Rocky Linux On HighPoint NVMe RAID AICs Installation Guide

V1.00-July 31st 2023

Table of Contents

1 Overview

The purpose of this document is to provide clear instructions on how to install Linux Rocky Linux to an SSD or RAID array hosted by HighPoint NVMe RAID AICs.

The following is a list of supported RAID AICs, Linux distributions and computing platforms.

Supported Linux distributions	Rocky Linux 8.6 Rocky Linux 8.7 Rocky Linux 9.0 Rocky Linux 9.1
Supported RAID AICs	SSD7105 SSD7202 SSD7502 SSD7505 SSD7540
Supported computing platforms	Dell Precision 7920 Tower Dell Precision 7960 Tower

In order to configure a bootable NVMe RAID array, you will need the following:

Note: *Prior to system installation, please do not connect any NVMe to the system board M.2 SLOT to prevent any unexpected situation during the installation process.*

1. **An NVMe SSD must be installed**. You must have at least one NVMe SSD installed into the NVMe RAID AICs.
2. **A PCIe 3.0/ 4.0/ 5.0 slot with x8 or x16 lanes.** The NVMe RAID AICs must be installed into a PCIe 3.0/ 4.0/ 5.0 slot with x8 or x16 lanes.
3. **Secure Boot must be disabled.** The UEFI capability of the NVMe NVMe RAID AIC has not been signed and certified. If Secure Boot is enabled, the system board will not recognize the NVMe NVMe RAID AIC, and you will be unable to proceed with installation.
4. **Prepare the Linux OS Installation media.** You will need an official Linux installation DVD or flash drive, or access to an official downloadable copy (which will then have to be burned/transferred to a DVD or flash drive).

5. If you are installing the OS using a DVD/Blu-Ray disc, you will need to **Install an optical drive into the system** (such as a DVD-ROM, DVD-RW or Blu-Ray drive).

6. **You will need a USB flash drive** – the UEFI package and driver should be extracted to the root directory of this flash drive.

   Note: *If you are using a USB flash drive as the Linux OS Installation media, then you will need to prepare another USB flash drive. Linux OS cannot be stored in a USB flash drive with UEFI package and driver.*

7. **Remove all other drives during the OS installation process.** Make sure only the NVMe RAID AICs, the USB flash drive, and the optical drive are installed into the system during this procedure. This includes any other USB hard drives, USB flash drives, memory sticks, or SAS/SATA drives. You can reattach these drives after the operating system has been successfully installed.

8. Make sure any non-HighPoint drivers are uninstalled for any SSDs hosted by the NVMe RAID AIC. 3rd party software and manufacturer provided drivers may prevent the NVMe RAID AIC from functioning properly.

2 Installing Rocky Linux

If you would like to install Linux Rocky Linux onto drives attached to the NVMe RAID AIC, please perform the following operations:

Step 1 Prepare Your Hardware for Installation

After you attach your NVMe SSDs to the NVMe RAID AICs, you can use **EFI Utility** to configure your NVMe SSDs into RAID arrays, or just use them as single disks.

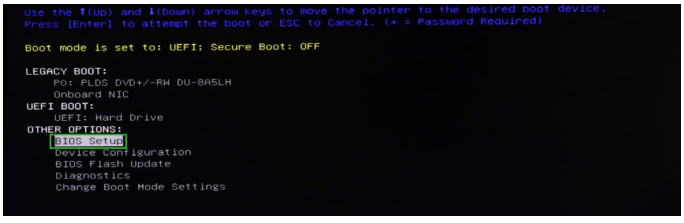
Before installation, you must remove all the NVMe SSDs, which are not physically attached to NVMe RAID AIC, from your system.

