HW # 6: Stacks and Procedures

All main questions carry equal weight. Credit awarded to only those answers for which work has been shown

1. [Procedures] Write a main program which sets the registers BX to either 0, 1 or 2. Write a procedure *DisplayTiger which* will display the string "War Eagle" in Blue or Orange depending upon the whether the input is 0 or 1. Single step through the program, displaying the values of the stack pointer so that you understand how the call and return are implemented.

List file for hw6-1.asm

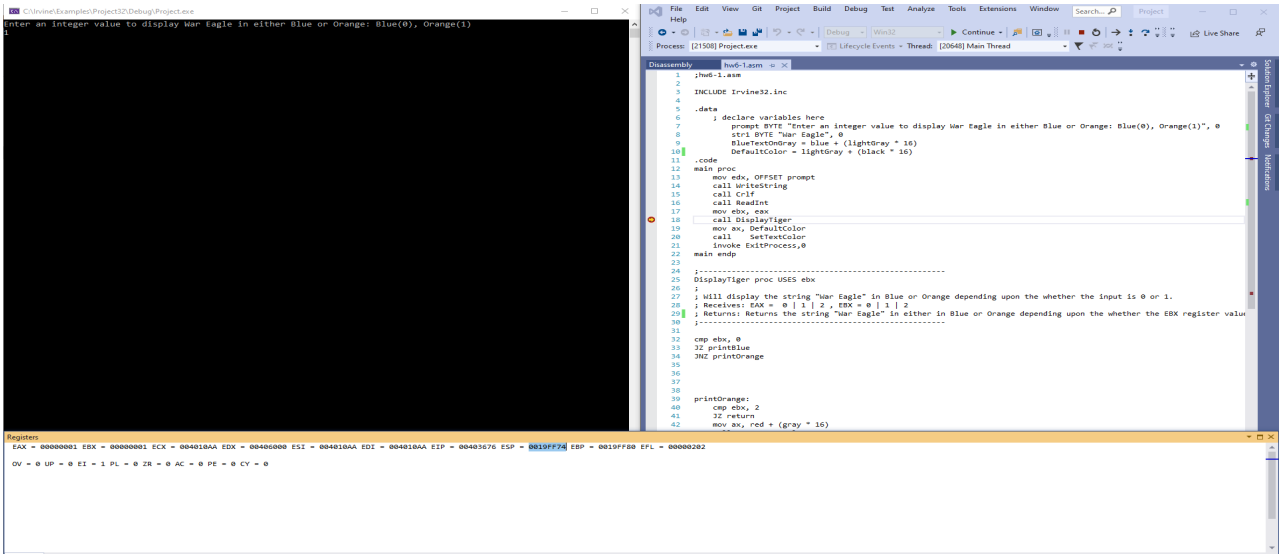
```
Microsoft (R) Macro Assembler Version 14.28.29337.0        03/03/21 19:03:00
hw6-1.asm                                                Page 1 - 1


                         ;hw6-1.asm

                         INCLUDE Irvine32.inc
                        C ; Include file for Irvine32.lib             (Irvine32.inc)
                        C
                        C ;OPTION CASEMAP:NONE              ; optional: make
identifiers case-sensitive
                        C
                        C INCLUDE SmallWin.inc              ; MS-Windows prototypes,
structures, and constants
                        C .NOLIST
                        C .LIST
                        C
                        C INCLUDE VirtualKeys.inc
                        C ; VirtualKeys.inc
                        C .NOLIST
                        C .LIST
                        C
                        C
                        C .NOLIST
                        C .LIST
                        C

 00000000                .data
                                ; declare variables here
 00000000 45 6E 74 65 72                prompt BYTE "Enter an integer value to display
War Eagle in either Blue or Orange: Blue(0), Orange(1)", 0
          20 61 6E 20 69
          6E 74 65 67 65
          72 20 76 61 6C
          75 65 20 74 6F
          20 64 69 73 70
          6C 61 79 20 57
          61 72 20 45 61
          67 6C 65 20 69
          6E 20 65 69 74
          68 65 72 20 42
          6C 75 65 20 6F
          72 20 4F 72 61
```

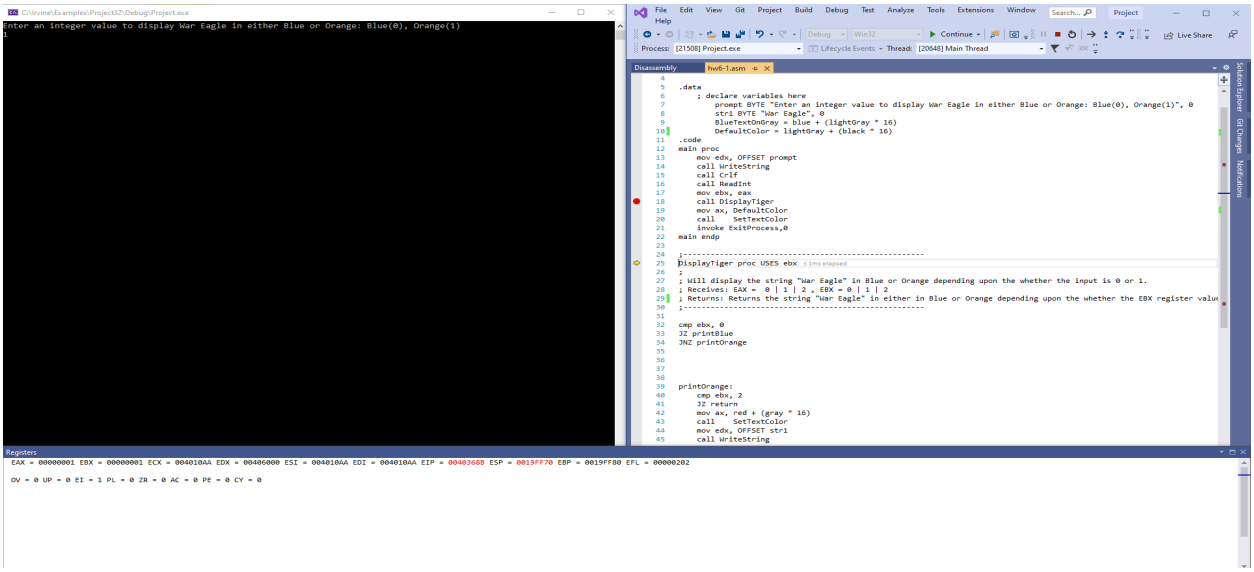
```
         6E 67 65 3A 20
         42 6C 75 65 28
         30 29 2C 20 4F
         72 61 6E 67 65
         28 31 29 00
 00000059 57 61 72 20 45                 str1 BYTE "War Eagle", 0
         61 67 6C 65 00
 = 00000071                              BlueTextOnGray = blue + (lightGray * 16)
 = 00000007                              DefaultColor = lightGray + (black * 16)
 00000000                    .code
 00000000                    main proc
 00000000  BA 00000000 R             mov edx, OFFSET prompt
 00000005  E8 00000000 E             call WriteString
 0000000A  E8 00000000 E             call Crlf
 0000000F  E8 00000000 E             call ReadInt
 00000014  8B D8                     mov ebx, eax
 00000016  E8 00000010                     call DisplayTiger
 0000001B  66| B8 0007                     mov ax, DefaultColor
 0000001F  E8 00000000 E             call   SetTextColor
                                     invoke ExitProcess,0
 00000024  6A 00          *          push   +000000000h
 00000026  E8 00000000 E   *             call   ExitProcess
 0000002B                    main endp

                             ;-----------------------------------------------------
 0000002B                    DisplayTiger proc USES ebx
                             ;
                             ; Will display the string "War Eagle" in Blue or Orange
depending upon the whether the input is 0 or 1.
                             ; Receives: EAX =  0 | 1 | 2 , EBX = 0 | 1 | 2
                             ; Returns: Returns the string "War Eagle" in either in Blue or
Orange depending upon the whether the EBX register value is 0 or 1.
                             ;-----------------------------------------------------

 0000002B  53             *      push   ebx
 0000002C  83 FB 00          cmp ebx, 0
 0000002F  74 1C             JZ printBlue
 00000031  75 00             JNZ printOrange




 00000033                    printOrange:
 00000033  83 FB 02                  cmp ebx, 2
 00000036  74 13                     JZ return
 00000038  66| B8 0084                    mov    ax, red + (gray * 16)
 0000003C  E8 00000000 E             call   SetTextColor
 00000041  BA 00000059 R             mov edx, OFFSET str1
 00000046  E8 00000000 E             call WriteString
 0000004B                    return: ret
 0000004B  5B             *      pop    ebx
 0000004C  C3             *      ret    00000h
 0000004D                    printBlue:
 0000004D  66| B8 0081                    mov    ax,blue + (gray * 16)
 00000051  E8 00000000 E             call   SetTextColor
 00000056  BA 00000059 R             mov edx, OFFSET str1
 0000005B  E8 00000000 E             call WriteString
                             ret
```

