INTRODUCTION TO THE COMPUTER

1.1 Introduction

A **computer** is an **electronic device** that manipulates **information or** a **programmable machine** designed to perform arithmetic and logical operations automatically and sequentially on the input given by the user and gives the desired output after processing. Computer is defined in the **Oxford dictionary** as "An **automatic electronic apparatus** for making calculations or controlling operations that are expressible in numerical or logical terms".

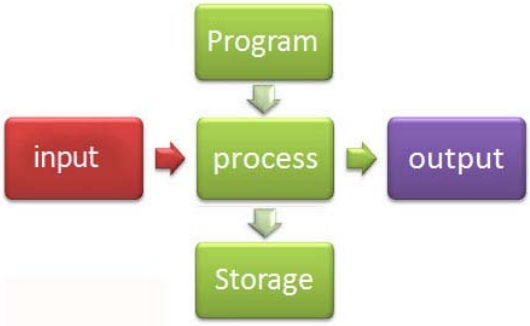
The definition clearly categorizes computer as an electronic apparatus although the initial computers were mechanical and electromechanical, definition is also pointing towards the two major areas of computer application viz. data processing and computer assisted control/operations. Another important confluence of the definition is the fact that the computer can perform only those operations/calculations which can be expressed in Logical or Numerical terms.

The term computer is derived from the Latin word '**computare**', which means to calculate. **Charles Babbage** is called the **"Father"** of the computer. Babbage was designed the **First mechanical computer** called **Analytical Engine.**

Computer components are divided into two major categories viz. - hardware and software. **Hardware** is the machine and its connected devices such as monitor, keyboard, mouse etc. **Software** is the set of programs that make use of hardware for performing various functions. Computer takes raw data as input from the user and processes them with the help of set of instructions (called **program**) and gives the result (output) and saves output for the future use. It can process both numerical and non-numerical (arithmetic and logical) calculations.

A computer has four functions:

a. accepts data	**Input**
b. processes data	**Processing**
c. produces output	**Output**
d. stores results	**Storage**



Input (Data):

Input is the raw information entered into a computer from the input devices. It is the collection of letters, numbers, images etc.

Examples **of Input Devices**: Keyboard, mouse, flash drive, scanner, speech recognition system **OCR** (optical character recognition), **OMR** (Optical mark recognition) **MICR** (Magnetic Ink Character recognition), touch pad, digital camera Bar code reader etc.

Process:

Process is the operation of data as per given instruction. It is totally internal process of the computer system. The main unit inside the computer is the **CPU**. This unit is responsible for all inside the computer. It controls all internal and external devices, performs arithmetic and logic operations. The **CPU** (**Central Processing Unit**) is the device that interprets and executes instructions.

Output:

Output is the processed data given by computer after data processing. Output is also called as **Result**. We can save these results in the storage devices for the future use.

Examples **of Output Devices**: Monitor printer, speakers, voice response system, projectors, headphones and headsets etc.

Storage:

A computer can transfer data quickly from storage to memory, process it, and then store it again for future use. Many computers store enormous amounts of data and make this data available for processing anytime it is needed. It describes into 2 ways

1. Primary memory
2. Secondary memory

1. Examples for Primary Memory:

A. **RAM** (**Random Access Memory / Read-Write Memory**)

B. **ROM** (**Read-only-memory**) they are also called volatile because it erases data if system shutdown or switch off

2. Examples for Secondary primary:

A. **Hard Disk** (Local Disk)

B. **Optical Disks**: CD-R, CD-RW, DVD-R, DVD-RW

G. **External Hard Disk etc**. it is non volatile.

1.2 Computer System:

All of the components of a computer system can be summarized with the simple equations.

COMPUTER SYSTEM = HARDWARE + SOFTWARE + USER

Hardware = Internal Devices + Peripheral Devices

All physical parts of the computer (or everything that we can touch) are known as Hardware.

Software = Programs. Software gives "intelligence" to the computer.

USER = Person, who operates computer.

Computers are made up of two parts: the **hardware** and the **software.**

Hardware: The physical equipment required to create use, manipulate and store electronic data is called **Hardware**.

Example: The components such as mother boards, chips, cables, circuits, displays, power supplies, keyboards, printers, speakers etc.

Software: The computerized instructions that operate a Computer which manipulates the data and execute particular functions or tasks. Software is commonly known as programs or applications that tell the hardware how to perform a task.

There are 3 major software's called...

i) Operating System software,

ii) Application software, and

iii) Programming software.

1.3 CHARACTERISTICS OF COMPUTERS

The characteristics of a computer that is so powerful and universally useful. They are...

1. **Speed**
2. **Accuracy**
3. **Diligence**
4. **Versatility**
5. **Storage capacity**

Let us discuss them briefly.

1. Speed

Computers work at an incredible speed. A powerful computer is capable of performing about 3-4 million simple instructions per second.

2. Accuracy

In addition to being fast, computers are also accurate. Errors that may occur can almost always be attributed to human error (inaccurate data, poorly designed system or faulty instructions / programs written by the programmer)

3. Diligence

Unlike human beings, computers are highly consistent. They do not suffer from human traits of boredom and tiredness resulting in lack of concentration. Computers, therefore, are better than human beings in performing voluminous and repetitive jobs.

