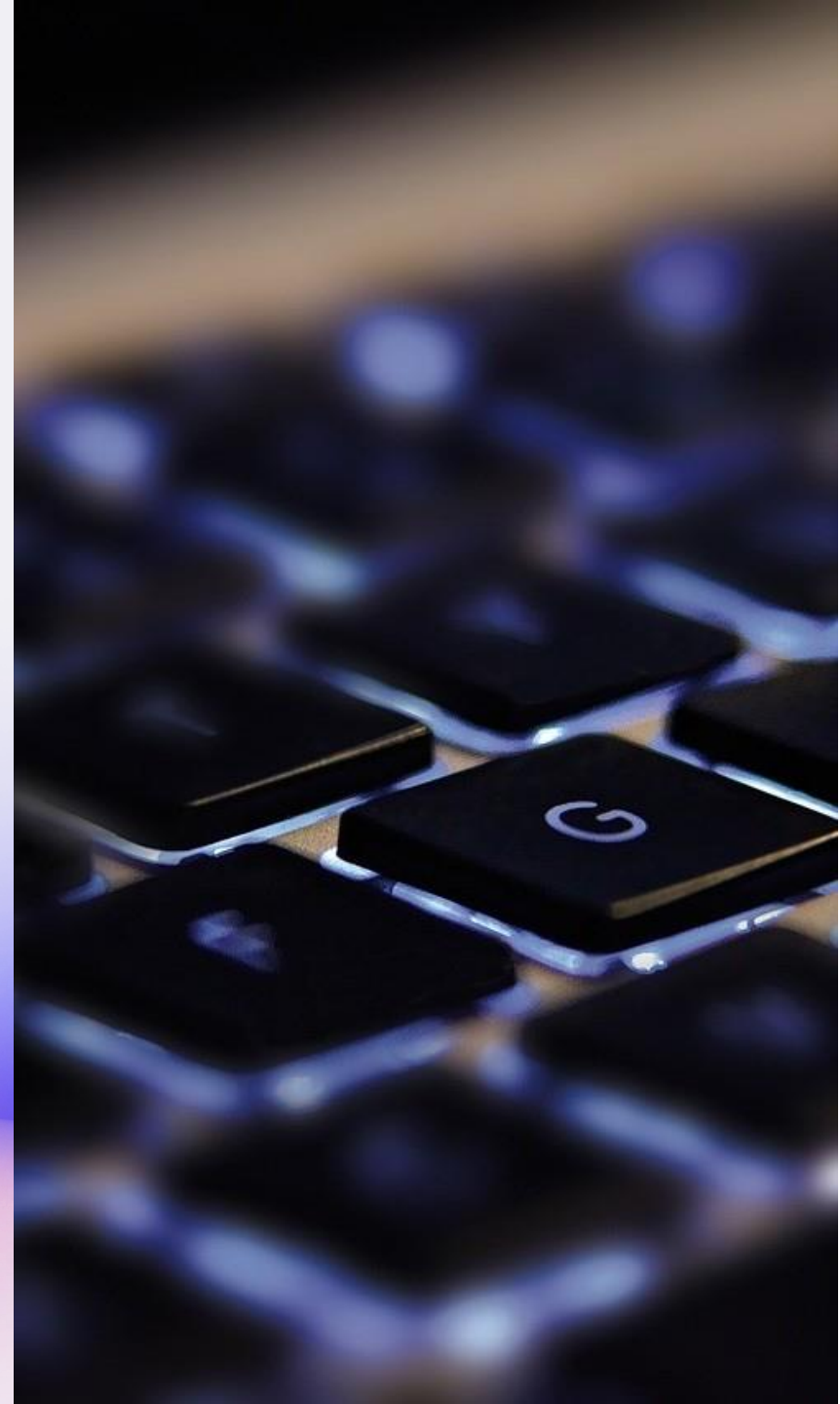# CPT 122 - Introduction to computer Hardware

Module 2 Unit 1 - Introduction to Different Parts of a Computer System

Content

Overview of Computer Hardware Components

The Central Processing Unit (CPU)

➤ Known as the brain of the computer, the CPU executes instructions and processes data.

➤ Key components include the Control Unit (CU), Arithmetic Logic Unit (ALU), and Registers and Cache.

➤ Understanding CPU performance factors like Clock Speed (measured in gigahertz) and Cores is crucial for assessing processing capabilities.

