

# Chapter-2

## Computer system

Computer consists of various hardware and software that provides the platform for computer to function and perform different task is collectively known as computer system. (Hardware, software, data information, procedure, user, communication)

### 1. Hardware

Parts of computer that can be observable and touchable. I.e. physical device of the computer, equipment, input/output device, processing device and storage device.

### 2. Software

Use to describe the instruction that tells or instruct hardware for their corresponding performance.

### 3. Data/ information

- Function of computer is to convert data into information.
- Data consists of raw facts and figures that are processed to form information.

### 4. Procedure

It is a description of how things or works are done, step for accomplishing a results. Reference manual is a guidelines, rules or instruction that provides the guidelines for processing the hardware of software.

### 5. Communication

Communication channel is required for sharing of the data or information between the computers. There are various manner on which various individual system are connected by wires, wireless, cables, lines, etc.

## 2.2 Types of computer hardware

Computer receive data, process it, produced output and stores it for further references such that computer should have four major components to perform these operation or tasks.

### Input device

It provides the platform for interact with computer system or used enter data and instruction to the computer. These device convert input data and instruction to the suitable binary code like ASCII that can be accept by the computer. Some major function of computer are;

- Interact with outside world and accepts data and instruction.
- Convert received data and information into binary form and provided to the processor.

### Central processing unit (CPU)

- Response for interpreting and executing most of the instruction and commands from the computer hardware and software and also control the operation of overall components of the computer system.
- It received the binary data from the input device and process according to the command and instruction and provides the results as output. It consist of the processing unit, memory unit and logical unit. Such that main function is to run the program by fetching instruction from the RAM, evaluating and executing them in sequence.
- CPU read instruction from memory, controlling the sequence of instructions and flow of data from one component to another component.
- Communicating with various peripheral (input/output) using system bus.

Some major components of CPU are;

- Control unit
- Arithmetic- Logical Unit
- Register

### **Control unit**

- Control unit provides the require timing and control signal for the operation of the computer. It control the flow of data between the CPU, memory unit and input/output device.
- The instruction for the control unit is provided by the program stored in the main memory, interprets the instructions and issues the signals which cause the other units of the system to execute (follow) them.
- It also provide the status control, timing signal that required for the operation of the various parts of the computer such that it is also known as central nervous system of the computer.
- It stored program in the memory.
- It fetch the instruction form the storage and decode each instruction and execute as required.
- It gives commands to transfer data from the input device to the memory to an ALU.
- It also transfer the results from ALU to memory and then to output devices.

### **Arithmetic Logic Unit (ALU)**

Here, various computing function are performed on data like addition, subtraction, multiplication and division and logical operation such as comparison AND, OR and Excusive OR.

The result of the operation is stored in Accumulator or some register.

- Accepts operands from register
- Perform arithmetic and logical operations
- Return a results to register or a memory.
- Logical operation of ALU provide the computer to make decision ability.

### **Register**

Registers are high speed temporary memory storage locations in the CPU that made from the electronic devices like transistors, flip flop, etc. it is also considered as CPU's memory and

primarily used to store data temporarily during execution of a program and are accessible to the user through instructions. These are the part of control unit and ALU rather than of memory.

### Output unit

- Output devices are used to present result that provided by the computer to user.
- Output from the computer is in the form of electrical signals, which is then converted to human understandable form into human readable form.

### Memory and storage devices

#### Memory unit

- Data and instructions which are entered through an input unit must be stored on the computer before the actual processing starts. And the results produced by the processing is also stored before passing to the output units.
- In case of intermediate results are produced during processing, it should store in somewhere in memory.

