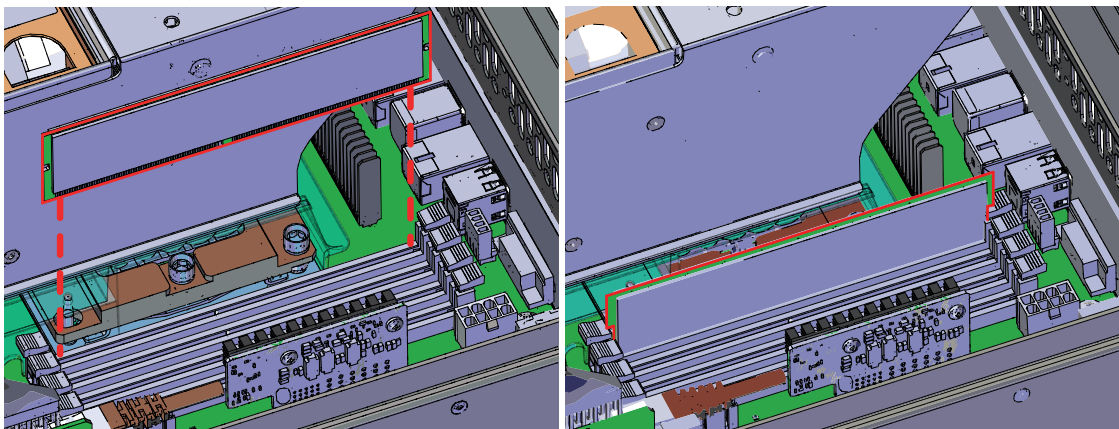
- c) Slide the DIMM out of the of DIMM slot and set it aside.

**Figure 86: DIMM Removal**



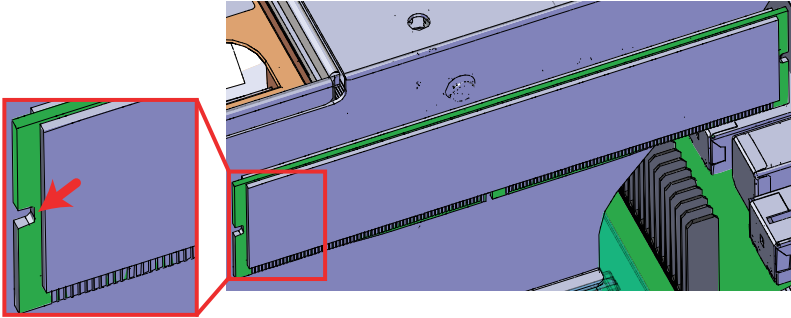
16. Install the DIMMs.
- a) Remove the new DIMM from the packaging and hold it by the corners to avoid damaging the DIMM.
  - b) Align the DIMM with the empty slot ensuring that it is facing in the correct direction.

**Figure 87: Installing the DIMM into the DIMM Slot**



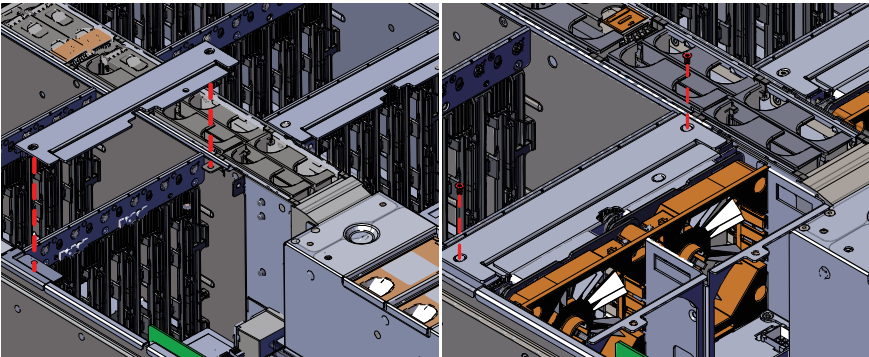
- c) Firmly press the DIMM into the slot until the ejector tabs snap into place over the notches on either side of the DIMM.

**Figure 88: DIMM Notches**



17. Install the fan bay.
  - a) Place the plenum in place behind the empty fan bay slot and install the screws that secure the plenum in place.

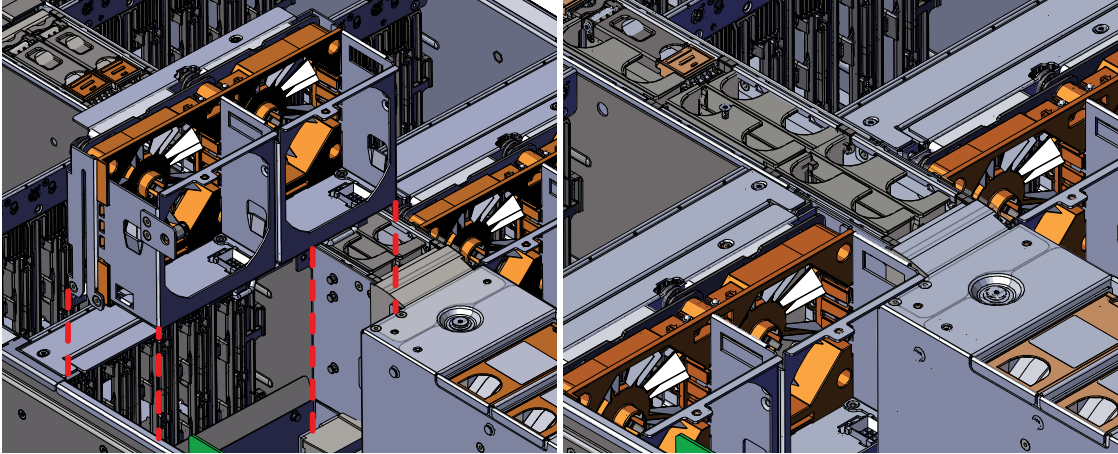
**Figure 89: Installing the Plenum**



- b) Align the fan bay within the location that in which it was uninstalled.

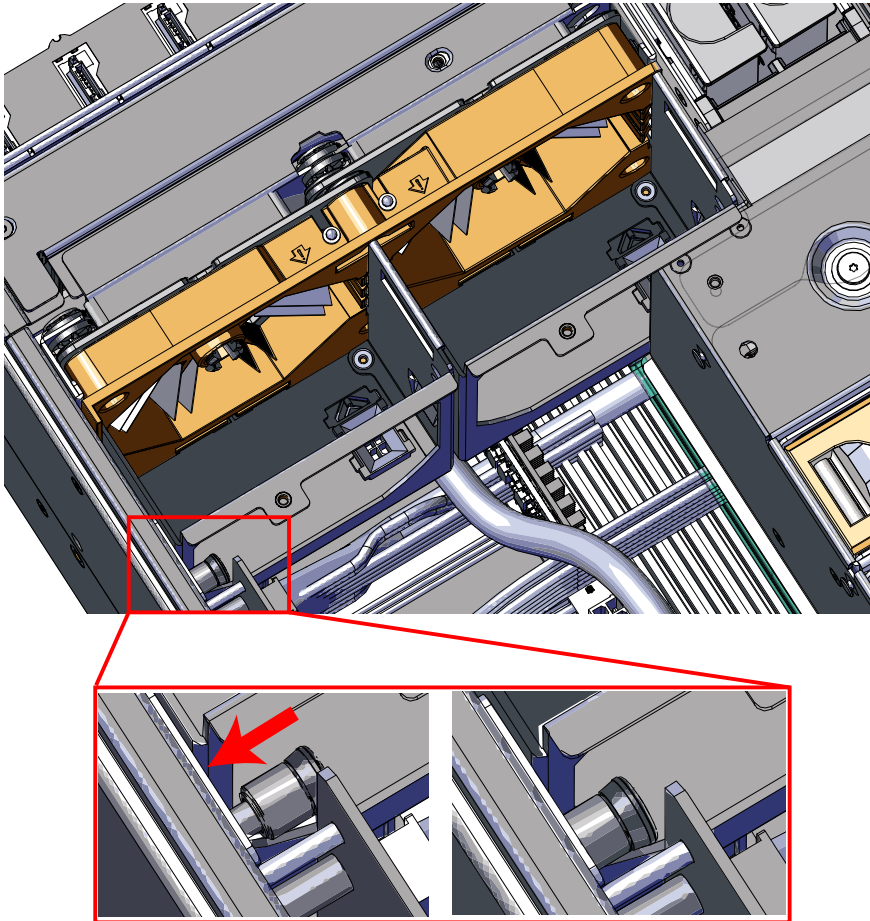
- c) Slide the fan bay into the chassis taking care not to pinch or damage any cables.

**Figure 90: Installing the Fan Bay**



- d) Ensure that the pin located on the inside of the fan bay is latched onto the chassis during the process of seating the fan bay. If the pin did not engage, use a Flathead screwdriver to disengage the pin by pulling it out and repositioning the fan bay until the pin engages with the chassis.

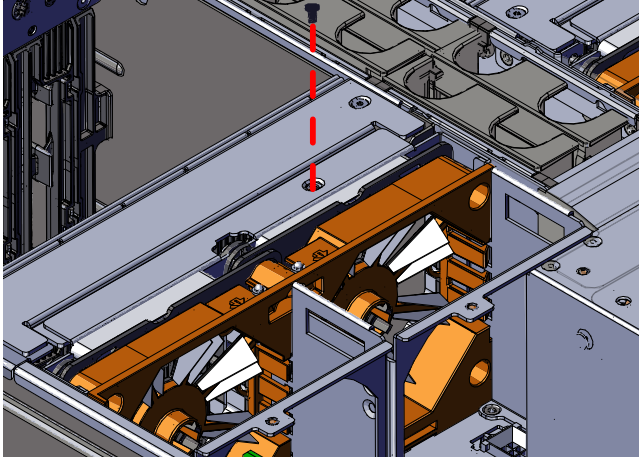
**Figure 91: Fan Bay Pin Engaged**





- e) Install the screw that secures the fan bay to the chassis.

**Figure 92: Fan Bay Screw**



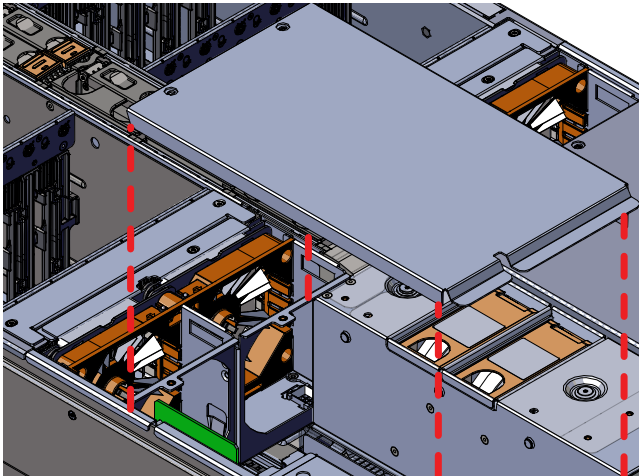
18. Install server cover panels.  
a) Align and press the server panel cover into place over the server bay.

---

**Note:** The Formex material that the panel is made from is flexible and will allow for the panel to be flexed to fit back into its original placement.

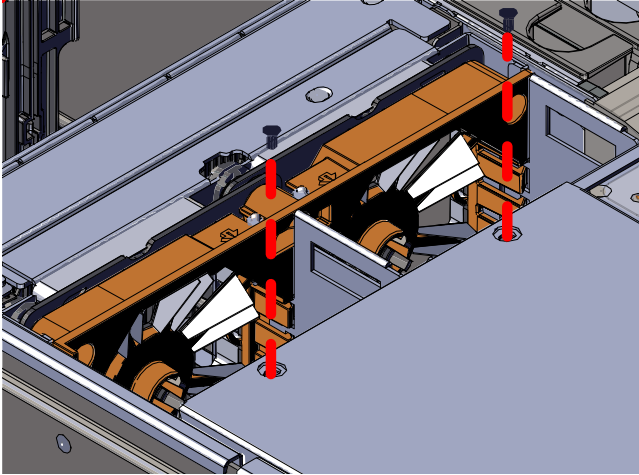
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**Figure 93: Installing the Server Cover Panel**



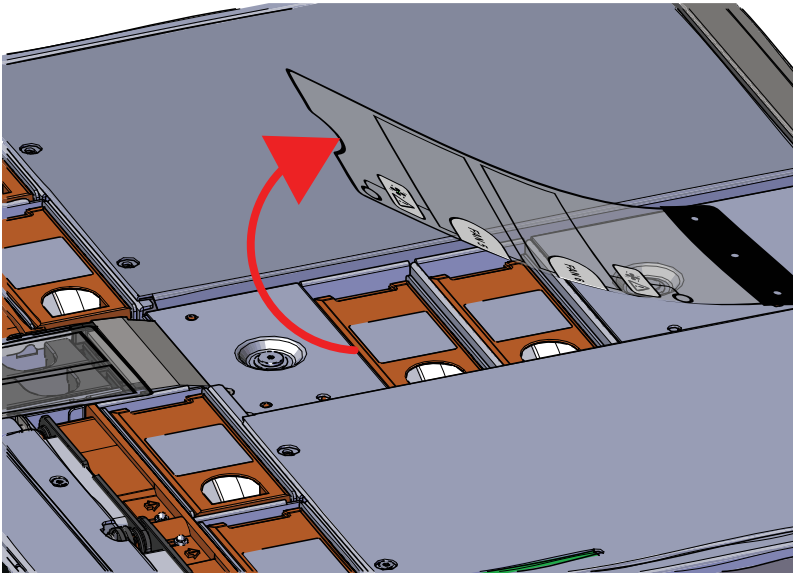
- b) Secure the server cover panel using the original screws and a T7 Torx screwdriver.

**Figure 94: Server Cover Panel Screws**



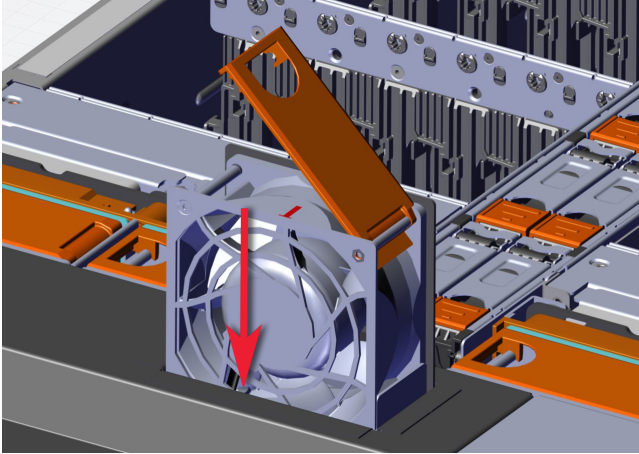
19. Install the System Fan.
  - a) Lift the System Fan flap and look inside the empty slot that will receive the System Fan and orient the System Fan so that the connector on the bottom of the fan is on the proper side.

**Figure 95: Lift the System Fan Flap**



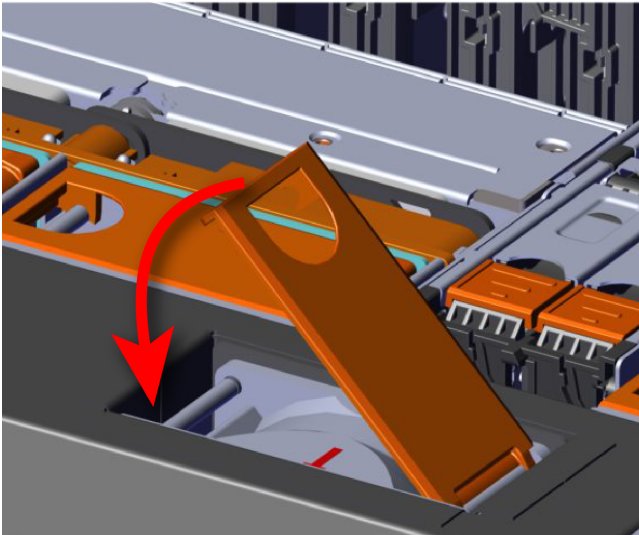
- b) Lower the fan down into the empty slot. Do not force it.

**Figure 96: Installing a System Fan**



- c) When the fan is fully inserted and the connectors are mated properly, close the housing cover clip as shown in the following image.

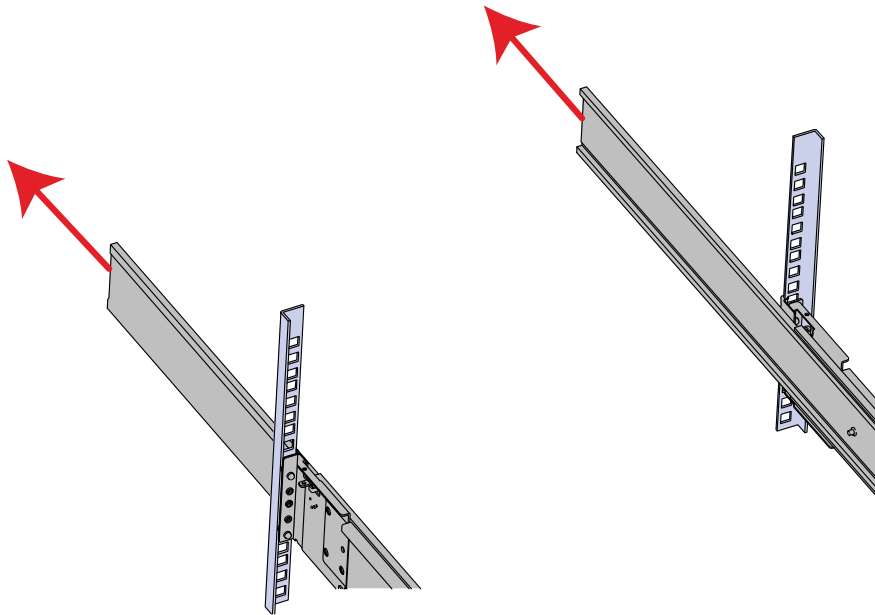
**Figure 97: Latching the Fan Housing Closed**



20. Install the remaining system fans in the same manner as the first.


21. Extend the mid-rails out of the rack so that they are protruding from the front of the rack and the safety latches engage.


**Figure 98: Extend Mid-Rails**



22. Install the chassis into the rails.

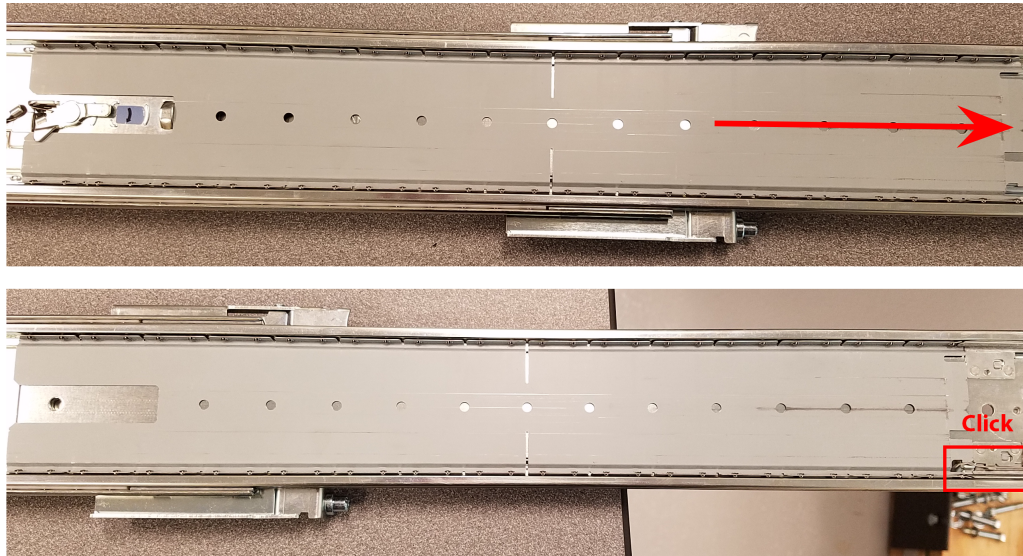
a)

**Caution:**  This step in the installation requires a minimum of 3 individuals to install safely, two to lift and one to guide the others whom may have difficulty seeing because the enclosure is in the way. Ensure that the appropriate measures are taken to safely support the enclosure during installation. The enclosure **MUST** have no drives installed and requires a two person team lift to install. **Do not attempt to lift the system if it is fully populated with drives.** The only case in which the system may be installed or removed with the drives populated is if the facility has a lift that is rated to handle the maximum weight of the fully loaded system.

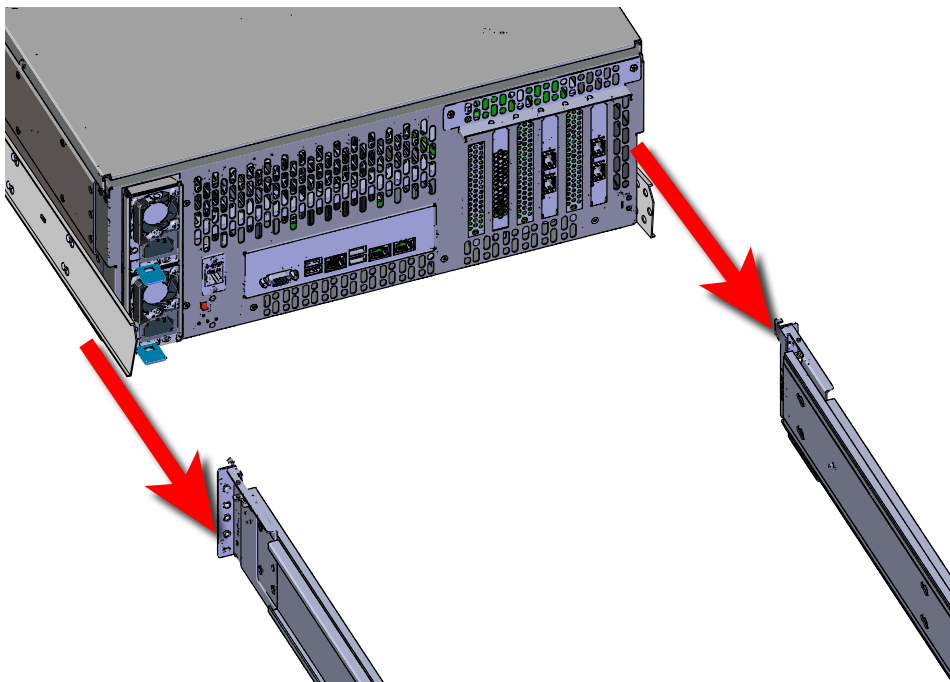
**Warning:**  Do not lift the chassis by the Cable Tray while removing the chassis from the rack OR while installing it into a rack. This can cause serious damage to the unit or serious

bodily harm to those handling the unit. Always team lift the chassis by gripping the underside of the unit, and never try to lift a chassis that is filled with drives.


**Figure 99: Bearing Plate**



**Figure 100: Installing the Chassis**



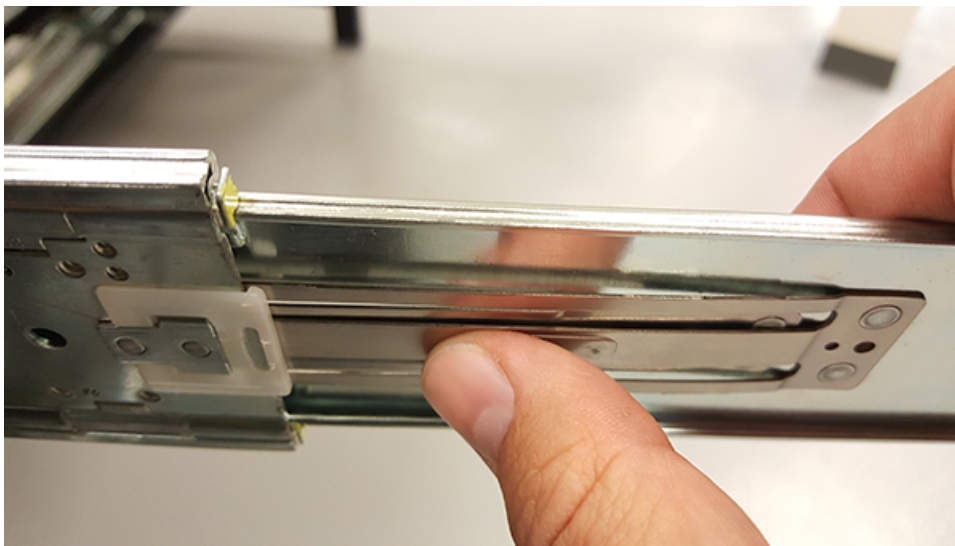
b)

**Caution:**  Make sure that the bearing plate on the inside of the mid-rails are fully forward and that the detent has engaged. This is to prevent potential damage due to improper mating of the rails.

Position one individual on each side of the enclosure to perform a team lift and have the third individual standing at the protruding rack rails to guide the chassis to mate with rack rails.

- c) Team-lift the enclosure until the inner rails that are attached to the chassis align with the extended mid-rails attached to the rack, and guide the inner rails on the chassis to mate with the rack rails.
- d) Once the rails are mated properly, slide the enclosure into the rack until it is stopped by the safety catch on the rails. Push the release lever on the safety latch located on the side of each of the rails and push the enclosure the rest of the way into the rack.

**Figure 101: Safety Latch Release**



- e) As the chassis is slid into the rack, position one installer at the rear of the rack to ensure that the pegs on the sides of the cover will slide correctly into the rear cover alignment brackets on both sides of the rack. If the chassis does not install smoothly or snags, check that the rear cover alignment brackets are not interfering with the chassis sidewalls, and try again.
23. Now that the chassis is installed, test the installation by sliding the enclosure in and out of the rack a minimum of three times. If the enclosure binds, catches, or displays any incorrect motion or behavior retry the installation.

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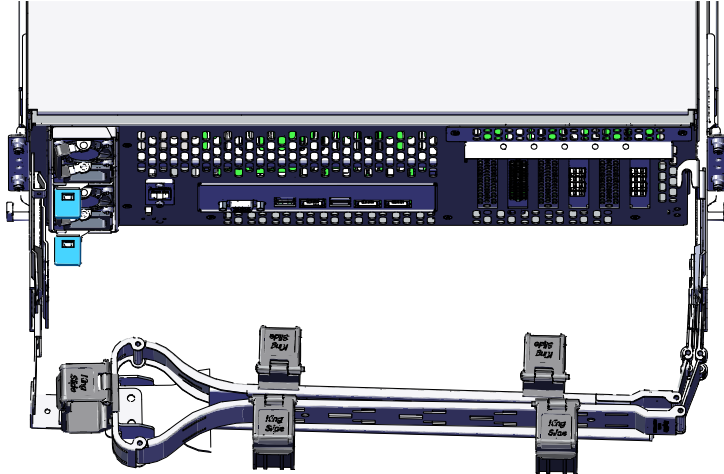
**Note:** Adjustments of the vertical rack rails may be required to fix any issues that may occur.

---

24. Install the CMA.
- a) Orient the CMA so that the elbow is on the left hand side.

- b) Attach all of the connectors to the brackets on the rails and chassis. There should be one at the elbow side and two at the other end.

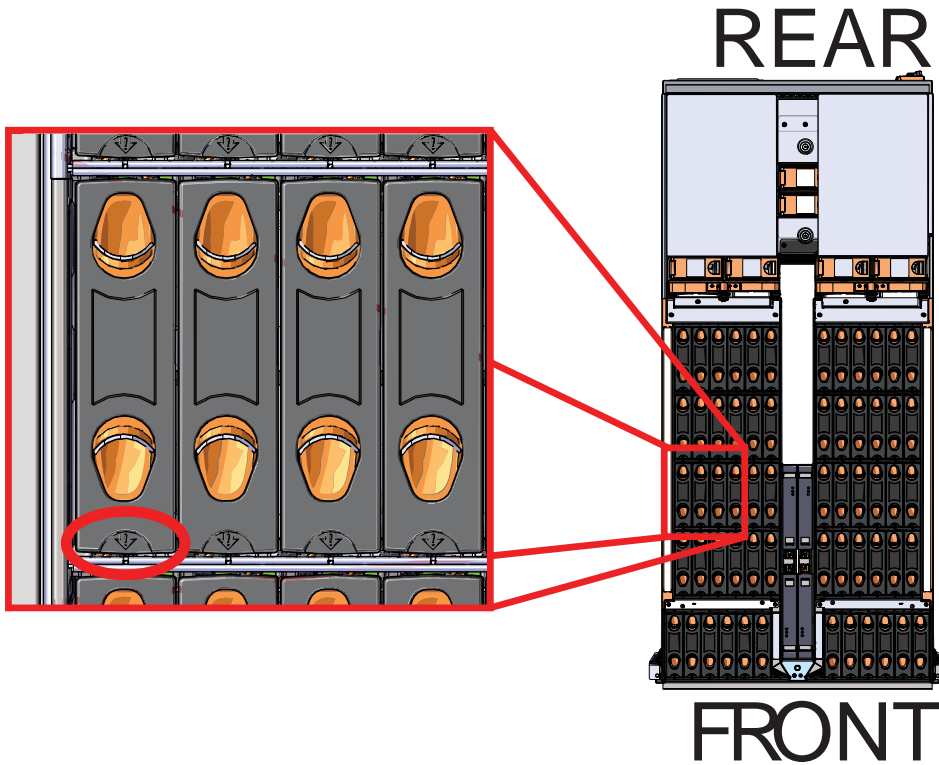
**Figure 102: CMA Orientation**



- c) Slowly slide the enclosure forward to ensure the CMA arm is operating properly, then slide it back into the rack.
- 25. Install the Drive Assembly.**
- a) Ensure that the enclosure has been pulled out of the rack until the rail latches engage.

- b) Find the LED pointer on the top of the drive carrier. This pointer should point toward the front of the unit as shown in the following image.

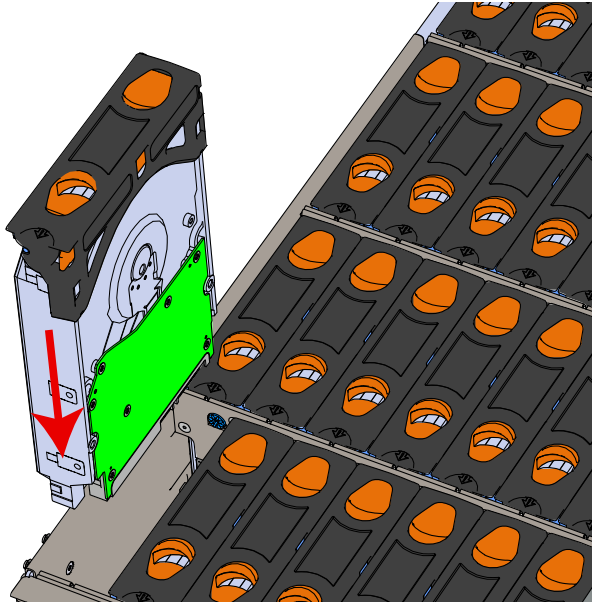
**Figure 103: LED Pointer Orientation**





- c) Align the drive with the empty slot that will receive it. Lower it into the slot, making sure it stays level and does not snag.

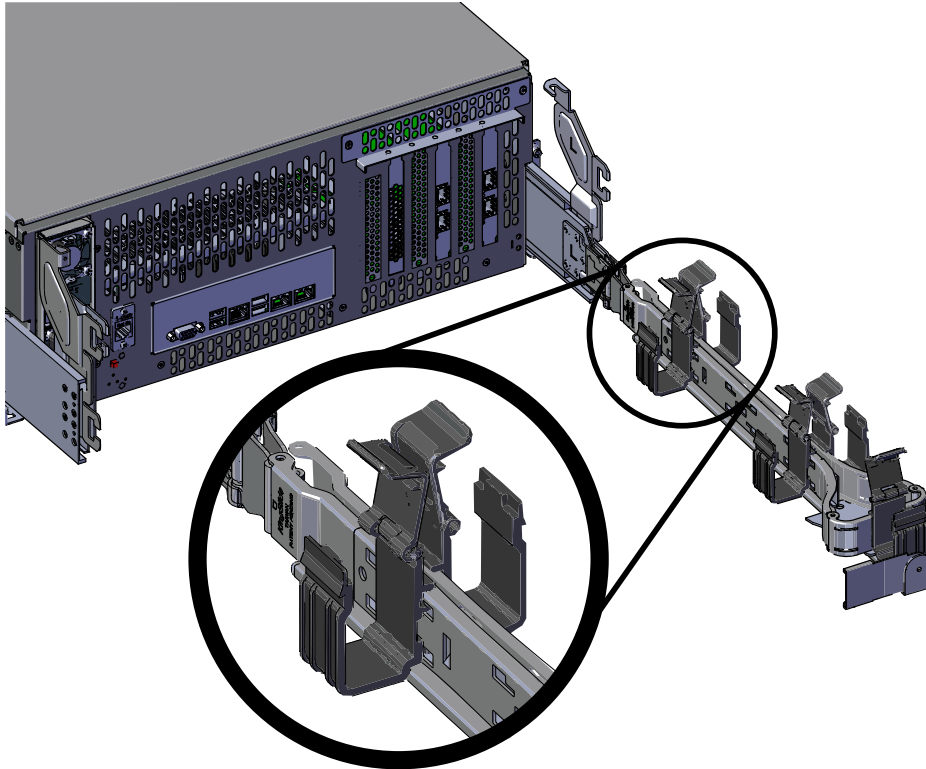
**Figure 104: Installing a Drive Assembly**



- d) Pinch the latch release and carefully press downward to seat the Drive Assembly the rest of the way.
26. Install each drive in the place it was removed from by following the labels or marks that were added earlier.
  27. Cable the CMA.
    - a) Unlatch the elbow side of the CMA arm and swing it forward by pressing the blue button that says "push" to unlatch it.

- b) Open all of the baskets

**Figure 105: Open Baskets**



- c) Route all of the cables being connected to the enclosure through the open baskets.
- d) Close all of the baskets.
- e) If the Ultrastar Serv60+8 is being installed in a rack and will subsequently be transported inside that rack, it is important to use the included cable tie to wrap the CMA bundle to ensure it does not get damaged during transport. If the Ultrastar Serv60+8 is instead being installed where it will operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.
- f) Reconnect the CMA at the elbow to the connectors on the rail.
- 28.** Test for binding in the extension of the CMA by gently pulling the enclosure out of the rack to ensure the cables extend properly and that the system doesn't bind at all. If it does, examine the point at which the binding occurred and adjust the seating of cables in the baskets, check the connections to the rails, and examine the joints of the CMA arm to ensure that they are all functioning properly.
- 29.** Make sure the CMA is in operational position by folding the arm in toward the enclosure and attaching the elbow end of the CMA to the connector that is attached to the rail. Verify that all of the cabling is in functional order and does not bind or catch.

## 4.8 CPU and Heat Sink Module Replacement

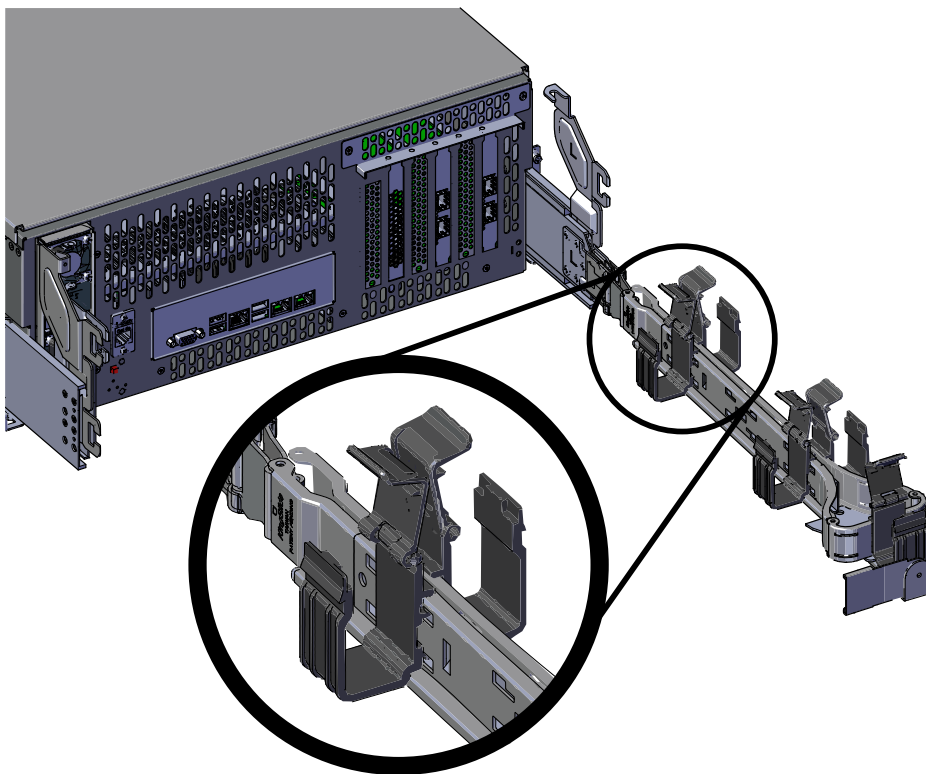
**Note:** The CPU and Heat Sink module are not hot swappable. The enclosure must be powered-down, disconnected from all cabling, and removed from the rack before replacing the CPU and Heat Sink module.

**Table 38: Procedure Info**

Required Tools	Required Parts	# of People Required	Time Required
<ul style="list-style-type: none"> <li>• T30 Torx Screwdriver</li> <li>• T15 Torx Screwdriver</li> </ul>	<ul style="list-style-type: none"> <li>• T30 Torx screws</li> </ul>	3	~2h

1. Uncable the CMA.
  - a) Open all of the baskets on the CMA.

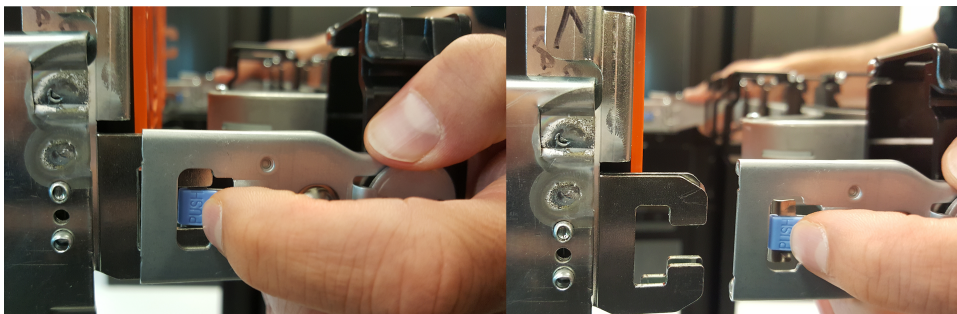
**Figure 106: Open Baskets**



- b) Remove one cable from the CMA at a time making sure not to put too much strain on the arm.

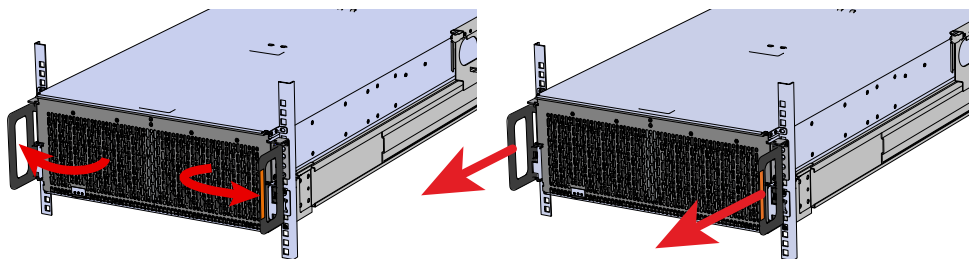
2. Unlatch all of the connectors that attach the CMA to the enclosure and the rail by locating the latch release button and pressing it from either side of the latch. There are three total connections that need to be removed, one at the elbow and two at the opposite end.

**Figure 107: Unlatching a CMA Connector**



3. Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

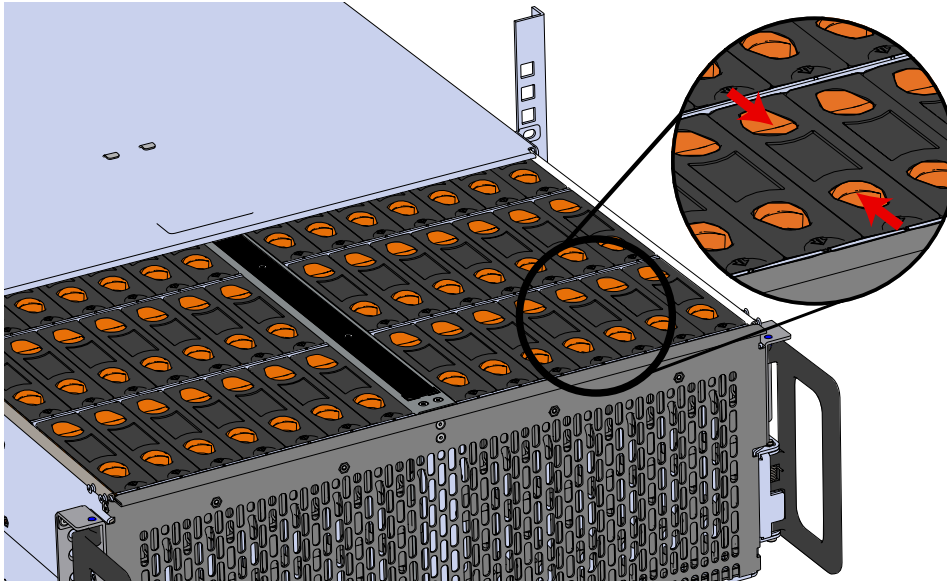
**Figure 108: Chassis Handle Operation**



4. Remove all of the drives from the chassis before uninstalling the chassis. Be prepared to label the drives as they are removed so they can be reinstalled in the same location in the new chassis.
5. Follow these steps to remove a Drive Assembly.
  - a) Find the latch release mechanism on the Drive Assembly being removed.

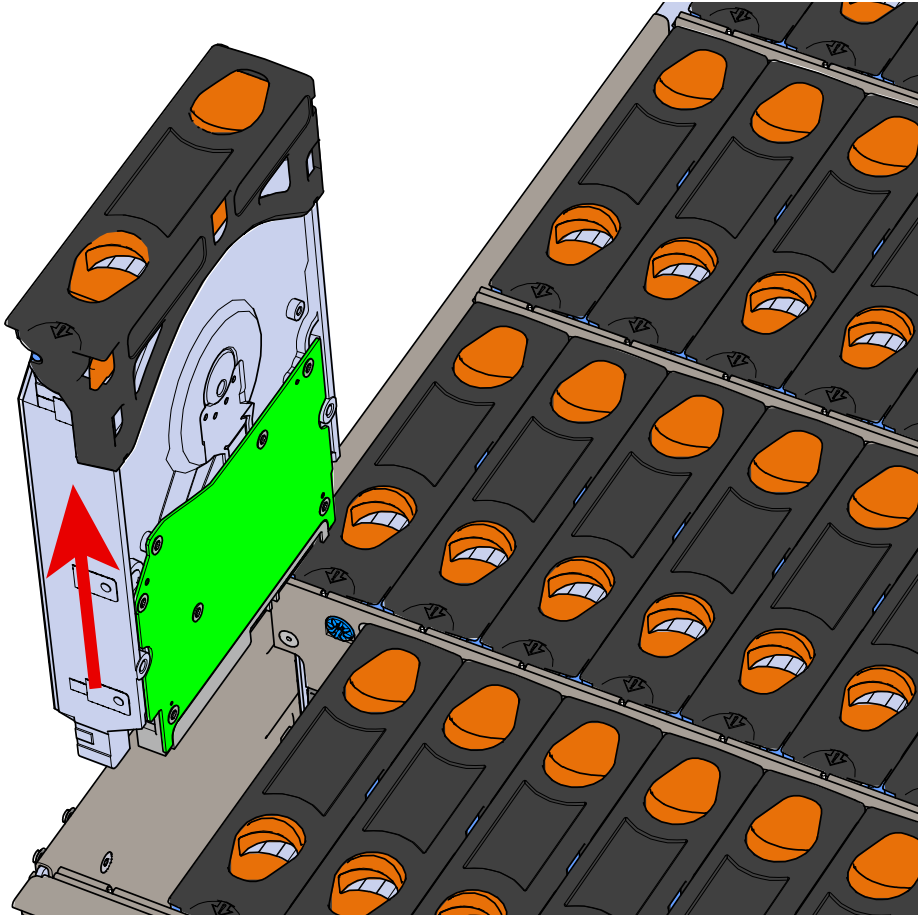
- b) Insert a finger and a thumb into the latch release and pinch to unlatch the Drive Assembly.

**Figure 109: Unlatch Drive Carrier (IOM Not Shown)**



- c) Lift the Drive Assembly free from the enclosure.

**Figure 110: Removing Drive Assembly**



6. Follow the previous step for each drive in the enclosure. Attach a label or mark the drives with the drive slot they were removed from in order to add them to the same slot in the future. Store the drives in an ESD safe location until the drives are ready to be installed back into an enclosure.

7. Release the safety latch on the inner rails on each side of the chassis as shown in the following image.

**Figure 111: Inner Rail Safety Latch Release**




8. Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. Make sure that the top cover comes with the chassis as it is extended out of the rack. The safety latches will prevent the enclosure from coming out of the rack completely.
9. Remove the chassis from the rack.
  - a) Be prepared to support the enclosure once it is free of the rails by having a second person or a lift to support the enclosure
  - b) Grasp both handles at the front of the enclosure and pull with even pressure until the enclosure will not extend further.
  - c) Locate the safety catches on the inner rails attached to the enclosure.

**Figure 112: Safety Latch Release**



- d) Depress the latch release lever for the safety latches on the rail and push the chassis very slightly forward. The chassis is now unsecured from the rack.
  - e) Ensure that you have the proper support mechanism to hold the chassis in position, whether that be a team lifting partner or an appropriate lift.
- 

**Warning:**  Do not lift the chassis by the Cable Tray while removing the chassis from the rack OR while installing it into a rack. This can cause serious damage to the unit or serious bodily harm to those handling the unit. Always team lift the chassis by gripping the underside of the unit, and never try to lift a chassis that is filled with drives.

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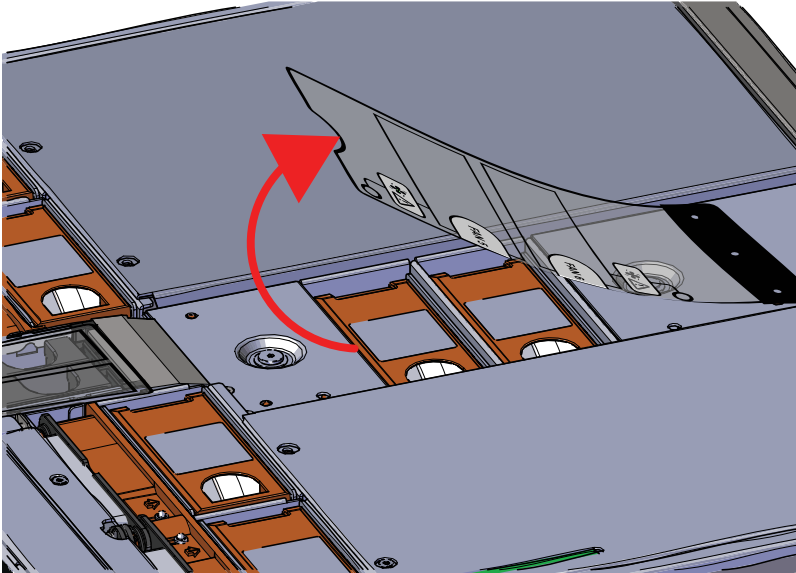
- f) Slide the chassis forward to free it from the rails. Place the chassis in a safe location to avoid damage.
- 10.** **Attention:** Place the enclosure on a flat ESD safe surface and ensure it is stable before continuing with the procedure.
- 

- 11.** Uninstall the internal System Fan.

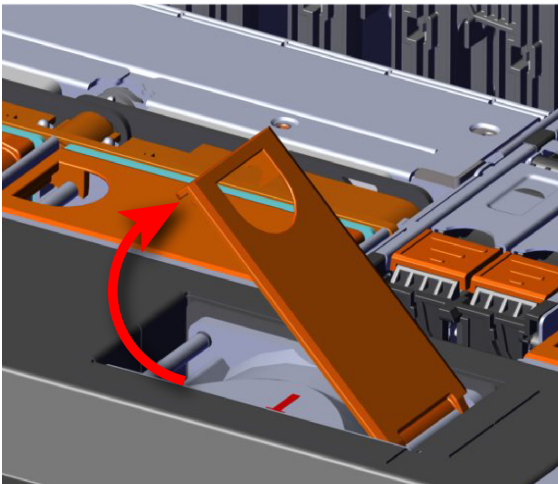


- a) Lift the System Fan flap and insert a finger into the service hole on the top of the System Fan and pull up to release the latch.

**Figure 113: Lift the System Fan Flap**

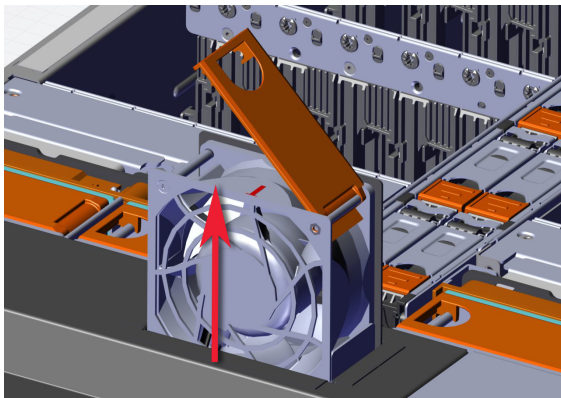


**Figure 114: Unlatching System Fan**



- b) Use the handle to pull evenly on the component to remove it from the enclosure.

**Figure 115: Removing System Fans**



- 12. Uninstall the rest of the system fans in the same manner as the first.
- 13. Uninstall server cover panel on both sides of the enclosure that contains the failed CPU and Heat Sink module.

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**Note:** The same steps to uninstall the server cover panel apply to both sides of the enclosure with the exception of the number of screws that secure the server cover panel. From the rear of the enclosure, the left panel contains two screws. The panel on the right side of the enclosure contains one screw.

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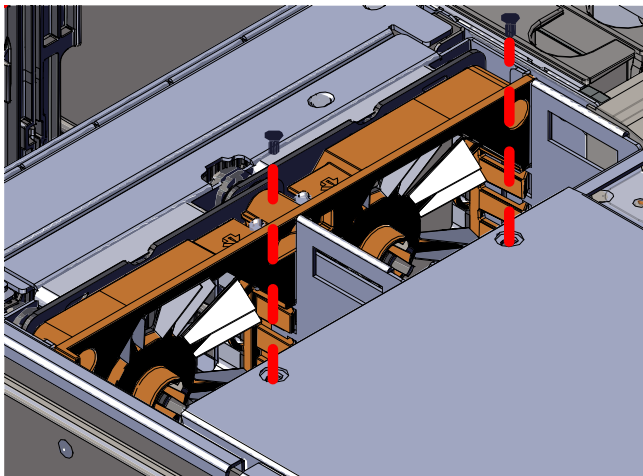
- a) Remove the screws that secure the server cover panels to the chassis using a T7 Torx screwdriver.

---

**Note:** When at the rear of the enclosure, the left server cover panel contains two T7 Torx screws. The left server cover panel contains only one T7 Torx screw.

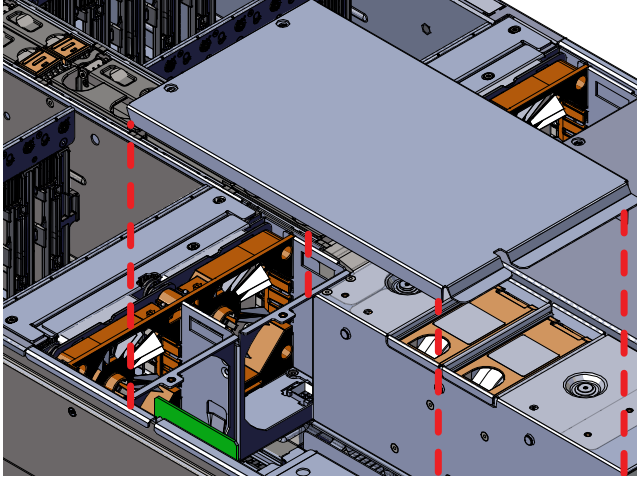
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**Figure 116: Removing the Server Cover Panel Screws**



- b) Remove the server cover panel by carefully pulling on the edge where the screws were removed.

**Figure 117: Removing the Server Cover Panel**

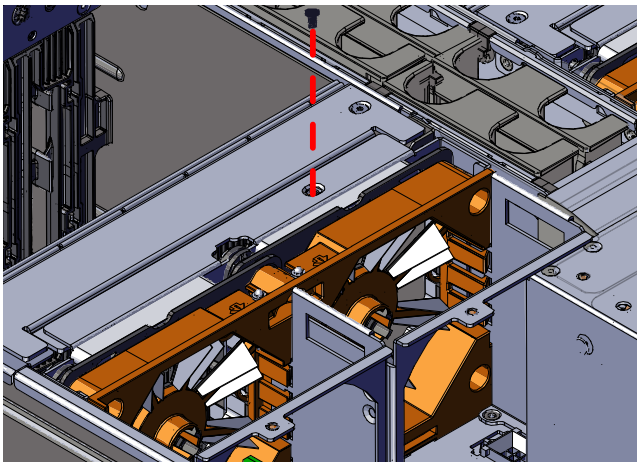


14. Uninstall the fan bays.

**Note:** Uninstall the fan bay on both sides.

- a) Remove the screw that secures the fan bay to the chassis.

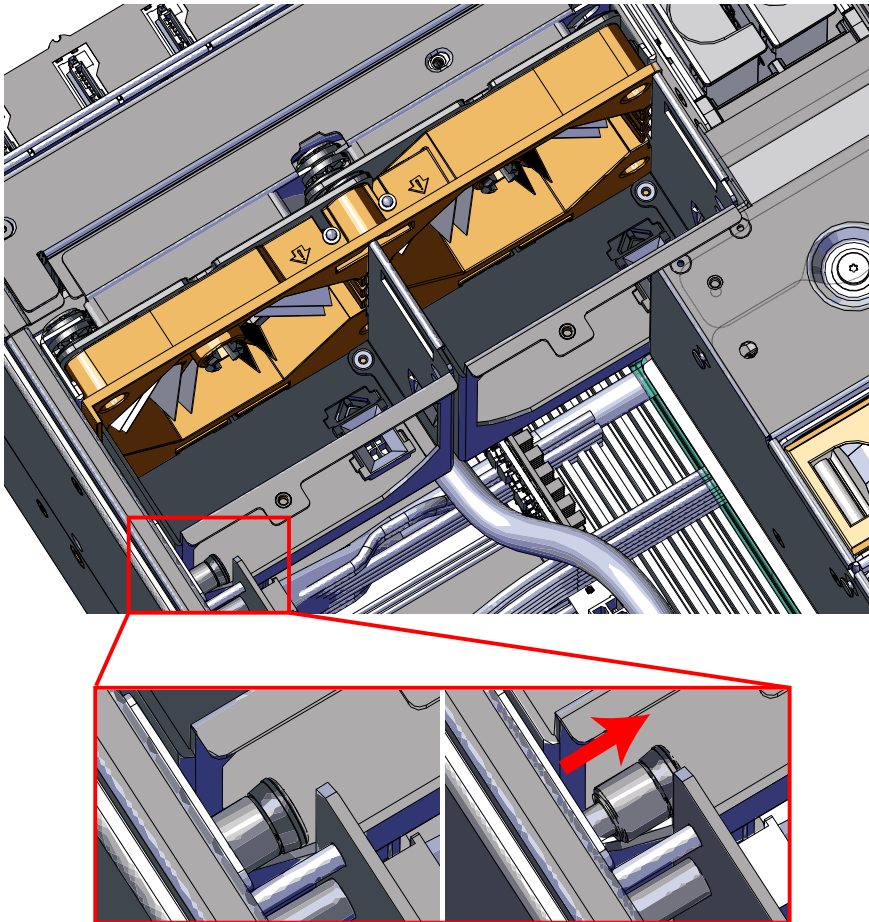
**Figure 118: Removing the Fan Bay Screws**



- b) Locate the pin that secures the outside of the fan bay to the chassis and pull the pin out and pull up on the fan bay until the cage is clear of the chassis.

**Note:** The fan bay is connected to the baseboard with a cable and does not need to be disconnected. When removing the fan bay, lay the assembly on the drive cage.

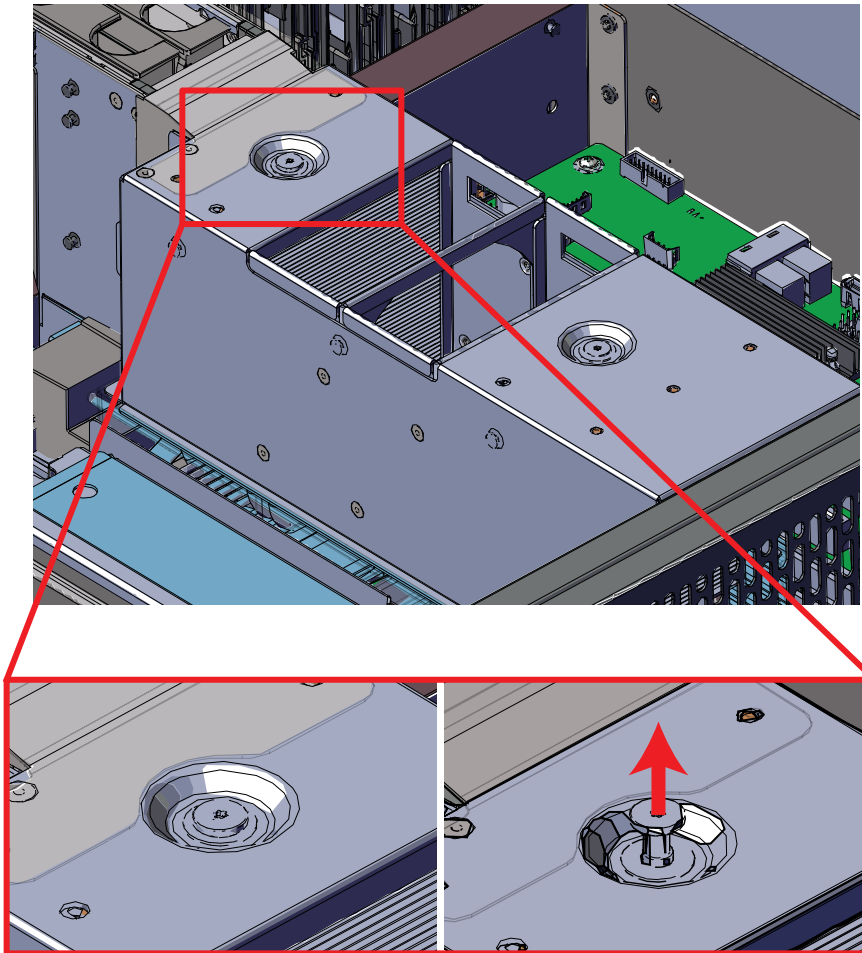
**Figure 119: Fan Bay Pin**



15. Uninstall the remaining fan bay in the same manner as the first.
16. Uninstall the System Fan Bay.

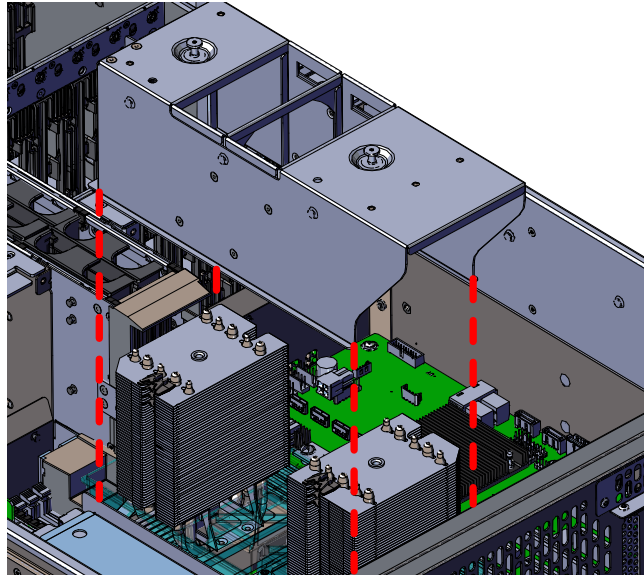
- a) Loosen the captive screws that secure the system fan bay to the chassis using a T15 Torx Screwdriver until the cover comes loose. The screws will be retained within the System Fan Bay while uninstalling the part.

**Figure 120: Loosening the System Fan Bay Captive Screws**



- b) Slide the system fan bay out of the chassis and set it aside.

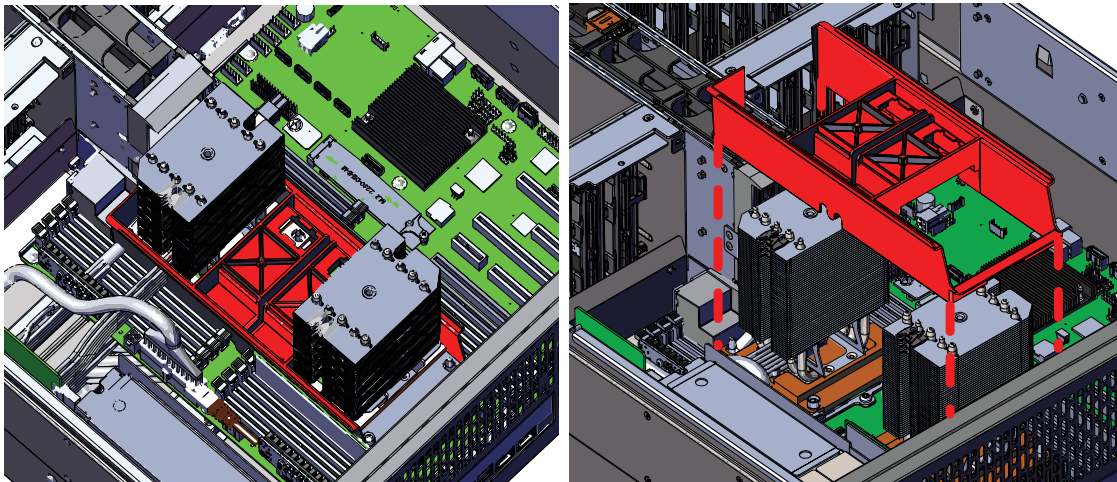
**Figure 121: Removing the System Fan Bay**



**17. Uninstall the System Fan base.**

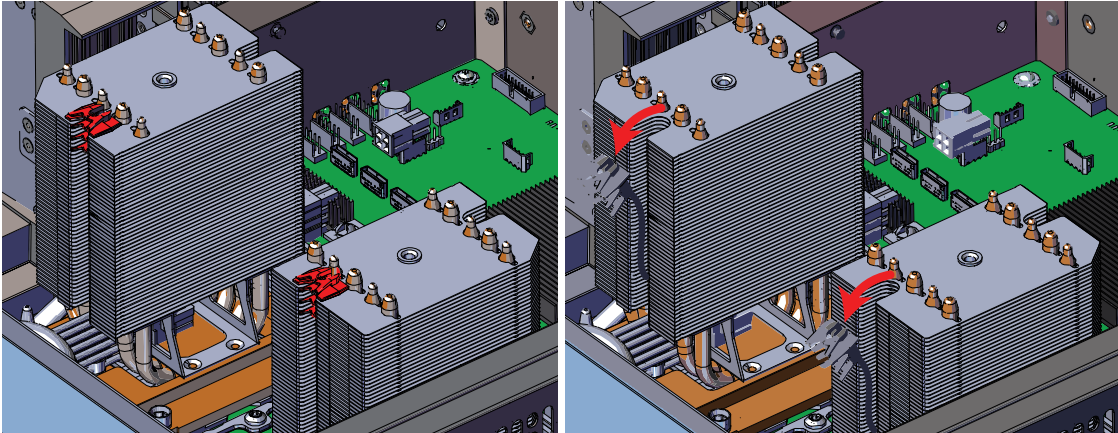
- a) Slide the system fan base up and over the CPUs until clear of the CPUs. Set the system fan base to the side with cables still attached. The cables are long enough to remain connected during these steps.

**Figure 122: Removing the System Fan Base (highlighted in red)**



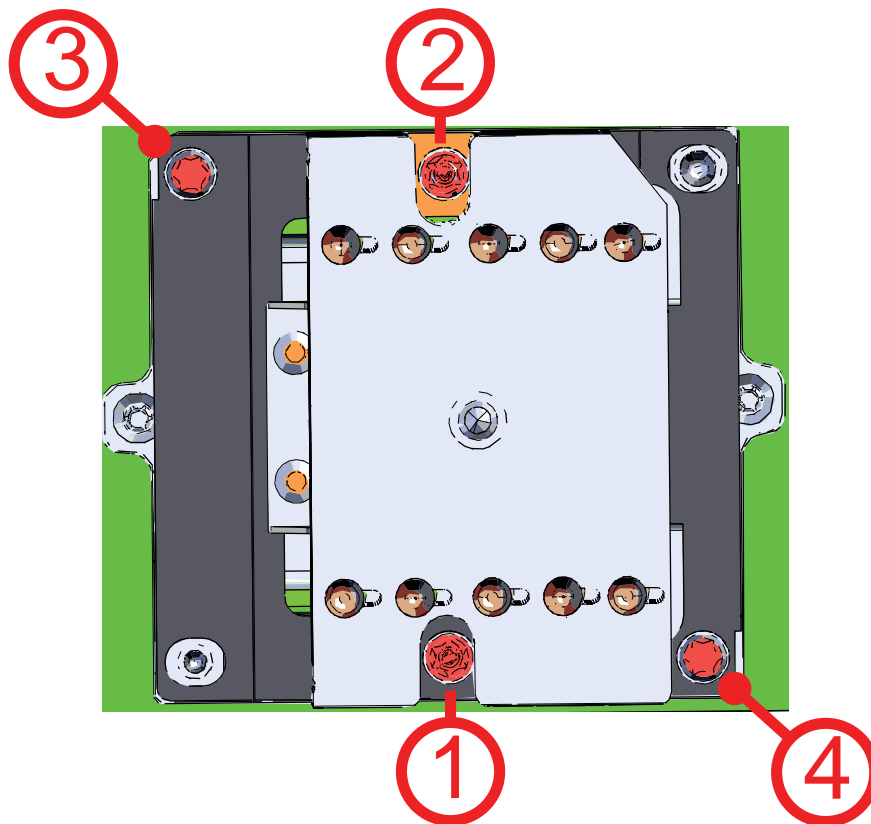
- b) Locate and remove the LED brackets that are attached to the Heat Sink.

**Figure 123: Uninstalling the CPU LED Brackets**



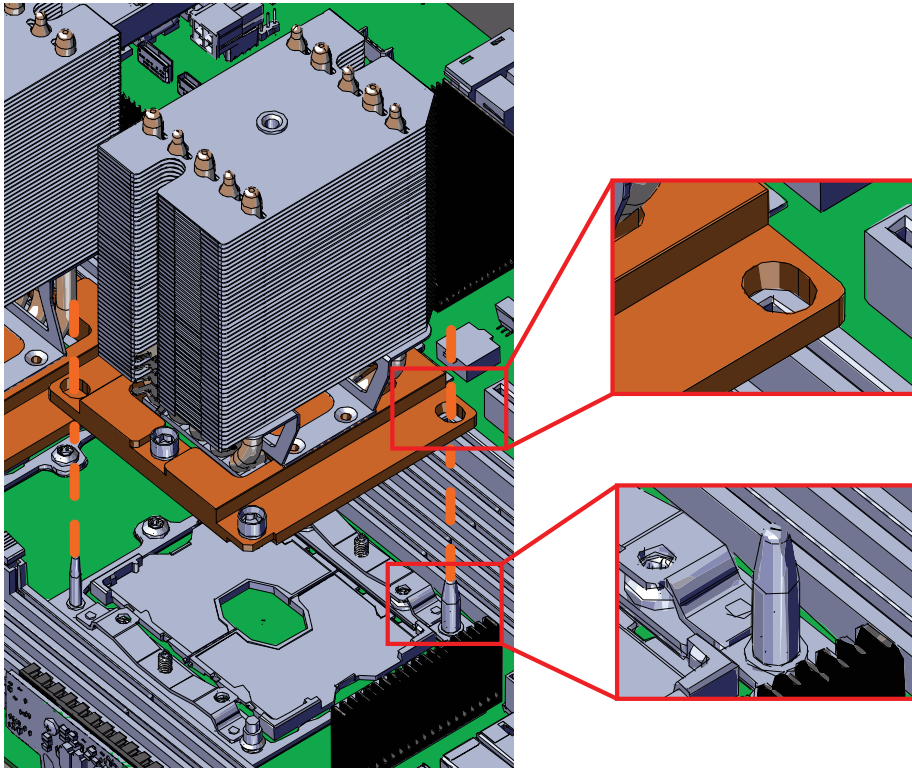
- 18. Uninstall the CPU and Heat Sink module.
  - a) Locate the failed CPU and Heat Sink module.
  - b) The Heat Sink must be removed by loosening the Torx T30 screws in a specific order. Use the following diagram to determine the specific order.

**Figure 124: Heat Sink Removal Order**



- c) Slide the Heat Sink clear of the socket alignment pins.
- 19.** Install the CPU and Heat Sink module.
- a) Locate the socket alignment pin on the baseboard and the alignment hole on the Heat Sink.
  - b) Carefully place the CPU and Heat Sink module in position on the socket alignment pins.

**Figure 125: Heat Sink Alignment Pins**

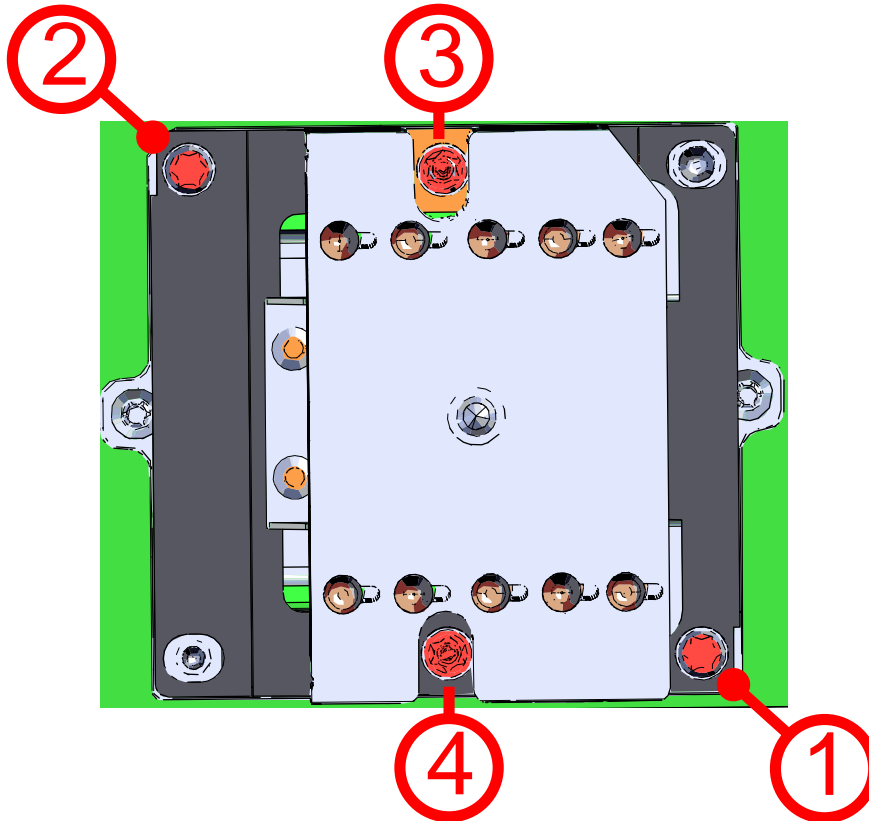


- c) The Heat Sink must be installed by tightening the Torx T30 screws in a specific order. Use the following diagram to determine the specific order.



**Note:** The Heat Sink screws must be tightened to a torque setting of 12in.-lbs. Do not over-tighten. Over-tightening may cause damage to the parts.

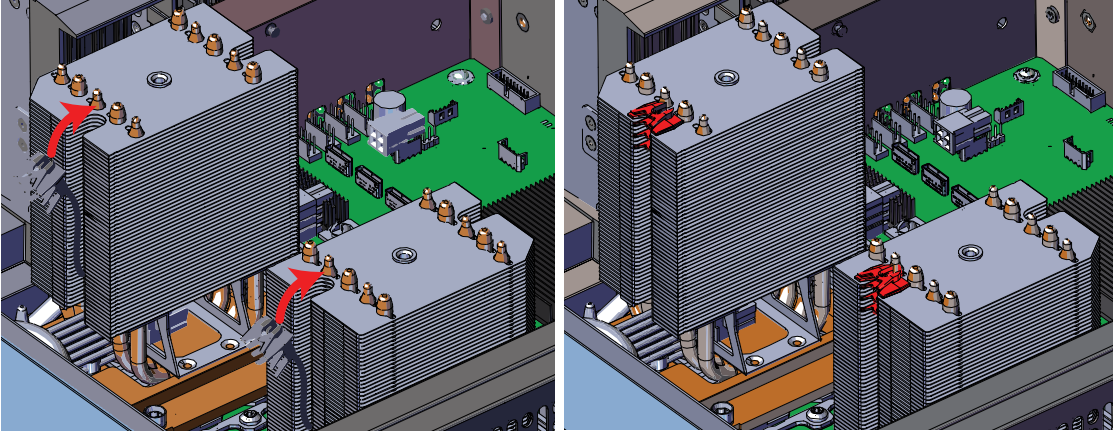
**Figure 126: Heat Sink Installation Order**



20. Install the System Fan base.
  - a) Slide the system fan base down over the CPUs until the base rests on the baseboard.

- b) Slide the LED cable and LED bracket into the Heat Sink channel and snap it into place at the top of the Heat Sink.

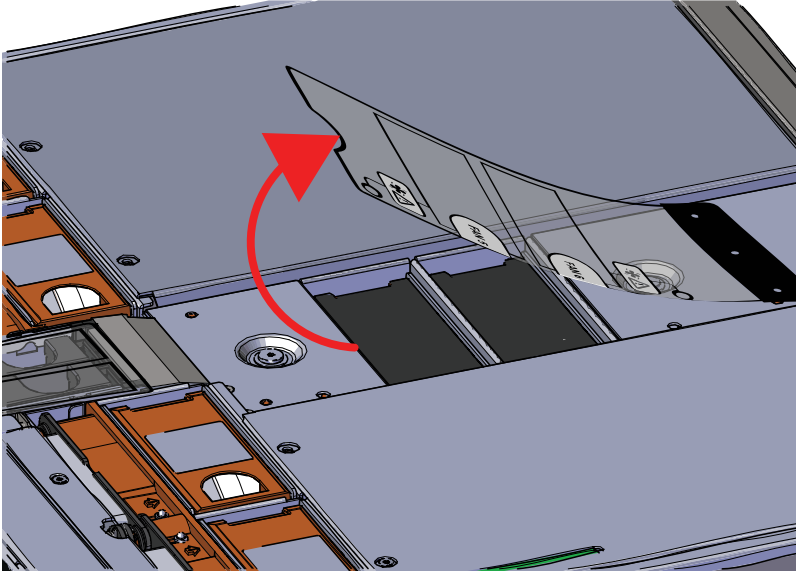
**Figure 127: Installing the CPU LED Brackets**



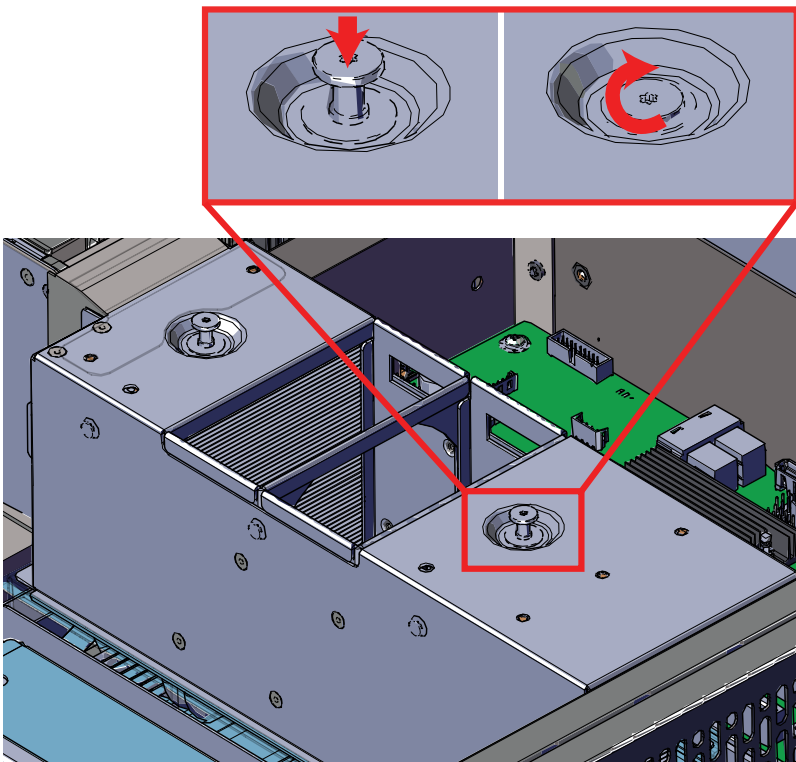
- c) Install the remaining LED bracket in the same manner as the first.
21. Install the System Fan Bay.
- a) Slide the system fan bay down over the CPUs until the captive screws line up with screw holes on the Heat Sink.

- b) Lift the system fan flap and push in and tighten the captive screws until the system fan bay is secure.

**Figure 128: Lift the System Fan Flap**



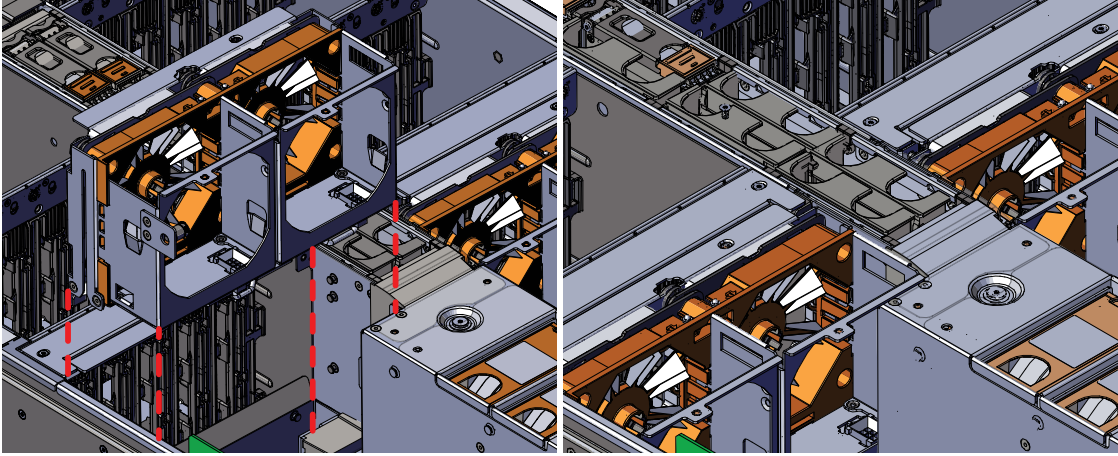
**Figure 129: Installing the System Fan Bay Captive Screws**



- 22. Install the fan bay.
  - a) Align the first fan bay within the location that in which it was uninstalled.

