Storage Configurator

Lenovo ThinkStation P360 Tower, Ultra, Tiny

Contents

Overview

The purpose of this document is to provide guidelines for users on how to optimally configure the system storage in the ThinkStation P360 series platform to insure proper functionality.

The P360 Tiny utilizes up to two NVMe M.2 SSD drives and has an onboard RAID controller.

When there are two M.2 SSDs in the system, the P360 Tiny can support RAID 0 or 1. The RAID option will only be available or shown for selection if the system detects two M.2 SSDs.

The P360 Ultra utilizes up to two NVMe M.2 SSD drives and a single 2.5" SATA drive and has an onboard RAID controller.

When there are two M.2 SSDs in the system the P360 Ultra can support RAID 0 or 1. The RAID option will only be available or shown for selection if the system detects two M.2 SSDs.

The P360 Tower utilizes both 2.5" and 3.5" SATA HDDs as well as NVMe M.2 SSDs with an on-board RAID controller for both drive types. In the Tower chassis, there are a maximum of four SATA drive locations and three NVMe drive locations for a potential total of up to seven drives that can physically be installed in the system. A maximum of two 3.5" SATA HDDs are supported simultaneously, while up to four 2.5" SATA HDDs are supported simultaneously.

When the appropriate number of drives are present in the system, the P360 Tower can support RAID 0, 1, 5, or 10 for the SATA drives and RAID 0 or 1 for the M.2 drives. A given RAID level will only be available or shown for selection if the system detects enough of the appropriate drives to support it.

RAID configurations for the systems are discussed in Section 3.

Considerations

General:

- A given array should not mix drive types or logical sizes. Mixing drive brands does not pose any issues so long as the brands share the same Lenovo part numbers.

- Each RAID level requires a certain minimum and or maximum number of drives. If altering the system storage devices after purchase or a previous configuration, it will be necessary to verify the proper types and number of devices for a desired RAID configuration have been installed. Altering or creating an array will require any existing OS to be reinstalled.

P360 Tower:

- The P360 Tower has on-board RAID support for both the NVMe M.2 drives and SATA drives. At the time of writing there are no add-in RAID controllers certified to work on this system.

- The ability to maximize the number of M.2 drives is dependent upon using a single optional NVMe M.2 PCIe Add In Card (AIC), and the two on-board NVMe M.2 slots.

- The ability to maximize the number of SATA hard drives (HDDs) is dependent upon using a Flex Bay or Front-Access Storage Enclosure (FASE) and optional storage drive cage. For more information see Section 2. Use of 125W CPUs require a larger fan and heat sink that will limit the system to a maximum of three SATA HDDs. The larger fan and heat sink will block the installation of the fourth HDD bay. Additionally, the use of four SATA HDDs will utilize all the available SATA ports on the motherboard. The system cannot be configured with an optical disk drive (ODD) when using four SATA HDDs.

- Although the system can support various configurations of NVMe and SATA drives, care should be given when selecting drives based on the types of RAID arrays that are desired.

  - Only one additional M.2 can be added to the two onboard M.2 slots using an AIC. This card can only be used in PCIe Slot 3. The PCIe M.2 adapter is limited to Gen 3 specifications while the onboard M.2 slots are Gen 4. See Section 2 for slot identification. The single M.2 Add In Card is only capable of Gen 3 speeds, even if Gen 4 drives are used. Only drives in the two onboard Gen 4 M.2 slots can be utilized together in a RAID configuration.

Section 1 – Installing NVMe Devices in the P360 Tower

Please make sure the NVMe devices are installed into the following locations on the ThinkStation P360 Tower motherboard seen below. The NVMe drives may use the dedicated Gen 4 capable onboard M.2 slots, as seen in the image below, or use one M.2 NVMe drive in a Gen 3 limited PCIe M.2 AIC in PCIe slot 3.
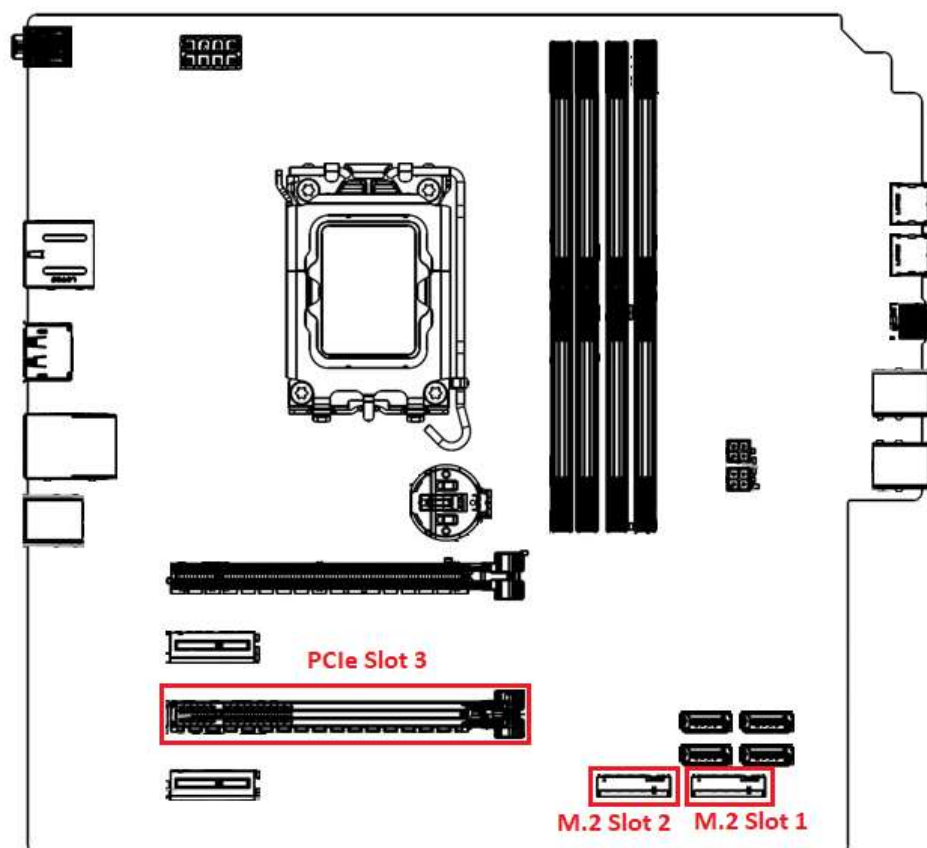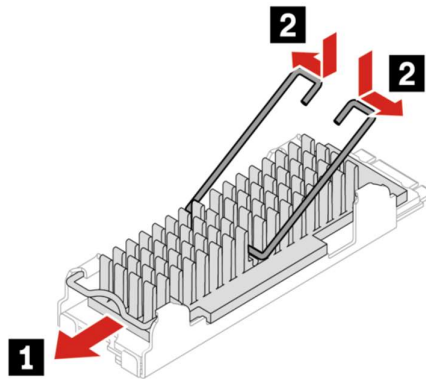
For M.2 NVMe drives in the onboard M.2 slots:

1. Remove the film that covers the thermal pad on the bracket, if any.
   Then, install the M.2 solid-state drive by sliding the drive in the bracket.
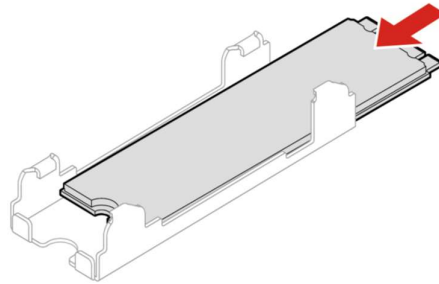
2. Remove the film that covers the thermal pad at the bottom of the heat
   sink, if any. Then, install the heat sink onto the M.2 drive in the bracket.

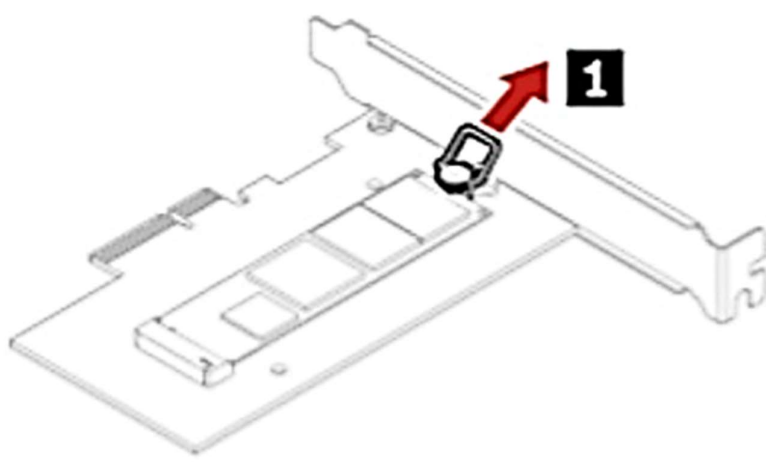3. Install the heat sink with the bracket into the system.
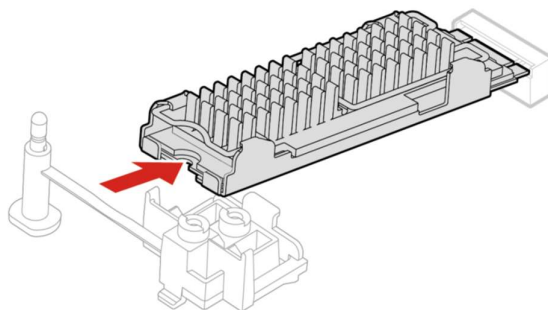
4. Insert the stopper.
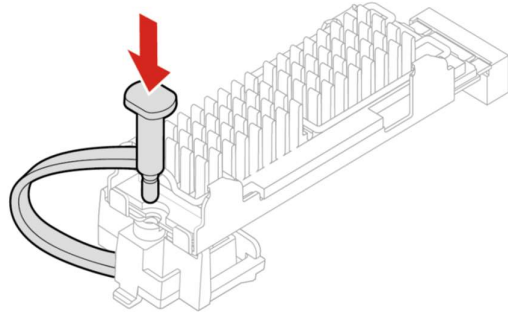
For M.2 NVMe drives installed in the Add-in Card:

