



# **Linux Ubuntu On HighPoint RR3700/2800/800/R700 RAID AIC Installation Guide**

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# 1 Overview

The purpose of this document is to provide clear instructions on how to install Linux Ubuntu to an SSD or RAID array hosted by HighPoint RR3700/2800/800/R700 series RAID AICs.

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

Supported Linux distributions	Ubuntu 20.04 Ubuntu 20.04.1 Ubuntu 20.04.2 Ubuntu 20.04.3 Ubuntu 20.04.4 Ubuntu 20.04.5 Ubuntu 20.10 Ubuntu 22.04 Ubuntu 22.04.1 Ubuntu 22.10 Ubuntu 22.04.3
Supported RAID AICs	RR3740A/ RR3740C RR3720A/ RR3720C RR2840A/ RR2840C RR840A/ RR840C RR3742A R710 R720

## 2 Installing Linux Ubuntu on RAID AIC

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

### Step 1 Prepare Your Hardware for Installation

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

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

You also need to prepare two USB flash drives or one USB flash drive and one optical disc (CD/DVD-ROM); one USB flash drive is used to store the RAID AIC UEFI package, while the other USB flash drive or optical disc is used to burn the ISO

#### Note

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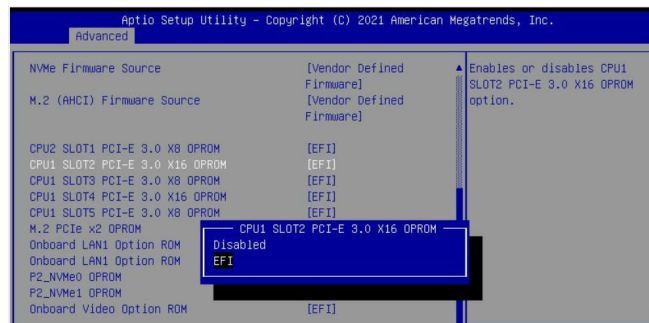
**RAID AIC support EFI boot.** If you have other SCSI adapters installed, you must make sure the RAID AIC EFI will be loaded firstly. If not, try to move it to another PCI slot. Otherwise, you may be unable to boot up your system.

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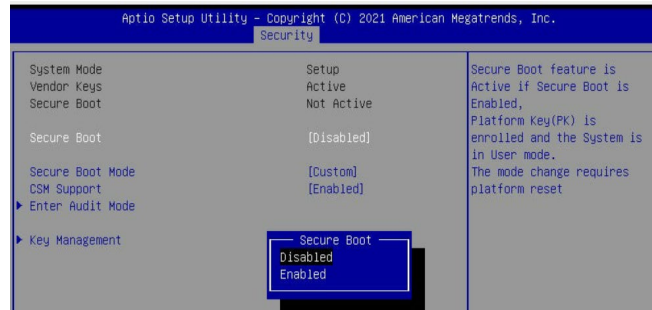
### Step 2 Check System EFI Settings

In your system EFI SETUP menu, change **Boot Sequence** in such a way that the system will first boot from **EFI** optical disc (CD/DVD-ROM) or **EFI** a Bootable USB flash drive, after you finish installation, set the RAID AIC as the first boot device to boot up the system. Refer to your motherboard EFI manual to see how to set boot sequence.

1. Set UEFI setting with SuperMicro H11DSi motherboard as an example.
  - a. "**Advanced->PCIe/PCI/PnP Configuration->CPU Slot PCI-E OPROM**" to "**EFI**". Suppose the RAID AIC is connected to motherboard CPU1 Slot 2 PCI-E X16, then you should set "CPU1 Slot 2 PCI-E X16 OPROM" to "EFI";

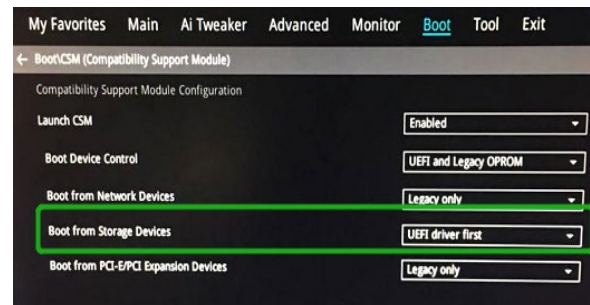


- b. Disable "Secure Boot", set "Attempt Secure Boot" to "Disabled".

