16.317: Microprocessor Systems Design I

Fall 2013

Lecture 16: Key Questions
October 11, 2013

1. Describe the operation of the following program.
What is the final value of SI if the 15 bytes between 0A001 and 0A00F have the following values?

    00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E

```
            MOV   DL, 05
            MOV   AX, 0A00
            MOV   DS, AX
            MOV   SI, 0000
            MOV   CX, 000F
AGAIN:      INC   SI
            CMP   [SI], DL
            LOOPNE AGAIN
```

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

3. Describe the basics of subroutines specific to the 80386.

4. Describe the operation of the CALL instruction.

5. Describe the operation of the RET instruction.

6. **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
```

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

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

9. **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