Note

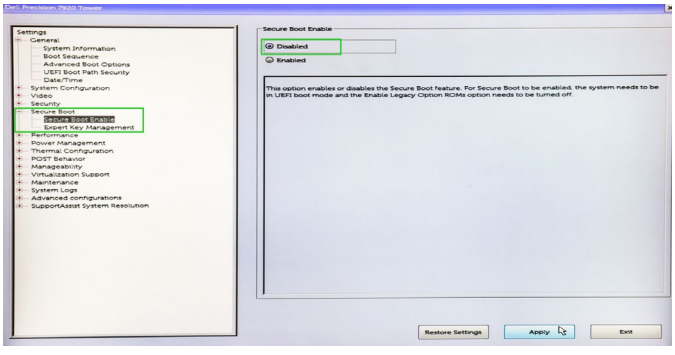
NVMe RAID AICs only support EFI boot. If you have other SCSI adapters installed, you must make sure the NVMe RAID AIC EFI will be loaded firstly. If not, try to move it to another PCI slot. Otherwise, you may be unable to boot up your system.

Step 2 Check System BIOS Settings

1. Boot the system and press **F12** to enter BIOS menus.
2. Enter **BIOS Setup**.



3. Find **Settings→Secure Boot→Secure Boot Enable**, select **Disabled**.



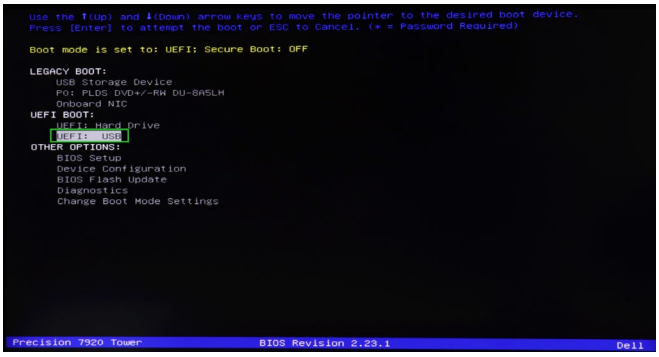
4. Save configuration and restart the system.

Step 3 Flash UEFI ROM to NVMe RAID AICs

Example: SSD7505

Note：Make sure your USB flash partition format is FAT32.

1. Unzip SSD7505 UEFI package to the root dir(/) of a USB flash drive, and connect the USB flash drive to the system board.
2. Enter the system board's BIOS menus, and select the "**UEFI: USB**" from the UEFI BOOT.



3. Use the command "**go.nsh**" to flash UEFI ROM to the SSD7505 and reboot the system.

```
FS1:\> go.nsh
FS1:\> load.efi 7505uefi.rom
Load Utility for Flash EPROM v1.1.0
 (built at Jan  5 2021 13:30:42)

Found adapter 0x75051103 at PCI 33:0:0
Flash size 0x10000, File size 0xee00
Offset address 0x20000
EPROM Vendor: WINBOND W25X40BV
Erasing .....Suceeded
Flashing ....

Flashing Success (total retry 0)

Verifing ....

Passed !
FS1:\> _
```

4. Use the "**exit**" command to exit the utility.

Step 4 Create the RAID Array

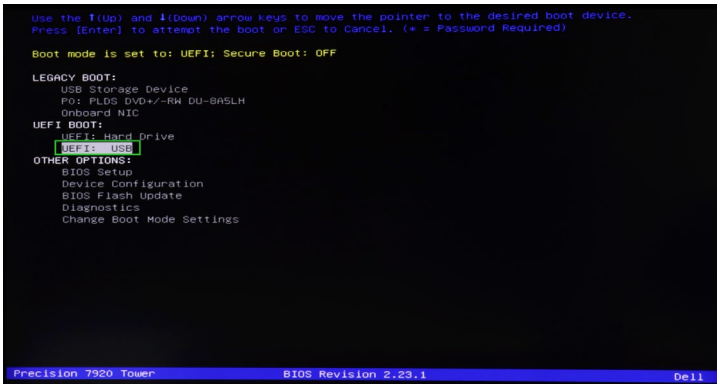
Two methods are provided to create the RAID arrays.

