Microsoft Office Package

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MS Windows and Computer Basics

Computer

The literal meaning of computer is a device that can calculate. However, modern computers can do a lot more than calculating. **A computer** is an electronic device that receives input, stores or processes the input as per user instructions and provides output in desired format.

Input-Process-Output Model

Computer input is called **data** and the output obtained after processing it, based on user's instructions is called **information**. Raw facts and figures which can be processed using arithmetic and logical operations to obtain information are called **data**.


Simplest Workflow of Computer
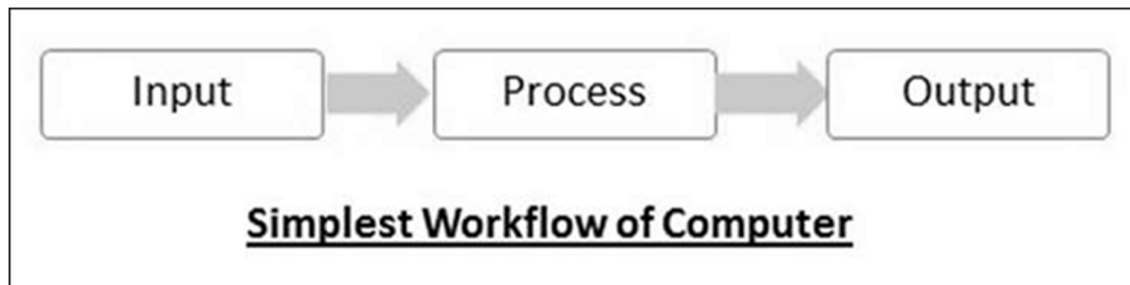
The processes that can be applied to data are of two types −

- **Arithmetic operations** − Examples include calculations like addition, subtraction, differentials, square root, etc.

- **Logical operations** − Examples include comparison operations like greater than, less than, equal to, opposite, etc.

The corresponding figure for an actual computer looks something like this −
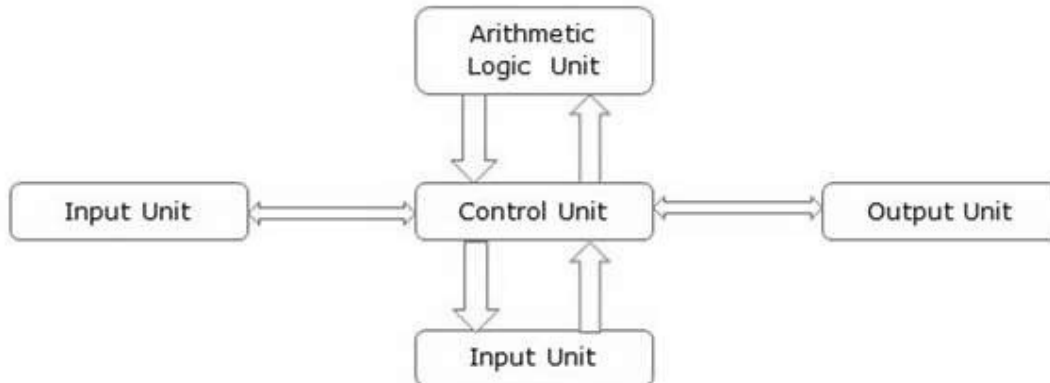
Basic Parts of a Computer

The basic parts of a computer are as follows −

- **Input Unit** − Devices like keyboard and mouse that are used to input data and instructions to the computer are called input unit.

- **Output Unit** − Devices like printers and visual display unit that are used to provide information to the user in desired format are called output unit.

- **Control Unit** − As the name suggests, this unit controls all the functions of the computer. All devices or parts of a computer interact through the control unit.

- **Arithmetic Logic Unit** − This is the brain of the computer where all arithmetic operations and logical operations take place.

- **Memory** − All input data, instructions and data interim to the processes are stored in the memory. Memory is of two types – **primary memory** and **secondary memory**. Primary memory resides within the CPU whereas secondary memory is external to it.

Control unit, arithmetic logic unit and memory are together called the **central processing unit** or **CPU**. Computer devices like keyboard, mouse, printer, etc. that we can see and touch are the **hardware** components of a computer. The set of instructions or programs that make the computer function using these hardware parts are called **software**. We cannot see or touch software. Both hardware and software are necessary for working of a computer.

Characteristics of Computer

To understand why computers are such an important part of our lives, let us look at some of its characteristics −

- **Speed** − Typically, a computer can carry out 3-4 million instructions per second.

- **Accuracy** − Computers exhibit a very high degree of accuracy. Errors that may occur are usually due to inaccurate data, wrong instructions or bug in chips – all human errors.

- **Reliability** − Computers can carry out same type of work repeatedly without throwing up errors due to tiredness or boredom, which are very common among humans.

- **Versatility** − Computers can carry out a wide range of work from data entry and ticket booking to complex mathematical calculations and continuous astronomical observations. If you can input the necessary data with correct instructions, computer will do the processing.

- **Storage Capacity** − Computers can store a very large amount of data at a fraction of cost of traditional storage of files. Also, data is safe from normal wear and tear associated with paper.

Advantages of Using Computer

Now that we know the characteristics of computers, we can see the advantages that computers offer−

- Computers can do the same task repetitively with same accuracy.

- Computers do not get tired or bored.

- Computers can take up routine tasks while releasing human resource for more intelligent functions.

Disadvantages of Using Computer

Despite so many advantages, computers have some disadvantages of their own −

- Computers have no intelligence; they follow the instructions blindly without considering the outcome.

- Regular electric supply is necessary to make computers work, which could prove difficult everywhere especially in developing nations.

Booting

Starting a computer or a computer-embedded device is called **booting**. Booting takes place in two steps −

- Switching on power supply

- Loading operating system into computer's main memory

- Keeping all applications in a state of readiness in case needed by the user

The first program or set of instructions that runs when the computer is switched on is called **BIOS** or **Basic Input Output System**. BIOS is firmware, i.e. a piece of software permanently programmed into the hardware.

If a system is already running but needs to be restarted, it is called **rebooting**. Rebooting may be required if a software or hardware has been installed or the system is unusually slow.

Computer - Classification

All modern computers and computing devices use microprocessors whose speeds and storage capacities are skyrocketing day by day. The developmental benchmark for computers is now their size. Computers are now classified on the basis of their use or size −

- Desktop
- Laptop
- Tablet
- Server
- Mainframe
- Supercomputer

Desktop

Desktop computers are **personal computers (PCs)** designed for use by an individual at a fixed location. IBM was the first computer to introduce and popularize use of desktops. A desktop unit typically has a CPU (Central Processing Unit), monitor, keyboard and mouse. Introduction of desktops popularized use of computers among common people as it was compact and affordable.

