Lesson 2 / Computer System

At the end of the lesson the students should be able to:

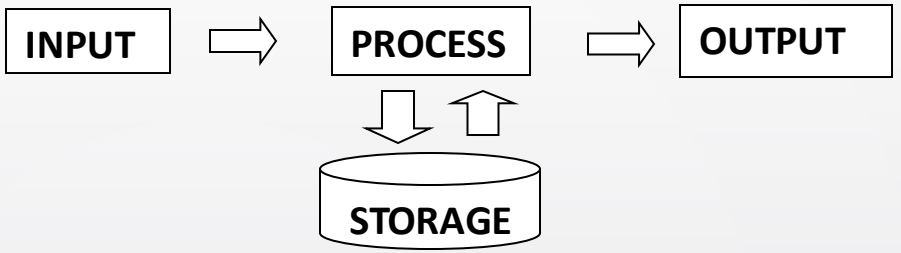
a. Identify the different functions of a computer system.

b. Identify the different components of a computer system.

c. Distinguish the different types of operating systems.

d. Explain the different trademarks of a computer system.

A computer system performs a wide range of functions, both hardware and software-based, to process and manage information. The basic functions of a computer system include:



- **Input:** The computer system receives data and instructions from various input devices, such as keyboards, mouse, scanners, and microphones.
- **Processing:** The central processing unit (CPU) of the computer processes data using arithmetic and logic operations as directed by the software. It performs calculations, makes decisions, and executes instructions.
- **Storage:** The computer system stores data and programs in various types of memory, such as RAM (Random Access Memory) and storage devices like hard drives or solid-state drives (SSDs).
- **Output:** Processed information is presented to the user through output devices such as monitors, printers, speakers, and projectors.
- These functions collectively enable computers to perform a diverse range of tasks and have become an integral part of various aspects of modern life, from personal use to business, research, education, and beyond.

A computer system is composed of various hardware and software components that work together to perform tasks and process information. These components can be broadly categorized into two main categories: hardware and software.

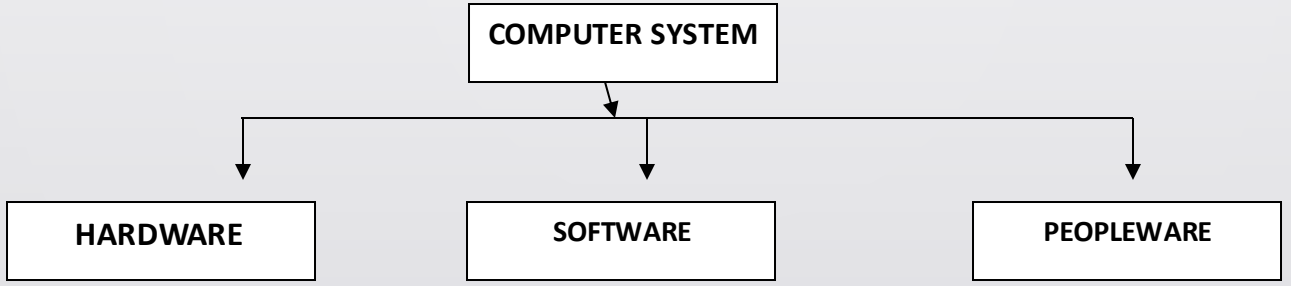
Computer System

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

COMPUTER SYSTEM = HARDWARE + SOFTWARE + PEOPLEWARE

A computer system is made up of three major components:

Hardware, Software and Peopleware. The physical units of a computer system excluding the third component), constitute its hardware. Hardware consists of mechanical, electrical and electronic parts of the system. Sets of programmed instructions constitute the software. Peopleware is the people element in the system.



