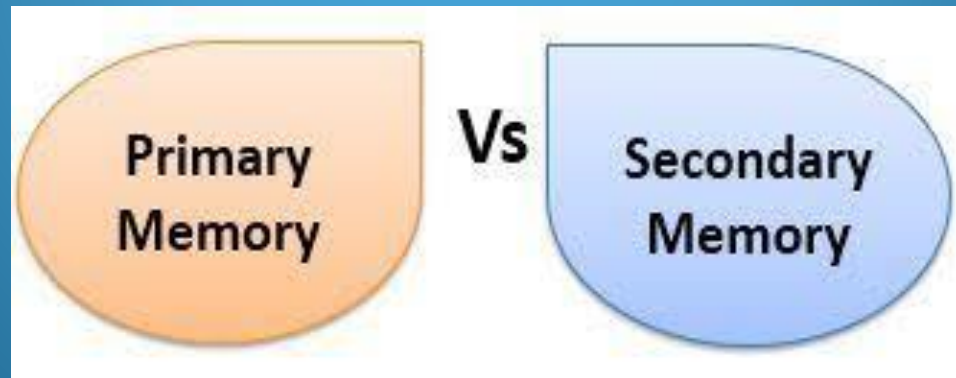


Chapter 3

Memory *and* Storage Devices



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Memory

- Computer memory is the storage space in 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. Each location or cell has a unique address which varies from zero to memory size minus one.

Computer Memory

Primary Memory

RAM

ROM

CASHM.

Secondary Memory

Floppy Disk

Hard Disk

CD

DVD

Pan drive

The kinds of memory

We have 3 kinds of memories:-

- 1. RAM (Random Access Memory).***
- 2. ROM (Read Only Memory).***
- 3. Cash Memory.***

The kinds of memory

1. RAM(Random Access Memory):-

The *main memory* in the computer, it's the location where data and programs are currently processed and stored (temporally).



RAM laptop

The kinds of memory

RAM is volatile” means that the data is only there while the computer is turned ,when the computer is shout off the content of the RAM is erased.

memory speed is measured in (MHz).

RAM PC

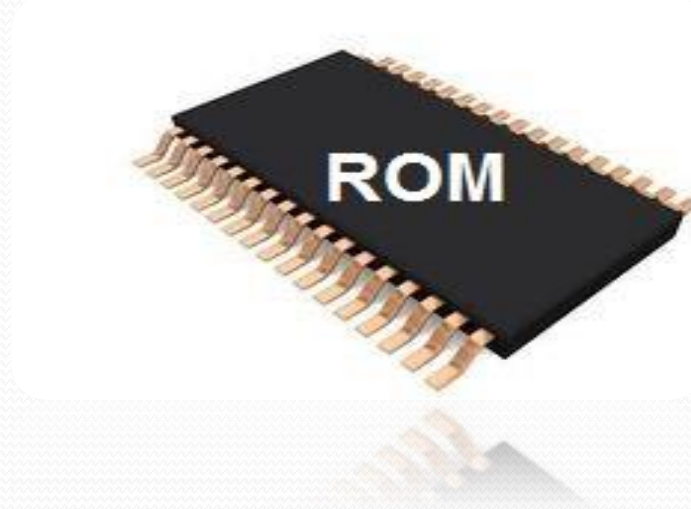


The kinds of memory

2. ROM (Read Only Memory)

It's another part of the **main memory**, but with very small capacity to keep the instruction(**BIOS**) which make computer work when turning it on.

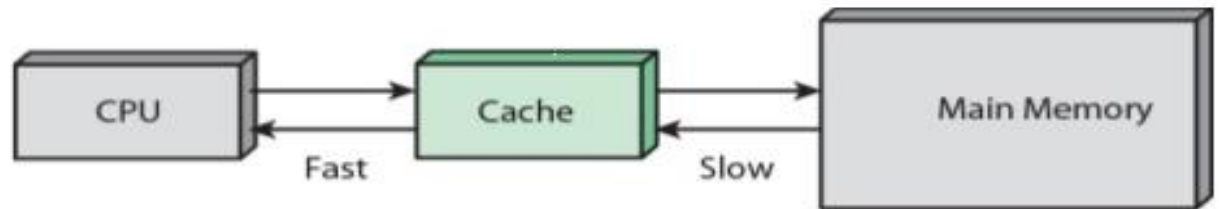
It's not volatile and the computer can't write on it.



