CS 327E Class 3

September 24, 2018

1) A join is used to concatenate rows from different tables that are related through referential integrity (i.e. connected via a primary key to foreign key relationship).

A. True
B. False

2) A join is also used to vertically stack up rows from different tables that share the same schema. For example, joining *T* and *S* below produces *R*.

```
T(800, '100 Main St', 'Burlington')
S(310, '45 San Jacinto', 'Austin')

R(800, '100 Main St', 'Burlington'
  310, '45 San Jacinto', 'Austin')
```

A. True
B. False

3) The fields involved in a join must be of the same data type.

A. True
B. False

4) A query can contain more than 1 join.

A. True
B. False

5) Which is <u>not</u> a valid join type?

A. Self join
B. Full join
C. Fuzzy join
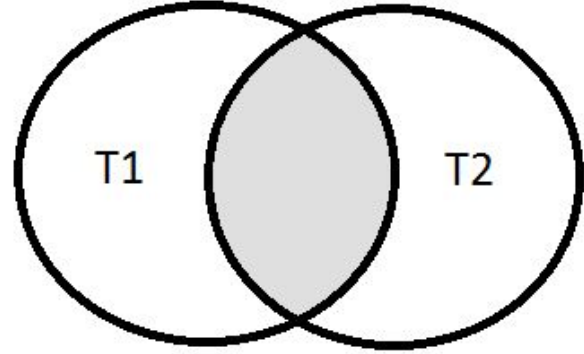D. Inner join

Syntax of Join Queries

```
SELECT <list of desired fields>
FROM <single table>
JOIN <single table> ON <common fields>
WHERE <boolean conditions>
ORDER BY <list of fields to sort on>
```

Inner Join

```
SELECT *
FROM T1 [INNER] JOIN T2
ON T1.c1 = T2.c2;
```

Inner Join

Employee

empid	emp_name	emp_dep
2	Mike	1
23	Dave	2
3	Sarah	
5	Jim	4
6	Sunil	1
37	Morgan	4

Department

depid	dep_name
1	Sales
2	Product
3	Research
4	Engineering
5	HR

SELECT emp_name, dep_name
FROM Employee **JOIN** Department **ON** emp_dep = depid;

Result Table

emp_name	dep_name
Mike	Sales
Dave	Product
Jim	Engineering
Sunil	Sales
Morgan	Engineering

First Question

*What are first and last names
and grades of students
who take CS313E with Prof. Mitra?*

Student(sid, fname, lname, dob)

Class(cno, cname, credits)

Teacher(tid, fname, lname, dept)

Takes(sid, cno, grade)

Teaches(tid, cno)

iClicker Question

*What are first and last names
and grades of students who
take CS313E with Prof. Mitra?*

How many inner joins are required
for this query?

A.   2 joins
B.   3 joins
C.   4 joins

Student(<u>sid</u>, fname, lname, dob)

Class(<u>cno</u>, cname, credits)

Teacher(<u>tid</u>, fname, lname, dept)

Takes(<u>sid</u>, <u>cno</u>, grade)

Teaches(<u>tid</u>, <u>cno</u>)

Second Question

Who are students who take both CS327E and CS329E?

Student(sid, fname, lname, dob)

Class(cno, cname, credits)

Teacher(tid, fname, lname, dept)

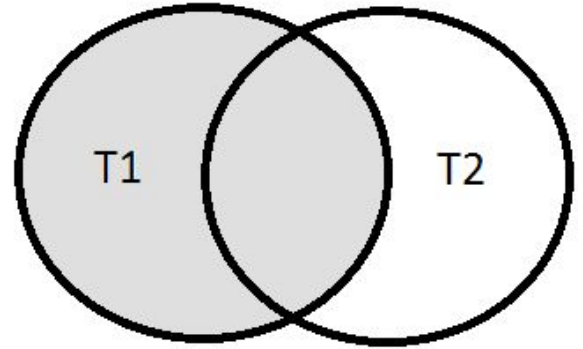Takes(sid, cno, grade)

Teaches(tid, cno)

Second Question

Who are students who take both
CS327E and CS329E?

Student(<u>sid</u>, fname, lname, dob)

Class(<u>cno</u>, cname, credits)

Teacher(<u>tid</u>, fname, lname, dept)

Takes(<u>sid</u>, <u>cno</u>, grade)

Teaches(<u>tid</u>, <u>cno</u>)

```sql
SELECT sid
FROM Takes
INNER JOIN Takes on sid = sid
WHERE cno = 'CS327E'
AND cno = 'CS329E'
```

Left Outer Join

```
SELECT *
FROM T1 LEFT [OUTER] JOIN T2
ON T1.c1 = T2.c2;
```

Left Outer Join

Employee

empid	emp_name	emp_dep
2	Mike	1
23	Dave	2
3	Sarah	
5	Jim	4
6	Sunil	1
37	Morgan	4

Department

depid	dep_name
1	Sales
2	Product
3	Research
4	Engineering
5	HR

SELECT emp_name, dep_name
FROM Employee **LEFT JOIN** Department **ON** emp_dep = depid
ORDER BY emp_name;

