

Storage Configurator

Lenovo ThinkStation P620

Lenovo



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Overview

The purpose of this document is to provide guidelines for users on how to optimally configure the system storage in the ThinkStation P620 platform in order to insure the proper functionality.

The P620 utilizes 3.5" SATA HDDs as well as NVMe M.2 SSDs with on-board RAID controllers for both drive types. There are a maximum of five SATA drive locations and eleven NVMe drive locations for a total of sixteen drives that can physically be installed in the system. However, the maximum number of drives supported in this system for simultaneous use is fourteen. This maximum number can be affected based on the hardware configuration of the system as well as the configuration of the RAID controllers. Enabling the NVMe RAID controller individually or the NVMe and the SATA RAID controllers simultaneously will alter the supported number of drives.

When the appropriate number of drives are present in system, the P620 can support RAID 0, 1, 5, and 10. A given RAID level will only be available or shown for selection if the system detects enough drives to support it. RAID configurations are discussed in Sections 3 and 4.

Considerations

- The P620 has on-board RAID support for both the NVMe and SATA. At the time of writing there are no add-in RAID controllers certified to work on the P620.
- The ability to maximize the number of NVMe drives is dependent upon using two optional Quad M.2 PCIe adapters, a single optional NVMe M.2 PCIe Add In Card, and the two on-board NVMe M.2 slots. Two Quad M.2 PCIe adapters can only be used if a single wide GPU is used. Slot 3 is reserved for the first GPU. Slot 1 and Slot 4 are the only other x16 PCIe slots that can accommodate a Quad M.2 PCIe adapter.
- The ability to maximize the number of SATA drives is dependent upon using two default HDD bays located at the bottom of the chassis, as well as two additional optional HDD bays that will mount next to those, and finally adding an additional storage location in the front bay. Using the front bay for an HDD device will require an optional Flex bay - Flex storage enclosure, a Front-access storage enclosure (FASE). For more information see Section 2.
- The P620 can simultaneously utilize up to fourteen drives. If the NVMe RAID controller is enabled this will reduce the maximum number of drives supported. Enabling the SATA RAID controller in addition to the NVMe RAID controller will further affect the number of supported drives.
 - If the NVMe RAID controller is disabled and the SATA RAID controller is enabled or disabled, the system will support up to fourteen drives.
 - If the NVMe RAID controller is enabled and the SATA RAID controller is disabled, the system will support a maximum of thirteen drives. Although the system can support thirteen drives, it can only support up to eight NVMe drives in any configuration. The maximum number of NVMe drives is eight and the maximum number of SATA drives is five.
 - If the NVMe RAID controller is enabled and the SATA RAID controller is enabled, the system can support a maximum of eight drives. Although the system can support eight drives, it can only support a maximum of six NVMe drives in any configuration.

- Although the system can support a wide array of configurations of NVMe and SATA drives, care should be given when selecting drives based on the types of RAID arrays that are desired.
 - A given array should not mix drive types or 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, it will be necessary to verify there are the proper types and number of devices for a desired RAID configuration.
 - In the proper configuration, the system can hold up to eleven NVMe M.2 drives and the system supports the Gen 4 PCIe standard for the latest generation of M.2 drives. The two designated slots on the motherboard can support up to Gen 4 speeds. However, the currently supported optional Quad M.2 PCIe card and the single M.2 Add In Card are only capable of Gen 3 speeds, even if Gen 4 drives are used.
- There are Lenovo limitations on the number of supported RAID arrays.
 - There is a maximum of two RAID arrays per RAID controller. This will limit the NVMe RAID controller to two arrays and limit the SATA RAID controller to two arrays for a total of 4 RAID arrays per system.
 - RAID arrays on the NVMe RAID controller are limited to a single interface. An array could be created with both M.2 drives in the on-board M.2 slots. An array could also be created on a single Quad M.2 PCIe adapter using up to 4 M.2 drives but an array cannot span interfaces or adapters.

Section 1 – Installing NVMe Devices

Please make sure the NVMe devices are installed into the following PCIe slot locations on the ThinkStation P620 motherboard seen below. The NVMe drives may use the dedicated Gen 4 capable onboard M.2 slots see *Figure 1* (1), or use up to two Quad M.2 PCIe adapters and one AIC single M.2 adapter in any of the Gen 3 capable PCIe slots, see *Figure 1* (2).

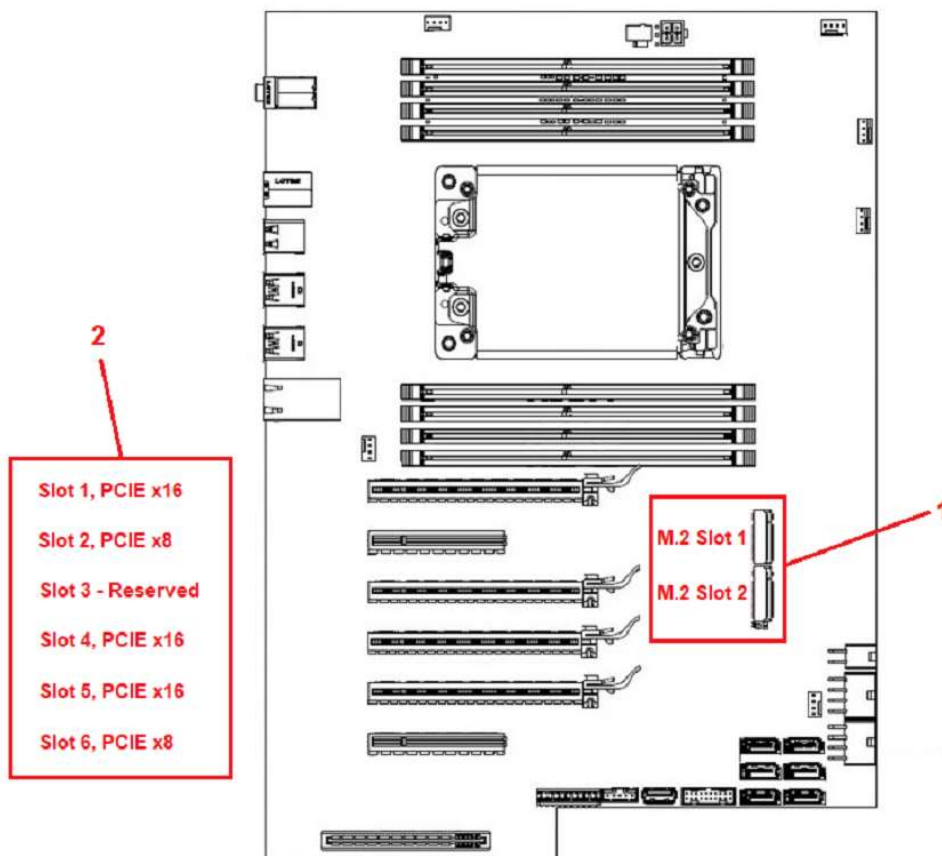
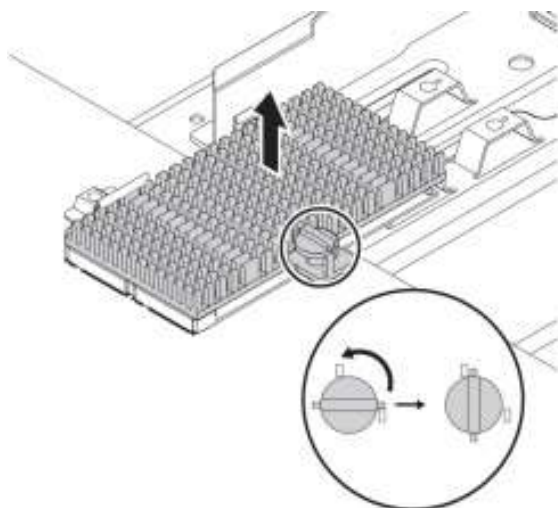


Figure 1

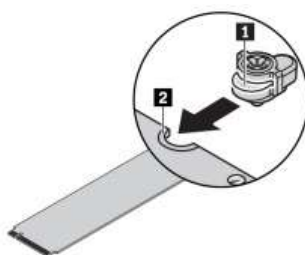
Note: Depending on the installation used, any of the designated PCIe slots see *Figure 1* (2) above may be used to configure NVMe drives except PCIe Slot 3 which is reserved for the first GPU.

For M.2 NVMe drives in the onboard M.2 slots:

1. Remove the heatsink covering the onboard M.2 slots by turning the mounting stud 90-degree counterclockwise to release the heat sink. Then, remove the heat sink from the system board.

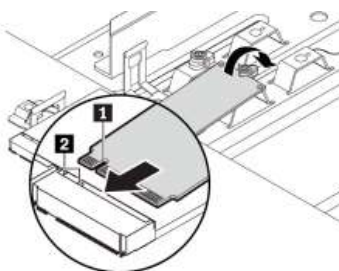


2. Remove the screw or screws from the mounting bracket and align the notch in the screw holder with the corresponding notch in the M.2 NVMe drive. Insert the screw holder onto the M.2 NVMe drive as shown.

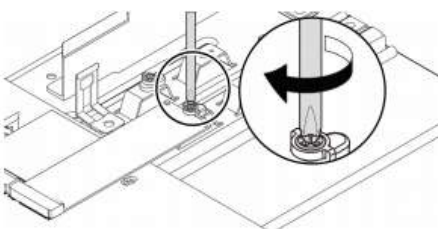


3. Hold the new drive by its edges so as not to touch the circuit board and ensure that the circuit board side is facing upward. Align the notch in the new drive with the slot key in the M.2 slot. Insert the drive into the corresponding slot at an angle of about 20 degrees until it is firmly secured. Pivot the M.2 NVMe drive downward.

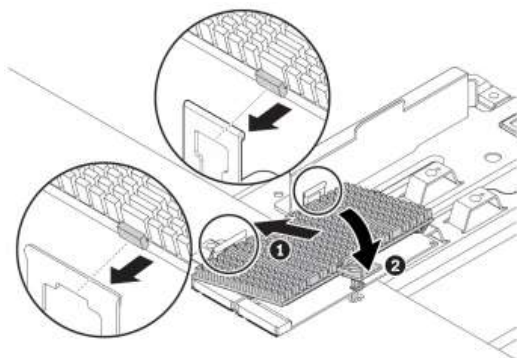
Note: If only one M.2 NVMe drive is installed, ensure that the drive is installed in the M.2 NVMe drive slot 1.



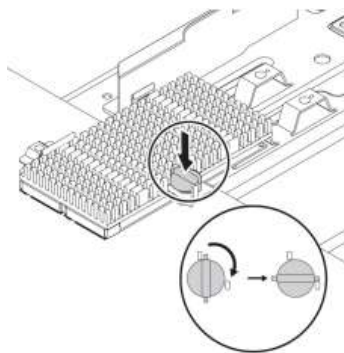
4. Tighten the screw to secure the M.2 NVMe drive. Be sure not to overtighten the screw.



5. If necessary, remove the film that protects the thermal pad on the heat sink. Insert the two hooks on the heat sink into the corresponding holes as shown. Then, press the heat sink downward. Ensure that the mounting stud on the heat sink is aligned with the hole in the system board.

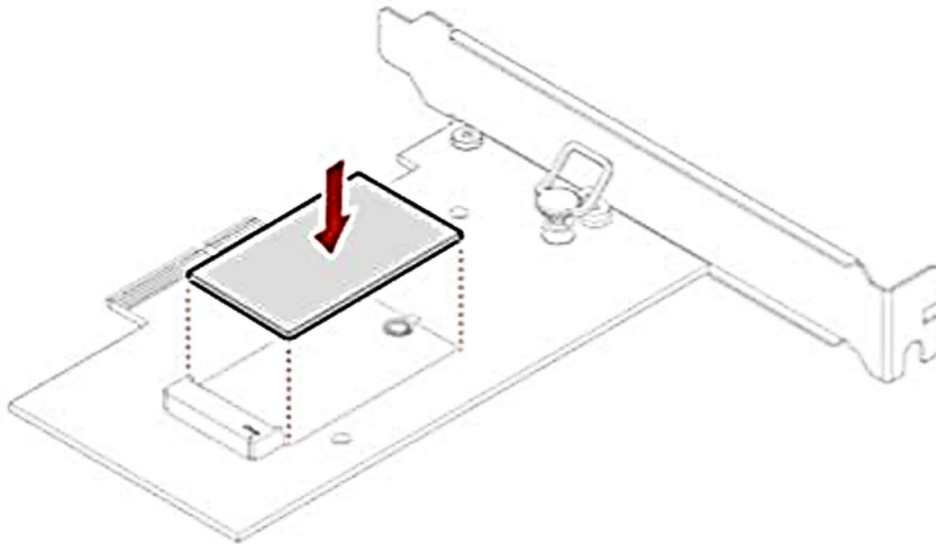


6. Press the mounting stud downward and turn the mounting stud 90-degree clockwise to secure the heat sink to the system board.

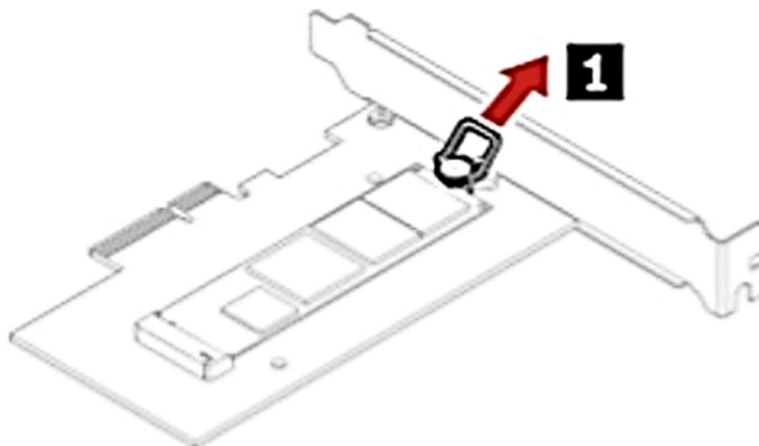


For M.2 NVMe drives installed in the Add-in Card:

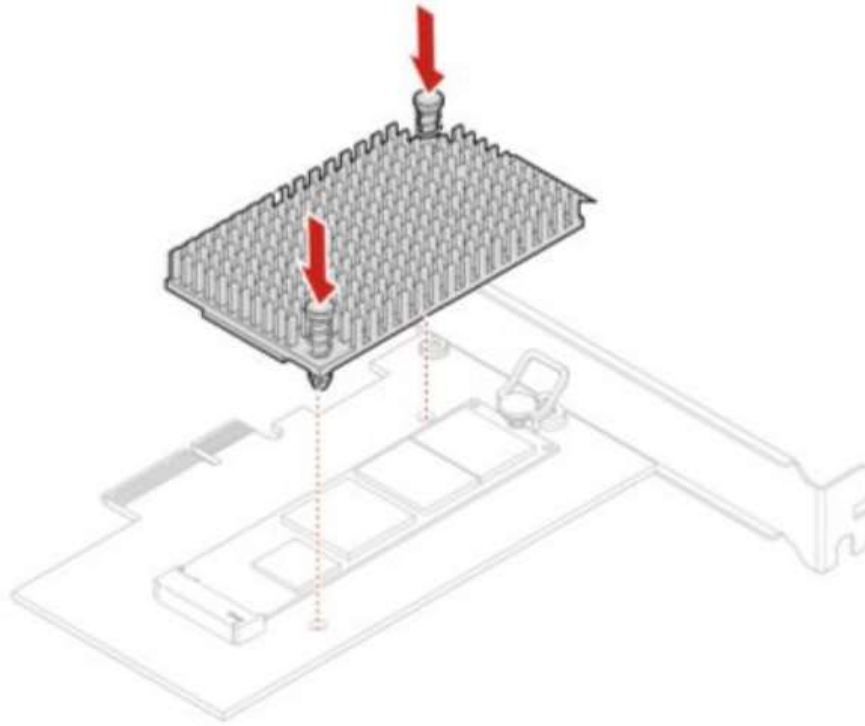
1. Ensure that a thermal pad is placed in position on the M.2 solid-state drive PCIe adapter.



2. Pull the retention latch outward on the M.2 solid-state drive adapter.

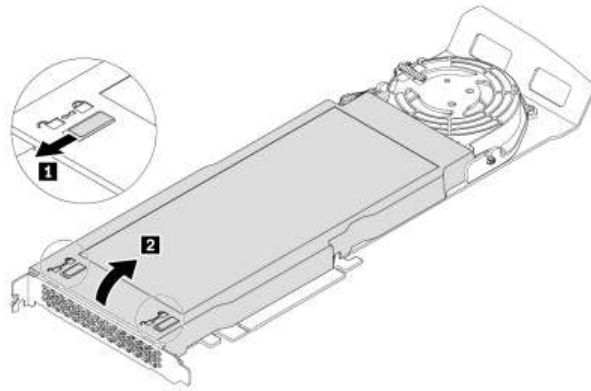


3. Hold the new drive by its edges so as not to touch the circuit board and ensure that the circuit board side is facing upward. Align the notch in the new M.2 NVMe drive with the slot key in the M.2 slot. Insert the plug of the retention latch into the hole to secure the new drive.

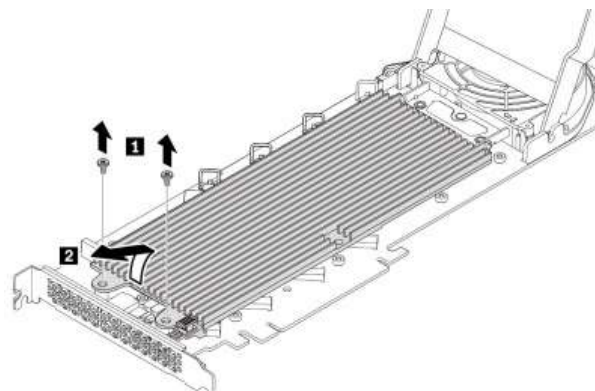


For M.2 NVMe drives in an M.2 quad drive PCIe adapter:

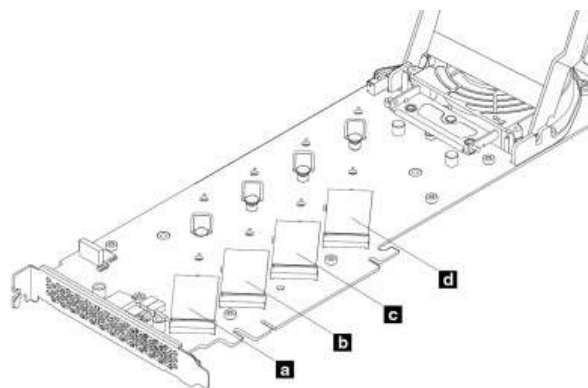
1. Slide the cover latches of the quad drive PCIe adapter to the open position. Then, pivot the cover as shown until it stops.