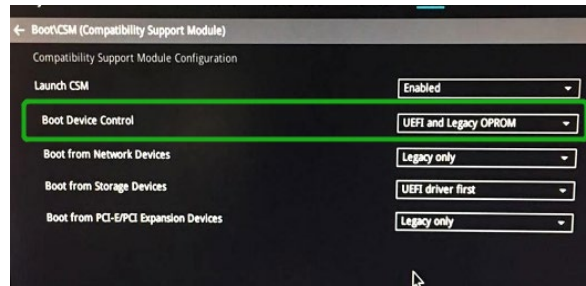


2. Set UEFI setting with ASUS PRIME X299 -DELUXE motherboard as an example:

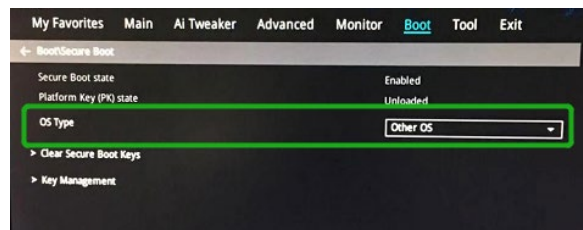
- a. Set "Boot from Storage Devices" to "UEFI driver first";



- b. And "Boot Device Control" to "UEFI Only" or "UEFI and Legacy OPRM";



- c. Set "OS Type" to "Other OS".



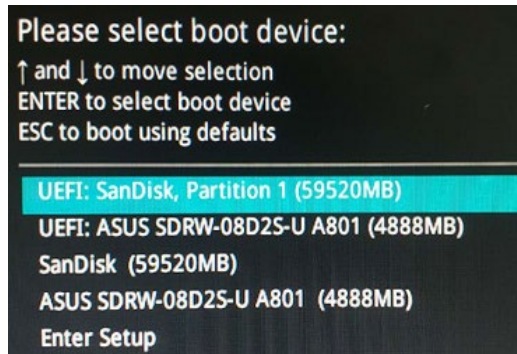
### Step 3 Flash UEFI ROM to RAID AIC

#### Example: RR3720C

For other products, please refer to: [Update BIOS UEFI ROM](#)

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

- a. Unzip RR3720C UEFI package to root dir(/) of a USB flash drive, and connect the USB flash drive to the motherboard;
- b. Boot from the UEFI USB flash drive and enter the UEFI environment;



- c. Use the command "go.nsh" to flash UEFI ROM to the RR3720C and reboot the system.

```
FS2:\> go.nsh
FS2:\> load.efi 3720uefi.blf /a
Load Utility for Flash EPROM v1.1.5
(built at Mar 28 2023 17:27:18)

Set flash size to 291K
Found adapter 0x37401103 at PCI 193:0:0
Offset address 0x0
EPROM Vendor: WINBOND W25X40BV
Erasing .....Succeeded
Flashing ....

Flashing Success (total retry 0)

Verifying ....

Passed !
FS2:\> _
```

- d. Use the "exit" command to exit the utility.

### Step 4 Create Array

#### Example: RR3720C

- a. Attach hard disks to RR3720C.

- b. Boot, enter the motherboard's Boot List and select start from UEFI USB flash.

```

Boot Override
UEFI: USB, Partition 1
(B97/D0/F0) UEFI PXE: IPv4 Intel(R) I350 Gigabit Network
Connection(MAC:3cecef40a1dc)

```

- c. Use the command “ArrayCreate.efi” to enter the Utility:

```

FS0:\> ArrayCreate.efi
Highpoint RAID utility for UEFI (version: 20211014)
==== Controller information:
  PCI Location: c1:00:00
  Vendor: HighPoint Technologies, Inc.
  Product: RocketRAID 3720 SAS Controller

==== Physical device list(count 3):
1/1 WDC WUH722020BL5204-8LG2YNHA, 20000521MB(MaxFree 20000521MB), Normal [RA] [WC]
1/2 WDC WUH722222AL5200-2TG0RM7E, 22000902MB(MaxFree 22000902MB), Normal [RA] [WC]
1/3 WDC WUH722222AL5200-2TG0R8GE, 22000902MB(MaxFree 22000902MB), Normal [RA] [WC]

==== Logical device list(count 0):
-----
>>> Please specify command to execute:
<<<

