TU München, Fakultät für Informatik
Lehrstuhl III: Datenbanksysteme
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Exercises for *Foundations in Data Engineering*, WiSe 23/24

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http://db.in.tum.de/teaching/ws2324/foundationsde

Sheet Nr. 06

Exercise 1 Decorrelate the following SQL query, you can use our WebInterface to test your query:

```
SELECT sum(l1.l_extendedprice)
FROM lineitem l1
WHERE l_extendedprice > (
      SELECT avg(l2.l_extendedprice)
      FROM lineitem l2
      WHERE l2.l_orderkey = l1.l_orderkey);
```

Exercise 2 Please transform this query into an equivalent query that does not contain correlated subqueries:

```
SELECT o1.o_orderkey
FROM orders o1
WHERE o1.o_totalprice < (
      SELECT avg(o2.o_totalprice)
      FROM orders o2
      WHERE o2.o_shippriority = o1.o_shippriority
         or o2.o_orderstatus = o1.o_orderstatus);
```

Exercise 3 Solve the queries using SQL based on the university schema. Use this WebInterface for it. By clicking on the button UniSchema you can see the different relations. Use the expanded *examination* relation:

```
WITH examination(MatrNr,CourseNr,PersNr,Grade) as (
    SELECT * FROM pruefen
    UNION
    VALUES (29120,0,0,3.0), (29555,0,0,2.0),
           (29555,0,0,1.3), (29555,0,0,1.0)
)
```

1. Calculate each student's average grade and return it with their name, matrnr and semester.
2. Based on the individual average grade, determine each student's rank within their cohort (students in the same semester).
3. Additionally, for each student calculate the difference between their average grade and the cohort's average. (The cohort's average is the average of individual averages.)

Exercise 4 We will use Postgres for some exercises of the upcoming exercise sheets. Therefore, install the Postgres database, explore it and play around. Here is a nice tutorial explaining everything: Tutorial Postgres.

The Ubuntu way:

```
sudo apt-get install postgresql
```

All other ways are explained on the Postgres installation website.