8086 Microprocessor

- Intel 8086 is an 16-bit microprocessor.
- It is modified version of 8085.
- It is 40 Pin Integrated circuit.
- Its operating frequencies are 5, 8 and 10 MHz
- It has 20 bit Address Bus.
- It supports pipe-lining.
- It has almost 29000 transistors

Block diagram of 8086

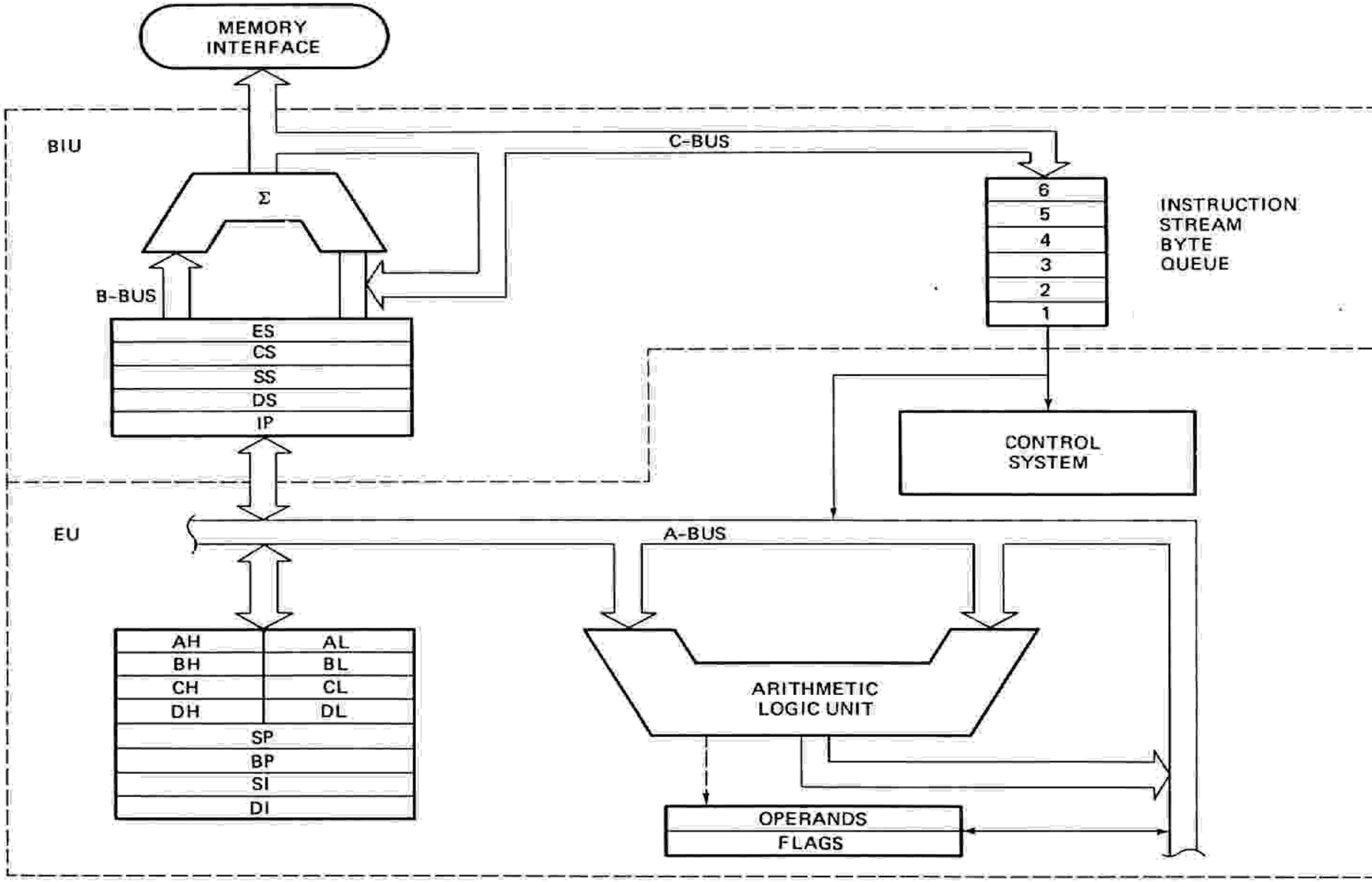
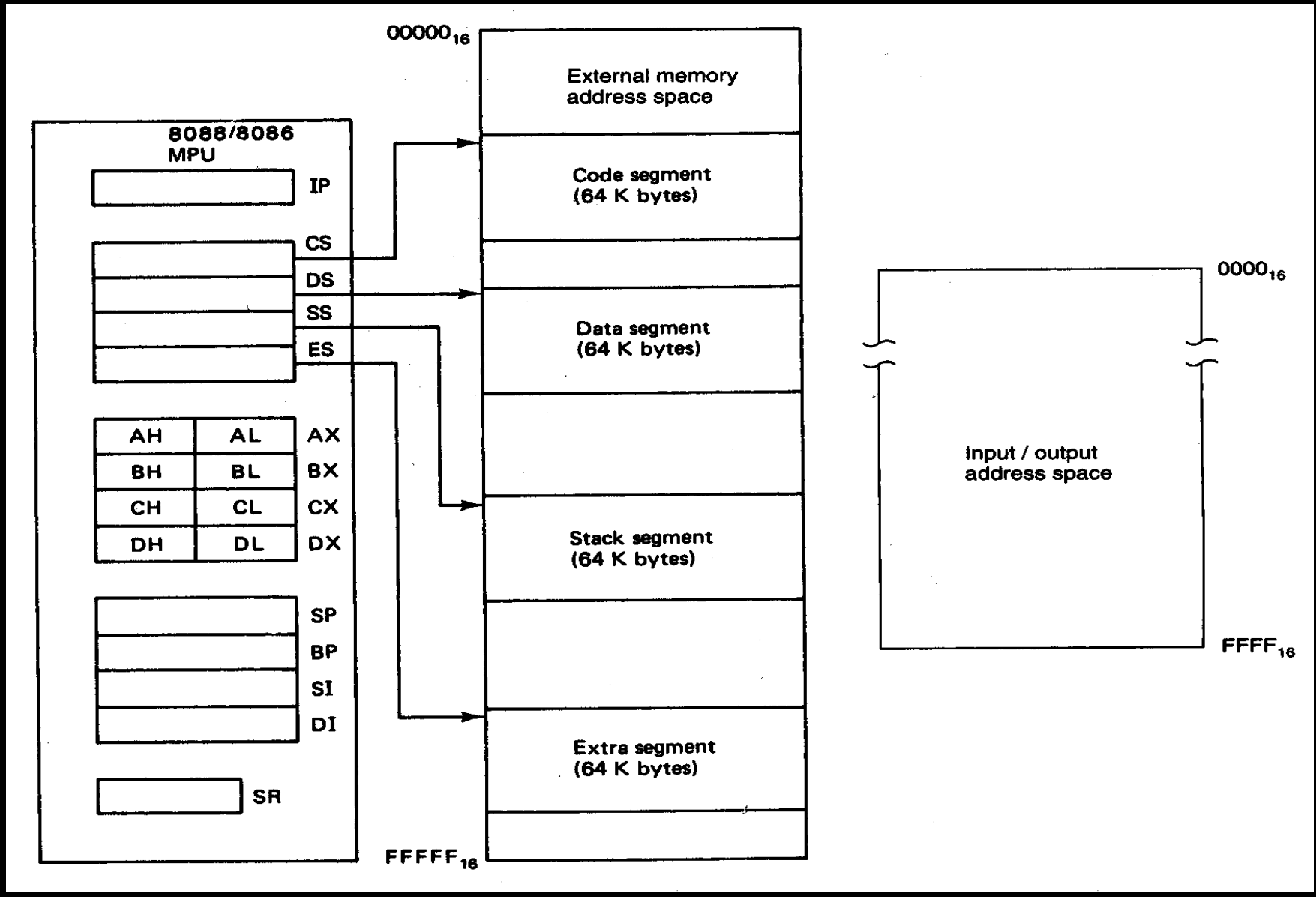
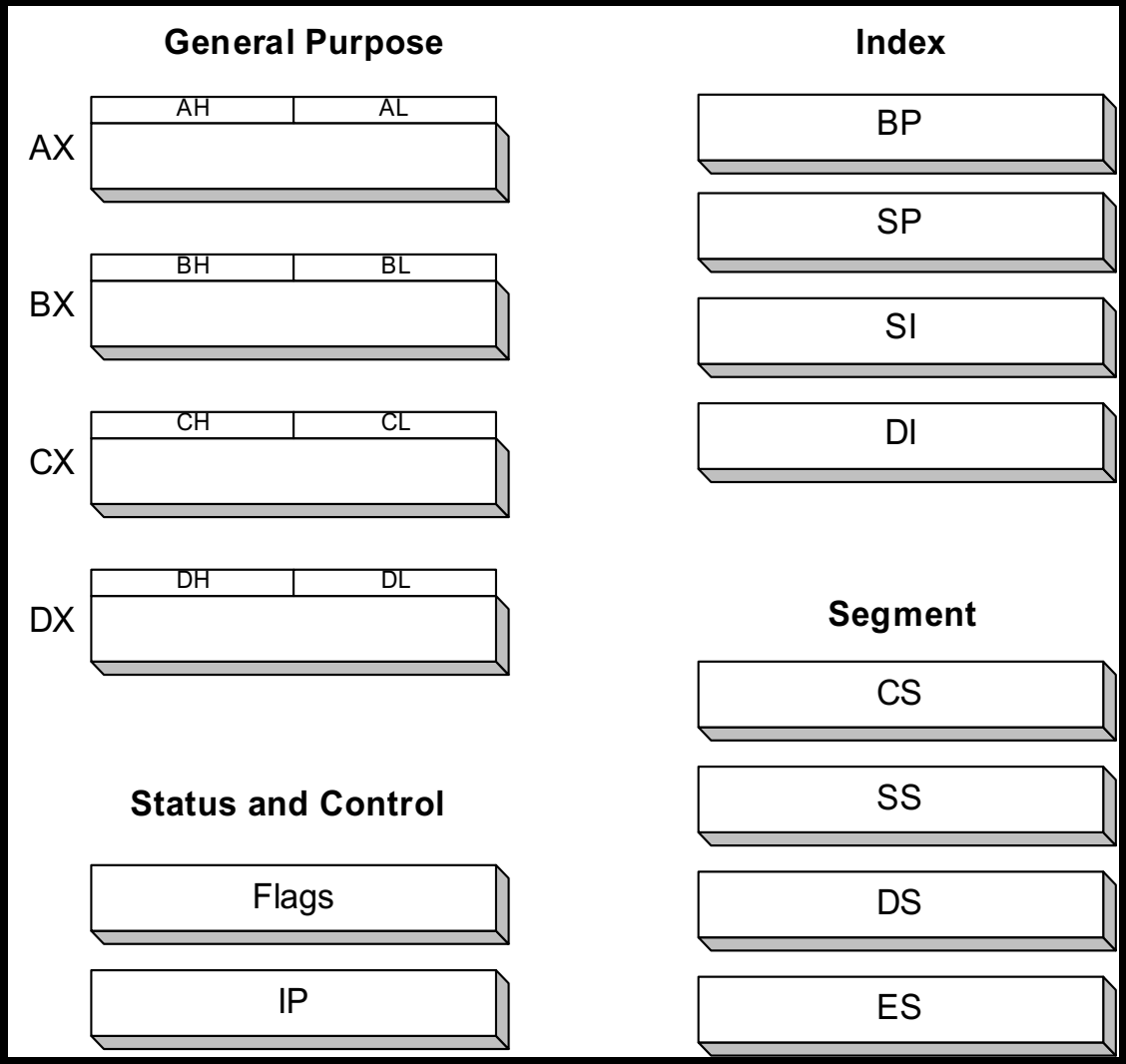


