Exercise 1 “Advanced Data Models”

Due until 22 April, 2008

Exercise 1.1 [Data Models]:
Explain the pros and cons of Relational Models, Semi-structured Models (e.g., XML), and Object Oriented Models.

Exercise 1.2 [Data Modeling]:
The following description sketches the requirements for a database system that manages information about a car rental agency. During interviews with employees and by an analysis of the current workflow and processes, the following facts have been identified as relevant:

- Our car rental agency has many offices. Each of them is located at a specific address with street, zip code and city and is identified by a unique ID.

- An office can own arbitrarily many cars. The date of the buy should be stored. A car is owned by exactly one office.

- A car is identified by a car number, which is only unique among all cars owned by an office.

- Cars can be rent by customers. A customer is identified by a (system-wide) customer ID. Furthermore he has a name and (perhaps more than one) telephone number(s).

- We only want to store the cars that a customer currently rents. We allow a customer to rent more than one car at a time, but a car can be rent by only one customer. We are also interested in the period of such a rent.

- It is important to distinguish between transporters and limousines. Besides them there are of course other kinds of cars in our information system. For transporters we want to store the loading capacity, for limousines it should be accessible whether they are equipped with air condition and/or mini bar.

- Our car rental agency holds a list of special customers, so called Premium Customers. For those customers, the usual discount they get should be stored. Additionally, a premium customer is associated with all limousines that he favors. Of course, a limousine can be favored by more than one premium customer.
1. Develop an ER diagram that models the above scenario. Use the 1:n-notation \(^1\) for cardinality constraints.

2. Give an object oriented model using UML Class Diagram.

3. Design a possible XML Schema for the scenario.

\(^1\)An alternative is the (min, max) notation. Please distinguish the difference between the two!