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# COMPUTER STUDIES NOTES

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## Secondary/Auxiliary Storage Devices and Media



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#### Secondary/Auxilia Storage Devices and Media

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  - floppy disks
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  - zip disks



## Secondary/Auxilia Storage Devices and Media

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Secondary storage (*also known as external memory or auxiliary storage*), these memory permanently store data for future reference. Secondary storage does not lose the data when the device is powered down (it is non-volatile). **Example:** Hard disk, Floppy disk, CD etc.

### Fixed Storage Media

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These are non-removable secondary storage devices such as the hard disk.

#### The Hard Disk

A hard disk is part of a unit, often called a "disk drive," "hard drive," or "hard disk drive," that store and provides relatively quick access to large amounts of data on an electromagnetically charged surface or set of surfaces. A hard disk is really a set of stacked "disks," each of which, like phonograph/ gramophone records, has data recorded electromagnetically in concentric circles or "tracks" on the disk. A "head" (something like a phonograph arm but in a relatively fixed position) records (writes) or reads the information on the tracks. Two heads, one on each side of a disk, read or write the data as the disk spins. Each read or write operation requires that data be located, which is an operation called a "seek." (Data already in a disk cache, however, will be located more quickly.)

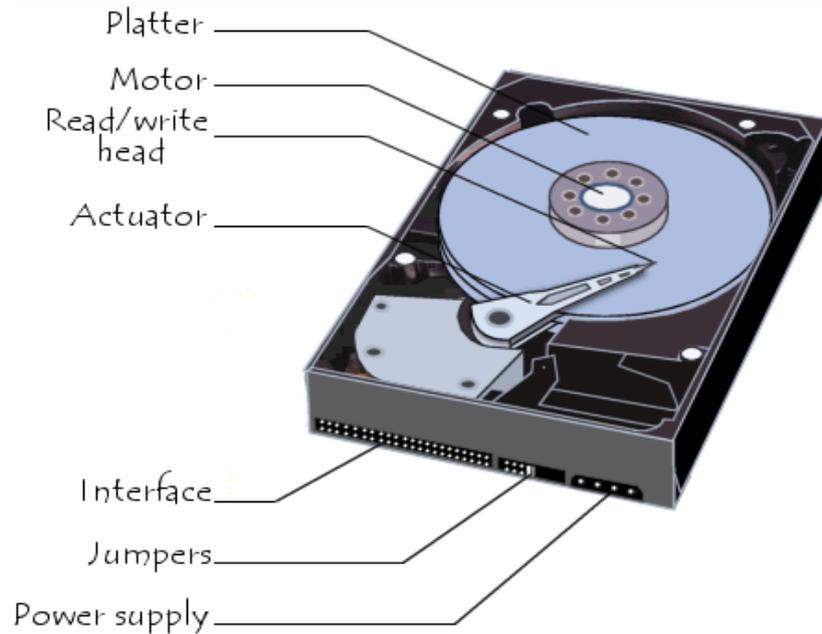


FIGURE 1: HARD DISK DRIVE

Several disk plates depending on the design are mounted together to form a disk pack. The plates within the pack are used as a unit. The disk pack plates are held on the rotational spindle, which is used by the drive motor to spin the disk pack's plate's surfaces past the R/W heads for the READ/WRITE operations to be possible on the recording surface.

