National University of Computer and Emerging Sciences

Laboratory Manual

for

Object Oriented Programming

Lab 04

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Objectives

After performing this lab, students shall be able to:

- To understand and implement copy constructor in C++.
- To understand and implement static data member and static member function in C++.
- To understand and implement const data member and const member function in C++.
- To understand and implement const object and scope resolution operator in C++.

TASK 1: Deep Copy Constructor

a. Create a class named "Student" with a private data member "name" of string type and aprivate data member "id" of integer pointer type.
b. Define a parameterized constructor that initializes both "name" and "id" data members.
c. Define a deep copy constructor that copies the "name" and "id" data members of one objectto another object.
d. Create two objects of the "Student" class using the parameterized constructor.
e. Copy one object to another object using the deep copy constructor.
f. Display the "name" and "id" data members of both objects to verify the deep copy constructor works properly.

TASK 2: Static Data Member and Static Member Function

a. Create a class named "Employee" with a private data member "name" of string type and astatic data member "count" of integer type initialized to 0.
b. Define a parameterized constructor that initializes the "name" data member andincrements the "count" static data member.
c. Define a static member function named "getCount" that returns the value of the "count"static data member.
d. Create three objects of the "Employee" class using the parameterized constructor.
e. Call the "getCount" static member function and display the number of objects created.

TASK 3: Const Data Member and Const Member Function

a. Create a class named "Circle" with a private data member "radius" of float type and a constdata member "pi" initialized to 3.14.
b. Define a parameterized constructor that initializes the "radius" data member.
c. Define a const member function named "getArea" that calculates and returns the area ofthe circle using the formula "pi * radius * radius".
d. Create an object of the "Circle" class using the parameterized constructor.
e. Call the "getArea" const member function and display the area of the circle.

TASK 4:Const Object and Scope Resolution Operator

a. Create a class named "Person" with a private data member "name" of string type.
b. Define a parameterized constructor that initializes the "name" data member.
c. Define a const member function named "getName" that returns the value of the "name"data member.
d. Create two objects of the "Person" class using the parameterized constructor.
e. Declare one object as const and try to modify its data member "name".
f. Use the scope resolution operator to access the non-const "getName" member function ofthe const object and display the value of the "name" data member.

TASK 5:

Create a class named "Student" with the following properties and methods:
a. A private data member "name" of string type.
b. A private static data member "totalStudents" of integer type, which keeps count of the totalnumber of students created.
c. A parameterized constructor that initializes the "name" data member and increments the"totalStudents" count.
d. A copy constructor that copies the "name" data member and increments the"totalStudents" count.
e. A const member function named "getName" that returns the value of the "name" datamember.
f. A static member function named "getTotalStudents" that returns the value of the"totalStudents" static data member.
g. Create two objects of the "Student" class using the parameterized constructor.
h. Create a third object of the "Student" class using the copy constructor from the first object.
i. Declare one object as const and try to modify its data member "name".
j. Use the scope resolution operator to access the non-const "getName" member function ofthe const object and display the value of the "name" data member.
k. Display the total number of students using the static member function"getTotalStudents".

Write the code for the above program and test it with appropriate input and output.