1. Ensure that a thermal pad is placed in position on the M.2 solid-state drive PCIe adapter.
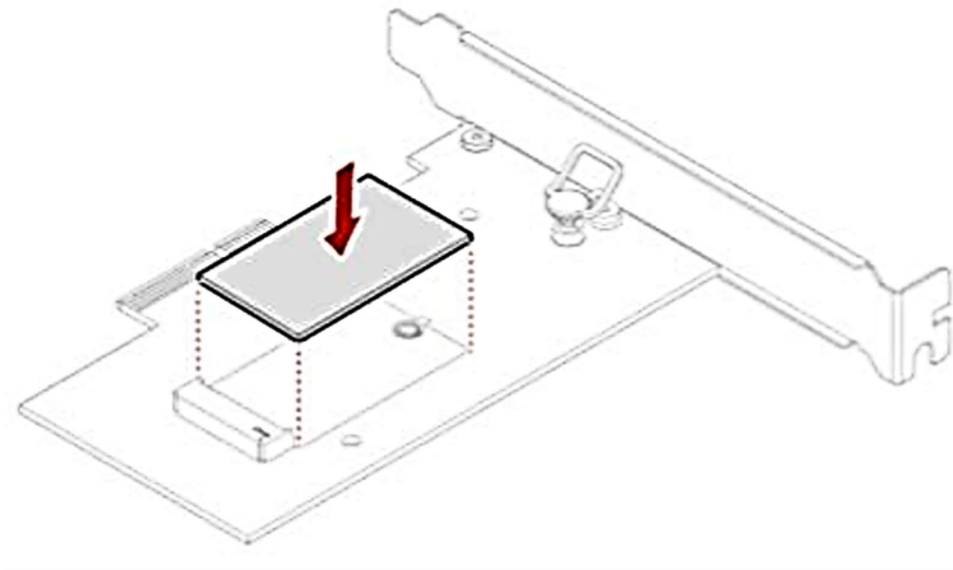
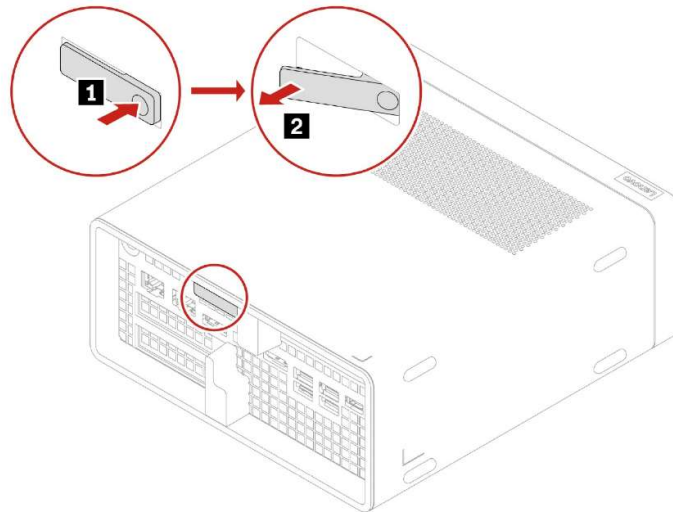2. Pull the retention latch outward on the M.2 solid-state drive adapter.

3. Hold the new drive by its edges so as not to touch the circuit board and ensure that the circuit board side is facing upward. Align the notch in the new M.2 NVMe drive with the slot key in the M.2 slot. Insert the plug of the retention latch into the hole to secure the new drive.
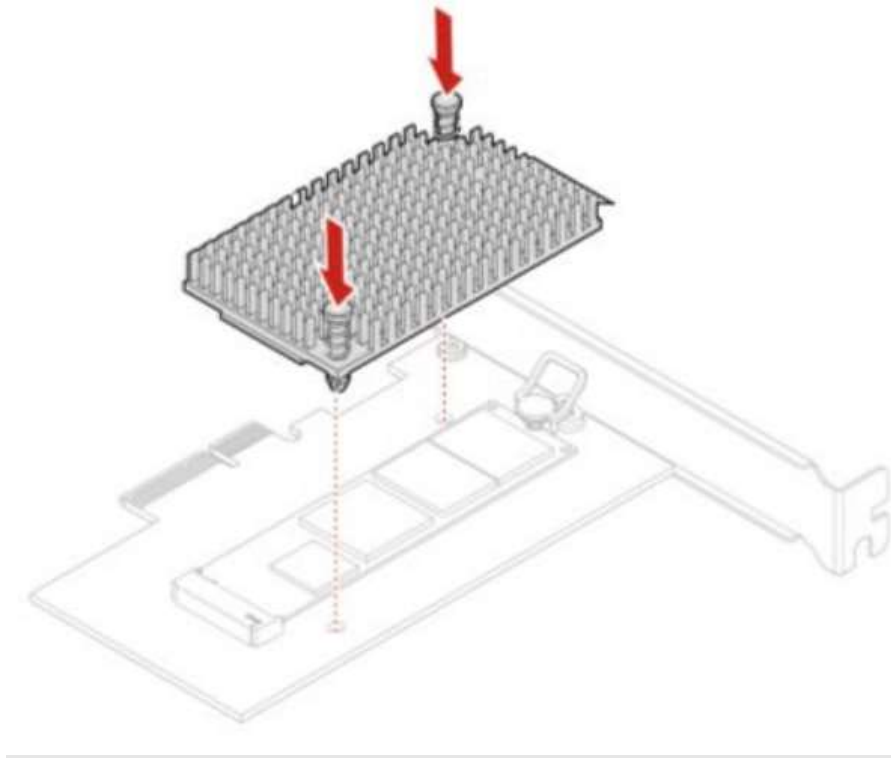
Section 2 – Installing NVMe Devices in the P360 Ultra

Please make sure the NVMe devices are installed into the following locations on the ThinkStation P360 Ultra motherboard seen below. Both NVMe slots are Gen 4 capable. When opening the chassis the NVMe slots are on the top of the double sided motherboard. There will be a heat sink in place that needs to be removed to access the slots. The steps to access the M.2 slots are outlined in thie section.


M.2 Slots
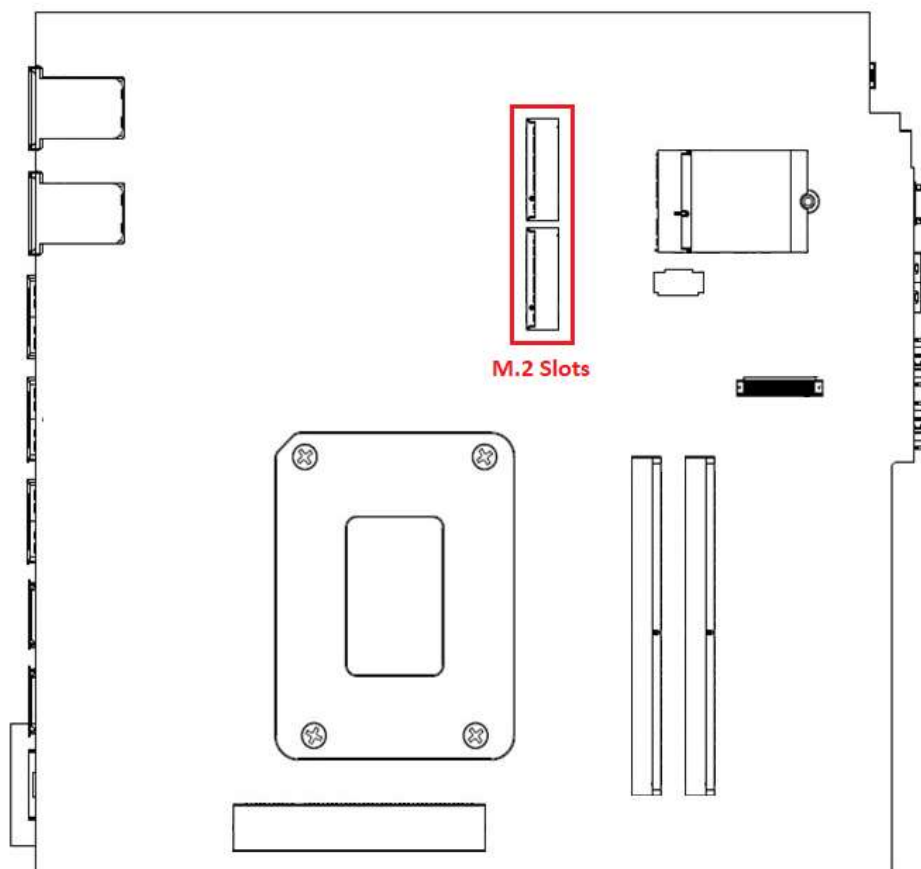
<u>Access the onboard M.2 NVMe slots:</u>

1. Power down the system. Remove the power cable and all attached
    devices and cables from the system. Locate the chassis opening lever
    on the back of the system. Push in one side of the lever and pull on the
    extended lever.

