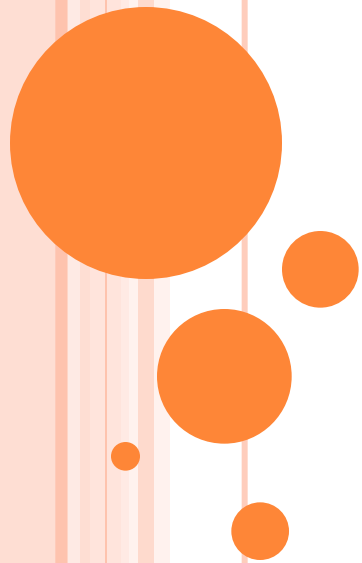


# UNIT II



# COMPUTER MEMORY

- A memory is just like a human brain. It is used to store data and instructions.
- Computer memory is the storage space in the computer, where data is to be processed and instructions required for processing are stored.
- The memory is divided into large number of small parts called cells.



## CONTINUE..

- Each location or cell has a unique address, which varies from zero to memory size minus one.
- For example, if the computer has 64k words, then this memory unit has  $64 * 1024 = 65536$  memory locations. The address of these locations varies from 0 to 65535.



# TYPES OF MEMORY

Memory is primarily of three types –

- Cache Memory
- Primary Memory/Main Memory
- Secondary Memory



# CACHE MEMORY

- Cache memory is a very high speed semiconductor memory which can speed up the CPU.
- It acts as a buffer between the CPU and the main memory.
- It is used to hold those parts of data and program which are most frequently used by the CPU.
- The parts of data and programs are transferred from the disk to cache memory by the operating system, from where the CPU can access them.



CONTINUE..



# ADVANTAGES

The advantages of cache memory are as follows –

- Cache memory is faster than main memory.
- It consumes less access time as compared to main memory.
- It stores the program that can be executed within a short period of time.
- It stores data for temporary use.



# DISADVANTAGES

The disadvantages of cache memory are as follows

–

- Cache memory has limited capacity.
- It is very expensive.





# PRIMARY MEMORY (MAIN MEMORY)

- Primary memory holds only those data and instructions on which the computer is currently working.
- It has a limited capacity and data is lost when power is switched off.
- It is generally made up of semiconductor device. These memories are not as fast as registers.
- The data and instruction required to be processed resides in the main memory.
- It is divided into two subcategories RAM and ROM.

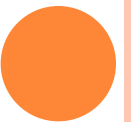


# CHARACTERISTICS OF MAIN MEMORY

- These are semiconductor memories.
- It is known as the main memory.
- Usually volatile memory.
- Data is lost in case power is switched off.
- It is the working memory of the computer.
- Faster than secondary memories.
- A computer cannot run without the primary memory.



CONTINUE..



# SECONDARY MEMORY

- This type of memory is also known as external memory or non-volatile. It is slower than the main memory.
- These are used for storing data/information permanently. CPU directly does not access these memories, instead they are accessed via input-output routines.
- The contents of secondary memories are first transferred to the main memory, and then the CPU can access it.
- For example, disk, CD-ROM, DVD, etc.



# CHARACTERISTICS OF SECONDARY MEMORY

- These are magnetic and optical memories.
- It is known as the backup memory.
- It is a non-volatile memory.
- Data is permanently stored even if power is switched off.
- It is used for storage of data in a computer.
- Computer may run without the secondary memory.
- Slower than primary memories.



CONTINUE..



# MEMORY UNIT

- Computers use memory in random access memory (RAM), which stores information temporarily and in storage drives, which permanently store data. RAM allows your computer to switch between programs and have large files ready to view.
- Memory unit is the amount of data that can be stored in the storage unit. This storage capacity is expressed in terms of Bytes.



# CONTINUE..

S.No.	Unit & Description
1	<b>Bit (Binary Digit)</b> A binary digit is logical 0 and 1 representing a passive or an active state of a component in an electric circuit.
2	<b>Nibble</b> A group of 4 bits is called nibble.
3	<b>Byte</b> A group of 8 bits is called byte. A byte is the smallest unit, which can represent a data item or a character.
4	<b>Word</b> A computer word, like a byte, is a group of fixed number of bits processed as a unit, which varies from computer to computer but is fixed for each computer. The length of a computer word is called word-size or word length. It may be as small as 8 bits or may be as long as 96 bits. A computer stores the information in the form of computer words.





