FAST School of Computing

Object Oriented Programming – Spring 2023

Cyber Security Department

LAB 13

Inheritance and Polymorphism in C++

Learning Outcomes

In this lab you are expected to learn the following:

- Basic Concept and Implementation of Inheritance and Polymorphsim

Note: Plagiarism(from some else or internet) in any 1 question will lead to zero marks in the whole lab task.

Problem 1:

Consider a class **BankAccount** that has:

Two attributes i.e. **accountID** and **balance** and A function named **balanceInquiry()** to get information about the current amount in the account.

Derive two classes from the BankAccount class i.e.

CurrentAccount and the **SavingsAccount**.

Both classes (CurrentAccount and SavingsAccount) inherit all attributes/behaviors from the BankAccount class. In addition, followings are required to be the part of both classes:

- Appropriate **constructors** to initialize data fields of base class
- A function named **amountWithdrawn**(amount) to withdraw certain amount while taken into account the following conditions:

While withdrawing from **current account,** the minimum balance should not decrease Rs. 5000, While withdrawing from **savings account**, the minimum balance should not decrease Rs. 10,000

- **amountDeposit(amount)** to deposit amount in the account
- In the main() function, create instances of derived classes (i.e. CurrentAccount and SavingsAccount) and invoke their respective functions to test their working

Problem 2:

Consider a base class named **Employee** and its derived classes **HourlyEmployee** and **PermanentEmployee** while taking into account the following criteria:

- Employee class has two data fields i.e. a **name** (of type string) and specific **empID** (of type integer)
- Both classes (HourlyEmployee and PermanentEmployee) have an attribute named **hourlyIncome**
- Both classes (HourlyEmployee and PermanentEmployee) have **three-argument** constructor to initialize the **hourlyIncome** as well as **data fields of the base class**
- Class **HourlyEmployee** has a function named **calculate_the_hourly_income** to calculate the income of an employee for the actual number of hours he or she worked. One hour income is Rs. 150
- Similarly, **PermanentEmployee** class has function named calculate_the_income

to calculate the income of an employee that gets paid the salary for exact 240 hours, no matter how many actual hours he or she worked. Again, one hour salary is Rs. 150.

- Implement all class definitions with their respective **constructors** to initialize all data members and functions to compute the total income of an employee. In the **main() function,** create an instance of both classes (i.e. HourlyEmployee and PermanentEmployee) and **test the working of functions** that calculate total income of an employee

Problem 3:

Consider a class **Computer** having Two fields (i.e. **companyName**, **price**) and A single function named **show()**

- A class named **Desktop** inherits Computer class and adds fields representing **color**, **monitor size**, and **processor** type and Override function named show() to display values of its all attributes
- A class named **Laptop** inherits Computer class and adds fields representing **color**, **size**, **weight**, and **processor** type and Override function named show() to display values of its all attributes
- In Main() instantiate objects of derived classes to access respective show() functions to see the polymorphic behavior.

Submission Details:

1. Save single .cpp file with your roll no and lab number e.g. i22-XXXX_Lab#.cpp
2. Take screen shot of running test cases of tasks.
3. Zip the .cpp file and screen shots (Do not create .rar file) with roll no and lab no. e.g. i22-XXXX_Lab#.zip.
4. Submit the zip file on google class room.