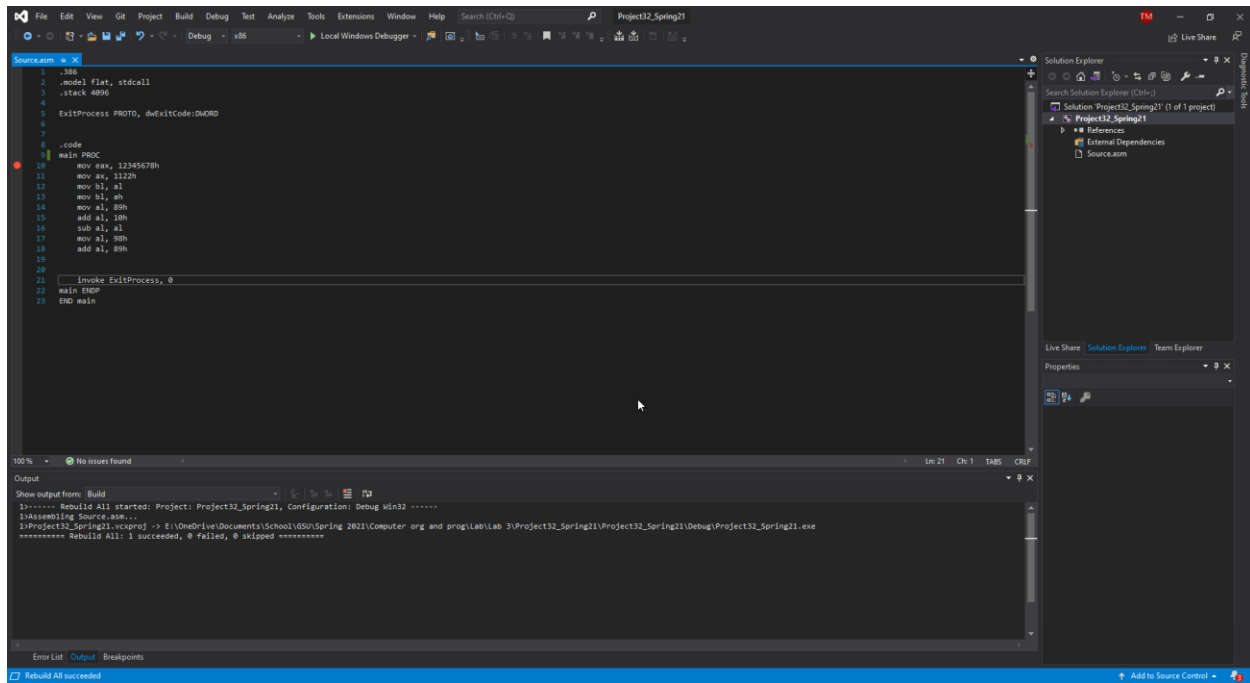Lab 3

Tracy Michaels

Section 018

Part A)

CSC 3210

Computer Organization and Programming

Lab 3 (b)

Answer Sheet

Student Name: Tracy Michaels

Section: 018

Debug through each line of code and explain the register content and flags.

(We already answered line 10 to 13 for your reference. Start writing your answer from Line 14)

Line: 10

Instruction: mov eax, 12345678h

Register value: EAX = 12345678

Explanation: 12345678 is a hexadecimal value which is 32-bit in binary. EAX register is also 32-bit.

Line 11:

Instruction: mov ax, 1122h

Register value: EAX = 12341122h

Explanation: 1122 is hexadecimal and it is 16-bit in binary. this mov instruction only updates AX (16 bit) register, a part of EAX register. That's why you can see that the upper portion of EAX register is NOT updated.

Line 12:

Instruction: mov bl, al

Register value: EBX = _ _ _ _ _ _ 22

Explanation: AL register is 8-bit long. When you mov the content of al register (22) to BL register, it only updates the first 8-bit of the EBX register. The rest contains the garbage value.

Line 14:

Instruction: mov al, 89h

What Register value of EAX register, after executing line 14.

- Register value: EAX = 12341189h

Explain the content of the EAX register.

