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| Week | Reverse Engineering Malware | Duration |
| 4 | Procedures in Assembly Language | 120 mins |

Marks allocation: 8/100 for CA practical submission

**Lesson Objectives**

* Understand procedures in assembly language
* Write and execute assembly language programs using procedures

1. Which statement is true about what will happen when the example code runs?

1: main PROC

2: push 10

3: push 20

4: call Ex2Sub

5: pop eax

6: INVOKE ExitProcess,0 ; program ends

7: main ENDP

8:

9: Ex2Sub PROC

10: pop eax

11: ret

12: Ex2Sub ENDP

a. EAX will equal 10 on line 6

b. The program will halt with a runtime error on Line 10

c. EAX will equal 20 on line 6

d. The program will halt with a runtime error on Line 11

2. What values will be written to the array when the following code executes?

.data

array DWORD 4 DUP(0)

.code

main PROC

mov eax,10

mov esi,0

call proc\_1

add esi,4

add eax,10

mov array[esi],eax

INVOKE ExitProcess,0 ; program ends

main ENDP

proc\_1 PROC

call proc\_2

add esi,4

add eax,10

mov array[esi],eax

ret

proc\_1 ENDP

proc\_2 PROC

call proc\_3

add esi,4

add eax,10

mov array[esi],eax

ret

proc\_2 ENDP

proc\_3 PROC

mov array[esi],eax

ret

proc\_3 ENDP

Ans: array[0] = 10, array[4] = 20, array[8] = 30, array[12] = 40

3. What a procedure in assembly language to calculate the area of rectangle.

To get the area of any rectangle, we have to multiply its length and width.

Area = Length \* Width

Assume that the l = 30 cm and w = 20 cm. Use appropriate 32 bit registers.

Hint: Length and Width are reserved words so cannot be used as variable names. Declare your variables as l and w. Use MUL w

Done without interactivity.asm

INCLUDE Irvine32.inc

.data

area SDWORD 0

l SDWORD 30

w SDWORD 20

.code

main PROC

mov eax,l

mul w

mov area,eax

INVOKE ExitProcess,0 ; program ends

main ENDP

END main

Done using interactivity.asm

INCLUDE Irvine32.inc

COUNT = 3

.data

val1 SDWORD ?

val2 SDWORD ?

str1 BYTE "Enter an length: ",0

str4 BYTE "Enter an width: ",0

str2 BYTE "The sum is: ",0

str3 BYTE "Press any key... ",0

area SDWORD 0

l SDWORD ?

w SDWORD ?

row BYTE ?

col BYTE ?

.code

main PROC

mov ecx,count

; Input multiple integers, using a loop

L1:

call ClrScr

mov area,0 ; reset sum each time loop is repeated

mov row,8

mov col,20

call Locate

; input the two integers

call Input

mov l,eax

add row,2

call Input2

mov w,eax

mul l

mov area,eax

call DisplaySum

call WaitForKey

loop L1

exit

main ENDP

; input an integer

Input PROC

call Locate

mov edx,OFFSET str1

call WriteString

call ReadInt

ret

Input ENDP

Input2 PROC

call Locate

mov edx,OFFSET str4

call WriteString

call ReadInt

ret

Input2 ENDP

; locate the cursor

Locate PROC

mov dh,row

mov dl,col

call Gotoxy

ret

Locate ENDP

DisplaySum PROC

add row,2

call Locate

mov edx,OFFSET str2

call WriteString

mov eax,area

call WriteInt

ret

DisplaySum ENDP

; Display "Press any key..." and wait for input

WaitForKey PROC

add row,2

call Locate

mov edx,OFFSET str3

call WriteString

call Readchar

ret

WaitForKey ENDP

END main

END