



# AMD RAID Quick Start Guide for the Ubuntu Desktop Operating System

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## Revision History

Date	Revision	Description
April 2025	1.01	<ul style="list-style-type: none"> <li>• Replaced the dd folder with &lt;directory&gt;</li> <li>• Made minor updates to clarify procedures.</li> <li>• Added section 3.2, “AMD X570 Chipset and Socket AM5-Compatible AMD Processors”</li> </ul>
October 2024	1.00	<ul style="list-style-type: none"> <li>• Minor updates to synchronize with other RAID documents.</li> <li>• Updated Table 1, “System Requirements.”</li> <li>• Updated Section 2.1, Step 5, “copy driver files.”</li> <li>• Updated Section 5.2, “Installing AMD RAID Driver during Ubuntu Desktop OS Installation.”</li> <li>• Updated Section 5.3, “Installing the AMD RAIDXpert2 Management Application.”</li> <li>• Updated Section 6.2, “Updating the AMD RAIDXpert2 Management Application.”</li> <li>• Updated Section 6.3, “Updating Drivers or Resync with an Updated Ubuntu Kernel.”</li> </ul>
September 2022	0.60	<ul style="list-style-type: none"> <li>• Removed duplication with <i>AMD RAID User Guide</i>, order# 53987.</li> <li>• Updated Table 1, “System Requirements.”</li> <li>• Corrected title of Chapter 2.</li> <li>• Updated Chapter 3, “Pre-Installation: Enabling RAID.”</li> <li>• Updated Section 4.2, “UEFI Configuration Utility.”</li> <li>• Updated Section 5.2, “Installing AMD RAID Driver during Ubuntu Desktop OS Installation.”</li> <li>• Updated Section 5.3, “Installing the AMD RAIDXpert2 Management Application.”</li> <li>• Added Chapter 6, “Updating Ubuntu RAID Drivers.”</li> </ul>
September 2021	0.51	<ul style="list-style-type: none"> <li>• Updated system requirements in Table 1.</li> <li>• In Section 2.1, “Copying AMD RAID Drivers to a Removable Storage Medium,” added <code>driver_sdk</code> requirement for installations.</li> <li>• In Chapter 4, “Creating the Bootable Virtual Disk,” added recommendation not to use SMR hard drives with AMD RAID systems.</li> <li>• Added Section 5.1, “Secure Boot Enablement.”</li> <li>• Updated Section 5.2, “Installing AMD RAID Driver during Ubuntu Desktop OS Installation”: <ul style="list-style-type: none"> <li>– General updates for Ubuntu version</li> <li>– Minor clarifications and corrections</li> <li>– New steps for when secure boot is enabled</li> </ul> </li> <li>• Updated a directory location in Section 5.3, “Installing the AMD RAIDXpert2 Management Application.”</li> </ul>
September 2020	0.50	Initial preliminary release.

# Chapter 1 General Information

## 1.1 Purpose

This Quick Start Guide is designed to assist with system setup in **RAID Mode** by performing the following general procedures:

- Copying the AMD RAID device drivers to removable storage media for the 64-bit Ubuntu® Desktop installation.
- Loading the AMD RAID device drivers on a supported AMD system during Ubuntu installation.
- Installing the AMD RAIDXpert2 (GUI) for RAID array management.

Refer to the *AMD RAID User Guide*, order# 53987 for information on configuring RAID mode on AMD platforms, arrays, disks, RAID levels, improving storage system performance, loading RAIDXpert2 drivers, and the RAIDXpert2 GUI.

## 1.2 System Requirements

**Table 1. System Requirements**

Component	Requirements
Memory (RAM)	For AMD Ryzen® processors and AMD Ryzen® desktop processors: Minimum: 16 GB total, Recommended: 32 GB total
Device Support	NVMe and AHCI support includes ATAPI DVD, SATA drives, SATA SSD drives, M.2 SATA drives, NVMe M.2 devices, NVMe HHHL devices or NVMe U.2 devices. The number of disks depends on the number, type, and capacity of arrays to be created.
Max Controller Count	For systems with driver 9.3.2/9.3.3: 18 controllers: 16 NVMe + 2 AHCI: Two controllers with device ID 0x7917 or 0x43BD and NVMe (one per NVMe)
Maximum Configuration	For systems with driver 9.3.2/9.3.3: <ul style="list-style-type: none"> <li>• 22 arrays for deletion</li> <li>• 12 arrays for creation</li> <li>• 22 devices (16 NVMe + 6 AHCI)</li> <li>• 8 devices per array</li> </ul>
Supported AMD Processors	AMD Ryzen Threadripper™, AMD Ryzen Threadripper™ PRO, AMD Ryzen 7000, AMD EPYC™ 4004
Supported AMD Chipsets	TRX40, WRX80, TRX50, WRX90, B650, X670

