Dell PowerEdge RAID Controller (PERC) S130 User's Guide

Notes, cautions, and warnings

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

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.

Contents

Overview

The Dell PowerEdge RAID Controller (PERC) S130 is an economical RAID solution for the Dell PowerEdge systems. The S130 controller supports up to ten SATA HDDs or SATA SSDs depending on your system backplane configuration.

PERC S130 specifications

The following table provides PERC S130 specifications:

Table 1. Specifications for PERC S130

Specification	PERC S130
SATA SSD technology	Yes
I/O controller	Intel X99 chipset
	Intel C236 chipset
	NOTE: The Intel C236 chipset is supported only on PowerEdge R330, R230, T330, and T130 systems.
Communication with the system	Integrated
Communication with the end devices	SATA links
SAS connectors	No
SATA connectors	Discrete on the system board
Dell-compliant SATA compatibility	Yes
Dell-compliant SAS compatibility	No
Direct-connected end devices	Dell-compliant HDDs and SSDs
SMART error support through management applications	Yes
Backplane supported systems	Yes
Software-based RAID	Volume, RAID 1, RAID 0, RAID 5, RAID 10
Support for internal tape drive	Yes
Support for global hot spare	Yes
Support for 512 native and 512e drives	Yes
Support for 4Kn native drives	Yes

Specification	PERC S130
Maximum number of global hot spares	Varies with the number of free disks in the system.
Pass through SSD support	Yes

The following table provides PERC S130 virtual disk specifications:

Table 2. Virtual disk specifications for PERC S130

Specification	For PowerEdge R730, T630, R630, R530, T430, R430, C4130, M630, FC630, M830, FC830, and FC430	For PowerEdge R330, R230, T330, and T130
Maximum number of virtual disks	10	10
Minimum virtual disk size	102 MB	102 MB
Maximum virtual disk size	No maximum size; there may be operating system size limitations.	No maximum size; there may be operating system size limitations.
Maximum number of physical disks per virtual disk	10	6
Maximum number of virtual disks per physical disk	10	10
4Kn disk support	Yes	Yes
Linux RAID support	Yes	Yes
Maximum number of physical disks that can be concatenated	N/A	N/A
Maximum number of physical disks in a Volume	1	1
Maximum number of physical disks in a RAID 0	10	6
Maximum number of physical disks in a RAID 1	2	2
Maximum number of physical disks in a RAID 5	10	6
Maximum number of physical disks in a RAID 10	10	6
Minimum number of physical disks that can be concatenated	N/A	N/A
Minimum number of physical disks in a Volume	1	1
Minimum number of physical disks in a RAID 0	2	2

Specification	For PowerEdge R730, T630, R630, R530, T430, R430, C4130, M630, FC630, M830, FC830, and FC430	For PowerEdge R330, R230, T330, and T130
Minimum number of physical disks in a RAID 1	2	2
Minimum number of physical disks in a RAID 5	3	3
Minimum number of physical disks in a RAID 10	4	4

NOTE: The configurations listed in the table above may vary with the hard-drive backplane of the system that you have.

Supported operating systems

The S130 controller supports the following operating systems:

- Microsoft Windows Server 2012
- Microsoft Windows Server 2012 R2
- Microsoft Windows Server 2008 R2 SP1 (64-bit)

   NOTE: While you install the Windows Server 2012 operating system, ensure that you install the hot fix update available at **support.microsoft.com/kb/2789962**.

- RHEL 7.2
- SLES 11 SP4
- SLES 12 SP1

   NOTE: The S130 controller supports only RHEL 7.2, SLES 11 SP4, and SLES 12 SP1. The Linux installer fails to detect the virtual disks if the RHEL 7.1 or earlier, SLES 11 SP3 or earlier, and SLES 12 SP2 or later are installed.

   NOTE: For the latest list of supported operating systems and driver installation instructions, see the system documentation at **dell.com/operatingsystemmanuals**. For specific operating system service pack requirements, see the Drivers and Downloads section at **dell.com/support/manuals**.

Supported PowerEdge systems

The following PowerEdge systems support S130 controller:

- Dell PowerEdge R730
- Dell PowerEdge T630
- Dell PowerEdge R630
- Dell PowerEdge R530
- Dell PowerEdge T430
- Dell PowerEdge R430
- Dell PowerEdge C4130
- Dell PowerEdge M630 (for M1000e enclosure)
- Dell PowerEdge M630 (for VRTX enclosure)
- Dell PowerEdge FC630

- Dell PowerEdge M830 (for M1000e enclosure)
- Dell PowerEdge M830 (for VRTX enclosure)
- Dell PowerEdge FC830
- Dell PowerEdge FC430
- Dell PowerEdge R330
- Dell PowerEdge R230
- Dell PowerEdge T330
- Dell PowerEdge T130

Supported physical disks

The PERC S130 controller supports the following physical disk types:

- SATA Hard Disk Drive (HDD)
- SATA Solid State Drive (SSD)

    NOTE: Mixing drives of different speeds (7,200 rpm, 10,000 rpm, or 15,000 rpm) and bandwidth (3 Gbps or 6 Gbps) while maintaining the same drive type (SATA) and technology (HDD or SSD), is supported.

Management applications for the PERC S130

The management applications enable you to manage and configure the RAID system, create and manage multiple disk groups, control and monitor multiple RAID systems, and provide online maintenance. The management applications for PERC S130 include:

- BIOS Configuration Utility — This is also known as <Ctrl><R>, is a storage management application that configures and maintains RAID disk groups and virtual disks. See BIOS Configuration Utility.
- Unified Extensible Firmware Interface (UEFI) RAID Configuration Utility— This storage management application integrated into the System BIOS (F2). See UEFI RAID configuration utility.
- Dell OpenManage Storage Management—This application enables you to perform controller and enclosure functions for all the supported the RAID controllers and enclosures from a single graphical or command-line interface, without using the controller BIOS utilities. For more information, see the *Dell OpenManage Storage Management User's Guide* at **dell.com/openmanagemanuals**.
- Lifecycle Controller—This is another management application for PERC. For more information, see Lifecycle controller User's Guide at **dell.com/esmmanuals**.

Physical Disks

📝 **NOTE:** PERC S130 supports HDD physical disks with a capacity of 2 TB or more.

📝 **NOTE:** The physical disks in a virtual disk must be of the same drive type (HDD or SSD). For example, you cannot mix a HDD and a SSD in the same virtual disk.

📝 **NOTE:** Mixing 512–byte native and 512–byte emulated drives in a virtual disk is allowed, but mixing 512–byte and 4 KB native drives in a virtual disk is not allowed.

Physical disk features

Physical disk roaming

Physical disk roaming is moving the physical disks from one cable connection or backplane slot to another on the same controller. The controller automatically recognizes the relocated physical disks and logically places them in the virtual disks, which are part of the disk group. You can perform disk roaming only when the system is turned off.

⚠ **CAUTION: Do not attempt disk roaming during RAID level migration (RLM) or online capacity expansion (OCE). This causes loss of the virtual disk.**

Physical disk hot-swapping

📝 **NOTE:** To check if the backplane supports hot swapping, see the Owner's Manual of your system.

Hot swapping is the manual replacement of a disk while the PERC S130 is online and performing its normal functions. The following requirements must be met before hot swapping a physical disk:

- The system backplane or enclosure must support hot swapping for the PERC S130.
- The replacement disk must be of the same protocol and disk technology. For example, only a SATA hard drive can replace a SATA hard drive and only a SATA SSD can replace a SATA SSD.

📝 **NOTE:** When hot-swapping a physical disk, ensure that the new disk is of equal or greater capacity to the physical disk that is being replaced.

Physical disk power management

Power management is a power-saving feature of the PERC S130. This feature supports power management of SATA hard drives (HDD) by using Extended Power Conditions (EPC). The EPC feature set provides the host with additional methods to control the power condition of a device.

Physical disk failure detection

Physical disk failure is detected and controller automatically rebuilds a new physical disk assigned as a hot spare.

Mirror rebuilding

A RAID mirror configuration can be rebuilt after a new physical disk is inserted and the physical disk is designated as a hot spare.

> **NOTE:** The system does not have to be rebooted.

Fault tolerance

The following fault tolerance features are available with the PERC S130:
- Physical disk failure detection (automatic).
- Virtual disk rebuild using hot spares (automatic, if the hot spare is configured for this feature).
- Parity generation and checking (RAID 5 only).
- Hot-swap manual replacement of a physical disk without rebooting the system (only for systems with a backplane that allows hot-swapping).

If one side of a RAID 1 (mirror) fails, data can be rebuilt by using the physical disk on the other side of the mirror.

If a physical disk in RAID 5 fails, parity data exists on the remaining physical disks, which can be used to restore the data to a new, replacement physical disk configured as a hot spare.

If a physical disk fails in RAID 10, the virtual disk remains functional and data is read from the surviving mirrored physical disk(s). A single disk failure in each mirrored set can be sustained, depending on how the mirrored set fails.

Self-Monitoring And Reporting Technology

The Self-Monitoring and Reporting Technology (SMART) feature monitors certain physical aspects of all motors, heads, and physical disk electronics to help detect predictable physical disk failures. Data on SMART compliant physical disks can be monitored to identify changes in values and determine whether the values are within threshold limits. Many mechanical and electrical failures display some degradation in performance before failure.

A SMART failure is also referred to as predicted as failure. There are numerous factors that are predicted physical disk failures, such as a bearing failure, a broken read/write head, and changes in spin-up rate. In addition, there are factors related to read/write surface failure, such as seek error rate and excessive bad sectors.

> **NOTE:** For detailed information on SCSI interface specifications, see **t10.org** and for detailed information on SATA interface specifications, see **t13.org**.

Native command queuing

Native Command Queuing (NCQ) is a command protocol used by SATA physical disks, which are supported on the S130 controller. NCQ allows the host to provide multiple input/output requests to a

disk simultaneously. The disk decides the order to process the commands to achieve maximum performance.

4Kn drives support

S130 supports 4Kn sector size, which enables disks of 4096 bytes as sector size. This is in addition to support of 512 byte sector size.

NOTE: Ensure that you use only the S130 UEFI configuration utility to configure 4Kn sector drives during pre-boot.

NOTE: Mixing 512−byte native and 512−byte emulated drives in a virtual disk is allowed, but mixing 512−byte and 4 KB native drives in a virtual disk is not allowed.

Physical disk write cache policy

Physical disk write cache policy feature enables the disk to cache the data first, and then the cached data is written to the storage device in the background. For more information about managing the physical disk write cache policy, see Managing the physical disk write cache policy.

