Upgrading PowerEdge VRTX to Support Shared Storage Expansion

Dell Engineering
December 2015

A Dell Technical White Paper

Revisions

Date	Description
December 2015	Initial release

Table of contents

1   Introduction

This document provides instructions on upgrading VRTX chassis to support shared storage expansion.

Shared storage expansion is a new feature of PowerEdge VRTX that allows customers to add additional shared storage infrastructure to the chassis. This feature has one or two Shared PowerEdge RAID Controller (PERC) 8 External cards installed in the VRTX chassis, connecting to Dell PowerVault MD1200 or MD1220 direct attached storage enclosures.

The Shared PERC 8 External card enables PCIe Input Output (IO) virtualization, which allows multiple systems to share the available hardware resources. The controller allows four server modules to access attached JBOD (Just a Bunch Of Disks) storage. Each server module's operating system (OS) loads a Virtual Function (VF) driver that allows the server module to communicate with the Shared PERC 8 firmware. Shared PERC 8 External card also supports fault tolerance between clustered controllers providing multipath I/O and failover support.

2 Overview of PowerEdge VRTX shared storage expansion configurations

The Dell PowerEdge VRTX system supports the following three storage expansion configurations:

1. Single Shared PowerEdge RAID Controller (PERC) 8 External card configuration
   - This configuration consists of single Shared PERC External card in the VRTX chassis connecting to one of two MD1200 or MD1220 storage enclosures.
   - It does not provide fault tolerance to SAS domain.
   - The cable topology recommended in this configuration enables you to easily upgrade to Fault Tolerant configuration.
2. Non-Fault Tolerant Dual Shared PERC 8 External card configuration
   - This configuration consists of two Shared PERC External cards in the VRTX chassis, each connecting to one of two MD1200 or MD1220 storage enclosures.
   - It does not provide fault tolerance to the storage subsystems.
   - Each Shared PERC 8 External card controls separate and independent storage subsystem.
3. Fault Tolerant Dual Shared PERC 8 External card configuration
   - This configuration consists of two Shared PERC 8 External cards in the VRTX chassis with cabling topology that supports up to two MD1200 or MD1220 storage enclosures in a Fault Tolerant mode.
   - The shared PERC cards are configured in an active-passive mode. Both the cards can access the storage subsystem. However, only the active controller will provide data access. If the active Shared PERC 8 card fails, the passive Shared PERC 8 card takes control in a seamless transition.

3 Prerequisites for upgrading PowerEdge VRTX to support shared storage

The following requirements must be met before upgrading PowerEdge VRTX to support shared storage expansion:

Hardware requirements

1. Ensure that you have met the following hardware requirements before upgrading PowerEdge VRTX to support shared storage expansion:

    a. Shared PowerEdge RAID Controller (PERC) 8 External cards – Supports up to two controllers per chassis
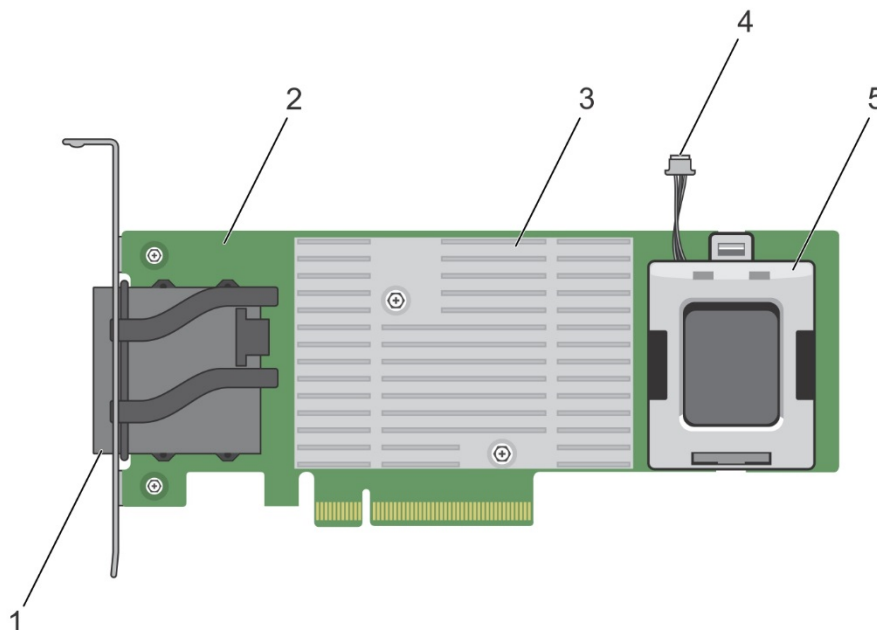
Figure 1   Shared PERC External card

1. External cable connectors
2. Shared PERC External card
3. Heat sink
4. Battery cable
5. Battery

    b. Dell PowerVault MD1200 or MD1220 direct attached storage enclosures – Supports up to two enclosures per SAS domain.
    c. Mini SAS 6 Gb (SAS 2.0) cables.

For more information about the supported cabling technologies, see Table 1.

> **Note**: Note that any other cable topologies are not supported.

The following table describes the cables supported on PowerVault MD1200 or MD1220 storage enclosures:

Table 1   Cables supported on PowerVault MD1200 or MD1220

Length	Dell Part Number	Usage
0.6 meter	W508F	Daisy Chain only to another MD1200 or MD1220
1.0 meter	171C5	Connect to Shared PERC 8 External card or Daisy Chain to another MD1200 or MD1220
2.0 meters	W390D	Connect to Shared PERC 8 External card or Daisy Chain to another MD1200 or MD1220
4.0 meters	U651D	Connect to Shared PERC 8 External card or Daisy Chain to another MD1200 or MD1220

Figure 2   Mini SAS 6 Gbs cable

Firmware and driver requirements

1. Ensure that you have the minimum baseline firmware and driver versions required to support shared storage expansion, as listed in the following table:

Note: This table might not include the latest versions. For the latest firmware and driver baseline, see *Dell PowerEdge VRTX Storage Subsystem Compatibility Matrix* at **Dell.com/poweredgemanuals**.

Table 2   Minimum baseline firmware and driver versions required

Component	Version
Chassis Management Controller (CMC) firmware	2.1
Chassis infrastructure firmware	2.21

SAS expander firmware	2.0
Shared PERC 8 firmware	23.13.16-0013
Shared PERC driver - Linux	6.903.05.00
Shared PERC driver - Windows	6.805.01.00
Shared PERC driver - VMware	6.805.56.00
MD1200 or MD1220 firmware	1.06

2. Download the latest firmware and driver version from **Dell.com/support/home**.

3.1 Upgrading PowerEdge VRTX to support shared storage expansion

Follow the steps in this section to upgrade PowerEdge VRTX to support storage expansion.

Note: Ensure DUPs (Dell Update Packages) for the required storage components are downloaded.

1. Follow the operating system (OS) procedure to back up all data from the shared storage drives.
2. Document your virtual drive configuration and mapping information by performing the following steps:

   a. Open **CLI terminal** and run the command **racadm raid get vdisks –o** to get the virtual disk configuration and server node mapping.
   Take a screenshot of the results page and save the captured screenshot to a location of choice, or write down the information and store it in a safe, secure location.

   b. Click **Chassis Overview** → **Storage** → **Virtual Disks** → **Assign** to view the virtual disk mapping by the CMC GUI.
   Take a screenshot of the results page and save the captured screenshot to a location of choice, or write down the information and store it in a safe, secure location.

   c. Click **Chassis Overview** → **Storage** → **Virtual Disks** to get the virtual disk configuration information by the CMC GUI.
   Take a screenshot of the results page and save the captured screenshot to a location of choice, or write down the information and store it in a safe, secure location.

