

Troubleshooting Hardware With Linux

Fort Worth Linux Users Group – 12 March 2005

I. Memory and Power Supply Problems / Testing

Memtest86 – <http://www.memtest.org>

*NOTE: This program isn't specific to Linux, but is included on many Linux CDs such as Knoppix.

Memtest can display front-side bus and memory frequency, PAT status, memory timings, ECC status and the number of memory channels.

Many problems that seem to be subsystem specific (hard drive, video, etc) can be traced back to bad memory. Check for damaged memory sockets and/or retaining clips. Again, while not Linux-specific, don't forget about the power supply! Poorly-designed, under-rated or defective power supplies may cause a variety of problems!

II. Hard Disc Drive Problems / Testing

smartctl – Control and monitor utility for S.M.A.R.T. hard disc drives

S.M.A.R.T. stands for **Self-Monitoring Analysis Reporting Technology**. Virtually ever modern-day hard drive is SMART-capable. The smartctl utility will let you know if the drive you are testing is SMART-capable or not.

Useful commands (as root):

``dd if=/dev/zero of=/dev/hda`` – will write all zeros to 1st IDE hard disc.

``dd if=/dev/zero of=/dev/hda bs=512 count=1`` – will zero out only the hard drive's Master Boot Record (MBR) (re-write the MBR with fdisk).

``dd if=/dev/hda of=/dev/fd0 bs=512 count=1`` – This will backup the MBR to a floppy disc.

``dd if=/dev/hda of=/dev/hdb bs=512`` – performs disc cloning. Copies 1st IDE hard drive contents to 2nd IDE hard drive.

``shred -v /dev/hda`` – overwrites the drive with random data. Use with caution! Can be used on /dev/fd0.

``smartctl -a /dev/hda`` - displays complete information about the 1st IDE hard disc.

``smartctl -i /dev/hda`` - displays the device model number, serial number, etc.

``smartctl -H /dev/hda`` - Ask the device to report its SMART health status.

smartctl can display the overall health of IDE and SCSI disc drives. A hard drive that appears to perform adequately most of the time may actually be in a pre-fail status. Use this command to query the hard drives log. If any problems are detected, it's probably a good idea to change out the drive. See ``man smartctl`` for commands on testing the drive whenever you encounter information from any of the above commands about imminent disc failure.

Smartmontools Homepage:

<http://smartmontools.sourceforge.net/>

II. Hard Disc Drive Problems / Testing (continued)

Monitoring Hard Disks with SMART by Bruce Allen:

<http://www.linuxjournal.com/article/6983>

III. File systems

fsck - check and repair various file systems including JFS, ReiserFS, Minix, MS-DOS and FAT32.

This command is available on all Linux systems. Use with caution! fsck cannot check NTFS file systems!

“Captive” NTFS can be used to read/write NTFS partitions. Knoppix will only read NTFS partitions by default! Useful for backing up data from PCs with inaccessible NTFS partitions in their native mode of operation (think Blue Screen of Death) to a CIFS/Samba/NFS server.

See ``man fsck``, ``apropos fsck`` or ``apropos captive`` for more information regarding these utilities.

IV. Hardware Device and Vendor ID Discovery

dmesg - print or control the kernel ring buffer. This program prints out bootup messages. Minimal information about hardware is returned, however.

pnpdump - dumps ISA Plug-And-Play devices resource information.

isapnp - Configures ISA Plug-And-Play devices. Use ``pnpdump`` to create the isapnp.conf file.

lspci - lists all PCI devices. This utility displays information about all PCI buses in the system and all devices connected to them. Much more useful than dmesg above.

Useful commands (as root):

``lspci`` - displays PCI information in human-readable format along with PCI bus identification.

``lspci -v`` - provides more verbose information including memory-start addresses and I/O ports.

``lspci -t`` - display bus tree.

``lspci -n`` - displays numeric ID numbers. Use in conjunction with ``lspci`` to determine who the hardware vendor is for a particular PCI device. Using this command we get something like this:

With ``lspci`` - 00:00.0 Host bridge: VIA Technologies, Inc. VT82C693A/694x [Apollo PRO133x] (rev 44)

With ``lspci -n`` - 00:00.0 Class 0600: 1106:0691 (rev 44)

We're interested in the first and last set of numbers here, the 00:00.0 and 1106:0691. 00:00.0 identifies the PCI bus the device is connected to. The 1106 indicates this a device made by VIA. VIA's PCI vendor ID is 1106. The number after the colon, 0691, represents the hardware device made by VIA. In this case it is a VT82C693A host bridge. You can now lookup that device you're having problems finding a driver for without having to open up the case or removing the PCI card. With so many devices built into system boards nowadays, this can prove to be a real time-saver. You may want to keep a list of PCI devices handy or you can look them up here:

PCI Vendor and Device Lists - <http://www.pcidatabase.com/>

The Linux PCI ID Repository - <http://pciids.sourceforge.net/>