Riding on the wave of desktop's popularity many software and hardware devices were developed specially for the home or office user. The foremost design consideration here was user friendliness.

Laptop

Despite its huge popularity, desktops gave way to a more compact and portable personal computer called laptop in 2000s. Laptops are also called **notebook computers** or simply **notebooks**. Laptops run using batteries and connect to networks using Wi-Fi (Wireless Fidelity) chips. They also have chips for energy efficiency so that they can conserve power whenever possible and have a longer life.

Modern laptops have enough processing power and storage capacity to be used for all office work, website designing, software development and even audio/video editing.

Tablet

After laptops computers were further miniaturized to develop machines that have processing power of a desktop but are small enough to be held in one's palm. Tablets have touch sensitive screen of typically 5 to 10 inches where one finger is used to touch icons and invoke applications.
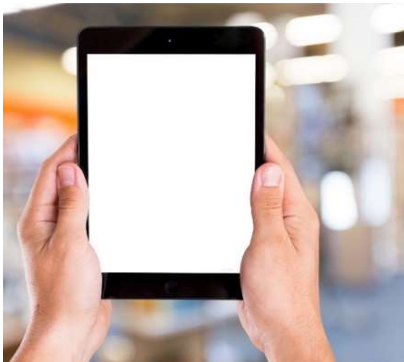
Keyboard is also displayed virtually whenever required and used with touch strokes. Applications that run on tablets are called **apps**. They use operating systems by Microsoft (Windows 8 and later versions) or Google (Android). Apple computers have developed their own tablet called **iPad** which uses a proprietary OS called **iOS**.

Server

Servers are computers with high processing speeds that provide one or more services to other systems on the **network**. They may or may not have screens attached to them. A group of computers or digital devices connected together to share resources is called a **network**.
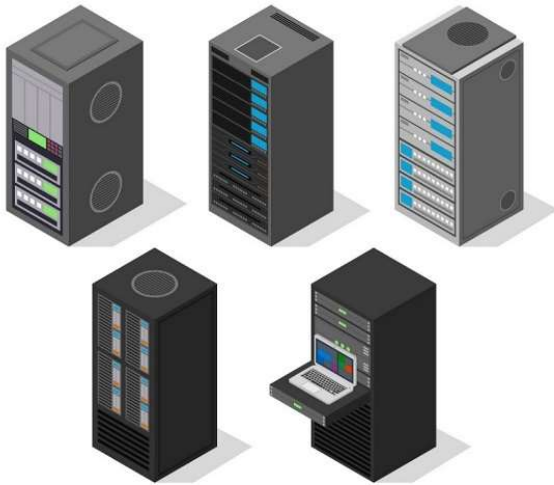
Servers have high processing powers and can handle multiple requests simultaneously. Most commonly found servers on networks include −

- File or storage server
- Game server
- Application server
- Database server
- Mail server
- Print server

Mainframe

Mainframes are computers used by organizations like banks, airlines and railways to handle millions and trillions of online transactions per second. Important features of mainframes are −

- Big in size
- Hundreds times Faster than servers, typically hundred megabytes per second

- Very expensive

- Use proprietary OS provided by the manufacturers

- In-built hardware, software and firmware security features

Supercomputer

Supercomputers are the fastest computers on Earth. They are used for carrying out complex, fast and time intensive calculations for scientific and engineering applications. Supercomputer speed or performance is measured in teraflops, i.e. 1012 floating point operations per second.

Chinese supercomputer **Sunway TaihuLight** is the world's fastest supercomputer with a rating of 93 petaflops per second, i.e. 93 quadrillion floating-point operations per second.

Most common uses of supercomputers include −

- Molecular mapping and research

- Weather forecasting

- Environmental research

- Oil and gas exploration

Software

As you know, hardware devices need user instructions to function. A set of instructions that achieve a single outcome are called program or procedure. Many programs function together to do a task make a **software**.

For example, word-processing software enables the user to create, edit and save documents. A web browser enables the user to view and share web pages and multimedia files. There are two categories of software −

- System Software
- Application Software
- Utility Software
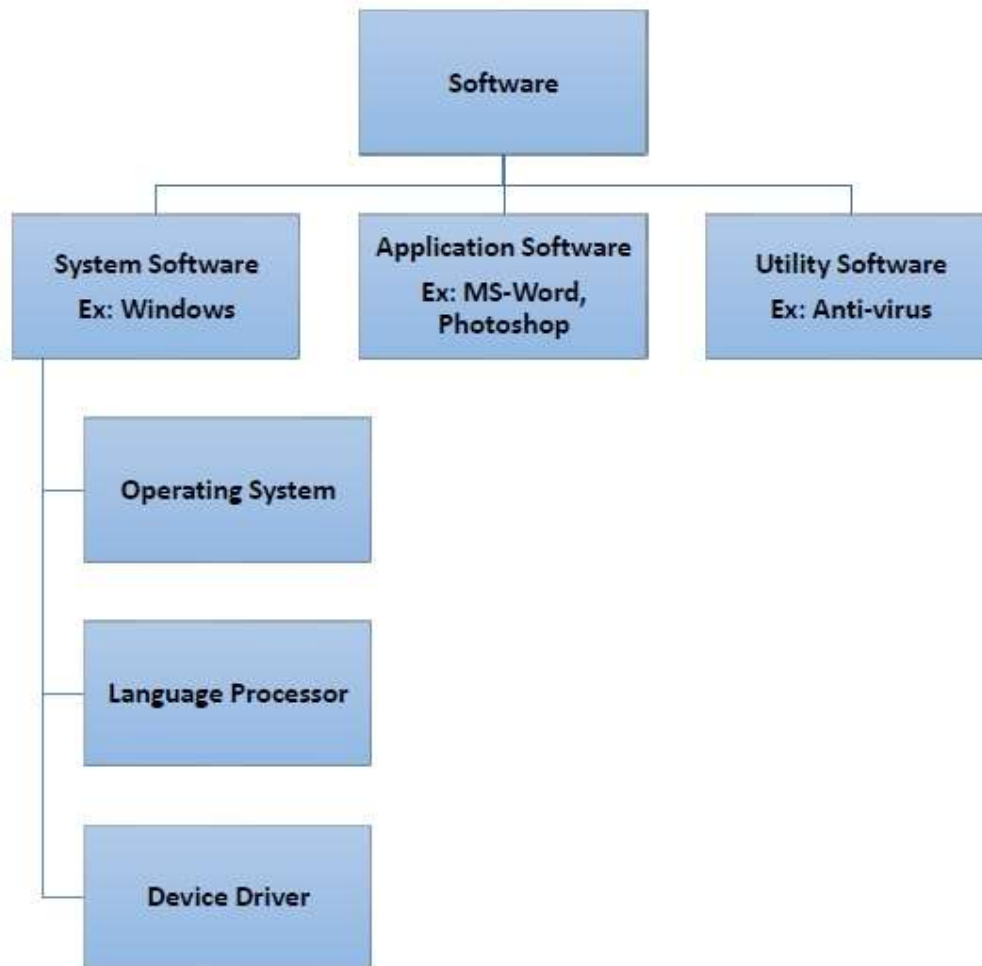
System Software

Software required to run the hardware parts of the computer and other application software are called **system software**. System software acts as **interface** between hardware and user

applications. An interface is needed because hardware devices or machines and humans speak in different languages.