NOTE: You can use UEFI or Option ROM (OPROM) to configure the physical disk write cache policy.

NOTE: You cannot configure physical disk write cache policy on a non-RAID disk.

NOTE: You cannot use Linux RAID to configure physical disk or virtual disk write cache policy.

Linux RAID

The Linux RAID feature is supported on all the Dell PowerEdge 13th generation systems. You can use Linux RAID to protect data across multiple devices. For more information about configuring Linux RAID, see Configuring Linux RAID.

NOTE: Ensure that you use only the S130 UEFI configuration utility to configure Linux RAID feature during pre-boot.

NOTE: You must ensure that the boot virtual disks are configured in RAID 1, using two physical disks of identical drive type (HDD and SSD) and sector size. However, you can also configure non-boot virtual disks in any of the supported RAID levels in the Linux operating system.

NOTE: If you are configuring Linux RAID for RHEL 7.2 on the PowerEdge R330, R230, T330, and T130 systems, ensure that you download the latest Driver Update Disk (DUD) available at **https://access.redhat.com/downloads/content/69/ver=/rhel---7/7.2/x86_64/product-software**.

NOTE: If you are configuring Linux RAID for SLES 11 SP4 or SLES 12 SP1 on the PowerEdge R330, R230, T330, and T130 systems, ensure that you download the latest Driver Update Disk (DUD) available at **https://drivers.suse.com/dell/Dell_PowerEdge_13G/sle-11-sp4-x86_64/1.0/install-readme.html**.

Virtual Disks

A logical grouping of physical disks attached to a PERC S130 allows creating multiple virtual disks of the same RAID levels, without exceeding a maximum of ten virtual disks.

The PERC S130 controller allows:

- Creating virtual disks of different RAID levels on a S130 controller.

  NOTE: Ensure that you do not mix RAID levels on the same physical disks.

- Building different virtual disks with different characteristics for different applications.

The PERC S130 controller does not allow:

- Creating a virtual disk from a mix of different type physical disks. For example, a RAID 10 virtual disk cannot be created from two SATA HDD physical disks and a SATA SSD physical disk. All of the physical disks must be of the same drive type (HDD or SSD).
- Selecting a physical disk as a dedicated hot spare if the physical disk is a different type from the physical disk of the virtual disks.

A virtual disk refers to data storage, which a controller creates using one or more physical disks.

NOTE: A virtual disk can be created from several physical disks, the operating system considers it a single disk.

The capacity of a virtual disk can be expanded online for any RAID level without rebooting the operating system.

Virtual disk features

TRIM for SSDs

TRIM allows an operating system to delete a block of data that is no longer considered in use, from the SSDs. The TRIM command resolves the Write Amplification issue for operating systems that have been supported. When an operating system deletes a file, the file is marked for deletion in the file system, but the contents on the disk are not actually erased. As a result, the SSDs do not know that the LBA (Logical Block Addressing) file previously occupied that can be erased. With the introduction of TRIM, when a file is deleted, the operating system sends a TRIM command along with the LBAs that do not contain valid data.

NOTE: TRIM feature is supported only on the pass-through SSDs.

To perform TRIM on the pass-through SSDs

1. Create a volume on a pass-through SSD drive.
2. In Windows operating system, navigate to the **Defragmentation and Optimize Drive** tool.
3. Select the volume created on the pass-through SSD and click the **Optimize** button.
   The volume is trimmed.

Disk initialization

For physical disks, initialization writes metadata to the physical disk so that the controller can use the physical disk.

Background Array Scan

Verifies and rectifies correctable media errors on mirror, volume, or parity data for virtual disks. Background Array Scan (BAS) starts automatically after a virtual disk is created while in the operating system.

Checkpointing

Allows different types of checkpointing (BGI, CC, and rebuild) to resume at the last point following a restart. After the system restarts, background checkpointing resumes at its most recent checkpoint.

The following are the three checkpoint features:
- Consistency Check (CC)
- Back Ground Initialization (BGI)
- Rebuild

Consistency Check

Consistency check (CC) is a background operation that verifies and corrects the mirror or parity data for fault-tolerant physical disks. It is recommended that you periodically run a consistency check on the physical disks.

By default, CC corrects mirror or parity inconsistencies. After the data is corrected, the data on the primary physical disk in a mirror set is assumed to be the correct data and is written to the secondary physical disk, mirror set.

CC reports data inconsistencies through an event notification. A CC cannot be user-initiated in the **BIOS Configuration Utility (<Ctrl><R>)**. However, CC can be initiated using Dell OpenManage Server Administrator Storage Management. For more infromation about Dell OMSA user's guide at **dell.com/openmanagemanuals**.

Background Initialization

BGI of a redundant virtual disk creates the parity data that allows the virtual disk to maintain its redundant data and survive a physical disk failure. Similar to consistency check (CC), BGI helps the controller to identify and correct problems that might occur with the redundant data at a later time.

⚠ CAUTION: Data is lost if a physical disk fails before the completion of a BGI.

BGI allows a redundant virtual disk to be used immediately.

NOTE: Although a BGI is software-initiated at the **BIOS Configuration Utility** (<Ctrl><R>), the PERC S130 drivers must be loaded before the BGI runs.

Automatic virtual disk rebuild

Rebuilds a redundant virtual disk automatically when a failure is detected, if a hot spare is assigned for this capability.

Virtual disk cache policies

The PERC S130 uses part of system memory for cache. It supports the following cache options:

- Read Ahead/Write Back
- No Read Ahead/Write Back
- Read Ahead/Write Through
- No Read Ahead/Write Through

Table 3. Read, Write, and Cache Policy for the PERC S130

Category	Supported by S130 controller
Cache Settings	Yes
Read Ahead/Write Back	Yes
No Read Ahead/Write Back	Yes
Read Ahead/Write Through	Yes
No Read Ahead/Write Through	Yes

NOTE: The current default for Write-Cache mode enablement is **Write Through**, **No Read Ahead** (WT, NRA). To enable **Write Back** (WB), a UPS is recommended.

NOTE: For more information about the physical disk write cache policy behavior, see the Troubleshooting your system section.

Virtual disk migration

The PERC S130 supports automatic virtual disk migration from one PERC S130 to another.

⚠ **CAUTION: The virtual disk is lost if you perform a virtual disk migration during an Online Capacity Expansion (OCE)/Reconfigure.**

NOTE: Backup the virtual disk data before migrating virtual disks.

NOTE: Ensure that all physical disks that are part of the virtual disk, are migrated. Virtual disks in optimal and degraded state are automatically migrated. A virtual disk in an offline state should not be migrated.

NOTE: A bootable virtual disk cannot be migrated between dissimilar system models.

NOTE: When you migrate virtual disks, ensure that you verify the number of virtual disks do not exceed 10.

Migrating a virtual disk

1. Turn-off the system that contains the source controller.
2. Turn-off the target system if the system does not support hot-insert of physical disks.
3. Move the appropriate physical disks from the source controller to the target controller in the target system.

   Physical disks do not have to be inserted into the same slots in the target system.
4. If the target system was turned-off, turn-on the system.

   △ CAUTION: The BIOS Configuration Utility (<CTRL><R>) pauses, and prompts for action, for the degraded virtual disk(s), if the "pause if degraded" option is enabled in the BIOS Configuration Utility (<CTRL><R>).

   △ CAUTION: After the migration occurs, ensure that all of the physical disks have been migrated and are present in the appropriate virtual disks.

Expanding virtual disk capacity

The capacity of a virtual disk can be expanded online by using the Online Capacity Expansion/ Reconfigure (OCE/Reconfigure). OCE/Reconfigure is a process that allows you to add storage capacity to an existing virtual disk. In most cases additional storage capacity can be added without taking the system offline.

   ✎ NOTE: If an additional physical disk needs to be added and the system does not support hot-swapping, the system must be turned off.

OCE/Reconfigure enables you to increase the total storage capacity of a virtual disk by integrating unused storage with the virtual disk.

Data can be accessed while the physical disks are added (if a system has hotswap capability) and while data on the virtual disk is being redistributed.

For Volume, RAID 1, and RAID 10, OCE/Reconfigure expands the virtual disk by using the available space of the physical disks, which have been members of the virtual disk. For RAID 0 and RAID 5, additional capacity can be attained by adding physical disks to the virtual disk.

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Cabling the drives for S130

⚠ 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: For information on removing and reinstalling system parts, see the PowerEdge Systems Owner's Manuals at **dell.com/poweredgemanuals**.

This section provides details about the cabling information for the integrated PERC S130 controller.

📝 NOTE: For information about cabling the drives for S130, see the hardware owner's manual of specific system available at **dell.com/poweredgemanuals**.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet and peripherals.

   📝 NOTE: It is recommended that you always use a static mat and static strap while working on components in the interior of the system.

2. Remove the system cover.
3. Locate the connectors J_SATA A and J_SATA B on the system board.
4. Connect the J_SATA A and J_SATA B connectors on the AHCI devices to the corresponding cable connectors on the backplane using the SATA cables.

   📝 NOTE: The first AHCI device provides connectivity to the drives available on port 0−3 and the second AHCI device provides connectivity to the drives available on port 4−7. For information about disk connectivity for AHCI devices, see Disk connectivity for AHCI devices.

5. Install the system cover.
6. Turn on the system.

   📝 NOTE: Ensure that you create boot LUN only on the hard-drives populated on port 0−3.
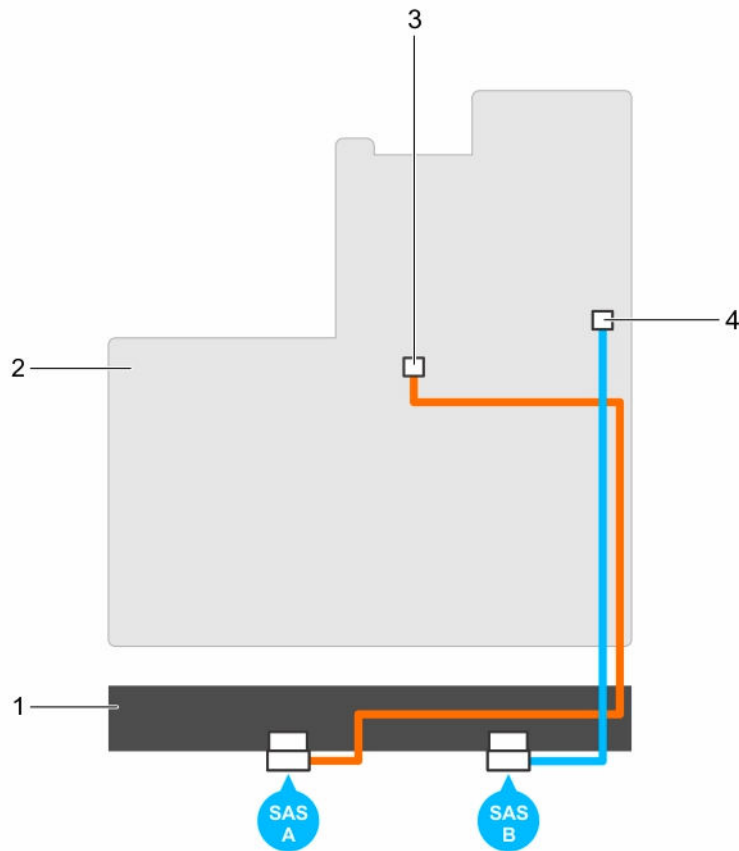
Figure 1. Cabling the S130 controller

1. backplane
2. system board
3. connector on the first AHCI device (J_SATA A)
4. connector on the second AHCI device (J_SATA B)

Disk connectivity for AHCI devices

The S130 controller supports systems with up to two AHCI devices. For systems with two AHCI devices, the first AHCI device connects the drives from ports 0−3 and the second AHCI device connects the drives from ports 4−7. For systems with one AHCI device, all the hard drives are connected to the single AHCI device.

