

Unit-5

Mass storage →

Mass storage refers to system meant to store large amounts of data.

- Mass storage refers to various techniques and devices for storing large amounts of data.
- Mass storage is distinct from main memory. Main memory is too small to accommodate all data and programs and because the data that it holds are lost when power is lost, the computer system must

provide secondary storage to back up main memory.

- Most modern computer system must provide secondary storage use disks as the principal online storage medium for both programs and data.
- Most programs - including compilers, assemblers, word processors, editors are stored on a disk until loaded into memory and then use the disk as both the source and destination of their processing.
- Hence proper management of disk storage is of central importance to a computer system.
- The operating system is responsible for the following activities in

connection with disk management

→ Free space management

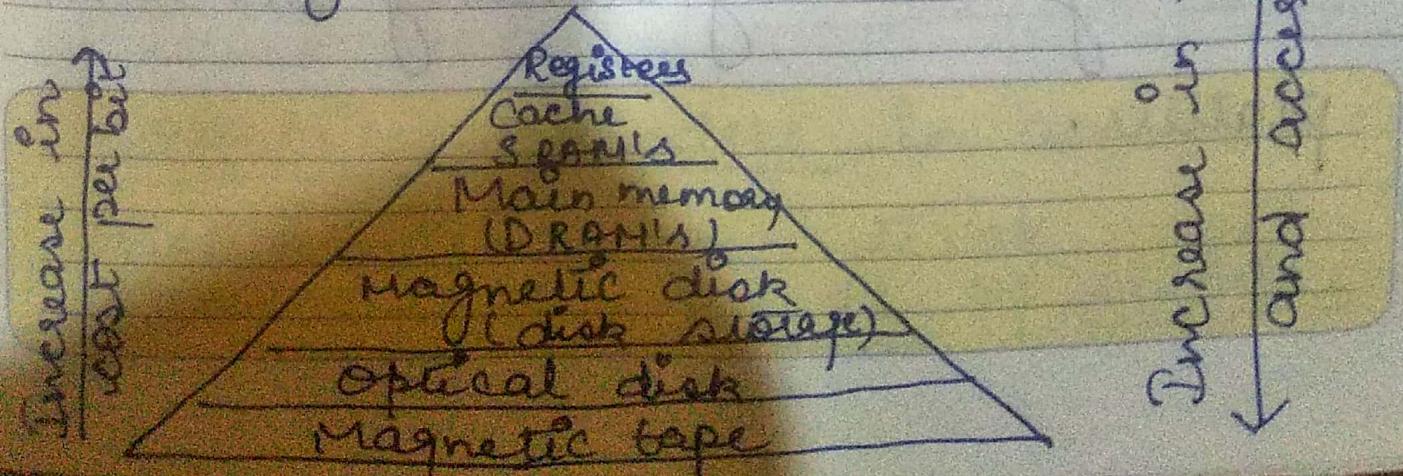
→ Storage allocation

→ Disk scheduling

Because secondary storage is used frequently, it must be used efficiently.

→ The entire speed of operation of a computer may hinge on the speeds of the disk subsystem and the algorithms that manipulate that subsystem.

Hierarchy of memory



Overview of Mass Storage Structure

→ Magnetic disks ↴

magnetic disks provide the bulk of secondary storage for modern computer systems.

→ Conceptually, disks are relatively simple. Each disk platter has a flat circular shape, like a CD. Common diameter ranges from 1.8 to 5.25 inches. The two surfaces of a platter are covered with a magnetic material. We store information by recording it magnetically on the platters.

- A read-write head "flies" just above each surface of every platter. The heads are attached to a disk arm that moves all the heads as a unit.
- The surface of a platter is logically divided into circular tracks, which are subdivided into sectors.
- The set of tracks that are at one arm position makes up a cylinder.
- There may be thousands of concentric cylinders in a disk drive, and each track may contain hundreds of sectors.

The storage capacity of common disk drives is measured in gigabytes.

- When the disk is in use, a drive motor spins it at high speed
- Most drives rotate 60 to 800 times per second.
- Disk speed has two parts -
 - i) The transfer rate is the rate at which data flow b/w the drive and computer.
 - ii) The positioning time, sometimes called the random access time, consists of the time necessary to move the disk arm to the desired cylinder, called the seek time

and the time necessary to move the disk arm for the desired sector to rotate to the disk head, called the rotational latency.

