Quantum.

ActiveScale

with ActiveScale OS 6.x software

P100 Support Guide

6-68838-05, Rev. A

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1 ActiveScale P100 product overview

This section provides an overview of the ActiveScale P100 system.

1.1   ActiveScale P100 identification

The ActiveScale P100 is a modular object storage system that allows you to store from either:

- 0.72 PB (raw) to 6.48 PB (raw) of storage using 10 TB HDDs.
- 0.864 PB (raw) to 7.776 PB (raw) of storage using 12 TB HDDs.
- 1.008 PB (raw) to 9.072 PB (raw) of storage using 14 TB HDD's.

Multi-site systems can achieve a maximum storage capacity of either:

- 19.44 PB (raw) using 10 TB HDDs.
- 23.328 PB (raw) using 12 TB HDDs.
- 27.216 PB (raw) using 14 TB HDDs.

> **Note:** 12 TB HDDs require ActiveScale OS 5.3 or later. 14 TB HDDs require 5.5 or later.

The base configuration consists of:

- Three System Nodes
- Six Storage Nodes
- Two System Interconnects

Figure 1-1.   ActiveScale P100 system layout
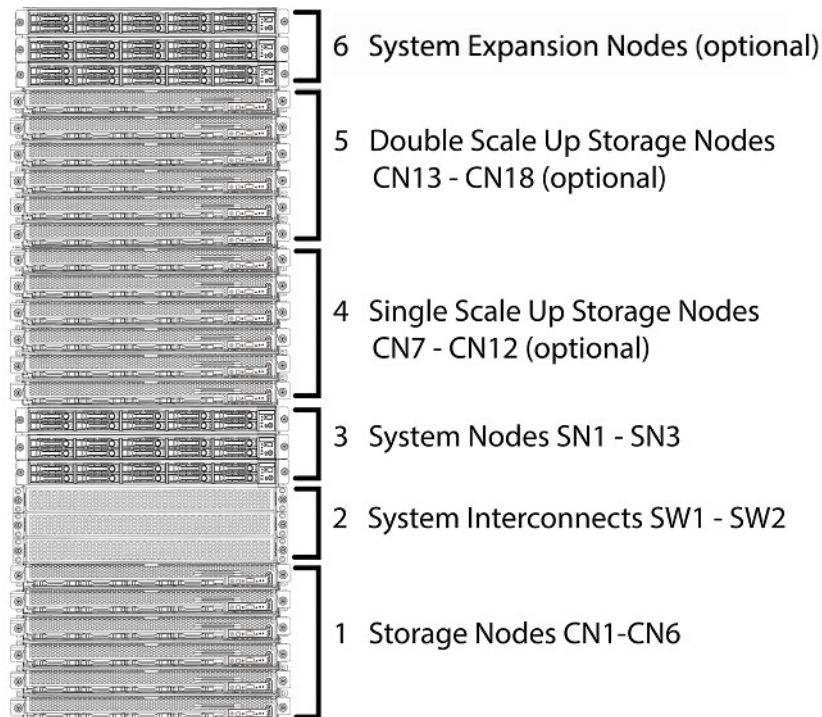
Table 1-1.   ActiveScale P100 component identification

Number	Hardware component	Quantity
1	Storage Node (CN)	6

Table 1-1.   ActiveScale P100 component identification

Number	Hardware component	Quantity
2	System Interconnect (SW)	2
3	System Node (SN)	3
4	Single scale up kit Storage Node (CN)	6
5	Double scale up kit Storage Node (CN)	6
6	System Expansion Node (SEN)	3[1]

1.Maximum amount per ActiveScale P100. System Expansion Nodes are sold individually.

1.2 System specification summary

The following table is a summary of specifications relevant to the ActiveScale P100 system.

Table 1-2.   System specification summary

Condition (fully configured)	Non-operating	Operating
Altitude	-984 ft to 39,371 ft (-300 m to 12,000 m)	-984 ft to 10,000 ft (-300 m to 3,048 m)
Height in rack units (U)	• **Base configuration**—12U • **Scale-up kit**—6U • **System Expansion Node kit**[1]—1U	
Power requirements (typical/maximum)	N/A	• **Base configuration**—1.85 to 2.03 kW • Base +1 configuration—3.23 to 3.54 kW • Base +2 configuration— 4.61 to 5.05 kW • **Scale-Up kit**—1.38 to 1.51 kW • **System Expansion Node kit**[1]—0.195 to 0.23 kW
Relative humidity	20% to 95% non-condensing	20% to 80% non-condensing
Relative humidity gradient	30% per hour maximum	30% per hour maximum
System width and depth	• **Width**—17.6 in (448.2 mm) • **Depth**—35 in (881 mm)	
Temperature	-40°F to 158°F (-40°C to 70°C)	50°F to 95°F (10°C to 35°C)
Temperature de-rating	33.8°F per 984.2 ft above 9842.5 ft (1°C per 300 m above 3000 m)	33.8°F per 984.2 ft above 3116.8 ft (1°C per 300 m above 950 m)
Temperature gradient	86°F (30°C)/hour	68°F (20°C)/hour
Thermal output	N/A	• **Base system**—6.31 to 6.92 KBTU/hour • Base +1 configuration—11.01 to 12.07 KBTU/hour • **Base+2 configuration—**15.71 to 17.22 KBTU/hour • **Scale-up kit**—4.70 to 5.15 KBTU/hour • **System Expansion Node kit**[1]—0.665 to 0.785 KBTU/hour
Weight	• **Base configuration**— 469 lbs (212.4 kg) • **Individual Scale up kit**— 348 lbs (157.8 kg) • **System Expansion Node kit**[1]—27 lbs (12.2 kg)	

1. Values are for one additional node. System Expansion Node kits can contain up to three additional nodes.

1.3 Available kits and upgrades

This section describes the upgrades and supplemental kits that are available for the ActiveScale P100.

1.3.1 Scale up kits

Scale up kits consist of six Storage Nodes. You can add two scale up kits to a base ActiveScale P100 configuration.

> **Note:** In a multi-site configuration, all scale up modifications must be implemented identically at each geographical location.

1.3.2 Scale out kits

Scaling out an ActiveScale P100 increases storage and networking capacity by adding either one or two new base systems. The System Interconnects in the primary system can be connected to the System Interconnects of up to two additional ActiveScale P100 systems, with each ActiveScale P100 system per location.

For more information, refer to Installing scale out kits on page 105.

1.3.3 System Expansion Node kits

System Expansion Node kits provide one additional System Node for your ActiveScale system. Additional System Nodes allow you to increase system performance with your current storage capacity. You can add up to three System Expansion Node kits (three additional System Nodes) to each ActiveScale P100 base system. Multi-site deployments can support up to 21 System Expansion Nodes.

System Expansion Node kits are supported with other upgrades, this includes:

- Scale out deployments
- Scale up deployments
- Multi-site deployments

> **Important:** System Expansion Node kits do not provide failover or high-availability capabilities to ActiveScale systems.

For more information, refer to Installing System Expansion Node kits on page 121.

2 Component overview

This section provides an overview of each component in the ActiveScale P100.

2.1   System Node

System Nodes are the front end of an ActiveScale system. They run a subset of the ActiveScale OS that handles the management path and parts of the data path.

The single logical System Node is comprised of System Nodes in multiples of three. The three System Nodes are clustered and the services and databases they run must have a minimum membership present in order to function.

2.2 S5L System Node Component Overview

The information in this section will help you identify the components in a System Node.

> **Note:** Newer versions of the System Node do not have a label above the LED panel.
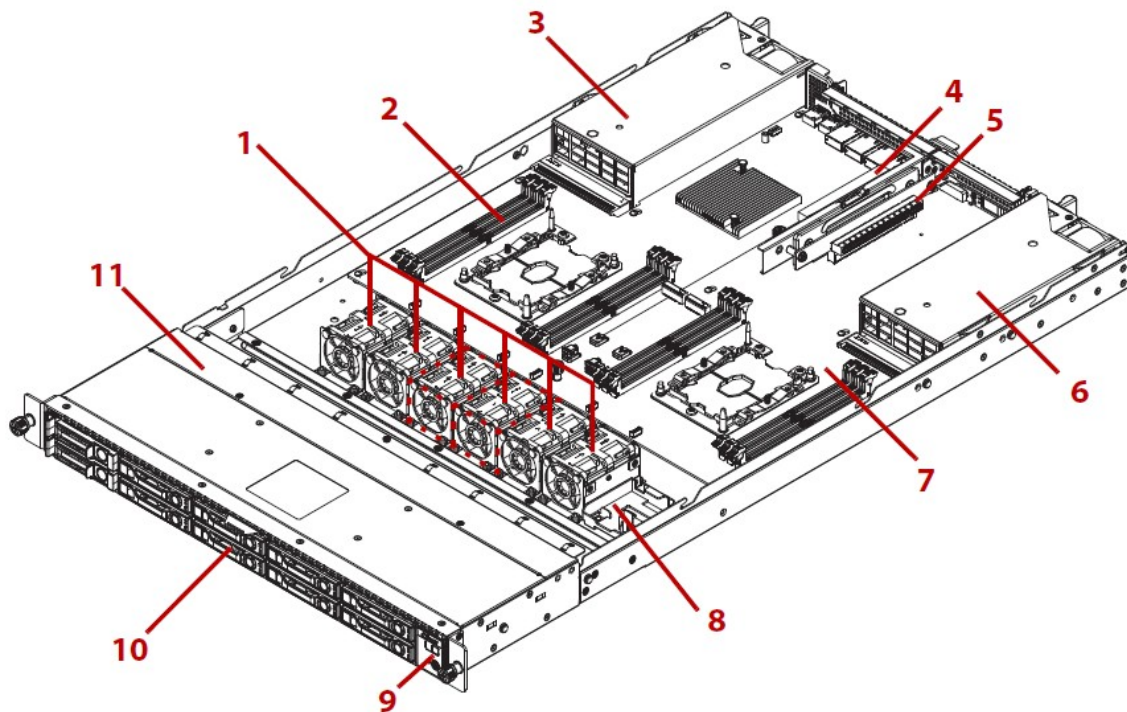
Number	Item	Description
1	Fan Module	(6) System fan modules or (4) System fan modules (without middle two fan modules
2	DIMM slots	(12) DDR4 DIMM slots
3	PSU assembly	PSU0, Redundant power supply unit assembly
4	Riser slot	Riser slot1 : PCIe x16 Gen 3 FHHL (CPU1)

Number	Item	Description
5	Riser slot	5 Riser slot2 : PCIe x16 Gen 3 HHHL or SAS mezzanine card (CPU0)
6	PSU assembly	6 PSU assembly PSU1, Redundant power supply unit assembly
7	Mainboard	System mainboard
8	Backup battery	Backup battery for SAS mezzanine card
9	Front control panel	Front Control Panel LEDs
10	HDD assembly	2.5" model: 8 x hard disk drive assemblies
11	Mid-Top cover	Design to cover the 2.5" model chassis

2.2.1 S5L System Front View
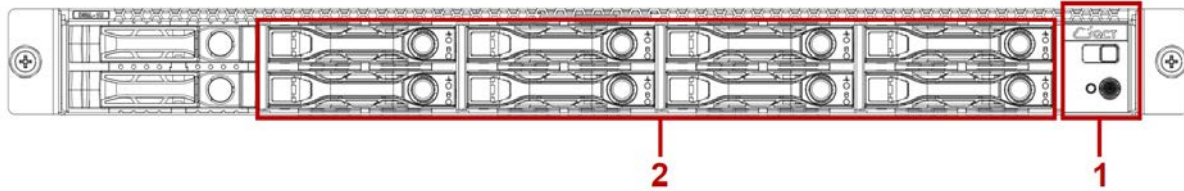
Number	Item	Description
1	Front control panel	Front Control panel (see below)
2	HDD bays	2.5": 8 x SAS/SATA HDD

S5L Front Control Panel
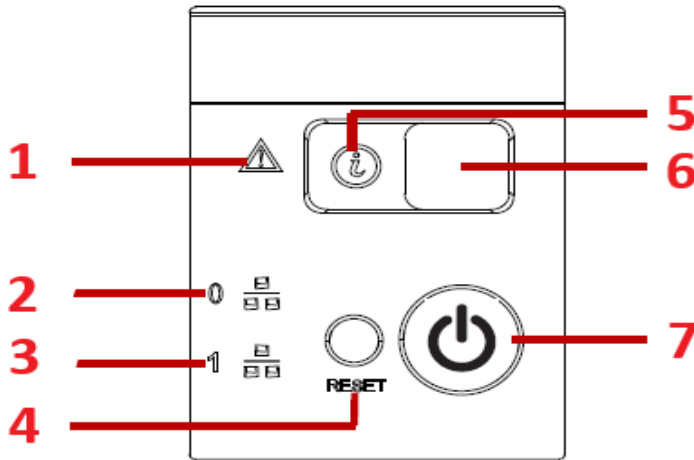
Number	Item	Description
1	Fault LED	Provides critical and non-critical failure notification
2	LAN LED	LAN access
3	LAN LED	LAN access
4	Reset button	Soft reset system function
5	Identification LED	Activate ID LED to identify system
6	ID button	Toggle ID LED
7	Power button with LED	Power on / off

S5L System Rear View
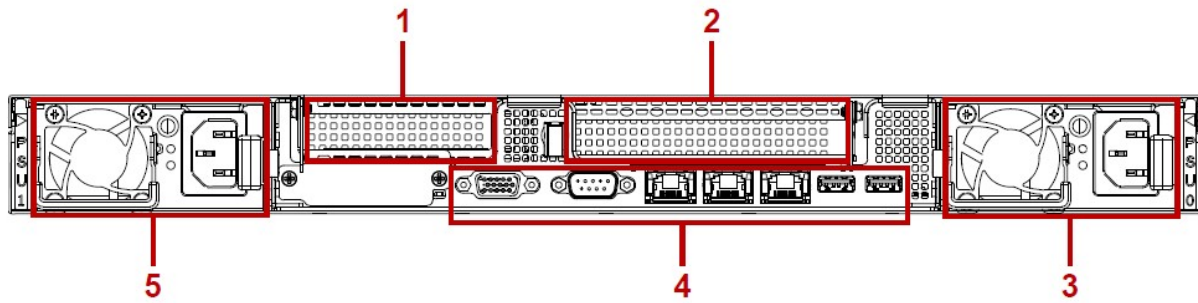
Number	Item	Description
1	Expansion slot	HHHL PCIe expansion slot with PCIe x16 signal support HHHL PCIe / SAS mezzanine card
2	Expansion slot	FHHL PCIe expansion slot with PCIe x16 signal support standard PCIe card
3	Power sub-system	Main power supply unit (PSU0)
4	System I/O ports	System I/O ports
5	Power sub-system	Main power supply unit (PSU1)

S5L System I/O Ports

Number	Item	Description
1	VGA connector	Maximum display resolution: 1920x1200 32bpp@60Hz (reduced blanking)
2	COM port A	DB9 port (Serial_A) for debug or terminal concentrator
3	NIC1	RJ45 connector
4	NIC0	RJ45 connector
5	Dedicated NIC	Dedicated RJ45 connector
6	USB ports	USB 3.0 ports

2.3 S2PC System Node

2.3.1 S2PC System Node component identification

The information in this section will help you identify the components in a System Node.

> **Note:** Newer versions of the System Node do not have a label above the LED panel.

Figure 2-2.   S2PC System Node front view
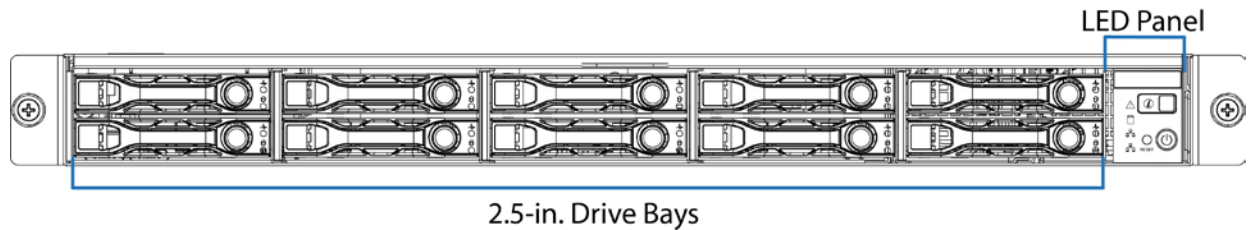
Figure 2-3.   S2PC System Node rear view
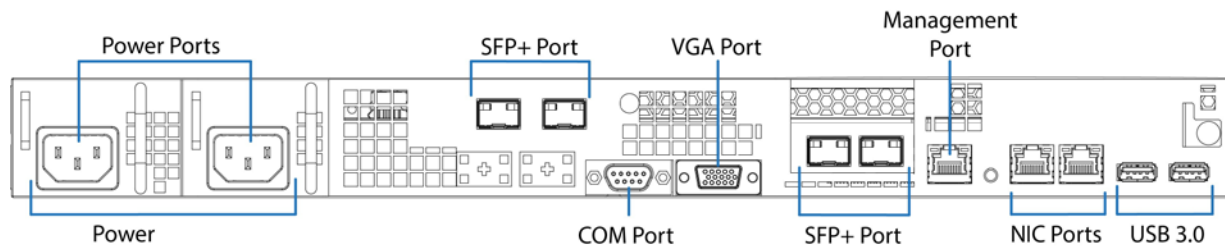
2.3.1.1 S2PC Physical port to Ethernet device mapping

Figure 2-4.   S2PC Physical port to Ethernet device mapping
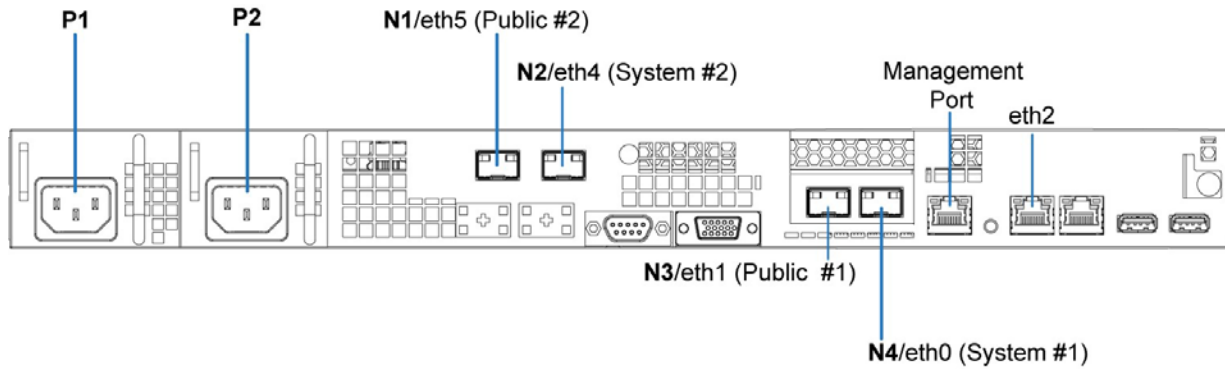
2.3.1.2 S2PC System Node LEDs and buttons

Figure 2-5.   System Node LEDs and buttons
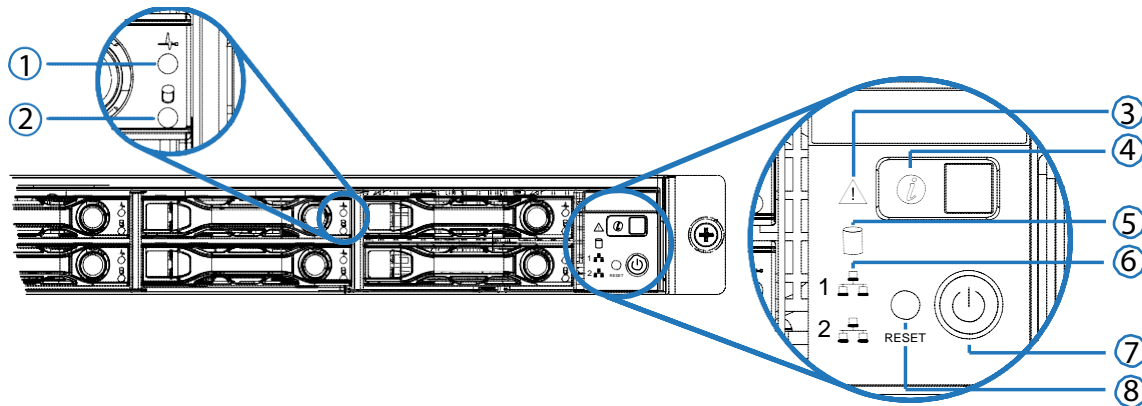
Table 2-3.   S2PC System Node control panel LED and button descriptions

Number	Name	Description	LED action
1	HDD status	Identifies hard disk drive status.	• **Blinking**—Activity • **Solid amber**— HDD failure detected. • **Off**—Drive slot is empty.
2	HDD activity	Identifies hard drive activity.	• **Blinking blue**—Hard disk drive access • **Off**—No access (non-SAS)

Table 2-3.   S2PC System Node control panel LED and button descriptions (continued)

Number	Name	Description	LED action
3	Fault	Identifies system events.	• **Solid amber**—Indicates the following events: – **Critical failure**—critical fan, voltage, temperature state. – **Non-critical failure**—non-critical fan, voltage, temperature state, CPU thermal trip, DC off. • **Blinking amber**—Indicates a change or event has occurred on the System Node. Use the SEL to get more info and to clear it if appropriate. • **Off**—SEL cleared or last pending warning or error has been de-asserted.
4	Identification	Locater LED.	• **Solid blue**—Identification feature has been activated. • **Blinking**—Identification LED has been activated • **Off**—No identification request
5	HDD activity	Identifies hard disk drive access.	• **Blinking blue**—Hard disk drive access (on-board SATA port only) • **Off**—No access (non-SAS)
6	LAN1/LAN2	Identifies Link or LAN1/LAN2 access	• **Solid blue**—Link • **Blinking blue**—LAN access (off when there is traffic)
7	Power button	Powers on/off System Node.	• **Solid blue**—Powered on • **Off**—Powered off
8	Reset button	Resets the System Node.	N/A

2.3.2 Replaceable parts for System Nodes

The following table lists all of the replaceable components for a System Node.

Replaceable part	Replacement by Quantum Corporation technician recommended?	Hot swappable?
1 TB HDD with drive carrier	No	Yes[1]
480 GB SSD with drive carrier	No	Yes[1]
PSU module, 400 W	No	Yes
System Node chassis	Yes	No

1.Only hot swappable after decommissioning.

2.3.3 S2PC and S5LSystem Node specification summary

The following table lists the system specifications for an individual System Node.

Condition	Specification
Dimensions	• **Width**—17.2 in (438 mm) • **Depth**— 29.2 in (741.6 mm) • **Height**— 1.73 in (44 mm)
Hot swappable?	No
Operating relative humidity	20% to 85% non-condensing
Operating temperature	41° to 104°F (5°C to 40°C)
Quantity (per system)	Three
Rack Units (U)	1U
Weight (per component)	27 lbs (12.2 kg)
Weight (total for all System Nodes)	81 lbs (36.6 kg)

2.4   System Interconnect

The ActiveScale System Interconnect is a Celestica D2020 switch with 48 10Gigabit SFP+ ports and 4 40 Gigabit QSFP+ ports. The SFP+ ports are used for communication between System Nodes and Storage Nodes. The QSFP+ ports are used for scale outs.

ActiveScale systems contain two System Interconnects that connect to the System and Storage Nodes for maximum bidirectional throughput.

Figure 2-6.   **System Interconnect**
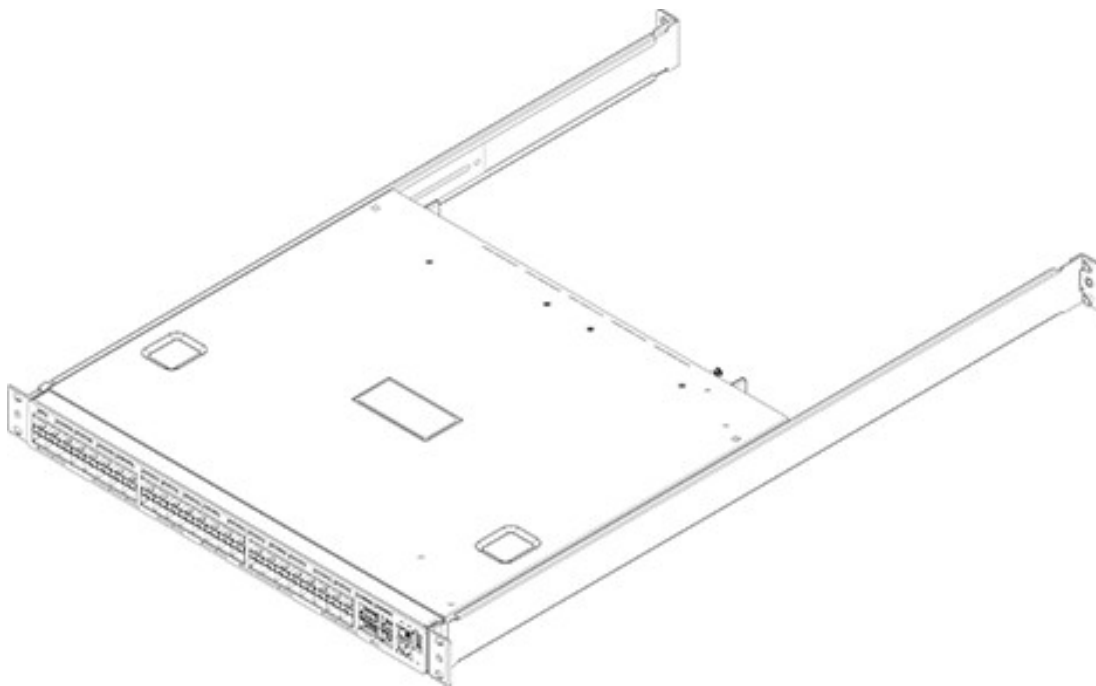
2.4.1 System Interconnect component identification

The information in this section will help you identify the components in ActiveScale System Interconnects.

2.4.1.1 System Interconnect front and rear view

Figure 2-7.   System Interconnect front view
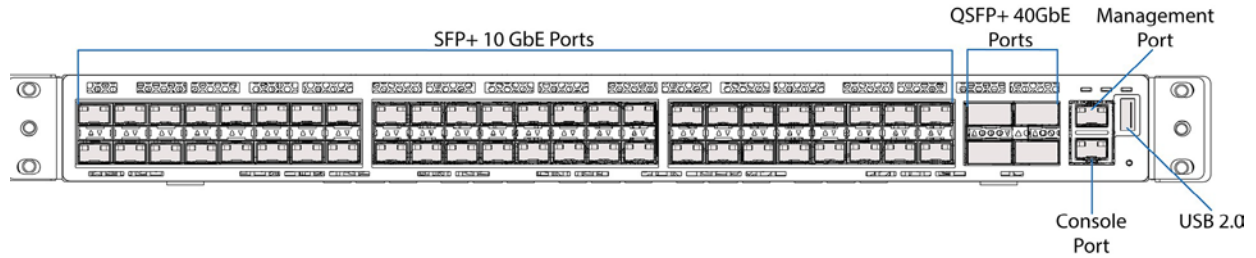
Figure 2-8.   System Interconnect rear view
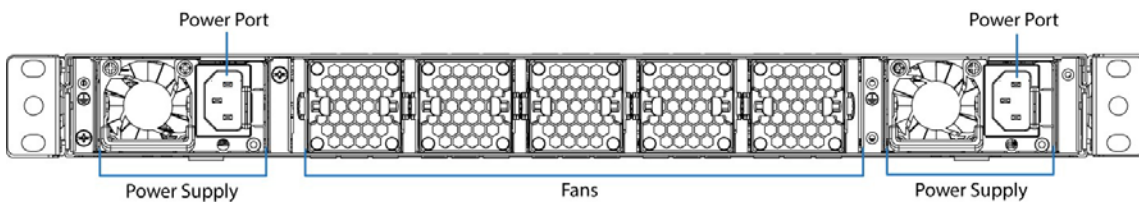
2.4.1.2 QSFP+ports

Figure 2-9.   QSFP+ ports

2.4.1.3 System Interconnect LEDs

Figure 2-10.   System Interconnect LEDs
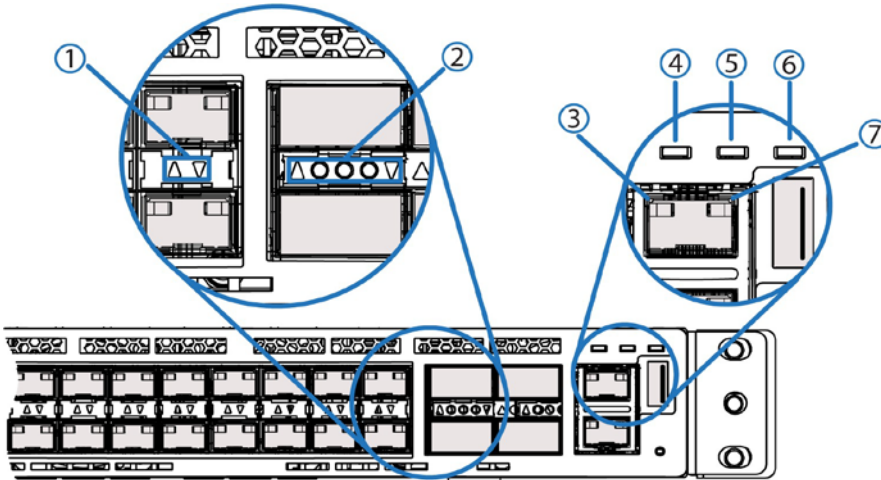
Table 2-4.   System Interconnect system LED descriptions

Number	LED name	Description	LED action
1	Link	Identifies data throughput on the port.	• **Blinking green**—Maximum data throughput (10Gbps) is occurring. • **Blinking amber**—Minimum data throughput (10/100Mbps) is occurring. • **Off**—No throughput is occurring.
2	Link	Identifies data throughput on the port.	• **Blinking green**—Maximum data throughput (40Gbps) is occurring. • **Blinking amber**—Minimum data throughput is occurring. • **Off**—No throughput is occurring.
3	Act	Identifies port activity.	• **Blinking green**—Activity is occurring on this port. • **Off**—No activity is occurring on this port.
4	P-L (PSU Left)	Identifies left PSU status.	• **Solid**—PSU is powered on and functioning properly. • **Off**—PSU is off or not functioning properly.
5	P-R (PSU Right)	Identifies right PSU status.	• **Solid**—PSU is powered on and functioning properly. • **Off**—PSU is off or not functioning properly.
6	STAT	Identifies System Interconnect status.	• **Blinking**—System Interconnect is powered on and functioning properly. • **Off**—System Interconnect is off or not functioning properly.

Table 2-4. System Interconnect system LED descriptions (continued)

Number	LED name	Description	LED action
7	Link	Identifies port data throughput.	• **Blinking green**—Maximum data throughput (1000Mbps) is occurring. • **Blinking ambe**r—Minimum data throughput (10/100Mbps) is occurring. • **Off**—No throughput is occurring.

2.4.2 Replaceable parts for System Interconnects

The following table lists all of the replaceable components for a System Interconnect.