- Explanation: move the hexadecimal number 89h, which is an 8-bit binary number into the lower part of the EAX register (AL or A Low) while the rest of the EAX register remains unchanged

Line 15:

Instruction: add al, 10h

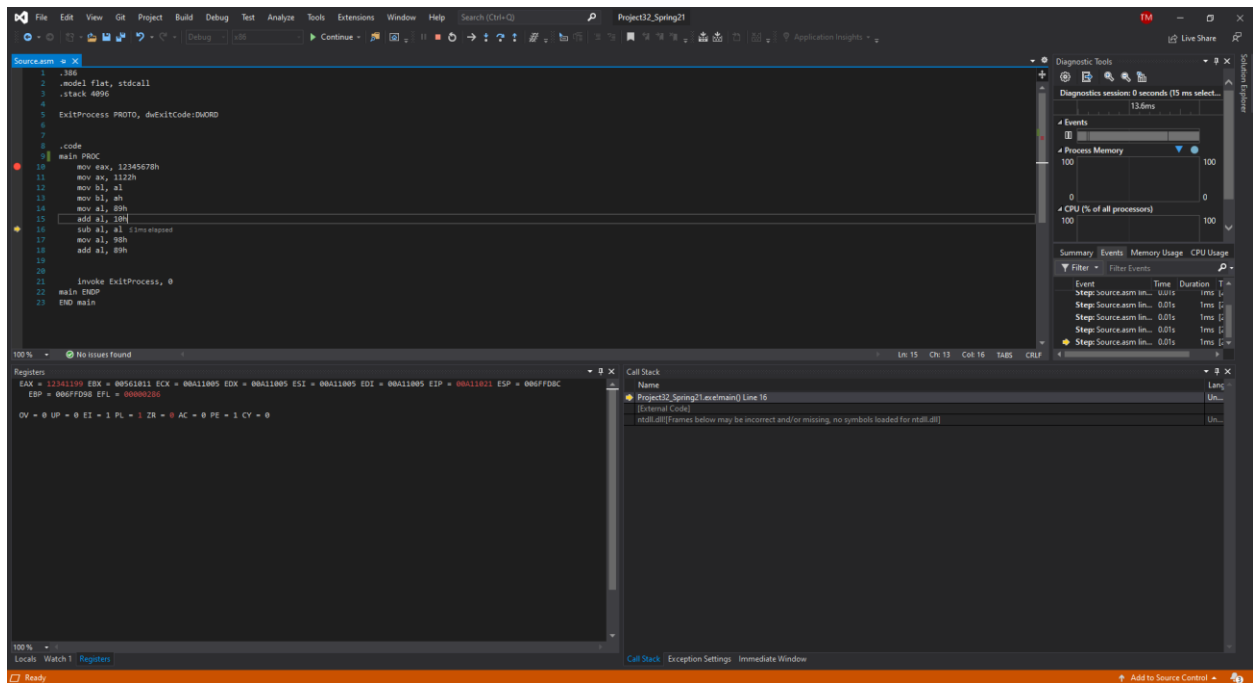What Register value of EAX, after executing line 15?

- Register Value: EAX = 12341199h

Do you see any change in flags?

- Sign Flag changed to a 1
- Zero Flag changed to a 0

Show the step of the hexadecimal addition.

Line 16:

