Department of Networks

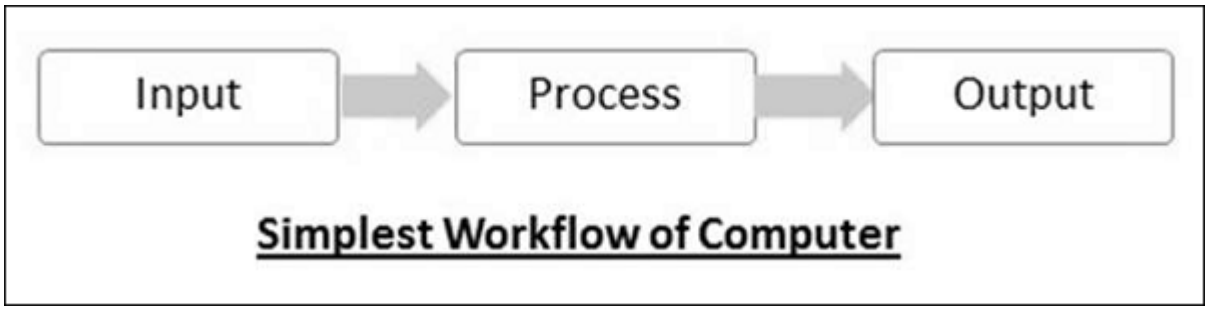
First Year

Problem Solving and Programming 1

A computer is an electronic device that receives input, stores or processes the input as per user instructions and provides output in desired format.

Input-Process-Output Model

Computer input is called **data** and the output obtained after processing it, based on user's instructions is called **information**.



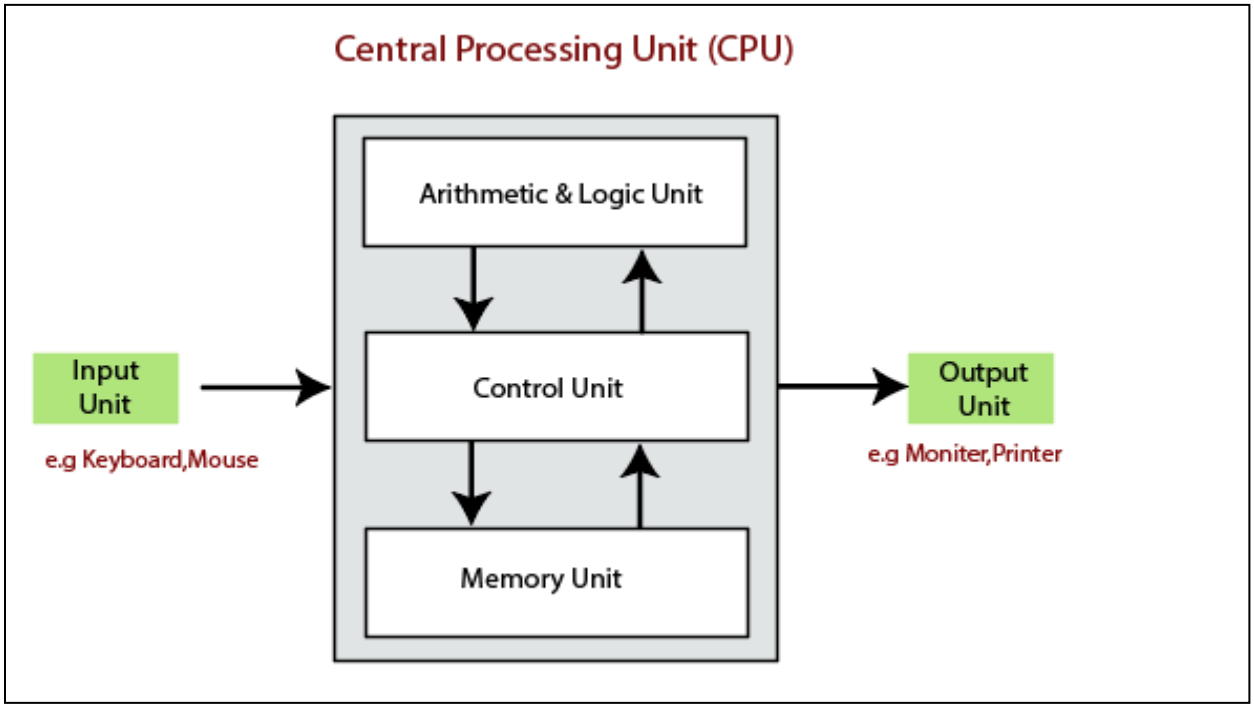
Simplest Workflow of Computer

Raw facts and figures which can be processed using arithmetic and logical operations to obtain information are called data.

