

Computer Organization

The architecture of the computers have not changed since decades, but the technology used to accomplish those operations may vary from one computer to another computer. However, the basic computer organization remains the same for all computer systems.

The block diagram of the computer system have the following three units.

- a) Input unit
- b) Central processing unit
- c) Output unit

Input unit:

- Accept data and instructions from the outside world.
- Convert it to a form that the computer can understand.
- Supply the converted data to the computer system for further processing.

Following are the some of the input devices:

1. Keyboard
2. Mouse
3. Light pen
4. Digitizer Sin
5. Track ball
6. Joystick
7. OCR (Optical Character Recognizer)
8. MICR (Magnetic Ink Character Recognizer)
9. OMR (Optical Mark Recognizer)

Central Processing Unit (CPU):

It is the heart of the computer system, i.e. all operations are carried out in CPU only.

- It performs all calculations and all decisions.

- It controls and co-ordinates all units of the computer.
- It interprets instructions of a program.
- It stores data temporarily and monitors external requests.
- The CPU is subdivided into the following subsystems.
 - i) Control unit
 - ii) Arithmetic and Logical unit
 - iii) Memory unit
 - a) Primary storage.
 - b) Secondary storage

Control Unit:

It instructs the computer how to carry out program instructions. It directs the flow of data between memory and Arithmetic Logical Unit. It controls and co-ordinates the entire computer system.

The control unit controls are other units in the computer. The input unit does not know when to receive data and where to put the data in the storage unit after receiving it. The control unit gives the necessary instructions to the input unit. Similarly, the control unit instructs the input unit where j to store the data after receiving it from the user. In the same way, it controls the flow of data and instructions from the storage unit to ALU. It also controls the flow of the results from ALU to the storage unit. The control unit also controls what should be sent to the O/P unit.

This component of the computer hardware has overall control of the computer system. During program execution the contorl. Unit fetches instructions from the primary memory, decodes

them to determine the operation required, and then sets up instruction execution. Eg. To add two numbers or to read a character from a keyboard. A number of registers are associated with the control unit.

Arithmetic and Logical unit:

Arithmetic and Logical unit performs all the arithmetic and Logical operations. Arithmetic operations like addition, subtraction, multiplication and logical operations, such as comparisons are performed in ALU.

All calculations are performed in the Arithmetic and Logical Unit (ALU) of the computer. ALU also does comparisons and takes decisions whenever any calculation has to be done, the control unit transfers the required data, from the storage unit to the ALU.

Memory unit:

Memory is the part of computer which holds data for processing and other information. It is also called as Main memory or Primary memory.

- Memory unit is a device that stores program instructions or data used by the CPU when performing a given function.
- Memory is a device, which is used to store information Temporarily permanently, it is the place where the information is safely kept.
- Secondary memory, such as disk storage, is functionally considered I/O because it is accessed through the I/O system.

a) Primary Storage:

The primary storage is also called as main memory, stores and access information very fastly. This is generally used to hold the program being currently-executed in the computer, the data being received from the input unit, the intermediate and final results of the program. The primary contents generally loses its contents when we switch off the computer.

Primary storage is also known as system memory, internal, temporary and RAM.

- It is installed on the main computer board (Motherboard)
- Typically comprised of ICs
- Fast access – usually in the order of nano seconds.

b) Secondary storage ;

The secondary storage is also known as Auxiliary storage. It is used like an archive. It may store several programs, documents, databases, etc. The program that we want to run on the computer is first transferred to the primary memory before it can run. Similarly, after running the program. If we need to save the results, we will transfer them to the secondary storage. The secondary memory is slower and cheaper than the primary memory. Some of the commonly used secondary memory devices are

1. Floppy diskette
2. Zip diskette
3. Hard disk
4. Magnetic disks and tapes etc.

Secondary memory

Secondary memory is also known as disk storage. external, long term.