**Note:** AMD recommends that you reset/reboot the system if you are adding or moving a SATA M.2 SSD or NVMe device(s):

1. In the OS, issue a reset/reboot.
2. Wait for the AMD BIOS screen to display, then press **ESC** or **F2** to enter the BIOS.
3. Power off the system.
4. Install or remove the necessary device(s).
5. Power on the system and allow the OS to boot properly.

**Note:** Using SMR hard drives with AMD RAID systems can cause poor performance or failures. AMD **does not** recommend this. SMR drives are not suitable for workloads that require many random writes (such as boot drive). If used with RAID, the multiple SMR drives and background RAID tasks (such as creates and rebuilds) compound any issues or problems.

**Table 2. BIOS Configuration for Platform RAID Support**

SoC SATA Mode	Chipset SATA Mode	NVMe RAID Mode	SATA RAID Support	NVMe RAID Support
AHCI / Auto	AHCI / Auto	Disabled	No	No
RAID	RAID	Enabled	Yes	Yes

## 1.3 System Setup

**IMPORTANT:** To protect your data, always perform a backup prior to installing any new, major hardware or software. If you are adding NVMe as RAID to your existing RAID arrays, then update all existing RAID controller drivers to the latest version and reboot the system. Later, connect NVMe and install RAID drivers on the NVMe devices or download driver software from the vendor support page.

A generic system setup process is described below:

1. Copy the **AMD RAID** drivers to a removable storage medium. See Section 2.1.
2. Power-on the system.
3. Access the platform BIOS window for the system and configure BIOS settings as outlined in Chapter 3 to enable RAID Mode on the system.

This enables the Platform BIOS to be configured in RAID mode by loading the **AMD RAID UEFI** driver.

4. Initialize the disks, using the RAIDXpert2 Configuration Utility (HII) or UEFI shell. (Refer to the *AMD RAID User Guide*, order# 53987.)
5. Create arrays, using the HII Configuration Utility or UEFI shell. See Chapter 4.
6. Load the **AMD RAID** drivers during operating system installation. See Section 5.2.
7. Complete the rest of the operating system installation.

8. Install the AMD RAID management application (AMD RAIDXpert2 GUI). See Section 5.3.

**Note:** *Native AHCI installation does not boot into the OS after the BIOS setting is changed to RAID mode.*

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## Chapter 2 Copying Drivers

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*Note:* Before copying drivers, verify that the Ubuntu® Desktop operating system installation media is available and ready to install.

### 2.1 Copying AMD RAID Drivers to a Removable Storage Medium

A removable storage medium is needed to copy **AMD RAID** drivers required for OS installation onto an **AMD RAID** bootable array.

Copy AMD RAID drivers to a removable storage medium:

1. Locate and use a system that is running a Windows/Linux operating system with an I/O port for removable storage media formatted as FAT32 (such as a USB flash drive).
2. Insert the storage medium into the system.
3. Go to a browser and access the website of your system supplier or motherboard vendor.
4. Download the AMD RAID drivers from the website to the appropriate removable storage medium.
5. Copy driver files from the `dd-rcraid-Ubuntu[Ubuntu_version]-[Linux_version]-x86_64` folder into a new directory that you create, located on a root path of the USB flash drive. For example:

```
<directory>
  • driver_sdk
  • post_install
  • post_install2
  • pre_install
  • rcraid.ko
  • rcraid_generic.ko
  • readme
```

---

## Chapter 3 Pre-Installation: Enabling RAID

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*Note:* The following steps, which describe how to configure a system to RAID, are specific to **AMD NDA BIOS** and are based on the **AMI BIOS**. The steps for other BIOS vendors are different.