> NOTE: For PowerEdge R330, R230, T330, and T130 systems, the S130 controller supports only one AHCI device, which provides connectivity to all the hard drives in the system.

The following table provides information about the disks connectivity to the AHCI devices supported on the thirteenth generation PowerEdge systems.

Table 4. Disk connectivity for AHCI devices

Chipset	Platform	AHCI device 1	AHCI device 2	Boot LUN Restriction
Intel X79	PowerEdge R730, T630, R630, R530, T430, R430, C4130, M630, FC630, M830, FC830, and FC430 systems	0–3	4–7	Yes
Intel C236	PowerEdge R330, R230, T330, and T130 systems	all the drive slots	N/A	N/A

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BIOS Configuration Utility

The **BIOS Configuration Utility**, also known as **(<Ctrl><R>)**, is a storage management application integrated into the System BIOS <F2>, which configures and maintains RAID disk groups and virtual disks. The **BIOS Configuration Utility (<Ctrl><R>)** is independent of the operating system.

NOTE: Use the **BIOS Configuration Utility (<Ctrl><R>)** for initial setup and disaster recovery. You can use advanced features through Dell OpenManage storage management applications.

The following sections provide information about using the **BIOS Configuration Utility (<Ctrl><R>)**. For more information, see the online help option by pressing <F1> in the **BIOS Configuration Utility (<Ctrl><R>)**.

The table below indicates the tasks that are supported or not supported by the PERC S130 at the **BIOS Configuration Utility (<Ctrl><R>)**.

Table 5. BIOS Configuration Utility (<Ctrl><R>) Tasks

PERC S130 Tasks	Supported by S130
Enable alarm	No
Disable alarm	No
Quiet alarm	No
Test alarm	No
Set check consistency rate	No
Rescan controller	Yes
Create virtual disk	Yes

Entering the BIOS Configuration Utility

1. Turn on the system.
2. While the system starts up, press <Ctrl><R> to boot to the BIOS configuration utility.

   CAUTION: If SATA Controller is not set to RAID Mode, data might be destroyed. Ensure that you backup all data before changing modes.

   NOTE: If the **BIOS Configuration Utility <Ctrl><R>** does not appear and your system uses a PERC S130, press <F2> to access the Dell system BIOS. In the **SATA Settings** field, ensure that SATA Controller is set to RAID Mode. If the settings are correct and the **BIOS Configuration Utility <Ctrl><R>** does not appear contact Dell support at **dell.com/support**.

NOTE: The PERC S130 adapter supports Dell-supported SATA-based tape devices. With the S130 controller, system can boot to a tape device using an internal Dell RD1000 tape device. Once configured to boot to a tape device, press <Esc> or click **Back** in any browser screen until you return to the **System Setup Main Menu** and exit normally to continue to boot to a tape device. The RD1000 option goes to the end of the boot order listing, if <Ctrl><Alt><Del> is selected and you would not be able to boot to RD1000.

Exiting the BIOS Configuration Utility

1. Press <Esc> in any menu screen.

   A dialog box is displayed to confirm your choice.
2. Select <C> to exit or press <Esc> to cancel.

Initializing the physical disks

New physical disks must be converted to RAID capable disks before they can be used. When you convert a disk to a RAID capable one, the controller configuration information is written to the physical disk. Physical disks with the following statuses can be initialized:

- **Non-RAID** — A physical disk that was configured by a non-PERC S130.
- **Ready** — Contains no stored data but has PERC S130 configuration information.

NOTE: Physical disks that are online cannot be converted to Non-RAID or RAID Capable disks.

1. Enter the BIOS configuration utilty. See [Entering the BIOS Configuration Utility](#).
2. In the **Main Menu** field use the arrow keys to select the **Initialize Physical Disk(s)** option.
3. Press <Enter>.

   The **Initializing the physical disk(s)** screen is displayed.

Converting to RAID disks

1. Enter the configuration utility. See [Entering the BIOS Configuration Utility](#).
2. Use the arrow keys to select **Initializing the physical disks** menu and press <Enter>.
3. Select **Convert to RAID disk** and press <Enter>.
4. Press <C> to continue.
5. In the **Physical Disks** menu, use the arrow keys to move between the physical disks and press <Insert> to select the desired physical disk.
6. Press <Enter>.

   The selected physical disk is converted to RAID capable disks.

Converting to Non-RAID disks

1. Enter the configuration utility. See [Entering the BIOS Configuration Utility](#).
2. Use the arrow keys to select **Initializing the physical disks** menu and press <Enter>.
3. Select **Convert to Non-RAID disk** and press <Enter>.

> ✎ **NOTE:** Create a boot virtual disk only from disk drives populated across slots 0-3 of the system. For information about the disk connectivity for AHCI devices, see Disk connectivity for AHCI devices, and for disks slot information, see the system specific Owner's Manual at **dell.com/ poweredgemanuals**.

4. Press <C> to continue.
5. In the **Physical Disks** menu, use the arrow keys to move between the physical disks and press <Insert> to select the desired physical disk.
6. Press <Enter>.

   The selected physical disk is converted to Non-RAID disks.

Creating the virtual disks

1. Enter the **BIOS Configuration Utility**. See Entering the BIOS Configuration Utility.
2. Select **Create Virtual Disks** from the **Main Menu** screen and press <Enter>.

   > ✎ **NOTE:** Create boot virtual disk only from disk drives populated across slots 0-3 of the system. For information about the disk connectivity for AHCI devices, see Disk connectivity for AHCI devices.

   > ✎ **NOTE:** The S130 controller supports maximum of 10 virtual disks per physical disk. You cannot modify any feature settings in UEFI or OPROM, if the number of virtual disks exceed the maximum limit of 10. For more information about troubleshooting this issue, see Unable to modify any feature settings in UEFI or OPROM.

3. In the **Physical Disks** field, select the physical disk(s) on which you want to create a virtual disk:
   a. To select a physical disk, press <Insert>.
   b. After selecting the physical disk(s) to be included in the virtual disk, press <Enter>.
4. In the **User Input** field, use the arrow keys to select a virtual disk type (RAID level) and press <Enter>.
5. Select a size for the virtual disk, depending on the available free space of the physical disks and press <Enter>.
6. In the **User Input** field, select a **Caching Mode**. Press <Enter>.
7. Press the <C> key to confirm that you want to create the virtual disk.

Selecting virtual disk sizes while creating a virtual disk

To create a virtual disk size of < 2.199 TB:

1. Use the <Page Up> or <Page Down> keys to select a size displayed incrementally or use the up arrow or down arrow keys to select a size displayed decrementally.
2. Continue with Creating the virtual disks.

To create a virtual disk size of > 2.199 TB:

1. Press the <Page Up> or the up arrow key to increase the virtual disk size.

2. At the maximum size, a dialog box is displayed in the **User Input** field. It inquires if you want to limit the size of the virtual disk or exceed the normal maximum size.

3. Press <Esc> to create a larger virtual disk.

4. Press the <Page Up> or the up arrow key, until the desired or maximum available size has been attained.

5. Continue with Creating the virtual disks.

Deleting the virtual disks

1. Enter the **BIOS Configuration Utility**. See <u>Entering the BIOS Configuration Utility</u>.
2. In the **Main Menu** screen, select **Deleting Virtual Disk** using the arrow keys and press <Enter>.
3. Select each virtual disk in the **Virtual Disks** field that you want to delete. Press <Insert> to confirm each selection.
4. Press <Enter>.

   > ⚠ CAUTION: A dialog box is displayed, describing the consequences of deleting the selected virtual disk(s). Deleting a virtual disk permanently destroys all data that is on the virtual disk, as well as the virtual disk itself. This action cannot be undone.

5. Press <C> to confirm the deletion.

   > 📝 NOTE: When a degraded or a failed virtual disk from one system is added to another system, and if the number of virtual disks exceeds the maximum limit of 10, you cannot delete the virtual disks that are in **Normal** or **Ready** state.

Swapping two virtual disks

1. Enter the **BIOS Configuration Utility**. See <u>Entering the BIOS Configuration Utility</u>.
2. In the **Main Menu** screen, select the **Swapping Two Virtual Disks** and press <Enter>.

   > 📝 NOTE: While swapping boot virtual disks, ensure that the boot virtual disks are created from disk drives populated across slots 0-3 of the system. For information about the disk connectivity for AHCI devices, see <u>Disk connectivity for AHCI devices</u>, and for disks slot information, see the system specific Owner's Manual at **dell.com/poweredgemanuals**.

3. Use the arrow keys to highlight a virtual disk at the **Virtual Disk** field. Press <Insert>.
4. Use the arrow keys to highlight another virtual disk. Press <Insert>.
5. Press <Enter> to swap the virtual disks.

   > 📝 NOTE: Only two virtual disks can be swapped at a time.

   > 📝 NOTE: When you create up to 10 virtual disks and swap the virtual disks using the **BIOS Configuration Utility**, the order of the virtual disk in option ROM (OPROM) appear different from the order of the virtual disk in operating system.

Managing the hot spare disks

Manage Hot Spare(s) screen enables you to assign or unassign a global or dedicated hot spare(s).