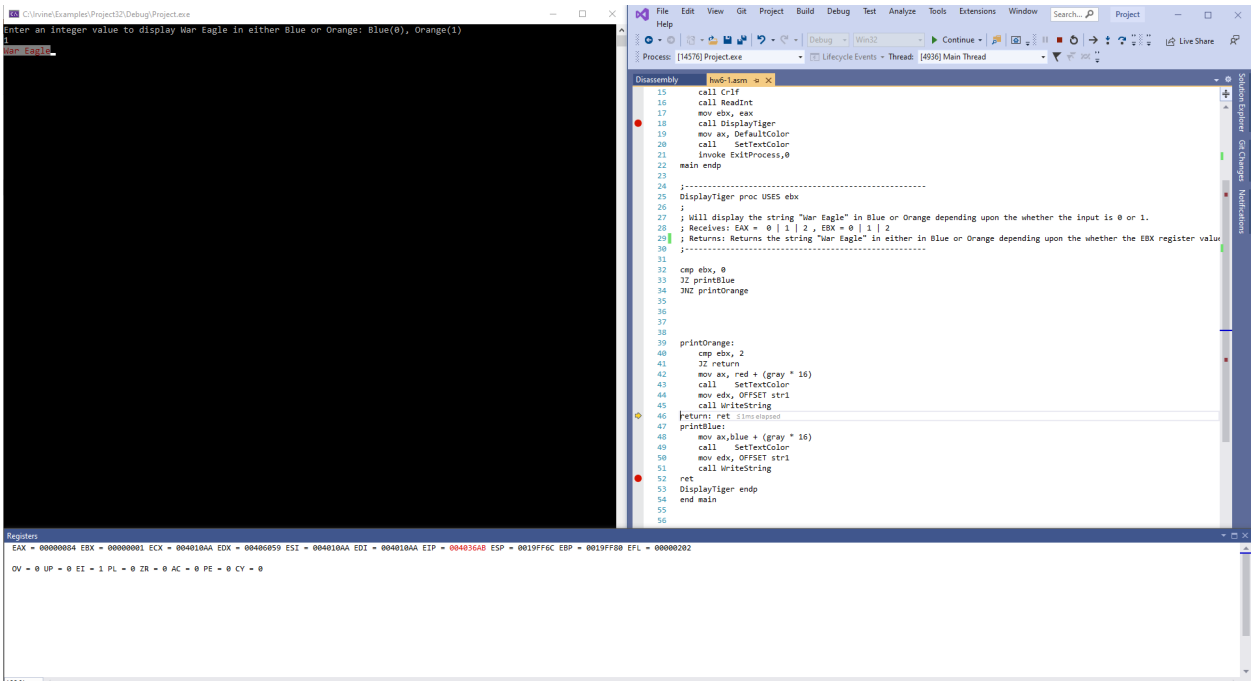
```
 00000060  5B           *       pop    ebx
 00000061  C3           *       ret    00000h
 00000062                   DisplayTiger endp
                            end main

_Microsoft (R) Macro Assembler Version 14.28.29337.0       03/03/21 19:03:00
hw6-1.asm                                                  Symbols 2 - 1
```

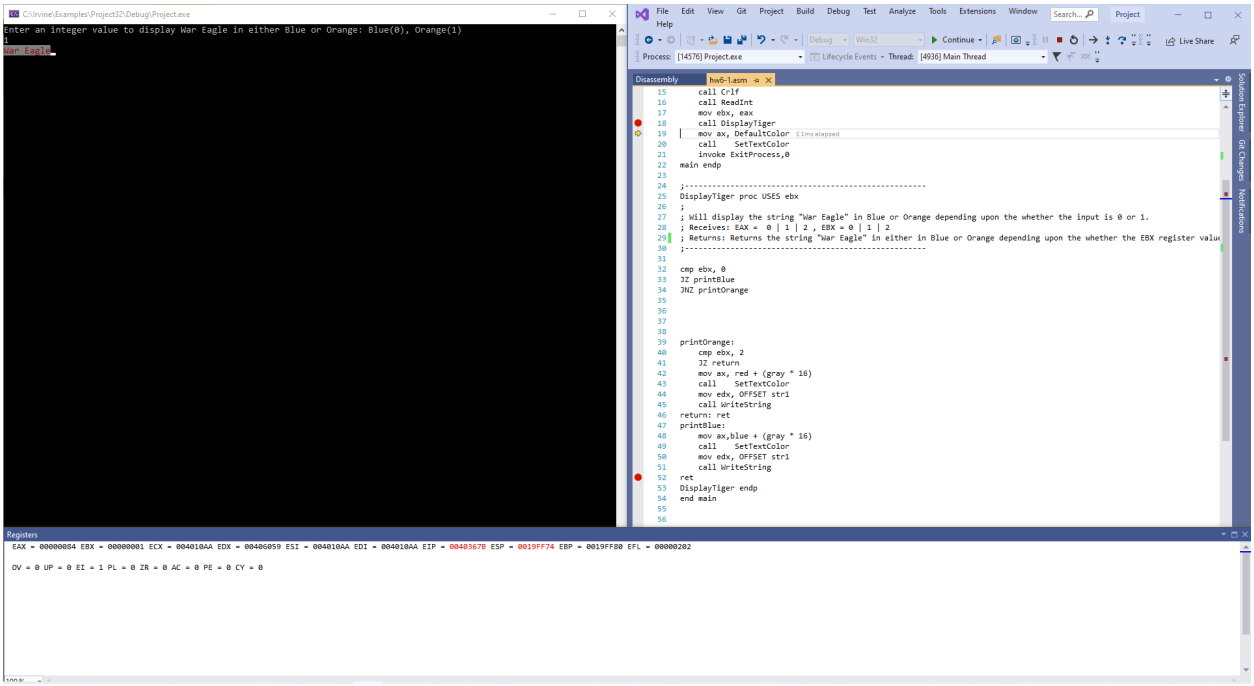
Screenshots for problem 1:

When BX is set to 1:

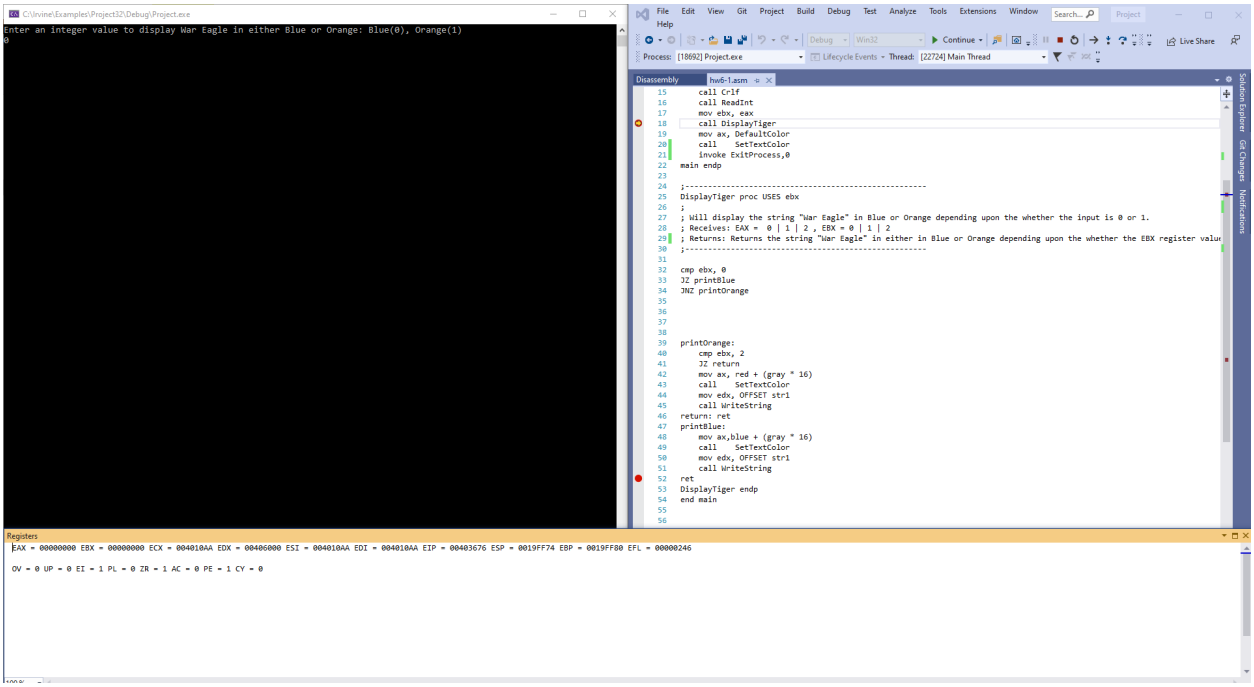


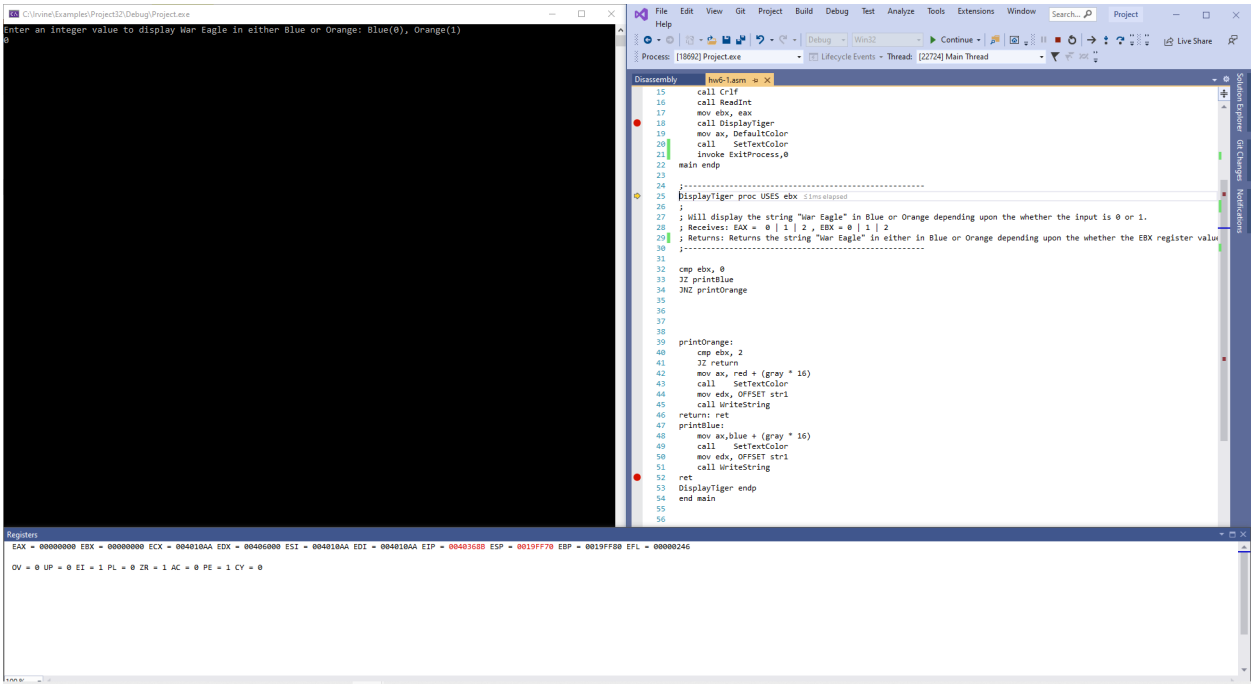


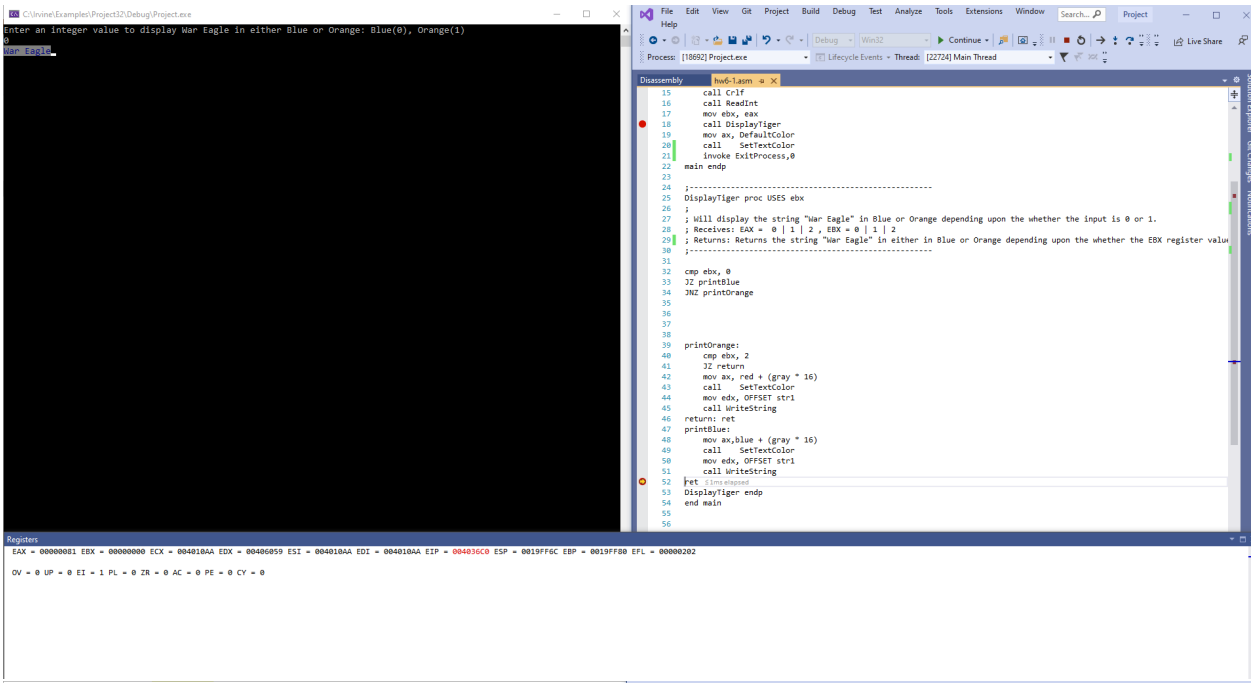

C:\Irvine\Examples\Project32\Debug\Project.exe
Enter an integer value to display War Eagle in either Blue or Orange: Blue(0), Orange(1)
1
War Eagle
File Edit View Git Project Build Debug Test Analyze Tools Extensions Window Help
Search...
Project
Debug
Win32
Continue
Live Share
Process: [14576] Project.exe
Lifecycle Events
Thread: [4936] Main Thread
Disassembly
hw6-1.asm
15 call C>If
16 call ReadInt
17 mov ebx, eax
18 call DisplayTiger
19 mov ax, DefaultColor
20 call SetTextColor
21 invoke ExitProcess,0
22 main endp
23
24 ;---
25 DisplayTiger proc USES ebx
26 ;
27 ; Will display the string "War Eagle" in Blue or Orange depending upon the whether the input is 0 or 1.
28 ; Receives: EAX = 0 | 1 | 2 , EBX = 0 | 1 | 2
29 ; Returns: Returns the string "War Eagle" in either in Blue or Orange depending upon the whether the EBX register valu
30 ;---
31
32 cmp ebx, 0
33 JZ printBlue
34 JNZ printOrange
35
36
37
38
39 printOrange:
40 cmp ebx, 2
41 JZ return
42 mov ax, red + (gray * 16)
43 call SetTextColor
44 mov edx, OFFSET str1
45 call WriteString
46 return: ret
47 printBlue:
48 mov ax,blue + (gray * 16)
49 call SetTextColor
50 mov edx, OFFSET str1
51 call WriteString
52 ret
53 DisplayTiger endp
54 end main
55
56
Registers
EAX = 00000084 EBX = 00000001 ECX = 004010AA EDX = 00406059 ESI = 004010AA EDI = 004010AA EIP = 004036AB ESP = 0019FF6C EBP = 0019FF80 EFL = 00000202
OV = 0 UP = 0 EI = 1 PL = 0 ZR = 0 AC = 0 PE = 0 CY = 0
Solution Explorer