3. Update the OS specific Shared PERC 8 driver to the required minimum baseline by performing the following steps:

Note: For the correct driver version, see *Dell PowerEdge VRTX Storage Subsystem Compatibility Matrix* at **Dell.com/poweredgemanuals** and Table 2 in this document.

   a. Download the drivers from **Dell.com/drivers**.
   b. Install or update Shared PERC 8 driver on all server blades in the VRTX chassis. For instructions on installing and updating Shared PERC 8 driver, see *Dell Shared PowerEdge RAID Controller 8 Cards for Dell PowerEdge VRTX Systems User's Guide* at **Dell.com/poweredgemanuals**.

Note: Only one software driver per OS is required for both Internal and External Shared PERC 8 cards.

Note: PERC H310/H710/H710P/H810 controllers use the same driver as Shared PERC 8 and do not require separate driver installations.

4. Turn off all the server modules.
5. To update the CMC firmware to the required minimum baseline by using the CMC web interface, perform the following steps:

Note: If you have redundant CMCs installed in the chassis, it is recommended to update both the CMCs to the same firmware version simultaneously with a single operation. If CMCs have different firmware and a failover occurs, unexpected results may occur.

Note: Before you update the CMC firmware, ensure that you turn on the chassis, but turn off all the servers in the chassis.

   a. In the left pane, go to any of the following pages:

   – **Chassis Overview → Update**
   – **Chassis Overview → Chassis Controller → Update**

   b. On the **Firmware Update** page, in the **CMC Firmware** section, select the required components under the **Update Targets** column for the CMC or CMCs (if standby CMC is present) you want to update, and then click **Apply CMC Update**.
   c. In the **Firmware Image** field, click **Browse** (Internet Explorer or Firefox) or **Choose File** (Google Chrome) to browse through the file location. The default name of the CMC firmware image file is vrtx_cmc.bin.
   d. Click **Begin Firmware Update**. The **Firmware Update Progress** section provides firmware update status information.
      A status indicator is displayed on the page while the image file is uploaded. File transfer time varies based on the connection speed. When the internal update process begins, the page automatically refreshes and the Firmware update timer is displayed.
   e. For a standby CMC, when the update is complete, the **Update State** field displays **Done**. For an active CMC, during the final phases of the firmware update process, the browser session and connection with CMC is lost temporarily because the active CMC is not connected to the network. You must log in after a few minutes when the active CMC has restarted. After CMC resets, the new firmware is displayed on the **Firmware Update** page.

Note: After the firmware update, delete the files from the web browser cache. For instructions about clearing the browser cache, see the web browser's online help.

6. To update the chassis infrastructure firmware to the required minimum baseline by using the CMC web interface, perform the following steps:

   a. Go to any of the following pages:

   – **Chassis Overview → Update**
   – **Chassis Overview → Chassis Controller → Update**

   b. In the **Firmware Update** page, in the **Chassis Infrastructure Firmware** section, in the **Update Targets** column, select the option, and click **Apply Chassis Infrastructure Firmware**.

    c. On the **Firmware Update** field, click **Browse** and then select the appropriate Chassis Infrastructure Firmware.

    d. Click **Begin Firmware Update**, and then click **Yes**.

       The **Firmware Update Progress** section provides firmware update status information. A status indicator is displayed on the page while the image file is uploaded. File transfer time varies based on the connection speed. When the internal update process begins, the page automatically refreshes and the Firmware update timer is displayed.

       Additional instructions to follow:

       – Do not click the **Refresh** icon or navigate to another page during the files transfer.

       – The **Update State** field displays the firmware update status.

       – When the update is complete, there is brief loss of connectivity to the main board, because it resets and the new firmware is displayed on the **Firmware Update** page.

7. Update the internal backplane expander firmware version by performing the following steps:

    a. Click **Chassis Overview → Storage → Update** and see if the internal backplane expander firmware version meets the required minimum baseline.

    b. Download Dell 12G PowerEdge Server Backplane Expander Firmware for PowerEdge VRTX from **Dell.com/support/home**.

    c. In the left pane, click **Chassis Overview → Storage → Update**.

    d. On the **Storage Component Update** page, click **Choose File**.

       The **Choose to Upload file** dialog box is displayed.

    e. Browse to the location where you downloaded the required DUP file.

    f. Select the DUP file, and click **Open**.

       The DUP file name and path are displayed in the **Browse** field.

    g. Click **Upload**.

       The DUP is uploaded to CMC. The **Storage Component Update** section displays only the components that are supported by the downloaded DUP file. The current version, latest available version and the **Update** check box for the components are displayed.

    h. Select the appropriate **Update** check boxes for the required components.

    i. Click **Update**.

       The firmware update action is initiated for the selected components. The progress is displayed in the Update column.

       After the action is complete, an appropriate message is displayed to indicate the completion or failure of the firmware update.

8. Update the Shared PERC 8 Internal controller firmware to the required minimum baseline by performing the following steps:

Note: Separate image files are used for updating Shared PERC 8 Internal controller firmware compared to Shared PERC 8 External controller firmware.
Note: If the chassis contains two Shared PERC 8 Internal controllers, ensure that both are updated to the same firmware version.

    a. Download the Windows update package of the Shared PERC 8 firmware for Dell PowerEdge VRTX from **Dell.com/support/home**.

b. Log in to VRTX CMC.

c. Ensure that you turn off all the server blades.

d. In the left pane, click **Chassis Overview → Storage → Update**.

e. On the **Storage Component Update** page, click **Choose File**.
The **Choose to Upload file** dialog box is displayed.

f. Browse to the location where you downloaded the Shared PERC 8 firmware file.

g. Select the file, and click **Open**.
The DUP file name and path are displayed in the **Browse** field.

h. Click **Upload**.

i. The DUP is uploaded to CMC. The **Storage Component Update** section displays only the components that are supported by the downloaded DUP file. The current version, latest available version and the **Update** check box are displayed for the components.

j. Select the appropriate **Update** check boxes for the required components.

k. Click **Update**.
The firmware update action is initiated for the selected components. The progress is displayed in the Update column.

9. Turn off the PowerEdge VRTX chassis by performing the following steps:

a. Turn off all the server modules using CMC.

b. Turn off the chassis.

c. Disconnect the chassis from the electrical outlets.

10. Install Shared PERC 8 External cards into the VRTX chassis by performing the following steps:

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

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

Caution: Do not operate the system without the cover for a duration exceeding five minutes.

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 came with the product.

Note: Dell recommends that you always use a static mat and static strap while working on components inside the system.

Note: To ensure proper operation and cooling, all bays in the system must be populated always with either a component or with a blank.

Caution: Do not remove Shared PERC 8 External cards from the system board while the PowerEdge VRTX system is turned on.

Note: In the single Shared PERC 8 External configuration, the card can be installed in either PCI slot 5 or 6. In the dual Shared PERC 8 External configuration, the cards must be installed in PCI slots 5 and 6.

a. Open the system cover.

b. Lift the expansion card latch out of the chassis slot.

c. Remove the filler bracket.

d. Hold the card by its edges, and align the card edge connector with the card connector on the system board.

e. Insert the card edge connector into the card connector until the card is fully seated.

f. Close the expansion card latch.

g. Close the system cover.

