

1. 8086

2.

	80286	80386SX
Data type (bits)	8, 16	8,16,32
Internal data bus	16 bits	32 bits

3. 16 bit or 32 bit microprocessor means that the microprocessor could work only on 8 bits or 16 bits of data at a time. It refers to the internal data path.

4. Yes.

5. Upward compatibility means that earlier processor versions can deal with programs written for new processor versions.

6. The 8088 has an 8-bit external data bus whereas the 8086 has a 16-bit data bus.

7. The 8088 has 4 bytes queue and the 8086 has 6 bytes queue but the 8088 queue can buffer 4 instructions since it works on 8 bit data where the 8086 can buffer only 3.

8. Change the internal architecture of the CPU (Pipelining).

9. BIU stands for Bus Interface Units and it is used to access memory and peripherals to fetch instructions and EU stands for Execution Units and it is used to execute instructions previously fetched.

10. a. CL,CH,BL,BH,AL,AH,DL,DH

b. AX, BX, CX, DX.

11. CS, DS, SS, SI, DI

12. b. 97F is greater than AL

c. values can not be loaded directly in any segment register.

f. values can not be loaded directly in any segment register.

i. AX (16 bit) is greater than AH (8 bits)

j. 23FB9 is greater than AX

13. CS: holds the base location of all executable instructions (code) in a program.

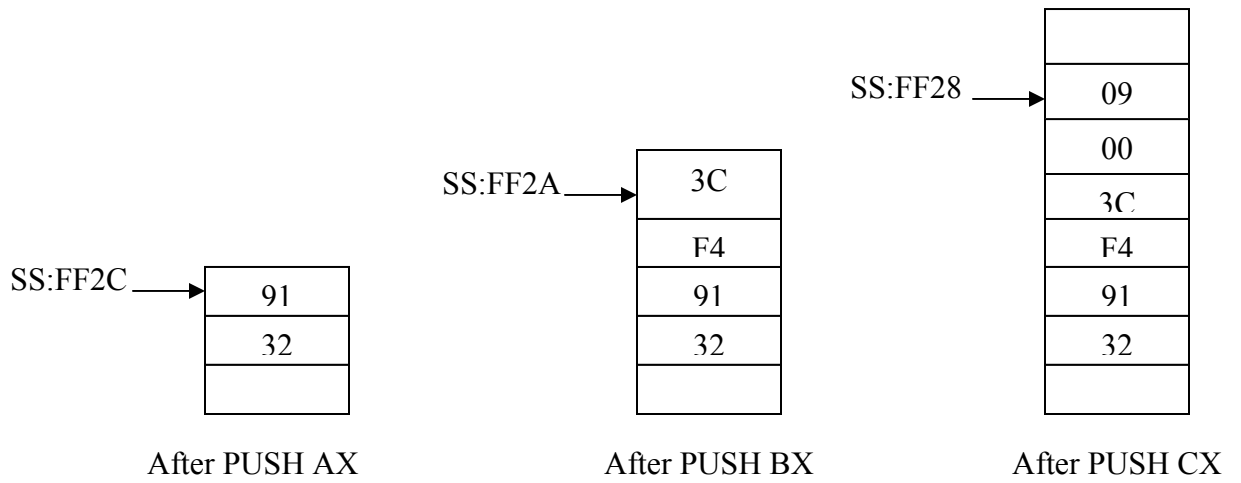
SS: holds the base location of the stack.

DS: is the default base location for variables. The CPU calculates their locations using the segment value in DS.