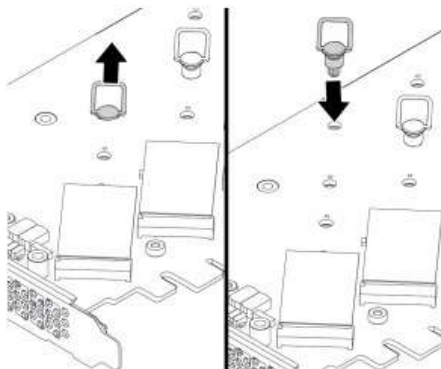
2. Loosen the screws that secure the M.2 NVMe drive heat sink. Then, remove the heat sink as shown.



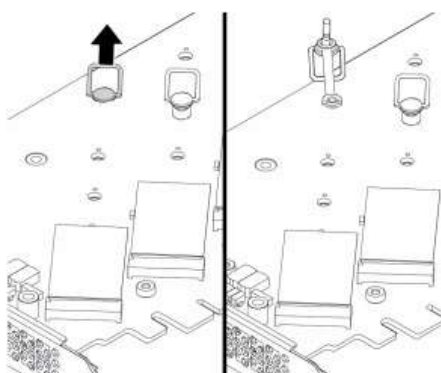
3. Install M.2 solid-state drives in the alphabetic order as shown.



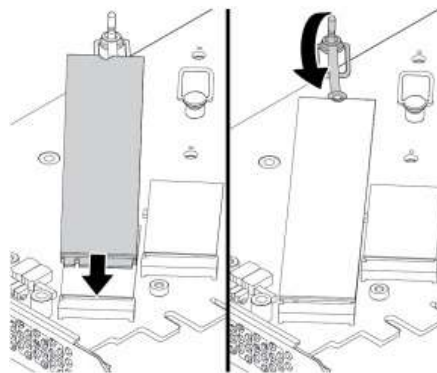
4. If necessary, move the retention latch to an appropriate location to suit the length of the new M.2 NVMe drive and remove any film on the thermal pads on which you want to install the M.2 NVMe drive.



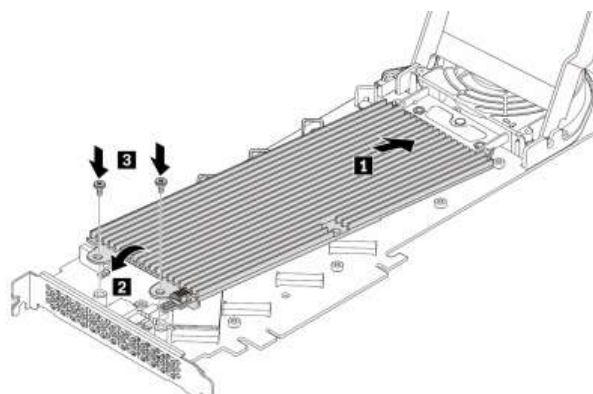
5. Pull the handle of the retention latch outward to the open position.



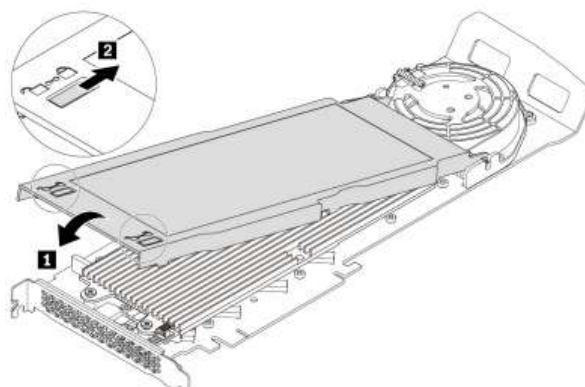
6. Hold the new drive by its edges so as not to touch the circuit board and ensure that the circuit board side is facing upward. Align the notch in the new M.2 NVMe drive with the slot key in the M.2 slot. Insert the drive into the corresponding slot on the PCIe adapter until it is firmly seated. Then, insert the plug of the retention latch into the hole to secure the new drive.



7. Install the heat sink as shown. Then tighten the screws to secure the heat sink.



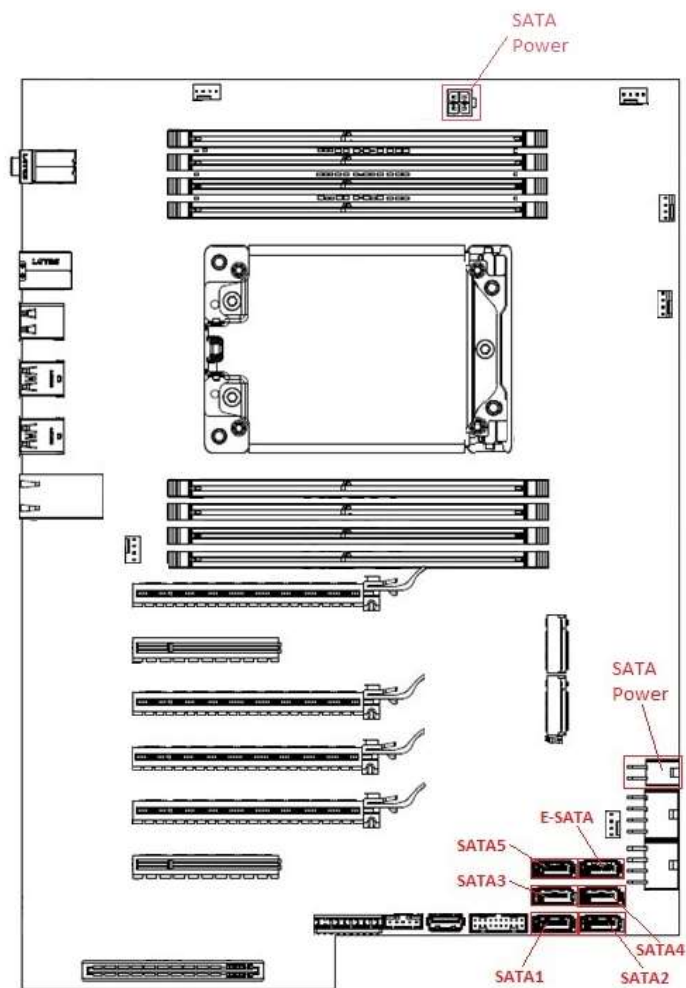
8. Install the cover as shown. Then, slide the cover latches to the locked position.



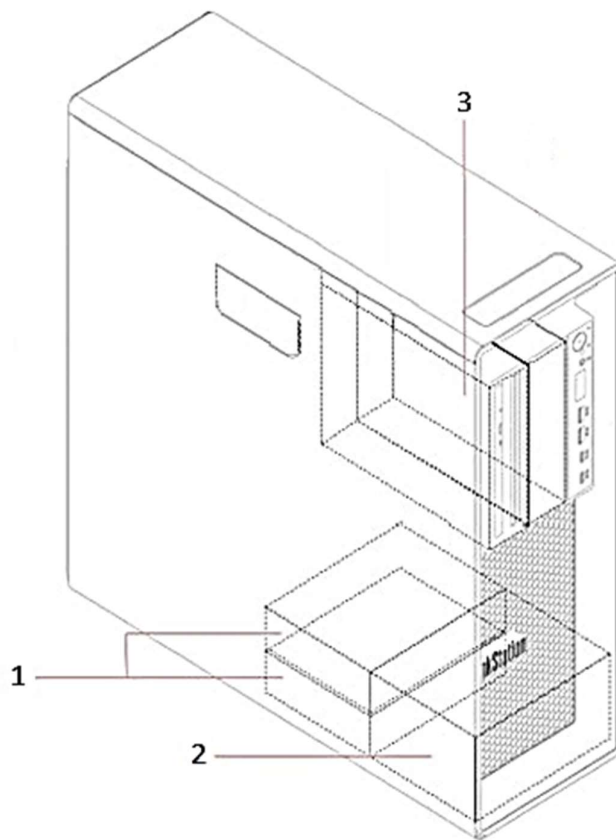
9. Install the M.2 NVMe drive PCIe adapter in a PCIe x16 card slot on the system board.

Section 2 – Installing HDDs/SSDs

The ThinkStation P620 is capable of holding up to five SATA HDDs. The system has a minimum of two SATA drive bays located in the bottom of the case. The system can be configured with an additional two bays adjacent to those. A Flex bay can be added in the front panel to allow for a Flex storage enclosure or a front-access storage enclosure.



Note: In some instances, additional parts may be required to install additional HDDs.



1 – 3.5" primary storage drive cage with trays

2 – 3.5" secondary (optional) storage drive cage with trays

This is only included if 3 or more standard drives are ordered during the production or it can be added in later with Option PN SBB0K66164.

3 – This bay can be used for an optical disc drive (ODD), as a Flex bay - Flex storage enclosure, or as a Front-access storage enclosure (FASE)

The space under this bay must remain unused due to thermal considerations.

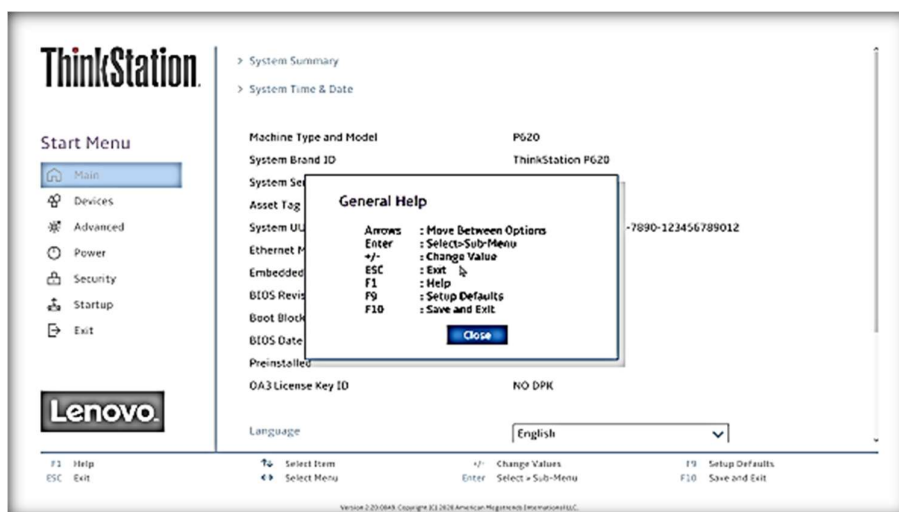
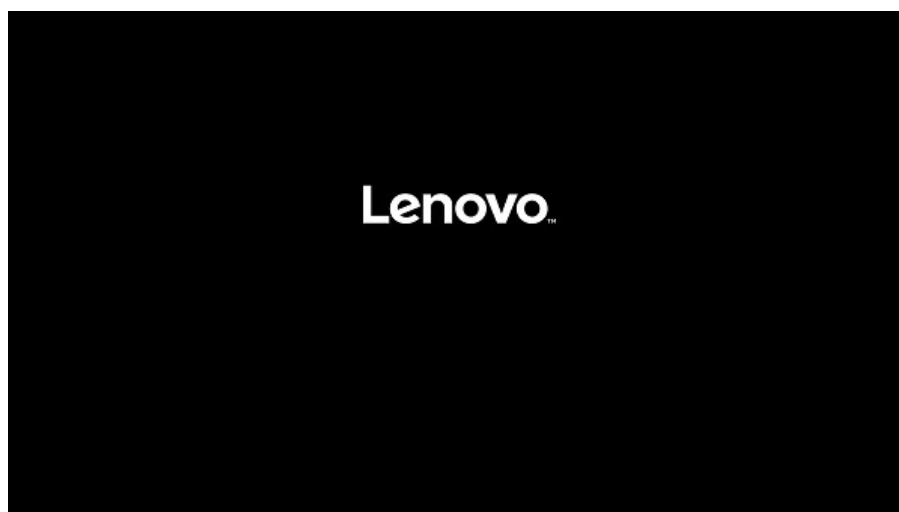
Notes: When using a Flex bay or FASE, additional parts may be required to install 2.5" SATA drives into the standard 3.5" enclosures.

Adding additional drives using the optional storage drive cage will require the use of 90-degree angled SATA data cables on the HDD side to be able to install and close the side cover. It will also be necessary to change the existing two drop SATA power cable to a four drop SATA power cable in order to be able to power the four drives.

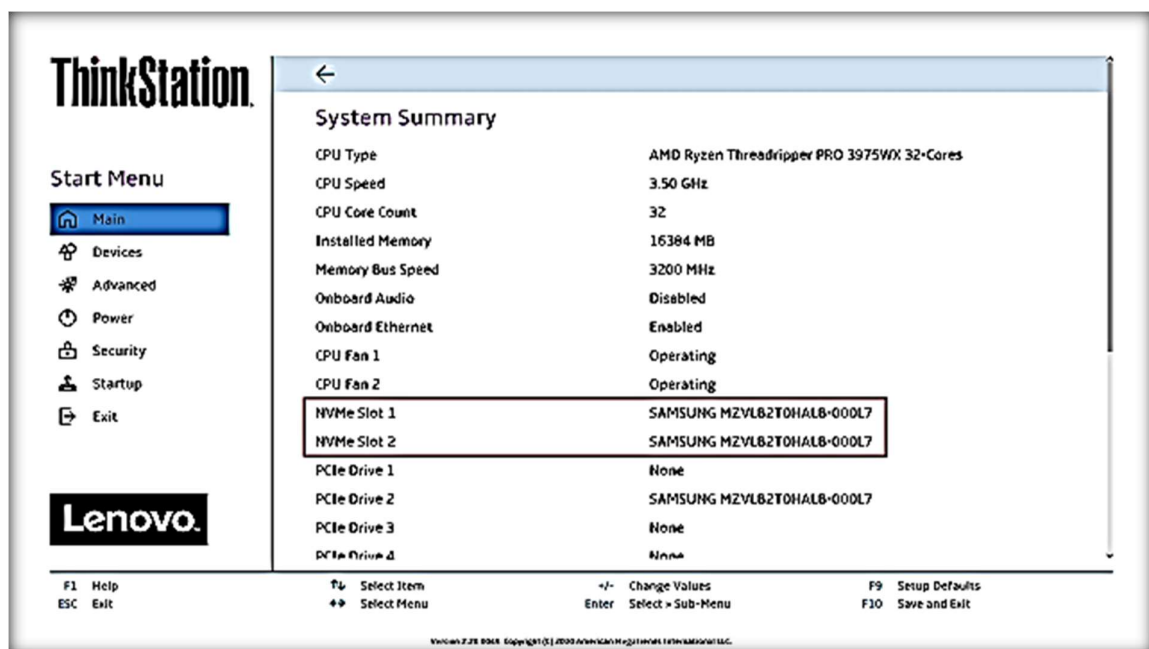
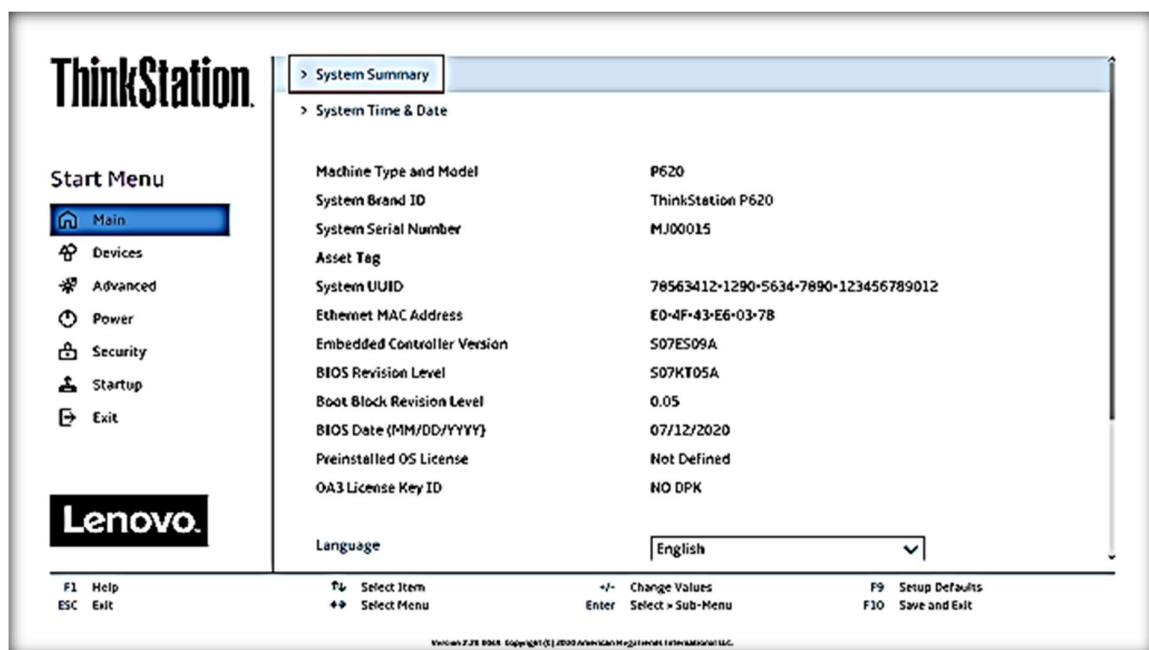
Section 3 – Configuring NVMe RAID for P620

Please refer to the following steps to configure NVMe RAID.

