

# CS 327E Class 6

October 15, 2018

# Announcements

- Midterm exam in CMA 2.306 on 10/29.
- Review session next class.

1) How many records are produced by Q1 when run on the ACL tables shown?

```
Q1: SELECT * FROM ACL_Artist_2017 UNION  
      SELECT * FROM ACL_Artist_2018;
```

**ACL\_Artist\_2017**

<u>id</u>	artist_name
jz	Jay Z
sp	Spoon
hcp	Red Hot Chili Peppers
atw	Asleep At The Wheel
ra	Ryan Adams
sor	School of Rock

**ACL\_Artist\_2018**

<u>id</u>	artist_name
pmc	Paul McCartney
kh	Khalid
stv	St. Vincent
mtc	Metallica
ra	Ryan Adams
sor	School of Rock

- A. 6
- B. 10
- C. 11
- D. 12

2) How many records are produced by Q2 when run on the ACL tables shown?

```
Q2: SELECT * FROM ACL_Artist_2017 UNION  
     SELECT id FROM ACL_Artist_2018;
```

**ACL\_Artist\_2017**

<u>id</u>	artist_name
jz	Jay Z
sp	Spoon
hcp	Red Hot Chili Peppers
atw	Asleep At The Wheel
ra	Ryan Adams
sor	School of Rock

**ACL\_Artist\_2018**

<u>id</u>	artist_name
pmc	Paul McCartney
kh	Khalid
stv	St. Vincent
mtc	Metallica
ra	Ryan Adams
sor	School of Rock

- A. 0
- B. 6
- C. 10
- D. 12

3) The queries Q1 and Q2 are functionally equivalent.

```
Q1: SELECT id, artist_name FROM ACL_Artist_2017 UNION  
     SELECT id, artist_name FROM ACL_Artist_2018;
```

```
Q2: SELECT a.id, a.artist_name  
     FROM ACL_Artist_2017 a  
     LEFT JOIN ACL_Artist_2018 b ON a.id = b.id  
     AND a.artist_name = b.artist_name;
```

A. True      B. False

4) How many records are produced by Q4 when run on the ACL tables shown?

```
Q4: SELECT * FROM ACL_Artist_2017 INTERSECT  
      SELECT * FROM ACL_Artist_2018;
```

**ACL\_Artist\_2017**

<u>id</u>	artist_name
jz	Jay Z
sp	Spoon
hcp	Red Hot Chili Peppers
atw	Asleep At The Wheel
ra	Ryan Adams
sor	School of Rock

**ACL\_Artist\_2018**

<u>id</u>	artist_name
pmc	Paul McCartney
kh	Khalid
stv	St. Vincent
mtc	Metallica
ra	Ryan Adams
sor	School of Rock

- A. 2
- B. 4
- C. 6
- D. 10

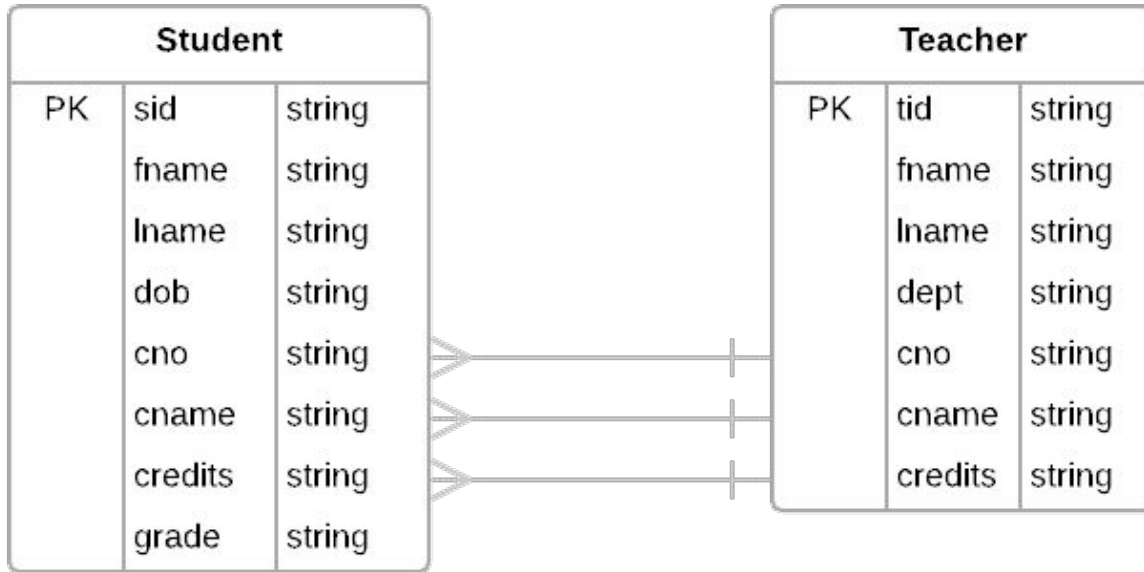
5) The queries Q1 and Q2 are functionally equivalent.

```
Q1: SELECT id, artist_name FROM ACL_Artist_2017 INTERSECT  
     SELECT id, artist_name FROM ACL_Artist_2018;
```

```
Q2: SELECT a.id, a.artist_name  
     FROM ACL_Artist_2017 a  
     JOIN ACL_Artist_2018 b ON a.id = b.id  
     AND a.artist_name = b.artist_name;
```

