FUNDAMENTALS OF COMPUTING

CHAPTER 3
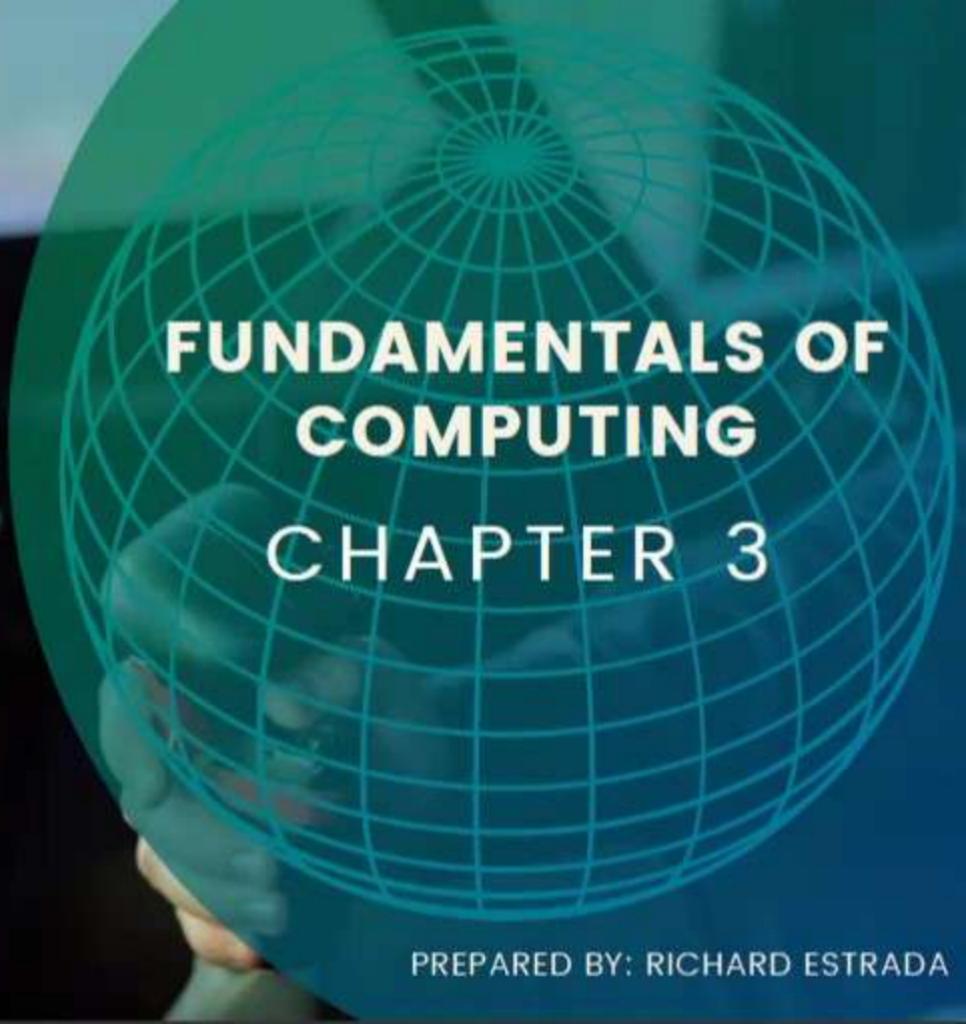
PREPARED BY: RICHARD ESTRADA

LEARNING OBJECTIVES

BASIC COMPUTER CONCEPTS
- FUNCTIONALITIES OF A COMPUTER
- ADVANTAGES AND DISADVANTAGES OF COMPUTERS
- COMPUTER TYPES
- COMPUTER APPLICATION
- COMPUTER GENERATIONS
- COMPUTER COMPONENTS

FUNCTIONALITIES OF A COMPUTER

Step 1 - Takes data as input.

Step 2 - Stores the data/instructions in its memory and uses them as required.

Step 3 - Processes the data and converts it into useful information.

Step 4 - Generates the output.

Step 5 - Controls all the above four steps.

