Precision 7875 Tower

RAID Guide

Regulatory Model: D04T
Regulatory Type: D04T001
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DELL Technologies

Notes, cautions, and warnings

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

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

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

Contents

1

Overview

This document describes the procedure to configure the Redundant Array of Independent Disks (RAID) volumes on Serial Advanced Technology Attachment (SATA) and Non-Volatile Memory express (NVMe) drives using the AMD RAID application, AMD RAIDXpert2.

This document provides a high-level overview of how to manage the RAID configurations. For more information, refer to AMD documentation, in particular the AMD-RAIDXpert2 User Guide and AMD NVMe/SATA RAID Quick Start Guide for Windows Operating Systems, both available at www.amd.com.

Scope

This document provides examples of RAID configurations using the Precision 7875 Tower.

In some of the screenshots, a firmware version may be listed as examples. The firmware version on your system may be different.

NVMe-related sections are subject to change as the technology evolves.

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Introduction

The following RAID types are supported on Precision 7875 Tower workstations:

- RAID 0
- RAID 1
- RAID 5
- RAID 10
- Volume (Just a Bunch Of Disks - JBOD)
- RAIDABLE or RAID Ready 7

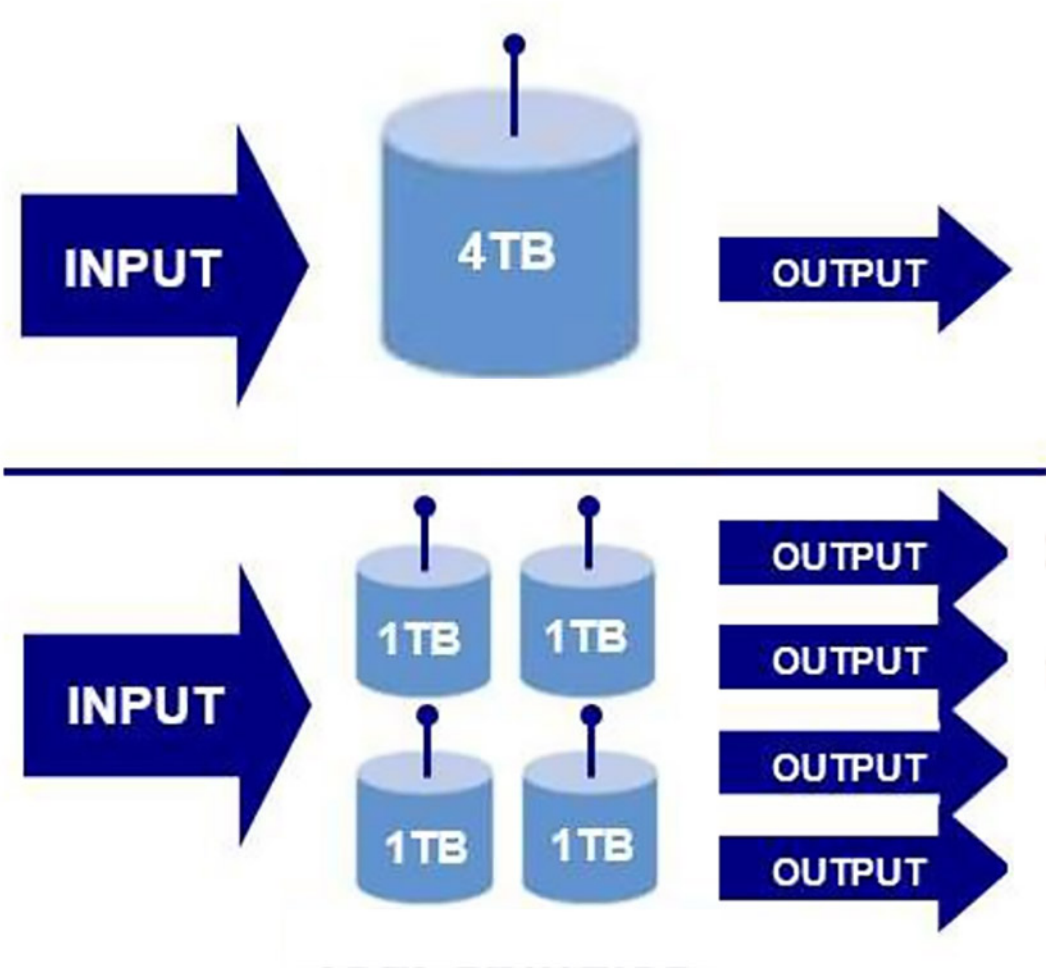
RAID 0

RAID 0 splits or stripes data across two or more drives for faster read and write performance. It uses more space compared to other RAID types, and performance increases as the number of drives increases. However, if any drive in the array fails, all the data is lost because there is no data redundancy.

The following are the key features of RAID 0:

- Two or more drives of the same size are required for RAID 0.
- A single-drive RAID 0 volume is almost equivalent to using raw drives in JBOD mode.
- In multiple-drive RAID 0 volumes, read and write operations are shared concurrently across multiple platters and heads. Therefore, it provides better performance.
- The total volume capacity as seen by the operating system is equal to the sum of the individual-drive capacities. For example, if you use four drives of 1 TB size, you get 4 x 1 TB = 4 TB.

The following figure illustrates that the total volume capacity of four 1 TB hard drives in a RAID 0 array is equivalent to one 4 TB hard drive, and that there is no data redundancy.



RAID 1

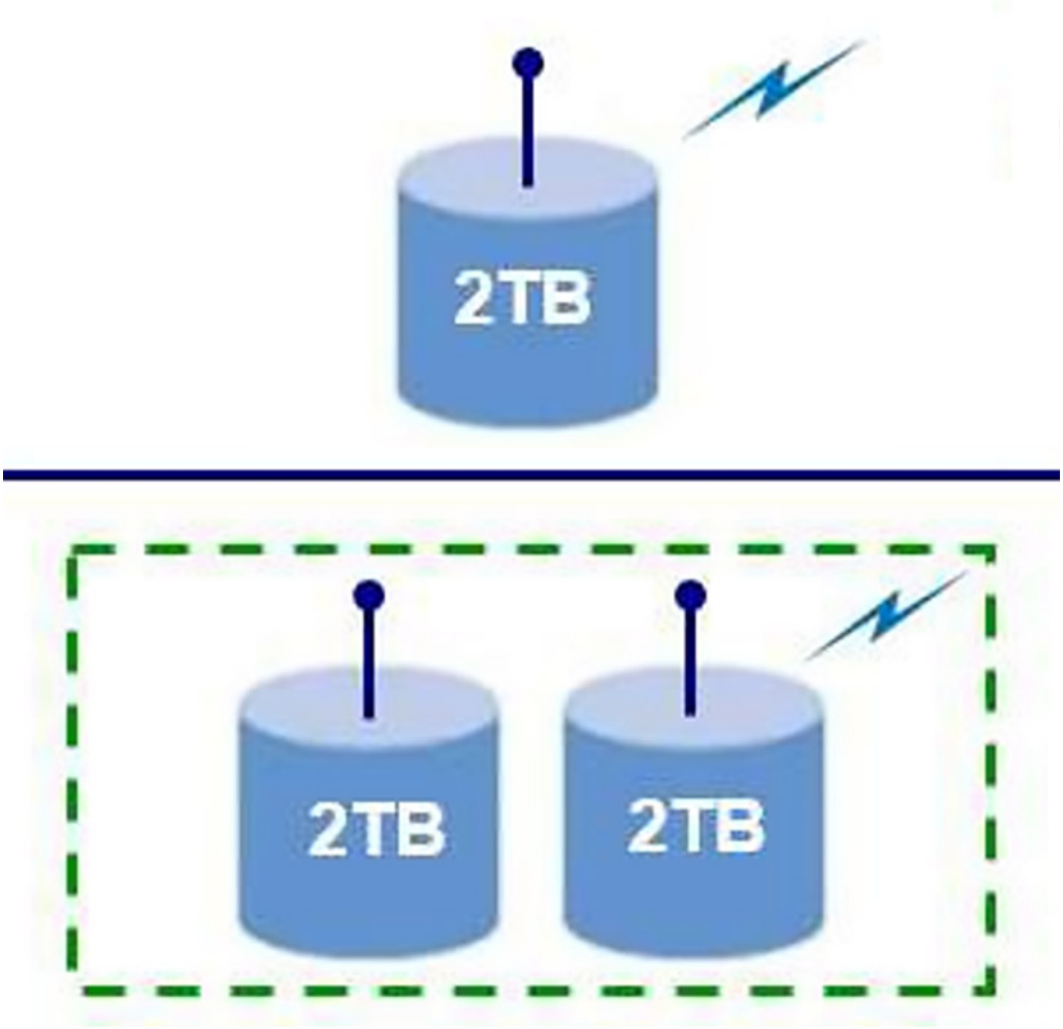
RAID 1, also known as the data mirroring, provides 100% redundancy for data protection.

By balancing the load, read performance can be twice as that of a single drive; write performance is almost same as a single drive. RAID 1 volumes are suitable for operating system volumes. A disadvantage is cost, as twice as many drives are required for RAID 1.

The following are the key features of RAID 1:

- 100% duplication of data with instant failover.
- Requires two drives, preferably of the same capacity. When two different capacity drives are used, the volume size is same as the capacity of the smaller drive. For example, if you use one 1 TB drive and one 2 TB drive in a RAID 1 array, the volume size is 1 TB.

The following figure shows that if one 2 TB drive fails, data is lost. However, when there are two 2 TB drives in a RAID 1 volume, data is still available even if one of the disks fails.



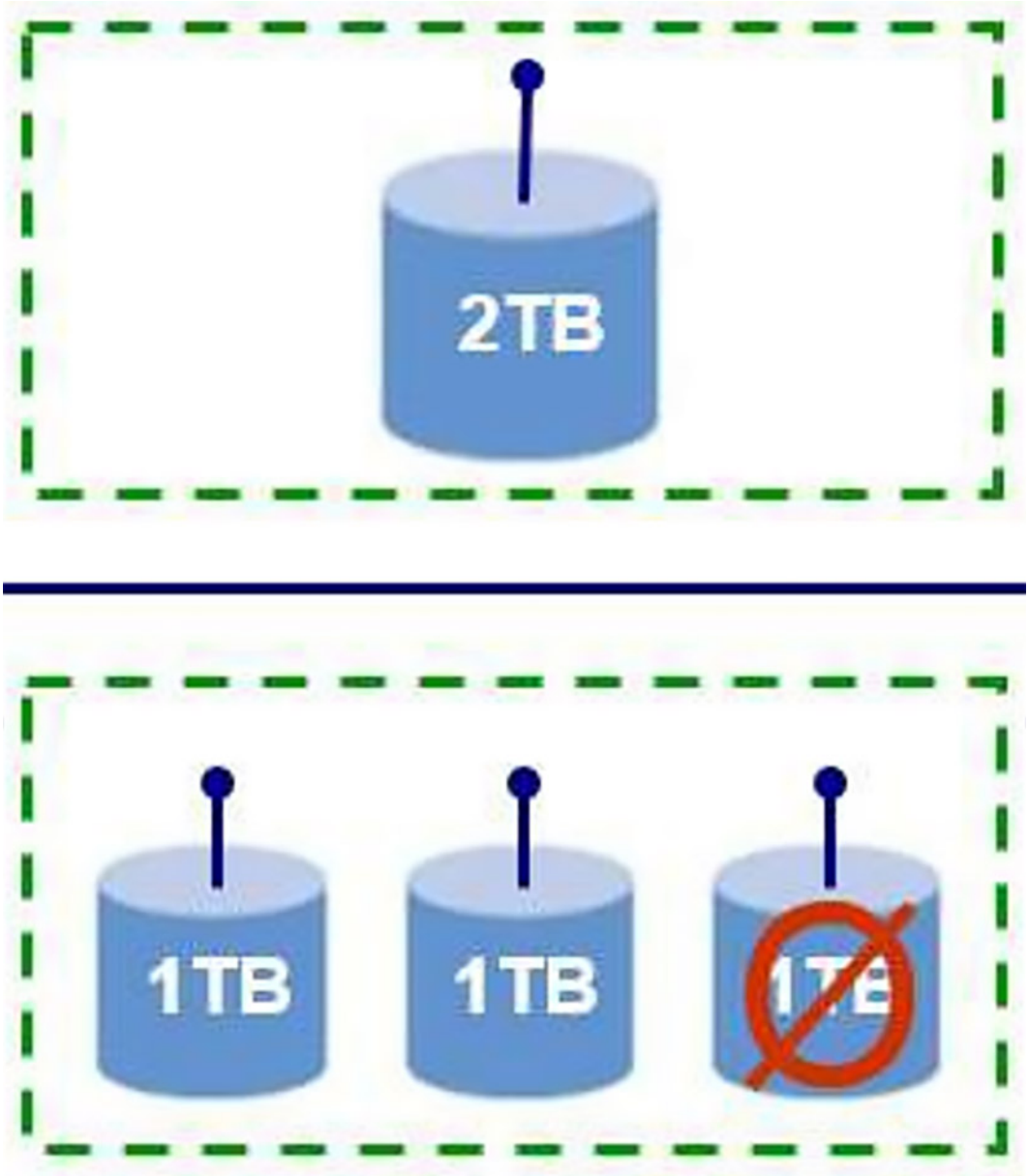
RAID 5

RAID 5 provides better performance by using data striping and protection through parity. The disadvantage of RAID 5 is that rebuilding a large RAID 5 volume requires a longer period of time.

The following are the key features of RAID 5:

- Requires at least three drives.
- Data is available even if one of the drives present in the volume fails. The failed drive must be replaced, and the volume must be rebuilt for the data to be accessible.
- The total capacity is *N*-1, where *N* is the total capacity of the drives in the array. For example, if you use three 1 TB drives in a RAID 5 array, the total volume size is 2 TB.

The following figure shows that if one 2 TB drive fails, data is lost. However, if there are three 1 TB drives in a RAID 5 array, the data is still available even if one of the drives fails.