Result Table

emp_name	dep_name
Dave	Product
Jim	Engineering
Mike	Sales
Morgan	Engineering
Sarah	
Sunil	Sales

Right Outer Join

```
SELECT *
FROM T1 RIGHT [OUTER] JOIN T2
ON T1.c1 = T2.c2;
```
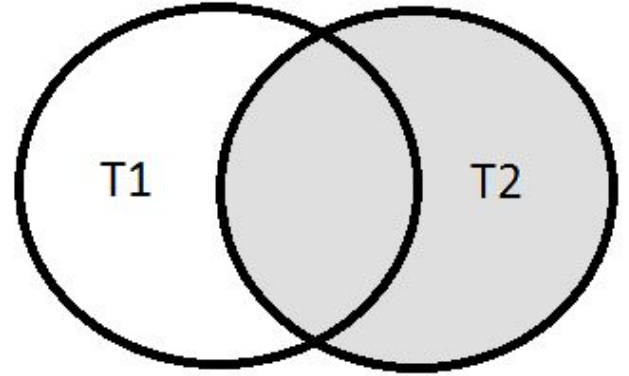
Right Outer Join

Employee

empid	emp_name	emp_dep
2	Mike	1
23	Dave	2
3	Sarah	
5	Jim	4
6	Sunil	1
37	Morgan	4

Department

depid	dep_name
1	Sales
2	Product
3	Research
4	Engineering
5	HR

SELECT emp_name, dep_name
FROM Employee **RIGHT JOIN** Department **ON** emp_dep = depid
ORDER BY dep_name, emp_name;

Result Table

emp_name	dep_name
Jim	Engineering
Morgan	Engineering
	HR
Dave	Product
	Research
Mike	Sales
Sunil	Sales

Full Outer Join

```
SELECT *
FROM T1 FULL [OUTER] JOIN T2
ON T1.c1 = T2.c2;
```
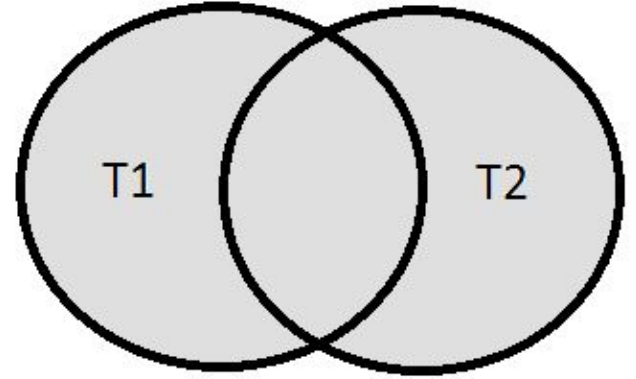
Full Outer Join

Employee

empid	emp_name	emp_dep
2	Mike	1
23	Dave	2
3	Sarah	
5	Jim	4
6	Sunil	1
37	Morgan	4

Department

depid	dep_name
1	Sales
2	Product
3	Research
4	Engineering
5	HR

SELECT emp_name, dep_name
FROM Employee **FULL JOIN** Department **ON** emp_dep = depid
ORDER BY dep_name, emp_name;

Result Table

emp_name	dep_name
Jim	Engineering
Morgan	Engineering
	HR
Dave	Product
	Research
Mike	Sales
Sunil	Sales
Sarah	

Third Question

Which students take nothing?

Student(<u>sid</u>, fname, lname, dob)

Class(<u>cno</u>, cname, credits)

Teacher(<u>tid</u>, fname, lname, dept)

Takes(<u>sid</u>, <u>cno</u>, grade)

Teaches(<u>tid</u>, <u>cno</u>)

iClicker Question

Which students take nothing?

How many joins does this query require?

A.   1
B.   2
C.   0

Student(<u>sid</u>, fname, lname, dob)

Class(<u>cno</u>, cname, credits)

Teacher(<u>tid</u>, fname, lname, dept)

Takes(<u>sid</u>, <u>cno</u>, grade)

Teaches(<u>tid</u>, <u>cno</u>)

Fourth Question

Which classes are taught by 2 teachers?

Student(sid, fname, lname, dob)

Class(cno, cname, credits)

Teacher(tid, fname, lname, dept)

Takes(sid, cno, grade)

Teaches(tid, cno)

iClicker Question

Which classes are taught by
2 teachers?

Which type of join does this query
require?

A. inner join
B. left/right outer join
C. full outer join

Student(<u>sid</u>, fname, lname, dob)

Class(<u>cno</u>, cname, credits)

Teacher(<u>tid</u>, fname, lname, dept)

Takes(<u>sid</u>, <u>cno</u>, grade)

Teaches(<u>tid</u>, <u>cno</u>)

BigQuery Demo

Milestone 3

http://www.cs.utexas.edu/~scohen/milestones/Milestone3.pdf