Chapter - 4

MEMORY DEVICES

Memory unit:

Computer is the physical device. This is used to store data or information on a temporary or permanent basis.

There are 2 classes of memory devices:-

- Primary memory
- Second memory

Primary memory

i. The primary memory of a computer system is otherwise called as main memory where we feed data and instruction to a computer for processing it gets stored in its main memory.

ii. The primary memory is essential, but expensive.

iii. The capacity of primary storage is limited. This is also volatile in nature.

Secondary memory :

i. The main memory has 2 district limitations that short storage capacity and volatile.
ii. Because of volatile, the main memory loses the stored information, once the power is off.
iii. These two limitations of the main memory are taken care of by the so-called auxiliary memory or secondary memory storage.
iv. These are non –volatile, high capacity, cheap but slower memory devices.
v. They are used to store a large volume of data on a permanent basis.

Memory classification

Memory in computer is used for the following purposes.

i) Store, program and data during execution.
ii) Store result of execution.
iii) Store, program and data for our future reference.

The memory is classified in hierarchical structure as follows

(1) Register memory

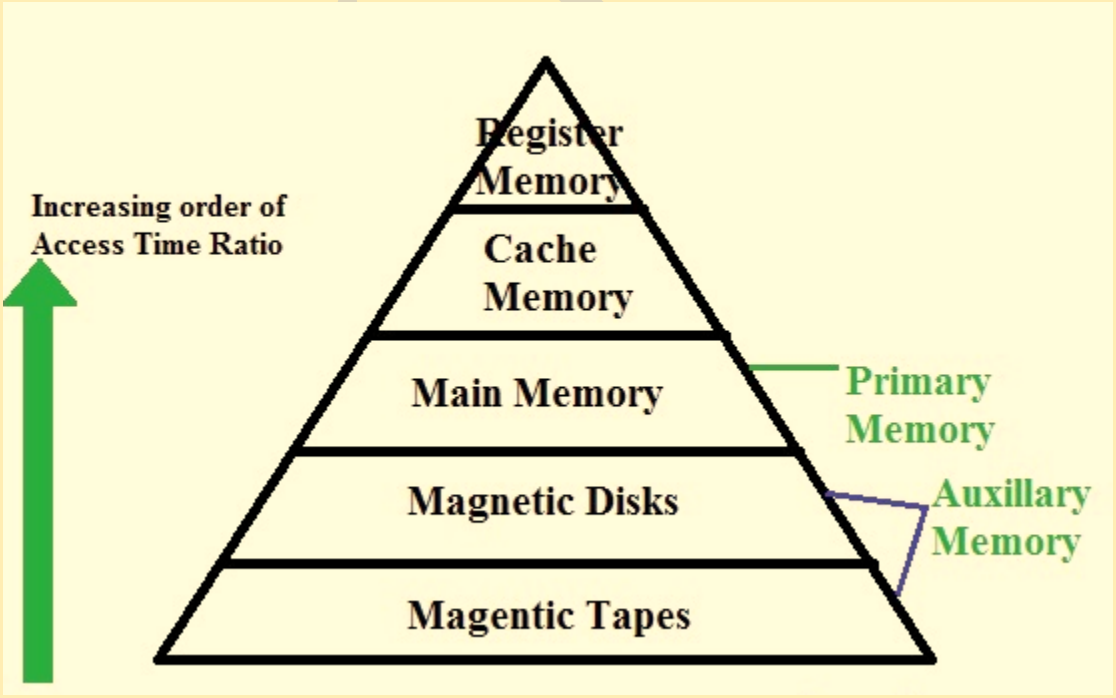
(2) Cache memory

(3) Main memory

(4) Auxiliary memory

In the hierarchical structure of memory the speed of access up the pyramid and the size of the memory increases down the pyramid.

Diagram



Reading from the memory or writing to the memory is called memory access.

