Problem 6: 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.

--→

Let

$Q_1 = \pi_{\text{P.pid ,P.pname,W.cname,W.salary}} (\sigma_{\text{W.}cname\text{='}Google\text{'}}(\text{P} \bowtie_{\text{P.pid=W.pid}} \text{W}))$

AND

$Q_2 = \pi_{Q_1\text{.pid ,}Q_1\text{.pname,}Q_1\text{.cname,}Q_1\text{.salary,K.pid2}} (\sigma_{\text{W.}cname\text{='}Google\text{'}}(Q_1 \bowtie_{Q_1\text{.pid=K.pid1}} \text{K}))$

Final Query:

$\pi_{Q_2\text{.pid ,}Q_2\text{.pname}}(\sigma_{Q_2.salary > Q_1.salary}(Q_2 \bowtie_{Q_2\text{.pid2=}Q_1\text{.pid}} Q_1))$

Problem 7: Problem 2. Find the cname of each company with headquarter in Bloomington, but not located in Indianapolis, along with the pid, name, and salary of each person who works for that company and who has the next-to-lowest salary at that company.

--→

Let

$Q_1 = \pi_{\text{c.cname}} (\sigma_{c.headquarter\text{='}Cupertino\text{'} \wedge\ c\text{L.}city \neq \text{'}Indianapolis\text{'}}(\text{C} \bowtie_{\text{C.cname=cL.cname}} \text{cL}))$

$Q_2 = \pi_{\text{W.pid ,W.cname,W.salary}} (\text{W} \bowtie_{\text{W.cname=}Q_1\text{.cname}} Q_2)$

$Q_3 = \pi_{\text{P.pid ,P.pname,}Q_2\text{.cname,}Q_2\text{.salary}} (\text{P} \bowtie_{\text{P.pid=}Q_2\text{.pid}} Q_2)$

$Q_4 = \pi_{Q_3\text{.pid ,}Q_3\text{.pname,}Q_3\text{.cname,}Q_3\text{.salary}} (Q_3 \bowtie_{Q_3\text{.pid}\neq Q_{31}\text{.pid} \wedge (Q_3\text{.salary-}Q_{31}\text{.salary}) > 0} Q_{31})$

Here Q_3 and Q_{31} are referring to same query being used. For understanding purpose, its renamed.

Final query

$= \pi_{Q_4\text{.pid ,}Q_4\text{.pname,}Q_4\text{.cname,}Q_4\text{.salary}} (Q_4 \bowtie_{Q_4\text{.pid}\neq Q_{41}\text{.pid} \wedge (Q_4\text{.salary-}Q_{41}\text{.salary}) = 0} Q_{41})$

Here Q_4 and Q_{41} are referring to same query being used . For understanding purpose, its renamed

Problem 8: 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.

-→

Let

$Q_1 = \pi_{\text{K.pid1,K.pid2,}W_1\text{.cname}} (W_1 \bowtie_{W_1\text{.cname=}W_2\text{.cname}} W_2 \bowtie_{(W_1\text{.pid=K.pid1}) \wedge W_2\text{.pid=K.pid2}} \text{K})$

$Q_2 = \pi_{Q_1.pid2, Q_1.cname}\ (Q_1)$

$Q_3 = \pi_{W.pid, W.cname}(W - \pi_{W_1.cname, W_1.pid}(W_1 \bowtie_{(W_1.cname=W_2.cname) \wedge (W_1.pid \neq W_2.pid)} W_2))$

Final query

$(\pi_{Q_2.pid2, Q_2.cname}\ (Q_2 - (\pi_{Q_{21}.pid2, Q_{21}.cname}\ (Q_{21} \bowtie_{Q_{21}.cname=Q_1.cname \wedge Q_{21}.pid2 \neq Q_1.pid2}\ Q_1)))) \cup Q_3$

Here Q_2 and Q_{21} are referring to same query being used. For understanding purpose, its renamed.

