

# Lab exam on Database Management Systems

4th Semester BSc.Engineering Exam-2021

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—The mark of each problem is 10. Once you are done with Problem-1, ask for Problem-2—



## Problem-1 :Database modeling and formulating queries

The database should store information about drugs, their categories, the diseases they can treat, their side effects, their commercial products, their interactions with other drugs, and possibly information about related clinical trials. To provide you with an idea of how the information to be loaded in the database might look like, consider the sample information available at the given .xlsx file. Please notice that the sample information does not correspond to what would be a database table (or relation).

### Sample Queries:

1. Find the number of drugs that have nausea as a side effect
2. Find the drugs that interact with butabarbital
3. Find the drugs with side effects cough and headache
4. Find the drugs that can be used to treat endocrine diseases
5. Find the most common treatment for immunological diseases that have not been used for hematological diseases
6. Find the diseases that can be treated with hydrocortisone but not with etanercept
7. Find the top-10 side effects that drugs used to treat asthma related diseases have
8. Find the drugs that have been studied in more than three clinical trials with more than 30 participants
9. Find the largest number of clinical trials and the drugs they have studied that have been active in the same period of time
10. Find that main researchers that have conducted clinical trials that study drugs that can be used to treat both respiratory and cardiovascular diseases
11. Find up to three main researchers that have conducted the larger number of clinical trials that study drugs that can be used to treat both respiratory and cardiovascular diseases
12. Find the categories of drugs that have been only studied in clinical trials based in United States

Complete the following tasks:

**Task-1:** Identify relevant data (consider the sample queries included in this problem).

**Task-2:** Create an (normalized) ER diagram with additional information about cardinality (Chen and [min,max]), roles if necessary, primary, candidate, and foreign keys. Do not blindly add ID attributes to all entity types. Instead, think about native attributes that could be used as primary keys. Please add a (short!) description explaining non-trivial design choices that you have made.

**Task-3:** Create an appropriate relational model, implement a database in a DBMS, write SQL solutions of the sample queries, and show the answers of the queries.

## **Problem-2 :Loading a database dump and formulating queries**

Unfortunately, a very common problem when working with databases in companies is that sometimes you are asked to work with a database that is not (well) documented. Thus, in this problem, you are asked to load given database dumps into PostgreSQL, understanding how the data was modeled, and querying it.

### **Task 1: Filling a database with data**

1. Import the data from the given data dump into PostgreSQL
2. Document in detail how you managed to set up and fill a PostgreSQL database with the data you are given

OR

1. Find out what data is contained in the dumps and how it is structured
2. Create a database that contains the data provided in the given dump file

### **Task 2: Querying the database**

Query the database you created in Task 1. Please find SQL statements expressing the following queries and execute them on your developed database.

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  2. Find the drugs that interact with butabarbital
  3. Find the drugs with side effects cough and headache
  4. Find the drugs that can be used to treat endocrine diseases
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