01

Fundamentals of Computer

Contents/ Index

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Computer Fundamentals – Overview

Today's world is an information-rich world and it has become a necessity for everyone to know about computers. A computer is an electronic data processing device, which accepts and stores data input, processes the data input, and generates the output in a required format. The purpose of this tutorial is to introduce you to Computers and its fundamentals.

Functionalities of a Computer

If we look at it in a very broad sense, any digital computer carries out the following five functions: Step 1 - Takes data as input. Step 2 - Stores the data/instructions in its memory and uses them as required. Step 3 - Processes the data and converts it into useful information. Step 4 - Generates the output. Step 5 - Controls all the above four steps.

Advantages of Computers

Following are certain advantages of computers. High Speed Computer is a very fast device.● It is capable of performing calculation of very large amount of data.● The computer has units of speed in microsecond, nanosecond, and even the picosecond.

It can perform millions of calculations in a few seconds as compared to man who will spend many months to perform the same task.

● **Accuracy**

In addition to being very fast, computers are very accurate.● The calculations are 100% error free.● Computers perform all jobs with 100% accuracy provided that the input is correct.

● **Storage Capability**

Memory is a very important characteristic of computers.● A computer has much more storage capacity than human beings.● It can store large amount of data.● It can store any type of data such as images, videos, text, audio, etc.

● **Diligence**

Unlike human beings, a computer is free from monotony, tiredness, and lack of● concentration. It can work continuously without any error and boredom.● It can perform repeated tasks with the same speed and accuracy.

• Versatility

A computer is a very versatile machine.• A computer is very flexible in performing the jobs to be done.• This machine can be used to solve the problems related to various fields.• At one instance, it may be solving a complex scientific problem and the very next• moment it may be playing a card game.

• Reliability

- ➢ A computer is a reliable machine.
- ➢ Modern electronic components have long lives.
- ➢ Computers are designed to make maintenance easy

• Automation

Computer is an automatic machine.

Automation is the ability to perform a given task automatically. Once the computer receives a program i.e., the program is stored in the computer memory, then the program and instruction can control the program execution without human interaction.

• Reduction in Paper Work and Cost

The use of computers for data processing in an organization leads to reduction in paper work and results in speeding up the process. As data in electronic files can be retrieved as and when required, the problem of maintenance of large number of paper files gets reduced. Though the initial investment for installing a computer is high, it substantially reduces the cost of each of its transaction.

Disadvantages of Computers

Following are certain disadvantages of computers.

• No I.Q.

- ➢ A computer is a machine that has no intelligence to perform any task.
- ➢ Each instruction has to be given to the computer.
- ➢ A computer cannot take any decision on its own.

• Dependency

It functions as per the user's instruction, thus it is fully dependent on humans.

• Environment

The operating environment of the computer should be dust free and suitable.

• **No Feeling**

> Computers have no feelings or emotions.
> It cannot make judgment based on feeling, taste, experience, and knowledge unlike humans.

2. Computer Fundamentals – Applications

In this chapter, we will discuss the application of computers in various fields.

Business

A computer has high speed of calculation, diligence, accuracy, reliability, or versatility which has made it an integrated part in all business organizations.

Computer is used in business organizations for:

➢ Payroll calculations
➢ Budgeting
➢ Sales analysis
➢ Financial forecasting
➢ Managing employee database
➢ Maintenance of stocks, etc.

Banking

Today, banking is almost totally dependent on computers.

Banks provide the following facilities:

➢ Online accounting facility, which includes checking current balance, making deposits and overdrafts, checking interest charges, shares, and trustee records.
➢ ATM machines which are completely• automated are making it even easier for customers to deal with banks.

Insurance

Insurance companies are keeping all records upto-date with the help of computers. Insurance companies, finance houses, and stock broking firms are widely using computers for their concerns.

Insurance companies are maintaining a database of all clients with information showing:

Procedure to continue with policies

• Starting date of the policies

• Next due installment of a policy

- Maturity date

- Interests due

- Survival benefits

- Bonus

Education

The computer helps in providing a lot of facilities in the education system.

- ➢ The computer provides a tool in the education system known as CBE (Computer Based Education).
- ➢ CBE involves control, delivery, and evaluation of learning.
- ➢ Computer education is rapidly increasing the graph of number of computer students.
- ➢ There are a number of methods in which educational institutions can use a computer to educate the students.
- ➢ It is used to prepare a database about performance of a student and analysis is carried out on this basis.

