16.317: Microprocessor Systems Design I

Fall 2012

Lecture 5: Key Questions
September 14, 2012

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
```