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Chapter One

Introduction to microcomputer architecture

The architecture of a computer is the general layout of its major components , the principle features of these components and how they are connected together .

The physical components of the computer are called hardware .

A set of instruction written for the computer to perform a task is called a program (A group of programs is called software) .

A- Computer hardware

A basic model that describe the basic components of computer hardware . basically it consists of four basic components these are:

1- Control processing unit (CPU) .
2- Memory unit .
3- I/O unit .
4- Buses that connects together .

1- CPU

The **main component** of any computer is the central processing unit (CPU) .

It consist of two basic units ,**processing unit and control unit** .

The processing unit which represent the executive part of the CPU, Can be further divided into two basic components arithmetic logic unit(ALU) and register.

ALU perform arithmetic operation such as addition ,subtraction , etc.

And logic operation such as AND , OR ,etc.

The result of the operation are stored either in registers or in memory or send to output device .

CPU consist of various register , these register are used primarily to store data temporarily during the execution of program .

The control unit of the CPU provided the necessary timing and control signals to all the operation in the computer . it controls the flow of data between the computer and it peripherals , or inside the computer itself .

2- MEMORY UNIT

It is like the page of not book with space for a fixed number of binary numbers on each line , however , these pages are generally mode of semiconductor material .

The user write the necessary instructions and data in memory , and asks the computer to perform the given task and fined the answer .

The memory unit usually described by its "size" which represents the number of locations in the memory (page lines) and its word length which specify the capacity in bits for each location in the memory these two parameters effected by the number of address bus and data bus of the microprocessor .

3- INPUT/OUTPUT UNIT (I/O)

The user can enter instructions and data in memory through such devices such as keyboard or simple switches , which is called input device .

The result (from the computer) can be displayed in several ways such as a monitor Or printer . these devices are called output devices the input and output devices are known as the peripherals .

4- BUSES

A bus is common group of wires that into connect components in the computer system .

In the microprocessor based computer system , three buses exist for information transfer between the microprocessor and its memory and I/O system :-

1- Address bus
2- Data bus
3- Control bus

1- Address bus

- It is a **unidirectional** bus , that used to register a memory location from the memory or an I/O location from the I/O device .
- The address bus **varies in width** with different version of the microprocessor
- the 8086 microprocessor has **20 bit address bus** , therefore it can address a maximum of 1M byte of memory location with an address ranged from $(00000)^H$ $(fffff)^H$.

2- Data bus

- The data bus transfer information between the microprocessor and its memory and I/O address space .
- The data bus various in width from 8- bits to 64- bits wide in various members of the Intel microprocessor family the advantage of a wider data bus is the speed in applications that use wide use wide data .

3- Control bus

The control bus contains lines that select the memory or I/O and cause them to perform a read or write operations .

In most computer system , there are four control bus connections MEMR (memory read control) , MEMW (memory write control) , IOR (I/O read control) , and IOW (I/O write control).

Computer software :-

Computer software are divided into :-

1- Operating system

A program which control coordinates use of hardware among various application , program and users (ex-MS DOS , windows , Linux , etc.)

2- Application programs

Program written to be used by the user (ex-Games Microsoft office , etc.)

3- Programming languages

The software refers to the programs that are written for the computer . it is possible to be familiar with various aspects of computer software without being concerned with details of how the computer hardware operates

a program is a list of instructions or statements for directing the computer to perform a required data processing task .