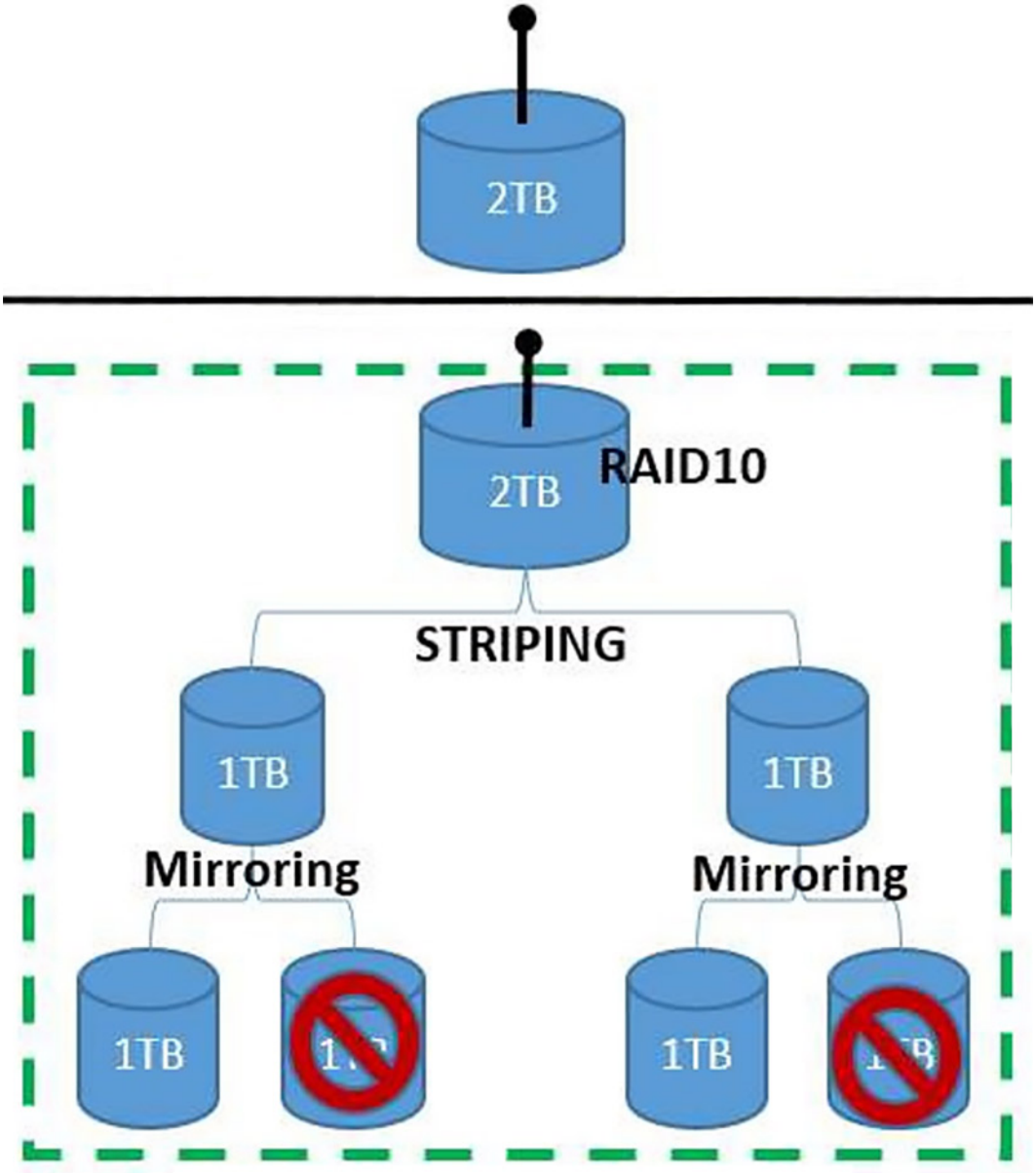
RAID 10

RAID 10 is a stripe of mirrors that combines the features of RAID 0 and RAID 1. As the blocks are striped and mirrored, the performance and redundancy are higher. The disadvantage of RAID 10 is that it is more expensive than other RAID levels, with a higher number of drives required.

The following are the key features of RAID 10:

- Requires a minimum of four drives. Only an even number of drives can be used, and an odd number of drives are not possible.
- The total volume capacity is half the sum of individual drives capacity. For example, when you use four drives of 1 TB, you get a RAID 10 volume of 2 TB.

The following figure shows that the data is still available even if one disk drive fails in each mirror.



Volume

Volume, also named as JBOD, uses raw drives without any RAID configuration. AMD RAIDXpert2 treats one or more disks or the unused space on a disk as a single array. It supports one to eight disks.

RAIDABLE

RAIDABLE is also known as RAID Ready. RAIDABLE disk can be transformed to RAID 0 or RAID 1. It supports only one disk.

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Configuring RAID with AMD RAIDXpert2

Creating the RAID volume

1. When your computer boots up, press **F2** to enter the BIOS Setup menu.
2. Click **Storage** in the main menu.
3. In the SATA Operation section, select the **RAID On** mode.
4. Click **APPLY CHANGES** to save the settings, then click **EXIT**.

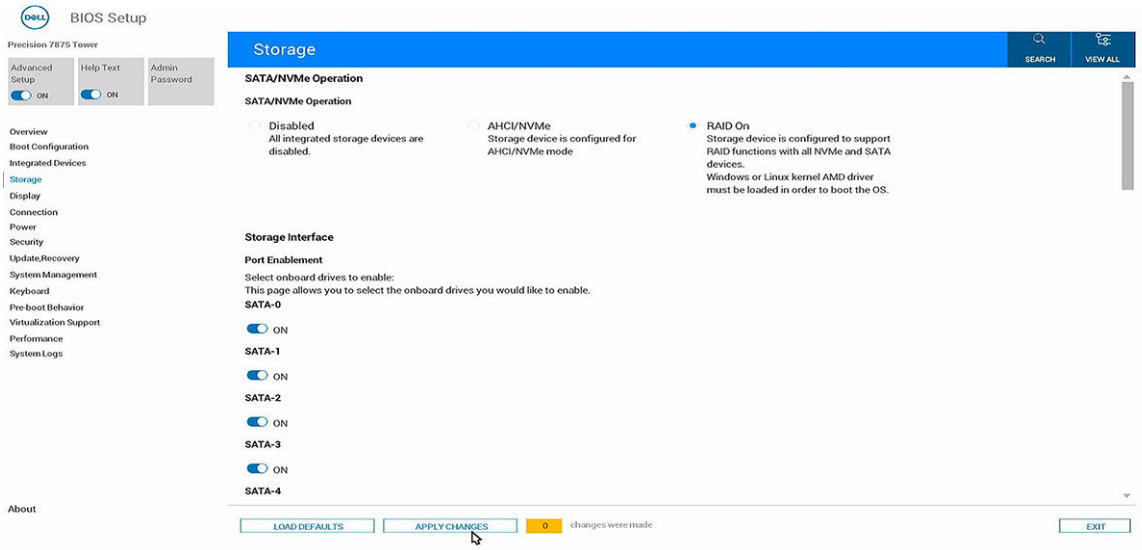

Figure 1. Creating the RAID volume - Apply changes

5. When your computer reboots, press the **F12** key to enter the One-Time Boot Settings menu.
6. In the Pre-Boot Tasks menu, select **Device Configuration**.
   The TPV EFI Device Manager appears.

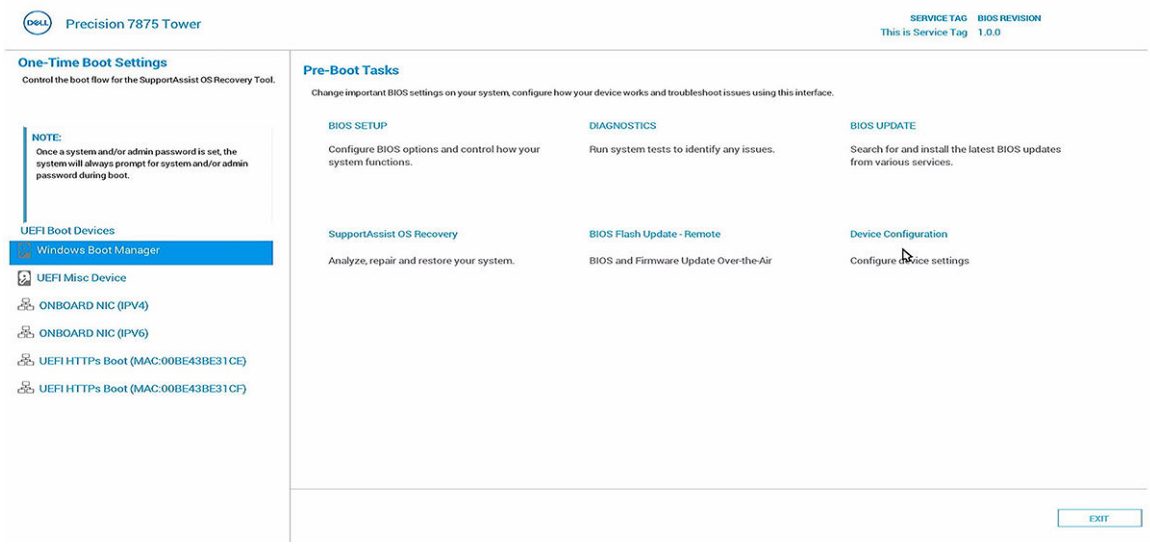

Figure 2. Device Configuration

7. From the Devices List, select **RAIDXpert2 Configuration Utility**.

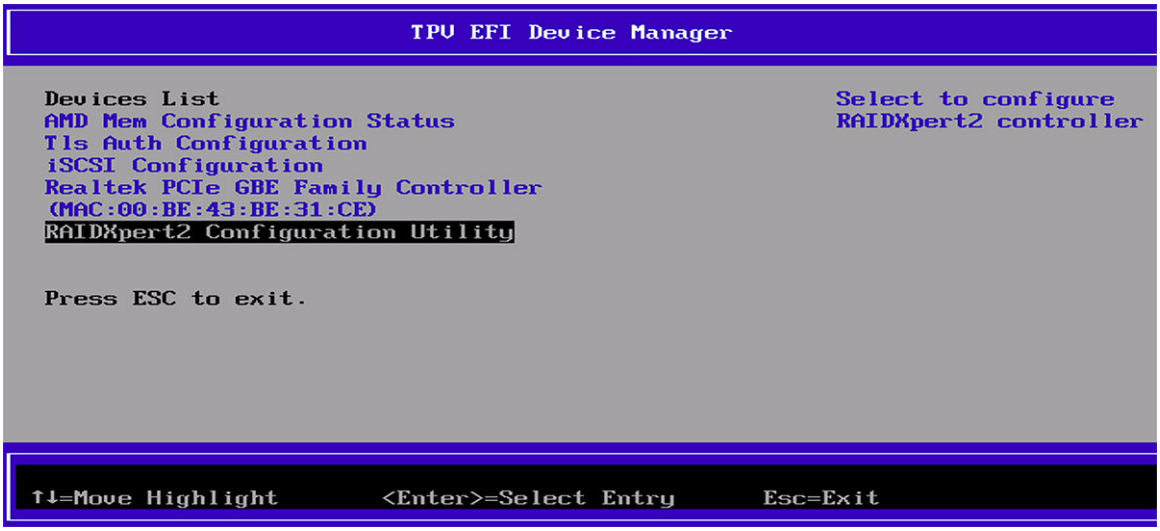

Figure 3. TPV EFI Device Manager - RAIDXpert2 Configuration Utility

8. On the Array Management pane, select **Manage Array Properties**.

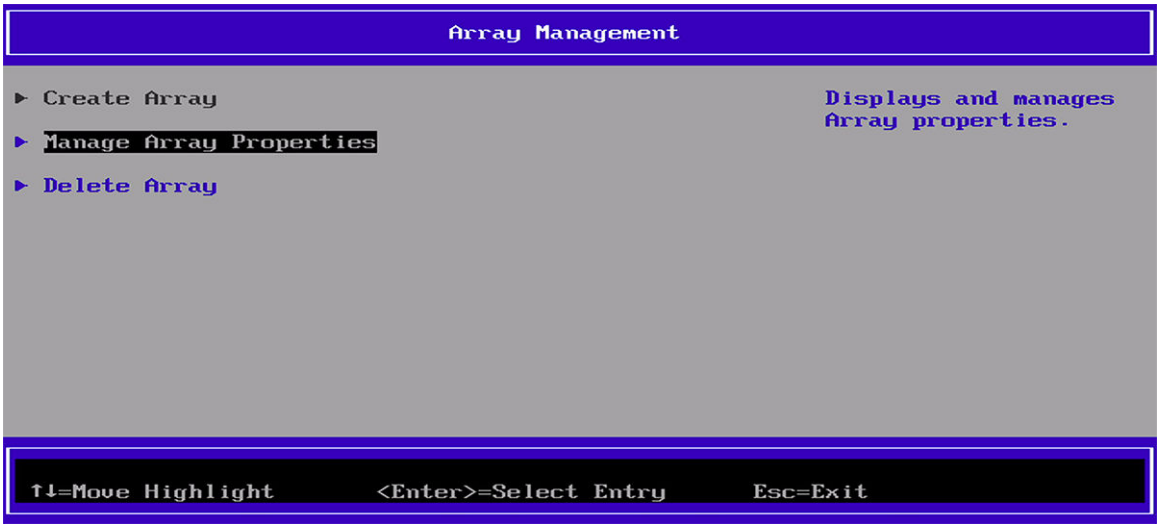

Figure 4. Array Management - Manage Array Properties

9. Select **Create Array**.

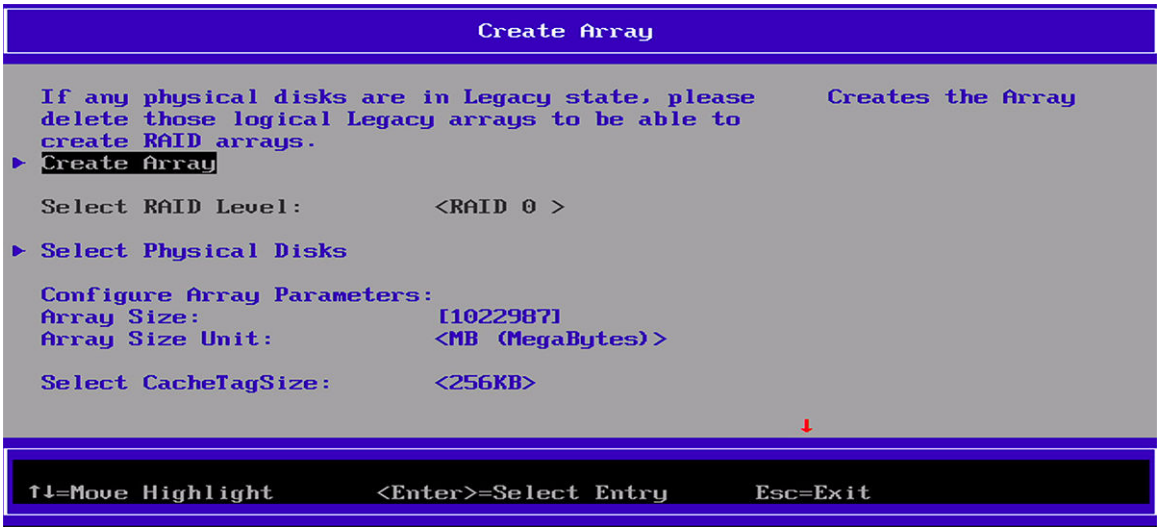

Figure 5. Create Array

10. On the Create Array pane, select **Select Physical Disks** to create the RAID mode.
    The list of RAID types is displayed.

