16.317: Microprocessor Systems Design I

Fall 2015

Lecture 4: Key Questions
September 11, 2015

1. Describe the general characteristics of the x86 architecture.

2. Briefly describe the x86 registers.

3. Describe the different memory spaces in the x86 architecture.

4. Describe the specifics of x86 memory addressing within instructions.

5. **Example:** Compute the address for the memory operand in each of the following instructions. The register contents and variables are as follows:

   - (ESI) = 00000100_{16}
   - (EDI) = 00000200_{16}
   - (EBX) = 00000300_{16}

a. Destination operand in: MOV [EBX+0400h], CX

b. Destination operand in: MOV [EDI+2*EBX], AH

c. Destination operand in MOV [EBX+EDI+0400h], AL

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

7. Describe how the x86 registers are accessed as 8-bit, 16-bit, and 32-bit values. Include the answer to the example provided in the slides (EAX = 1A2B3C4DH).

8. Describe how to determine the number of bytes being accessed from memory in an x86 instruction.

9. Describe the use of the MOV instruction.

10. 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
```