

Introduction to Information Technology

Introduction to Computer:

"Computer" is an advanced electronic machine that takes given data as input, performs arithmetic and logical operations at a fast speed and provides results as output. A computer performs the following functions:-

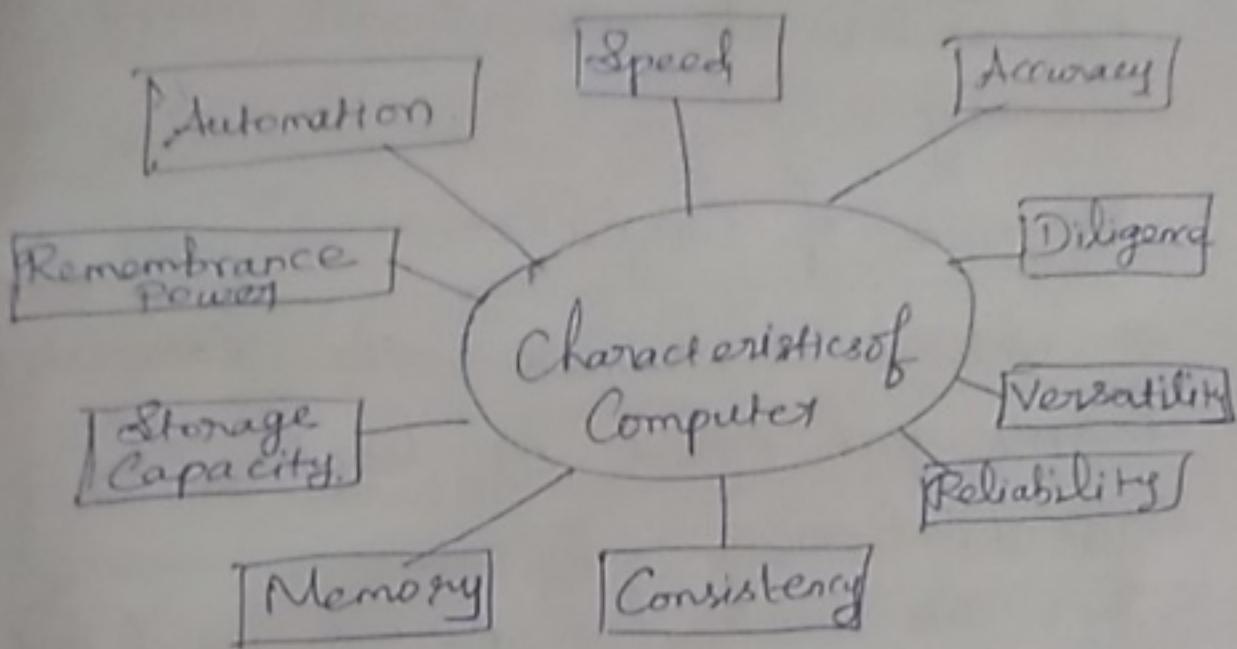
- ↳ It accepts information from the user through various input devices.
- ↳ It performs basic arithmetic and logic operations on the desired data.
- ↳ It provides the desired results.

Characteristics of Computers:

The characteristics of the computers have made them so powerful and universally useful.

The term 'characteristics' here, indicates the qualities or features of a computer system.

There are various characteristics of Computer System depending on their Size, Capacity and Specifications



Speed of Computer:-

- * Speed is one of the major characteristics of the computer system.
- * A powerful computer can handle trillions of instructions per second which is really incredible.
- * With its incredible speed, computers can reduce the amount of time to perform any digital task.
- * The speed of a computer is measured in microseconds and nanoseconds.

Accuracy of Computer:-

- * The degree of accuracy in Computer is very high: Computers can perform calculations at ~~rate~~ almost 100% accuracy.

Diligence of Computer:-

- * Unlike a human, the Computer doesn't get tired or lacks its concentration.
- * It can work for hours without any fault.

Versatility of Computer:-

- * Versatility is one of the most wonderful features of Computer.
- * This means that the Computer has the ability to perform completely different kinds of works with the same accuracy and efficiency at the same time.

Reliability of Computer:

→ The results obtained by the computer are very reliable. But this is true only when the data given to the computer or program is correct and reliable.

Consistency of Computer:

→ The computer is so consistent that it can perform trillions of processes without errors for several hours.
→ It provides consistent results for the same set of data, that is, if it is given the same set of data multiple times, it will give the same result each time.

