**National University of Computer and Emerging Sciences**



**Programming Fundamentals CS188**

**Laboratory Manual**

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| Course Instructor | Mirza Mubasher Baig |
| Lab Instructor(s) | [Samia Akhter](mailto:l202265@lhr.nu.edu.pk) & Faraz Yousaf |
| Section | BDS-1A1 & A2 |
| Semester | FALL 2021 |

**FAST School of Computing**

**Department of Software Engineering**

**FAST-NU, Lahore, Pakistan**

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| **National University of Computer and Emerging Sciences, Lahore Campus** | | | | |
| C:\Users\saif\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\final design.jpg | **Lab No 10** | | | |
| **Course Name:** | **Programming Fundamentals** | **Course Code:** | **CS 1002** |
| **Program:** | **BS(DS)** | **Semester:** | **Fall 2021** |
| **Duration:** | **2.5 hours** | **Total Points:** | **10 + 15 + 10** |
| **Lab Date:** | **Friday, December 10, 2021** | **Weight** | **3%** |
| **Section:** | **BDS-1A** | **Page(s):** |  |
| **Instruction/Notes:** | **Cheating during the lab will result in negative marks** | | | |

**Topics Covered:** Loops and Arrays

**Appetizer [5 + 5 Points]**

1. Write a function that reads **n** elements into a one dimensional integer array.  
   Your function must have the following prototype

**void cin\_Array( int arr[], int n)**

1. Write a function that display the first **n** elements into a one dimensional integer array. Your function must have the following form also called the function prototype

**void cout\_Array( const int arr[], int n)**

**Problem No 1: [10 + 5 Points]**

1. Write a function that computes the frequency of each digit in all the numbers stored in an integer array of size N. The function will have the following prototype

**void Digit\_Frequency( int Numbers[], int N, int F[])**

This function has the following parameters

**int Numbers[]:** An array of integers containing numbers (positive/negative)

**int N:** An integer specifying the number of values to be processed.

**int F[]:** An uninitialized array of size 10 that will be used to return the frequency of each digit to the caller

1. Write a main function that creates an array of size 20. The function must ask the user to specify the total numbers **n** (0< n < 21) and then input **n** number in the array using the above function.

The main function must create an integer array of size 10 to hold the frequencies of various digits.

It must then pass the array containing numbers and the array of frequencies to the Digit\_Frequency function to compute the frequency.

The main function must finally display both the arrays of numbers and digit frequencies on screen using the cout\_Array function.

**Problem No 2: [FLIP ARRAY] [10 Points]**

A 2D array can be flipped vertically as shown in the examples below. In this task you are required to write a C++ programs that takes an array of size at-most 10x10 from the user as input and then flip the array and show the flipped array to the user. Note that you are allowed to use only one array of size 10x10 in your program and your program must flip the array before it is shown to the user

|  |  |
| --- | --- |
| **Input Matrix** | **After flip** |
| 0 1 2 3  4 5 6 7  8 9 10 11 | 3 2 1 0  7 6 5 4  11 10 9 8 |

Your program must ask the user to enter the number of rows and number of columns in the array, where each of these values must be less than 10, and then take input in the array and store the result of the flip the values without using a second array