

CIS560

Subqueries – Part 1

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Computer Science



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Topics

- Review
 - Logical Processing Phases
 - Joins
- Subqueries
 - Introduction
 - Self-contained
 - Single-valued
 - Multi-valued

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Review

•ANSI Processing Order (Logical)

```

      6      8
5 SELECT [DISTINCT | TOP]...
1 FROM ...
2 WHERE ...
3 GROUP BY ...
4 HAVING ...
7 ORDER BY ...
  FETCH ... OFFSET ...

```

- OFFSET-FETCH is part of the ORDER BY clause



Joins - Review

- Joins operate on two input tables.
- Produce a single output table.
- There are three types of joins:
 - CROSS JOIN
 - INNER JOIN
 - OUTER JOIN
- All differ in their logical processing phases.



Joins - Review

- **CROSS JOIN** has a single logical processing phase:
 1. Produces a Cartesian Product
- **INNER JOIN** has two logical processing phases:
 1. Produces a Cartesian Product
 2. Filters rows based on a provided predicate
- **OUTER JOIN** has three logical processing phases:
 1. Produces a Cartesian Product
 2. Filters rows based on a provided predicate
 3. Adds rows from preserved table



Subqueries

- **Queries within queries,**
or “nested queries”
- **Terms:**
 - **Outer query**
The query whose result set is returned to the caller.
 - **Subquery (or inner query)**
The query whose result set is used by the outer query.



Subqueries

- Two variations
 - Self-contained
No dependency on the outer query
 - Correlated
Has a dependency on the outer query
- Three types of returns
 - Single-valued: Scalar-value only
 - Multi-valued: Single column, zero or more rows
 - Table-valued: One or more columns, zero or more rows



Self-contained Subqueries

- No dependency on outer query
- Logically evaluated once, then result used by outer query



Self-contained **Scalar** Subqueries

- Returns a single value
- Can appear anywhere in the outer query where a single-valued expression is allowed
- What if a single value isn't returned?
 - If subquery produces no value...
A null is returned.
 - If subquery returns more than one value...
The query fails with an error.



Self-contained **Multi-valued** Subqueries

- Returns multiple values as a single column
- Can be used with the predicate IN
- Syntax:

```
<scalar_expr> IN (<multi-valued subquery>)
```
- Often can be rewritten with JOINS.

