

Homework #9

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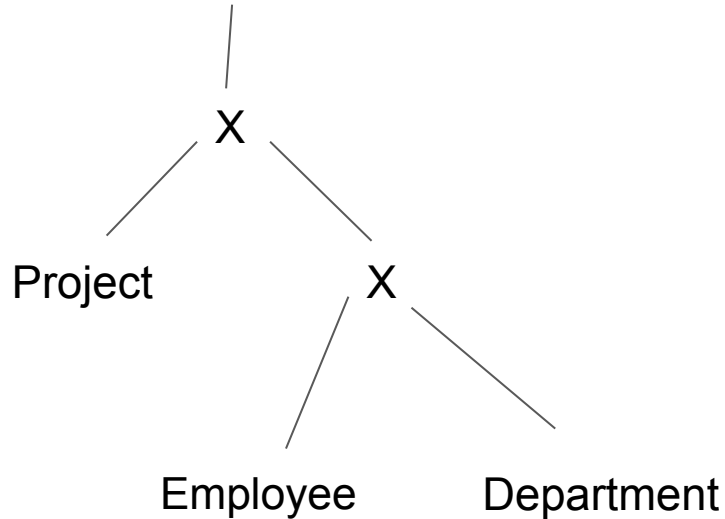
Initial Query

```
SELECT Pnumber, Dnum, Lname, Address, Bdate  
FROM DEPARTMENT, PROJECT, EMPLOYEE  
WHERE Dnum=Dnumber  
AND Mgr_ssn=Ssn  
    AND Plocation = 'Stafford';
```

Initial Tree

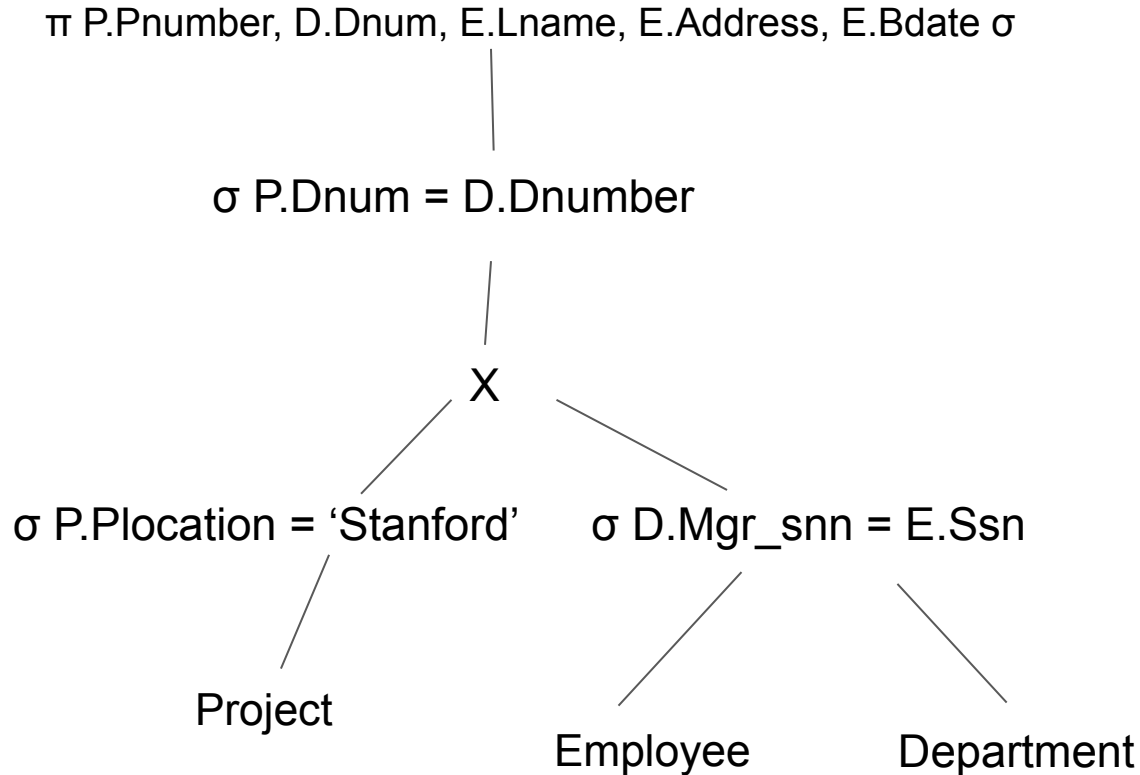
π P.Pnumber, P.Dnum, E.Lname, E.Address, E.Bdate