S.No.	Unit & Description
1	<b>Kilobyte (KB)</b> 1 KB = 1024 Bytes
2	<b>Megabyte (MB)</b> 1 MB = 1024 KB
3	<b>GigaByte (GB)</b> 1 GB = 1024 MB
4	<b>TeraByte (TB)</b> 1 TB = 1024 GB
5	<b>PetaByte (PB)</b> 1 PB = 1024 TB



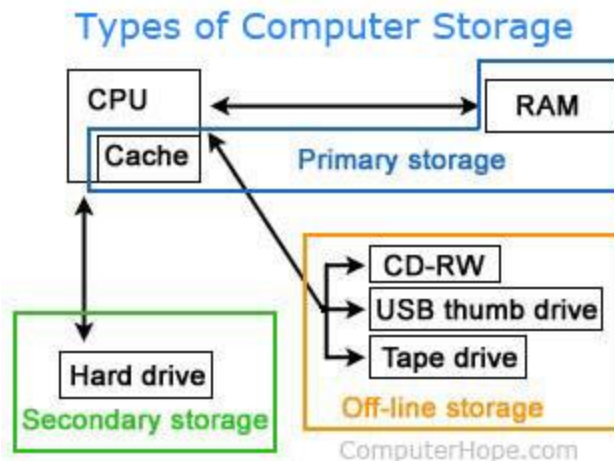
## SECONDARY STORAGE DEVICE

- Alternatively referred to as external memory, secondary memory, and auxiliary storage, a secondary storage device is a non-volatile device that holds data until it is deleted or overwritten.
- Secondary storage is about two orders of magnitude cheaper than primary storage.
- Consequently, a hard drive or an additional, slower SSD may be used as secondary storage to a primary, faster, PCIe SSD.



## CONTINUE..

- The image shows three types of storage. However, off-line storage is a subset of secondary storage, as they both serve the same purpose and do not interact directly with the CPU.



## CONTINUE..

- A hard disk drive (sometimes abbreviated as a hard drive, HD, or HDD) is a non-volatile data storage device. It is usually installed internally in a computer, attached directly to the disk controller of the computer's motherboard. It contains one or more platters, housed inside of an air-sealed casing.
- Data is written to the platters using a magnetic head, which moves rapidly over them as they spin.



## CONTINUE..

- Internal hard disks reside in a drive bay, connected to the motherboard using an ATA, SCSI, or SATA cable. They are powered by a connection to the computer's PSU (power supply unit).



# HARD DRIVES IN MODERN COMPUTERS

- Modern computers often use an SSD (solid-state drive) as the primary storage device, instead of an HDD. HDDs are slower than SSDs when reading and writing data, but offer greater storage capacity for the price.
- Although an HDD may still be used as a computer's primary storage, it's common for it to be installed as a secondary disk drive.



## CONTINUE..

- For example, the primary SSD may contain the operating system and installed software, and a secondary HDD may be used to store documents, downloads, and audio or video files.



# FLASH DRIVE

- A flash drive is a small, ultra-portable storage device which, unlike an optical drive or a traditional hard drive, has no moving parts.
- Flash drives connect to computers and other devices via a built-in USB Type-A or USB-C plug, making one a kind of combination USB device and cable.
- Flash drives are often referred to as pen drives, thumb drives, or jump drives. The terms USB drive and solid-state drive (SSD) are also sometimes used but most of the time those refer to larger, not-so-mobile USB-based storage devices like external hard drives.





# HOW TO USE A FLASH DRIVE

- To use a flash drive, just insert it into a free USB port on the computer.
- On most computers, you'll be alerted that the flash drive was inserted and the contents of the drive will appear on the screen, similar to how other drives on your computer appear when you browse for files.
- You can also use a flash drive with an Android phone or connect one to an iPhone or iPad.
- Exactly what happens when you use your flash drive depends on your version of Windows or other operating system, and how you have your computer configured.



## AVAILABLE FLASH DRIVE SIZES

- Most flash drives have a storage capacity from 8 GB to 64 GB. Smaller and larger flash drives are also available, but they're harder to find.
- One of the first flash drives was just 8 MB in size. The largest one we're aware of is a USB 3.0 flash drive with a 2 TB (2048 GB) capacity from Kingston.