ADVANTAGES
OF COMPUTERS

HIGH SPEED

- Computer is a very fast device.
- It is capable of performing calculation of very large amount of data.
- The computer has units of speed in microsecond, nanosecond, and even the picosecond.
- It can perform millions of calculations in a few seconds as compared to man who will spend many months to perform the same task.
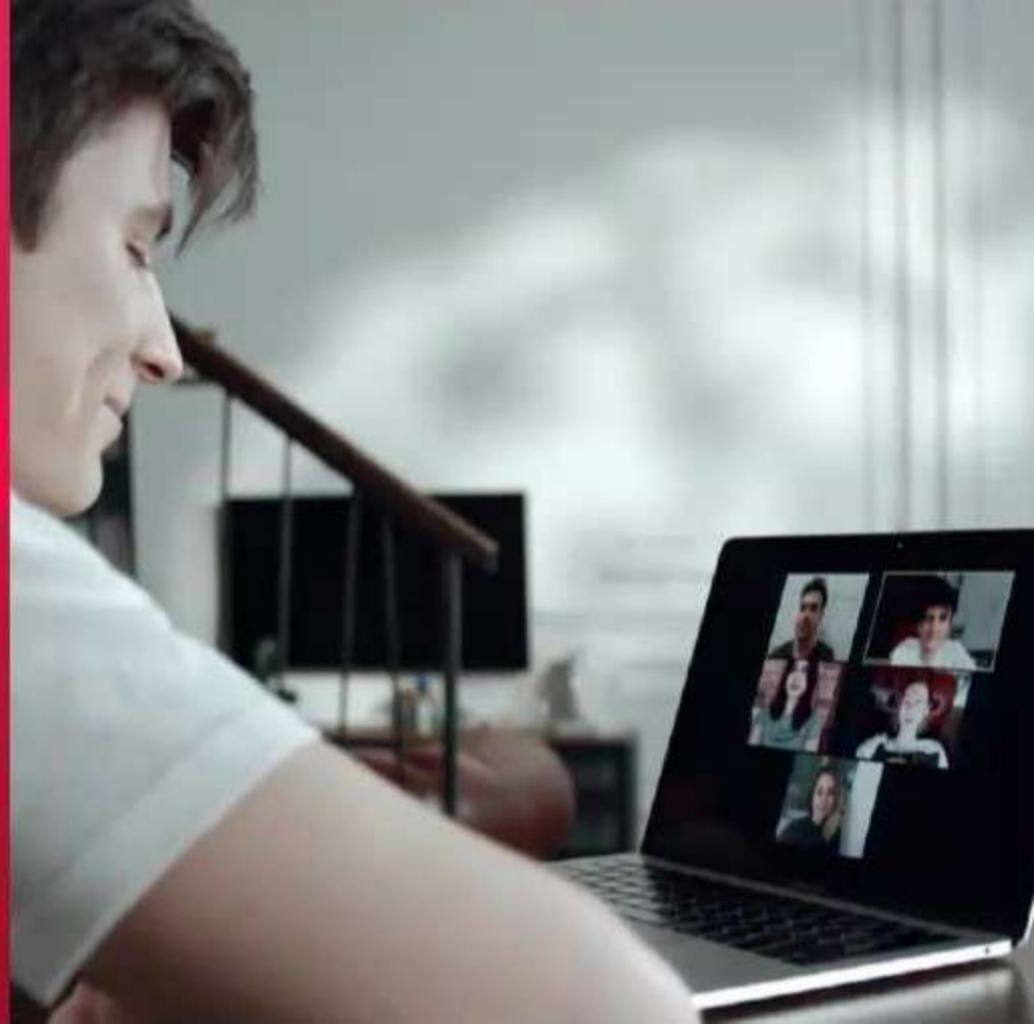
ACCURACY

- In addition to being very fast, computers are very accurate.
- The calculations are 100% error free.
- Computers perform all jobs with 100% accuracy provided that the input is correct.

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STORAGE CAPABILITY

- Memory is a very important characteristic of computers.
- A computer has much more storage capacity than human beings.
- It can store large amount of data.
- It can store any type of data such as images, videos, text, audio, etc.