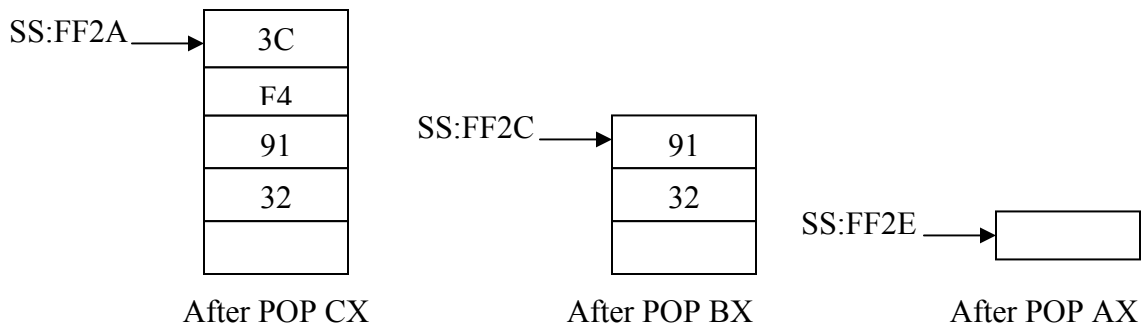
ES: is an additional base location for memory variables.

- 14.** The logical address: 3499:2500
The physical address: 36E90
The lower range of the code segment: 34990
The upper range of the code segment: 4498F
- 15.** The logical address: 1296:0100
The physical address: 12A60
The lower range of the code segment: 12960
The upper range of the code segment: 2295F
- 16.** The physical address: 38949
The logical address: 3499:3FB9
The lower range of the data segment: 34990
The upper range of the data segment: 4498F
- 17.** The physical address: 1A648
The logical address: 1298:7CC8
The lower range of the data segment: 12980
The upper range of the data segment: 2297F
- 18.** A possible logical address: 0046:000C
- 19.** no, the instruction is out of the range of the code segment since (the upper range
 $27000 + \text{FFFF} = 36\text{FFF}$)
CS Shifted left= $389\text{F2} - 1282 = 37770$
CS=3777
- 22.** b
- 23.** c
- 24.** decremented, incremented
- 25.** b
- 26.** The main disadvantage of the stack is its access time.
- 27.** The physical address: 24578
The logical address: 2000:4578
The lower range of the stack segment: 20000
The upper range of the data segment: 2FFFF
- 28.** 24FB

29.



30. POP CX
POP BX
POP AX



31. a. SS:BP
b. DS:DI
c. CS:IP
d. DS:SI
e. SS:SP
f. DS:BX

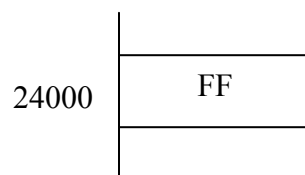
32. a. The override segment register SS:[BX] and the default segment register DS:[BX]
 b. The override segment register SS:[DI] and the default segment register DS:[DI]
 c. The override segment register DS:[BP+6] and the default segment register SS:[BP+6]
33. a. CF=1, AF=1, ZF=1, SF=0, PF=1
 b. CF=0, AF=0, ZF=0, SF=1, PF=0
 c. CF=0, AF=1, ZF=0, SF=0, PF=1

34.

a) **MOV [SI], AL**

Physical address (PA) = DS (Shifted left) + SI

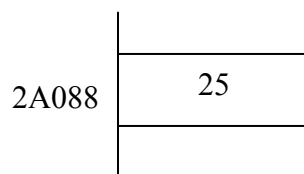
$$2000X\ 10h + 4000 = 24000$$



b) **MOV [SI+BX+8], AH**

Physical address (PA) = DS (Shifted left) + SI + BX + 8

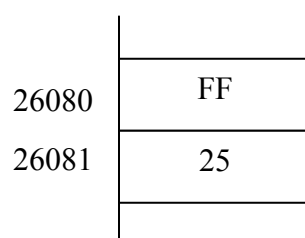
$$2000X\ 10h + 4000 + 6080 + 8 = 2A088$$



