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# Dell PowerEdge T560

## Installation and Service Manual

## Notes, cautions, and warnings

 **NOTE:** A NOTE indicates important information that helps you make better use of your product.

 **CAUTION:** A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

 **WARNING:** A WARNING indicates a potential for property damage, personal injury, or death.



|                                                                     |           |
|---------------------------------------------------------------------|-----------|
| <b>Chapter 1: About this document.....</b>                          | <b>8</b>  |
| <b>Chapter 2: Dell PowerEdge T560 system overview.....</b>          | <b>9</b>  |
| Front view of the system.....                                       | 10        |
| Rear view of the system.....                                        | 22        |
| Inside the system .....                                             | 24        |
| Locating the Express Service Code and Service Tag.....              | 25        |
| System information labels.....                                      | 26        |
| <b>Chapter 3: Technical specifications.....</b>                     | <b>33</b> |
| Chassis dimensions.....                                             | 33        |
| System weight.....                                                  | 34        |
| Processor specifications.....                                       | 34        |
| PSU specifications.....                                             | 34        |
| Cooling fan specifications.....                                     | 37        |
| Supported operating systems.....                                    | 37        |
| System battery specifications.....                                  | 37        |
| Expansion card riser specifications.....                            | 38        |
| Memory specifications.....                                          | 38        |
| Storage controller specifications.....                              | 39        |
| Drives.....                                                         | 39        |
| GPU specifications.....                                             | 39        |
| Ports and connectors specifications.....                            | 40        |
| NIC port specifications.....                                        | 40        |
| Serial connector specifications.....                                | 40        |
| Ports specifications.....                                           | 40        |
| Video specifications.....                                           | 40        |
| Environmental specifications.....                                   | 41        |
| Thermal restriction matrix.....                                     | 42        |
| Thermal air restrictions.....                                       | 45        |
| <b>Chapter 4: Initial system setup and configuration.....</b>       | <b>47</b> |
| Setting up the system.....                                          | 47        |
| iDRAC configuration.....                                            | 47        |
| Options to set up iDRAC IP address.....                             | 47        |
| Options to log in to iDRAC.....                                     | 47        |
| Resources to install operating system.....                          | 48        |
| Options to download drivers and firmware .....                      | 48        |
| Options to download and install OS drivers .....                    | 49        |
| Downloading drivers and firmware.....                               | 49        |
| <b>Chapter 5: Pre-operating system management applications.....</b> | <b>50</b> |
| System Setup.....                                                   | 50        |
| System BIOS.....                                                    | 51        |

|                                                                                       |           |
|---------------------------------------------------------------------------------------|-----------|
| iDRAC Settings.....                                                                   | 74        |
| Device Settings.....                                                                  | 74        |
| Service Tag Settings.....                                                             | 74        |
| Dell Lifecycle Controller.....                                                        | 74        |
| Embedded system management.....                                                       | 74        |
| Boot Manager.....                                                                     | 74        |
| PXE boot.....                                                                         | 75        |
| <b>Chapter 6: Minimum to POST and system management configuration validation.....</b> | <b>76</b> |
| Minimum configuration to POST .....                                                   | 76        |
| Configuration validation.....                                                         | 76        |
| Error messages.....                                                                   | 77        |
| <b>Chapter 7: Installing and removing system components .....</b>                     | <b>78</b> |
| Safety instructions.....                                                              | 78        |
| Before working inside your system .....                                               | 79        |
| After working inside your system.....                                                 | 79        |
| Recommended tools.....                                                                | 79        |
| Optional front bezel.....                                                             | 80        |
| Removing the front bezel.....                                                         | 80        |
| Installing the front bezel.....                                                       | 80        |
| System feet.....                                                                      | 81        |
| Removing the system feet.....                                                         | 81        |
| Installing the system feet.....                                                       | 82        |
| Optional caster wheels .....                                                          | 83        |
| Removing caster wheels.....                                                           | 83        |
| Installing caster wheels.....                                                         | 84        |
| System cover.....                                                                     | 85        |
| Removing the system cover.....                                                        | 85        |
| Installing the system cover.....                                                      | 86        |
| Air shroud.....                                                                       | 88        |
| Removing the air shroud.....                                                          | 88        |
| Installing the air shroud.....                                                        | 88        |
| Cooling fans.....                                                                     | 89        |
| Fan board view.....                                                                   | 89        |
| Removing the cooling fan cage.....                                                    | 91        |
| Installing the cooling fan cage.....                                                  | 92        |
| Removing a cooling fan.....                                                           | 93        |
| Installing a cooling fan.....                                                         | 94        |
| Cable routing.....                                                                    | 95        |
| Front PERC module.....                                                                | 151       |
| Removing the front PERC module.....                                                   | 151       |
| Installing the front PERC module.....                                                 | 153       |
| Drives.....                                                                           | 154       |
| Removing a drive blank.....                                                           | 154       |
| Installing a drive blank.....                                                         | 155       |
| Removing a drive carrier.....                                                         | 155       |
| Installing the drive carrier.....                                                     | 156       |
| Installing the drive into the drive carrier.....                                      | 157       |

|                                                    |     |
|----------------------------------------------------|-----|
| Removing the drive from the drive carrier.....     | 158 |
| Drive backplane.....                               | 159 |
| Drive backplane.....                               | 159 |
| Removing the 3.5-inch drive backplane .....        | 161 |
| Installing the 3.5-inch drive backplane.....       | 162 |
| Removing the 2.5-inch drive backplane .....        | 163 |
| Installing the 2.5-inch drive backplane.....       | 164 |
| Drive bays.....                                    | 165 |
| Removing the drive bay blank.....                  | 165 |
| Installing the drive bay blank.....                | 167 |
| Removing a drive bay.....                          | 169 |
| Installing a drive bay.....                        | 171 |
| Optional optical drive.....                        | 173 |
| Removing the optical drive blank.....              | 173 |
| Installing the optical drive blank.....            | 174 |
| Removing the optical drive.....                    | 175 |
| Installing the optical drive.....                  | 176 |
| Optional tape backup unit.....                     | 177 |
| Removing the tape backup unit blank.....           | 177 |
| Installing the tape backup unit blank.....         | 178 |
| Removing the tape backup unit.....                 | 179 |
| Installing the tape backup unit.....               | 180 |
| Front IO module.....                               | 181 |
| Removing the front IO module.....                  | 181 |
| Installing the front IO module.....                | 182 |
| System memory.....                                 | 183 |
| System memory guidelines.....                      | 183 |
| General memory module installation guidelines..... | 185 |
| Removing a memory module.....                      | 185 |
| Installing a memory module.....                    | 186 |
| Optional BOSS-N1 module.....                       | 187 |
| Removing the BOSS-N1 module.....                   | 187 |
| Installing the BOSS-N1 module.....                 | 188 |
| Removing the BOSS-N1 card carrier.....             | 190 |
| Installing the BOSS-N1 card carrier.....           | 191 |
| Optional internal USB card.....                    | 192 |
| Removing the internal USB card.....                | 193 |
| Installing the internal USB card.....              | 193 |
| Expansion cards and expansion card risers.....     | 194 |
| Expansion card installation guidelines.....        | 195 |
| Removing a expansion card.....                     | 203 |
| Installing an expansion card.....                  | 204 |
| Optional GPU card.....                             | 206 |
| Removing the GPU card holder.....                  | 206 |
| Installing the GPU card holder.....                | 206 |
| GPU riser.....                                     | 207 |
| Removing the GPU riser.....                        | 207 |
| Installing the GPU riser.....                      | 208 |
| Processor and heat sink .....                      | 209 |
| Removing the processor and heat sink module.....   | 209 |

|                                                                |            |
|----------------------------------------------------------------|------------|
| Removing the processor.....                                    | 211        |
| Installing the processor.....                                  | 213        |
| Installing the processor and heat sink module.....             | 217        |
| Optional OCP NIC card.....                                     | 219        |
| Removing the OCP card.....                                     | 219        |
| Installing the OCP card.....                                   | 221        |
| Optional serial COM port.....                                  | 223        |
| Removing the serial COM port.....                              | 223        |
| Installing the serial COM port.....                            | 224        |
| System battery .....                                           | 225        |
| Replacing the system battery.....                              | 225        |
| Intrusion switch.....                                          | 226        |
| Removing the intrusion switch module.....                      | 226        |
| Installing the intrusion switch module.....                    | 227        |
| Power supply unit.....                                         | 228        |
| Hot spare feature.....                                         | 228        |
| Removing a power supply unit blank.....                        | 229        |
| Installing a power supply unit blank.....                      | 229        |
| Removing a power supply unit adapter.....                      | 230        |
| Installing a power supply unit adapter.....                    | 230        |
| Removing a power supply unit.....                              | 230        |
| Installing a power supply unit.....                            | 231        |
| Power interposer board.....                                    | 233        |
| PIB board view.....                                            | 233        |
| Removing the power interposer board.....                       | 233        |
| Installing the power interposer board.....                     | 234        |
| System board.....                                              | 235        |
| Removing the system board.....                                 | 235        |
| Installing the system board.....                               | 236        |
| Restoring the system using Easy Restore.....                   | 238        |
| Manually update the Service Tag.....                           | 238        |
| Trusted Platform Module.....                                   | 239        |
| Upgrading the Trusted Platform Module.....                     | 239        |
| Initializing TPM for users.....                                | 240        |
| Initializing the TPM 2.0 for users.....                        | 240        |
| <b>Chapter 8: Upgrade Kits.....</b>                            | <b>241</b> |
| BOSS-N1 module kit.....                                        | 241        |
| GPU kit.....                                                   | 244        |
| Internal USB card kit.....                                     | 245        |
| Serial COM port kit.....                                       | 245        |
| <b>Chapter 9: Jumpers and connectors.....</b>                  | <b>246</b> |
| System board connectors.....                                   | 246        |
| System board jumper settings.....                              | 248        |
| Disabling a forgotten password.....                            | 248        |
| <b>Chapter 10: System diagnostics and indicator codes.....</b> | <b>250</b> |
| System board diagnostic LED indicators.....                    | 250        |

|                                                                    |            |
|--------------------------------------------------------------------|------------|
| Status LED indicators.....                                         | 256        |
| System health and system ID indicator codes.....                   | 257        |
| iDRAC Quick Sync 2 indicator codes.....                            | 258        |
| iDRAC Direct LED indicator codes.....                              | 258        |
| NIC indicator codes.....                                           | 259        |
| Power supply unit indicator codes.....                             | 259        |
| Drive indicator codes.....                                         | 261        |
| Using system diagnostics.....                                      | 261        |
| Dell Embedded System Diagnostics.....                              | 261        |
| <b>Chapter 11: Getting help.....</b>                               | <b>263</b> |
| Recycling or End-of-Life service information.....                  | 263        |
| Contacting Dell Technologies.....                                  | 263        |
| Accessing system information by using QRL.....                     | 263        |
| Quick Resource Locator for PowerEdge T560 system.....              | 264        |
| Receiving automated support with Secure Connect Gateway (SCG)..... | 264        |
| <b>Chapter 12: Documentation resources.....</b>                    | <b>265</b> |

# About this document

This document provides an overview about the system, information about installing and replacing components, diagnostic tools, and guidelines to be followed while installing certain components.

# Dell PowerEdge T560 system overview

The PowerEdge T560 system is a 2-socket 4.5U tower server that supports:

- Up to two 4<sup>th</sup> Generation Intel® Xeon® Scalable Processors with up to 32 cores
- Up to two 5<sup>th</sup> Generation Intel® Xeon® Scalable Processors with up to 28 cores
- 16 RDIMM slots
- Two redundant AC or DC power supply units
- Up to 12 x 3.5-inch SAS/SATA HDD drives
- Up to 8 x 3.5-inch SAS/SATA HDD drives
- Up to 8 x 3.5-inch SAS/ SATA HDD + 8 x 2.5-inch NVMe SSD drives
- Up to 8 x 2.5-inch SAS/SATA HDD drives
- Up to 16 x 2.5-inch SAS/SATA HDD drives
- Up to 24 x 2.5-inch SAS/SATA HDD drives

 **NOTE:** For more information about how to hot swap NVMe PCIe SSD U.2 device, see the *Dell Express Flash NVMe PCIe SSD User's Guide* at <https://www.dell.com/support> > **Browse all Products** > **Data Center Infrastructure** > **Storage Adapters & Controllers** > **Dell PowerEdge Express Flash NVMe PCIe SSD** > **Documentation** > **Manuals and Documents**.

 **NOTE:** All instances of SAS, SATA, and NVMe drives are referred to as drives in this document, unless specified otherwise.

 **CAUTION:** Do not install GPUs, network cards, or other PCIe devices on your system that are not validated and tested by Dell. Damage caused by unauthorized and invalidated hardware installation will null and void the system warranty.

## Topics:

- [Front view of the system](#)
- [Rear view of the system](#)
- [Inside the system](#)
- [Locating the Express Service Code and Service Tag](#)
- [System information labels](#)

# Front view of the system



Figure 1. Front view of 12 x 3.5-inch drive system

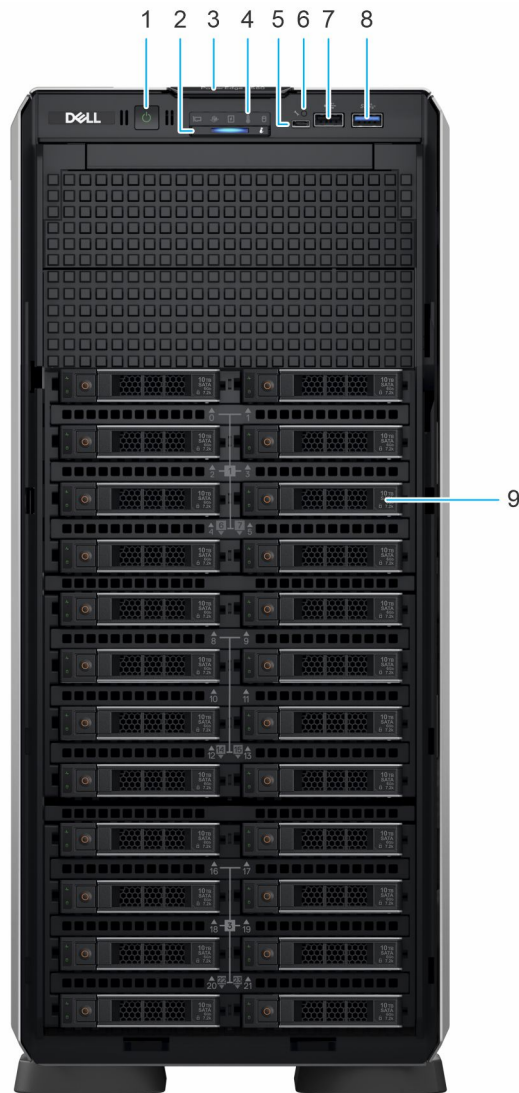
Table 1. Features available on the front of the system

| Item | Ports, panels, and slots       | Icon                                                                                | Description                                                                                                                                                                                    |
|------|--------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Power button                   |  | Indicates if the system is powered on or off. Press the power button to manually power on or off the system.                                                                                   |
| 2    | System health and ID indicator |  | Indicates the system health. For more information, see the System health and system ID indicator codes section.                                                                                |
| 3    | Express Service Tag            | N/A                                                                                 | A slide-out label panel that contains the Express Service Tag that has system information such as Service Tag, NIC, MAC address, and so on. If you have opted for the secure default access to |



**Table 1. Features available on the front of the system (continued)**

| Item | Ports, panels, and slots         | Icon                                                                                | Description                                                                                                                                                                                                                                                                         |
|------|----------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      |                                  |                                                                                     | iDRAC, the Information tag will also contain the iDRAC secure default password.                                                                                                                                                                                                     |
| 4    | Status LED indicators            | N/A                                                                                 | Indicates the status of the system. For more information, see the Status LED indicators section.                                                                                                                                                                                    |
| 5    | iDRAC Direct (Micro-AB USB) port |    | The iDRAC Direct (Micro-AB USB) port enables you to access the iDRAC direct Micro-AB USB features. For more information, see the <i>Integrated Dell Remote Access Controller User's Guide</i> at <a href="http://www.dell.com/poweredgemanuals">www.dell.com/poweredgemanuals</a> . |
| 6    | iDRAC status LED                 | N/A                                                                                 | The iDRAC Direct LED indicator lights up to indicate that the port is connected and is being used as a part of the iDRAC subsystem. For more information, see <a href="#">iDRAC Direct LED indicator codes</a>                                                                      |
| 7    | USB 2.0 port                     |  | Supports 4-pin, USB 2.0 compliant devices.                                                                                                                                                                                                                                          |
| 8    | USB 3.0 port                     |  | Supports 9-pin, USB 3.0 compliant devices                                                                                                                                                                                                                                           |
| 9    | Drive Bay                        | N/A                                                                                 | Enables you to install SAS/SATA drives that are supported on your system.                                                                                                                                                                                                           |



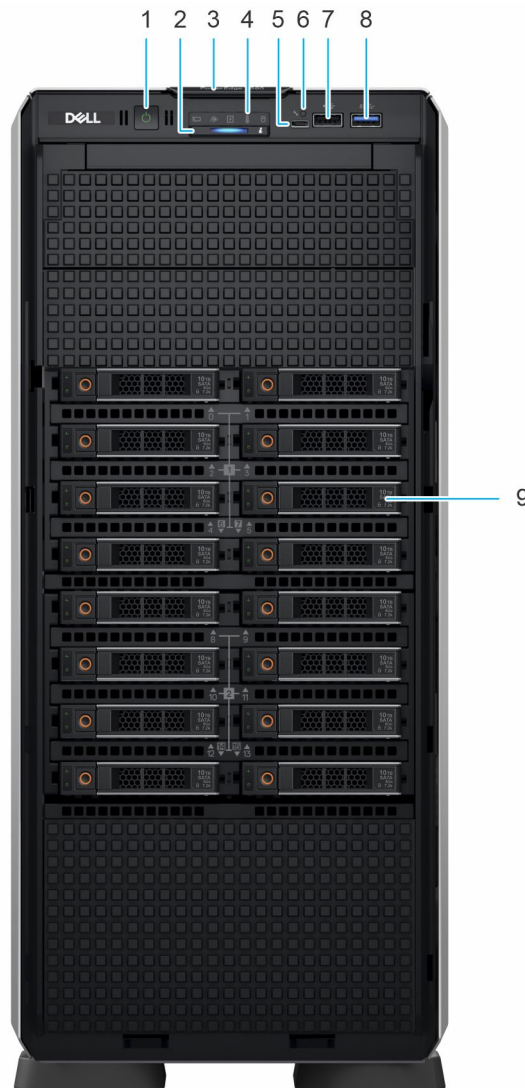
**Figure 2. Front view of 24 x 2.5-inch drive system**

**Table 2. Features available on the front of the system**

| Item | Ports, panels, and slots       | Icon                                                                                | Description                                                                                                                                                                                                                                                                    |
|------|--------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Power button                   |  | Indicates if the system is powered on or off. Press the power button to manually power on or off the system.                                                                                                                                                                   |
| 2    | System health and ID indicator |  | Indicates the system health. For more information, see the System health and system ID indicator codes section.                                                                                                                                                                |
| 3    | Express Service Tag            | N/A                                                                                 | A slide-out label panel that contains the Express Service Tag that has system information such as Service Tag, NIC, MAC address, and so on. If you have opted for the secure default access to iDRAC, the Information tag will also contain the iDRAC secure default password. |

**Table 2. Features available on the front of the system (continued)**

| Item | Ports, panels, and slots         | Icon                                                                               | Description                                                                                                                                                                                                                                                                         |
|------|----------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4    | Status LED indicators            | N/A                                                                                | Indicates the status of the system. For more information, see the Status LED indicators section.                                                                                                                                                                                    |
| 5    | iDRAC Direct (Micro-AB USB) port |   | The iDRAC Direct (Micro-AB USB) port enables you to access the iDRAC direct Micro-AB USB features. For more information, see the <i>Integrated Dell Remote Access Controller User's Guide</i> at <a href="http://www.dell.com/poweredgemanuals">www.dell.com/poweredgemanuals</a> . |
| 6    | iDRAC status LED                 | N/A                                                                                | The iDRAC Direct LED indicator lights up to indicate that the port is connected and is being used as a part of the iDRAC subsystem. For more information, see <a href="#">iDRAC Direct LED indicator codes</a>                                                                      |
| 7    | USB 2.0 port                     |   | Supports 4-pin, USB 2.0 compliant devices.                                                                                                                                                                                                                                          |
| 8    | USB 3.0 port                     |  | Supports 9-pin, USB 3.0 compliant devices                                                                                                                                                                                                                                           |
| 9    | Drive Bay                        | N/A                                                                                | Enables you to install SAS/SATA drives that are supported on your system.                                                                                                                                                                                                           |



**Figure 3. Front view of 16 x 2.5-inch drive system**

**Table 3. Features available on the front of the system**

| Item | Ports, panels, and slots       | Icon                                                                                | Description                                                                                                                                                                                                                                                                    |
|------|--------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Power button                   |  | Indicates if the system is powered on or off. Press the power button to manually power on or off the system.                                                                                                                                                                   |
| 2    | System health and ID indicator |  | Indicates the system health. For more information, see the System health and system ID indicator codes section.                                                                                                                                                                |
| 3    | Express Service Tag            | N/A                                                                                 | A slide-out label panel that contains the Express Service Tag that has system information such as Service Tag, NIC, MAC address, and so on. If you have opted for the secure default access to iDRAC, the Information tag will also contain the iDRAC secure default password. |

**Table 3. Features available on the front of the system (continued)**

| Item | Ports, panels, and slots         | Icon                                                                               | Description                                                                                                                                                                                                                                                                         |
|------|----------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4    | Status LED indicators            | N/A                                                                                | Indicates the status of the system. For more information, see the Status LED indicators section.                                                                                                                                                                                    |
| 5    | iDRAC Direct (Micro-AB USB) port |   | The iDRAC Direct (Micro-AB USB) port enables you to access the iDRAC direct Micro-AB USB features. For more information, see the <i>Integrated Dell Remote Access Controller User's Guide</i> at <a href="http://www.dell.com/poweredgemanuals">www.dell.com/poweredgemanuals</a> . |
| 6    | iDRAC status LED                 | N/A                                                                                | The iDRAC Direct LED indicator lights up to indicate that the port is connected and is being used as a part of the iDRAC subsystem. For more information, see <a href="#">iDRAC Direct LED indicator codes</a>                                                                      |
| 7    | USB 2.0 port                     |   | Supports 4-pin, USB 2.0 compliant devices.                                                                                                                                                                                                                                          |
| 8    | USB 3.0 port                     |  | Supports 9-pin, USB 3.0 compliant devices                                                                                                                                                                                                                                           |
| 9    | Drive Bay                        | N/A                                                                                | Enables you to install SAS/SATA drives that are supported on your system.                                                                                                                                                                                                           |

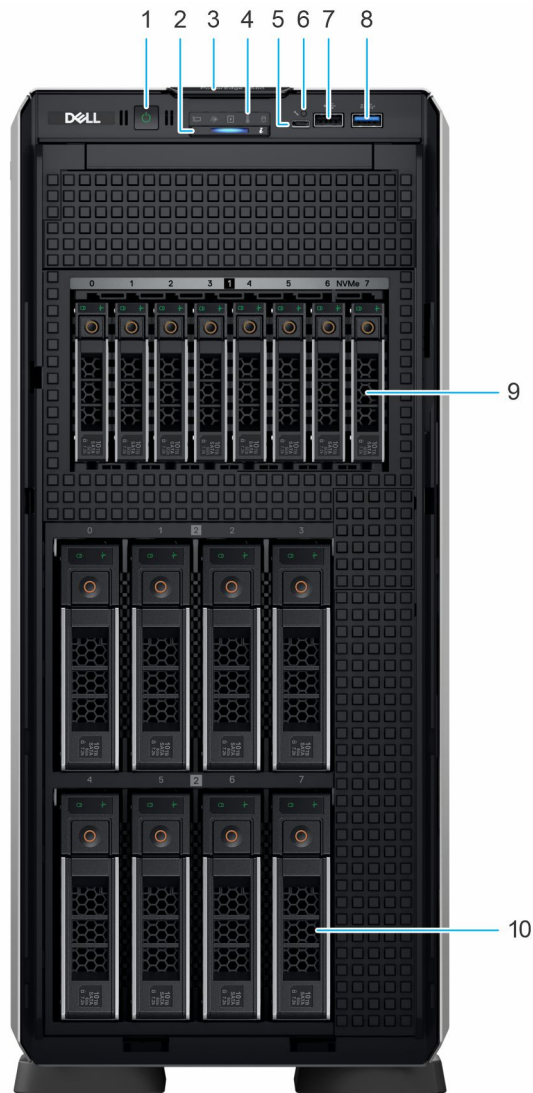


Figure 4. Front view of 8 x 3.5-inch + 8 x 2.5-inch drive system

Table 4. Features available on the front of the system

| Item | Ports, panels, and slots       | Icon                                                                                | Description                                                                                                                                                                                                                                                                    |
|------|--------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Power button                   |  | Indicates if the system is powered on or off. Press the power button to manually power on or off the system.                                                                                                                                                                   |
| 2    | System health and ID indicator |  | Indicates the system health. For more information, see the System health and system ID indicator codes section.                                                                                                                                                                |
| 3    | Express Service Tag            | N/A                                                                                 | A slide-out label panel that contains the Express Service Tag that has system information such as Service Tag, NIC, MAC address, and so on. If you have opted for the secure default access to iDRAC, the Information tag will also contain the iDRAC secure default password. |

**Table 4. Features available on the front of the system (continued)**

| Item | Ports, panels, and slots         | Icon                                                                               | Description                                                                                                                                                                                                                                                                         |
|------|----------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4    | Status LED indicators            | N/A                                                                                | Indicates the status of the system. For more information, see the Status LED indicators section.                                                                                                                                                                                    |
| 5    | iDRAC Direct (Micro-AB USB) port |   | The iDRAC Direct (Micro-AB USB) port enables you to access the iDRAC direct Micro-AB USB features. For more information, see the <i>Integrated Dell Remote Access Controller User's Guide</i> at <a href="http://www.dell.com/poweredgemanuals">www.dell.com/poweredgemanuals</a> . |
| 6    | iDRAC status LED                 | N/A                                                                                | The iDRAC Direct LED indicator lights up to indicate that the port is connected and is being used as a part of the iDRAC subsystem. For more information, see <a href="#">iDRAC Direct LED indicator codes</a>                                                                      |
| 7    | USB 2.0 port                     |   | Supports 4-pin, USB 2.0 compliant devices.                                                                                                                                                                                                                                          |
| 8    | USB 3.0 port                     |  | Supports 9-pin, USB 3.0 compliant devices                                                                                                                                                                                                                                           |
| 9    | 2.5-inch Drive Bay               | N/A                                                                                | Enables you to install NVMe drives that are supported on your system                                                                                                                                                                                                                |
| 10   | 3.5-inch Drive Bay               | N/A                                                                                | Enables you to install SAS/SATA drives that are supported on your system.                                                                                                                                                                                                           |



**Figure 5. Front view of 8 x 3.5-inch drive system**

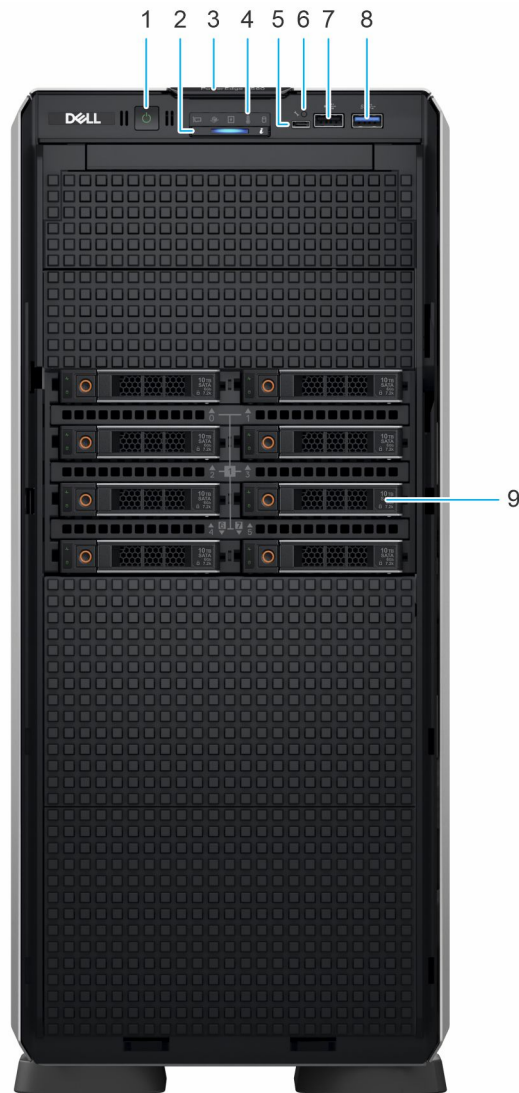
**Table 5. Features available on the front of the system**

| Item | Ports, panels, and slots       | Icon                                                                                | Description                                                                                                                                                                                                                                                                    |
|------|--------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Power button                   |  | Indicates if the system is powered on or off. Press the power button to manually power on or off the system.                                                                                                                                                                   |
| 2    | System health and ID indicator |  | Indicates the system health. For more information, see the System health and system ID indicator codes section.                                                                                                                                                                |
| 3    | Express Service Tag            | N/A                                                                                 | A slide-out label panel that contains the Express Service Tag that has system information such as Service Tag, NIC, MAC address, and so on. If you have opted for the secure default access to iDRAC, the Information tag will also contain the iDRAC secure default password. |



**Table 5. Features available on the front of the system (continued)**

| Item | Ports, panels, and slots         | Icon                                                                               | Description                                                                                                                                                                                                                                                                         |
|------|----------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4    | Status LED indicators            | N/A                                                                                | Indicates the status of the system. For more information, see the Status LED indicators section.                                                                                                                                                                                    |
| 5    | iDRAC Direct (Micro-AB USB) port |   | The iDRAC Direct (Micro-AB USB) port enables you to access the iDRAC direct Micro-AB USB features. For more information, see the <i>Integrated Dell Remote Access Controller User's Guide</i> at <a href="http://www.dell.com/poweredgemanuals">www.dell.com/poweredgemanuals</a> . |
| 6    | iDRAC status LED                 | N/A                                                                                | The iDRAC Direct LED indicator lights up to indicate that the port is connected and is being used as a part of the iDRAC subsystem. For more information, see <a href="#">iDRAC Direct LED indicator codes</a>                                                                      |
| 7    | USB 2.0 port                     |   | Supports 4-pin, USB 2.0 compliant devices.                                                                                                                                                                                                                                          |
| 8    | USB 3.0 port                     |  | Supports 9-pin, USB 3.0 compliant devices                                                                                                                                                                                                                                           |
| 9    | Drive Bay                        | N/A                                                                                | Enables you to install SAS/SATA drives that are supported on your system.                                                                                                                                                                                                           |



**Figure 6. Front view of 8 x 2.5-inch drive system**

**Table 6. Features available on the front of the system**

| Item | Ports, panels, and slots       | Icon                                                                                | Description                                                                                                                                                                                                                                                                    |
|------|--------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Power button                   |  | Indicates if the system is powered on or off. Press the power button to manually power on or off the system.                                                                                                                                                                   |
| 2    | System health and ID indicator |  | Indicates the system health. For more information, see the System health and system ID indicator codes section.                                                                                                                                                                |
| 3    | Express Service Tag            | N/A                                                                                 | A slide-out label panel that contains the Express Service Tag that has system information such as Service Tag, NIC, MAC address, and so on. If you have opted for the secure default access to iDRAC, the Information tag will also contain the iDRAC secure default password. |

**Table 6. Features available on the front of the system (continued)**

| Item | Ports, panels, and slots         | Icon                                                                               | Description                                                                                                                                                                                                                                                                         |
|------|----------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4    | Status LED indicators            | N/A                                                                                | Indicates the status of the system. For more information, see the Status LED indicators section.                                                                                                                                                                                    |
| 5    | iDRAC Direct (Micro-AB USB) port |   | The iDRAC Direct (Micro-AB USB) port enables you to access the iDRAC direct Micro-AB USB features. For more information, see the <i>Integrated Dell Remote Access Controller User's Guide</i> at <a href="http://www.dell.com/poweredgemanuals">www.dell.com/poweredgemanuals</a> . |
| 6    | iDRAC status LED                 | N/A                                                                                | The iDRAC Direct LED indicator lights up to indicate that the port is connected and is being used as a part of the iDRAC subsystem. For more information, see <a href="#">iDRAC Direct LED indicator codes</a>                                                                      |
| 7    | USB 2.0 port                     |   | Supports 4-pin, USB 2.0 compliant devices.                                                                                                                                                                                                                                          |
| 8    | USB 3.0 port                     |  | Supports 9-pin, USB 3.0 compliant devices                                                                                                                                                                                                                                           |
| 9    | Drive Bay                        | N/A                                                                                | Enables you to install SAS/SATA drives that are supported on your system.                                                                                                                                                                                                           |

 **NOTE:** For more information about ports, panels, and slots, see the [Technical specifications](#) section.

# Rear view of the system

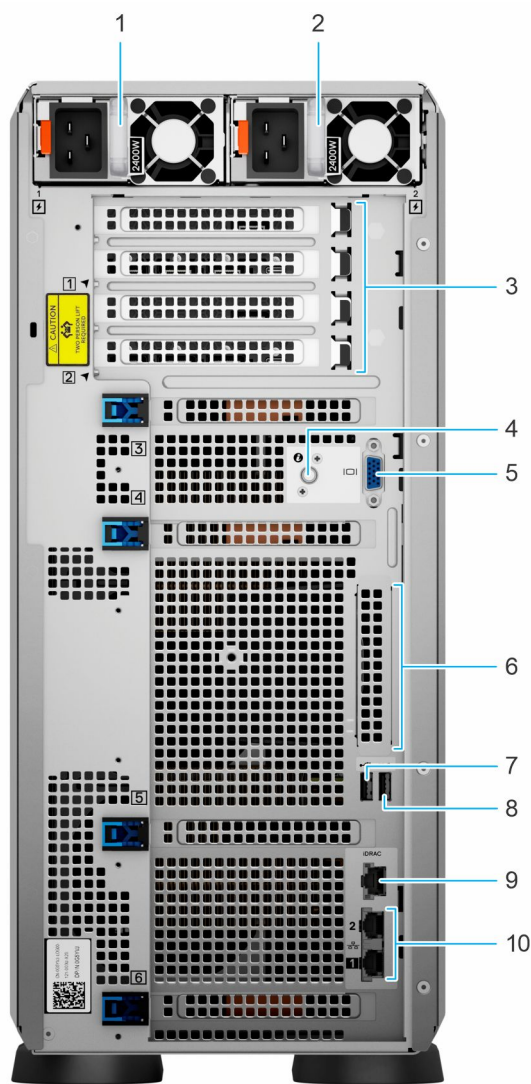


Figure 7. Rear view of the system

Table 7. Rear view of the system

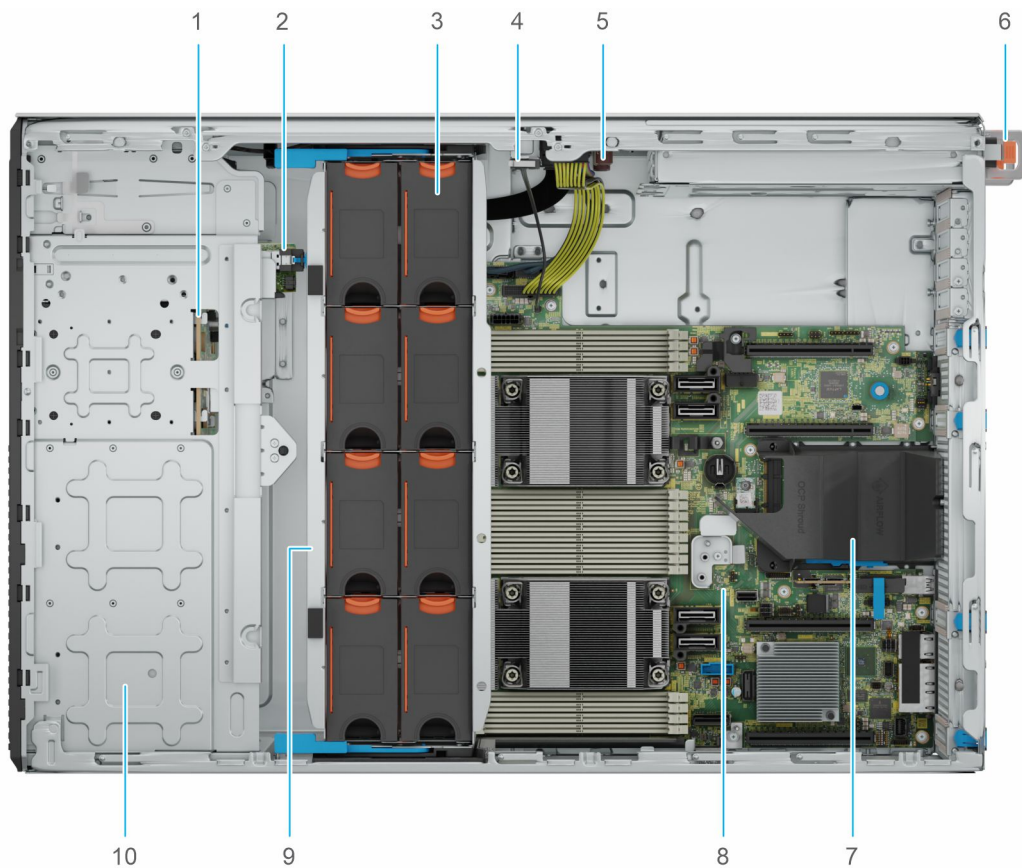
| Item | Ports, panels, or slots       | Icon                                                                                | Description                                                                                                                                                                                                                             |
|------|-------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Power supply unit (PSU 1)     | N/A                                                                                 | PSU1 is the primary PSU of the system.                                                                                                                                                                                                  |
| 2    | Power supply unit (PSU 2)     | N/A                                                                                 | PSU2 is the secondary PSU of the system.                                                                                                                                                                                                |
| 3    | PCIe expansion card slots (4) | N/A                                                                                 | Enables you to connect PCI Express expansion cards.                                                                                                                                                                                     |
| 4    | System identification button  |  | The System Identification (ID) button is available on the front and back of the system. Press the button to identify a system in a rack by turning on the system ID button. You can also use the system ID button to reset iDRAC and to |

**Table 7. Rear view of the system (continued)**

| Item | Ports, panels, or slots        | Icon                                                                                | Description                                                                                                                                                                                                            |
|------|--------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      |                                |                                                                                     | access BIOS using the step through mode. When pressed, the system ID LED in the back panel blinks until either the front or rear button is pressed again. Press the button to toggle between on or off mode.           |
| 5    | VGA port                       |    | Enables you to connect a display device to the system.                                                                                                                                                                 |
| 6    | OCP NIC port (optional)        | N/A                                                                                 | The OCP NIC card supports OCP 3.0. The NIC ports are integrated on the OCP card which is connected to the system board.                                                                                                |
| 7    | USB 2.0                        |    | Supports 4-pin, USB 2.0 compliant devices                                                                                                                                                                              |
| 8    | USB 3.0                        | N/A                                                                                 | Supports 9-pin, USB 3.0 compliant devices                                                                                                                                                                              |
| 9    | Dedicated iDRAC9 Ethernet port | <b>iDRAC</b>                                                                        | Enables you to remotely access iDRAC. For more information, see the <i>Integrated Dell Remote Access Controller User's Guide</i> at <a href="http://www.dell.com/poweredgemanuals">www.dell.com/poweredgemanuals</a> . |
| 10   | NIC ports (2)                  |  | The NIC ports that are integrated on the LOM card provide network connectivity which is connected to the system board.                                                                                                 |

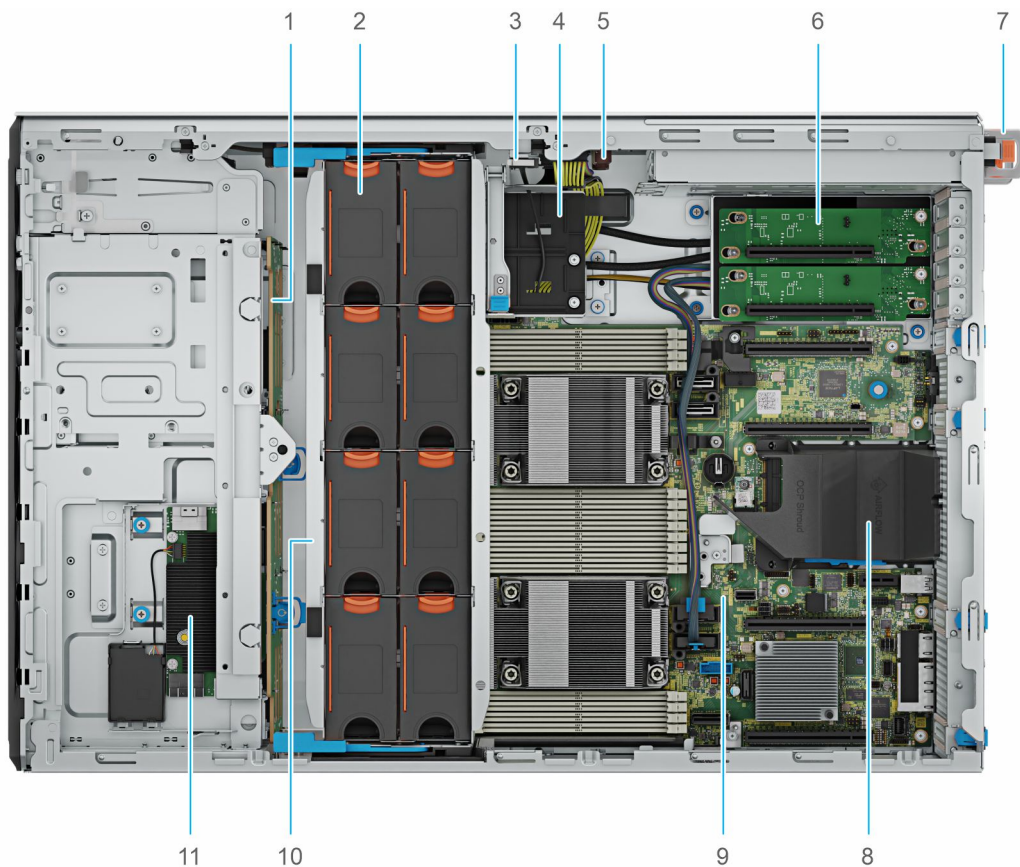
 **NOTE:** For more information about ports, panels, and slots, see the [Technical specifications](#) section.

## Inside the system



**Figure 8. Inside the system for 24 x 2.5-inch configuration**

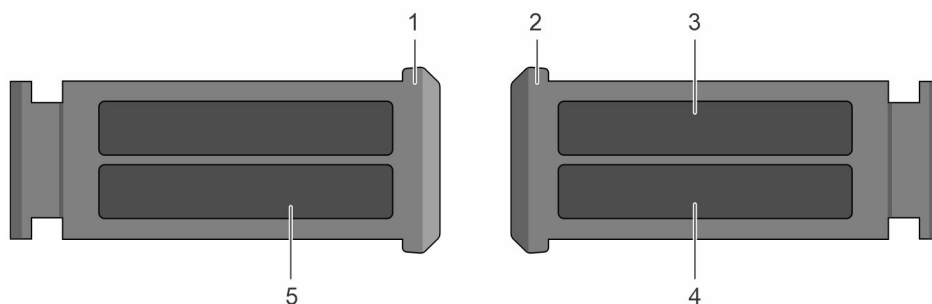
1. 2.5-inch drive backplane
2. BOSS-N1 module
3. Cooling fan
4. Intrusion switch
5. Power interposer board
6. PSU 1
7. OCP air shroud
8. System board
9. Cooling fan cage
10. 2.5-inch drive bay



**Figure 9. Inside the system for 8 x 3.5-inch + 8 x 2.5-inch configuration**

1. 3.5-inch drive backplane
2. Cooling fans
3. Intrusion switch
4. GPU card holder
5. Power interposer board
6. PCIe Gen5 GPU riser
7. PSU 1
8. OCP air shroud
9. System board
10. Cooling fan cage
11. fPERC module

## Locating the Express Service Code and Service Tag



**Figure 10. Locating the Express Service Code and Service tag**

1. Express Service Tag (front view)
2. Express Service Tag (rear view)
3. OpenManage Mobile (OMM) label
4. iDRAC MAC address and iDRAC secure password label
5. Service Tag, Express Service Code, QRL label

## System information labels

The system information label is located on the back side of the system cover.

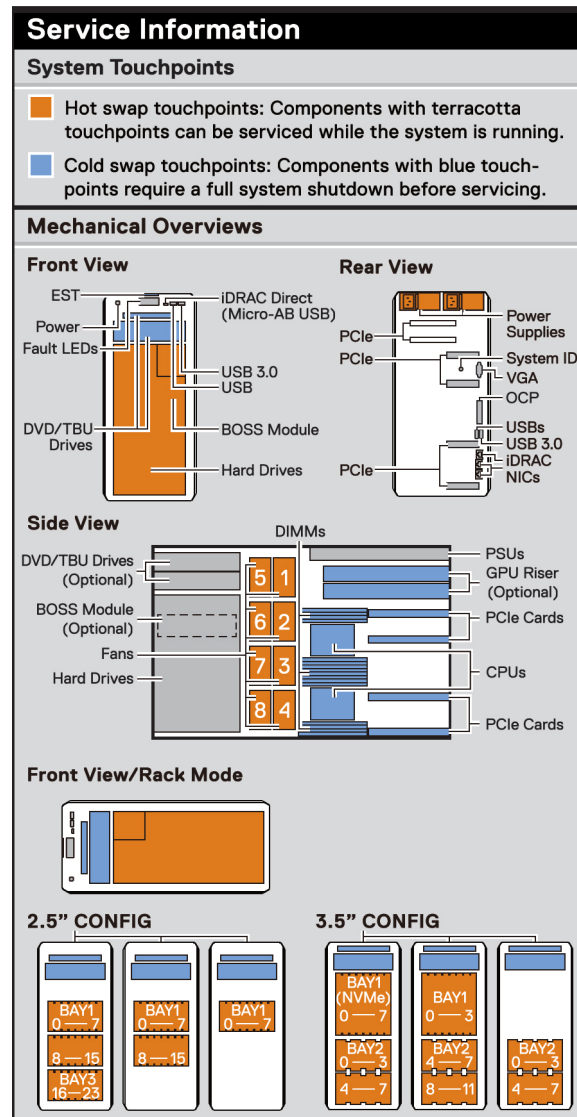


Figure 11. Service information



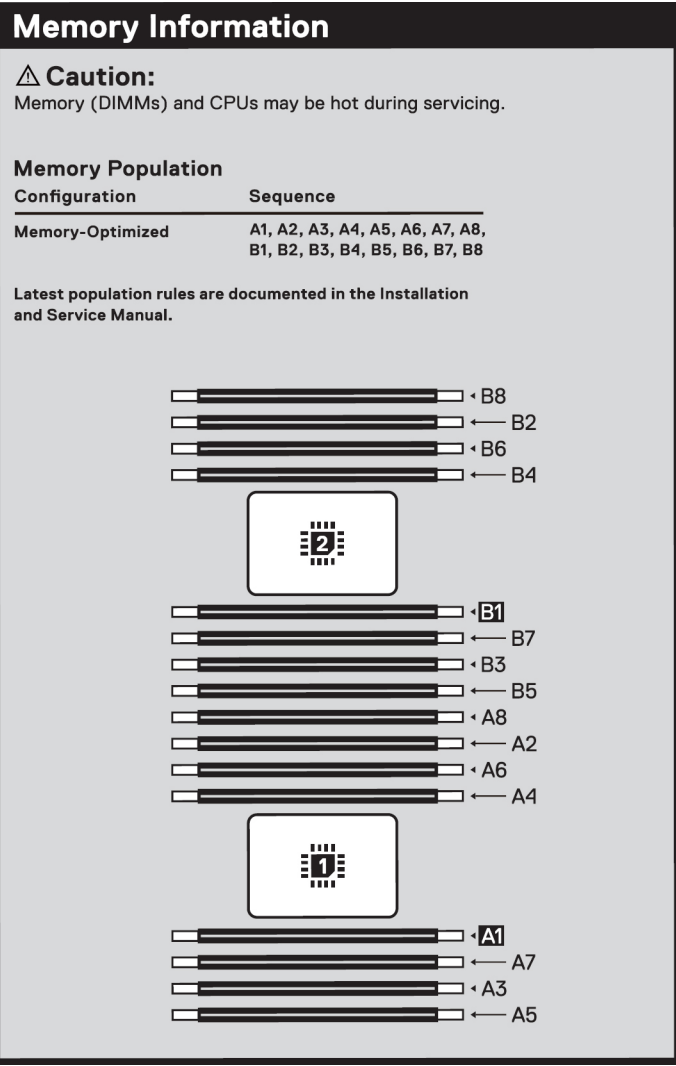


Figure 12. Memory information

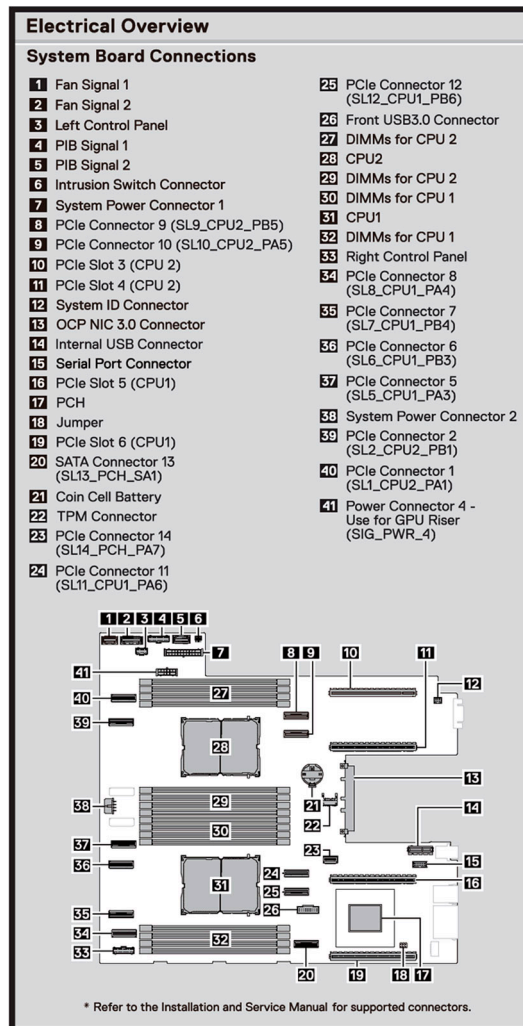


Figure 13. Electrical overview

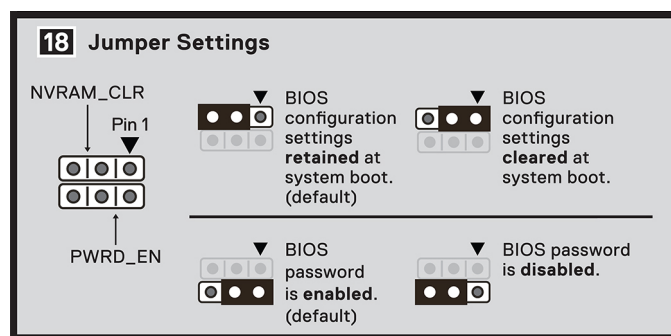


Figure 14. Jumper settings

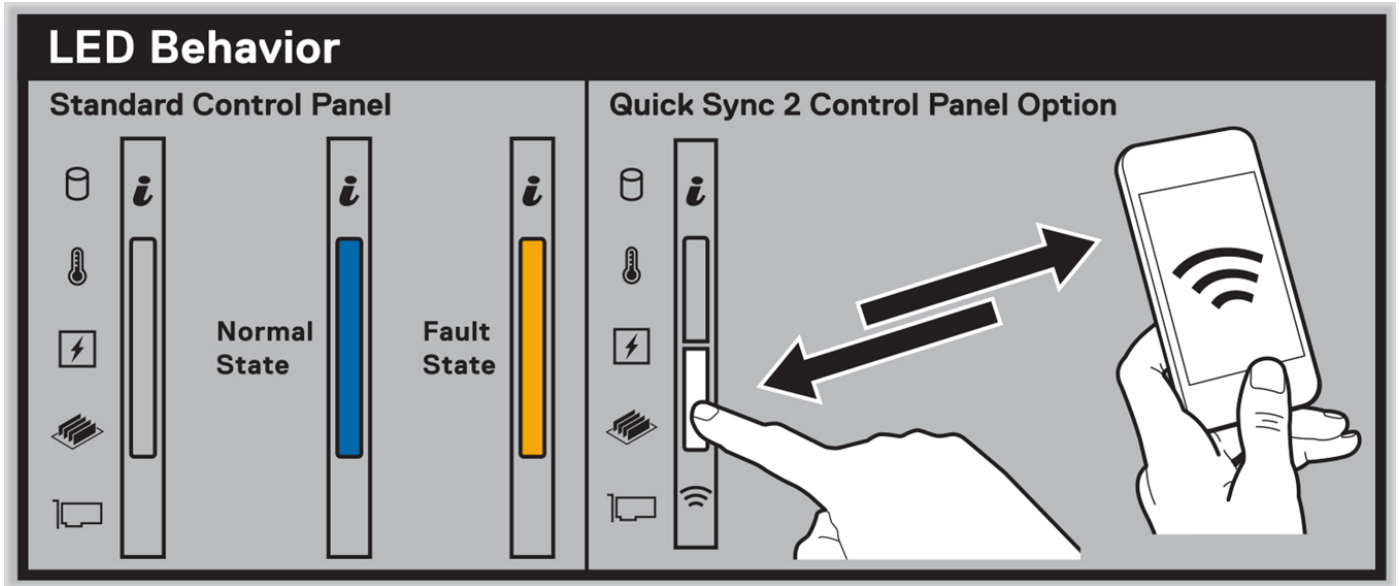


Figure 15. LED behavior

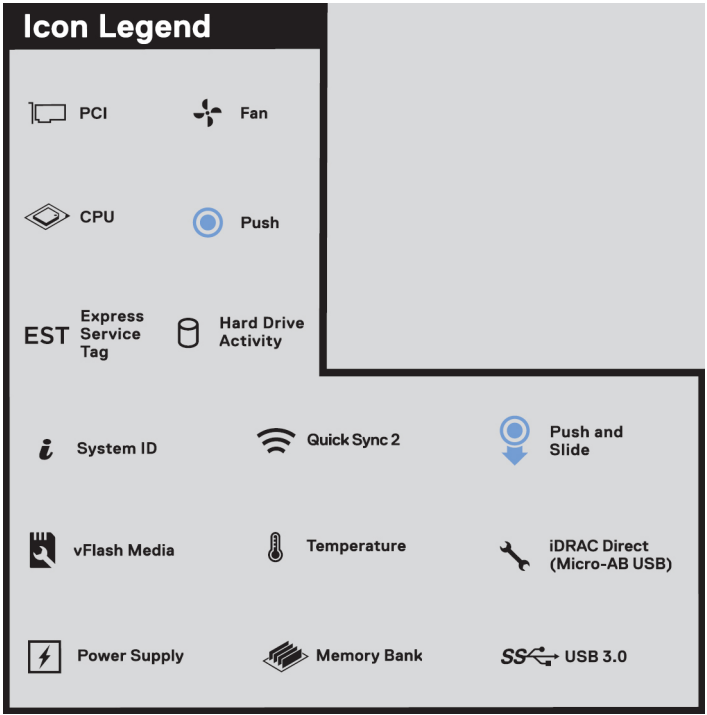
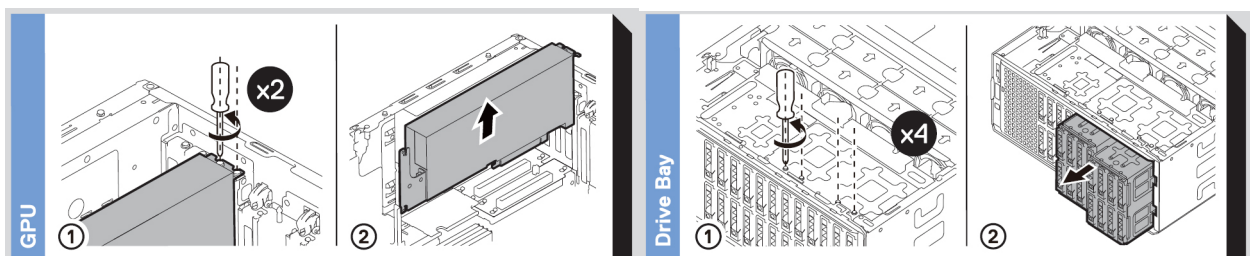
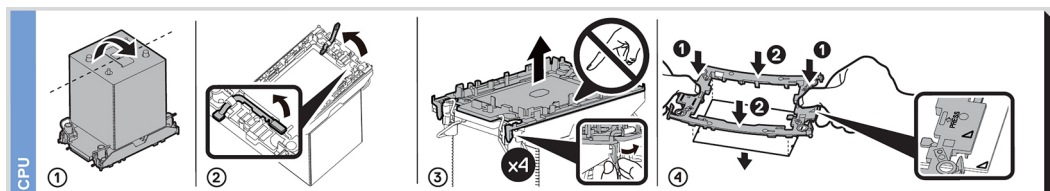
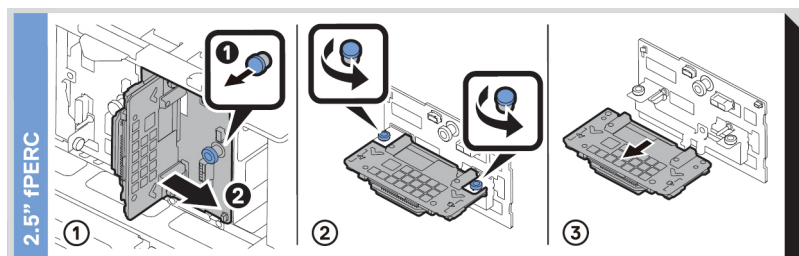
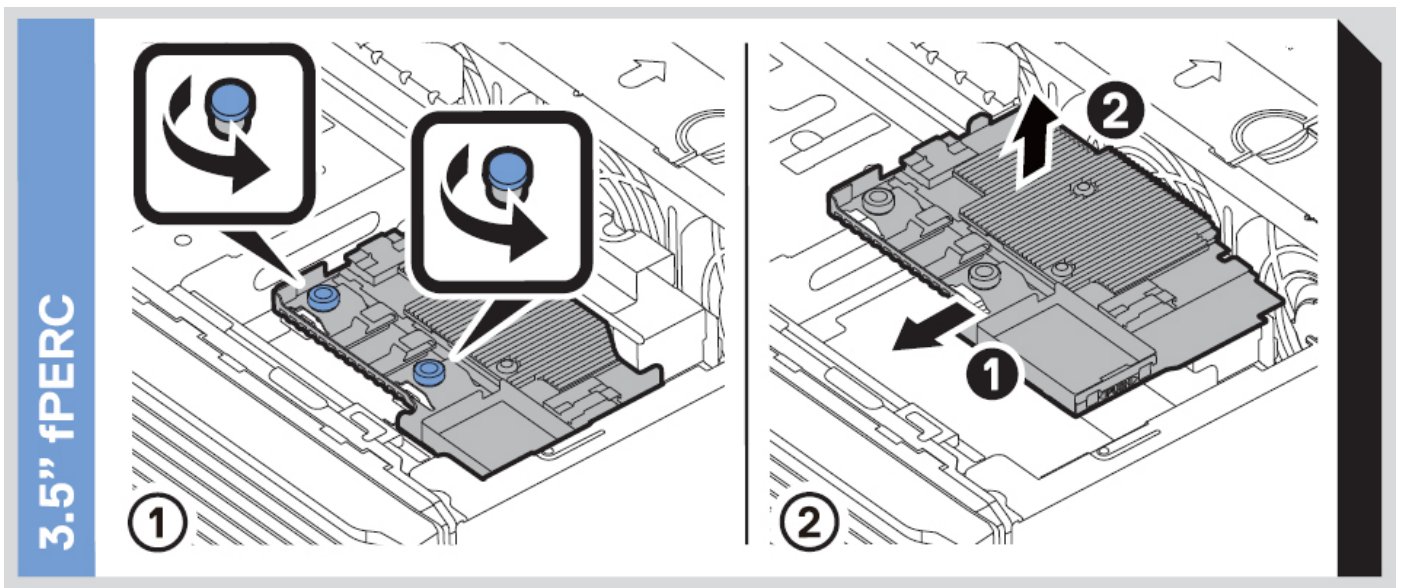
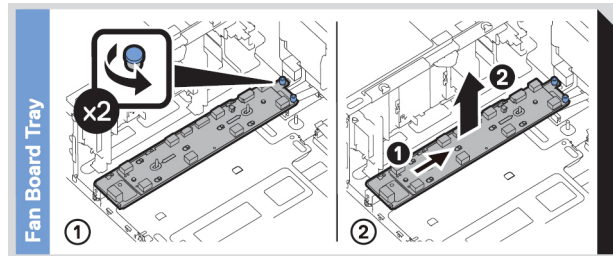
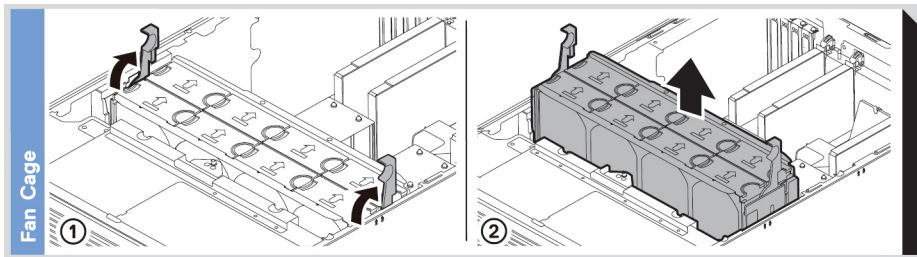


Figure 16. Icon legend



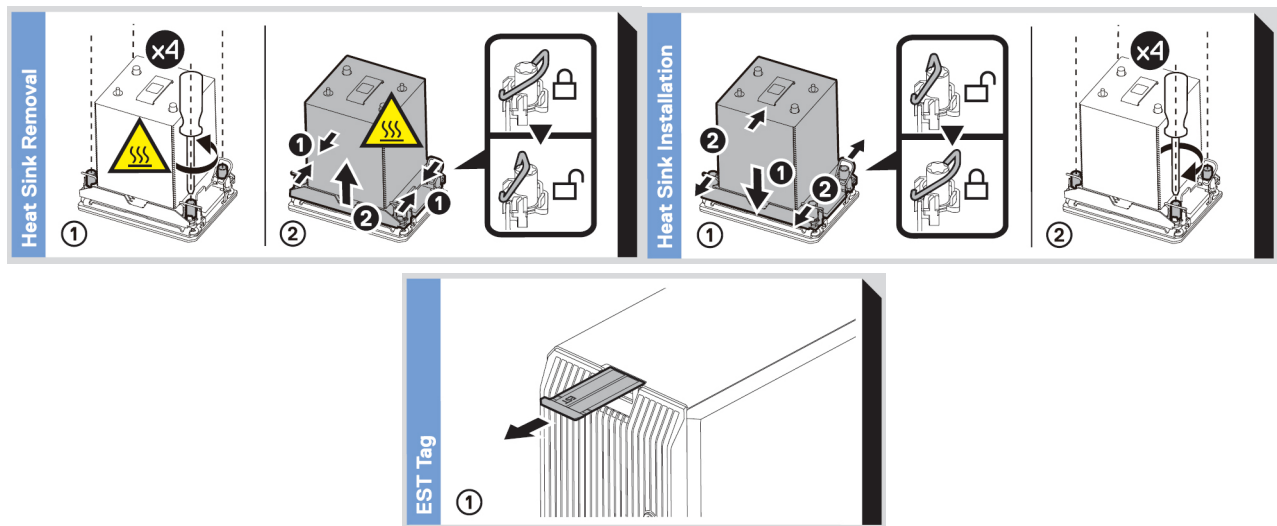
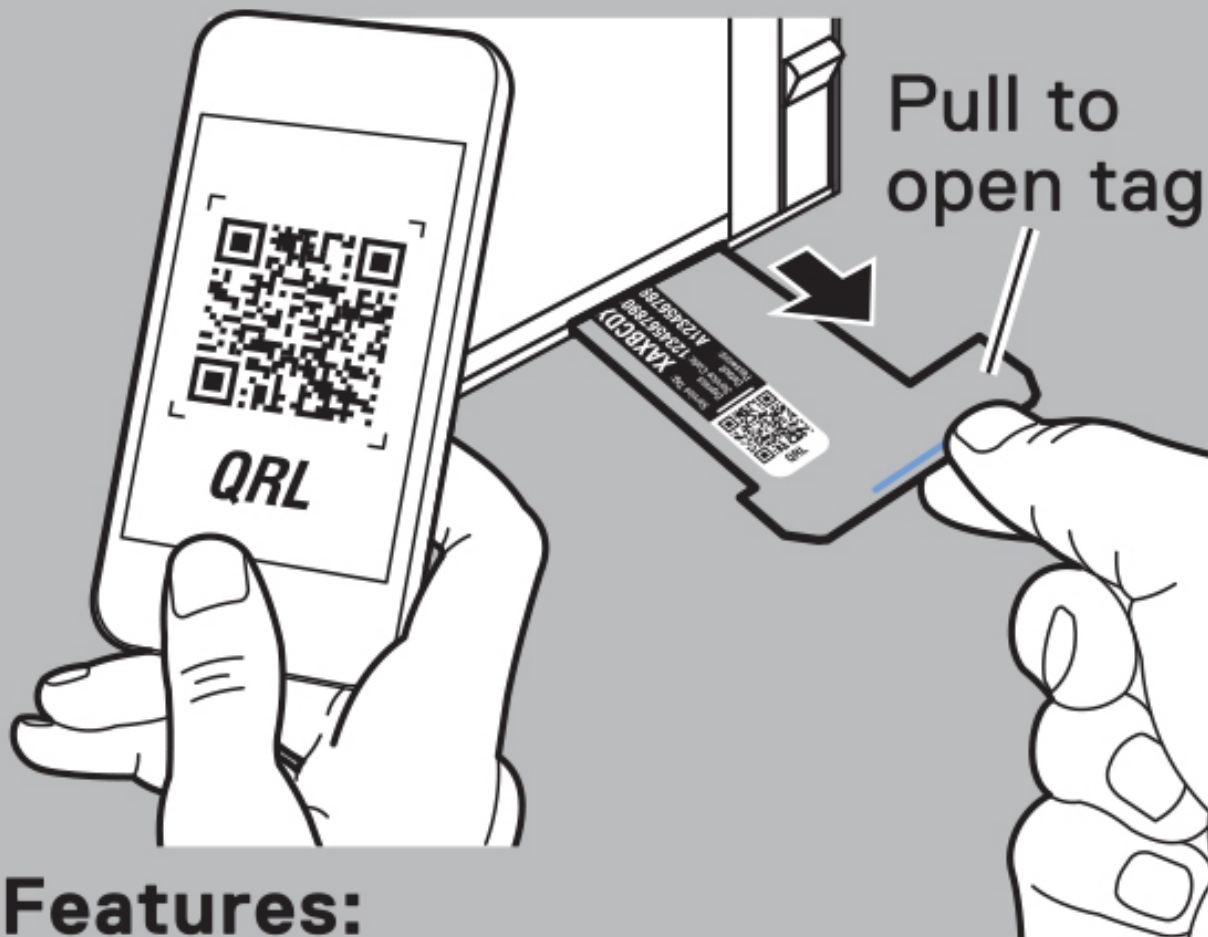


Figure 17. System tasks

# Express Service Tag



## Features:

- Service Tag
- MAC Addresses (bottom of tag)
- Password (bottom of tag)
- Express Service Code
- Quick Resource Locator (QRL)
  - Scan to see troubleshooting and how-to videos and documentation

Figure 18. Express service tag

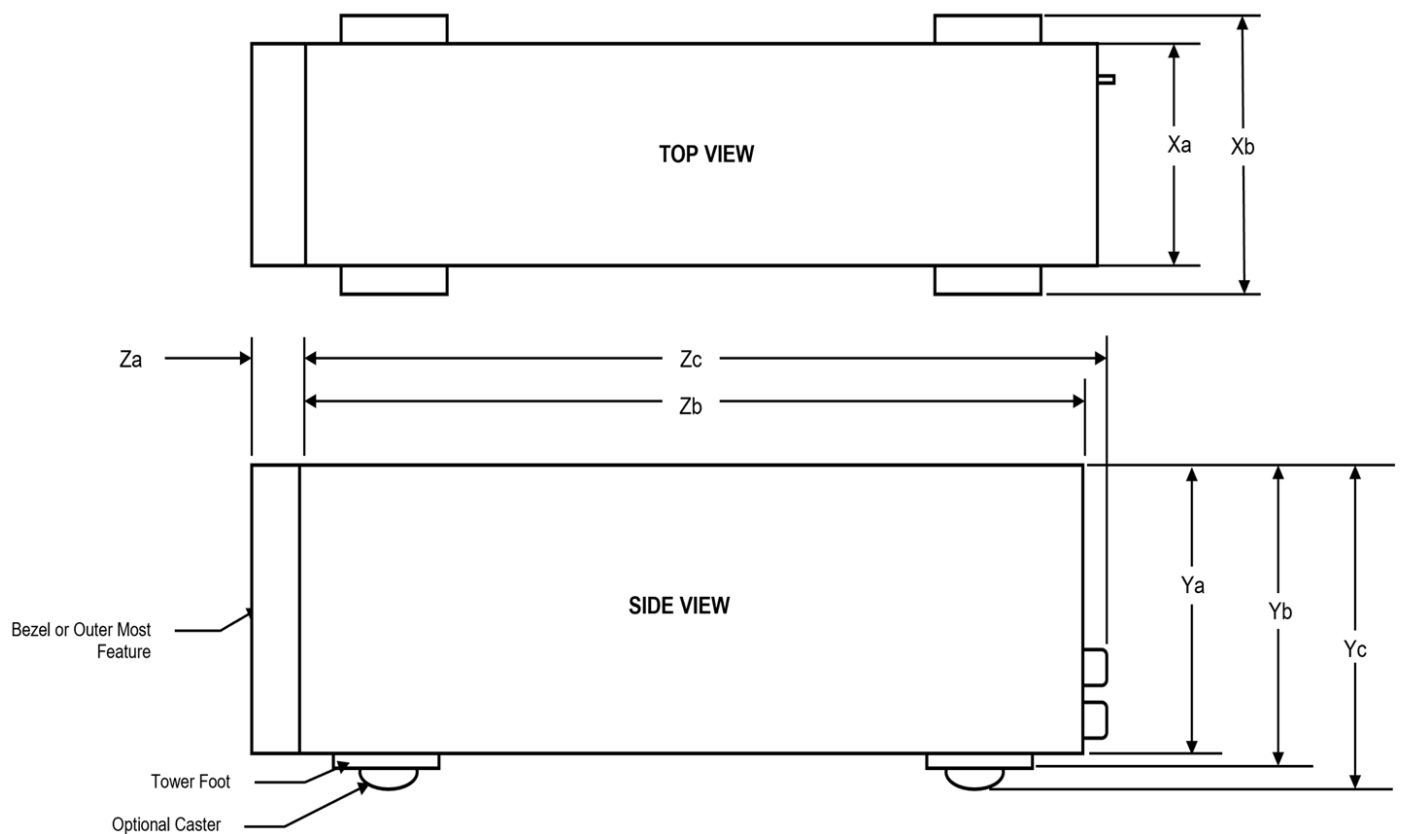
# Technical specifications

The technical and environmental specifications of your system are outlined in this section.

## Topics:

- Chassis dimensions
- System weight
- Processor specifications
- PSU specifications
- Cooling fan specifications
- Supported operating systems
- System battery specifications
- Expansion card riser specifications
- Memory specifications
- Storage controller specifications
- Drives
- GPU specifications
- Ports and connectors specifications
- Video specifications
- Environmental specifications

## Chassis dimensions



**Figure 19. Chassis dimensions**



**Table 8. Chassis dimension for the system**

| Drives                     | Xa                     | Xb                      | Ya                      | Yb                      | Yc                      | Za (with bezel)       | Zb                      | Zc                      |
|----------------------------|------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-----------------------|-------------------------|-------------------------|
| 12 x 3.5-inch SAS/SATA HDD | 200.0 mm (7.87 inches) | 293.0 mm (11.53 inches) | 446.0 mm (17.55 inches) | 464.0 mm (18.26 inches) | 508.8 mm (20.03 inches) | 17.6 mm (0.69 inches) | 660.6 mm (26.00 inches) | 695.5 mm (27.38 inches) |

## System weight

**Table 9. PowerEdge T560 system weight**

| System configuration                        | Maximum weight (with all drives/SSDs) |
|---------------------------------------------|---------------------------------------|
| 12 x 3.5-inch (SAS/SATA)                    | 48 kg (107.32 pound)                  |
| 8 x 3.5-inch (SAS/SATA)                     | 43.16 kg (95.15 pound)                |
| 8 x 3.5-inch (SAS/SATA) + 8 x 2.5-inch NVMe | 46.84 kg (103.26 pound)               |
| 8 x 2.5-inch (SAS/SATA)                     | 39.40 kg (86.86 pound)                |
| 16 x 2.5-inch (SAS/SATA)                    | 42.02 kg (92.63 pound)                |
| 24 x 2.5-inch (SAS/SATA)                    | 44.64 kg (98.41 pound)                |

## Processor specifications

**Table 10. PowerEdge T560 processor specifications**

| Supported processors                                                          | Number of processors supported |
|-------------------------------------------------------------------------------|--------------------------------|
| 4 <sup>th</sup> or 5 <sup>th</sup> Generation Intel® Xeon Scalable processors | Up to two                      |

## PSU specifications

The PowerEdge T560 system supports up to two AC or DC power supply units (PSUs).

**Table 11. PSU specifications**

| PSU                   | Class    | Heat dissipation (maximum) (BTU/hr) | Frequency (Hz) | AC Voltage |           |       | DC Voltage |       |             | Current (A) |
|-----------------------|----------|-------------------------------------|----------------|------------|-----------|-------|------------|-------|-------------|-------------|
|                       |          |                                     |                | 100–120 V  | 200–240 V | 277 V | 240 V      | 336 V | -48—(-60) V |             |
| 600 W mixed mode      | Platinum | 2250                                | 50/60          | 600 W      | 600 W     | N/A   | N/A        | N/A   | N/A         | 7.1 - 3.6   |
|                       | N/A      |                                     | N/A            | N/A        | N/A       | N/A   | 600 W      | N/A   | N/A         | 2.9         |
| 700 W mixed mode HLAC | Titanium | 2625                                | 50/60          | N/A        | 700 W     | N/A   | N/A        | N/A   | N/A         | 4.1         |
|                       | N/A      |                                     | N/A            | N/A        | N/A       | N/A   | 700 W      | N/A   | N/A         | 3.4         |
| 800 W mixed mode      | Platinum | 3000                                | 50/60          | 800 W      | 800 W     | N/A   | N/A        | N/A   | N/A         | 9.2 - 4.7   |
|                       | N/A      |                                     | N/A            | N/A        | N/A       | N/A   | 800 W      | N/A   | N/A         | 3.8         |



**Table 11. PSU specifications (continued)**

| PSU                     | Class    | Heat dissipation (maximum) (BTU/hr) | Frequency (Hz) | AC Voltage |           |        | DC Voltage |        |             | Current (A) |
|-------------------------|----------|-------------------------------------|----------------|------------|-----------|--------|------------|--------|-------------|-------------|
|                         |          |                                     |                | 100–120 V  | 200–240 V | 277 V  | 240 V      | 336 V  | -48—(-60) V |             |
| 1100 W -48 V DC         | N/A      | 4265                                | N/A            | N/A        | N/A       | N/A    | N/A        | N/A    | 1100 W      | 27.0        |
| 1100 W mixed mode       | Titanium | 4125                                | 50/60          | 1050 W     | 1100 W    | N/A    | N/A        | N/A    | N/A         | 12 - 6.3    |
|                         | N/A      |                                     | N/A            | N/A        | N/A       | N/A    | 1100 W     | N/A    | N/A         | 5.2         |
| 1400 W mixed mode       | Platinum | 5250                                | 50/60          | 1050 W     | 1400 W    | N/A    | N/A        | N/A    | N/A         | 12 - 8      |
|                         | N/A      |                                     | N/A            | N/A        | N/A       | N/A    | 1400 W     | N/A    | N/A         | 6.6         |
| 1400 W 277 Vac and HVDC | Titanium | 5250                                | 50/60          | N/A        | N/A       | 1400 W | N/A        | N/A    | N/A         | 5.8         |
|                         |          | 5250                                | N/A            | N/A        | N/A       | N/A    | N/A        | 1400 W | N/A         | 5.17        |
| 1800 W mixed mode HLAC  | Titanium | 6610                                | 50/60          | N/A        | 1800 W    | N/A    | N/A        | N/A    | N/A         | 10.0        |
|                         | N/A      |                                     | N/A            | N/A        | N/A       | N/A    | 1800 W     | N/A    | N/A         | 8.2         |
| 2400 W mixed mode       | Platinum | 9000                                | 50/60          | 1400 W     | 2400 W    | N/A    | N/A        | N/A    | N/A         | 16 - 13.5   |
|                         | N/A      |                                     | N/A            | N/A        | N/A       | N/A    | 2400 W     | N/A    | N/A         | 11.2        |
| 2800 W mixed mode HLAC  | Titanium | 10500                               | 50/60          | N/A        | 2800 W    | N/A    | N/A        | N/A    | N/A         | 15.6        |
|                         |          |                                     | N/A            | N/A        | N/A       | N/A    | 2800 W     | N/A    | N/A         | 13.6        |

- NOTE:** If a system with AC 1400W/1100W PSUs operates at low line 100-120 V AC, then the power rating per PSU is derated to 1050 W.
- NOTE:** If a system with AC 2400 W PSUs operates at low line 100-120 V AC, then the power rating per PSU is derated to 1400 W.
- NOTE:** Heat dissipation is calculated using the PSU wattage rating.
- NOTE:** When selecting or upgrading the system configuration, to ensure optimum power utilization, verify the system power consumption with the Dell Energy Smart Solution Advisor available at [Dell.com/ESSA](https://www.dell.com/ESSA).
- NOTE:** The input voltage for the 1400 W mixed mode PSU is 277 V AC (249 V AC - 305 V AC) and 336 V DC (260 V DC - 400 V DC).

**Figure 20. PSU power cord connectors**



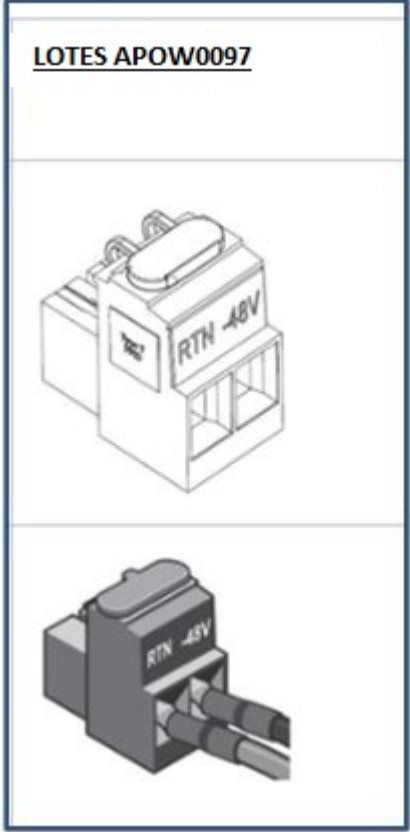


Figure 21. Types of PSU power cords

Table 12. PSU power cables

| Form factor     | Output                | Power cord |
|-----------------|-----------------------|------------|
| Redundant 60 mm | 600 W mixed mode      | C13        |
|                 | 700 W mixed mode HLAC |            |
|                 | 800 W mixed mode      |            |
|                 | 1100 W mixed mode     |            |

**Table 12. PSU power cables (continued)**

| Form factor     | Output                 | Power cord     |
|-----------------|------------------------|----------------|
|                 | 1400 W mixed mode      |                |
|                 | 1100 W -48 V DC        | LOTES APOW0097 |
|                 | 1400W 277Vac and HVDC  | APP 2006G1     |
|                 | 1800 W mixed mode HLAC | C15            |
| Redundant 86 mm | 2400 W mixed mode      | C19            |
|                 | 2800 W mixed mode HLAC | C21            |

 **NOTE:** C13 power cable combined with C14 to C15 jumper power cable can be used to adapt 1800 W PSU.

## Cooling fan specifications

The Dell PowerEdge T560 system supports up to eight standard (STD) or High Performance (HPR) cooling fans that are connected to the system board directly.

