



SSD7000 数据 RAID Linux 安装指南

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概述

本指南包括在Linux操作系统上使用SSD7000和SSD7500系列NVMe阵列卡以及SSD6540系列NVMe 阵列机柜的重要硬件/软件要求、安装和升级过程以及故障排除提示。

前提条件

本节介绍了SSD7000和SSD7500系列NVMe 阵列卡以及SSD6540系列NVMe 阵列机柜的基本硬件和软件要求。

UEFI BIOS 设置

本节介绍如何配置主板UEFI设置，以便与SSD7000和SSD7500系列NVMe阵列卡以及SSD6540系列NVMe阵列机柜一起使用。

Driver Installation驱动程序安装

本节介绍了在Linux环境中，SSD7000和SSD7500系列NVMe阵列卡，以及SSD6540系列NVMe阵列机柜的驱动程序安装、驱动程序升级和驱动程序卸载过程。

管理软件安装

本节介绍如何下载和安装适用于Linux发行版的HighPoint RAID管理软件套件。下载内容包括Web RAID管理界面（WebGUI）和CLI（命令行界面）。

故障排除

如果您在安装或使用SSD7000和SSD7500系列NVMe阵列卡或SSD6540系列NVMe 阵列机柜时遇到任何困难，请参阅本节。它包括对常见报告的技术问题的解决方案和描述。

附录

本节介绍如何为您通过我们的在线支持门户提交的支持案例收集故障排除信息。

数据RAID 配置的先决条件

要配置不可引导的NVMe RAID数组，您将需要以下内容：

1. **必须安装一个NVMe SSD。** 必须在HighPointNVMe阵列卡/机柜中安装或连接至少一个NVMe SSD。
2. **一个PCIe 4.0插槽或PCIe3.0与x8或x16通道。** HighPoint NVMe阵列卡必须安装在具有x8或x16通道的PCIe 4.0插槽或PCIe3.0中。
3. **您的主板必须有一个UEFI BIOS，带有第三方设备（如HighPoint NVMe RAID控制器、光驱和USB闪存驱动器）的选项ROM设置。** 如果配置不正确，系统将无法加载SSD7000/SSD7500 RAID控制器。请检查控制器的兼容性列表以获得推荐的主板。
4. **必须禁用安全引导。** SSD7000系列Linux驱动程序功能尚未签署和认证。如果启用安全引导，主板将无法识别SSD7000控制器，您将无法继续安装。
5. **确保为HighPoint NVMe阵列卡/机柜托管的SSD卸载了任何非HighPoint驱动程序。** 第三方软件和制造商提供的驱动程序可能会妨碍SSD7000正常工作。

警告：

- 1) 在卸载驱动程序时，无法删除控制器和SSD可能会导致数据丢失。
- 2) 在将SSD7000系列NVMe 阵列卡和RAID阵列移动到另一个Linux系统之前，请始终确保安装了SSD7000驱动程序。

卸载SSD7000驱动程序后，Linux发行版将始终加载默认的NVMe支持，或者如果在未加载驱动程序时检测到卡的存在，则该驱动程序将仅将NVMe SSD识别为单独的磁盘。

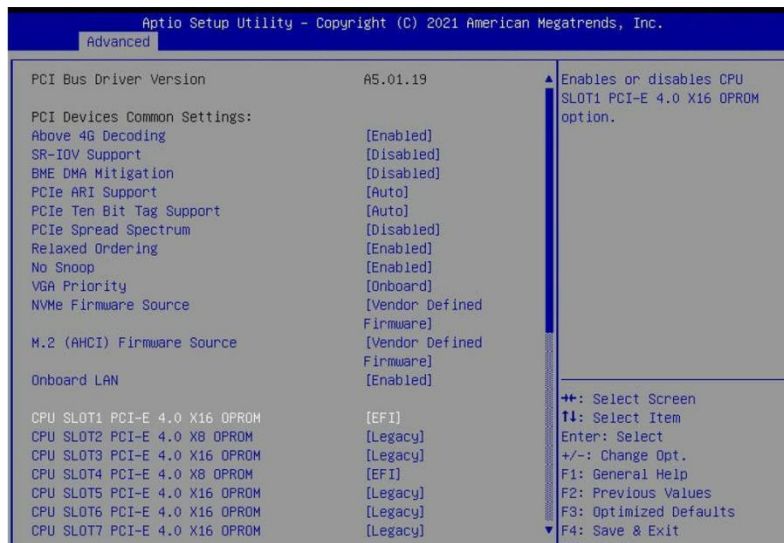
如果分别对SSD进行识别，则它们所包含的任何数据都可能丢失——包括RAID配置数据。

UEFI BIOS 设置

注意：只需要设置SSD7105/7202/7502/7505/7540/7580A/7580B

不同的主板将提供不同的与UEFI相关的BIOS设置。请咨询您的主板的用户手册以了解更多信息。本节提供了使用SuperMicro H12SSL-i主板的示例。

1. 启动系统，并访问主板BIOS菜单。
2. 在高级->PCIe/PCI/PnP 配置下->，将“CPU 插槽 x PCI-EOPROM" 更改为"EFI"。“x”表示PCIE插槽分配。在本例中，SSD7505被安装在“CPU插槽1”



中。

3. 将“安全引导”设置为“已禁用”。



驱动程序安装

安装开源驱动程序

1. 打开系统电源并启动Linux发行版。
2. 打开具有根权限的系统终端，并使用以下命令验证是否检测到HighPointNVMe阵列卡/机柜：

lspci

示例屏幕截图 (SSD7101A/7104/7120/6540/6540M):

```
[root@localhost test]# lspci
00:00.0 Host bridge: Intel Corporation 8th Gen Core Processor Host Bridge/DRAM Registers (rev 0a)
00:01.0 PCI bridge: Intel Corporation Xeon E3-1200 v5/E3-1500 v5/6th Gen Core Processor PCIe Controller (x16) (rev 0a)
00:02.0 VGA compatible controller: Intel Corporation UHD Graphics 630 (Desktop 9 Series)
00:12.0 Signal processing controller: Intel Corporation Cannon Lake PCH Thermal Controller (rev 10)
00:14.0 USB controller: Intel Corporation Cannon Lake PCH USB 3.1 xHCI Host Controller (rev 10)
00:14.2 RAM memory: Intel Corporation Cannon Lake PCH Shared SRAM (rev 10)
00:14.3 Network controller: Intel Corporation Wireless-AC 9560 [Jefferson Peak] (rev 10)
00:16.0 Communication controller: Intel Corporation Cannon Lake PCH HECI Controller (rev 10)
00:17.0 SATA controller: Intel Corporation Cannon Lake PCH SATA AHCI Controller (rev 10)
00:1b.0 PCI bridge: Intel Corporation Cannon Lake PCH PCI Express Root Port #17 (rev f0)
00:1c.0 PCI bridge: Intel Corporation Cannon Lake PCH PCI Express Root Port #1 (rev f0)
00:1c.4 PCI bridge: Intel Corporation Cannon Lake PCH PCI Express Root Port #5 (rev f0)
00:1c.6 PCI bridge: Intel Corporation Cannon Lake PCH PCI Express Root Port #7 (rev f0)
00:1d.0 PCI bridge: Intel Corporation Cannon Lake PCH PCI Express Root Port #9 (rev f0)
00:1f.0 ISA bridge: Intel Corporation Z390 Chipset LPC/eSPI Controller (rev 10)
00:1f.3 Audio device: Intel Corporation Cannon Lake PCH CAVS (rev 10)
00:1f.4 SMBus: Intel Corporation Cannon Lake PCH SMBus Controller (rev 10)
00:1f.5 Serial bus controller [0c80]: Intel Corporation Cannon Lake PCH SPI Controller (rev 10)
00:1f.6 Ethernet controller: Intel Corporation Ethernet Connection (7) I219-V (rev 10)
01:00.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
02:00.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
02:09.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
02:10.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
02:11.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
03:00.0 Non-Volatile memory controller: Samsung Electronics Co Ltd NVMe SSD Controller SM981/PM981
04:00.0 Non-Volatile memory controller: Samsung Electronics Co Ltd NVMe SSD Controller SM981/PM981
05:00.0 Non-Volatile memory controller: Samsung Electronics Co Ltd NVMe SSD Controller SM981/PM981
06:00.0 Non-Volatile memory controller: Samsung Electronics Co Ltd NVMe SSD Controller SM981/PM981
73:00.0 Ethernet controller: Aquantia corp. AQUANTIA Aquantia AQC107 10GbE 17/17/17/17 Ethernet Controller (rev 02)
74:00.0 PCI bridge: ASMedia Technology Inc. ASM1184e PCIe Switch Port
75:01.0 PCI bridge: ASMedia Technology Inc. ASM1184e PCIe Switch Port
75:03.0 PCI bridge: ASMedia Technology Inc. ASM1184e PCIe Switch Port
75:05.0 PCI bridge: ASMedia Technology Inc. ASM1184e PCIe Switch Port
75:07.0 PCI bridge: ASMedia Technology Inc. ASM1184e PCIe Switch Port
```