Git Changes
Notifications

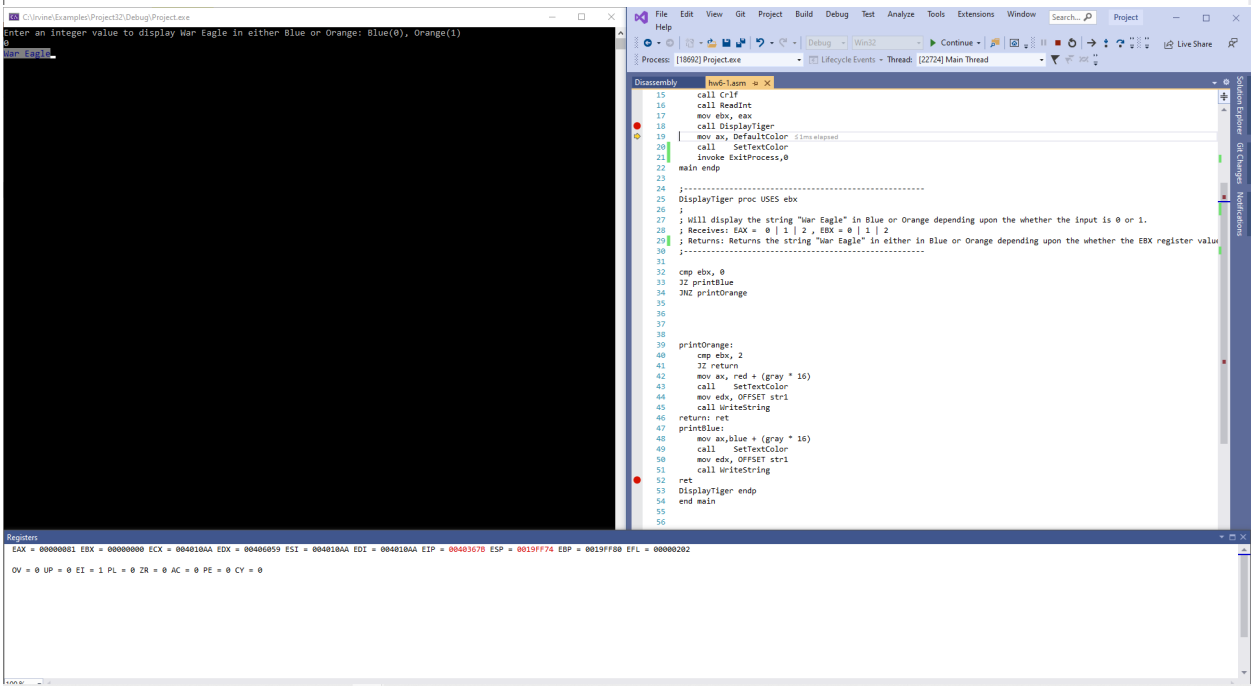

C:\Irvine\Examples\Project32\Debug\Project.exe
Enter an integer value to display War Eagle in either Blue or Orange: Blue(0), Orange(1)
1
War Eagle
File Edit View Git Project Build Debug Test Analyze Tools Extensions Window Help
Search...
Project
Debug
Win32
Continue
Live Share
Process: [14576] Project.exe
Lifecycle Events
Thread: [4936] Main Thread
Disassembly
hw6-1.asm
15 call C>If
16 call ReadInt
17 mov ebx, eax
18 call DisplayTiger
19 mov ax, DefaultColor
20 call SetTextColor
21 invoke ExitProcess,0
22 main endp
23
24 ;---
25 DisplayTiger proc USES ebx
26 ;
27 ; Will display the string "War Eagle" in Blue or Orange depending upon the whether the input is 0 or 1.
28 ; Receives: EAX = 0 | 1 | 2 , EBX = 0 | 1 | 2
29 ; Returns: Returns the string "War Eagle" in either in Blue or Orange depending upon the whether the EBX register valu
30 ;---
31
32 cmp ebx, 0
33 JZ printBlue
34 JNZ printOrange
35
36
37
38
39 printOrange:
40 cmp ebx, 2
41 JZ return
42 mov ax, red + (gray * 16)
43 call SetTextColor
44 mov edx, OFFSET str1
45 call WriteString
46 return: ret
47 printBlue:
48 mov ax,blue + (gray * 16)
49 call SetTextColor
50 mov edx, OFFSET str1
51 call WriteString
52 ret
53 DisplayTiger endp
54 end main
55
56
Registers
EAX = 00000084 EBX = 00000001 ECX = 004010AA EDX = 00406059 ESI = 004010AA EDI = 004010AA EIP = 0040367B ESP = 0019FF74 EBP = 0019FF80 EFL = 00000202
OV = 0 UP = 0 EI = 1 PL = 0 ZR = 0 AC = 0 PE = 0 CY = 0
Solution Explorer
Git Changes
Notifications

When BX is set to 0:

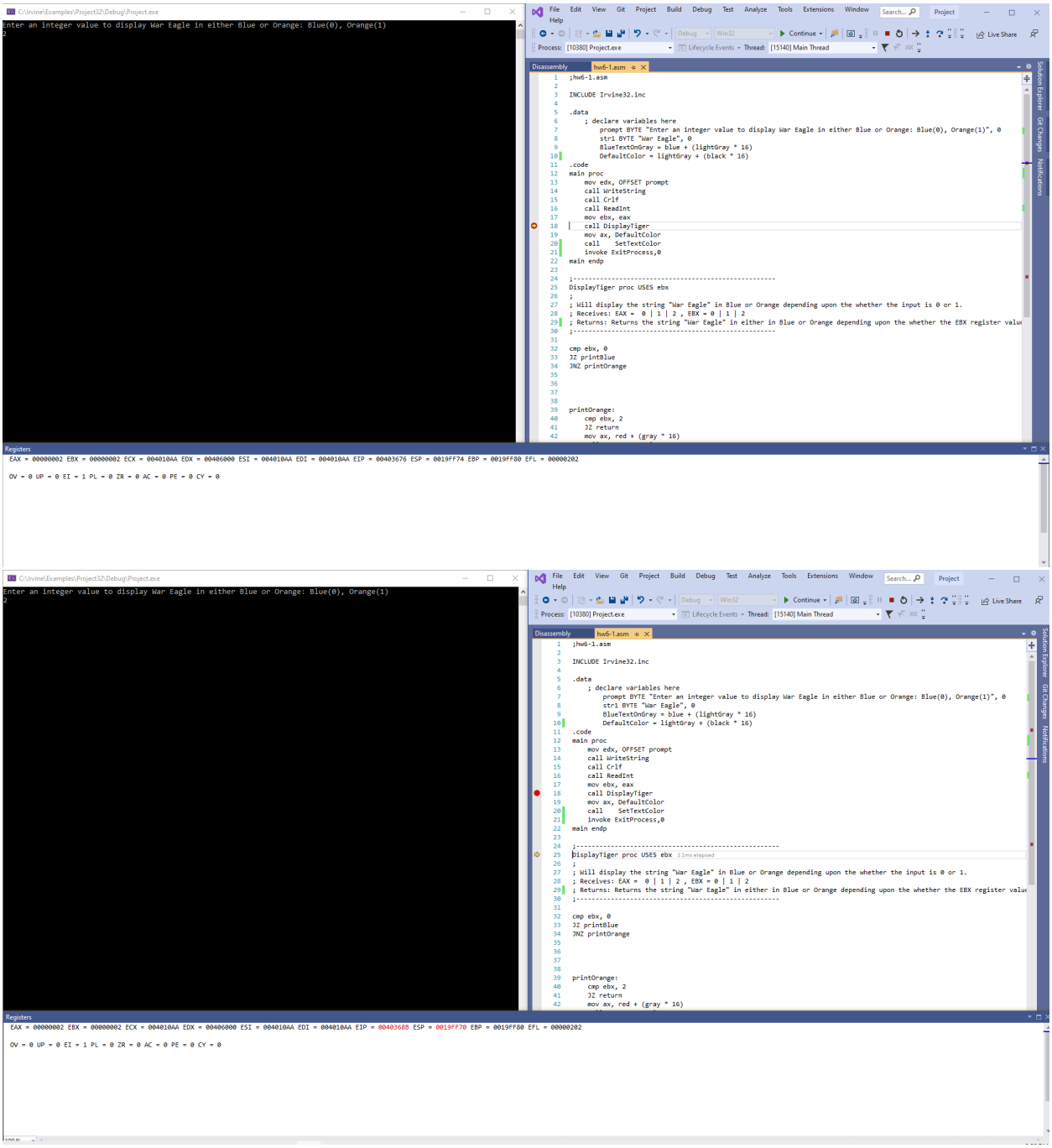


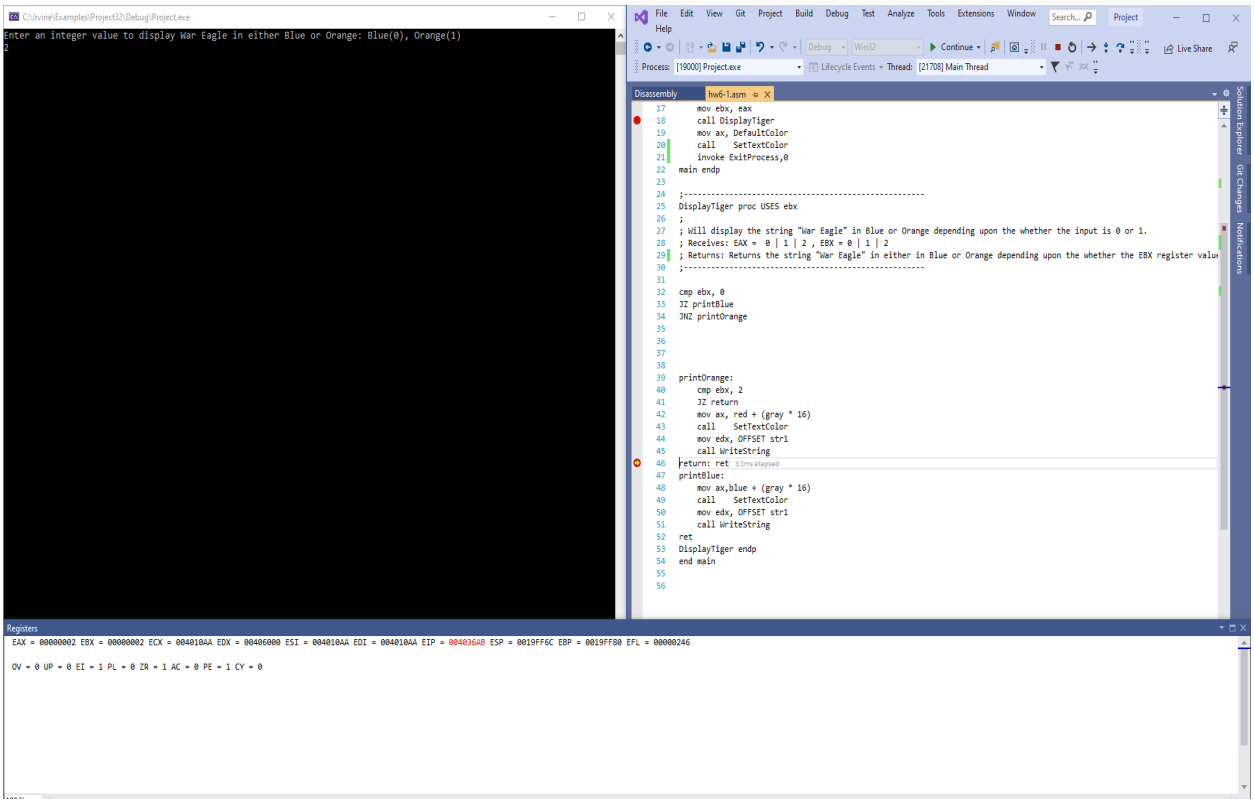


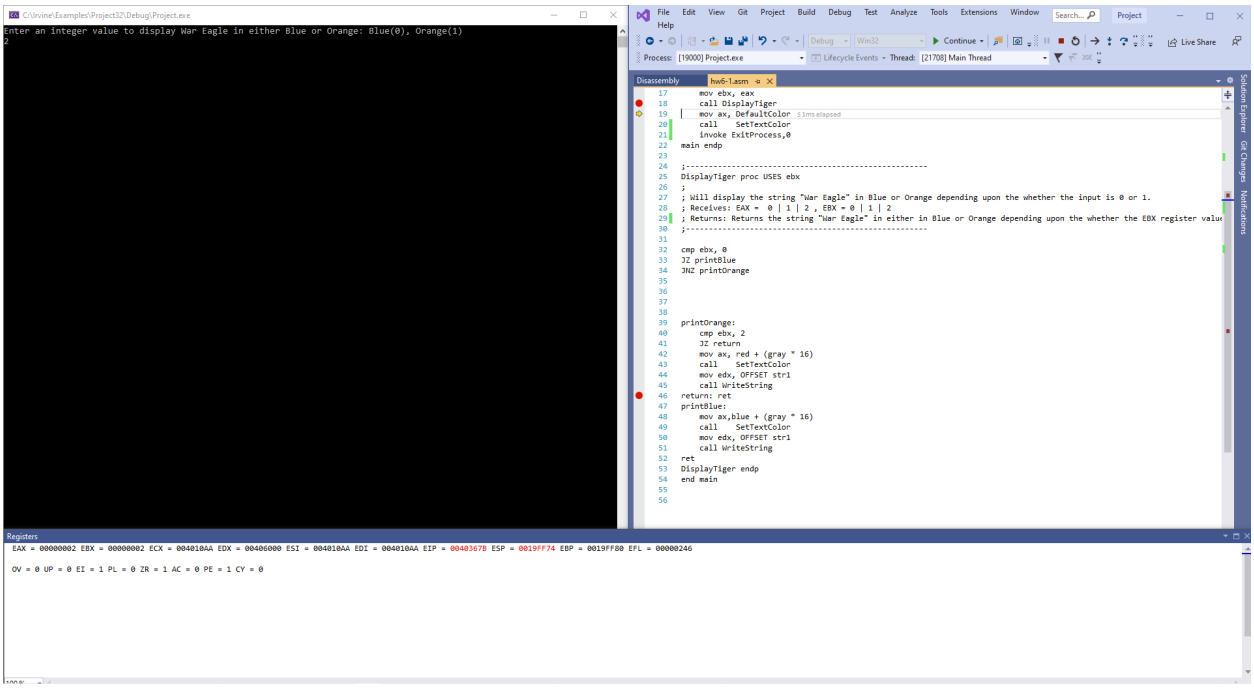

C:\Irvine\Examples\Project32\Debug\Project.exe
Enter an integer value to display War Eagle in either Blue or Orange: Blue(0), Orange(1)
0
War Eagle
File Edit View Git Project Build Debug Test Analyze Tools Extensions Window Help
Search...
Project
Debug
Win32
Continue
Live Share
Process: [18692] Project.exe
Lifecycle Events
Thread: [22724] Main Thread
Disassembly
hw6-1.asm
call Crlf
call ReadInt
mov ebx, eax
call DisplayTiger
mov ax, DefaultColor
call SetTextColor
invoke ExitProcess,0
main endp
;---
DisplayTiger proc USES ebx
;
; Will display the string "War Eagle" in Blue or Orange depending upon the whether the input is 0 or 1.
; Receives: EAX = 0 | 1 | 2 , EBX = 0 | 1 | 2
; Returns: Returns the string "War Eagle" in either in Blue or Orange depending upon the whether the EBX register valu
;---
cmp ebx, 0
JZ printBlue
JNZ printOrange
printOrange:
cmp ebx, 2
JZ return
mov ax, red + (gray * 16)
call SetTextColor
mov edx, OFFSET str1
call WriteString
return: ret
printBlue:
mov ax,blue + (gray * 16)
call SetTextColor
mov edx, OFFSET str1
call WriteString
ret
DisplayTiger endp
end main
Registers
EAX = 00000081 EBX = 00000000 ECX = 004010AA EDX = 00406059 ESI = 004010AA EDI = 004010AA EIP = 004036C0 ESP = 0019FF6C EBP = 0019FF80 EFL = 00000202
OV = 0 UP = 0 EI = 1 PL = 0 ZR = 0 AC = 0 PE = 0 CY = 0


C:\Irvine\Examples\Project32\Debug\Project.exe
Enter an integer value to display War Eagle in either Blue or Orange: Blue(0), Orange(1)
0
War Eagle
File Edit View Git Project Build Debug Test Analyze Tools Extensions Window Help
Search...
Project
Debug
Win32
Continue
Live Share
Process: [18692] Project.exe
Lifecycle Events
Thread: [22724] Main Thread
Disassembly
hw6-1.asm
call Crlf
call ReadInt
mov ebx, eax
call DisplayTiger
mov ax, DefaultColor
call SetTextColor
invoke ExitProcess,0
main endp
;---
DisplayTiger proc USES ebx
;
; Will display the string "War Eagle" in Blue or Orange depending upon the whether the input is 0 or 1.
; Receives: EAX = 0 | 1 | 2 , EBX = 0 | 1 | 2
; Returns: Returns the string "War Eagle" in either in Blue or Orange depending upon the whether the EBX register valu
;---
cmp ebx, 0
JZ printBlue
JNZ printOrange
printOrange:
cmp ebx, 2
JZ return
mov ax, red + (gray * 16)
call SetTextColor
mov edx, OFFSET str1
call WriteString
return: ret
printBlue:
mov ax,blue + (gray * 16)
call SetTextColor
mov edx, OFFSET str1
call WriteString
ret
DisplayTiger endp
end main
Registers
EAX = 00000081 EBX = 00000000 ECX = 004010AA EDX = 00406059 ESI = 004010AA EDI = 004010AA EIP = 0040367B ESP = 0019FF74 EBP = 0019FF80 EFL = 00000202
OV = 0 UP = 0 EI = 1 PL = 0 ZR = 0 AC = 0 PE = 0 CY = 0

When BX is set to 2:




C:\Irvine\Examples\Project32\Debug\Project.exe
Enter an integer value to display War Eagle in either Blue or Orange: Blue(0), Orange(1)
2
File Edit View Git Project Build Debug Test Analyze Tools Extensions Window Help
