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Ministry of Higher Education and Scientific Research

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Chapter 2

Computer Hardware & Software

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1. Introduction:

In today's world, computers are indispensable instruments for communication, commerce, education, and pleasure. Hardware and software are the two primary parts of a computer system. The physical components of a computer that are visible and touchable, like the keyboard, display, and CPU, are referred to as hardware. In contrast, software is made up of programs and instructions that guide the hardware on how to function. All computer systems are built on hardware and software, which cooperate to carry out tasks precisely and effectively.

2. Definition of a Computer:

When we think of a computer, we generally picture computer hardware: the monitor, the keyboard, and the electronic circuitry contained within the rectangular case. There is more to a computer than this, however. The missing element is software–the instructions that tell the computer how to operate the hardware. All computers must have these two components to function. However, it is software that gives the computer one of its most distinguishing characteristics—the ability to program a single machine to perform many different functions. In general terms, a computer is a machine operating under the control of instructions stored in its own memory. These operations and instructions enable the computer to receive data from a user (input), transform and manipulate the data according to specified rules (process), produce results (output). Additionally, data, instructions, and information are stored (storage) for future retrieval and use. Many computers are also capable of another task: communicating directly with other machines. A computer is a programmable device that stores, retrieves, and processes data. The term "computer" was originally given to humans (human computers) who performed numerical calculations using mechanical calculators, such as the abacus and slide rule. The term was later given to a mechanical device as they began replacing the human computers. Today's

computers are electronic devices that accept data (input), process that data, produce output, and store (storage) the results. Below is a picture of a computer with each of the main components. In the picture below, you can see the desktop computer, flat-panel display, speakers, keyboard, and mouse. We've also labeled each of the input devices and output devices.

Figure 1: A Computer with Its Components

3. **Types of computers:**

- **Supercomputers:** Extremely powerful computers used for complex calculations such as weather forecasting, scientific research, and simulations.
- **Mainframe Computers**: Large computers used by organizations to process huge amounts of data and support many users at the same time (banks, government institutions).

- **Minicomputers**: Medium-sized computers that support multiple users. They are less powerful than mainframes and are mostly used in small organizations.
- **Personal Computers (PCs)**: Computers designed for individual use.
- **Workstations**: High-performance computers used for specialized tasks such as graphic design, engineering, and scientific applications.
- **Embedded Computers**: Computers built into other devices to control their functions, such as in cars, washing machines, and medical equipment.
- **Mobile Computers**: Portable devices such as: Tablets & Smartphones

Figure 2: type of Computer

4. **Components of a Computer:**

hardware: Physical structure that houses a computer's processor, memory, storage, communication ports and peripheral devices. Each of these

components (called devices) have a different purpose, which may be either accepting inputs, storing data or sending outputs. Usually, the core components that represent the bare minimum that allow a computer to function are:

Processor (CPU) The component that processes and executes inputs received from hardware and software.

Figure 3: CPU

- Motherboard A mainboard that provides basic connection between all the other hardware components and devices (internal and external).

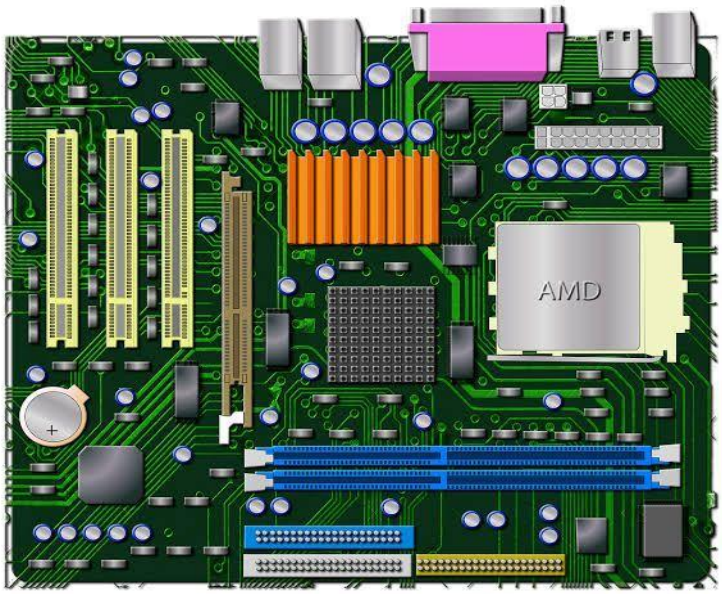

Figure 4: motherboard

❖ Memory (RAM) A temporary data storage space that stores the information the CPU is actively using.

Figure 5: RAM

❖ **Storage Devices:**

- **HDD (Hard Disk Drive):** Uses spinning magnetic disks to store data; slower but usually cheaper and with larger capacity.
- **SSD (Solid State Drive):** Uses flash memory with no moving parts; faster, more durable, but generally more expensive and smaller in capacity.

Figure 6: SSD

- Power supply unit That's pretty self-explanatory: without power, no electronic device can work

Figure 7: PSU

Software:

Software is a set of programs and instructions that tell the computer how to perform tasks. It enables the hardware to operate and execute various functions.

Types of Software:

- **System Software:**
  - Manages computer hardware and provides a platform for running applications.
  - Example: Operating systems like Windows, Linux, macOS.

Figure 8: Different Operating Systems

- **Application Software:**
  - Helps users perform specific tasks.

- Example: Microsoft Word, web browsers, games.

Figure 9: Computer Applications