CSE 331L / EEE 332L

Microprocessor Interfacing & Embedded System

Section: 6, 7 & 8, Spring 2021

Lab- 06: Bit-Shift and MUL/DIV

Bit-shift:

- The instructions have two possible formats. For a single shift or rotate, the form is

  Opcode destination,l
- For a shift or rotate of N positions, the form is

  Opcode destination, CL

  where CL contains N. In both cases, destination is an 8 or 16 bit register or memory location.

MUL/DIV:

Instruction	**Algorithm (= is assignment)**
MUL (unsigned multiplication)	MUL Source (register/memory loc) **Algorithm (byte):** AX = AL x Source **Algorithm (word):** DX:AX = AX x Source (register/memory loc)
IMUL (signed multiplication)	IMUL Source (register/memory loc) **Algorithm (byte):** AX = AL x Source **Algorithm (word):** DX:AX = AX x Source
DIV (unsigned multiplication)	DIV divisor (register/memory loc) **Algorithm (byte):** AL (quotient) = AX / divisor AH (remainder) = AX % divisor **Algorithm (word):** AX (quotient) = (DX:AX) / divisor DX (remainder) = (DX:AX) % divisor
IDIV (signed multiplication)	IDIV divisor (register/memory loc) **Algorithm (byte):** AL (quotient) = AX / divisor AH (remainder) = AX % divisor **Algorithm (word):** AX (quotient) = (DX:AX) / divisor DX (remainder) = (DX:AX) % divisor

Example 5: Factorial of 5

```
01 include emu8086.inc
02
03 .model small
04 .stack 100h
05 .data
06     n db 5
07 .code
08
09     mov ax, @data
10     mov ds, ax
11
12     mov cl, n
13     mov al, 1
14
15     fact:
16     mul cl
17
18     dec cl
19     cmp cl, 1
20     jne fact
21
22     call print_num
23
24     define_print_num
25     define_print_num_uns
26
```

Example 6: division

```
.model small
.stack 100h
.data
    n db 4
.code
    mov ax, @data
    mov ds, ax

    mov ax, 25

    div n

    mov dl, al  ;quotient in dl
    mov dh, ah  ;remainder in dh

    mov ah, 2
    add dl, 30h
    int 21h     ;display quotient

    mov dl, 20h
    int 21h     ;print space

    mov dl, dh
    add dl, 30h
    int 21h     ;display remainder

    mov ah, 4ch
    int 21h
```