CS 327E Class 4

February 18, 2019

1) What is the relationship between the *Actor* and *Movie* entities shown?

A. *1:1*
B. *1:m*
C. *m:n*

Actor

id	name	age
1	Christian Bale	45
2	Lady Gaga	32
3	Glenn Close	71
4	Bradley Cooper	44

Movie

id	title	year
bp	Black Panther	2018
sb	A Star is Born	2018
vi	Vice	2018
tw	The Wife	2017

Cast

actor	movie
1	vi
2	sb
3	tw
4	sb

2) How many joins are needed to find all cast members who acted in 'A Star is Born' and return the name and age for each member?

A. 1
B. 2
C. 3

Actor

id	name	age
1	Christian Bale	45
2	Lady Gaga	32
3	Glenn Close	71
4	Bradley Cooper	44

Movie

id	title	year
bp	Black Panther	2018
sb	A Star is Born	2018
vi	Vice	2018
tw	The Wife	2017

Cast

actor	movie
1	vi
2	sb
3	tw
4	sb

3) What if we wanted to model an actor who directed themselves in a movie? How would the schema change in order to represent the various roles that a single person can perform in movie? (e.g. actor, director, producer, screenwriter)

A. Add a *role* field to the *Cast* table
B. Create a *Director* table with the same schema as the *Actor table*
C. A and B
D. None of the above

Actor

id	name	age
1	Christian Bale	45
2	Lady Gaga	32
3	Glenn Close	71
4	Bradley Cooper	44

Movie

id	title	year
bp	Black Panther	2018
sb	A Star is Born	2018
vi	Vice	2018
tw	The Wife	2017

Cast

actor	movie
1	vi
2	sb
3	tw
4	sb

4) What is the relationship between the *Person* and *Movie* entities in this updated schema?

A. *1:1*
B. *1:m*
C. *m:n*

Person

id	name	age
1	Christian Bale	45
2	Lady Gaga	32
3	Glenn Close	71
4	Bradley Cooper	44

Movie

id	title	year
bp	Black Panther	2018
sb	A Star is Born	2018
vi	Vice	2018
tw	The Wife	2017

Cast_Crew

person	movie	role
1	vi	Actor
2	sb	Actor
4	sb	Actor
4	sb	Director

5) What can we do to ensure that the *role* field in *Cast_Crew* contains consistent data? For example, suppose we want every screenwriter record to be stored consistently as 'Screenwriter' (as opposed to 'Writer', 'Screen-Writer', 'Script Person', etc).

Person

id	name	age
1	Christian Bale	45
2	Lady Gaga	32
3	Glenn Close	71
4	Bradley Cooper	44

Movie

id	title	year
bp	Black Panther	2018
sb	A Star is Born	2018
vi	Vice	2018
tw	The Wife	2017

Cast_Crew

person	movie	role
1	vi	Actor
2	sb	Actor
4	sb	Actor
4	sb	Director

A. Create a reference table for every distinct role
B. Add a foreign key on *Cast_Crew.role* that points to the new *Role* table
C. A and B
D. None of the above

Terminology

- Entity: An object or a thing
- Usually a noun
- Common Examples: Person, Team, Product, Sales Order

Analogies with OOP:

- Entity: analogous to Object
- Entity Type: analogous to Class

Questions:

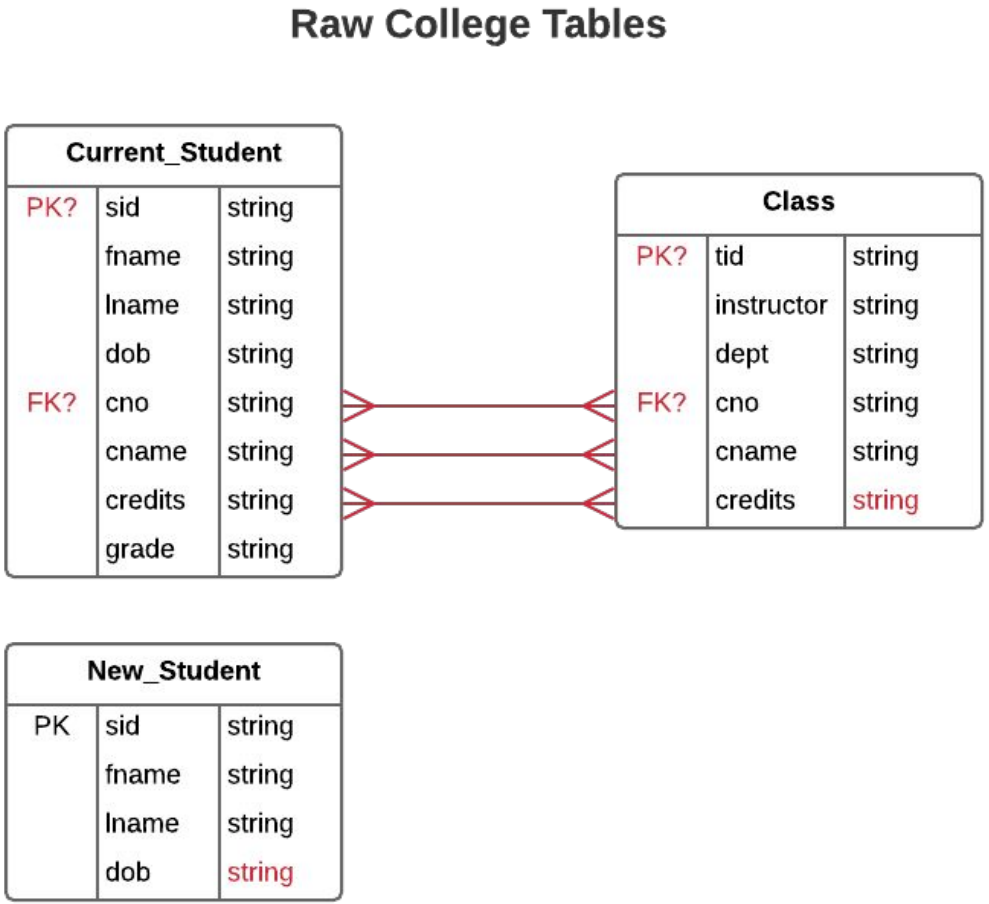
- What are the boundaries?
- How to handle hierarchies?