DILIGENCE

- Unlike human beings, a computer is free from monotony, tiredness, and lack of concentration.
- It can work continuously without any error and boredom.
- It can perform repeated tasks with the same speed and accuracy.

VERSATILITY

- A computer is a very versatile machine.
- A computer is very flexible in performing the jobs to be done.
- This machine can be used to solve the problems related to various fields.
- At one instance, it may be solving a complex scientific problem and the very next moment it may be playing a card game.

RELIABILITY

- A computer is a reliable machine.
- Modern electronic components have long lives.
- Computers are designed to make maintenance easy.

AUTOMATION

- Computer is an automatic machine.
- Automation is the ability to perform a given task automatically. Once the computer receives a program i.e., the program is stored in the computer memory, then the program and instruction can control the program execution without human interaction.
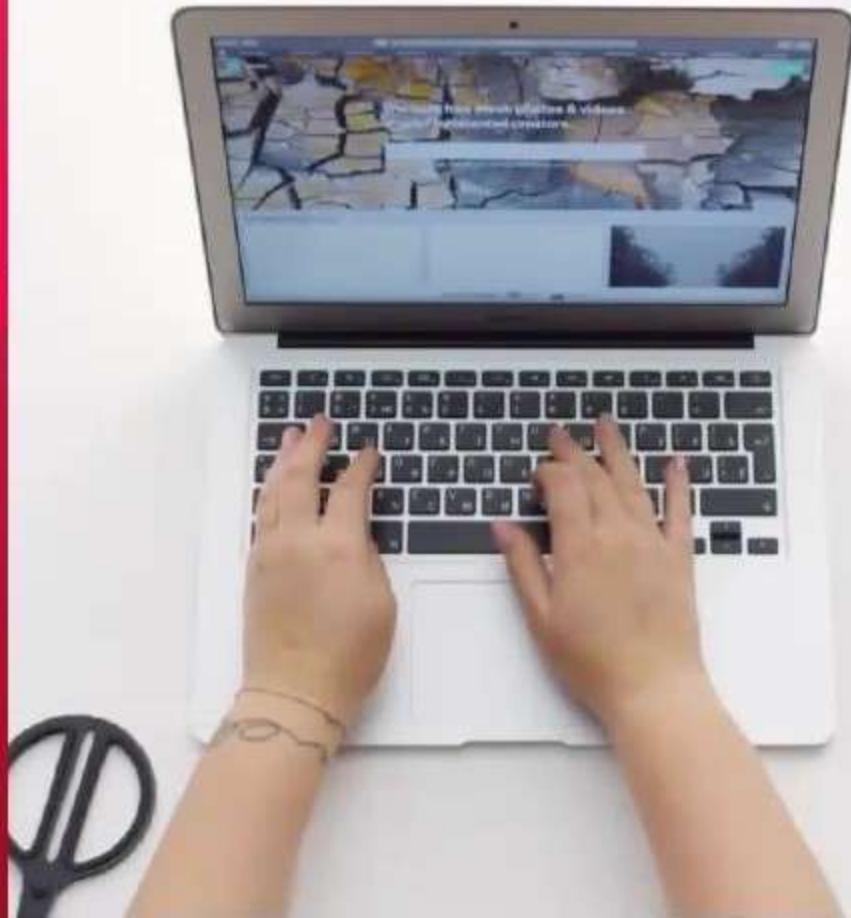
REDUCTION IN PAPER WORK AND COST

- The use of computers for data processing in an organization leads to reduction in paper work and results in speeding up the process.
- As data in electronic files can be retrieved as and when required, the problem of maintenance of large number of paper files gets reduced.
- Though the initial investment for installing a computer is high, it substantially reduces the cost of each of its transaction.

DISADVANTAGES OF COMPUTERS

NO I.Q.

- A computer is a machine that has no intelligence to perform any task.
- Each instruction has to be given to the computer.
- A computer cannot take any decision on its own.