**Table 13. Cooling fan specifications**

| Fan type                          | Abbreviation | Also known as          | Label color | Label image                                                                           |
|-----------------------------------|--------------|------------------------|-------------|---------------------------------------------------------------------------------------|
| <b>Standard fan</b>               | STD          | STD - Standard         | N/A         |   |
| <b>High Performance (HPR) fan</b> | HPR          | HPR - High Performance | N/A         |  |

## Supported operating systems

The PowerEdge T560 system supports the following operating systems:

- Canonical Ubuntu Server LTS
- Microsoft Windows Server with Hyper-V
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server
- VMware ESXi

For more information, go to [www.dell.com/ossupport](http://www.dell.com/ossupport).

## System battery specifications

The PowerEdge T560 system uses one CR 2032 3.0-V lithium coin cell battery.

# Expansion card riser specifications

The PowerEdge T560 system supports up to four PCIe x16 slots (3 Gen4 with x16 lanes, 1 Gen4 x16 slot with x8 lanes) on the system board. Additionally, the system supports two Gen5 x16 GPU riser slots.

**Table 14. Expansion card slots supported on the system board**

| PCIe slot | Expansion card riser | Processor connection | Height      | Length      | Slot width          |
|-----------|----------------------|----------------------|-------------|-------------|---------------------|
| Slot 1    | GPU riser            | Processor 2          | Full Height | Full Length | x16                 |
| Slot 2    | GPU riser            | Processor 1          | Full Height | Full Length | x16                 |
| Slot 3    | NA                   | Processor 2          | Full Height | Half Length | x16                 |
| Slot 4    | NA                   | Processor 2          | Full Height | Half Length | x16                 |
| Slot 5    | NA                   | Processor 1          | Full Height | Half Length | x16 (with x8 lanes) |
| Slot 6    | NA                   | Processor 1          | Full Height | Half Length | x16                 |

# Memory specifications

The PowerEdge T560 system supports the following memory specifications for optimized operation.

**Table 15. Memory specifications for 4<sup>th</sup> Generation Intel® Xeon Scalable processors**

| DIMM type  | DIMM rank   | DIMM capacity | Single processor        |                         | Dual processors         |                         |
|------------|-------------|---------------|-------------------------|-------------------------|-------------------------|-------------------------|
|            |             |               | Minimum system capacity | Maximum system capacity | Minimum system capacity | Maximum system capacity |
| DDR5 RDIMM | Single rank | 16 GB         | 16 GB                   | 128 GB                  | 32 GB                   | 256 GB                  |
|            | Dual rank   | 32 GB         | 32 GB                   | 256 GB                  | 64 GB                   | 512 GB                  |
|            |             | 64 GB         | 64 GB                   | 512 GB                  | 128 GB                  | 1 TB                    |

**Table 16. Memory module sockets**

| Memory module sockets | Rated DIMM Speed                |
|-----------------------|---------------------------------|
| 16, 288-pin           | 4000 MT/s, 4400 MT/s, 4800 MT/s |

**NOTE:** Memory DIMM slots are not hot pluggable.

**NOTE:** The processor may reduce the performance of the rated DIMM speed.

**Table 17. Memory specifications for 5<sup>th</sup> Generation Intel® Xeon Scalable processors**

| DIMM type  | DIMM rank   | DIMM capacity | Single processor        |                         | Dual processors         |                         |
|------------|-------------|---------------|-------------------------|-------------------------|-------------------------|-------------------------|
|            |             |               | Minimum system capacity | Maximum system capacity | Minimum system capacity | Maximum system capacity |
| DDR5 RDIMM | Single rank | 16 GB         | 16 GB                   | 128 GB                  | 32 GB                   | 256 GB                  |
|            | Dual rank   | 32 GB         | 32 GB                   | 256 GB                  | 64 GB                   | 512 GB                  |
|            |             | 64 GB         | 64 GB                   | 512 GB                  | 128 GB                  | 1 TB                    |
|            |             | 96 GB         | 96 GB                   | 768 TB                  | 192 GB                  | 1.5 TB                  |

**Table 18. Memory module sockets**

| Memory module sockets | Rated DIMM Speed                                      |
|-----------------------|-------------------------------------------------------|
| 16, 288-pin           | 4000 MT/s, 4400 MT/s, 4800 MT/s, 5200 MT/s, 5600 MT/s |

**NOTE:** Memory DIMM slots are not hot pluggable.

**NOTE:** The processor may reduce the performance of the rated DIMM speed.

## Storage controller specifications

The PowerEdge T560 system supports the following controller cards:

**Table 19. Storage controller cards**

| Supported storage controller cards                                                                                                                                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Internal controllers <ul style="list-style-type: none"> <li>• HBA355i fPERC</li> <li>• H355 fPERC</li> <li>• H755 fPERC</li> <li>• H755N fPERC</li> <li>• H965i fPERC</li> </ul> |
| External controllers <ul style="list-style-type: none"> <li>• HBA355e</li> </ul>                                                                                                 |
| Internal Boot <ul style="list-style-type: none"> <li>• Boot Optimized Storage Subsystem (BOSS-N1): HWRAID 0/1 (2x M.2 NVMe SSDs)</li> </ul>                                      |
| Software RAID <ul style="list-style-type: none"> <li>• S160</li> </ul>                                                                                                           |
| SAS Hot Bus Adapters (HBA) <ul style="list-style-type: none"> <li>• 22.5 Gbps SAS Ext. HBA</li> </ul>                                                                            |

## Drives

The PowerEdge T560 system supports:

- Up to 12 x 3.5-inch SAS/SATA HDD drives
- Up to 8 x 3.5-inch SAS/SATA HDD drives
- Up to 8 x 3.5-inch SAS/ SATA HDD + 8 x 2.5-inch NVMe SSD drives
- Up to 8 x 2.5-inch SAS/SATA HDD drives
- Up to 16 x 2.5-inch SAS/SATA HDD drives
- Up to 24 x 2.5-inch SAS/SATA HDD drives

**NOTE:** For more information about how to hot swap NVMe PCIe SSD U.2 device, see the *Dell Express Flash NVMe PCIe SSD User's Guide* at <https://www.dell.com/support> > **Browse all Products** > **Data Center Infrastructure** > **Storage Adapters & Controllers** > **Dell PowerEdge Express Flash NVMe PCIe SSD** > **Documentation** > **Manuals and Documents**.

## GPU specifications

The PowerEdge T560 system supports up to two 300 W double-width GPUs or six 75 W single-width GPUs .

**NOTE:** Systems configured with GPUs will have higher fan acoustics.

# Ports and connectors specifications

## NIC port specifications

The PowerEdge T560 system supports up to two 10/100/1000 Mbps Network Interface Controller (NIC) ports embedded on the LAN on Motherboard (LOM) and integrated on the optional Open Compute Project (OCP) cards.

**Table 20. NIC port specification for the system**

| Feature       | Specifications |
|---------------|----------------|
| LOM on Planar | 2 x 1 GbE      |
| OCP card      | 1 x OCP x8 3.0 |

## Serial connector specifications

The PowerEdge T560 system supports one serial port on the system board, which is Data Terminal Equipment (DTE), 16550-compliant .

The serial connector is installed as default on the system board.

## Ports specifications

**Table 21. PowerEdge T560 port specifications**

| Front                                |              | Rear                            |              | Internal (Optional)             |              |
|--------------------------------------|--------------|---------------------------------|--------------|---------------------------------|--------------|
| Port type                            | No. of ports | Port type                       | No. of ports | Port type                       | No. of ports |
| 1 x USB 2.0-compliant port           | One          | 1 x Dedicated iDRAC (RJ45) port | One          | Internal USB 3.0-compliant port | One          |
| 1 x USB 3.0-compliant port           | One          | 1 x USB 2.0-compliant port      | One          |                                 |              |
| 1 x iDRAC Direct (Micro-AB USB) port | One          | 1 x USB 3.0-compliant port      | One          |                                 |              |
|                                      |              | DB-15 VGA port                  | One          |                                 |              |

 **NOTE:** The micro USB 2.0 compliant port can only be used as an iDRAC Direct or a management port.

## Video specifications

The PowerEdge T560 system supports integrated Matrox G200 graphics controller with 16 MB of video frame buffer.

**Table 22. Supported video resolution options**

| Resolution  | Refresh rate (Hz) | Color depth (bits) |
|-------------|-------------------|--------------------|
| 1024 x 768  | 60                | 8, 16, 32          |
| 1280 x 800  | 60                | 8, 16, 32          |
| 1280 x 1024 | 60                | 8, 16, 32          |
| 1360 x 768  | 60                | 8, 16, 32          |
| 1440 x 900  | 60                | 8, 16, 32          |

**Table 22. Supported video resolution options (continued)**

| Resolution  | Refresh rate (Hz) | Color depth (bits) |
|-------------|-------------------|--------------------|
| 1600 x 900  | 60                | 8, 16, 32          |
| 1600 x 1200 | 60                | 8, 16, 32          |
| 1680 x 1050 | 60                | 8, 16, 32          |
| 1920 x 1080 | 60                | 8, 16, 32          |
| 1920 x 1200 | 60                | 8, 16, 32          |

## Environmental specifications

**NOTE:** For additional information about environmental certifications, refer to the *Product Environmental Datasheet* located with the *Documentation* on [www.dell.com/support/home](http://www.dell.com/support/home).

**Table 23. Continuous Operation Specifications for ASHRAE A2**

| Description                                           | Allowable continuous operations                                                   |
|-------------------------------------------------------|-----------------------------------------------------------------------------------|
| Temperature range for altitudes <= 900 m (<= 2953 ft) | 10–35°C (50–95°F) with no direct sunlight on the equipment                        |
| Humidity percent range (non-condensing at all times)  | 8% RH with -12°C minimum dew point to 80% RH with 21°C (69.8°F) maximum dew point |
| Operational altitude de-rating                        | Maximum temperature is reduced by 1°C/300 m (33.8°F/984 Ft) above 900 m (2953 Ft) |

**Table 24. Continuous Operation Specifications for ASHRAE A3**

| Description                                           | Allowable continuous operations                                                   |
|-------------------------------------------------------|-----------------------------------------------------------------------------------|
| Temperature range for altitudes <= 900 m (<= 2953 ft) | 5–40°C (41–104°F) with no direct sunlight on the equipment                        |
| Humidity percent range (non-condensing at all times)  | 8% RH with -12°C minimum dew point to 85% RH with 24°C (75.2°F) maximum dew point |
| Operational altitude de-rating                        | Maximum temperature is reduced by 1°C/175 m (33.8°F/574 Ft) above 900 m (2953 Ft) |

**Table 25. Continuous Operation Specifications for ASHRAE A4**

| Description                                           | Allowable continuous operations                                                   |
|-------------------------------------------------------|-----------------------------------------------------------------------------------|
| Temperature range for altitudes <= 900 m (<= 2953 ft) | 5–45°C (41–113°F) with no direct sunlight on the equipment                        |
| Humidity percent range (non-condensing at all times)  | 8% RH with -12°C minimum dew point to 90% RH with 24°C (75.2°F) maximum dew point |
| Operational altitude de-rating                        | Maximum temperature is reduced by 1°C/125 m (33.8°F/410 Ft) above 900 m (2953 Ft) |

**Table 26. Continuous Operation Specifications for Rugged Environment**

| Description                                           | Allowable continuous operations                                                   |
|-------------------------------------------------------|-----------------------------------------------------------------------------------|
| Temperature range for altitudes <= 900 m (<= 2953 ft) | 5–55°C (41–131°F) with no direct sunlight on the equipment                        |
| Humidity percent range (non-condensing at all times)  | 8% RH with -12°C minimum dew point to 90% RH with 24°C (75.2°F) maximum dew point |

**Table 26. Continuous Operation Specifications for Rugged Environment (continued)**

| Description                    | Allowable continuous operations                                                   |
|--------------------------------|-----------------------------------------------------------------------------------|
| Operational altitude de-rating | Maximum temperature is reduced by 1°C/125 m (33.8°F/410 Ft) above 900 m (2953 Ft) |

**Table 27. Common Environmental Specifications for ASHRAE A2, A3, A4 and Rugged**

| Description                                                                | Allowable continuous operations                                                                                                                                                                                                                                  |
|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Maximum temperature gradient (applies to both operation and non-operation) | 20°C in an hour* (36°F in an hour) and 5°C in 15 minutes (41°F in 15 minutes), 5°C in an hour* (41°F in an hour) for tape<br><i>i</i> <b>NOTE:</b> * - Per ASHRAE thermal guidelines for tape hardware, these are not instantaneous rates of temperature change. |
| Non-operational temperature limits                                         | -40 to 65°C (-104 to 149°F)                                                                                                                                                                                                                                      |
| Non-operational humidity limits                                            | 5% to 95% RH with 27°C (80.6°F) maximum dew point                                                                                                                                                                                                                |
| Maximum non-operational altitude                                           | 12,000 meters (39,370 feet)                                                                                                                                                                                                                                      |
| Maximum operational altitude                                               | 3,048 meters (10,000 feet)                                                                                                                                                                                                                                       |

**Table 28. Maximum vibration specifications**

| Maximum vibration | Specifications                                                                 |
|-------------------|--------------------------------------------------------------------------------|
| Operating         | 0.26 G <sub>rms</sub> at 5 Hz to 350 Hz (all operation orientations)           |
| Storage           | 1.88 G <sub>rms</sub> at 10 Hz to 500 Hz for 15 minutes (all six sides tested) |

**Table 29. Maximum shock pulse specifications**

| Maximum shock pulse | Specifications                                                                                                                                       |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating           | Six consecutively executed shock pulses in the positive and negative x, y, and z axis of 6 G for up to 11 ms.                                        |
| Storage             | Six consecutively executed shock pulses in the positive and negative x, y, and z axis (one pulse on each side of the system) of 71 G for up to 2 ms. |

## Thermal restriction matrix

**Table 30. Processor and heat sink matrix**

| Heat sink | Processor TDP |
|-----------|---------------|
| STD HSK   | ≤ 150 W       |
| HPR HSK   | > 150 W       |

**Table 31. Label reference**

| Label | Description      |
|-------|------------------|
| STD   | Standard         |
| HPR   | High performance |
| HSK   | Heat sink        |



**Table 32. Thermal restriction matrix**

| Drive Configuration                    | Processor | Fans   | CPU TDP | Fan redundancy | CPU HSK   |            | GPU support |          | TBU support | GPU riser configuration |
|----------------------------------------|-----------|--------|---------|----------------|-----------|------------|-------------|----------|-------------|-------------------------|
|                                        |           |        |         |                | TDP>150 W | TDP<=150 W | GPU<=75 W   | GPU>75 W |             |                         |
| 8 x 3.5                                | 1         | STDx3  | <=185   | No             | HPR HSK   | STD HSK    | No          | No       | No          | Riser 0,2               |
|                                        | 1 or 2    | STDx4  | <=185   | No             |           |            | No          | No       | Riser 0,1,2 |                         |
|                                        | 1 or 2    | STDx8  | <=250   | Yes            |           |            | No          | No       | Riser 0,1,2 |                         |
|                                        | 1 or 2    | HPRx4  | <=250   | No             |           |            | Yes/No      | No       | Riser 0,1,2 |                         |
|                                        | 1 or 2    | *HPRx7 | <=250   | Yes            |           |            | ***Yes/No   | No       | Yes         | Riser 0                 |
|                                        |           |        |         | **No           |           |            | ** Yes /No  | **Yes    | Yes         | Riser 1,2               |
|                                        | 1 or 2    | HPRx8  | <=250   | Yes            |           |            | Yes/No      | Yes      | No          | Riser 1,2               |
| 12x3.5 & ****8x2.5<br>16x2.5<br>24x2.5 | 1 or 2    | STDx4  | <=185   | No             | HPR HSK   | STD HSK    | No          | No       | No          | Riser 0,1,2             |
|                                        | 1 or 2    | STDx8  | <=250   | Yes            |           |            | No          | No       | No          | Riser 0,1,2             |
|                                        | 1 or 2    | HPRx4  | <=250   | No             |           |            | Yes/No      | No       | No          | Riser 0,1,2             |
|                                        | 1 or 2    | *HPRx7 | <=250   | Yes            |           |            | ***Yes/No   | No       | Yes         | Riser 0                 |
|                                        |           |        |         | **No           |           |            | ** Yes /No  | ** Yes   | Yes         | Riser 1,2               |
|                                        | 1 or 2    | HPRx8  | <=250   | Yes            |           |            | Yes/No      | Yes      | No          | Riser 1,2               |
| 8 x 3.5 + 8 x 2.5 (NVMe)               | 1 or 2    | HPRx4  | <=250   | No             | HPR HSK   | STD HSK    | Yes/No      | No       | No          | Riser 0,1,2             |
|                                        | 1 or 2    | *HPRx7 | <=250   | Yes            |           |            | *** Yes/No  | No       | Yes         | Riser 0                 |
|                                        |           |        |         | **No           |           |            | ** Yes /No  | ** Yes   | Yes         | Riser 1,2               |
|                                        | 1 or 2    | HPRx8  | <=250   | Yes            |           |            | Yes/No      | Yes      | No          | Riser 1,2               |

**NOTE:** STD and HPR fans support DIMM capacity of less than or equal to 64 GB. Memory capacity of greater than/equal to 96 GB or less than/equal to 128 GB is supported by HPR fan only.

**NOTE:** \*HPRx7 counts are only for with TBU configuration. System without TBU configuration does not support HPRx7 counts.

**NOTE:** \*\*HPRx7 with TBU configuration:

- Riser 1 does not support GPU >75W. GPU <75W support Nvidia A2 and does not support Nvidia L4..
- Riser 2 GPU <75 W supports Nvidia A2 and Nvidia L4. For GPU >150 W supports Nvidia A30 (165 W) only.
- Fan redundancy is not supported with riser installed.

**NOTE:** \*\*\*HPRx7 with TBU configuration supports fan redundancy when GPUs <75W are installed on PCIe slot 3,4,5,6.

**NOTE:** \*\*\*\* SAS4 configuration requires minimum STDx8 fans.

**Table 33. Thermal matrix for all configurations**

| System Configuration |       | Configuration 1: 8 x 2.5-inch, 16 x 2.5-inch and 24 x 2.5-inch SAS/SATA |         |         |         | Configuration 2: 8x3.5-inch SAS/SATA |         |         |         | Configuration 3: 8x3.5-inch + 8 x NVMe |         | Configuration 4: 12 x 3.5-inch SAS/SATA |         |         |         |
|----------------------|-------|-------------------------------------------------------------------------|---------|---------|---------|--------------------------------------|---------|---------|---------|----------------------------------------|---------|-----------------------------------------|---------|---------|---------|
| Fan                  |       | STD                                                                     | STD     | HPR     | HPR     | STD                                  | STD     | HPR     | HPR     | HPR                                    | HPR     | STD                                     | STD     | HPR     | HPR     |
| Fan count            |       | x4                                                                      | x8      | x4      | x8      | x3, x4                               | x8      | x4      | x8      | x4                                     | x8      | x4                                      | x8      | x4      | x8      |
| CPU TDP              | 125 W | STD HSK                                                                 | STD HSK | STD HSK | STD HSK | STD HSK                              | STD HSK | STD HSK | STD HSK | STD HSK                                | STD HSK | STD HSK                                 | STD HSK | STD HSK | STD HSK |
|                      | 135 W | STD HSK                                                                 | STD HSK | STD HSK | STD HSK | STD HSK                              | STD HSK | STD HSK | STD HSK | STD HSK                                | STD HSK | STD HSK                                 | STD HSK | STD HSK | STD HSK |
|                      | 150 W | STD HSK                                                                 | STD HSK | STD HSK | STD HSK | STD HSK                              | STD HSK | STD HSK | STD HSK | STD HSK                                | STD HSK | STD HSK                                 | STD HSK | STD HSK | STD HSK |
|                      | 165 W | HPR HSK                                                                 | HPR HSK | HPR HSK | HPR HSK | HPR HSK                              | HPR HSK | HPR HSK | HPR HSK | HPR HSK                                | HPR HSK | HPR HSK                                 | HPR HSK | HPR HSK | HPR HSK |
|                      | 185 W | HPR HSK                                                                 | HPR HSK | HPR HSK | HPR HSK | HPR HSK                              | HPR HSK | HPR HSK | HPR HSK | HPR HSK                                | HPR HSK | HPR HSK                                 | HPR HSK | HPR HSK | HPR HSK |
|                      | 205 W | Not Supported: Requires < 25°C                                          | HPR HSK | HPR HSK | HPR HSK | Not Supported: Requires < 25°C       | HPR HSK | HPR HSK | HPR HSK | HPR HSK                                | HPR HSK | Not Supported: Requires < 25°C          | HPR HSK | HPR HSK | HPR HSK |
|                      |       |                                                                         | HPR HSK | HPR HSK | HPR HSK |                                      | HPR HSK | HPR HSK | HPR HSK | HPR HSK                                | HPR HSK |                                         | HPR HSK | HPR HSK | HPR HSK |
|                      | 225 W |                                                                         | HPR HSK | HPR HSK | HPR HSK |                                      | HPR HSK | HPR HSK | HPR HSK | HPR HSK                                | HPR HSK |                                         | HPR HSK | HPR HSK | HPR HSK |
|                      | 250 W |                                                                         | HPR HSK | HPR HSK | HPR HSK |                                      | HPR HSK | HPR HSK | HPR HSK | HPR HSK                                | HPR HSK |                                         | HPR HSK | HPR HSK | HPR HSK |

**Table 34. GPU thermal restriction matrix**

| GPU TDP | Supported GPU   | Fan configuration     | Maximum supported quantity | Note                                                           |
|---------|-----------------|-----------------------|----------------------------|----------------------------------------------------------------|
| 300 W   | Nvidia A40, L40 | HPRx8                 | 2                          | NA                                                             |
| 165 W   | Nvidia A30      | HPRx8                 | 2                          | NA                                                             |
|         |                 | HPRx7 (with TBU only) | 1                          | Only supported on Riser 2 and does not support fan redundancy. |
| < 75 W  | Nvidia A2       | HPRx8                 | 6                          | NA                                                             |

**Table 34. GPU thermal restriction matrix (continued)**

| GPU TDP | Supported GPU | Fan configuration     | Maximum supported quantity | Note                                                           |
|---------|---------------|-----------------------|----------------------------|----------------------------------------------------------------|
|         |               | HPRx7 (with TBU only) | 6                          | Does not support fan redundancy when installed on Riser        |
|         |               | HPRx4                 | 6                          | Does not support fan redundancy                                |
|         | Nvidia L4     | HPRx8                 | 5                          | NA                                                             |
|         |               | HPRx7 (with TBU only) | 4                          | Only supported on Riser 2 and does not support fan redundancy. |
|         |               | HPRx4                 | 4                          | Does not support fan redundancy                                |

**NOTE:** Nvidia L4 GPU is not supported on Riser 1 in HPRx7 and HPRx4 configurations due to thermal constraint and is not supported at PCIe slot 5 as Nvidia L4 is a PCIe x16 GPU card.

## Thermal air restrictions

### Thermal air restrictions for different configurations

**Table 35. 8 x 3.5-inch drive configuration**

| Standard Operating Support (ASHRAE A2 compliant)<br><b>NOTE:</b> All options supported unless otherwise noted.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Extended ambient 40° C Operating Support (ASHRAE A3 compliant)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Extended ambient 45° C Operating Support (ASHRAE A4 compliant)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>3x or 4x STD Fan config only support CPU Base TDP&lt;=185W</li> <li>3x STD Fans config does not support BOSS module</li> <li>HPR fan is required to support 96GB &lt;= DDR5 DIMM &lt;= 128GB</li> <li>With STD Fans, the following OCP3.0 &amp; PCIe cards only support optic cable with thermal Spec 85C and power &lt;=1.2W <ul style="list-style-type: none"> <li>Mellanox CX6 Lx 25GB 2P PCIe card</li> <li>Broadcom 25GB 4P SPF 57504 PCIe card</li> <li>Intel 25GB 4P E810-CCV PCIe card</li> <li>Intel 25GB 2P XXV710 PCIe card</li> <li>Intel 25GB 4P E810-XXV OCP card</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>Two PSUs are required. System performance may be reduced in the event of a PSU failure</li> <li>Does not support 3x or 4x STD Fans configs</li> <li>Does not support 8x STD fans configurations with CPU Base TDP &gt; 125W</li> <li>HPRx8 Fans configuration is required to support BOSS M.2 Module</li> <li>Does not support TBU</li> <li>Does not support Non-Dell qualified peripheral cards and Channel devices (FW) cards</li> <li>Does not support PCIe card consuming power &gt;= 25W and Mellanox CX6 Lx 25GB 2P PCIe card</li> <li>Does not support OCP transfer rate &gt;25G or cooling tier &gt; 10</li> <li>Does not support GPU card</li> <li>Optic Cable with spec 85C is required.</li> </ul> | <ul style="list-style-type: none"> <li>Two PSUs are required. System performance may be reduced in the event of a PSU failure</li> <li>Does not support STD fans configs</li> <li>Does not support 4x HPR fans config with CPU Base TDP &gt; 150W</li> <li>Does not support 8x HPR fans configs with CPU Base TDP &gt; 225W</li> <li>Does not support TBU</li> <li>Does not support BOSS M.2 Module</li> <li>Does not support Non-Dell qualified peripheral cards and Channel devices (FW) cards</li> <li>Does not support PCIe card consuming power &gt;= 25W and Mellanox CX6 Lx 25GB 2P PCIe card</li> <li>Does not support OCP transfer rate &gt;25G or cooling tier &gt; 10</li> <li>Does not support GPU card</li> <li>Optic Cable with spec 85C is required.</li> </ul> |

**Table 36. 8 x 2.5-inch, 16 x 2.5-inch, 24 x 2.5-inch and 12 x 3.5-inch drive configuration**

| Standard Operating Support (ASHRAE A2 compliant)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Extended ambient 40° C Operating Support (ASHRAE A3 compliant)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Extended ambient 45° C Operating Support (ASHRAE A4 compliant)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>4x STD fans support only processor with TDP&lt;=185W</li> <li>Does not support 2.5" SAS4 drives with STDx4 Fans</li> <li>With STD Fans, the following OCP3.0 &amp; PCIe cards only support optic cable with thermal Spec 85C and power &lt;=1.2W <ul style="list-style-type: none"> <li>Mellanox CX6 Lx 25GB 2P PCIe card</li> <li>Broadcom 25GB 4P SPF 57504 PCIe card</li> <li>Intel 25GB 4P E810-CCV PCIe card</li> <li>Intel 25GB 2P XXV710 PCIe card</li> <li>Intel 25GB 4P E810-XXV OCP card</li> <li>HPR fan is required to support 96GB &lt;= DDR5 DIMM &lt;= 128GB</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>Two PSUs are required. System performance may be reduced in the event of a PSU failure</li> <li>Does not support 3x or 4x STD Fans configs</li> <li>Does not support 8x STD fans configurations with CPU Base TDP &gt; 125W</li> <li>HPRx8 Fans configuration is required to support BOSS M.2 Module</li> <li>Does not support TBU</li> <li>Does not support Non-Dell qualified peripheral cards and Channel devices (FW) cards</li> <li>Does not support PCIe card consuming power &gt;= 25W and Mellanox CX6 Lx 25GB 2P PCIe card</li> <li>Does not support OCP transfer rate &gt;25G or cooling tier &gt; 10</li> <li>Does not support GPU card</li> <li>Optic Cable with spec 85C is required.</li> </ul> | <ul style="list-style-type: none"> <li>Two PSUs are required. System performance may be reduced in the event of a PSU failure</li> <li>Does not support STD fans configs</li> <li>Does not support 4x HPR fans config with CPU Base TDP &gt; 150W</li> <li>Does not support 8x HPR fans configs with CPU Base TDP &gt; 225W</li> <li>Does not support TBU</li> <li>Does not support BOSS M.2 Module</li> <li>Does not support Non-Dell qualified peripheral cards and Channel devices (FW) cards</li> <li>Does not support PCIe card consuming power &gt;= 25W and Mellanox CX6 Lx 25GB 2P PCIe card</li> <li>Does not support OCP transfer rate &gt;25G or cooling tier &gt; 10</li> <li>Does not support GPU card</li> <li>Optic Cable with spec 85C is required.</li> </ul> |

**Table 37. 8 x 3.5-inch + 8 x 2.5-inch NVMe drive configuration**

| Standard Operating Support (ASHRAE A2 compliant) | Extended ambient 40° C Operating Support (ASHRAE A3 compliant)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Extended ambient 45° C Operating Support (ASHRAE A4 compliant)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| HPR fans are required.                           | <ul style="list-style-type: none"> <li>Two PSUs are required</li> <li>System performance may be reduced in the event of a PSU failure</li> <li>Does not support TBU</li> <li>HPRx8 Fans configuration is required to support BOSS M.2 Module</li> <li>Does not support Non-Dell qualified peripheral cards and Channel devices (FW) cards</li> <li>Does not support PCIe card consuming power &gt;= 25W and Mellanox CX6 Lx 25GB 2P PCIe card</li> <li>Does not support OCP transfer rate &gt;25G or cooling tier &gt; 10</li> <li>Does not support GPU card</li> <li>Optic Cable with spec 85C is required</li> </ul> | <ul style="list-style-type: none"> <li>Two PSUs are required. System performance may be reduced in the event of a PSU failure</li> <li>Does not support 4x HPR fans config with CPU Base TDP &gt; 150W</li> <li>Does not support 8x HPR fans configs with CPU Base TDP &gt; 225W</li> <li>Does not support TBU</li> <li>Does not support BOSS M.2 Module</li> <li>Does not support Non-Dell qualified peripheral cards and Channel devices (FW) cards</li> <li>Does not support PCIe card consuming power &gt;= 25W and Mellanox CX6 Lx 25GB 2P PCIe card</li> <li>Does not support OCP transfer rate &gt;25G or cooling tier &gt; 10</li> <li>Does not support GPU card</li> <li>Optic Cable with spec 85C is required.</li> </ul> |

# Initial system setup and configuration

This section describes the tasks for initial setup and configuration of the Dell system. The section also provides general steps to set up the system and the reference guides for detailed information.

## Topics:

- [Setting up the system](#)
- [iDRAC configuration](#)
- [Resources to install operating system](#)

## Setting up the system

Perform the following steps to set up the system:

### Steps

Unpack the system.

## iDRAC configuration

The Integrated Dell Remote Access Controller (iDRAC) is designed to make you more productive as a system administrator and improve the overall availability of Dell servers. iDRAC alerts you to system issues, helps you to perform remote management, and reduces the need for physical access to the system.

## Options to set up iDRAC IP address

To enable communication between your system and iDRAC, you must first configure the network settings based on your network infrastructure. The network settings option is set to **DHCP**, by default.

 **NOTE:** For static IP configuration, you must request for the settings at the time of purchase.

You can set up the iDRAC IP address using one of the interfaces in the table below. For information about setting up iDRAC IP address, see the documentation links provided in the table below.

 **NOTE:** To access iDRAC, ensure that you connect the ethernet cable to the iDRAC dedicated network port or use the iDRAC Direct port by using the micro USB (type AB) cable.

## Options to log in to iDRAC

To log in to the iDRAC Web User Interface, open a browser and enter the IP address.

You can log in to iDRAC as:

- iDRAC user
- Microsoft Active Directory user
- Lightweight Directory Access Protocol (LDAP) user

In the login screen displayed, if you have opted for secure default access to iDRAC, the default username is `root` and enter the iDRAC secure default password available on back of the Information Tag. If you opted for legacy password, use the iDRAC legacy username and password - `root` and `calvin`, the iDRAC default password will be blank on the information tag. Then you will be prompted and required to create a password of your choice before proceeding. You can also log in by using your Single Sign-On or Smart Card.

 **NOTE:** Ensure that you change the default username and password after setting up the iDRAC IP address.

For more information about logging in to the iDRAC and iDRAC licenses, see the latest [Integrated Dell Remote Access Controller User's Guide](#).

 **NOTE:** To determine the most recent iDRAC release for your platform and for latest documentation version, see KB article [KB78115](#).

You can also access iDRAC using command-line protocol - RACADM. For more information, see the [Integrated Dell Remote Access Controller RACADM CLI Guide](#).

You can also access iDRAC using automation tool - Redfish API. For more information, see the [Integrated Dell Remote Access Controller User's Guide Redfish API Guide](#).

## Resources to install operating system

If the system is shipped without an operating system, you can install a supported operating system by using one of the resources provided in the table below. For information about how to install the operating system, see the documentation links provided in the table below.

**Table 38. Resources to install the operating system**

| Resource                      | Documentation links                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| iDRAC                         | <a href="#">Integrated Dell Remote Access Controller User's Guide</a> .or for system specific INtegrated Dell Remote Access Controller User's Guide, go to <a href="#">poweredge manuals</a> > <b>Product Support</b> page of your system > <b>Documentation</b> .<br> <b>NOTE:</b> To determine the most recent iDRAC release for your platform and for latest documentation version, see KB article at <a href="#">KB78115</a> .                                                                                                           |
| Lifecycle Controller          | Dell Lifecycle Controller User's Guide at <a href="#">idracmanuals</a> or for system specific Dell Lifecycle Controller User's Guide , go to <a href="#">poweredge manuals</a> > <b>Product Support</b> page of your system > <b>Documentation</b> . Dell recommends using Lifecycle Controller to install the OS, since all required drivers are installed on the system.<br> <b>NOTE:</b> To determine the most recent iDRAC release for your platform and for latest documentation version, see KB article at <a href="#">KB78115</a> . |
| OpenManage Deployment Toolkit | <a href="#">openmanage manuals</a> > OpenManage Deployment Toolkit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Dell certified VMware ESXi    | <a href="#">Virtualization solutions</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

 **NOTE:** For more information about installation and how-to videos for operating systems supported on PowerEdge systems, see [Supported Operating Systems for Dell PowerEdge systems](#).

## Options to download drivers and firmware

You can download firmware from the Dell support site. For information about downloading firmware, see the [Downloading drivers and firmware](#) section.

You can also choose any one of the following options to download the firmware. For information about how to download the firmware, see the documentation links provided in the table below.

**Table 39. Options to download firmware**

| Option                                                                              | Documentation link                                                                                         |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| Using Integrated Dell Remote Access Controller Lifecycle Controller (iDRAC with LC) | <a href="http://www.dell.com/idracmanuals">www.dell.com/idracmanuals</a>                                   |
| Using Dell Repository Manager (DRM)                                                 | <a href="http://www.dell.com/openmanagemanuals">www.dell.com/openmanagemanuals</a> > Repository Manager    |
| Using Dell Server Update Utility (SUU)                                              | <a href="http://www.dell.com/openmanagemanuals">www.dell.com/openmanagemanuals</a> > Server Update Utility |

**Table 39. Options to download firmware (continued)**

| Option                                         | Documentation link                                                                                                 |
|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Using Dell OpenManage Deployment Toolkit (DTK) | <a href="http://www.dell.com/openmanagemanuals">www.dell.com/openmanagemanuals</a> > OpenManage Deployment Toolkit |
| Using iDRAC virtual media                      | <a href="http://www.dell.com/idracmanuals">www.dell.com/idracmanuals</a>                                           |

## Options to download and install OS drivers

You can choose any one of the following options to download and install OS drivers. For information about how to download or install OS drivers, see the documentation links provided in the table below.

**Table 40. Options to download and install OS drivers**

| Option              | Documentation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dell support site   | <a href="#">Downloading drivers and firmware</a> section.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| iDRAC virtual media | <a href="#">Integrated Dell Remote Access Controller User's Guide</a> or for system specific, go to <a href="#">Integrated Dell Remote Access Controller User's Guide</a> > <b>Product Support</b> page of your system > <b>Documentation</b> .<br> <b>NOTE:</b> To determine the most recent iDRAC release for your platform and for latest documentation version, see <a href="http://www.dell.com/support/article/sln000178115">www.dell.com/support/article/sln000178115</a> . |

## Downloading drivers and firmware

It is recommended that you download and install the latest BIOS, drivers, and systems management firmware on the system.

### Prerequisites

Ensure that you clear the web browser cache before downloading the drivers and firmware.

### Steps

1. Go to [www.dell.com/support/drivers](http://www.dell.com/support/drivers).
2. Enter the Service Tag of the system in the **Enter a Dell Service Tag, Dell Product ID or Model** field, and then press Enter.

 **NOTE:** If you do not have the Service Tag, click **Browse all products**, and navigate to your product.

3. On the displayed product page, click **Drivers & Downloads**.  
On the **Drivers & Downloads** page, all drivers that are applicable to the system are displayed.
4. Download the drivers to a USB drive, CD, or DVD.

# Pre-operating system management applications

You can manage basic settings and features of a system without booting to the operating system by using the system firmware.

## Options to manage the pre-operating system applications

You can use any one of the following options to manage the pre-operating system applications:

- System Setup
- Dell Lifecycle Controller
- Boot Manager
- Preboot Execution Environment (PXE)

### Topics:

- [System Setup](#)
- [Dell Lifecycle Controller](#)
- [Boot Manager](#)
- [PXE boot](#)

## System Setup

Using the

**System Setup** option, you can configure the BIOS settings, iDRAC settings, and device settings of the system.

You can access system setup by using any one of the following interfaces:

- Graphical User interface — To access go to iDRAC Dashboard, click **Configurations > BIOS Settings**.
- Text browser — To enable the text browser, use the Console Redirection.

To view

**System Setup**, power on the system, press F2, and click **System Setup Main Menu**.

 **NOTE:** If the operating system begins to load before you press F2, wait for the system to finish booting, and then restart the system and try again.

The options on the

**System Setup Main Menu** screen are described in the following table:

**Table 41. System Setup Main Menu**

| Option                | Description                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>System BIOS</b>    | Enables you to configure the BIOS settings.                                                                                                                                                                                                                                                                                                                                                              |
| <b>iDRAC Settings</b> | Enables you to configure the iDRAC settings. The iDRAC settings utility is an interface to set up and configure the iDRAC parameters by using UEFI (Unified Extensible Firmware Interface). You can enable or disable various iDRAC parameters by using the iDRAC settings utility. For more information about this utility, see <a href="#">Integrated Dell Remote Access Controller User's Guide</a> . |



**Table 41. System Setup Main Menu (continued)**

| Option                      | Description                                                                                        |
|-----------------------------|----------------------------------------------------------------------------------------------------|
| <b>Device Settings</b>      | Enables you to configure device settings for devices such as storage controllers or network cards. |
| <b>Service Tag Settings</b> | Enables you to configure the System Service Tag.                                                   |

## System BIOS

To view the **System BIOS** screen, power on the system, press F2, and click **System Setup Main Menu > System BIOS**.

**Table 42. System BIOS details**

| Option                         | Description                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>System Information</b>      | Provides information about the system such as the system model name, BIOS version, and Service Tag.                                                                                                                                                                                                                                                                                               |
| <b>Memory Settings</b>         | Specifies information and options related to the installed memory.                                                                                                                                                                                                                                                                                                                                |
| <b>Processor Settings</b>      | Specifies information and options related to the processor such as speed and cache size.                                                                                                                                                                                                                                                                                                          |
| <b>SATA Settings</b>           | Specifies options to enable or disable the embedded SATA controller and ports.                                                                                                                                                                                                                                                                                                                    |
| <b>NVMe Settings</b>           | Specifies options to change the NVMe settings. If the system contains the NVMe drives that you want to configure in a RAID array, you must set both this field and the <b>Embedded SATA</b> field on the <b>SATA Settings</b> menu to <b>RAID</b> mode. You might also need to change the <b>Boot Mode</b> setting to <b>UEFI</b> . Otherwise, you should set this field to <b>Non-RAID</b> mode. |
| <b>Boot Settings</b>           | Specifies options to specify the Boot mode (BIOS or UEFI). Enables you to modify UEFI and BIOS boot settings.                                                                                                                                                                                                                                                                                     |
| <b>Network Settings</b>        | Specifies options to manage the UEFI network settings and boot protocols.<br><br>Legacy network settings are managed from the <b>Device Settings</b> menu.<br><br> <b>NOTE:</b> Network Settings are not supported in BIOS boot mode.                                                                          |
| <b>Integrated Devices</b>      | Specifies options to manage integrated device controllers and ports, specifies related features, and options.                                                                                                                                                                                                                                                                                     |
| <b>Serial Communication</b>    | Specifies options to manage the serial ports, its related features, and options.                                                                                                                                                                                                                                                                                                                  |
| <b>System Profile Settings</b> | Specifies options to change the processor power management settings, memory frequency.                                                                                                                                                                                                                                                                                                            |
| <b>System Security</b>         | Specifies options to configure the system security settings, such as system password, setup password, Trusted Platform Module (TPM) security, and UEFI secure boot. It also manages the power button on the system.                                                                                                                                                                               |
| <b>Redundant OS Control</b>    | Sets the redundant OS information for redundant OS control.                                                                                                                                                                                                                                                                                                                                       |
| <b>Miscellaneous Settings</b>  | Specifies options to change the system date and time.                                                                                                                                                                                                                                                                                                                                             |

## System Information

To view the **System Information** screen, power on the system, press F2, and click **System Setup Main Menu > System BIOS > System Information**.

**Table 43. System Information details**

| Option                   | Description                      |
|--------------------------|----------------------------------|
| <b>System Model Name</b> | Specifies the system model name. |

**Table 43. System Information details (continued)**

| Option                                         | Description                                                                                    |
|------------------------------------------------|------------------------------------------------------------------------------------------------|
| <b>System BIOS Version</b>                     | Specifies the BIOS version installed on the system.                                            |
| <b>System Management Engine Version</b>        | Specifies the current version of the Management Engine firmware.                               |
| <b>System Service Tag</b>                      | Specifies the system Service Tag.                                                              |
| <b>System Manufacturer</b>                     | Specifies the name of the system manufacturer.                                                 |
| <b>System Manufacturer Contact Information</b> | Specifies the contact information of the system manufacturer.                                  |
| <b>System CPLD Version</b>                     | Specifies the current version of the system Complex Programmable Logic Device (CPLD) firmware. |
| <b>UEFI Compliance Version</b>                 | Specifies the UEFI compliance level of the system firmware.                                    |

## Memory Settings

To view the **Memory Settings** screen, power on the system, press F2, and click **System Setup Main Menu > System BIOS > Memory Settings**.

**Table 44. Memory Settings details**

| Option                                        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>System Memory Size</b>                     | Specifies the size of the system memory.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>System Memory Type</b>                     | Specifies the type of memory installed in the system.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>System Memory Speed</b>                    | Specifies the speed of the system memory.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Video Memory</b>                           | Specifies the size video memory.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>System Memory Testing</b>                  | Specifies whether the system memory tests are run during system boot. The two options available are <b>Enabled</b> and <b>Disabled</b> . This option is set to <b>Disabled</b> by default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Memory Operating Mode</b>                  | This field selects the memory operating mode. This feature is active only if a valid memory configuration is detected. When <b>Optimizer Mode</b> is enabled, the DRAM controllers operate independently in 64-bit mode and provide optimized memory performance. When <b>Dell Fault Resilient Mode (FRM)</b> is enabled, a percentage of the total installed memory is configured to create a fault resilient zone starting from lowest system memory address for use by select hypervisors for host virtualization resilience. Specify the FRM percentage by using the Fault Resilient Mode Memory Size[%] feature. When <b>Dell NUMA Fault Resilient Mode (FRM)</b> is enabled, a percentage of the installed memory in every NUMA node is configured to create a fault resilient zone for use by select hypervisors for host virtualization resilience. Specify the FRM percentage by using the Fault Resilient Mode Memory Size[%] feature. |
| <b>Current State of Memory Operating Mode</b> | Specifies the current state of the memory operating mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Fault Resilient Mode Memory Size[%]</b>    | Select to define the percent of total memory size that must be used by the fault resilient mode, when selected in the Memory Operating mode. When Fault Resilient Mode is not selected, this option is grayed out and not used by Fault Resilient Mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Node Interleaving</b>                      | Enables or disables the Node interleaving option. Specifies if the Non-Uniform Memory Architecture (NUMA) is supported. If this field is set to <b>Enabled</b> , memory interleaving is supported if a symmetric memory configuration is installed. If the field is set to <b>Disabled</b> , the system supports NUMA (asymmetric) memory configurations. This option is set to <b>Disabled</b> by default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>ADDDC Settings</b>                         | Enables or disables ADDDC Setting feature. When Adaptive Double DRAM Device Correction (ADDDC) is enabled, failing DRAMs are dynamically                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

**Table 44. Memory Settings details (continued)**

| Option                                                                       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                              | mapped out. When set to <b>Enabled</b> it can impact the system performance under certain workloads. This feature is applicable for x4 DIMMs only. This option is set to <b>Enabled</b> by default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Memory training</b>                                                       | <p>When option is set to <b>Fast</b> and memory configuration is not changed, the system uses previously saved memory training parameters to train the memory subsystems and system boot time is also reduced. If memory configuration is changed, the system automatically enables <b>Retrain at Next boot</b> to force one-time full memory training steps, and then go back to <b>Fast</b> afterward.</p> <p>When option is set to <b>Retrain at Next boot</b>, the system performs the force one-time full memory training steps at next power on and boot time is slowed on next boot.</p> <p>When option is set to <b>Enable</b>, the system performs the force full memory training steps on every power on and boot time is slowed on every boot.</p> |
| <b>DIMM Self Healing (Post Package Repair) on Uncorrectable Memory Error</b> | Enables or disables Post Packing Repair (PPR) on uncorrectable memory error. This option is set to <b>Enabled</b> by default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Correctable Error Logging</b>                                             | Enables or disables correctable error logging. This option is set to <b>Disabled</b> by default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Memory Paging Policy</b>                                                  | This option sets Memory Paging Policy.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Memory Map Out</b>                                                        | This option controls DIMMs slots on the system. This option is set to <b>Enabled</b> by default. It allows to disable system installed DIMMs.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## Processor Settings

To view the **Processor Settings** screen, power on the system, press F2, and click **System Setup Main Menu > System BIOS > Processor Settings**.

**Table 45. Processor Settings details**

| Option                        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Logical Processor</b>      | Each processor core supports up to two logical processors. If this option is set to <b>Enabled</b> , the BIOS displays all the logical processors. If this option is set to <b>Disabled</b> , the BIOS displays only one logical processor per core. This option is set to <b>Enabled</b> by default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>CPU Interconnect Speed</b> | <p>Enables you to govern the frequency of the communication links among the processors in the system.</p> <p><b>NOTE:</b> The standard and basic bin processors support lower link frequencies.</p> <p>The options available are <b>Maximum data rate, 16 GT/s, 14.4 GT/s</b>, and <b>12.8 GT/s</b>. This option is set to <b>Maximum data rate</b> by default.</p> <p>Maximum data rate indicates that the BIOS runs the communication links at the maximum frequency supported by the processors. You can also select specific frequencies that the processors support, which can vary.</p> <p>For best performance, you should select <b>Maximum data rate</b>. Any reduction in the communication link frequency affects the performance of non-local memory access and cache coherency traffic.</p> |

**Table 45. Processor Settings details (continued)**

| Option                              | Description                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                     | <p>In addition, it can slow access to non-local I/O devices from a particular processor.</p> <p>However, if power saving considerations outweigh performance, reduce the frequency of the processor communication links. Before reducing the frequency, you must localize the memory and I/O access to the nearest NUMA node to minimize the impact to system performance.</p> |
| <b>Virtualization Technology</b>    | Enables or disables the virtualization technology for the processor. This option is set to <b>Enabled</b> by default.                                                                                                                                                                                                                                                          |
| <b>Kernel DMA Protection</b>        | This option is set to <b>Disabled</b> by default. When option is set to <b>Enabled</b> , BIOS and Operating System will enable direct memory access protection for DMA capable peripheral devices using virtualization technology.                                                                                                                                             |
| <b>Directory Mode</b>               | Enables or disables the directory mode. This option is set to <b>Enabled</b> by default.                                                                                                                                                                                                                                                                                       |
| <b>Adjacent Cache Line Prefetch</b> | Optimizes the system for applications that need high utilization of sequential memory access. This option is set to <b>Enabled</b> by default. You can disable this option for applications that need high utilization of random memory access.                                                                                                                                |
| <b>Hardware Prefetcher</b>          | Enables or disables the hardware prefetcher. This option is set to <b>Enabled</b> by default.                                                                                                                                                                                                                                                                                  |
| <b>DCU Streamer Prefetcher</b>      | Enables or disables the Data Cache Unit (DCU) streamer prefetcher. This option is set to <b>Enabled</b> by default.                                                                                                                                                                                                                                                            |
| <b>DCU IP Prefetcher</b>            | Enables or disables the Data Cache Unit (DCU) IP prefetcher. This option is set to <b>Enabled</b> by default.                                                                                                                                                                                                                                                                  |
| <b>Sub NUMA Cluster</b>             | Enables or disables the Sub NUMA Cluster. This option is set to <b>Disabled</b> by default.                                                                                                                                                                                                                                                                                    |
| <b>MADT Core Enumeration</b>        | Specifies the MADT Core Enumeration. This option is set to default in <b>Round Robin</b> . Linear option supports industry core enumeration whereas, Round Robin option supports Dell optimized core enumeration.                                                                                                                                                              |
| <b>UMA Based Clustering</b>         | It is a read-only field and displays as <b>Quadrant</b> , when Sub NUMA Cluster is disabled or displays as <b>Disabled</b> , when Sub NUMA Cluster is either 2-way or 4-way.                                                                                                                                                                                                   |
| <b>UPI Prefetch</b>                 | Enables you to get the memory read started early on DDR bus. The Ultra Path Interconnect (UPI) Rx path spawns the speculative memory that is read to Integrated Memory Controller (iMC) directly. This option is set to <b>Enabled</b> by default.                                                                                                                             |
| <b>XPT Prefetch</b>                 | This option is set to <b>Enabled</b> by default.                                                                                                                                                                                                                                                                                                                               |
| <b>LLC Prefetch</b>                 | Enables or disables the LLC Prefetch on all threads. This option is set to <b>Enabled</b> by default.                                                                                                                                                                                                                                                                          |
| <b>Dead Line LLC Alloc</b>          | Enables or disables the Dead Line LLC Alloc. This option is set to <b>Enabled</b> by default. You can enable this option to enter the dead lines in LLC or disable the option to not enter the dead lines in LLC.                                                                                                                                                              |
| <b>Directory AtoS</b>               | Enables or disables the Directory AtoS. AtoS optimization reduces remote read latencies for repeat read accesses without intervening writes. This option is set to <b>Disabled</b> by default.                                                                                                                                                                                 |

**Table 45. Processor Settings details (continued)**

| Option                                 | Description                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>AVX P1</b>                          | Enables you to reconfigure the processor Thermal Design Power (TDP) levels during POST based on the power and thermal delivery capabilities of the system. TDP verifies the maximum heat the cooling system is must dissipate. This option is set to <b>Normal</b> by default.<br><b>NOTE:</b> This option is only available on certain stock keeping units (SKUs) of the processors.                      |
| <b>Dynamic SST-Performance Profile</b> | Enables you to reconfigure the processor using Dynamic or Static Speed Select Technology. This option is set to <b>Disabled</b> by default.                                                                                                                                                                                                                                                                |
| <b>SST-Performance Profile</b>         | Enables you to reconfigure the processor using Speed Select Technology.                                                                                                                                                                                                                                                                                                                                    |
| <b>Intel SST-BF</b>                    | Enables Intel SST-BF. This option is displayed if Performance Per Watt (operating system) or Custom (when OSPM is enabled) system profiles are selected. This option is set to <b>Disabled</b> by default.                                                                                                                                                                                                 |
| <b>Intel SST-CP</b>                    | Enables Intel SST-CP. This option is displayed if Performance Per Watt (operating system) or Custom (when OSPM is enabled) system profiles are selected. This option is displayed and selectable for each system profile mode. This option is set to <b>Disabled</b> by default.                                                                                                                           |
| <b>x2APIC Mode</b>                     | Enables or disables x2APIC mode. This option is set to <b>Enabled</b> by default.<br><b>NOTE:</b> For two processors 64 cores configuration, x2APIC mode is not switchable if 256 threads are enabled (BIOS settings: All CCD, cores, and logical processors enabled).                                                                                                                                     |
| <b>AVX ICCP Pre-Grant License</b>      | Enables or disables AVX ICCP Pre-Grant License. This option is set to <b>Disabled</b> by default.                                                                                                                                                                                                                                                                                                          |
| <b>AVX ICCP Pre-Grant Level</b>        | Enables you to select between the different AVX ICC transition levels offered by Intel. This option is set to <b>128 heavy</b> by default.                                                                                                                                                                                                                                                                 |
| <b>Opportunistic Snoop Broadcast</b>   | Opportunistic Snoop Broadcast (OSB) is a feature within the PCIe protocol that enhances system performance by reducing latency and improving data transfer efficiency. <b>Auto</b> is default and controlled by SI Compatibility and Directory Mode Enable or Disable.                                                                                                                                     |
| <b>Dell Controlled Turbo</b>           |                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Dell Controlled Turbo Setting</b>   | Controls the turbo engagement. Enable this option only when System Profile is set to <b>Performance</b> or <b>Custom</b> , and CPU Power Management is set to <b>Performance</b> . This item can be selected for each system profile mode. This option is set to <b>Disabled</b> by default.<br><b>NOTE:</b> Depending on the number of installed processors, there might be up to two processor listings. |
| <b>Dell AVX Scaling Technology</b>     | Enables you to configure the Dell AVX scaling technology. This option is set to <b>0</b> by default. Enter the value from 0 to 12 bins. The value that is entered decreases the Dell AVX Scaling Technology frequency when the Dell-controlled Turbo feature is enabled.                                                                                                                                   |
| <b>Number of Cores per Processor</b>   | Controls the number of enabled cores in each processor. This option is set to <b>All</b> by default.                                                                                                                                                                                                                                                                                                       |

**Table 45. Processor Settings details (continued)**

| Option                               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CPU Physical Address Limit</b>    | Limit CPU physical address to 46 bits to support older Hyper-V. If enabled, automatically disables TME-MT. This option is set to <b>Enabled</b> by default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>AMP Prefetch</b>                  | This option enables one of the Mid-Level Cache (MLC) AMP hardware Prefetcher. This option is set to <b>Disabled</b> by default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Homeless Prefetch</b>             | This option allows L1 Data Cache Unit (DCU) to prefetch, when the Fill Buffers (FB) is full. Auto maps to hardware default setting. This option is set to <b>Auto</b> by default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Uncore Frequency RAPL</b>         | This setting controls whether the Running Average Power Limit (RAPL) balancer is enabled or not. If enabled, it activates the uncore power budgeting. This option is set to <b>Enabled</b> by default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Processor Core Speed</b>          | Specifies the maximum core frequency of the processor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Processor Bus Speed</b>           | Specifies the bus speed of the processor.<br><b>NOTE:</b> The processor bus speed option displays only when both processors are installed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Local Machine Check Exception</b> | Enables or disables the local machine check exception. This is an extension of the MCA Recovery mechanism providing the capability to deliver Uncorrected Recoverable (UCR) Software Recoverable Action Required (SRAR) errors to one or more specific logical processors threads receiving previously poisoned or corrupted data. When enabled, the UCR SRAR Machine Check Exception is delivered only to the affected thread rather than broadcast to all threads in the system. The feature supports operating system recovery for cases of multiple recoverable faults that are detected close, which would otherwise result in a fatal machine check event. The feature is available only on Advanced RAS processors. This option is set to <b>Enabled</b> by default. |
| <b>CPU Crash Log Support</b>         | This field controls Intel CPU Crash Log feature for collection of previous crash data from shared SRAM of Out-of-Band Management Service Module at post reset. This option is set to <b>Disabled</b> by default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>PROCESSOR n</b>                   | <b>NOTE:</b> Depending on the number of processors, there might be up to n processors listed.<br><br>The following settings are displayed for each processor:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

**Table 46. Processor n details**

| Option                       | Description                                                                     |
|------------------------------|---------------------------------------------------------------------------------|
| <b>Family-Model-Stepping</b> | Specifies the family, model, and stepping of the processor as defined by Intel. |
| <b>Brand</b>                 | Specifies the brand name.                                                       |
| <b>Level 2 Cache</b>         | Specifies the total L2 cache.                                                   |
| <b>Level 3 Cache</b>         | Specifies the total L3 cache.                                                   |
| <b>Number of Cores</b>       | Specifies the number of cores per processor.                                    |
| <b>Microcode</b>             | Specifies the processor microcode version.                                      |

## SATA Settings

To view the **SATA Settings** screen, power on the system, press F2, and click **System Setup Main Menu > System BIOS > SATA Settings**.

Table 47. SATA Settings details

| Option                      | Description                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Embedded SATA</b>        | Enables the embedded SATA option to be set to <b>Off</b> , <b>AHCI mode</b> , or <b>RAID modes</b> . This option is set to <b>AHCI Mode</b> by default.<br><b>NOTE:</b> <ol style="list-style-type: none"><li>1. You might also need to change the Boot Mode setting to UEFI. Otherwise, you should set the field to Non-RAID mode.</li><li>2. No ESXi and Ubuntu OS support under RAID mode.</li></ol> |
| <b>Security Freeze Lock</b> | Sends <b>Security Freeze Lock</b> command to the embedded SATA drives during POST. This option is applicable only for AHCI Mode. This option is set to <b>Enabled</b> by default.                                                                                                                                                                                                                       |
| <b>Write Cache</b>          | Enables or disables the command for the embedded SATA drives during POST. This option is applicable only for AHCI Mode. This option is set to <b>Disabled</b> by default.                                                                                                                                                                                                                               |
| <b>Port n</b>               | Sets the drive type of the selected device.<br><br>For <b>AHCI Mode</b> , BIOS support is always enabled.                                                                                                                                                                                                                                                                                               |

Table 48. Port n

| Options           | Descriptions                                                                                                           |
|-------------------|------------------------------------------------------------------------------------------------------------------------|
| <b>Model</b>      | Specifies the drive model of the selected device.                                                                      |
| <b>Drive Type</b> | Specifies the type of drive attached to the SATA port.                                                                 |
| <b>Capacity</b>   | Specifies the total capacity of the drive. This field is undefined for removable media devices such as optical drives. |

## NVMe Settings

This option sets the NVMe drive mode. If the system contains NVMe drives that you want to configure in a RAID array, you must set both this field and the Embedded SATA field on the SATA settings menu to RAID Mode. You may also need to change the Boot Mode setting to UEFI.

To view the **NVMe Settings** screen, power on the system, press F2, and click **System Setup Main Menu > System BIOS > NVMe Settings**.

Table 49. NVMe Settings details

| Option                  | Description                                                                                                                                                                                        |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>NVMe Mode</b>        | Enables or disables the boot mode. The option is set to <b>Non-RAID</b> mode by default.<br><b>NOTE:</b> <b>NVMe mode</b> option is available only when the boot mode is set to <b>UEFI mode</b> . |
| <b>BIOS NVMe Driver</b> | Sets the drive type to boot the NVMe driver. The available options are <b>Dell Qualified Drives</b> and <b>All Drives</b> . This option is set to <b>Dell Qualified Drives</b> by default.         |

## Boot Settings

You can use the **Boot Settings** screen to set the boot mode to either **BIOS** or **UEFI**. It also enables you to specify the boot order. The **Boot Settings** only support **UEFI** mode.

- **UEFI:** The Unified Extensible Firmware Interface (UEFI) is a new interface between operating systems and platform firmware. The interface consists of data tables with platform related information, boot and runtime service calls that are available to the operating system and its loader. The following benefits are available when the **Boot Mode** is set to **UEFI**:

- Support for drive partitions larger than 2 TB.
- Enhanced security (e.g., UEFI Secure Boot).
- Faster boot time.

 **NOTE:** You must use only the UEFI boot mode in order to boot from NVMe drives.

- **BIOS:** The **BIOS Boot Mode** is the legacy boot mode. It is maintained for backward compatibility.

To view the **Boot Settings** screen, power on the system, press F2, and click **System Setup Main Menu > System BIOS > Boot Settings**.

**Table 50. Boot Settings details**

| Option                                       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Boot Mode</b>                             | Enables you to set the boot mode of the system. If the operating system supports UEFI, you can set this option to UEFI. Setting this field to BIOS allows compatibility with non-UEFI operating systems. This option is set to <b>UEFI</b> by default.<br> <b>CAUTION:</b> Switching the boot mode may prevent the system from booting if the operating system is not installed in the same boot mode.<br> <b>NOTE:</b> Setting this field to UEFI disables the <b>BIOS Boot Settings</b> menu. |
| <b>Boot Sequence Retry</b>                   | Enables or disables the Boot sequence retry feature or resets the system. When this option is set to <b>Enabled</b> and the system fails to boot, the system re-attempts the boot sequence after 30 seconds. When this option is set to <b>Reset</b> and the system fails to boot, the system reboots immediately. This option is set to <b>Enabled</b> by default.                                                                                                                                                                                                                                                                                               |
| <b>Hard-disk Failover</b>                    | Enables or disables the Hard-disk failover. This option is set to <b>Disabled</b> by default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Generic USB Boot</b>                      | Enables or disables the generic USB boot placeholder. This option is set to <b>Disabled</b> by default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Hard-disk Drive Placeholder</b>           | Enables or disables the Hard-disk drive placeholder. This option is set to <b>Disabled</b> by default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Clean all SysPrep variables and order</b> | When this option is set to <b>None</b> , BIOS will do nothing. When set to <b>Yes</b> , BIOS will delete variables of SysPrep #### and SysPrepOrder this option is a onetime option, will reset to none when deleting variables. This setting is only available in <b>UEFI Boot Mode</b> . This option is set to <b>None</b> by default.                                                                                                                                                                                                                                                                                                                          |
| <b>UEFI Boot Settings</b>                    | Specifies the UEFI boot sequence. Enables or disables UEFI Boot options.<br> <b>NOTE:</b> This option controls the UEFI boot order. The first option in the list will be attempted first.                                                                                                                                                                                                                                                                                                                                                                                      |

**Table 51. UEFI Boot Settings**

| Option                            | Description                                                |
|-----------------------------------|------------------------------------------------------------|
| <b>UEFI Boot Sequence</b>         | Enables you to change the boot device order.               |
| <b>Boot Option Enable/Disable</b> | Enables you to select the enabled or disabled boot devices |

## Choosing system boot mode

System Setup enables you to specify one of the following boot modes for installing your operating system:

- UEFI boot mode (the default), is an enhanced 64-bit boot interface. If you have configured your system to boot to UEFI mode, it replaces the system BIOS.
1. From the **System Setup Main Menu**, click **Boot Settings**, and select **Boot Mode**.
  2. Select the UEFI boot mode you want the system to boot into.

 **CAUTION:** Switching the boot mode may prevent the system from booting if the operating system is not installed in the same boot mode.

3. After the system boots in the specified boot mode, proceed to install your operating system from that mode.

 **NOTE:** Operating systems must be UEFI-compatible to be installed from the UEFI boot mode. DOS and 32-bit operating systems do not support UEFI and can only be installed from the BIOS boot mode.



 **NOTE:** For the latest information about supported operating systems, go to [www.dell.com/ossupport](http://www.dell.com/ossupport).

## Changing boot order

### About this task

You may have to change the boot order if you want to boot from a USB key or an optical drive. The following instructions may vary if you have selected **BIOS** for **Boot Mode**.

 **NOTE:** Changing the drive boot sequence is only supported in BIOS boot mode.

### Steps

1. On the **System Setup Main Menu** screen, click **System BIOS > Boot Settings > UEFI Boot Settings > UEFI Boot Sequence**.
2. Use the arrow keys to select a boot device, and use the plus (+) and minus (-) sign keys to move the device down or up in the order.
3. Click **Exit**, and then click **Yes** to save the settings on exit.

 **NOTE:** You can also enable or disable boot order devices as needed.

## Network Settings

To view the **Network Settings** screen, power on the system, press F2, and click **System Setup Main Menu > System BIOS > Network Settings**.

 **NOTE:** Network Settings are not supported in BIOS boot mode.

**Table 52. Network Settings details**

| Option                                     | Description                                                                                                                                                                           |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>UEFI PXE Settings</b>                   | Enables you to control the configuration of the UEFI PXE device.                                                                                                                      |
| <b>Number of PXE Devices</b>               | This field specifies the number of PXE devices. This option is set to <b>4</b> by default.                                                                                            |
| <b>PXE Device n</b> (n = 1 to 4)           | Enables or disables the device. When enabled, a UEFI PXE boot option is created for the device.                                                                                       |
| <b>PXE Device n Settings</b> (n = 1 to 4)  | Enables you to control the configuration of the PXE device.                                                                                                                           |
| <b>UEFI HTTP Settings</b>                  | Enables you to control the configuration of the UEFI HTTP device.                                                                                                                     |
| <b>HTTP Device n</b> (n = 1 to 4)          | Enables or disables the device. When enabled, a UEFI HTTP boot option is created for the device.                                                                                      |
| <b>HTTP Device n Settings</b> (n = 1 to 4) | Enables you to control the configuration of the HTTP device.                                                                                                                          |
| <b>UEFI iSCSI Settings</b>                 | Enables you to control the configuration of the iSCSI device.                                                                                                                         |
| <b>iSCSI Initiator Name</b>                | Specifies the name of the iSCSI initiator in IQN format.                                                                                                                              |
| <b>iSCSI Device1</b>                       | Enables or disables the iSCSI device. When disabled, a UEFI boot option is created for the iSCSI device automatically. This is set to <b>Disabled</b> by default.                     |
| <b>iSCSI Device1 Settings</b>              | Enables you to control the configuration of the iSCSI device.                                                                                                                         |
| <b>UEFI NVMe-oF Settings</b>               | Enables you to control the configuration of the NVMe-oF devices.                                                                                                                      |
| <b>NVMe-oF</b>                             | Enables or disables the NVMe-oF feature. When enabled, it allows to configure the host and target parameters needed for fabric connection. This is set to <b>Disabled</b> by default. |
| <b>NVMe-oF Host NQN</b>                    | This field specifies the name of the NVMe-oF host NQN. Allowed input is in the following format: nqn.yyyy-mm.<Reserved Domain Name>:<Unique                                           |

**Table 52. Network Settings details (continued)**

| Option                            | Description                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                   | String>. Leave it empty to use system generated value with following format: nqn.1988-11.com.dell:<Model name>.<Model number>.<Service Tag>.                                                                                                                                                                                          |
| <b>NVMe-oF Host Id</b>            | This field specifies a 16 bytes value of the NVMe-oF host identifier that uniquely identifies this host with the controller in the NVM subsystem. Allowed input is a hexadecimal-encoded string in this format: 00112233-4455-6677-8899-aabbccddeeff. Leave it empty to use system generated value. A value of all FF is not allowed. |
| <b>Host Security Key Path</b>     | This field specifies the Host security key path.                                                                                                                                                                                                                                                                                      |
| <b>NVMe-oF SubSystem Settings</b> | This field controls the parameters for the NVMe-oF subsystem n connections.                                                                                                                                                                                                                                                           |

**Table 53. PXE Device n Settings details**

| Option               | Description                                                                                                                              |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Interface</b>     | Specifies NIC interface used for the PXE device.                                                                                         |
| <b>Protocol</b>      | Specifies Protocol used for PXE device. This option is set to <b>IPv4</b> or <b>IPv6</b> . This option is set to <b>IPv4</b> by default. |
| <b>VLAN</b>          | Enables VLAN for PXE device. This option is set to <b>Enabled</b> or <b>Disabled</b> . This option is set to <b>Disabled</b> by default. |
| <b>VLAN ID</b>       | Shows the VLAN ID for the PXE device                                                                                                     |
| <b>VLAN Priority</b> | Shows the VLAN Priority for the PXE device.                                                                                              |

**Table 54. HTTP Device n Settings details**

| Option                                                     | Description                                                                                                                               |
|------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Interface</b>                                           | Specifies NIC interface used for the HTTP device.                                                                                         |
| <b>Protocol</b>                                            | Specifies Protocol used for HTTP device. This option is set to <b>IPv4</b> or <b>IPv6</b> . This option is set to <b>IPv4</b> by default. |
| <b>VLAN</b>                                                | Enables VLAN for HTTP device. This option is set to <b>Enable</b> or <b>Disable</b> . This option is set to <b>Disable</b> by default.    |
| <b>VLAN ID</b>                                             | Shows the VLAN ID for the HTTP device                                                                                                     |
| <b>VLAN Priority</b>                                       | Shows the VLAN Priority for the HTTP device.                                                                                              |
| <b>DHCP</b>                                                | Enables or disables DHCP for this HTTP device. This option is set to <b>Enabled</b> by default.                                           |
| <b>IP Address</b>                                          | Specifies IP address for the HTTP device.                                                                                                 |
| <b>Subnet Mask</b>                                         | Specifies subnet mask for the HTTP device.                                                                                                |
| <b>Gateway</b>                                             | Specifies gateway for the HTTP device.                                                                                                    |
| <b>DNS info via DHCP</b>                                   | Enables or disables DNS Information from DHCP. This option is set to <b>Enabled</b> by default.                                           |
| <b>Primary DNS</b>                                         | Specifies the primary DNS server IP address for the HTTP Device.                                                                          |
| <b>Secondary DNS</b>                                       | Specifies the secondary DNS server IP address for the HTTP Device.                                                                        |
| <b>URI (will obtain from DHCP server if not specified)</b> | Obtain URI from the DHCP server if not specified                                                                                          |
| <b>TLS Authentication Configuration</b>                    | Specifies the option for TLS authentication configuration.                                                                                |

**Table 55. iSCSI Device1 Settings screen details**

| Option                       | Description                                                                                 |
|------------------------------|---------------------------------------------------------------------------------------------|
| <b>Connection 1</b>          | Enables or disables the iSCSI connection. This option is set to <b>Disabled</b> by default. |
| <b>Connection 2</b>          | Enables or disables the iSCSI connection. This option is set to <b>Disabled</b> by default. |
| <b>Connection 1 Settings</b> | Enables you to control the configuration for the iSCSI connection.                          |
| <b>Connection 2 Settings</b> | Enables you to control the configuration for the iSCSI connection.                          |
| <b>Connection Order</b>      | Enables you to control the order for which the iSCSI connections will be attempted.         |

**Table 56. iSCSI Device1 Settings Connection 1 details**

| Option                       | Description                                                                                                                                |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Interface</b>             | Specifies NIC interface used for the iSCSI device.                                                                                         |
| <b>Protocol</b>              | Specifies Protocol used for iSCSI device. This option is set to <b>IPv4</b> or <b>IPv6</b> . This option is set to <b>IPv4</b> by default. |
| <b>VLAN</b>                  | Enables VLAN for iSCSI device. This option is set to <b>Enable</b> or <b>Disable</b> . This option is set to <b>Disable</b> by default.    |
| <b>VLAN ID</b>               | Shows the VLAN ID for the iSCSI device                                                                                                     |
| <b>VLAN Priority</b>         | Shows the VLAN Priority for the iSCSI device.                                                                                              |
| <b>Retry Count</b>           | Specifies the retry count for this iSCSI device connection. This option is set to <b>3</b> by default.                                     |
| <b>Timeout</b>               | Specifies the time out for this iSCSI device connection. This option is set to <b>10000</b> by default.                                    |
| <b>DHCP</b>                  | Enables or disables DHCP for this iSCSI device. This option is set to <b>Enable</b> by default.                                            |
| <b>Initiator IP Address</b>  | Specifies IP address for the iSCSI device.                                                                                                 |
| <b>Initiator Subnet Mask</b> | -                                                                                                                                          |
| <b>Initiator Gateway</b>     | -                                                                                                                                          |
| <b>Target info via DHCP</b>  | -                                                                                                                                          |
| <b>Target Name</b>           | -                                                                                                                                          |
| <b>Target IP Address</b>     | -                                                                                                                                          |
| <b>Target Port</b>           | -                                                                                                                                          |
| <b>Target Boot LUN</b>       | -                                                                                                                                          |
| <b>ISID</b>                  | -                                                                                                                                          |
| <b>Authentication type</b>   | Specifies the authentication type for this iSCSI device connection. This option is set to <b>None</b> by default.                          |
| <b>CHAP Type</b>             | -                                                                                                                                          |
| <b>CHAP Name</b>             | -                                                                                                                                          |
| <b>CHAP Secret</b>           | -                                                                                                                                          |
| <b>Reverse CHAP Name</b>     | -                                                                                                                                          |
| <b>Reverse CHAP Secret</b>   | -                                                                                                                                          |

**Table 57. TLS Authentication Configuration screen details**

| Option                         | Description                                                                                                                                                                                                 |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>TLS Authentication Mode</b> | View or modify the device's boot TLS Authentication Mode. This option is set to <b>One Way</b> by default. <b>None</b> means the HTTP server and the client will not authenticate each other for this boot. |

**Table 57. TLS Authentication Configuration screen details (continued)**

| Option                                | Description                                     |
|---------------------------------------|-------------------------------------------------|
| <b>Root Certificate Configuration</b> | Import, delete, or export the root certificate. |

**Table 58. NVMe-oF SubSystem Settings screen details**

| Option                                           | Description                                                                              |
|--------------------------------------------------|------------------------------------------------------------------------------------------|
| <b>NVMe-oF SubSystem n</b> (n = 1 to 4)          | Enables or disables NVMe-oF SubSystem. This option is set to <b>Disabled</b> by default. |
| <b>NVMe-oF SubSystem n Settings</b> (n = 1 to 4) | Enables you to control the configuration of the NVMe-oF SubSystem, if <b>Enabled</b> .   |

**Table 59. NVMe-oF SubSystem n Settings**

| Option                                 | Description                                                                                                              |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| <b>Interface</b>                       | NIC interface used for NVMe-oF connections. This option is set to <b>Embedded NIC 1 Port 1 Partition 1</b> by default.   |
| <b>Transport Type</b>                  | This field sets the value of transport type for NVMe-oF connection. This option is set to <b>TCP</b> by default.         |
| <b>Protocol</b>                        | This field sets the value of protocol type for NVMe-oF connection. This option is set to <b>IPv4</b> by default.         |
| <b>VLAN</b>                            | Enables or disables VLAN for this NVMe-oF connections. This option is set to <b>Disabled</b> by default.                 |
| <b>VLAN ID</b>                         | Specifies the VLAN Id for this NVMe-oF connection. This option is set to <b>1</b> by default.                            |
| <b>VLAN Priority</b>                   | Specifies the VLAN priority for this NVMe-oF connection. This option is set to <b>0</b> by default.                      |
| <b>Retry Count</b>                     | Specifies the retry count for this NVMe-oF connection. This option is set to <b>3</b> by default.                        |
| <b>Timeout</b>                         | Specifies the time out for this NVMe-oF connection. This option is set to <b>10000</b> by default.                       |
| <b>DHCP</b>                            | Enables and disables the DHCP for this NVMe-oF connection. This option is set to <b>Disabled</b> by default.             |
| <b>Host IP Address</b>                 | Specifies the Host IP Address for this NVMe-oF connection.                                                               |
| <b>Host Subnet Mask</b>                | Specifies the Host Subnet Mask for this NVMe-oF connection.                                                              |
| <b>Host Gateway</b>                    | Specifies the Host Gateway for this NVMe-oF connection.                                                                  |
| <b>NVMe-oF Subsystem info via DHCP</b> | Enables and disables the NVMe-oF subsystem's DHCP for this connection. This option is set to <b>Disabled</b> by default. |
| <b>NVMe-oF Subsystem NQN</b>           | Specifies the NVMe-oF subsystem's NQN for this connection.                                                               |
| <b>NVMe-oF Subsystem Address</b>       | Specifies the NVMe-oF subsystem's IP address for this connection.                                                        |
| <b>NVMe-oF Subsystem Port</b>          | Specifies the NVMe-oF subsystem's port for this connection. This option is set to <b>4420</b> by default.                |
| <b>NVMe-oF Subsystem NID</b>           | Specifies the NamespaceID (NID) for this NVMe-oF connection.                                                             |
| <b>NVMe-oF Subsystem Controller ID</b> | Specifies the NVMe-oF subsystem's Controller ID for this connection. This option is set to <b>0</b> by default.          |
| <b>Security</b>                        | Enables or disables the security option for this NVMe-oF connection. This option is set to <b>Disabled</b> by default.   |
| <b>Authentication Type</b>             | Specifies the authentication type for this NVMe-oF connection. This option is set to <b>None</b> by default.             |

**Table 59. NVMe-oF SubSystem n Settings (continued)**

| Option          | Description                                                |
|-----------------|------------------------------------------------------------|
| SecurityKeyPath | Specifies the SecurityKeyPath for this NVMe-oF connection. |

## Integrated Devices

To view the **Integrated Devices** screen, power on the system, press F2, and click **System Setup Main Menu > System BIOS > Integrated Devices**.

**Table 60. Integrated Devices details**

| Option                                                                                                    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>User Accessible USB Ports</b>                                                                          | <p>Configures the user accessible USB ports. Selecting <b>Only Back Ports On</b> disables the front USB ports; selecting <b>All Ports Off</b> disables all front and back USB ports. Selecting <b>Only Back Ports On</b> disables the front USB ports; selecting <b>All Ports Off</b> disables all front and back USB ports; selecting <b>All Ports Off (Dynamic)</b> disables all front and back USB ports during POST. Selecting <b>All Ports Off</b> disables all front and back USB ports; selecting <b>All Ports Off (Dynamic)</b> disables all front and back USB ports during POST. Selecting <b>All Ports Off</b> disables all front and back USB ports. This option is set to <b>All Ports On</b> by default. When user accessible USB ports are set to <b>All Ports Off (Dynamic)</b> the <b>Enable Front Ports Only</b> option is enabled.</p> <ul style="list-style-type: none"> <li>• <b>Enable Front Ports Only:</b> Enables or disables the front USB ports during the operating system runtime.</li> </ul> <p>The USB keyboard and mouse still function in certain USB ports during the boot process, depending on the selection. After the boot process is complete, the USB ports will be enabled or disabled as per the setting.</p> |
| <b>Internal USB Port</b>                                                                                  | <p>Enables or disables the internal USB port. This option is set to <b>On</b> or <b>Off</b>. This option is set to <b>On</b> by default.</p> <p><b>NOTE:</b> The Internal USB port is on the PCIe riser 1b.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>iDRAC Direct USB Port</b>                                                                              | <p>The iDRAC Direct USB port is managed by iDRAC exclusively with no host visibility. This option is set to <b>ON</b> or <b>OFF</b>. When set to <b>OFF</b>, iDRAC does not detect any USB devices installed in this managed port. This option is set to <b>On</b> by default.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Integrated Network Card1</b>                                                                           | <p>Enables or disables the integrated network card. When this option is set to <b>Enabled</b>, the card is not available to the operating system. This option is set to <b>On</b> by default.</p> <p><b>NOTE:</b> If set to Disabled (operating system), the Integrated NICs might still be available for shared network access by iDRAC.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Embedded NIC1 and NIC2 Embedded NIC1, NIC2, NIC3 and NIC4 Embedded NIC1 Integrated RAID controller</b> | <p>Enables or disables the Embedded NIC1 and NIC2. If set to <b>Disabled (OS)</b>, the NIC may still be available for shared network access by the embedded management controller.</p> <p>Configure the <b>Embedded NIC1 and NIC2</b> option by using the NIC management utilities of the system. This option is set to <b>Enabled</b> by default.</p> <p>Enables or disables the Embedded NIC1 and NIC2. If set to <b>Disabled (OS)</b>, the NIC may still be available for shared network access by the embedded management controller.</p> <p>Configure the <b>Embedded NIC1, NIC2, NIC3 and NIC4</b> option by using the NIC management utilities of the system. This option is set to <b>Enabled</b> by default.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

**Table 60. Integrated Devices details (continued)**

| Option                                            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                   | <p>Enables or disables the Embedded NIC1. If set to <b>Disabled (OS)</b>, the NIC may still be available for shared network access by the embedded management controller. Configure the <b>Embedded NIC1</b> option by using the NIC management utilities of the system. This option is set to <b>Enabled</b> by default.</p> <p>Enables or disables the integrated RAID controllers. This option is set to <b>Enabled</b> by default.</p>                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>I/OAT DMA Engine</b>                           | <p>Enables or disables the I/O Acceleration Technology (I/OAT) option. I/OAT is a set of DMA features designed to accelerate network traffic and lower CPU utilization. Enable only if the hardware and software support the feature. This option is set to <b>Disabled</b> by default.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Embedded Video Controller</b>                  | <p>Enables or disables the use of Embedded Video Controller as the primary display. When set to <b>Enabled</b>, the Embedded Video Controller will be the primary display even if add-in graphic cards are installed. When set to <b>Disabled</b>, an add-in graphics card is used as the primary display. BIOS will output displays to both the primary add-in video and the embedded video during POST and preboot environment. The embedded video will then be disabled right before the operating system boots. This option is set to <b>Enabled</b> by default.</p> <p><b>NOTE:</b> When there are multiple add-in graphic cards installed in the system, the first card discovered during PCI enumeration is selected as the primary video. You might have to rearrange the cards in the slots in order to control which card is the primary video.</p> |
| <b>I/O Snoop HoldOff Response</b>                 | <p>Selects the number of cycles PCI I/O can withhold snoop requests, from the CPU, to allow time to complete its own write to LLC. This setting can help improve performance on workloads where throughput and latency are critical. The option available is <b>2K Cycles</b> by default.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Current State of Embedded Video Controller</b> | <p>Displays the current state of the embedded video controller. The <b>Current State of Embedded Video Controller</b> option is a read-only field. If the Embedded Video Controller is the only display capability in the system (that is, no add-in graphics card is installed), then the Embedded Video Controller is automatically used as the primary display even if the <b>Embedded Video Controller</b> setting is set to <b>Disabled</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>SR-IOV Global Enable</b>                       | <p>Enables or disables the BIOS configuration of Single Root I/O Virtualization (SR-IOV) devices. This option is set to <b>Disabled</b> by default.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>OS Watchdog Timer</b>                          | <p>If your system stops responding, this watchdog timer aids in the recovery of your operating system. When this option is set to <b>Enabled</b>, the operating system initializes the timer. When this option is set to <b>Disabled</b> (the default), the timer does not have any effect on the system.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Empty Slot Unhide</b>                          | <p>Enables or disables the root ports of all the empty slots that are accessible to the BIOS and operating system. This option is set to <b>Disabled</b> by default.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Memory Mapped I/O above 4 GB</b>               | <p>Enables or disables the support for the PCIe devices that need large amounts of memory. Enable this option only for 64-bit operating systems. This option is set to <b>Enabled</b> by default.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Memory Mapped I/O Base</b>                     | <p>When set to <b>12 TB</b>, the system maps the MMIO base to 12 TB. Enable this option for an operating system that requires 44-bit PCIe addressing. When set to <b>512 GB</b>, the system maps the MMIO base to 512 GB, and reduces the maximum support for memory to less than 512 GB. Enable this option only for the 4 GPU DGMA issue. This option is set to <b>56 TB</b> by default.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>IIO PCIe Data Link Feature Exchange</b>        | <p>This field allows globally disabling <b>PCIe Data Link Feature Exchange</b>. This may be needed to support certain legacy hardware.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

**Table 60. Integrated Devices details (continued)**

| Option                  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Slot Disablement</b> | <p>Enables or disables or boot driver disables the available PCIe slots on your system. The slot disablement feature controls the configuration of the PCIe cards installed in the specified slot. Slots must be disabled only when the installed peripheral card prevents booting into the operating system or causes delays in system startup. If the slot is disabled, both the Option ROM and UEFI drivers are disabled. Only slots that are present on the system will be available for control. When this option is set to boot driver disabled, both the Option ROM and UEFI driver from the slot will not run during POST. The system will not boot from the card and its pre-boot services will not be available. However, the card is available to the operating system.</p> <p><b>Slot n:</b> Enables or disables or only the boot driver is disabled for the PCIe slot n. This option is set to <b>Enabled</b> by default.</p> |
| <b>Slot Bifurcation</b> | <p><b>Auto Discovery Bifurcation Settings</b> allows <b>Platform Default Bifurcation</b>, <b>Auto Discovery of Bifurcation</b>, and <b>Manual bifurcation Control</b>.</p> <p>This option is set to <b>Platform Default Bifurcation</b> by default. The slot bifurcation field is accessible when set to <b>Manual bifurcation Control</b> and is grayed out when set to <b>Platform Default Bifurcation</b> and <b>Auto Discovery of Bifurcation</b>.</p> <p><b>NOTE:</b> The slot bifurcation supports on PCIe slot only, does not support slot type from Paddle card to Riser and Slimline connector to Riser.</p>                                                                                                                                                                                                                                                                                                                      |

## Serial Communication

To view the **Serial Communication** screen, power on the system, press F2, and click **System Setup Main Menu > System BIOS > Serial Communication**.