Machines understand only binary language i.e. 0 (absence of electric signal) and 1 (presence of electric signal) while humans speak in English, French, German, Tamil, Hindi and many other languages. English is the pre-dominant language of interacting with computers. Software is required to convert all human instructions into machine understandable instructions. And this is exactly what system software does.

Based on its function, system software is of four types −

- Operating System
- Language Processor
- Device Drivers

Operating System

System software that is responsible for functioning of all hardware parts and their interoperability to carry out tasks successfully is called **operating system (OS)**. OS is the first software to be loaded into computer memory when the computer is switched on and this is called **booting**. OS manages a computer's basic functions like storing data in memory, retrieving files from storage devices, scheduling tasks based on priority, etc.

Language Processor

As discussed earlier, an important function of system software is to convert all user instructions into machine understandable language. When we talk of human machine interactions, languages are of three types −

- **Machine-level language** − This language is nothing but a string of 0s and 1s that the machines can understand. It is completely machine dependent.

- **Assembly-level language** − This language introduces a layer of abstraction by defining **mnemonics**. **Mnemonics** are English like words or symbols used to denote a long string of 0s and 1s. For example, the word "READ" can be defined to mean that computer has to retrieve data from the memory. The complete **instruction** will also tell the memory address. Assembly level language is **machine dependent**.

- **High level language** − This language uses English like statements and is completely independent of machines. Programs written using high level languages are easy to create, read and understand.

Program written in high level programming languages like Java, C++, etc. is called **source code**. A set of instructions in machine readable form is called **object code** or **machine code**. **System software** that converts source code to object code is called **language processor**. There are three types of language interpreters−

- **Assembler** − Converts assembly level program into machine level program.

- **Interpreter** − Converts high level programs into machine level program line by line.
- **Compiler** − Converts high level programs into machine level programs at one go rather than line by line.

Device Drivers

System software that controls and monitors functioning of a specific device on computer is called **device driver**. Each device like printer, scanner, microphone, speaker, etc. that needs to be attached externally to the system has a specific driver associated with it. When you attach a new device, you need to install its driver so that the OS knows how it needs to be managed.

Application Software

Software that performs a single task and nothing else is called **application software**. Application software are very specialized in their function and approach to solving a problem. So spreadsheet software can only do operations with numbers and nothing else. Hospital management software will manage hospital activities and nothing else. Here are some commonly used applications software −

- Word processing
- Spreadsheet
- Presentation
- Database management
- Multimedia tools

Utility Software

Application software that assist system software in doing their work is called **utility software**. Thus, utility software is actually a cross between system software and application software. Examples of utility software include −

- Antivirus software
- Disk management tools
- File management tools
- Compression tools
- Backup tools

MS Windows

Windows is a product line of proprietary graphical operating systems developed and marketed by Microsoft. It is grouped into families and sub-families that cater to particular sectors of the computing industry – Windows (unqualified) for a consumer or corporate workstation, Windows Server for a server and Windows IoT for an embedded system. Windows is sold as either a consumer retail product or licensed to third-party hardware manufacturers who sell products bundled with Windows.

The first version of Windows, Windows 1.0, was released on November 20, 1985, as a graphical operating system shell for MS-DOS in response to the growing interest in graphical user interfaces (GUIs).[12] The name "Windows" is a reference to the windowing system in GUIs.[13] The 1990 release of Windows 3.0 catapulted its market success and led to various other product families, including the now-defunct Windows 9x, Windows Mobile, Windows Phone, and Windows CE/Embedded Compact. Windows is the most popular desktop operating system in the world, with a 70% market share as of March 2023, according to StatCounter;[14] however when including mobile OSes, it is not the most used, in favor of Android.[15]

The most recent version of Windows is Windows 11 for consumer PCs and tablets, Windows 11 Enterprise for corporations, and Windows Server 2025 for servers. Still supported are some editions of Windows 10, Windows Server 2016 or later (and exceptionally with paid support down to Windows Server 2008).

Features of Windows

Microsoft Windows includes a lot of features to help users. Some of its excellent features are as follows:

1. **Control Panel:** Windows provides a Control Panel feature that includes many tools to configure and manage the resources on their computer. For example, users can change settings for audio, video, printers, mouse, keyboard, network connections, date and

