HPT374 UDMA/ATA133 RAID Controller

Red Hat Linux

Installation Guide

Version 2.12

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1 Overview

The purpose of this document is to provide clear instructions on how to install and use HPT374 UDMA/ATA133 RAID Controller on Red Hat Linux system.

2 Installing Red Hat Linux on HPT374 Controller

If you would like to install Red Hat Linux onto drives attached to HPT374 Controller, please perform the following operations:

Step 1 Prepare Your Hardware for Installation

After you attach your hard disks to HPT374 Controller, you can use the BIOS Setting Utility to configure your hard disks as RAID arrays, or just use them as single disks.

Before installation, you must remove all the disk drives, which are not physically attached to HPT374 Controller, from your system.

Note

If you have other SCSI adapters installed, you must make sure the HPT374 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 Driver Diskette

Driver is contained in a floppy diskette image file, if you are installing Red Hat Linux on i686 type CPU, the image file is rhdd-i686.img; if you are installing Red Hat Linux on i586 type CPU, the image file is rhdd-i686.img; if you are installing Red Hat Linux on athlon type CPU, the image file is rhdd-athlon.img

On a DOS or Windows system, you can make the Red Hat driver diskette using rawrite.exe. It can be found on the Red Hat Linux CD (under /dosutils). Just run it under a command window and follow its prompt.

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:

for i686 type CPU

dd if=rhdd-i686.img of=/dev/fd0

for i586 type CPU

dd if=rhdd-i586.img of=/dev/fd0

for Athlon type CPU

dd if=rhdd-athlon.img of=/dev/fd0

Step 4 Install Red Hat Linux

1) Start installing Red Hat Linux by booting from the installation CD.
2) On "**Welcome to Red Hat Linux**" installation screen, a prompted label "**boot:**" will appear at the bottom of the screen. If you are installing Red Hat Linux 7.0/7.1/7.3, type in "**expert text**" (without quotation mark) and then press **enter**. If you are installing Red Hat Linux 7.2, type in "**expert text updates**" (without quotation mark) and then press **enter**. If you are installing Red Hat Linux 8.0/9.0, type in "**linux text expert hde=noprobe hdf=noprobe hdg=noprobe hdh=noprobe hdi=noprobe hdj=noprobe hdk=noprobe hdl=noprobe**" (without quotation mark) and then press **enter**.
3) When prompted "**Do you have a driver disk?**". Select "**Yes**".
4) If you are not install Red Hat Linux 9.0, skip this step. When "**Driver Disk Source** " appears, select "**fd0**" and then select "**OK**".
5) When prompted "**Insert your driver disk and press OK to continue**", insert the driver diskette in the floppy drive and then select "**OK**".
6) If you are installing Red Hat Linux 7.1/7.2/7.3/8.0/9.0, please **go to step 11** since the system will load HPT374 driver automatically.
7) After the "**Devices**" dialog box appears, select "**Add Device**" option.
8) When asked "**What kind of device would you like to add?**", select "**SCSI**", and then select "**Ok**".
9) Scroll down to "**HPT374 UDMA/ATA133 RAID Controller**", and then select "**Ok**".
10) The installation process will now display the " **HPT374 UDMA/ATA133 RAID Controller**" as been found, select "**Done**".
11) If you are installing Red Hat Linux 7.2, when asked "Insert your updates disk and press ok to continue", just press <Enter> to continue.
12) If you are installing Red Hat Linux 8.0/9.0, when prompted "**A few systems will need to pass special options to the kernel at boot time …**" in the "Boot Loader Configuration" dialog, type in "**hde=noprobe hdf=noprobe hdg=noprobe hdh=noprobe hdi=noprobe hdj=noprobe hdk=noprobe hdl=noprobe**" in the blank.

13) When asked "**where do you want to install the boot loader? ** " in the "Boot Loader Configuration" dialog, you must select "**Master Boot Record (MBR)**" to make your system be able to boot HPT374 Controller.

14) Continue the installation as normal. You can refer to Red Hat Linux installation guide.

Note

The system device mapping order is the same as the order shown in HPT374 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.