The processes that can be applied to data are of two types −

- Arithmetic operations − Examples include calculations like addition, subtraction, differentials, square root, etc.
- Logical operations − Examples include comparison operations like greater than, less than, equal to, opposite, etc.

The corresponding figure for an actual computer looks something



like the above figure –

The basic parts of a computer are as follows −

- **Input Unit** − Devices like keyboard and mouse that are used to input data and instructions to the computer are called input unit.
- **Output Unit** − Devices like printer and visual display unit that are used to provide information to the user in desired format are called output unit.
- **Control Unit** − As the name suggests, this unit controls all the functions of the computer. All devices or parts of computer interact through the control unit.
- **Arithmetic Logic Unit** − This is the brain of the computer where all arithmetic operations and logical operations take place.

- **Memory** − All input data, instructions and data interim to the processes are stored in the memory. Memory is of two types – **primary memory** and **secondary memory**. Primary memory resides within the CPU whereas secondary memory is external to it.

Characteristics of Computer

To understand why computers are such an important part of our lives, let us look at some of its characteristics −

- **Speed** − Typically, a computer can carry out 3-4 million instructions per second.
- **Accuracy** − Computers exhibit a very high degree of accuracy. Errors that may occur are usually due to inaccurate data, wrong instructions or bug in chips – all human errors.
- **Reliability** − Computers can carry out same type of work repeatedly without throwing up errors due to tiredness or boredom, which are very common among humans.
- **Versatility** − Computers can carry out a wide range of work from data entry and ticket booking to complex mathematical calculations and continuous astronomical observations. If you can input the necessary data with correct instructions, computer will do the processing.
- **Storage Capacity** − Computers can store a very large amount of data at a fraction of cost of traditional storage of files. Also, data is safe from normal wear and tear associated with paper.

Computer Program

A computer program is a sequence of instructions written using a Computer Programming Language to perform a specified task by the computer.

The two important terms that we have used in the above definition are −

- Sequence of instructions
- Computer Programming Language

Computer Programming

If you understood what a **computer program** is, then we will say: the act of writing computer programs is called computer programming.

there are hundreds of programming languages, which can be used to write computer programs and following are a few of them −

- Java
- C
- C++
- Python
- PHP
- Perl
- Ruby

A set of instructions that achieve a single outcome are called program or procedure. Many programs functioning together to do a task make a **software**.

For example, a word-processing software enables the user to create, edit and save documents. A web browser enables the user to view and share web pages and multimedia files. There are two categories of software −

