Introduction to Computer

Overview

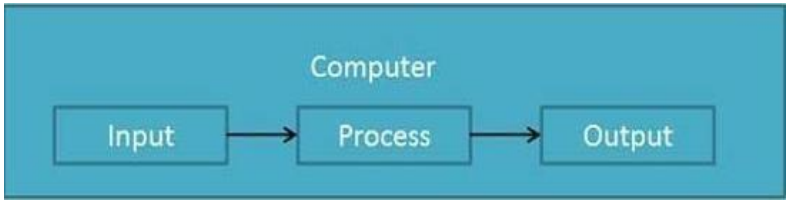
- Definition of computer
- Functionalities of acomputer
- Advantages
- Disadvantages
- Types of Computer
- Components of Computer

Definition of computer

- The word “computer” comes from the word “Compute”, which means to calculate..
- A computer is an electronic machine that is used to solve different kinds of problems according to a set of instructions given to it.
- “A computer is an electronic device, receives input, stores it in memory, process it according to the user’s requirements and gives output as a result.”

Functionalities of a computer

- Takes data as input.
- Stores the data/instructions in its memory and use them when required.
- Processes the data and converts it into useful information.
- Generates the output
- Controls all the above four steps.



Advantages

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 for doing 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 correct input has been given.

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 and many others.

Diligence

- Unlike human beings, a computer is free from tiredness and lack Of concentration and fatigue.
- It can work continuously without any error and boredom.
- It can do repeated work with same speed and accuracy.

Versatility

- Acomputer is a very versatile machine.
- Acomputer 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 means ability to perform the given task automatically.
- Once a program is given to computer i.e., stored in computer memory, the program and instruction can control the program execution without human interaction.

Reduction in Paper Work

- The use of computers for data processing in an organization leads to reduction in paper work and results in speeding up a 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.

Reduction in Cost

- Though the initial investment for installing a computer is high but it substantially reduces the cost of each of its transaction.

Disadvantages

No I.Q

- Acomputer is a machine that has no intelligence to perform any task.
- Each instruction has to be given to computer.
- Acomputer cannot take any decision on itsown.

Dependency

- It functions as per a user's instruction, so it is fully dependent on human being

Environment

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

No Feeling

- Computers have no feelings or emotions.
- It cannot make judgement based on feeling, taste, experience, and knowledge unlike a human being.

Types of Computer

Since the advent of the first computer different **types and sizes of computers** are offering different services. Computers can be as big as occupying a large building and as small as a laptop or a microcontroller in mobile & embedded systems.

The five basic types of computersare.

- 1. Super computer
- 2. Mainframe Computer
- 3. Minicomputer
- 4. WorkStation
- 5. Microcomputer

Super Computer

- The **most powerful computers** in terms of performance and data processing are the supercomputers.
- These are specialized and task specific computers used by large organizations.
- These computers are used for research and exploration purposes, like **NASA** uses supercomputers for launching space shuttles, controlling them and for space exploration purpose.
- The supercomputers are very expensive and very large in size. It can be accommodated in large air conditioned rooms; some super computers can span an entire building.

Uses of Supercomputer

In Pakistan and other countries Supercomputers are used by Educational Institutes like NUST (Pakistan) for research purposes. Pakistan Atomic Energy commission & Heavy Industry Taxila uses supercomputers for Research purposes.

- Space Exploration
- Earthquake studies
- Weather Forecasting
- Nuclear weapons testing

Popular Supercomputers

- IBM's Sequoia, in United States
- Fujitsu's K Computer in Japan
- IBM's Mira in United States
- IBM's SuperMUC in Germany
- NUDT Tianhe-1A in China

Super Computer

Mainframe computer

- Although Mainframes are not as powerful as supercomputers, but certainly they are quite expensive and many large firms & government organizations uses Mainframes to run their business operations.
- The Mainframe computers can be accommodated in large air conditioned rooms because of its size.
- Mainframe computers are the fastest computers with large data storage capacity & store large amount of data.
- Acts as server in client server environment.
- Banks educational institutions & insurance companies use mainframe computers to store data about their customers, students & insurance policy holders.

Mainframe computer

Popular Mainframe computers

- Fujitsu’s ICL VME
- Hitachi’s Z800

Mainframe computer

Minicomputers

- Minicomputers are used by small businesses & firms. Minicomputers are also called as **“Midrange Computers”**. Supports 250 users simultaneously.
- These are small machines and can be accommodated on a disk with not as processing and data storage capabilities as super-computers & Mainframes**.**
- These computers are not designed for a single user. Individual departments of a large company or organizations use Mini-computers for specific purposes.
- For example, for operating business and scientific applications.
- **Popular Minicomputers**