### 3.1 AMD SPx-Series Processors

Enable RAID for AMD SPx-Series processors before installation:

1. Power-on the system.
2. Press **ESC** or **F2** to enter the System BIOS setup page.
3. In the BIOS setup:
  - a. Select the **Advanced** tab.
  - b. Select **AMD CBS**, then press **Enter**.
  - c. Select **FCH Common Options**, then press **Enter**.
  - d. Select **SATA Configuration Options**, then press **Enter**.
  - e. Set **SATA Enable** to **Enabled**, then press **Enter**.
  - f. Set **SATA Mode** to **RAID**, then press **Enter**.
4. In the BIOS setup:
  - a. Select the **Advanced** tab.
  - b. Select **AMD CBS**, then press **Enter**.
  - c. Select **Chipset Common Options**, then press **Enter**.
  - d. Select **Chipset SATA Configuration Options**, then press **Enter**.
  - e. Set **Chipset SATA0 Enable** to **Enabled**, then press **Enter**.
  - f. Set **Chipset SATA1 Enable** to **Enabled**, then press **Enter**.
  - g. Set **Chipset SATA Mode** to **RAID**, then press **Enter**.
5. In the **BIOS** setup:
  - a. Select the **Advanced** tab.
  - b. Select **AMD PBS** tab, then press **Enter**.
  - c. Set the **NVMe RAID Mode** to **Enabled**, then press **Enter**.
6. Save (**F4**) the settings and restart the system.

## 3.2 AMD X570 Chipset and Socket AM5-Compatible AMD Processors

Enable RAID for AMD X570 Chipset and Socket AM5-Compatible AMD Processors:

1. Power on the system.
2. Press **ESC** to enter the System BIOS setup page.
3. In the BIOS setup:
  - a. Select the **Advanced** tab.
  - b. Select **AMD CBS**, then press **Enter**.
  - c. Select **PROM21 Chipset Common Options**, then press **Enter**.
  - d. Select **PROM21 Chipset SATA Configuration Options**, then press **Enter**.
  - e. Set **SATA Mode** to **RAID**, then press **Enter**.
4. In the BIOS setup:
  - a. Select the **Advanced** tab.
  - b. Select **AMD PBS**, then press **Enter**.
  - c. Set the **NVMe RAID Mode** to **Enabled**, then press **Enter**.
5. Save (**F4**) the settings and restart the system.

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## Chapter 4 Creating the Bootable Virtual Disk

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To create a bootable virtual disk, you can use either the RAIDXpert2 Configuration Utility (HII mode) or the command line (UEFI mode).

*Note: The following steps, which describe how to configure arrays in RAID mode, are specific to AMD NDA BIOS and are based on AMI BIOS.*

### 4.1 Using the RAIDXpert2 Configuration Utility (HII Mode)

**Warning:** For OS installation, AMD recommends creating only one array and installing to it. If more arrays are needed, you can create them in the OS GUI/CLI or HII/CLI after the OS installation is complete.

For the AMD Ryzen™ SPx-Series Processor, use the configuration utility (HII) to create a bootable virtual disk:

1. Power-on the system.
  - a. Press **ESC** or **F2** to get into the **Platform BIOS**.
  - b. Select the **Advanced** tab.
  - c. Select **RAIDXpert2 Configuration Utility**, then press **Enter**.
2. At the RAIDXpert2 Configuration Utility's main menu, use the arrow keys to select **Array Management**, then press **Enter**.
3. Use the **arrow keys** to select **Create Array**, then press **Enter**.
4. Select **RAID Level**, then press **Enter**.
  - a. From the **Select RAID Level** drop-down menu, use the arrow keys to select the desired RAID level, then press **Enter**.
5. Select the disks with which to create the array:
  - a. Use the arrow keys to select **Select Physical Disks**, then press **Enter**.
  - b. To select individual disks, highlight a disk with the arrow keys, then press the **Space Bar** or **Enter**. Any number of disks may be selected using this method.
  - c. To select all disks, use the arrow keys to select **Check All**, then press **Enter**.
  - d. Use the arrow keys to select **Apply Changes**, then press **Enter**.

*Note: If there is a long list of options, "Apply Changes" might be off-screen until you use the arrow keys.*
6. (Optional) Select an array size:
  - a. Use the arrow keys to select **Array Size**, then press **Enter**.