Note: *The following installation process uses the SSD7505 as an example.*

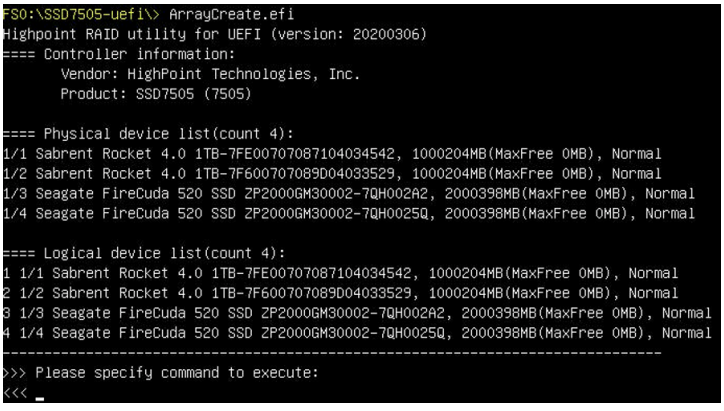
Note2: *The following screenshots are only used for reference.*

Method 1 UEFI Command Line (RAID Tool)

1. Attach NVMe SSDs to the NVMe RAID AIC.
2. Enter the system board's BIOS menus, and select the "**UEFI: USB**" from the UEFI BOOT.

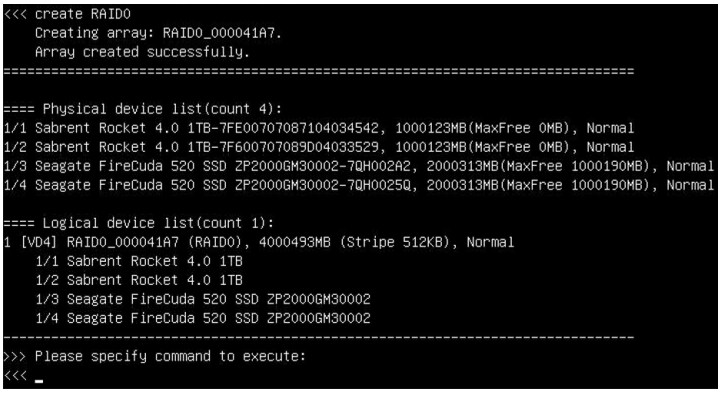


3. Use the command "**ArrayCreate.efi**" to enter the Utility:



4. Use the command “**create RAID0**”.

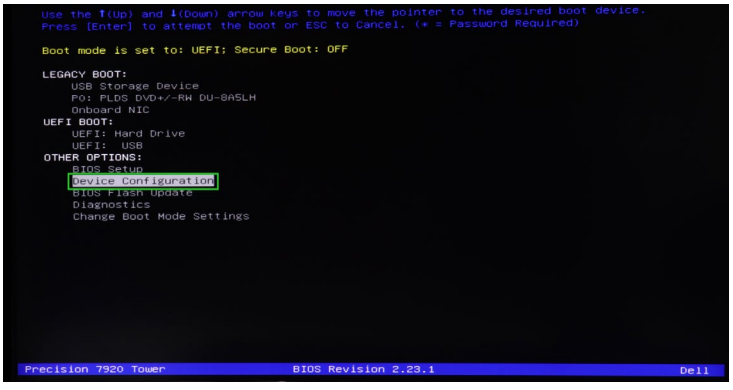
   This will create a RAID0 array using all of the NVMe SSDs, and the maximum available capacity.



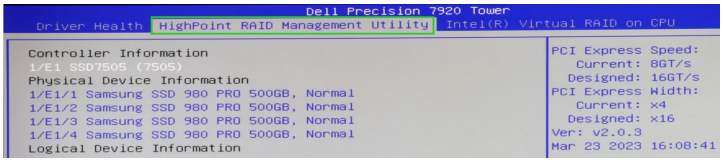
5. Use the “exit” command to exit the utility.
6. For additional command lines, refer to Appendix A.

