Exercise 02: Relational algebra, DML and DDL

Task 1: Relational algebra

Given the following relations:

R:

A	Y	Z
1	1	2
2	1	1
3	1	1
9	3	4
7	2	2

S:

Y	Z	B
1	2	6
1	2	7
1	1	8
7	8	9
2	1	5
3	9	4
2	4	2
9	4	1

What is the result relation and the relational schema of:

a) $\beta_{D \leftarrow Y}(\pi_Y(\sigma_{Y=1 \vee Z=2}(R)))$

D
1
2

b) $\sigma_{Y=1}(\pi_{Z,Y}(S)) \cap \pi_{Z,Y}(\sigma_{Y=1}(S))$

Y	Z
1	2
1	1

c) $\pi_A(\sigma_{A<3}(R)) \times \pi_B(\sigma_{B>7}(S))$

A	B
1	8
1	9
2	8
2	9

d) $R \bowtie S$

A	Y	Z	B
1	1	2	6
1	1	2	7
2	1	1	8
3	1	1	8

e) $\beta_{K \leftarrow Y}(R) \bowtie S$

A	K	Z	Y	B
1	1	2	1	6
1	1	2	1	7
2	1	1	1	8
2	1	1	2	5
3	1	1	1	8
3	1	1	2	5
9	3	4	2	2
9	3	4	9	1
7	2	2	1	6
7	2	2	1	7

f) $\sigma_{A=1}(R \cup \beta_{A \leftarrow B}(S))$

A	X	Y
1	1	2
1	9	4

g) $\pi_{Y,Z}(R) - \pi_{Y,Z}(S)$

Y	Z
3	4
2	2

h) $\pi_{Y,Z}(R) \cap \pi_{Y,Z}(S)$

Y	Z
1	2
1	1

i) $\sigma_{Y=1 \vee Z=2}(\pi_{Y,Z}(R) \cup \pi_{Y,Z}(S))$

Y	Z
1	2
1	1
2	2

Task 2: Check the results with SQL

In this task, you will use Microsoft SQL Server Management Studio to check the solutions determined in Task 1. To do this, use the access data you have received or alternatively the local installation (see the additional task on exercise sheet 1). Information on installing and logging in to the server can be found in the Learning Campus in the section on organisational info.

a) Download the SQL script for this exercise and run it in Microsoft SQL Server Management Studio.
b) You will find the solutions to Tasks 1 b, d and f in this script. Follow the way the script was used to output the solutions.
c) Verify your results from the other parts of the task.