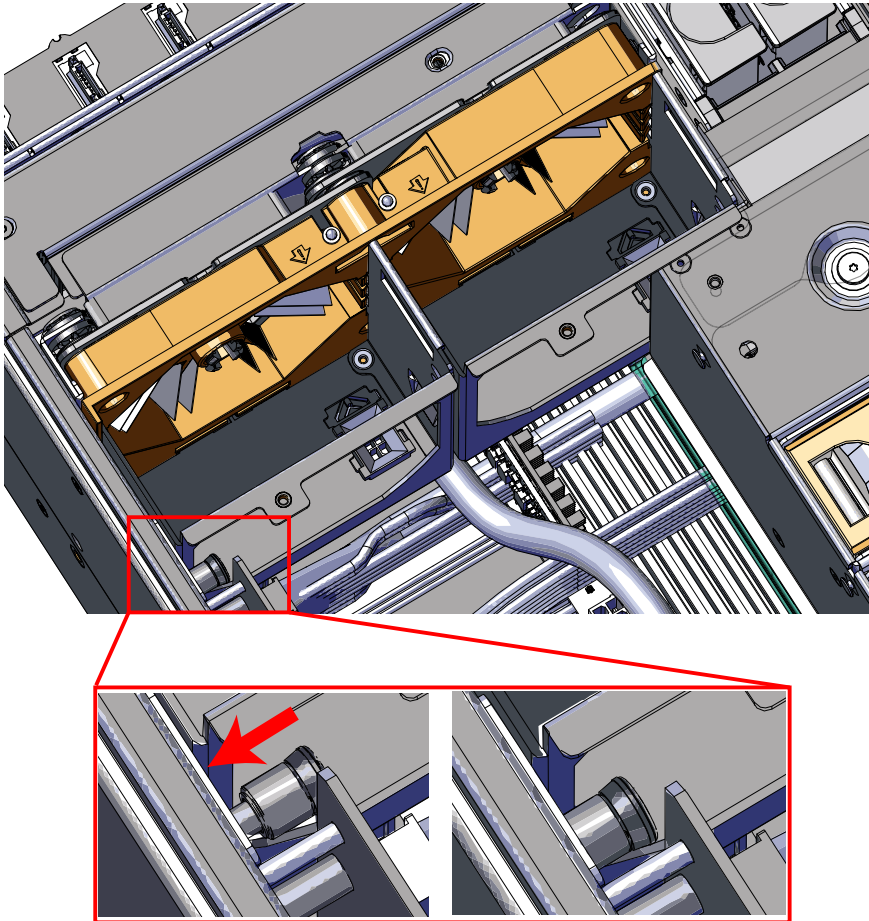
- b) Slide the fan bay into the chassis taking care not to pinch or damage any cables.

**Figure 130: Installing the Fan Bay**



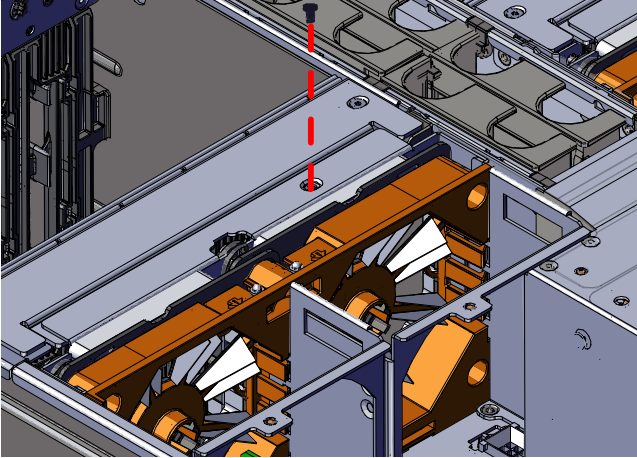
- c) Ensure that the pin located on the inside of the fan bay is latched onto the chassis during the process of seating the fan bay. If the pin did not engage, use a Flathead screwdriver to disengage the pin by pulling it out and repositioning the fan bay until the pin engages with the chassis.

**Figure 131: Fan Bay Pin Engaged**



- d) Install the screw that secures the mid-bulkhead fan cage to the chassis.

**Figure 132: Fan Bay Screw**



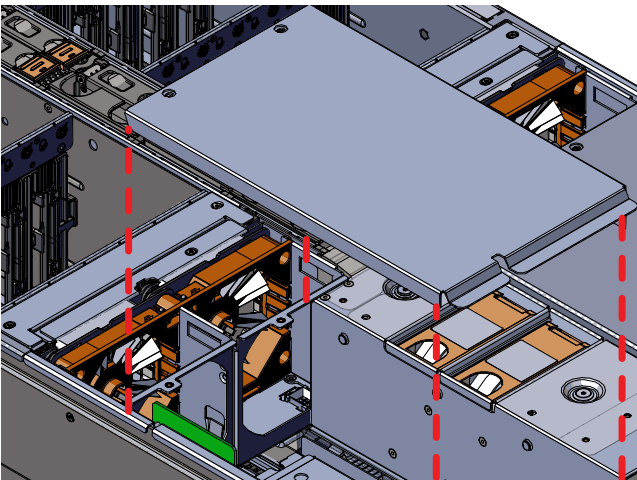
23. Install the remaining fan bay in the same manner as the first.  
24. Install server cover panels.  
a) Align and press the server panel cover into place over the server bay.

---

**Note:** The Formex material that the panel is made from is flexible and will allow for the panel to be flexed to fit back into its original placement.

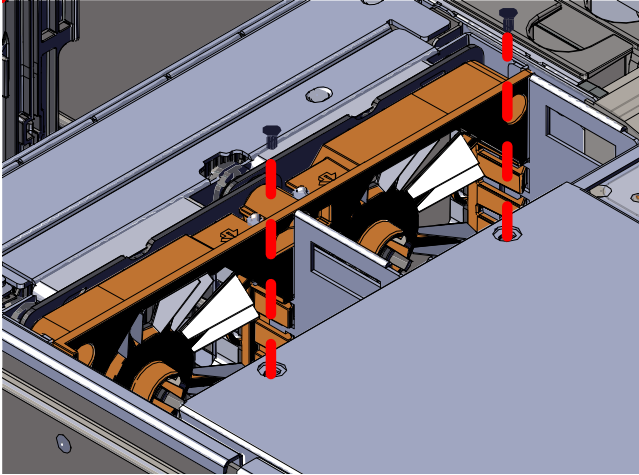
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**Figure 133: Installing the Server Cover Panel**



- b) Secure the server cover panel using the original screws and a T7 Torx screwdriver.

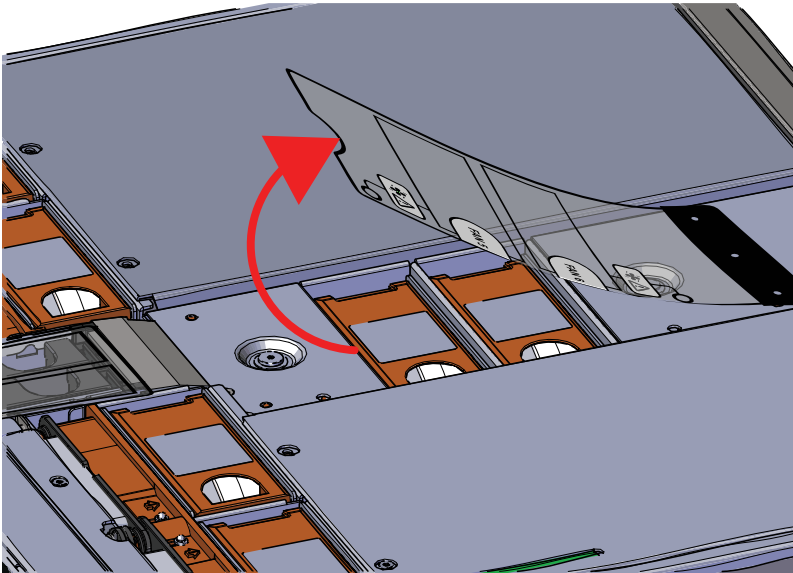
**Figure 134: Server Cover Panel Screws**



**25. Install the System Fan.**

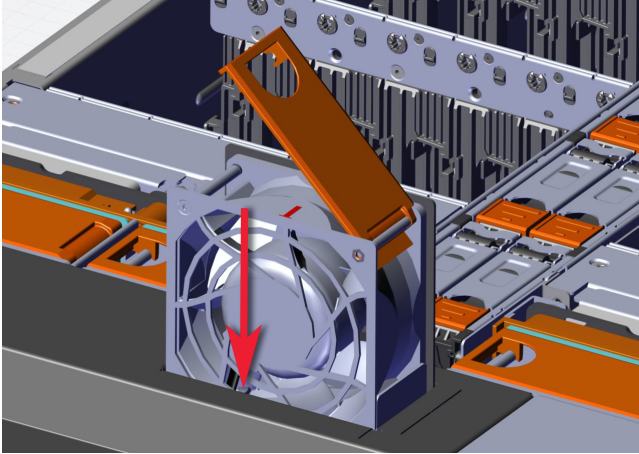
- a) Lift the System Fan flap and look inside the empty slot that will receive the System Fan and orient the System Fan so that the connector on the bottom of the fan is on the proper side.

**Figure 135: Lift the System Fan Flap**



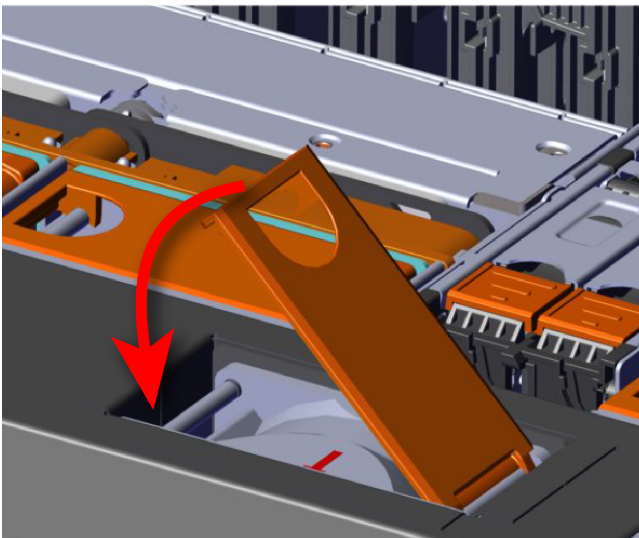
- b) Lower the fan down into the empty slot. Do not force it.

**Figure 136: Installing a System Fan**



- c) When the fan is fully inserted and the connectors are mated properly, close the housing cover clip as shown in the following image.

**Figure 137: Latching the Fan Housing Closed**

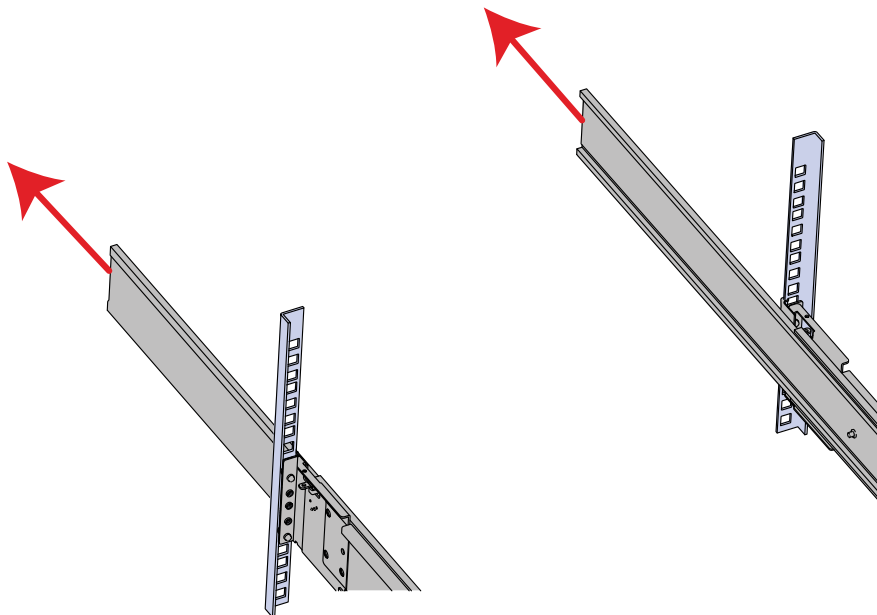


26. Install the remaining system fans in the same manner as the first.




- 27. Extend the mid-rails out of the rack so that they are protruding from the front of the rack and the safety latches engage.


**Figure 138: Extend Mid-Rails**



- 28. Install the chassis into the rails.

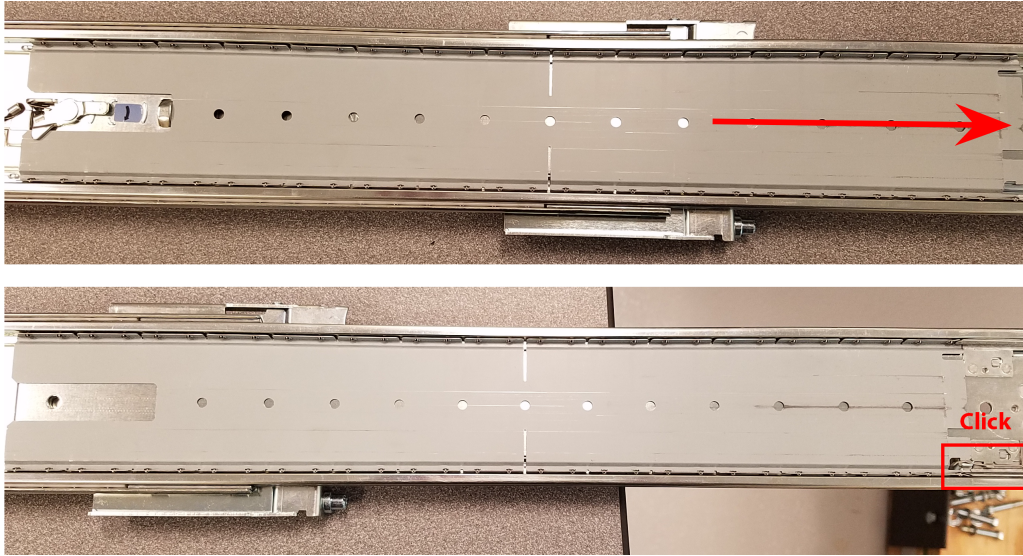
a)

**Caution:**  This step in the installation requires a minimum of 3 individuals to install safely, two to lift and one to guide the others whom may have difficulty seeing because the enclosure is in the way. Ensure that the appropriate measures are taken to safely support the enclosure during installation. The enclosure **MUST** have no drives installed and requires a two person team lift to install. **Do not attempt to lift the system if it is fully populated with drives.** The only case in which the system may be installed or removed with the drives populated is if the facility has a lift that is rated to handle the maximum weight of the fully loaded system.

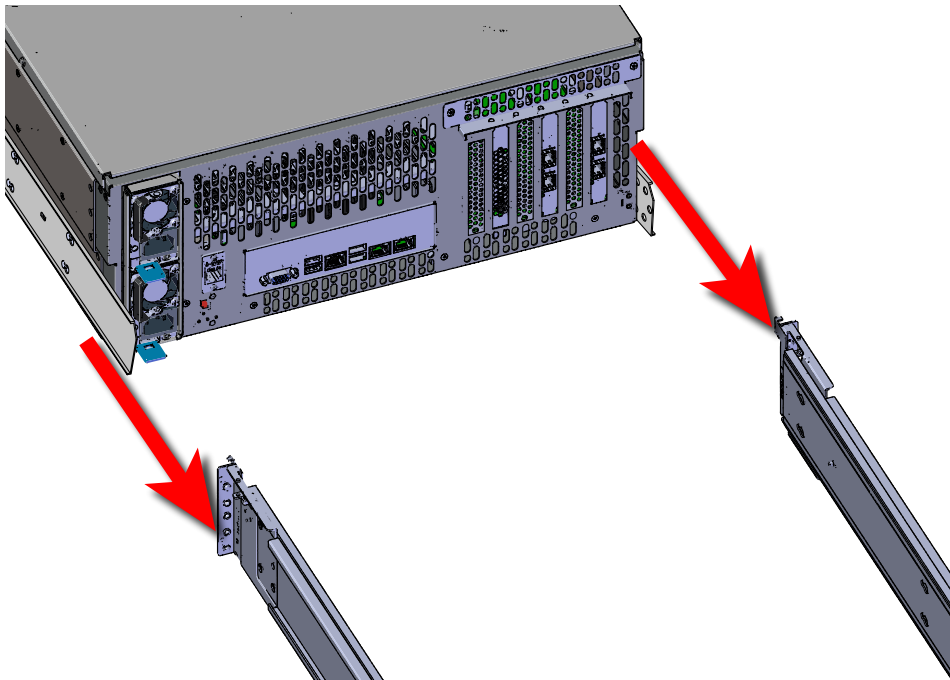
**Warning:**  Do not lift the chassis by the Cable Tray while removing the chassis from the rack OR while installing it into a rack. This can cause serious damage to the unit or serious

bodily harm to those handling the unit. Always team lift the chassis by gripping the underside of the unit, and never try to lift a chassis that is filled with drives.


**Figure 139: Bearing Plate**



**Figure 140: Installing the Chassis**



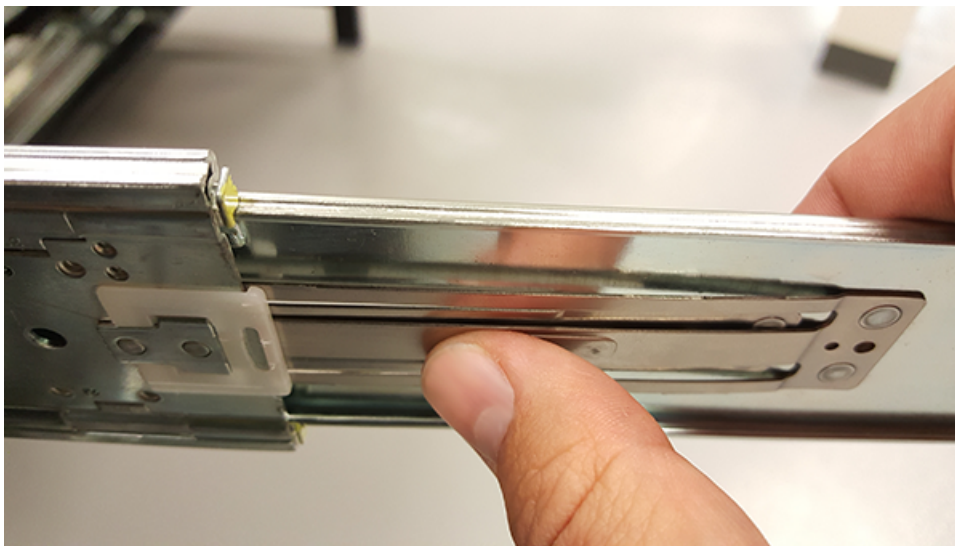
b)

**Caution:**  Make sure that the bearing plate on the inside of the mid-rails are fully forward and that the detent has engaged. This is to prevent potential damage due to improper mating of the rails.

Position one individual on each side of the enclosure to perform a team lift and have the third individual standing at the protruding rack rails to guide the chassis to mate with rack rails.

- c) Team-lift the enclosure until the inner rails that are attached to the chassis align with the extended mid-rails attached to the rack, and guide the inner rails on the chassis to mate with the rack rails.
- d) Once the rails are mated properly, slide the enclosure into the rack until it is stopped by the safety catch on the rails. Push the release lever on the safety latch located on the side of each of the rails and push the enclosure the rest of the way into the rack.

**Figure 141: Safety Latch Release**



- e) As the chassis is slid into the rack, position one installer at the rear of the rack to ensure that the pegs on the sides of the cover will slide correctly into the rear cover alignment brackets on both sides of the rack. If the chassis does not install smoothly or snags, check that the rear cover alignment brackets are not interfering with the chassis sidewalls, and try again.
29. Now that the chassis is installed, test the installation by sliding the enclosure in and out of the rack a minimum of three times. If the enclosure binds, catches, or displays any incorrect motion or behavior retry the installation.

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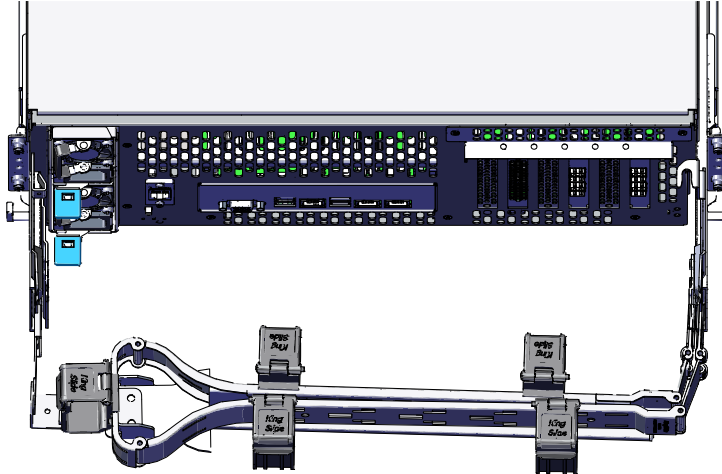
**Note:** Adjustments of the vertical rack rails may be required to fix any issues that may occur.

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30. Install the CMA.
- a) Orient the CMA so that the elbow is on the left hand side.

- b) Attach all of the connectors to the brackets on the rails and chassis. There should be one at the elbow side and two at the other end.

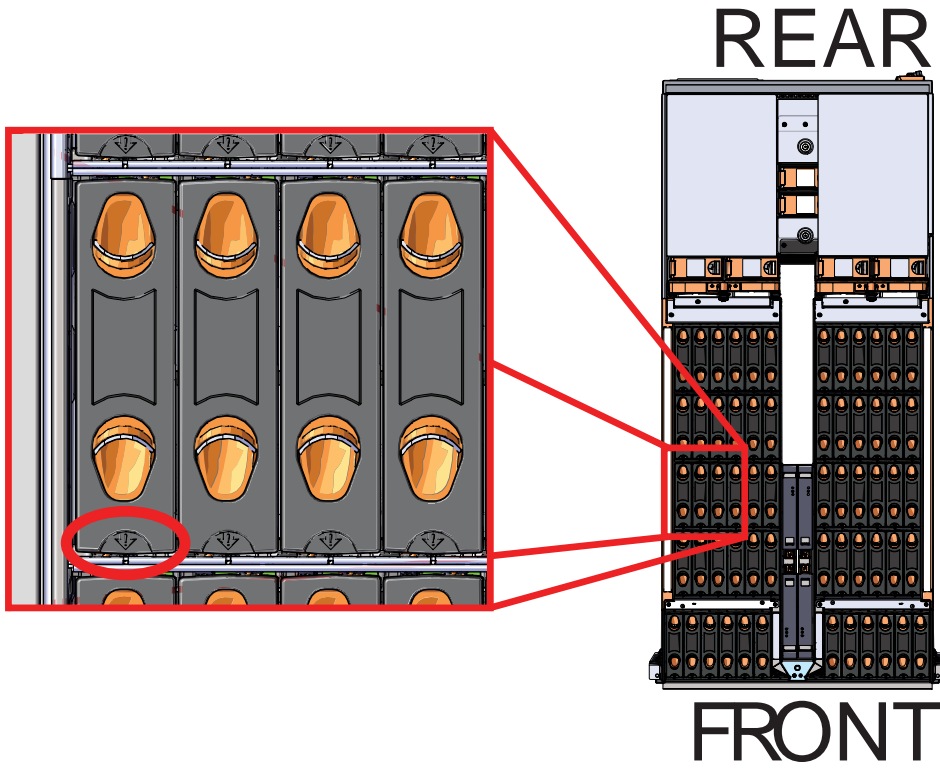
**Figure 142: CMA Orientation**



- c) Slowly slide the enclosure forward to ensure the CMA arm is operating properly, then slide it back into the rack.
- 31. Install the Drive Assembly.**
- a) Ensure that the enclosure has been pulled out of the rack until the rail latches engage.

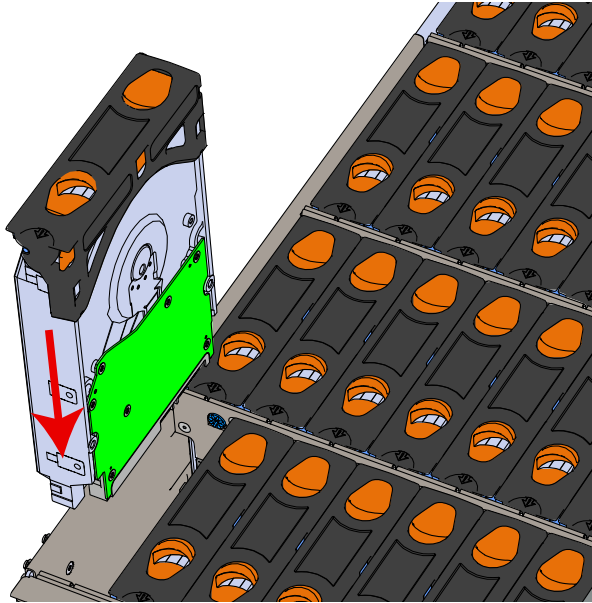
- b) Find the LED pointer on the top of the drive carrier. This pointer should point toward the front of the unit as shown in the following image.

**Figure 143: LED Pointer Orientation**



- c) Align the drive with the empty slot that will receive it. Lower it into the slot, making sure it stays level and does not snag.

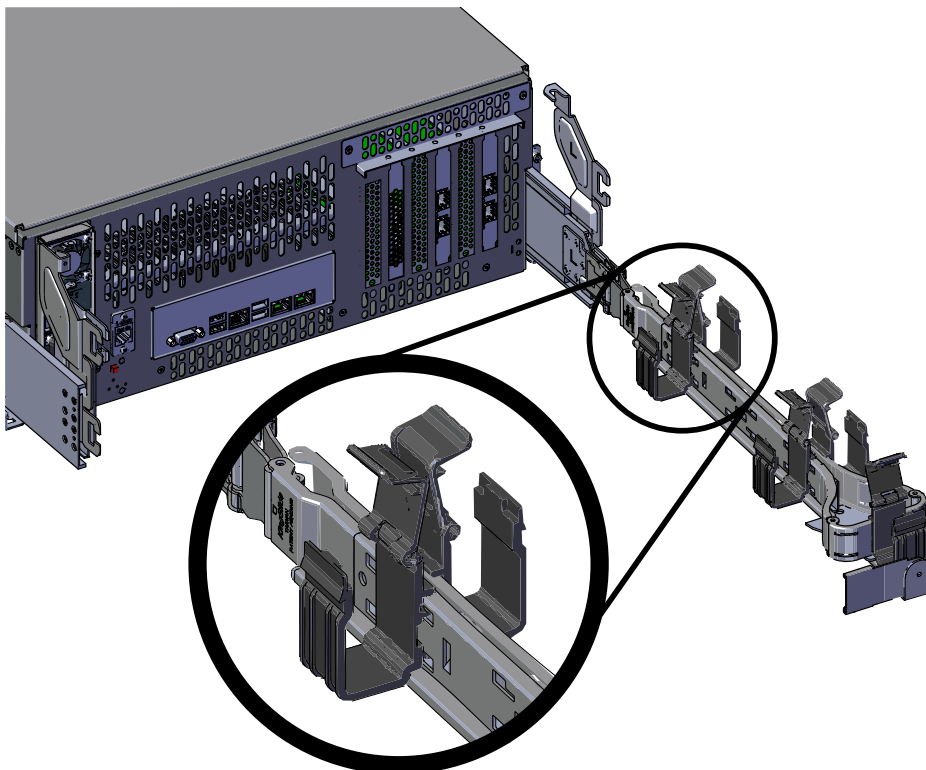
**Figure 144: Installing a Drive Assembly**



- d) Pinch the latch release and carefully press downward to seat the Drive Assembly the rest of the way.
32. Install each drive in the place it was removed from by following the labels or marks that were added earlier.
  33. Cable the CMA.
    - a) Unlatch the elbow side of the CMA arm and swing it forward by pressing the blue button that says "push" to unlatch it.

b) Open all of the baskets

**Figure 145: Open Baskets**



- c) Route all of the cables being connected to the enclosure through the open baskets.
  - d) Close all of the baskets.
  - e) If the Ultrastar Serv60+8 is being installed in a rack and will subsequently be transported inside that rack, it is important to use the included cable tie to wrap the CMA bundle to ensure it does not get damaged during transport. If the Ultrastar Serv60+8 is instead being installed where it will operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.
  - f) Reconnect the CMA at the elbow to the connectors on the rail.
34. Test for binding in the extension of the CMA by gently pulling the enclosure out of the rack to ensure the cables extend properly and that the system doesn't bind at all. If it does, examine the point at which the binding occurred and adjust the seating of cables in the baskets, check the connections to the rails, and examine the joints of the CMA arm to ensure that they are all functioning properly.
  35. Make sure the CMA is in operational position by folding the arm in toward the enclosure and attaching the elbow end of the CMA to the connector that is attached to the rail. Verify that all of the cabling is in functional order and does not bind or catch.

## 4.9 Heat Sink Replacement

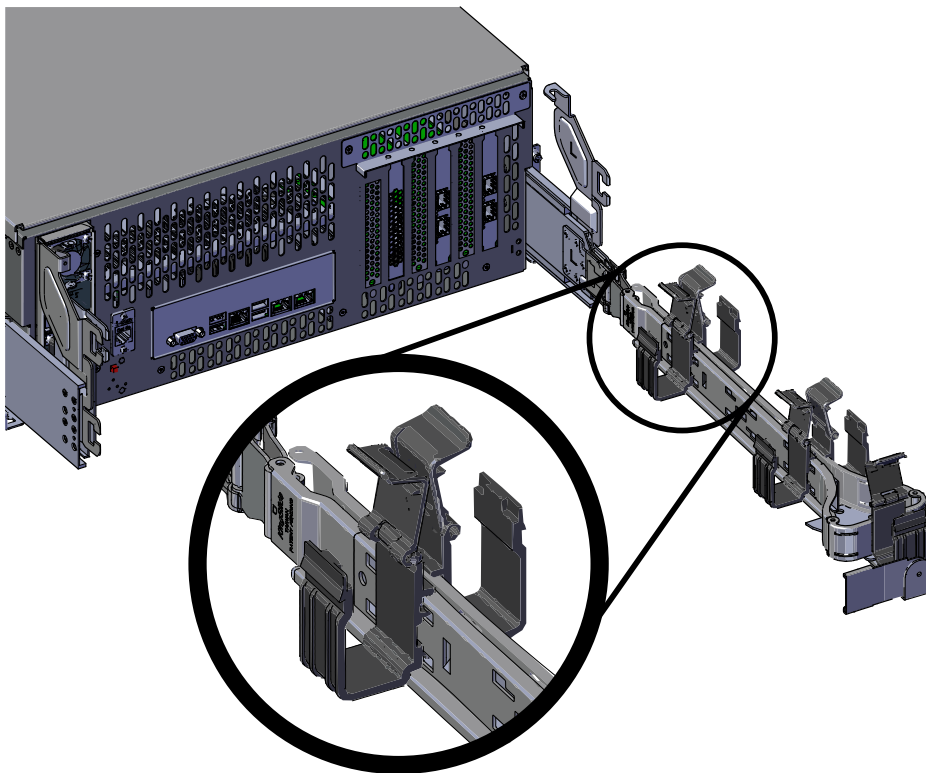
**Note:** The Heat Sink is not hot swappable. The enclosure must be powered-down, disconnected from all cabling, and removed from the rack before replacing the Heat Sink.

**Table 39: Procedure Info**

Required Tools	Required Parts	# of People Required	Time Required
<ul style="list-style-type: none"> <li>• T30 Torx Screwdriver</li> <li>• Plastic Spudger (not provided)</li> <li>• Isopropyl Alcohol and lint-free wipes (not provided)</li> </ul>	<ul style="list-style-type: none"> <li>• T30 Torx screws</li> </ul>	3	~2h

1. Uncable the CMA.
  - a) Open all of the baskets on the CMA.

**Figure 146: Open Baskets**

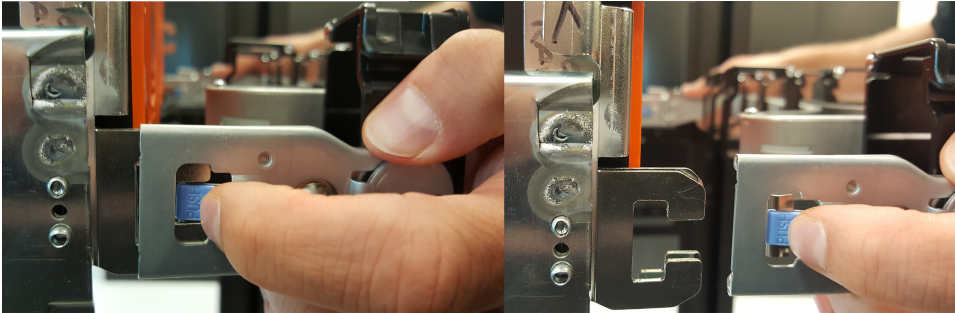


- b) Remove one cable from the CMA at a time making sure not to put too much strain on the arm.



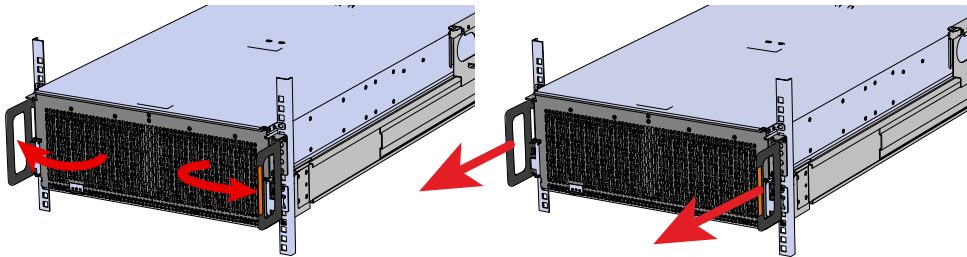
2. Unlatch all of the connectors that attach the CMA to the enclosure and the rail by locating the latch release button and pressing it from either side of the latch. There are three total connections that need to be removed, one at the elbow and two at the opposite end.

**Figure 147: Unlatching a CMA Connector**



3. Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

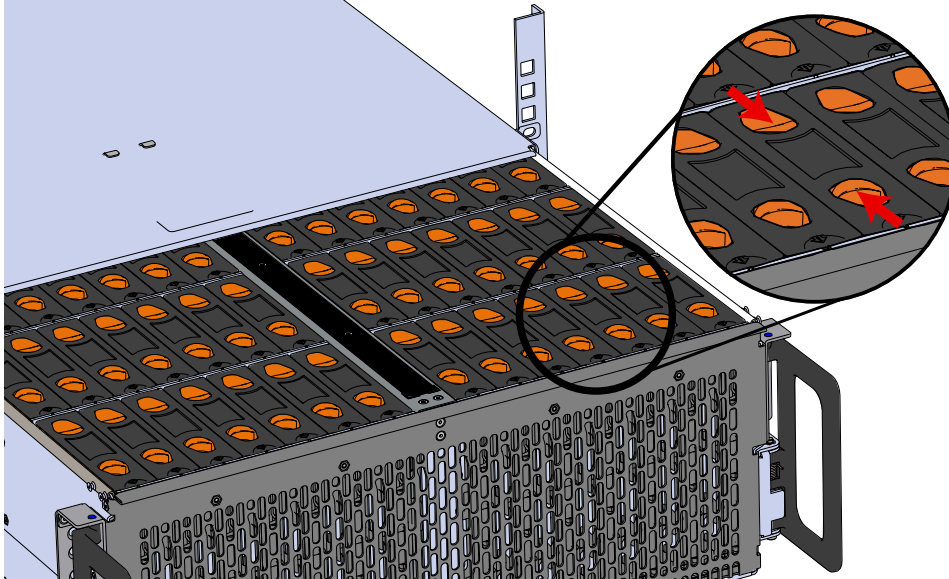
**Figure 148: Chassis Handle Operation**



4. Remove all of the drives from the chassis before uninstalling the chassis. Be prepared to label the drives as they are removed so they can be reinstalled in the same location in the new chassis.
5. Follow these steps to remove a Drive Assembly.
  - a) Find the latch release mechanism on the Drive Assembly being removed.

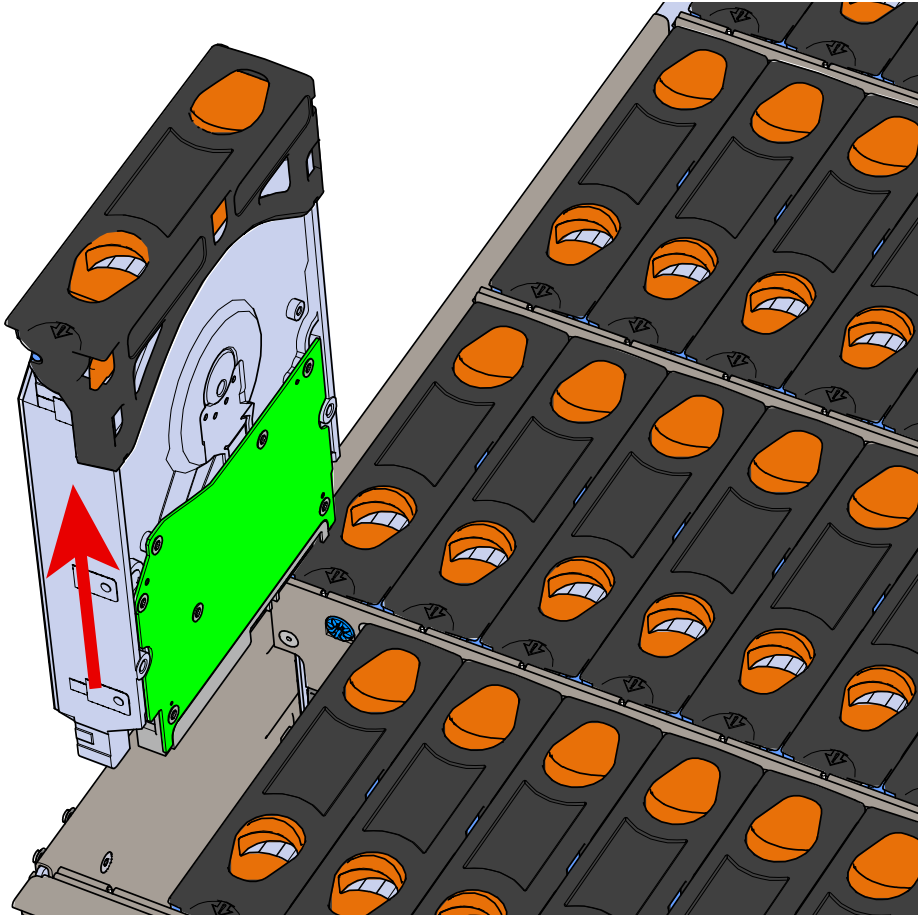
- b) Insert a finger and a thumb into the latch release and pinch to unlatch the Drive Assembly.

**Figure 149: Unlatch Drive Carrier (IOM Not Shown)**



- c) Lift the Drive Assembly free from the enclosure.

**Figure 150: Removing Drive Assembly**



6. Follow the previous step for each drive in the enclosure. Attach a label or mark the drives with the drive slot they were removed from in order to add them to the same slot in the future. Store the drives in an ESD safe location until the drives are ready to be installed back into an enclosure.

7. Release the safety latch on the inner rails on each side of the chassis as shown in the following image.

**Figure 151: Inner Rail Safety Latch Release**




8. Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. Make sure that the top cover comes with the chassis as it is extended out of the rack. The safety latches will prevent the enclosure from coming out of the rack completely.
9. Remove the chassis from the rack.
  - a) Be prepared to support the enclosure once it is free of the rails by having a second person or a lift to support the enclosure
  - b) Grasp both handles at the front of the enclosure and pull with even pressure until the enclosure will not extend further.
  - c) Locate the safety catches on the inner rails attached to the enclosure.

**Figure 152: Safety Latch Release**



- d) Depress the latch release lever for the safety latches on the rail and push the chassis very slightly forward. The chassis is now unsecured from the rack.
- e) Ensure that you have the proper support mechanism to hold the chassis in position, whether that be a team lifting partner or an appropriate lift.

---

**Warning:**  Do not lift the chassis by the Cable Tray while removing the chassis from the rack OR while installing it into a rack. This can cause serious damage to the unit or serious bodily harm to those handling the unit. Always team lift the chassis by gripping the underside of the unit, and never try to lift a chassis that is filled with drives.

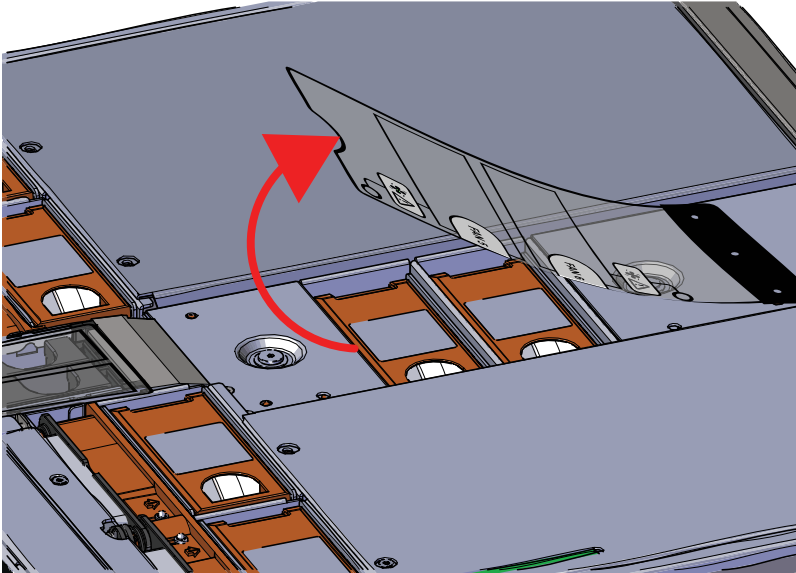
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- f) Slide the chassis forward to free it from the rails. Place the chassis in a safe location to avoid damage.
- 10.** **Attention:** Place the enclosure on a flat ESD safe surface and ensure it is stable before continuing with the procedure.
- 

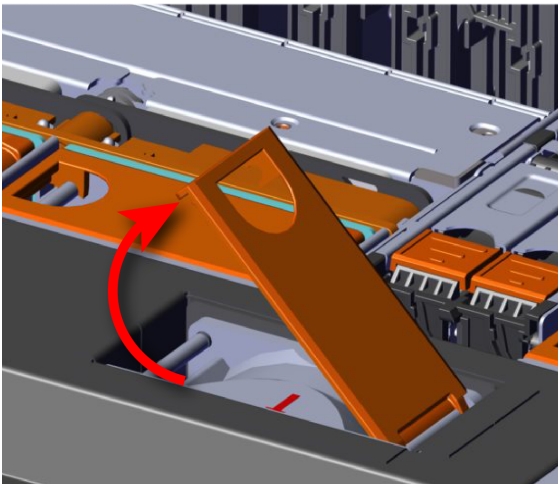
- 11.** Uninstall the internal System Fan.

- a) Lift the System Fan flap and insert a finger into the service hole on the top of the System Fan and pull up to release the latch.

**Figure 153: Lift the System Fan Flap**

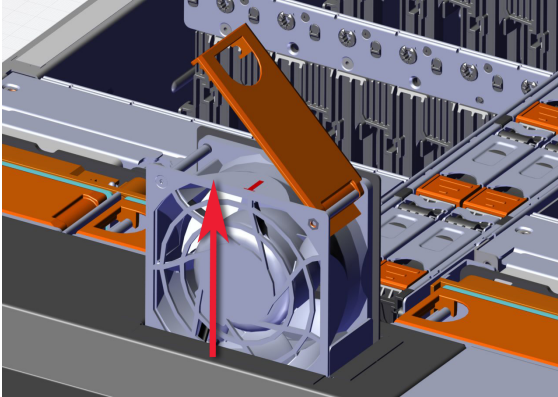


**Figure 154: Unlatching System Fan**



- b) Use the handle to pull evenly on the component to remove it from the enclosure.

**Figure 155: Removing System Fans**



12. Uninstall the rest of the system fans in the same manner as the first.
13. Uninstall server cover panel on both sides of the enclosure that contains the failed Heat Sink.

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**Note:** Uninstall the server cover panel on the side that requires the CPU replacement. The same steps to uninstall the server cover panel apply to both sides of the enclosure with the exception of the number of screws that secure the server cover panel. From the rear of the enclosure, the left panel contains two screws. The panel on the right side of the enclosure contains one screw.

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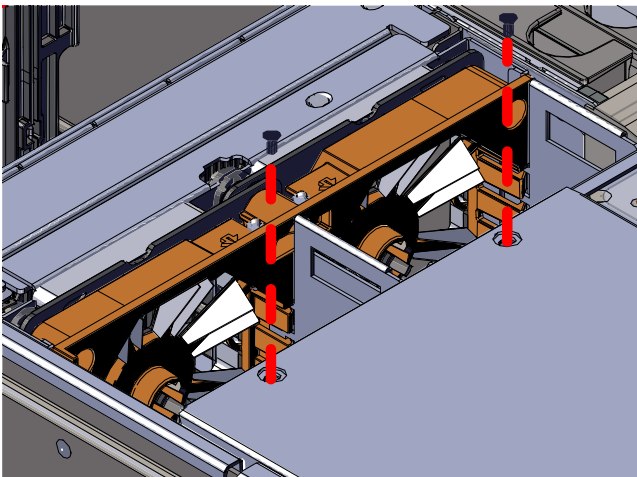
- a) Remove the screws that secure the server cover panels to the chassis using a T7 Torx screwdriver.

---

**Note:** When at the rear of the enclosure, the left server cover panel contains two T7 Torx screws. The left server cover panel contains only one T7 Torx screw.

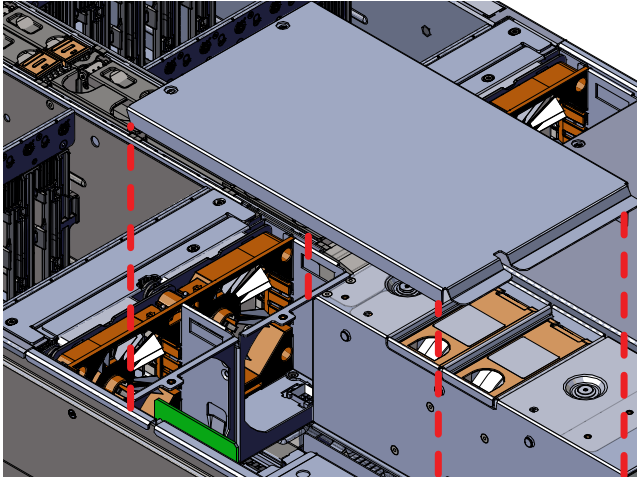
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**Figure 156: Removing the Server Cover Panel Screws**



- b) Remove the server cover panel by carefully pulling on the edge where the screws were removed.

**Figure 157: Removing the Server Cover Panel**



14. Uninstall the fan bays.

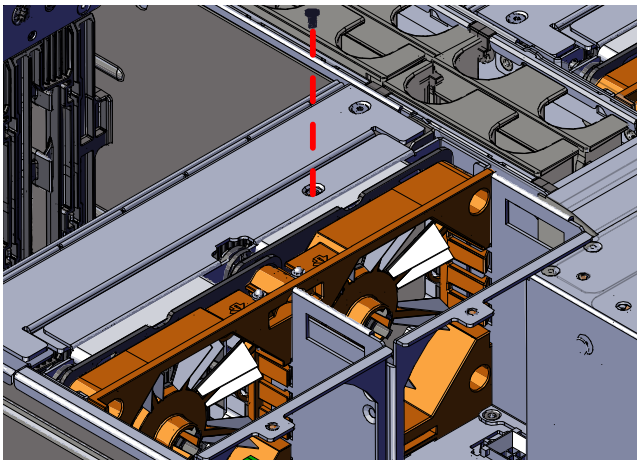
---

**Note:** Uninstall the fan bay on both sides.

---

- a) Remove the screw that secures the fan bay to the chassis.

**Figure 158: Removing the Fan Bay Screws**

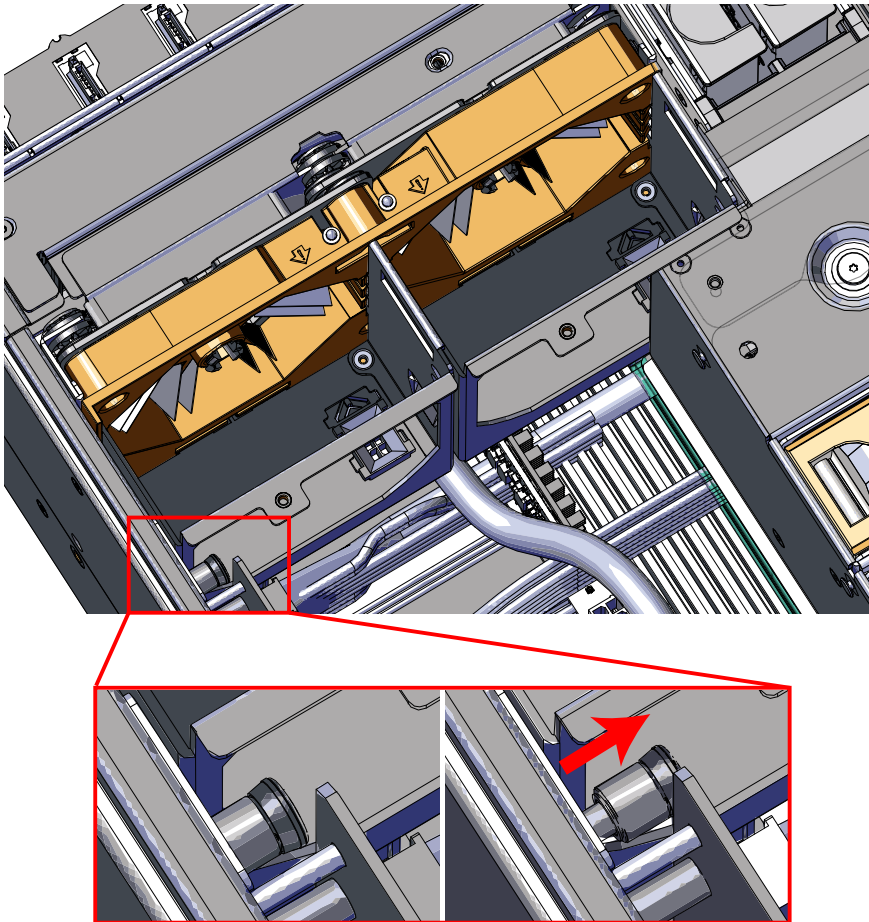


- b) Locate the pin that secures the outside of the fan bay to the chassis and pull the pin out and pull up on the fan bay until the cage is clear of the chassis.



**Note:** The fan bay is connected to the baseboard with a cable and does not need to be disconnected. When removing the fan bay, lay the assembly on the drive cage.

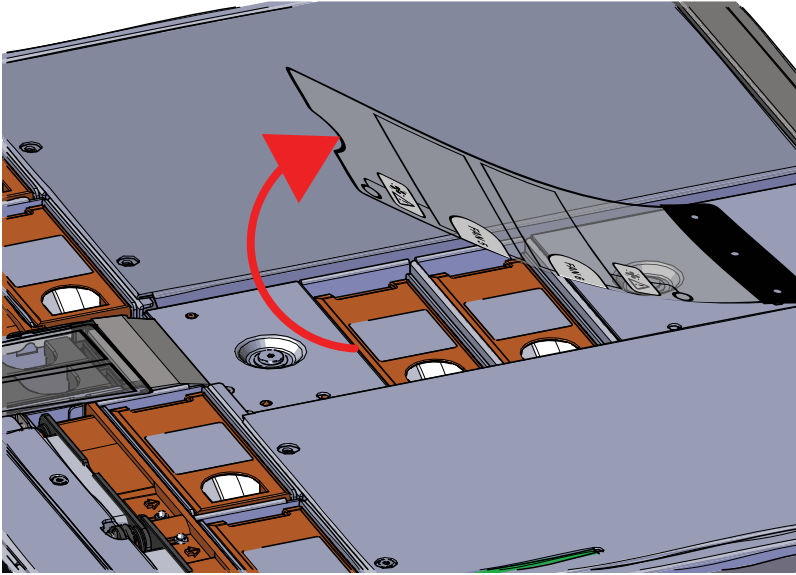
**Figure 159: Fan Bay Pin**



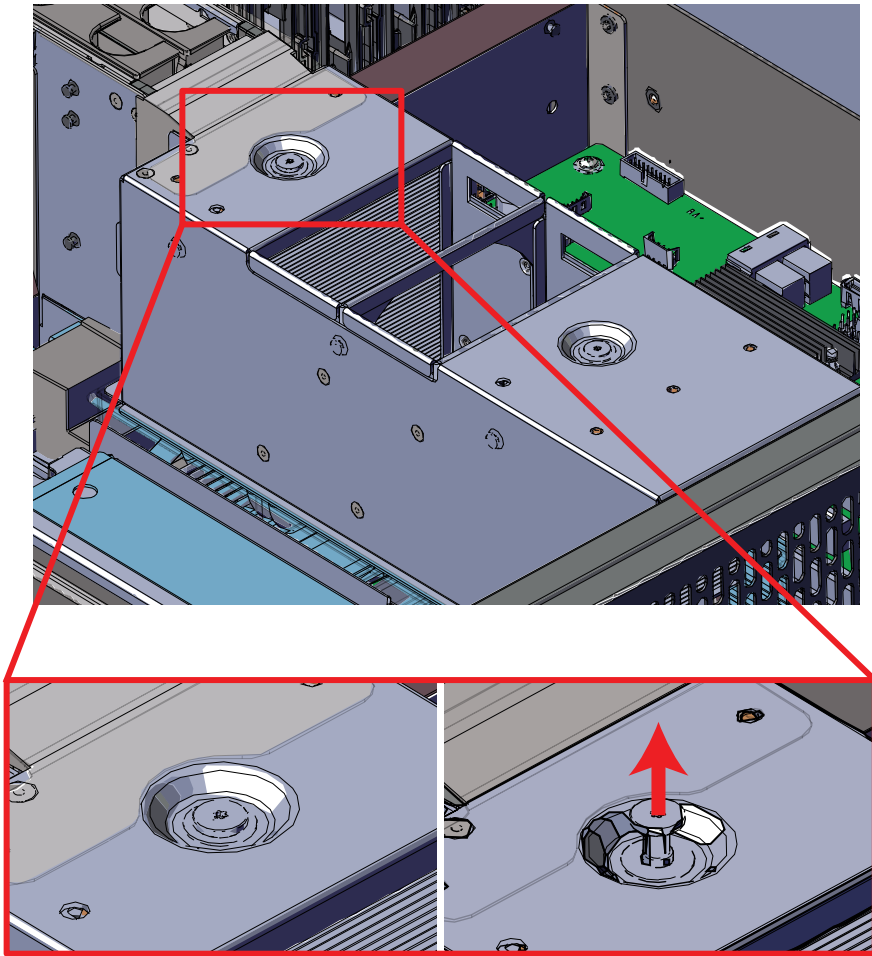
15. Uninstall the remaining fan bay in the same manner as the first.
16. Uninstall the System Fan Bay.

- a) Lift the system fan flap and loosen the captive screws that secure the system fan bay to the chassis until the cover comes loose. The screws will be retained within the System Fan Bay while uninstalling the part.

**Figure 160: Lift the System Fan Flap**

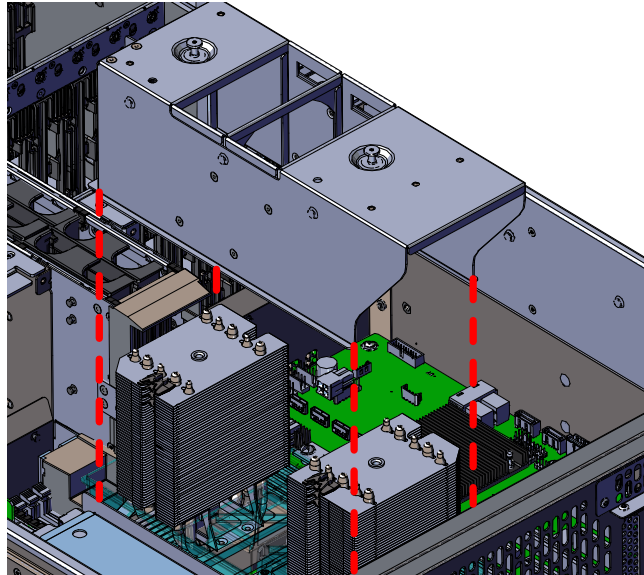


**Figure 161: Loosening the System Fan Bay Captive Screws**



- b) Slide the system fan bay out of the chassis and set it aside.

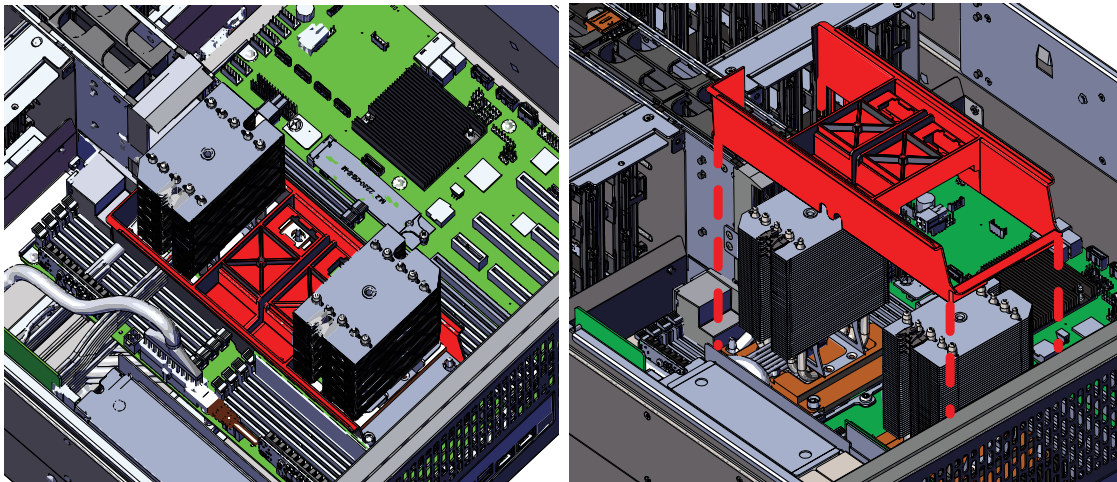
**Figure 162: Removing the System Fan Bay**



**17. Uninstall the System Fan base.**

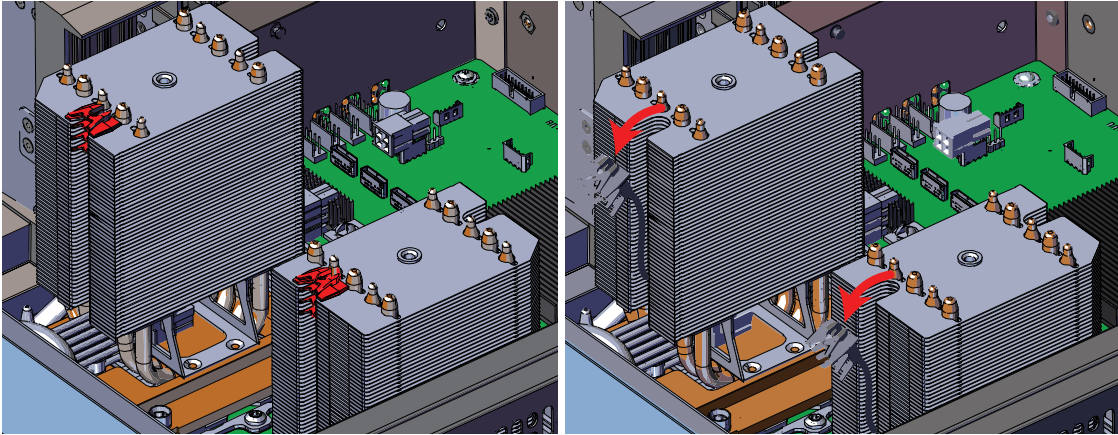
- a) Slide the system fan base up and over the CPUs until clear of the CPUs. Set the system fan base to the side with cables still attached. The cables are long enough to remain connected during these steps.

**Figure 163: Removing the System Fan Base (highlighted in red)**



- b) Locate and remove the LED brackets that are attached to the Heat Sink.

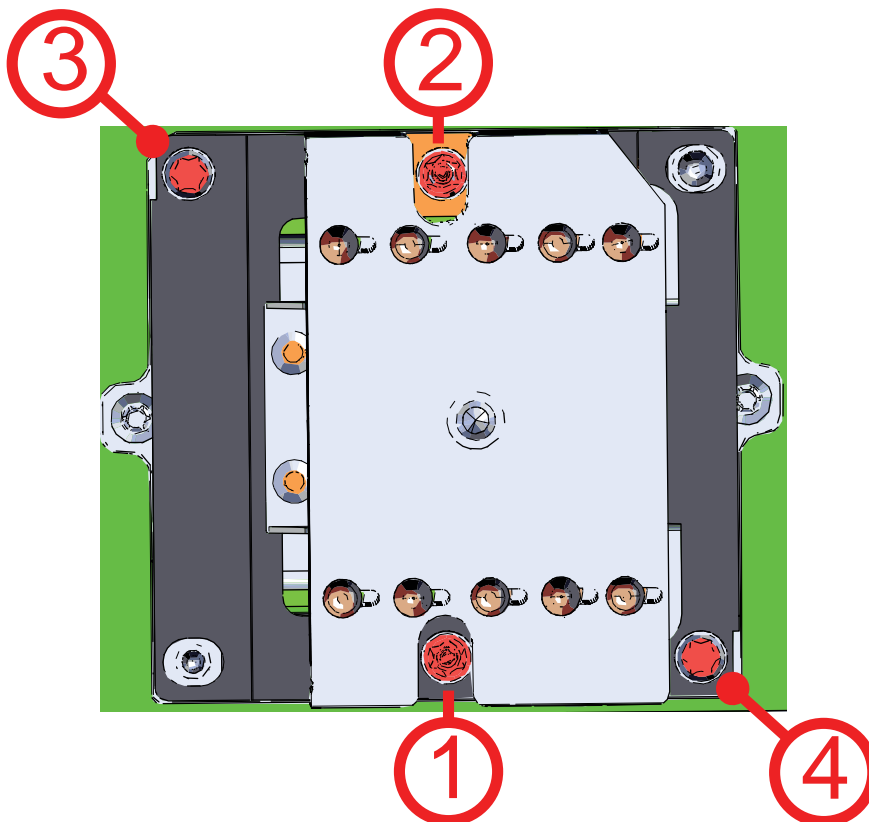
**Figure 164: Uninstalling the CPU LED Brackets**



**18. Uninstall the Heat Sink.**

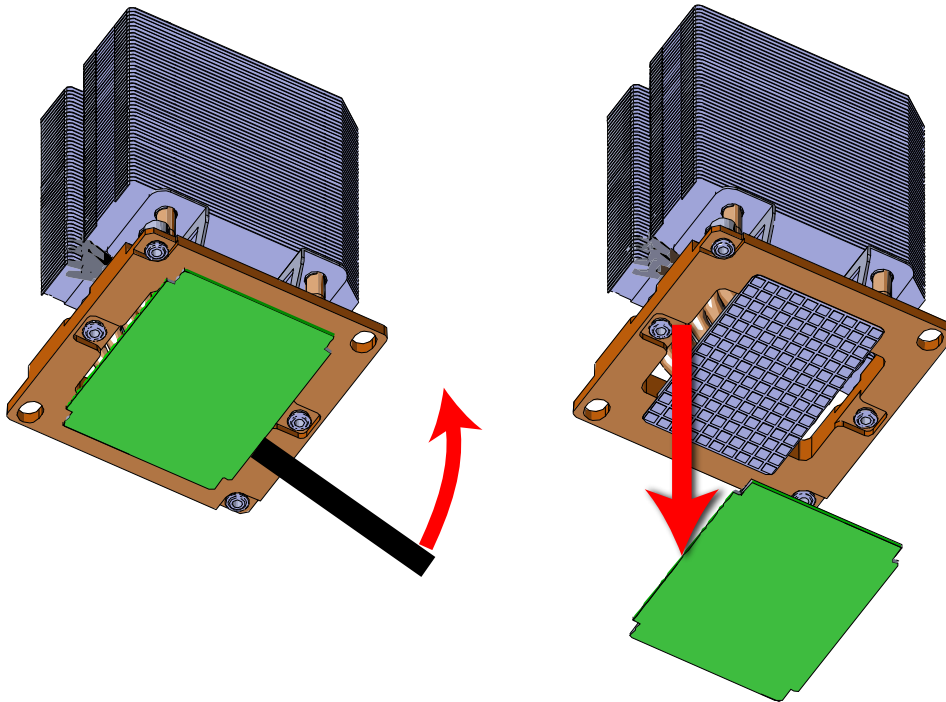
- a) Locate the failed Heat Sink.  
b) The Heat Sink must be removed by loosening the Torx T30 screws in a specific order. Use the following diagram to determine the specific order.

**Figure 165: Heat Sink Removal Order**



- c) Slide the Heat Sink clear of the socket alignment pins.
19. Remove the CPU from the Heat Sink.
- a) Locate the seam that connects the CPU and Heat Sink.

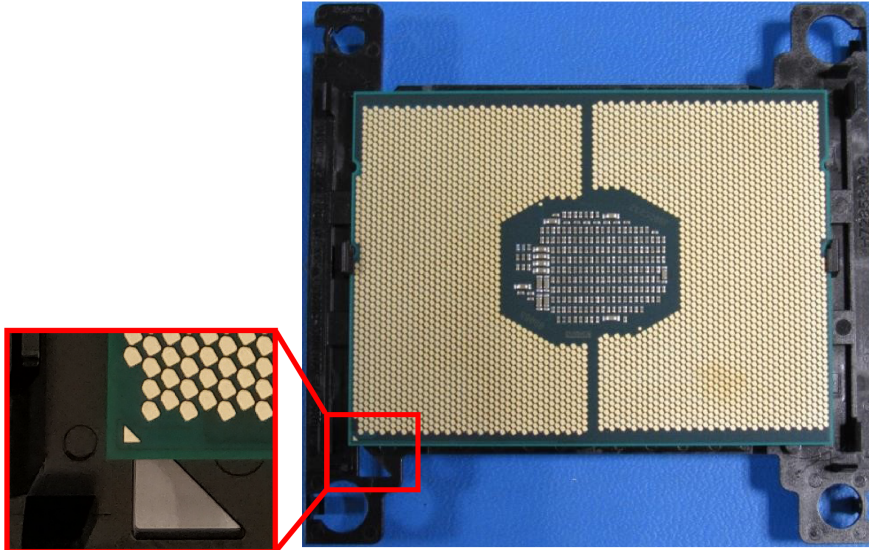
**Figure 166: Removing the CPU from the Heat Sink with a Spudger**



- b) Insert the edge of a plastic spudger in between the CPU and Heat Sink and carefully pry the two components apart. The plastic spudger may need to be worked around the edges of the entire CPU and Heat Sink to separate the two parts.
20. Install the Heat Sink onto the CPU.
- a) Clean the thermal compound from the top of the CPU using isopropyl alcohol and lint-free wipes. Ensure that the CPU is residue free and dry before installing the replacement Heat Sink.

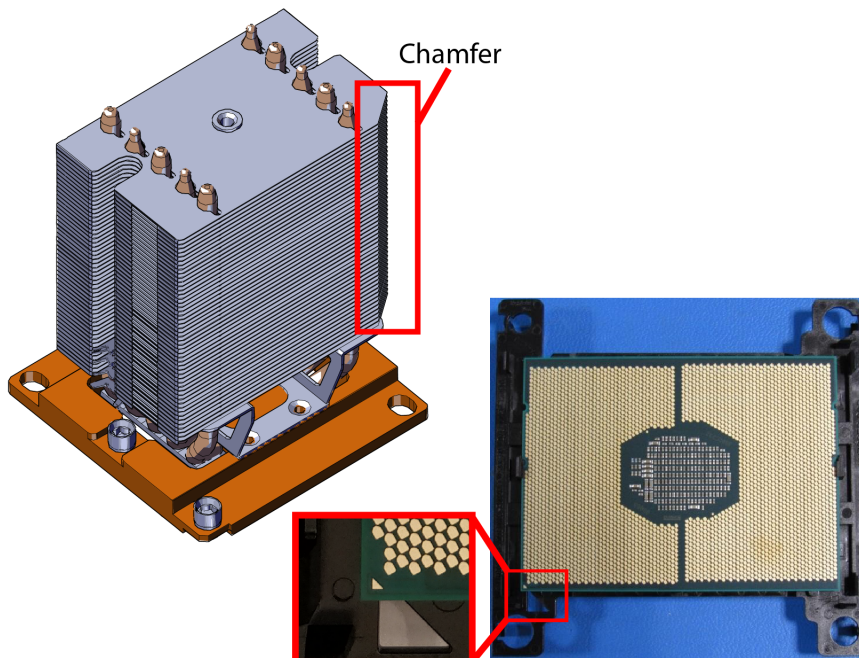
- b) Align the gold triangle on the CPU with the triangle on CPU retainer and snap the CPU into the plastic CPU retainer.

**Figure 167: CPU and CPR Retainer Triangles**



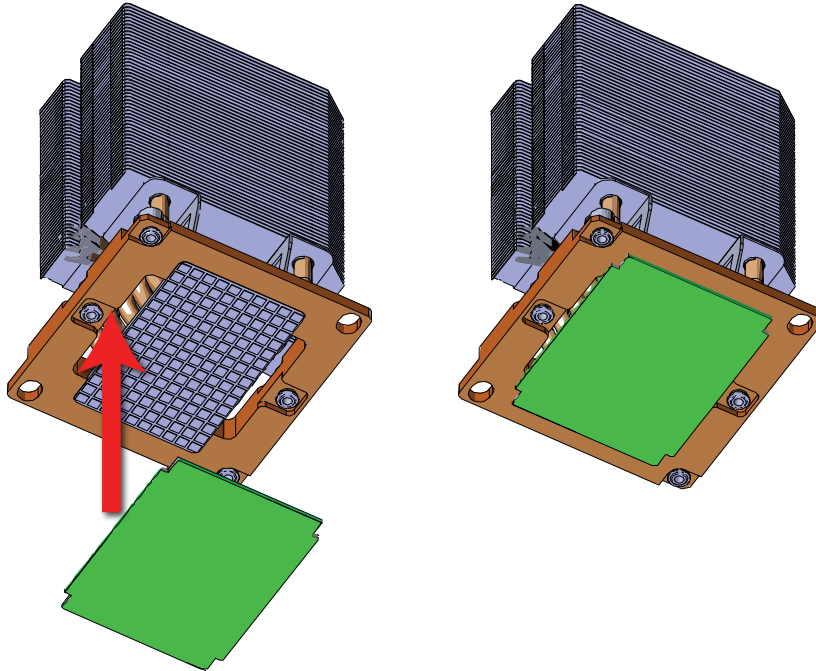
- c) Unpack and remove the protective plastic tray that is attached to the bottom of the Heat Sink. The protective plastic tray protects the thermal compound until it is ready to be installed.  
d) Align the triangles on the CPU and CPU retainer with the chamfer on the Heat Sink.

**Figure 168: Heat Sink Chamfer**



- e) Press the CPU retainer firmly into the Heat Sink to ensure the thermal compound is evenly spread out across the CPU.

**Figure 169: Attaching the CPU to the Heat Sink**

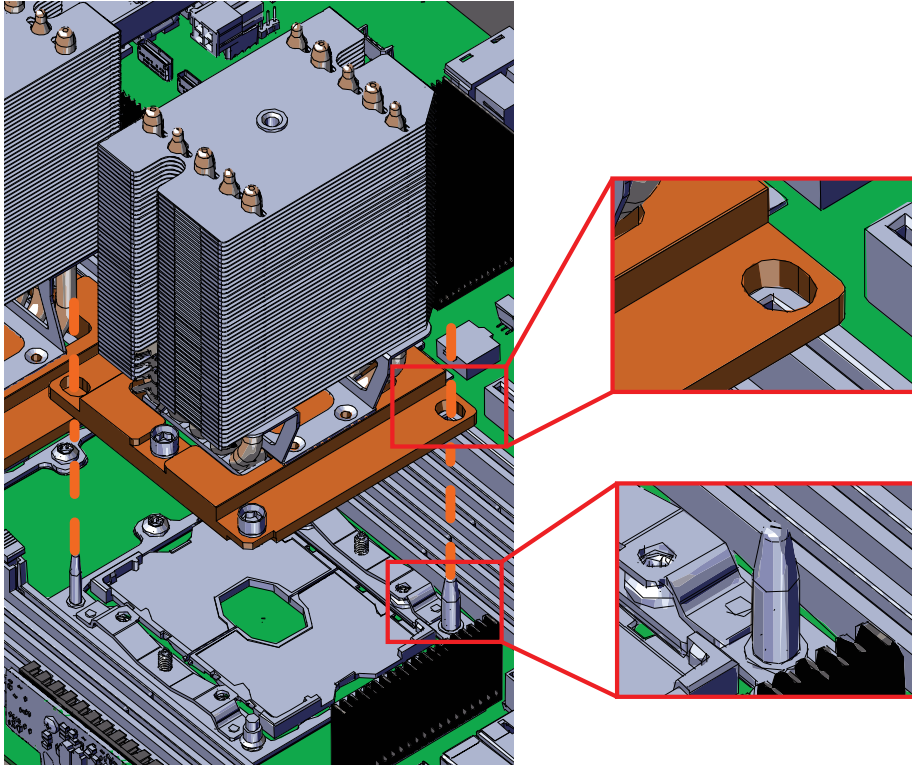


21. Install the Heat Sink onto the CPU socket.
  - a) Locate the socket alignment pin on the baseboard and the alignment hole on the Heat Sink.



- b) Carefully place the Heat Sink module in position on the socket alignment pins.

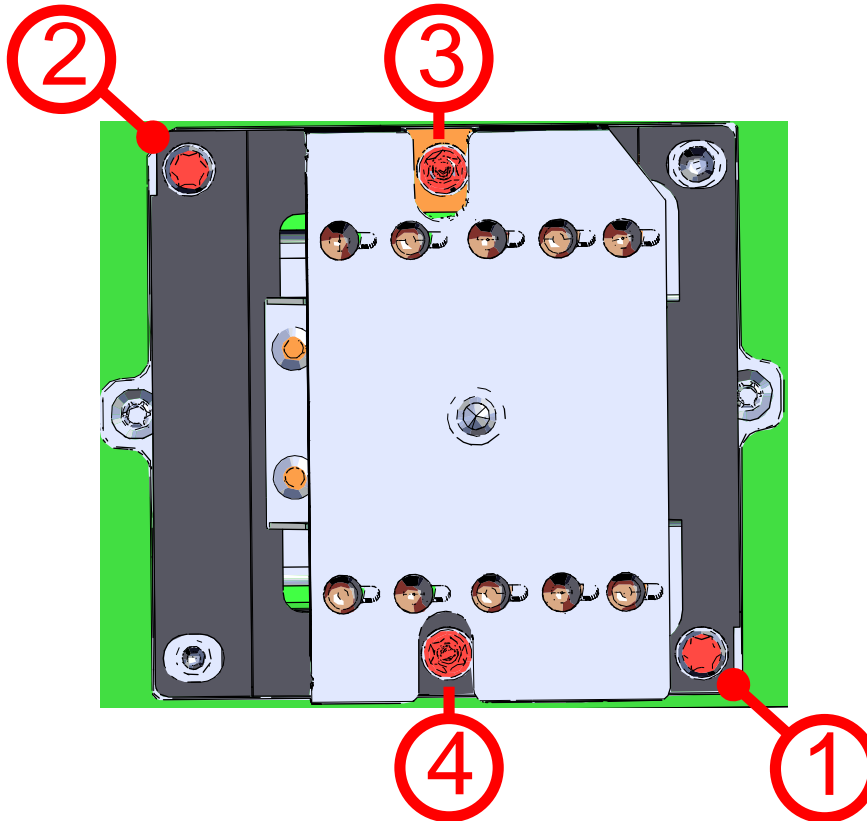
**Figure 170: Heat Sink Alignment Pins**



- c) The Heat Sink must be installed by tightening the Torx T30 screws in a specific order. Use the following diagram to determine the specific order.

**Note:** The Heat Sink screws must be tightened to a torque setting of 12in.-lbs. Do not over-tighten. Over-tightening may cause damage to the parts.

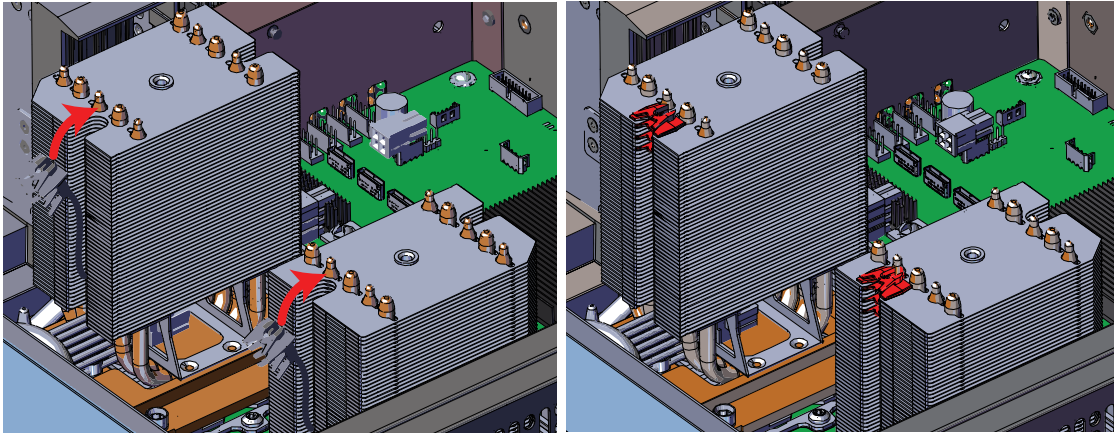
**Figure 171: Heat Sink Installation Order**



22. Install the System Fan base.
  - a) Slide the system fan base down over the CPUs until the base rests on the baseboard.

- b) Slide the LED cable and LED bracket into the Heat Sink channel and snap it into place at the top of the Heat Sink.

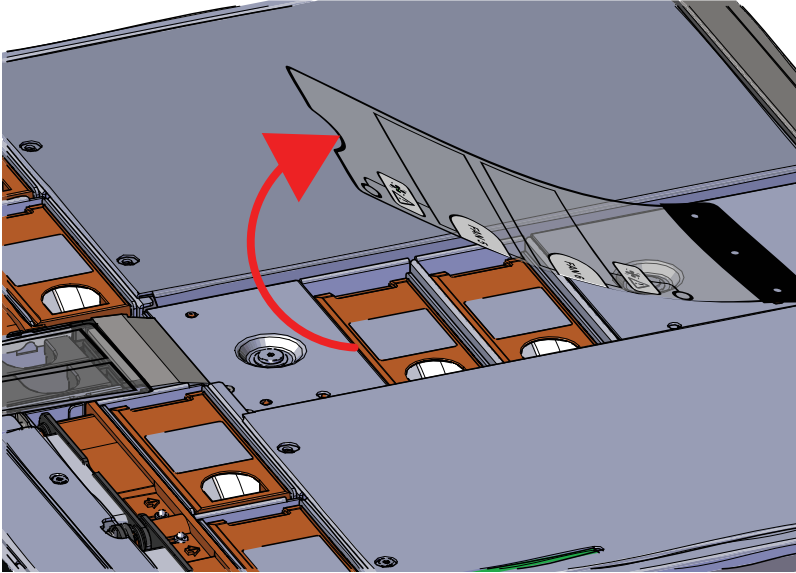
**Figure 172: Installing the CPU LED Brackets**



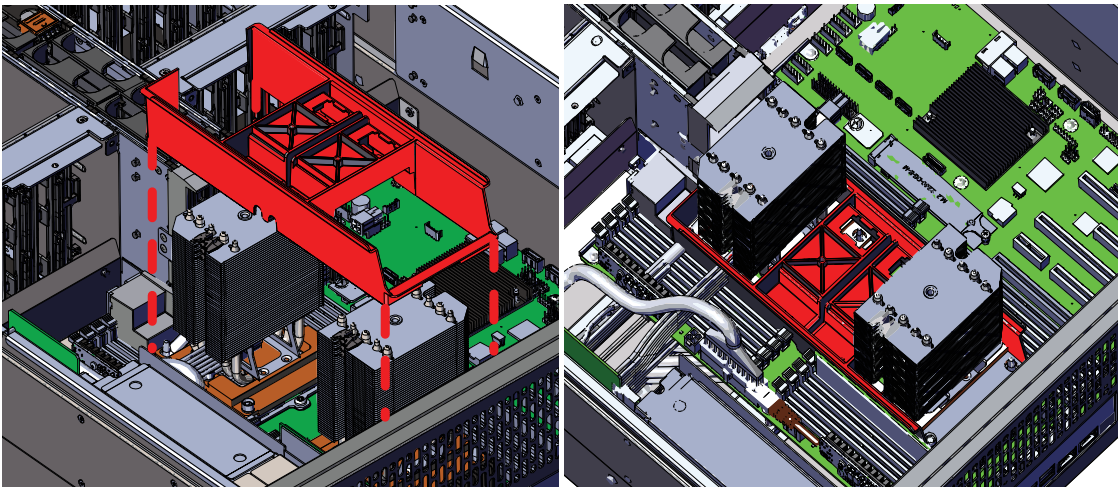
- c) Install the remaining LED bracket in the same manner as the first.
- 23. Install the System Fan Bay.**
- a) Slide the system fan bay down over the CPUs until the captive screws line up with screw holes on the Heat Sink.