Method 2 UEFI HII（UEFI Utility）

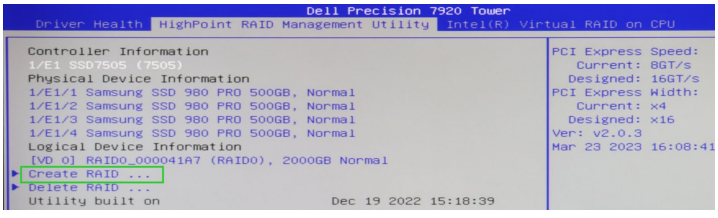
1. Boot the system and press **F12** to enter BIOS menus.
2. Enter **Device Configuration**.



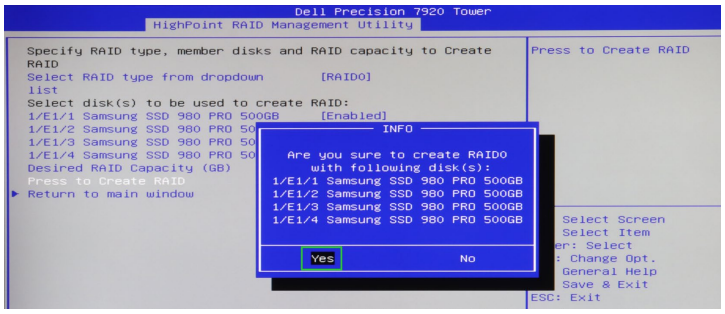
3. Select "**HighPoint RAID Management Utility**".



4. Select **Create RAID…**

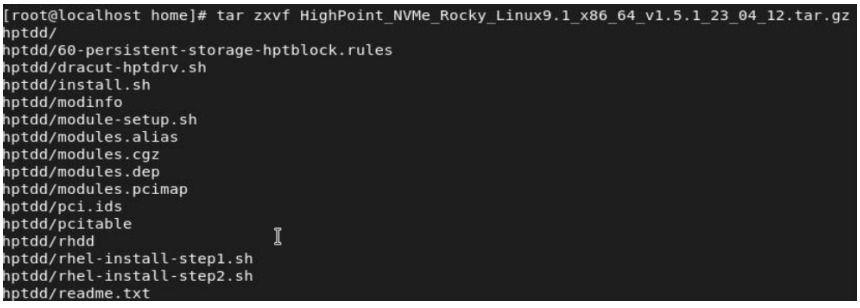


5. In **Create** menu, a device list will appear, and display all available hard disks. Select the RAID type from dropdown list. Use the **up** and **down** keys of the keyboard or the mouse to select the RAID type and press the **Enter** key.



Step 5 Prepare the Driver Diskette

Extract **HighPoint_NVMe_Rocky_Linuxxx.xx_x86_64_vx.x.x_xx_xx_xx.tar.gz** to the top(/) directory of an USB flash drive. It will look like:



Step 6 Install Rocky Linux

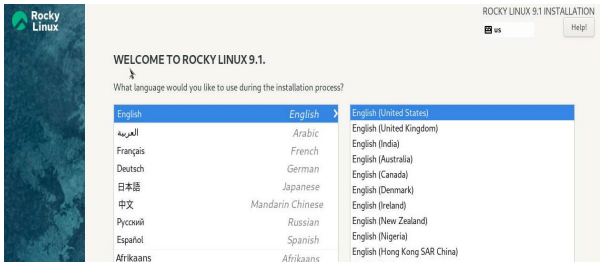
Example: Rocky Linux 9.1

1. Before starting the installation procedure, verify the status of your network environment. To ensure Rocky Linux is successfully installed to the RAID array, we recommend that the system is disconnected from the internet and any local network.
2. Insert the USB flash drive into the target system.
3. Boot the system using a bootable USB drive.
4. When the Installation screen appears, press '**e**' to edit boot command line option.

