

— Engineering Web and Data-intensive Systems - Winter Term 2019/20 —

Assignment 3.

From: Dec 13 2019

To: Jan 09 2020

1 Mapping to Relational Database

Based on the domain model of the OLAT system provided with this assignment (olat-system.asta), you are asked to design and implement a relational database.

Tasks & Deliverables:

a) Essay Question:

Please provide a general approach on how to map class diagrams (OO designs) to relational databases. Discuss the challenges and sketch possible solutions or best practices. We expect at least 1 page of text as an answer. Submit as PDF!

b) Create DB structures:

Provide a database schema design in SQL. This means, you submit a SQL file containing all the required `CREATE TABLE` and `ALTER TABLE` statements. The database shall be normalized (Aim for the 3rd or Boyce-Codd normal form).

We recommend using Astah as modeling tool. Then, you can simply export the SQL file without having to type it by hand. Additionally, if you made mistakes, it's easier to update the model. If you use the tool, please provide the `.asta` file as well.

c) Explain Decisions:

Make sure to include annotations that explain your design choices (possibly with respect to the first task), either in the model (easier!) or as comments in the SQL script.

d) Test Data:

Please populate your database with example data such that you provide one (1) Course. Add data such that you get around 5 instances of all associations and classes. The deliverable here is a SQL file containing `INSERT` statements in the correct order.

e) Write SQL Queries:

Try to provide two SQL `SELECT` queries to answer the following questions. If you think that there can be no solution (with a single query), state why!

- Given a Course (referenced by its ID), please provide a sorted list of its Groups with the number of members in each group.
- For each top-level DiscussionTopic, compute the set of Persons who contributed to the topic and its replies.

General Instructions:

- An updated domain model is provided with this assignment, so you have to base your solution on this version!
- In Astah software, use the entity-relationship diagram (ERD) to express the database structure. Be sure to include all the necessary entities/relations, relationships, cardinalities, proper physical/logical naming, primary keys, foreign keys, and required alternate keys (indexes).
- For the testing SQL scripts and queries, we recommend using the MySQL (MariaDB) database server. Basically, there are two convenient alternatives:
 - 1) Install the server on your machine. It's easiest to use the XAMPP open source web server solution stack. XAMPP is available for nearly every major OS. To access the DB, the server provides php-MyAdmin.
 - 2) Use the universities MySQL server. The computing center operates such a server that is accessible via your university account. You can also use phpMyAdmin to test your scripts. A guide on how to use the server can be found on: <https://www.uni-koblenz-landau.de/de/koblenz/GHRKO/service/mysql> (only in German)
- Please submit your solutions in the solutions/assignment03 group folder.
- Make sure to include your group's name in the file names, e.g. as a prefix. For group *alpha*, you could use a name like `alpha-query1.sql`.
- Please be prepared to discuss your solution in your next exercise slot!
- It's better to have all the underlying members in the discussion, and it's possible for the members to do that in different exercise slots.