- b) Lift the system fan flap and push in and tighten the captive screws until the system fan bay is secure.

**Figure 173: Lift the System Fan Flap**



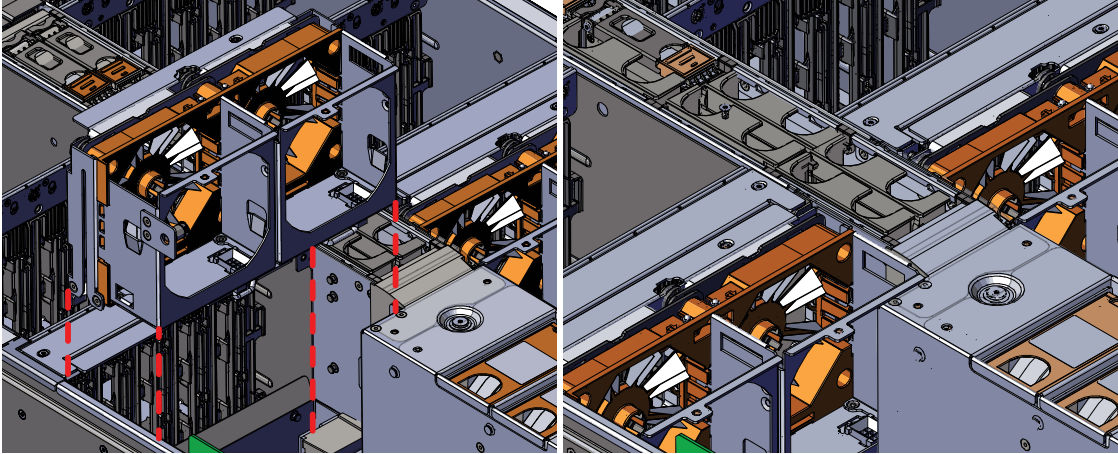
**Figure 174: Installing the System Fan Bay Captive Screws (highlighted in red)**



- 24.** Install the fan bay.
- a) Align the first fan bay within the location that in which it was uninstalled.

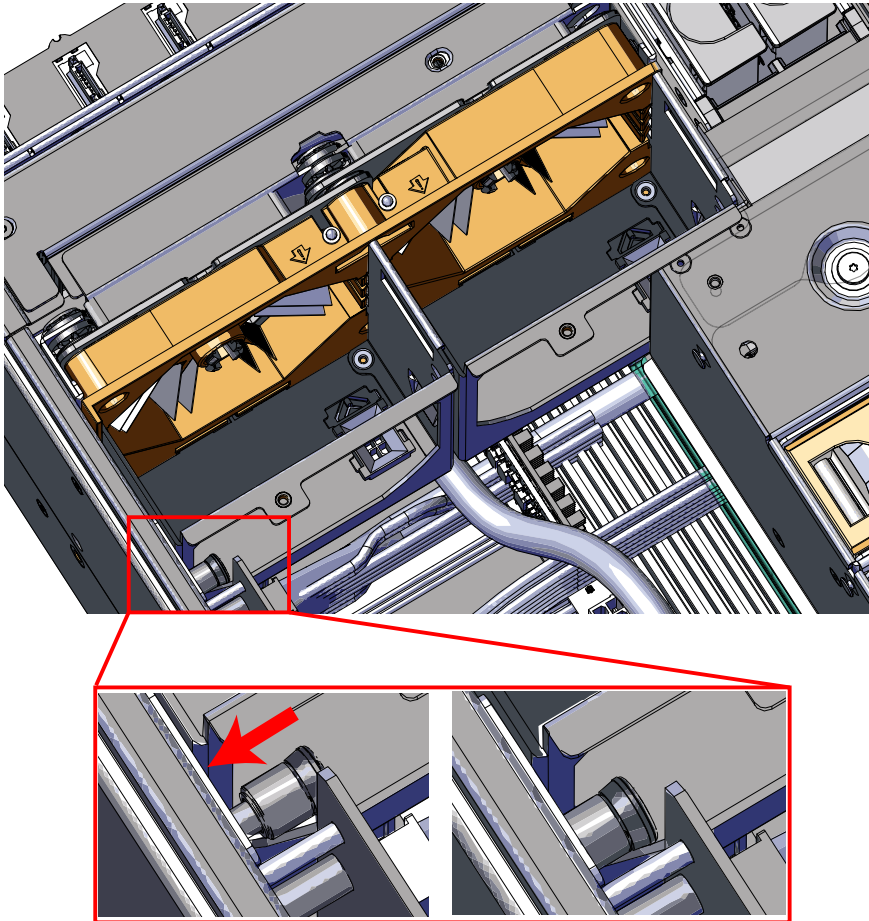
- b) Slide the fan bay into the chassis taking care not to pinch or damage any cables.

**Figure 175: Installing the Fan Bay**



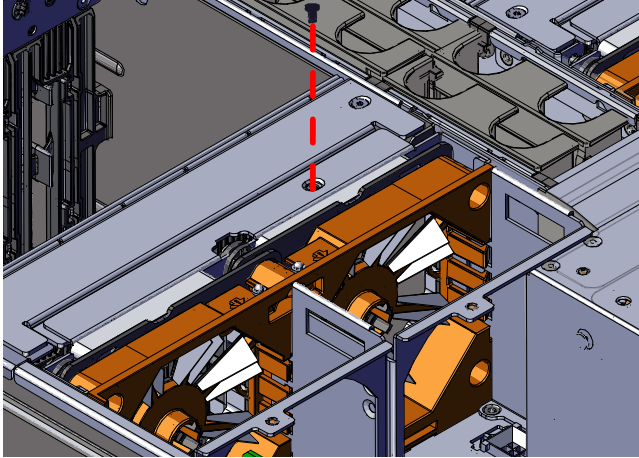
- c) Ensure that the pin located on the inside of the fan bay is latched onto the chassis during the process of seating the fan bay. If the pin did not engage, use a Flathead screwdriver to disengage the pin by pulling it out and repositioning the fan bay until the pin engages with the chassis.

**Figure 176: Fan Bay Pin Engaged**



- d) Install the screw that secures the mid-bulkhead fan cage to the chassis.

**Figure 177: Fan Bay Screw**



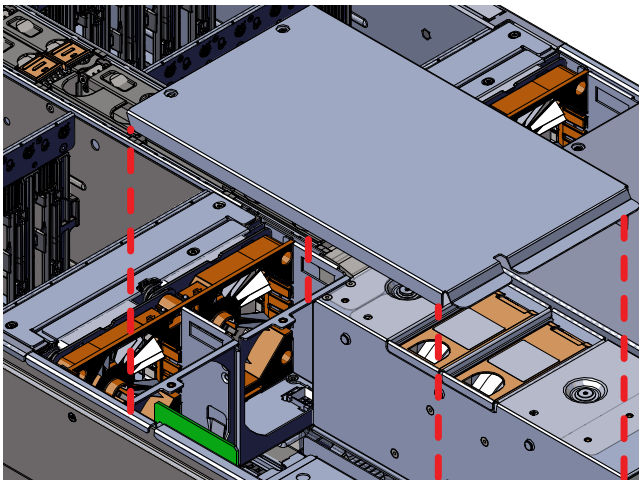
25. Install the remaining fan bay in the same manner as the first.  
26. Install server cover panels.  
a) Align and press the server panel cover into place over the server bay.

---

**Note:** The Formex material that the panel is made from is flexible and will allow for the panel to be flexed to fit back into its original placement.

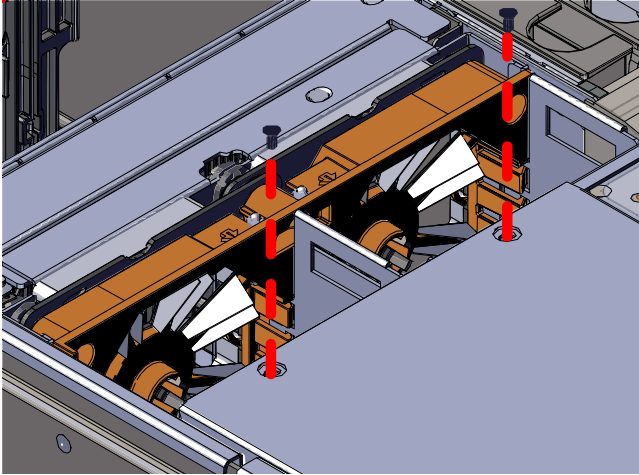
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**Figure 178: Installing the Server Cover Panel**



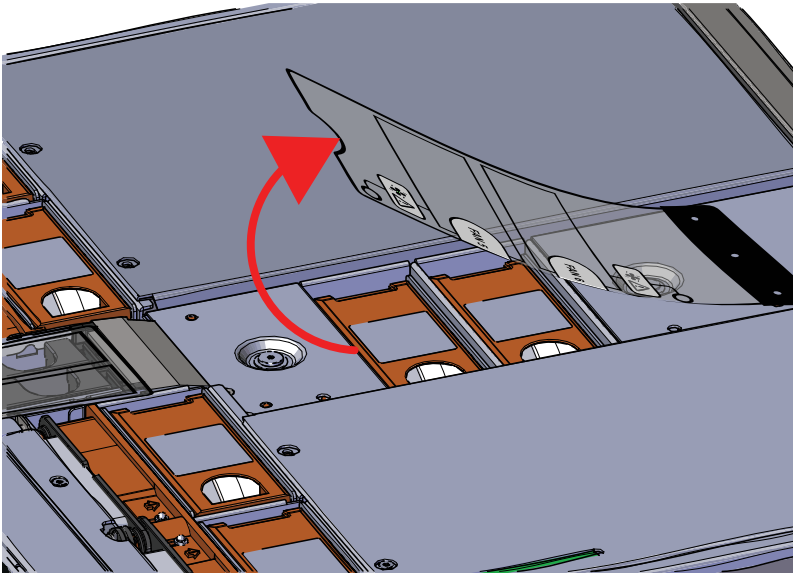
- b) Secure the server cover panel using the original screws and a T7 Torx screwdriver.

**Figure 179: Server Cover Panel Screws**



27. Install the System Fan.
  - a) Lift the System Fan flap and look inside the empty slot that will receive the System Fan and orient the System Fan so that the connector on the bottom of the fan is on the proper side.

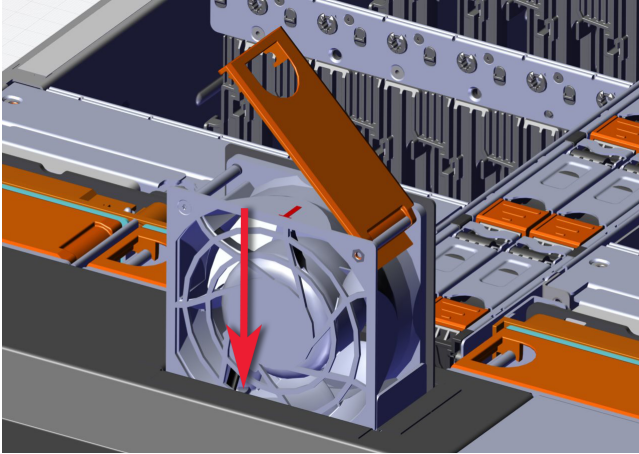
**Figure 180: Lift the System Fan Flap**





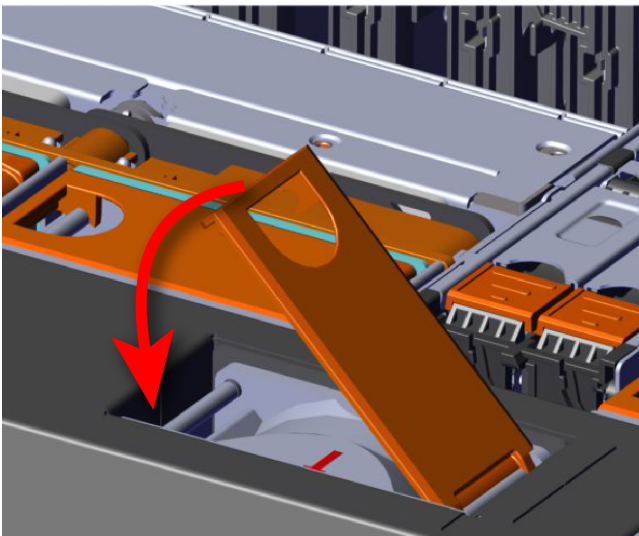
- b) Lower the fan down into the empty slot. Do not force it.

**Figure 181: Installing a System Fan**



- c) When the fan is fully inserted and the connectors are mated properly, close the housing cover clip as shown in the following image.

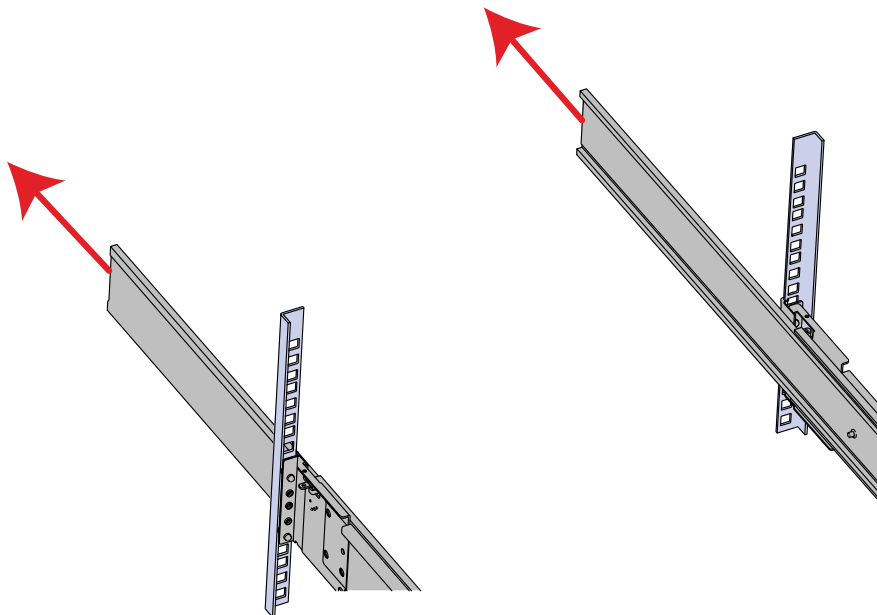
**Figure 182: Latching the Fan Housing Closed**



- 28.** Install the remaining system fans in the same manner as the first.


- 29. Extend the mid-rails out of the rack so that they are protruding from the front of the rack and the safety latches engage.


**Figure 183: Extend Mid-Rails**



- 30. Install the chassis into the rails.

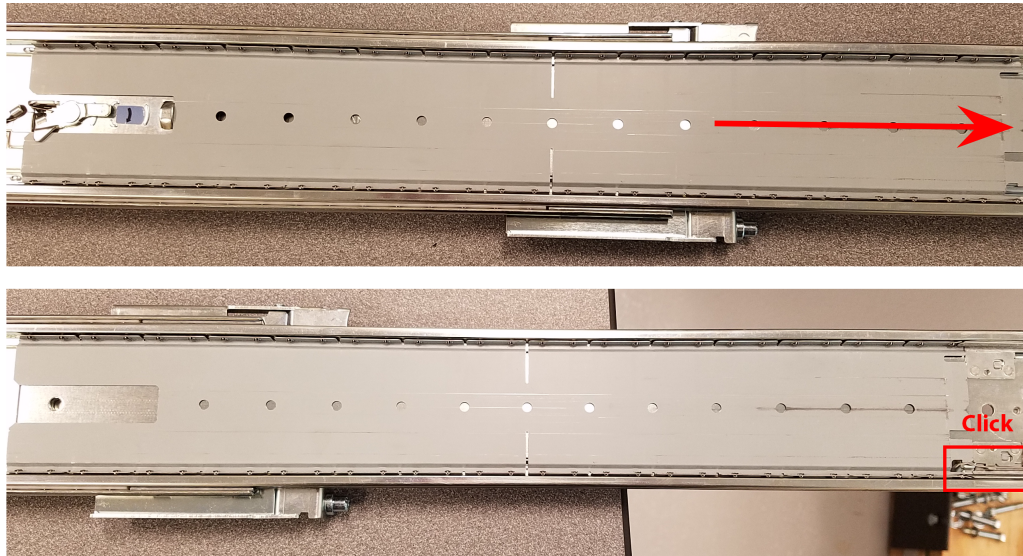
a)

**Caution:**  This step in the installation requires a minimum of 3 individuals to install safely, two to lift and one to guide the others whom may have difficulty seeing because the enclosure is in the way. Ensure that the appropriate measures are taken to safely support the enclosure during installation. The enclosure **MUST** have no drives installed and requires a two person team lift to install. **Do not attempt to lift the system if it is fully populated with drives.** The only case in which the system may be installed or removed with the drives populated is if the facility has a lift that is rated to handle the maximum weight of the fully loaded system.

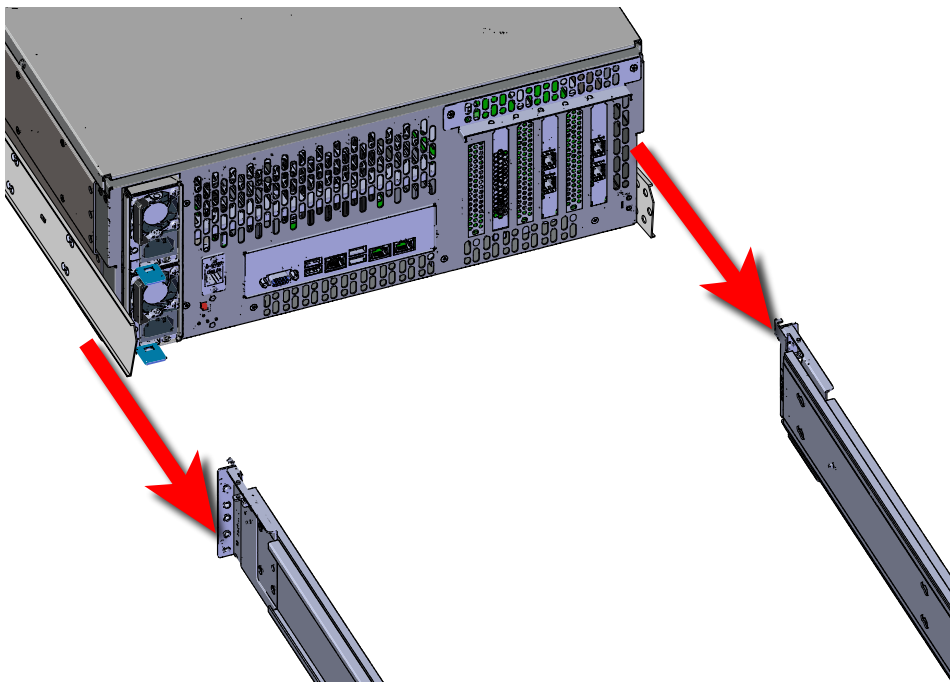
**Warning:**  Do not lift the chassis by the Cable Tray while removing the chassis from the rack OR while installing it into a rack. This can cause serious damage to the unit or serious

bodily harm to those handling the unit. Always team lift the chassis by gripping the underside of the unit, and never try to lift a chassis that is filled with drives.


**Figure 184: Bearing Plate**



**Figure 185: Installing the Chassis**



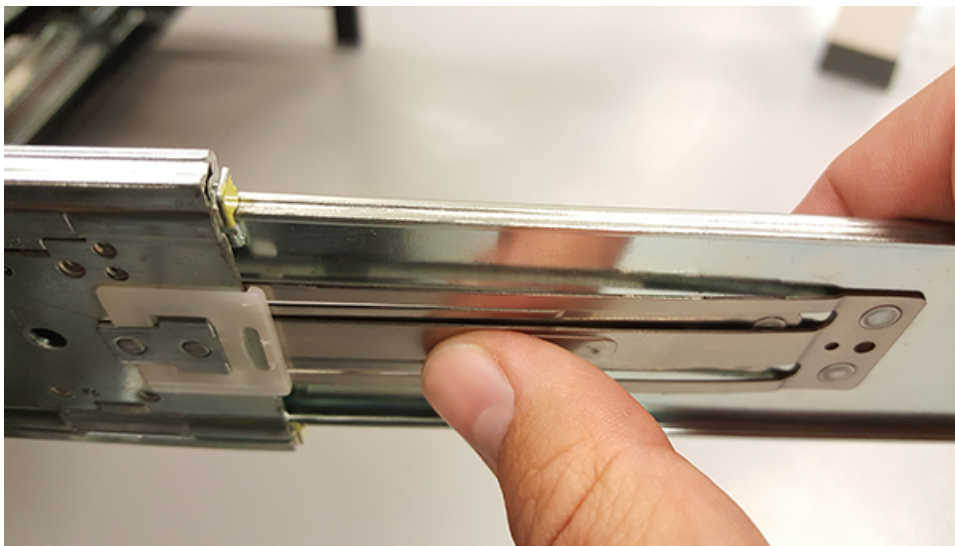
b)

**Caution:**  Make sure that the bearing plate on the inside of the mid-rails are fully forward and that the detent has engaged. This is to prevent potential damage due to improper mating of the rails.

Position one individual on each side of the enclosure to perform a team lift and have the third individual standing at the protruding rack rails to guide the chassis to mate with rack rails.

- c) Team-lift the enclosure until the inner rails that are attached to the chassis align with the extended mid-rails attached to the rack, and guide the inner rails on the chassis to mate with the rack rails.
- d) Once the rails are mated properly, slide the enclosure into the rack until it is stopped by the safety catch on the rails. Push the release lever on the safety latch located on the side of each of the rails and push the enclosure the rest of the way into the rack.

**Figure 186: Safety Latch Release**



- e) As the chassis is slid into the rack, position one installer at the rear of the rack to ensure that the pegs on the sides of the cover will slide correctly into the rear cover alignment brackets on both sides of the rack. If the chassis does not install smoothly or snags, check that the rear cover alignment brackets are not interfering with the chassis sidewalls, and try again.
31. Now that the chassis is installed, test the installation by sliding the enclosure in and out of the rack a minimum of three times. If the enclosure binds, catches, or displays any incorrect motion or behavior retry the installation.

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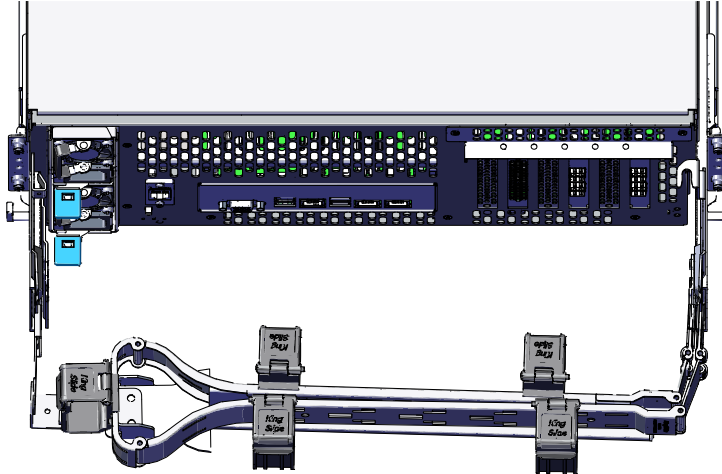
**Note:** Adjustments of the vertical rack rails may be required to fix any issues that may occur.

---

32. Install the CMA.
- a) Orient the CMA so that the elbow is on the left hand side.

- b) Attach all of the connectors to the brackets on the rails and chassis. There should be one at the elbow side and two at the other end.

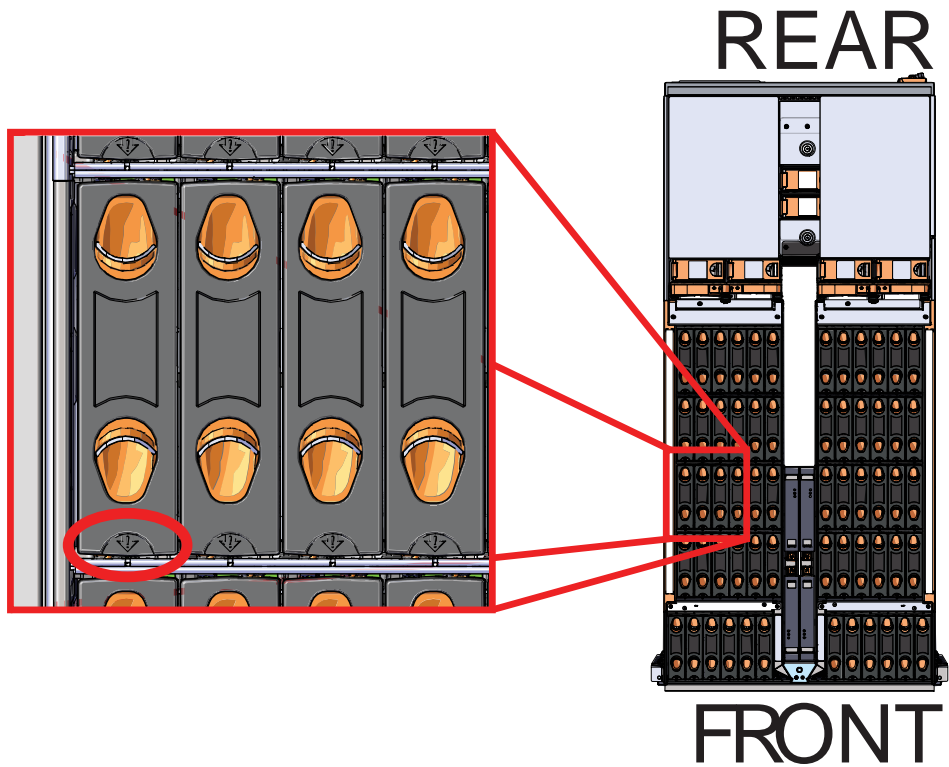
**Figure 187: CMA Orientation**



- c) Slowly slide the enclosure forward to ensure the CMA arm is operating properly, then slide it back into the rack.
- 33. Install the Drive Assembly.**
- a) Ensure that the enclosure has been pulled out of the rack until the rail latches engage.

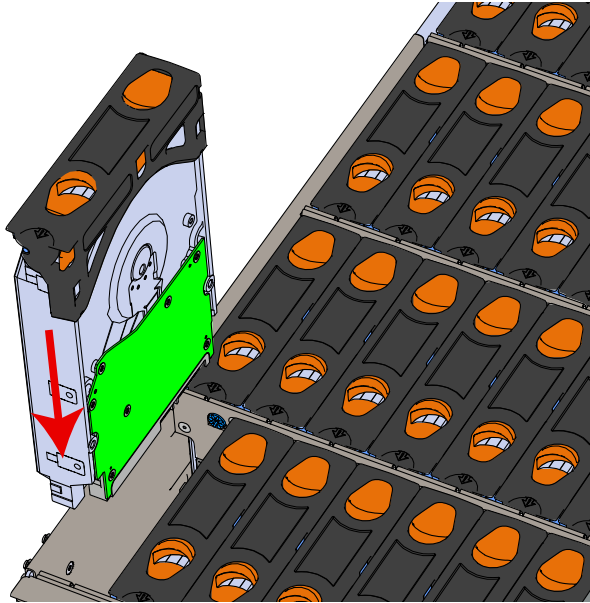
- b) Find the LED pointer on the top of the drive carrier. This pointer should point toward the front of the unit as shown in the following image.

**Figure 188: LED Pointer Orientation**



- c) Align the drive with the empty slot that will receive it. Lower it into the slot, making sure it stays level and does not snag.

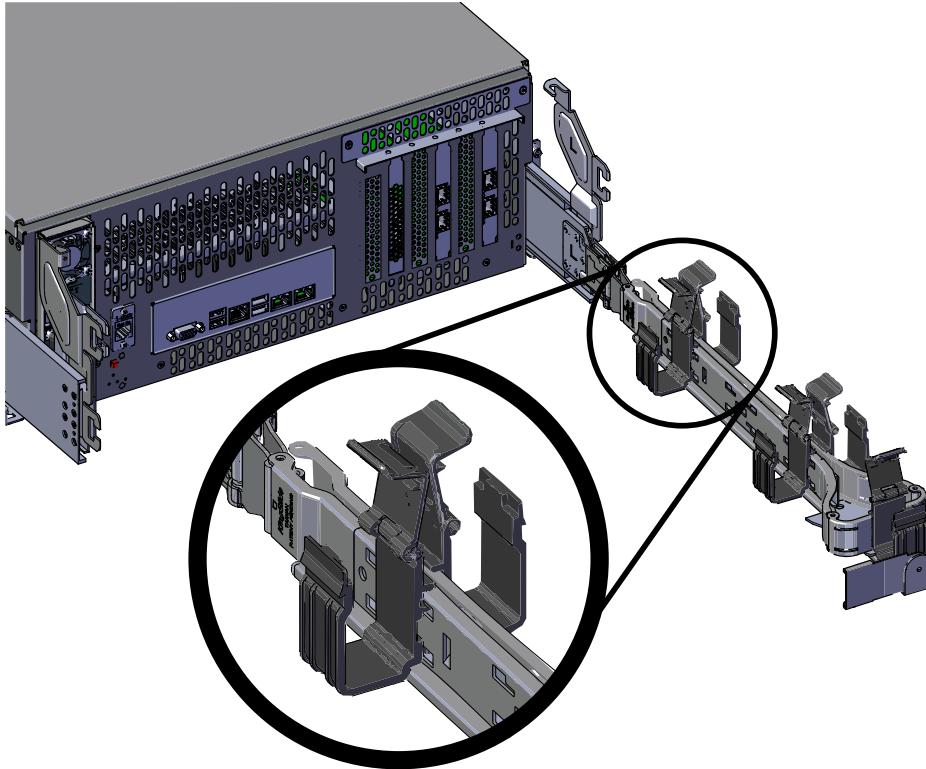
**Figure 189: Installing a Drive Assembly**



- d) Pinch the latch release and carefully press downward to seat the Drive Assembly the rest of the way.
34. Install each drive in the place it was removed from by following the labels or marks that were added earlier.
  35. Cable the CMA.
    - a) Unlatch the elbow side of the CMA arm and swing it forward by pressing the blue button that says "push" to unlatch it.

- b) Open all of the baskets

**Figure 190: Open Baskets**



- c) Route all of the cables being connected to the enclosure through the open baskets.
- d) Close all of the baskets.
- e) If the Ultrastar Serv60+8 is being installed in a rack and will subsequently be transported inside that rack, it is important to use the included cable tie to wrap the CMA bundle to ensure it does not get damaged during transport. If the Ultrastar Serv60+8 is instead being installed where it will operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.
- f) Reconnect the CMA at the elbow to the connectors on the rail.
- 36.** Test for binding in the extension of the CMA by gently pulling the enclosure out of the rack to ensure the cables extend properly and that the system doesn't bind at all. If it does, examine the point at which the binding occurred and adjust the seating of cables in the baskets, check the connections to the rails, and examine the joints of the CMA arm to ensure that they are all functioning properly.
- 37.** Make sure the CMA is in operational position by folding the arm in toward the enclosure and attaching the elbow end of the CMA to the connector that is attached to the rail. Verify that all of the cabling is in functional order and does not bind or catch.



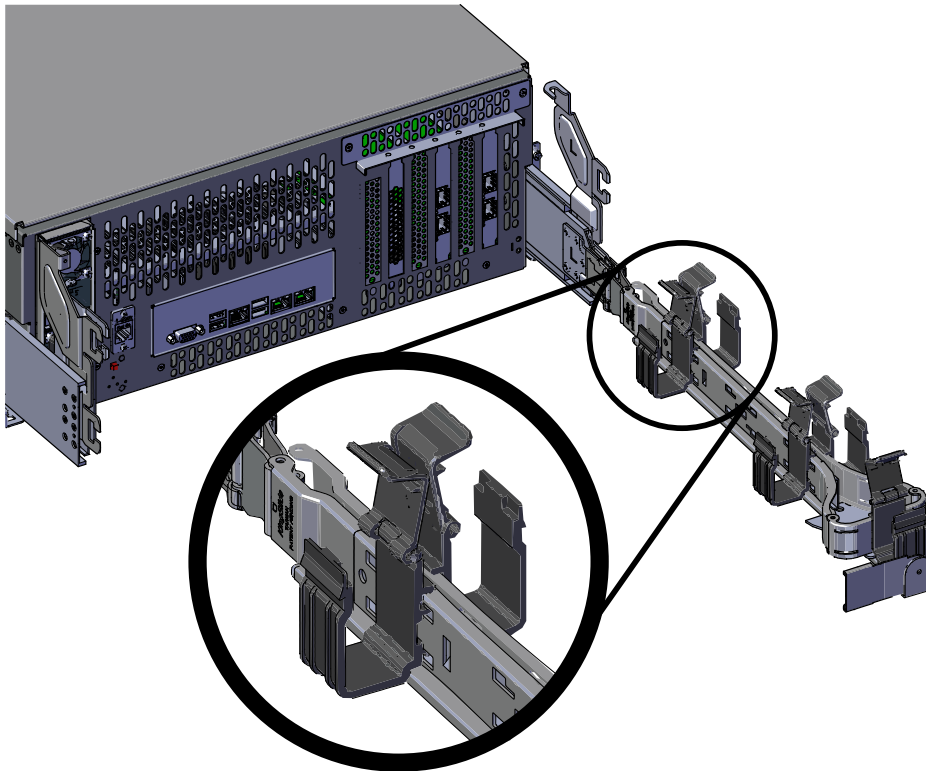
## 4.10 M.2 Replacement

**Table 40: Procedure Info**

Required Tools	Required Parts	# of People Required	Time Required
<ul style="list-style-type: none"><li>T7 Torx Screwdriver</li></ul>	<ul style="list-style-type: none"><li>T7 Torx screws</li></ul>	3	1h 30m

1. Uncable the CMA.
  - a) Open all of the baskets on the CMA.

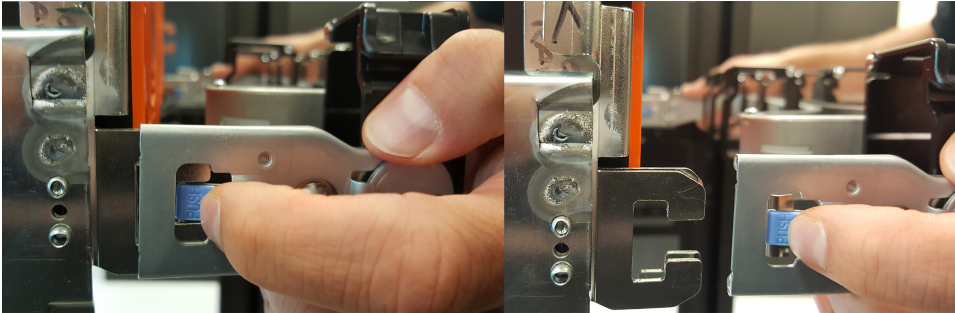
**Figure 191: Open Baskets**



- b) Remove one cable from the CMA at a time making sure not to put too much strain on the arm.

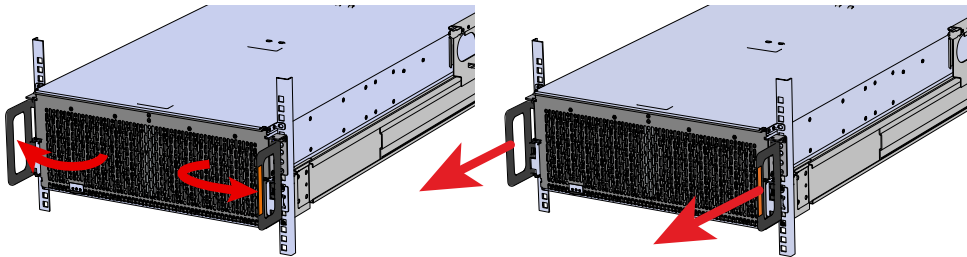
2. Unlatch all of the connectors that attach the CMA to the enclosure and the rail by locating the latch release button and pressing it from either side of the latch. There are three total connections that need to be removed, one at the elbow and two at the opposite end.

**Figure 192: Unlatching a CMA Connector**



3. Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

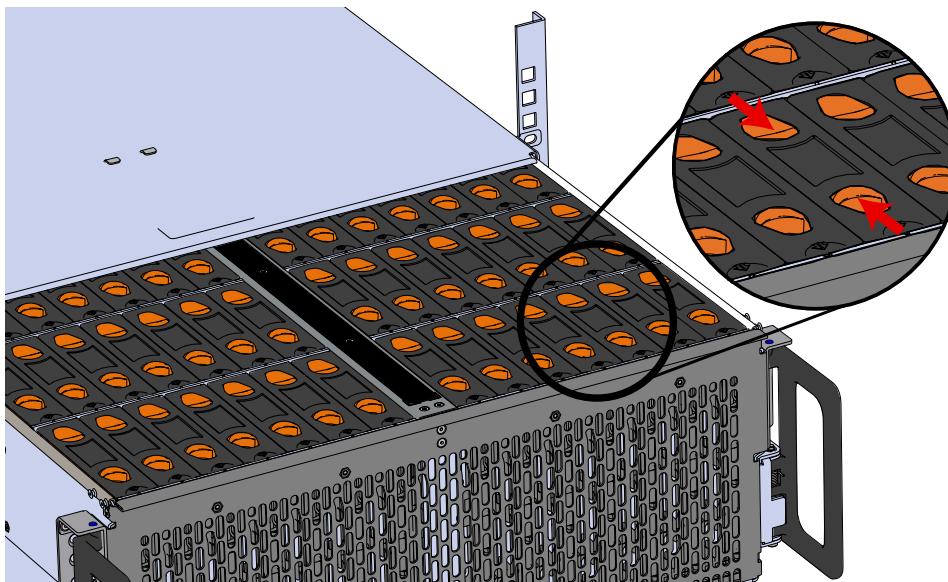
**Figure 193: Chassis Handle Operation**



4. Remove all of the drives from the chassis before uninstalling the chassis. Be prepared to label the drives as they are removed so they can be reinstalled in the same location in the new chassis.
5. Follow these steps to remove a Drive Assembly.
  - a) Find the latch release mechanism on the Drive Assembly being removed.

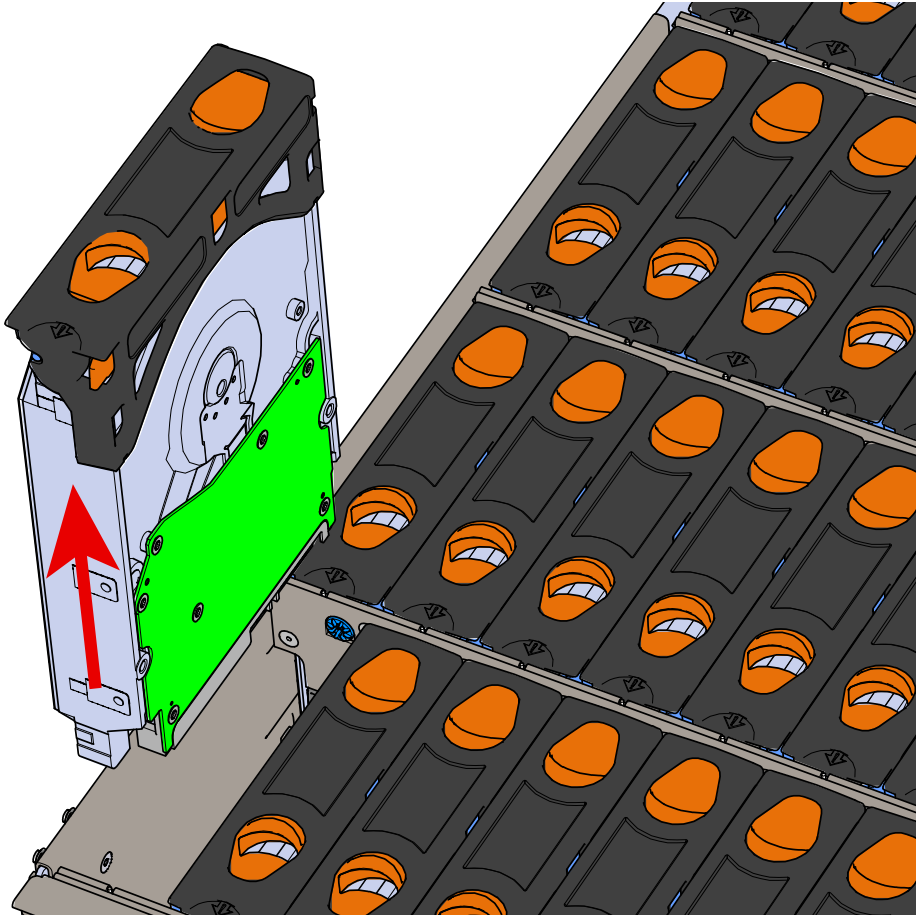
b) Insert a finger and a thumb into the latch release and pinch to unlatch the Drive Assembly.

**Figure 194: Unlatch Drive Carrier (IOM Not Shown)**



- c) Lift the Drive Assembly free from the enclosure.

**Figure 195: Removing Drive Assembly**



6. Follow the previous step for each drive in the enclosure. Attach a label or mark the drives with the drive slot they were removed from in order to add them to the same slot in the future. Store the drives in an ESD safe location until the drives are ready to be installed back into an enclosure.

7. Release the safety latch on the inner rails on each side of the chassis as shown in the following image.

**Figure 196: Inner Rail Safety Latch Release**




8. Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. Make sure that the top cover comes with the chassis as it is extended out of the rack. The safety latches will prevent the enclosure from coming out of the rack completely.
9. Remove the chassis from the rack.
  - a) Be prepared to support the enclosure once it is free of the rails by having a second person or a lift to support the enclosure
  - b) Grasp both handles at the front of the enclosure and pull with even pressure until the enclosure will not extend further.
  - c) Locate the safety catches on the inner rails attached to the enclosure.

**Figure 197: Safety Latch Release**



- d) Depress the latch release lever for the safety latches on the rail and push the chassis very slightly forward. The chassis is now unsecured from the rack.
- e) Ensure that you have the proper support mechanism to hold the chassis in position, whether that be a team lifting partner or an appropriate lift.

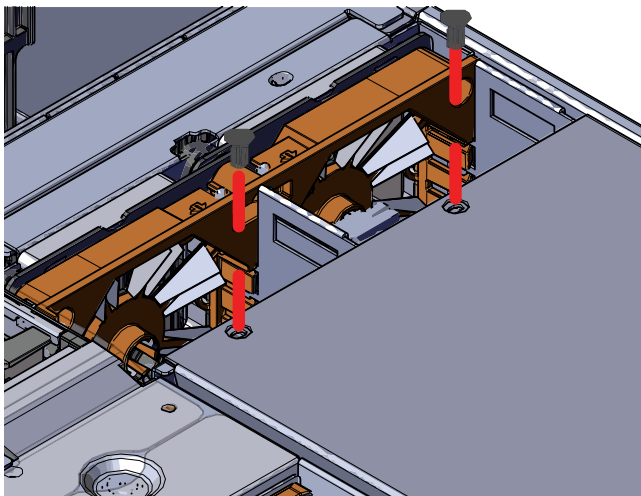
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**Warning:**  Do not lift the chassis by the Cable Tray while removing the chassis from the rack OR while installing it into a rack. This can cause serious damage to the unit or serious bodily harm to those handling the unit. Always team lift the chassis by gripping the underside of the unit, and never try to lift a chassis that is filled with drives.

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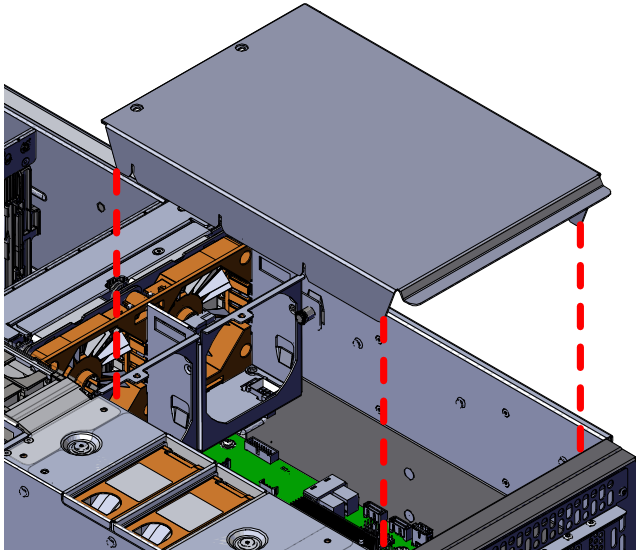
- f) Slide the chassis forward to free it from the rails. Place the chassis in a safe location to avoid damage.
10. **Attention:** Place the enclosure on a flat ESD safe surface and ensure it is stable before continuing with the procedure.
- 
11. Uninstall server cover panel over the Add-in cards. The server cover panel that needs to be removed is located (from the rear of the enclosure) on the right side of the enclosure.
- a) Remove the screws that secure the server cover panels to the chassis using a T7 Torx screwdriver.

**Figure 198: Removing the Server Cover Panel Screws**



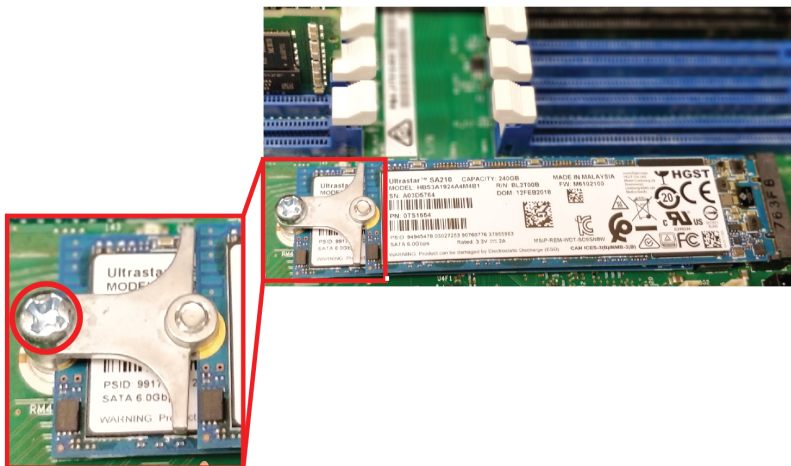
- b) Remove the server cover panel by carefully pulling on the edge where the screws were removed.

**Figure 199: Removing the Server Cover Panel**



12. Uninstall the M.2.
- a) Locate the M.2 installed on the baseboard.
- b) Remove the Philips head screw that secures the M.2 to the baseboard.

**Figure 200: M.2 Screw**



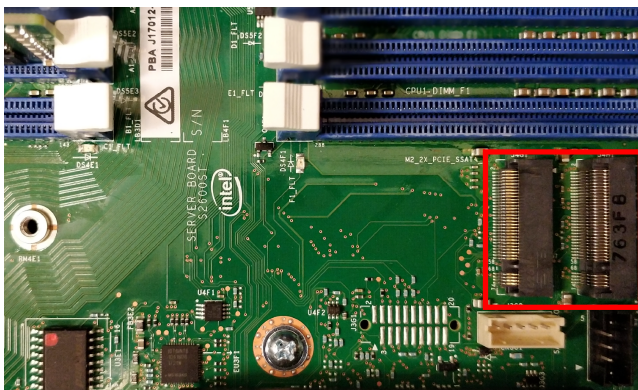
- c) Pull the top M.2 out of the connector.

**Figure 201: Uninstalling the M.2s**



- d) Repeat the previous substep to remove the bottom M.2.
13. Install the M.2.
- a) Locate the M.2 connectors on the baseboard.

**Figure 202: M.2 Connectors**



- b) Slide the card edge of the bottom M.2 into the M.2 connector on the baseboard.
- c) Slide the card edge of the top M.2 into the M.2 connector on the baseboard.

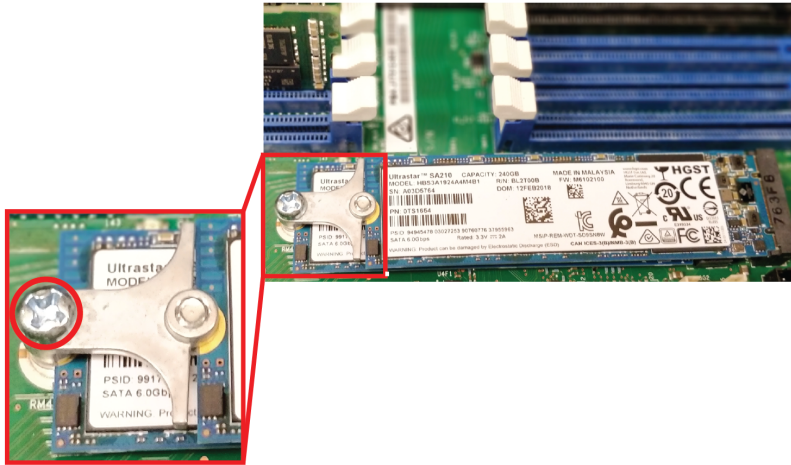
**Figure 203: M.2 Install (Top)**





- d) Secure both M.2s with the Philips head screw that held the failed M.2s.

**Figure 204: M.2 Screw**



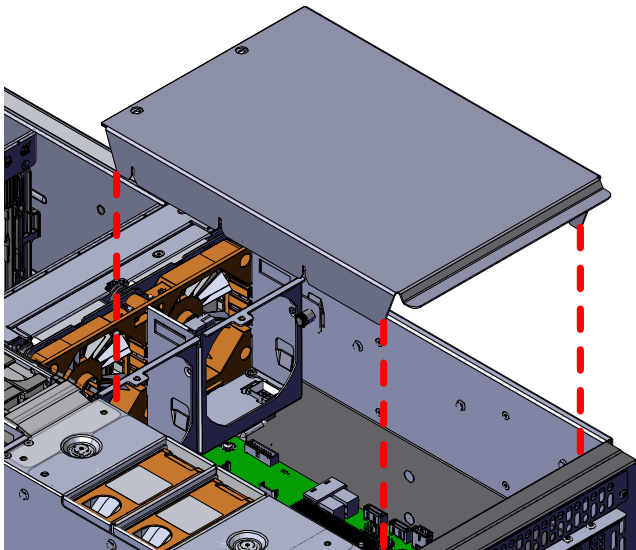
14. Install server cover panels.
  - a) Align and press the server panel cover into place over the server bay.

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**Note:** The Formex material that the panel is made from is flexible and will allow for the panel to be flexed to fit back into its original placement.

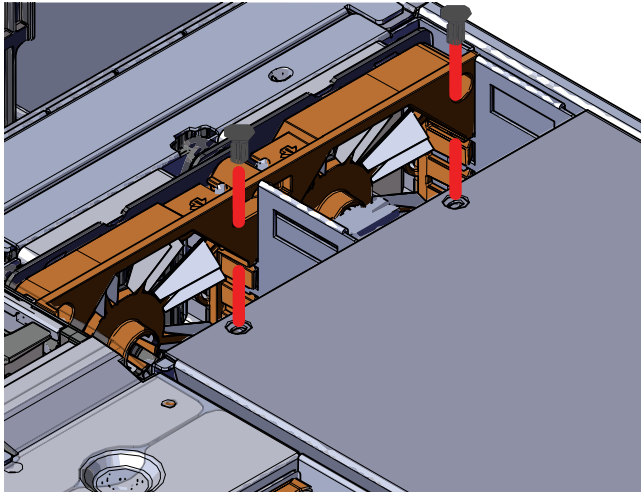
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**Figure 205: Installing the Server Cover Panel**



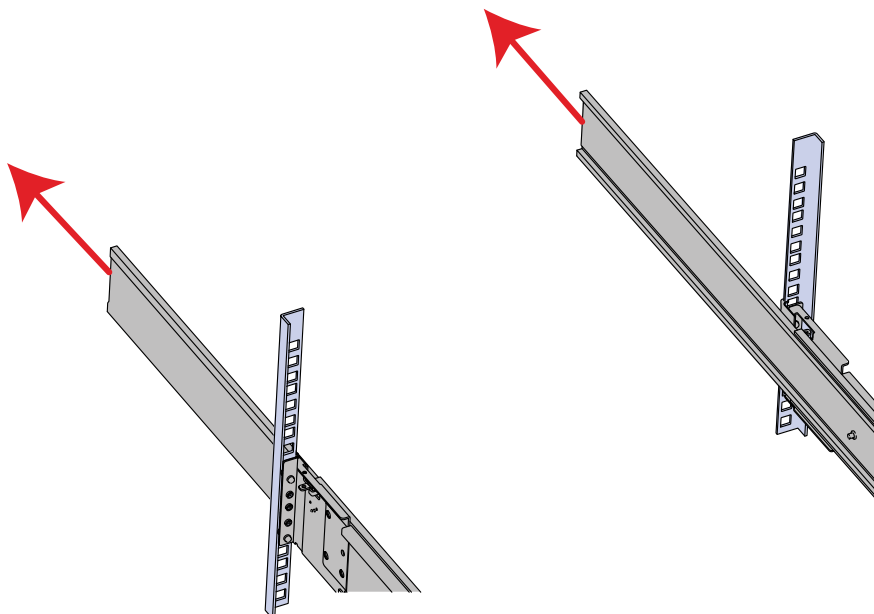
- b) Secure the server cover panel using the original screws and a T7 Torx screwdriver.

**Figure 206: Server Cover Panel Screws**




- 15. Extend the mid-rails out of the rack so that they are protruding from the front of the rack and the safety latches engage.

**Figure 207: Extend Mid-Rails**




- 16. Install the chassis into the rails.
  - a)

**Caution:**  This step in the installation requires a minimum of 3 individuals to install safely, two to lift and one to guide the others whom may have difficulty seeing because the enclosure is in the way. Ensure that the appropriate measures are taken to safely support the enclosure

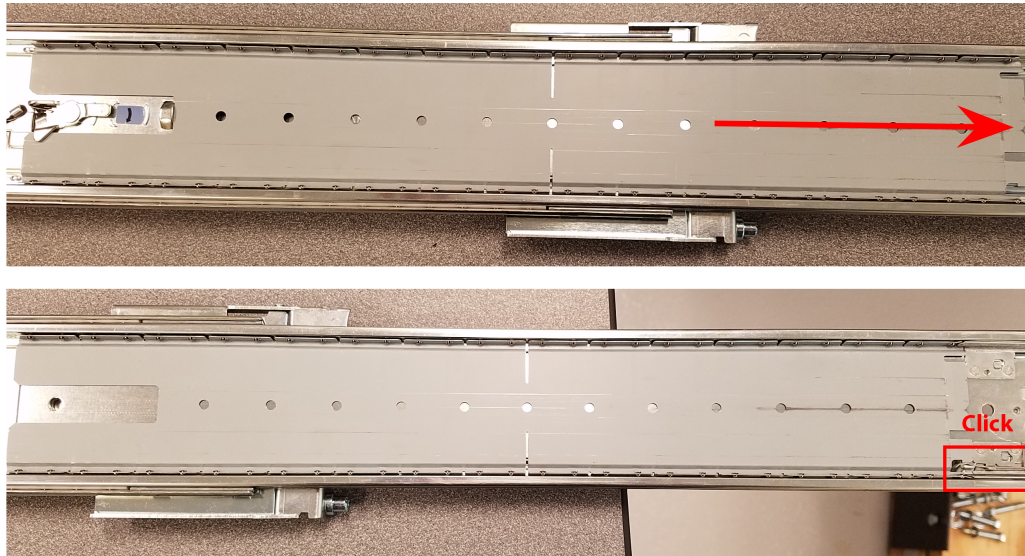
during installation. The enclosure **MUST** have no drives installed and requires a two person team lift to install. **Do not attempt to lift the system if it is fully populated with drives.** The only case in which the system may be installed or removed with the drives populated is if the facility has a lift that is rated to handle the maximum weight of the fully loaded system.

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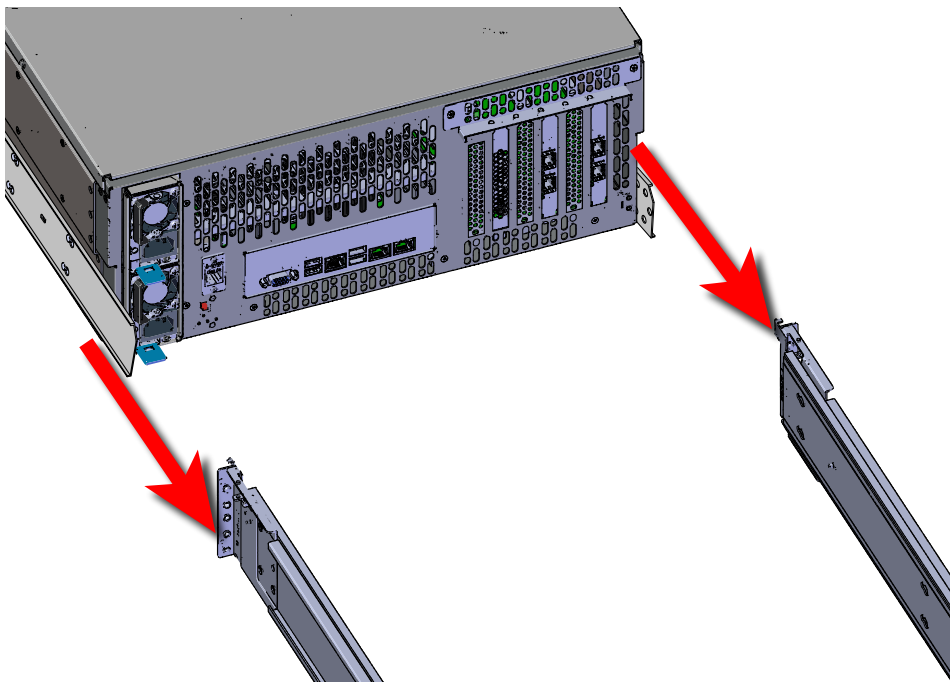
**Warning:**  Do not lift the chassis by the Cable Tray while removing the chassis from the rack OR while installing it into a rack. This can cause serious damage to the unit or serious

bodily harm to those handling the unit. Always team lift the chassis by gripping the underside of the unit, and never try to lift a chassis that is filled with drives.


**Figure 208: Bearing Plate**



**Figure 209: Installing the Chassis**



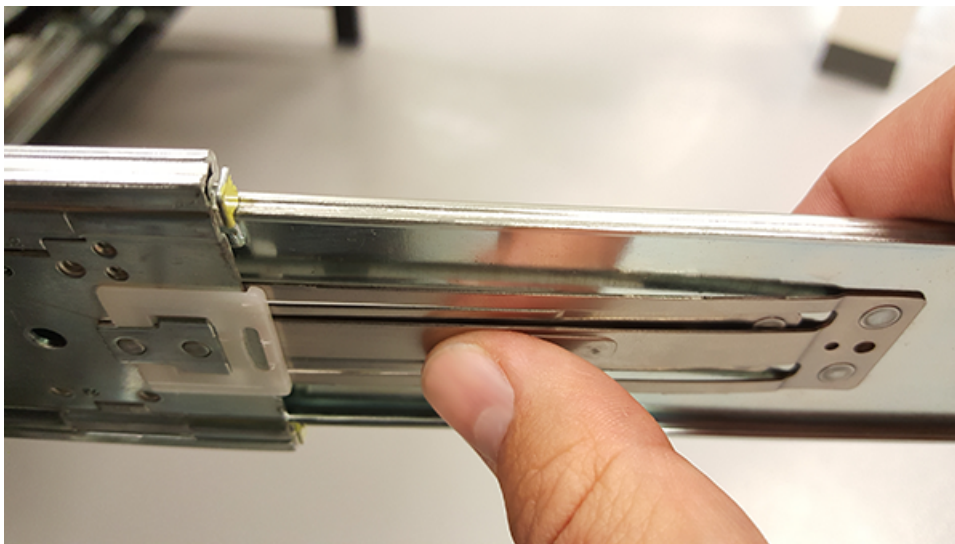
b)

**Caution:**  Make sure that the bearing plate on the inside of the mid-rails are fully forward and that the detent has engaged. This is to prevent potential damage due to improper mating of the rails.

Position one individual on each side of the enclosure to perform a team lift and have the third individual standing at the protruding rack rails to guide the chassis to mate with rack rails.

- c) Team-lift the enclosure until the inner rails that are attached to the chassis align with the extended mid-rails attached to the rack, and guide the inner rails on the chassis to mate with the rack rails.
- d) Once the rails are mated properly, slide the enclosure into the rack until it is stopped by the safety catch on the rails. Push the release lever on the safety latch located on the side of each of the rails and push the enclosure the rest of the way into the rack.

**Figure 210: Safety Latch Release**



- e) As the chassis is slid into the rack, position one installer at the rear of the rack to ensure that the pegs on the sides of the cover will slide correctly into the rear cover alignment brackets on both sides of the rack. If the chassis does not install smoothly or snags, check that the rear cover alignment brackets are not interfering with the chassis sidewalls, and try again.
17. Now that the chassis is installed, test the installation by sliding the enclosure in and out of the rack a minimum of three times. If the enclosure binds, catches, or displays any incorrect motion or behavior retry the installation.

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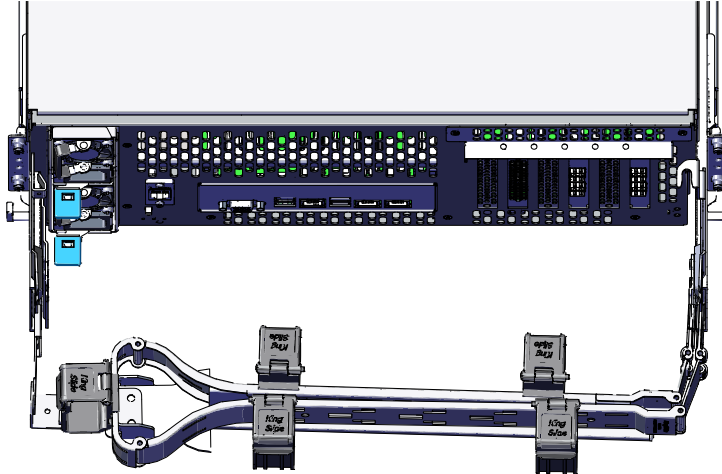
**Note:** Adjustments of the vertical rack rails may be required to fix any issues that may occur.

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18. Install the CMA.
- a) Orient the CMA so that the elbow is on the left hand side.

- b) Attach all of the connectors to the brackets on the rails and chassis. There should be one at the elbow side and two at the other end.

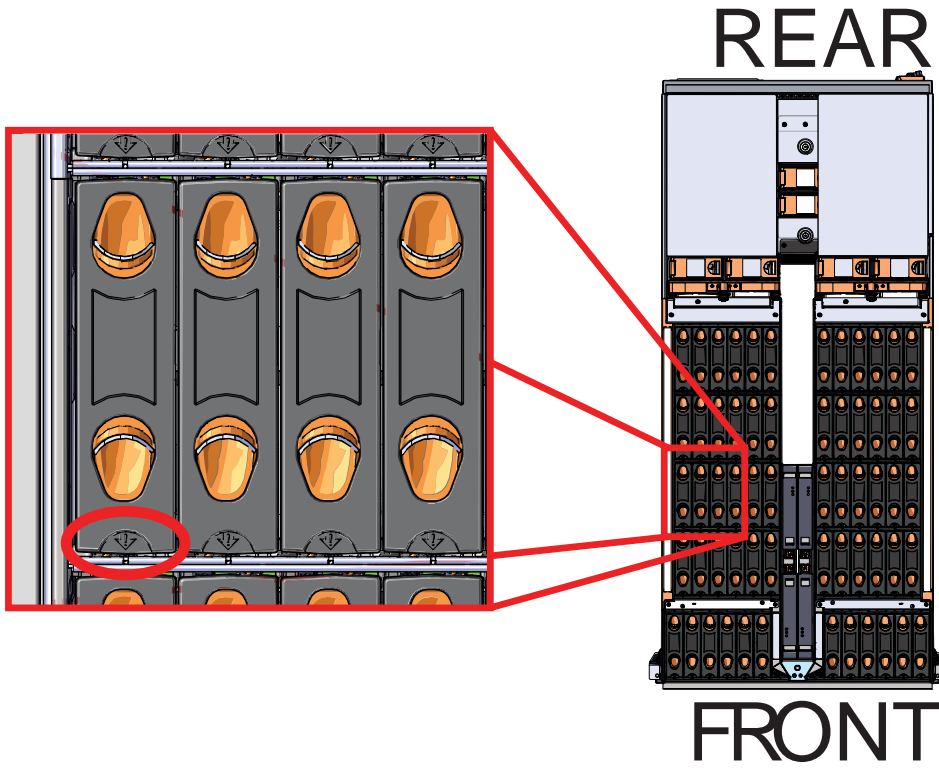
**Figure 211: CMA Orientation**



- c) Slowly slide the enclosure forward to ensure the CMA arm is operating properly, then slide it back into the rack.
19. Install the Drive Assembly.
    - a) Ensure that the enclosure has been pulled out of the rack until the rail latches engage.

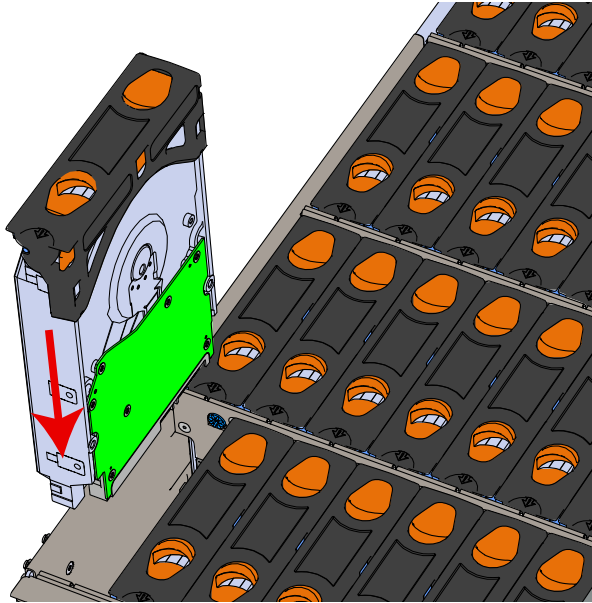
- b) Find the LED pointer on the top of the drive carrier. This pointer should point toward the front of the unit as shown in the following image.

**Figure 212: LED Pointer Orientation**



- c) Align the drive with the empty slot that will receive it. Lower it into the slot, making sure it stays level and does not snag.

**Figure 213: Installing a Drive Assembly**

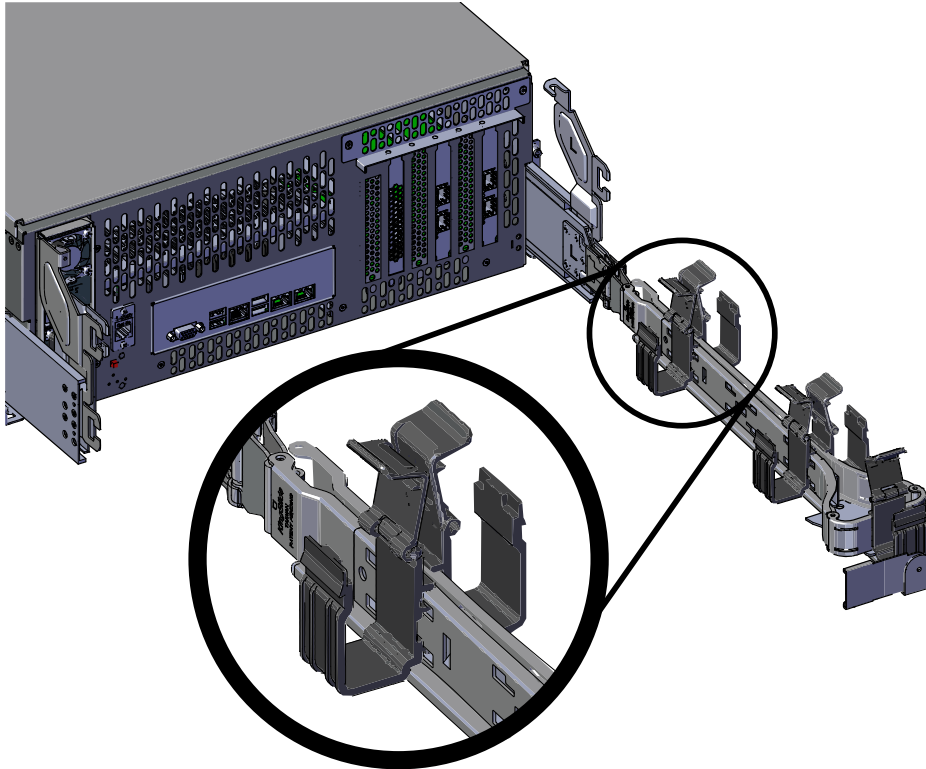


- d) Pinch the latch release and carefully press downward to seat the Drive Assembly the rest of the way.
20. Install each drive in the place it was removed from by following the labels or marks that were added earlier.
  21. Cable the CMA.
    - a) Unlatch the elbow side of the CMA arm and swing it forward by pressing the blue button that says "push" to unlatch it.



- b) Open all of the baskets

**Figure 214: Open Baskets**



- c) Route all of the cables being connected to the enclosure through the open baskets.
- d) Close all of the baskets.
- e) If the Ultrastar Serv60+8 is being installed in a rack and will subsequently be transported inside that rack, it is important to use the included cable tie to wrap the CMA bundle to ensure it does not get damaged during transport. If the Ultrastar Serv60+8 is instead being installed where it will operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.
- f) Reconnect the CMA at the elbow to the connectors on the rail.
- 22.** Test for binding in the extension of the CMA by gently pulling the enclosure out of the rack to ensure the cables extend properly and that the system doesn't bind at all. If it does, examine the point at which the binding occurred and adjust the seating of cables in the baskets, check the connections to the rails, and examine the joints of the CMA arm to ensure that they are all functioning properly.
- 23.** Make sure the CMA is in operational position by folding the arm in toward the enclosure and attaching the elbow end of the CMA to the connector that is attached to the rail. Verify that all of the cabling is in functional order and does not bind or catch.

## 4.11 Add-in Card Replacement

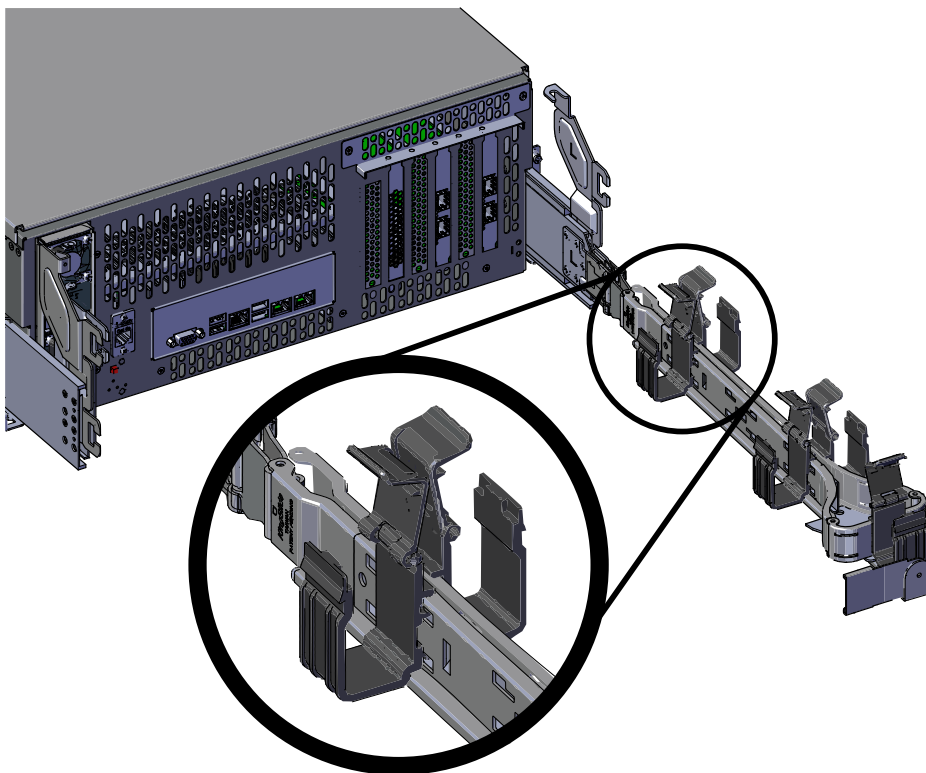
**Note:** The Add-in card is not hot swappable. The enclosure must be powered-down, disconnected from all cabling, and removed from the rack before replacing the Add-in card.

**Table 41: Procedure Info**

Required Tools	Required Parts	# of People Required	Time Required
<ul style="list-style-type: none"> <li>T7 Torx Screwdriver</li> </ul>	<ul style="list-style-type: none"> <li>T7 Torx screws</li> </ul>	3	1h 30m

1. Uncable the CMA.
  - a) Open all of the baskets on the CMA.

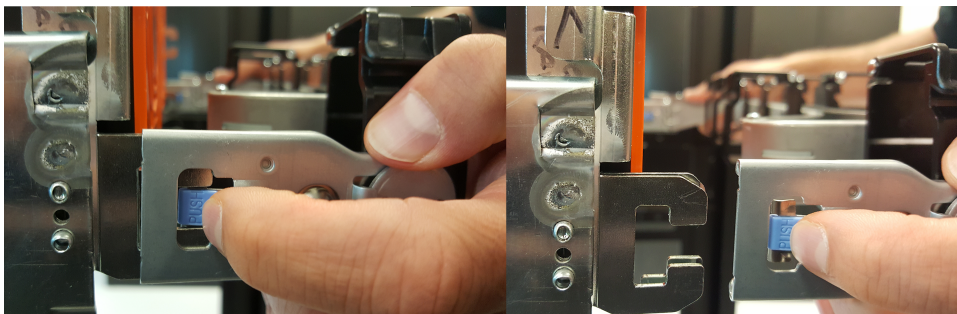
**Figure 215: Open Baskets**



- b) Remove one cable from the CMA at a time making sure not to put too much strain on the arm.

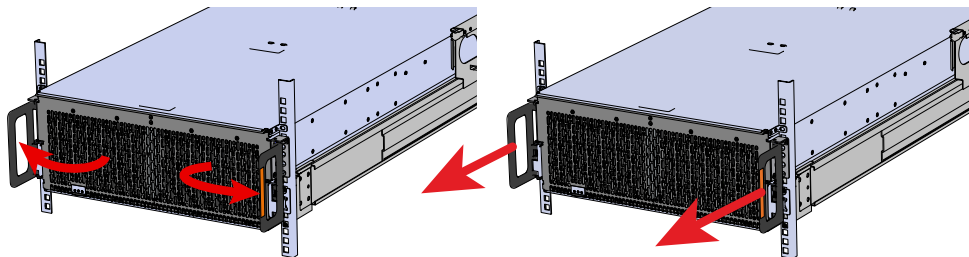
2. Unlatch all of the connectors that attach the CMA to the enclosure and the rail by locating the latch release button and pressing it from either side of the latch. There are three total connections that need to be removed, one at the elbow and two at the opposite end.

**Figure 216: Unlatching a CMA Connector**



3. Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

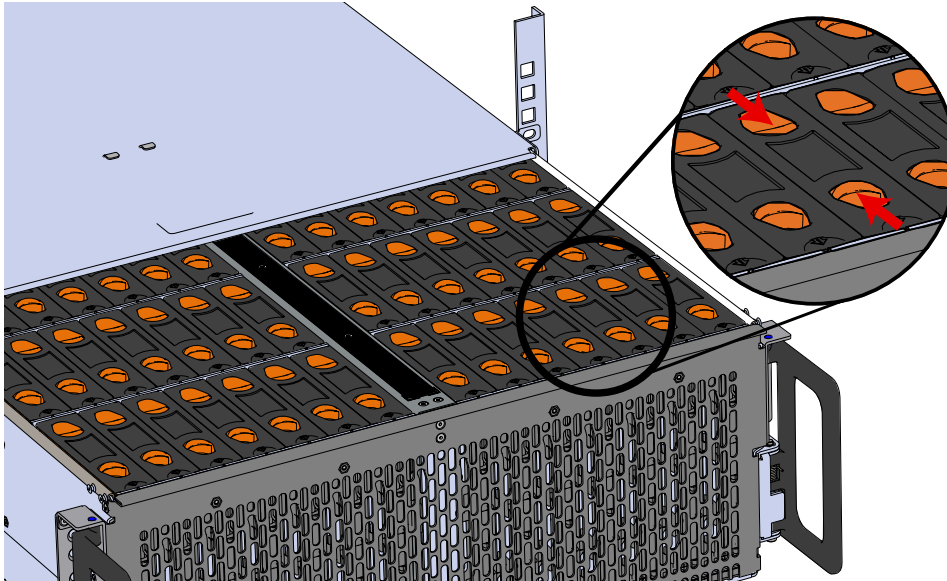
**Figure 217: Chassis Handle Operation**



4. Remove all of the drives from the chassis before uninstalling the chassis. Be prepared to label the drives as they are removed so they can be reinstalled in the same location in the new chassis.
5. Follow these steps to remove a Drive Assembly.
  - a) Find the latch release mechanism on the Drive Assembly being removed.

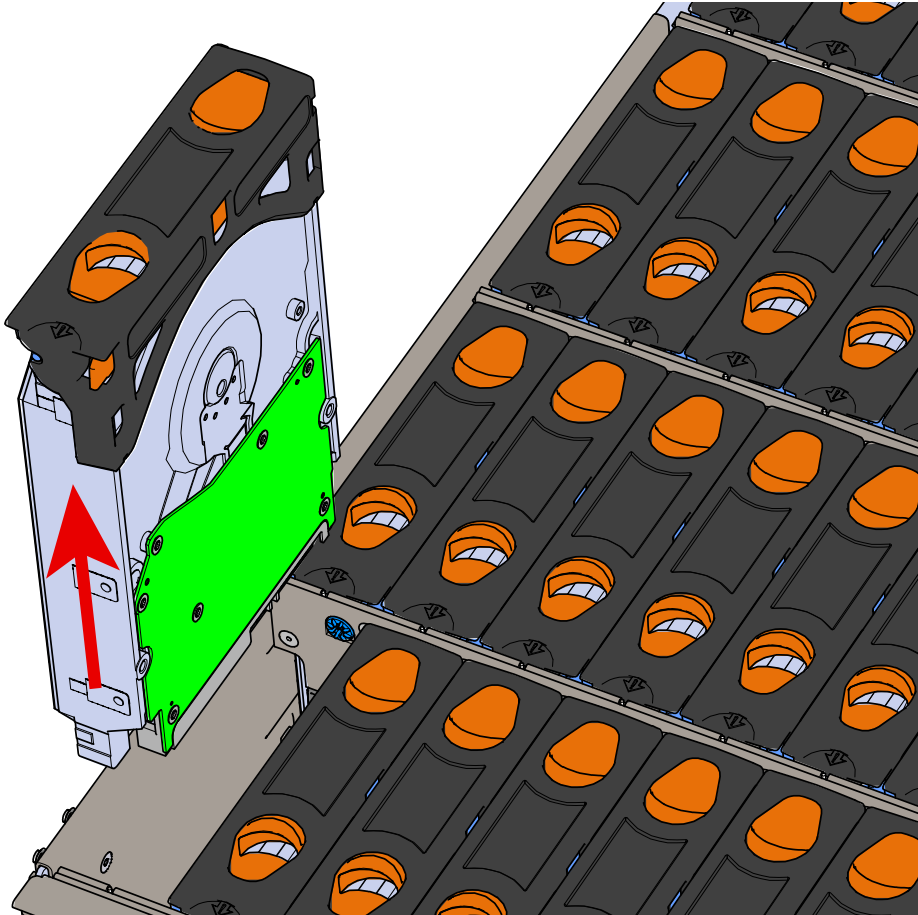
- b) Insert a finger and a thumb into the latch release and pinch to unlatch the Drive Assembly.

