16.317: Microprocessor Systems Design I

Fall 2012

Lecture 10: Key Questions
September 26, 2012

1. Explain the operations of the flag control instructions (LAHF/SAHF, CLC/STC/CMC, CLI/STI).

2. **Example:** Given the following initial state, list all changed registers and/or memory locations and their new values. Where appropriate, you should also list the state of the carry flag (CF).

Initial state:

EAX: 00000000H
EBX: 0000000AH
ECX: 00000005H
EDX: 00000000H
ESI: 00000008H
EDI: FFFF0000H
EBP: 00000400H
ESP: 00002000H
DS: 100FH
SS: 1000H
FLAGS: 00H

Address		
10110H	04	00
10112H	10	10
10114H	89	01
10116H	20	40
10118H	02	00
1011AH	00	16
1011CH	17	03
1011EH	FF	00
10120H	1E	00
10122H	06	00
10124H	08	00
10126H	0A	00

Instructions:

```
LAHF
MOV   [20H], AH
MOV   AH, [30H]
SAHF
MOV   AX, [26H]
CMC
RCL   AX, CL
```

3. Describe the operation of the compare instruction.

4. Complete the following table that describes the different x86 condition codes.

Mnemonic (cc)	Condition tested	Status flag setting for true condition
O		
NO		
B, NAE, C		
NB, AE, NC		
S		
NS		
P, PE		
NP, PO		
E, Z		
NE, NZ		
BE, NA		
NBE, A		
L, NGE		
NL, GE		
LE, NG		
NLE, G		

5. Describe the operation of the SETcc instruction. How can this instruction be used?

6. **Example:** Show the results of the following instructions, assuming that DS:100H = 0001H, DS:102H = 0003H, DS:104H = 1011H, DS:106H = 1011H, DS:108H = ABCDH, DS:10AH = DCBAH

   What complex condition does this sequence test?

```
MOV     AX, [100H]
CMP     AX, [102H]
SETLE   BL
MOV     AX, [104H]
CMP     AX, [106H]
SETE    BH
AND     BL, BH
MOV     AX, [108H]
CMP     AX, [10AH]
SETNE   BH
OR      BL, BH
```