**NOTE:** The serial port is optional for the PowerEdge T560 system. The Serial Communication option is applicable only if the serial COM port is installed in the system.

**Table 61. Serial Communication details**

| Option                      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Serial Communication</b> | <p>Enables the serial communication options. Selects serial communication devices (Serial Device 1 and Serial Device 2) in BIOS. BIOS console redirection can also be enabled, and the port address can be specified.</p> <p>The options available for System without serial COM port (DB9) are <b>On without Console Redirection</b>, <b>On with Console Redirection</b>, <b>Off</b>, <b>Auto</b>. This option is set to <b>Auto</b> if the external serial connector is available (connected to the rear I/O board). Else the default will be <b>Off</b>.</p>                                                                                                                                                                                                        |
| <b>Serial Port Address</b>  | <p>Enables you to set the port address for serial devices. This option is set to either <b>COM1</b> or <b>COM2</b> for the serial device (<b>COM1=0x3F8,COM2=0x2F8</b>) and set to <b>COM1</b> by default.</p> <p><b>NOTE:</b> You can use only Serial Device 2 for the Serial Over LAN (SOL) feature. To use console redirection by SOL, configure the same port address for console redirection and the serial device.</p> <p><b>NOTE:</b> Every time the system boots, the BIOS syncs the serial MUX setting that is saved in iDRAC. The serial MUX setting can independently be changed in iDRAC. Loading the BIOS default settings from within the BIOS setup utility may not always revert the serial MUX setting to the default setting of Serial Device 1.</p> |

**Table 61. Serial Communication details (continued)**

| Option                           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>External Serial Connector</b> | <p>Enables you to associate the External Serial Connector to <b>Serial Device 1</b>, <b>Serial Device 2</b>, or the <b>Remote Access Device</b> by using this option. This option is set to <b>Serial Device 1</b> by default.</p> <p><b>NOTE:</b> Only Serial Device 2 can be used for Serial Over LAN (SOL). To use console redirection by SOL, configure the same port address for console redirection and the serial device.</p> <p><b>NOTE:</b> Every time the system boots, the BIOS syncs the serial MUX setting saved in iDRAC. The serial MUX setting can independently be changed in iDRAC. Loading the BIOS default settings from within the BIOS setup utility may not always revert this setting to the default setting of Serial Device 1.</p> |
| <b>Failsafe Baud Rate</b>        | <p>Specifies the failsafe baud rate for console redirection. The BIOS attempts to determine the baud rate automatically. This failsafe baud rate is used only if the attempt fails, and the value must not be changed. This option is set to <b>115200</b> by default.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Remote Terminal Type</b>      | <p>Sets the remote console terminal type. This option is set to <b>VT100/VT220</b> by default.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Redirection After Boot</b>    | <p>Enables or disables the BIOS console redirection when the operating system is loaded. This option is set to <b>Enabled</b> by default.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

## System Profile Settings

To view the **System Profile Settings** screen, power on the system, press F2, and click **System Setup Main Menu > System BIOS > System Profile Settings**.

**Table 62. System Profile Settings details**

| Option                        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>System Profile</b>         | <p>Sets the system profile. If you set the System Profile option to a mode other than <b>Performance Per Watt (DAPC)</b>, the BIOS automatically sets the rest of the options. You can only change the rest of the options if the mode is set to <b>Custom</b>. This option is set to <b>Performance Per Watt (DAPC)</b> by default. Other options include <b>Custom</b>, <b>Performance</b>, <b>Performance Per Watt (OS)</b> and <b>Workstation Performance</b>.</p> <p><b>NOTE:</b> All the parameters on the system profile setting screen are available only when the <b>System Profile</b> option is set to <b>Custom</b>.</p> |
| <b>Optimized Power Mode</b>   | <p>When set to <b>Enabled</b>, processor is tuned for lower power consumption. Also sets C1E to Enabled, sets CPU Power Management to System DBPM mode, sets Energy Efficient Policy to Performance, sets Uncore Frequency to Dynamic, and sets Dynamic Load Line Switch to <b>Enabled</b>.</p>                                                                                                                                                                                                                                                                                                                                      |
| <b>CPU Power Management</b>   | <p>Sets the CPU power management. This option is set to <b>System DBPM (DAPC)</b> by default. Other option includes <b>Maximum Performance</b>, <b>OS DBPM</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Memory Frequency</b>       | <p>Sets the speed of the system memory. You can select <b>Maximum Performance</b>, <b>Maximum Reliability</b> or a specific speed. This option is set to <b>Maximum Performance</b> by default.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Turbo Boost</b>            | <p>Enables or disables the processor to operate in the turbo boost mode. This option is set to <b>Enabled</b> by default.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Energy Efficient Turbo</b> | <p>Energy Efficient Turbo (EET) is a mode of operation where a processor's core frequency is adjusted within the turbo range based on workload. This option is set to <b>Enabled</b> by default.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>C1E</b>                    | <p>Enables or disables the processor to switch to a minimum performance state when it is idle. This option is set to <b>Enabled</b> by default.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>C-States</b>               | <p>Enables or disables the processor to operate in all available power states. C States allow the processor to enter lower power states when idle. When set to <b>Enabled</b> (OS controlled) or</p>                                                                                                                                                                                                                                                                                                                                                                                                                                 |



**Table 62. System Profile Settings details (continued)**

| Option                                            | Description                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                   | when set to <b>Autonomous</b> (if hardware controlled is supported), the processor can operate in all available Power States to save power, but may increase memory latency and frequency jitter. This option is set to <b>Enabled</b> by default.                                                                                                                                                                          |
| <b>Memory Patrol Scrub</b>                        | Sets the memory patrol scrub mode. This option is set to <b>Standard</b> by default.                                                                                                                                                                                                                                                                                                                                        |
| <b>Memory Refresh Rate</b>                        | Sets the memory refresh rate to either 1x or 2x. This option is set to <b>1x</b> by default.                                                                                                                                                                                                                                                                                                                                |
| <b>Uncore Frequency</b>                           | Enables you to select the <b>Uncore Frequency</b> option. <b>Dynamic mode</b> enables the processor to optimize power resources across cores and uncores during runtime. The optimization of the uncore frequency to either save power or optimize performance is influenced by the setting of the <b>Energy Efficient Policy</b> option.                                                                                   |
| <b>Energy Efficient Policy</b>                    | Enables you to select the <b>Energy Efficient Policy</b> option. The CPU uses the setting to manipulate the internal behavior of the processor and determines whether to target higher performance or better power savings. This option is set to <b>Balanced Performance</b> by default.                                                                                                                                   |
| <b>Monitor/Mwait</b>                              | Enables the Monitor/Mwait instructions in the processor. This option is set to <b>Enabled</b> for all system profiles, except <b>Custom</b> by default.<br><i>i</i> <b>NOTE:</b> This option can be disabled when System Profile is set to <b>Custom</b> .<br><i>i</i> <b>NOTE:</b> When C States is set to Enabled in the Custom mode, changing the Monitor/Mwait setting does not impact the system power or performance. |
| <b>Workload Profile</b>                           | This option allows the user to specify the targeted workload of a server. It allows optimization of performance based on the workload type. This option is set to <b>Not Configured</b> by default.                                                                                                                                                                                                                         |
| <b>CPU Interconnect Bus Link Power Management</b> | Enables or disables the CPU Interconnect Bus Link Power Management. This option is set to <b>Enabled</b> by default.                                                                                                                                                                                                                                                                                                        |
| <b>PCI ASPM L1 Link Power Management</b>          | Enables or disables the PCI <b>ASPM L1 Link Power Management</b> . This option is set to <b>Enabled</b> by default.                                                                                                                                                                                                                                                                                                         |

## System Security

To view the **System Security** screen, power on the system, press F2, and click **System Setup Main Menu > System BIOS > System Security**.

**Table 63. System Security details**

| Option                           | Description                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CPU AES-NI</b>                | Improves the speed of applications by performing encryption and decryption by using the Advanced Encryption Standard Instruction Set (AES-NI). This option is set to <b>Enabled</b> by default.                                                                                                                                                                                                                                         |
| <b>Strong Password Status</b>    | If enabled, you must set up a password that has at least one character in lowercase, uppercase, digit, and a special character. Also, you have the option to set the minimum number of characters in both the new passwords. If disabled, you can set a password that has any character in it but the passwords must not have more than 32 characters. Changes made by enabling or disabling this feature become immediately effective. |
| <b>System Password</b>           | Sets the system password. This option is set to <b>Enabled</b> by default and is read-only if the password jumper is not installed in the system.                                                                                                                                                                                                                                                                                       |
| <b>Setup Password</b>            | Sets the setup password. This option is read-only if the password jumper is not installed in the system.                                                                                                                                                                                                                                                                                                                                |
| <b>Password Status</b>           | Locks the system password. This option is set to <b>Unlocked</b> by default.                                                                                                                                                                                                                                                                                                                                                            |
| <b>TPM Information</b>           | Indicates the type of Trusted Platform Module, if present.                                                                                                                                                                                                                                                                                                                                                                              |
| <b>EMR CPU TDX/ IFS features</b> | This option is set to <b>Disabled</b> by default.                                                                                                                                                                                                                                                                                                                                                                                       |

**Table 64. TPM 2.0 security information**

| Option                | Description                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                         |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TPM Information       |                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                         |
| TPM Security          |  <b>NOTE:</b> The TPM menu is available only when the TPM module is installed.<br><br>Enables you to control the reporting mode of the TPM. When set to Off, the presence of the TPM is not reported to the OS. When set to On, the presence of the TPM is reported to the OS. The <b>TPM Security</b> option is set to <b>Off</b> by default. |                                                                                                                                                                                                         |
|                       | When TPM 2.0 is installed, the <b>TPM Security</b> option is set to <b>On</b> or <b>Off</b> . This option is set to <b>Off</b> by default.                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                         |
| TPM Information       | Indicates the type of Trusted Platform Module, if present.                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                         |
| TPM Firmware          | Indicates the firmware version of the TPM.                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                         |
| TPM Hierarchy         | Enables, disables, or clears the storage and endorsement hierarchies. When set to <b>Enabled</b> , the storage and endorsement hierarchies can be used.                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                         |
|                       | When set to <b>Disabled</b> , the storage and endorsement hierarchies cannot be used.                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                         |
|                       | When set to <b>Clear</b> , the storage and endorsement hierarchies are cleared of any values, and then reset to <b>Enabled</b> .                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                         |
| TPM Advanced Settings | Specifies TPM Advanced Settings details.                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                         |
|                       | TPM PPI Bypass Provision                                                                                                                                                                                                                                                                                                                                                                                                        | When set to <b>Enabled</b> , allows the Operating System to bypass Physical Presence Interface (PPI) prompts when issuing PPI Advanced Configuration and Power interface (ACPI) provisioning operations |
|                       | TPM PPI Bypass Clear                                                                                                                                                                                                                                                                                                                                                                                                            | When set to <b>Enabled</b> allows the Operating System to bypass Physical Presence Interface (PPI) prompts when issuing PPI Advanced Configuration and Power Interface (ACPI) clear operations.         |
|                       | TPM Algorithm Selection                                                                                                                                                                                                                                                                                                                                                                                                         | Allows to choose between the TPM encryption standards SHA1 and SHA256                                                                                                                                   |

**Table 65. System Security details**

| Option                                 | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Intel(R) TXT</b>                    | Enables you to set the Intel Trusted Execution Technology (TXT) option. To enable the <b>Intel TXT</b> option, virtualization technology and TPM Security must be enabled with Pre-boot measurements. This option is set to <b>Off</b> by default. It is set <b>On</b> for Secure Launch (Firmware Protection) support on Windows 2022.                                                                                                                                                                                                                                                                    |
| <b>Memory Encryption</b>               | Enables or disables the Intel Total Memory Encryption (TME) and Multi-Tenant (Intel® TME-MT). When option is set to <b>Disabled</b> , BIOS disables both TME and MK-TME technology. When option is set to <b>Single Key</b> BIOS enables the TME technology. When option is set to <b>Multiple Keys</b> , BIOS enables the TME-MT technology. This option is set to <b>Disabled</b> by default.                                                                                                                                                                                                            |
| <b>TME Encryption Bypass</b>           | This option is set to <b>Disabled</b> by default when Memory Encryption option is disabled.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Intel(R) SGX</b>                    | Enables you to set the Intel Software Guard Extension (SGX) option. To enable the <b>Intel SGX</b> option, processor must be SGX capable, memory population must be compatible (minimum x8 identical DIMM1 to DIMM8 per CPU socket, not support on persistent memory configuration), memory operating mode must be set at optimizer mode, memory encryption must be enabled and node interleaving must be disabled. This option is set to <b>Off</b> by default. When this option is to <b>Off</b> , BIOS disables the SGX technology. When this option is to <b>On</b> , BIOS enables the SGX technology. |
| <b>SGX Package Info In-Band Access</b> | Enables you to access the Intel Software Guard Extension (SGX) package info in-band option. This option is set to <b>Off</b> by default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>PPMRR Size</b>                      | Sets the PPMRR size.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

**Table 65. System Security details (continued)**

| Option                                                  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>SGX QoS</b>                                          | Enables or disables the SGX quality of service.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Select Owner EPOCH input type</b>                    | Enables you to select <b>Change to New random Owner EPOCHs</b> or <b>Manual User Defined Owner EPOCHs</b> . Each EPOCH is 64-bit. After generating new EPOCH by selecting <b>Change to New random Owner EPOCHs</b> , the selection reverts back to <b>Manual User Defined Owner EPOCHs</b> .                                                                                                                                                                                                                                                                                                                                                                                        |
|                                                         | <b>Software Guard Extensions Epoch n</b> : Sets the Software Guard Extensions Epoch values.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Enable writes to SGXLEPUBKEYHASH[3:0] from OS/SW</b> | Enables or disables the Enable writes to SGXLEPUBKEYHASH[3:0] from OS/SW.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                                         | <b>SGX LE Public Key Hash0</b> : Sets the bytes from 0-7 for SGX Launch Enclave Public Key Hash.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                         | <b>SGX LE Public Key Hash1</b> : Sets the bytes from 8-15 for SGX Launch Enclave Public Key Hash.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                                         | <b>SGX LE Public Key Hash2</b> : Sets the bytes from 16-23 for SGX Launch Enclave Public Key Hash.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                                         | <b>SGX LE Public Key Hash3</b> : Sets the bytes from 24-31 for SGX Launch Enclave Public Key Hash.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Enable/Disable SGX Auto MP Registration Agent</b>    | Enables or disables the SGX Auto MP Registration. The MP registration agent is responsible to register the platform.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>SGX Factory Reset</b>                                | Enables you to reset the SGX option to factory settings. This option is set to <b>Off</b> by default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Power Button</b>                                     | Enables or disables the power button on the front of the system. This option is set to <b>EnabledDisabled</b> by default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>AC Power Recovery</b>                                | Sets how the system behaves after AC power is restored to the system. This option is set to <b>Last</b> by default.<br> <b>NOTE:</b> The host system will not power on up until iDRAC Root of Trust (RoT) is completed, host power on will be delayed by minimum 90 seconds after the AC applied.                                                                                                                                                                                                                                                                                                |
| <b>AC Power Recovery Delay</b>                          | Sets the time delay for the system to power up after AC power is restored to the system. This option is set to <b>Immediate</b> by default. When this option is set to <b>Immediate</b> , there is no delay for power up. When this option is set to <b>Random</b> , the system creates a random delay for power up. When this option is set to <b>User Defined</b> , the system delay time is manually to power up.                                                                                                                                                                                                                                                                |
| <b>User Defined Delay (120 s to 600 s)</b>              | Sets the <b>User Defined Delay</b> option when the <b>User Defined</b> option for <b>AC Power Recovery Delay</b> is selected. The actual AC recovery time needs to add iDRAC root of trust time (around 50 seconds).                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>UEFI Variable Access</b>                             | Provides varying degrees of securing UEFI variables. When set to <b>Standard</b> (the default), UEFI variables are accessible in the operating system per the UEFI specification. When set to <b>Controlled</b> , selected UEFI variables are protected in the environment and new UEFI boot entries are forced to be at the end of the current boot order.                                                                                                                                                                                                                                                                                                                         |
| <b>In-Band Manageability Interface</b>                  | When set to <b>Disabled</b> , this setting hides the Management Engine's (ME), HECI devices, and the system's IPMI devices from the operating system. This prevents the operating system from changing the ME power capping settings, and blocks access to all in-band management tools. All management should be managed through out-of-band. This option is set to <b>Enabled</b> by default.<br> <b>NOTE:</b> BIOS update requires HECI devices to be operational and DUP updates require IPMI interface to be operational. This setting needs to be set to Enabled to avoid updating errors. |

**Table 65. System Security details (continued)**

| Option                            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                  |                                                                                                                                                                                                                 |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                           |                      |                                                                                                                                                                                                                                                                |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>SMM Security Mitigation</b>    | Enables or disables the UEFI SMM security migration protections. It is enabled for Windows 2022 support.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                  |                                                                                                                                                                                                                 |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                           |                      |                                                                                                                                                                                                                                                                |
| <b>Secure Boot</b>                | Enables Secure Boot, where the BIOS authenticates each pre-boot image by using the certificates in the Secure Boot Policy. Secure Boot is set to <b>Disabled</b> by default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                  |                                                                                                                                                                                                                 |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                           |                      |                                                                                                                                                                                                                                                                |
| <b>Secure Boot Policy</b>         | <p>Allows selecting the Secure Boot Policy.</p> <ul style="list-style-type: none"> <li>When set to <b>Standard</b>, the BIOS uses the key and certificates from the system manufacturer to authenticate pre-boot images.</li> <li>When set to <b>Linux(R) Boot</b>, VMware(R) Boot, or Microsoft(R) Boot, the Secure Boot Policy includes only certificates necessary for the corresponding operating system.</li> <li>When set to <b>Custom</b>, the BIOS uses the user-customized key and certificates.</li> </ul> <p> <b>NOTE:</b> Note: If Custom mode is selected, the Secure Boot Custom Policy Settings menu is displayed.</p> <p> <b>NOTE:</b> Note: Changing the default security certificates may cause the system to fail booting from certain boot options.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                  |                                                                                                                                                                                                                 |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                           |                      |                                                                                                                                                                                                                                                                |
| <b>Secure Boot Mode</b>           | <p>Configures how the BIOS uses the Secure Boot Policy Objects (PK, KEK, db, dbx).</p> <p>If the current mode is set to <b>Deployed Mode</b>, the available options are <b>User Mode</b> and <b>Deployed Mode</b>. If the current mode is set to <b>User Mode</b>, the available options are <b>User Mode</b>, <b>Audit Mode</b>, and <b>Deployed Mode</b></p> <p>Below are the details of different boot modes available in the <b>Secure Boot Mode</b> option.</p> <table> <tr> <td><b>User Mode</b></td><td>In <b>User Mode</b>, PK must be installed, and BIOS performs signature verification on programmatic attempts to update policy objects. The BIOS allows unauthenticated programmatic transitions between modes.</td></tr> <tr> <td><b>Audit mode</b></td><td>In <b>Audit Mode</b>, PK is not present. BIOS does not authenticate programmatic update to the policy objects and transitions between modes. The BIOS performs a signature verification on pre-boot images and logs the results in the image Execution Information Table, but executes the images whether they pass or fail verification. <b>Audit Mode</b> is useful for programmatic determination of a working set of policy objects.</td></tr> <tr> <td><b>Deployed Mode</b></td><td><b>Deployed Mode</b> is the most secure mode. In <b>Deployed Mode</b>, PK must be installed and the BIOS performs signature verification on programmatic attempts to update policy objects. <b>Deployed Mode</b> restricts the programmatic mode transitions.</td></tr> </table> | <b>User Mode</b> | In <b>User Mode</b> , PK must be installed, and BIOS performs signature verification on programmatic attempts to update policy objects. The BIOS allows unauthenticated programmatic transitions between modes. | <b>Audit mode</b> | In <b>Audit Mode</b> , PK is not present. BIOS does not authenticate programmatic update to the policy objects and transitions between modes. The BIOS performs a signature verification on pre-boot images and logs the results in the image Execution Information Table, but executes the images whether they pass or fail verification. <b>Audit Mode</b> is useful for programmatic determination of a working set of policy objects. | <b>Deployed Mode</b> | <b>Deployed Mode</b> is the most secure mode. In <b>Deployed Mode</b> , PK must be installed and the BIOS performs signature verification on programmatic attempts to update policy objects. <b>Deployed Mode</b> restricts the programmatic mode transitions. |
| <b>User Mode</b>                  | In <b>User Mode</b> , PK must be installed, and BIOS performs signature verification on programmatic attempts to update policy objects. The BIOS allows unauthenticated programmatic transitions between modes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                  |                                                                                                                                                                                                                 |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                           |                      |                                                                                                                                                                                                                                                                |
| <b>Audit mode</b>                 | In <b>Audit Mode</b> , PK is not present. BIOS does not authenticate programmatic update to the policy objects and transitions between modes. The BIOS performs a signature verification on pre-boot images and logs the results in the image Execution Information Table, but executes the images whether they pass or fail verification. <b>Audit Mode</b> is useful for programmatic determination of a working set of policy objects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                  |                                                                                                                                                                                                                 |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                           |                      |                                                                                                                                                                                                                                                                |
| <b>Deployed Mode</b>              | <b>Deployed Mode</b> is the most secure mode. In <b>Deployed Mode</b> , PK must be installed and the BIOS performs signature verification on programmatic attempts to update policy objects. <b>Deployed Mode</b> restricts the programmatic mode transitions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                  |                                                                                                                                                                                                                 |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                           |                      |                                                                                                                                                                                                                                                                |
| <b>Secure Boot Policy Summary</b> | <p>Specifies the list of certificates and hashes that secure boot uses to authenticate images. Below are the list of options available on the <b>Secure Boot Policy Summary</b> screen:</p> <ol style="list-style-type: none"> <li><b>Platform Key (PK)</b></li> <li><b>Key Exchange Key (KEK) Database Entries</b></li> <li><b>Authorized Signature Database (db) Entries</b></li> </ol> <p>The options above are described through the following fields:</p> <ul style="list-style-type: none"> <li>Type</li> <li>Issuer</li> <li>Subject</li> <li>Signature Owner GUID</li> </ul> <ol style="list-style-type: none"> <li><b>Forbidden Signature Database (dbx) Entries</b></li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                  |                                                                                                                                                                                                                 |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                           |                      |                                                                                                                                                                                                                                                                |

**Table 65. System Security details (continued)**

| Option                                          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Secure Boot Custom Policy Settings</b>       | Configures the Secure Boot Custom Policy. To enable this option, set the Secure Boot Policy to <b>Custom</b> option. Below are the list of options available on the <b>Secure Boot Custom Policy Settings</b> screen: <ol style="list-style-type: none"> <li>1. <b>Platform Key (PK)</b></li> <li>2. <b>Key Exchange Key (KEK) Database Entries</b></li> <li>3. <b>Authorized Signature Database (db) Entries</b></li> <li>4. <b>Forbidden Signature Database (dbx) Entries</b></li> <li>5. <b>Delete All Policy Entries (PK, KEK, db, and dbx)</b></li> <li>6. <b>Restore Default Policy Entries (PK, KEK, db, and dbx)</b></li> <li>7. <b>Export Firmware Hash Values</b></li> </ol> |
| <b>Intel Trust Domain Extension(TDX)</b>        | <b>Intel Trust Domain Extension (TDX)</b> is a hardware-based trusted execution environment. It is designed to protect sensitive data and applications in Trust Domain(TD) or Virtual Machine(VM) from unauthorized access. <b>Memory Encryption</b> must be set to <b>Multiple Keys</b> for TDX to be enabled. TDX is set to <b>Disabled</b> by default.                                                                                                                                                                                                                                                                                                                              |
| <b>TME-MT/TDX Key Spilt to non-zero value</b>   | When the TME-MT/TDX Key Spilt to non-zero value is set to <b>1, 2, 3, 4, 5, or 6</b> , it designates the number of bits for TDX usage, while the rest will be used by TME-MT. It is set to <b>1</b> by default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Disable excluding Mem below 1MB in CMR</b>   | Convertible Memory Range (CMR) is programmed to define the memory region that are convertible between Intel SGX and Intel TDX usage. This option allows system to include memory region below 1MB in CMR. It is set to <b>Disabled</b> by default.                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>TDX Secure Arbitration Mode Loader(SEAM)</b> | This SW module runs in a new CPU Secure Arbitration Mode (SEAM) as peer virtual machine manager (VMM). This SEAM module supports TD entry and exit using the existing virtualization infrastructure. It is set to <b>Disabled</b> by default.                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Intel(R) In-Field Scan</b>                   | The Intel(R) In-field Scan feature allows software to scan processor cores for latent faults. The scan can be performed in the field after the server is deployed. When <b>Enabled</b> , the BIOS configures all processors to respond to software scan requests. When this setting is <b>Disabled</b> , the processors will not respond to software scan requests. It is set to <b>Disabled</b> by default.                                                                                                                                                                                                                                                                           |

## Creating a system and setup password

### Prerequisites

Ensure that the password jumper is enabled. The password jumper enables or disables the system password and setup password features. For more information, see the section.

 **NOTE:** If the password jumper setting is disabled, the existing system password and setup password are deleted and you need not provide the system password to boot the system.

### Steps

1. To enter System Setup, press F2 immediately after turning on or rebooting your system.
2. On the **System Setup Main Menu** screen, click **System BIOS > System Security**.
3. On the **System Security** screen, verify that **Password Status** is set to **Unlocked**.
4. In the **System Password** field, type your system password, and press Enter or Tab.  
Use the following guidelines to assign the system password:
  - A password can have up to 32 characters.
A message prompts you to reenter the system password.
5. Reenter the system password, and click **OK**.
6. In the **Setup Password** field, type your setup password and press Enter or Tab.  
A message prompts you to reenter the setup password.
7. Reenter the setup password, and click **OK**.
8. Press Esc to return to the System BIOS screen. Press Esc again.  
A message prompts you to save the changes.

 **NOTE:** Password protection does not take effect until the system reboots.

## Using your system password to secure your system

### About this task

If you have assigned a setup password, the system accepts your setup password as an alternate system password.

### Steps

1. Turn on or reboot your system.
2. Type the system password and press Enter.

### Next steps

When **Password Status** is set to **Locked**, type the system password and press Enter when prompted at reboot.

 **NOTE:** If an incorrect system password is typed, the system displays a message and prompts you to reenter your password. You have three attempts to type the correct password. After the third unsuccessful attempt, the system displays an error message that the system has stopped functioning and must be turned off. Even after you turn off and restart the system, the error message is displayed until the correct password is entered.

## Deleting or changing system and setup password

### Prerequisites

 **NOTE:** You cannot delete or change an existing system or setup password if the **Password Status** is set to **Locked**.

### Steps

1. To enter System Setup, press F2 immediately after turning on or restarting your system.
2. On the **System Setup Main Menu** screen, click **System BIOS > System Security**.
3. On the **System Security** screen, ensure that **Password Status** is set to **Unlocked**.
4. In the **System Password** field, alter or delete the existing system password, and then press Enter or Tab.
5. In the **Setup Password** field, alter or delete the existing setup password, and then press Enter or Tab.  
If you change the system and setup password, a message prompts you to reenter the new password. If you delete the system and setup password, a message prompts you to confirm the deletion.
6. Press Esc to return to the **System BIOS** screen. Press Esc again, and a message prompts you to save the changes.
7. Select **Setup Password**, change, or delete the existing setup password and press Enter or Tab.  
 **NOTE:** If you change the system password or setup password, a message prompts you to reenter the new password. If you delete the system password or setup password, a message prompts you to confirm the deletion.

## Operating with setup password enabled

If **Setup Password** is set to **Enabled**, type the correct setup password before modifying the system setup options.

If you do not type the correct password in three attempts, the system displays the following message:

```
Invalid Password! Number of unsuccessful password attempts: <x> System Halted! Must  
power down.
```

Even after you power off and restart the system, the error message is displayed until the correct password is typed. The following options are exceptions:

- If **System Password** is not set to **Enabled** and is not locked through the **Password Status** option, you can assign a system password. For more information, see the System Security Settings screen section.
- You cannot disable or change an existing system password.

 **NOTE:** You can use the password status option with the setup password option to protect the system password from unauthorized changes.

## Redundant OS Control

To view the **Redundant OS Control** screen, power on the system, press F2, and click **System Setup Main Menu > System BIOS > Redundant OS Control**.

**Table 66. Redundant OS Control details**

| Option                       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Redundant OS Location</b> | Enables you to select a backup disk from the following devices:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Redundant OS State</b>    |  <b>NOTE:</b> This option is disabled if <b>Redundant OS Location</b> is set to <b>None</b> .<br>When set to <b>Visible</b> , the backup disk is visible to the boot list and OS. When set to <b>Hidden</b> , the backup disk is disabled and is not visible to the boot list and OS. This option is set to <b>Visible</b> by default.<br> <b>NOTE:</b> BIOS disables the device in hardware, so it is not accessed by the OS. |
| <b>Redundant OS Boot</b>     |  <b>NOTE:</b> This option is disabled if <b>Redundant OS Location</b> is set to <b>None</b> or if <b>Redundant OS State</b> is set to <b>Hidden</b> .<br>When set to <b>Enabled</b> , BIOS boots to the device specified in <b>Redundant OS Location</b> . When set to <b>Disabled</b> , BIOS preserves the current boot list settings. This option is set to <b>Disabled</b> by default.                                                                                                                       |

## Miscellaneous Settings

To view the **Miscellaneous Settings** screen, power on the system, press F2, and click **System Setup Main Menu > System BIOS > Miscellaneous Settings**.

**Table 67. Miscellaneous Settings details**

| Option                               | Description                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>System Time</b>                   | Enables you to set the time on the system.                                                                                                                                                                                                                                                                                                                               |
| <b>System Date</b>                   | Enables you to set the date on the system.                                                                                                                                                                                                                                                                                                                               |
| <b>Time Zone</b>                     | Enables you to select required Time Zone.                                                                                                                                                                                                                                                                                                                                |
| <b>Daylight Savings Time</b>         | Enables or disables Daylight Savings Time. This option is set to <b>Disabled</b> by default.                                                                                                                                                                                                                                                                             |
| <b>Asset Tag</b>                     | Specifies the asset tag and enables you to modify it for security and tracking purposes.                                                                                                                                                                                                                                                                                 |
| <b>Keyboard NumLock</b>              | Enables you to set whether the system boots with the NumLock enabled or disabled. This option is set to <b>On</b> by default.<br> <b>NOTE:</b> This option does not apply to 84-key keyboards.                                                                                        |
| <b>F1/F2 Prompt on Error</b>         | Enables or disables the F1/F2 prompt on error. This option is set to <b>Enabled</b> by default. The F1/F2 prompt also includes keyboard errors.                                                                                                                                                                                                                          |
| <b>Load Legacy Video Option ROM</b>  | This option determines whether the system BIOS will load legacy video (INT 10h) option ROM from the video controller. This option is set to <b>Disabled</b> by default.<br> <b>NOTE:</b> This option cannot be set to Enabled, when the Boot mode is UEFI and Secure Boot is enabled. |
| <b>Dell Wyse P25/P45 BIOS Access</b> | Enables or disables the Dell Wyse P25/P45 BIOS Access. This option is set to <b>Enabled</b> by default.                                                                                                                                                                                                                                                                  |



**Table 67. Miscellaneous Settings details (continued)**

| Option                     | Description                                                                                |
|----------------------------|--------------------------------------------------------------------------------------------|
| <b>Power Cycle Request</b> | Enables or disables the Power Cycle Request. This option is set to <b>None</b> by default. |

## iDRAC Settings

The iDRAC settings is an interface to set up and configure the iDRAC parameters by using UEFI. You can enable or disable various iDRAC parameters by using the iDRAC settings.

 **NOTE:** Accessing some of the features on the iDRAC settings needs the iDRAC Enterprise License upgrade.

For more information about using iDRAC, see *Dell Integrated Dell Remote Access Controller User's Guide* at [idracmanuals](#).

## Device Settings

**Device Settings** enables you to configure device parameters such as storage controllers or network cards.

## Service Tag Settings

**Service Tag Settings** enables you to configure the System Service Tag.

## Dell Lifecycle Controller

Dell Lifecycle Controller (LC) provides advanced embedded systems management capabilities including system deployment, configuration, update, maintenance, and diagnosis. LC is delivered as part of the iDRAC out-of-band solution and Dell system embedded Unified Extensible Firmware Interface (UEFI) applications.

## Embedded system management

The Dell Lifecycle Controller provides advanced embedded system management throughout the lifecycle of the system. The Dell Lifecycle Controller is started during the boot sequence and functions independently of the operating system.

 **NOTE:** Certain platform configurations may not support the full set of features provided by the Dell Lifecycle Controller.

For more information about setting up the Dell Lifecycle Controller, configuring hardware and firmware, and deploying the operating system, see the Dell Lifecycle Controller documentation at [idracmanuals](#).

## Boot Manager

The **Boot Manager** option enables you to select boot options and diagnostic utilities.

To enter **Boot Manager**, power on the system and press F11.

**Table 68. Boot Manager details**

| Option                         | Description                                                                                                                                                                                                                                 |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Continue Normal Boot</b>    | The system attempts to boot to devices starting with the first item in the boot order. If the boot attempt fails, the system continues with the next item in the boot order until the boot is successful or no more boot options are found. |
| <b>One-shot UEFI Boot Menu</b> | Allows you to select a UEFI boot option for a one-time boot. The option selected does not modify the boot order settings.                                                                                                                   |
| <b>Launch System Setup</b>     | Enables you to access System Setup.                                                                                                                                                                                                         |



**Table 68. Boot Manager details (continued)**

| Option                             | Description                                                                                                       |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| <b>Launch Lifecycle Controller</b> | Exits the Boot Manager and invokes the Dell Lifecycle Controller program.                                         |
| <b>System Utilities</b>            | Enables you to launch System Utilities menu such as Launch Diagnostics, BIOS update File Explorer, Reboot System. |

## PXE boot

You can use the Preboot Execution Environment (PXE) option to boot and configure the networked systems remotely.

To access the **PXE boot** option, boot the system and then press F12 during POST instead of using standard Boot Sequence from BIOS Setup. It does not pull any menu or allows managing of network devices.

# Minimum to POST and system management configuration validation

This section describes the minimum to POST system requirement and system management configuration validation of the Dell system.

## Topics:

- [Minimum configuration to POST](#)
- [Configuration validation](#)

## Minimum configuration to POST

The components listed below are the minimum configuration to POST:

- One processor in processor socket 1
- One memory modules (DIMM) in slot A1
- One power supply unit
- System board + PIB board + FIO board

## Configuration validation

The new generation of Dell systems have added interconnect flexibility and advanced iDRAC management features to collect precise system configuration information and report configuration errors.

When the system is powered on, information about installed cables, risers, backplanes, power supplies, floating card (fPERC, adapter PERC , BOSS), and processor is obtained from the CPLD and backplane memory maps are analyzed. This information forms a unique configuration, which is compared with one of the qualified configurations that are stored in a table that is maintained by iDRAC.

One or more sensors are assigned to each of the configuration elements. During POST, any configuration validation error is logged in the System Event Log (SEL)/LifeCycle (LC) log. The reported events are categorized in the configuration validation error table.

**Table 69. Configuration validation error**

| Error          | Description                                                                                                                                 | Possible cause and recommendations                                                                                             | Example                                                   |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| Config Error   | A configuration element within the closest match contains something that is unexpected and does not match any Dell qualified configuration. | Wrong configuration                                                                                                            | Config Error: Backplane cable CTRS_SRC_SA1 and BP-DST_SA1 |
|                |                                                                                                                                             | The element reported in HWC8010 errors are assembled incorrectly. Verify element (cable, risers, etc) placement in the system. | Config Error : SL Cable PLANAR_SL7 and CTRL_DST_PA1       |
| Config Missing | iDRAC found a configuration element missing within the closest match detected.                                                              | Missing or damaged cable, device, or part                                                                                      | Config Missing: Float card front PERC/HBAadapter PERC/HBA |
|                |                                                                                                                                             | Missing element or cable is reported in HWC8010 error logs. Install the                                                        | Config Missing : SL cable PLANAR_SL8 and CTRL_DST_PA1     |

**Table 69. Configuration validation error (continued)**

| Error      | Description                                                                                                         | Possible cause and recommendations                                                                                               | Example                 |
|------------|---------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------|
|            |                                                                                                                     | missing element (cable, risers, etc).                                                                                            |                         |
| Comm Error | A configuration element is not responding to iDRAC using the management interface while running an inventory check. | System management sideband communication<br>Unplug AC Power, reseal the element and replace the element if the problem persists. | Comm Error: Backplane 2 |

## Error messages

This section describes the error messages that are displayed on the screen during POST or captured in the system event log (SEL)/LifeCycle (LC) log.

**Table 70. Error message HWC8010**

| Error code                  | HWC8010                                                                                                                                                                                           |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Message                     | The System Configuration Check operation that is resulted in the following issue involving the indicated component type                                                                           |
| Arguments                   | Riser, floating card (fPERC, adapter PERC, BOSS), backplane, processor, cable, or other components                                                                                                |
| Detailed Description        | The issue that is identified in the message is observed in the System Configuration Check operation.                                                                                              |
| Recommended Response Action | Do the following and retry the operation:<br>1. Disconnect the input power.<br>2. Check for proper cable connection and component placement. If the issue persists, contact the service provider. |
| Category                    | System Health (HWC = Hardware Config)                                                                                                                                                             |
| Severity                    | Critical                                                                                                                                                                                          |
| Trap/EventID                | 2329                                                                                                                                                                                              |

**Table 71. Error message HWC8011**

| Error code                  | HWC8011                                                                                                                                                                                           |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Message                     | The System Configuration Check operation that is resulted in multiple issues involving the indicated component type                                                                               |
| Arguments                   | Riser, floating card (fPERC, adapter PERC, BOSS), backplane, processor, cable, or other components                                                                                                |
| Detailed Description        | Multiple issues are observed in the System Configuration Check operation.                                                                                                                         |
| Recommended Response Action | Do the following and retry the operation:<br>1. Disconnect the input power.<br>2. Check for proper cable connection and component placement. If the issue persists, contact the service provider. |
| Category                    | System Health (HWC = Hardware Config)                                                                                                                                                             |
| Severity                    | Critical                                                                                                                                                                                          |

# Installing and removing system components

## Topics:

- Safety instructions
- Before working inside your system
- After working inside your system
- Recommended tools
- Optional front bezel
- System feet
- Optional caster wheels
- System cover
- Air shroud
- Cooling fans
- Cable routing
- Front PERC module
- Drives
- Drive backplane
- Drive bays
- Optional optical drive
- Optional tape backup unit
- Front IO module
- System memory
- Optional BOSS-N1 module
- Optional internal USB card
- Expansion cards and expansion card risers
- Optional GPU card
- GPU riser
- Processor and heat sink
- Optional OCP NIC card
- Optional serial COM port
- System battery
- Intrusion switch
- Power supply unit
- Power interposer board
- System board
- Trusted Platform Module

## Safety instructions

 **NOTE:** Whenever you need to lift the system, get others to assist you. To avoid injury, do not attempt to lift the system by yourself.

 **CAUTION:** Ensure that two or more people lift the system horizontally from the box and place it on a flat surface, rack lift, or into the rails.

 **WARNING:** Opening or removing the system cover while the system is powered on may expose you to a risk of electric shock.

 **WARNING:** Do not operate the system without the cover for a duration exceeding five minutes. Operating the system without the system cover can result in component damage.

**CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

**NOTE:** It is recommended that you always use an antistatic mat and antistatic strap while working on components inside the system.

**CAUTION:** To ensure proper operation and cooling, all system bays and fans must always be populated with a component or a blank.

**NOTE:** While replacing the hot swappable PSU, after next server boot, the new PSU automatically updates to the same firmware and configuration of the replaced one. For updating to the latest firmware and changing the configuration, see the *Lifecycle Controller User's Guide* at [idracmanuals](#).

**NOTE:** While replacing faulty storage controller, FC, or NIC card with the same type of card, after you power on the system, the new card automatically updates to the same firmware and configuration of the faulty one. For updating to the latest firmware and changing the configuration, see the *Lifecycle Controller User's Guide* at [idracmanuals](#).

## Before working inside your system

### Prerequisites

Follow the safety guidelines listed in the [Safety instructions](#).

### Steps

1. Power off the system and all attached peripherals.
2. Disconnect the system from the electrical outlet and disconnect the peripherals.
3. If applicable, remove the system from the rack.

For more information, see the *Rail Installation Guide* relevant to your rail solutions at [www.dell.com/poweredgemanuals](http://www.dell.com/poweredgemanuals).

4. Remove the system cover.

## After working inside your system

### Prerequisites

Follow the safety guidelines listed in [Safety instructions](#).

### Steps

Reconnect the peripherals and connect the system to the electrical outlet, and then power on the system.

## Recommended tools

You may need some or all of the following tools to perform the removal and installation procedures:

You need the following tools to assemble the cables for a DC power supply unit:

- AMP 90871-1 hand-crimping tool or equivalent
- Tyco Electronics 58433-3 or equivalent
- Wire-stripper pliers to remove insulation from size 10 AWG solid or stranded, insulated copper wire

**NOTE:** Use alpha wire part number 3080 or equivalent (65/30 stranding).

# Optional front bezel

## Removing the front bezel

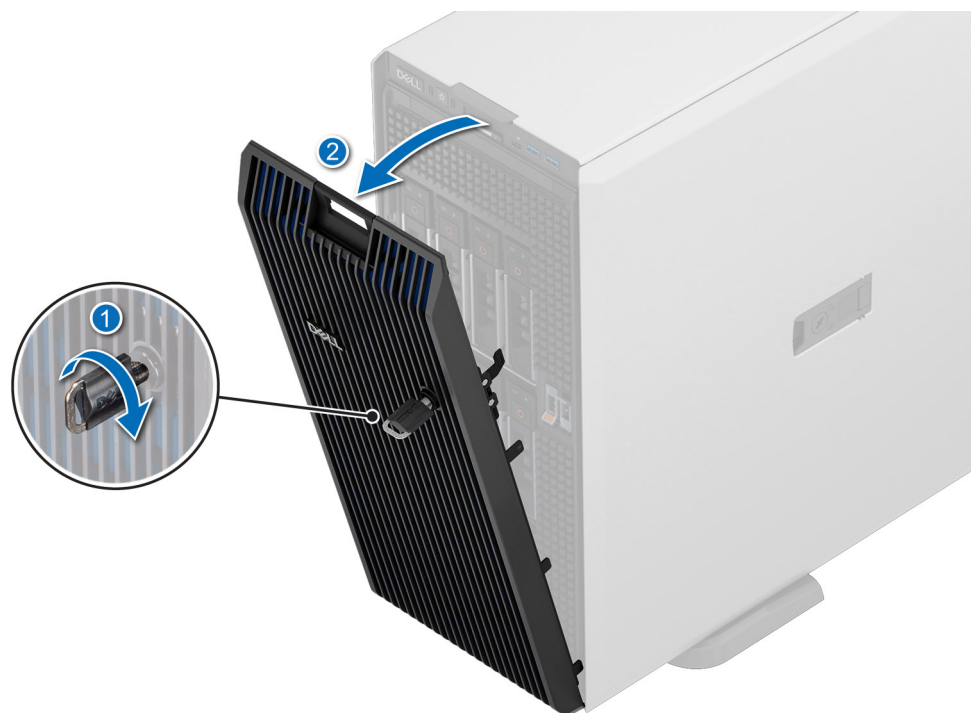
### Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. Keep the bezel key handy.

 **NOTE:** The bezel key is part of the security bezel package.

### Steps

1. Unlock the bezel.
2. Pull from the top end of the bezel to disengage it from the system.
3. Unhook the bezel tabs from the slots at the bottom of the system to remove the bezel from the system.



**Figure 22. Removing the front bezel**

### Next steps

[Installing the front bezel.](#)

## Installing the front bezel

### Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. Locate and remove the bezel key.

 **NOTE:** The bezel key is part of the security bezel package.

### Steps

1. Align and insert the tabs on the bezel into the slots on the system.

2. Push the bezel toward the system until the it locks into place.
3. Lock the bezel.

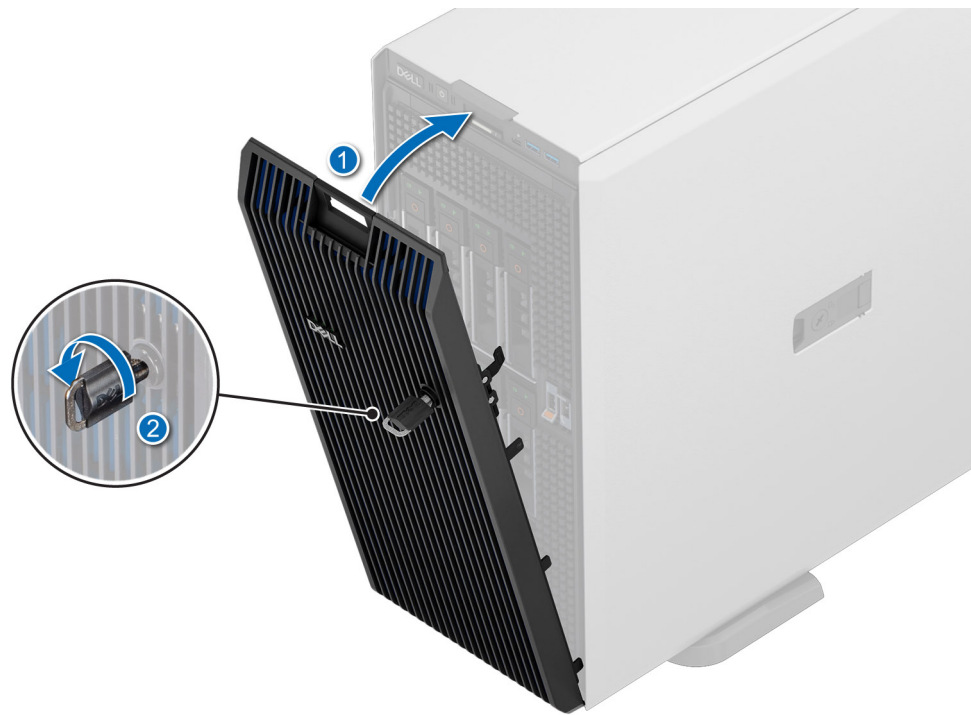


Figure 23. Installing the front bezel

## System feet

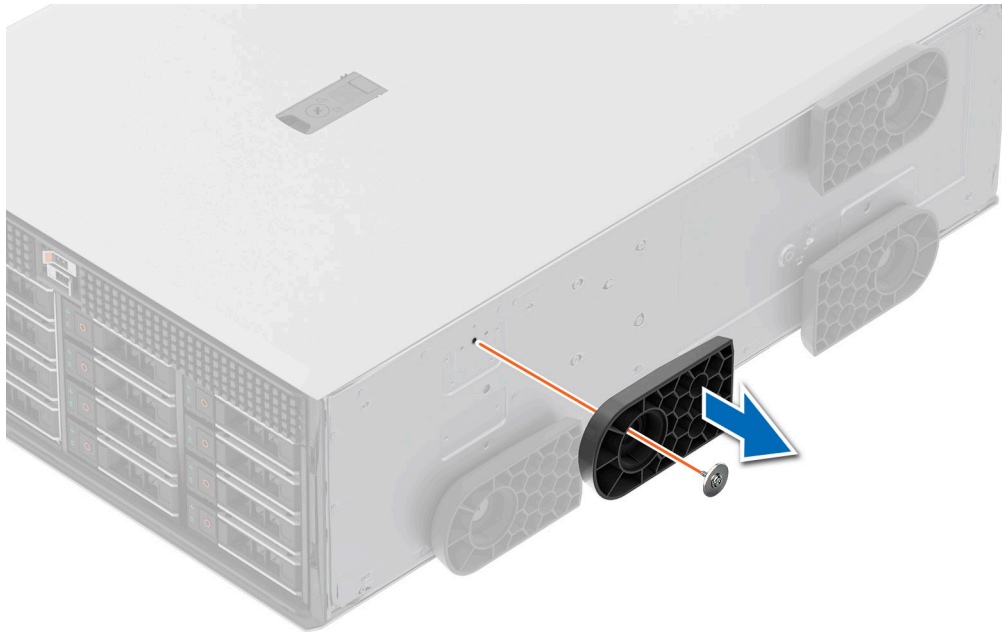
### Removing the system feet

#### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Place the system on its side on a flat, stable surface.
3. Rotate the system feet inward.

#### Steps

1. Using the Phillips #2 screwdriver, remove the screw that secures the foot to the base of the system.
2. Repeat the preceding step to remove the remaining system feet.



**Figure 24. Removing the system feet**

#### **Next steps**

Installing the system feet or install the caster wheels.

## **Installing the system feet**

#### **Prerequisites**

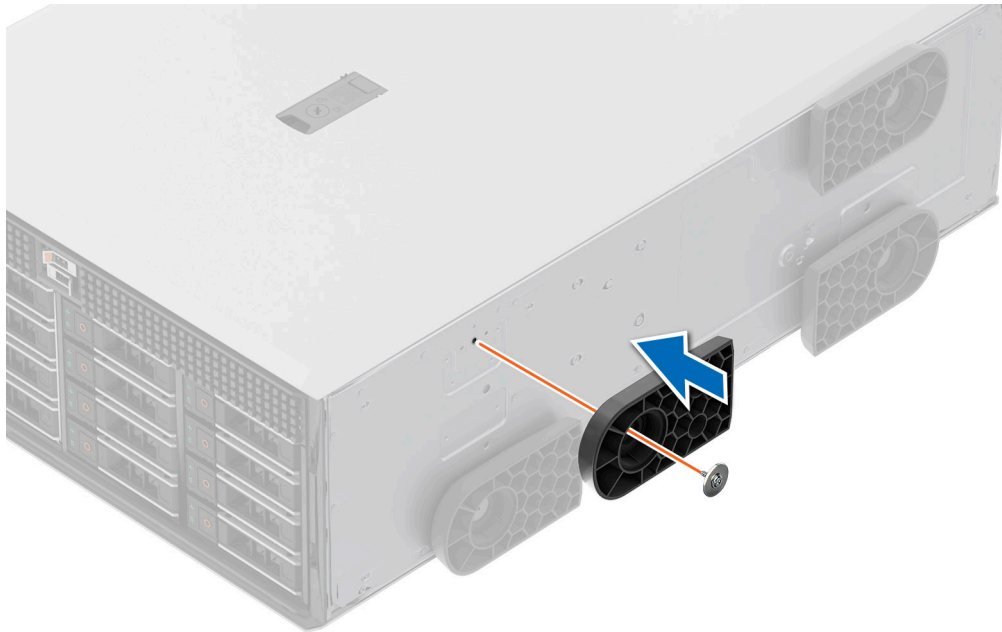
**CAUTION:** Install the feet on a stand-alone tower system to provide stability to the system. An unstable system might tip over and cause injury to the user or damage to the system.

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Place the system on its side, on a flat, stable surface.

#### **Steps**

1. Align the three tabs on the system foot with the three slots on the base of the system.
2. Using the Phillips #2 screwdriver, tighten the screw that secures the foot to the base of the system.
3. Repeat the preceding step to install the remaining system feet.





**Figure 25. Installing the system feet**

#### **Next steps**

1. Place the system upright on a flat, stable surface, and rotate the system feet outward.
2. Follow the procedure listed in [After working inside your system](#).

## **Optional caster wheels**

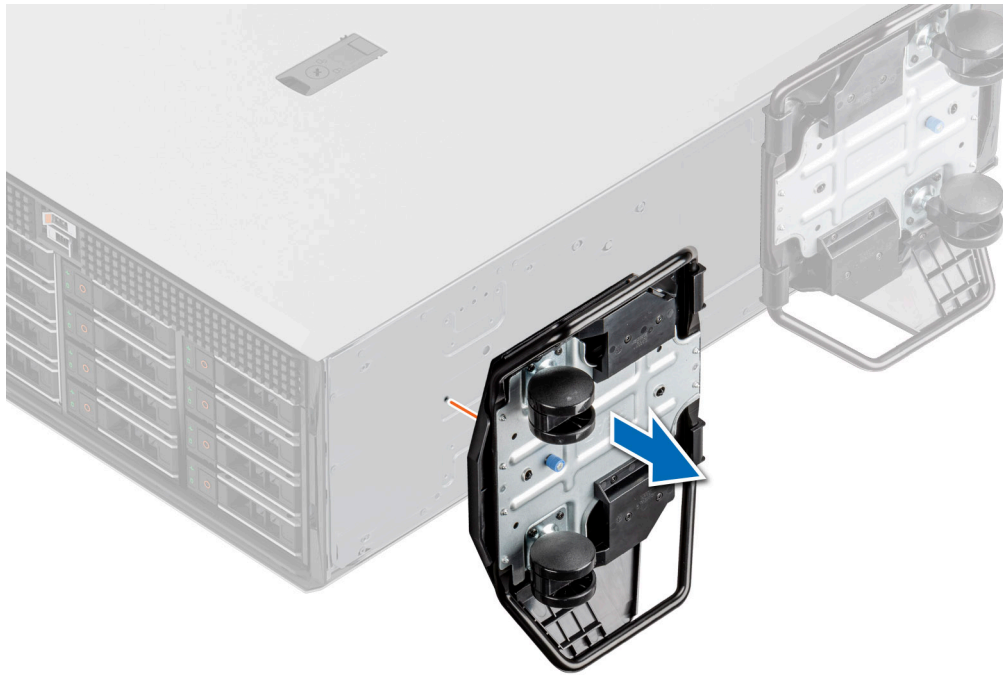
### **Removing caster wheels**

#### **Prerequisites**

1. Follow the safety guidelines listed in [Safety instructions](#).
2. If installed, [remove the system feet](#).
3. Place the system on a flat, stable surface.

#### **Steps**

Using the Phillips #2 screwdriver, loosen the captive screw and remove the caster wheels from the base of the system.



**Figure 26. Removing caster wheels**

#### Next steps

replace the caster wheels or install the system feet.

## Installing caster wheels

#### Prerequisites

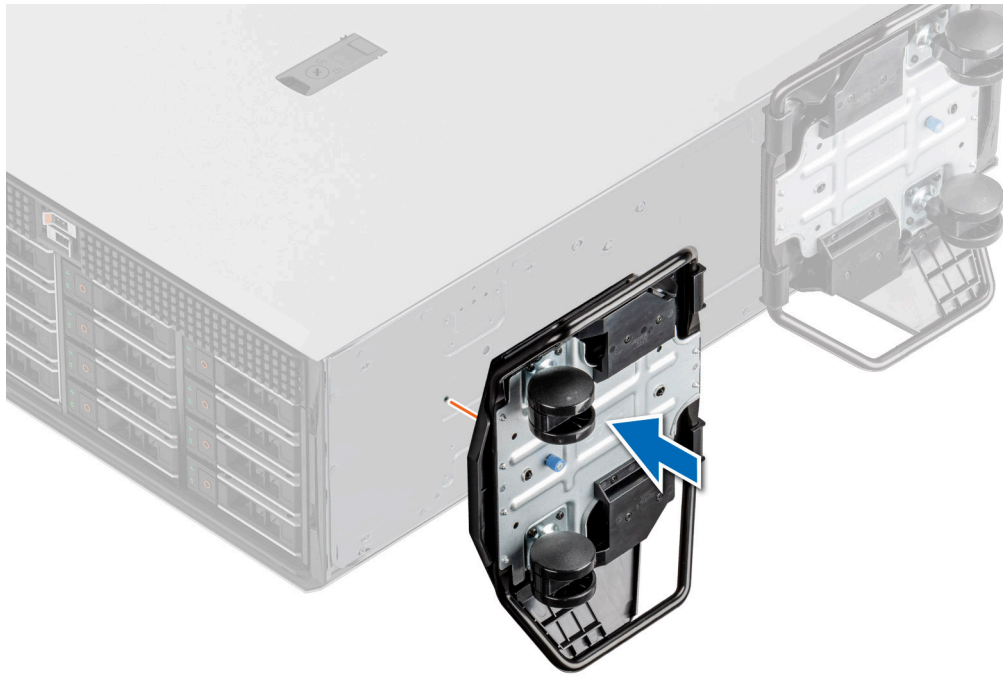
1. Follow the safety guidelines listed in [Safety instructions](#).
2. Place the system on its side on a flat, stable surface.
3. If installed, [remove the system feet](#).

**CAUTION:** Install the caster wheels on a stand-alone tower system to provide stability to the system. An unstable system might tip over and cause injury or damage to the system.

**NOTE:** This, T series server only uses Dell caster wheels.

#### Steps

Align the caster wheels to the base of system and tighten the captive screw to secure the caster wheels into place.



**Figure 27. Installing caster wheels**

#### **Next steps**

Follow the procedure listed in [After working inside your system](#).

## **System cover**

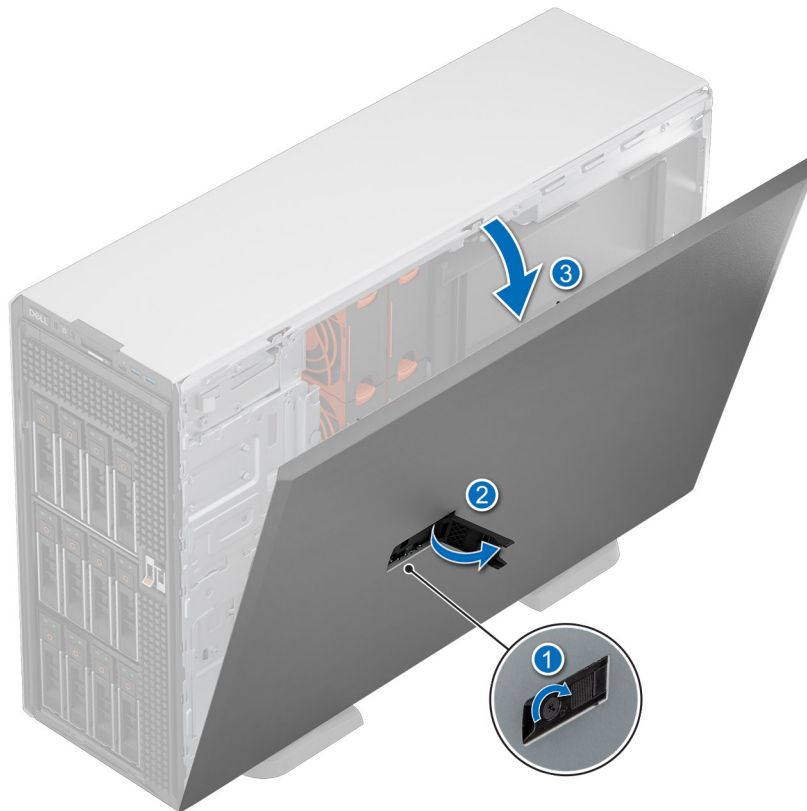
### **Removing the system cover**

#### **Prerequisites**

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Power off the system, and any attached peripherals.
3. Disconnect the system from the electrical outlet and peripherals.
4. If installed, [remove the front bezel](#).

#### **Steps**

1. Use a 1/4-inch flat head or a Phillips #2 screwdriver to turn the cover release latch lock counterclockwise to the unlock position.
2. Lift the release latch until the system cover slides back.
3. Lift the cover from the system.



**Figure 28. Removing the system cover**

### Next steps

Replace the system cover.

## Installing the system cover

### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#)

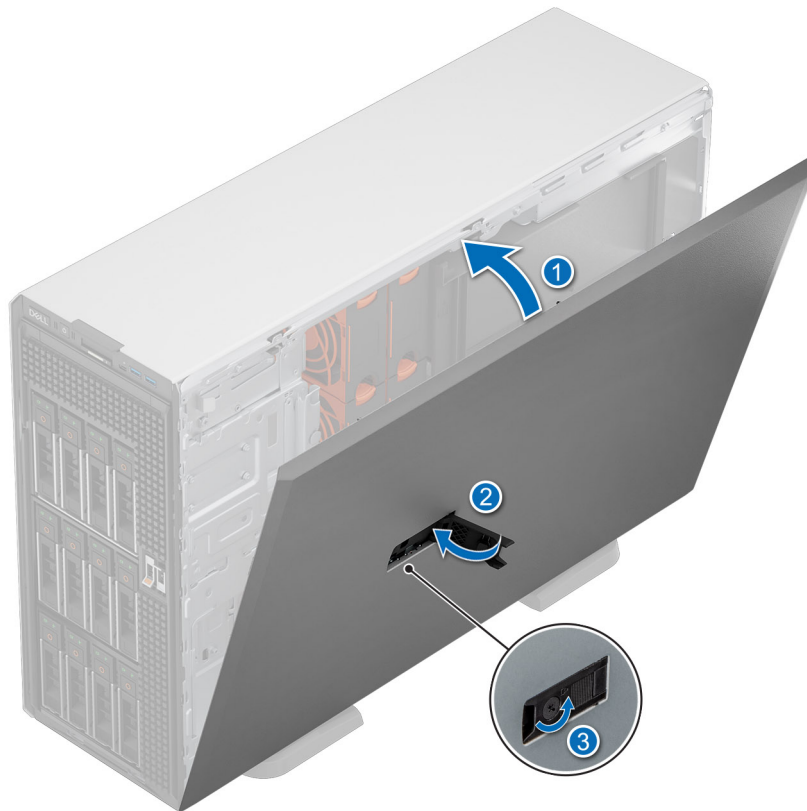
**NOTE:** Ensure that all internal cables are connected and routed properly, and that there are no tools or extra parts that are left inside the system.

### Steps

1. Align the tabs on the system cover with the guide slots on the system and slide the system cover.
2. Close the system cover release latch.

**NOTE:** Ensure that the system cover closes without obstruction or unnecessary force. Reseat any cables or components or realign the system cover if necessary.

3. Using a 1/4-inch flat head or Phillips #2 screwdriver, rotate the lock clockwise to the lock position.



**Figure 29. Installing the system cover**

#### **Next steps**

1. If removed, [install the front bezel](#).
2. Reconnect the peripherals and connect the system to the electrical outlet.
3. Power on the system, including all attached peripherals.

# Air shroud

## Removing the air shroud

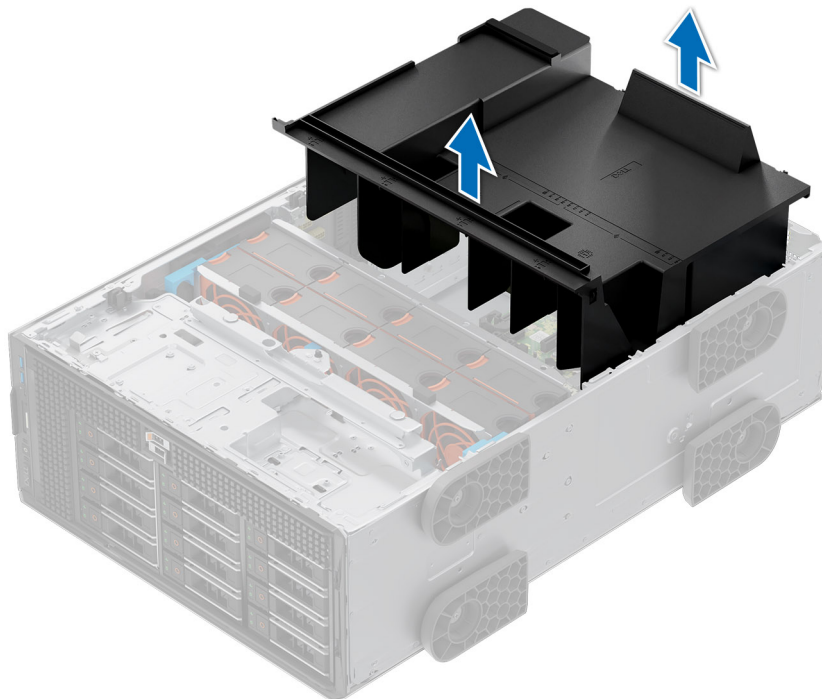
### Prerequisites

**CAUTION:** Never operate your system with the air shroud removed. The system may get overheated quickly, resulting in shutdown of the system and loss of data.

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).

### Steps

Hold the edges of the air shroud, and lift the air shroud out of the system.



**Figure 30. Removing the air shroud**

### Next steps

[Replace the air shroud.](#)

## Installing the air shroud

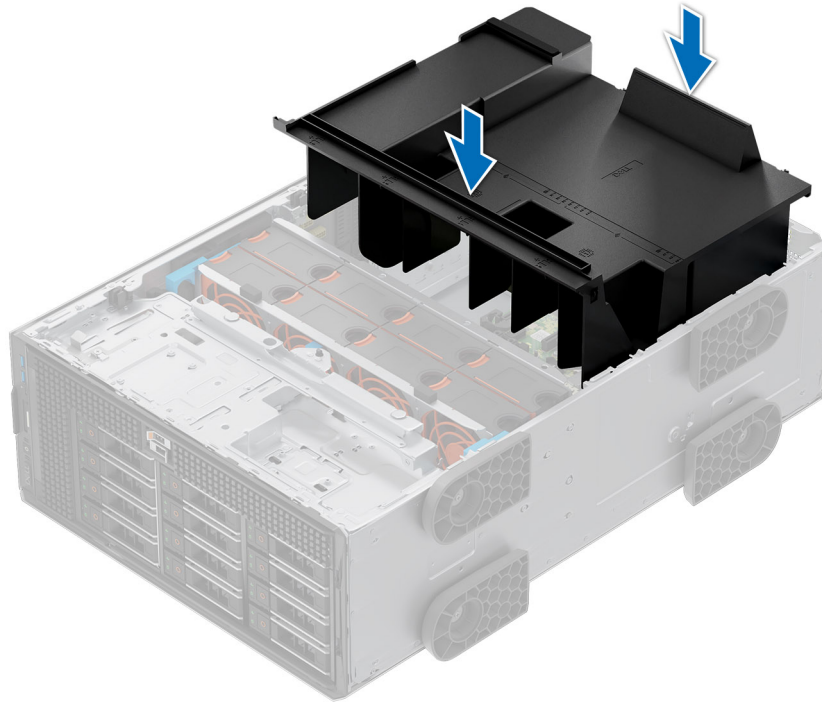
### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).
3. If applicable, route the cables inside the system along the chassis wall and secure the cables by using the cable-securing bracket.

### Steps

1. Align the tabs on the air shroud with the guide pins on the system.

2. Lower the air shroud into the system, until firmly seated.



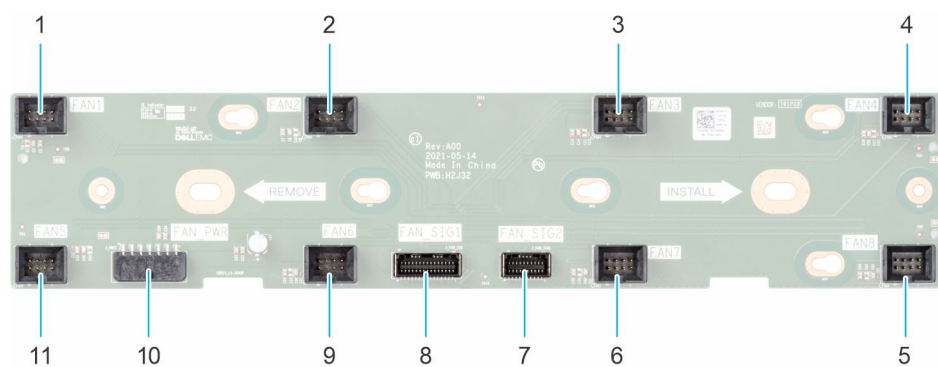
**Figure 31. Installing the air shroud**

#### Next steps

Follow the procedure listed in [After working inside your system.](#)

## Cooling fans

### Fan board view



**Figure 32. Fan board connectors**

1. FAN1
2. FAN2
3. FAN3
4. FAN4
5. FAN8
6. FAN7
7. FAN\_SIG2



8. FAN\_SIG1
9. FAN6
10. FAN\_PWR
11. FAN5

## Removing the fan board tray

### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. [Remove the air shroud](#).
4. [Remove the cooling fan cage](#).
5. Disconnect the cables that are connected to the fan board.

### Steps

1. Loosen the captive screw and slide the fan board tray to the right of the system to disengage it from the chassis.
2. Lift the fan board tray out of the system.

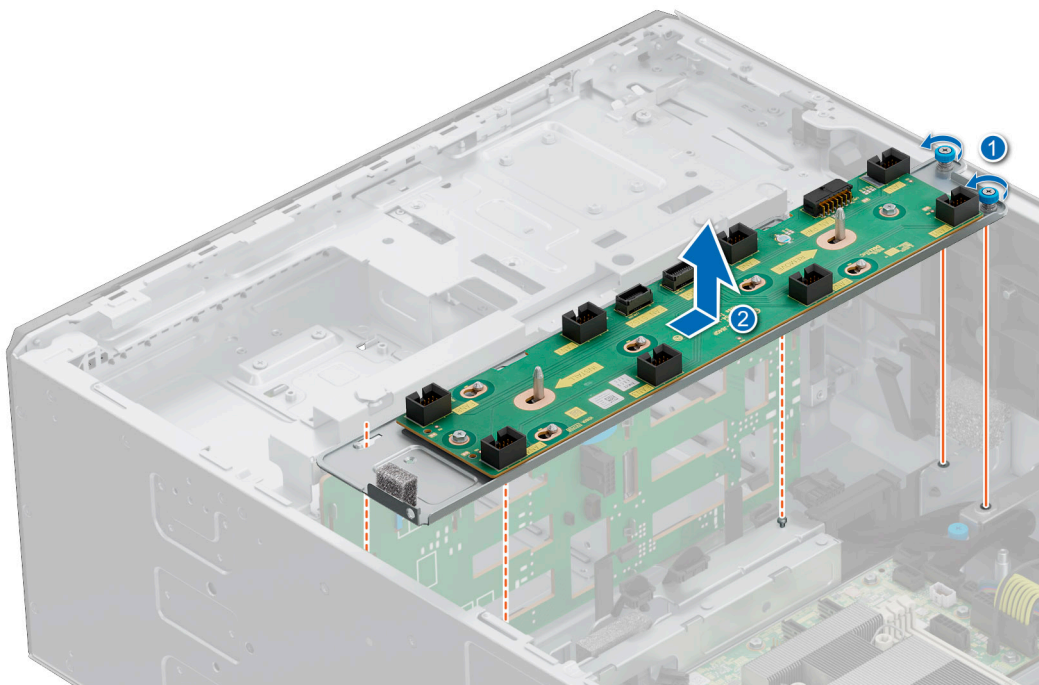


Figure 33. Remove the fan board tray

### Next steps

[Replace the fan board tray](#).

## Installing the fan board tray

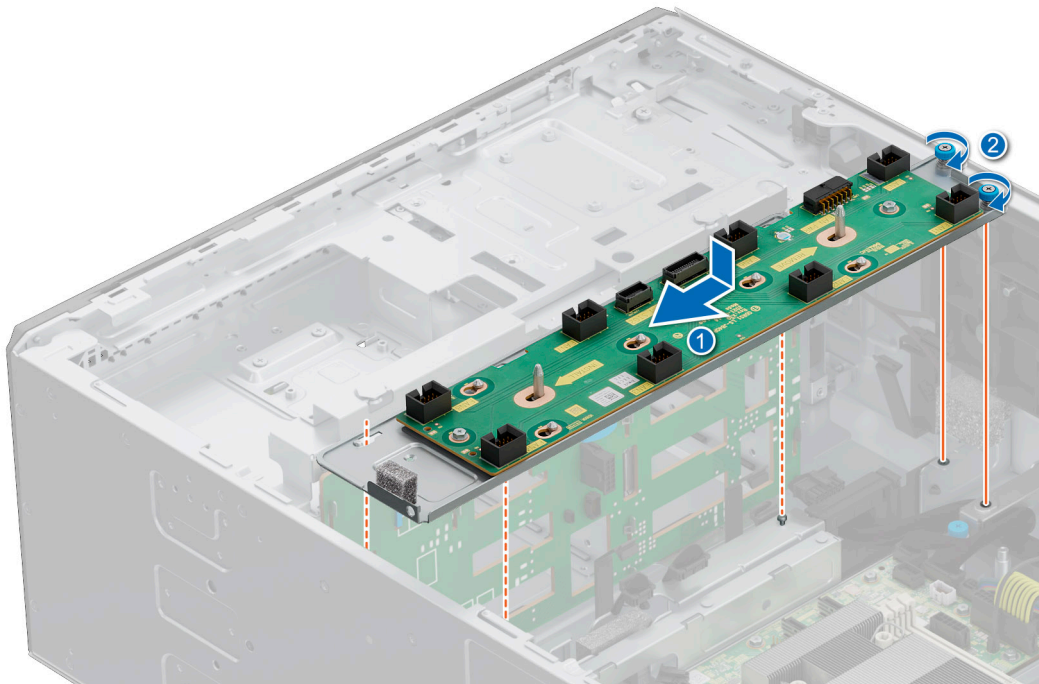
### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. [Remove the air shroud](#).
4. [Remove the cooling fan assembly](#).
5. Disconnect the cables that are connected to the fan board.



### Steps

1. Align the fan board tray to the guide pins on the system, slide the tray to the left of the system to lock it in place.
2. Tighten the captive screw to secure the fan board tray to the system.



**Figure 34. Installing the fan board tray**

### Next steps

1. Connect the cables to the fan board.
2. [Install the cooling fan assembly.](#)
3. [Install the air shroud.](#)
4. Follow the procedure listed in [After working inside your system.](#)

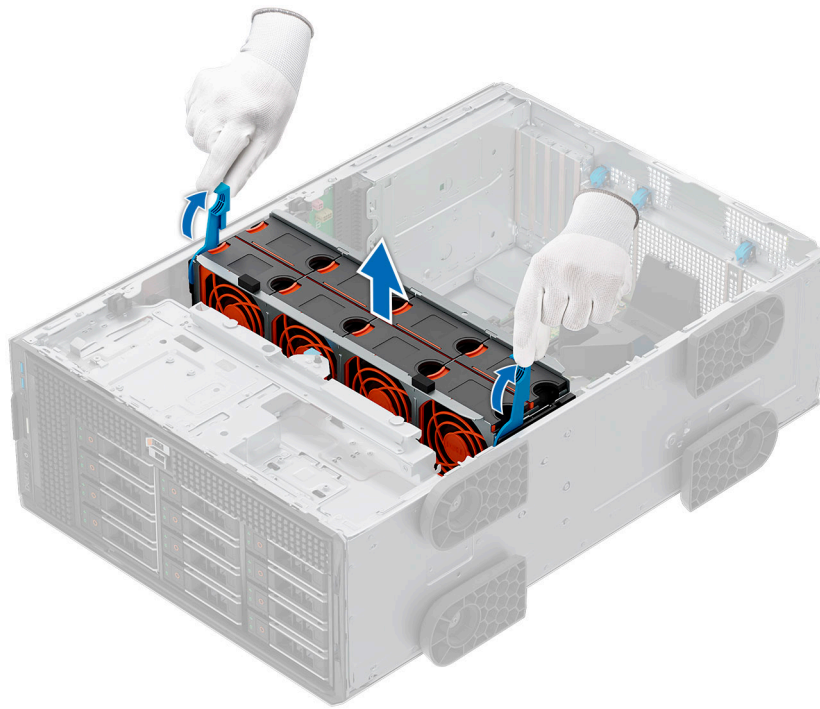
## Removing the cooling fan cage

### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions.](#)
2. Follow the procedure that is listed in [Before working inside your system .](#)
3. [Remove the air shroud.](#)

### Steps

1. Lift the blue release levers to unlock the cooling fan cage assembly from the system.
2. Hold the release levers, and lift the cooling fan cage assembly away from the system.



**Figure 35. Removing the cooling fan assembly**

#### Next steps

Replace the cooling fan assembly.

## Installing the cooling fan cage

#### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).

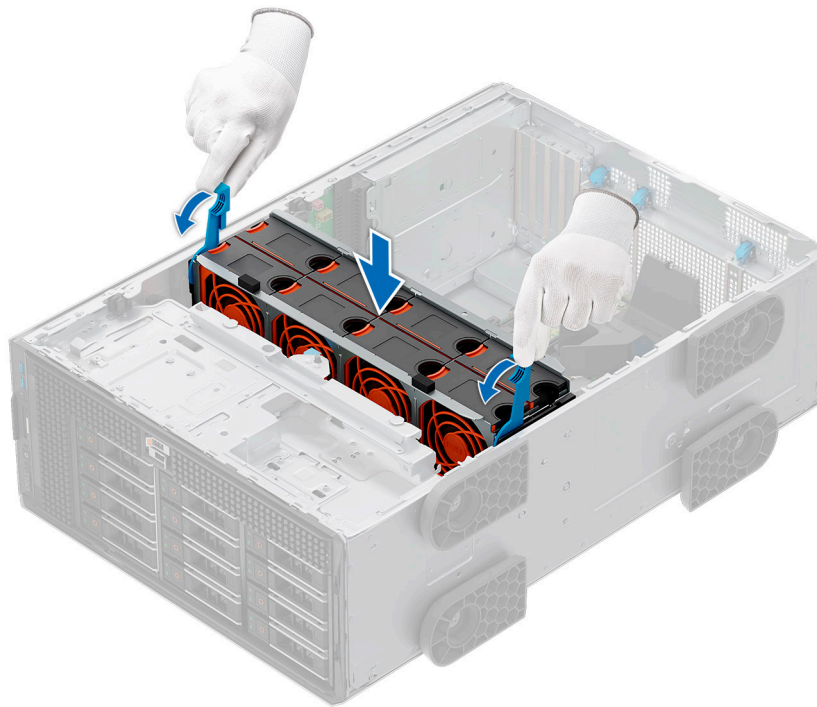


**CAUTION:** Ensure that the cables inside the system are correctly installed and retained by the cable retention bracket before installing the cooling fan cage. Incorrectly installed cables may get damaged.

