PennState

CMPSC431W: Database Management Systems

Lecture 20
10/14/15

Instructor: Yu-San Lin
yusan@psu.edu

Course Website: http://www.cse.psu.edu/~yul189/cmpsc431w
Slides based on McGraw-Hill & Dr. Wang-Chien Lee

Set Operations

- Three set-manipulation constructs:
  - UNION
  - INTERSECT
  - EXCEPT
- Other set operations:
  - IN: if an element is in a given set
  - op ANY, op ALL: compare a value with the elements in a given set
  - EXISTS: check if a set is empty

(Q5) Find the names of sailors who have reserved a red or a green boat

- Without set operations

(Q5) Find the names of sailors who have reserved a red or a green boat

- With set operations

(Q6) Find the names of sailors who have reserved a red and a green boat

- Without set operations

(Q6) Find the names of sailors who have reserved a red and a green boat

- With set operations

(Q19) Find the sids of all sailors who have reserved red boats but not green boats

(Q20) Find all sids of sailors who have a rating of 10 or reserved boat 104

Nested Queries

- A nested query is a query that has another query embedded within it (a subquery)
- A very powerful feature of SQL
- `WHERE`, `FROM`, and `HAVING` clauses can contain subqueries

(Q1) Find the names of sailors who have reserved boat 103

- With nested query

- How would you change this to sailors who have *not* reserved boat 103?

(Q2) Find the names of sailors who have reserved a red boat.

Conceptual Evaluation for Nested Queries

- Construct the cross-product of the tables in the FROM clause of out-level query
- For each row in the cross-product, while testing the condition in the WHERE clause:
  - Compute the subquery
  - Recursively apply the process to inner subqueries

Nested Queries with Correlation

- In the nested queries so far, the inner subquery has been completely *independent* of the outer query
- In general, the inner subquery could dependent on the row currently being examined in the outer query

(Q1) Find the names of sailors who have reserved boat number 103.

- Have inner query depend on outer query

Set-Comparison Operators

- `UNIQUE`: returns `TRUE` if no duplicates in the tested set or the tested set is empty
- op `ANY`: compare to *at least one* of the tuple in the set
  - IN ≡ _____
- op `ALL`: compare to *all* of the tuple in the set
  - NOT IN ≡ _____
- `op = {<, <=, =, <>, >=, >}`

(Q22) Find sailors whose rating is better than some sailor called Horatio.

(Q23) Find sailors whose rating is better than every sailor called Horatio.

(Q9) Find the names of sailors who have reserved all boats

- Approach 1

(Q9) Find the names of sailors who have reserved all boats

- Approach 2

Don’t Forget

- Project phase 2 presentation tomorrow 6pm to 8pm @073 Willard
  - Project reports will be turned in before presentation
- Homework 3 due next Friday (10/23)