The kinds of memory

3. Cash Memory: -

- a. It's linked to C.P.U. , It has very fast chip keeps frequently used program and data, therefore it increase the speed of the computer.
- b. It reduces the gap speed of computer.



Storage Devices

- Secondary memory or Secondary storage system, includes the disk and other storage media used to store data permanently to keep your software programs and application programs.
- You have to save your work on storage devices before shutting the computer down.

Kind of storage devices

1. **Hard Drive Disk(HDD).**
2. **Compact Disk (CD Rom).**
3. **Compact Disc-Recordable (CD-R).**
4. **Digital Versatile Disk (DVD).**
5. **Flash Memory.**

Kind of storage devices

1. Hard disk:-

- * It's the most important storage media in the computer, it keeps software programs and application programs, it composed of several magnetic disks in single unit.
- * Hard drives store operating systems and programs as well as data files such as photographs, videos, and documents.

Kind of storage devices

A) An internal hard drive is connected directly to the motherboard and other components inside the laptop casing or desktop tower .



Kind of storage devices

B) An external hard drive has its own casing, and connects to the computer with a input port.



Kind of storage devices

2- Compact Disk (CD Rom):-

It's an important disk which was a LASER to read the information it's suitable for storage programs that mix of (Text, graphic and audio) capacity around 700 MB.

A-Filled
B-free space



Kind of storage devises

3- Compact Disc-Recordable (CD-R):-

Is a digital optical disc storage format. A CD-R disc is a compact disc that can be written once and read many times.



Kind of storage devices

4- Digital Versatile Disk (DVD):-

It's a high capacity development of CD Rom and CD-R it can store a GB of information it's used to store high quality films and videos.

It capacity is between 4.7-17 GB.



Kind of storage devices

5- Flash memory: -

It's divided into blocks so it saves and erases information in fast way.



Data Representation in Memory

- Data and instructions cannot be entered and processed directly into computers using human language. Any type of data may be it numbers, letters, special symbols, sound or pictures must first be converted into machine-readable form i.e. binary form.

Types of data representation

As far as computers are concerned, number systems can be classified into two major categories:

- **Decimal number system:-** Decimal number system has ten digits ranging from (0-9).

Place value:- $10^{n-1} \dots 10^4 10^3 10^2 10^1 10^0$

- **Binary number system:-**

It uses two digits namely, (1 and 0) to represent numbers.