  K-202, Texas Instrument TI-990, SDS-92, IBM Midrange computers etc

Minicomputers

WorkStation

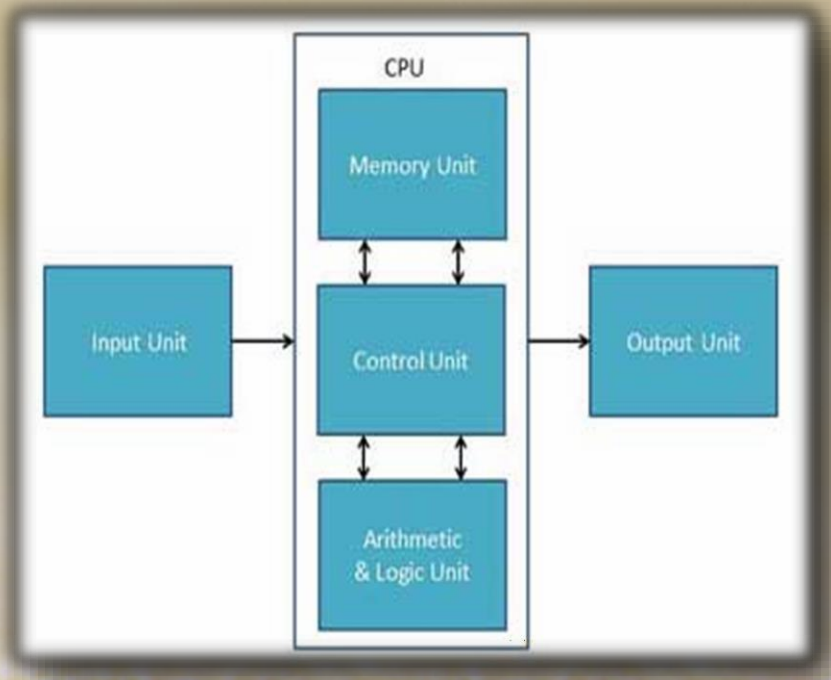
It is also a single user computer system which is similar to personal computer but have more powerful microprocessor.

Microcomputers

- Desktop computers, laptops, personal digital assistant (PDA), tablets & smartphones are all **types of microcomputers**.
- The micro-computers are widely used & the fastest growing computers.
- These computers are the cheapest among the other three types of computers.
- The Microcomputers are specially designed for general usage like entertainment, education and work purposes.
- Wellknown manufacturers of Micro-computer are Dell, Apple,Samsung, Sony and Toshiba.

Micro Computer

Micro Computer



Components of Computer

Input Unit

This unit contains devices with the help of which we enter data into computer. This unit makes link between user and computer. The input devices translate the information into the form understandable by computer.

CPU (Central Processing Unit)

CPU is considered as the brain of the computer. CPU performs all types of data processing operations. It stores data, intermediate results and instructions(program). It controls the operation of all parts of computer.

CPU itself has following three components

- ALU(Arithmetic Logic Unit)
- Memory Unit
- Control Unit

Output Unit

Output unit consists of devices with the help of which we get the information from computer. This unit is a link between computer and users. Output devices translate the computer's output into the form understandable by users.

What is Hardware?

Hardware represents the physical and tangible components of a computer.

- Physically connected
- Can be touched and seen

Examples of Hardware arefollowing:

- **Input devices --** keyboard, mouse etc.
- **Output devices --** printer, monitor etc.
- **Secondary storage devices --** Hard disk, CD, DVD etc.
- **Internal components --** CPU, motherboard, RAM etc.

Hardware

What is Software?

Set of instructions used to operate computer hardware and execute specific task.

Computer programs, documentation

Can't physically touched

Ordered sequence of instructions

- Perform well definedFunction
- Solve a particularproblem
- Ms-office
- Antivirus

Comparison [1]

Hardware Definition

- Devices that are required to store and execute (or run) the software.

Software Definition

- Collection of instructions that enables a user to interact with the computer.

Software is a program that enables a computer to perform a specific task.

Comparison [2]

Hardware types

- Input devices
- Storage devices
- Processing devices
- Output devices

Software types

- System software
- Programming software
- Application software

Comparison[3]

Hardware Function

- Hardware serves as the delivery system for software solutions.

Software Function

- Software performs a specific task by giving an ordered set of programmatic instructions to hardware.

Comparison[4]

Interdependency

- Hardware can not perform any operation or task without software.
- Software can not executed without hardware.
- To deliver its set of instructions, Software is installed on hardware.

Comparison[5]

Development:

- Hardware is made-up of electronic components.
- Software is developed by writing instructions in a programming language.

Comparison [6]

Durability

- Hardware wears out over time
- Software does not wear out over time

Comparison[7]

Affected

- Hardware is not affected by a virus.
- Software is affected by a virus.

Comparison[8]

Replacement:

- If Hardware is damaged, it can be replaced with new one.
- If Software is damaged, it can be replaced with its backup copy.

Comparison[9]

Nature

- Hardware is physical in nature.
- Software is logical in nature

Types of Hardware?

