

CSE 414

SECTION 4 – RELATIONAL ALGEBRA

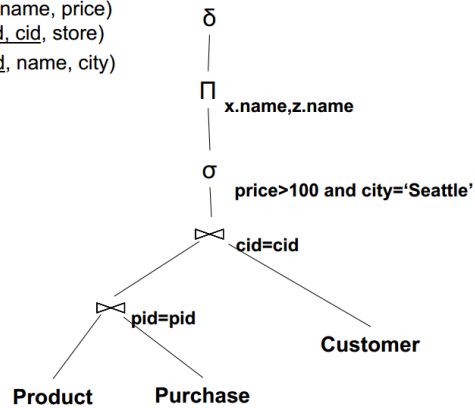
Why RA?

- ❖ Formalism for describing queries
- ❖ Basis of relational databases
- ❖ Will make you a SQL wizard!

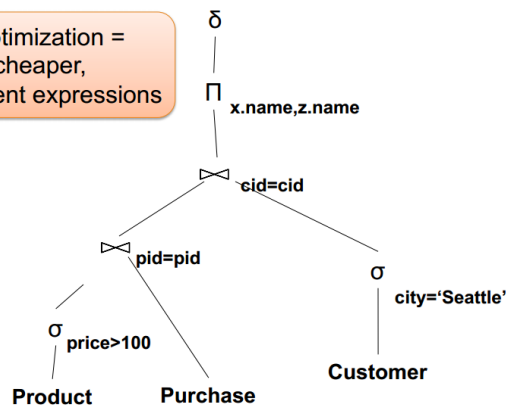
Notes on RA

❖ Multiple possible query plans

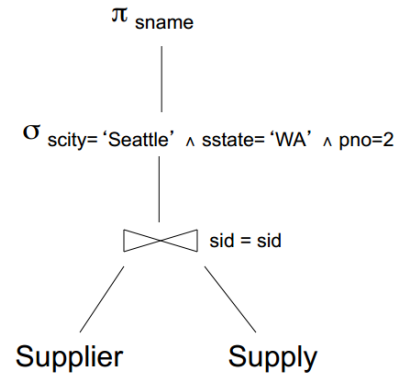
Product(pid, name, price)
 Purchase(pid, cid, store)
 Customer(cid, name, city)



Query optimization = finding cheaper, equivalent expressions



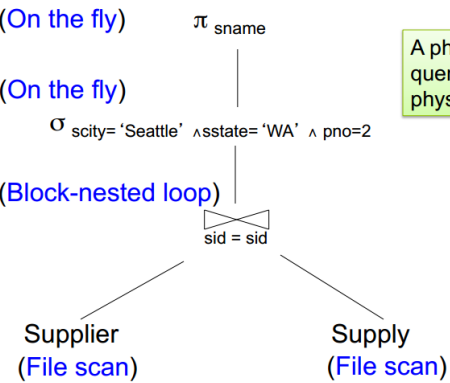
❖ Logical vs. Physical query plans



(On the fly)

(On the fly)

(Block-nested loop)

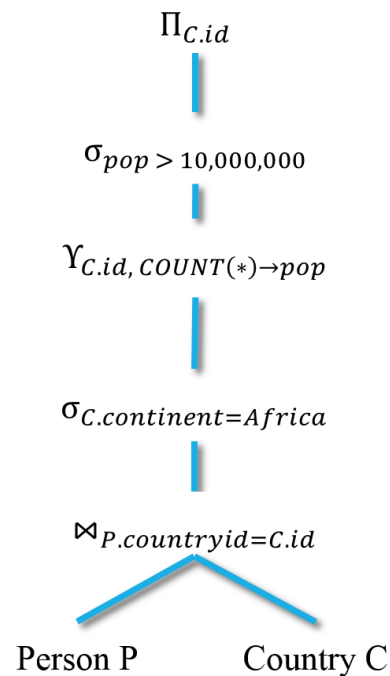


A physical query plan is a logical query plan annotated with physical implementation details

Example: RA-to-SQL

Person(id, name, countryid)

Country(id, name, continent)



```
SELECT C.id
FROM Person P, Country C
WHERE P.countryid = C.id
AND C.continent='Africa'
GROUP BY C.id
HAVING COUNT(*) > 10000000
```

Can we make a more efficient plan?

Equivalently in equation form: $\Pi_{C.id}(\sigma_{pop > 10,000,000}(\gamma_{C.id, COUNT(*) \rightarrow pop}(\sigma_{C.continent=Africa}(Person\ P \bowtie_{P.countryid=C.id} Country\ C))))$

RA Reference Sheet

Name	Symbol
Selection	σ
Projection	π
Join	\bowtie
Group By	γ
Set Difference	$-$
Duplicate Elimination	δ