1. Enter the BIOS Configuration Utility. See <u>Entering the BIOS Configuration Utility</u>.
2. In the **Main Menu** screen, use the arrow keys to select **Manage Hot Spare(s)** and press <Enter>.
   The **Manage Hot Spare(s)** screen display:
   - global hot spare disks
   - dedicated hot spare disks

Assigning the global hot spare disks

Global hot spare disk is a backup physical disk that can be used by any redundant virtual disk. It is not assigned (dedicated) to any specific virtual disk. Virtual disks can typically be rebuilt by using a global

spare disk, as long as the global hot spare is not already part of the virtual disk and has enough available capacity. Unlike a dedicated hot spare, a global hot spare can be assigned at anytime, even while tasks are running on virtual disks.

> **NOTE:** A hot spare can be created only if a physical disk is in **Ready** or **Normal** state, in the **Physical Disks** field. If the physical disk is in **Online** state, the disk is being used by a virtual disk and cannot be selected as a hot spare.

Perform the following procedure to assign a global hot spare disk:

1. Enter the **BIOS Configuration utility**. See Entering the BIOS Configuration Utility.
2. In the **Main Menu** screen, select the **Manage Hot Spare** and press <Enter>.
3. Select **Assign Global Hot Spare(s)**. Press <Enter>.

   > **NOTE:** Assign global hot spare only from disk drives populated across slots 0-3 of the system. For information about the disk connectivity for AHCI devices, see Disk connectivity for AHCI devices, and for disks slot information, see the system specific Owner's Manual at **dell.com/poweredgemanuals**.

4. Use the up or down arrow key to select a physical disk(s) to be used as a global hot spare(s). Press <Insert>.
5. Press <Enter> to add the global hot spare.
6. Press the <C> key to confirm the action.

Assigning the dedicated hot spare disks

A dedicated hot spare is a backup physical disk for the redundant virtual disk to which it is assigned. The physical disk that is used as a dedicated hot spare cannot be a member of an existing virtual disk. When the hot spare is activated, it becomes the receptacle for the data from the failed physical disk member of the volume, without interrupting the system or requiring your intervention. A dedicated hot spare can be assigned to any redundant virtual disk, and up to four hot spares can be assigned to a virtual disk. A dedicated hot spare cannot be assigned while a task is running on the virtual disk.

> **NOTE:** A virtual disk is marked **Failed** or **Degraded** if a physical disk reports a **Failed** state, or if the SAS/SATA cable to the physical disk or power cable is disconnected.

> **NOTE:** If a virtual disk with an assigned dedicated hot spare is deleted, the dedicated hot spare is also deleted and the physical disk state changes to **Ready**.

Perform the following procedure to assign a dedicated hot spare disk:

1. Enter the **BIOS Configuration utility**. See Entering the BIOS Configuration Utility.
2. In the **Main Menu** screen, select the **Manage Hot Spare** and press <Enter>.
3. Select **Assign Dedicated Hot Spare(s)**. Press <Enter>.

   > **NOTE:** Assign dedicated hot spare for boot virtual disk only from disk drives populated across slots 0-3 of the system. For slot information, see the system Owner's Manual at **dell.com/poweredgemanuals**.

   > **NOTE:** For PowerEdge R330, R230, T330, and T130 systems, you can assign a dedicated hot spare for boot virtual disk on the disk drives populated across any slots in the system.

4. Use the up or down arrow key to select a physical disk(s) for use as a dedicated hot spare(s). Press <Insert>.
5. Use the up or down arrow key to select a physical disk(s) for use as a dedicated hot spare(s) and press <Insert>.
6. Press <Enter> to add the dedicated hot spare.
7. Press the <C> key to confirm the action.

Unassign hot spare disks

1. Enter the **BIOS Configuration utility**. See [Entering the BIOS Configuration Utility](#).
2. In the **Main Menu** screen, select the **Manage Hot Spare** and press <Enter>.
3. Select **Unassign Hot Spare(s)**. Press <Enter>.
4. Use the up or down arrow key to select the physical disk(s) to delete as a hot spare(s).
5. Press <Insert>. To delete the hot spare, press <Enter>
6. Press the <C> key to confirm the action.

Viewing the physical disks details

1. Enter the **BIOS Configuration Utility**. See [Entering the BIOS Configuration Utility](#).
2. In the **Main Menu** screen, select **View Physical Disk Details** and press <Enter>.
3. Use the arrow keys to choose a physical disk.
4. The following details of the physical disks are displayed:
    a. Physical disk number
    b. Channel number
    c. Physical disk size
    d. Physical disk status: **Non-RAID/Ready/Online**
    e. Amount of free space
    f. Manufacturer and model number
    g. World Wide Address
    h. SATA Cache Policy (Enabled or Disabled)
    i. S.M.A.R.T. State: Error (if a disk with a S.M.A.R.T. error is discovered)
5. Press <Esc> to return to the main window.

Viewing the virtual disks details

1. Enter the **BIOS Configuration Utility**. See [Entering the BIOS Configuration Utility](#).
2. In the **Main Menu** screen, select **View Virtual Disk Details** and press <Enter>.
3. Use the arrow keys to choose a virtual disk.
4. The following details of the virtual disks are displayed:
    a. Virtual disk number
    b. RAID Level
    c. Size
    d. Status (**Read Ahead/Write Back, No Read Ahead/Write Back, Read Ahead/Write Through, No Read Ahead/Write Through**)
5. Press <Esc> to return to the main window.

    > NOTE: The **Physical Disks** field indicates the physical disks that are in the virtual disk, highlighted by green text.

Rescanning the disks

The **Rescan Disks** option rescans all the channels, searches for new or removed physical disks, and re-reads the configuration information from each physical disk.

📝 NOTE: Sometimes when a physical disk has failed, you can get it online through a rescan.

1. Enter the **BIOS Configuration Utility**. See Entering the BIOS Configuration Utility.
2. In the **Main Menu** screen, use the arrows to select the **Rescan Disks**.
3. Press <Enter> to continue rescanning.

Controller Options

The **Controller Options** feature helps you to enable the **BIOS Stop on Error** option. The boot process pauses when **Pause if...** is enabled and a virtual disk becomes **Degraded** or has **Failed**. Press <Enter> to continue booting.
View the error message on the window. If **Pause...** is **OFF**, the error message is displayed briefly, but the system continues to boot.

1. Enter the **BIOS Configuration Utility**. See Entering the BIOS Configuration Utility.
2. In the **Main Menu** screen, use the arrows to select the **Controller Options**.
3. In the **Controller Options** field, use the up or down arrow keys to scroll to the desired controller option.
    a. **Pause if Degraded**

       When **ON**, the BIOS stops booting when a degraded virtual disk is found.

       Press <Enter> to toggle between **ON** and **OFF**.
    b. **Pause if Failed**

       When **ON**, the BIOS stops booting when a failed virtual disk is found.

       Press <Enter> to toggle between **ON** and **OFF**.
    c. **Manage Physical Disk Write Cache**
       • If the option is set to **Default**:

         – the physical disk write cache policy is enabled for SSDs and HDDs of bandwidth 3 Gbps.
         – the physical disk write cache feature is disabled for HDDs of bandwidth 6 Gbps.
       • If the option is set to **Enable**, the feature is enabled on the disk selected.
       • If the option is set to **Disable**, The feature is disabled on the disk selected.
4. Press <Esc> to return to the main window.

Continue to boot

1. Enter the **BIOS Configuration Utility**. See Entering the BIOS Configuration Utility.
2. In the **Main Menu** screen, use the arrows to select the **Continue to Boot**.
   The system restarts normally.

6

UEFI RAID configuration utility

The UEFI (Unified Extensible Firmware Interface) RAID configuration utility is a storage management application integrated into the System BIOS <F2>. It is used to configure and manage RAID, virtual disks, and physical disks. This utility is independent of the operating system.

> **NOTE:** The following sections provide information about using the UEFI RAID configuration utility. For more information, see the online help option in the UEFI RAID configuration utility.

> **NOTE:** Use the UEFI RAID configuration utility for initial setup.

Entering the DELL PERC S130 Configuration Utility

1. Turn on the system.
2. While the system starts up, press <F2> to enter **System Setup**.
   The list of menu items in the **System Setup Main Menu** screen is displayed.
3. Click **Device Settings**.
   Device Settings lists the NIC ports and all the options of the S130 configuration utility.
   To access the management menu for the controller, use the arrow keys or the mouse.

   > **NOTE:** For more information on all the options, click **Help** that is available on the top right-hand corner of the browser screen. Help information for individual option menus can also be viewed by scrolling down on each option.

   > **NOTE:** Some of the options within the UEFI RAID configuration utility are not present if the controller does not support the corresponding feature. Options may also be grayed out if the feature is not supported in existing configuration.

4. Click **Dell S130 Configuration Utility**.
   Displays the list of **Configuration Options**:

   - **Controller Management**: allows you to configure, manage, and view the controller properties.
   - **Virtual Disk Management**: allows you to configure, manage, and view the virtual disk properties.
   - **Physical Disk Management**: allows you to configure, manage, view and perform varied operations on the physical disk properties.

Exiting the DELL PERC S130 Configuration Utility

1. Click **Finish** at the bottom-right corner on the **System Setup Main Menu** screen.
   A warning message is displayed to confirm your choice.
2. Click **Yes** to exit the configuration utility.

Controller management

Viewing the controller properties

View Controller Information screen allows you to view the controller properties and the firmware properties.
In the **System Setup Main Menu**, click **Device Settings** → **Dell PERC S130 Configuration Utility** → **Controller Management** → **View Controller Information**.
The table explains the **View Controller Information** screen details:

Menu Item	Description
PCI ID	Displays the PCI ID.
Physical disk Count	Displays the total number of physical disks available on the system.
Virtual Disk Count	Displays the total number of virtual disks available.
UEFI Driver Version	Displays the UEFI driver version installed on the system.
Firmware Build Time	Displays the time and date when you last updated the firmware.

Changing the boot order of the virtual disks

Set Bootable Device allows you to change the boot order of the virtual disk.

1. Enter the **Dell PERC S130 Configuration Utility**. See Entering the DELL PERC S130 Configuration Utility.
2. Click **Controller Management** → **Change Controller Properties**.

    📝 NOTE: While swapping boot virtual disks, ensure that the boot virtual disks are created from disk drives populated across slots 0-3 of the system. For information about the disk connectivity for AHCI devices, see Disk connectivity for AHCI devices, and for disks slot information, see the system specific Owner's Manual at **dell.com/poweredgemanuals**.
3. Click the link **Set Bootable Device**.

    A **Change Order** dialog box displays the list of virtual disks available.
4. Use the arrow keys to set a virtual disk and **+** or **−** to change the order of the virtual disks that need to be booted first.
5. Click **Ok**.

