

HOMEWORK 1 (Overview)

To quickly get an overview of a database design, an ER diagram can be used to show other database designers how a database can look like.

Important requirements and information:

- A maximum of 8 pages including the ER and UML diagrams.
- Applications such as <https://app.diagrams.net/> are recommended although a clear hand drawn diagram is also acceptable. Please refrain from using dark mode in diagrams.
- Note that links to diagrams are not allowed.

REQUIRED TASKS (P)

1. Express the case study's Database Data Requirements as schemas with attributes and fitting domains (data types). Motivate the chosen design as a whole by relating to the case study in a short paragraph.

Important notes:

- All data listed under Database Data Requirements must be included.
- Attributes expected to have multiple values are accepted, e.g. tags is an acceptable attribute even though a post may have multiple tags.
- Data types must be one of integer, string, date or boolean.
- Use the same format as the example below including underlining the primary key.

Example: Car (carRegNr: string, seats:int, manufactured:date)

2. Identify what foreign keys each schema contains and what schema each foreign key references.
3. Draw a complete ER diagram based on the database structure you have proposed. Based on your diagram, explain the following:
 - a. How entities relate to each other and what the cardinality between them is.
 - b. Why each weak entity is weak.

Important notes:

- The same notations as the lectures must be used, including notations for cardinality.
- Generic relationship types such as "has", "makes" and "is" are acceptable if fitting.

NOTE: 1) Homework **MUST** be handed in via Canvas **only** and in the correct assignment folder, in one file representing the entire homework. 2) Your names, group number must be included in the document. 3) Take into consideration this **exercise is accumulative** and builds upon your solutions. 4) **All homeworks are based solely on the course case study.**

Grading Criteria:

- Are the schemas written in the correct format?
- Do the domains chosen fit the data?
- For any given schema, is the primary key able to uniquely identify each record within that schema?
- Are all data listed under Database Data Requirements present in the schemas?
- Are non-nullable attributes never forced to be null?
- Is the design of schemas as a whole motivated in a short paragraph by relating to the case study?
- Are all foreign keys and the tables they refer to correctly identified?
- Is each cardinality, weak entity and relationship in the ER diagram explained?
- Is the ER diagram clear and readable?
- Does the ER diagram correctly and exclusively use the lectures notations, including cardinality?
- Is the ER diagram consistent with, and include all, the schemas?

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HOMEWORK 1 P+ (ER to UML diagram)

Important Requirement:

To be able to pass the P+ assignment, the corresponding P assignment has to pass.

TASKS (P+):

1. Include your schemas and ER diagram from HW 1.
2. ER to UML
 - a. Translate your ER diagram into an UML diagram. Make sure that both diagrams are equivalent (for tips, see the FAQ on modeling techniques).
 - b. Explain each multiplicity and each relationship, i.e. why the relationship is an aggregation, weak relationship, composition, inheritance or association.

Important notes :

- Generic relationship types such as “has”, “makes” and “is” are acceptable if fitting.
- The same notations as the lectures’ must be used, including notations for multiplicity.

3. Designing the database with a strict no-NULL policy would make the data so spread out that getting a simple overview of the database would be hard. However, it’s still important to understand why NULL values are usually avoided. Therefore, please explain at least one disadvantage of allowing NULL values.

Grading Criteria:

- Is the UML diagram equivalent to the ER diagram?
- Does the UML diagram correctly and exclusively use the lectures notations, including multiplicity?
- Is the UML diagram consistent with, and include all, the chosen schemas?
- Does your solution include an explanation for each multiplicity and relationship type?
- Is the UML diagram clear and readable?
- Is at least one reason given for why NULL values are disadvantageous?

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