Instructions

Package Inheritance Hierarchy

Package delivery services such as FedEx and UPS offer a number of different shipping options, each with specific costs associated.

Create an inheritance hierarchy to represent the various types of packages. Use **Package** as the base class of the hierarchy and then include classes**TwoDayPackage** and **OvernightPackage** that derive from Package. Base class Package 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 ounces) and cost per ounce** to ship the package. Package's constructor should initialize these data members.

Ensure that the weight and cost per ounce contains positive values. The Package class should provide a public member function **calculateCost** that returns a double indicating the cost associated with shipping the package. Package's calculateCost function should determine the cost by multiplying the weight by the cost per ounce.

Derived class TwoDayPackage should inherit the functionality of base class Package, but also include a data member that represents a **flat fee per ounce** that the shipping company charges for two day delivery. 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 a flat fee per ounce to the standard cost per ounce calculated by the base class Package's calculateCost function.

Class OvernightPackage should inherit directly from class Package and contain an additional data member representing an additional **flat fee per ounce** charged for overnight delivery service. OvernightPackage should redefine member function calculateCost so that it adds the additional fee per ounce to the standard cost per ounce before calculating the shipping cost.

Create a program that **displays** the address information and calculates the shipping costs for several packages. The program should contain **a vector of Package pointers** to objects of classes Package, TwoDayPackage and OvernightPackage. Loop through the vector to process the packages polymorphically. For each package invoke **get functions** to obtain the address information of the sender and recipient, then print the two addresses as they would appear as mailing labels. Display the weight of the package being shipped and its shipping method. Also call each package's calculateCost member function and print the result. Keep track of total shipping cost for all Packages in the vector, and display this total when the loop terminates.

Please test your inheritance hierarchy with the main function. You can pick the costs for the packages charged by the delivery service. Display the address information and calculate the shipping cost for at least 3 packages (at least 1 of each for Package, TwoDayPackage and OvernightPackage objects). Make sure you use **a vector of Package pointers** to the objects to show the use of polymorphism. You can define the values for the package information in the main function (make up names, addresses, weights, delivery method).

Please make sure to **put your name** in the file name of all the .cpp files and comment your code. Submit the **zip** of all you code files.

Sample possible output:

Package delivery services program

Cost per ounce for a package: $.50/ounce
Additional cost for two day delivery: $2.00/ounce
Additional cost for overnight delivery: $5.00/ounce

Package 1:

Sender:
John Smith
1 Davidson Road
Piscataway, NJ 08854

Receipent:
Tom Smith
2 Davidson Road
Piscataway, NJ 08854

Weight of package: 10 ounces
Type of delivery: Regular Delivery
Cost of Package: $5.00

Package 2:

Sender:
Mary Smith
3 Davidson Road
Piscataway, NJ 08854

Receipent:
Jennifer Smith
4 Davidson Road
Piscataway, NJ 08854

Weight of package: 5 ounces
Type of delivery: Two Day Delivery
Cost of Package: $12.50

Package 3:

Sender:
John Smith
1 Davidson Road
Piscataway, NJ 08854

Receipent:
Mary Smith
3 Davidson Road
Piscataway, NJ 08854

Weight of package: 2 ounces
Type of delivery: Overnight Delivery
Cost of Package: $11.00

Total cost of all the packages: $28.50