HPT370 UDMA/ATA100

RAID Controller

SuSE Linux 7.1

Installation Guide

Version 1.0

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1 Overview

The purpose of this document is to provide clear instructions on how to install and use HPT370 UDMA/ATA100 RAID Controller on a SuSE Linux 7.1 system.

2 Installing SuSE Linux on HPT370 Controller

If you would like to install SuSE Linux onto drives attached to HPT370 controller, please perform the following operations:

Step 1 Prepare Your Hardware for Installation

After you attach your hard disks to HPT370 controller, you can use HPT370 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 HPT370 controller, from 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 SuSE Linux 7.1 onto HPT370 controller, you must boot from a customized boot diskette to start installation.

First obtain the boot diskette image file, suse71boot.img.

On a DOS or Windows system, you can make the boot diskette using rawrite.exe. It can be found on the SuSE Linux 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 “suse71boot.img” should be typed as “suse71~1.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=suse71boot.img of=/dev/fd0
```

Step 4 Install SuSE Linux

1) Start installing the SuSE Linux by booting from the bootable disk provided for HPT370 driver.

2) When a prompted label "**boot:**" appears, press "**enter**".

3) The hpt370 module will be automatically loaded. You can simply continue the installation as normal. Please refer to SuSE Linux installation guide.

Note

The system device mapping order is the same as the order shown in HPT370 BIOS Setting Utility. 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 you are asked to select the kernel to install, you must have 2.2.18 kernel selected. Installing 2.4.0-4GB kernel is optional.

5) When installation completed the system will startup without rebooting. Logon to the system as root and insert the HPT370 driver diskette into floppy drive, then type in the following commands to perform a post installation script:

```
# mount /floppy
# cp /floppy/370postinstall /tmp
# sh /tmp/370postinstall
```

The post installation script will copy new kernel and driver modules to your hard disk. Just follow its prompt. When it is done, you can reboot the system:

```
# umount /floppy
# reboot
```

Now SuSE Linux should boot up from your HPT370 controller.

3 Installing HPT370 Driver on an Existing System

If you are currently running Linux and would like to access drives or arrays attached to the HPT370 Controller, you can perform the following steps.

Step 1 Obtain the Driver Module

SuSE 7.1 Linux system may use version 2.2.18 kernel or version 2.4.0 kernel. You must first check your system to find which kernel it uses, and get the corresponding driver module for it. On the driver diskette there are both driver modules for kernel version 2.2.18 and 2.4.0:

2.2.18/hpt370.o	Driver for 2.2.18 kernel

2.4.0-4GB/hpt370.o	Driver for 2.4.0 kernel

Step 2 Update the Kernel

To use the hpt370 driver module on a SuSE Linux 7.1 system, you must update the kernel to remove HPT366 IDE 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 SuSE Linux CD.

Before you build the new kernel, you should remove the following 2 lines from /usr/src/linux/drivers/ide/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 driver diskette

If you do not want to build the kernel by yourself, you can simply use the kernel we provided. If you are using 2.2.18 kernel, you can update it with the file "**linux**" on the boot diskette. If you are using 2.4.0 kernel, you can update it with file "**vmlinuz_24.without370**" on the driver 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.without370". You can change it to whatever name you want.):

```
image=/boot/vmlinuz_24.without370
    label=linux_24.370
    read-only
    root=/dev/hda6
image=/boot/vmlinuz.without370
    label=linux.370
    read-only
    root=/dev/hda6
```

To tell lilo to boot the new kernel by default, you may also modify "**default=**" line to "**default=linux_24.370**" or "**default=linux.370**".

Note

Your root file system may be not on /dev/hda6. Check the correct location and modify the line "root=/dev/hda6" to match your system configuration.

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 hpt370.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 hpt370.o. Try to load SCSI modules first.

E.g. # **insmod scsi_mod**
insmod sd_mod
insmod hpt370.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 HPT370 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 hpt370.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 hpt370.o can be located):

If you are using 2.2.18 kernel, use

install -d /lib/modules/2.2.18/scsi
install -c hpt370.o /lib/modules/2.2.18/scsi

If you are using 2.4.0 kernel, use

install -d /lib/modules/2.4.0-4GB/kernel/drivers/scsi

 # install -c hpt370.o /lib/modules/2.4.0-4GB/kernel/drivers/scsi

Now inform the system when to load the module by editing the file "**/etc/modules.conf**" and add the following line:

probe all block-major-8 scsi_mod sd_mod hpt370

This tells the kernel to try loading the SCSI and hpt370 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 hpt370 driver.

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/hpt after startup:

/dev/sda1 /mnt/hpt ext2 defaults 0 0

4 Monitoring the Driver

Once the driver is running, you can monitor the driver through the Linux proc file system support. There is a special file, /proc/scsi/hpt370/0, through which you can read driver status and send control commands to the driver.

Checking Devices Status

Using the following command to show driver status:

 # cat /proc/scsi/hpt370/0

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 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,d" > /proc/scsi/hpt370/0

In the command, "**a**" is array number shown in the logical device list. "**b**" is controller number (always 0 if you have one HPT370 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/hpt370/0

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

If rebuilding cannot automatically start, you can use the command

echo "hpt rebuild start" > /proc/scsi/hpt370/0

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

echo "hpt rebuild stop" > /proc/scsi/hpt370/0

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 attached devices by typing in the following command:

echo "hpt rescan all" > /proc/scsi/hpt370/0

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/hpt370/0

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 HPT370 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 HPT370 controller, you can update the driver just by reinstalling it following the previous section, "**Install driver to an existing system**".

If you are using a system installed to HPT370 controller, you can update the driver by the

following steps.

1) First obtain the new driver module file hpt370.o. Refer to previous section "**Obtain the driver module**". In the following steps, we assume you have copied it to /tmp/hpt370.o.

2) Replace hpt370.o in the boot RAM disk image.

If you are using 2.2.18 kernel, you can use the following commands:

```
# gzip -dc /boot/initrd.suse > /tmp/initrd.ext2
# mkdir /mnt/initrd
# mount -o loop /tmp/initrd.ext2 /mnt/initrd
# cp /tmp/hpt370.o /mnt/initrd/lib/modules/2.2.18/scsi/hpt370.o
# umount /mnt/initrd
# gzip -c /tmp/initrd.ext2 > /boot/initrd.suse
```

If you are using 2.4.0 kernel, you can use the following commands:

```
# gzip -dc /boot/initrd_24 > /tmp/initrd.ext2
# mkdir /mnt/initrd
# mount -o loop /tmp/initrd.ext2 /mnt/initrd
# cp /tmp/hpt370.o /mnt/initrd/lib/modules/2.4.0-4GB/kernel/drviers/scsi/hpt370.o
# umount /mnt/initrd
# gzip -c /tmp/initrd.ext2 > /boot/initrd_24
```

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

```
# lilo
```

4) Update the hpt370.o in /lib/modules:

On 2.2.18 kernel, use

```
# cp /tmp/hpt370.o /lib/modules/2.2.18/scsi/hpt370.o
```

On 2.4.0 kernel, use

```
# cp /tmp/hpt370.o /lib/modules/2.4.0-4GB/kernel/drivers/scsi/hpt370.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 HPT370 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.

If you are using KDE or GNOME workstation, they are already installed. Otherwise you may check your system and 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 hpt370 daemon:                                    done
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 KDE, you can also run the software by select the KDE menu "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 HPT370 controller. Just remove the lines you add 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 hpt370 daemon:                                    done
Uninstall finished!
[root@tmp]#
```