Search... Project
Debug Win32 Continue Live Share
Process: [19000] Project.exe Lifecycle Events Thread: [21708] Main Thread
Disassembly hw6-1.asm
17 mov ebx, eax
18 call DisplayTiger
19 mov ax, DefaultColor
20 call SetTextColor
21 invoke ExitProcess,0
22 main endp
23
24 ;---
25 DisplayTiger proc USES ebx
26 ;
27 ; Will display the string "War Eagle" in Blue or Orange depending upon the whether the input is 0 or 1.
28 ; Receives: EAX = 0 | 1 | 2 , EBX = 0 | 1 | 2
29 ; Returns: Returns the string "War Eagle" in either in Blue or Orange depending upon the whether the EBX register valu
30 ;---
31
32 cmp ebx, 0
33 JZ printBlue
34 JNZ printOrange
35
36
37
38
39 printOrange:
40 cmp ebx, 2
41 JZ return
42 mov ax, red + (gray * 16)
43 call SetTextColor
44 mov edx, OFFSET str1
45 call WriteString
46 return: ret
47 printBlue:
48 mov ax,blue + (gray * 16)
49 call SetTextColor
50 mov edx, OFFSET str1
51 call WriteString
52 ret
53 DisplayTiger endp
54 end main
55
56
Registers
EAX = 00000002 EBX = 00000002 ECX = 004010AA EDX = 00406000 ESI = 004010AA EDI = 004010AA EIP = 004036AB ESP = 0019FF6C EBP = 0019FF80 EFL = 00000246
OV = 0 UP = 0 EI = 1 PL = 0 ZR = 1 AC = 0 PE = 1 CY = 0
Solution Explorer Git Changes Notifications


C:\Irvine\Examples\Project32\Debug\Project.exe
Enter an integer value to display War Eagle in either Blue or Orange: Blue(0), Orange(1)
2
File Edit View Git Project Build Debug Test Analyze Tools Extensions Window Help
Search... Project
Debug Win32 Continue Live Share
Process: [19000] Project.exe Lifecycle Events Thread: [21708] Main Thread
Disassembly hw6-1.asm
17 mov ebx, eax
18 call DisplayTiger
19 mov ax, DefaultColor
20 call SetTextColor
21 invoke ExitProcess,0
22 main endp
23
24 ;---
25 DisplayTiger proc USES ebx
26 ;
27 ; Will display the string "War Eagle" in Blue or Orange depending upon the whether the input is 0 or 1.
28 ; Receives: EAX = 0 | 1 | 2 , EBX = 0 | 1 | 2
29 ; Returns: Returns the string "War Eagle" in either in Blue or Orange depending upon the whether the EBX register valu
30 ;---
31
32 cmp ebx, 0
33 JZ printBlue
34 JNZ printOrange
35
36
37
38
39 printOrange:
40 cmp ebx, 2
41 JZ return
42 mov ax, red + (gray * 16)
43 call SetTextColor
44 mov edx, OFFSET str1
45 call WriteString
46 return: ret
47 printBlue:
48 mov ax,blue + (gray * 16)
49 call SetTextColor
50 mov edx, OFFSET str1
51 call WriteString
52 ret
53 DisplayTiger endp
54 end main
55
56
Registers
EAX = 00000002 EBX = 00000002 ECX = 004010AA EDX = 00406000 ESI = 004010AA EDI = 004010AA EIP = 0040367B ESP = 0019FF74 EBP = 0019FF80 EFL = 00000246
OV = 0 UP = 0 EI = 1 PL = 0 ZR = 1 AC = 0 PE = 1 CY = 0
Solution Explorer Git Changes Notifications

2. [Arrays] Write a program that:

- 1. Prompts the user for integer input 5 times
  2. Stores these inputs in a stack using the Push instruction
  3. After the storing is complete in Step 2, pop the stored values and display them on the screen using WriteInt (notDumpRegs).