3 Installing driver on an Existing System

If you are currently running **Red Hat Linux 7.0/7.1/7.2/7.3** and would like to access drives or arrays attached to the HPT374 Controller, please **go to step 2** directly.

Note

If you use a SCSI adapter to boot your system, you must make sure the HPT374 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.

Step 1 Update Lilo/Grub

If you are currently running **Red Hat Linux 8.0/9.0,** you must update /etc/lilo.conf or /etc/grub.conf at first.

1. If you are using Lilo to boot your system, update **/etc/lilo.conf.**

   E.g.(xxx is the kernel version,2.4.18-14 for Red Hat Linux 8.0, 2.4.20-8 for Red Hat Linux 9.0)

```
Prompt
timeout=50
default=linux
boot=/dev/hdc
map=/boot/map
install=/boot/message
linear

image=/boot/vmlinuz-xxx
      label=linux
      initrd=/boot/initrd-xxx.img
      read-only
      append="hde=noprobe hdf=noprobe hdg=noprobe hdh=noprobe
      hdi=noprobe hdj=noprobe hdk=noprobe hdl=noprobe root=LABLE=/"
```

   Then you need to run lilo:

   # lilo

2. If you are using Grub to boot your system, update **/etc/grub.conf.**

   E.g.

```
default=0
```

```
timeout=10
splashimage=(hd0,0)/grub/splash.xpm.gz
title Red Hat Linux (xxx)
    root (hd0,0)
     kernel /vmlinux-xxx hde=noprobe hdf=noprobe hdg=noprobe
hdh=noprobe hdi=noprobe hdj=noprobe hdk=noprobe hdl=noprobe ro
root=LABLE=/
    initrd /initrd-xxx.img
```

The kernel parameters, "**hdx=noprobe**", are used to prevent Red Hat 8.0/9.0 kernel from loading the default HPT374 IDE driver. When your system has other IDE interfaces supported by Linux, you may need to modify "**hdx=noprobe**" according to your hardware configuration.

Then reboot the system to make new kernel parameter take effect.

Step 2 Obtain the Driver Module

You can extract the module file from the file modules.cgz on the driver disk. Using the following commands:

```
# mount /dev/fd0
# cd /tmp
# gzip -dc /mnt/floppy/modules.cgz | cpio -idumv
```

Driver modules for all supported kernel versions will be extracted. You can find the driver module for your running kernel under the directory that matches your kernel version (/tmp/`uname –r`/hpt374.o).

Step 3 Test the Driver Module

You can test out the module to ensure that it works for your system by changing working directory to the location where hpt374.o resides and typing in the command "**insmod hpt374.o**".

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

1) You haven't loaded the SCSI module before loading hptmv.o. Try to load SCSI modules first.

E.g.
```
# insmod scsi_mod
# insmod sd_mod
# insmod hpt374.o
```

2) You are using a kernel that is build off a different configuration with the driver. In this case the precompiled drivers cannot be used. You can build a driver for your kernel using the OpenSource package for HPT374 controller.

To ensure the module has been loaded successfully, you can check the driver status by typing in the command "**cat /proc/scsi/hpt374/x**", where **x** is the filename you found under /proc/scsi/hpt374/. You should see the driver banner and a list of 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 array using 2 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 hpt374.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 hpt374.o can be located):

On Red Hat Linux 7.0, use

```
# cp hpt374.o /lib/modules/2.2.16-22/scsi/
```

On Red Hat Linux 7.1/7.2/7.3/8.0/9.0, use

```
# cp hpt374.o /lib/modules/`uname –r`/kernel/drivers/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:

```
probeall block-major-8 scsi_mod sd_mod hpt374
options –k hpt374
```

This tells the kernel to try loading the SCSI and hpt374 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 "scsi_mod" and "sd_mod" from that line.

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 RR154x/1640 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, the using the following commands (we assume the file is /boot/initrd-2.4.2-2.img. For Redhat 7.2 system, just need to substitute "initrd-2.4.2-2.img" with "initrd-2.4.7-10.img" to get the default RAM disk file name):

