CSC 3210
Computer Organization and Programming
Lab 9
Answer Sheet

Student Name: Vivian Do
Section: CRN 90913; 11:00-12:40
Oct 22 2021

Lab 9(a)

Debug through each line of instructions.
Take screenshot that includes code and register window.
Record the register content.
and explain the register contents.

Code:

lab9a.asm

```
1  ; Lab 9a
2  .386
3  .model flat, stdcall
4  .stack 4096
5  ExitProcess proto, dwExitCode:dword
6
7  .data
8      intarray DWORD 10000h, 20000h, 30000h, 40000h
9
10 .code
11 main proc
12     mov edi, OFFSET intarray            ; EDI = address of intarray
13     mov ecx, LENGTHOF intarray          ; initialize loop counter
14     mov eax, 0                          ; sum = 0
15     L1:                                 ; mark beginning of loop
16     add eax, [edi]                      ; add an integer
17     add edi, TYPE intarray              ; point to next element
18     loop L1                             ; repeat until EXC = 0
19     invoke ExitProcess, 0
20
21 main endp
22 end main
23
```

Line number: 12
Instruction: mov edi, OFFSET intarray
Register Values: EDI = 00C74000
Screenshot:

Registers

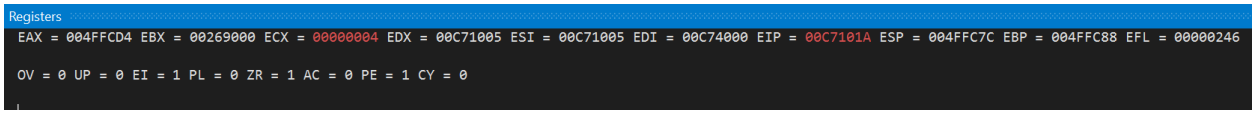
```
EAX = 004FFCD4 EBX = 00269000 ECX = 00C71005 EDX = 00C71005 ESI = 00C71005 EDI = 00C74000 EIP = 00C71015 ESP = 004FFC7C EBP = 004FFC88 EFL = 00000246

OV = 0 UP = 0 EI = 1 PL = 0 ZR = 1 AC = 0 PE = 1 CY = 0
```

Explanation: setting the number address of intarray (00C74000)

(Copy this format as needed)

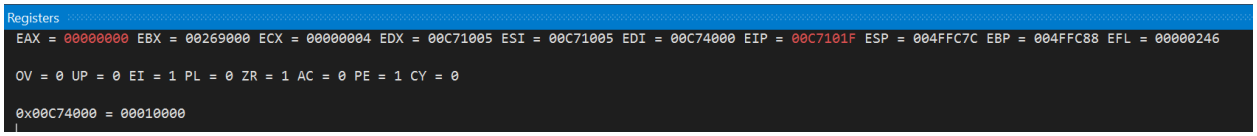
Line number: 13
Instruction: mov ecx, LENGTHOF intarray

Register Values: ECX = 00000004
Screenshot:



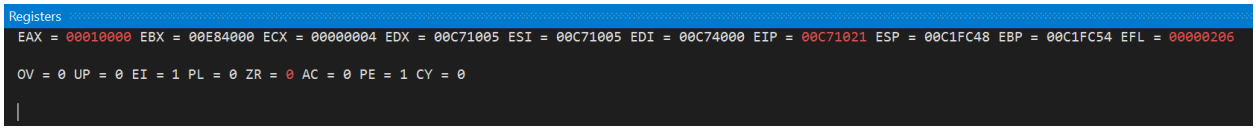
Explanation: ECX register is updated, returning the number of elements in intarray (4)

Line number: 14
Instruction: mov eax, 0
Register Values: EAX = 00000000
Screenshot:



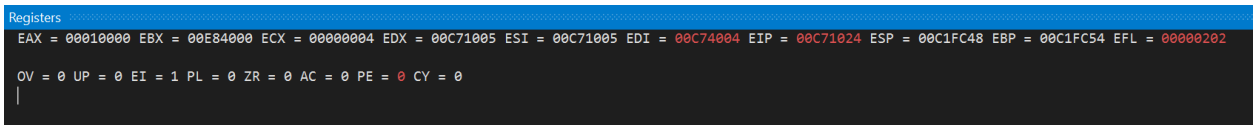
Explanation: EAX register has been zero'd in order to initialize the sum

