Business School
UNIVERSITY OF COLORADO DENVER

Information Systems Program

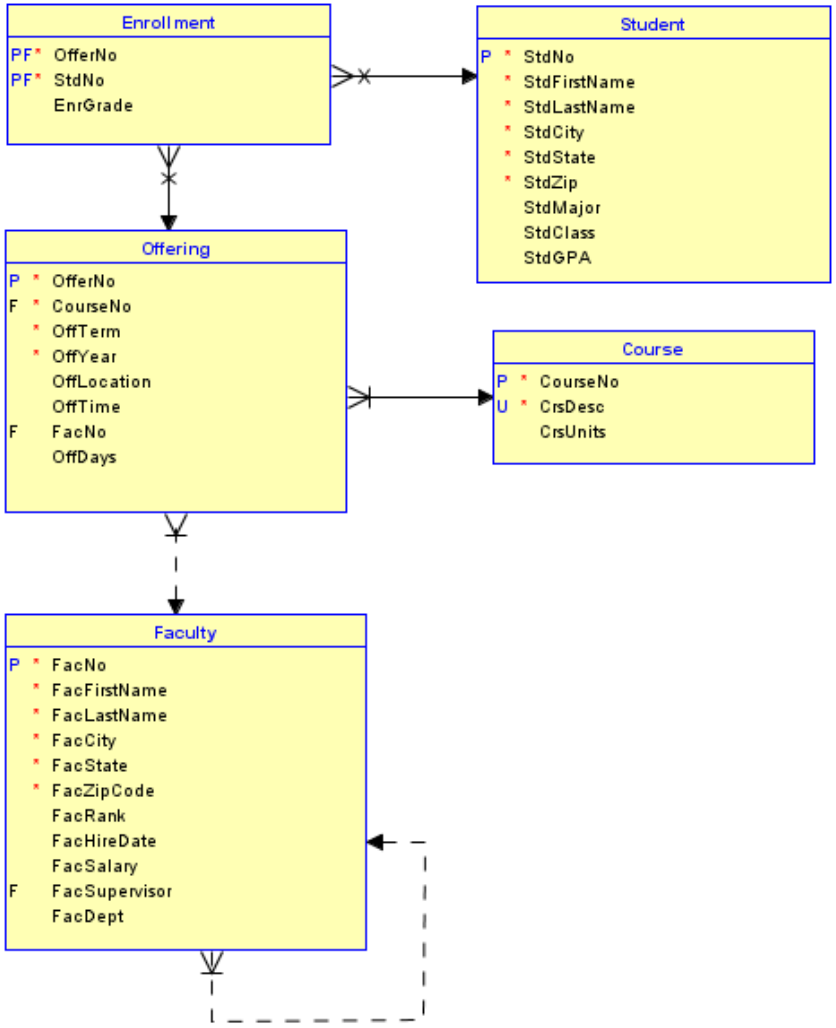
Module 12
Advanced Query Formulation with SQL

Lesson 2: Nested Queries in the SELECT Statement

Lesson Objectives

- Write and interpret SELECT statements with type I nested queries in the WHERE clause
- Write UPDATE and DELETE statements with Type I nested queries
- Identify nested aggregate functions in a problem statement
- Use nested queries in the FROM clause for problems involving nested aggregate functions

University Database Diagram



Overview of Type I Nested Queries

Alternative join style

- Query inside a query
- Also known as non-correlated or independent nested query

Syntax elements

- Use in WHERE and HAVING conditions
- No reference to outer query
- Like a nested procedure with a single execution

Type I Nested Query Example I

Example 1: Students with a high grade

```
SELECT StdNo, StdFirstName, StdLastName,
       StdMajor
 FROM Student
 WHERE Student.StdNo IN
  ( SELECT StdNo FROM Enrollment
     WHERE EnrGrade >= 3.5  );
```


Type I Nested Query Example II

Example 2: Student details and grade for students with a high grade in a fall 2019 offering

```
SELECT StdFirstName, StdLastName, StdCity,
       EnrGrade
 FROM Student INNER JOIN Enrollment
        ON Student.StdNo = Enrollment.StdNo
 WHERE EnrGrade >= 3.5
   AND Enrollment.OfferNo IN
  ( SELECT OfferNo FROM Offering
     WHERE OffTerm = 'FALL'
       AND OffYear = 2019 );
```


DELETE Example

- Use Type I nested queries to test conditions on tables related to the target table
- Portable across most SQL DBMSs

Example 3: Delete offerings taught by Leonard Vince.

```
DELETE FROM Offering
 WHERE Offering.FacNo IN
  ( SELECT FacNo FROM Faculty
     WHERE FacFirstName = 'JUDY'
       AND FacLastName = 'CHAN' );
```


UPDATE Example

Example 4: Update the location of offerings taught by Leonard Vince.

```
UPDATE Offering
 SET OffLocation = 'BLM412'
 WHERE OffYear = 2020
   AND FacNo IN
 ( SELECT FacNo FROM Faculty
    WHERE FacFirstName = 'JUDY'
      AND FacLastName = 'CHAN');
```


Nested Queries in the FROM Clause

Consistency in language design

- Replace object with object expression
- Replace table in the FROM clause with a table expression (SELECT statement)

Specialized uses

- Nested aggregates
- Independent aggregate calculations
- Simplification of complex, decision making queries

Example of a Nested FROM Query

Example 5: Retrieve the course number, course description, count of offerings, and average enrollment (average of count) across offerings.

```
SELECT T.CourseNo, T.CrsDesc,
       COUNT(*) AS NumOfferings,
       Avg(T.EnrollCount) AS AvgEnroll
 FROM
  (SELECT Course.CourseNo, CrsDesc,
          Offering.OfferNo,
          COUNT(*) AS EnrollCount
   FROM Offering, Enrollment, Course
   WHERE Offering.OfferNo = Enrollment.OfferNo
     AND Course.CourseNo = Offering.CourseNo
   GROUP BY Course.CourseNo, CrsDesc,
         Offering.OfferNo ) T
 GROUP BY T.CourseNo, T.CrsDesc;
```


Summary

- Alternative join style using Type I nested queries
- Type I nested queries to test conditions on non target tables in UPDATE and DELETE statements
- Nested queries in FROM clause for nested aggregate functions and independent aggregate functions