A. True      B. False

# What's wrong with this design?

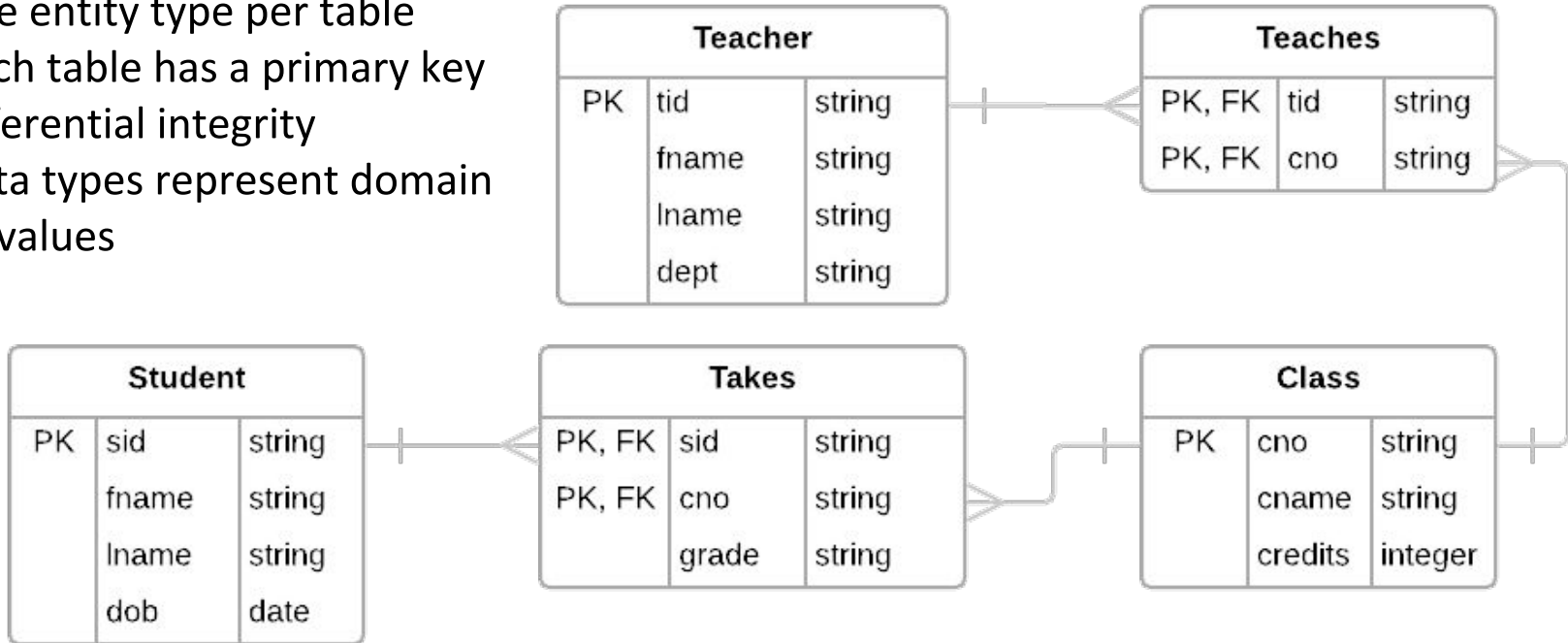


- Insert Anomaly
- Update Anomaly
- Delete Anomaly



# Design Principles

- one entity type per table
- each table has a primary key
- referential integrity
- data types represent domain of values



