LAB #3

Explain the operations performed on 1-D Arrays using C language

Objective

- To understand Arrays in C language
- To implement the basic operations on Arrays

Pre-Lab

Arrays

Array is a collection of multiple elements. It is one of the derived data types in C programming.

Characteristics of array:

- Elements (aka items) in the array are stored in a contiguous memory location.
- Each element in the array has an index that is used to access that element.
- The index of the first element in the array is 0, the index of the second element is 2, and so on.

Array in C/C++

Array in C/C++ programming can store only homogenous items i.e. items having same data types.

Syntax:

<data_type> <array_name>[<array_size>];

Array of integers

```
int int_arr[10];
```

Array of characters

```
char char_arr[10];
```

Here 10 is the size of the array. It means, it can store 10 items.

Initializing array:

Example: Initialize an integer array to store integer values from 1 to 10.

```
int arr[10] = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10};
```

Array Example

How to print specific element in array?

Example: Print the 3rd element in the array. The index of the 3rd element is 2 as index of the array starts with zero.

```
#include <iostream>
int main() {
    int arr[10] = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10};
     cout<<arr[2];
     return 0;
}
```

Output: 3

Traversing Array

We can use any looping statement in C/C++ like do, do-while or for loop statement to print the array.

How to print array in C/C++ program using for loop? [Traversing Array]
Here is the simple code to traverse the elements in the array and print them using a for loop.

```
#include <iostream>
 int main() {
    int arr[10] = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10};
    int i;
     for(i = 0; i < 10; i++) {
        cout<<arr[i];}
     return 0;
}
```
Output: **1 2 3 4 5 6 7 8 9 10**

How to print array in C/C++ program using while loop?
```
#include <iostream>
 int main() {
    int arr[10] = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10};
    int i=0;
     while(i<10) {
        cout<< arr[i];
        i++;
    }
     return 0;
}
```

Output: **1 2 3 4 5 6 7 8 9 10**

How to print array in C/C++ program using do-while?

```
#include <iostream>
 int main() {
    int arr[10] = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10};
    int i=0;

    do {
        cout<< arr[i];
        i++;
    } while(i<10);
     return 0;
}
```
Output: **1 2 3 4 5 6 7 8 9 10**

Pre-Lab Task

Task 1: Write a program to print bytes reserved for various types of data & space required for storing them in memory using arrays.

```
# Include <iostream>
int main()
{
int i[10] ;
char c[10];
long l[10];

cout<<"The type 'int' requires" <<sizeof( int)<< " Bytes \n";
cout<< sizeof(i)<< " Memory locations are reserved for ten
'int' elements";
/* Complete the code by printing the size of other data types
and variables */
return 0;
}
```

Task 2: Write a C program which take 10 integer values as input from user and store them in an array. The program also finds the sum and product of all elements of that array.

In-Lab Tasks

Lab Task 1: Write a C program which take 20 integer values as input from user and print the following:

       a. The count of positive values.

       b. The count of negative values.

       c. The count of odd values.

       d. The count of even values.

       e. The count of zero values.

       f. The largest element of array.

       g. The smallest element of array.

Lab Task 2: Write a C program that finds the largest three distinct elements in an array

For example, if the given arrays is {-10,1, 2, 10, 10, 9 , 8, 6, 4, 0}, it should return, Largest 1 =10, Largest 2 = 9 (not considering 10 again) and Largest 3 = 9.

Lab Task 3: Given an array of random numbers, write a C program that push (by swapping) all the zero's of a given array to the end of the array.

For example, if the given arrays is {1, 0, 0, 4, 3, 7, 8, 0, 10}, it should be changed to {1, 10, 8, 4, 3, 7, 0, 0, 0}. The order of all other elements should be same.

Rubric for Lab Assessment

The student performance for the assigned task during the lab session was:			
Excellent	The student completed assigned tasks without any help from the instructor and showed the results appropriately.	4	
Good	The student completed assigned tasks with minimal help from the instructor and showed the results appropriately.	3	
Average	The student could not complete all assigned tasks and showed partial results.	2	
Worst	The student did not complete assigned tasks.	1	

Instructor Signature: _____   **Date:**_____