time, power saving options, user accounts, installed applications, etc.
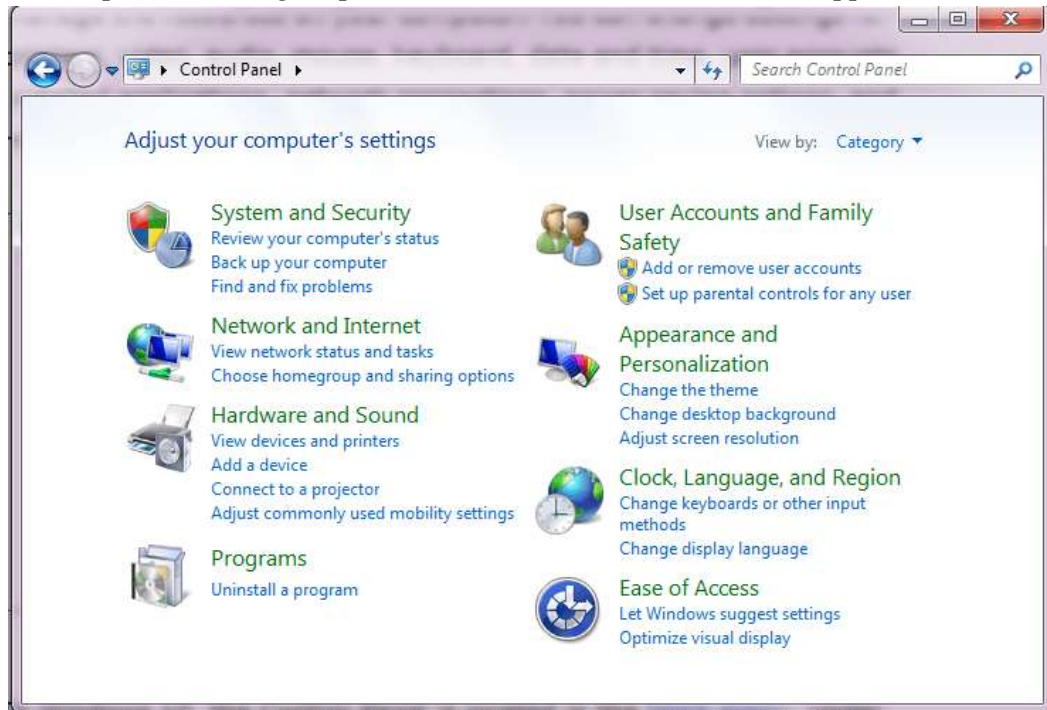
2. **Cortana:** Windows 10 introduced a feature named Cortana, which is able to accept voice commands. It can perform various tasks such as it can answers your questions, search data on your computer, online purchases, set reminders, and appointments, etc. Furthermore, it acts like other voice-activated services such as Google Assistant, Alexa, or Siri, including one more benefit of searching the information on your computer. To open the Cortana in Windows 10, press **Window key + S**.
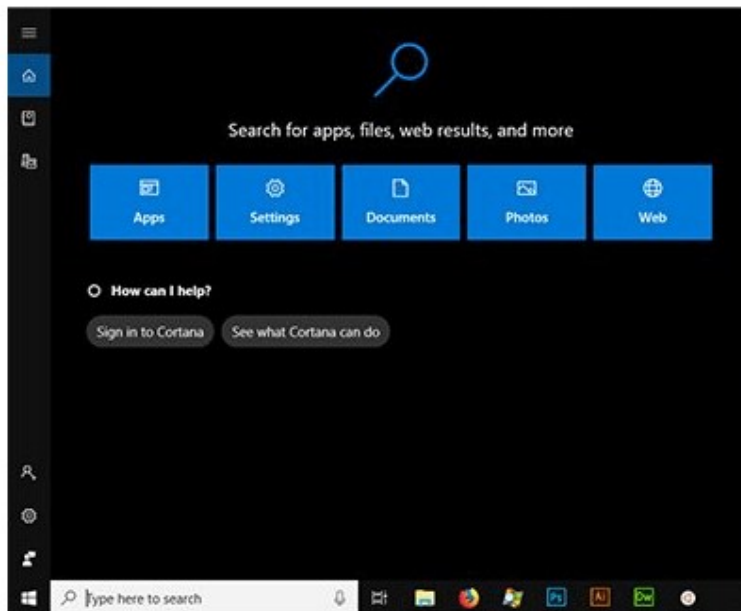
3. **File Explorer:** It is also known as Windows Explorer, which displays your files and folders on the computer. It allows users to browse the data on the hard drive, SSD and other inserted removable disks like pen drives and CDs, and you can manage the content according to the requirements such as delete, rename, search, and transfer the data.
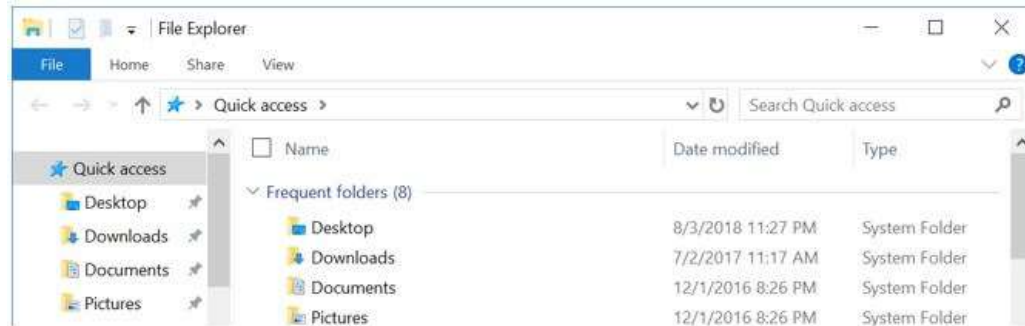

4. **Internet browser:** As the internet browser is very important to search for anything, view pages, online shopping, play games, watch videos, etc. Windows come with a pre-installed internet browser. in Windows 10, the Edge internet browser is the default browser. Furthermore, Internet Explorer was the default browser in Microsoft Windows from the Windows edition 95 to 8.1 version.
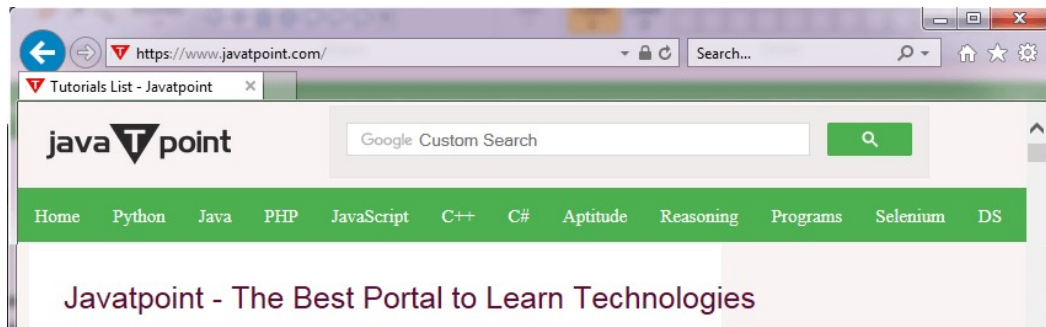
5. **Microsoft Paint:** Since November 1985, Microsoft Windows comes with pre-installed Microsoft Paint. It is a simple software to create, view, and edit an image. It offers several tools to draw an image, crop, resize, and save an image with a different file