The Motherboard

➤ Serving as the central hub, the motherboard connects all components and peripherals.

➤ Key components on the motherboard include the Chipset, facilitating data flow, and BIOS/UEFI, initializing hardware during booting.

Memory (RAM and ROM)

➤ RAM provides temporary data storage for seamless operation, with DDR4 and DDR5 being prevalent types.

➤ ROM stores essential firmware and system instructions, crucial for system boot-up.

➤ Increased RAM capacity enhances multitasking and performance in memory-intensive activities.

Storage Devices

➤ Hard Disk Drives (HDD) offer large storage capacities, while Solid-State Drives (SSD) provide faster read/write speeds.

➤ Hybrid Drives (SSHD) combine HDD storage capacity with SSD speed.

➤ Interfaces like SATA, NVMe, and M.2 connect storage devices to the motherboard, enhancing data transfer speeds.

Power Supply Unit (PSU)

➤ The PSU converts electrical power for computer components, distributing power efficiently.

➤ Key specifications include Wattage, indicating total power output, and Efficiency.
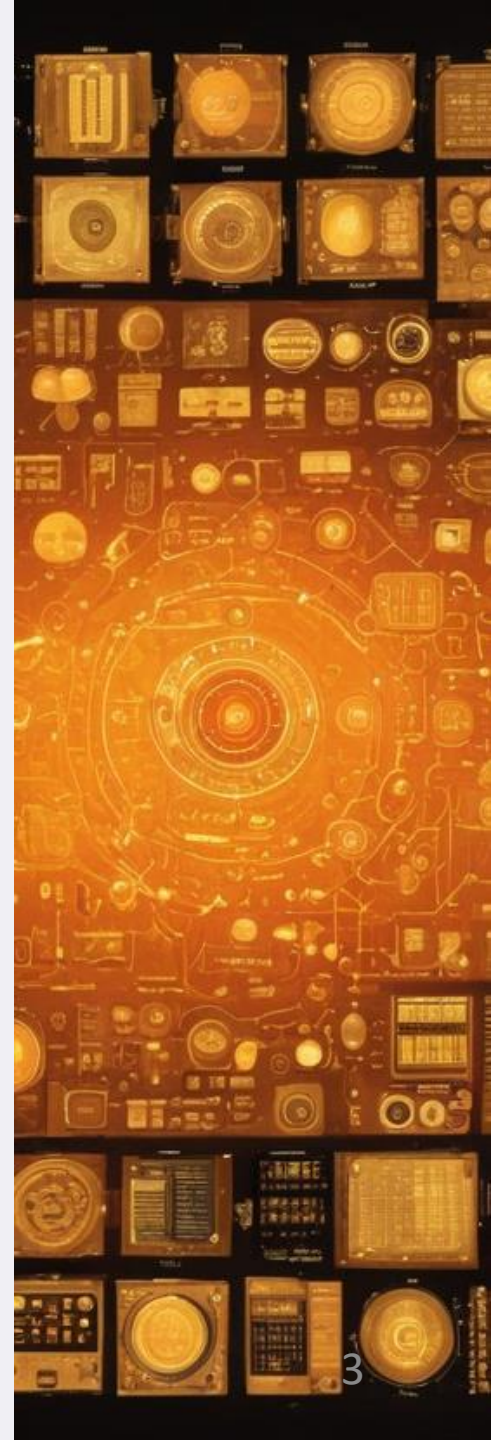
Understanding the Central Processing Unit (CPU)

Introduction to the CPU

➢ The Central Processing Unit (CPU) is often referred to as the brain of the computer.

➢ Responsible for executing instructions and processing data.

Components of the CPU

➢ Control Unit (CU)

➢ Arithmetic Logic Unit (ALU)

➢ Registers and Cache – temporary storage areas holding data needed during processing.

CPU Performance Factors

➢ Clock Speed, measured in gigahertz (GHz),

➢ determines how quickly instructions are processed.

Cores and Threads

➢ Enable handling multiple tasks simultaneously.

➢ Modern CPUs have multiple cores for enhanced performance.

CPU Architecture

➢ Defines the design and instruction set the CPU can execute. Examples include ARM and x86.

