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# LECTURE 1

# INTRODUCTION TO MICROPROSSOR ARCHITECTURE

BY:

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## Introduction

Each computer has contain three components:

- Memory unit.
- Input/output ports unit.
- Central Processing Unit (CPU). Which consists of the Arithmetic/Logic Unit (ALU) (perform arithmetic and logical operations) and Control Unit and various registers to store data.

The CPU reads the instructions from memory and performs the tasks specified. It's communicate with the input/output devices either to accept or to send data. These devices are also known as peripherals. Figure 1 shown the block diagram of a computer.

In the late 1960's, the CPU was designed with discrete components on various boards. With the advent of the integrated circuit technology, it became possible to build the CPU on a single chip, this came to be known as a microprocessor as shown in Figure 2 can be replaced the CPU by the MPU (Microprocessor Unit).

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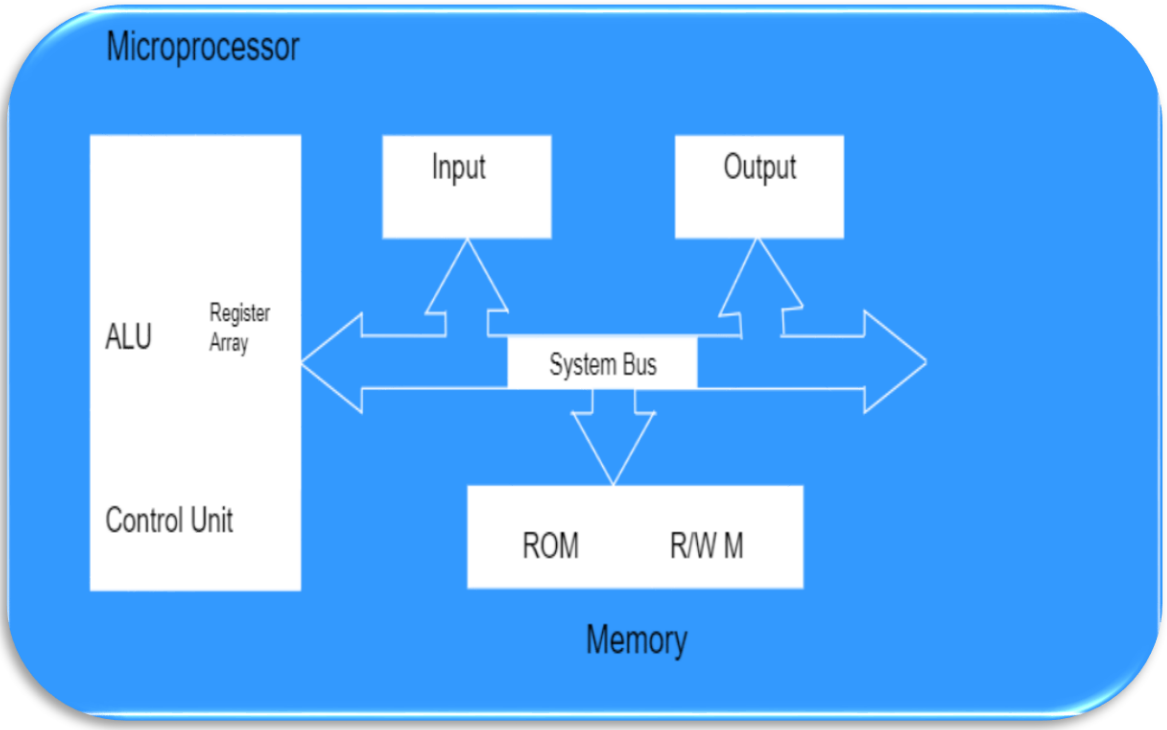



