Contents

1 Introduction

1.1 Computer

Basically it is a fast calculating machine which is now a days used for variety of uses ranging from house hold works to space technology. The credit of invention of this machine goes to the English Mathematician Charles Babbage.

1.2 Types of Computer

Based on nature, computers are classified into Analog computers and Digital computers. The former one deals with measuring physical quantities (concerned with continuous variables) which are of late rarely used. The digital computer operates by counting and it deals with the discrete variables.There is a combined form called Hybrid computer, which has both features.

Based on application computers are classified as special purpose computers and general computers. As the name tells special computers are designed to perform certain specific tasks where as the other category is designed to cater the needs of variety of users.

1.3 Basic Structure of a Digital Computer

The von Neumann architecture, which is also known as the von Neumann model and Princeton architecture, is a computer architecture based on that described in 1945 by the mathematician and physicist John von Neumann.This describes a design architecture for an electronic digital computer with parts consisting of a processing unit containing an arithmetic logic unit and processor registers; a control unit containing an instruction register and program counter; a memory to store both data and instructions; external mass storage; and input and output mechanisms.The key idea of the Von Neumann architecture is the stored program concept.A stored-program digital computer is one that keeps its program instructions, as well as its data, in read-write, random-access memory (RAM). Stored-program computers were an advancement over the program-controlled computers of the 1940s.

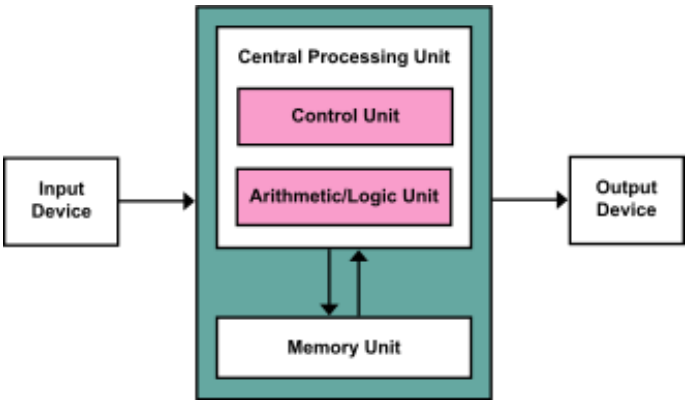

Figure 1: Block Diagram of Computer

The main components of a computer are Input unit (IU), Central Processing unit (CPU) and Output unit (OU). The information like data, programs etc are passed to the computer through input devices. The keyboard, mouse, floppy disk, CD, DVD, joystick etc

are certain input devices. The output device is to get information from a computer after processing . VDU (Visual Display Unit), Printer, Floppy disk, CD etc are output devices.

The brain of a computer is CPU. It has three components- Memory unit, Control unit and Arithmetic and Logical unit (ALU)- Memory unit also called storage device is to store information. Two types memory are there in a computer. They are RAM (random access memory) and ROM (read only memory). When a program is called, it is loaded and processed in RAM. When the computer is switched off, what ever stored in RAM will be deleted.So it is a temporary memory. Where as ROM is a permanent memory, where data, program etc are stored for future use. Inside a computer there is storage device called Hard disk, where data are stored and can be accessed at any time.

The control unit is for controlling the execution and interpreting of instructions stored in the memory. ALU is the unit where the arithmetic and logical operations are performed.The information to a computer is transformed to groups of binary digits, called bit. The length of bit varies from computer to computer, from 8 to 64. A group of 8 bits is called a Byte and a byte generally represents one alphanumeric (Alphabets and Numerals) character. The physical components of a computer are called hardwares. But for the machine to work it requires certain programs (A set of instructions is called a program). They are called softwares. There are two types of softwares – System software and Application software – System software includes Operating systems, Utility programs and Language processors.

1.3.1 Operating System

The set of instructions which resides in the computer and governs the system are called operating systems, without which the machine will never function. They are the medium of communication between a computer and the user. DOS, Windows, Linux, Unix etc are Operating Systems.

1.3.2 Utility Programs

These programs are developed by the manufacturer for the users to do various tasks. Word, Excel, Photoshop, Paint etc are some of them.

1.4 Programming Language

1.4.1 Low level Language

Low level languages are machine level and assembly level language. In machine level language computer only understand digital numbers i.e. in the form of 0 and 1. So, instruction given to the computer is in the form binary digit, which is difficult to implement instruction in binary code. This type of program is not portable, difficult to maintain and also error prone. The assembly language is on other hand modified version of machine level language. Where instructions are given in English like word as ADD, SUM, MOV etc. It is easy to write and understand but it is hard for the computer to understand. So the translator used here is assembler to translate into machine level. Although language is bit easier, programmer has to know low level details related to low level language. In the assembly level language the data are stored in the computer register, which varies for different computer. Hence it is not portable.

1.4.2 High level Language

These languages are machine independent, means it is portable. The language in this category is Pascal, Cobol, Fortran etc. High level languages are not understood by the machine. So it needs to translate by the translator into machine level. A translator is software which is used to translate high level language as well as low level language in to machine level language.

1.5 Compiler, Interpreter and Assembler

Compiler and interpreter are used to convert the high level language into machine level language. The program written in high level language is known as source program and the corresponding machine level language program is called as object program. Both compiler and interpreter perform the same task but there working is different. Compiler read the program at-a-time and searches the error and lists them. If the program is error free then it is converted into object program. When program size is large then compiler is preferred. Whereas interpreter read only one line of the source code and convert it to object code. If it check error, statement by statement and hence of take more time.

An assembler program creates object code by translating combinations of mnemonics and syntax for operations and addressing modes into their numerical equivalents. This representation typically includes an operation code ("opcode") as well as other control bits and data. The assembler also calculates constant expressions and resolves symbolic names for memory locations and other entities.

1.6 Traditional and Structured Programming

Structured programming is a programming paradigm aimed at improving the clarity, quality, and development time of a computer program by making extensive use of subroutines, block structures, for and while loops—in contrast to using simple tests and jumps such as the go to statement which could lead to "spaghetti code" causing difficulty to both follow and maintain.

It is possible to do structured programming in any programming language, though it is preferable to use something like a procedural programming language. Some of the languages initially used for structured programming include: ALGOL, Pascal, PL/I and Ada – but most new procedural programming languages since that time have included features to encourage structured programming, and sometimes deliberately left out features – notably GOTO – in an effort to make unstructured programming more difficult. Structured programming (sometimes known as modular programming) is a subset of imperative programming that enforces a logical structure on the program being written to make it more efficient and easier to understand and modify.