# Normal Forms

**1NF:** A database schema is in 1NF *iff* all attributes have scalar values.

**2NF:** 1NF + all non-key attributes must be *functionally determined* by the *entire* primary key.

**3NF:** 2NF + all non-key attributes must be *functionally determined* by *only* the primary key.

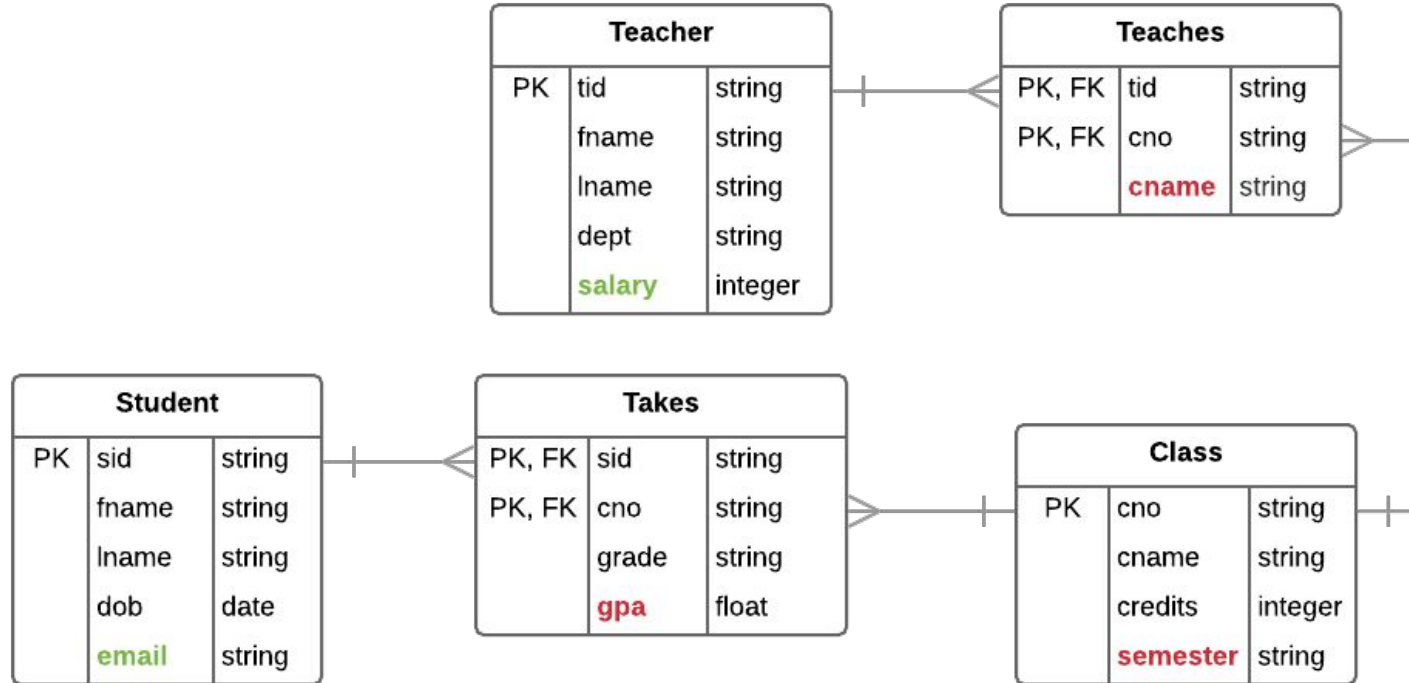
## Functional Dependencies:

If two records agree on the attributes  $A_1, A_2, \dots, A_n$  then they must also agree on the attributes  $B_1, B_2, \dots, B_n$

## Formally:

$$A_1, A_2, \dots, A_n \rightarrow B_1, B_2, \dots, B_n$$

# Normal Form Violations



# BigQuery Demo

# Practice Problem

Formulate a SQL query that finds any orphan sid records in the table Takes.

Student(sid, fname, lname, dob)

Class(cno, cname, credits)

Teacher(tid, fname, lname, dept)

Takes(sid, cno, grade)

Teaches(tid, cno)

# iClicker Question

Formulate a SQL query that finds any orphan sid records in the table Takes.

Student(sid, fname, lname, dob)  
Class(cno, cname, credits)  
Teacher(tid, fname, lname, dept)  
Takes(sid, cno, grade)  
Teaches(tid, cno)

Does the query require an outer join?

- A. Yes
- B. No