

HPT370/372/372A ATA RAID Controller

Caldera OpenLinux 2.3 / 2.4

Installation Guide

Version 1.3

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1 Overview

The purpose of this document is to provide clear instructions on how to install and use HPT37x ATA RAID Controller on Caldera OpenLinux system.

The driver supports following HighPoint ATA RAID controllers:

HPT370 UDMA/ATA100 RAID Controller
HPT372 UDMA/ATA133 RAID Controller
HPT372A UDMA/ATA133 RAID Controller

2 Installing Caldera OpenLinux on HPT370/372/372A Controller

If you would like to install Caldera OpenLinux onto drives attached to HPT37x controller, please perform the following operations:

Step 1 Prepare Your Hardware for Installation

After you attach your hard disks to HPT37x controller, you can use HPT37x BIOS Setting Utility to configure your hard disks as RAID 0, RAID 1, RAID 0/1 or JBOD arrays, or just use them as single disks.

Before installation, you must remove all the disk drives, which are not physically attached to HPT37x controller, from your system.

Note

If you have other SCSI adapters installed, you must make sure the HPT37x controller BIOS will be loaded firstly. If not, try to move it to another PCI slot. Otherwise you may be unable to boot up your system.

Step 2 Check System BIOS Settings

In your system BIOS SETUP menu, change **Boot Sequence** in such a way that the system will first boot from floppy or CDROM, and then from SCSI. Refer to your BIOS manual to see how to set boot sequence.

If your BIOS settings do not support such a boot sequence, you can first set it to boot from floppy or CDROM. After you finish installation, set SCSI as the first boot device to boot up the system.

Step 3 Prepare the Boot Diskette

To install Caldera OpenLinux onto HPT37x controller, you must boot from a customized boot diskette to start installation.

First obtain the boot diskette image file, col23boot.img or col24boot.img. If you are installing Caldera OpenLinux 2.3, you should use col23boot.img. If you are installing Caldera OpenLinux 2.4, you should use col24boot.img.

On a DOS or Windows system, you can make the boot diskette using rawrite.exe. It can be found on the Caldera OpenLinux CD (under /dosutils). Just run it under a command window and follow its prompt. (Note: rawrite.exe can only read 8.3 file name format, so the file name “col23boot.img” should be typed as “col23b~1.img”).

On a Linux system, you can use the “dd” command to make the boot diskette. Insert a floppy disk into the floppy drive and type the command:

```
# dd if=col23boot.img of=/dev/fd0
```

Step 4 Install Caldera OpenLinux

- 1) Start installing the Caldera OpenLinux by booting from the bootable disk provided for HPT37x driver.
- 2) When a prompted label "**boot:**" appears, press “**enter**”.
- 3) The hpt37x2 module will be automatically loaded. You can simply continue the installation as normal. Please refer to Caldera OpenLinux installation guide.

Note

The system device mapping order is the same as the order shown in HPT37x BIOS Setting Utility. If you have no other SCSI adapters installed, the device marked as “BOOT” or “HDD0” will be /dev/sda, “HDD1” will be /dev/sdb, “HDD2” will be /dev/sdc, etc. When creating mount points, you must mount /boot on /dev/sda.

- 4) When the “Setup Boot Loader” screen appears, you must select “write master boot record (MBR)” option to make the system be able to boot up from your HPT37x controller.

3 Installing HPT370/372/372A Driver on an Existing System

If you are currently running Linux and would like to access drives or arrays attached to the HPT37x Controller, you can perform the following steps.

Note

1. If you use a SCSI adapter to boot your system, you must make sure the HPT37x controller BIOS will be loaded after that adapter’s BIOS. If not, try to move it to another PCI slot. Otherwise you may be unable to boot up your system.
2. A defect in default Caldera OpenLinux 2.4 kernel will hang your system during boot phase with HPT372 chip. So, if you want to use HPT372 chip with Caldera OpenLinux 2.4 system, you should boot from the provided boot floppy and update the

kernel first.