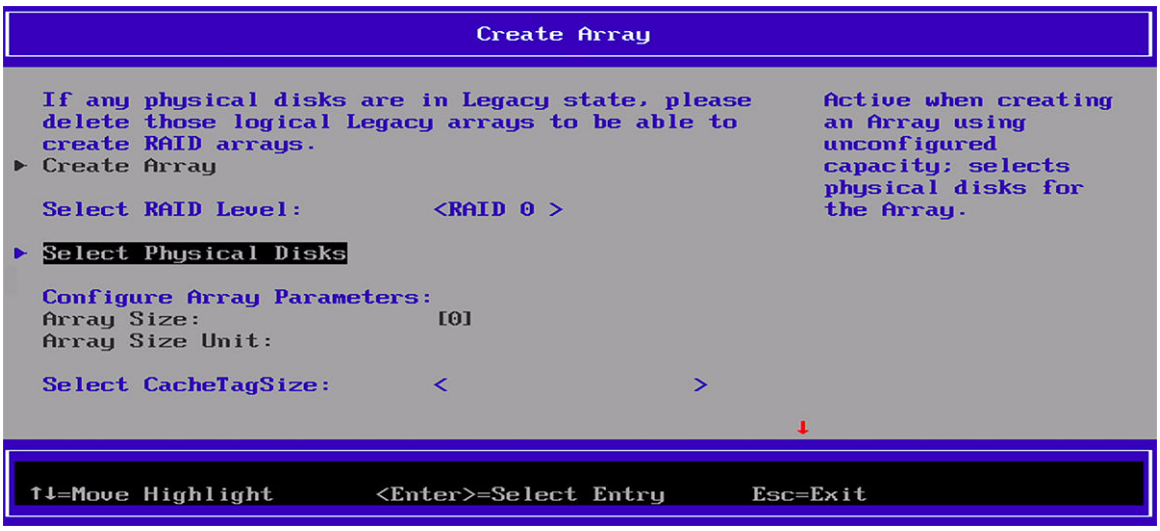

Figure 6. Create Array - Select Physical Disks

11. From the list, select the desired RAID type.
12. In the Select Media Type section, select the disk.
    Ensure that **[X]** is selected next to the disk.
13. Select **Apply Changes** to save the settings.

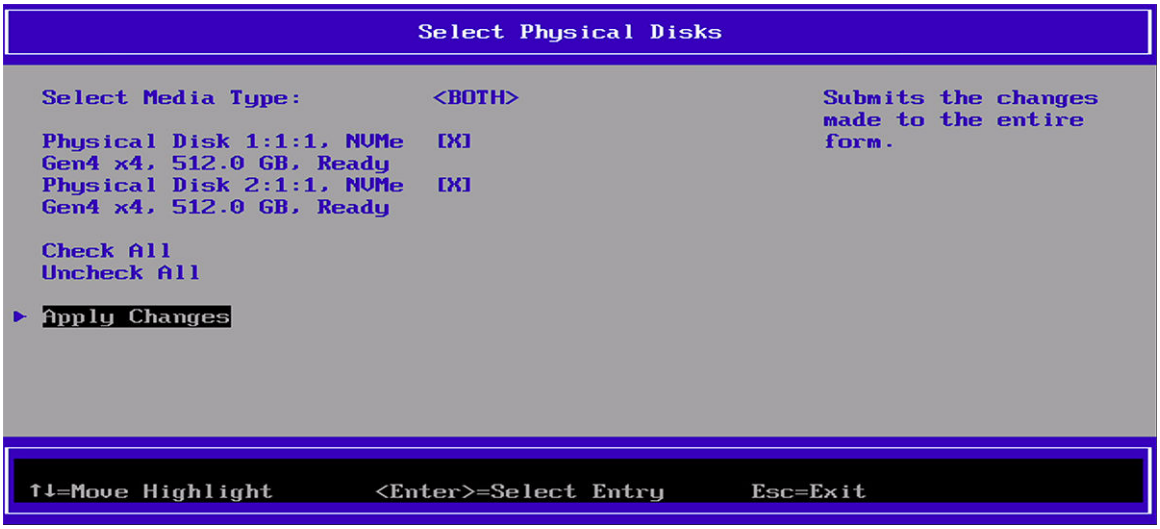

Figure 7. Select Physical Disks - Apply Changes

NOTE: To check if the RAID array is created, on the Create Array pane, click **Create Array**. On the Array Management pane, click **Manage Array Properties** to view the RAID volume that is created.

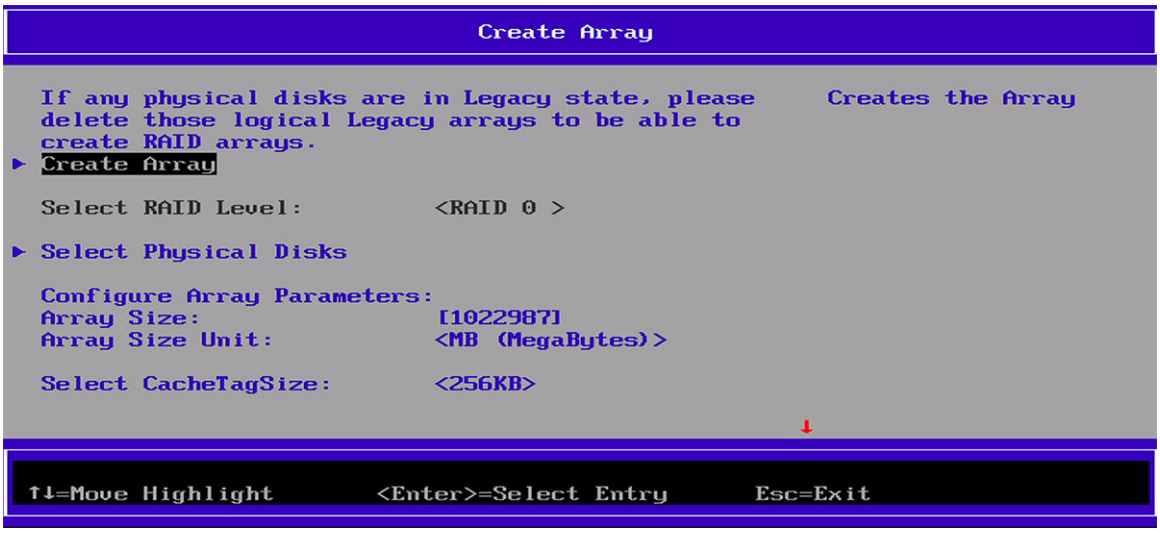

Figure 8. Create Array

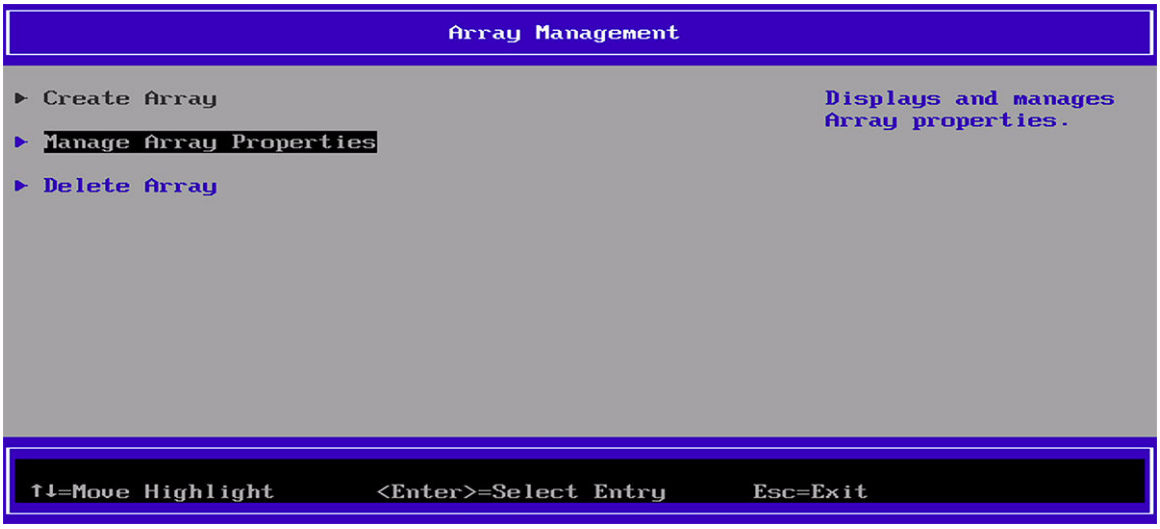

Figure 9. Array Management - Manage Array Properties

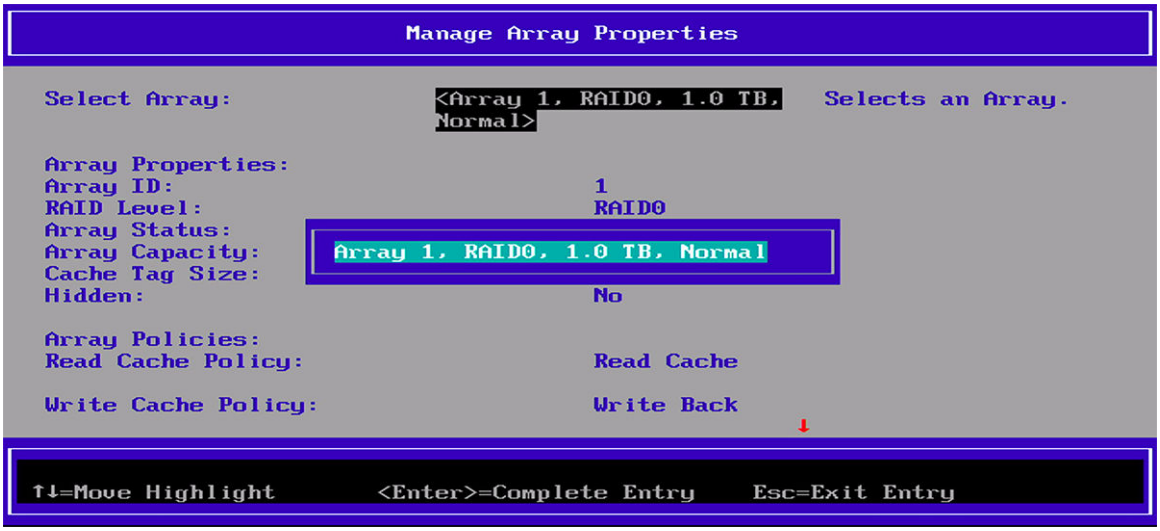

Figure 10. Manage Array Properties

Downloading the RAID driver

NOTE: These steps are to be performed only if you want to change or reinstall the operating system.

1. Go to www.dell.com/support and search for your product.
2. Click **Drivers & Downloads** and download the AMD Chipset Device Software.
3. Double-click the **.exe** file of the downloaded chipset driver.
4. Select **Extract** and save the package to your system.

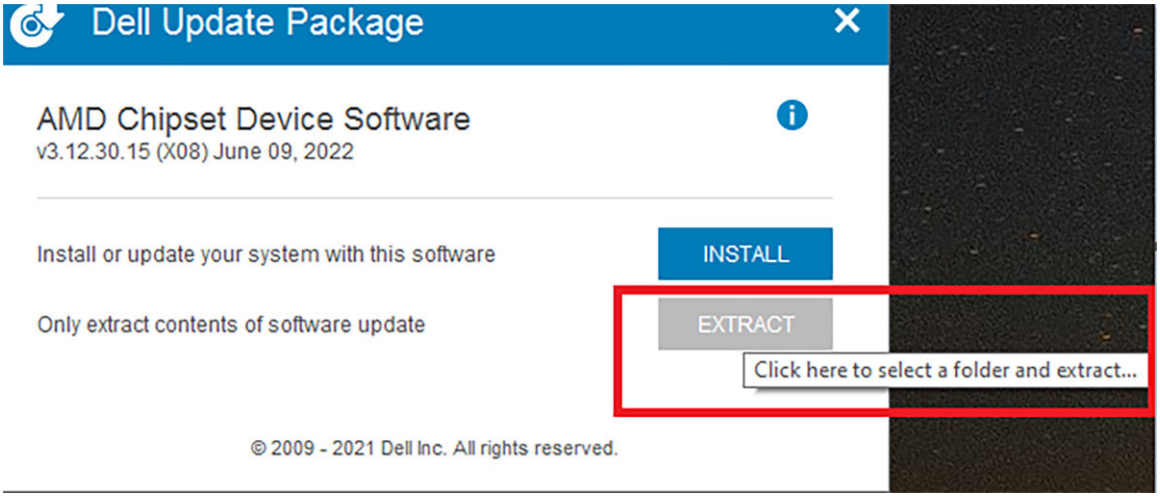

Figure 11. Downloading the RAID driver

Installing an operating system to the RAID array

NOTE: You must configure the RAID volume before installing the operating system to the RAID array.

1. Insert the **`Windows operating system installation media`** or **`disk`**.
2. In the Windows setup box, click **Browse**.
3. Go to the folder containing the downloaded AMD RAID driver.
4. Load the **rcbottom.inf** in the folder.
5. Repeat steps 2 to 3 to load the **rcraid.inf** file, followed by the **rccfg.inf** file.
6. Complete the installation by following the instructions that are displayed on the screen.

   NOTE: You can verify if the RAID driver installation is complete by checking in the Device Manager. The installation of the operating system is supported only on the first RAID volume.

7. Reboot the operating system and install the AMD RAIDXpert2 application from the AMD Chipset Device Software that is downloaded previously.
8. Open the AMD RAIDXpert2 app from the Windows Start icon.
9. From the menu, select **Disk** > **Properties**.

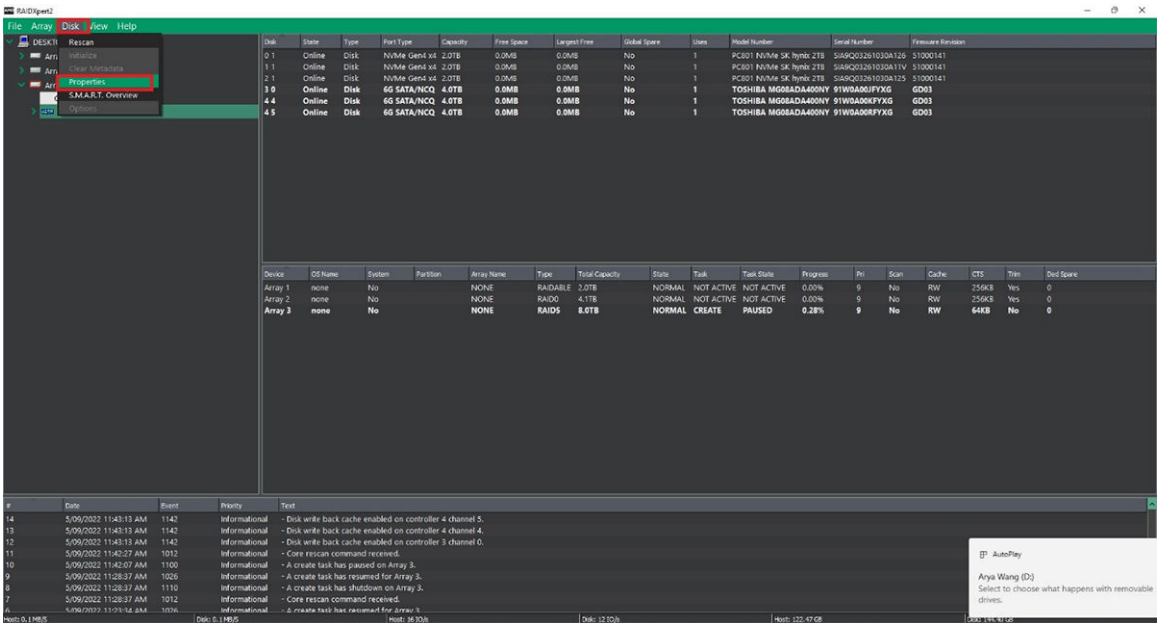

Figure 12. RAIDXpert2 - Disk - Properties

10. Select the required **Disk**.
    The Disk properties are displayed.

    NOTE: If the Disk Write Back Caching and Disk Read Ahead are already enabled, skip steps 11 and 12.