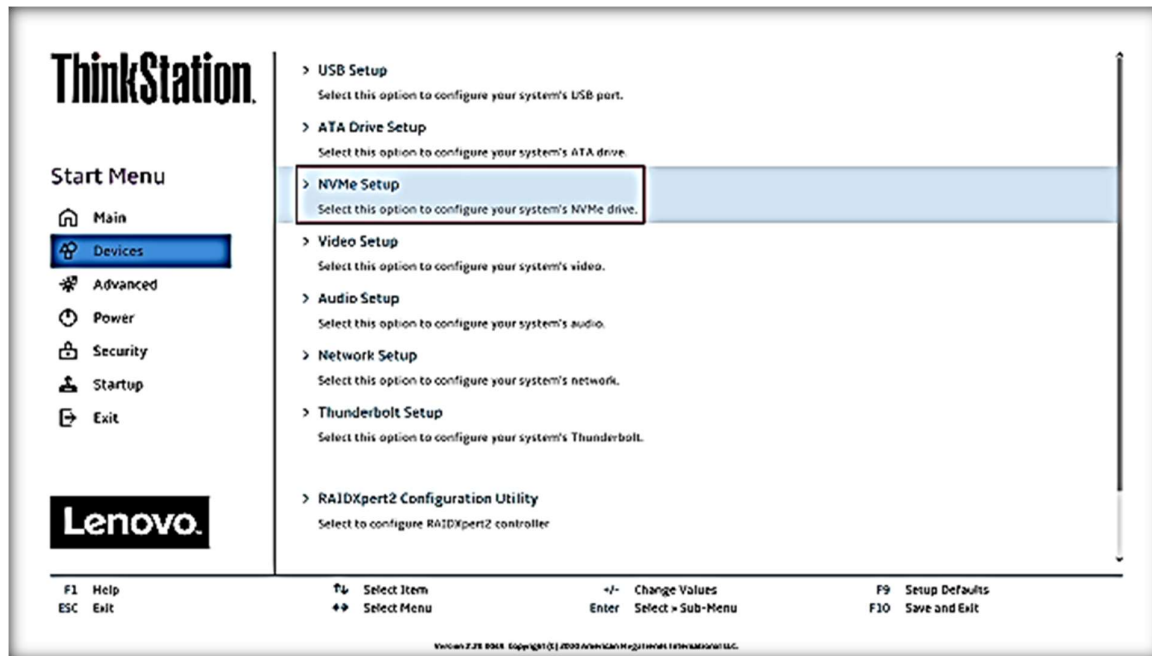
1. Boot into the BIOS by pressing the function F1 key at the “Lenovo” splash screen.



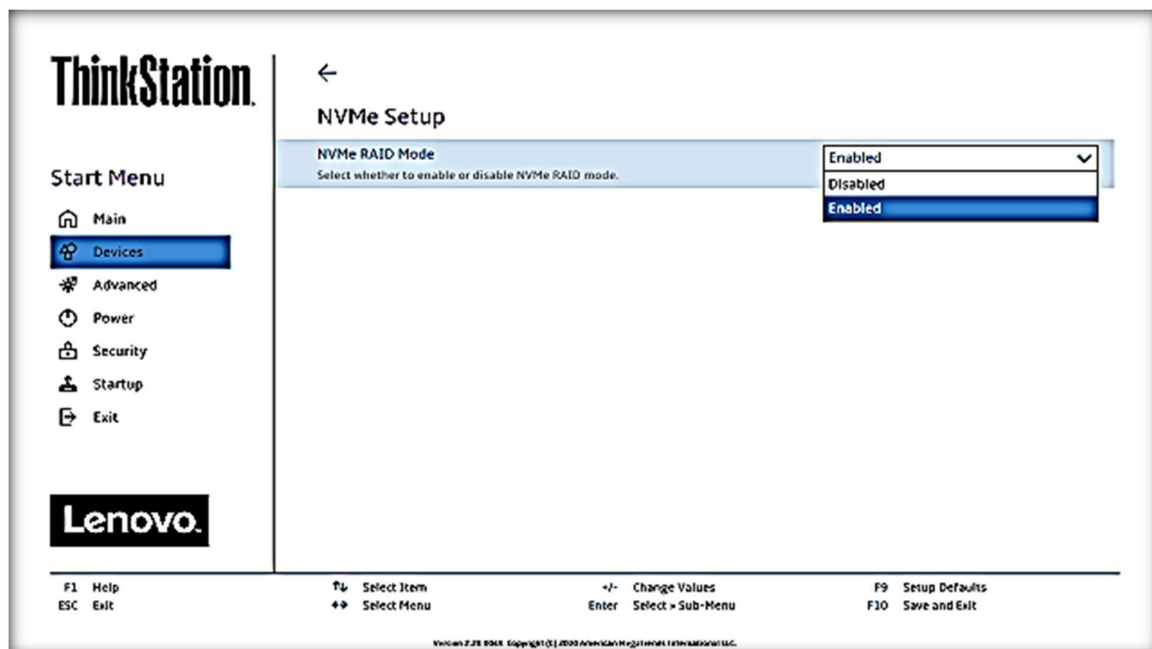
2. Select "System Summary" to verify BIOS is recognizing the NVMe drives.



3. Select the “Devices” menu at the BIOS main screen setup utility and then select “NVMe Setup”.

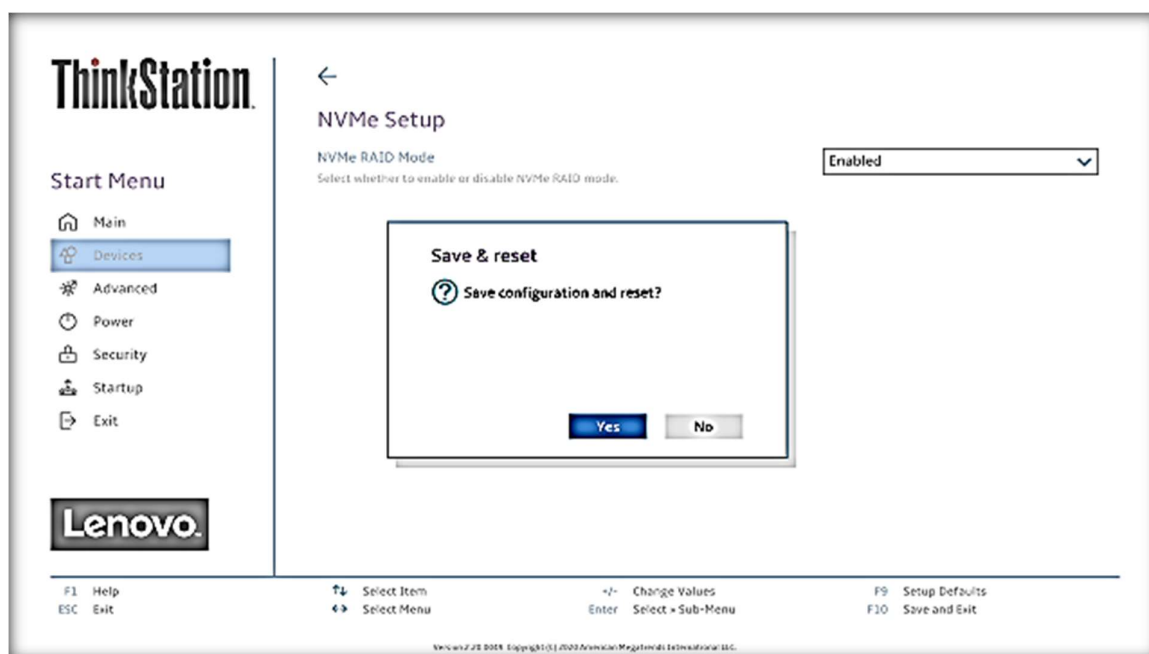


4. In the “NVMe Setup” menu, select “NVMe RAID Mode” and change or verify the option is set to “Enabled”.

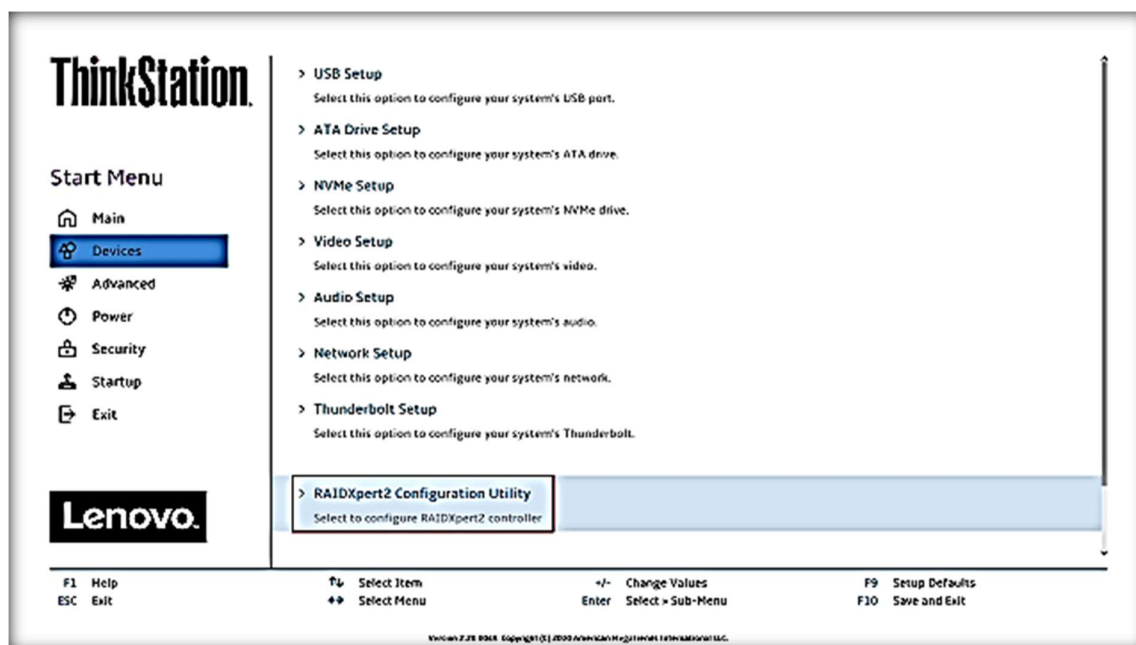


Note: In order to secure erase NVMe drives, the ‘NVMe Setup’ option must be set to ‘Disabled’ mode.

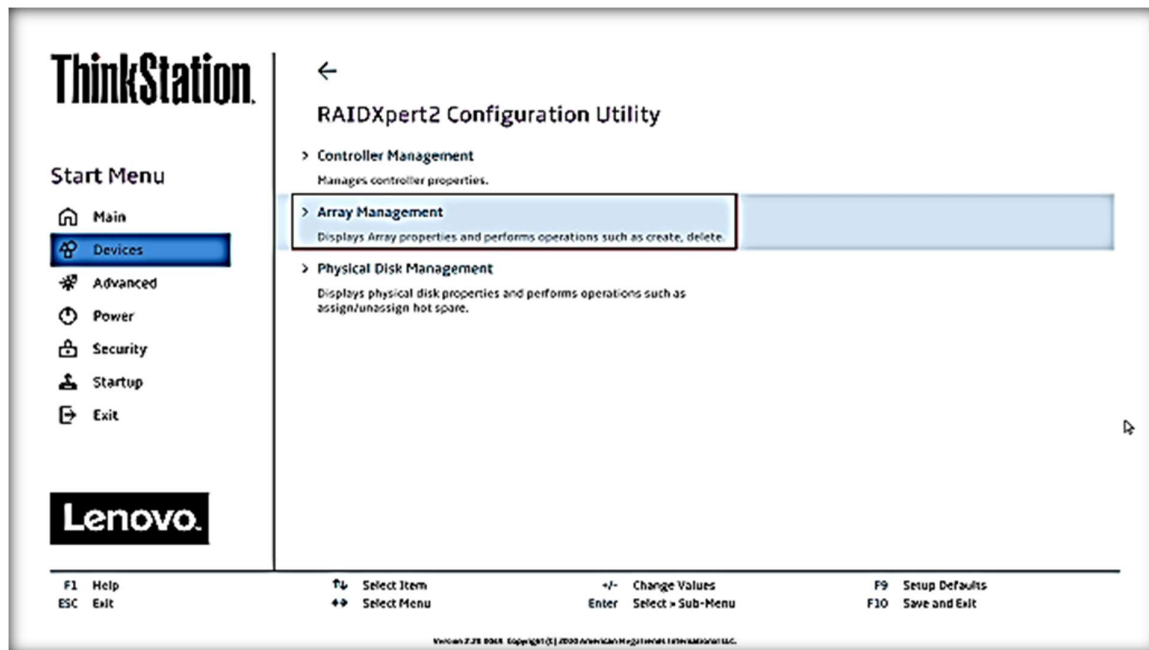
5. Press function F10 to save and Exit BIOS setup.



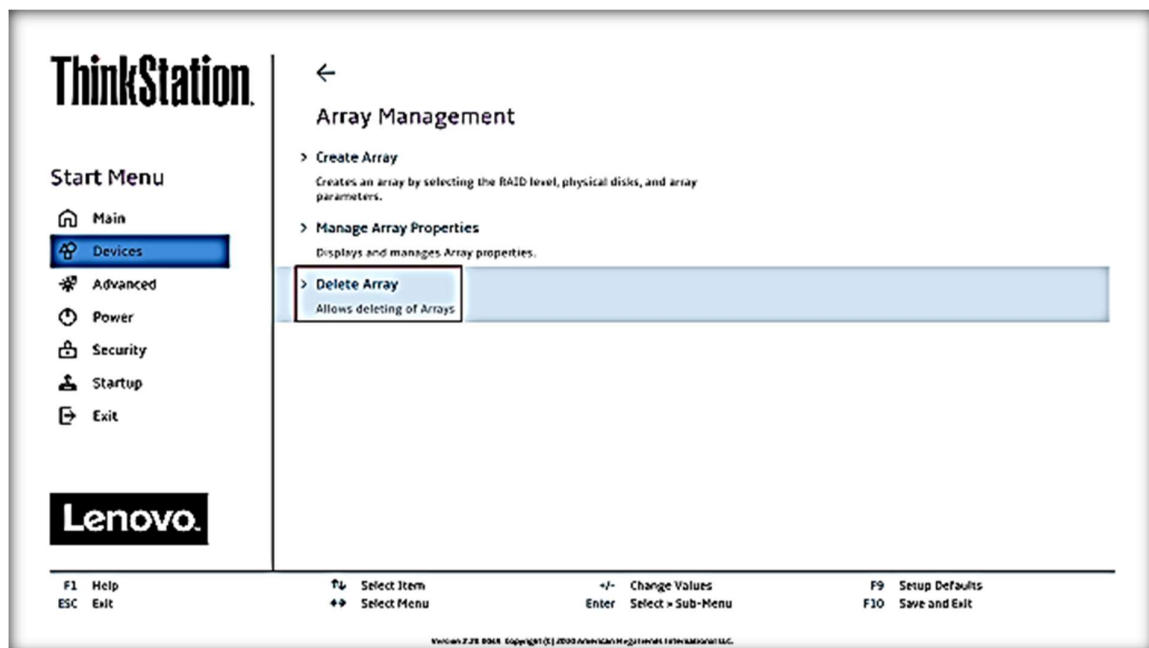
6. As the system reboots, press the function F1 key to go back into BIOS setup. Select the “Devices” menu at the BIOS main screen setup utility and “RAIDXpert2 Configuration Utility”.



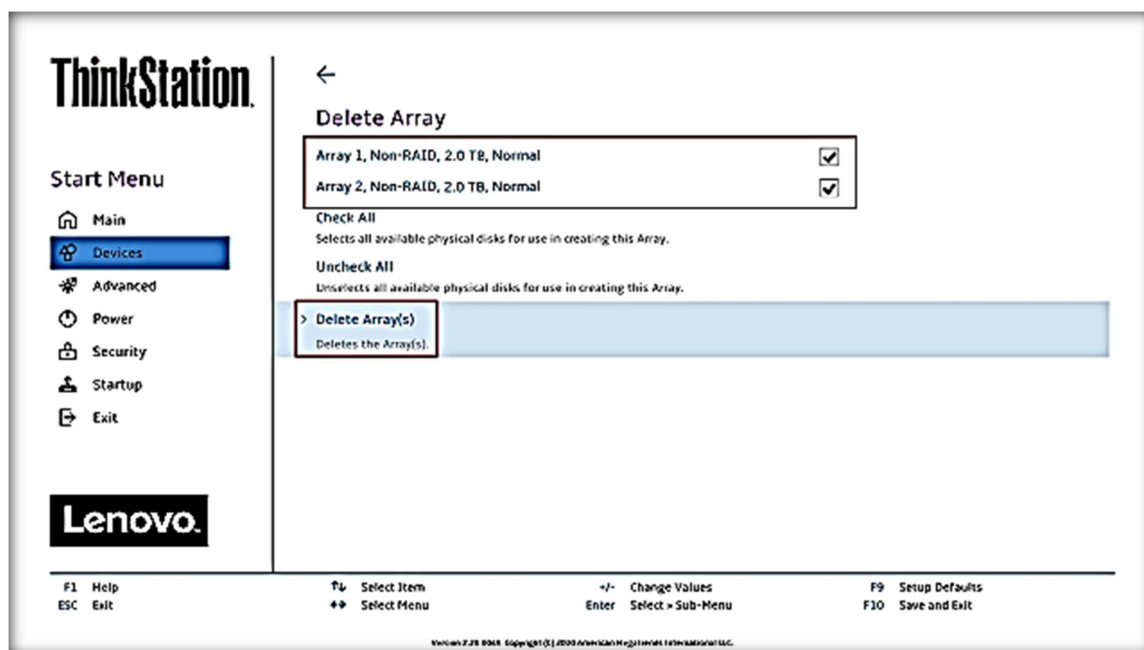
7. Select "Array Management".



