LAB NO. 03

STRUCTURES IN C++

Lab Objectives

Following are the lab objectives:
1. Structures in C++

Instructions

- This is individual Lab work/task.
- Complete this lab work within lab timing.
- Discussion with peers is not allowed.
- Copy paste from Internet will give you **negative marks**.
- Lab work is divided into small tasks, complete all tasks sequentially.

Structure in C++

Structure is a collection of variables of different data types under a single name. It is similar to a class in that, both holds a collection of data of different data types.

For example: You want to store some information about a person: his/her name, citizenship number and salary. You can easily create different variables name, citNo, salary to store these information separately.

However, in the future, you would want to store information about multiple persons. Now, you'd need to create different variables for each information per person: name1, citNo1, salary1, name2, citNo2, salary2

You can easily visualize how big and messy the code would look. Also, since no relation between the variables (information) would exist, it's going to be a daunting task.

A better approach will be to have a collection of all related information under a single name Person, and use it for every person. Now, the code looks much cleaner, readable and efficient as well.

This collection of all related information under a single name Person is a structure.

How to declare a structure in C++ programming?

The struct keyword defines a structure type followed by an identifier (name of the structure).

Then inside the curly braces, you can declare one or more members (declare variables inside curly braces) of that structure. For example:

```
struct Person
{
    char name[50];
    int age;
    float salary;
};
```

How to define a structure variable?

Once you declare a structure person as above. You can define a structure variable as:

```
Person bill;
```

Here, a structure variable bill is defined which is of type structure Person.

How to access members of a structure?

The members of structure variable is accessed using a **dot (.)** operator.

Suppose, you want to access age of structure variable bill and assign it 50 to it. You can perform this task by using following code below:

```
bill.age = 50;
```

Lab Tasks

Q1. C++ Program to assign data to members of a structure variable and display it.

```cpp
#include <iostream>
using namespace std;

struct Person
{
    char name[50];
    int age;
    float salary;
};

int main()
{
    Person p1;

    cout << "Enter Full name: ";
    cin.get(p1.name, 50);
    cout << "Enter age: ";
    cin >> p1.age;
    cout << "Enter salary: ";
    cin >> p1.salary;

    cout << "\nDisplaying Information." << endl;
    cout << "Name: " << p1.name << endl;
    cout <<"Age: " << p1.age << endl;
    cout << "Salary: " << p1.salary;

    return 0;
```

```
}
```

Output

```
Enter Full name: Magdalena Dankova
Enter age: 27
Enter salary: 1024.4

Displaying Information.
Name: Magdalena Dankova
Age: 27
Salary: 1024.4
```

Q2. Example for Nested Structure

```cpp
#include<iostream.h>
    struct Address
    {
        char HouseNo[25];
        char City[25];
        char PinCode[25];
    };
    struct Employee
    {
      int Id;
      char Name[25];
      float Salary;
      struct Address Add;
    };
    void main()
    {
        int i;
        Employee E;
        cout << "\n\tEnter Employee Id : ";
        cin >> E.Id;
        cout << "\n\tEnter Employee Name : ";
        cin >> E.Name;
        cout << "\n\tEnter Employee Salary : ";
        cin >> E.Salary;
        cout << "\n\tEnter Employee House No : ";
        cin >> E.Add.HouseNo;
        cout << "\n\tEnter Employee City : ";
        cin >> E.Add.City;
```

```cpp
        cout << "\n\tEnter Employee House No : ";
        cin >> E.Add.PinCode;
        cout << "\nDetails of Employees";
        cout << "\n\tEmployee Id : " << E.Id;
        cout << "\n\tEmployee Name : " << E.Name;
        cout << "\n\tEmployee Salary : " << E.Salary;
        cout << "\n\tEmployee House No : " << E.Add.HouseNo;
        cout << "\n\tEmployee City : " << E.Add.City;
        cout << "\n\tEmployee House No : " << E.Add.PinCode;
    }
```

Output :

```
        Enter Employee Id : 101
        Enter Employee Name : Suresh
        Enter Employee Salary : 45000
        Enter Employee House No : 4598/D
        Enter Employee City : Delhi
        Enter Employee Pin Code : 110056
    Details of Employees
        Employee Id : 101
        Employee Name : Suresh
        Employee Salary : 45000
        Employee House No : 4598/D
        Employee City : Delhi
            Employee Pin Code : 110056
```

Q3. Write a program that declares a structure to store date. Declare an instance of this structure to represent date of birth. The program should read the day, month and year values of birth date and display date of birth in dd/mm/yy format.

```cpp
#include<iostream>
using namespace std;
struct Date
{
        int day;
        int month;
        int year;
};
void main()
{
        Date birthDate;
        cout << "Enter day of birth";  //enter day
        cin >> birthDate.day;  //display day
        cout << "Enter month of birth";        //enter month
        cin >> birthDate.month;       //display month
        cout << "Enter year of birth"; //enter year
        cin >> birthDate.year;//display year
```

```
        cout << "your date of birth is: " << birthDate.day << "/" << birthDate.month << "/"<<
birthDate.year << "\n";
        system("pause");
}
```

Q4. Write a C++ program that declares a structure to store the distance covered by a player along with the minutes and seconds taken to cover the distance. The program should input the records of two players and then display the record of the winner player.

Home Activity

Q5. There is a structure called employee that holds information like employee code, name, date of joining. Write a program to create an array of the structure and enter some data into it. Then ask the user to enter current date. Display the names of those employees whose tenure is 3 or more than 3 years according to the given current date.

Q6. Write a C++ program that declare a structure to store income, tax rate and tax of a person. The program defines an array of structure to store the record of five persons. It inputs income and tax rate of five person and then displays the tax payable.