On the edit command window, move the cursor to the end of line "linuxefi /images / pxeboot... ", and append "**modprobe.blacklist=nvme** " (d do not include the quotation marks).

Press **CTRL+X** or **F10** to start the system.

5. When the following window appears during the installation process,



Press **CTRL+ALT+F2** to switch to the shell on console 2, and press **ENTER** to activate this console.

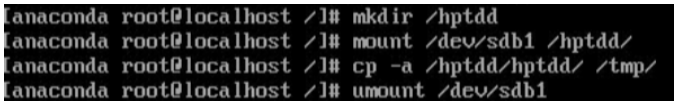
Next, execute the following commands:

 # mkdir /hptdd ← Create mount point for USB flash drive

 # mount /dev/sda1 /hptdd/ ← Mount the USB flash drive to /hptdd

 # cp -a /hptdd/hptdd /tmp/ ← Copy driver installation file to system temporary directory

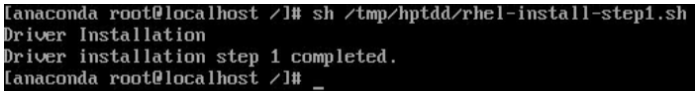
 # umount /hptdd ← Unmount the USB flash drive



When the USB flash drive is unmounted, please unplug the USB flash drive from the system.

Next, execute the following commands to install the driver for Linux Rocky Linux.

 # sh /tmp/hptdd/ rhel-install-step1.sh ← Load NVMe RAID AIC driver.

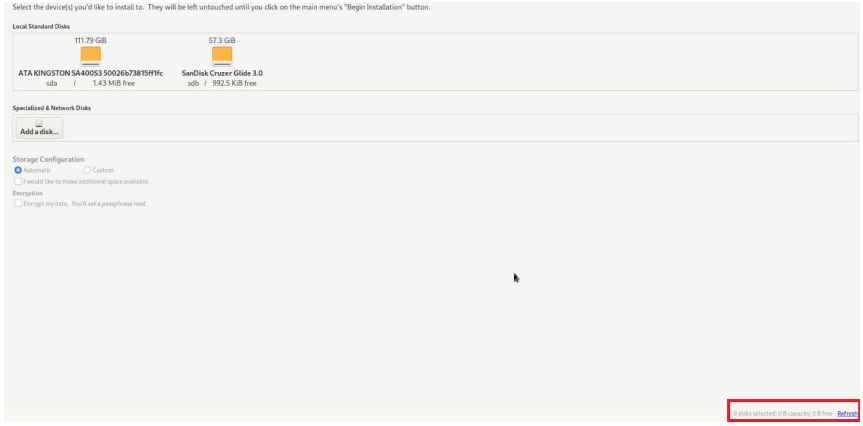


6. Then press **ALT+F6** to switch back to installation screen and continue the installation as usual**.**

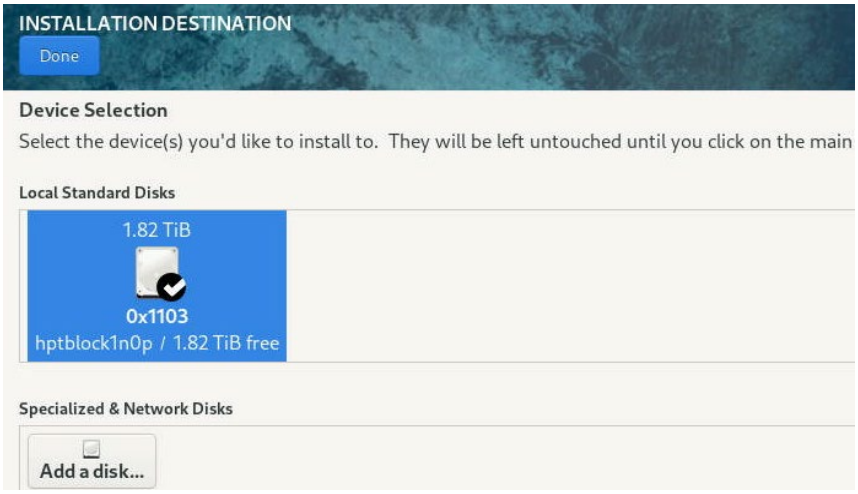
7. When the following window appears during the installation process,