DEPENDENCY

- It functions as per the user's instruction, thus it is fully dependent on humans.

ENVIRONMENT

- The operating environment of the computer should be dust free and suitable.

NO FEELING

- Computers have no feelings or emotions.
- It cannot make judgment based on feeling, taste, experience, and knowledge unlike humans.

COMPUTER - APPLICATIONS

HEALTH

BANKING

EDUCATION

BUSINESS

COMMUNICATION

COMPUTER – GENERATIONS
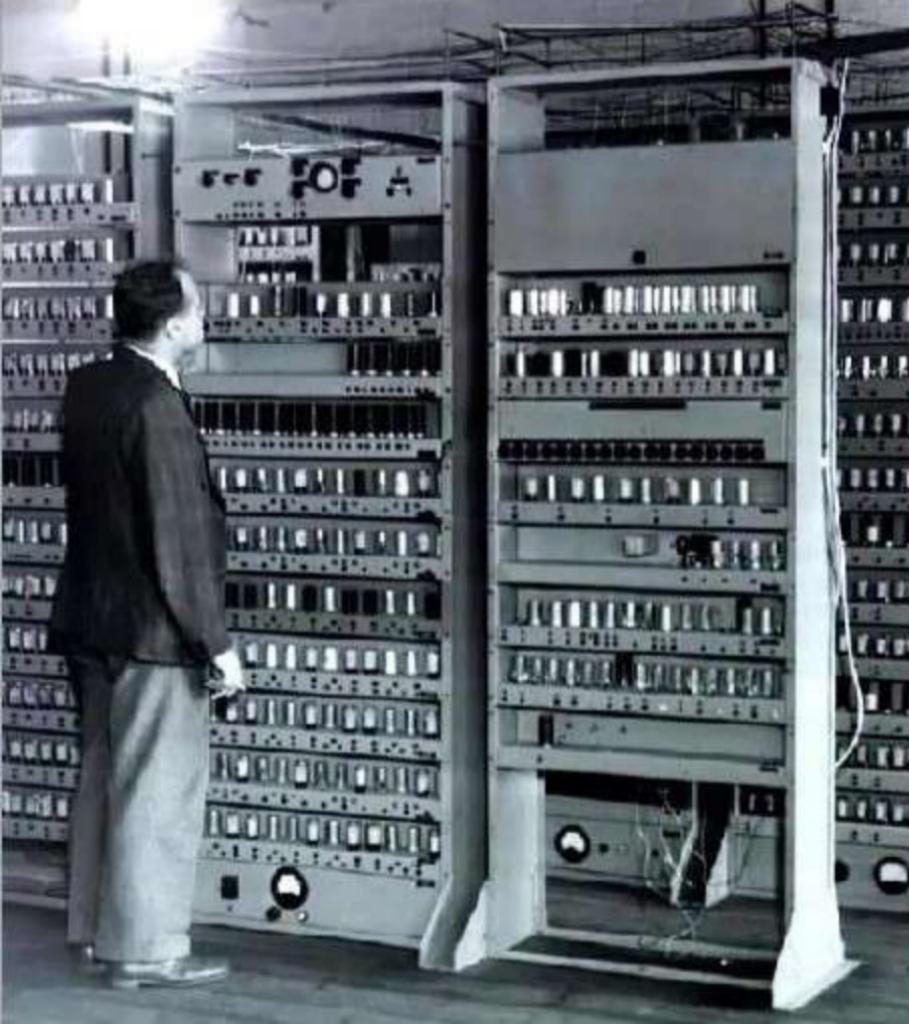
FIRST GENERATION

- The period of first generation: 1946-1959. Vacuum tube based.

Property of Museum of History & Industry, Seattle

SECOND GENERATION

- The period of second generation: 1959-1965. Transistor based.

THIRD GENERATION

- The period of third generation: 1965–1971. Integrated Circuit based.

FOURTH GENERATION

- The period of fourth generation: 1971–1980. VLSI microprocessor based.

FIFTH GENERATION

- The period of fifth generation: 1980-onwards. ULSI microprocessor based.

