PC STORAGE DEVICES

TYPES OF STORAGE DEVICE INTERFACES:

- SCSI Interface Discussion.
- IDE Interface Discussion.
- EIDE Interfaces Discussion

STORAGE DEVICES:

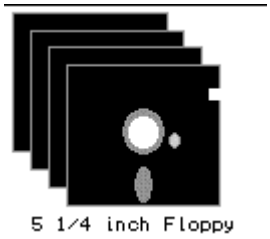
- HARD DRIVES
- FLOPPY DRIVES
- CD-ROM Devices
- REMOVABLE MASS STORAGE DEVICES:

Floppy Drive Storage (CPU)

The original purpose of floppy drives was to store data and transport data in a useable form. Floppy diskettes were inexpensive and easy to handle. They are becoming somewhat overshadowed by today's technology of CD-ROM, ZIP, and JAZ drives.

There are basically two popular sizes of floppy drives. (however, I consider there have been at least 4 types.):

Type 1 = 5 1/4 inch Floppies. They are almost never used anymore. They are low capacity, and slow; however, they look like this:



5 1/4 inch Floppy

Originally, 5 1/4 Inch floppies had 1 side and 185 KB space, they later were formatted at 360KB, and even later, you could format for 720 KB.

Type 2 = 3.5 inch Floppies. These are still very popular; however, they are taking a back seat to CD-ROM for software distribution from most vendors.

These floppies could be formatted at 720 KB (DD2S), 1.2 MB, and 1.44 MB.In some instances, they have been specially formatted at 1.68 MB and 1.72 MB; however, without special software you cannot format at these levels.

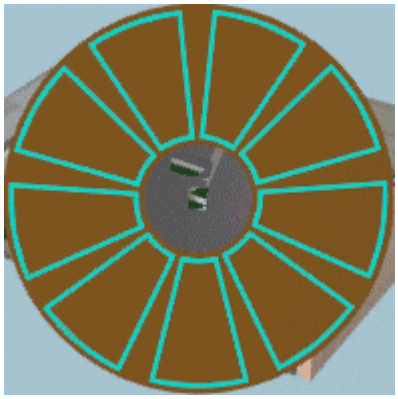
3.5 inch Floppy

These 3.5 inch floppies are excellent for small file portability; however, today, many graphics images alone are larger than the 1.44MB. If you need to carry many large files, they require multiple floppies which become cumbersome to handle.

Notice the disk case is hard, but inside the case, there is a flexible disk called a "platter" or a surface. There are normally two surface on a single platter in a floppy drive. The Read/Write head is on the robot arm that extends over the surface.

The platter on a floppy diskette drive are coated with some magnetic film material that can record data in the form of magnetized spots on the surface.

The disk surface has "tracks" that are concentric circles (complete circles) that are next to each other on each surface. The tracks on the outside are larger than the tracks on the inner part of the surface. There may be 200 or more tracks per surface.



Then each surface is subdivided into "sectors" Each sector on each surface will be able to contain a specific amount of bytes (8 bit characters), usually 512 bytes per sector. The size of the sector determines the amount of data that can be written, and the amount that will be wasted if only a few characters are in a record. A one byte record written to a sector occupies the entire track in that sector.

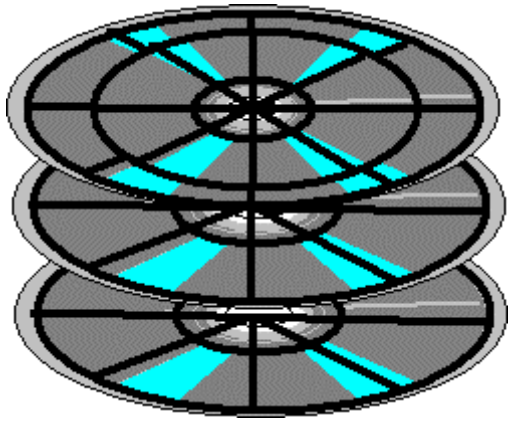
A floppy diskette must have a record that defines the disk to the CPU for access/writing. In a DOS environment, this record is the File Allocation Table (FAT). The speed of rotation is a factor in the access speed of the drive. The read/write head must move to the proper track before it can read. Once at the proper track, it must wait for the proper sector to rotate under the head to read the data. This is called the "latency" time.

The more files you have on a diskette, the larger the FAT table. Consequently, if you have a large number of files on the floppy, the less actual data you can put on the drive, for example, with one file on a floppy, you can put almost 1.44MB of data; for 250 files, you might only be able to put 1.2 MB of data on the same diskette!

Hard Drive Storage (CPU)

What we normally refer to as a "hard drive" is a storage with one or more metal disks (called platters), arranged on a spindle, one above the other; with a read/write head (most often on an arm that can be moved to a specific point on the recording surfaces. This read/write apparatus is probably the first true 'robot'.

Notice the disk, called a "platter" or a surface. There are multiple surfaces and platters in some hard disk drives.



The Read/Write head is on the robot arm that extends over the surface. The motor and controls for the read/write are in the bottom left corner, and the setup circuitry is in the bottom right corner. The container is open in this illustration; however, it is normally hermetically sealed to keep out dust.

The platters on a hard disk drive are metal, coated with some magnetic film material that can record data in the form of magnetized spots on the surface.

The disk surface has "tracks" that are concentric circles (complete circles) that are next to each other on each surface. The tracks on the outside are larger than the tracks on the inner part of the surface. There may be 200 or more tracks per surface. If I have 10 surfaces, then I can have one cylinder composed of track 1 on each surface. Track 2 on all surfaces is one more cylinder. And so on, so that I have a cylinder for each track on the first surface.

Then each surface is subdivided into "sectors". Each sector on each surface will be able to contain a specific amount of bytes (8 bit characters), usually 512 bytes per each section of a track per sector. Each sector contains a portion of each track on the surface. So, if there are 200 tracks on the surface, a sector contains portions of 200 tracks.

The size of the sector determines the amount of data that can be written, and the amount that will be wasted if only a few characters are in a record. A one byte record written to a sector occupies the entire track in that sector.

A hard disk (and a floppy) must have a record that defines the disk to the CPU for access/writing. In a DOS environment, this record is the File Allocation Table (FAT). It contains the information about where to find anything written on the disk. Windows NT uses either DOS FAT or NTFS file systems. OS/2 uses a HPFS (high performance file system). The formats are different than FAT systems, but the information on the disk can still be found.

The disk rotates at about 3600 RPM in most older drives. Some of the newer drives rotate at 4500 to 7200 RMP and a faster 10,000RMP model was introduced recently. The rotation speed is a factor in the access speed of the drive. The read/write head must move to the proper track before it can read. Once at the proper track, it must wait for the proper sector to rotate under the head to read the data. The factors that influence a hard drives performance are generally:

1. Rotation Speed.
2. Seek Time.
3. Head Switch Time.
4. Cylinder Switch Time.
5. Rotational Latency.
6. Data Access Time
7. Hard Drive Cache
8. Data Organization
9. Transfer Rate
10. Interface Type

Redundant Array of Inexpensive Disks (RAID)

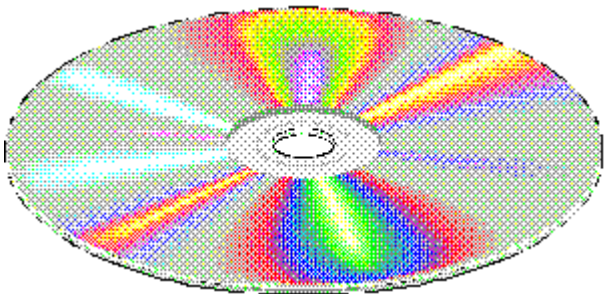
RAID Devices are multiple hard drives arranged in a cabinet, usually in a "tower" type cabinet. The thing that make them different from a large hard drive is primarily the multiple drives, which are 'hot-swapable'. This means that if a single drive of the RAID array fails, you can insert a new drive and the reconfigure to recover the data that was on the drive that failed.

The statement above is incomplete because there are also more things about RAID drives that make them different from normal hard drives.

1. They normally have much more storage than a single hard drive. But since the advent of 3.2 GB and 6.+ GB hard drives the size may not be more important unless you have serious amounts of data.
2. RAID devices will usually have from 3 to 7 drives in their cabinet.
3. Data is written (called "striping") to multiple drives rather than to a single drive.
4. RAID devices allow you to 'mirror' data on another drive in the array.

CD-ROM Storage (CPU)

CD-ROM stands for Compact Disk - Read Only Memory. The actual CD-ROM disk looks similar to this:



CDs are the actual Compact Disks that you place in the CD-ROM drive.CDs hold approximately 650 MB of information.

However, you must have a "CD-ROM" drive to be able to see or use the contents of a CD. You will need a "recordable" CD-ROM drive if you want to record on a CD.

A compact disk (CD) is a plastic disk, coated with aluminum alloy. The "plastic" base is made of a polycarbonate wafer (if you want to know more, consult a chemical engineer). The CD is written to by a laser, and read by a laser.

CDs are available in 63 and 74 minute versions. 4.72 inches (120 mm) in diameter, 1.2mm thick, and has a 15mm hole in the center for mounting in the drive.

CD-ROM drives are rated in terms speed. The are single, 2, 4, 6, 8, 12, and even a 16 speed in was introduced in 1997.

A single speed CD-ROM drive was designed to transfer data at 150 KiloBytesPS (KBPS) per second. Each speed rating is a number times 150 kbps. So, a 2 speed should transfer data at a 300 KBPS, and a 10 speed should be 150 MBPS x 10 = 1,500 kbps. or about 1.5MBPS.

Access Time is another matter - typically 100 to 200 Milleseconds! Very slow, but the higher speed drives help overcome this through higher transfer rates.

CD-ROM interfaces are SCSI/ASPI (Advanced SCISI Programming Interface) and IDE/ATAPI (AT Attachment Packet Interface), and proprietary versions.