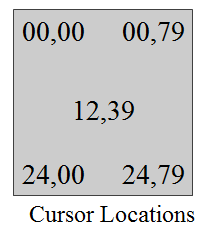
**CS222- Lab 6**

**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.**

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* 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**.**