- b. The array size defaults to the maximum size allowed by the number of physical disks and RAID level selected. For a smaller array size, enter the desired value.
  - c. Press **Enter** when the desired size is reached.
7. (Optional) Use the arrow keys to select **Cache Tag Size**.
  - Any Array with only HDD/SSD has the default CTS of 64 k.
  - Any Array with only NVMe has the default CTS of 256 k.
8. (Optional) Use the arrow keys to select **Read Cache Policy**, then press **Enter**.
  - a. Select the desired read cache policy, then press **Enter**.
9. (Optional) Use the arrow keys to select **Write Cache Policy**, then press **Enter**.
  - a. Select the desired write cache policy, then press **Enter**.
10. Use the arrow keys to select **Create Array**, then press **Enter**.
11. After completing array creation, press **F4** to save and exit the BIOS.

## 4.2 Using the Command Line/UEFI Configuration Utility

*Note:* To ensure that the `rcadm` program can be installed properly, Linux® operating system modules must include the `gcc+` compiler and the `pthread` library.

For the AMD Ryzen™ SPx-Series Processor, use the command line to create a bootable virtual disk:

1. At the system Power-On Self-Test (POST) screen, press **ESC** or **F2** to access the **UEFI Configuration Utility** (UEFI Boot Manager).
2. Boot to the **EFI Internal** shell.
 

*Note:* Obtain the `rcadm.efi` file from your system supplier or motherboard vendor and copy it onto a UEFI flash drive in the root directory.
3. Enter **fsx**: where *x* is the number of the UEFI Flash Drive.
4. Use **rcadm** to create the desired Boot Virtual Disk. You may have to press the **Page-Up** key to see more of the information. Examples:
  - a. Query the devices connected in the system:
 

```
rcadm.efi -M -qa
```

Output displays the UEFI Version, physical devices, and arrays.
  - b. Create a RAID1 on disks 2, 3 with a max size available and enables Read/Write Cache – default cache setting:
 

```
rcadm.efi -C -r1 -d 2 3
```
  - c. Create a RAID0 on disks 1, 2 with a size of 100 GB and enables Read Cache:
 

```
rcadm.efi -C -r0 -d 1 2 -s 100000 -ca r
```
  - d. Create a RAID10 on disks 1, 2, 3, 4 with a size of 125 GB and enables Write Cache:
 

```
rcadm.efi -C -r10 -d 1 2 3 4 -s 125000 -ca w
```

---

## Chapter 5 Installing the AMD RAID Drivers

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Perform the steps in this chapter during your Ubuntu Desktop OS Installation.

### 5.1 Enabling Secure Boot

*Note:* These steps, which enable Secure Boot, are specific to **AMD NDA BIOS** and are based on **AMI BIOS**.

*Note:* If you do **NOT** want to enable Secure Boot, go to Section 5.2 to install AMD RAID drivers.

To enable Secure Boot:

1. Power-on the system.
2. Press **ESC** or **F2** to enter the platform BIOS.
3. Select the **Security** Tab
4. Select **Secure Boot**, then press **Enter**.
5. Select Restore Factory Keys, then press Enter.
6. Select **Yes**, then press **Enter**.
7. Select **Secure Boot**, then press **Enter**.
8. Select **Enable**, then press **Enter**.
9. Press **F4** to save and exit the BIOS.

### 5.2 Installing AMD RAID Drivers

*Note:* Before starting this procedure, obtain the AMD RAID drivers from your system supplier or motherboard vendor. Copy the AMD RAID drivers to a new directory on a USB flash drive formatted as FAT32. (See Section 2.1.)

*Note:* The Ubuntu driver CD-ROM .iso image contains all Linux variations for a release.

*Note:* Not all windows indicated in this procedure display during installation.

*Note:* AMD recommends that you reset/reboot the system if you are adding or moving a SATA M.2 SSD or NVMe device(s). See the note following Table 1. System Requirements.

*Note:* AMD RAID Linux installations do not support Hot Swap of any devices.

**Warning:** For OS installation, AMD recommends creating only one array and installing to it. If more arrays are needed, they can be created in the OS GUI/CLI or HII/CLI after the OS installation is complete.

During the Ubuntu OS installation, install the AMD RAID drivers:

1. Power-on the system.

*Note:* For the best experience, ensure that the network is connected.

2. Insert the **Ubuntu Linux** operating system installation media (USB or DVD).
3. Boot to the Ubuntu USB drive to open the **GNU GRUB** window.

