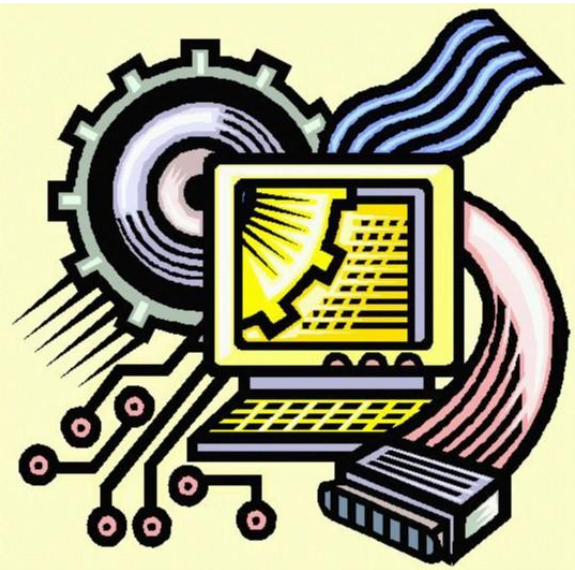


Computer Organization Fundamentals



Lecture 1

BASIC CONCEPTS

INTRODUCTION

Let us begin with the word ‘compute’. It means ‘calculate’. We all are familiar with calculations in our day to day life. We apply mathematical operations like addition, subtraction, multiplication, etc. and many other formulas for calculations.

➤ Simpler calculations take less time. But complex calculations take much longer time. Another factor is accuracy in calculations. So scientists thought of an idea to develop a machine which can perform this type of arithmetic calculation **faster** and with **full accuracy**. This gave birth to a device or machine called '**computer**'.

- The computer we see today is quite different from the one made in the beginning.
- The number of applications of a computer has increased.
- The speed and accuracy of calculation has increased.

- Reservation of tickets in Air Lines and Railways,
- Payment of telephone and electricity bills,
- Deposits and withdrawals of money from banks,
- Business data processing,
- Medical diagnosis,
- Weather forecasting, etc.
- There are some of the areas where computer has become extremely useful.

However, there is one **limitation** of the computer function . Human beings do calculations on their own. But computer is a dumb machine and it has to be given proper instructions to carry out its calculation. This is why we should know how a computer works.

OBJECTIVES

After going through this lesson you will be in a position to

- define a computer
- identify characteristics of computer
- know the origin and evolution of computer
- identify capability of computer in terms of speed and accuracy
- distinguish computer from human beings and calculator
- identify the role of computer

WHAT IS A COMPUTER?

Computer is an electronic device. As mentioned in the introduction it can do arithmetic calculations faster. But as you will see later it does much more than that. It can be compared to a magic box, which serves different purpose to different people.

For a common man computer is simply a calculator, which works automatic and quite fast. For a person who knows much about it, computer is a machine capable of solving problems and manipulating data. It accepts data, processes the data by doing some mathematical and logical operations and gives us the desired output.

Therefore, we may define *computer as a device that transforms data*. Data can be anything like marks obtained by you in various subjects. It can also be name, age, gender, weight, height, etc. of all the students in your class or income, savings, investments, etc., of a country. Computer can be defined in terms of its **functions**.

It can

- I. Accept data
- II. Store data
- III. Process data as desired
- IV. Retrieve the stored data when required
- V. Print the result in desired format.



Fig. 1.1: Personal Computer

CHARACTERISTICS OF COMPUTER

Let us identify the major characteristics of computer. These can be discussed under the headings of *speed, accuracy, diligence, versatility, Power of Remembering, No IQ, no feelings.*

Speed

As you know computer can work very fast. It takes only few seconds for calculations that we take hours to complete. Suppose you are asked to calculate the average monthly income of one thousand persons in your neighborhood. For this you have to add income from all sources for all persons on a day to day basis and find out the average for each one of them



How long will it take for you to do this? One day, two days or one week? Do you know your small computer can finish this work in few seconds?

The weather forecasting that you see every day on TV is the results of compilation and analysis of huge amount of data on temperature, humidity, pressure, etc. of various places on computers. It takes few minutes for the computer to process this huge amount of data and give the result.

You will be surprised to know that computer can perform millions (1,000,000) of instructions and even more per second. Therefore, we determine the speed of computer in terms of microsecond (10^{-6} part of a second) or nanosecond (10^{-9} part of a second). From this you can imagine how fast your computer performs work.

Accuracy

Suppose some one calculates faster but commits a lot of errors in computing. Such result is useless. Suppose you want to divide 15 by 7. You may work out up to 2 decimal places and say the dividend is 2.14. I may calculate up to 4 decimal places and say that the result is 2.1428. Some one else may go up to 9 decimal places and say the result is 2.142857143. Hence, in addition to speed, the computer should have accuracy or correctness in computing.

The degree of accuracy of computer is very high and every calculation is performed with the same accuracy. The accuracy level is determined on the basis of designing computer. The errors in computer are due to human and inaccurate data.



Diligence

A computer is free from tiredness, lack of concentration, fatigue, etc.

It can work for hours without creating any error. If millions of calculations are to be performed, a computer will perform every calculation with the same accuracy. Due to this capability it overpowers human being in routine type of work.

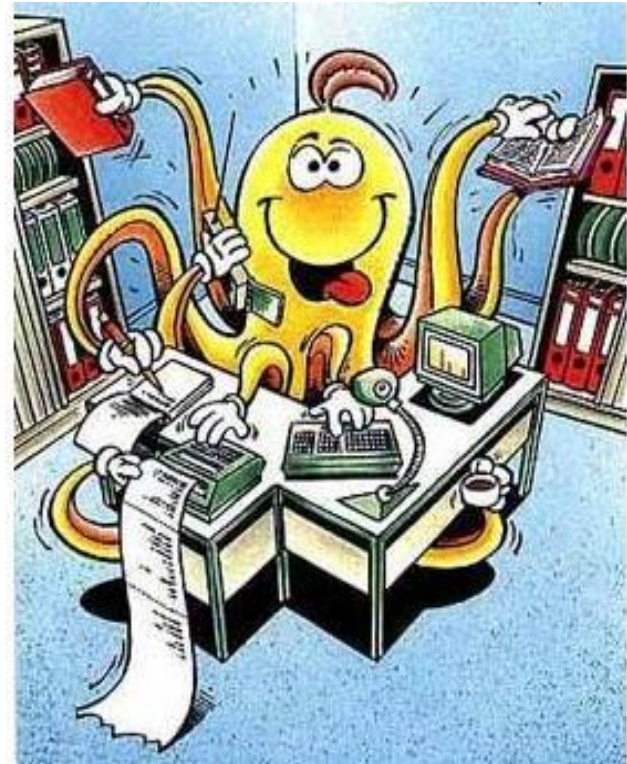


DILIGENCE

Versatility

It means the capacity to perform completely different type of work. You may use your computer to prepare payroll slips. Next moment you may use it for inventory management or to prepare electric bills.

All that is done by multitasking property of computer in which the processing of the applications are done in a multitask manner.



Power of Remembering

Computer has the power of storing any amount of information or data. Any information can be stored and recalled as long as you require it, for any numbers of years. It depends entirely upon you how much data you want to store in a computer and when to lose or retrieve these data.

No IQ (intelligence quotient)

Computer is a dumb machine and it cannot do any work without instruction from the user. It performs the instructions at tremendous 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.

No Feeling

It does not have feelings or emotion, taste, knowledge and experience. Thus it does not get tired even after long hours of work. It does not distinguish between users.



Storage

The Computer has an in-built memory where it can store a large amount of data. 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.

**The
END**

Any Questions?