CS-450 — Summer 2017   Dr. A. Motro   10 July 2017

Assignment No. 3: Relational Algebra

Solutions due 14 July.

Download the attached files (raeval-0.3.1 and raeval-0.2-basic-instructions). You may need to download the Java Runtime Environment.

Create a database for your design from Homework 2. You should create CSV files for each relation and load them into **raeval** (about 250 tuples altogether should be enough). Include tuples that give meaningful results to the queries listed below.

Notes: For dates and expiration use 6 digits (e.g., July 31, 2017 is coded 170731). This will allow comparing dates easily with $>, \leq$, etc.). Department numbers, employee numbers, customer numbers, supplier numbers, items numbers and transaction numbers should have the format Dnnn, Ennn, Cnnn, Snnn, Innn and Tnnn, where nnn are three digit numbers.

Formulate each of the following 10 queries in the relational algebra. You may use any of the operators (both basic and derived). In each case, your answer should be a single relational algebra expression. Debug each of your queries in **raeval**.

How to submit. (1) Type your solutions and create a pdf file called *queries.pdf*. (2) Log your interaction with **raeval** in a file *execute.txt*. (3) Create a zip file called *hw3.zip* that combines *queries.pdf* and *execute.txt*, and upload to Blackboard only this zip file. Submissions different than this will not be graded.

About the log file. Create the log file using **log** *filename*. Start logging using **log start**. List each of your tables using the command **show** *relation*. Then execute each of your queries (as a sequence of operations). Stop logging using **log stop**.

1. Items (Item#, Desc) that are available from at least two suppliers at the same cost.

2. Items (Item#, Desc) that were purchased at least once in a quantity that is larger than one of its procured quantities).

3. Items (Item#, Desc) with quantity-on-hand greater than 20, that have not been purchased in 2017.

4. Items (Item#, Desc) with quantity-on-hand less than 20, that have not been procured since 2016.

5. Customers (Cust#, Cname) whose credit cards have all expired (expiration date earlier than today's date)

6. Customers (Cust#, Cname) who purchased all the items that are available from supplier S001.

7. Customers (Cust#, Cname) that have made at least one purchase in 2016 of an item whose price was over $100.

8. Employees who work for one department but manage another (Emp#, Ename, Dept#-of-work-department, Dept#-of-managed-department).

9. Pairs of employees (Emp#, Ename, Emp#, Ename) in the same department who share at least one skill.

10. Pairs of employees (Emp#, Ename, Emp#, Ename) in the same department who have identical skills.