Line number: 16
Instruction: add eax, [edi]
Register Values: EAX = 00010000
Screenshot:



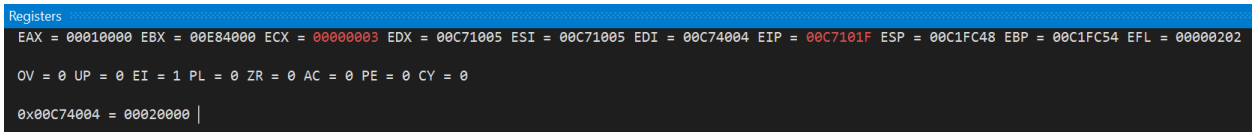
Explanation: EAX register is updated, adding the first value of intarray (1000h)

Line number: 17
Instruction: add edi, TYPE intarray
Register Values: EDI = 00C74004
Screenshot:



Explanation: EDI register is updated by pointing to the next element in intarray (4)

Line number: 18
Instruction: loop L1
Register Values: ECX = 00000003
Screenshot:

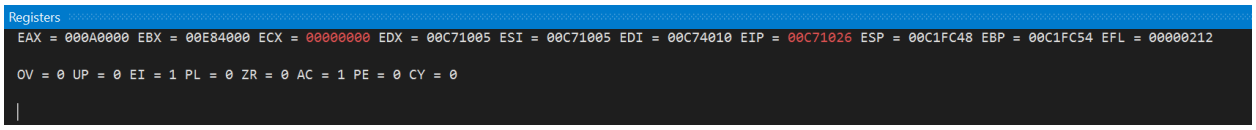


Explanation: ECX is updated with the next iteration

Since lines 16, 17, and 18 are in the loop L1, it will continue to add the next value to EAX from EDI and point to the next element in intarray

- EAX = 00030000 EDI = 00C74008 ECX = 00000002
- EAX = 00060000 EDI = 00C7400C ECX = 00000001
- EAX = 000A0000 EDI = 00C74010 ECX = 00000000

End Results:

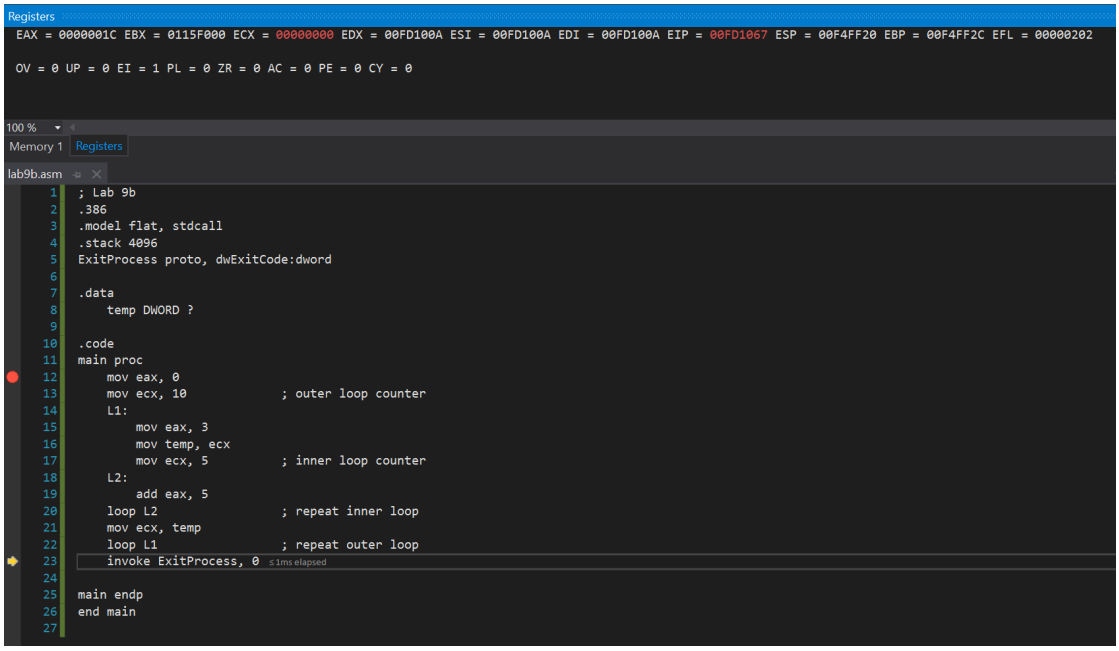


EAX = 000A0000
ECX = 00000000

Lab 9(b)

Debug until you reach “INVOKE ExitProcess, 0”.
Take a screenshot of the code and register window at the end
Record the content of the EAX register
Then explain the register content.

