# 8086

## Register Organisation

We categerise the register set into four groups as, fellows,

1) General Data Registers.

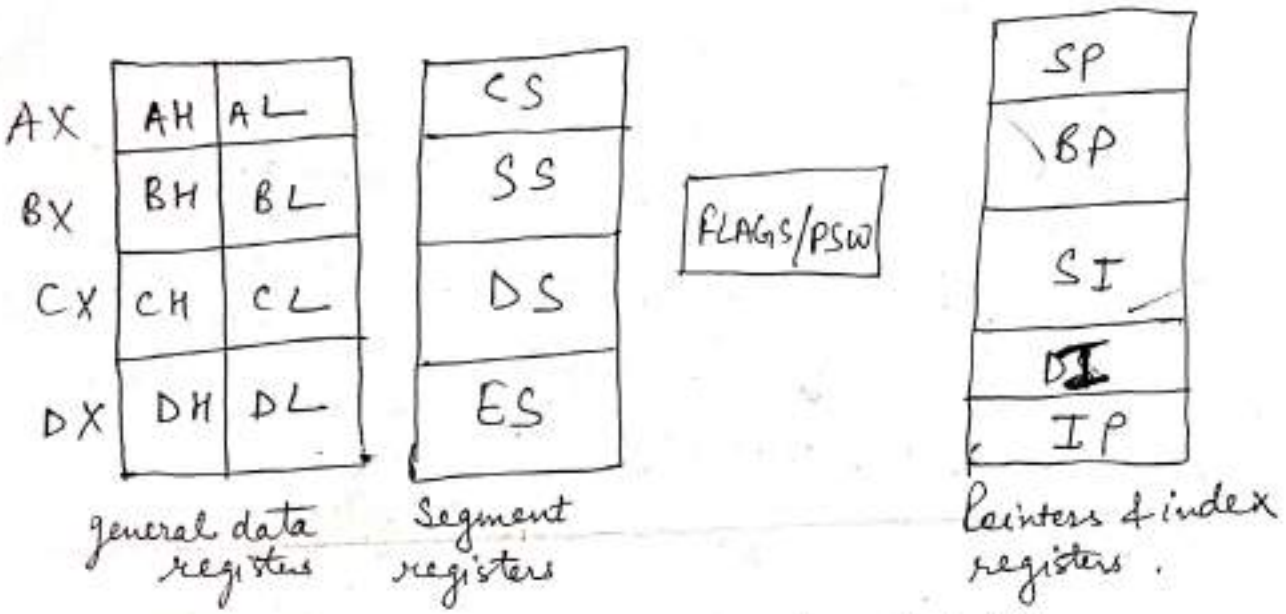


fig:- Register organisation of 8086

1) The registers AX, BX, CX and DX are the general purpose 16 bit registers. AX is used as 16 bit accumulator, with lower 8 bit of AX designated as AL & higher 8 bit as AH. AL can be used as 8 bit accumulator for 8 bit operations.

2) Usually the letter L & H specify the lower & higher bytes of a particular registers. for example CH means the higher 8 bits of the CX register & CL means the lower 8 bit's of CX register. The letter X is used to specify the Complete 16 bit register. CX register is also used as default counter in case of string and loop instruction. The register BX is used as an offset storage for forming physical address in case of certain addressing modes. DX register is general purpose register which may be used as an implicit operand or destination in case of few instructions.

2) Segment Registers :
8088 addresses a segmented memory. The complete 1 megebyte memory, which the 8086 address, is divided in 16 logical segments. Each segment thus contains 64 Kbytes of memory. There are four segment registers.

1) Code Segment register (CS) → It is used for addressing a memory location in the code Segment of memory, where the executable program is stored.

2) Data Segment register (DS) → It points to the data Segment of memory, where data is ~~stored~~ resided.

3) Extra Segment register (ES) → It also refers to a Segment which is essentially another data segment of memory. Thus extra Segment also contains data.

4) Stack Segment Register (SS) → the stack segment register is used is used for addressing stack Segment of memory i.e. memory which is used to store stack data.

3) Pointer and index Registers
The pointer contain offset with in particul segments. The pointer IP, BP and SP usually contain offsets with in code (IP) & stack (BP & SP) segments.
The register SI is generally used to store the offset of Source data in data segment while DI register is used to store the offset of destination in data or extra Segment segment. The index registers are used as general purpose registers as well as for offset storage in case of indexed, base indexed & relative based indexed addressing modes.

4) Flag register.

8086 has a 16 bit flag register which is divided in two parts.

1) Condition code or status flags. (CY, P, AC, Z, S and O (overflow flag) also included)

2) machine control flags. (D, I, T).

→ Condition code or status flags: → this part of flag register 8086 reflects the results of operations performed by ALU.

→. Control flag register is the higher byte of flag register of 8086. it contains three flags, viz. direction flag (D), interrupt flag (I) & trap flag (T).

| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | X | X | X | D | D | I | T | S | Z | X | AC | X | P | X | CY |

1) S - Sign flag → This flag is set when result of any computation is negative. for signed computations, the Sign flag equals the MSB of the result.

2) Z - Zero flag → This flag is set if the result of computation or comparison performed by the previous instruction / instructions is zero.

3) P - Parity flag → This flag is set to 1 if the lower byte of the result contain even number of 1s.

4) C - Carry flag → This flag is set when there is carry out of MSB in case of addition or borrow in case of subtraction.

5) T - Trap flag → if this flag is set, the processor enter the single step execution mode. In other words, a trap interrupt is generated after execution of each instruction.

6) I - Interrupt flag → if this flag is set, the maskable interrupt are recognised by CPU, otherwise they are ignored.

7) D - Direction flag → this is used by string manipulation instructions. if this ~~bit~~ flag bit is '0' the string is

processed beginning from lowest address to highest address i.e. auto incrementing mode. otherwise string is processed from the highest address towards the lowest address i.e. auto decrementing mode.

6) AC – Auxiallary Carry flag :— This is set if there is carry from the lowest nibble, during addition or borrow for the lowest nibble during Substraction.

7) O – Overflow flag → This flag is set if an overflow occurs, i.e. if the result of signed operation is large enough to be accomodated in a destination register.