CSC 355 Database Systems
Lecture 7

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Today:

- SQL queries
  - Inner joins
  - Outer joins
  - Query problems with joins

Joins

- Data that is distributed among multiple tables can be combined into a single set of tuples for use in a query using different types of *joins*:
  - Inner joins (equi-join, natural join)
  - Outer joins (left, right, full)

Inner Joins

- … *TABLE1* INNER JOIN *TABLE2*
  ON *condition*;

  - Equi-join: includes all attributes of *TABLE1* and *TABLE2*, and *condition* is equality on shared attribute(s)
  - Natural join: like equi-join, but only displays one copy of each shared attribute

Join Example

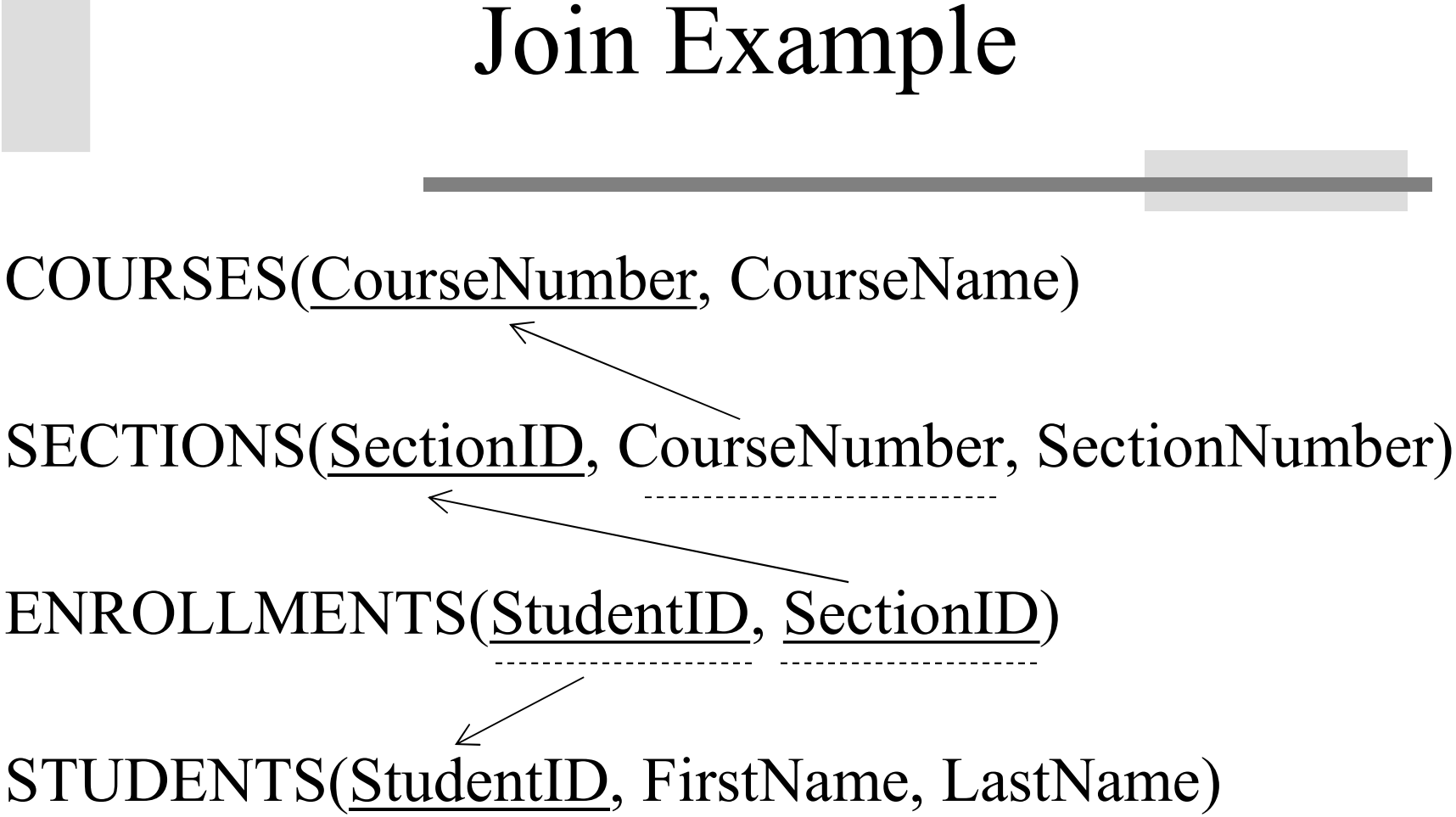


Table Aliases

- Can give alternate names to tables in FROM

  FROM *TABLE1 T1* INNER JOIN *TABLE2 T2*
  ON *condition*;

