

National University of Computer and Emerging Sciences



Object Oriented Programming

Lab 9

Inheritance

Department of Computer Sciences

(CL 103)

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Note: Read Instructions Carefully

Instructions:

1. Submit .docx file with format Section_18F-XXXX.docx. Example C_18F-1234.docx. Also make separate .cpp file for all the questions with names Section_18F-XXXX_q1.cpp, Section_18F-XXXX_q2.cpp and so on. Upload all the files in the submission. Don't make any .zip or .rar file.
2. Submission will not be accepted if not in the above format.

Question 1

Design a class named Person Data with the following member variables:

- First Name
- Last Name
- Address
- City
- State
- Zip
- Phone No.

Write the appropriate accessor (getter) and mutator (setter) functions for these member variables. Next, design a class named Customer Data, which is derived from the Person Data class. The Customer Data class should have the following member variables:

- Customer Number
- Mailing List

The Customer Number variable will be used to hold a unique integer for each customer. The Mailing List variable should be a bool. It will be set to true if the customer wishes to be on a mailing list, or false if the customer does not wish to be on a mailing list. Write appropriate Accessor and Mutator functions for these member variables. Customer Data class will have the

- Input Customer Data member function which will Input all the data for customer.
- Display Customer Data member function which will display all the data for customer.

Demonstrate an object of the Customer Data class in a simple program.

Question 2

A retail store has a preferred customer plan where customers may earn discounts on all their purchases. The amount of a customer's discount is determined by the amount of the customer's cumulative purchases in the store.

- When a preferred customer spends \$500, he or she gets a 5% discount on all future purchases.
- When a preferred customer spends \$1,000, he or she gets a 6% discount on all future purchases.
- When a preferred customer spends \$1,500, he or she gets a 7% discount on all future purchases.
- When a preferred customer spends \$2,000 or more, he or she gets a 10% discount on all future purchases.
- Design a class named Preferred Customer, which is derived from the Customer Data class you created in

problem 1. The PreferredCustomer class should have the following member variables:

- purchasesAmount (a double)
- discountLevel (a double)

The purchasesAmount variable holds the total of a customer's purchases to date. The discountLevel variable should be set to the correct discount percentage, according to the store's preferred customer plan.

Write appropriate member functions for this class and demonstrate it in a simple program.

Question 3

Write a class Person. It should have the following three attributes:

- A. Name
- B. Age
- C. Gender

Now do the following steps

- Inherit a class EmployedPerson from person.
- Employed should inherit only Name from the Person.
- Employed should have an attribute NIC number.

- Employed has a member function Employ that should output “Hi, I am Employ from Employed Class”.
- Inherit another class Unemployed from Person.
- Unemployed should inherit Name from Person.

Question 4

Design an abstract class Employee with subclasses Piece Worker and Hourly Worker.

A Piece Worker represents an employee whose pay is based on then number of pieces of merchandise produced. An Hourly Worker represents an employee whose pay is based on an hourly wage and then number of hours worked. Hourly workers receive overtime pay (1.5 times the hourly wage) for all hours worked in excess of 40 hours. Class Piece Worker should contain private instance variables wage (to store the employee’s wage per piece) and pieces (to store the number of pieces produced). Class Hourly Worker should contain private instance variables wage (to store the employee’s wage per hour) and hours (to store the hours worked). In class Piece Worker, provide a concrete implementation of method earnings that calculates the employee’s earnings by multiplying the number of pieces produced by the wage per piece. In class Hourly Worker, provide a concrete implementation of method earnings that calculates the employee’s earnings by multiplying the number of hours worked by the wage per hour. If the number of hours worked, is over 40, be sure to pay the Hourly Worker for the overtime hours.

Question 5

Note: This is an open-ended question, your approach to the solution would decide your marks.

You are required to make a solution to this question and show it to the instructor before coding it. You are required to make a system to store the information of people at your university, the usual users of the system would be the teachers, students and in some cases a teacher’s assistant (TA).

Teachers are paid 1,500 per lecture. The TA is paid with respect to the number of assignments they have checked. (PKR. 30 per assignment), the system should calculate the total stipend payable to the TA. The system also needs to have a function that when called would display all the relevant data of the person (since this function will not be modifying any data it should be constant). Every user will have a unique ID assigned to them and once assigned it cannot be changed. The TA plays the role of both the student and a teacher at the same time. You have to identify the classes involved and apply OOP concepts where needed.

Hint: All three users of the system have a few properties that are the same, use OOP concepts to make use of this information.

Create a main function to test your system, only use pointers and dynamic memory allocation for creating objects.