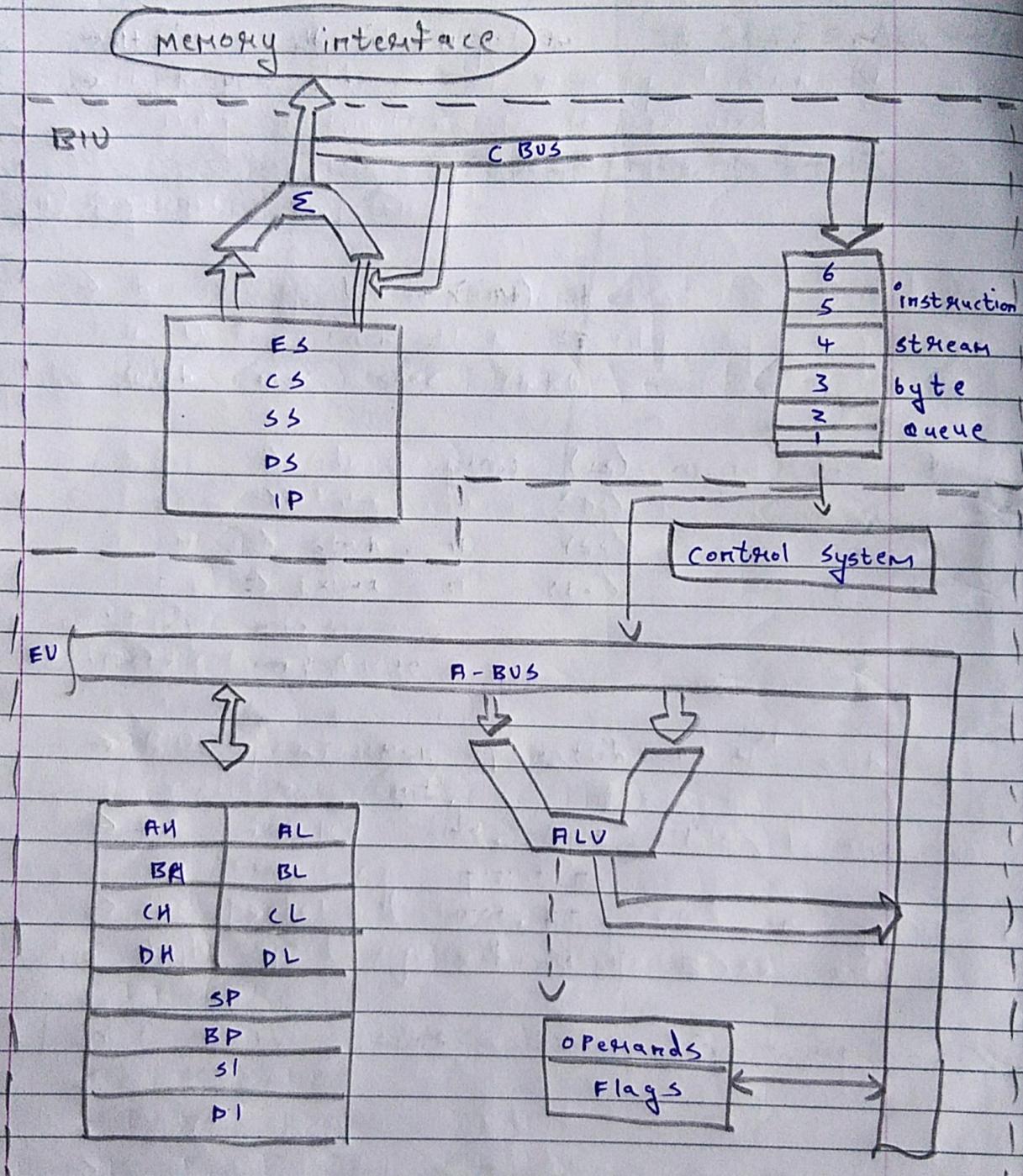


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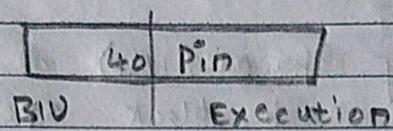
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Q Draw & explain internal architecture of 8086



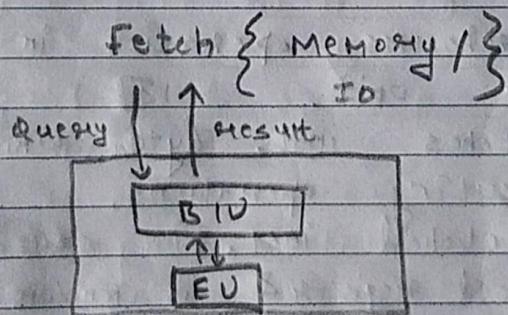
## # Internal Architecture of 8086

- ⇒ Divided into two parts :-
- Bus interface unit
  - Execution unit.
- ⇒ It is a 40 pin processor.



