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C++ Programming Assignment

Basic class & objects

1. Write a program to create student class and accept data members of it by the object and display them

2. Write a program to Create employee class with the data members and appropriate member function for getting data and displaying data by simple default member function

3. Write a program to create Book class, with data members as follows- book_no, book_name, author, edition, price, qty, bill, discount, netbill . Calculate bill and apply discount 5% on them, also calculate netbill. Initialize these data members by the objects of its class

Array of objects

1. Create a C++ program that demonstrates the use of arrays of objects. The program should simulate a simple student management system

   a. Create a class Student with the following attributes:
   - name (string), rollNumber (integer), marks (integer array of size 5)

   b. Implement the following member functions in the Student class:
   - getDetails(): Asks the user to input the student's details (name, roll number, and marks)
   - displayDetails(): Displays the student's details

   c. Create an array of Student objects with a size of 10.

2. Use a loop to ask the user to input the details of 10 students and store them in the array.
3. Use another loop to display the details of all students in the array.

4. Create a C++ program that demonstrates the use of arrays of objects. The program should simulate a simple hotel reservation system.

   a. Create a class Room with the following attributes:

   - roomNumber (integer), roomType (string), guestName (string), checkInDate (string), checkOutDate (string)

b. Implement the following member functions in the Room class:

- getDetails(): Asks the user to input the room's details (room number, room type, guest name, check-in date, and check-out date)
- displayDetails(): Displays the room's details.

c. Create an array of Room objects with a size of 5.

d. Use a loop to ask the user to input the details of 5 rooms and store them in the array.

e. Use another loop to display the details of all rooms in the array.

f. Implement a function to search for a room by room number and display its details if found.

g. Implement a function to update the guest name and check-out date of a room.

Constructor

1. Create a C++ program that implements a Book class with the following requirements:

Attributes: title (string), author (string), pages (integer), price (double)

Add default constructor and Parameterized Constructor write display method to show the book details.

- Use proper encapsulation and data hiding techniques

- Use meaningful variable names and comments to explain the code.

2. Create a class Point with data members as x,y. Create Default and Parameterized constructors. Writegetters and setters for all the data members. Also add the display function. Create the object of this class in main method and invoke all the methods in that class.

3. Create a class ComplexNumber with data members real, imaginary. Create Default and Parameterized constructors. Write getters and setters for all the data members. Also add the display function. Createthe object of this class in main method and invoke all the methods in that class.

4. Create Date class with members day, month, year. Write no argument and parameterized constructor.Create two objects and initialize them using no argument and parameterized constructor respectively.Print date using display function.

5. Create a class Person with data members as name, age, city. Write getters and setters for all the data members. Also add the display function. Create Default and Parameterized constructors. Create the objectof this class in main method and invoke all the methods in that class.

Static variables

1. Create a C++ program that implements a University class with the following requirements:

Attributes: name (string),location (string),

Static Members:

- totalStudents (integer): The total number of students enrolled in all universities (static Veriable)
- getTotalStudents() (static function): Returns the total number of students enrolled in all Universities.

Member Functions:

1. enrollStudent(): Increments the totalStudents static variable by 1.
2. displayInfo(): Displays the university's name and location

Polymorphism

1. Implement a C++ program that demonstrates compile-time polymorphism using function overloading. Create a class called Calculator with the following member functions:

1. calculateArea(int): Calculates and returns the area of a square with the given side length
2. calculateArea(int, int): Calculates and returns the area of a rectangle with the given length and width
3. calculateArea(double, double): Calculates and returns the area of an ellipse with the given major and minor axes

2. Create a C++ program that demonstrates runtime polymorphism using virtual functions and pointers to the base class. The program should simulate a simple graphics system with different shapes.

i. Create a base class Shape with the following attributes:

- color (string), filled (boolean)

ii. Implement the following virtual functions in the Shape class:

- draw()
- getArea()
- getPerimeter()

iii. Create three derived classes Circle, Rectangle, and Triangle that inherit from Shape.

iv. In the Circle class, override the draw() function to display a message indicating that a circle is being drawn

v. In the Rectangle class, override the getArea() function to calculate and return the area of the rectangle

vi. In the Triangle class, override the getPerimeter() function to calculate and return the perimeter of the triangle

vii. Create pointers to the Shape class and dynamically allocate objects of Circle, Rectangle and triangle

viii. Call the virtual functions through the pointers to demonstrate runtime polymorphism.

3. Implement a C++ program for Binary Operator Overloading to Subtract two Complex Number.

Inheritance

1. Develop a class hierarchy for vehicles. Start with a base class Vehicle having attributes (vehicle_no,owner_name) and create derived classes two-wheeler having members (veh_type as Motorcycle, scooter etc.).Define functions accepts() and display().

Write a main() function to accept and display details of two-wheelers. [Single Inheritance]

2. Implement given Inheritance. Define a base class Shape with properties like area and perimeter. Create derived classes like Circle, Rectangle, and Triangle. Accept suitable attributes as per shape. [Hierarchical Inheritance]

3. Write a c++ program to implement **Multilevel Inheritance**. Consider base class1 as Animal, base class2 as Dog and derived class as Baby_dog.Consider suitable attributes and function.

4. Employee Payroll System with Abstract Classes:

Select suitable type of inheritance to implement given scenario

Problem Statement: Design an employee payroll system. Create an abstract class Employee with attributes like name and employee ID. Derive concrete classes like Hourly Employee and Salaried Employee. Define abstract methods for calculating pay in the base class and implement them in the derived classes.