

21L-5288

BCS-3C

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Fall 2022

Assignment-1

Total Marks:85

Submission: Submit hard copies. Deadline -Friday, 9th September 2022, 5:00 pm

Question 1: [0.2 marks per cell = 20 marks approx]

Fill the status of these flags and values of ax and bx after each instruction of the program is executed. Assume ax and bx are initially 0.

Program Instructions	OF	SF	ZF	AF	PF	CF	ax	bx
xor ax, ax	0	0	1	0	1	0	0000	0000
mov ax, 1	0	0	1	0	1	0	1	0000
add ax, 2	0	0	0	0	1	0	3	0000
add ax, 1	0	0	0	0	0	0	4	0000
mov bx, 0x3410	0	0	0	0	0	0	0004	3410
mov ax, 0xEECB	0	0	0	0	0	0	EECB	3410
add ax, bx	0	0	0	0	1	1	22DB	3410
xor bx, bx	0	0	1	0	1	0	22DB	0000
mov ax, -32768	0	0	1	0	1	0	8000	0000
add ax, -1	1	0	0	0	1	1	7FFF	0000
xor ax, ax	0	0	1	0	1	0	0000	0000
sub ax, 2	0	1	0	1	0	1	FFFE	0000

Question 2: [1 mark per register and memory cell = 13 marks]

Given this memory snapshot where memory starting from offset 0x123D, what will be updated memory values after the following snippet of code is executed. Also show the final values of ax, cx and dx registers. Show full working.

7D	12	CF	5A	37	89	9A	BD	C9	34
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```