**Figure 218: Unlatch Drive Carrier (IOM Not Shown)**



- c) Lift the Drive Assembly free from the enclosure.

**Figure 219: Removing Drive Assembly**



6. Follow the previous step for each drive in the enclosure. Attach a label or mark the drives with the drive slot they were removed from in order to add them to the same slot in the future. Store the drives in an ESD safe location until the drives are ready to be installed back into an enclosure.

7. Release the safety latch on the inner rails on each side of the chassis as shown in the following image.

**Figure 220: Inner Rail Safety Latch Release**




8. Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. Make sure that the top cover comes with the chassis as it is extended out of the rack. The safety latches will prevent the enclosure from coming out of the rack completely.
9. Remove the chassis from the rack.
  - a) Be prepared to support the enclosure once it is free of the rails by having a second person or a lift to support the enclosure
  - b) Grasp both handles at the front of the enclosure and pull with even pressure until the enclosure will not extend further.
  - c) Locate the safety catches on the inner rails attached to the enclosure.

**Figure 221: Safety Latch Release**



- d) Depress the latch release lever for the safety latches on the rail and push the chassis very slightly forward. The chassis is now unsecured from the rack.
- e) Ensure that you have the proper support mechanism to hold the chassis in position, whether that be a team lifting partner or an appropriate lift.

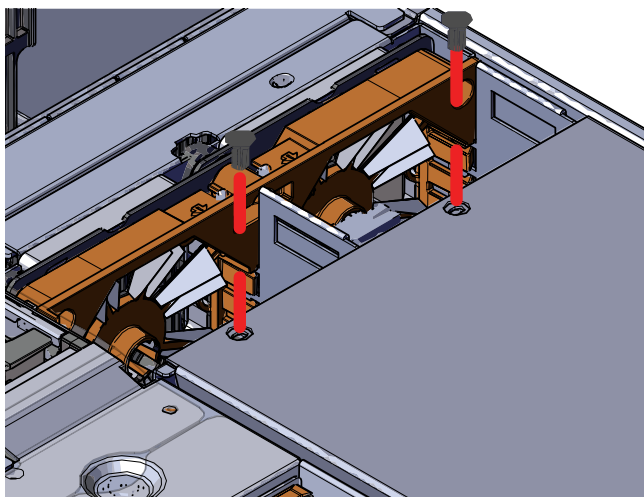
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**Warning:**  Do not lift the chassis by the Cable Tray while removing the chassis from the rack OR while installing it into a rack. This can cause serious damage to the unit or serious bodily harm to those handling the unit. Always team lift the chassis by gripping the underside of the unit, and never try to lift a chassis that is filled with drives.

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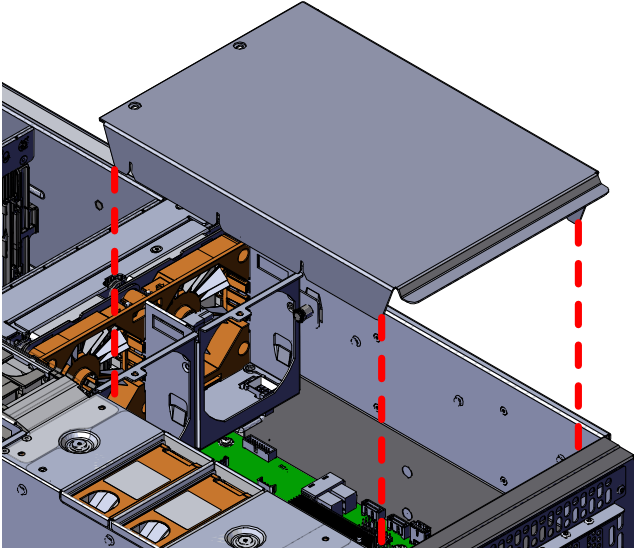
- f) Slide the chassis forward to free it from the rails. Place the chassis in a safe location to avoid damage.
10. Uninstall server cover panel over the Add-in cards. The server cover panel that needs to be removed is located (from the rear of the enclosure) on the right side of the enclosure.
- a) Remove the screws that secure the server cover panels to the chassis using a T7 Torx screwdriver.

**Figure 222: Removing the Server Cover Panel Screws**



- b) Remove the server cover panel by carefully pulling on the edge where the screws were removed.

**Figure 223: Removing the Server Cover Panel**



11. Uninstall the add-in card bracket.
- a) From the rear of the enclosure, remove the eight screws that secure the add-in cards to the enclosure using a T10 Torx Screwdriver.

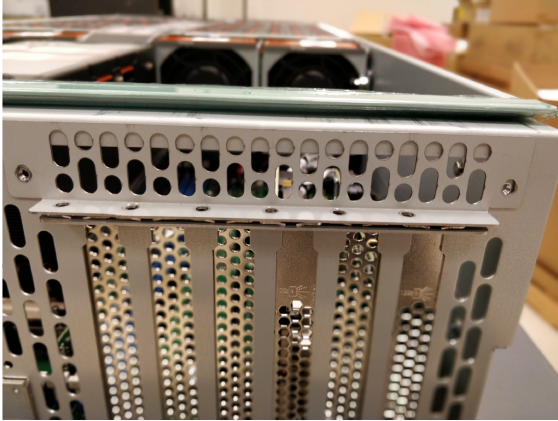
**Figure 224: Add-In Card Screws**



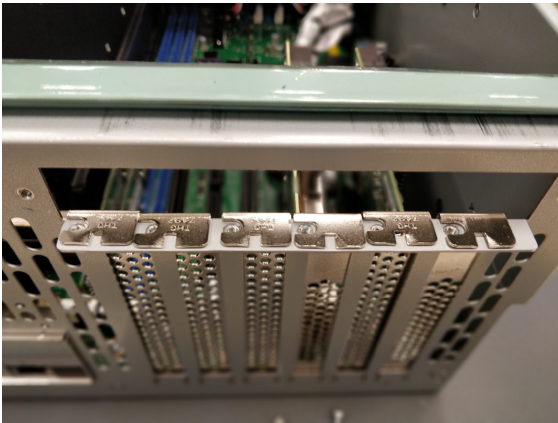


- b) Remove the bracket from the end of the chassis.

**Figure 225: Add-In Card Bracket**



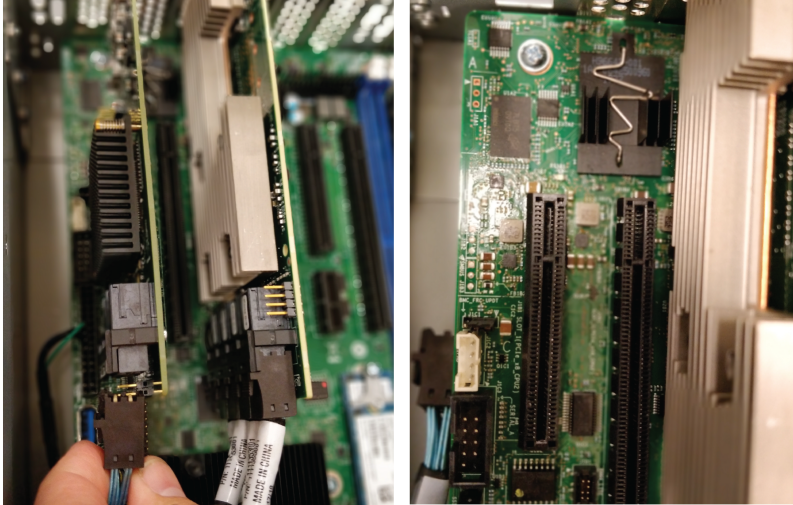
**Figure 226: Add-In Card Bracket Removed**



12. Uninstall the add-in cards.
  - a) Locate the first add-in card.

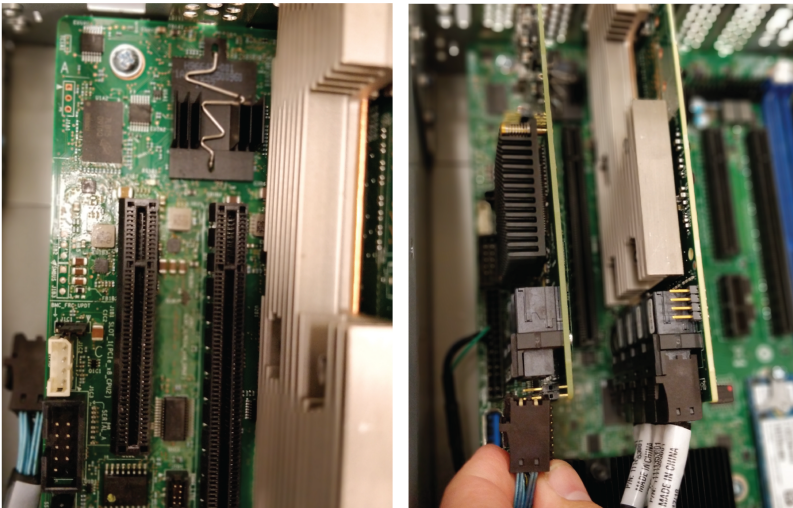
- b) Remove all cabling from the add-in card.

**Figure 227: Add-In Card Remove Cabling and Uninstall**



- c) Carefully pull up on the add-in card until it comes free from the connector on the baseboard.
13. Install the add-in cards.
    - a) Locate the connector for the add-in card being installed.
    - b) Set the card edge of the add-in card on the connector and firmly press down until the add-in card is seated.

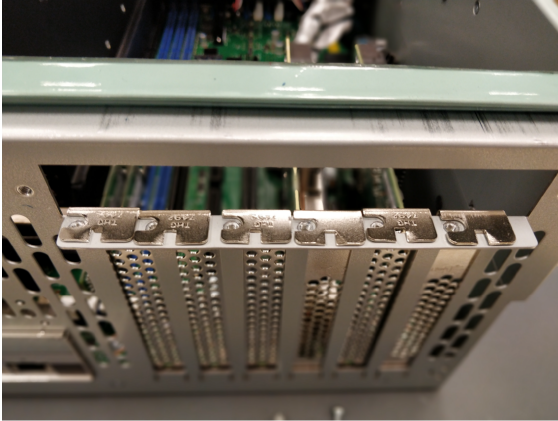
**Figure 228: Add-In Card Install and Connect Cabling**



14. Install the add-in card bracket.

- a) From the rear of in the enclosure, line the add-in card bracket up with the holes on the add-in cards.

**Figure 229: Add-In Card Bracket Removed**



**Figure 230: Add-In Card Bracket Installed**



- b) Secure the bracket to the chassis with the eight T10 Torx screws that held the bracket in originally.

**Figure 231: Add-In Card Screws**



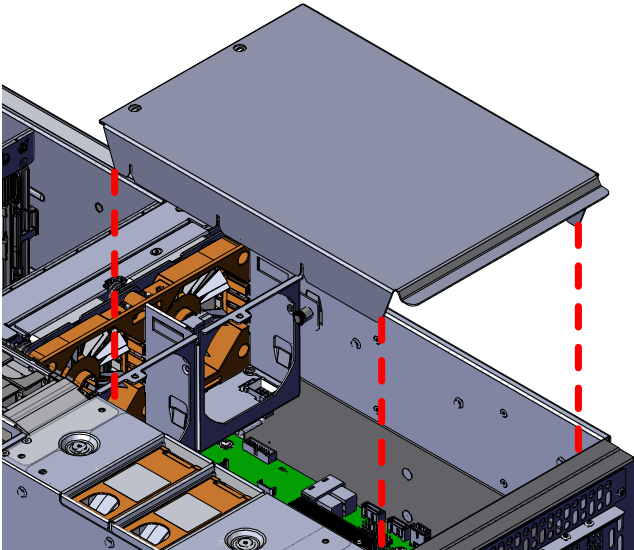
15. Install server cover panels.
  - a) Align and press the server panel cover into place over the server bay.

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**Note:** The Formex material that the panel is made from is flexible and will allow for the panel to be flexed to fit back into its original placement.

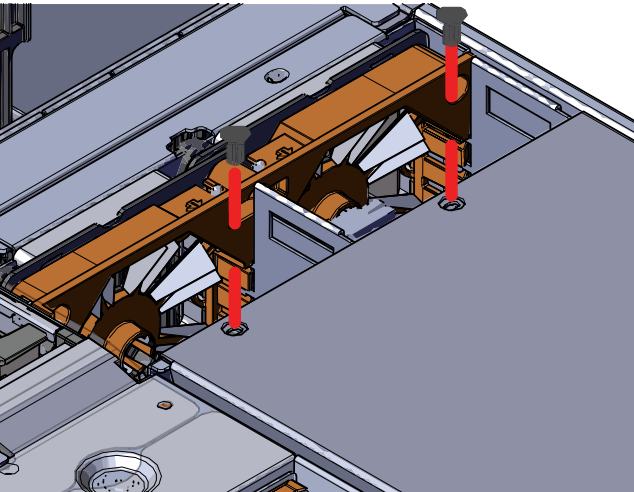
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**Figure 232: Installing the Server Cover Panel**



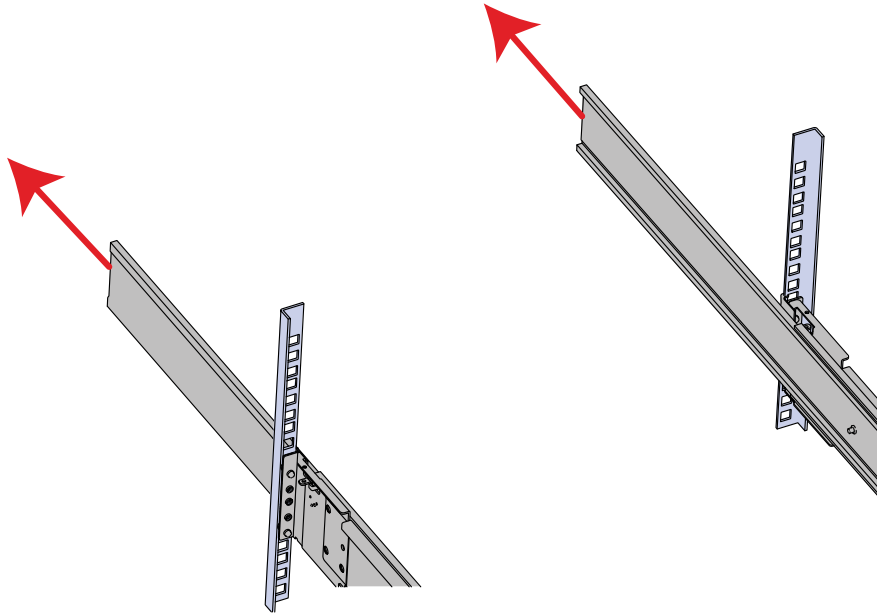
- b) Secure the server cover panel using the original screws and a T7 Torx screwdriver.

**Figure 233: Server Cover Panel Screws**




- 16. Extend the mid-rails out of the rack so that they are protruding from the front of the rack and the safety latches engage.


**Figure 234: Extend Mid-Rails**



- 17. Install the chassis into the rails.

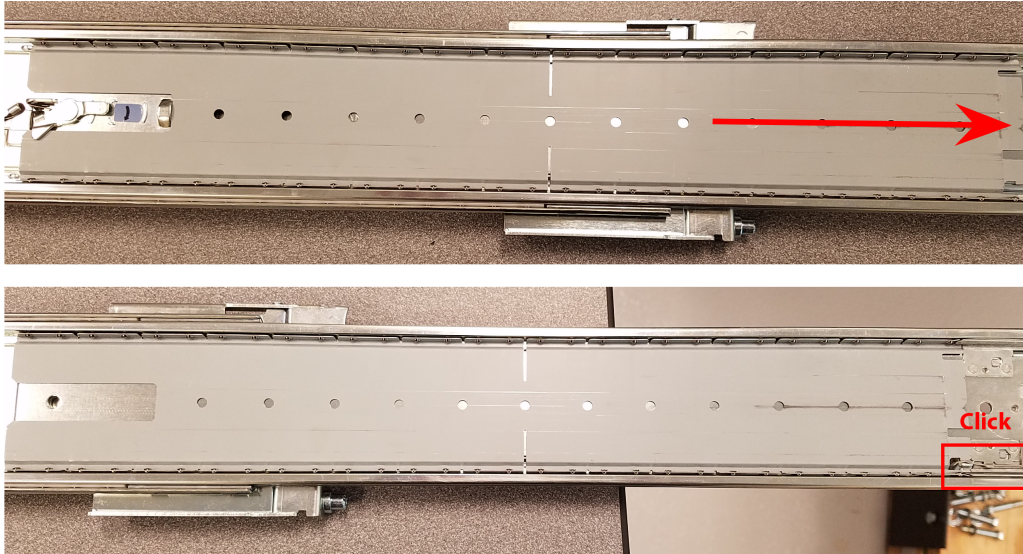
a)

**Caution:**  This step in the installation requires a minimum of 3 individuals to install safely, two to lift and one to guide the others whom may have difficulty seeing because the enclosure is in the way. Ensure that the appropriate measures are taken to safely support the enclosure during installation. The enclosure **MUST** have no drives installed and requires a two person team lift to install. **Do not attempt to lift the system if it is fully populated with drives.** The only case in which the system may be installed or removed with the drives populated is if the facility has a lift that is rated to handle the maximum weight of the fully loaded system.

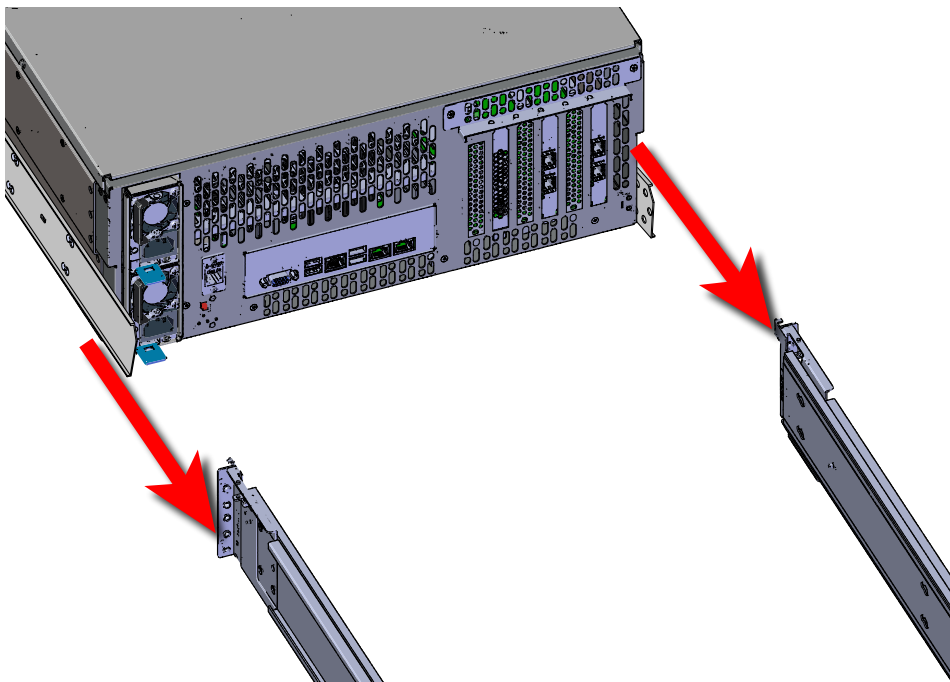
**Warning:**  Do not lift the chassis by the Cable Tray while removing the chassis from the rack OR while installing it into a rack. This can cause serious damage to the unit or serious

bodily harm to those handling the unit. Always team lift the chassis by gripping the underside of the unit, and never try to lift a chassis that is filled with drives.


**Figure 235: Bearing Plate**



**Figure 236: Installing the Chassis**



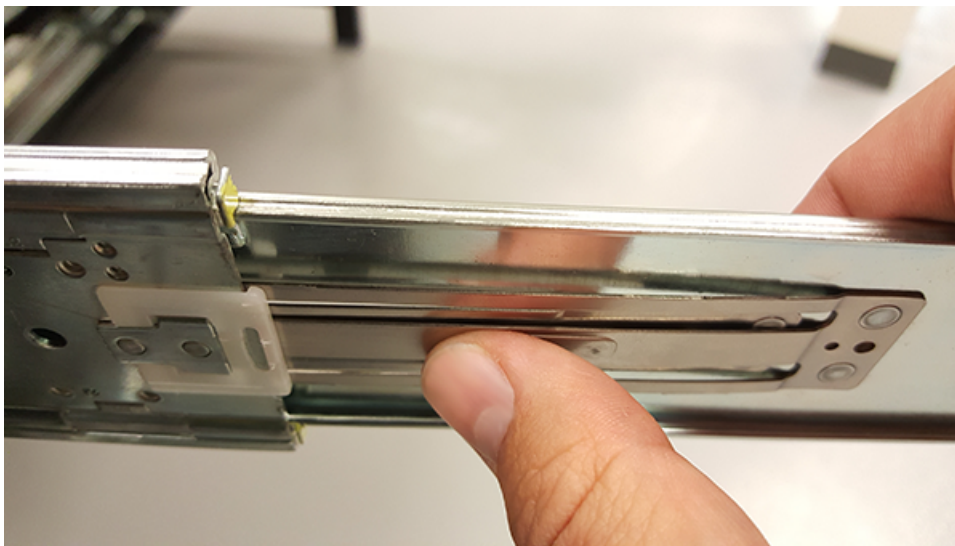
b)

**Caution:**  Make sure that the bearing plate on the inside of the mid-rails are fully forward and that the detent has engaged. This is to prevent potential damage due to improper mating of the rails.

Position one individual on each side of the enclosure to perform a team lift and have the third individual standing at the protruding rack rails to guide the chassis to mate with rack rails.

- c) Team-lift the enclosure until the inner rails that are attached to the chassis align with the extended mid-rails attached to the rack, and guide the inner rails on the chassis to mate with the rack rails.
- d) Once the rails are mated properly, slide the enclosure into the rack until it is stopped by the safety catch on the rails. Push the release lever on the safety latch located on the side of each of the rails and push the enclosure the rest of the way into the rack.

**Figure 237: Safety Latch Release**



- e) As the chassis is slid into the rack, position one installer at the rear of the rack to ensure that the pegs on the sides of the cover will slide correctly into the rear cover alignment brackets on both sides of the rack. If the chassis does not install smoothly or snags, check that the rear cover alignment brackets are not interfering with the chassis sidewalls, and try again.
18. Now that the chassis is installed, test the installation by sliding the enclosure in and out of the rack a minimum of three times. If the enclosure binds, catches, or displays any incorrect motion or behavior retry the installation.

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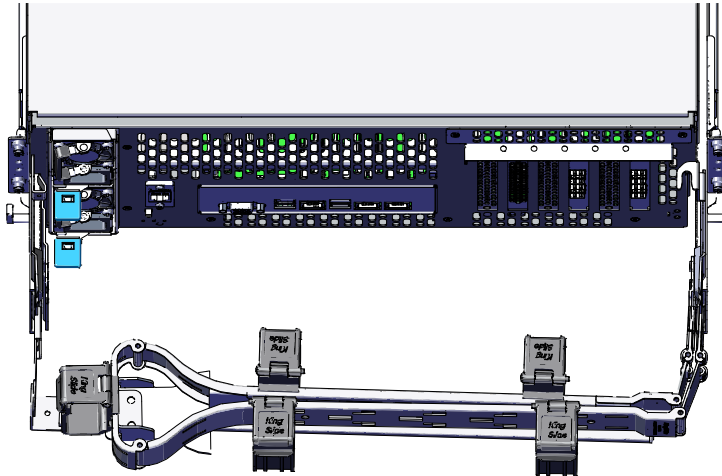
**Note:** Adjustments of the vertical rack rails may be required to fix any issues that may occur.

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19. Install the CMA.
- a) Orient the CMA so that the elbow is on the left hand side.

- b) Attach all of the connectors to the brackets on the rails and chassis. There should be one at the elbow side and two at the other end.

**Figure 238: CMA Orientation**

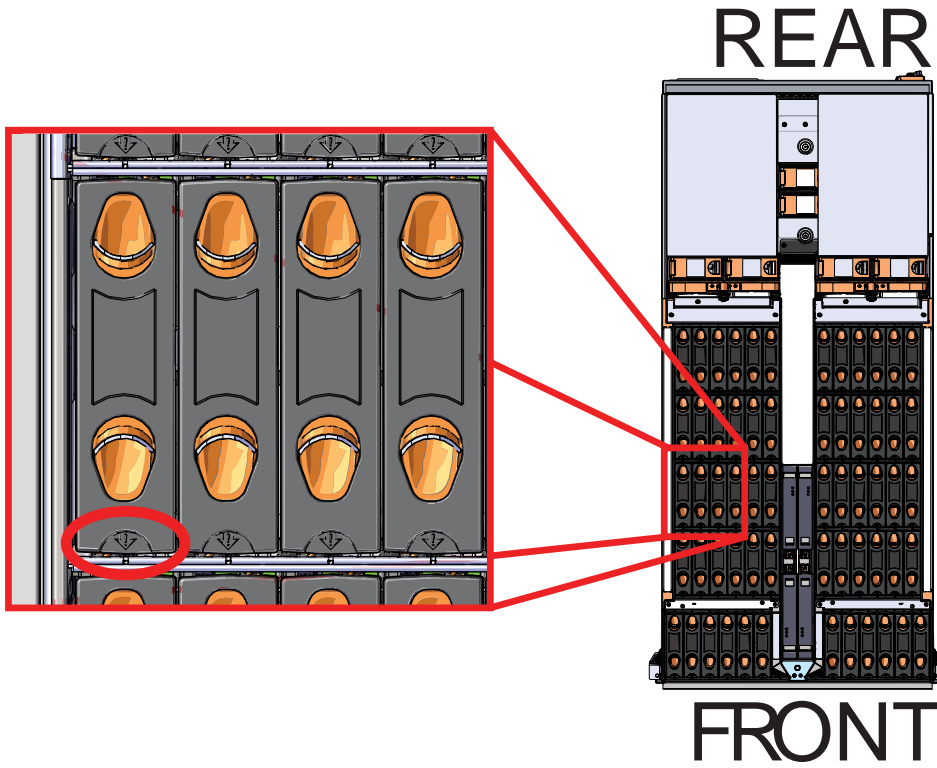


- c) Slowly slide the enclosure forward to ensure the CMA arm is operating properly, then slide it back into the rack.
- 20. Install the Drive Assembly.**
- a) Ensure that the enclosure has been pulled out of the rack until the rail latches engage.



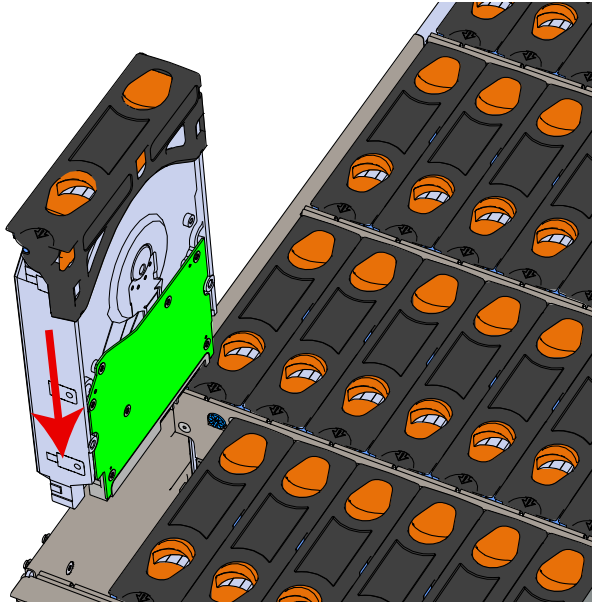
- b) Find the LED pointer on the top of the drive carrier. This pointer should point toward the front of the unit as shown in the following image.

**Figure 239: LED Pointer Orientation**



- c) Align the drive with the empty slot that will receive it. Lower it into the slot, making sure it stays level and does not snag.

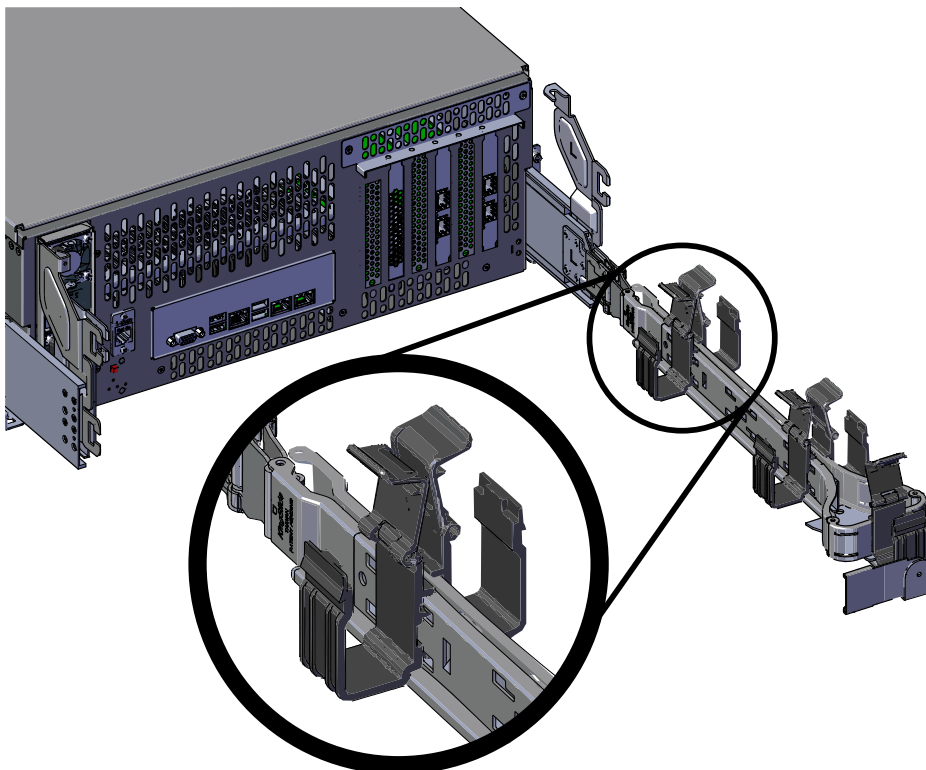
**Figure 240: Installing a Drive Assembly**



- d) Pinch the latch release and carefully press downward to seat the Drive Assembly the rest of the way.
- 21.** Install each drive in the place it was removed from by following the labels or marks that were added earlier.
- 22.** Cable the CMA.
- a) Unlatch the elbow side of the CMA arm and swing it forward by pressing the blue button that says “push” to unlatch it.

b) Open all of the baskets

**Figure 241: Open Baskets**



- c) Route all of the cables being connected to the enclosure through the open baskets.
  - d) Close all of the baskets.
  - e) If the Ultrastar Serv60+8 is being installed in a rack and will subsequently be transported inside that rack, it is important to use the included cable tie to wrap the CMA bundle to ensure it does not get damaged during transport. If the Ultrastar Serv60+8 is instead being installed where it will operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.
  - f) Reconnect the CMA at the elbow to the connectors on the rail.
- 23.** Test for binding in the extension of the CMA by gently pulling the enclosure out of the rack to ensure the cables extend properly and that the system doesn't bind at all. If it does, examine the point at which the binding occurred and adjust the seating of cables in the baskets, check the connections to the rails, and examine the joints of the CMA arm to ensure that they are all functioning properly.
- 24.** Make sure the CMA is in operational position by folding the arm in toward the enclosure and attaching the elbow end of the CMA to the connector that is attached to the rail. Verify that all of the cabling is in functional order and does not bind or catch.

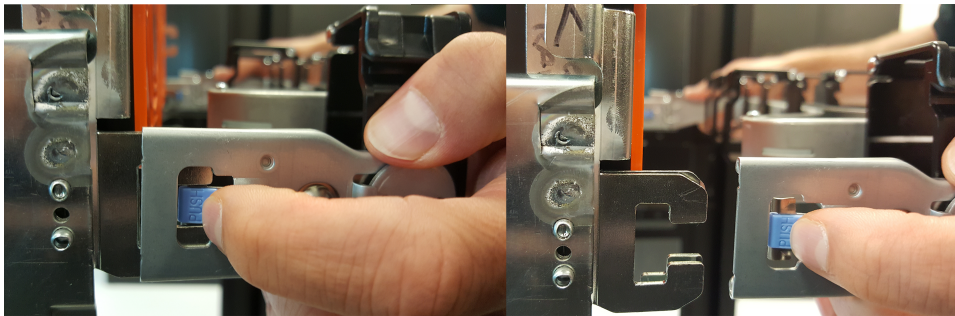
## 4.12 CMA Replacement

**Table 42: Replacement Procedure Info**

Required Tools	Required Parts	# of People Required	Time Required
<ul style="list-style-type: none"><li>• # 2 Philips Screwdriver</li><li>• Cable Ties (for configurations with greater than 10 total cables)</li><li>• Tape Measure</li></ul>	<ul style="list-style-type: none"><li>• Low-Profile M4 x 3.2mm Philips screws</li></ul>	1	15m

1. Place the CMA into service position.
  - a) Unlatch the CMA at the elbow connector by pressing the blue release button to unlatch the connector from the rail.

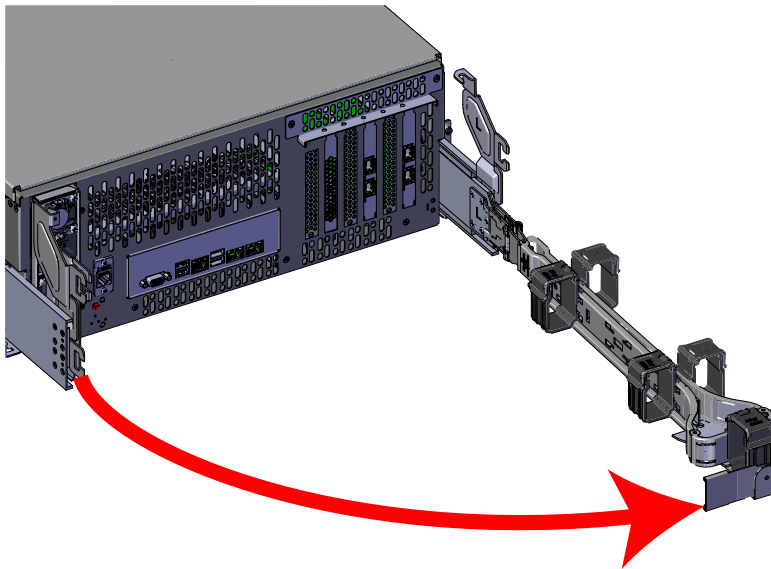
**Figure 242: Unlatching a CMA Connector**



- b) Swing the CMA away from the enclosure.

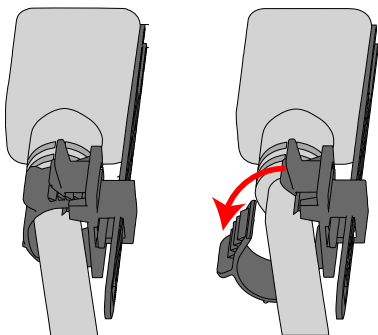
- c) The arm should be extended away from the enclosure as shown in the following example.

**Figure 243: CMAs in service position (Cables not shown)**



2. Power down the Enclosure.
  - a) Locate the redundant PSUs at the rear of the enclosure.
  - b) Detach the cable retention clip from both power cords.

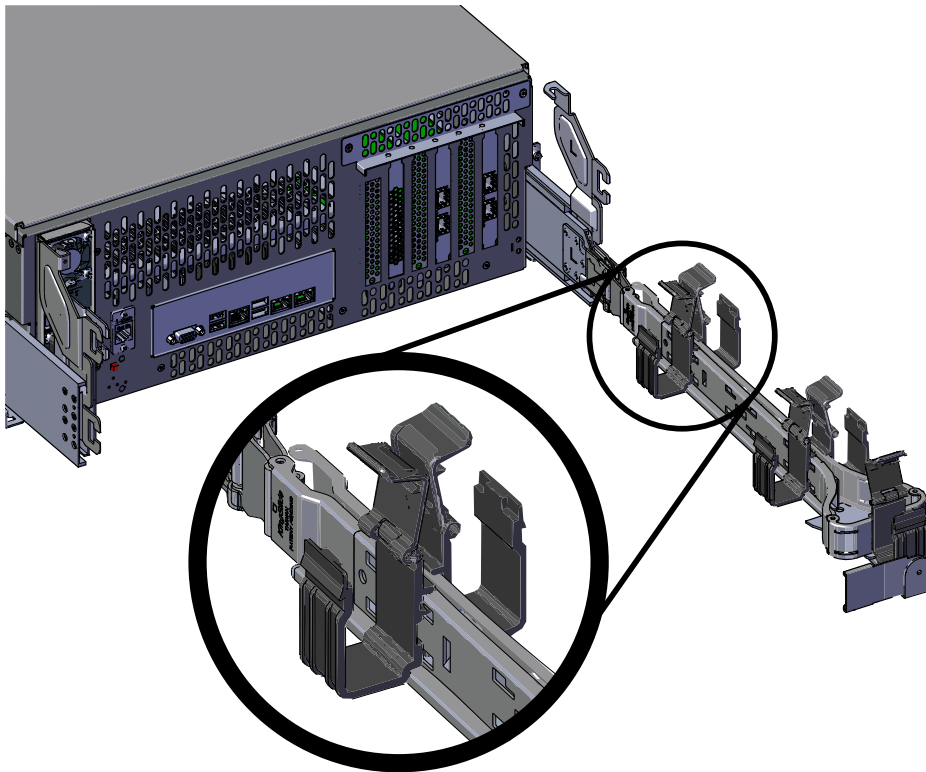
**Figure 244: Cable Retention Mechanism**



- c) Power down the enclosure by disconnecting both power cables, one from each PSU.
3. Disconnect any other cabling that is connected to the rest of the rear IO ports.
4. Uncable the CMA.

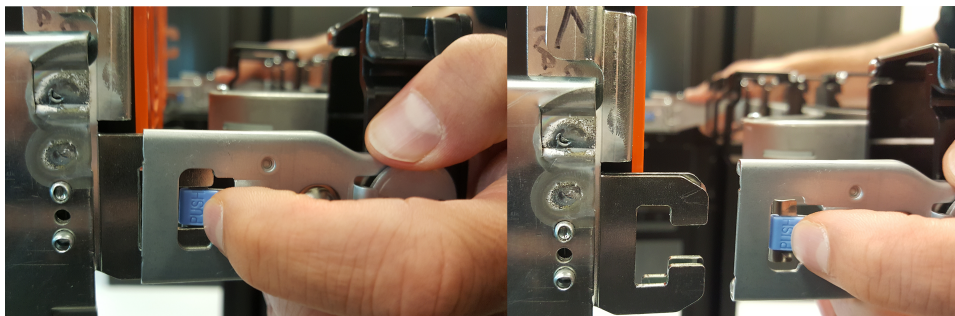
- a) Open all of the baskets on the CMA.

**Figure 245: Open Baskets**



- b) Remove one cable from the CMA at a time making sure not to put too much strain on the arm.
5. Unlatch all of the connectors that attach the CMA to the enclosure and the rail by locating the latch release button and pressing it from either side of the latch. There are three total connections that need to be removed, one at the elbow and two at the opposite end.

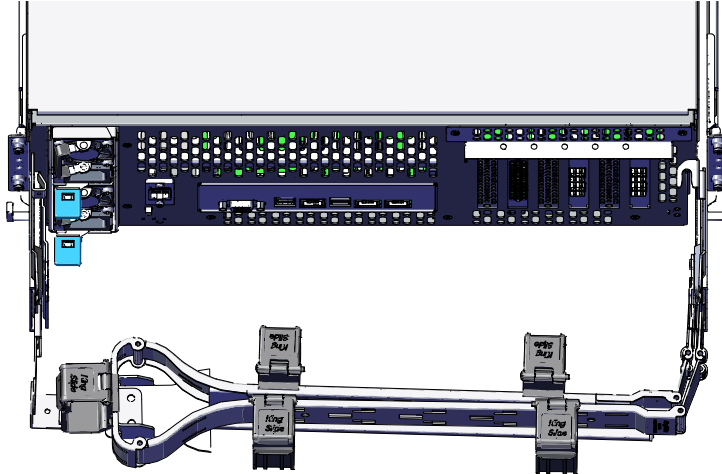
**Figure 246: Unlatching a CMA Connector**



6. Install the CMA.
  - a) Orient the CMA so that the elbow is on the left hand side.

- b) Attach all of the connectors to the brackets on the rails and chassis. There should be one at the elbow side and two at the other end.

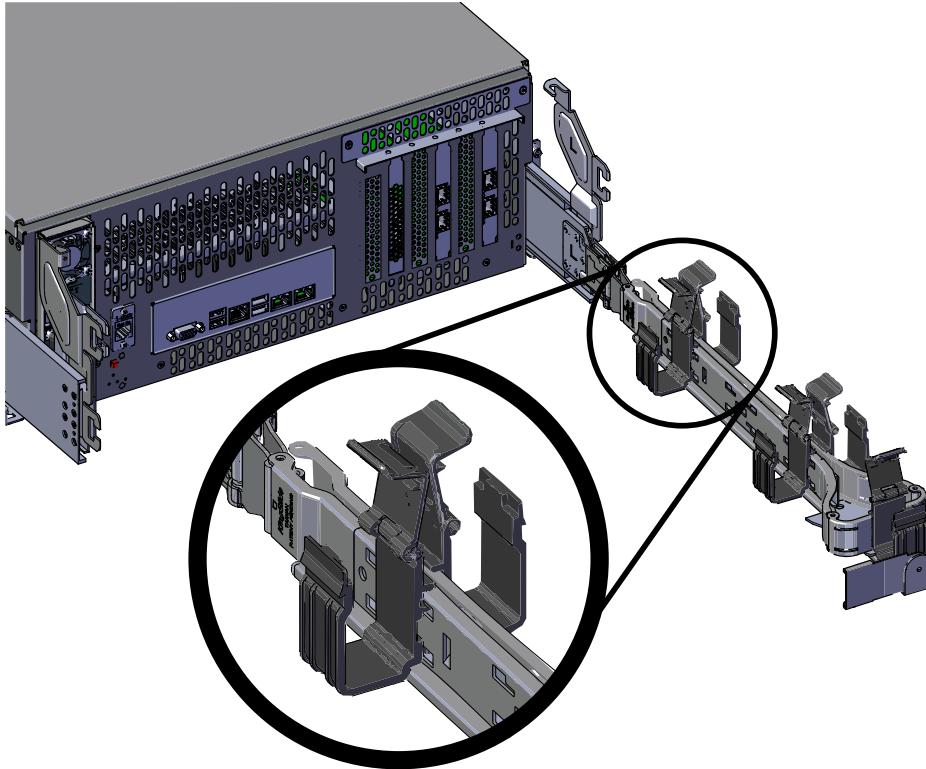
**Figure 247: CMA Orientation**



- c) Slowly slide the enclosure forward to ensure the CMA arm is operating properly, then slide it back into the rack.
- 7. Cable the CMA.**
- a) Unlatch the elbow side of the CMA arm and swing it forward by pressing the blue button that says “push” to unlatch it.

- b) Open all of the baskets

**Figure 248: Open Baskets**



- c) Route all of the cables being connected to the enclosure through the open baskets.
- d) Close all of the baskets.
- e) If the Ultrastar Serv60+8 is being installed in a rack and will subsequently be transported inside that rack, it is important to use the included cable tie to wrap the CMA bundle to ensure it does not get damaged during transport. If the Ultrastar Serv60+8 is instead being installed where it will operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.
- f) Reconnect the CMA at the elbow to the connectors on the rail.
8. Test for binding in the extension of the CMA by gently pulling the enclosure out of the rack to ensure the cables extend properly and that the system doesn't bind at all. If it does, examine the point at which the binding occurred and adjust the seating of cables in the baskets, check the connections to the rails, and examine the joints of the CMA arm to ensure that they are all functioning properly.
9. Make sure the CMA is in operational position by folding the arm in toward the enclosure and attaching the elbow end of the CMA to the connector that is attached to the rail. Verify that all of the cabling is in functional order and does not bind or catch.



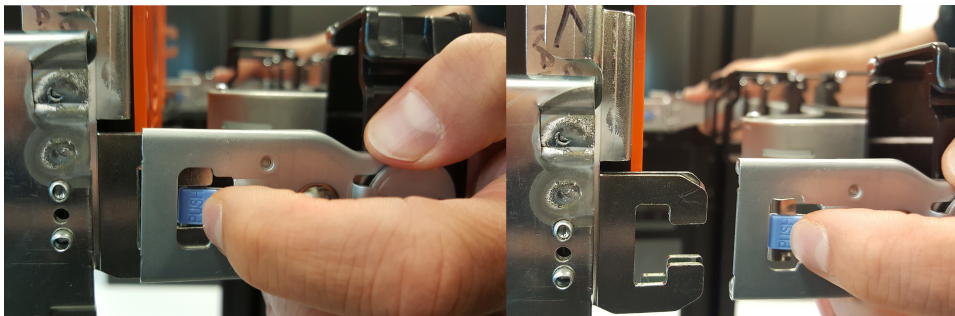
## 4.13 Rails Replacement

**Table 43: Procedure Info**

Required Tools	Required Parts	# of People Required	Time Required
<ul style="list-style-type: none"> <li>• Long T15 Torx Screwdriver</li> <li>• # 2 Philips Screwdriver</li> <li>• Long T10 Torx Screwdriver</li> <li>• Cable Ties (for configurations with greater than 10 total cables)</li> <li>• Tape Measure</li> <li>• Level</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Reuse:</b> M5 x 10mm T15 Torx screws</li> <li>• <b>Reuse:</b> Included Washers</li> <li>• Low-Profile M4 x 3.2mm Philips screws (included with rail assembly)</li> <li>• <b>Optional (if using CMA Tray):</b> M3 x 8mm T10 Torx screws</li> </ul>	3 Total (2 for Team Lifting Purposes and 1 to Guide and Spot)	~1h

1. Place the CMA into service position.
  - a) Unlatch the CMA at the elbow connector by pressing the blue release button to unlatch the connector from the rail.

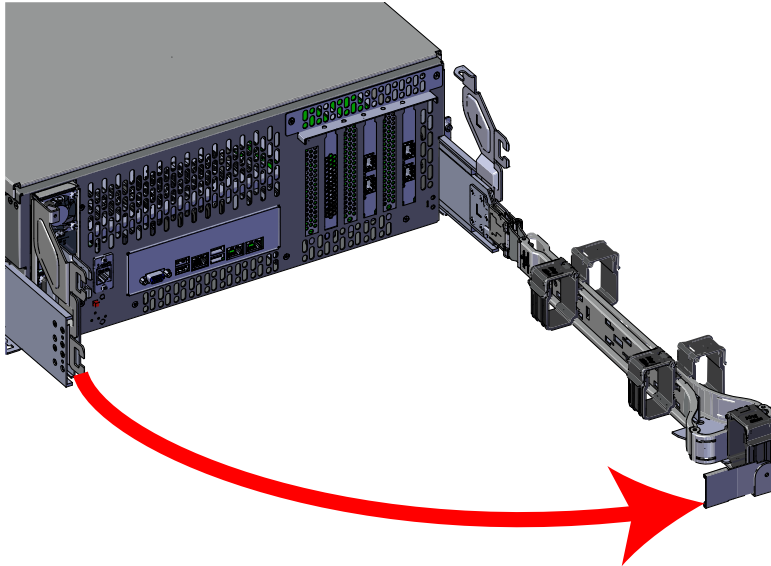
**Figure 249: Unlatching a CMA Connector**



- b) Swing the CMA away from the enclosure.

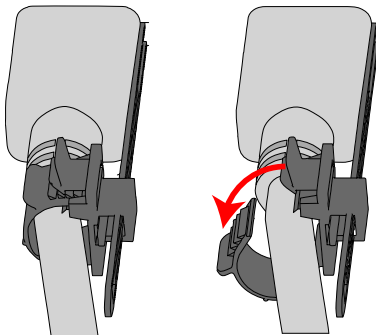
- c) The arm should be extended away from the enclosure as shown in the following example.

**Figure 250: CMAs in service position (Cables not shown)**



2. Power down the Enclosure.
  - a) Locate the redundant PSUs at the rear of the enclosure.
  - b) Detach the cable retention clip from both power cords.

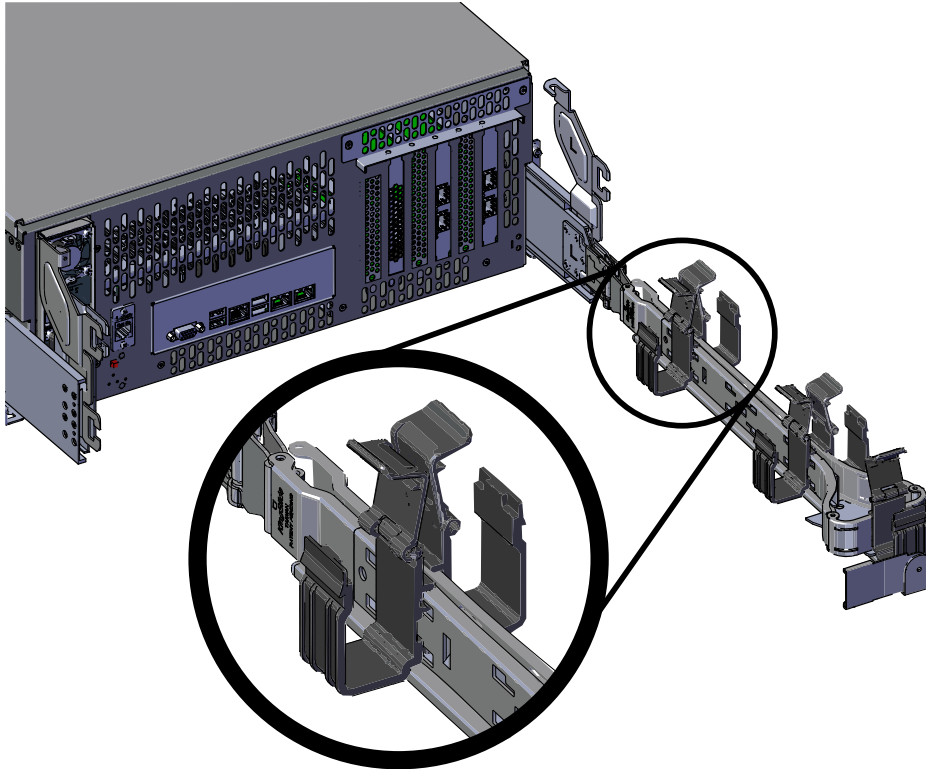
**Figure 251: Cable Retention Mechanism**



- c) Power down the enclosure by disconnecting both power cables, one from each PSU.
3. Uncable the CMA.

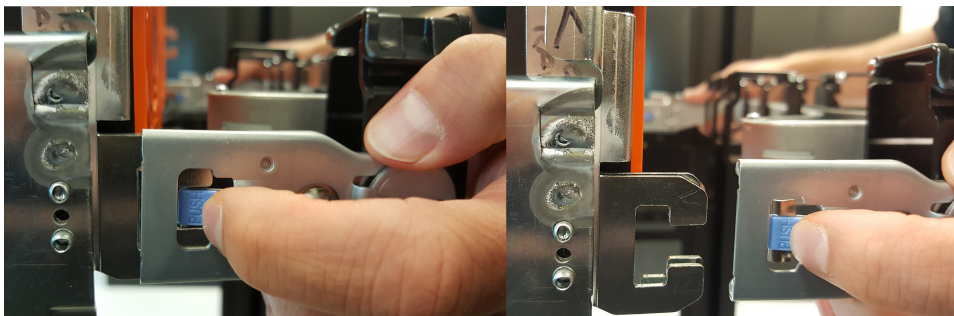
- a) Open all of the baskets on the CMA.

**Figure 252: Open Baskets**




- b) Remove one cable from the CMA at a time making sure not to put too much strain on the arm.
4. Unlatch all of the connectors that attach the CMA to the enclosure and the rail by locating the latch release button and pressing it from either side of the latch. There are three total connections that need to be removed, one at the elbow and two at the opposite end.

**Figure 253: Unlatching a CMA Connector**



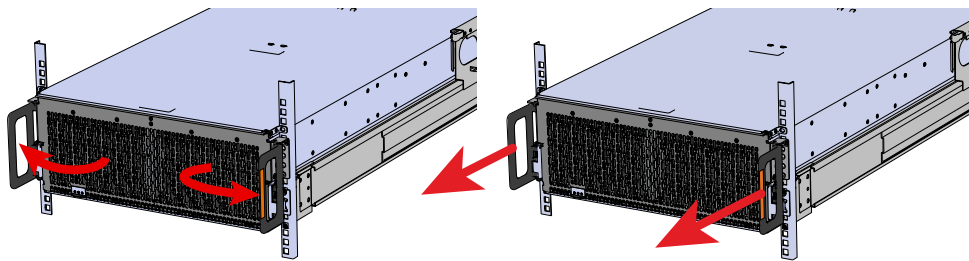
5. Complete the previous step for the second CMA.

**Warning:**  The following steps regarding uninstalling drives from the enclosure should be followed in order to reduce the weight enough to remove the chassis during the rails replacement process. However,

if there is proper lift/support equipment rated to support the full weight of the enclosure, 95.25 kg / 210 lbs. , these steps can be skipped. If not, please follow these drive removal instructions to remove all of the drives and reduce the weight. **Never try to support the weight of the full system by hand.** Doing so could cause damage to the system or serious bodily harm.

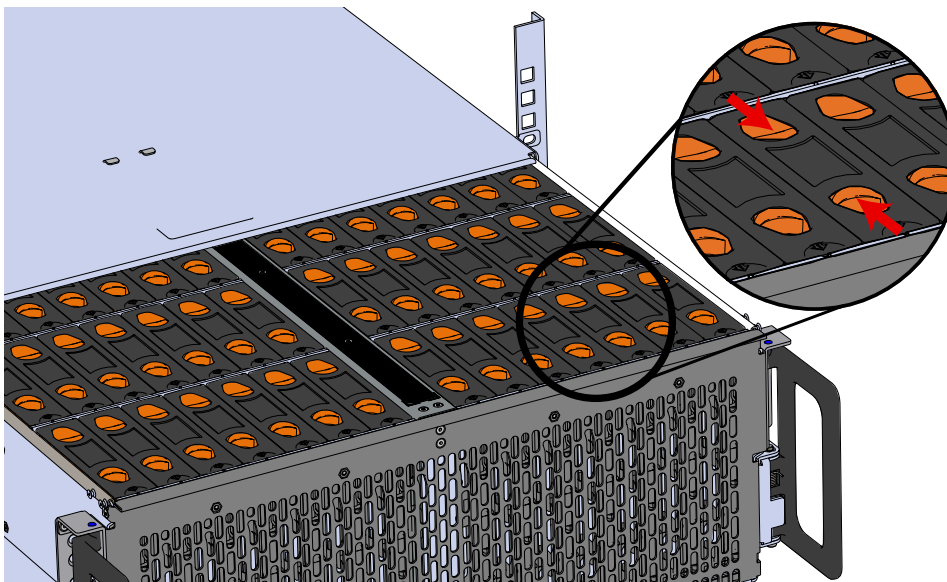
6. Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

**Figure 254: Chassis Handle Operation**



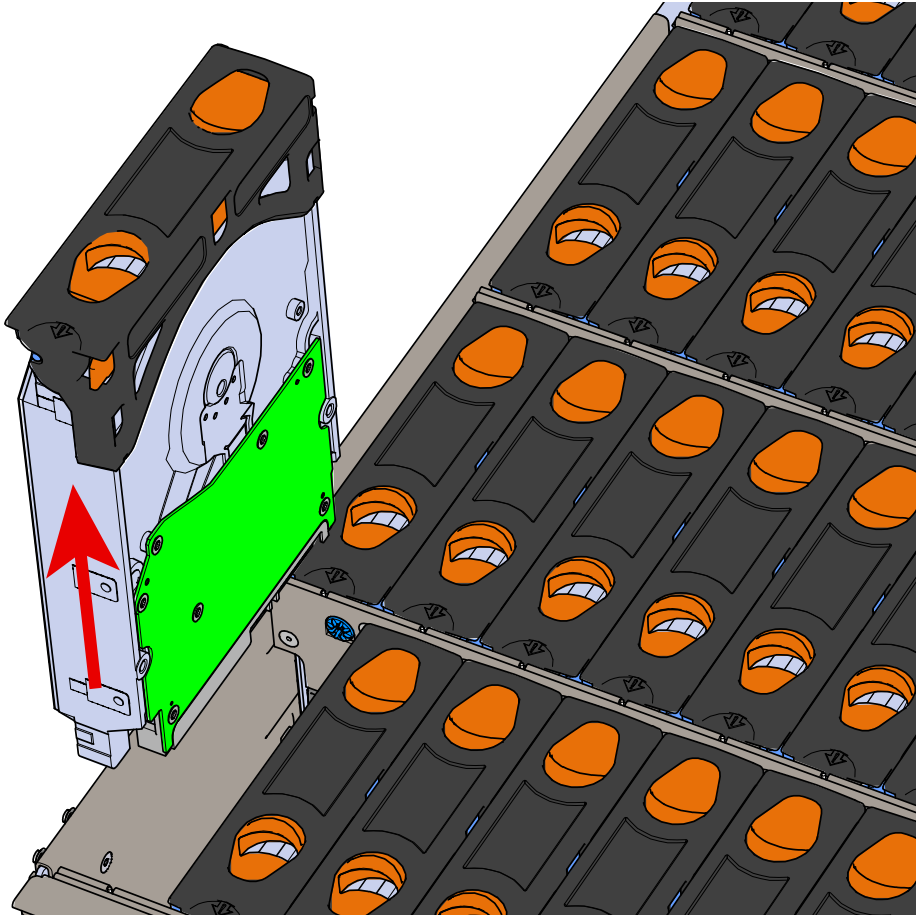
7. Follow these steps to remove a Drive Assembly.
  - a) Find the latch release mechanism on the Drive Assembly being removed.
  - b) Insert a finger and a thumb into the latch release and pinch to unlatch the Drive Assembly.

**Figure 255: Unlatch Drive Carrier (IOM Not Shown)**



- c) Lift the Drive Assembly free from the enclosure.

**Figure 256: Removing Drive Assembly**



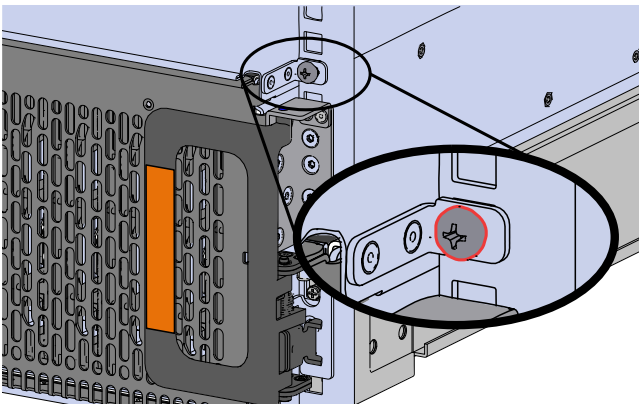
8. Follow the previous step for each drive in the enclosure. Attach a label or mark the drives with the drive slot they were removed from in order to add them to the same slot in the future. Store the drives in an ESD safe location until the drives are ready to be installed back into an enclosure.

9. Release the safety latch on the inner rails on each side of the chassis as shown in the following image.

**Figure 257: Inner Rail Safety Latch Release**



10. Push the chassis back into the rack.
11. Locate the M5 x 12mm Philips Pan Head screws on the top cover of the enclosure that keep it in place when the drawer is extended and unscrew them using a #2 Philips head screwdriver. This will allow the top cover to move freely with the enclosure when the enclosure is removed.



12. Remove the chassis from the rack.
  - a) Be prepared to support the enclosure once it is free of the rails by having a second person or a lift to support the enclosure
  - b) Grasp both handles at the front of the enclosure and pull with even pressure until the enclosure will not extend further.


- c) Locate the safety catches on the inner rails attached to the enclosure.

**Figure 258: Safety Latch Release**



- d) Depress the latch release lever for the safety latches on the rail and push the chassis very slightly forward. The chassis is now unsecured from the rack.
- e) Ensure that you have the proper support mechanism to hold the chassis in position, whether that be a team lifting partner or an appropriate lift.

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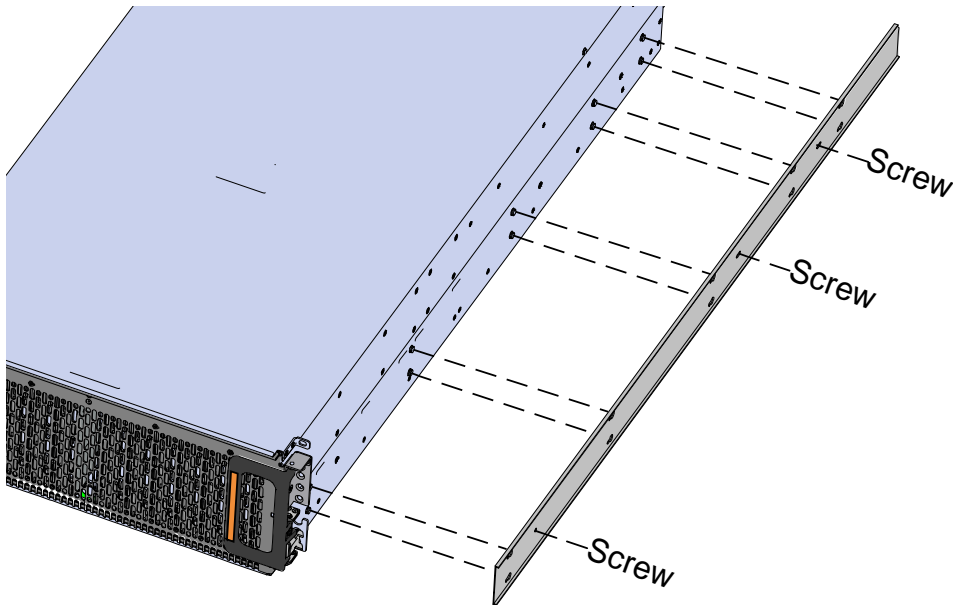
**Warning:**  Do not lift the chassis by the Cable Tray while removing the chassis from the rack OR while installing it into a rack. This can cause serious damage to the unit or serious bodily harm to those handling the unit. Always team lift the chassis by gripping the underside of the unit, and never try to lift a chassis that is filled with drives.

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- f) Slide the chassis forward to free it from the rails. Place the chassis in a safe location to avoid damage.
- 13.** Uninstall the inner rails from the sides of the chassis.

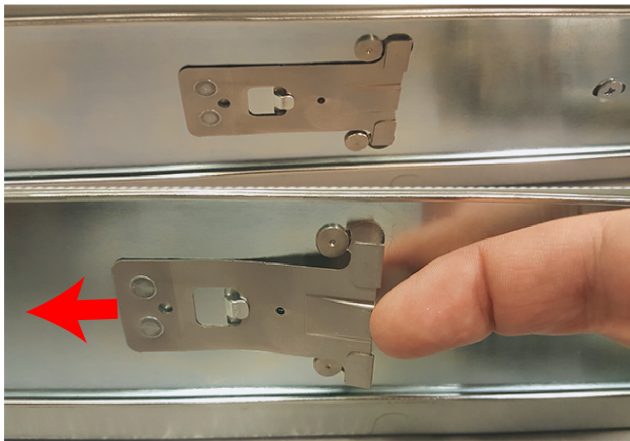
- a) Unscrew the three Low-Profile M4 x 3.2mm Philips screws that attach the inner rails to the chassis using a #2 Philips head screwdriver.

**Figure 259: Remove Inner Rail**



- b) Locate and unlatch the springlock on the side of the inner rail.

**Figure 260: Inner Rail Spring Latch**

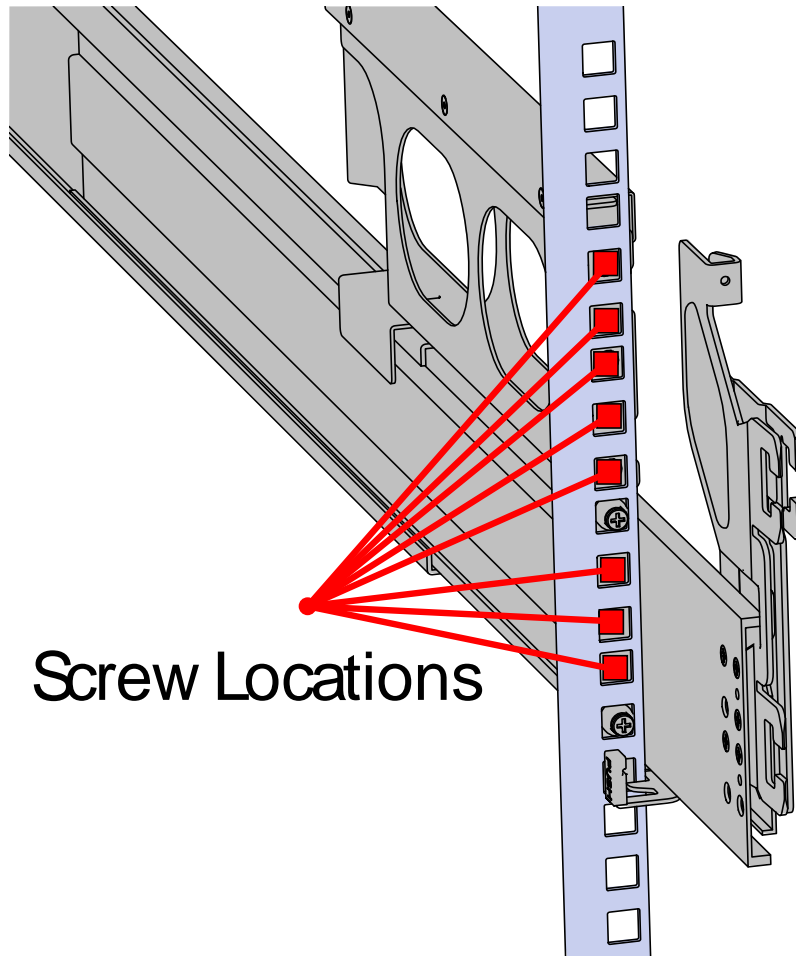


- c) Slide the inner rail toward the front of the enclosure to unlock it from the pegs that secure it to the sidewall and pull it free.
14. Remove the screws that secure the rack rails to the rack.



- a) Uninstall the alignment bracket by removing the screws that secure it to the rack posts using the screw locations in the following image. Be careful, the alignment bracket will be free once the screws are removed. Make sure you have a solid grip on it before removing the final screw.

**Figure 261: Rear Screw Locations**



- b) Uninstall the rest of the screws in the rear rack rail.

- c) Move to the front of the rack and remove the three screws that hold the rack latch bracket to the front of the rack using a T15 Torx screwdriver. Be careful, the rack latch bracket will be free once the screws are removed. Make sure you have a solid grip on it before removing the final screw.

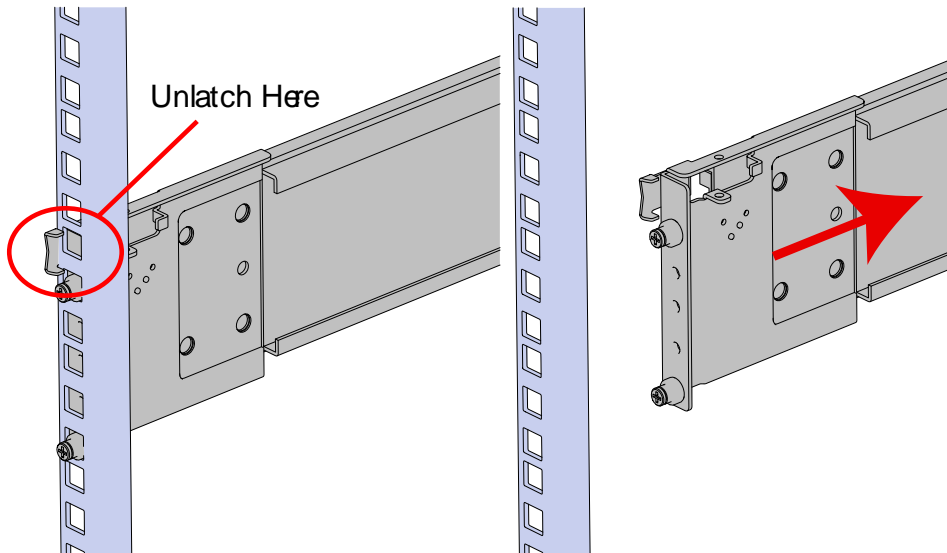
**Figure 262: Rack Latch Bracket Installed**



15. Uninstall the rack rails from the rack.

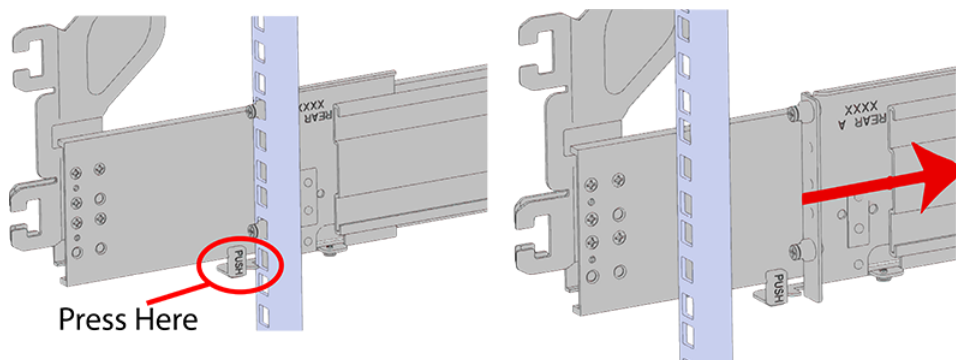
- a) From the front of the rack, locate the release clip as shown in the following image.

**Figure 263: Front Rail Release Clip Operation**



- b) Press the release clip and press lightly toward the rear of the rack to compress the rail clear of the rack post.  
c) Let go of the rail and move to the rear of the rack.  
d) Support the rail with one hand and press the release button with the other to free the rail from the rack and remove it.

**Figure 264: Rear Rail Latch Release Button**



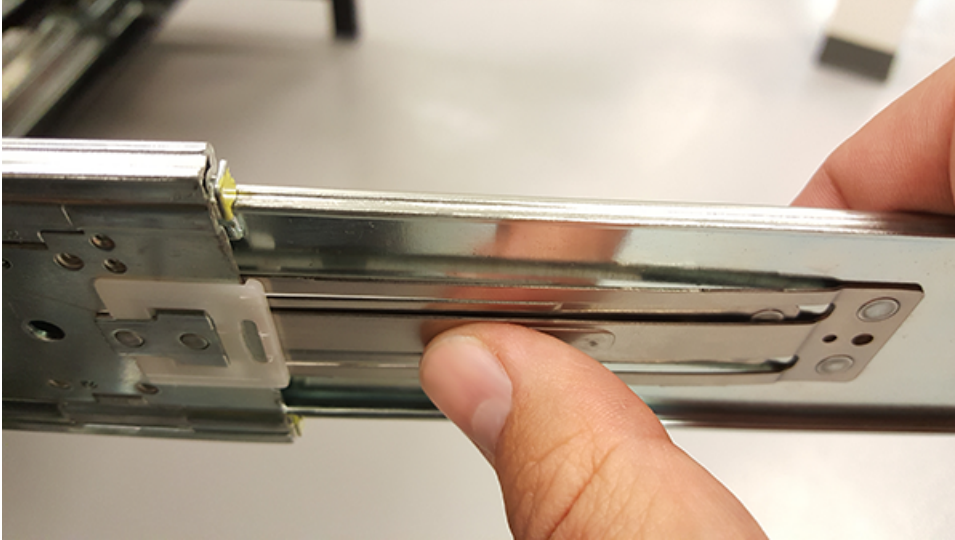
16. Gather the replacement rails and prepare to install them.  
17. Remove the inner rail that is nested inside the rack rails.

**Note:** There are Right and Left rails and they must be installed as a set. Each inner rail will read "R" for the right or "L" for the left embossed on the inside. Each outer rail will read "R-Front" for the right or "L-Front" for the left. Right and Left refer to when you are facing the front of the rack.

- a) Start by sliding the inner rail out of the outer/rack rail until the safety latch engages and the inner rail will not extend further. It will only slide one way.

- b) Press on the safety latch release spring located on the side of the rail and slide the inner rail out the rest of the way.

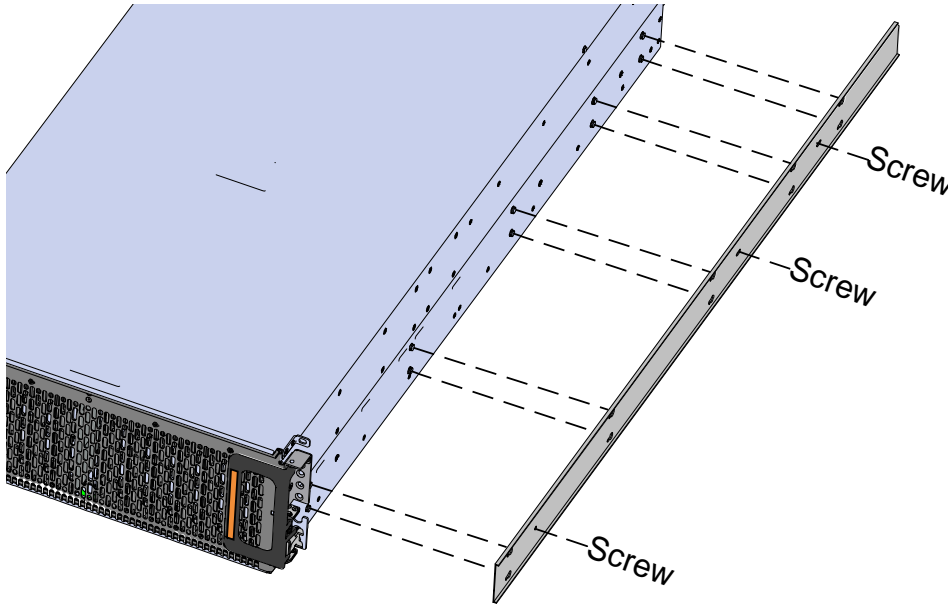
**Figure 265: Rail Safety Latch**



18. Install the inner rail onto the chassis making sure they are installed on the correct side. Each inner rail will read "R" for the right or "L" for the left embossed on the side that faces away from the chassis. Right and Left are with reference to looking at the front of the enclosure.
  - a) Orient the inner rails so that the flat side is facing the enclosure and the side with the grooves is facing away from the enclosure.

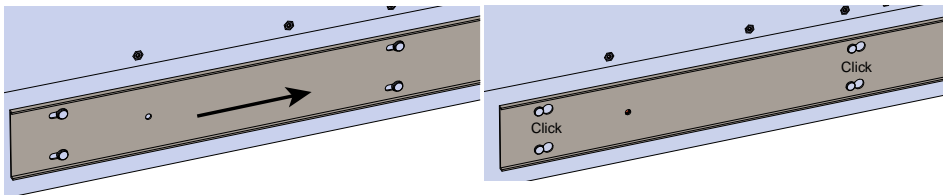
- b) Align the keyholes on the inner rail to the mounting pegs on the side of the enclosure and press the inner rail flush against the chassis. If the keyholes don't line up with the pegs, flip the rail length-wise to see if this will align them.

**Figure 266: Inner Rail Attachment**




- c) Slide the inner rail toward the rear of the chassis to lock it in place. There will be an audible click and the mounting pegs will cover the front part of the keyhole.

**Figure 267: Slide Inner Rail**



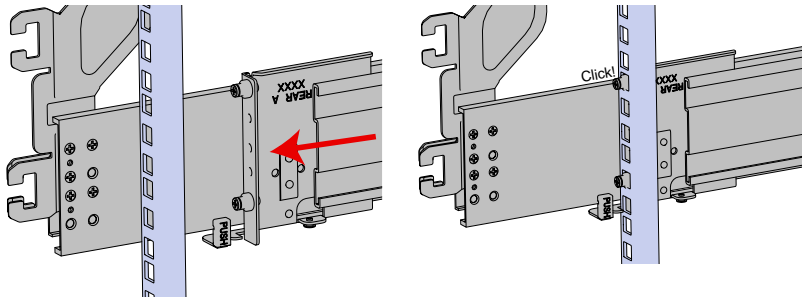
- d)

**Caution:**  When installing the inner rail onto the chassis, make sure to only use the special Low-Profile M4 x 3.2mm Philips screws provided in the accessory kit with the CMA. These screws should be tightened to .90-1.12 Nm / 8-10 in-lbf using a # 2 Philips Screwdriver. These screws are specially designed for this purpose. Using unapproved screws could cause damage to the slides inside the rail.

Install the three special low-profile M4 x 3.2mm Philips screws provided to secure the inner rail to the chassis.

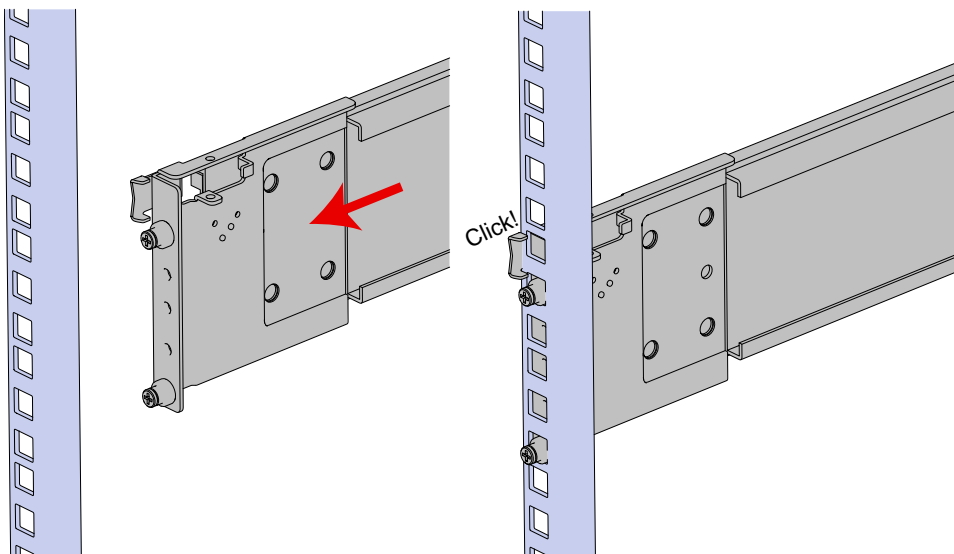
- e) Follow these steps for the second inner rail on the opposite side of the enclosure.
19. Install the outer rails into the rack. Pay special attention to which side is being installed. The embossed R is for the right side and L is for the left side. Right and Left refer to when you are facing the front of the rack.
- Move to the rear of the rack.
  - Orient the rail so that the word "REAR" that is embossed into the metal of the rail is at the rear end of the rack, and the release latch is facing the inside of the rack posts as shown in the following image.