SSD7204:

```
16:1e.6 System peripheral: Intel Corporation Sky Lake-E PCI Registers (rev 04)
17:00.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
18:00.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
18:10.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
1a:00.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
1b:00.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
1b:09.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
1b:10.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
1b:11.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
1c:00.0 Non-Volatile memory controller: Samsung Electronics Co Ltd NVMe SSD Controller SM961/PM961
1d:00.0 Non-Volatile memory controller: Samsung Electronics Co Ltd NVMe SSD Controller SM961/PM961
1f:00.0 Non-Volatile memory controller: Samsung Electronics Co Ltd NVMe SSD Controller SM961/PM961
64:00.0 PCI bridge: Intel Corporation Sky Lake-E PCI Express Root Port A (rev 04)
64:05.0 System peripheral: Intel Corporation Sky Lake-E VT-d (rev 04)
64:05.2 System peripheral: Intel Corporation Sky Lake-E RAS Configuration Registers (rev 04)
64:05.4 PIC: Intel Corporation Sky Lake-E IOAPIC Configuration Registers (rev 04)
64:08.0 System peripheral: Intel Corporation Sky Lake-E Integrated Memory Controller (rev 04)
64:09.0 System peripheral: Intel Corporation Sky Lake-E Integrated Memory Controller (rev 04)
64:0a.0 System peripheral: Intel Corporation Sky Lake-E Integrated Memory Controller (rev 04)
64:0a.1 System peripheral: Intel Corporation Sky Lake-E Integrated Memory Controller (rev 04)
64:0a.2 System peripheral: Intel Corporation Sky Lake-E Integrated Memory Controller (rev 04)
64:0a.3 System peripheral: Intel Corporation Sky Lake-E Integrated Memory Controller (rev 04)
64:0a.4 System peripheral: Intel Corporation Sky Lake-E Integrated Memory Controller (rev 04)
64:0a.5 System peripheral: Intel Corporation Sky Lake-E LM Channel 1 (rev 04)
64:0a.6 System peripheral: Intel Corporation Sky Lake-E LMS Channel 1 (rev 04)
64:0a.7 System peripheral: Intel Corporation Sky Lake-E LMDP Channel 1 (rev 04)
64:0b.0 System peripheral: Intel Corporation Sky Lake-E DECS Channel 2 (rev 04)
64:0b.1 System peripheral: Intel Corporation Sky Lake-E LM Channel 2 (rev 04)
64:0b.2 System peripheral: Intel Corporation Sky Lake-E LMS Channel 2 (rev 04)
64:0b.3 System peripheral: Intel Corporation Sky Lake-E LMDP Channel 2 (rev 04)
64:0c.0 System peripheral: Intel Corporation Sky Lake-E Integrated Memory Controller (rev 04)
64:0c.1 System peripheral: Intel Corporation Sky Lake-E Integrated Memory Controller (rev 04)
64:0c.2 System peripheral: Intel Corporation Sky Lake-E Integrated Memory Controller (rev 04)
64:0c.3 System peripheral: Intel Corporation Sky Lake-E Integrated Memory Controller (rev 04)
64:0c.4 System peripheral: Intel Corporation Sky Lake-E Integrated Memory Controller (rev 04)
64:0c.5 System peripheral: Intel Corporation Sky Lake-E LM Channel 1 (rev 04)
64:0c.6 System peripheral: Intel Corporation Sky Lake-E LMS Channel 1 (rev 04)
64:0c.7 System peripheral: Intel Corporation Sky Lake-E LMDP Channel 1 (rev 04)
64:0d.0 System peripheral: Intel Corporation Sky Lake-E DECS Channel 2 (rev 04)
64:0d.1 System peripheral: Intel Corporation Sky Lake-E LM Channel 2 (rev 04)
64:0d.2 System peripheral: Intel Corporation Sky Lake-E LMS Channel 2 (rev 04)
64:0d.3 System peripheral: Intel Corporation Sky Lake-E LMDP Channel 2 (rev 04)
65:00.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
66:00.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
66:10.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
68:00.0 VGA compatible controller: NVIDIA Corporation GK208B [GeForce GT 710] (rev a1)
68:00.1 Audio device: NVIDIA Corporation GK208 HDMI/DP Audio Controller (rev a1)
b2:05.0 System peripheral: Intel Corporation Sky Lake-E VT-d (rev 04)
```

SSD7184/7180:

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19:00.2 System peripheral: PLX Technology, Inc. Device 87d0 (rev ca)
19:00.3 System peripheral: PLX Technology, Inc. Device 87d0 (rev ca)
19:00.4 System peripheral: PLX Technology, Inc. Device 87d0 (rev ca)
1a:08.0 PCI bridge: PLX Technology, Inc. Device 8749 (rev ca)
1a:09.0 PCI bridge: PLX Technology, Inc. Device 8749 (rev ca)
1a:0a.0 PCI bridge: PLX Technology, Inc. Device 8749 (rev ca)
1a:0b.0 PCI bridge: PLX Technology, Inc. Device 8749 (rev ca)
1a:10.0 PCI bridge: PLX Technology, Inc. Device 8749 (rev ca)
1a:11.0 PCI bridge: PLX Technology, Inc. Device 8749 (rev ca)
1a:12.0 PCI bridge: PLX Technology, Inc. Device 8749 (rev ca)
1a:13.0 PCI bridge: PLX Technology, Inc. Device 8749 (rev ca)
1b:00.0 Non-Volatile memory controller: Western Digital Device 2400
1c:00.0 Non-Volatile memory controller: Western Digital Device 2400
1d:00.0 Non-Volatile memory controller: Western Digital Device 2400
1e:00.0 Non-Volatile memory controller: Western Digital Device 2400
1f:00.0 Non-Volatile memory controller: Western Digital Device 2400
20:00.0 Non-Volatile memory controller: Western Digital Device 2400
21:00.0 Non-Volatile memory controller: Western Digital Device 2400
22:00.0 Non-Volatile memory controller: Western Digital Device 2400
04:00.0 PCI bridge: Intel Corporation Sky Lake-E PCI Express Root Port A (rev 04)
64:05.0 System peripheral: Intel Corporation Sky Lake-E VT-d (rev 04)
64:05.2 System peripheral: Intel Corporation Sky Lake-E RAS Configuration Registers
64:05.4 PCI: Intel Corporation Sky Lake-E I/O APIC Configuration Registers (rev 04)

