Department of biology

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((Computer Science))

Stage (1)

LEC- ((2))

Computer Components

By

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Lecture 2: Computer Components

Hardware Parts, I/O Units, Memory Types, CPU Basics, and Personal Computers

Learning Objectives

- Identify the main portions of a computer system (system unit and peripherals).
- Describe core hardware parts: motherboard, CPU, memory, storage, and expansion cards.
- Classify input and output units with examples.
- Compare memory types (RAM, ROM, cache, secondary storage).
- Explain basic CPU components (ALU, Control Unit, registers) and their roles.
- Summarize personal computer features and common types.

Key Terms

Term	Meaning (short)
System Unit	The main case that houses core components (CPU, memory, storage).
Motherboard	Main circuit board connecting CPU, memory, storage, and devices.
RAM	Volatile main memory used while programs run.
ROM	Non-volatile memory storing firmware/boot instructions.
Cache	Small, very fast memory close to the CPU.
ALU	Arithmetic Logic Unit: performs calculations and logic operations.
Control Unit	Directs CPU operations and instruction execution.
Register	Very small, ultra-fast storage inside the CPU.

Input
Receives data and commands from users or sensors

Processing
CPU and memory work on instructions and data

Output
Shows or prints results

Storage
Keeps programs and files

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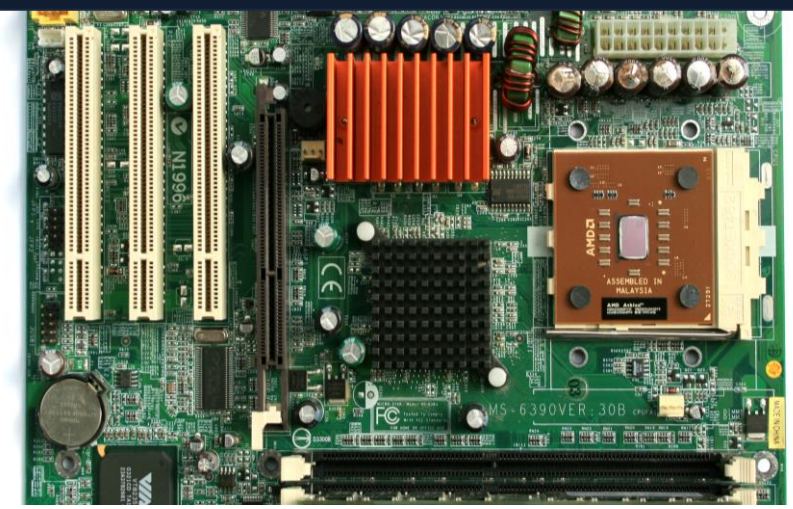
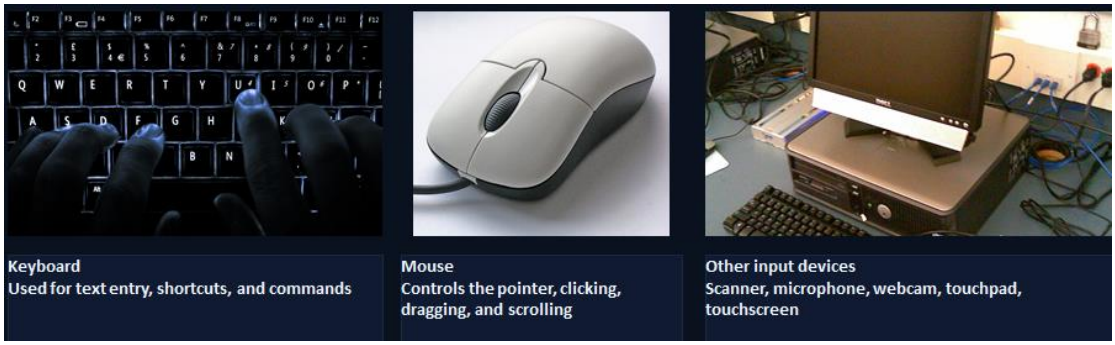
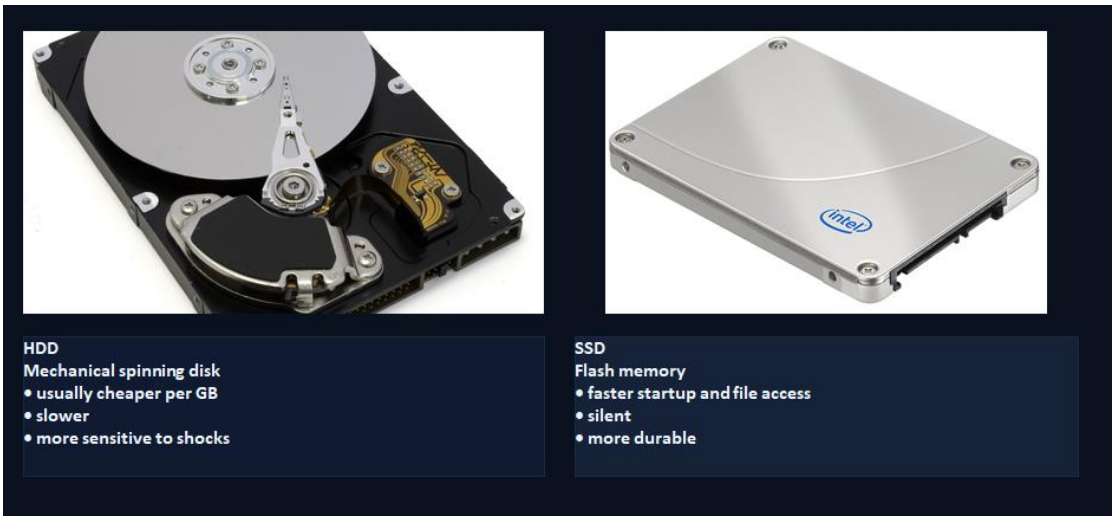


