**Databases 1 Exam 2021.05.25 Name:**

**Neptun code:**

Copy your solutions into this file and send it to the following email address: [nikovits@inf.elte.hu](mailto:nikovits@inf.elte.hu). You should send the **results (output) of the queries** too. If you don’t send the output, I will give much fewer points!!! You can use ARAMIS or ULLMAN database.

Deadline: 13:40.

(If you think you couldn’t reach grade 2 within the deadline, then you can have an extended deadline **extra 60 minutes** for a grade 2.)

Each exercise counts 10 points, so altogether you can get 60 points.

Grades are the following: 2 -> 20 points, 3-> 30 points, 4 -> 40 points, 5 -> 50 points

**Exercise 1. SQL WITH statement (**Tables needed: nikovits.emp, nikovits.sal\_cat)

Give the following result for which you can use the WITH statement. Give the employees for whom it is true that his salary is less than the average salary of the employees falling in the same salary category as his salary category. In the result give the employee’s name, his salary, and the average salary of his salary category. **(ename, sal, category\_avg)**

**Exercise 2. Recursion in Datalog (**Tables needed: nikovits.flight)

We have a relation FLIGHT(Airline, Orig, Dest, Cost) which contains the flights and their costs from a city (Orig) to another city (Dest). Write a recursive SQL query (a similar Datalog query can help you) which gives the destination cities that can be reached from ‘Denver’ with at most 1200 cost. The output should contain the destination city and the cost of the whole journey.

**(Dest\_city, Cost)**.

**Exercise 3. DML (**Tables needed: nikovits.emp)

Create a table EMP2 which has the same tuples as nikovits.EMP, then write an UPDATE statement (not a pl/sql program !!!) on this table which increases the salaries of the employees for whom it is true that the summarized salaries of his direct subordinates are larger than 6000 (>6000). The increment is the average salary of the employee's direct subordinates. After the update, select the new average salary of the employees and give it too. (**Avg\_Sal**)

**Exercise 4. Functional Dependencies**

Consider a relation with schema S(A, B, C, D) and FD’s A->B, B->C, B->D.

a) What are all the keys of S?

b) What are all the superkeys that are not keys?

**Exercise 5. Normal Forms**

Consider a relation with schema R(A, B, C, D, E) and FD’s AB->C, DE->C, B->D.

a) Indicate the BCNF violations.

b) Decompose the relations, as necessary, into collections of relations that are in BCNF.

**Exercise 6. E-R models and DDL**

Convert the following E-R diagram to a relational database schema using the object-oriented method. Give the CREATE TABLE statements with **primary key** and **foreign key** definitions. The statements should be syntactically correct, please run them in Oracle to test it. (You can use any Oracle datatype for the columns.)

![A képen szöveg, térkép látható

Automatikusan generált leírás]()