Replaceable part	Replacement by Quantum Corporation technician recommended?	Hot swappable?	Part number
Complete System Interconnect[1]	No	Yes	1EX0255
Fan module	No	Yes	1EX0022
PSU module, 460W	No	Yes	1EX0024
QSFP+ 40G short-range transceiver	No	Yes	1EX0268
SFP+ 10G long-range transceiver	No	Yes	1EX0261
SFP+ 10G short-range transceiver	No	Yes	1EX0237

1.Replacement rails are not included. Retain the rack rails from the faulty System Interconnect.

2.4.3 System Interconnect specification summary

The following table lists the system specifications for an individual System Interconnect.

Condition	Specification
Dimensions	• **Width**—17.3 in (438 mm) • **Depth**—17 in (431 mm) • **Height**—1.73 in (44 mm)
Hot swappable?	
Operating relative humidity	20% to 85% non-condensing
Operating temperature	41° to 104°F (5°C to 40°C)
Quantity (per system)	Two
Rack Units (U)	1U
Weight (individual)	20 lbs (9 kg)
Weight (total for all System Interconnects)	40 lbs (18 kg)

2.5 Storage Node

The Storage Node provides the bulk data object storage for the ActiveScale P100 system. Each Storage Node is equipped with 12 hard disk drives housed in a pull-out style drive tray.

Figure 2-11.   Storage Node
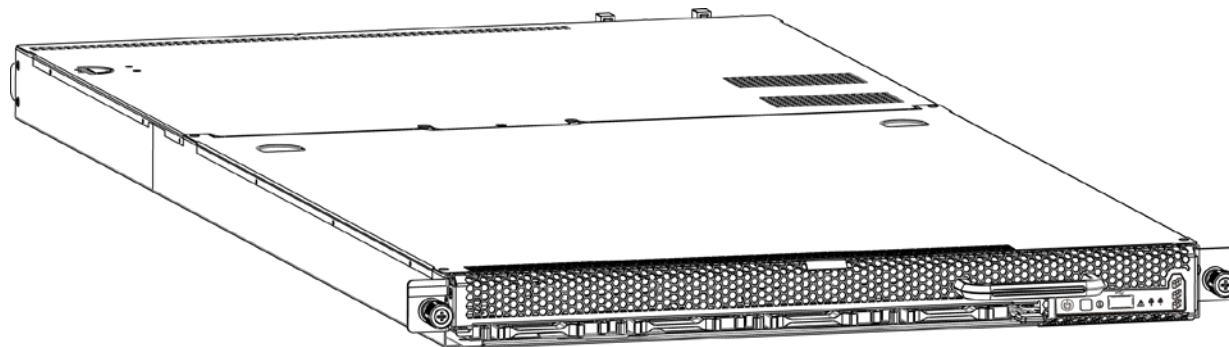
2.5.1 Storage Node component identification

The information in this section will help you identify the components in an ActiveScale Storage Node.

2.5.1.1 Storage Node front and rear view
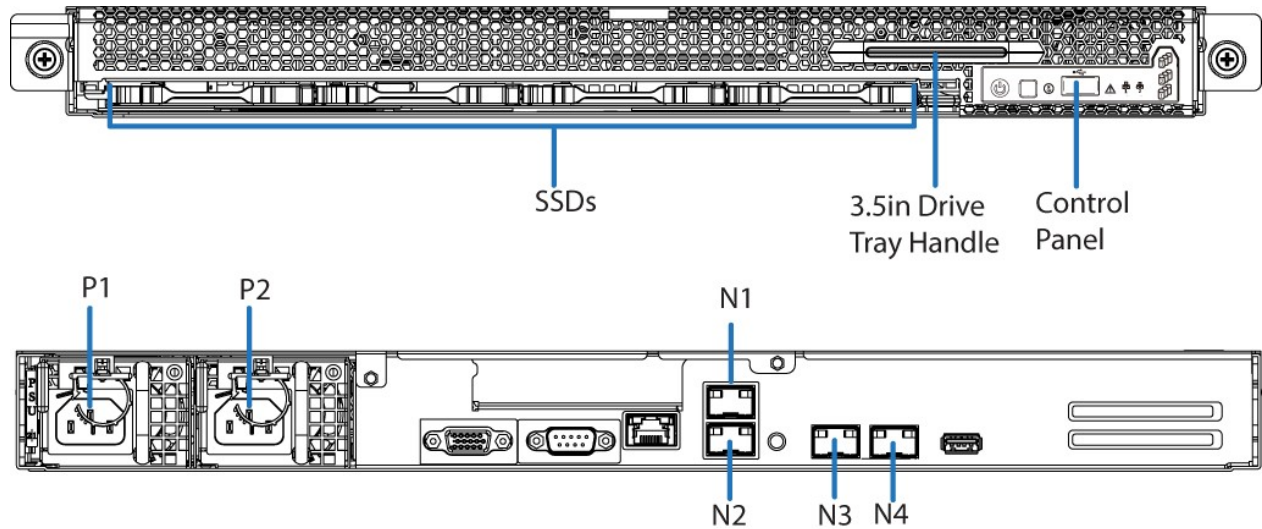
2.5.1.2 Physical port to Ethernet device mapping
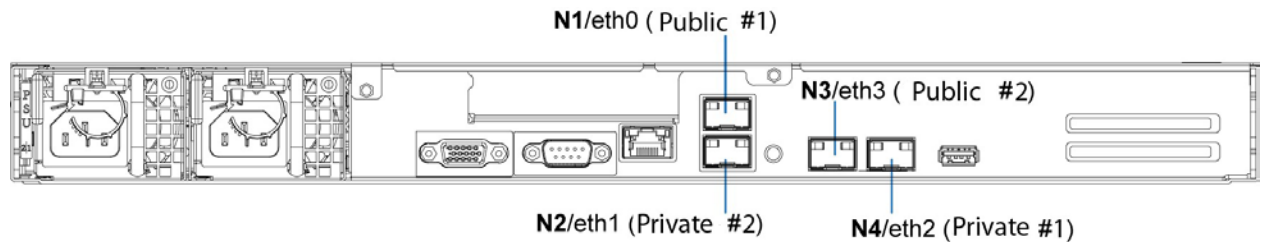
2.5.1.3 Storage Node LEDs, buttons, and ports
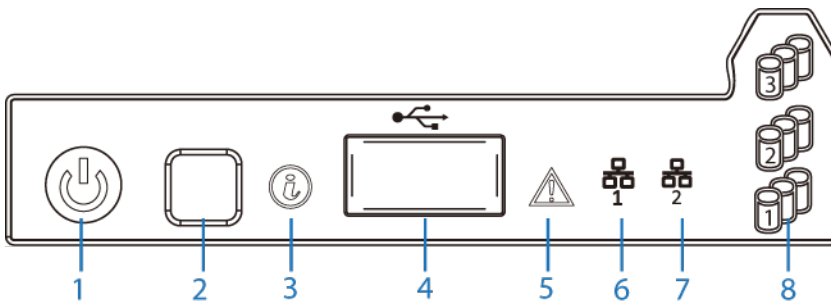
Table 2-5.   Storage Node control panel LED and button descriptions

Number	Name	Description	LED action
1	Power button with LED	Powers the system on or off. LED indicates that the component is powered on.	• **Solid blue**—Powered on • **Off**—Powered off
2	ID button	Activates or deactivates the identification LED.	N/A
3	Identification LED	Indicates that the identification feature has been activated.	• **Blinking**—Identification LED has been activated. • **Off**—No identification request.

Table 2-5. Storage Node control panel LED and button descriptions (continued)

Number	Name	Description	LED action
4	USB 2.0 port	Connects to a USB device.	N/A
5	Fault	Indicates items that require attention.	• **Solid amber**— Can indicate the following: – **Critical Failure**—critical fan, voltage, temperature state – **Non-Critical Failure**—non-critical fan, voltage, temperature state, CPU thermal trip, DC off. Also on when the SEL is full. • **Off**—SEL cleared or last pending warning or error has been de-asserted.
6	LAN1	Indicates Link or LAN1 access.	• **Solid blue**—Link • **Blinking blue**—LAN access (off when there is traffic).
7	LAN2	Indicates Link or LAN2 access.	• **Solid blue**—Link • **Blinking Blue**—LAN access (off when there is traffic).
8	HDD Activity	Indicates activity on the hard drive when flashing. The three HDD activity LEDs correlate to the rows of drives in the tray and whether or not there is activity there.	• **Blinking blue**—Hard disk drive access (only on-board SATA port). • **Off**—No access (non-SAS)

2.5.2 Replaceable parts for Storage Nodes

The following table lists all of the replaceable components for a Storage Node.

Replaceable part	Hot swappable?	Part number
10 TB HDD with carrier	Yes[1]	1EX0225
12 TB HDD with carrier	Yes[1]	1EX1135
14 TB HDD with carrier	Yes	1EX1892
480 GB SSD with carrier	Yes	1EX0226
PSU module, 400 W	Yes	1EX0209
Storage Node chassis	--	1EX0224

1.Only hot swappable after decommissioning.

2.5.3 Storage Node specifications

The following table lists the system specifications for an individual Storage Node.

Table 2-6.   Storage Node Specifications

Condition	Specification
Dimensions	• **Width**—17.6 in (448.2 mm) • **Depth**—35 in (881 mm) • **Height**—1.7 in (43.2 mm)
Hot swappable?	No
Operating relative humidity	20% to 85% non-condensing
Operating temperature	41° to 104°F (5°C to 40°C)
Quantity (per system)	Six
Rack Units (U)	1U
Weight (per component)	58 lbs (26.3 kg))
Weight (total for all Storage Nodes)	348 lbs (157.8 kg)

2.6 Pull-out Tabs

Both the System and Storage Nodes have a pull-out tab that contains the part number and serial number of the node printed on it. The pull-out tab can be located in the following locations:

- **System Node** - Top-center of the node.
- **Storage Node** - To the right of the SSD drive.

2.7 Mounting kits

ActiveScale P100 systems can ship with one of two rail kit configurations:

- The System Nodes, Storage Nodes, and System Interconnects all use 3U rail kits.
- The System Interconnects use a 3U rail kit. The System Nodes and Storage Nodes use 1U rail kits.

The following sections describe each of the available mounting kits for each component.

2.7.1 Differences between the 1U mounting kits

ActiveScale P100 systems use different mounting kits for System and Storage Nodes.

2.7.1.1 System Node mounting kit

The System Node mounting kits consist of an inner rail and an outer rail with white plastic tabs on the inner rails. The inner rail is secured to the server using pegs and a single screw on each side. The outer rails

clip into the rack rails using a tool-less design. The inner rails slide and lock into the outer rails, and can be extended in front of the server for service.

2.7.1.2 Storage Node mounting kit

The Storage Node mounting kit 1U rails have the words "LEFT" and "RIGHT" stamped on them. The rails clip into the rack rails using a tool-less design.

2.7.2 Differences between the 3U mounting kits

All 3U Mounting kits use the same base design.

Figure 2-12.   Base 3U mounting kit
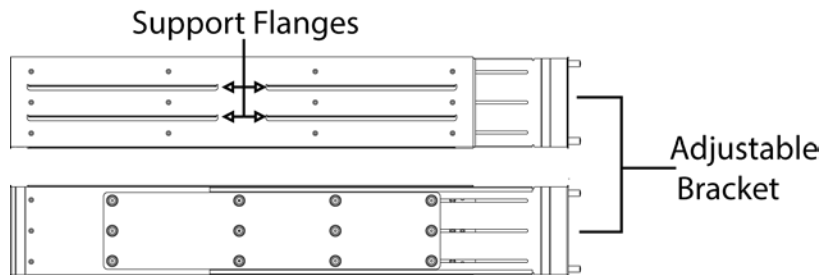
3U mounting kits also include a stability bracket.

Figure 2-13.   System Interconnect 3U mounting bracket (shown in blue)
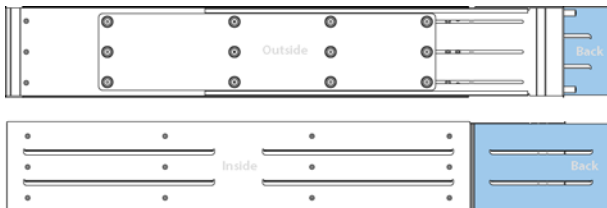
This additional bracket has a set of slots at the end. These slots are designed to receive a set of tabs that protrude from the back of System Interconnects and Storage Nodes. This prevents the components from tilting or shifting during operation and maintenance.

Figure 2-14.   3U mounting kit vertical stability slots
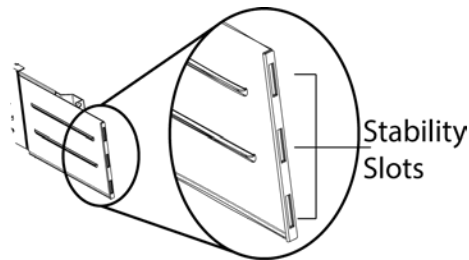
While both the System Interconnect and Storage Nodes share the additional extension on the mounting brackets, the support flanges are longer on the Storage Node 3U mounting kit.

Figure 2-15.   Support flange differences
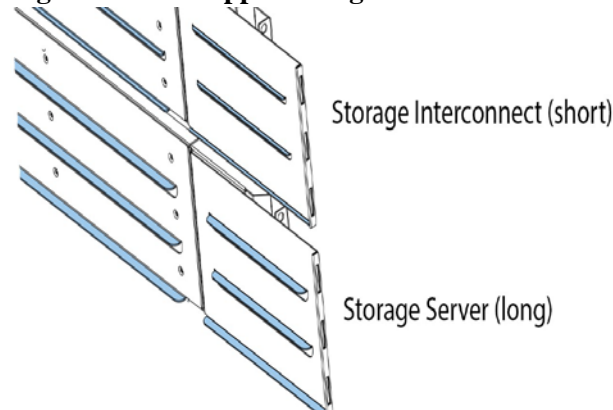
2.7.2.1 3U washer plates

3U mounting kits also come with a set of washer plates that are used to secure the mounting brackets to the rack posts. These washer plates come in two varieties:

Figure 2-16.   With standoffs

Figure 2-17.   Flush

Each kit has four washer plates, two per bracket. Of the two washer plates per bracket, one is used to attach the mounting bracket to the front rack posts, and one is used to attach the rear. However, the type of washer plate that is used for each of the three types of 3U Mounting kits is different depending on the kit. The following table shows which washer plates to use with the 3U Mounting kit being installed.

Table 2-7.   Correct Washer Plates for each 3U mounting kit

3U mounting kit	Front Washer Plate	Rear Washer Plate
System Interconnect	Standoffs	Flush
Storage Node	Flush	Flush
System Node	Standoffs	Flush

Washer plates also have a front and a back.The chamfered holes should open towards the outside of the rack so that the screws sit flush. In the washer plate with the standoffs, screws should only be inserted into the top and bottom holes. The thumbscrews on the blanking plates will attach to the standoffs.

2.7.3 Replaceable parts for mounting kits

The following table lists all of the replaceable mounting kits in the system.

Replaceable part	Hot swappable?	Part number
Storage Node 1U mounting kit	No	1EX0404
System Interconnect mounting kit	No	1EX0244
System Node and System Expansion Node 1U mounting kit	No	1EX0135

3 Parts replacement steps

The following sections describe replacement procedures for the ActiveScale P100.

3.1 S5L Node Assembly

This topic provides images to assist in removal and replacement of the S5L Server components.

3.1.1 Removing the Top Cover

To remove the Top Cover Rear:
1. Remove the screw in the middle.
2. Press and hold on the Blue release mechanism and push forward.
3. Remove the lid.
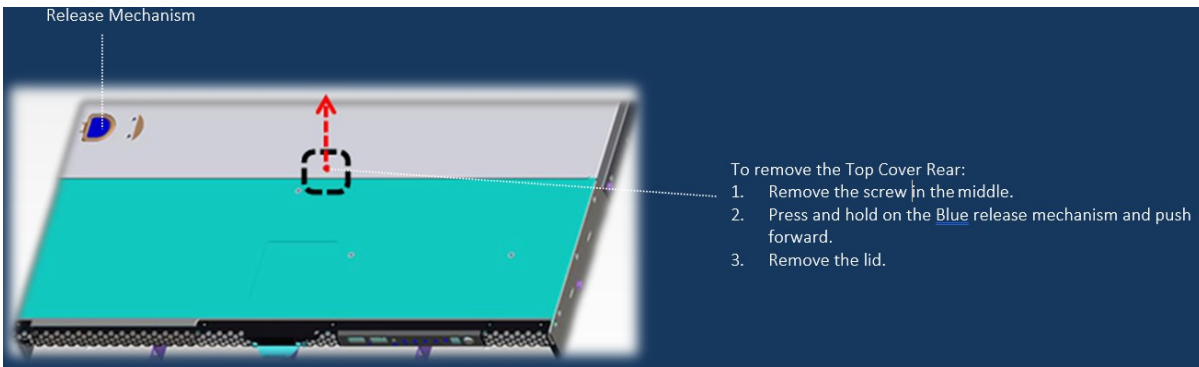
3.1.2 Installing the Motherboard

1. Slide in the Motherboard following the arrow's direction in place.
2. Lock the motherboard in place with 2 screws.
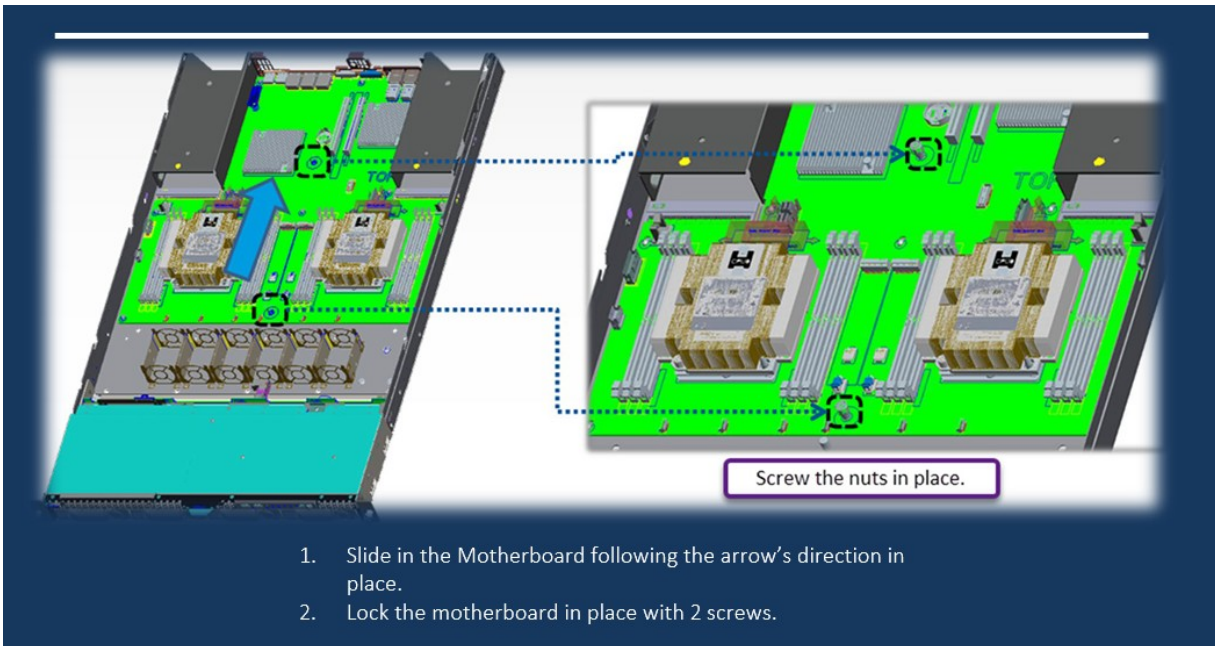
3.1.3 HDD Board Installation

The following images provides instructions for the Top Cover removal and assembly.

3.1.3.1 Removing the Top Cover

Middle Top Cover Removal and Assembly

1. Remove both screws.

2. Remove Middle Top Cover.

Middle Top Cover Removal and Assembly

3. Install the Front Panel BD and its cable.

1. Remove and keep this screw aside.

2. Front Panel Bracket should be easily removable.

4. Secure the Front Panel BD with a screw.

5. Reinsert the Front Panel BD/Bracket in place and secure it with the same screw from Step 1.

3.1.3.2 Inserting the HDD Backplane

Step Installation

1. Insert the HDD Back Plane in place.

2. Fasten and secure the back plane with 3 screws.

3. Put the Middle Top Cover and its screws back in place respectively.
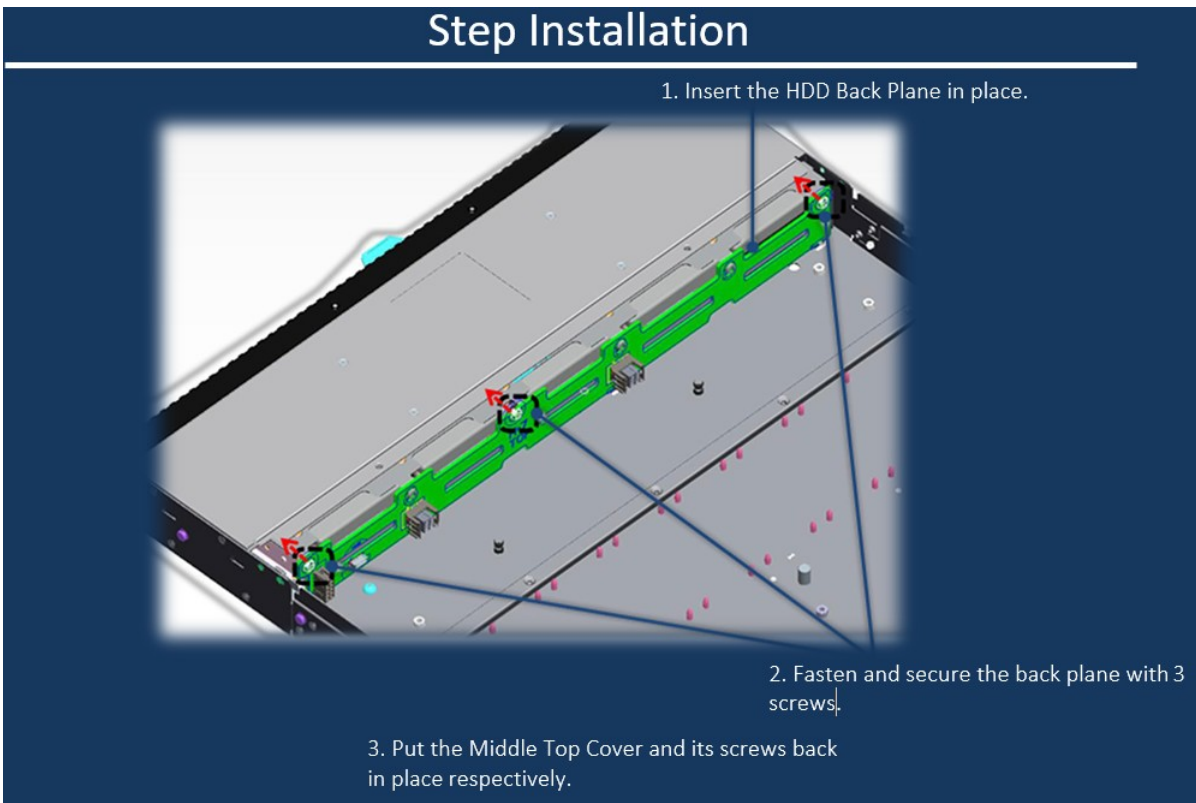
3.1.4 Fans Assembly

3.1.4.1 Assembling The Fan Components
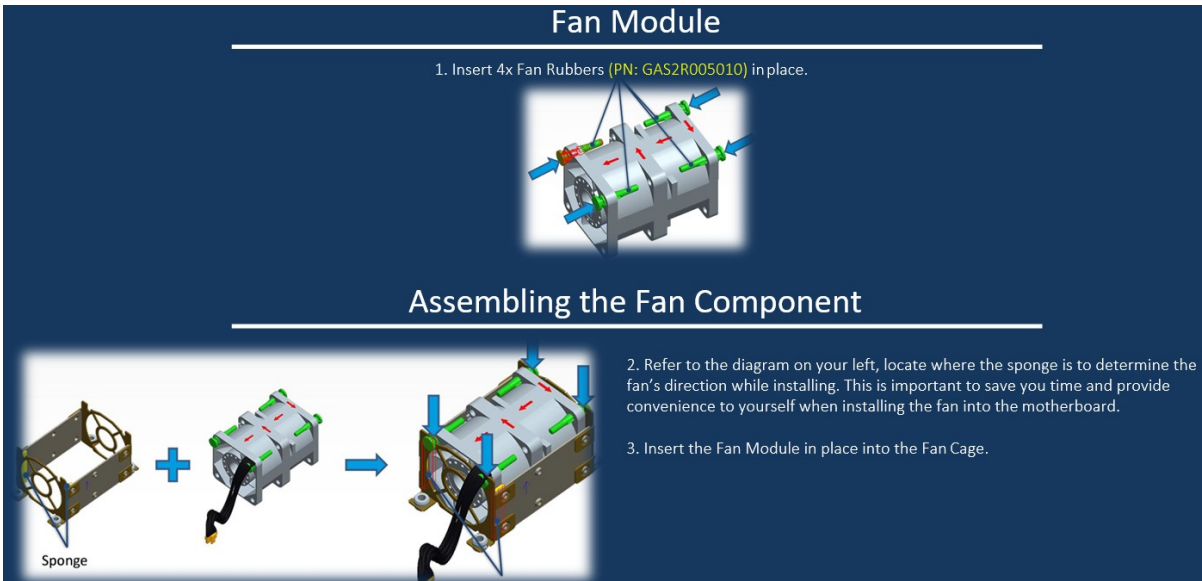
3.1.4.2 Installing the Fan Assembly

Fan Installation

4. Install the fans, the sponge side of the Fan Cage should be facing the motherboard.

5. Place the air duct cover after installing the Fan Cages.
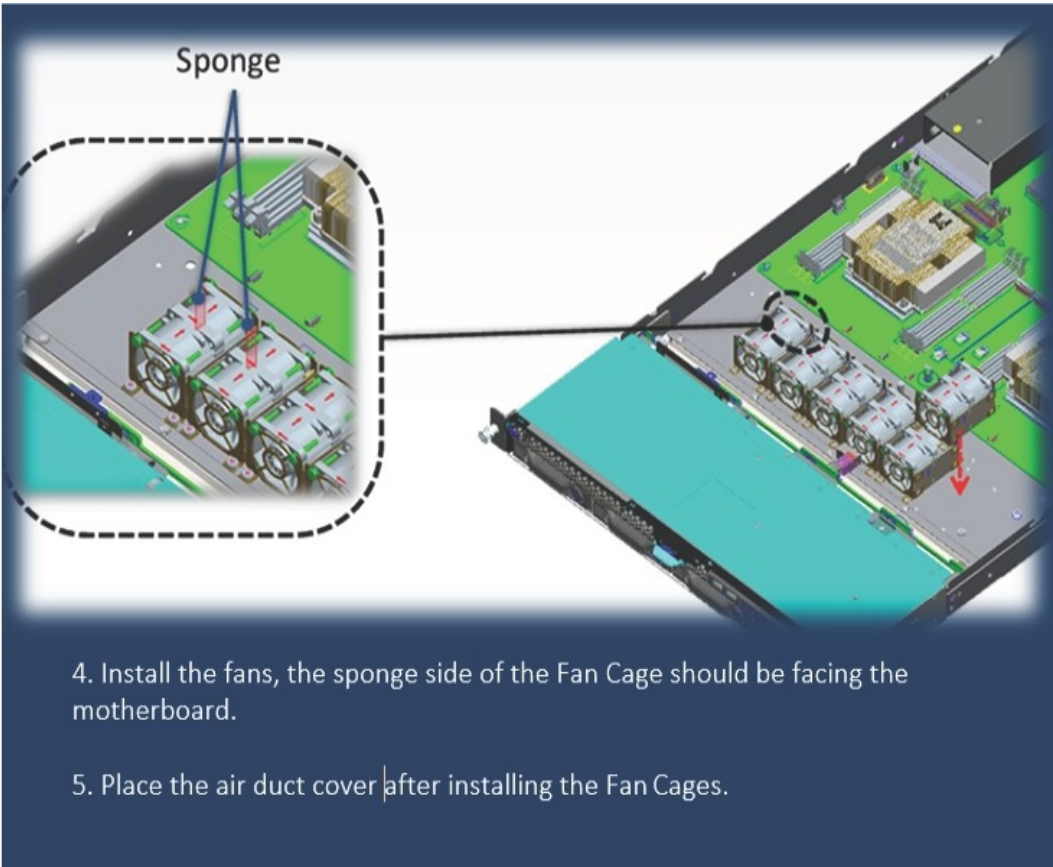
3.1.4.3 Routing the Fan Cables
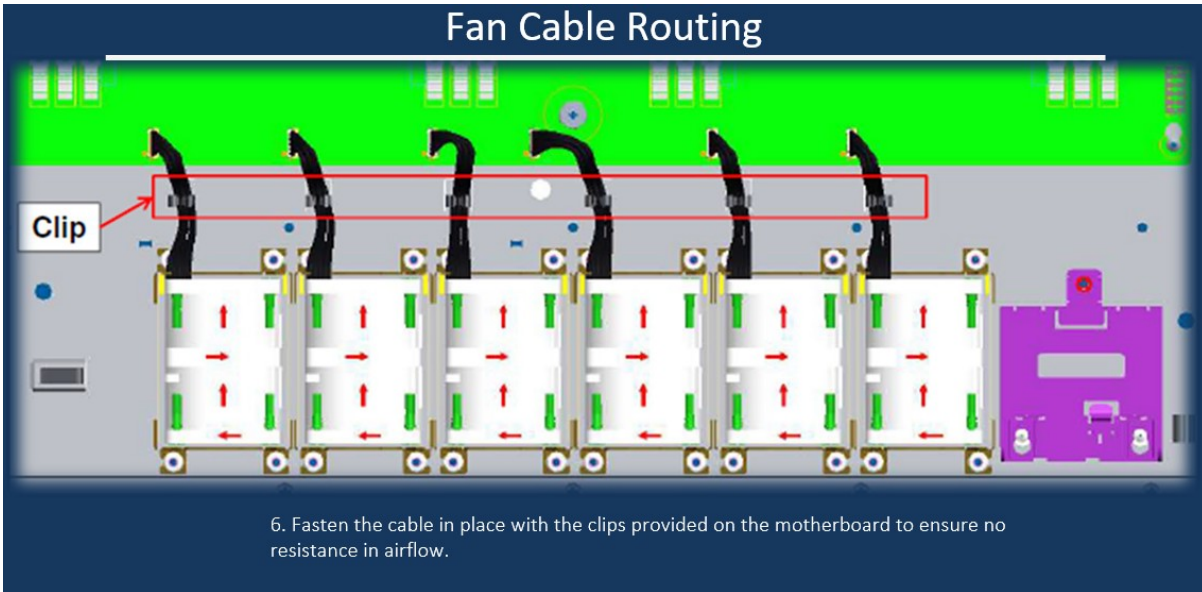
3.1.5 GPIO, SMBUS, Main Power Connections

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MINISAS_HD_0(SAS)

SAS_HD_B(PORT4-7)   SAS_HD_A(PORT0-3)

Clip

Make sure the
cables on this side
are secured with
the clip provided.

