16.317: Microprocessor Systems Design I

Spring 2013

Lecture 5: Key Questions
February 1, 2013

1. Describe the basic structure of an assembly language statement.

2. Describe the structure of the source file shown below:

```
TITLE    BLOCK-MOVE PROGRAM

        PAGE    ,132

COMMENT *This program moves a block of specified number of bytes
        from one place to another place*


;Define constants used in this program

        N         =       16           ;Bytes to be moved
        BLK1ADDR=         100H          ;Source block offset address
        BLK2ADDR=         120H          ;Destination block offset addr
        DATASEGADDR=      1020H         ;Data segment start address


STACK_SEG         SEGMENT       STACK 'STACK'
                  DB            64 DUP(?)
STACK_SEG         ENDS


CODE_SEG          SEGMENT       'CODE'
BLOCK             PROC          FAR
        ASSUME   CS:CODE_SEG,SS:STACK_SEG

;To return to DEBUG program put return address on the stack

        PUSH      DS
        MOV       AX, 0
        PUSH      AX

;Set up the data segment address

        MOV       AX, DATASEGADDR
        MOV       DS, AX

;Set up the source and destination offset addresses

        MOV       SI, BLK1ADDR
        MOV       DI, BLK2ADDR

;Set up the count of bytes to be moved

        MOV       CX, N

;Copy source block to destination block

NXTPT:  MOV       AH, [SI]           ;Move a byte
        MOV       [DI], AH
        INC       SI                 ;Update pointers
        INC       DI
        DEC       CX                 ;Update byte counter
        JNZ       NXTPT              ;Repeat for next byte
        RET                          ;Return to DEBUG program
BLOCK             ENDP
CODE_SEG          ENDS
        END       BLOCK              ;End of program
```

3. What additional information is provided in the listing file (.lst)?

4. What information is typically encoded in an instruction?

5. What is the benefit of having fixed-length instructions? Variable-length instructions?

6. Describe how the 80386 registers are accessed as 8-bit, 16-bit, and 32-bit values. Include the answer to the example provided in the slides (EAX = 1A2B3C4DH).

7. Describe how to determine the number of bytes being accessed from memory in an 80386DX instruction.

8. Describe the use of the MOV instruction.

9. The example program below shows the initialization of internal registers with immediate data and address information, using MOV instructions. Show the state of all affected registers. Also, explain why AX is used to initialize segment registers.

```
MOV  AX,2000H
MOV  DS, AX
MOV  ES, AX
MOV  AX,3000H
MOV  SS,AX
MOV  AX,0H
MOV  BX,AX
MOV  CX,0AH
MOV  DX,100H
MOV  SI,200H
MOV  DI,300H
```