```

- d. Use the command “create RAID0”.  
This will create a RAID0 array using all of the hard disks, and the maximum available capacity.

```

<<< create RAID0
  Creating array: RAID0_000041A7.
  Array created successfully.
=====
==== Physical device list(count 3):
1/1 WDC WUH722020BL5204-8LG2YNHA, 20000521MB(MaxFree 0MB), Normal [RA] [WC]
1/2 WDC WUH722222AL5200-2TG0RM7E, 22000902MB(MaxFree 2000381MB), Normal [RA] [WC]
1/3 WDC WUH722222AL5200-2TG0R8GE, 22000902MB(MaxFree 2000381MB), Normal [RA] [WC]

==== Logical device list(count 1):
1 [VD0-0] RAID0_000041A7 (RAID0), 60001565MB (Stripe 64KB), Normal
  1/1 WDC WUH722020BL5204
  1/2 WDC WUH722222AL5200
  1/3 WDC WUH722222AL5200
-----
>>> Please specify command to execute:
<<<

```

- e. Use the “exit” command to exit the utility.  
f. For additional command lines, refer to [Appendix A](#).

**Note:** RR3740/ RR3720/ R710/ R720 series RAID AICs also support the creation method of BIOS/UEFI HII. Please refer to [UM-Chapter 4](#)

## Step 5 Prepare the Driver Diskette

Extract **RR3740a\_ubuntuxx.xx.x\_x86\_64\_vx.xx.xx\_xx\_xx\_xx.tar.gz** to the top(/) directory of an USB flash drive. It will look like:

```

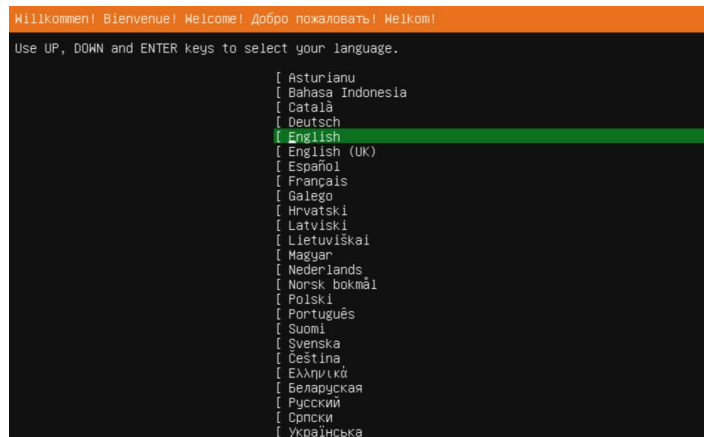
root@test:/mnt# tar zxvf RR3740a_ubuntu20.04.5_LTS_x86_64_v1.23.13_23_03_07.tar.gz
hptdd/
hptdd/postinst.sh
hptdd/postinst2.sh
hptdd/boot/
hptdd/boot/rr3740a5.4.0-125-genericx86_64.ko.gz
hptdd/hptdrv
hptdd/hptblock
hptdd/60-persistent-storage-hptblock.rules
hptdd/preinst.sh
hptdd/readme.txt

```

## Step 6 Install Linux Ubuntu

### Example: Ubuntu20.04.5 Server

- a. Before starting the installation procedure, verify the status of your network environment. To ensure Ubuntu is successfully installed to the RAID array, we recommend that the system is disconnected from the internet and any local network.
- b. Insert a USB flash drive or optical disc (CD/DVD-ROM) to the motherboard.
- c. Boot the system using a bootable USB flash drive or optical disc (CD/DVD-ROM).
- d. When the following window appears during the installation process, please refer to the instructions below the two images below, depending on your operating system.



- 1). If you use Ubuntu Server, press **ALT+F2** to switch to the shell on console 2 and press **ENTER** to activate this console.
- 2). If you use Ubuntu Desktop, please press **CTRL+ALT+F3** to switch to the shell on console 2 and press **ENTER** to activate this console.

### Ubuntu login: ubuntu

```
Welcome to Ubuntu 20.04.5 LTS (GNU/Linux 5.4.0-125-generic x86_64)

* Documentation:  https://help.ubuntu.com
* Management:    https://landscape.canonical.com
* Support:        https://ubuntu.com/advantage

System information as of Thu Mar  9 01:35:21 UTC 2023

System load:   1.77      Memory usage: 1%   Processes:    781
Usage of /home: unknown  Swap usage:   0%   Users logged in: 0

0 updates can be applied immediately.

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

ubuntu-server@ubuntu-server:~$ _
```

- e. Switch to root privileges.

```
ubuntu-server@ubuntu-server:~$ sudo su
root@ubuntu-server:/home/ubuntu-server#
```

- f. 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
```

```
:~# mkdir /hptdd
:~# mount /dev/sda1 /hptdd/
:~# cp -a /hptdd/hptdd/ /tmp/
:~# umount /hptdd/
```

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

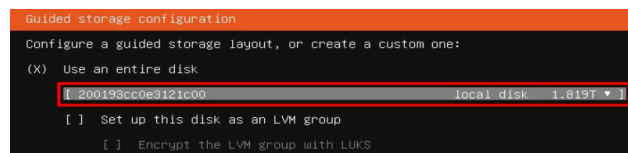
- g. Next, execute the following commands to install binary driver for Linux Ubuntu.