EAX Register value: EAX = 0000001C
Screenshot:



Explanation: This program never stops running. The results of the outer loop (L1) decrements ECX to zero and the inner loop (L2) decrements ECX to FFFFFFFFh. This will then cause the outer loop (L1) to repeat again, hence the program continuously running.

Lab 9(c)

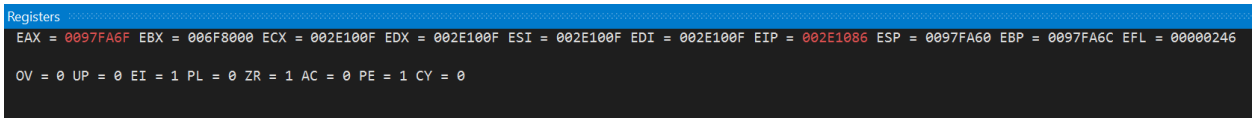
Debug through each line of instructions.
Take screenshot that includes code and register window.
Record the register content.
and explain the register contents.

Code:

lab9c.asm lab9b.asm

```
1  ; Lab 9c
2  .386
3  .model flat, stdcall
4  .stack 4096
5  ExitProcess proto, dwExitCode:dword
6
7  .code
8  main proc
9      mov al, 01101111b
10     and al, 00101101b          ; a. AL =
11     mov al, 6Dh
12     and al, 4Ah                ; b. AL =
13     mov al, 00001111b
14     or al, 61h                 ; c. AL =
15     mov al, 94h
16     xor al, 37h                ; d. AL =
17     invoke ExitProcess, 0
18
19 main endp
20 end main
21
```

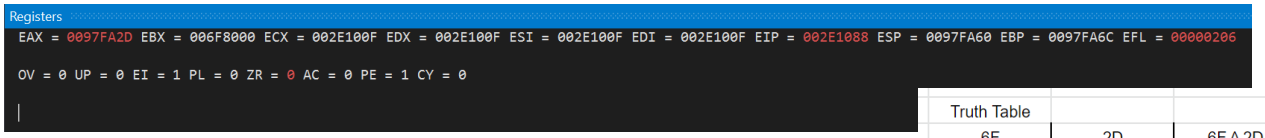
Line number: 9
Instruction: mov al, 01101111b
Register Values: EAX = 0097FA6F
Screenshot:



Explanation: AL in EAX register is updated with 01101111b (6Fh)

(Copy this format as needed)

Line number: 10
Instruction: and al, 00101101b
Register Values: EAX = 0097FA2D
Screenshot:

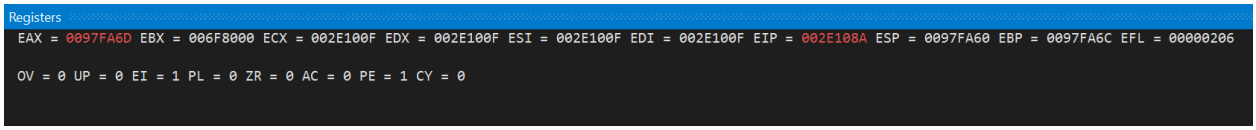


Truth Table

6F	2D	6F ^ 2D
0	0	0
1	0	0
1	1	1
0	0	0
1	1	1
1	1	1
1	0	0
1	1	1

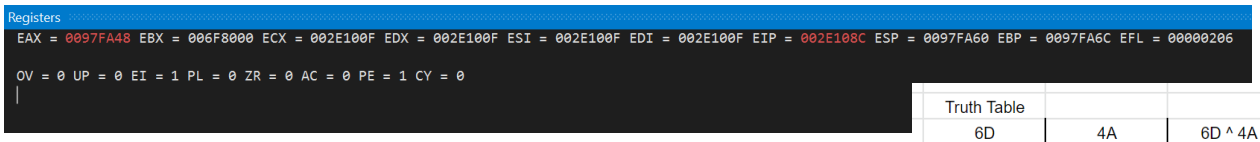
Explanation: AL in EAX register is updated with 2Dh (00101101b).
01101111b (6Fh) ^ 00101101b (2Dh) -> 00101101b (2Dh)