    The changes to the boot order of the virtual disks are displayed.

Stopping the system from booting if there is a critical BIOS error

Change Controller Properties screen allows you to either enable or disable the option to stop the system from booting if there is any critical BIOS error, which requires manual intervention.

1. Enter the **Dell PERC S130 Configuration Utility**. See Entering the DELL PERC S130 Configuration Utility.
2. Click **Controller Management** → **Change Controller Properties**.

NOTE: While swapping boot virtual disks, ensure that the boot virtual disks are created from disk drives populated across slots 0-3 of the system. For information about the disk connectivity for AHCI devices, see Disk connectivity for AHCI devices, and for disks slot information, see the system specific Owner's Manual at **dell.com/poweredgemanuals**.

3. You can either enable or disable the **Enable BIOS Stop On Error**.

Converting physical disk to Non-RAID disk

1. Enter the **Dell PERC S130 Configuration Utility**. See Entering the DELL PERC S130 Configuration Utility.
2. Click **Controller Management** → **Convert to Non-RAID Disk**.

   NOTE: Create boot virtual disk only from disk drives populated across slots 0-3 of the system. For information about the disk connectivity for AHCI devices, see Disk connectivity for AHCI devices, and for disks slot information, see the system specific Owner's Manual at **dell.com/ poweredgemanuals**.

3. Select **Select physical disks from slots other than slots 0-3**.
4. Select the physical disk and click **OK**.
   A confirmation screen is displayed.
5. Click **Yes** to continue.

Converting physical disk to RAID capable disk

1. Enter the **Dell PERC S130 Configuration Utility**. See Entering the DELL PERC S130 Configuration Utility.
2. Click **Controller Management** → **Convert to RAID Capable Disk**.
3. Select the physical disk to convert to RAID capable disk.
4. Click **OK**.
   A confirmation screen is displayed.
5. Click **Yes** to continue.

Rescan the disks

1. Enter the **Dell PERC S130 Configuration Utility**. See Entering the DELL PERC S130 Configuration Utility.
2. Click **Controller Management** → **Rescan Disks**.
   The **Rescan Disks** screen is displayed. It provides information about the latest physical disk and virtual disk configurations.

Virtual disk management

Configuring Windows RAID

1. Enter the **Dell PERC S130 Configuration Utility**. See Entering the DELL PERC S130 Configuration Utility.
2. Click **Controller Management** → **Convert to RAID capable disk**.
3. Select **Windows RAID**.

> **NOTE:** Create boot virtual disk only from disk drives populated across slots 0-3 of the system. For information about the disk connectivity for AHCI devices, see [Disk connectivity for AHCI devices](#).

4. Select **Select physical disks from slots other than slots 0-3**.
5. Select the physical disk and click **OK**.

   A confirmation screen is displayed.
6. Click **Yes** to continue.
7. After converting the physical disks, click the **Virtual Disk Management** in the **Controller Options** screen.
8. Click **Create Virtual Disks**
9. Click **Select the Physical Disk**.
10. Select media type and the physical disks.
11. Click **OK**.

    A confirmation screen is displayed.
12. Click **Yes** to continue.

Configuring Linux RAID

> **NOTE:** The S130 controller supports only RHEL 7.2, SLES 11 SP4, and SLES 12 SP1. The Linux installer fails to detect the virtual disks, if the RHEL 7.1 or earlier, SLES 11 SP3 or earlier, and SLES 12 SP2 or later are installed.

> **NOTE:** The Linux RAID feature is supported on all the 13th generation systems.

> **NOTE:** If you are configuring Linux RAID for RHEL 7.2 on the PowerEdge R330, R230, T330, and T130 systems, ensure that you download the latest Driver Update Disk (DUD) available at **https://access.redhat.com/downloads/content/69/ver=/rhel---7/7.2/x86_64/product-software**.

> **NOTE:** If you are configuring Linux RAID for SLES 11 SP4 or SLES 12 SP1 on the PowerEdge R330, R230, T330, and T130 systems, ensure that you download the latest Driver Update Disk (DUD) available at **https://drivers.suse.com/dell/Dell_PowerEdge_13G/sle-11-sp4-x86_64/1.0/install-readme.html**.

> **NOTE:** Ensure that you do not use Dell Lifecycle Controller to configure Linux RAID on the system.

1. Enter the **Dell PERC S130 Configuration Utility**. See [Entering the DELL PERC S130 Configuration Utility](#).
2. Click **Controller Management** → **Convert to RAID capable disk**.
3. Select the **Linux RAID** type.
4. Select **Select physical disks from slots other than slots 0-3**.
5. Select the physical disk and click **OK**.

   A confirmation screen is displayed.
6. Click **Yes** to continue.
7. After converting the physical disks, go to **Virtual Disk Management** screen, and click **Create Virtual Disks**.
8. Select the required Linux operating system.

   > **NOTE:** If you select RHEL as the operating system, the entire physical disk space is used in the **Virtual Disk Size** field. With RHEL, you can create virtual disks only on the entire physical disk space.

> **NOTE:** If you select SLES as the operating system, you can create virtual disks on both full and partial physical disk space.

9. Click **Select the Physical Disk**.
10. Select media type and the physical disks.
11. Click **OK**.

   A confirmation screen is displayed.
12. Click **Yes** to continue.

Mixed RAID configuration

If your system detects mixed RAID configurations with both Windows and Linux RAID disks, then the S130 UEFI configuration utility displays the mixed configuration screen where you are recommended to perform the following tasks:

1. To convert the Linux RAID disks:
   a. In the WARNING: MIXED CONFIGURATION screen, select **Windows** RAID configuration.
   b. Select the physical disks with Linux RAID configuration listed, and click the link **CONVERT TO NON-RAID**. If you do not want to convert the disks to non-RAID, remove the physical disks with Linux RAID configurations from the system.
2. To convert the Windows RAID disks:
   a. In the WARNING: MIXED CONFIGURATION screen, select **Linux** RAID configuration.
   b. Select the physical disks with Windows RAID configuration listed, and click the link **CONVERT TO NON-RAID**. If you do not want to convert the disks to non-RAID, remove the physical disks with Windows RAID configurations from the system.

> **NOTE:** The S130 controller does not support mixed RAID configuration. If the mixed RAID configuration with both Windows and Linux RAID disks is detected, then you cannot perform any further tasks until you clear the physical disks or convert the physical disks.

Manage virtual disk properties

The **View Virtual Disk Properties** screen allows you to view the virtual disk properties and the policies.
In the **System Setup Main Menu**, click **Device Settings → Dell PERC S130 Configuration Utility → Virtual Disk Management → Manage Virtual Disk Properties**.
The table explains the **Manage Virtual Disk Properties** screen details:

Menu Item	Description
Virtual Disk Status	Displays the virtual disk status.
Virtual Disk Capacity	Displays the capacity of the virtual disk.
Sector Size	Displays the sector size enabled.
Read Cache Policy	Displays the read cache policies associated with the virtual disk.
Write Cache Policy	Displays the write cache policies associated with the virtual disk.
Physical Disk Write Cache	Displays the status of the physical disk write cache policy.

Menu Item	Description
Modify the Physical Disk Write Cache	Enables you to modify the physical disk write cache policy settings. *NOTE:* If you have Linux RAID configured on the system then you cannot modify any settings in this field.
Physical disk Write Cache	Enables you to change the physical disk write cache policy settings. *NOTE:* If you have Linux RAID configured on the system then you can only view the physical disk write cache setting.
View Associated Physical Disk	Clicking this link displays the physical disk that is associated with the specific virtual disk

Viewing virtual disks properties and policies

View Virtual Disk Properties screen allows you to view the virtual disk properties and the policies.
In the **System Setup Main Menu**, click **Device Settings** → **Dell PERC S130 Configuration Utility** → **Virtual Disk Management** → **View Virtual Disk Properties**.
The table explains the **View Virtual Disk Properties** screen details:

Menu Item	Description
Virtual Disk ID	Displays the virtual disk ID.
RAID level	Displays the RAID level associated with the virtual disk.
Virtual Disk Status	Displays the status of the virtual disk.
Virtual Disk Capacity	Displays the capacity of the virtual disk.
Sector Size	Displays the sector size enabled.
Read Cache Policy	Displays the read cache policies associated with the virtual disk
Write Cache Policy	Displays the write cache policies associated with the virtual disk
Associated Physical Disk	Displays the physical disk which is associated with the specific virtual disk

Deleting the virtual disks

1. Enter the **Dell PERC S130 Configuration Utility**. See Entering the DELL PERC S130 Configuration Utility.
2. Click **Virtual Disk Management** → **Select Virtual Disk Operations**.
3. Select a virtual disk that you want to delete from the drop-down menu.
4. Click the link **Delete Virtual Disks**.
   To continue, confirm the option that you selected.
5. Select **Confirm** and click **Yes** to continue.
   The selected virtual disk is deleted.

NOTE: When a degraded or a failed virtual disk from one system is added to another system, and if the number of virtual disks exceeds the maximum limit of 10, you cannot delete the virtual disks that are in **Normal** or **Ready** state.

Physical disk management

Viewing physical disk properties

View Physical Disk Properties screen allows you to view the properties of physical disk and also provides details about the virtual disks associated with the physical disk.
In the **System Setup Main Menu**, click **Device Settings → Dell PERC S130 Configuration Utility → Physical Disk Management → View Physical Disk Properties**.
The table explains the **View Physical Disk Properties** screen details:

Menu Item	Description
Select Physical Disk	Allows you to select the physical disks from the drop-down menu.
Physical Disk Properties	Displays information about the physical disk properties.
Physical disk ID	Displays the ID of the physical disk.
State	Displays if it is a RAID capable disk or a Non-RAID disk.
Size	Displays the total storage space of the physical disk.
SMART status	Displays if the SMART feature is enabled or disabled for the physical disk.
Revision	Displays the revision.
Device Type	Displays the device type.
Certified	Displays if the physical disk is Dell certified or not.
Connector Port	Displays the port number in which the physical disk is installed.
SAS Address	Displays the SAS address.
Disk Cache Setting	Displays if the disk cache is enabled or disabled.
Available Space	Displays the free space of the respective physical disk.
Used Space	Displays the used space of the respective physical disk.
Disk Protocol	Displays if the protocol of the physical disks.
Media Type	Displays the type of disk selected.
Disk Sector Size	Displays the type of sector size enabled.
Negotiated Physical Disk Transfer speed	Displays the speed at which the data is transferred.
Associated Virtual Disks	Displays the virtual disk associated with the respective physical disk.

