Problem:

When attempting to install an operating system to hard disks 137 GB and larger,the operating system does not boot. Windows fails to enterthe second stage of the install (from the hard disk) and gives a "Disk Read Error." Linux appears to successfully install but gives a "GRUB Level 1.5 Error 18" upon the first attempt to boot from the new system.

Background:

48-bit logical block addressing (LBA) is a technology that extends the capacity of IDE ATA/ATAPI devices beyond the previous limit of 137.4 GB. This limit applies to IDE ATA/ATAPI devices only and not to SCSI interface devices. The original design specification for the ATA interface only provided 28 bits with which to address the devices. This meant that a hard disk could only have a maximum of 268,435,456 sectors of 512 bytes of data, thus limiting the ATA interface to a maximum of 137.4 GB. With 48-bit addressing the limit is 144 petabytes (144,000,000 GB).

Solution:

The procedure for enabling access to hard drives larger than 137 GB varies according to the operating system installed on the machine.

Windows XP

Windows XP requires the installation of Service Pack 1 or higher to recognize partitions/drives larger than 137 GB. Windows XP installation disks with Service Pack 1 or higher will automatically recognize the extra space and install correctly with no further action required. Pre-SP1 Windows XP installation disks require the following precedure:

1. Install Windows XP to a 136 GB (or smaller) partition.
2. Apply Service Pack 1 or higher.
3. Boot the board from alternate media containing a partitioning tool such as Partition Magic, Parted, GParted, or QTParted. (See Useful Links.)
4. Resize the partition containing the OS to occupy the rest of the disk.
5. Boot the system from the hard disk.

Windows verifies the partition and reboots. Once the OS loads, it installs drivers for the hard disk and reboots again. When the system comes back up, the expanded, bootable partition occupies the entire disk.

Windows 2000

1. Install Windows 2000 to a 32 GB or smaller partition and reboot.
2. Apply Service Pack 3 or 4.
3. Open the registry editor (regedit.exe).
4. Navigate to the registry subkey:
   `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\atapi\Parameters`
5. From the Edit menu, select New, DWORD Value.
6. Enter the name `EnableBigLba`, and press Enter.
7. Double-click the new value, set it to 1, then click OK.
8. Close the registry editor and reboot.

9. Boot the board from alternate media containing a partitioning tool such as Partition Magic, parted, GParted, or QTParted. (See Useful Links.)
10. Resize the partition containing the OS to occupy the rest of the disk. Boot the system from the hard disk.

Windows verifies the partition and reboots. Once the OS loads, it installs drivers for the hard disk and reboots again. When the system comes back up, the expanded, bootable partition occupies the entire disk.

Linux

There are two possible solutions for enabling large disk access in Linux.

Solution 1:

During installation of the OS, create a small (100-250 MB) "/boot" partition near the beginning of the drive. This will circumvent the problem altogether.

Solution 2:

If you prefer to have your entire file system in one partition, install the OS to a 136 GB or smaller partition, then:

1. Boot the board from alternate media containing a partitioning tool such as Partition Magic, parted, GParted, or QTParted.(See Useful Links.)
2. Resize the partition containing the OS to occupy the rest of the disk.
3. Boot the system from the hard disk.

During boot, the system runs "fsck" to verify the disk, then reboots. When the system comes back up, the expanded, bootable partition occupies the entire disk.

Useful Links

- Partition Magic is a commercial product used for manipulating hard disk partitions.
- Parted is a powerful open source command-line partition editor which can be run from alternate bootable media such as a boot floppy, bootable USB thumb drive or a Live CD.
- GParted is a graphical front-end to Parted.
- QTParted is a graphical front-end to Parted using the QT toolkit.
- Parted Magic is a Linux-based Live CD which includes Parted partitioning software and several other useful hard disk management tools.

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