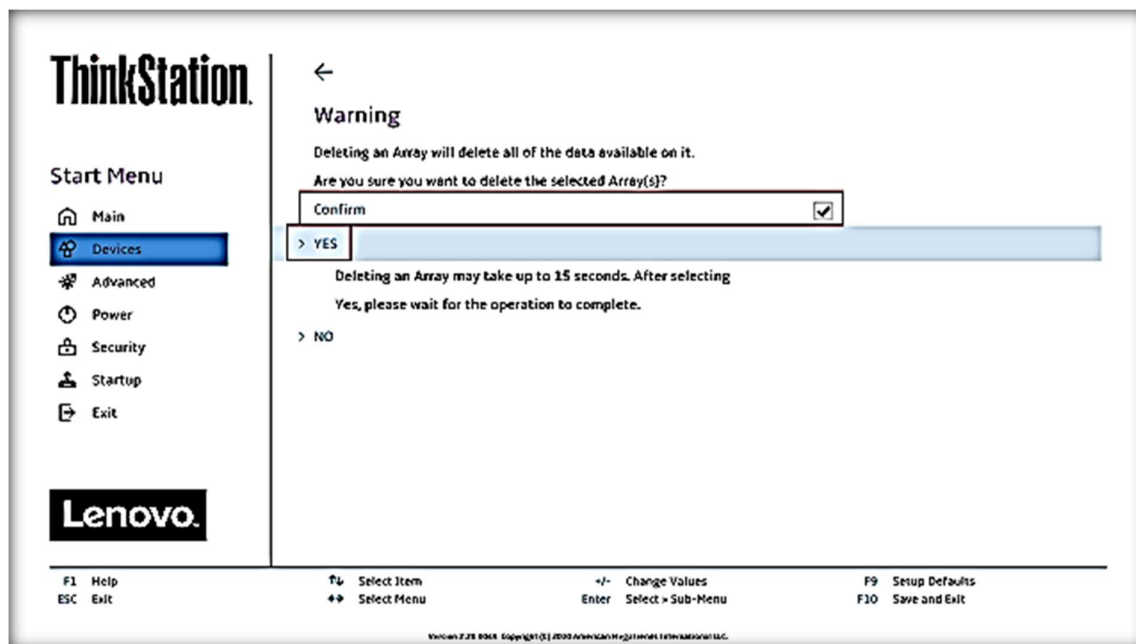
8. To ensure that all disks will be available it may be necessary to clear any previous data from the disks. If no arrays have been created previously but the "Delete Array" option is available, select it. If no arrays exist on the system, the "Manage Array Properties" and "Delete Array" options are unavailable.



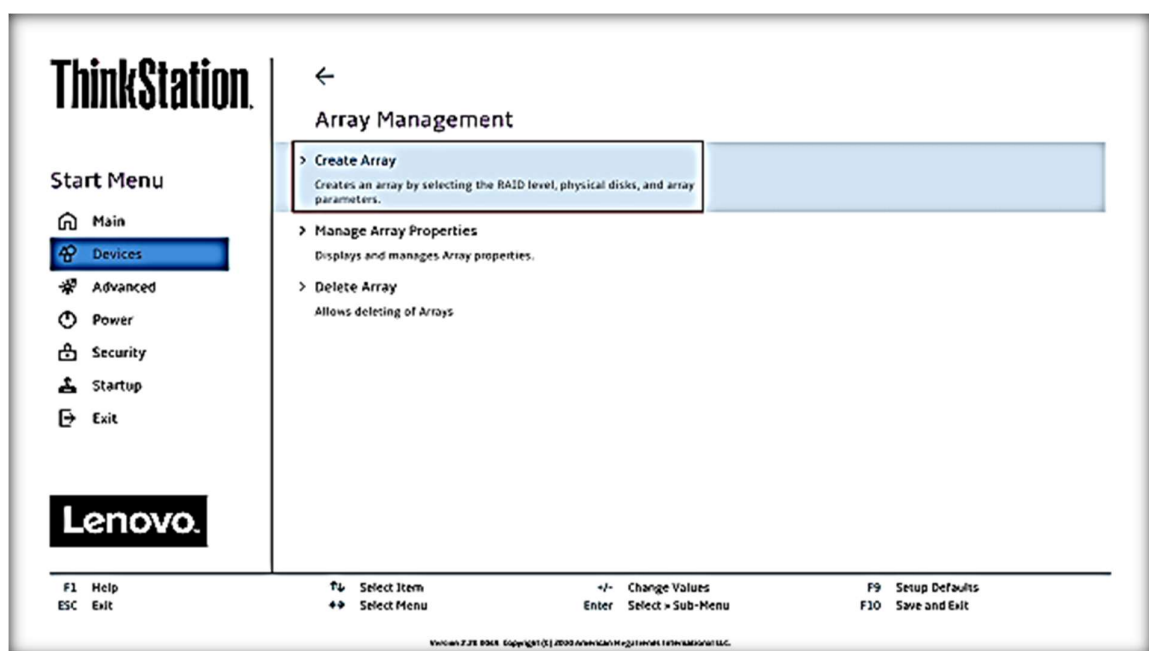
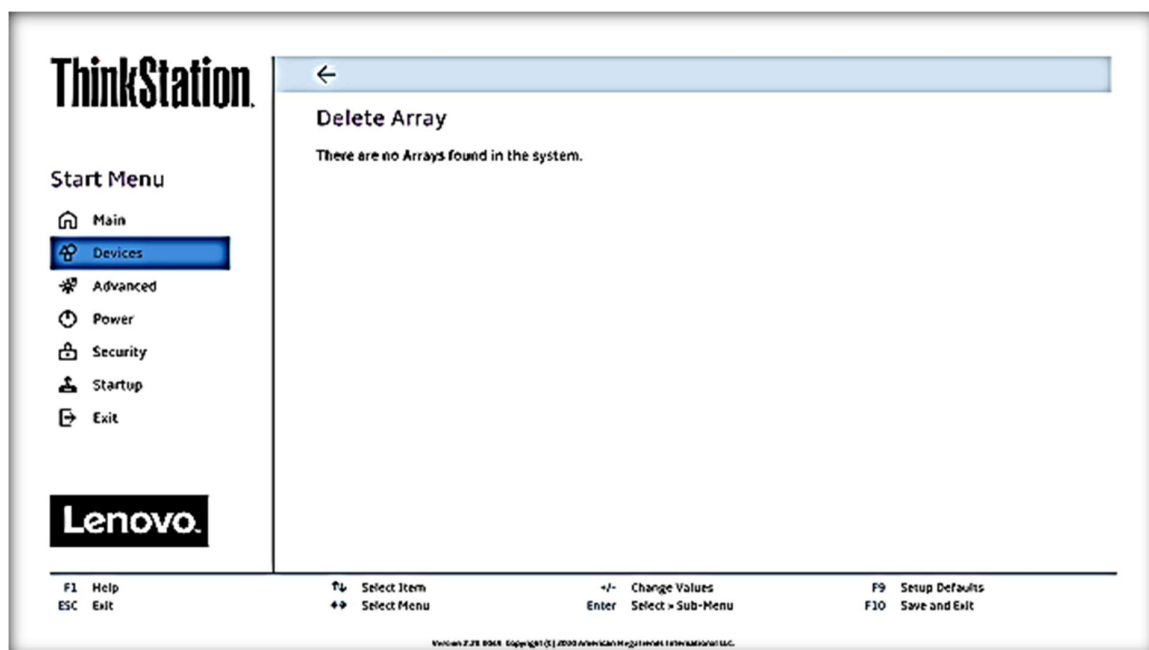
9. All existing arrays are shown. Check the box for each array to be deleted and select "Delete Arrays".



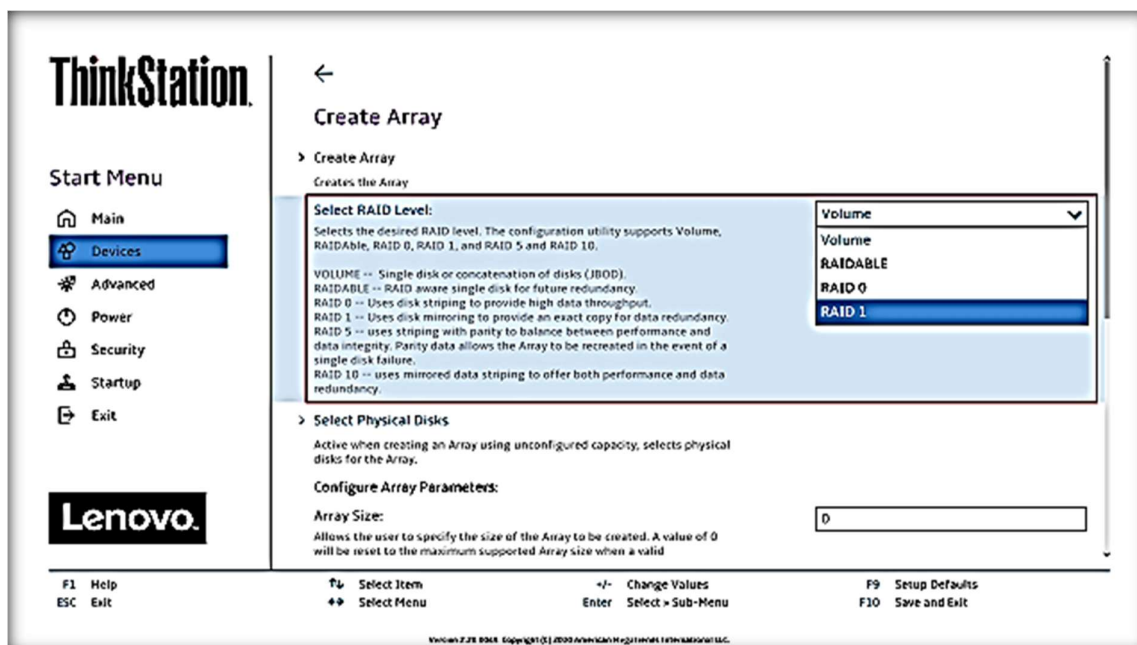
10. Check the "Confirm" box and select "YES" to complete the process.



11. No arrays are found on the system. Go back to the main menu and note the only available option is “Create Array”. Select “Create Array”.

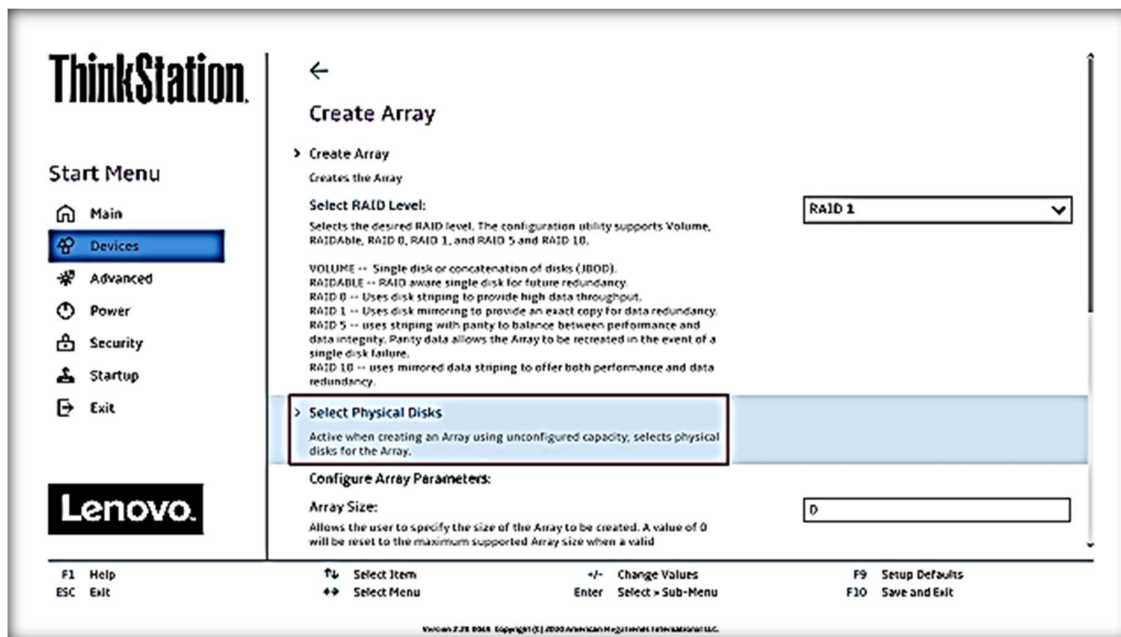


12. Select “Select RAID Level” and choose the desired RAID level.

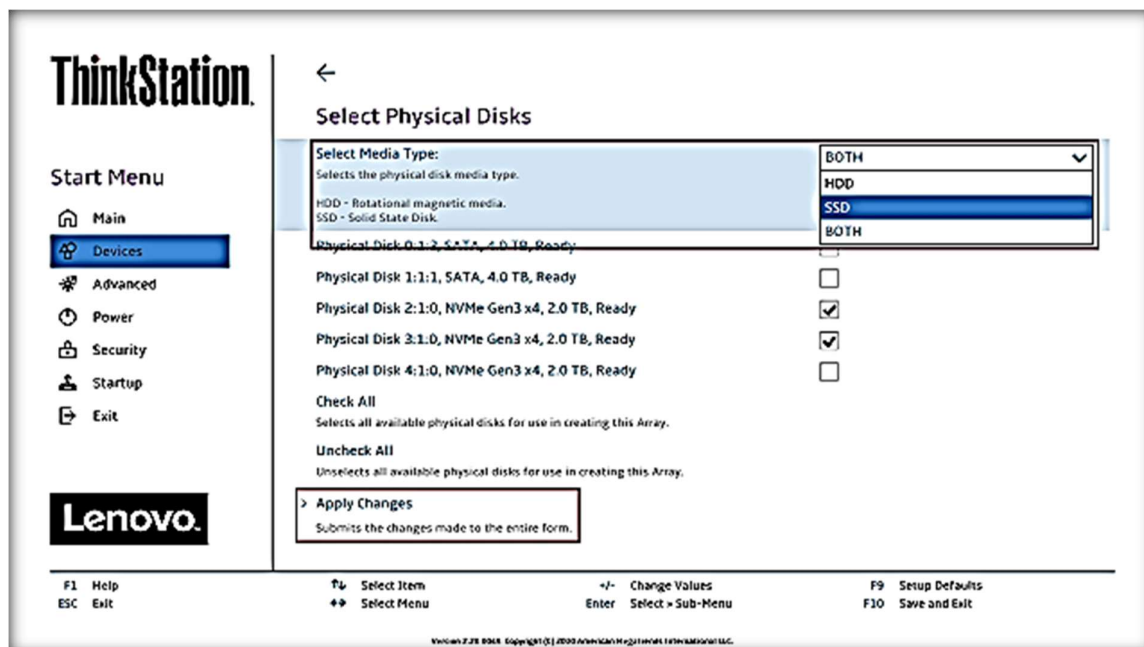


Note: All RAID levels are listed below “Select RAID Level” with a brief description. However, based on the available drives in the system, not all RAID levels may be shown in the drop-down box.

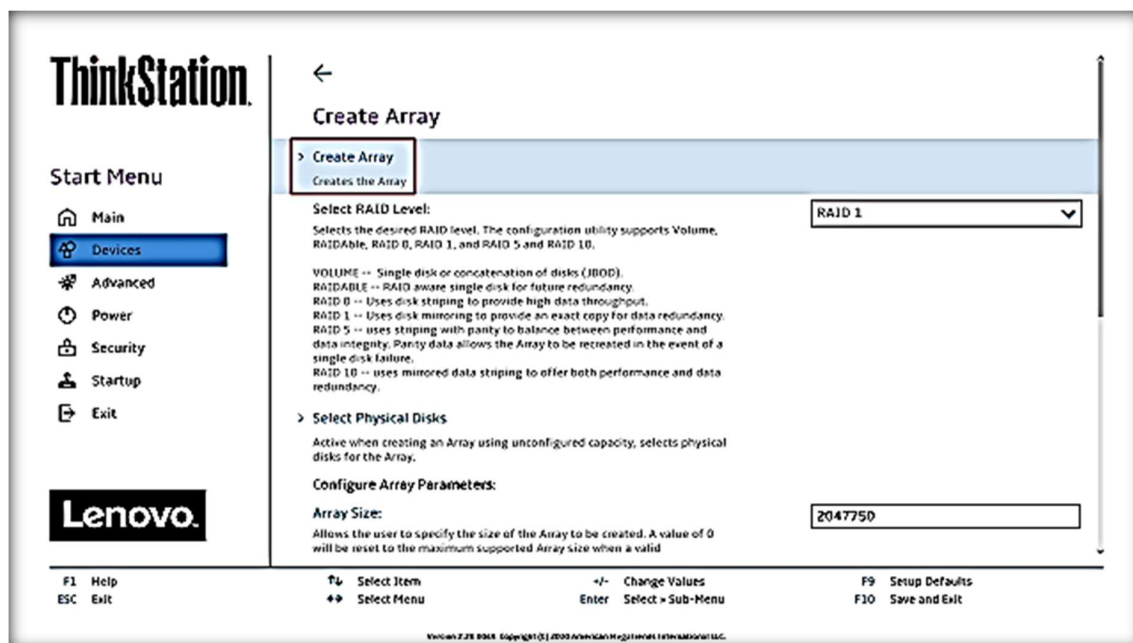
13. After selecting the desired RAID level, proceed with “Select Physical Disks”.



