Databases 2023: lab assignment 1

Domain description, ER-modelling and mapping to SQL DDL

In lab 1, we will be going through the design process of a database. We start with the description of the domain and will extract an adequate ER-model from this description. This ER-model will be transformed into a relational database scheme with constraints.

Note that lab 2 is based on lab 1. You will use the database scheme of lab 1. Bad results for lab 1 require redoing and possibly postponement of lab 2, so take it seriously. According to our planning, you will receive feedback on lab 1 about two weeks before the deadline of lab 2.

Preparation

Study the material on ER-modelling, transformation of the model to relational database schemes and normalisation well.

Cooperation

You are supposed to work on the labs in groups of two. If there are personal circumstances that make it hard to work together, you are allowed to work on your own. Groups of three or more are forbidden.

Step 1: Description of the domain

Describing your domain is the first step. Your casus may be based on your own environment and/or on you own fantasy. Describe in natural language what this domain looks like: persons, objects, properties, connections, requirements and so on. There are some minimum requirements with respect to the complexity of your domain (see ER-model). The description should be about 200-400 words long. If you want see an example domain description, have a look at the "vliegveld" in this map.

Step 2: ER-model

The second step is the creation of the ER-model. Try to be as precise and complete as possible: entities, attributes, cardinality ratios, participation constraints (mandatory/optional/disjoint/overlapping). It might be possible that there are issues in your domain description that cannot be expressed in the ER-diagram. You can mention them in a textual comment.

The ER-diagram may become unreadable if you mention all attributes, so we suggest that you leave them out of the diagram and describe them in a textual comment.

The following requirements hold for your diagram:

- *There are at least 10 and at most 20 entity types. Subtypes also count as entity types.*
- *The ER-model contains 1:n and m:n relations (and may be you are also able to find a sensible 1:1 relation).*
- *The ER-model contains at least one ISA-hierarchy. Mention the participation constraints.*

Step 3: Transformation to a relational schema
The third step is the transformation of the ER-model to a relational database schema.
The result of this transformation is a collection of SQL DDL commands representing the
ER-model. We are talking about create table statements, including attribute types,
primary key and foreign key constraints and also more general constraints. The DDL
commands must be executable on SQLite.

Stap 4: A posteriori normalisation
Take a critical look at the schema you just have created, based on your knowledge of
normalisation theory. Do you see normal form violations? If you want to have more
background reading about the relation between ER-modelling and normalisation, take
look at the article by Teorey c.s. in this map.

Stap 5: Realisation of your data definition statements on SQLite
Run your SQL DDL commands statements on your own SQLite database. Create a text
file, named dbdef.txt. It should run without problems on SQLite. Read more on using
SQLite on the BB-page.

Submittance
Create a zipped file containing the following documents:
- A PDF-document containing the domain description (domain.pdf).
- A PDF-document containing the ER-model (er.pdf). You are allowed to create your
  ER-model using some tool, but you may also draw it by hand and scan it
  afterwards.
- A PDF-document describing the transformation from ER-model to relational
  schema. This should also contain your considerations with respect to
  normalisation (transform.pdf).
- A text file dbdef.txt, containing the SQL DDL commands to create your database.

Details about the submit protocol can be found on BB.