SATA/SAS Connections

MEZZ_SIDE

Clip

SAS_HD_B(PORT4-7)   SAS_HD_A(PORT0-3)

PCIe Riser Module

2. Lift up Riser Module.
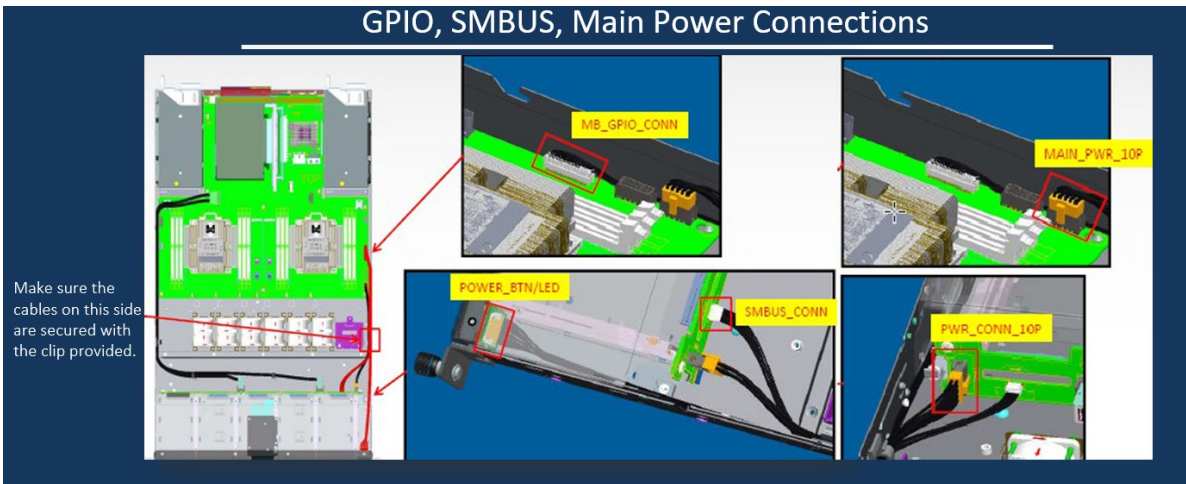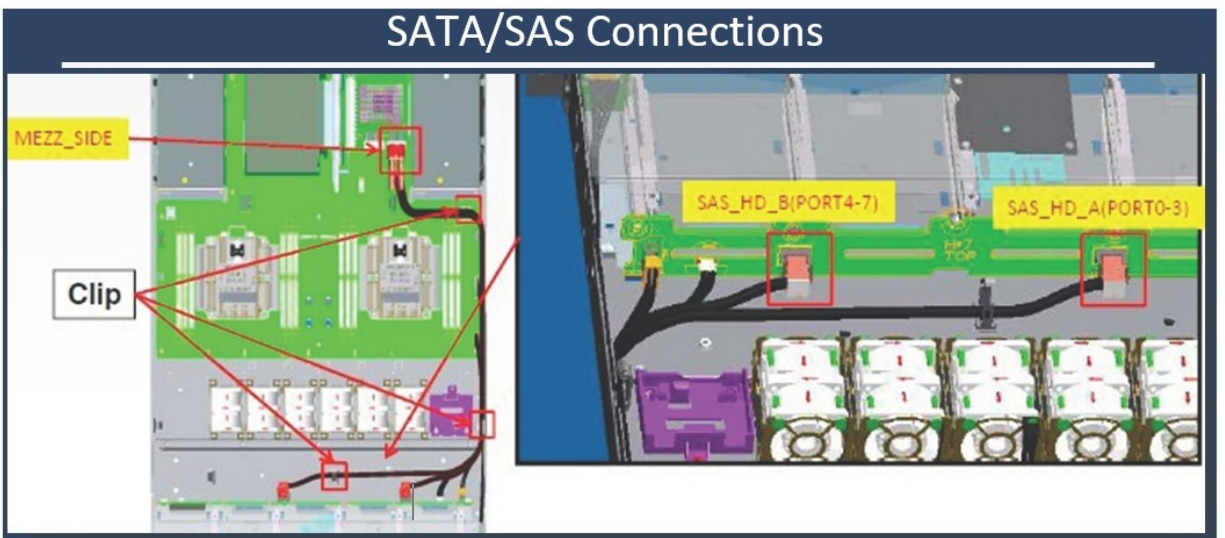
1. Turn off plunger before removing Riser Module.

Riser Assembly pt. 1

1. Insert Riser 1 Board according to the diagram.

2. Secure Riser 1 Board with 2 screws.

3. We'll be working on the other side of the riser in the next page.
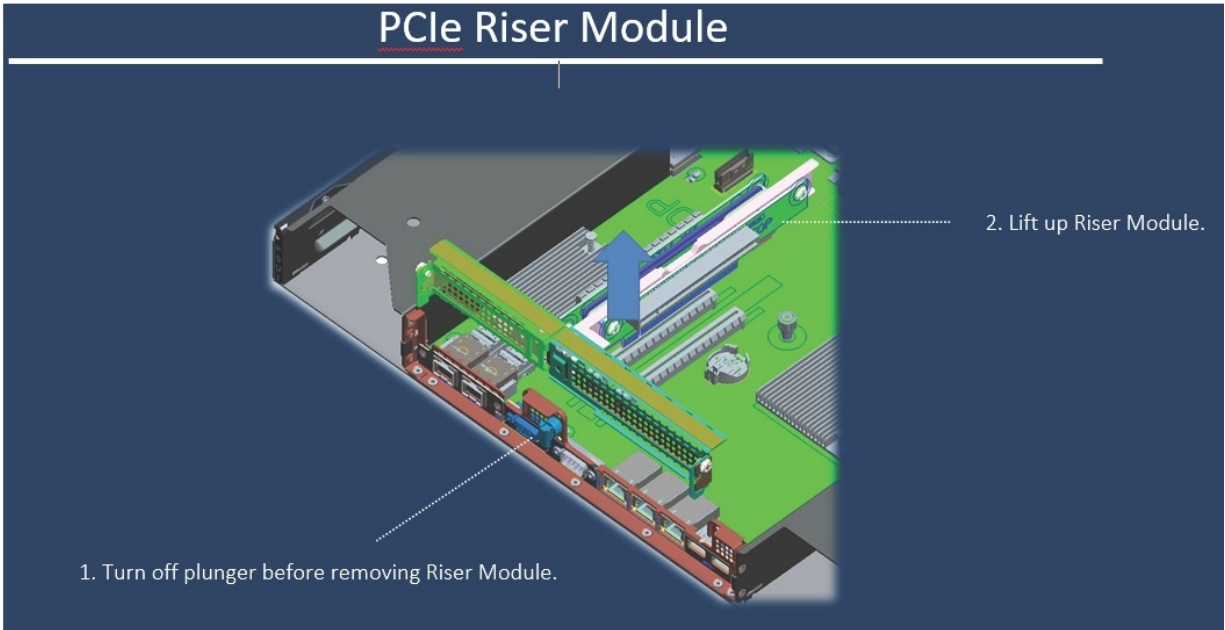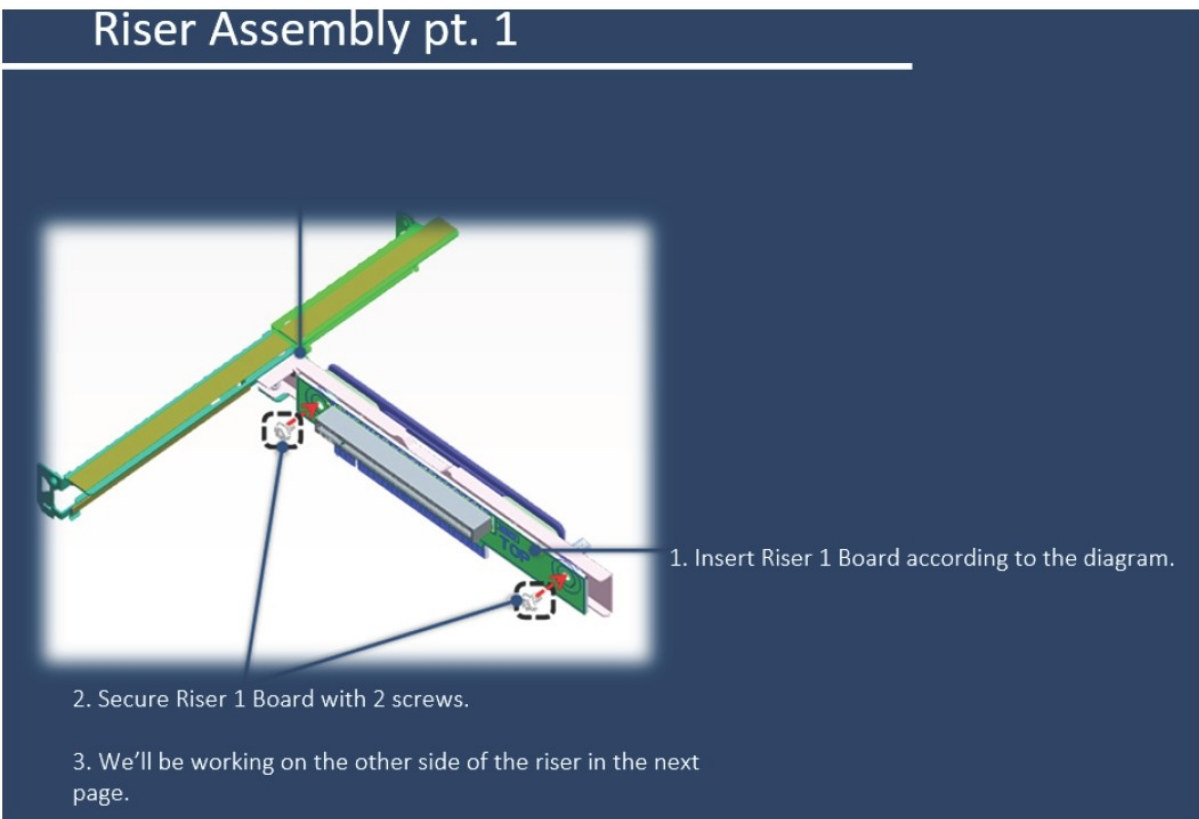
Riser Assembly pt. 2

Same Riser Bracket but flipped.

1.Attach Riser 2 Board.

2. Secure Riser 2 Board with 2 Screws.

Installing ISA Brackets

1. Install the ISA Bracket.
1. Install the ISA Bracket.
2. Secure the ISA Brackets with 2 Screws.
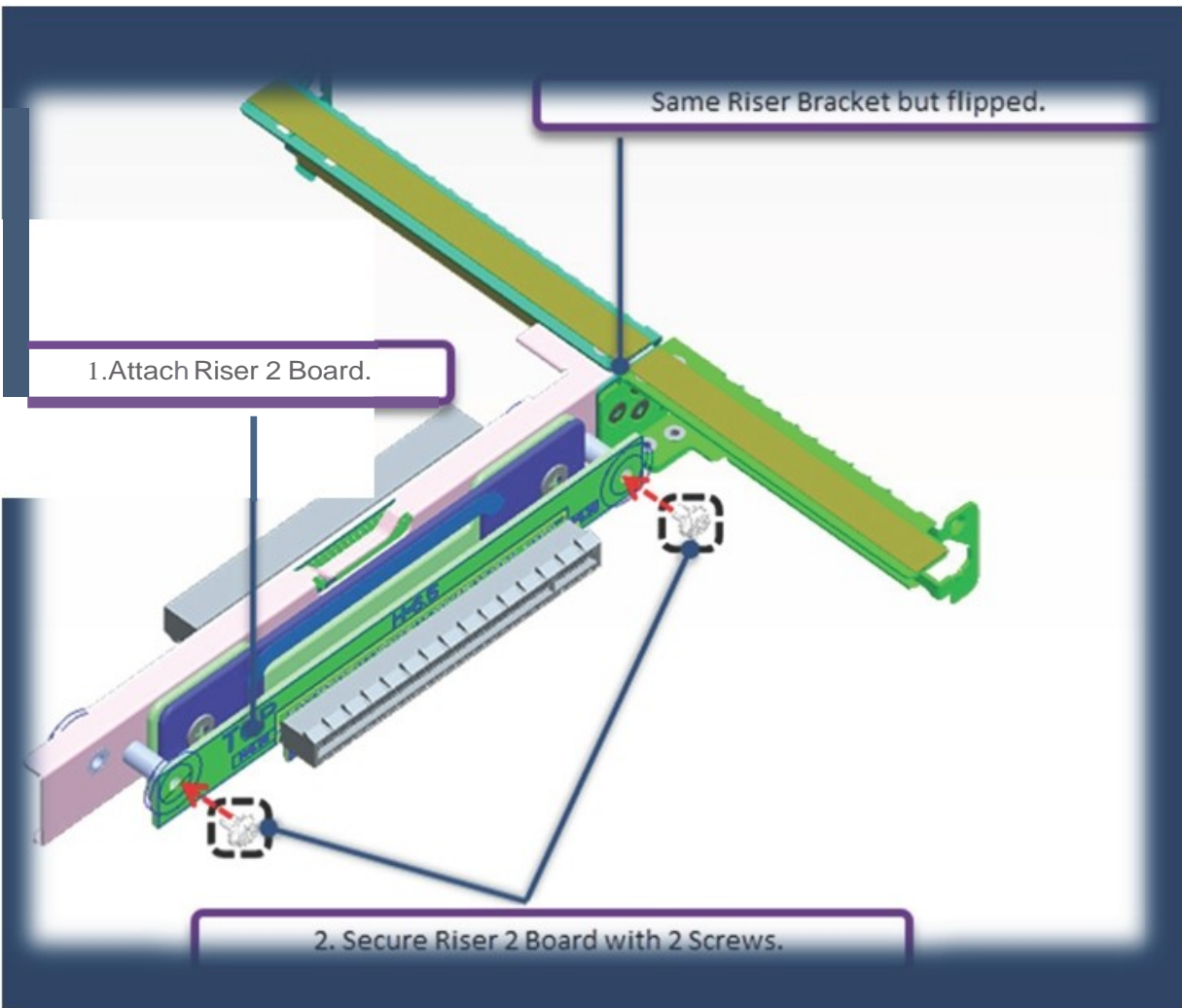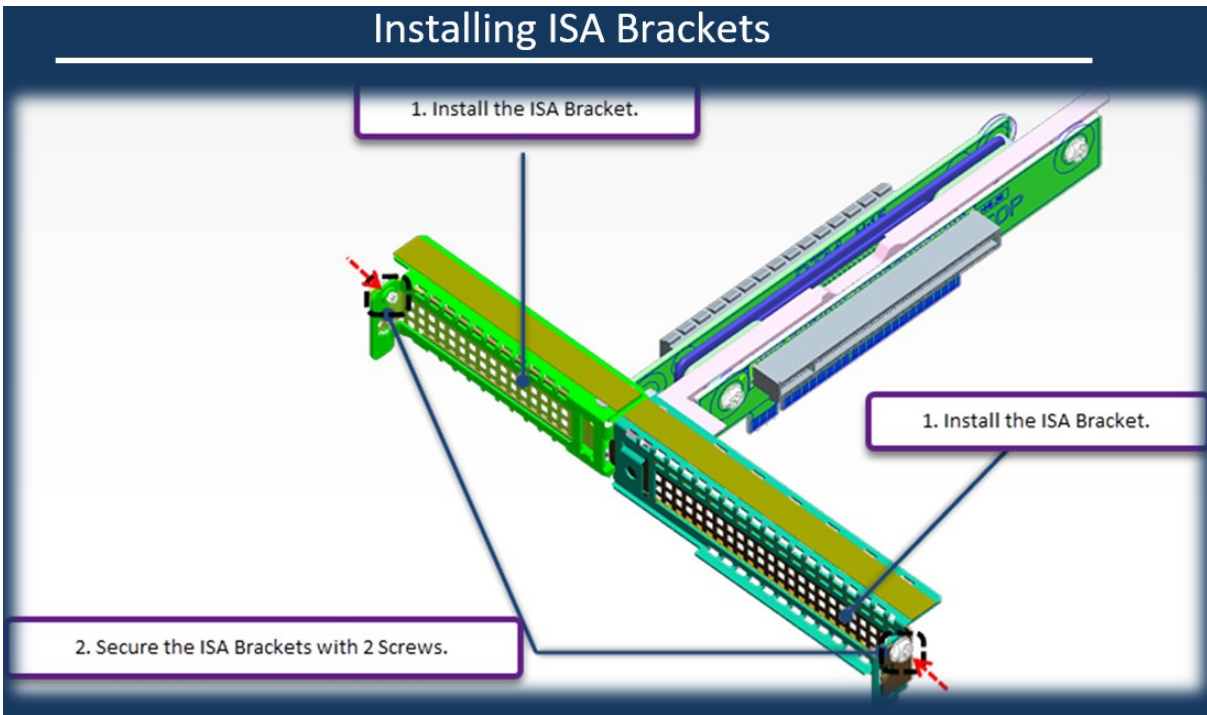
3.1.6 Handles Installation
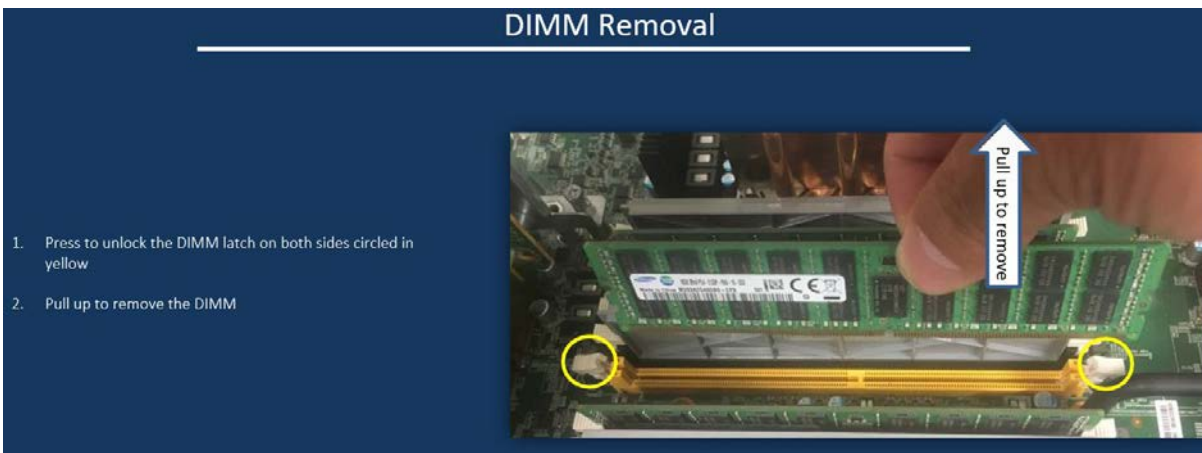
1. Put Handles in place.
2. Fasten Handle to Chassis with 2 Screws.
3. Repeat steps for the other side.

3.1.7 DIMM Removal

3.1.8 CPU Assembly
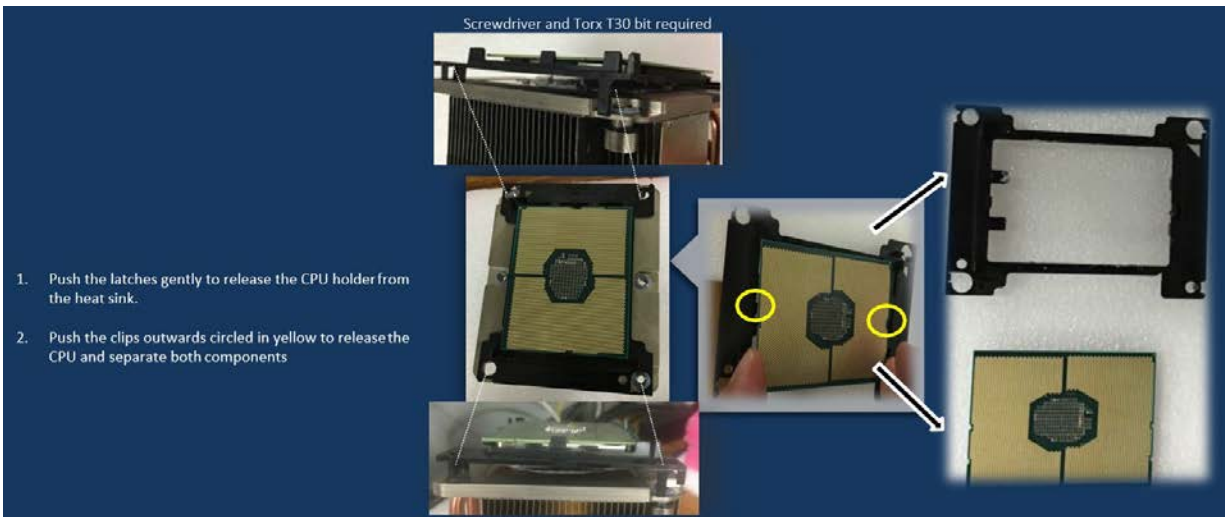
3.2   S2PC System Node part replacement instructions

The follow sections provide instructions for servicing System Node components.

3.2.1 S2PC Replacing System Node drives (SSD and HDD)

The replacement procedures in this section apply to both the SSD and HDD drives at the front of the system.

Table 3-8.   System Node drive replacement overview

Required Tools	Personnel Required	Replacement Time
None	1	15 to 25 Minutes

3.2.1.1 S2PC Removing a System Node drive

To remove a System Node drive:

1. If you are replacing a faulty drive, locate the drive and verify that is in the **Decommissioned** state.

    > **Important:** The replacement drive must be the same model as the drive that you are replacing. Also, the disk must be completely empty, with no data and no partition table.

    > **Important:** If you are removing drives as part of System or Storage Node replacement, skip steps a through f.

    a. On the **ActiveScale SM Dashboard**, click the **Resources** tab.

    b. In the system image on the resources page, click the node with the faulty drive. The node will have an alert icon, and the node status page will appear.

    c. Scroll down the page to the components lists and click the tab for HDDs or SSDs depending on which type of drive has failed.

    d. Look through the list of drives and locate the faulty drive. The status column for the drive will read **Degraded**, **Decommissioning**, or **Decommissioned**.

    > **Note:** For more information about drive states, refer to the *ActiveScale Administrator Guide.*

    • If the status is **Degraded**, the drive has displayed problematic behavior and will undergo automatic repair. If the problematic behavior continues, the drive will be decommissioned.

    > **Important:** Do not remove a drive in the **Degraded** state. If the drive returns to the **Online** state, the automatic repairs were successful and no further action is required.

    • If the status is **Decommissioning**, the drive is either undergoing automatic repair, or is being prepared for safe removal from the system. When it is safe to remove the drive, the state will change to **Decommissioned**.

    > **Important:** Do not remove drives in the **Decommissioning** state. If the drive never reaches the **Decommissioned** state, contact support.

    • If the status is **Decommissioned**, proceed with physical drive replacement.

    e. Click the **Ident** button to light the front identification LED on the drive.

    f. Identify the physical location of the drive.

2. Press the release button on the drive carrier to release the handle.

3. Pull the drive out of the slot with even pressure.

Figure 3-18.   Removing a drive
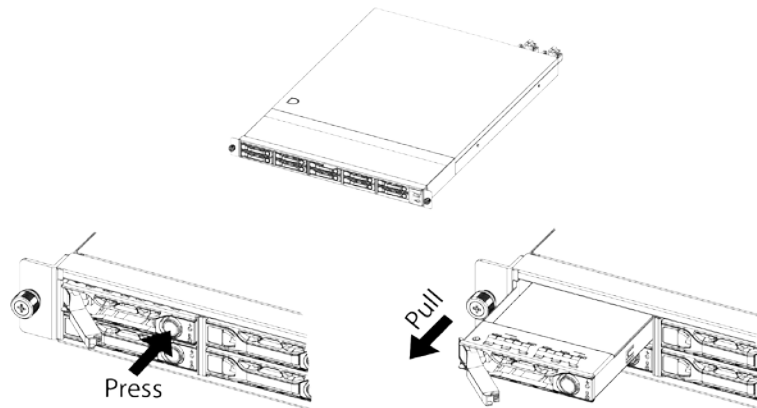
4.   Record the serial number of the failed device for return purposes.

3.2.1.2 Installing a System Node drive

To install a replacement System Node drive:

1.   Insert the replacement drive into the empty slot left by the faulty drive.

2.   Place one finger on each side of the drive and press with even pressure until the drive stops.

3.   Swing the release handle back into the carrier to fully seat the drive into the slot. When the drive is inserted, the LEDs on the drive carrier will light up as the drive is being integrated into the system.

4.   Wait for the activity LED to start begin flashing to be sure the drive is integrated successfully.

5.   Check to make sure that the drive has been reintegrated and the status is **Online**. If the status is **Degraded**, **Decommissioning**, or **Decommissioned**, wait for approximately 15 minutes and check again.

> **Important:** If the status does not change to **Online**, retry the replacement process or contact Quantum Corporation Support.

3.2.2 S2PC Replacing System Node PSUs

> **Caution:** Be careful not to accidentally remove the power cord of the second PSU. This will power down the System Node and can cause data loss.

Table 3-9.   System Node PSU Replacement Overview

Required Tools	Personnel Required	Replacement Time
None	1	15 to 25 Minutes

3.2.2.1 S2PC Removing a System Node PSU

To remove a System Node PSU:

1.   Unplug the AC power cord from the faulty PSU.

2. Press the release lever in towards the handle to release the PSU from the server.

3. Grasp the handle and pull with even pressure until the unit is removed.

Figure 3-19.   Scalar Node PSU handle and latch release
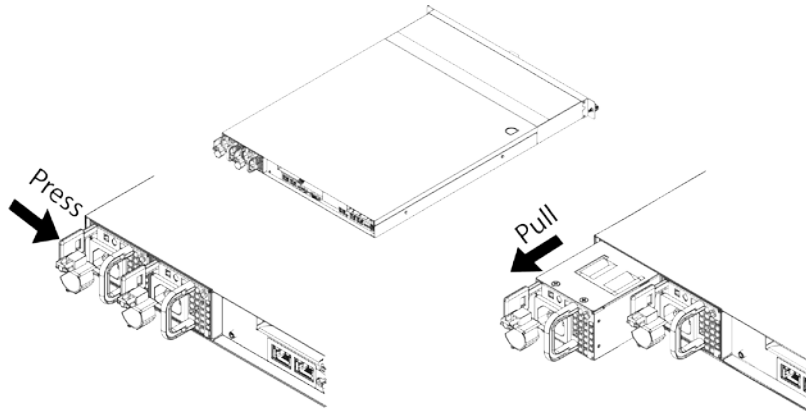
4. Record the serial number of the failed device for return purposes.

3.2.2.2 Installing a System Node PSU

To install a replacement System Node PSU:

1. Align the replacement PSU to the empty slot with the handle facing inward and the release tab facing outward.

2. Push the PSU into the server until there is an audible click.

3. Reconnect the AC power cord.

4. Once the power cord is connected, check that the LED on the rear of the PSU is green.

3.2.3 Replacing SFP+ transceivers

The Small Form-factor Pluggable Plus (SFP+) ports support high density data transfers between the System Node and System Interconnects at a rate of up to 10Gbit/s. This connection also controls commands, diagnostic information, and component information to the host.

Table 3-10.   SFP+ Transceiver Replacement Overview

Required Tools	Personnel Required	Replacement Time
None	1	5 to 10 minutes

3.2.3.1 Removing a SFP+ transceiver

To remove an SFP transceiver:

1. From the rear of the rack, remove the fiber optic cables from the failed SFP+ transceiver on the System Node.

2. Remove the transceiver from the server.

3. Open the SFP+ transceiver latch and remove the LC cable connector.

4. Remove the SFP+ transceiver from the System Node.

Figure 3-20.   SFP+ transceiver removal
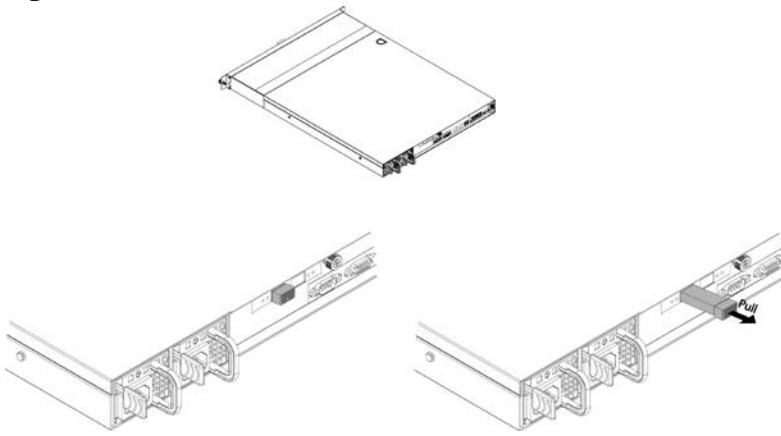
5. Record the serial number of the failed device for return purposes.

3.2.3.2 Installing a SFP+ transceiver

To install a replacement SFP+ transceiver:

1. Open the latch on the SFP+ transceiver.

2. From the rear of rack with the label facing down, insert the SFP+ transceiver into the SFP+ port on the System Node.

3. Close the latch on the SFP+ transceiver.

Figure 3-21.   SFP+ transceiver installation
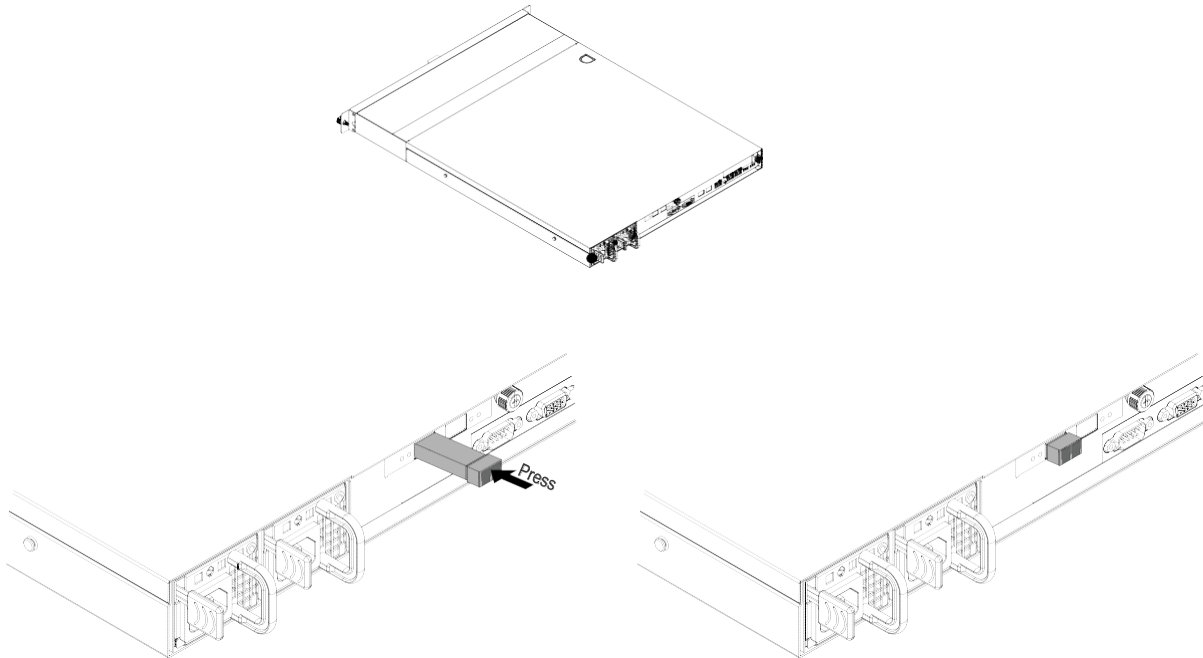
4. Insert both of the fiber optic cables into the replacement SFP+ transceiver.

