Instructions for a project creation

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23. září 2020

Every project has to contain at least five tables and five relationships. The maximal number of tables is ten. The optimal number of tables is seven. Try to avoid having simple database where most of the tables are codebooks and there is just one table connecting all of them.

You will select the topic of the task by yourself and consult it with the teacher on a exercise. The topic should be nontrivial and original. The inappropriate topics are:

- Topics where you have a very limited knowledge

- Database that are very static (i.e. database of WWII combats)

If you are not sure whether the topic of your project is appropriate are your teacher. Project has to be created individually. The student has to be capable to speak fluently about his solution and be prepared to answer questions about his solution.

1 Task specification

The task specification of your project has to have the following description:

- WHY? - answer why you need such application. Usually, there is something wrong. Try to describe it.

- WHAT FOR? - describe a major goals of you application.

- WHO? - describe the roles in your application. include at least two roles (admin role is not counting).

- INPUTS/OUTPUT - Clearly describe the expected inputs and outputs of your database. The use of some Mock screens for that purpose.

- FUNCTIONS - List of major functions with a description of those functions. Use case diagram have to be included. Table of events, reactions and the roles being responsible.

2   Final project

Mandatory parts of the final project:

- **Task specification** - see Section 1 for details.

- **Data analysis**

  - linear notation of list of entity types and their attributes
  - conceptual model (ERD or UML)
  - relational data model
  - complete tables of attributes – data model
  - list of more constraints corresponding to entities and relationships

- **Functional dependencies and Normal forms**

  - Set of functional dependencies.
  - Minimalization of this set.
  - Creation of a relational data model in BCNF.
  - Comparison of a conceptual model with the BCNF model.

3   Project submission

The project will be submitted in five steps steps. Each step has its own deadlines specified below. Every student needs to submit at least some solution before each deadline in order to be allowed to submit in the subsequent attempts. Only the formal analysis step is obligatory, the rest is mandatory.

- *Task specification* (Deadlines 9.10. / 23.10. / 6.11.) - It has to clearly describe the task specification as it is depicted in Section 1. We expect clear and concise A4 text of standard size.

- *Data analysis* (Deadlines 6.11. / 20.11.) - conceptual model, relational data model, linear notation, detailed description of table attributes, integrity constraints.

- *SQL scripts* (Deadlines 20.11. / 27.11.) - DDL and DML SQL scripts corresponding to your database. See Section 4 for details.

- *Formal analysis* (Deadline 4.12. - this part is obligatory) - Functional dependencies and normal forms.

- *Project presentation* (on the last exercise) - approx. 3 - 5 minutes presentation that summarizes your project.

4   SQL scripts

SQL skripts has to have the following parts:

- DDL script with commands that inserts a data.

- SQL script with a valid SELECT statements. There are six groups of queries that are defined as follows:

  - 4 queries with basic search, ordering and work with values - at least two queries have to contain arithmetic function or some other function for work with values (see lecture about data types). Two queries have to contain ORDER BY where one query

has to sort according to a computed value or value obtained by a function. One sort has to be descending. (2 points)

– 4 queries selecting rows - all have to contain the WHERE clause. One query combine AND and OR operators. One query have to contain negation. One query contain LIKE operator and regular expressions. One query should manipulate with an attribute (arithmetic operation or function). (2 points)

– 4 queries with set operations and subqueries in condition - here you have to create four queries where each query is using different construct, but they are semantically equivalent. Therefore, they have to return the same result. The goal is to try a transformation between IN, EXISTS, ALL and the set operations such as UNION, INTERSECT and EXCEPT. (2 points)

– 4 queries with aggregate function and grouping - all queries has to contain an aggregate function. Three queries have to contain GROUP BY and one query has to have HAVING. (3 points)

– 4 queries with join and aggregate functions - the first query have to contain common inner join written using JOIN. The second query has to be an equivalent of the first query using the IN construct. The second query can not contain JOIN keyword. Both queries have to be equivalent and return the same result. The third query has to use the outer query and the last query has to use outer query, GROUP BY, and WHERE. There have to be an aggregation function in the last or third query. (3 points)

– 2 complicated queries - there have to be an subquery behind FROM or behind SELECT. (3 points)

• The should be an text explanation of a query before each SELECT statement. This textual explanation in common English has to correspond to the semantic of a query.

• All scripts are automatically evaluated by the submission information system (dbedu.cs.vsb.cz). The system assigns points to each query group. The lecturer can change the final score according to the description and complexity of the queries.