Object Oriented ProgrammingLab

SPRING - 2023

LAB 06

FAST National University of
Computer and Emerging Sciences

Learning Outcomes

In this lab you are expected to learn the following:

- Structures

Structures

Structure is a user-defined data type that allows you to combine data items of different kinds.

Structure Declaration

```
struct Books {
    int book_id;
    int pages;
    int price;
};
```

Types of Members

Structures in C++ can contain two types of members:

- **Data Member:** These members are normal C++ variables. We can create a structure with variables of different data types in C++.
- **Member Functions:** These members are normal C++ functions. Along with variables, we can also include functions inside a structure declaration.

Accessing Structure Members

```
#include<iostream>
using namespace std;
struct Books {
    int book_id;
    int pages;
    int price;
};
int main() {
Books Book1;
Books Book2;
Book1.book_id=123;
cin>>Book1.pages;
cin>>Book2.pages;
}
```

Array of Structures

```
#include<iostream>
using namespace std;
struct Books {
     int book_id;
     int pages;
     int price;
};
int main() {
     Book b1[3]={{1,275,70},{2,600,90},{3,786,100}};
     //can also assigned values using cin
     for(int i=0; i<3; i++){
          cin>>b1[i].book_id;
          cin>>b1[i].pages;
          cin>>b1[i].price;
     }
}
```

Lab Tasks

Submission Instructions:

1. Create a single cpp file containing all the functions of the problems and main function.
2. Save the **cpp** file with the task number
   e.g. Q1.cpp
3. Now create a new folder with name *ROLLNO_SEC_LAB01* **e.g. i22XXXX_A_LAB06**
4. You need to display your roll no and name before the output of each question.
5. Move all of your .**cpp files (without the main function i.e., comment out the mainfunction)** to this newly created directory and compress it into a **.zip file**.
6. Now you have to submit this zipped file on Google Classroom.
7. If you don't follow the above-mentioned submission instruction, you will be marked **zero.**
8. Plagiarism in the Lab Task will result in **zero** marks in the whole category.

Question 1.

A. Declare a structure named Complex having two data members named;
   - real of type int
   - imaginary of type int.

B. Write a member function addComplex that will add two complex numbers using structures. To add two complex numbers, just add the corresponding real and imaginary parts. For Example, the sum of 5 + 3*i* and 4 + 2*i* is 9 + 5*i.*

Prototype:
Complex addComplex(Complex &c2);

Question 2.

A. Declare a structure named as CustomTime having three data members named;
   - hours of type int
   - mins of type int
   - secs of type int

B. Write a member function timeToSecs to calculate the total seconds in time. Convert time to seconds (of type int) and return it.

Prototype:
int timeToSecs( );

C. Write a member function AddTimes which takes CustomTime object t1 and CustomTime object t2 as parameters.
   1. You have to convert these two objects t1, t2 in seconds using above-defined function timeToSecs.
   2. Add both seconds returned from above step.

Prototype:
int AddTimes(CustomTime &t1, CustomTime &t2);

Question 3.

A. Declare a structure Named Student having data members named;
   - Name of type string
   - roll_no of type string
   - age of type int

B. Write a function getNames which takes a dynamic array and size s as parameters and will return the names of all students having age 18.

Prototype:
string* getNames(Student *std, int s);

C. Write a function getEvenRollno which takes a dynamic array and size s as parameters and will return an array of a structure containing information of students having even roll numbers. In order to get an even roll number just check its last digit. (FORMAT OF ROLL_NO: 21i-1234)

Prototype:
Student* getEvenRollno(Student *std);

Question 4.

A. Declare a structure named as CourseRegistration having data members named;
   - courseCode of type string
   - courseTitle of type string
   - CreditHours of type int
   - Section of type char

B. Declare a structure named as SemesterRegistration having data members named;
   - semesterCode of type string
   - course_reg of type CourseRegistration (an array of size 5)

C. Write a member function GetCreditHoursCount which will return the total number of credit hours registered in it.

Prototype:
int GetCreditHoursCount();

D. Write a member function FindCourseInSemesterRegistration which takes a course code as a parameter and returns true if the course is registered in the semester.

Prototype:
bool FindCourseInSemesterRegistration(string courseCode);