11. In the Disk Write Back Caching, select **Enable**.
12. In the Disk Read Ahead, select **Enable**.

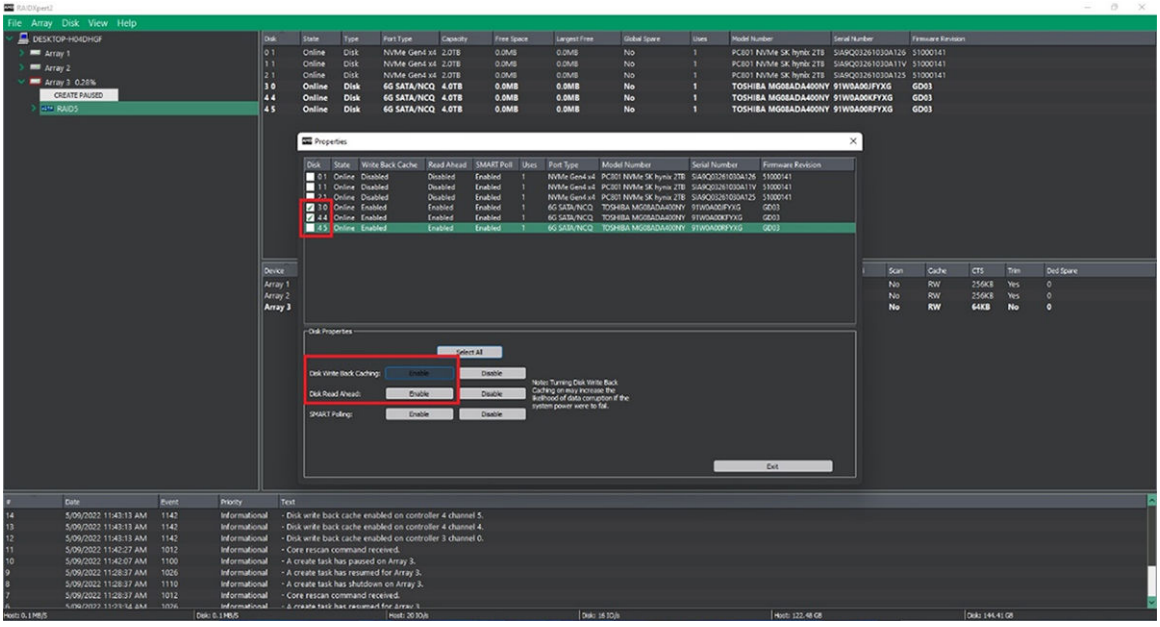

Figure 13. Enable

NOTE: You must not use Shingled Magnetic Recording (SMR) Hard Disk Drives (HDDs). For redundant arrays, the Create process starts after the operating system and RAID drivers are installed and the computer is booted to the operating system. However, the arrays are immediately available for use as a boot array or data array. You must confirm that the RAID Create process is completed for redundancy to be active.

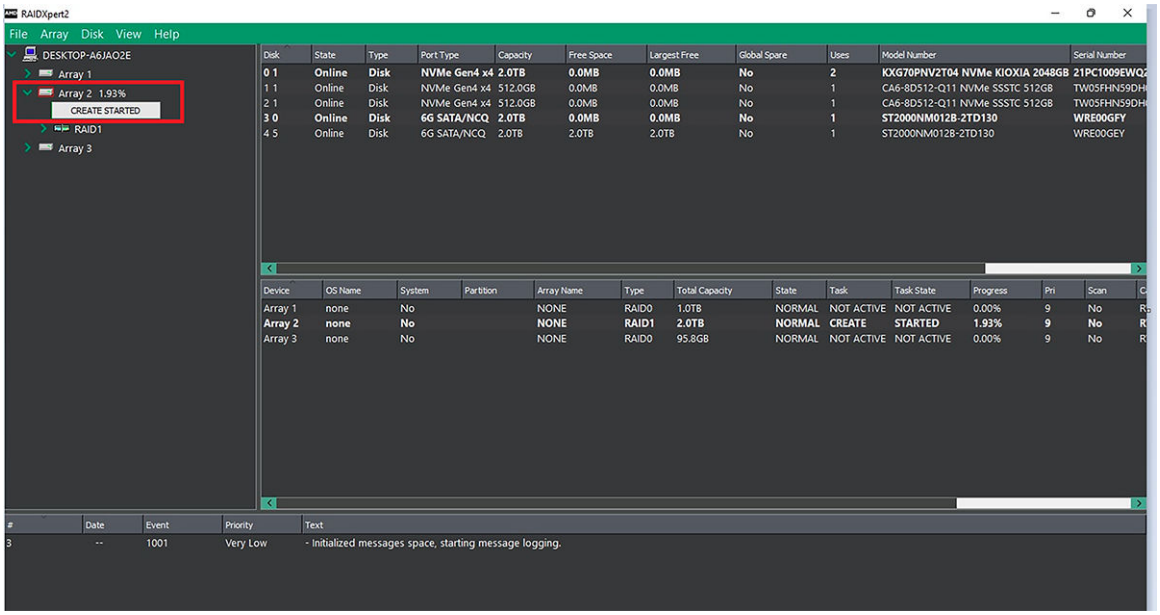

Figure 14. Create started

Deleting the RAID volume

1. Press the **F12** key to enter the One-Time Boot Settings menu.
2. Select **Device Configuration**.

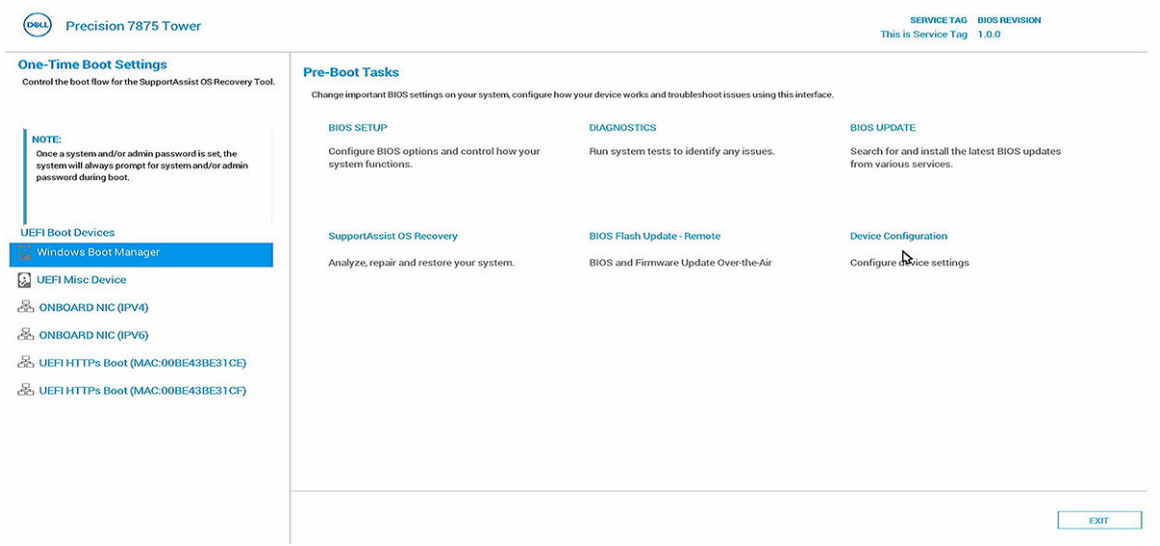

Figure 15. Device Configuration

The TPV EFI Device Manager pane appears.

3. From the Devices List, select **RAIDXpert2 Configuration Utility**.

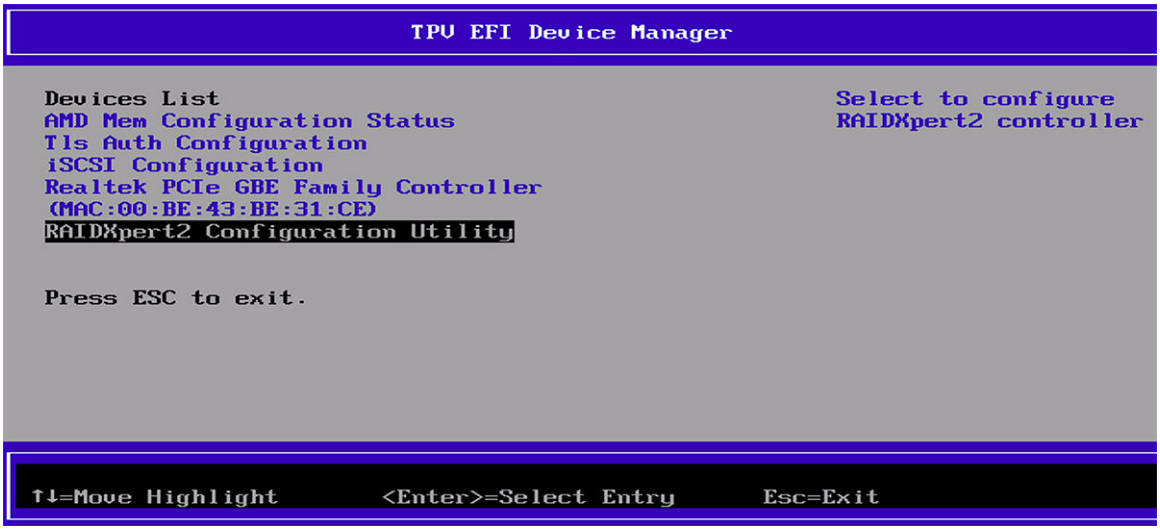

Figure 16. TPV EFI Device Manager - RAIDXpert2 Configuration Utility

4. On the Array Management pane, select **Manage Array Properties**.

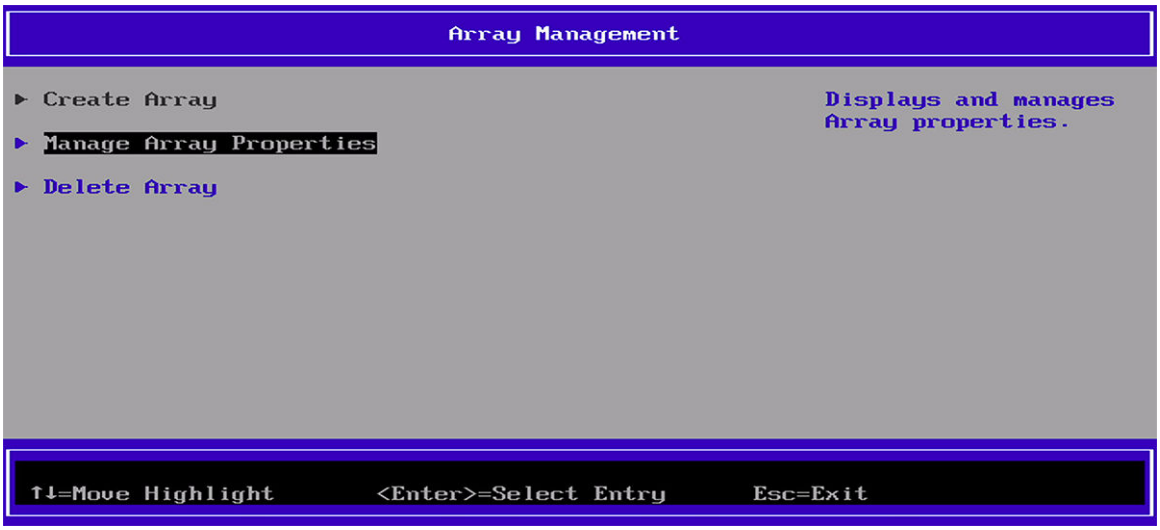

Figure 17. Array Management - Manage Array Properties

5. Select **Delete Array**.
   Ensure **[X]** is selected next to the Delete Array.

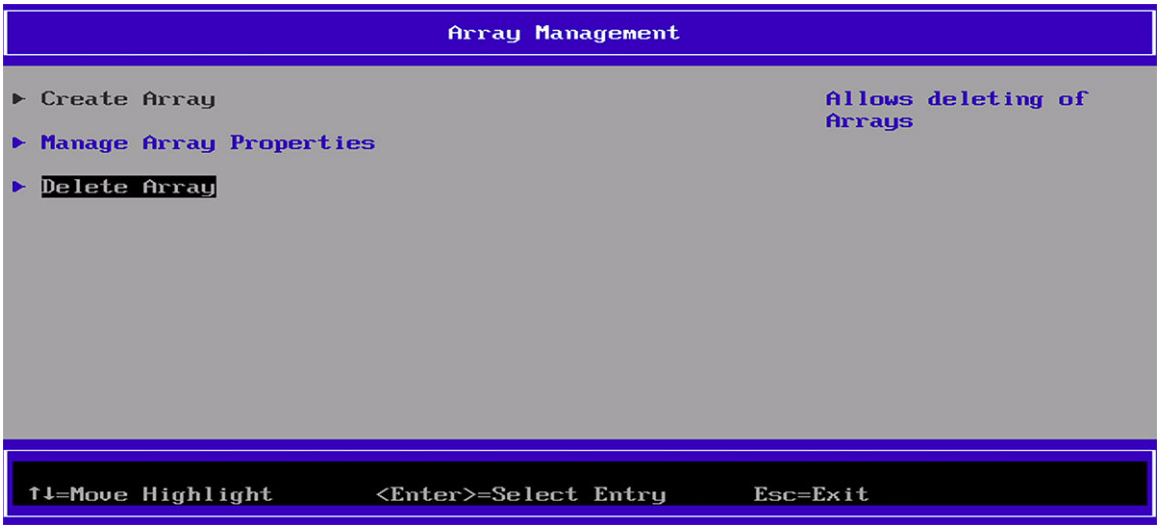

Figure 18. Array Management - Delete Array

6. Select **Check All**.
7. Select **Delete Array(s)** .

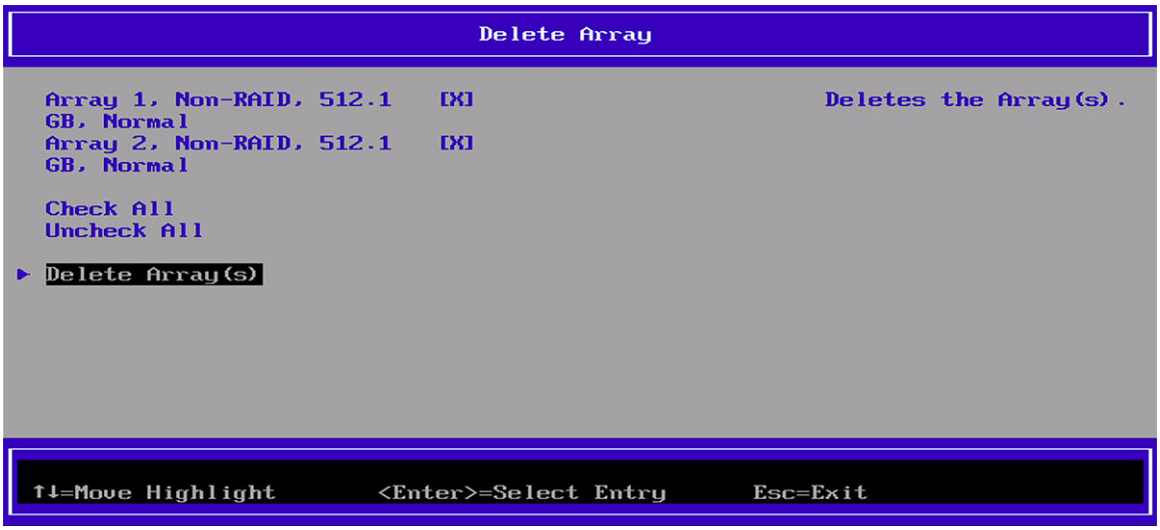

Figure 19. Delete Array(s)

