

# STORAGE DEVICES

COMP101 / COMP-111

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## Chapter 3

# Storage Devices

### Storage Device:

A **storage** device is a computer hardware component that writes and reads information or instructions to and from the storage media. Examples of most popular storage devices are hard disk drive, CD/DVD drive, and USB flash drive. A computer performs two operations on the storage devices.

- **Writing:** In a writing process, storage device records/stores information or instructions from memory to a storage medium
- **Reading:** In a reading process, storage device transfers information or instructions from storage medium into computer's memory (for use by OS or application program)

When a storage device writes data (or programs) on storage medium, it performs a function as an output device. Similarly, when a storage device reads data from disk and loads it into RAM, it performs a function as an input device.

### Types of Storage Devices:

Some important types of storage devices are mentioned below:

- Magnetic Storage Devices
- Optical Storage Devices
- Flash Memory Devices

### Magnetic Storage Devices:

Magnetic storage is one of the most widely used secondary storage in computers. It consists of a magnetic medium on which information is stored. Hard disk, floppy disk, Zip Disk, Magnetic Tap are examples of magnetic storage devices.

### Hard Disk

Hard disk drives are **non-volatile magnetic storage** devices capable of remembering vast amounts of data. An electromagnet in the read/write head charges the disk's surface with either a positive or negative charge, this is how **binary** 1 or 0 is represented. The read/write head is then capable of detecting the magnetic charges left on the disk's surface, this is how data is read. The disk surface is divided into concentric circles (tracks) and sectors (wedges). Dividing the surface in this way provides physical addresses to remember where data is saved. A circuit board carefully co-ordinates the rotating disk and swinging **actuator** arm to allow the read/write head to access any location very quickly.

Typical **HDD** capacities are measured in Terabytes (TB). They can be installed inside a computer or purchased in a portable (external) format.

## Floppy Disk:

It is a type of storage media capable of storing electronic data, like a computer file. It is also known as **floppy** or **floppy diskette**. The floppy diskette was first created in 1967 by IBM as an alternative to buying hard drives, which were extremely expensive at the time. The picture shown on next page is an example of a 3.5" floppy diskette, one of the most commonly used floppy diskettes, capable of storing 1.44 MB of data. To read and write to this diskette it would be inserted into a floppy drive.



## Optical Storage Devices:

An optical disc has a single spiral track that spirals from the center to outside edge. Information on the optical disc is stored in the form of microscopic pits (small holes) and lands. A binary digit '0' is represented by a pit and a binary digit '1' is represented by a land. **Pits** are tiny reflective bumps that are created with a laser beam. **Lands** are flat areas separating the pits. A land reflects laser light, which is read as binary digit

1. A pit absorbs or scatters light, which is read as binary digit 0. High-powered laser beam creates the pits. A lower-powered laser light reads data from the disc. Different types of optical discs are CD, DVD, Blu-ray Discs etc.

### CD:

CD stands for Compact Disc. It is an optical disc used for storing digital data. It was originally developed for sound recording but now it is widely used for storing computer data and programs. Storage capacity of CDs ranges from 350 MB to 800 MB. CDs are mostly used for storing huge amount of data, application programs, operating systems, and device drivers. Types of CDs are Read-only (CD-ROM), Recordable (CD-R) and Rewritable (CD-RW) etc.

### DVD:

DVD stands for Digital Video Disc or Digital Versatile Disc. A DVD is similar to a CD. It has the same diameter and thickness as CD and is made up of the same material. Data is also stored just like a CD on a spiral track in the form of lands and pits (bumps). However, DVD has larger data storage capacity and higher resolution than CD. Its data storage capacity is up to 17 GB or more. DVD is specially used to store movie films. It is also used to store huge amount of data, music, and software of large size. DVD drive or DVD player is used to read the data stored on a DVD. A DVD player can play CDs also. Types of DVDs read-only (DVD-ROM), recordable (DVD-R), and rewritable (DVD-RW)