1) Register memory : This memory is inbuilt in the C.P.U. This consist of several electronic registers. A register is nothing but a group of binary cells each capable of holding 1 bit. Register with n cells can store n bits of information.
2) Cache memory : The cache memory lies in the path between the processor and the main memory. The size of this memory is also less. This is used for storing frequently used program and data
3) Main memory : This is the memory where program is stored for execution by CPU. This memory directly communication with C.P.U. Unless program and data are located into this memory, execution is not possible. After execution the result is stored in this memory .It is volatile in nature so in order to cave the contents for loss, it is to be transferred to secondary memory access. Speed is higher

than auxiliary memory. Main memory consists of RAM and ROM.

Types of main memory

RAM (Random Access Memory) :

i. Random Access Memory or volatile memory is used by the system to store data for processing by a computer's Central Processing Unit (CPU) also known as the processor.
ii. The key benefit of RAM over other types of storage is its retrieval time and consistency.
iii. Because of this speed and consistency, RAM is used as main memory or primary memory storage.
iv. As of today, the two types of RAM architecture being used in different computer system, i.e. Static RAM (SRAM) and Dynamic RAM (dram).

SRAM (Static Random Access Memory) : The word static indicates that the memory retains its contents as long as power is on.

However, as the power gets down, the data are lost. SRAM needn't be refreshed periodically. It is very fast but much more expensive than DRAM.

DRAM (Dynamic Random Access Memory) :It is named so because it is very unstable. The data continuous to move in and out of the memory as long as power is available. DRAM must be continuously refreshed in order to maintain the data. DRAM is used for most system memory because it is cheap and small.

ROM (Read Only Memory) : Read Only Memory which contains contents that once written, can only be read and used, but cannot be modified by the user. These contents are written by the manufactured. The contents of the ROM are not lost even in case of a sudden power failure, thus making it non-volatile in nature.

PROM : PROM stands for Programmable Read Only Memory. We know that it is not possible to modify or erase programs stored in ROM , but it is possible for us to store our program in PROM cheap. Once the program are written it can't be changed and remain intact even if power is switched off.

EPROM :

EPROM stands for Erasable Programmable Read Only Memory .In this, contents can be erased and reprogrammed repeatedly . Erasing is possible by use of Ultra Violet(UV) light.

EEPROM :

EEPROM stands for Electrically Erasable Programmable Read Only Memory. In this erasing, the contents are possible by applying high voltage electricity rather than ultra violet light.

Register unit

A collection of special memory units to hold the information on a temporary basis inside the C.P.U (not in main memory) constitute a register. These are electronic memory units and facilitated speedy transfer of information between different parts of C.P.U. The various types of register are given below

i. Memory Addresses Register (MAR) :This register holds the address of the memory location, where the current instruction is stored.

ii. Memory Buffer Register (MBR) : The contents of the memory word are held in this register. A memory word is either an instructions or data , which is read from written to a memory location.

iii. Program Counter(PC) register : This register holds the address of the next instructions to be the executed during the execution of the current instruction, the content of the PC are

updated, to point to the address of the next instruction to be executed. PC is also called pointer.

iv. ACCUMULATOR (AC) Register : The accumulator register performs arithmetic and logical operations. it is used to store intermediate results during a program run.

v. Instruction Register (IR) : The current instruction , which is being executed is held here. every instruction has 2 parts, i.e an operation part and an address part.

vi. Input register (INPR) : Input register receives the input character from an input device and stores it.

vii. Output register (OUTR) : Output register holds the character and supplies it to the output device.

viii. Data Register (DR) :It holds the memory operates.

Auxiliary memory :

i. As main memory is of limited capacity and size, it is not possible to store everything in main memory.
ii. To supplement the necessity of more memory, auxiliary memory is used.
iii. This is non-volatile in memory.
iv. It is of unlimited capacity .
v. Both read and write operation is possible.
vi. Access speed is very less.
vii. It stores data permanently until it is erased by the user.
viii. Data or program stored in auxiliary memory is to be loaded into main memory for execution.
ix. This is also known as secondary memory or back-up memory.
x. Examples of this memory are Hard Disk, Floppy Disk, Magnetic Disk, Magnetic Tape, CD(Compact Disc), DVD(Digital Versatile/Video Disc), Blue Ray Disc, Pen Drive(PD),Zip Drive etc.