5. Check to make sure that the activity LED on the port where the SFP+ transceiver replacement occurred is blinking steadily. This behavior confirms that data is being transmitted along that port.

3.2.4 Replacing System Nodes

Caution: The System Node weights . Take precautions when handling the System Node.

Caution: Disconnect all power sources before servicing.

Caution: Verify that the power cables are not damaged. If they are damaged, they may be a shock hazard and the system may need to be shutdown to replace the server.

Table 3-11.   System Node replacement overview

Required Tools	Personnel Required	Replacement Time
#2 Phillips Head Screwdriver	1	25 Minutes

3.2.4.1 Removing a System Node

To remove a System Node:

> **Tip:** Before you begin, verify that the cables connected to the System Node are labeled properly so they can be reconnected in the same order.

1. Shut down the node. If the node is already powered down (for example, because it has failed), skip this step.

> **Important:** Do not shut down a node unless all other nodes are healthy.

Figure 3-22.   Resources > Rack > Node > Shutdown

er: r00001 **Hardware Failures:**

System Node: HGST-S3-Site1-R01-SG01 | Action ▾

Status: Online   Serial:

Machine LED OFF

⟳ Reboot Node

⏻ Shutdown Node

SSDs

a. Click **Resources.**

b. On multi-site systems, select a site from the **Sites** pull-down menu.

c. In the **Racks** pull-down menu, select a system.

d. In the rack graphic, select the node you want to shut down. Typically, the node you want to shut down has a failure icon overlay.

e. In the node's **Actions** pull-down menu, select **Shutdown Node**.

f. A pop-up appears asking you to confirm that all other nodes in the system are healthy. If so, type the password for `admin` and click **Shutdown**.

Do not shutdown this node unless all other servers are up and running normally. Are you sure you want to continue?

Password [Password]

Cancel   Shut Down

g. Wait for ActiveScale SM to display a notification in a green banner indicating that the node was shut down successfully:

shutdown machine93a7c1a6-490c-440e-9f63-40c9a2689b85

> Rack: R01 | Action ▼

eScale P-100   **Serial Number:** USCSJO0101DA9999   **Software Vers**

h. Confirm that you shut down the right node by checking that its front and back LEDs are off.

2. Disconnect all the cables from the System Node.

3. Remove all of the drives from the front of the System Node. For more information, refer to the section S2PC Removing a System Node drive on page 49.

4. Unscrew the thumb screws on the front of the System Node. From this point, the removal procedure for the System Node differs based on the mounting kit used. **(1U mounting kit only, skip for 3U mounting kits)** Grasp the System Node and pull with even pressure until the System Node will not extend further.

5. **(1U mounting kit only, skip for 3U mounting kits)** Unlatch the System Node from the rack.

    a. Locate the release lever on the side of the System Node.

Figure 3-23.   Release Levers
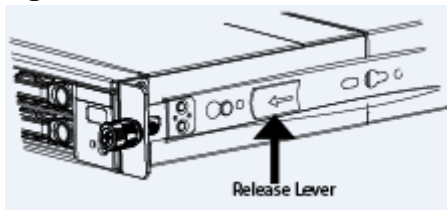
b. Press the latch release levers toward the front of the System Node. The System Node is now free from the rack and can be fully removed.

6. Carefully remove the System Node from the system.

7. (1U mounting kit only, skip for 3U mounting kits) For safety, push the rails that are extending out of the front of the rack back into the rack.

    a. Press the white release lever on the inside of the outer rails towards the front of the System Node.

    b. Push the rails into the rack.

8. **(1U mounting kit only, skip for 3U mounting kits)** Remove the rails from the faulty System Node

    a. Unscrew the two screws that attach the rails to the System Node.

    b. Slide the rails from the faulty System Node.

9. Record the serial number for return purposes. The serial number and part number are located on a pull-out tab located at the top of the System Node.

3.2.4.2 Installing a System Node

The installation procedure for the System Node differs based on the mounting kit used. For more information about 3U mounting kits, refer to Replacing 3U mounting kits on page 62. To install a System Node:

1. **(1U mounting kit only, skip for 3U mounting kits)** Attach the inner rails to the new System Node.

    a. Align the holes in the inner rail with the pegs on the side of the System Node.

    b. Slide the rail forward to lock it in place.

Figure 3-24.   Locking the inner rail to the System Node
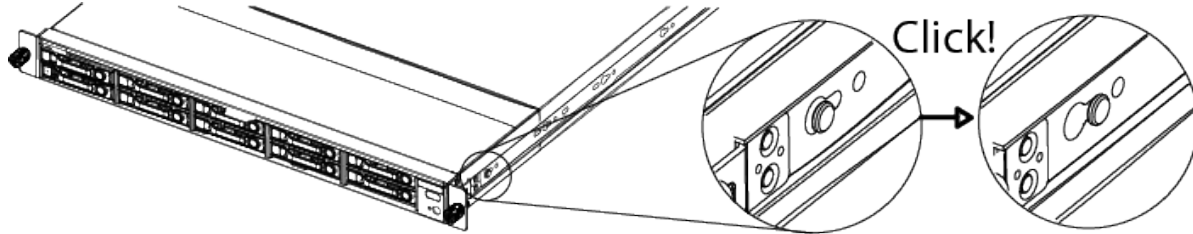
    c. Secure the inner rail to the System Node using one of the screws.

    d. Repeat these steps to attach the other inner rail.

2. **(1U mounting kit only, skip for 3U mounting kits)** Re-extend the rails on the rack using the levers on the inside of the rails.

3. Align the System Node to the rails attached to the rack.

4. Push the System Node into the rack until it stops. If the System Node uses a 1U mounting kit, the System Node will stop before it is fully seated in the rack.

5. **(1U mounting kit only, skip for 3U mounting kits)** On the sides of the rail, pull the blue tabs to allow the inner rail to slide all the way in.

6. With the System Node inserted fully into the rack, tighten the thumbscrews on the front of the System Node.

7. Replace the drives. For more information, refer to Installing a System Node drive on page 51.

8. Reconnect all of the cables in the order you removed them.

9. Power on the new System Node.

3.3 System Interconnect part replacement instructions

The following sections provide instructions for servicing System Interconnect components.

3.3.1 Replacing System Interconnect fans

Table 3-12.   System Interconnect fan replacement overview

Required tools	Personnel required	Replacement time
None	1	15 to 25 minutes

> **Tip:** Replacing the fans might require the use of a ladder or flashlight. This is because System Interconnects are biased towards the rear of the rack, but are only accessible from the front. This means that you might have difficulty locating the fans in a standard configuration.

3.3.1.1 Removing a System Interconnect fan

To remove the System interconnect fan:

1. Remove the blanking panel from the System Interconnect mounting kit.

    a. Remove the thumb screw from the front of the blanking panel.

    b. Grasp the blanking panel by the front cutouts.

    c. Pull the blanking panel from the mounting kit.

    > **Note:** You might have to remove adjacent blanking panels to fully access the 3U mounting kit or System Interconnects.

2. Identify the malfunctioning fan at the back of the System Interconnect.

3. Grasp the clips and pinch to unlatch the fan from the system.

4. With even pressure, pull the fan out of the system.

5. Record the serial number of the faulty device for return purposes.

3.3.1.2 Installing a System Interconnect fan

To install a replacement System Interconnect fan:

1. Align the replacement fan to the empty slot.

2. With even pressure, push the replacement fan into the system until there is an audible click. The fan should begin operating immediately.

3. Replace the blanking panels at the front of the system.

3.3.2 Replacing System Interconnect PSUs

> **Caution:** Be careful not to accidentally remove the power cord of the second PSU. This will bring the System Interconnect down and cause data loss.

Table 3-13.   System Interconnect PSU replacement overview

Required tools	Personnel required	Replacement time
None	1	15 to 25 minutes

> **Tip:** Replacing the PSU might require the use of a ladder or flashlight.

3.3.2.1 Removing a System Interconnect PSU

To remove a System Interconnect PSU:

1. Remove the blanking panel from the System Interconnect mounting kit.

    a. Remove the thumb screw from the front of the blanking panel.

    b. Grasp the blanking panel by the front cutouts.

    c. Pull the blanking panel from the mounting kit.

> **Note:** You might have to remove adjacent blanking panels to fully access the 3U mounting kit or System Interconnects.

2. Remove the PSU power cable.

3. Press the latch release lever. This action releases the PSU from the System Interconnect.

Figure 3-25.   Latch release lever and handle
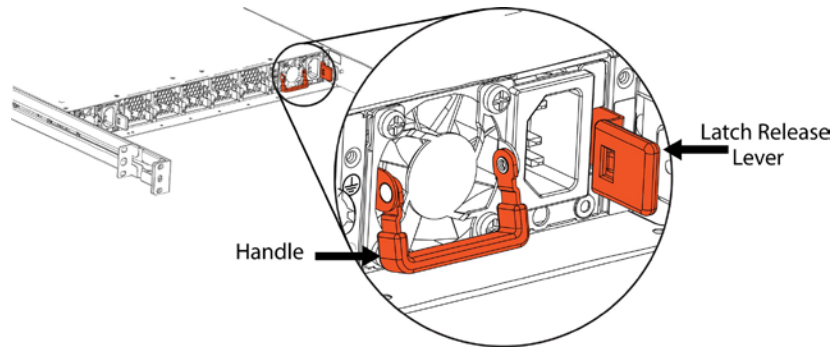
4. Grasp the handle and pull with even pressure until the PSU is removed from the system.

Figure 3-26.   Removing the PSU
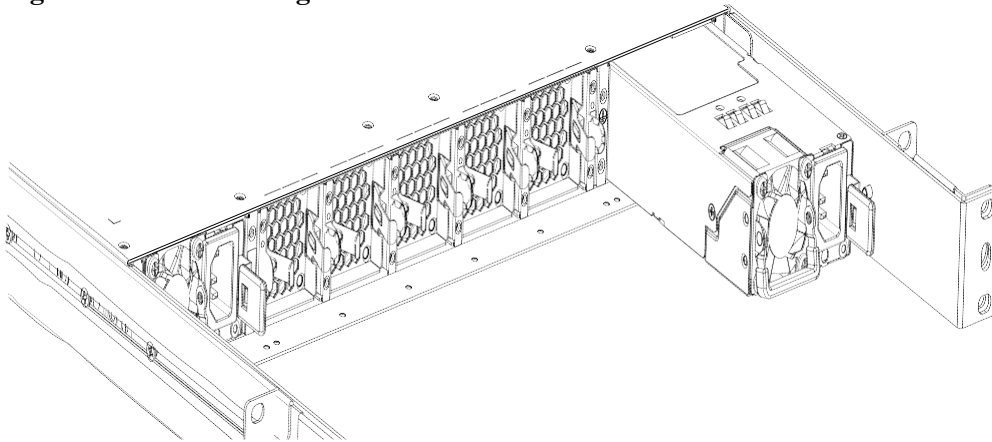
5. Record the serial number of the faulty device for return purposes.

3.3.2.2 Installing a System Interconnect PSU

To install a replacement System Interconnect PSU:

1. Align the replacement PSU to the empty slot.

2. Push with even pressure until there is an audible click.

3. Plug the power cord into the new PSU.

4. Replace the blanking panels at the front of the system.

3.3.3 Replacing QSFP+ 40G transceivers

Table 3-14.   System Interconnect QSFP+ 40G transceiver replacement overview

Required tools	Personnel required	Replacement time
None	1	5 to 10 min

3.3.3.1 Removing a System Interconnect QSFP+ 40G transceiver

To remove a QSFP+ 40G transceiver:

1. From the rear of the rack, remove the fiber optic cable from the failed transceiver.

2. Pull the transceiver loop until it is unseated from the port.

3. Remove the transceiver from the System Interconnect.

4. Record the serial number of the faulty component for return purposes.

Figure 3-27.   QSFP+ transceiver uninstalled
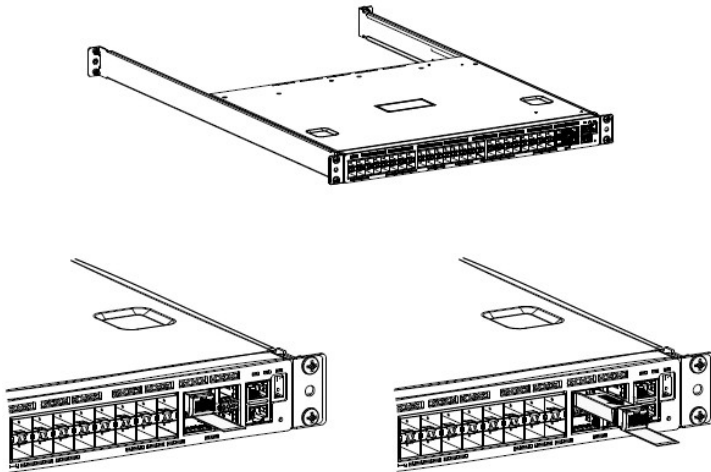
3.3.3.2 Installing a System Interconnect QSFP+ 40G transceiver

To install a replacement QSFP+ 40G transceiver:

1. From the rear of rack, with the label facing down, insert the transceiver into the Management port.

2. Push on the rear of the transceiver until there is an audible click.

Figure 3-28.   QSFP+ transceiver installed
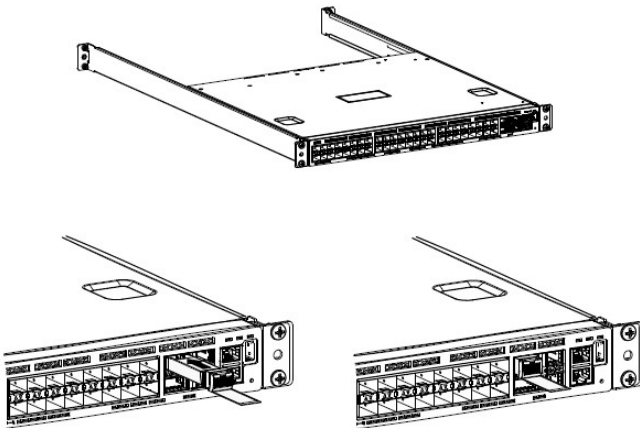
3. Insert both of the fiber optic cables into the QSFP+ transceiver.

3.3.4 Replacing System Interconnects

> **Caution:** If your System Interconnects use a custom configuration, contact Quantum Corporation support to obtain the custom configuration file before proceeding.

Table 3-15. System Interconnect Replacement Overview

Required tools	Personnel required	Replacement time
None	1	60 to 75 minutes

> **Caution:** Taking down a System Interconnect for replacement will limit bandwidth availability.

3.3.4.1 Removing a System Interconnect

To remove a System Interconnect:

1. Remove the blanking panel from the System Interconnect mounting kit.

   a. Remove the thumb screw from the front of the blanking panel.

   b. Grasp the blanking panel by the front cutouts.

   c. Pull the blanking panel from the mounting kit.

   > **Note:** You might have to remove adjacent blanking panels to fully access the 3U mounting kit or System Interconnects.

2. At the rear of the rack, remove the network cables from the front of the System Interconnect.

3. At the front of the rack, remove the power cords from the rear of the System Interconnect.

4. Locate and unscrew the retention screws on the front of the system that secure the 3U mounting kit adapter to the rack.

5. Gripping the System Interconnect firmly with both hands, pull forward with even pressure until it releases from the rack.

Figure 3-29. Removing System Interconnects
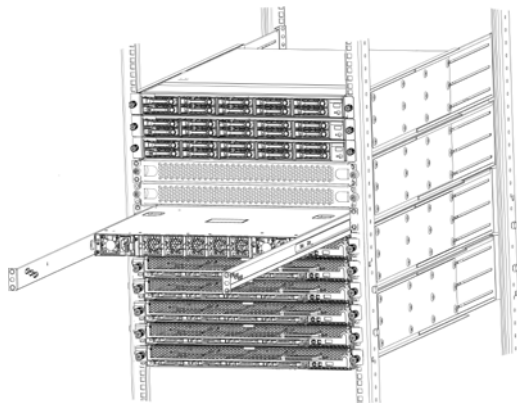
6. Record the serial number on the faulty component for return purposes.

3.3.4.2 Installing a System Interconnect

To install a replacement System Interconnect:

1. Align the replacement System Interconnect with the empty space in the rack and slide it completely into the rack.

2. From the front of the rack, reconnect the two power cords to the back of the System Interconnect.

3. Secure the blanking panels using the thumbscrews.

4. Reconnect all of the networking cables using the Cabling Map on page 66.

3.3.4.3 Programming a System Interconnect

> **Important:** The steps in this section are only required if you are replacing System Interconnect 2.

Replacement System Interconnects are programmed to function as System Interconnect 1 in the rack. If you are replacing System Interconnect 2, it must be reprogrammed.

To program a System Interconnect:

1. Obtain the correct System Interconnect configuration file for your system from Quantum Corporation support.

2. Edit the System Interconnect configuration file as follows:

   a. Modify the IP address for the syslog target to match your environment.

   b. Modify the IP address for VLAN to match your environment.

   c. Modify the time and time zone to match your environment.

3. Connect your computer to the Ethernet port on the System Interconnect.

4. Configure your computer manually to be on the same network as the System Interconnect with the following values:

   – Management Port: `192.168.123.0/24`

   – Subnet: `255.255.255.0`

   – Gateway: `192.168.123.123`

5. Open a `Telnet` session to the replacement System Interconnect and replace *`switchport_IP`* with the default IP address `192.168.123.123`.

   The System Interconnect command prompt appears.

6. Log in using the default credentials (user name admin, no password).

7. Type `enable` to enter the Privileged EXEC command mode.

```
(Routing)>enable
```

8. Type `configure` to enter the Privileged CONF command mode.

```
(Routing)#configure
(Routing)(Config)#
```

9. Configure the name of the switch.

```
(Routing)(Config)#DC01-SW02
(DC01-SW02)#
```

Replace `DC01` with the data center index you use for this data center. Replace `SW01` with `SW02` if you are replacing the upper System Interconnect.

The prompt changes to the new name of the switch.

10. Copy the entire contents of your modified System Interconnect configuration file, and paste it into the telnet session.

11. Save the new configuration.

```
(DC01-SW02) #write memory
Are you sure you want to save? (y/n) y
Config file 'startup-config' created
successfully. Configuration Saved!
```

This operation may take a few minutes. Management interfaces are not available during this time.

12. Verify that the settings on the System Interconnect match your configuration file.

```
(DC01-SW02) #show startup-config
```

3.4 Storage Node part replacement instructions

The following sections provide information about Storage Node part replacement.

3.4.1 Replacing 3.5 inch drives

Table 3-16. 3.5 HDD replacement overview

Required tools	Personnel required	Replacement time
None	1	15 to 25 minutes

3.4.1.1 Drive replacement guidelines

When replacing drives, do not:

- Install 10 TB drives into slots that held 12 TB drives.
- Install 10 TB or 12 TB drives into slots that held 14 TB drives.

3.4.1.2 Removing a 3.5 inch drive

To remove a 3.5 inch drive:

1. If you are replacing a faulty drive, locate the drive and verify that is in the **Decommissioned** state.

    > **Important:** The replacement drive must be the same type and equal or greter in size as the drive that you are replacing. Also, the disk must be completely empty, with no data and no partition table.

    > **Important:** If you are removing drives as part of System or Storage Node replacement, skip steps a through f.

    a. On the **ActiveScale SM Dashboard**, click the **Resources** tab.

    b. In the system image on the resources page, click the node with the faulty drive. The node will have an alert icon, and the node status page will appear.

    c. Scroll down the page to the components lists and click the tab for HDDs or SSDs depending on which type of drive has failed.

    d. Look through the list of drives and locate the faulty drive. The status column for the drive will read **Degraded**, **Decommissioning**, or **Decommissioned**.

    > **Note:** For more information about drive states, refer to the *ActiveScale OS Administrator Guide*.

    *   If the status is **Degraded**, the drive has displayed problematic behavior and will undergo automatic repair. If the problematic behavior continues, the drive will be decommissioned.

    > **Important:** Do not remove a drive in the **Degraded** state. If the drive returns to the **Online** state, the automatic repairs were successful and no further action is required.

    *   If the status is **Decommissioning**, the drive is either undergoing automatic repair, or is being prepared for safe removal from the system. When it is safe to remove the drive, the state will change to **Decommissioned**.

    > **Important:** Do not remove drives in the **Decommissioning** state. If the drive never reaches the **Decommissioned** state, contact Quantum Corporation support.

    *   If the status is **Decommissioned**, proceed with physical drive replacement.

    e. Click the **Ident** button to light the front identification LED on the drive.

    f. Identify the physical location of the drive.

2. Remove the drive tray.

    a. Locate the release lever under the drive tray handle at the front of the Storage Node.

Figure 3-30.   Drive tray release lever
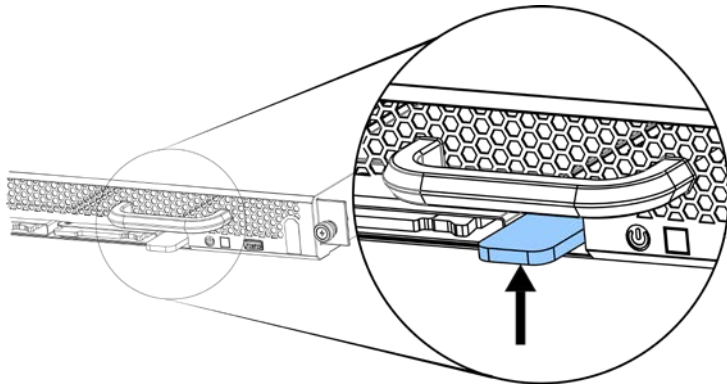
b. Press upward on the release lever and use the handle to pull the tray out of the Storage Node with even pressure.

Figure 3-31.   Drive tray pulled out
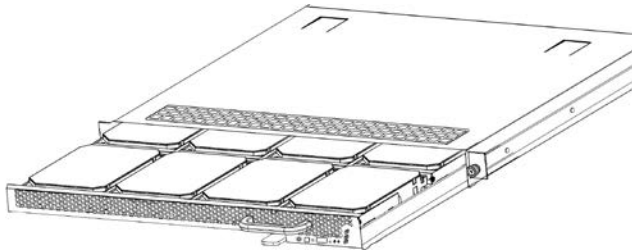
3. Remove the necessary drives from the drive tray.

> **Important:** If you remove more than one drive, record the order that the drives were removed so that they can be placed back in the proper location. Consider labeling each drive.

a. Locate the drive carrier handle release button.

b. Press the release button and swing the drive carrier handle upward.

Figure 3-32.   Drive handle operation
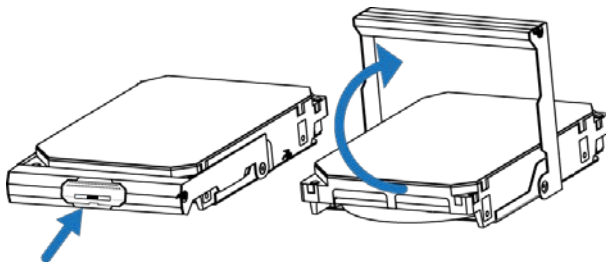
The drive is now free from the tray and can be removed.

Repeat these steps for all required drives. If you are removing drives as part of a Storage Node replacement, remove all of the drives. If you are returning a faulty drive, record the serial number for return purposes.

3.4.1.3 Installing a 3.5 inch drive

To install a replacement 3.5 inch drive:

1. Position the drive carrier handle on the replacement drive in the upward position.
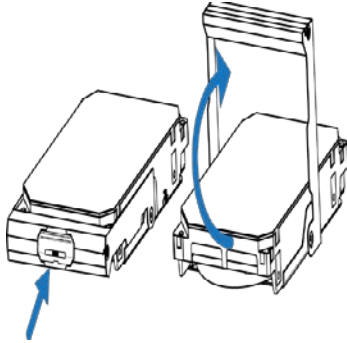
2. Align the drive in the drive tray with the power and data connectors facing toward the rack and set it in the drive tray.

3. Swing the drive carrier handle down. The drive should slide into place and there should be a click when the drive is secured.

4. Slide the drive tray back into the system.

5. Check to make sure that the drive has been reintegrated and the status is **Online**. If the status is **Degraded**, **Decommissioning**, or **Decommissioned**, wait for approximately 15 minutes and check again.

> **Important:** If the status does not change to **Online**, retry the replacement process or contact Quantum Corporation Support.

3.4.2 Replacing 2.5 inch drives

Table 3-17.   2.5 inch drive replacement overview

Required tools	Personnel required	Replacement time
None	1	15 to 25 minutes

3.4.2.1 Removing a 2.5 inch drive

To remove the 2.5 inch SSD:

1. If you are replacing a faulty drive, locate the drive and verify that is in the **Decommissioned** state.

> **Important:** The replacement drive must be the same model as the drive that you are replacing. Also, the disk must be completely empty, with no data and no partition table.

> **Important:** If you are removing drives as part of System or Storage Node replacement, skip steps a through f.

a. On the **ActiveScale SM Dashboard**, click the **Resources** tab.

b. In the system image on the resources page, click the node with the faulty drive. The node will have an alert icon, and the node status page will appear.

c. Scroll down the page to the components lists and click the tab for HDDs or SSDs depending on which type of drive has failed.

d. Look through the list of drives and locate the faulty drive. The status column for the drive will read **Degraded**, **Decommissioning**, or **Decommissioned**.

> **Note:** For more information about drive states, refer to the *ActiveScale OS Administrator Guide*.

  • If the status is **Degraded**, the drive has displayed problematic behavior and will undergo automatic repair. If the problematic behavior continues, the drive will be decommissioned.

> **Important:** Do not remove a drive in the **Degraded** state. If the drive returns to the **Online** state, the automatic repairs were successful and no further action is required.

  • If the status is **Decommissioning**, the drive is either undergoing automatic repair, or is being prepared for safe removal from the system. When it is safe to remove the drive, the state will change to **Decommissioned**.

> **Important:** Do not remove drives in the **Decommissioning** state. If the drive never reaches the **Decommissioned** state, contact Quantum Corporation support.

  • If the status is **Decommissioned**, proceed with physical drive replacement.

e. Click the **Ident** button to light the front identification LED on the drive.

f. Identify the physical location of the drive.

2. Press the drive carrier handle release. The handle will pop out.

Figure 3-33.   Removing the 2.5 inch drive
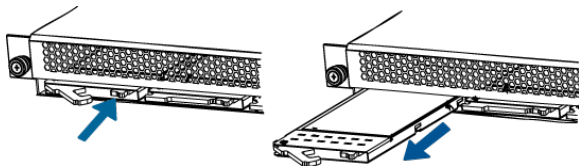
3. Use the handle to pull the faulty SSD from the system.

4. Record the serial number of the faulty device for return purposes.

3.4.2.2 Installing a 2.5 inch drive

To install a replacement 2.5 inch drive:

1. Align the replacement drive with the empty slot and slide it into the Storage Node until it stops.

2. Press the drive carrier handle in until there is an audible click.

3. Check to make sure that the drive has been reintegrated and the status is **Online**. If the status is **Degraded**, **Decommissioning**, or **Decommissioned**, wait for approximately 15 minutes and check again.

> **Important:** If the status does not change to **Online**, retry the replacement process or contact Quantum Support.

3.4.3 Replacing Storage Node PSUs

Table 3-18.   Storage Node PSU replacement overview

Required tools	Personnel required	Replacement time
None	1	15 to 25 minutes

3.4.3.1 Removing a Storage Node PSU

To remove the Storage Node PSU:

1. Unplug the AC power cord from the faulty PSU.

2. Press the release lever in towards the handle to release the PSU.

3. Grasp the handle and pull with even pressure until the unit is removed.

3.4.3.2 Installing a Storage Node PSU

To install a replacement Storage Node PSU:

1. With the handle facing inward, align the replacement PSU with the empty slot.

2. Release the lever outward and push the PSU into the server until there is an audible click.

3. Reconnect the AC power cords.

4. Using ActiveScale SM, verify that the PSU is functional.

   a. In the **ActiveScale SM Dashboard**, click the **Resources** tab.

   b. In the system image on the **Resources** page, click the node with the degraded PSU. The node will have an alert icon. The node's status page will appear.

   c. Check that all of the PSU Icons listed under the PSU section do not have alert notifications.

Figure 3-34.   PSU failure (left) and online PSU (right) icons

3.4.4 Replacing Storage Nodes

> **Caution:** The Storage Node weighs 87 lbs (39.46 kg). Two people are required to move it.

Table 3-19.   Storage Node replacement overview

Required tools	Personnel required	Replacement time
None	2	60 to 75 minutes

3.4.4.1 Removing a Storage Node

To remove a Storage Node:

1. Shut down the node. If the node is already powered down (for example, because it has failed), skip this step.

> **Important:** Do not shut down a node unless all other nodes are healthy.

Figure 3-35.   Resources > Rack > Node > Shutdown

a. Click **Resources.**

b. On multi-site systems, select a site from the **Sites** pull-down menu.

c. In the **Racks** pull-down menu, select a system.

d. In the rack graphic, select the node you want to shut down. Typically, the node you want to shut down has a failure icon overlay.

e. In the node's **Actions** pull-down menu, select **Shutdown Node**.

    f.   A pop-up appears asking you to confirm that all other nodes in the system are healthy. If so, type the password for `admin` and click **Shutdown**.

Do not shutdown this node unless all other servers are up and running normally. Are you sure you want to continue?

Password   Password

Cancel   Shut Down

    g.   Wait for ActiveScale SM to display a notification in a green banner indicating that the node was shut down successfully:

shutdown machine93a7c1a6-490c-440e-9f63-40c9a2689b85

> Rack: R01 | Action ▼

eScale P-100 **Serial Number:** USCSJOO101DA9999 **Software Vers**

    h.   Confirm that you shut down the right node by checking that its front and back LEDs are off.

2.   Disconnect all of the cables from the faulty Storage Node.

Important: Remove the drives before removing the Storage Node from the rack. You do NOT have to decommission the drives.

---

3.   Remove the 2.5 inch drives from the Storage Node. For more information, refer to Removing a 2.5 inch drive on page 66.

Figure 3-36.   Removing the 2.5 inch drive
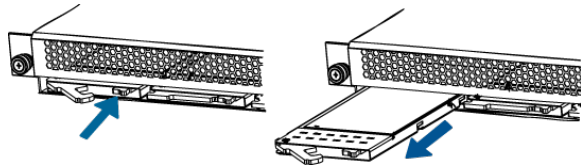
4. Remove the 3.5 inch drives from the Storage Node. For more information, refer to Removing a 3.5 inch drive on page 63.