Use the following:

```
.data
PromptUser BYTE "Please enter a value:", 0
```

In your submission, please embed the full program (.asm and .lst file) and one screen shot with at least one positive and one negative input value.

List file for hw6-2.asm

```
hw6-2.asm                                              Page 1 - 1


                         ; hw6-2.asm

                         INCLUDE Irvine32.inc
                        C ; Include file for Irvine32.lib             (Irvine32.inc)
                        C
                        C ;OPTION CASEMAP:NONE             ; optional: make
identifiers case-sensitive
                        C
                        C INCLUDE SmallWin.inc             ; MS-Windows prototypes,
structures, and constants
                        C .NOLIST
                        C .LIST
                        C
                        C INCLUDE VirtualKeys.inc
                        C ; VirtualKeys.inc
                        C .NOLIST
                        C .LIST
                        C
                        C
                        C .NOLIST
                        C .LIST
                        C
 00000000                .data
 00000000 50 6C 65 61 73  PromptUser BYTE "Please enter a value:", 0
          65 20 65 6E 74
          65 72 20 61 20
          76 61 6C 75 65
          3A 00
 00000016 48 65 72 65 20  Stackcontent BYTE "Here are the stack values:", 0
          61 72 65 20 74
```

```
          68 65 20 73 74
          61 63 6B 20 76
          61 6C 75 65 73
          3A 00
 00000031  00000005 [             inputArray DWORD 5 DUP(?)
           00000000
          ]
 00000000                   .code
 00000000                   main proc
 00000000  B9 00000005             mov ecx, LENGTHOF inputArray
 00000005  BE 00000031 R    mov esi, OFFSET inputArray

 0000000A                   L1:
 0000000A  BA 00000000 R    mov edx,OFFSET PromptUser
 0000000F  E8 00000000 E    call  WriteString
 00000014  E8 00000000 E    call  Crlf
 00000019  E8 00000000 E    call  ReadInt
 0000001E  50               push eax
 0000001F  E2 E9            loop l1

 00000021  E8 00000000 E    call Crlf
 00000026  BA 00000016 R    mov edx, OFFSET Stackcontent
 0000002B  E8 00000000 E    call WriteString
 00000030  B9 00000005             mov ecx, LENGTHOF inputArray

 00000035                   L2:
 00000035  58               pop eax
 00000036  E8 00000000 E    call Crlf
 0000003B  E8 00000000 E    call WriteInt
 00000040  E2 F3            loop L2

                            invoke ExitProcess,0
 00000042  6A 00        *       push   +000000000h
 00000044  E8 00000000 E   *          call   ExitProcess
 00000049                   main endp
                            end main
_Microsoft (R) Macro Assembler Version 14.28.29337.0       03/03/21 20:37:08
hw6-2.asm                                                Symbols 2 - 1
```

.asm file for hw6-2.asm

```
; hw6-2.asm

INCLUDE Irvine32.inc
.data
PromptUser BYTE "Please enter a value:", 0
Stackcontent BYTE "Here are the stack values:", 0
inputArray DWORD 5 DUP(?)
.code
main proc
mov ecx, LENGTHOF inputArray
mov esi, OFFSET inputArray

L1:
mov edx,OFFSET PromptUser
call  WriteString
```

```
call  Crlf
call  ReadInt
push eax
loop l1

call Crlf
mov edx, OFFSET Stackcontent
call WriteString
mov ecx, LENGTHOF inputArray

L2:
pop eax
call Crlf
call WriteInt
loop L2

invoke ExitProcess,0
main endp
end main
```

screen shot with at least one positive and one negative input value.

3. [Compares, Procedures] Write a procedure, *Search* which searches the stack for the value that you provide in the register AX and returns its index, assuming the first value is stored in index *0*. Write a main program that fills the stack with negative values, sets AX and calls *Search* and prints the index at which the value was found.

For example, if the inputs are: -5, -6, -1, -10, -44, -79

and AX is set in the main program to be -1, then the expected output of your code is:

The target value is -1, and is located at index: 2

In cases where more than one element has the same value, you only have to output one of them. If the value is not found, print 0.

Use the following:

```
.data
prompt      BYTE "Please input a value: ", 0
spacing     BYTE ", ",0;
String2     BYTE "The target value is,” 0
String2     BYTE “and is located at index: ",0
String3     BYTE  "Value not found,", 0
```

In your submission, please embed the full program (.asm and .lst file) and one screen shot showing the values found. Please test several sets of positive and negative values

