National University of Computer and Emerging Sciences

Lab Manual

Computer Organization and Assembly Language

Lab 06

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Class	CS3
Sections	A, D, H, K
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Objectives

- Subroutines Saving and restoring registers
- Subroutines passing parameters through stack
- Understanding Display memory formation
- Writing Hello world in assembly

Contents

Note for all questions: You can make as many memory variables, subroutines as you need. Must read all the manual before starting.

ACTIVITY 1:

Write a subroutine (clr_scr) in assembly to clear the screen of DOSBox Command Window.

ACTIVITY 2:

Initialize AX with last 4 digits of your roll number as **Hexadecimal number** (for example, if your roll number is 16L-4195 then AX should be initialized with 0x4195). Then write a subroutine (ASCII_convert) which uses your roll number information from AX and returns a character string which contains equivalent ASCII from characters equivalent to every digit of your roll number.

(You can see **ASCII Table** in **[1]** to find equivalent codes for numeric characters)

ACTIVITY 3:

Write an assembly language program which fulfills the following:

1. Use the subroutine (clr_scr) developed in (**Activity 1**), to clear the DOSBox command window.

2. Use the subroutine (ASCII_convert) developed in (**Activity 2**), to get string of your roll number then prints your own custom message including your name and roll number on the DOSBox command widows.

> **Sample Message:**
>
> "My Name is Mickael Jackson, my roll # is 16L-4195, I love praying five times a day."

ACTIVITY 4:

Initialize **AX** with last 4 digits of your roll number as **Hexadecimal number** (for example, if your roll number is 16L-4195 then **AX** should be initialized with 0x4195). Write a subroutine which separates every digit of your roll number.

$$[d1, d2, d3, d4] = Digit\_Separator(0x4195)$$

Write another subroutine to determine r and l described as follows:

If your roll number is 16L-4195 then

$$r = \frac{d1 + d2 + d3 + d4}{4} = (4 + 1 + 9 + 5) \ shiftright \ by \ 2bits = 4$$

And

$$l = r + 3 = 6.$$

ACTIVITY 5:

Write a program that calculates the sum of the following series:

$$f = \sum_{n=1}^{l} r^n$$

For the calculation of this series, you are required to make multiple subroutines. Copy and call the subroutine of **Activity 4** to obtain r and l and f **MUST** be stored in a 32bit number. Also make 32bit addition subroutine (you have already done 32bit addition in **Lab4** and **Lab5**). Parameter passing from one subroutine to the other should be via stack. The final answer should be returned from stack as well.

REFERENCES

[1] ASCII Table - ASCII Code Chart with Characters & Values (ascii-tables.com)