Business School
UNIVERSITY OF COLORADO DENVER

Information Systems Program

Module 12
Advanced Query Formulation with SQL

Lesson 5: Summary of Problem-Solving Guidelines

Lesson Objectives

- Apply problem-solving guidelines to practice problems and graded assignment
- Gain insight about advanced query formulation in actual business situations
- Gain awareness about additional topics of advanced query formulation

Summary of Text Patterns for Advanced Matching Problems

Problem Type	Pattern Characteristic
One-sided outer join	Preserving non-matching entities such as "include an entity even if missing or not yet assigned". Design of child table usually has a foreign key allowing null values.
Membership exception	Exclusivity words such as not, never, or only connecting prominent nouns in a sentence; Exclusive membership of independent or related sets; Typical problem involving childless parent rows
Containment exception	Containment exception with adjectives such as all or every connecting prominent nouns in a sentence; Match a parent entity to a subset of child entities; Often applied to M-N relationships
Nested and independent aggregate calculations	Nested summary calculations such as average of enrollment counts; Independent aggregate calculations such as sum of part cost and sum of labor cost

Summary of Statement Patterns for Advanced Matching Problems

Problem Type	Statement Patterns
One-sided outer join	LEFT (RIGHT) JOIN keywords; order of joins and one-sided outer usually does not matter
Membership exception	NOT IN pattern with primary key of parent table NOT IN foreign key of child table
Containment exception	COUNT method with comparison of count of rows in a group to the count of rows in parent table; Nested query in the HAVING clause with count comparison; Typically use same conditions in outer query and subquery to retrieve comparable subsets
Nested aggregate	Nested query in FROM clause for nested aggregate calculations; One nested query per independent aggregate in the FROM clause

Statement Pattern for Mixing Joins and a One-Sided Outer Join

```
SELECT <ColumnList>
FROM <OneSidedOuterJoinOperation>
     <JoinOperation1>
     <JoinOperation2>
…    <JoinOperationN-2>
WHERE RowCondition1 … AND RowConditionM
  [ AND ( RowConditionM+1 … OR RowConditionM+P ] );
```


NOT IN Statement Pattern for Membership Exceptions

```
SELECT <ParentTableColumns> [,<RelatedTableColumns>]
FROM <ParentTable> [, <RelatedTables>]
WHERE [ <JoinConditions> ]
  AND [ <OtherConditions> ]
  AND <ParentPK> NOT IN
    ( SELECT <ChildFK> FROM <ChildTable>
      [ WHERE <ChildRowConditions> ] );
```


COUNT Statement Pattern for Containment Exceptions

```
SELECT <ChildTableColumns> [, <RelatedTableColumns>]
 FROM <ChildTable> [, <RelatedTables>]
 WHERE [<JoinConditions>]
   AND [<ChildTableConditions>]
   AND [<RelatedTableConditions>]
 GROUP BY <ChildTableColumns>,
          [<RelatedTableColumns>]
 HAVING COUNT(*) =
    ( SELECT COUNT(*)
       FROM <ParentTable>
       [ WHERE <ParentTableConditions> ] );
```


Practice Problems

- Essential for skill development on advanced query formulation
- Extra problems with the University database
- Additional practice problems with the Order Entry database
- Assignment involving the Intercollegiate Athletic database

Advanced Query Formulation in Practice

- Expect no knowledge of text patterns by users
- Use text patterns and sample tables to communicate with users
- Uncommon to find requirements of advanced matching problems
- Do not overuse advanced query formulation
- Important when finding requirements of advanced matching problems

Additional Topics beyond Module 12

SQL extensions for data warehouses in course 3

- Subtotal operators
- Analytic functions
- Materialized views
- Data mining input (optional module)

Advanced topics in the textbook

- Null value handling
- Hierarchical queries
- Embedded SQL and Triggers
- Object and NoSQL databases