For additional information about installing or removing the PCIe adapter card in VRTX chassis, see *Dell PowerEdge VRTX Enclosure Owner's Manual* at **Dell.com/poweredgemanuals**.
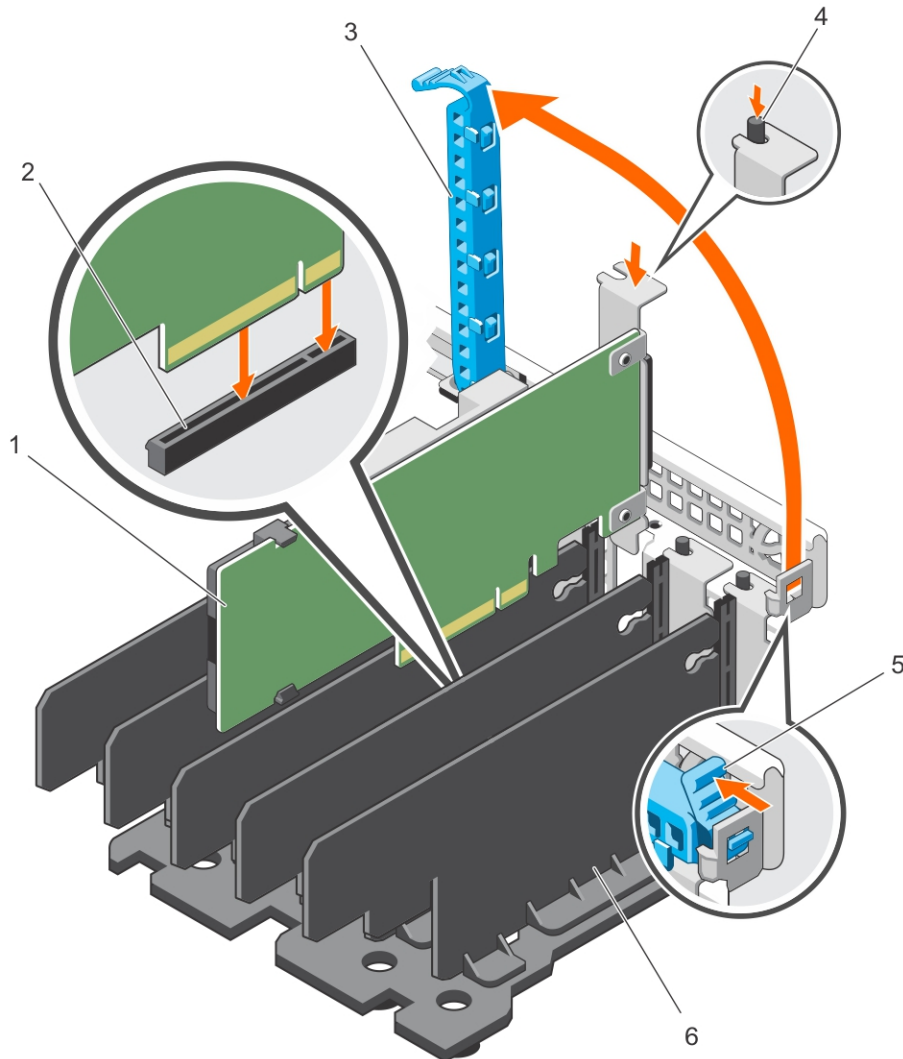
Figure 3   Removing and installing Shared PERC 8 External card

1. Shared PERC 8 External card
2. Card connector on the system board
3. Expansion card latch
4. Metal standoff
5. Release tab
6. Divider unit

11. Turn on the PowerEdge VRTX chassis by performing the following steps:

    a. Reconnect the chassis power supply units (PSUs) to the electrical outlets.

Note: Note that CMC will automatically turn on.

    b. When CMC is ready, log in to the CMC GUI and turn on the chassis.

Note: Do not power on the blade servers in the chassis.

12. Update the Shared PERC 8 External card firmware to the required minimum baseline by performing the following steps:

Note: For dual Shared PERC 8 External configuration, ensure that both the cards are updated to the same firmware version.
Note: Separate image files are used for updating Shared PERC 8 Internal firmware compared to Shared PERC 8 External firmware.

    a. Download the Windows update package of the Shared PERC 8 External controller firmware for Dell PowerEdge VRTX from **Dell.com/support/home**.
    b. Log in to VRTX CMC.
    c. Ensure that you turn off all the server blades.
    d. In the left pane, click **Chassis Overview** → **Storage** → **Update**.
    e. On the **Storage Component Update** page, click **Choose File**.
       The **Choose to Upload file** dialog box is displayed.
    f. Browse to the location where you downloaded the Shared PERC 8 External card firmware file.
    g. Select the file, and click **Open**.
       The DUP file name and path are displayed in the **Browse** field.
    h. Click **Upload**.
       The DUP is uploaded to CMC. The **Storage Component Update** section displays only the components that are supported by the downloaded DUP file. The current version, latest available version and the **Update** check box for the components are displayed.
    i. Select the appropriate **Update** check boxes for the required components.
    j. Click **Update**.
       The firmware update action is initiated for the selected components. The progress is displayed in the Update column.

13. Set the operating mode for Shared PERC 8 External controller.

    By default, the newly installed Shared PERC 8 External cards operate in single controller, non-fault tolerant mode.
    – To change to Dual Shared PERC 8 External Fault Tolerant mode, click **Chassis Overview** → **Storage** → **Controllers** → **Troubleshooting** → **Actions** → **Enable Fault Tolerance** for both controllers.
    – To set Shared PERC 8 External cards back to single controller, non-fault tolerant mode, click **Chassis Overview** → **Storage** → **Controllers** → **Troubleshooting** → **Actions** → **Disable Fault Tolerance**.

- To disable Shared PERC 8 External cards, click **Chassis Overview** → **Storage** → **Controllers** → **Troubleshooting** → **Actions** → **Disable RAID Controller**.
- To enable Shared PERC 8 External cards, click **Chassis Overview** → **Storage** → **Controllers** → **Troubleshooting** → **Actions** → **Enable RAID Controller**.

14. Turn off the PowerEdge VRTX chassis by performing the following steps:

    a. Turn off the chassis by using the CMC GUI.
    b. Disconnect the chassis from the electrical outlets.

15. Set up PowerVault MD1200 or MD1220 storage enclosures.
    The following requirements must be met before setting up PowerVault MD1200 or MD1220 storage enclosures:

    - A maximum of two PowerVault MD1200 or MD1220 enclosures can be daisy chained on each Shared PERC 8 External domain.
    - Mixing of PowerVault MD1200 with MD1220 is supported.
    - The enclosure mode switch must be set to unified mode before the enclosure is turned on.

Note: Enclosure split-mode is not supported in VRTX.

For additional information about setting up PowerVault MD1200 or MD1220 storage enclosures, see *Dell PowerVault MD1200 & MD1220 Hardware Owner's Manual* at **Dell.com/powervaultmanuals**.

16. Cable PowerVault MD1200 or MD1220 storage enclosures.

Note: The specified cabling topology must be followed for fault tolerance to function.

Ensure that both the VRTX chassis and storage enclosures are disconnected from the electrical outlets.
For information about cables that are supported on Dell PowerVault MD1200 and MD1220, see Table 1 in the document.

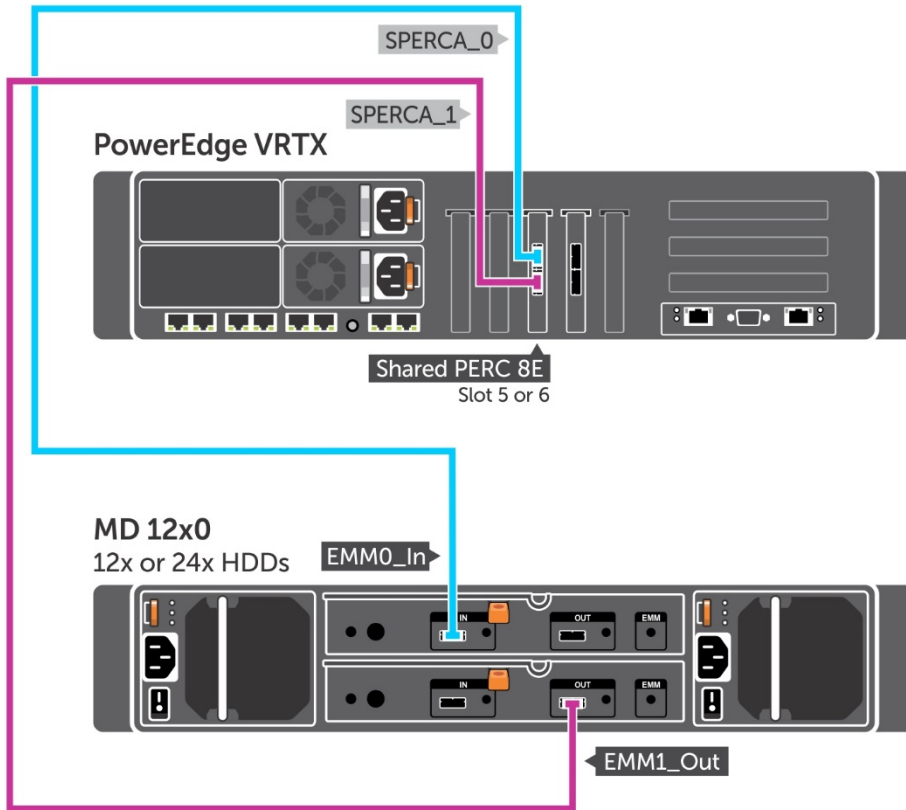a. Connecting Single Shared PERC 8 External card configuration (non-fault tolerant) to one enclosure.

Figure 4   Single Shared PERC 8 External card configuration (non-fault tolerant) to one enclosure

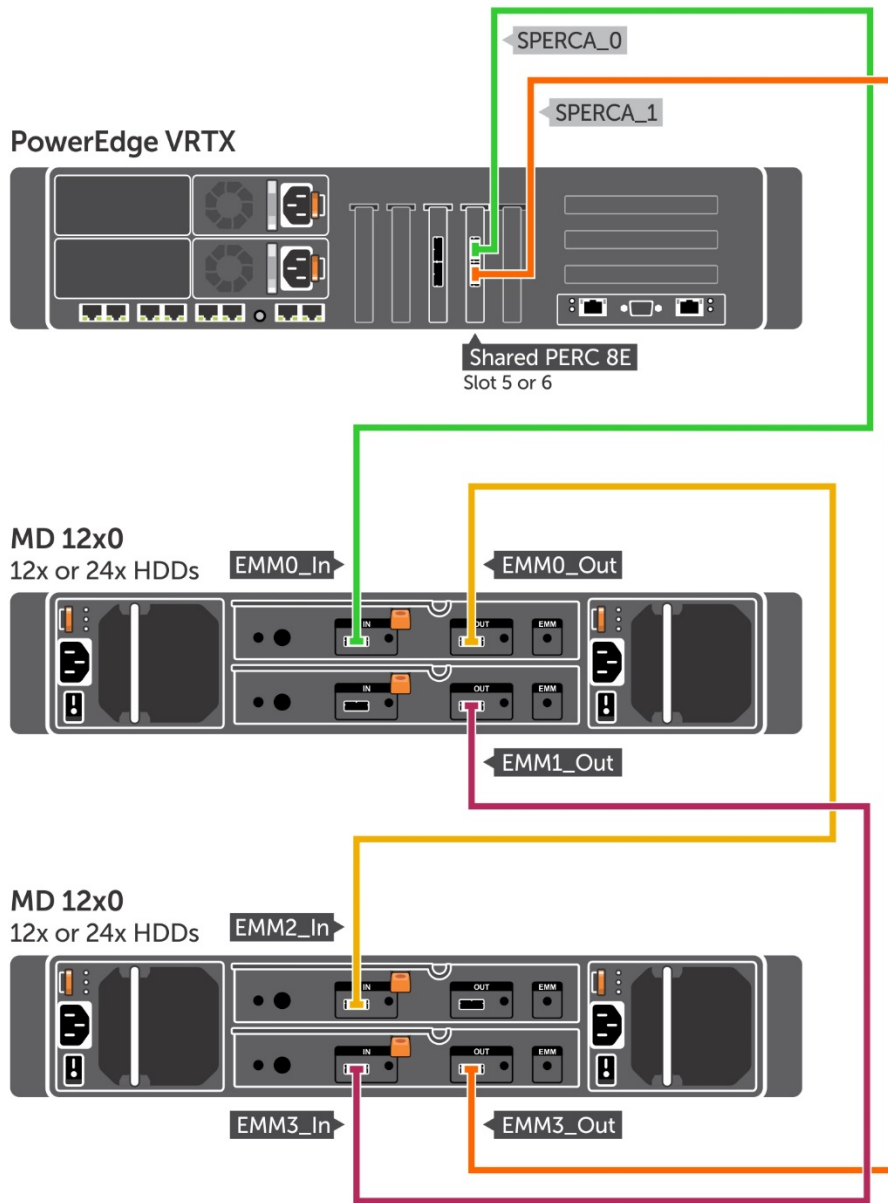b. Connecting Single Shared PERC 8 External card configuration (non-fault tolerant) to two enclosures.

Figure 5   Single Shared PERC 8 External card configuration (non-fault tolerant) to two enclosures

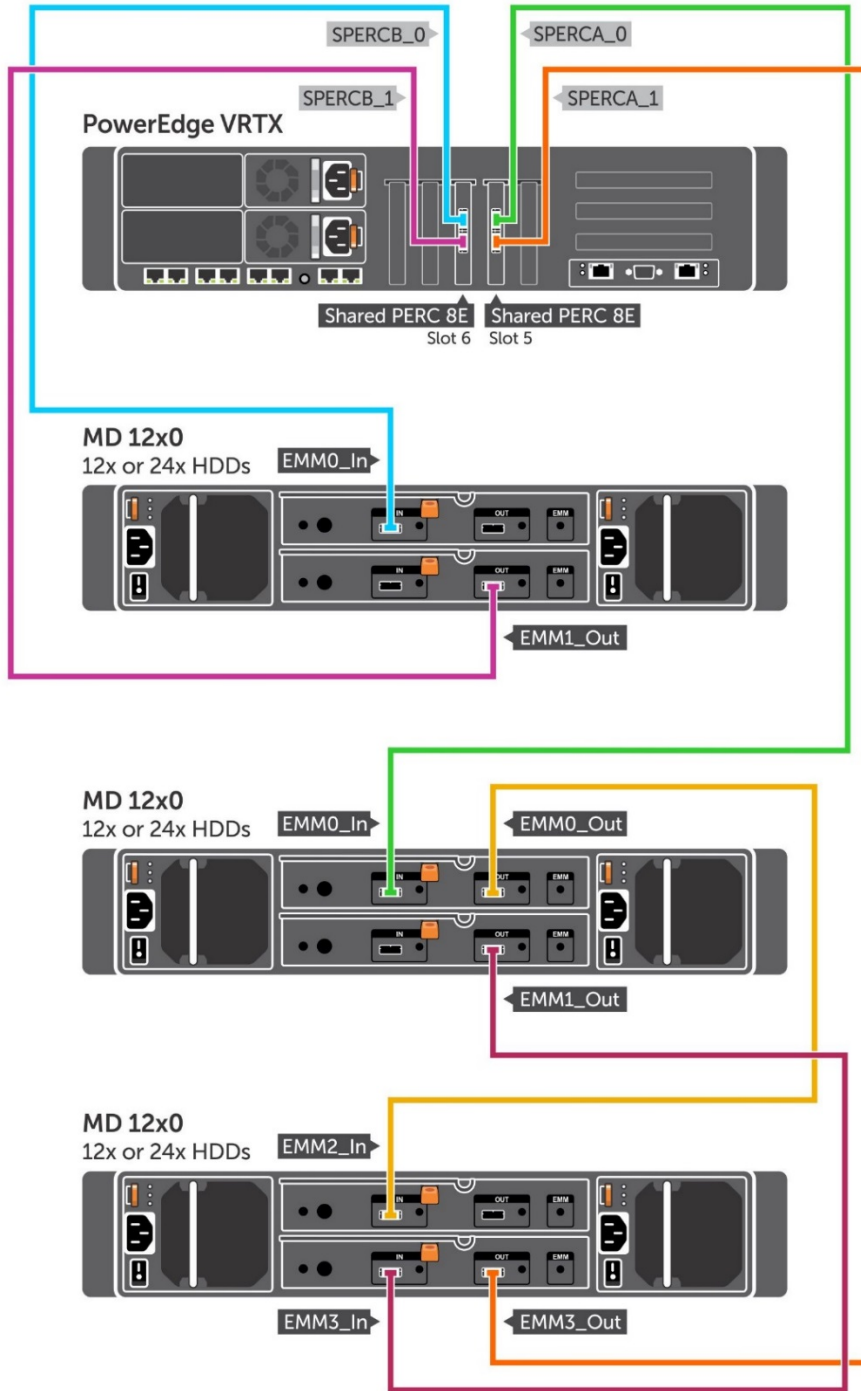c. Connecting non-fault tolerant dual Shared PERC External configuration to enclosures

Figure 6   Dual Shared PERC 8 External non-fault tolerance mode

Note: In dual Shared PERC 8 External non-fault tolerance mode, the two Shared PERC 8 External controllers are independent and cannot communicate with each other.

d. Connecting fault tolerant dual Shared PERC External card configuration to one enclosure.
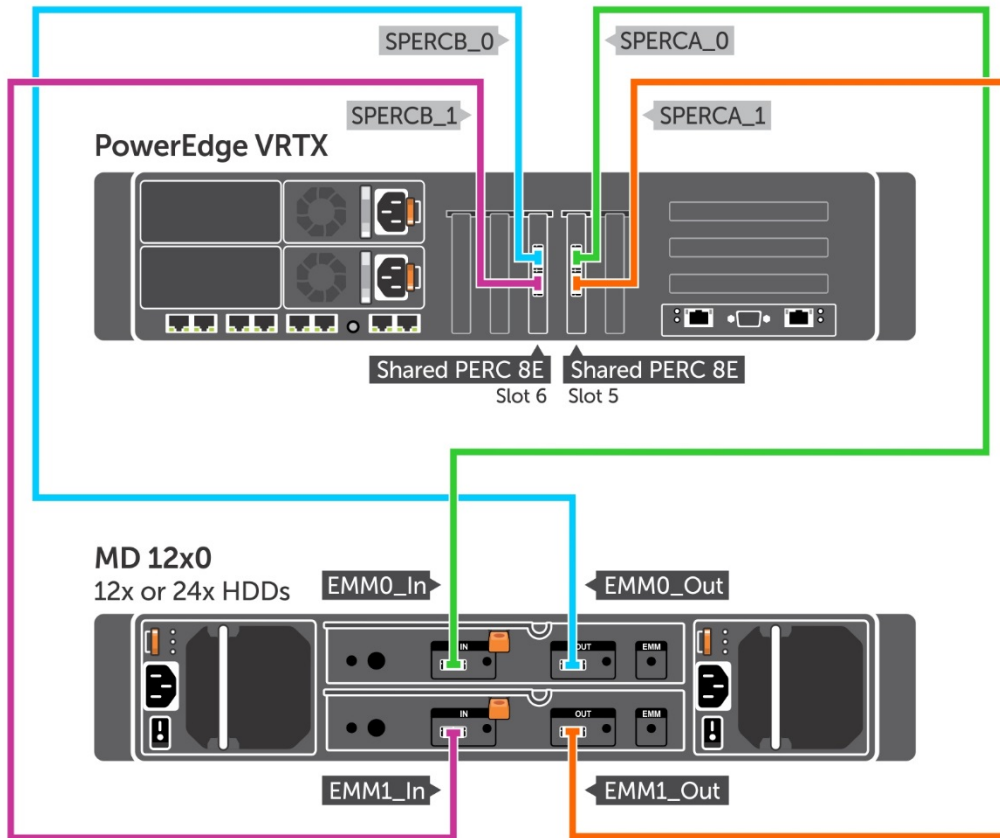

Figure 7   Fault tolerant dual Shared PERC External card configuration to one enclosure

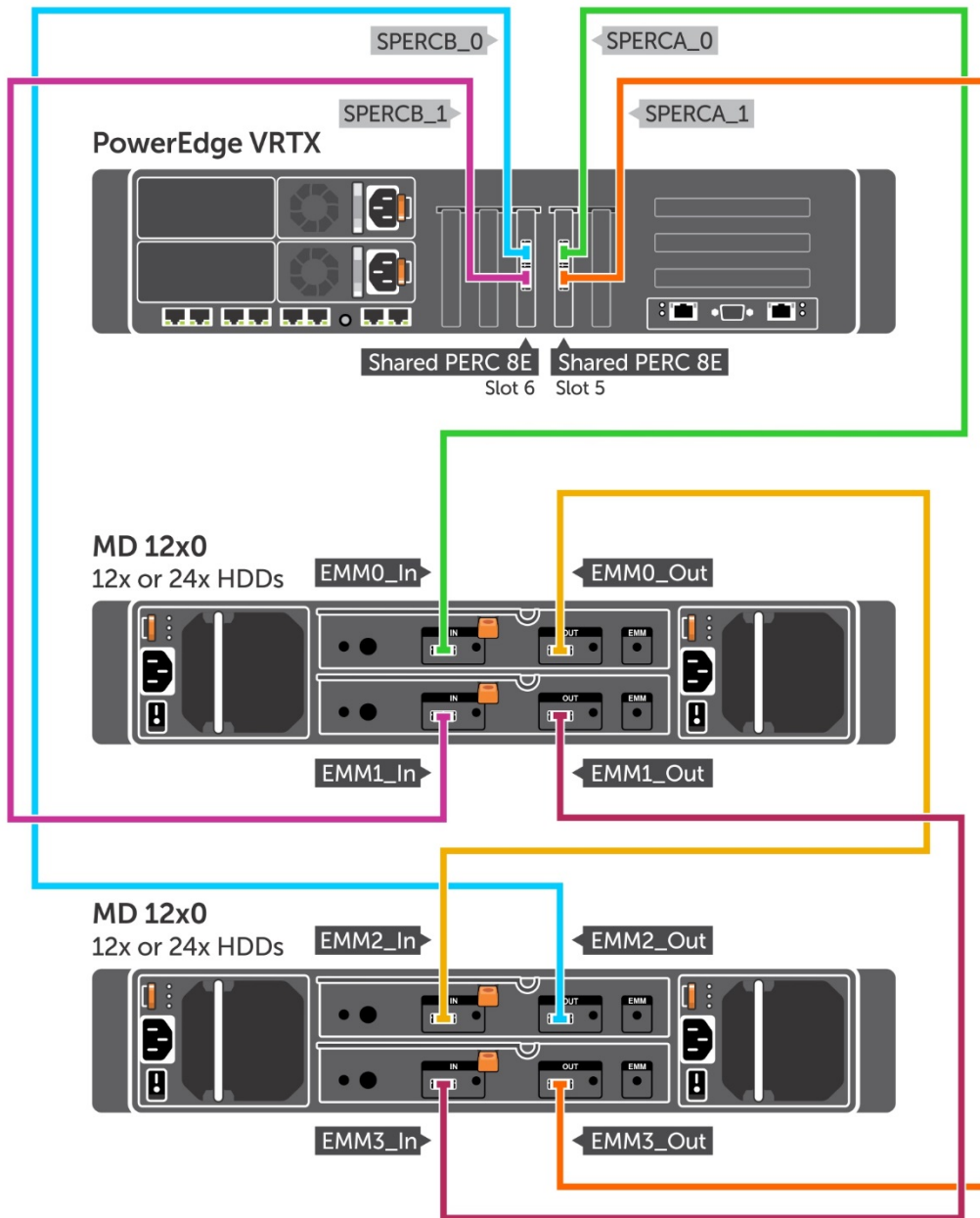e. Connecting fault tolerant dual Shared PERC External card configuration to two enclosures.

Figure 8   Fault tolerant dual Shared PERC External card configuration to two enclosures

17. Turn on the PowerVault MD1200 or MD1220 storage enclosures by performing the following steps:

    a.   Connect the PSUs to the power source.

Note: Before connecting the PSUs, ensure that the power switch on both PSUs is in the OFF position.

    b.   Turn on the power switches on all PSUs and cooling fan modules.
       Before tuning on PowerVault MD1200 and MD1220 storage enclosures, Dell recommends that you turn on the VRTX chassis. For additional information about setting up PowerVault MD1200 and MD1220 storage enclosures, see *Dell PowerVault MD1200 & MD1220 Hardware Owner's Manual* at **Dell.com/powervaultmanuals**.

18. Turn on the PowerEdge VRTX chassis by performing the following steps:

    a.   Reconnect the chassis PSUs to the electrical outlets.

Note: Note that CMC will automatically turn on.

    b.   Log in to the CMC GUI and turn on the chassis.

Note: Do not turn on the server blades.

19. Update the PowerVault MD1200 or MD1220 storage enclosures firmware to the required minimum baseline by performing the following steps:

Note: You can download the firmware updates for your storage enclosure using Dell Update Package available at **Dell.com/support/home**.

    a.   In the left pane, click **Chassis Overview** → **Storage** → **Update**.
    b.   On the **Storage Component Update** page, click **Choose File**.
       The **Choose to Upload file** dialog box is displayed.
    c.   Browse to the location where you downloaded the required DUP file.
    d.   Select the DUP file, and click **Open**.
       The DUP file name and path are displayed in the **Browse** field.
    e.   Click **Upload**.
       The DUP is uploaded to CMC. The **Storage Component Update** section displays only the components that are supported by the downloaded DUP file. The current version, latest available version and the **Update** check box are displayed for the components.
    f.   Select the appropriate **Update** check boxes for the required components.
    g.   Click **Update**.
       The firmware update action is initiated for the selected components. The progress is displayed in the Update column.
       After the action is complete, an appropriate message is displayed to indicate the completion or failure of the firmware update.

20. View Storage Capacity and Status of the storage components by performing the following steps:

a. Go to **Chassis Overview**.

The **Chassis Health** page is displayed.

b. The **Storage capacity details**, the **Fault Tolerant Mode (Active/Passive)**, and **Fault Tolerant Status (Enabled)** information is displayed on the right pane.

This fault-tolerance information is displayed only if the fault tolerant feature is enabled for the storage components.

c. The lower section of chassis graphics provides the left view of the chassis. Point to the storage component sub-graphic. The text hint provides additional information about the storage component.

d. Click the storage component sub graphic to view the related information in the right pane.
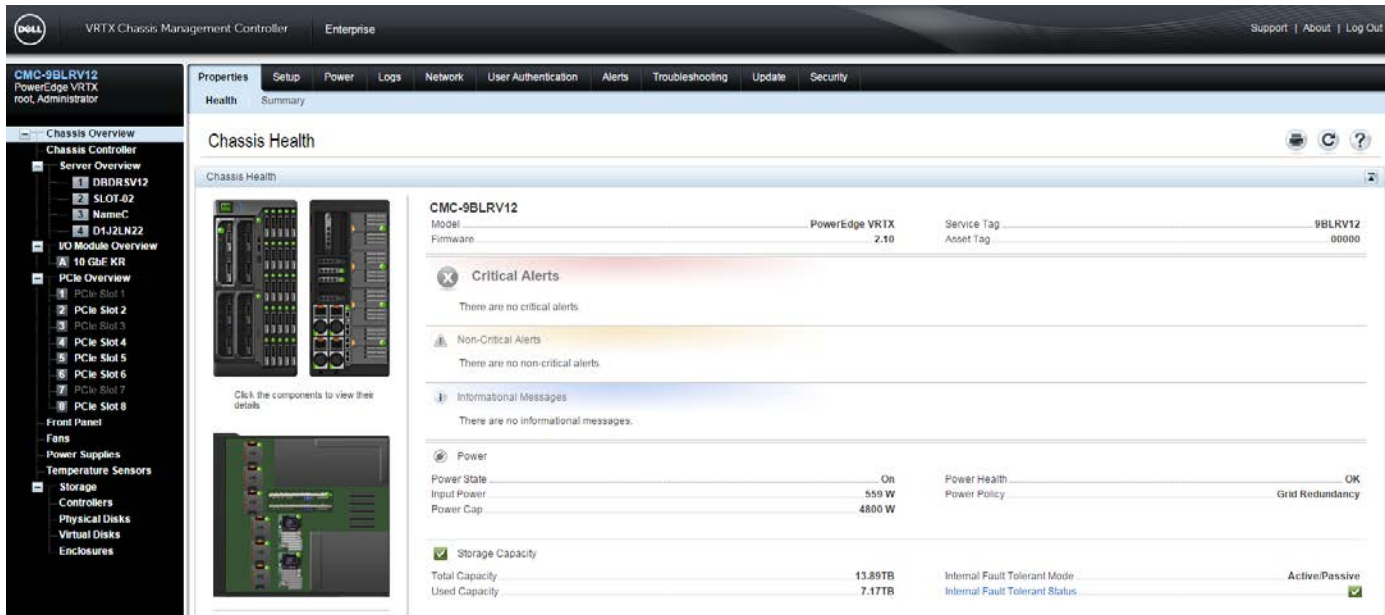
21. To view the Status of the storage components, perform the following steps:

In the left pane, click **Chassis Overview → Storage → Properties → Status**.

The Storage Overview page displays the following information:

- Graphic summary of the physical disk drives installed in the chassis and their status.
- Summary of all the storage components with links to their respective pages.
- Used capacity and total capacity of the storage.
- Controller information.

Note: In case of a fault-tolerant controller, the name format is: Shared <PERC number> (Integrated <number>).

For example, the active controller is Shared PERC 8 (Integrated 1) and the peer controller is Shared PERC 8 (Integrated 2).

- Recently logged storage events.

Note: For more information, see **Online Help**.

22. View the storage Topology by performing the following steps:

    a. In the left pane, click **Chassis Overview** → **Storage** → **Properties** → **Topology**.

    b. On the **Topology** page, click <**controller name**> to view the respective pages.

> **Note**: You can view the name of the controller that is active in controlling the storage devices associated with this CMC and also the passive controller acting as a stand-by.

    c. Under each installed controller, click the links **View Virtual Disks**, <**enclosure name**>, and **View Physical Disks** to open the respective pages.

23. View the attributes that indicate the correct functioning of fault-tolerant features of Shared PERC by performing the following steps:

    a. In the left pane, click **Chassis Overview** → **Storage** → **Troubleshooting** → **Setup Troubleshooting**.

        The **Storage Setup Troubleshooting** page is displayed.

        On the **Storage Setup Troubleshooting** page, you can:

    –   View the following attributes when the controller is in fault-tolerant mode:
        >   Two Shared PERCs detected
        >   Two expanders detected
        >   Shared PERCs and expanders correctly cabled

> Correct Firmware on Shared PERCs
> Correct Firmware on Expanders
> Correct Firmware on Chassis Infrastructure
> Shared PERCs have the same settings: Indicates whether or not Shared PERCs have the same settings
- View the following attributes when the Internal controller is not in fault-tolerant mode:
> One Shared PERC detected
> One expander detected
> Shared PERC and expanders correctly cabled
- View the following attributes when the External controller is in fault tolerant mode:
> Two Shared PERCs detected
> Shared PERCs are installed in different fabrics
> Shared PERCs and EMMs are connected correctly
> Correct firmware on Shared PERCs
> Shared PERCs have the same settings
- View the following attributes when the External controller is not in fault-tolerant mode:
> One Shared PERC detected
> Shared PERCs and EMMs are connected correctly

24. Map Virtual Adapters (VA) to server slots.

Using the Virtual Adapter (VA) feature, you can share the installed storage with the four servers. This is accomplished by mapping the VA to a server slot and then creating and assigning Virtual Disks (VDs) to VA.
Before assigning a VA to a server slot, ensure that:
- Servers are turned off or server slots are empty.
- VA must be unmapped from a server slot before it can be remapped to another server slot.

Default mapping is **VA1—Server Slot 1**, **VA2—Server Slot 2**, **VA3—Server Slot 3**, and **VA4—Server Slot 4**. You need an Enterprise License to modify the default mappings of VA to server slot.
You can map only one VA to one server slot at a time.
If full height server is inserted, then the upper slot has the VA mapped to it while the bottom slot is still unmapped. For example, a full height in slot one has VA1 assigned to slot one and VA3 is still unmapped.
To map or unmap a Virtual Adapter from a server slot, perform the following steps:

a. In the left pane, click **Chassis Overview** → **Storage** → **Setup** → **Virtualization**.
The **Storage Virtualization** page is displayed.
b. In the **Virtual Adapters Mapped** table, from the **Action** drop-down menu, select one of the following options, and then click **Apply**.

> **< Slot #>** — Select the slot to which the VA must be assigned.
> **Unmap** — Select to remove the VA assignment from a slot.

The VA is mapped or unmapped from the selected server slot based on the selected action.

25. Create, assign, and manage Virtual Disk (VD) by performing the following steps:

Disk storage within the PowerVault MD1200 and MD1220 storage enclosures can be configured and managed by CMC.

Note: Ensure that the physical disks are installed.

a. In the left pane, click **Chassis Overview** → **Storage** → **Virtual Disks** → **Create**.
b. On the **Create Virtual Disk** page, under the **Settings** section, type appropriate data, and from the **Select Physical Disks** section, select the appropriate Shared PERC 8 External card from the drop-down menu.
c. Select the number of physical disk drives on the basis of RAID level selected earlier, and then click **Create Virtual Disk**.
d. Click **Assign** to open **Assign Virtual Disks** page.
e. You can now assign VDs to **Server Slot**.
f. Click **Manage** to **open Manage Virtual Disks** page, you can modify properties, delete, rename or initialize the VDs.

26. View and manage PowerVault MD1200 or MD1220 storage enclosures by performing the following steps:

    Customers of PowerEdge VRTX can use CMC web interface or RACADM to view PowerVault MD1200 or MD1220 storage enclosures components, attributes, and health status.

    a. Click **Chassis Overview** → **Storage** → **Enclosures** → **Properties**.
       The **Enclosure Properties** page provides the health status for all internal and external storage enclosures attached to Shared PERC 8 controllers. Click **on + icon** to view **Physical Disks**, **Advanced Properties** and the following components for specific enclosure:

       > Fans
       > Power Supplies
       > Temperature sensors
       > Enclosure firmware revision

    b. Click **Chassis Overview** → **Storage** → **Enclosures** → **Setup**.
       The **Enclosure Setup** page allows users to set Asset Tag, Asset Name, and Temperature Warning Thresholds for the enclosure.

27. Turn on the server blades.

    a. Before turning on the blade servers, Dell recommends that you set up all the components of internal and external shared storage, verify the firmware versions, and check the health status of the VRTX shared storage infrastructure.
    b. Boot the server blades to the desired OS.
    c. Verify that the OS can see all shared storage components that have been assigned to the server blade.
    d. Verify that the device drivers meet the minimum baseline requirements.

28. Configure multipath for the Fault Tolerant Dual Shared PERC 8 External card configuration.

    For more information about setting up multipath, see *Dell Shared PowerEdge RAID Controller 8 Cards for Dell PowerEdge VRTX Systems User's Guide* at **Dell.com/poweredgemanuals**.

4 Troubleshooting

4.1 Shared PERC 8 External cards fail to function

Issue:

Shared PERC 8 External cards fail to function in systems with the Fault Tolerant Shared PERC 8 external card configuration.

Corrective Action:

This issue may occur if the Shared PERC 8 external card property settings between the two Shared PERC 8 external cards are not compatible. Ensure that the firmware packages are identical for both the Shared PERC 8 external cards.

4.2 EMM failure message seen after EMM firmware update

Issue:

CMC displays error message immediately after an enclosure update that the EMM has failed.

Corrective Action:

After an EMM update, turn off and restart the VRTX chassis.

4.3 Incorrect number of virtual disks displayed in Windows Disk Manager

Issue:

The number of disks displayed in **Windows Disk Manager** is more than the actual number of virtual disks assigned to the server.

Corrective Action:

This issue occurs if the MPIO feature is not installed in systems with the Fault Tolerant Shared PERC 8 card configuration. Install MPIO services from the list of features that can be installed on the server. For instructions on how to install MPIO, see **Installing and Configuring MPIO** at **technet.microsoft.com**.

4.4 Multiple Disks Become Inaccessible

Issue:

Multiple disks become simultaneously inaccessible.

Corrective Action:

Multiple physical disk errors in a single array indicate a failure in cabling or connection and can involve loss of data. Perform the following steps to recover the virtual disk:

> **Caution**: Follow the safety precautions to prevent electrostatic discharge.

1. Turn off the system, check the cable connections, and reseat the physical disks.

2. Ensure that all the disks are present in the enclosure.
3. Turn on the system, and log in to **Chassis Management Controller**.
4. Use the CMC to import or clear the foreign configuration that is detected.