COMPUTER – TYPES

COMPUTER - TYPES

PC (PERSONAL COMPUTER)

WORKSTATION

MINI COMPUTER

MAIN FRAME

SUPERCOMPUTER
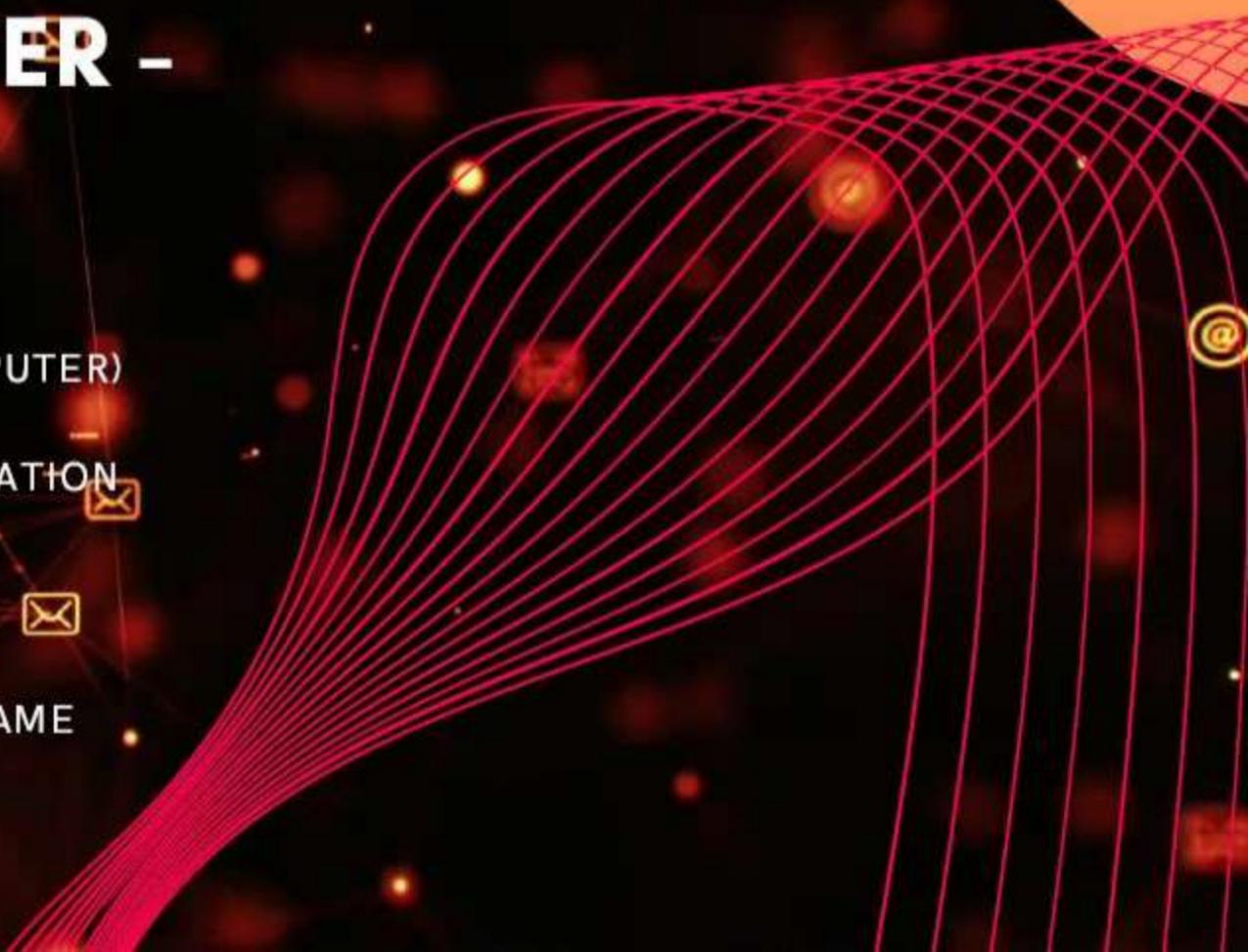
PC (PERSONAL COMPUTER)

A PC can be defined as a small, relatively inexpensive computer designed for an individual user. PCs are based on the microprocessor technology that enables manufacturers to put an entire CPU on one chip. Businesses use personal computers for word processing, accounting, desktop publishing, and for running spreadsheet and database management applications. At home, the most popular use for personal computers is playing games and surfing the Internet.