σ P.Dnum = D.Dnumber AND D.Mgr_snn = E.Ssn AND P.Plocation = 'Stanford'

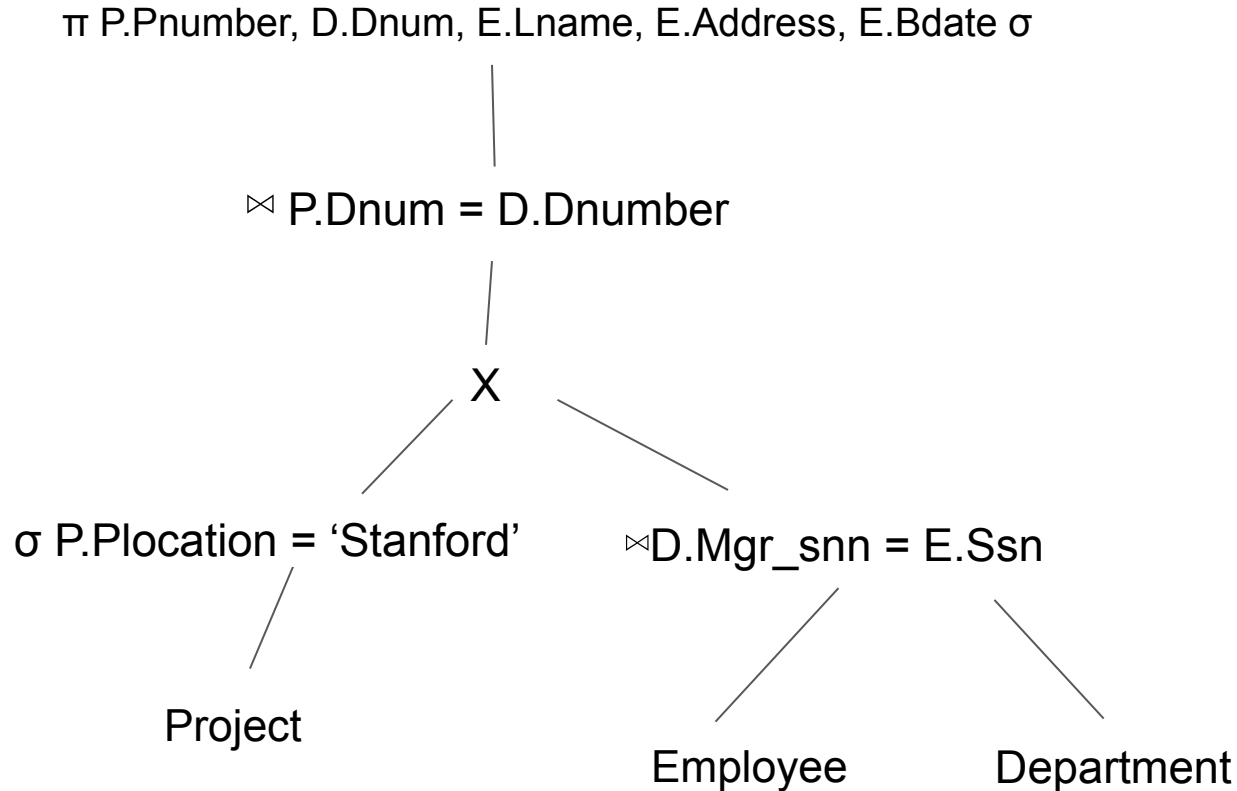


R1 - break up select operations into cascade of select operations.

R9 - rearrange leaf nodes of the tree so that the leaf nodes with most restrictive select operations are executed first in the query tree.



- ⊗ R12: Combine Cartesian product operation with subsequent select operation into a join operation.



R3, R4, R7, and R11 - break down and move lists of projection attributes down tree as far as possible by creating new project operations as needed.