extension.
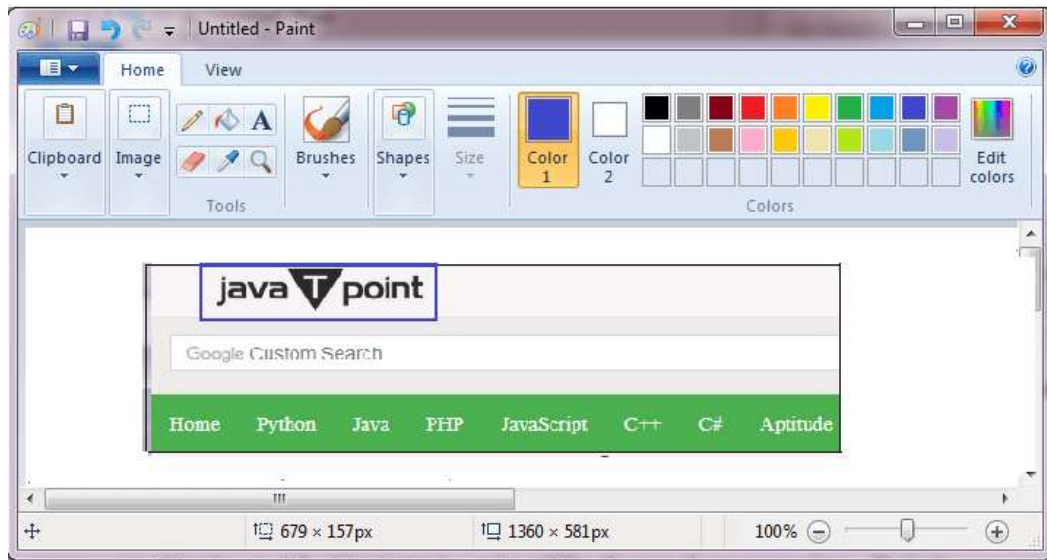
6. **Taskbar:** Windows comes with a taskbar that displays currently opened programs, it also allows users to access any specific programs. Additionally, it includes the notification area on the right side that shows date and time, battery, network, volume, and other background running applications.
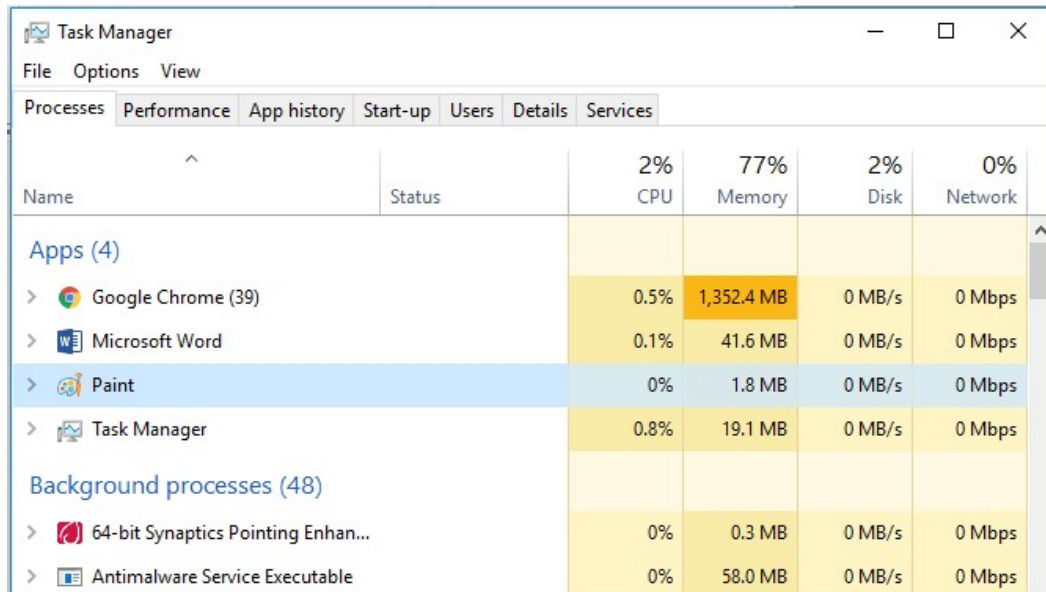
7. **Start menu:** Microsoft Windows contains a start menu to the left side of the taskbar. It displays programs and utilities that are installed on the computer. It can be simply opened by clicking on the Start menu button or pressing the start key on the keyboard.
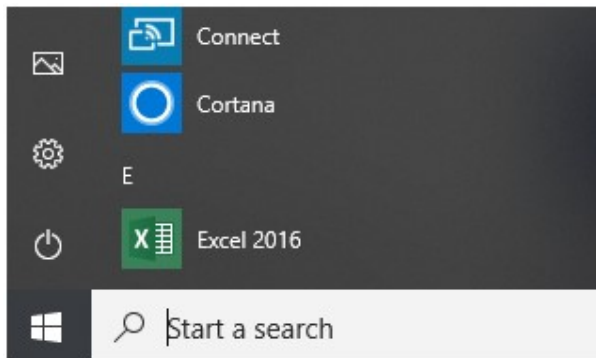
8. **Task Manager:** Windows includes the task manager feature that provides detail of the running applications or programs on the computer. You can also check how much of the system resources, such as RAM, CPU, disk I/O, are being used by each of the

applications.

9. **Disk Cleanup:** It is used to free up disk space with the help of deleting temporary or unnecessary files. It also helps to enhance the performance of the computer, and boost storage space to download the programs and documents. To open Disk Cleanup, follow the below steps:

   o   Open the File Explorer by pressing **Window + E.**

   o   Then, right-click on any disk drive and select Properties option from the drop-down list.

   o   Now, click on the **Disk Cleanup.**
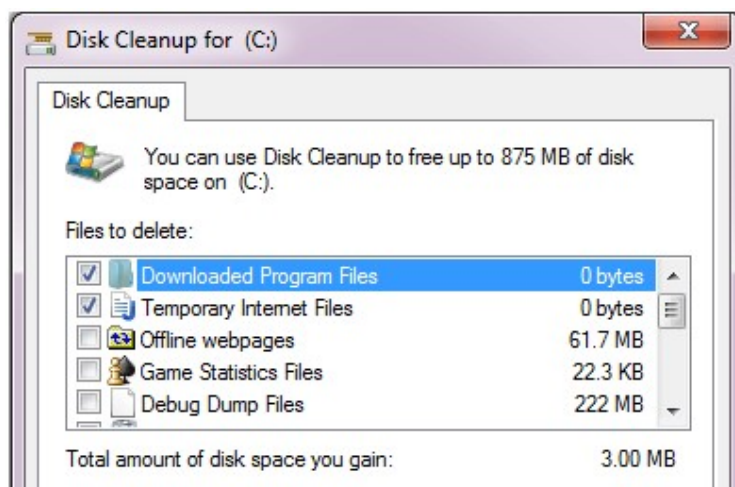
Windows Shortcut Keys List

Basic Windows Navigation

Shortcut	Action
Win	Open the Start Menu
Win + D	Show desktop (Minimize all open windows)
Win + M	Minimize all windows
Win + Shift + M	Restore minimized windows
Win + E	Open File Explorer
Win + I	Open Settings
Win + L	Lock your PC
Win + R	Open the Run dialog box
Win + S	Open Search bar
Win + V	Open Clipboard history (Windows 10 and later)
Win + X	Open the Quick Link menu (power user menu)

Window Management Shortcuts

Managing multiple **open windows** can often become a challenge, especially when working with many applications at once. However, **window management shortcuts** on Windows allow you to effortlessly organize your workspace and boost your multitasking productivity. From quickly switching between apps with Alt + Tab to snapping windows to the sides of your screen with Win + Left/Right Arrow, these shortcuts are essential for maintaining focus and

efficiency. They can help you navigate through windows without needing to use your mouse, making them a favorite for **power users** and those who prefer to keep their hands on the keyboard.

