

## Intel 8085

- \* Intel 8085 is an 8-bit NMOS microprocessor
- \* It is a 40 pin I.C package fabricated on single LSI chip.
- \* Uses a single +5v DC supply for operations
- \* Clock speed is about 3MHz
- \* has 80 basic instructions and 246 opcodes

## Important sections

Intel 8085 consist of three main sections

They are :

1. Arithmetic Logic Unit (ALU)
2. Timing and control unit
3. Set of Registers.

## ALU

~~ALU~~ Performs arithmetic & logical operations

such as

- 1) Addition
- 2) Subtraction
- 3) Clear
- 4) AND
- 5) OR
- 6) XOR
- 7) NOT etc.

## Registers

- Used by the microprocessor for temporary storage and manipulation of data and instructions.
- Retains data till they are sent to the memory or I/O Device.

### Types of registers in Intel 8085

- 1) One 8-bit accumulator (Acc) [a.k.a register A]
- 2) Six 8-bit general purpose registers  
[These are named as .B,.C,.D,.E,.H and L]
- 3) 1 16-bit stack pointer, [SP]
- 4) 1 16-bit program counter [PC]
- 5) Instruction Register
- 6) Temporary Register

## Accumulator (Acc)

- \* Register 'A' is an ~~and~~ accumulator, a 8-bit register associated with the ALU in 8085.
- \* Used to ~~store~~ hold one of the operands for an arithmetic or logical operation.
- \* Serves as one input to the ALU and other operand may be stored either in the memory or in one of the general purpose registers.

## General-Purpose Register

- 8085 contains six 8-bit general-purpose registers. [Named as B, C, D, E, H, L]

- To hold 16-bit data a combination of two 8-bit registers (known as Register Pair) can be employed

- Valid Register pairs in 8085 are:

\* B - C

\* D - E

\* H - L

- Programmer can not form a register-pair by selecting any two registers of his choice.
- H-L pair used to act as memory pointer and holds the 16-bit address of a memory location.

### Program Counter (PC)

- 16-bit special-purpose register.
- Used to hold the memory address of the next instruction to be executed.
- keeps track of memory addresses of the instructions in a program while they are executed
- Microprocessor increments the content of the program counter during execution of ~~that~~ instruction so that it points to the address of the next instruction in the program at the end of the execution of an instruction.

## Stack Pointer (SP)

- 16-bit special function register
- During the execution of a program sometimes it becomes necessary to save the contents of some registers which are needed for some other operations. Contents of such registers are saved in the stack.
- The Stack Pointer (SP) controls addressing of the stack.
- SP holds the address of the top elements of data stored in the stack.

## Instruction Register

Holds opcode of the instruction which is being decoded and executed.

## Temporary Register

\* 8-bit register associated with ALU.

\* Holds data during an arithmetic / Logical operation

\* Used by microprocessor

\* Not accessible by programmer

## Flags

- \* Intel 8085 contains 5 flip-flops to serve as status flag
- \* Flip-flops are set or reset according to the conditions which arise during an arithmetic or logical operations.

5 status flags of Intel 8085 are:

- (i) Carry Flag (C<sub>S</sub>)
- (ii) Parity Flag (P)
- (iii) Auxiliary Carry Flag (AC)
- (iv) Zero Flag (Z)
- (v) Sign Flag (S).

- \* If a flip-flop for particular flag is set it indicates 1. When it is reset, it indicates 0.

## Carry Flag (CS)

- \* After execution of an arithmetic if a carry is produced the carry flag CS is set to 1 otherwise it is 0.
- \* Carry Flag is set or reset in case of addition as well as subtraction.
- \* After the addition of two 8-bit numbers, if sum is larger than 8-bits, a carry is produced and the carry flag is set to 1.
- \* In subtraction if borrow occurs the carry flag is set to 1.
- \* Carry flag holds carry out of MSB resulting from the execution of an arithmetic operation.

## Parity Flag (P)

- \* Parity Flag (P) is set to 1, if the result of an arithmetic or logical operation contains even number of 1s. It is reset ie; 0, if the result contains odd number of 1s.

## Auxiliary Carry Flag (AC)

- \* Holds carry out of the bit number 3 to the bit number 4 resulting from the execution of an arithmetic operation.
- \* Counting Bits starts from 0

## Zero flag (Z)

- \* Zero flag Z is set to 1, if the result of an arithmetic or logical operation is 0.
- \* If the result is not zero, the flag is set to 0.

## Sign Flag (S)

- \* Set to 1, if the result of an arithmetic or logical operation is negative
- \* If the result is positive, sign flag is set to 0
- \* has significance only when signed arithmetic operation is performed.
- \* MSB is reserved by the programmer to represent a signed number.
- \* If number is negative, the sign bit is 1. & sign bit is 0 for positive number

## Timing And Control Unit

- \* Generates timing and control signals required for the execution of instructions.
- \* Controls data flow between CPU and peripherals
- \* Provides status, control and timing signals which are required for operation of memory & I/O devices.
- \* Controls entire operations of the microprocessors and peripherals connected to it.

BLOCK DIAGRAM OF 8085

