

SOFTWARE AND HARDWARE

Software

- Software is a collection of instructions that enable the user to interact with a computer, its hardware, or perform tasks.
- Without software, most computers would be useless.
- For example, without a browser software, you could not surf the internet.

Types of Software

- Application Software
- Utility Software
- System Software

Application Software

- Application software is a program or group of programs designed for end users.
- Examples of an application include a word processor, a spreadsheet, an accounting application, a web browser, a media player, a file viewer etc.

Features of Application Software

- Close to the user
- Easy to design
- More interactive
- Slow in speed
- Generally written in high-level language
- Easy to understand
- Easy to manipulate and use
- Bigger in size and requires large storage space

Examples of Application Software

- Student Record Software
- Inventory Management Software
- Income Tax Software
- Railways Reservation Software
- Microsoft Office Suite Software
- Microsoft Word
- Microsoft Excel
- Microsoft PowerPoint
- Application Software

System Software

- The system software is a collection of programs designed to operate, control, and extend the processing capabilities of the computer itself.
- System software is generally prepared by the computer manufacturers.
- These software products comprise of programs written in low-level languages, which interact with the hardware at a very basic level.
- System software serves as the interface between the hardware and the end users.

Features of a System Software

- Close to the system
- Fast in speed
- Difficult to design
- Difficult to understand
- Less interactive
- Smaller in size
- Difficult to manipulate
- Generally written in low-level language

Examples of System Software

- Operating System
- Compilers
- Interpreter
- Assemblers

Operating System

A set of programs that help in controlling and managing the hardware and software resources of a computer system is termed as operating system. It establishes relationship between hardware and software. It has three major responsibilities:

- Perform basic tasks including recognising input from keyboard, sending output to the display screen and keeping track of files and directories on the desk. It also controls peripheral devices.
- Ensure that different programs and users running simultaneously do not interfere with each other.
- Provide a software platform to run other program.

Utility Software

- A utility program is a type of system software that assists users with controlling or maintaining the operation of a computer, its devices, or its software.
- Utility programs typically offer features that provide an environment conducive to successful use of application software.

Examples of Utility Software

- Disk checkers scan an operating hard drive and check for logical (filesystem) or physical errors.
- Disk compression utilities transparently compress/uncompress the contents of a disk, increasing the capacity of the disk.
- Disk cleaners find files that are unnecessary to computer operation, or take up considerable amounts of space.
- Anti-virus utilities scan for computer viruses and block or remove them.
- Debuggers typically permit the examination and modification of data and program instructions in memory

Computer Language

- Computer languages are the languages through which user can communicate with the computer by writing program instructions.
- Every computer programming language contains a set of predefined words and a set of rules (syntax) that are used to create instructions of a program.

Classification of Languages

- Low Level Language
- Medium Level Language
- High Level Language

Low Level Language (Machine Language)

- Low Level language is the only language which can be understood by the computer.
- Binary Language is an example of low level language. The binary language contains only two symbols 1 & 0. All the instructions of binary language are written in the form of binary numbers 1's & 0's. A computer can directly understand the binary language.
- As the CPU directly understands the binary language instructions, it does not requires any translator. CPU directly starts executing the binary language instructions, and takes very less time to execute the instructions as it does not requires any translation.

- **Advantages**

1. A computer can easily understand the low level language.
2. Low level language instructions are executed directly without any translation.
3. Low level language instructions require very less time for their execution.

Disadvantages

1. Low level language instructions are very difficult to use and understand.
2. Low level language instructions are machine dependent, that means a program written for a particular machine does not execute on other machines.
3. In low level language, there is more chance for errors and it is very difficult to find errors, debug and modify.

Middle Level Language (Assembly Language)

- Middle level language is a computer language in which the instructions are created using symbols such as letters, digits and special characters. In assembly language, we use predefined words called mnemonics.
- Binary code instructions in low level language are replaced with mnemonics and operands in middle level language. But computer can not understand mnemonics, so we use a translator called Assembler to translate mnemonics into binary language.
- Assembler is a translator which takes assembly code as input and produces machine code as output.

- **Advantages**

1. Writing instructions in middle level language is easier than writing instructions in low level language.
2. Middle level language is more readable compared to low level language.
3. Easy to understand, find errors and modify.

Disadvantages

1. Middle level language is specific to a particular machine architecture, that means it is machine dependent.
2. Middle level language needs to be translated into low level language.
3. Middle level language executes slower compared to low level language.

High Level Language

- High level language is a computer language which can be understood by the users.
- High level language is very similar to the human languages and have a set of grammar rules that are used to make instructions more easily. Every high level language have a set of predefined words known as Keywords and a set of rules known as Syntax to create instructions.
- High level language is more easier to understand for the users but the computer can not understand it. High level language needs to be converted into low level language to make it understandable by the computer.
- We use Compiler or interpretor to convert high level language to

- **Advantages**

1. Writing instructions in high level language is more easier.
2. High level language is more readable and understandable.
3. The programs created using high level language runs on different machines with little change or no change.
4. Easy to understand, create programs, find errors and modify.

- **Disadvantages**

1. High level language needs to be translated to low level language.
2. High level language executes slower compared to middle and low level languages.
3. Understanding Computer Languages

HARDWARE



Desktop



Laptop



Motherboard



Processor



RAM



Hardisk external



Keyboard



Power supply

Hardware

- Computer hardware is the physical components that a computer system requires to function.
- It encompasses everything with a circuit board that operates within a PC or laptop; including the motherboard, graphics card, CPU (Central Processing Unit), ventilation fans, webcam, power supply, and so on.
- Although a computer can function only when both hardware and software are working together, the speed of a system will largely rely on the hardware used.

- The keyboard is a basic input device that is used to enter data into a computer or any other electronic device by pressing keys.
- It has different sets of keys for letters, numbers, characters, and functions.
- Keyboards are connected to a computer through USB or a Bluetooth device for wireless communication.
- Keyboards are of two sizes 84 keys or 101/102 keys, but now keyboards with 104 keys or 108 keys are also available for Windows and Internet.



Keys	Description
Typing Keys	These keys include the letter keys (A-Z) and digit keys (09) which generally give the same layout as that of typewriters.
Numeric Keypad	It is used to enter the numeric data or cursor movement. Generally, it consists of a set of 17 keys that are laid out in the same configuration used by most adding machines and calculators.
Function Keys	The twelve function keys are present on the keyboard which are arranged in a row at the top of the keyboard. Each function key has a unique meaning and is used for some specific purpose.
Control keys	These keys provide cursor and screen control. It includes four directional arrow keys. Control keys also include Home, End, Insert, Delete, Page Up, Page Down, Control(Ctrl), Alternate(Alt), Escape(Esc)
Special Purpose Keys	Keyboard also contains some special purpose keys such as Enter, Shift, Caps Lock, Num Lock, Space bar, Tab, and Print Screen.

Mouse

- The mouse is a hand-held input device which is used to move cursor or pointer across the screen.
- Laptop computers come with a touchpad that works as a mouse. It lets you control the movement of cursor or pointer by moving your finger over the touchpad.
- Common types of the mouse:
 - Trackball Mouse
 - Mechanical Mouse
 - Optical Mouse
 - Cordless or Wireless Mouse

- **Scanner:** The scanner uses the pictures and pages of text as input. It scans the picture or a document. The scanned picture or document then converted into a digital format or file and is displayed on the screen as an output. It uses optical character recognition techniques to convert images into digital ones.
- **Joystick:** A joystick is also a pointing input device like a mouse. It is made up of a stick with a spherical base. The base is fitted in a socket that allows free movement of the stick. The movement of stick controls the cursor or pointer on the screen.
- **Microphone:** The microphone is a computer input device that is used to input the sound. It receives the sound vibrations and converts them into audio signals or sends to a recording medium. The audio signals are converted into digital data and stored in the computer.

Monitors

- Monitors, commonly called as Visual Display Unit (VDU), are the main output device of a computer. It forms images from tiny dots, called pixels that are arranged in a rectangular form.
- The sharpness of the image depends upon the number of pixels.
- There are two kinds of viewing screen used for monitors.
 - Cathode-Ray Tube (CRT)
 - Flat-Panel Display

Printer

- A printer produces hard copies of the processed data. It enables the user, to print images, text or any other information onto the paper.
- Based on the printing mechanism, the printers are of two types: Impact Printers and Non-impact Printers.

Printer

- Impact Printer: The impact printer uses a hammer or print head to print the character or images onto the paper. Examples: Character Printers, Dot Matrix Printers.
- Non-Impact Printer: They print characters and images without direct physical contact between the paper and the printing machinery. These printers can print a complete page at a time, so they are also known as page printers.

Hardware	Software
Physical parts of the computer are called hardware.	A set of instructions given to the computer is called software
You can touch, see and feel hardware	You cannot touch and feel software
Hardware is constructed using physical materials or components.	Software is developed by writing instructions in programming language
Computer is hardware, which operates under the control of a software.	The operations of computer are controlled through software
If hardware is damaged, it is replaced with new one	If software is damaged or corrupted, its backup copy can be reinstalled
Hardware is not affected by computer viruses	Software is affected by computer viruses
Hardware cannot be transferred from one place to another electronically through network	Software can be transferred from one place to another electronically through network
User cannot make new duplicate copies of the hardware	User can make many new duplicate copies of the software