# Introduction Computer Systems

Lecture 1

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# Introduction:

- A computer is an electronic device that manipulates information, or data, by accepting data (input), processing it according to specified rules, producing information (output), and storing the results for future use. All computers, from large-scale supercomputers to smartphones, operate based on this fundamental principle.

# Main components:

- A computer system is made of two main parts that work together.
- Hardware: The physical, tangible components of a computer, such as the central processing unit (CPU), memory, and storage devices.
- Software: The programs and instructions that tell the hardware what to do. The two main categories are system software, which runs the hardware (like an operating system), and application software, which performs specific tasks for the user (like a web browser)

# How a computer works

- The process of a computer transforming data into useful information is known as the input-processing-output cycle.
- **1.Input:** The computer receives data and instructions from input devices like a keyboard, mouse, or microphone.
- **2.Processing:** The CPU, or "brain" of the computer, executes the instructions and performs calculations on the data.
- 3. **Storage:** The computer temporarily holds data in its main memory (RAM) for quick access and permanently stores it on devices like a hard drive.

**4.Output:** The processed information is shown to the user through output devices like a monitor, speakers, or printer.

- **5.Control:** A control unit within the CPU oversees and coordinates all the operations happening inside the computer.

# History

- The concept of computing evolved over many centuries.
- **Early devices:** The abacus was used in ancient civilizations for counting, and mechanical calculators emerged in the 17th century.
- **The analytical engine:** In the 1830s, Charles Babbage designed the Analytical Engine, a blueprint for a general-purpose, programmable mechanical computer.
- **First electronic computers:** The first electronic computers were developed during World War II. The ENIAC (1945) was a massive, room-sized machine that used vacuum tubes.
- **The stored program concept:** In 1948, the Manchester Baby became the first computer to run a program from memory, a fundamental concept for all modern computers.

**Transistors and integrated circuits:** The invention of the transistor (1947) and later the integrated circuit (microchip) led to smaller, faster, and cheaper computers, paving the way for the personal computer revolution in the 1970s

- **Types of computers:**
- Computers come in many forms, each suited for different functions.
- **Personal Computers (PCs):** Designed for personal use, these include desktop computers, laptops, and tablets.

- **Servers:** Computers optimized to provide services and data to other computers over a network, such as when you browse the internet

**Supercomputers:** Extremely powerful, high-speed machines used for complex scientific calculations and specialized applications.

- **Embedded Systems:** Tiny computers built into other devices, such as appliances, cars, and medical equipment, to perform specific functions.

- **Wearable Computers:** Small, portable devices worn on the body, including smartwatches and fitness trackers.

# Applications

- The versatility of computers allows for countless applications across every aspect of modern life.

- **Productivity:** Word processors, spreadsheets, and presentation software (e.g., Microsoft Office) are used for office and schoolwork.
- **Communication:** Computers enable instant messaging, email, and video conferencing (e.g., Zoom).
- **Entertainment:** Video games, media players, and streaming services (e.g., Netflix, Spotify) all rely on computer technology.

- **Creative software:** Applications for graphic design, video editing, and music production are essential tools for creative professionals.

- **Business:** Software for enterprise resource planning (ERP), customer relationship management (CRM), and accounting helps businesses manage their operations.