Menu Item	Description
Dell Part Number	Displays the part number of the physical disk.
Serial Number of Disk	Displays the serial number of the physical disk.
Hardware Vendor	Displays the information about the hardware vendor.
Manufacturing Date	Displays the manufacturing date of the physical disk.

Managing the physical disk write cache policy

Perform the following procedure to enable the physical disk write cache policy:

1. Enter the **Dell PERC S130 Configuration Utility**. See Entering the DELL PERC S130 Configuration Utility.
2. Click **Physical Disk Management → Select Physical Disk Operations**.
3. Click the link **Manage Physical Disk Properties**.
   The **Manage Physical Disk Properties** screen is displayed.
4. Choose from the following physical disk write cache policies:

Physical disk write cache policies	Description
Default	The physical disk write cache feature is enabled for: • SSDs • 3 Gbps HDDs The physical disk write cache feature is disabled for 6 Gbps HDDs.
Enable	The feature is enabled on the disk selected.
Disable	The feature is disabled on the disk selected.

5. Click **Apply** to save the changes made.

   ![note icon] **NOTE:** Ensure that you change the physical disk write cache policy of a global hot spare disk after rebuild to the write cache policy of the last configured virtual disk.

   ![note icon] **NOTE:** In the **View Virtual Disk Properties** screen, ensure that the physical disk write cache setting is consistent across the physical disk(s) associated with the virtual disk.

   ![note icon] **NOTE:** If you have Linux RAID configured on the system, you cannot modify the physical disk write cache policy feature settings.

   ![note icon] **NOTE:** For more information about the physical disk write cache behavior, see the Troubleshooting your system section.

Selecting the 4Kn sector size

1. Enter the **Dell PERC S130 Configuration Utility**. See [Entering the DELL PERC S130 Configuration Utility](#).
2. Click **Virtual Disk Management** → **Create Virtual Disks**.
3. Click the link **Select the Physical Disk**.
4. Select **4Kn** sector size.
5. To save the changes made, click **Apply Changes**.

Assigning the global hot spare

1. Enter the **Dell PERC S130 Configuration Utility**. See [Entering the DELL PERC S130 Configuration Utility](#).
2. Click **Physical Disk Management** → **Select Physical Disk Operations**.

   NOTE: Assign global hot spare only from disk drives populated across slots 0-3 of the system. For information about the disk connectivity for AHCI devices, see [Disk connectivity for AHCI devices](#),and for disks slot information, see the system specific Owner's Manual at **dell.com/poweredgemanuals**.

3. Select the physical disk that is in the ready state from the drop-down menu.
4. Click the link **Assign Global Hot Spare**.

   NOTE: A global hot spare disk cannot be created if you have Linux RAID configured on the system.

Unassign a global hot spare

1. Enter the **Dell PERC S130 Configuration Utility**. See [Entering the DELL PERC S130 Configuration Utility](#).
2. Click **Physical Disk Management** → **Select Physical Disk Operations**.
3. Select a global hot spare disk from the drop-down menu.
4. Click the link **Unassign Hot Spare**.

Assigning the dedicated hot spare

1. Enter the **Dell PERC S130 Configuration Utility**. See [Entering the DELL PERC S130 Configuration Utility](#).
2. Click **Virtual Disk Management** → **Manage Virtual Disk Properties** → **Manage Dedicated Hot Spares**.

   NOTE: Assign dedicated hot spare only from disk drives populated across slots 0-3 of the system. For information about the disk connectivity for AHCI devices, see [Disk connectivity for AHCI devices](#),and for disks slot information, see the system specific Owner's Manual at **dell.com/poweredgemanuals**.

3. Select the physical disk that is in the ready state from the drop-down menu.
4. Click the link **Add Hot Spare Disk**.

Installing the drivers

The Dell PowerEdge RAID Controller (PERC) S130 requires software drivers to operate with the supported operating systems. Installing drivers for the PERC S130 are dependent on the type of the system and the operating system that you have.

NOTE: To check operating system compatibility, see **dell.com/support/manuals**.

Pre-installation requirements

Before you install the operating system:

- Read the Microsoft Getting Started document that is shipped with your Windows operating system.
- Ensure that your system has the latest BIOS, firmware, and driver updates. If required, download the latest BIOS, firmware, and driver updates from **dell.com/support**.
- Create a device driver media (USB drive, CD, or DVD).

Setting the SATA controller to RAID mode

1. Turn on the system.
2. When the **Dell Power-On Self-Test (POST)** screen is displayed, press <F2>.
3. When the **Dell PowerEdge System** window is displayed, scroll to **SATA Settings** and press <Enter>.
   In the sub-screen, confirm that the **SATA Controller** is set to a RAID mode.

   NOTE: If necessary, use the space bar to change the setting.
4. Press <Esc> to exit.
5. Press <Esc> again.

Initializing the virtual disks

For more information about Initialing the virtual disks, see <u>Initializing the physical disks</u>.

Creating a virtual disk

For more information about creating a virtual disk, see <u>Creating the virtual disks</u>.

Checking PERC S130 options and the boot list priority.

1. At the **Virtual Disks** field, ensure the bootable virtual disk is the first virtual disk listed. If the bootable virtual disk is not the first virtual disk listed, see <u>Swapping two virtual disks</u>.

> ![note] **NOTE:** If Non-RAID virtual disks are used (and appear in the Virtual Disks list), the **Swap Two Virtual Disks** option is enabled only if the system contains a RAID Capable physical disk.

2. Select **Continue to Boot** and press <Enter>.

Creating the device driver media for Windows driver installation

Downloading drivers for PERC S130 from the Dell support website for all operating systems

1. Go to **dell.com/drivers**.
2. In the **Product Selection** section, enter the service tag of your system in the **Service Tag or Express Service Code** field.

   > ![note] **NOTE:** If you do not have the service tag, select **Automatically detect my Service Tag for me** to allow the system to automatically detect your service tag, or select **Choose from a list of all Dell products** to select your product from the **Product Selection** page.

3. Select the **Operating System**, **Category**, **Release Date**, and **Importance** from the respective drop-down lists.

   The drivers that are applicable to your selection are displayed.
4. Download the drivers that you require to a USB drive, CD, or DVD.
5. During the operating system installation, use the media that you created with the **Load Driver** option to load mass storage drivers. For more information on reinstalling the operating system, see the operating system document at **dell.com/operatingsystemmanuals**.

Downloading drivers from the Dell Systems Service and Diagnostic Tools media for Windows

1. Insert the *Dell Systems Service and Diagnostics Tools* media in a system.

   The **Welcome to Dell Service and Diagnostic Utilities** screen is displayed.
2. Select your system model and operating system.

   For the list of supported operating systems, see [Supported operating systems](#).
3. Click **Continue**.
4. From the list of drivers displayed, select the driver you require.
5. Select the self-extracting zip file and click **Run**.
6. Copy the driver to a CD, DVD, or USB drive.

   Repeat this step for all the drivers you require.
7. During the operating system installation, use the media that you created with the **Load Driver** option to load mass storage drivers.

   For more information on reinstalling the operating system, see the relevant section for your operating system.

Installing the driver for Windows Server 2008 R2 or Windows Server 2012/2012 R2

1. Power on the system and boot to the Microsoft Windows Server CD.
2. Follow the instructions on the screen until you reach the **Where do you want to install Windows?** screen.
3. Insert the CD-ROM, DVD or USB flash drive that contains the driver files.
4. In the **Load Driver** sub-screen, click **Browse**.
5. Select the directory that has the controller driver files and click **OK**.
6. In the **Select the driver to be installed** window, select **Dell PERC S130** controller and click **Next** to load the driver files.
7. After the driver loads you return to the **Where do you want to install Windows?** screen, click **Next** to continue the installation procedure.

When the installation is complete, to configure the S130 controller, install the configuration driver (if necessary) used by Dell OpenManage (OMSA) component.

> **NOTE:** While you install the Windows Server 2012 operating system, ensure that you install the hotfix update available at **support.microsoft.com/kb/2789962**.

> **NOTE:** For 4Kn sector drives, ensure that you use **diskpart.exe** file to create a partition while installing the Windows 2012 or Windows 2012 R2 operating systems. For more information, see **https://technet.microsoft.com/en-us/library/dn387075.aspx**.

Updating the existing driver for Windows Server 2008 or Windows Server 2012/2012 R2

1. Select **Start → Control Panel → System and Security → System.**
   The **View basic information about your computer** window is displayed.
2. Click the link **Device Manager**.
   The **Device Manager** screen is displayed.
3. Click **Storage controller** for updating **Dell PERC S130 Controller** and click **System devices** for updating **Dell PERC S130 Configuration Device**.
4. Double-click the RAID controller for which you want to update the driver.
5. Click the **Driver** tab and click **Update Driver**.
   The **Upgrade Device Driver Wizard** is displayed.
6. Insert the media (USB key/CD/DVD) containing the driver.
7. Click **Browse my computer for driver software** window.
8. Click **Let me pick from a list of device drivers on my computer**.
9. Click **Have Disk** button and browse to the appropriate location.
10. Select the appropriate RAID controller and click **Next**.
    The new driver(s) are uploaded.
11. Close all windows and restart your system for the changes to take effect.

Troubleshooting your system

To get help with your Dell PowerEdge RAID Controller (PERC) S130, you can contact your Dell Technical Service representative or see **dell.com/support.**

Unable to create a new partition while installing Windows 2012/2012 R2 operating system

Likely Cause: If you boot the system in the UEFI mode and then try to install Windows 2012/2012 R2 operating system on a virtual disk that uses 4K native drives, the following error message is displayed: `We could not create a new partition.`

Corrective Action: To resolve this issue:

1. In the **Where do you want to install Windows?** wizard, select the partition created by **setup.exe** file, and then click **Delete**. Repeat this procedure for other partitions created by **setup.exe** file.

2. To create a new installation partition, click **New**, and then continue installing the OS.

   ✏ NOTE: To avoid this issue, ensure that you use **diskpart.exe** file to create a partition while installing the Windows 20012/2012 R2 OS.

0x0000003B or 0x0000007E stop error occurs on a system while using a 4K sector disks

Likely Cause: When you boot the system after installing Windows 2012 R2 on a 4K native drives, your system stops functioning and results in a BSOD with the following error message:

`system_thread_exception_not_handled (WppRecorder.sys)`

Corrective Action: To resolve this issue:

1. Boot to the recovery console.
2. Start command prompt.
3. Run the following command:

   `c:\windows\system32\compact.exe /U c:\windows\system32\drivers\*.sys`
4. Restart the system.
5. After you boot successfully, disable the NTFS compression system-wide.

