Assignment 1 : Basic Programming

Data and File Structures Laboratory

Deadline : 27 July 2016

Posted on : 20 July 2016

Clarification by 22 July 2016

Programming Environment

Login to the virtual machine, where CS16XX is your roll number

`ssh mtc16XX@192.168.64.35`	if you use *vi* or *emacs*
`ssh -X mtc16XX@192.168.64.35`	if you use *gedit*

Set up the basic programming environment for Assignment 1

`cd dfslab`	go to the directory for DFS Lab
`mkdir -p assign1`	create directory for Assignment 1
`cd assign1`	go to the directory for Assignment 1

Create the solutions for Assignment 1 (e.g., in *gedit*)

`gedit cs16XX-assign1-progY.c`	Y = problem number

Programming Environment

First few lines of *every* assignment program

```
/*-------------------------------------
Name :
Roll :
Date :
Desc :
Acks :
-------------------------------------*/
```

Compiling and running your program

```
gcc -g -Wall -o progY cs16XX-assign1-progY.c
./progY
```

Problem 1

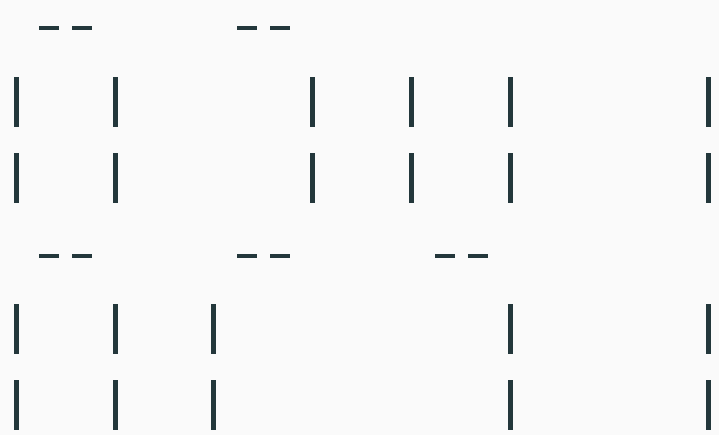
Write a program that prints numbers in LCD display style.

Input : Digit $(0 - 9)$ and Size (s)

Output : Print the digit in an LCD style, using s '-' signs for each horizontal segment and s '|' signs for each vertical one.

Thus, each digit should occupy $s + 2$ columns and $2s + 3$ rows.

Example – Digits for $s = 2$



Problem 2

In a list of n elements, an element x is called the *majority element* if it appears more than $\frac{n}{2}$ times. Write a C program that takes as input from the user a list (or string) of characters, and finds the majority element in the list, if any. If there is no majority element, output *NA*.

Input : [A,B,B,X,B,C,D,B,F,A,B,B,L,B,B] Output : B

Input : [A,A,B,X,B,C,D,B,F,A,B,C,L,B,B] Output : NA

Problem 3

Write a C program that takes as input two integer matrices M and N from the user, and outputs the matrix product $M \times N$, if the matrix multiplication makes sense. If not, output a custom error message.

Input : $\begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 5 \end{bmatrix} \begin{bmatrix} 2 & 1 \\ 1 & 0 \\ 0 & 3 \end{bmatrix}$ Output : $\begin{bmatrix} 2 & 7 \\ 2 & 15 \end{bmatrix}$

Input : $\begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 5 \end{bmatrix} \begin{bmatrix} 2 & 1 \\ 1 & 0 \end{bmatrix}$ Output : Error Message

Problem 4

Write a C program that outputs the n-th Fibonacci Number given a positive integer n as input. You may assume that $n < 30$.

$$F_0 = 0, \quad F_1 = 1, \qquad F_n = F_{n-1} + F_{n-2} \text{ for } n \geq 2$$

Input : 6 Output : 8

Input : 15 Output : 610

Submission Procedure

Will be explained on 27 July 2016, in the Lab.

Please come prepared with all your solutions.