**Figure 268: Rear Rail Latch Release Latch**



- Align the rail on the rack posts at the U-height desired for installation. The bottom of the rail will be the lower most U of the total 4U height.
- Pull the rail toward the rack post until the toolless latching mechanism engages the rack. The latching mechanism may need to be pulled open to get around the rack post.
- Move to the front of the rack.
- Align the front of the rail with the holes on the rack posts that will receive the rails and pull the rail toward the holes until the toolless latching mechanism engages the rack.

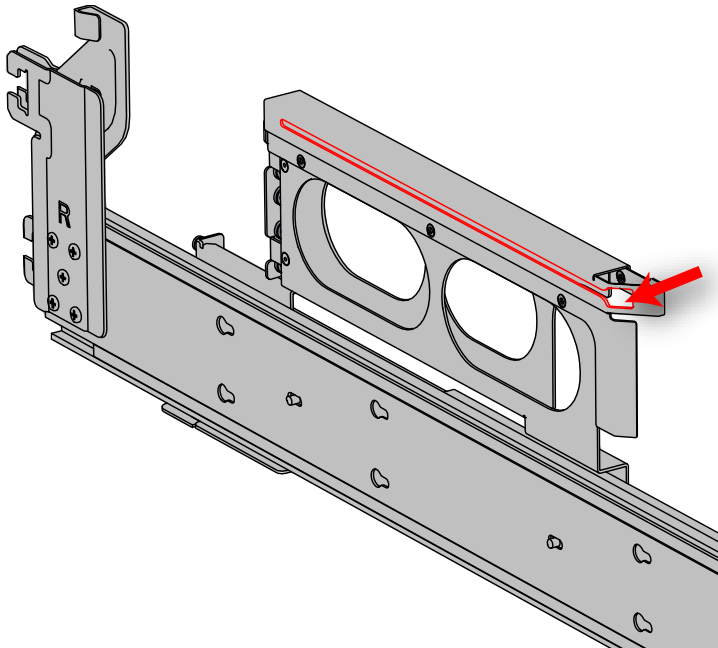
**Figure 269: Front Rail Release Clip Operation**



- Use a level to make sure that the rails are aligned properly.

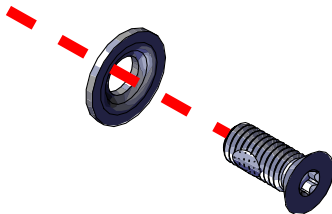
- h) Follow these steps for the other outer rail.
- 20.** Install the rear cover alignment brackets.
- a) From the rear of the rack, orient the alignment brackets so that the groove that will catch the cover is facing the inside of the rack.


**Figure 270: Alignment Bracket Groove (highlighted in red)**



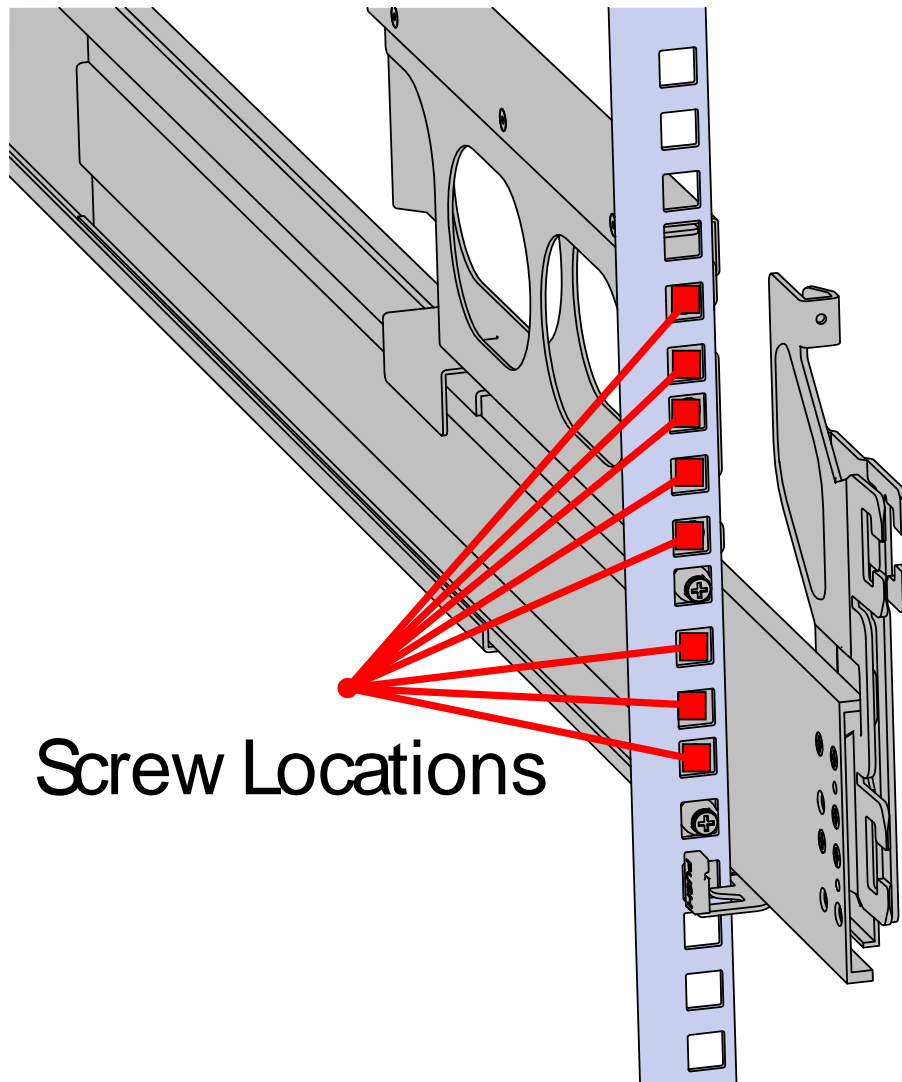
- b) Use five of the M5 x 10mm T15 Torx screws and five of the included washers and attach the rear cover alignment bracket to the vertical rail with the Long T15 Torx Screwdriver. Add three M5 x 10mm T15 Torx screws and three included washers to attach the rear rail (the three lower holes) to the rack posts as shown in the following image. These screws should be tightened to 3.38-3.61 Nm / 30-32 in-lbf using a Long T15 Torx Screwdriver.

**Figure 271: Screw and Washer Order**



**Caution:**  Be careful to set the screw properly into the cage nuts to prevent crossthreading.

**Figure 272: Screw Installation Location**



21. Install the two rack latch brackets at the front of the rack.
  - a) Orient the brackets so that the screw holes are between the two pins supporting the outer rails as shown in the following image. There is a left and a right. Use the image below as a guide for how to




orient this bracket and mirror it for the other side. Notice the increased distance between the top two screw holes and the lower screwholes and the flange being oriented on the outside.

**Figure 273: Rack Latch Bracket Installed**





- b) Use 6 of the included M5 x 12mm screws and the T15 Torx screwdriver to install each bracket, 3 screws per bracket.

**Caution:**  Always install the top cover onto the enclosure before installing the chassis into a rack. Not having the top cover installed may damage the alignment brackets.

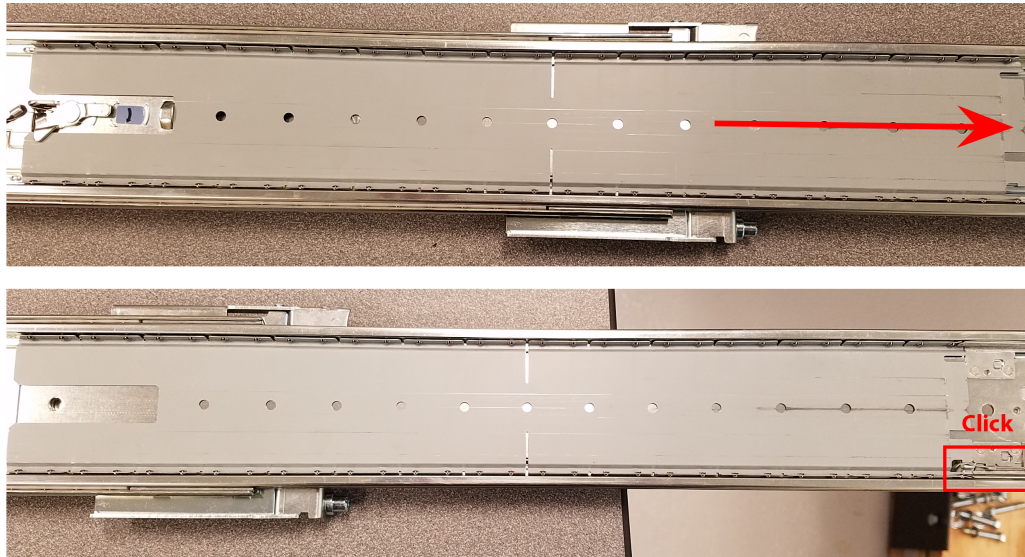
22. Install the chassis into the rails.

a)

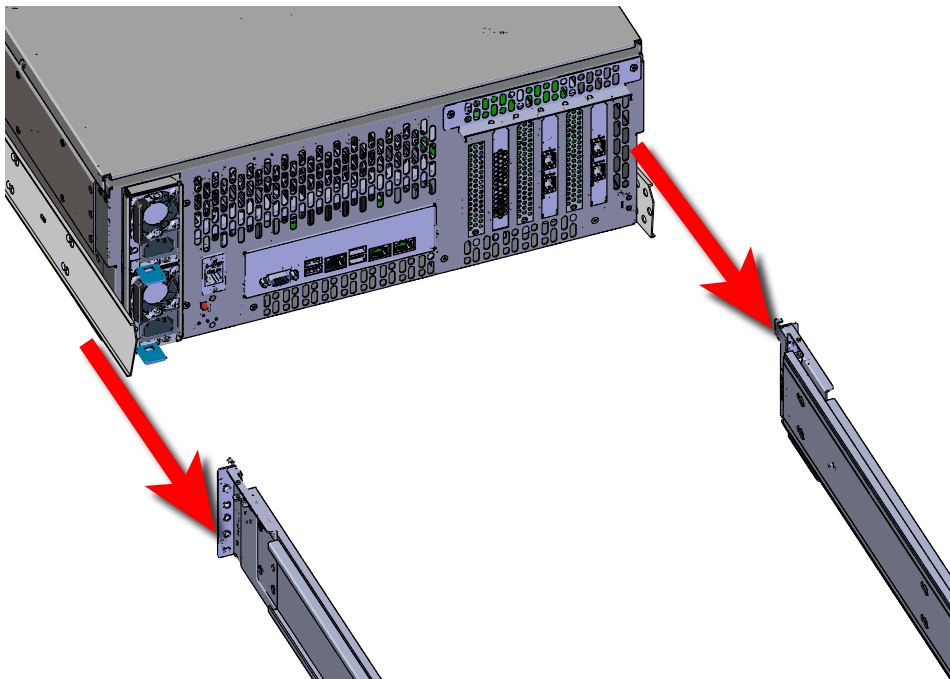
**Caution:**  This step in the installation requires a minimum of 3 individuals to install safely, two to lift and one to guide the others whom may have difficulty seeing because the enclosure is in the way. Ensure that the appropriate measures are taken to safely support the enclosure during installation. The enclosure **MUST** have no drives installed and requires a two person team lift to install. **Do not attempt to lift the system if it is fully populated with drives.** The only case in which the system may be installed or removed with the drives populated is if the facility has a lift that is rated to handle the maximum weight of the fully loaded system.

**Warning:**  Do not lift the chassis by the Cable Tray while removing the chassis from the rack OR while installing it into a rack. This can cause serious damage to the unit or serious bodily harm to those handling the unit. Always team lift the chassis by gripping the underside of the unit, and never try to lift a chassis that is filled with drives.


**Figure 274: Bearing Plate**



**Figure 275: Installing the Chassis**



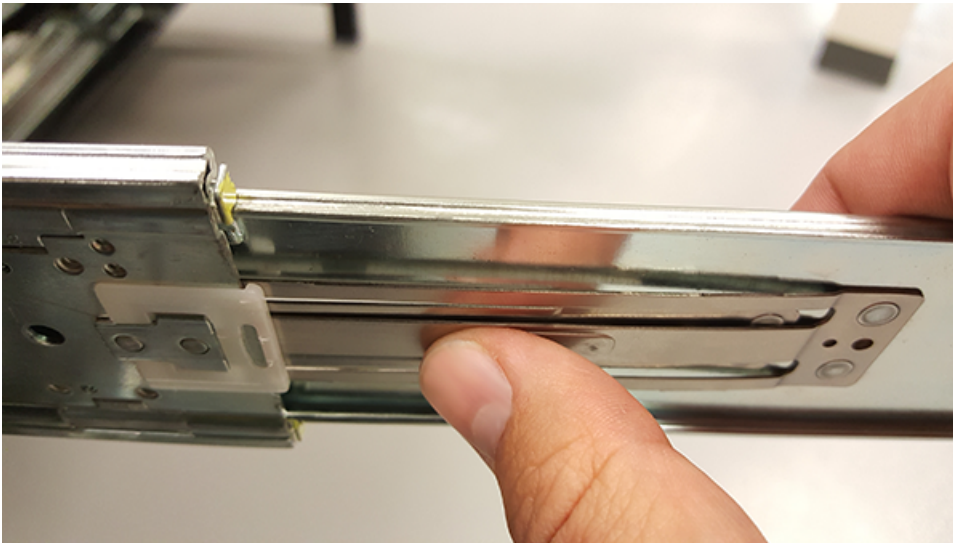
b)

**Caution:**  Make sure that the bearing plate on the inside of the mid-rails are fully forward and that the detent has engaged. This is to prevent potential damage due to improper mating of the rails.

Position one individual on each side of the enclosure to perform a team lift and have the third individual standing at the protruding rack rails to guide the chassis to mate with rack rails.

- c) Team-lift the enclosure until the inner rails that are attached to the chassis align with the extended mid-rails attached to the rack, and guide the inner rails on the chassis to mate with the rack rails.
- d) Once the rails are mated properly, slide the enclosure into the rack until it is stopped by the safety catch on the rails. Push the release lever on the safety latch located on the side of each of the rails and push the enclosure the rest of the way into the rack.

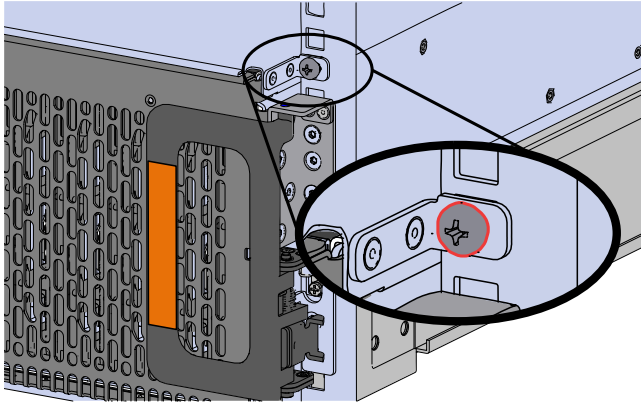
**Figure 276: Safety Latch Release**



- e) As the chassis is slid into the rack, position one installer at the rear of the rack to ensure that the pegs on the sides of the cover will slide correctly into the rear cover alignment brackets on both sides of the rack. If the chassis does not install smoothly or snags, check that the rear cover alignment brackets are not interfering with the chassis sidewalls, and try again.

23. Secure the chassis top cover to the rack using the included washers, the M5 x 12mm Phillips Pan Head screws, and a Philips screwdriver as shown in the following image. These screws should be tightened to 3.38-3.61 Nm / 30-32 in-lbf using a # 2 Philips Screwdriver.

**Figure 277: Cover Retention Screws**

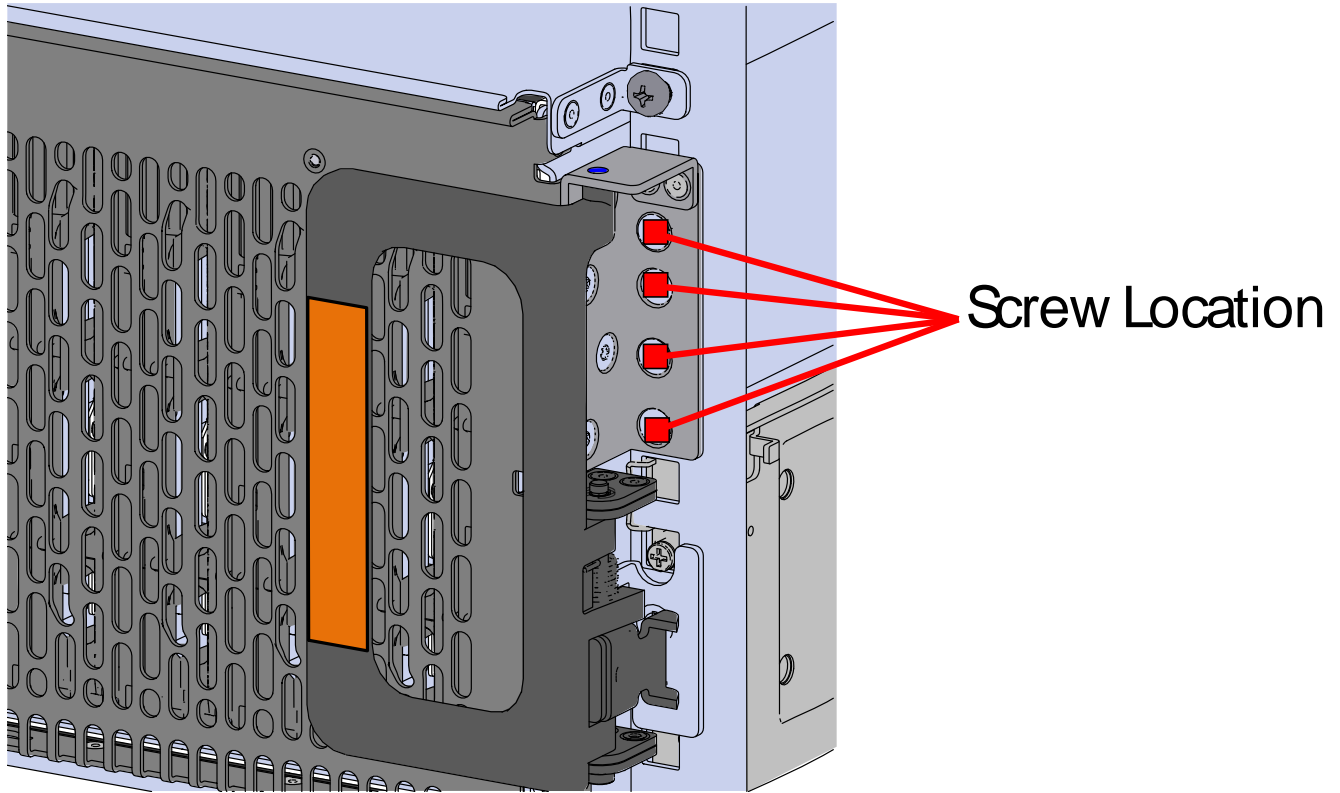


**Note:** If any drives were removed earlier to facilitate the removal of the chassis, follow the rest of the steps to reinstall the drives by following the labeling scheme noted earlier. If not, proceed to the cabling section.

24. If the chassis is being installed into a rack that will be shipped fully assembled, you **must** install eight (four per side) of the included M5 x 10mm T15 Torx screws into the two brackets at the front of the chassis in the following locations. These screws should be tightened to 3.38-3.61 Nm / 30-32 in-lbf using a Long

T15 Torx Screwdriver. If this chassis will not be installed into a rack for shipping purposes, skip this step and move on to the next one.

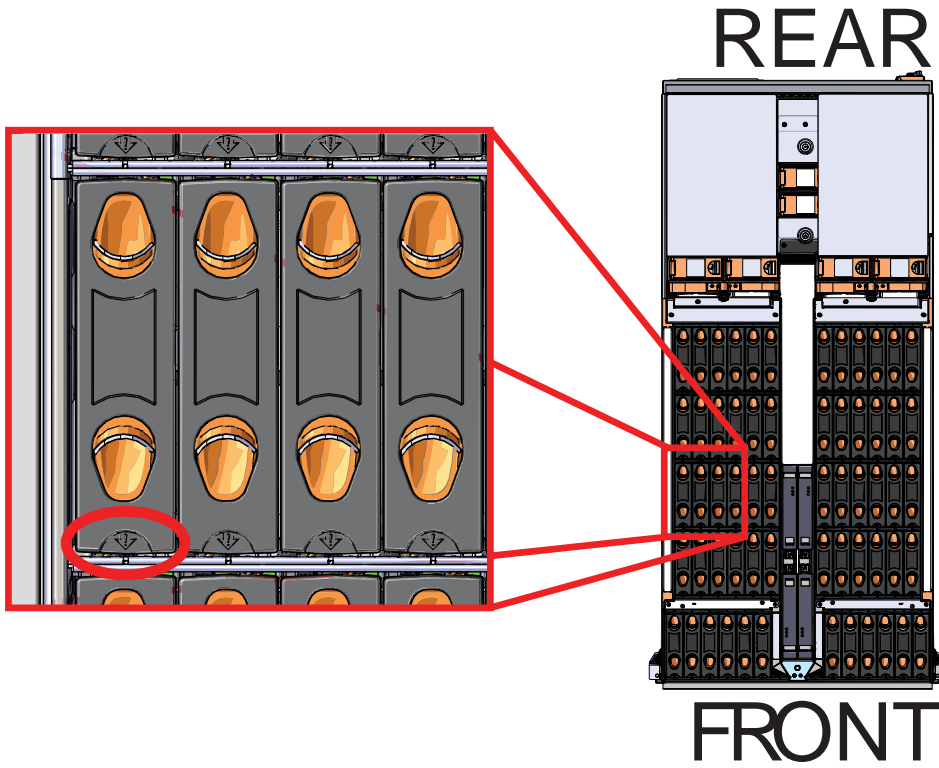
**Figure 278: Shipping Bracket Screw Locations**



25. Install the Drive Assembly.
  - a) Ensure that the enclosure has been pulled out of the rack until the rail latches engage.

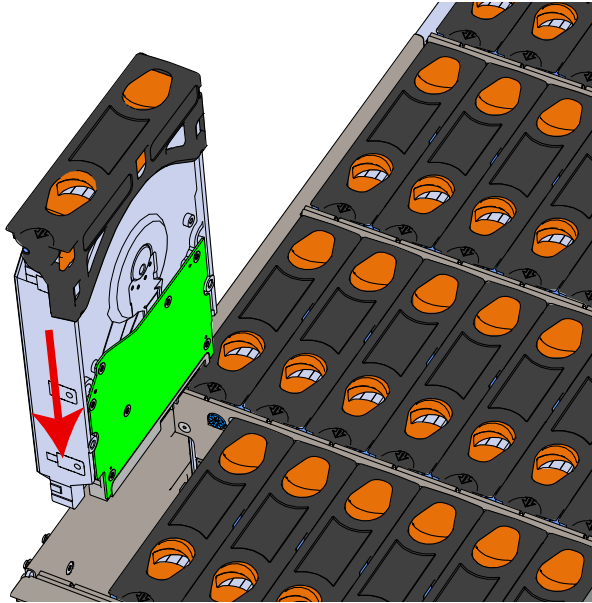
- b) Find the LED pointer on the top of the drive carrier. This pointer should point toward the front of the unit as shown in the following image.

**Figure 279: LED Pointer Orientation**



- c) Align the drive with the empty slot that will receive it. Lower it into the slot, making sure it stays level and does not snag.

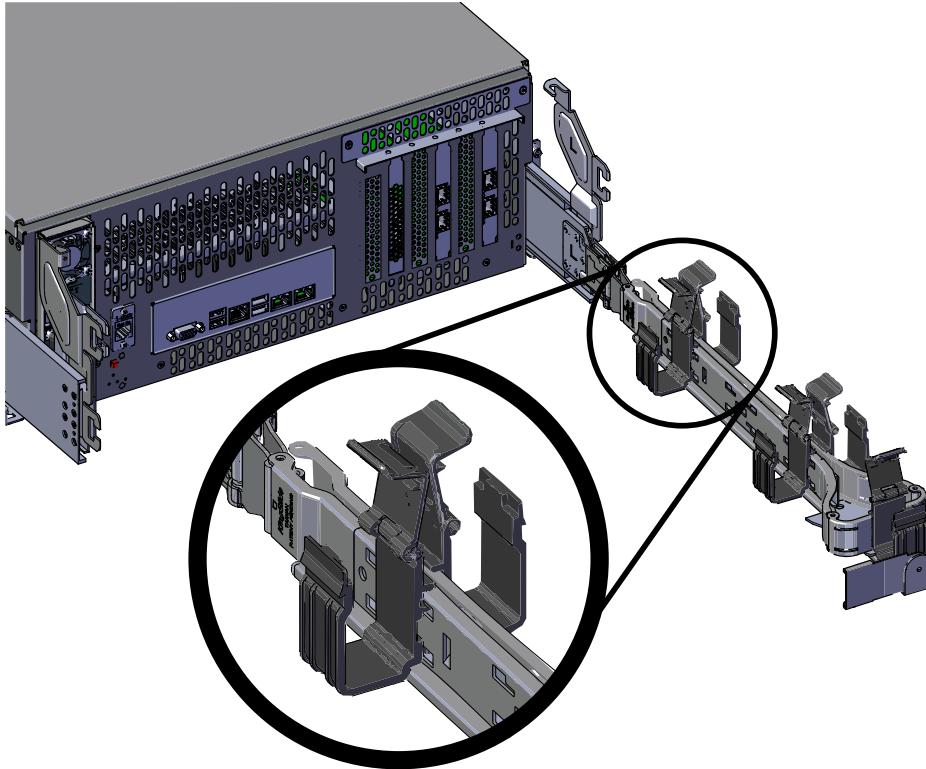
**Figure 280: Installing a Drive Assembly**



- d) Pinch the latch release and carefully press downward to seat the Drive Assembly the rest of the way.
26. Install each drive in the place it was removed from by following the labels or marks that were added earlier.
  27. Cable the CMA.
    - a) Unlatch the elbow side of the CMA arm and swing it forward by pressing the blue button that says "push" to unlatch it.

- b) Open all of the baskets

**Figure 281: Open Baskets**



- c) Route all of the cables being connected to the enclosure through the open baskets.
- d) Close all of the baskets.
- e) If the Ultrastar Serv60+8 is being installed in a rack and will subsequently be transported inside that rack, it is important to use the included cable tie to wrap the CMA bundle to ensure it does not get damaged during transport. If the Ultrastar Serv60+8 is instead being installed where it will operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.
- f) Reconnect the CMA at the elbow to the connectors on the rail.
- 28.** Test for binding in the extension of the CMA by gently pulling the enclosure out of the rack to ensure the cables extend properly and that the system doesn't bind at all. If it does, examine the point at which the binding occurred and adjust the seating of cables in the baskets, check the connections to the rails, and examine the joints of the CMA arm to ensure that they are all functioning properly.
- 29.** Make sure the CMA is in operational position by folding the arm in toward the enclosure and attaching the elbow end of the CMA to the connector that is attached to the rail. Verify that all of the cabling is in functional order and does not bind or catch.



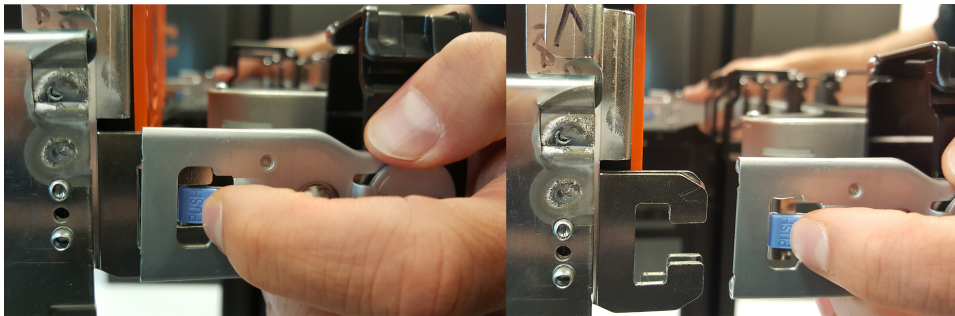
## 4.14 Chassis Replacement

**Table 44: Procedure Info**

Required Tools	Required Parts	# of People Required	Time Required
<ul style="list-style-type: none"><li>• Long T15 Torx Screwdriver</li><li>• # 2 Philips Screwdriver</li><li>• T30 Torx Screwdriver</li><li>• Tape Measure</li><li>• Level</li></ul>	<ul style="list-style-type: none"><li>• M5 x 10mm T15 Torx screws</li><li>• Included Washers</li><li>• Low-Profile M4 x 3.2mm Philips screws (included with rail assembly)</li></ul>	3	~2h

1. Place the CMA into service position.
  - a) Unlatch the CMA at the elbow connector by pressing the blue release button to unlatch the connector from the rail.

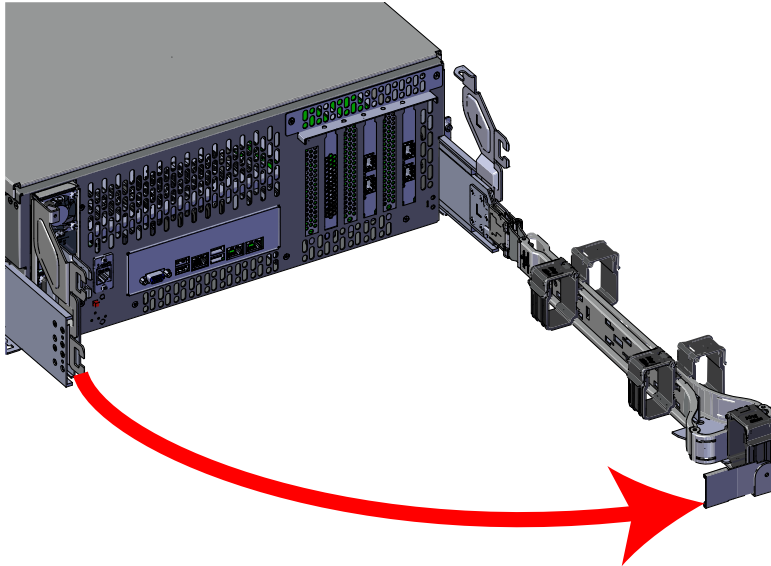
**Figure 282: Unlatching a CMA Connector**



- b) Swing the CMA away from the enclosure.

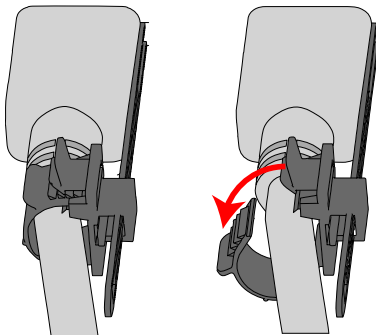
- c) The arm should be extended away from the enclosure as shown in the following example.

**Figure 283: CMAs in service position (Cables not shown)**



2. Power down the Enclosure.
  - a) Locate the redundant PSUs at the rear of the enclosure.
  - b) Detach the cable retention clip from both power cords.

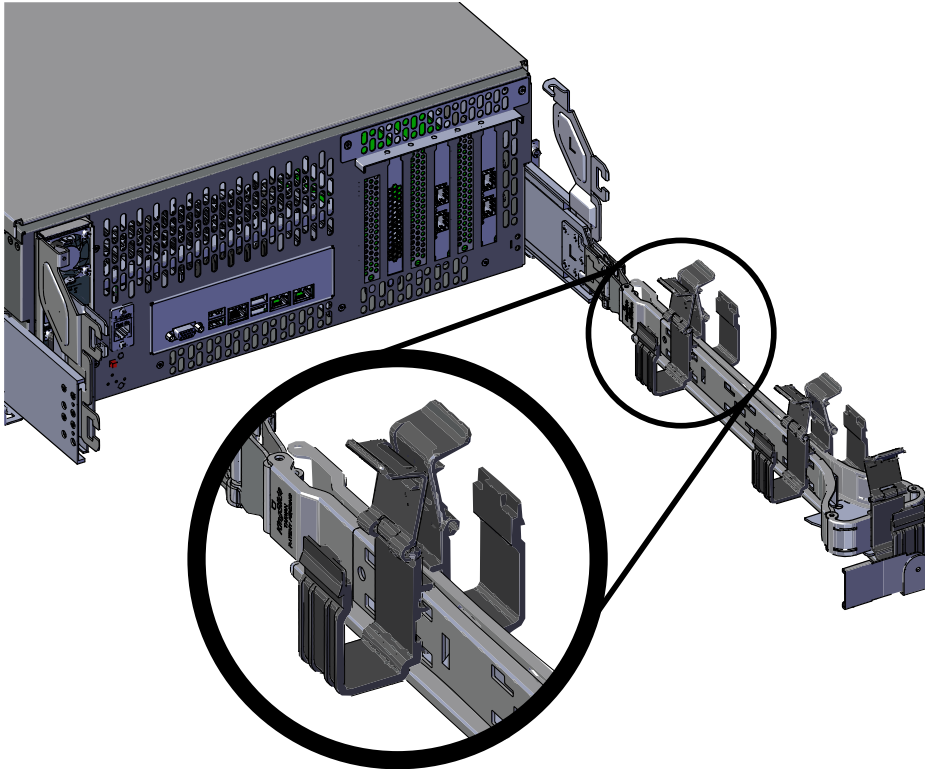
**Figure 284: Cable Retention Mechanism**



- c) Power down the enclosure by disconnecting both power cables, one from each PSU.
3. Disconnect any other cabling that is connected to the rest of the rear IO ports.
4. Uncable the CMA.

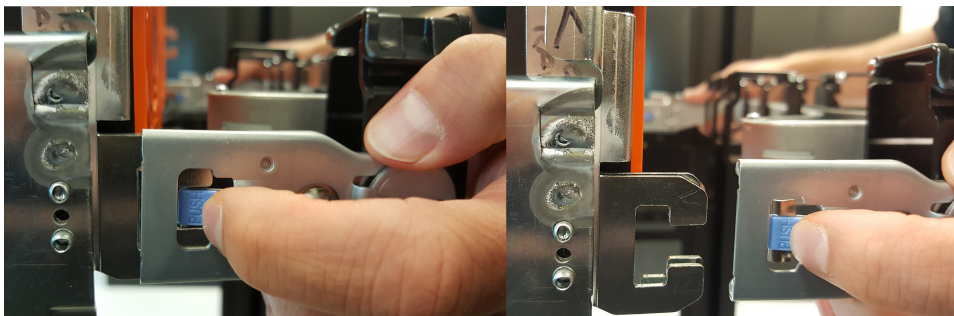
- a) Open all of the baskets on the CMA.

**Figure 285: Open Baskets**



- b) Remove one cable from the CMA at a time making sure not to put too much strain on the arm.
5. Unlatch all of the connectors that attach the CMA to the enclosure and the rail by locating the latch release button and pressing it from either side of the latch. There are three total connections that need to be removed, one at the elbow and two at the opposite end.

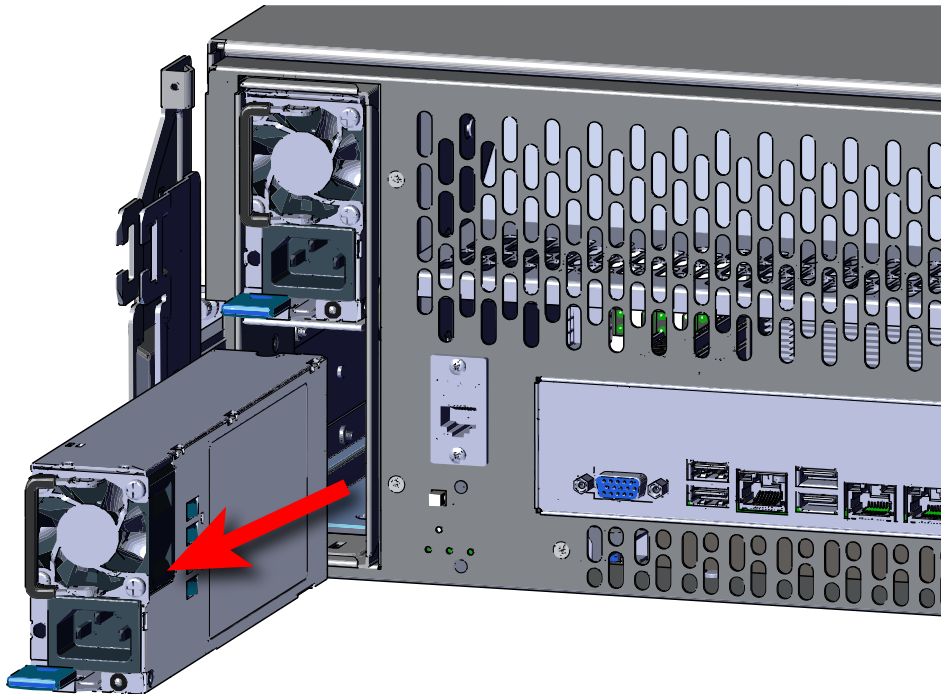
**Figure 286: Unlatching a CMA Connector**



6. Uninstall the PSU.

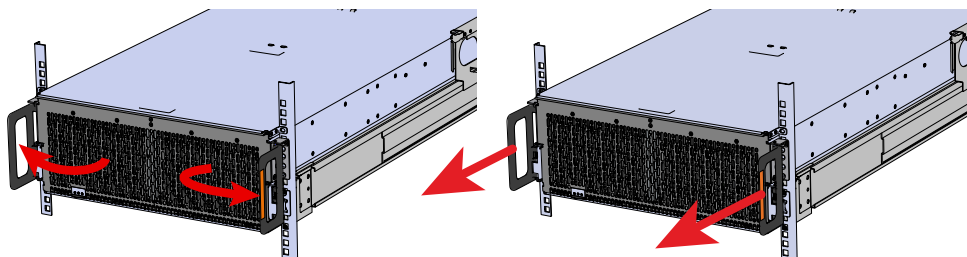
- a) Grasp the release lever and the metal handle in a downward pinching motion to release the latching mechanism.

**Figure 287: Uninstalling PSU**



- b) Pull the PSU straight out with even pressure.
7. Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

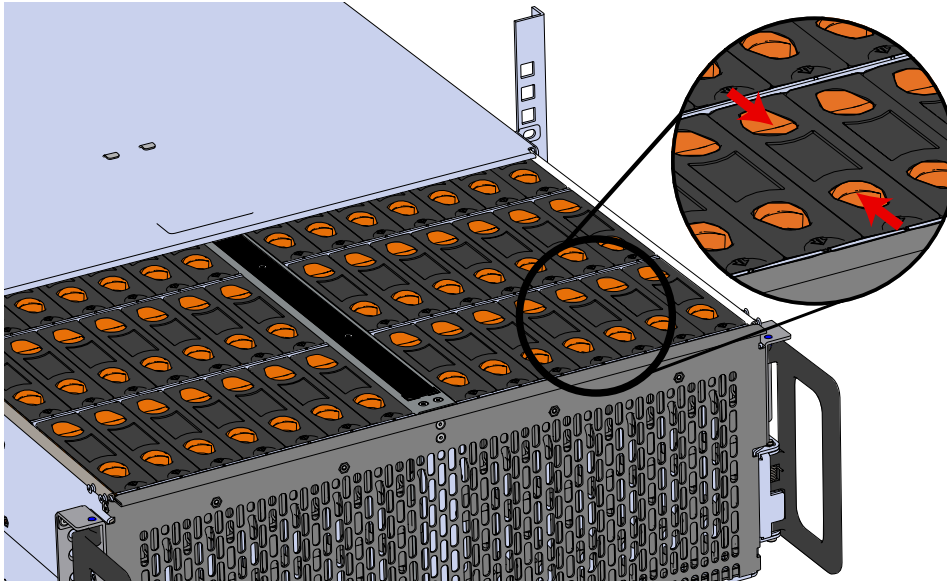
**Figure 288: Chassis Handle Operation**



8. Remove all of the drives from the chassis before uninstalling the chassis. Be prepared to label the drives as they are removed so they can be reinstalled in the same location in the new chassis.
9. Follow these steps to remove a Drive Assembly.
  - a) Find the latch release mechanism on the Drive Assembly being removed.

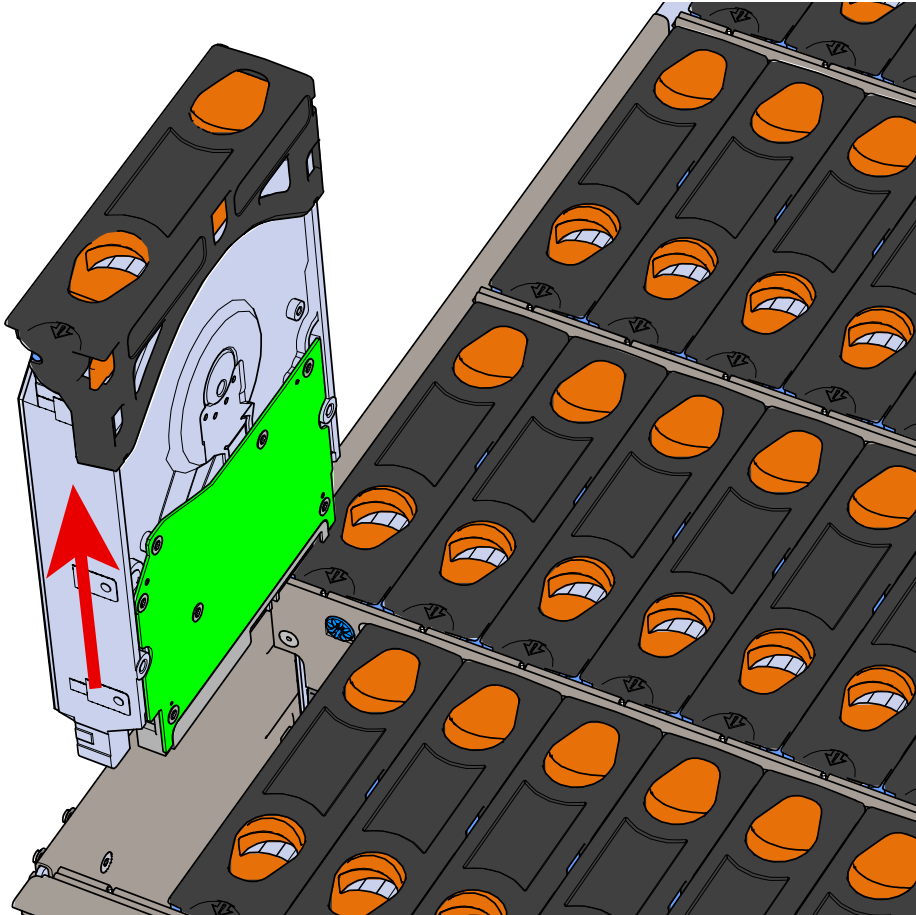
- b) Insert a finger and a thumb into the latch release and pinch to unlatch the Drive Assembly.

**Figure 289: Unlatch Drive Carrier (IOM Not Shown)**



- c) Lift the Drive Assembly free from the enclosure.

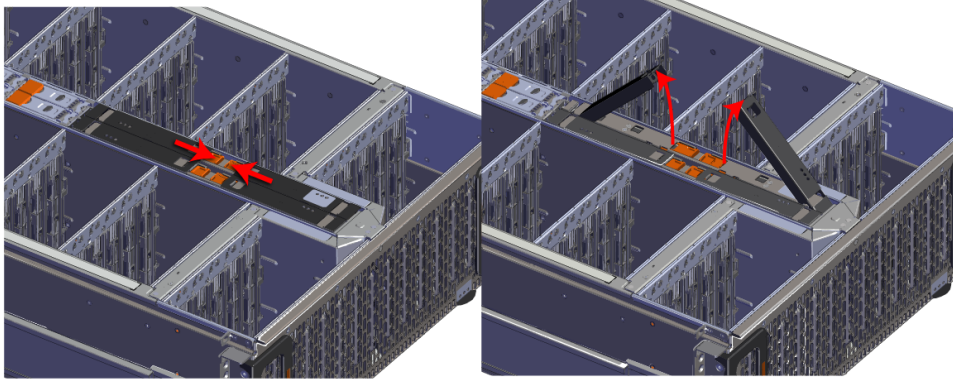
**Figure 290: Removing Drive Assembly**



10. Follow the previous step for each drive in the enclosure. Attach a label or mark the drives with the drive slot they were removed from in order to add them to the same slot in the future. Store the drives in an ESD safe location until the drives are ready to be installed back into an enclosure.
11. Uninstall the IOM.

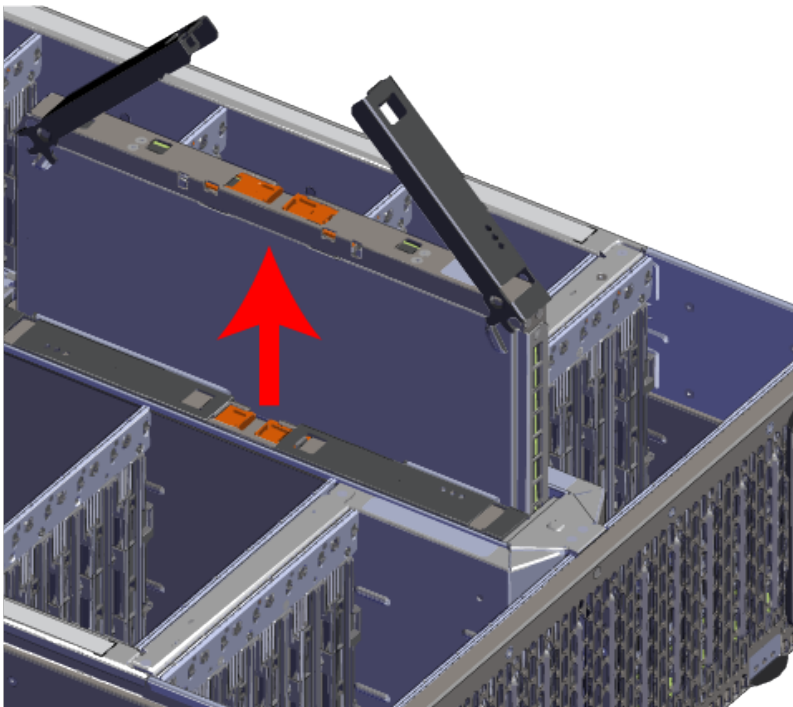
- a) Locate the latch release on the IOM and press it in the direction shown in the following image.

**Figure 291: Unlatching the IOM**



- b) Grasp both handles, one handle in each hand, and lift evenly with both hands to ensure the IOM comes out straight. This will prevent any damage to the pins on the internal connectors.

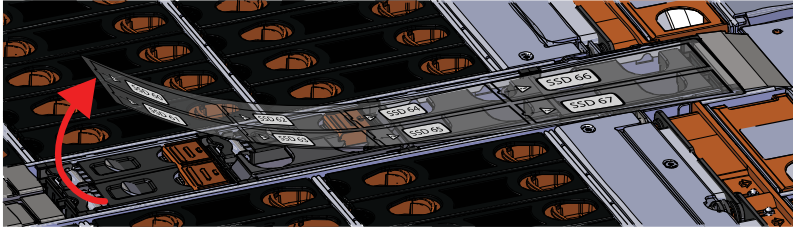
**Figure 292: Removing IOM**



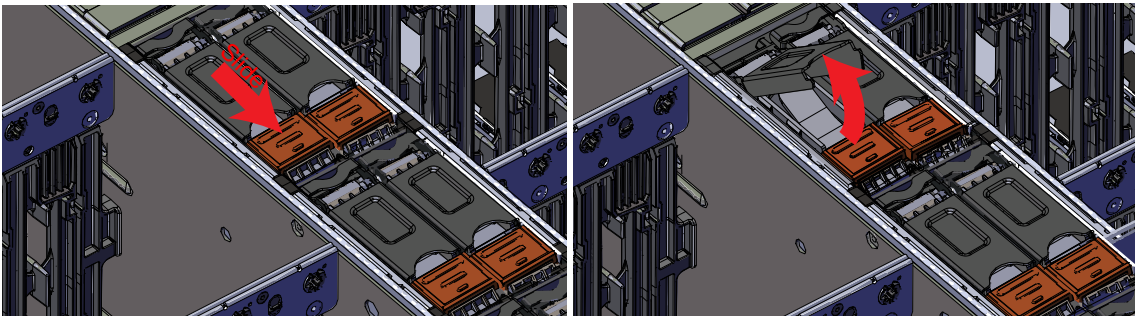
12. Remove the IOM Blank from IOM slot B.
13. Uninstall the System SSD.

a) Lift the center channel flap and press the latch release as shown in the following image.

**Figure 293: Lift the Center Channel Flap**

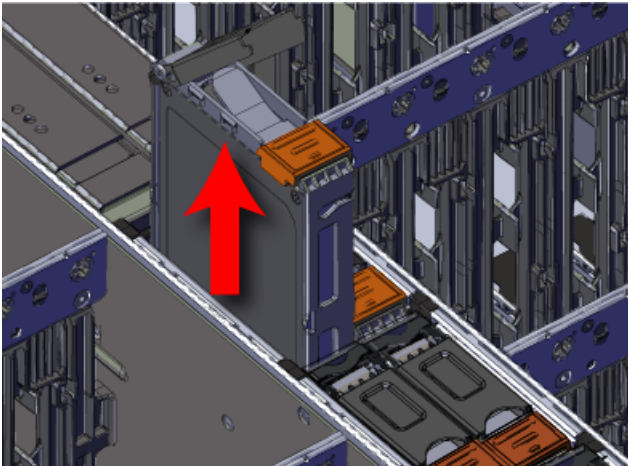


**Figure 294: Latch Release**



b) Grasp the handle that pops up and pull evenly to remove the component.

**Figure 295: System SSD Removal**

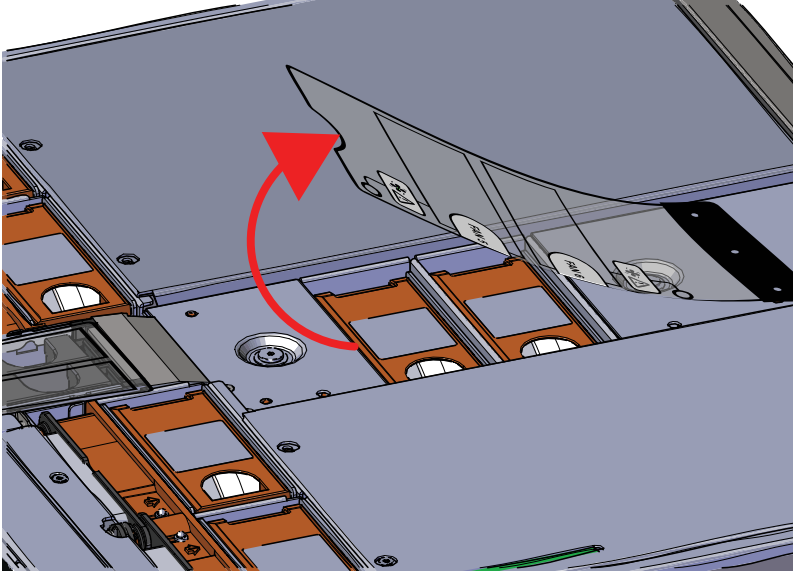


14. Uninstall the rest of the System SSD assemblies in the same way as the first.
15. Uninstall the internal System Fan.

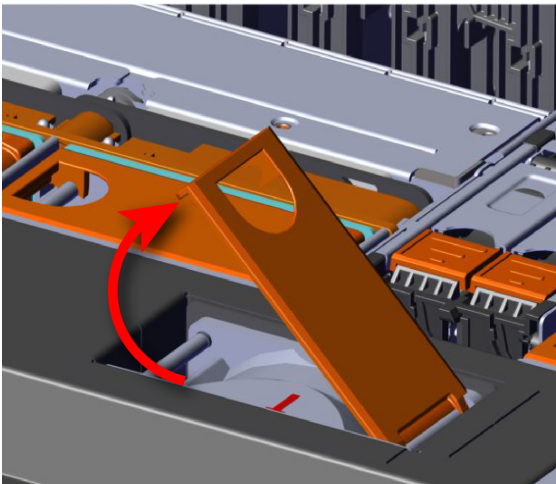


- a) Lift the System Fan flap and insert a finger into the service hole on the top of the System Fan and pull up to release the latch.

**Figure 296: Lift the System Fan Flap**

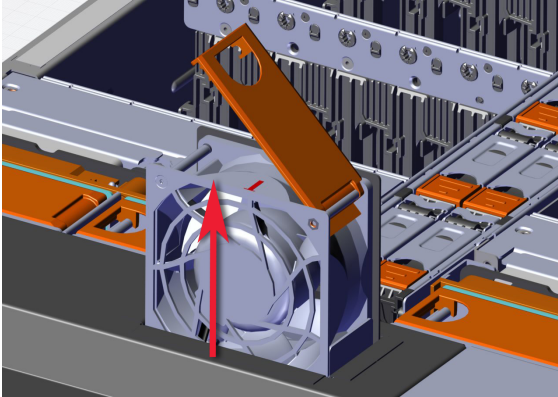


**Figure 297: Unlatching System Fan**



- b) Use the handle to pull evenly on the component to remove it from the enclosure.

**Figure 298: Removing System Fans**



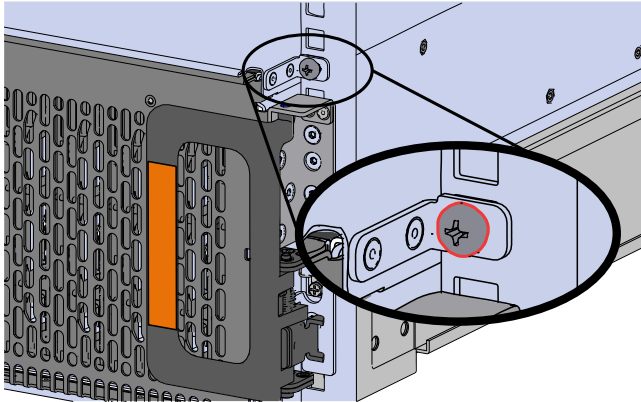
16. Uninstall the rest of the system fans in the same manner as the first.
17. Release the safety latch on the inner rails on each side of the chassis as shown in the following image.

**Figure 299: Inner Rail Safety Latch Release**



18. Push the chassis back into the rack.

19. Locate the M5 x 12mm Philips Pan Head screws on the top cover of the enclosure that keep it in place when the drawer is extended and unscrew them using a #2 Philips head screwdriver. This will allow the top cover to move freely with the enclosure when the enclosure is removed.



20. Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. Make sure that the top cover comes with the chassis as it is extended out of the rack. The safety latches will prevent the enclosure from coming out of the rack completely.
21. Remove the chassis from the rack.
  - a) Be prepared to support the enclosure once it is free of the rails by having a second person or a lift to support the enclosure
  - b) Grasp both handles at the front of the enclosure and pull with even pressure until the enclosure will not extend further.
  - c) Locate the safety catches on the inner rails attached to the enclosure.


**Figure 300: Safety Latch Release**



- d) Depress the latch release lever for the safety latches on the rail and push the chassis very slightly forward. The chassis is now unsecured from the rack.

- e) Ensure that you have the proper support mechanism to hold the chassis in position, whether that be a team lifting partner or an appropriate lift.

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**Warning:**  Do not lift the chassis by the Cable Tray while removing the chassis from the rack OR while installing it into a rack. This can cause serious damage to the unit or serious bodily harm to those handling the unit. Always team lift the chassis by gripping the underside of the unit, and never try to lift a chassis that is filled with drives.

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- f) Slide the chassis forward to free it from the rails. Place the chassis in a safe location to avoid damage.

## 22. Uninstall server cover panels.

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**Note:** The same steps to uninstall the server cover panel apply to both sides of the enclosure with the exception of the number of screws that secure the server cover panel. From the rear of the enclosure, the left panel contains two screws. The panel on the right side of the enclosure contains one screw.

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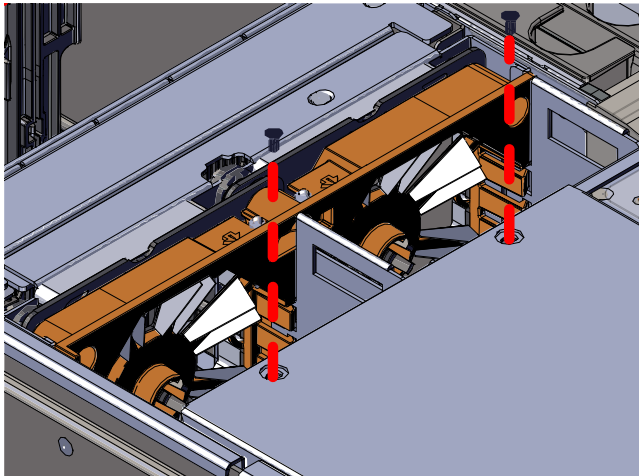
- a) Remove the screws that secure the server cover panels to the chassis using a T7 Torx screwdriver.

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**Note:** When at the rear of the enclosure, the left server cover panel contains two T7 Torx screws. The left server cover panel contains only one T7 Torx screw.

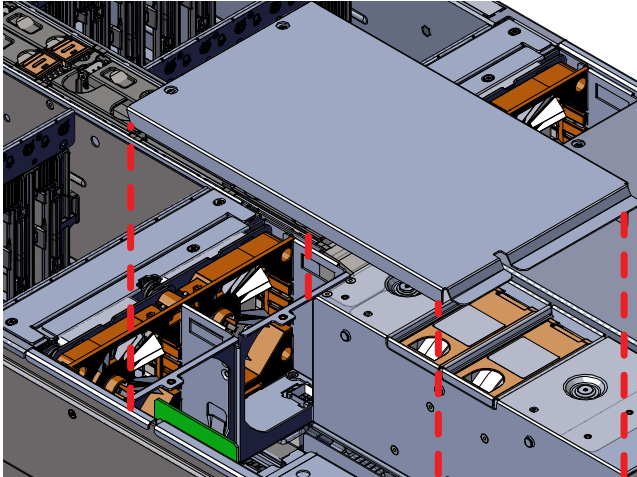
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**Figure 301: Removing the Server Cover Panel Screws**



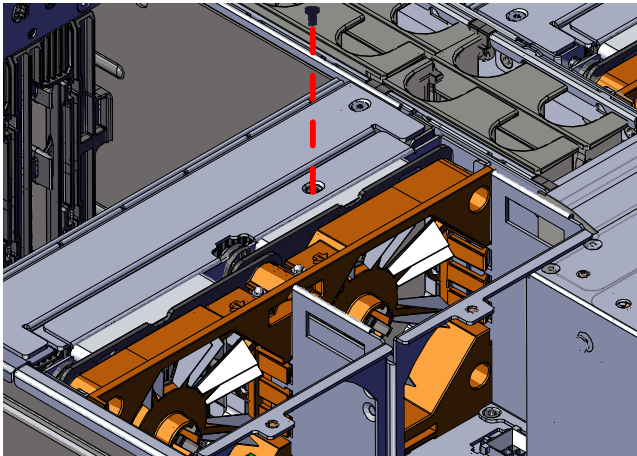
- b) Remove the server cover panel by carefully pulling on the edge where the screws were removed.

**Figure 302: Removing the Server Cover Panel**



23. Uninstall the server cover panel in the same manner as the first.
24. Uninstall the fan bay.
  - a) Remove the screw that secures the fan bay to the chassis.

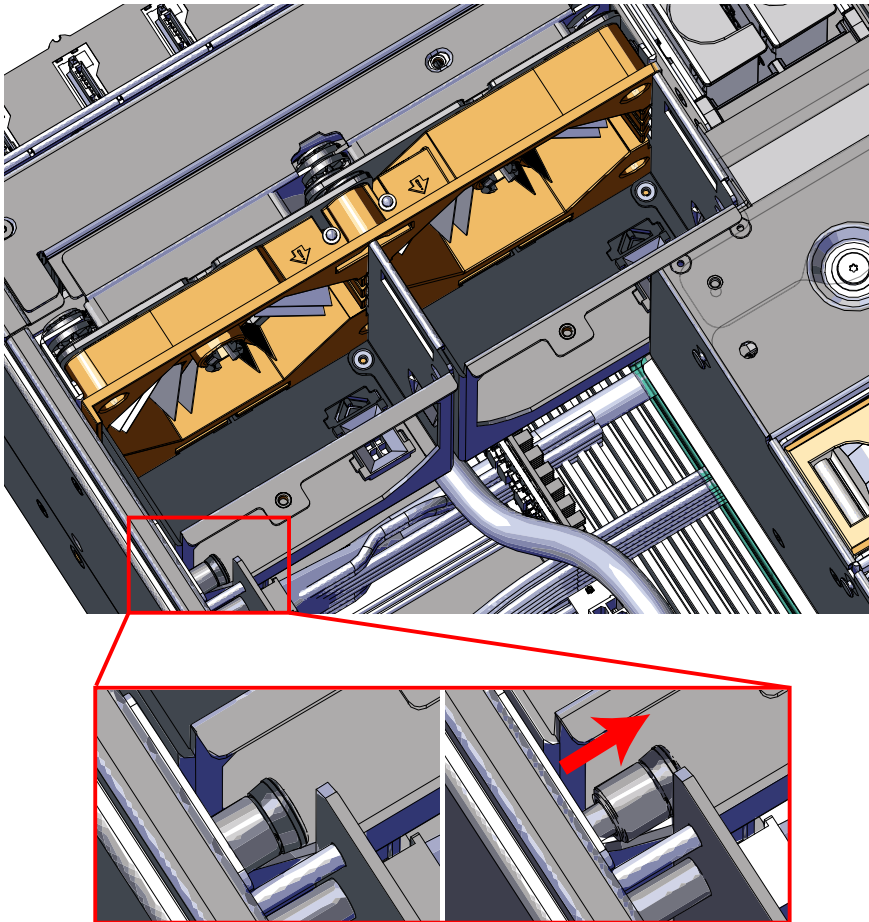
**Figure 303: Removing the Fan Bay Screws**



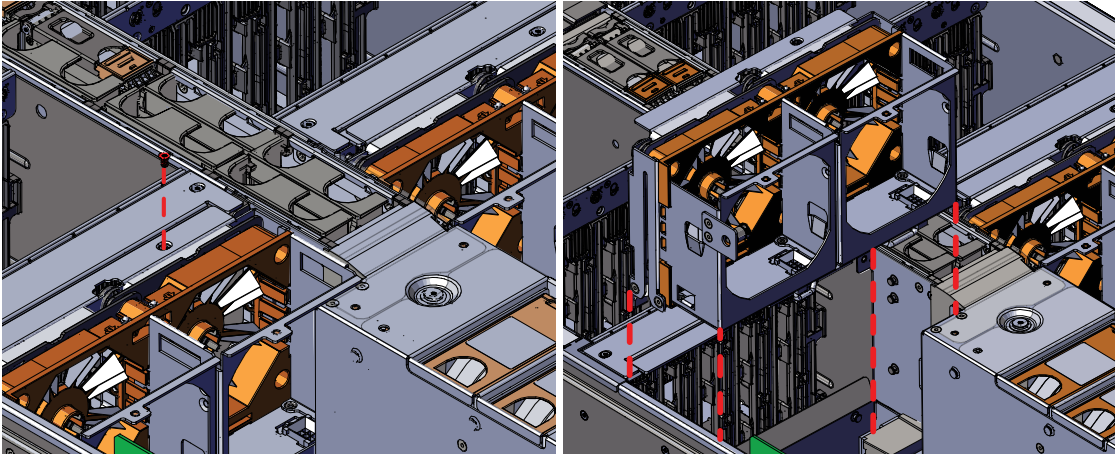
- b) Locate the pin that secures the outside of the fan bay to the chassis and pull the pin out and pull up on the fan bay until the cage is clear of the chassis.

**Note:** The fan bay is connected to the baseboard with a cable and does not need to be disconnected. When removing the fan bay to replace DIMMs, lay the assembly on the drive cage.

**Figure 304: Fan Bay Pin**

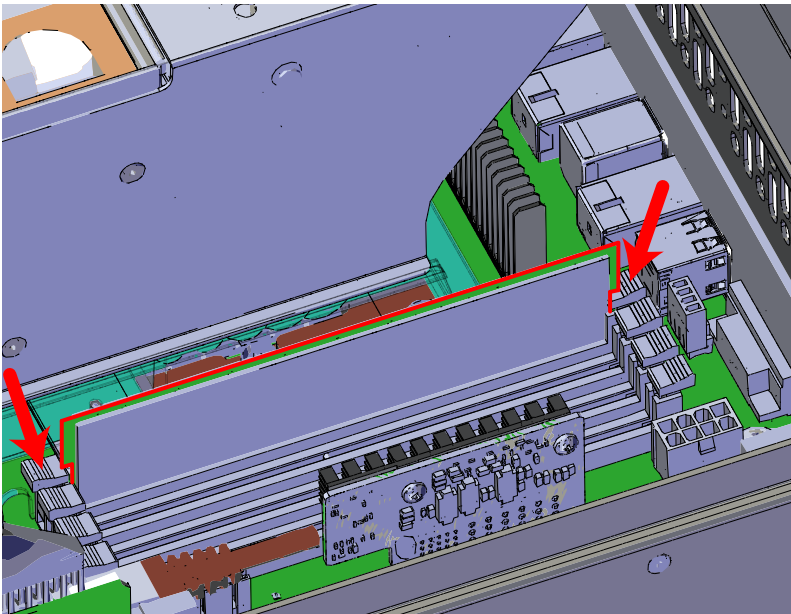


**Figure 305: Removing the Fan Bay**



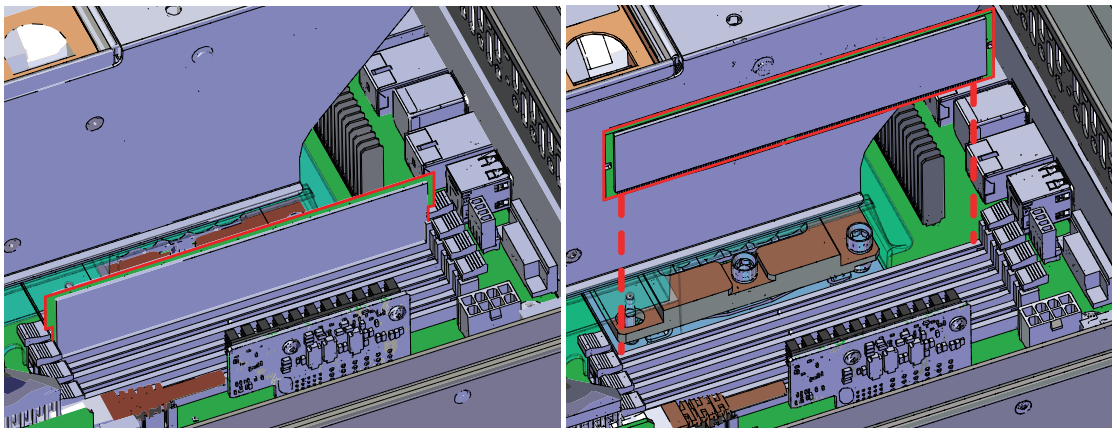
25. Uninstall the remaining fan bay in the same manner as the first.
26. Uninstall the DIMMs.
  - a) Locate the DIMMs on both sides of the server.
  - b) Carefully push apart on the DIMM ejector tabs located on either side of the DIMM slots.

**Figure 306: DIMM Ejector Tabs**



c) Slide the DIMM out of the of DIMM slot and set it aside.

**Figure 307: DIMM Removal**

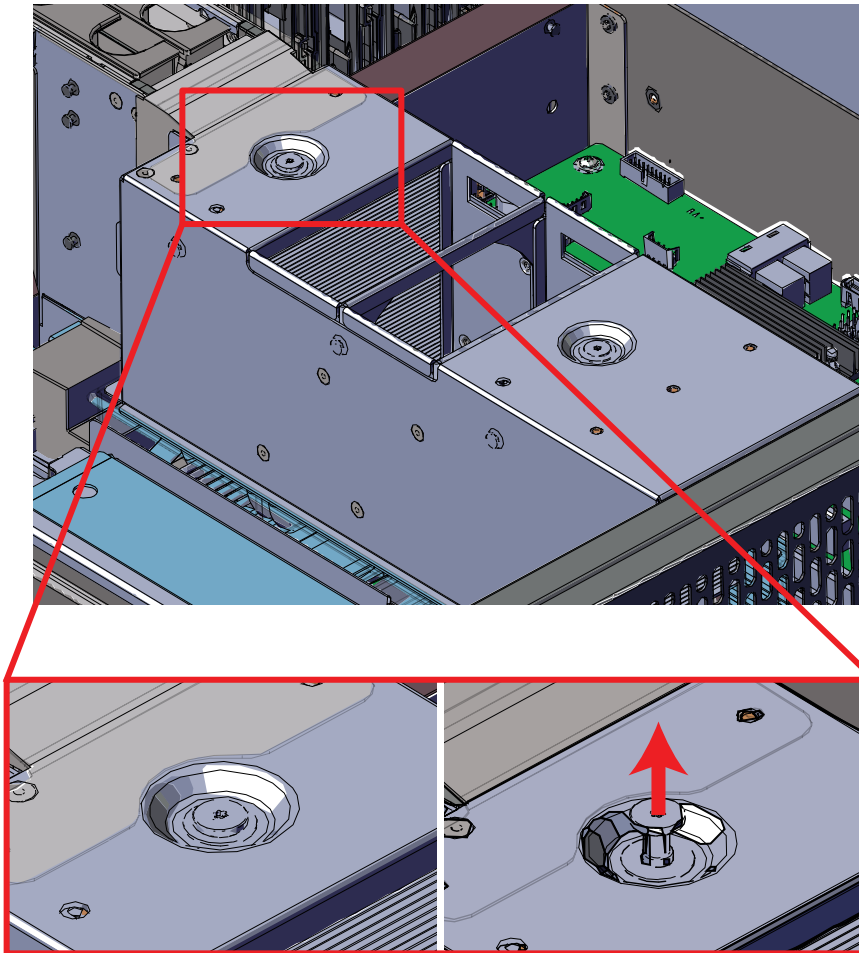


27. Uninstall the System Fan Bay.



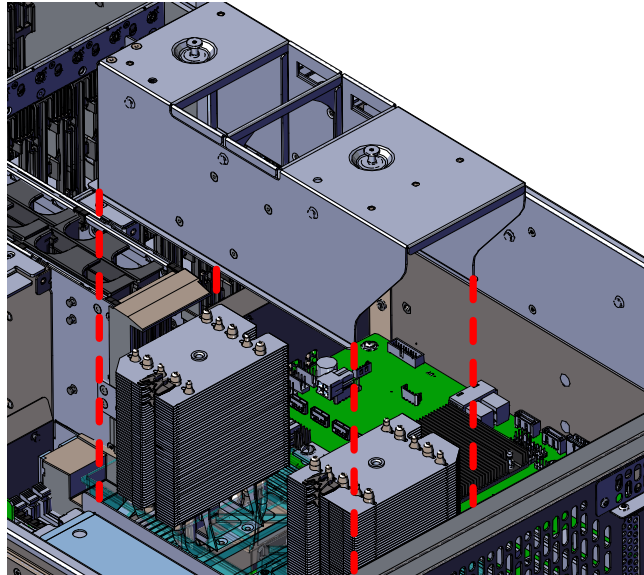
- a) Loosen the captive screws that secure the system fan bay to the chassis using a T15 Torx Screwdriver until the cover comes loose. The screws will be retained within the System Fan Bay while uninstalling the part.

**Figure 308: Loosening the System Fan Bay Captive Screws**



- b) Slide the system fan bay out of the chassis and set it aside.

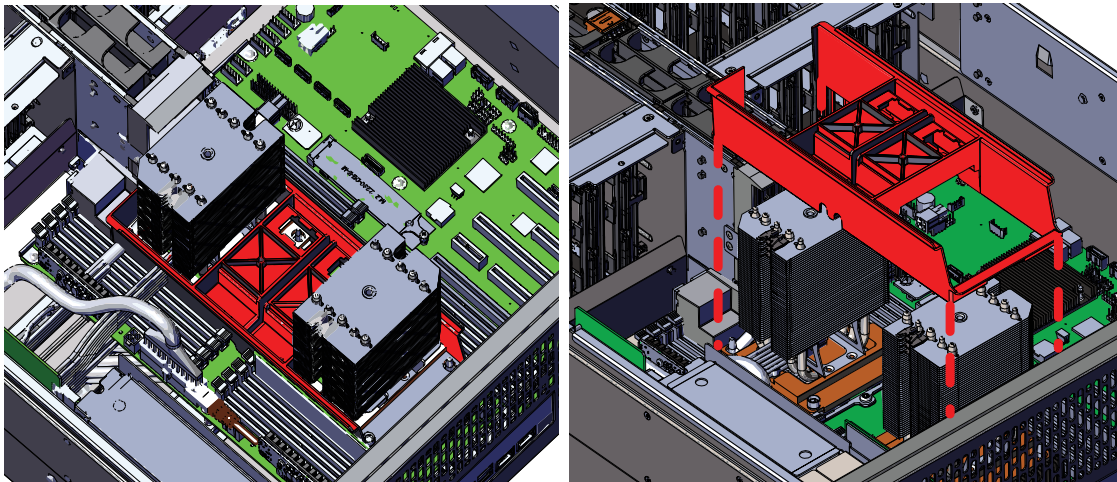
**Figure 309: Removing the System Fan Bay**



**28. Uninstall the System Fan base.**

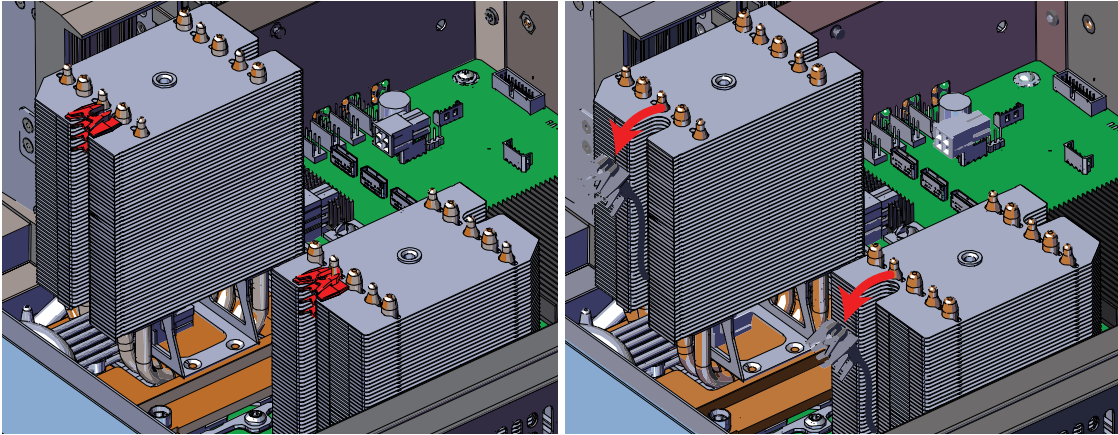
- a) Slide the system fan base up and over the CPUs until clear of the CPUs. Set the system fan base to the side with cables still attached. The cables are long enough to remain connected during these steps.

**Figure 310: Removing the System Fan Base (highlighted in red)**



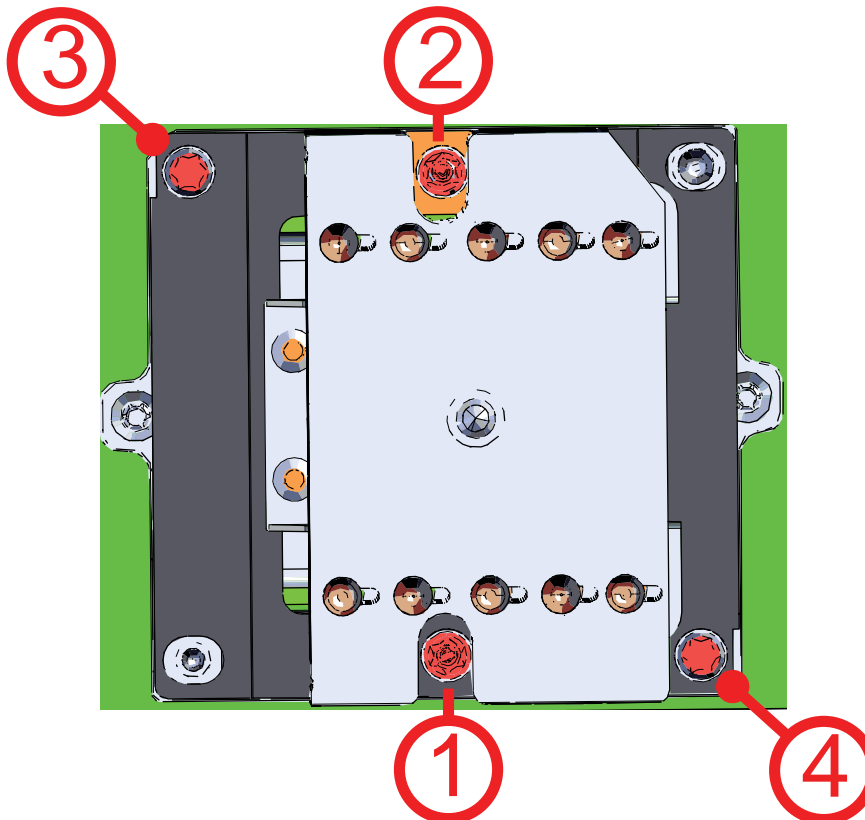
- b) Locate and remove the LED brackets that are attached to the Heat Sink.

**Figure 311: Uninstalling the CPU LED Brackets**



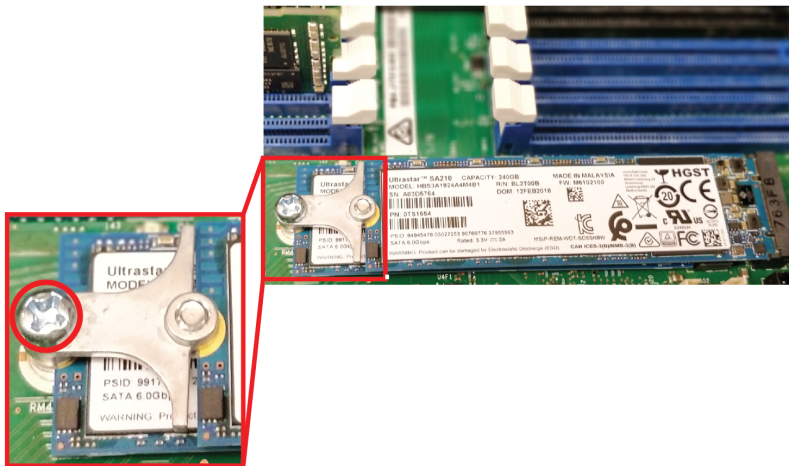
29. Uninstall the CPU and Heat Sink module.
- Locate the CPU and Heat Sink modules.
  - The Heat Sink must be removed by loosening the Torx T30 screws in a specific order. Use the following diagram to determine the specific order.

**Figure 312: Heat Sink Removal Order**



- c) Slide the Heat Sink clear of the socket alignment pins.
- 30. Uninstall the M.2.**
- a) Locate the M.2 installed on the baseboard.
  - b) Remove the Philips head screw that secures the M.2 to the baseboard.

**Figure 313: M.2 Screw**



- c) Pull the top M.2 out of the connector.

**Figure 314: Uninstalling the M.2s**



- d) Repeat the previous substep to remove the bottom M.2.
- 31. Uninstall the add-in card bracket.**

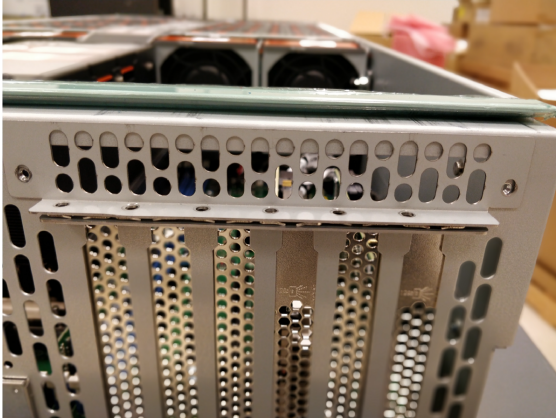
- a) From the rear of the enclosure, remove the eight screws that secure the add-in cards to the enclosure using a T10 Torx Screwdriver.

