Relational Algebra October 26, 2017 Chapter 4 p 100-116

1

Queries

- How do we implement a query?
- How do we optimize a query?
- How to we talk about a query?

• We will use this lecture plus the Indexes/Storage engine lecture to understand Query Planning and Optimization

Algebra vs Calculus

- Relational Algebra
 - queries are composed of operators
 - step by step procedure for solving the query
 - relationally complete
- Relational Calculus (p 116-126)
 - describe result of query without specifying how to compute

• Expressiveness: Algebra vs Calculus (section 4.4)

Queries: Defined

• Input and output are *relations*

• Queries work on *instances* of relations

• May refer to columns/fields by name or position

may need to rename columns/fields to avoid conflict

Queries

- Composed of operators
- Operators:
 - accept one to two relation instances
 - produce a relation instance
- Can *compose* queries
- Relational algebra expression
 - relation (produced by some operator(s))

Example Data

• From your book, 102

sid	sname	rating	age
22	Dustin	7	45.0
31	Lubber	8	55.5
58	Rusty	10	35.0

Figure 4.1 Instance S1 of Sailors

sid	sname	rating	age
28	yuppy	9	35.0
31	Lubber	8	55.5
44	guppy	5	35.0
58	Rusty	10	35.0

Figure 4.2 Instance S2 of Sailors

sid	bid	day
22	101	10/10/96
58	103	11/12/96

Figure 4.3 Instance R1 of Reserves

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Basic Operators

• Selection

- Projection
- Union/Intersection
- Cross-product

• Difference

Joins

• Conditional Joins

• Equijoin

• Natural Join

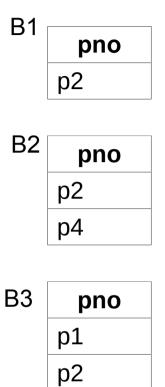
Others

• Division

• Renaming

Division Example

Α		
sno	pno	
s1	p1	
s1	p2	
s1	р3	
s1	p4	
s2	p1	
s2	p2	
s3	p2	
s4	p2	
s4	p4	



р4

A/B1 A/B2 A/B3

Examples: from the book

- Find the snames
 - who have reserved boat 103.
 - who have reserved any boat.
 - who have reserved a red boat.
 - who have reserved a red or green boat.
 - who have reserved a red and green boat.
 - who have reserved exactly 2 boats.
 - who have reserved at least 2 boats.
 - with age over 20 who have not reserved a red boat.
 - who reserved all boats.
- Find the colors of the boats reserved by Lubber.