2. Follow the procedure listed in [Before working inside your system](#).
3. If installed, [Remove the air shroud](#).

#### Steps

1. Holding the blue release lever of the cooling fan cage, align the guide rails with the guides on the system.
2. Lower the cooling fan cage assembly into the system until seated firmly.
3. Lower the blue release lever and press to lock the cooling fan cage assembly into the system.



**Figure 36. Installing the cooling fan assembly**

#### Next steps

1. [Install the air shroud.](#)
2. Follow the procedure listed in [After working inside your system.](#)

## Removing a cooling fan

The procedure for removing a standard and a high-performance fan is identical.

#### Prerequisites

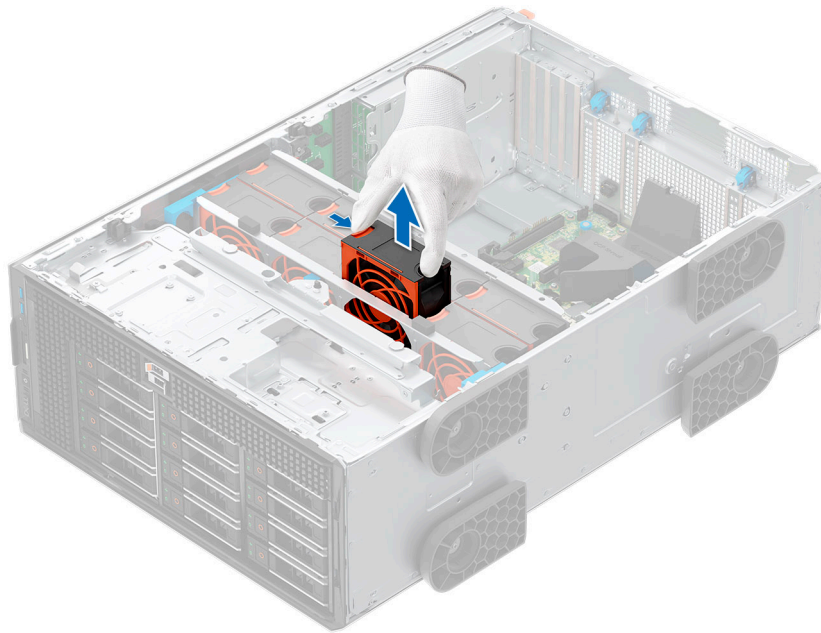
**NOTE:** Opening or removing the system cover when the system is on may expose you to a risk of electric shock. Exercise utmost care while removing or installing cooling fans.

**CAUTION:** The cooling fans are hot swappable. To maintain proper cooling while the system is on, replace only one fan at a time.

1. Follow the safety guidelines listed in [Safety instructions.](#)
2. Follow the procedure that is listed in [Before working inside your system .](#)

#### Steps

Press the release tab and lift the cooling fan out of the cooling fan cage.



**Figure 37. Removing a cooling fan**

#### Next steps

Replace the cooling fan.

## Installing a cooling fan

The procedure for installing a standard and a high-performance fan is identical.

#### Prerequisites

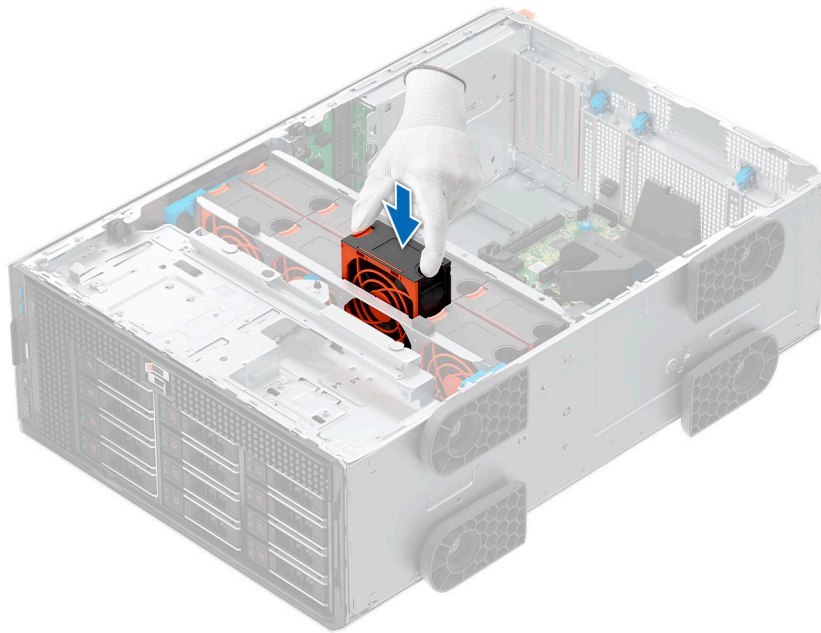
**NOTE:** Opening or removing the system cover when the system is on may expose you to a risk of electric shock. Exercise utmost care while removing or installing cooling fans.

**CAUTION:** The cooling fans are hot swappable. To maintain proper cooling while the system is on, replace only one fan at a time.

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).

#### Steps

Align and lower the cooling fan into the cooling fan assembly until the fan clicks into place.

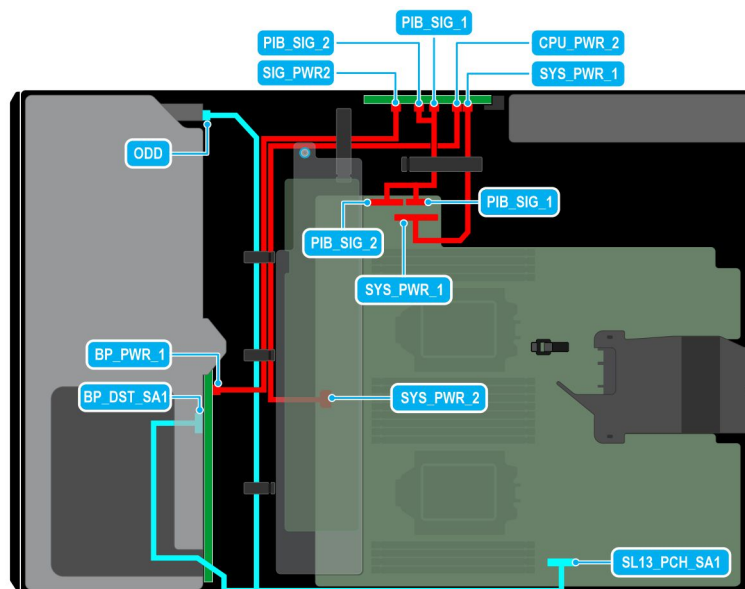


**Figure 38. Installing a cooling fan**

#### Next steps

1. [Install the air shroud.](#)
2. Follow the procedure listed in [After working inside your system.](#)

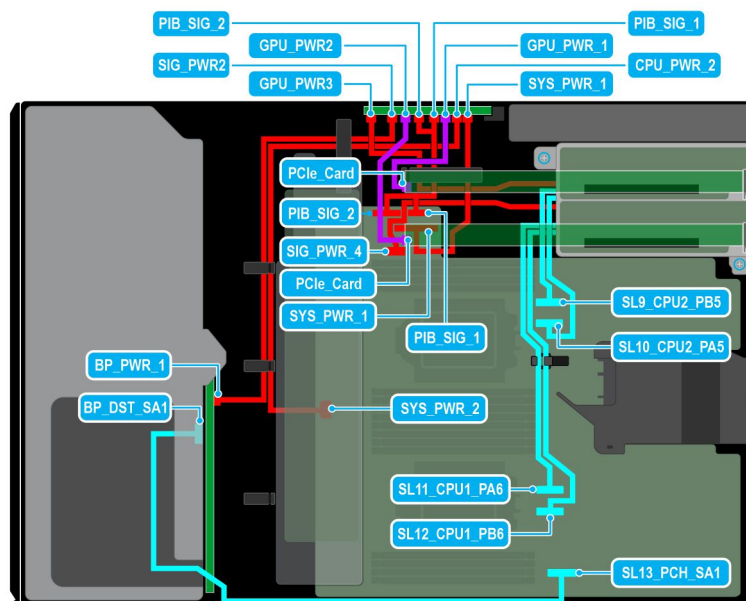
## Cable routing



**Figure 39. Configuration 1: 8x3.5-inch (ChipsetSATA ) on CPU 2**

**Table 72. Configuration 1: 8x3.5-inch (ChipsetSATA ) on CPU 2**

| Order | From                                             | To                                              |
|-------|--------------------------------------------------|-------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)      | SYS_PWR_1 (Power connector on PIB)              |
| 2     | SYS_PWR_2 (Power connector on system board)      | CPU_PWR_2 (Power connector on PIB)              |
| 3     | BP_PWR_1 (Backplane power connector)             | SIG_PWR_2 (Power connector on PIB)              |
| 4     | BP_DST_SA1 (Signal connector on backplane)       | SL13_PCH_SA1 (Signal connector on system board) |
| 5     | PIB_SIG_1 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB)        |
| 6     | PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_2 (PIB signal connectors on PIB)        |
| 7     | ODD (Optical disk drive)                         | SL13_PCH_SA1 (Signal connector on system board) |



**Figure 40. Configuration 2: 8x3.5-inch (ChipsetSATA) + GPUx2 on CPU 2**

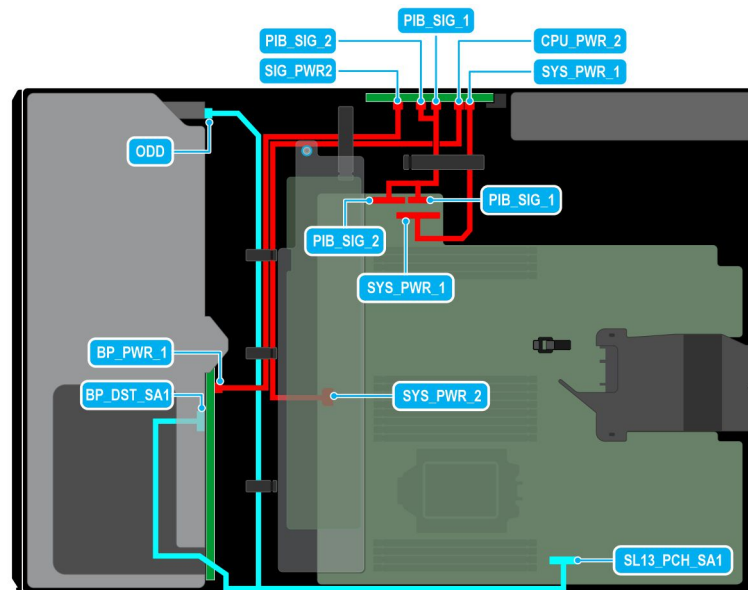
**Table 73. Configuration 2: 8x3.5-inch (ChipsetSATA) + GPUx2 on CPU 2**

| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane power connector)                                                                  | SIG_PWR_2 (Power connector on PIB)                                                    |
| 4     | BP_DST_SA1 (Signal connector on backplane)                                                            | SL13_PCH_SA1 (Signal connector on system board)                                       |
| 5     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 6     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |



**Table 73. Configuration 2: 8x3.5-inch (ChipsetSATA) + GPUx2 on CPU 2 (continued)**

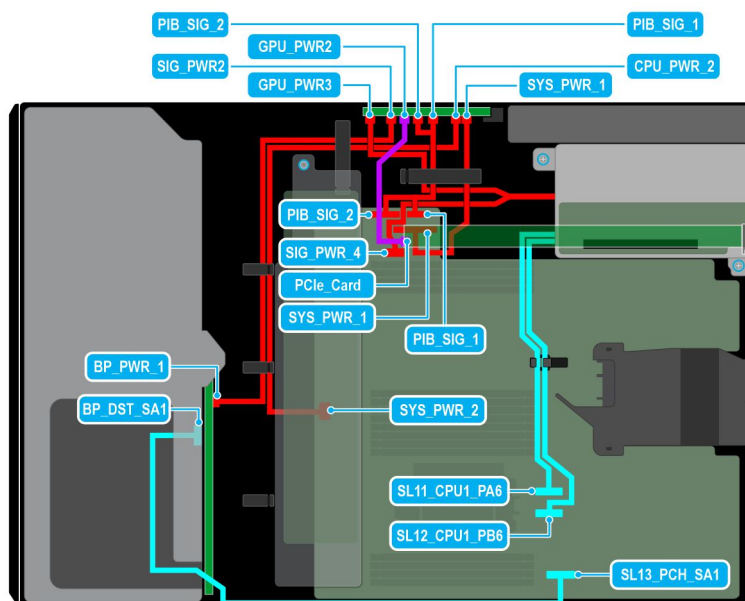
| Order | From                                                                                  | To                      |
|-------|---------------------------------------------------------------------------------------|-------------------------|
| 7     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB) | RISER_PWR_1 (GPU Riser) |
| 8     | SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)                    | GPU Riser 1             |
| 9     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                   | GPU Riser 2             |



**Figure 41. Configuration 3: 8x3.5-inch (ChipsetSATA) on CPU 1**

**Table 74. Configuration 3: 8x3.5-inch (ChipsetSATA) on CPU 1**

| Order | From                                             | To                                              |
|-------|--------------------------------------------------|-------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)      | SYS_PWR_1 (Power connector on PIB)              |
| 2     | SYS_PWR_2 (Power connector on system board)      | CPU_PWR_2 (Power connector on PIB)              |
| 3     | BP_PWR_1 (Backplane power connector)             | SIG_PWR_2 (Power connector on PIB)              |
| 4     | BP_DST_SA1 (Signal connector on backplane)       | SL13_PCH_SA1 (Signal connector on system board) |
| 5     | PIB_SIG_1 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB)        |
| 6     | PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_2 (PIB signal connectors on PIB)        |
| 7     | ODD (Optical disk drive)                         | SL13_PCH_SA1 (Signal connector on system board) |

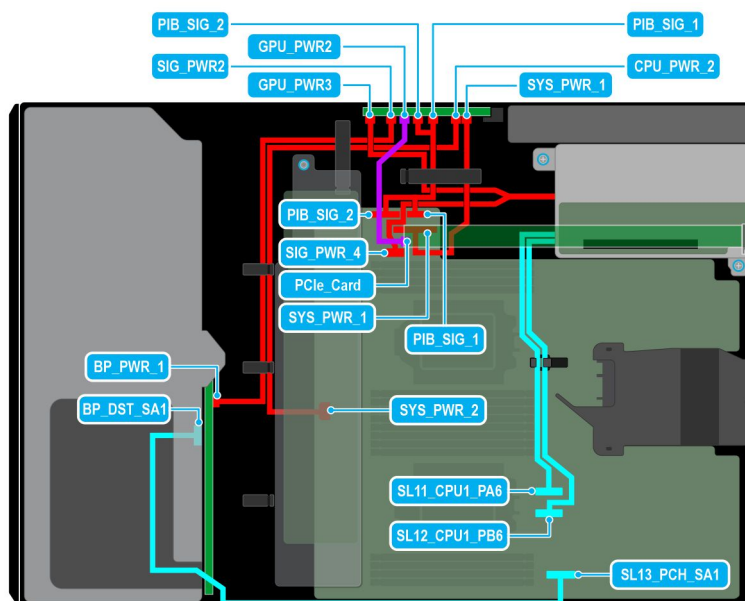


**Figure 42. Configuration 4: 8 x 3.5-inch (Chipset SATA) + 1 x GPU on CPU 1**

**Table 75. Configuration 4: 8 x 3.5-inch (Chipset SATA) + 1 x GPU on CPU 1**

| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane power connector)                                                                  | SIG_PWR_2 (Power connector on PIB)                                                    |
| 4     | BP_DST_SA1 (Signal connector on backplane)                                                            | SL13_PCH_SA1 (Signal connector on system board)                                       |
| 5     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 6     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 7     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 9     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |

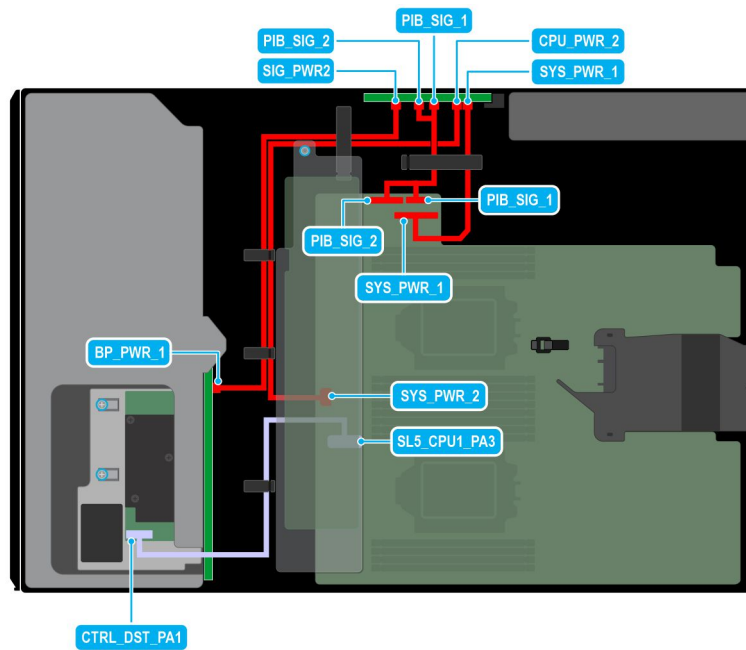




**Figure 43. Configuration 5: 8 x 3.5-inch (Chipset SATA) + 1 x GPU on CPU 2**

**Table 76. Configuration 5: 8 x 3.5-inch (Chipset SATA) + 1 x GPU on CPU 2**

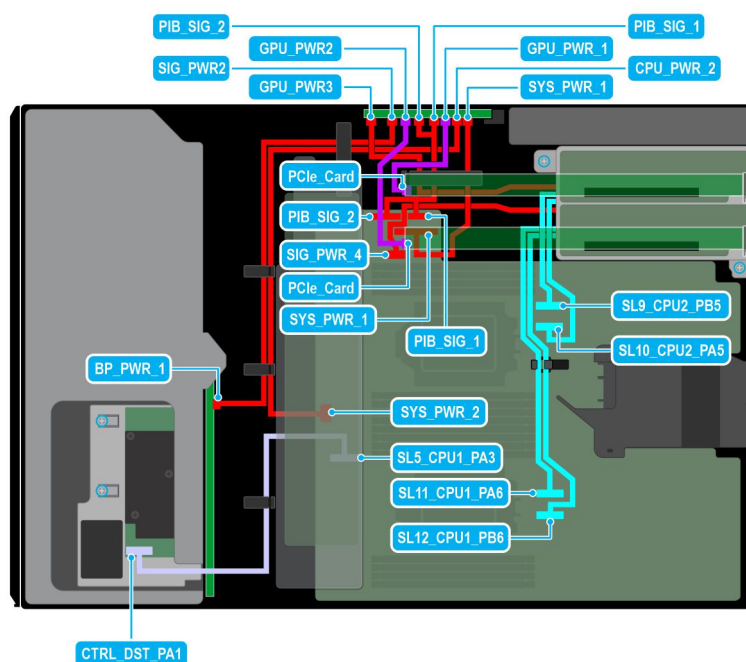
| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane power connector)                                                                  | SIG_PWR_2 (Power connector on PIB)                                                    |
| 4     | BP_DST_SA1 (Signal connector on backplane)                                                            | SL13_PCH_SA1 (Signal connector on system board)                                       |
| 5     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 6     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 7     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 9     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |



**Figure 44. Configuration 6: 8x3.5-inch (SAS/SATA) on CPU 2**

**Table 77. Configuration 6: 8x3.5-inch (SAS/SATA) on CPU 2**

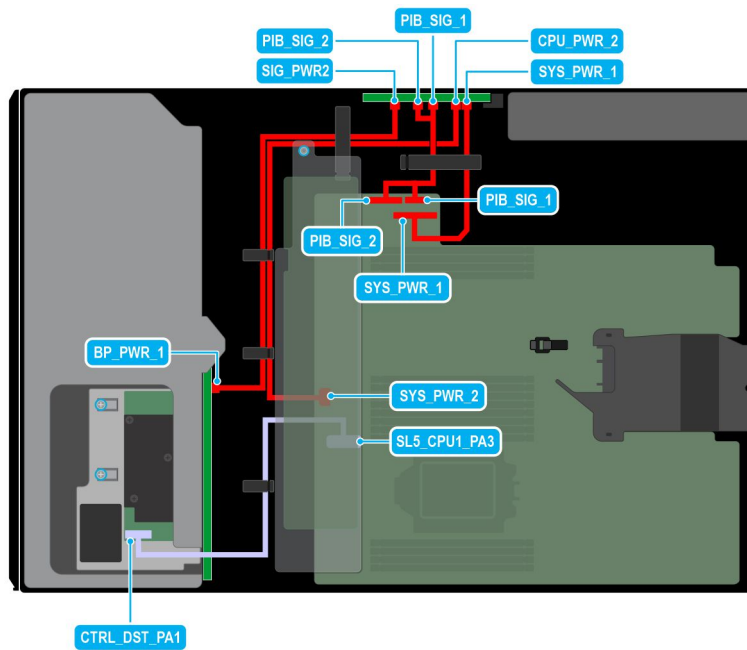
| Order | From                                             | To                                       |
|-------|--------------------------------------------------|------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)      | SYS_PWR_1 (Power connector on PIB)       |
| 2     | SYS_PWR_2 (Power connector on system board)      | CPU_PWR_2 (Power connector on PIB)       |
| 3     | BP_PWR_1 (Backplane power connector)             | SIG_PWR_2 (Power connector on PIB)       |
| 4     | PIB_SIG_1 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) |
| 5     | PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_2 (PIB signal connectors on PIB) |
| 6     | SL5_CPU1_PA3 (Signal connector on system board)  | CTRL_DST_PA1 (fPERC 11 connector)        |



**Figure 45. Configuration 7: 8x3.5-inch (SAS/SATA ) + GPUx2 on CPU 2**

**Table 78. Configuration 7: 8x3.5-inch (SAS/SATA ) + GPUx2 on CPU 2**

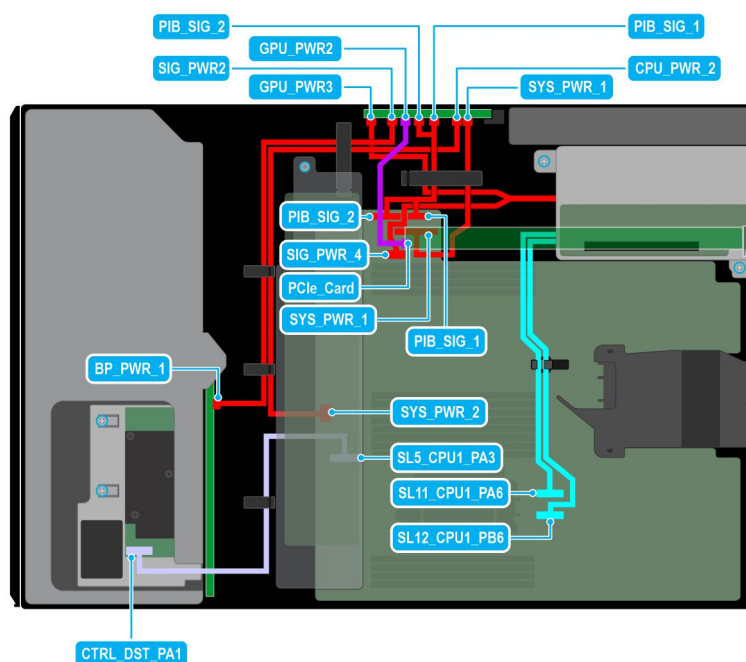
| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane power connector)                                                                  | SIG_PWR_2 (Power connector on PIB)                                                    |
| 4     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 5     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 6     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 7     | SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)                                    | GPU Riser 1                                                                           |
| 8     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 9     | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |



**Figure 46. Configuration 8: 8x3.5-inch (SAS/SATA) on CPU 1**

**Table 79. Configuration 8: 8x3.5-inch (SAS/SATA) on CPU 1**

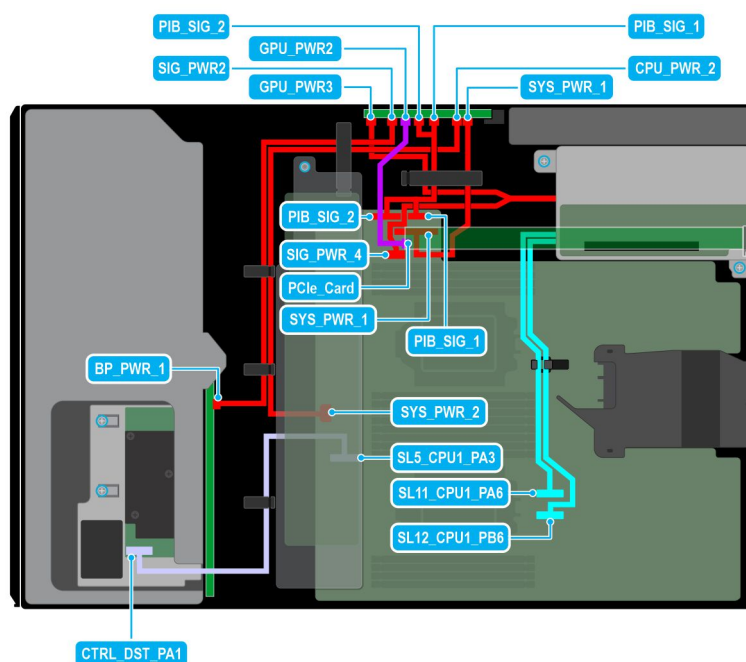
| Order | From                                             | To                                       |
|-------|--------------------------------------------------|------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)      | SYS_PWR_1 (Power connector on PIB)       |
| 2     | SYS_PWR_2 (Power connector on system board)      | CPU_PWR_2 (Power connector on PIB)       |
| 3     | BP_PWR_1 (Backplane power connector)             | SIG_PWR_2 (Power connector on PIB)       |
| 4     | PIB_SIG_1 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) |
| 5     | PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_2 (PIB signal connectors on PIB) |
| 6     | SL5_CPU1_PA3 (Signal connector on system board)  | CTRL_DST_PA1 (fPERC 11 connector)        |



**Figure 47. Configuration 9: 8x3.5-inch (SAS/SATA ) + GPUx1 on CPU 1**

**Table 80. Configuration 9: 8x3.5-inch (SAS/SATA ) + GPUx1 on CPU 1**

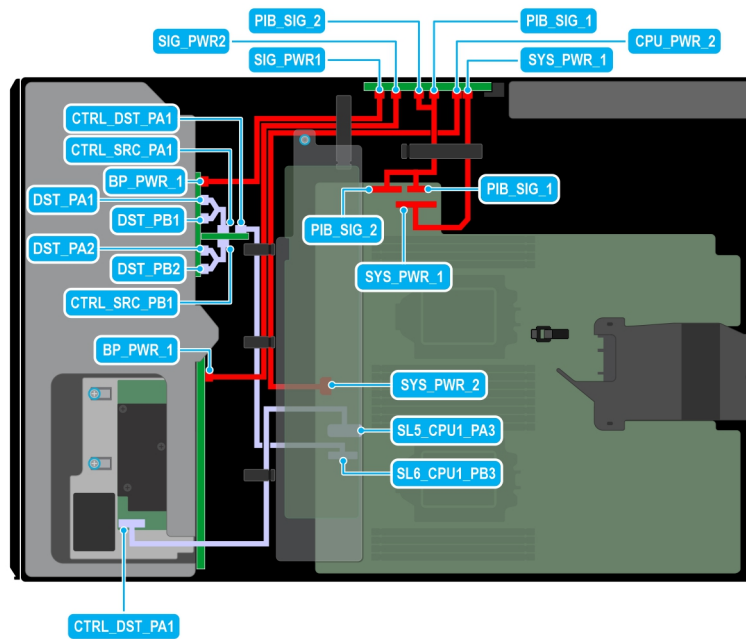
| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane power connector)                                                                  | SIG_PWR_2 (Power connector on PIB)                                                    |
| 4     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 5     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 6     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 7     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 8     | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |



**Figure 48. Configuration 10 : 8x3.5-inch (SAS/SATA ) + GPUx1 on CPU 2**

**Table 81. Configuration 10 : 8x3.5-inch (SAS/SATA ) + GPUx1 on CPU 2**

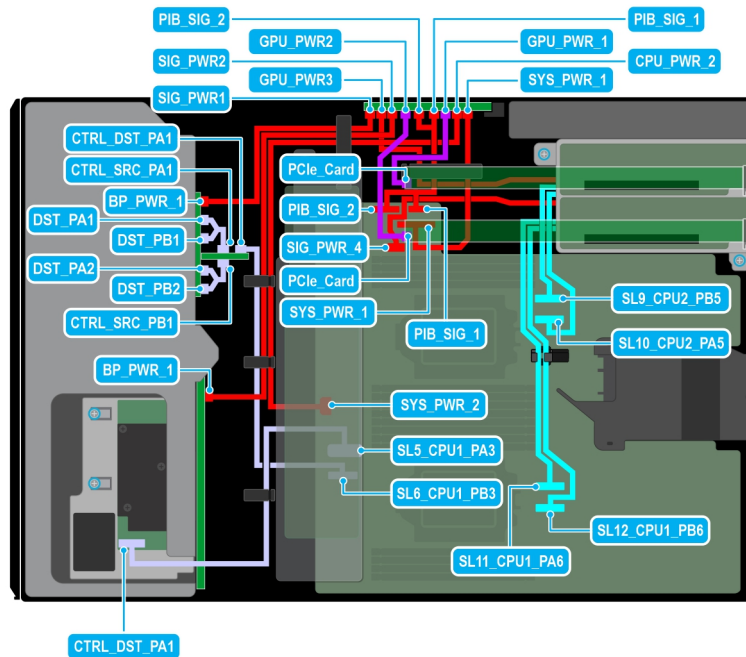
| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane power connector)                                                                  | SIG_PWR_2 (Power connector on PIB)                                                    |
| 4     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 5     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 6     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 7     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 8     | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |



**Figure 49. Configuration 11: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC11 ) on CPU 2**

**Table 82. Configuration 11: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC11 ) on CPU 2**

| Order | From                                             | To                                               |
|-------|--------------------------------------------------|--------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)      | SYS_PWR_1 (Power connector on PIB)               |
| 2     | SYS_PWR_2 (Power connector on system board)      | CPU_PWR_2 (Power connector on PIB)               |
| 3     | BP_PWR_1 (Backplane 1 power connector)           | SIG_PWR_1 (Power connector on PIB)               |
| 4     | BP_PWR_1 (Backplane 2 power connector)           | SIG_PWR_2 (Power connector on PIB)               |
| 5     | PIB_SIG_1 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB)         |
| 6     | PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_2 (PIB signal connectors on PIB)         |
| 7     | SL5_CPU1_PA3 (Signal connector on system board)  | CTRL_DST_PA1 (fPERC 11 connector)                |
| 8     | SL6_CPU1_PB3 (Signal connector on system board)  | CTRL_DST_PB1 (NVMe RAID)                         |
| 9     | DST_PA1 and DST_PB1 (Backplane signal connector) | CTRL_SRC_PA1 (Controller connector on NVMe RAID) |
| 10    | DST_PA2 and DST_PB2 (Backplane signal connector) | CTRL_SRC_PB1 (Controller connector on NVMe RAID) |

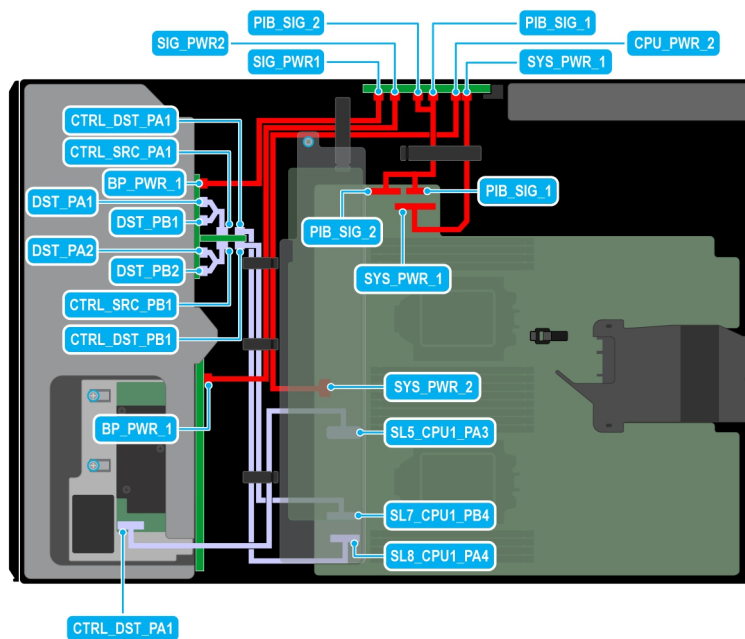


**Figure 50. Configuration 12: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC11 ) + GPUx2 on CPU 2**

**Table 83. Configuration 12: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC11 ) + GPUx2 on CPU 2**

| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane 1 power connector)                                                                | SIG_PWR_1 (Power connector on PIB)                                                    |
| 4     | BP_PWR_1 (Backplane 2 power connector)                                                                | SIG_PWR_2 (Power connector on PIB)                                                    |
| 5     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 6     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 7     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 8     | SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)                                    | GPU Riser 1                                                                           |
| 9     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 10    | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |
| 11    | SL6_CPU1_PB3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (NVMe RAID)                                                              |
| 12    | DST_PA1 and DST_PB1 (Backplane signal connector)                                                      | CTRL_SRC_PA1 (Controller connector on NVMe RAID)                                      |
| 13    | DST_PA2 and DST_PB2 (Backplane signal connector)                                                      | CTRL_SRC_PB1 (Controller connector on NVMe RAID)                                      |

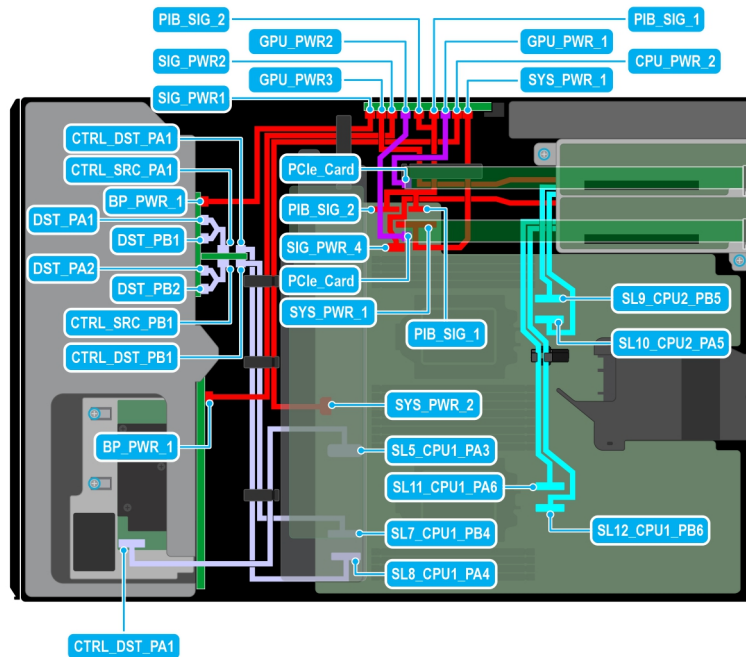




**Figure 51. Configuration 13: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC12 ) on CPU 2**

**Table 84. Configuration 13: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC12 ) on CPU 2**

| Order | From                                             | To                                               |
|-------|--------------------------------------------------|--------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)      | SYS_PWR_1 (Power connector on PIB)               |
| 2     | SYS_PWR_2 (Power connector on system board)      | CPU_PWR_2 (Power connector on PIB)               |
| 3     | BP_PWR_1 (Backplane 1 power connector)           | SIG_PWR_1 (Power connector on PIB)               |
| 4     | BP_PWR_1 (Backplane 2 power connector)           | SIG_PWR_2 (Power connector on PIB)               |
| 5     | PIB_SIG_1 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB)         |
| 6     | PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_2 (PIB signal connectors on PIB)         |
| 7     | SL5_CPU1_PA3 (Signal connector on system board)  | CTRL_DST_PA1 (fPERC 12 connector)                |
| 8     | SL7_CPU1_PB4 (Signal connector on system board)  | CTRL_DST_PB1 (fPERC 12 connector)                |
| 9     | SL8_CPU1_PA4 (Signal connector on system board)  | CTRL_DST_PA1 (fPERC 12 connector)                |
| 10    | DST_PA1 and DST_PB1 (Backplane signal connector) | CTRL_SRC_PA1 (Controller connector on NVMe RAID) |
| 11    | DST_PA2 and DST_PB2 (Backplane signal connector) | CTRL_SRC_PB1 (Controller connector on NVMe RAID) |



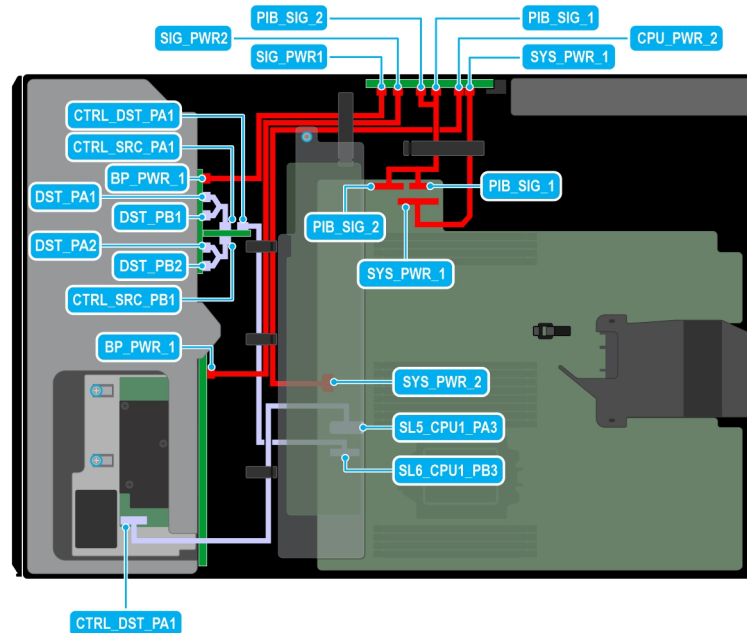
**Figure 52. Configuration 14: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC12 ) + GPUx2 on CPU 2**

**Table 85. Configuration 14: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC12 ) + GPUx2 on CPU 2**

| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane 1 power connector)                                                                | SIG_PWR_1 (Power connector on PIB)                                                    |
| 4     | BP_PWR_1 (Backplane 2 power connector)                                                                | SIG_PWR_2 (Power connector on PIB)                                                    |
| 5     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 6     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 7     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 8     | SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)                                    | GPU Riser 1                                                                           |
| 9     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 10    | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |
| 11    | SL7_CPU1_PB4 (Signal connector on system board)                                                       | CTRL_DST_PB1 (fPERC 12 connector)                                                     |
| 12    | SL8_CPU1_PA4 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 12 connector)                                                     |
| 13    | DST_PA1 and DST_PB1 (Backplane signal connector)                                                      | CTRL_SRC_PA1 (Controller connector on NVMe RAID)                                      |

**Table 85. Configuration 14: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC12 ) + GPUx2 on CPU 2 (continued)**

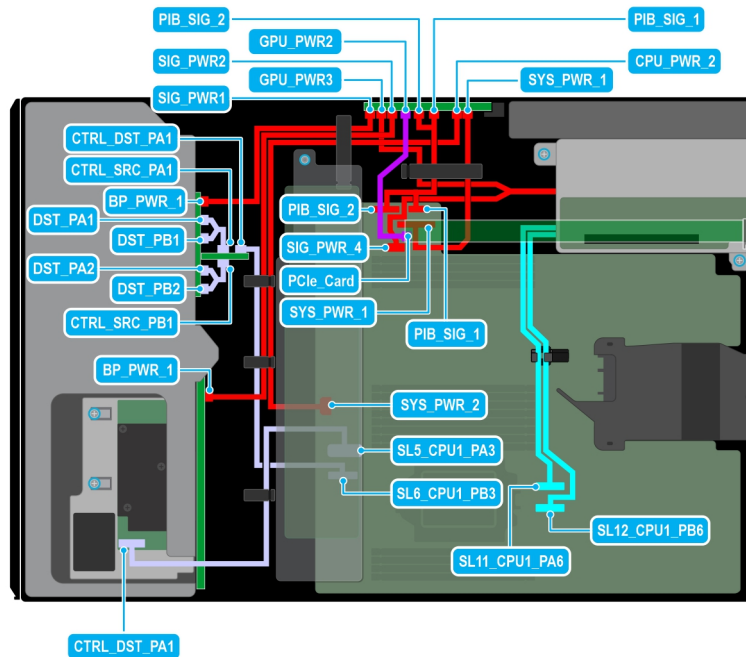
| Order | From                                             | To                                              |
|-------|--------------------------------------------------|-------------------------------------------------|
| 14    | DST_PA2 and DST_PB2 (Backplane signal connector) | CTRL_SRC_PB1(Controller connector on NVMe RAID) |



**Figure 53. Configuration 15: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC11) on CPU 1**

**Table 86. Configuration 15: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC11) on CPU 1**

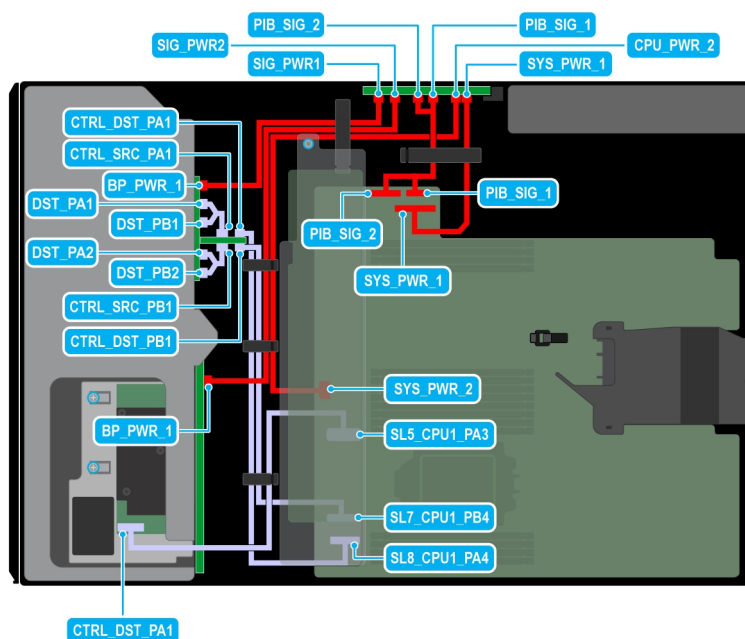
| Order | From                                             | To                                               |
|-------|--------------------------------------------------|--------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)      | SYS_PWR_1 (Power connector on PIB)               |
| 2     | SYS_PWR_2 (Power connector on system board)      | CPU_PWR_2 (Power connector on PIB)               |
| 3     | BP_PWR_1 (Backplane 1 power connector)           | SIG_PWR_1 (Power connector on PIB)               |
| 4     | BP_PWR_1 (Backplane 2 power connector)           | SIG_PWR_2 (Power connector on PIB)               |
| 5     | PIB_SIG_1 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB)         |
| 6     | PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_2 (PIB signal connectors on PIB)         |
| 7     | SL5_CPU1_PA3 (Signal connector on system board)  | CTRL_DST_PA1 (fPERC 11 connector)                |
| 8     | SL6_CPU1_PB3 (Signal connector on system board)  | CTRL_DST_PA1 (NVMe RAID)                         |
| 9     | DST_PA1 and DST_PB1 (Backplane signal connector) | CTRL_SRC_PA1 (Controller connector on NVMe RAID) |
| 10    | DST_PA2 and DST_PB2 (Backplane signal connector) | CTRL_SRC_PB1(Controller connector on NVMe RAID)  |



**Figure 54. Configuration 16: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC11 ) + GPUx 1 on CPU 1**

**Table 87. Configuration 16: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC11 ) + GPUx 1 on CPU 1**

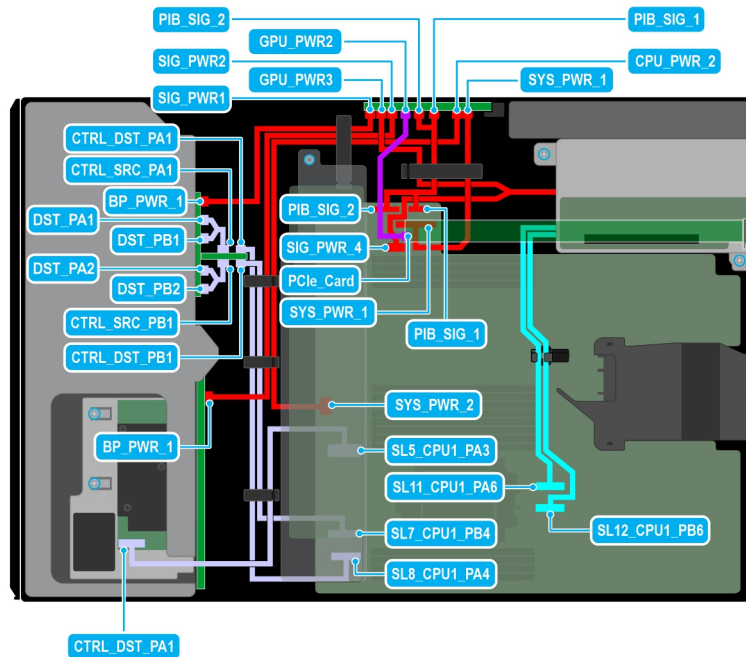
| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane 1 power connector)                                                                | SIG_PWR_1 (Power connector on PIB)                                                    |
| 4     | BP_PWR_1 (Backplane 2 power connector)                                                                | SIG_PWR_2 (Power connector on PIB)                                                    |
| 5     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 6     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 7     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 8     | SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)                                    | GPU Riser 1                                                                           |
| 9     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 10    | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |
| 11    | DST_PA1 and DST_PB1 (Backplane signal connector)                                                      | CTRL_SRC_PA1 (Controller connector on NVMe RAID)                                      |
| 12    | DST_PA2 and DST_PB2 (Backplane signal connector)                                                      | CTRL_SRC_PB1 (Controller connector on NVMe RAID)                                      |



**Figure 55. Configuration 17: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC12 ) on CPU 1**

**Table 88. Configuration 17: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC12 ) on CPU 1**

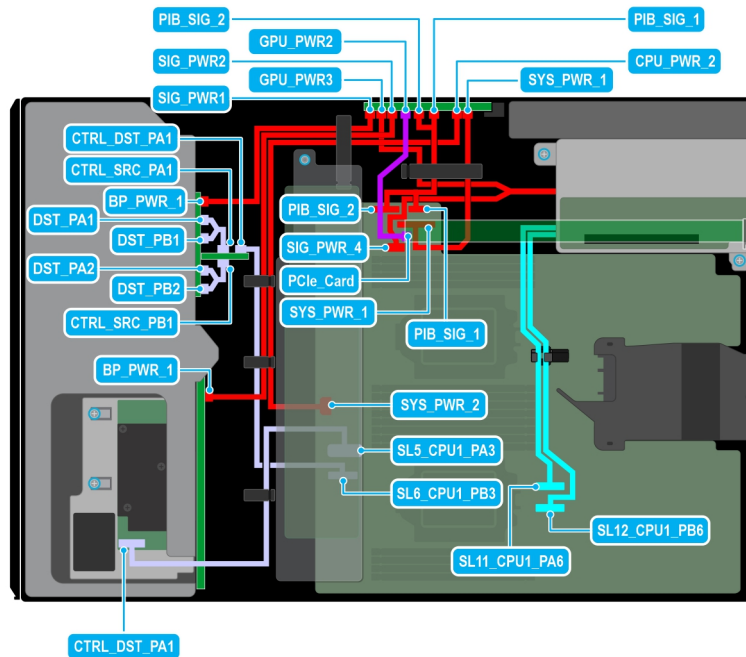
| Order | From                                             | To                                               |
|-------|--------------------------------------------------|--------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)      | SYS_PWR_1 (Power connector on PIB)               |
| 2     | SYS_PWR_2 (Power connector on system board)      | CPU_PWR_2 (Power connector on PIB)               |
| 3     | BP_PWR_1 (Backplane 1 power connector)           | SIG_PWR_1 (Power connector on PIB)               |
| 4     | BP_PWR_1 (Backplane 2 power connector)           | SIG_PWR_2 (Power connector on PIB)               |
| 5     | SL5_CPU1_PA3 (Signal connector on system board)  | CTRL_DST_PA1 (fPERC 11 connector)                |
| 6     | SL7_CPU1_PB4 (Signal connector on system board)  | CTRL_DST_PB1 (fPERC 12 connector)                |
| 7     | SL8_CPU1_PA4 (Signal connector on system board)  | CTRL_DST_PA1 (fPERC 12 connector)                |
| 8     | DST_PA1 and DST_PB1 (Backplane signal connector) | CTRL_SRC_PA1 (Controller connector on NVMe RAID) |
| 9     | DST_PA2 and DST_PB2 (Backplane signal connector) | CTRL_SRC_PB1 (Controller connector on NVMe RAID) |



**Figure 56. Configuration 18: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC12 ) + GPUx 1 on CPU 1**

**Table 89. Configuration 18: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC12 ) + GPUx 1 on CPU 1**

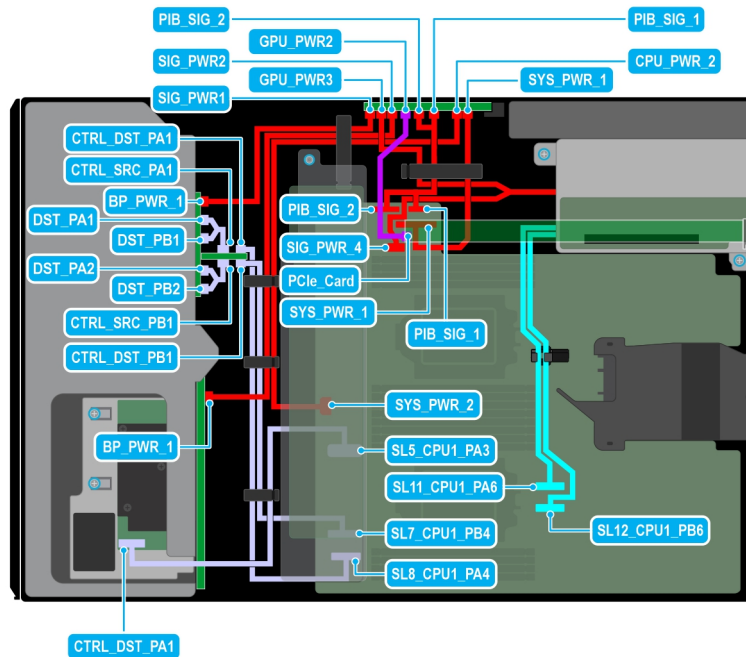
| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane 1 power connector)                                                                | SIG_PWR_1 (Power connector on PIB)                                                    |
| 4     | BP_PWR_1 (Backplane 2 power connector)                                                                | SIG_PWR_2 (Power connector on PIB)                                                    |
| 5     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 6     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 7     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 8     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 9     | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |
| 10    | SL7_CPU1_PB4 (Signal connector on system board)                                                       | CTRL_DST_PB1 (fPERC 12 connector)                                                     |
| 11    | SL8_CPU1_PA4 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 12 connector)                                                     |
| 12    | DST_PA1 and DST_PB1 (Backplane signal connector)                                                      | CTRL_SRC_PA1 (Controller connector on NVMe RAID)                                      |
| 13    | DST_PA2 and DST_PB2 (Backplane signal connector)                                                      | CTRL_SRC_PB1 (Controller connector on NVMe RAID)                                      |



**Figure 57. Configuration 19: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC11 ) + GPUx 1 on CPU 2**

**Table 90. Configuration 19: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC11 ) + GPUx 1 on CPU 2**

| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane 1 power connector)                                                                | SIG_PWR_1 (Power connector on PIB)                                                    |
| 4     | BP_PWR_1 (Backplane 2 power connector)                                                                | SIG_PWR_2 (Power connector on PIB)                                                    |
| 5     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 6     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 7     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 8     | SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)                                    | GPU Riser 1                                                                           |
| 9     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 10    | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |
| 11    | DST_PA1 and DST_PB1 (Backplane signal connector)                                                      | CTRL_SRC_PA1 (Controller connector on NVMe RAID)                                      |
| 12    | DST_PA2 and DST_PB2 (Backplane signal connector)                                                      | CTRL_SRC_PB1 (Controller connector on NVMe RAID)                                      |

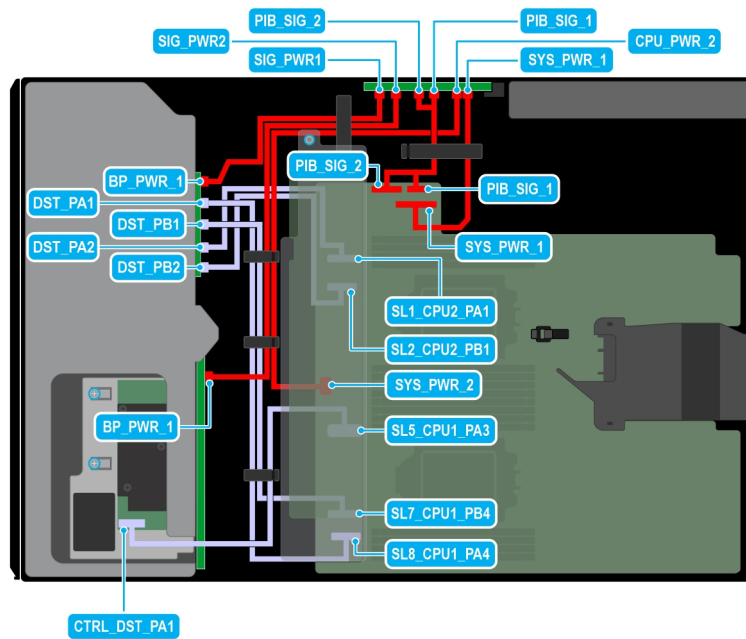


**Figure 58. Configuration 20: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC12) + GPUx 1 on CPU 2**

**Table 91. Configuration 20: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC12) + GPUx 1 on CPU 2**

| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane 1 power connector)                                                                | SIG_PWR_1 (Power connector on PIB)                                                    |
| 4     | BP_PWR_1 (Backplane 2 power connector)                                                                | SIG_PWR_2 (Power connector on PIB)                                                    |
| 5     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 6     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 7     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 8     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 9     | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |
| 10    | SL7_CPU1_PB4 (Signal connector on system board)                                                       | CTRL_DST_PB1 (fPERC 12 connector)                                                     |
| 11    | SL8_CPU1_PA4 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 12 connector)                                                     |
| 12    | DST_PA1 and DST_PB1 (Backplane signal connector)                                                      | CTRL_SRC_PA1 (Controller connector on NVMe RAID)                                      |
| 13    | DST_PA2 and DST_PB2 (Backplane signal connector)                                                      | CTRL_SRC_PB1 (Controller connector on NVMe RAID)                                      |

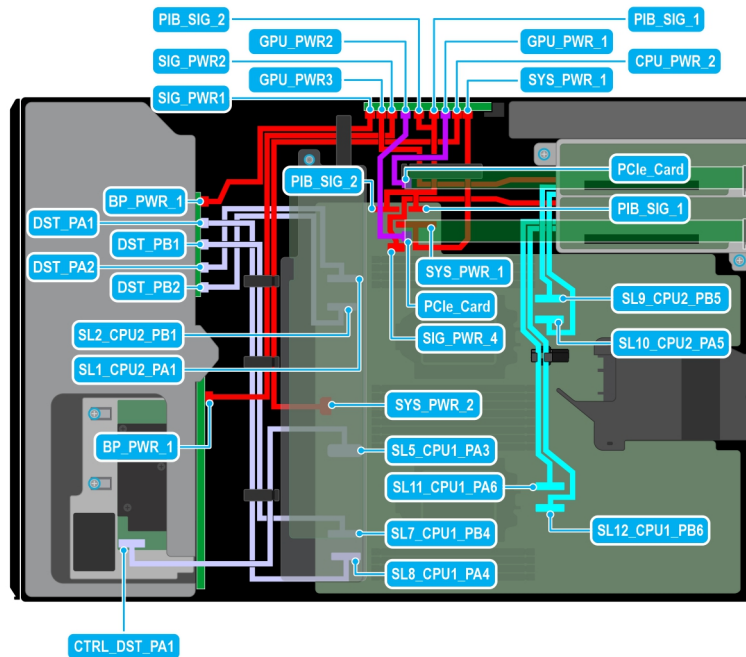




**Figure 59. Configuration 21: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe) on CPU 2**

**Table 92. Configuration 21: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe) on CPU 2**

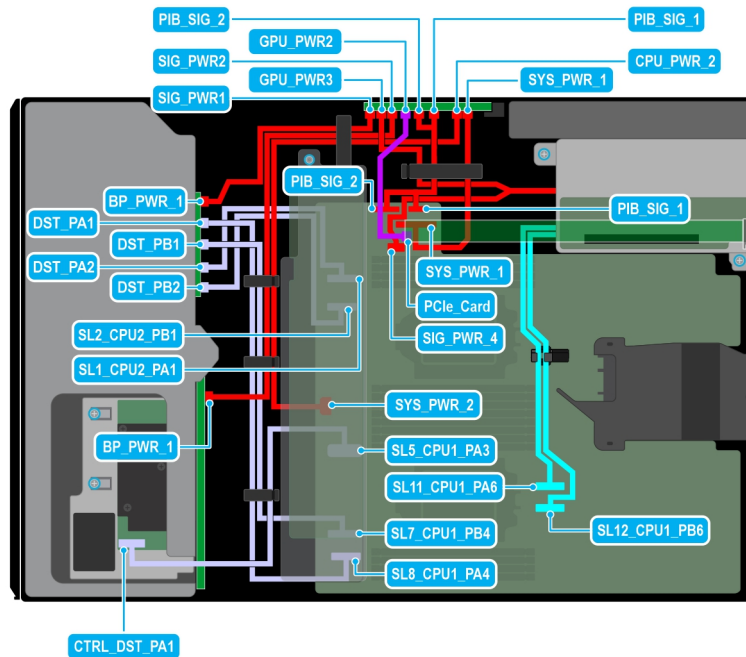
| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane 1 power connector)                                                                | SIG_PWR_1 (Power connector on PIB)                                                    |
| 4     | BP_PWR_1 (Backplane 2 power connector)                                                                | SIG_PWR_2 (Power connector on PIB)                                                    |
| 5     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 6     | SL1_CPU2_PA1 (Signal connector on system board)                                                       | DST_PA2 (Backplane signal connector)                                                  |
| 7     | SL2_CPU2_PB1 (Signal connector on system board)                                                       | DST_PB2 (Backplane signal connector)                                                  |
| 8     | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |
| 9     | SL7_CPU1_PB4 (Signal connector on system board)                                                       | DST_PB1 (Backplane signal connector)                                                  |
| 10    | SL8_CPU1_PA4 (Signal connector on system board)                                                       | DST_PA1 (Backplane signal connector)                                                  |



**Figure 60. Configuration 22: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe) + GPUx2 on CPU 2**

**Table 93. Configuration 22: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe) + GPUx2 on CPU 2**

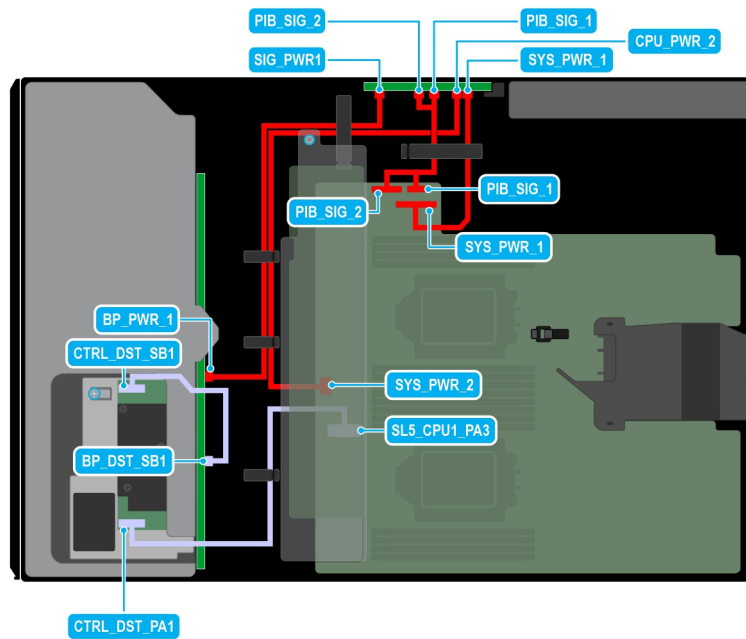
| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane 1 power connector)                                                                | SIG_PWR_1 (Power connector on PIB)                                                    |
| 4     | BP_PWR_1 (Backplane 2 power connector)                                                                | SIG_PWR_2 (Power connector on PIB)                                                    |
| 5     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 6     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 7     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 8     | SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)                                    | GPU Riser 1                                                                           |
| 9     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 10    | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |
| 11    | SL7_CPU1_PB4 (Signal connector on system board)                                                       | DST_PB1 (Backplane signal connector)                                                  |
| 12    | SL8_CPU1_PA4 (Signal connector on system board)                                                       | DST_PA1 (Backplane signal connector)                                                  |



**Figure 61. Configuration 23: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe) + GPUx1 on CPU 2**

**Table 94. Configuration 23: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe) + GPUx1 on CPU 2**

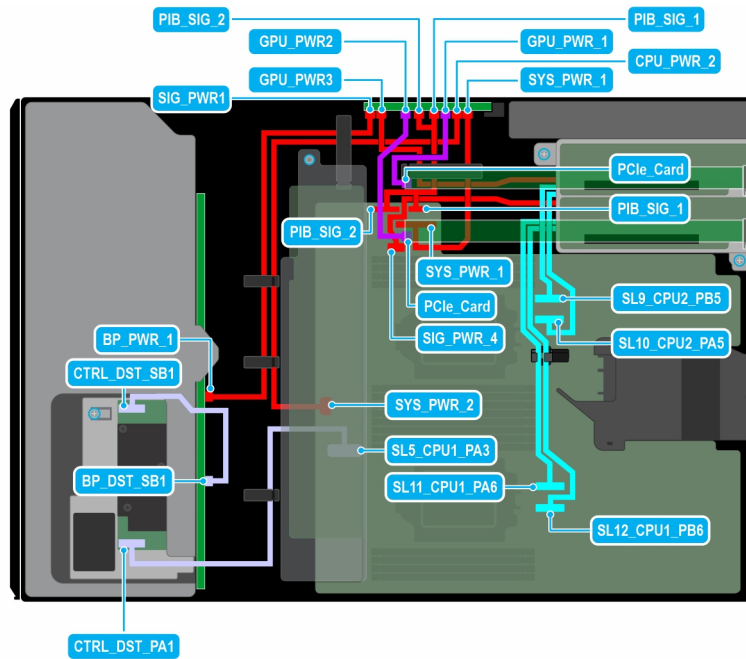
| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane 1 power connector)                                                                | SIG_PWR_1 (Power connector on PIB)                                                    |
| 4     | BP_PWR_1 (Backplane 2 power connector)                                                                | SIG_PWR_2 (Power connector on PIB)                                                    |
| 5     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 6     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 7     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 8     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 9     | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |
| 10    | SL7_CPU1_PB4 (Signal connector on system board)                                                       | DST_PB1 (Backplane signal connector)                                                  |
| 11    | SL8_CPU1_PA4 (Signal connector on system board)                                                       | DST_PA1 (Backplane signal connector)                                                  |



**Figure 62. Configuration 24: 12x3.5-inch (SAS/SATA ) on CPU 2**

**Table 95. Configuration 24: 12x3.5-inch (SAS/SATA ) on CPU 2**

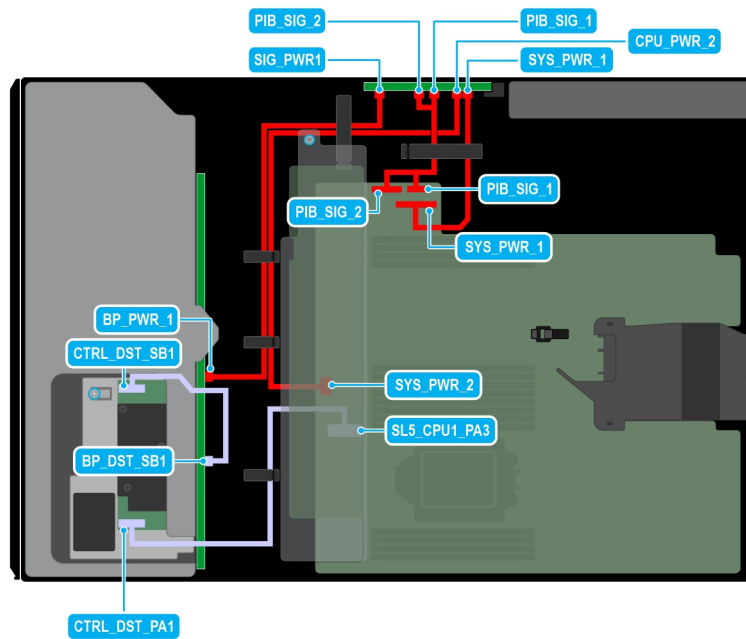
| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane 1 power connector)                                                                | SIG_PWR_1 (Power connector on PIB)                                                    |
| 4     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 5     | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |
| 6     | BP_DST_SB1 (Backplane signal connector)                                                               | CTRL_SRC_SB1 (fPERC 11 signal connector)                                              |



**Figure 63. Configuration 25: 12x3.5-inch (SAS/SATA) + GPUx2 on CPU 2**

**Table 96. Configuration 25: 12x3.5-inch (SAS/SATA) + GPUx2 on CPU 2**

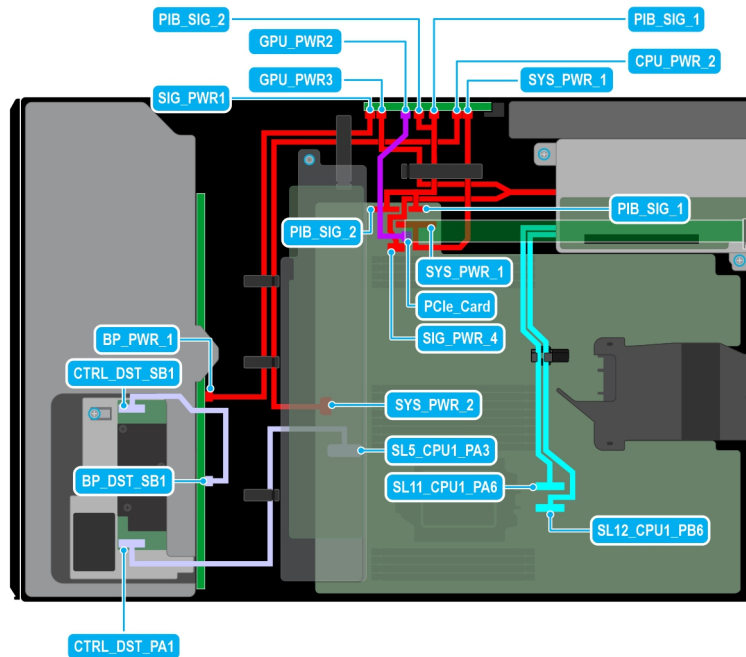
| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane power connector)                                                                  | SIG_PWR_2 (Power connector on PIB)                                                    |
| 4     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 5     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 6     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 7     | SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)                                    | GPU Riser 1                                                                           |
| 8     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 9     | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |
| 10    | BP_DST_SB1 (Backplane signal connector)                                                               | CTRL_SRC_SB1 (fPERC 11 signal connector)                                              |



**Figure 64. Configuration 26: 12x3.5-inch (SAS/SATA ) on CPU 1**

**Table 97. Configuration 26: 12x3.5-inch (SAS/SATA ) on CPU 1**

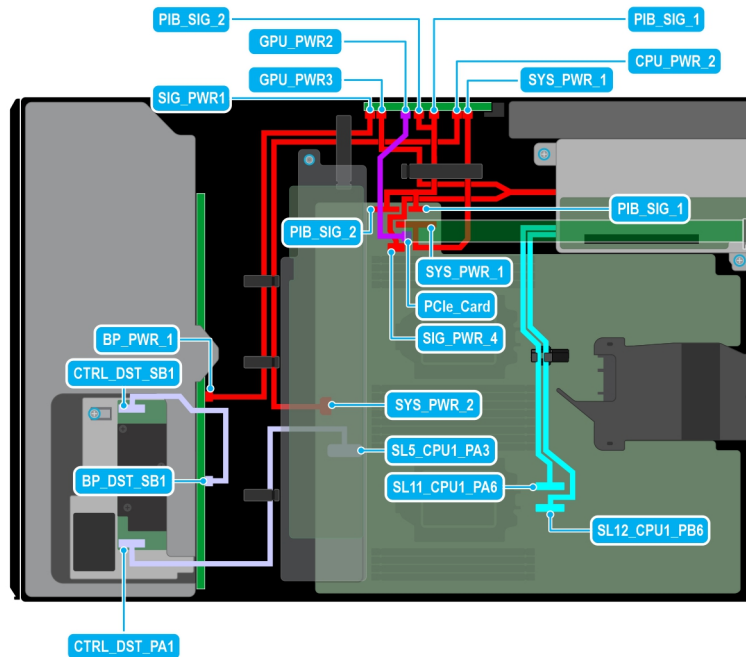
| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane 1 power connector)                                                                | SIG_PWR_1 (Power connector on PIB)                                                    |
| 4     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 5     | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |
| 6     | BP_DST_SB1 (Backplane signal connector)                                                               | CTRL_SRC_SB1 (fPERC 11 signal connector)                                              |



**Figure 65. Configuration 27 12x3.5-inch (SAS/SATA) + GPUx1 on CPU 1**

**Table 98. Configuration 27 12x3.5-inch (SAS/SATA) + GPUx1 on CPU 1**

| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane power connector)                                                                  | SIG_PWR_2 (Power connector on PIB)                                                    |
| 4     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 5     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 6     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 7     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 8     | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |
| 9     | BP_DST_SB1 (Backplane signal connector)                                                               | CTRL_SRC_SB1 (fPERC 11 signal connector)                                              |

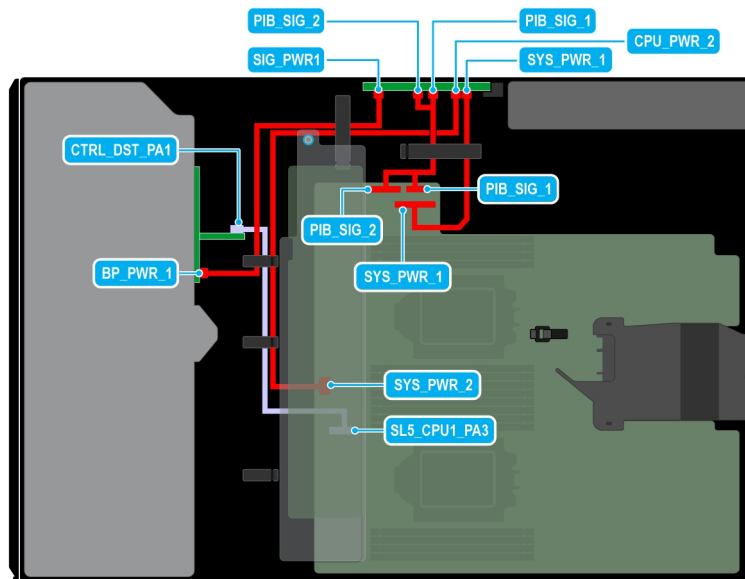


**Figure 66. Configuration 28 : 12x3.5-inch (SAS/SATA) + GPUx1 on CPU 2**

**Table 99. Configuration 28 : 12x3.5-inch (SAS/SATA) + GPUx1 on CPU 2**

| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane power connector)                                                                  | SIG_PWR_2 (Power connector on PIB)                                                    |
| 4     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 5     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 6     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 7     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 8     | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |
| 9     | BP_DST_SB1 (Backplane signal connector)                                                               | CTRL_SRC_SB1 (fPERC 11 signal connector)                                              |





**Figure 67. Configuration 29: 8 x2.5 -inch (SAS4/SATA) fPERC11 on CPU 2**

**Table 100. Configuration 29: 8 x2.5 -inch (SAS4/SATA) fPERC11 on CPU 2**

| Order | From                                             | To                                       |
|-------|--------------------------------------------------|------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)      | SYS_PWR_1 (Power connector on PIB)       |
| 2     | SYS_PWR_2 (Power connector on system board)      | CPU_PWR_2 (Power connector on PIB)       |
| 3     | BP_PWR_1 (Backplane power connector)             | SIG_PWR_2 (Power connector on PIB)       |
| 4     | PIB_SIG_1 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) |
| 5     | PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_2 (PIB signal connectors on PIB) |
| 6     | SL5_CPU1_PA3 (Signal connector on system board)  | CTRL_DST_PA1 (fPERC 11 connector)        |

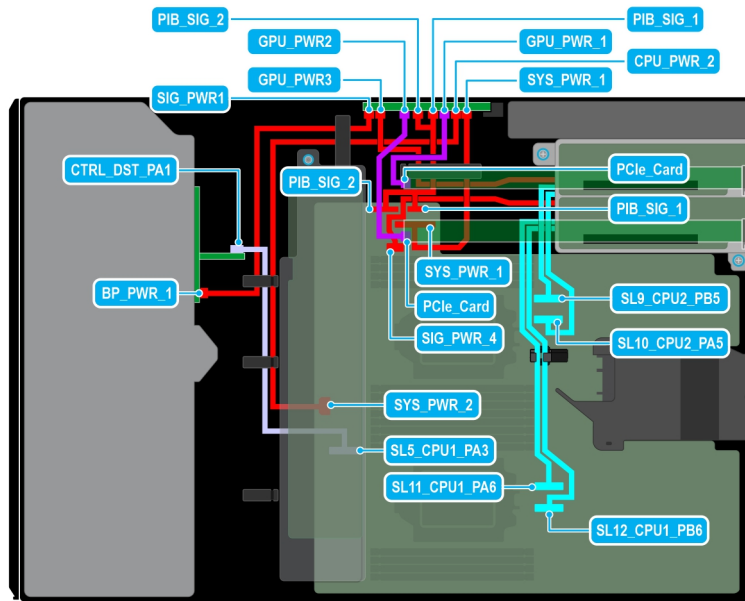
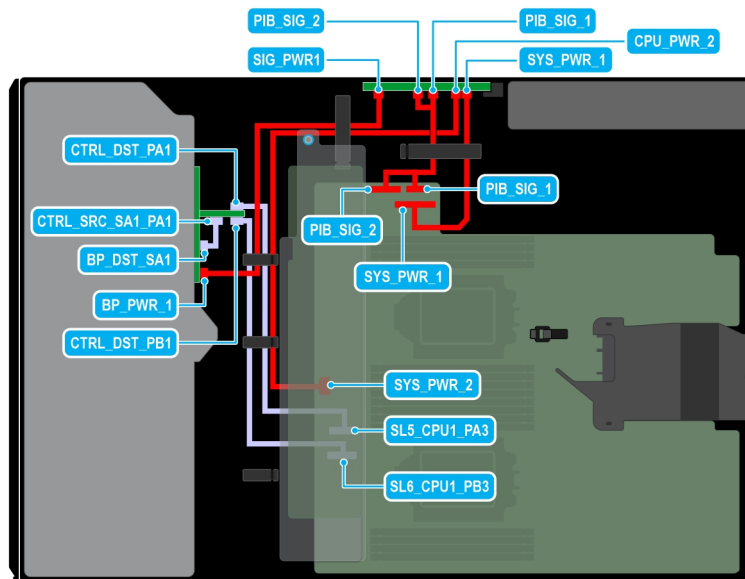


Figure 68. Configuration 30: 8 x2.5-inch (SAS4/SATA) fPERC11 + GPUx2 on CPU 2

Table 101. Configuration 30: 8 x2.5-inch (SAS4/SATA) fPERC11 + GPUx2 on CPU 2

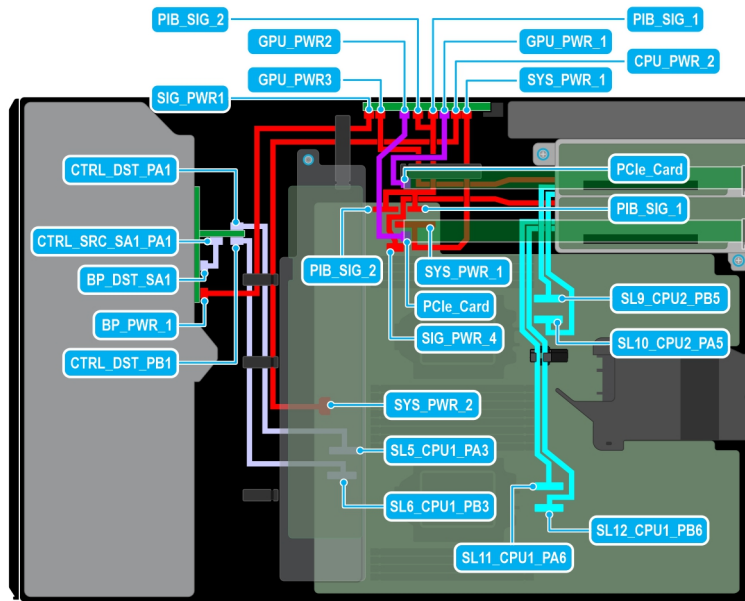
| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane power connector)                                                                  | SIG_PWR_2 (Power connector on PIB)                                                    |
| 4     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 5     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 6     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 7     | SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)                                    | GPU Riser 1                                                                           |
| 8     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 9     | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |



**Figure 69. Configuration 31: 8 x2.5-inch (SAS4/SATA) fPERC12 on CPU 2**

**Table 102. Configuration 31: 8 x2.5-inch (SAS4/SATA) fPERC12 on CPU 2**

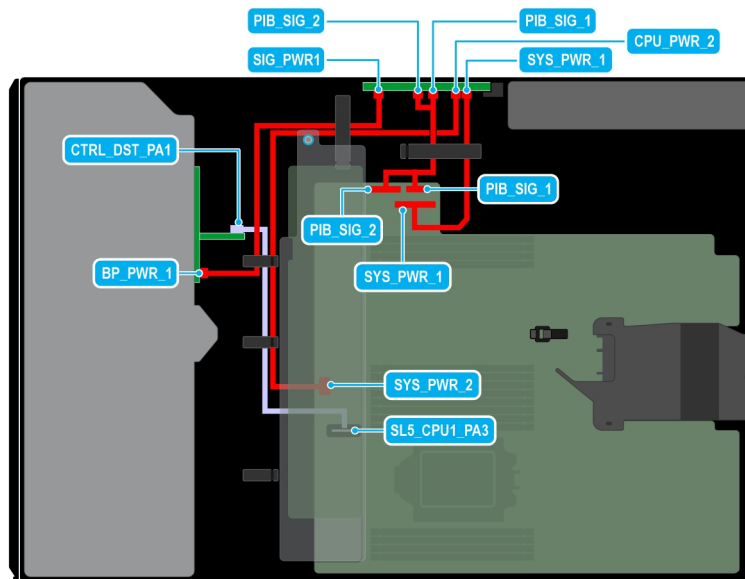
| Order | From                                             | To                                              |
|-------|--------------------------------------------------|-------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)      | SYS_PWR_1 (Power connector on PIB)              |
| 2     | SYS_PWR_2 (Power connector on system board)      | CPU_PWR_2 (Power connector on PIB)              |
| 3     | BP_PWR_1 (Backplane power connector)             | SIG_PWR_2 (Power connector on PIB)              |
| 4     | PIB_SIG_1 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB)        |
| 5     | PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_2 (PIB signal connectors on PIB)        |
| 6     | SL5_CPU1_PA3 (Signal connector on system board)  | CTRL_DST_PA1 (fPERC 12 connector)               |
| 7     | SL6_CPU1_PB3 (Signal connector on system board)  | CTRL_DST_PB1 (fPERC 12 connector)               |
| 8     | BP_DST_SA1 (Backplane signal connector)          | CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12) |