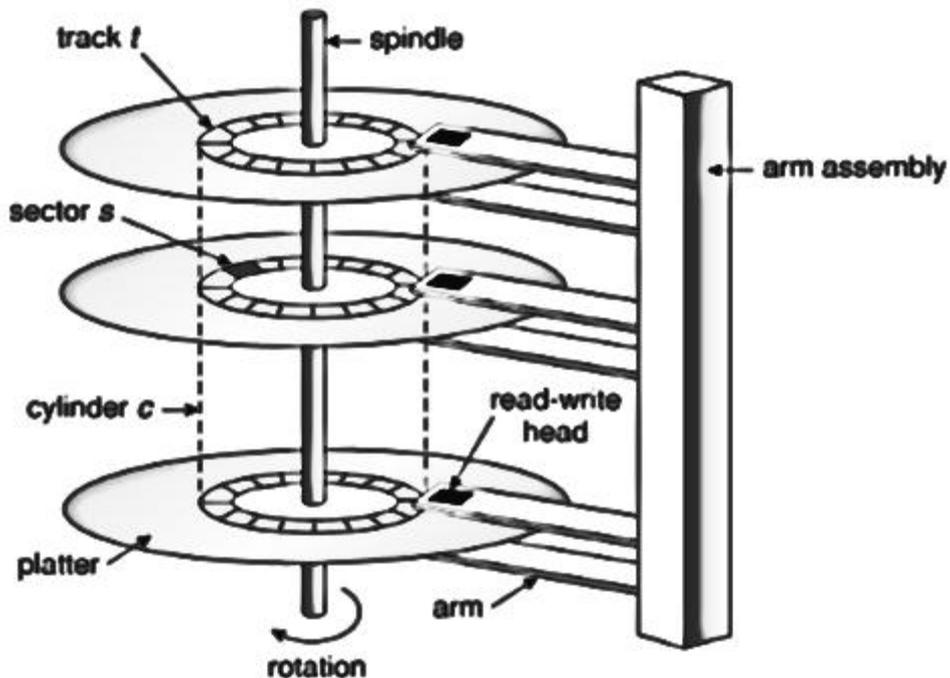


FIGURE 2: HARD DISK PLATTERS



The read and write operations are carried out by the R/W heads in the disk drive, under the influence of the computer's command signal.

### **Advantages of Hard Disks**

1. They store large volumes of information
2. Accessing data is random, faster and more easier as compared to other auxiliary devices
3. They are more reliable than other magnetic disks because they are protected from dust.

### **Removable Storage Devices**

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These are secondary storage devices that can be carried and used in various hardware platforms. For a removable storage device to function, a special hardware component is needed in the host computer hardware called **the drive** that helps in reading and writing of secondary storage devices. *Examples include: Floppy disk, tape disk, flash disk, compact disks, digital versatile disks etc.*

### **Floppy Disks**

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A floppy disk is a secondary removable storage device made of a thin magnetically plastic enclosed in a plastic case. The inscription of data is done on the magnetic coating around the plastic. There are two common types of floppy disks namely: 5.25 inch and 3.5 inch each of the disks has a low density (single sided) and a high density (double sided) version. The single sided is designed in a way that data can only be recorded on a single side of the disk platter while a double sided disk is designed to record information on both sides of the disk platter

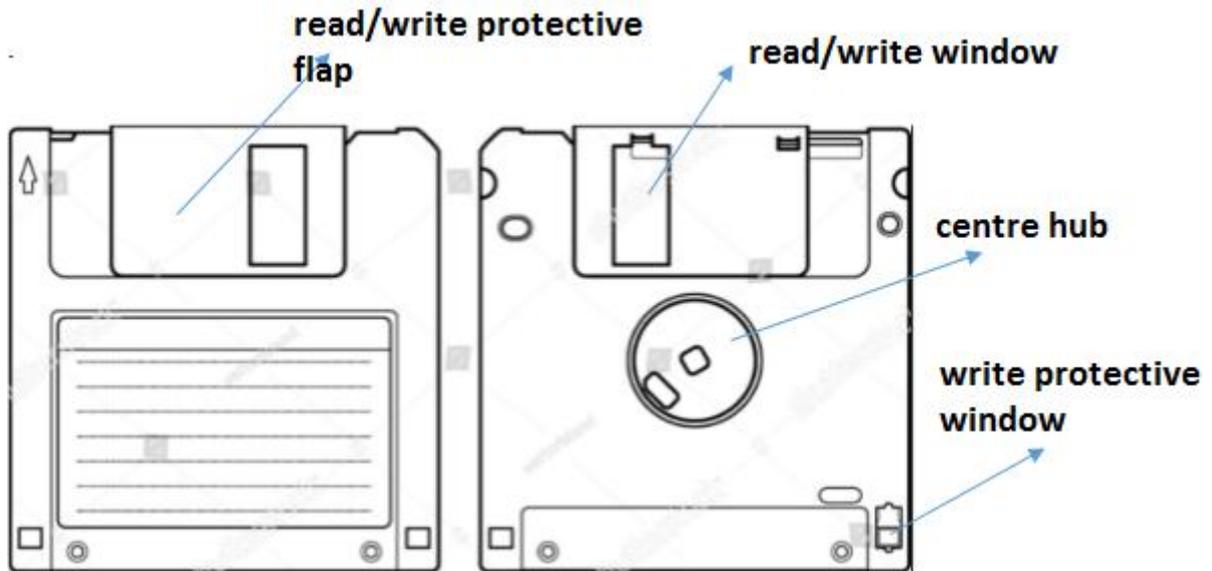


FIGURE 3: TOP AND BOTTOM VIEW OF A FLOPPY DISK

### **The Disk Platter**

This is a magnetic metal oxide surface in the disk that holds data in tracks and sectors. The sectors and tracks have the same storage capacity. The area within the same track bound by two edges of a sector, forms the unit for read/write operations.

### **Advantages of floppy disks**

1. They are portable
2. Data can be written into, read and altered
3. Its quicker to access data because data is directly accessed

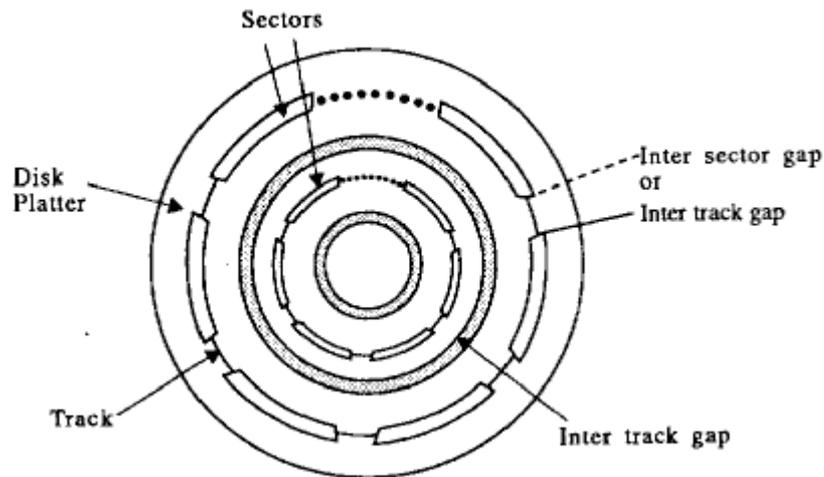


FIGURE 4: THE DISK PLATTER

### Disadvantages of floppy disks

1. They are easily destroyed or corrupted by dust, heat and magnetic fields
2. They store small volumes of data i.e. 1.44 MB for a 3.5 inch floppy disk
3. Most modern hardware devices do not support floppy disks

### Tape

This is a flexible plastic ribbon on which data can be stored using a magnetic process. Data is stored as magnetic spots arranged in columns on the magnetic tape. Magnetic tapes are sequential access devices. This implies that if the information is at the end of the tape, the program will have to read almost the entire tape, which may take a lot of time.

### Advantages of tapes

1. Can store large volume of data
2. Can store data for longer periods of time as compared to floppy disks
3. They are light and easy to carry

### Disadvantages of tapes

1. Most computer hardware components don't support tapes
2. Takes a longer time to read from the tape



3. There is wastage of space due to the inter-block gaps (IRG)

## Optical Disks

The first optical laser disk was only demonstrated in 1972. This was the 12-inch Laserrision, a video disk in which the video signal was stored in an analog form similar to the present video cassette recorders. Later in 1975, Philips together with Sony defined the standard for the 5-in audio CD (compact disc). This is a read-only device, but the audio information is stored digitally.

In 1977 the first 12-inch writeable (once) disk (WORM) was introduced. So far the devices developed were targeted at the consumer audio-visual market.

In 1980, Philips and Sony introduced a version of the CD that was used for storing digital data for computer applications. As this acted as a memory device, it was called the CD-ROM. Finally in 1987, Sony demonstrated the erasable and rewritable 5.25-inch optical disk drive. Recently, products became available enabling the user to create his own CD-ROM using the CD drive.

### **1. Compact Disks**

A compact disc is a thin, circular disc of metal and plastic about 12cm (just over 4.5 inches) in diameter. It's actually made of three layers. Most of the CD is made from a tough, brittle plastic called polycarbonate. Sandwiched in the middle there is a thin layer of aluminum to reflect back light.

Finally, on top of the aluminum, is a protective layer of plastic and **lacquer**. The first thing you notice about a CD is that it is shiny on one side and dull on the other. The dull side usually has a label on it telling you what's on the CD; the shiny side is the important part. It's shiny so that a laser beam can bounce off the disc and read the information stored on it.

Data is stored into a disk using a method called **Sampling**. This is the process of converting data into bits i.e. zeros and ones (binary language). On the surface of a disk are pits and land. **Pits** are created by a laser beam and represent zeros, so every time the laser burns a bump into the disc, a zero is stored there. The lack of a bump (which is a flat, unburned area on the disc, called a **land**) represents the



number one. Thus, the laser can store all the information sampled from the original track of music by burning some areas (to represent zeros) and leaving other areas unburned (to represent ones).

The Compact Disc was originally developed to store and play back sound recordings only, but the format was later adapted for storage of data (CD-ROM), write once audio and data storage (CD-R) R-recordable, rewritable media (CD-RW), Video Compact Discs (VCD), Super Video Compact Discs (SVCD), PhotoCD, PictureCD, CD-i, and Enhanced CD. Audio CDs and audio players have been commercially available since October 1982. Have a storage capacity of 700MB or 80 minutes of continuous play.

## **2. Digital Versatile Disks**

This is an optical disc storage format, invented and developed by Philips, Sony, Toshiba, and Panasonic in 1995, DVDs offer higher storage capacity than Compact Discs while having the same dimensions: Have a storage capacity of 4.7 GB or 2 hours of continuous play, up to 20 GB. The modern DVDs are called a Blu-Ray Disc and HD DVD- In 2006; two new formats called HD DVD and Blu-ray Disc were released as the successor to DVD. HD DVD competed unsuccessfully with Blu-ray Disc in the format war of 2006–2008. A dual layer HD (high definition) DVD can store up to 30GB and a dual layer Blu-ray disc can hold up to 50GB.

## **Zip Disks**

Zip disk is an advancement of a floppy disk that was introduced by Lomega in 1994. Zip disks come with different capacities from 100MB-250MB.



## Topical questions

1. What role does secondary storage media play?
2. List any three types of storage media you know
3. Which is the most commonly used high capacity storage medium with microcomputers?
4. What are the advantages of Hard disks over floppy disks?
5. List two advantages and two disadvantages of using magnetic tapes
6. Give at least one type of storage device that might be used for each of the following:
  - a. Storing programs when not in the main memory
  - b. Storing large sequential files
  - c. Storing large direct access files
7. Distinguish between:
  - a. Primary and secondary storage media
  - b. Fixed and removable storage media
  - c. Optical disks and magnetic disks
8. State four advantages of optical disks over magnetic disks
9. State two advantages of magnetic disks over optical disks
10. State three precautionary measures that should be observed to avoid damaging:
  - a. Optical disks
  - b. Magnetic disks
11. Draw a well labelled structure of a floppy disk.
12. What is a drive?



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