mov dx, 0x123E
mov cx, 4
mov [0x123F], cx
add dx, cx
mov ax, [0x1242]
mov [0x1243], ch
mov word [0x123F], 5

```

Question 3: [4 marks]

Suppose CS=2667 and IP=107E and DS=199F then what should be the offset of DS to access the same memory location as CS: IP?

Offset for DS is (DCFE)₁₆. Working on attached Pages.

working on attached sheet

Question 4:

Given that: CS=0x5645, DS=0x1000, ES=0x6783, SS=0x0FFF, BX=0x4567, SI=0x1000, DI=0x2000, BP=0x4500

Write the physical address of the memory locations read or written by the following instructions. : [2*6 = 12 marks]

- mov ax, [si] 0x11000
- mov ax, [bp] 0x14500
- mov ax, [cs:bp+20] 0x5A964
- mov ax, [bx+si+10] 0x15571
- mov [ss:bx+di], ax 0x16557
- mov [bp+si+0x200], 20 0x111F0

Question 5: [1*8 = 8 marks]

Identify which of the following are valid statements?

Instruction	Valid/Invalid? Justification?
mov al, bx	invalid; Can't store 16 bit data in 8 bit register.
add bx, bl	invalid; Invalid combination of opcode and operand.
mov 3, ax	invalid; register to constant operation not allowed.
mov IP, 5	invalid; IP is not addressable directly, use jmp.
mov [0117], [0119]	invalid; Can't move data from memory to memory.
mov [0117], 40	valid; storing constant value at memory location.
mov ax, [si+di+100]	invalid; Cannot have two index registers as offset.
add sp, 2	invalid; Stack pointer cannot be manipulated directly.

Question 6: [2*9 = 18 marks]

Calculate the physical address generated by the following segment: offset pairs. Show calculation.

working on attached sheet

Logical Address	Physical Address
FFFF:4006	0x103FF6
AB01:FFFF	0x BB00F
1DDD:0436	0x 1E206
1234:7920	0x 19C60
74F0:2123	0x 77023
0000:6727	0x 6727
FFFF:4336	0x 104326
1080:0100	0x 10900
AB01:FFFF	0x BB00F

Question 7: [2*5 = 10 marks]

What are the first and the last physical memory addresses accessible using the following segment values?

a. 1000

First = 0x10000
last = 0x1FFFF

10000
+ FFFF

0x1FFFF

- b. 0FFF
- c. 1002
- d. 0001
- e. E000

(b) 0FFF:

$$\text{First} = 0 \times 0 \text{FFF} 0$$

$$\text{last} = 0 \times 1 \text{FFEF}$$

(c) 1002:

$$\text{First} = 0 \times 1002 0$$

$$\text{last} = 0 \times 2001 \text{F}$$

(d) 0001:

$$\text{First} = 0 \times 0001 0$$

$$\text{last} = 0 \times 1000 \text{F}$$

(e) E000:-

$$\text{first} = 0 \times \text{E}0000$$

~~$$\text{last} = 0 \times \text{A} \text{FFFFF}$$~~

$$\text{last} = 0 \times \text{E} \text{FFFFF}$$

Q3: CS = 2667 DS = 199F
IP = 107E

of $CS+IP = CS * 10h + ip$

$$= 2667 * 10^4 + 107 E$$

$$= 26670 + 107E$$

$= 276 \text{ EE} \rightarrow$ Physical memory we need to access

of $DS + \text{offset} = DS * \text{low} + \text{offset}$

$$276EE = 199F * 10h + offset$$

$$\text{offset} = 276EE - (199F * 10h)$$

offset = ~~0~~ DCFE

offset needed = $\boxed{\text{DCFE}}$

⑧ $= 0 \times \text{FFFF} \times 10 \times 10 \times 10 \times 10$

Q4: $\cdot \text{mov ax, [si]}$ $\neq 0 \times \text{FFF0} * 10\text{h} + 0 \times 1000$
 $\neq (0 \times 11000) \neq 0 \times 1000 * 10\text{h} + 0 \times 1000$
 $\neq 0 \times 11000 = 0 \times 11000$

~~• mov al, bx~~

• `mov ax, [bp] = 0xFFFF * 10h + 0x4500`
~~`= 0x14500`~~ `= 0x144F0`

$$\begin{aligned} \cdot \text{mov ax}, [\text{cs:bp}+20] &= 0x5645 * 10h + 0x4500 \\ &\quad + (20)_{10} \\ &= 0x5A950 + (14)_{16} \\ &= 0x5A964 \end{aligned}$$

$$\begin{aligned} \bullet \text{ mov ax, [bx + Si + 10]} &= 0x1000 * 10h + 0x4567 \\ &\quad + 0x1000 + A \\ &= 0x15571 \end{aligned}$$

$$\begin{aligned} \bullet \text{ mov [SS:bx + di], ax} &= 0x0FFF * 10h + \\ &\quad + 0x4567 + 0x2000 \\ &= 0x16557 \end{aligned}$$

$$\begin{aligned} \bullet \text{ mov [bp + Si + 0x200], 20} & \\ &= 0x0FFF * 10h + 0x1000 + 0x200 \\ &= 0x111F0 \end{aligned}$$

Q6: FFFF:4006 =

$$= FFFF * 10h + 4006$$

$$= 0x103FF6$$

$$\begin{array}{r} \textcircled{1} \\ FFFF0 \\ + 4006 \\ \hline 103FF6 \end{array}$$

$$\begin{aligned} \bullet \text{ ABO1: FFFF} \\ &= ABO1 * 10h + FFFF \\ &= 0xBBOOF \end{aligned}$$

$$\bullet \text{ 1DDD: 0436}$$

$$\begin{aligned} &= 1DDD * 10h + 0436 \\ &= 0x1E206 \end{aligned}$$

$$\begin{aligned} \bullet \text{ 1234: 7920} \\ &= 12340 + 7920 \\ &= 0x19C60 \end{aligned}$$

$$\begin{aligned} \bullet \text{ 74F0: 2123} &= 74F00 + 2123 \\ &= 0x77023 \end{aligned}$$

Date: / /

$$\begin{aligned} & \bullet \quad 0000:6727 \\ & \quad = 00000 + 6727 \\ & \quad = 0 \times 6727 \end{aligned}$$

$$\begin{aligned} & \bullet \quad FFFF:4336 \\ & \quad = FFFF0 + 4336 \\ & \quad = 0 \times 104326 \end{aligned}$$

$$\begin{aligned} & \bullet \quad 1080:0100 \\ & \quad = 10800 + 0100 \\ & \quad = 0 \times 10900 \end{aligned}$$

$$\begin{aligned} & \bullet \quad AB01:FFFF \\ & \quad = AB010 + FFFF \\ & \quad = 0 \times BB00F \end{aligned}$$