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Practicum 1 - Data Modelling
Databases

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1. Provide a conceptual database model in the form of an E/R Diagram. Include entity sets, relationship sets, attributes, cardinalities (using *min...max* notation), primary keys, weak entities (if present) etc. Explain your main design choices and describe relevant constraints.

2. Create a relational schema for the conceptual model developed in the previous task. Use the *relation(key,foreign key → table,...)* notation. Also annotate nullable and unique attributes. Explain which constraints from the conceptual model cannot be expressed in the relational model.

Practicum Scenario 1

You are asked to design the database for a ride sharing company, "HUBRIS". The business model is simple, there is an app that connects drivers with people in need of transport (riders). Riders pay for rides through the app which allows the company tho charge a service fee on the paid amount. All the riders and drivers have a known name and a unique identifier. For drivers, the model of car and their license plate is also known to the company. For riders, a credit card number is sometimes known. A person cannot be both driver and rider. For rides a date and time is known. Rides also track the specific driver and the (possibly multiple) riders that participated and the ride price when known.

Practicum Scenario 2

You are asked to develop a database for a tennis club "SLAMMERS". The membership list contains basic information about members: member number (assigned by the club administrator), first name, last name, possibly several telephone number(s). Substantial fees are due every calendar year. For fee payments, the amount, the paying member, the membership year and the bank transfer date are tracked.

For tennis matches played at the club the database needs to record the players involved, the date and the result per player/match combination. Matches are always played in the context of some club tournament and thus have a tournament name and round number. Sometimes a location for matches is also known.

Practicum Scenario 3

You are asked to develop a database for small company. The company wants to have a database keeping track of their employees and contracts. Each employee has a a unique employee identification number, and we have to store the name and date of birth. The company has different departments which are identified by their name. Every employee works for at least one department, but due to restructuring a department does not necessarily have any employees. If an employee works for a department, he/she has one or more job titles (software engineer, manager, accountant, cleaner, etc.) associated with this work (that is, the job titles can depend on employee and department). This association should also carry the information on the fte (that the employee works on a particular job title for a department). The salary depends on the job title.

The company has contracts which have a unique contract number, and every contract has a start date, an end date and the price that the customer pays on fulfilment of the contract. We assign each customer a unique customer number, and store the name and address. We also store what contract was ordered by what customer. For the customers, we distinguish foreign customers and local customers. For the local customers it is important to know whether the customer belongs to the public or private sector since different taxation rates may apply. For foreign customers we store information on the language of communication and currency in which payments are made.

For every contract, we create one or more working groups. Each working group is assigned to precisely one contract. The working groups have a theme which is unique among the working groups for a particular contract. Every working group has precisely one leader assigned to it, and consists of one or more employees. Every employee can lead and can be part of an arbitrary number of working groups. Each working group is assigned a bonus (percentage of the contract payment) which will be payed on fulfilment of the contract.