- Not directly accessible – data transferred through an I/O system.
- Non – volatile and long term storage.
- Not as fast as internal memory – typically milliseconds instead of nano seconds.
- Holds larger amounts of data.
- Some devices can be removed for archival.

O/P Unit :

Devices used to get the response or result of a process from the computer is called O/P. Output unit is the communication between the user and the computer.

The O/P unit of a computer provides the information and results of a computation to the outside world. As we know. Computers do not work in the decimal system, they work in the binary system. Therefore it required. the output unit also converts the binary data into a form that users can understand.

Commonly used O/p devices are :

- a) Visual Display Unit (VDU) or monitor
- b) Printer
- c) Computer output microfilm
- d) Plotter.

Functioning of a computer

A computer will function properly with the help of hardware and software. Hardware includes mechanical and electronic devices and software

includes programs; the operating systems. Stored data and respective storage devices.

i) Receiving input :

The required input information is fed into a computer through various input devices like keyboard, mouse etc. Input also can be supplied by another computer devices like Floppy disc, CD-ROM etc.

ii) Processing the information :

The operations that has to be performed with the input received are carried out based on the instructions in the program.

iii) Storing the information :

The information can be stored in hard disk or in other storage devices like floppy disks, CDs,. etc.

iv) Producing output :

The processed information and other details are communicated to the outside world through output devices like monitor, printer, etc.

Components of A Computer System:

Components of a computer system can be divided into following two main groups:

1. Hardware
2. Software

Hardware:

Computer is a collection of several components working together. Some of these components are essential, others add more performance.

Computer hardware is made up of the following parts:

- i) CPU
- ii) Peripherals

Software:

Software is the set of instructions or programs, which are useful for particular purpose. It is classified into Application software and system software.

(i) System software is a set of programs, that are used to control and co-ordinate the entire computer system. Ex: MS-DOS, MS-Windows, UNIX etc.

(ii) Application software is a set of programs that are used to perform particular task
Ex: Accounting software , baking software etc.,

- a) Magnetic Core Memory
- b) Semi-conductor Memory
- a) ROM (Read Only Memory)
- b) RAM (Random Access Memory)

ROM	RAM
It is a non-volatile memory	It is a volatile memory
The contents are permanent	The contents are temporary
Cost effective	Cost is very high
Available in high storage capacity	Available in high storage capacity
Available in small storage capacity	Available in small storage capacity
Processing Speed is low	Processing Speed is high
Generally the operating system supporting programs can be stored	User defined programs can be stored at any time

Components of CPU:

1. Motherboard
2. Processor
3. RAM Chips
4. Empty RAM chip slots
5. Floppy Disk Drive
6. Hard Disk Drive
7. Power Supply Box
8. Expansion slots
9. ROM Chips
10. Speaker

Other primary memories in computers are:

1. PROM (Programmable Read Only Memory)
2. EPROM (Erasable PROM)
3. EEPROM (Electrically Erasable PROM)

Types of Memory and Devices:

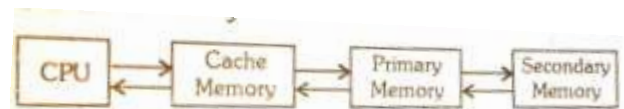
- a) Primary or Main Memory
- b) Secondary Memory

Measurement of Storage Capacity:

- 1 Byte = 8 bits
- 1024 Bytes = 1 KB (kilobytes)
- 1024 KB = 1 MB (Mega byte)
- 1024 MB = 1 GB (Giga byte)

Primary Memory:

Cache Memory:



- a) it stores the current information.

- b) Reduces the access time.
- c) Increases the performance.
- d) Increases the speed of CPU
- e) Fast accessing

Virtual Memory:

A process cannot be loaded in a system whose main memory size is less than the total memory required by the process.

Virtual memory is a memory management scheme that overcomes this limitations by allowing the execution of processes that might not be completely loaded in the main memory.

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