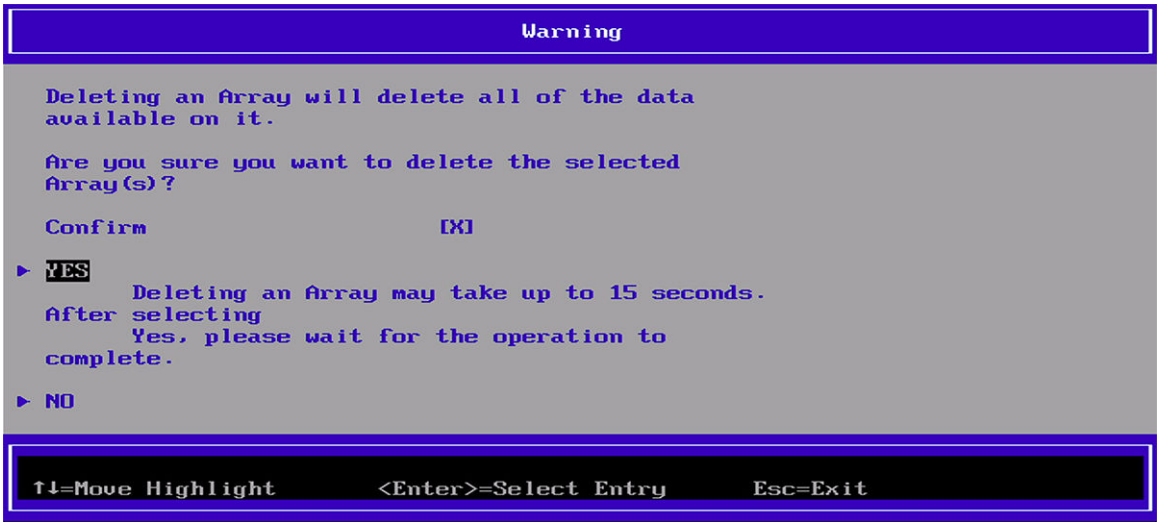

Figure 20. Confirm - Delete Array(s)

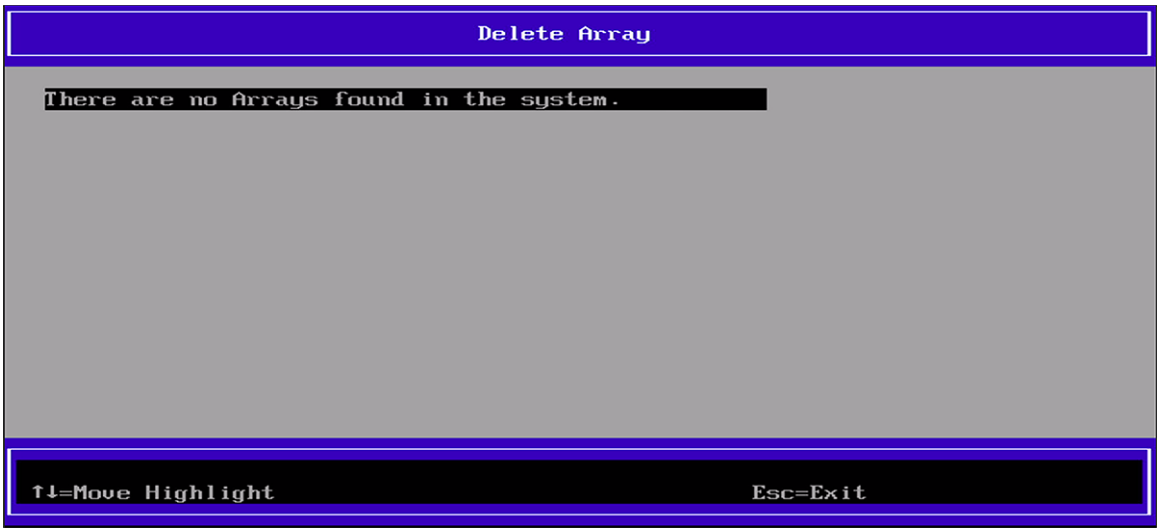

Figure 21. Delete Array - Confirmation status

4

Platform supported controllers

This topic provides a brief description on controllers supported in each platform.

The workstation used in this guide is the Precision 7875 Tower. The Precision 7875 Tower system supports AMD Ryzen Threadripper Pro processors and ship with the AMD PROM21 chipset. The below table provides details on the different storage controllers and the platform support for each.

Table 1. Platform supported controllers

RAID Controller	Precision 7875 Tower
Broadcom MegaRAID SAS 9540-8i	Optional SATA SAS, SSD
Broadcom MegaRAID SAS 9660-16i	Optional SATA SAS, SSD

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Broadcom MegaRAID 9540-8i and 9660-16i Controllers

In this current generation, the Configuration utility in Legacy BIOS mode is defeatured. And so, the user has to use UEFI-HII Configuration utility to do RAID configurations with Broadcom MegaRAID 9540-8i and 9660-16i controllers. The user is free to use either legacy BIOS mode or UEFI boot mode after successfully creating the RAID volumes.

Create RAID volume

Enter the Device Configuration menu

During system POST, press the F12 menu when the Dell logo is loading. A progress bar appears if your keystroke is successful. You are presented with a menu similar to the below.

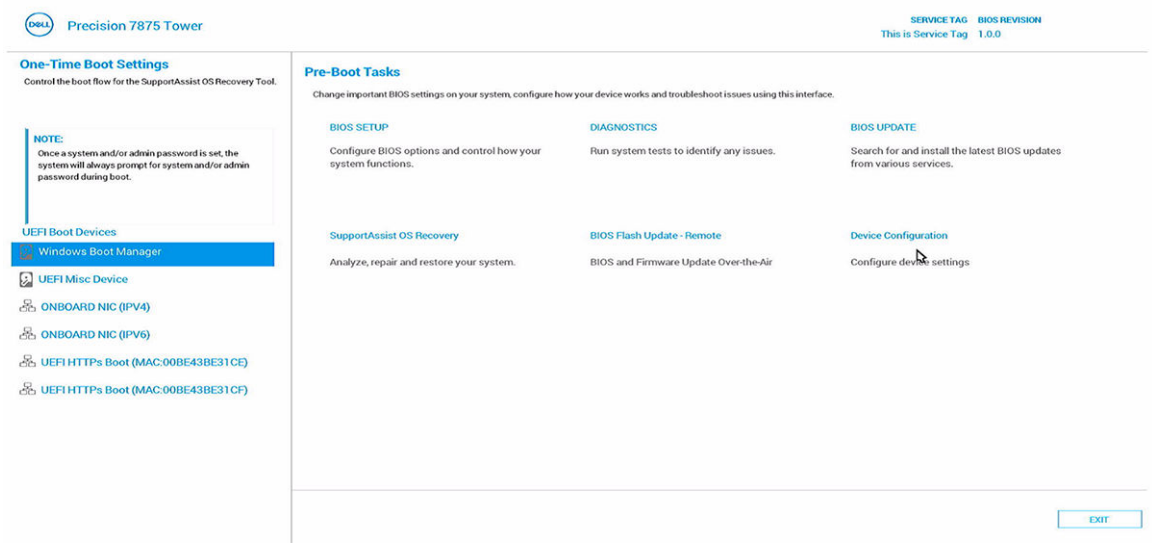

Figure 22. Device Configuration Menu

Using the ↑ and ↓ arrow keys, go to **Device Configuration**, and press the **ENTER** key on your keyboard. Depending upon the devices you have installed in the system, you may be presented with different options than the below. You can use the left and right arrow keys to select to the different devices you have installed in the system.

Select the UEFI-HII configuration utility for Broadcom RAID controllers

Once inside the MegaRAID Configuration Utility, the user can navigate around using the up (↑) and down (↓) arrows on the keyboard. ESC can be used to exit the device and return to the Boot Options menu. Use **ENTER** to select the menu option. These options are also described at the bottom right-hand corner of the screen.

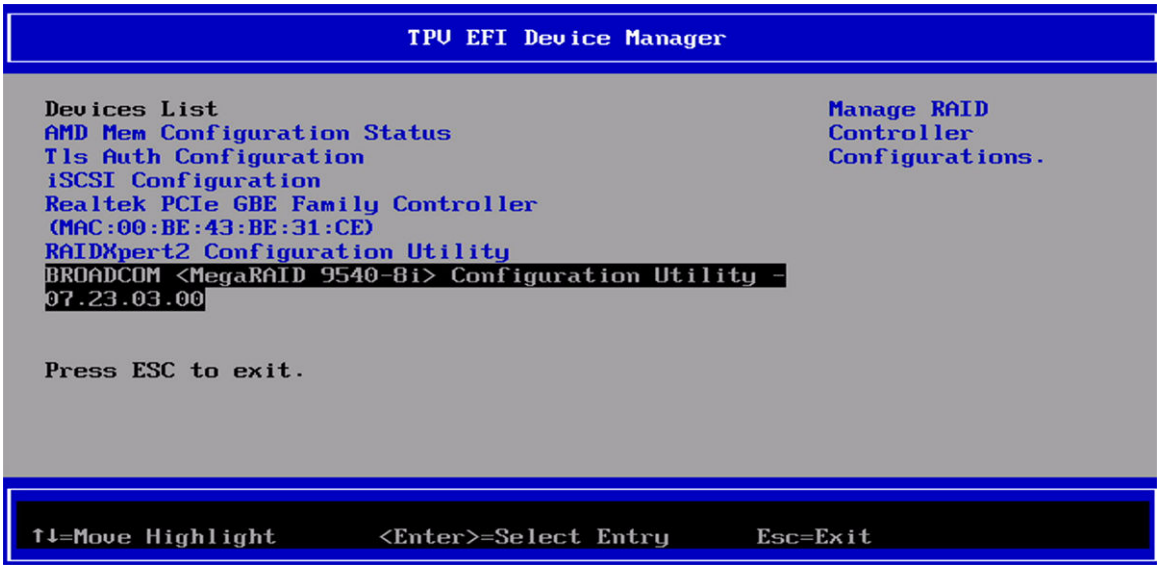

Figure 23. UEFI-HII configuration utility for BroadcomRAID 9540 controller

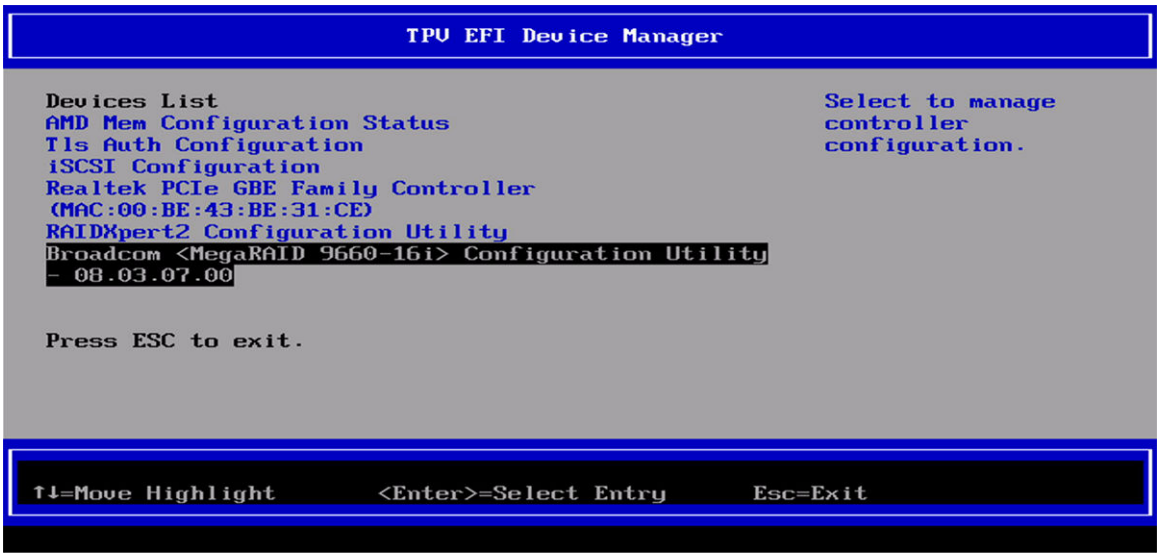

Figure 24. UEFI-HII configuration utility for BroadcomRAID 9660 controller

Creating the RAID Volume

When you are ready to create a RAID Array or Virtual Drive, go to **Configuration Management** and press **Enter**. You are presented with the below menu.

Figure 25. Creating the RAID Volume - Configuration Management

Press **Enter** again to select **Create Virtual Drive** to begin setting the RAID array.

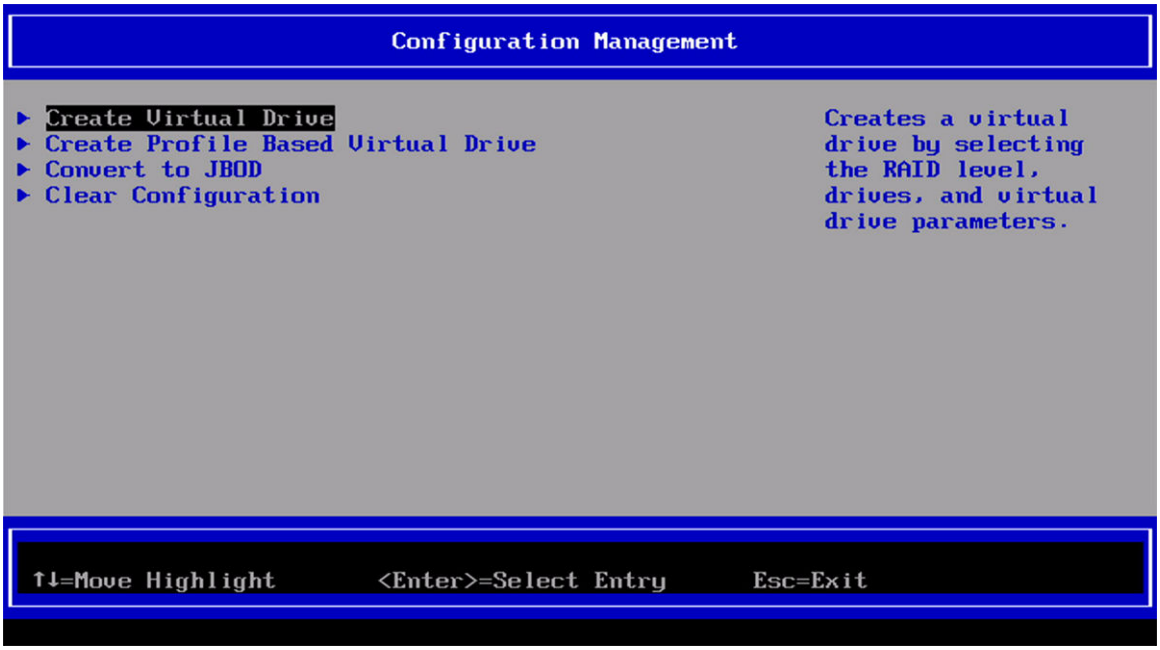

Figure 26. Creating the RAID Volume - Create Virtual Drive

Choosing a RAID 0 or 1 level

The first step to creating a RAID array is to choose the RAID level desired. You can either use the **+/-** keys on the keyboard to change the RAID level, or press **Enter** to bring up a list of supported RAID options based on the hard drives available in the system. Alternatively, you can use the up and down arrows to navigate down to other options. We will proceed with using the default options. When ready, go to **Select Drives** option and press **Enter**.