Marketing

In marketing, uses of the computer are following:

- **Advertising** - With computers, advertising professionals create art and graphics, write and revise copy, and print and disseminate ads with the goal of selling more products.
- **Home Shopping** - Home shopping has been made possible through the use of computerized catalogues that provide access to product information and permit direct entry of orders to be filled by the customers.

Healthcare

Computers have become an important part in hospitals, labs, and dispensaries. They are being used in hospitals to keep the record of patients and medicines. It is also used in scanning and diagnosing different diseases. ECG, EEG, ultrasounds and CT scans, etc. are also done by computerized machines.

Following are some major fields of health care in which computers are used.

- Diagnostic System - Computers are used to collect data and identify the cause of illness.
- Lab-Diagnostic System - All tests can be done and the reports are prepared by computer.
- Patient Monitoring System - These are used to check the patient's signs for abnormality such as in Cardiac Arrest, ECG, etc.

- Pharma Information System - Computer is used to check drug labels, expiry dates, harmful side effects, etc.
- Surgery - Nowadays, computers are also used in performing surgery.

Engineering Design

Computers are widely used for engineering purpose.

One of the major areas is CAD (Computer Aided Design) that provides creation and modification of images. Some of the fields are:

- **Structural Engineering** - Requires stress and strain analysis for design of ships, buildings, budgets, airplanes, etc.
- **Industrial Engineering** - Computers deal with design, implementation, and improvement of integrated systems of people, materials, and equipment.
- **Architectural Engineering** - Computers help in planning towns, designing buildings, determining a range of buildings on a site using both 2D and 3D drawings.

Military

Computers are largely used in defense. Modern tanks, missiles, weapons, etc. Military also employs computerized control systems. Some military areas where a computer has been used are:

Missile Control

Military Communication

Military Operation and Planning

Smart Weapons

Communication

Communication is a way to convey a message, an idea, a picture, or speech that is received and understood clearly and correctly by the person for whom it is meant.

Some main areas in this category are:

- E-mail
- Chatting
- Usenet
- FTP
- Telnet

- Video-conferencing

Government

Computers play an important role in government services.

Some major fields in this category are:

- Budgets
- Sales tax department
- Income tax department
- Computation of male/female ratio
- Computerization of voters lists
- Computerization of PAN card
- Weather forecasting

3. Computer Fundamentals – Generations

Generation in computer terminology is a change in technology a computer is/was being used. Initially, the generation term was used to distinguish between varying hardware technologies. Nowadays, generation includes both hardware and software, which together make up an entire computer system.

There are five computer generations known till date. Each generation has been discussed in detail along with their time period and characteristics. In the following table, approximate dates against each generation have been mentioned, which are normally accepted.

Following are the main five generations of computers.

Sr. No.	Generation & Description
1	**First Generation:** The period of first generation: 1946-1959. Vacuum tube based
2	**Second Generation:** The period of second generation: 1959-1965. Transistor based.
3	**Third Generation:** The period of third generation: 1965-1971. Integrated Circuit based.
4	**Fourth Generation:** The period of fourth generation: 1971-1980. VLSI microprocessor based
5	**Fifth Generation:** The period of fifth generation: 1980-onwards. ULSI microprocessor based

4. Computer Fundamentals – Basics of Computer

Hardware- The term hardware refers to the physical components of your computer such as the system unit, mouse, keyboard, monitor etc.

Software- The software is the instructions that make the computer work. Software is held either on your computer's hard disk, CD-ROM, DVD or on a diskette (floppy disk) and is loaded (i.e. copied) from the disk into the computers RAM (Random Access Memory), as and when required.

Types of Computers

- Mini and Mainframe Computers

  Very powerful, used by large organizations such as banks to control the entire business operation. Very expensive!

- Personal Computers

  Cheap and easy to use. Often used as stand-alone computers or in a network. May be connected to large mainframe computers within big companies.

Hardware Components

Input Devices -- "How to tell it what to do"

- A keyboard and mouse are the standard way to interact with the computer. Other devices include joysticks and game pads used primarily for games.

Output Devices -- "How it shows you what it is doing"

- The monitor (the screen) is how the computer sends information back to you. A printer is also an output device.