Line number: 11
Instruction: mov al, 6Dh
Register Values: EAX = 0097FA6D
Screenshot:



Explanation: AL in EAX register is updated with 6Dh

Line number: 12
Instruction: and al, 4Ah
Register Values: EAX = 0097FA48
Screenshot:

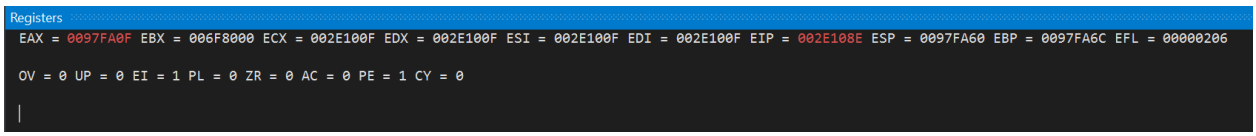


Truth Table

6D	4A	6D ^ 4A
0	0	0
1	1	1
1	0	0
0	0	0
1	1	1
1	0	0
0	1	0
1	0	0

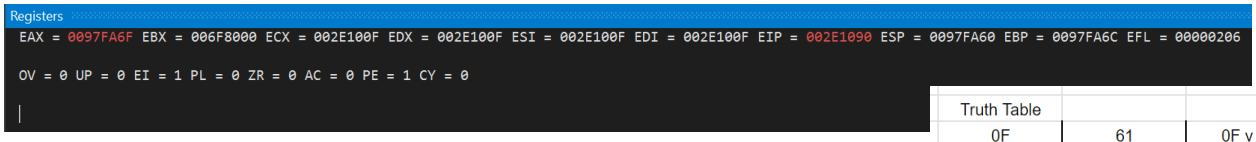
Explanation: AL in EAX register is updated with 48h (01001000b)
6Dh (01101101b) ^ 4Ah (01001010b) -> 48h (01001000)

Line number: 13
Instruction: mov al, 00001111b
Register Values: EAX = 0097FA0F
Screenshot:



Explanation: AL in EAX register is updated with 00001111b (0Fh)

Line number: 14
Instruction: or al, 61h
Register Values: EAX = 0097FA6F
Screenshot:



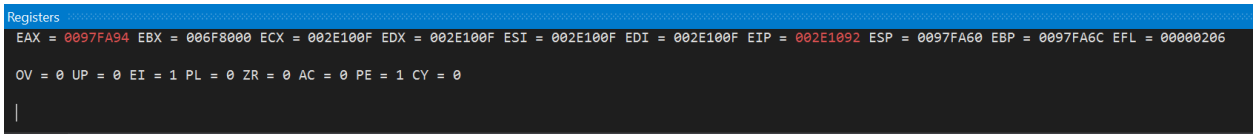
Truth Table

0F	61	0F v 61
0	0	0
0	1	1
0	1	1
0	0	0
1	0	1
1	0	1
1	0	1
1	1	1

Explanation: AL in EAX register is updated with 6Fh (01101111b)
0Fh (00001111b) v 61h (01100001b) -> 6Fh (01101111b)

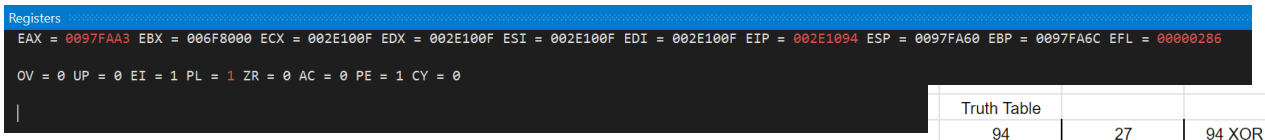
Line number: 15
Instruction: mov al, 94h
Register Values: EAX = 0097FA94

Screenshot:



Explanation: AL in EAX register is updated with 94h

Line number: 16
Instruction: xor al, 37h
Register Values: EAX = 0097FAA3
Screenshot:



Explanation: AL in EAX register is updated with A3h (10100011b)
94h (10010100b) xor 37h (00110111b) -> A3h (10100011b)

Truth Table		
94	27	94 XOR 37
1	0	1
0	0	0
0	1	1
1	1	0
0	0	0
1	1	0
0	1	1
0	1	1