ALMUSTAQBAL UNIVERSITY
Department of Radiology Technologies

computer components lecture two

by Hasan Faez

introduction

Computers are powerful machines that have revolutionized modern life. To understand how they work, it is essential to explore their components and how these components interact to perform complex tasks. In this lecture, we will delve into the various parts of a computer, including its structure, hardware components, input/output units, and memory types.

1. Computer Portions

The computer can be divided into three main portions, each playing a critical role:

a. Central Processing Unit (CPU):

- Known as the brain of the computer.
- Responsible for executing instructions and processing data.
- Composed of three key units:
- Control Unit (CU): Directs operations and manages the flow of data.
- Arithmetic Logic Unit (ALU): Performs arithmetic and logical operations.
- Registers: Temporary storage for quick access to data and instructions.

b. Input and Output (I/O) Units:

- **These units serve as the communication bridge between the computer and the external world.**
- **Input units (e.g., keyboards, mice) send data to the computer.**
- **Output units (e.g., monitors, printers) display processed information.**

c. Memory:

- **Stores data, instructions, and results temporarily or permanently.**
- **Divided into primary memory (RAM/ROM) and secondary storage (hard drives, SSDs).**

.Hardware Parts

Computer hardware refers to the tangible components of a system. These are divided into several categories:

a. Motherboard:

- The main circuit board connecting all hardware components.
- Contains slots for CPU, memory, and peripheral devices.

b. CPU (Processor):

- Handles processing and computations.
- Measured in clock speed (GHz) and number of cores.

c. Storage Devices:

- Hard Disk Drive (HDD): Magnetic storage with larger capacity but slower speed.
- Solid-State Drive (SSD): Faster, more reliable storage based on flash memory.

d. Power Supply Unit (PSU):

- Converts electrical power to the appropriate voltage for computer components.

e. Peripherals:

- Input Devices: Keyboards, mice, scanners, and cameras.
- Output Devices: Monitors, printers, and speakers.

3. Input/Output Units (I/O Units)

Input/Output units facilitate communication between the user and the system.

a. Input Units:

- Accept data and commands from the user. Examples:
- Keyboard: Allows text and command input.
- Mouse: Facilitates point-and-click navigation.
- Microphone: Captures audio.

b. Output Units:

- Display processed results to the user. Examples:
- Monitor: Displays visual output.
- Printer: Produces hard copies of documents.
- Speakers: Produce audio output.

c. Combined I/O Devices:

- Devices that function as both input and output units.

Examples:

- Touchscreen: Acts as both a display and an input device.
- External Hard Drives: Allow data storage and retrieval.

4. Memory Types

Memory is crucial for storing data and instructions. It is categorized into several types based functionality:

a. Primary Memory (Volatile):

1. Random Access Memory (RAM):
   - Temporary storage for active programs and data.
   - Loses data when power is turned off.
2. Cache Memory:
   - Faster memory located inside or near the CPU.
   - Speeds up access to frequently used data.

b. Primary Memory (Non-Volatile):

1. Read-Only Memory (ROM):
   - Permanent storage for essential startup instructions (e.g., BIOS).

c. Secondary Storage (Non-Volatile):

- Used for long-term data storage. Examples include:
- Hard Drives (HDD).
- Solid-State Drives (SSD).
- Optical Disks (CD/DVD).

d. Tertiary Storage:

- Used for backups or archival purposes, such as tape drives.

e. Virtual Memory:

- A section of the hard drive used as RAM when physical RAM is insufficient.

- **Secondary Memory:-**

Stores data and programs permanently :its retained after the power is turned off

- 1. Hard drive (HD): A hard disk is part of a unit, often called a "disk drive," "hard drive," or "hard disk drive," that store and provides relatively quick access to large amounts of data on an electromagnetically charged surface or set of surfaces.
- 2. Optical Disk: an optical disc drive (ODD) is a disk drive that uses laser light as part of the process of reading or writing data to or from optical discs. Some drives can only read from discs, but recent drives are commonly both readers and recorders, also called burners or writers. Compact discs, DVDs, and Blu-ray discs are common types of optical media which can be read and recorded by such drives.

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computer components lecture three

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- Introduction :

Computers are intricate systems made up of hardware and software that work together to perform tasks. This lecture will focus on continuing our exploration of computer components, with emphasis on the basic components of the CPU, different types of computer ports, and personal computers, including their features and various types.

1. Basic CPU Components

The Central Processing Unit (CPU) is the brain of the computer, responsible for executing instructions and managing processes. It comprises several key components that ensure efficient processing:

a. Control Unit (CU):

The control unit (CU) is a component of a computer's central processing unit (CPU) that directs the operation of the processor. A CU typically uses a binary decoder to convert coded instructions into timing and control signals that direct the operation of the other units (memory, arithmetic logic unit and input and output devices, etc.).

