Unit I

FUNDAMENTALS OF COMPUTER

What is Computer?

A computer is a programmable electronic device that processes and stores data based on a set of instructions. It takes raw data as **input**, processes it, and produces meaningful information as **output**.

Basic Operations

Computers perform five fundamental operations to function:

- **Inputting:** The process of entering data and instructions into the computer.
- **Processing:** Performing calculations and operations on the data to transform it.
- **Outputting:** Presenting the results of the processing to the user.
- **Storing:** Saving data and instructions for future use.
- **Controlling:** Managing and coordinating all the other operations.

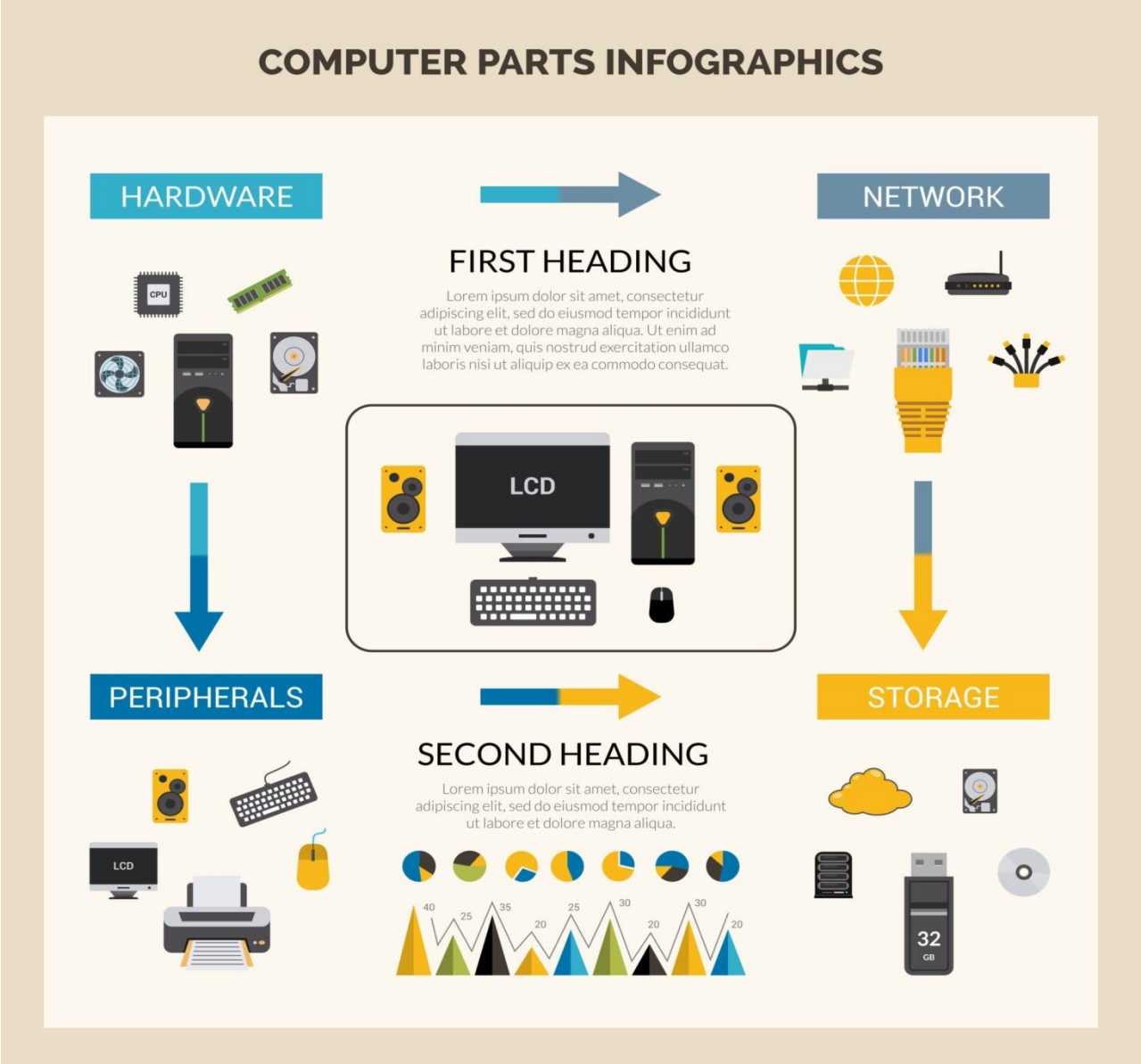
Components of a Computer

A computer system consists of two main parts: **hardware** and **software**.

Computer Hardware

Hardware refers to the **physical, tangible parts** of a computer that you can see and touch.

- **Input Devices:** Used to enter data and instructions. Examples include a **keyboard**, **mouse**, and **scanner**.
- **Output Devices:** Used to display or provide the processed results. Examples include a **monitor**, **printer**, and **speakers**.
- **Processing Devices:** The "brain" of the computer, which executes instructions. The primary component is the **Central Processing Unit (CPU)**.
- **Storage Devices:** Used to store data. This includes both **primary storage** (like **RAM**, which is temporary) and **secondary storage** (like a **Hard Disk Drive** or **SSD**, which is permanent).



Computer Software

Software is the set of **intangible instructions, data, or programs** that tell the hardware what to do.

- **System Software:** Manages the computer's basic functions and hardware. The most important example is the **operating system** (e.g., Windows, macOS, Linux).
- **Application Software:** Programs designed for specific user tasks, such as **Microsoft Word** for writing documents or **Google Chrome** for web browsing.

Characteristics of a Computer

Computers are defined by their impressive qualities:

- **Speed:** They can perform tasks and calculations at incredibly high speeds, far beyond human capability.

- **Accuracy:** They perform operations with near-perfect precision, with errors typically resulting from incorrect human input ("garbage in, garbage out").
- **Diligence:** A computer can work continuously for long periods without fatigue, loss of concentration, or making mistakes.