## \* Bus Interface unit

- ⇒ Functions
- Fetch inst./data from memory.
  - Write a data to memory.
  - Read data from ports.
  - Write data from ports.



- ⇒ Three Functional parts
- Instruction pointer
  - Segment Registers
  - Instruction queue

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## ① Instruction Pointer :

- It is a 16-bit register.
- It keeps address of memory location of coming instruction to be executed.

## ② Segment Registers :

- The memory space (1MB) of 8086 is divided into 4 blocks, each block specified by register with max size 64KB.

- ⇒ code segment (CS)
- ⇒ data      || (DS)
- ⇒ stack    || (SS)
- ⇒ Extra    || (ES)

## ③ Instruction Queue :

- BIU performs operation in parallel with execution unit.
- BIU fetches inst. byte while Execution unit is executing operations.
- The prefetched inst. is saved in group of high speed registers & is known as inst. queue.

## \* Execution Unit

- Functions**
- To tell BID where to fetch the inst / data from.
  - To decode & execute the inst.
  - It contains control circuitry to perform various internal operations.

- Functional parts**
- General purpose registers
  - Pointers & index registers
  - ALU
  - Flag Registers
  - Timing & control unit.

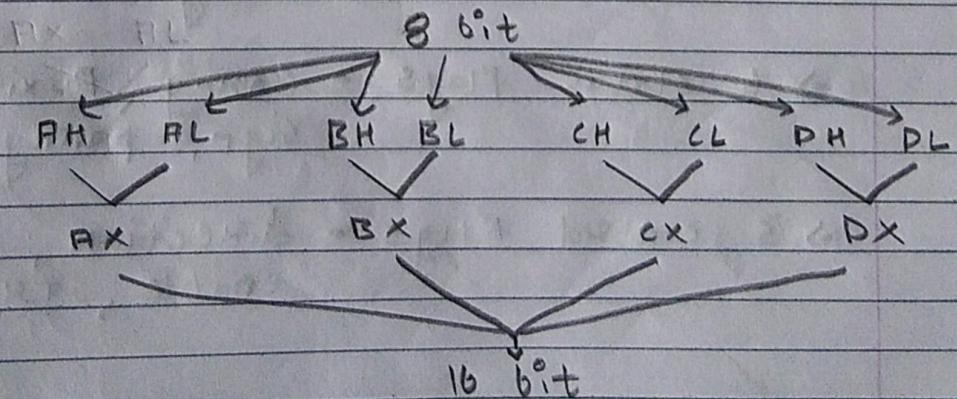
### ① General Purpose Registers (GPR's)

→ GPR's are 4 in 8086 - AX

- BX
- CX
- DX

→ Each is of 16-bit.

→ 16-bit is divided into two 8-bit for each



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## (II) Pointers & index reg

→ 8086 has two pointers & two index Reg.

- Stack pointer (SP)
- Base pointer (BP)
- Source index (SI)
- destination index (DI)

## (III) ALU

→ 16 bit ALU performs arithmetic & logical operations. 8-bit as well as 16-bit.

## (IV) Flag register

→ 8086 has 16 bit flag Reg.

