Lab 10: Object Oriented Analysis and Design

**Topic: Inheritance**

# Objective

Making students familiarize with the concepts of inheritance

# Instructions

**Whether mentioned or not, make copy constructor and overload assignment operator**

## Task 1

Pakistan Post Office (PPO) offer a number of different shipping options, each package has specific costs. Create an inheritance hierarchy to represent various types of packages.

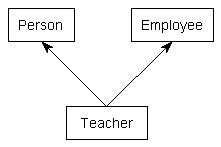
1. Use class ***Package\_PPO*** as the base class of the hierarchy, then include classes ***NormalPakage***, ***TwoDayPackage*** and ***OvernightPackage*** that derive from ***Package\_PPO***
2. Base class ***Package\_PPO*** should include data members representing the name, address, city, state and ZIP code for both the sender and the recipient of the package, in addition to data members that store the weight (in Kg) and cost per KG to ship the package. Package\_PPO’s constructor should initialize these data members. Ensure that the weight and cost per KG contain positive values.
3. ***Package\_PPO*** should provide a public member function calculateCost that returns a double indicating the cost associated with shipping the package.
4. ***NormalPakage*** have all same attribute as base class but its calculateCost function should determine the cost by multiplying the weight by the cost per KG.
5. Derived class ***TwoDayPackage*** should inherit the functionality of base class Package, but also include a data member that represents a flat fee that the shipping company charges for two-day-delivery service. ***TwoDayPackage’s*** constructor should receive a value to initialize this data member. ***TwoDayPackage*** should redefine member function calculateCost so that it computes the shipping cost by adding the flat fee to the weight-based cost.
6. Class ***OvernightPackage*** should inherit directly from class Package\_PPO and contain an additional data member representing an additional fee per KG charged for overnight-delivery service. ***OvernightPackage*** should redefine member function calculateCost so that it adds the additional fee per KG to the standard cost per KG before calculating the shipping cost.

**Instructions:**

1. Create different type of Constructors according to question
2. Create Setter getter where necessary
3. Your design should use all concepts of OOP we have studied so far.

## Task 2: MULTIPLE INHERITANCE is a part of Midterm

Provide the C++ implementation of the following.



The Person class has name and age as its attributes. It has an overloaded constructor to initialize the values and appropriate accessor and mutator methods. The Employee class has name of the employer and wage as its attributes with an overloaded constructor and appropriate accessor and mutator methods. The Teacher class is inherited from both Person and Employee class. This is known as MULTIPLE inheritance. You will do it like this in Teacher class:

class Teacher: public Person, public Employee

Note that teacher is inheriting from both Person and Employee. In multiple inheritance, there are more than 1 parents. In this example, there are two parents. There could have been more than 2 parent classes too.

Teacher has an attribute of Pay Scale of type integer. It has overloaded constructor, appropriate accessor (getter), mutator (setter) methods and a display function to print the Name, Age, Name of Employer, Wage and Pay Scale of Teacher.