16.317: Microprocessor Systems Design I

Fall 2015

Lecture 15: Key Questions
October 9, 2015

1. Describe the general structure and purpose of a subroutine.

2. Describe the basics of subroutines specific to the x86 instruction set.

3. Describe the operation of the CALL instruction.

4. Describe the operation of the RET instruction.

5. **Example:** Assuming AX = 2 and BX = 4, show the results of the following sequence. Assume the addresses of the first three instructions are CS:0005, CS:0008, and CS:0009, respectively:

```
        CALL  SUM
        RET                 ; End main function
SUM PROC NEAR
        MOV   DX, AX
        ADD   DX, BX
        RET
SUM ENDP
```

6. Explain the different instructions used to save state on the stack.

7. Explain the different instructions used to restore state from the stack.

8. **Example:** Assuming the initial state below, what is the resulting stack state of each of the following sequences?

EAX: 12345678H
EBX: 0000000AH
ECX: FF0000FFH
EDX: 00000000H
ESI: 00000008H
EDI: FFFF0000H
EBP: 00000400H
ESP: 00002000H
DS: 2110H
SS: 1000H

a. PUSH BX
   PUSH AX

b. PUSH EBX
   PUSH EAX

c. PUSHA