- a. Use the arrow keys to select **Ubuntu**.
- b. Press the **e** key to edit the boot string.

At the end of the Linux string, add the following:

```
break=mount
```

*Note:* The string should look similar to this (with possible variations due to video card differences):

```
splash --- break=mount
```

- c. Press **F10**.

*Note:* If the BusyBox shell does not appear (the screen is black) reset the system and try with the following settings:

```
Enter: break=mount nomodeset
```

The string should look like the following:

```
splash --- break=mount nomodeset
```

4. Complete the following when the BusyBox shell appears:

- a. Insert the USB flash drive.
- b. Press **Enter** to get a prompt.
- c. To mount the drive containing the RAID drivers:

```
Enter: mount -t vfat /dev/sdb1 /tmp
```

*Note:* Instead of `/dev/sdb1`, you may need to enter `/dev/sdc1` or `/dev/sdd1`, depending on the number of devices. Enter `ls /dev/sd*` to list possible entries.

- d. Enter: `cp -a /tmp/<directory> /`
- e. Enter `/<directory>/pre-install`, then wait for the command to complete.
- f. Enter: `umount /tmp`
- g. Remove the USB flash drive containing the drivers.
- h. Enter: **exit**.

5. Wait for the **Welcome to Ubuntu** screen to load.

*Note* If the Welcome to Ubuntu screen is not displayed, but the Ubuntu Desktop is displayed, double-click **Install Ubuntu**.

6. Select the desired Language, accessibility settings, and keyboard layout, then click **Next**.
7. Configure your network connection, then click **Next**.
8. If prompted to install Ubuntu, select **Install Ubuntu**, then click **Next**.
9. Select **Interactive Installation**, then click **Next**.
10. Select your desired applications, then click **Next**.
11. In the **Optimize computer** window, select the desired settings, then click **Next**.
12. At the Disk setup window, select **Erase Disk and Install Ubuntu**, then click **Next**.
13. On the **Choose where to install Ubuntu** window, verify **AMD RAID Array** as the selected drive, then click **Next**.
14. For **Create your account**, type valid entries for the following fields: *your name*, *computer name*, *username*, *password*, and *password confirmation*, then click **Next**.
15. Select the desired **Timezone**, then click **Next**.
16. Confirm your choices on the **Ready to Install** window, then click **Install**.
17. Wait for the **Installation Complete** window to display (this may take a few minutes). Then, complete the following:

**CAUTION:** Do NOT click “Restart Now.”

  - a. Close the **Installation Complete** window by clicking the X in the upper right corner, then open the **Terminal** application.
  - b. Insert the USB flash drive used in a previous step.
  - c. Mount the drive containing the RAID drivers:  
Enter: `sudo mount -t vfat /dev/sdb1 /mnt`

**Note:** Instead of `/dev/sdb1`, you may need to enter `/dev/sdc1` or `/dev/sdd1`, depending on the number of devices. You can enter `ls /dev/sd*` to list possible entries.
  - d. Enter: `sudo cp -a /mnt/<directory> /`
  - e. Enter: `sudo /<directory>/post_install`
  - f. If prompted for an input password, enter a password, then press **Enter**.
  - g. If prompted for an input password again, re-enter the password to confirm it, then press **Enter**.
18. Wait until you see the **Setup is Complete** message, then reboot the system to finish the installation.
19. Remove the installation media:
  - a. If prompted, remove the USB flash drive.
  - b. When the installation media is removed, press **Enter** to reboot the system.
20. If prompted, finalize the kernel upgrade:

- a. Wait for the system to reboot. After the BIOS screen appears, the “**Press any key to enter the MOK management**” window is displayed. *Within 5 seconds*, press any key to enter MOK management.
- b. Select **Enroll MOK**, then press **Enter**.
- c. Select **Continue**, then press **Enter**.
- d. At the Enroll the Key(s), select **Yes**, then press **Enter**.
- e. On the password window, enter the password you used for Step 17e, then press **Enter**.
- f. Select **Reboot**, then press **Enter**.

