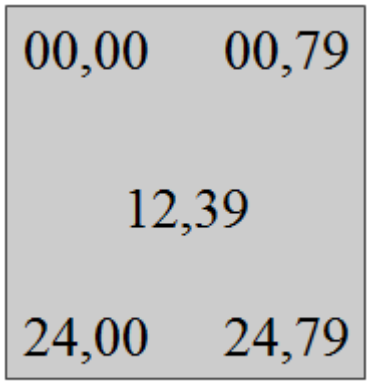
CS222- Lab 6

Assembly language Programming

The goal of this is to familiarize the students with 8086 assembly language features.

INT 10 /INT 21

- **INT 10H subroutines are used to communicate with the computer's screen video.**



Cursor Locations

- INT 10H Function 06
  - AL = number of lines to scroll (with AL=00, window will be cleared)
  - BH = attribute of blank rows
  - CH, CL = upper row, left column
  - DH, DL = lower row, right column

- INT 10H function 02; setting the cursor to a specific location
  - Function AH = 02 will change the position of the cursor to any location.
  - The desired cursor location is in DH = row, DL = column

P1:
Write a program that clears the screen and sets the cursor at the center of the screen

```
; clearing the screen
        MOV AX, 0600H     ;scroll the entire page
        MOV BH, 07        ; normal attribute (white on black)
        MOV CX, 0000      ; upper left
            MOV DX,184FH      ; lower right
            INT 10H
;setting the cursor at the center
        MOV AH,02  ; set cursor option
        MOV BH, 00 ; page 0
```

MOV DL, 39 ;
MOV DH, 12 ;
INT 10H

- **INT 10H function 03; get current cursor position**

MOV AH, 03
MOV BH, 00
INT 10H

Test Different examples
Ans here:

P2:

- **INT 21H is provided by DOS to be invoked to perform extremely useful functions.**
- **INT 21H Option 09: Outputting a string of data to the monitor**
  - **INT 21H can be used to send a set of ASCII data to the monitor.**
  - **AH = 09; DX = offset address of the ASCII data to be displayed.**
  - **INT 21H option 09 will display the ASCII data string pointed to by DX until it encounters the dollar sign "$".**

A11 DB ' India is my country','$'

lea DX, msg
MOV AH,09
INT 21H

Test Different examples
Ans here:

P3:

- **INT 21H Option 02**: Outputting a single character to the monitor
  - DL is loaded with the character first

```
MOV AH,02
Mov dl,'j'
INT 21H
```

Test Different examples

Ans here:

P4:

Study the following ALP for:

- Clear the screen
- Set the cursor to the center
- Display the message “This is a test of the display routine”

```
        .MODEL SMALL
        .STACK 64
;--------------
        .DATA
MESSAGE DB      'This is a test of the display routine','$'
;--------------
        .CODE
MAIN    PROC    FAR
        MOV     AX,@DATA
        MOV     DS,AX
        CALL    CLEAR           ;CLEAR THE SCREEN
        CALL    CURSOR          ;SET CURSOR POSITION
        CALL    DISPLAY         ;DISPLAY MESSAGE
        MOV     AH,4CH
        INT     21H             ;GO BACK TO DOS
        MAIN    ENDP
;THIS SUBROUTINE CLEARS THE SCREEN
    CLEAR PROC
        MOV     AX,0600H            ;SCROLL SCREEN FUNCTION
        MOV     BH,07               ;NORMAL ATTRIBUTE
        MOV     CX,0000             ;SCROLL FROM ROW=00,COL=00
        MOV     DX,184FH            ;TO ROW=18H,COL=4FH
        INT     10H             ;INVOKE INTERRUPT TO CLEAR SCREEN
        RET
          CLEAR  ENDP
;THIS SUBROUTINE SETS THE CURSOR AT THE CENTER OF THE SCREEN
     CURSOR   PROC
        MOV     AH,02           ;SET CURSOR FUNCTION
        MOV     BH,00           ;PAGE 00
        MOV     DH,12           ;CENTER ROW
        MOV     DL,39           ;CENTER COLUMN
        INT     10H         ;INVOKE INTERRUPT TO SET CURSOR POSITION
        RET
```

```
            CURSOR   ENDP
;THIS SUBROUTINE DISPLAYS A STRING ON THE SCREEN
          DISPLAY      PROC
           MOV     AH,09              ;DISPLAY FUNCTION
           MOV     DX,OFFSET MESSAGE    ;DX POINTS TO OUTPUT BUFFER
           INT     21H                ;INVOKE INTERRUPT TO DISPLAY STRING
           RET
              DISPLAY      ENDP
           END     MAIN
```

Your task:
Write ALP to performs the following, (1) clears the screen, (2) sets the cursor at the beginning ;of the third line from the top of the screen, (3) accepts the message "IBM perSonal ;COmputer" from the keyboard, (4) converts lowercase letters of the message to uppercase, ; (5) displays the converted ;results on the next line.