WORKSTATION

Workstation is a computer used for engineering applications (CAD/CAM), desktop publishing, software development, and other such types of applications which require a moderate amount of computing power and relatively high quality graphics capabilities.

Workstations generally come with a large, high-resolution graphics screen, large amount of RAM, inbuilt network support, and a graphical user interface. Most workstations also have mass storage device such as a disk drive, but a special type of workstation, called diskless workstation, comes without a disk drive.

MINICOMPUTER

It is a midsize multi-processing system capable of supporting up to 250 users simultaneously

MAINFRAME

Mainframe is very large in size and is an expensive computer capable of supporting hundreds or even thousands of users simultaneously. Mainframe executes many programs concurrently and supports many simultaneous execution of programs.

SUPERCOMPUTER

Supercomputers are one of the fastest computers currently available. Supercomputers are very expensive and are employed for specialized applications that require immense amount of mathematical calculations (number crunching).

For example, weather forecasting, scientific simulations, (animated) graphics, fluid dynamic calculations, nuclear energy research, electronic design, and analysis of geological data (e.g. in petrochemical prospecting).

COMPUTER – COMPONENTS
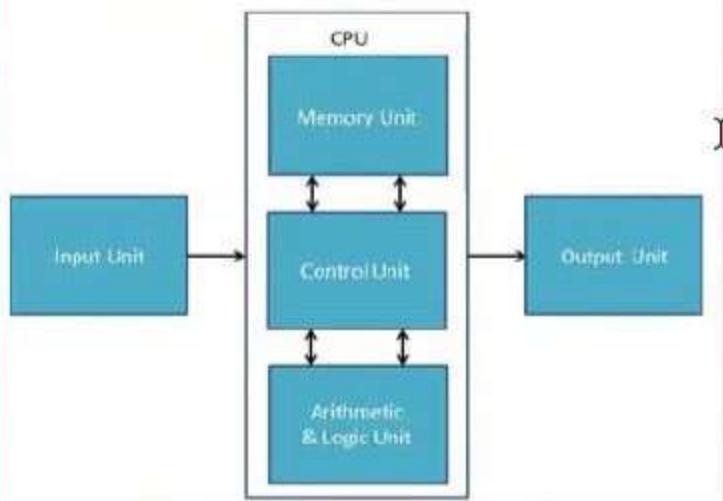
Take Input: The process of entering data and instructions into the computer system.

Store Data: Saving data and instructions so that they are available for processing as and when required.

Processing Data: Performing arithmetic, and logical operations on data in order to convert them into useful information.

Output Information: The process of producing useful information or results for the user, such as a printed report or visual display.

Control the workflow: Directs the manner and sequence in which all of the above operations are performed.

INPUT UNIT

This unit contains devices with the help of which we enter data into the computer. This unit creates a link between the user and the computer. The input devices translate the information into a form understandable by the computer.
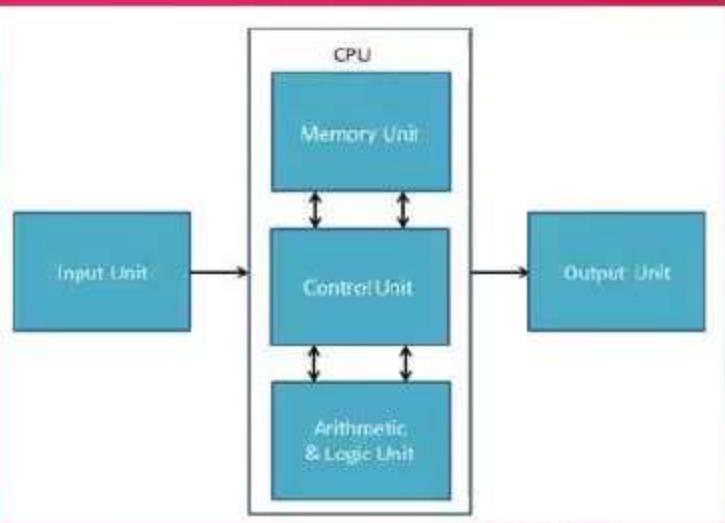
CPU (CENTRAL PROCESSING UNIT)

