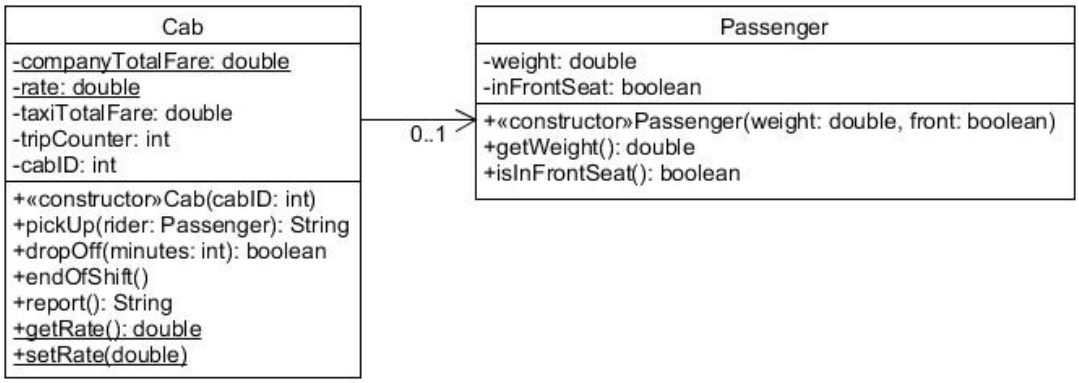
COMP10062 Lab 3: Taxi Driver

Instructions

1. Define Java classes named `Cab` and `Passenger` based on the class diagram below.



   Note: The arrow in the class diagram is an *association* arrow. It shows that a `Cab` can hold 0 or 1 `Passenger` objects. This is implemented with a private instance variable of type `Passenger` which either contains a reference to a **Passenger** object or `null` if there is no passenger. This instance variable is represented by the arrow. It is not listed with the other instance variables.

2. Create a `CabSimulation` class with a `main()` method. Have the `main()` method, first ask what the day's rate is (in dollars per minute) and set the static `rate` variable. Do this before instantiating any `Cab` objects. Then instantiate two `Cab` objects with `cabID`s of *1111* and *2222*.

3. Most of the `main()` method will consist of a `while` loop following this sequence:
   a. Prompt for a Cab ID (any invalid ID will break out of the loop).
   b. Ask for the next passenger's weight in Kilograms.
   c. Ask if they are sitting in the front seat or the back seat.
   d. Create a new `Passenger` object and pass it to the `Cab` via the `pickUp()` method. Print the `String` returned from this method (see below for details). If there is a problem (i.e. the `Passenger` parameter is `null`), this method should return `null`.
   e. Ask how many minutes the trip lasted and pass it to the `dropOff()` method. This method should return `false` if there is no current passenger when it is called, or `true` otherwise.
   f. Loop back.

4. After getting out of the while loop, call the `endOfShift()` method for each `Cab`. In this method, add the `taxiTotalFare` to the `companyTotalFare`.

5. Then call the `report()` method for each of the Cab objects. This method returns a `String` like the one shown in the sample output. You must print this String from the `main()` method.

6. The variable `companyTotalFare` is used to keep track of all money coming in for the cab company. It is a class variable.

7. The variable `taxiTotalFare` is used to keep track of money coming in for a particular `Cab` object. It is an instance variable. A new fare is calculated whenever `dropOff()` is called. It is defined as the number of minutes in the trip multiplied by the rate.

8. The variable `tripCounter` is used to count the number of trips a particular Cab object makes. It is an instance variable.

9. The `pickUp()` method should return a `String` containing the cab's id, the current trip number, a message stating the passenger is in the front seat (if that's true) and a message stating that the airbag is on (if that's true). The airbag will automatically turn on if the passenger weighs 40.0 kg or more and is sitting in the front seat.

10. Comment your code to JavaDoc standards. Indent your code consistently (ALT-SHIFT-F!) and use meaningful variable names for any extra variables you create.

Hints and Notes

The `Passenger` and `Cab` methods never use any `System.out` method calls. Instead, they return values to the `main()` method.

Pay attention to and test your error cases (e.g. `dropOff()` called when there is no `Passenger` in the `Cab`; `pickUp()` called with a null `Passenger`; etc). These error cases might never come up in the `main()` method you are being asked to write, so you should test them with a separate `main()` method. You do not have to hand in this test `main()` method.

The `Cab` object has to return a formatted output string from the `report()` method. You can do this with the `String.format()` method. This method works exactly like `System.out.printf()` except that it returns a formatted `String` instead of printing to standard output.

Handing In

Zip up your NetBeans project and put it in the drop box. See the drop box for the due date and evaluation details.

Sample Output

```
What is today's rate? 1.55
Which Cab? 1111
New passenger weight (kg): 35
In front seat? (y/n) yes
Cab 1111 pickup 1. Passenger in front seat.
How long is the trip in minutes? 23
Which Cab? 1111
New passenger weight (kg): 56
In front seat? (y/n) y
Cab 1111 pickup 2. Passenger in front seat. Airbag is on.
How long is the trip in minutes? 52
Which Cab? 2222
New passenger weight (kg): 76
In front seat? (y/n) no
Cab 2222 pickup 1.
How long is the trip in minutes? 12
Which Cab? 1111
New passenger weight (kg): 50
In front seat? (y/n) y
Cab 1111 pickup 3. Passenger in front seat. Airbag is on.
How long is the trip in minutes? 45
Which Cab? 0

Cab 1111 had 3 trips and earned $186.00 (90.9% of day's total).
Cab 2222 had 1 trips and earned $18.60 (9.1% of day's total).
```