National University
Of Computer and Emerging Sciences

EE2003 – Computer Organization and Assembly Language (Sp'24) Mar 2024

Assignment: 03, **Weight:** 3.0, Due Date: 2 Jun, **CLO:** 3

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Note:

Plagiarism will be marked zero straight away to all parties involved.

Question: Write a recursive function to calculate the Fibonacci of a number. The number is passed as a parameter via the stack and the calculated Fibonacci number is returned in the AX register. A local variable should be used to store the return value from the first recursive call. The Fibonacci function is defined as follows:

Fibonacci(0) = 0

Fibonacci(1) = 1

Fibonacci(n) = Fibonacci(n-1) + Fibonacci(n-2)

```
[org 0x0100]
jmp start

; fib(n) logic fib(0) = 0 , fib(1) = 1 (basecase) else fib(n-1) + fib(n-2)

 fibonacci:
  push bp
  mov bp,sp
  sub sp,2              ; store the space for local variable

  mov ax,[bp+4]         ; mov var in this case 5 into the ax
  cmp ax,1              ; compare the value of ax with 1
  jbe base_case         ; if value is less than or equal to 1 then go to base_case
subroutine
  sub ax,1              ; fib(n-1)
```

```
 push ax              ; store that value
 call fibonacci       ; recursive call
 add sp,2
 mov [bp-2],ax

 mov ax,[bp+4]
 sub ax,2             ;fib(n-2)
 push ax
 call fibonacci       ; recursive call
 add sp,2
 add ax,[bp-2]        ;fib(n-2)+fib(n-1)

 jmp fib_end


base_case:
 mov ax,[bp+4]
 cmp ax,1             ;compare if the value in the ax reg is 1 then jmp to subroutine
fib_one
 je fib_one
 mov ax , 0           ;else mov 0 into the ax
 jmp fib_end

fib_one:
 mov ax,1

fib_end:
mov sp,bp
pop bp
ret

start:
mov ax,5
push ax
call fibonacci
add sp,2
```

```
 mov bx,ax      ;value returned from the function is stored in the ax  ,now just for
displaying mov the value from ax to bx

 mov ax,0x4c00
 int 0x21
```