Homework: Database Systems Overview

This document defines the homework assignments from the "Databases" Course @ Software University. Please submit as homework a single **`zip`** / **`rar`** / **`7z`** archive holding the solutions (source code) of all below described problems.

Problem 1. What Database Models do You Know?

Perform a research (e.g. in Google or Wikipedia) and provide an information about different type of **database models**. Provide detailed information about one of the database models by your choice, different from the relational model. Write in a text file called "**database-models.txt**". Use English.

Problem 2. Which are the Main Functions Performed by a RDBMS?

Perform a research (e.g. Google or Wikipedia) and provide an information about the **relational database management systems** and their main functions. Write in a text file called "**rdbms-functions.txt**". Use English.

Problem 3. Define What is "Table" in Database Terms

Perform a research (e.g. Google or Wikipedia) and provide an information about **database table**. What is table? How information is stored in tables? What is the difference between **tables** and **relations**? Write in a text file called "**table.txt**".

Problem 4. Difference between a Primary and Foreign Key

Perform a research (e.g. Google or Wikipedia) and provide an information about **primary and foreign keys** in the RDBMS Systems. What is the **primary key**? Why do we need it? What is the **foreign key**? What is the purpose of foreign keys? What is the difference between a primary and foreign key? Write in a text file called "**difference-primary-foreign-key.txt**".

Problem 5. Relationships between Tables in Relational Databases

Perform a research (e.g. Google or Wikipedia) and provide an information about tab**le relationships in relational databases**. Provide more information about every relationship type (one-to-many, many-to-many, many-to-one, one-to-one, others). Write in a text file called "**table-relationships.txt**".

Problem 6. Schema Normalization

Perform a research (e.g. Google or Wikipedia) and provide an information about **database schema normalization**. There is a lot of information about **database normalization** on the Web. Explain briefly the process of schema normalization. Write in a text file called "**database-normalization.txt**".

Problem 7. Advantages of Normalized Databases

Perform a research (e.g. Google or Wikipedia) and find an information about the **benefits of database normalization**. Write in a text file called "**database-normalization.txt**".

Problem 8. Database Integrity Constraints

Explain the **database integrity constrains**. What are the **constraint types**? When are they used? Provide definition for all of them (primary key constraint, unique key constraint, foreign key constraint, others). Write in a text file called "**integrity-constraints.txt**".

Problem 9. Pros and Cons of Using Indexes in a Database?

Perform a research (e.g. Google or Wikipedia) and provide an information about **database indexes**. What is **index**? What indexing methods exist? What is **clustered index**? What is **B-Tree**? What is **column-store index**? What is **full-text search index**? What is **spatial index**? What are the pros and cons of using indexes? Write in a text file called "**indexes.txt**".

Problem 10. SQL Language

Perform a research (e.g. Google or Wikipedia) and provide an information about the **SQL language**. What type of language is SQL? What is its purpose? Provide an example with simple **SQL query**. Write in a text file called "**sql.txt**".

Problem 11. Transactions

Perform a research (e.g. Google or Wikipedia) and provide a basic information about **database transactions** and their application? What is **ACID transaction**? What is **transaction log**? Write in a text file called "**transactions.txt**".

Problem 12. What is a NoSQL Database?

Perform a research (e.g. Google or Wikipedia) and provide an information about **non-relational databases (NoSQL)**? Give a few examples of NoSQL databases. Write in a text file called "**nosql.txt**".

Problem 13. * Install SQL Server, MySQL and Oracle

Try to install **MS SQL Server**. You can follow instructions from this video https://softuni.bg/trainings/1045/First-steps-with-Microsoft-SQL-Server. Try to create new user and login with this user. Try to create new database with few tables.

Try the same with MySQL and Oracle XE.