

# Introduction to Computers

## 1. What is a Computer?

- A computer is a device which can be programmed to carry out a finite set of arithmetic operations.
- A computer is, at its most basic, a machine which can take instructions, and perform computations based on those instructions.
- A computer is an electronic device which is capable of receiving the inputs (data from the user), storing it for a desired period of time, manipulating it according to the set of instructions (called program) and producing the output to the user in desired form. It performs a variety of operations in accordance to the set of instructions.

When reading the above definitions, we may find some common characteristics of computers such as:

- It is a man-made machine
- It accepts instructions of a human given in a sequential manner
- As per the given instructions, it performs some calculations and does changes for the information fed by human
- Releases or produces an output that is useful to the user

Since the computer is a man-made digital electronic device, it has a physical structure with several parts like the monitor, processor, mouse, and key board which are tangible. These are called **Hardware**. The sets of instructions which are also called computer programs installed in the computer are called **Software**. These softwares tell the hardware what to do and how to do to accomplish some tasks expected by the user to get done by the computer. The web browsers like Mozilla Fire Fox, Computer games, and Word processors like Microsoft Word are some examples for Software.

## 2. Characteristics of the Computer

The range of users of computers is overwhelming. Why is so popular? What can it do that we, as humans, cannot? The computer's superiority lies in its special characteristics such as speed, reliability, accuracy, diligence, versatility, storage capacity, etc. Let us discuss on each characteristic briefly.

**2.1 Speed** A computer can perform tasks very fast. For example, the amount of work that a human being can do in an entire year (if he worked day and night and did nothing else) can be accomplished by a computer within a few minutes. As you are aware now, inside the system unit, the operations occur through electronic circuits. When data, instructions, and information flow along these circuits, they travel at close to the speed of light. This allows billions of operations to be carried out in a single second.

**2.2 Reliability** Electronic components in modern computers are dependable because they have a low failure rate. The high reliability of the components enables the computer to produce consistent results.

**2.3 Accuracy** The accuracy of a computer is consistently high and the degree of accuracy of a particular computer depends upon its design. Errors can occur in a computer, but these are mainly due to human mistakes. Thus, computers can process large amounts of data and generate error-free results, provided the data is entered correctly. If inaccurate data is entered, the resulting outputs will also be incorrect. This computing principle is known as *Garbage in, garbage out (GIGO)*.

**2.4 Diligence** Unlike human beings, a computer is free from boredom, tiredness, lack of concentration, etc., hence a computer can work for hours without making any errors or complaints. Even if ten million calculations have to be performed, a computer will perform the ten millionth calculations with exactly the same accuracy and speed as the first one.

**2.5 Versatility** The computers have the capacity to perform completely different type of work. You may use your computer to prepare payroll slips at the moment. Next moment you may use it for inventory management or to prepare electric bills. The computers are flexible enough to adapt to any type of work and outputs according to what is fed and instructed.

**2.6 Power of remembering** Every piece of information that a user „stores“ on a computer can be retained as long as it is needed and can be recalled when necessary. Even after several years, the information recalled would be identical to what was fed to the computer. A computer will never „lose“ stored information on its own; a user has to „remove“ (or delete) the information from it.

**2.7 No Feeling** Computers do not have emotions. They have no feelings and no instincts because they are machines. Although human beings have succeeded in building a memory for the computer, a computer does not possess the equivalent of a human brain. Based on our feelings, taste, knowledge and experience, we often make certain judgments in our day-to-day life, but computers cannot make such judgments on their own. Their judgment is based on the instructions given to them in the form of programs by someone.

**2.8 No IQ** Computer is a dumb machine and it cannot do any work without instruction from the user. It performs the instructions at wonderful speed and with accuracy. It is you to decide what you want to do and in what sequence. So a computer cannot take its own decision as you can.

**2.9 Storage** The computer has an in-built memory where it can store a large amount of data. This is called **Primary Storage**. This Primary Storage has a limited capacity but it is very important as the processing unit of the computer can act directly only on instructions and data on the primary storage. But, you can also store data in secondary storage devices such as floppies, which can be kept outside your computer and can be carried to other computers. These are called **Secondary Storage**. Before the computer can process the data stored in Secondary storage devices, the data must be moved from secondary storage device to primary storage. This is not a serious drawback. The computers can retrieve information from files in a secondary storage device in a few milliseconds.

### **2.3 Limitations of the Computer**

It is obvious that the computer has a variety of capabilities. Similarly, this man made machine has some its own limitations as well. Such limitations are given below:

- The computer can do only what you tell it to do-you cannot expect the computer give you something which you did not ask.
- It cannot generate information on its own-the computer will work only if you operate it and give the instructions. It cannot give you information unless you feed it required data.  It will give wrong information if you feed it with wrong data- the computer cannot identify what the correct data and what the wrong data are.
- It cannot correct wrong instruction- if you give the computer wrong instruction, it will not be able to do anything to rectify it. The only thing it can do is to stop functioning till you correct the mistake.

**2.4 Different Types of Computers** When you hear the word “Computer”, most of the time a **personal computer** like **desktop** or **laptop** will come to your mind as they are widely used by the people around us. However, these computers come in many sizes and shapes that perform different functions which is useful in our daily lives. You are using a type of computer even when you withdraw cash from an ATM (Automatic Teller Machine) or scan groceries at the shop, or use a calculator. It is said that the ENIAC, which is considered as the first electronic general-purpose computer was of size of a large room. However, with the advance of technologies the size of a today’s computer has become smaller as of a small wrist watch. These computers have different processing powers as well.