- **Versatility:** They can perform a wide range of different tasks, from scientific research to playing games.
- **Reliability:** When well-maintained, computers provide consistent and dependable performance.
- **Memory:** They have a large storage capacity to hold vast amounts of data and instructions for later retrieval.

Types of Computers and Their Applications

Computers are categorized by their size, power, and purpose.

- **Supercomputers:** The fastest and most expensive computers, used for complex tasks like weather forecasting and scientific research.
- **Mainframe Computers:** Large, powerful computers used by big organizations for handling massive amounts of data and processing transactions (e.g., in banks and large corporations).
- **Minicomputers:** Mid-sized computers that are less powerful than mainframes but can support multiple users simultaneously.
- **Microcomputers:** The most common type, also known as **Personal Computers (PCs)**, designed for individual use. Examples include **desktops**, **laptops**, and **smartphones**.

Input Devices

Input devices are hardware components that allow users to send data, commands, and other information into a computer. They act as the "listeners" of the system.

- **Keyboard:** The primary text entry device, used to type letters, numbers, and symbols, as well as to execute commands.
- **Mouse:** A pointing device used to control the cursor on the screen. It allows for selecting, clicking, dragging, and interacting with on-screen objects.
- **Scanner:** A device that captures an image of a physical document, photo, or object and converts it into a digital format.
- **Microphone:** Converts sound waves into an electrical signal, allowing for the input of audio data, such as voice commands or recordings.
- **Touchpad:** A flat, touch-sensitive surface found on laptops that functions as a mouse, allowing you to control the cursor by moving your finger.
- **Touch Screen:** A display screen that can detect and respond to touch. It acts as both an input and output device, allowing direct interaction with the displayed content.
- **Light Pen:** An older type of pointing device that uses a light-sensitive sensor to draw or select objects directly on the screen, primarily used with CRT (Cathode Ray Tube) monitors.
- **Joystick:** A hand-held lever used to control the movement or actions of an on-screen object, most commonly used in gaming and flight simulators.