ANS Here:

```
.model small
.stack 64
.data

a1 DB 'H', 'e', 'l', 'l', 'o'
a2 dw 111h, 222h, 333h, 444h, 555h
.code

start:  mov ax,@data
       mov ds,ax
          LEA SI, a1
          MOV CX, 5
          MOV AH, 0Eh
      m: LODSB
        INT 10h
        LOOP m
        ;Load word at DS:[SI] into AX
        LEA SI, a2
          MOV CX, 5
          REP LODSW
        mov ah,4ch
        int 21h
        end
```

P5:
String Instructions

Load byte at DS:[SI] into AL. Update SI.
Algorithm:
AL = DS:[SI]
if DF = 0 then
SI = SI + 1
else
SI = SI - 1

Example

a1 DB 'H', 'e', 'l', 'l', 'o'

LEA SI, a1
MOV CX, 5
MOV AH, 0Eh
m: LODSB
INT 10h
LOOP m

Your task:

Load word at DS:[SI] into AX. Update SI.

Your Answer Here:

P6:

Copy byte at DS:[SI] to ES:[DI]. Update SI and DI.

Algorithm:
ES:[DI] = DS:[SI]

```
if DF = 0 then
SI = SI + 1
DI = DI + 1
else
SI = SI - 1
DI = DI - 1
```

Example

```
a1 DB 1,2,3,4,5
a2 DB 5 DUP(0)

LEA SI, a1
LEA DI, a2
MOV CX, 5
REP MOVSB
```

Your task

Copy **word** at DS:[SI] to ES:[DI]. Update SI and DI.

Answer Here:

P7:

PUSH l general purpose registers DI, SI, BP to stack and pop BX, DX, CX, AX from the stack.

POP DI

```
POP SI
POP BP

POP BX
POP DX
POP CX
POP AX
```

Your task

Push all general purpose registers AX, CX, DX, BX, SP, BP, SI, DI in the stack

Pop to different register and verify the operation.
Answer Here:

P8:
Compare String: Study the following sample program

```
.model small
.stack 64
.data

  STR1 DB "ENTER FIRST STRING HERE ->$"
  STR2 DB "ENTER SECOND STRING HERE ->$"
  STR11 DB "FIRST STRING : ->$"
  STR22 DB "SECOND STRING: ->$"

  INSTR1 DB 20 DUP("$")
  INSTR2 DB 20 DUP("$")
  NEWLINE DB 10,13,"$"
  N DB ?
  S DB ?
  MSG1 DB "BOTH STRING ARE SAME$"
  MSG2 DB "BOTH STRING ARE DIFFERENT$"
```

```
.code


START:  MOV AX,@DATA
        MOV DS,AX

        LEA SI,INSTR1
        LEA DI,INSTR2

;GET STRING
        MOV AH,09H
        LEA DX,STR1
        INT 21H

        MOV AH,0AH
        MOV DX,SI
        INT 21H


        MOV AH,09H
        LEA DX,NEWLINE
        INT 21H

        MOV AH,09H
        LEA DX,STR2
        INT 21H

        MOV AH,0AH
        MOV DX,DI
        INT 21H


        MOV AH,09H
        LEA DX,NEWLINE
        INT 21H


;PRINT THE STRING
```

```
        MOV AH,09H
        LEA DX,STR11
        INT 21H

        MOV AH,09H
        LEA DX,INSTR1+2
        INT 21H

        MOV AH,09H
        LEA DX,NEWLINE
        INT 21H

        MOV AH,09H
        LEA DX,STR22
        INT 21H

        MOV AH,09H
        LEA DX,INSTR2+2
        INT 21H

        MOV AH,09H
        LEA DX,NEWLINE
        INT 21H

;STRING COMPARISION
        MOV BX,00

        MOV BL,INSTR1+1
        MOV BH,INSTR2+1

        CMP BL,BH
        JNE L1

        ADD SI,2
        ADD DI,2

      L2:MOV BL,BYTE PTR[SI]
```

```
        CMP BYTE PTR[DI],BL
        JNE L1
        INC SI
        INC DI
        CMP BYTE PTR[DI],"$"
        JNE L2

        MOV AH,09H
        LEA DX,MSG1
        INT 21H

        JMP L5

      L1:MOV AH,09H
        LEA DX,MSG2
        INT 21H



     L5:
        MOV AH,09H
        LEA DX,NEWLINE
        INT 21H

        MOV AH,4CH
        INT 21H

END START
```

Modify the program to report the position of the difference.

Your Answer Here:

P9:

Store byte in AL into ES:[DI]. Update DI.

Example:
.data
a1 DW 5 dup(0)

```
LEA DI, a1
MOV AL, 12h
MOV CX, 5
REP STOSB
```

Write an ALO t Store word in AX into ES:[DI]. Update DI.

Your Ans Here

Submission :
Submit single doc/pdf file with above answers. Course work submission through cs322.iitp@gmail.com with subject: YourrollNo_Lab4. **Due on** 14th September 2018 , 5PM**.**