6.	Restart the system again.

For more information, see the KB article **https://support.microsoft.com/en-us/kb/3027108#/en-us/kb/3027108**.

Performance degradation after disabling physical disk write cache policy

Corrective Action:	To resolve this issue, enable the physical disk write cache policy.

> **NOTE:** Ensure that there is constant power supply to the system (An UPS is recommended).

> **NOTE:** If you create virtual disk using Dell LifeCycle controller, then the physical disk write cache policy is set to default. For more information about the physical disk write cache policy behavior, see Managing the physical disk write cache policy.

Unable to modify any feature settings in UEFI or OPROM

Likely Cause:	You cannot modify the settings in UEFI or OPROM if the number of virtual disks is more than 10.

Corrective Action:	To resolve this issue:

1.	Start the operating system.
2.	Use Dell OpenManage to ensure that the maximum number of virtual disks does not exceed 10.

Unable to recover the crash dump file when the operating system fails

Likely Cause:	If boot virtual disk is created on disks other than disks populated from port 0-3, you cannot recover the MEMORY.dmp file.

Corrective Action:	Ensure that the boot virtual disk is created on the disks populated from port 0-3.

> **NOTE:** If you are using PowerEdge R330, R230, T130, and T330 systems, you will not see this issue.

System startup issues

To troubleshoot the system startup issues, perform the following:

System does not boot

Check for the following causes when the system does not boot:

- Incorrect **Controller Mode** at the **System Setup**
- Incorrect **Boot Mode**, **Boot Sequence**, and/or **Boot Sequence Retry**
- Bootable virtual disk is in **Failed** state
- Incorrect **Boot Order** for a bootable virtual disk
- A Non-RAID virtual disk is no longer in the first position in the BIOS Configuration Utility (<Ctrl><R>) list after the system is rebooted
- In the Linux RAID configuration, if virtual disks created exceed the maximum limit of 10 and the boot virtual disk is not listed as one of the 10 virtual disks in UEFI configuration utility.

Controller mode is set incorrectly at System Setup

1. In the system startup, when the **Dell Power-On Self-Test (POST)** screen is displayed, press <F2> to enter the **Dell Inc. PowerEdge BIOS** screen.
2. Scroll to **SATA Settings**. Press <Enter> and ensure that the **SATA Controller** is set to RAID mode.

   NOTE: While switching from **RAID Mode** to **ATA Mode** or **AHCI Mode**, there may be data loss.

Boot mode, boot sequence, and/or boot sequence retry are set incorrectly

1. Turn on the system
2. When the Dell **POST** screen is displayed, press <F2> to enter the **Dell Inc. PowerEdge BIOS** screen.
3. Scroll to **Boot Settings**. Press <Enter> and ensure that **Boot Mode** is set to **BIOS**.
4. Scroll to **Boot Sequence**. Press <Enter> and ensure that **Hard drive C:** is the first device listed.
5. Scroll to **Boot Sequence Retry**. Ensure that the setting is **Enabled**.
6. Press <Esc> to exit and continue booting.

   NOTE: If changes are made at the **Dell Inc. PowerEdge BIOS** screen, a dialog box is displayed and asks you to save your changes and then exit.

Bootable virtual disk is in a failed state

1. Press <Ctrl><Alt><Del> to restart.
2. After the system restart, press <Ctrl><R>. Check the status of the bootable virtual disk at the **Virtual Disk** field, or by highlighting **View Virtual Disks Details** and pressing <Enter>.
3. Check for missing or offline physical disks.

The boot order is incorrect for a bootable virtual disk

1. When prompted at system startup, press <Ctrl><R> to access the PERC BIOS Configuration Utility.
2. Check **Virtual Disks** and ensure that the bootable virtual disk is the first virtual disk listed.
3. If required, use the **Swap Two Virtual Disks** option to reposition the virtual disks.

A Non-RAID virtual disk is no longer in the first position in the BIOS Configuration Utility (<Ctrl><R>) list after the system is rebooted

✎ **NOTE:** When booting from a Non-RAID virtual disk, creating a virtual disk in Dell OpenManage Server Administrator changes the virtual disk order and displaces the bootable Non-RAID virtual disk from the first position. PERC S130 then attempts to boot from the first virtual disk.

✎ **NOTE:** A Non-RAID virtual disk can be created from Non-RAID physical disks (which are physical disks initialized by a controller other than the PERC S130).

1. When prompted at system startup, press <Ctrl><R> to access the BIOS Configuration.
2. Check Virtual Disks and determine if the bootable Non-RAID virtual disk is no longer in the first position.
3. Use the **Swap Two Virtual Disks** option to swap the virtual disks and place the bootable Non-RAID virtual disk in the first position of the **Virtual Disks** field.

The BIOS Configuration Utility (<Ctrl><R>) option does not display

The **BIOS Configuration Utility (<Ctrl><R>)** option does not display if the PERC S130 mode is set incorrectly in the system BIOS. For correct **SATA Setting**, see Controller mode is set incorrectly at System Setup .

Warning Message

The **Dell Inc. PERC S130 Controller BIOS** screen is one of the first screens to appear during your system's boot sequence. If the system's virtual disks were in **Normal** or **Ready** status before a system boot, the boot sequence continues normally to the Microsoft Windows Server 2008 operating system. But, if a virtual disk is in **Degraded** or **Failed** status, or if specific options in the **Controller Options** field were changed previously at the **BIOS Configuration Utility (<Ctrl><R>)**, the following warning messages appear during the boot sequence.

WARNING: Found virtual disks that are degraded

This warning message is displayed when at least one virtual disk is in a **Degraded** state and **Pause if Degraded** is set to **ON** at the **BIOS Configuration Utility (<Ctrl><R>)**.

The following message is displayed after the warning is displayed: --- **Press <Enter> to continue, or <CTRL><R> to enter setup ---**.

Press <Enter> to allow the operating system to continue with the boot sequence, or press <Ctrl><R> to enter into the **BIOS Configuration Utility (<Ctrl><R>)** to investigate the cause of the **Degraded** virtual disk.

To investigate the cause, check for the following:

- Whether a physical disk in the virtual disk has failed or has gone offline. Check the status at the **Physical Disks** field. A **Degraded** status depends on the RAID level of the virtual disk and the number of physical disks that have failed:

  −For a virtual disk at RAID 1 or RAID 5, a single physical disk failure causes a **Degraded** status.

  −For a virtual disk at RAID 10, the failure of a physical disk in each of the mirror sets creates a **Degraded** status for the RAID 10. The failure of two physical disks in the same mirror set creates a **Failed** status for the RAID 10.

- Whether the controller has failed due to a firmware failure or a component failure. A failed controller causes a virtual disk not to boot.

For the virtual disk to recover from **Degraded** status, the failed physical disk must be replaced and the virtual disk must be rebuilt using Dell OpenManage Server Administrator Storage Management. When the rebuild operation is completed, the virtual disk status changes from **Degraded** to **Ready**. For a description of the rebuild function, see Storage Management at **dell.com/support/manuals**.

WARNING: Found virtual disks that are failed

This warning message is displayed when at least one virtual disk is in a **Failed** state and **Pause if Failed** is set to **ON** at the **BIOS Configuration Utility (<Ctrl><R>)**.

The following message is displayed after the warning is displayed: **--- Press <Enter> to continue, or <Ctrl><R> to enter setup ---** .

Press <Enter> to allow the operating system to continue its boot, or press <Ctrl><R> to enter into the **BIOS Configuration Utility (<Ctrl><R>)** to investigate the cause of the **Failed** virtual disk.

NOTE: A boot virtual disk that is in a **Failed** state prevents the operating system from booting.

To investigate the cause, check for the following:

- Determine if a single or multiple physical disks in a non-redundant virtual disk have failed. If **yes**, data is lost. Recover the lost data from a backup storage source.
- Determine if two or more physical disks in a redundant virtual disk have failed. If **yes**, data is lost. Recover the lost data from a backup storage source.

NOTE: For a RAID 10, if a single physical disk fails in each mirrored set, the redundant virtual disk goes to a **Degraded** status but data is not lost. If two physical disks fail in one of the mirrored sets, the redundant virtual disk goes to a **Failed** status and data is lost.

WARNING: Found virtual disks that are degraded and failed

This warning message is displayed when multiple virtual disks are in **Degraded** and **Failed** state and **Pause if Degraded** or **Pause if Failed** are set to **ON** at the **BIOS Configuration Utility (<Ctrl><R>)**.

The following message is displayed after the warning is displayed: **--- Press <Enter> to continue, or <Ctrl><R> to enter setup ---** .

Press <Enter> to allow the operating system to continue its boot, or press <Ctrl><R> to enter into the **BIOS Configuration Utility (<Ctrl><R>)** to investigate the cause of the **Degraded** and **Failed** virtual disks.

NOTE: A boot virtual disk that is in a **Failed** state prevents the operating system from booting.

To investigate the cause, check for the following:

- Whether the virtual disk is in **Degraded** status because one of the physical disks of a RAID 1 or RAID 5 virtual disk has failed, or one of the physical disks of a RAID 10 virtual disk has failed. Press <Ctrl><R> and verify if the physical disks are offline or missing. Remove and replace a failed physical disk. A second physical disk failure could cause a **Degraded** virtual disk to change to **Failed** status.
- Whether the virtual disk is in a **Failed** status because one or more of the physical disks have failed. Press <Ctrl><R> and verify if the physical disks are offline or missing. Remove and replace the failed physical disk or disks.

Other errors appearing on the BIOS screen

S130 does not display greater than ten virtual disks in the BIOS Configuration Utility (<CTRL><R>)

Likely Cause:	The function is not supported.
Corrective Action:	Remove all physical disks except for the last one(s) added. Then proceed with deleting the virtual disks that are not needed. Remember to take account of the virtual disks that are currently being used.

Unable to delete virtual disks when there are more than ten virtual disks present in the system

Likely cause:	The function is not supported.
Corrective Action:	Remove all physical disks except for the last one(s) added. Then proceed with deleting the virtual disks that are not needed. Remember to take account of the virtual disks that are currently being used.

Virtual disk rebuild status in the BIOS Configuration Utility (<CTRL><R>)

Likely Cause:	Rebuild is not supported in the **BIOS Configuration Utility (<CTRL><R>)**.
Corrective Action:	Boot to a supported operating system. Rebuild starts. To view rebuild status, install a supported storage application.

Virtual disks - Related errors

Cannot create a virtual disk

If you are unable to create a virtual disk, check the following causes:

1. The physical disk is not displayed.
2. Insufficient free space available on the selected physical disks.
3. Incorrect number of physical disks selected for the desired RAID level .
4. The desired physical disk is unavailable.