HARDWARE

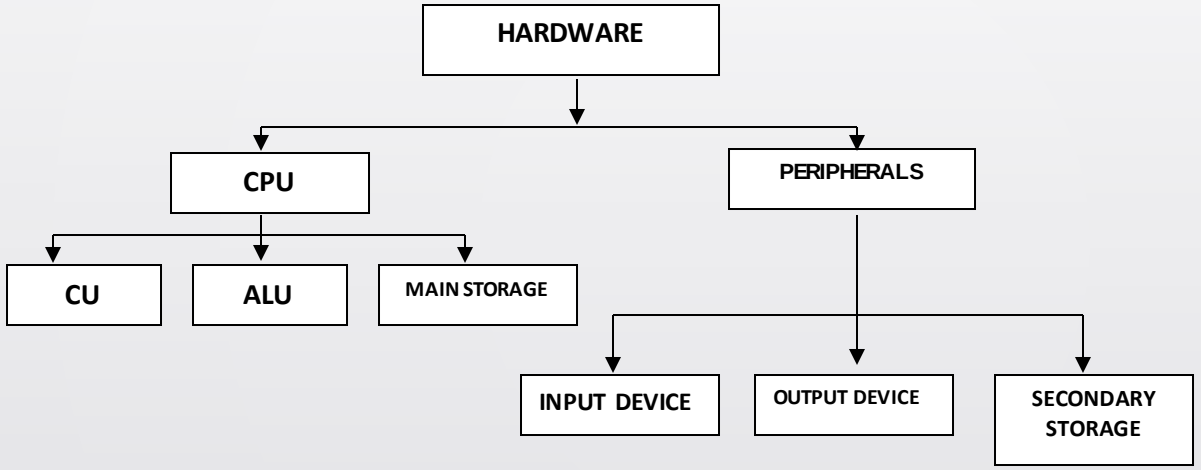
A computer, like human brain, receives data and instructions, stores them and processes the data according to the instructions given to it. It receives data from input devices, stores them in memory and displays them through an output device. The physical devices that make up a computer are referred to as **hardware**. Computer hardware can be broadly' classified into two: ***CPU*** and ***peripherals***. The **CPU** is perhaps the most important part of a computer. The other hardware pieces like input devices, output devices, etc. are called **peripherals**.

1. **Central Processing Unit (CPU)**

- CPU is the brain of a computer. It has an arithmetic logic unit (ALU) to perform arithmetical and logical operations. It has a control unit to co-ordinate the activities of the CPU and main memory for primary storage.

2. COMPUTER PERIPHERALS

- The input/output and storage devices surround the central processing unit (CPU). Hence, they are called the **peripheral devices**. They are usually the electromechanical devices connected to the CPU that exchange data and programs with the CPU. The users interact with the CPU through these devices.


HARDWARE
CPU
PERIPHERALS
CU
ALU
MAIN STORAGE
INPUT DEVICE
OUTPUT DEVICE
SECONDARY STORAGE

Hardware Components:

1. **Central Processing Unit (CPU):** The CPU is the "brain" of the computer that executes instructions and performs calculations. It consists of an arithmetic logic unit (ALU) for mathematical and logical operations, and a control unit that manages the execution of instructions.
2. **Memory:**

Primary Memory (RAM): Random Access Memory (RAM) provides temporary storage for data and program instructions that the CPU is currently using. It allows for fast data access but is volatile (loses data when power is turned off).

Secondary Memory: This includes storage devices like hard drives, solid-state drives, and optical drives that provide long-term storage for data even when the computer is turned off.

3. **Input Devices:**

Keyboard: Used for entering text and commands.

Mouse: Used for pointing and clicking on graphical interfaces.

Touchscreen: Allows users to interact directly with the screen using touch gestures.

Scanners, Cameras, Microphones: Capture various types of input, such as images, audio, and video.

4. **Output Devices:**

Monitor/Display: Presents visual output to the user.

Printer: Produces hard copies of documents and images.

Speakers: Provide audio output.

5. **Storage Devices:** Apart from primary and secondary memory, other storage devices like USB drives, memory cards, and external hard drives are used to store and transfer data.
6. **Motherboard:** The main circuit board that connects and coordinates various hardware components.
7. **Power Supply Unit (PSU):** Supplies power to the computer components.
8. **Cooling System:** Fans and heat sinks that prevent the components from overheating.

- **Software**

- Computer needs to be given instructions to perform any task. A set of instructions for a specific task is termed a routine and a complete set of instructions to execute a related set of tasks is a **program**.

- **Software**, also called a **program**, consists of a series of related instructions, organized for a common purpose, that tells the computer what tasks to perform and how to perform them. You interact with a program through its user interface. The user interface controls how you enter data and instructions and how information is displayed on the screen. Software today often has a graphical user interface. With a **graphical user interface** (**GUI) (**pronounced as gooey), you interact with the software using text, graphics, and visual images such as icons. An ***icon*** is a miniature image that represents a program, an instruction, or some other object. You can use the mouse to select icons that perform operations such as starting a program. Computer programs or software can be divided into two major categories: ***systems software and applications software***.