Note: See Create a RAID volume on how to create a RAID volume.

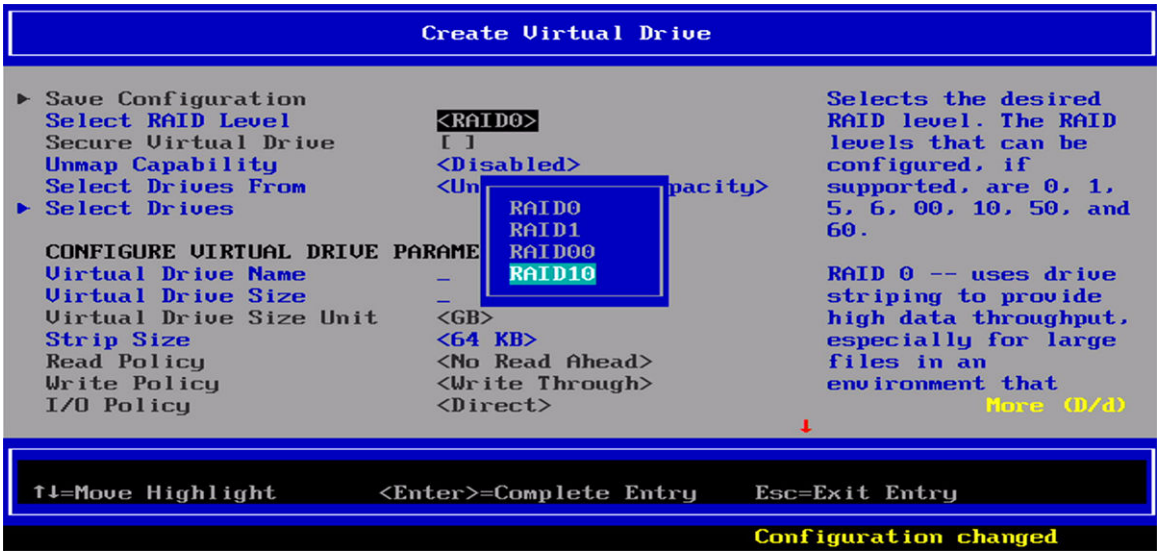

Figure 27. Choosing a RAID 0 or 1 level

Selecting disks

You are presented with a screen similar to the below. **Select Media Type** allows you to choose which types of drives are displayed in the list. **Select Interface Type** allows you to choose which types of interfaces will be shown, either SATA, SAS, or both. **Logical Sector size** allows you to limit only to showing 512B or 4k-Native drives, or both.

Figure 28. Selecting disks

To select your drive, go to the **Unconfigured** drive, select the drive that you would like to include in your RAID array, and press **Enter**. You can also press **+** key while the drive is highlighted to select it, or the **–** key while a drive is highlighted to deselect that drive.

When finished, select **Apply Changes**, and press the **Enter**.

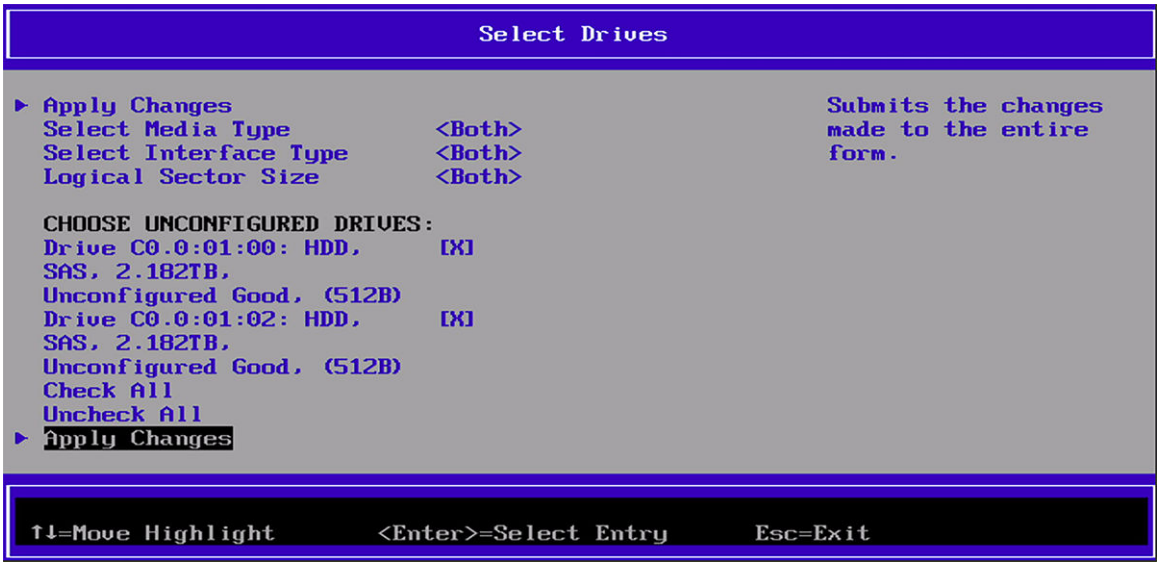

Figure 29. Selecting disks - Apply Changes

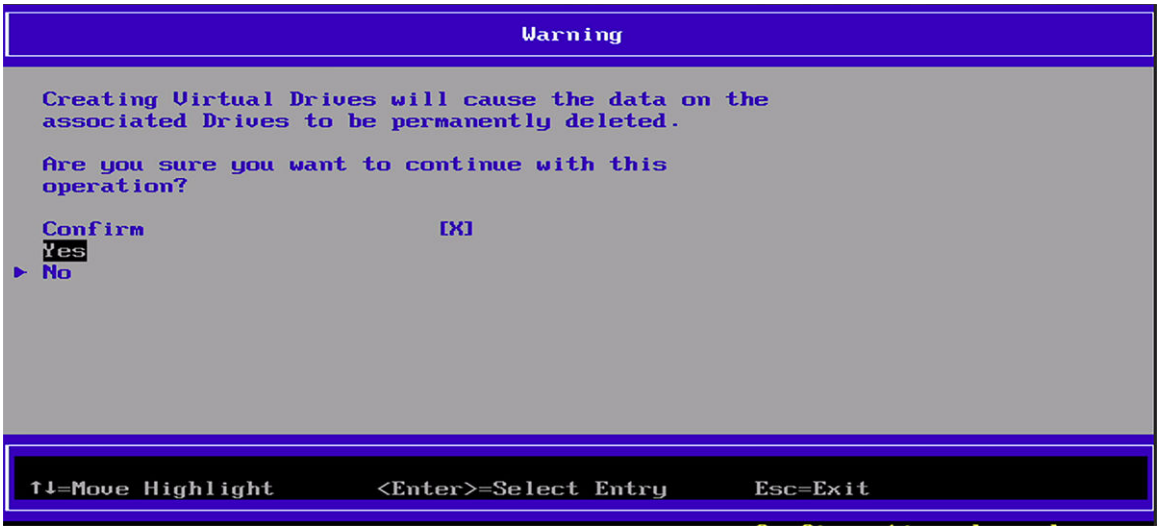

Figure 30. Selecting - Yes

Saving Configuration and Confirmation

You will now be back at the previous menu. Select **Save Configuration** and press **Enter**. At this point, you are presented with a final warning that creating the drive causes all data to be lost. Press **Enter** and enable the confirmation button.

Alternatively, you can use **+** key to enable the confirmation button. Use the arrow keys to navigate down to **OK**, and press **Enter** again. Your RAID array is created and begins initialization.

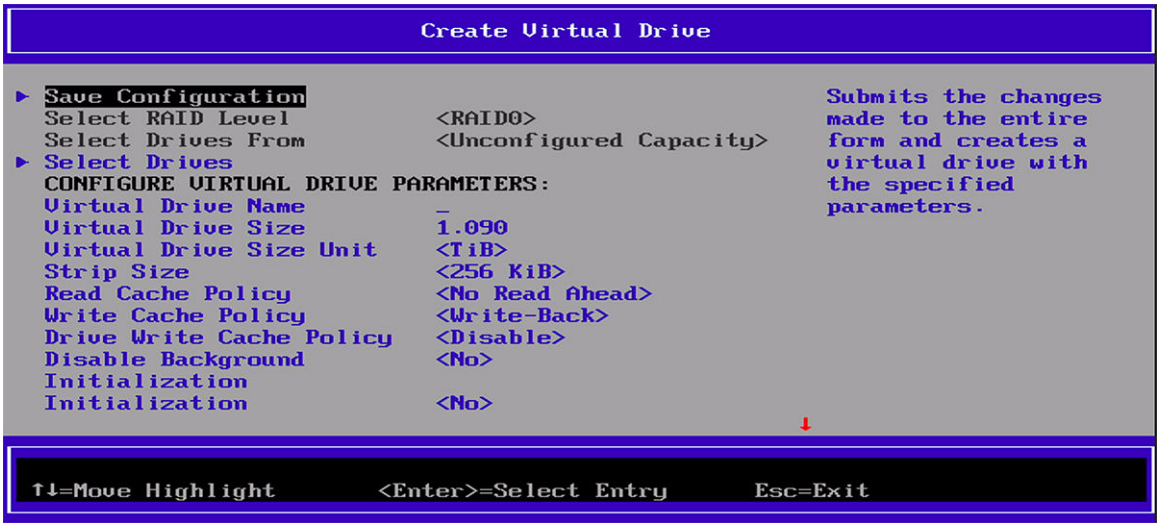

Figure 31. Saving Configuration and Confirmation

Figure 32. Saving Configuration and Confirmation - Selecting OK

NOTE: Press **ESC** back to main menu.

Press **Y** to save the change and then exit.

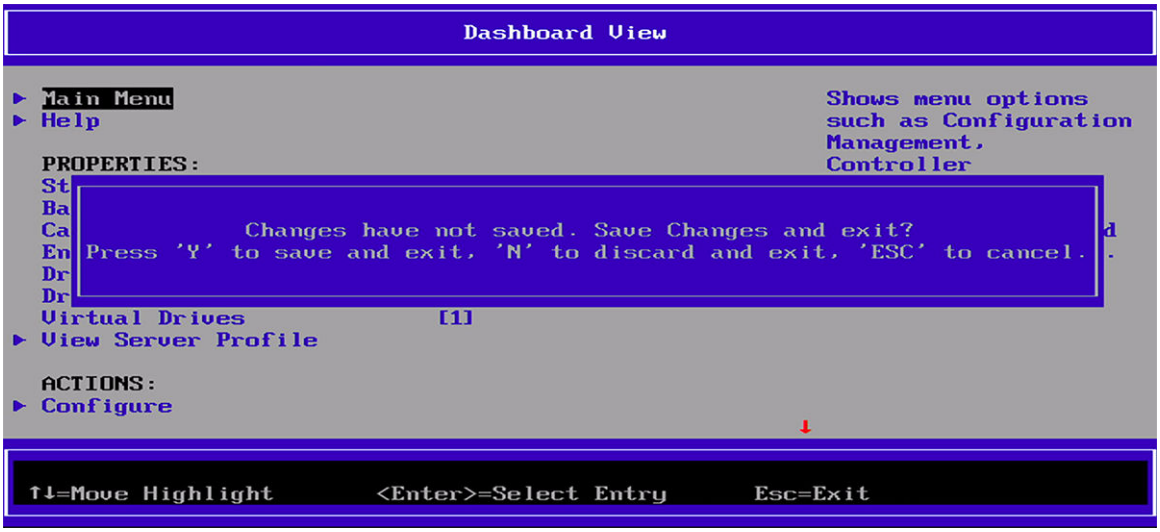

Figure 33. Saving Configuration and Confirmation - Press Y to save the change and exit

Create RAID10 volume

This topic describes about creating a RAID10 volume.

RAID is a spanned volume, and so it requires additional steps to create a RAID compared to other volumes. The additional steps are shown below for an example of creating a RAID volume from 4x 2 TB drives.

Choosing a RAID Level: Choose **RAID10** from select RAID level option.

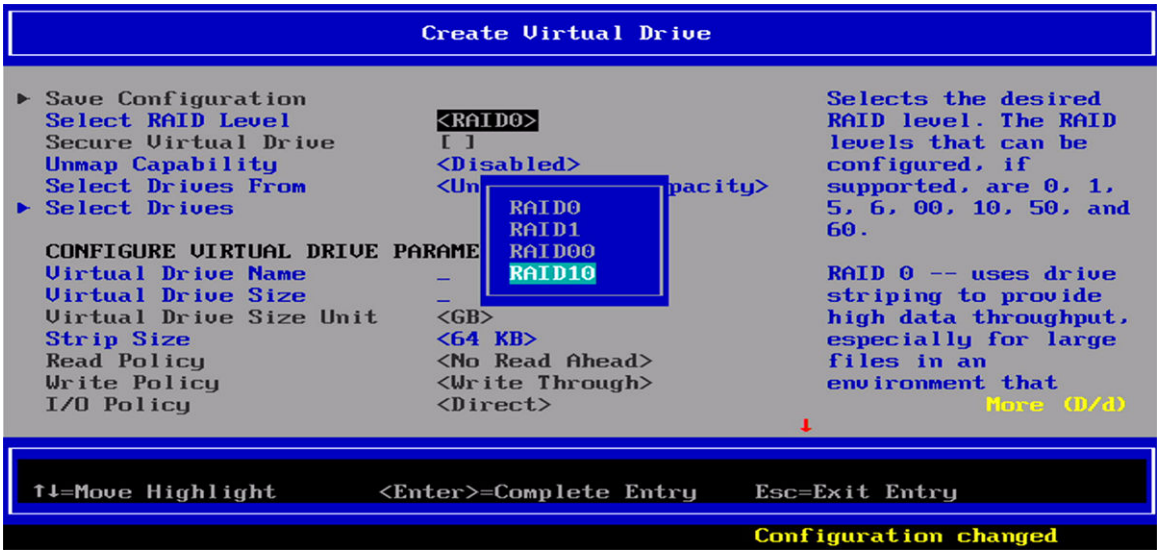

Figure 34. Create RAID10 volume

Select Span Drives

As RAID10 is a spanned virtual drive, you need to add multiple spans. For a four-drive RAID10, you need two spans of RAID1. Select **Add More Spans** to create two spans.

Then go to **Select Drives** for each span as shown below.