Step 1 Obtain the Driver Module

You can extract the module file from the boot diskette provided. Insert the boot diskette into floppy drive and type the following commands:

```
# mount /dev/fd0
# gzip -dc /mnt/floppy/initrd.gz > /tmp/initrd.ext2
# mkdir /mnt/initrd
# mount -o loop /tmp/initrd.ext2 /mnt/initrd
# cp /mnt/initrd/lib/modules/2.2.14/scsi/hpt37x2.o /tmp
# umount /mnt/initrd
```

The driver module, hpt37x2.o, will be copied to /tmp for your use.

Step 2 Update the Kernel (Caldera OpenLinux 2.4 only)

To use the hpt37x2 driver module on a Caldera OpenLinux 2.4 system, you must update the kernel to remove HPT366 IDE chipset support from it. There are two ways to do this.

1. Building a new kernel from kernel source

To build a new kernel, you must have installed kernel source. You can find the kernel source on Caldera CD.

Before you build the new kernel, you should remove the following 2 lines from /usr/src/linux/drivers/block/ide-pci.c:

```
{DEVID_HPT34X, "HPT34X", PCI_HPT34X, NULL, ...
{DEVID_HPT366, "HPT366", PCI_HPT366, ATA66_HPT366, ...
```

For more information on how to build and install a new kernel from kernel source, please refer to Linux kernel documents.

2. Using the kernel on the boot diskette

If you do not want to build the kernel by yourself, you can simply use the kernel we provided. Just copy the file “**vmlinuz**” on the boot diskette.

After you get the new kernel, copy it to the boot directory and modify /etc/lilo.conf settings to install the new kernel. You can use the command “vi /etc/lilo.conf” to open lilo.conf with the vi editor and modify it. There may be several entries in the file. Generally you can add the following lines to the file (in this example, we name the new kernel file as “vmlinuz.new”. You can change it to whatever name you want.):

```
image=/boot/vmlinuz.new
label=linux_new
read-only
```

root=/dev/hda1

To tell lilo to boot the new kernel by default, you may also modify “**default=**” line to “**default=linux_new**”.

Note

1. Your root file system may be not on /dev/hda1. Check the correct location and modify the line “root=/dev/hda1” to match your system configuration. You can use the “mount” command to see on which device you root file system is mounted.
 2. Your system may also need an initial RAM disk image to boot up, especially when you use a SCSI drive to boot. Check existing sections in your lilo.conf file and copy the “initrd=” line to the new section you added.
-

After you finish the modification, save the file and exit the editor, then use the command “**lilo**” to install the kernel. Reboot from the new kernel to go to the next step, “**Test the driver module**”.

Step 3 Test the Driver Module

You can test out the module to ensure that it works for your system by typing in “**insmod hpt37x2.o**”.

Sometimes insmod will report “**unresolved symbols**” when you attempt to load the module. This can be caused by two ways:

- 1) If your system is using a kernel which has not built-in SCSI support, you must load the SCSI module before load hpt37x2.o. Try to load SCSI modules first.

E.g. # **insmod scsi_mod**
 # **insmod sd_mod**
 # **insmod hpt37x2.o**

- 2) If you recompile the kernel with SCSI support and still receive the “**unresolved symbols**” error, it may be caused that you have not configured symbol versioning correctly. To correct it, recompile the kernel with symbol versioning configured. Please refer to the kernel documents for more information.

If the module has been loaded successfully you should see the HPT37x2 banner and a display screen of the attached drives. You can now access the drives as a SCSI device (the first device is /dev/sda, then /dev/sdb, etc.).

Example

You have configured a RAID 0/1 using 4 disks. It will be registered to system as device /dev/sda. You can use “**fdisk /dev/sda**” to create a partition on it, which will be /dev/sda1, and use “**mkfs /dev/sda1**” to setup a file system on the partition. Then you can mount /dev/sda1 to somewhere to access it.