2. While pulling on the lever, hold the chassis body in place until the
   motherboard assembly slides out of the chassis shell.
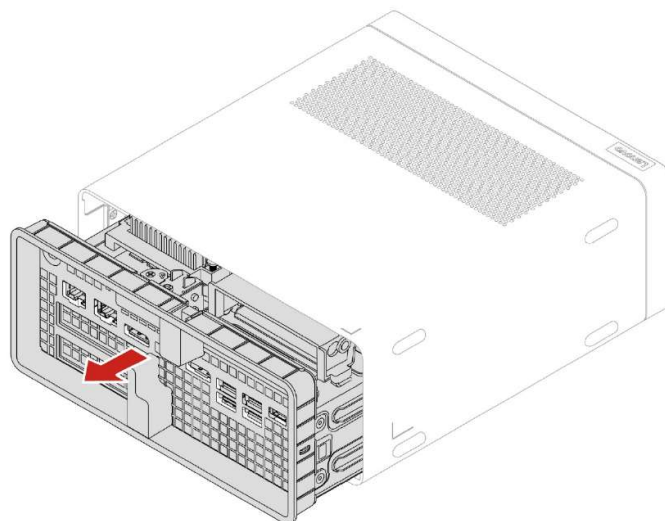
3. The NVMe M.2 heat sink is now accessible as seen in the image below. To remove the heat sink, squeeze the locking handle and pull up on the heat sink.
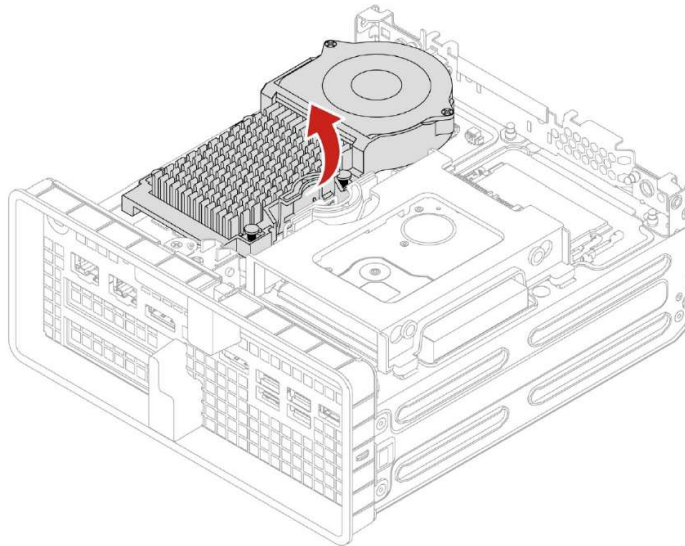
4. Reverse the steps to reassemble the system.

<u>Remove and install the onboard M.2 NVMe drives:</u>

1. To remove a drive, pull up on the retaining plunger for the M.2. It may be necessary to gently pull up on the drive to free it from the heat sink pad underneath. When the drive is free, pull it sideways away from the slot as seen in step 2 below.
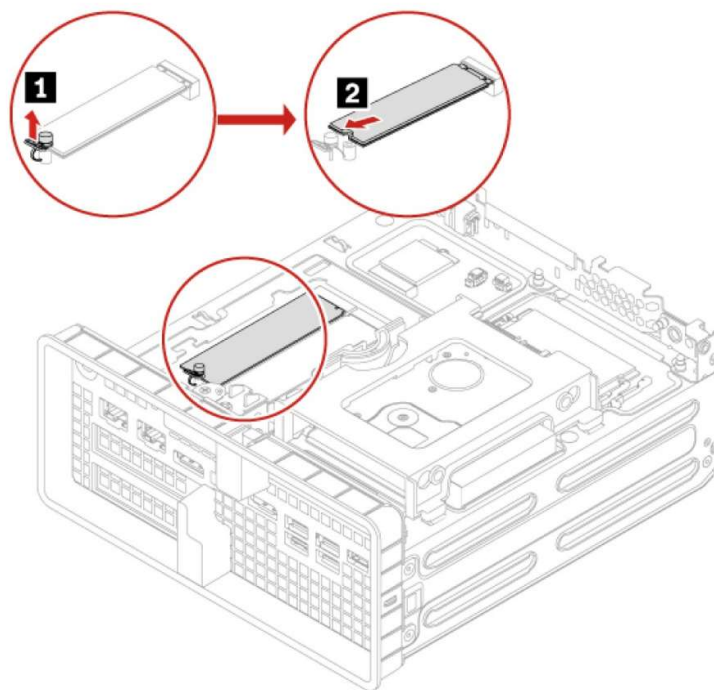
2. Reverse the steps to install a drive.

Section 3 – Installing NVMe Devices in the P360 Tiny

There are only two Gen 4 M.2 slots in the P360 Tiny. No other drives can be added to the system. The steps to access to these M.2 slots is explained in this section.

Accessing the M.2 drives:

1. Disconnect the power and all connected devices.
2. Remove the rear screw, (1) in the image.
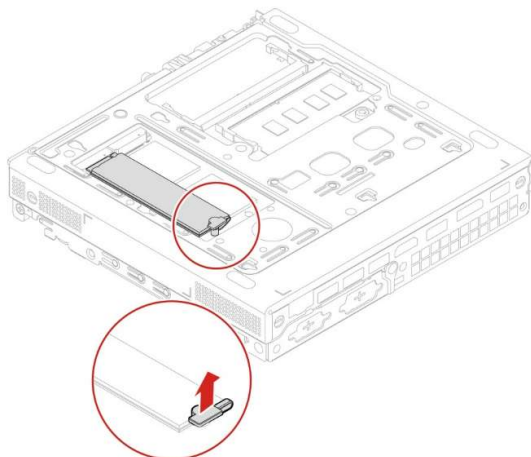3. Slide the cover forward and lift to remove it (2).
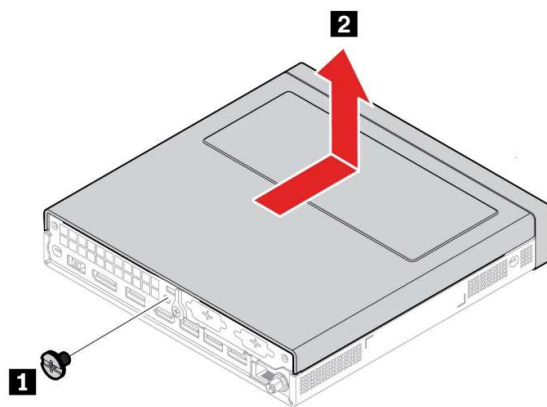
4. Turn the system over and slide the bottom plate towards the front of the system.
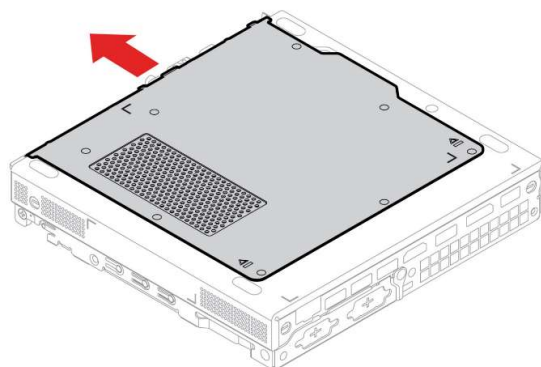
Removal and installation of the M.2 drives:

1. Locate the M.2 drive(s) and remove the retention latch(es).

2. With the retention latch removed the M.2 SSD should lift slightly. If it remains attached to the heat sink pad underneath it, pull up on it gently until it is free of the pad. Slowly slide the M.2 horizontally away from the M.2 slot. To install the M.2 drive(s), reverse the procedure.
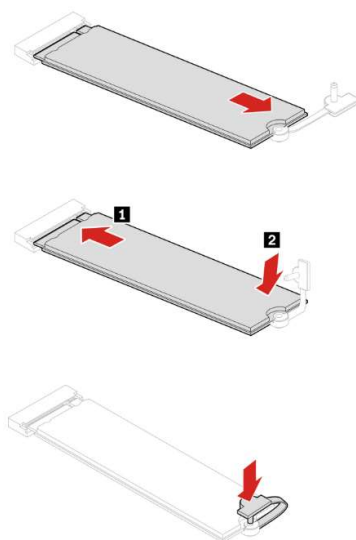
3. Reverse steps 1-4 of "Accessing the M.2 drives" to reassemble the system.

