CS4123 Autumn 2016

Homework Assignment 9

Taxi Club

Here is the E-R diagram representing a Taxi Club. Members register in order to use the taxis driven by Drivers who are registered with the club. Each member's full name is registered along with his/her mobile number. Each driver's surname (Dname), mobile number, badge number and city are registered. Registered members can use an app to call a taxi whenever they are in one of the cities covered by the system. Each trip is recorded with the following information: the Mnum, the Dnum, the date, the time of pickup and the cost of the trip. Typical values of the Attributes are given in Q4 - Q10. Use these to decide on domains. *(Apologies if you are familiar with the Hailo system, as no resemblance is intended.)*

Q1
Convert the Many-to-Many relationship shown in the ER diagram into a dependent entity. Sketch the new entity and show its relationships. Indicate the identifying attribute(s) of this entity which should include the attributes it inherits from the existing entities.

Q2
Using the basic sets, **IDs, Numbers, Names, Dates** and **Money** declare at least 6 specific **Domains** that are needed to model the data. Write the Z record schemas for the Relations implied by the E-R diagram and the description above, consistent with your answers to Q1.

Q3
(a) Write the State schema in Z for the ***TaxiClub*** database. Include the existential and referential integrity constraints.
(b) Give the SQL code for the referential integrity constraints

Q4
Write a Z operation schema to specify the successful insertion into the TaxiClub database of a tuple **d?** representing a new driver in the system. The operation must check that neither the driver number nor his/her badge number are already registered in the system.

Q5
Write an operation schema to add a new trip into the database, using the tuple variable **t?**. Check that the driver and the member for this trip are both existing in the database and that identifier of the trip is unique.

Q6
Write a Z operation schema to successfully delete the member identified by the domain variable **m?** and all the trips associated with that member.

Q7
Write an operation schema to delete from the database a driver identified by the domain variable **d?**
The operation will only succeed if the driver has not had a trip since the 1st December 2015.