**Figure 70. Configuration 32: 8 x2.5-inch ( SAS4/SATA) fPERC12 + GPUx2 on CPU 2**

**Table 103. Configuration 32: 8 x2.5-inch ( SAS4/SATA) fPERC12 + GPUx2 on CPU 2**

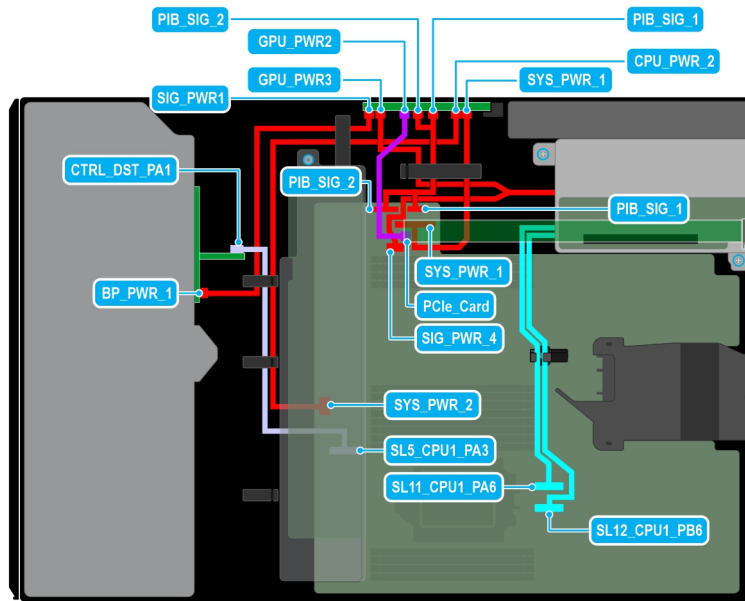
| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane power connector)                                                                  | SIG_PWR_2 (Power connector on PIB)                                                    |
| 4     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 5     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 6     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 7     | SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)                                    | GPU Riser 1                                                                           |
| 8     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 9     | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 12 connector)                                                     |
| 10    | SL6_CPU1_PB3 (Signal connector on system board)                                                       | CTRL_DST_PB1 (fPERC 12 connector)                                                     |
| 11    | BP_DST_SA1 (Backplane signal connector)                                                               | CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12)                                       |



**Figure 71. Configuration 33: 8 x2.5-inch (SAS4/SATA) fPERC11 on CPU 1**

**Table 104. Configuration 33: 8 x2.5-inch (SAS4/SATA) fPERC11 on CPU 1**

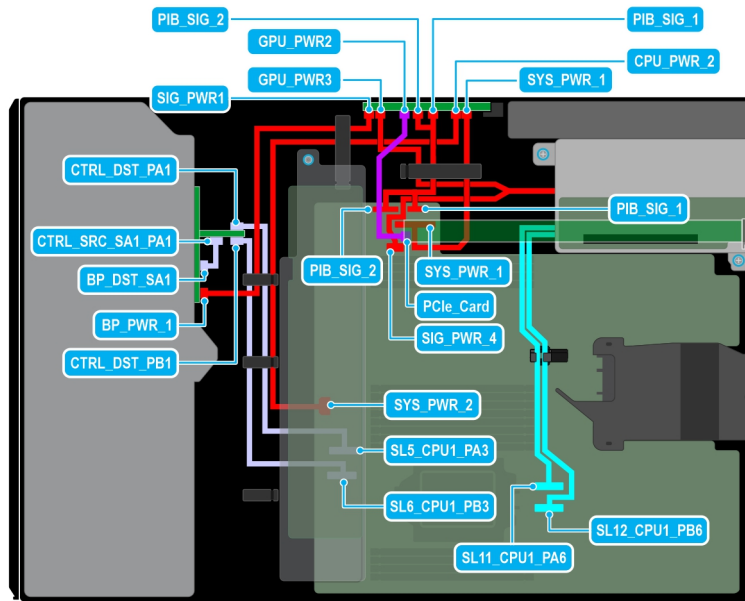
| Order | From                                             | To                                       |
|-------|--------------------------------------------------|------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)      | SYS_PWR_1 (Power connector on PIB)       |
| 2     | SYS_PWR_2 (Power connector on system board)      | CPU_PWR_2 (Power connector on PIB)       |
| 3     | BP_PWR_1 (Backplane power connector)             | SIG_PWR_2 (Power connector on PIB)       |
| 4     | PIB_SIG_1 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) |
| 5     | PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_2 (PIB signal connectors on PIB) |
| 6     | SL5_CPU1_PA3 (Signal connector on system board)  | CTRL_DST_PA1 (fPERC 11 connector)        |



**Figure 72. Configuration 34: 8 x2.5-inch (SAS4/SATA) fPERC11 + GPUx 1 on CPU 1**

**Table 105. Configuration 34: 8 x2.5-inch (SAS4/SATA) fPERC11 + GPUx 1 on CPU 1**

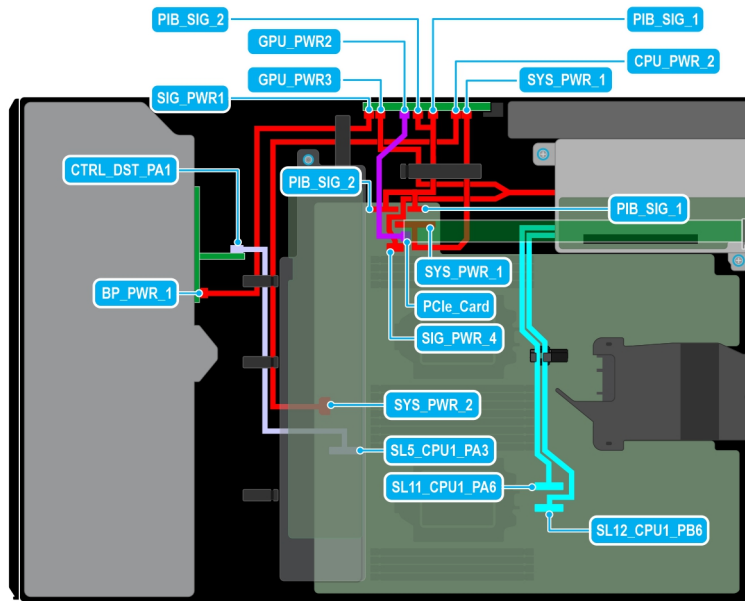
| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane power connector)                                                                  | SIG_PWR_2 (Power connector on PIB)                                                    |
| 4     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 5     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 6     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 7     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 8     | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |



**Figure 73. Configuration 35: 8 x2.5-inch ( SAS4/SATA) fPERC12 + GPUx 1 on CPU 1**

**Table 106. Configuration 35: 8 x2.5-inch ( SAS4/SATA) fPERC12 + GPUx 1 on CPU 1**

| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane power connector)                                                                  | SIG_PWR_2 (Power connector on PIB)                                                    |
| 4     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 5     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 6     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 7     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 8     | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 12 connector)                                                     |
| 9     | SL6_CPU1_PB3 (Signal connector on system board)                                                       | CTRL_DST_PB1 (fPERC 12 connector)                                                     |
| 10    | BP_DST_SA1 (Backplane signal connector)                                                               | CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12)                                       |

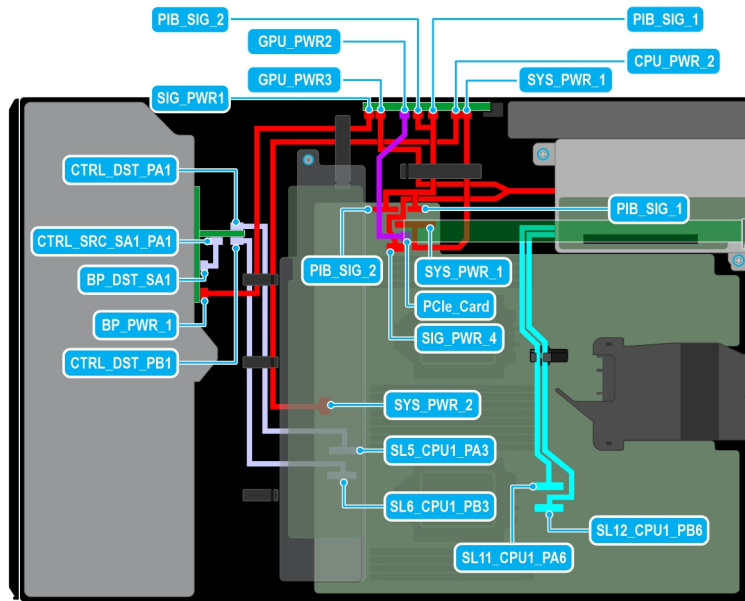


**Figure 74. Configuration 36: 8 x2.5 -inch (SAS4/SATA) fPERC11 + GPUx 1 on CPU 2**

**Table 107. Configuration 36: 8 x2.5 -inch (SAS4/SATA) fPERC11 + GPUx 1 on CPU 2**

| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane power connector)                                                                  | SIG_PWR_2 (Power connector on PIB)                                                    |
| 4     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 5     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 6     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 7     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 8     | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |

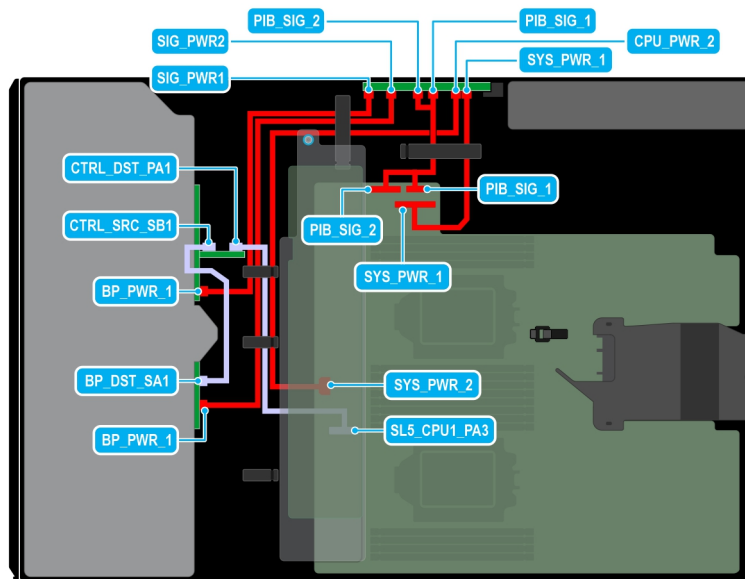




**Figure 75. Configuration 37: 8 x2.5-inch ( SAS4/SATA) fPERC12 + GPUx 1 on CPU 2**

**Table 108. Configuration 37: 8 x2.5-inch ( SAS4/SATA) fPERC12 + GPUx 1 on CPU 2**

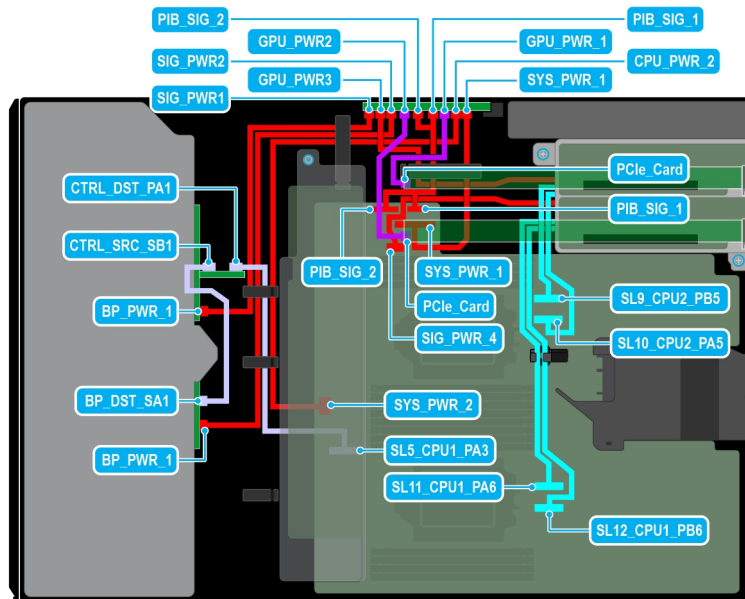
| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane power connector)                                                                  | SIG_PWR_2 (Power connector on PIB)                                                    |
| 4     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 5     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 6     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 7     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 8     | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 12 connector)                                                     |
| 9     | SL6_CPU1_PB3 (Signal connector on system board)                                                       | CTRL_DST_PB1 (fPERC 12 connector)                                                     |
| 10    | BP_DST_SA1 (Backplane signal connector)                                                               | CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12)                                       |



**Figure 76. Configuration 38: 16 x2.5 -inch (SAS4/SATA) fPERC11 on CPU 2**

**Table 109. Configuration 38: 16 x2.5 -inch (SAS4/SATA) fPERC11 on CPU 2**

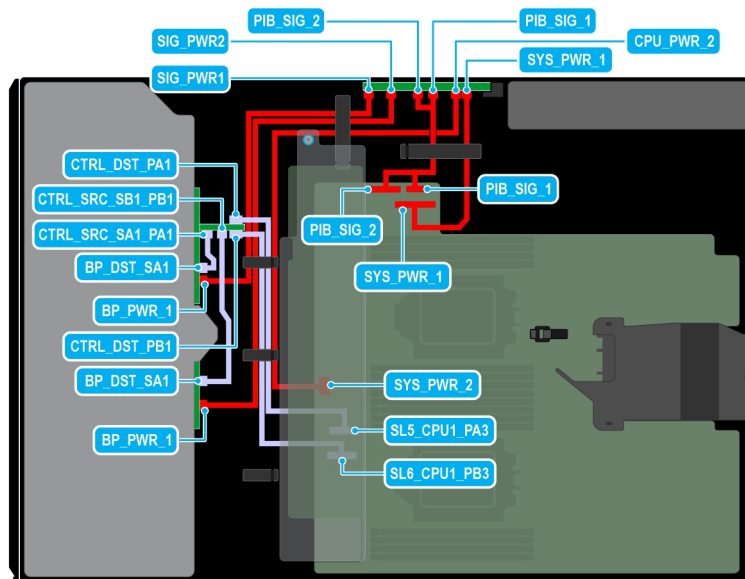
| Order | From                                             | To                                       |
|-------|--------------------------------------------------|------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)      | SYS_PWR_1 (Power connector on PIB)       |
| 2     | SYS_PWR_2 (Power connector on system board)      | CPU_PWR_2 (Power connector on PIB)       |
| 3     | BP_PWR_1 (Backplane 1 power connector)           | SIG_PWR_1 (Power connector on PIB)       |
| 4     | BP_PWR_1 (Backplane 2 power connector)           | SIG_PWR_2 (Power connector on PIB)       |
| 5     | PIB_SIG_1 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) |
| 6     | PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_2 (PIB signal connectors on PIB) |
| 7     | SL5_CPU1_PA3 (Signal connector on system board)  | CTRL_DST_PA1 (fPERC 11 connector)        |
| 8     | BP_DST_SB1 (Backplane signal connector)          | CTRL_SRC_SB1 (fPERC 11 signal connector) |



**Figure 77. Configuration 39: 16 x2.5 -inch (SAS4/SATA) fPERC11 + GPUx2 on CPU 2**

**Table 110. Configuration 39: 16 x2.5 -inch (SAS4/SATA) fPERC11 + GPUx2 on CPU 2**

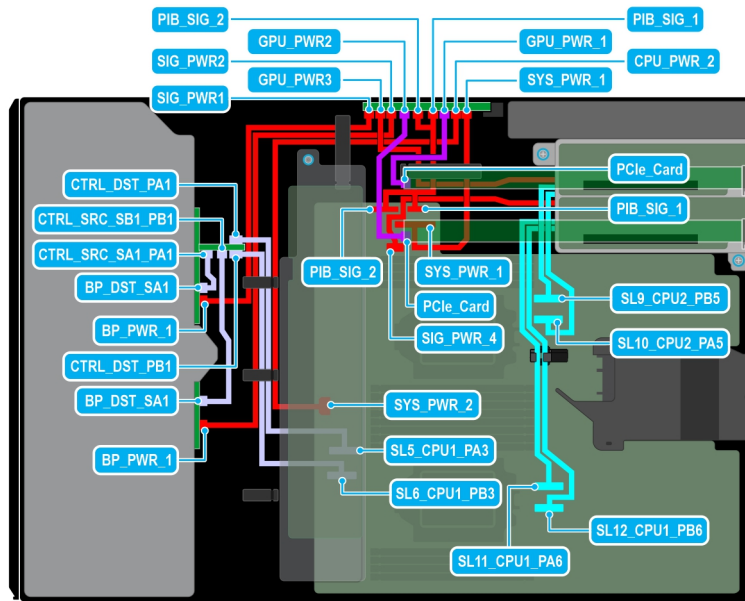
| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane 1 power connector)                                                                | SIG_PWR_1 (Power connector on PIB)                                                    |
| 4     | BP_PWR_1 (Backplane 2 power connector)                                                                | SIG_PWR_2 (Power connector on PIB)                                                    |
| 5     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 6     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 7     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 8     | SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)                                    | GPU Riser 1                                                                           |
| 9     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 10    | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |
| 11    | BP_DST_SB1 (Backplane signal connector)                                                               | CTRL_SRC_SB1 (fPERC 11 signal connector)                                              |



**Figure 78. Configuration 40: 16 x2.5-inch ( SAS4/SATA) fPERC12 on CPU 2**

**Table 111. Configuration 40:16 x2.5-inch ( SAS4/SATA) fPERC12 on CPU 2**

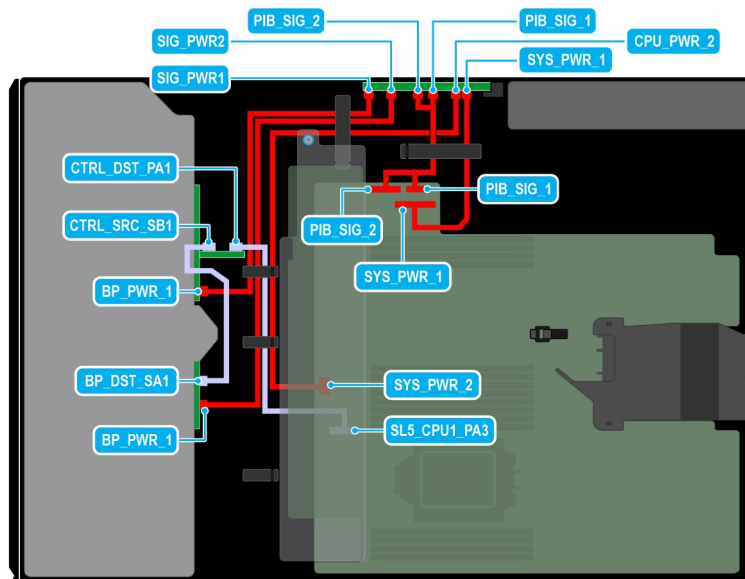
| Order | From                                             | To                                              |
|-------|--------------------------------------------------|-------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)      | SYS_PWR_1 (Power connector on PIB)              |
| 2     | SYS_PWR_2 (Power connector on system board)      | CPU_PWR_2 (Power connector on PIB)              |
| 3     | BP_PWR_1 (Backplane 1 power connector)           | SIG_PWR_1 (Power connector on PIB)              |
| 4     | BP_PWR_1 (Backplane 2 power connector)           | SIG_PWR_2 (Power connector on PIB)              |
| 5     | PIB_SIG_1 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB)        |
| 6     | PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_2 (PIB signal connectors on PIB)        |
| 7     | SL5_CPU1_PA3 (Signal connector on system board)  | CTRL_DST_PA1 (fPERC 12 connector)               |
| 8     | SL6_CPU1_PB3 (Signal connector on system board)  | CTRL_DST_PB1 (fPERC 12 connector)               |
| 9     | BP_DST_SA1 (Backplane 1 signal connector)        | CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12) |
| 10    | BP_DST_SA1 (Backplane 2 signal connector)        | CTRL_SRC_SB1_PB1 (Signal connector on fPERC 12) |



**Figure 79. Configuration 41: 16 x2.5-inch ( SAS4/SATA) fPERC12 + GPUx2 on CPU 2**

**Table 112. Configuration 41: 16 x2.5-inch ( SAS4/SATA) fPERC12 + GPUx2 on CPU 2**

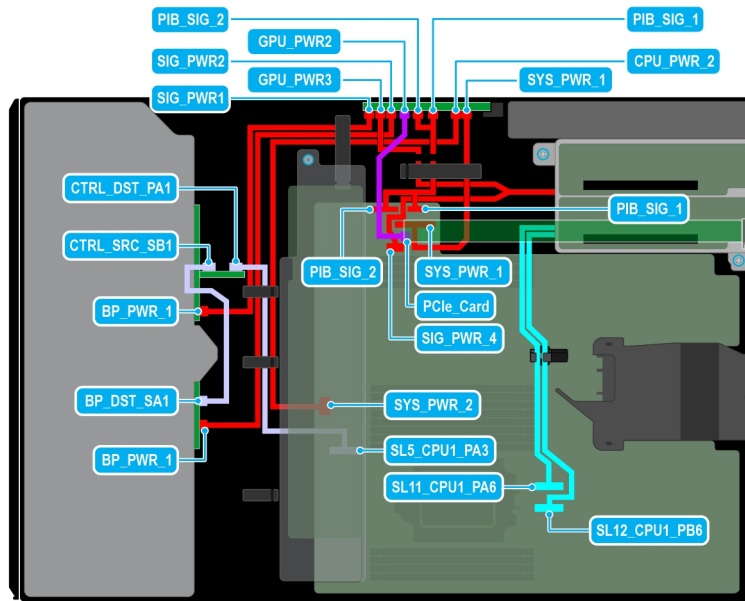
| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane 1 power connector)                                                                | SIG_PWR_1 (Power connector on PIB)                                                    |
| 4     | BP_PWR_1 (Backplane 2 power connector)                                                                | SIG_PWR_2 (Power connector on PIB)                                                    |
| 5     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 6     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 7     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 8     | SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)                                    | GPU Riser 1                                                                           |
| 9     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 10    | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |
| 11    | SL6_CPU1_PB3 (Signal connector on system board)                                                       | CTRL_DST_PB1 (fPERC 12 connector)                                                     |
| 12    | BP_DST_SA1 (Backplane 1 signal connector)                                                             | CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12)                                       |
| 13    | BP_DST_SA1 (Backplane 2 signal connector)                                                             | CTRL_SRC_SB1_PB1 (Signal connector on fPERC 12)                                       |



**Figure 80. Configuration 42 : 16 x2.5-inch (SAS4/SATA) fPERC11 on CPU 1**

**Table 113. Configuration 42 : 16 x2.5-inch (SAS4/SATA) fPERC11 on CPU 1**

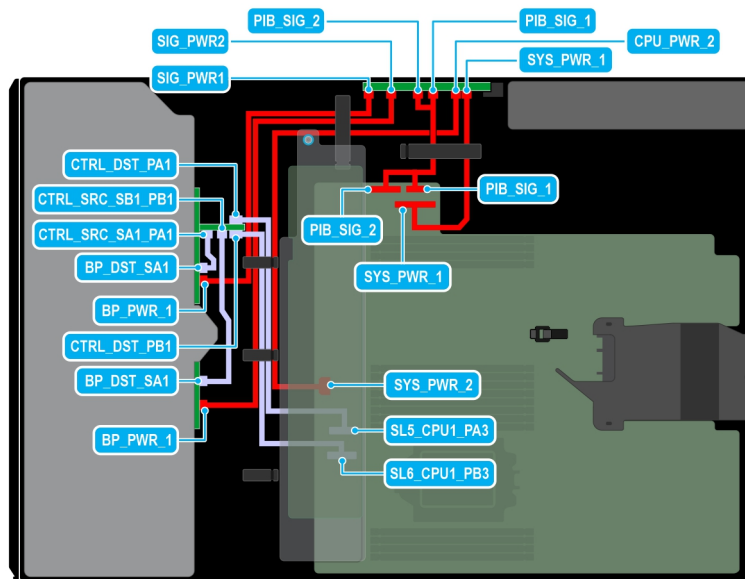
| Order | From                                             | To                                       |
|-------|--------------------------------------------------|------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)      | SYS_PWR_1 (Power connector on PIB)       |
| 2     | SYS_PWR_2 (Power connector on system board)      | CPU_PWR_2 (Power connector on PIB)       |
| 3     | BP_PWR_1 (Backplane 1 power connector)           | SIG_PWR_1 (Power connector on PIB)       |
| 4     | BP_PWR_1 (Backplane 2 power connector)           | SIG_PWR_2 (Power connector on PIB)       |
| 5     | PIB_SIG_1 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) |
| 6     | PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_2 (PIB signal connectors on PIB) |
| 7     | SL5_CPU1_PA3 (Signal connector on system board)  | CTRL_DST_PA1 (fPERC 11 connector)        |
| 8     | BP_DST_SB1 (Backplane signal connector)          | CTRL_SRC_SB1 (fPERC 11 signal connector) |



**Figure 81. Configuration 43: 16 x2.5-inch (SAS4/SATA) fPERC11 + GPUx 1 on CPU 1**

**Table 114. Configuration 43: 16 x2.5-inch (SAS4/SATA) fPERC11 + GPUx 1 on CPU 1**

| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane 1 power connector)                                                                | SIG_PWR_1 (Power connector on PIB)                                                    |
| 4     | BP_PWR_1 (Backplane 2 power connector)                                                                | SIG_PWR_2 (Power connector on PIB)                                                    |
| 5     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 6     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 7     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 8     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 9     | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |
| 10    | BP_DST_SB1 (Backplane signal connector)                                                               | CTRL_SRC_SB1 (fPERC 11 signal connector)                                              |

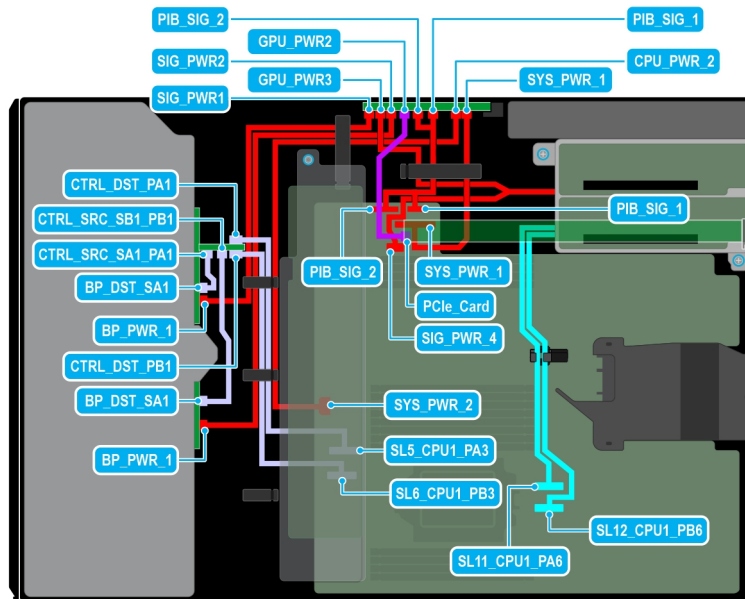


**Figure 82. Configuration 44: 16 x2.5-inch ( SAS4/SATA) fPERC12 on CPU 1**

**Table 115. Configuration 44: 16 x2.5-inch ( SAS4/SATA) fPERC12 on CPU 1**

| Order | From                                             | To                                              |
|-------|--------------------------------------------------|-------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)      | SYS_PWR_1 (Power connector on PIB)              |
| 2     | SYS_PWR_2 (Power connector on system board)      | CPU_PWR_2 (Power connector on PIB)              |
| 3     | BP_PWR_1 (Backplane 1 power connector)           | SIG_PWR_1 (Power connector on PIB)              |
| 4     | BP_PWR_1 (Backplane 2 power connector)           | SIG_PWR_2 (Power connector on PIB)              |
| 5     | PIB_SIG_1 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB)        |
| 6     | PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_2 (PIB signal connectors on PIB)        |
| 7     | SL5_CPU1_PA3 (Signal connector on system board)  | CTRL_DST_PA1 (fPERC 12 connector)               |
| 8     | SL6_CPU1_PB3 (Signal connector on system board)  | CTRL_DST_PB1 (fPERC 12 connector)               |
| 9     | BP_DST_SA1 (Backplane 1 signal connector)        | CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12) |
| 10    | BP_DST_SA1 (Backplane 2 signal connector)        | CTRL_SRC_SB1_PB1 (Signal connector on fPERC 12) |

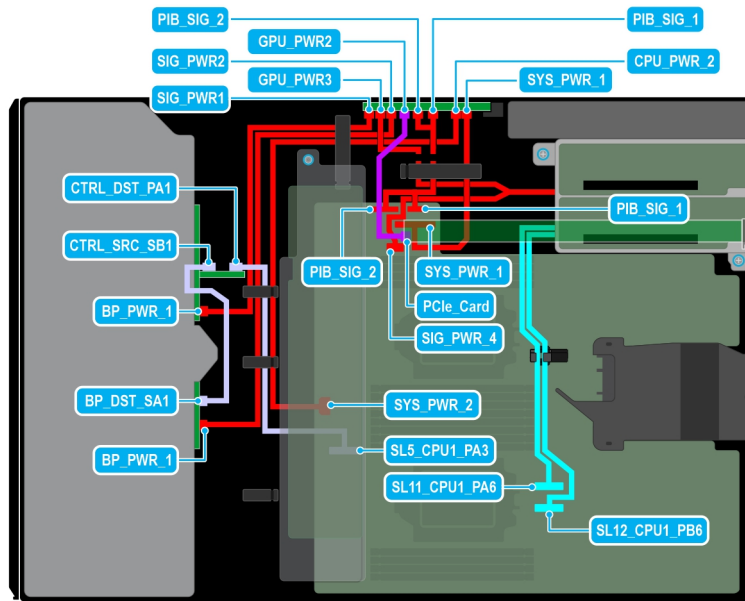




**Figure 83. Configuration 45:16 x2.5 -inch ( SAS4/SATA) fPERC12 + GPUx1 on CPU 1**

**Table 116. Configuration 45: 16 x2.5 -inch ( SAS4/SATA) fPERC12 + GPUx1 on CPU 1**

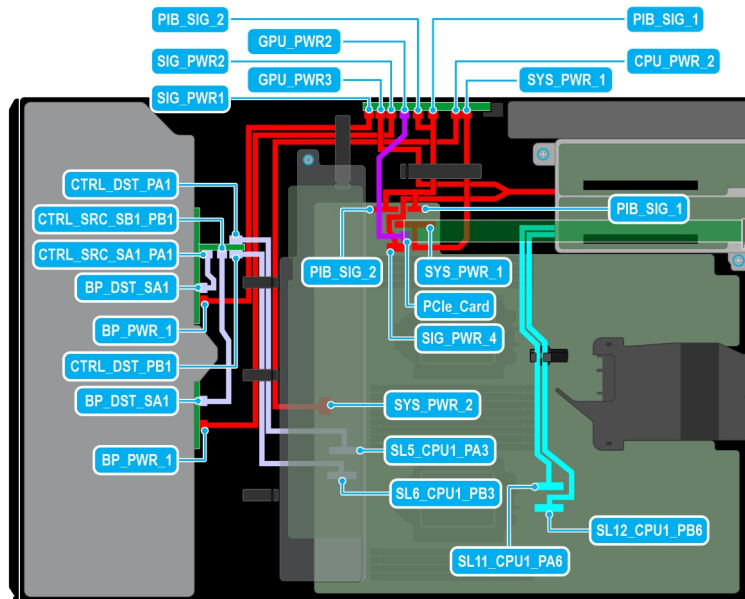
| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane 1 power connector)                                                                | SIG_PWR_1 (Power connector on PIB)                                                    |
| 4     | BP_PWR_1 (Backplane 2 power connector)                                                                | SIG_PWR_2 (Power connector on PIB)                                                    |
| 5     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 6     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 7     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 8     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 9     | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |
| 10    | SL6_CPU1_PB3 (Signal connector on system board)                                                       | CTRL_DST_PB1 (fPERC 12 connector)                                                     |
| 11    | BP_DST_SA1 (Backplane 1 signal connector)                                                             | CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12)                                       |
| 12    | BP_DST_SA1 (Backplane 2 signal connector)                                                             | CTRL_SRC_SB1_PB1 (Signal connector on fPERC 12)                                       |



**Figure 84. Configuration 46: 16 x2.5-inch (SAS4/SATA) fPERC11 + GPUx 1 on CPU 2**

**Table 117. Configuration 46 16 x2.5-inch (SAS4/SATA) fPERC11 + GPUx 1 on CPU 2**

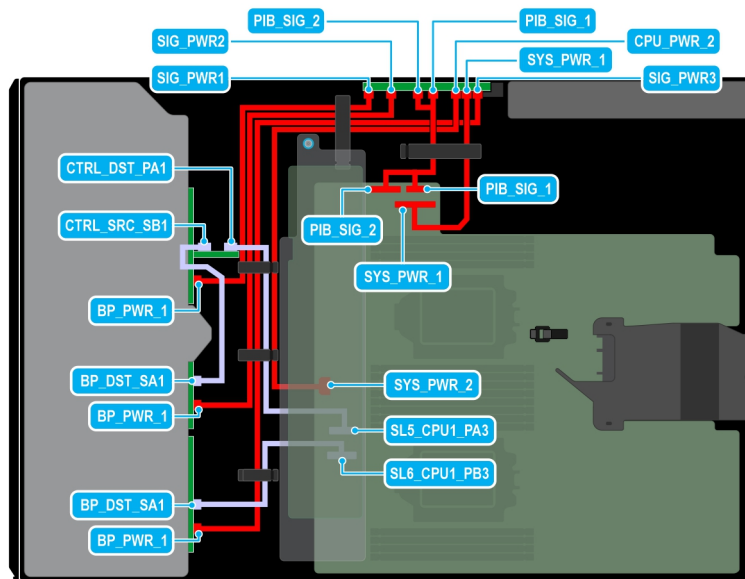
| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane 1 power connector)                                                                | SIG_PWR_1 (Power connector on PIB)                                                    |
| 4     | BP_PWR_1 (Backplane 2 power connector)                                                                | SIG_PWR_2 (Power connector on PIB)                                                    |
| 5     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 6     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 7     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 8     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 9     | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |
| 10    | BP_DST_SB1 (Backplane signal connector)                                                               | CTRL_SRC_SB1 (fPERC 11 signal connector)                                              |



**Figure 85. Configuration 47: 16 x2.5 -inch ( SAS4/SATA) fPERC12 + GPUx1 on CPU 2**

**Table 118. Configuration 47: 16 x2.5 -inch ( SAS4/SATA) fPERC12 + GPUx1 on CPU 2**

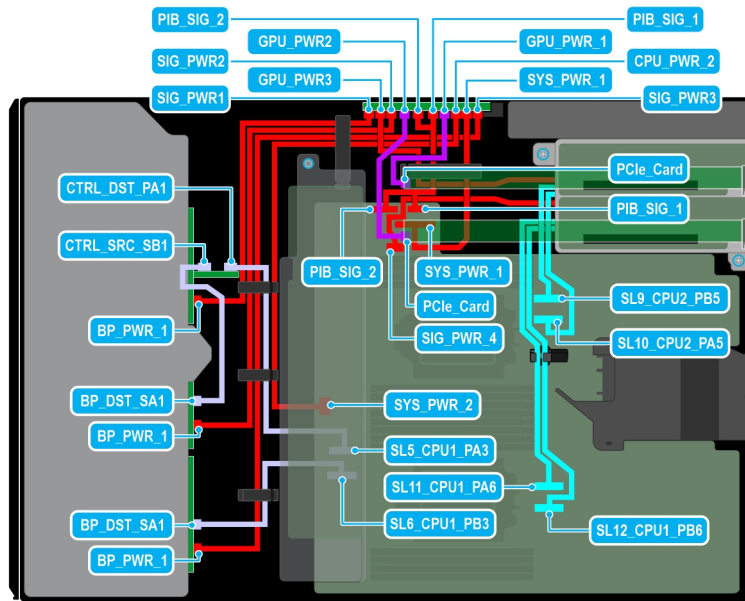
| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane 1 power connector)                                                                | SIG_PWR_1 (Power connector on PIB)                                                    |
| 4     | BP_PWR_1 (Backplane 2 power connector)                                                                | SIG_PWR_2 (Power connector on PIB)                                                    |
| 5     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 6     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 7     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 8     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 9     | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |
| 10    | SL6_CPU1_PB3 (Signal connector on system board)                                                       | CTRL_DST_PB1 (fPERC 12 connector)                                                     |
| 11    | BP_DST_SA1 (Backplane 1 signal connector)                                                             | CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12)                                       |
| 12    | BP_DST_SA1 (Backplane 2 signal connector)                                                             | CTRL_SRC_SB1_PB1 (Signal connector on fPERC 12)                                       |



**Figure 86. Configuration 48: 24x2.5-inch (SAS4/SATA) fPERC11 on CPU 2**

**Table 119. Configuration 48: 24x2.5-inch (SAS4/SATA) fPERC11 on CPU 2**

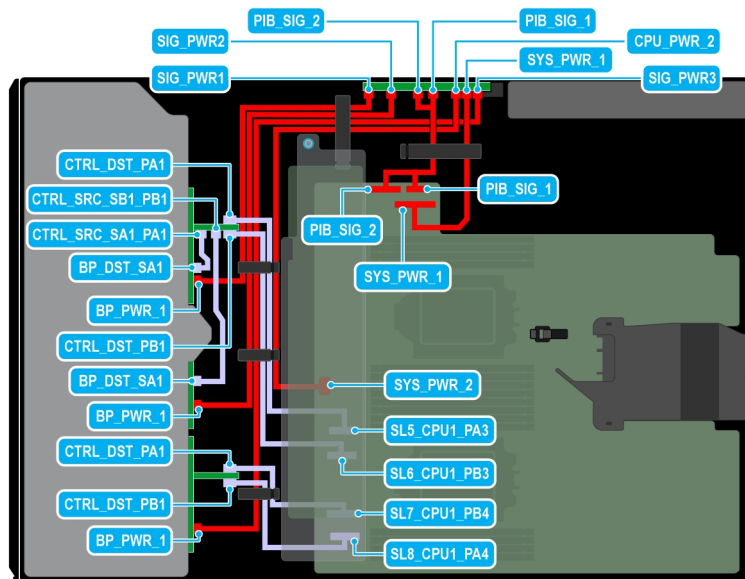
| Order | From                                             | To                                       |
|-------|--------------------------------------------------|------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)      | SYS_PWR_1 (Power connector on PIB)       |
| 2     | SYS_PWR_2 (Power connector on system board)      | CPU_PWR_2 (Power connector on PIB)       |
| 3     | BP_PWR_1 (Backplane 1 power connector)           | SIG_PWR_1 (Power connector on PIB)       |
| 4     | BP_PWR_1 (Backplane 2 power connector)           | SIG_PWR_2 (Power connector on PIB)       |
| 5     | BP_PWR_1 (Backplane 3 power connector)           | SIG_PWR_3 (Power connector on PIB)       |
| 6     | PIB_SIG_1 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) |
| 7     | PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_2 (PIB signal connectors on PIB) |
| 8     | SL5_CPU1_PA3 (Signal connector on system board)  | CTRL_DST_PA1 (fPERC 11 connector)        |
| 9     | BP_DST_SA1 (Backplane signal connector)          | CTRL_SRC_SB1 (fPERC 11 signal connector) |
| 10    | SL6_CPU1_PB3 (Signal connector on system board)  | BP_DST_PB1 (Backplane signal connector)  |



**Figure 87. Configuration 49: 24x2.5-inch (SAS4/SATA) fPERC11 + GPUx2 on CPU 2**

**Table 120. Configuration 49: 24x2.5-inch (SAS4/SATA) fPERC11 + GPUx2 on CPU 2**

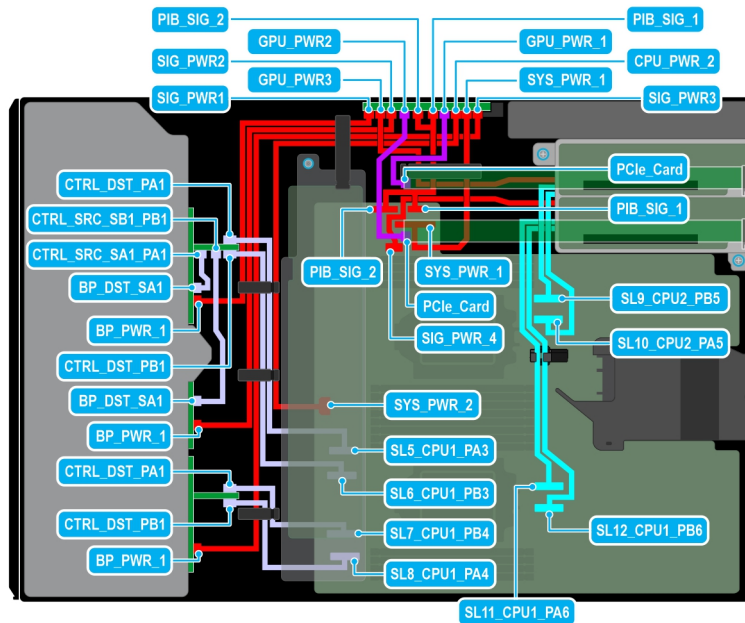
| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane 1 power connector)                                                                | SIG_PWR_1 (Power connector on PIB)                                                    |
| 4     | BP_PWR_1 (Backplane 2 power connector)                                                                | SIG_PWR_2 (Power connector on PIB)                                                    |
| 5     | BP_PWR_1 (Backplane 3 power connector)                                                                | SIG_PWR_3 (Power connector on PIB)                                                    |
| 6     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 7     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 8     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 9     | SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)                                    | GPU Riser 1                                                                           |
| 10    | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 11    | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |
| 12    | BP_DST_SA1 (Backplane signal connector)                                                               | CTRL_SRC_SB1 (fPERC 11 signal connector)                                              |
| 13    | SL6_CPU1_PB3 (Signal connector on system board)                                                       | BP_DST_PB1 (Backplane signal connector)                                               |



**Figure 88. Configuration 50: 24x2.5-inch (SAS4/SATA) fPERC12 on CPU 2**

**Table 121. Configuration 50: 24x2.5-inch (SAS4/SATA) fPERC12 on CPU 2**

| Order | From                                             | To                                              |
|-------|--------------------------------------------------|-------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)      | SYS_PWR_1 (Power connector on PIB)              |
| 2     | SYS_PWR_2 (Power connector on system board)      | CPU_PWR_2 (Power connector on PIB)              |
| 3     | BP_PWR_1 (Backplane 1 power connector)           | SIG_PWR_1 (Power connector on PIB)              |
| 4     | BP_PWR_1 (Backplane 2 power connector)           | SIG_PWR_2 (Power connector on PIB)              |
| 5     | BP_PWR_1 (Backplane 3 power connector)           | SIG_PWR_3 (Power connector on PIB)              |
| 6     | PIB_SIG_1 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB)        |
| 7     | PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_2 (PIB signal connectors on PIB)        |
| 8     | SL5_CPU1_PA3 (Signal connector on system board)  | CTRL_DST_PA1 (fPERC 12 connector)               |
| 9     | BP_DST_SA1 (Backplane signal connector)          | CTRL_SRC_SB1 (fPERC 12 signal connector)        |
| 10    | SL6_CPU1_PB3 (Signal connector on system board)  | BP_DST_PB1 (Backplane signal connector)         |
| 11    | SL7_CPU1_PB4 (Signal connector on system board)  | CTRL_DST_PA1 (fPERC 12 connector)               |
| 12    | SL8_CPU1_PA4 (Signal connector on system board)  | CTRL_DST_PB1 (fPERC 12 connector)               |
| 13    | BP_DST_SA1 (Backplane 1 signal connector)        | CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12) |
| 14    | BP_DST_SA1 (Backplane 2 signal connector)        | CTRL_SRC_SB1_PB1 (Signal connector on fPERC 12) |



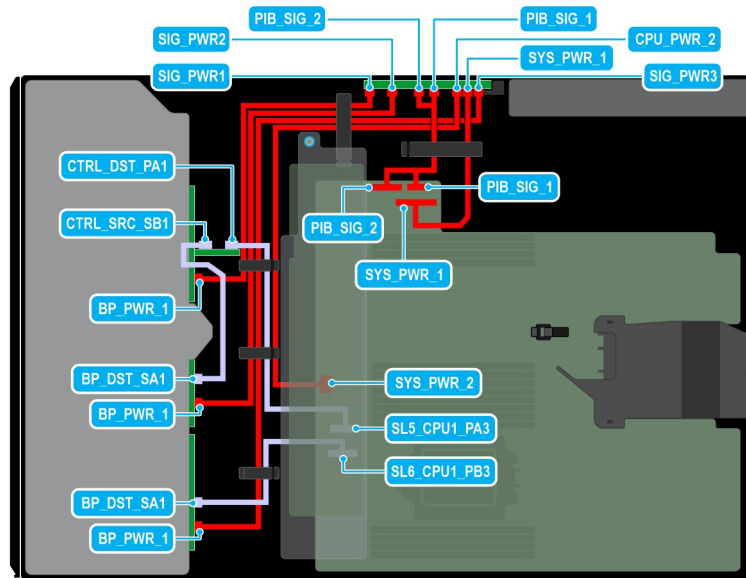
**Figure 89. Configuration 51: 24x2.5-inch (SAS4/SATA) fPERC12 + GPUx2 on CPU 2**

**Table 122. Configuration 51: 24x2.5-inch (SAS4/SATA) fPERC12 + GPUx2 on CPU 2**

| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane 1 power connector)                                                                | SIG_PWR_1 (Power connector on PIB)                                                    |
| 4     | BP_PWR_1 (Backplane 2 power connector)                                                                | SIG_PWR_2 (Power connector on PIB)                                                    |
| 5     | BP_PWR_1 (Backplane 3 power connector)                                                                | SIG_PWR_3 (Power connector on PIB)                                                    |
| 6     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 7     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 8     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 9     | SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)                                    | GPU Riser 1                                                                           |
| 10    | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 11    | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 12 connector)                                                     |
| 12    | BP_DST_SA1 (Backplane signal connector)                                                               | CTRL_SRC_SB1 (fPERC 12 signal connector)                                              |
| 13    | SL6_CPU1_PB3 (Signal connector on system board)                                                       | BP_DST_PB1 (Backplane signal connector)                                               |
| 14    | SL7_CPU1_PB4 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 12 connector)                                                     |

**Table 122. Configuration 51: 24x2.5-inch (SAS4/SATA) fPERC12 + GPUx2 on CPU 2 (continued)**

| Order | From                                            | To                                              |
|-------|-------------------------------------------------|-------------------------------------------------|
| 15    | SL8_CPU1_PA4 (Signal connector on system board) | CTRL_DST_PB1 (fPERC 12 connector)               |
| 16    | BP_DST_SA1 (Backplane 1 signal connector)       | CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12) |
| 17    | BP_DST_SA1 (Backplane 2 signal connector)       | CTRL_SRC_SB1_PB1 (Signal connector on fPERC 12) |

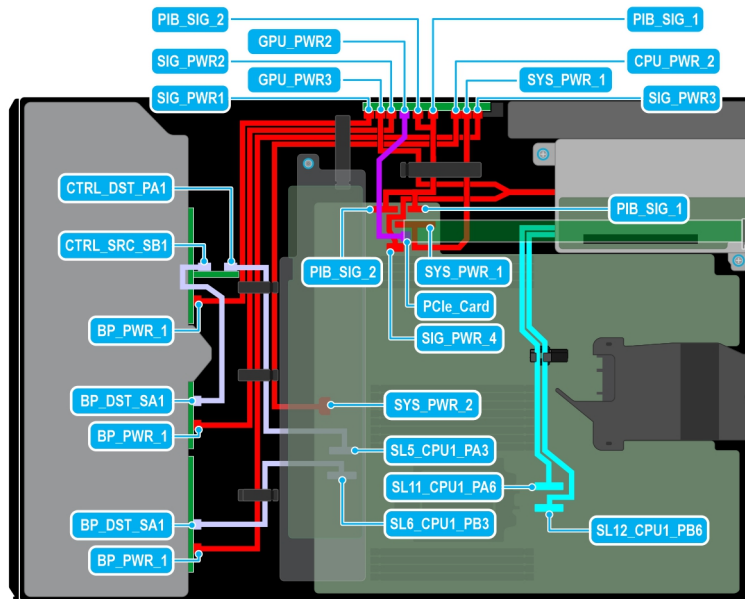


**Figure 90. Configuration 52: 24x2.5-inch (SAS4/SATA) fPERC11 on CPU 1**

**Table 123. Configuration 52: 24x2.5-inch (SAS4/SATA) fPERC11 on CPU 1**

| Order | From                                             | To                                       |
|-------|--------------------------------------------------|------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)      | SYS_PWR_1 (Power connector on PIB)       |
| 2     | SYS_PWR_2 (Power connector on system board)      | CPU_PWR_2 (Power connector on PIB)       |
| 3     | BP_PWR_1 (Backplane 1 power connector)           | SIG_PWR_1 (Power connector on PIB)       |
| 4     | BP_PWR_1 (Backplane 2 power connector)           | SIG_PWR_2 (Power connector on PIB)       |
| 5     | BP_PWR_1 (Backplane 3 power connector)           | SIG_PWR_3 (Power connector on PIB)       |
| 6     | PIB_SIG_1 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) |
| 7     | PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_2 (PIB signal connectors on PIB) |
| 8     | SL5_CPU1_PA3 (Signal connector on system board)  | CTRL_DST_PA1 (fPERC 11 connector)        |
| 9     | BP_DST_SA1 (Backplane signal connector)          | CTRL_SRC_SB1 (fPERC 11 signal connector) |
| 10    | SL6_CPU1_PB3 (Signal connector on system board)  | BP_DST_PB1 (Backplane signal connector)  |

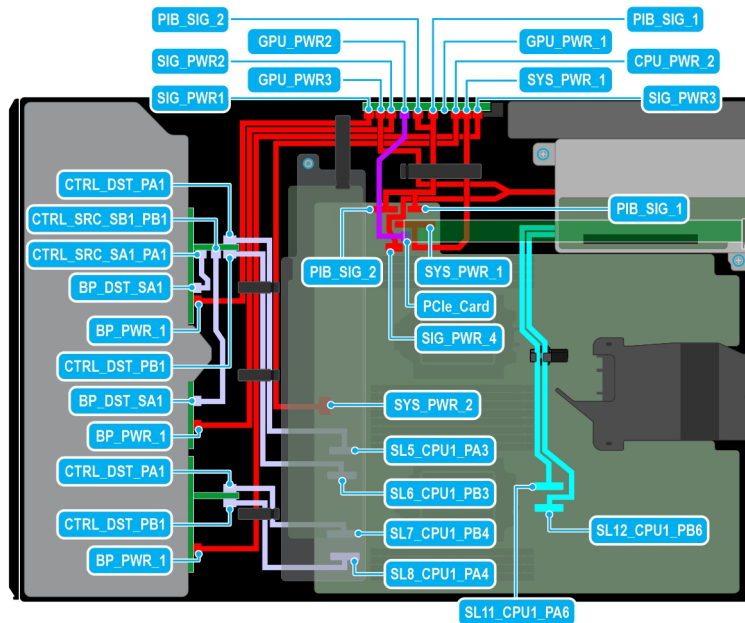




**Figure 91. Configuration 53: 24x2.5-inch (SAS4/SATA) fPERC11 + GPUx1 on CPU 1**

**Table 124. Configuration 53: 24x2.5-inch (SAS4/SATA) fPERC11 + GPUx1 on CPU 1**

| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane 1 power connector)                                                                | SIG_PWR_1 (Power connector on PIB)                                                    |
| 4     | BP_PWR_1 (Backplane 2 power connector)                                                                | SIG_PWR_2 (Power connector on PIB)                                                    |
| 5     | BP_PWR_1 (Backplane 3 power connector)                                                                | SIG_PWR_3 (Power connector on PIB)                                                    |
| 6     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 7     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 8     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 9     | SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)                                    | GPU Riser 1                                                                           |
| 10    | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 11    | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |
| 12    | BP_DST_SA1 (Backplane signal connector)                                                               | CTRL_SRC_SB1 (fPERC 11 signal connector)                                              |
| 13    | SL6_CPU1_PB3 (Signal connector on system board)                                                       | BP_DST_PB1 (Backplane signal connector)                                               |



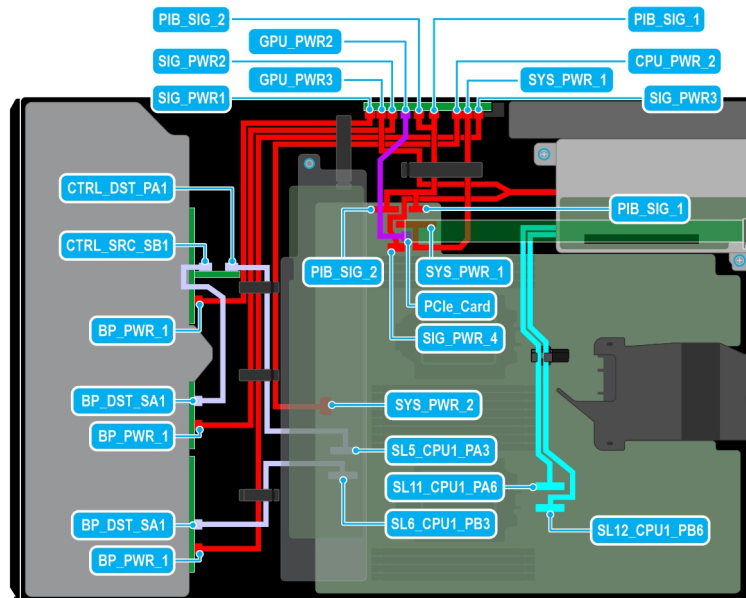
**Figure 92. Configuration 54: 24x2.5-inch (SAS4/SATA) fPERC12 + GPUx1 on CPU 1**

**Table 125. Configuration 54: 24x2.5-inch (SAS4/SATA) fPERC12 + GPUx1 on CPU 1**

| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane 1 power connector)                                                                | SIG_PWR_1 (Power connector on PIB)                                                    |
| 4     | BP_PWR_1 (Backplane 2 power connector)                                                                | SIG_PWR_2 (Power connector on PIB)                                                    |
| 5     | BP_PWR_1 (Backplane 3 power connector)                                                                | SIG_PWR_3 (Power connector on PIB)                                                    |
| 6     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 7     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 8     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 9     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 10    | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 12 connector)                                                     |
| 11    | BP_DST_SA1 (Backplane signal connector)                                                               | CTRL_SRC_SB1 (fPERC 12 signal connector)                                              |
| 12    | SL6_CPU1_PB3 (Signal connector on system board)                                                       | BP_DST_PB1 (Backplane signal connector)                                               |
| 13    | SL7_CPU1_PB4 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 12 connector)                                                     |
| 14    | SL8_CPU1_PA4 (Signal connector on system board)                                                       | CTRL_DST_PB1 (fPERC 12 connector)                                                     |

**Table 125. Configuration 54: 24x2.5-inch (SAS4/SATA) fPERC12 + GPUx1 on CPU 1 (continued)**

| Order | From                                      | To                                              |
|-------|-------------------------------------------|-------------------------------------------------|
| 15    | BP_DST_SA1 (Backplane 1 signal connector) | CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12) |
| 16    | BP_DST_SA1 (Backplane 2 signal connector) | CTRL_SRC_SB1_PB1 (Signal connector on fPERC 12) |



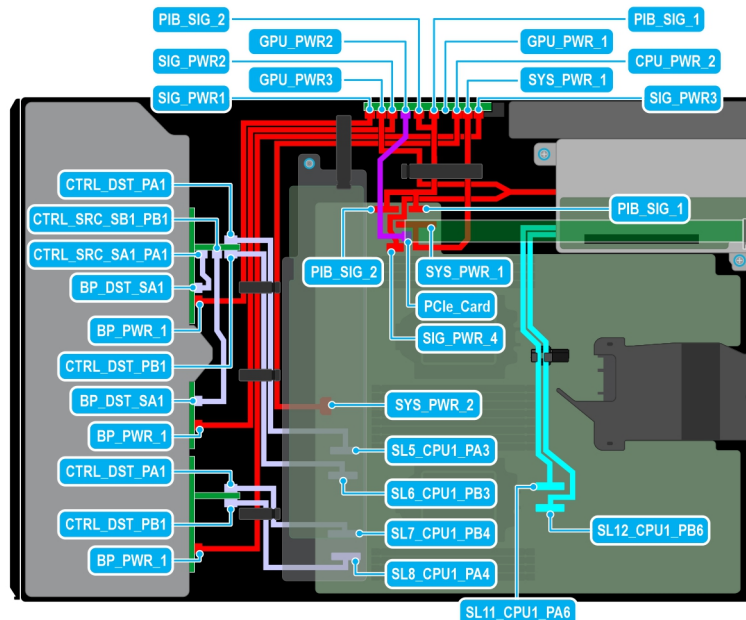
**Figure 93. Configuration 55: 24x2.5-inch (SAS4/SATA) PERC11 + GPUx1 on CPU 2**

**Table 126. Configuration 55: 24x2.5-inch (SAS4/SATA) PERC11 + GPUx1 on CPU 2**

| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane 1 power connector)                                                                | SIG_PWR_1 (Power connector on PIB)                                                    |
| 4     | BP_PWR_1 (Backplane 2 power connector)                                                                | SIG_PWR_2 (Power connector on PIB)                                                    |
| 5     | BP_PWR_1 (Backplane 3 power connector)                                                                | SIG_PWR_3 (Power connector on PIB)                                                    |
| 6     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 7     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 8     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 9     | SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)                                    | GPU Riser 1                                                                           |
| 10    | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 11    | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 11 connector)                                                     |

**Table 126. Configuration 55: 24x2.5-inch (SAS4/SATA) PERC11 + GPUx1 on CPU 2 (continued)**

| Order | From                                            | To                                       |
|-------|-------------------------------------------------|------------------------------------------|
| 12    | BP_DST_SA1 (Backplane signal connector)         | CTRL_SRC_SB1 (fPERC 11 signal connector) |
| 13    | SL6_CPU1_PB3 (Signal connector on system board) | BP_DST_PB1 (Backplane signal connector)  |



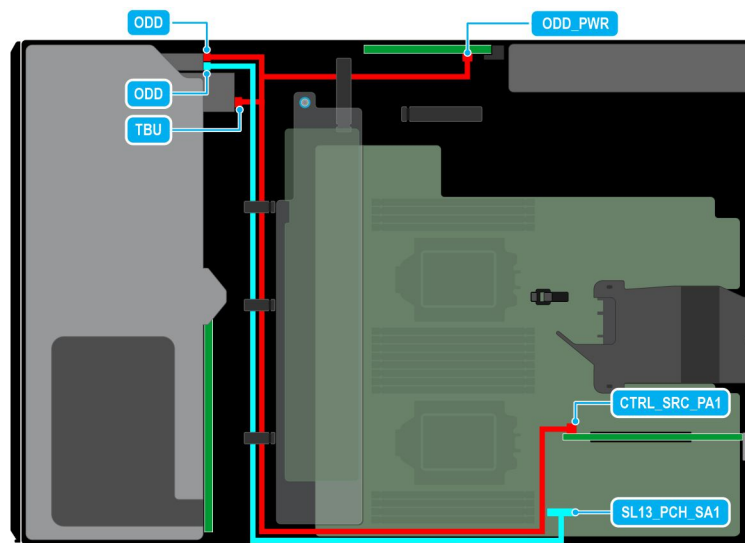
**Figure 94. Configuration 56: 24x2.5-inch (SAS4/SATA) fPERC12 + GPUx1 on CPU 2**

**Table 127. Configuration 56: 24x2.5-inch (SAS4/SATA) fPERC12 + GPUx1 on CPU 2**

| Order | From                                                                                                  | To                                                                                    |
|-------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | SYS_PWR_1 (Power connector on system board)                                                           | SYS_PWR_1 (Power connector on PIB)                                                    |
| 2     | SYS_PWR_2 (Power connector on system board)                                                           | CPU_PWR_2 (Power connector on PIB)                                                    |
| 3     | BP_PWR_1 (Backplane 1 power connector)                                                                | SIG_PWR_1 (Power connector on PIB)                                                    |
| 4     | BP_PWR_1 (Backplane 2 power connector)                                                                | SIG_PWR_2 (Power connector on PIB)                                                    |
| 5     | BP_PWR_1 (Backplane 3 power connector)                                                                | SIG_PWR_3 (Power connector on PIB)                                                    |
| 6     | PCIe card                                                                                             | GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)                                   |
| 7     | PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board) | PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB) |
| 8     | SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)                 | RISER_PWR_1 (GPU Riser)                                                               |
| 9     | SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)                                   | GPU Riser 2                                                                           |
| 10    | SL5_CPU1_PA3 (Signal connector on system board)                                                       | CTRL_DST_PA1 (fPERC 12 connector)                                                     |
| 11    | BP_DST_SA1 (Backplane signal connector)                                                               | CTRL_SRC_SB1 (fPERC 12 signal connector)                                              |

**Table 127. Configuration 56: 24x2.5-inch (SAS4/SATA) fPERC12 + GPUx1 on CPU 2 (continued)**

| Order | From                                            | To                                              |
|-------|-------------------------------------------------|-------------------------------------------------|
| 12    | SL6_CPU1_PB3 (Signal connector on system board) | BP_DST_PB1 (Backplane signal connector)         |
| 13    | SL7_CPU1_PB4 (Signal connector on system board) | CTRL_DST_PA1 (fPERC 12 connector)               |
| 14    | SL8_CPU1_PA4 (Signal connector on system board) | CTRL_DST_PB1 (fPERC 12 connector)               |
| 15    | BP_DST_SA1 (Backplane 1 signal connector)       | CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12) |
| 16    | BP_DST_SA1 (Backplane 2 signal connector)       | CTRL_SRC_SB1_PB1 (Signal connector on fPERC 12) |



**Figure 95. Configuration 57: 8x3.5 -inch ( SAS/SATA) + Optical disk drive + Tape backup unit**

**Table 128. Configuration 57: 8x3.5 -inch ( SAS/SATA) + Optical disk drive + Tape backup unit**

| Order | From                                                                                  | To                                                                   |
|-------|---------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| 1     | ODD_PWR (Optical disk drive power connector on PIB)                                   | ODD (Optical disk drive)                                             |
| 2     | DD_PWR (Optical disk drive power connector on PIB) and CTRL_SRC_SA1 (APERC connector) | TBU (Tape backup unit) and ODD (Optical disk drive)                  |
| 3     | SL13_PCH_SA1 (Signal connector on system board)                                       | BP_DST_SA1 (Backplane signal connector) and ODD (Optical disk drive) |

## Front PERC module

### Removing the front PERC module

#### Prerequisites

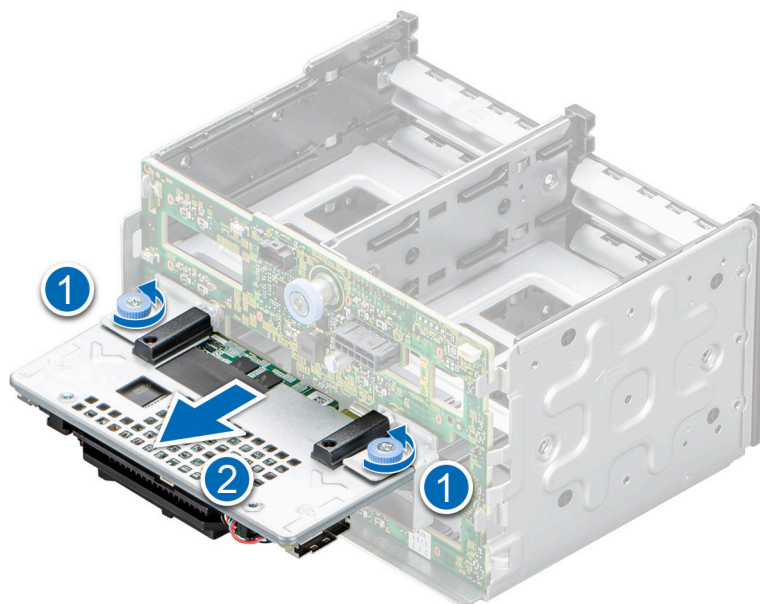
1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. Disconnect all the cables connected to the front PERC module.

### Steps

1. Using a Phillips #2 screwdriver, loosen the captive screws on the front PERC module.
2. Slide the front PERC module to disengage from the connector on the drive backplane.



**Figure 96. Removing the front PERC module from the 3.5-inch drive backplane**



**Figure 97. Removing the front PERC module from the 2.5-inch drive backplane**

### Next steps

Install the front PERC module.

## Installing the front PERC module

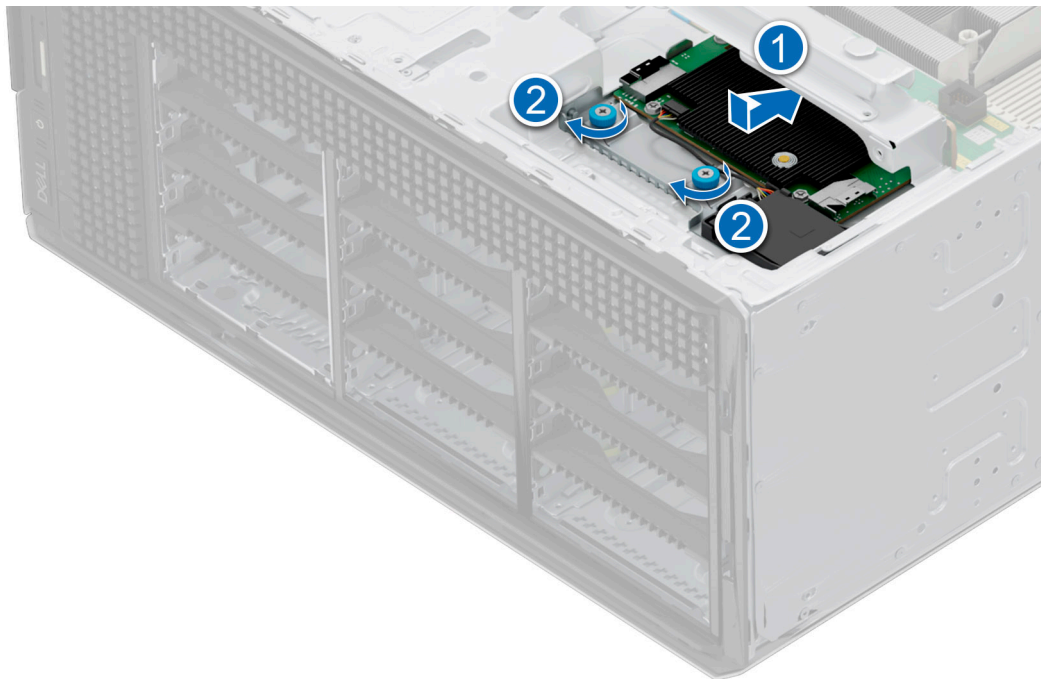
### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. Disconnect all the cables connected to the front PERC module.

### Steps

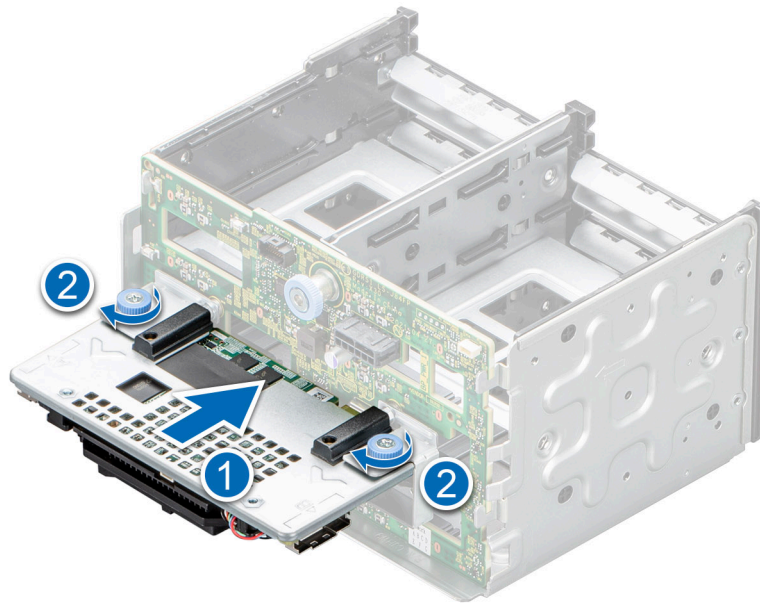
1. Align the connectors and guide slots on the front PERC module with the connectors and guide pins on the drive backplane.
2. Slide the front PERC module until the module is connected to the drive backplane.
3. Using a Phillips #2 screwdriver, tighten the captive screws on the front PERC module.

 **NOTE:** The numbers on the image do not depict the exact steps. The numbers are for representation of sequence.



**Figure 98. Installing the front PERC module to the 3.5-inch drive backplane**





**Figure 99. Installing the front PERC module to the 2.5-inch drive backplane**

#### Next steps

1. Connect the cables to the front PERC module.
2. Follow the procedure listed in [After working inside your system](#).

## Drives

### Removing a drive blank

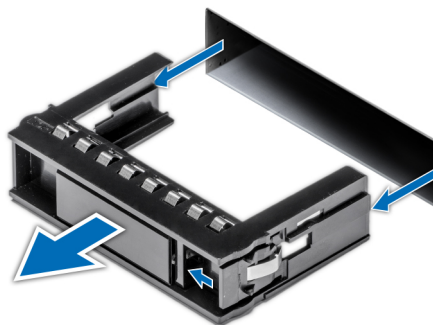
#### Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. If installed, [remove the front bezel](#).

**CAUTION:** To maintain proper system cooling, drive blanks must be installed in all empty drive slots.

#### Steps

Press the release button, and slide the drive blank out of the drive slot.



**Figure 100. Removing a drive blank**



### Next steps

1. [Replace the drive blank.](#)

## Installing a drive blank

### Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. If installed, [remove the front bezel](#).

### Steps

Slide the drive blank into the drive slot until the release button clicks into place.

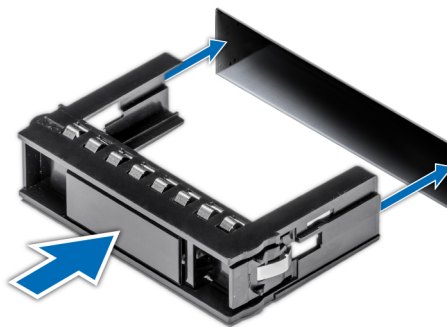


Figure 101. Installing a drive blank

## Removing a drive carrier

### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).
2. [Remove the front bezel](#).
3. Using the management software, prepare the drive for removal. If the drive is online, the green activity or fault indicator flashes while the drive is turning off. When the drive indicators are off, the drive is ready for removal. For more information, see the storage controller documentation.

**CAUTION:** Before attempting to remove or install a drive while the system is running, see the documentation for the storage controller card to ensure that the host adapter is configured correctly to support drive removal and insertion.

**CAUTION:** To prevent data loss, ensure that your operating system supports drive installation. See the documentation supplied with your operating system.

### Steps

1. Press the release button to open the drive carrier release handle.
2. Holding the drive carrier release handle, slide the drive carrier out of the drive slot.

**NOTE:** If you are not replacing the drive immediately, install a drive blank in the empty drive slot to maintain proper system cooling.



Figure 102. Removing a drive carrier

### Next steps

Replace the drive or a drive blank.

## Installing the drive carrier

### Prerequisites

- ⚠ **CAUTION:** Before removing or installing a drive while the system is running, see the [www.dell.com/storagecontrollermanuals](http://www.dell.com/storagecontrollermanuals) documentation for the storage controller card to ensure that the host adapter is configured correctly to support drive removal and insertion.
- ⚠ **CAUTION:** Combining SAS and SATA drives in the same RAID volume is not supported.
- ⚠ **CAUTION:** When installing a drive, ensure that the adjacent drives are fully installed. Inserting a drive carrier and attempting to lock its handle next to a partially installed carrier can damage the partially installed carrier's shield spring and make it unusable.
- ℹ **NOTE:** Ensure that the drive carrier's release handle is in the open position before inserting the carrier into the slot.
- ⚠ **CAUTION:** To prevent data loss, ensure that your operating system supports hot-swap drive installation. See the documentation supplied with your operating system.
- ⚠ **CAUTION:** When a replacement hot swappable drive is installed and the system is powered on, the drive automatically begins to rebuild. Ensure that the replacement drive is blank or contains data that you wish to overwrite. Any data on the replacement drive is immediately lost after the drive is installed.

1. Follow the safety guidelines listed in [Safety instructions](#).
2. [Remove the front bezel](#).
3. Remove the drive carrier or remove the drive blank when you want to assemble the drives into the system.

### Steps

1. Slide the drive carrier into the drive slot and push until the drive connects with the backplane.
2. Close the drive carrier release handle to lock the drive in place.



Figure 103. Installing a drive carrier

### Next steps

install the front bezel.

## Installing the drive into the drive carrier

### Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. [Remove the drive blank](#).

### Steps

1. Insert the drive into the drive carrier with the drive connector facing towards the rear of the carrier.
2. Align the screw holes on the drive with the screws holes on the drive carrier.
3. Using a Phillips #1 screwdriver, secure the drive to the drive carrier with the screws.

**NOTE:** When installing a drive into the drive carrier, ensure that the screws are torqued to 4 lbf-in.

**NOTE:** If the drive carrier has Torx screw, use Torx 6 (for 2.5-inch drive) or Torx 8 (for 3.5-inch drive) screwdriver to install the drive.





**Figure 104. Installing a drive into the drive carrier**

#### Next steps

1. [Install the drive carrier.](#)

## Removing the drive from the drive carrier

#### Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. [Remove the drive carrier.](#)

#### Steps

1. Using a Phillips #1 screwdriver, remove the screws from the slide rails on the drive carrier.

 **NOTE:** If the drive carrier has Torx screw, use Torx 6 (for 2.5-inch drive) or Torx 8 (for 3.5-inch drive) screwdriver to remove the drive.



2. Lift the drive out of the drive carrier.



**Figure 105. Removing the drive from the drive carrier**

### Next steps

Install the drive into the drive carrier.

## Drive backplane

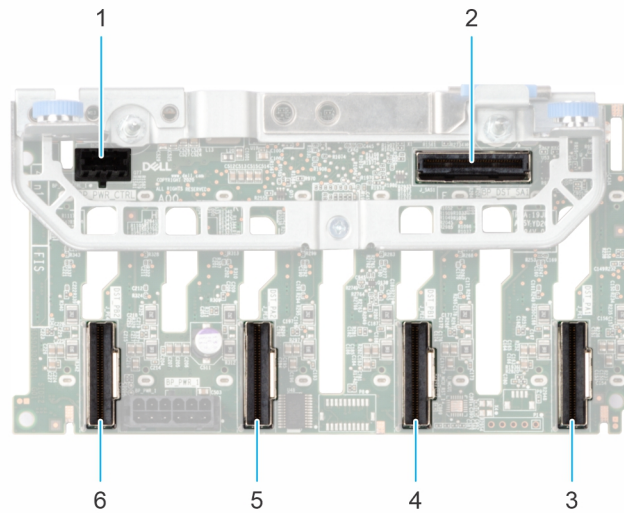
This is a service technician replaceable part only.

## Drive backplane

Depending on your system configuration, the drive backplanes that are supported are listed here:

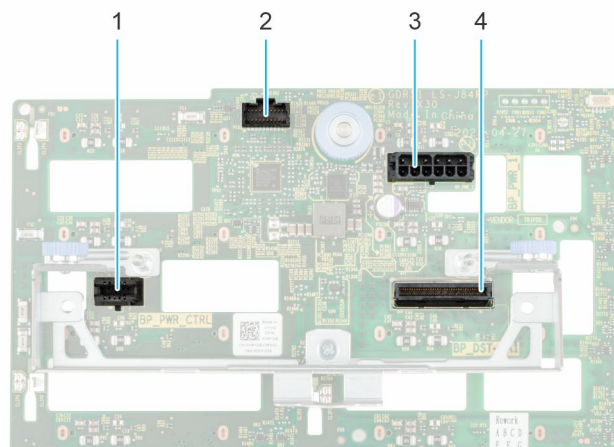
**Table 129. Supported backplane options**

| System         | Supported hard drives options         |
|----------------|---------------------------------------|
| PowerEdge T560 | 2.5-inch (x 8) NVMe backplane         |
|                | 2.5-inch (x 8) SAS, or SATA backplane |
|                | 3.5-inch (x 8) SAS or SATA backplane  |



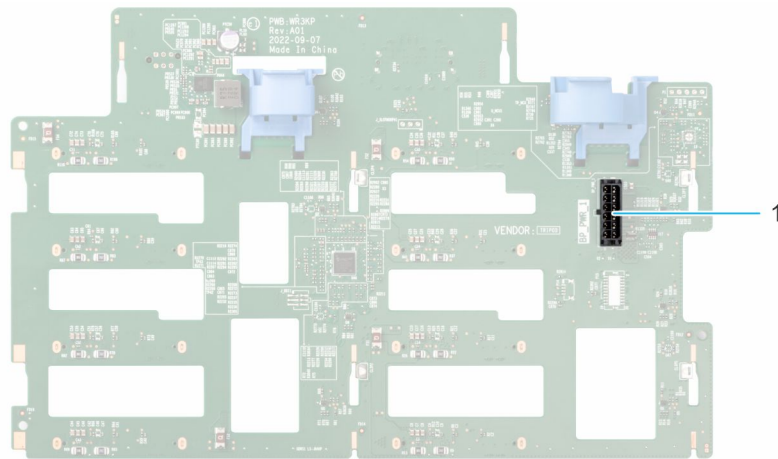
**Figure 106. 8 x 2.5-inch NVMe drive backplane**

1. BP\_PWR\_CTRL
2. BP\_DST\_SA1 (PERC to backplane)
3. BP\_DST\_PA1
4. BP\_DST\_PB1
5. BP\_DST\_PA2
6. BP\_DST\_PB2



**Figure 107. 8 x 2.5-inch drive backplane**

1. BP\_PWR\_CTRL
2. BP\_DST\_SA1 (PERC to backplane)
3. BP\_PWR\_1 (backplane power and signal cable to system board)
4. BP\_DST\_PA1 (PCIe/NVMe connector)



**Figure 108. 8 x 3.5-inch drive backplane**

1. BP\_PWR\_1 (backplane power and signal cable to system board)

## Removing the 3.5-inch drive backplane

### Prerequisites

**CAUTION:** To prevent damage to the drives and backplane, remove the drives from the system before removing the backplane.

**CAUTION:** Note the number of each drive and temporarily label them before you remove the drive so that you can reinstall them in the same location.

**NOTE:** The procedure to remove the backplane is similar for all backplane configurations.

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. [Remove the cooling fan assembly](#).
4. [Remove the drives](#).
5. [Removing the front PERC module](#)
6. Disconnect the drive backplane cables from the connector on the backplane.

### Steps

1. Press the blue release tabs to disengage the drive backplane from the hooks on the system.
2. Lift and pull the drive backplane out of the system.





**Figure 109. Removing the 3.5-inch drive backplane**

#### Next steps

Replace the 3.5-inch drive backplane .

## Installing the 3.5-inch drive backplane

#### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#) .
3. [Remove the cooling fan assembly](#).
4. [Remove the drives](#).
5. [Remove the front PERC module](#)

**NOTE:** To avoid damaging the backplane, ensure to move the control panel cables from the cable routing clips before removing the backplane.

**NOTE:** Route the cable properly when you replace it to prevent the cable from being pinched or crimped.

#### Steps

1. Align the guides on the system with the slots on the backplane.
2. Insert the backplane into the guides and lower the backplane until the blue release tabs clicks into place.
3. Route the cables properly through the cable guide and connect the cables to the connector on the system board.





**Figure 110. Installing the 3.5-inch drive backplane**

#### Next steps

1. [Install the drives.](#)
2. Connect the drive backplane cables to the connector on the backplane.
3. [Install the cooling fan assembly.](#)
4. [Install the front PERC module.](#)
5. Follow the procedure listed in [After working inside your system.](#)

## Removing the 2.5-inch drive backplane

#### Prerequisites

**CAUTION:** To prevent damage to the drives and backplane, remove the drives from the system before removing the backplane.

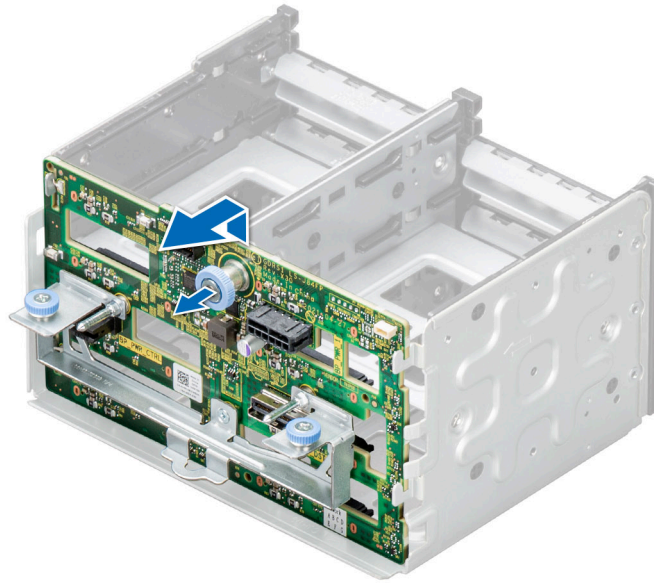
**CAUTION:** Note the number of each drive and temporarily label them before you remove the drive so that you can reinstall them in the same location.

