JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR

Faculty of Education and Methodology (CS)

Faculty Name-   JV'n Gangacharan Pal (Assistant Professor)

Program-   B.Tech. Ist Semester / 1 Year

Course Name –   Fundamentals of Computer

Session No. & Name -   1.6 **Memory**

Academic Day starts with –

- Greeting with saying **'Namaste'** by joining Hands together following by 2-3 Minutes Happy session, Celebrating birthday of any student of respective class and **National Anthem**.

National song' Vande Mataram'

Memory

The computer memory holds the data and instructions needed to process raw data and produce output. It is the same as a human mind, where data, information, and instructions are stored. It is a data storage device or a data storage component where instructions for processing data are kept along with the data that has to be processed. Both the input and the output can be held here.

The computer memory is divided into large number of small parts known as cells. Each cell has a unique address which varies from 0 to memory size minus one. Computer memory is

of two types: Volatile (RAM) and Non-volatile (ROM). The secondary memory (hard disk) is referred as storage not memory.

Need a computer memory

In the computer system, we need computer memory to store various types of data like text, images, video, audio, documents, etc. We can retrieve it when the data is required. For example, when we write and execute any computer program, it is initially stored in primary memory. If the processor does not need particular items for a longer time, the program or data is automatically saved into the permanent or secondary memory. Then the data is called from secondary memory to main memory and performs the execution of codes.

Working of Memory

A program is loaded from secondary memory to primary memory when it is opened. There are several types of memory and storage, for example, a program being moved from a solid-state drive (SSD) to RAM (Random Access Memory). The opened software will be able to communicate with the computer's processor at a faster rate because primary storage is accessed more quickly. The main or primary memory can be accessed quickly from storage locations such as temporary memory slots.

Data in memory is only saved temporarily since memory is volatile. Data saved in volatile memory will be erased immediately whenever a computer is turned off. A file is transported to secondary memory for permanently storage when it is saved.

There are numerous kinds of memory present in a computer. Depending on the primary memory utilized, it will perform differently, but semiconductor-based memory is typically connected with memory. Integrated circuits utilizing metal-oxide-semiconductor (MOS) transistors based on silicon will be used to make semiconductor memory.

Features of Memory

1. **Location:** It represents the internal or external location of the memory in a computer. The internal memory is inbuilt in computer memory. It is also known as primary memory. the example of primary memory are registers, cache and main memory. Whereas, external memory is the separate storage device from the computer, such as disk, tape, USB pen drive.

2. **Capacity:** It is the most important feature of computer memory. Storage capacity can vary in external and internal memory. External devices' storage capacity is measured in terms of bytes, whereas the internal memory is measured with bytes or words. The storage word length can vary in bits, such as 8, 16 or 32 bits.

3. **Access Methods:** Memory can be accessed through four modes of memory.

   o **DMA:** As the name specifies, Direct Memory Address (DMA) is a method that allows input/output (I/O) devices to access or retrieve data directly or from the main memory.

   o **Sequential Access Method:** The sequential access method is used in a data storage device to read stored data sequentially from the computer memory. Whereas, the data received from random access memory (RAM) can be in any order.

   o **Random Access Method:** It is a method used to randomly access data from memory. This method is the opposite of SAM. For example, to go from A to Z in random access, we can directly jump to any specified location. In the Sequential method, we have to follow all intervening from A to Z to reach at the particular memory location.

   o **Associative Access Method:** It is a special type of memory that optimizes search performance through defined data to directly access the stored information based on a memory address.

4. **Unit of transfer:** As the name suggests, a unit of transfer measures the transfer rate of bits that can be read or write in or out of the memory devices. The transfer rate of data can be different in external and internal memory.

   o **Internal memory:** The transfer rate of bits is mostly equal to the word size.

   o **External memory:** The transfer rate of bit or unit is not equal to the word length. It is always greater than a word or may be referred to as blocks.

5. **Performance:** The performance of memory is majorly divided into three parts.

   o **Access Time:** In random access memory, it represents the total time taken by memory devices to perform a read or write operation that an address is sent to memory.

   o **Memory Cycle Time:** Total time required to access memory block and additional required time before starting second access.

   o **Transfer rate:** It describes the transfer rate of data used to transmit memory to or from an external or internal memory device. Bit transfer can be different for different external and internal devices.

6. **Physical types:** It defines the physical type of memory used in a computer such as magnetic, semiconductor, magneto-optical and optical.

7. **Organization:** It defines the physical structure of the bits used in memory.

8. **Physical characteristics:** It specifies the physical behavior of the memory like volatile, non-volatile or non-erasable memory. Volatile memory is known as RAM, which requires power to retain stored information, and if any power loss has occurred, stored data will be lost. Non-volatile memory is a permanent storage memory that is used to obtain any stored information, even when the power is off. Non-erasable memory is a type of memory that cannot be erased after the manufactured like ROM because at the time of manufactured ROM are programmed.