- **Stylus:** A pen-like tool used for interacting with touchscreens, offering more precision than a finger, especially for drawing or taking notes.

Output Devices

Output devices are hardware components that receive processed data from the computer and present it to the user in a human-perceptible format, such as text, images, or sound. They are the "speakers" of the system.

- **Monitor:** The most common visual output device. It displays text, graphics, and video on a screen, allowing you to see the results of your computer's processing.
- **Printer:** A device that converts digital data into a physical, hard copy, typically on paper.
- **Speaker:** Converts electrical signals into sound waves, allowing the user to hear audio from the computer.
- **Screen Image Projector:** A device that projects an enlarged image or video onto a large screen or surface, used for presentations and large-scale viewing.

A **storage device** is any computing hardware that's used to store, port, and extract data files and objects. It holds and saves information both temporarily and permanently. There are two main types of software: **system software** and **application software**. System software manages the computer's hardware, while application software helps users perform specific tasks.

Storage Devices

Storage devices can be categorized by how they store data. Here are three common types:

- **Hard Disk Drive (HDD):** An HDD is a traditional storage device that uses a spinning platter and a read/write head to store and retrieve data magnetically. . It's known for having a large storage capacity at a relatively low cost, making it ideal for storing operating systems, applications, and large files. However, because it has moving parts, it's slower and more susceptible to damage than other modern storage devices.
- **Compact Disc (CD) & Digital Versatile Disc (DVD):** These are **optical storage devices** that use a laser to read data from a spinning disc. Data is encoded as a series of tiny pits and lands on the disc's surface.
    - A **CD** was initially designed for audio but can also store data (CD-ROM). A standard CD has a storage capacity of up to 700 MB.
    - A **DVD** is a more advanced version with a significantly higher storage capacity, typically ranging from 4.7 GB to 17 GB. It can store more data because its laser uses a shorter wavelength, allowing for smaller pits and more closely spaced tracks.
    - Both CDs and DVDs have largely been replaced by modern storage like flash drives and online streaming services.
- **Mass Storage Devices:** This is a broad term for any device capable of storing a large amount of data. This includes **HDDs**, **Solid-State Drives (SSDs)**, **USB flash drives**, and **memory cards**. SSDs are a modern alternative to HDDs, using flash memory to store data electronically. Because they

have no moving parts, they are faster, more durable, and quieter than HDDs, but they are also more expensive.

Software Concepts & Types

Software is a set of instructions, or programs, that tells a computer what to do. It's the non-physical component that makes a computer system functional. There are two main types of software:

- **System Software:** This software is the foundation of a computer system. It manages and controls the computer's hardware components and provides a platform for other software to run. It acts as an intermediary between the user, application software, and the computer's hardware. Examples include:
    - **Operating Systems (OS):** The most crucial type of system software. It manages all the hardware and software resources of the computer. Examples are **Windows**, **macOS**, and **Linux**.
    - **Device Drivers:** These are programs that allow the operating system to communicate with hardware devices like printers and graphics cards.
    - **Utility Software:** This helps to maintain, analyze, and optimize the computer. Examples include disk cleaners and antivirus programs.
- **Application Software:** Also known as **apps**, this software is designed for end-users to perform specific tasks. It cannot run without a system software platform. Examples include:
    - **Productivity Software:** Word processors (**Microsoft Word**), spreadsheets (**Excel**), and presentation software (**PowerPoint**).
    - **Entertainment Software:** Video games, media players like **VLC**, and streaming apps like **Netflix**.
    - **Web Browsers: Google Chrome**, **Firefox**, and **Safari**.
    - **Specialized Software:** Graphic design tools (**Adobe Photoshop**), video editors (**Adobe Premiere Pro**), and accounting software