Step 4 Configure System to Automatically Load the Driver

Most likely, you will not want to type in "**insmod hpt37x2.o**" each time you boot up the system. Therefore you must install the module and tell the system about it. To install the module, type in the following commands (first change directory to where the proper hpt37x2.o can be located):

```
# install -d /lib/modules/2.2.14/scsi
# install -c hpt37x2.o /lib/modules/2.2.14/scsi
```

Then you should inform the system when to load the module.

1. If you have no other SCSI adapters installed, you can edit the file "**/etc/modules.conf**" and add the following lines:

```
alias block-major-8 hpt37x2
pre-install hpt37x2 modprobe sd_mod
options -k hpt37x2
```

This tells the kernel to try loading the SCSI and hpt37x2 modules whenever it tries to access a SCSI device `/dev/sd[a-z]`. If you have SCSI support compiled in kernel, you may remove the line "**pre-install hpt37x2 ...**".

The line "**options -k hpt37x2**" ensures the module will not be autocleaned. Otherwise the RAID management software will not run properly if system loads the driver with "autoclean" option.

Notice

Upon your system configuration the modules configuration file may be another file, possibly deprecated "conf.modules" file. You may have to check which configuration file you use and modify the correct one.

Now, reboot the system and try to type in the command "**fdisk /dev/sda**". The kernel should automatically load the hpt37x2 driver.

2. If you use a SCSI adapter to boot the system, you cannot do as above since this may conflict with other SCSI devices. However, you can add the driver to the existing RAM disk image. First check which image file you are using by checking the "initrd=" line in file `/etc/lilo.conf`, then use the following commands (we assume the file is `/boot/initrd-2.2.14.gz`):

```
# gzip -dc /boot/initrd-2.2.14.gz > /tmp/initrd.ext2
# mkdir /mnt/initrd
# mount -o loop /tmp/initrd.ext2 /mnt/initrd
# cp hpt37x2.o /mnt/initrd/linux/modules (specify the correct location of
hpt37x2.o here)
# echo "hpt37x2" >> /mnt/initrd/etc/modules/rootfs
# umount /mnt/initrd
# gzip -c /tmp/initrd.ext2 > /boot/initrd-2.2.14.gz
```

```
# lilo
```

Then reboot your system and the driver will be loaded.

Step 5 Configure System to Mount Volumes When Startup

Now you can inform the system to automatically mount the array by modifying the file `/etc/fstab`. E.g. You can add the following line to tell the system to mount `/dev/sda1` to location `/mnt/raid` after startup:

```
/dev/sda1    /mnt/raid    ext2    defaults    0 0
```

4 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/hpt37x2/`. 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.

Checking Devices Status

Using the following command to show driver status:

```
# cat /proc/scsi/hpt37x2/X
```

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

Rebuilding a Critical Array

A RAID 1 array or a RAID 0/1 array may become critical after a disk member failed. When an array is in critical status, it will lose the ability of fault tolerance until you finish rebuilding.

Generally rebuilding will automatically start if you have a spare disk for the RAID 1 array or you have replaced the failed disk. In these cases, the array needs to be synchronized to ensure data consistency. If the array is broken, you must first add a disk to the array. To add a disk to an array and start rebuilding, you can use the following command:

```
# echo "hpt rebuild a b,c,d" > /proc/scsi/hpt37x2/X
```

In the command, "`a`" is array number as shown in the logical device list. "`b`" is controller number (always 0 if you have one HPT37x controller installed), "`c`" is bus number (0 for primary channel, 1 for secondary channel), "`d`" is device number (0 for

master device, 1 for slave device). E.g.

```
# echo "hpt rebuild 1 0,1,0" > /proc/scsi/hpt37x2/X
```

will rebuild the array with logical device number 1 using the secondary master disk on the controller.

If rebuilding cannot be automatically started, you can use command

```
# echo "hpt rebuild start" > /proc/scsi/hpt37x2/X
```

to start rebuilding. To stop the rebuilding process, use command

```
# echo "hpt rebuild stop" > /proc/scsi/hpt37x2/X
```

Rescanning Devices

If you attach a disk after the system boots up, the driver will not detect the disk automatically. In this case, you can tell the driver to rescan the devices attached to it by typing in the following command:

```
# echo "hpt rescan all" > /proc/scsi/hpt37x2/X
```

This command will rescan all devices and refresh their states. If you want to rescan only a single device, you can use

```
# echo "hpt rescan a,b,c" > /proc/scsi/hpt37x2/X
```

In the command, "a,b,c" specifies the controller, bus and device number for the disk. E.g. 0,1,0 specifies the secondary master disk on the first HPT37x controller.