- System Software
- Application Software
- Utility Software

Algorithm

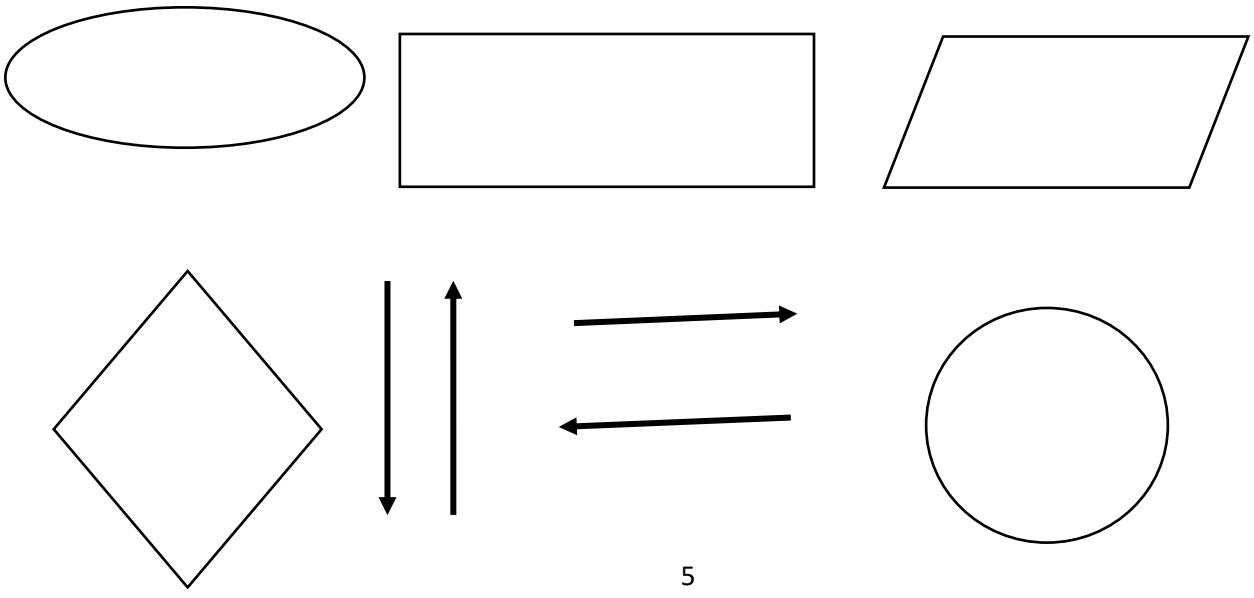
From programming point of view, an **algorithm** is a step-by-step procedure to resolve any problem. An algorithm is an effective method expressed as a finite set of well-defined instructions.

A flowchart is a blueprint that pictorially represents the algorithm and its steps. The steps of a flowchart do not have a specific size and shape rather it is designed in different shapes and sizes (see the image given below).

Benefits of Flowchart

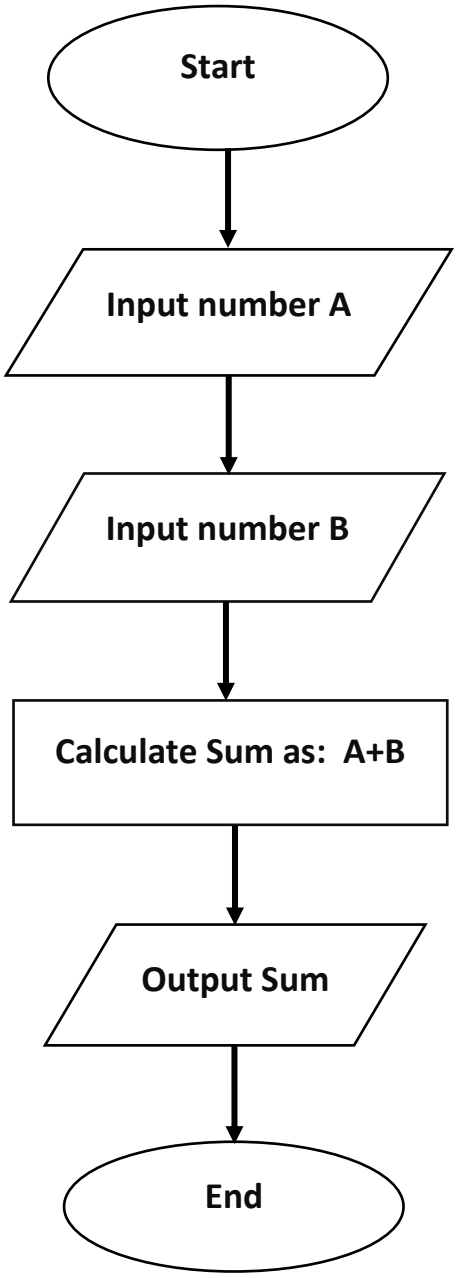
- **Simplify the Logic**
- **Makes Communication Better**
- **Effective Analysis**
- **Useful in Coding**
- **Proper Testing**

Flow-Chart Symbols



Flowchart Example – Simple Algorithms

A flowchart can also be used in visualizing algorithms, regardless of its complexity. Here is an example that shows how flowchart can be used in showing a simple summation process.



Flowchart Example – Calculate Profit and Loss