Exercise 7: Query Optimization*

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1 Exercise 1

Consider 3 relations r(ABC), s(CDEFG), t(EHK) và 2 relational algebra expressions

- $\pi_{\text{BK}}\left(\sigma_{A=a\wedge D=d}\left(\sigma_{s.E=t.E}\left((r*s)\times t\right)\right)\right)$
- $\pi_{\text{BK}}\left(\pi_{\text{BC}}\left(\sigma_{A=a}r\right)*\pi_{C}\left(\sigma_{D=d}s\right)*\pi_{\text{EK}}\left(t\right)\right)$

1. Are these two expressions equivalent? Justify your answer
2. Using the transformation rules and heuristic algebraic optimization algorithm, optimize the first expression.

2 Exercise 2

Consider the following query:

```
SELECT Name, Address
FROM EMPLOYEE E , DEPARTMENT D
WHERE D.Name = 'Research' AND D.DeptId = E.DeptId;
```

1. Draw at two query trees that can represent this query.
2. Draw the initial query tree for the query and show how the query tree is optimized

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