**NOTE:** The procedure to remove the backplane is similar for all backplane configurations.

1. Follow the safety guidelines listed in [Safety instructions.](#)
2. Follow the procedure that is listed in [Before working inside your system.](#)
3. [Remove the cooling fan cage.](#)
4. [Remove the drives.](#)
5. [Remove the front PERC module](#)
6. Disconnect the drive backplane cables from the connectors on the backplane.

#### Steps

1. Pull the blue release stand-off to disengage the drive backplane from the hooks on the system.
2. Lift and pull the drive backplane out of the system.



**Figure 111. Removing the 2.5-inch drive backplane**

#### Next steps

Replace the 2.5-inch drive backplane .

## Installing the 2.5-inch drive backplane

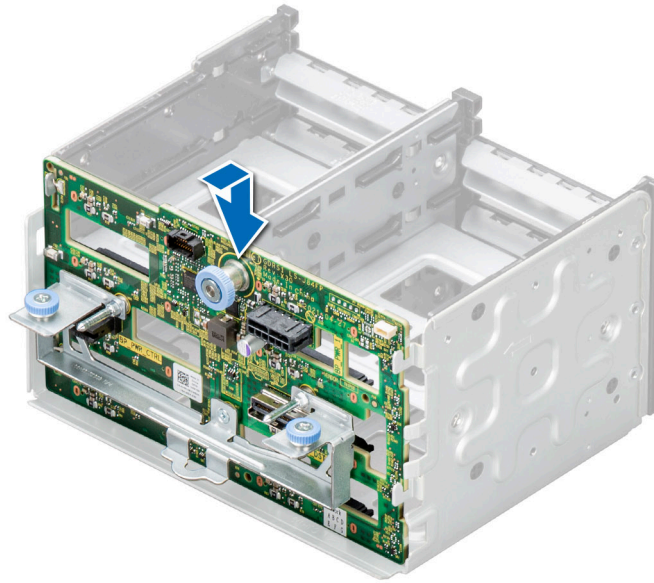
#### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#) .
3. [Remove the cooling fan cage](#).
4. [Remove the drives](#).
5. [Remove the front PERC module](#)

**NOTE:** Route the cable properly to prevent the cable from being pinched or crimped.

#### Steps

1. Align the guides on the system with the slots on the backplane.
2. Insert the backplane into the guides and lower the backplane until the blue release stand-off clicks into place.



**Figure 112. Installing the 2.5-inch drive backplane**

#### Next steps

1. [Install the drives.](#)
2. Connect the drive backplane cables to the connector on the backplane.
3. [Install the cooling fan cage.](#)
4. [Install the front PERC module.](#)
5. Follow the procedure listed in [After working inside your system.](#)

## Drive bays

### Removing the drive bay blank

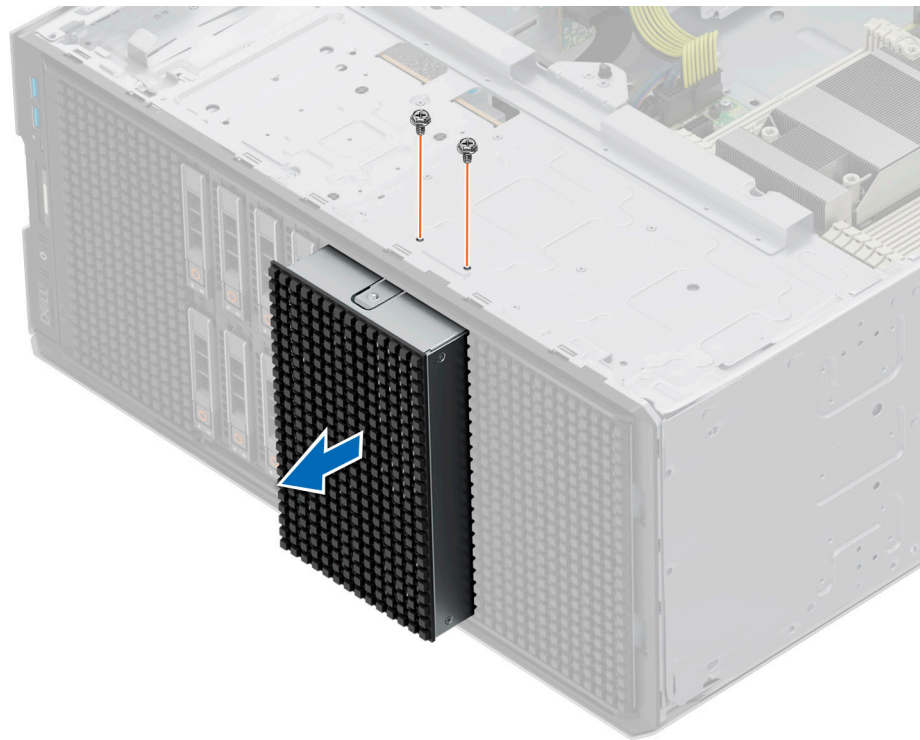
#### Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions.](#)
2. [Remove the system cover.](#)
3. If installed, [remove the front bezel.](#)

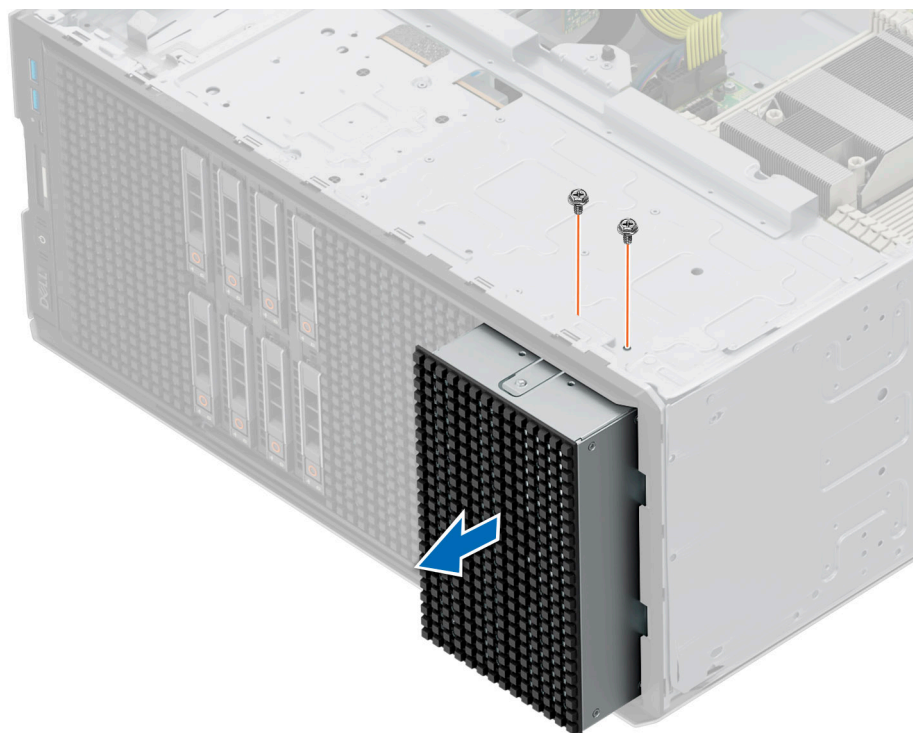
#### Steps

1. Using a Phillips #2 screwdriver, remove the screws that secure the drive bay blank to the system.
2. Using a flat head screwdriver, remove the drive bay blank.

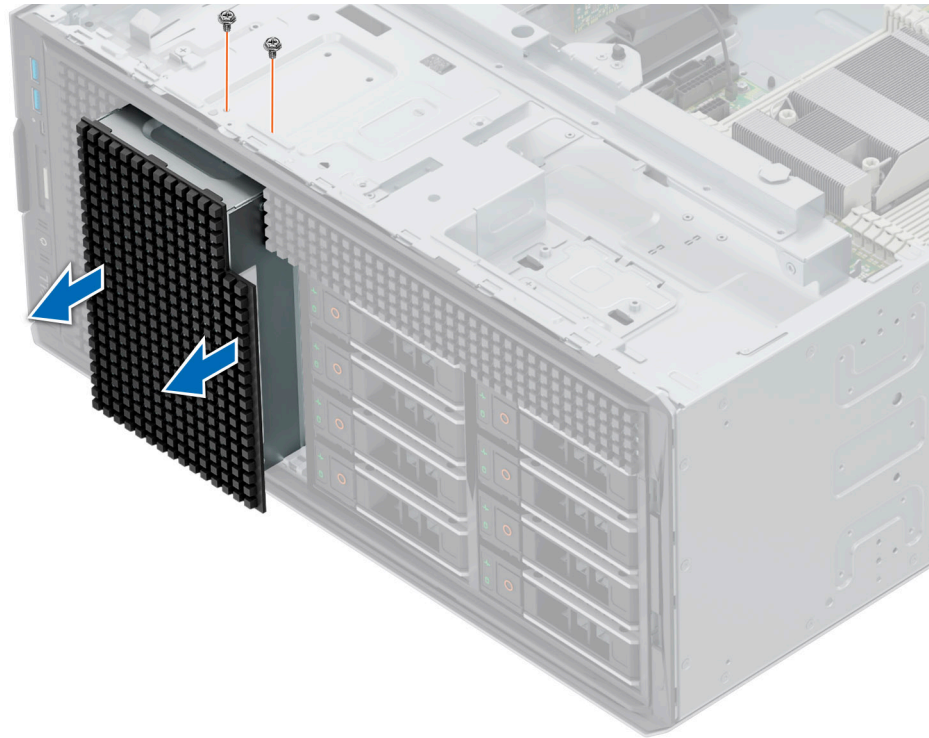
 **NOTE:** The procedure to remove the drive bay blanks are similar.



**Figure 113. Removing the drive bay blank**



**Figure 114. Removing the drive bay blank**



**Figure 115. Removing the NVMe drive bay blank**

#### Next steps

Replace the drive bay blank or install the drive bay.

## Installing the drive bay blank

#### Prerequisites

Follow the safety guidelines listed in the [Safety instructions](#).

#### Steps

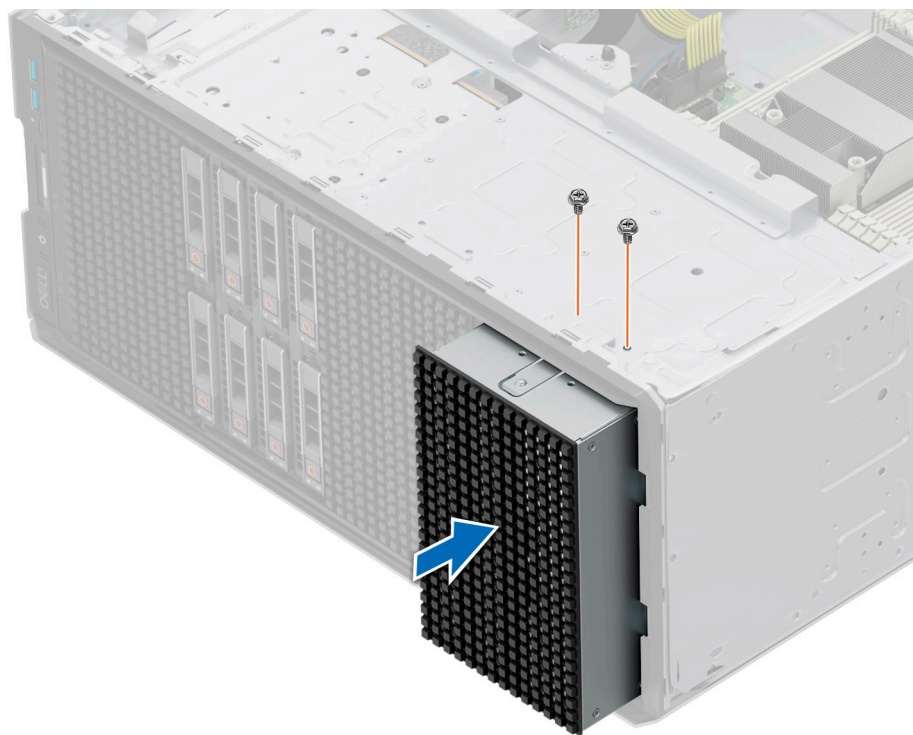
1. Align and push the blank into the drive bay slot, until it clicks into place.

**NOTE:** The procedure to install the drive bay blanks are similar.





**Figure 116. Installing the drive bay blank**



**Figure 117. Installing the drive bay blank**



**Figure 118. Installing the NVMe drive bay blank**

2. Using a Phillips #2 screwdriver, tighten the screws that secure the drive bay blank to the system.

#### Next steps

1. If removed, [install the front bezel](#).
2. [Replace the system cover](#).
3. Follow the procedure listed in [After working inside your system](#).

## Removing a drive bay

#### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. [Remove all the drives](#).
4. [Remove the backplane from drive bay](#).

#### Steps

1. Using the Phillips #2 screwdriver, remove the screws securing the drive bay to the system.
2. Slide the drive bay out of the system.

**NOTE:** The procedure to remove the drive bays is similar for all configurations.

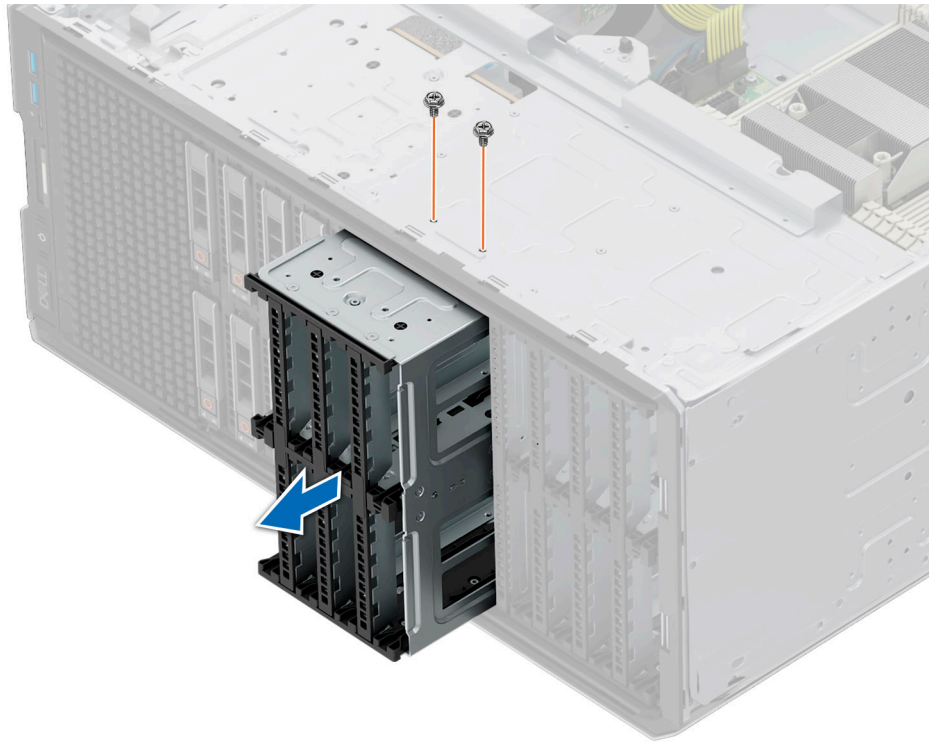


Figure 119. Removing a drive bay

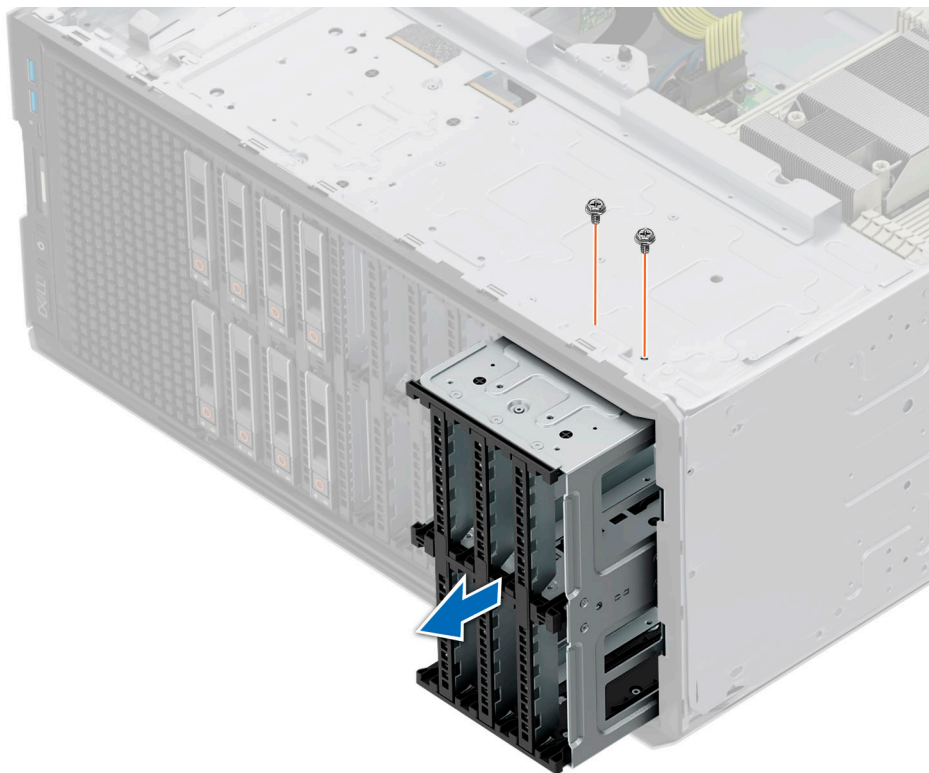
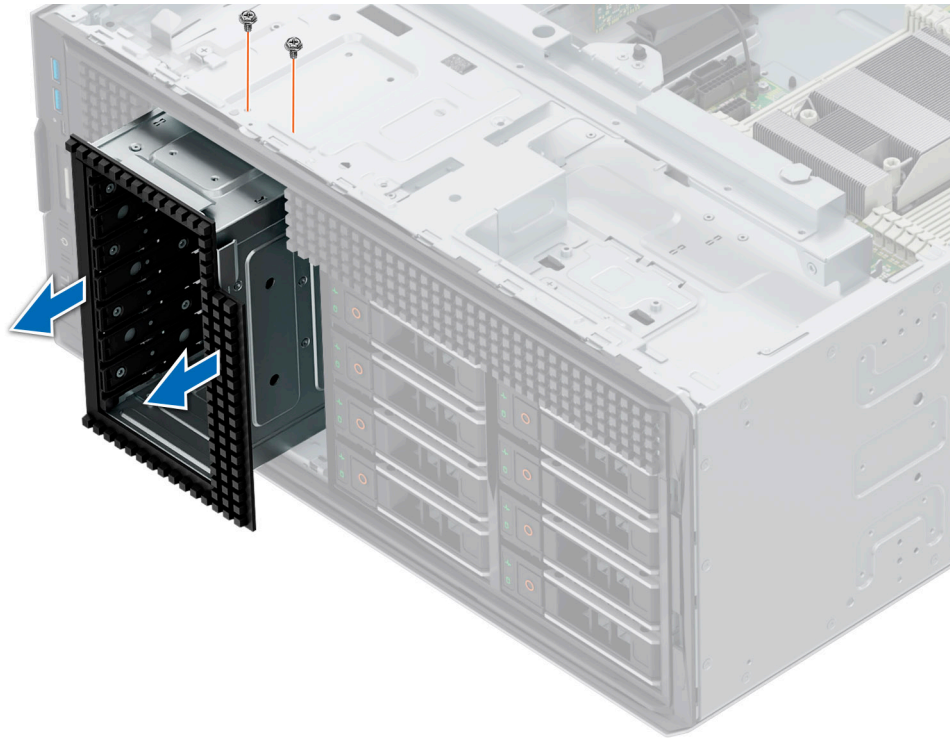


Figure 120. Removing a drive bay





**Figure 121. Removing a NVMe drive bay**

#### Next steps

Replace the drive bay.

## Installing a drive bay

#### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. [Remove the drives](#).
4. [Remove the drive from the drive backplane](#).

#### Steps

1. Insert the drive bay into the drive bay slot in the system.
2. Using the Phillips #2 screwdriver secure the drive bay to the system.

**NOTE:** The procedure to install the drive bays is similar for all configurations.

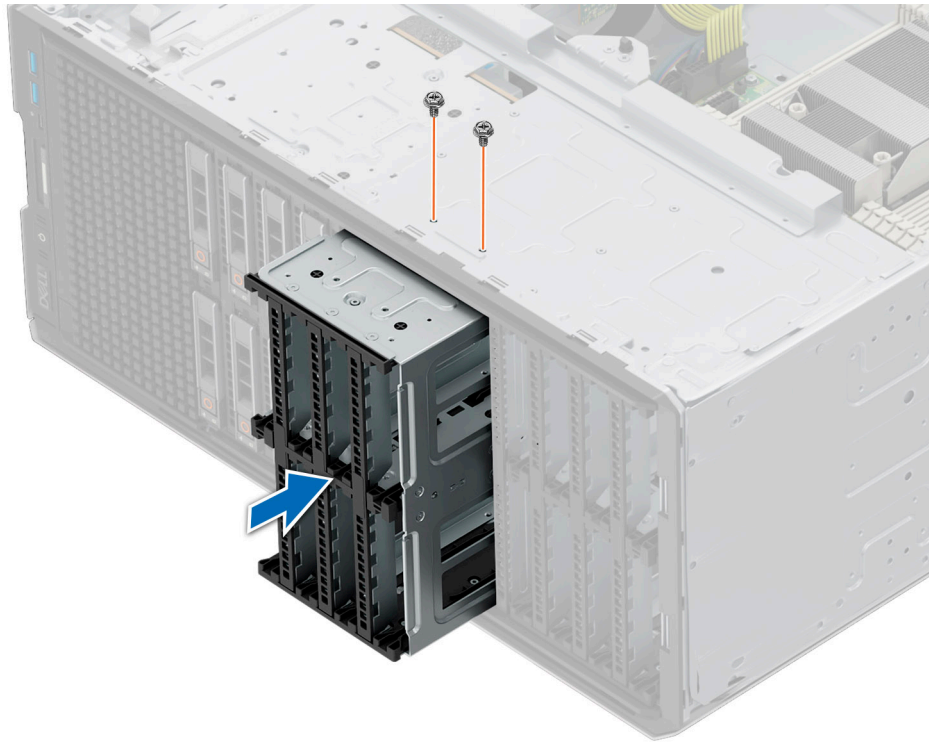


Figure 122. Installing a drive bay

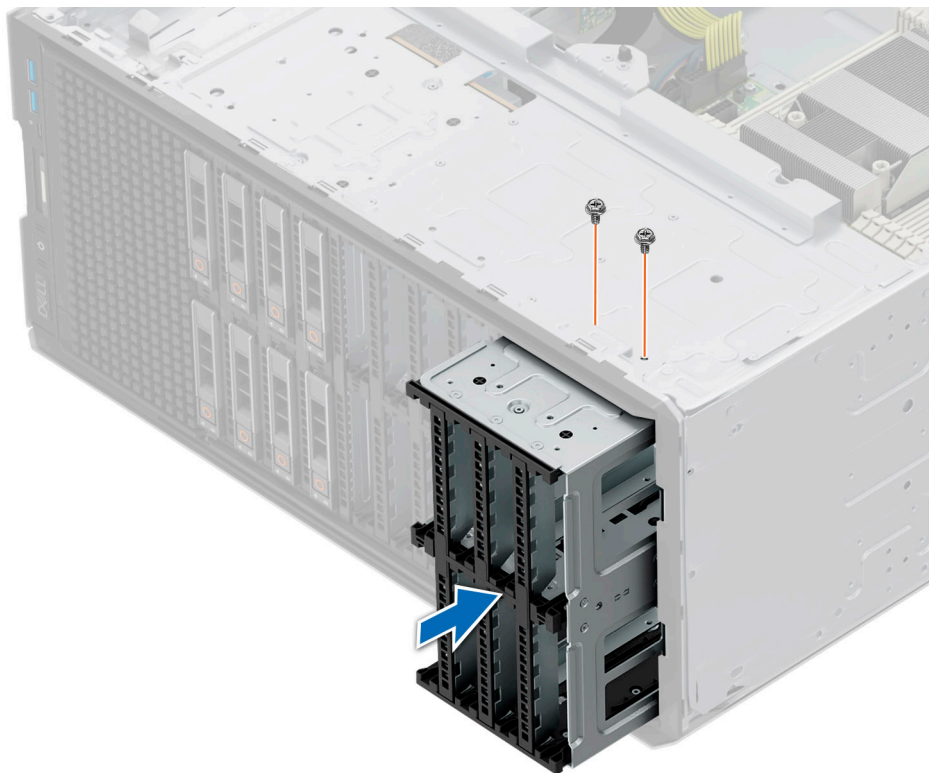
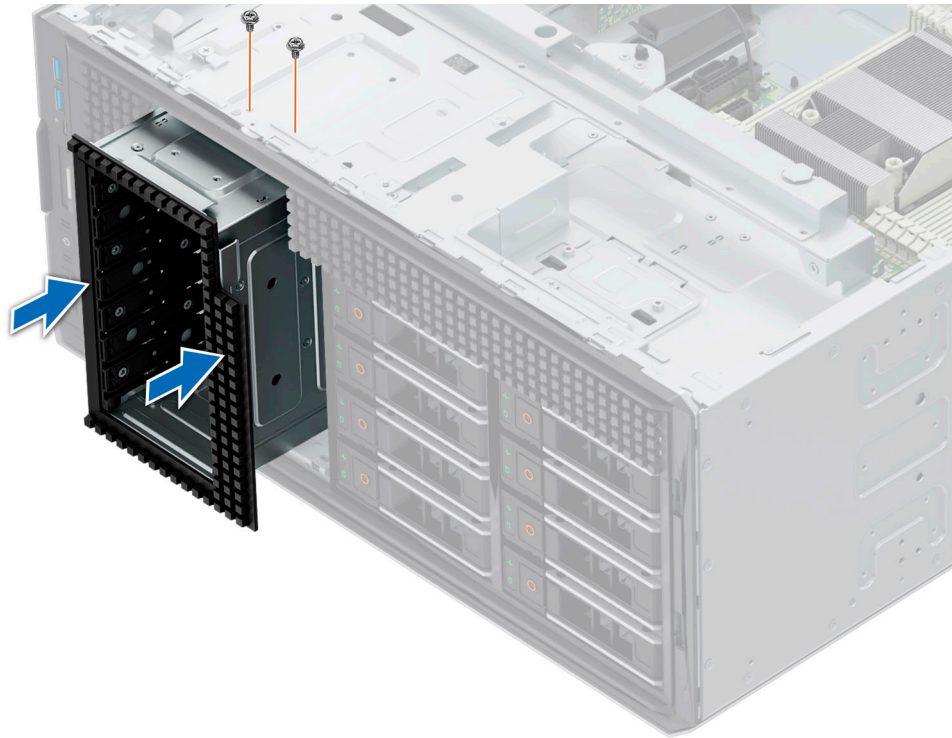


Figure 123. Installing a drive bay



**Figure 124. Installing a NVME drive bay**

#### Next steps

1. [Install the backplane to the drive plane.](#)
2. [Install the drives.](#)
3. Follow the procedure listed in [After working inside your system.](#)

## Optional optical drive

This is a service technician replaceable part only.

## Removing the optical drive blank

#### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions.](#)
2. Follow the procedure that is listed in [Before working inside your system .](#)
3. If installed, [remove the front bezel.](#)

#### Steps

Press the release tab and slide the optical drive blank out of the system.



**Figure 125. Removing the optical drive blank**

#### **Next steps**

Replace the optical drive blank or install the optical drive.

## **Installing the optical drive blank**

#### **Prerequisites**

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. If installed, [remove the front bezel](#).

#### **Steps**

Hold the tabs on the optical drive blank and push the optical drive blank into the optical drive slot.



**Figure 126. Installing the optical drive blank**

#### Next steps

1. If removed, [install the front bezel](#).
2. Follow the procedure that is listed in [After working inside your system](#).

## Removing the optical drive

#### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. If installed, [remove the front bezel](#).
4. Disconnect the power and data cables from the optical drive.

**NOTE:** Ensure that you note the routing of the power and data cable on the side of the system as you remove them from the system board and drive.

#### Steps

Press the release tab and slide the optical drive towards the front of the system.





**Figure 127. Removing the optical drive**

#### Next steps

Replace the optical drive or install the optical drive blank.

## Installing the optical drive

#### Prerequisites

**i NOTE:** Only slim 9.5-mm SATA DVD-ROM drive or DVD+/-RW drive can be installed in your system. External optical drives can be connected through USB ports.

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. If installed, [remove the front bezel](#).

#### Steps

1. Align the optical drive with the slot on the system.
2. Slide the optical drive into the slot until the release tab clicks into place.



**Figure 128. Installing the optical drive**

#### Next steps

1. If removed, [install the front bezel](#).
2. Connect the power cable and the data cable to the optical drive.  
**i** **NOTE:** Route the cables properly to prevent them from being pinched or crimped.
3. Follow the procedure that is listed in [After working inside your system](#).

## Optional tape backup unit

This is a service technician replaceable part only.

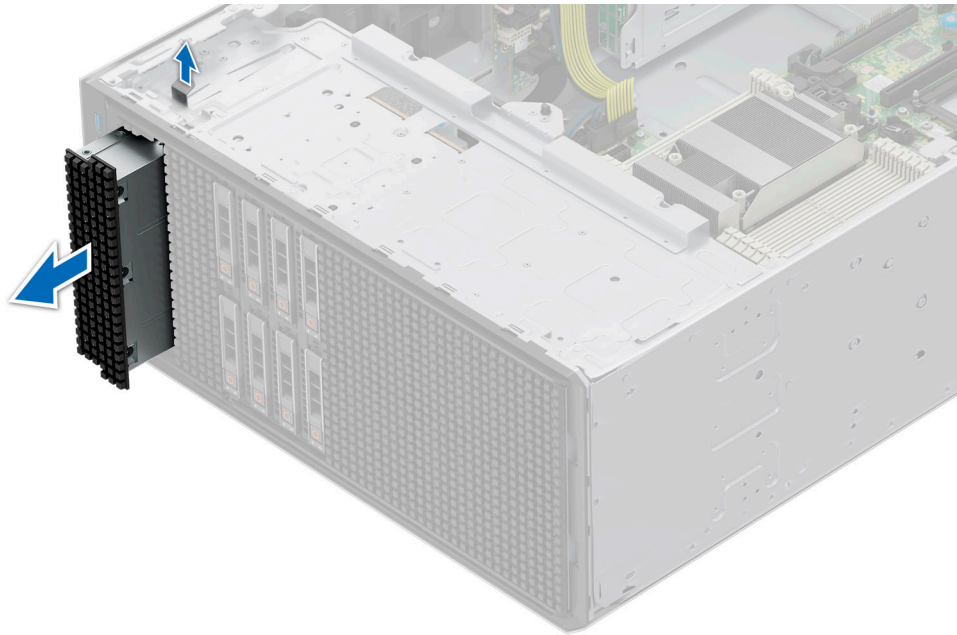
## Removing the tape backup unit blank

#### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. If installed, [remove the front bezel](#).

#### Steps

Push the protrusion at the rear of the tape backup unit blank and slide it towards the front of the system.



**Figure 129. Removing the tape backup unit blank**

#### **Next steps**

Replace the tape backup unit blank or install the tape backup drive.

## **Installing the tape backup unit blank**

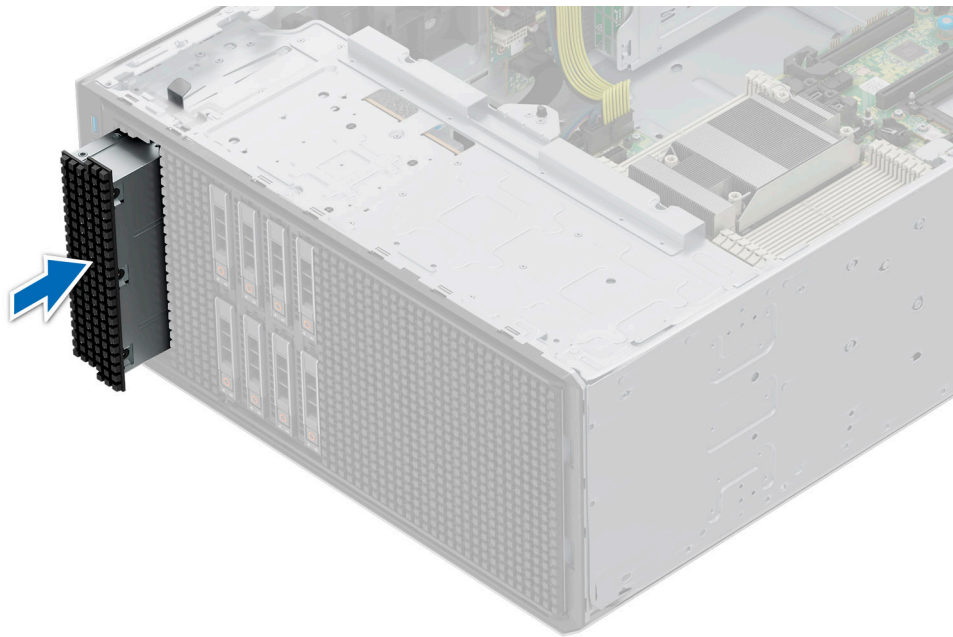
#### **Prerequisites**

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. If installed, [remove the front bezel](#).

#### **Steps**

Align and slide the tape backup unit blank into the slot on the system until it clicks into place.





**Figure 130. Installing the tape backup unit blank**

#### Next steps

1. If removed, [install the front bezel](#).
2. Follow the procedure that is listed in [After working inside your system](#).

## Removing the tape backup unit

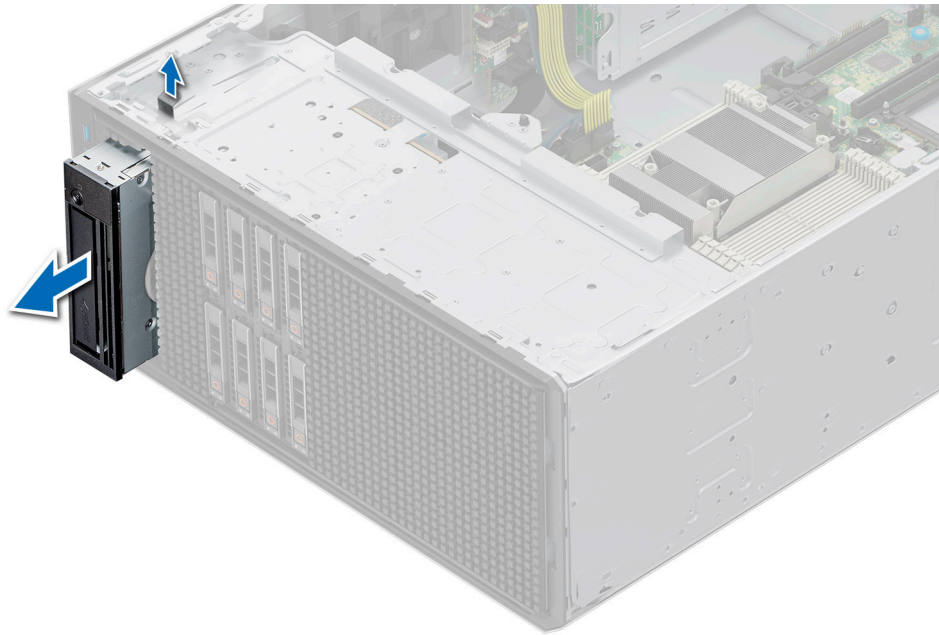
#### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. [Remove the air shroud](#).
4. If installed, [remove the front bezel](#).
5. Disconnect the power and data cables from the tape backup unit.

**NOTE:** Ensure that you note the routing of the power and data cable on the side of the system as you remove them from the system board and drive.

#### Steps

1. Using a Phillips #2 screwdriver, remove the screw securing the tape backup unit to the system.
2. Slide the tape backup unit towards the front of the system.



**Figure 131. Removing the tape backup unit**

#### **Next steps**

Replace the tape backup unit or install the tape backup unit blank.

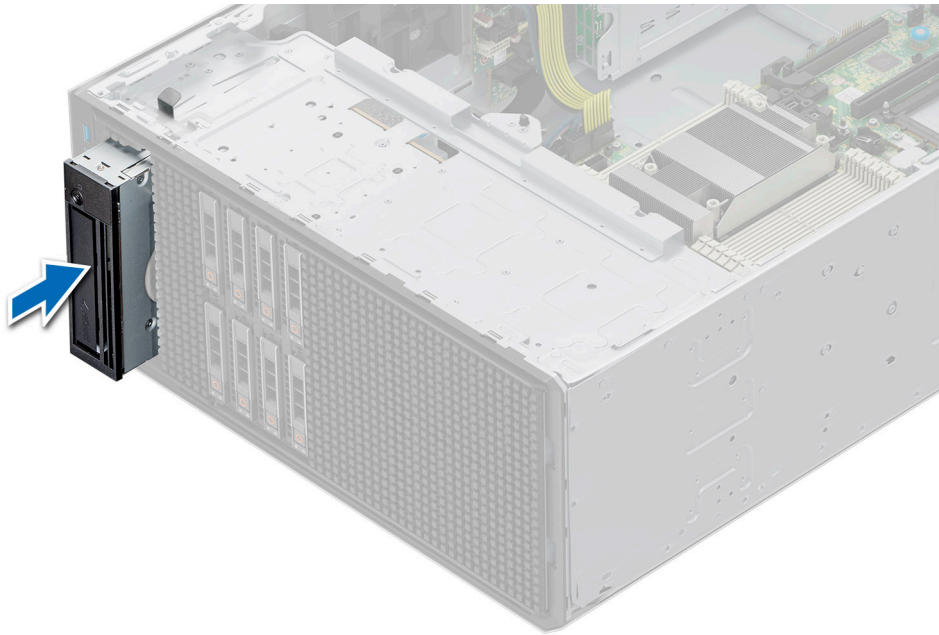
## **Installing the tape backup unit**

#### **Prerequisites**

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. [Remove the air shroud](#).
4. If installed, [remove the front bezel](#).

#### **Steps**

1. Align and slide the tape backup unit in the slot on the system.
2. Using a Phillips #2 screwdriver, secure the tape backup unit to the system.



**Figure 132. Installing the tape backup unit**

#### Next steps

1. Connect the power cable and the data cable to the tape backup unit.  
**i** **NOTE:** Route the cables properly to prevent them from being pinched or crimped.
2. [Install the air shroud.](#)
3. If removed, [install the front bezel.](#)
4. Follow the procedure that is listed in [After working inside your system.](#)

## Front IO module

This is a service technician replaceable part only.

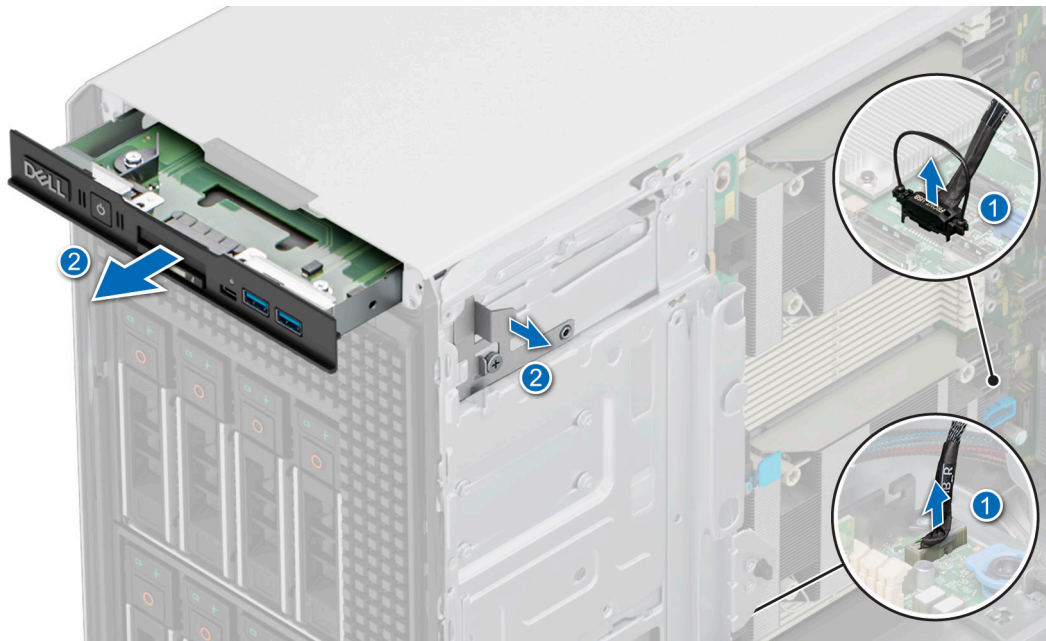
## Removing the front IO module

#### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions.](#)
2. Follow the procedure that is listed in [Before working inside your system .](#)
3. [Remove the air shroud.](#)
4. [Remove the front bezel.](#)
- 5.

#### Steps

1. Disconnect the power and data cables of the front IO module from the system board.
2. Pull the metal release bracket and slide the front IO module towards the front of the system.



**Figure 133. Removing the front IO module**

#### **Next steps**

Replace the front IO module.

## **Installing the front IO module**

#### **Prerequisites**

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. [Remove the air shroud](#).
4. [Remove the front bezel](#).

#### **Steps**

1. Align the front IO module with the slot on the system.
2. Slide the front IO module into the slot until the release bracket clicks into place.



**Figure 134. Installing the front IO module**

3. Connect the power and data cables from the front IO module to the system board.

#### **Next steps**

1. Connect the power cable and the data cable to the front IO module.  
**NOTE:** Route the cables properly to prevent them from being pinched or crimped.
2. [Install the front bezel.](#)
3. [Install the air shroud.](#)
4. Follow the procedure that is listed in [After working inside your system.](#)

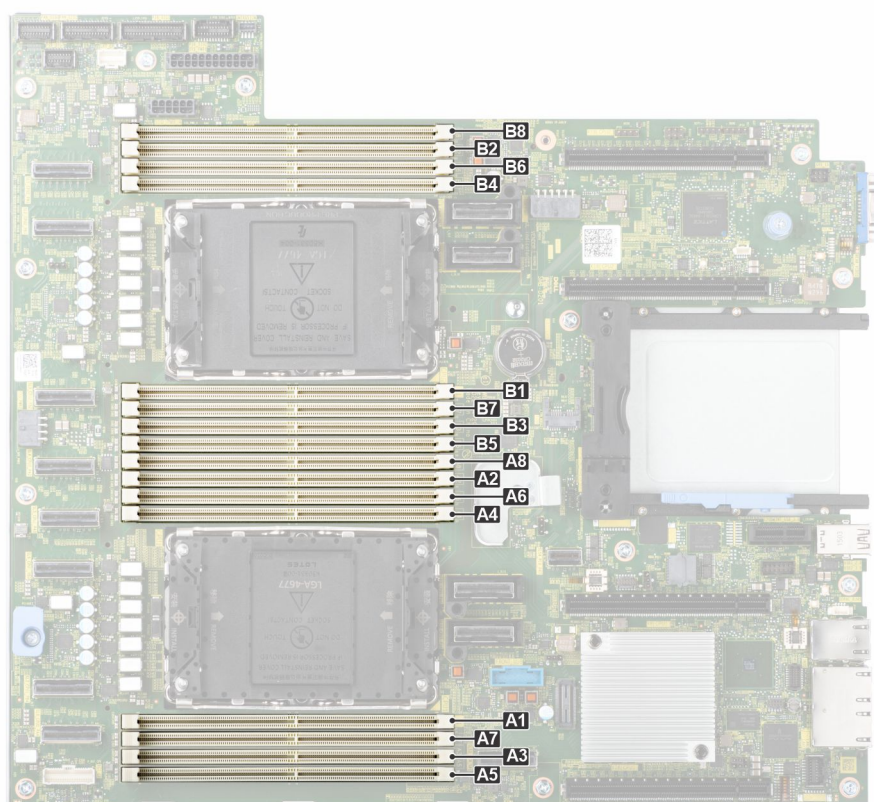
## **System memory**

### **System memory guidelines**

The PowerEdge T560 system supports DDR5 registered DIMMs (RDIMMs).

Your system memory is organized into eight channels per processor (one memory socket per channel), 8 memory sockets per processor and 16 memory sockets per system.





**Figure 135. Memory channels**

Memory channels are organized as follows:

**Table 130. Memory channels**

| Processor   | Channel A | Channel B | Channel C | Channel D | Channel E | Channel F | Channel G | Channel H |
|-------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Processor 1 | A1        | A7        | A3        | A5        | A4        | A6        | A2        | A8        |
| Processor 2 | B1        | B7        | B3        | B5        | B4        | B6        | B2        | B8        |

**Table 131. Supported memory matrix**

| DIMM type | Rank | Capacity            | DIMM rated voltage and speed                       | Operating Speed                    |
|-----------|------|---------------------|----------------------------------------------------|------------------------------------|
|           |      |                     |                                                    | 1 DIMM per channel (DPC)           |
| RDIMM     | 1 R  | 16 GB               | DDR5 (1.1 V), 4800 MT/s<br>DDR5 (1.1 V), 5600 MT/s | Up to 4800 MT/s<br>Up to 5200 MT/s |
|           | 2 R  | 32 GB, 64 GB, 96 GB | DDR5 (1.1 V), 4800 MT/s<br>DDR5 (1.1 V), 5600 MT/s | Up to 4800 MT/s<br>Up to 5200 MT/s |

**NOTE:** 5600 MT/s RDIMMs are applicable for 5<sup>th</sup> Generation Intel® Xeon Scalable processors.

 **NOTE:** The processor may reduce the performance of the rated DIMM speed.

## General memory module installation guidelines

To ensure optimal performance of your system, observe the following general guidelines when configuring your system memory. If your system's memory configuration fails to observe these guidelines, your system might not boot, stop responding during memory configuration, or operate with reduced memory.

The memory bus may operate at speeds of 5200 MT/s, 4800 MT/s, 4400 MT/s or 4000 MT/s depending on the following factors:

- System profile selected (for example, Performance, Performance Per Watt Optimized (OS), or Custom [can be run at high speed or lower])
- Maximum supported DIMM speed of the processors
- Maximum supported speed of the DIMMs

 **NOTE:** MT/s indicates DIMM speed in MegaTransfers per second.

 **NOTE:** Fault Resilient Memory - Non-Uniform Memory Access (NUMA) is supported only when 8 or 16 DIMMs are installed.

The following are the recommended guidelines for installing memory modules:

- All DIMMs must be DDR5.
- Mixing of DIMMs is not allowed
- All DDR5 DIMMs must operate at the same speed per processor.
- If memory modules with different speeds are installed, they operate at the speed of the slowest installed memory module(s).
- Populate memory module sockets only if a processor is installed.
  - For single-processor systems, sockets A1 to A8 are available.
  - For dual-processor systems, sockets A1 to A8 and sockets B1 to B8 are available.
  - A minimum of 1 DIMM must be populated for each installed processor.
- In **Optimizer Mode**, the DRAM controllers operate independently in the 64-bit mode and provide optimized memory performance.

**Table 132. Memory population rules**

| Processor                                                                                   | Memory population                                                                              | Memory population information                     |
|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|---------------------------------------------------|
| Single processor                                                                            | A{1}, A{2}, A{3}, A{4}, A{5}, A{6}, A{7}, A{8}                                                 | 1, 2, 4, 6 and 8 DIMMs are allowed                |
| Dual processor (Start with processor1. Processor 1 and processor 2 population should match) | A{1}, B{1}, A{2}, B{2}, A{3}, B{3}, A{4}, B{4}, A{5}, B{5}, A{6}, B{6}, A{7}, B{7}, A{8}, B{8} | 2, 4, 8, 12 and 16 DIMMs are supported per system |

- Supported RDIMM configurations are 1, 2, 4, 6, and 8 DIMMs per processor.
- Supported 96GB RDIMM configurations are 1, 6 and 8 DIMMs per processor.
- Populate eight equal memory modules per processor (one DIMM per channel) at a time to maximize performance.

 **NOTE:** Equal memory modules refer to DIMMs with identical electrical specification and capacity that may be from different vendors.

## Removing a memory module

### Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).
3. [Remove the air shroud](#).

 **WARNING:** The memory modules are hot to touch for some time after the system has been powered off. Allow the memory modules to cool before handling them.

**NOTE:** To ensure proper system cooling, memory module blanks must be installed in any memory socket that is not occupied. The memory module blanks compatible with T560 are DDR5 gray color blanks. Remove the memory module blanks only if you intend to install memory modules in these sockets.

### Steps

1. Locate the appropriate memory module socket.
2. To release the memory module from the socket, simultaneously press the ejectors on both ends of the memory module socket to fully open.

**CAUTION:** Handle each memory module only by the card edges, ensuring not to touch the middle of the memory module or metallic contacts.

3. Lift the memory module away from the system.

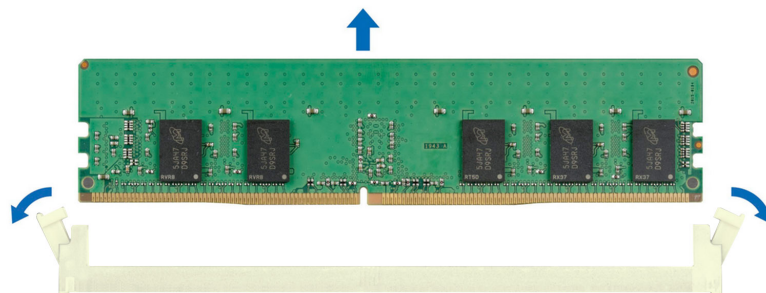


Figure 136. Removing a memory module

### Next steps

Replace the memory module.

## Installing a memory module

### Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).
3. [Remove the air shroud](#).

### Steps

1. Locate the appropriate memory module socket.

**CAUTION:** Handle each memory module only by the card edges, ensuring not to touch the middle of the memory module or metallic contacts.

**NOTE:** Ensure that the socket ejector latches are fully open before installing the memory module.

2. Align the edge connector of the memory module with the alignment key of the memory module socket, and insert the memory module in the socket.

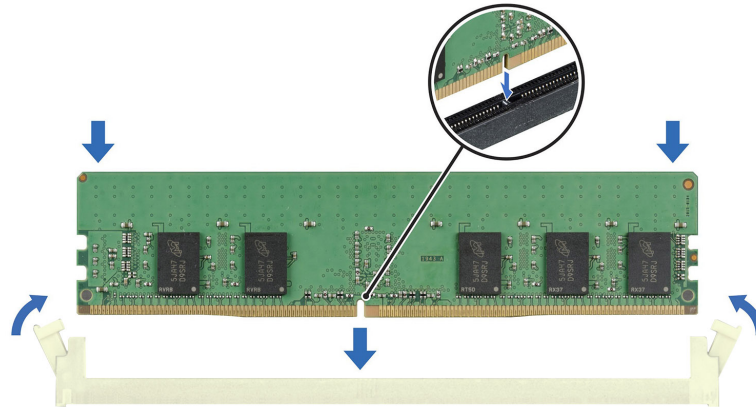


**CAUTION:** To prevent damage to the memory module or the memory module socket during installation, do not bend or flex the memory module; insert both ends of the memory module simultaneously.

**NOTE:** The memory module socket has an alignment key that enables you to install the memory module in the socket in only one orientation.

**CAUTION:** Do not apply pressure at the center of the memory module; apply pressure at both ends of the memory module evenly.

3. Press the memory module with your thumbs until the ejectors firmly click into place. When the memory module is properly seated in the socket, the levers on the memory module socket align with the levers on the other sockets that have memory modules that are installed.



**Figure 137. Installing a memory module**

#### Next steps

1. [Install the air shroud.](#)
2. Follow the procedure listed in [After working inside your system.](#)
3. To verify that the memory module has been installed properly, press F2 during reboot and navigate to **System Setup Main Menu > System BIOS > Memory Settings**. In the **Memory Settings** screen, the System Memory Size must reflect the updated capacity of the installed memory.
4. If the System Memory Size is incorrect, one or more of the memory modules may not be installed properly. . Shut down the system and ensure that the memory modules are firmly seated in the correct sockets.
5. Run the system memory test in system diagnostics.

## Optional BOSS-N1 module

### Removing the BOSS-N1 module

#### Prerequisites

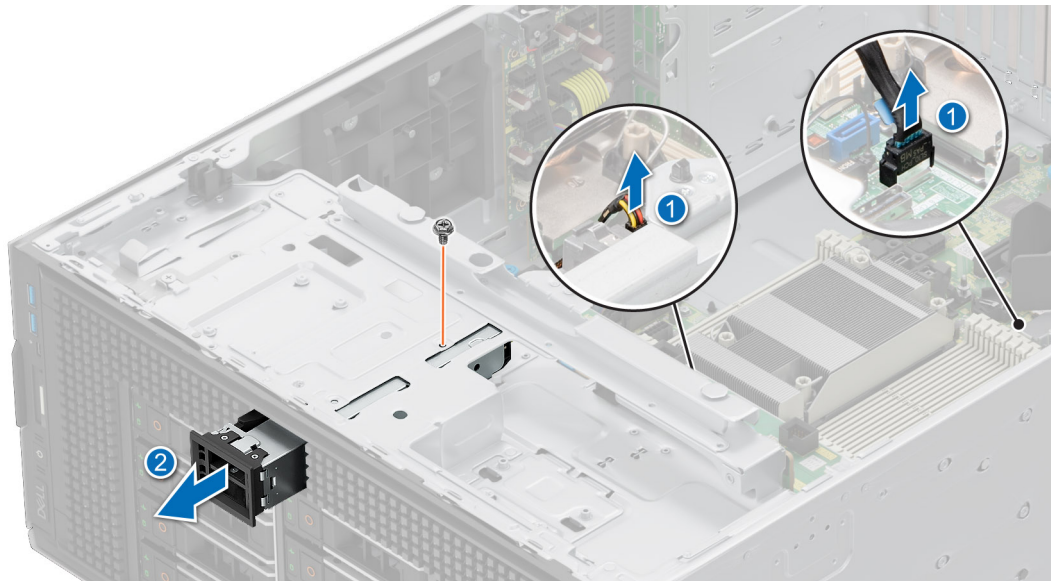
1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#) .
3. [Remove the air shroud.](#)
4. If installed, [remove the front bezel.](#)

#### Steps

1. Disconnect the cables connected to the system board from the BOSS-N1 module.

2. Using a Phillips #2 screwdriver, remove the screw securing the BOSS-N1 module to the system.
3. Slide the BOSS-N1 module out of the system.

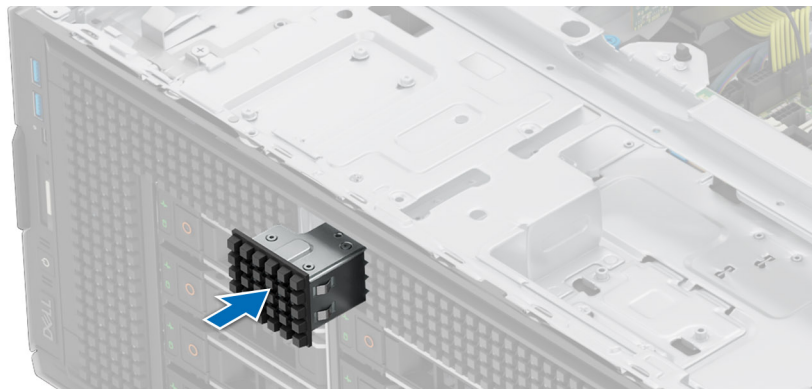
**NOTE:** The numbers on the image do not depict the exact steps. The numbers are for representation of sequence.



**Figure 138. Removing the BOSS-N1 module**

4. Align the blank with the BOSS-N1 module slot and push it into the bay until it clicks into place.

**NOTE:** Blanks must be installed in empty slots to maintain FCC certification of the system. The blanks also keep dust and dirt out of the system and aid in proper cooling and airflow inside the system.



**Figure 139. Installing the BOSS-N1 module blank**

5. Using a Phillips #2 screwdriver, tighten the screw that secures the BOSS-N1 module blank to the system.

### Next steps

Replace the BOSS-N1 module.

## Installing the BOSS-N1 module

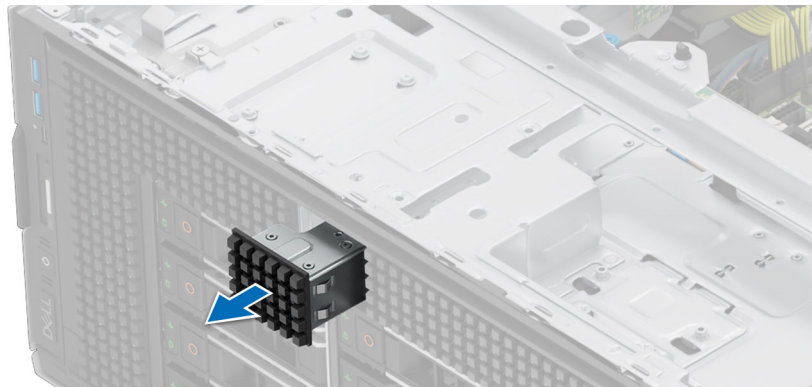
### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. [Remove the air shroud](#).

4. If installed, [remove the front bezel](#).

### Steps

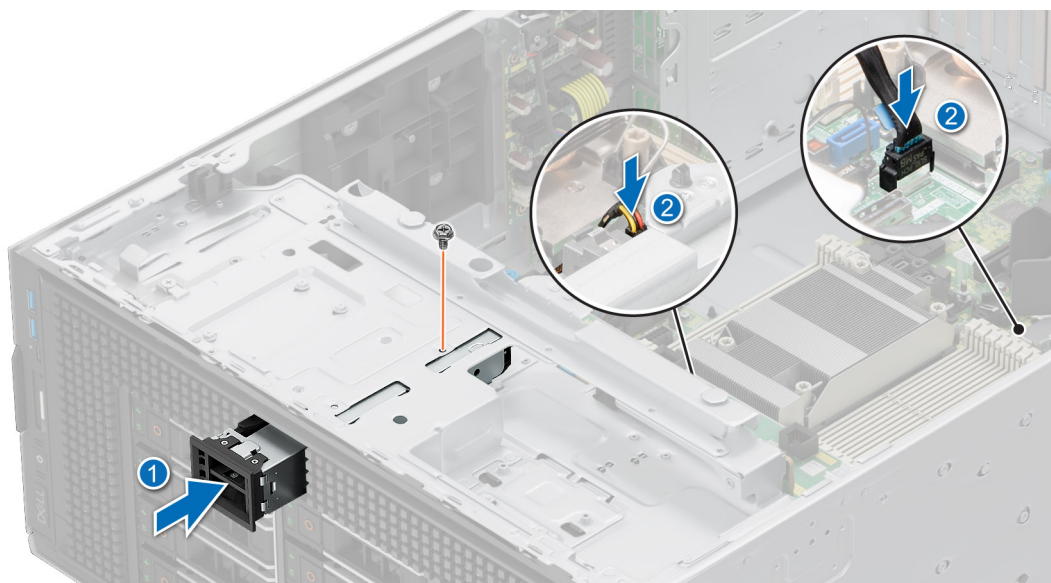
1. Using a Phillips #2 screwdriver, remove the screw that secures the BOSS-N1 module blank from the system.
2. Slide out the BOSS-N1 module blank from the system using a flat head screwdriver.



**Figure 140. Removing the BOSS-N1 module blank**

3. Align the BOSS-N1 module to the BOSS-N1 slot on the chassis and push it into the slot.
4. Using a Phillips #2 screwdriver, secure the BOSS-N1 module to the system.

**NOTE:** The numbers on the image do not depict the exact steps. The numbers are for representation of sequence.



**Figure 141. Installing the BOSS-N1 module**

5. Connect the cables to the system board connectors.

**NOTE:** Route the cables properly to prevent them from being pinched or crimped.

### Next steps

1. If removed, [install the front bezel](#).
2. [Install the air shroud](#).
3. Follow the procedure that is listed in [After working inside your system](#).

## Removing the BOSS-N1 card carrier

### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. If installed, [remove the front bezel](#).

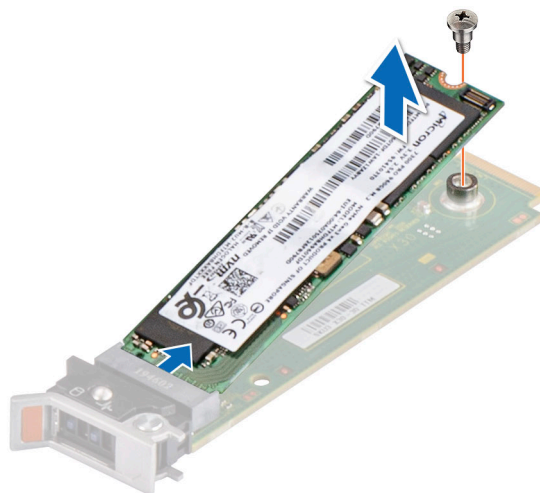
### Steps

1. Open the release latch and slide the BOSS-N1 card carrier out of the BOSS-N1 module.



**Figure 142. Removing the BOSS-N1 card carrier**

2. Using the Phillips #1 screwdriver remove the M3 x 0.5 x 4.5 mm screw that secures the M.2 NVMe SSD to the BOSS-N1 card carrier.
3. Slide the M.2 NVMe SSD out from the BOSS-N1 card carrier.



**Figure 143. Removing the M.2 NVMe SSD**

4. If not installing the BOSS-N1 card carrier, align and push the BOSS-N1 card carrier blank into the BOSS-N1 module to fill the empty BOSS-N1 card carrier slot.



**Figure 144. Installing the BOSS-N1 card carrier blank**

### Next steps

[Replace the BOSS-N1 module](#)

## Installing the BOSS-N1 card carrier

### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#) .
2. Follow the procedure that is listed in [Before working inside your system](#)
3. If installed, [remove the front bezel](#).

### Steps

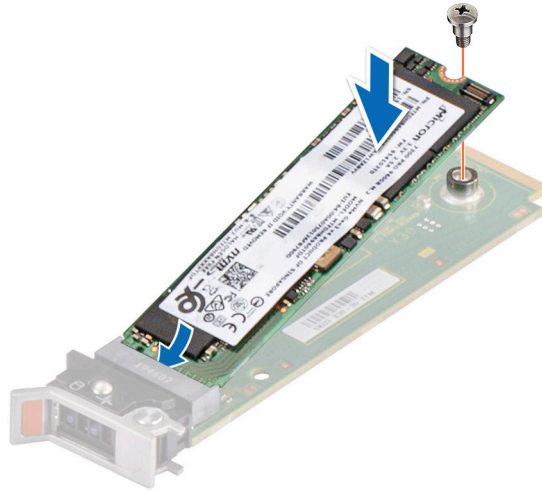
1. Press the release clip and pull the BOSS-N1 card carrier blank out of the system.



**Figure 145. Removing the BOSS-N1 card carrier blank**

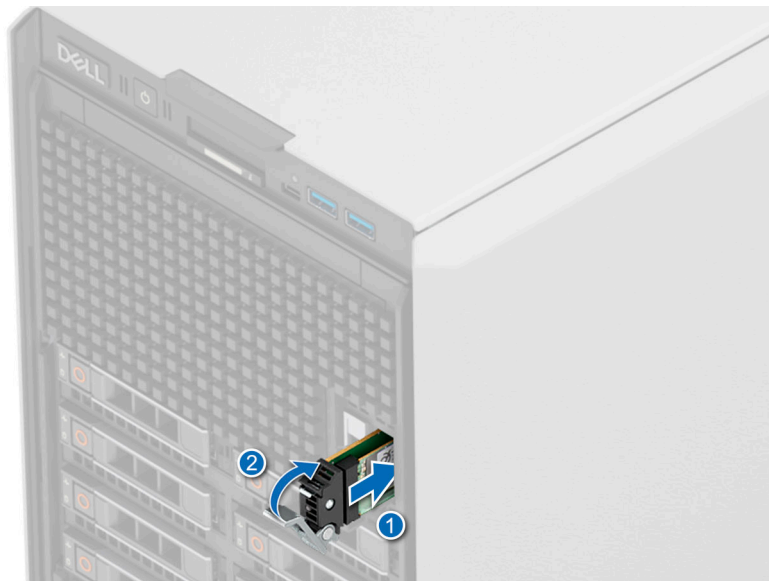


2. Align the M.2 NVMe SSD at an angle with the BOSS-N1 card carrier.
3. Insert the M.2 NVMe SSD until it is firmly seated in the BOSS-N1 card carrier.
4. Using the Phillips #1 screwdriver, secure the M.2 NVMe SSD on the BOSS-N1 card carrier with the M3 x 0.5 x 4.5 mm screw.



**Figure 146. Installing the M.2 NVMe SSD**

5. Align and push the BOSS-N1 card carrier into the slot in the BOSS-N1 module.
6. Close the release latch to secure the BOSS-N1 card carrier.



**Figure 147. Installing the BOSS-N1 card carrier**

#### Next steps

1. If removed, [install the front bezel](#).
2. Follow the procedure that is listed in [After working inside your system](#).

## Optional internal USB card

**NOTE:** To locate the internal USB port on the system board, see the [System board jumpers and connectors](#) section.

## Removing the internal USB card

### Prerequisites

**CAUTION:** To avoid interference with other components in the server, the maximum permissible dimensions of the USB memory key are 15.9 mm wide x 57.15 mm long x 7.9 mm high.

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. Follow the procedure listed in the [Before working inside your system](#).
3. [Remove the expansion card risers](#).

### Steps

1. Holding the blue tag, lift the internal USB card to disconnect from the connector on the system board.
2. Remove the USB memory key from the internal USB card.

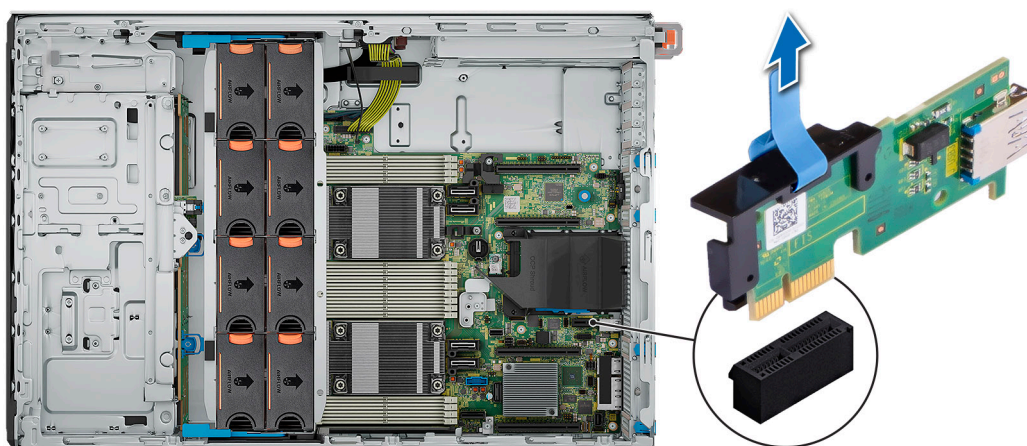


Figure 148. Removing the internal USB card

### Next steps

1. [Replace the internal USB card](#).

## Installing the internal USB card

### Prerequisites

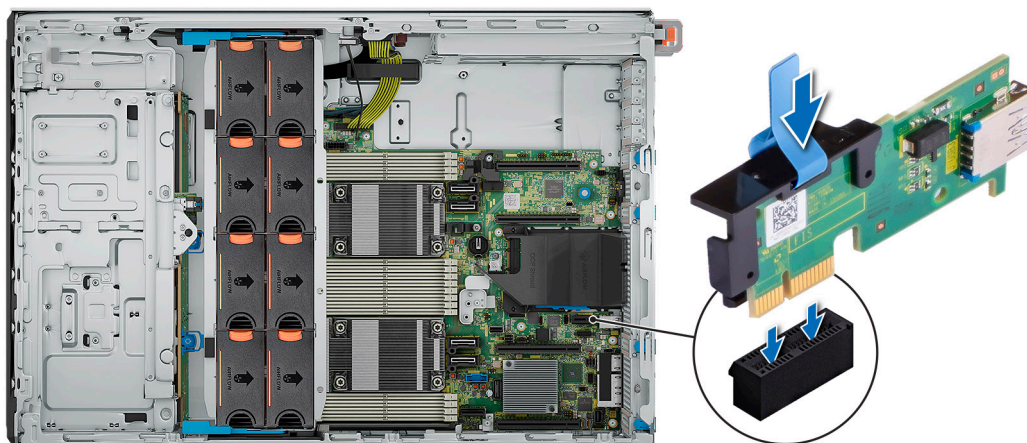
1. Follow the safety guidelines listed in the [Safety instructions](#).
2. Follow the procedure listed in the [Before working inside your system](#).
3. [Remove the expansion card risers](#).

### Steps

1. Connect the USB key to the internal USB card.

**NOTE:** For information about the exact location of USB on system board, see [System board jumpers and connectors](#) section.

2. Align the internal USB card with the connector on the system board and press firmly until the internal USB card is seated.



**Figure 149. Installing the internal USB card**

### Next steps

1. [Install the expansion card risers.](#)
2. Follow the procedure listed in [After working inside your system.](#)
3. While booting, press F2 to enter **System Setup** and verify that the system detects the USB memory key.

## Expansion cards and expansion card risers

**i NOTE:** When an expansion card is not supported or missing, the iDRAC and Lifecycle Controller logs an event. This does not prevent your system from booting. However, if a F1/F2 pause occurs with an error message, see Troubleshooting expansion cards section in the PowerEdge Servers Troubleshooting Guide at [www.dell.com/poweredgemanuals](http://www.dell.com/poweredgemanuals).



# Expansion card installation guidelines

The following table describes the supported expansion cards and riser configurations:

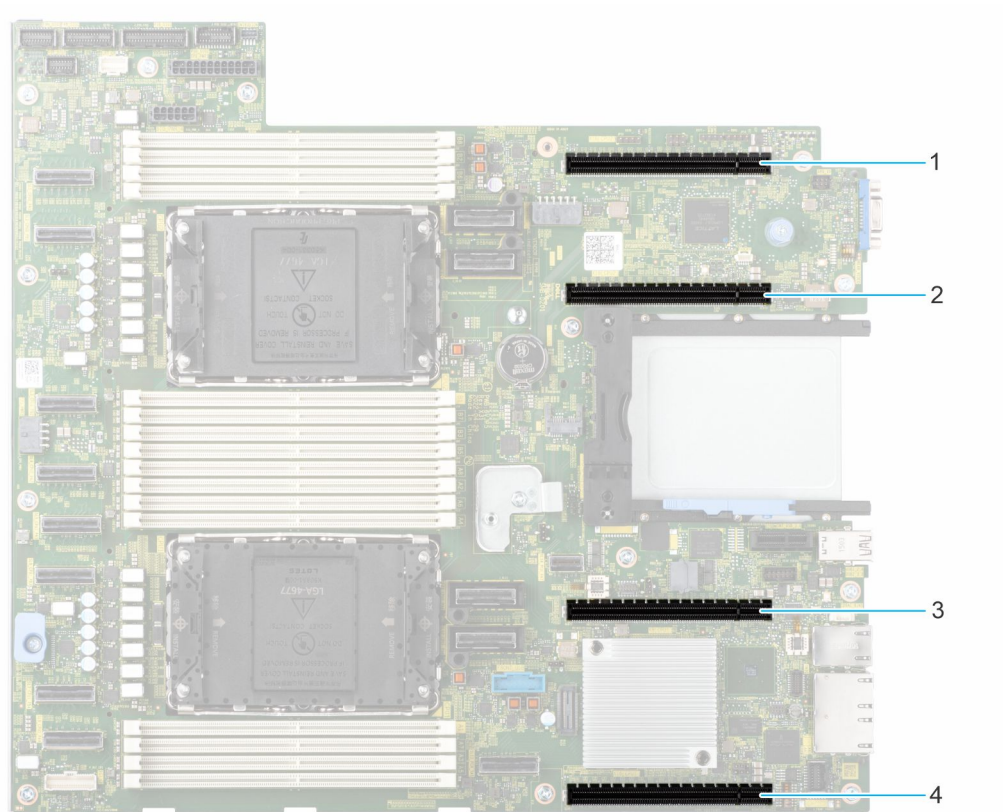


Figure 150. Expansion card riser slot connectors

- 1. PCIe Slot 3 (CPU 2)
- 2. PCIe Slot 4 (CPU 2)
- 3. PCIe Slot 5 (CPU 1)
- 4. PCIe Slot 6 (CPU 1)

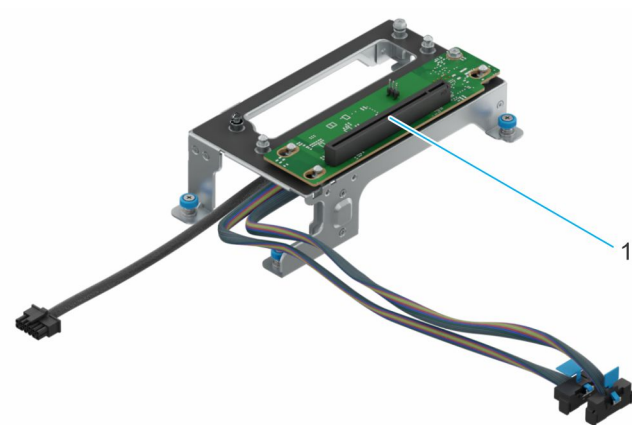
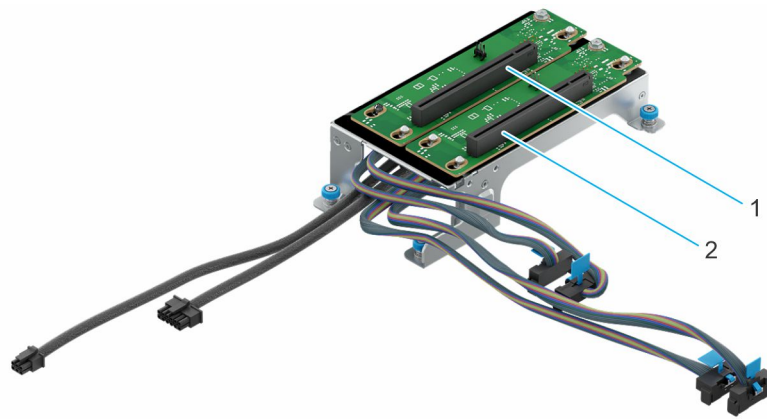


Figure 151. GPU Riser RC1 Module

- 1. Slot 2



**Figure 152. GPU Riser RC2 Module**

1. Slot 1
2. Slot 2

**Table 133. Expansion card riser configurations**

| Configurations                   | Expansion card risers | PCIe Slot ID | Form factor                           | Controlling processor | Slot's electrical bandwidth/ physical connector |
|----------------------------------|-----------------------|--------------|---------------------------------------|-----------------------|-------------------------------------------------|
| Config1. 1 x16 FHFL + 2 x16 FHHL | RC1                   | 2            | Full height Full Length, Double Width | Processor 1           | PCIe Gen5 x16 (x16 connector)                   |
| Config1-1. 1x FHFL + 4 x FHHL    | RC1                   | 2            | Full height Full Length, Double Width | Processor 1           | PCIe Gen5 x16 (x16 connector)                   |
| Config2. 2 x FHFL + 4x FHHL      | RC2                   | 1            | Full height Full Length, Double Width | Processor 2           | PCIe Gen5 x16 (x16 connector)                   |
|                                  | RC2                   | 2            |                                       | Processor 1           | PCIe Gen5 x16 (x16 connector)                   |

**NOTE:** The expansion-card slots are not hot-swappable.

The following table provides guidelines for installing expansion cards to ensure proper cooling and mechanical fit. The expansion cards with the highest priority should be installed first using the slot priority indicated. All the other expansion cards should be installed in the card priority and slot priority order.