Common hardware parts: • **Motherboard: main circuit board** • **CPU: executes instructions** • **RAM: temporary working memory** • **Storage drive: HDD / SSD** • **Power supply: provides electricity** • **Ports and connectors: link peripherals**





1. Computer Portions

A computer system is often described as two major portions:

- **System unit**: the case that contains internal hardware (CPU, memory, storage, motherboard).
- **External devices (peripherals)**: input, output, and communication devices connected to the system unit.

2. Hardware Parts (Inside the system unit)

Core components

- Motherboard: main board that provides connectors (slots, sockets, ports).
- CPU: executes instructions; the 'brain' of the computer.
- Main memory (RAM): temporary working area for running programs.
- Storage (SSD/HDD): long-term data storage.
- Power supply: converts AC to DC and powers components.

Optional / expansion components

- GPU (graphics card) for display and parallel processing
- Sound card for enhanced audio
- Network interface card (NIC) for wired networking
- Cooling system (fans, heat sinks) to manage temperature

3. I/O Units (Input and Output)

I/O units enable interaction between the user and the computer.

Input units

- Keyboard, mouse, touch screen
- Scanner, camera
- Microphone
- Sensors (IoT devices)

Output units

- Monitor/projector
- Printer/plotter
- Speakers/headphones
- Haptic devices (vibration feedback)

Input vs. Output (table)

Category	Purpose	Examples
Input	Send data to the computer	Keyboard, mouse, scanner
Output	Present results to the user	Monitor, printer, speakers
Both (I/O)	Send and receive data	Touchscreen, network card, USB storage

4. Memory Types

Memory can be categorized by speed, location, and whether it keeps data without power (non-volatile).

Primary memory (main/internal)

- Registers (fastest, inside CPU)
- Cache (L1/L2/L3) – very fast, reduces access time to RAM
- RAM – main working memory (volatile)
- ROM – stores firmware/boot code (non-volatile)

Secondary memory (storage)

- SSD (fast, no moving parts)
- HDD (large capacity, mechanical)
- USB flash drives, memory cards
- Cloud storage (online)

Rule of thumb

Faster memory is usually smaller and more expensive; slower storage is larger and cheaper.

5. Basic CPU Components

The CPU coordinates and performs processing through three main parts:

- **ALU (Arithmetic Logic Unit):** performs arithmetic (add, subtract) and logic (AND, OR, compare).
- **Control Unit (CU):** fetches and decodes instructions; controls data flow between CPU, memory, and devices.
- **Registers:** tiny storage locations holding immediate data and instruction addresses during execution.

The machine cycle (simplified)

1. Fetch instruction from memory
2. Decode instruction
3. Execute instruction (ALU/CU)
4. Store result

6. Personal Computer (Features and Types)

Typical features

- Designed for one user at a time
- General-purpose (documents, browsing, multimedia, coding)
- Uses standard OS (Windows/macOS/Linux)
- Connects to networks and peripherals

Common PC types

- Desktop PC
- Laptop/Notebook
- 2-in-1 (convertible)
- Workstation (high performance)
- Mini PC / Small-form-factor PC