

# Databases 1

## TD: Query Optimization

**Exercise 1.** In the TMDB database, optimize the database for the following queries:

1. For a given director, list all their movies ordered by their vote average
2. For a given actor, list the titles of all movies they star in together with the name of their role, ordered by their release date
3. Find the top-10 most prolific directors and actors

**Exercise 2.** In the SNCF database, write a query that attempts to plan a trip between two given train stations e.g., 'gare de Lille Flandres' and 'gare de Montpellier-Saint-Roch', with at most 3 changes. Optimize the database accordingly.

**Exercise 3.** In a *uni-i* database, create an inverted index for the attribute Hobbies of the table Student; you can assume that the number of hobbies is at most 4. Try perform all the necessary data transformations in SQL (using built-in string functions). Consider queries that attempt to find students that have hobbies: 1) HB1; 2) HB2 or HB3; 3) HB3 and HB4; 4) (HB2 or HB3) and HB4. Compare the performance between using LIKE operator and using the inverted index.

**Exercise 4.** In groups of 3 using the databases *tpc-h-i*, compare the performance before and after indexation of the following queries

1. Find the number of order with the total price between 150000 and 160000;
2. Find the top-10 (LIMIT 10) customers ordered by their account balance;
3. Average retail prices of parts for every brand;
4. List top-10 (LIMIT 10) clerks in terms of the total prices of orders they handle;
5. For each market segment count the number of clients who have ordered a part with price 906;

**Exercise 5.** In groups of 3 using the databases *uni-i*, compare the performance before and after indexation on the following queries:

1. List the students taught by the professor 105
2. List the top-10 (LIMIT 10) professor in terms of the number of students they teach in their courses

**Exercise 6.\*** Consider the same kind of queries but this time use the GIN index of PostgreSQL. Cf. <https://www.postgresql.org/docs/12/textsearch-tables.html>