```
# sh /tmp/hptdd/preinst.sh ← Load RAID AIC binary driver.
```

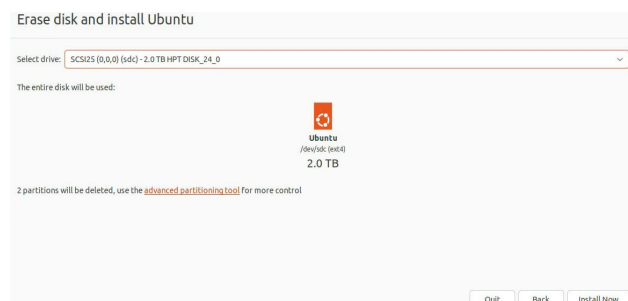
```
:~# sh /tmp/hptdd/preinst.sh
This step succeeded!
```

- h. Then press **ALT+F1** to switch back to installation screen and continue the installation as usual.
- i. Select the previously created RAID.

#### Ubuntu Server:



#### Ubuntu Desktop:



- j. When the screen shows that “install complete”,

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

**# sh /tmp/hptdd/postinst.sh** ← Install RAID AIC binary driver.

A message will be displayed that the binary driver has been installed successfully.

```
root@ubuntu-server:/home/ubuntu-server# sh /tmp/hptdd/postinst.sh
mount: failed to read mtab: No such file or directory
cryptsetup: ERROR: Couldn't resolve device /dev/sdc2
cryptsetup: WARNING: Couldn't determine root device
W: Possible missing firmware /lib/firmware/ast_dp501_fw.bin for module ast
W: Couldn't identify type of root file system for fsck hook
We have completed the driver installation.
root@ubuntu-server:/home/ubuntu-server# _
```

**Note:** Running **postinst2.sh** is automatically invoked when running **postinst.sh**, so you don't need to run **postinst2.sh** again.

- k. Press “**ALT+F1**” to switch back to installation screen and finish the installation.
- l. After Ubuntu has been installed, you can reconnect the system to the network/internet and update the system as needed.
- m. If you want to boot from another kernel, please install the opensource driver after entering the system.
  - 1). Enter the system.
  - 2). use “**apt-get update**” to retrieve new lists of ubuntu packages (**please connect to the internet**).

- 3). Download the appropriate opensource driver from the Software Downloads web page.
- 4). Extract driver package:

```
#tar zxvf RR37xx_8xx_28xx_Linux_X86_64_Src_vx.xx.xx_xx_xx_xx.tar.gz
```

- 5). Run the **.bin** file to install the driver package.

```
#sh rr37xx_8xx_28xx_linux_x86_64_src_vxx.x.x_xx_xx_xx.bin
```

```
root@test:/mnt# sh rr37xx_8xx_28xx_linux_x86_64_src_v1.23.13_23_01_16.bin
Verifying archive integrity... All good.
Uncompressing RR3740A/840A 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)
```

- 6). Follow the prompts to complete the driver installation.

```
Synchronizing state of hptdrv-monitor.service with SysV service script with /lib/systemd/systemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install enable hptdrv-monitor
update-rc.d: warning: enable action will have no effect on runlevel 1

SUCCESS: Driver rr3740a is installed successfully for kernel 5.4.0-125-generic.
Please restart the system for the driver to take effect.
If you want to uninstall the driver from the computer please run hptuninrr3740a to uninstall the driver files.
root@test:/mnt#
```

- n. Restart and select a new kernel to enter the system.

### 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/rr3740a/`. Through this file you can view driver status and send control commands to the driver.

#### Note

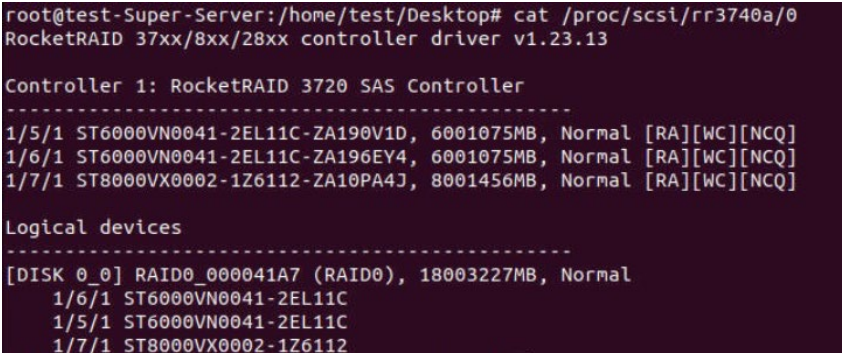
---

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.

---

Use the following commands to view the driver status, RAID AICs and logical devices or use [RAID Management software](#) to do so.

# `cat /proc/scsi/rr3740a/x`