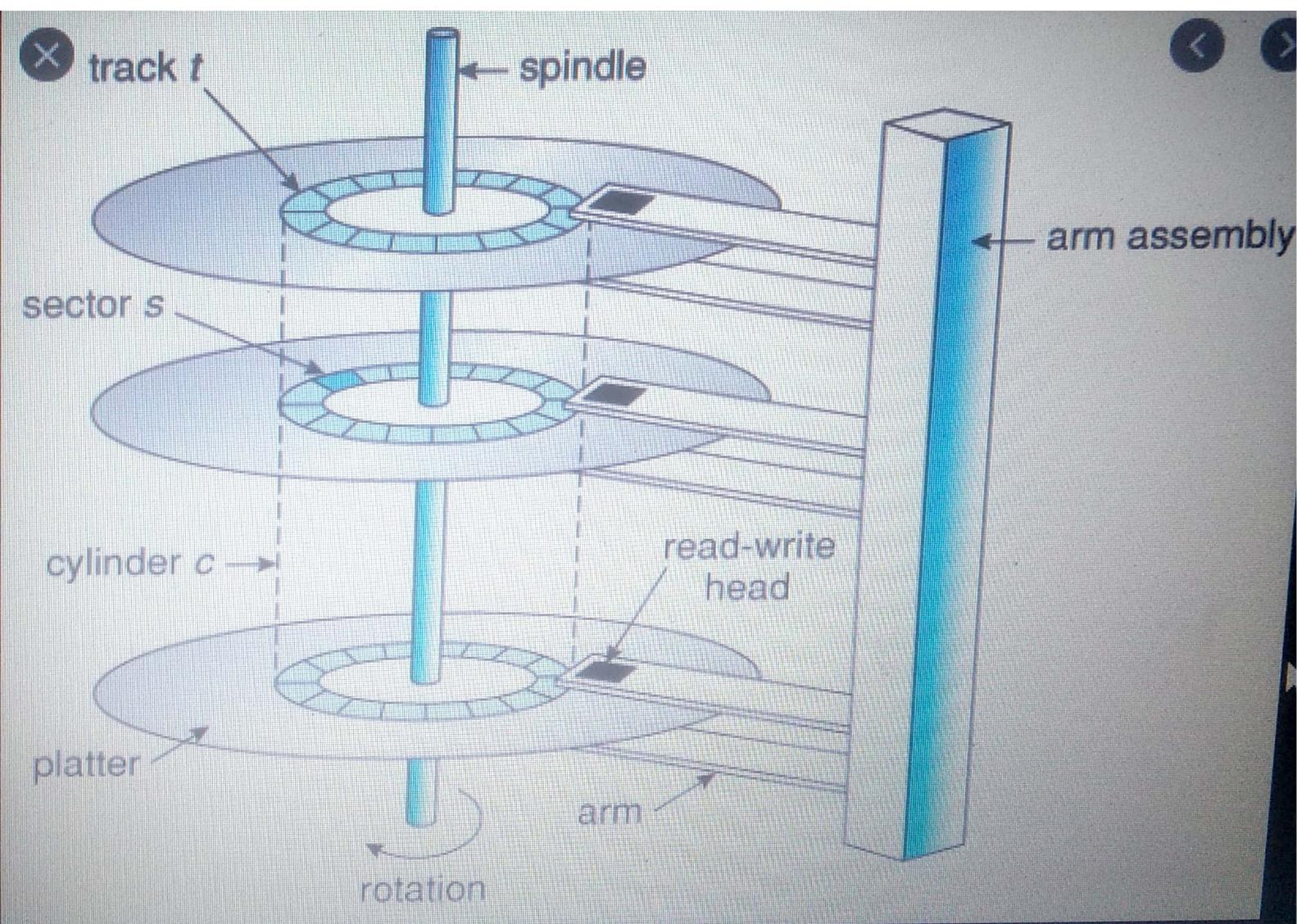
- Typical disks can transfer several megabytes of data per second, and they have seek times and rotational latencies of several milliseconds.
- A disk can be removable, allowing different disks of one platter, held in a plastic case to prevent damage while not in the disk drive.



Disk Transfer rates

As with many aspects of computing, published performance numbers for disks are not the same as real-world performance numbers.

The transfer rate may be the rate at which bits can be read from the magnetic media by the disk head, but that is different from the rate at which blocks are delivered to the operating system.



→ Magnetic Tapes ↴

magnetic tapes was used as an early-secondary storage medium. Although it is relatively permanent and can hold large quantities of data, its access time is slow compared with that of main memory and magnetic disk.

→ In addition, random access to magnetic tape is about a thousand times slower than random access to magnetic

disk, so tapes are not very useful for secondary storage.



- Tapes are used mainly for backup, for storage of infrequently used information and as a medium for transferring information from one system to another.
- A tape is kept in a spool and is wound or rewound past a read-write head. Moving to the correct spot on a tape can take minutes, but once positioned, tape drives can write data at speeds comparable to disk drives.
- Tape capacities vary greatly, depending on the particular kind of tape drive. Typically, they store from 20 GB to 200 GB.



Some have built-in compression that can more than double the effective storage.

→ Tapes and drives are usually categorized by width, including 4, 8 and 19 millimeters and 11/4 and 1/2 inch.

It provides a third level of storage.

Tertiary storage device

The main objective of the tertiary storage level is to provide huge storage capacity at low cost. Several types of storage devices are available to be used at the tertiary storage in hierarchical storage system.

- They include magnetic tape, optical disks and optical tapes.
- These storage devices are composed of fixed storage drives and removable media units.
- The storage drives are fixed to the computer systems, The removable media unit can be removed from the drives so that the storage capacity can be expanded with more media units.