➢ Impacts compatibility and performance.
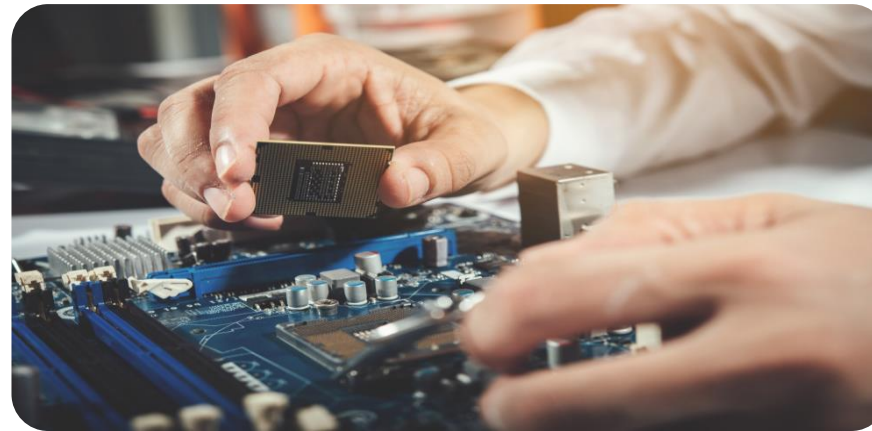
Exploring the Motherboard and Its Components

Chipset

➢ The silicon backbone of the motherboard

   Acts as a communication hub

➢ Facilitates data flow between different hardware components

BIOS/UEFI

➢ Firmware that initializes and tests hardware during the booting process

➢ Provides runtime services for the operating system

Slots

➢ Connectors on the motherboard

➢ Expansion cards like GPUs, sound cards, and network cards can be inserted

➢ Enhances system functionality

Ports

➢ Inputs or connection points where components plug in

➢ Includes USB for peripherals, HDMI for monitors, and Ethernet for network connectivity

Form Factors

➢ The physical size and shape of the

   motherboard Determines the case size it fits

   into.
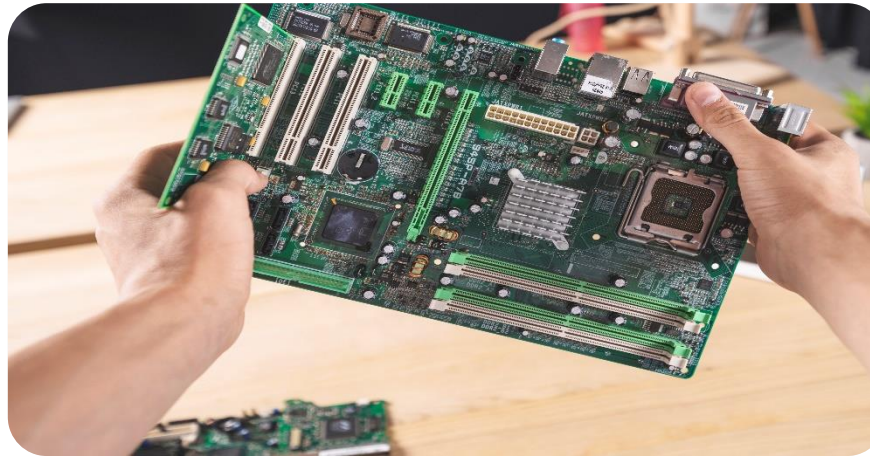
Unveiling the Role of Memory in Computer Systems

RAM (Random Access Memory)

➢ RAM serves as temporary data storage during computer operation, enabling rapid reading and writing of data to support seamless application functioning and system processes.

ROM (Read-Ofily Memory)

➢ ROM stores essential firmware and system instructions that are retained even when the computer is powered off, crucial for booting up the system.

DDR4 and DDR5

➢ Different types of RAM are available, with DDR4 and DDR5 being prevalent.

➢ DDR5 offers superior speeds and performance, enhancing multitasking abilities and boosting performance in memory- intensive activities like gaming and video editing.

Cache

➢ A smaller, faster memory that stores frequently accessed data from the main memory, aiding in quicker data retrieval for the CPU during processing.