Memory of Computer:

→ A computer has a built-in memory where it can store instant data immediately.

→ RAM (Random Access Memory) that holds data as long as the computer is connected to a power source.

↳ In addition, the computer includes ROM ~~Components~~ (Read Only Memory), the cache memory of different levels, Virtual memory, etc.

Storage Capacity of Computer:

↳ Computers can store vast amounts of data.

↳ The option to store data in Secondary devices such as external drives, or floppies, etc.

↳ Due to their incredible speed, computers can quickly retrieve data from storage devices.

↳ The storage capacity of the computer is commonly measured in Mega-Byte (MB), Giga-Bytes (GB), Tera-Bytes (TB), and Peta-bytes (PB).

Rememberance Power of Computer:

↳ The computer has the power to store any data or information for

as long as we like.

Automation in Computer :

→ Computers can also be used to automate routine tasks with the help of a task scheduler such as launching a specific application or software, sending an email, scanning for viruses, and many other maintenance tasks.

Generations of Computer : 1 to 5th.

There were constant developments and innovations in computer technology that made computers ~~more~~ so powerful and useful.

All such developments are divided into different generations of computers

Generation	Period	Technology Used
------------	--------	-----------------

1 st Gen	1946-1958	Vacuum Tubes.
---------------------	-----------	---------------

2 nd Gen	1959-1965	Transistors.
---------------------	-----------	--------------

3 rd Gen	1965-1971	Integrated Circuits
---------------------	-----------	---------------------

4 th Gen	1971-1980	Microprocessors
---------------------	-----------	-----------------

5 th Gen	1980-Present	AI & VLSI
---------------------	--------------	-----------

First Generation (1946-1959) :

- * This is the earliest generation of computers. Known as the first generation of computers.
- * During the first generation, computers were developed using vacuum tubes as the core technology.
- * First-generation computers used the machine language, the lowest-level programming language so that it could be easily processed and understood by computers.

Examples: UNIVAC, IBM-650, IBM-701

Advantages of the first Generation Computers:-

- * Due to the use of machine languages, computers of this generation were faster as early development.

- * Computer were able to perform calculations in milliseconds.

Disadvantages of the first Generation Computers

- * First generation Computers were very large and could also cover an entire room.
- * Computers of this generation too much heat and required a large cooling system.
- * Storage capacity in computers was very low in this generation.

Second Generation (1959- 1965).

- * The second generation of computers began with the widespread use of transistors.
- * Magnetic Cores (as primary memory devices) and magnetic tapes (as Secondary Storage devices) were also used for memory requirements in computers.
- * During the Second generation, computers used assembly languages.

instead of binary machine languages.

- * Besides, early versions of high-level languages such as COBOL and FORTRAN, were also introduced in this generation.

Advantages of the Second Generation Computers.

- * The transistor helped to make the second generation computer slightly smaller than the first generation computer.
- * Due to magnetic core technology, computers of this generation could store instructions in memory.
- * Computers became faster, reliable and were able to perform calculations in microseconds.

Disadvantages of the Second Generation Computers.

- * A cooling system was still needed in the second generation.

* Second generation computers required maintenance at regular intervals.

* The cost of the computer was still high however, less than the ~~first~~ first generation computer.

Third Generation (1965 - 1971)

* The third generation of computers was characterized by the use of integrated circuits (ICs) in computers rather than transistors.

* The integrated circuits were very small in size and helped to make the computer smaller than its predecessor.

* In terms of languages, third-generation computers used higher-level languages such as COBOL, BASIC, ALGOL-68.

Advantages of the Third Generation Computers :-

* Third-generation computers were smaller than previous-generation

computers, making second-generation computers portable and available for commercial use at relatively low price.

- * Computers were fast, reliable and could perform calculations in nanoseconds.
- * Computers in the third generation produced less heat and became more energy efficient than the previous generation.

Disadvantages of the Third Generation Computers:

- * Third-generation computers also required a cooling system.
- * Production and maintenance of integrated circuits were difficult at that time.
- * The price of third-generation computers was still high for personal needs.

Fourth Generation (1971-1980)

→ The fourth-generation period is considered from 1971 to 1980.

→ During this generation, computers were developed using the microprocessor as the main component of the technology.

→ Microprocessors were also based on LSI (Large Scale Integration) and VLSI (Very Large Scale Integration) technologies.

→ Due to their compact size, computers became available for personal use during the fourth generation.

→ Besides, high-level programming languages such as C, C++, DBASE etc.

Advantages of the Fourth Generation Computers:

* Due to the compact size, the computer became widely available for commercial and personal use.

It also led to the revolutionary use of personal computers (PCs)

- * Fourth-generation computers were faster, smaller, reliable, more energy efficient than their predecessors.
- * The amount of heat in fourth-generation computers was greatly reduced.

Disadvantages of the Fourth Generation Computers:-

- * The construction of VLSI circuits and microprocessors, was complex and required highly sophisticated technology and advanced technical skills.
- * A cooling fan was included in computers instead of an air conditioning system.
- * Fourth generation computers still used integrated circuits and therefore high technical skills were required to construct and assemble these ICs.

Fifth Generation (1980 to Present)

- ↳ Fifth generation computers are based on VLSI (Ultra Large Scale Integration) technology, AI (Artificial Intelligence) software, and Parallel Processing hardware.
- ↳ Fifth-generation computers are still using integrated circuits to meet various needs.
- ↳ Some such languages include C, C++, Java, .Net etc.
- ↳ Common examples of fifth generation computers are Desktop, Laptop, Tablet.

Advantages of the fifth Generation Computers:

- * Fifth generation computers are available in different sizes and they can now fit on the palm as well.
- * With the use of AI in the fifth generation, computers have become

So smart that they can understand human language and recognize pictures of individuals and things.

Disadvantages of the fifth generation

Computers

- * With advanced features and accuracy computers have also replaced humans in various fields, increasing unemployment.
- * The amount of wastage of computers and their parts is increasing significantly.
- * Computers have also become a threat to personal use and businesses as there are various types of cybercrimes that can cause damage to personal details as well as financial losses.

History of Computer :-

From the introduction of the first computer in the early 1800's through the many types of portable and handheld computers available now, the evolution of computers continues to this day.

1834 → Charles Babbage invents the analytical engine, and allowed for more general purpose calculation.

1887 → Herman Hollerith develops a tabulating system that uses punch cards to speed up processing for the 1890 U.S. Census.

1911 → Herman Hollerith's Tabulating Machine Company merges with two other companies to form the Computing - Tabulating - Recording Company, which is now called IBM.

1957

→ George Stibitz, a scientist at Bell laboratories builds a demonstration circuit called the "Model K" Adder.

1947

→ Bell labs scientists developed the first generation transistor, a solid state electronic device with three terminals.

1971

→ Intel introduces the first microprocessor, the intel 4004.

1975

→ Bill Gates and Paul Allen formed Microsoft, a computer software company that transformed into a global technology corporation. When Microsoft went

public in ¹⁹⁸⁷, Gates became the youngest billionaire in the world at age 31.

1976

→ Steve Jobs and Steve Wozniak founded Apple Computer.

1981 → IBM releases its first PC, which gained widespread adoption. The IBM PC runs on Microsoft Disk Operating System.

1991 → Swiss Computer programmer Tim-Berners-Lee introduces the World Wide Web.

2010 → The iPad, a handheld tablet produced by Apple is launched.

Computer Hardware :-

Computer hardware is a collective term used to describe any of the physical components of an analog or digital computers.

Computer hardware can be categorized as internal or external components.

Internal Computer hardware Components

Internal Components collectively process or store the instructions delivered by the program or operating system

(1) Motherboard :

→ This is a printed circuit board that holds the Central Processing Unit

(2) CPU :

→ The CPU is the brain of the computer that processes and execute digital instructions from Various programs

(3) RAM :

→ RAM is temporary memory storage that makes information immediately accessible to programs.

(4) Harddrive :

→ Hard disk drives are physical storage devices that store both

permanent and temporary data in different formats.

(5) Solid-State drive (SSD)

↳ SSDs are storage devices based on NAND flash memory technology.

(6) Optical drive:

↳ Optical drives typically reside in an on-device drive bay. Enable the computer to read and interact with non magnetic external media.

(7) Graphical Processing Unit:-

↳ This chip based device processes graphical data and often functions as an extension to the main CPU.

Common Input Hardware Components:

(1) Mouse:

↳ A mouse is a hand-held pointing device that moves a cursor around a computer screen.

(2) Keyboard:

→ A Keyboard is an input device featuring a standard QWERTY keyboard.

(3) Microphone:-

→ Microphone is a device that translates sound waves into electric signals.

(4) Touch pad:-

→ A touchpad is an ~~input~~ input device, external or built into a laptop.

(5) USB Flash drive:-

→ USB flash drive is an external removable storage devices that uses flash memory.

(6) Memory Card:-

→ A Memory card is a type of portable external storage media.

Output Hardware Components:

* Monitor:

↳ A Monitor is an output device similar to a TV Screen that displays information, documents or images.

* Printer:

↳ Printer renders electronic data from a Computer into printed material.

* Speaker:

↳ A Speaker is an external audio output device.

* Headphones, earphones, earbuds:

↳ These devices provide audio output that's audible only to a single listener.

Computer Software

↳ Computer Software refers to program code that is executed on the computer hardware that facilitates the completion of tasks by a computer.

↳ A Computer program is a specific sequence of instructions written in programming code that is carried out by a computer processor to complete a specific task.

Software's are broadly classified into two types i.e.,

(1) System Software.

(2) Application Software.

(1) System Software:-

System Software is a computer program that helps the user to run computer hardware or software and manages the interaction between them.

↳ It is software that constantly runs in the computer background, maintaining the computer hardware and computer's basic functionalities, including the operating system, utility software and interface.

↳ They are the first thing that gets loaded in the system's memory whenever you turn on your computer. System software is also known as "Low-level Software", because the end-users do not operate them.

The further classifications of System Software are as follows:

1. Operating System
2. Device Drivers.
3. Firmware
4. Utility.

1. Operating System:

↳ It is a group of software that handles the execution of programs and offers general services for the application that runs over the computer.

- ↳ There are various types of operating systems available in the market.
- * Microsoft Windows.
 - * Apple's iOS.
 - * Apple's Mac OS.
 - * Android.
 - * CentOS.
 - * Linux.
 - * Ubuntu.
 - * Onix.

2. Device Drivers.

↳ The device driver is a type of software that operates or controls some specific hardware devices linked to your system.

- * BIOS (Basic Input Output System) Device Driver.
- * USB (Universal Serial Bus) Driver.
- * Motherboard Drivers.
- * Display Drivers.

- * Printer Drivers
- * Sound Card Drivers
- * ROM (Read Only Memory)
- * VGA (Video Graphic Array)
Detailed

3. Firmware.

↳ Firmware is a type of ~~prog.~~ permanent Software embedded in the System's ROM (Read-Only memory) to provide low-level control for some particular system devices hardware.

- * Computer Peripherals.
- * Consumer Appliances.
- * Embedded Systems.
- * UEFI (Unified Extensible Firmware Interface)
- * BIOS (Basic Input/Output System)

4. Utility:

↳ Utility Software is developed to provide support in analyzing, optimizing, along configuring and maintaining a computer.

- * Norton and McAfee Antivirus.
- * WinRAR.
- * Directory Opus.
- * Disk defragmenter.
- * WinZip.
- * Windows File Explorer.
- * Razer Coated.

Application Software:-

Application programs or software applications are end-user computer programs developed primarily to provide specific functionality to the user.

(a) Word Processors.

(b) Database Software.

(c) Multimedia Software

(d) Web Browsers,

~~(e)~~

(a) Word Processors:-

↳ Word processor applications are globally used for documentation.

making notes and typing data.

Some examples of Word Processors.

- * MS Word (Microsoft)
- * iWork - Pages (Apple)
- * Corel WordPerfect
- * Google Docs

(b) Database Software:

↳ Database Software is used to create, manage, modify and organize a massive amount of data quickly retrieved. Another name for database software is Database Management System (DBMS).

- * Oracle.
- * MS Access
- * SQLite.
- * Microsoft SQL Server.
- * File Maker.
- * dBase.
- * MySQL

(c) Multimedia Software:

- ↳ This software enables the users to play, create or record images, music and Video files.
- ↳ Different graphic designing companies widely use multimedia Software to make animation, images and posts.
 - * Adobe Photo shop.
 - * Windows Movie Maker.
 - * Corel Draw.

(d) Web Browsers:

- ↳ These are a type of Software that is globally used to browse the internet.
- ↳ Web browsers help the users in positioning as well as fetching data across the web.
 - * Chrome.
 - * Mozilla Firefox.
 - * Microsoft internet Explorer.
 - * Opera.
 - * Microsoft Edge.