16.317: Microprocessor Systems Design I

Summer 2012

Lecture 6: Key Questions
July 25, 2012

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

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

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 (Ex. 6.11). 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

9. What are the major differences between real mode and protected mode?

10. What are the benefits offered by protected mode operation on the 80386?

11. Describe the difference between global and local memory.

12. Explain the purpose and general organization of descriptors.

13. Explain the general memory address calculation used in protected mode.

14. Explain the purpose and format of selectors.

15. Describe the descriptor tables used on the 80386DX.

16. Describe the global descriptor table register (GDTR).

17. GDTR questions:

a. What is the GDT base address and limit if
   - GDTR = 1234000000FFH?

   - GDTR = FEDC1AB20007H?

   - GDTR = AABB11221F0FH?

b. What is the size of the GDT and number of descriptors it holds in each of the examples above?

c. What is the maximum GDT size and number of descriptors?

18. Show how selectors and the GDTR are used to access global memory.

19. Show the process used for local memory accesses on the 80386.

20. Describe the interrupt descriptor table and its purpose.

21. Describe the process of task switching and the structures used in task switching on the 80386.