CS1073 Assignment #8 - Fall 2020

Submission Deadline: Friday, November 6th before 12:00 NOON (Atlantic Daylight Time Zone) in the Assignment 8 dropbox in Desire2Learn. (Read the submission instructions at the end of this document carefully).

The purpose of this assignment is:

- to gain practice with inheritance
- to practice good object-oriented design

This assignment is to be done individually. If you have questions, direct them to a tutor/assistant during a help session in the "Faculty of Computer Science Student Success Centre" team or to your course instructor.

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1. Harrison Ford Car Dealership Customer Management System

The Harrison Ford Car Dealership in Wellington, Ohio has hired you to write a customer management system for them. (http://www.harrisonfordwellington.com/)

Harrison Ford needs to keep track of their customers' information and use the system to figure out how much to charge customers when they come back to the dealership to get regularly scheduled maintenance performed on their car.

Driver class: Download HarrisonFord.java

You have been provided a **`HarrisonFord.java`** file that creates a Customer and two WarrantyCustomer objects. You should not make any changes to this file. Look carefully at the code to make sure that your classes support the method calls and output expected by the driver class. In the end, your output should look just like the output provided below.

Customer Class

Create a **`Customer`** class to keep track of a customer's name, their car model, and how many months have passed since their car's last scheduled maintenance. These instance variables should all be private. The Customer class will provide a number of methods for accessing and mutating some of these instance data, and for calculating the cost of maintenance visits and preparing an invoice report, as described below.

The `Customer` class will have a **constructor** that takes the customer's name and car model as parameters, and will initialize the `monthsSinceVisit` (i.e., the number of months since the last maintenance visit) to zero.

The `Customer` class should also provide an **accessor and a mutator for the `monthsSinceVisit`**. The mutator for monthsSinceVisit should be called **`incMonthsSinceVisit()`** and should be a simple method that increments the value by one month at a time (an employee would increment this for each customer on the first of each month).

Also, provide a **`getNextVisitCost()`** method that returns the cost of the next maintenance visit. This method returns the total visit cost, which is calculated using the following formula: Harrison Ford rewards its customers for frequent maintenance visits by charging $20/visit + $12/month since the last visit.

Finally, when customers visit they need to be provided with an invoice. Provide a **`createVisitInovice()`** method that displays a Customer's information and the maintenance cost in a nicely organized way (using whitespace), and correctly formats any dollar values. Your output should look just like the output in the sample below. **`createVisitInvoice()`** should also set the `monthsSinceVisit` value back to zero, so that customers are not overcharged mistakenly on a future visit.

WarrantyCustomer Class

Harrison Ford also tries to encourage customers to purchase warranties when they purchase their cars. Warranty customers are covered for many problems that might occur with their car. They also get a 20% discount off any regularly scheduled maintenance, but this discount can only be offered once every 12 months.

Write a **`WarrantyCustomer`** class that inherits from the `Customer` class, and provide overridden versions of the **`getNextVisitCost`**() method (that provides the discount) and **`createVisitInvoice`**() method (that makes clear that a the customer has purchased a warranty). You will also need to add an instance variable that keeps track of the number of months since the last discount was applied. The overridden **`getNextVisitCost()`** will set this value back to zero, once the discount has been applied to a price.

As always, ensure your code is fully commented using Javadoc comments and inline comments as appropriate.

NOTE: Harrison Ford is serious about maximizing code reuse, so they don't want you to repeat any code in your class hierarchy unnecessarily (to do this make sure you use the **super** keyword as appropriate in each of your methods and constructor of the `WarrantyCustomer` class).

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Hint: You will obviously need to start by writing the Customer class. You may want to, therefore, comment out lines (using //) in the driver class that refer to the WarrantyCustomer class and objects initially. This way you can develop and test your Customer class first. Once your Customer class is working as expected, you can start working on the WarrantyCustomer class and uncomment the lines you initially commented out in the driver (or just redownload the file from D2L).

Sample output is provided below:

```
*********************************
* HARRISON FORD CUSTOMER SYSTEM *
*********************************
November 1, 2019
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INVOICE for: John Smith
        model: Escape
        last visit: 1
        next visit cost: $32.00

INVOICE for: Harold Lee
        model: Fiesta
        last visit: 3
        next visit cost: $56.00
        months since discount: 3        (has warranty)

INVOICE for: Beth Blart
        model: Focus
        last visit: 4
        next visit cost: $68.00
        months since discount: 4        (has warranty)

November 1, 2020
----------------
INVOICE for: John Smith
        model: Escape
        last visit: 12
        next visit cost: $164.00

INVOICE for: Harold Lee
        model: Fiesta
        last visit: 0
        next visit cost: $20.00
        months since discount: 3        (has warranty)

INVOICE for: Beth Blart
        model: Focus
        last visit: 12
        next visit cost: $131.20
        months since discount: 16       (has warranty)
```

Submission instructions are on the next page…

Your electronic assignment submission (submitted via Desire2Learn) will consist of two files:

i. a written report. This should begin with a title page; just as we described in Assignment #1, your title page should include: the course (CS 1073), your section (FR01A, FR02A, FR03A or FR04A), the assignment number, your full name, and your UNB student number. That should be followed by two sections, with each part clearly identified with a section heading. Include:

   a. The source code for your application in Question 1. Do not include the HarrisonFord.java file in your report.

   b. The sample output you created by running the program as per Question 1.

   (Aside: Your source code should contain Javadoc comments, however, you do not need to include the .html files.)

   This written report should be prepared using a word processor; we recommend using Microsoft Word (i.e. create a .docx file for your report). Copy & paste your java source code & required output into the report document. Add appropriate headings for each part. Fix up the formatting where necessary, adjusting line breaks & page breaks to ensure that your document is easy to read. Use a monospaced font for your code to maintain proper indentation.) Once the report is complete and you've checked it all over, save the .docx file for your own records, and then **save a second copy in pdf format for submission**. (Note: Be sure to open that file in a pdf viewer to verify that the pdf was generated correctly.) The **SINGLE pdf file** containing your report will be submitted to the appropriate assignment drop box on Desire2Learn. (It is important that you submit a pdf file and NOT the original Word document. This pdf will allow the marker to write comments directly on your work to give you better feedback.)

   Note: Please name this report as follows: **YourName_As8_Report.pdf**

ii. an archive file (**.zip**) that contains your Java source code and output for this assignment. Make sure that your archive includes all .java files including the HarrisonFord.java file provided (in case the marker wishes to compile & run your code to test it). You should not include the report document or the .class files in your archive. This archive should be submitted as a **single file** to the appropriate drop box on Desire2Learn.

   Note: Please name this archive file as follows:
   YourName_As8_Archive.zip