Section 4 – Installing HDDs/SSDs in the P360 Tower

The ThinkStation P360 can hold a maximum of four SATA HDDs/SSDs. The P360 motherboard has four SATA port connections, labelled SATA1, SATA2, SATA3, and SATA4 in the order they show up in the system BIOS. A DVD-ROM installed in the system will utilize one of the SATA ports and limit the system to a maximum of three SATA HDDs/SSDs.
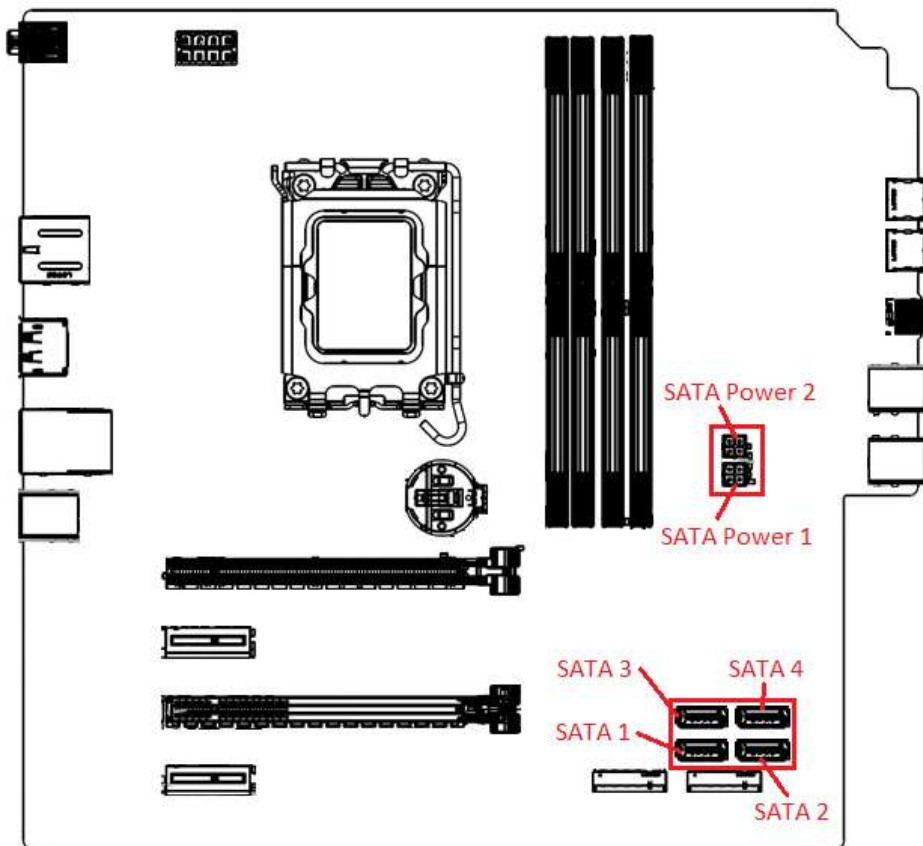
<u>P360 Tower</u>
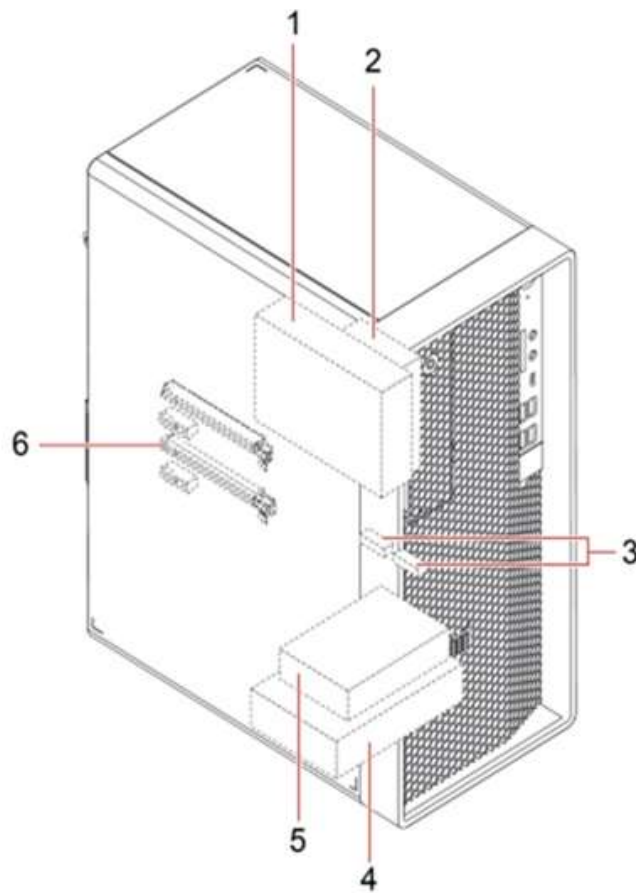
1 – Flex bay (optional) to install a 3.5" secondary storage drive cage or a 3.5" front-access storage enclosure (FASE)

2 – 2.5" secondary (optional) storage drive cage

3 – Two M.2 solid-state drive slots

4 – 3.5" primary storage drive cage

5 – 2.5" secondary (optional) storage drive cage

6 – Slot 3 for additional M.2 solid-state drive

<u>Note:</u> When adding additional drives after purchase, additional parts will likely be required such as, Add-In-Cards, enclosures, and cables.

Section 5 – Installing HDDs in the P360 Ultra

The P360 Ultra supports one 2.5" SATA drive. Adding a SATA drive into a P360 Ultra will require additional parts and cables.

SATA Connector Port
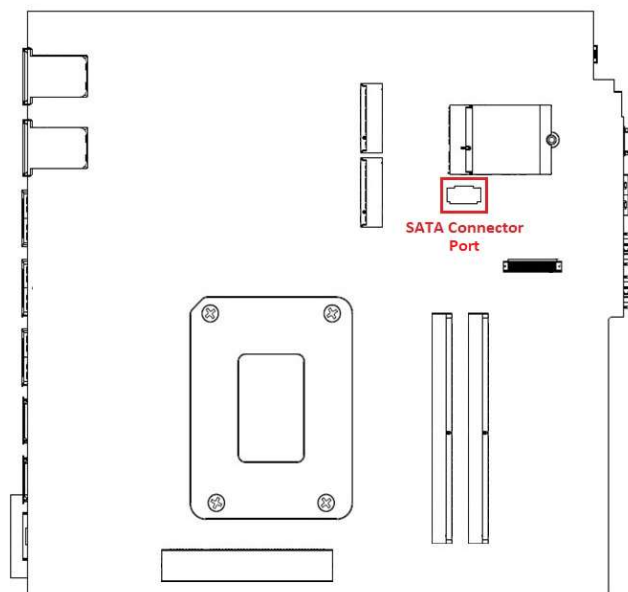
Accessing the SATA HDD:

1. Power down the system. Remove the power cable and all attached devices and cables from the system. Locate the chassis opening lever on the back of the system. Push in one side of the lever and pull on the extended lever.

2. While pulling on the lever, hold the chassis body in place until the motherboard assembly slides out of the chassis shell.
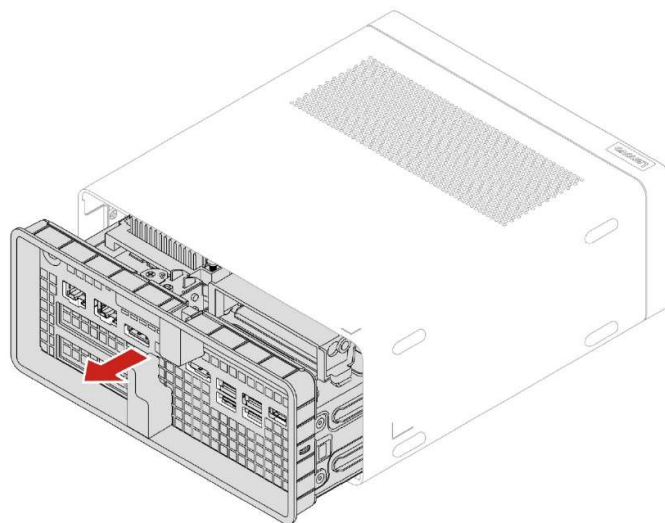
3. The NVMe M.2 heat sink is now accessible as seen in the image below. If it is necessary to install or remove the SATA cable from the motherboard it is necessary to remove the M.2 heatsink to access the motherboard SATA port. To remove the heat sink, squeeze the locking handle and pull up on the heat sink.
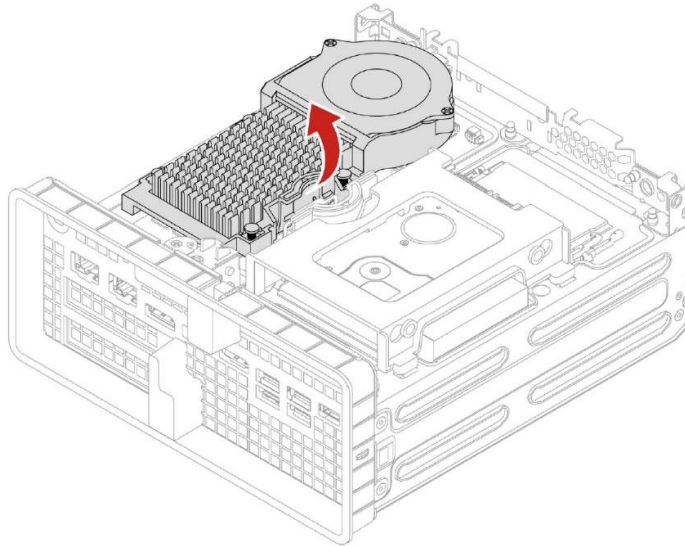

4. Reverse the steps to reassemble the system.

Remove and install the onboard M.2 NVMe drives:

1. To remove the drive, remove the drive plugs, then squeeze the locking handle and pull up on the drive carrier. When the carrier is free, remove it from the system and turn it over.
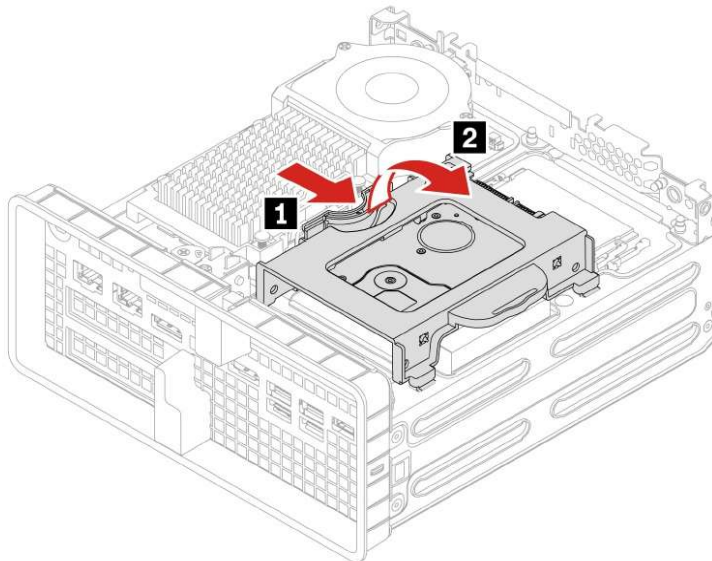
2. Gently stretch the drive carrier apart until the drive comes loose from the screw hole pins. Lift the drive up and out of the carrier.
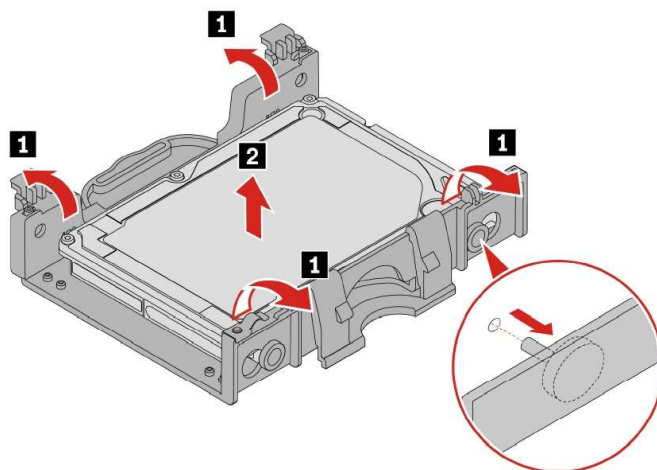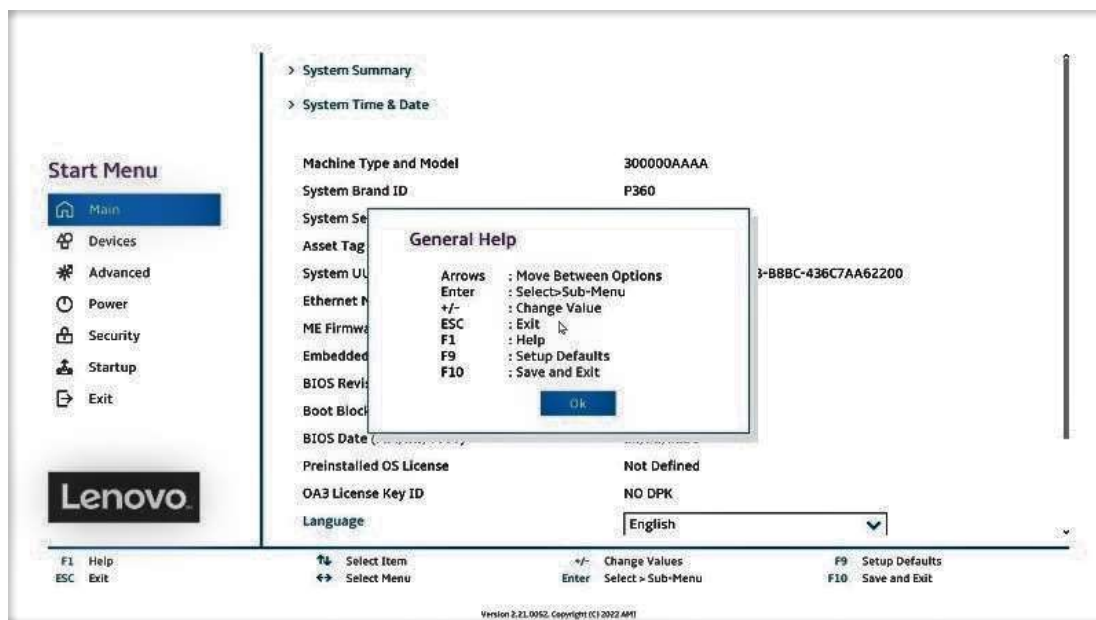

3. Reverse the steps to install a new drive.

Section 6 – Configuring RAID

Please refer to the following steps to configure RAID for both NVMe and SATA drives. Examples may show configurations that are not possible on all systems.

1. Boot into the BIOS by pressing the function F1 key at the "Lenovo" splash screen.

2. Select "System Summary" and scroll down to verify BIOS is recognizing all the drives installed in the system.
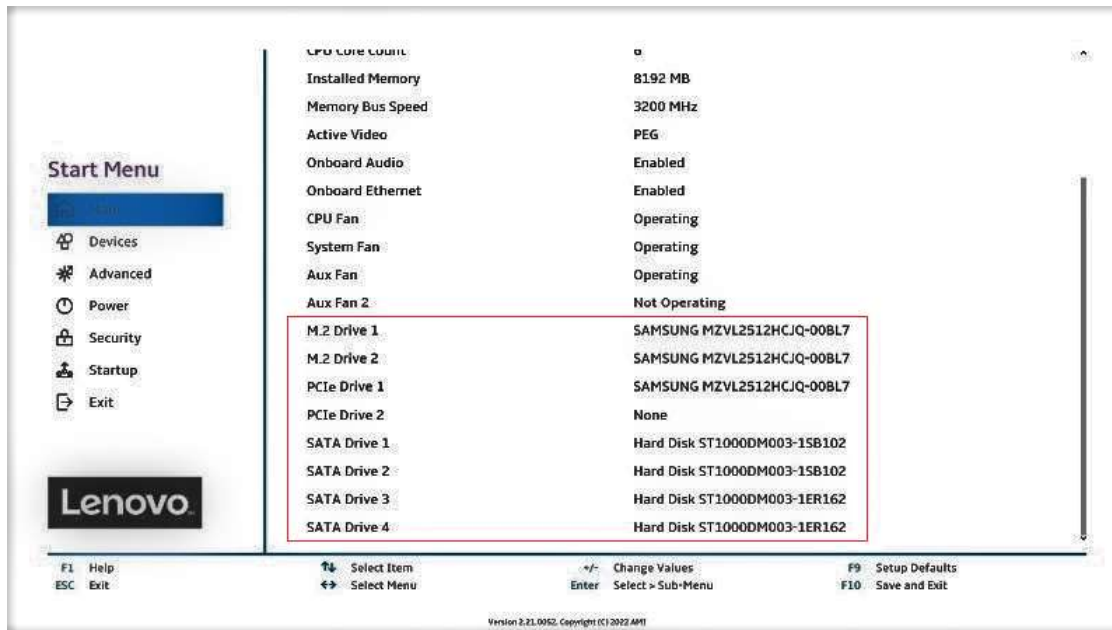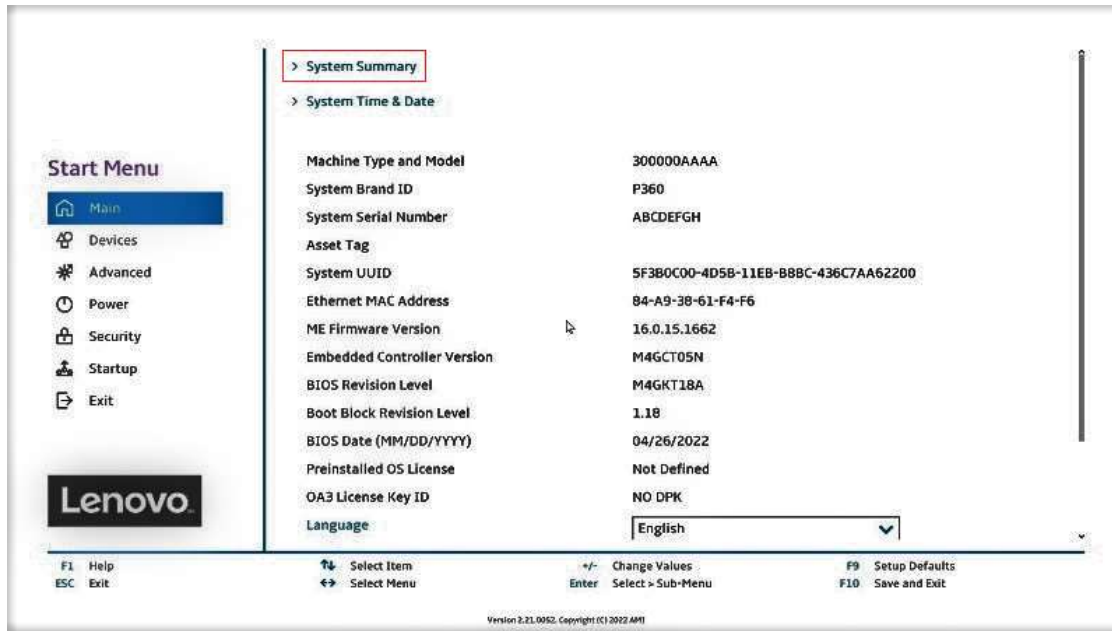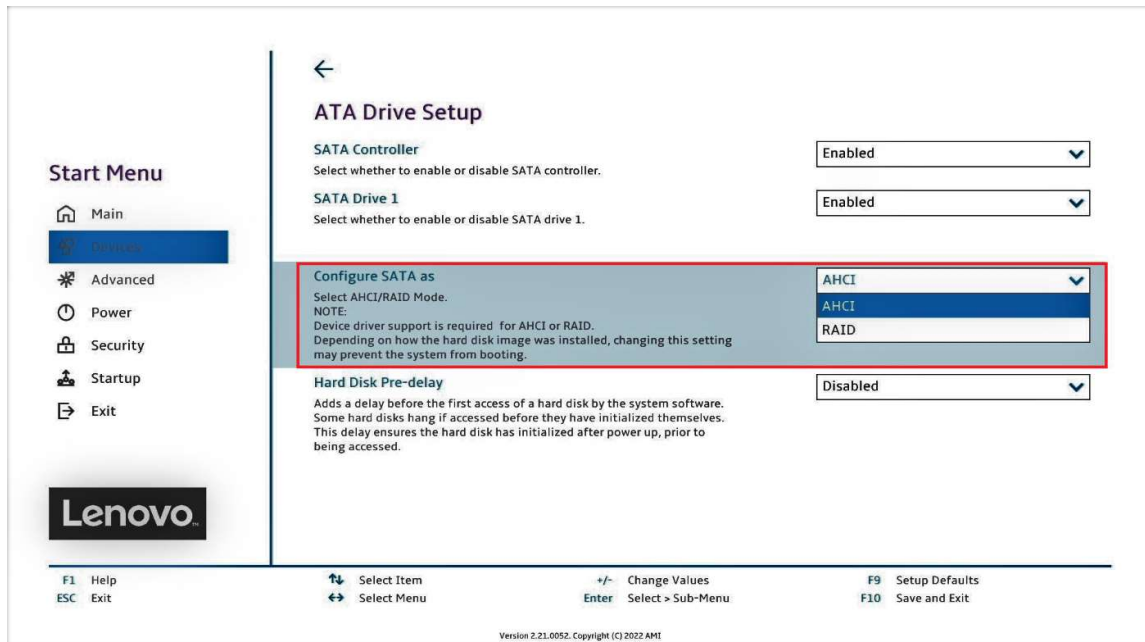

Note: From this point forward, the examples will utilize the M.2 NVMe drives. The process is the same for both drive types.