INPUT DEVICES:

- ➤ The Mouse - Used to 'drive' Microsoft Windows
- ➤ The Keyboard - The keyboard is still the commonest way of entering information into a computer
- ➤ Tracker Balls - An alternative to the traditional mouse and often used by graphic designers
- ➤ Scanners - A scanner allows you to scan printed material and convert it into a file format that may be used within the PC.
- ➤ Touch Pads - A device that lays on the desktop and responds to pressure
- ➤ Light Pens - Used to allow users to point to areas on a screen
- ➤ Joysticks - Many games require a joystick for the proper playing of the game

OUTPUT DEVICES:

VDU - The computer screen is used for outputting information in an understandable format.

- ➢ Printers -There are many different types of printers. In large organizations laser printers are most commonly used due to the fact that they can print very fast and give a very high quality output.
- ➢ Plotters - A plotter is an output device similar to a printer, but normally allows you to print larger images.
- ➢ Speakers - Enhances the value of educational and presentation products.
- ➢ Speech Synthesisers - Gives you the ability to not only to display text on a monitor but also to read the text to you

STORAGE DEVICES:

"How it saves data and programs"

Hard disk drives are an internal, higher capacity drive which also stores the operating system which runs when you power on the computer.

"Floppy" disk drives allow you to save work on small disks and take the data with you.

Hard Disks - Speed: Very fast!

The speed of a hard disk is often quoted as "average access time" speed, measured in milliseconds. The smaller this number the faster the disk.

Capacity: Enormous!

Often 40/80 Gigabytes. A Gigabyte is equivalent to 1024 Megabytes.

Cost: Hard disks costs are falling rapidly and normally represent the cheapest way of storing data.

Diskettes (Floppy Disks)

Speed: Very slow!

Capacity: Normally 1.44 Mbytes.

Cost: Very cheap

CD-ROM Disks

Speed: Bit slower than hard disks. The original CD-ROM speciation is given a value of 1x speed, and later, faster CD-ROMs are quoted as a multiple of this value.

Capacity: Around 650 Mbytes and more

DVD Drives

Speed: Much faster than CD-ROM drives but not as fast as hard disks.

Capacity:Up to 17 Gbytes

Cost: Slightly higher than CD-ROM drives.

Memory -- "How the processor stores and uses immediate data

RAM - Random Access Memory

The main 'working' memory used by the computer. When the operating system loads from disk when you first switch on the computer, it is copied into RAM. As a rough rule, a Microsoft Windows based computer will operate faster if you install more RAM. Data and programs stored in RAM are volatile (i.e. the information is lost when you switch off the computer).

ROM – Read Only Memory - As the name suggests is a special type of memory chip that holds software that can be read but not written to. A good example is the ROM-BIOS chip, which contains read only software. Often network cards and video cards also contain ROM chips.

How Computer Memory Is Measured

Bit - All computers work on a binary numbering system, i.e. they process data in ones or zeros. This 1 or 0 level of storage is called a bit.

Byte - A byte consists of eight bits.

Kilobyte - A kilobyte (KB) consists of 1024 bytes.

Megabyte - A megabyte (MB) consists of 1024 kilobytes.

Gigabyte - A gigabyte (GB) consists of 1024 megabytes.

Microprocessors

 "The brain of the computer"

PCs primarily use microprocessors (sometimes called the chip). The older Intel versions include the 386, 486 and now the Pentium line.

The CPU (Central Processing Unit) is normally an Intel Pentium (or equivalent) and it is one of the most important components within your computer. It determines how fast your computer will run and is measured by its MHz speed. Thus a 600 MHz Pentium is much faster than say a 400 MHz Pentium CPU. It is the CPU that performs all the calculations within the computer.

Operating Systems Software: The operating system is a special type of program that loads automatically when you start your computer. The operating system allows you to use the advanced features of a modern computer without having to learn all the details of how the hardware works. The link between the hardware and you, the user makes the computer easy to use without having to understand bits and bytes!

Applications software: An application program is the type of program that you use once the operating system has been loaded. Examples include word-processing programs, spreadsheets and databases

Information Network:

LAN: A LAN (Local Area Network) is a system whereby individual PCs are connected together within a company or organization.

WAN: A WAN (Wide Area Network) as the name implies allows you to connect to other computers over a wider area (i.e. the whole world).

Uses of Network:

If ten people are working together within an office it makes sense for them all to be connected.

- ➢ In this way the office can have a single printer and all ten people can print to it.
- ➢ In a similar way other devices such as modems or scanners can be shared.
- ➢ Even more useful is the ability to share information when connected to a network.