CC-112L

Programming Fundamentals

Laboratory 07

Introduction to Programming, Algorithms and C

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Department of Information Technology

University of the Punjab

Lahore, Pakistan

Pre-Lab Contents:

This section includes all the topics and concepts covered in the lab so far. Students are expected to review these materials before starting new lab activities to ensure a thorough understanding of the subject matter.

Learning Objectives:

- Understand fundamental programming concepts covered in previous lab sessions.
- Reinforce their knowledge of syntax, logic, and problem-solving techniques.
- Develop a clear understanding of programming constructs such as variables, loops, and conditionals.
- Identify and correct common programming errors.
- Improve their ability to write, debug, and optimize code efficiently.
- Strengthen logical thinking and algorithm development skills.

Resources Required:

- Desktop Computer or Laptop
- Microsoft ® Visual Studio 2022

General Instructions:

- In this Lab, you are **NOT** allowed to discuss your solution with your colleagues, even not allowed to ask how is s/he doing, this may result in negative marking. You can **ONLY** discuss with your Teaching Assistants (TAs) or Lab Instructor.
- Your TAs will be available in the Lab for your help. Alternatively, you can send your queries via email to one of the followings.

Teachers:		
Course Instructor	Hafiz Anzar Ahmad	anzar@pucit.edu.pk
Teacher Assistants	Manahil	Bitf21m002@pucit.edu.pk
	Maheen Fatima	Bitf22m031@pucit.edu.pk
	Rimsha Majeed	Bitf22m029@pucit.edu.pk
	Momna Muzaffar	Bcsf22m021@pucit.edu.pk
	Zainab Mehmood	Bcsf22m038@pucit.edu.pk
	Khadija tul Kubra	Bitf22m025@pucit.edu.pk
	Inam ul Haq	Bitf22m017@pucit.edu.pk
	M. Saad	Bitf23m003@pucit.edu.pk
	Saqib	bcsf22m016@pucit.edu.pk
	Subhan	bcsf22m043@pucit.edu.pk

1.Sum of Digits

Write a function to calculate the sum of the digits of a given positive integer.

```
Enter a positive integer: 53
Sum of digits: 8
```

2. Reverse Digits

Write a function to reverse the digits of a given number.

```
Enter a positive integer: 123
Reversed number: 321
```

3.Palindrome Check

Write a function to check if a given number is a palindrome (reads the same forward and backward).

For Example:
12321 is palindrome
12346 is not palindrome

```
Enter a positive integer: 121
121 is a palindrome.
```

4.Factorial Calculation (Iteration)

Write a function to calculate the factorial of a given number using iteration.

For Example:
Factorial of 5 = 5! = 1*2*3*4*5 = 120
Factorial of 3 = 3! = 3* 2*1 = 6

```
Enter a non-negative integer: 3
Factorial of 3 is 6
```

5.Strong Number Check

A strong number is a number where the sum of the factorial of its digits equals the number itself.
Write a function to check if a number is a strong number.

For Example:
1! + 4! + 5! = 145

```
Enter a positive integer: 145
145 is a Strong Number.
```

6.Binary-Decimal Conversion

Write functions to:

- Convert a binary number (given as an integer) to decimal.
- Convert a decimal number to binary.

```
Enter a binary number: 10
Decimal equivalent: 2
Enter a decimal number: 2
Binary equivalent: 10
```

7.Custom Implementations of Built-in Functions

Write implementations for the following built-in functions and test them in a menu-driven program:

- double sqrt(double x); → **Square root function**
- double fabs(double x); → **Absolute value function**
- double ceil(double x); → **Ceiling function (smallest integer greater than or equal to x)**

Sample Output
Enter a number for square root: 25
Square root of 25.0000 is 5.0000

Enter a number for absolute value: -3.6
Absolute value of -3.6000 is 3.6000

Enter a number for ceiling: 4.2
Ceiling of 4.2000 is 5.0000

8.Random Number Generation

Write functions to:

- Generate a random number between a given range **[low, high]**.
- Generate a random even number between **low** and **high**.
- Generate a random number in a given range **[low, high]** that is a **multiple of N**.

```
Enter low and high values: 1 10
Random number between 1 and 10: 2
Random even number between 1 and 10: 10
Enter a number N: 5
Random multiple of 5 between 1 and 10: 5
```