

ADC Assignment 2

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6. Reconsider Problem 1. Find the pid and name of each person who works for Google and who has a strictly higher salary than some other person who he or she knows and who also works for Google.(a) Formulate this query in Relational Algebra in standard notation.(b) Formulate this query in RA SQL.

Ans:

$$\begin{aligned} & (\pi_{pid,pname} (P \bowtie \pi_{cname='Google'}(W))) \cap (\pi_{p1.pid,p1.pname} (P_1 \bowtie_{p1.pid=w1.pid} \\ & (\pi_{pid,salary}(W_1)) \bowtie_{p1.pid=pid1} K \bowtie_{pid2=w2.pid \wedge w1.salary > w2.salary} \\ & (\pi_{cname,pid,salary}(\sigma_{cname='Google'}(W_2)))) \bowtie_{p2.pid=w2.pid} (P_2)) \end{aligned}$$

7. Reconsider Problem 2. Find the cname of each company withheadquarter in Bloomington, but not located in Indianapolis,along with the pid, name, and salary of each person who worksfor that company and who has the next-to-lowest salary at thatcompany.(a)Formulate this query in Relational Algebra in standardnotation.(b)Formulate this query in RA SQL.

Ans:

$$\begin{aligned} & \pi_{w.cname,w.pid,p.pname,w.salary} (W \bowtie_{w.pid=p.pid} (\pi_{pname,pid}(P)) \bowtie_{c.cname=w.cname} \\ & (\pi_{cname}(\sigma_{headquarter='Cupertino'}(C)) \bowtie_{cl.cname=w.cname} (\pi_{cname} \\ & (\sigma_{city<>'Indianapolis'})) \bowtie_{w.salary > w1.salary} (\pi_{salary}(W_1))) - \\ & (\pi_{w.cname,w.pid,p.pname,w.salary} (W \bowtie_{w.pid=p.pid} (\pi_{pname,pid}(P)) \bowtie_{w1.salary < w.salary} \\ & (\pi_{salary,cname})(W_1)) \bowtie_{w2.salary < w.salary \wedge w2.salary < w1.salary} (\pi_{salary,cname}(W_2)) \\ & \bowtie_{w1.cname=c1.cname \wedge w2.cname=c1.cname} (\pi_{cname}(C_1))) \end{aligned}$$

8. Reconsider Problem 3. Find each (c,p) pair where c is the cname of a company and p is the pid of a person who works for that company and who is known by all other persons who work for that company.(a)Formulate this query in Relational Algebra in standard notation.(b)Formulate this query in RA SQL.

Ans:

$$\begin{aligned} & \pi_{w.cname,w.pid}(W) - \pi_{q1.cname,q1.pid}(\pi_{w5.pid,w5.cname,w2.cname}(W_2) \\ & \bowtie_{w2.pid <> w5.pid \wedge w2.cname <> w5.cname} (W_5)) - \pi_{w4.pid,w4.cname,w3.pid,w3.cname}(W_3) \\ & \bowtie_{k1.pid2=w4.pid \wedge w3.pid <> w4.pid \wedge w3.cname=w4.cname} (W_4))q1 \end{aligned}$$

9. Reconsider Problem 4. Find each skill that is not a jobskill of any person who works for Yahoo or for Netflix.(a)Formulate this query in Relational Algebra in standard notation.(b)Formulate this query in RA SQL.

Ans:

$$\begin{aligned} & \pi_{skill}(\mathbf{Skill}) - \pi_{ps.skill}(PS) \bowtie_{w.pid=ps.pid} \\ & (\pi_{pid}(\sigma_{cname='Netflix' \vee cname='Yahoo'}(W))) \end{aligned}$$

10. Reconsider Problem 5. Find the pid and name of each person who manages all-but-one person who works for Google.(a)Formulate this query in Relational Algebra in standard notation.(b)Formulate this query in RA SQL.

Ans:

$$\begin{aligned} & (\pi_{pid,pname}(P) \bowtie_{p.pid=h.mid} (h) \bowtie_{w.pid=h.eid \wedge w.cname='Google'} (W)) \\ & \cap \\ & (\pi_{p1.pid,p1.pname}(P_1) \bowtie_{w1.cname='Google'} \wedge p1.pid=w1.pid (W_1)) \end{aligned}$$

11. Some person has a salary that is strictly lower than that of each of the persons who he or she manages.

Ans:

$$\begin{aligned} & \pi_{pid}(P) \subsetneq \pi_{w.pid}(\sigma_{w1.salary < w2.salary} \\ & (W_1 \bowtie_{w1.pid=h.mid} H \bowtie_{h.eid=w2.pid} W_2)) \end{aligned}$$

12. No person knows all persons who work for Google.

Ans:

$$\pi_{pid}(W_1 \bowtie_{w1.pid=k.pid1} K \bowtie_{k.pid2=w2.pid} (\sigma_{w2.cname='Google'}(W_2))) = \emptyset$$

13. Each person knows all of his or her managers.

Ans:

$$\pi_{pid}(P) \subseteq (\pi_{p1.pid}(P_1) \bowtie_{p1.pid=k.pid1} K \bowtie_{k.pid2=p2.pid} (P_2) \cap \pi_{p1.pid}(P_1 \bowtie_{p1.pid=h.eid} H \bowtie_{h.mid=p2.pid} (P_2)))$$

14. Each employee and his or her managers work for the same company.

Ans:

$$\pi_{w.pid}(W) \subseteq \pi_{pid}(\sigma_{w1.cname=w2.cname}(W_1) \bowtie_{w1.pid=h.eid} (H) \bowtie_{h.mid=w2.pid} (W_2))$$

15. The attribute pid is a primary key of the Person relation.

Ans:

$$\pi_{pid}(\sigma_{p1.pname <> p2.pname}((P_1) \bowtie_{p1.pid=p2.pid} (P_2))) \neq \emptyset$$