**Figure 315: Add-In Card Screws**

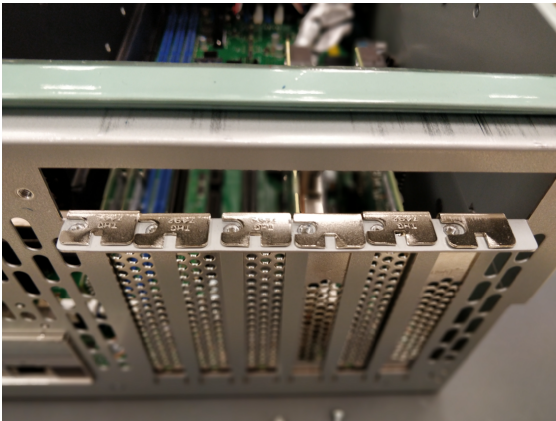


- b) Remove the bracket from the end of the chassis.

**Figure 316: Add-In Card Bracket**



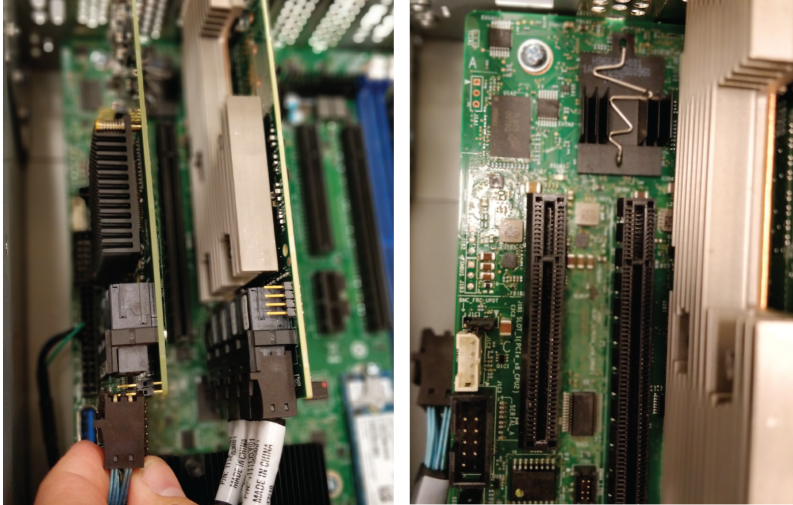
**Figure 317: Add-In Card Bracket Removed**



32. Uninstall the add-in cards.
  - a) Locate the first add-in card.

- b) Remove all cabling from the add-in card.

**Figure 318: Add-In Card Remove Cabling and Uninstall**

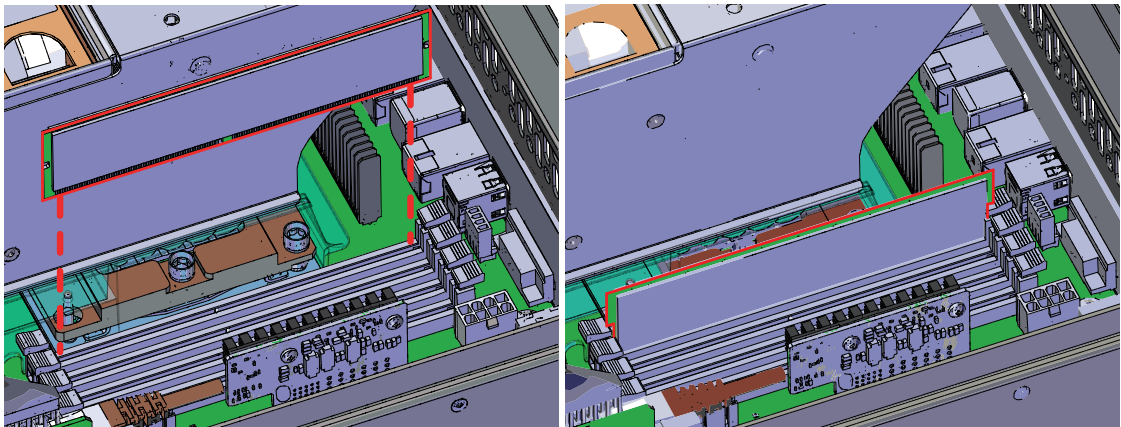


- c) Carefully pull up on the add-in card until it comes free from the connector on the baseboard.

**33. Install the DIMMs.**

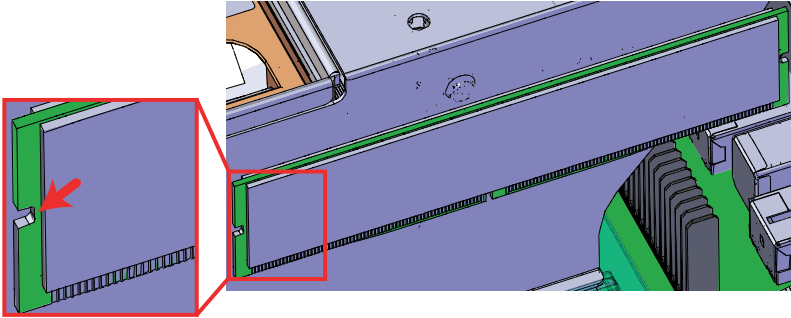
- a) Remove the new DIMM from the packaging and hold it by the corners to avoid damaging the DIMM.  
b) Align the DIMM with the empty slot ensuring that it is facing in the correct direction.

**Figure 319: Installing the DIMM into the DIMM Slot**



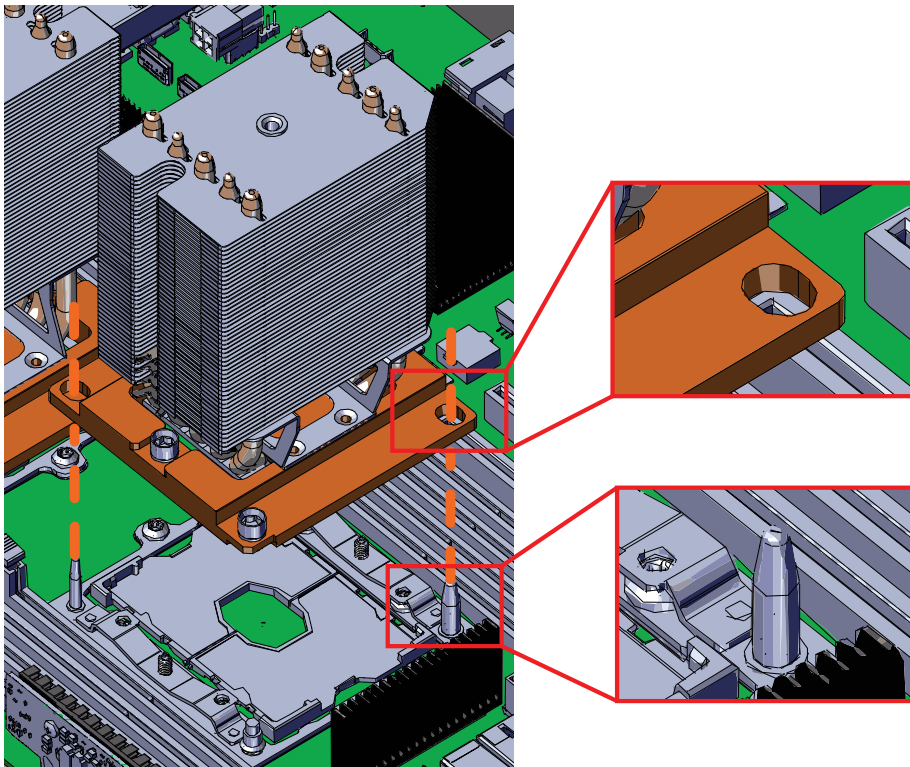
- c) Firmly press the DIMM into the slot until the ejector tabs snap into place over the notches on either side of the DIMM.

**Figure 320: DIMM Notches**



34. Install the CPU and Heat Sink module.
  - a) Locate the socket alignment pin on the baseboard and the alignment hole on the Heat Sink.
  - b) Carefully place the CPU and Heat Sink module in position on the socket alignment pins.

**Figure 321: Heat Sink Alignment Pins**

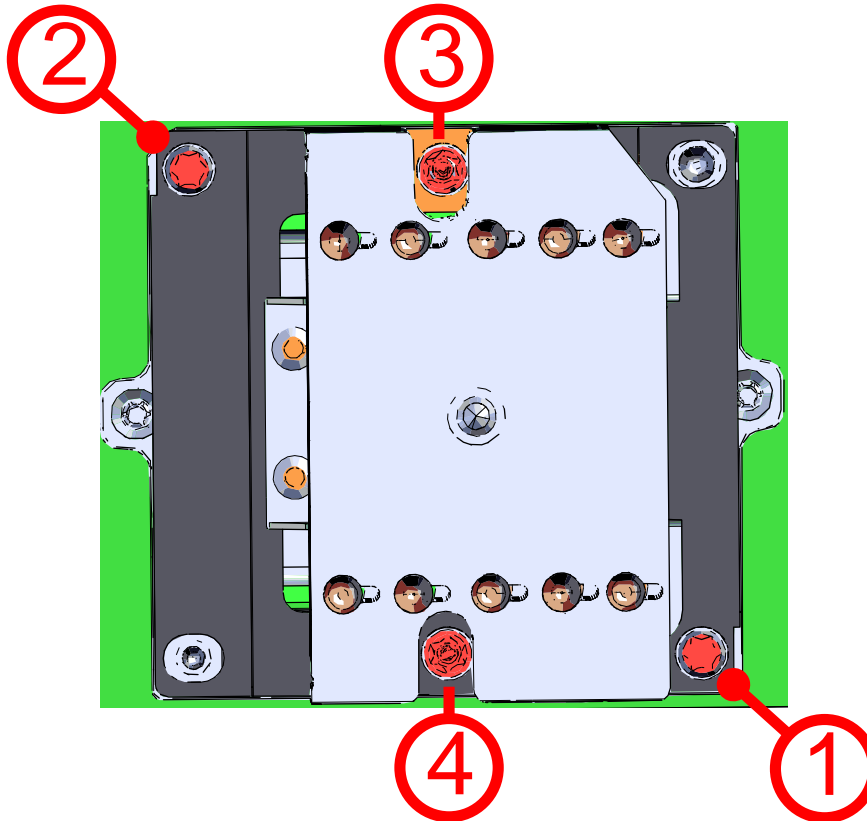


- c) The Heat Sink must be installed by tightening the Torx T30 screws in a specific order. Use the following diagram to determine the specific order.



**Note:** The Heat Sink screws must be tightened to a torque setting of 12in.-lbs. Do not over-tighten. Over-tightening may cause damage to the parts.

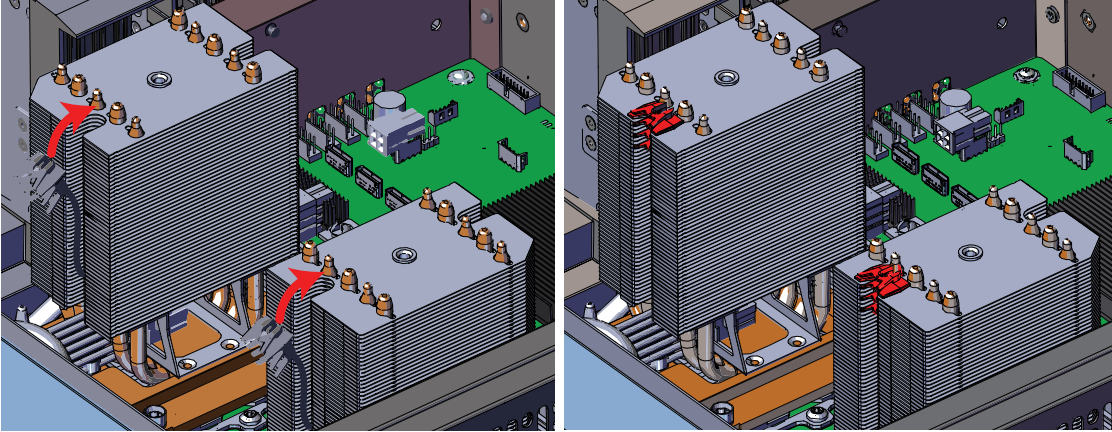
**Figure 322: Heat Sink Installation Order**



35. Install the System Fan base.
  - a) Slide the system fan base down over the CPUs until the base rests on the baseboard.

- b) Slide the LED cable and LED bracket into the Heat Sink channel and snap it into place at the top of the Heat Sink.

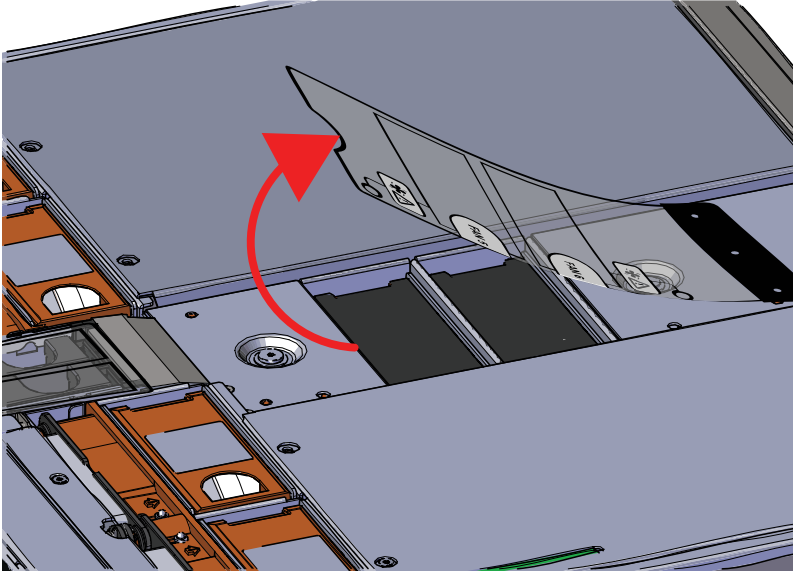
**Figure 323: Installing the CPU LED Brackets**



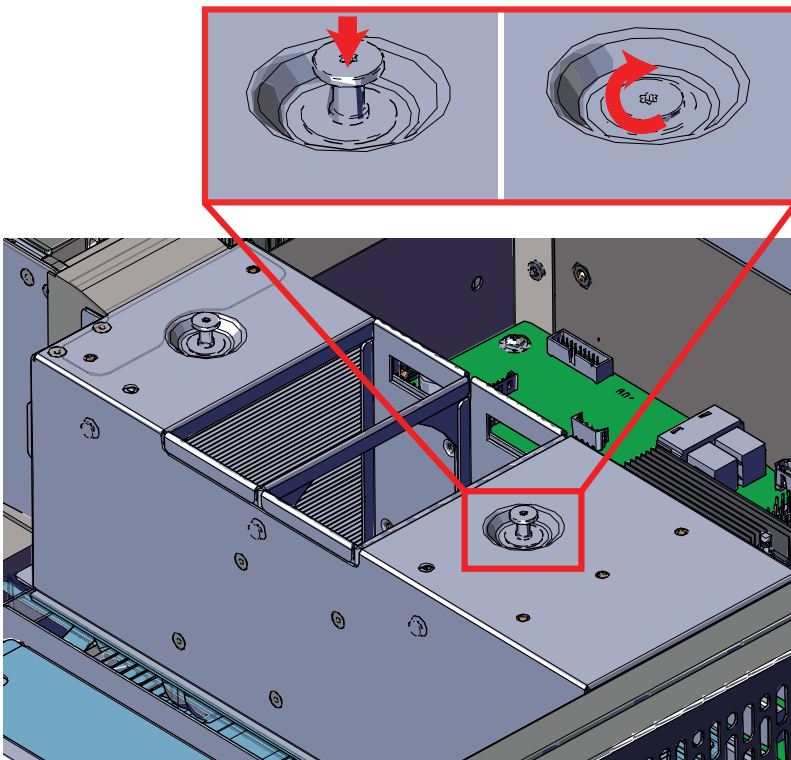
- c) Install the remaining LED bracket in the same manner as the first.
- 36. Install the System Fan Bay.**
- a) Slide the system fan bay down over the CPUs until the captive screws line up with screw holes on the Heat Sink.

- b) Lift the system fan flap and push in and tighten the captive screws until the system fan bay is secure.

**Figure 324: Lift the System Fan Flap**



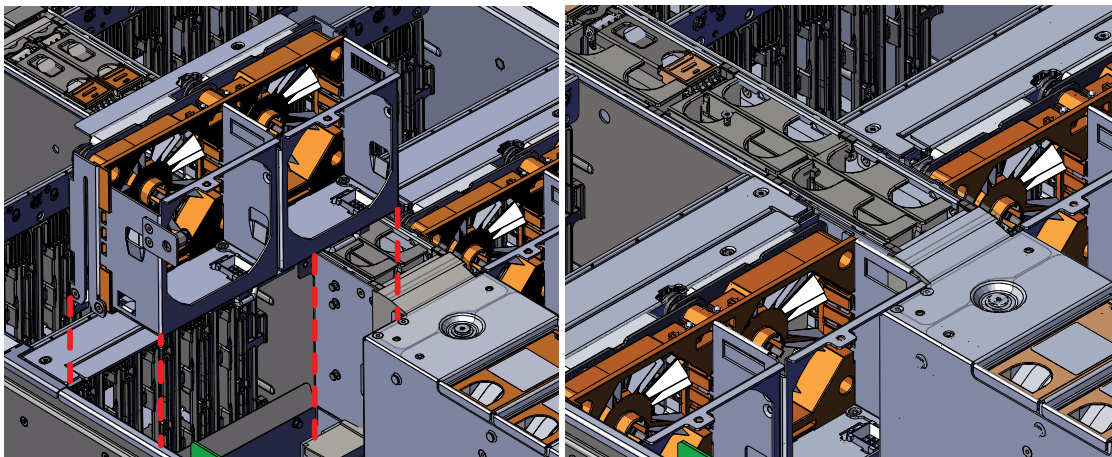
**Figure 325: Installing the System Fan Bay Captive Screws**



37. Install the fan bay.
- a) Align the first fan bay within the location that in which it was uninstalled.

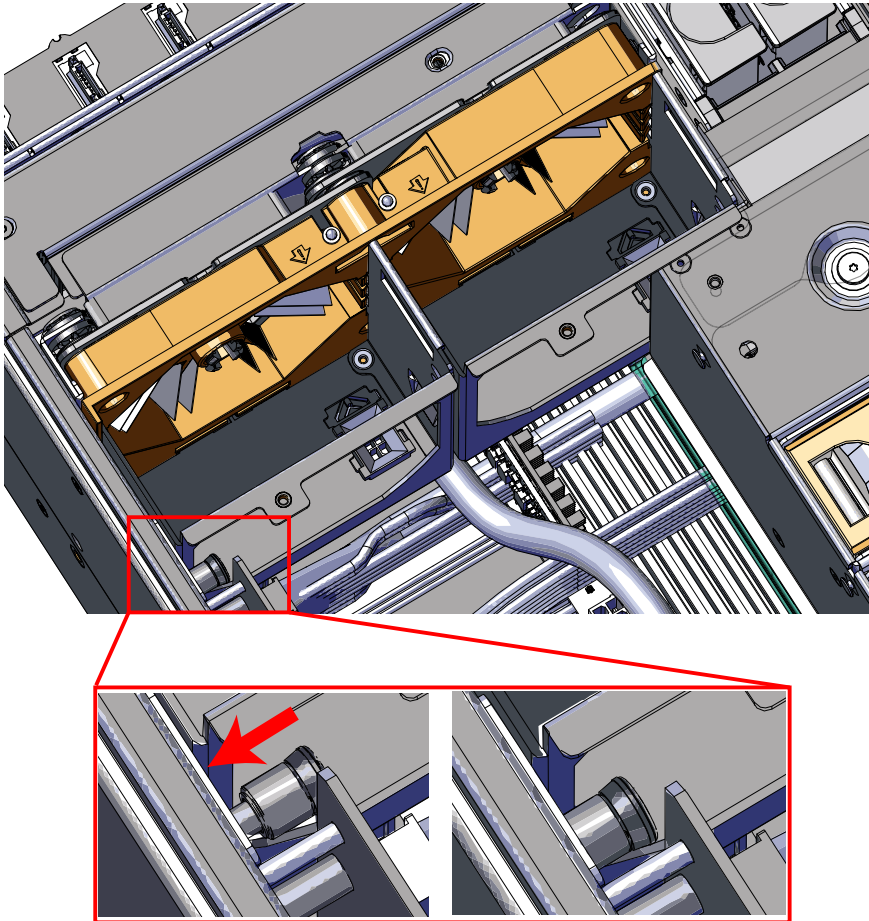
- b) Slide the fan bay into the chassis taking care not to pinch or damage any cables.

**Figure 326: Installing the Fan Bay**



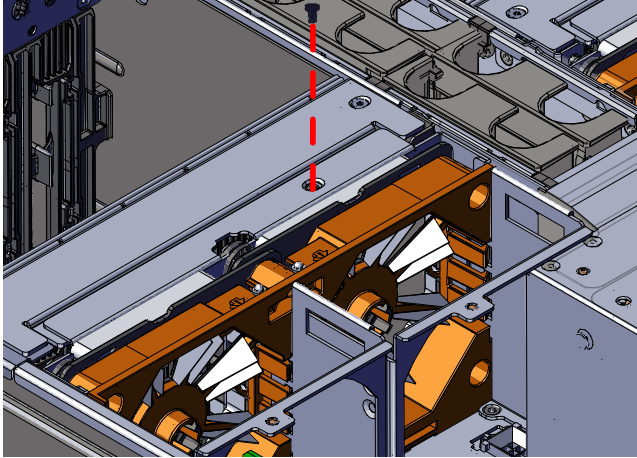
- c) Ensure that the pin located on the inside of the fan bay is latched onto the chassis during the process of seating the fan bay. If the pin did not engage, use a Flathead screwdriver to disengage the pin by pulling it out and repositioning the fan bay until the pin engages with the chassis.

**Figure 327: Fan Bay Pin Engaged**



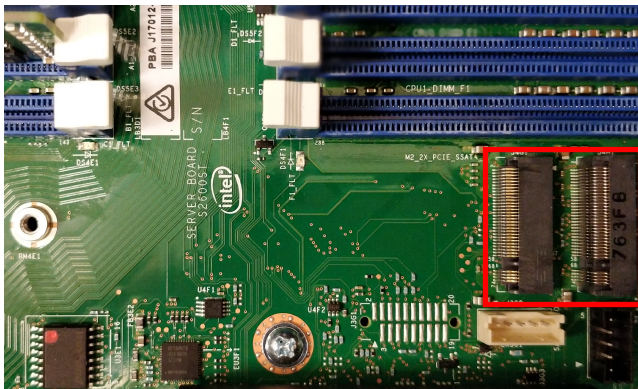
- d) Install the screw that secures the mid-bulkhead fan cage to the chassis.

**Figure 328: Fan Bay Screw**



38. Install the remaining fan bay in the same manner as the first.
39. Install the M.2.
  - a) Locate the M.2 connectors on the baseboard.

**Figure 329: M.2 Connectors**



- b) Slide the card edge of the bottom M.2 into the M.2 connector on the baseboard.

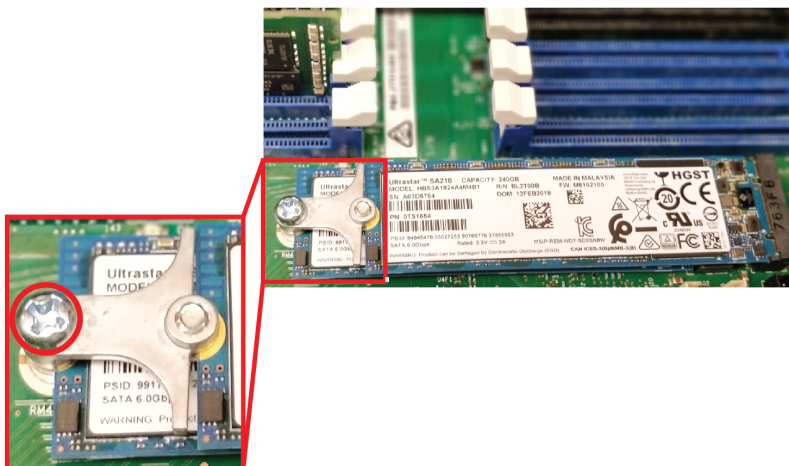
- c) Slide the card edge of the top M.2 into the M.2 connector on the baseboard.

**Figure 330: M.2 Install (Top)**



- d) Secure both M.2s with the Philips head screw that held the failed M.2s.

**Figure 331: M.2 Screw**

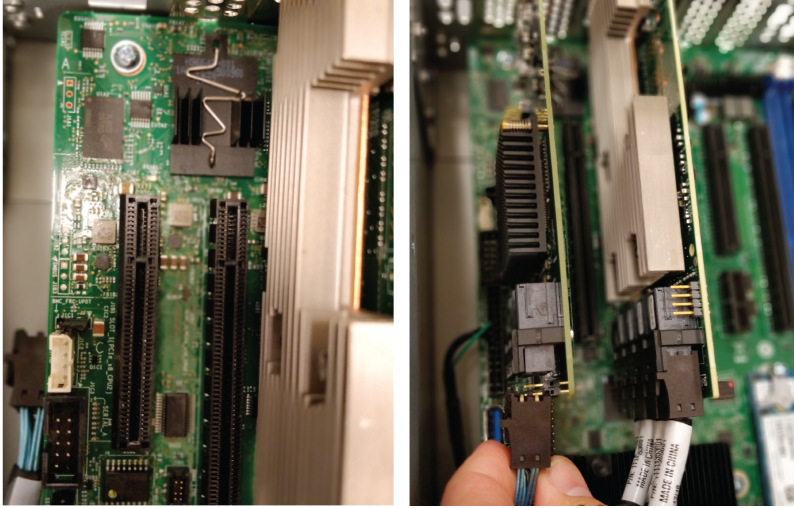


**40. Install the add-in cards.**

- a) Locate the connector for the add-in card being installed.

- b) Set the card edge of the add-in card on the connector and firmly press down until the add-in card is seated.

**Figure 332: Add-In Card Install and Connect Cabling**

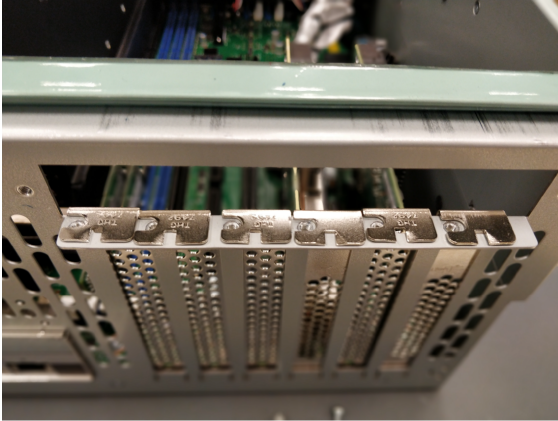


41. Install the add-in card bracket.



- a) From the rear of in the enclosure, line the add-in card bracket up with the holes on the add-in cards.

**Figure 333: Add-In Card Bracket Removed**



**Figure 334: Add-In Card Bracket Installed**



- b) Secure the bracket to the chassis with the eight T10 Torx screws that held the bracket in originally.

**Figure 335: Add-In Card Screws**



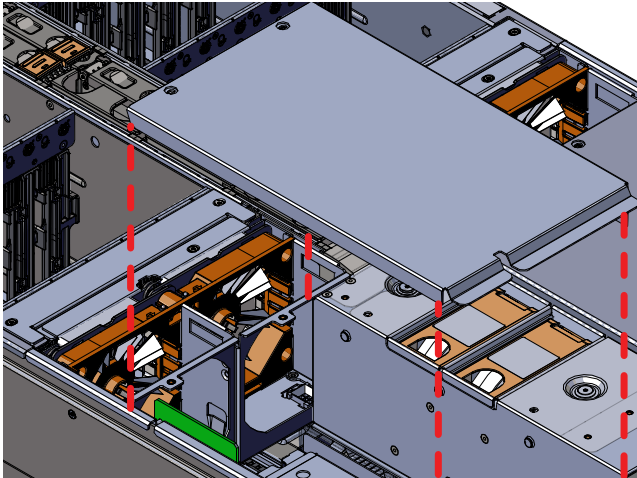
42. Install server cover panels.
  - a) Align and press the server panel cover into place over the server bay.

---

**Note:** The Formex material that the panel is made from is flexible and will allow for the panel to be flexed to fit back into its original placement.

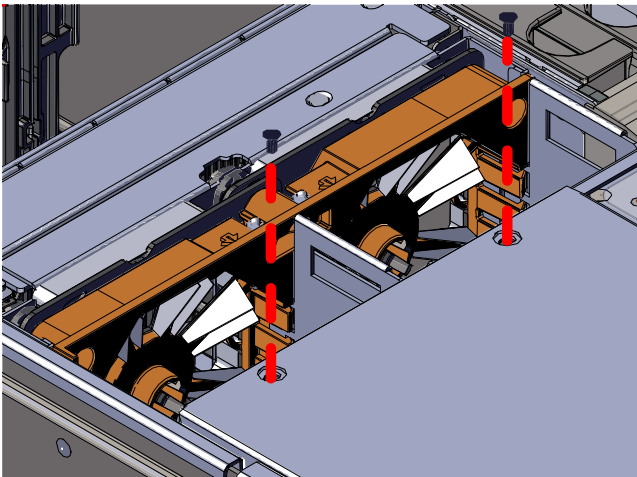
---

**Figure 336: Removing the Server Cover Panel**



- b) Secure the server cover panel using the original screws and a T7 Torx screwdriver.

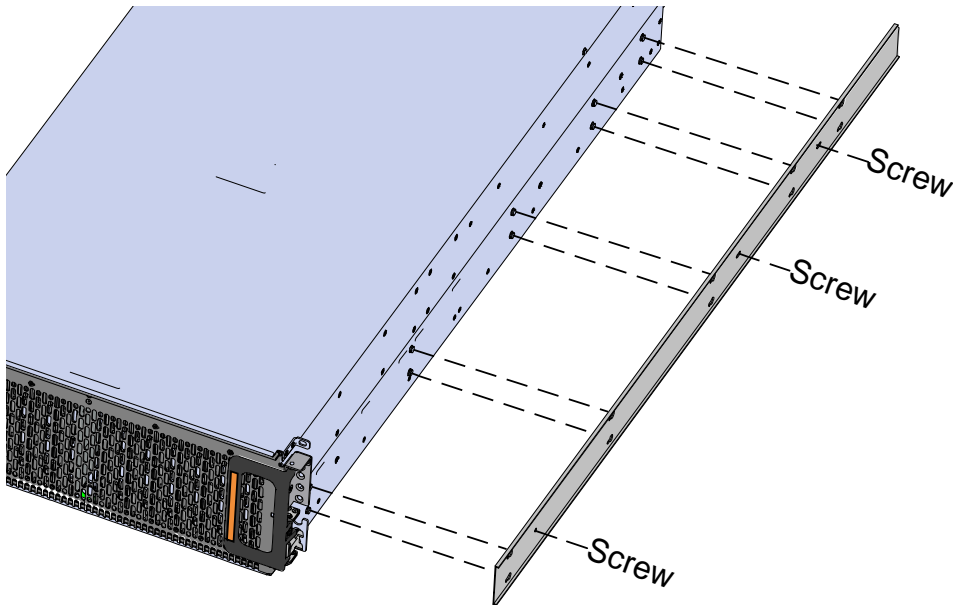
**Figure 337: Server Cover Panel Screws**



43. Install the remaining server cover panel in the same manner as the first.
44. Uninstall the inner rails from the sides of the chassis.

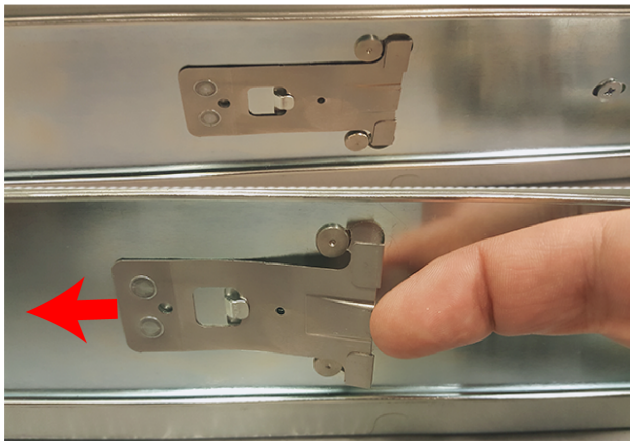
- a) Unscrew the three Low-Profile M4 x 3.2mm Philips screws that attach the inner rails to the chassis using a #2 Philips head screwdriver.

**Figure 338: Remove Inner Rail**




- b) Locate and unlatch the springlock on the side of the inner rail.

**Figure 339: Inner Rail Spring Latch**



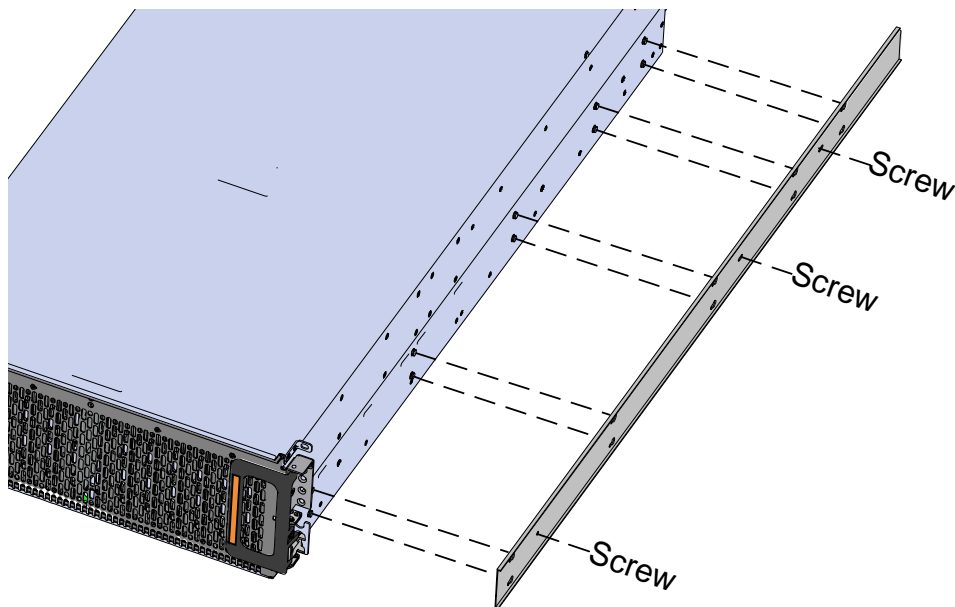
- c) Slide the inner rail toward the front of the enclosure to unlock it from the pegs that secure it to the sidewall and pull it free.

**Note:** Follow the next step if the cable tray was installed.

**Caution:**  Always install the top cover onto the enclosure before installing the chassis into a rack. Not having the top cover installed may damage the alignment brackets.

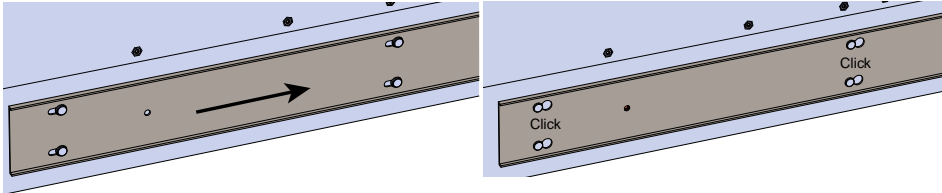
45. Ensure the top cover is installed.
  - a) From the rear of the enclosure, align the top cover with the grooves on the top of the chassis.
  - b) Ensure that there is a good catch of the top cover by the chassis and slide it in all the way.
46. Install the inner rail onto the chassis making sure they are installed on the correct side. Each inner rail will read "R" for the right or "L" for the left embossed on the side that faces away from the chassis. Right and Left are with reference to looking at the front of the enclosure.
  - a) Orient the inner rails so that the flat side is facing the enclosure and the side with the grooves is facing away from the enclosure.
  - b) Align the keyholes on the inner rail to the mounting pegs on the side of the enclosure and press the inner rail flush against the chassis. If the keyholes don't line up with the pegs, flip the rail length-wise to see if this will align them.

**Figure 340: Inner Rail Attachment**




- c) Slide the inner rail toward the rear of the chassis to lock it in place. There will be an audible click and the mounting pegs will cover the front part of the keyhole.

**Figure 341: Slide Inner Rail**



- d)

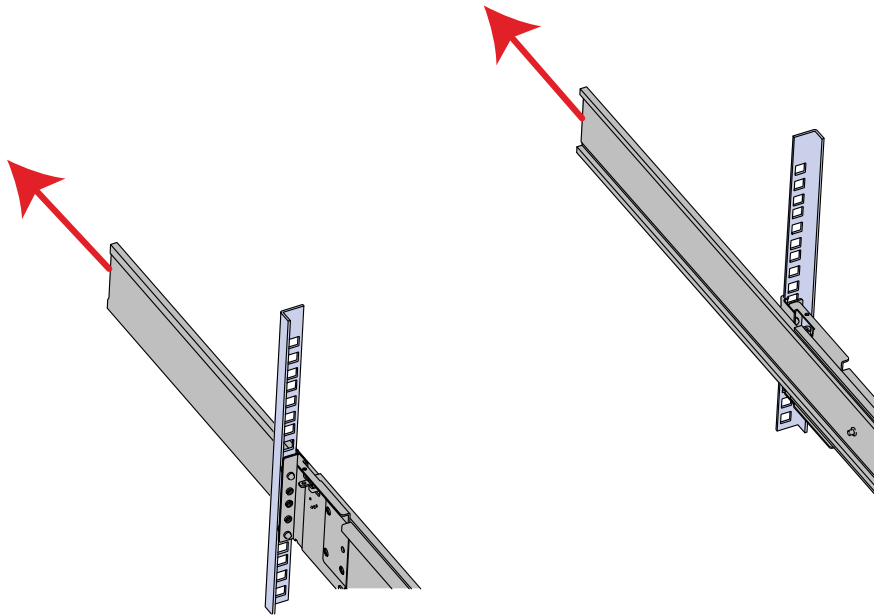
**Caution:**  When installing the inner rail onto the chassis, make sure to only use the special Low-Profile M4 x 3.2mm Philips screws provided in the accessory kit with the CMA. These screws should be tightened to .90-1.12 Nm / 8-10 in-lbf using a # 2 Philips Screwdriver. These screws are specially designed for this purpose. Using unapproved screws could cause damage to the slides inside the rail.

Install the three special low-profile M4 x 3.2mm Philips screws provided to secure the inner rail to the chassis.

- e) Follow these steps for the second inner rail on the opposite side of the enclosure.


47. Extend the mid-rails out of the rack so that they are protruding from the front of the rack and the safety latches engage.


**Figure 342: Extend Mid-Rails**



48. Install the chassis into the rails.

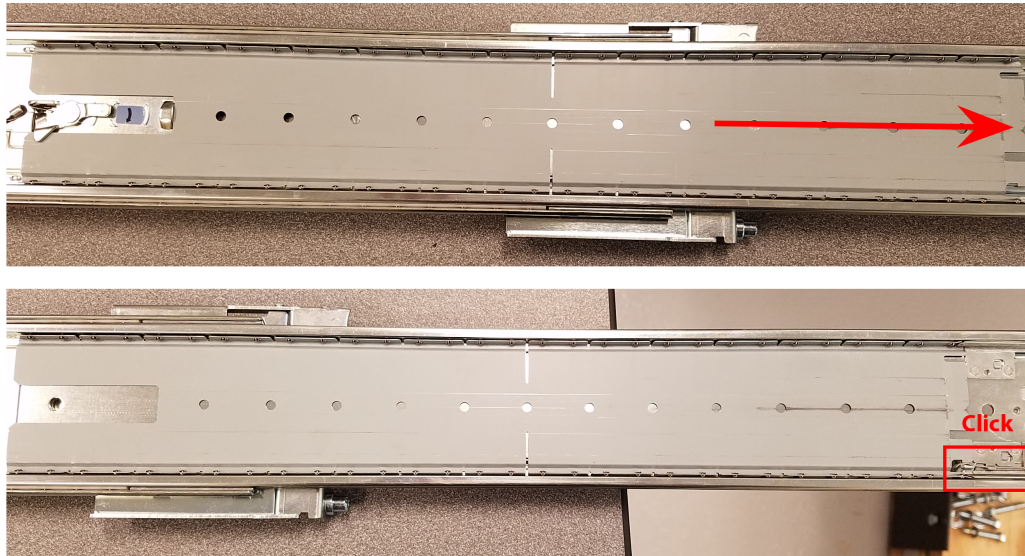
a)

**Caution:**  This step in the installation requires a minimum of 3 individuals to install safely, two to lift and one to guide the others whom may have difficulty seeing because the enclosure is in the way. Ensure that the appropriate measures are taken to safely support the enclosure during installation. The enclosure **MUST** have no drives installed and requires a two person team lift to install. **Do not attempt to lift the system if it is fully populated with drives.** The only case in which the system may be installed or removed with the drives populated is if the facility has a lift that is rated to handle the maximum weight of the fully loaded system.

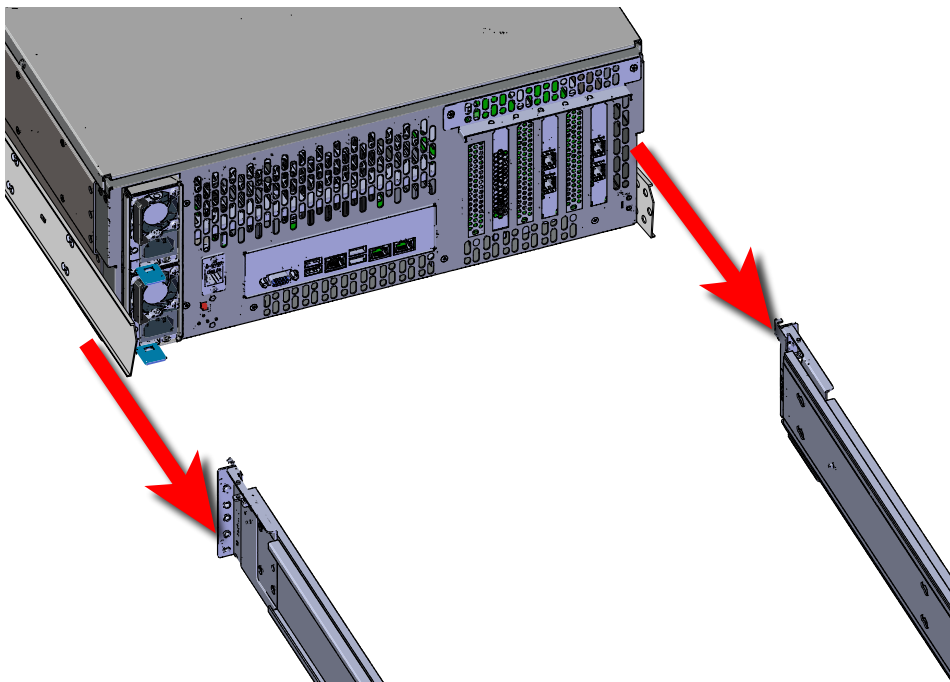
**Warning:**  Do not lift the chassis by the Cable Tray while removing the chassis from the rack OR while installing it into a rack. This can cause serious damage to the unit or serious

bodily harm to those handling the unit. Always team lift the chassis by gripping the underside of the unit, and never try to lift a chassis that is filled with drives.


**Figure 343: Bearing Plate**



**Figure 344: Installing the Chassis**



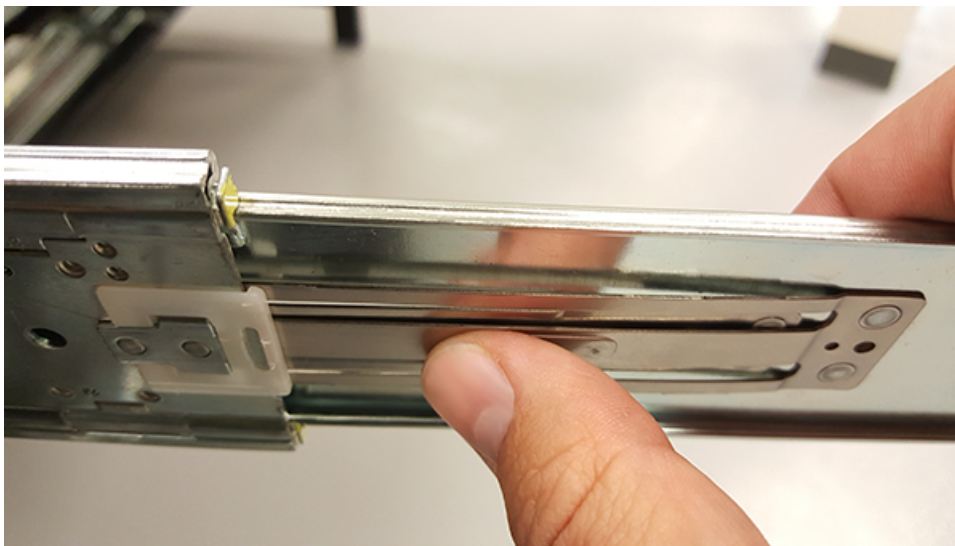
b)

**Caution:**  Make sure that the bearing plate on the inside of the mid-rails are fully forward and that the detent has engaged. This is to prevent potential damage due to improper mating of the rails.

Position one individual on each side of the enclosure to perform a team lift and have the third individual standing at the protruding rack rails to guide the chassis to mate with rack rails.

- c) Team-lift the enclosure until the inner rails that are attached to the chassis align with the extended mid-rails attached to the rack, and guide the inner rails on the chassis to mate with the rack rails.
- d) Once the rails are mated properly, slide the enclosure into the rack until it is stopped by the safety catch on the rails. Push the release lever on the safety latch located on the side of each of the rails and push the enclosure the rest of the way into the rack.

**Figure 345: Safety Latch Release**

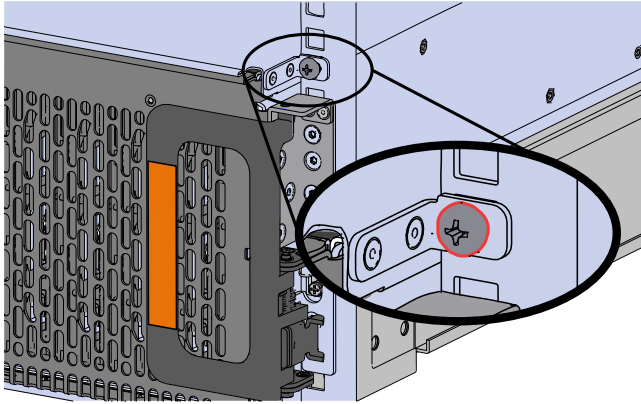


- e) As the chassis is slid into the rack, position one installer at the rear of the rack to ensure that the pegs on the sides of the cover will slide correctly into the rear cover alignment brackets on both sides of the rack. If the chassis does not install smoothly or snags, check that the rear cover alignment brackets are not interfering with the chassis sidewalls, and try again.



49. Secure the chassis top cover to the rack using the included washers, the M5 x 12mm Phillips Pan Head screws, and a Philips screwdriver as shown in the following image. These screws should be tightened to 3.38-3.61 Nm / 30-32 in-lbf using a # 2 Philips Screwdriver.

**Figure 346: Cover Retention Screws**



50. Now that the chassis is installed, test the installation by sliding the enclosure in and out of the rack a minimum of three times. If the enclosure binds, catches, or displays any incorrect motion or behavior retry the installation.

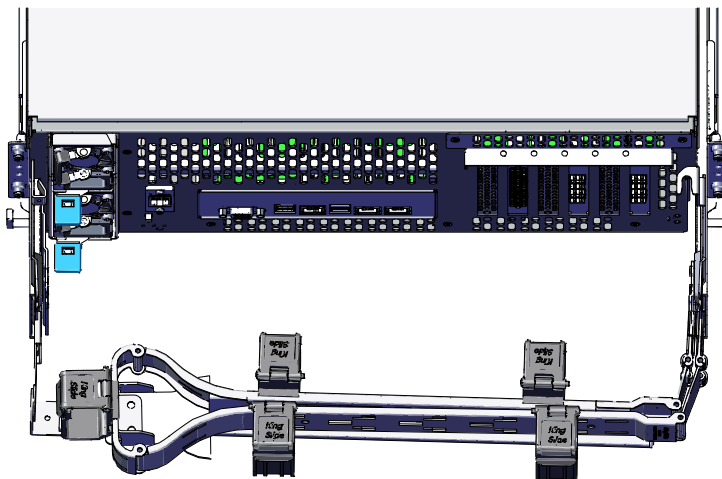
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**Note:** Adjustments of the vertical rack rails may be required to fix any issues that may occur.

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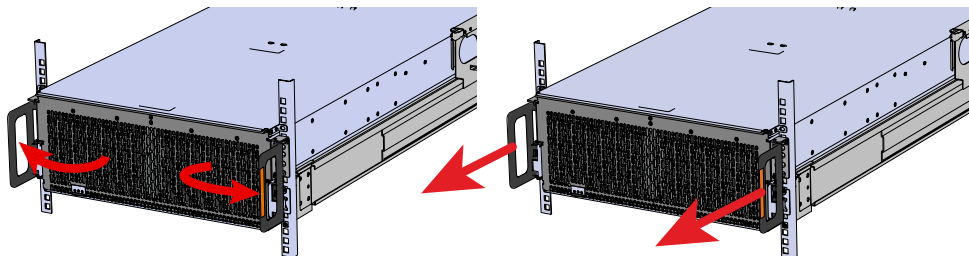
51. Install the CMA.
  - a) Orient the CMA so that the elbow is on the left hand side.
  - b) Attach all of the connectors to the brackets on the rails and chassis. There should be one at the elbow side and two at the other end.

**Figure 347: CMA Orientation**




- c) Slowly slide the enclosure forward to ensure the CMA arm is operating properly, then slide it back into the rack.
- 52. Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

**Figure 348: Chassis Handle Operation**



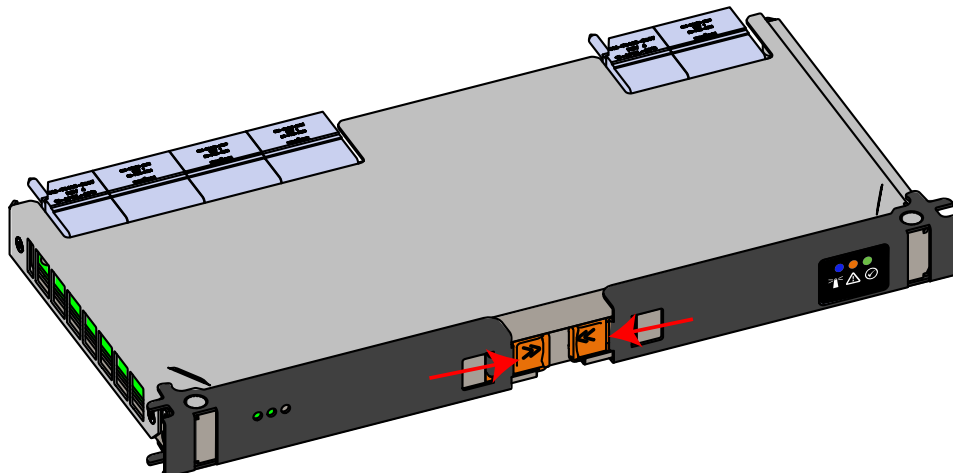
- 53. Install the IOM.

a)

**Caution:**  If a pin on the IOM's internal connectors is bent or damaged, the IOM will have to be replaced. For this reason it is imperative that the IOM is not forced into position, that it is inserted straight, and that the directions for installing the IOM are followed exactly.

- b) Ensure that the handles on the IOM are not latched. To unlatch them, press the latch release in the direction shown in the following image.

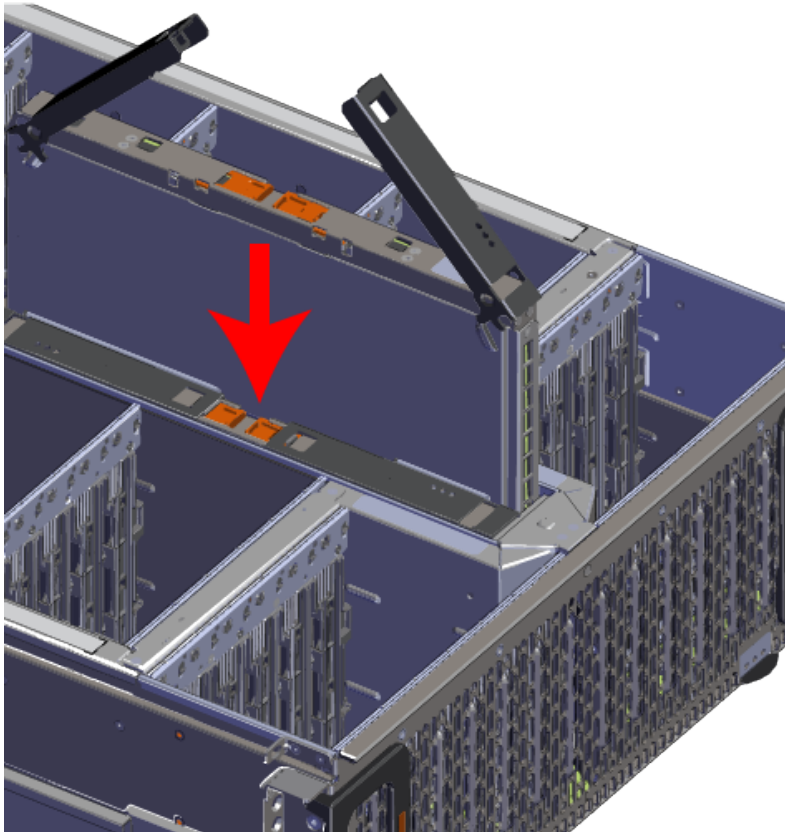
**Figure 349: Unlatching IOM Handles**



- c) Align the IOM with the empty slot on the top of the chassis so that the arrow on the IOM latch release is facing toward the side shown in the following image.

- d) Slowly lower the IOM into the empty slot while being careful to keep it level. Do not to force it.

**Figure 350: Installing the IOM**



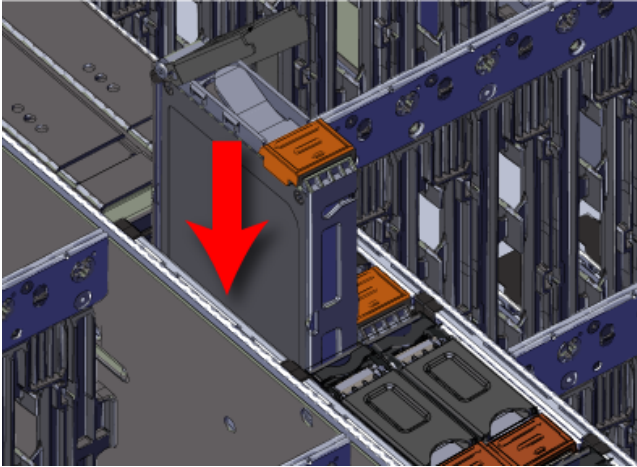
- e) When the IOM is lowered fully, apply light pressure with both hands evenly on the IOM body, not the handles, to seat the IOM in the connector. If the IOM won't seat correctly, **DO NOT FORCE IT**. Instead, back the IOM out, check the pins to make sure none are damaged, and try again.
- f) Once the IOM is seated properly in the slot, close the handles until they latch closed.
54. Install the drive blank in slot B using the same method as installing the IOM.
55. Install the System SSD.
- a) Lift the center channel flap and orient the assembly so that the latch release button is facing toward the rear of the system.

**Figure 351: Lift the Center Channel Flap**



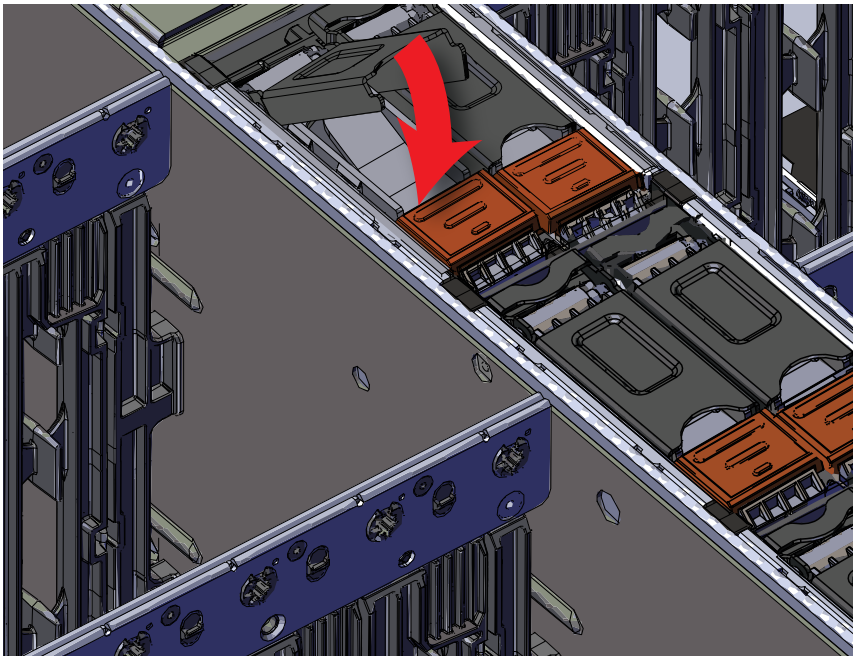
- b) Align the System SSD with the empty drive slot and lower it slowly into the slot. Do not force it.

**Figure 352: System SSD Install**



- a) Once the SSD will not lower any further, press the handle down until it clicks into place.

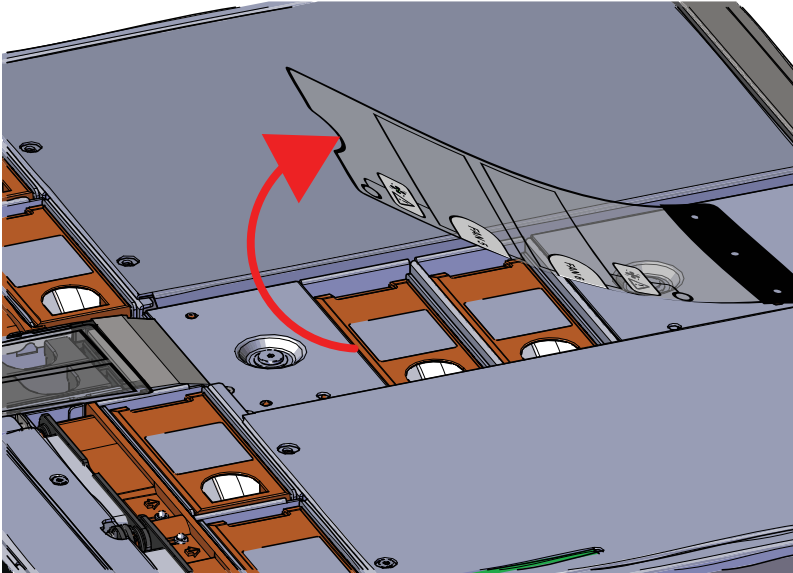
**Figure 353: System SSD Carrier Latching Closed**



56. Install the rest of the System SSDs in the same manner as the first.  
57. Install the System Fan.

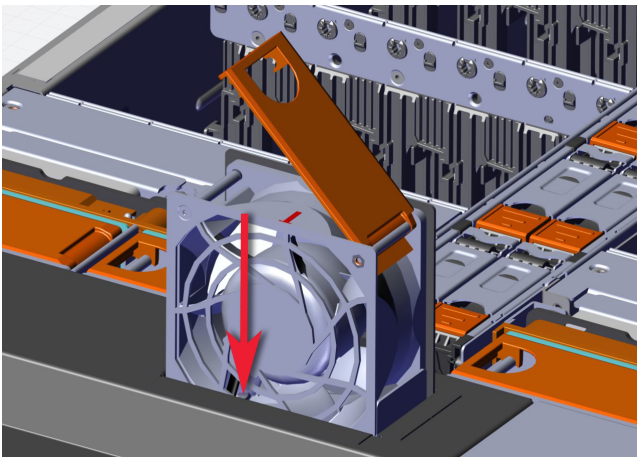
- a) Lift the System Fan flap and look inside the empty slot that will receive the System Fan and orient the System Fan so that the connector on the bottom of the fan is on the proper side.

**Figure 354: Lift the System Fan Flap**



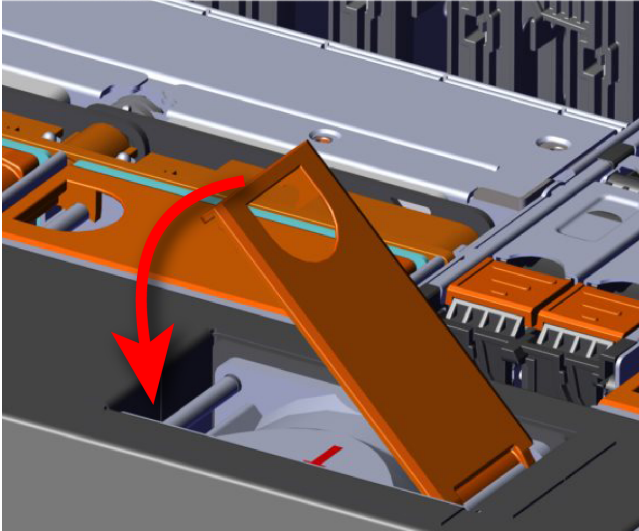
- b) Lower the fan down into the empty slot. Do not force it.

**Figure 355: Installing a System Fan**



- c) When the fan is fully inserted and the connectors are mated properly, close the housing cover clip as shown in the following image.

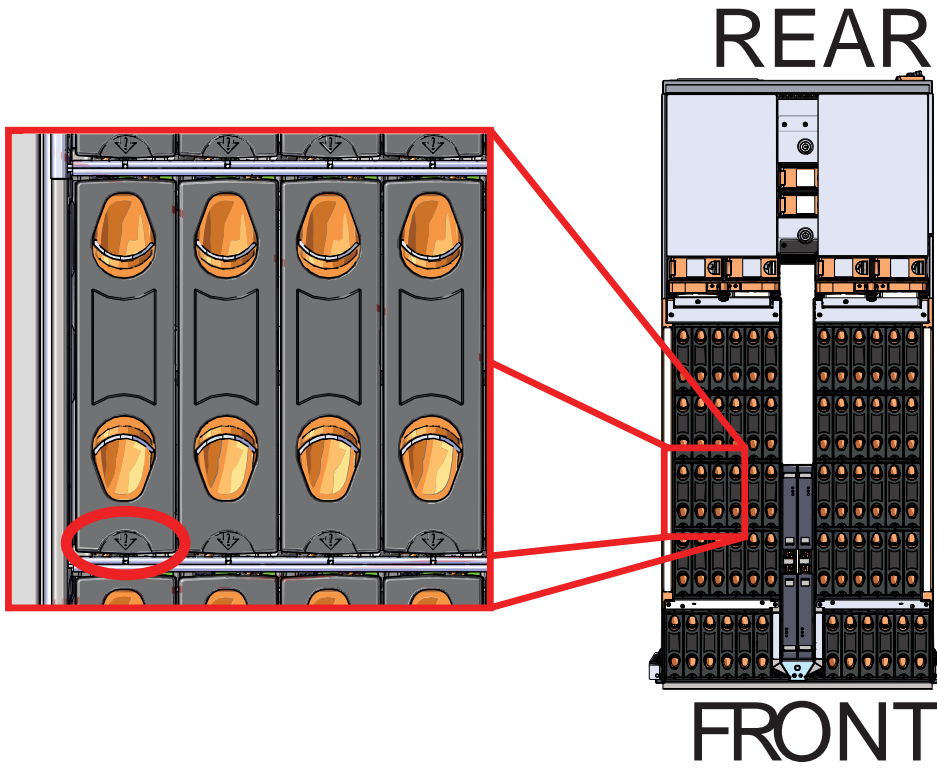
**Figure 356: Latching the Fan Housing Closed**



58. Install the remaining system fans in the same manner as the first.
59. Install the Drive Assembly.
- a) Ensure that the enclosure has been pulled out of the rack until the rail latches engage.

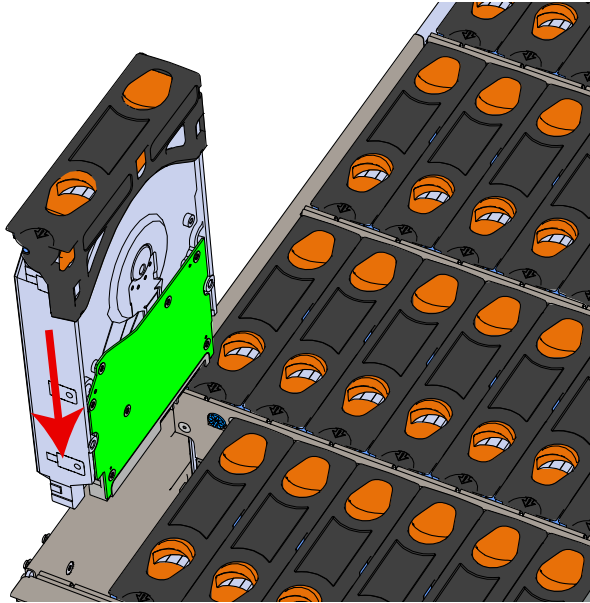
- b) Find the LED pointer on the top of the drive carrier. This pointer should point toward the front of the unit as shown in the following image.

**Figure 357: LED Pointer Orientation**



- c) Align the drive with the empty slot that will receive it. Lower it into the slot, making sure it stays level and does not snag.

**Figure 358: Installing a Drive Assembly**

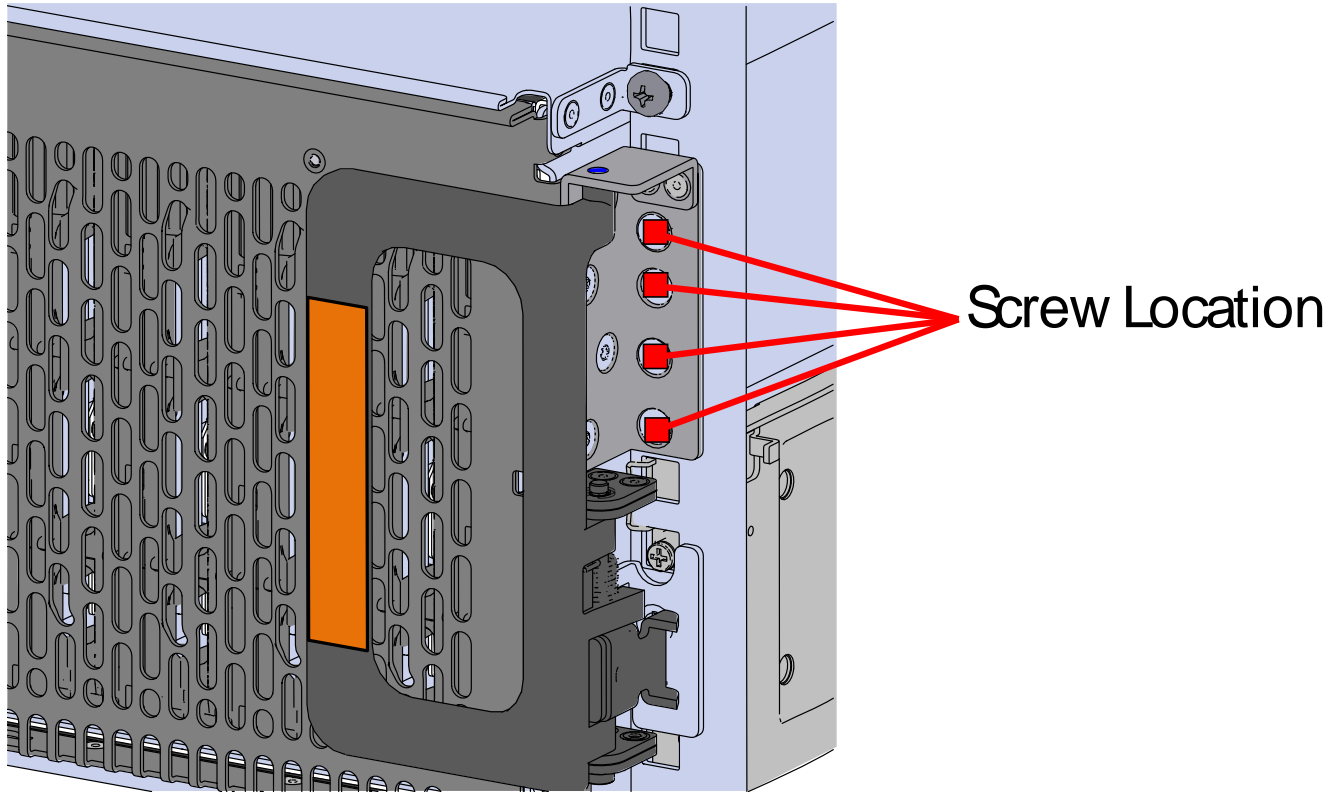


- d) Pinch the latch release and carefully press downward to seat the Drive Assembly the rest of the way.
60. Install each drive in the place it was removed from by following the labels or marks that were added earlier.
61. If the chassis is being installed into a rack that will be shipped fully assembled, you **must** install eight (four per side) of the included M5 x 10mm T15 Torx screws into the two brackets at the front of the chassis in the following locations. These screws should be tightened to 3.38-3.61 Nm / 30-32 in-lbf using a Long



T15 Torx Screwdriver. If this chassis will not be installed into a rack for shipping purposes, skip this step and move on to the next one.

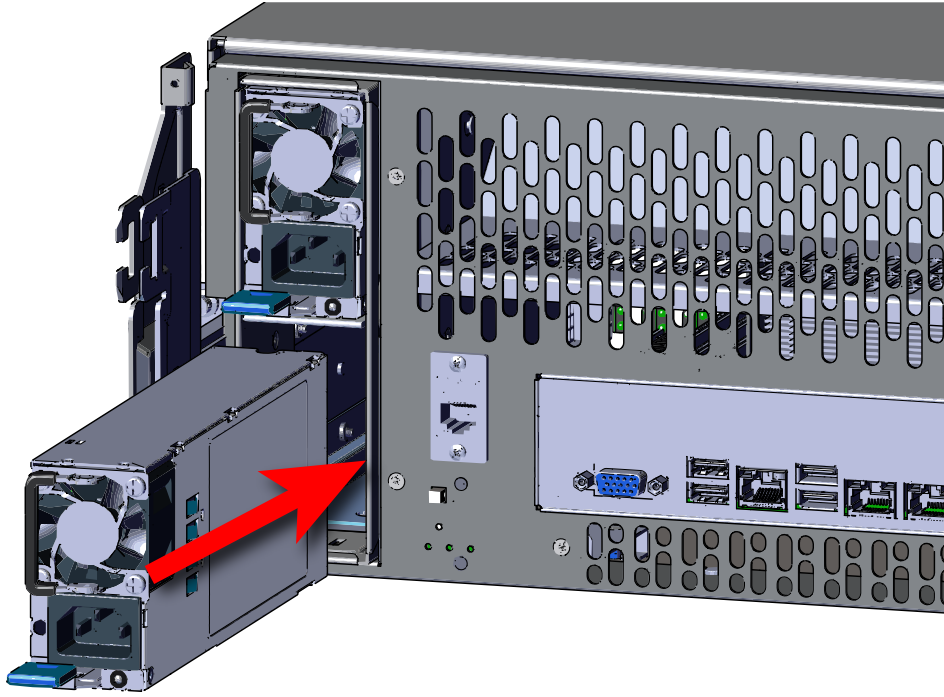
**Figure 359: Shipping Bracket Screw Locations**



62. Install the PSU.
  - a) Align the PSU in the orientation shown in the following image.

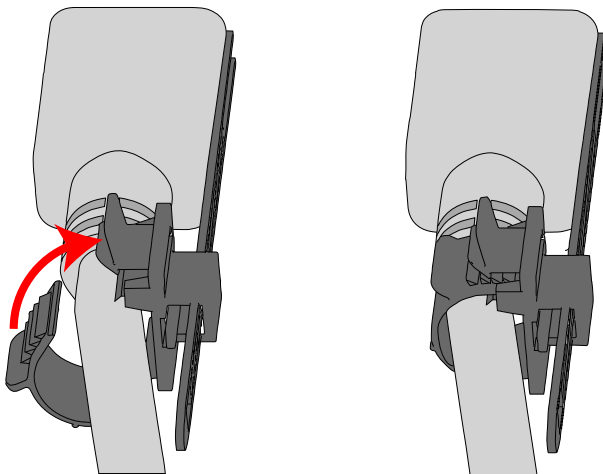
- b) Slide the PSU into the slot until it seats fully into the chassis.

**Figure 360: Installing the PSU**



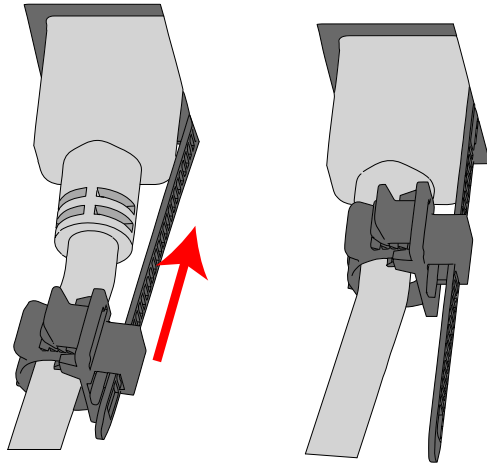
- c) Plug the power cable into the receptacle at the back of the PSU.  
d) Loop the retention clip on the PSU cables around the cable and pinch it until the clip catches and locks in place.

**Figure 361: Cable Retention Mechanism**



- e) Slide the retention clip forward until it stops near the cable connector. Doing this will ensure that the retention clip functions properly in the event the cable is pulled on for some reason.

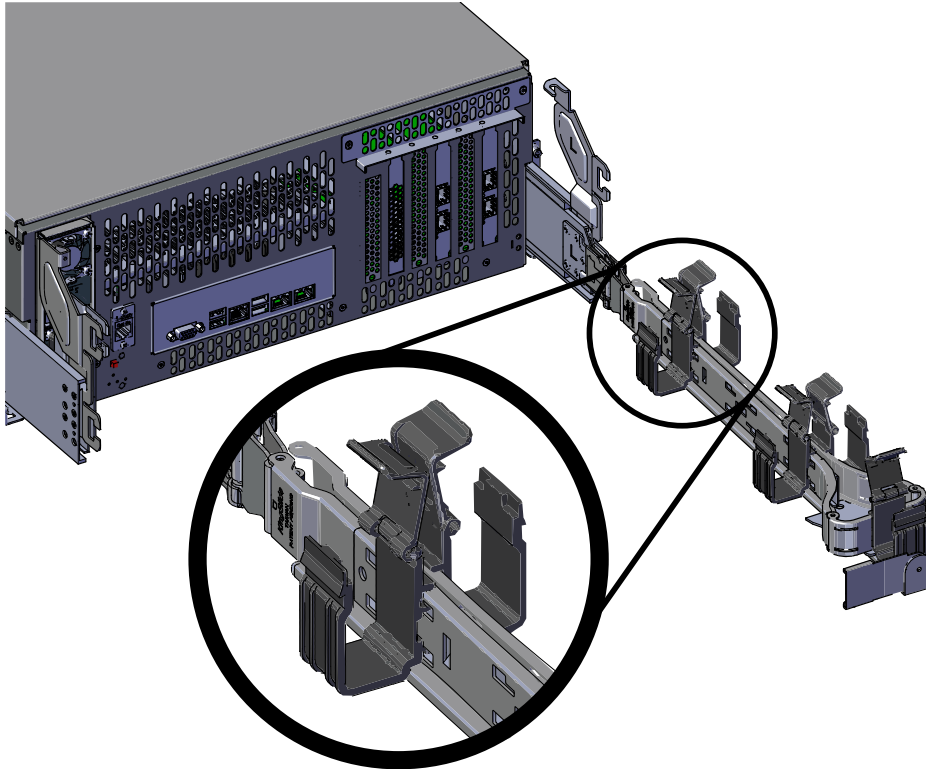
**Figure 362: Cinching Cable Retention Clip**



63. Install the second PSU.
64. Cable the CMA.
  - a) Unlatch the elbow side of the CMA arm and swing it forward by pressing the blue button that says “push” to unlatch it.

- b) Open all of the baskets

**Figure 363: Open Baskets**



- c) Route all of the cables being connected to the enclosure through the open baskets.
- d) Close all of the baskets.
- e) If the Ultrastar Serv60+8 is being installed in a rack and will subsequently be transported inside that rack, it is important to use the included cable tie to wrap the CMA bundle to ensure it does not get damaged during transport. If the Ultrastar Serv60+8 is instead being installed where it will operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.
- f) Reconnect the CMA at the elbow to the connectors on the rail.
- 65.** Test for binding in the extension of the CMA by gently pulling the enclosure out of the rack to ensure the cables extend properly and that the system doesn't bind at all. If it does, examine the point at which the binding occurred and adjust the seating of cables in the baskets, check the connections to the rails, and examine the joints of the CMA arm to ensure that they are all functioning properly.
- 66.** Make sure the CMA is in operational position by folding the arm in toward the enclosure and attaching the elbow end of the CMA to the connector that is attached to the rail. Verify that all of the cabling is in functional order and does not bind or catch.

## 5 System Management

### 5.1 Storage Subsystem Firmware Upgrade

This section provides information on actions that should be taken before starting a firmware upgrade on the Ultrastar Serv60+8.

After the firmware has been downloaded to the IOM, the IOM will reset and boot to the new firmware. The Ultrastar Serv60+8 will need to be taken offline for the firmware upgrade. Ensure that all user activity has been paused during the upgrade procedure. Failing to do so could result in loss of data.

**SAS and SATA Configurations:** If the enclosure contains SAS or SATA drives, the enclosure firmware should not be upgraded while online. This is due to the configuration having no redundancy due to only having a single IOM. When the IOM is rebooted, the single path to the drives to service I/O will be taken down and restored to service when finished booting.

Users should install all of the required downloads before beginning the firmware upgrade process.

#### Devices (<dev>)

In order to initiate a firmware upgrade on the enclosure, a target must be identified. Linux targets are referred to as sg (SCSI Generic) devices and appear as /dev/sgX in the Linux Firmware Upgrade procedure. Windows targets are referred to as SCSI devices and appear as SCSI<dev> in the Windows Firmware Upgrade.