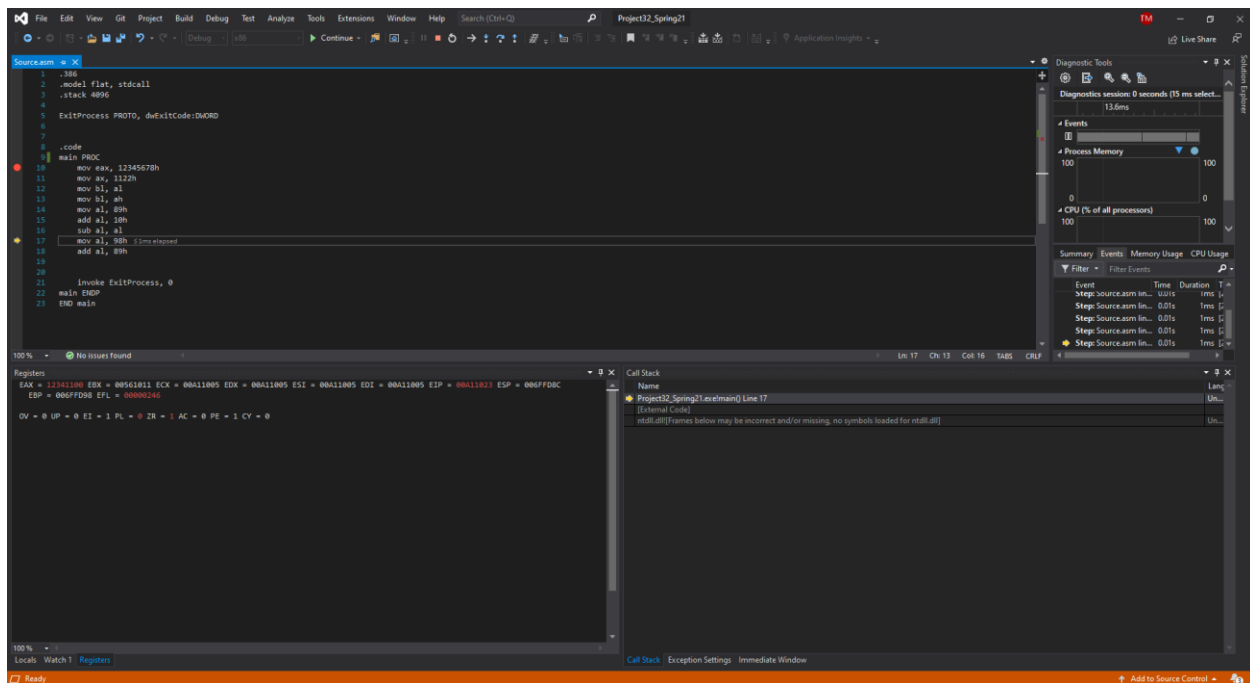Instruction: sub al, al

What Register value of EAX, after executing line 15?

-    Register Value: EAX = 12341100h

Do you see any change in flags?

-    Sign Flag chanted to 0
-    Sero Flag changed to 1

Show the step of the hexadecimal subtraction.

Line 17, 18:

Instruction:

      mov al, 98h

      add al, 89h

What Register value of EAX, after executing line 17 and 18?

- Line 17 Register Value: EAX = 12341198h
- Line 18 Register Value: EAX = 12341121h

Do you see any change in flags?

- Overflow Flag changed to a 1
- Zero Flag changed to a 0
- Carry Flag changed to a 1
- Auxiliary Flag Changed to a 1

Show the step of the hexadecimal addition.

```asm
1     .386
2     .model flat, stdcall
3     .stack 4096
4
5     ExitProcess PROTO, dwExitCode:DWORD
6
7
8     .code
9     main PROC
10        mov eax, 12345678h
11        mov ax, 1122h
12        mov bl, al
13        mov bl, ah
14        mov al, 89h
15        add al, 10h
16        sub al, al
17        mov al, 98h
18        add al, 89h
19
20
21        invoke ExitProcess, 0    <1ms elapsed
22    main ENDP
23    END main
```

100 %   No issues found   Ln: 21   Ch: 1   TABS   CRLF

Registers

```
EAX = 12341121 EBX = 00561011 ECX = 00A11005 EDX = 00A11005 ESI = 00A11005 EDI = 00A11005 EIP = 00A11027 ESP = 006FFD8C
EBP = 006FFD98 EFL = 00000A17

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

100 %

Locals   Watch 1   Registers

Call Stack

Name	Lang
Project32_Spring21.exe!main() Line 21	Un...
[External Code]	
ntdll.dll![Frames below may be incorrect and/or missing, no symbols loaded for ntdll.dll]	Un...

Call Stack   Exception Settings   Immediate Window

Ready   Add to Source Control

Part C)

Lab 3

Problem 1 $\quad 0. \dfrac{\left((0.5 \cdot 3) + (0.5 \cdot 10) \right) \cdot 500 \cdot 10^6}{2.2 \times 10^9}$

$= \dfrac{3250 \times 10^6}{2.2 \times 10^9} = \dfrac{3250}{2.2 \times 10^3} = \boxed{1.477 \text{ seconds}}$

Problem 2 $\quad 20 \cdot 30 = \boxed{600 \times 10^6 \text{ instructions}}$