**Figure 1: Traditional Block Diagram of a Computer**

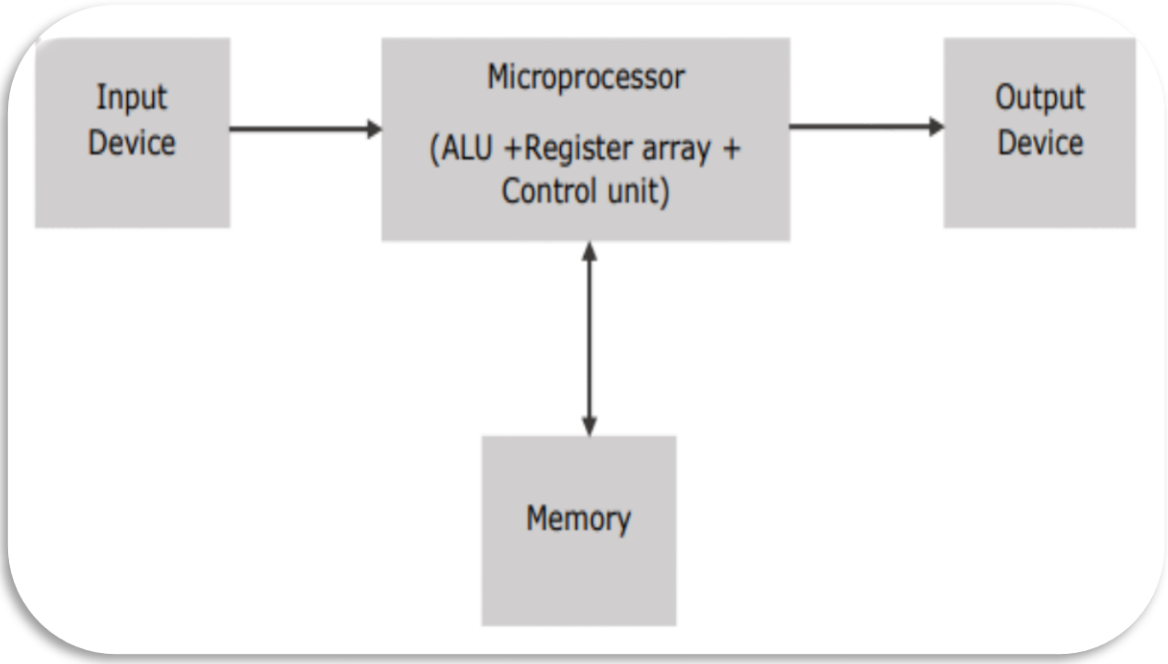



**Figure 2: Block Diagram of a Computer with the Microprocessor**

## Memory Unit

Memory is a collection of storage registers used to transfer information in and out of the unit. Memory is one of the easiest pieces of hardware to add to computer. The actual work is done in (memory) and the finished result is stored in (disk). The information stored in the memory as binary code in groups of bits called word. The binary is two logic levels:

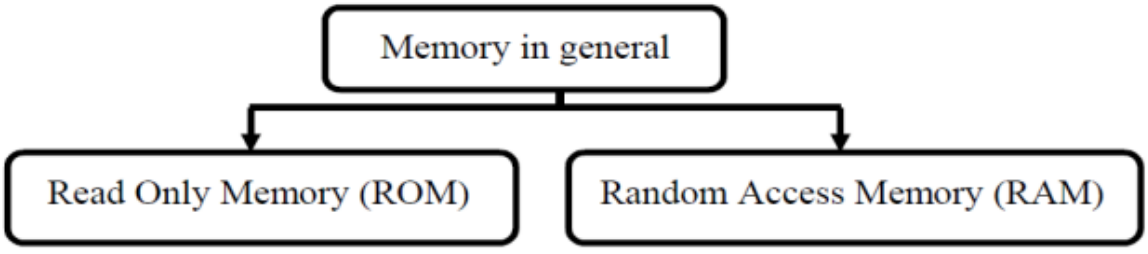
- ❖ Logic (1).
- ❖ Logic (0).

**Bit**: is binary digit (1) or (0),

**Byte**: is a group of eight bits, and

**Word**: is a group of sixteen bits.

Memory in general is divided into two general categories:



***Read Only Memory (ROM)*** is a class of storage medium used in computers and other electronic devices. Data stored in ROM cannot be modified, or can be modified only slowly or with difficulty.

ROM memories have gradually evolved from fixed read-only memories to memories than can be programmed and then re-programmed. There are many type of Re-Programed memory:

- ROM (Read Only Memory).
- PROM (Programmable Read Only Memory).
- EPROM (Erasable Programmable Read Only Memory).
- EEPROM (Electrically Erasable Programmable Read Only Memory).

***Random Access Memory (RAM)*** is the memory that the computer uses to temporarily store the information as it is being processed.

| ***Random Access Memory (RAM)*** | ***Read Only Memory (ROM)*** |
|---|---|
| 1. Temporary storage | 1. Permanent storage |
| 2. Store data in MBs | 2. Store data in GBs |
| 3. Volatile | 3. Non- Volatile |
| 4. Used in normal operation | 4. Used for startup process of computer |
| 5. Writing data is faster | 5. Writing data is slower |

## Input/output ports unit

Input/Output, or I/O, refers to the communication between an information processing system (such as a computer), and the outside world, possibly a human, or another information processing system. Inputs are the signals or data received by the system, and outputs are the signals or data sent from the system to the user. Keyboard or a mouse may be an input device for a computer, while monitors and printers are considered output devices for a computer. There are two type of I/O ports:

- Parallel port, all bits of information represented by a **byte** or **word** are input or output simultaneously.
- Serial port, all bits of information are input or output one at a time.

## Microprocessor

A microprocessor can be simply defined as follows:

- The microprocessor is a programmable device that takes in numbers, performs on them arithmetic or logical operations according to the program stored in memory (PROM) and then produces other numbers as a result.

The word microprocessor can be split into "micro" and "processor":

- The word "micro" means the level of scale used to fabricate an integrated chip (IC) i.e., a micro meter scale.
- The word "processor" means the device that processes data esp., digital data (1's and 0's).
- To process mean to manipulate i.e., to do some arithmetic and logical operations.
- The CPU consists of memory (Array of registers) to store data, the ALU to perform arithmetic and logical operations and control unit (decoders, counters, encoders and control lines) Integrated circuit (IC).

➢ In 1959 Integrated circuit was invented. it consists of several electronic components like transistors resistors etc. Grown on a single silicon chip techniques of integration are:

| ***Technique used*** | ***Num. of Gates*** |
|---|---|
| Small-scale integration (SSI) | Fewer than 12 Gates |
| Medium-scale integration (MSI) | 12 to 99 |
| Large-scale integration (LSI) | 100 to 9999 |
| Very large-scale integration (VLSI) | 10,000 to 99,999 |
| Ultra large-scale integration (ULSI) | 100,000 or more |

- As the technology moved from SSI to VLSI the face of the computer changed. The central processing unit of a digital computer, built into a single IC is called microprocessor.