FIGURE 2-7 8086 internal block diagram. (*Intel Corp.*)

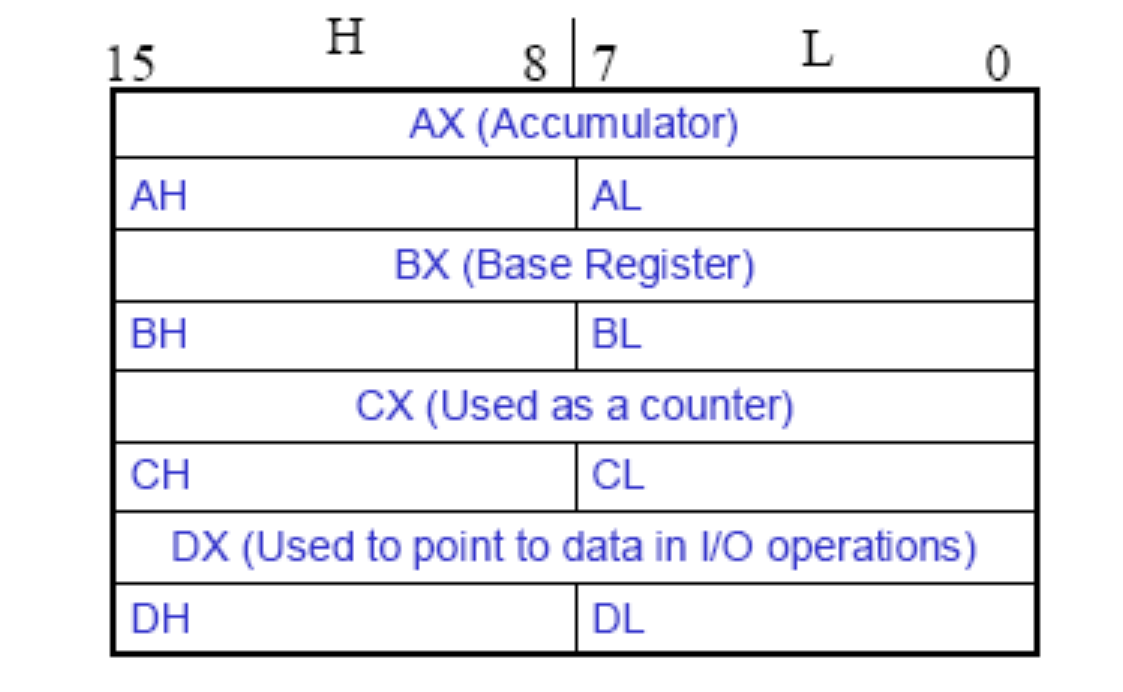
Software Model of the 8086 Microprocessors



8086 Registers



General Purpose Registers



AX - the Accumulator
BX - the Base Register
CX - the Count Register
DX - the Data Register

- Normally used for storing temporary results
- Each of the registers is 16 bits wide **(AX, BX, CX, DX)**
- Can be accessed as either 16 or 8 bits AX, AH, AL

General Purpose Registers

- **AX**
  - Accumulator Register
  - Preferred register to use in arithmetic, logic and data transfer instructions because it generates the shortest Machine Language Code
  - Must be used in multiplication and division operations
  - Must also be used in I/O operations
- **BX**
  - Base Register
  - Also serves as an address register

General Purpose Registers

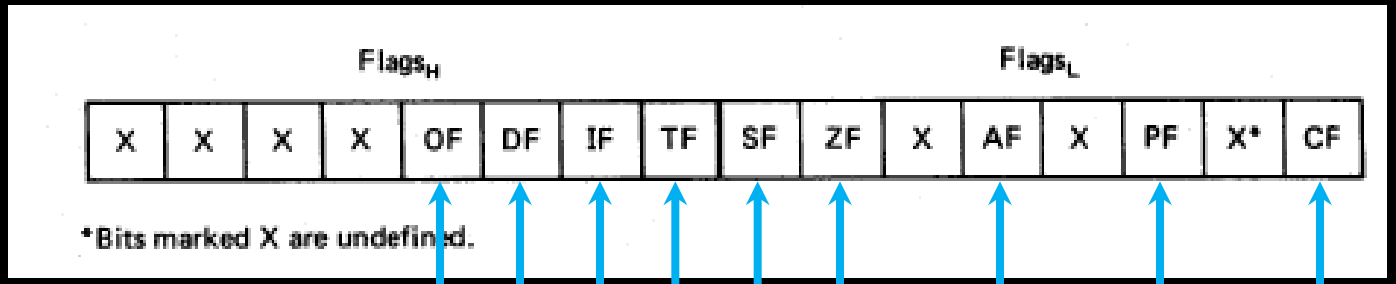
- **CX**
  - Count register
  - Used as a loop counter
  - Used in shift and rotate operations
- **DX**
  - Data register
  - Used in multiplication and division
  - Also used in I/O operations

Pointer and Index Registers

SP	Stack Pointer
BP	Base Pointer
SI	Source Index
DI	Destination Index
IP	Instruction Pointer

- All 16 bits wide, L/H bytes are not accessible
- Used as memory pointers
  - Example: MOV AH, [SI]
    - *Move the byte stored in memory location whose address is contained in register SI to register AH*
- IP is not under direct control of the programmer

Flag Register



Overflow

Direction

Interrupt enable

Trap

Sign

Zero

Auxiliary Carry

Parity

Carry

6 are status flags

3 are control flag

8086 Programmer's Model

BIU registers
(20 bit adder)

ES		Extra Segment
CS		Code Segment
SS		Stack Segment
DS		Data Segment
IP		Instruction Pointer