**Table 134. Config 0: No riser – CPU**

| Card Type                     | Slot Priority | Maximum number of cards |
|-------------------------------|---------------|-------------------------|
| Intel COMMs Card (OCP 3.0)    | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)    | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)    | INT           | 1                       |
| Broadcom COMMs Card (OCP 3.0) | INT           | 1                       |
| Broadcom COMMs Card (OCP 3.0) | INT           | 1                       |
| Broadcom COMMs Card (OCP 3.0) | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)    | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)    | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)    | INT           | 1                       |

**Table 134. Config 0: No riser – CPU (continued)**

| Card Type                                | Slot Priority | Maximum number of cards |
|------------------------------------------|---------------|-------------------------|
| Broadcom COMMs Card (OCP 3.0)            | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)               | INT           | 1                       |
| Foxconn BOSS                             | INT           | 1                       |
| Foxconn BOSS                             | INT           | 1                       |
| Foxconn BOSS                             | INT           | 1                       |
| Foxconn PERC/HBA                         | INT           | 2                       |
| Foxconn PERC/HBA                         | 4, 6, 3       | 3                       |
| Compal/Foxconn/Inventec/Wistron PERC/HBA | INT           | 2                       |
| Foxconn PERC/HBA                         | INT           | 2                       |
| Foxconn PERC/HBA                         | INT           | 1                       |
| Foxconn PERC/HBA                         | INT           | 2                       |
| Foxconn PERC/HBA                         | INT           | 2                       |
| Foxconn PERC/HBA                         | 4, 6, 3, 5    | 4                       |
| Foxconn PERC/HBA                         | 4, 6, 3, 5    | 4                       |
| Foxconn PERC/HBA                         | 5             | 1                       |
| Foxconn PERC/HBA                         | 5             | 1                       |
| Nvidia GPU                               | 4, 6, 3       | 3                       |
| Nvidia GPU                               | 4, 6, 3, 5    | 4                       |
| Broadcom COMMs Card (PCIe)               | 4, 6, 3       | 3                       |
| Intel COMMs Card (PCIe)                  | 4, 6, 3       | 3                       |
| Intel COMMs Card (PCIe)                  | 4, 6, 3       | 3                       |
| Broadcom (Emulex) COMMs Card (PCIe)      | 4, 6, 3, 5    | 4                       |
| Mellanox COMMs Card (PCIe)               | 4, 6, 3       | 3                       |
| Broadcom COMMs Card (PCIe)               | 4, 6, 3, 5    | 4                       |
| Broadcom COMMs Card (PCIe)               | 4, 6, 3, 5    | 4                       |
| Broadcom COMMs Card (PCIe)               | 4, 6, 3, 5    | 4                       |
| Intel COMMs Card (PCIe)                  | 4, 6, 3, 5    | 4                       |
| Intel COMMs Card (PCIe)                  | 4, 6, 3, 5    | 4                       |
| Intel COMMs Card (PCIe)                  | 4, 6, 3, 5    | 4                       |
| Intel COMMs Card (PCIe)                  | 4, 6, 3, 5    | 4                       |
| Broadcom COMMs Card (PCIe)               | 4, 6, 3, 5    | 4                       |
| Broadcom COMMs Card (PCIe)               | 4, 6, 3, 5    | 4                       |
| Intel COMMs Card (PCIe)                  | 4, 6, 3, 5    | 4                       |
| Inventec Serial                          | 5             | 1                       |

**Table 135. Config0-1 No riser-CPU**

| Card type                                | Slot priority | Maximum number of cards |
|------------------------------------------|---------------|-------------------------|
| Intel COMMs Card (OCP 3.0)               | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)               | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)               | INT           | 1                       |
| Broadcom COMMs Card (OCP 3.0)            | INT           | 1                       |
| Broadcom COMMs Card (OCP 3.0)            | INT           | 1                       |
| Broadcom COMMs Card (OCP 3.0)            | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)               | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)               | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)               | INT           | 1                       |
| Broadcom COMMs Card (OCP 3.0)            | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)               | INT           | 1                       |
| Foxconn BOSS                             | INT           | 1                       |
| Foxconn BOSS                             | INT           | 1                       |
| Foxconn BOSS                             | INT           | 1                       |
| Foxconn PERC/HBA                         | INT           | 2                       |
| Foxconn PERC/HBA                         | 6             | 1                       |
| Compal/Foxconn/Inventec/Wistron PERC/HBA | INT           | 2                       |
| Foxconn PERC/HBA                         | INT           | 2                       |
| Foxconn PERC/HBA                         | INT           | 1                       |
| Foxconn PERC/HBA                         | INT           | 2                       |
| Foxconn PERC/HBA                         | INT           | 2                       |
| Foxconn PERC/HBA                         | 6, 5          | 2                       |
| Foxconn PERC/HBA                         | 6, 5          | 2                       |
| Foxconn PERC/HBA                         | 5             | 1                       |
| Foxconn PERC/HBA                         | 5             | 1                       |
| Inventec Serial                          | 5             | 1                       |
| Nvidia GPU                               | 6             | 1                       |
| Nvidia GPU                               | 6, 5          | 2                       |
| Broadcom COMMs Card (PCIe)               | 6             | 1                       |
| Intel COMMs Card (PCIe)                  | 6             | 1                       |
| Intel COMMs Card (PCIe)                  | 6             | 1                       |
| Broadcom (Emulex) COMMs Card (PCIe)      | 6, 5          | 2                       |
| Mellanox COMMs Card (PCIe)               | 6             | 1                       |
| Broadcom COMMs Card (PCIe)               | 6, 5          | 2                       |
| Broadcom COMMs Card (PCIe)               | 6, 5          | 2                       |
| Broadcom COMMs Card (PCIe)               | 6, 5          | 2                       |

**Table 135. Config0-1 No riser-CPU (continued)**

| Card type                  | Slot priority | Maximum number of cards |
|----------------------------|---------------|-------------------------|
| Intel COMMs Card (PCIe)    | 6, 5          | 2                       |
| Intel COMMs Card (PCIe)    | 6, 5          | 2                       |
| Intel COMMs Card (PCIe)    | 6, 5          | 2                       |
| Intel COMMs Card (PCIe)    | 6, 5          | 2                       |
| Broadcom COMMs Card (PCIe) | 6, 5          | 2                       |
| Broadcom COMMs Card (PCIe) | 6, 5          | 2                       |
| Intel COMMs Card (PCIe)    | 6, 5          | 2                       |

**Table 136. Config1. R1A**

| Card type                                | Slot priority | Maximum number of cards |
|------------------------------------------|---------------|-------------------------|
| Intel COMMs Card (OCP 3.0)               | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)               | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)               | INT           | 1                       |
| Broadcom COMMs Card (OCP 3.0)            | INT           | 1                       |
| Broadcom COMMs Card (OCP 3.0)            | INT           | 1                       |
| Broadcom COMMs Card (OCP 3.0)            | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)               | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)               | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)               | INT           | 1                       |
| Broadcom COMMs Card (OCP 3.0)            | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)               | INT           | 1                       |
| Foxconn BOSS                             | INT           | 1                       |
| Foxconn BOSS                             | INT           | 1                       |
| Foxconn BOSS                             | INT           | 1                       |
| Foxconn PERC/HBA                         | INT           | 2                       |
| Foxconn PERC/HBA                         | 2, 6          | 2                       |
| Compal/Foxconn/Inventec/Wistron PERC/HBA | INT           | 2                       |
| Foxconn PERC/HBA                         | INT           | 2                       |
| Foxconn PERC/HBA                         | INT           | 1                       |
| Foxconn PERC/HBA                         | INT           | 2                       |
| Foxconn PERC/HBA                         | INT           | 2                       |
| Foxconn PERC/HBA                         | 2, 6, 5       | 3                       |
| Foxconn PERC/HBA                         | 2, 6, 5       | 3                       |
| Foxconn PERC/HBA                         | 5             | 1                       |
| Foxconn PERC/HBA                         | 5             | 1                       |
| Inventec Serial                          | 5             | 1                       |
| Nvidia GPU                               | 2             | 1                       |

**Table 136. Config1. R1A (continued)**

| Card type                           | Slot priority | Maximum number of cards |
|-------------------------------------|---------------|-------------------------|
| Nvidia GPU                          | 2             | 1                       |
| Nvidia GPU                          | 2, 6          | 2                       |
| Nvidia GPU                          | 2, 6, 5       | 3                       |
| Broadcom COMMs Card (PCIe)          | 2, 6          | 2                       |
| Intel COMMs Card (PCIe)             | 2, 6          | 2                       |
| Intel COMMs Card (PCIe)             | 2, 6          | 2                       |
| Broadcom (Emulex) COMMs Card (PCIe) | 2, 6, 5       | 3                       |
| Mellanox COMMs Card (PCIe)          | 2, 6          | 2                       |
| Broadcom COMMs Card (PCIe)          | 2, 6, 5       | 3                       |
| Broadcom COMMs Card (PCIe)          | 2, 6, 5       | 3                       |
| Broadcom COMMs Card (PCIe)          | 2, 6, 5       | 3                       |
| Intel COMMs Card (PCIe)             | 2, 6, 5       | 3                       |
| Intel COMMs Card (PCIe)             | 2, 6, 5       | 3                       |
| Intel COMMs Card (PCIe)             | 2, 6, 5       | 3                       |
| Intel COMMs Card (PCIe)             | 2, 6, 5       | 3                       |
| Broadcom COMMs Card (PCIe)          | 2, 6, 5       | 3                       |
| Broadcom COMMs Card (PCIe)          | 2, 6, 5       | 3                       |
| Intel COMMs Card (PCIe)             | 2, 6, 5       | 3                       |

**Table 137. Config1-1. R1A**

| Card type                     | Slot priority | Maximum number of cards |
|-------------------------------|---------------|-------------------------|
| Intel COMMs Card (OCP 3.0)    | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)    | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)    | INT           | 1                       |
| Broadcom COMMs Card (OCP 3.0) | INT           | 1                       |
| Broadcom COMMs Card (OCP 3.0) | INT           | 1                       |
| Broadcom COMMs Card (OCP 3.0) | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)    | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)    | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)    | INT           | 1                       |
| Broadcom COMMs Card (OCP 3.0) | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)    | INT           | 1                       |
| Foxconn BOSS                  | INT           | 1                       |
| Foxconn BOSS                  | INT           | 1                       |
| Foxconn BOSS                  | INT           | 1                       |
| Foxconn PERC/HBA              | INT           | 2                       |
| Foxconn PERC/HBA              | 2, 4, 6, 3    | 4                       |

**Table 137. Config1-1. R1A (continued)**

| Card type                                | Slot priority | Maximum number of cards |
|------------------------------------------|---------------|-------------------------|
| Compal/Foxconn/Inventec/Wistron PERC/HBA | INT           | 2                       |
| Foxconn PERC/HBA                         | INT           | 2                       |
| Foxconn PERC/HBA                         | INT           | 1                       |
| Foxconn PERC/HBA                         | INT           | 2                       |
| Foxconn PERC/HBA                         | INT           | 2                       |
| Foxconn PERC/HBA                         | 2, 4, 6, 3, 5 | 5                       |
| Foxconn PERC/HBA                         | 2, 4, 6, 3, 5 | 5                       |
| Foxconn PERC/HBA                         | 5             | 1                       |
| Foxconn PERC/HBA                         | 5             | 1                       |
| Nvidia GPU                               | 2             | 1                       |
| Nvidia GPU                               | 2             | 1                       |
| Nvidia GPU                               | 2, 4, 6, 3    | 4                       |
| Nvidia GPU                               | 2, 4, 6, 3, 5 | 5                       |
| Broadcom COMMs Card (PCIe)               | 2, 4, 6, 3    | 4                       |
| Intel COMMs Card (PCIe)                  | 2, 4, 6, 3    | 4                       |
| Intel COMMs Card (PCIe)                  | 2, 4, 6, 3    | 4                       |
| Broadcom (Emulex) COMMs Card (PCIe)      | 2, 4, 6, 3, 5 | 5                       |
| Mellanox COMMs Card (PCIe)               | 2, 4, 6, 3    | 4                       |
| Broadcom COMMs Card (PCIe)               | 2, 4, 6, 3, 5 | 5                       |
| Broadcom COMMs Card (PCIe)               | 2, 4, 6, 3, 5 | 5                       |
| Broadcom COMMs Card (PCIe)               | 2, 4, 6, 3, 5 | 5                       |
| Intel COMMs Card (PCIe)                  | 2, 4, 6, 3, 5 | 5                       |
| Intel COMMs Card (PCIe)                  | 2, 4, 6, 3, 5 | 5                       |
| Intel COMMs Card (PCIe)                  | 2, 4, 6, 3, 5 | 5                       |
| Intel COMMs Card (PCIe)                  | 2, 4, 6, 3, 5 | 5                       |
| Broadcom COMMs Card (PCIe)               | 2, 4, 6, 3, 5 | 5                       |
| Broadcom COMMs Card (PCIe)               | 2, 4, 6, 3, 5 | 5                       |
| Intel COMMs Card (PCIe)                  | 2, 4, 6, 3, 5 | 5                       |
| Inventec Serial                          | 5             | 1                       |

**Table 138. Config2. R1A + R1b**

| Card type                     | Slot priority | Maximum number of cards |
|-------------------------------|---------------|-------------------------|
| Intel COMMs Card (OCP 3.0)    | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)    | INT           | 1                       |
| Intel COMMs Card (OCP 3.0)    | INT           | 1                       |
| Broadcom COMMs Card (OCP 3.0) | INT           | 1                       |
| Broadcom COMMs Card (OCP 3.0) | INT           | 1                       |

**Table 138. Config2. R1A + R1b (continued)**

| <b>Card type</b>                         | <b>Slot priority</b> | <b>Maximum number of cards</b> |
|------------------------------------------|----------------------|--------------------------------|
| Broadcom COMMs Card (OCP 3.0)            | INT                  | 1                              |
| Intel COMMs Card (OCP 3.0)               | INT                  | 1                              |
| Intel COMMs Card (OCP 3.0)               | INT                  | 1                              |
| Intel COMMs Card (OCP 3.0)               | INT                  | 1                              |
| Broadcom COMMs Card (OCP 3.0)            | INT                  | 1                              |
| Intel COMMs Card (OCP 3.0)               | INT                  | 1                              |
| Foxconn BOSS                             | INT                  | 1                              |
| Foxconn BOSS                             | INT                  | 1                              |
| Foxconn BOSS                             | INT                  | 1                              |
| Foxconn PERC/HBA                         | INT                  | 2                              |
| Foxconn PERC/HBA                         | 2, 1, 4, 6, 3        | 5                              |
| Compal/Foxconn/Inventec/Wistron PERC/HBA | INT                  | 2                              |
| Foxconn PERC/HBA                         | INT                  | 2                              |
| Foxconn PERC/HBA                         | INT                  | 1                              |
| Foxconn PERC/HBA                         | INT                  | 2                              |
| Foxconn PERC/HBA                         | INT                  | 2                              |
| Foxconn PERC/HBA                         | 2, 1, 4, 6, 3, 5     | 6                              |
| Foxconn PERC/HBA                         | 2, 1, 4, 6, 3, 5     | 6                              |
| Foxconn PERC/HBA                         | 5                    | 1                              |
| Foxconn PERC/HBA                         | 5                    | 1                              |
| Inventec Serial                          | 5                    | 1                              |
| Nvidia GPU                               | 2, 1                 | 2                              |
| Nvidia GPU                               | 2, 1                 | 2                              |
| Nvidia GPU                               | 2, 1, 4, 6, 3        | 5                              |
| Nvidia GPU                               | 2, 1, 4, 6, 3, 5     | 6                              |
| Broadcom COMMs Card (PCIe)               | 2, 1, 4, 6, 3        | 5                              |
| Intel COMMs Card (PCIe)                  | 2, 1, 4, 6, 3        | 5                              |
| Intel COMMs Card (PCIe)                  | 2, 1, 4, 6, 3        | 5                              |
| Broadcom (Emulex) COMMs Card (PCIe)      | 2, 1, 4, 6, 3, 5     | 6                              |
| Mellanox COMMs Card (PCIe)               | 2, 1, 4, 6, 3        | 5                              |
| Broadcom COMMs Card (PCIe)               | 2, 1, 4, 6, 3, 5     | 6                              |
| Broadcom COMMs Card (PCIe)               | 2, 1, 4, 6, 3, 5     | 6                              |
| Broadcom COMMs Card (PCIe)               | 2, 1, 4, 6, 3, 5     | 6                              |
| Intel COMMs Card (PCIe)                  | 2, 1, 4, 6, 3, 5     | 6                              |
| Intel COMMs Card (PCIe)                  | 2, 1, 4, 6, 3, 5     | 6                              |
| Intel COMMs Card (PCIe)                  | 2, 1, 4, 6, 3, 5     | 6                              |



**Table 138. Config2. R1A + R1b (continued)**

| Card type                  | Slot priority    | Maximum number of cards |
|----------------------------|------------------|-------------------------|
| Intel COMMs Card (PCIe)    | 2, 1, 4, 6, 3, 5 | 6                       |
| Broadcom COMMs Card (PCIe) | 2, 1, 4, 6, 3, 5 | 6                       |
| Broadcom COMMs Card (PCIe) | 2, 1, 4, 6, 3, 5 | 6                       |
| Intel COMMs Card (PCIe)    | 2, 1, 4, 6, 3, 5 | 6                       |

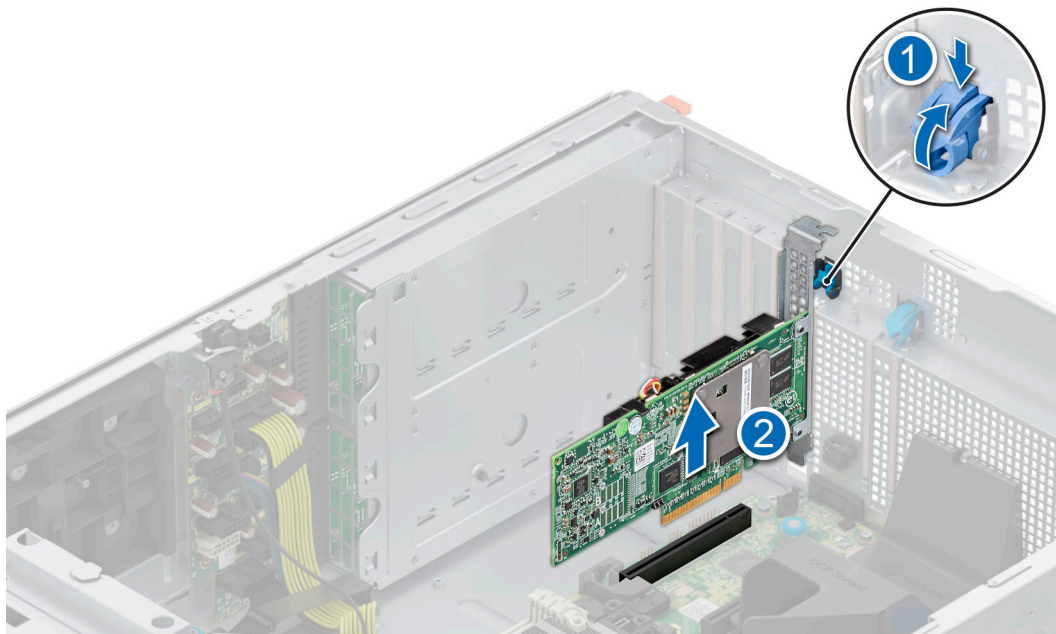
## Removing a expansion card

### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. [Remove the air shroud](#).

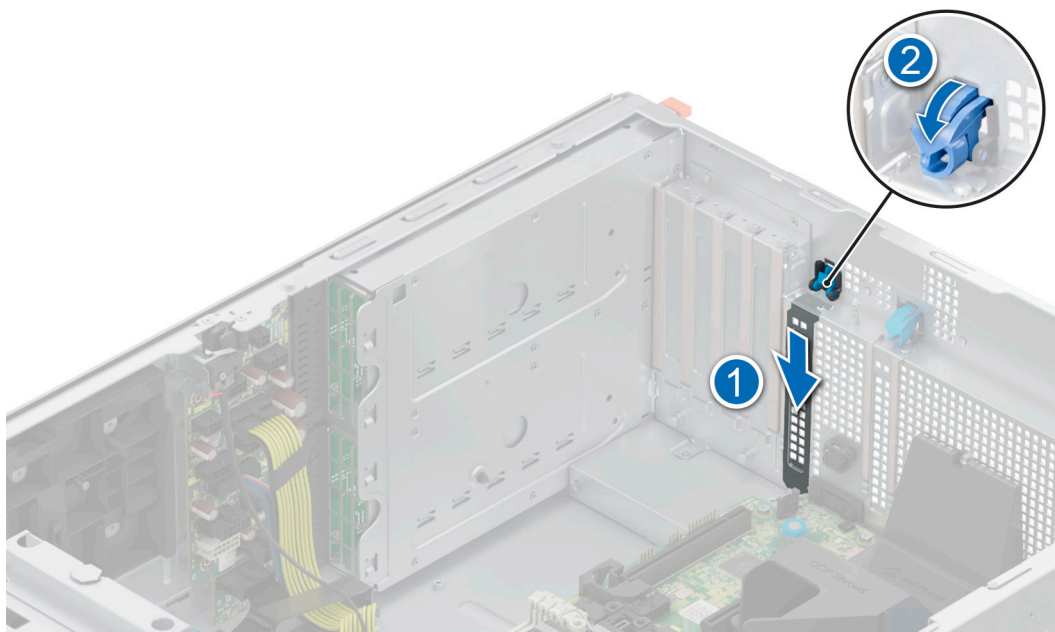
### Steps

1. Disconnect the cables from the expansion card.
2. Press the expansion card latch and push down the latch to open it.
3. Hold the expansion card by the edge, and pull the card up to remove it from the expansion card connector and the system.



**Figure 153. Removing an expansion card**

4. Install the filler brackets by performing the following steps:
    - a. Align the slot on the filler bracket with the tab on the expansion card slot.
    - b. Press the expansion card latch till the filler bracket locks into place.
- NOTE:** Filler brackets must be installed in empty expansion-card slots to maintain FCC certification of the system. The brackets also keep dust and dirt out of the system and aid in proper cooling and airflow inside the system.



**Figure 154. Installing the filler bracket**

### Next steps

Replace the expansion card.

## Installing an expansion card

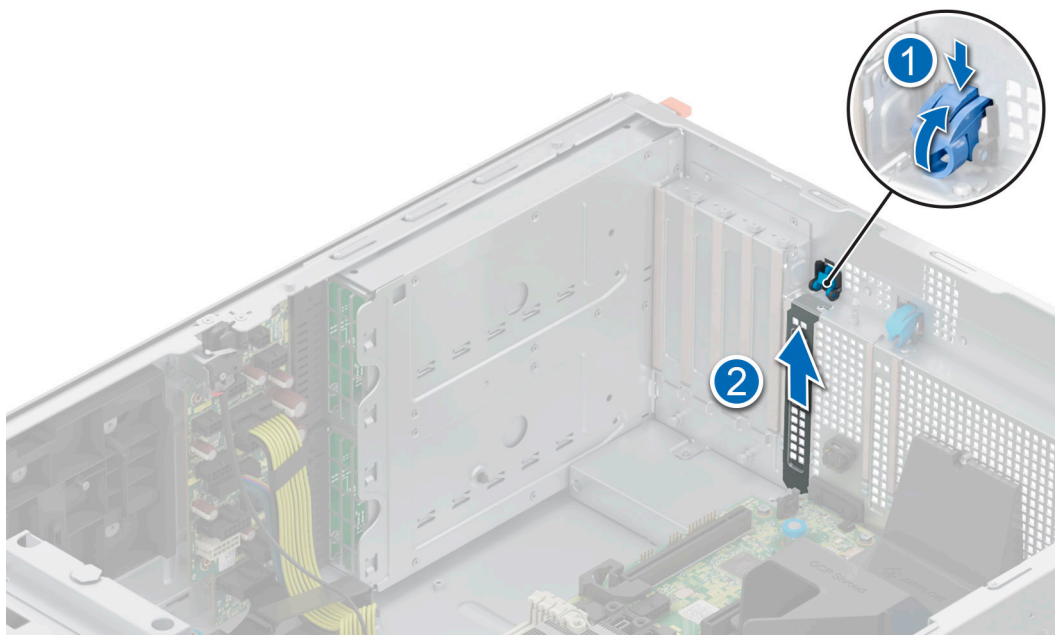
### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. [Remove the air shroud](#).

### Steps

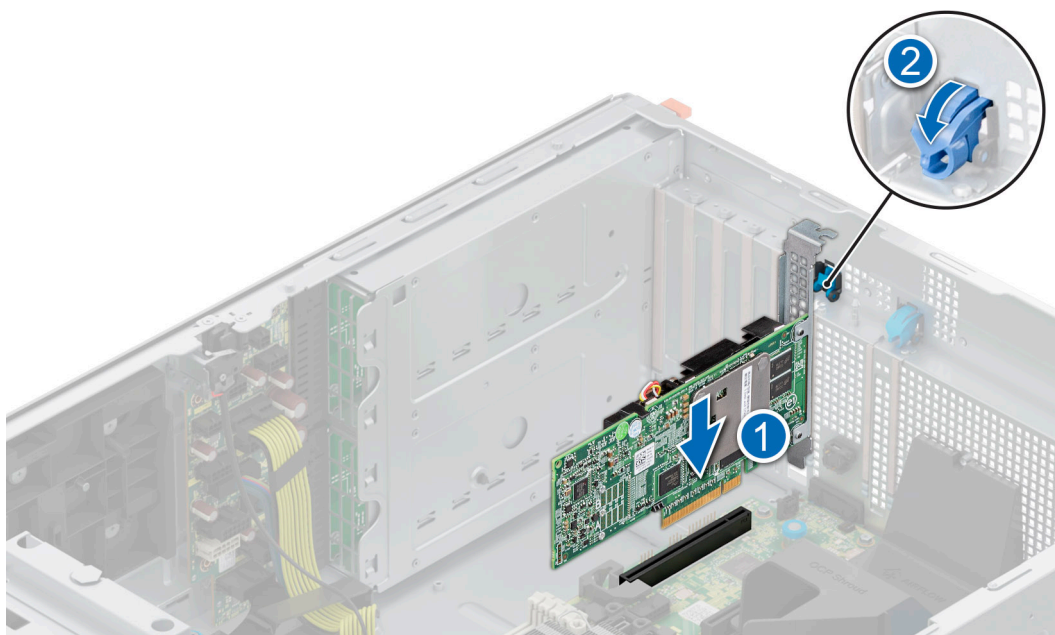
1. Unpack the expansion card and prepare it for installation.  
For instructions, see the documentation accompanying the card.
2. Open the expansion card latch adjacent to the slot you want to install the expansion card.
3. Remove the existing expansion card or filler bracket from the expansion card holder.

**NOTE:** Store this bracket for future use. Filler brackets must be installed in empty expansion-card slots to maintain FCC certification of the system. The brackets also keep dust and dirt out of the system and aid in proper cooling and airflow inside the system.



**Figure 155. Removing the filler bracket**

4. Holding the card by the edges, position the card so that the card aligns with the expansion card connector.
5. Insert the card firmly into the expansion card connector until the card is fully seated.
6. Close the expansion card latch by pushing the latch up until the latch snaps into place.



**Figure 156. Installing an expansion card**

7. Connect the cables to the expansion card.

#### **Next steps**

1. [Install the air shroud.](#)
2. Follow the procedure listed in [After working inside your system.](#)

# Optional GPU card

## Removing the GPU card holder

### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. [Remove the air shroud](#).

### Steps

Loosen the captive screws and pull the GPU card holder from the system.

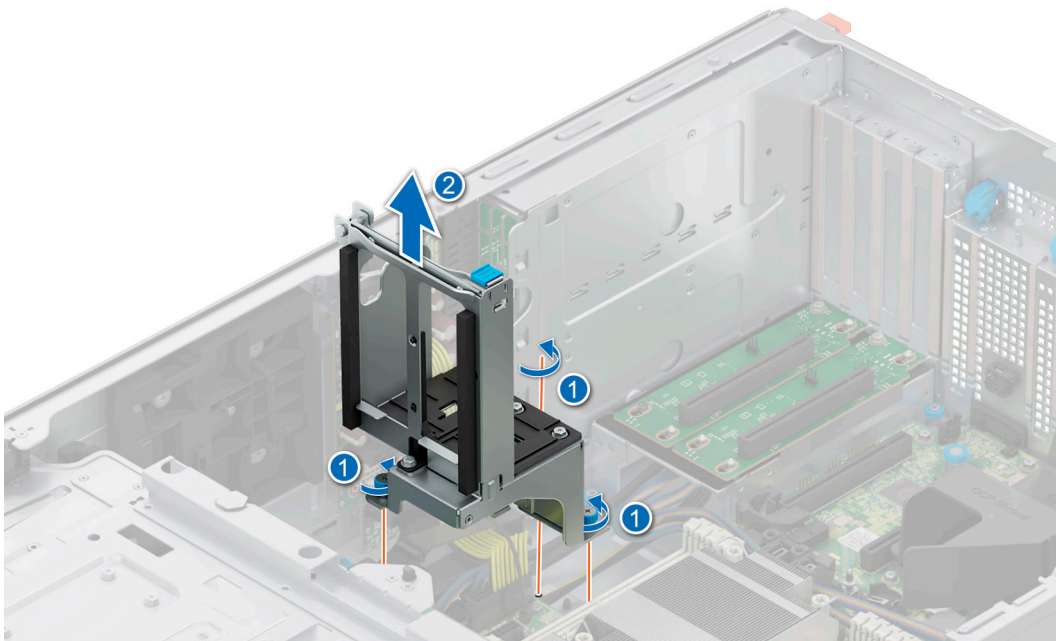


Figure 157. Removing GPU card holder

### Next steps

[Replace the GPU card holder](#).

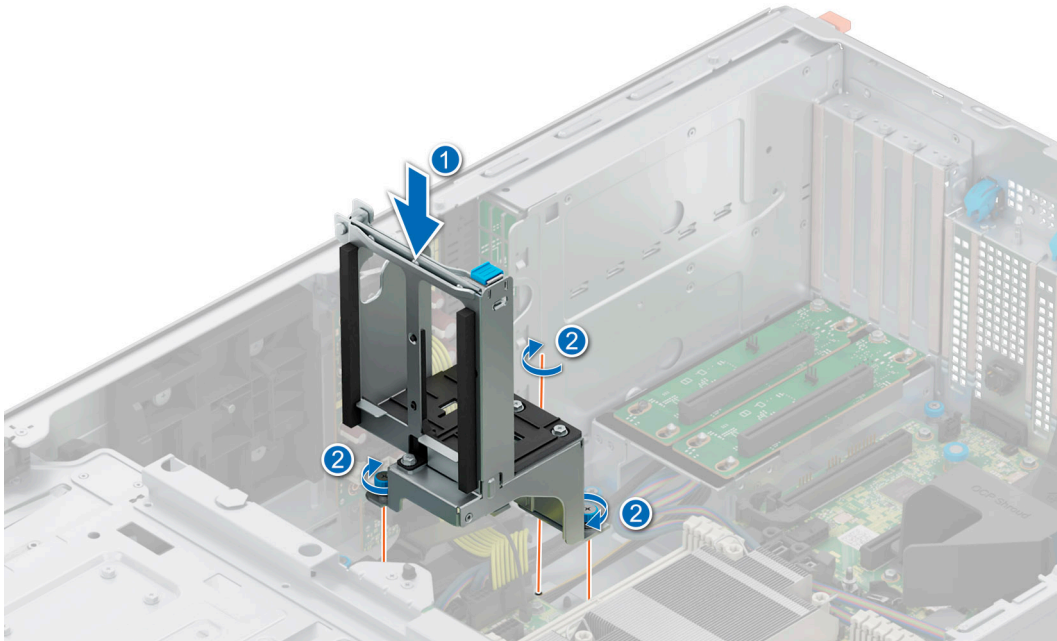
## Installing the GPU card holder

### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. [Remove the air shroud](#).

### Steps

1. Align and lower the GPU card holder to the guide pin on the system.
2. Tighten the captive screws, until the GPU card holder is firmly seated.



**Figure 158. Installing the GPU card holder**

#### Next steps

1. [Install the air shroud.](#)
2. Follow the procedure listed in [After working inside your system.](#)

## GPU riser

### Removing the GPU riser

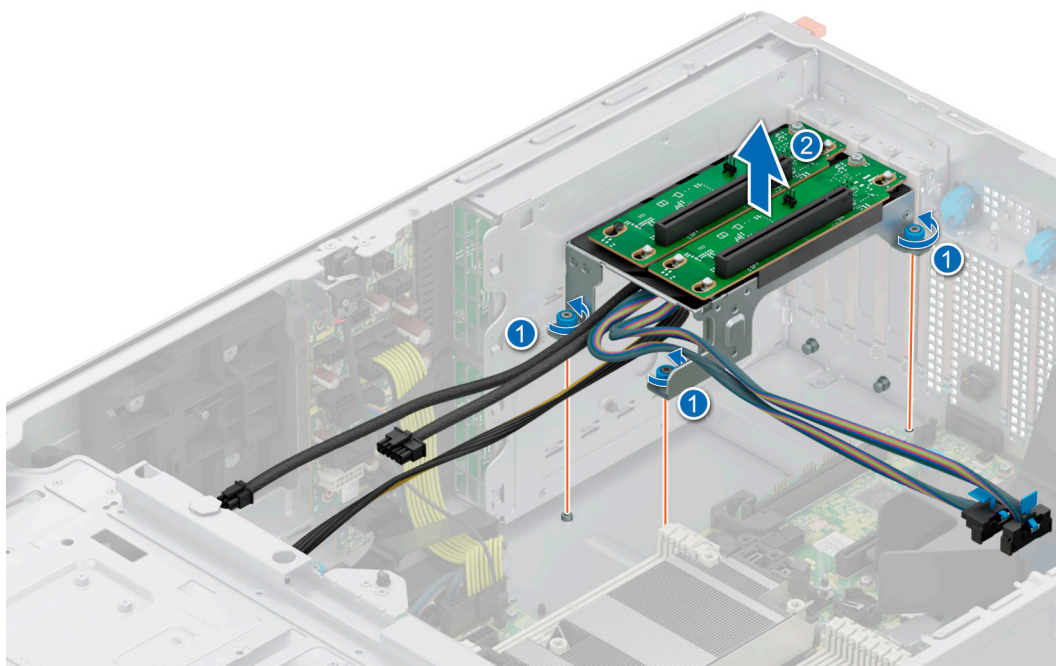
#### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions.](#)
2. Follow the procedure that is listed in [Before working inside your system .](#)
3. [Remove the air shroud.](#)

#### Steps

1. Disconnect the cables from the GPU riser connected to the system board.
2. Loosen the captive screws and pull the GPU riser from the system.





**Figure 159. Removing the GPU riser**

#### **Next steps**

Replace the GPU riser.

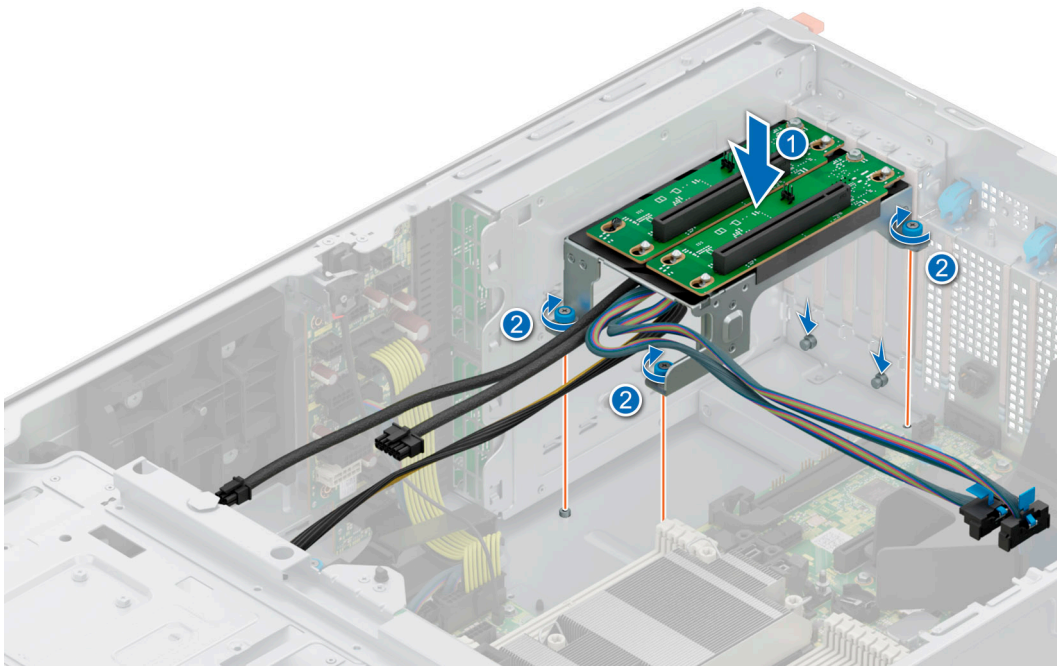
## **Installing the GPU riser**

#### **Prerequisites**

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. [Remove the air shroud](#).

#### **Steps**

1. Align the GPU riser to the guide pins and lower the GPU riser in the system.
2. Tighten the captive screws, until the GPU riser is firmly seated.



**Figure 160. Installing the GPU riser**

#### Next steps

1. Connect the cables to the system board connectors.
2. [Install the air shroud.](#)
3. Follow the procedure listed in [After working inside your system.](#)

## Processor and heat sink

This is a service technician replaceable part only.

## Removing the processor and heat sink module

#### Prerequisites

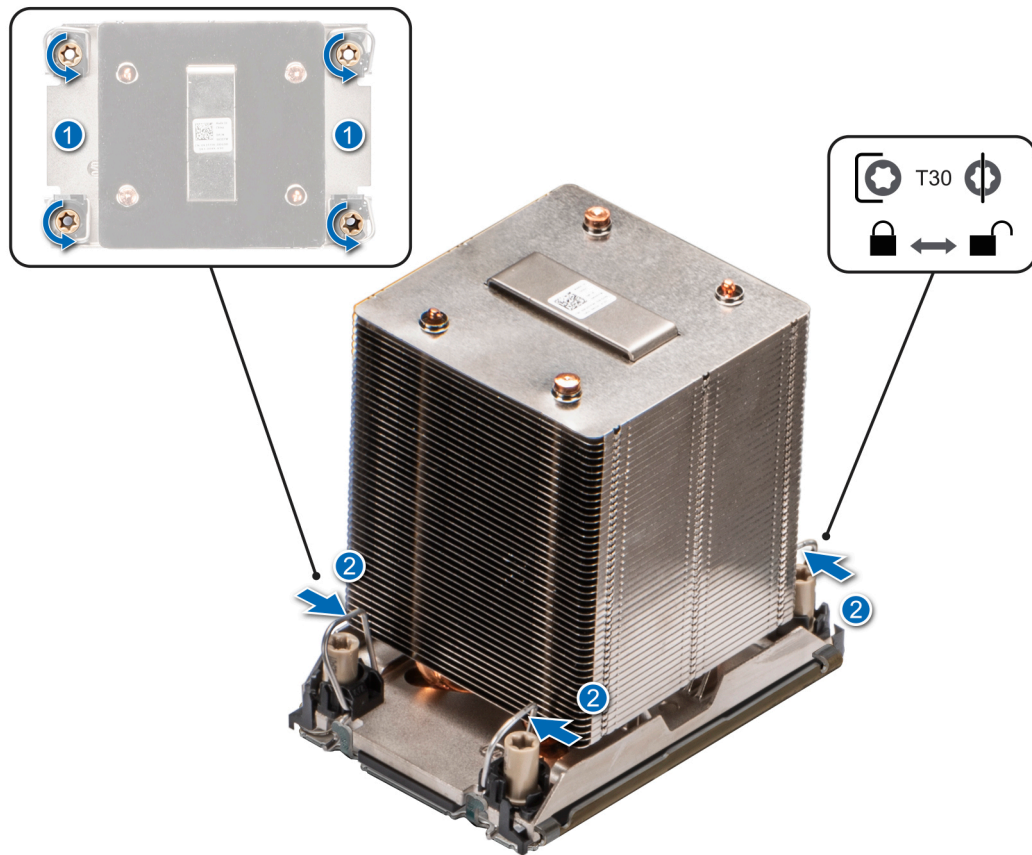
1. Follow the safety guidelines listed in [Safety instructions.](#)
2. Follow the procedure that is listed in [Before working inside your system .](#)
3. [Remove the air shroud.](#)

**NOTE:** The heat sink and processor are hot to touch for some time after the system has been powered down. Allow the heat sink and processor to cool down before handling them.

#### Steps

1. Ensure all four anti-tilt wires are in the locked position (outward position), and then using a Torx T30 tool, loosen the captive nuts on the processor heat sink module (PHM) in the order that is mentioned below:
  - a. Loosen the first nut three turns.
  - b. Loosen the nut diagonally opposite to the nut you loosened first.
  - c. Repeat the procedure for the remaining two nuts.
  - d. Return to the first nut and loosen it completely.

**NOTE:** Ensure that the anti-tilt wires on the PHM are in locked position when loosening the captive nuts.
2. Set all the anti-tilt wires to unlocked position (inward position).



**Figure 161. Removing the processor heat sink module**

3. Lift the PHM from the system and set the PHM aside with the processor side facing up.



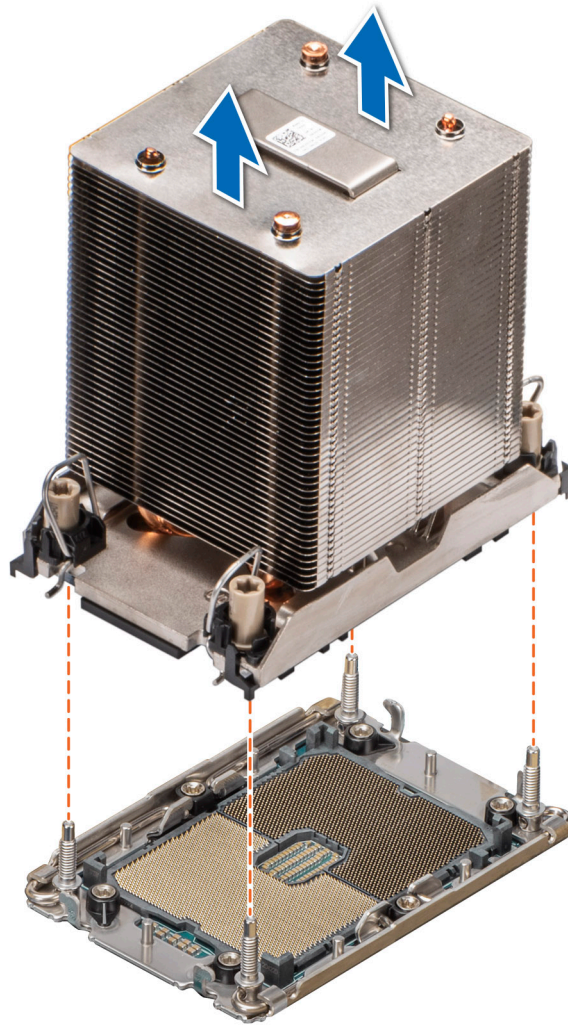


Figure 162. Removing a heat sink

### Next steps

If you are removing a faulty heat sink, [Removing the processor and heat sink module](#) , if not, [Removing the processor](#) .

## Removing the processor

### Prerequisites

**⚠ WARNING:** Remove the processor from processor and heat sink module (PHM) only if you are replacing the processor or heat sink.

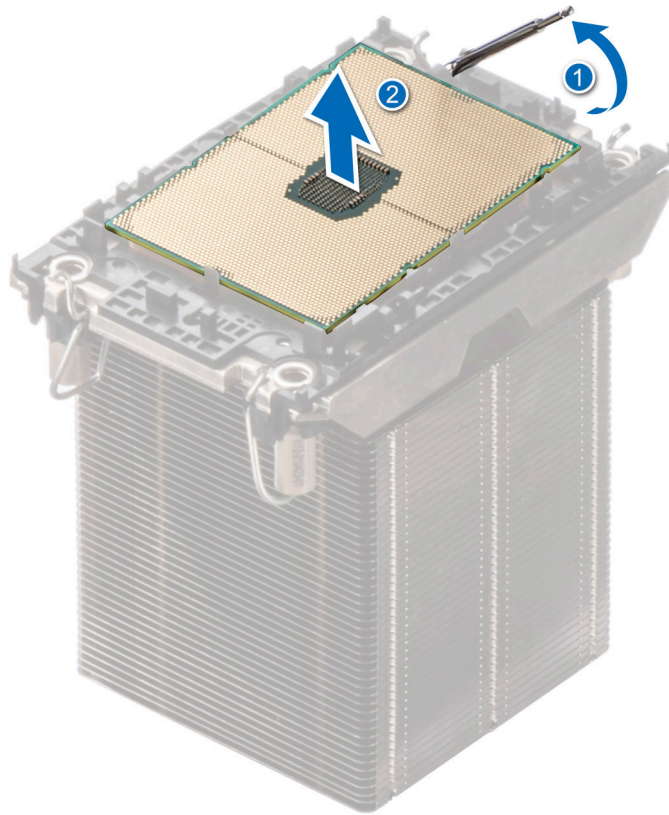
1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#) .
3. [Remove the air shroud](#).
4. [Remove the processor heat sink module](#).

**⚠ CAUTION:** You may find the CMOS battery loss or CMOS checksum error displayed during the first instance of powering on the system after the processor or system board replacement which is expected. To fix this, simply go to setup option to configure the system settings.

### Steps

1. Place the heat sink with the processor side facing up.

2. Using your thumb, lift up the Thermal Interface Material (TIM) break lever to release the processor from the TIM and retaining clip.
  3. Holding the processor by the edges, lift the processor away from the retaining clip.
- NOTE:** Ensure to hold the retaining clip to the heat sink as you lift the TIM break lever.



**Figure 163. Lift up the TIM break lever**

**NOTE:** Ensure to return the TIM break lever back to original position.

4. Using your thumb and index finger, first hold the retaining clip release tab at the pin 1 connector, pull out the tip of the retaining clip release tab, and then lift the retaining clip partially from the heat sink.
5. Repeat the procedure at the remaining three corners of the retaining clip.
6. After all the corners are released from the heat sink, lift the retaining clip from the pin 1 corner of the heat sink.



**Figure 164. Removing the retaining clip**

#### Next steps

Replace the processor.

## Installing the processor

#### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. [Remove the air shroud](#).
4. [Remove the processor and heat sink module](#).

#### Steps

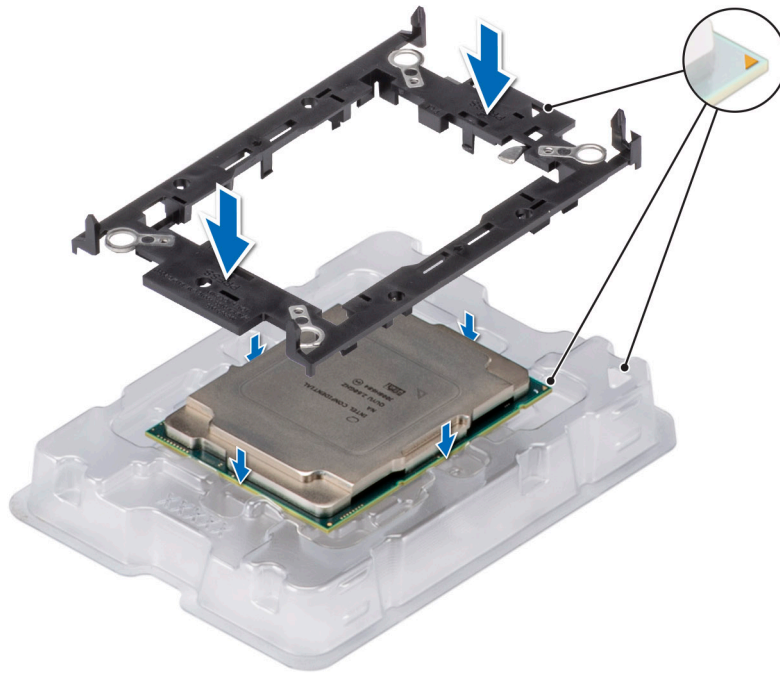
1. Place the processor in the processor tray.

**NOTE:** Ensure the pin 1 indicator on the processor tray is aligned with the pin 1 indicator on the processor.

2. Place the retaining clip on top of the processor in the processor tray aligning pin 1 indicator on the processor.

**NOTE:** Ensure the pin 1 indicator on the retaining clip is aligned with the pin 1 indicator on the processor before placing the retaining clip on the processor.

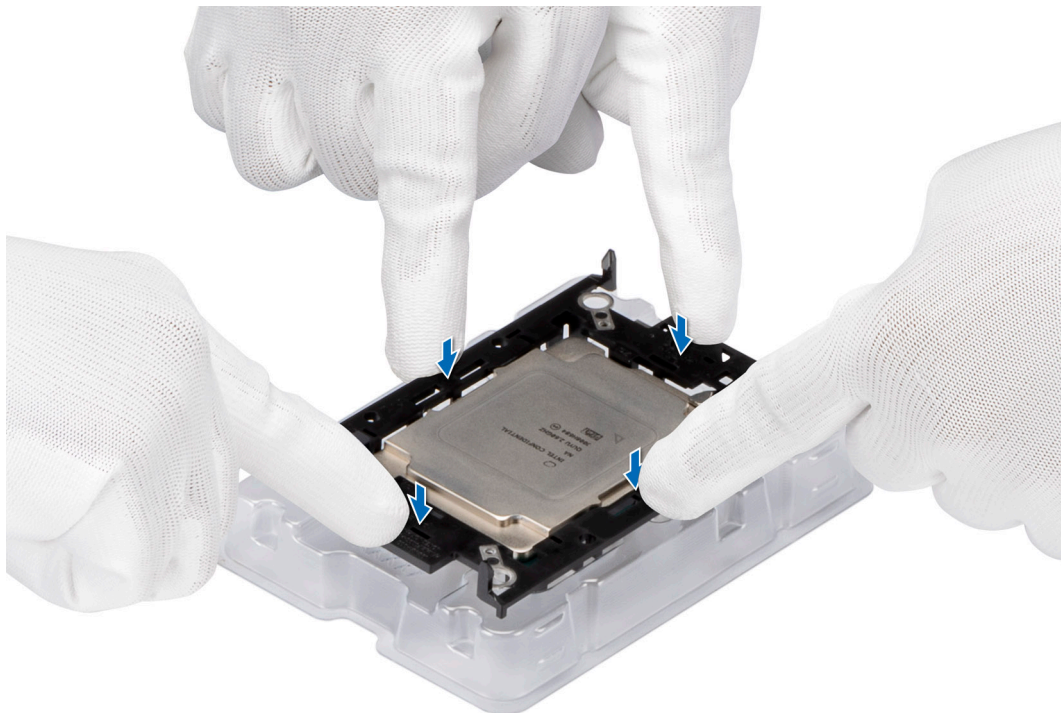
**NOTE:** Before you install the heat sink, ensure to place the processor and retaining clip in the tray.



**Figure 165. Installing the retaining clip**

3. Align the processor with retaining clip, by using the fingers press the retaining clip on all the four sides until it clicks into place.

**NOTE:** Ensure the processor is securely latched to the retaining clip.



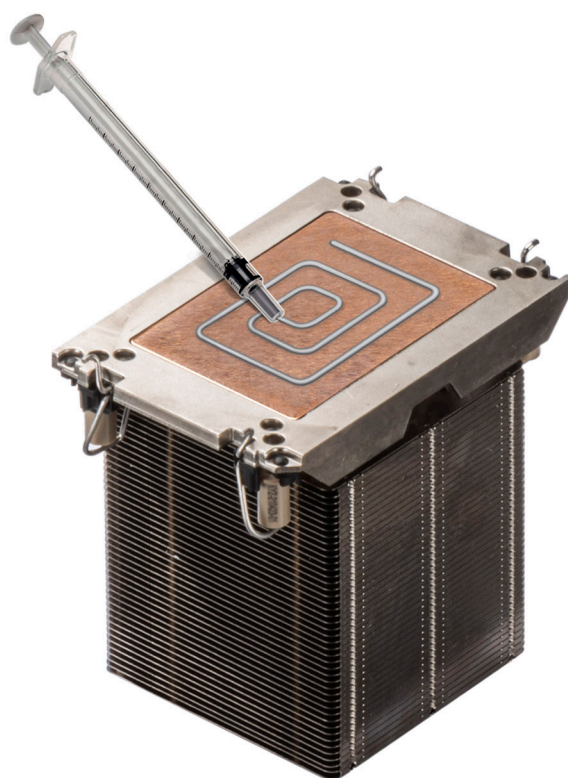
**Figure 166. Press the retaining clip on the four sides**

4. Apply thermal grease in a quadrilateral design on the top of the processor.

**CAUTION:** Applying too much thermal grease can result in excess grease coming in contact with and contaminating the processor socket.



**NOTE:** The thermal grease syringe is intended for single use only. Dispose the syringe after you use it.



**Figure 167. Applying thermal grease**

5. For new heat sink, remove the Thermal Interface Material (TIM) protective film from the base of heat sink.



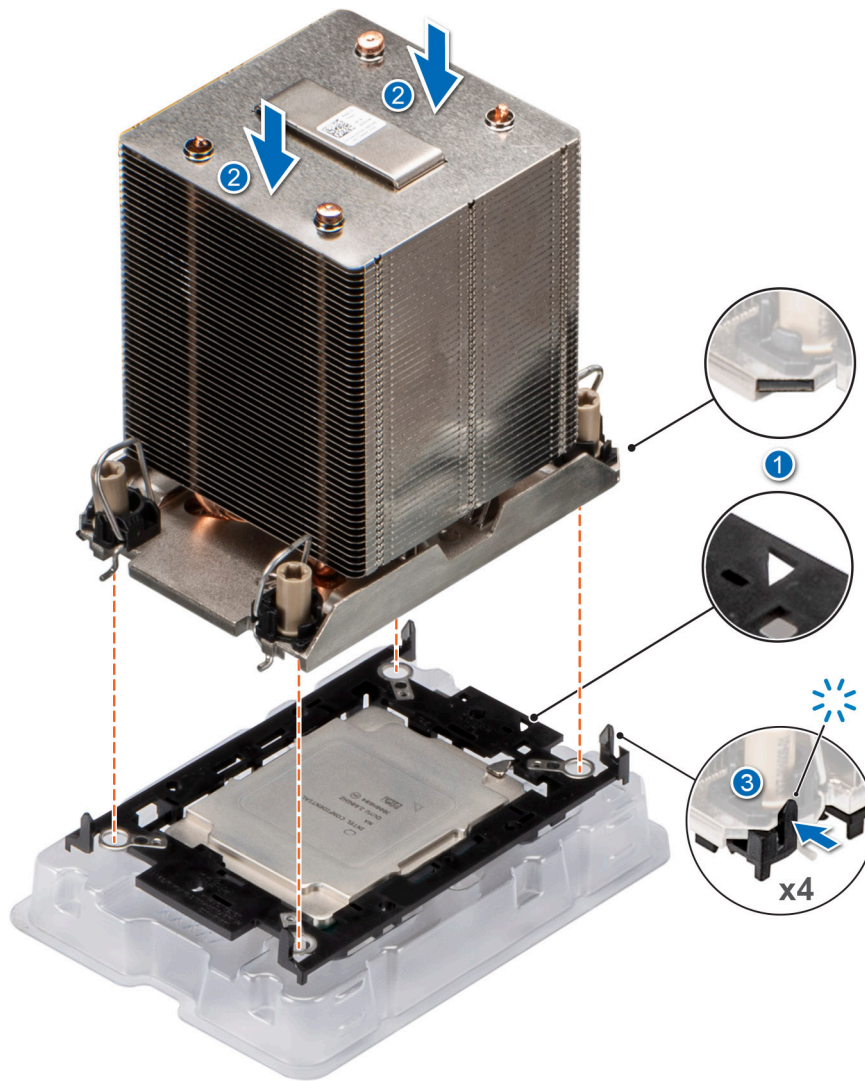
**Figure 168. Removing the Thermal Interface Material (TIM) protective film**

6. Place the heat sink on the processor and press the base of the heat sink until the retaining clip locks onto the heat sink at all the four corners.

**CAUTION:** To avoid damaging the fins on the heat sink, do not press down on the heat sink fins.

**NOTE:**

- Ensure latching features on retaining clip and heat sink are aligned during assembly.
- Ensure that the pin 1 indicator on the heat sink is aligned with the pin 1 indicator on the retaining clip before placing the heat sink onto the retaining clip.



**Figure 169. Installing the heat sink onto the processor**

#### Next steps

1. [Install the processor heat sink module.](#)
2. [Install the air shroud.](#)
3. Follow the procedure listed in [After working inside your system.](#)

## Installing the processor and heat sink module

#### Prerequisites

Never remove the heat sink from a processor unless you intend to replace the processor or system board. The heat sink is necessary to maintain proper thermal conditions.

1. Follow the safety guidelines listed in [Safety instructions.](#)
2. Follow the procedure that is listed in [Before working inside your system .](#)
3. [Remove the air shroud.](#)
4. If installed, remove the processor dust cover.

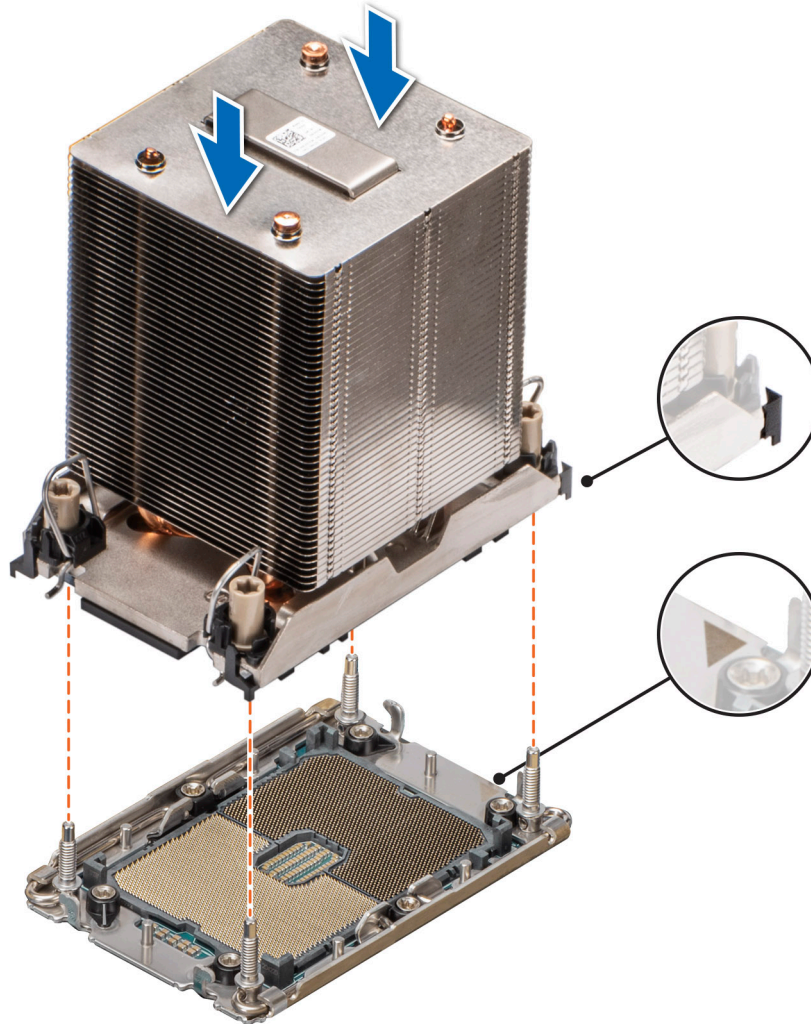
#### Steps

1. Set the anti-tilt wires to the unlocked position on the heat sink (inward position).

2. Align the pin 1 indicator of the heat sink to the system board, and then place the processor heat sink module (PHM) on the processor socket.

**CAUTION:** To avoid damaging the fins on the heat sink, do not press down on the heat sink fins.

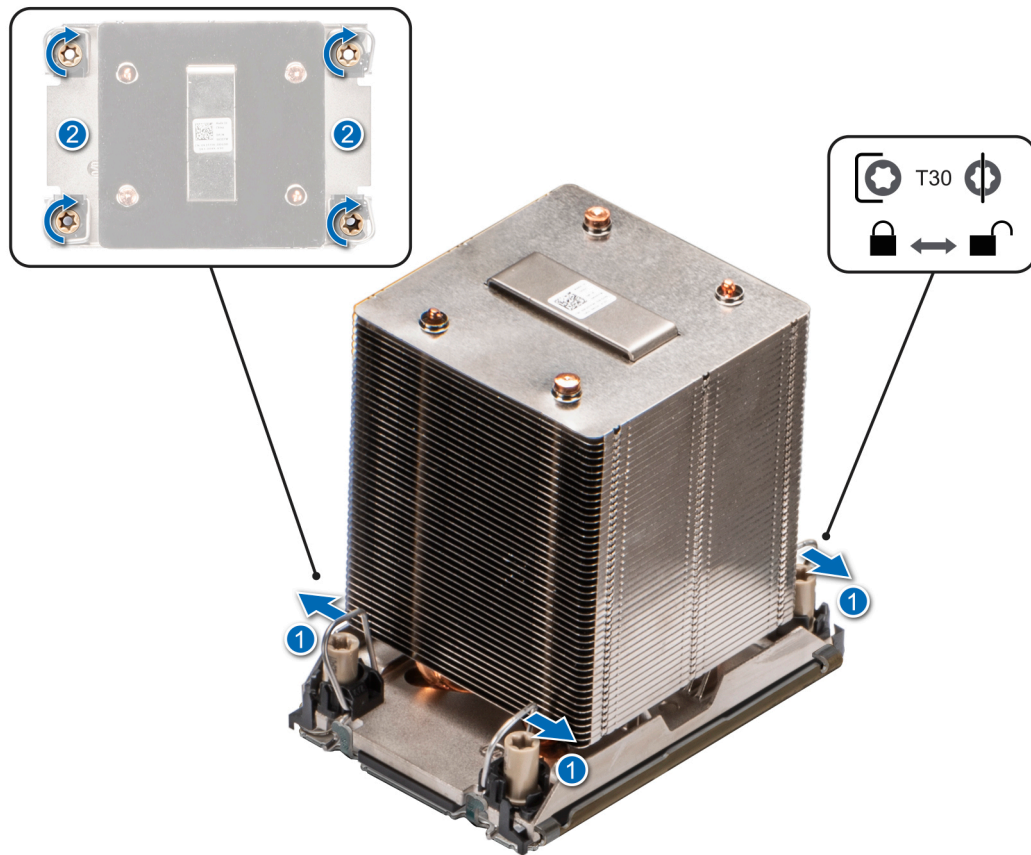
**NOTE:** Ensure that the PHM is held parallel to the system board to prevent damaging the components.



**Figure 170. Installing the processor heat sink**

3. Set the anti-tilt wires to the locked position (outward position), and then using the Torx T30 tool, tighten the nuts (12 in-lbf) on the PHM:
  - a. Tighten the first nut three turns.
  - b. Tighten the nut diagonally opposite to the nut you tighten first.
  - c. Repeat the procedure for the remaining two nuts.
  - d. Return to the first nut to tighten it completely.





**Figure 171. Set the anti-tilt wires to the locked position and tightening the nuts**

#### Next steps

1. [Install the air shroud.](#)
2. Follow the procedure listed in [After working inside your system.](#)

## Optional OCP NIC card

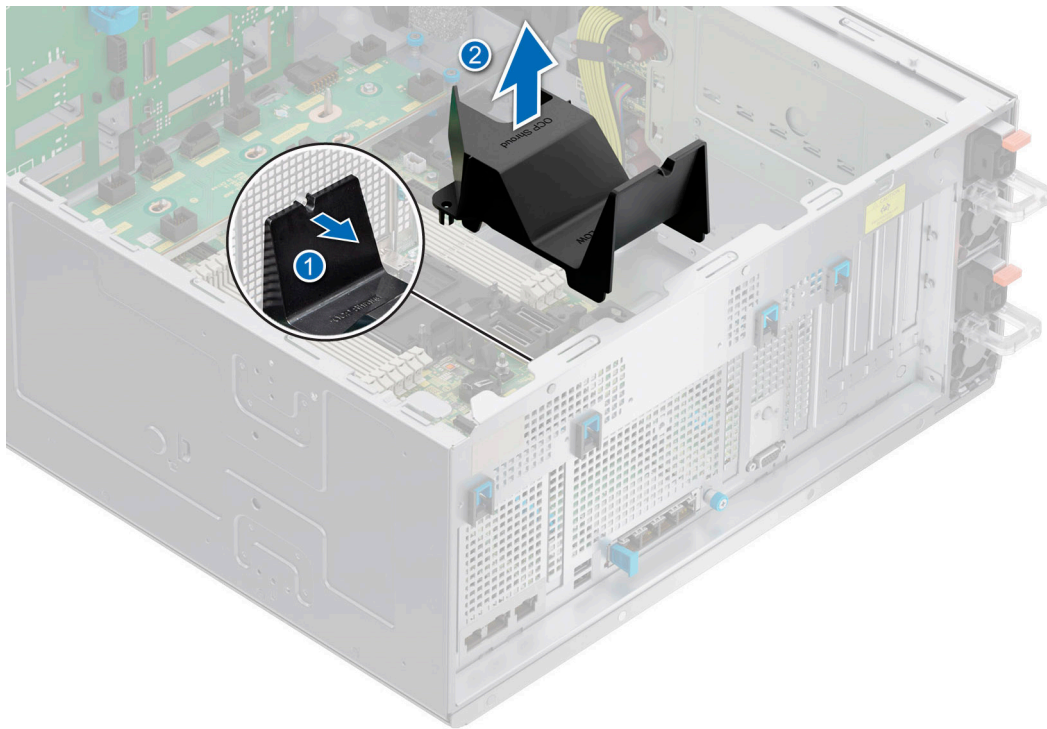
### Removing the OCP card

#### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions.](#)
2. Follow the procedure that is listed in [Before working inside your system .](#)
3. [Remove the air shroud.](#)

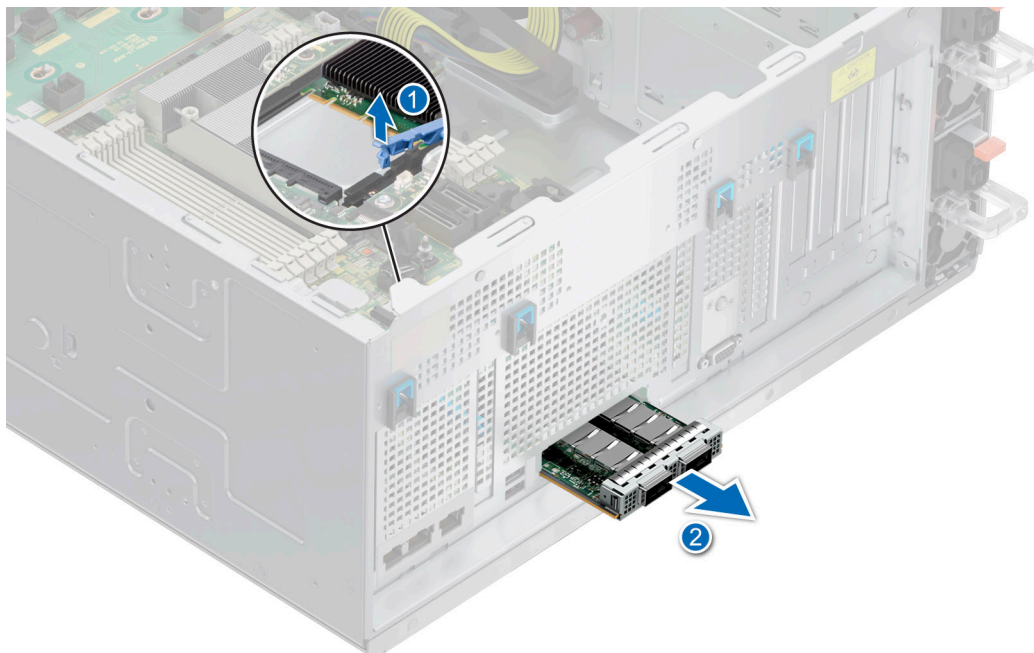
#### Steps

1. Slide the OCP air shroud toward the front of the system and lift the OCP air shroud out of the system.



**Figure 172. Removing the OCP air shroud**

2. Open the blue latch to disengage the OCP card.
3. Push the OCP card towards the rear end of the system to disconnect from the connector on the system board.
4. Slide the OCP card out of the slot on the system.



**Figure 173. Removing the OCP card**

5. If the OCP card is not going to be replaced, install the OCP card blank.

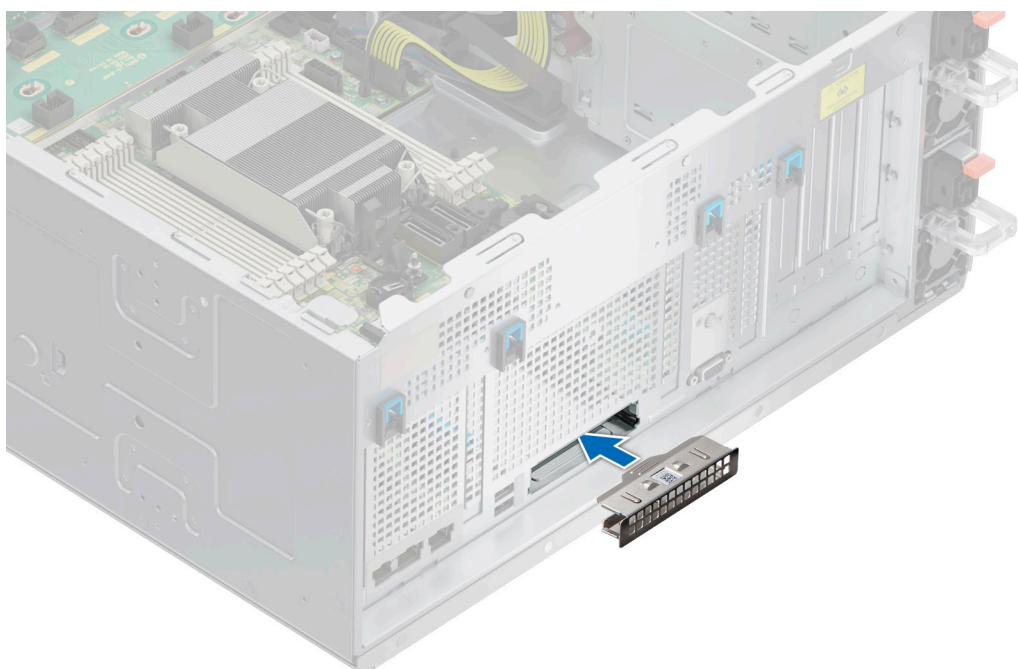


Figure 174. Installation of OCP card blank

### Next steps

Replace the OCP card.

## Installing the OCP card

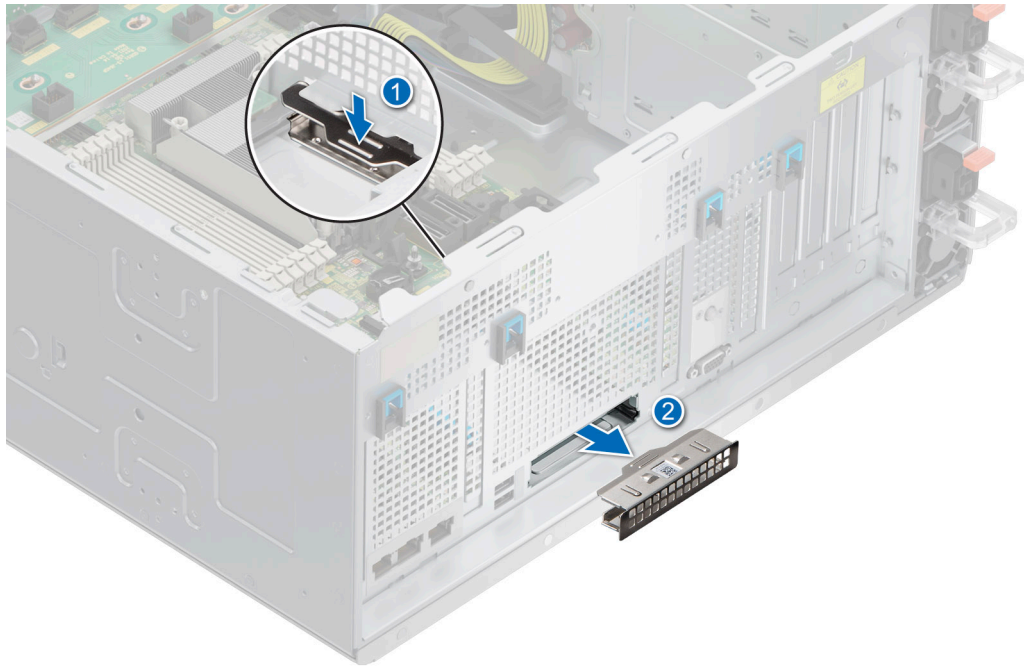
### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. [Remove the air shroud](#).

**CAUTION:** Do not install GPUs, network cards, or other PCIe devices on your system that are not validated and tested by Dell. Damage caused by unauthorized and invalidated hardware installation will null and void the system warranty.

### Steps

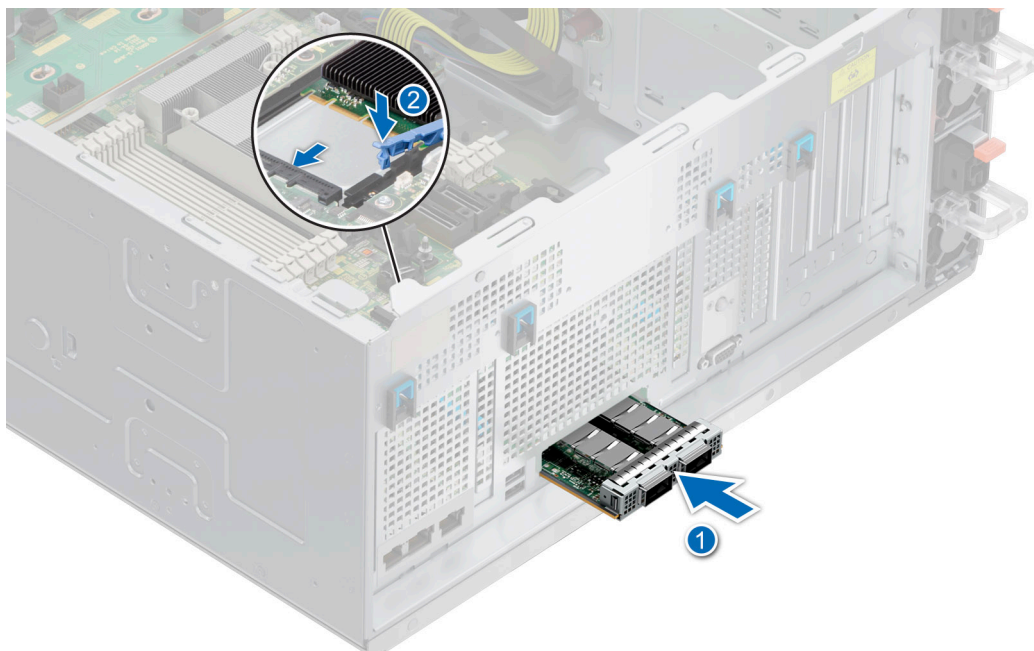
1. If installed, remove the OCP card blank.



**Figure 175. Removal of the OCP card blank**

2. Open the blue latch on the system board.
3. Slide the OCP card into the slot in the system.
4. Push until the OCP card is connected to the connector on the system board.
5. Close the blue latch to lock the OCP card to the system.

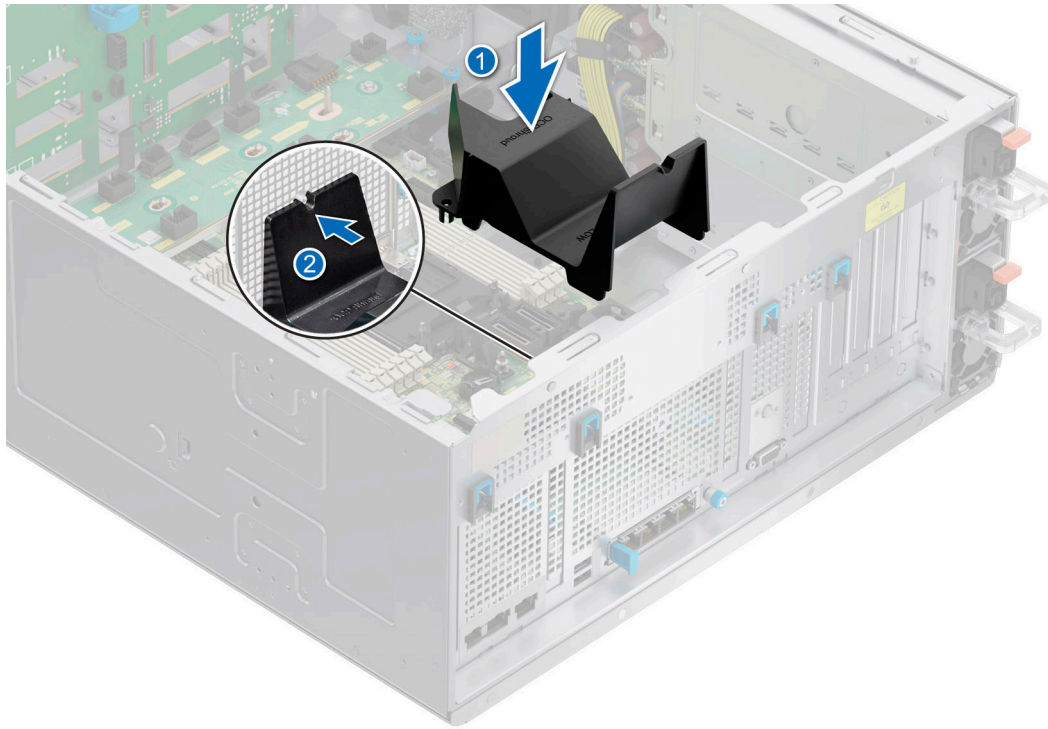
**NOTE:** The numbers on the image do not depict the exact steps. The numbers are for representation of sequence.



**Figure 176. Installing the OCP card**

6. Align the OCP air shroud to the guide pins on the chassis and lower the OCP air shroud.





**Figure 177. Installing the OCP air shroud**

#### Next steps

1. [Install the air shroud.](#)
2. Follow the procedure listed in [After working inside your system.](#)

## Optional serial COM port

This is a service technician replaceable part only.

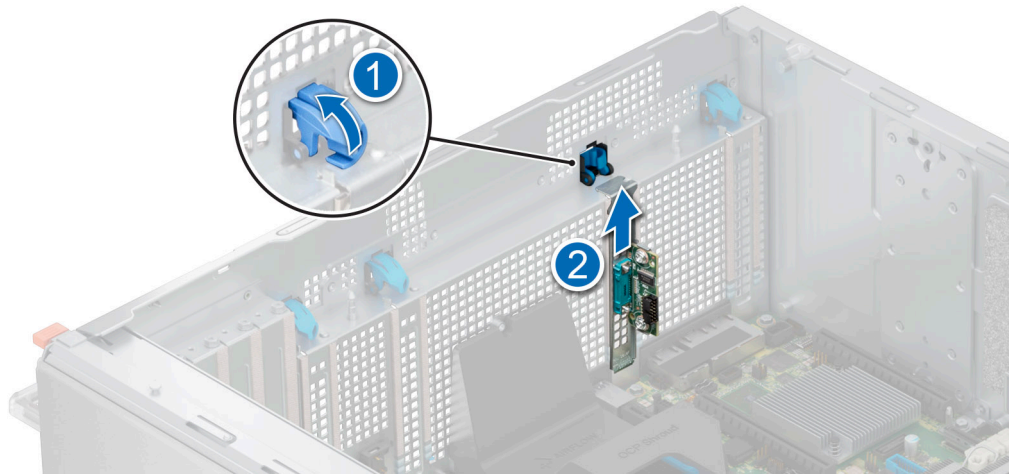
## Removing the serial COM port

#### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions.](#)
2. Follow the procedure that is listed in [Before working inside your system](#) .
3. [Remove the air shroud.](#)
4. Disconnect the cable connected to the serial COM port.

#### Steps

1. Open the blue latch and slide the serial COM port out of the system.



**Figure 178. Removing the serial COM port**

2. Install the filler bracket if not replacing the serial COM port.

#### Next steps

Replace the serial COM port.

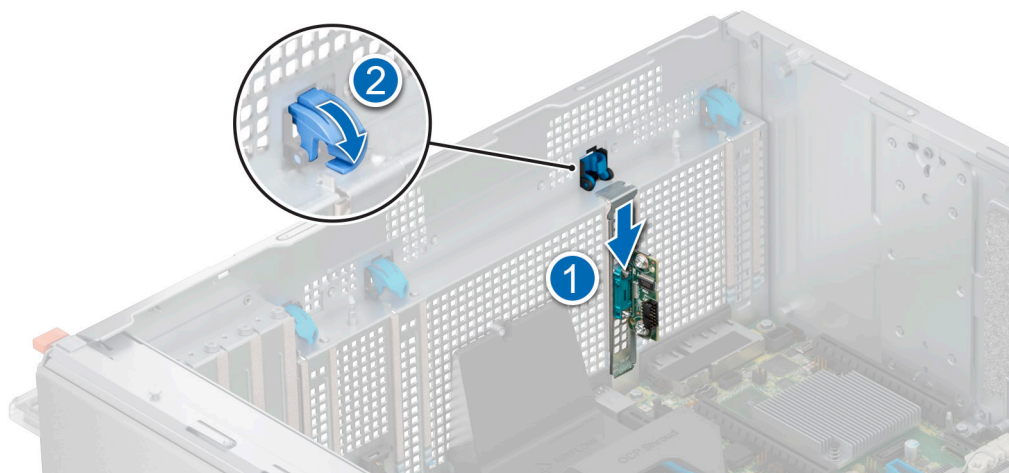
## Installing the serial COM port

#### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. [Remove the air shroud](#).

#### Steps

1. Open the blue latch and remove the filler bracket from the system.
2. Slide the serial COM port and close the blue latch, until it snaps into place.



**Figure 179. Installing the serial COM port**

#### Next steps

1. Connect the cable to serial COM port.

2. [Install the air shroud.](#)
3. Follow the procedure listed in [After working inside your system.](#)

## System battery

This is a service technician replaceable part only.

### Replacing the system battery

#### Prerequisites

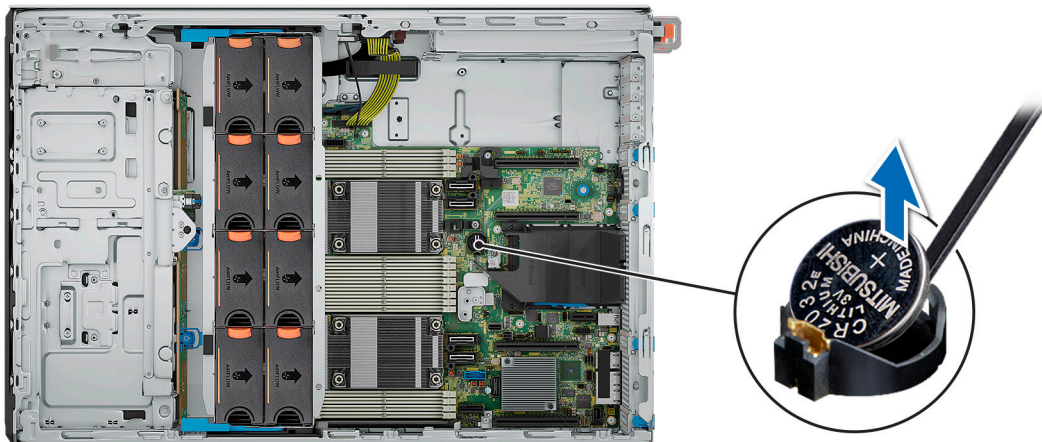
**⚠ WARNING:** There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type that is recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions. See the Safety instructions that came with your system for more information.

1. Follow the safety guidelines listed in the [Safety instructions.](#)
2. Follow the procedure listed in the [Before working inside your system .](#)
3. If applicable, disconnect the power or data cables from the expansion cards.
4. [Remove the expansion card risers.](#)

#### Steps

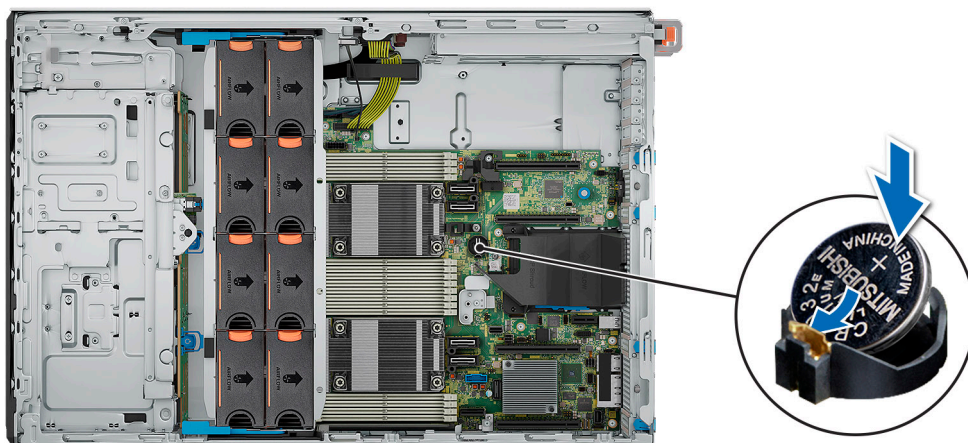
1. To remove the battery:
  - a. Use a plastic scribe to pry out the system battery.

**⚠ CAUTION:** To avoid damage to the battery connector, you must firmly support the connector while installing or removing a battery.