Figure 3-37. Drive tray release lever
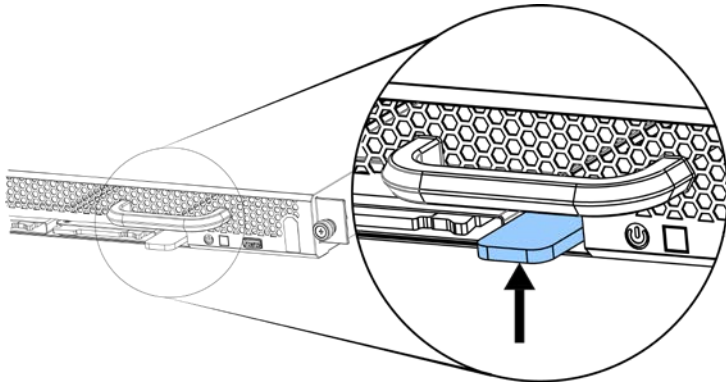

Note: Press upward on the release lever and use the handle to pull the tray out of the Storage Node with even pressure.

Figure 3-38. Drive tray pulled out
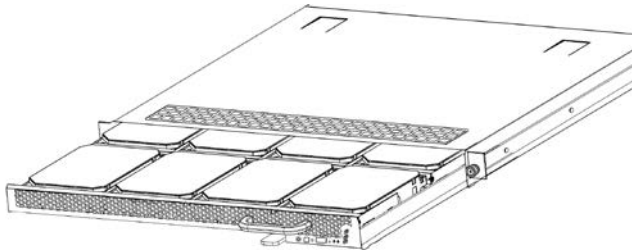
5. Unscrew the thumb screws located on the front of the System Node.

Warning: There is no lock or warning indication that the Storage Node is about to come free from the rack. Use extreme caution.

---

6. Grasp the Storage Node and pull it out of the rack using even pressure.

7. Record the serial number for return purposes. The serial number and part number are located on a pull-out tab located to the right of the SSD drive.

3.4.4.2 Installing a Storage Node

To install the replacement Storage Node:

1. Slide the Storage Node into the rack until it stops.

2. Tighten the thumb screws on the front of the Storage Node.

3. Replace the 2.5 inch drives. For more information, refer to Installing a 2.5 inch drive on page 68.

4. Replace the 3.5 inch drives. For more information, refer to Installing a 3.5 inch drive on page 65.

5. Reconnect all of the cables in the original configuration. For more information, refer to Cabling map on page 83.

6. Power on the Storage Node using the power button on the front panel.

7. If Quantum Corporation support is not onsite, contact customer support for the final post-replacement procedures for bringing the Storage Node online.

3.5 Mounting kit replacement instructions

ActiveScale systems can use different rail kits for each component. Use the following table to determine which sections are relevant for your mounting kits.

Component	Mounting kit type	Relevant topics
System Node	1U	• Replacing System Node 1U mounting kits on page 76.
	3U	• Replacing 3U mounting kits on page 72.
System Interconnect	3U	• Replacing 3U mounting kits on page 72.
Storage Node	1U	• Replacing Storage Node 1U mounting kits on page 78.
	3U	• Replacing 3U mounting kits on page 72.

3.5.1 Replacing 3U mounting kits

Important: Replacing 3U mounting kits requires the removal of multiple System Nodes, Storage Nodes, or System Interconnects. Because of this, shutdown of the ActiveScale P100 is required.

Table 3-20.   3U mounting kit replacement overview

Required Tools	Personnel Required	Replacement Time
None	2	3-4 hours

3.5.1.1 Removing a 3U mounting kit

To remove a 3U mounting kit, do the following:

1. Shutdown the ActiveScale P100 system using ActiveScale SM

   a. In ActiveScale SM, click **Resources**.

   b. On multi-site systems, select a site from the Sites pull-down menu.

   c. In the Racks pull-down menu, select a system.

   d. In the rack **Action** pull-down menu, select **Shutdown Rack**.

2. Remove the components from the faulty 3U mounting kit. For more information, refer to:

   – Removing a System Node on page 113

   – Removing a System Interconnect on page 33

   – Removing a Storage Node on page 44

3. From the rear of the rack and working on one bracket at a time, use a long Phillips head screwdriver and unscrew the two screws securing the washer plate to the 3U rail.

   > **Warning:** Make sure to hold the 3U bracket firmly and do not let go until it has completely cleared the rack. There is a danger of dropping the bracket and losing it in the interior of the rack, causing damage to the system, yourself, or others.

   The washer plate will come free, but the 3U bracket will still be supported in the system by the mounting pegs on the bracket itself.

4. Move to the front of the rack and unscrew the two screws securing the 3U mounting bracket to the front of the rack.

5. Grasp a secure surface on the 3U bracket and apply pressure toward the back of the rack to collapse the bracket enough that it clears the front rack post.

6. Pull toward the front of the rack gently to release the mounting pegs from the rear of the rack. The 3U mounting bracket should now be free and can be removed.

7. Use the previous steps to remove the second 3U bracket.

3.5.1.2 Installing a 3U mounting kit

To install a 3U mounting kit, do the following:

> **Important:** Make sure that the mounting bracket is being attached to the correct side. The support flanges that the components will lie on should be facing toward the inside of the rack. Flanges should be supporting components from the bottom of each U-space. If the flanges are not installed properly, the rail kit will not install correctly. In the case of an incorrect installation, the washer plates will not attach easily.

> **Tip:** Have the mounting screws, washer plates, and screwdriver within reach while installing the 3U mounting kits. You will have to hold the mounting

bracket being installed with one hand while installing the washer plates and screws with the other.

1. Fully extend the bracket you are installing.

   Caution: If performing this task alone is too difficult or unsafe because of the build circumstances, have another person assist you. The second person can

support the 3U Mounting Kit at the rear of the rack while it is being secured to the front. This will prevent it from falling while it is being installed.

2. From the front of the rack, lead the pegged end of the mounting bracket into the rack, sliding the pegs into the mounting holes on the posts at the rear of the rack.

3. With the pegs inserted at the rear of the rack, slowly and carefully collapse the fully extended bracket until the screw holes on the bracket are flush behind the mounting holes on the front rack posts.

4. Hold the bracket flush with the mounting holes on the rack stems at the U level it will be installed at.

5. With your free hand, pick up the washer plate. Ensure that the standoffs or chamfered holes are facing out so the screws will sit flush.

6. Align the bracket flush with the rack post so the top screw hole is aligned with the holes on the rack post and the mounting bracket.

7. Use the hand holding the mounting bracket to pinch all of parts together with the rack post between them. This action will free your other hand.

8. Screw one of the M5 screws into the top mounting hole until it is finger tight. This will be enough to support the mounting bracket which will allow you to release your hand.

9. Finish securing the washerplate to the front of the rack with another M5 screw inserted into the bottom screw hole.

10. Use a level to ensure the mounting bracket is level. If it is not, retry mounting the bracket.

11. Once level, use a Phillips head screw driver to tighten the screws.

12. Move to the rear of the rack and install a flush washer plate to the rear of the rack. The screws should be installed as shown.
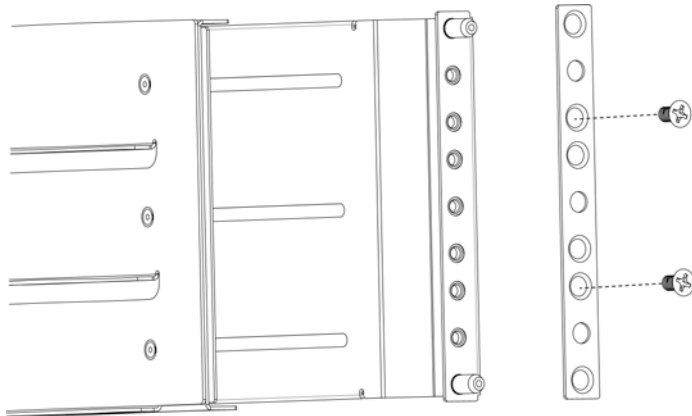
13. Re-install the components that you removed from the faulty 3U mounting kit. For more information, refer to:

    –   Installing a System Node on page 115

    –   Installing a System Interconnect on page 34

    –   Installing a Storage Node on page 45

3.5.2 Replacing System Node 1U mounting kits

Table 3-21.   System Node 1U mounting kit replacement overview

Required Tools	Personnel Required	Replacement Time
None	2	3-4 hours

3.5.2.1 Removing a System Node 1U mounting kit

To remove a System Node 1U mounting kit:

1. Remove the System Node and its attached rails. For more information, refer to the Removing a System Node on page 113.

2. Remove the outer rails from the rack.

3. Push the hook on the rear outer rail downwards, then outwards.

4. Remove the outer rail.

5. Repeat the previous steps to remove the second rail.

3.5.2.2 Installing a 1U System Node mounting kit

To install the replacement System Node mounting kit:

1. Attach the outer rails to the rack.

> **Note:** Verify that you are installing the correct rail on each side of the rack. The rear of each rail is marked with "rear".

   a. Extend the outer rail enough that it extends between the two vertical rails of the rack.

Figure 3-39.   Expand the outer Rail
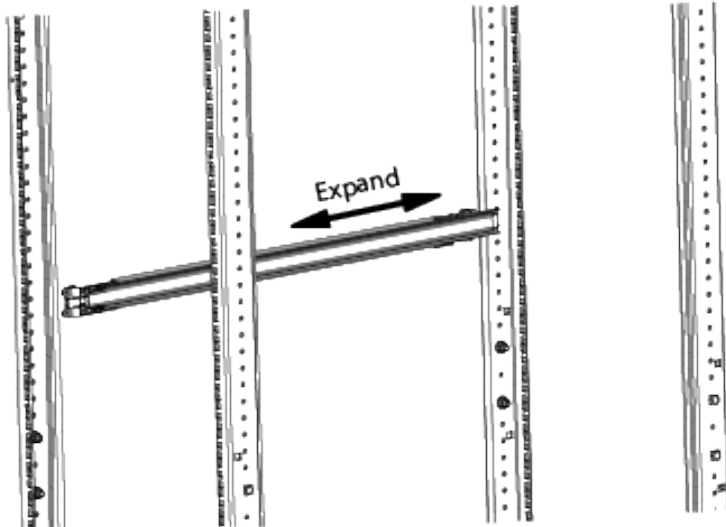
   b. Position the hook on the rear outer rail around the rear vertical rail.

   c. Slide the rear outer rail pegs into the desired slots.

   d. Position the hook on the rear outer rail over the rear vertical rail and then slide the rear outer rail pegs into the desired slots. The clip at the rear of the rail kit is installed over the rack rail to hold it in place.

Figure 3-40.   Rail attaching to rear vertical rail
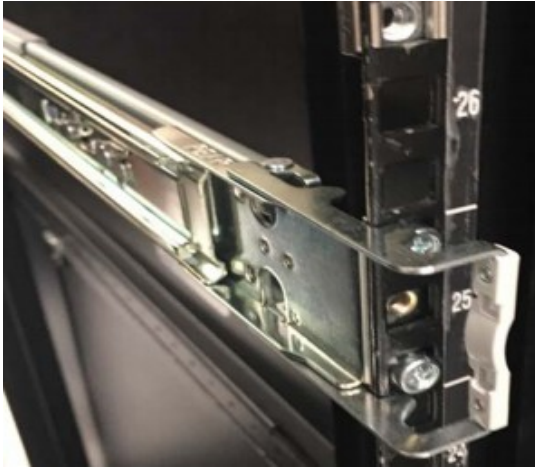
     e.   Extend the outer rail forward and insert the pegs into the front vertical rail.

Figure 3-41.   Rail attaching to front vertical rail

     f.   Extend the inner rail to its full length.

     g.   Remove the inner rail by sliding the white clip with a rounded edge forward.

> **Note:** Be cautious leaving the outer rails extending out of the rack. Consider pushing the outer rails back until you are ready to install the node.

    h.   Repeat the previous steps to attach the other rail to the rack.

2. Replace the System Node. For more information, refer to Installing a System Node on page 115.

3.5.3 Replacing Storage Node 1U mounting kits

Table 3-22.   **Storage Node 1U mounting kit replacement overview**

Required Tools	Personnel Required	Replacement Time
None	2	3-4 hours

3.5.3.1 Removing a Storage Node 1U mounting kit

To remove a Storage Node 1U mounting kit, do the following:

1. Remove the Storage Node from the rails. For more information, refer to Removing a Storage Node on page 44.

2. From the rear of the rack, press the tab marked PUSH located on the inside of the 1U rail.

3. Free the mounting kit rail from the rack vertical rail.

4. Move to the front of the rack and grasp the 1U mounting kit rail.

5. Press the front tab marked PUSH to release the mounting kit rail.

> **Caution:** Make sure to hold the 1U bracket firmly and do not let go until it has completely cleared the rack. There is a danger of dropping the bracket and losing it in the interior of the rack, causing damage to the system, oneself, or others.

6. Complete the previous steps to remove the second 1U rail.

3.5.3.2 Installing a Storage Node 1U mounting kit

To install the replacement Storage Node 1U mounting kit, do the following:

1. Align the mounting kit left rail with the rack front vertical rail.

2. Press the tab marked "PUSH" to secure the rail to the rack.

3. Align the mounting kit left rail with the rack rear vertical rail.

4.   Press the tab marked "PUSH" to secure the rail to the rack.

Repeat these steps to install the right mounting kit rail.

5.   Replace the Storage Node. For more information, refer to Installing a Storage Node on page 45.

4 System cabling

This section describes how to cable a system after hardware installation is complete.

4.1   Reading cable labels

Cable labels in ActiveScale systems use a standard format to indicate where they should be connected in the system. This format is based on a set of provided component and port abbreviations. Using these port numbers and component abbreviations, you can determine the connection points for each cable.Components and ports are numbered and abbreviated as shown.

> **Note:** System Expansion Nodes have unlabeled cables. When cabling System Expansion Nodes, refer to the cable wiring key on the System Interconnect and the diagrams in this section for the correct cable locations. S

4.1.1   ActiveScale P100 S5L components and port identification

S5L System Node Expansion

S5l System I/O Ports

Number	Item	Description
1	VGA connector	Maximum display resolution: 1920x1200 32bpp@60Hz (reduced blanking)
2	COM port A	DB9 port (Serial_A) for debug or terminal concentrator
3	NIC1	RJ45 connector
4	NIC0	RJ45 connector
5	Dedicated NIC	Dedicated RJ45 connector
6	USB ports	USB 3.0 ports

4.1.2 S2PC System Node

System Node (SN)
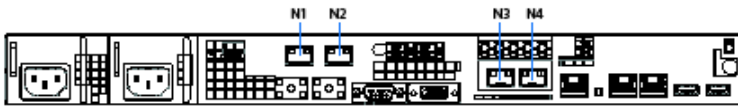
System Expansion Node (SEN)
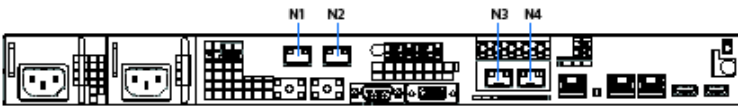
System Interconnect (SW)
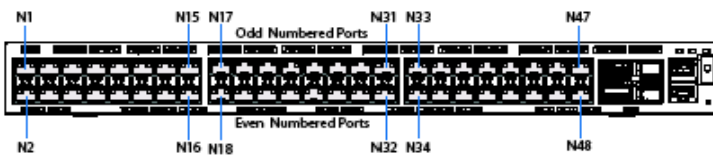
Storage Node (CN)
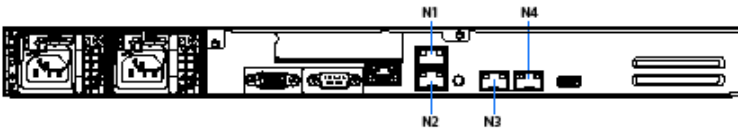
Figure 4-42.   Example cable label

CN6.N4:SW2.12

| Component Name and Number | Component Port | Component Name and Number | Component Port |

Component 1   Component 2
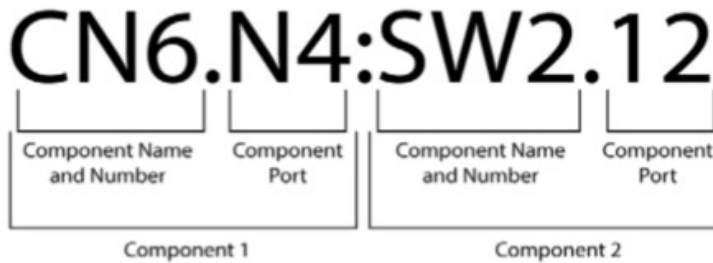
Table 4-23.   Example cable label key

Component	Component name and number	Component port	Location
Component 1	CN6	N4	Storage Node 6, port 4
Component 2	SW2	12	System Interconnect 2, port 12

4.2 Cabling map

The following table and cabling diagram provide the information needed to connect the cables to the correct component.

> **Note:** All cable lengths are two meters.

Figure 4-43.   ActiveScale P100 - cable wiring key
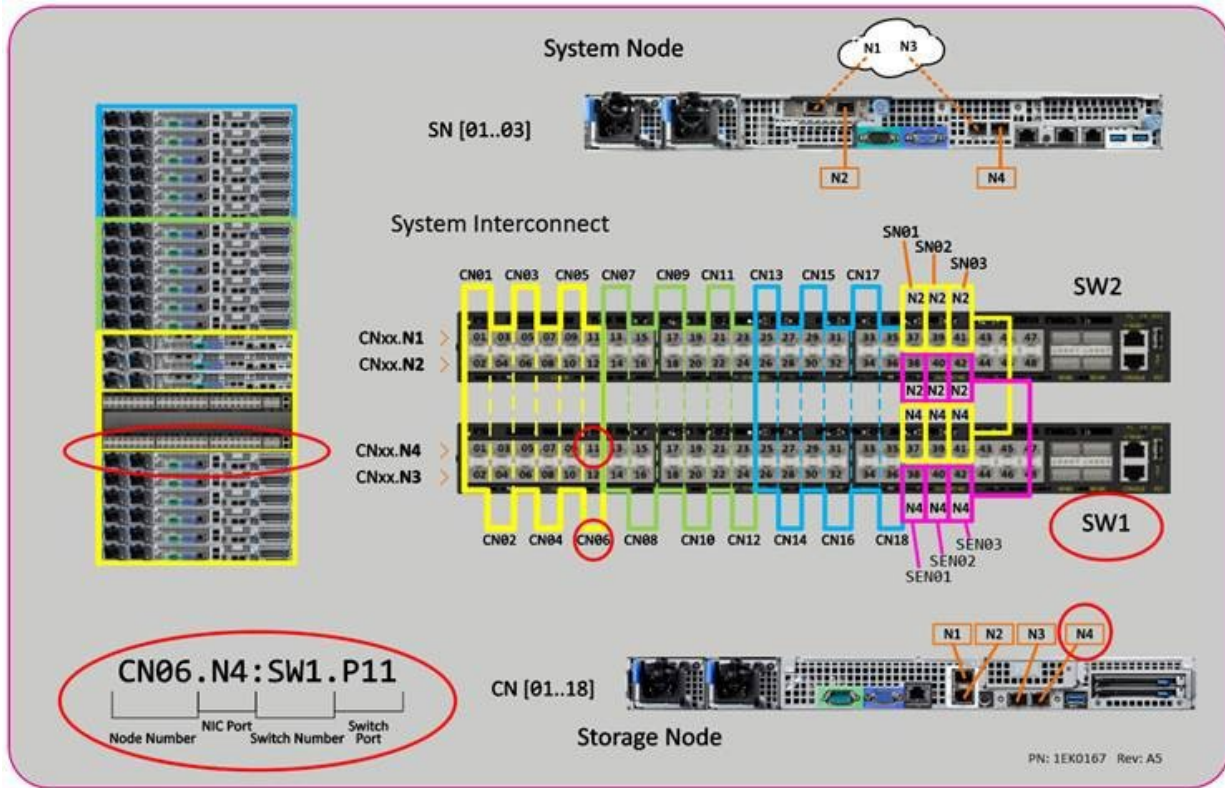
Table 4-24. System cabling

Local device	Local port	Full cable location	Peer port	Peer device
SEN03[1]	N4	SEN3.N4.SW1.42	42	SW1
	N2	SEN3.N2.SW2.42	42	SW2
SEN02[1]	N4	SEN2.N4.SW1.40	40	SW1
	N2	SEN2.N2.SW2.40	40	SW2
SEN01[1]	N4	SEN1.N4.SW1.38	38	SW1
	N2	SEN1.N2.SW2.38	38	SW2
CN18	N4	CN18.N4.SW1.35	35	SW1
	N3	CN18.N3.SW1.36	36	SW1
	N2	CN18.N2.SW2.36	36	SW2
	N1	CN18.N1.SW2.35	35	SW2
CN17	N4	CN17.N4.SW1.33	33	SW1
	N3	CN17.N3.SW1.34	34	SW1
	N2	CN17.N2.SW2.34	34	SW2
	N1	CN17.N1.SW2.33	33	SW2
CN16	N4	CN16.N4.SW1.31	31	SW1
	N3	CN16.N3.SW1.32	32	SW1
	N2	CN16.N2.SW2.32	32	SW2
	N1	CN16.N1.SW2.31	31	SW2
CN15	N4	CN15.N4.SW1.29	29	SW1
	N3	CN15.N3.SW1.30	30	SW1
	N2	CN15.N2.SW2.30	30	SW2
	N1	CN15.N1.SW2.29	29	SW2
CN14	N4	CN14.N4.SW1.27	27	SW1
	N3	CN14.N3.SW1.28	28	SW1
	N2	CN14.N2.SW2.28	28	SW2
	N1	CN14.N1.SW2.27	27	SW2
CN13	N4	CN13.N4.SW1.25	25	SW1
	N3	CN13.N3.SW1.26	26	SW1
	N2	CN13.N2.SW2.26	26	SW2
	N1	CN13.N1.SW2.25	25	SW2
CN12	N4	CN12.N4.SW1.23	23	SW1
	N3	CN12.N3.SW1.24	24	SW1
	N2	CN12.N2.SW2.24	24	SW2
	N1	CN12.N1.SW2.23	23	SW2

Table 4-24. System cabling (continued)

Local device	Local port	Full cable location	Peer port	Peer device
CN11	N4	CN11.N4.SW1.21	21	SW1
	N3	CN11.N3.SW1.22	22	SW1
	N2	CN11.N2.SW2.22	22	SW2
	N1	CN11.N1.SW2.21	21	SW2
CN10	N4	CN10.N4.SW1.19	19	SW1
	N3	CN10.N3.SW1.20	20	SW1
	N2	CN10.N2.SW2.20	20	SW2
	N1	CN10.N1.SW2.19	19	SW2
CN09	N4	CN9.N4.SW1.17	17	SW1
	N3	CN9.N3.SW1.18	18	SW1
	N2	CN9.N2.SW2.18	18	SW2
	N1	CN9.N1.SW2.17	17	SW2
CN08	N4	CN8.N4.SW1.15	15	SW1
	N3	CN8.N3.SW1.16	16	SW1
	N2	CN8.N2.SW2.16	16	SW2
	N1	CN8.N1.SW2.15	15	SW2
CN07	N4	CN7.N4.SW1.13	13	SW1
	N3	CN7.N3.SW1.14	14	SW1
	N2	CN7.N2.SW2.14	14	SW2
	N1	CN7.N1.SW2.13	13	SW2
SN03	N4	SN3.N4.SW1.41	41	SW1
	N2	SN3.N2.SW2.41	41	SW2
SN02	N4	SN2.N4.SW1.39	39	SW1
	N2	SN2.N2.SW2.39	39	SW2
SN01	N4	SN1.N4.SW1.37	37	SW1
	N2	SN1.N2.SW2.37	37	SW2
CN06	N4	CN6.N4.SW1.11	11	SW1
	N3	CN6.N3.SW1.12	12	SW1
	N2	CN6.N2.SW2.12	12	SW2
	N1	CN6.N1.SW2.11	11	SW2
CN05	N4	CN5.N4.SW1.9	9	SW1
	N3	CN5.N3.SW1.10	10	SW1
	N2	CN5.N2.SW2.10	10	SW2
	N1	CN5.N1.SW2.9	9	SW2

Table 4-24. System cabling (continued)

Local device	Local port	Full cable location	Peer port	Peer device
CN04	N4	CN4.N4.SW1.7	7	SW1
	N3	CN4.N3.SW1.8	8	SW1
	N2	CN4.N2.SW2.8	8	SW2
	N1	CN4.N1.SW2.7	7	SW2
CN03	N4	CN3.N4.SW1.5	5	SW1
	N3	CN3.N3.SW1.6	6	SW1
	N2	CN3.N2.SW2.6	6	SW2
	N1	CN3.N1.SW2.5	5	SW2
CN02	N4	CN2.N4.SW1.3	3	SW1
	N3	CN2.N3.SW1.4	4	SW1
	N2	CN2.N2.SW2.4	4	SW2
	N1	CN2.N1.SW2.3	3	SW2
CN01	N4	CN1.N4.SW1.1	1	SW1
	N3	CN1.N3.SW1.2	2	SW1
	N2	CN1.N2.SW2.2	2	SW2
	N1	CN1.N1.SW2.1	1	SW2

1.System Expansion Nodes use unlabeled cables.

4.3 User provided cables

To connect to the public network, the customer must provide networking cables that are compatible with the SFP+ transceivers that are installed in the rear of each System Node. The transceivers require a multi-mode, duplex, fiber optic cable (50/125) with an LC connector at the appliance end of the cable. The fiber type of the cable will depend on the length of cable required. The rack to rack cable must be an OM3 MPO Type-B female to female cable. If rack to rack connectivity uses the customer infrastructure, Type-A, Type-B, or Type-C cables may be required.

Table 4-25. User provided cable length required

Length needed to reach site network in meters	Fiber type needed
Up to 300	OM3 MPO Multi-mode fiber
Up to 400	OM4 MPO Multi-mode fiber
>400	Contact Quantum Corporation support for options.

5 Installing scale up kits

Scale up kits are available that consist of six Storage Nodes. Up to two scale up kits can be added per base configuration.

5.1   Unpacking scale up kits

Unpacking scale up kits similar to unpacking the first pallet of the base configuration. The only difference is the contents of the Accessory box and the labels on the Storage Nodes.

Table 5-1.   Scale up pallet contents

Carton	Contents
Accessory box	• 30 10G SFP+ 2M DAC Cables • Two 3U rails • Quick Start Poster
Six Storage Node boxes	Each box contains: • One Storage Node • One 1U Rail Kit[1] • Two C13 to C14 power cables

1.If your scale up kit came with 3U rails, the 1U Rail Kit is not included.

To unpack the scale up kits:

1. Remove the overwrap to reveal the accessory boxes and the Storage Node boxes.

2. Unpack the Storage Nodes one at a time and inspect them for damage.

5.2   Installing scale up Storage Nodes

Base system Storage Nodes and scale up Storage Nodes are installed in the same way. Scale up kits are installed bottom to top, as shown.

For more information regarding Storage Node installation, refer to Adding Storage Nodes to the rack on page 31.

Figure 5-1.   ActiveScale P100 system layout
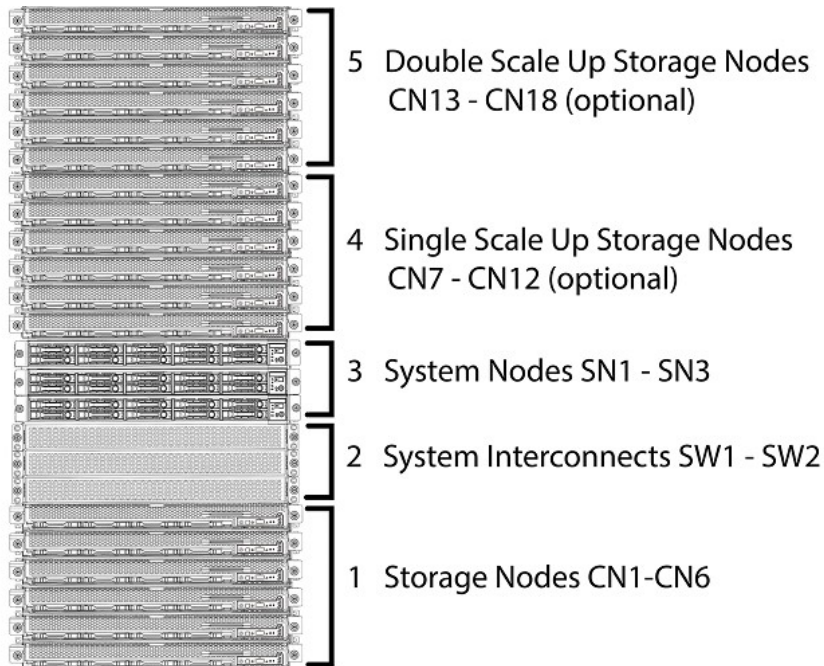
5.2.1 Cabling a scaled up system

Once the Storage Nodes are added to the ActiveScale P100 system, the only other hardware-based step is to connect the data cables.

The 10G DAC cables included in the scale up kit have both blue and green labels. The label colors indicate the location of the associated Storage Node and System Interconnect port.

Table 5-2.   10G DAC cable reference

Cable type	Number of labels	Label color	Storage node location
Base system	Two	Yellow	Storage column one
Scale up kit	Four	Two green	Storage column two
		Two blue	Storage column three

For more information, refer to System cabling on page 81.

5.3 Software steps for a scale up addition

Scaling up allows you to expand the capacity of your system by adding a new column (in other words, a scale up kit) to each system in your deployment. Each system must have identical scale up and scale out configurations. Follow this procedure after you have completed the hardware steps for a **single** scale up kit. For hardware steps, see the *ActiveScale P100/ Installation Guide*.

At this point, all nodes in the new scale up kit have link-local IP addresses and ActiveScale OS preinstalled on them.

> **Warning:** This section applies to single site deployments only.
> Multi-site scale up kits are different from single site scale up kits. Ensure that you have the right type of scale up kit for your deployment. Do not attempt to convert a scale up kit from single/multi to multi/single site.

> **Important:** The system must be in a stable state before scaling up. The scale up job checks data safety levels when it starts. If the system is freshly installed, or if you just completed an initial scale up, wait 10-15 minutes for the system to stabilize and start recording data safety levels. This is particularly important if you purchased multiple columns for an initial install. Systems that have been running for some time may have a data safety issue as reported in ActiveScale OS SM. You must resolve any data safety issues before attempting to scale up. If the data safety of the system is not optimal or there are failed drives, fix the issues by replacing the drives before starting this procedure.

> **Warning:** You can only do one scale up at a time.
> You must complete the scale up of one system before starting the scale up of another system. Even on multi-site deployments, you can only scale up one system at one site at a time. Because the scale up kits are factory installed to be

identical, adding two scale up kits simultaneously results in link-local IP address conflicts.

Warning: Components in the scale up kit might have newer firmware than your existing components have. This procedure does not upgrade or downgrade any firmware.

Warning: If a scale up/out job is already in progress, wait until the current job is complete.

Warning: Do not start a log collection job while a scale up job is running.

---

1. Power up all components in the scale up kit.
2. Start the scale up wizard.
   a. Click **Configuration** > **Upgrade**.
   b. In the **System Expansion** section, scroll down to **Scale Up**.
   c. Click **Start**.

