

Chapter - 6

Memory units

Memory is basically a device that has the capacity to store information. A memory unit is the amount of data that the memory can hold. Besides, we measure this storage capacity in terms of bytes.

Unit of memory

The storage capacity of the memory is expressed in various units of memory. These are as follows:-

Bit

A microprocessor uses binary digits 0 and 1 to decide the OFF and ON state respectively, of various circuits.

A bit is the smallest unit of representation in the binary language.

Nibble

A nibble is a collection of 4 bits.

Byte

A byte is the representation of a group of 8 bits. Moreover, a byte is a unit that expresses any word, symbol, or character in the

Computer Language.

Computer memory is always in terms of bytes.

Word

A computer word is similar to a byte, as it is also a group of bits.

A computer word is fixed for each computer. At the same time it varies from computer to computer.

The length of a computer word is the word-size or word length.

Therefore, a computer stores information in the form of computer word.

Types of Computer Memory

1. Primary Memory

This is the main type of memory in a computer that communicates directly with the CPU, cache and auxiliary memory. It allows immediate access from temporary memory slots or other storage locations.

This type of computer memory keeps data and programs when the process is active to use them.

RAM

RAM is a type of memory in computer hardware that temporarily stores data and programs.

It is the fastest part of the main memory which can be directly accessed by the CPU. It reads and writes programs until the computer is switched on. RAM is of two types: DRAM and SRAM.

- DRAM full form is Dynamic Random Access Memory. It is a type of RAM that is used for dynamic data storage. Every cell in DRAM consists of one-bit information. A cell is composed of a transistor and a capacitor.

* This capacitor and transistor are extremely small in size.

* The capacitor needs a continuous refresh to retain information since it is volatile.

SRAM full form is Static Random Access Memory.

* This type of RAM stores static data in memory which remains active until there is power supply.

* Same sized SRAM chip holds less data than DRAM.

* It does not require a continuous refresh.

ROM

Read only Memory is a permanent storage type.

This is a type of read-only of computer memory that only reads the stored information but it does not have the capability to modify or write.

* It is a non-volatile type of memory in computer, the information stays even after a power cut or when the system has been shut down.

- **PROM** : It is a digital ROM which only once allows writing any information or program. This is done using a special PROM programmer or burner device.

- **EPROM** : In this type of ROM data can be erased as well as a reprogrammed only once.

- It can store data for a minimum of 10-20 years. To erase and reprogram EPROM, the user needs to pass UV light for

40 minutes. post this, the data can be ~~recreated~~ recovered.

• EEPROM:-

The full form of EEPROM is Electrically Erasable and Programmable Read Only Memory. It is an electrically erasable and programmable ROM.

This allows data to be erased using a high-voltage electrical charge.

* It can be reprogrammed up to thousands of times.

2. Secondary Memory / Auxiliary Memory

It is a permanent type of memory in computer that holds a large amount of data. This is an external memory that represents different storage media on which data and programs can be saved for long term. It is not directly accessible by the CPU and is available as external devices such as CDs, DVDs, and USBs. They are cheaper than primary memory but slower than primary memory.

• Hard disk: It is a type of permanent computer memory that stores programs, files and data. It is stored on the motherboard of the computer that does not lose data even when

Register $\rightarrow$ Cache $\rightarrow$ RAM $\rightarrow$ SSD $\rightarrow$ HDD $\rightarrow$

Optical disk $\rightarrow$ magnetic tape

(Fastest to Slowest)

there is power outage or when the system has been switched off.

• Compact Disc (CD):

It is an optical storage device that stores different types of data, such as audio, video, files, and other information. CD uses light to read and write data from CDs.

• pen drive:

This portable device is a type of secondary memory in computers that is used for permanently storing data.

It is also known as a USB flash drive that stores and transfers

* Cache Memory:-

Cache memory, often simply referred to as "cache" is a type of computer memory that serves as a buffer b/w.

the central processing unit (CPU) and the main memory (RAM). Cache memory plays a crucial role in computer systems by

Storing frequently accessed data and Instructions, leading to high speed data access for the processor. As a result, it significantly enhances the overall speed and performance of the computer system.

Example:-

A common example of cache memory is when a web browser stores a copy of web pages you visit on your computer. So the next time you access that page, it loads faster because the data is readily available in the cache. Instead of having to download it again from the server, essentially, it's temporary storage area for frequently used data to speed up access time.

memory Address and Locations

- * When a variable is created in C, a memory address is assigned to the variable.
- * The memory address is the location of where the variable is stored on the computer.
- * When we assign a value to the variable, it is stored in this memory address.