Exam 1DV513/2DV513

Date: 2018-01-02 – 2018-01-13
Deadline: 2018-01-13 23:55
Examiner: Lars Karlsson

Instructions

You are allowed to use any written sources (e.g. books, Wikipedia etc.), but your solution must be your own. You are *not allowed* to copy solutions directly from any sources, written or oral. Make sure you reference any sources you use (either title and URL, or title, author and year).

You are allowed to use any software, e.g., a database manager to test your solutions or design before you submit. Since you are allowed to check source code, any syntax errors or similar will result in no points.

Submit Your answers on Moodle no later than the deadline. This is a strict deadline. You are allowed to make one submission. If you are unable to submit via Moodle, you can mail Your exam to Lars Karlsson (kala224@lnu.se) using *Exam DV513* as the subject line.

Submit as a PDF document, or a zip-file if you include multiple documents. You are allowed to submit scanned copies of handwritten documents as long as they are readable and in PDF.

Grading

The exam contains 5 problems that are each worth 10 points.
Grades ECTS: A (46-50), B (41-45), C (36-40), D (31-35), E (25-30).

Help?

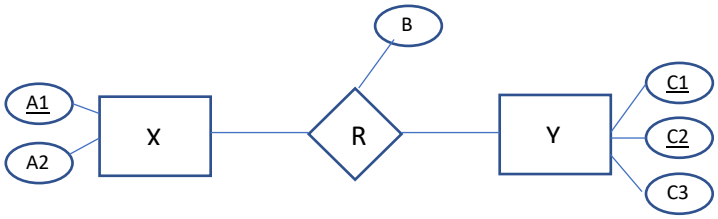
If there are some questions that you do not understand, you can contact Lars Karlsson (kala224@lnu.se). Do not expect answers outside of office ours and do not expect to get an answer faster than within 4 hours (so do not wait until the last minute to ask questions!).

Problems

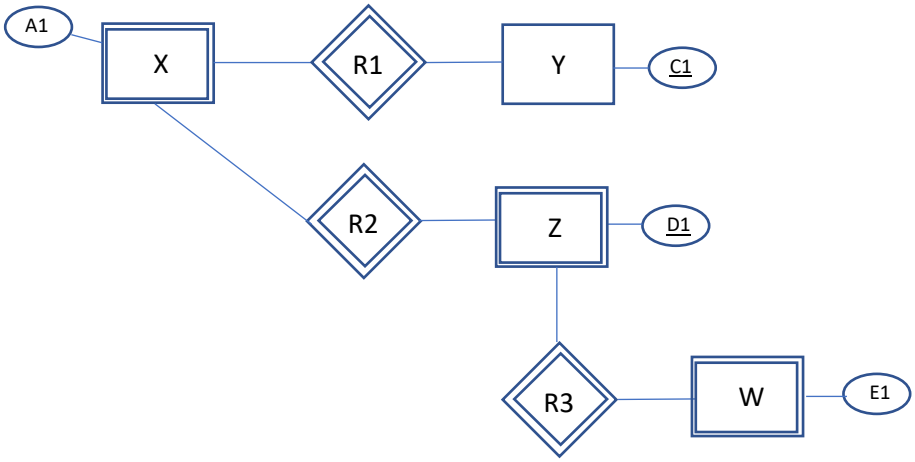
A. E/R to schemas

Convert the following E/R schemas to relational schemas

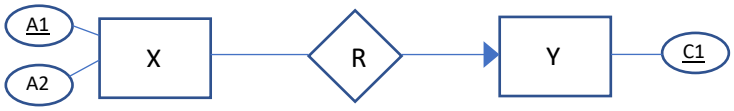
1.



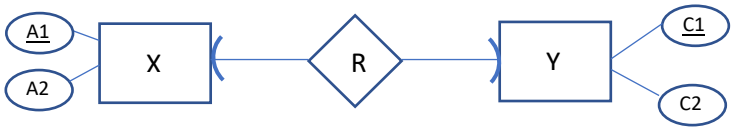
2.



3.



4.



B. Logical Design

Design a database for a food recipe service. The database should at least contain the following entities: category, recipe, ingredient, comment and user.

A recipe can be created by a user and is composed of one or more ingredients. A recipe may have many categories e.g. Tex-Mex, Cake or Soup. Any user can comment on a recipe in a thread like manner and a user may also comment on a comment. A user may have a list of favorite recipes.

1. Design the database using an E/R diagram. If you use a different syntax than the one in the lectures/lab assignments, describe how it should be interpreted. Constraints (keys etc.) shall be a part of the design.
2. Translate the E/R diagram into a SQLite database design.
3. Create the following queries:
    a. Which users has created more than 10 recipes?
    b. Which recipe has been most favorized?

C. Generic questions

1. Why is *indexing* important?
2. Explain *ACID*.
3. Explain *redundancy* and why is it good/bad?
4. Explain *DDL/DML*.
5. Explain *Referential integrity*.

D. Normalization

Explain the concept of normalization in general and 1NF, 2NF, 3NF and BCNF in detail.

E. SQL

1. Write the following database modifications in SQL based on the following schemas describing a simplified planet system;

Star(<u>Name</u>)
Planet(<u>Name</u>, EquatorialCircumference, StarName*)
Moon(<u>Name</u>, PlanetName*)

- Add our sun and the three innermost planets.
- The equatorial circumference in measured in kilometers. Change it to miles.
- Remove all planets having less than 20 moons.
- Find all moons having the characters sequence ‘tan’ as a part of its name.

2. Name and explain the join operators in SQL.

3. Explain the concept of transactions.