#### Required Downloads:

- **SG3 Utils:** download version 1.42 from the SG3 Utils website at: [http://sg.danny.cz/sg/sg3\\_utils.html](http://sg.danny.cz/sg/sg3_utils.html)

#### 5.1.1 Downloading Firmware from the Support Portal

---

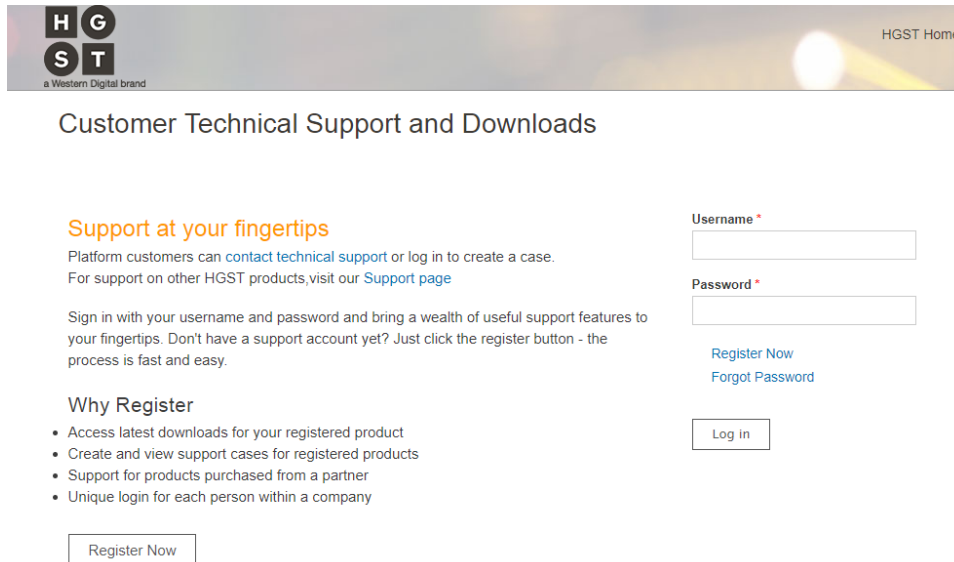
**Note:** The product must be registered in order to download firmware updates.

---

1. Open a web browser and navigate to: <https://support.hgst.com/>.
2. Navigate to the Platforms page by clicking **Explore** under the Platform Support category. The Platforms Support page will appear.
3. Locate the Ultrastar Serv60+8 and click **Explore** under the product. The Ultrastar Serv60+8 page will appear.
4. Access the Downloads/Documents page by clicking the **Explore** button under the Downloads/Documents section. The Customer Technical Support and Downloads page will appear.
5. Log in to the Customer Technical Support and Downloads page using a username and password. To get a username and password click **Register Now** and fill out the form.

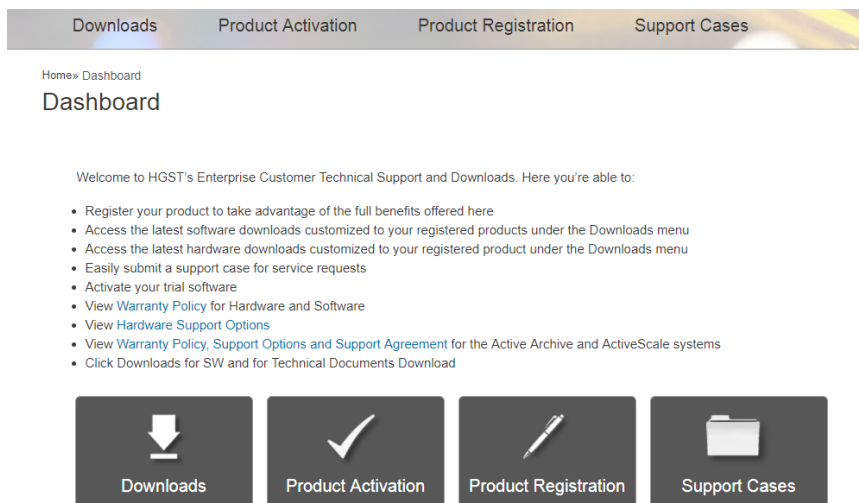
**Note:** If the product has not been registered, complete the registration first before continuing.

**Figure 364: Customer Technical Support and Downloads**



6. Access the product Downloads by clicking **Downloads** in the Dashboard. The Downloads page will appear.

**Figure 365: Dashboard**



7. Select the Ultrastar Serv60+8 from the Downloads list. The product downloads will appear.
8. View the firmware download options by selecting **Firmware > Enclosure > (firmware folder)**. The Downloads page will appear and display the firmware files.

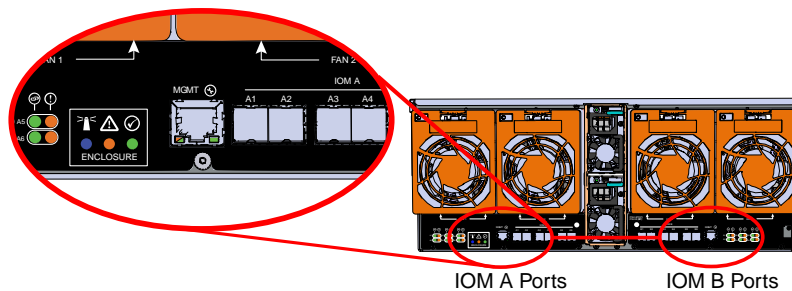
9. Download the firmware by clicking **Download** next to the latest firmware file.  
The product firmware will download.

### 5.1.2 Linux Upgrade Preparation

To prepare the firmware package for download, do the following:

1. Login to the on board server host. This can be done using a connection to the server IP over BMC Web GUI or by connecting to the server subsystem management port at the rear of the enclosure.
2. Type the **sg\_scan -i** command to verify that the enclosure has been found by the server.
3. **The following upgrade preparation steps apply only if the user is upgrading via OOBM.** If this does not apply, please proceed to the upgrade procedure.
  - a) **IMPORTANT:** There is a firmware upgrade requirement which requires both Ethernet interfaces be connected and obtain IP addresses via DHCP prior to starting the upgrade process. The Ethernet ports are shown in the following image:

**Figure 366: Ethernet Ports ( IOM A port magnified)**



- b) After connecting both Ethernet interfaces and obtaining IP addresses via DHCP, locate the **SCSIX:X,X,X** device name from the **sg\_scan -i** output from step 2.
- c) Verify that both OOBMs have IP addresses by issuing the command **sg\_ses SCSIX:X,X,X -p0x7**
- d) Locate the IP addresses in the Enclosure Services Controller Electronics (ESCE) elements, indicated by the **XXX.XXX.XXX.XXX** in the results as shown in the following example:

```
Element type: Enclosure services controller electronics, subenclosure id: 0 [ti=5]

Overall descriptor: <empty>
Element 0 descriptor: ESCE IOMA,IOM PART NUM ,IOM SERIAL
NUM,5000CCAB0500003C,XXX.XXX.XXX.XXX
Element 1 descriptor: ESCE IOMB,IOM PART NUM ,IOM SERIAL
NUM,5000CCAB0500007C,XXX.XXX.XXX.XXX
```

### 5.1.3 Linux Upgrade to New Firmware

To download the new firmware package, do the following:

1. Locate the **/dev/sgX** device name from the **sg\_scan -i**.
2. In the terminal, type:

```
sg_ses_microcode /dev/sgX -m 0xe -N -b 4096 -I <filename> -vv
```

3. Press **Enter**.

The firmware begins loading onto the IOM. The upgrade can take up to 20 minutes to complete.

---

**Important:**

Due to the firmware image being a .tar.gz file, the enclosure has to unpack and load the firmware onto the respective ICs which may take up to 15 minutes. Once the `sg_ses_microcode` command is issued wait 20 minutes to ensure the enclosure has time to perform this process. To check the status of this process, use the Redfish out-of-band management to make a GET request to the following target:

```
curl -G -k -u admin:admin -H "Content-type: application/json" https://<ip
address>/redfish/v1/UpdateService/Actions/UpdateService.SimpleUpdate/Status
```

---

**Note:**

Execute the command until you see the following result:

```
{"ErrorCode":0,"StatusCode":2,"Description":"FW update completed. Waiting for
activation.,"EstimatedRemainingMinutes":0}
```

---

**Attention:** If the OOBM is not being used, query Page Eh by executing the following command `sg_ses <device> -p0xe`. The first time this command is issued, the output may be inaccurate, please ignore and issue the command again. The string to observe for download microcode status is "Complete, no error, start after hard reset or power cycle [0x11]" before proceeding to the activate step.

**Example output:**

```
sg_ses /dev/sg0 -p 0xe

HGST H4102-J 2020
Download microcode status diagnostic page:
  number of secondary subenclosures: 0
  generation code: 0x0
  subenclosure identifier: 0 [primary]
    download microcode status: Complete, no error, start after hard reset or
power cycle [0x11]
  download microcode additional status: 0x0
  download microcode maximum size: 1703914 bytes
  download microcode expected buffer id: 0x0
  download microcode expected buffer id offset: 0
```

---

4. Once the download is complete, type:

```
sg_ses_microcode /dev/sgX -m 0xf
```

5. Press **Enter**.

The IOM will reset in a staggered manner. This process can take up to 5 minutes to activate.



6. Verify the installation is correct by repeating the `sg_scan` again.

### 5.1.4 Non-Automatic Firmware Activation in Linux

1. Locate the `/dev/sgX` device name from the `sg_scan -i`.
2. Execute the following command to upgrade the enclosure firmware using `sg_ses_microcode`.
  - a) Issue the following command:

```
sg_ses_microcode /dev/sgX -m 0xe -N -b 4096 -I <filename> -vv
```

3. Press **Enter**.

The firmware begins loading onto the IOMs. The upgrade can take up to 20 minutes to complete.

**Important:** Due to the firmware image being a `.tar.gz` file, the enclosure has to unpack and load the firmware onto the respective ICs which may take up to 15 minutes. Once the `sg_ses_microcode` command is issued wait 20 minutes to ensure the enclosure has time to perform this process. To check the status of this process, use the Redfish out-of-band management to make a GET request to the following target:

```
curl -G -k -u admin:admin -H "Content-type:application/json" https://<ip address>/redfish/v1/UpdateService/Actions/UpdateService.SimpleUpdate/Status
```

**Note:** Execute the command until you see the following result:

```
{"ErrorCode":0,"StatusCode":2,"Description":"FW update completed. Waiting for activation.", "EstimatedRemainingMinutes":0}
```

**Attention:** If the OOBM is not being used, query Page Eh by executing the following command `sg_ses <device> -p0xe`. The first time this command is issued, the output may be inaccurate, please ignore and issue the command again. The string to observe for download microcode status is "Complete, no error, start after hard reset or power cycle [0x11]" before proceeding to the activate step.

**Example output:**

```
sg_ses /dev/sg0 -p 0xe

HGST H4102-J 2020
Download microcode status diagnostic page:
number of secondary subenclosures: 0
generation code: 0x0
subenclosure identifier: 0 [primary]
download microcode status: Complete, no error, start after hard reset or
power cycle [0x11]
download microcode additional status: 0x0
download microcode maximum size: 1703914 bytes
download microcode expected buffer id: 0x0
download microcode expected buffer id offset: 0
```

4. Issues the following command to activate IOM A:

```
sg_ses /dev/sg<dev> -p4 -c -d 02,00,01,00
```

**Note:** Activate only one IOM at a time to ensure there is always at least one path to the drives. The user will need to issue a reset to each IOM to activate the firmware using an `sg_ses` command to ensure this occurs properly.

5. Ensure multi-pathing can see all of the expected drives after activating IOM A.
  - a) Execute the following command to verify that there are two paths to each drive:

```
multipath -ll | grep -i "active ready running" -c
```

### 5.1.5 Windows Upgrade Preparation

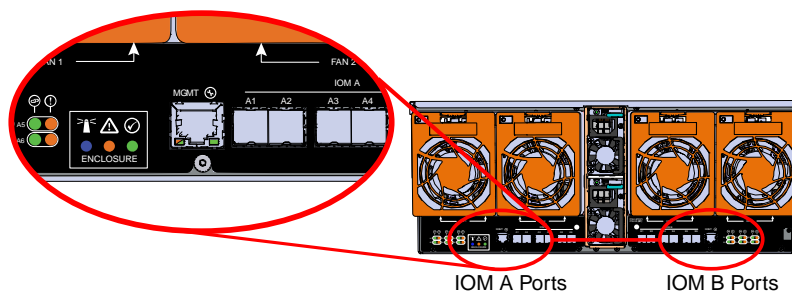
To upgrade firmware using a windows server, do the following:

1. Make sure that `sg3_utils` is installed on the system.
2. Log on to the Windows server and launch a command prompt.
3. Input the `sg_scan -s` command to find the IOM devices to ensure that they can be accessed.

**Note:** If the Ultrastar Serv60+8 is connected to an HBA that does not present the Enclosure Services Processor to the host for management purposes, HGST recommends attaching the Ultrastar Serv60+8 to a host that does expose the Enclosure Services Processor so that the upgrade may be performed.

4. To determine which IOM is which, use the **SCSIX: X,X,X** string with the `sg_ses` command.
5. **The following upgrade preparation steps apply only if the user is upgrading via OOBM.** If this does not apply, please proceed to the upgrade procedure.
  - a) **IMPORTANT:** There is a firmware upgrade requirement which requires both Ethernet interfaces be connected and obtain IP addresses via DHCP prior to starting the upgrade process. The Ethernet ports are shown in the following image:

**Figure 367: Ethernet Ports ( IOM A port magnified)**



- b) After connecting both Ethernet interfaces and obtaining IP addresses via DHCP, locate the `/dev/sgX` device name from the `sg_scan -i` output from step 2.
  - c) Verify that both OOBMs have IP addresses by issuing the command `sg_ses /dev/sgX -p0x7`

- d) Locate the IP addresses in the Enclosure Services Controller Electronics (ESCE) elements, indicated by the **XXX.XXX.XXX.XXX** in the results as shown in the following example:

```
Element type: Enclosure services controller electronics, subenclosure id: 0 [ti=5]

Overall descriptor: <empty>
Element 0 descriptor: ESCE IOMA,IOM PART NUM ,IOM SERIAL
NUM,5000CCAB0500003C,XXX.XXX.XXX.XXX
Element 1 descriptor: ESCE IOMB,IOM PART NUM ,IOM SERIAL
NUM,5000CCAB0500007C,XXX.XXX.XXX.XXX
```

### 5.1.6 Windows Upgrade to New Firmware

To download the new firmware package, do the following:

1. Input the **sg\_scan -s** command to find the IOM devices to ensure that they can be accessed.

**Note:** If the Ultrastar Serv60+8 is connected to an HBA that does not present the Enclosure Services Processor to the host for management purposes, HGST recommends attaching the Ultrastar Serv60+8 to a host that does expose the Enclosure Services Processor so that the upgrade may be performed.

2. In the terminal, type:

```
sg_ses_microcode SCSI:X,X,X -m 0xe -N -b 4096 -I <filename> -vv
```

3. Press **Enter**.

The firmware begins loading onto the IOM. The upgrade can take up to **20 minutes** to complete.

**Important:** Due to the firmware image being a .tar.gz file, the enclosure has to unpack and load the firmware onto the respective ICs which may take up to 15 minutes. Once the `sg_ses_microcode` command is issued wait 20 minutes to ensure the enclosure has time to perform this process. To check the status of this process, use the Redfish out-of-band management to make a GET request to the following target:

```
curl -G -k -u admin:admin -H "Content-type: application/json" https://<ip
address>/redfish/v1/UpdateService/Actions/UpdateService.SimpleUpdate/Status
```

**Attention:** If the OOBM is not being used, query Page Eh by executing the following command `sg_ses <device> -p 0xe`. The first time this command is issued, the output may be inaccurate, please ignore and issue the command again. The string to observe for download microcode status is "Complete, no error, start after hard reset or power cycle [0x11]" before proceeding to the activate step.

**Example output:**

```
sg_ses /dev/sg0 -p 0xe

HGST H4102-J 2020
```

```

Download microcode status diagnostic page:
  number of secondary subenclosures: 0
  generation code: 0x0
  subenclosure identifier: 0 [primary]
    download microcode status: Complete, no error, start after hard reset or
power cycle [0x11]
  download microcode additional status: 0x0
  download microcode maximum size: 1703914 bytes
  download microcode expected buffer id: 0x0
  download microcode expected buffer id offset: 0

```

4. Once the download is complete, type:

```
sg_ses_microcode /dev/sgX -m 0xf
```

5. Press **Enter**.

The IOM will reset in a staggered manner. This process can take up to 5 minutes to activate.

### 5.1.7 Non-Automatic Firmware Activation in Windows

1. Upgrade the enclosure firmware using `sg_ses_microcode` by executing the following command:

```
sg_ses_microcode SCSI:X,X,X -m 0xe -N -b 4096 -I <filename> -vv
```

**Attention:** If the OOBM is not being used, query Page Eh by executing the following command `sg_ses <device> -p0xe`.

2. Press **Enter**.

The firmware begins loading onto the IOM. The upgrade can take up to **20 minutes** to complete.

**Important:** Due to the firmware image being a .tar.gz file, the enclosure has to unpack and load the firmware onto the respective ICs which may take up to 15 minutes. Once the `sg_ses_microcode` command is issued wait 20 minutes to ensure the enclosure has time to perform this process. To check the status of this process, use the Redfish out-of-band management to make a GET request to the following target:

```
curl -G -k -u admin:admin -H "Content-type: application/json" https://<ip
address>/redfish/v1/UpdateService/Actions/UpdateService.SimpleUpdate/Status
```

**Attention:** If the OOBM is not being used, query Page Eh by executing the following command `sg_ses <device> -p0xe`. The first time this command is issued, the output may be inaccurate, please ignore and issue the command again. The string to observe for download microcode status is "Complete, no error, start after hard reset or power cycle [0x11]" before proceeding to the activate step.

**Example output:**

```

sg_ses /dev/sg0 -p 0xe

HGST H4102-J 2020
Download microcode status diagnostic page:
number of secondary subenclosures: 0
generation code: 0x0
subenclosure identifier: 0 [primary]
download microcode status: Complete, no error, start after hard reset or
power cycle [0x11]
download microcode additional status: 0x0
download microcode maximum size: 1703914 bytes
download microcode expected buffer id: 0x0
download microcode expected buffer id offset: 0

```

**3. Issue the following command to activate IOM A:**

```
sg_ses SCSI<dev> -p4 -c -d 02,00,01,00
```

**5.1.8 Upgrading Firmware with OOBM**

The following procedure should be followed to upgrade the firmware of the Ultrastar Serv60+8 using the OOBM API.

1. Visit the HGST Support portal at <http://www.hgst.com/support/platforms-support> and download the firmware package for the Ultrastar Serv60+8.
2. Extract the downloaded zip file and place file in a location that is accessible to the Ultrastar Serv60+8.
3. Make a POST call to the UpdateService object using the SimpleUpdate action. In the body of the POST the ImageURI as the data parameter and set the value of this parameter to the file location of the bin file.

```

POST /redfish/v1/UpdateService/Actions/UpdateService.SimpleUpdate HTTP/1.1
Content-Type: application/json;charset=utf-8
Content-Length: <computed length>
OData-Version: 4.0
Authorization: Basic userid:password
{
  "ImageURI": "tftp://<users IP Address>/"
}

```

**Note:** TFTP or HTTPS are supported.

4. To check the status of this process, make a GET request to the following target:

---

**Note:** The command may need to be issued multiple times to check the status until it reports a completed status. This should be completed before completing the remainder of the procedure.

---

```
curl -G -k -u admin:admin -H "Content-type: application/json" https://<ip  
address>/redfish/v1/UpdateService/Actions/UpdateService.SimpleUpdate/Status
```

---

**Note:** Execute the command until you see the following result:

```
{"ErrorCode":0,"StatusCode":2,"Description":"FW update completed. Waiting for  
activation.", "EstimatedRemainingMinutes":0}
```

---

5. To activate the firmware, send a POST to the UpdateService object using the FWActivate command.

```
curl -X POST -k -u admin:admin -H "Content-type: application/json" https://<ip  
address>/redfish/v1/UpdateService/Actions/UpdateService.FWActivate
```

## 5.2 BIOS Firmware Update

### Requirements

This section outlines the requirements and procedures needed to update to the latest version of BIOS firmware. There are two ways to upgrade the BIOS firmware; using EFI boot mode or using legacy boot mode that requires a USB drive containing the BIOS update files. The following is a list containing requirements for each of the BIOS update options.

#### Updating BIOS Firmware using EFI Boot Mode

- Linux operating system
- 1GB (or greater) FAT32 partition on the host operating system
- Latest version of the BIOS firmware

#### Updating BIOS Firmware using the Legacy Boot Mode

- Windows operating system
- USB Drive w/ a 1GB (or greater) FAT32 partition
- Latest version of the BIOS firmware

#### Reading the BIOS ID

Before executing the BIOS update, you will need to determine what the current version of the BIOS. This version verification is required to ensure the current version of the BIOS is not incrementally larger than the BIOS update. The version of the BIOS appears in the BIOS ID string and will require some deciphering. To find the current version of the BIOS, you must locate the **MajorVer**, **MinorVer**, and **RelNum** as seen in the following key:

**BIOS ID Version Key:**  
BoardFamilyID.OEMID.**MajorVer**.**MinorVer**.**RelNum**.BuildDateTime

This example uses the BIOS Version Key to determine the BIOS version number by locating the **MajorVer**, **MinorVer**, and **RelNum**:

```
BIOS ID Version Example:  
SE5C620.86B.00.01.0009.101920170742  
The version of the BIOS is 00.01.0009 in this example.
```

### 5.2.1 Updating BIOS Firmware using EFI Boot Mode

1. Check the current BIOS version using Dmidecode.
  - a) SSH into the enclosure.
  - b) Check the current BIOS version by issuing the command:

```
sudo dmidecode -t 0 | grep Version
```

A BIOS ID number will be displayed with the BIOS version number contained in it. To learn how to read the BIOS ID see: [BIOS Firmware Update](#) on page 286.

#### Current BIOS Version Example

```
Version: SE5C620.86B.00.01.0009.101920170742
```

- c) Verify that the version of the BIOS is incrementally earlier version than the BIOS update that you are going load.

---

**Note:** If a downgrade of the BIOS is necessary, please contact support: [Points of Contact](#) on page 349.

---

2. Copy the BIOS update ZIP file to the root of the FAT32 partition. The process of copying the ZIP file to the partition will vary depending on the version of the operating system.

---

**Note:** The **Startup.nsh** file must be located at the root of the EFI partition. Do not move the **Startup.nsh** into the other folder that is part of the BIOS update.

---

3. Setup a one-time boot using the EFI Shell.

---

**Warning:** Failure to set a one-time boot may result in the system being caught in boot loop.

---

- a) Using the Terminal, locate the EFI Shell by issuing the command:

```
efibootmgr
```

The efibootmgr will display a list of boot manager options.

#### efibootmgr Options

```
root@root: /home/hgst/Downloads/BIOS Update# efibootmgr  
BootCurrent: 0014
```

```
Timeout: 1 seconds
BootOrder: 0014, 0005, 0007, 0009, 000B, 000D, 000F, 0011, 0013, 0004, 0006, 0008,
000A, 000C, 0000, 0001, 0002, 000E, 0010, 0012, 0003
Boot0000* Enter Setup
Boot0001 Boot Device List
Boot0002 Network Boot
Boot0003* Launch EFI Shell
...
```

- b) Locate the line that is labeled `Launch EFI Shell` and identify the boot number next to it. In this example, the boot number is `0003` and it will be used to issue the one-time boot command.
- c) Setup the one-time boot option by issuing the command:

```
efibootmgr -n 0003
```

The command will return the following information related to the next boot of the enclosure.

### One-time boot Option

```
root@root: /home/hgst/Downloads/BIOS Update# efibootmgr -n 0003
BootNext: 0003
BootCurrent: 0014
Timeout: 1 seconds
BootOrder: 0014, 0005, 0007, 0009, 000B, 000D, 000F, 0011, 0013, 0004, 0006, 0008,
000A, 000C, 0000, 0001, 0002, 000E, 0010, 0012, 0003
Boot0000* Enter Setup
Boot0001 Boot Device List
Boot0002 Network Boot
Boot0003* Launch EFI Shell
...
```

- d) Verify that `BootNext` has changed to `0003`. The `BootNext` value indicates what option will be booted next when the enclosure is restarted.
  - e) Restart the enclosure.  
The EFI shell will automatically launch the **Startup.nsh** file and start the BIOS update. The BIOS will begin to flash on the system and the enclosure will restart. Once the system restarts, it will run through the different components to verify that there were no errors that occurred during the update. The enclosure will restart a second time to finish applying the BIOS updates.
4. Once the enclosure boots through the normal boot screen, navigate to the root of the EFI partition and delete the **Startup.nsh** file. Failure to delete the **Startup.nsh** can lead to the enclosure being set on a continuous boot loop.
  5. Verify that the BIOS has been updated using Dmidecode.
    - a) Check the current BIOS version by issuing the command:

```
sudo dmidecode -t 0 | grep Version
```

A BIOS ID number will be displayed with the BIOS version number contained in it. To learn how to read the BIOS ID see: [BIOS Firmware Update](#) on page 286.

### Current BIOS Version Example

```
Version: SE5C620.86B.00.01.0013.030920180427
```

- b) Verify that the version of the BIOS is the latest version.



## 5.2.2 Updating BIOS Firmware using the Legacy Boot Mode

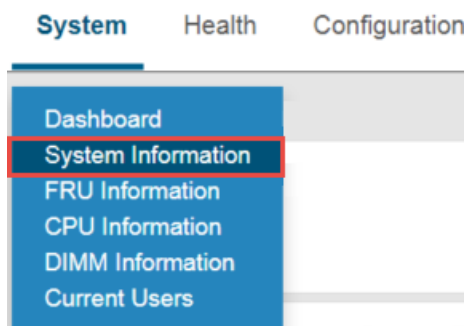
1. Create a FAT32 boot partition on a USB drive that has 1GB (or greater) worth of space and load the BIOS update files onto the partition.

**Note:** The **Startup.nsh** file must be located at the root of the EFI partition. Do not move the **Startup.nsh** into the other folder that is part of the BIOS update.

Name	Type
files	File folder
Startup.nsh	NSH File

2. Plug the USB drive into a USB port on the rear of the enclosure.
3. From a laptop, check the current BIOS version using the BMC Web GUI.
  - a) Navigate to the IP Address of the enclosure and log into the BMC Web GUI.
  - b) From the Menu Bar, select **System > System Information**.

**Figure 368: System Menu — System Information**



- c) In the System Firmware Version section, locate the BIOS ID.
- d) Verify that the version of the BIOS is an earlier version than the BIOS update that you are going load.

**Figure 369: Example of Current BIOS Firmware Version**

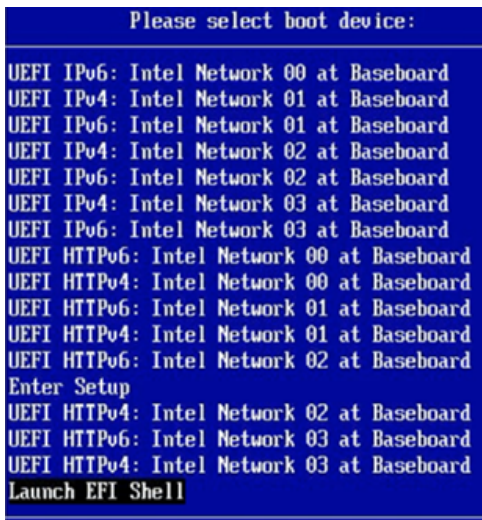


**Note:** To learn how to read the BIOS ID see: [BIOS Firmware Update](#) on page 286.

4. Restart the enclosure and launch the EFI Shell from the BIOS boot menu to update the BIOS.
  - a) Launch the KVM by selecting **Remote Control > iKVM over HTML5** from the Menu Bar and click **Launch iKVM over HTML5**.
  - b) Reboot the system.

- c) While the BIOS is running through its boot sequence, press F6 and select EFI shell from the boot device menu.

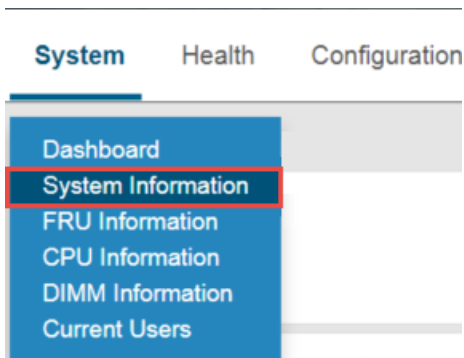
**Figure 370: Launch EFI Shell**



The EFI shell will automatically launch the **Startup.nsh** file and start the BIOS update. The BIOS will begin to flash on the system and the enclosure will restart. Once the system restarts, it will run through the different components to verify that there were no errors that occurred during the update. The enclosure will restart a second time to finish applying the BIOS updates.

5. Once the enclosure boots through the normal boot screen, navigate to the BIOS folder and delete the **Startup.nsh** file. Failure to delete the **Startup.nsh** can lead to boot loop issues on the enclosure.
6. Check the latest BIOS version using the BMC Web GUI.
  - a) From the Menu Bar, select **System > System Information**.

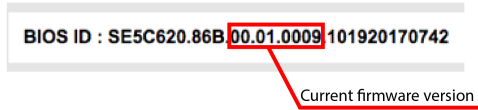
**Figure 371: System Menu — System Information**



- b) In the System Firmware Version section, locate the BIOS ID.

- c) Verify that the version of the BIOS is the latest version.

**Figure 372: Example of Updated BIOS Firmware Version**



**Note:** To learn how to read the BIOS ID see: [BIOS Firmware Update](#) on page 286.

## 5.3 HGST BMC Web GUI

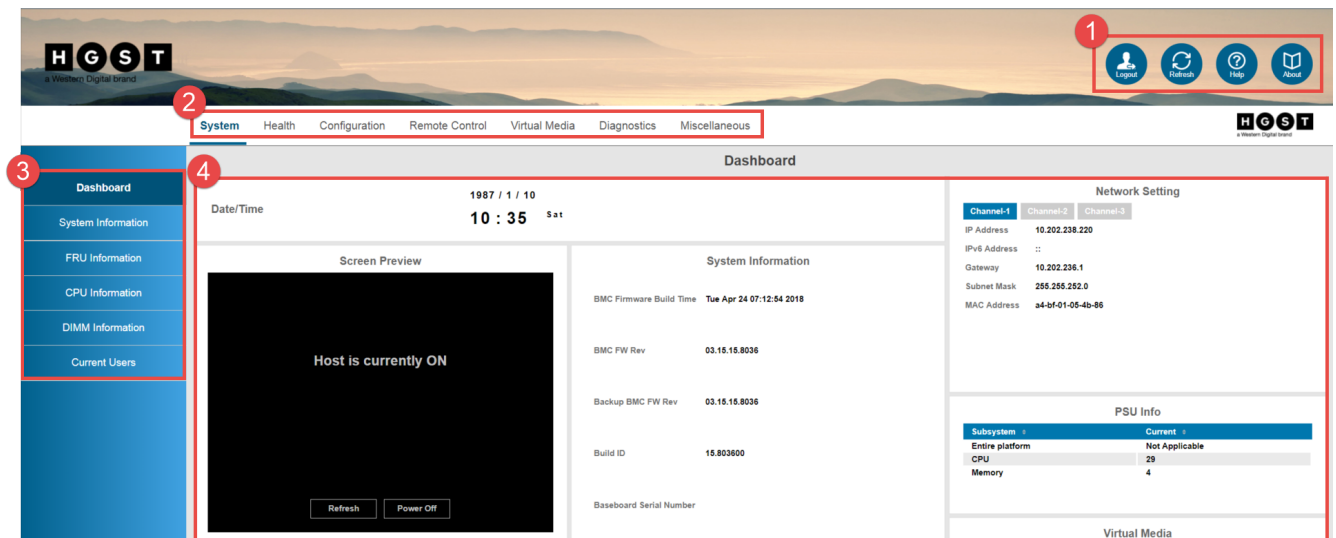
This section provides information on the BMC Web GUI and how to use the different features to interact with the enclosure.

### 5.3.1 BMC Web GUI Overview

The BMC Web GUI is a web-based management interface that allows users to interact with the enclosure. The user can configure network settings, manage profiles, check the health of the enclosure and components within the enclosure, configure remote settings, generate diagnostic logs, and so on.

This overview will provide information about the basic parts of the BMC GUI. The BMC Web GUI is made up of the Actions Menu, Menu Bar, Sidebar Menu, and Dashboard. The following image and list highlights the location of each of the main parts of the BMC Web GUI.

**Figure 373: BMC Web GUI Overview**



1. Action Menu
2. Menu Bar
3. Sidebar Menu

#### 4. Dashboard

The following section provides a list of the supported browsers that can be used to access the BMC Web GUI:

**Table 45:**

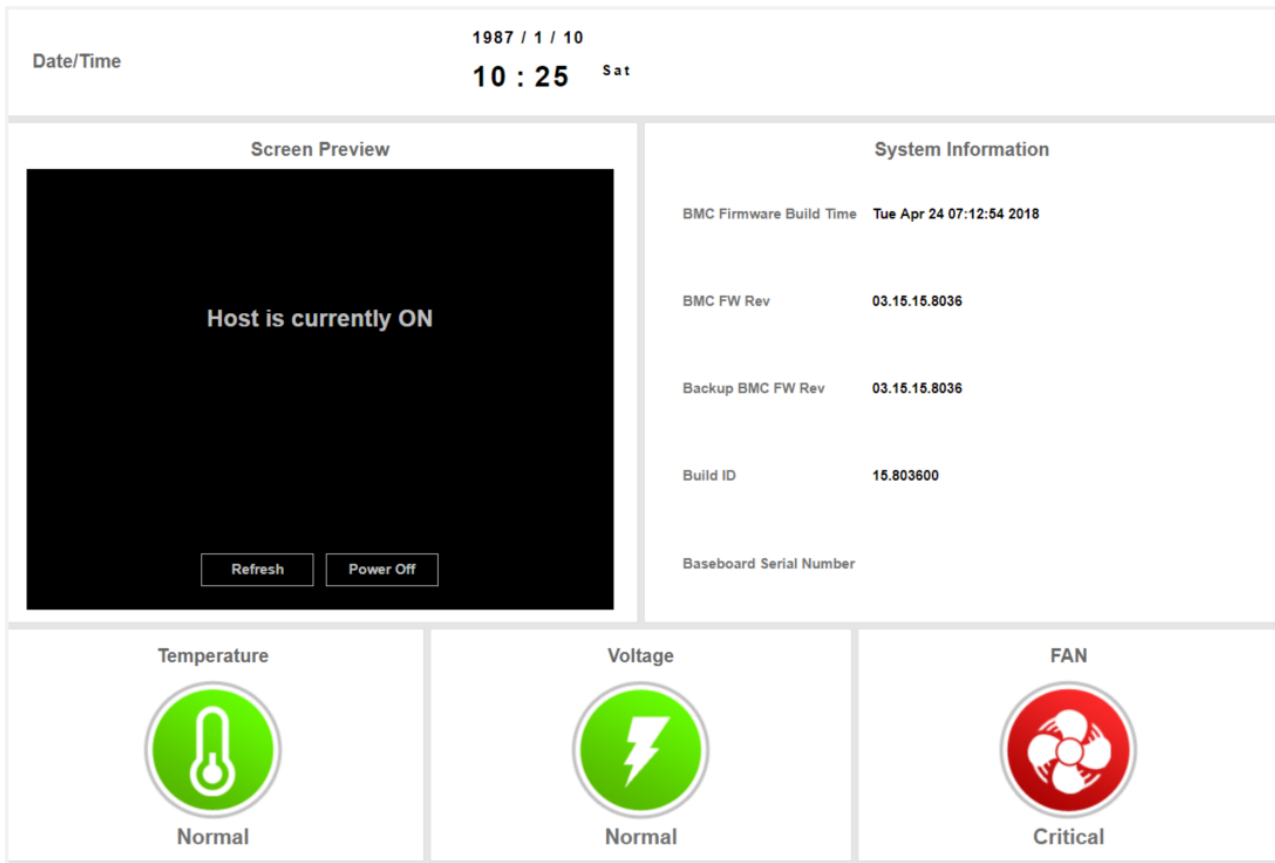
Web Browser	Version
Google Chrome	66.0.3359.139 (Official Build) (64-bit) or newer
Mozilla Firefox	59.0.2 (64-bit) or newer
Microsoft Edge	<ul style="list-style-type: none"> <li>• Microsoft Edge: 41.16299.402.0 or newer</li> <li>• Microsoft EdgeHTML: 16.16299 or newer</li> </ul>
Internet Explorer	11.0.9600.16428 or newer  <hr/> <p><b>Note:</b> Internet Explorer 11 cannot mount ISO images with the HTML 5 media feature.</p> <hr/>
Safari	11.0.3 (11604.5.6.1.1) or newer

##### 5.3.1.1 Dashboard

The dashboard is located in the center of the webpage and acts as the main view when the BMC Web GUI loads. The dashboard contains several different views that allow the user to get a top level view of alerts, settings, general system information, and logs. The dashboard configuration will display different information

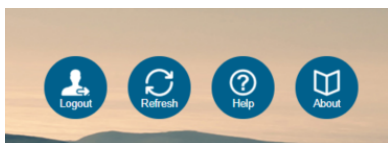
based on user privilege settings. A lower set of user privileges will result in the display of less critical information. Administrators will have access to all of the features and information related to the BMC Web GUI.

**Figure 374: BMC Web GUI Dashboard**



For contextual information on how specific features in the dashboard function, click the Help button located in the Actions Menu in the top right-hand corner of the BMC Web GUI. The BMC Web GUI Help guides the user on specific user tasks within the section that user is located in. The BMC Web GUI Help can remain on while the BMC Web GUI is being used or it can be hidden by clicking the Help button.

**Figure 375: Actions Menu — Help button**



### 5.3.2 User Management

This section provides information related to configuring user credentials, creating a user, deleting an existing user, modifying an existing user, and ending user sessions.

The user management within the BMC Web GUI is controlled mostly from the User List that appears in the main window of the Users section. This section is comprised of a table that contains the list of users and three buttons used to add, modify, or delete a user.

**Figure 376: User List**

User ID	User Name	User Status	Network Privilege
1	anonymous	Enable	No Access
2	root	Enable	Administrator
3	~	~	~
4	~	~	~
5	~	~	~
6	~	~	~
7	~	~	~
8	~	~	~
9	~	~	~
10	~	~	~
11	~	~	~

Number of configured users: 2

Add User   Modify User   Delete User

- User List Table:** The User List table contains a list of the current users that have access to the enclosure through the BMC Web GUI. The user ID, user name, user status, and network privilege can be viewed in the User List table. Additional settings can be viewed individually while managing each user from the Modify User window.
- User List Buttons:** The User List buttons allow the user to add, modify, or delete a selected user.

### 5.3.2.1 User Privileges

While managing users, it is important to understand user privileges. The BMC Web GUI contains five categories of user privileges: Administrator, Operator, User, Callback, and No Access. The following image displays the new user window with the possible options for selecting user privileges.

**Figure 377: User Privileges**

User Name:

Password:

Confirm Password:

Network Privileges: Administrator ▼

- Administrator
- Operator
- User
- Callback
- No Access

Add   Cancel

Each user role has a specific set of features that can be accessed when logged into the BMC Web GUI. This means that the BMC Web GUI will display differently depending on the privileges that are assigned to each user role. The most notable BMC Web GUI changes based on user roles will occur in the Menu Bar, Sidebar Menu, and the Dashboard. The following section provides information for each of the user roles contained in the BMC Web GUI.

**Note:** For specific details related to each of the user privileges, from the Action Menu in the top right-hand corner, click **Help** and select the **Click here to get detailed network privilege of each level** link in the GUI. This has to be done while the user is in the Add or Modify User window.

- **Administrator:** This user role allows the user to have full access of the BMC Web GUI. The administrator role allows for full access to BMC Web GUI configurations, features, and views. The BMC Web GUI Administrator privileges contains the following available options:

**Menu Bar:**

- System
- Health
- Configuration
- Remote Control
- Virtual Media
- Diagnostics
- Miscellaneous

**Dashboard:**

- Date/Time
- Network Settings
- Screen Preview
- System Information
- Temperature, Voltage, and Fan status
- Virtual Media
- SEL Logs
- Current Users

- **Operator:** This user role allows the selected user to have a great deal of access to the BMC Web GUI. The operator is the only other type of user role that can change a subset of BMC Web GUI configurations. The operator can configure the Event Log, Server Power Control, System Diagnostics, the SOL Log, and Power Telemetry. The operator can also view basic system information, server health, system configurations, server diagnostics, and power profiles. The BMC Web GUI will reduce selections in the Menu Bar that appears across the top of the dashboard. As a result, the selections under each category will also be reduced based on the privilege level. The BMC Web GUI Operator privileges contains the following available options:

**Menu Bar:**

- System
- Health
- Configuration
- Remote Control
- Diagnostics

**Dashboard:**

- Summary
- Web Session Timeout
- System Firmware Version

- **User:** This user role allows the selected user to have access to view basic information related to the BMC Web GUI, such as: logs and diagnostics. Other privileges include power control on the enclosure and some basic configurations on the BMC. The BMC Web GUI User privileges contains the following available options:

**Menu Bar:**

- System
- Health
- Configuration
- Remote Control
- Diagnostics

**Dashboard:**

- Summary
  - Web Session Timeout
  - System Firmware Version
- **Callback:** This user role is the lowest privilege level with IPMI read-only access and no access to the BMC Web GUI.
  - **No Access:** This user role disconnects all network privileges for the user. This allows the Administrator to turn off access to the BMC Web GUI without deleting the user.

### 5.3.2.2 *Changing the Default Administrator Credentials*

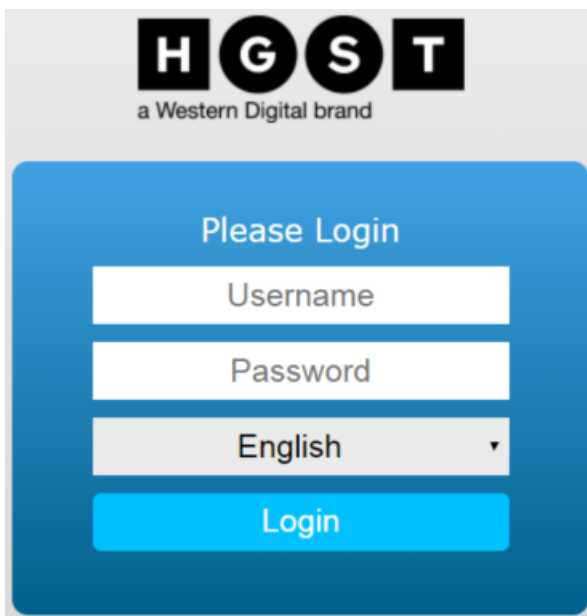
---

**Note:** Administrator privileges are required to change the default Administrator credentials.

---

1. Log in to the BMC Web GUI.

**Figure 378: BMC Web GUI Login**



- a) Open a browser window and navigate to the HGST BMC Web GUI IP address.

---

**Note:** The IP Address can be found in the BIOS.

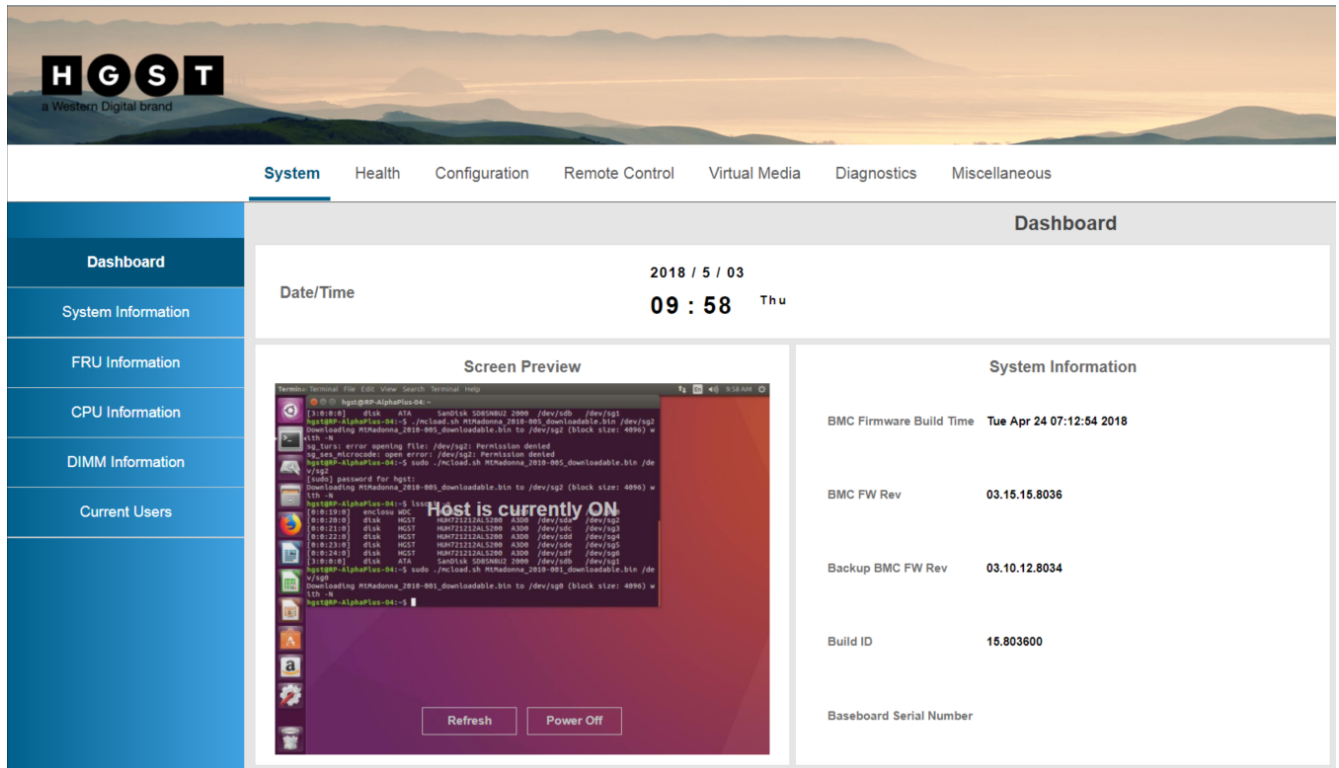
---

- b) Type **root** for the username and **root** for the password
- c) Click **Login**.



The management dashboard will appear.

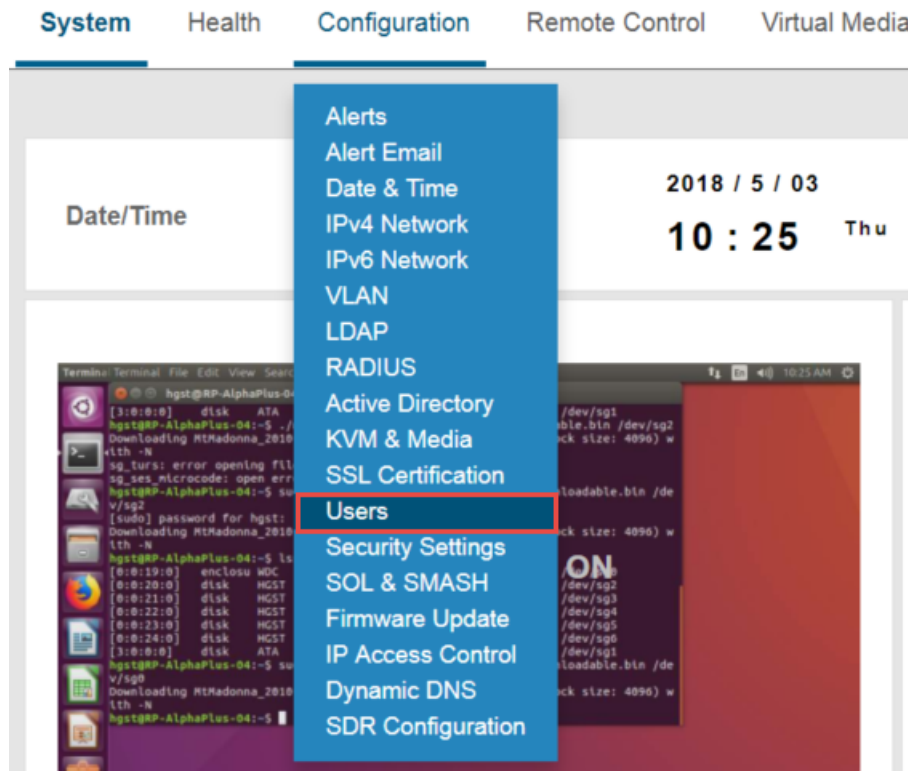
**Figure 379: Management Dashboard**



- From the Menu Bar, select **Configuration > Users**.

The User List window will appear.

**Figure 380: Configuration Menu — Users**



**Figure 381: User List**

User ID	User Name	User Status	Network Privilege
1	anonymous	Disable	No Access
2	root	Enable	Administrator
3	test1	Enable	Administrator
4	admin	Enable	Administrator
5	~	~	~
6	~	~	~

3. Modify the default Administrator credentials.
  - a) Select **root** from the User List and click **Modify User**.

The Modify User window will appear.

**Figure 382: Select Root**

User ID	User Name	User Status	Network Privilege
1	anonymous	Disable	No Access
2	root	Enable	Administrator
3	test1	Enable	Administrator
4	admin	Enable	Administrator
5	~	~	~
6	~	~	~

**Figure 383: Modify User — Root**

User Name:

Change Password

Password:

Confirm Password:

Network Privileges:

User Enable:

b) Complete the following required fields:

**Figure 384: Add New User**

User Name:

Change Password

Password:

Confirm Password:

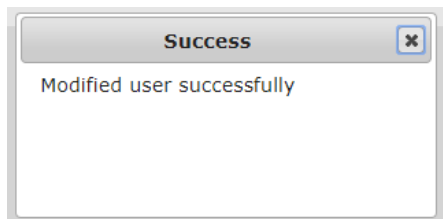
Network Privileges:

User Enable:

- **Password:** Create a new password
  - **Confirm Password:** Confirm the newly created password
  - **Network Privileges:** Select the network privileges for the user
  - **User Enabled:** Leave the value as Unchanged.
- c) Click **Modify**.

A message notifying that user has been modified will appear.

**Figure 385: User was Modified successfully**



**Note:** If it is preferred to create a completely new administrator, disable root as the Administrator. Select disable from the User Enable drop-down list and save the new configuration. Create a new administrator by following the instructions in [Creating a New User](#) on page 304 and set the User Enable drop-down list value to **Administrator**.

4. Verify the user modifications appear in the User List. The User Status and Network Privilege changes can be viewed from the user list.

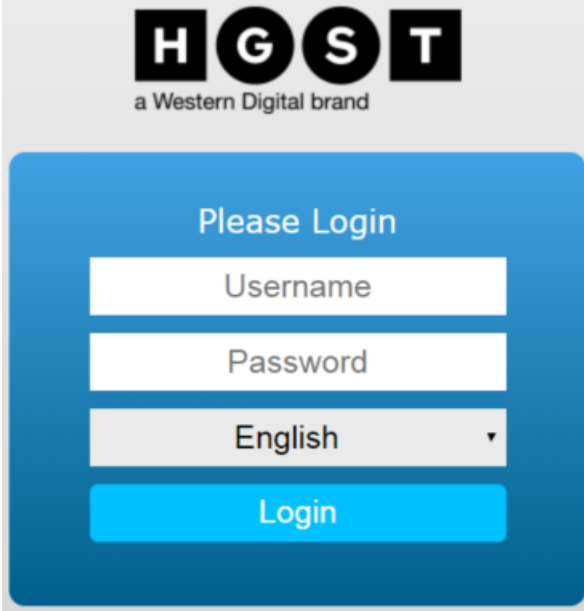
**Figure 386: User added to the User List**

User ID	User Name	User Status	Network Privilege
1	anonymous	Disable	No Access
2	root	Enable	Administrator
3	test1	Enable	Administrator
4	admin	Enable	Administrator
5	~	~	~
6	~	~	~

5. Verify that the new Administrator credentials work as expected.
  - a) Log out of the BMC Web GUI by clicking **Logout** from Actions Menu in the top right-hand corner and confirming the logout selection.

b) Log in to the BMC Web GUI.

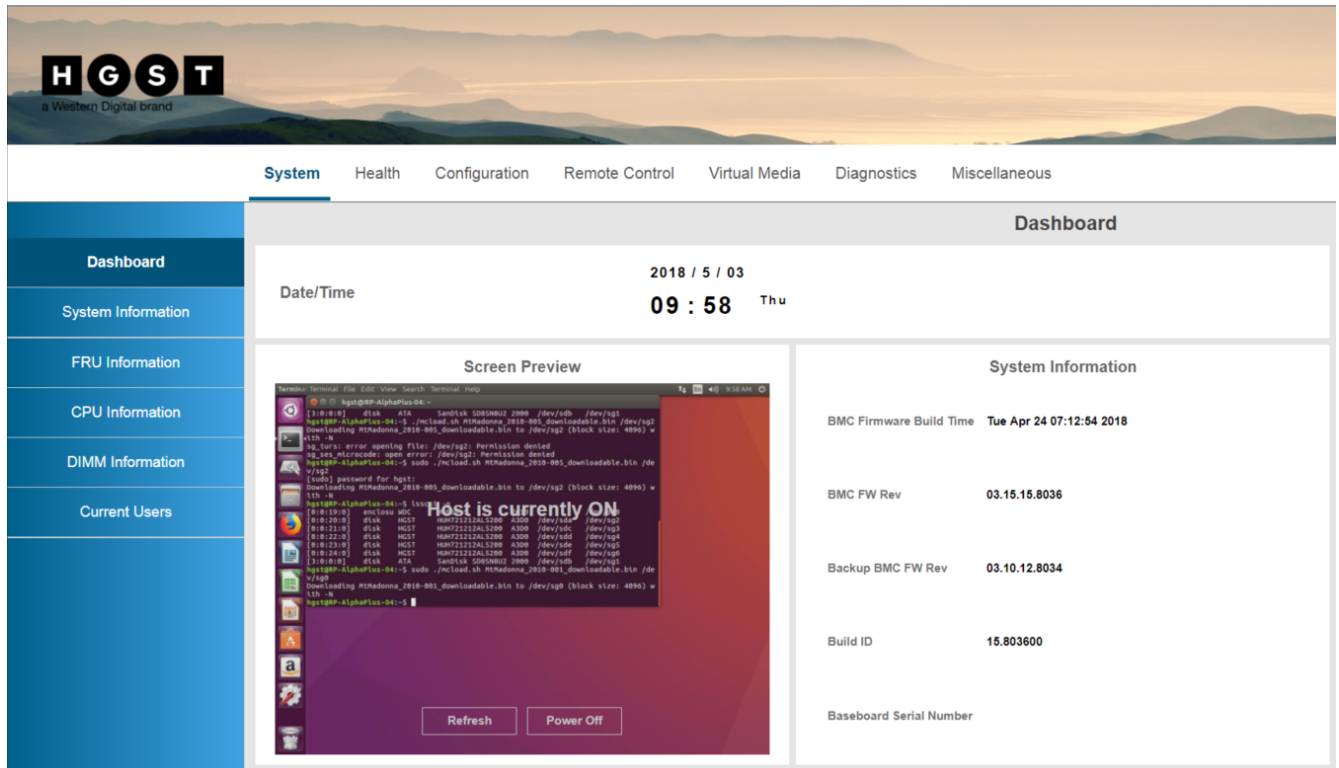
**Figure 387: HGST BMC Login**



- Open a browser window and navigate to the BMC Web GUI IP address.
- Type a username and password.
- Choose a language from the drop-down list.
- Click **Login**.

The BMC Web GUI Dashboard will appear.

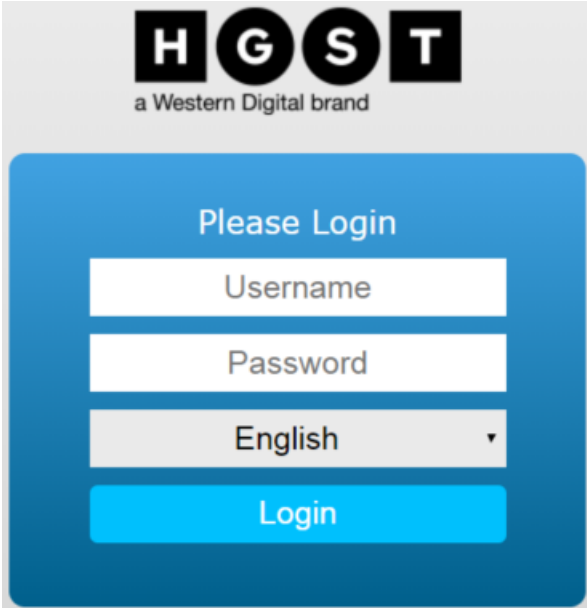
**Figure 388: BMC Web GUI Dashboard**



### 5.3.2.3 Logging into the BMC Web GUI

Log in to the BMC Web GUI.

**Figure 389: HGST BMC Login**

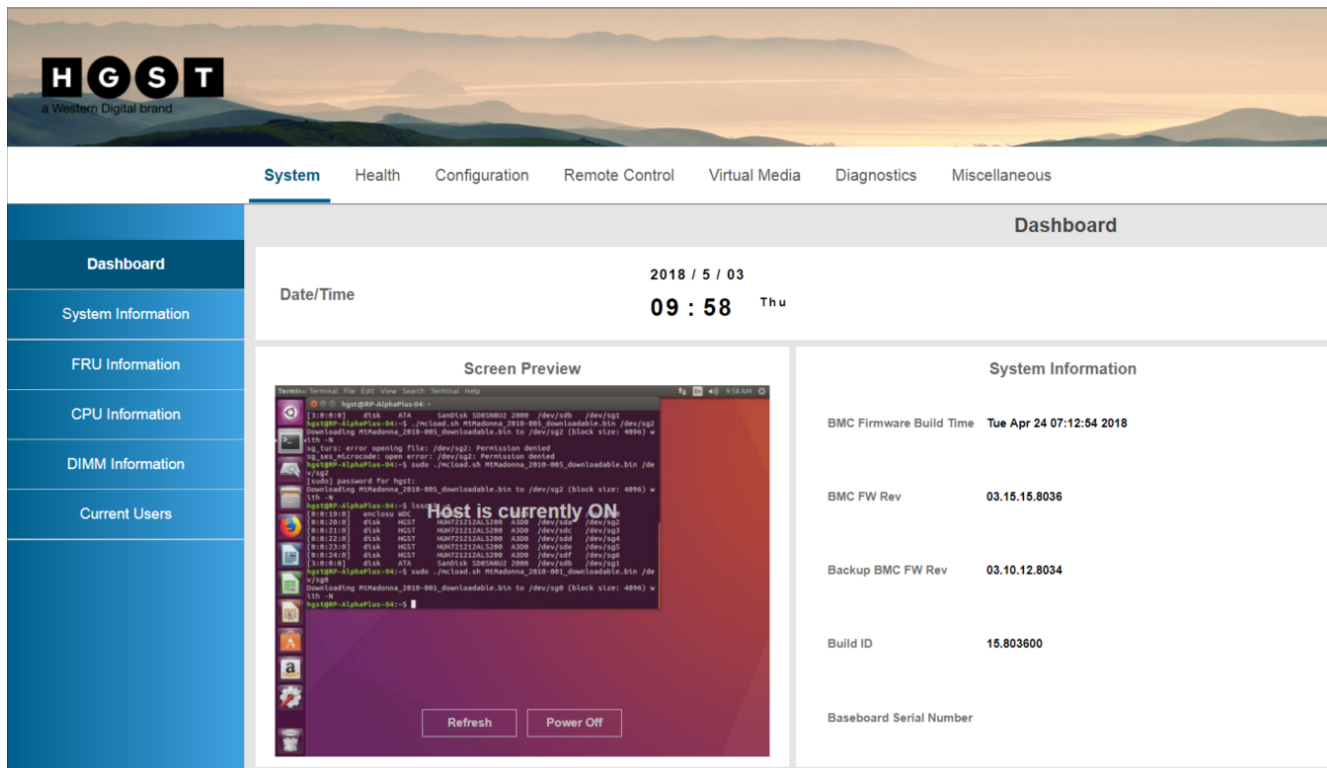


The screenshot shows the HGST BMC Login interface. At the top, the HGST logo is displayed in black squares, with the text "a Western Digital brand" underneath. Below the logo is a blue login form with the heading "Please Login". The form contains four input fields: "Username", "Password", and "English" (a dropdown menu), followed by a blue "Login" button.

- Open a browser window and navigate to the BMC Web GUI IP address.
- Type a username and password
- Click **Login**.

The Management Dashboard will appear.

**Figure 390: Management Dashboard**



### 5.3.2.4 Creating a New User

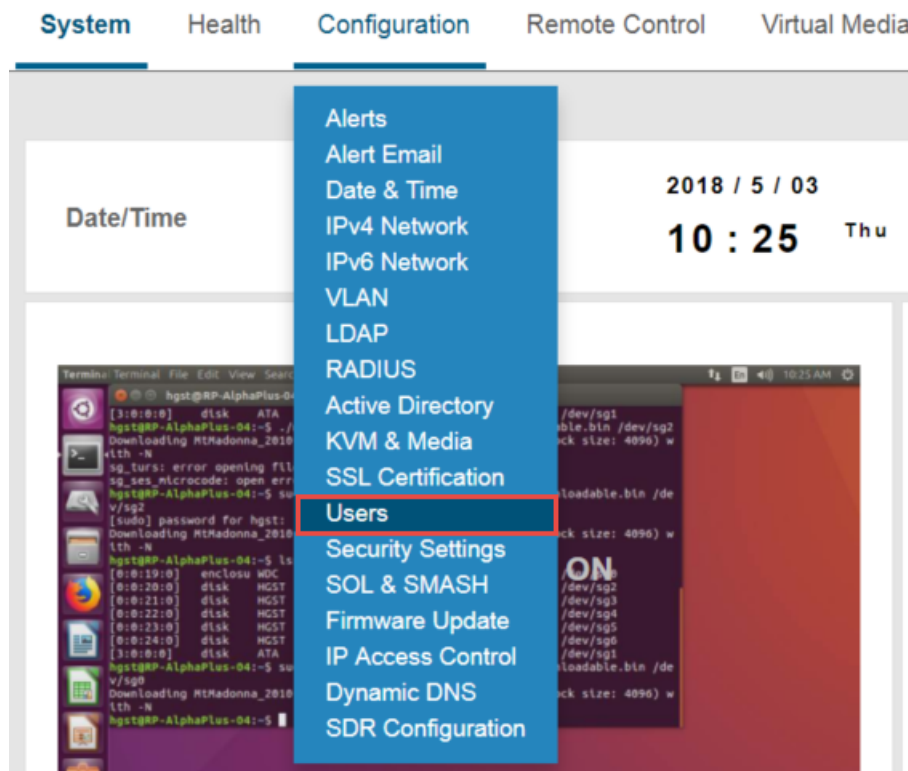
**Note:** The user is required to log in with a user that has administrator privileges to create a new user. For more information on how to log into the BMC Web GUI, see: [Logging into the BMC Web GUI](#) on page 303.

1. From the Menu Bar, select **Configuration > Users**.



The User List window will appear.

**Figure 391: Configuration Menu — Users**



**Figure 392: User List**

User ID	User Name	User Status	Network Privilege
1	anonymous	Disable	No Access
2	root	Enable	Administrator
3	test1	Enable	Administrator
4	admin	Enable	Administrator
5	~	~	~
6	~	~	~

2. Create a new user.
  - a) Select an empty user slot from the User List and click **Add User**.

The Add New User window will appear.

**Figure 393: Empty User Slot**

User ID	User Name	User Status	Network Privilege
1	anonymous	Disable	No Access
2	root	Enable	Administrator
3	test1	Enable	Administrator
4	admin	Enable	Administrator
5	~	~	~
6	~	~	~
7	~	~	~
8	~	~	~

**Figure 394: Add New User Fields**

User Name:

Password:

Confirm Password:

Network Privileges:

b) Complete the following required fields:

**Figure 395: Add New User**

User Name:

Password:

Confirm Password:

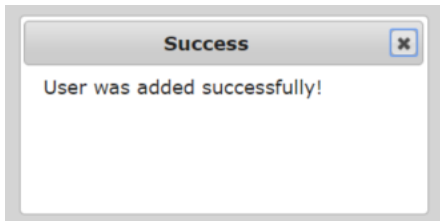
Network Privileges:

- **User Name:** Create a user name with no spaces
- **Password:** Create a password
- **Confirm Password:** Confirm the created password
- **Network Privileges:** Select the network privileges for the user

c) Click **Add**.

A message notifying that user has been added will appear.

**Figure 396: User was added successfully**



d) Verify the user has been added to the User List.

**Figure 397: User added to the User List**

User ID	User Name	User Status	Network Privilege
1	anonymous	Disable	No Access
2	root	Enable	Administrator
3	test1	Enable	Administrator
4	admin	Enable	Administrator
5	FirstLast	Enable	User
6	~	~	~

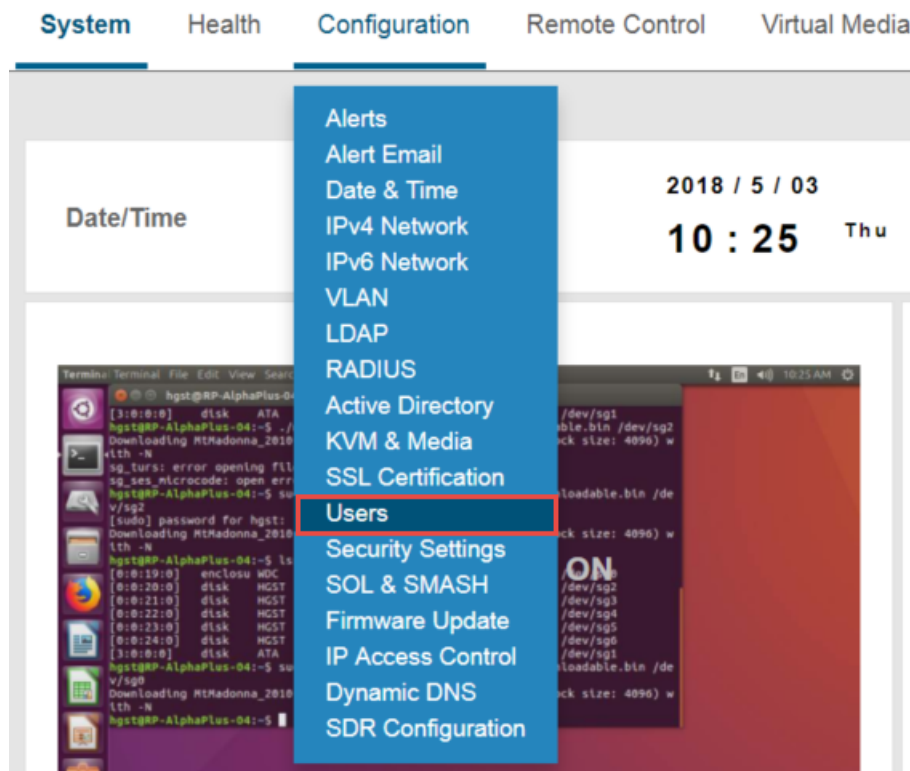
### 5.3.2.5 Modifying a User

**Note:** The user is required to log in with a user that has administrator privileges to modify a user. For more information on how to log into the BMC Web GUI, see: [Logging into the BMC Web GUI](#) on page 303.

1. From the Menu Bar, select **Configuration > Users**.

The User List window will appear.

**Figure 398: Configuration Menu — Users**



**Figure 399: User List**

User ID	User Name	User Status	Network Privilege
1	anonymous	Disable	No Access
2	root	Enable	Administrator
3	test1	Enable	Administrator
4	admin	Enable	Administrator
5	FirstLast	Enable	User
6	~	~	~

2. Modify a user.
  - a) Select an existing user from the User List and click **Modify User**.

The Modify User window will appear.

**Figure 400: Select a User**

User ID	User Name	User Status	Network Privilege
1	anonymous	Disable	No Access
2	root	Enable	Administrator
3	test1	Enable	Administrator
4	admin	Enable	Administrator
5	FirstLast	Enable	User
6	~	~	~

**Figure 401: Modify User**

User Name:   
 Change Password   
 Password:   
 Confirm Password:   
 Network Privileges:   
 User Enable:

b) Complete the following required fields:

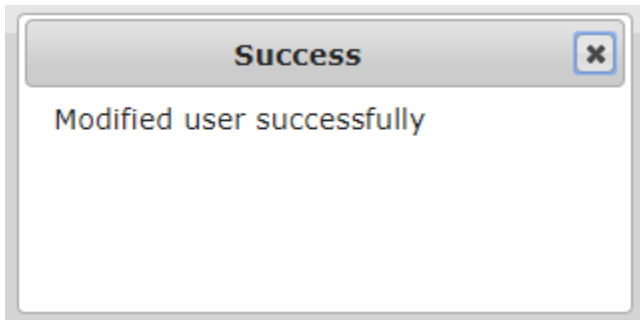
**Figure 402: Add New User**

User Name:   
 Change Password   
 Password:   
 Confirm Password:   
 Network Privileges:   
 User Enable:

- **User Name:** This field cannot be edited
- **Change Password:** Select the checkbox (this will allow the user to change the existing password)
- **Password:** Create a new password
- **Confirm Password:** Confirm the newly created password

- **Network Privileges:** Change the network privileges for the user by selecting a value from the drop-down list
- c) Click **Modify**.  
 A message notifying that user has been modified will appear.

**Figure 403: User was Modified successfully**



- d) Verify the user modifications appear in the User List. The User Status and Network Privilege changes can be viewed from the user list.

**Figure 404: User Modified in the User List**

User ID	User Name	User Status	Network Privilege
1	anonymous	Disable	No Access
2	root	Enable	Administrator
3	test1	Enable	Administrator
4	admin	Enable	Administrator
5	~	~	~
6	~	~	~

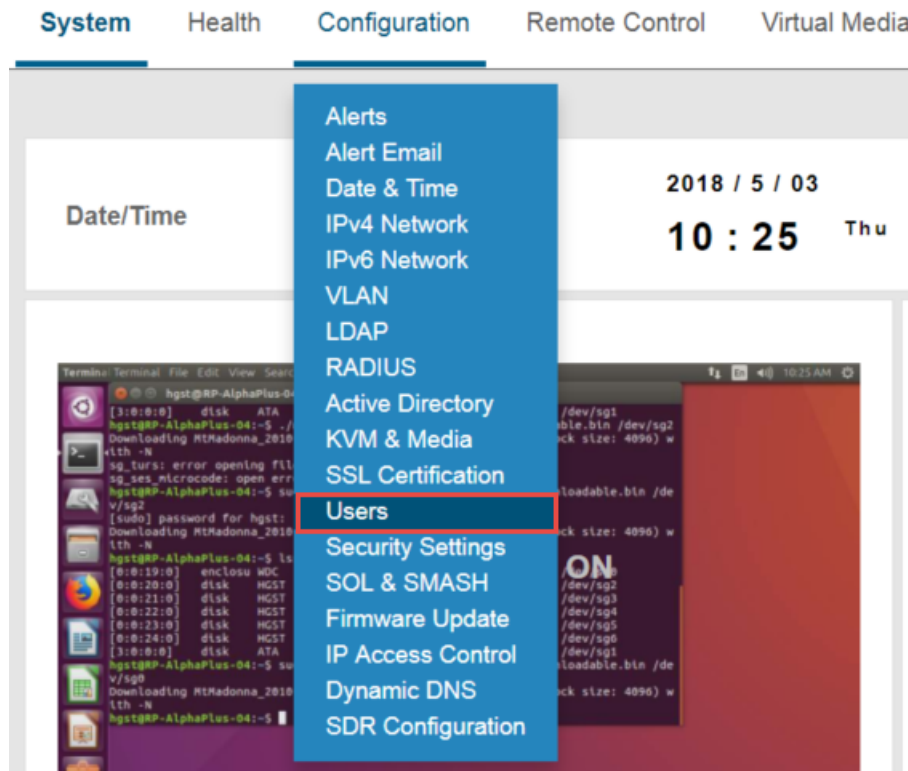
### 5.3.2.6 Deleting a User

**Note:** The user is required to log in with a user that has administrator privileges to deleting a user. For more information on how to log into the BMC Web GUI, see: [Logging into the BMC Web GUI](#) on page 303.

1. From the Menu Bar, select **Configuration > Users**.

The User List window will appear.

**Figure 405: Configuration Menu — Users**



**Figure 406: User List**

User ID	User Name	User Status	Network Privilege
1	anonymous	Disable	No Access
2	root	Enable	Administrator
3	test1	Enable	Administrator
4	admin	Enable	Administrator
5	FirstLast	Enable	User
6	~	~	~

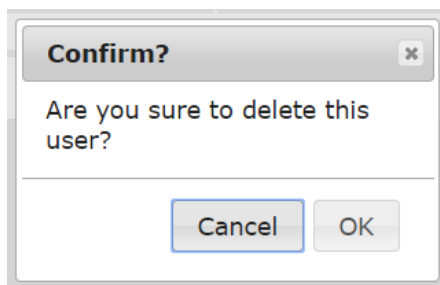
2. Delete a user.
  - a) Select an existing user from the User List and click **Delete User**.

A delete user confirm message will appear.

**Figure 407: Select a User**

User ID	User Name	User Status	Network Privilege
1	anonymous	Disable	No Access
2	root	Enable	Administrator
3	test1	Enable	Administrator
4	admin	Enable	Administrator
5	FirstLast	Enable	User
6	~	~	~

**Figure 408: Delete User?**



- b) Click **OK**.  
A user has been deleted message will appear.

### 5.3.2.7 Ending a User Session

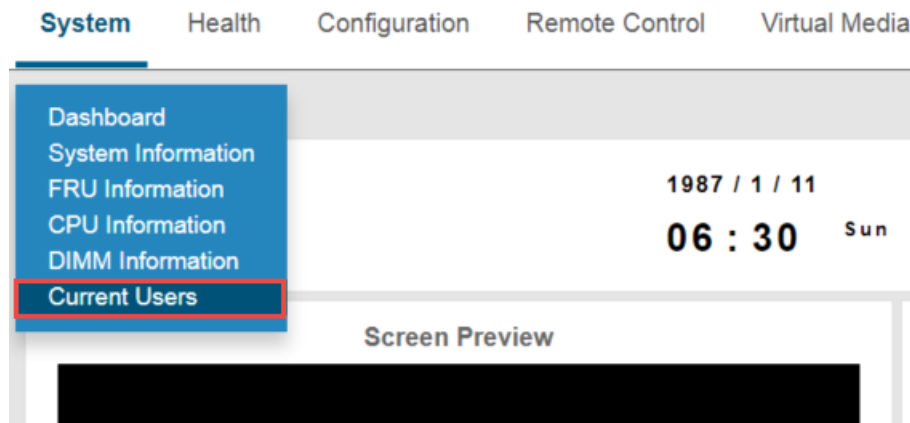
**Note:** The user is required to log in with a user that has administrator privileges to end a user session. For more information on how to log into the BMC Web GUI, see: [Logging into the BMC Web GUI](#) on page 303.

1. From the Menu Bar, select **System > Current Users**.



The Current User window will appear.

**Figure 409: System Menu — Current Users**



**Figure 410: Current User**

User Name	Type	KVM Number	vMedia Number	IP Address	Kill Session
root (me)	Web(HTTPS)	0	0	10.111.106.85	kill me

2. Click **Kill me** next to the user session that needs to be ended. A delete session confirm message will appear.

**Figure 411: Ending a User Session**

User Name	Type	KVM Number	vMedia Number	IP Address	Kill Session
root (me)	Web(HTTPS)	0	0	10.111.106.85	kill me

3. Click **OK** and verify that the user session has been ended. If you are ending the session of the current user, that user will automatically be logged out.

### 5.3.3 Security Features

This section provides information related to the security features for the BMC Web GUI. The Security Settings window contains the IP Blocking, Port Settings, and Optional Network Services sections. Each of the sections default to specific settings, but the settings may be altered, enabled, or disabled to better fit specific needs.

### 5.3.3.1 *Enabling Security Settings*

---

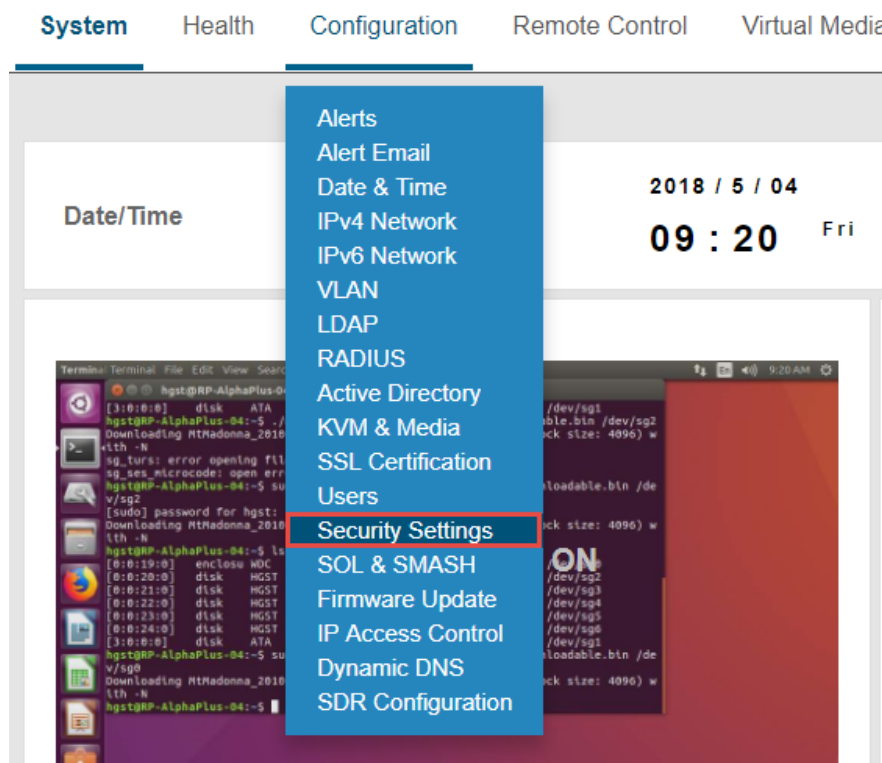
**Note:** The user is required to log in with a user that has administrator privileges to enable security settings. For more information on how to log into the BMC Web GUI, see: [Logging into the BMC Web GUI](#) on page 303.

---

1. From the Menu Bar, select **Configuration > Security Settings**.

The Security Settings window will appear.

**Figure 412: Configuration Menu — Security Settings**



**Figure 413: Security Settings**

**IP Blocking Settings**

- IP Blocking  Enable
- Failed Login Attempts
- Failed Login Attempts Interval Time (sec)
- Remote Client Lockout Time (sec)

**Port Settings**

- HTTPS (Secure) Port

**Optional Network Services**

- SMASH SSH  Enable
- SOL SSH  Enable
- HTTPS  Enable
- IPMI over LAN  Enable

2. The Security settings default to a standard set of settings. If the standard settings are sufficient, exit the Security Settings section. If a new or updated settings are preferred, complete the information as shown in section below:
  - a) Default IP Blocking Settings:

**Figure 414: IP Blocking Settings**

**IP Blocking Settings**

IP Blocking  Enable

Failed Login Attempts

Failed Login Attempts Interval Time (sec)

Remote Client Lockout Time (sec)

- **IP Blocking:** The checkbox is selected by default. Uncheck **Enable** to disable the IP Block Settings.
- **Failed Login Attempts:** The value of **3** failed login attempts set by default. The user has to have three failed attempts before being locked out. On the fourth failed attempt the user will be locked out. Input a different number to change the amount of failed attempts that are aloud before the user is locked out.
- **Failed Login Interval Time (sec):** The value of **20** seconds between failed login attempts is set by default. Input a different number of seconds to change the amount of time between being locked out due to failed login attempts. The number of failed login attempts is defined by the **Failed Login Attempts** field.
- **Remote Client Lockout Time (sec):** The value of **120** seconds of remote client lockout time is set by default. If the user exceeds the number of failed login attempts, it will lock remote access to the BMC Web GUI for the defined amount of time. Input a different number of seconds to change the amount of time between being locked out due to failed login attempts.

- b) Default Port Settings:

**Figure 415: Port Settings**

**Port Settings**

HTTPS (Secure) Port

- **HTTPS (Secure) Port** The port settings are set to a default of **443**. Input a different number to change the specific port that is being connected.

