Section 4 – Solutions

Question 1

Consider the following database schema:

\( \text{Neighbors}(name1, name2, duration) \)
\( \text{Colleagues}(name1, name2, duration) \)

Write a Relational Algebra Plan for the SQL query:

\[
\text{SELECT DISTINCT C1.name1, C2.name2}
\text{FROM Colleagues C1, Neighbors N, Colleagues C2}
\text{WHERE C1.name2 = N.name1}
\text{AND N.name2 = C2.name1}
\text{AND C1.duration < 10}
\text{AND C2.duration < 10}
\text{AND N.duration > 100}
\]

Question 2

Consider the following database schema:

\( \text{R}(A, B) \)
\( \text{S}(C, D, E) \)
\( \text{T}(F, H, G) \)

Write a Relational Algebra Plan for the SQL query:

\[
\text{SELECT R.B, S.E, SUM(T.G) AS sumG}
\text{FROM R, S, T}
\text{WHERE R.A = S.C}
\text{AND S.D = T.F}
\text{AND T.H > 55}
\text{GROUP BY R.B, S.E}
\]
Question 3

Consider the following database schema:

- Users(uid, name)
- Comment(uid, pid, score, txt)
- Picture(pid, uid, img)

**Part a**

Write a Relational Algebra Plan for the SQL query:

```sql
SELECT DISTINCT U.uid
FROM Users U, Picture P, Comment C
WHERE U.uid = P.uid
AND P.pid = C.pid
AND C.score > 8
GROUP BY U.uid, P.pid
HAVING COUNT(*) > 10
```

**Part b**

Write a Relational Algebra Plan for the SQL query:

```sql
SELECT P.pid
FROM Picture P
WHERE NOT EXISTS
(SELECT * FROM Comment C
WHERE P.pid = C.pid
AND C.score < 5)
```

**Part c**

Write an equivalent SQL query. Bonus: do it without using a subquery!

```sql
SELECT U.uid
FROM Users U, Comment C
WHERE U.uid = C.uid
AND C.score < 3
GROUP BY U.uid
HAVING COUNT(*) > 20
```