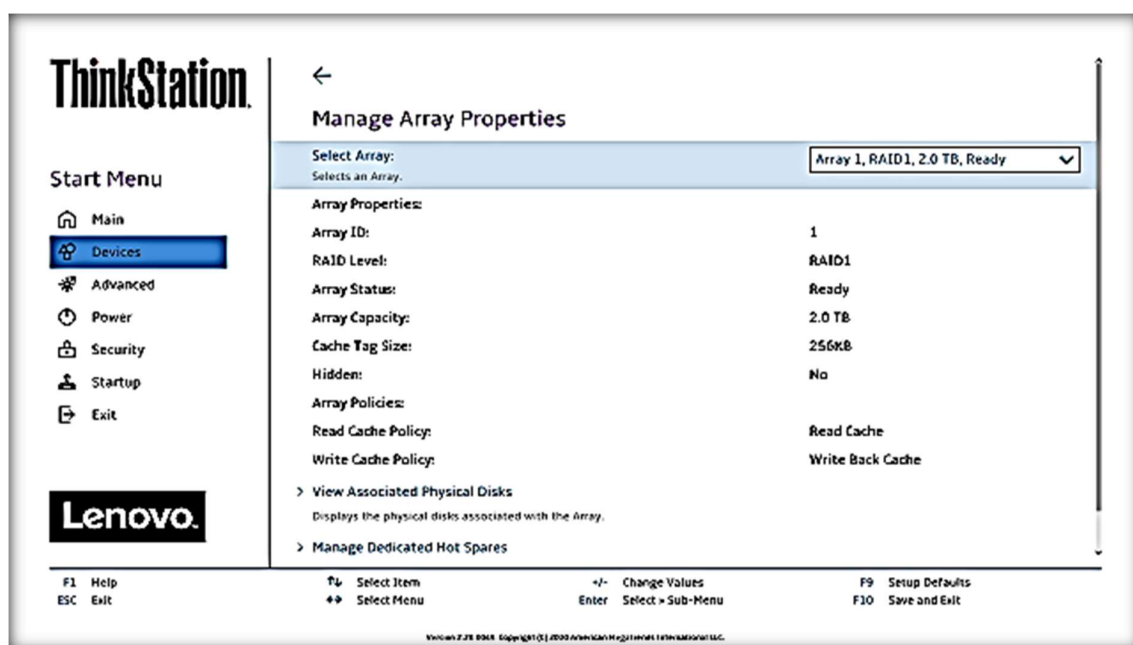
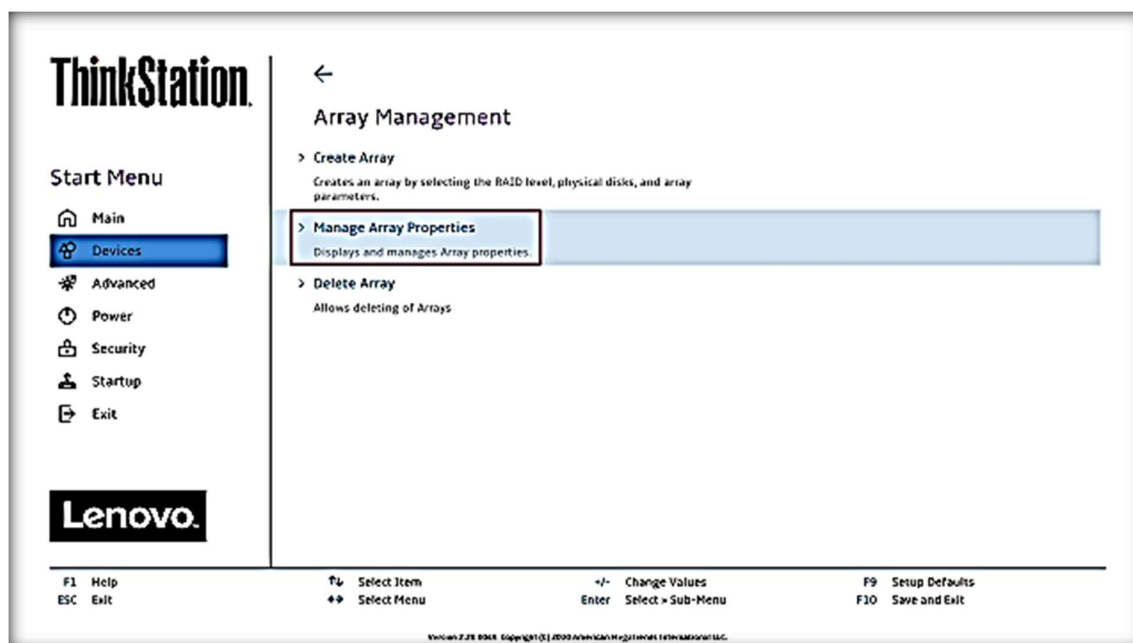
14. There is an option to select media type to only show HDDs or SSDs.
This can be used to ensure that only one type of drive is selected.
Check the boxes of the desired disks and then select "Apply Changes".



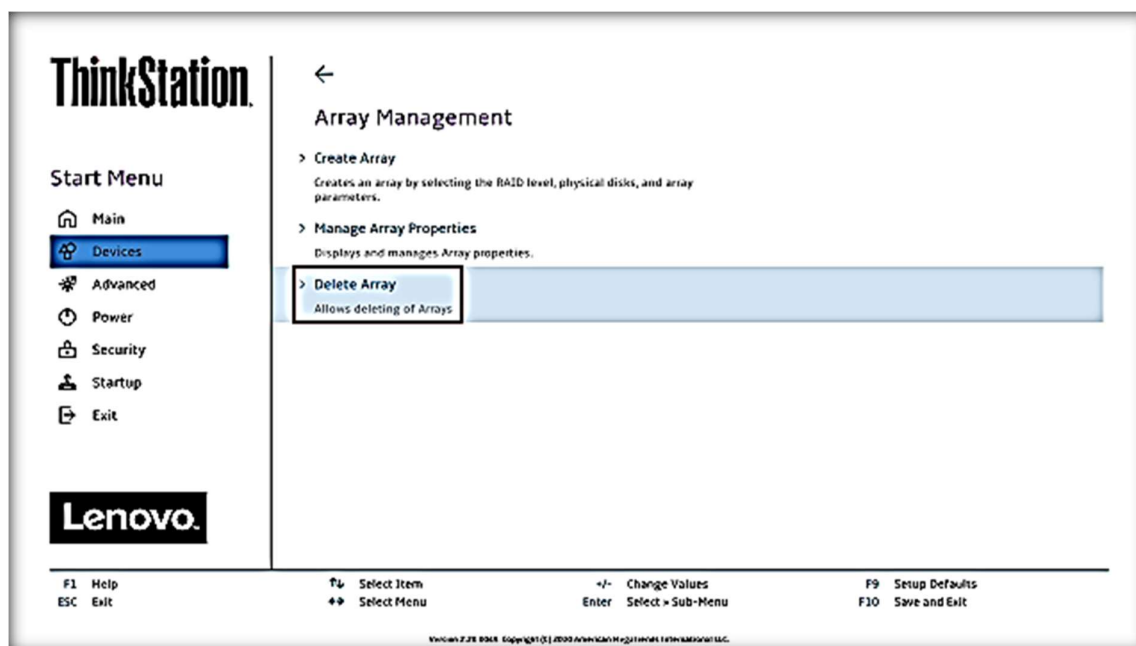
15. Select "Create Array" to complete the process.



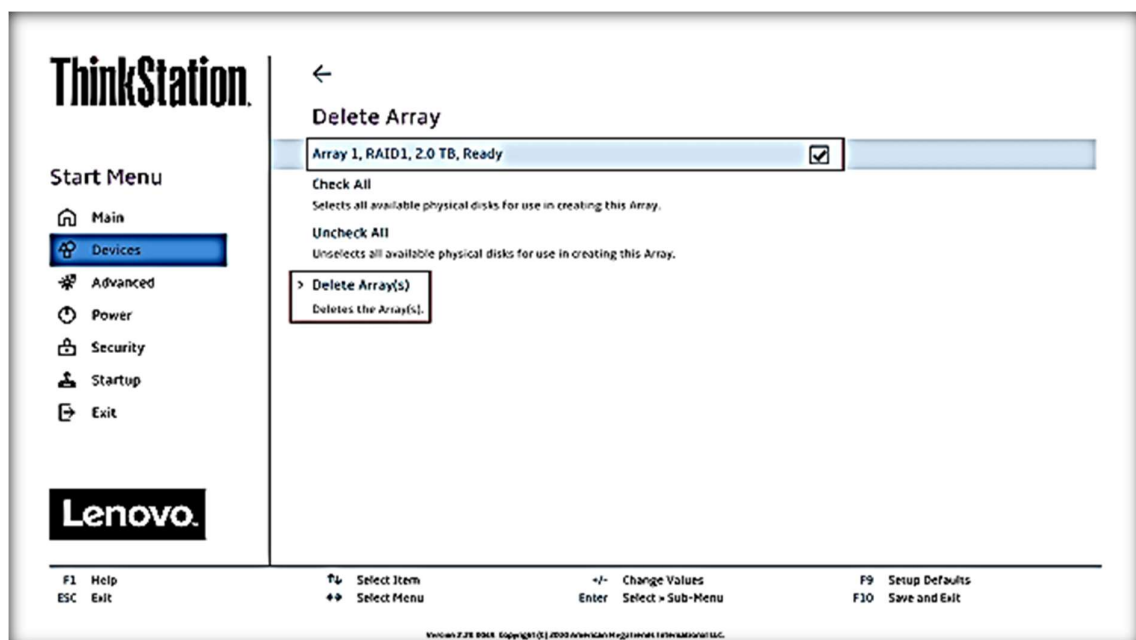
16. To verify the array was created and to view information about the array, select "Manage Array Properties".



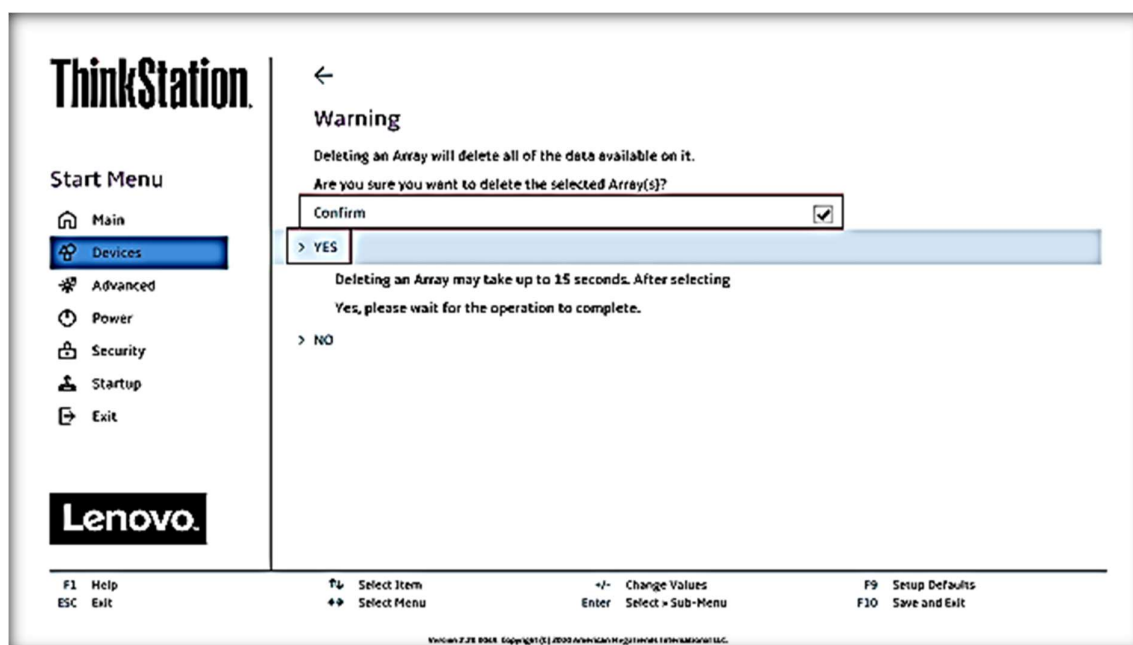
17. To delete the RAID array, return to the “Array Management” menu and select “Delete Array”.



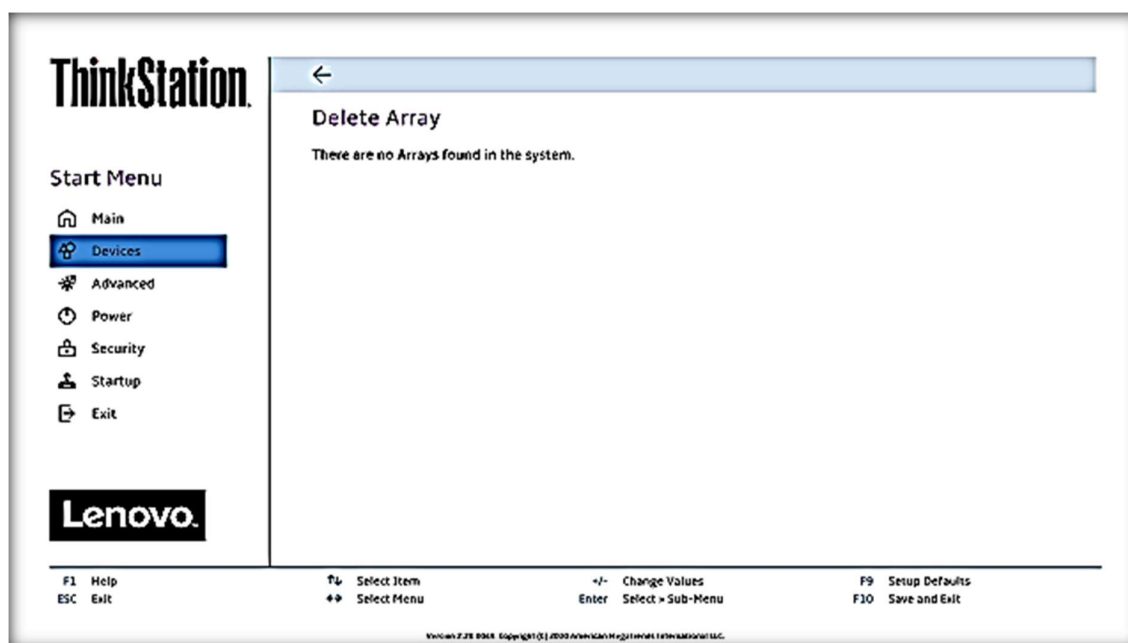
18. All existing arrays are shown. Check the box for each array to be deleted and select “Delete Arrays”.



19. Check the “Confirm” box and select “YES” to complete the process.



20. No arrays are found on the system.

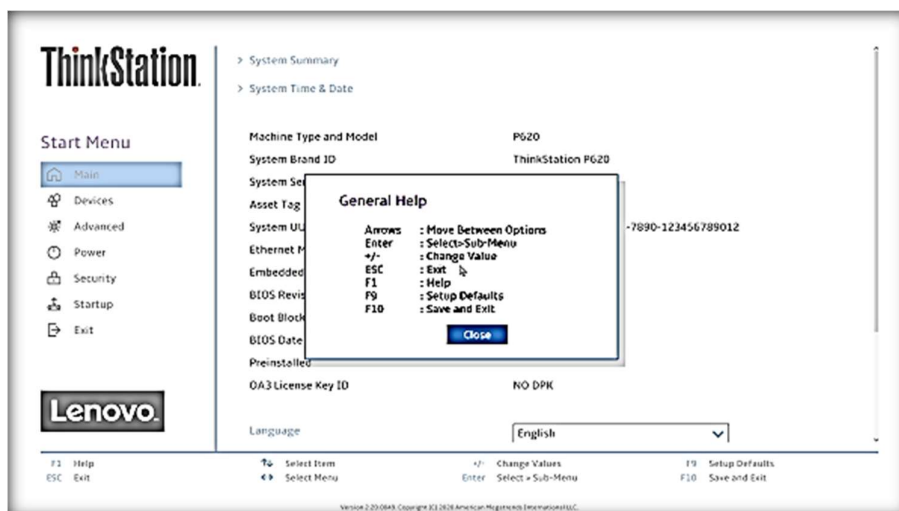
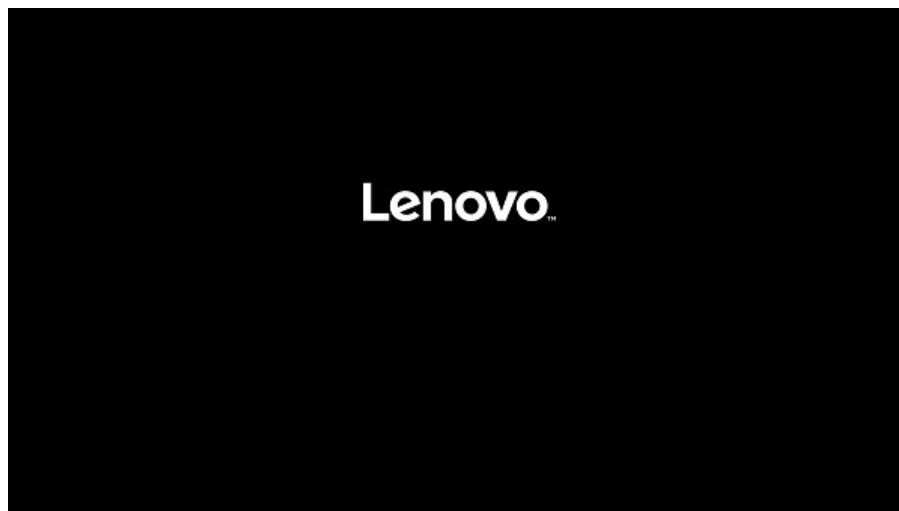


Note: The user may not see the RAID array show up in the BIOS boot sequence until after a bootable operating system has been installed on the RAID array.