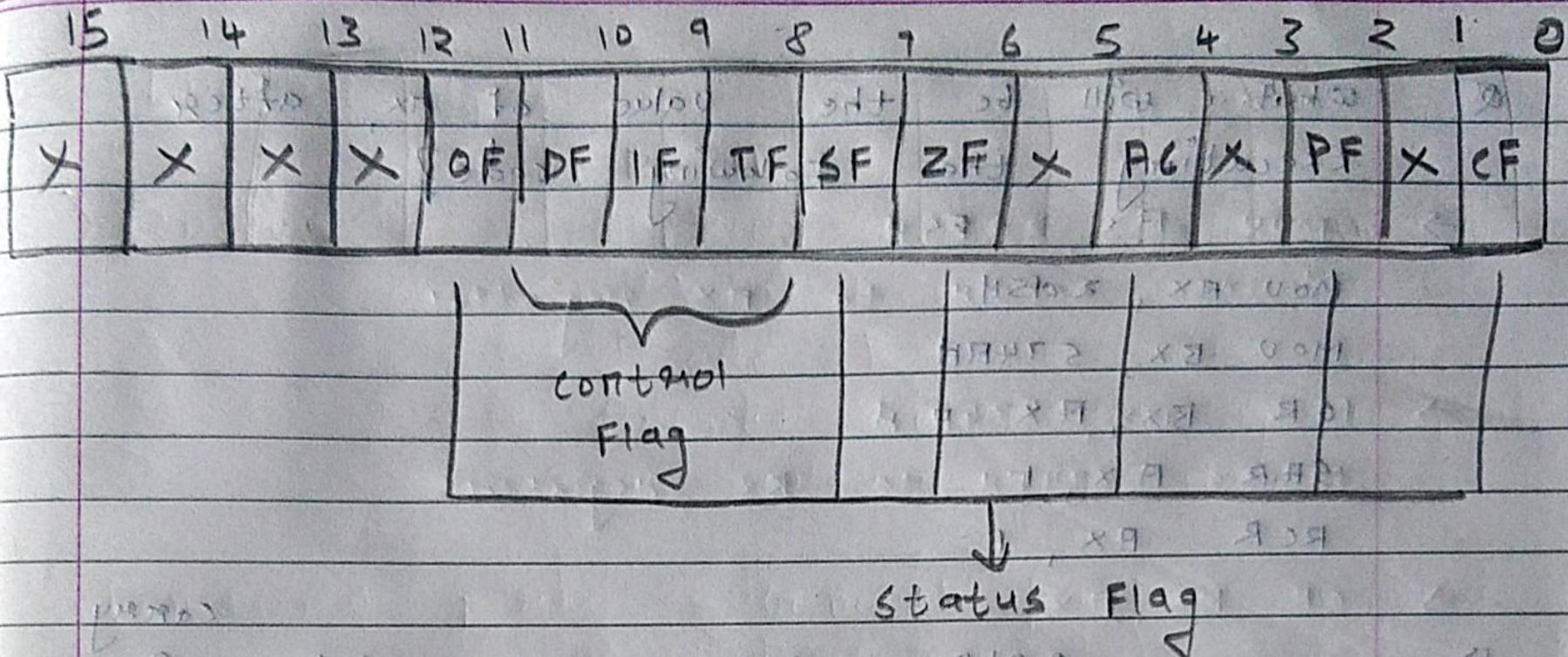
↓  
9 flags & 7 flags (unused)

→ 9 Flags = status flag (6)  
= control flag (3)

→ 6 status flags - carry, auxiliary, zero, sign, parity, overflow.

→ 3 control flags - direction, interrupt enable, trap

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## ① Timing & Control Unit

→ The control Unit of E.U. directs all internal operations & also responsible for generation of control signals.

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a)  $CARRY = 0$

$\rightarrow \text{MOV AX, } 20F5H$

Moves  $20F5H$  to AX register

$\rightarrow \text{MOV BX, } 574FH$

Moves  $574FH$  to BX register

$\rightarrow \text{OR BX, AX}$

|    |      |      |      |      |
|----|------|------|------|------|
| BX | 0101 | 0111 | 0100 | 1010 |
| AX | 0010 | 0000 | 1111 | 0101 |
| OR |      |      |      |      |
|    | 0111 | 0111 | 1111 | 1111 |
|    | 1    | 1    | F    | F    |

$\rightarrow \text{SAR AX, 1}$

|     |      |      |      |      |    |
|-----|------|------|------|------|----|
| AX  | 0010 | 0000 | 1111 | 0101 | CF |
| SAR | 0001 | 0000 | 0111 | 1010 |    |
|     |      |      |      |      | 1  |

$\rightarrow \text{RCR AX, 1}$

|     |      |      |      |        |    |
|-----|------|------|------|--------|----|
| AX  | 0001 | 0000 | 0111 | 1010   | CF |
| RCR | 1000 | 1000 | 0011 | 1101   | 0  |
|     | 8    | 8    | 3    | 13 (D) |    |

AX = 883D