## 5.3 Installing AMD RAIDXpert2 and Updating AMD RAID Drivers

To install the AMD RAIDXpert2 management application and update the AMD RAID drivers, perform these steps:

1. Contact your system supplier or motherboard vendor to obtain the new AMD RAID Ubuntu installer package.
2. Copy the `raidxpert2_9.3.x-00yyy_amd64.deb` package to a USB flash drive, formatted as FAT32.
3. Insert the USB flash drive with the AMD RAID installer package that you copied in the previous step.
4. Copy the AMD RAID package from the USB flash drive to your home folder.
5. Install the AMD RAIDXpert2 management application and update the AMD RAID driver:
  - a. Verify that the network is connected and configured.
  - b. Open a **Terminal** window by selecting the Terminal icon from the list of applications.
  - c. Enter: `sudo apt update`
  - d. Enter your password if prompted.
  - e. Enter: `sudo apt install -y ./raidxpert2_9.3.x-00yyy_amd64.deb` and provide your password if prompted.
  - f. If prompted to enter a secure boot password, enter a password, then press **Enter**. Remember the password for later.  
If asked to input the password again, re-enter the password to confirm it, then press **Enter**.
  - g. Wait for the command to complete (this may take a few minutes).
  - h. Reboot the system.
6. If prompted, finalize the kernel upgrade:
  - a. Wait for the system to reboot. After the BIOS screen appears, the **Press any key to enter the MOK management** window is displayed. Within 5 seconds, press any key to enter MOK management.

- b. Select **Enroll MOK**, then press **Enter**.
  - c. Select **Continue**, then press **Enter**.
  - d. When prompted with **Enroll the Key(s)**, select **Yes**, then press **Enter**.
  - e. At the password window, enter the password you used for Step 5f, then press **Enter**.
  - f. Select **Reboot**, then press **Enter**.
7. Log into the system.
  8. Launch the RAIDXpert2 GUI (Graphical User Interface):
    - a. Click the **RAIDXpert2** application icon in the list of applications.
    - b. Enter your password when prompted.
    - c. (Optional) To pin RAIDXpert2 to the dashboard, right click the RAIDXpert2 icon and select **Pin to Dash**. If desired, you can drag the icon to rearrange its position.
  9. Launch the RAIDXpert2 CLI (Command Line Interface):
    - a. Open a **Terminal** window.
    - b. Enter: `sudo rcadm -M -qa`
    - c. Enter your password if prompted.

## Chapter 6 Updating AMD RAIDXpert2 and AMD RAID Drivers

### 6.1 System Update Overview

**IMPORTANT:** *To protect your data, always perform a backup before installing any new, major hardware or software. If you are adding NVMe devices to existing AMD RAID arrays, update all existing AMD RAID controller drivers to the latest version and restart the system, then connect the NVMe devices and install the AMD RAID driver onto them.*

The following steps summarize the system update process:

1. Back up the user data before doing any upgrade.
2. Copy the AMD RAIDXpert2 installer package to the system.
3. Install the AMD RAIDXpert2 package to update the AMD RAIDXpert2 Management Suite, including the AMD RAID driver.
4. Restart the system.

### 6.2 Updating AMD RAIDXpert2 and AMD RAID Driver

**Note:** *The AMD RAID driver is automatically synchronized with updated Ubuntu kernels.*

Update the AMD RAIDXpert2 management application and the AMD RAID driver:

1. Contact your system supplier or motherboard vendor to obtain the new AMD RAID Ubuntu installer package.
2. Copy the `raidxpert2_9.3.x-00yyy_amd64.deb` package to a USB flash drive, formatted as FAT32.
3. Insert the USB flash drive with the AMD RAID installer package that you copied in the previous step.
4. Copy the AMD RAID package from the USB flash drive to your home folder.
5. Update the AMD RAIDXpert2 Management Application and the AMD RAID driver:
  - a. Open a **Terminal** window by selecting the **Terminal** icon from the list of applications.
  - b. Enter: `sudo apt install -y ./raidxpert2_9.3.x-00yyy_amd64.deb`
  - c. Enter your password if prompted.
  - d. Wait for the command to complete (this may take a few minutes).
  - e. Reboot the system.
6. Log into the system.

7. Launch the RAIDXpert2 GUI (Graphical User Interface):
  - a. Click the **RAIDXpert2** application icon in the list of applications.
  - b. Enter your password when prompted.
8. Launch the RAIDXpert2 CLI (Command Line Interface):
  - a. Open a **Terminal** window.
  - b. Enter: `sudo rcadm -M -qa`
  - c. Enter your password if prompted.