asm file

```
; hw6-3.asm

INCLUDE Irvine32.inc

.data
	prompt  BYTE "Please input a value: ", 0
	spacing BYTE ", ",0
	Str2 BYTE "The target value is ", 0
	Str3 BYTE "and is located at index: ", 0
	Str4 BYTE  "Value not found,", 0
	target SDWORD ?
	firstValue SDWORD ?
.code
	main proc


	mov ecx, 5
	mov esi, 0

	input:
	mov edx, OFFSET prompt
	call WriteString
	mov edx, OFFSET spacing
	call WriteString
	call ReadInt
	push eax
	loop input
```

```
	mov ebp, esp

	mov edx, OFFSET Str2
	call WriteString
	call ReadInt


	call Search

	invoke ExitProcess,0
	main endp
	;-----------------------------------------------------------------------------------------------------------------;
	Search proc USES ebp
	;-----------------------------------------------------------------------------------------------------------------;
	; Searches the stack for the value that you provide in the register AX and returns its index.
	; Receives: AX
	; Returns: Returns the index of the value stored in AX, assuming the first value is stored in index 0

	;-----------------------------------------------------------------------------------------------------------------;

	mov ebx, [ebp + 16]
	mov firstValue, ebx

	cmp eax, [ebp]
	JZ fifthVal
	JNZ forthVal

	fifthVal:
	mov edx, OFFSET Str3
	call WriteString
	mov eax, 4
	call WriteDec

	ret


	forthVal:
	cmp eax, [ebp + 4]
	JNZ thirdVal
	mov edx, OFFSET Str3
	call WriteString
	;pop [ebp + 4]
	mov eax, 3
	call WriteDec
	ret

	thirdVal:
	cmp eax, [ebp + 8]
	JNZ secVal
	mov edx, OFFSET Str3
	call WriteString
	mov eax, 2
	call WriteDec
```

```
	ret

	secVal:
	cmp eax, [ebp + 12]
	JNZ fVal
	mov edx, OFFSET Str3
	call WriteString
	mov eax, 1
	call WriteDec
	ret

	fVal:
	cmp eax, [ebp + 16]
	JNZ ValNotFound
	mov edx, OFFSET Str3
	call WriteString
	mov eax, 0
	call WriteDec
	ret

	ValNotFound:
	mov edx, OFFSET Str4
	call WriteString
	mov eax, -1
	call WriteInt
	ret
	Search endp
	end main



	list file

	; hw6-3.asm

                         INCLUDE Irvine32.inc
                        C ; Include file for Irvine32.lib             (Irvine32.inc)
                        C
                        C ;OPTION CASEMAP:NONE              ; optional: make
identifiers case-sensitive
                        C
                        C INCLUDE SmallWin.inc              ; MS-Windows prototypes,
structures, and constants
                        C .NOLIST
                        C .LIST
                        C
                        C INCLUDE VirtualKeys.inc
                        C ; VirtualKeys.inc
                        C .NOLIST
                        C .LIST
                        C
                        C
                        C .NOLIST
                        C .LIST
                        C

 00000000                .data
 00000000 50 6C 65 61 73          prompt  BYTE "Please input a value: ", 0
```

```
         65 20 69 6E 70
         75 74 20 61 20
         76 61 6C 75 65
         3A 20 00
 00000017 2C 20 00               spacing BYTE ", ",0
 0000001A 54 68 65 20 74         Str2 BYTE "The target value is ", 0
         61 72 67 65 74
         20 76 61 6C 75
         65 20 69 73 20
         00
 0000002F 61 6E 64 20 69         Str3 BYTE "and is located at index: ", 0
         73 20 6C 6F 63
         61 74 65 64 20
         61 74 20 69 6E
         64 65 78 3A 20
         00
 00000049 56 61 6C 75 65         Str4 BYTE  "Value not found,", 0
         20 6E 6F 74 20
         66 6F 75 6E 64
         2C 00
 0000005A 00000000               target SDWORD ?
 0000005E 00000000               firstValue SDWORD ?
 00000000                  .code
 00000000                        main proc


 00000000  B9 00000005                 mov ecx, 5
 00000005  BE 00000000                 mov esi, 0

 0000000A                        input:
 0000000A  BA 00000000 R         mov edx, OFFSET prompt
 0000000F  E8 00000000 E         call WriteString
 00000014  BA 00000017 R         mov edx, OFFSET spacing
 00000019  E8 00000000 E         call WriteString
 0000001E  E8 00000000 E         call ReadInt
 00000023  50                    push eax
 00000024  E2 E4                 loop input
 00000026  8B EC                 mov ebp, esp

 00000028  BA 0000001A R         mov edx, OFFSET Str2
 0000002D  E8 00000000 E         call WriteString
 00000032  E8 00000000 E         call ReadInt


 00000037  E8 00000007                 call Search

                                 invoke ExitProcess,0
 0000003C  6A 00        *       push   +000000000h
 0000003E  E8 00000000 E   *           call   ExitProcess
 00000043                        main endp
                                 ;--------------------------------------------------
-----------------------------------------------------------------------------;
 00000043                        Search proc USES ebp
                                 ;--------------------------------------------------
-----------------------------------------------------------------------------;
                                 ; Searches the stack for the value that you provide in
the register AX and returns its index.
                                 ; Receives: AX
```

```
                                ; Returns: Returns the index of the value stored in AX,
assuming the first value is stored in index 0

                                ;---------------------------------------------------
-------------------------------------------------------------------------;

 00000043  55           *       push   ebp
 00000044  8B 5D 10             mov ebx, [ebp + 16]
 00000047  89 1D 0000005E R     mov firstValue, ebx

 0000004D  3B 45 00             cmp eax, [ebp]
 00000050  74 02                JZ fifthVal
 00000052  75 16                JNZ forthVal

 00000054                       fifthVal:
 00000054  BA 0000002F R        mov edx, OFFSET Str3
 00000059  E8 00000000 E        call WriteString
 0000005E  B8 00000004                 mov eax, 4
 00000063  E8 00000000 E        call WriteDec

                                ret
 00000068  5D           *       pop    ebp
 00000069  C3           *       ret    00000h


 0000006A                       forthVal:
 0000006A  3B 45 04             cmp eax, [ebp + 4]
 0000006D  75 16                JNZ thirdVal
 0000006F  BA 0000002F R        mov edx, OFFSET Str3
 00000074  E8 00000000 E        call WriteString
                                ;pop [ebp + 4]
 00000079  B8 00000003                 mov eax, 3
 0000007E  E8 00000000 E        call WriteDec
                                ret
 00000083  5D           *       pop    ebp
 00000084  C3           *       ret    00000h

 00000085                       thirdVal:
 00000085  3B 45 08             cmp eax, [ebp + 8]
 00000088  75 16                JNZ secVal
 0000008A  BA 0000002F R        mov edx, OFFSET Str3
 0000008F  E8 00000000 E        call WriteString
 00000094  B8 00000002                 mov eax, 2
 00000099  E8 00000000 E        call WriteDec
                                ret
 0000009E  5D           *       pop    ebp
 0000009F  C3           *       ret    00000h

 000000A0                       secVal:
 000000A0  3B 45 0C             cmp eax, [ebp + 12]
 000000A3  75 16                JNZ fVal
 000000A5  BA 0000002F R        mov edx, OFFSET Str3
 000000AA  E8 00000000 E        call WriteString
 000000AF  B8 00000001                 mov eax, 1
 000000B4  E8 00000000 E        call WriteDec
                                ret
 000000B9  5D           *       pop    ebp
 000000BA  C3           *       ret    00000h
```

```
 000000BB                           fVal:
 000000BB  3B 45 10                 cmp eax, [ebp + 16]
 000000BE  75 16                    JNZ ValNotFound
 000000C0  BA 0000002F R            mov edx, OFFSET Str3
 000000C5  E8 00000000 E            call WriteString
 000000CA  B8 00000000                     mov eax, 0
 000000CF  E8 00000000 E            call WriteDec
                                    ret
 000000D4  5D            *       pop    ebp
 000000D5  C3            *       ret    00000h

 000000D6                           ValNotFound:
 000000D6  BA 00000049 R            mov edx, OFFSET Str4
 000000DB  E8 00000000 E            call WriteString
 000000E0  B8 FFFFFFFF                     mov eax, -1
 000000E5  E8 00000000 E            call WriteInt
                                    ret
 000000EA  5D            *       pop    ebp
 000000EB  C3            *       ret    00000h
 000000EC                           Search endp
                                    end main
_Microsoft (R) Macro Assembler Version 14.28.29337.0       03/03/21 20:49:12
hw6-3.asm                                                Symbols 2 - 1
```

Microsoft Visual Studio Debug Console

```
Please input a value: , -1
Please input a value: , -2
Please input a value: , -3
Please input a value: , -4
Please input a value: , -5
The target value is -1
and is located at index: 0
C:\Irvine\Examples\Project32\Debug\Project.exe (process 23676) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Autom
Press any key to close this window . . .
```

Microsoft Visual Studio Debug Console

```
Please input a value: , -1
Please input a value: , -2
Please input a value: , -3
Please input a value: , -4
Please input a value: , -5
The target value is -2
and is located at index: 1
C:\Irvine\Examples\Project32\Debug\Project.exe (process 13712) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debu
Press any key to close this window . . .
```

Microsoft Visual Studio Debug Console

```
Please input a value: , -1
Please input a value: , -2
Please input a value: , -3
Please input a value: , -4
Please input a value: , -5
The target value is -3
and is located at index: 2
C:\Irvine\Examples\Project32\Debug\Project.exe (process 16600) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debuggi
Press any key to close this window . . .
```

Microsoft Visual Studio Debug Console

```
Please input a value: , -1
Please input a value: , -2
Please input a value: , -3
Please input a value: , -4
Please input a value: , -5
The target value is -4
and is located at index: 3
C:\Irvine\Examples\Project32\Debug\Project.exe (process 16020) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging
Press any key to close this window . . .
```

Microsoft Visual Studio Debug Console

```
Please input a value: , -1
Please input a value: , -2
Please input a value: , -3
Please input a value: , -4
Please input a value: , -5
The target value is -5
and is located at index: 4
C:\Irvine\Examples\Project32\Debug\Project.exe (process 22728) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically
Press any key to close this window . . .
```

Value not found:

Microsoft Visual Studio Debug Console

```
Please input a value: , -1
Please input a value: , -2
Please input a value: , -3
Please input a value: , -4
Please input a value: , -5
The target value is -6
Value not found,-1
C:\Irvine\Examples\Project32\Debug\Project.exe (process 11516) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close
Press any key to close this window . . .
```

where more than one element has the same value, and only one of them is outputted

output shows the index of the last instance of the repeated element -5 in the screenshot below: