Microcomputer Architecture

The word ***computer*** comes the word ***(compute)*** the word compute means to ***(calculate)*** or to ***(count)***, computer is an electronic device that manipulates information or ***(data).*** It has ability to store, retrieval, and process data.

Advantages of computer system: -

1- Store and retrieve large quantities of data.
2-The speed is faster than in any other form of data processing.
3-A single computer can perform a wide variety of activities as directed by a set of instructions (program).
4-Once data and instructions are fed into the computer, processing is continuous with a minimum of human intervention.
5-Data and programs may be stored inside the computer in definite and be retrieved quickly.
6- Accuracy is greater than any other system.

Computer parts:

Computers have two kinds of parts:

1- Hardware: Includes the electronic and mechanical devices that process the data.

A computer hardware have the following components

1.1 Cpu(central processing system) or processor

The cpu consist the following units;

a-ALU(Arithmetic logic unit)

b- Cu (control unit)

c- Registers:

1.2 memory unit

1.3 Input / Output unit

1.4 Secondary memory

1.5 Bus structure

The main **internal hardware** features of a computer are the **processor(cpu)**, **memory** , buses and **registers** (registers are special processor components for holding address and data).

The **external hardware** features are the computer Input/Output devices such as(keyboard, monitor..) and secondary memory such as floopy disk ,hard **,.**

Note: the external hardware also called Peripheral devices that Used to expand the computer's input, output and storage capabilities:

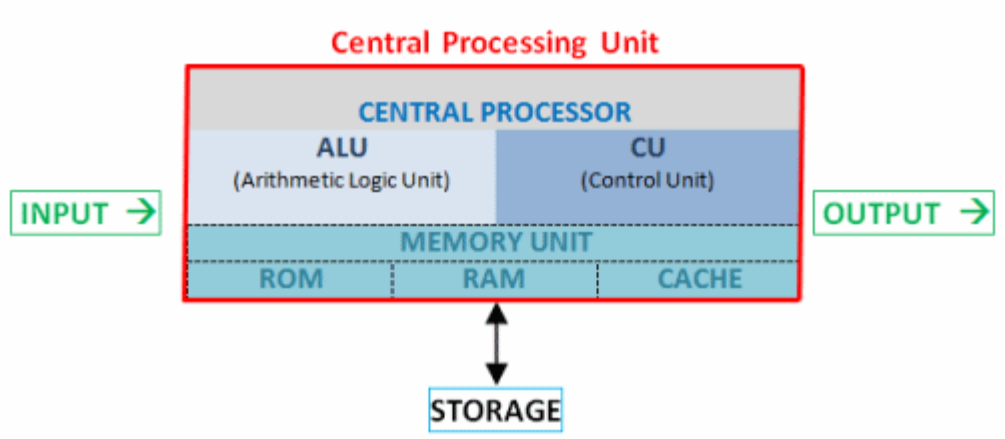

Fig1 : Computer hardware compound

2- software: A computer program that tells the computer how to perform particular tasks.
there is two kinds of it are :

a- application software: such as word processing ,excel , …and programs that writing by the user.

b- system software: such as operating system , complier,…

Note :

1- program consists of list of instructions stored in memory
2- Data Refers to the symbols that represent facts, objects, or ideas.
3- informationThe results of the computer storing data as bits and bytes; the words, numbers, sounds, and graphics.

1- The Processor(Cpu)

The CPU or processor is the **electronic circuitry** within a **computer** acts as the controller of all actions or services provided by the system. (**CPU**) carries out the **instructions** of a **computer program** by three basic steps: **fetch**, **decode**, and **execute** Instructions.
The processor in a personal computer is often called a **microprocessor**. That term simply means that the processor's elements are contained on a single integrated circuitry **(IC) chip**.

Note:

a-The operations of a CPU can be reduced to three basic steps: **fetch**, **decode**, and **execute** Instructions.

b- the CPU is the brains of the computer where most calculations take place

c- Most modern CPUs are **microprocessors,** meaning they are contained on a single **integrated circuit** (IC) chip.

Components of a CPU:

The typical components of a CPU include the following**:**

1-Arithmetic and Logic Unit (ALU), that performs arithmetic , logic and decision operations on the operands in instructions.

2- Control Unit (CU), which manages the various components of the computer and directs all of the processors operations. . It **fetch** and **interprets** instructions from memory and transforms a series of signals to activate other parts of the computer **to execute** them. Control unit calling on the ALU when necessary to perform the calculations .

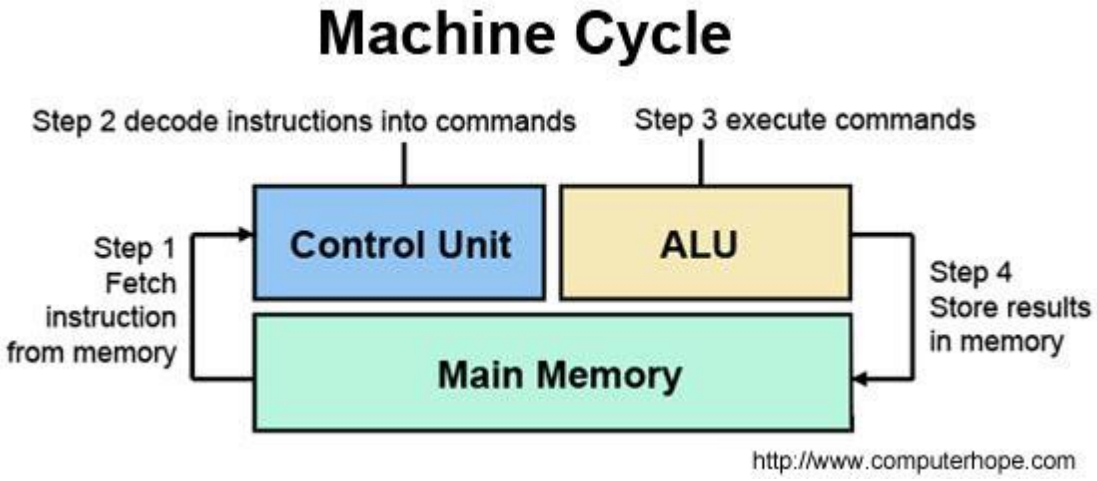

FIG.2 Machine cycle

3- Registers , A special, high-speed storage area within the CPU .it is used for temporary storage of data , instruction or address of memory location where data is stored rather than the actual data itself.)

. Registers supply operands to the ALU and store the results of operations. For example, if two numbers are to be multiplied, both numbers must be in registers, and the result is also placed in a register.

Note:

An **operand** is the part of a computer instruction that specifies data.

The Most Important Register are :

Program counter (PC): hold address of the next instruction
Instruction register (IR): Hold instruction while it is decoded and Executed
Address register (AR): holds the address of memory location.

The instruction is brought in from the memory and placed in the IR. The Control Unit(CU) then decodes the instruction and execute it . At the same time the CU sets the PC/IP to the address of the next instruction

What is CPU Clock Speed?

The clock speed OR clock rate of a processor is the number of instructions it can executes in any given second, measured in Megaherts(MHz) or Gigahertz (GHz).

For example, a CPU has a clock speed of 1 Hz if it can process one piece of instruction every second. a CPU that has a clock speed of 3.0 GHz can process 3 billion instructions each and every second.

.

المحاضرة الثانية

المرحلة الاولى

المادة : تقنيات الحاسبة

مدرسة المادة : ست وداد عبد الخضر