

# 16.317: Microprocessor Systems Design I

Spring 2015

## Lecture 12: Key Questions

February 25, 2015

1. Describe the two general classes of jump instruction.

2. Given the instructions below, what are the resulting register values if:

- AX = 0010H, BX = 0010H
- AX = 1234H, BX = 4321H

What type of high-level program structure does this sequence demonstrate?

```
CMP  AX, BX
JE   L1
ADD  AX, 1
JMP  L2
L1:  SUB  AX, 1
L2:  MOV  [100H], AX
```

3. **Example:** Given the instructions below, what are the resulting register values if, initially, AX = 0001H?

What type of high-level program structure does this sequence demonstrate?

```
      MOV CX, 5
L:    SHL  AX, 1
      DEC  CX
      JNZ  L
```

4. **Example:** Given the instructions below, what are the resulting register values if, initially, AX = 0001H?

What type of high-level program structure does this sequence demonstrate?

```
      MOV CX, 5
L:    JCXZ END
      ADD  AX, AX
      DEC  CX
      JMP  L
END:  MOV  [10H], AX
```

5. Describe the x86 loop instructions, as well as how these instructions can be used in a typical program.

6. Rewrite the post-tested loop example from earlier to use a loop instruction.

```
      MOV  CX, 5
L:    SHL  AX, 1
      DEC  CX
      JNZ  L
```

7. 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 EAX, 000A000h
MOV ESI, 00000000h
MOV CX, 000Fh
AGAIN: INC ESI
      CMP [EAX+ESI], DL
      LOOPNE AGAIN
```