CS430/630 – Midterm Exam

For both questions, you are given the following schema:

Parts (pid:integer, pname:string, year:integer, price:integer)
Suppliers (sid:integer, sname: string, state:string, zipcode:string)
Orders (pid:integer, sid:integer, quantity:integer)

A factory keeps a database with parts that it uses, the suppliers of those parts, and purchase orders. Each part is uniquely identified by pid. It has a string description pname, year of fabrication and price per unit. Parts are provided by suppliers, and each supplier is uniquely identified by sid. Each supplier has a name sname, and it operates at the given state and zipcode. The company has a number of orders for parts, and each order contains the pid of the part ordered, the sid of the supplier from which the part is ordered, and the quantity ordered.

Question 1 (15 points) [equal split for all sub-questions]

Write relational algebra expressions for the following queries given the schema above:

(a) Find the name of parts purchased from Massachusetts in quantity of at least 100 (in a single order).

(b) Find the name of parts shipped from zipcode 02125 for which there is no order with quantity less than 100.

(c) Find the zipcode of suppliers for which there is an order for a part called ‘rotor’, and who supply only parts costing more than $20.

(d) Find the name of suppliers who are the only suppliers in their zipcode (i.e., there is no other supplier in the same zipcode).

(e) [630 only] Find the name of the most expensive part(s) among parts that are supplied by at least two different suppliers (i.e., there must be orders for that part from at least two different suppliers).

Note: for Q1, you are NOT ALLOWED to use SQL, answers in SQL will not receive any marks.

Question 2 (15 points) [equal split for all sub-questions]

Write SQL queries for the following:

(a) Find the highest price among parts that were ordered only from suppliers in zipcode 12345 (do not include parts for which there was no order placed at all).

(b) Find the total dollar amount paid for each part (listed by pid) that is supplied by at least ten different suppliers (the total dollar amount includes all orders for a part).

(c) Find the names of suppliers who supply all parts (i.e., pids) costing more than $100.

(d) For each supplier who supplies at least 10 different parts (in orders with any quantity), list the supplier name and the average dollar amount per order calculated over orders with quantity at least 10.

(e) [630 only] Find the supplier(s) with the highest amount of total sales (total sales refers to combined dollar amount value for all orders filled by that supplier). List supplier sid.

Note: for Q2, you are NOT ALLOWED to use views, answers with views will not receive any marks.