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SSD7140A:

```

00:1f.6 Ethernet controller: Intel Corporation Ethernet Connection (7) I219-V (rev 10)
01:00.0 PCI bridge: PLX Technology, Inc. Device 8749 (rev ca)
01:00.1 System peripheral: PLX Technology, Inc. Device 87d0 (rev ca)
01:00.2 System peripheral: PLX Technology, Inc. Device 87d0 (rev ca)
01:00.3 System peripheral: PLX Technology, Inc. Device 87d0 (rev ca)
01:00.4 System peripheral: PLX Technology, Inc. Device 87d0 (rev ca)
02:08.0 PCI bridge: PLX Technology, Inc. Device 8749 (rev ca)
02:09.0 PCI bridge: PLX Technology, Inc. Device 8749 (rev ca)
02:0a.0 PCI bridge: PLX Technology, Inc. Device 8749 (rev ca)
02:0b.0 PCI bridge: PLX Technology, Inc. Device 8749 (rev ca)
02:10.0 PCI bridge: PLX Technology, Inc. Device 8749 (rev ca)
02:11.0 PCI bridge: PLX Technology, Inc. Device 8749 (rev ca)
02:12.0 PCI bridge: PLX Technology, Inc. Device 8749 (rev ca)
02:13.0 PCI bridge: PLX Technology, Inc. Device 8749 (rev ca)
03:00.0 Non-Volatile memory controller: Samsung Electronics Co Ltd NVMe SSD Controller SM981/PM981
04:00.0 Non-Volatile memory controller: Sandisk Corp WD Black 2018/PC SN520 NVMe SSD (rev 01)
05:00.0 Non-Volatile memory controller: Sandisk Corp WD Black 2018/PC SN520 NVMe SSD (rev 01)
06:00.0 Non-Volatile memory controller: Silicon Motion, Inc. Device 2262 (rev 03)
07:00.0 Non-Volatile memory controller: Samsung Electronics Co Ltd NVMe SSD Controller SM981/PM981
08:00.0 Non-Volatile memory controller: Sandisk Corp WD Black 2018/PC SN520 NVMe SSD (rev 01)
09:00.0 Non-Volatile memory controller: Toshiba America Info Systems Device 011a
0a:00.0 Non-Volatile memory controller: Sandisk Corp WD Black 2018/PC SN720 NVMe SSD
77:00.0 Ethernet controller: Aquantia Corp. AQ107 NBase-T/IEEE 802.3bz2 Ethernet Controller [AQtion] (rev 02)
78:00.0 PCI bridge: ASMedia Technology Inc. ASM1184e PCIe Switch Port
79:01.0 PCI bridge: ASMedia Technology Inc. ASM1184e PCIe Switch Port
79:03.0 PCI bridge: ASMedia Technology Inc. ASM1184e PCIe Switch Port
79:05.0 PCI bridge: ASMedia Technology Inc. ASM1184e PCIe Switch Port
79:07.0 PCI bridge: ASMedia Technology Inc. ASM1184e PCIe Switch Port
root@debian:~# █

```

SSD7105:

```

00:14.3 ISA bridge: Advanced Micro Devices, Inc. [AMD] FCH LPC Bridge (rev 51)
00:18.0 Host bridge: Advanced Micro Devices, Inc. [AMD] Starship Device 24; Function 0
00:18.1 Host bridge: Advanced Micro Devices, Inc. [AMD] Starship Device 24; Function 1
00:18.2 Host bridge: Advanced Micro Devices, Inc. [AMD] Starship Device 24; Function 2
00:18.3 Host bridge: Advanced Micro Devices, Inc. [AMD] Starship Device 24; Function 3
00:18.4 Host bridge: Advanced Micro Devices, Inc. [AMD] Starship Device 24; Function 4
00:18.5 Host bridge: Advanced Micro Devices, Inc. [AMD] Starship Device 24; Function 5
00:18.6 Host bridge: Advanced Micro Devices, Inc. [AMD] Starship Device 24; Function 6
00:18.7 Host bridge: Advanced Micro Devices, Inc. [AMD] Starship Device 24; Function 7
01:00.0 PCI bridge: PLX Technology, Inc. PEX 8749 48-Lane, 18-Port PCI Express Gen 3 (8.0 GT/s) Multi-Root Switch with DMA (rev ca)
01:00.1 System peripheral: PLX Technology, Inc. PEX PCI Express Switch DMA Interface (rev ca)
01:00.2 System peripheral: PLX Technology, Inc. PEX PCI Express Switch DMA Interface (rev ca)
01:00.3 System peripheral: PLX Technology, Inc. PEX PCI Express Switch DMA Interface (rev ca)
01:00.4 System peripheral: PLX Technology, Inc. PEX PCI Express Switch DMA Interface (rev ca)
02:00.0 PCI bridge: PLX Technology, Inc. PEX 8749 48-Lane, 18-Port PCI Express Gen 3 (8.0 GT/s) Multi-Root Switch with DMA (rev ca)
02:09.0 PCI bridge: PLX Technology, Inc. PEX 8749 48-Lane, 18-Port PCI Express Gen 3 (8.0 GT/s) Multi-Root Switch with DMA (rev ca)
02:10.0 PCI bridge: PLX Technology, Inc. PEX 8749 48-Lane, 18-Port PCI Express Gen 3 (8.0 GT/s) Multi-Root Switch with DMA (rev ca)
02:11.0 PCI bridge: PLX Technology, Inc. PEX 8749 48-Lane, 18-Port PCI Express Gen 3 (8.0 GT/s) Multi-Root Switch with DMA (rev ca)
02:12.0 PCI bridge: PLX Technology, Inc. PEX 8749 48-Lane, 18-Port PCI Express Gen 3 (8.0 GT/s) Multi-Root Switch with DMA (rev ca)
04:00.0 Non-Volatile memory controller: Toshiba Corporation XG6 NVMe SSD Controller
05:00.0 Non-Volatile memory controller: Toshiba Corporation Device 0116
06:00.0 Non-Volatile memory controller: Toshiba Corporation Device 0116
07:00.0 RAID bus controller: HighPoint Technologies, Inc. Device 7105 (rev 01)
08:00.0 Non-Essential Instrumentation [1300]: Advanced Micro Devices, Inc. [AMD] Starship/Matisse PCIe Dummy Function
09:00.0 Non-Essential Instrumentation [1380]: Advanced Micro Devices, Inc. [AMD] Starship/Matisse Reserved SPP
09:00.3 USB controller: Advanced Micro Devices, Inc. [AMD] Starship USB 3.0 Host Controller
20:00.0 Host bridge: Advanced Micro Devices, Inc. [AMD] Starship/Matisse Root Complex

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SSD7202:

```
16:1e.4 System peripheral: Intel Corporation Sky Lake-E PCU Registers (rev 04)
16:1e.5 System peripheral: Intel Corporation Sky Lake-E PCU Registers (rev 04)
16:1e.6 System peripheral: Intel Corporation Sky Lake-E PCU Registers (rev 04)
17:00.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
18:00.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
18:10.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
1a:00.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
1b:08.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
1b:09.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
1b:10.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
1b:11.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
1d:00.0 Non-Volatile memory controller: Samsung Electronics Co Ltd NVMe SSD Controller SM961/PM961
1e:00.0 RAID bus controller: HighPoint Technologies, Inc. Device 7202 (rev 01)
1f:00.0 Non-Volatile memory controller: Samsung Electronics Co Ltd NVMe SSD Controller SM961/PM961
64:00.0 PCI Bridge: Intel Corporation Sky Lake-E PCI Express Root Port A (rev 04)
64:05.0 System peripheral: Intel Corporation Sky Lake-E VT-d (rev 04)
64:05.2 System peripheral: Intel Corporation Sky Lake-E RAS Configuration Registers (rev 04)
64:05.4 PIC: Intel Corporation Sky Lake-E IOxAPIC Configuration Registers (rev 04)
64:08.0 System peripheral: Intel Corporation Sky Lake-E Integrated Memory Controller (rev 04)
64:09.0 System peripheral: Intel Corporation Sky Lake-E Integrated Memory Controller (rev 04)
64:0a.0 System peripheral: Intel Corporation Sky Lake-E Integrated Memory Controller (rev 04)
64:0a.2 System peripheral: Intel Corporation Sky Lake-E Integrated Memory Controller (rev 04)
64:0a.3 System peripheral: Intel Corporation Sky Lake-E Integrated Memory Controller (rev 04)
64:0a.4 System peripheral: Intel Corporation Sky Lake-E Integrated Memory Controller (rev 04)
64:0a.5 System peripheral: Intel Corporation Sky Lake-E LM Channel 1 (rev 04)
64:0a.6 System peripheral: Intel Corporation Sky Lake-E LMPD Channel 1 (rev 04)
64:0a.7 System peripheral: Intel Corporation Sky Lake-E LMPD Channel 1 (rev 04)
64:0b.0 System peripheral: Intel Corporation Sky Lake-E DECS Channel 2 (rev 04)
64:0b.1 System peripheral: Intel Corporation Sky Lake-E LM Channel 2 (rev 04)
64:0b.2 System peripheral: Intel Corporation Sky Lake-E LMS Channel 2 (rev 04)
64:0b.3 System peripheral: Intel Corporation Sky Lake-E LMPD Channel 2 (rev 04)
64:0c.0 System peripheral: Intel Corporation Sky Lake-E Integrated Memory Controller (rev 04)
64:0c.1 System peripheral: Intel Corporation Sky Lake-E Integrated Memory Controller (rev 04)
64:0c.2 System peripheral: Intel Corporation Sky Lake-E Integrated Memory Controller (rev 04)
64:0c.3 System peripheral: Intel Corporation Sky Lake-E Integrated Memory Controller (rev 04)
64:0c.4 System peripheral: Intel Corporation Sky Lake-E Integrated Memory Controller (rev 04)
64:0c.5 System peripheral: Intel Corporation Sky Lake-E LM Channel 1 (rev 04)
64:0c.6 System peripheral: Intel Corporation Sky Lake-E LMS Channel 1 (rev 04)
64:0c.7 System peripheral: Intel Corporation Sky Lake-E LMPD Channel 1 (rev 04)
64:0d.0 System peripheral: Intel Corporation Sky Lake-E DECS Channel 2 (rev 04)
64:0d.1 System peripheral: Intel Corporation Sky Lake-E LM Channel 2 (rev 04)
64:0d.2 System peripheral: Intel Corporation Sky Lake-E LMS Channel 2 (rev 04)
64:0d.3 System peripheral: Intel Corporation Sky Lake-E LMPD Channel 2 (rev 04)
65:00.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
66:00.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
66:10.0 PCI bridge: PLX Technology, Inc. PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch (rev ca)
08:00.0 Non-Volatile memory controller: NVIDIA Corporation GK208B (Tesla G700) (rev a1)
68:00.1 Audio device: NVIDIA Corporation GK208 HDMI/DP Audio Controller (rev a1)
b2:05.0 System peripheral: Intel Corporation Sky Lake-E VT-d (rev 04)
b2:05.2 System peripheral: Intel Corporation Sky Lake-E RAS Configuration Registers (rev 04)
b2:05.4 PIC: Intel Corporation Sky Lake-E IOxAPIC Configuration Registers (rev 04)
```

SSD7505:

