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**Department of Cyber Security**

**Subject:**

**MICROPROCESSORS**

**Lecture: (1)**

**introduction to microprocessor**

**Class: Second**

**Lecturer: M.Sc.Muntather AL-mussawee**

# **Definition of a Microprocessor**

# A microprocessor is an electronic chip that contains the central

# processing unit (CPU) responsible for executing calculations and

# controlling other components within a system. It acts as the "brain" of a

# computer, processing data and executing instructions.

# **History of the Microprocessor**

# First Microprocessor: The first commercially available

# microprocessor, the Intel 4004, was developed in 1971. It was a

# 4-bit processor designed for basic data processing.

# Technological Evolution: Following the 4004, more advanced

# processors emerged, such as the Intel 8008 (1972) and Intel 8080

# (1974), contributing to the development of personal computers.

# 

# **Types of Microprocessors**

# **1. General-Purpose Processors:**

# Examples include Intel and AMD processors used in desktops and

# laptops.

# **2. Embedded Processors**

# Used in specialized devices like home appliances, control systems,

# and medical devices.

# **3. Digital Signal Processors (DSP)**

# Used for processing audio and visual signals, commonly found in

# mobile phones and audio devices.

# **4. Multi-Core Processors:**

# These contain multiple cores within the same chip, allowing for

# more efficient multitasking.

# **5. Graphics Processing Units (GPUs):**

# Specialized for graphics rendering and complex computations,

# such as those produced by NVIDIA and AMD Radeon

# **Applications**

# Personal Computers: Where the microprocessor executes software

# and provides user interfaces.

# Mobile Devices: Such as smartphones and tablets.

# Smart Appliances: Like smart refrigerators and home security

# devices. Industrial Applications: In automation and control systems.

# **The Processor Consists Of**

# A microprocessor, often referred to as a CPU (Central Processing

# Unit), consists of several key components that work together to

# execute instructions and process data. Here's a breakdown of its main

# components:

# **1. Arithmetic Logic Unit (ALU)**

# Performs arithmetic operations (such as addition and subtraction) and

# logical operations (such as AND and OR).

# **2. Control Unit (CU)**

# Manages the flow of data within the processor and interprets

# instructions, directing the ALU and other components to operate

# according to commands.

# **3. Registers**

# Small, fast memory locations within the processor used to temporarily

# store data, such as intermediate results of instructions

# **4. Cache Memory**

# o Used to store frequently accessed data and instructions, improving

# processor performance by reducing access time to the main

# memory.

# **5. Buses**

# o Communication pathways that transfer data between different parts

# of the microprocessor, including data, address, and control buses.

# **6. Input/Output Units (1/0 Units)**

# o Manage communication between the processor and external

# devices, such as keyboards and displays.

# **7. Internal Logic**

# o Includes the circuits that organize operations within the processor,

# such as timing circuits and other logical circuits

# **CLASSIFICATION OF MICROPROCESSORS:**

# Based on their specification, application and architecture

# microprocessors are classified. Based on size of data bus

# • 4-bit microprocessor

# • 8-bit microprocessor

# 16-bit microprocessor

# • 32-bit microprocessor

# **The processor consists of two parts:**

# 1- Software: Software consists of three modules:

# A- The control and transfer unit is responsible for exchanging

# information between the parts of the processor itself.

# b- The bus communication unit is responsible for exchanging

# information between the processor and other parts of the computer.

# c- The arithmetic and logic unit, which is responsible for processing

# digital data.

# 2- hardware

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