

CSE 344: Section 4

Relational Algebra

January 25th, 2018

RA Operators

\cap - Intersect

$$R1 \cap R2 = R1 - (R1 - R2)$$

$$R1 \cap R2 = R1 \bowtie R2$$

Standard:

\cup - Union

$-$ - Diff.

σ - Select

π - Project

ρ - Rename

Joins:

\bowtie - Nat. Join

$\bowtie_{\text{L.O.}}$ - L.O. Join

$\bowtie_{\text{R.O.}}$ - R.O. Join

$\bowtie_{\text{F.O.}}$ - F.O. Join

\times - Cross Product

Extended:

δ - Duplicate Elim.

γ - Group/Agg.

τ - Sorting

A Few More SQL Keywords

(<sub>) INTERSECT (<sub>)

(<sub>) UNION (<sub>)

(<sub>) EXCEPT (<sub>)

∑ Notation

Grouping and aggregation on group:

$\sum_{attr_1, \dots, attr_k} count/sum/max/min(attr) \rightarrow alias$

Aggregation on the entire table:

$\sum count/sum/max/min(attr) \rightarrow alias$

Query Plans (Example SQL -> RA)

Select-Join-Project structure

Make this SQL query into RA (remember FWGHOS):

```
SELECT R.b, T.c, max(T.a) AS T_max
  FROM Table_R AS R, Table_T AS T
 WHERE R.b = T.b
  GROUP BY R.b, T.c
HAVING max(T.a) > 99
```

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```

$\pi_{R.b, T.c, T_{max}}(\sigma_{T_{max} > 99}(\gamma_{R.b, T.c, \max(T.a) \rightarrow T_{max}}(R \bowtie_{R.b=T.b} T)))$