5.

The physical disk is not displayed

This error might be because:

1. The controller cannot communicate with the physical disks.
2. A cable might be loose or defective.
3. The physical disk might be a SAS drive.
   Re-seat the physical disks in the backplane and check their cables.

Insufficient free space available on the selected physical disks

There must be sufficient available free space on the physical disk(s) used by the virtual disk.

Incorrect number of physical disks selected for the desired RAID level

For details about RAID levels and the allowable number of physical disks used with each RAID level, see understanding RAID levels in *RAID Technology Guide* at **dell.com/support/manuals**.

The desired physical disk is unavailable

Determine whether the physical disk:

1. Is a dedicated hot spare and unavailable for use in another virtual disk.
2. Is full or has insufficient available capacity.

The system already has a maximum of eight virtual disks

Delete unused virtual disks.

⚠ CAUTION: Deleting a virtual disk destroys all data on the virtual disk.

A virtual disk is in a failed state

If the virtual disk is in a failed state, check the following causes in the listed order:

1.
2.
3.

The virtual disk has lost one or more physical disks

Replace the failed physical disk(s) and restore the data from a backup storage source.

A physical disk in the virtual disk has failed or has been removed

1. Re-install the original physical disk if it was inadvertently removed. Perform a **Rescan**.
2. Check the status of the physical disks in the virtual disk. Replace any failed disk(s), if necessary. Restore the data from a backup storage source.
   After any change, perform a rescan to verify if the disk is still in a **Failed** state.

The virtual disk has lost the maximum allowable physical disks per RAID level

One or more physical disks have failed:

1. If the virtual disk is non-redundant, the failure of a single physical disk can cause the virtual disk to fail.
2. If the virtual disk is redundant, two or more physical disks have failed and the virtual disk cannot be rebuilt.
   Create a new virtual disk. Restore the data from a backup storage source.

A virtual disk is in a degraded state

If the virtual disk is in a degraded state, check the following causes:

1. A physical disk was removed.
2. Physical or mechanical problems with the physical disk.
3. The virtual disk has lost redundancy.
4. Corrupted metadata in the virtual disk.

A physical disk was removed

1. Install the original physical disk, if it was inadvertently removed, or replace it with a new or used physical disk.
2. Initialize a new physical disk. Perform a **Rescan** for all physical disks that are replaced.
3. If the physical disk was not removed, check that its cables are correctly installed.

Physical or mechanical problems with the physical disk

1. Check if the physical disk in the virtual disk has failed.
2. If a physical disk was recently removed and replaced, check that it is correctly positioned in the backplane. Check the cable connections at the physical disk and at the system board. Perform a **Rescan**.

The virtual disk has lost redundancy

1. One or more physical disks in the virtual disk have failed. Due to the failed physical disk or disks, the virtual disk is no longer maintaining redundant (mirrored or parity) data. The failure of an additional physical disk results in lost data.
2. Replace the physical disk or disks. Rebuild the physical disk using Storage Management. See the applicable **Storage Management** screen at **dell.com/support/manuals**.

Corrupted metadata in the virtual disk

1. Delete the virtual disk that has the failed metadata.
2. Assign the physical disk as a hot spare to rebuild a redundant virtual disk.
3. To create a non-redundant virtual disk, delete and rebuilt the data on a virtual disk, and restore the data from a backup storage source.

Cannot assign a dedicated hot spare to a virtual disk

If you cannot assign a dedicated hot spare to a virtual disk, check the following causes:

1. The RAID level does not allow a dedicated hot spare to be created.
2. The designated physical disk does not have sufficient capacity to be a dedicated hot spare.
3. The physical disk is already part of a virtual disk.
4. The physical disk are of different types.

The RAID level does not allow a dedicated hot spare to be created

Hot spares cannot be created for Volume or RAID 0 virtual disks.

The designated physical disk does not have sufficient capacity to be a dedicated hot spare

The capacity of the physical disk selected to be a dedicated hot spare must be equal to or larger than the capacity of the smallest physical disk in the virtual disk. For example, if the physical disk selected for a dedicated hot spare is 160 GB, and the physical disks in the virtual disk are 80 GB, 160 GB, and 500 GB, a dedicated hot spare can be assigned. That is because the physical disk selected for the dedicated hot spare is larger than the smallest (80 GB) physical disk in the virtual disk.

The physical disk is already part of a virtual disk

A dedicated hot spare cannot be assigned to another virtual disk.

The physical disk are of different types

The physical disk used as a dedicated hot spare must be the same type as the physical disks that are already part of the virtual disk. For example, if a virtual disk consists of SATA-II physical disks, the dedicated hot spare must be a SATA-II physical disk.

Cannot create a global hot spare

If you cannot create a global hot spare, check the following causes:

1. There are no empty physical disks available or the physical disks have not been converted to RAID capable disks.
2. The physical disk is already part of a virtual disk.
3. The physical disk assigned as the global hot spare has failed.
4. The physical disk assigned as the global hot spare is missing.

There are no empty physical disks available or the physical disks have not been converted to RAID capable disks

Install additional physical disks and convert them to RAID Capable disks. If existing physical disks are **Non-RAID** they need to be converted to RAID Capable disks.

⚠️ **WARNING: When a physical disk is converted to RAID Capable disks, all data on the physical disk is lost.**

📝 **NOTE:** A physical disk with a **Non-RAID** status can be converted to RAID Capable disks, if desired, but it is no longer **Non-RAID** (Converting to RAID Capable disk adds PERC S130 configuration information to the physical disk).

The physical disk is already part of a virtual disk

A hot spare cannot be selected if it is already part of an existing virtual disk.

The physical disk assigned as the global hot spare has failed

When prompted at system startup, press <Ctrl><R>to access the **BIOS Configuration Utility (<Ctrl><R>)**.
In the **BIOS Configuration Utility (<Ctrl><R>)**, select **View Virtual Disk Details** and press <Enter>.
Determine whether the physical disk that is designated as the global hot spare has a status of **Failed**.

1. Check to see if the physical disk is malfunctioning or is physically disconnected.
2. Select another physical disk as the global hot spare.

The physical disk assigned as the global hot spare is missing

- Check to see if the physical disk was removed from the backplane or cable connection, or whether the cables from the controller to the physical disk are disconnected or faulty.
- Perform a rescan to verify that the physical disk is still missing.

Physical disk - related errors

The physical disk fails

If the physical disk fails, check the following causes:

- A physical disk is not visible in the BIOS Configuration Utility <Ctrl><R> or is offline.
- A physical disk is highlighted red at the BIOS Configuration Utility <Ctrl><R>.

A physical disk is not visible in the BIOS Configuration Utility <Ctrl><R> or is offline

1. Check that the cables are properly connected.
2. Check that the physical disk is installed properly in the system's backplane.
3. Check the system's backplane for damage.
4. Reinstall the physical disk and ensure that it is seated correctly in the system's backplane.
5. Check if the Physical Disk might be a SAS drive.
6. Perform a Rescan, to perform either of the following:
   a. Update the status of storage devices attached to the controller.
   b. Fix an error caused by deleting or initializing a virtual disk.

A physical disk is highlighted red at the BIOS Configuration Utility <Ctrl><R>

1. Replace the physical disk. Depending on the RAID level of the virtual disk, data might be lost.
2. Perform a **rescan** to confirm that the new disk was discovered.

A dedicated hot spare fails

If a dedicated hot spare fails, check the following causes:

1. The controller cannot communicate with the hot spare.
2. The dedicated spare is not visible in the BIOS Configuration Utility <Ctrl><R> or is offline.

The controller cannot communicate with the hot spare

1. Check that the cable from the controller to the physical disk is connected properly.
2. Ensure that the physical disk is still assigned as a global or dedicated hot spare.
3. Check if the physical disk assigned as the hot spare has failed.

The dedicated spare is not visible in the BIOS Configuration Utility <Ctrl><R> or is offline

1. Check if the physical disk has been removed or has failed.
2. Check for a loose or bad cable.

Failed or degraded virtual disk

The removal of one physical disk from a virtual disk causes:

1. A Volume or RAID 0 virtual disk to change to **Failed** status.
2. A RAID 1 and RAID 5 virtual disk to change to **Degraded** status.
3. A RAID 10 virtual disk to change to **Degraded** status (when a physical disk is removed from one of the mirrored sets).
   Re-insert the removed physical disk and perform a Rescan of the virtual disk.

Cannot initialize a physical disk

Check whether or not the physical disk is:

1. Already a member of a virtual disk.
2. Currently a global or dedicated hot spare.
3. Reporting an **Offline** state.
   Only physical disks that are **Ready** state can be initialized.

Cannot create a virtual disk on selected physical disks

Check whether these physical/virtual disks were migrated from a legacy controller with mixed RAID levels. If so, creating additional virtual disk(s) on these physical disk(s) is not allowed.

Cannot perform an Online Capacity Expansion / Reconfigure on a virtual disk

Check whether these physical/virtual disks were migrated from a legacy controller with mixed RAID levels. If so, Online Capacity Expansion / Reconfigure by adding physical disk on such a set of physical disks is not allowed.

Status LED is not working

Ensure system is booted to the operating system. Install **Dell Open Manage Server Administrator** management utility version 7.0 (or higher).

Getting help

You can get help with your Dell product by contacting Dell, or send feedback on product documentation.

Contacting Dell

NOTE: If you do not have an active internet connection, you can find the contact information on your purchase invoice, packing slip, bill, or Dell product catalog.

Dell provides several online and telephone-based support and service options. Availability varies by country and product, and some services may not be available in your area. To contact Dell for sales, technical support, or customer service issues:

Go to **Dell.com/contactdell.**

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 a physical DR Series system by pulling out the information tag. This can also be found on the support tab in the GUI. This information is used by Dell to route support calls to the appropriate personnel.

Related Documentation

NOTE: For all storage controllers and PCIe SSD documents, go to **dell.com/ storagecontrollermanuals**.

NOTE: For all Dell OpenManage documents, go to **dell.com/openmanagemanuals**.

NOTE: For all operating system documents, go to **dell.com/operatingsystemmanuals**.

NOTE: For all PowerEdge documentation, go to **dell.com/poweredgemanuals**.

NOTE: For all PowerVault documentation, go to **dell.com/powervaultmanuals**.

Your product documentation includes, *Dell PowerEdge RAID Controller (PERC) S130 User's Guide*. The User's Guide discusses features, installation, management, and troubleshooting of the PERC S130 controller.

Documentation feedback

Click the **Feedback** link in any of the Dell documentation pages, fill out the form, and click **Submit** to send your feedback.