Shortcut	Action
Alt + Tab	Switch between open applications
Alt + F4	Close the current window
Ctrl + Shift + Esc or Ctrl + Alt + Del	Open Task Manager
Win + Left Arrow	Snap window to the left side of the screen
Win + Right Arrow	Snap window to the right side of the screen
Win + Up Arrow	Maximize the window
Win + Down Arrow	Minimize the window
Win + Shift + Left/Right Arrow	Move a window between monitors (for dual screen setups)
Win + Home	Minimize all windows except the active one

File Explorer Shortcuts

When working with **files and folders** on Windows, **File Explorer** shortcuts are crucial for improving speed and workflow. These shortcuts allow you to navigate, organize, and manage your **documents** and **directories** without clicking through multiple menus. Whether you need to create a new folder (Ctrl + Shift + N), rename files (F2), or open the properties of a selected item (Alt + Enter), mastering **File Explorer shortcuts** enhances your overall efficiency. This set of shortcuts is especially useful for those dealing with large numbers of files or frequently performing tasks like copying, moving, or renaming files.

Shortcut	Action
Ctrl + N	Open a new File Explorer window
Ctrl + T	Open a new tab in File Explorer (Windows 11)
Ctrl + W	Close the current tab or window
Ctrl + Shift + N	Create a new folder
F2	Rename the selected file/folder
Ctrl + A	Select all items in a folder
Ctrl + C	Copy selected items
Ctrl + X	Cut selected items
Ctrl + V	Paste copied or cut items
Ctrl + Z	Undo an action
Ctrl + Y	Redo an action
Alt + D	Select the address bar in File Explorer
F3	Search for a file in File Explorer
Ctrl + F	Open the search bar in File Explorer

Shortcut	Action
Alt + Enter	Open the Properties of a selected file/folder

Text Editing Shortcuts

Whether you're working in **Word documents**, **Notepad**, or any other text editor, knowing the essential **text editing shortcuts** is key to maximizing your productivity. Shortcuts like Ctrl + C (copy), Ctrl + X (cut), and Ctrl + V (paste) are the building blocks of text manipulation. For more advanced text handling, shortcuts such as Ctrl + Z (undo) and Ctrl + Shift + Z (redo) allow you to correct mistakes and improve efficiency without ever taking your hands off the keyboard. These text editing shortcuts are essential for both casual users and professionals who frequently edit documents or code.

Shortcut	Action
Ctrl + C	Copy selected text
Ctrl + X	Cut selected text
Ctrl + V	Paste copied or cut text
Ctrl + A	Select all text
Ctrl + Z	Undo action
Ctrl + Y	Redo action
Ctrl + F	Open Find dialog
Ctrl + H	Open Replace dialog

Shortcut	Action
Ctrl + B	Bold selected text
Ctrl + I	Italicize selected text
Ctrl + U	Underline selected text
Ctrl + P	Open Print dialog
Ctrl + S	Save document
Ctrl + N	Create new document
Ctrl + O	Open an existing document

Taskbar & System Tray Shortcuts

The **Taskbar** and **System Tray** are central to managing your active applications and system notifications in Windows. By mastering **taskbar keyboard shortcuts**, you can quickly access pinned applications, open the system tray, and cycle through running programs. For instance, using Win + T to cycle through pinned apps or Win + 1 to open a specific app on the taskbar saves time and reduces the need for mouse-based navigation. These shortcuts are particularly useful for those who have multiple programs open simultaneously and want to switch between them swiftly.

Shortcut	Action
Win + T	Focus on the taskbar and cycle through pinned apps
Win + B	Focus on the notification area (system tray)

Shortcut	Action
Win + 1, 2, 3,...	Open apps pinned to the taskbar (1st, 2nd, 3rd, etc.)
Alt + Tab	Switch between open apps
Ctrl + Shift + Esc	Open Task Manager directly
Win + P	Project to another display or projector
Win + N	Open Notification Center
Win + A	Open Quick Settings

Task Manager Shortcut

- **Ctrl + Shift + Esc**: Opens the **Task Manager** directly, allowing you to monitor and manage system processes, end tasks, and troubleshoot performance issues.

- **Ctrl + Alt + Del**: Opens the security options screen, where you can choose to open **Task Manager**, lock the PC, sign out, or access other settings.

Full Screen Keyboard Shortcut

- **F11**: This key toggles **full-screen mode** in most applications, such as browsers (Google Chrome, Firefox, Edge) and File Explorer.

- **Win + Up Arrow**: Maximizes the current window to full screen (on supported apps).

- **Win + Down Arrow**: Restores the window to its previous size or minimizes it (on supported apps).

Hotkey for Snipping Tool

- **Win + Shift + S**: This keyboard shortcut opens the **Snipping Tool** and allows you to take screenshots of a portion of your screen. Once the screen is captured, you can annotate or save the image.

- **Win + Shift + S (Windows 11)**: Snipping Tool is slightly more integrated with Windows 11. This hotkey allows for more advanced screen capturing options like rectangular snip, freeform snip, window snip, and full-screen snip.

Key Shortcut for Screenshot

- **PrtScn (Print Screen)**: Takes a full-screen screenshot and copies it to the clipboard. You can then paste it into any application (like MS Paint or Word) using **Ctrl + V**.

- **Alt + PrtScn**: Captures a screenshot of the **active window** only and saves it to the clipboard.

- **Win + PrtScn**: Takes a full-screen screenshot and saves it directly to the **Screenshots** folder in **Pictures**.

What are the most commonly used Windows keyboard shortcuts for productivity?

The most commonly used Windows shortcuts for productivity include:

- *Ctrl + C (Copy)*

- *Ctrl + V (Paste)*

- *Ctrl + Z (Undo)*

- *Alt + Tab (Switch between open apps)*

- *Win + D (Show or hide desktop)*

- *Ctrl + Shift + Esc (Open Task Manager)*

Computer Hardware

Computer hardware includes the physical parts of a computer, such as a case, central processing unit (CPU), random access memory (RAM), monitor, and mouse which processes the input according to the set of instructions provided to it by the user and gives the desired output.