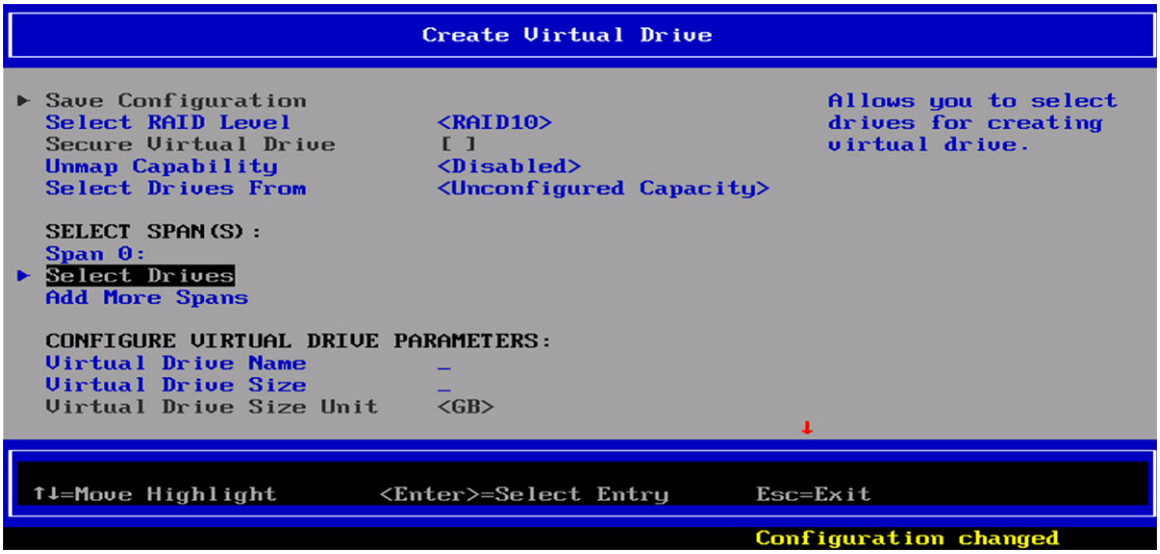

Figure 35. Select Drives

Selecting drives for Span 0

To select drives for Span 0, go to**Select Drives** > **Choose Unconfigured drives** > **Apply Changes**. For this example, two drives are selected.

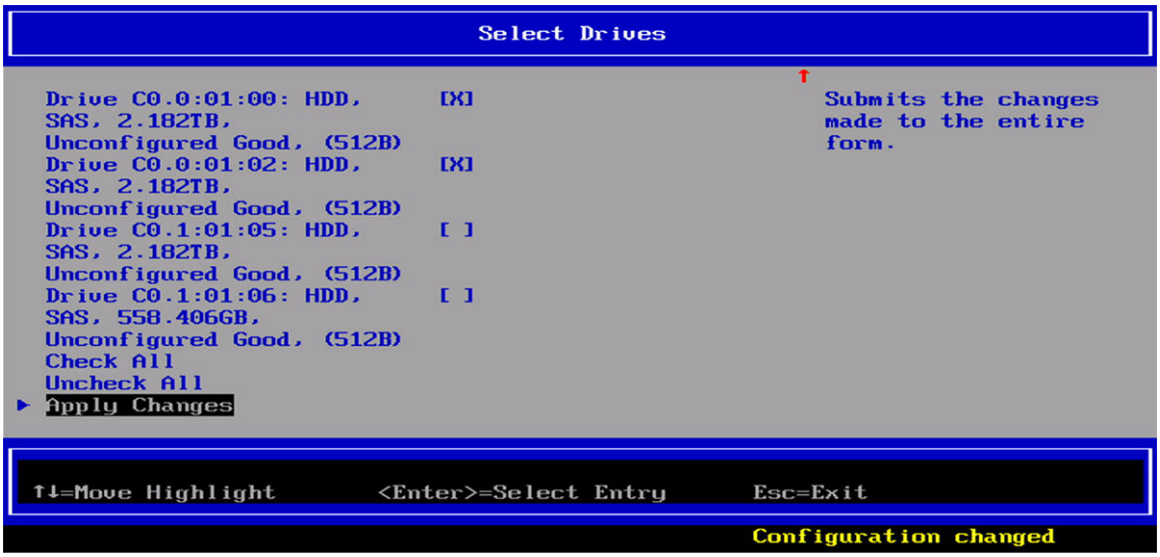

Figure 36. Selecting drives for Span 0

A pane opens requesting confirmation. Select **OK**.

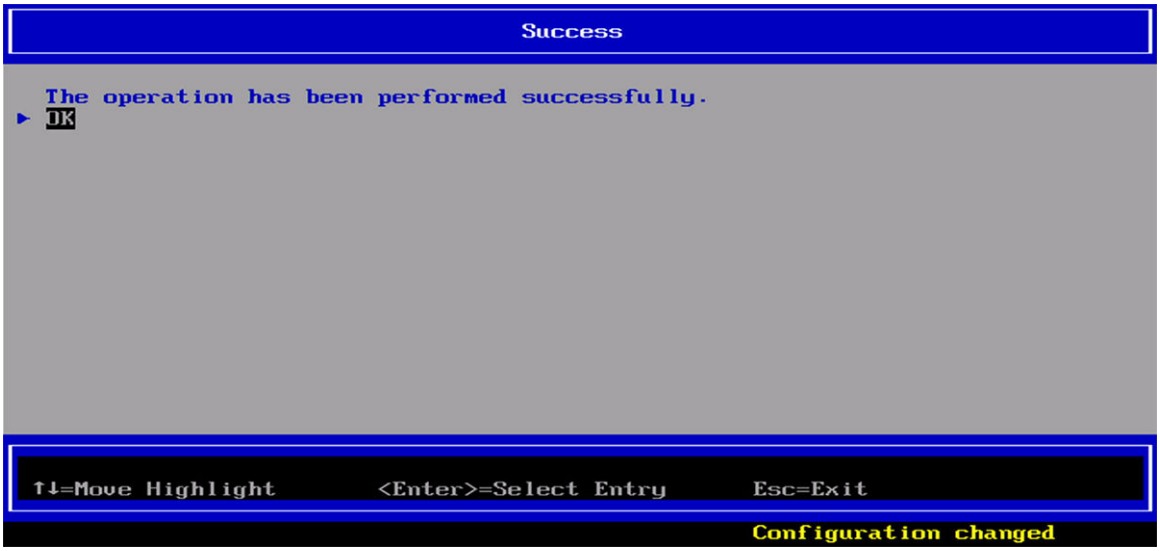

Figure 37. Select OK

Span 0 is selected.

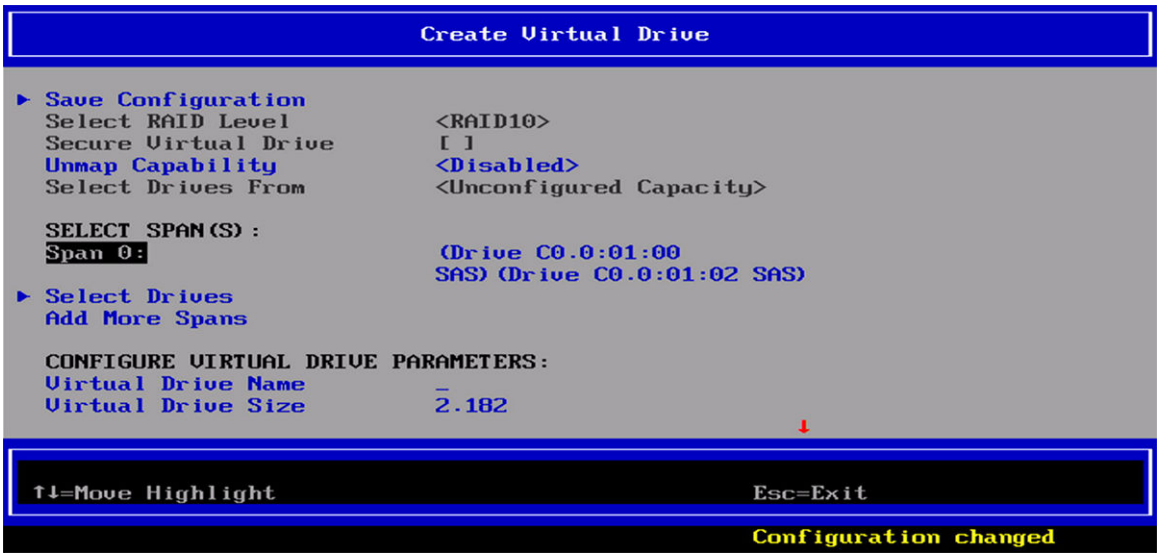

Figure 38. SELECT SPAN(s): Span 0

After selecting the two drives, apply the changes.

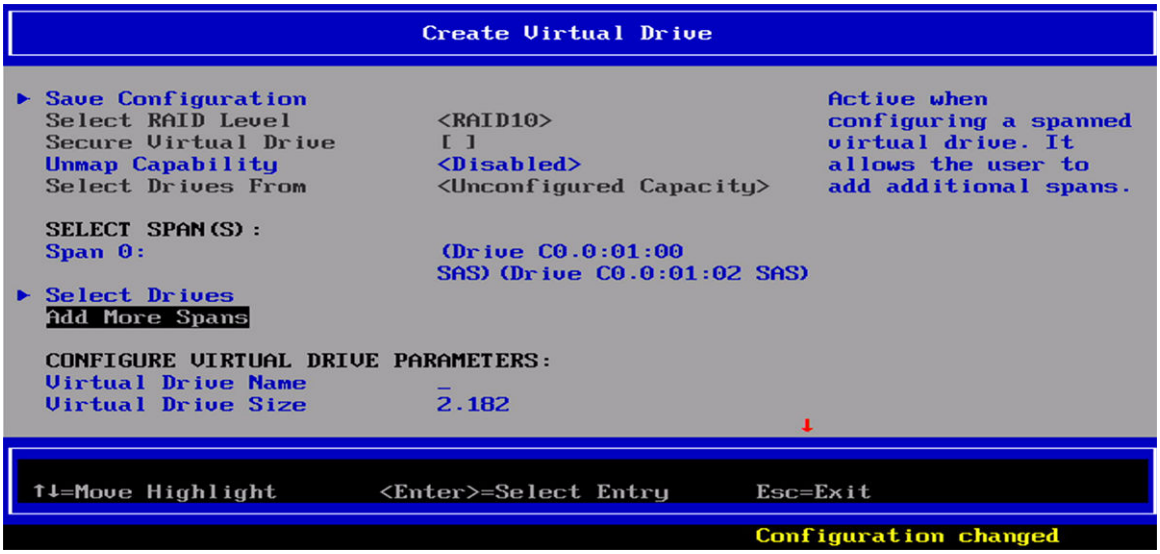

Figure 39. Selecting Drives for Span 0 - Apply Changes

Selecting drives for Span 1

To select drives for Span 1, go to **Select Drives** > **Choose Unconfigured drives** > **Apply Changes**. For this example, two drives that are left are selected and changes applied.

Once both spans have been drives selected, you see a screen similar shown below.

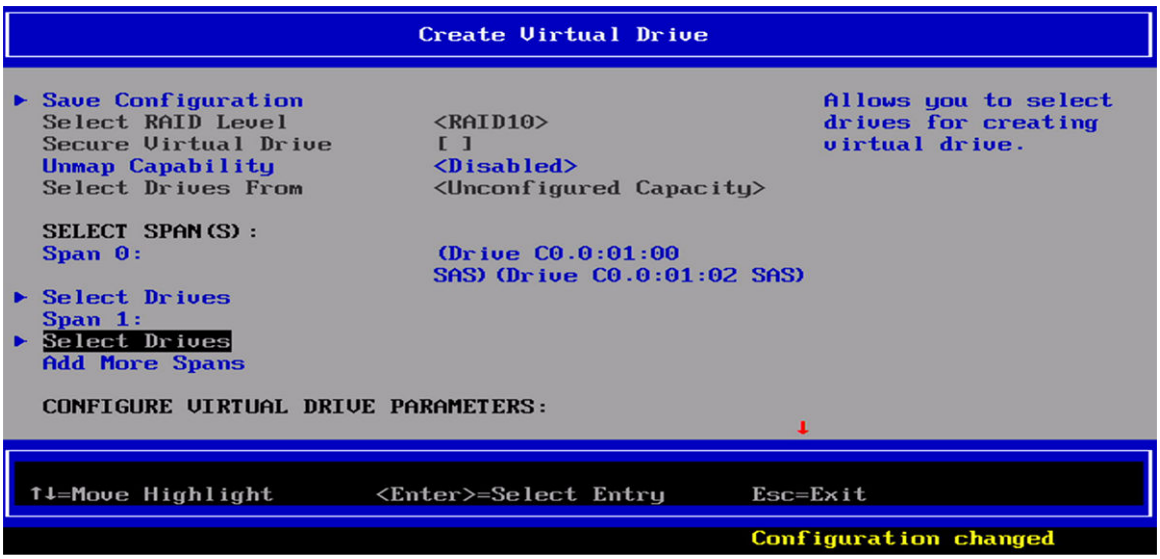

Figure 40. Selecting drives for Span 1

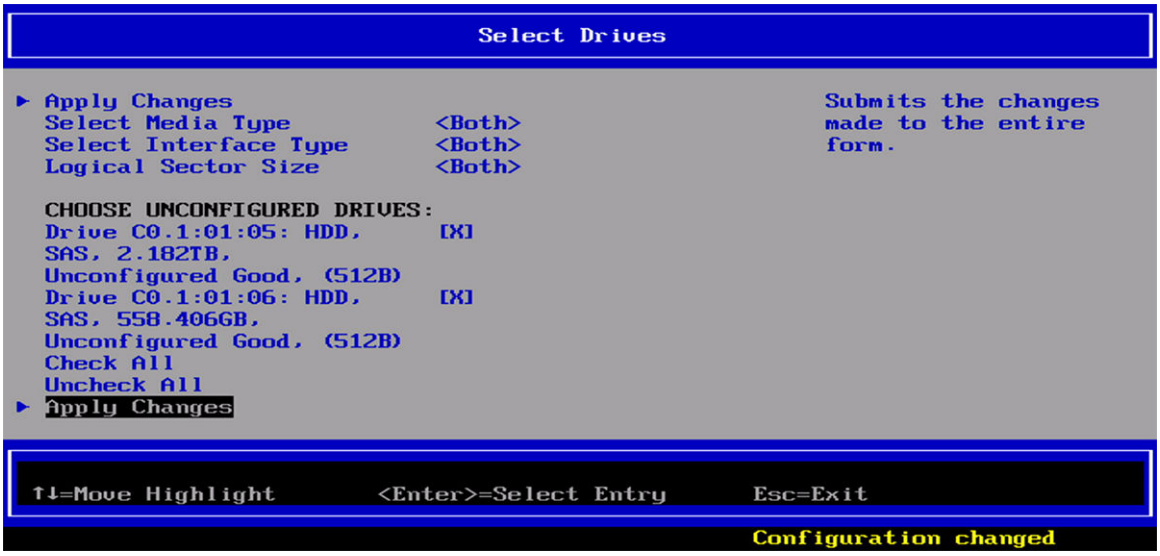

Figure 41. Selecting drives for Span 1 - Apply Changes

A pane opens requesting confirmation. Select **OK**.