3. Select the "Devices" menu at the BIOS main screen setup utility and then select "ATA Drive Setup".
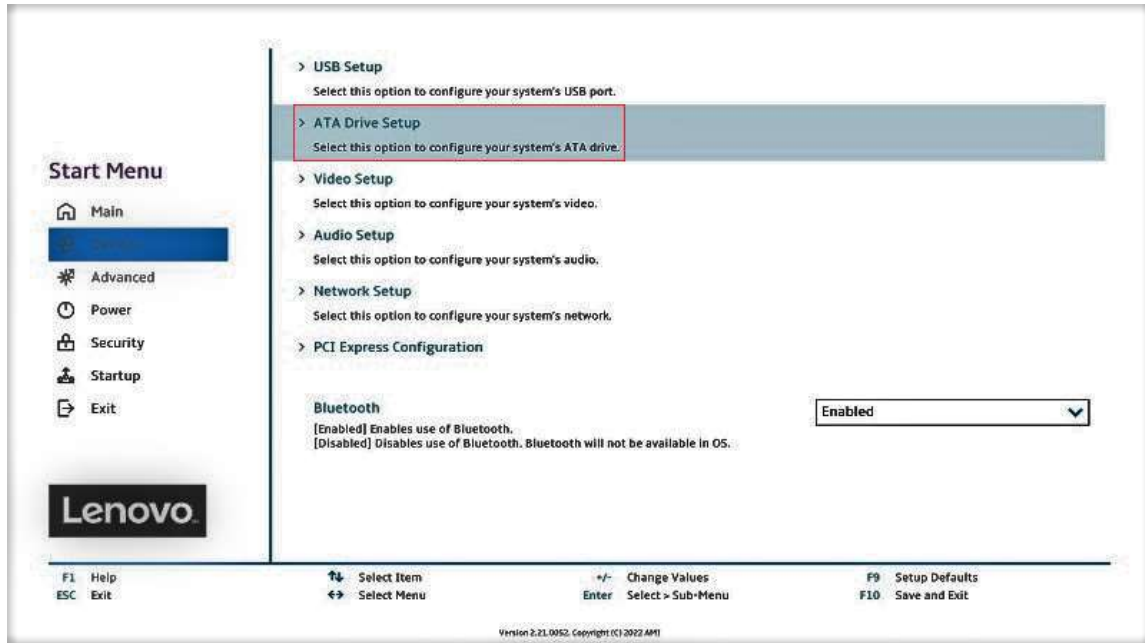
4. In the "ATA Drive Setup" menu, select "Configure SATA as" and change or verify the option is set to "RAID".


Notes: In order to secure erase any drives, the 'Configure SATA as' option must be set to 'AHCI' mode.
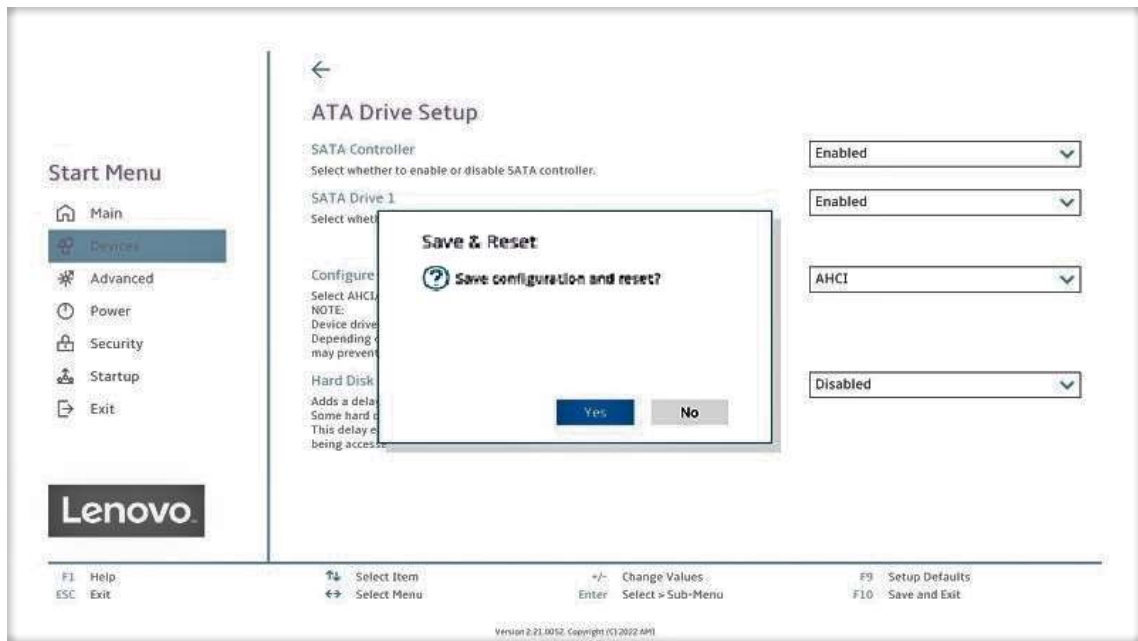
The "Intel(R) RST with Intel (R) Optane" option utilizes an Optane device for RAID cache, but only when an Intel Optane device is present in the system.

5. When selecting to enable RAID the system will prompt a warning that changing the setting may result in the failure of the system to boot. Select "Yes" to continue.
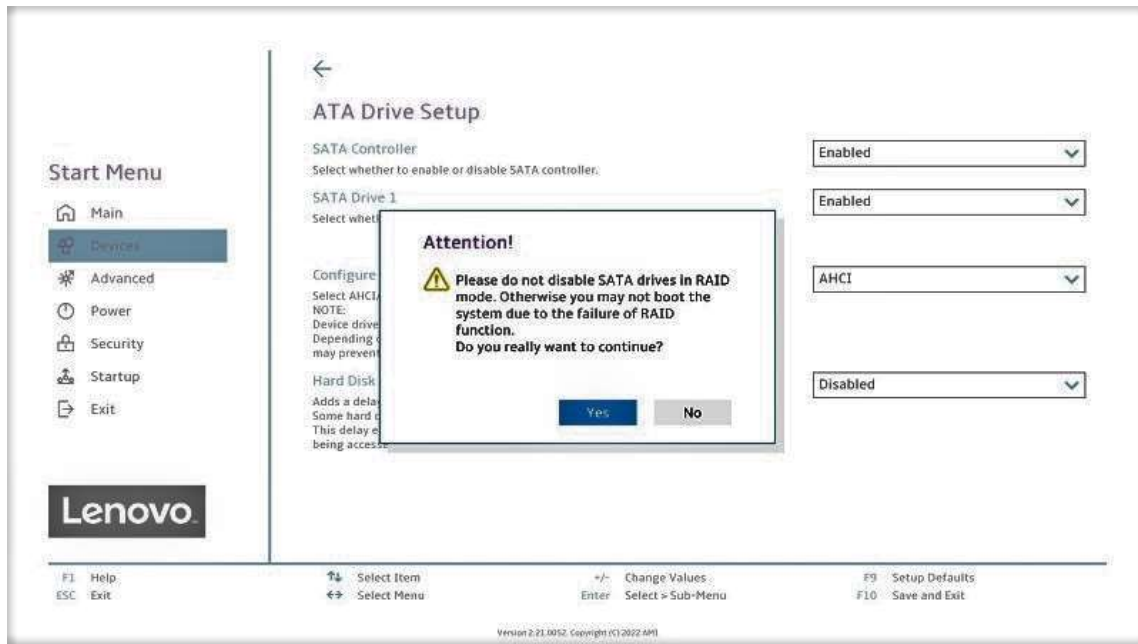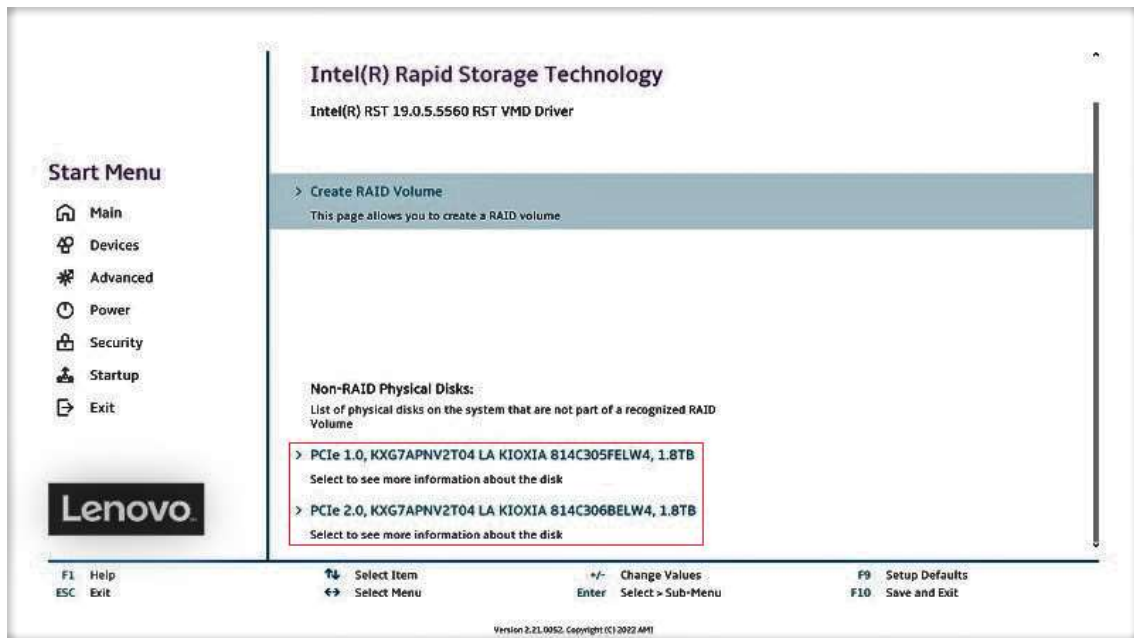

