Relational Algebra

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Chapter 4

p 100-116

Queries

- How do we implement a query?
- How do we optimize a query?
- How to we talk about a query?
- What is the definition of Computer Science?

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))

Basic Operators

- Selection
- Projection
- Union/Intersection
- Cross-product
- Difference

Joins

- Conditional Joins
- Equijoin
- Natural Join

Others

- Division

- Renaming

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.

19.8.1