Memory Capacity

➢ Increased RAM capacity enhances multitasking abilities and overall system performance, particularly in memory- intensive tasks.
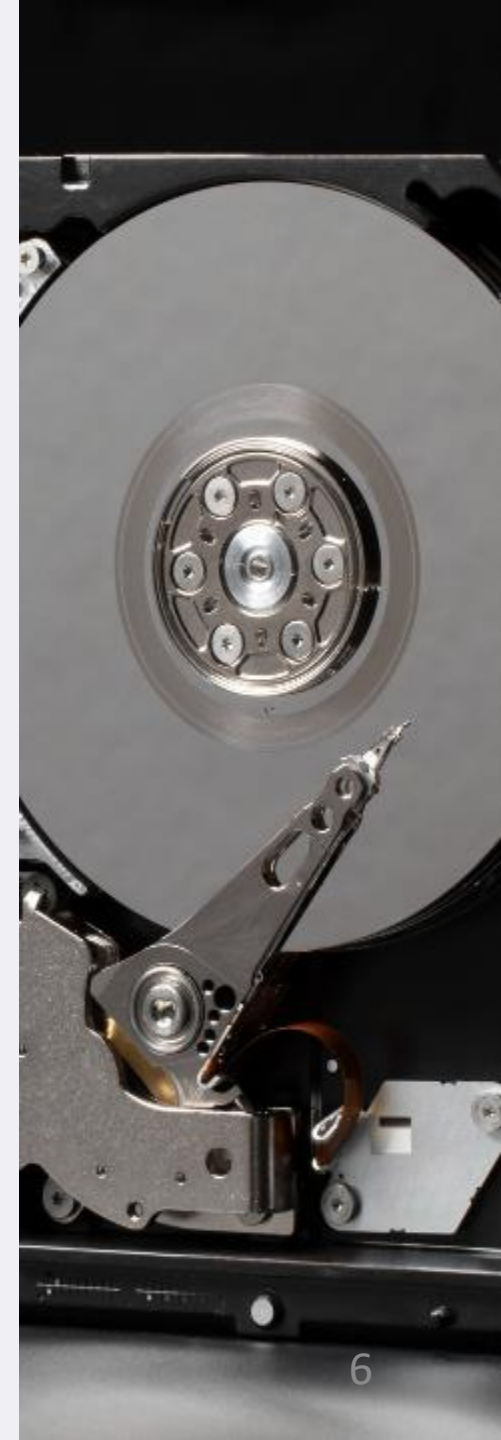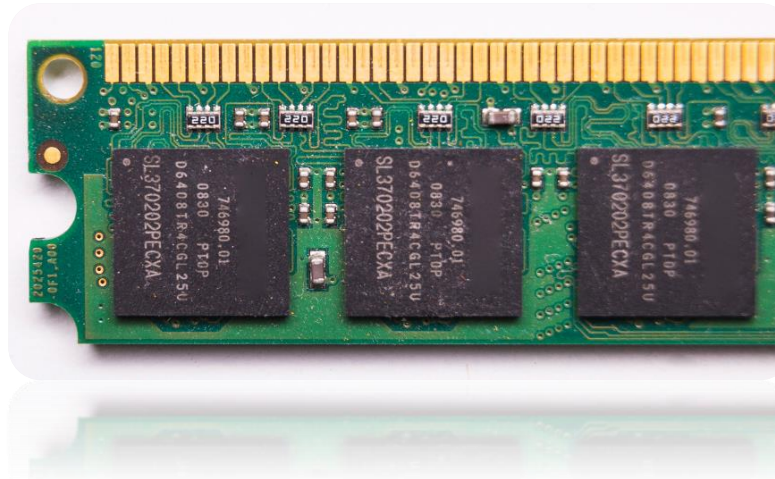
Storage Devices and Their Functions

Hard Disk Drives (HDD)

➢ Traditional storage devices utilizing spinning disks for data read/write operations

➢ Offering large storage capacities at cost-effective rates

Solid-State Drives (SSD)

➢ Modern storage devices employing flash memory for data storage

➢ Delivering faster read/write speeds and enhanced performance compared to HDDs

Storage Devices and Their Functions

Hybrid Drives (SSHD)

➢ Combining the high storage capacity of HDDs with the speed of SSDs

➢ Utilizing solid-state storage to cache frequently accessed data

Storage Interfaces

➢ **SATA (Serial ATA):** Common interface connecting HDDs and SSDs to the motherboard

➢ **NVMe (Non-Volatile Memory Express):** Advanced interface for SSDs, providing higher data transfer speeds by connecting directly to the PCIe bus

➢ **M.2:** Form factor for SSDs compatible with both SATA and NVMe interfaces

Powering Up: The Importance of Power Supply Units

Introduction to Power Supply Units (PSUs)

➤ PSU is a critical component in a computer system.