The computer has mainly has two major components:

1. Hardware

2. Software

In this article, we only discuss computer hardware.
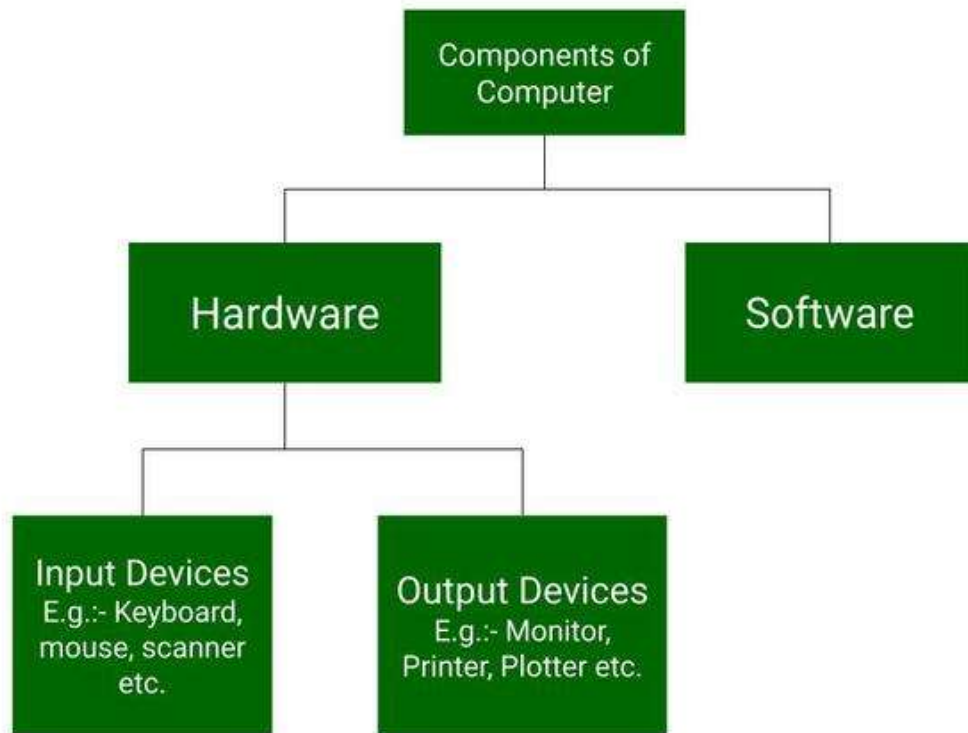
What is Computer Hardware?

Computer hardware is a physical device of computers that we can see and touch. For e.g. Monitor, Central Processing Unit, Mouse, Joystick, etc. Using these devices, we can control computer operations like input and output.

Computer Hardware Parts

These hardware components are further divided into the following categories, which are:

1. Input Devices
2. Output Devices
3. Storage Devices
4. Internal Components

1. Input Devices

Input devices are those devices with the help of which the user interacts with the computer. Or, In other words, with the help of input devices, the user enters the data or information into the computer. This information or data is accepted by the input devices and converted into a computer-acceptable format, which is further sent to the computer system for processing.

Now we discuss some input devices:

- **Keyboard:** It is the most common and main input device for computers. The data is inputted by typing on the keyboard. It consists of 104 keys in total. It contains numeric keys, alphabet keys, and different function keys as well. Earlier, it was connected to the computer via cable, now as technology has advanced, you can connect a keyboard using Bluetooth.

- **Mouse:** A mouse is a kind of pointing device which is rolled over to control the cursor on the screen and it has functional keys like left, middle, and right buttons. Using these functional keys, on by the click of which an object is selected or to open a file by just a click of a mouse. It also consists of a sensor inside which notifies its speed to the computer and according to which the cursor is moved on the screen.

- **Scanner:** As the name suggests, it scans images, documents, etc., and converts them into digital form and that can be further edited and used. It works just like a Xerox machine.

- **Track Ball:** It is a device much like an upside-down mouse. It does not use much space for movement like a mouse. As the trackball remains stationary and the user moves the ball in various directions, it affects the screen movements directly.

- **Light Pen:** It is a light-sensitive device and it is touched to the CRT screen where it can detect, a raster on the screen as it passes by and, with the help of this user can draw anything like lines, figures, or any objects.

- **Microphone:** It is a kind of voice input system that can be attached to a computer system to record sounds. It converts human speech or voice into electrical signals. This electrical signal is processed by the computer and the word is recognized.

- **Optical Character Reader:** It is used to detect alphanumeric characters that are written or printed on paper using a low-frequency light source. This light is absorbed by the dark areas and reflected by the light areas, now this reflected light is received by the photocells. It is like a scanner.

- **Bar Code Reader:** It is used to read bar codes and convert them into electric pulse which will further processed by the computer. Here, the barcode is data that is coded into white and black lines(or light and dark lines).

2. Output Devices

These are the devices that are used to display the output of any task given to the computer in human-readable form.

Now we discuss some output devices:

- **Monitor:** The monitor is the main output device. It is also called VDU(visual display unit) and it looks like a TV screen. The Monitor displays the information from the computer. It is used to display text, video, images, etc.

- **Printer:** A printer is an output device that transfers data from the computer in a printed format by using text or images on paper. There are both colored and black & white printers. Further, there are also different types of printers, like Laser Printer, Dot-matrix printers, and Inkjet printers.

- **Plotter:** It is similar to a printer, but potters are large in size. A plotter is used to generate large drawings, architectural blueprints, etc. on paper and these are high-quality images and drawings and large in size.

- **Speakers:** It is a very common output device, and it gives sound as an output. Speaker is generally used to play music or anything that has sound.

3. Storage Devices

There are some devices that are used for storage purposes and are known as secondary storage devices. Some of them were discussed below:

I. CD (Compact disc): A CD is circular in shape and made up of thin platted glass and plastic polycarbonate material. It has a storage capacity of 600 MB to 700 MB of data. It has a standard size of 12 cm with a hole in the center of about 1.5 cm and 1.2 mm in thickness. There are basically 3 types of CDs, which are:

- **CD-ROM (CD – Read Only Memory):** Contents of this type of CD cannot be erased by the user. Only the publisher is allowed to access the data imprinted on this CD. CD-ROM is basically used for commercial purposes like for a music album or any application package by a software company.

- **CD-R (CD-Recordable):** In this, content or data can be stored once. After that, they can be read many times but the data or content cannot be rewritten or erased. (Kind of one-time use)

- **CD-RW(CD-Rewritable):** As the name suggests, this type of CD is used to rewrite the content or erase previous content and again write new content many times.

II. DVD (Digital Video/Versatile Disc): A DVD is the same as a CD but with some more features. A DVD comes in single and dual-layer formats. It has much greater storage capacity in comparison to CD. The storage capacity of a DVD with one-sided single layer is – 4.7 GB, one-sided double layer – 8.5 GB, double-sided single layer – 9.4 GB, and double-sided double layer – 17 GB. There are also some types in DVDs, which are :

- **DVD-ROM:** In this type, the contents of the DVD cannot be written on or erased by the user. DVD ROM is used for applications and database for distributing them in large amounts.

- **DVD-R / DVD+R:** DVD-R (DVD minus R) and DVD+R (DVD plus R) are two different kinds of discs and they are once recordable format. Also, they have no difference virtually.