**Figure 180. Removing the system battery**

2. To install a new system battery:
  - a. Hold the battery with the positive side facing up and slide it under the securing tabs.
  - b. Press the battery into the connector until it snaps into place.



**Figure 181. Installing the system battery**

### Next steps

1. [Install the expansion card risers.](#)
2. If applicable, connect the cables to one or more expansion cards.
3. Follow the procedure listed in [After working inside your system.](#)
4. Confirm that the battery is operating properly, by performing the following steps:
  - a. Enter the System Setup, while booting, by pressing F2.
  - b. Enter the correct time and date in the System Setup **Time** and **Date** fields.
  - c. **Exit** the System Setup.
  - d. To test the newly installed battery, check the time and date at least an hour after installing the battery.
  - e. Enter the System Setup and if the time and date are still incorrect, see [Getting help](#) section.

## Intrusion switch

This is a service technician replaceable part only.

## Removing the intrusion switch module

### Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions.](#)
2. Follow the procedure listed in the [Before working inside your system.](#)
3. [Remove the expansion card riser.](#)

**NOTE:** Ensure that you note the routing of the cable as you remove it from the system board. Route the cable properly when you replace it to prevent the cable from being pinched or crimped.

### Steps

1. Disconnect the intrusion switch cable from the connector on the rear I/O board.
2. Using a Phillips #1 screwdriver, loosen the screw on the intrusion switch module.
3. Slide the intrusion switch module out of the slot on the system.

**NOTE:** The numbers on the image do not depict the exact steps. The numbers are for representation of sequence.



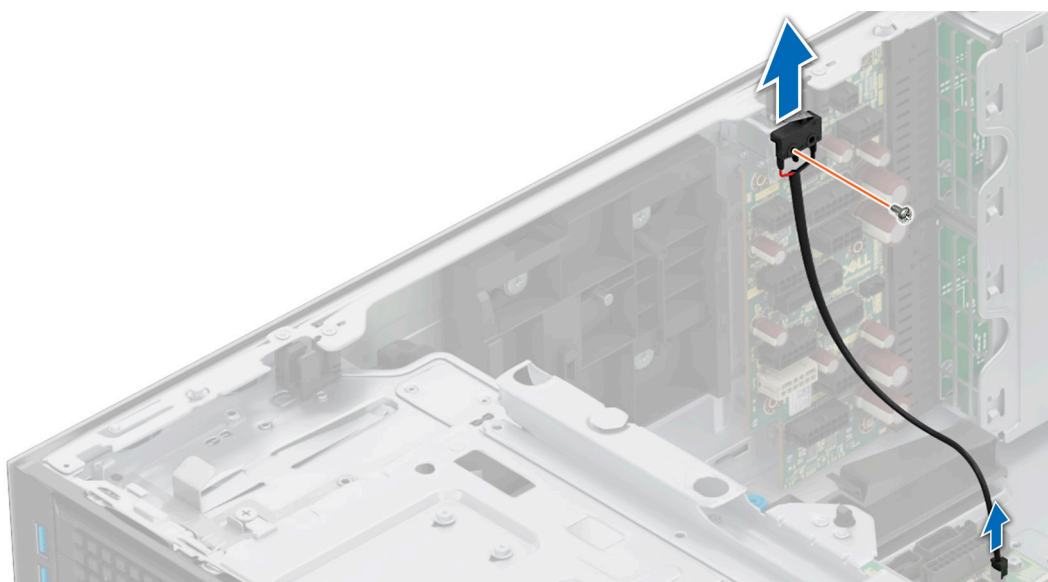


Figure 182. Removing the intrusion switch module

### Next steps

1. [Replace the intrusion switch module.](#)

## Installing the intrusion switch module

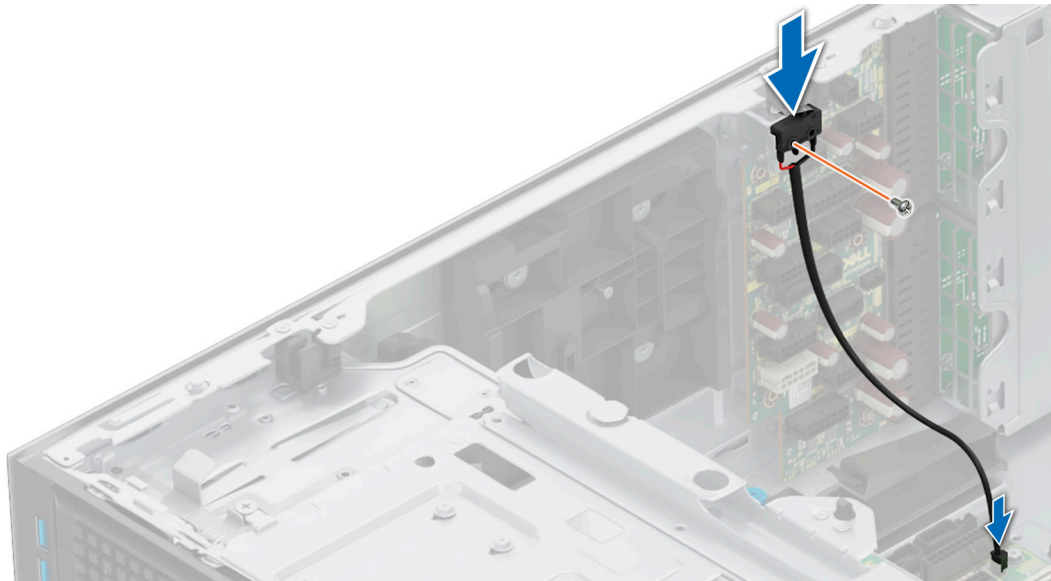
### Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).
3. [Remove the expansion card riser](#).

**NOTE:** Ensure that you note the routing of the cable as you remove it from the system board. Route the cable properly when you replace it to prevent the cable from being pinched or crimped.

### Steps

1. Align and slide the intrusion switch module into the slot in the system until firmly seated.
2. Using a Phillips #1 screwdriver, tighten the screw on the intrusion switch module.
3. Connect the intrusion switch cable to the connector on the rear I/O board.



**Figure 183. Installing the intrusion switch module**

#### Next steps

1. [Install the expansion card riser.](#)
2. Follow the procedure listed in [After working inside your system.](#)

## Power supply unit

**NOTE:** While replacing the hot swappable PSU, after next server boot; the new PSU automatically updates to the same firmware and configuration of the replaced one. For updating to the latest firmware and changing the configuration, see the *Lifecycle Controller User's Guide* at [idracmanuals](#).

## Hot spare feature

Your system supports the hot spare feature that significantly reduces the power overhead associated with the power supply unit (PSU) redundancy.

When the hot spare feature is enabled, one of the redundant PSUs is switched to the sleep state. The active PSU supports 100 percent of the system load, thus operating at higher efficiency. The PSU in the sleep state monitors output voltage of the active PSU. If the output voltage of the active PSU drops, the PSU in the sleep state returns to an active output state.

If having both PSUs active is more efficient than having one PSU in the sleep state, the active PSU can also activate the sleeping PSU.

The default PSU settings are as follows:

- If the load on the active PSU is more than 50 percent of PSU rated power wattage, then the redundant PSU is switched to the active state.
- If the load on the active PSU falls below 20 percent of PSU rated power wattage, then the redundant PSU is switched to the sleep state.

You can configure the hot spare feature by using the iDRAC settings. For more information, see the *iDRAC User's Guide* available at [www.dell.com/poweredgemanuals](http://www.dell.com/poweredgemanuals).

## Removing a power supply unit blank

### Prerequisites

Follow the safety guidelines listed in the [Safety instructions](#).

### Steps

Pull the blank out of the system.

**CAUTION:** To ensure proper system cooling, the PSU blank must be installed in the second PSU bay in a non-redundant configuration. Remove the PSU blank only if you are installing a second PSU.

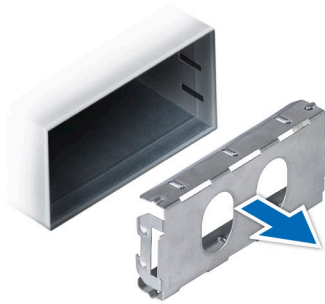


Figure 184. Removing a power supply unit blank

### Next steps

1. [Replace the PSU blank](#) or [install the PSU](#).

## Installing a power supply unit blank

### Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).  
**NOTE:** Install the power supply unit (PSU) blank only in the second PSU bay.
2. If required, [Remove the PSU](#).

### Steps

Align the PSU blank with the PSU bay and push it into the PSU bay until it clicks into place.

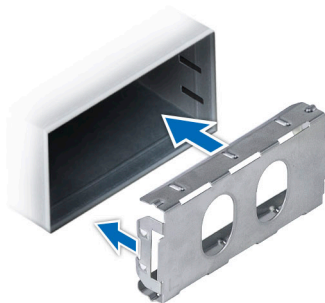


Figure 185. Installing a power supply unit blank

## Removing a power supply unit adapter

Remove the PSU adapter, when installing PSU with 86 mm wide form factor.

### Prerequisites

Follow the safety guidelines listed in the [Safety instructions](#).

### Steps

Press release latch and remove the power supply unit adapter.

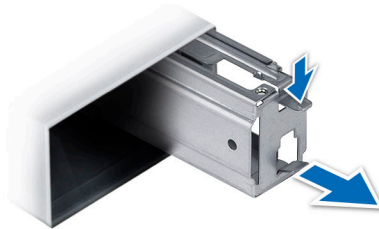


Figure 186. Removing a power supply unit adapter

### Next steps

Replace the power supply unit adapter or Install the power supply unit.

## Installing a power supply unit adapter

### Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. If required, [remove the power supply unit](#).

 **NOTE:** Remove the PSU adapter, when installing PSU with 86 mm wide form factor.

### Steps

Align and insert the power supply unit adapter, until the adapter clicks into place.

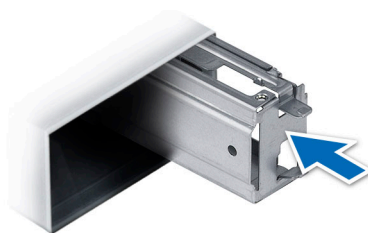


Figure 187. Installing a power supply unit adapter

## Removing a power supply unit

### Prerequisites

 **CAUTION:** The system needs one power supply unit (PSU) for normal operation. On power-redundant systems, remove and replace only one PSU at a time in a system that is powered on.

1. Follow the safety guidelines listed in [Safety instructions](#).

2. Disconnect the power cable from the power source and from the PSU that you intend to remove, and then remove the cable from the strap on the PSU handle.

### Steps

Press the orange release latch and slide the PSU out of the system by using the PSU handle.

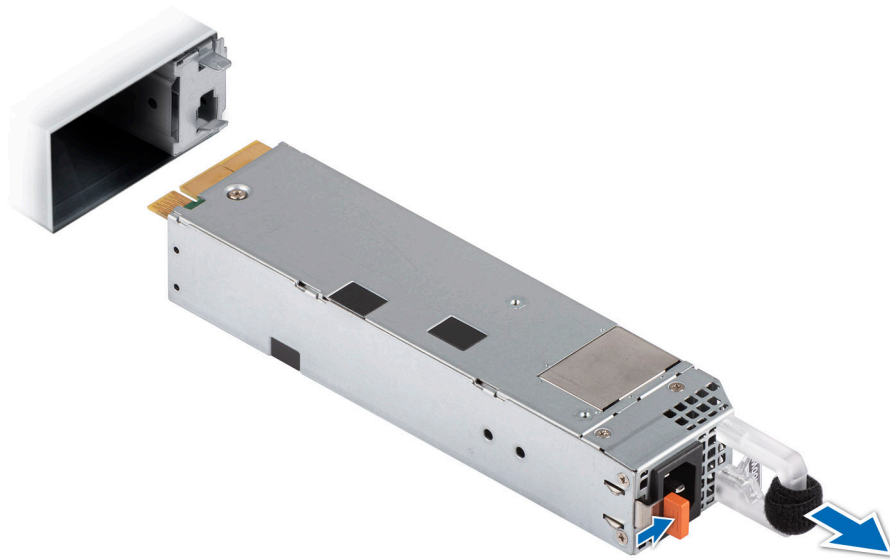


Figure 188. Removing a 60 mm power supply unit

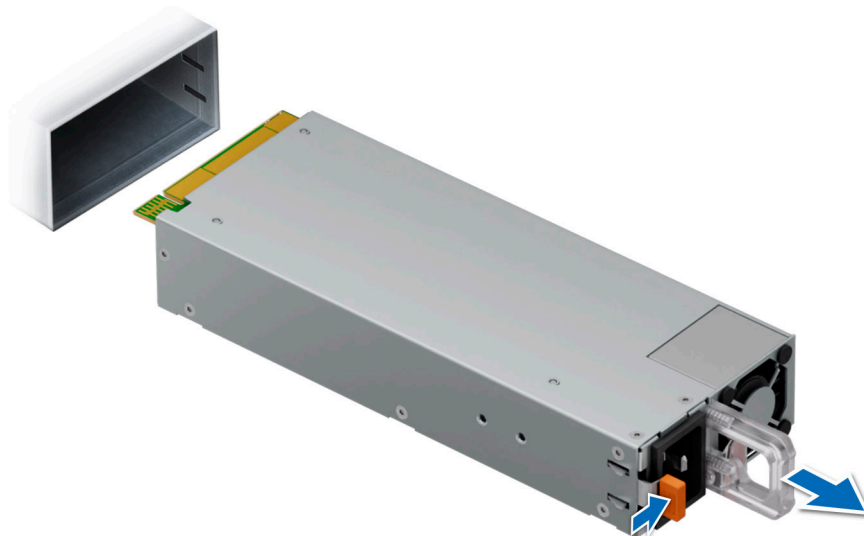


Figure 189. Removing a 86 mm power supply unit

### Next steps

Replace the power supply unit..

## Installing a power supply unit

### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).

2. For systems that support redundant PSU, ensure that both the PSUs are of the same type and have the same maximum output power.

**NOTE:** The maximum output power (shown in watts) is listed on the PSU label.

### Steps

Slide the PSU into the system until the PSU is fully seated and the release latch snaps into place.

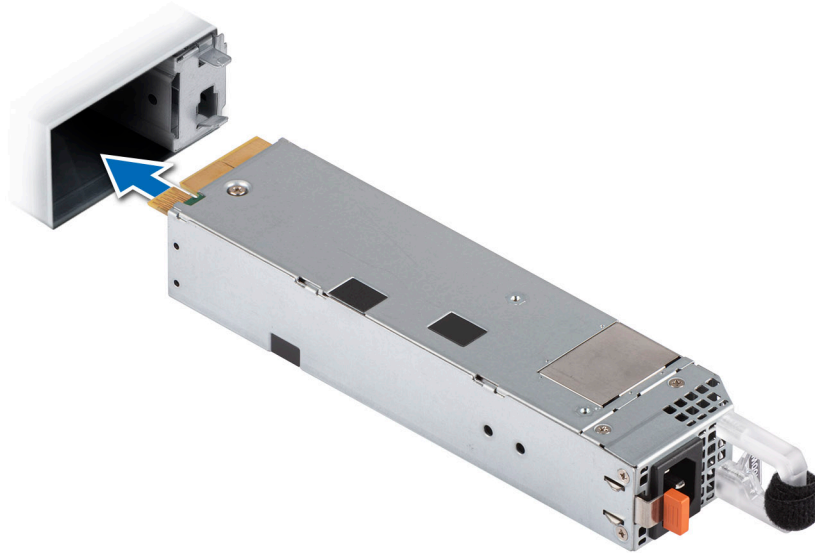


Figure 190. Installing a 60 mm power supply unit



Figure 191. Installing an 86 mm power supply unit

### Next steps

1. Connect the power cable to the PSU, and plug the cable into a power outlet.

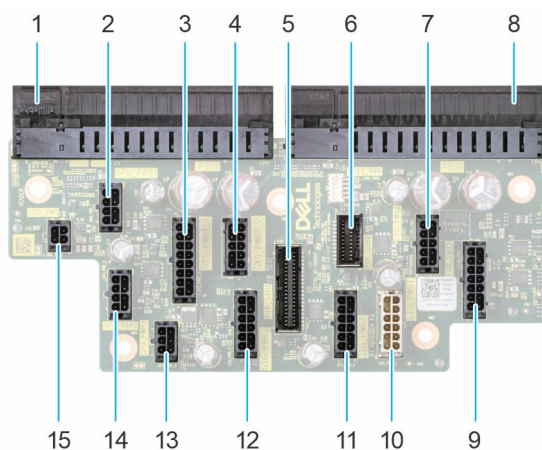
**CAUTION:** When connecting the power cable to the PSU, secure the cable to the PSU with the strap.

**NOTE:** When installing, hot swapping, or hot adding a new PSU, wait for 15 seconds for the system to recognize the PSU and determine its status. The PSU redundancy may not occur until discovery is complete. Wait until the new PSU is discovered and enabled before you remove the other PSU. The PSU status indicator turns green to signify that the PSU is functioning properly.

# Power interposer board

This is a service technician replaceable part only.

## PIB board view



**Figure 192. Power interposer board connectors**

1. J\_PS1
2. GPU\_PWR1
3. SYS\_PWR1\_1
4. SYS\_PWR1\_2
5. PIB\_SIG1
6. PIB\_SIG2
7. CPU\_PWR2
8. J\_PS2
9. FAN\_PWR1
10. SIG\_PWR\_1
11. SIG\_PWR\_2
12. SIG\_PWR\_3
13. GPU\_PWR\_3
14. GPU\_PWR\_2
15. ODD\_PWR

## Removing the power interposer board

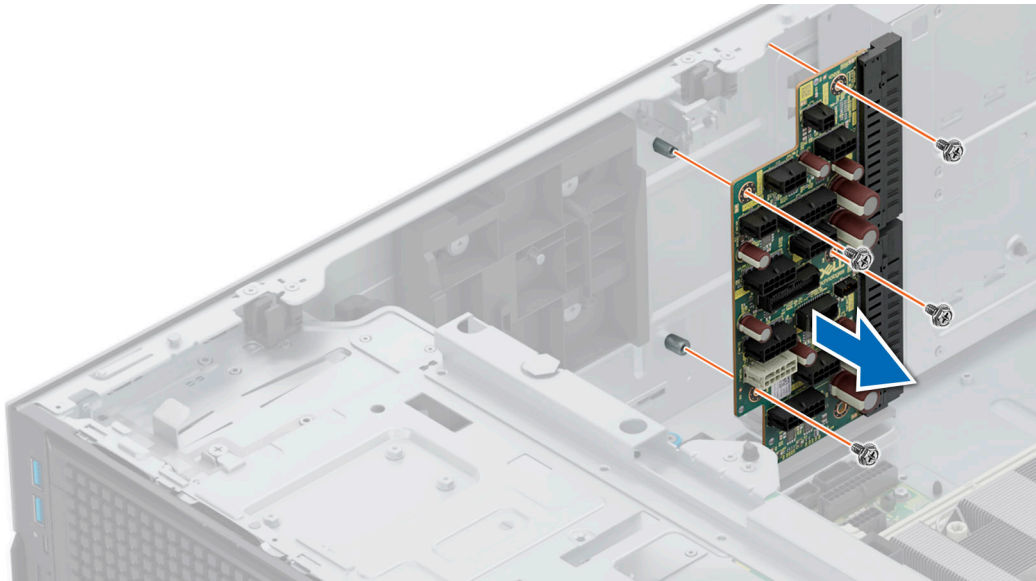
### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. [Remove the air shroud](#).
4. [Remove the PSU](#).

### Steps

1. Disconnect all the power cables from the PIB.
2. Using the Phillips #2 screwdriver, remove the screws that secure the PIB to the system.
3. Lift the PIB out of the system.





**Figure 193. Removing the power interposer board**

### Next steps

Replace the power interposer board.

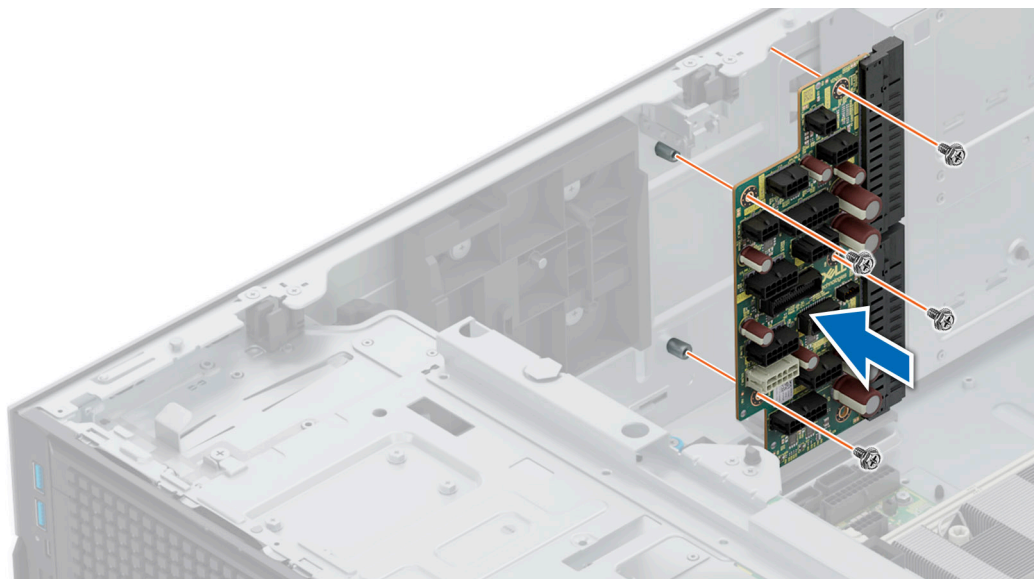
## Installing the power interposer board

### Prerequisites

1. Follow the safety guidelines listed in [Safety instructions](#).
2. Follow the procedure that is listed in [Before working inside your system](#).
3. [Remove the air shroud](#).
4. [Remove the PSU](#).

### Steps

1. Align the screw holes on the power interposer board (PIB) with the holes on the system.
2. Using the Phillips #2 screwdriver, secure the PIB to the system using the screws.
3. Connect all the disconnected power cables to the PIB.



**Figure 194. Installing the power interposer board**

### Next steps

1. [Install the PSUs.](#)
2. [Install the air shroud.](#)
3. Follow the procedure listed in [After working inside your system.](#)

## System board

This is a service technician replaceable part only.

## Removing the system board

### Prerequisites

**CAUTION:** If you are using the Trusted Platform Module (TPM) with an encryption key, you may be prompted to create a recovery key during program or System Setup. Be sure to create and safely store this recovery key. If you replace this system board, you must supply the recovery key when you restart your system or program before you can access the encrypted data on your drives.

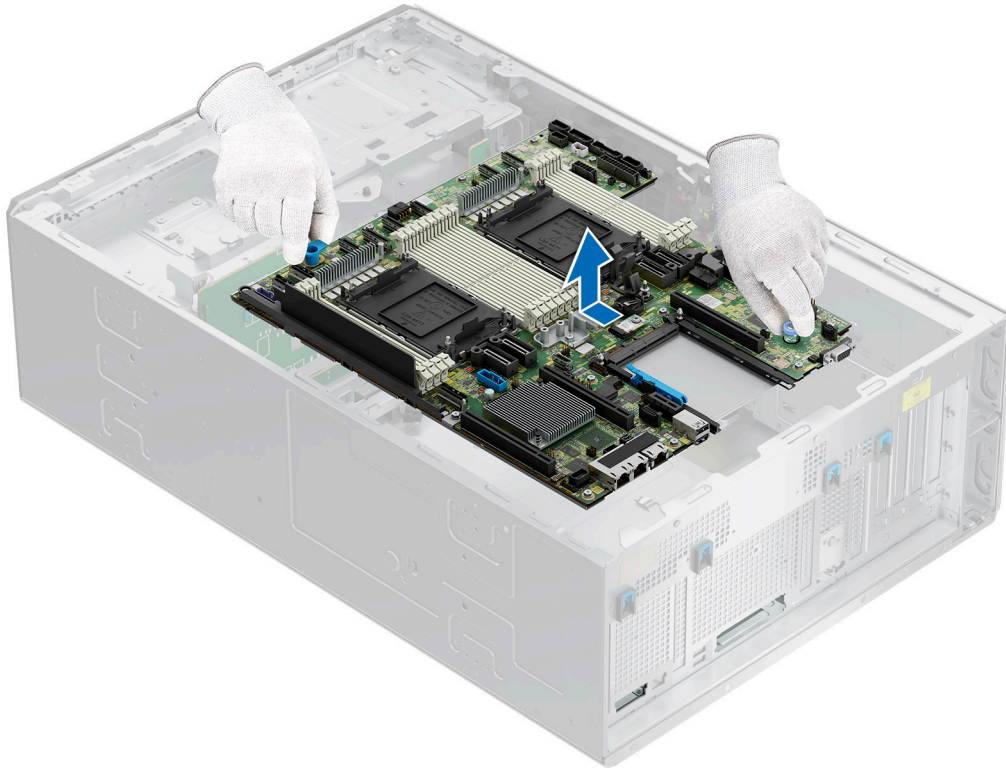
1. Follow the safety guidelines listed in the [Safety instructions.](#)
2. Follow the procedure listed in the [Before working inside your system.](#)
3. Remove the following components:
  - a. [Air shroud](#)
  - b. [Cooling fan cage assembly](#)
  - c. [Memory modules](#)
  - d. [Serial COM port \(if installed\)](#)
  - e. [Expansion card risers](#)
  - f. [Processor and heat sink module](#)
  - g. [BOSS-N1 module](#)
  - h. [Internal USB card \(if installed\)](#)
  - i. [OCP card \(if installed\)](#)
  - j. [Power supply units \(PSU\)](#)
  - k. Disconnect all the cables from the system board and make note of all the cable connections.

 **CAUTION:** Take care not to damage the system identification button while removing the system board from the system.

 **CAUTION:** Do not lift the system board by holding a memory module, processor, or other components.

### Steps

1. Using the system board holder and plunger, slide the system board towards the front of the system.
2. At a tilted angle, lift the system board out of the chassis.



**Figure 195. Removing the system board**

### Next steps

1. [Replace the system board.](#)

## Installing the system board

### Prerequisites

 **NOTE:** Before replacing the system board, replace the old iDRAC MAC address label on the Express Service Tag with the iDRAC MAC address label of the replacement system board.

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).
3. If you are replacing the system board, remove all the components that are listed in the removing the system board section.

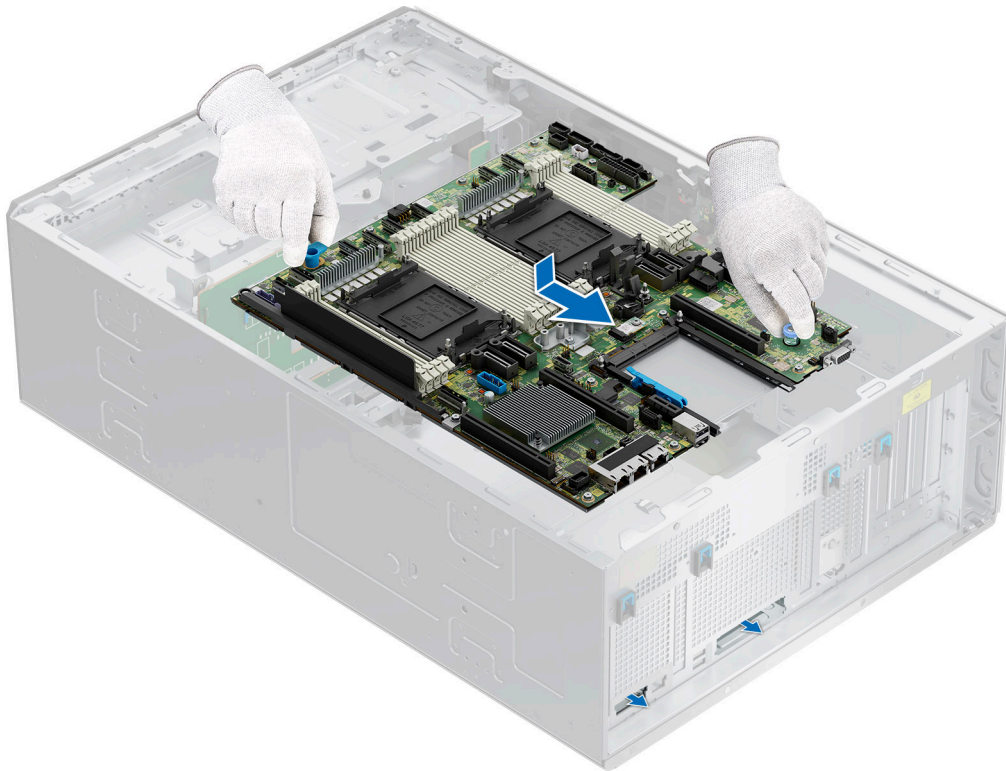
### Steps

1. Unpack the new system board assembly.

 **CAUTION:** Do not lift the system board by holding a memory module, processor, or other components.

**CAUTION:** Take care not to damage the system identification button while placing the system board into the chassis.

2. Holding the system board holder and plunger, lower the system board at a tilted angle into the system.
3. Slide the system board towards the rear of the chassis until the connectors are firmly seated in the slots.



**Figure 196. Installing the system board**

### Next steps

1. Replace the following components:
  - a. [Trusted Platform Module \(TPM\)](#)  
**NOTE:** The TPM Module must be replaced only while installing new system board.
  - b. [Internal USB card \(if removed\)](#)
  - c. [OCP card \(if removed\)](#)
  - d. [Processor and heat sink module](#)
  - e. [Memory modules](#)
  - f. [Expansion card risers](#)
  - g. [Serial COM port \(if removed\)](#)
  - h. [BOSS-N1 module](#)
  - i. [Cooling fan cage assembly](#)
  - j. [Air shroud](#)
  - k. [Power supply units \(PSU\)](#)
2. Reconnect all cables to the system board.  
**NOTE:** Ensure that the cables inside the system are routed along the chassis wall and secured using the cable securing bracket.
3. Ensure that you perform the following steps:
  - a. Use the Easy Restore feature to restore the Service Tag. See the [Restoring the system by using the Easy Restore feature](#) section.
  - b. If the service tag is not backed up in the backup flash device, enter the system service tag manually. See the [Manually update the Service Tag](#) by using System Setup section.
  - c. Update the BIOS and iDRAC versions.

- d. Re-enable the Trusted Platform Module (TPM). See the [Upgrading the Trusted Platform Module](#) section.
4. Follow the procedure listed in [After working inside your system](#).

## Restoring the system using Easy Restore

The Easy Restore feature enables you to restore your service tag, license, UEFI configuration, and the system configuration data after replacing the system board. All data is backed up in a backup flash device automatically. If BIOS detects a new system board, and the service tag in the backup flash device, BIOS prompts the user to restore the backup information.

### About this task

Below is a list of options/steps available:

#### Steps

1. Restore the service tag, license, and diagnostics information, press **Y**
2. Navigate to the Lifecycle Controller based restore options, press **N**
3. Restore data from a previously created **Hardware Server Profile**, press **F10**

 **NOTE:** When the restore process is complete, BIOS prompts to restore the system configuration data.

4. Restore data from a previously created **Hardware Server Profile**, press **F10**
5. To restore the system configuration data, press **Y**
6. To use the default configuration settings, press **N**

 **NOTE:** After the restore process is complete, system reboots.

## Manually update the Service Tag

After replacing a system board, if Easy Restore fails, follow this process to manually enter the Service Tag, using **System Setup**.

### About this task

If you know the system service tag, use the **System Setup** menu to enter the service tag.

#### Steps

1. Power on the system.
2. To enter the **System Setup**, press **F2**.
3. Click **Service Tag Settings**.
4. Enter the service tag.

 **NOTE:** You can enter the service tag only when the **Service Tag** field is empty. Ensure that you enter the correct service tag. Once the service tag is entered, it cannot be updated or changed. Incorrectly entered service tag will lead to system board replacement.

5. Click **OK**.

# Trusted Platform Module

This is a service technician replaceable part only.

## Upgrading the Trusted Platform Module

### Removing the TPM

#### Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).



#### NOTE:

- Ensure the operating system is compatible with the TPM version you are installing.
- Ensure that you download and install the latest BIOS firmware on your system.
- Ensure that the BIOS is configured to enable UEFI boot mode.



**CAUTION:** The TPM plug-in module is cryptographically bound to that particular system board after it is installed. When the system is powered on, any attempt to remove an installed TPM plug-in module breaks the cryptographic binding, and the removed TPM cannot be installed on another system board. Ensure any keys you have stored on the TPM have been securely transferred.

#### Steps

1. Locate the TPM connector on the system board. For more information, see .
2. Press to hold the module down and remove the screw using the security Torx 8-bit shipped with the TPM module.
3. Slide the TPM module out from its connector.
4. Push the plastic rivet away from the TPM connector and rotate it 90° counterclockwise to release it from the system board.
5. Pull the plastic rivet out of its slot on the system board.

### Installing the TPM

#### Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).

#### Steps

1. To install the TPM, align the edge connectors on the TPM with the slot on the TPM connector.
2. Insert the TPM into the TPM connector such that the plastic rivet aligns with the slot on the system board.
3. Press the plastic rivet until the rivet snaps into place.
4. Replace the screw that secures the TPM to the system board.

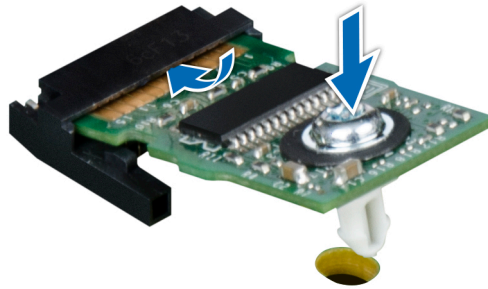


Figure 197. Installing the TPM

## Initializing TPM for users

### Steps

1. Initialize the TPM.  
For more information, see [Initializing the TPM 2.0 for users](#).
2. The **TPM Status** changes to **Enabled, Activated**.

## Initializing the TPM 2.0 for users

### Steps

1. While booting your system, press F2 to enter System Setup.
2. On the **System Setup Main Menu** screen, click **System BIOS** > **System Security Settings**.
3. From the **TPM Security** option, select **On**.
4. Save the settings.
5. Restart your system.



## Upgrade Kits

The table lists the available After Point Of Sale [APOS] kits.

**Table 139. Upgrade kits**

| Kits                              | Related links to service instructions                                                                        |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------|
| Bezel                             | See <a href="#">Installing the front bezel</a>                                                               |
| BOSS-N1                           | See <a href="#">Installing the BOSS-N1 card carrier</a>                                                      |
| GPU                               | See <a href="#">Installing the GPU riser</a>                                                                 |
| Drives                            | See <a href="#">Installing the drive carrier</a>                                                             |
| Memory                            | See <a href="#">Installing a memory module</a>                                                               |
| PERC                              | See <a href="#">Installing the front PERC module</a> and also see the document included with the kit.        |
| Network cards (OCP)               | See <a href="#">Installing the OCP card</a>                                                                  |
| PCIe SSD card                     | See <a href="#">Installing the drive carrier</a>                                                             |
| Power cords                       | Offered, but without special service instructions                                                            |
| Power supplies                    | See <a href="#">Installing a power supply unit</a>                                                           |
| Quick sync                        | Offered, but without special service instructions                                                            |
| TPM                               | See <a href="#">Upgrading the Trusted Platform Module</a>                                                    |
| Processor enablement thermal kits | See <a href="#">Installing the processor</a>                                                                 |
| Internal USB 3.0 card             | See <a href="#">Installing the internal USB card</a>                                                         |
| Serial COM port                   | See <a href="#">Installing the serial COM port</a>                                                           |
| Cables                            | Offered, but without special service instructions                                                            |
| Fans                              | See <a href="#">Installing a cooling fan</a>                                                                 |
| Heat sink                         | See <a href="#">Installing the processor</a>                                                                 |
| Risers                            | Not available as APOS kits, upgrades offered only with the "Basic Deployment Upgrade of Dell Server" service |
| Cable Management Arm (CMA)        | Offered, but without special service instructions                                                            |

### Topics:

- [BOSS-N1 module kit](#)
- [GPU kit](#)
- [Internal USB card kit](#)
- [Serial COM port kit](#)

## BOSS-N1 module kit

The BOSS-N1 module supports up to two M.2 NVMe SSDs.

Before you begin the installation or removal process, follow the [safety guidelines](#) and [before working inside the system](#) instructions.

**Table 140. BOSS-N1 module kit components**

| Components in kit              | T560 (quantity) |
|--------------------------------|-----------------|
| BOSS-N1 controller card module | 1               |
| BOSS-N1 card carrier           | 1 or 2*         |
| M.2 NVMe SSD                   | 1 or 2*         |
| M.2 NVMe SSD capacity label    | 1 or 2†         |
| BOSS-N1 card carrier blank     | 1               |
| M3 x 0.5 x 4.5 mm screws       | 1               |

**NOTE:** \*The quantity depends on the purchase order.

**NOTE:** †The quantity depends on the BOSS-N1 card carrier

To remove the BOSS blank :

1. Power off the system.
2. Use a screwdriver to push out the blank from the BOSS-N1 module blank.



**Figure 198. Removing the BOSS-N1 module blank**



**Figure 199. Installing the BOSS-N1 module blank**

To install the BOSS-N1 module:

1. To install the BOSS-N1 module, see [Installing the BOSS-N1 card carrier](#) steps 1 to 5.

**NOTE:** Refer to [cable routing](#) section, configuration 49 and 50 for more information on connecting the BOSS cables to system board connectors.

**NOTE:** Installing the BOSS-N1 card carrier does not require the system to be powered off. System shutdown is only required when installing the BOSS-N1 controller card module.

# GPU kit

Table 141. GPU power cable matrix

| Catego<br>ry                                         | Supported GPUs         | Type                       | Vendor | Cable                                                                                                             | Cable quantity |
|------------------------------------------------------|------------------------|----------------------------|--------|-------------------------------------------------------------------------------------------------------------------|----------------|
| GPU                                                  | NVIDIA A2, NVIDIA L4   | HL (FH and LP<br>brackets) | NVIDIA | Not required                                                                                                      | Not required   |
| GPU                                                  | NVIDIA A30, NVIDIA L40 | FH and FL                  | NVIDIA | CPU type 2 x 4 (8-position)<br> | Not required   |
| HL - Half Length, FH - Full Height, FL - Full Length |                        |                            |        |                                                                                                                   |                |

# Internal USB card kit

The internal USB card kit contains one internal USB card. For installation of internal USB card, see [Installing the internal USB card](#) section.

# Serial COM port kit

The serial COM port kit contains the components that are listed in the table.

**Table 142. Serial COM port kit**

| Components           | Quantity |
|----------------------|----------|
| Serial COM port card | 1        |
| Cable                | 1        |

For installation procedure of the serial COM port, see [Installing the serial COM port](#) section.

## Jumpers and connectors

This topic provides some basic and specific information about jumpers and switches. It also describes the connectors on the various boards in the system. Jumpers on the system board help to disable the system and reset the passwords. To install components and cables correctly, you must know the connectors on the system board.

### Topics:

- [System board connectors](#)
- [System board jumper settings](#)
- [Disabling a forgotten password](#)

## System board connectors

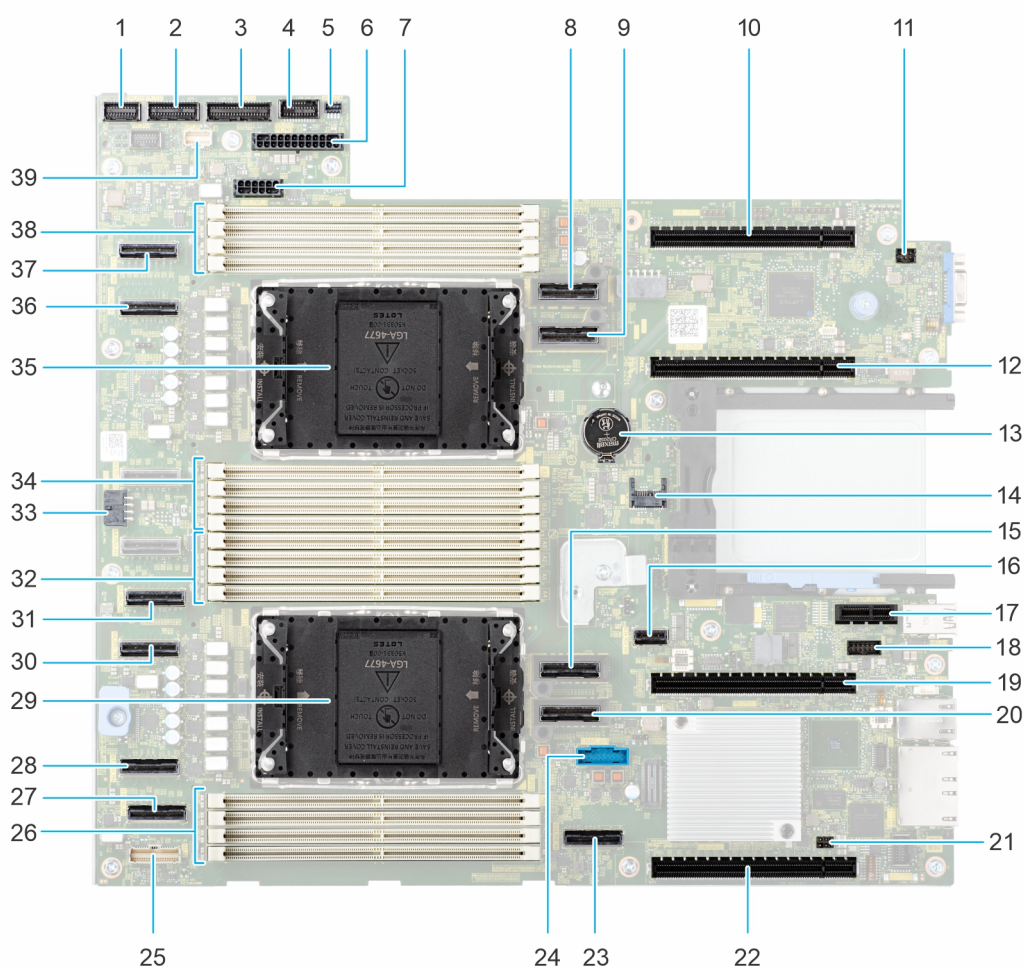


Figure 200. System board jumpers and connectors

Table 143. System board jumpers and connectors

| Item | Connector | Description  |
|------|-----------|--------------|
| 1    | FAN_SIG1  | Fan Signal 1 |

**Table 143. System board jumpers and connectors (continued)**

| Item | Connector                  | Description                                |
|------|----------------------------|--------------------------------------------|
| 2    | FAN_SIG2                   | Fan Signal 2                               |
| 3    | PIB_SIG1                   | PIB Signal 1                               |
| 4    | PIB_SIG2                   | PIB Signal 2                               |
| 5    | Intrusion Switch Connector | Intrusion Switch Connector                 |
| 6    | SYS_PWR1                   | System Power Connector 1                   |
| 7    | SIG_PWR_4                  | Power Connector 4 (Use for GPU Riser)      |
| 8    | SL9_CPU2_PB5               | PCIe Connector 9                           |
| 9    | SL10_CPU2_PA5              | PCIe Connector 10                          |
| 10   | x16 (CPU2)                 | PCIe Slot 3 (CPU 2)                        |
| 11   | System ID Connector        | System ID Connector                        |
| 12   | x16 (CPU2)                 | PCIe Slot 4 (CPU 2)                        |
| 13   | Coin Cell Battery          | Coin Cell Battery                          |
| 14   | TPM Connector              | TPM Connector                              |
| 15   | SL11_CPU1_PA6              | PCIe Connector 11                          |
| 16   | SL14_PCH_PA7               | PCIe Connector 14                          |
| 17   | Internal USB Connector     | Internal USB Connector                     |
| 18   | Serial Port Connector      | Serial Port Connector                      |
| 19   | x16 (CPU1)                 | PCIe Slot 5                                |
| 20   | SL12_CPU1_PB6              | PCIe Connector 12                          |
| 21   | Jumper                     | Jumper                                     |
| 22   | x16 (CPU1)                 | PCIe Slot 6                                |
| 23   | SL13_PCH_SA1               | SATA Connector 13                          |
| 24   | Front USB 3.0 Connector    | Front USB 3.0 Connector                    |
| 25   | Right Control Panel        | Right Control Panel                        |
| 26   | A1, A7, A3, A5             | DIMMs for Processor 1, Channels A, B, C, D |
| 27   | SL8_CPU1_PA4               | PCIe Connector 8                           |
| 28   | SL7_CPU1_PB4               | PCIe Connector 7                           |
| 29   | CPU 1                      | Processor 1                                |
| 30   | SL6_CPU1_PB3               | PCIe Connector 6                           |
| 31   | SL5_CPU1_PA3               | PCIe Connector 5                           |
| 32   | A8, A2, A6, A4             | DIMMs for Processor 1, Channels H, G, F, E |
| 33   | SYS_PWR2                   | System Power Connector 2                   |
| 34   | B1, B7, B3, B5             | DIMMs for Processor 2, Channels A, B, C, D |
| 35   | CPU 2                      | Processor 2                                |
| 36   | SL2_CPU2_PB1               | PCIe Connector 2                           |



**Table 143. System board jumpers and connectors (continued)**

| Item | Connector          | Description                                |
|------|--------------------|--------------------------------------------|
| 37   | SL1_CPU2_PA1       | PCIe Connector 1                           |
| 38   | B8, B2, B6, B4     | DIMMs for Processor 2, Channels H, G, F, E |
| 39   | Left Control Panel | Left Control Panel                         |

## System board jumper settings

For information about resetting the password jumper to disable a password, see the [Disabling a forgotten password](#) section.

**Table 144. System board jumper settings**

| Jumper    | Setting                                                                                           | Description                                                                                                             |
|-----------|---------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| PWRD_EN   |  2 4 6 (default) | The BIOS password feature is enabled.                                                                                   |
|           |  2 4 6           | The BIOS password feature is disabled. The BIOS password is now disabled and you are not allowed to set a new password. |
| NVRAM_CLR |  1 3 5 (default) | The BIOS configuration settings are retained at system boot.                                                            |
|           |  1 3 5         | The BIOS configuration settings are cleared at system boot.                                                             |

**CAUTION:** You should be cautious when changing the BIOS settings. The BIOS interface is designed for advanced users. Any changes in the setting might prevent your system from starting correctly and may even result in data loss.

## Disabling a forgotten password

The software security features of the system include a system password and a setup password. The password jumper enables or disables password features and clears any password(s) currently in use.

### Prerequisites

**CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

### Steps

1. Power off the system and all attached peripherals. Disconnect the system from the electrical outlet, and disconnect the peripherals.
2. Remove the system cover.
3. Move the jumper on the system board from pins 2 and 4 to pins 4 and 6.
4. Replace the system cover.

**NOTE:** The existing passwords are not disabled (erased) until the system boots with the jumper on pins 4 and 6. However, before you assign a new system and/or setup password, you must move the jumper back to pins 2 and 4.

 **NOTE:** If you assign a new system and/or setup password with the jumper on pins 4 and 6, the system disables the new password(s) the next time it boots.

5. Reconnect the peripherals and connect the system to the electrical outlet, and then power on the system.
6. Power off the system.
7. Remove the system cover.
8. Move the jumper on the system board from pins 4 and 6 to pins 2 and 4.
9. Replace the system cover.
10. Reconnect the peripherals and connect the system to the electrical outlet, and then power on the system.
11. Assign a new system and/or setup password.

## System diagnostics and indicator codes

The diagnostic indicators on the system front panel display system status during system startup.

### Topics:

- System board diagnostic LED indicators
- Status LED indicators
- System health and system ID indicator codes
- iDRAC Quick Sync 2 indicator codes
- iDRAC Direct LED indicator codes
- NIC indicator codes
- Power supply unit indicator codes
- Drive indicator codes
- Using system diagnostics

## System board diagnostic LED indicators

The system board LED indicators provide status of the system when it is powered on, which help identify POST and hardware issues.

The following tables show the behavior system board diagnostic LED indicators during power sequencing and power faults.

**Table 145. Legend**

| LED ON                                                                              | LED OFF                                                                             | Blink    |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------|
|  |  | <b>B</b> |

**Table 146. System board diagnostic LED indicators during power sequencing**

| DS7                                                                                 | DS6                                                                                 | DS5                                                                                 | DS4                                                                                 | DS3                                                                                 | DS2                                                                                  | DS1                                                                                   | Description                                                                                 |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
|  |  |  |  |  |  |  | Power on Reset                                                                              |
|  |  |  |  |  |  |  | 5V_AUX Enabled, waiting for 5V_AUX / V_VSB11_AU<br>X Power Good                             |
|  |  |  |  |  |  |  | VRD_1P05_P VNN_SW_EN enabled, waiting for VRD_1P05_P VNN_SW_PG<br>Power Good &PCH_SLP_SUS_N |

**Table 146. System board diagnostic LED indicators during power sequencing (continued)**

| DS7                                                                                 | DS6                                                                                 | DS5                                                                                 | DS4                                                                                 | DS3                                                                                 | DS2                                                                                  | DS1                                                                                   | Description                                                                                  |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
|    |    |    |    |    |    |    | PCH_RSMRST_R_N Enabled, waiting cBmcPostReady ready. Waiting for PS*_PG ready.               |
|    |    |    |    |    |    |    | Waiting for cSysPowerOn = '1' & cBMCHoldInS5 = '0'. CPLD_MEM_VIN_MGMT_EN_R = cDimmCheck Good |
|    |    |    |    |    |    |    | Vrd_12V_DIMM_EN / P12V_EN / CPLD_MEM_VIN_MGMT_EN Enabled, waiting BP_SIG_PWR*_PG.            |
|  |  |  |  |  |  |  | VRD_3P3_EN Enabled, waiting for VRD_3P3_MAIN_PG Power Good                                   |
|  |  |  |  |  |  |  | VRD_CPU*_VCCD Enabled, waiting for VRD_CPU*_VCCD_PG = '1'                                    |
|  |  |  |  |  |  |  | VRD_CPU*_VPP Rail(s) Enabled, waiting for VRD_CPU*_VPP Rail(s) Power Good                    |
|  |  |  |  |  |  |  | VRD_CPU*_VCCFA Rail(s) Enabled, waiting for VRD_CPU*_                                        |

**Table 146. System board diagnostic LED indicators during power sequencing (continued)**

| DS7                                                                                 | DS6                                                                                 | DS5                                                                                 | DS4                                                                                 | DS3                                                                                 | DS2                                                                                  | DS1                                                                                   | Description                                                                                                                          |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                      |                                                                                       | VCCFA Rail(s) Power Good                                                                                                             |
|    |    |    |    |    |    |    | VRD_CPU*_FIVRA Rail(s) Enabled, waiting for VRD_CPU*_FIVRA Rail(s) Power Good                                                        |
|    |    |    |    |    |    |    | VRD_CPU*_I NFAON Rail(s) Enabled, waiting for VRD_CPU*_I NFAON Rail(s) Power Good                                                    |
|   |   |   |   |   |   |   | VRD_CPU*_PVNN Rail(s) Enabled, waiting for VRD_CPU*_PVNN Rail(s) Power Good                                                          |
|  |  |  |  |  |  |  | VRD_CPU*_VCCIN Rail(s) Enabled, cDramPwrOk Enable, waiting for VRD_CPU*_VCCIN Rail(s) Power Good and hold after Power Good for 100ms |
|  |  |  |  |  |  |  | PCH_PWRGOD Enabled, CLK_BUFFER_EN Enabled, SYSTEM_PWRGOOD Enable, waiting for PCH_CPLD_PROCPWRGD and wait 5ms                        |
|  |  |  |  |  |  |  | VRD_P5V_EN Enabled, waiting for                                                                                                      |

**Table 146. System board diagnostic LED indicators during power sequencing (continued)**

| DS7                                                                                | DS6                                                                                | DS5                                                                                | DS4                                                                                | DS3                                                                                | DS2                                                                                 | DS1                                                                                  | Description                   |
|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-------------------------------|
|                                                                                    |                                                                                    |                                                                                    |                                                                                    |                                                                                    |                                                                                     |                                                                                      | VRD_P5V_P<br>G Power<br>Good. |
|   |   |   |   |   |   |   | [S0_RUN]                      |
|   |   |   |   |   |   |   | [PD_IDLE]                     |
|   |   |   |   |   |   |   | [SPD_STATE<br>7]              |
|   |   |   |   |   |   |   | [SPD_IDLE]                    |
|   |   |   |   |   |   |   | [KULL_MAIN]                   |
|  |  |  |  |  |  |  | [KULL_AUX]                    |

**Table 147. System board diagnostic LED indicators during power faults**

| DS7                                                                                 | DS6                                                                                 | DS5                                                                                 | DS4                                                                                 | DS3                                                                                 | DS2                                                                                  | DS1                                                                                   | Description            |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------|
| <b>B</b>                                                                            | <b>B</b>                                                                            | <b>B</b>                                                                            |  |  |  |  | VrdCpu1Vccd<br>Fault   |
|  |  |  | <b>B</b>                                                                            |  | <b>B</b>                                                                             | <b>B</b>                                                                              | VrdCpu1Vccin<br>Fault  |
| <b>B</b>                                                                            | <b>B</b>                                                                            | <b>B</b>                                                                            |  |  |  | <b>B</b>                                                                              | VrdCpu1VppF<br>ault    |
| <b>B</b>                                                                            | <b>B</b>                                                                            | <b>B</b>                                                                            |  |  | <b>B</b>                                                                             |  | VrdCpu1Vccfa<br>Fault  |
| <b>B</b>                                                                            | <b>B</b>                                                                            | <b>B</b>                                                                            |  |  | <b>B</b>                                                                             | <b>B</b>                                                                              | VrdCpu1Fivra<br>Fault  |
| <b>B</b>                                                                            | <b>B</b>                                                                            | <b>B</b>                                                                            |  | <b>B</b>                                                                            |  |  | VrdCpu1Infao<br>nFault |

**Table 147. System board diagnostic LED indicators during power faults (continued)**

| DS7                                                                                 | DS6                                                                                 | DS5                                                                                 | DS4                                                                                 | DS3                                                                                 | DS2                                                                                   | DS1                                                                                   | Description            |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------|
| B                                                                                   | B                                                                                   | B                                                                                   |    | B                                                                                   |     | B                                                                                     | VrdCpu1Pvnn Fault      |
| B                                                                                   | B                                                                                   | B                                                                                   | B                                                                                   |    | B                                                                                     |    | VrdCpu2Vccd Fault      |
| B                                                                                   | B                                                                                   | B                                                                                   | B                                                                                   |    | B                                                                                     | B                                                                                     | VrdCpu2VppF<br>ault    |
| B                                                                                   | B                                                                                   | B                                                                                   | B                                                                                   | B                                                                                   |     |    | VrdCpu2Vccf<br>aFault  |
|    |    | B                                                                                   | B                                                                                   |    | B                                                                                     |    | VrdCpu2Vccin<br>Fault  |
| B                                                                                   | B                                                                                   | B                                                                                   | B                                                                                   | B                                                                                   |     | B                                                                                     | VrdCpu2Fivra<br>Fault  |
| B                                                                                   | B                                                                                   | B                                                                                   | B                                                                                   | B                                                                                   | B                                                                                     |  | VrdCpu2Infao<br>nFault |
| B                                                                                   | B                                                                                   | B                                                                                   | B                                                                                   | B                                                                                   | B                                                                                     | B                                                                                     | VrdCpu2Pvnn<br>Fault   |
|  | B                                                                                   | B                                                                                   | B                                                                                   | B                                                                                   |   | B                                                                                     | BpSigPwrFaul<br>t0     |
|  | B                                                                                   | B                                                                                   | B                                                                                   | B                                                                                   | B                                                                                     |  | BpSigPwrFaul<br>t1     |
|  | B                                                                                   | B                                                                                   | B                                                                                   | B                                                                                   | B                                                                                     | B                                                                                     | BpSigPwrFaul<br>t2     |
| B                                                                                   |  |  |  |  |  |  | BpSigPwrFaul<br>t3     |
| B                                                                                   |  |  |  |  |   | B                                                                                     | BpSigPwrFaul<br>t4     |
| B                                                                                   |  |  |  |  | B                                                                                     |  | BpSigPwrFaul<br>t5     |



**Table 147. System board diagnostic LED indicators during power faults (continued)**

| DS7 | DS6                                                                                 | DS5                                                                                 | DS4                                                                                 | DS3                                                                                 | DS2                                                                                  | DS1                                                                                   | Description        |
|-----|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------|
| B   |    |    |    |    | B                                                                                    | B                                                                                     | BpSigPwrFault6     |
| B   |    | B                                                                                   |    |    |    | B                                                                                     | Vrd1v05PvnnSwFault |
| B   | B                                                                                   |    |    | B                                                                                   |    | B                                                                                     | VrdP5vFault        |
| B   |    | B                                                                                   |    | B                                                                                   | B                                                                                    |    | VrdP3v3Fault       |
| B   |    | B                                                                                   | B                                                                                   |    | B                                                                                    | B                                                                                     | VrdP5vSwFault      |
| B   |   | B                                                                                   | B                                                                                   | B                                                                                   |   |   | cVrdVsb11SwFault   |
| B   |  | B                                                                                   | B                                                                                   | B                                                                                   |  | B                                                                                     | OcpFault           |
| B   | B                                                                                   |  | B                                                                                   | B                                                                                   |  |  | CPU1_M_CHAB_fault  |
| B   | B                                                                                   |  | B                                                                                   | B                                                                                   |  | B                                                                                     | CPU1_M_CHCD_fault  |
| B   | B                                                                                   |  | B                                                                                   | B                                                                                   | B                                                                                    |  | CPU1_M_CH EF_fault |
| B   | B                                                                                   |  | B                                                                                   | B                                                                                   | B                                                                                    | B                                                                                     | CPU1_M_CH GH_fault |
| B   | B                                                                                   | B                                                                                   |  | B                                                                                   | B                                                                                    |  | CPU2_M_CHAB_fault  |
| B   | B                                                                                   | B                                                                                   |  | B                                                                                   | B                                                                                    | B                                                                                     | CPU2_M_CHCD_fault  |
| B   | B                                                                                   | B                                                                                   | B                                                                                   |  |  |  | CPU2_M_CH EF_fault |

**Table 147. System board diagnostic LED indicators during power faults (continued)**

| DS7 | DS6                                                                                 | DS5                                                                                 | DS4                                                                                | DS3                                                                                 | DS2                                                                                  | DS1                                                                                  | Description           |
|-----|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------------------|
| B   | B                                                                                   | B                                                                                   | B                                                                                  |    |    | B                                                                                    | CPU2_M_CH<br>GH_fault |
| B   |    |    |   |    |    |   | RUN_SDPM_<br>ARMED    |
| B   |    |    |   |    |    | B                                                                                    | SDPM_STAT<br>E4       |
| B   |    |    |   |    | B                                                                                    | B                                                                                    | SDPM_STAT<br>E5       |
| B   |    | B                                                                                   |   | B                                                                                   |    | B                                                                                    | SDPM_STAT<br>E45      |
| B   | B                                                                                   |   |  |   |   |  | SDPM_DISAR<br>M2      |
| B   |  |  | B                                                                                  |  |  | B                                                                                    | RUN_CPS_A<br>RMED     |

## Status LED indicators

 **NOTE:** The indicators display solid amber if any error occurs.



**Figure 201. Status LED indicators**

**Table 148. Status LED indicators and descriptions**

| Icon                                                                                | Description           | Condition                                                                                                                                                   | Corrective action                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------------------------------------------------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Drive indicator       | The indicator turns solid amber if there is a drive error.                                                                                                  | <ul style="list-style-type: none"> <li>Check the System Event Log to determine if the drive has an error.</li> <li>Run the appropriate Online Diagnostics test. Restart the system and run embedded diagnostics (ePSA).</li> <li>If the drives are configured in a RAID array, restart the system, and enter the host adapter configuration utility program.</li> </ul> |
|  | Temperature indicator | The indicator turns solid amber if the system experiences a thermal error (for example, the ambient temperature is out of range or there is a fan failure). | <p>Ensure that none of the following conditions exist:</p> <ul style="list-style-type: none"> <li>A cooling fan has been removed or has failed.</li> <li>System cover, air shrouds, or back filler bracket has been removed.</li> </ul>                                                                                                                                 |

**Table 148. Status LED indicators and descriptions (continued)**

| Icon                                                                                                                                                                                                                 | Description          | Condition                                                                                                                                                                    | Corrective action                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                     | Electrical indicator | The indicator turns solid amber if the system experiences an electrical error (for example, voltage out of range, or a failed power supply unit (PSU) or voltage regulator). | <ul style="list-style-type: none"> <li>• Ambient temperature is too high.</li> <li>• External airflow is obstructed.</li> </ul> <p>If the problem persists, see the <a href="#">Getting help</a> section.</p> <p>Check the System Event Log or system messages for the specific issue. If it is due to a problem with the PSU, check the LED on the PSU. Reseat the PSU.</p> <p>If the problem persists, see the <a href="#">Getting help</a> section.</p> |
|                                                                                                                                     | Memory indicator     | The indicator turns solid amber if a memory error occurs.                                                                                                                    | <p>Check the System Event Log or system messages for the location of the failed memory. Reseat the memory module.</p> <p>If the problem persists, see the <a href="#">Getting help</a> section.</p>                                                                                                                                                                                                                                                        |
|                                                                                                                                     | PCIe indicator       | The indicator turns solid amber if a PCIe card experiences an error.                                                                                                         | <p>Restart the system. Update any required drivers for the PCIe card. Reinstall the card.</p> <p>If the problem persists, see the <a href="#">Getting help</a> section.</p>                                                                                                                                                                                                                                                                                |
| <p> <b>NOTE:</b> For more information about the supported PCIe cards, see the Expansion card installation guidelines section.</p> |                      |                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

## System health and system ID indicator codes

The system health and system ID indicator is located on the left control panel of the system.

**Table 149. System health and system ID indicator codes**

| System health and system ID indicator code | Condition                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Solid blue                                 | Indicates that the system is powered on, is healthy, and system ID mode is not active. Press the system health and system ID button to switch to system ID mode.                                                                                                                                                                                                                              |
| Blinking blue                              | Indicates that the system ID mode is active. Press the system health and system ID button to switch to system health mode.                                                                                                                                                                                                                                                                    |
| Solid amber                                | Indicates that the system is in fail-safe mode. If the problem persists, see the <a href="#">Getting help</a> section.                                                                                                                                                                                                                                                                        |
| Blinking amber                             | Indicates that the system is experiencing a fault. Check the System Event Log for specific error messages. For information about the event and error messages generated by the system firmware and agents that monitor system components, go to <a href="http://qrl.dell.com">qrl.dell.com</a> > <b>Look Up</b> > <b>Error Code</b> , type the error code, and then click <b>Look it up</b> . |

# iDRAC Quick Sync 2 indicator codes

iDRAC Quick Sync 2 module (optional) is located on the left control panel front IO panel of the system.



Table 150. iDRAC Quick Sync 2 indicators and descriptions

| iDRAC Quick Sync 2 indicator code                   | Condition                                                                                                                                     | Corrective action                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Off (default state)                                 | Indicates that the iDRAC Quick Sync 2 feature is powered off. Press the iDRAC Quick Sync 2 button to power on the iDRAC Quick Sync 2 feature. | If the LED fails to power on, reseal the left control panel flex cable and check. If the problem persists, see the <a href="#">Getting help</a> section.                                                                                                                                                                               |
| Solid white                                         | Indicates that iDRAC Quick Sync 2 is ready to communicate. Press the iDRAC Quick Sync 2 button to power off.                                  | If the LED fails to power off, restart the system. If the problem persists, see the <a href="#">Getting help</a> section.                                                                                                                                                                                                              |
| Blinks white rapidly                                | Indicates data transfer activity.                                                                                                             | If the indicator continues to blink indefinitely, see the <a href="#">Getting help</a> section.                                                                                                                                                                                                                                        |
| Blinks white slowly                                 | Indicates that firmware update is in progress.                                                                                                | If the indicator continues to blink indefinitely, see the <a href="#">Getting help</a> section.                                                                                                                                                                                                                                        |
| Blinks white five times rapidly and then powers off | Indicates that the iDRAC Quick Sync 2 feature is disabled.                                                                                    | Check if iDRAC Quick Sync 2 feature is configured to be disabled by iDRAC. If the problem persists, see the <a href="#">Getting help</a> section. <a href="http://www.dell.com/poweredgemanuals">www.dell.com/poweredgemanuals</a> or <i>Dell OpenManage Server Administrator User's Guide</i> at <a href="#">openmanage manuals</a> . |
| Solid amber                                         | Indicates that the system is in fail-safe mode.                                                                                               | Restart the system. If the problem persists, see the <a href="#">Getting help</a> section.                                                                                                                                                                                                                                             |
| Blinking amber                                      | Indicates that the iDRAC Quick Sync 2 hardware is not responding properly.                                                                    | Restart the system. If the problem persists, see the <a href="#">Getting help</a> section.                                                                                                                                                                                                                                             |

## iDRAC Direct LED indicator codes

The iDRAC Direct LED indicator lights up to indicate that the port is connected and is being used as a part of the iDRAC subsystem.

You can configure iDRAC Direct by using a USB to micro USB (type AB) cable, which you can connect to your laptop or tablet. Cable length should not exceed 3 feet (0.91 meters). Performance could be affected by cable quality. The following table describes iDRAC Direct activity when the iDRAC Direct port is active:

Table 151. iDRAC Direct LED indicator codes

| iDRAC Direct LED indicator code                             | Condition                                                    |
|-------------------------------------------------------------|--------------------------------------------------------------|
| Solid green for two seconds                                 | Indicates that the laptop or tablet is connected.            |
| Blinking green (on for two seconds and off for two seconds) | Indicates that the laptop or tablet connected is recognized. |

Table 151. iDRAC Direct LED indicator codes (continued)

| iDRAC Direct LED indicator code | Condition                                         |
|---------------------------------|---------------------------------------------------|
| LED Indicator off               | Indicates that the laptop or tablet is unplugged. |

## NIC indicator codes

Each NIC on the back of the system has indicators that provide information about the activity and link status. The activity LED indicator indicates if data is flowing through the NIC, and the link LED indicator indicates the speed of the connected network.

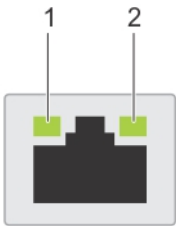


Figure 202. NIC indicator codes

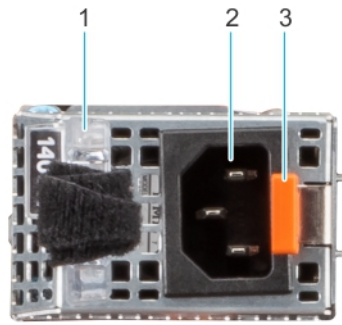
- 1. Link LED indicator
- 2. Activity LED indicator

Table 152. NIC indicator codes

| NIC indicator codes                                                | Condition                                                                                                                           |
|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Link and activity indicators are off.                              | Indicates that the NIC is not connected to the network.                                                                             |
| Link indicator is green, and activity indicator is blinking green. | Indicates that the NIC is connected to a valid network at its maximum port speed, and data is being sent or received.               |
| Link indicator is amber, and activity indicator is blinking green. | Indicates that the NIC is connected to a valid network at less than its maximum port speed, and data is being sent or received.     |
| Link indicator is green, and activity indicator is off.            | Indicates that the NIC is connected to a valid network at its maximum port speed, and data is not being sent or received.           |
| Link indicator is amber, and activity indicator is off.            | Indicates that the NIC is connected to a valid network at less than its maximum port speed, and data is not being sent or received. |
| Link indicator is blinking green, and activity is off.             | Indicates that the NIC identity is enabled through the NIC configuration utility.                                                   |

## Power supply unit indicator codes

AC and DC power supply units (PSUs) have an illuminated translucent handle that serves as an indicator. The indicator shows if power is present or if a power fault has occurred.



**Figure 203. AC PSU status indicator**

1. AC PSU handle
2. Socket
3. Release latch

**Table 153. AC and DC PSU status indicator codes**

| Power indicator codes          | Condition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Green                          | Indicates that a valid power source is connected to the PSU and the PSU is operational.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Blinking amber                 | Indicates an issue with the PSU.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Not powered on                 | Indicates that the power is not connected to the PSU.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Blinking green                 | Indicates that the firmware of the PSU is being updated.<br><div> <div>⚠</div> <div><b>CAUTION:</b> Do not disconnect the power cord or unplug the PSU when updating firmware. If firmware update is interrupted, the PSUs will not function.</div> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Blinking greens and powers off | <p>When hot-plugging a PSU, it blinks green five times at a rate of 4 Hz and powers off. This indicates a PSU mismatch due to efficiency, feature set, health status, or supported voltage.</p> <div> <div>⚠</div> <div><b>CAUTION:</b> If two PSUs are installed, both the PSUs must have the same type of label; for example, Extended Power Performance (EPP) label. Mixing PSUs from previous generations of PowerEdge servers is not supported, even if the PSUs have the same power rating. This results in a PSU mismatch condition or failure to power on the system.</div> </div> <div> <div>⚠</div> <div><b>CAUTION:</b> If two PSUs are used, they must be of the same type and have the same maximum output power.</div> </div> <div> <div>⚠</div> <div><b>CAUTION:</b> When correcting a PSU mismatch, replace the PSU with the blinking indicator. Swapping the PSU to make a matched pair can result in an error condition and an unexpected system shutdown. To change from a high output configuration to a low output configuration or vice versa, you must power off the system.</div> </div> <div> <div>⚠</div> <div><b>CAUTION:</b> AC PSUs support both 240 V and 120 V input voltages with the exception of Titanium PSUs, which support only 240 V. When two identical PSUs receive different input voltages, they can output different wattages, and trigger a mismatch.</div> </div> |

# Drive indicator codes

The LEDs on the drive carrier indicate the state of each drive. Each drive carrier has two LEDs: an activity LED (green) and a status LED (bicolor, green/amber). The activity LED blinks whenever the drive is accessed.

**NOTE:** If the drive is in the Advanced Host Controller Interface (AHCI) mode, the status LED indicator does not power on.

**NOTE:** Drive status indicator behavior is managed by Storage Spaces Direct. Not all drive status indicators may be used.

Table 154. Drive indicator codes

| Drive status indicator code                                                                    | Condition                                                                                                                                                                                                                 |
|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Blinks green twice per second                                                                  | Indicates that the drive is being identified or preparing for removal.                                                                                                                                                    |
| Not powered on                                                                                 | Indicates that the drive is ready for removal.<br><b>NOTE:</b> The drive status indicator remains off until all drives are initialized after the system is powered on. Drives are not ready for removal during this time. |
| Blinks green, amber, and then powers off                                                       | Indicates that there is an unexpected drive failure.                                                                                                                                                                      |
| Blinks amber four times per second                                                             | Indicates that the drive has failed.                                                                                                                                                                                      |
| Blinks green slowly                                                                            | Indicates that the drive is rebuilding.                                                                                                                                                                                   |
| Solid green                                                                                    | Indicates that the drive is online.                                                                                                                                                                                       |
| Blinks green for three seconds, amber for three seconds, and then powers off after six seconds | Indicates that the rebuild has stopped.                                                                                                                                                                                   |

## Using system diagnostics

If you experience an issue with the system, run the system diagnostics before contacting Dell for technical assistance. The purpose of running system diagnostics is to test the system hardware without using additional equipment or risking data loss. If you are unable to fix the issue yourself, service and support personnel can use the diagnostics results to help you solve the issue.

## Dell Embedded System Diagnostics

**NOTE:** The Dell Embedded System Diagnostics is also known as Enhanced Pre-boot System Assessment (ePSA) diagnostics.

The Embedded System Diagnostics provide a set of options for particular device groups or devices allowing you to:

- Run tests automatically or in an interactive mode
- Repeat tests
- Display or save test results
- Run thorough tests to introduce additional test options to provide extra information about the failed device(s)
- View status messages that inform you if tests are completed successfully
- View error messages that inform you of issues encountered during testing

## Running the Embedded System Diagnostics from Boot Manager

Run the Embedded System Diagnostics (ePSA) if your system does not boot.

### Steps

1. When the system is booting, press F11.
2. Use the up arrow and down arrow keys to select **System Utilities > Launch Diagnostics**.



3. Alternatively, when the system is booting, press F10, select **Hardware Diagnostics > Run Hardware Diagnostics**. The **ePSA Pre-boot System Assessment** window is displayed, listing all devices detected in the system. The diagnostics starts executing the tests on all the detected devices.

## Running the Embedded System Diagnostics from the Dell Lifecycle Controller

### Steps

1. When the system is booting, press F10.
2. Select **Hardware Diagnostics → Run Hardware Diagnostics**. The **ePSA Pre-boot System Assessment** window is displayed, listing all devices detected in the system. The diagnostics start executing the tests on all the detected devices.

## System diagnostic controls

Table 155. System diagnostic controls

| Menu          | Description                                                                                                                                 |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Configuration | Displays the configuration and status information of all detected devices.                                                                  |
| Results       | Displays the results of all tests that are run.                                                                                             |
| System health | Provides the current overview of the system performance.                                                                                    |
| Event log     | Displays a time-stamped log of the results of all tests run on the system. This is displayed if at least one event description is recorded. |

## Getting help

### Topics:

- [Recycling or End-of-Life service information](#)
- [Contacting Dell Technologies](#)
- [Accessing system information by using QRL](#)
- [Receiving automated support with Secure Connect Gateway \(SCG\)](#)

## Recycling or End-of-Life service information

Take back and recycling services are offered for this product in certain countries. If you want to dispose of system components, visit [www.dell.com/recyclingworldwide](http://www.dell.com/recyclingworldwide) and select the relevant country.

## Contacting Dell Technologies

Dell provides online and telephone based support and service options. If you do not have an active internet connection, you can find Dell contact information on your purchase invoice, packing slip, bill or Dell product catalog. The availability of services varies depending on the country and product, and some services may not be available in your area. To contact Dell for sales, technical assistance, or customer service issues follow these steps:

### Steps

1. Go to [www.dell.com/support/home](http://www.dell.com/support/home).
2. Select your country from the drop-down menu on the lower right corner of the page.
3. For customized support:
  - a. Enter the system Service Tag in the **Enter a Service Tag, Serial Number, Service Request, Model, or Keyword** field.
  - b. Click **Search**.  
The support page that lists the various support categories is displayed.
4. For general support:
  - a. Select your product category.
  - b. Select your product segment.
  - c. Select your product.  
The support page that lists the various support categories is displayed.
5. For contact details of Dell Global Technical Support:
  - a. Click [Contact Technical Support](#).
  - b. The **Contact Technical Support** page is displayed with details to call, chat, or e-mail the Dell Global Technical Support team.

## Accessing system information by using QRL

You can use the Quick Resource Locator (QRL) located on the Express service tag in the front of the T560 system, to access information about PowerEdge T560. There is also another QRL for accessing product information located on the back of the system cover.

### Prerequisites

Ensure that your smartphone or tablet has a QR code scanner installed.

The QRL includes the following information about your system:

- How-to videos
- Reference materials, including the Installation and Service Manual, and mechanical overview
- The system service tag to quickly access the specific hardware configuration and warranty information
- A direct link to Dell to contact technical assistance and sales teams

### Steps

1. Go to [www.dell.com/qrl](http://www.dell.com/qrl), and navigate to your specific product or
2. Use your smart phone or tablet to scan the model-specific Quick Resource (QR) code on your system or in the Quick Resource Locator section.

## Quick Resource Locator for PowerEdge T560 system



**Figure 204. Quick Resource Locator for PowerEdge T560 system**

## Receiving automated support with Secure Connect Gateway (SCG)

Dell Secure Connect Gateway (SCG) is an optional Dell Services offering that automates technical support for your Dell server, storage, and networking devices. By installing and setting up a Secure Connect Gateway (SCG) application in your IT environment, you can receive the following benefits:

- Automated issue detection — Secure Connect Gateway (SCG) monitors your Dell devices and automatically detects hardware issues, both proactively and predictively.
- Automated case creation — When an issue is detected, Secure Connect Gateway (SCG) automatically opens a support case with Dell Technical Support.
- Automated diagnostic collection — Secure Connect Gateway (SCG) automatically collects system state information from your devices and uploads it securely to Dell. This information is used by Dell Technical Support to troubleshoot the issue.
- Proactive contact — A Dell Technical Support agent contacts you about the support case and helps you resolve the issue.

The available benefits vary depending on the Dell Service entitlement purchased for your device. For more information about Secure Connect Gateway (SCG), go to [www.dell.com/secureconnectgateway](http://www.dell.com/secureconnectgateway).

## Documentation resources

This section provides information about the documentation resources for your system.

To view the document that is listed in the documentation resources table:

- From the Dell support site:
  1. Click the documentation link that is provided in the Location column in the table.
  2. Click the required product or product version.
-  **NOTE:** To locate the model number, see the front of your system.
- 3. On the Product Support page, click **Documentation**.
- Using search engines:
  - Type the name and version of the document in the search box.

**Table 156. Additional documentation resources for your system**

| Task                    | Document                                                                                                                                                                         | Location                                                                                     |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| Setting up your system  | For information about setting up your system, see the <i>Getting Started Guide</i> document that is shipped with your system.                                                    | <a href="http://www.dell.com/poweredgemanuals">www.dell.com/poweredgemanuals</a>             |
| Configuring your system | For information about the iDRAC features, configuring and logging in to iDRAC, and managing your system remotely, see the Integrated Dell Remote Access Controller User's Guide. | <a href="http://www.dell.com/poweredgemanuals">www.dell.com/poweredgemanuals</a>             |
|                         | For information about understanding Remote Access Controller Admin (RACADM) subcommands and supported RACADM interfaces, see the RACADM CLI Guide for iDRAC.                     |                                                                                              |
|                         | For information about Redfish and its protocol, supported schema, and Redfish Eventing implemented in iDRAC, see the Redfish API Guide.                                          |                                                                                              |
|                         | For information about iDRAC property database group and object descriptions, see the Attribute Registry Guide.                                                                   |                                                                                              |
|                         | For information about Intel QuickAssist Technology, see the Integrated Dell Remote Access Controller User's Guide.                                                               |                                                                                              |
|                         | For information about earlier versions of, the iDRAC documents.                                                                                                                  | <a href="http://www.dell.com/idracmanuals">www.dell.com/idracmanuals</a>                     |
|                         | To identify the version of iDRAC available on your system, on the iDRAC web interface, click <b>? &gt; About</b> .                                                               |                                                                                              |
|                         | For information about installing the operating system, see the operating system documentation.                                                                                   | <a href="http://www.dell.com/operatingsystemmanuals">www.dell.com/operatingsystemmanuals</a> |
|                         | For information about updating drivers and firmware, see the Methods to download firmware and drivers section in this document.                                                  | <a href="http://www.dell.com/support/drivers">www.dell.com/support/drivers</a>               |

**Table 156. Additional documentation resources for your system (continued)**

| Task                                                             | Document                                                                                                                                                                                                                                                                           | Location                                                                                                             |
|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Managing your system                                             | For information about systems management software offered by Dell, see the Dell OpenManage Systems Management Overview Guide.                                                                                                                                                      | <a href="http://www.dell.com/poweredgemanuals">www.dell.com/poweredgemanuals</a>                                     |
|                                                                  | For information about setting up, using, and troubleshooting OpenManage, see the Dell OpenManage Server Administrator User's Guide.                                                                                                                                                | <a href="http://www.dell.com/openmanagemanuals">www.dell.com/openmanagemanuals</a> > OpenManage Server Administrator |
|                                                                  | For information about installing and using Dell Secure Connect Gateway, see the Dell Secure Connect Gateway Enterprise User's Guide.                                                                                                                                               | <a href="https://www.dell.com/serviceabilitytools">https://www.dell.com/serviceabilitytools</a>                      |
|                                                                  | For information about partner programs enterprise systems management, see the OpenManage Connections Enterprise Systems Management documents.                                                                                                                                      | <a href="http://www.dell.com/openmanagemanuals">www.dell.com/openmanagemanuals</a>                                   |
| Working with the Dell PowerEdge RAID controllers (if applicable) | For information about understanding the features of the Dell PowerEdge RAID controllers (PERC), Software RAID controllers, or BOSS card and deploying the cards, see the Storage controller documentation.                                                                         | <a href="http://www.dell.com/storagecontrollermanuals">www.dell.com/storagecontrollermanuals</a>                     |
| Understanding event and error messages                           | For information about the event and error messages generated by the system firmware and agents that monitor system components, go to <a href="http://qrl.dell.com">qrl.dell.com</a> > <b>Look Up</b> > <b>Error Code</b> , type the error code, and then click <b>Look it up</b> . | <a href="http://www.dell.com/qrl">www.dell.com/qrl</a>                                                               |
| Troubleshooting your system                                      | For information about identifying and troubleshooting the PowerEdge server issues, see the Server Troubleshooting Guide.                                                                                                                                                           | <a href="http://www.dell.com/poweredgemanuals">www.dell.com/poweredgemanuals</a>                                     |