```
# gzip –dc /boot/initrd-2.4.2-2.img > /tmp/initrd.ext2
```

 # mkdir /mnt/initrd
 # mount –o loop /tmp/initrd.ext2 /mnt/initrd
 # cp hpt374.o /mnt/initrd/lib/ (specify the correct location of hpt374.o here)

Now, add a line "insmod /lib/hpt374.o" to the file /mnt/initrd/linuxrc, just below the line of insmoding SCSI adapter's kernel module. Example of linuxrc:

```
……
echo "Loading scsi_mod module"
insmod /lib/scsi_mod.o
echo "Loading sd_mod module"
insmod /lib/sd_mod.o
echo "Loading aic7xxx module"
insmod /lib/aic7xxx.o          ← SCSI adapter's kernel module
insmod /lib/hpt374.o           ← new inserted line
echo "Loading jbd module"
……
```

 # umount /mnt/initrd
 # gzip –c /tmp/initrd.ext2 > /boot/initrd-2.4.2-2.img

If you are using Lilo to boot your system, you also need to run lilo:

 # 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

For Red Hat Linux 8.0/9.0, you also add the following line:

/dev/sda1 /mnt/raid ext3 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/hpt374/. 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/hpt374/x

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

Rebuilding a Critical Array

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

Generally rebuilding will automatically start if you have a spare disk or you have put back the failed disk. In these cases, the array only 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" > /proc/scsi/hpt374/x

In the command, "**a**" is array number shown in the logical device list. "**b**" is channel number, "**c**" is device number (0 for master device, 1 for slave device). E.g.

echo "hpt rebuild 1,2,1" > /proc/scsi/hpt374/x

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

If rebuilding cannot be automatically started, you can use command

echo "hpt rebuild start" > /proc/scsi/hpt374/x

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

echo "hpt rebuild stop" > /proc/scsi/hpt374/x

Verifying RAID 1/RAID 5

To RAID 1/RAID 5,verifying will ensure data consistency.

You can use the following command to start verifying:

echo "hpt verify start a" > /proc/scsi/hpt374/x

To stop the verifying process, use command:

echo "hpt verify stop a" > /proc/scsi/hpt374/x

In the command, "**a**" is array number shown in the logical device list.

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/hpt374/x

This command will rescan all devices and refresh their states.

5 Updating the Driver

If you are not booting from disks attached to HPT374 Controller, you can update the driver just by reinstalling it following the previous section, "**Install driver on an Existing System**".

If you are using a system installed to HPT374 Controller, you can update the driver by the following steps.

1) First obtain the new driver module file hpt374.o. Refer to the previous section "**Obtain the Driver Module**". In the following steps, we assume you have copied it to /tmp/hpt374.o.

2) Replace hpt374.o in the boot RAM disk image, /boot/initrd-xxx.img, where xxx is the kernel version. (2.2.16-22 for Red Hat Linux 7.0, 2.4.2-2 for Red Hat Linux 7.1, 2.4.7-10 for Red Hat Linux 7.2)

```
# gzip -dc /boot/initrd-xxx.img > /tmp/initrd.ext2
# mkdir /mnt/initrd
# mount -o loop /tmp/initrd.ext2 /mnt/initrd
# cp /tmp/hpt374.o /mnt/initrd/lib/hpt374.o
# umount /mnt/initrd
# gzip -c /tmp/initrd.ext2 > /boot/initrd-xxx.img
```

3) If you are using lilo to boot your system, use "**lilo**" to reinstall the RAM disk:

```
# lilo
```

4) Update hpt374.o in /lib/modules:

Red Hat Linux 7.0:

```
# cp /tmp/hpt374.o /lib/modules/2.2.16-22/scsi/hpt374.o
```

Red Hat Linux 7.1/7.2/7.3/8.0/9.0:

```
# cp /tmp/hpt374.o /lib/modules/`uname –r`/kernel/drivers/scsi/hpt374.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 HPT374 Controller. Installation of the management software is optional but recommended.

Please refer to HighPoint RAID Management Software documents about more information.

7 Uninstalling

You can only uninstall the driver when your system is not booting from devices attached to HPT374 Controller. Just remove the lines you added to /etc/modules.conf and /etc/fstab.