

EECE.3170: Microprocessor Systems Design I

Summer 2016

Lecture 2: Key Questions May 18, 2016

1. Describe the general characteristics of the x86 architecture.

2. Briefly describe the x86 registers.

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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`

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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
```

11. Describe the operation of the MOVSX/MOVZX instructions. How/when are these instructions useful?
12. Assume: AX = 0100H, DX = 8100H, (100H) = 00H, (101H) = FFH. What are the results of the following instructions?
- a. MOVSX EBX, AX
 - b. MOVSX EBX, DX
 - c. MOVZX EBX, DX
 - d. MOVSX EBX, BYTE PTR [100H]
 - e. MOVSX EBX, WORD PTR [100H]

13. Explain the operation of the XCHG instruction.

14. Explain the operation of the LEA instruction.

15. **Example:** Given the initial memory state below:

	Lo		Hi	
0x528000	50	88	31	A3
0x528004	B2	FF	0F	7D
0x528008	07	D0	BE	22
0x52800C	11	96	00	14

Show the results of the following short instruction sequence.

```
MOV    EAX, 528000h
MOV    EBX, [EAX+2]
XCHG   BL, BH
LEA    EDX, [EAX+8]
MOV    ECX, [EDX-3]
```