UNIT IV

**4.1 MASS STORAGE STRUCTURE**

Overview of Mass-Storage Structure

Magnetic Disks :

Traditional magnetic disks have the following basic structure:

- One or more platters in the form of disks covered with magnetic media.

- Hard disk platters are made of rigid metal

- Each platter has two working surfaces.

- Each working surface is divided into a number of concentric rings called tracks.

- The collection of all tracks that are the same distance from the edge of the platter, is called a cylinder.

- Each track is further divided into sectors, traditionally containing 512 bytes of data each, Sectors also include a header and a trailer, including checksum information among other things.

- The data on a hard drive is read by read-write heads.

- The standard configuration uses one head per surface, each on a separate arm, and controlled by a common arm assembly which moves all heads simultaneously from one cylinder to another.

- The storage capacity of a traditional disk drive is equal to the number of heads, times the number of tracks per surface, times the number of sectors per track, times the number of bytes per sector.

- The **positioning time**, or **seek time** or **random access time** is the time for the disk arm to move the heads to the cylinder containing the desired sector.

- The **rotational latency** is the additional time waiting for the disk to rotate the desired sector to the disk head

- The transfer rate, which is the time required to move the data electronically from the disk to the computer.
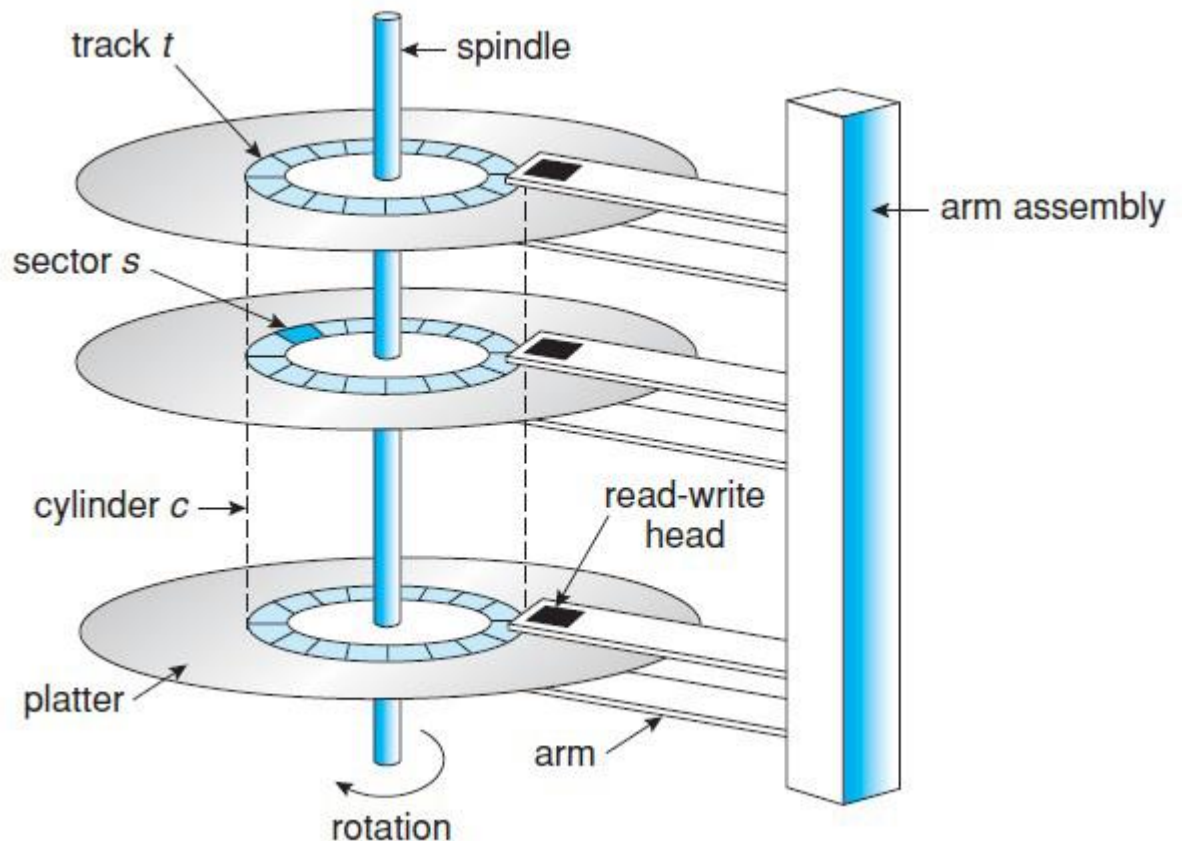
ig: Moving-head disk mechanism

- Disk drives are connected to the computer via a cable known as the **I/O Bus.**

- Some of the common interface formats include Enhanced Integrated Drive Electronics, EIDE; Advanced Technology Attachment, ATA; Serial ATA, SATA, Universal Serial Bus, USB; Fiber Channel, FC, and Small Computer Systems Interface, SCSI.

- The **host controller** is at the computer end of the I/O bus, and the **disk controller** is built into the disk itself.

- The CPU issues commands to the host controller via I/O ports.

Solid-State Disks - New

- SSDs use memory technology as a small fast hard disk. Specific implementations may use either flash memory or DRAM chips protected by a battery to sustain the information through power cycles.

- Because SSDs have no moving parts they are much faster than traditional hard drives, and certain problems such as the scheduling of disk accesses simply do not apply.

- They are more expensive than hard drives, generally not as large, and may have shorter life spans.

- SSDs are especially useful as a high-speed cache. Another variation is a boot disk containing the OS and some application executable, but no vital user data.

- SSDs are also used in laptops to make them smaller, faster, and lighter.

- Because SSDs are so much faster than traditional hard disks, the throughput of the bus can become a limiting factor, causing some SSDs to be connected directly to the system PCI bus for example.

Magnetic Tapes

- Magnetic tapes were once used for common secondary storage before the days of hard disk drives, but today are used primarily for backups.

- Accessing a particular spot on a magnetic tape can be slow, but once reading or writing commences, access speeds are comparable to disk drives.

- Capacities of tape drives can range from 20 to 200 GB, and compression can double that capacity.