RAM – Memory Chip

ROM

ROM – Memory

RAM vs ROM

Lecture-5

Characteristics of Memory:

In the broad sense, a microcomputer memory system can be logically divided into three groups:

1) Processor memory

2) Primary or main memory

3) Secondary memory

- Processor memory refers to a set of internal registers. These registers hold temporary results when computation is in progress.

- Primary memory or the main memory is the internal memory to store both program and data. The processor can access these memories directly.

- Secondary memory refers to the storage medium compositing slow devices such as hard disks and floppies. Sometimes, secondary memories are also referred to as auxiliary or back up storage.

In order to design an efficient memory system, the following characteristics of memory must be known:

1. Volatile or Non-volatile : An important characteristic of a memory is whether it is volatile or non volatile. The contents of volatile memory are lost if the power is turned off. On the other hand, a non volatile memory retains its contents after the power is switched off. The best known non volatile memory is magnetic core.

2. Cost : The most important factor of a memory system is its cost, expressed in dollars per bit. A good design implies a very low cost per bit.

3. Access time and cycle time

   a) Access time, tA : The access time 'tA' is defined as the average time taken to read a unit of information from the memory. Sometimes the access time is also referred to as read access time.

   b) Cycle time, tC : The cycle time 'tC' of a memory unit is defined as the average time lapse between two successive read/write operations.

4. Access mode : The access mode refers to the manner in which information can be accessed from the memory. There are two major access modes. They are the random access mode (RAM) and sequential access modes (magnetic tape). as shown in the figure 1.
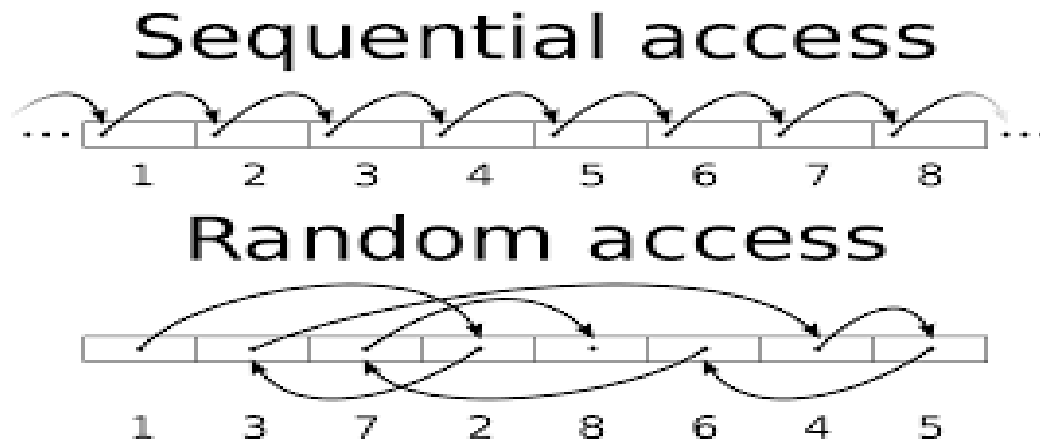

Fig1.Memory access methods

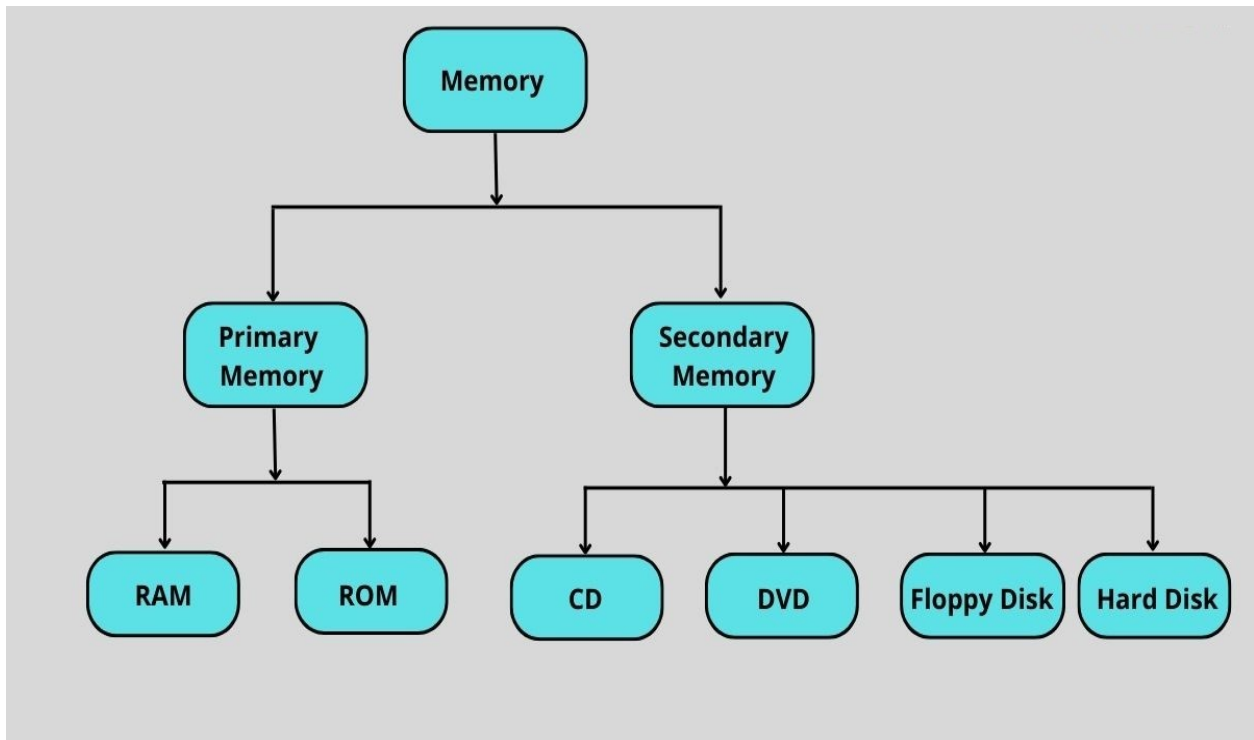5. Storage type: The types of memory as shown in the figure 2.

Fig. 2 Types of memory (main and Secondary)

Difference Between Primary and Secondary Memory

Primary memory	Secondary memory
Primary memory is temporary.	Secondary memory is permanent.
Primary memory is faster than secondary memory because it is directly accessible to the CPU.	Secondary memory is slower than Primary memory because it is not directly accessible to the CPU.
Primary memory is directly accessible by Processor/CPU.	Secondary memory is not directly accessible by the CPU.
Primary memory is volatile	Secondary memory is non-volatile

Primary memory	Secondary memory
Primary memory devices are more expensive than secondary storage devices.	Secondary memory devices are less expensive than primary memory devices.
The memory devices used for primary memory are semiconductor memories.	The secondary memory devices are magnetic memories.
The capacity of primary memory is usually within the range of 16 to 32 GB.	The capacity of secondary memory ranges from 200 GB to some terabytes.
Primary memory is also known as Main memory or Internal memory.	Secondary memory is also known as External memory or Auxiliary memory.
Examples: RAM, ROM, Cache memory, PROM, EPROM, Registers, etc.	Examples: Hard Disk, Floppy Disk, Magnetic Tapes, etc.