- Can use aliases *T1* and *T2* anywhere in query
  - Useful in joins if table names are long…

Inner Joins vs. Outer Joins

- An *inner join* requires that tuples in the tables satisfy some condition to create a tuple in the result.
- An *outer join* does not: a tuple in the result may be either
  - the combination of two tuples that satisfy the condition (*matching tuple*)
  - a tuple that does not match anything, combined with an all-NULL tuple (*non-matching tuple*)

Left Outer Join

- Includes all matching tuples, plus a tuple for each tuple in the first table that has no match

... *TABLE1* LEFT OUTER JOIN *TABLE2*
ON *TABLE1.Attribute* = *TABLE2.Attribute*;

Right Outer Join

- Includes all matching tuples, plus a tuple for each tuple in the second table that has no match

... *TABLE1* RIGHT OUTER JOIN *TABLE2*
ON *TABLE1.Attribute* = *TABLE2.Attribute*;

Full Outer Join

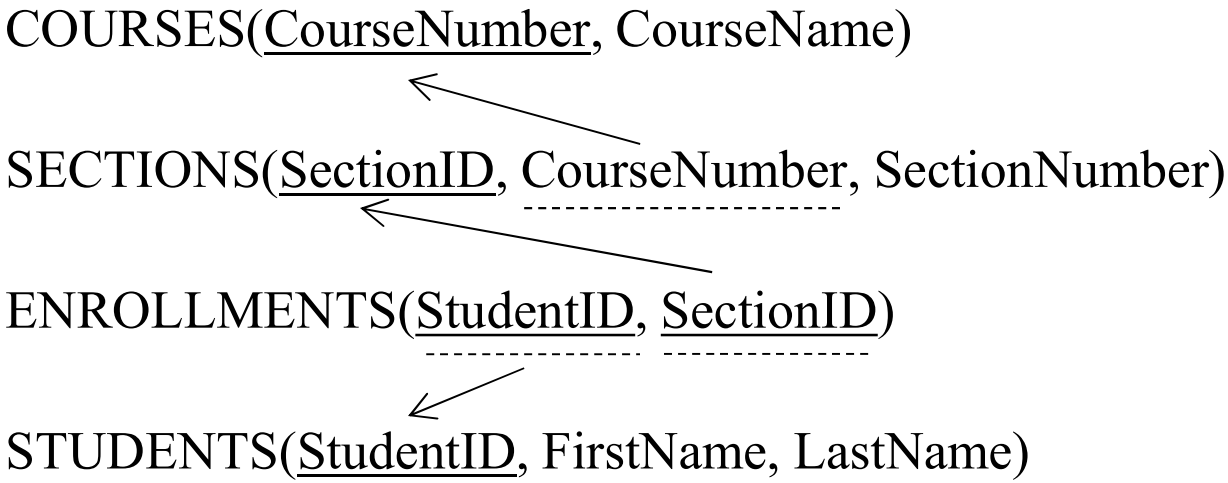
- Includes all matching tuples, plus a tuple for each tuple in either table that has no match

... *TABLE1* FULL OUTER JOIN *TABLE2*
ON *TABLE1.Attribute* = *TABLE2.Attribute*;

Query Problems

- Give the names of all students that have enrolled in any GAM course
- Give the ID numbers of all students who have not enrolled in any classes
- Give the names of all members of HerCDM
- Give the names of all students who are the president of a student group
- Give the names of all courses that Abigail Winter has enrolled in

Final Join Example



"For each student, list the course names and section numbers that he/she is enrolled in. (Then find the total number of courses he/she is enrolled in.)

Next:

- SQL queries
  - Subqueries