

Introduction to Databases, ITU, Fall 2004

Rasmus Pagh

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Exercises on October 22

You are unlikely to be able to do all the exercises in two hours. Therefore you are encouraged to prepare at home, and use the exercises for those parts you find difficult.

1. The aim of this problem is to create a relational database suitable for OLAP queries. In particular, it should use a star schema. The data can be found in the relations **PC**, **Laptop**, **Printer**, **Products**, **Salesmen**, and **Sales** in the example data available at the course home page (NB: The data in **Products** has changed.)
 - (a) Define and create a fact table, where each sale in **Sales** is a fact, and corresponding dimension tables. The measure of a fact should be the sales price, and the dimensions should be product and salesman.
 - (b) Fill the fact and dimension tables with data from the above relations. Use the syntax `INSERT INTO R <SQL query computing the tuples to insert>`
 - (c) Try out your design by computing the following aggregates:
 - i. The average sales price, grouped by product type.
 - ii. The sum of PC sales for 2003 and 2004, grouped by salesman.
 - iii. The sum of all sales for 2003 and 2004, grouped by salesman and maker.
2. GUV 5.2.1 a), b), c), d), e), f), g). For each relational algebra expression, write a corresponding SQL expression, and try it out in Oracle (sample data can be copied and pasted from the files at www.itu.dk/people/pagh/IDB04/data/). Verify that the result agrees with the value of your relational algebra expression (interpreted as relational algebra on bags).
3. Consider the following SQL expressions:
 - (a) `(S UNION (SELECT DISTINCT * FROM R WHERE A ≥ 0))
NATURAL JOIN (SELECT DISTINCT * FROM R WHERE B = 0)`
 - (b) `(SELECT DISTINCT * FROM (R NATURAL JOIN S) WHERE B = 0)
UNION (SELECT DISTINCT * FROM R WHERE (B = 0 AND A ≥ 0))`

Convert the expressions into relational algebra. Try to show that (a) and (b) are equivalent. What algebraic laws do you use?

To be handed in no later than October 29, 1 PM:

Problem 3 from the trial exam, December 2003, available on the course home page under “useful links”, or directly at: <http://www.itu.dk/people/pagh/IDB04/trialexam.pdf>

As always, your hand-in must be completed individually.