Software Components:

1. **Operating System (OS):** Manages hardware and software resources, provides a user interface, and enables the execution of programs.

2. **System Software:** Software that supports the functioning of the computer, including device drivers, utilities, and libraries.

3. **Application Software:** Programs designed to perform specific tasks or applications, such as word processors, web browsers, and photo editors.

4. **Programming Languages:** Tools for writing software programs, including high-level languages like Python, Java, C++, and more.

5. **Utilities:** Software tools that assist in managing and maintaining the computer, such as disk cleanup, antivirus, and backup software.

6. **User Interface:** The graphical or textual interface that allows users to interact with the computer and its software.

Operating System - (OS) is software that acts as an intermediary between computer hardware and software applications. It provides a platform for managing and controlling various hardware components, facilitating communication between software programs and hardware devices, and ensuring efficient and secure use of computer resources.

- Common examples of operating systems include:
- **Microsoft Windows:** A widely used operating system for personal computers and servers.
- **macOS:** The operating system developed by Apple for their Macintosh computers.
- **Linux:** An open-source Unix-like operating system kernel that forms the basis of various Linux distributions (distros).
- **Android:** An operating system based on the Linux kernel, primarily designed for mobile devices.
- **iOS:** Apple's mobile operating system used in iPhones and iPads.
- Operating systems play a crucial role in enabling users and software to interact with computer hardware effectively and efficiently. They come in various types, each designed for specific hardware platforms or use cases.

Here are some common distinctions among different types of operating systems:

Single-user OS expects to deal with one set of input devices those that can be controlled by one user at a time

Multiuser OS allows a single, centralized computer to deal with simultaneous input, output and processing request from many users.

Server OS provides tools for managing distributed networks, e-mails servers, and Web hosting sites.

Desktop OS is designed for a desktop or notebook personal computer.

Handheld OS is designed for devices, such as smart phones and tablets computer.

These components work together to create a functional computing environment. Here are the main "trademarks" or components of a computer system:

1. **Hardware:** This refers to the physical components of a computer system. It includes devices such as the central processing unit (CPU), memory modules, storage devices (hard drives, SSDs), input/output devices (keyboard, mouse, monitor), graphics cards, network interfaces, and more. Hardware components are the tangible parts that you can see and touch.

2. **Software:** Software consists of the programs, data, and instructions that tell the hardware how to perform specific tasks. It includes the operating system, applications, utilities, and programming languages. Software can be categorized into system software (e.g., operating systems) and application software (e.g., word processors, web browsers).

3. **Operating System (OS):** The operating system is a critical piece of software that manages and controls the hardware resources of a computer system. It provides a user interface, handles process management, memory management, file system management, and device communication.

4. **Data:** Data refers to the raw information that is processed and manipulated by the computer system. It can include text, numbers, images, audio, video, and other types of information. Data is stored in various formats and is used by software to perform tasks and produce meaningful output.

5. **Input/Output (I/O):** Input devices, such as keyboards and mice, allow users to provide instructions or data to the computer. Output devices, such as monitors and printers, display or produce results generated by the computer.

6. Memory: Memory refers to the storage areas that hold data, instructions, and programs that the CPU is actively using. There are different types of memory in a computer, including RAM (Random Access Memory) for temporary storage and cache memory for quick data access by the CPU.

7. **Processor (CPU):** The central processing unit is the "brain" of the computer. It executes instructions from software programs, performs calculations, and manages data movement between different parts of the computer system.

8. **Storage Devices:** These devices provide long-term storage for data and programs. They include hard disk drives (HDDs), solid-state drives (SSDs), optical drives (CD/DVD), and removable storage devices (USB drives, memory cards).

9. **Network Connectivity:** Network components allow computers to communicate with each other over local or global networks. This enables data sharing, communication, and remote access.

10. **Peripherals:** These are additional devices connected to the computer system, such as printers, scanners, webcams, and external hard drives. Peripherals expand the capabilities of the computer for specific tasks.

These trademarks, or components, collectively work together to create a functional computer system capable of processing data, running software applications, and performing various tasks. Each component plays a unique role in ensuring the proper functioning of the overall system.