

Computer Basics This chapter lays a foundation for one of the most influential forces available in modern times, the computer. A computer is an electronic device, operating under the control of instructions, which tells the machine what to do. It is capable of accepting data (input), processing data arithmetically and logically, producing output from the processing, and storing the results for future use. The chapter begins with the characteristics, evolution, and various generations of computers. The discussion also explores the classification of computers and their features. The chapter concludes with an overview on basic computer units and computer applications.

1.1 Introduction

In the beginning of the civilization, people used fingers and pebbles for computing purposes. In fact, the word digits in Latin actually means finger and calculus means pebble. This gives a clue into the origin of early computing concepts. With the development of civilization, the computing needs also grew. The need for a mechanism to perform lengthy calculations led to the invention of, first, calculator and then computers. The term computer is derived from the word compute, which means to calculate. A computer is an electronic machine devised for performing calculations and controlling operations that can be expressed either in logical or in numerical terms. In simple words, a computer is an electronic device that performs diverse operations with the help of instructions to process the data in order to achieve desired results. Although the application domain of a computer depends totally on human creativity and imagination, it covers a huge area of applications including education, industries, government, medicine, scientific research, law, and even music and arts. Computers are one of the most influential forces available in modern times. Harnessing the power of computers enables relatively limited and fallible human capacities for memory, logical decision making, reaction and perfection to be extended to almost infinite levels. Millions of complex calculations can be done in a mere fraction of time; difficult decisions can be made with unerring accuracy for comparatively little cost. Computers are widely seen as instruments for future progress and as tools to achieve sustainability by way of improved access to information with the help of video-conferencing and e-mail. Indeed, computers have left such an impression on modern civilization that we call this era as the “information age”.

1.1.1 Characteristics of Computers

The human race developed computers so that it could perform intricate operations, such as calculation and data processing, or simply for entertainment. Today, much of the world’s infrastructure runs on computers and it has profoundly changed our lives, mostly for the better. Let us discuss some of the characteristics of computers, which make them an essential part of every emerging technology and such a desirable tool in human development.

Speed: The computers process data at an extremely fast rate, at millions or billions of instructions per second. A computer can perform a huge task in a few seconds that otherwise a normal human being may take days or even years to complete. The speed of a computer is calculated in MHz (mega-hertz), that is, one million instructions per second. At present, a powerful computer can perform billions of operations in just one second.

- **Accuracy:** Besides the efficiency, the computers are also very accurate. The level of accuracy depends on the instructions and the type of machines being used. Since the computer is capable of doing only what it is instructed to do, faulty instructions for data processing may lead to faulty results. This is known as Garbage In Garbage Out (GIGO).
- **Diligence:** Computer, being a machine, does not suffer from the human traits of tiredness and lack of concentration. If four million calculations have to be performed, then the computer will

perform the last four-millionth calculation with the same accuracy and speed as the first calculation. ●

Reliability: Generally, reliability is the measurement of the performance of a computer, which is measured against some predetermined standard for operation without any failure. The major reason behind the reliability of the computers is that, at hardware level, it does not require any human intervention between its processing operations. Moreover, computers have built-in diagnostic capabilities, which help in the continuous monitoring of the system. ●

Storage Capability: Computers can store large amounts of data and can recall the required information almost instantaneously. The main memory of the computer is relatively small and it can hold only a certain amount of data; therefore, the data are stored on secondary storage devices such as magnetic tape or disks. Small sections of data can be accessed very quickly from these storage devices and brought into the main memory, as and when required, for processing. ●

Versatility: Computers are quite versatile in nature. It can perform multiple tasks simultaneously with equal ease. For example, at one moment it can be used to draft a letter, another moment it can be used to play music and in between, one can print a document as well. All this work is possible by changing the program (computer instructions). ●

Resource Sharing: In the initial stages of development, computers used to be isolated machines. With the tremendous growth in computer technologies, computers today have the capability to connect with each other. This has made the sharing of costly resources like printers possible. Apart from device sharing, data and information can also be shared among groups of computers, thus creating a large information and knowledge base. Although processing has become less tedious with the development of computers, it is still a time-consuming and expensive job. Sometimes, a program works properly for some period and then suddenly produces an error. This happens because of a rare combination of events or due to an error in the instruction provided by the user. Therefore, computer parts require regular checking and maintenance in order to give correct results. Furthermore, computers need to be installed in a dust-free place. Generally, some parts of computers get heated up due to heavy processing. Therefore, the ambient temperature of the computer system should be maintained.