Princeton University

COS425 - Database Systems
William O'Connell - Spring 1996

Homework #2 - Relational Languages

Graded out of 100 points; Due: in class, Tue., Feb 27th.

1. [30 pts] (A) Produce the resultant table after doing a *natural join* of all three tables shown in the attachment. (B) Also show the relational algebra query to do this using only the **select** and **product** operators.

2. [35 pts] Let the following relation schemas be given:

R = (A, B, C)
S = (D, E, F)

Let relations r(R) and s(S) be given. Give an expression in **both** tuple and domain relational calculus that is equivalent to each of the following:

a. $\Pi_A \langle r \rangle$

b. $\delta_{B\,=\,17}(r)$

c. $r \times s$

d. $\Pi_{A,\,F}(\delta_{C\,=\,D}(r \times s))$

3. [35 pts] Let R = (A, B) and S = (A, C), and let r(R) and s(S) be relations. Write relational algebra expressions equivalent to the following domain relational calculus expressions.

a. $\{\ [a\ ]\ |\ \exists b\ (\ [a, b]\ \varepsilon\ r\ \wedge b = 17)\ \}$

b. $\{\ [a, b, c]\ |\ [a, b]\ \varepsilon\ r\ \wedge\ [a, c]\ \varepsilon\ s\}$

c. $\{\ [a, b, c]\ \ |\ \exists c\ \langle\ [a, c]\ \varepsilon\ s \wedge \exists b_1, b_2\ (\ [a, b_1]\ \varepsilon\ r \wedge\ [c, b_2]\ \varepsilon\ r \wedge b_1 > b_2) \rangle\}$

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Table 1: Suppliers

S#	SNAME	STATUS	CITY
S1	Chen	20	Dallas
S2	Jones	10	Seattle
S3	Walter	30	Seattle
S4	Au	20	Dallas
S5	Codd	30	Newark

Table 2: Parts

P#	PNAME	COLOR	WEIGHT	CITY
P1	Plug	Red	12	Dallas
P2	Pan	Green	17	Seattle
P3	Cap	Blue	17	Prine-ton
P4	Cap	Red	14	Dallas
P5	Hose	Blue	12	Seattle
P6	Fan	Red	19	Dallas

Table 3: Supplier_Part

Supplier#	Part#	Quantity
S1	P1	500
S1	P2	150
S1	P3	250
S1	P4	150
S1	P5	375
S1	P6	375
S2	P1	500
S2	P2	250
S3	P2	150
S4	P2	150
S4	P4	500
S4	P5	250