### Blu-Ray Disc:

Blu-ray disc (BD) is a new type of optical storage device. This storage device is reliable, faster, and has higher storage capacity than CD and DVD. Its storage capacity is up to 1000 GB or

more. Bumps (pits) on



the Blu-ray disc are much smaller and very closely (tightly) packed than DVD. This increases the storage capacity of Blu-ray discs. Blu-ray discs are better storage for storing movies because they require more storage. Blu-ray drive is used to read the information on the Blu-ray disc. Some game consoles contain a Blu-ray drive

### Flash Memory Devices:

Flash memory devices are also called Solid-state storage devices. It has no moving parts in it. It is neither magnetic nor optical. It contains a solid chip (an integrated circuit) that can store data. Flash memory chips are a type of solid state storage media. Information inside solid state storage media is stored and read electrically. Most of the solid-state storage media are non-volatile. Solid-state storage devices are widely used in PCs, PDAs, tablets, notebooks, smartphones, digital cameras, portable media players, and other mobile devices. Types of Flash Memory Devices are Solid-state drives (SSDs), USB flash drives and Memory cards etc.

### Solid-State Drive (SSD):

Solid-state drive (SSD) is a storage device that typically uses flash memory to store data/information. It contains its own processor to manage its storage. It has faster access time than traditional hard disk drives. SSD has no moving parts (mechanical components). SSD can be in the form of a flash memory chip installed directly on a motherboard or an adapter card. It also may be housed in a separate casing that is connected to the motherboard. External SSDs are also available. SSDs are used in all types of computers such as desktops, servers, laptops, tablets, and mobile devices (such as DV cameras, portable media players). Some computers have both a hard disk and an SSD. They are available in different sizes such as 1.8 inches, 2.5 inches, and 3.5 inches. Storage capacity of SSDs can be up to 4 TB or more.

### USB Flash Drive:

USB flash drive is also known as a pen drive or thumb drive. It is a flash memory device. It is connected to a USB port in a computer or mobile device for writing and reading data. It is a non-volatile memory. It is small in physical size and light-weight storage device. Today, USB flash drive is commonly used as portable storage. Today, USB flash drives are widely used in PCs and other mobile computers/devices for transferring data from one computer/device to another. USB flash drives are available in different shapes, sizes, and storage capacities. Storage capacities of USB flash drives can be up to 256 GB or more.

### Memory Card:

A memory card is sometimes called a flash memory card or a storage card. It is a small size removable flash memory device. Flash memory cards are widely used in digital cameras, mobile phones, PDAs, video games, and other portable devices. A memory card can be inserted into a slot in a computer, mobile device, or card reader/writer. Usually, card reader/writer is used to store or read information to and from memory cards. A card reader/writer is usually connected to the USB port of computer. Some computers and photo printers have built-in card readers/writers or slots that read memory cards.

Q. Differentiate between HDD & SSD.

Parameter	HDD	SSD
<b>Full Form</b>	HDD stands for Hard Disk Drive.	SSD stands for Solid State Drive.
<b>Components</b>	HDD contains moving mechanical parts, like the arm.	SSD does not contain, mechanical parts, only electronic parts like ICs.
<b>R/W Time</b>	HDD has longer R/W time.	SSD has shorter R/W time..
<b>Latency</b>	HDD has higher latency.	SSD has lower latency.
<b>I/O operations per second</b>	HDD supports fewer I/O operations per second.	SSD supports more I/O operations per second.
<b>Fragmentation</b>	HDD has fragmentation.	SSD does not have fragmentation.
<b>Weight</b>	HDD is heavier in weight.	SSD is lighter in weight.
<b>Size</b>	HDD is larger in size.	SSD is more compact in size.
<b>Data Transfer</b>	In HDD the data transfer is sequential.	In SSD the data transfer is random access.
<b>Reliability</b>	HDD is less reliable due to possibility of mechanical failure, like head crash and susceptibility to strong magnets.	SSD is more reliable.
<b>Cost</b>	HDD is cheaper per unit storage.	SSD is costlier per unit storage.
<b>Time of Release</b>	HDD is older and more traditional.	SSD is newer to use.
<b>Noise</b>	HDD can produce noise due to mechanical movements.	SSD does not produce noise.