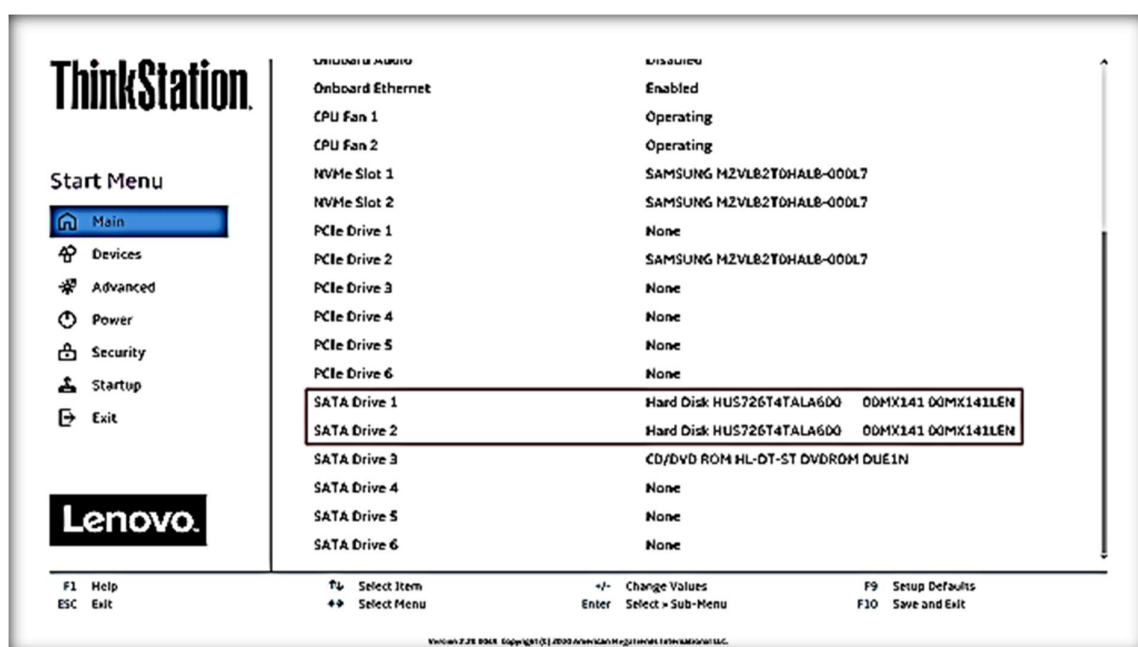
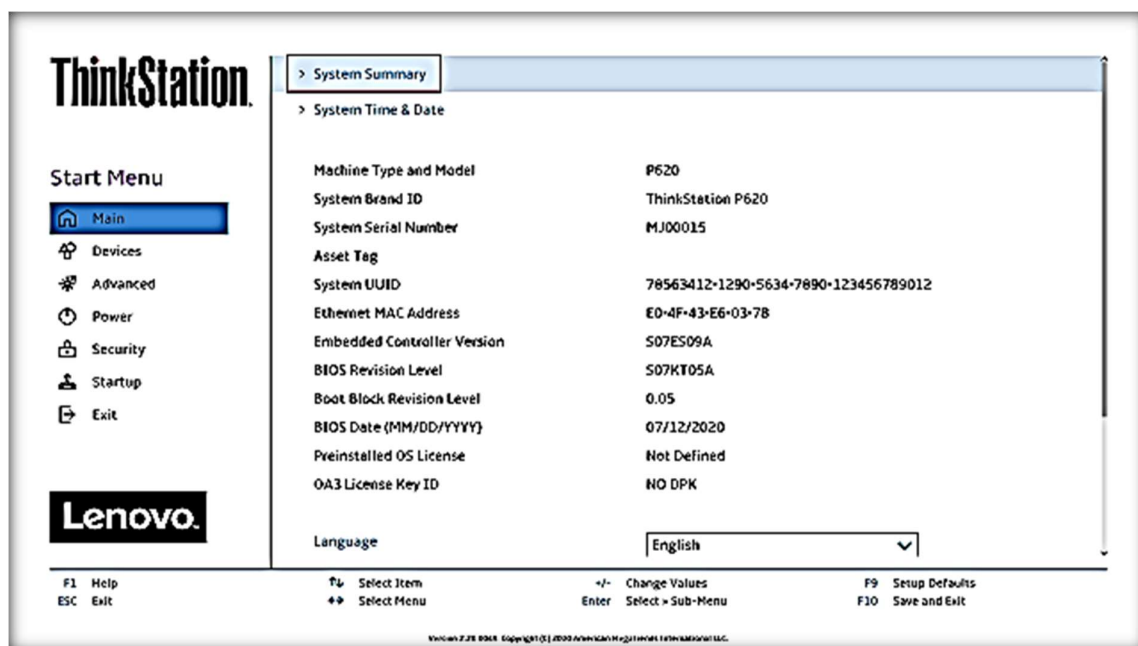
Section 4 – Configuring SATA RAID for P620

Please refer to the following steps to configure SATA RAID.

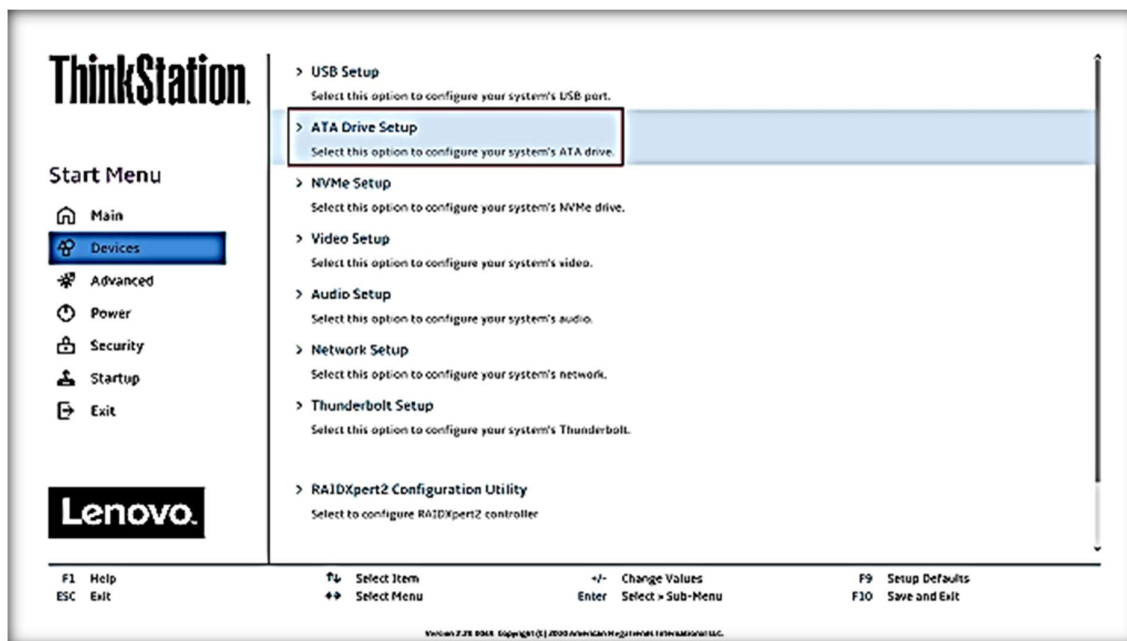
1. Boot into the BIOS by pressing the function F1 key at the “Lenovo” splash screen.



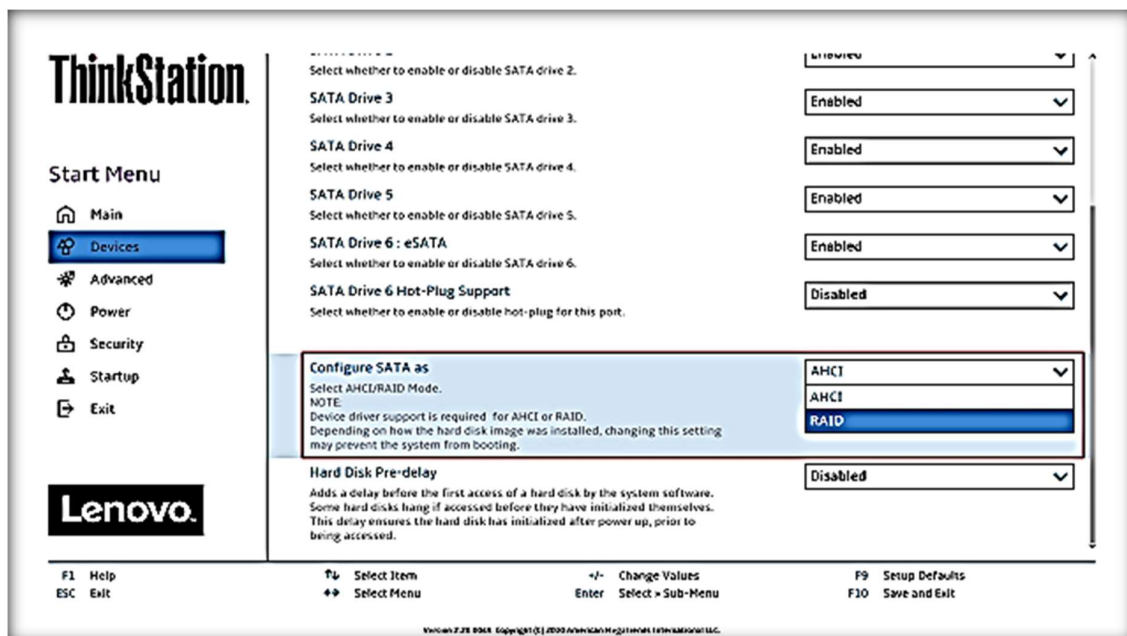
2. Select "System Summary" to verify BIOS is recognizing the SATA drives.



3. Select the “Devices” menu at the BIOS main screen setup utility and then select “ATA Drive Setup”.

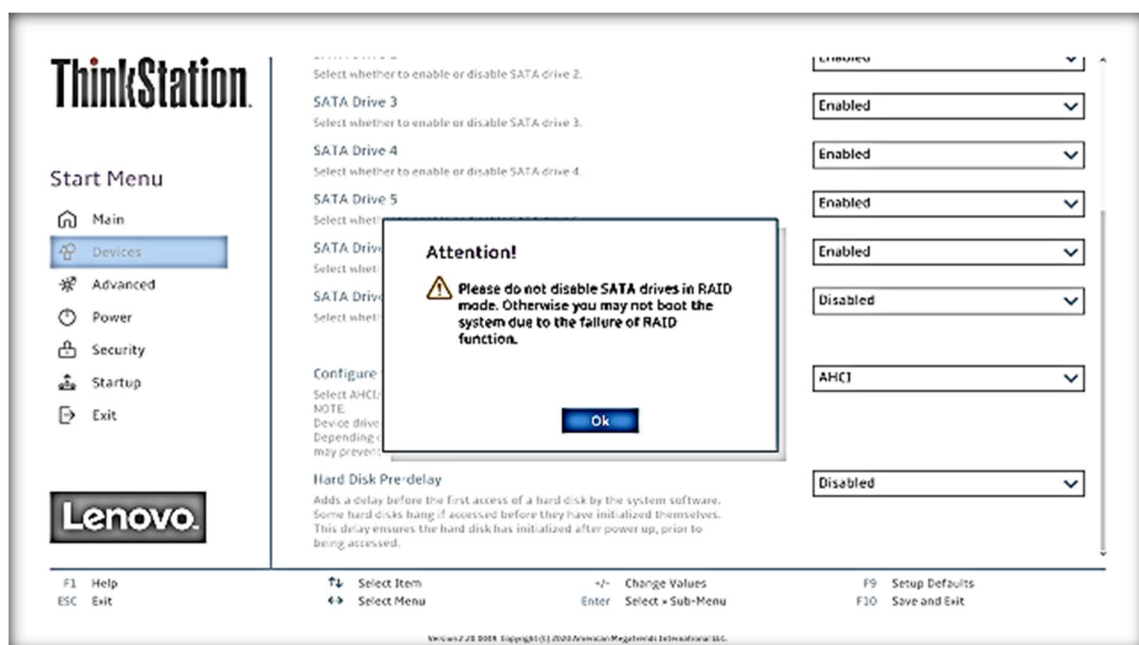


4. In the “ATA Drive Setup” menu, select “Configure SATA as” and change or verify the option is set to “RAID”.

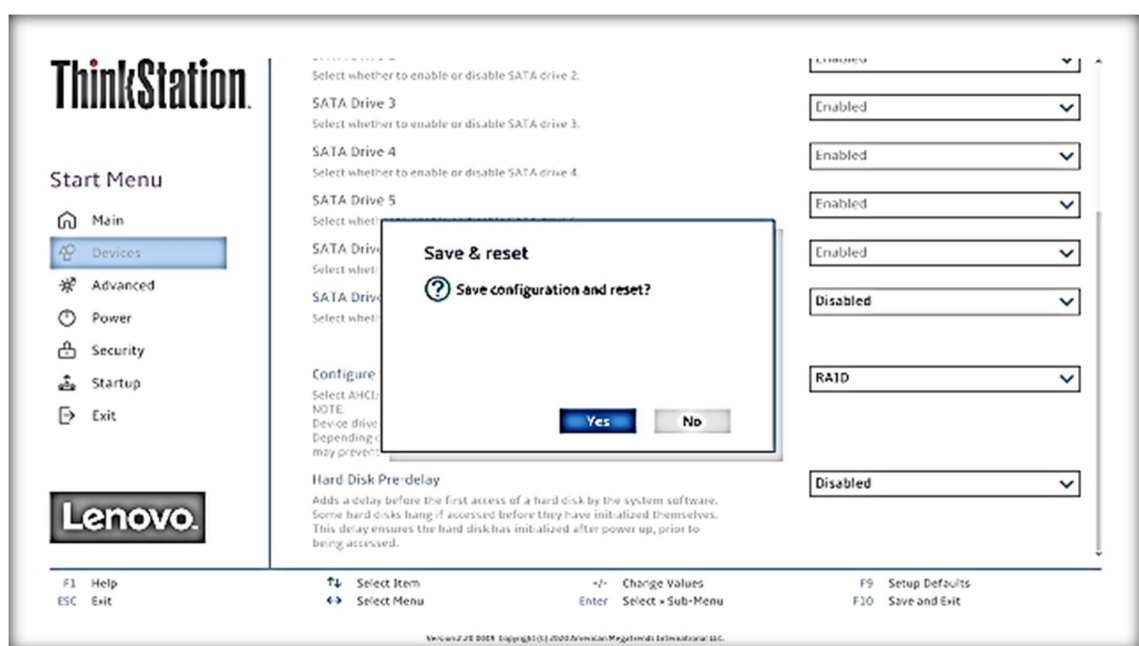


Note: In order to secure erase SATA drives, the ‘Configure SATA as’ option must be set to ‘AHCI’ mode.

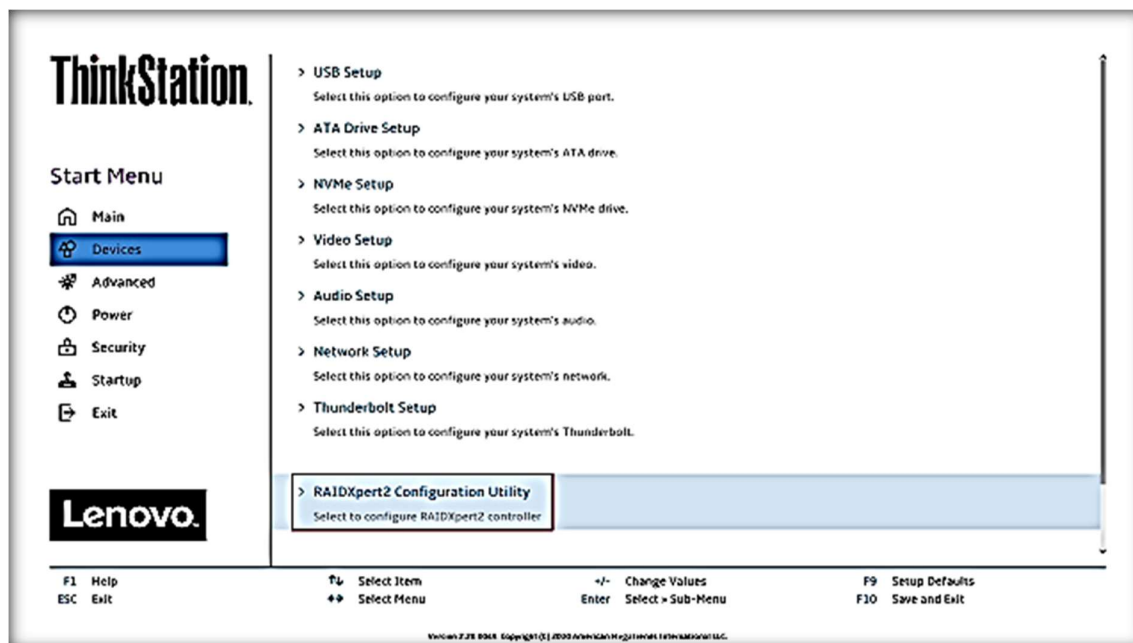
5. At the "Attention" prompt select OK to proceed.



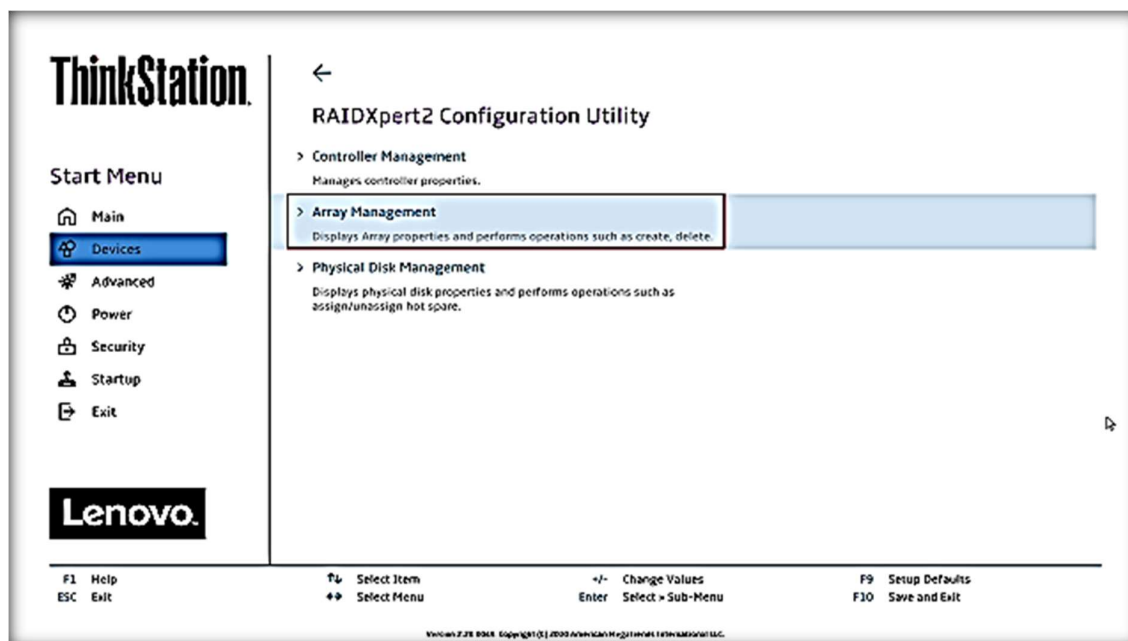
6. Press function F10 to save and Exit BIOS setup.



