

SL : 452 : Algebra

\Rightarrow self-contained subexpressions

\rightarrow allow bottom-up evaluation/
semantics

\rightarrow also needed for Datalog



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Datalog

- up to now: conjunctive queries

$f(\dots) :- atom_1, atom_2, \dots, atom_n.$

Consider non-atomic subqueries

head $\leftarrow atom_1 \wedge subq_1 \wedge subq_2 \wedge \dots$

bottom up idea

e.g.

$\begin{cases} v_1(\dots) :- sq_3 \\ v_1(\dots) :- sq_4 \end{cases}$

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Example

- * all country codes and org.abbrevs, s.t.
 - County is a member in org
 - **or** $\text{County} \geq 10.000.000$ inhabitants
 - org established before 1990

SQL:

```
select i.country, i.organization
from ismember i
where exists (select * from country c
or where c.code = i.country and c.population >= 10000000)
and exists (select * from organization o
            where o.abbreviation = i.organization and established < '01-JAN-1990')
```

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cost query plan: 247

```
select i.country, i.organization
from ismember i
where exists (select * from country c
or where c.code = i.country and c.population >= 10000000)
and exists (select * from organization o
            where o.abbreviation = i.organization and established < '01-JAN-1990')
```

Calculus:

$$F(X, Y) \equiv \exists T : \text{ismember}(X, Y, T)$$

$$\begin{cases} \text{Rec: } X \\ \text{m: } X \end{cases} \quad \begin{cases} \text{Rec: } Y \\ \text{m: } Y \end{cases}$$

$$\begin{array}{l} F(X, Y) \equiv \exists T : \text{ismember}(X, Y, T) \\ \quad \wedge (\exists N, P, A, G, CP : \text{country}(N, X, P, A, G, CP) \\ \quad \quad \quad \wedge P \geq 10.000.000) \\ \quad \wedge \exists ON, E, H, HC, HP : \text{org}(ON, Y, E, H, HC, HP) \\ \quad \quad \quad \wedge E \leq '01-JAN-1990') \end{array}$$

RNF:

SRNF: ✓

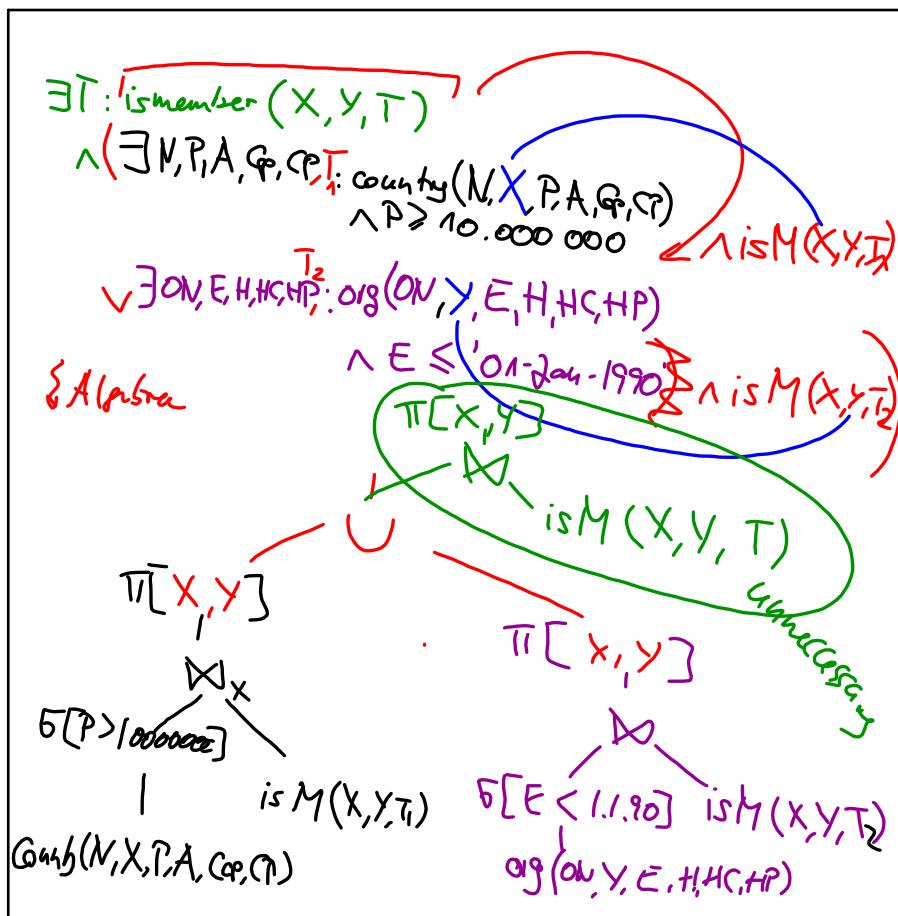
Id. Hg:

X \cup Y : only allowed if domains coincide

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Situation Slide 448 :

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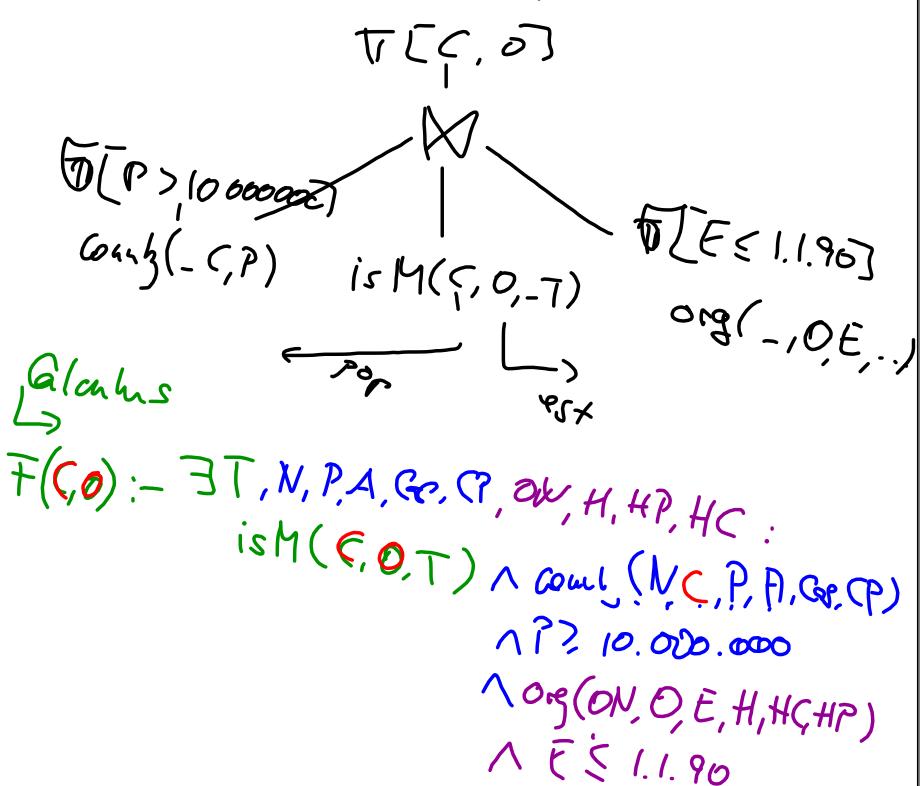
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(select c.code , i1.organization
 from country c, ismember i1
 where c.code = i1.country and c.population >= 10000000)
 union
 (select i2.country , o.abbreviation
 from organization o, ismember i2
 where o.abbreviation = i2.organization and established < '01-JAN-1990')

Their plan: cost 26

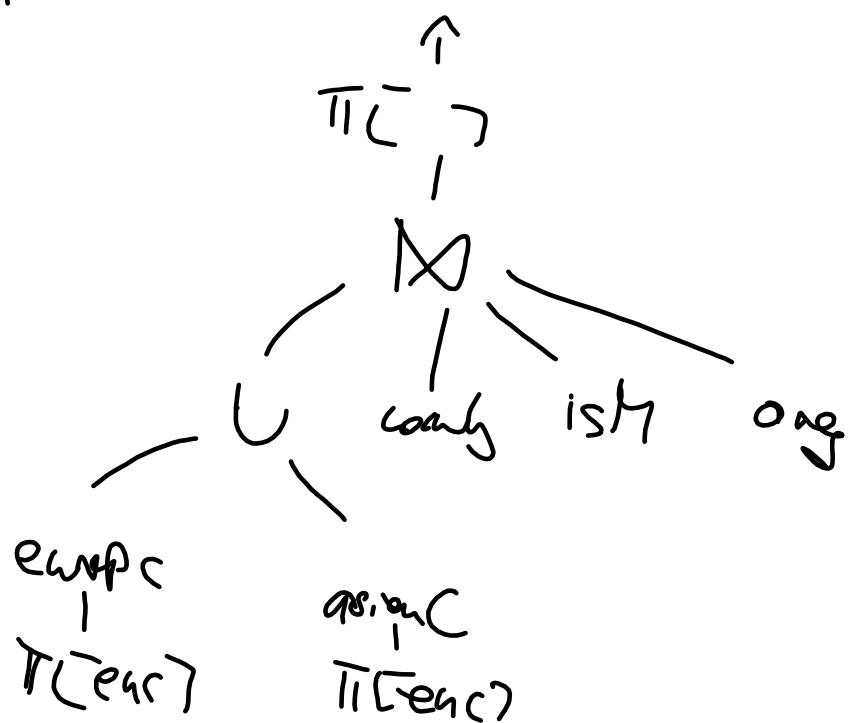
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Another alpha solution



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SI.451



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