National University of Computer and Emerging Sciences

Laboratory Manual

for

Computer Organization and Assembly Language Programming

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OBJECTIVES:

- How to pass parameters through stack.
- How to use base pointer (BP) to access stack variables.
- How to implement a nested function call in another function.

Instructions:

1. **Submit work in a single Word file with screenshots of meaningful results.**
2. **Do not submit asm, lst , or com files.**
3. **Press F2 if you want to step over the function Call. F1 will step into the function.**

(Do not submit a zip folder)

Task 1: Implement a function Subtract(int a, int b, int c, int d) that performs following operation
globalVar = a – b – c – d ;

Run your code three times (Generic code to run for any test case) with three different parameters and verify the answer on AFD. Do not hard code 3 separate cases.
You have to pass parameters through stack and read them using BP. Properly clear the stack while returning from the function.

1. 0xA, 0x1, 0x2, 0x2 (Answer should be 10-1-2-2 = 5)
2. 0x9, 0x1, 0x5, 0x0 (Ans = 9-1-5-0 = 3)
3. 0xF, 0x1, 0x8, 0x4 (Ans = 15-1-8-4 = 2)

```
; You have to run three test cases like this:

Start:
; function call Test i
push 0xA
Push 0x1
Push 0x2
Push 0x2
Call Subtract
;verify answer here

; function call Test ii
push 0x9
```

```
Push 0x1
Push 0x5
Push 0x0
Call Subtract
;verify answer here

; function call Test iii
push 0xF
Push 0x1
Push 0x8
Push 0x4
Call Subtract
;verify answer here
```

Task 2: Implement a function AnotherFunction(int a, int b, int c, int d) that performs following operation

int AntoherFunction(int a, int b, int c, int d)
{
localVar1 = Subtract(a,b,c,d) ; This is nested function call. Update Subtract such that it returns the result.
localVar2 = Subtract(c,d,0,0) ; pass zero as last two parameters.
return localVar1 + localVar2;
}

Run your code three times with three different parameters(Generic code) and verify the answer on AFD. Properly apply all the concepts and watch nested activation records. Save and Restore the registers (state) properly.

1. 0xA, 0x1, 0x2, 0x2 (Answer should be (10-1-2-2)+ (2-2-0-0) = 5+0 = 5)
2. 0x9, 0x1, 0x5, 0x0 (Ans = (9-1-5-0)+(5-0-0-0) = 3+5 = 8)
3. 0xF, 0x1, 0x8, 0x4 (Ans = (15-1-8-4)+(8-4-0-0) = 2+4 = 6)

```
; This exercise is NOT using any global variables. We are passing parameters, returning values, keeping local variables and saving/restoring registers now.
; You have to run three test cases like this:

Start:
; function call Test i
push 0xA
Push 0x1
Push 0x2
Push 0x2
```

```
Call AnotherFunction
Pop AX ;verify answer here

; function call Test ii
push 0x9
Push 0x1
Push 0x5
Push 0x0
Call AnotherFunction
Pop AX ;verify answer here

; function call Test iii
push 0xF
Push 0x1
Push 0x8
Push 0x4
Call AnotherFunction
Pop AX ;verify answer here
```