- **DVD-RW / DVD+RW:** This is a kind of rewritable disc and it allows up to 1,000 rewrites.

- **DVD-RAM:** DVD RAM is accessed like a hard disk. It provides high data security and storage capacity. This is a kind of rewritable disc and it allows up to 1,00,000 rewrites.

III. Hard Disk: An hard disk is a non-volatile storage device that uses its read/write heads to store digital data on a magnetic surface of a rigid plate. It is generally 3.5 inches in size for desktops and 2.5 inches in size for laptops. A hard disk can be classified further into 3 types, which are:

- **Internal Hard Disk:** It has a common storage capacity stated as GB or TB. A system case or cabinet is the place where it is located. It can perform faster operations and its storage is fixed. It is mainly used to store large data files and programs.

- **Internal Cartridges:** The Internal hard disk can't be removed from the system cabinet easily. To resolve this problem Internal Cartridges are introduced. So, Internal cartridges are easy to remove CDs. It has a storage capacity of 2 GB to 160 GB. It is used as an alternative to an internal hard disk.

- **Hard Disk Packs:** It is used by organizations such as banks, and government sector organizations to store large amounts of data. It has a storage capacity of a range of PB(Peta Bytes).

Hardware Components

Some important hardware devices known as the internal components are discussed below:

1. CPU (Central Processing Unit)

The CPU is also known as the heart of the computer. It consists of three units, generally known as the control unit, Arithmetic Logical Unit (ALU), and the memory unit. Below is the block diagram of the CPU is given:
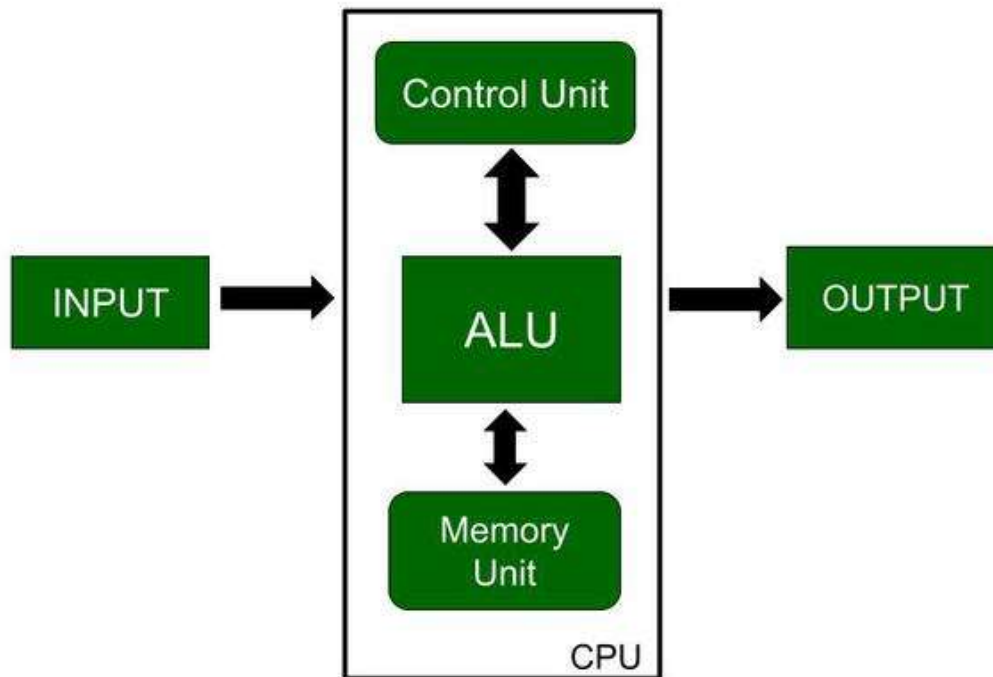
As shown in the diagram input is given to the CPU through input devices. This input goes to memory and the control unit gets instructions from memory. The control unit now decides what to do with the input or instructions and transfers it to ALU. Now, ALU performs various operations like addition, subtraction, multiplication, division, logical operations, etc. After that, the final result gets stored in memory and finally passed to output devices to give the output. So, this is how the CPU works.

2. Motherboard

It is the main circuit board inside a computer, and it contains most of the electronic components together. All the components of the computer are directly or indirectly connected to the motherboard. It includes RAM slots, controllers, system chipsets, etc.

3. RAM (Random Access Memory)

It is also known as temporary or volatile memory. It holds the program and data, which are currently in process or processing. All the data is erased as soon as the computer is turned off or in case of a power failure. Data stored in this memory can be changed. There are two types of RAM: -

1. **SRAM (Static RAM):** SRAM basically consists of a flip-flop using a transistor or Mosfet (MOS). It is fast and has less access time. In this refreshing circuits are not required. But it is costly and requires more space. For e.g. cache memory.

2. **DRAM (Dynamic RAM):** DRAM consists of capacitors and the data is stored in the form of capacitors. Capacitors charge when data is 1 and don't charge if data is 0. It requires refreshing circuits, as leakage of current in the capacitor can occur, so they need to be refreshed to the data. It is slower and has a higher access time. It is cheaper in comparison with SRAM. For e.g. Main memory.

4. Video Graphics Array Port

A video input commonly used on computer monitors is called a video graphics array (VGA) port. Verifying that there isn't a loose connection, a damaged cable, or a broken display is one step in troubleshooting a VGA port. Compressed air can also be sprayed inside the VGA port by a computer expert to make sure it's dust-free.

5. Power Supply

All of a computer system's parts are powered by a power source. Typically, a power cord is used to connect a computer tower to an electrical outlet. By turning off the computer, unplugging and separating the power supply cord, or trying a different cord or socket, a technician can diagnose the power supply.

6. Cooling Fan

A computer's system to prevent overheating uses cooling fans. To aid customers who use their computers intensively, such as when streaming video or playing games, many computers contain more than one cooling fan. If a user detects their computer overheating, a computer expert might need to repair the cooling fan. The blades may be examined for any damage and cleared of any foreign objects. A technician's standard method of troubleshooting may involve replacing computer fans.

7. Hard Drive

On a computer system, files, programs, and other types of information are stored on hard drives, which are data storage devices. They utilise hard drives, which are magnetically coated discs used to store digital versions of information. A computer technician can suspect a corrupt hard disk when a hard drive dies.

Relationship Between Computer Hardware and Software

- Both the Hardware and software are mutually dependent on each other. Each should function properly so that the computer produces an output.

- Software utilization can not be done without supporting of the hardware.

- Relevant software should be loaded into the hardware to get the latest software.

- Hardware is a one-time expense while software is not.

- Software development is very expensive while hardware cant be developed if in use once.

- Many software applications and their sub-applications can be loaded on hardware to run different jobs.

- The software acts as an interface between the user and the hardware.

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