- c) Default Optional Network Services:

**Figure 416: Optional Network Services**

**Optional Network Services**

SMASH SSH  Enable

SOL SSH  Enable

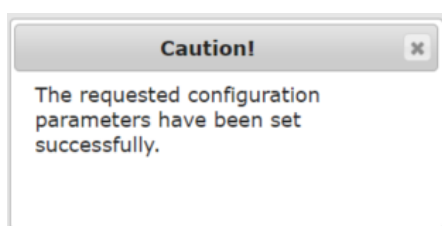
HTTPS  Enable

IPMI over LAN  Enable

- **SMASH SSH:** The checkbox is selected by default. Uncheck **Enable** to disable SMASH SSH.
- **SOL SSH:** The checkbox is not selected by default. Check **Enable** to enable SOL SSH.

- **HTTPS:** The checkbox is selected by default. Uncheck **Enable** to disable secure web browsing.
  - **IPMI over LAN:** The checkbox is selected by default. Uncheck **Enable** to disable IPMI access over LAN.
3. Save the new settings.  
A message notifying that the parameters of the security section have been set will appear.

**Figure 417: Security Settings Set**



### 5.3.4 Network Settings

This section provides information related to the network settings for the BMC Web GUI. The Administrator may enable, disable, or configuring the network settings for the IPv4 Network, IPv6 Network, and VLAN. When changing any settings related to networking, it is important to notify any users of upcoming changes to avoid conflicts. Also, ensure that all hosts that are physically connected to the enclosure are available after the network settings have been changed.

#### 5.3.4.1 Configuring the IPv4 Network Settings

---

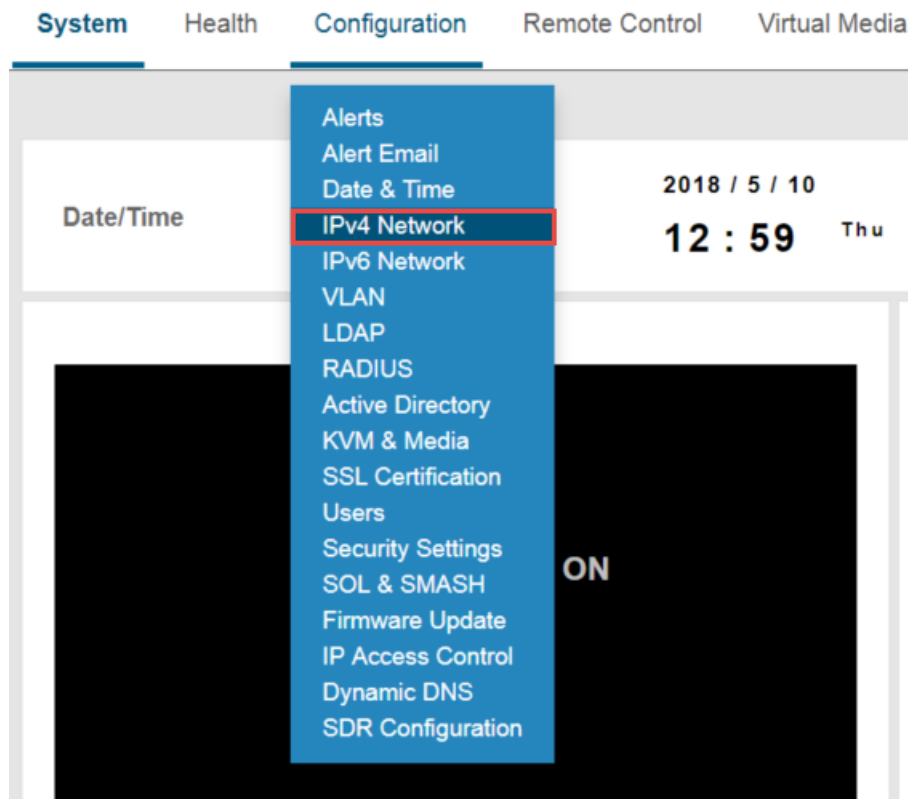
**Note:** The user is required to log in with a user that has Operator privileges or higher to configure IPv4 Network Settings. For more information on how to log into the BMC Web GUI, see: [Logging into the BMC Web GUI](#) on page 303.

---

1. From the Menu Bar, select **Configuration > IPv4 Network**.

The IPv4 Network Settings window will appear.

**Figure 418: Configuration Menu — IPv4 Network**



**Figure 419: IPv4 Network Settings**

Hostname	<input type="text" value="rpxtremebmcstest"/>
Enable LAN Failover	<input type="checkbox"/>
LAN Channel	<input type="text" value="Channel-3"/>
MAC Address	<input type="text" value="a4-bf-01-05-4b-88"/>
NIC Description	<b>Dedicated to BMC</b>
Link Status	<b>UP</b>
<input checked="" type="radio"/> Obtain an IP address automatically (use DHCP) <input type="radio"/> Use the following IP address <input type="radio"/> Disable	
IP Address	<input type="text" value="10.202.238.217"/>
Subnet Mask	<input type="text" value="255.255.252.0"/>
Gateway	<input type="text" value="10.202.236.1"/>
Primary DNS Server	<input type="text" value="10.86.1.1"/>
Secondary DNS Server	<input type="text" value="10.86.2.1"/>
<input type="button" value="Save"/>	

2. Enable and configure the IPv4 Network Settings by completing the following steps:

**Note:** No changes are needed to this section if DHCP is the preferred method. The BMC Web GUI is set to DHCP by default.

**Figure 420: IPv4 Network Settings — Enabled**

Hostname	Hostnumber1
Enable LAN Failover	<input checked="" type="checkbox"/>
LAN Channel	Channel-1
MAC Address	a4-bf-01-05-4f-d6
NIC Description	Shared between Host and BMC
Link Status	UP
<input checked="" type="radio"/> Obtain an IP address automatically (use DHCP) <input type="radio"/> Use the following IP address <input type="radio"/> Disable	
IP Address	10.202.239.250
Subnet Mask	255.255.252.0
Gateway	10.202.236.1
Primary DNS Server	10.86.1.1
Secondary DNS Server	10.86.2.1

Save

- a) **Hostname:** The hostname is autogenerated by default. To change the defaulted hostname, type a new hostname into the field.
- b) **Enable LAN Failover:** The Enable LAN Failover is defaulted to disabled. Select the checkbox to enable this feature.
- c) **LAN Channel:** The LAN Channel option defaults to Channel-3. Choose another option from the drop-down list to change the value.
- d) **MAC Address:** The MAC Address is autogenerated.
- e) **NIC Description:** Defaulted to Dedicated to BMC Web GUI with no option to change the value.
- f) **Link Status:** The Link Status defaults to **Obtain an IP address automatically (use DHCP)**. This configures the IPv4 network settings to use DHCP for the IP Address, Subnet Mask, Gateway, Primary DNS Server, and Secondary DNS Server. The other options allow for the user to choose a specific IP Address or to disable the IPv4 Network altogether.
- g) **IP Address:** The IP Address is obtained by DHCP by default. Select the option **Use the following IP address** to enter a specific IP Address into the field next to IP address.
- h) **Subnet Mask:** The Subnet Mask is obtained by DHCP by default. The **Use the following IP address** option must be selected to input a specific subnet mask.
- i) **Gateway:** The Gateway is obtained by DHCP by default. The **Use the following IP address** option must be selected to input a specific gateway.
- j) **Primary DNS Server:** The Primary DNS Server is obtained by DHCP by default. The **Use the following IP address** option must be selected to input the primary DNS server.
- k) **Secondary DNS Server:** The Secondary DNS Server is obtained by DHCP by default. The **Use the following IP address** option must be selected to input the secondary DNS server.

3. Save the new settings.

A message notifying that the parameters of the IPv4 Network Settings section have been set will appear.

#### 5.3.4.2 *Configuring the IPv6 Network Settings*

---

**Note:** The user is required to log in with a user that has Operator privileges or higher to configure IPv6 Network Settings. For more information on how to log into the BMC Web GUI, see: [Logging into the BMC Web GUI](#) on page 303.

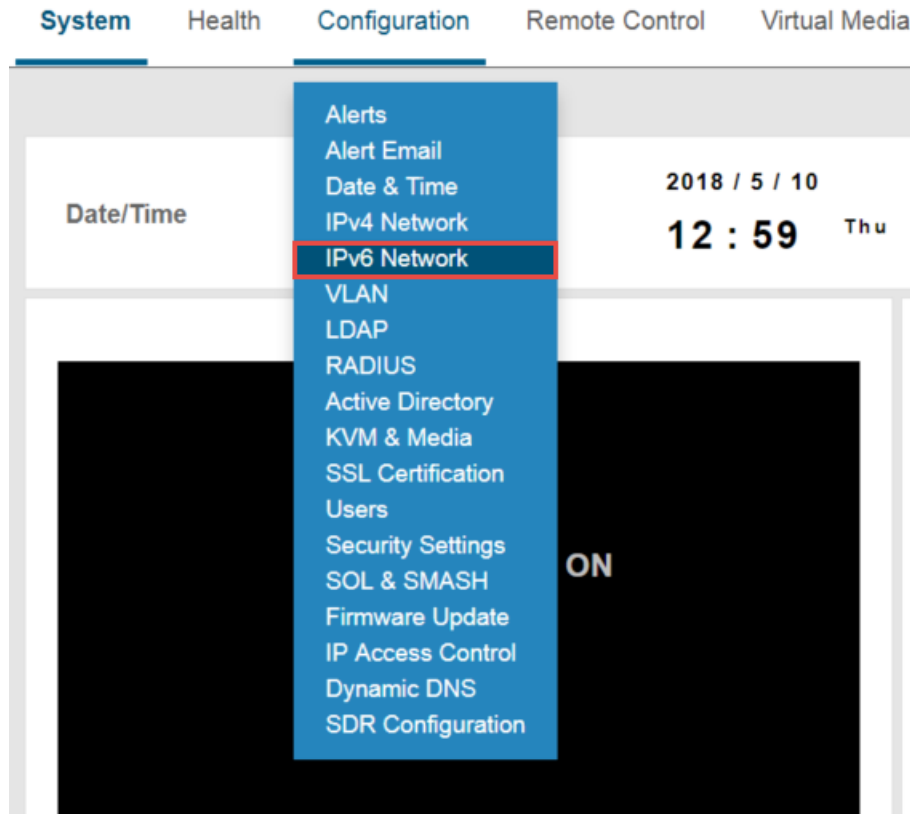
---

1. From the Menu Bar, select **Configuration > IPv6 Network**.

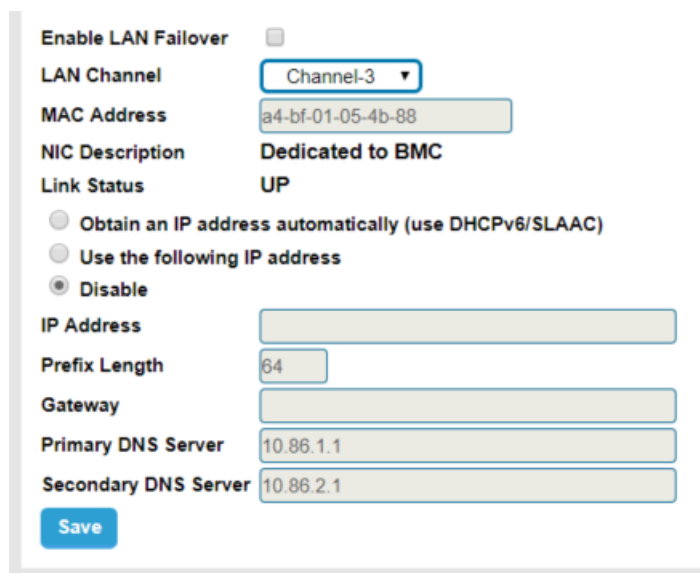


The IPv6 Network Settings window will appear.

**Figure 421: Configuration Menu — IPv6 Network**



**Figure 422: IPv6 Network Settings**



2. Enable and configure the IPv6 Network Settings by completing the following steps:

**Figure 423: IPv6 Network Settings — Enabled**

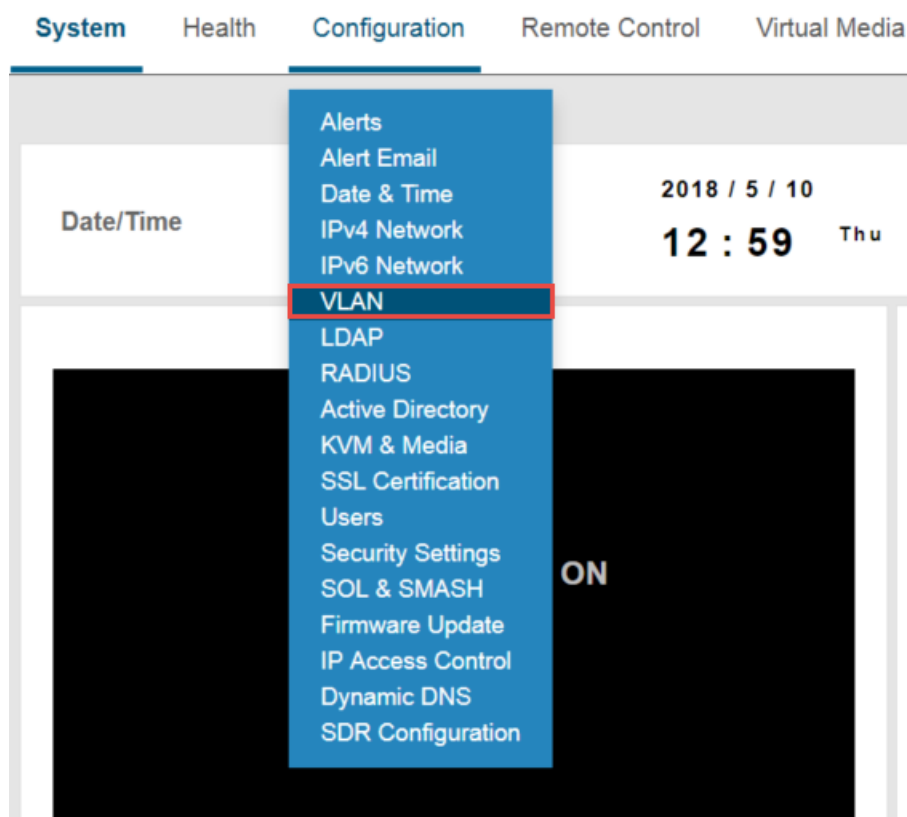
- Enable LAN Failover:** The Enable LAN Failover is defaulted to disabled. Select the checkbox to enable this feature.
  - LAN Channel:** The LAN Channel option defaults to Channel-3. Choose another option from the drop-down list to change the value.
  - MAC Address:** The MAC Address is autogenerated.
  - NIC Description:** Defaulted to Dedicated to BMC Web GUI with no option to change the value.
  - Link Status:** The Link Status defaults to **Disable**. This configures the IPv6 network settings to disabled. Select another option to enable the link status. The user may select the option to enable DHCP or to use a specific IP Address.
  - IP Address:** The IP Address is uneditable by default. Select the option **Use the following IP address** to enter a specific IP Address into the field next to IP address.
  - Prefix Length:** The IPv6 Prefix Length is uneditable by default. Select the option **Use the following IP address** to enter a specific Prefix Length into the field.
- 
- Note:** The Prefix Length is used to identify how many bits of a Global Unicast IPv6 Address are available in the network.
- 
- Gateway:** The Gateway is uneditable by default. The **Use the following IP address** option must be selected to input a specific gateway.
  - Primary DNS Server:** The Primary DNS Server is uneditable by default. The **Use the following IP address** option must be selected to input the primary DNS server.
  - Secondary DNS Server:** The Secondary DNS Server is uneditable by default. The **Use the following IP address** option must be selected to input the secondary DNS server.
3. Save the new settings.  
A message notifying that the parameters of the IPv6 Network Settings section have been set will appear.

### 5.3.4.3 Configuring VLAN Settings

**Note:** The user is required to log in with a user that has Operator privileges or higher to configure VLAN Settings. For more information on how to log into the BMC Web GUI, see: [Logging into the BMC Web GUI](#) on page 303.

1. From the Menu Bar, select **Configuration > VLAN**.  
The VLAN Settings window will appear.

**Figure 424: Configuration Menu — VLAN**



**Figure 425: VLAN Settings**

LAN Channel

Enable VLAN

VLAN ID

VLAN Priority

2. Enable and configure the VLAN settings by completing the following steps:

**Figure 426: VLAN Settings — Enabled**

- a) **LAN Channel:** The LAN Channel option defaults to Channel-3. Choose another option from the drop-down list to change the value.
  - b) **Enable VLAN:** The VLAN option defaults to disabled. The checkbox must be selected to enable VLAN.
  - c) **VLAN ID:** The VLAN ID defaults to a value of 0. When the VLAN is enabled an ID of 1 to 4094 must be chosen.
  - d) **VLAN Priority:** The VLAN Priority defaults to a value of 0 (zero). When the VLAN is enabled a priority of 1 (lowest priority) to 7 (highest priority) must be chosen.
3. Save the new settings.  
A message notifying that the parameters of the VLAN Settings section have been set will appear.

### 5.3.5 BMC Web GUI Firmware

This section provides information related to updating BMC Web GUI firmware. The firmware update can be acquired from HGST support. For more information on how to get the latest version of firmware, see: [Downloading Firmware from the Support Portal](#) on page 277. When updating firmware, it is important to notify any users of upcoming changes to avoid conflicts. Also, ensure that all hosts that are physically connected to the enclosure are available after the firmware update has been completed.

#### 5.3.5.1 Updating BMC Web GUI Firmware

---

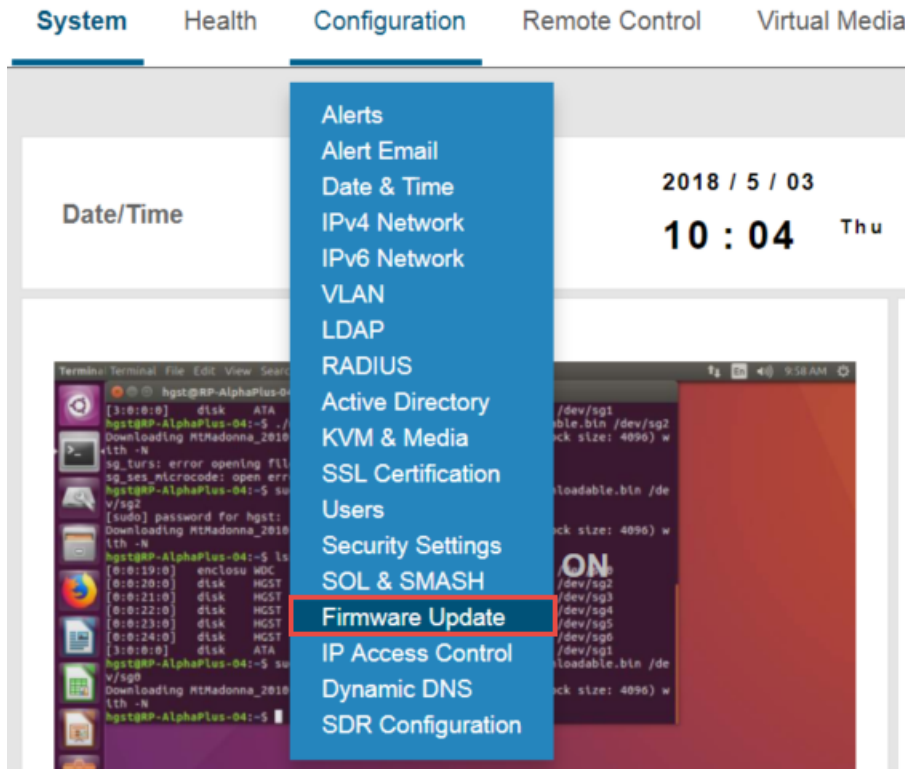
**Note:** The user is required to log in with a user that has administrator privileges to configure IPv4 Network Settings. For more information on how to log into the BMC Web GUI, see: [Logging into the BMC Web GUI](#) on page 303.

---

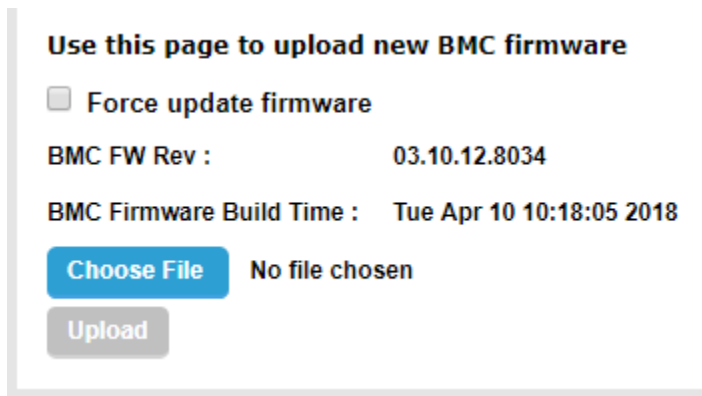
1. The latest versions on firmware must be downloaded for the HGST Support site to update the BMC Web GUI firmware. For instructions on how to download the latest version of firmware, see: [Downloading Firmware from the Support Portal](#) on page 277.
2. From the Menu Bar, select **Configuration > Firmware Update**.

The Firmware Update screen will appear.

**Figure 427: Firmware Upgrade Menu**

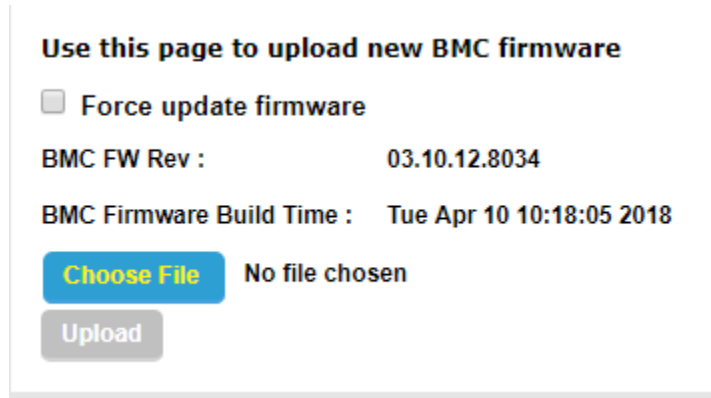


**Figure 428: Firmware Update Screen**



3. Click **Choose File** in the BMC Firmware Update section.

**Figure 429: Choose File**



**Use this page to upload new BMC firmware**

Force update firmware

BMC FW Rev : 03.10.12.8034

BMC Firmware Build Time : Tue Apr 10 10:18:05 2018

**Choose File** No file chosen

Upload

4. Navigate to the latest version of firmware that was downloaded from the HGST Support site.
5. Select the BMC .bin file that lists the update with the 2Fan - 2CPU option.
6. Click **Upload** in the BMC Firmware Update section.

The firmware update begins to upload to the BMC.

**Figure 430: Upload**

**Use this page to upload new BMC firmware**

Force update firmware

BMC FW Rev : 03.10.12.8034

BMC Firmware Build Time : Tue Apr 10 10:18:05 2018

**Choose File** RubyPeak-2Fan-2Cpu-si-BMC\_FW-Update.bin

**Upload**

**Figure 431: Upload Progress**

**Use this page to upload new BMC firmware**

Force update firmware

BMC FW Rev : 03.10.12.8034

BMC Firmware Build Time : Tue Apr 10 10:18:05 2018

**Upload firmware : Done.**

**Authenticate firmware : Done.**

**Program firmware : 91%**

**Reboot BMC : Pending...**

**Note:** This could take a few minutes to complete.

7. The BMC will lose connection and the session will expire during the reboot. The BMC must reboot to complete the update.
8. Log back into the BMC Web GUI.
9. From the Menu Bar, select **Configuration > Firmware Update**.

The Firmware Update screen will appear.

Figure 432: Firmware Upgrade Menu

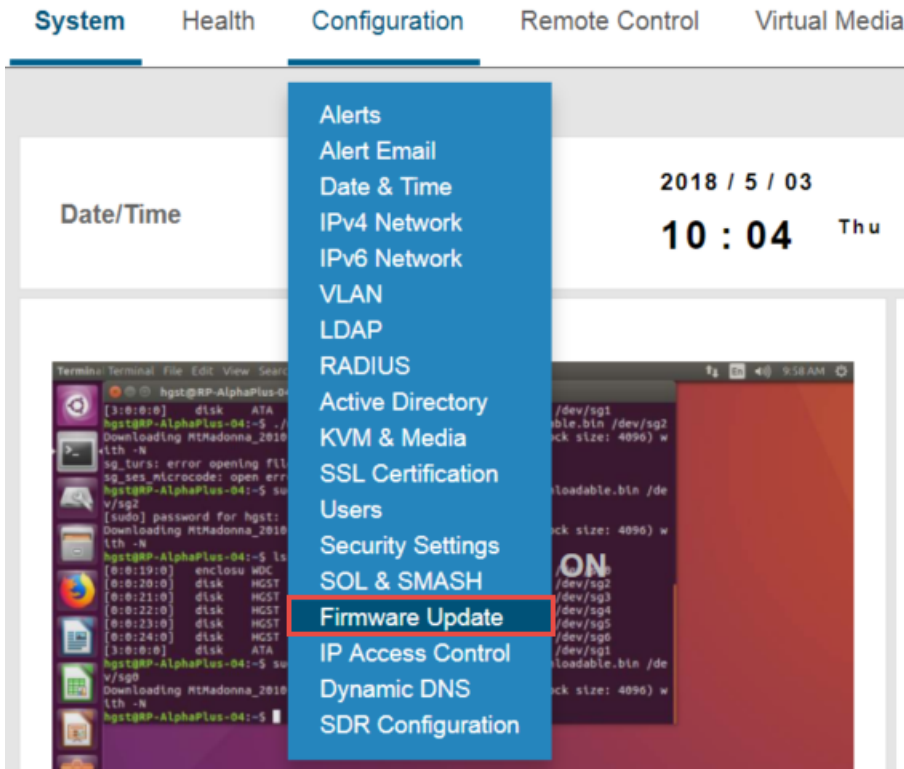
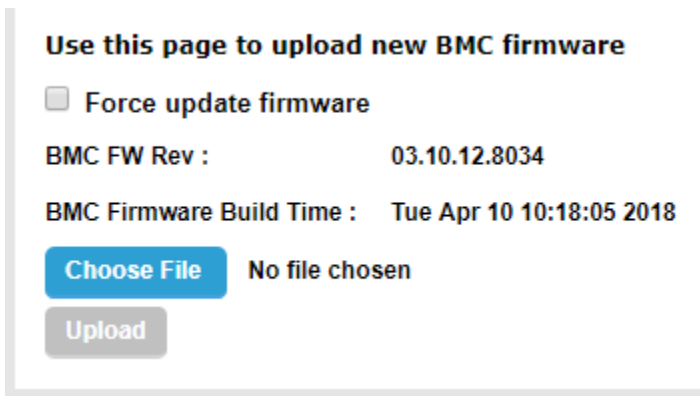


Figure 433: Firmware Update Screen





10. Verify the firmware version has changed to the version that was downloaded from the HGST Support site.

**Figure 434: Firmware Update Screen—Updated**

**Use this page to upload new BMC firmware**

Force update firmware

Restore to default

BMC FW Rev : **03.15.15.8036**

BMC Firmware Build Time : Tue Apr 24 07:12:54 2018

**Choose File** No file chosen

Upload

### 5.3.5.2 Updating the Server BMC Firmware Using Redfish OOBM

1. Download the firmware package from the support portal. Follow the instructions outlined in [Downloading Firmware from the Support Portal](#) on page 277.
2. Determine which .bin file is required based on the system configuration being upgraded. There are two .bin files in the firmware package that can be used to upgrade the BMC firmware. One is for systems with a single CPU, and one is for systems with two CPUs. The following examples show what to look for in the file names. Look for the number of CPUs listed in the file name (bolded).

```
RubyPeak-2Fan-1Cpu-si-BMC_FW-Update.bin
```

```
RubyPeak-2Fan-2Cpu-si-BMC_FW-Update.bin
```

3. Once the update file is chosen, place the update file on a server or fileshare that is accessible to the Ultrastar Serv60+8. The Ultrastar Serv60+8 can access servers or fileshares that use the following communications protocols:
  - HTTP
  - HTTPS
  - FTP
  - TFTP
4. Make a POST command to the BMC to start the upgrade process.
  - a) The following is a list of information needed to construct a proper POST to the BMC for upgrade:
    - The URI of the location of the BMC update .bin file.
    - The IP address of the BMC being upgraded.
    - A software client program capable of making RESTful commands to the BMC, e.g. Postman or CURL

- b) The following example command uses CURL to make send the update command, and that is followed by a breakdown of the command's structure:

```
curl -k -u USERNAME:PASSWORD -X POST -i -H Content-Type:application/json
-d '{"ImageURI" : \"http://FILESERVER/RubyPeak-2Fan-2Cpu-si-BMC_FW-Update.bin\",
  \"Targets\" : [\"/redfish/v1/UpdateService/SoftwareInventory/BMC\"]}'
https://BMC IP Address/redfish/v1/UpdateService/Actions/UpdateService.SimpleUpdate
```

The structure of the POST command can be broken down into three components: the base command with required headers, the data object containing the address to the firmware update image, and the Redfish API target that will execute the command.

The base command and headers can be broken down as follows:

- The **-k** modifier allows a connection to an unsecured server and can be omitted if the user prefers to store the BMC firmware package on an SSL enabled server.
- The **-u** modifier enables the Basic Auth requirement and is followed by the **USERNAME:PASSWORD** of the account activating the upgrade.

---

**Note:** The upgrade must come from an account the appropriate roles and permissions to modify firmware code.

---

- **-X POST** specifies the type of REST command being entered. POST is required for firmware upgrades.
- **-i** specifies that the HTTP response headers should be included in the response output.
- **-H** specifies a header to be sent with the response body. In this example the Content-Type header is set to **application/json** to let the BMC know to expect a JSON formatted request body.

The data object contains a JSON formatted request body that sets the address of the .bin image on the host that stores it, and a "Target" that specifies which item in the Software Inventory object to update. In this case that is set to the BMC.

The final component is the base target that initiates the SimpleUpdate action in the update service.

5. The BMC will commit the update and the response should looking something like the following:

```
HTTP/1.1 303 See Other
Location: /redfish/v1/TaskMonit/deb1fde1-db8c-44c2-bba6-95d83f2c9e79
Content-Type: application/json
OData-Version: 4.0
Cache-Control: no-cache
Access-Control-Allow-Origin: *
Strict-Transport-Security: max-age=31536000; includeSubdomains; preload
X-UA-Compatible: IE=11
X-Frame-Options: SAMEORIGIN
X-XSS-Protection: 1; mode=block
Content-Length: 154
Date: Fri, 30 Nov 2018 17:16:24 GMT
Server: lighttpd/1.4.48

{"@odata.type": "#Message.v1_0_5.Message", "MessageId": "Base.1.1.0.Success", "Message": "Successfully Completed Request", "Severity": "OK", "Resolution": "None"}
```

Notice that the response body returns all of the HTTP headers because the **-i** modifier was set. This is followed by a JSON formatted response body listing the status of the update and whether it was successful.

### 5.3.6 Event Logs

This section provides information related to the BMC Web GUI Event Logs. The Event Log displays all of system event logs that are captured by the BMC.

The Event Log window uses event log category and severity category filters to limit the number of results to easily locate specific logs. The event log results will be displayed in the Event Log table based on the selections from these fields.

**Figure 435: Event Log**

The screenshot shows the Event Log interface. At the top, there is a header 'Event Log'. Below the header, there are several filters and controls:

- 1. Event Log Category:** A dropdown menu labeled 'Select an event log category:' with 'All Events' selected.
- 2. Severity Category:** A section with checkboxes for 'Informational', 'Warning', and 'Critical'. Below the checkboxes, it says 'This page has 50 event entries'.
- 3. Entries Selector:** A dropdown menu labeled 'Number of entries per page' with '50' selected. It also includes navigation arrows and '1 / 80'.
- 4. Event Log Table:** A table with the following columns: Event ID, Time Stamp, Sensor Name, Controller, Severity, Sensor Type, and Description. The table contains 15 rows of event log entries.

A warning message is displayed above the table: 'Warning: SEL is at capacity. New events are now over-writing old events.'

Event ID	Time Stamp	Sensor Name	Controller	Severity	Sensor Type	Description
36	Thu Jan 8 12:57:23 1987	BIOS Evt Sensor	BIOS	Informational	System Event	OEM System Boot Event - Asserted
35	Thu Jan 8 12:55:58 1987	AutoCfg Status	BMC	Informational	Management Subsystem Health	State Asserted - Parse error - Asserted
34	Thu Jan 8 12:55:39 1987	#01	BMC	Informational	Power Unit	Power Off / Power Down - Deasserted
33	Thu Jan 8 12:55:34 1987	#01	BMC	Informational	Power Unit	Power Off / Power Down - Asserted
32	Thu Jan 8 12:54:14 1987	BIOS Evt Sensor	BIOS	Informational	System Event	OEM System Boot Event - Asserted
31	Wed Jan 7 18:45:08 1987	BIOS Evt Sensor	BIOS	Informational	System Event	OEM System Boot Event - Asserted
30	Wed Jan 7 18:19:44 1987	BIOS Evt Sensor	BIOS	Informational	System Event	OEM System Boot Event - Asserted
29	Wed Jan 7 18:18:17 1987	AutoCfg Status	BMC	Informational	Management Subsystem Health	State Asserted - Parse error - Asserted
28	Wed Jan 7 18:18:00 1987	#01	BMC	Informational	Power Unit	Power Off / Power Down - Deasserted
27	Wed Jan 7 18:17:55 1987	#01	BMC	Informational	Power Unit	Power Off / Power Down - Asserted
26	Wed Jan 7 17:57:59 1987	BIOS Evt Sensor	BIOS	Informational	System Event	OEM System Boot Event - Asserted
25	Wed Jan 7 17:33:50 1987	BIOS Evt Sensor	BIOS	Informational	System Event	OEM System Boot Event - Asserted

- 1. Event Log Category:** The Event Log Category drop-down list contains the option to filter by Sensor-specific events, BIOS Generated Events, System Management Software Events or the All Events options can be selected to display all event logs.
- 2. Severity Category:** The Severity Category options allow the user to filter based on the severity of the warning. The severity can be filtered based on the event log being informational, an enclosure warning or a critical issue. One or more options may be selected. If no options are selected the severity category will not be applied and the table will display all severity categories.
- 3. Entries Selector:** The Entries Selector drop-down list allows the user to select the amount of Event Logs that are displayed in the table.
- 4. Event Log Table:** The Event Log table is populated with the Event Logs that are available at the time of loading. The window must be refreshed to get any event logs that may have occurred since the page was loaded.

**Note:** Live warnings will sometimes be displayed just above the Event Log table.

**Warning: SEL is at capacity. New events are now over-writing old events.**

Event ID	Time Stamp	Sensor Name	Controller
36	Thu Jan 8 12:57:23 1987	BIOS Evt Sensor	BIOS
35	Thu Jan 8 12:55:58 1987	AutoCfg Status	BMC
34	Thu Jan 8 12:55:39 1987	#01	BMC
33	Thu Jan 8 12:55:34 1987	#01	BMC

**Figure 436: Event Log Buttons**



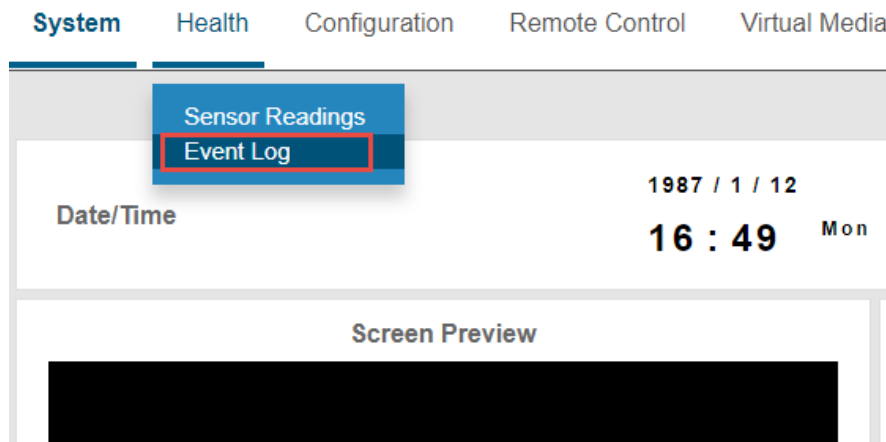
- 1. Clear Event Log:** When clicked, the Clear Event Log button clears the results that currently appear in the Event Log.
- 2. Save Event Log:** When clicked, the Save Event Log button saves the event log as a zip file containing one in hex and one in plain text Event Log report.
- 3. Refresh Event Log:** When clicked, the Refresh Event Log button refreshed the events that appear in the table. This action searches for latest logs that may not have been added to the table yet and adds them.

#### 5.3.6.1 Viewing Event Logs

1. From the Menu Bar, select **Health > Event Log**.

The Event Log screen will appear.

**Figure 437: Event Log Menu**



**Figure 438: Event Log Window**

Select an event log category:

Severity category:  
 Informational  Warning  Critical  
 This page has 50 event entries

Number of entries per page: 50 << < 1 / 6 > >> Total Event Log: 291

Event ID	Time Stamp	Sensor Name	Controller	Severity	Sensor Type	Description
291	Mon Jan 26 14:10:53 1987	Expander Temp	BMC	Informational	Temperature	Upper Non-critical - going high - Deasserted
290	Mon Jan 26 11:45:45 1987	Expander Temp	BMC	Warning	Temperature	Upper Non-critical - going high - Asserted
289	Sun Jan 25 20:03:06 1987	Expander Temp	BMC	Informational	Temperature	Upper Non-critical - going high - Deasserted
288	Sun Jan 25 13:37:06 1987	Expander Temp	BMC	Warning	Temperature	Upper Non-critical - going high - Asserted

2. Complete the following actions to view event logs:

**Figure 439: Event Log Filters**

Select an event log category:

Severity category:  
 Informational  Warning  Critical  
 This page has 50 event entries

- a) Select an event log category: choose an event
- b) Severity category: Select the severity of the event type

The events will populate in the table based on the selected category values.

**Figure 440: Event Log Results**

Select an event log category:

Severity category:  
 Informational  Warning  Critical  
 This page has 50 event entries

**Warning: SEL is at capacity. New events are now over-writing old events.**

Event ID	Time Stamp	Sensor Name	Controller	Severity
10	Mon Jan 5 11:48:59 1987	FAN ENCL 6	BMC	Warning
8	Mon Jan 5 11:48:59 1987	FAN ENCL 5	BMC	Warning
2	Mon Jan 5 11:48:50 1987	BB +3.3V Vbat	BMC	Warning
1	Mon Jan 5 11:48:50 1987	#50	BMC	Warning

- Do the following to change how the events are displayed within the table:

**Figure 441: Event Log Entries Selector**

Number of entries per page  << < 1 / 12 > >>

- Change the Number of entries per page by selecting a value from the drop-down list.
- Navigate through even pages by clicking the forward button. The fast forward button skips to the last page of results.

The events will populate in the table based on the selected category values and based on the selected number of entries.

**Figure 442: Event Log Results — Entries**

Number of entries per page  << < 1 / 6 > >>

Severity	Sensor Type	Description
Warning	Fan	Lower Non-critical - going low - Asserted
Warning	Fan	Lower Non-critical - going low - Asserted

- Refresh the event log by clicking the Refresh Event Log button.  
The Event Log table will refresh and cycle through the results. This action may be used at any time that different values are applied to the event logs.
- Save the Event Log.
  - Save the even log by clicking the **Save Event Log** button.  
The Event Log will be saved as a .zip file.
  - Open the .zip file by double-clicking the file and selecting how to open the file.
  - Extract the file to the desktop.

**Note:** The event logs will be saved in a hex file and a text file. The text file provides detailed results related to the events that have occurred on the enclosure within the constraints of the search.

---

## 6. Clear the Event Log.

**Note:** This will clear all of the events that are reported in the current table. If this is not the preferred result, skip this step.

---

- a) The Event Logs can be cleared by clicking the **Clear Event Log** button once the Event Log files have been generated.
- b) Click **OK** when the clear events log confirmation appears.  
The event logs will be cleared from the table.

## 5.4 Partially Populated Enclosures

### 5.4.1 Partial Population Configurations

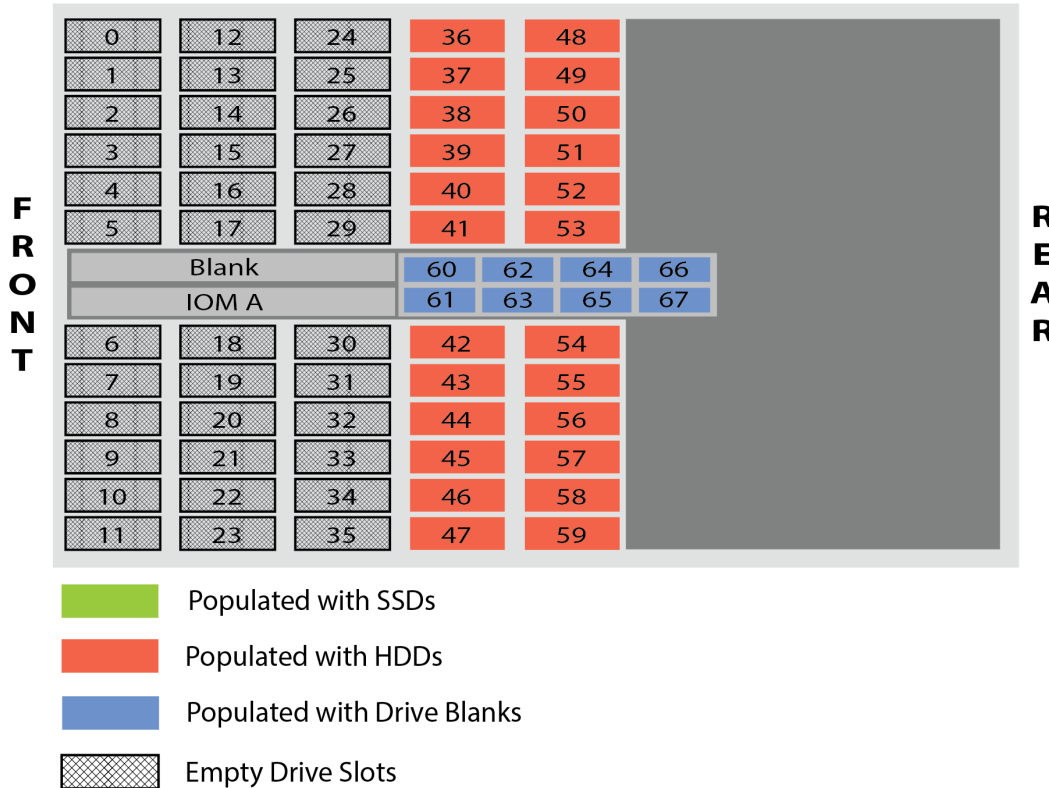
The Ultrastar Serv60+8 supports partially populated configurations that allow a user to increase the size of storage based on their needs. There are specific requirements that must be followed to ensure that the enclosure functions properly during operation. Partial population configurations that do not comply with the requirements listed in this section may result in enclosure performance issues. The following section details the requirements for HDD and HDD/SSD based configurations.

#### Minimum HDD Partial Population

The enclosure supports a minimum of 24 SAS or SATA HDDs for a partially populated enclosure. The center SSD channel supports a minimum configuration of no SSDs with a maximum of eight SSDs. The SSDs must be populated from the drive slots closest to the rear of the enclosure first, starting with drive slot 67 and work backward. The remaining unpopulated center channel drive slots must be populated with drive blanks until the center channel is full. The enclosure does not support a mix of SAS and SATA drives. The enclosure must be populated starting with the drives closest to the rear of the enclosure and work towards the front of the enclosure. If more drives are installed into the enclosure, any unfinished rows must be completed with drive

blanks. The image below details the minimum required configuration for an HDD only drive bay and minimum SSD center channel configuration.

**Figure 443: Minimum HDD Partial Population**



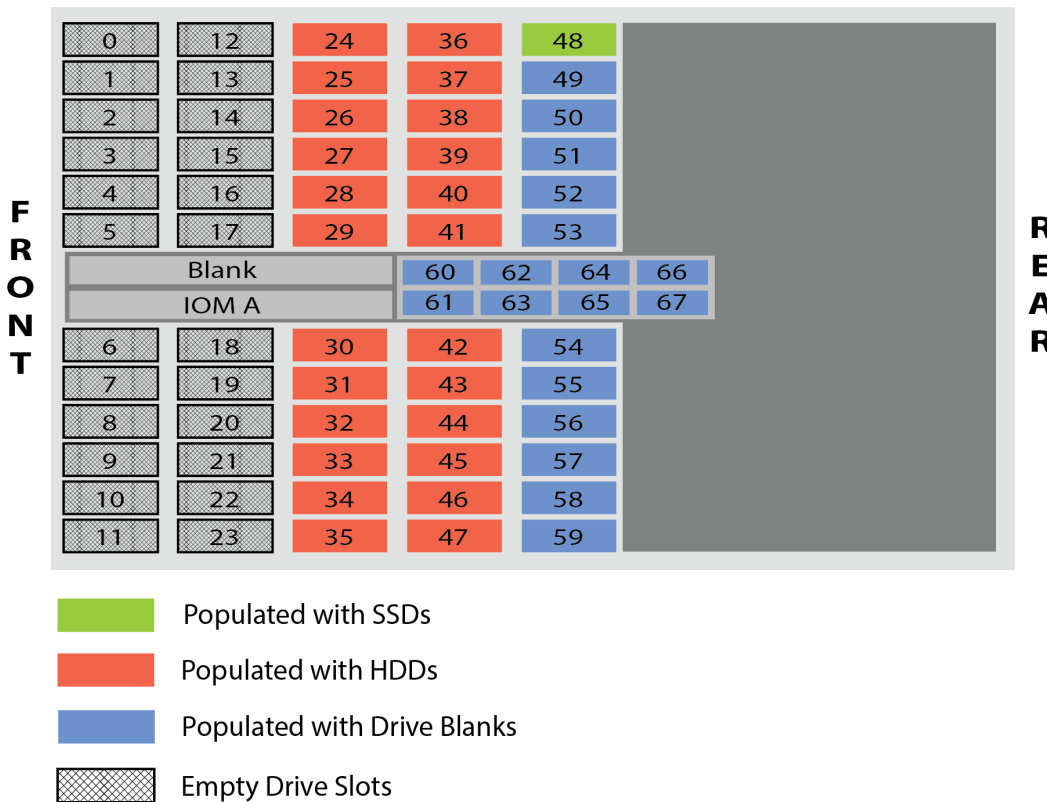
**Minimum HDD and Minimum SSD Partial Population:**

The enclosure supports a minimum of 24 HDDs and one SSD in the drive bay and a configuration of no SSDs in the center channel for a partially populated enclosure. The enclosure can support a minimum of one SSD with the remaining drive slots within that row being completed with drive blanks. The center SSD channel supports a minimum of no SSDs with a maximum of eight SSDs. The SSDs must be populated from the drive slots closest to the rear IO first, starting with drive slot 67 and work backward. The remaining unpopulated center channel drive slots must be populated with drive blanks until the center channel is full. The enclosure does not support a mix of SAS and SATA drives. The image below details the minimum required configuration for an HDD and SSD with the minimum SSD center channel configuration.



**Note:** When installing SSDs for this configuration, the preinstalled HDDs will have to be moved one entire row to the next vacant row near the front of the enclosure.

**Figure 444: Minimum HDD and Minimum SSD Partial Population**



**Minimum HDD and Maximum SSD Partial Population:**

The enclosure supports a minimum of 24 HDDs and one SSD in the drive bay and a configuration of no SSDs in the center channel for a partially populated enclosure. The enclosure can support a maximum of up to 24 total SSDs in this configuration. The center SSD channel supports a minimum configuration of no SSDs with a maximum of eight SSDs. The center channel SSDs must be populated from the drive slots closest to the rear IO first, starting with drive slot 67 and work backward. The remaining unpopulated center channel drive slots must be populated with drive blanks until the center channel is full. The enclosure does not support a mix of SAS and SATA drives. The image below details the required configuration for minimum HDD and maximum SSD with the minimum SSD center channel configuration.

**Note:** When installing SSDs for this configuration, the preinstalled HDDs will have to be moved two entire rows to the next vacant pair of rows near the front of the enclosure.

**Figure 445: Minimum HDD and Maximum SSD Partial Population**

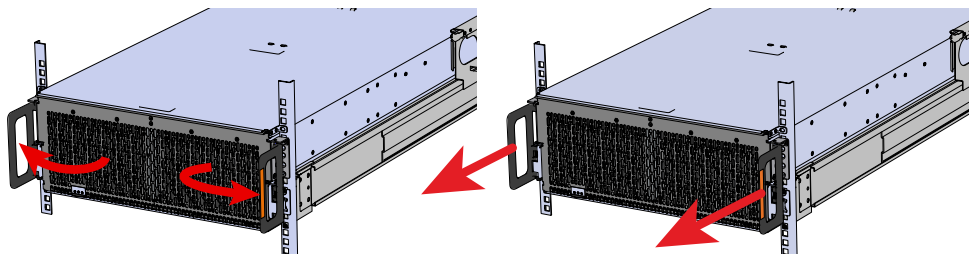


### 5.4.2 Installing Drives

This section provides steps on how to install drives into the enclosure. The enclosure is shipped with a minimum of 24 HDDs and may require HDDs to be moved to other drives slots if SSDs are being installed. Before beginning the process of adding drives, refer to the [Partial Population Configurations](#) on page 335 section to determine what configuration will be used and what is required of that configuration.

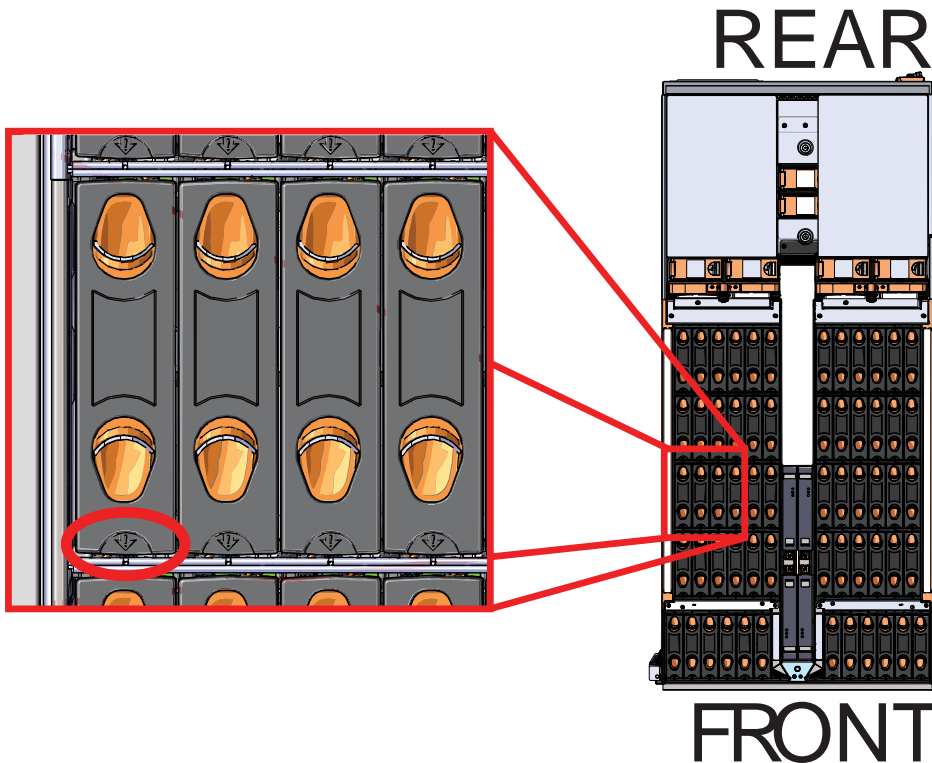
1. Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

**Figure 446: Chassis Handle Operation**



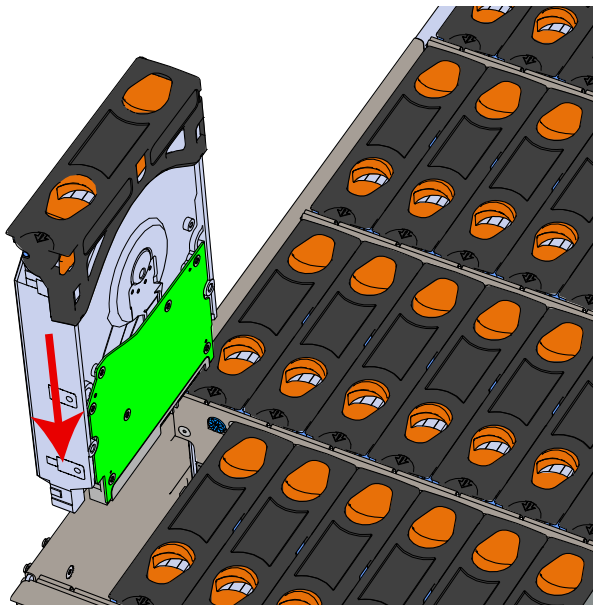
2. Locate the area that the new drives will be installed into. When adding SSDs, the drives slots may already contain a drive. The drive will have to be removed and relocated before installing the HDD.
3. Follow the requirements for partial populations listed in [Partial Population Configurations](#) on page 335.
4. Install the Drive Assembly.
  - a) Ensure that the enclosure has been pulled out of the rack until the rail latches engage.
  - b) Find the LED pointer on the top of the drive carrier. This pointer should point toward the front of the unit as shown in the following image.

**Figure 447: LED Pointer Orientation**



- c) Align the drive with the empty slot that will receive it. Lower it into the slot, making sure it stays level and does not snag.

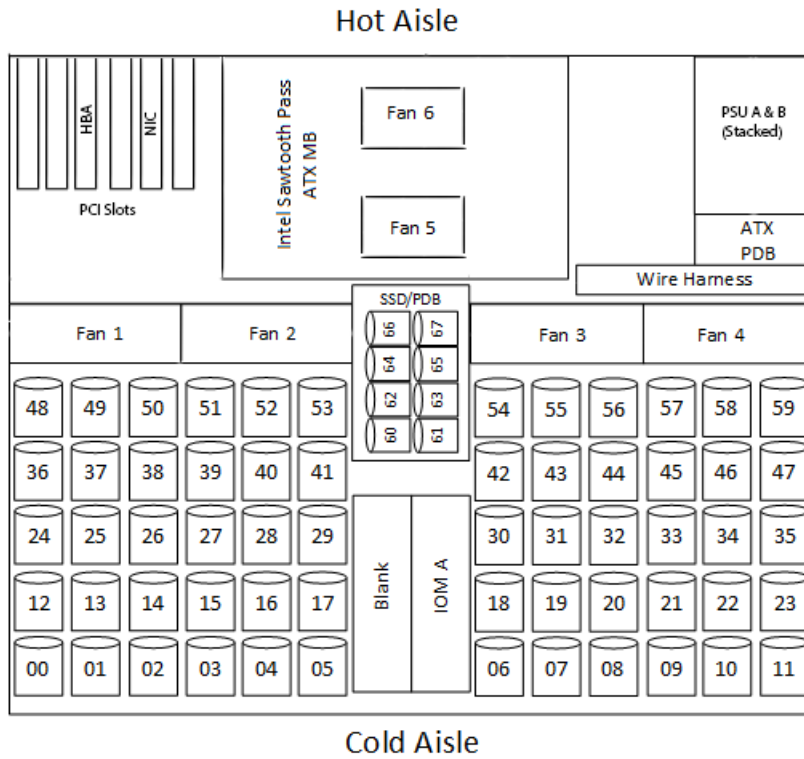
**Figure 448: Installing a Drive Assembly**



- d) Pinch the latch release and carefully press downward to seat the Drive Assembly the rest of the way.

5. Install each drive in the same way the first was installed. Make sure to follow the drive layout shown in the following image.

**Figure 449: Drive Layout**



6. Push the enclosure back into the rack to ensure proper cooling.

## 6 Safety

The following chapter provides safety and regulatory information for the Ultrastar Serv60+8.

### 6.1 Electrostatic Discharge



Electrostatic discharge can harm delicate components inside HGST products.

Electrostatic discharge (ESD) is a discharge of stored static electricity that can damage equipment and impair electrical circuitry. It occurs when electronic components are improperly handled and can result in complete or intermittent failures.

Wear an ESD wrist strap for installation, service and maintenance to prevent damage to components in the product. Ensure the antistatic wrist strap is attached to a chassis ground (any unpainted metal surface). If possible, keep one hand on the frame when you install or remove an ESD-sensitive part.

Before moving ESD-sensitive parts place them in ESD static-protective bags until you are ready to install the part.

### 6.2 Optimizing Location

Failure to recognize the importance of optimally locating your product and failure to protect against electrostatic discharge (ESD) when handling your product can result in lowered system performance or system failure.

Do not position the unit in an environment that has extreme high temperatures or extreme low temperatures. Be aware of the proximity of the unit to heaters, radiators, and air conditioners.

Position the unit so that there is adequate space around it for proper cooling and ventilation. Consult the product documentation for spacing information.

Keep the unit away from direct strong magnetic fields, excessive dust, and electronic/electrical equipment that generate electrical noise.

### 6.3 Power Connections

Be aware of the ampere limit on any power supply or extension cables being used. The total ampere rating being pulled on a circuit by all devices combined should not exceed 80% of the maximum limit for the circuit.

**CAUTION** The power outlet must be easily accessible close to the unit.



Always use properly grounded, unmodified electrical outlets and cables. Ensure all outlets and cables are rated to supply the proper voltage and current.



This unit has more than one power supply connection; both power cords must be removed from the power supplies to completely remove power from the unit. There is no switch or other disconnect device.

## 6.4 Power Cords



Use only tested and approved power cords to connect to properly grounded power outlets or insulated sockets of the rack's internal power supply.

If an AC power cord was not provided with your product, purchase one that is approved for use in your country or region.

**CAUTION** To avoid electrical shock or fire, check the power cord(s) that will be used with the product as follows:

- The power cord must have an electrical rating that is greater than that of the electrical current rating marked on the product.
- Do not attempt to modify or use the AC power cord(s) if they are not the exact type required to fit into the grounded electrical outlets.
- The power supply cord(s) must be plugged into socket-outlet(s) that is / are provided with a suitable earth ground.
- The power supply cord(s) is / are the main disconnect device to AC power. The socket outlet(s) must be near the equipment and readily accessible for disconnection.

## 6.5 Rackmountable Systems

### CAUTION

**Always install rack rails and storage enclosure according to Ultrastar Serv60+8 product documentation. Follow all cautions, warnings, labels, and instructions provided within the rackmount instructions.**

Reliable grounding of rack-mounted equipment should be maintained.

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

Observe the maximum rated ambient temperature, which is specified in the product documentation.

**For safe operation of the equipment, installation of the equipment in a rack should be such that the amount of air flow is not impeded so that the safe operation of the equipment is not compromised.**

## 6.6 Safety and Service



All maintenance and service actions appropriate to the end-users are described in the product documentation. All other servicing should be referred to an HGST-authorized service technician.



To avoid shock hazard, turn off power to the unit by unplugging both power cords before servicing the unit. Use extreme caution around the chassis because potentially harmful voltages are present.



When replacing a hot-plug power supply, unplug the power cord to the power supply being replaced before removing it from the Ultrastar Serv60+8.



The power supply in this product contains no user-serviceable parts. Do not open the power supply. Hazardous voltage, current and energy levels are present inside the power supply. Return to manufacturer for servicing.



Use caution when accessing part of the product that are labeled as potential shock hazards, hazardous access to moving parts such as fan blades or caution labels.

## 6.7 Safety Warnings and Cautions

To avoid personal injury or property damage, before you begin installing the product, read, observe, and adhere to all of the following safety instructions and information. The following safety symbols may be used throughout the documentation and may be marked on the product and/or the product packaging.

**CAUTION** Indicates the presence of a hazard that may cause minor personal injury or property damage if the CAUTION is ignored.

**WARNING** Indicates the presence of a hazard that may result in serious personal injury if the WARNING is ignored.



Indicates potential hazard if indicated information is ignored.



Indicates shock hazards that result in serious injury or death if safety instructions are not followed.



Indicates do not touch fan blades, may result in injury.



Indicates disconnect all power sources before servicing.



## 7 Disclaimers

Learn about the Regulatory, Safety, and Electromagnetic standards for which this product is compliant.

The following chapter describes the Regulatory Statement of Compliance, Safety Compliance, and Electromagnetic Compatibility Agency Requirements for the Ultrastar Serv60+8.

### 7.1 Restricted Access Location

The Ultrastar Serv60+8 is intended for installation in a server room or computer room where at least one of the following conditions apply:

- access can only be gained by **service persons** or by **users** who have been instructed about the restrictions applied to the location and about any precautions that shall be taken and/or
- access is through the use of a **tool** or lock and key, or other means of security, and is controlled by the authority responsible for the location.

### 7.2 Safety Compliance

Product Name: **Ultrastar Serv60+8**

Regulatory Model: **H4060-S**

Electromagnetic Compatibility Emissions: **Class A**

This product has been tested and evaluated as Information Technology Equipment (ITE) at accredited third-party laboratories for all safety, emissions and immunity testing required for the countries and regions where the product is marketed and sold. The product has been verified as compliant with the latest applicable standards, regulations and directives for those regions/countries. The suitability of this product for other product categories other than ITE may require further evaluation.

The product is labeled with a unique regulatory model that is printed on the label and affixed to every unit. The label will provide traceability to the regulatory approvals listed in this document. The document applies to any product that bears the regulatory model and type names including marketing names other than those listed in this document.

### 7.3 Electromagnetic Compatibility (EMC) Class A Compliance

The **H4060-S** complies with and conforms to the latest international standards as applicable:

**Table 46: Emissions and Immunity Compliance Lists**

Emissions	Immunity
FCC CFR 47 Part 15, Subpart B	EN 61000-3-2 Harmonic Current Emissions
ICES-003	EN 61000-3-3 Voltage Fluctuations and Flicker
EN 55032	EN 55024
CISPR 32	KN35
CE – EMC Directive 2014/30/EU	EN 61000-4-2 ESD

Emissions	Immunity
VCCI V-3	EN 61000-4-3 Radiated Immunity
BSMI CNS13438	EN 61000-4-4 EFT
KN32	EN 61000-4-5 Surge
AS/NZS CISPR 32	EN 61000-4-6 RF Common Mode
TR CU 020/2011	EN 61000-4-8 Power Frequency Magnetic Field
	EN 61000-4-11 Voltage Dips and Interruptions

## 7.4 Country Certifications

**Table 47: Country Certifications**

Country/Region	Authority or Mark
North America (Canada, USA)	Nemko
European Union	CE
Japan	VCCI
Korea	MSIP
Taiwan	BSMI
Australia/New Zealand	RCM
Russia, Kazakhstan, Belarus, Armenia	CU EAC
Ukraine	Ukrsepro
Mexico	NOM
Israel	SII
South Africa	SABS
India	BIS

## 8 Regulatory Statements

The following chapter provides regulatory statements for the Ultrastar Serv60+8, **H4060-S**.

HGST Storage Enclosures are marked to indicate compliance to various country and regional standards.

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**Note:** *Potential equipment damage:* Operation of this equipment with cables that are not properly shielded and not correctly grounded may cause interference to other electronic equipment and result in violation of Class A legal requirements. Changes or modifications to this equipment that are not expressly approved in advance by HGST will void the warranty. In addition, changes or modifications to this equipment might cause it to create harmful interference.

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### 8.1 Europe (CE Declaration of Conformity)

Marking by the symbol indicates compliance of this system to the applicable Council Directives of the European Union, including the Electromagnetic Compatibility Directive (2014/30/EU) and the Low Voltage Directive (2014/30/EU). A “Declaration of Conformity” in accordance with the applicable directives has been made and is on file at HGST Europe.

### 8.2 FCC Class A Notice

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

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**Note:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if it is not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Any modifications made to this device that are not approved by HGST may void the authority granted to the user by the FCC to operate equipment.

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### 8.3 ICES-003 Class A Notice—Avis NMB-003, Classe A

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

### 8.4 Japanese Compliance Statement, Class A ITE

The following Japanese compliance statement pertains to VCCI EMI regulations:

この装置は、クラスA機器です。この装置を住宅環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

VCCI – A

**English translation:**

This is a Class A product based on the Technical Requirement of the Voluntary Control Council for Interference by Information Technology (VCCI). In a domestic environment, this product may cause radio interference, in which case the user may be required to take corrective actions.

## 8.5 Taiwan Warning Label Statement, Class A ITE

**警告使用者:**

此為甲類資訊技術設備，於居住環境中使用時，  
可能會造成射頻擾動，在此種情況下，使用者會  
被要求採取某些適當的對策。

**English translation:**

This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take adequate measures.

## 9 Points of Contact

For further assistance with an HGST product, contact Platform Engineering technical support. Please be prepared to provide the following information: Serial Number (S/N), product name, model number, and a brief description of the issue.

**Email:**

[support@wdc.com](mailto:support@wdc.com)

**Website:**

<http://support.hgst.com>

## A Site and System Operation Requirements

### A.1 Power Requirements

The following table describes the A/C input power specification for the Ultrastar Serv60+8.

**Table 48: AC Power Specifications**

Power	
Alternating Current (AC) Power Supply (2 per enclosure)	
Wattage (per power supply)  <b>Note:</b> Max and Typical Power Consumption values represent the output power to the system. Input power will vary depending on the PSU efficiency and load sharing between PSUs	<b>Supply Rating:</b> 80 PLUS Platinum rated  <b>Max Power Consumption:</b> ~2000W  <b>Typical Power Consumption:</b> ~1800W
Voltage (per power supply)	200 - 240 VAC, auto-ranging, 50/60 Hz
Maximum inrush current (per power supply)	

**Caution:** The Ultrastar Serv60+8 can only be plugged into highline. If the unit is plugged into lowline, the PSU will report a "Critical" state when status pages are queried using SES. In this case, the enclosure will power up, but the drives will not.

### A.2 Supported Operating Systems

**Table 49: Compatible Operating Systems**

Operating System
Microsoft® Windows Server 2012 R2 x64
Microsoft® Windows Server 2016 R1 x64
RedHat® Red Hat Enterprise Linux (x86_64) 7.4
RedHat® Red Hat Enterprise Linux (x86_64) 7.3
RedHat® Red Hat Enterprise Linux (x86_64) 7.2
Ubuntu® Ubuntu Server 16.04 Kernel 4.4

## A.3 List of Supported Server Components

**Table 50: List of Supported CPUs**

Product	Clock Frequency	Cores	L4 Cache	Wattage
Intel Xeon Silver 4114	2.20GHz	10 Cores	13.75MB	85W
Intel Xeon Gold 5118	2.30GHz	12 Cores	16.50	105W
Intel Xeon Gold 6140	2.30GHz	18 Cores	24.75MB	140W

**Table 51: List of Supported DIMMs**

Brand	Model Number	Size	Type	Form Factor	Rank	Speed
Samsung	M386A8K40BM2-CTD	64GB	DDR4	LRDIMM	4 Rank	2666 MHz
Samsung	M386AAK40B40-CWD	128GB	DDR4	LRDIMM	8 Rank	2666 MHz
Samsung	M393A1G40EB2-CTD	8GB	DDR4	RDIMM	2 Rank	2666 MHz
Samsung	M393A1G43EB1-CTD	8GB	DDR4	RDIMM	2 Rank	2666 MHz
Samsung	M393A1K43BB1-CTD	8GB	DDR4	RDIMM	1 Rank	2666 MHz
Samsung	M393A2G40EB2-CTD	16GB	DDR4	RDIMM	2 Rank	2666 MHz
Samsung	M393A2K40BB2-CTD	16GB	DDR4	RDIMM	1 Rank	2666 MHz
Samsung	M393A2K43BB1-CTD	16GB	DDR4	RDIMM	2 Rank	2666 MHz
Samsung	M393A4K40BB2-CTD	32GB	DDR4	RDIMM	2 Rank	2666 MHz
Samsung	M393A8K40B22-CWD	64GB	DDR4	RDIMM	4 Rank	2666 MHz
Samsung	M393AA4K40B42-CWD	128GB	DDR4	RDIMM	8 Rank	2666 MHz
Micron	MTA18ASF1G72PDZ-2G6B1	8GB	DDR4	RDIMM	2 Rank	2666 MHz
Micron	MTA18ASF2G72PDZ-2G6D1	16GB	DDR4	RDIMM	2 Rank	2666 MHz
Micron	MTA18ASF2G72PDZ-2G6E1	16GB	DDR4	RDIMM	2 Rank	2666 MHz
Micron	MTA18ASF2G72PDZ-2G6H1	16GB	DDR4	RDIMM	2 Rank	2666 MHz
Micron	MTA36ASF2G72PZ-2G6B1	16GB	DDR4	RDIMM	2 Rank	2666 MHz
Micron	MTA36ASF2G72PZ-2G6B2	16GB	DDR4	RDIMM	2 Rank	2666 MHz
Micron	MTA36ASF4G72PZ-2G6B2	32GB	DDR4	RDIMM	2 Rank	2666 MHz
Micron	MTA36ASF4G72PZ-2G6D1	32GB	DDR4	RDIMM	2 Rank	2666 MHz
Micron	MTA36ASF4G72PZ-2G6E1	32GB	DDR4	RDIMM	2 Rank	2666 MHz
Micron	MTA36ASF4G72PZ-2G6H1	32GB	DDR4	RDIMM	4 Rank	2666 MHz
Micron	MTA72ASS8G72LZ-2G6B2	64GB	DDR4	RDIMM	4 Rank	2666 MHz
Micron	MTA9ASF1G72PZ-2G6D1	8GB	DDR4	RDIMM	1 Rank	2666 MHz

Brand	Model Number	Size	Type	Form Factor	Rank	Speed
Micron	MTA9ASF51272PZ-2G6B1	4GB	DDR4	RDIMM	1 Rank	2666 MHz

**Table 52: Supported Add-in Cards**

Brand	Model	Type	Connection Speed
Broadcom	9361-8i	External SAS HBA	12Gb/s
Broadcom	9361-16i	External SAS HBA	12Gb/s
Broadcom	9305-16e	External SAS HBA	12Gb/s
Broadcom	9305-16i	External SAS HBA	12Gb/s
Broadcom	9300-16i	External SAS HBA	12Gb/s
Broadcom	9300-8e	External SAS HBA	12Gb/s
Broadcom	9300-8i	External SAS HBA	12Gb/s
Intel	X520-DA2	NIC	10G SFP+
Intel	X710-DA2	NIC	10G SFP+
Intel	X550-T2	NIC	10G-BaseT
Intel	X540-T2	NIC	10G-BaseT
Chelsio	T6225-CR	NIC	25G
Mellanox	ConnectX-4 Lx (MCX4121A-ACAT)	NIC	25G

## A.4 Ultrastar Serv60+8 Rack Requirements

The Ultrastar Serv60+8 is designed to be installed into a rack that meets the EIA-310 standard at a minimum 1200 mm (47.24in.) of usable rack space, frame to frame. The vertical rack rails must be set between 32 in. - 36 in. to support the enclosure. It requires 4U of rack space, and it should be installed into the rack at the lowest possible U height to keep the load on the rack balanced.

**Table 53: Required Rack Specifications**

Parameter	Requirement
Rack Depth	1200 mm (47.24in.) of usable rack space, frame to frame
Rack Width	450mm with (17.72in.) with 465mm (18.31in.) $\pm$ 1.5mm nominal hole spacing. See EIA-310 Rack Standard
Rack Units (U)	4U
Vertical Rack Rail Spacing	32 in. - 36 in.
Static Load Rating	2250 lbs.



Parameter	Requirement
Dynamic Load Rating	1360.77 / 3000 lbs.

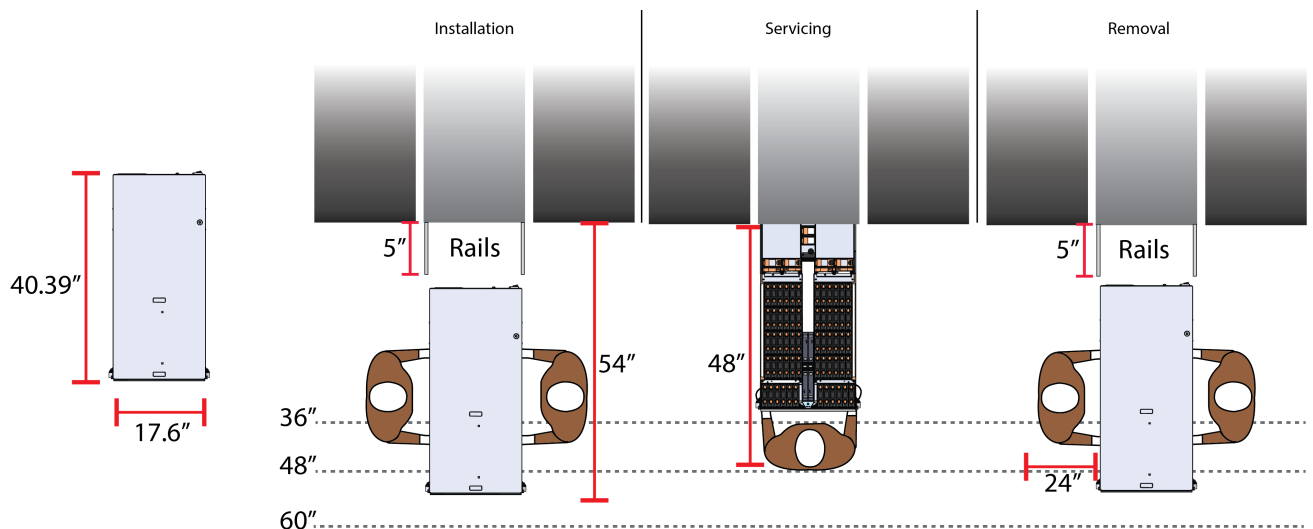


**Warning:** When extended out of the rack on the rail system, the Ultrastar Serv60+8 will be ~950 mm / 37.4in. extended outward. This is a tipping hazard. Make sure that any rack supporting the enclosure **MUST BE BOLTED TO THE FLOOR** before servicing or extending out of the rack. Ensure that leveling feet, anti-tilt, and any other safety features recommended by the specific rack manufacturers have also been deployed before servicing.

The following section provides specific information necessary to install, service, and remove the Ultrastar Serv60+8. The installation of the Ultrastar Serv60+8 requires two people and a space of 1371mm / 54in. in front of the installation space. The servicing of the enclosure requires one person and a minimum of 1219.2mm / 48in. of space in front of the installation space. The removal of the enclosure requires two people, 1371mm / 54in. of space in front of the installation space, and 24in. on either side of the enclosure for two people to remove the enclosure.

**Warning:** The handles on the front of the chassis are not intended to be used to support the weight of the Ultrastar Serv60+8. Lifting the unit by the chassis handles or trying to support the unit on the handles can cause them to fail. This can cause serious damage to the unit or serious bodily harm to those handling the unit. Always team lift the chassis by gripping the underside of the unit, and never try to lift a chassis that is filled with drives.

**Figure 450: Installation, Servicing, and Removal**



### A.4.1 Compatible Hardware Configuration

The following table(s) list the approved hardware configurations for the Ultrastar Serv60+8:

**Table 54: Compatible Hardware Configuration 1**

Parameter	Rack	PDU (Vertical)	PDU Mounting Bracket	Additional Mounting Bracket Hardware
<b>Vendor</b>	CRENLO/EMCOR	Server Technology	Server Technology	Various
<b>Part Number</b>	AS-160099-03 (Drawing Number EMCOR 526121 Rev 5)	412-0761-11_STV-4501 412-0761-20_STV-4502 412-0761-23_STV-4503	KIT-MBVPT-1B (one kit per PDU)	4 x M6 x 16 Hex Cap Screws 8 x M6 Fender Washers 4 x M6 Hex Nut with Nylon Lock
<b>Quantity</b>	1	2	2	Varies

**Table 55: Compatible Hardware Configuration 2**

Parameter	Rack	PDU (Vertical)	PDU Mounting Bracket	Additional Mounting Bracket Hardware
<b>Vendor</b>	AFCO/Legrand	Server Technology	Server Technology	Various
<b>Part Number</b>	<b>Options:</b> 42RU – WEDIT605 45RU – WEDIT604 48RU – WEDIT603 51RU – WEDIT606	412-0761-11_STV-4501 412-0761-20_STV-4502 412-0761-23_STV-4503	KIT-MB-40	None
<b>Quantity</b>	1 rack	2	1	N/A

**Table 56: Compatible Hardware Configuration 3**

Parameter	Rack	PDU (Vertical)	PDU Mounting Bracket	Additional Mounting Bracket Hardware
<b>Vendor</b>	TRIPP LITE	Server Technology	Server Technology	Various
<b>Part Number</b>	<b>Options:</b> SR42UBDP (Rack) SREXTENDER 25U (Rack Extension) SREXTENDER 42U (Rack Extension) SREXTENDER 48U (Rack Extension)	412-0761-11_STV-4501 412-0761-20_STV-4502 412-0761-23_STV-4503	KIT-MBVPT-1B	None

Parameter	Rack	PDU (Vertical)	PDU Mounting Bracket	Additional Mounting Bracket Hardware
Quantity	1 rack	2	1	N/A

## A.5 ESD

The enclosure is designed to dissipate all electrostatic discharge (ESD) to the chassis base. Ensure that there is sufficient electrical and mechanical connection from the chassis base to the rack rails, and that the rack itself is tied to earth ground. Precautions must be taken to ensure that the system is not exposed to ESD while handling components or servicing the unit.

The unit must be grounded in accordance with all local/regional and national electrical codes.

## A.6 Enclosure Cooling

The Ultrastar Serv60+8 storage subsystem has an advanced thermal algorithm running within the logical enclosure services process called the SEP that monitors all of the temperature sensors in the enclosure. The SEP makes adjustments to the fan speeds based upon the thermal sensors. The fan algorithm takes into account the component and the warning and critical threshold limits defaulted and managed by the SEP controller. If any temperature sensor exceeds the temperature threshold configured in the SES pages, the fan speed will increase to cool the enclosure. If the enclosure encounters low temperatures, the enclosure will reduce fan speed in an attempt to conserve power and not over-cool the enclosure. This algorithm is agnostic to effects of altitude and humidity. The algorithm works based on temperatures within the enclosure with emphasis on reducing power consumption.

The server subsystem also has a thermal algorithm that functions similarly to the storage subsystem. The BMC reads thermal sensors in each of the four memory banks, CPUs, on-board NIC, temperature sensors on the motherboard, and the IOM SXP temperature, from the BMC itself to react to changing thermal conditions and adjust the speed of the two server subsystem fan as necessary. The rack that the Ultrastar Serv60+8 is installed in must not restrict airflow to the enclosure. Racks with doors should be tested to ensure they do not constrict airflow to the enclosure.

The Ultrastar Serv60+8 system provides its own cooling using four (4) 80mm fans mounted internally behind the drive bay and two (2) 80mm fans mounted above the server motherboard in custom fan housings. These fans draw air from the cold aisle (drive bay side) to the hot aisle (server side) through the enclosure. When the Ultrastar Serv60+8 is extended out of the rack, the cover of the enclosure remains inside the rack which exposes the drives. This feature allows for easier access to drives and simplifies maintenance tasks related to internal components. However, there is a limit to the amount of time the enclosure can be extended out of the rack before the enclosure will begin to overheat.

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**Attention:** Limit the amount of time that the enclosure is extended out of the rack to only what is necessary to exchange a component or perform regular maintenance and should be limited to a maximum of 5 minutes total. **Never extend the enclosure out for longer than 5 minutes to prevent overheating.** Only extend the enclosure out of the rack as far as necessary to service components. The enclosure is equipped with a sensor that will be tripped when the enclosure's top cover has been opened resulting in the system fans increasing to max speed. In the event that a fan has failed, it must be replaced before any other CRUs and should be removed from the enclosure within 30 seconds of removing the enclosure cover.

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## A.7 Host Connectivity

The following table displays the power cable approved by HGST:

**Table 57: Approved Power Cables**

Type	Part Number	Dimension (overmold)	Length
Standard C13 - C14 Power Cable	1EX0064	C13 to C14	3M