IC250 Laboratory Assignment 01

Aditya Nigam

August 8, 2016

IC250 Programming and Data structure Practicum

Lab Assignment 01 Date : 9^{th} August 2016

/* The objective of this write-up is to motivate students to do the exercise seriously. It may include a simple description of the context or an example of usage of the computation with set of input and output data */

Introduction/Problem Context

This is our zeroth assignment of IC250 Lab session 2016 (Aug-Dec). It assumes that you are familiar with basic C language programing and fundamentals of mathematics. It is essentially a review of C programming that you have already done in IC150P. In this assignment there are five programming exercises that each student have to code then get yourself evaluated and finally upload it on moodle.

C Programming Review

1. **Formula evaluation in loop :** The natural logarithm can be approximated by the following formula:

$$log(x) = \frac{x-1}{x} + \frac{1}{2} * \left(\frac{x-1}{x}\right)^2 + \frac{1}{2} * \left(\frac{x-1}{x}\right)^3 + \frac{1}{2} * \left(\frac{x-1}{x}\right)^4 \ldots \quad (1)$$

   If x, n is input through the keyboard, write a C program to calculate the sum of first n terms of this series and returns the value of $log(x)$.

   Output Description :

```
>> ./logarithm
>> Enter the value of x : 2
>> Enter the number of terms n : 5
>> The value of log(2) approximated to 5 terms is : 1.23345
```

2. **File Input and Output :** Write a C code that can read the marks of any given student with a roll number r from a file *master.txt* and print its marksheet in the format presented below. The data written in *master.txt* file is in tabular format as shown below :

Table 1: Data format in *master.txt* file

Roll Number	Name	IC250		CS250		EE255		ME251		CE250	
110112	Satish Kumar	77	B	37	D	67	B	71	B	33	B
110113	Anil Kumar	77	B	37	D	67	B	71	B	33	B
110114	Vipin Shekhar	27	D	77	A	67	B	71	B	33	B

The division of the student is *First* if his percentage is more than 60, *Second* if it is between 45 to 60 and *Third* if it is between 30 to 45. A student will *FAIL* if it has got a percentage below 30.

Output Description :

```
>> ./marksheet
>> Enter the roll number of the student : 110112
```

```
                        Indian Institute of Technology Mandi
                         Academic Session : (Aug-Dec) 2016
------------------------------------------------------------------------
Name of the Student : Satish Kumar
Roll Number         : 110112
------------------------------------------------------------------------
Sr. No |  Subject Code   |  Maximum  |   Marks Obtained   |    Grade
------------------------------------------------------------------------
  [1]         IC250           100             77                 B

  [2]         CS250           100             37                 D

  [3]         EE255           100             67                 B

  [4]         ME251           100             71                 B

  [5]         CE250           50              33                 B
------------------------------------------------------------------------
                     Total   450      Total  285

                  Percentage   63% Student passed with First division
------------------------------------------------------------------------
```

3. **Sieve of Eratosthenes :** Write a C code that can implement thr following procedure to generate prime numbers from 1 to 100 into a program.

   a Fill an array $num[100]$ with numbers from 1 to 100.

   b Starting with the second entry in the arry, set all its multiples to zeros.

   c Proceed to the next non-zero element and set all its multiples to zeros.

   d Repeat Step [c], till you have set up the multiples of all the non-zero elements to zero.

   e At the conclusion of the Step [d], all the non-zero entries left in the array would be the prime numbers, so print out these numbers.

   Output Description :

```
>> ./SieveOE
There are 23 prime numbers between 1 to 100 printed as follows :
1, 2, 3, 5, 7, 11, 13, 17, 23 .......
```

4. **Palindrome :** Check whether a given string is a palindrome or not. Palindrome strings are defined as the strings that are read as same from either sides, for example "MALAYALAM" or "ABCDEREDCBA".

   Output Description :

```
>> ./Palindrome
Please enter the string to be checked as Palindrome :
sachin
sachin is NOT a Palindrome string.
```

5. **Arrays and Pointers :** What is the output of the following program. Also explain the output.

   Output Description :

```
#include <stdio.h>
void f(int*,int);
void main()
{
    int a[5], i,b=16;
    for (i=0;i<5;i++)
       a[i] = 2*i;
    f(a,b);
    for(i=0;i<5;i++)
        printf("\n %d",a[i]);
    printf("\n %d", b);
}
void f(int *x, int y)
{
    int i;
    for(i=0;i<5;i++)
       *(x+i) +=2;
    y+=2;
}
```