c) **MOV [BX], AX**

Physical address (PA) = DS (Shifted left) + BX

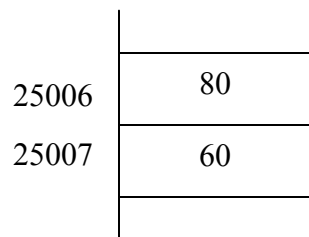
$$2000X\ 10h + 6080 = 26080$$



d) MOV [DI+6], BX

Physical address (PA)= DS (Shifted left)+ DI+ 6

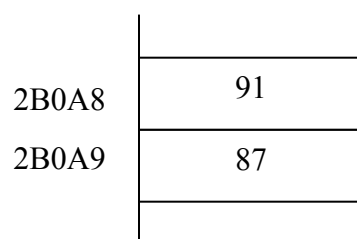
$$2000X\ 10h + 5000 + 6 = 25006$$



e) MOV [DI][BX]+28, CX

Physical address (PA)= DS (Shifted left)+ DI+ BX+ 28

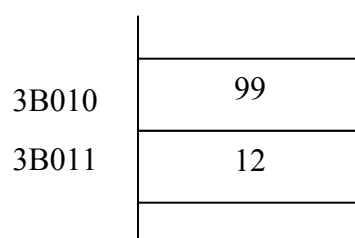
$$2000X\ 10h + 6080 + 5000 + 28 = 2B0A8$$



f) MOV [BP][SI]+10, DX

Physical address (PA)= SS (Shifted left)+ BP+ SI+ 10

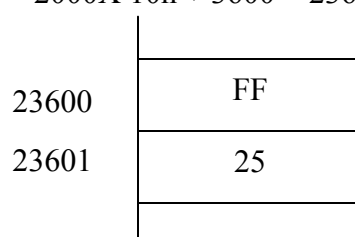
$$3000X\ 10h + 7000 + 4000 + 10 = 3B010$$



g) MOV [3600], AX

Physical address (PA)= DS (Shifted left)+ 3600

$$2000X\ 10h + 3600 = 23600$$



h) MOV [BX]+30, DX

Physical address (PA)= DS (Shifted left)+ BX+ 30

$$2000X 10h + 6080 + 30 = 260B0$$

260B0	99
260B1	12

i) MOV [BP]+200, AX

Physical address (PA)= SS (Shifted left)+ BP+ 200

$$3000X 10h + 7000 + 200 = 37200$$

37200	FF
37201	25

j) MOV [BP+SI+100], BX

Physical address (PA)= SS (Shifted left)+ BP+ SI+ 100

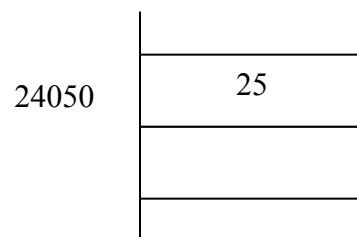
$$3000X 10h + 7000 + 4000 + 100 = 3B100$$

3B100	80
3B101	60

k) MOV [SI]+50, AH

Physical address (PA)= DS (Shifted left)+ SI+ 50

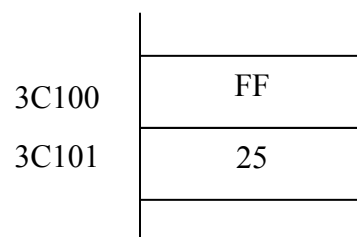
$$2000X 10h + 4000 + 50 = 24050$$



l) MOV [DI+BP+100], AX

Physical address (PA)= SS (Shifted left)+ DI+BP+ 100

$$3000X 10h + 7000 + 5000 + 100 = 3C100$$



35.

- | | |
|------------------------|-------------------------------|
| a) MOV AX, DS | REGISTER |
| b) MOV BX,5678H | IMMEDIATE |
| c) MOV CX,[3000] | DIRECT |
| d) MOV AL,CH | REGISTER |
| e) MOV [DI],BX | REGISTER INDIRECT |
| f) MOV AL, [BX] | REGISTER INDIRECT |
| g) MOV DX, [BP+DI+4] | BASED INDEXED RELATIVE |
| h) MOV CX, DS | REGISTER |
| i) MOV [BP+6], AL | BASED RELATIVE |
| j) MOV AH, [BX+ SI+50] | BASED INDEXED RELATIVE |
| k) MOV BL, [SI]+10 | INDEXED RELATIVE |

l) MOV [BP][SI]+12, AX ***BASED INDEXED RELATIVE***

36.

a) MOV BX, 129FH

MOV [1450], BX

DS:1450 **9F**

DS:1451 **12**

b) MOV DX, 8C63H

MOV [2348], DX

DS:2348 **63**

DS:2349 **8C**