Place value:- $2^{n-1} \dots 2^5 2^4 2^3 2^2 2^1 2^0$

Converting between binary and decimal numbers

EXAMPLE

- Convert 101101_2 to base 10 (or decimal) number

Place value	2^5	2^4	2^3	2^2	2^1	2^0
Binary digits	1	0	1	1	0	1

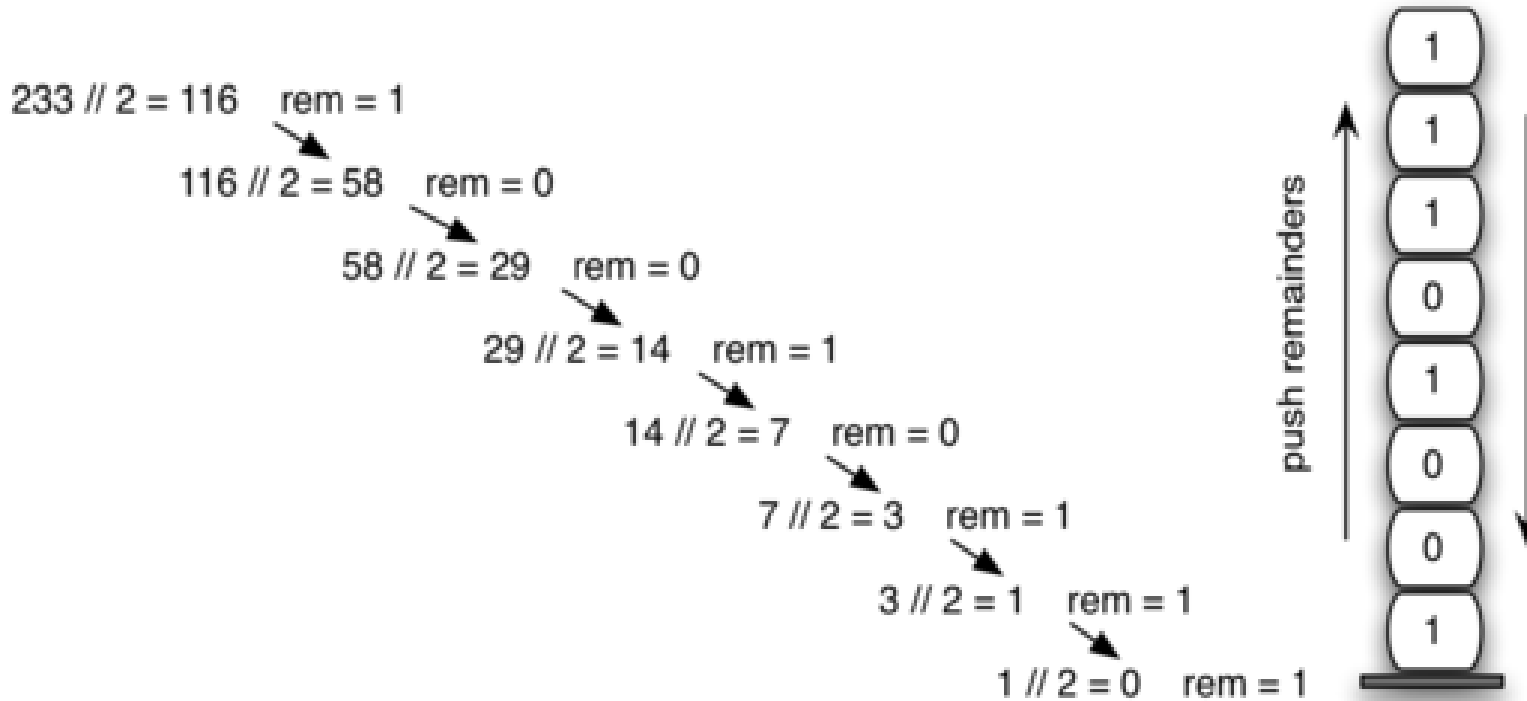
- Multiply each digit by its place value

$$N_{10} = (1 * 2^5) + (0 * 2^4) + (1 * 2^3) + (1 * 2^2) + (0 * 2^1) + (1 * 2^0)$$

$$N_{10} = 32 + 0 + 8 + 4 + 0 + 1$$

$$= 45_{10}$$

Converting between decimal and binary numbers



- $N = (11101001)_2$

Types of data representation

- **Octal number system:-**
- Consists of eight digits ranging from (0-7).the place value of octal numbers goes up in factors of eight from right to left.

- **Hexadecimal number system:-**
- This is a base 16 number system that consists of sixteen digits ranging from 0-9 and letters A-F where A is equivalent to 10,B to 11 up to F which is equivalent to 15 in base ten system. The place value of hexadecimal numbers goes up in factors of sixteen.

Computer Performance

- It is the amount of work accomplished by a computer system.
- Means the factors that affect the speed of *CPU* Processing .
- *1. Clock speed.*
- *2. Memory capacity.*
- *Hard disk speed.*
- *Bus speed.*
- *Graphic Accelerator.*



Thank You So Much