```
07:00.3 USB controller: Advanced Micro Devices, Inc. [AMD] Matisse USB 3.0 Host Controller
08:00.0 SATA controller: Advanced Micro Devices, Inc. [AMD] FCH SATA Controller [AHCI mode] (rev 51)
0a:00.0 SATA controller: Advanced Micro Devices, Inc. [AMD] FCH SATA Controller [AHCI mode] (rev 51)
0a:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
0b:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
0b:0c.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
0b:1c.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
0c:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
0d:10.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
0d:14.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
0d:18.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
0d:1c.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
0e:00.0 Non-Volatile memory controller: Seagate Technology PLC Device 5016 (rev 01)
0f:00.0 Non-Volatile memory controller: Seagate Technology PLC Device 5016 (rev 01)
10:00.0 Non-Volatile memory controller: Seagate Technology PLC Device 5016 (rev 01)
11:00.0 Non-Volatile memory controller: Seagate Technology PLC Device 5016 (rev 01)
12:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
13:14.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
13:15.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
14:00.0 RAID bus controller: HighPoint Technologies, Inc. Device 7505 (rev 01)
16:00.0 Mass storage controller: Broadcom / LSI Device c010 (rev b0)
```

SSD7540:

```
d7:12.2 System peripheral: Intel Corporation Sky Lake-E M3KTI Registers (rev 07)
d7:15.0 System peripheral: Intel Corporation Sky Lake-E M2PCI Registers (rev 07)
d7:15.1 Performance counters: Intel Corporation Sky Lake-E DDRIO Registers (rev 07)
d7:16.0 System peripheral: Intel Corporation Sky Lake-E M2PCI Registers (rev 07)
d7:16.1 Performance counters: Intel Corporation Sky Lake-E DDRIO Registers (rev 07)
d7:16.4 System peripheral: Intel Corporation Sky Lake-E M2PCI Registers (rev 07)
d7:16.5 Performance counters: Intel Corporation Sky Lake-E DDRIO Registers (rev 07)
08:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
09:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
09:04.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
09:0c.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
09:1c.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
0a:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
0b:10.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
0b:14.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
0b:18.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
0b:1c.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
0c:00.0 Non-Volatile memory controller: Sandisk Corp WD Black 2018/PC SN520 NVMe SSD (rev 01)
0d:00.0 Non-Volatile memory controller: Samsung Electronics Co Ltd NVMe SSD Controller SM981/PM983
0e:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
11:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
11:04.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
11:08.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
11:0c.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
14:00.0 Non-Volatile memory controller: Sandisk Corp WD Black 2018/PC SN520 NVMe SSD (rev 01)
15:00.0 Non-Volatile memory controller: Sandisk Corp WD Black 2018/PC SN520 NVMe SSD (rev 01)
16:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
17:14.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
17:15.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
18:00.0 RAID bus controller: HighPoint Technologies, Inc. Device 7540 (rev 01)
1a:00.0 Mass storage controller: Broadcom / LSI Device c010 (rev b0)
[root@localhost csl]#
```


SSD7502:

```
40:01.0 Host bridge: Advanced Micro Devices, Inc. [AMD] Starship/Matisse PCIe Dummy Host Bridge
40:01.1 PCI bridge: Advanced Micro Devices, Inc. [AMD] Starship/Matisse GPP Bridge
40:02.0 Host bridge: Advanced Micro Devices, Inc. [AMD] Starship/Matisse PCIe Dummy Host Bridge
40:03.0 Host bridge: Advanced Micro Devices, Inc. [AMD] Starship/Matisse PCIe Dummy Host Bridge
40:04.0 Host bridge: Advanced Micro Devices, Inc. [AMD] Starship/Matisse PCIe Dummy Host Bridge
40:05.0 Host bridge: Advanced Micro Devices, Inc. [AMD] Starship/Matisse PCIe Dummy Host Bridge
40:07.0 Host bridge: Advanced Micro Devices, Inc. [AMD] Starship/Matisse PCIe Dummy Host Bridge
40:07.1 PCI bridge: Advanced Micro Devices, Inc. [AMD] Starship/Matisse Internal PCIe GPP Bridge 0 to bus[E:B]
40:08.0 Host bridge: Advanced Micro Devices, Inc. [AMD] Starship/Matisse PCIe Dummy Host Bridge
40:08.1 PCI bridge: Advanced Micro Devices, Inc. [AMD] Starship/Matisse Internal PCIe GPP Bridge 0 to bus[E:B]
41:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
42:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
42:0c.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
42:1c.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
43:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
44:10.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
44:14.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
44:18.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
44:1c.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
45:00.0 Non-Volatile memory controller: Samsung Electronics Co Ltd NVMe SSD Controller SM981/PM981/PM983
46:00.0 Non-Volatile memory controller: Samsung Electronics Co Ltd NVMe SSD Controller SM981/PM981/PM983
49:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
4a:14.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
4a:15.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
```

SSD7580A:

```
00:18.7 Host bridge: Advanced Micro Devices, Inc. [AMD] Matisse Device 24: Function 7
01:00.0 Non-Volatile memory controller: Samsung Electronics Co Ltd Device a80a
02:00.0 PCI bridge: Advanced Micro Devices, Inc. [AMD] Matisse Switch Upstream
03:00.0 PCI bridge: Advanced Micro Devices, Inc. [AMD] Matisse PCIe GPP Bridge
03:01.0 PCI bridge: Advanced Micro Devices, Inc. [AMD] Matisse PCIe GPP Bridge
03:07.0 PCI bridge: Advanced Micro Devices, Inc. [AMD] Matisse PCIe GPP Bridge
03:03.0 PCI bridge: Advanced Micro Devices, Inc. [AMD] Matisse PCIe GPP Bridge
03:04.0 PCI bridge: Advanced Micro Devices, Inc. [AMD] Matisse PCIe GPP Bridge
03:05.0 PCI bridge: Advanced Micro Devices, Inc. [AMD] Matisse PCIe GPP Bridge
03:08.0 PCI bridge: Advanced Micro Devices, Inc. [AMD] Matisse PCIe GPP Bridge
03:09.0 PCI bridge: Advanced Micro Devices, Inc. [AMD] Matisse PCIe GPP Bridge
03:0a.0 PCI bridge: Advanced Micro Devices, Inc. [AMD] Matisse PCIe GPP Bridge
04:00.0 Non-Volatile memory controller: Samsung Electronics Co Ltd NVMe SSD Controller SM981/PM981/PM983
05:00.0 Non-Volatile memory controller: Samsung Electronics Co Ltd Device a80a
06:00.0 VGA compatible controller: NVIDIA Corporation GK208B [GeForce GT 710] (rev a1)
06:00.1 Audio device: NVIDIA Corporation GK208 HDMI/DP Audio Controller (rev 01)
07:00.0 Network controller: Intel Corporation Wi-Fi 6 AX200 (rev 1a)
08:00.0 Ethernet controller: Intel Corporation I211 Gigabit Network Connection (rev 03)
09:00.0 Ethernet controller: Realtek Semiconductor Co., Ltd. RTL8125 2.5GbE Controller (rev 01)
0a:00.0 Non-Essential Instrumentation [1300]: Advanced Micro Devices, Inc. [AMD] Starship/Matisse Reserved SPP
0a:00.1 USB controller: Advanced Micro Devices, Inc. [AMD] Matisse USB 3.0 Host Controller
0a:00.3 USB controller: Advanced Micro Devices, Inc. [AMD] Matisse USB 3.0 Host Controller
0b:00.0 RAID bus controller: Advanced Micro Devices, Inc. [AMD] Device 7916 (rev 51)
0c:00.0 RAID bus controller: Advanced Micro Devices, Inc. [AMD] Device 7916 (rev 51)
0d:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
0e:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
0e:04.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
0e:0c.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
0e:1c.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
0f:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
10:10.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
10:14.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
10:18.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
10:1c.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
12:00.0 Non-Volatile memory controller: Samsung Electronics Co Ltd NVMe SSD Controller SM981/PM981/PM983
14:00.0 Non-Volatile memory controller: Samsung Electronics Co Ltd NVMe SSD Controller SM981/PM981/PM983
15:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
16:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
16:04.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
16:08.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
16:0c.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
17:00.0 Non-Volatile memory controller: Western Digital Device 2400
18:00.0 Non-Volatile memory controller: Western Digital Device 2400
19:00.0 Non-Volatile memory controller: Western Digital Device 2400
1a:00.0 Non-Volatile memory controller: Western Digital Device 2400
1b:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
1c:14.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
1c:15.0 PCI bridge: Broadcom / LSI Device c010 (rev b0)
1d:00.0 RAID bus controller: HighPoint Technologies, Inc. Device 7580 (rev 01)
```

SSD7580B:

```
0:00.0 PCI bridge: LSI Logic / Symbios Logic Device c010 (rev 00)
9:00.0 PCI bridge: LSI Logic / Symbios Logic Device c010 (rev 00)
9:01.0 PCI bridge: LSI Logic / Symbios Logic Device c010 (rev 00)
9:02.0 PCI bridge: LSI Logic / Symbios Logic Device c010 (rev 00)
9:03.0 PCI bridge: LSI Logic / Symbios Logic Device c010 (rev 00)
9:04.0 PCI bridge: LSI Logic / Symbios Logic Device c010 (rev 00)
9:05.0 PCI bridge: LSI Logic / Symbios Logic Device c010 (rev 00)
9:06.0 PCI bridge: LSI Logic / Symbios Logic Device c010 (rev 00)
9:07.0 PCI bridge: LSI Logic / Symbios Logic Device c010 (rev 00)
9:08.0 PCI bridge: LSI Logic / Symbios Logic Device c010 (rev 00)
9:1f.0 PCI bridge: LSI Logic / Symbios Logic Device c010 (rev 00)
a:00.0 Non-Volatile memory controller: Western Digital Device 2400
b:00.0 Non-Volatile memory controller: Western Digital Device 2200
c:00.0 Non-Volatile memory controller: Micron Technology Inc Device 51b1 (rev 02)
d:00.0 Non-Volatile memory controller: Micron Technology Inc Device 51b1 (rev 02)
e:00.0 Non-Volatile memory controller: Intel Corporation Optane DC P4800X Series SSD
f:00.0 Non-Volatile memory controller: Intel Corporation Optane DC P4800X Series SSD
0:00.0 Non-Volatile memory controller: Samsung Electronics Co Ltd NVMe SSD Controller SM981/PM981
1:00.0 Non-Volatile memory controller: Toshiba America Info Systems Device 0110 (rev 01)
2:00.0 RAID bus controller: HighPoint Technologies, Inc. Device 7580 (rev 11)
3:00.0 Serial Attached SCSI controller: LSI Logic / Symbios Logic Device 00b2 (rev b0)
b2:05.0 System peripheral: Intel Corporation Device 2034 (rev 04)
b2:05.2 System peripheral: Intel Corporation Sky Lake-E RAS Configuration Registers (rev 04)
b2:05.4 PIC: Intel Corporation Device 2036 (rev 04)
b2:12.0 Performance counters: Intel Corporation Sky Lake-E M3KTI Registers (rev 04)
b2:12.1 Performance counters: Intel Corporation Sky Lake-E M3KTI Registers (rev 04)
b2:12.2 System peripheral: Intel Corporation Sky Lake-E M3KTI Registers (rev 04)
b2:15.0 System peripheral: Intel Corporation Sky Lake-E M2PCI Registers (rev 04)
b2:16.0 System peripheral: Intel Corporation Sky Lake-E M2PCI Registers (rev 04)
b2:16.4 System peripheral: Intel Corporation Sky Lake-E M2PCI Registers (rev 04)
b2:17.0 System peripheral: Intel Corporation Sky Lake-E M2PCI Registers (rev 04)
root@test-Super-Server:~/home/test#
```

此外，您还可以使用以下命令验证是否检测到NVMe驱动程序: **fdisk -l**

示例截图 (SSD7101A-1):

```
Disk /dev/mapper/centos-swap: 8388 MB, 8388608000 bytes, 16384000 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes

Disk /dev/nvme3n1: 512.1 GB, 512110190592 bytes, 1000215216 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes

Disk /dev/nvme2n1: 512.1 GB, 512110190592 bytes, 1000215216 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes

Disk /dev/nvme0n1: 512.1 GB, 512110190592 bytes, 1000215216 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes

Disk /dev/nvme1n1: 2000.4 GB, 2000398934016 bytes, 3907029168 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes

Disk /dev/mapper/centos-home: 192.9 GB, 192904429568 bytes, 376766464 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
```

3. 从“软件下载”网页中下载适当的驱动程序:

SSD7105:<http://www.highpoint-tech.cn/product-detail7105.html>

SSD7202:<http://www.highpoint-tech.cn/product-detail7202.html>

SSD7101A-1/SSD7104F/SSD7104/SSD7204/SSD7140A:

<http://www.highpoint-tech.cn/product-detail7101a.html>

SSD7120/SSD7180/SSD7184:

<http://www.highpoint-tech.cn/product-detail7120.html>

SSD6540 Enclosures:

<http://www.highpoint-tech.cn/product-detail6540.html>

SSD7502/SSD7505/SSD7540:

<http://www.highpoint-tech.cn/product-detail7502.html>

SSD7580A/SSD7580B:

<http://www.highpoint-tech.cn/product-detail7580.html>

4. 使用具有根权限的系统终端，浏览到驱动程序下载所在的目录，并输入以下命令来提取Linux开源驱动程序软件包:

tar zxvf HighPoint_NVMe_G5_Linux_Src_vx.x.xx_xx_xx_xx.tar.gz

```
[root@localhost Downloads]# tar zxvf HighPoint_NVMe_G5_Linux_Src_v1.2.13_20_03_17.tar.gz
hptnme_g5_linux_src_v1.2.13_20_03_17.bin
README_
```

注意：屏幕截图中显示的驱动程序修订可能与当前的软件版本不一致。请确保从产品的软件更新页面下载最新的驱动程序更新。

5. 使用以下命令安装开源驱动程序

```
sh hptnvme_g5_linux_src_vx.x.xx_xx_xx_xx.bin or
./hptnvme_g5_linux_src_vx.x.xx_xx_xx_xx.bin
```

```
[root@localhost Downloads]# sh hptnvme_g5_linux_src_v1.2.13_20_03_17.bin
Verifying archive integrity... All good.
Uncompressing HighPoint NVMe RAID Controller Linux Open Source package installer.....
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)
Created symlink from /etc/systemd/system/default.target.wants/hptdrv-monitor.service to /usr/lib/systemd/system/hptdrv-monitor.service.

Please run hptuninhptnvme to uninstall the driver files.

Please restart the system for the driver to take effect.
[root@localhost Downloads]#
```

```
[root@localhost Downloads]# ./hptnvme_g5_linux_src_v1.2.20_2020_09_28.bin
Verifying archive integrity... All good.
Uncompressing HighPoint NVMe RAID Controller Linux Open Source package installer.....
.....
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)
old crashkernel=auto resume=/dev/mapper/cl-swap rd.lvm.lv=cl/root rd.lvm.lv=cl/swap rhgb quiet
new crashkernel=auto
resume=/dev/mapper/cl-swap
rd.lvm.lv=cl/root
rd.lvm.lv=cl/swap
rhgb
quiet pcie_aspm=off
Generating grub configuration file ...
Adding boot menu entry for EFI firmware configuration
done
Synchronizing state of hptdrv-monitor.service with SysV service script with /usr/lib/systemd/systemd-sysv-inst
all.
Executing: /usr/lib/systemd/systemd-sysv-install enable hptdrv-monitor
Created symlink /etc/systemd/system/default.target.wants/hptdrv-monitor.service -> /usr/lib/systemd/system/hptd
rv-monitor.service.