Problem 9: Find each skill that is not a job skill of any person who works for Yahoo or for Netflix.

Let

$Q_1 = \pi_{pS.skill}\ \left(\sigma_{W.cname = 'Yahoo' \vee W.cname = 'Netflix'}(pS \bowtie_{pS.pid=W.pid} W)\right)$

Final query →

$\pi_{S.skill}(S - \pi_{S_1.skill}(S_1 \bowtie_{S_1.skill=Q_1.skill} Q_1))$

Problem 10: Reconsider Problem 5. Find the pid and name of each person who manages all-but-one person who works for Google.

→Let

$Q_1 = \pi_{M.eid, M.mid}\ (\sigma_{W.cname = 'Google' \wedge W_1.cname = 'Google'}(M \bowtie_{M.eid=W.pid} W \bowtie_{M.mid=W_1.pid} W_1)$

Final Query =

Here we are assuming $Q_1.mid$ as pid (renaming column to desired name)

$\pi_{pid, P.pname}\ (Q_1 \bowtie_{Q_1.mid=P.pid} P)$
$- \pi_{Q_{11}.mid, P_1.pname}\ (Q_{11} \bowtie_{Q_{12}.eid \neq Q_{11}.eid \wedge Q_{12}.mid \neq Q_{11}.mid} Q_{12} \bowtie_{Q_{11}.mid=P.pid} P)$

Here Q_1 , Q_{11} , Q_{12} are referring to same query being used . For understanding purpose, its renamed

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

-→

Let

$Q_1 = \pi_{M.eid, M.mid, W.salary, W.cname}\ \left(\sigma_{W.cname = W_1.cname}\ (M \bowtie_{M.eid=W.pid}\ W \bowtie_{M.mid=W_1.pid}\ W_1)\right)$

$Q_2 = \pi_{M.mid, W.salary, W.cname}\ (M \bowtie_{M.mid=W.pid}\ W)$

$$Q_3$$
$$= \pi_{Q_2.mid,Q_2.salary,Q_2.cname}(Q_2$$
$$- \pi_{Q_2.mid,Q_2.salary,Q_2.cname}(\sigma_{Q_2.cname=Q_1.cname \wedge Q_2.mid=Q_1.mid \wedge \sim(Q_2.salary<Q_1.salary)}(Q_2 \bowtie Q_1))$$

Final Query →

$$Q_3 \neq \emptyset$$

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

➔ Let

$$Q_1 = \pi_{W.pid}(\sigma_{W.cname='Google'}(W))$$

$$Q_2 = \pi_{K.pid1}(K \bowtie_{K.pid2=Q_1.pid} Q_1)$$

$$Q_3 = \pi_{P.pid}(P - \pi_{Q_2.pid1}(Q_2))$$

Final Query is $Q_3 \neq \emptyset$

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

-→
Let

$$Q_1 = \pi_{M.eid}(M - \pi_{M.eid}(\sigma_{K.pid1=M.eid \wedge K.pid2=M.mid}(M \bowtie K)))$$

Final query: $Q_1 = \emptyset$

Problem 14: Each employee and his or her managers work for the same company.
-→ Final query:
Let

$$Q_1 = \pi_{M.eid,M.mid,W.cname}(M \bowtie_{M.eid=W.pid} W)$$

$$Q_2 = \pi_{Q_1.eid,Q_1.mid}(Q_1) \cap \pi_{Q_1.eid,Q_1.mid}(\sigma_{Q_1.mid=W.pid \wedge Q_1.cname \neq W.cname}(Q_1 \bowtie W))$$

Final query: $Q_2 = \emptyset$

Problem 15: The attribute pid is a primary key of the Person relation
-→ Final query:

$$\pi_{P1.pid}(P1_{\bowtie P1.pid=P2.pid \wedge P1.pname \neq P2.pname \vee P1.city \neq P2.city} P2) = \emptyset$$