CPU is considered as the brain of the computer. CPU performs all types of data processing operations. It stores data, intermediate results, and instructions (program). It controls the operation of all parts of the computer.
CPU itself has the following three components
- ALU (Arithmetic Logic Unit)
- Memory Unit
- Control Unit

OUTPUT UNIT

The output unit consists of devices with the help of which we get the information from the computer. This unit is a link between the computer and the users. Output devices translate the computer's output into a form understandable by the users.
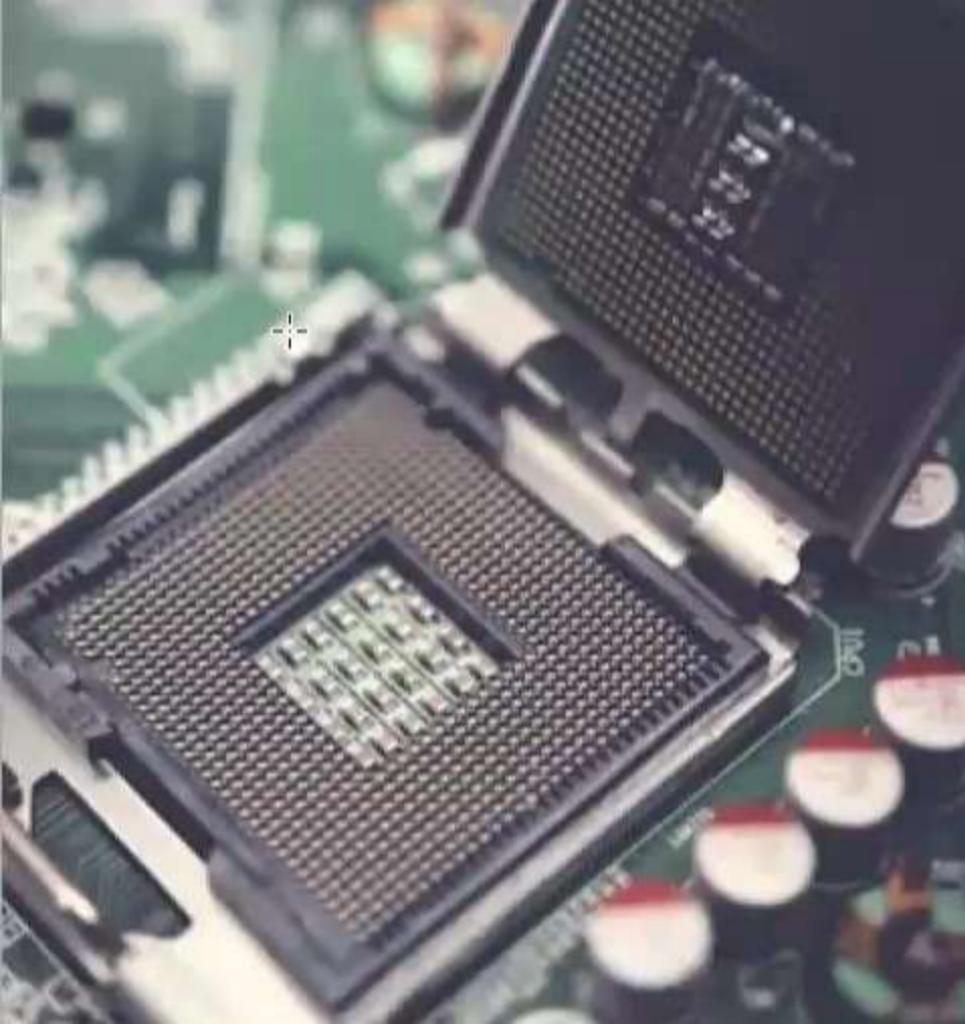
CENTRAL PROCESSING UNIT

This unit contains devices with the help of which we enter data into the computer. This unit creates a link between the user and the computer. The input devices translate the information into a form understandable by the computer.