➤ Responsible for converting electrical power from an outlet into usable power for various hardware components.

Wattage and Power Output

➤ Indicates the total power output available.

➤ Higher wattage necessary for systems with more powerful components.

Efficiency Ratings

➤ Efficiency ratings such as 80 Plus Bronze, Silver, Gold, Platinum, and Titanium.

➤ Higher ratings indicate higher efficiency in power conversion.

Power Distribution

➤ PSU distributes power to essential components like the motherboard, CPU, GPU, and other hardware.

➤ Ensures smooth and reliable operation of the computer system.

Compatibility and Performafice

➤ Ensuring compatibility with the motherboard and providing sufficient power are crucial.

➤ A well-functioning PSU is vital for the overall performance and longevity of a computer system.
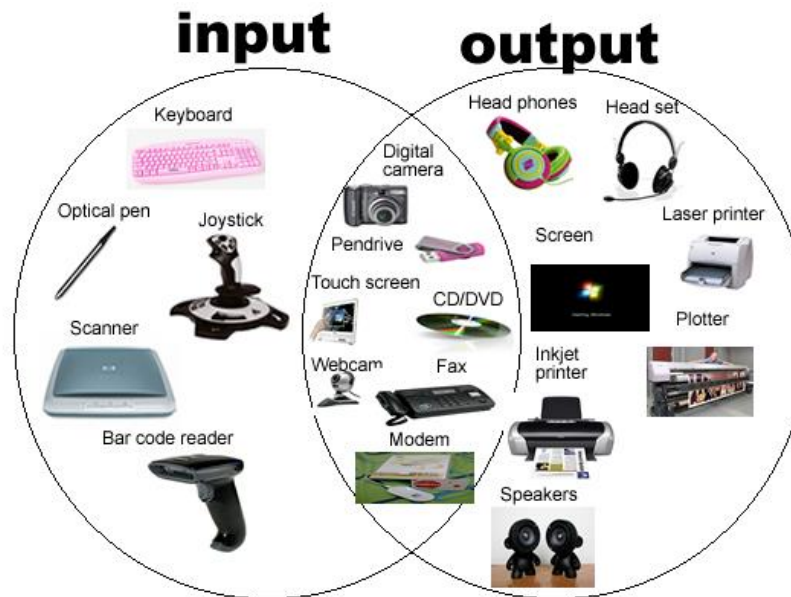
Input and Output Devices

Input Devices

- **Keyboard:** Used for typing text and commands.

- **Mouse**: Enables pointing, clicking, and navigating the user interface.

- **Scanner**: Utilized for digitizing physical documents.

- **Webcam**: Used for capturing video and images.

Combination Devices

- **Touchscreens**: Allow direct interaction with the display.

- **Multifunction Printers**: Combine printing, scanning, copying, and faxing functions.

Output Devices

- **Monitor:** Displays visual output from the computer.

  Printer: Produces physical copies of digital documents.

- **Speakers:** Outputs sound from the computer.

Input and Output Devices

Importance of Input and Output Devices

➢ Input devices enable users to provide data and commands to the computer.

➢ Output devices convey information from the computer to the user.

➢ Combination devices serve both input and output functions, enhancing user interaction with the system.

Key Considerations

➢ Understanding the role of input and output devices is crucial for effective user-computer interaction.

➢ Choosing the right input and output devices can significantly impact user experience and productivity.

➢ Proper maintenance and utilization of these devices are essential for optimal system performance.

Enhancing System Capabilities with Expansion Cards

Graphics Cards (GPUs)

➢ Enhance a computer's ability to render graphics

➢ Crucial for tasks like gaming, video editing, and 3D rendering

Sound Cards

➢ Improve audio output quality

➢ Add advanced audio processing capabilities to the system

Network Interface Cards (NICs)

➢ Provide wired or wireless network connectivity Enable seamless communication

USB Expansion Cards

➢ Add additional USB ports to the computer Expand connectivity options for peripherals and devices

Installing Expansion Cards

➢ Inserting them into the appropriate PCIe slots on the motherboard

➢ Ensuring compatibility and sufficient power supply for optimal performance

black Sapphire Graphic Card