16.317: Microprocessor Systems Design I

Spring 2012

Lecture 15: Key Questions
February 29, 2012

1. Explain the operation of the bit test instructions (BT, BTR, BTS, BTC)

2. Explain the operation of the bit scan instructions (BSF, BSR).

3. **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: 00000000H
EDX: 00000000H
CF: 0
ESI: 00000008H
EDI: FFFF0000H
EBP: 00000400H
ESP: 00002000H
DS: 2110H
SS: 1000H

Address		
21100H	04	00
21102H	10	10
21104H	89	01
21106H	20	40
21108H	02	00
2110AH	00	16
2110CH	17	03
2110EH	FF	00
21110H	1E	00
21112H	06	00
21114H	08	00
21116H	0A	00

Instructions:

```
BT    [02H], 4
BTC   [10H], 1
BTS   [04H], 1
BSF   CX, [0EH]
BSR   DX, [09H]
```

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

5. **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
```