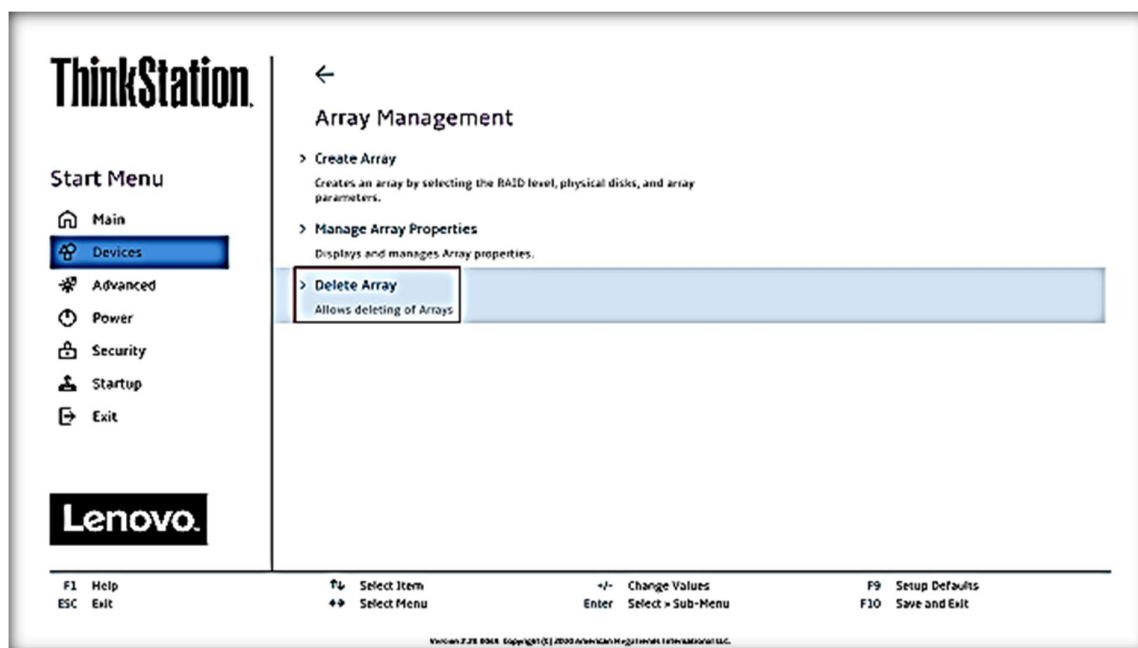
- As the system reboots, press the function F1 key to go back into BIOS setup. Select the “Devices” menu at the BIOS main screen setup utility and “RAIDXpert2 Configuration Utility”.



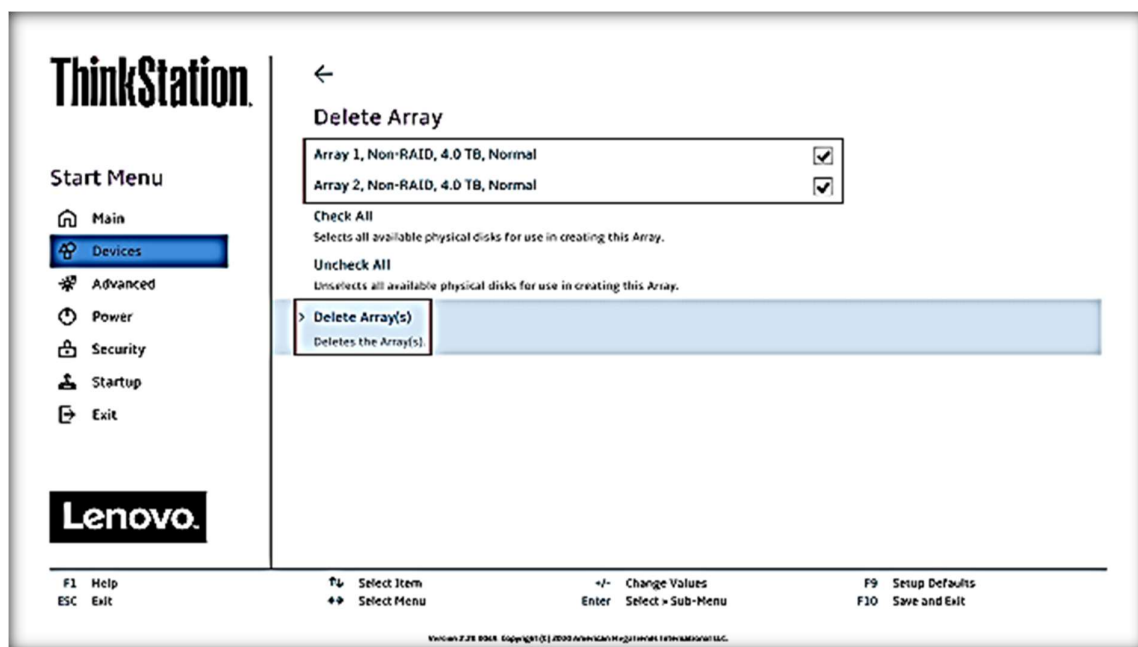
- Select “Array Management”.



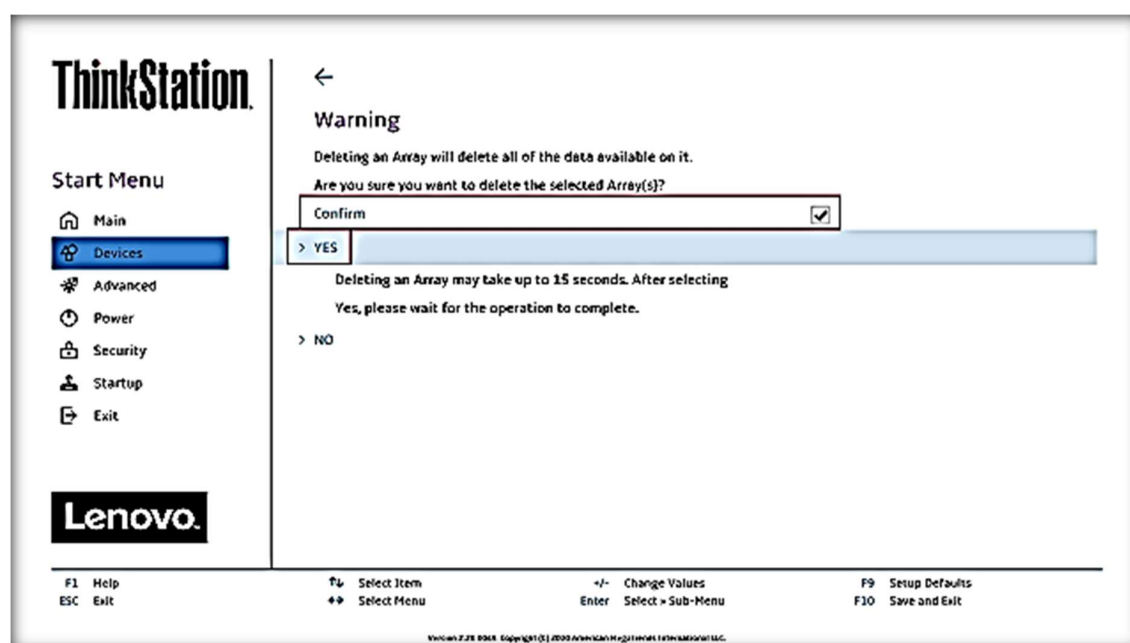
- To ensure that all disks will be available it may be necessary to clear any previous data from the disks. If no arrays have been created previously but the “Delete Array” option is available, select it. If no arrays exist on the system, the “Manage Array Properties” and “Delete Array” options are unavailable.



- All existing arrays are shown. Check the box for each array to be deleted and select “Delete Arrays”.



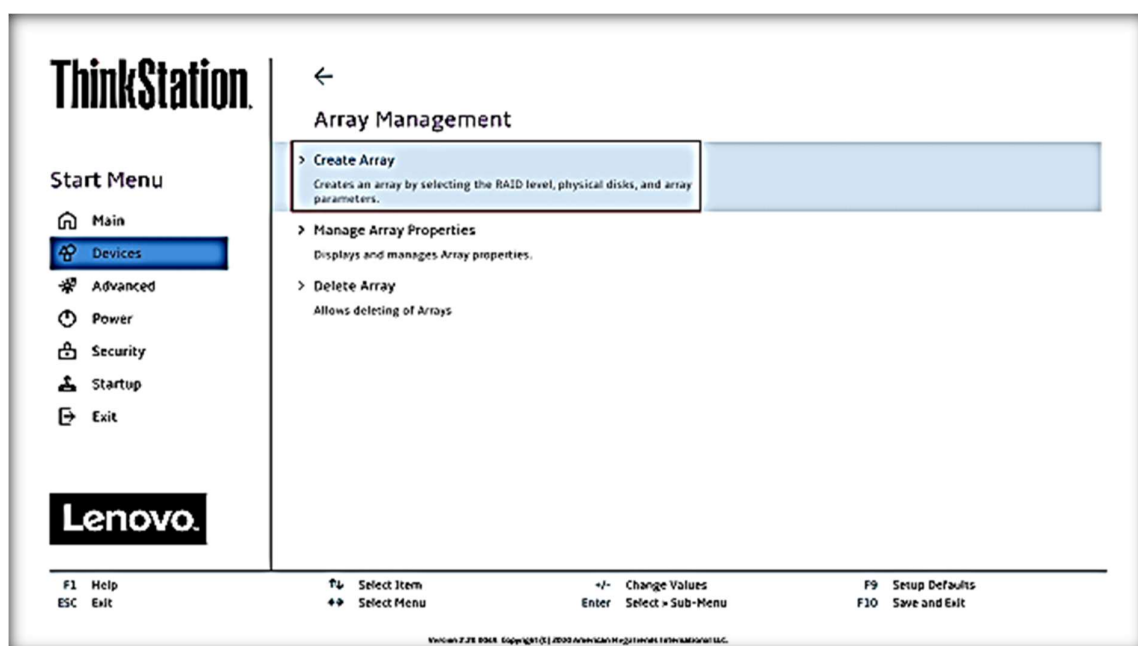
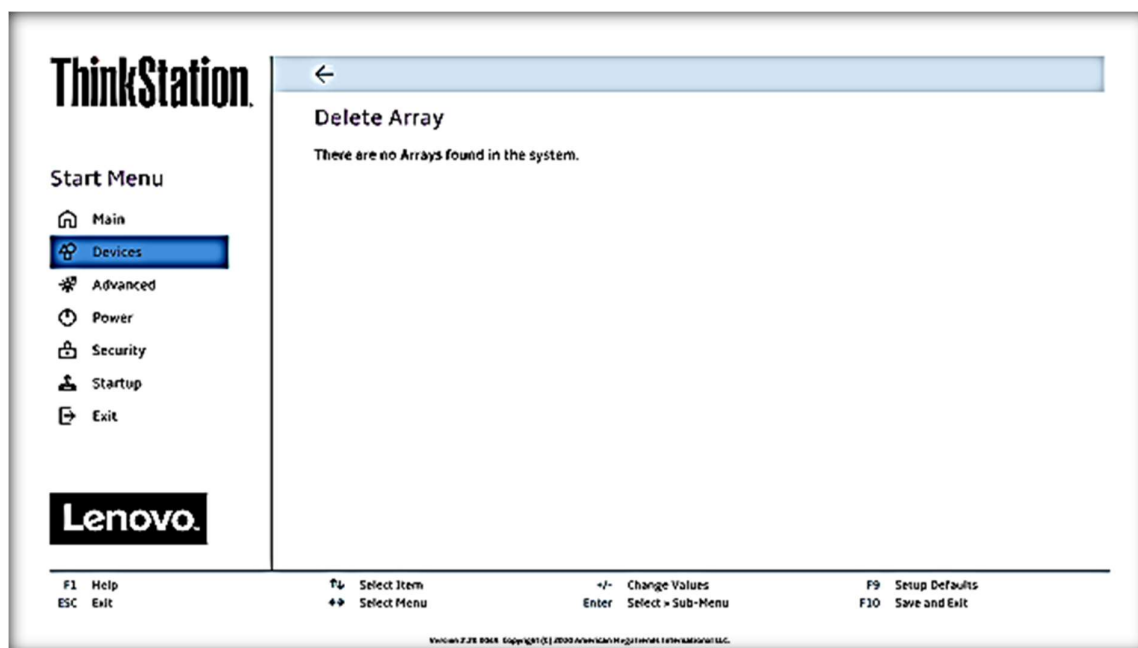
11. Check the "Confirm" box and select "YES" to complete the process.



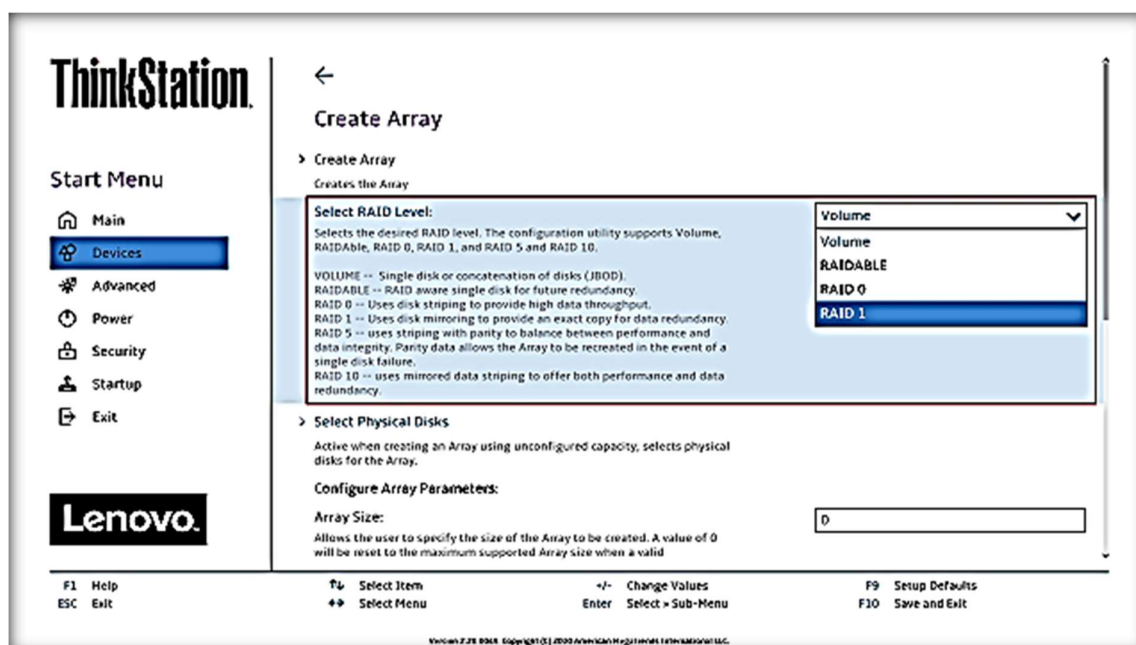
Lenovo

12. No arrays are found on the system. Go back to the main menu and note the only available option is “Create Array”. Select “Create Array”.

Lenovo

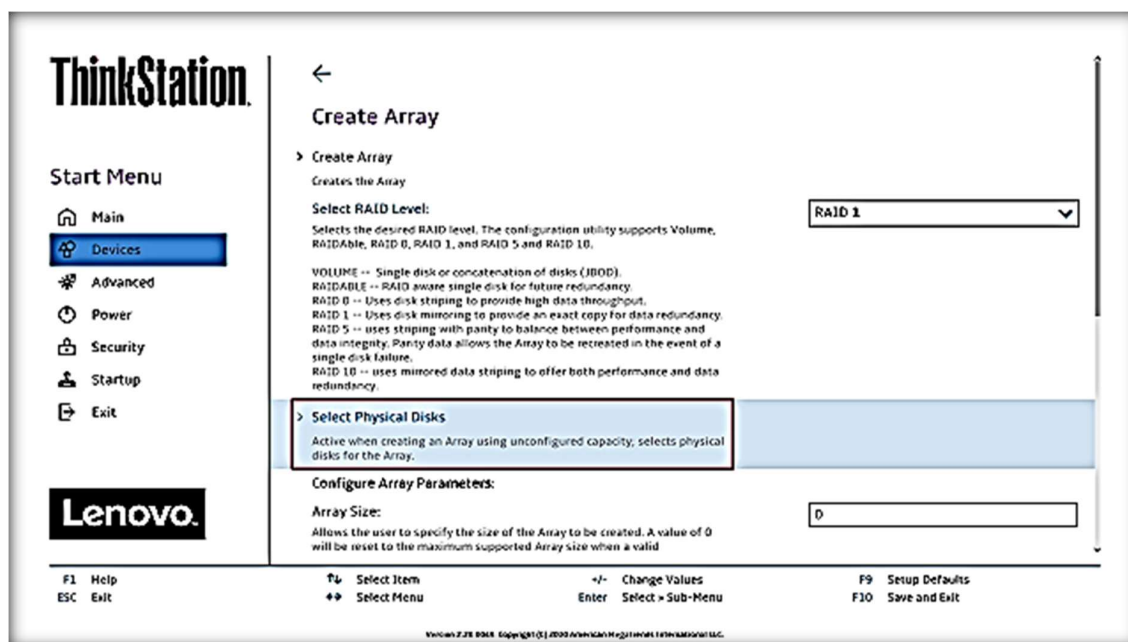


13. Select “Select RAID Level” and choose the desired RAID level.

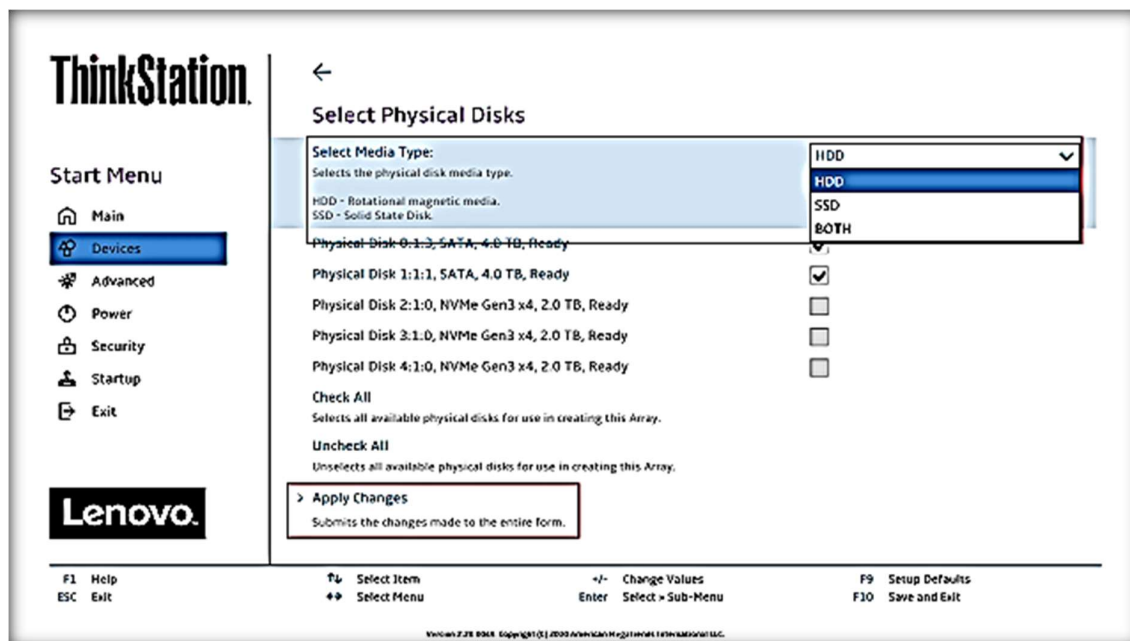


Note: All RAID levels are listed below “Select RAID Level” with a brief description. However, based on the available drives in the system, not all RAID levels may be shown in the drop-down box.

