

LAB 3

Project Background

A lot of the time when querying databases, you will need to handle large amounts of data. In this lab you are given a finished LMS along with input data to query to. You will need to use your previously set up work environment and load the provided data into your database. The queries only need to be able to execute in PostgreSQL, so there is no need to create a Graphic User Interface to visualize your data.

Rules

1. The labs must be done in groups of exactly two people. No larger groups are allowed, and if you have extraordinary extenuating circumstances that force you to do the labs alone, you must obtain permission to do so from the course leader. Both students in a group must be able to present all of the lab for the group to pass. Lab assistants do not record partial labs.
2. You must present correct and valid solutions to all the given tasks in order to pass the lab.
3. Presenting P+ assignments are optional for a higher grade if the given tasks are completed and passed.
4. This is a PSQL lab. No other programming languages, either embedded in the database or external to it, are allowed.
5. Please refrain from creating any [functions](#) since this lab is designed to assess query programming languages.
6. You are not allowed to hard-code anything except that which has been explicitly given to you in the problems. In particular, this means that constructs like `limit 1` or similar artificial ways of reducing the output are forbidden.
7. You must utilize nothing but a single top-level `SELECT` statement to answer every problem(although you are, of course, allowed to use any number of sub-selects required within that top level statement). You are specifically forbidden from referencing any temporary data structures like views or temporary tables from your solutions.
8. No alterations of the database and data is allowed in this laboration.

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Loading data into the database

OBS! The data from your previous labs will not be used for this lab. Consider dropping these relations from the database if you have passed the previous lab, alternatively use your partner's database when setting up the new database.

1. For the lab environment, please read the “Postgre installation guide” available on Canvas.
2. Download the files LMS-schema.psql and LMS-inputs.psql from Canvas.
3. One file at a time, move the downloaded files to a folder in your home catalogue. Suggested method for doing this remotely is available under the section “Moving files local → KTH-remote “ in the installation guide.
4. Run the `psql -h nestor2.csc.kth.se` command and connect to the database
5. Run the `\i <filename>.psql` command with your moved files and remember to create the schema before the inputs.

Lab Presentation

Course related terminology is expected during the the lab presentation and make sure you have the following ready to be presented to the TA:

- All queries asked for in the tasks, ready to be executed.
- Motivations for how the solution for the requested queries are sensible. (Not all tasks have one query as an answer, but they have to be good enough for e.g. a client to accept.)

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Querying the Database

Queries for the following questions are to be completed and should show a satisfactory result. Lists and tables are expected to be alphabetical or numerical in order.

1. How many fines were paid with a card in September 2021?

Expected output format:

```
septemberfines
-----
```

2. Which student has read the most amount of pages? Present all the students' sum of read pages. (Assume that a student has finished a book that is returned)

Expected output format:

```
name | pages
-----+-----
```

3. Present all currently available books with a title starting with S and ending in S or a title starting with H and ending in S.

Expected output format:

```
title
-----
```

4. Rank the top 3 most popular books per genre. (Assume that the book titles that have been borrowed the most times are the most popular)

Expected output format:

```
title | genre | rank
-----+-----+-----
```

5. Which program has the greatest sum of fines? Present all the programs' percentage of the total sum of fines.

Expected output format:

```
program | sum | percentage
-----+-----+-----
```

6. Rank the top 5 of the all time most popular books in the romcom genre based on the amount of times they've been borrowed. (Assume that the book titles that have been borrowed the most are the most popular)

Tips: Use the PSQL function rank

Expected output format:

```
title | rank
-----+-----
```

7. Present the likelihood that a top 10% popular book will be returned late. (Assume that the book titles that have been borrowed the most are the most popular)

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Expected output format:

```
likelihood
-----
```

8. Present a report for each week from the first week in January to the first week in June this year (2021) on how many books were borrowed, returned and late.

Expected output format:

```
week | borrowed | returned | late
-----+-----+-----+-----
```

9. For each book series, use the recursive method to present the name of each book in the series in order.

Expected output format:

```
series
-----
Book1 -> Book 2 -> Book3
```

1. P+

Create a Graphical User Interface (GUI) for admins with the following criteria:

- a. Admins should be able to create, read, update and delete books and users.
- b. Admins should be able to search for books and users in a search bar, using certain criterias.
- c. No interaction with the command prompt is allowed.

OBS! Focus on implementing the features rather than making the GUI visually pleasing, since **we will not evaluate the visuals** but rather the functionality.

2. P+

Setup the [Mondial Database](#) and complete the queries.

Setup:

- a. Download the files **mondial-schema.psql** and **mondial-inputs.psql** from the [Mondial website](#).

Note: We are generating the Database under PostgreSQL.

- b. One file at a time, move the downloaded files from the Mondial DB to a folder in your home catalogue. Suggested method for doing this remotely is available under “Moving files local → KTH-remote “ in the installation guide.

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- c. Run the `psql -h psql-dd1368-ht21.sys.kth.se` command and connect to the database
- d. Run the `\i <filename>.psql` command with your moved files and remember to create the schema before the inputs.

Queries:

1. Which bordering countries have the greatest contrast in wealth?
2. Consider a river system as a main river and all the tributary rivers that flow into it, and their respective tributary rivers a.s.o. Present a table that shows the names of the rivers of the longest branch(es) of each river system and the total length of each shown branch, as well as the number of rivers in each and the rank of the number of rivers in the branch. The required output format is given by this example of solving the same problem for the Brandywine, Greyflood and Anduin rivers in the Middle Earth:

rank	path	numrivers	totlength
1	Brandywine	1	2029
2	Greyflood-Hoarfell-Etter	3	4202
2	Greyflood-Loudwater-Rivenfall	3	3951
4	Anduin-Sitich-Elos-Kangar	4	7822
4	Anduin-Minas River-Tanauil-Renkar	4	7165