Al-Mustaqbal University / College of Engineering Technology
Department (Communications Technical Engineering)
Class (First)
Subject (Computer) / Code (UOMU0000017)
Lecturer (Dr. Noor AbdAlKarem Mohammedali)
1ˢᵗ term – Lecture No. 2 & Lecture Name (Computer Components)

Computer Components

The world of computers is built on a complex yet fascinating assembly of components that work together to perform intricate tasks, from basic calculations to advanced artificial intelligence. At the core of every computer are several fundamental elements, including the central processing unit (CPU), memory (RAM), storage drives, motherboard, and power supply, each playing a critical role in the system's functionality. Understanding these components and their interactions is essential for anyone looking to delve into computer engineering, upgrade their systems, or gain a better appreciation for the technology that permeates our daily lives. Whether it's the CPU's speed, the RAM's capacity, or the type of storage, every element influences a computer's performance and efficiency, paving the way for innovation and connectivity in our digital world.

♣ Computer Portions

The main components of a computer are often referred to as its "portions." Each part plays a critical role in the overall functionality and performance of the system.

A. Central Processing Unit (CPU)

The CPU, often called the computer's "brain," performs calculations and executes instructions. It processes data and coordinates the activities of all other hardware components.

1. **Cores:**
   Modern CPUs have multiple cores, allowing them to handle several tasks simultaneously.
2. **Clock Speed:**
   Measured in gigahertz (GHz), this indicates how fast the CPU can process instructions.
3. **Cache Memory:**
   This is a small amount of high-speed memory located within the CPU, temporarily storing frequently accessed data for quick retrieval.

Al-Mustaqbal University / College of Engineering Technology
Department (Communications Technical Engineering)
Class (First)
Subject (Computer) / Code (UOMU0000017)
Lecturer (Dr. Noor AbdAlKarem Mohammedali)
1ˢᵗ term – Lecture No. 2 & Lecture Name (Computer Components)

B. Motherboard

The motherboard is the main circuit board that connects all computer components. It provides electrical connections between the CPU, memory, storage, and peripherals.
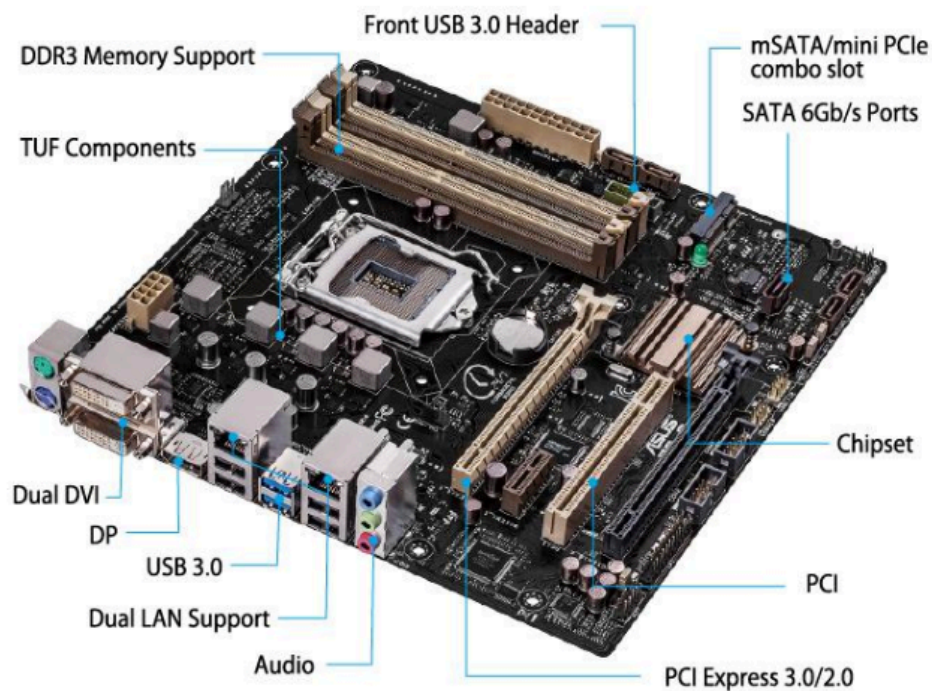
1. **Socket:**
   The CPU socket determines compatibility with specific CPU models.
2. **Chipset:** This controls data flow between the CPU, memory, and other peripherals, affecting system performance and capabilities.
3. **Expansion Slots:**
   Slots such as PCIe allow additional cards (graphics, sound, network) to be added to enhance functionality.

C. Random Access Memory (RAM)

RAM is the computer's short-term memory, storing data currently in use or being processed.

1. **Volatile Memory:**
   RAM loses its data when the power is turned off.

Email (noor.abdulkareem@uomus.edu.iq**)**

Al-Mustaqbal University / College of Engineering Technology
Department (Communications Technical Engineering)
Class (First)
Subject (Computer) / Code (UOMU0000017)
Lecturer (Dr. Noor AbdAlKarem Mohammedali)
1ˢᵗ term – Lecture No. 2 & Lecture Name (Computer Components)

2. **Capacity and Speed:**
   More RAM allows more applications to run simultaneously, while faster RAM improves system responsiveness.
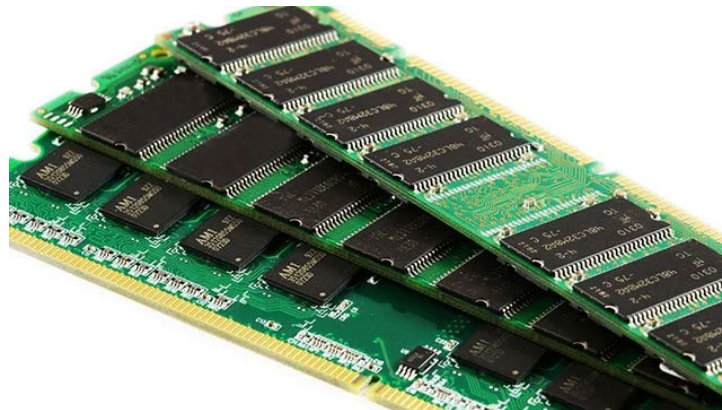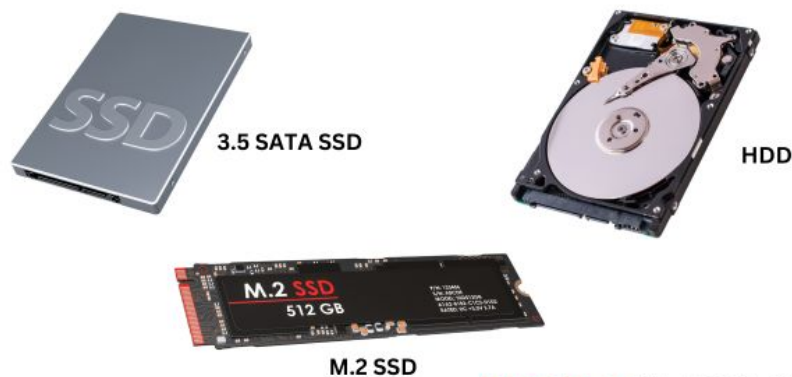

D. Storage Drives

Storage drives retain data and applications even when the computer is off. There are primarily two types:

1. **Hard Disk Drive (HDD):**
   Uses spinning disks to read/write data. Offers large capacity at lower cost but slower performance.
2. **Solid State Drive (SSD):**
   Uses flash memory for faster access times and improved performance, usually at a higher cost per gigabyte.

Al-Mustaqbal University / College of Engineering Technology
Department (Communications Technical Engineering)
Class (First)
Subject (Computer) / Code (UOMU0000017)
Lecturer (Dr. Noor AbdAlKarem Mohammedali)
1ˢᵗ term – Lecture No. 2 & Lecture Name (Computer Components)

E. Power Supply Unit (PSU)

The PSU converts electrical power from an outlet into usable power for the computer's internal components. It distributes power to the motherboard, CPU, storage drives, and other peripherals.

1. **Wattage:** The PSU must provide sufficient wattage to support all components.
2. **Efficiency Rating:**
   Efficiency ratings (like 80 PLUS) indicate how effectively the PSU converts incoming power without waste.
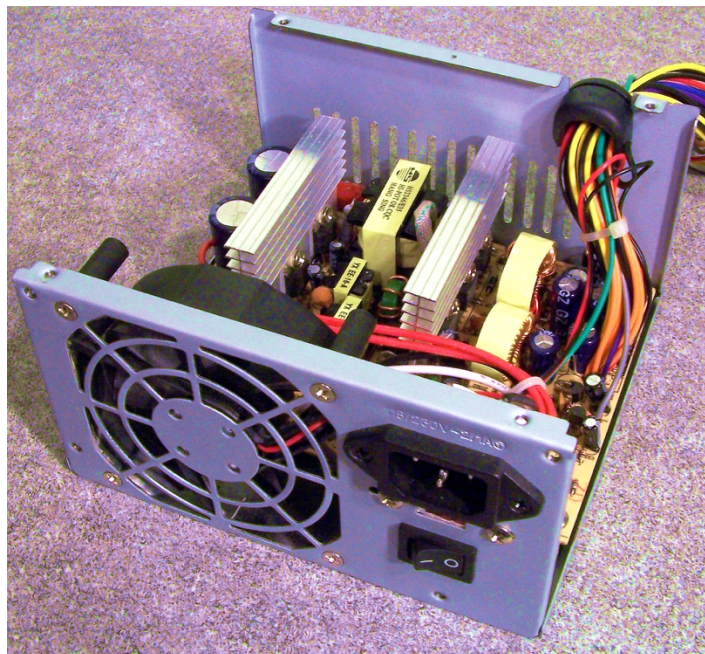
F. Graphics Processing Unit (GPU)

The GPU is specialized for rendering images and video, improving performance in graphics-intensive applications like gaming and video editing.

1. **Integrated vs. Dedicated:**
   Some CPUs come with integrated graphics, while dedicated GPUs offer better performance for complex graphics tasks.

Email (noor.abdulkareem@uomus.edu.iq**)**

Al-Mustaqbal University / College of Engineering Technology
Department (Communications Technical Engineering)
Class (First)
Subject (Computer) / Code (UOMU0000017)
Lecturer (Dr. Noor AbdAlKarem Mohammedali)
1ˢᵗ term – Lecture No. 2 & Lecture Name (Computer Components)

2. **VRAM:**
   Video RAM (VRAM) is used to store textures and images the GPU creates, affecting the quality and speed of rendering.

G. Cooling System

Cooling prevents overheating and maintains performance.

1. **Air Cooling:**
   Uses fans and heatsinks.
2. **Liquid Cooling:**
   Uses liquid circulation for more efficient cooling in high-performance systems.

Air Cooling   **Liquid Cooling**

Al-Mustaqbal University / College of Engineering Technology
Department (Communications Technical Engineering)
Class (First)
Subject (Computer) / Code (UOMU0000017)
Lecturer (Dr. Noor AbdAlKarem Mohammedali)
1ˢᵗ term – Lecture No. 2 & Lecture Name (Computer Components)

H. Networking Components

Enable communication between computers and devices.

1. **Network Interface Card (NIC):**
   Allows wired (Ethernet) or wireless (Wi-Fi) network connections.
2. **Modems and Routers:**
   Manage data traffic and provide internet connectivity.

♣ Input / Output (I/O) Units

I/O units enable communication between the computer and the outside world.
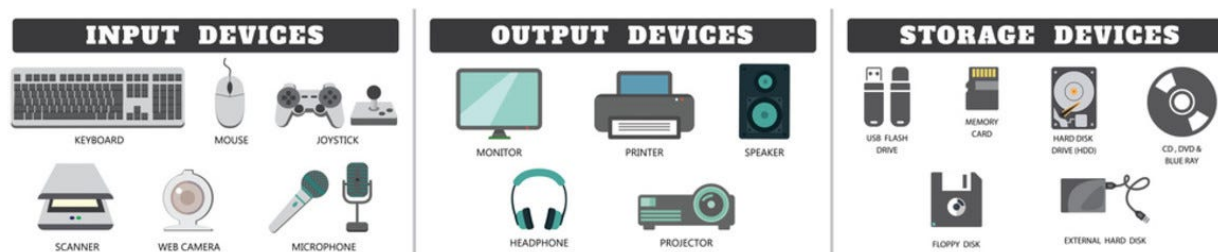
A. Input Devices

- Keyboard
- Mouse
- Scanner
- Microphone

B. Output Devices

- Monitor (LCD, LED, OLED)
- Printer
- Speakers

C. Storage I/O

- USB (Universal Serial Bus)
- External Hard Drives and SSDs

Email (noor.abdulkareem@uomus.edu.iq**)**

Al-Mustaqbal University / College of Engineering Technology
Department (Communications Technical Engineering)
Class (First)
Subject (Computer) / Code (UOMU0000017)
Lecturer (Dr. Noor AbdAlKarem Mohammedali)
1st term – Lecture No. 2 & Lecture Name (Computer Components)

♣ Memory Types

Memory stores data and instructions temporarily or permanently.

A. Volatile Memory

- **RAM**
  - o **DRAM:** Requires constant refreshing
  - o **SRAM:** Faster, used for cache memory

B. Non-Volatile Memory

- **ROM:** Stores boot instructions
- **Flash Memory:** Used in SSDs and USB drives

C. Cache Memory: High-speed memory inside or near the CPU.

D. Virtual Memory: Uses hard drive space as extra RAM.

E. Storage Memory

- Magnetic Storage (HDD)
- Optical Storage (CD, DVD, Blu-ray)
- Solid State Storage (SSD, flash drives)

♣ Basic CPU Components

A. Arithmetic Logic Unit (ALU): Performs arithmetic and logical operations.

B. Control Unit (CU): Directs processor operations.

C. Registers: Small, fast storage locations inside the CPU.

D. Cache Memory: Speeds up processing.

E. Bus Interface: Connects CPU to motherboard components.

F. Clock: Synchronizes operations and determines CPU speed.

Al-Mustaqbal University / College of Engineering Technology
Department (Communications Technical Engineering)
Class (First)
Subject (Computer) / Code (UOMU0000017)
Lecturer (Dr. Noor AbdAlKarem Mohammedali)
1ˢᵗ term – Lecture No. 2 & Lecture Name (Computer Components)

♣ Computer Ports

Ports are interfaces on a computer that allow peripheral devices to connect and communicate with the computer system. Here are some common types of computer ports:

A. USB Ports (Universal Serial Bus): Widely used for connecting a variety of devices, including keyboards, mice, printers, and external storage drives. USB ports support data transfer and power supply.

B. HDMI (High-Definition Multimedia Interface): Transmits high-definition video and audio signals to monitors, TVs, and projectors. It's commonly used for video output.
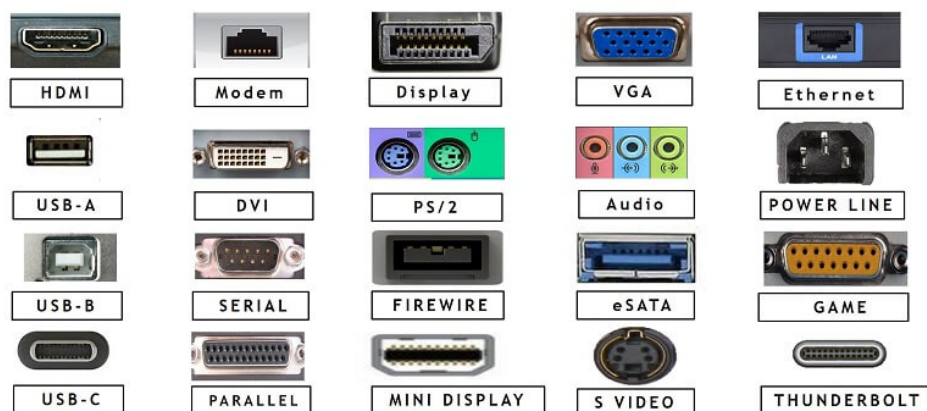
C. Ethernet Port: Allows wired network connections (typically for local area networks) using Ethernet cables.

D. Audio Ports: Includes ports for headphones, microphones, and speakers. Common audio ports are the 3.5mm headphone jack and digital audio ports like optical audio.

E. Display Ports: Various display connections connect monitors and projectors, such as VGA (Video Graphics Array), DVI (Digital Visual Interface), and DisplayPort.

F. Thunderbolt Port: A high-speed port that supports data, video, and power on a single connection, commonly found on modern laptops and desktops.

G. Serial and Parallel Ports: Older port types, used for specific connections such as printers (parallel) and external modems (serial), have been largely replaced by USB.

Al-Mustaqbal University / College of Engineering Technology
Department (Communications Technical Engineering)
Class (First)
Subject (Computer) / Code (UOMU0000017)
Lecturer (Dr. Noor AbdAlKarem Mohammedali)
1ˢᵗ term – Lecture No. 2 & Lecture Name (Computer Components)

♣ Personal Computer (PC)

A personal computer (PC) is a multi-purpose computer designed for individual use. PCs can perform a variety of tasks, including word processing, internet browsing, gaming, and multimedia consumption. Here's an overview of their features and types:

A. Features of Personal Computers

1) User-Friendly Interface:

PCs typically operate with graphical user interfaces (GUIs) that make them accessible for beginners.

2) Versatility:
PCs can run various software for productivity, entertainment, and specialized tasks (e.g., graphic design and programming).

3) Connectivity:

Equipped with various I/O ports, network interfaces, and wireless capabilities for online communication and file sharing.

4) Upgradeability:
Many PCs can be custom-built or easily upgraded, allowing users to enhance

performance by adding or replacing components (e.g., RAM, storage, graphics cards).

5) Storage Options:

It supports different storage types (HDD, SSD), allowing for extensive data storage and organization.

B. Types of Personal Computers

1) Desktop Computers:

Stationary systems typically have a separate monitor, CPU, keyboard, and mouse. They offer higher performance and upgradability options but lack portability.

Email (noor.abdulkareem@uomus.edu.iq**)**

Al-Mustaqbal University / College of Engineering Technology
Department (Communications Technical Engineering)
Class (First)
Subject (Computer) / Code (UOMU0000017)
Lecturer (Dr. Noor AbdAlKarem Mohammedali)
1st term – Lecture No. 2 & Lecture Name (Computer Components)

Flat-panel Display (Output Device)
Desktop Computer (System Unit)
Speaker (Output Device)
Keyboard (Input Device)
Mouse (Input Device)

2) Laptops:

Portable computers with an integrated design that combines the display, CPU, keyboard, and battery into a single unit. Laptops are convenient for mobile use but may have limited upgrade options.

Webcam
Display Screen
Power button
Speaker
Keyboard
Power port (DC Input)
Touchpad
Palm rest
USB port

3) All-in-One Computers:

These integrate the monitor and CPU into a single unit, offering a cleaner and space- saving design without sacrificing performance.

Email (noor.abdulkareem@uomus.edu.iq**)**

Al-Mustaqbal University / College of Engineering Technology
Department (Communications Technical Engineering)
Class (First)
Subject (Computer) / Code (UOMU0000017)
Lecturer (Dr. Noor AbdAlKarem Mohammedali)
1ˢᵗ term – Lecture No. 2 & Lecture Name (Computer Components)

4) Tablets:

Portable touchscreen devices with varying computing power. Tablets can run mobile operating systems and are typically lighter and more portable than laptops.


5) Mini PCs and Micro PCs:

Compact desktops or small form-factor computers are designed for basic computing tasks. They consume less power and take up less space but may have limited performance.

Al-Mustaqbal University / College of Engineering Technology
Department (Communications Technical Engineering)
Class (First)
Subject (Computer) / Code (UOMU0000017)
Lecturer (Dr. Noor AbdAlKarem Mohammedali)
1ˢᵗ term – Lecture No. 2 & Lecture Name (Computer Components)
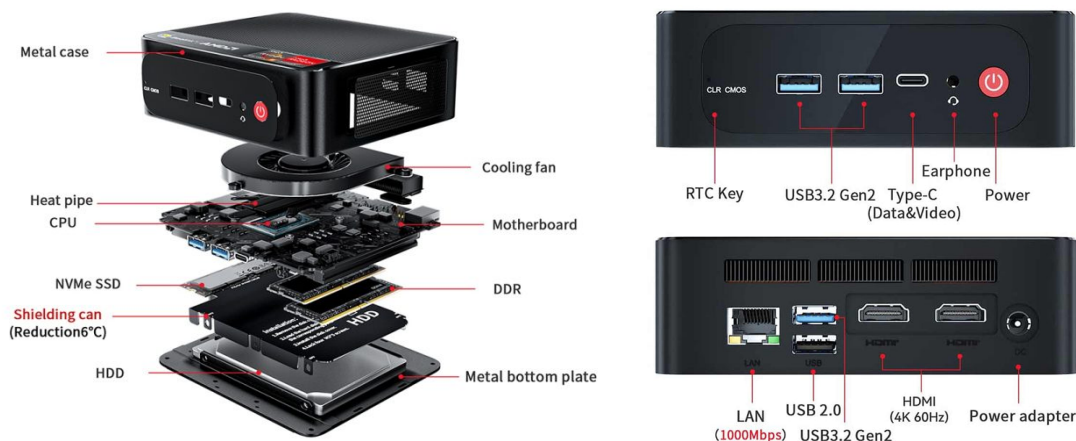
6) Gaming PCs:

Specialized desktop or laptop computers designed to handle high-performance gaming. They usually include powerful GPUs, fast processors, enhanced cooling systems, and ample RAM.