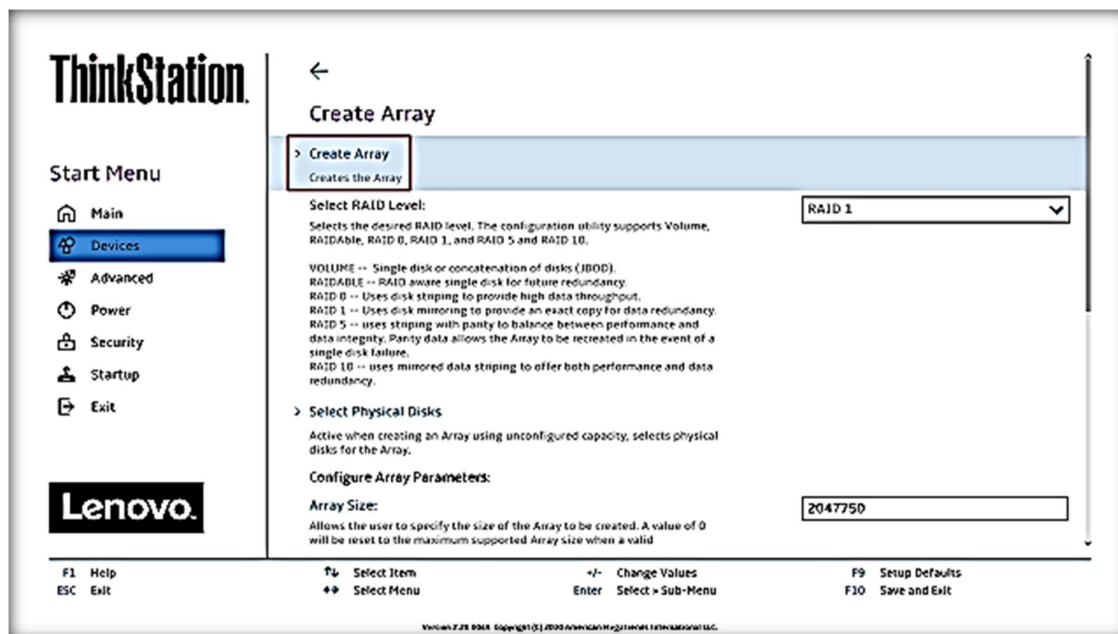
14. After selecting the desired RAID level, proceed with “Select Physical Disks”.



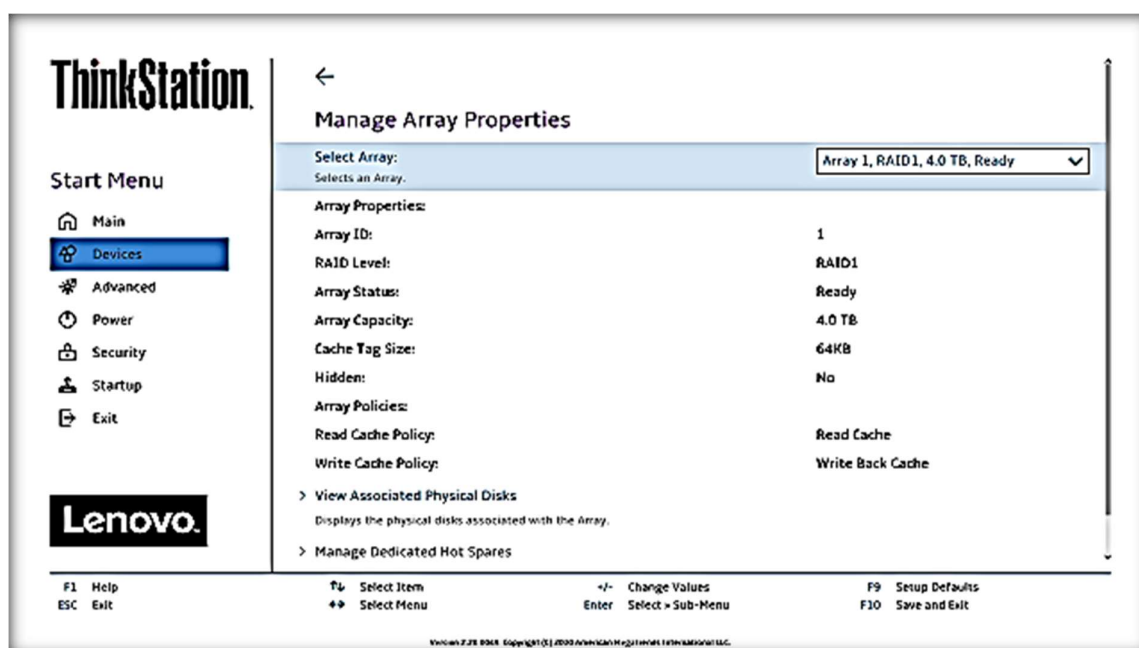
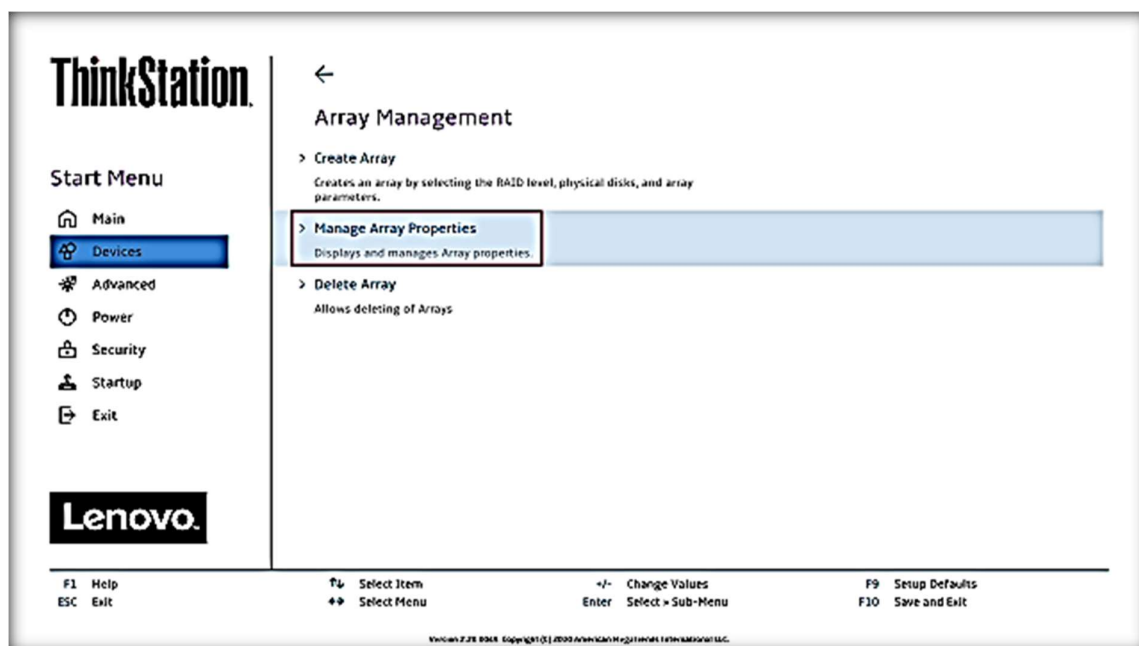
15. There is an option to select media type to only show HDDs or SSDs.
This can be used to ensure that only one type of drive is selected.
Check the boxes of the desired disks and then select “Apply Changes”.



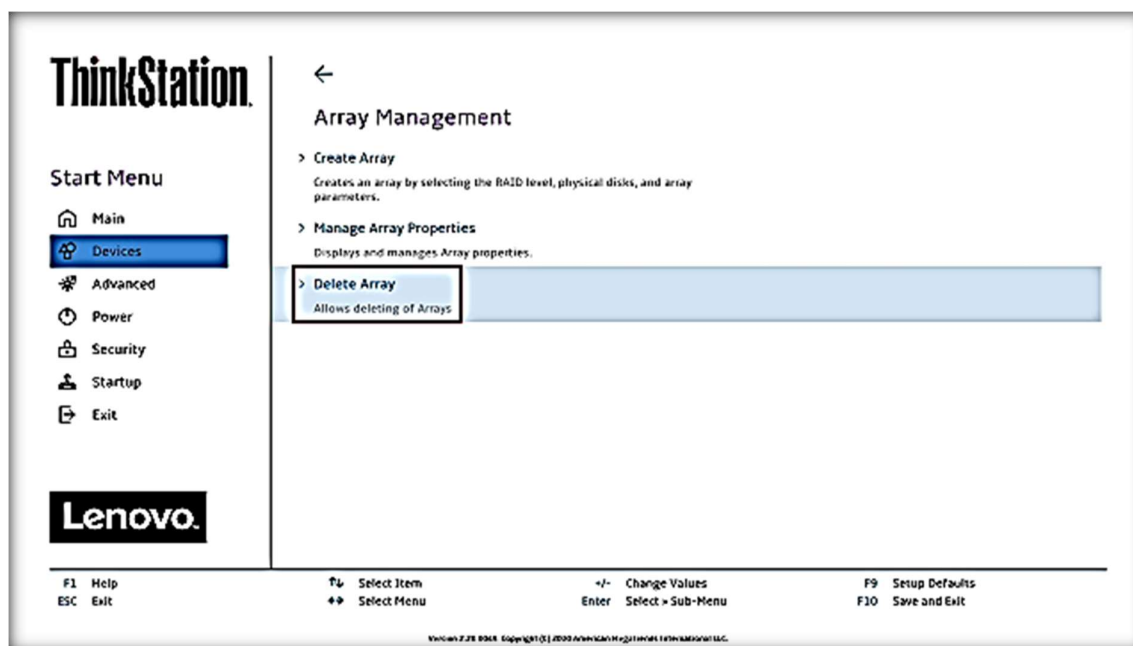
16. Select “Create Array” to complete the process.



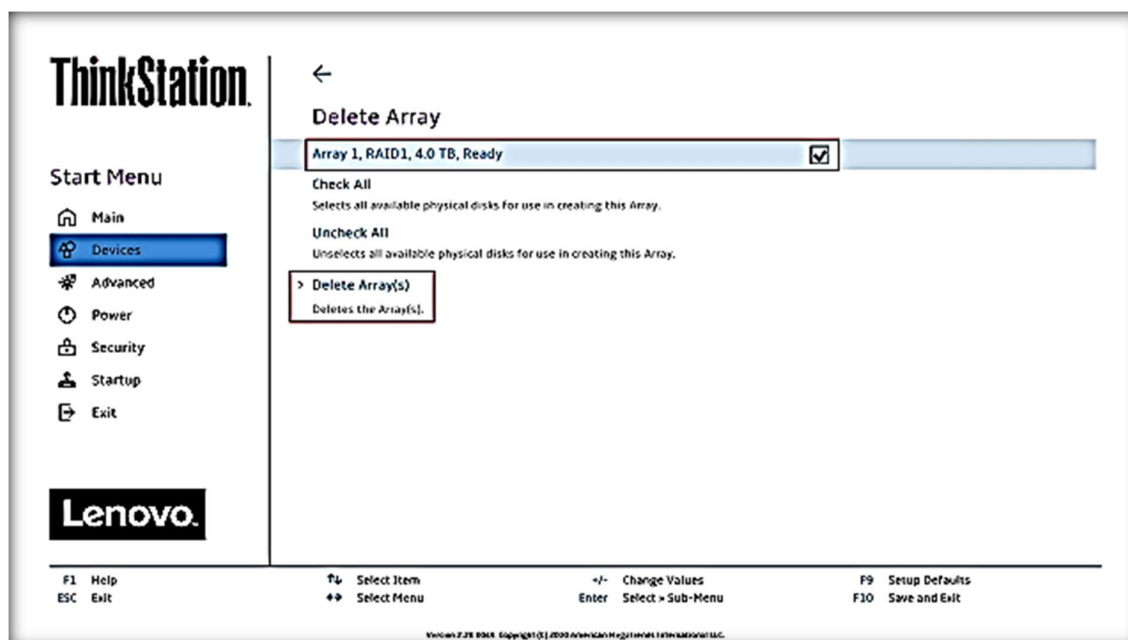
17. To verify the array was created and to view information about the array, select "Manage Array Properties".



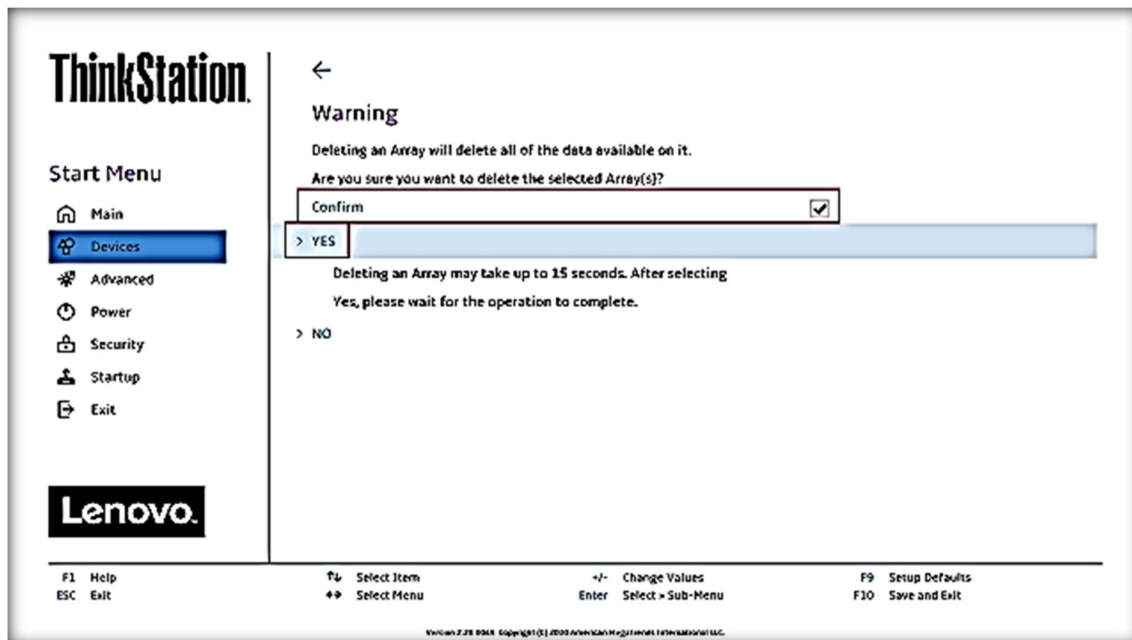
18. To delete the RAID array, return to the “Array Management” menu and select “Delete Array”.



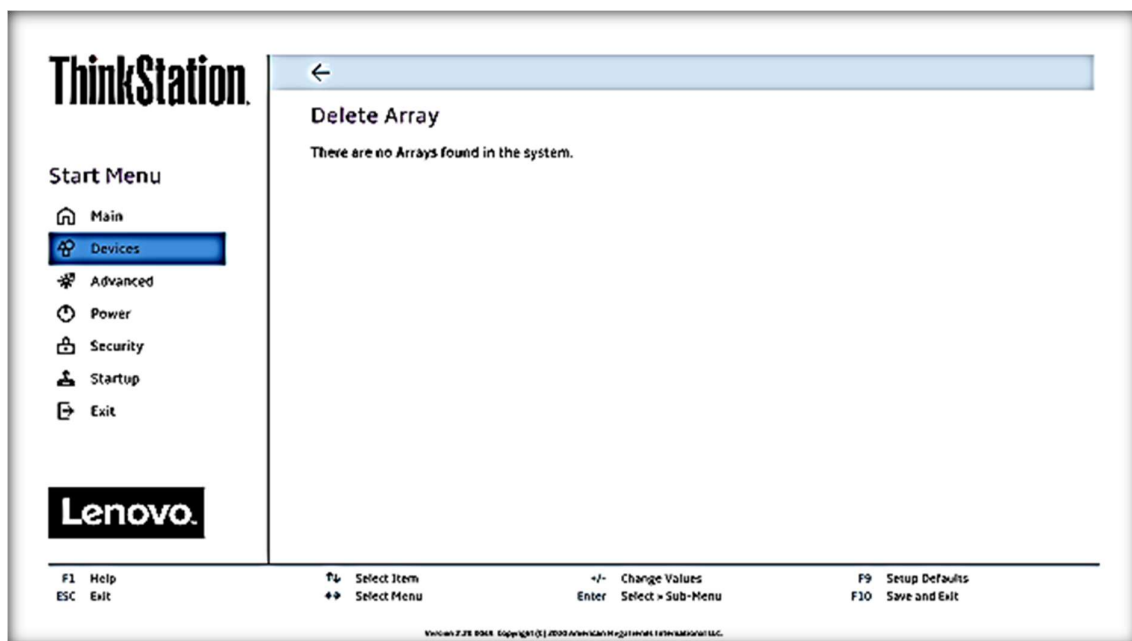
19. All existing arrays are shown. Check the box for each array to be deleted and select “Delete Arrays”.



20. Check the “Confirm” box and select “YES” to complete the process.



21. No arrays are found on the system.



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 RAID array.

Section 5 – Document Revision History

Version	Date	Author	Updates
1.0	07/09/2020	Scott Crowe	Initial launch release