1) Set **Root Password**

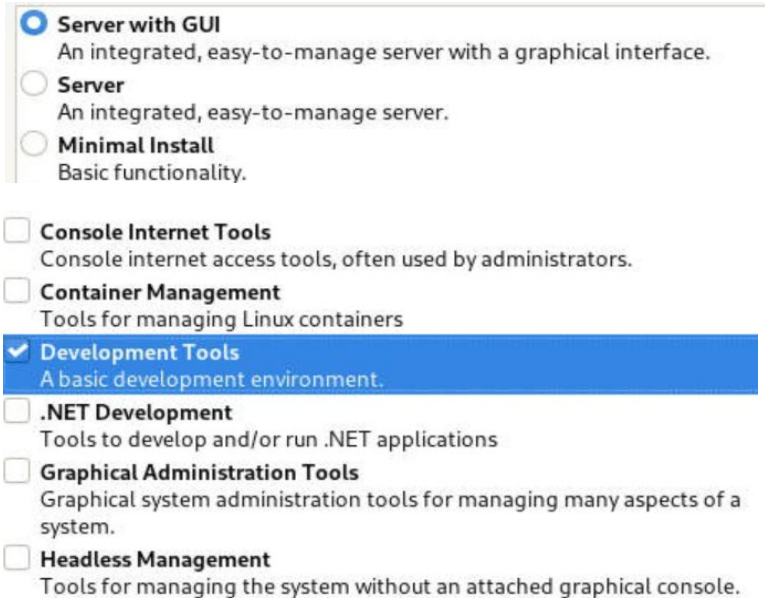
2) Select **Installation Destination** and click "**refresh**"



3) Then choose your own disk.

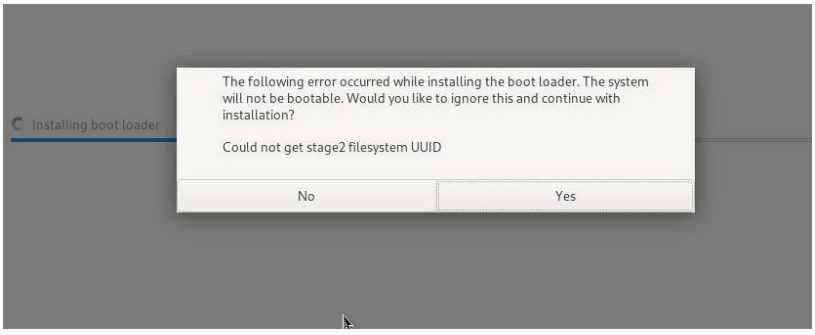


4) Set **Software Selection** and choose **Server with GUI→Development Tools**

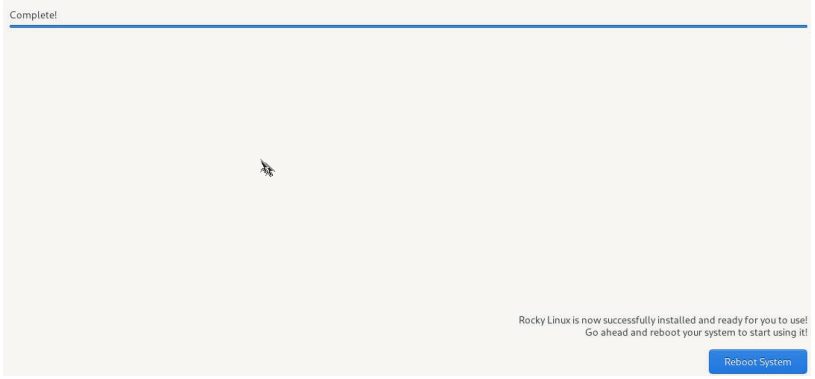


8. Then begin installation.

9. If the following information is displayed during the installation, select "**Yes**".



10. When the screen shows that "**complete!**".



press **CTRL+ALT+F2** to the shell and type the following commands:

 # cp -r /tmp/hptdd /mnt/sysimage/tmp/hptdd ← Copy the driver installation file to system

 # chroot /mnt/sysimage ← Switch to the top(/) directory
 # sh /tmp/hptdd/rhel-install-step2.sh ← Install NVMe RAID AIC driver
 # rm -rf /tmp/hptdd ← Delete the driver file
 # exit ← Exit the top(/) directory

```
[anaconda root@localhost /]# cp -r /tmp/hptdd /mnt/sysimage/tmp/hptdd
[anaconda root@localhost /]# chroot /mnt/sysimage/
[anaconda root@localhost /]# sh /tmp/hptdd/rhel-install-step2.sh
Driver Installation
Updating 5.14.0-162.6.1.el9_1.x86_64...
Driver installation step 2 completed.
[anaconda root@localhost /]# rm -rf /tmp/hptdd/
[anaconda root@localhost /]# exit
exit
[anaconda root@localhost /]#
```

11. Press **ALT+F6** to switch back to installation screen and finish the installation.
12. If you want to boot from another kernel, please install the NVMe RAID AIC opensource driver after entering the system.
13. Restart to enter the system, **please connect to the internet:**
14. Download the appropriate driver from the Software Downloads web page.
15. Extract the driver package:
    tar zxvf HighPoint_NVMe_G5_Linux_Src_Src_vx.xx.xx_xx_xx_xx.tar.gz
16. Run the **.bin** file to install the driver package.
    sh hptnvme_g5_linux_src_vxx.x.x_xx_xx_xx.bin or
    ./hptnvme_g5_linux_src_vxx.x.x_xx_xx_xx.bin

```
[root@localhost home]# ./hptnvme_g5_linux_src_v1.5.1_2023_02_21.bin
Verifying archive integrity... All good.
Uncompressing HighPoint NVMe RAID Controller Linux Open Source package installe
..................................................
Checking and installing required toolchain and utility ...
Found program make (/usr/bin/make)
Found program gcc (/usr/bin/gcc)
Found program perl (/usr/bin/perl)
Found program wget (/usr/bin/wget)
```

17. Follow the prompts to complete the driver installation.

```
Created symlink /etc/systemd/system/default.target.wants/hptdrv-monitor.service
→ /usr/lib/systemd/system/hptdrv-monitor.service.

SUCCESS: Driver hptnvme is installed successfully for kernel 5.14.0-162.6.1.el9_
1.x86_64.
Please restart the system for the driver to take effect.
If you want to uninstall the driver from the computer, please run hptuninhptnvme
 to uninstall the driver files.
[root@localhost home]#
```

18. After Rocky Linux has been installed, you can reconnect the system to the network/internet and update the system as needed.

3 Monitoring the Driver

Once the driver is running, you can monitor it through the Linux proc file system support. There is a special file under /proc/scsi/hptnvme /. Through this file you can view driver status and send control commands to the driver.

Note

The file name is the SCSI host number allocated by OS. If you have no other SCSI cards installed, it will be 0. In the following sections, we will use x to represent this number.

Using the following command to show driver status:

cat /proc/scsi/hptnvme /x

This command will show the driver version number, physical device list and logical device list.