1. Input devices
2. Output Devices
3. Storage Devices
4. Processing Devices

1. Input Devices

1.Keyboard
2.Mouse
3.Joy Stick
4.Light pen
5.Track Ball
6.Scanner
7.Graphic Tablet
8.Microphone
9.Magnetic Ink Card Reader(MICR)
10.Bar Code Reader

2. Output Devices

1. Headphones
2. Monitor
3. Plotter
4. Printer
5. Projector
6. Speakers

Both input and Output Devices

1. Modems
2. Network cards
3. Touch Screen
4. Headsets
5. Facsimile (FAX)

3. Storage Devices

1. Primary Memory
2. Secondary Memory
3. Optical disc drive
4. Floppy disk
5. Memory card
6. USB flash drive
7. Magnetic Tapes

4. Processing Devices

1. Memory
2. Central Processing Unit
3. Motherboard
4. Data bus
5. Address bus
6. Expansion slots

Software and its types

1. System software
2. Application software

1. SystemSoftware

- Enable application software to interact with the computer
- System software is the interface between the hardware and user application.
- Need of applicationsoftware
- Three basic types
  - Operating System (MS-DOS, Windows, Linux, Ubuntu)
  - Utility Programs (Backup software, Compression utility, File manager)
  - Language Translator (Compiler, Interpreter)
  - Device Drivers (USB, Printer, Keyboard, Mouse, Scanner, etc.)

Operating System

Operating System is a system software that provides an interface for the user to interact with the computer.
Manages the basic operation.
Examples

1. OS
2. DOS
3. Windows
4. UNIX
5. LINUX etc

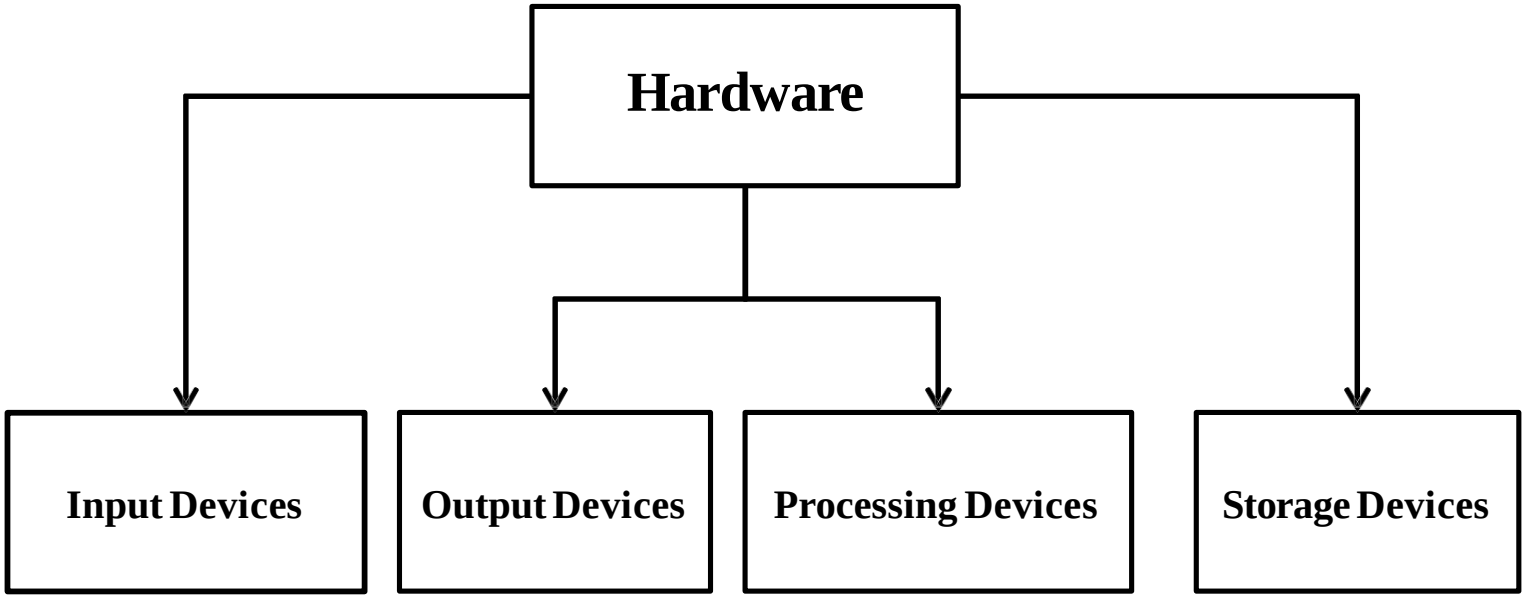
2. Application software

Designed to solve the specific problems of users Also known as software package

Different kinds of application software such as

- Commercial Software (MS-Office)
- Scientific Software (Astronomy, Earth observation satellites)
- Multimedia Software (VLC Player, Adobe Photoshop, Windows Media Player)
- Financial Software (Microsoft Money, Google Spreadsheet)
- Games

Hardware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Input Devices
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Processing Devices
Storage Devices