#### Types of memory

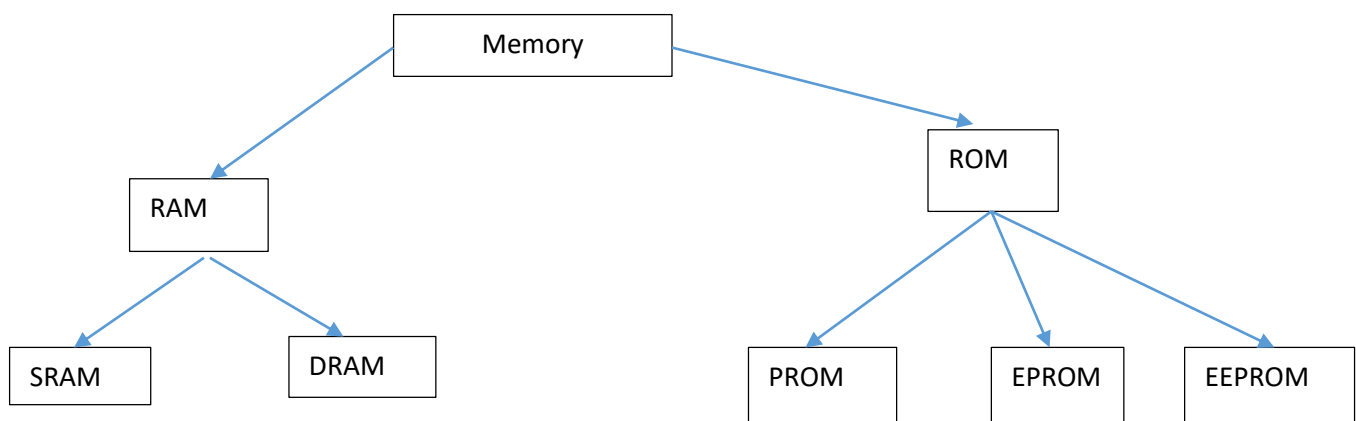
A. Primary memory

B. Secondary memory

i. Primary memory

- Primary memory directly communicate with main memory. It enable computer to store data and instruction temporarily.
- Here, the data and instructions are hold. It also hold intermediate results of processing.
- Primary memory is volatile(content store in this memory loses when power supply is off)

#### Type of primary memory



##### 1. Random Access Memory (RAM)

- Main memory or primary memory. Here the program and data that required for CPU during execution of program are stored in this memory.
- When power is switch off the data are loss as it is a volatile memory.

It is of two type;

SRAM (Static Random Access memory)

DRAM (Dynamic Random Access Memory)

### Differences between SRAM and DRAM

SRAM	DRAM
Construction of circuits similar to D flip flops.	Constructed of tiny capacitors that leak electricity.
It can hold content as long as power is available.	It required maintenance of data by recharging in every few milliseconds.
It cannot store many bits per chip	Can store many bits per chip
User more power, generate more heat, expensive	Use less power, generate less heat, inexpensive
Used for cache memory	Used for main memory

## 2. Read only memory (ROM)

It stores important information that is required for system operation, like the program essential to boot the computer.

Not volatile

Used in embedded systems or where the programming needs no change.

Used in calculators and peripheral devices.

Types of Read Only Memory

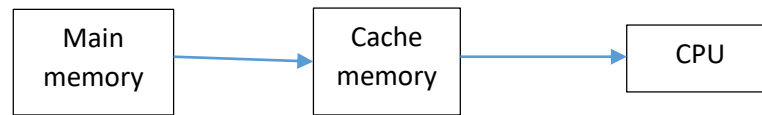
- i. PROM (Programmable read only memory)
  - It can be programmed by user.
  - Once programmed, the data and instruction cannot be changed.
- ii. EPROM (Erasable Programmable read only memory)
  - Can be reprogrammed.
  - To erase data from it, expose it to ultra violet light.
  - To reprogram it, erase all the previous data.
- iii. EEPROM (Electrically Erasable Programmable read only memory)

By applying electric field data can be erased, no need of ultra violet light. We can erase only portions of the chip.

## Difference between RAM and ROM (Homework)

Cache memory

- Cache memory is a very high speed memory that is placed between the CPU and main memory to operate at the speed of the CPU. And it help to reduce the average time to access data from the main memory.



- Cache is a smaller and faster memory which stores copies of the data from frequently used main memory locations.

### **Secondary storage**

- It is the memory that supplements the main memory. And non-volatile memory.
- Used for transferring the data to program from one computer to another computer.
- This memory are high storage device used for storage of data and program permanently.
- It is backup device that provides the storage of data and valuable information.
- Example, magnetic tape, magnetic disc, optical disk, etc.