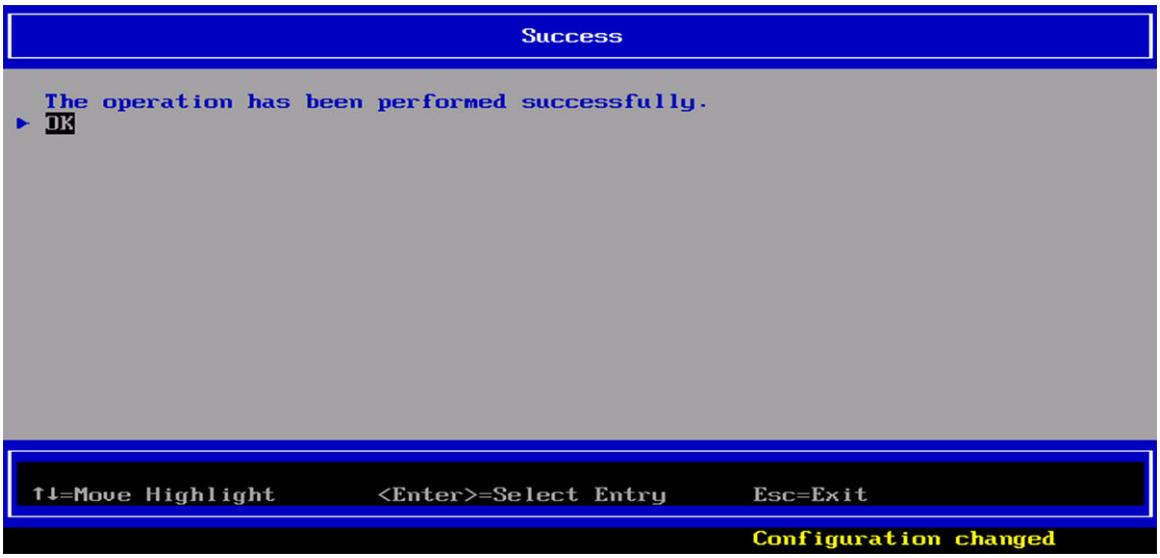

Figure 42. Selecting drives for Span 1- Selecting OK

Saving Configuration and Confirmation

Go to **Save Configuration** and press the **Enter** key. You are presented with a final warning that creating the drive can cause all data to be lost. Press the **Enter** key and enable the confirmation button. Alternatively, you can use the **+** key to enable the confirmation button. Use the arrow keys to navigate down to **Yes**, and press **Enter** again. Your RAID array is created and begins initialization.

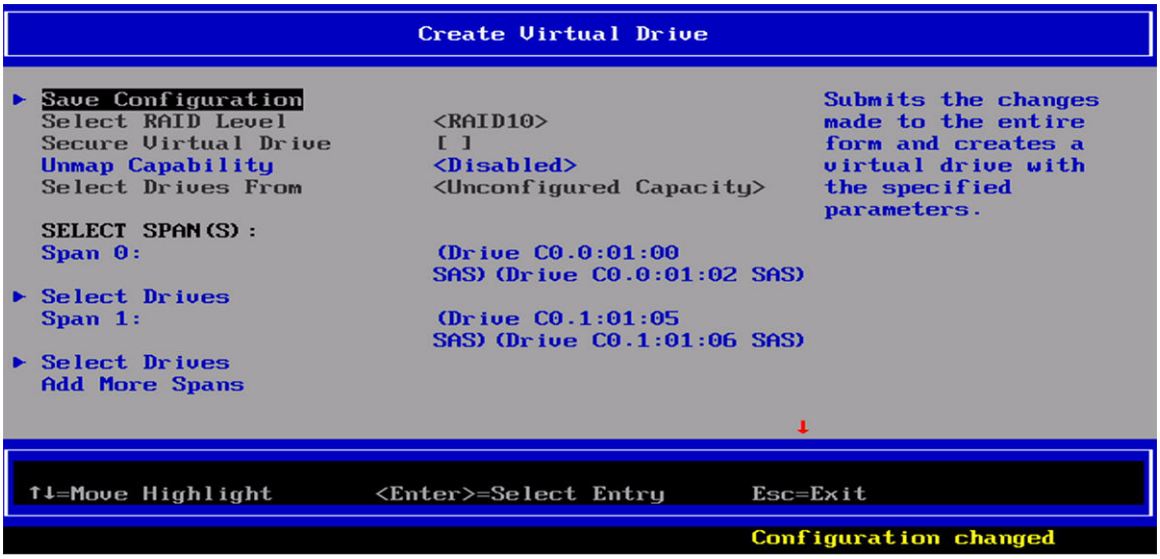

Figure 43. Saving Configuration and Confirmation

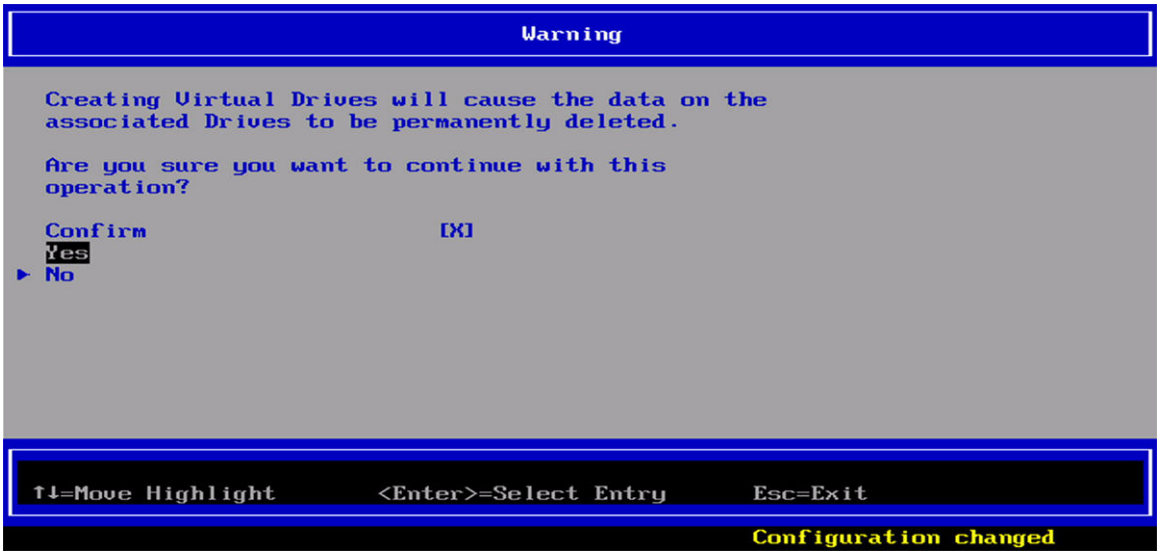

Figure 44. Saving Configuration and Confirmation - Confirm Yes

Delete RAID volume

This topic describes how to delete RAID volume.

Enter the Device Configuration menu

During system POST, press the F12 menu when the Dell logo is loading. A progress bar appears if your keystroke is successful. You will now be presented with a menu similar to the below.

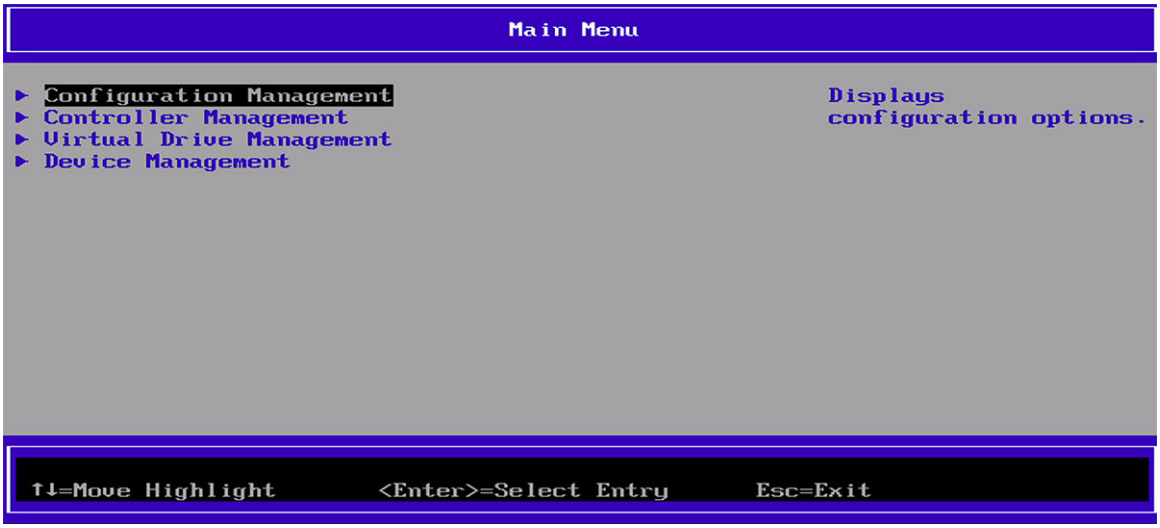

Figure 45. Device Configuration menu

Using the ↑ and ↓ arrow keys, navigate to Device Configuration, and press the **ENTER** key on your keyboard. Depending upon the devices you have installed in the system, you are presented with different options. You can use the left and right arrow keys to navigate to the different devices you have installed in the system.

Select the UEFI-HII configuration utility for Broadcom RAID controllers

Once inside the **MegaRAID Configuration Utility**, the user can navigate around using the up (↑) and down (↓) arrows on the keyboard. ESC can be used to exit the device and return to the **Boot Options** menu. **ENTER** is used to select the highlighted menu option. These options are also described at the bottom right-hand corner of the screen.

Managing a Virtual Drive: From this menu, use the down arrows to select **Virtual Drive Group Properties** and press the **Enter** key.

Figure 46. Select the UEFI-HII configuration utility for Broadcom RAID controllers

Selecting a Virtual Drive

Using the arrow keys, navigate to the Virtual Drive that you are planning on deleting, and press the **Enter** key. The following example contains a single Virtual Drive.

Figure 47. Selecting a Virtual Drive

Deleting the Virtual Drive

The next menu will show you the status and configuration information for the RAID drive. You can make changes to the RAID array at this point. To delete the Virtual Drive, use the arrow keys to **Clear Configuration** and press **Enter** key.

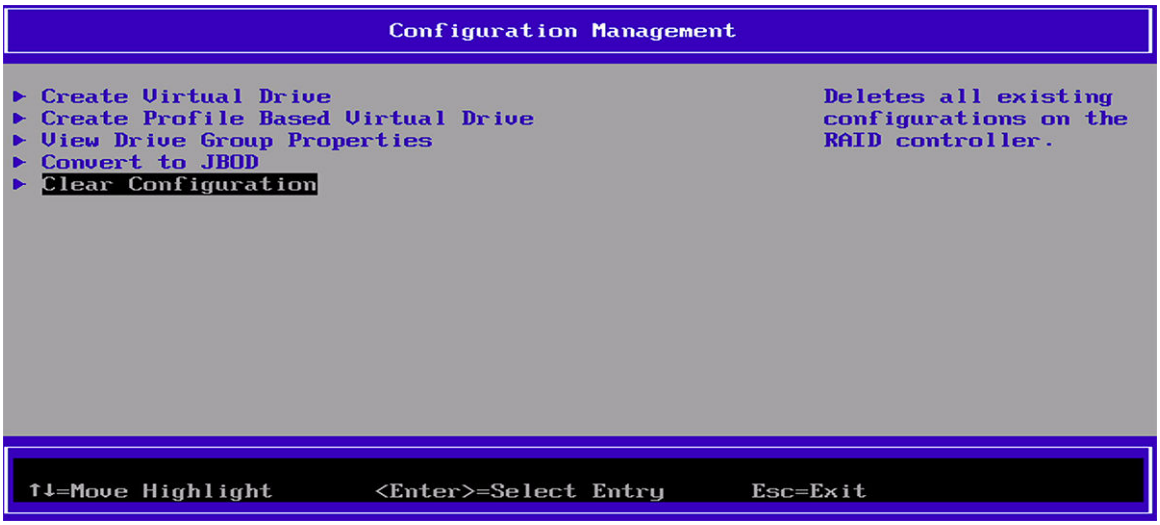

Figure 48. Deleting the Virtual Drive

This brings up a small submenu as shown below. Use the arrow keys again to delete Virtual Drive as shown below and press **Enter**.

Figure 49. Clear the configuration

Select **Yes** to delete the Virtual Drive.

After you enable and confirm, your RAID array is deleted.

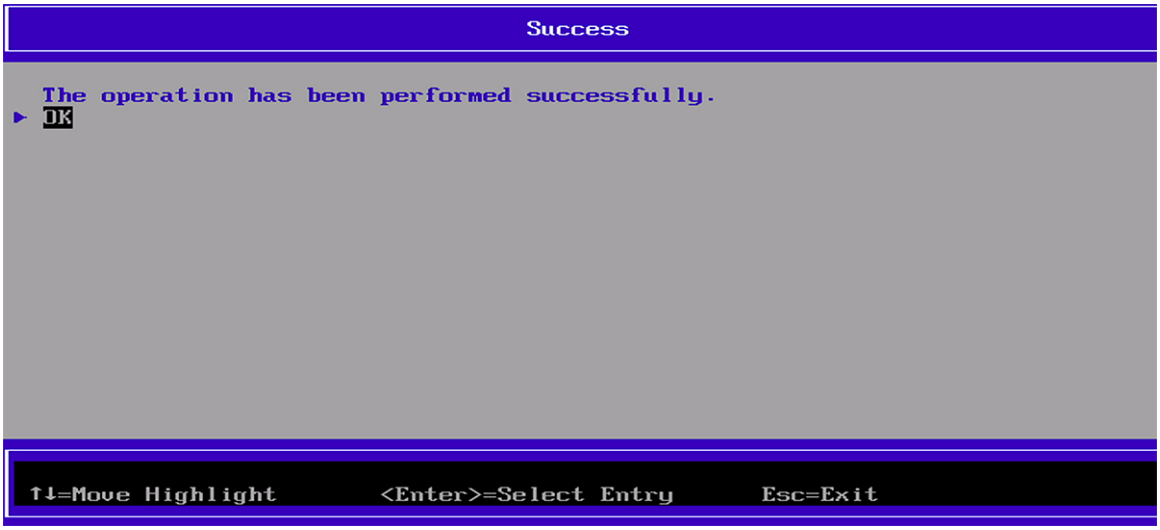

Figure 50. Deleted virtual drive

6

Conclusion

There are multiple ways to manage the RAID configuration in Precision workstations.

Only the basic methods under pre-boot environment are specified in this document. However, there are advanced methods and applications available to do these basic steps and advanced configurations options.

7

Getting help and contacting Dell

Self-help resources

You can get information and help on Dell products and services using these self-help resources:

Table 2. Self-help resources

Self-help resources	Resource location
Information about Dell products and services	www.dell.com
My Dell app	
Tips	
Contact Support	In Windows search, type `Contact Support`, and press Enter.
Online help for operating system	www.dell.com/support/windows
Access top solutions, diagnostics, drivers and downloads, and learn more about your computer through videos, manuals, and documents.	Your Dell computer is uniquely identified by a Service Tag or Express Service Code. To view relevant support resources for your Dell computer, enter the Service Tag or Express Service Code at www.dell.com/support. For more information about how to find the Service Tag for your computer, see Locate the Service Tag on your computer.
Dell knowledge base articles	1. Go to www.dell.com/support. 2. On the menu bar at the top of the Support page, select **Support** > **Knowledge Base**. 3. In the Search field on the Knowledge Base page, type the keyword, topic, or model number, and then click or tap the search icon to view the related articles.

Contacting Dell

To contact Dell for sales, technical support, or customer service issues, see www.dell.com/contactdell.

NOTE: Availability varies by country/region and product, and some services may not be available in your country/region.

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