AB LESSON

the goal is to familiarize yourself with databases, the SQL query language and the interface of the database manager.

For tasks, there is a PostgreSQL database with the following connection parameters:

It is necessary to solve the lessona table called joe\_data ’’ that contains

Estonian rivers and tablenamed 'monitoring\_stations'.The fields of the joe\_data table are important

length of the river ( length\_k m ) and the beginning of the river and geographic coordinates of the end point( lon1, lat1 start; lon2, lat2 end).

Every river and changes in the riverthe monitoring station for monitoring has its own

identifier. Tables 'joe\_data'and 'monitoring\_stations' are related

with the id identifier 'id\_jogi', i.e. eachthe monitoring station is connected to one particular river,

by which it is located.

**Tasks**

**1. Write a program that would connect to the above database and output the 5 longest rivers.**

**2. Inherit rivers that are main rivers and longer than 70 km. It can be used to determine the principal**

**id\_main river out.**

**3. Find the monitoring stations located on the rivers found in the previous point.**

** The keywords 'inner join' and 'subqueries'.**

** To begin with, the task can be simplified and a request can be made without considering the previous request**

**4. Get the coordinates of the beginning and end point of the river from the database and find the distance between these points**

**distance as the crow flies. The result can be limited to, for example, the first 10 entries.**

** To find the distance between two points, you use the following formula:**

**d = R\*acos(sin(lat1)\*sin(lat2) + cos(lat1)\*cos(lat2)\*cos(lon1 lon2));**

** R is the radius of the earth. Unit according to the units in which you want the answer**

** Values inherited from tables are in degrees, but C math.h trigonometric functions**

**require arguments in radians.**

 The PQgetvalue function returns a result of string type. So it would come around

to convert to a floating point number so that it is possible to perform calculations with it.

**For advanced students**

**1. In addition, use the seire\_jogi\_hydrol table, which contains the measurement results of the river flow**

**with the unit m3/s (field charge). Find 5 Estonian rivers with the largest average flow.**

**2. Find the annual flow averages of the 5 longest rivers in the time period 1990-2000 (50 rows in total).**

**3. Are the annual flows of different rivers correlated? Find the Pärnu and Võhande rivers**

**using the correlation coefficient of the annual mean flow from the previous query**

**CORR(X, Y) function.**

**4. Using the fields id\_jogi, id\_suubla, id\_peajogi, issue the rivers taking into account their**

**mutual hierarchy. To limit the output, ask the user which river they want**

**issue. For example**

 *Choose river: Pärnu*

*-Pärnu*

*+Navesti*

*-Sauga*

*+Hirve*

*-Are*

*-Kõrisoo*

*+Saki*

*-Tõntsu*

*-Marjassaa*

*+Elbu*