```
root@test-Super-Server:/home/test/Desktop# cat /proc/scsi/rr3740a/0
RocketRAID 37xx/8xx/28xx controller driver v1.23.13

Controller 1: RocketRAID 3720 SAS Controller
-----
1/5/1 ST6000VN0041-2EL11C-ZA190V1D, 6001075MB, Normal [RA][WC][NCQ]
1/6/1 ST6000VN0041-2EL11C-ZA196EY4, 6001075MB, Normal [RA][WC][NCQ]
1/7/1 ST8000VX0002-1Z6112-ZA10PA4J, 8001456MB, Normal [RA][WC][NCQ]

Logical devices
-----
[DISK 0_0] RAID0_000041A7 (RAID0), 18003227MB, Normal
  1/6/1 ST6000VN0041-2EL11C
  1/5/1 ST6000VN0041-2EL11C
  1/7/1 ST8000VX0002-1Z6112
```

### 4 Installing RAID Management Software

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

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

## 5 Troubleshooting

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.

If you have already installed the opensource driver, please Ignore this step.

If you have not installed opensource driver, please follow the steps below.

- a. Press **ESC** when booting, until the following interface appears. Choose “**Advanced options for Ubuntu**” and press **Enter**.

```
Ubuntu
*Advanced options for Ubuntu
UEFI Firmware Settings
```

- b. Select the default (kernel: 5.4.0-125-generic) and enter the system.

```
Ubuntu, with Linux 5.4.0-139-generic
Ubuntu, with Linux 5.4.0-139-generic (recovery mode)
*Ubuntu, with Linux 5.4.0-125-generic
Ubuntu, with Linux 5.4.0-125-generic (recovery mode)
```

***Note:** Different Ubuntu Linux distributions have different initial kernels, the above picture is for reference only.*

- c. Download the appropriate opensource driver from the Software Downloads web page.
- d. Extract the opensource driver package:  
`#tar zxvf RR37xx_8xx_28xx_Linux_X86_64_Src_vx.xx.xx_xx_xx_xx.tar.gz`
- e. Run the **.bin** file to install the opensource driver.

```
#sh rr37xx_8xx_28xx_linux_x86_64_src_vxx.x.x_xx_xx_xx.bin
```

```
root@test:/mnt# sh rr37xx_8xx_28xx_linux_x86_64_src_v1.23.13_23_01_16.bin
Verifying archive integrity... All good.
Uncompressing RR3740A/840A 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)
```

- f. Follow the prompts to complete the driver installation.

```
Synchronizing state of hptdrv-monitor.service with SysV service script with /lib/systemd/systemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install enable hptdrv-monitor
update-rc.d: warning: enable action will have no effect on runlevel 1

SUCCESS: Driver rr3740a is installed successfully for kernel 5.4.0-125-generic.
Please restart the system for the driver to take effect.
If you want to uninstall the driver from the computer, please run hptunlnrr3740a to uninstall the driver files.
root@test:/mnt#
```

- g. After the driver installation is complete, reboot the system.

## 6 Rebuilding Driver Module for System Update

When the system updates the kernel packages, the driver module `rr3740a.ko` should be built and installed manually before reboot.

Please refer to the README file distributed with the 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 (RAID0/1/10/5/50) Member Disk list (1/1, 1/2|\*)  
Capacity (100|\*)

**Note1:** The RR840/RR2840/RR3720/RR3740/RR3742 RAID AICs can support RAID0/1/10/5/50.

**Note2:** The R710/R720 RAID AICs can support RAID0/RAID1/RAID10.

### 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 array with all disks and with maximum capacity.

```
<<< create RAID5 *
```

Create RAID5 array with all disks and with maximum capacity.

```
<<< create RAID50,3 1/1, 1/2, 1/3, 1/4, 1/5, 1/6
```

Create RAID50 array with disk 1/1, 1/2, 1/3, 1/4, 1/5, 1/6 and with sub member count 3 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.