

CENTRAL PROCESSING UNIT(CPU):

Computer system is the CPU. It controls the functioning of the other units and processes data.

The CPU is sometimes called the processor, or in the personal computer field called” microprocessor”.

Microprocessor:- a single integrated circuit(I.C) that contain all the electronics necessary to follow instruction stored in internal memory. In other words, it contains all the electronics needed to execute a program. The microprocessor calculates(adds, multiplies, numbers, and so on), performs logical operations(compares, numbers, makes, decisions), and controls the transfer of data(moves, information among devices), and timing.

The capacity or size of a microprocessor chip is determined by the number of data bits it can handle. A 4-bit processor has a 4-bit data width and an 8-bit processors are generally employed as dedicated controllers in industrial applications and domestic appliances such as washing machines and TV receivers.

Modern PC’s use 32-bit processor such as the 486 and the Pentium. Early generation computers used the 16-bit 80286 and earlier still, the XT computer used the 8-bit 8088 processor.

Microprocessor also differ in the speed with which they execute instruction. CPU speed is indicated by the frequency of the system clock in megahertz(MHz, millions of cycles per second). While the bit width or size determines the quantity of information that may be transferred in any one cycle, the speed determines the number of such transaction per second.

Table bellow consist CPU's microprocessors by PC manufacturers, the yeas they were launched their by size and speed.

CPU	Launched	Bit size	Speed(MHz)
8088	1979	8	5
8086	1978	16	8
80286	1982	16	8-16
80386	1985	32	16-25
80486	1989	32	25-100
Pentium	1993	32	60-200

CPU control-signals:

The number and type of control signals depends on the microprocessor used and the design of the system. Controls signals are normally active low e.g. active when at logic 0. Active low signals are signified by abar(-). The main control; signals of a CPU are as follows.

The clock pulse signal:- A clock pulse is essential requirement for the operation of the processor.



The clock pulse wave form the clock control signal synchronizes the movement of the data around the various element of the system and determines the speed of operation, without which the system comes to a halt.

Read(RD)and write(WR):

The CPU determines the direction of data transfer to or from the microprocessor channel. This is carried out by the read and write control lines. In a READ operation when the CPU is receiving data from memory, the READ line is active allowing data to be transferred to the CPU. In a WRITE operation when the CPU is so riling data to memory, the WEITE line is active enabling data transfer from the CPU to memory.

Interrupts:

When a peripheral device such as a printer, a keyboard or a modem needs attention, a hardware interrupt signal, INTR(interrupt request), sort to the CPU. When such a signals is received, the main program is interrupt temporarily to allow the CPU to deal with the request. After servicing the peripheral device, the CPU returns to the original program at the point where it left it.

In general CPU consists of the following parts:

a) Arithmetic and logic unit(ALU)

Execution of the most operations within a computer(such as arithmetic or logic operation), takes place in the ALU.

EX: consider a typical example, suppose there are two numbers located in the main memory are to be added.

SOL: They are brought into the ALU, where the actual additions is carried out, the sum may then be stored in the memory and from there to an output devices.

Similarly any other arithmetic or logic operations can be performed in a similar way.

In general not all operands in an going computation reside in the main memory, since processors normally contain a number of high-speed

storage elements, called” registers” which may be used for temporary storage of often used operands.

b) Internal-bus structure:

This allows the various parts to communicate with each other. Communication between the internal bus and the external word is accomplished by driver/buffer interface circuits, one of the address lines and another for the data bit.

c) A number of registers:

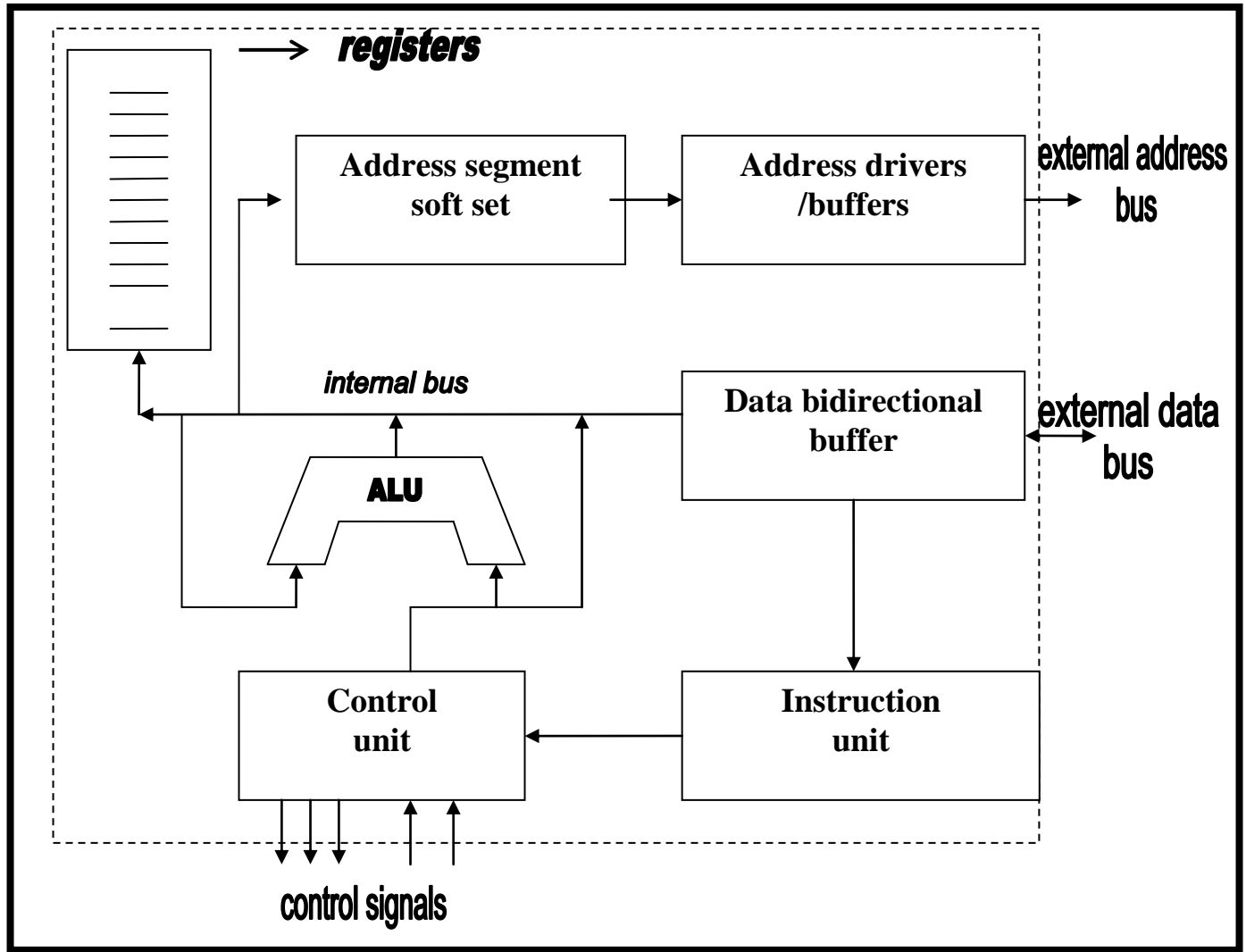
The processor provides a number registers to be used as temporary stores of digital information.

d) Instruction unit:

The instruction unit receives and stores each instruction, decodes it and informs the control unit of all the necessary steps to execute the instruction.

e) Address logic:

The address of a memory location is offset format before an address is sent to the address bus, it must be translated into an absolute(physical) address. This task is carried out by address logic unit.



f) Control unit:

The operation of the previous described (I/O units & ALU) must be coordinated in some organized way, which is the task of a control unit. Although the control unit does not perform any actual processing on the data, it acts as central nervous system used to send control signals to other unit.

The control unit provides the timing and control signals necessary to synchouse the internal operation of the CPU as well as the computer system as a whole.