Assignment: Database and Information Systems

COMP2004J: Databases and Information Systems
Weight: **20% of final grade**
Due Date: Friday 1st June 2018 @ 23:55

Note: This is an *individual* assignment: everything you submit should be your own work.

Description

A car rental company requires a database to keep track of its business. Within this database, it needs to record information about its customers (called "members"). This includes their name, address, telephone number, membership number and the date they joined on. The company only rents cars to members. Each rental lasts for one day, so a car can be rented at most once per day. To help customers search the database, the company also wants to record details about the cars. This includes the car's manufacturer's name, the model, the year it was made, the registration number, the number of seats it has, and the price to rent it. This price can change over time (for example, the price would be lower for older cars, or cars that are in poorer condition). The company will often buy several cars of the same model. In addition to renting cars, the company will also sell ex-rental cars after they have been rented for a period of time. Unlike rentals, cars can be sold to either members or non-members. Obviously, once a car is sold it is no longer available for rent. This should be reflected in the database. The company would like to record the amount of money they received whenever a car was rented or sold. For rental cars, they would also like to record the distance that each car has travelled.

Tasks

1. From the above description, create an Entity Relationship diagram to model a database for this company. Show clearly the process of developing the model and document any assumptions that you make. When defining your model, you should make sure that it is possible to answer the questions in part 4 (below). (20 marks)
2. Map the ER diagram to a relational model. Show clearly the process used and state the reasons for your choice of primary keys and foreign keys in your model. Again, document any assumptions you have made. (20 marks)
3. Write appropriate CREATE TABLE statements for your relational model. Justify your choice of data types for each attribute and any constraints you include. (15 marks)
4. Write SQL queries that will find an answer to each of the following questions. Each question should be answered by 1 query. (20 marks):
    - How much money did the company earn from selling cars in 2015?

- Which rental car has driven the furthest distance in total?
- Which member has driven rented cars the furthest distance in total?
- Which day(s) did the company have the most rentals?
- How many cars of each model does the company have available for rent?
- Who was the 10th member to join? (Hint: the LIMIT clause may be useful here)
- What car is the cheapest to rent?
- How old is the company's oldest car? (Hint: MySQL's date and time functions may be useful here)
- Which cars have never been rented?
- A customer wants to rent a car that can hold at least 4 people, is less than 2 years old and costs less than 1,000 RMB per day to rent. What suitable cars are available?

5. Build a Java project, which manipulates the database in part 3. It can help the manager do the tasks below (25 marks):
   - Add a new member to the system.
   - Add a new car to the system.
   - Find the detail information of a car by giving its registration number.
   - Find all available cars.

Note

- This assignment will require you to do some independent research outside of what is directly covered in the lectures.
- The quality of presentation will be taken into account when grading. Rewards will be given for work that is clearly and professionally presented.

Submission

- Submit to Moodle before 23:55 on Friday June 1st 2018.
- Submit a PDF file, containing 5 sections: one section for each of the 5 tasks above and all your java codes. You must use an appropriate software package to draw your E-R diagram: hand-drawn diagrams are not acceptable.