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**CSC253 ADVANCED C# ProGRAMMING**

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LAB 06 **OBJECT-ORIENTED PROGRAMMING: INHERITANCE**

# Objectives

In this lab assignment, students will learn:

* to create a base class in an inheritance hierarchy
* to create derived classes that inherit attributes and behaviors from a base class.
* to write constructors in derived classes
* to override methods in base class

# Goals

In this lab assignment, students will demonstrate the abilities:

* to create a base class in an inheritance hierarchy
* to create derived classes that inherit attributes and behaviors from a base class.
* to write constructors in derived classes
* to override methods in base class

# Description

Create a C# console application for each question. When you create a new C# project, Visual Studio creates a folder to hold every file and sub-folder for your project. You need to zip this folder and submit the zip file to Blackboard.

A package-delivery company offers three different shipping options, each with specific costs associated. Create an inheritance hierarchy to represent various types of packages. Use Package as the base class of the hierarchy. Then add two derived classes TwoDayPackage and OvernightPackage. Base class Package has four public auto-implemented properties to store the name and address for the package’s sender and recipient, and two private instance variables to store the weight (in ounces) and cost per ounce to ship the package. Create public properties for these instance variables. Their values should be 0 or higher. Attempts to store negative values in them should be ignored. Package’s constructor should have six parameters: sender’s name, sender’s address, recipient’s name, recipient’s address, weight and cost per ounce. Package should provide a public virtual method CalculateCost that returns a decimal value for the cost for shipping the package, which equals the weight multiplied by the cost per ounce. Derived class TwoDayPackage has an additional private instance variable (and corresponding public property) to store a flat fee the shipping company charges for two-day delivery service. This flat-fee should be 0 or higher. TwoDayPackage’s constructor should have an additional parameter for this flat fee. This class should redefine method CalculateCost so that it computes the shipping cost by adding the flat fee to the weight-based cost calculated by base class’s CalculateCost method. Class OvernightPackage should inherit everything from class Package and has an additional private instance variable (and corresponding public property) representing an additional fee per ounce charged for overnight delivery service. This fee should be 0 or higher. OvernightPackage’s constructor should have an additional parameter for this additional fee per ounce. This class should redefine method CalculateCost so that it adds the additional fee per ounce to the standard cost per ounce when calculating the shipping cost.

Use the following TestPackages class to test your code.

class TestPackages

{

static void Main(string[] args)

{

Package regularPackage = new Package("Peter Anderson", "123 Main St, Ashville, NC 27111", "Mary Brown", "456 Broad St, Benson, NC 27222", 14, 0.5M);

Console.WriteLine("\nRegular Package: ");

Console.WriteLine(" Sender's Name: {0}", regularPackage.SenderName);

Console.WriteLine(" Sender's Address: {0}", regularPackage.SenderAddress);

Console.WriteLine(" Recipient's Name: {0}", regularPackage.RecipName);

Console.WriteLine(" Recipient's Address: {0}", regularPackage.RecipAddress);

Console.WriteLine(" Weight: {0}", regularPackage.Weight);

Console.WriteLine(" Cost Per Ounce: {0:C}", regularPackage.CostPerOunce);

Console.WriteLine(" Shipping Cost: {0:C}", regularPackage.CalculateCost());

TwoDayPackage twoDayPackage = new TwoDayPackage("Peter Anderson", "123 Main St, Ashville, NC 27111", "Mary Brown", "456 Broad St, Benson, NC 27222", 14, 0.5M, 4M);

Console.WriteLine("\nTwo-Day Package: ");

Console.WriteLine(" Sender's Name: {0}", twoDayPackage.SenderName);

Console.WriteLine(" Sender's Address: {0}", twoDayPackage.SenderAddress);

Console.WriteLine(" Recipient's Name: {0}", twoDayPackage.RecipName);

Console.WriteLine(" Recipient's Address: {0}", twoDayPackage.RecipAddress);

Console.WriteLine(" Weight: {0}", twoDayPackage.Weight);

Console.WriteLine(" Cost Per Ounce: {0:C}", twoDayPackage.CostPerOunce);

Console.WriteLine(" Flat Fee: {0:C}", twoDayPackage.FlatFee);

Console.WriteLine(" Shipping Cost: {0:C}", twoDayPackage.CalculateCost());

OvernightPackage overnightPackage = new OvernightPackage("Peter Anderson", "123 Main St, Ashville, NC 27111", "Mary Brown", "456 Broad St, Benson, NC 27222", 14, 0.5M, 0.8M);

Console.WriteLine("\nOvernight Package: ");

Console.WriteLine(" Sender's Name: {0}", overnightPackage.SenderName);

Console.WriteLine(" Sender's Address: {0}", overnightPackage.SenderAddress);

Console.WriteLine(" Recipient's Name: {0}", overnightPackage.RecipName);

Console.WriteLine(" Recipient's Address: {0}", overnightPackage.RecipAddress);

Console.WriteLine(" Weight: {0}", overnightPackage.Weight);

Console.WriteLine(" Cost Per Ounce: {0:C}", overnightPackage.CostPerOunce);

Console.WriteLine(" Additional Cost Per Ounce: {0:C}", overnightPackage.AddFeePerOunce);

Console.WriteLine(" Shipping Cost: {0:C}", overnightPackage.CalculateCost());

}

}

The following is the expected output:

Regular Package:

Sender's Name: Peter Anderson

Sender's Address: 123 Main St, Ashville, NC 27111

Recipient's Name: Mary Brown

Recipient's Address: 456 Broad St, Benson, NC 27222

Weight: 14

Cost Per Ounce: $0.50

Shipping Cost: $7.00

Two-Day Package:

Sender's Name: Peter Anderson

Sender's Address: 123 Main St, Ashville, NC 27111

Recipient's Name: Mary Brown

Recipient's Address: 456 Broad St, Benson, NC 27222

Weight: 14

Cost Per Ounce: $0.50

Flat Fee: $4.00

Shipping Cost: $11.00

Overnight Package:

Sender's Name: Peter Anderson

Sender's Address: 123 Main St, Ashville, NC 27111

Recipient's Name: Mary Brown

Recipient's Address: 456 Broad St, Benson, NC 27222

Weight: 14

Cost Per Ounce: $0.50

Additional Cost Per Ounce: $0.80

Shipping Cost: $18.20

Press any key to continue . . .

# Grading rubric

Package class instance variables and properties [10 pts]

Package class constructor [10 pts]

Package class CalculateCost method [10 pts]

TwoDayPackage class instance variables and properties [10 pts]

TwoDayPackage class constructor [10 pts]

TwoDayPackage class CalculateCost method [10 pts]

OvernightPackage class instance variables and properties [10 pts]

OvernightPackage class constructor [10 pts]

OvernightPackage class CalculateCost method [10 pts]

Others [10 pts]