National University of Computer and Emerging Sciences

Laboratory Manual

for

Computer Organization and Assembly Language Programming

(EL 213)

Course Instructor	Ms. Aatira Anum
Lab Instructor(s)	M. Salman Mubarik Rasaal Ahmad
Section	H
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Department of Computer Science

FAST-NU, Lahore, Pakistan

Objectives

After performing this lab, students shall be able to:

- ✓ Subroutines
- ✓ Display Memory
- ✓ String Instructions
- ✓ Hooking
- ✓ Interrupts

Exercise 1: Write a program that takes a c-string *myStr* and two characters *charToFind* and *charToReplace* from the user and replaces all the occurrences of *charToFind* with *charToReplace* in *myStr* and shows it on display memory. Your program should create a space of 50 characters on the heap in order to save *myStr*.

Sample Output:

InputString: ddsdfhgrtsdfhjghjksdd

CharToFind: d

CharToReplace: $

ModifiedString: $$s$fhgrts$fhjghjks$$

Exercise 2: Hook int 80h such that whenever Left, Up, Down, and right keys are pressed the asterisk on-screen will mow Left, Up, down, and right respectively.

Initially, your start code should do the following:

customISRforINT80h:
; check what input key is pressed and move the asterisk on the screen accordingly.

start:
; clear screen
; print an asterisk in the middle of the screen.
; hook int80h
; infinite loop for testing

Exercise 3: The following program keeps taking a key from the user and filling the screen with this key. Fix the code such that it exits when the user presses ESC (Escape).

```
; Infinite Key Printing
[org 0x0100]
jmp start
;-----------------------------------------------
printKey: push ax
                    pop bx ; bx=ax

                    push es
                    push ax
                    push cx
                    push di

                    mov ax, 0xb800
                    mov es, ax ; point es to video base
                    xor di, di ; point di to top left column
                    mov al, bl
                    mov ah, 0x07 ; normal attribute

                    mov cx, 2000 ; number of screen locations
                    cld ; auto increment mode
                    rep stosw ; clear the whole screen
                    pop di
                    pop cx
                    pop ax
                    pop es
                    ret

;-----------------------------------------------
start: mov ah, 0 ; service 0 – get keystroke
             int 0x16 ; call BIOS keyboard service

             call printKey ; clear the screen
             jmp start

             mov ax, 0x4c00 ; terminate program
             int 0x21
```

Exercise 4: Write a code to read a key from the keyboard and displays the next character on screen. For example, if ‘e’ is pressed then ‘f’ is displayed.

Exercise 5: Write an assembly code that performs following functions.

- Clear the screen.
- Write “C” on screen at coordinates (12,40)
- Wait for a key to be pressed ,
- If a ‘L’ is pressed, display ‘Left’ on left of ‘C’ (output = Left C)
- If a ‘R’ pressed, display ‘Right’ on right of ‘C’ (Output = Right C)