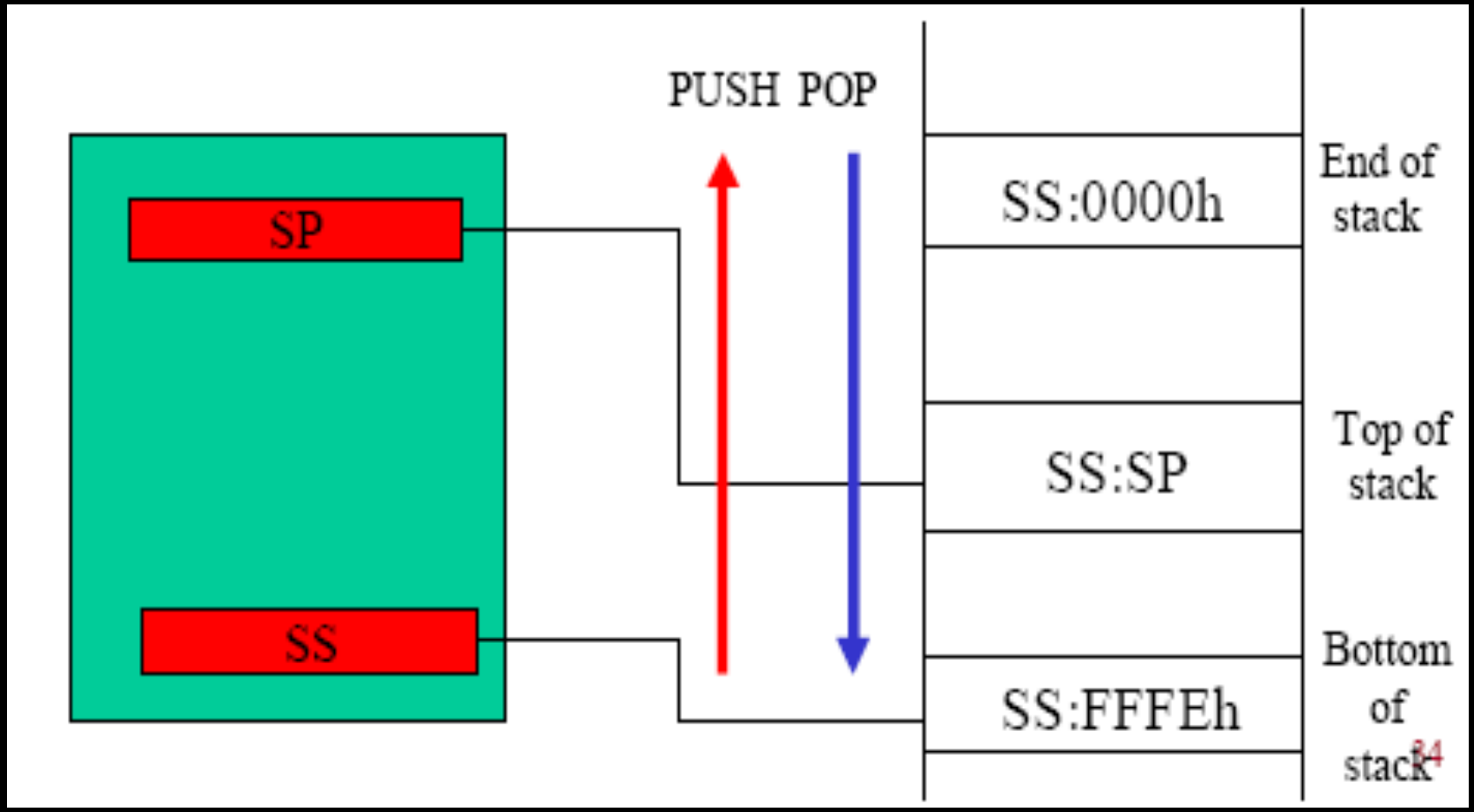
EU registers

AX	AH	AL	Accumulator
BX	BH	BL	Base Register
CX	CH	CL	Count Register
DX	DH	DL	Data Register
	SP		Stack Pointer
	BP		Base Pointer
	SI		Source Index Register
	DI		Destination Index Register
	FLAGS		

The Stack

- The stack is used for temporary storage of information such as data or addresses.
- When a **CALL** is executed, the 8086 automatically **PUSH**es the current value of CS and IP onto the stack.
- Other registers can also be pushed
- Before return from the **subroutine**, **POP** instructions can be used to pop values back from the stack into the corresponding registers.

The Stack


PUSH POP
SP
SS
SS:0000h
SS:SP
SS:FFFEh
End of stack
Top of stack
Bottom of stack