6. Press F10 to save and Exit BIOS setup.

7. As the system reboots, press the function F1 key at the Lenovo splash screen to enter the BIOS setup. Select the "Devices" menu at the BIOS main screen setup utility and then "Intel(R) Rapid Storage Technology".
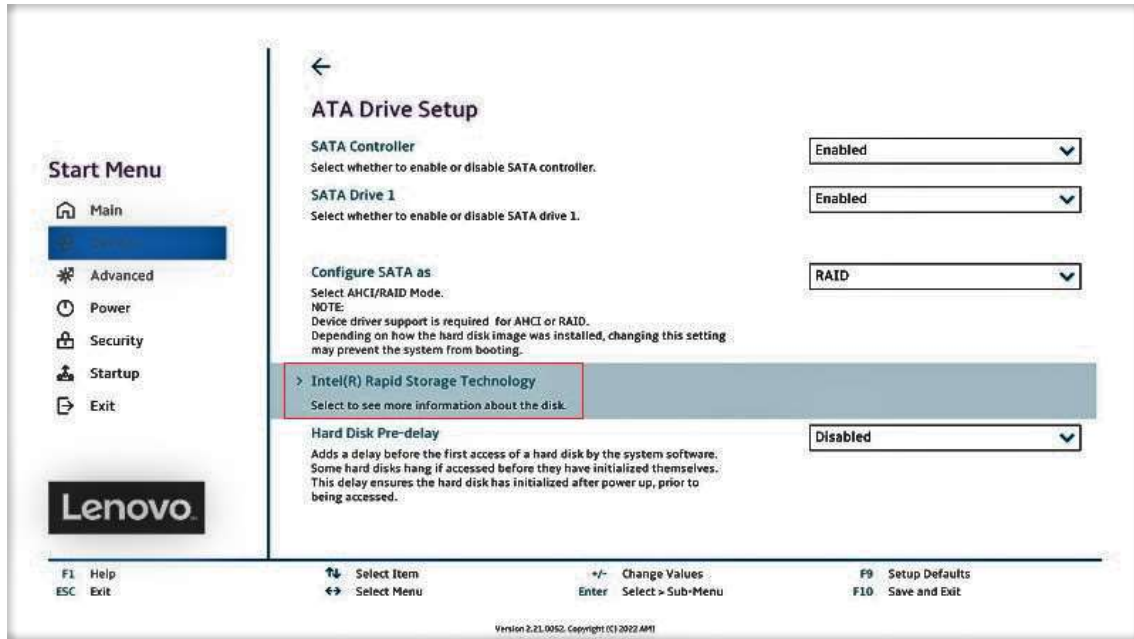

8. Verify all the desired drives are available.

9. If all the disks installed are not shown as available, it may be necessary to clear any previous data from the disks. If no arrays have been created previously but there is an existing volume shown, it will be necessary to delete any previous arrays. Advance to step 16 to complete the process to delete any arrays. Return and proceed to step 11 once the desired drives are available.

10. Select "Create RAID Volume".
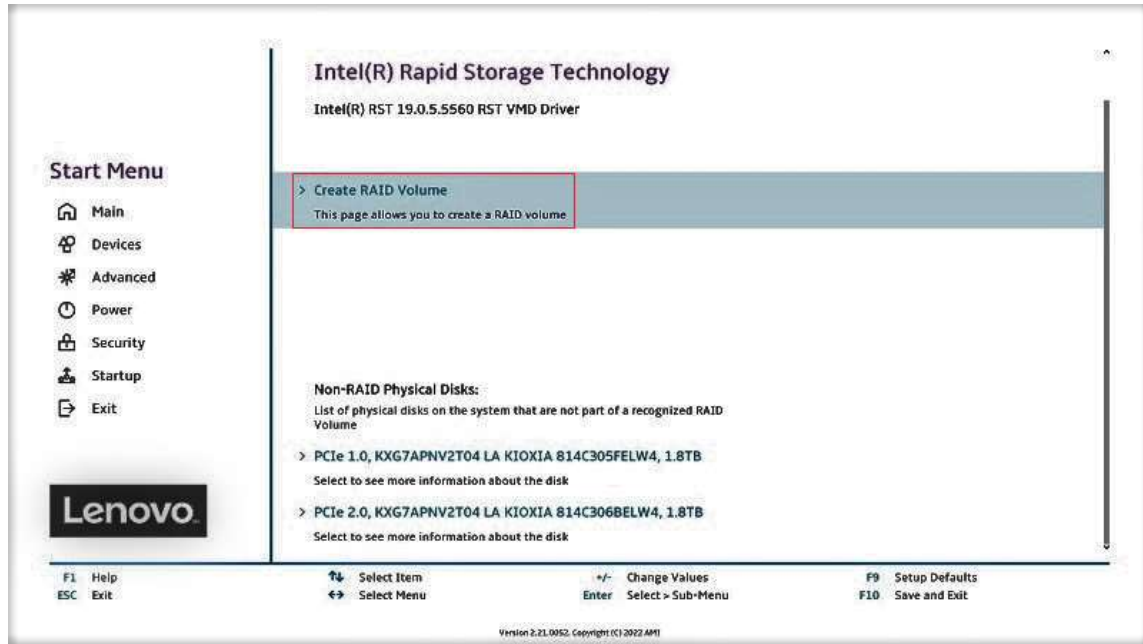
11. Choose a name for the volume.

12. Select the drop-down box for "RAID Level" and select the desired RAID
    level. The RAID level options displayed are based on the type and
   number of drives available in the system.

13. On the same page, select the drop-down box for each drive and select "X" to add the drive to the array. Once all the required drives are added, select "Create Volume".
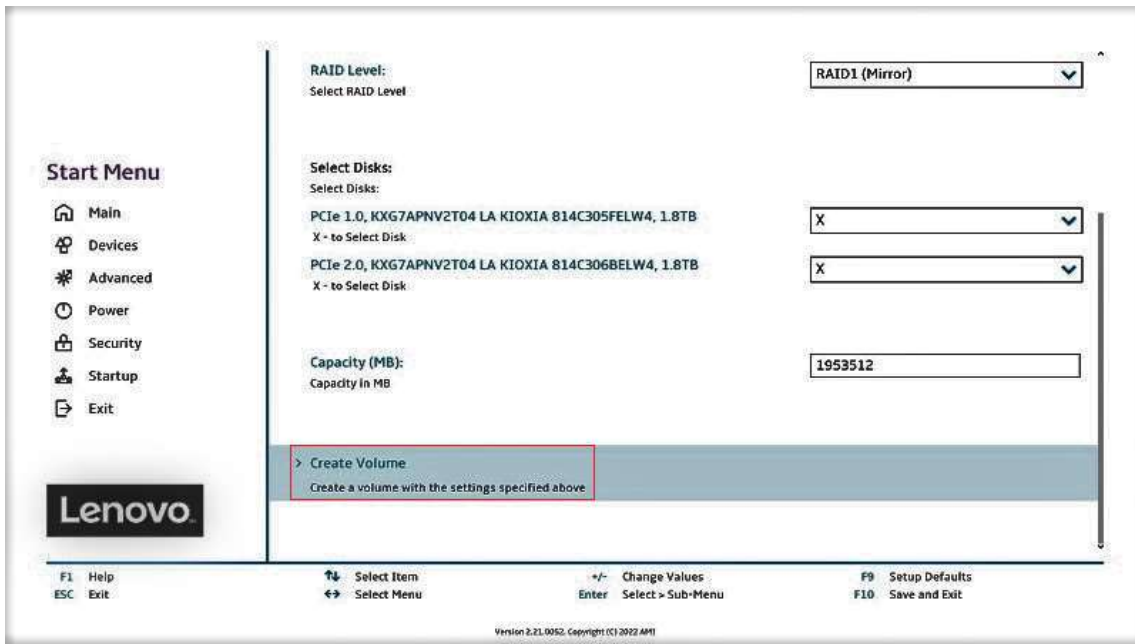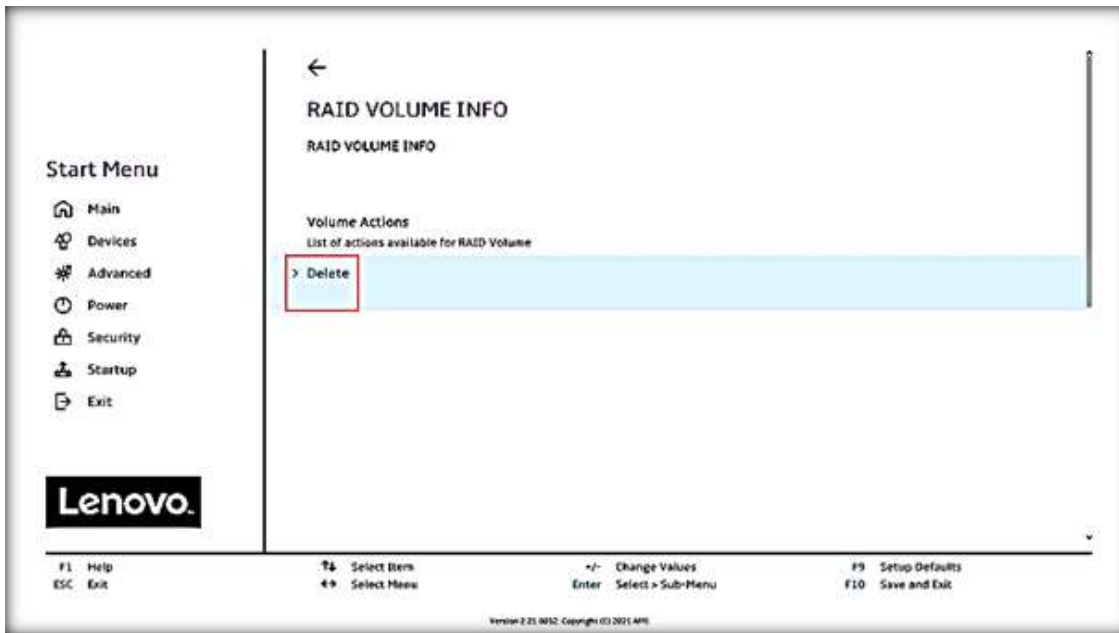