4 Installing RAID Management Software

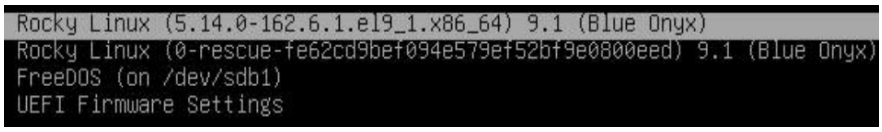
HighPoint's RAID Management Software can be used to check the status of the SSDs and RAID arrays hosted by the NVMe RAID AIC. Installation of the management software is optional but recommended.

Please refer to HighPoint RAID Management Software documentation for more information.

5 Trouble Shooting

If you do not install the system or update the kernel according to the installation manual, the system will crash and you will not be able to enter. Please follow the steps below.

a. Select the default (kernel: 5.14.0-162.6.1.el9.x86_64) and enter the system.

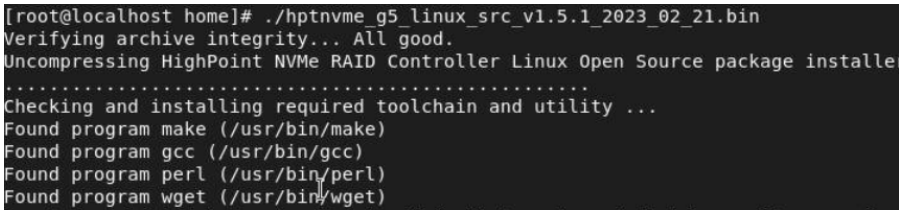


b. Install Linux Opensource driver.

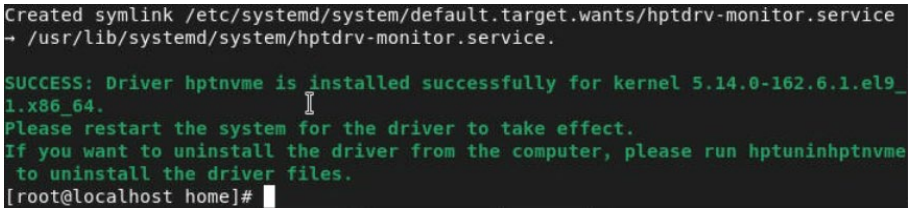
c. Download the appropriate driver from the Software Downloads web page.

d. Run the **.bin** file to install the driver package.
sh hptnvme_g5_linux_src_vxx.x.x_xx_xx_xx.bin or

./hptnvme_g5_linux_src_vxx.x.x_xx_xx_xx.bin



e. Follow the prompts to complete the driver installation.



f. After the installation is complete, you can perform system update operations.

6 Rebuilding Driver Module for System Update

When the system updates the kernel packages, the driver module hptnvme.ko should be built and installed manually before reboot.

Please refer to the README file distributed with NVMe RAID AIC opensource package on how to build and install the driver module.

7 Appendix A

Support command: help/info/quit/exit/create/delete.

- **Create Command**
  Syntax
  Create Array Type (RAID0/RAID1/RAID10) Member Disk list (1/1,1/2|*)
  Capacity (100|*)

  Examples
  <<< create RAID0
  <<< create RAID0 *
  <<< create RAID0 * *
  Create RAID0 array with all disks and with maximum capacity.

  <<< create RAID1 1/1, 1/3 10
  Create RAID1 array with disk 1/1 and 1/3 and with 10GB capacity.

  <<< create RAID10
  <<< create RAID10 *
  <<< create RAID10 * *
  Create RAID10 array with all disks and with maximum capacity.

- **Delete Command**
  Syntax
  delete {array ID}

  Examples
  <<< delete 1
  Delete the first array from Logical device list.
  <<< delete 2
  Delete the second array from Logical device list.

- **Info Command**
  Syntax
  info
  Display physical device list and logical list

- **Exit Command**
  Syntax
  Q/q/quit/exit
  Quit the application

- **Help Command**
  Syntax
  H/h/help
  This is help message.