CPU is considered as the brain of the computer.
- CPU performs all types of data processing operations.
- It stores data, intermediate results, and instructions (program).
- It controls the operation of all parts of the computer.

MEMORY OR STORAGE UNIT

This unit can store instructions, data, and intermediate results. This unit supplies information to other units of the computer when needed. It is also known as internal storage unit or the main memory or the primary storage or Random Access Memory (RAM).
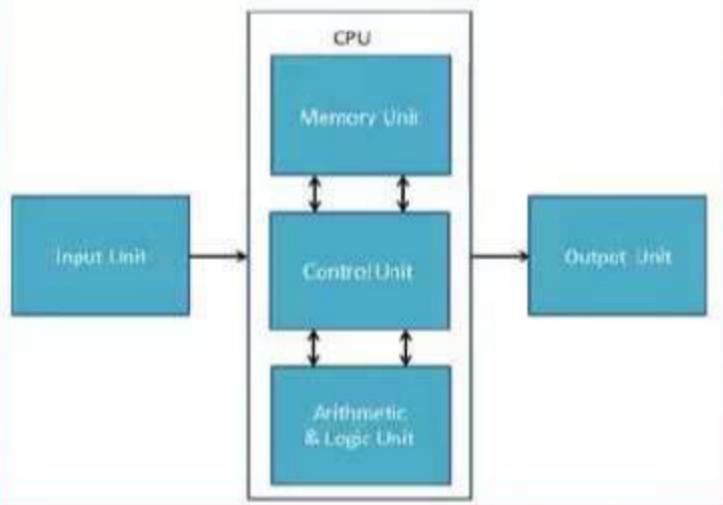
CONTROL UNIT

This unit controls the operations of all parts of the computer but does not carry out any actual data processing operations.

- It is responsible for controlling the transfer of data and instructions among other units of a computer.
- It manages and coordinates all the units of the computer.
- It obtains the instructions from the memory, interprets them, and directs the operation of the computer.
- It communicates with Input/Output devices for transfer of data or results from storage.
- It does not process or store data.

ALU (ARITHMETIC LOGIC UNIT)
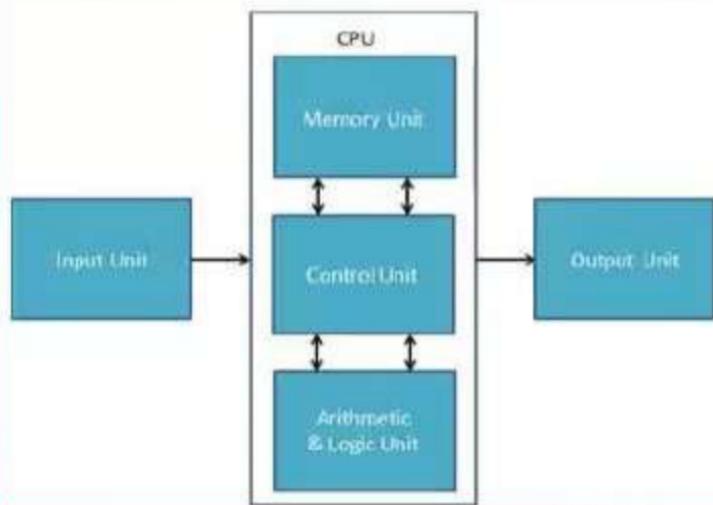
This unit consists of two subsections namely:
- Arithmetic Section
- Logic Section

Arithmetic Section
Function of arithmetic section is to perform arithmetic operations like addition, subtraction, multiplication, and division. All complex operations are done by making repetitive use of the above operations.

Logic Section
Function of logic section is to perform logic operations such as comparing, selecting, matching, and merging of data.