14. From the opening page of the "Intel(R) Rapid Storage Technology", verify the volume was created properly.
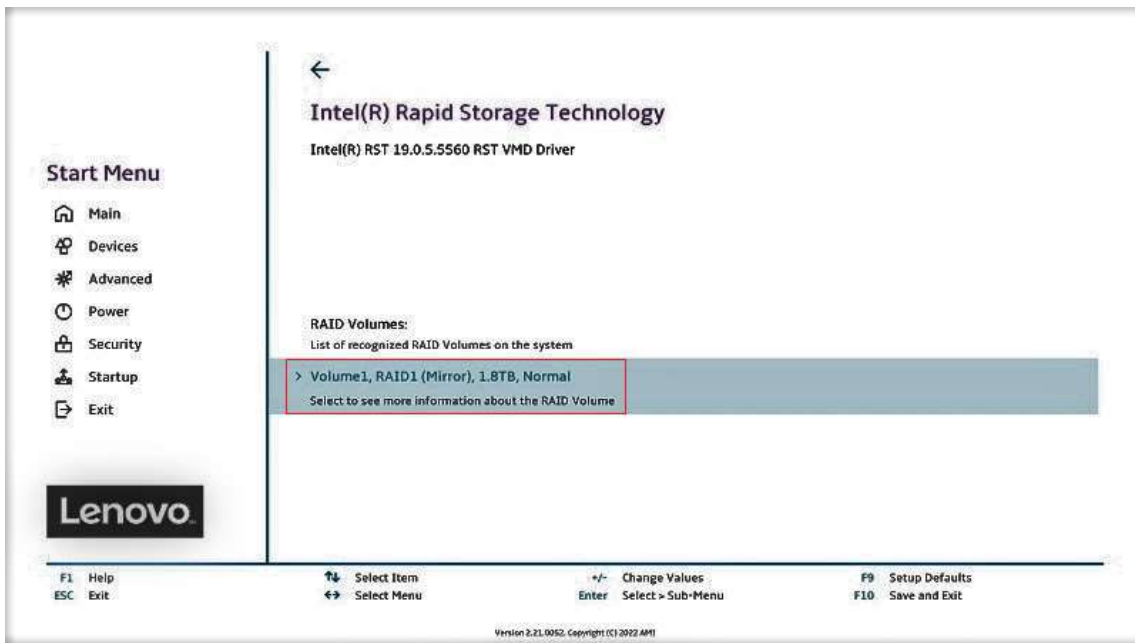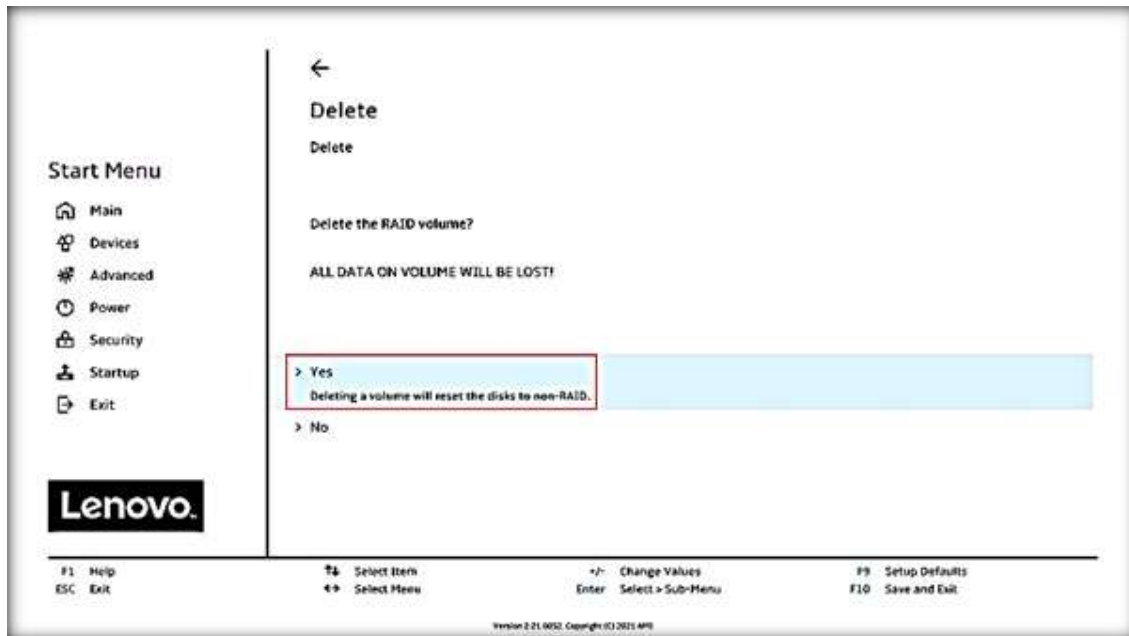
15. To delete an array, select a displayed volume to view information about it.
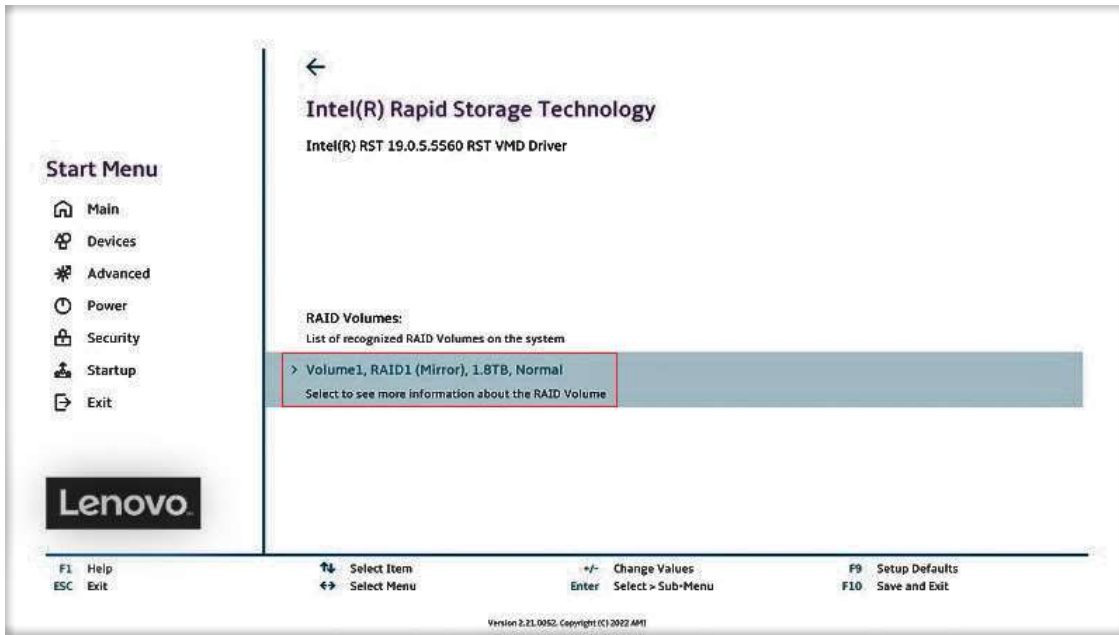
16. Select the "Delete" option.

17. Select "Yes" to confirm the deletion of the volume.

18. To verify the array was deleted, return the opening page of the "Intel(R) Rapid Storage Technology" and verify the drives are once again seen as available for the creation of a new array.

Note: The user may not see the RAID array show up in the BIOS boot sequence until after a bootable operating system has been installed on the array.

Section 5 – Document Revision History

Version	Date	Author	Updates
1.0	5/31/22	Scott Crowe	Initial launch release
1.1	7/8/22	Scott Crowe	Update for new system