4. Versatility

Computers are versatile machines and are capable of performing any task as long as it can be broken down into a series of logical steps. The presence of computers can be seen in almost every sphere – Railway / Air reservation, Banks, Hotels, Weather forecasting and many more.

5. Storage Capacity

Today's computers can store large volumes of data. A piece of information once recorded (or stored) in the computer, can never be forgotten and can be retrieved almost instantaneously.

1.4 COMPUTER ORGANIZATION / SYSTEM

A computer system consists of mainly four basic units viz. - Input Unit, Storage Unit, Central Processing Unit and Output Unit. Central Processing unit further includes Arithmetic logic unit and control unit. A computer performs five major operations or functions irrespective of its size and make. These are –

- it accepts data or instructions as input,
- it stores data and instructions,
- it processes data as per the instructions,
- it controls all operations inside a computer, and
- it gives results in the form of output.

1.5 How does a computer work :

A computer functions in the following fashion –

a. **The computer accepts input:** Computer input is whatever is entered or fed into a computer system. Input can be supplied by a person or by another computer or device (such as a diskette or CD-ROM). Some examples of input include the words and symbols in a document, numbers for a calculation, and instructions for completing a process, pictures, and so on.

b. **The computer performs useful operations:** Manipulating the data in many ways. This manipulation is called processing. Examples of processing include performing calculations, sorting lists of words or numbers, modifying documents and pictures according to user instructions, and drawing graphs. A computer processes data in the CPU.

c. **Process:** A systematic series of actions a computer uses to manipulate data.

d. **The computer stores data.** A computer must store data so that it is available for processing. Most computers have more than one location for storing data .The place where the computer stores the data depends on how the data is being used. The storage of data in the computer is called ‘online storage’ while the storage of data on computer tapes, diskettes or CD-ROMs is called ‘offline storage’.

e. **The computer produces output:** Computer output is information that has been produced by a computer. Some examples of computer output include reports, documents, music, graphs, and pictures. Output can be in several different formats, such as paper, diskette, or on screen.

1.6 Application of computers in various fields

Computers have their application or utility everywhere. We find their applications in almost every sphere of life–particularly in fields where computations are required to be done at a very fast speed and where data is so complicated that the human brain finds it difficult to cope up with. Some of the prominent areas of computer applications are:

1. In Tourism: Hotels use computers to speed up billing and checkout the availability of rooms. In case of railways and airline reservations for booking tickets.

2. In Banking: Banks also have started using computers extensively. Terminals are provided in the branch and the main computer is located centrally. This enables the branches to use the central computer system for information on things such as current balance, deposits, overdrafts, interest charges, etc. MICR encoded cheques can be read and sorted out with a speed of 3,000 cheques per minute by computers as

compared to hours taken by manual sorting. Electronic funds transfer (EFT) allows a person to transfer funds in a very short time.

3. In Transportation: Today computers have made it possible for planes to land in foggy and stormy atmosphere also. The aircraft has a variety of sensors, which measure the plane's altitude, position, speed, height and direction. Computer use all this information to keep the plane flying in the right direction. In fact, the Auto–pilot feature has made the work of pilot much easy.

4. In Education: Computers have proved to be excellent teachers. They can possess the knowledge given to them by the experts and teach you with all the patience in the world. You may like to repeat a lesson hundred times, go ahead, you may get tired but the computer will keep on teaching you. Computer based instructions (CBI) and Computer Aided Learning (CAL) are common tools used for teaching. Computer based encyclopedia such as Britannica provide you enormous amount of information on anything.

5. In Entertainment: Computers are also great entertainers. Many computer games are available which are like the traditional games like chess, football, cricket, etc. Dungeons and dragons provide the opportunity to test your memory and ability to think. Other games like Braino and Volcano test your knowledge.

6. Desk Top Publishing: DTP has made printing procedure faster, more efficient and accurate. The traditional method of printing involves phototypesetting the text, cutting and pasting the typed text by the artist, where the artist has to draw lines and boxes manually to create a ready to use artwork.

7. Computer and Medical Science: Computers have proved to be very useful in the field of medical science. In hospitals, computers are used for monitoring patients, raising the alarm if the pulse rate falls below a certain level, maintaining medical

records, record of patient's treatment, laboratory test, billing, etc. Computer controlled electronic scanners can build up a picture of a patient slice by slice, measuring the strength of the rays which have been sent through the body. A computer uses this information to show a cross section of the body revealing any abnormalities which cannot be seen from outside. Computers also help a doctor to perform difficult surgical procedures.

8. Space Research: All the satellites and spacecraft could not have taken their flight but for the valuable assistance provided to the scientists by computers. Spacecrafts are monitored with the help of computers.

MODEL QUESTIONS

1. A computer is an _____ device. **(Electronic)**
2. The term computer is derived from the _____ word. **(Latin)**
3. Charles Babbage is called the _____ of the computer. **(Father)**
4. Babbage was designed the First mechanical computer called **Analytical Engine**
5. Computer components are divided into two major categories _____ **(hardware and software)**
6. Set of instructions called _____ **(program)**
7. The CPU is the device that interprets and executes _____.**(instructions)**
8. Volatile memory _____ data if system shutdown or switch off.**(erases)**
9. Example of non volatile memory **Hard Disk (Local Disk)**
10. Software is commonly known as programs or _____**(applications)**

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