Please run hptuninhptnvme to uninstall the driver files.

Please restart the system for the driver to take effect.
[root@localhost Downloads]#
```

- 驱动程序安装完成后，系统将提示您重新启动，以使驱动程序生效。手动重新启动系统。
- 重新启动发行版后，以root权限打开系统终端，并使用以下命令检查驱动程序状态：

```
dmesg | grep hptnvme
```

下面的屏幕截图显示了驱动程序 v1.2.13。

```
[root@localhost Downloads]# dmesg | grep hptnvme
[ 4.431322] hptnvme: loading out-of-tree module taints kernel.
[ 4.431325] hptnvme: module license 'Proprietary' taints kernel.
[ 4.431706] hptnvme: module verification failed: signature and/or required key missing - tainting kernel
[ 5.381222] hptnvme: HighPoint NVMe RAID controller driver (G5) v1.2.13 block major fc
[ 5.382480] scsi hosts: hptnvme
[ 5.382617] hptnvme 0000:03:00.0: irq 145 for MSI/MSI-X
[ 5.382622] hptnvme 0000:03:00.0: irq 146 for MSI/MSI-X
[ 5.382625] hptnvme 0000:03:00.0: irq 147 for MSI/MSI-X
[ 5.382630] hptnvme 0000:03:00.0: irq 148 for MSI/MSI-X
[ 5.382633] hptnvme 0000:03:00.0: irq 149 for MSI/MSI-X
[ 5.382637] hptnvme 0000:03:00.0: irq 150 for MSI/MSI-X
```

此外，您还可以使用以下命令检查NVMe驱动程序：

fdisk -l

```
Disk /dev/hptblock0n0p: 465.78 GiB, 500107862016 bytes, 976773168 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes

Disk /dev/hptblock0n1p: 465.78 GiB, 500107862016 bytes, 976773168 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes

Disk /dev/hptblock0n2p: 465.78 GiB, 500107862016 bytes, 976773168 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes

Disk /dev/hptblock0n3p: 465.78 GiB, 500107862016 bytes, 976773168 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
```

更新驱动程序

截至2022年5月，当前的开源驱动程序版本包括我们的自动编译功能——每次系统启动时，自动编译都会检查内核版本，以确保兼容性。如果检测到一个新的内核，自动编译将检查我们的在线数据库所需的更新，并自动编译一个新的驱动程序。

最新的开源驱动程序可以从软件下载的网页中获得。如果您想使用此下载程序进行手动更新，请按照以下步骤操作。

1. 先决条件

- a. 确保HighPoint NVMe 阵列卡/机柜已安装到主板中。
- b. 使用根权限打开系统终端，以使用以下命令检查当前驱动程序版本：

dmesg | grep hptnvme.

下面的屏幕截图显示，已经安装了驱动程序版本v1.2.13:

```
[root@localhost Downloads]# dmesg | grep hptnvme
[ 4.431322] hptnvme: loading out-of-tree module taints kernel.
[ 4.431325] hptnvme: module license 'Proprietary' taints kernel.
[ 4.431786] hptnvme: module verification failed: signature and/or required key missing - tainting kernel
[ 5.381222] hptnvme: HighPoint NVMe RAID controller driver (65) v1.2.13 block major fc
[ 5.382480] SCSI host6: hptnvme
[ 5.382617] hptnvme 0000:03:00.0: irq 145 for MSI/MSI-X
[ 5.382622] hptnvme 0000:03:00.0: irq 146 for MSI/MSI-X
[ 5.382625] hptnvme 0000:03:00.0: irq 147 for MSI/MSI-X
[ 5.382630] hptnvme 0000:03:00.0: irq 148 for MSI/MSI-X
[ 5.382633] hptnvme 0000:03:00.0: irq 149 for MSI/MSI-X
[ 5.382637] hptnvme 0000:03:00.0: irq 150 for MSI/MSI-X
```

2. 更新驱动程序

- a. 打开最新驱动程序版本所在的目录，并以root权限打开系统终端。执行以下命令以完成安装。图示的驱动程序版本为v1.2.14。

- b. 使用以下命令提取Linux开源驱动程序软件包:

```
tar zxvf HighPoint_NVMe_G5_Linux_Src_vx.x.xx_xx_xx_xx.tar.gz
```

```
[root@localhost Downloads]# tar zxvf HighPoint_NVMe_G5_Linux_Src_v1.2.14_20_04_10.tar.gz
hptnvme_g5_linux_src_v1.2.14_20_04_10.bin
README
```

- c. 确保系统联网。要手动安装最新的开源驱动程序，请以root权限打开系统终端，然后输入以下命令:

```
./hptnvme_g5_linux_src_vx.x.xx_xx_xx_xx.bin
```

```
[root@localhost Downloads]# ./hptnvme_g5_linux_src_v1.2.14_20_04_10.bin
Verifying archive integrity... All good.
Uncompressing HighPoint NVMe RAID Controller Linux Open Source package installer.....
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)
old crashkernel=auto rd.lvm.lv=centos/root rd.lvm.lv=centos/swap rhgb quiet intel_iommu=off and iommu=off
new crashkernel=auto
rd.lvm.lv=centos/root
rd.lvm.lv=centos/swap
rhgb
quiet intel_iommu=off and iommu=off
Generating grub configuration file ...
Found linux image: /boot/vmlinuz-3.10.0-1062.10.1.el7.x86_64
Found initrd image: /boot/initramfs-3.10.0-1062.10.1.el7.x86_64.img
Found linux image: /boot/vmlinuz-3.10.0-1062.el7.x86_64
Found initrd image: /boot/initramfs-3.10.0-1062.el7.x86_64.img
Found linux image: /boot/vmlinuz-0-rescue-cd0401dc0d1649da9932eac9f5546670
Found initrd image: /boot/initramfs-0-rescue-cd0401dc0d1649da9932eac9f5546670.img
done

Please run hptuninhptnvme to uninstall the driver files.

Please restart the system for the driver to take effect.
[root@localhost Downloads]#
```

- d. 在驱动程序安装完成后，系统将提示您重新启动，以允许新的驱动程序生效。请手动重启系统。

注意: 有关此过程的更多信息，请查阅每个开源下载中包含的自述文件。

- e. 发行版重新启动后，以root权限打开系统终端，并使用以下命令检查当前驱动程序版本:

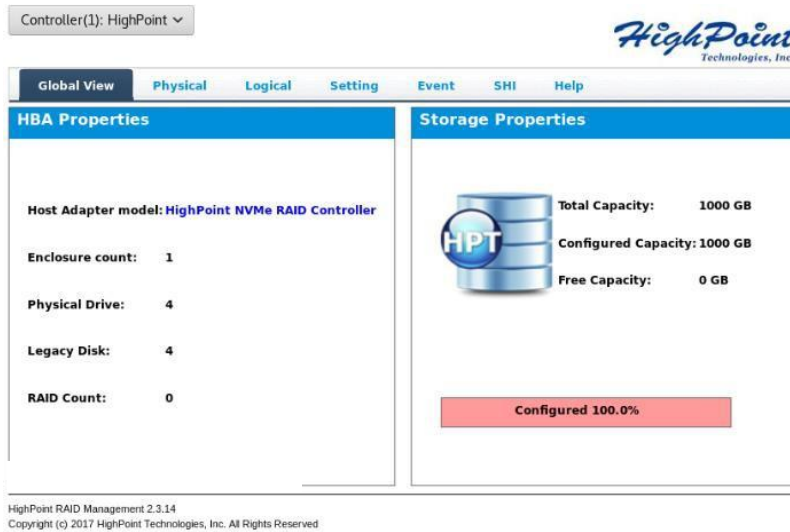
```
dmesg | grep hptnvme.
```

下面的屏幕截图显示了驱动程序v1.2.14已安装:

```
[root@localhost test]# dmesg | grep hptnvme
[ 4.267125] hptnvme: loading out-of-tree module taints kernel.
[ 4.267128] hptnvme: module license 'Proprietary' taints kernel.
[ 4.267485] hptnvme: module verification failed: signature and/or required key missing - tainting kernel
[ 5.216399] hptnvme: HighPoint NVMe RAID controller driver (G5) v1.2.14 block major fc
[ 5.217813] hptnvme 0000:03:00.0: irq 145 for MSI/MSI-X
[ 5.217817] hptnvme 0000:03:00.0: irq 146 for MSI/MSI-X
[ 5.217820] hptnvme 0000:03:00.0: irq 147 for MSI/MSI-X
[ 5.217823] hptnvme 0000:03:00.0: irq 148 for MSI/MSI-X
[ 5.217827] hptnvme 0000:03:00.0: irq 149 for MSI/MSI-X
```

- f. 打开WebGUI，以确保它可以连接到控制器，并识别NVMeSSD/RAID阵列。

- g. 如下图所示，新的驱动程序已在启动时成功安装和加载 -WebGUI可以连接到控制器，并识别SSD和RAID阵列：



卸载驱动程序

1. 先决条件

- a. 关闭系统，并从主板上卸下NVMe RAID控制器卡。
- 注意: 在卸载驱动程序时，无法删除控制器和SSD可能会导致数据丢失。** 在卸载SSD7000驱动程序后，Linux发行版将加载默认的NVMe支持——此驱动程序将只将NVMeSSD识别为单独的磁盘。

2. 要卸载驱动程序:

- b. 使用根权限打开系统终端。输入以下命令以卸载驱动程序:

```
Hptuninhptnvme
```

- c. 按“Y”确认。

```
[root@localhost Downloads]# hptuninhptnvme
Are you sure to uninstall the driver hptnvme from system? (Y/n): y
Removed symlink /etc/systemd/system/default.target.wants/hptdrv-monitor.service.
Removed symlink /etc/systemd/system/sysinit.target.wants/systemd-hptdrv.service.
All files installed have been deleted from the system.
[root@localhost Downloads]#
```

- d. 卸载驱动程序后，请手动重新启动系统。

- e. 重新启动后，以根权限打开系统终端。并输入以下命令以检查驱动器状态：

lsmod | grep hptnvme

Before uninstalling:

```
[root@localhost test]# lsmod | grep hptnvme  
hptnvme                235401  0
```

After uninstalling:

```
[root@localhost test]# lsmod | grep hptnvme  
[root@localhost test]#
```

- f. 如果系统没有显示有关“hptnvme”的信息，则该驱动程序已成功卸载。

HighPoint RAID 管理 (WebGUI) 安装 / 驱动程序安装验证

HighPointRAID管理软件用于配置和监控由HighPointNVMe RAID控制器/框托管的SSD。

从HighPoint 网站下载高点RAID管理软件包：

SSD7105:<http://www.highpoint-tech.cn/product-detail7105.html>

SSD7202:<http://www.highpoint-tech.cn/product-detail7202.html>

SSD7101A-1/SSD7104F/SSD7104/SSD7204/SSD7140A:

<http://www.highpoint-tech.cn/product-detail7101a.html>

SSD7120/SSD7180/SSD7184:

<http://www.highpoint-tech.cn/product-detail7120.html>

SSD6540 Enclosures:

<http://www.highpoint-tech.cn/product-detail6540.html>

SSD7502/SSD7505/SSD7540:

[http://www.highpoint-tech.cn/product-
detail7502.html](http://www.highpoint-tech.cn/product-detail7502.html)

SSD7580A/SSD7580B:

[http://www.highpoint-tech.cn/product-
detail7580.html](http://www.highpoint-tech.cn/product-detail7580.html)

1. 使用具有root权限的系统终端，浏览到软件下载的目录，并输入以下命令以提取管理软件包：

tar zxvf RAID_Manage_Linux_v2.x.x.x_x_x_x.tgz

```
[root@localhost Downloads]# tar zxvf RAID_Manage_Linux_v2.3.14.1_17_07_26.tgz
HPT_CLI_Guide.pdf
README.txt
RAID_Manage_Linux_v2.3.14_17_07_26.bin
```

注意：屏幕截图中显示的驱动程序修订可能与当前的软件版本不一致。请确保从产品的软件更新页面下载最新的驱动程序更新。

2. 使用以下命令安装 HighPoint RAID管理软件(WebGUI & CLI)

./RAID_Manage_Linux_v2.x.x.x_x_x_x.bin

```
[root@localhost Downloads]# ./RAID_Manage_Linux_v2.3.14_17_07_26.bin
-----
Install .....
Package readline6/hptsvr-https-2.3.14-17.0718.x86_64.rpm will be installed!
Starting hptdaemon (via systemctl): [ OK ]
Clean .....
Finish .....
```

3. 软件安装完毕后，打开WebGUI，确保它可以连接到SSD7000系列RAID控制器或机柜。
4. 您还可以使用CLI（命令行界面）检查控制器。使用系统终端，输入以下命令：

hptraidconf

有关CLI的更多信息，请下载本指南: [Link](#)

```
[root@localhost test]# hptraidconf
```

```
HPT CLI>query devices
```


ID	Capacity	MaxFree	Flag	Status	ModelNumber
1/E1/1	250.06	0	SINGLE	LEGACY	Samsung SSD 960 EVO 250GB
1/E1/2	250.06	0	SINGLE	LEGACY	Samsung SSD 960 EVO 250GB
1/E1/3	250.06	0	SINGLE	LEGACY	Samsung SSD 960 EVO 250GB
1/E1/4	250.06	0	SINGLE	LEGACY	Samsung SSD 960 EVO 250GB

```
HPT CLI>
```


5. 如果WebGUI/CLI可以连接到控制器并识别NVMeSSD，则驱动程序已经安装并正常工作：

SSD7105/7505/7101A/7204/7104/7120/6540/6540M/7180/7184/7140A/7540/
7580A/7580B:

Controller(1): HighPoint ▾




Global View Physical Logical Setting Event SHI Help

HBA Properties	Storage Properties
Host Adapter model: HighPoint NVMe RAID Controller	 Total Capacity: 1000 GB
Enclosure count: 1	Configured Capacity: 1000 GB
Physical Drive: 4	Free Capacity: 0 GB
Legacy Disk: 4	Configured 100.0%
RAID Count: 0	


HighPoint RAID Management 2.3.14
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SSD7202/7502:

Controller(1): HighPoint ▾



Global View Physical Logical Setting Event SHI Help

HBA Properties	Storage Properties
Host Adapter model: HighPoint NVMe RAID Controller	 Total Capacity: 500 GB
Enclosure count: 1	Configured Capacity: 500 GB
Physical Drive: 2	Free Capacity: 0 GB
Legacy Disk: 2	Configured 100.0%
RAID Count: 0	

HighPoint RAID Management 2.3.14
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卸载 HighPoint RAID 管理软件(WEBGUI & CLI)

使用根权限打开系统终端。输入以下命令以卸载驱动程序:

dpkg -r hptsvr (or rpm -e hptsvr-https)

```
root@test-desktop: /home/test
root@test-desktop:/home/test# dpkg -r hptsvr
(Reading database ... 151203 files and directories currently installed.)
Removing hptsvr (3.0.4) ...
root@test-desktop:/home/test#
```

请输入以下命令，以检查WebGUI是否已被成功删除:

hptraidconf

卸载后:

```
root@test-X299-UD4-Pro:/home/test/Desktop# hptraidconf
hptraidconf: command not found
root@test-X299-UD4-Pro:/home/test/Desktop#
```

故障排除

WebGUI

1. WebGUI 安装失败

如果您使用Ubuntu系统，安装WebGUI时系统可能会提示您缺少ReadLine5软件包，这将中断安装过程。

