Relational Algebra

Oct 19, 2011

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