Figure 5-2.   Starting a single site scale up
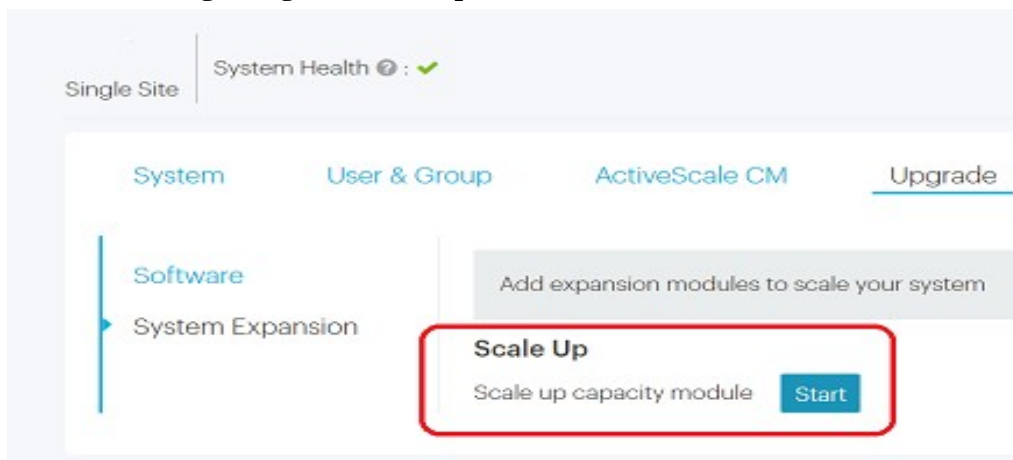
The scale up wizard starts. ActiveScale OS disables the DHCP server on the System Nodes and scans for the scale up kit's link local IP addresses.

– If the wizard indicates that a scale up kit is not available, check the power-on state and cabling of each component in the scale up kit and then click **Start** again.

– If the wizard indicates that the ActiveScale OS or firmware on the scale up kit is newer than the version on the existing components, stop. Update the ActiveScale OS and re-run this procedure. For upgrade help, contact Quantum Support.

– If the wizard finds no problems, it displays the system's network settings.

Figure 5-3.   Scale up: Summary of scan

3. Validate the network settings in each tab against your settings as specified in your *ActiveScale P100/ Site Survey*, and/or change the Storage Network settings.

4. Click **Next** to review each tab.

5. When you reach the last tab, click **Proceed**.

6. Click **Apply** to confirm.

Figure 5-4.   Scale up: Applying network settings
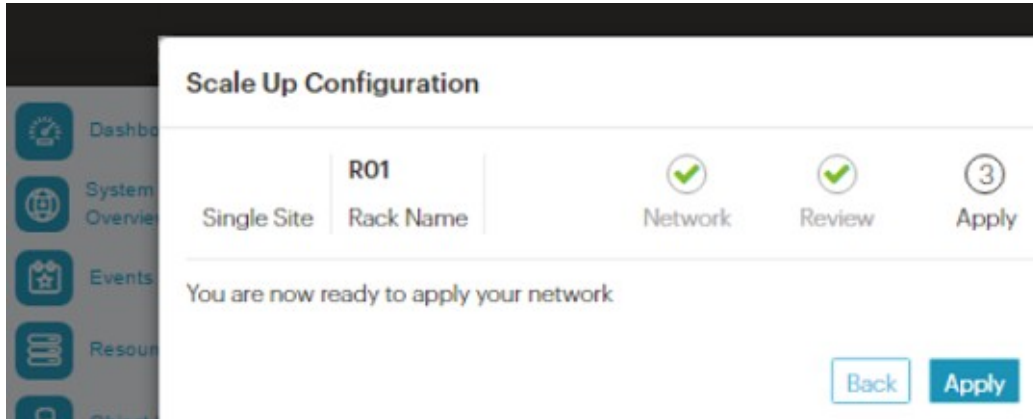
The wizard notifies you to check the scale up job on the **Jobs** page.
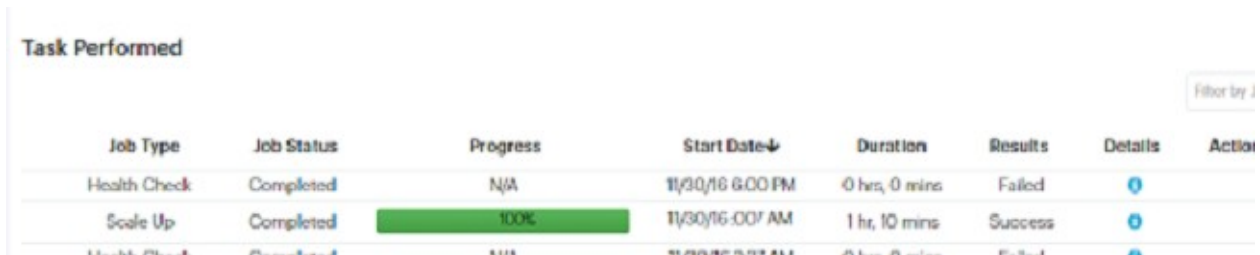
Figure 5-5.   Scale up: Notification of job in progress

7. Navigate to the **Jobs** page, and wait until the scale out job indicates success or failure. This takes about 1.5 hours.

When the scale up job succeeds, its **Progress** bar is **100%** and its **Results** field is **Success**.

Figure 5-6.   Scale up: Job success

If the scale out job fails, click the icon in its **Details** column to see why it failed and suggestions on how to correct the problem. Follow the suggestions.

8. Check the dashboard to confirm that the new capacity of the system is as expected.

Figure 5-7.   Scale up: Visual confirmation on dashboard
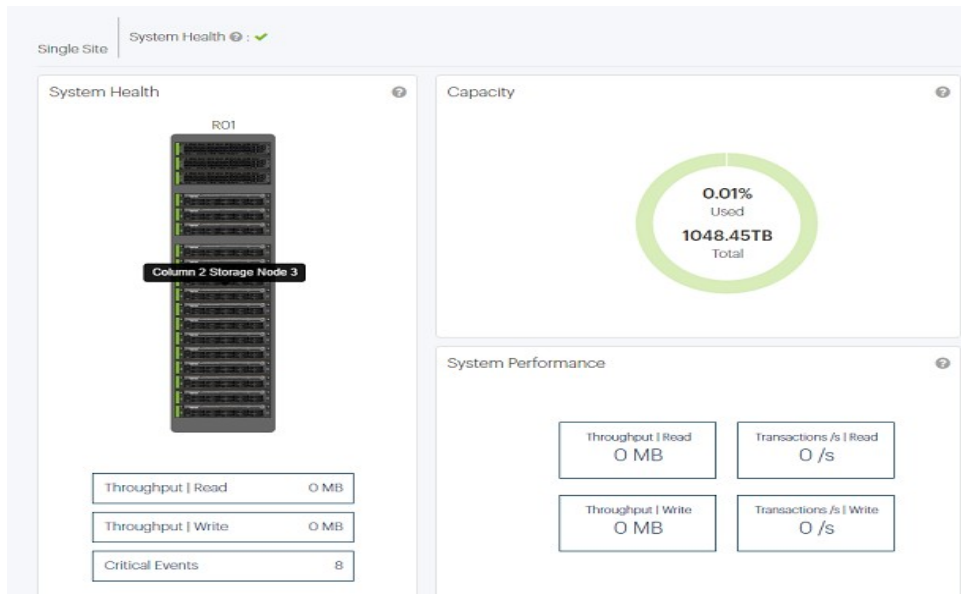
9. Check the **Resources** page to confirm that the new column is displayed in the rack graphic.

Figure 5-8.   Scale up: Confirmation on Resources page

5.3.1 Scaling up multi-site systems

In a multi-site system, each scale up kit adds one new column to the primary ActiveScale P100 system in each of the three sites.

All nodes in the new scale up kit have link local IP addresses and ActiveScale OS pre-installed on them.

> **Important:** To obtain the transceivers required for multi-site installation, you must purchase a 3GEO kit for each ActiveScale P100. Multi-site scale up kits are different from single site scale up kits. Do not try converting them to single site scale up kits.

Understand the following guidelines before attempting a multi-site system scale up:

- The public network must have adequate ports to make all the necessary connections.

- Multi-site systems must have enough space to accommodate the multi-site scale up kits. This means that each site must have rack space for a matching scale up.

- If you have ordered two multi-site scale up kits, only scale one location at a time. Scaling up with two kits simultaneously results in local link IP conflict because scale up kits are factory installed to be identical.

- If a scale up or scale out job is already in progress, wait until the current job is complete to start the multi-site scale up job.

5.4 Cabling multi-site systems

Install the transceivers in the multi-site kits, then cable ports 47 and 48 of the System Interconnects to the WAN. If you have scaled up the ActiveScale P100 with a second column of storage, also connect port 45 to the WAN. If you have scaled up the ActiveScale P100 with a third column of storage, also connect port 46 to the WAN.

5.5 Software steps for a multi-site scale up addition

Scaling up allows you to expand the capacity of your system by adding a new column (in other words, a scale up kit) to each system in your deployment. Each system must have identical scale up and scale out configurations. Follow this procedure after you have completed the hardware steps for a **single** scale up kit **at each site**. For hardware steps, see the *ActiveScale P100/ Installation Guide*.

At this point, all nodes in the new scale up kit have link-local IP addresses and ActiveScale OS preinstalled on them.

Warning: This section applies to multi-site deployments only.
Multi-site scale up kits are different from single site scale up kits. Ensure that you have the right type of scale up kit for your deployment. Do not attempt to convert a scale up kit from single/multi to multi/single site.

Important: The system must be in a stable state before scaling up. The scale up job checks data safety levels when it starts. If the system is freshly installed, or if you just completed an initial scale up, wait 10-15 minutes for the system to stabilize and start recording data safety levels. This is particularly important if you purchased multiple columns for an initial install. Systems that have been running for some time may have a data safety issue as reported in ActiveScale SM You must resolve any data safety issues before attempting to scale up. If the

data safety of the system is not optimal or there are failed drives, fix the issues by replacing the drives before starting this procedure.

Warning: You can only do one scale up at a time. You must complete a scale up before starting another scale up.

Warning: Components in the scale up kit might have newer firmware than your existing components have. This procedure does not upgrade or downgrade any firmware.

Warning: If a scale up/out job is already in progress, wait until the current job is complete.

Warning: Do not start a log collection job while a scale up job is running.

1. Power up all components in the scale up kit at each site.
2. Log into ActiveScale SM from any site.
3. Start the scale up wizard.
   a. Click **Configuration** > **Upgrade**.
   b. In the **System Expansion** section, scroll down to **Scale Up**.
   c. Click **Add Column**.

Figure 5-9.   Starting a multi-site scale up
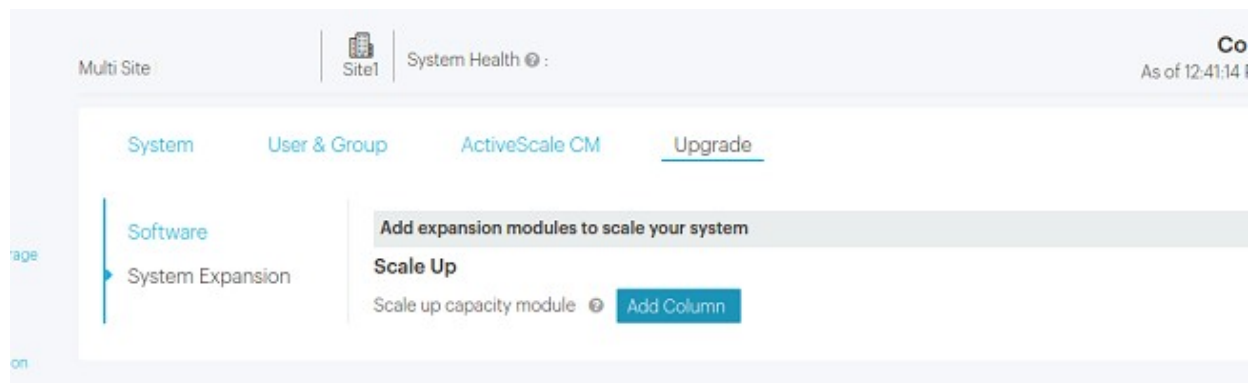
The scale up wizard starts. ActiveScale OS disables the DHCP server on the System Nodes and scans for the scale up kit's link local IP addresses.

- If the wizard indicates that a scale up kit is not available, check the power-on state and cabling of each component in the scale up kit and then click **Start** again.

Figure 5-10.   Scale up error: No kits found

- If the wizard indicates that the ActiveScale OS or firmware on the scale up kit is newer than the version on the existing components, stop. Update the ActiveScale OS and re-run this procedure. For upgrade help, contact Quantum Support.

- If the wizard finds no problems, it displays a **Rack Selection** page.

4. On the **Rack Selection** page, select the system corresponding to the location of the new scale up kit and click **Next**.

Figure 5-11.   Scale up: Selecting a rack

The wizard displays the system's network settings.

Figure 5-12.   Scale up: Summary of scan

5. Validate the network settings in each tab against your settings as specified in your *ActiveScale P100/ Site Survey*, and/or change the Storage Network settings.

6. Click **Next** to review each tab.

7. When you reach the last tab, click **Proceed**.

    A pop-up displays a warning: this is your last chance to change your network configuration. Click **Back** to make changes.

8. Click **Apply** to confirm.

Figure 5-13.   Scale up: Applying network settings

The wizard notifies you to check the scale up job on the **Jobs** page.

Figure 5-14.   Scale up: Notification of job in progress

9. Navigate to the **Jobs** page, and wait until the scale out job indicates success or failure. This takes about 1.5 hours.

    When the scale up job succeeds, its **Progress** bar is **100%** and its **Results** field is **Success**.

Figure 5-15.   Scale up: Job success

    If the scale out job fails, click the icon in its **Details** column to see why it failed and suggestions on how to correct the problem. Follow the suggestions.

10. Check the dashboard to confirm that the new capacity of the system is as expected.

Figure 5-16.   Scale up: Visual confirmation on dashboard

11. Check the **Resources** page to confirm that the new column is displayed in the rack graphic.

Figure 5-17.   Scale up: Confirmation on Resources page

6 Installing scale out kits

Scaling out an ActiveScale P100 increases storage and networking capacity by adding either one or two new base systems that each contain a new pair of System Interconnects, three system nodes, and six storage nodes. The System Interconnects of the primary system can be connected to the System Interconnects of up to two additional ActiveScale P100 systems, with each ActiveScale P100 system per location, supporting up to two scale up kits.

6.1 Hardware steps for scaling out

Complete these hardware steps before proceeding to the software steps for scale out. On multi-site systems, complete all hardware steps at each site before proceeding on to the software steps.

The steps below explain how to:

- Connect cables between the existing system and the new system.

> **Note:** If both systems are new installations, complete the Customer Bringup Wizard on the first system, then connect the system interconnect links, and finally power up the servers on the second system.

- If necessary, reconfigure the ports on the new and existing systems.

> **Note:** By default, ports 49 and 51 are active in a no shut mode. If the defaults were changed, reconfigure the ports on your systems for the links to come up.

- For multi-site systems, connect the uplinks to the networks.

6.2 Parts Required for Scale Out

Part	Description
Single-rack scale out connectivity kit Part number: 1EX0259	Contains four 40Gb **male** transceivers that plug into the scale out ports on the System Interconnects: • If you are adding a second system, you need two kits for a total of eight transceivers: four plug into the System Interconnect scale out ports on the first system, and four plug into the System Interconnect scale out ports on the second system. • If you are adding a third system or more, you only need one kit for a total of four transceivers; they plug into the System Interconnect scale out ports on the new system.
OM3 or OM4 MPO multi-mode fiber cables	**Important:** These cables are customer supplied. • OM3 cables must be 100m or shorter. That means your new system must be within 100m of your existing system. • OM4 cables must be 150m or shorter. That means your new system must be within 150m of your existing system. **Warning:** If rack-to-rack connectivity uses customer infrastructure, Type-A, Type-B, or Type-C cables may be required.

6.2.1 Additional Parts Required for Multi-Site Configuration

If you are performing a multi-site scale out, additional parts are required.

Table 6-1.   Parts needed per system, per site

System configuration	Uplink mode	Transceivers needed, per system, per site			Cables needed, per system, per site
		Type	Part number	Quantity	
ActiveScale P100, base system (one column)	Mode 1 (two individual 10G access ports (48,47) per System Interconnect)	SFP+ Finisar FTLX8574D3B CV-iT	1EX0272 (there are 4 in each kit)	1	2 10Gb cables per System Interconnect (4 cables total)
	Mode 2 (one 10G trunk (port 48) per System Interconnect)	SFP+ Finisar FTLX8574D3B CV-iT	1EX0279 (there are 2 in each kit)	1	1 10Gb cable per System Interconnect (2 cables total)
	Mode 3 (one 40G trunk (port 50) per System Interconnect)	QSFP+ ASM, FINISAR 40G QSFP+ SR OPTIC, FTL410QE3C	1EX0268 (there is 1 in each kit)	2	1 40Gb cable per System Interconnect (2 cables total)
	Mode 4 (three 10G trunks (ports 48,47,46) with LACP per System Interconnect)	SFP+ Finisar FTLX8574D3B CV-iT	1EX0279 (there are 2 in each kit)	3	3 10Gb cables per System Interconnect (6 cables total)
	Mode 5 (two 40G trunks (ports 50,52) with LACP per System Interconnect)	QSFP+ ASM, FINISAR 40G QSFP+ SR OPTIC, FTL410QE3C	1EX0268 (there is 1 in each kit)	2	2 40Gb cables per System Interconnect (4 cables total)
ActiveScale P100, mid system (two columns)	Mode 1 (three individual 10G access ports (48,47,45) per System Interconnect)	SFP+ Finisar FTLX8574D3B CV-iT	1EX0272 and 1EX0279	1 of each	3 10Gb cables per System Interconnect (6 cables total)
	Mode 2 (one 10G trunk (port 48) per System Interconnect)	SFP+ Finisar FTLX8574D3B CV-iT	1EX0279 (there are 2 in each kit)	1	1 10Gb cable per System Interconnect (2 cables total)
	Mode 3 (one 40G trunk (port 50) per System Interconnect)	QSFP+ ASM, FINISAR 40G QSFP+ SR OPTIC, FTL410QE3C	1EX0268 (there is 1 in each kit)	2	1 10Gb cable per System Interconnect (2 cables total)
	Mode 4 (three 10G trunks (ports 48,47,46) with LACP per System Interconnect)	SFP+ Finisar FTLX8574D3B CV-iT	1EX0272 and 1EX0279	1 of each	3 10Gb cables per System Interconnect (6 cables total)
	Mode 5 (two 40G trunks (ports 50,52) with LACP per System Interconnect)	QSFP+ ASM, FINISAR 40G QSFP+ SR OPTIC, FTL410QE3C	1EX0268 (there is 1 in each kit)	2	2 40Gb cables per System Interconnect (4 cables total)

Table 6-1.   Parts needed per system, per site (continued)

System configuration	Uplink mode	Transceivers needed, per system, per site			Cables needed, per system, per site
		Type	**Part number**	**Quantity**	
ActiveScale P100, full system (three columns)	Mode 1 (four individual 10G access ports (48,47,46,45) per System Interconnect)	SFP+ Finisar FTLX8574D3B CV-iT	1EX0272 (there are 4 in each kit)	2	4 10Gb cables per System Interconnect (8 cables total)
	Mode 2 (one 10G trunk (port 48) per System Interconnect)	SFP+ Finisar FTLX8574D3B CV-iT	1EX0279 (there are 2 in each kit)	1	1 10Gb cable per System Interconnect (2 cables total)
	Mode 3 (one 40G trunk (port 50) per System Interconnect)	QSFP+ ASM, FINISAR 40G QSFP+ SR OPTIC, FTL410QE3C	1EX0268 (there is 1 in each kit)	2	1 40Gb cable per System Interconnect (2 cables total)
	Mode 4 (three 10G trunks (ports 48,47,46) with LACP per System Interconnect)	SFP+ Finisar FTLX8574D3B CV-iT	1EX0272 and 1EX0279	1 of each	3 10Gb cables per System Interconnect (6 cables total)
	Mode 5 (two 40G trunks (ports 50,52) with LACP per System Interconnect)	QSFP+ ASM, FINISAR 40G QSFP+ SR OPTIC, FTL410QE3C	1EX0268 (there is 1 in each kit)	2	2 40Gb cables per System Interconnect (4 cables total)

Note: The transceivers listed are shown with a part number you must purchase for each system. Purchase the part number specified for your chosen uplink mode. Part numbers correspond to upgrade kits. Cables are customer-supplied and must be *LC to LC multi- mode fiber optic patch cable* (LC multi- mode 50/125mm MMF OM3 or OM4 10Gb laser optimized fiber). These cables must comply with the Ethernet 10GBASE-SR standard. Ensure that, for the cable type chosen, you do not exceed the specified maximum 10GBASE-SR cable length. For example, do not exceed a length of 400m if you are using 10G OM4 multi-mode cables.

6.3 Connecting the Cables Between the Systems

To cable the systems, connect the cables between the systems to form a closed loop.

Figure 6-1. **Location of scale out ports: 49 (M1) and 51 (M3)**
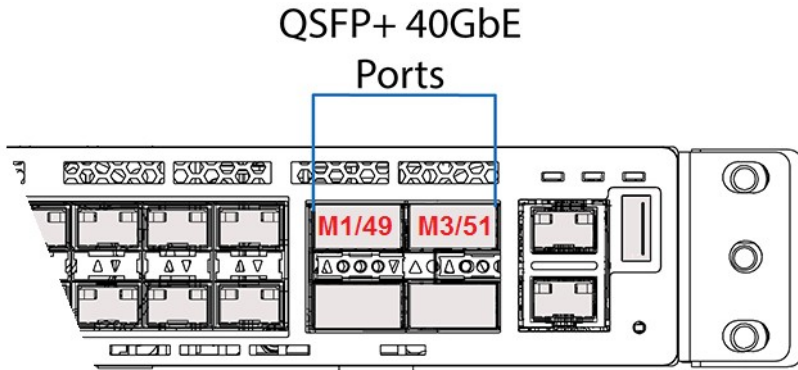
6.3.1 Cabling Two Systems

Follow the instructions in this section if you are adding a second system (system 2) to your original system.

The figure below shows the correct scale out cabling between two systems using an OM3 MPO Type-B female-to-female rack-to-rack cable. If the rack to rack connectivity uses the customer infrastructure, Type-A, Type-B, or Type-C cables may be required.

Figure 6-2. **Scale out cabling between two systems**
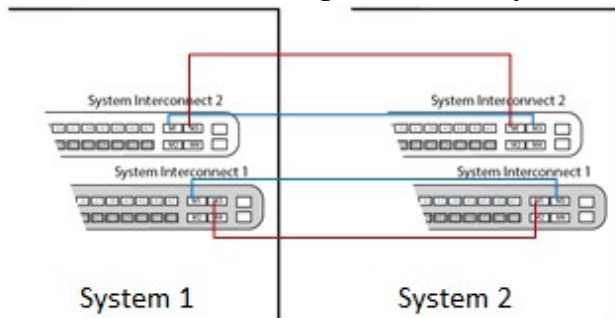
To cable system 2:

1. Insert 40Gb transceivers into ports 49 (M1) and 51 (M3) of System Interconnects 1 and 2 **on both systems**, for a total of eight transceivers plugged in.

2. Connect your OM3/OM4 cables to the transceivers you plugged in as follows:

   – Connect System 1, System Interconnect 1, port 49 to System 2, System Interconnect 1, port 51.

   – Connect System 1, System Interconnect 2, port 49 to System 2, System Interconnect 2, port 51.

   – Connect System 2, System Interconnect 1, port 49 to System 1, System Interconnect 1, port 51.

   – Connect System 2, System Interconnect 2, port 49 to System 1, System Interconnect 2, port 51.

6.4 Cabling Three Systems

Follow the instructions in this section if you are adding a third system (system 3).

This figure shows the correct scale out cabling between three systems using an OM3 MPO Type-B female-to-female rack-to-rack cable.

Figure 6-3.   Scale out cabling between 3 systems
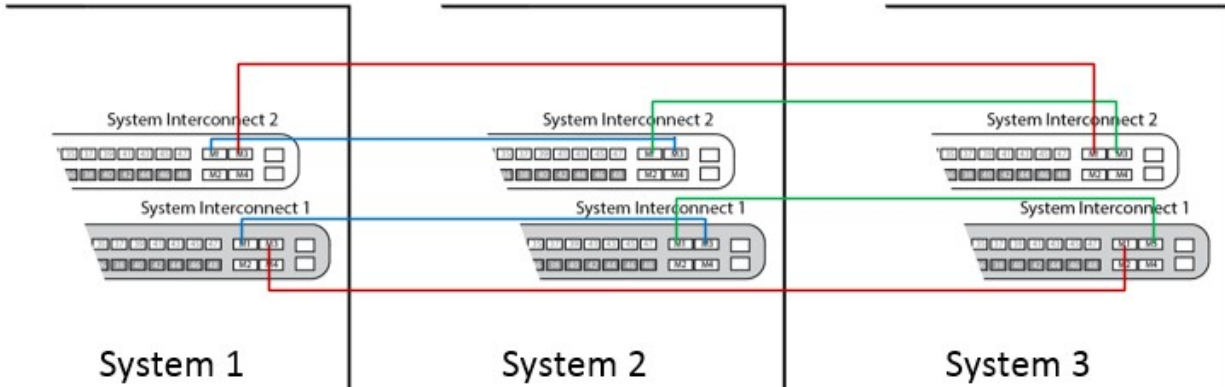
1. Insert 40Gb transceivers into ports 49 (M1) and 51 (M3) of System Interconnects 1 and 2 **on the new system**, for a total of four transceivers plugged in.

2. Disconnect and reconnect your OM3/OM4 cables to the transceivers you plugged in as follows:

    > **Warning:** Disconnect one cable at a time, otherwise you lose connectivity to your system entirely.

    a. Disconnect the cable in System 1, System Interconnect 1, port 51 and connect it to System 3, System Interconnect 1, port 51.

    b. Disconnect the cable in System 1, System Interconnect 2, port 51 and connect it to System 3, System Interconnect 2, port 51.

    c. Connect System 3, System Interconnect 1, port 49 to System 1, System Interconnect 1, port 51.

    d. Connect System 3, System Interconnect 2, port 49 to System 1, System Interconnect 2, port 51.

6.5 Opening Interconnect Ports

By default, ports 49 and 51 are active in a no shut mode. If the defaults were changed, reconfigure the ports on your systems for the links to come up.

1. Reconfigure the System Interconnects on the existing system:

    a. Connect an Ethernet cable from your laptop to port 44 on System Interconnect 1 of the existing system.

    b. Reconfigure the System Interconnects on the existing system:

    a. Create an alias on your laptop to **System Interconnect 1** on the existing system:

    > **Note:** Change the IP address in the first alias to match your network settings, but do not change the link-local IP address in the second alias.

    ```
    sudo ifconfig eth1:0 172.16.110.240 up #this IP address should match
    your setup
    sudo ifconfig eth1:1 169.254.110.240 up
    ```

    b. Connect to **System Interconnect 1** (username: `admin`, no password):

    ```
    lab@mw-<SystemIP>: $ telnet <IP_of_System_Interconnect_1> lab@mw-
    SystemIP: $ telnet IP of System Interconnect 1 Trying
    172.16.110.200...
    Connected to 172.16.110.200. Escape character is '^]'. User:admin
    Password:
    ```

    c. Run the following commands:

    ```
    (SiteN_System_Interconnect1)      >en
    (SiteN_System_Interconnect1)       #conf
    (SiteN_System_Interconnect1)    (Config)#interface 0/49
    (SiteN_System_Interconnect1)    (Interface 0/49)#no shutdown
    (SiteN_System_Interconnect1)    (Interface 0/49)#exit
    (SiteN_System_Interconnect1)    (Config)#interface 0/51
    (SiteN_System_Interconnect1)    (Interface 0/51)#no shutdown
    (SiteN_System_Interconnect1)    (Interface 0/51)#exit
    (SiteN_System_Interconnect1)    (Config)#exit
    (SiteN_System_Interconnect1) #write memory confirm
    Config file 'startup-config' created successfully. Configuration Saved!
    (SiteN_System_Interconnect1)    (Config)#show  interfaces  status  all |
    include  0/49
    0/49ScaleoutNetwork_InterconnectUp40G   Full40G  FullUnknown Active
    (Site1_Storage_Interconnect1) (Config)#show interfaces status all |
    include 0/51
    0/51ScaleoutNetwork_InterconnectUp40G    FullUnknown Inactive
    (SiteN_System_Interconnect1) (Config)#exit
    ```

2. Create an alias on your laptop to **System Interconnect 2** on the existing system:

    > **Note:** Change the IP address in the first alias to match your network settings, but do not change the link-local IP address in the second alias.

    ```
    sudo ifconfig eth1:0 172.16.210.240 up #this IP address should match
    your setup
    sudo ifconfig eth1:1 169.254.210.240 up
    ```

3. Connect to **System Interconnect 2** (username: `admin`, no password):

    ```
    lab@mw-<System IP>:$ telnet <IP of System Interconnect 2> Trying
    ```

```
172.16.210.200...
Connected to 172.16.210.200. Escape character is '^]'. User:admin
Password:
```

4. Run the following commands:

```
(SiteN_System_Interconnect2)      >en
(SiteN_System_Interconnect2)       #conf
(SiteN_System_Interconnect2)     (Config)#interface 0/49
(SiteN_System_Interconnect2)     (Interface 0/49)#no shutdown
(SiteN_System_Interconnect2)     (Interface 0/49)#exit
(SiteN_System_Interconnect2)     (Config)#interface 0/51
(SiteN_System_Interconnect2)     (Interface 0/51)#no shutdown
(SiteN_System_Interconnect2)     (Interface 0/51)#exit
(SiteN_System_Interconnect2)     (Config)#exit
(SiteN_System_Interconnect2) #write memory confirm
Config file 'startup-config' created successfully. Configuration Saved!
(SiteN_System_Interconnect2) #show   interfaces   status   all | include
0/49
0/49ScaleoutNetwork_InterconnectUp40G Full40G     FullUnknown Active
(SiteN_System_Interconnect2) #show   interfaces   status   all | include
0/51
0/51ScaleoutNetwork_InterconnectUp40G      FullUnknown Inactive
(SiteN_System_Interconnect2) #quit
Connection closed by foreign host.
```

5. Reconfigure the System Interconnects on the new systems:

    a. Connect an Ethernet cable from your laptop to port 44 on System Interconnect 1 of the new system.

    b. Create an alias on your laptop to **System Interconnect 1** on the new system:

        > **Note:** Do not change the link-local IP address in the command below.

