Digital Logic Circuits

❖ Digital Computers

1. Digital

- A computer that performs calculations and logical operations with quantities represented as digits, usually in the binary number system.
- A computer that accepts and processes data that has been converted into binary numbers.
- The first electronic digital computers, developed in late 1940s, were used primarily for numerical computations.

2. Bit

- A bit is short for binary digit and is a single unit of information that can have a value of either 0 or 1.
- All instructions that the computer executes and the data that it processes is made up of a group of bits.
- Information is represented in digital computers in groups of bits. By using various coding techniques, groups of bits can be made to represent not only binary numbers but also other discrete symbols, such as decimal digits or letters of the alphabet.

3. Program

- A sequence of instructions for the computer is called a program.
- The data that are manipulated by the program constitute the database.

4. Computer hardware

- A computer system is subdivided into two functional entities.
    1) Hardware
    2) Software

- **Software** is the electronic instructions that tell the computer to perform a task.

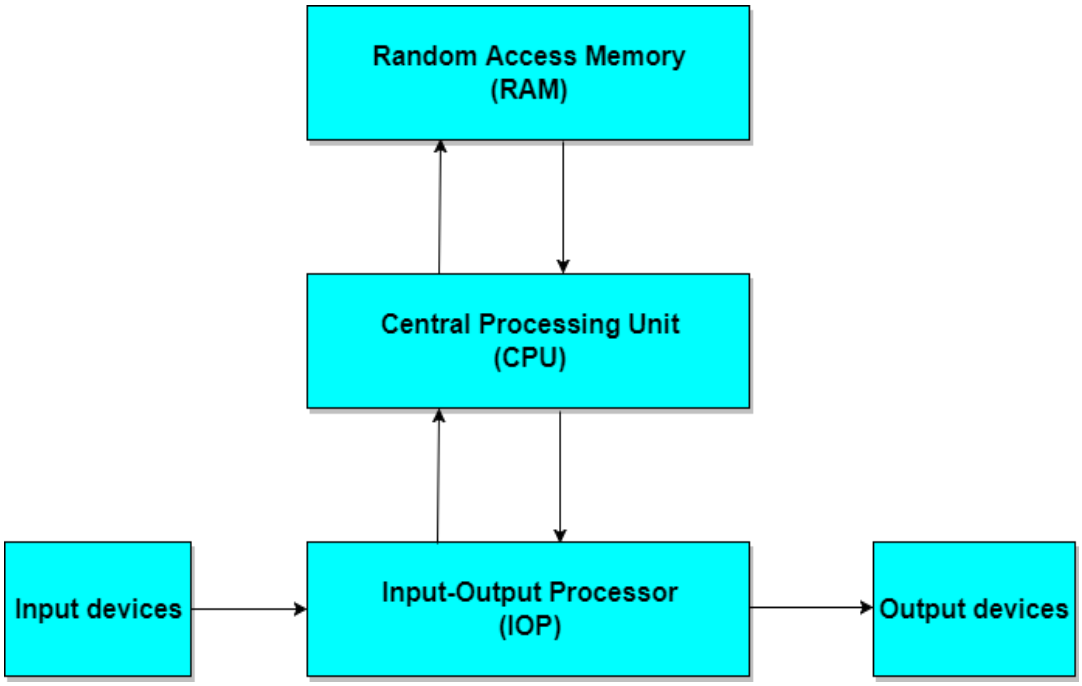
- **Software**, commonly known as programs, consists of all the electronic instructions that tell the hardware how to perform a task.

- Computer systems divide software systems into two major classes: System Software and Application Software

- **Hardware** is the physical parts of computer.

- **Hardware** refers to the physical elements of a computer. This is also sometime called the machinery or the equipment of the computer. Examples of hardware in a computer are the keyboard, the monitor, the mouse and the processing unit.

- The hardware of computer is usually divided into 3 major parts shown in diagram.



- **CPU** has two major parts called

  1) **Arithmetic and logic unit** for manipulating data, a number of registers for storing data. Arithmetic and logic unit do the work of addition, subtraction, multiplication, division, AND, OR, NOT, Exclusive OR etc.

  2) **Control unit** for fetching instructions from memory to be processed by the ALU and executing instructions.

- **Memory** is used to store data and instructions before and after processing also known as Random Access Memory (RAM) because CPU can access any location in memory at random and retrieve binary information.

  - There are two classes of storage, called **primary and secondary. Primary storage** is a fast memory that operates at electronic speeds. **Secondary storage** is used when large amounts of data and many programs have to be stored

- **Input device** is the device by which we can send data to computer from outside of the computer. Example of input Device: Mouse, Keyboard, Scanner, light pen, joystick etc. **The output devices** send the result done by the computer to the outer world or to the user (out side the computer). Example: Monitor, Printer, Speaker etc.

5. Computer organization

- Computer Organization is concerned with the way the hardware components operate and the way they are connected together to form the computer system.
- The basic design of a computer includes how different parts of computer are organized and how various operations are performed between different parts of computer to do a specific task.

6. Computer design

- Computer Design is concerned with the hardware design of the computer. Once the computer specifications are formulated, it is the task of the designer to develop hardware for the system.
- Computer design is concerned with the determination of what hardware should be used and how the parts should be connected. This aspect of computer hardware is sometimes referred to as computer implementation.

7. Computer architecture

- Computer architecture is a specification detailing how a set of software and hardware technology standards interact to form a computer system or platform.
- In short, computer architecture refers to how a computer system is designed and what technologies it is compatible with.

	Primary Memory(main Memory)	Secondary Memory(auxiliary Memory)
Volatility	This is volatile.	This is Non-volatile.
Access Time	Access Time is higher Than Secondary memories.	Access Time is lower Than Primary memories.
Memory Status	This is a Temporary Memory.	This is a Permanent Memory.
Capacity	At present time, 512 MB to 8 GB RAMs are available.	At Present time 80 GB to 4 TB Hard Disc Drive are available.
Price	Higher than HDD/Secondary Memory	Lower Than primary Memory.
Connection	Connected via Slots.	Connected Via Cables.
Accessible	Primary memory is directly accessible to the CPU	Secondary memory is not directly accessible to the CPU
Speed	It is relatively fast memory.	It is slow in compare to main memory.