Most computer resources are managed by the CU. It directs the flow of data between the CPU and the other devices.

b. Arithmetic Logic Unit (ALU):

What is an arithmetic-logic unit (ALU)?

An arithmetic-logic unit is the part of a central processing unit that carries out arithmetic and logic operations on the operands in computer instruction words.

In some processors, the ALU is divided into two units: an **arithmetic unit (AU) and a logic unit (LU)**. Some processors contain more than one AU -- for example, one for fixed-point operations and another for floating-point operations.

In computer systems, floating-point computations are sometimes done by a floating-point unit (FPU) on a separate chip called a numeric coprocessor.

How does an arithmetic-logic unit work?

Typically, the ALU has direct input and output access to the processor controller, main memory (random access memory or RAM in a personal computer) and input/output devices. Inputs and outputs flow along an electronic path that is called a bus.

The input consists of an instruction word, sometimes called a machine instruction word, that contains an operation code or "opcode," one or more operands and sometimes a format code. The operation code tells the ALU what operation to perform and the operands are used in the operation.

The output consists of a result that is placed in a storage register and settings that indicate whether the operation was performed successfully. If it isn't, some sort of status will be stored in a permanent place that is sometimes called the machine status word.

c. Registers:

- Small, high-speed storage areas within the CPU.
- Temporarily hold data, instructions, and addresses that the CPU needs to access quickly.
- Examples: Accumulator register, instruction register, program counter.

d. Cache Memory:

- A small, high-speed memory located within or very close to the CPU.
- Stores frequently accessed data and instructions to speed up processing.

e. Buses:

- Communication pathways that transfer data between the CPU, memory, and othe components.
- Types:
- Data Bus: Transfers data.
- Address Bus: Carries memory addresses.
- Control Bus: Sends control signals.

2. Computer Ports

Computer ports are physical or virtual connection points that allow peripherals to communicate with the computer system. They serve as the interface for transferring data and power.

a. Types of Ports:

1. USB (Universal Serial Bus):

- Widely used for connecting peripherals like keyboards, mice, and external drives.
- Versions: USB 2.0, USB 3.0, USB-C (faster and reversible).

2. HDMI (High-Definition Multimedia Interface):

- Used to transmit high-definition video and audio.
- Commonly used for connecting monitors, TVs, and projectors.

3. Ethernet Port:

- Used for wired internet connections.
- Offers reliable and high-speed data transmission.

4. Audio Ports:

- Connect headphones, microphones, and speakers.
- Includes 3.5mm jacks and digital audio ports.

5. Display Ports (VGA, DVI, and DisplayPort):

- Connect monitors and projectors.
- VGA (older technology), DVI, and DisplayPort are commonly used for displays.

6. Thunderbolt:

- High-speed port for data, video, and power transfer.
- Often used in advanced computing systems.

3. Personal Computer

A Personal Computer (PC) is a general-purpose computer designed for individual use. PCs are widely used in homes, offices, and schools for tasks ranging from basic word processing to gaming and software development.

a. Components of a Personal Computer:

- Central Processing Unit (CPU): Handles computations and operations.
- Monitor: Displays visual output from the computer.
- Keyboard and Mouse: Input devices for user interaction.
- Storage Devices: Hard drives, SSDs for saving data.
- Motherboard: Connects all components of the PC.

b. Applications of a Personal Computer:

- Internet browsing, email, and social media.
- Document creation (word processors, spreadsheets).
- Media playback (music, videos).
- Gaming, graphic design, and software development.

4- Personal Computer (Features and Types)

a. Features of a Personal Computer:

1. **User-Friendly** Interface:

• Operating systems like Windows, macOS, or Linux provide intuitive interfaces.

2. **Portability**:

• Laptops and tablets allow mobility and flexibility.

3. Expandability:

• Easy to upgrade components like RAM, storage, and graphics cards.

4. Affordability:

• PCs are available at various price points, making them accessible to a wide audience.

5. Connectivity:

• Equipped with Wi-Fi, Bluetooth, and Ethernet for seamless communication.

b. Types of Personal Computers:

1. Desktop Computers:

- Stationary systems designed for home or office use.
- Offer powerful performance and easy upgrade options.

2. Laptops:

- Portable computers with built-in screens, keyboards, and batteries.
- Ideal for students and professionals who require mobility.

3. Tablets:

- Lightweight devices with touchscreens.
- Suited for casual use, such as reading, browsing, or media playback.

4. All-in-One PCs:

- Combines the CPU and monitor in a single unit.
- Saves space and is aesthetically pleasing.

5. Gaming PCs:

- High-performance computers tailored for gaming.
- Equipped with powerful GPUs, advanced cooling systems, and high-speed processors.

6. Workstations:

- Designed for professional tasks like 3D rendering, video editing, and scientific simulations.
- Feature advanced hardware for heavy workloads.

Thank you for listening