        ```
        sudo ifconfig eth1:0  <ip_address> up
        ```

    c. Connect to **System Interconnect 1** (username: admin, no password):

        ```
        lab@mw-<System IP>:~$ telnet <System Interconnect 1 IP> Trying
        Connected to 169.254.110.200. Escape character is '^]'. User:admin
        Password:
        ```

    d. Run the following commands:

        ```
        (SiteN_System_Interconnect1)      >en
        (SiteN_System_Interconnect1)       #conf
        (SiteN_System_Interconnect1)     (Config)#interface 0/49
        (SiteN_System_Interconnect1)     (Interface 0/49)#no shutdown
        (SiteN_System_Interconnect1)     (Interface 0/49)#exit
        (SiteN_System_Interconnect1)     (Config)#interface 0/51
        (SiteN_System_Interconnect1)     (Interface 0/51)#no shutdown
        (SiteN_System_Interconnect1)     (Interface 0/51)#exit
        (SiteN_System_Interconnect1)     (Config)#exit
        (SiteN_System_Interconnect1) #write memory confirm
        Config file 'startup-config' created successfully. Configuration Saved!
        (SiteN_System_Interconnect1) #show   interfaces   status   all | include
        ```

```
0/49
0/49ScaleoutNetwork_InterconnectUp40G FullUnknown Inactive
(SiteN_System_Interconnect1) #show  interfaces  status  all | include
0/51
0/51ScaleoutNetwork_InterconnectUp40G   Full40G  FullUnknown Active
(SiteN_System_Interconnect1) #exit
(SiteN_System_Interconnect1)   >q
Connection  closed  by  foreign  host.
```

e. Create an alias on your laptop to **System Interconnect 2** on the new system:

> **Note:** Do not change the link-local IP address in the command below.

```
sudo ifconfig eth1:0 169.254.210.240 up
```

f. Connect to **System Interconnect 2** (username: `admin`, no password):

```
lab@mw-von:~$ telnet 169.254.210.200
Trying 169.254.210.200...
Connected to 169.254.210.200. Escape character is '^]'.
User:admin
Password:
```

g. Run the following commands:

```
(SiteN_System_Interconnect2) >enable
(SiteN_System_Interconnect2)   #configure
(SiteN_System_Interconnect2)   (Config)#interface 0/49
(SiteN_System_Interconnect2)   (Interface 0/49)#no shutdown
(SiteN_System_Interconnect2)   (Interface 0/49)#exit
(SiteN_System_Interconnect2)   (Config)#interface 0/51
(SiteN_System_Interconnect2)   (Interface 0/51)#no shutdown
(SiteN_System_Interconnect2)   (Interface 0/51)#exit
(SiteN_System_Interconnect2)   (Config)#exit
(SiteN_System_Interconnect2) #write memory confirm
Config file 'startup-config' created successfully. Configuration Saved!
(SiteN_System_Interconnect2) #show  interfaces  status  all | include
0/49
0/49ScaleoutNetwork_InterconnectUp40G FullUnknown Inactive
(SiteN_System_Interconnect2) #show  interfaces  status  all | include
0/51
0/51ScaleoutNetwork_InterconnectUp40G   Full40G  FullUnknown Active
(SiteN_System_Interconnect2) #exit
(SiteN_System_Interconnect2) >q
Connection closed by foreign host.
```

6. If necessary, repeat all sub-steps in step 2 on system 3.

6.6 Additional steps for multi-site configurations

If you are scaling out a multi-site configuration, complete these additional steps before running the configuration wizard:

1. Configure the System Interconnects for your chosen uplink mode.

   > **Important:** This is an irreversible procedure and must be done by Quantum support running the configuration wizard.

2. Connect transceivers to specific System Interconnect uplink ports depending on your chosen uplink mode, and connect cables from these transceivers to your corresponding network, at each site.

   > **Note:** Connect transceivers to ports 52 and 50 on each System Interconnect, on each system, at each site

   – For uplink mode 1 (two individual 10G access ports (48,47) per System Interconnect):

   • Connect transceivers to ports 48 and 47 on each System Interconnect, on each system, at each site.

   • (For ActiveScale P100 with Column 2): Connect transceivers to port 46 on each System Interconnect, on each system, at each site.

   • (For ActiveScale P100 with Column 3): Connect transceivers to port 45 on each System Interconnect, on each system, at each site.

   – For uplink mode 2 (one 10G trunk port (48) per System Interconnect):

   • Connect transceivers to port 48 on each System Interconnect, on each system, at each site.

   – For uplink mode 3 (one 40G trunk port (50) per System Interconnect):

   • Connect transceivers to port 50 on each System Interconnect, on each system, at each site.

   – For uplink mode 4 (three 10G trunks ports (48,47,46) with LACP per System Interconnect):

   • Provide non-conflicting VLAN IDs and configure your respective switch ports for LACP.

   • Connect transceivers to ports 48, 47, and 46 on each System Interconnect, on each system, at each site.

   – For uplink mode 5 (two 40G trunks ports (52,50) with LACP per System Interconnect):

   • Provide non-conflicting VLAN IDs and configure your respective switch ports for LACP.

   • Connect transceivers to ports 52 and 50 on each System Interconnect, on each system, at each site.

Table 6-2.   System Interconnect uplink ports

System type	Local device	Local port	Your network
1 column	System Interconnect 1 (**SW1**)	**47**	Site*N*_Column1_StorageNetwork1
	System Interconnect 2 (**SW2**)	**47**	Site*N*_Column1_StorageNetwork2
	System Interconnect 1 (**SW1**)	**48**	Site*N*_SystemNetwork1
	System Interconnect 2 (**SW2**)	**48**	Site*N*_SystemNetwork2
2 column	System Interconnect 1 (**SW1**)	**46**	Site*N*_Column2_StorageNetwork1
	System Interconnect 2 (**SW2**)	**46**	Site*N*_Column2_StorageNetwork2
3 column	System Interconnect 1 (**SW1**)	**45**	Site*N*_Column3_StorageNetwork1
	System Interconnect 2 (**SW2**)	**45**	Site*N*_Column3_StorageNetwork2

Figure 6-4.   Uplinks illustrated
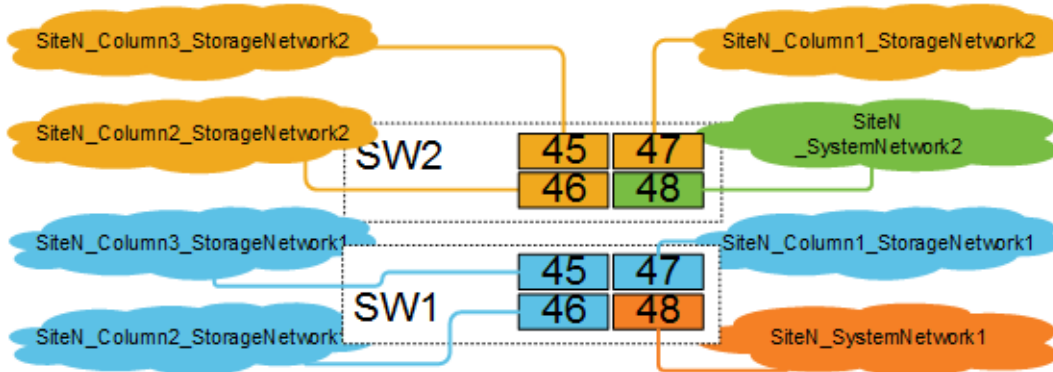
This completes the hardware setup for scaling out by one additional system.

6.6.1 Software steps for scaling out

Warning: If your system is running ActiveScale OS 5.0.1, stop. Contact Quantum Support to update the host names of all components on all your systems **before** you follow this procedure.

Before following these steps, complete the hardware steps in the ActiveScale P100 *Installation Guide* **at each site**. You can only scale out incrementally (one new system at a time at each site).

At this point, all nodes in the new system have link local IP addresses and ActiveScale OS pre-installed on them.

Important: The existing system(s) must be in a stable state before scaling out. The scale out job checks data safety levels when it starts. If a system is freshly installed, or if you just completed one scale out, wait 10-15 minutes for the system to stabilize and to update its data safety levels. This is particularly important if you purchased multiple systems for an initial install. Systems that have been running for some time may report a lowered data safety after a scale out. You must resolve any data safety issues before attempting to scale out. If the data safety of the system is not optimal or there are failed drives, fix the issues by replacing the drives before starting this procedure.

Warning: Components in the new system might have newer firmware than your existing components have. This procedure does not upgrade or downgrade any firmware.

Warning: Do not start a log collection job while a scale out job is running.

1.   Start the scale out wizard.

Important: On multi-site deployments, start this wizard from any **one** site. You only need to run it at one site.

    a.   In ActiveScale SM click **Configuration** > **Upgrade**.

    b.   In the **System Expansion** section, scroll down to **Scale Out**.

    c.   Click **Start**.

Figure 6-5.   **Starting a scale out**
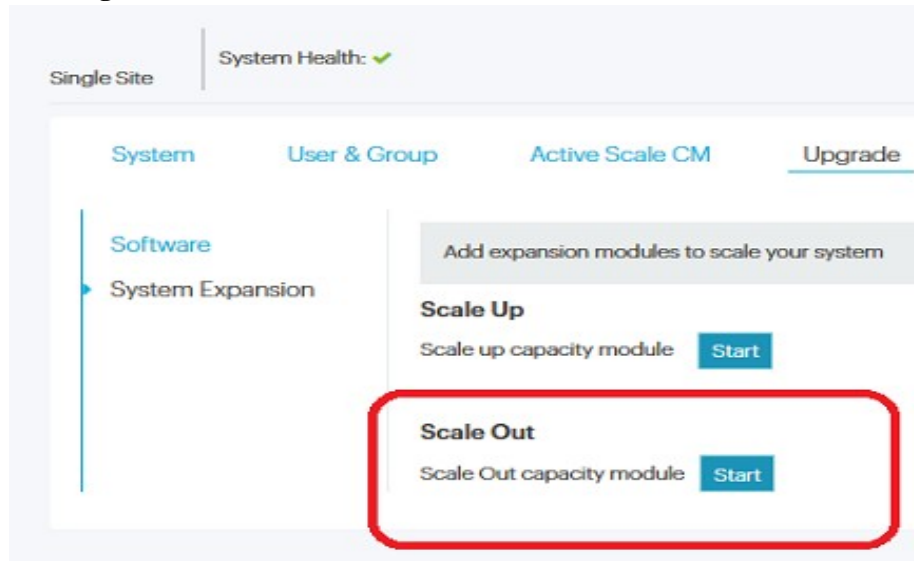
The scale out wizard starts. ActiveScale OS disables the DHCP server on the System Nodes and scans for the new system's link local IP addresses.

> **Important:** Scale out is not allowing you to proceed when the new racks are higher in software version than the old racks

A pop-up appears with results of system scan:

Figure 6-6.   **Sample pop-up with results of system scan**
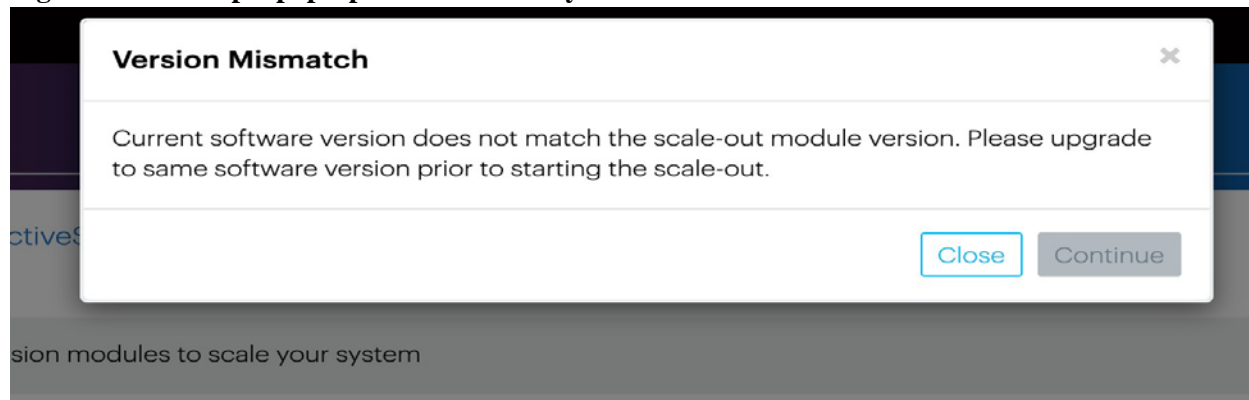
    –   If the wizard indicates that no scale out system are available, click **Close**. Check the power-on state and cabling of each component in the new system and start the wizard again.

    –   If the wizard indicates that there is a version mismatch, click **Close**. Update the ActiveScale OS on the existing system(s) and start the wizard again. For upgrade help, contact Quantum Support.

    –   If the wizard finds no problems, click **Continue**. The wizard displays the network settings.

Figure 6-7.   Scale out: Summary of scan

2. **For each site**, validate the network settings in each tab against your settings as specified in your *ActiveScale P100   Site Survey*, and/or change the Storage Network settings.

    > **Tip:** You can change the 4th octet of the new system's Public Network IP addresses and you can change Storage Network addresses. System Network addresses are carried forward from the existing system(s), so you cannot change them.

3. Click **Next** to review each tab.

    > **Important:** On multi-site deployments, the wizard presents two levels of tabs. **It is critical that you review all the tabs.** In other words, you must review Site 1's network settings in each tab, Site 2's network settings in each tab, and Site 3's network settings in each tab.

4. When you reach the last tab, click **Proceed**.

Figure 6-8.   Scale out: Click Proceed to apply network settings

The wizard notifies you to check the scale out job on the **Jobs** page.

5. Navigate to the **Jobs** page, and wait until the scale out job indicates success or failure.

The **Jobs** page displays the progress of the scale out job. Depending on the size of the system, this job runs for 3 to 18 hours.

Figure 6-9.   Scale out: Job progress

Job Type	Job Site	Job Status	Progress	Start Date↓	Duration	Results	Details	Actions
Scale-out		Completed	100%	4/10/18 11:02 PM	4 hrs, 9 mins	Success	ℹ	
Scale-out		Completed	100%	4/10/18 6:34 PM	3 hrs, 50 mins	Success	ℹ	
Scale-out		Completed	100%	4/10/18 2:35 PM	3 hrs, 22 mins	Success	ℹ	
Scale-out		Completed	100%	4/10/18 10:49 AM	3 hrs, 9 mins	Success	ℹ	
Scale-out		Completed	100%	4/9/18 9:48 PM	2 hrs, 46 mins	Success	ℹ	
Scale-out		Completed	100%	4/9/18 6:52 PM	2 hrs, 29 mins	Success	ℹ	

If the scale out job fails, click the icon in its **Details** column to see why it failed and suggestions on how to correct the problem. Follow the suggestions.

If the scale out job succeeds, ActiveScale SM displays a pop-up prompting you to change the `hgstsupport` password for the entire system.

The new system has a different `hgstsupport` password than the existing system(s). Therefore, best practice is to set a common `hgstsupport` password for the entire system.

6. Click the link in the pop-up to start the password wizard.

7. Check the dashboard to confirm that the new system is displayed in the **Resources** tile and that the total capacity of the system is upgraded as expected.

Figure 6-10.   Scale Out: Confirmation on dashboard
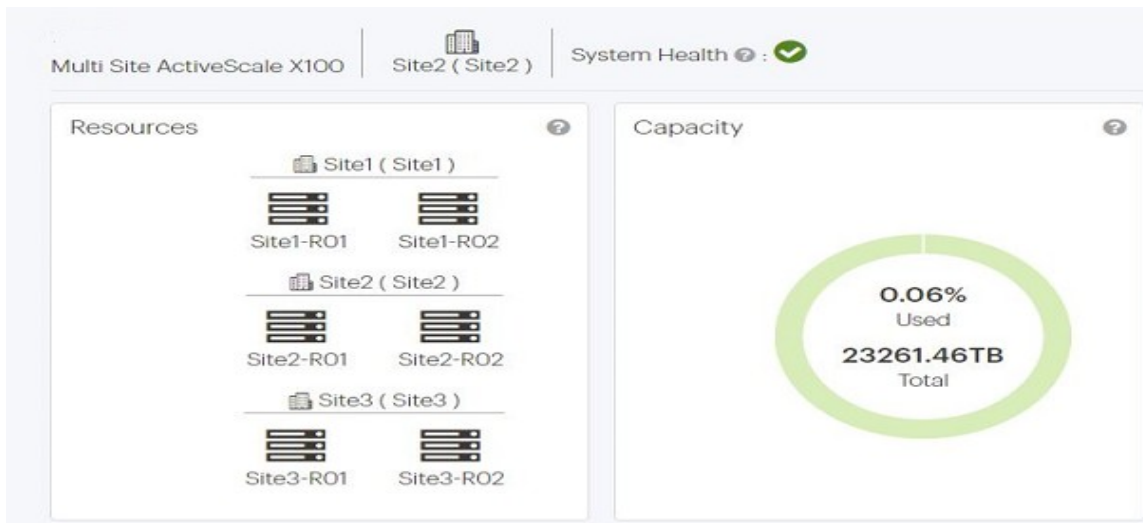
8. Check **Resources** to confirm that the new system's components are displayed with correct host names.

   For example, for a multi-site deployment, System Node 3 on the second system at site 1 should have the host name **Site1-R02-SG03**.

Figure 6-11.   Scale out: Confirmation on Resources pane
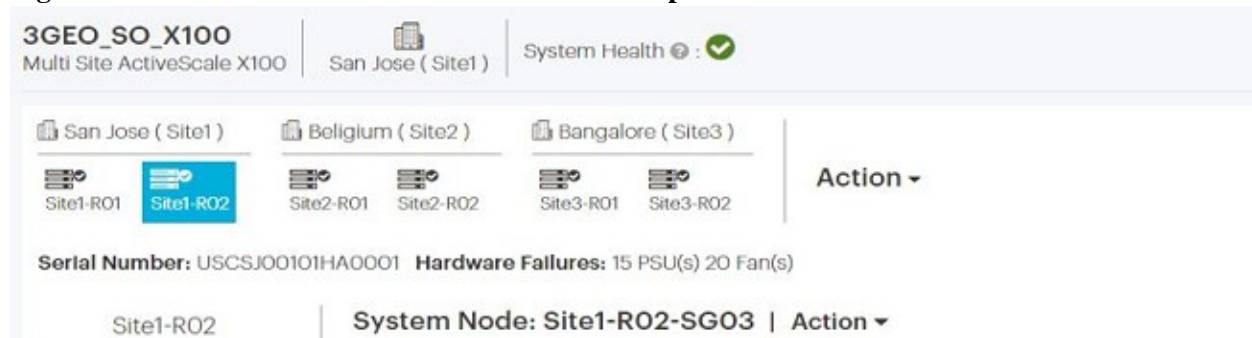
9. Contact support to update the SSH keys on the new system.

At this point, scaling out the system is done.

> **Tip:** If the existing system had encryption enabled, your new system(s) automatically have encryption enabled also.

6.6.2 Post-requisites

On systems with virtual IPs defined, add virtual IPs to the System Nodes on the new system, and add these nodes to the existing failover group. For details, see the *ActiveScale OS Administrator Guide*.

7 Installing System Expansion Node kits

System Expansion Node kits provide one additional System Node for your ActiveScale system. Additional System Nodes allow you to increase system performance with your current storage capacity. You can add up to three System Expansion Node kits (three additional System Nodes) to each ActiveScale P100 base system. Multi-site deployments can support up to 21 System Expansion Nodes.

System Expansion Node kits are supported with other upgrades, this includes:

- Scale out deployments
- Scale up deployments
- Multi-site deployments

> **Important:** System Expansion Node kits do not provide failover or high-availability capabilities to ActiveScale systems.

7.1 System Expansion Node kit requirements

Before purchasing a System Expansion Node kit, ensure that your ActiveScale system meets the requirements in this section.

7.1.1 Public Network IP address requirements

System Expansion Nodes in the same local rack must be in the same subnet. Each System Expansion Node requires a host IP address.

7.1.2 Multi-site deployment requirements

There is no requirement to mirror System Expansion Nodes across multi-site deployments. For example, you can install System Expansion Node kits in a single rack in a multi-site deployment without issue.

7.2 Rack requirements

Ensure that your rack can meet the additional requirements for each added System Expansion Node:

- 1U rack space
- 27 lbs (12.2 kg) of additional weight
- 0.665 at 785 KBTU/hour of additional thermal output
- 230 W of additional power

7.3 Unpacking System Expansion Node kits

Table 7-1.   Kit contents

Part	Contents
System Expansion Node kit Part number - 1EX12541EX1255	• One System Node • One 1U System Node mounting kit • System Node power cables • Two 10G SFP+ 1M DAC cables • Two 10G SFP+ SR Optic transceivers

To unpack the System Expansion Node kits:

1. Remove the cables and mounting kit.
2. Remove the System Expansion Node.
3. Inspect each item in the box for damage.

Repeat this process for each System Expansion Node kit.

7.4 Installing System Expansion Node kits

System Nodes and System Expansion Nodes use the same installation procedure. Starting from the lowest U-space above the existing equipment, the install System Expansion Nodes from bottom to top.

Figure 7-1.   System Expansion Node rack locations

6 System Expansion Nodes (optional)

5 Double Scale Up Storage Nodes
   CN13 - CN18 (optional)

4 Single Scale Up Storage Nodes
   CN7 - CN12 (optional)

3 System Nodes SN1 - SN3

2 System Interconnects SW1 - SW2

1 Storage Nodes CN1-CN6
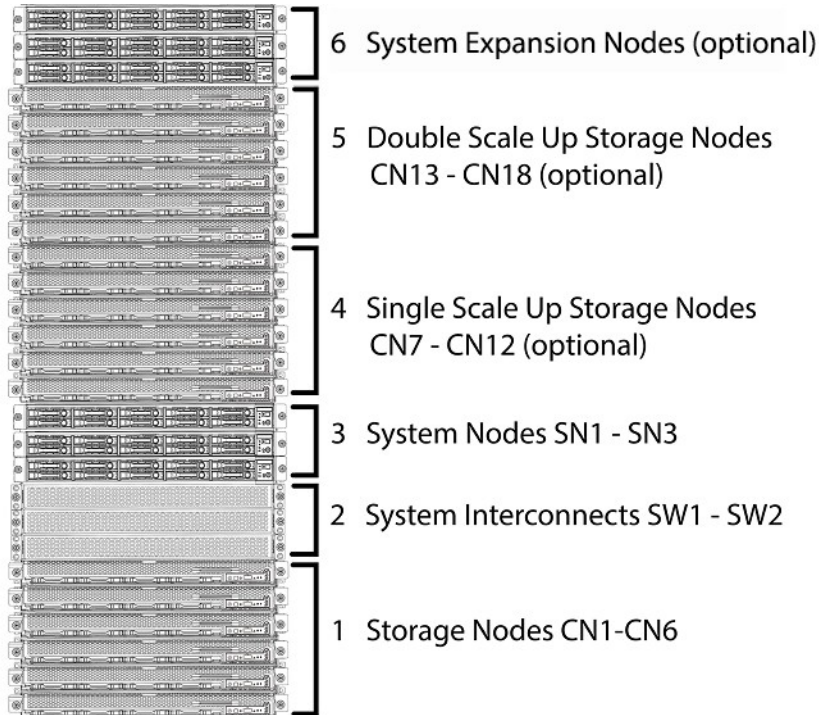
7.4.1 Installing the 1U rail kit

To install the rails for the System Expansion Node:

  1.   Attach the outer rails to the rack.

> **Note:** Verify that you are installing the correct rail on each side of the rack. The rear of each rail is marked with "rear".

  a.   Extend the outer rail enough that it extends between the two vertical rails of the rack.

Figure 7-2.   Expand the outer Rail
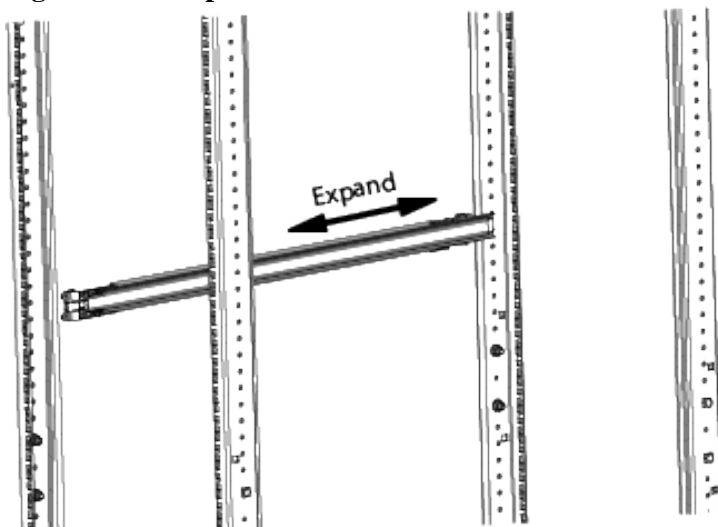
Expand

b. Position the hook on the rear outer rail around the rear vertical rail.

c. Slide the rear outer rail pegs into the desired slots.

d. Position the hook on the rear outer rail over the rear vertical rail and then slide the rear outer rail pegs into the desired slots. The clip at the rear of the rail kit is installed over the rack rail to hold it in place.

Figure 7-3.   Rail attaching to rear vertical rail
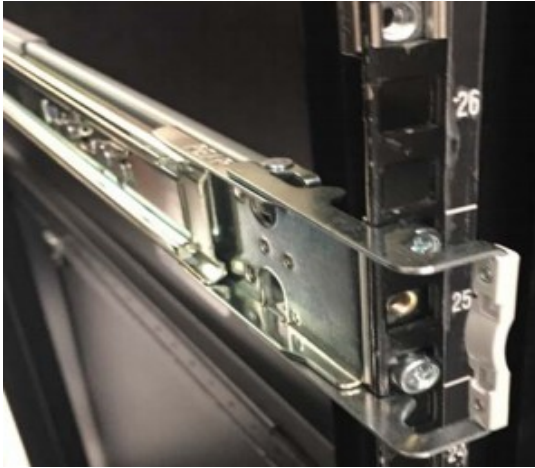
e. Extend the outer rail forward and insert the pegs into the front vertical rail.

Figure 7-4.   Rail attaching to front vertical rail

f. Extend the inner rail to its full length.

g. Remove the inner rail by sliding the white clip with a rounded edge forward.

> **Note:** Be cautious leaving the outer rails extending out of the rack. Consider pushing the outer rails back until you are ready to install the node.

h. Repeat the previous steps to attach the other rail to the rack.

2. Attach the inner rails to the node.

a. Align the holes in the inner rail with the pegs on the side of the node.

b. Slide the rail forward to lock it in place.

Figure 7-5.   Locking the inner rail to the node
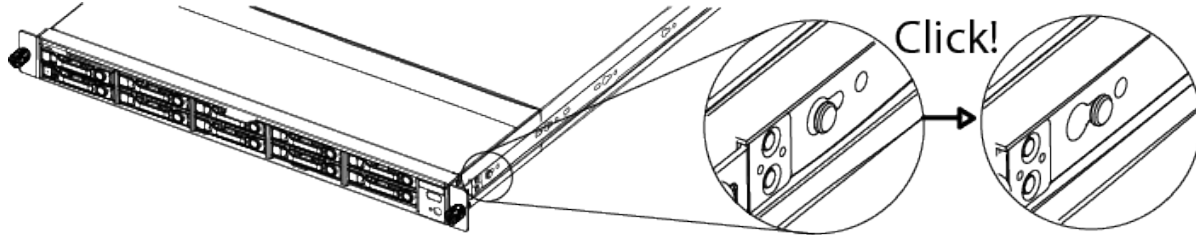

c. Secure the inner rail to the node using one of the screws.

Repeat these steps to attach the second rail.

7.4.2 Installing a System Expansion Node into the rack

> **Important:** Install components into the rack from bottom to top.

> **Important:** The System Expansion Node weighs 27 lbs (12.2 kg), take precautions when lifting.

To install a System Expansion Node:

1. Re-extend the outer rails from the rack.

2. Align the rails on the node to the rails attached to the rack

3. Push the node into the rack. On the sides of the rail, pull the blue tabs forward to allow the inner rail to slide all the way in.

4. With the node inserted fully into the rack, screw the thumb screws on the front of the system into the node.

Repeat these steps to install all of the System Expansion Nodes.

> **Important:** You can install all of the System Expansion Nodes into the rack at once. However, the nodes must be powered on and configured one at a time.

7.5 Connecting the System Expansion Node kit networking cables

Use the following table and image to cable each System Expansion Node.

Figure 7-6. **ActiveScale P100 Cabling Diagram**
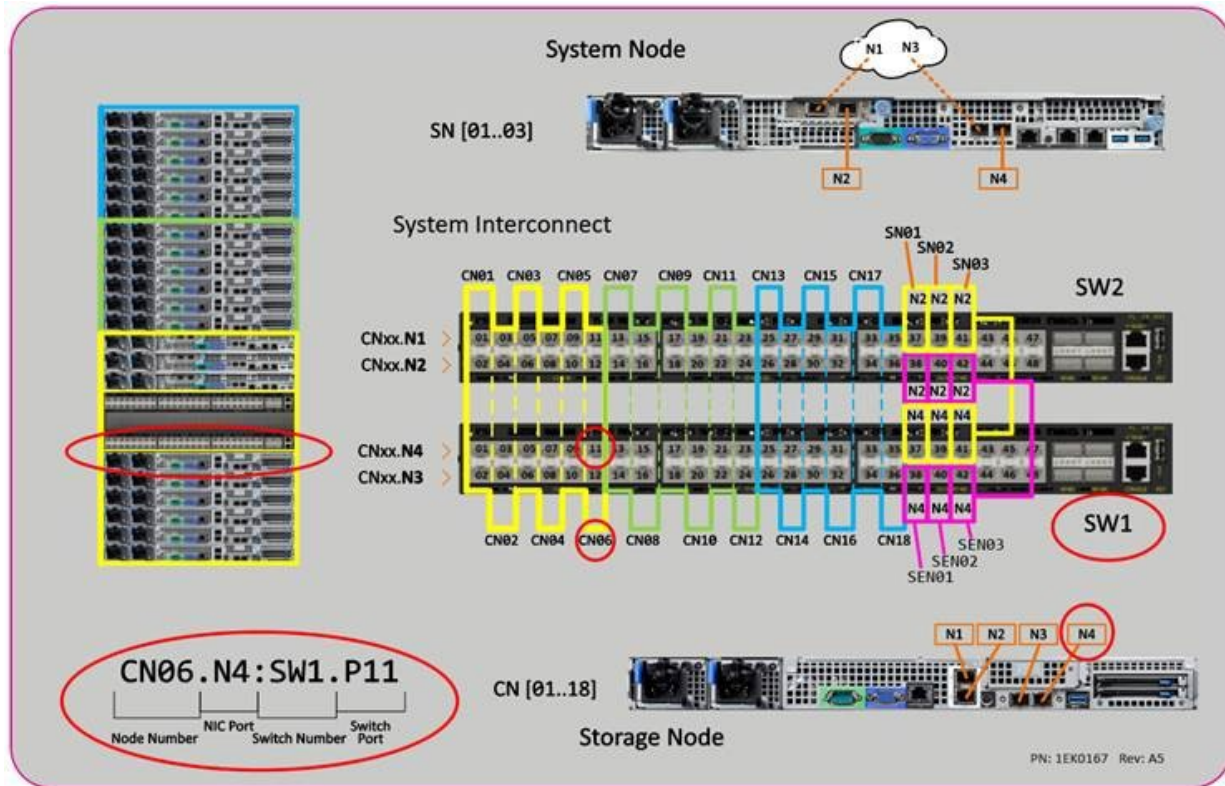
Table 7-2. **System Interconnect connections for the System Expansion Nodes**

Local device	Local port	Peer port	Peer device	Cable
System Expansion Node 3	N2	N42	SW2	10G SFP+ 1M DAC
	N4	N42	SW1	
System Expansion Node 2	N2	N40	SW2	
	N4	N40	SW1	
System Expansion Node 1	N2	N38	SW2	
	N4	N38	SW1	

7.6 Installing System Expansion Node kits in multi-site systems

A multi-site system can support up to 21 System Expansion Nodes. System Expansion Nodes do not need to be mirrored across multiple sites.