**1. Microcomputers:** most common type of computers in the society. Can be used at your workplace, at school or on your study desk at home. Used by single user at a time. Small in size. Also called **Personal Computers (PCs)**.

**2. Minicomputers:** used by multi-users. In the middle when the computers are ranged from smallest to largest. Used in laboratories.

**3. Mainframes:** Largest in size. Capable of handling and processing very large amounts of data quickly.

**4. Super computers:** Used for performing complex scientific and numerical computations such as weather forecasting, fluid dynamics, nuclear simulations, theoretical astrophysics. Sometimes called as “**Workstations**” Since the Personal Computers are the most common category of computers among the individuals let’s talk more on PCs.

## 2.5. Different Types of Personal Computers

A Personal Computer (Mostly referred to as PC in the community) is designed as a more user-friendly device to be directly used by the end-user rather having an especially skilled separate computer operator. It is less expensive compared to other types of computers listed above. PCs come in different forms as listed below and we will have a description on each form of PC separately. It is noticeable that only few famous forms of PCs used today are listed below and the list may be extended by adding many more in the future with the advancement of the technologies. □ Desktop □ Laptop □ Netbook □ PDAs □ Wearable Computers □ Tablets

**2.5.1 Desktop PCs** Usually the desktop computers are placed in a fixed location and the name has derived as it is intended to be sitting on a top of a desk. A monitor, mouse, and a key board can be seen as parts of a typical desktop computer.

**2.5.2 Laptop Computers** Laptops are similar to desktop PCs in operation, but designed for mobile use. Capable of operating on the battery power and the battery can be charged with the external power adaptor. An in-built keyboard, Liquid Crystal Display unit (LCD screen), a touch pad (also known as track pad) to act as the mouse are the commonly seen components. However, a mouse can be also used instead of the touch pad. Laptops are obviously smaller in size and weight less than the desktop PCs. Therefore, it is difficult to access its internal hardware thus difficult to upgrade as much as a desktop. But adding more **RAM** or **Hard Drive** is possible. Built-in web camera is a common feature of a modern laptop computer and these laptops come in different weights, sizes, performances, speeds.

**2.5.3 Netbook** Netbooks belong to the laptop family, but are inexpensive and relatively smaller in size. Though the set of features and the capacity of netbooks were lesser compared to regular laptops at the time of introducing them to the market, nowadays the netbooks come in advanced features and in high capacities as similar to modern laptops.

**2.5.4 PDAs** Personal Digital Assistants (PDAs) are handheld computers which are also called palmtop computers due to its size which is smaller enough to keep it on your palm. Most of the PDAs are pen-based and come with a stylus (a writing pen) to be used as the input device which is sensitive to its touch screen. Most of them can access the Internet by means of Bluetooth or Wi-Fi facilities. PDAs allow you to organize your personal or business work and to manage your tasks through its facilities. It may be used as a Cellular phone to send and receive calls, to search in the web, to download and play audio/video files, to send/receive emails, to type in a text editor to jot down notes or write a document, take pictures or record videos, etc. Following Figure 2.6 shows two images of PDAs.

**2.5.5 Wearable Computers** The computers that can be worn on the body are known as Wearable computers. There is a constant interaction between the computer and user. These computers are mostly used to track human actions when the hands and other sensory organs are engaged in other activities.

**2.5.6 Tablets** Tablets are mobile computers larger than PDAs and smaller than Laptops described above. Usually operated by its touch screen and no formal key board are used. The people using them spent most of their time outside and would not have access to a keyboard or mouse. Usually the input method is the stylus or the digital pen. Tablets have become famous and ideal for field technicians and health workers due to its very light nature and the portability.

**2.6 Main parts of a computer system** You learned in the previous section that computers come in many varieties, from tiny computers to very large super computers. But no matters how complex it is or how big it is, every computer is part of a system. A complete computer system consists of four main parts as follows (see figure 2.10 below): □ Hardware □ Software □ Data □ User (Live ware)

**2.6.1 Hardware** The tangible parts that make up the computer are called „Hardware“. The physical parts such as monitor, key board, processor, and speakers can be identified as hardware.

**2.6.2 Software** Computer software is a set of instructions that tells computer hardware what to do. The computer will work according to the instructions given to it. We can use the generic term **computer program** to refer any piece of software. Some software are specially designed for the primary functions of the computer to manage its operations while some software are designed for the users to get their work done, ex. to prepare a letter.

**2.6.3 Data** Any individual fact or piece of information in a form suitable for use with a computer is known as „data“. This information may be in the form of text, documents, images, audio clips or software program. The primary use of the computer is to convert these data into useful information to the user. The computer accepts data from some sources or from the user to produce useful information. Thus the raw data fed into the computer may not make much sense to the users until it is processed.

**2.6.4 User/ Live ware** Though the computers automate most functions we cannot say that it is fully automatic, as the intervention of a human being or an operator is often needed. You may think whether a user is essential as you might have seen some performs their job without a person sitting in front of the computer. But you should not forget that the people design and build the programs running on it. The people do repairs to computer systems when needed. Therefore, „User“ is an essential part of a computer system. Further, you will learn about the applications that you can run in „Personal computers“ within this course material.

## 2.7 Self-assessment Questions

- 1 Define a computer.
- 2 Define the following terms with examples. a. Hardware b. Software
- 3 Briefly explain the relationship between Hardware, Software and users.
- 4 List main characteristics of the computer. Briefly describe them.
- 5 Write three significant limitations of the computer.
- 6 What are the four classifications of the computers according to their size and the data processing power?
- 7 List different types of personal computers. Briefly describe three.
- 8 Name the four main parts of a complete computer system. Briefly describe them.
- 9 State the difference between data and information.