COMP9315 22T1 Final Exam

The University of New South Wales

COMP9315 DBMS Implementation 22T1 Final Exam

DBMS Implementation

[Instructions] [PostgreSQL] [C] [Q1-3 Info]
[Q1] [Q2] [Q3] [Q4] [Q5] [Q6] **[Q7]** [Q8]

Question 7 (10 marks)

Translate the SQL queries below into an efficient sequence of relational algebra operations. Use the notation for relational algebra operations from the Course Notes i.e.

- Selection: `Sel[`*`Condition`*`]`*`Relation`*
- Projection: `Proj[`*`AttrList`*`]`*`Relation`*
- Join: *`Rel`*$_1$ `Join[`*`Condition`*`]` *`Rel`*$_2$
- Set Union: *`Rel`*$_1$ `U` *`Rel`*$_2$
- Set Intersection: *`Rel`*$_1$ `^` *`Rel`*$_2$
- Set Membership: `(`*`Attr`* `in` *`RelWithOneAttr`*`)` (is used as a boolean expression)

When showing complex relational algebra, write it as a sequence of "assignment" statements, with a single relational algebra operation on the right hand side, and a temporary relation to hold the result on the left hand side. The temporary relation can be used in subsequent "assignment" statements.

Example: `select x,y from R where z = 5;` is rendered as:

```
Tmp1 = Sel[z=5] R
Res  = Proj[x,y] Tmp1
```

Write relational algebra operations for each of these operations on the tables `R(a,b,c)` and `S(c,d)` and `T(d,e,f,g)`

a.
```
select * from S where c = 5 and d = 8
```

b.
```
select a,d from R join S on R.c = S.c
```

c.
```
select *
from   R
where  c in (select c from S where d = 3)
```

d.
```
select a,f,g
from   R join S on (R.c = S.c) join T on (S.d = T.d)
where  R.b = 2 and S.c = 5 and T.e = 10
```

You do not need to worry about the sizes of tables, intermediate result, projected tuples, number of memory buffers, etc. in answering this question. Treat this as the initial relational algebra transformation stage after parsing the SQL and before query optimisation, and apply the common heuristics used in this phase.

State all assumptions. Show all working.

Instructions:

- Type your answer to this question into the file called `q7.txt`
- Submit via: **`give cs9315 exam_q7 q7.txt`**
  or via: Webcms3 > exams > Final Exam > Q7 submission > Make Submission

End of Question