Table 7-3. **Multi-site example configuration**

Rack	System Expansion Nodes per ActiveScale P100 system
Primary rack	3
Scale out rack 1	3
Scale out rack 2	3
Scale out rack 3	3

Table 7-3. Multi-site example configuration

Rack	System Expansion Nodes per ActiveScale P100 system
Scale out rack 4	3
Scale out rack 5	2
Scale out rack 6	1
Scale out rack 7	1
Scale out rack 8	2
	21 total

> **Important:** If you are installing System Expansion Nodes in multiple racks, install all of the kits in a single rack before moving on to the next rack.

7.7 Programming the System Interconnects

After cabling the System Expansion Nodes, log into the System Interconnect and open ports 38 (for System Expansion Node 1), 40 (for System Expansion Node 2) and 42 (for System Expansion Node 3).

> **Note:** The VLANs on each port will be automatically enabled while running the System Expansion Node configuration wizard.

To program each System Interconnect:

1. Connect an Ethernet cable from your laptop to port 44 on System Interconnect 1.

2. Configure your computer to be on the same network as the System Interconnect using the following values:

   – Management Port: `192.168.123.0/24`

   – Subnet: `255.255.255.0`

   – Gateway: `192.168.123.123`

3. Open a `Telnet` session to the System Interconnect and replace `switchport_IP` with the default IP address `192.168.123.123`.

   The System Interconnect command prompt appears.

4. Log in using the default credentials:

   – **User name:** admin

   – no password

5. Type `enable` to enter the Privileged EXEC command mode.

   ```
   (Routing)>enable
   ```

6. Type `configure` to enter the Privileged CONF command mode.

   ```
   (Routing)#configure
   (Routing) (Config)#
   ```

7. Open the required ports for the System Expansion Node:

   > **Important:** If you are installing more than one System Expansion Node, open the necessary ports on both System Interconnects before continuing to the next node.

   a. System Expansion Node 1

   ```
   en
   conf

   interface 0/38
   no shutdown
   exit

   exit

   write memory confirm

   Config file 'startup-config' created successfully. Configuration Saved!
   ```

b. System Expansion Node 2

```
en
conf

interface 0/40
no shutdown
exit

exit

write memory confirm

Config file 'startup-config' created successfully. Configuration Saved!
```

c. System Expansion Node 3

```
en
conf

interface 0/42
no shutdown
exit

exit

write memory confirm

Config file 'startup-config' created successfully. Configuration Saved!
```

Repeat steps 1-7 to open the ports on System Interconnect 2.

If the management switch needs to be updated, contact Quantum technical support.

7.8 Powering on the System Expansion Node

Power on the System Expansion Node using the front power button.

> **Important:** If you are installing more than one System Node, only power on one System Expansion node at a time, then run the system expansion wizard for that node. Repeat these steps for each System Expansion Node.

7.9 Software steps for adding a System Expansion Node kit

Before following these steps, complete the hardware steps in the *ActiveScale P100/ Installation Guide.* You can add one new System Expansion Node at a time to only one system at any one site.

At this point, all nodes in the new system have link local IP addresses and ActiveScale OS pre-installed on them.

> **Warning:** Components in the System Expansion Node might have newer firmware than your existing components have. This procedure does not upgrade or downgrade any firmware.

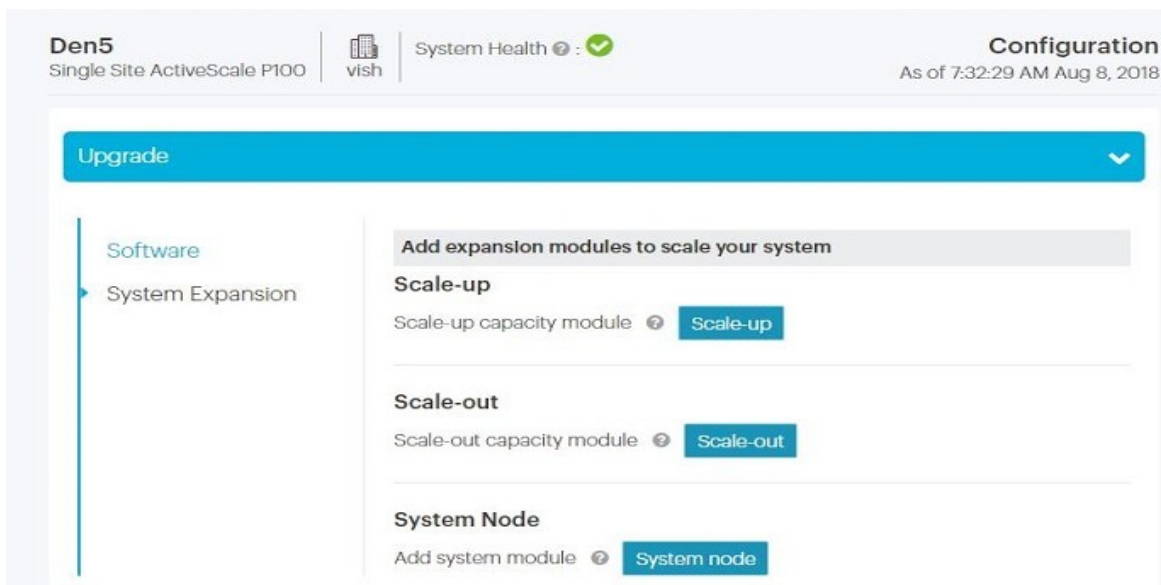> **Warning:** Do not start a log collection job while a System Expansion Node job is running.

1. Start the system expansion wizard.

   > **Important:** On multi-site deployments, log into the GUI from the on each sites System Node to initiate the wizard.
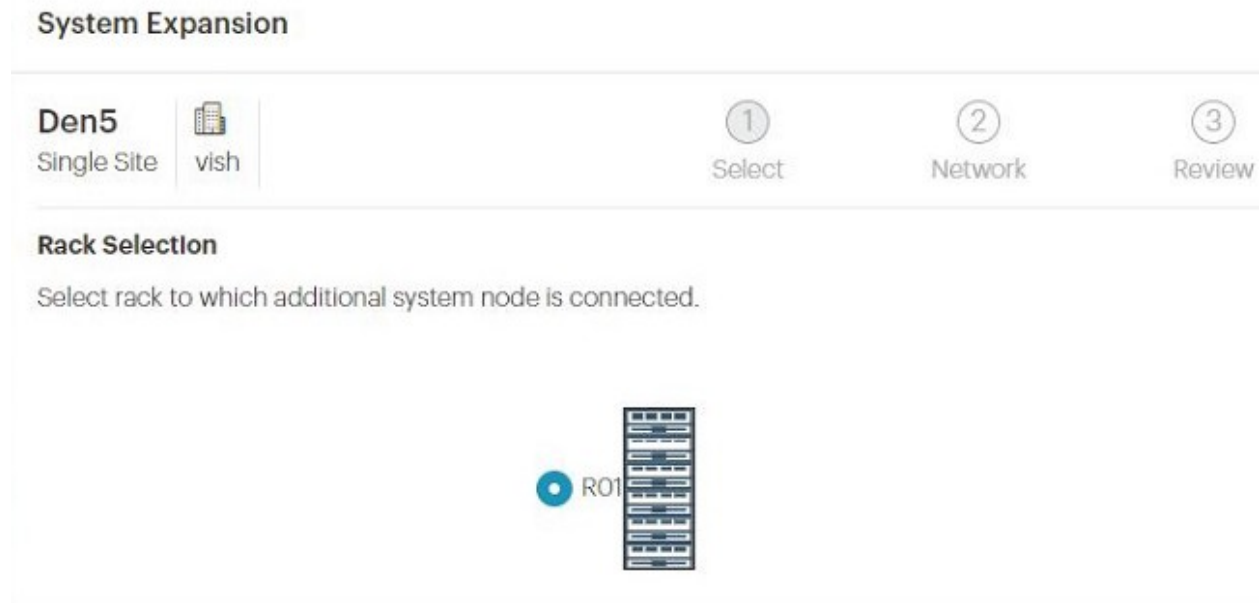
   d. In the **System Expansion** section, scroll down to **System Node**.

   e. Click **System node**.

Figure 7-7.   Starting a System Expansion Node job

f. Select the system which the new System Expansion Node is attached to, and click **Next**.

Figure 7-8. Selecting which system the new System Expansion Node is attached to

The System Expansion Node wizard starts. ActiveScale OS disables the DHCP server on the System Nodes and scans for the new System Expansion Node's link local IP addresses.

– If the wizard indicates that no System Expansion Nodes are available, click **Close**. Check the power-on state and cabling of the System Expansion Node and start the wizard again.

– If the wizard finds no problems, click **Continue**. The wizard displays the network settings.

Figure 7-9.   System Expansion Node: Summary of scan

2. **For each site**, validate the network settings in each tab against your settings as specified in your *ActiveScale P100 Site Survey*, and/or change the Storage Network settings.

> **Tip:** You can change the 4th octet of the new system's Public Network IP addresses. System Network addresses are carried forward from the existing system(s), so you cannot change them.

3. Click **Next** to review inputs.

> **Important:** On multi-site deployments, the wizard presents two levels of tabs. **It is critical that you review all the details.** In other words, you must review Site 1's network settings in each tab, Site 2's network settings in each tab, and Site 3's network settings in each tab.

4. When you reach the last tab, click **Proceed**.

Figure 7-10.   System Expansion Node: Click Proceed to apply network settings

The wizard notifies you to check the System Expansion job on the **Jobs** page.

5. Navigate to the **Jobs** page, and wait until the System Expansion job indicates success or failure.

    The **Jobs** page displays the progress of the System Expansion job.

Figure 7-11.   System Expansion Node: Job progress
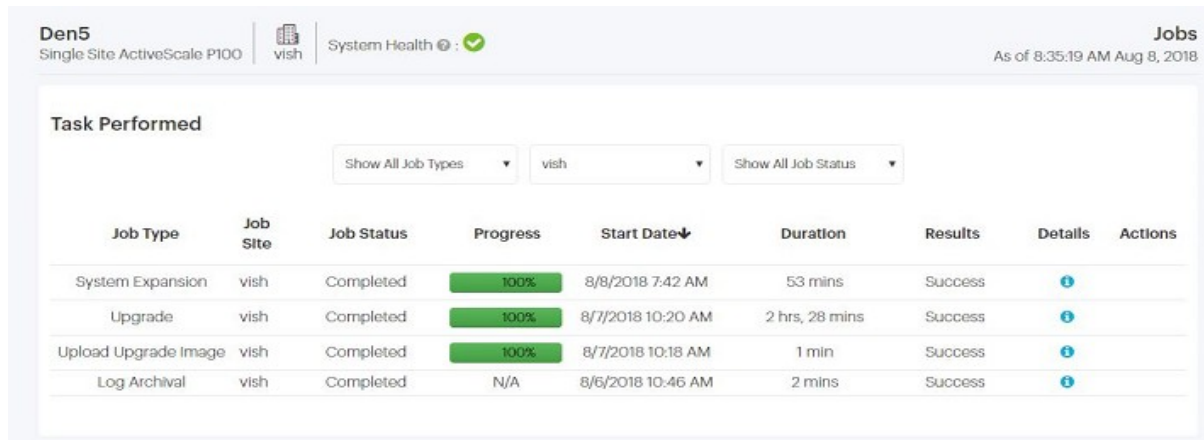
If the System Expansion Node job fails, click the icon in its **Details** column to see why it failed and suggestions on how to correct the problem. Follow the suggestions.

If the System Expansion Node job succeeds, the **Results** column changes from **In-Progress** to **Success.**

Figure 7-12.   System Expansion Node: Job success
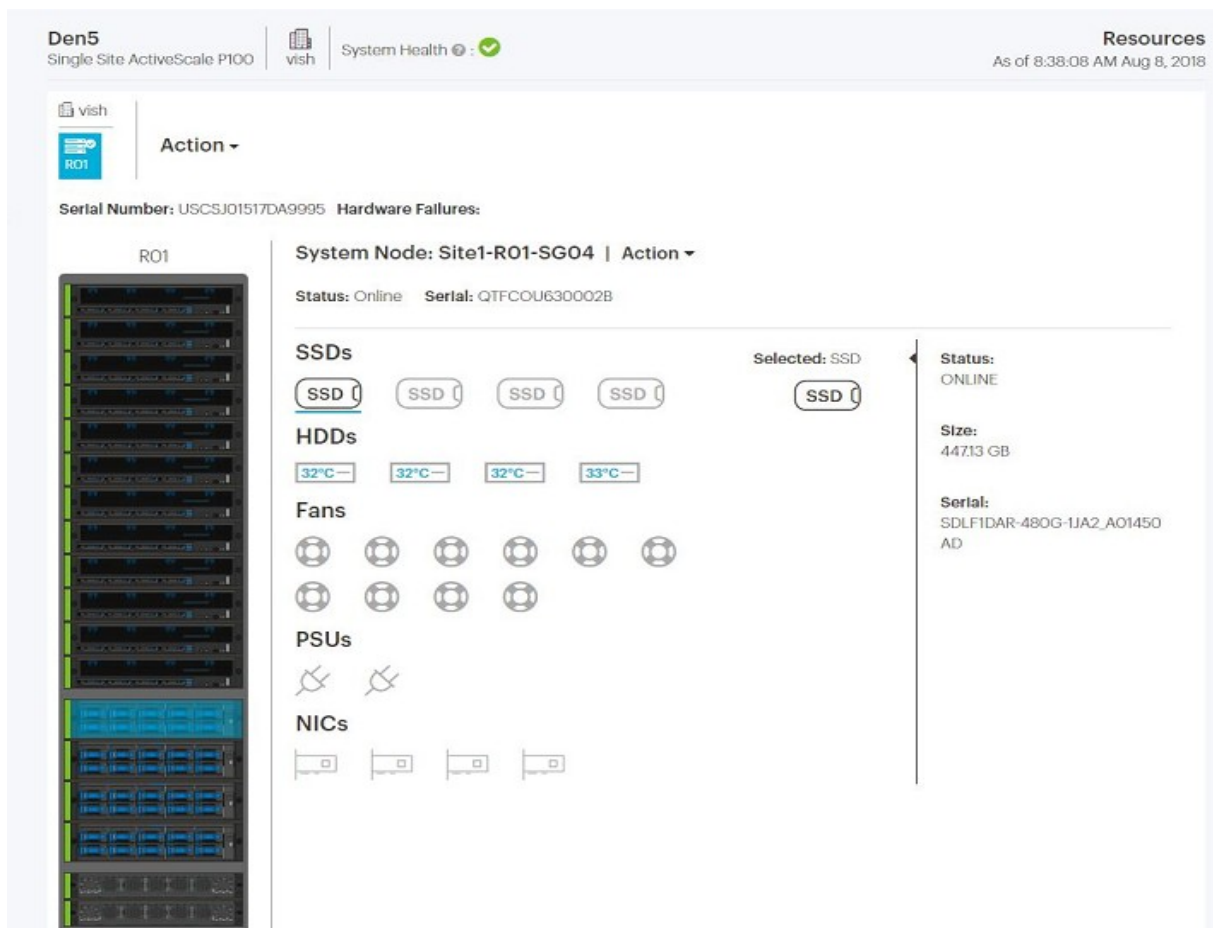
6. Log out of the GUI and log back in to see the new system node and check the dashboard to confirm that the new system node is displayed in the **Resources** tile with the correct name.

For example, for a multi-site deployment, System Expansion Node 3 on the second system at site 1 should have the host name **Site1-R02-SEN03**.

Figure 7-13.   System Expansion Node: Confirmation on dashboard

Figure 7-14. System Expansion Node: Confirmation on Resources pane

7. If you are using NFS client failover, assign a virtual IP address to the new System Expansion Node. For more information, see the *ActiveScale OS Administrator Guide.*

You have now completed the addition of the System Expansion Node.

8 System specifications

This section provides the specifications for the ActiveScale P100.

8.1   System specification summary

The following table is a summary of specifications relevant to the ActiveScale P100 system

S5L Specifications

Processor	**Processor Type:** Intel® Xeon® Processor Scalable Family	Storage Controller	Intel® C622: (6) SATA 6Gb/s ports SATA RAID 0, 1
	Max. TDP Support: Up to 165W TD	Power Supply	**Option 1:** (2) High efficiency hot-plug 500W PSU, 80 Plus Platinum
	Number of Processors: 2 Processors		
	Internal Interconnect: 9.6GT/s, 10.4GT/s		**Option 2:** (2) High efficiency hot-plug 800W PSU, 80 Plus Platinum
Form Factor	1U Rack Mount	Onboard Storage	**Option 1:** (2) PCIe Gen3x1 M.2 per node
Dimensions	**W x H x D (inch):** 17.24 x 1.7x 29.21		**Option 2:** (2) SATA M.2 per node
	W x H x D (mm): 438 x 43.2x 742	Fan	(6) Dual-rotor FAN
Weight	**3.5" :** 10.14kg		(4) Dual-rotor FAN (Optional, only support CPU 85W-105W CPU)
	2.5" : 9.57kg		
Chipset	Intel® C622	Video	Aspeed AST 2500 BMC, eSPI interface, 64MB SPI Flash chip (w/o VLN), IPMI 2.0 support, NC-SI support in PHY board
Storage	**Internal Storage:** (2) PCIe Gen3x1 or sSATAx1 2280/22110 M.2		
	SKU - #1 : 8x 2.5" hot-plug SATA/SAS HDD/SSD		
	SKU - #2 : 4x 3.5"/2.5" hot-plug SATA/SAS HDD/SSD + 2x 2.5" 7mm fixed SATA drive		
Memory	**Total Slots:** 12	Rear I/O	(2) USB 3.0 ports
	Capacity: Up to 768GB RDIMM		(1) VGA port (BMC AST2500 supports)
	Memory Type: 2666 MHz DDR4 RDIMM		(1) RS232 serial port
	Memory Size: 64GB, 32GB, 16GB, 8GB RDIMM		(1) ID LED
Expansion Slot	(1) PCIe Gen3 x16 LP MD-2 (CPU0)		(1) GbE RJ45 management port
	(1) PCIe Gen3 x16 FHHL (CPU1)		(2) Gbe RJ45 from PCH LBG-1
Network Controller	**Basic LAN Ports:**		(2) LAN Ports (Option, depend on LoM chip solution)
	Lewisburg Integrated Network Solution Dual port 1GbE		
	(2) 1000BASE-T using Marvell® 88E1514 external PHY	System Management	IPMI v2.0 Compliant, on board "KVM over IP" support
	Two additional LAN Ports:	Operating Environment	Operating temperature:
	Option 1 : (2) Broadcom chip BCM5720L 1G (RJ45)		5°C to 35°C (41°F to 95°F)
	Option 2 : (2) Broadcom chip BCM57416 10G (RJ45)		Non-operating temperature:
	Option 3 : (2) Broadcom chip BCM57416 10G (SFP+)		-40°C to 65°C (-40°F to 149°F)
	Option 4 : (2) Broadcom chip BCM57417 25G (SFP28)		Operating relative humidity:
Front I/O	(1) Power button w/ LED		50% to 85%RH.
	(1) ID button		Non-operating relative humidity:
	(1) Reset button		20% to 90%RH
	(1) Status LED	TPM	TPM 1.2/2.0 SPI module
	(1) ID LED		
	(1) HDD LED		
	(2) LAN LEDs for 2 Ports Gbe from LBG-1 (not support optional LoM)		
	(2) USB 2.0 Ports (LFF SKU Only)		

Table 8-4.   S5L System Specificcations.

Specifications	Description
Form factor	1U rack mount
Chassis dimensions(W x H x D)	17.24 x 1.7 x 29.21 inches 438 x 43.2 x 742 mm
Processor	Processor type:Intel® Xeon® Processor Scalable Family (codename Skylake-SP)Max. TDP support:165W, Optimized power delivery for 85W, VRD 13Number of processors: 2Internal Interconnect: 10.4 GT/s, 9.6 GT/s
Chipset	Intel® C621
Memory	Total slots: 12 Memory type: DDR4 2666 MT/s RDIMM Memory size: 8GB, 16GB, 32 GB* *More options refer to the AVL
Storage	• 2.5" HDD SKU(8) 2.5" SATA HDDs
Networking	• Basic LAN port – (1) Dedicated RJ45 GbE management port from PHY RTL8211 to BMC – (2) RJ45 GbE ports from PCH with MARVELL® 88E1514 (Port_0/Port_1) • Optional NIC (PORT_2/PORT3): (more options refer to the AVL) – (2) BCM5720L 1G (RJ45) – (2) BCM57416 10G (RJ45) – (2) BCM57416 10G (SFP+) – (2) BCM57417 25G (SFP28)
Expansion slots	• Riser 1 – PCIe x16 Gen 3 FHHL (CPU1) • Riser 2 – PCIe x16 Gen 3 HHHL or SAS mezzanine card (CPU0)
Onboard storage	(2) 2280/22110 M.2 slot, Gen3 PCIex1 or sSATA x1 from PCH
Video	Integrated Aspeed AST2500 with 8MB DDR4 video memory
Front I/O	• Power/ID/Reset Buttons • LAN (Port_0, Port_1)/Status/ID LEDs • (2) USB 2.0 ports (3.5" HDD model)

Specifications	Description
Rear I/O	• (2) USB 3.0 ports • (1) VGA port?(1) RS232 serial port • (2) GbE RJ45 port from PCH • (1) GbE RJ45 management port • (1) ID LED • (1) IO from standard FHHL PCIe card • (1) IO from standard HHHL PCIe card • (2) LAN ports (optional, depend on LoM chip solution, more options refer to the AVL)
TPM	Yes (optional, SPI mode)
ACPI	ACPI compliance, S0, S5 support
Power supply*	• 500W* and 800W Titanium/Platinum redundant PSU, 100-240VAC 50/60Hz, AC/HVDC support • 1100W redundant DC PSU: Acbel I/P: DC -39 - -72V, 37A max
System rating	• 100-120/200-240Vac, 50/60Hz, 6.5/3.3A or 240Vdc, 3.5A (per PSU Inlet) • 100-115V/120V/200-240Vac, 50/60Hz, 6.5A/6.5A/3.3A or 240Vdc, 3.5A (per PSU Inlet) • 100-115V/120V/200-240Vac, 50/60Hz, 7.4A/7.4A/ 3.3A or 240Vdc, 3.5A (per PSU Inlet) • -48Vdc, 25A (per PSU Inlet)
Fan*	(6) Dual-rotor fan modules or (4) dual-rotor fan modules*
System management	IPMI v2.0 Compliant, on board "KVM over IP" support
Weight (Max. configuration)	• 15.64 Kg (3.5" HDD model) • 15.29 Kg (2.5" HDD model)
Operating environment	• Operating temperature: 5°C to 35°C (41°F to 95°F) • Non-operating temperature: -40°C to 65°C (-40°F to 149°F) • Operating relative humidity: 50% to 85%RH. • Non-operating relative humidity: 20% to 90%RH

Table 8-5.   System specification summary

Condition (fully configured)	Non-operating	Operating
Altitude	-984 ft to 39,371 ft (-300 m to 12,000 m)	-984 ft to 10,000 ft (-300 m to 3,048 m)
Height in rack units (U)	• **Base configuration**—12U • **Scale-up kit**—6U • **System Expansion Node kit**[1]—1U	

Table 8-5.   System specification summary (continued)

Condition (fully configured)	Non-operating	Operating
Power requirements (typical/ maximum)	N/A	• **Base configuration**—1.85 to 2.03 kW • Base +1 configuration—3.23 to 3.54 kW • Base +2 configuration— 4.61 to 5.05 kW • **Scale-Up kit**—1.38 to 1.51 kW • **System Expansion Node kit**[1]—0.195 to 0.23 kW
Relative humidity	20% to 95% non-condensing	20% to 80% non-condensing
Relative humidity gradient	30% per hour maximum	30% per hour maximum
System width and depth	• **Width**—17.6 in (448.2 mm) • **Depth**—35 in (881 mm)	
Temperature	-40°F to 158°F (-40°C to 70°C)	50°F to 95°F (10°C to 35°C)
Temperature de-rating	33.8°F per 984.2 ft above 9842.5 ft (1°C per 300 m above 3000 m)	33.8°F per 984.2 ft above 3116.8 ft (1°C per 300 m above 950 m)
Temperature gradient	86°F (30°C)/hour	68°F (20°C)/hour
Thermal output	N/A	• **Base system**—6.31 to 6.92 KBTU/hour • **Scale-up kit**—4.70 to 5.15 KBTU/hour • **System Expansion Node kit**[1]—0.665 to 0.785 KBTU/hour
Weight	• **Base configuration**— 469 lbs (212.4 kg) • **Individual Scale up kit**— 348 lbs (157.8 kg) • **System Expansion Node kit**[1]—27 lbs (12.2 kg)	

1. Values are for one additional node. System Expansion Node kits can contain up to three additional nodes.

8.2 System Interconnect specifications

The following table lists the system specifications for an individual System Interconnect.

Condition	Specification
Dimensions	• **Width**—17.3 in (438 mm) • **Depth**—17 in (431 mm) • **Height**—1.73 in (44 mm)
Hot swappable?	
Operating relative humidity	20% to 85% non-condensing
Operating temperature	41° to 104°F (5°C to 40°C)
Quantity (per system)	Two
Rack Units (U)	1U
Weight (individual)	20 lbs (9 kg)
Weight (total for all System Interconnects)	40 lbs (18 kg)

System Node specifications

The following table lists the system specifications for an individual System Node.

Condition	Specification
Dimensions	• **Width**—17.2 in (438 mm) • **Depth**— 29.2 in (741.6 mm) • **Height**— 1.73 in (44 mm)
Hot swappable?	No
Operating relative humidity	20% to 85% non-condensing
Operating temperature	41° to 104°F (5°C to 40°C)
Quantity (per system)	Three
Rack Units (U)	1U
Weight (per component)	27 lbs (12.2 kg)
Weight (total for all System Nodes)	81 lbs (36.6 kg)

8.3 Storage Node specifications

The following table lists the system specifications for an individual Storage Node.

Table 8-6.   Storage Node Specifications

Condition	Specification
Dimensions	• **Width**—17.6 in (448.2 mm) • **Depth**—35 in (881 mm) • **Height**—1.7 in (43.2 mm)
Hot swappable?	No
Operating relative humidity	20% to 85% non-condensing
Operating temperature	41° to 104°F (5°C to 40°C)
Quantity (per system)	Six
Rack Units (U)	1U
Weight (per component)	58 lbs (26.3 kg))
Weight (total for all Storage Nodes)	348 lbs (157.8 kg)

8.4 Hard disk drive specifications (System Nodes)

The following table lists the specifications for the Quantum Corporation qualified hard disk drives contained within the System Nodes.

Table 8-7.   1 TB hard disk drive specification summary

Condition	Specification
Model	Travelstar® 7K1000
Capacity	1 TB

Table 8-7. 1 TB hard disk drive specification summary (continued)

Condition	Specification
Dimensions	• **Width**— 2.75 in (70 mm) • **Depth**—3.93 in (100 mm) • **Height**—.37 in (9.5 mm)
Hot swappable	Yes[1]
Operating relative humidity	5% to 95%, non-condensing
Operating temperature (internal)	0°C to 70°C (32°F to 158°F)
Quantity (per System Node)	Four
Replacement part number	1EX0222
Replacement Parts	N/A - Replacement part number includes drive carrier, drive, and screws.
Type	SATA

1.Only hot swappable after decommissioning.

8.5 Hard disk drive specifications (Storage Nodes)

The following tables list the specifications for the Quantum Corporation qualified hard disk drives contained within the Storage Nodes.

Table 8-8. 10 TB hard disk drive specification summary

Condition	Specification
Model	Ultrastar® He10
Capacity	10 TB
Dimensions	• **Width**—4 in (101.6 (+/-0.25) mm) • **Depth**—5.78 in (147mm) • **Height**—1 in (26.1mm)
Hot swappable	Yes[1]
Operating relative humidity	5% to 95%, non-condensing
Operating Temperature (internal)	0°C to 70° C (32°F to 158°F)
Quantity (per component - 12per node)	72 - 216 per full capacity. 12 per storage node.
Replacement part number	1EX0225
Replacement parts	N/A - Replacement part number includes drive carrier, drive, and screws.
Type	SAS

1.Only hot swappable after decommissioning.

Table 8-9. 12 TB hard disk drive specification summary

Condition	Specification
Model	Ultrastar® He12

Table 8-9.   12 TB hard disk drive specification summary (continued)

Condition	Specification
Capacity	12 TB
Dimensions	• **Width**—4 in (101.6 (+/-0.25) mm) • **Depth**—5.78 in (147mm) • **Height**—1 in (26.1mm)
Hot swappable	Yes[1]
Operating relative humidity	5% to 95%, non-condensing
Operating Temperature (internal)	0°C to 70° C (32°F to 158°F)
Quantity (per component - 12 per node)	72 - 216 per full capacity. 12 per storage node.
Replacement part number	1EX1135
Replacement parts	N/A - Replacement part number includes drive carrier, drive, and screws.
Type	SAS

1.Only hot swappable after decommissioning.

Table 8-10.   14 TB hard disk drive specification summary

Condition	Specification
Model	Ultrastar® He14
Capacity	14 TB
Dimensions	• **Width**—4 in (101.6 (+/-0.25) mm) • **Depth**—5.78 in (147mm) • **Height**—1 in (26.1mm)
Hot swappable	Yes[1]
Operating relative humidity	5% to 95%, non-condensing
Operating Temperature (internal)	0°C to 70° C (32°F to 158°F)
Quantity (per component - 12 per node)	72 - 216 per full capacity. 12 per storage node.
Replacement part number	1EX1892
Replacement parts	N/A - Replacement part number includes drive carrier, drive, and screws.
Type	SAS

1.Only hot swappable after decommissioning.

8.6 Solid state drive specifications (System and Storage Nodes)

The following table displays the Quantum Corporation qualified solid state drives (SSD) contained within the System Nodes and Storage Nodes.

Table 8-11.   480 GB solid state drive specification summary

Condition	Specification
Model	SanDisk CloudSpeed Eco™ Gen. II SATA SSD
Capacity	480 GB
Dimensions	• **Width**—2.75 in (69.85 mm) • **Depth**—3.9 in (100.2 mm) • **Height**—.28 in (7.17 mm)
Hot Swappable	Yes[1]
Operating relative humidity	5% to 95%, non-condensing
Operating temperature (internal)	0° to 70° C (32°F to 158°F)
Quantity (per component)	• One per Storage Node • Four per System Node
Replacement part number	• System Node—1EX0221 • Storage Node—1EX0226
Type	SATA

1.Only hot swappable after decommissioning.

Contacting Support

For further assistance, contact the Quantum Corporation Support Center.

Region	Support Contact
North America	1-800-284-5101 (toll free)
	+1-720-249-5700
EMEA	+1-800-7826-8888 (toll free)
	+49 6131 324 185
Asia Pacific	+800-7826-8887 (toll free)
	+603-7953-3010
For World Wide Support	https://www.quantum.com/support