Note

If the driver detects out a new disk plugged by rescanning the command and there is a broken RAID 1 array, the disk will be automatically used to rebuild the RAID 1 array.

5 Updating the Driver

If you are not booting from disks attached to HPT37x controller, you can update the driver just by reinstalling it following the previous section, "**Installing HPT 370/372/372A Driver on an Existing System**".

If you are using a system installed to HPT37x controller, you can update the driver by the following steps.

1) First obtain the new driver module file hpt37x2.o. Refer to the previous section "**Obtain the Driver Module**". In the following steps, we assume you have copied it to /tmp/hpt37x2.o.

2) Replace hpt37x2.o in the boot RAM disk image by using the following commands:

```
# gzip -dc /boot/initrd-2.2.14.gz > /tmp/initrd.ext2
```

```
# mkdir /mnt/initrd
# mount -o loop /tmp/initrd.ext2 /mnt/initrd
# cp /tmp/hpt37x2.o /mnt/initrd/linux/modules/
# umount /mnt/initrd
# gzip -c /tmp/initrd.ext2 > /boot/initrd-2.2.14.gz
```

3) Use "lilo" to reinstall the RAM disk:

```
# lilo
```

4) Update the hpt37x2.o in /lib/modules:

```
# cp /tmp/hpt37x2.o /lib/modules/2.2.14/scsi/hpt37x2.o
```

5) Reboot your system to make the new driver take effect.

6 Installing RAID Management Software

HighPoint RAID Management Software is used to configure and keep track of your hard disks and RAID arrays attached to HPT37x controller. Installation of the management software is optional but recommended.

Checking System Requirements

To run the RAID Management GUI, you must have the following software packages installed on your system:

- 1) X-Window system
- 2) gtk library v1.2 or later.

You can refer to your Linux system manual for how to install these packages.

Preparing the Installation Files

You should have two files to finish the installation.

hptinstall.sh	Installation script file
hptraid.tar.gz	Package of software components

Installing the Software Package

Before installation, you must log on as root and change the directory to the location where your installation files are. Then you can use the command "**sh hptinstall.sh -i**" to install the software.

The following is an example.

```
[root@tmp]# ls
hptinstall.sh hptraid.tar.gz
```

```
[root@tmp]# sh hptinstall.sh -i
Starting hptsvr daemon: [ OK ]
HighPoint ATA RAID Management Software has been installed successfully!
[root@tmp]#
```

Note

If an old version is installed on your system you will be prompted to choose whether to overwrite existing files or not. To continue installation, type in “Y”.

Running the Management Software

You must log on as root to run the management software.

To run the software from a console window, you can just type in “**hptraid**” to start it. If you do not want to block the console, type in “**hptraid&**”.

If you are using GNOME or KDE, you can also run it from the menu bar:

On KDE, you can start it by choosing “**Menus (menu-bar)->Applications->HighPoint ATA RAID Management Software**”.

On GNOME, you can start it by choosing “**KDE menus->GNOME->Applications->HighPoint ATA RAID Management Software**”.

7 Uninstalling

Uninstalling the Driver

You can only uninstall the driver when your system is not booting from devices attached to HPT37x controller. Just remove the lines you added to /etc/modules.conf and /etc/fstab.

Uninstalling the Management Software

Before you uninstall the software, you must log on as root. Then you can use the command “**hptinstall.sh -u**” to uninstall the software.

```
[root@tmp]# hptinstall.sh -u
Are you sure to uninstall HighPoint ATA RAID Management Software?(Y/N)y
Stopping hptsvr daemon:
Uninstall finished!
[root@tmp]#
```