> **Note**: For information about importing or clearing foreign configuration, see the Dell Chassis Management Controller for Dell PowerEdge VRTX User's Guide at **Dell.com/poweredgemanuals**.

If the virtual disk is redundant and transitioned to **Degraded** state before going **Offline**, a rebuild operation starts automatically after the configuration is imported. If the virtual disk has gone directly to the **Offline** state due to a cable pull or power loss situation, the virtual disk is imported to its **Optimal** state without a rebuild.

4.5 Shared PERC 8 card boots into safe mode

In the event of some failure conditions encountered at boot, Shared PERC 8 boots with restricted capability in safe mode without user intervention. In such a condition, Shared PERC 8 reports all configured disk drives as Foreign to the management application. The Dell Chassis Management Controller (CMC) displays events generated by the Shared PERC 8 card indicating the reason for booting into safe mode.

The following table details the conditions and the corresponding event notifications that are reported to the CMC.

Category	Event Reported to the CMC	Failure Description	Corrective Action
Pinned Cache	`Controller cache pinned for missing or offline VDs: %s`	The Shared PERC 8 card preserves dirty cache for a virtual disk that was transitioned to offline or deleted due to missing physical disks.	You can restore the preserved cache to the virtual disk once the original drives are re-inserted and the foreign configuration is imported.
SAS Discovery	`Controller booted to safe mode due to critical errors Critical Error during boot – On-board expander FW or mfg image is corrupted – reflash image`	This issue occurs if expanders are not detected.	Reseat the expanders and connect the cables.
	`Critical Error during boot – NVDATA image is invalid – reflash NVDATA image`	The NVData image is invalid.	Contact Dell Technical Support. For more information, see Getting Help.
Controller is in safe mode event	`RAID Controller in Chassis Slot X has entered safe mode with limited functionality due to Controller booted to safe`	A controller will enter safe mode for the following reasons: 1. Incorrect cable configurations	To connect the cable correctly, see Cable PowerVault MD1200 or MD1220 storage enclosures.

	mode due to critical errors RAID Controller in Chassis Slot X has entered safe mode with limited functionality due to Critical Error during boot – All drives will be hidden	• Controllers with a Fault Tolerant cable configuration but both cards are not set to Fault Tolerant mode. • The controller is cabled incorrectly and discovery detects a loop or duplicate SAS address.	
		2. Pinned Cache	Allow cache to flush, this may include reinserting removed disks or replacing cables.
		3. Critical errors such as memory errors were found on the card	Contact Dell Technical Support. For more information, see Getting Help.

4.6 Troubleshooting a controller

To troubleshoot a controller, perform the following steps:

1. In the left pane, click **Chassis Overview** → **Storage** → **Controllers** → **Troubleshooting**.
2. On the **Controller Troubleshooting** page, from the **Actions** drop-down list for the respective controller, select any one of the following, and then click **Apply**.

- **Reset Configuration** — Deletes the virtual disks and hot spares. However, the data on the disks is not erased.
- **Export TTY Log** — The TTY debug log from the storage controller is exported to your local system.
- **Discard Pinned Cache** — Deletes data that is stored in RAID controller cache.

Note: If there is pinned cache, the option to clear it is present. If there is no pinned cache, this option is not displayed.

- **Disable RAID Controller** — Disables the peer controller. This option is available in the drop-down menu only for Integrated 2 PERC when it is not disabled.
- **Enable RAID Controller** — Enables the peer controller. If Integrated 2 PERC is already disabled, then the Enable Raid Controller option is available in the drop-down menu.

Note: For a disabled PERC, none of the other options such as Reset Configuration, Export TTY Log, Discard Pinned Cache, and Disable RAID Controller are available in the drop-down menu.

Note: Displays an error message if the blades are turned on.
The command fails if the blade is turned on.

4.7 Troubleshooting Enclosure Management Modules (EMM)

Caution: Dell recommends that you turn off the host server before turning off the enclosure to prevent loss of data.

1. If the EMM status LED is solid or blinking amber (two or four times per sequence), perform the following troubleshooting steps:

   a. Turn off the server.
   b. Remove the EMM and verify that the pins on backplane and EMM are not bent.
   For information about removing an EMM, see *Dell PowerVault MD1200 & MD1220 Hardware Owner's Manual* at **Dell.com/powervaultmanuals**.
   c. Reinstall the EMM and wait for 30 seconds.
   For information about installing an EMM, see *Dell PowerVault MD1200 & MD1220 Hardware Owner's Manual* at **Dell.com/powervaultmanuals**.
   d. Turn on the server.
   e. Check the EMM status LED.
   f. If the problem is not resolved, see Getting Help.

2. If EMM status LED is blinking amber (five times per sequence), update the firmware to the latest supported firmware on both the EMMs.

3. If the link status LEDs are not green, perform the following steps:

   a. Turn off the server.
   b. Reseat the cables on the storage enclosure and the server.
   c. Restart the storage enclosure and wait until enclosure is fully booted.
   d. Turn on the server.
   e. Check the link status LED. If the link status LED is not green, proceed to the next step.
   f. Replace the cables.
   g. If the problem is not resolved, see Getting Help.

4.8 Enclosure Connections Problem

1. Verify that the EMM port link status LED and the EMM status LED are solid green for each port that is connected to a cable.
   If the LEDs are not solid green, see Enclosure Management Module topic in *Dell PowerVault MD1200 & MD1220 Hardware Owner's Manual* at **Dell.com/powervaultmanuals**.
2. Ensure that all the cables are attached correctly according to the enclosure mode you selected.
   For more information about enclosure modes, see Operating Your Storage Enclosure topic in *Dell PowerVault MD1200 & MD1220 Hardware Owner's Manual* at **Dell.com/powervaultmanuals**.
3. If you reseated cables, restart the host server.

Note: You must turn off the host server before reseating the cables on the enclosure.

If the problem is not resolved, see Getting Help.

5 Getting Help

5.1 Contacting Dell

Dell provides several online and telephone-based support and service options. If you do not have an active internet connection, you can find contact information on your purchase invoice, packing slip, bill, or Dell product catalog. Availability varies by country and product, and some services may not be available in your area. To contact Dell for sales, technical assistance, or customer-service issues:

1. Go to **Dell.com/support**.
2. Select your country from the drop-down menu on the bottom right corner of the page.
3. For customized support:

   a. Enter your system Service Tag in the **Enter your Service Tag** field.
   b. Click **Submit**.
      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.

5.2 Locating your system Service Tag

Your system is identified by a unique Express Service Code and Service Tag number. The Express Service Code and Service Tag are found on the front of the system by pulling out the information tag. Alternatively, the information may be on a sticker on the chassis of the system. This information is used by Dell to route support calls to the appropriate personnel.

Note: The Quick Resource Locator (QRL) code on the information tag is unique to your system. Scan the QRL to get immediate access to your system information using your smart phone or tablet.

A   Additional resources

For more information about the PowerEdge VRTX system components, see the following documents on Dell Support site:

- Chassis Management Controller Version 2.1 for Dell PowerEdge VRTX User's Guide
- Dell Shared PowerEdge RAID Controller (PERC) 8 for VRTX User's Guide.
- Dell PowerEdge VRTX Getting Started Guide
- Dell PowerEdge VRTX Storage Subsystem Compatibility Matrix
- Dell PowerEdge VRTX Enclosure Owner's Manual
- Dell PowerVault MD1200 & MD1220 Technical Guidebook
- Dell PowerVault MD1200 & MD1220 Hardware Owners 'Manual