Due Date: 02.01.2022 23:55

CENG211 – Programming Fundamentals
Homework #4

In this homework, you are expected to implement a simplified version of the "Rent-a-car Application" in Java.
You should fulfill the concepts of:

- Exception Handling
- Generics
- Collections
- Object Oriented Design
- UML Class Diagram
- UML Sequence Diagram

In this application, there are two different types of car rental: commercial and individual. Commercial rental is on a monthly basis and individual rental is on a daily basis. The price is calculated as follow:

daily_price=model_base_price*model-year-ratio

Model Year	Model Year Ratio
2022	1
2020 - 2021	0.95
2017 - 2019	0.9

**Please note that discount is available for both individual and commercial customers.*

Individual customers rent on a daily basis. The customer may have membership or rent without being a member. However, the company offers a 10% discount for the members. There is no discount for the rentals without a membership. The overall price is calculated by multiplying the number of days and daily_price of the rental car and also 10% discount for the members.

Each customer has an ID. ID format differs for members (12 digit String) and customers without membership (11 digit integer) which is based on Turkish Republic Identity Number (***Hint:*** *Generics)*. To illustrate;

ID Number for a member - M12345678910

ID Number for a non-member customer - 12345678910

Commercial customers rent on a monthly basis. All commercial customers have a membership. The monthly price for commercial customers is calculated by 30 days and daily_price and also special discount for the customer. The discount differs for the customer status as follows:

Table 1. Discount Table

Customer Type	**Discount**
Silver	20%
Gold	25%
Platinum	30%

Similar to individual customers, all commercial customers have an ID (8 digit string). The ID starts with S, G or P based on the customer type. To illustrate;

Silver member *- S1234567*

Gold member *- G7896321*

Platinum member *- P9876543*

****Please note that the company may add new commercial customer types in the future (**Hint**: Interfaces).*

The file that consists of different rentals information is given: HW4_Rentals.csv The columns of the file are given in the following for each different rental type:

Individual Rental: ***type****, **customer ID, number of days, car model, car model year, base price***

Commercial Rental: ***type****, **customer ID, number of months, car model, car model year, base price***

**Individual rentals are indicated as 'Individual' and commercial rentals are indicated as 'Commercial' in the given input file.*

<u>The application should work as follow:</u>

1. Read the file to process the rentals.
    a. If *customer ID* format is not appropriate for customer types, necessary exceptions should be thrown. (You should think about the exceptions.)
2. Calculate the price of the rentals.
3. Generate a 7-digit integer rental code for each rental.
4. The application should calculate some rental statistics as follow:
    a. Total number of cars rented
    b. Total number of commercial rentals
    c. Total number of commercial rental-month
    d. Total number of individual rentals
    e. Total number of individual rental-day
    f. Total number of rentals of individual non-member customers
    g. Total number of rentals of individual member customers
    h. Total number of rentals of silver commercial customers
    i. Total number of rentals of gold commercial customers
    j. Total number of rentals of platinum commercial customers

You are expected to satisfy object-oriented design guidelines.

You are expected to draw a UML Class Diagram, UML Sequence Diagram, and UML Statechart Diagram in the given scenario. For the UML Sequence Diagram, you should only draw 'the 'calculating the rental price of a commercial rental' part. Please add your csv files and UML diagrams inside your project.

Sample Output:

Welcome!

Total number of cars rented: …

Total number of commercial rentals: …

Total number of commercial rental-month: …

Total number of individual rentals: …

Total number of individual rental-day: …

Total number of rentals of individual non-member customers: …

Total number of rentals of individual member customers: …

Total number of rentals of silver commercial customers: ….

Total number of rentals of gold commercial customers: …

Total number of rentals of platinum commercial customers: …

Individual Rentals:

No Rental Code Customer ID isMember Number of Days Car Model Model Year Rental Price

1 ……..

2 …….

3 …….

..

Commercial Rentals:

No Rental Code Customer ID Customer Type Number of Months Car Model Model Year Rental Price

1 ……..

2 …….

3 …….

4 …….

..

Important Notes:

1. You can use standard **java.io** packages to read files. Do NOT use other 3rd party libraries.

2. You should use relative paths (e.g. `Files/sample.csv`) instead of absolute paths (e.g. `C:\\user\\eclipse-workspace\\MyProject\\Files\\sample.csv`).

3. To support **Turkish characters** you may need to change your project's text file encoding to UTF8: Right-click on your project (in package explorer) → Properties → Text file encoding → Other → UTF8 → Apply.

4. You are expected to write clean, readable, and tester-friendly code. Please try to maximize reusability and prevent redundancy in your methods.

Assignment Rules:

1. In this lecture's homework, there is no cheating allowed. If any cheating has been detected, they will be graded as 0 and there will be no further discussion on this.
2. You are expected to submit your homework in groups. Therefore, only one of you will be sufficient to submit your homework.
3. Make sure you export your homework as an Eclipse project. You can use other IDEs as well, however, you must test if it is supported by Eclipse.
4. Submit your homework through CMS.
5. Export your Java Project with your assigned group ID (which will be announced on CMS) as the given format below:

   G05_CENG211_HW4.zip

6. Please be informed that your submissions may be anonymously used in software testing and maintenance research studies. Your names and student IDs will be replaced with non-identifying strings. If you do not want your submissions to be used in research studies, please inform the instructor (Dr. Tuglular) via e-mail.

Grading:

Item	**Marks (Total 100)**
Interfaces	10
Generics	10
Collections (Arraylist operations)	5
Exception Handling	10
Reading Data from Files	5
Remaining Code	10
UML Class Diagram	20
UML Sequence Diagram	15
UML Statechart Diagram	15