Backend Programming: Home Work

Shipping Company

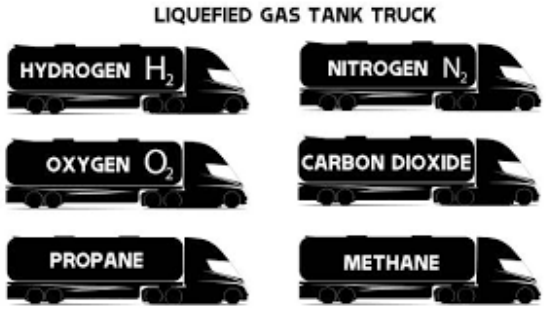
Object Oriented Programming Solution

40 Points

1. Project Description:

You work is to design and implement an application using Java, to be used to calculate the shipping cost of Liquide and Liquide gas products from Hamburg harbor in Germany, to several cities in Europe on regular bases, The shipments will be transferred by special trucks that can carry Liquide and liquid gases (Tanker). The shipments will be one of the following, Materials:

1- Oxygen O2, Risk factor is 17%
2- Hydrogen H2, Risk factor is 18%
3- Nitrogen N2, Risk factor is 2%
4- Propene, Risk factor 20%
5- Carbon Dioxide, Risk factor 10%
6- Methane, Risk factor 18%
7- Benzene, Supper E95, Risk factor 20%
8- Benzene, Supper, Risk factor 20%
9- Water, Risk factor 0%.
10- Milk, Risk factor 0%.



You have at the same time 3 different shipping options:

1- Small Tanker Trucks: Length: 300 inches, Radius: 24 inches
2- Medium Tanker Trucks: Length: 380 inches, Radius: 40 inches
3- Large Tanker Trucks Length: 860 inches, Radius: 52 inches

Where:

- The shipping cost for cost is based on the two variables the distance between cities, and the risk factor.
- The cost Kilometer per gallon will be 0.01 Euro / per gallon per kilometer, and in addition to the risk factor listed above,
- The company will accept shipments to the following cities:
    - 1- Berlin,
    - 2- Munching,
    - 3- Leipzig,
    - 4- Dresden,
    - 5- Köln,
    - 6- Rome,
    - 7- Parris,
    - 8- Wien,
    - 9- Madrid,
    - 10- Any other city will be add it by providing the distance.



- The truck must return empty to Hamburg, so the cost will be 0.6 euro per Kilometer, must include it in the cost.
- The shipments will be only from Hamburg to city listed above, and any transportation from 2 cities, will required to be through Hamburg.
- All the calculation must be done in both Gallon, and cubic meter.

Task .1: Prepare the Data: 2 Points

From the google earth, extract the distance in Kilometer between Hamburg harbor, and each city, uses the center of the city as indicator. This can be done using google map manually.

From google find the Liquide density (Weight per Gallon) for each materials listed above and add the results tor

Task .2: Prepare the Project: 3 Points

In Eclipse, create a project Called Shipping Company. Add to it the following:

1- Info class, which include, your name, matriculation number and your group, date of the creation, total number of line of codes.
2- Tanks package,
3- Distance package,
4- Calculation package,
5- Main package,

Write a program that calculate the ***Best shipping*** methods and cost s according to your regular shipping products and distance (Whatever number of the products that you have).

The program must read from user the order information for the user example: 3200 gallon of O2 to be shipped from Hamburg to Berlin, then calculate the best shipping methods according to less price, for example (1 big Tanker, and 1 small Tanker, According to maximum volume and weight of the shipment and the total).

2. Solution Steps:

Please follows the following steps during the solution:

A. In Package ***Tanks*** create a class ***Item*** that has:

- Constructors.
- Getter and setters.
- Calculate Volume Method.
- Print item info.

B. In the ***Tanker*** package create ***Truck*** class that has.

- Constructors.
- Getter and Setters.
- Calculate Volume.
- Print tanker info.

C. In the ***distance*** package create method ***Calculation*** that used to perform all the needed calculations, which has at least the following methods:

- The totalVolume method,
- The totalWeight method,
- The bestShipping method,
- The hippingPrice method,
- The addItems method,
- The addOrder method,
- The printItem method to print items information's,
- The printOrder method to show order information's and price,

D. Create Test main static methods to

- Add products details
- Read the order.
- Print the results.

3. The Solution condition

The solution must has the following teaches (Not following the following condition you will have penalties of each points):

1- Base on OOP, no static methods are allowed, except of Lambda Function if needed. (10 points penalty)

2- All variables must be private, (4 point penalty)

3- Uses ***inheritance***, and ***abstract*** in the solution (4 points penalty).

4- Uses Array or list to save the shape of the items, (item object) (2 points penalty).

5- Uses Array or list to save the order information. (Numbers of items) (2 points penalty).

6- Not following the package structures (Please uses the correct package and class names as shown above. (2 Points penalty).

7- UTF 8 character coding (1 point penalty).

Please save Java program that:

1- Create a project called ***YourNameHW***, please uses your first name and last name.

2- Write your name in the code as comment.

4. Report The Solution

Please write a Java program that contained the following information you include in your reports the following points:

1. You can add any other methods, classes that you see necessary to show your work for example (nice printing, entering data, ..)
2. Write comments to explain your program in correct ways.
3. You can uses lists or arrayList.

Notes:

1- This home work ***is individual*** each student has to submit her/his solution within the time frame, any failed of submission in the deadline, he will get zero.

2- Please save your homework ***src directory only*** in compressed file like: ***YourNameHW.zip***

3- Please submit your homework as zip file before 15 June 12:00 PM using the team upload link in MsTeam account***, any submission by email later submission will be counted sorry.***

4- Nonworking program or fail in submission on time will get zero.

5- Any copy of the home work will cause failing the course, it is individual work so do it along.

6- Please upload you report or the file in the assignment under your name in ***MsTeam.***

7- Please do not send any questions after 17:00, and in holydays, or day off, thank you,

Good Luck

Prof. Dr. Rand Kouatly