```
root@test-PRIME-Z390-A:/home/test/Downloads# sh RAID_Manage_Linux_v2.3.14_17_07_26.bin
-----
Install .....
Package readline lib not found! will be installed!
Install param error!
Clean .....
Finish .....
```

解决方案:

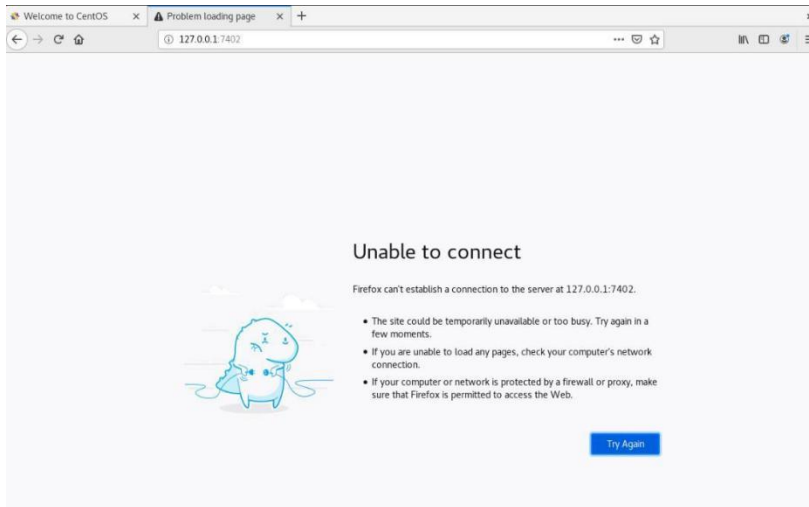
- a. 启用根权限后，您可以使用以下命令使用终端在加载readline5，并允许安装WebGUI:

apt-get install libreadline5

- b. 完成后，重新启动WebGUI安装过程。

2. WebGUI 无法连接到控制器

如果您无法使用WebGUI访问SSD7000系列阵列卡或机柜：



a. WebGUI服务未能成功启动。

解决方案：

通过打开具有根权限的系统终端并输入以下命令来启动WebGUI:

```
hptsvr
```

b. 无法编译该驱动程序。

```
[root@localhost test]# hptsvr
proc file invalid, dwControllerId=0
Driver is not loaded.
[root@localhost test]#
```

解决方案：

1. 确保SSD7000系列阵列卡或机柜中至少安装了一个NVMe SSD。
2. 确保主板能够识别SSD7000设备，并在BIOS发布期间显示NVMe信息。
3. 如果使用CentOS系统，请以root权限打开系统终端并输入以下命令以安装“elfutils-libelf-devel”：

```
yum install elfutils-libelf-devel
```

完成后，再次安装SSD7000驱动程序。

4. 如果您使用Ubuntu/Debian系统，请打开具有根权限的系统终端，并输入以下命令来安装“libelf-dev”：

```
yum install libelf-dev
```

完成后，再次安装SSD7000驱动程序。

3. 编译gcc、make和其他驱动程序文件失败。

对于 Ubuntu

在安装驱动程序时，由于各种因素，驱动程序文件如gcc和mace无法编译，从而中断驱动程序安装过程：

这个问题可能是由：

a. 系统未连接到网络（互联网连接）

解决方案：

- a. 再次检查系统的网络连接
- b. 确认后，重新安装驱动程序。

b. 系统进程占用/繁忙

解决方案：

打开具有根权限的系统终端，并输入以下命令：

```
apt-get update
```

这将提示系统释放该进程并更新下载源代码。在释放系统进程后，请再次安装驱动程序。

对于 Redhat

在安装驱动程序时，由于各种因素，驱动程序文件如gcc和mace无法编译，从而中断了驱动程序的安装过程：

```
root@localhost Documents|# ./hptnvme_g5_linux_src_v1.4.1_2022_03_04.bin
Verifying archive integrity... All good.
Uncompressing HighPoint NVMe RAID Controller Linux Open Source package installer.....
checking and installing required toolchain and utility ...
Installing program make ... (failed)
Installing program gcc ... (failed)
```

或带有‘[subscription-manager repos](#)’的提示：

```
compile:default boot kernel: /boot/vmlinuz-3.10.0-1160.el7.x86_64
dumpkernels:kernel installed
kernel-3.10.0-1160.el7.x86_64
dumpkernels:kernel-devel installed
kernel-devel-3.10.0-1160.el7.x86_64
dumpkernels:repo list kernel-devel

dumpkernels:end
installlib_centos elfutils-libelf-devel
There are no enabled repos.
Run "yum repolist all" to see the repos you have.
To enable Red Hat Subscription Management repositories:
| subscription-manager repos --enable <repo>
To enable custom repositories:
| yum-config-manager --enable <repo>
compile:some build tools are missing.
/var/lock/subsys/hptdrv-monitor:
```

解决方案:

01. 到红帽网站和注册一个帐户:

[Register for | Red Hat IDP](#)

02. 使用根权限打开系统终端。

请输入以下命令以进行登录:

```
subscription-manager register --username=*** --password=***  
--auto-attach
```

```
[root@localhost Documents]# subscription-manager register --username=*** --password=*** --auto-attach  
Registering to: subscription.rhsm.redhat.com:443/subscription  
The system has been registered with ID: 963725aa-d99d-48bc-bb7c-3011c4eef91f  
The registered system name is: localhost.localdomain
```

重新安装驱动程序

```
[root@localhost Documents]# ./hptnvme_g5_linux_src_v1.4.1_2022_03_04.bin  
Verifying archive integrity... All good.  
Uncompressing HighPoint NVMe RAID Controller Linux Open Source package installer....  
.....  
Checking and installing required toolchain and utility ...  
Installing program make ... done  
Installing program gcc ... done
```

4. 如果您遇到任何其他与WebGUI或CLI相关的问题, 请使用我们的在线支持门户 <http://highpoint.mikecrm.com/vr1DAsz>提交问题, 其中包括尽可能详细的问题描述, 并上传以下内容:

收集以下日志文件: pci.log, drivermod.log, hptdrv.log, kernel.log

有关定位和收集这些日志的更多信息, 请点击以下链接 [link](#)

控制器和驱动器的检测问题

如果系统无法检测到控制器或SSD, 请确保在故障排除过程中删除系统中与SSD7000系列阵列卡或机柜无关的所有NVMe设备。其他NVMe设备的存在可能会干扰对SSD7000设备的检测。

如果您遇到任何其他与控制器相关的问题, 请使用我们的在线支持门户提交一张支持票, 其中包括尽可能详细的对问题的描述。

<http://highpoint.mikecrm.com/vr1DAsz>

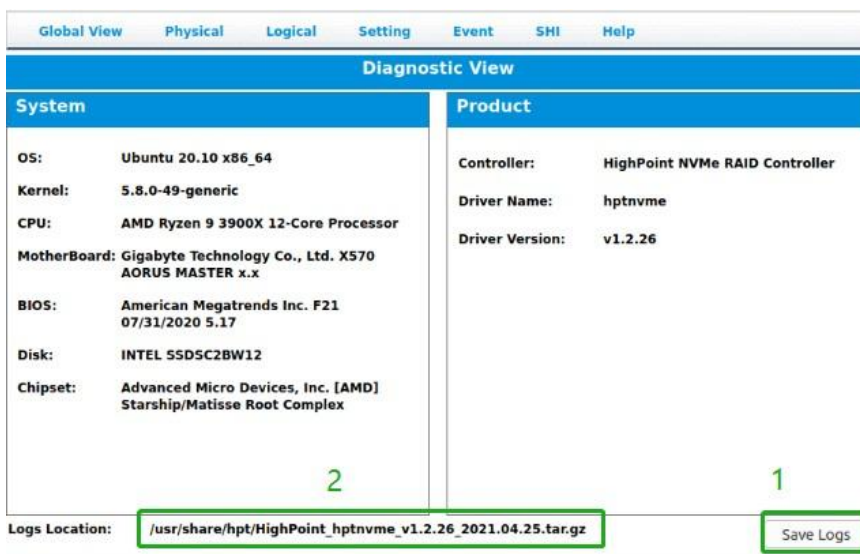
请查看附录-提供的系统日志、屏幕截图和其他有关您的系统的信息, 将使我们的支持部门能够尽快和有效地解决您的支持问题 [Appendix](#)。

附录

When submitting a support ticket via our Online Support Portal, the following information will help our Support Department diagnose and resolve your issue as quickly and efficiently as possible.

如何在WEBGUI中收集日志信息

- 1-单击“自我诊断解决方案”：诊断视图为故障排除提供了“一键式”信息收集系统。它将收集所有必要的硬件、软件和存储配置数据，并将其编译成单个文件，可通过我们的在线支持门户直接传输给我们的FAE团队；



02. 您还可以单击“帮助”→“诊断”以进入诊断视图。



03. 单击“保存日志”按钮，以创建诊断文件。



注意，这个过程可能需要几分钟才能完成。

如何在CLI中收集日志信息

01. 执行命令 `hptraidconf` 进入CLI;
02. 在CLI中执行命令“diag”，将收集日志信息。

```
HPT CLI>diag

The diagnostic information has been saved in /usr/share/hpt/HighPoint_2021.04.07.
tar.gz
HPT CLI>
```

请使用我们的在线服务将日志文件提交给我们的支持部门：

<http://highpoint.mikecrm.com/vr1DAsz>