Design Principles

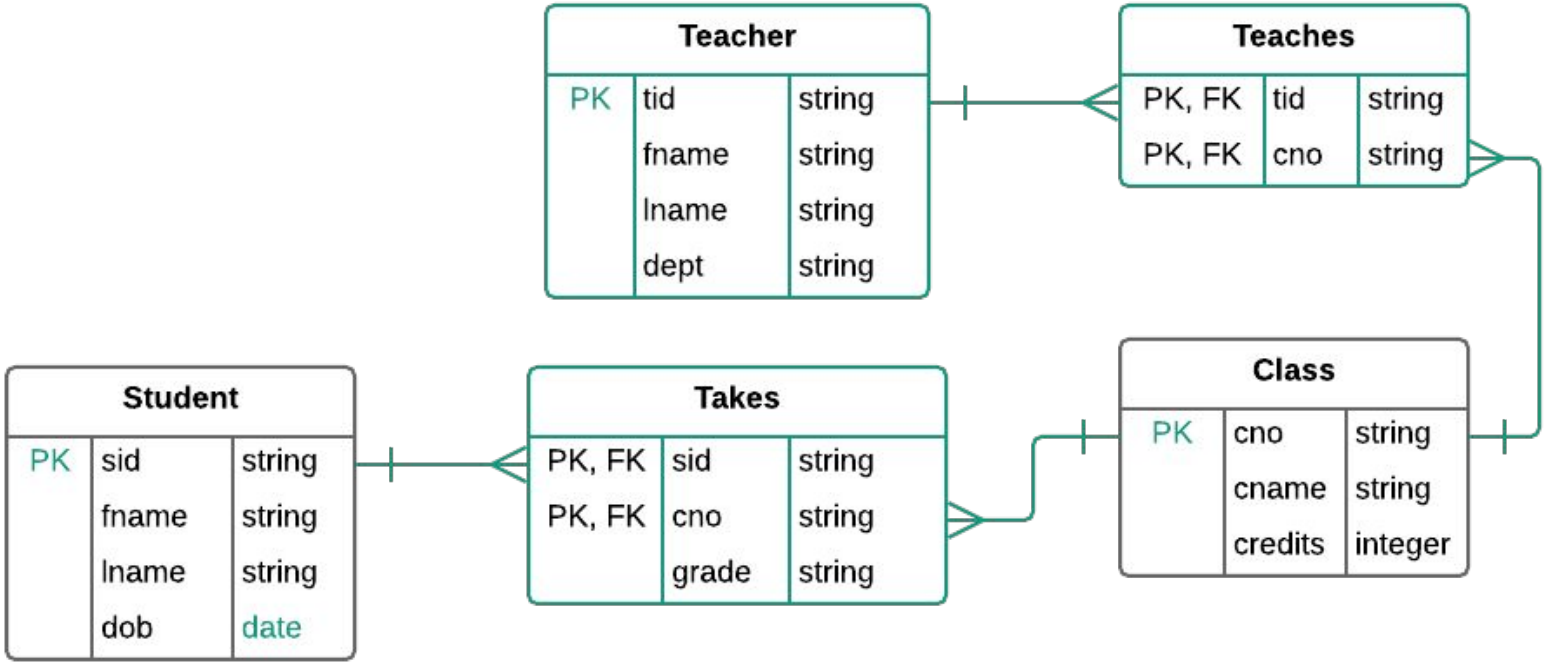
- A table models a single entity type and an entity type is modeled by a single table
- Each field in a table is assigned a primitive data type
- Each field in a table is assigned a *precise* data type
- Each table contains a single Primary Key (PK)
- Each child table contains a Foreign Key (FK) that points to its parent(s)
- Each *m:n* relationship is modeled with a junction table

What can go wrong

- Insert Anomaly
- Update Anomaly
- Delete Anomaly



Normalized College Tables



Normal Forms

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

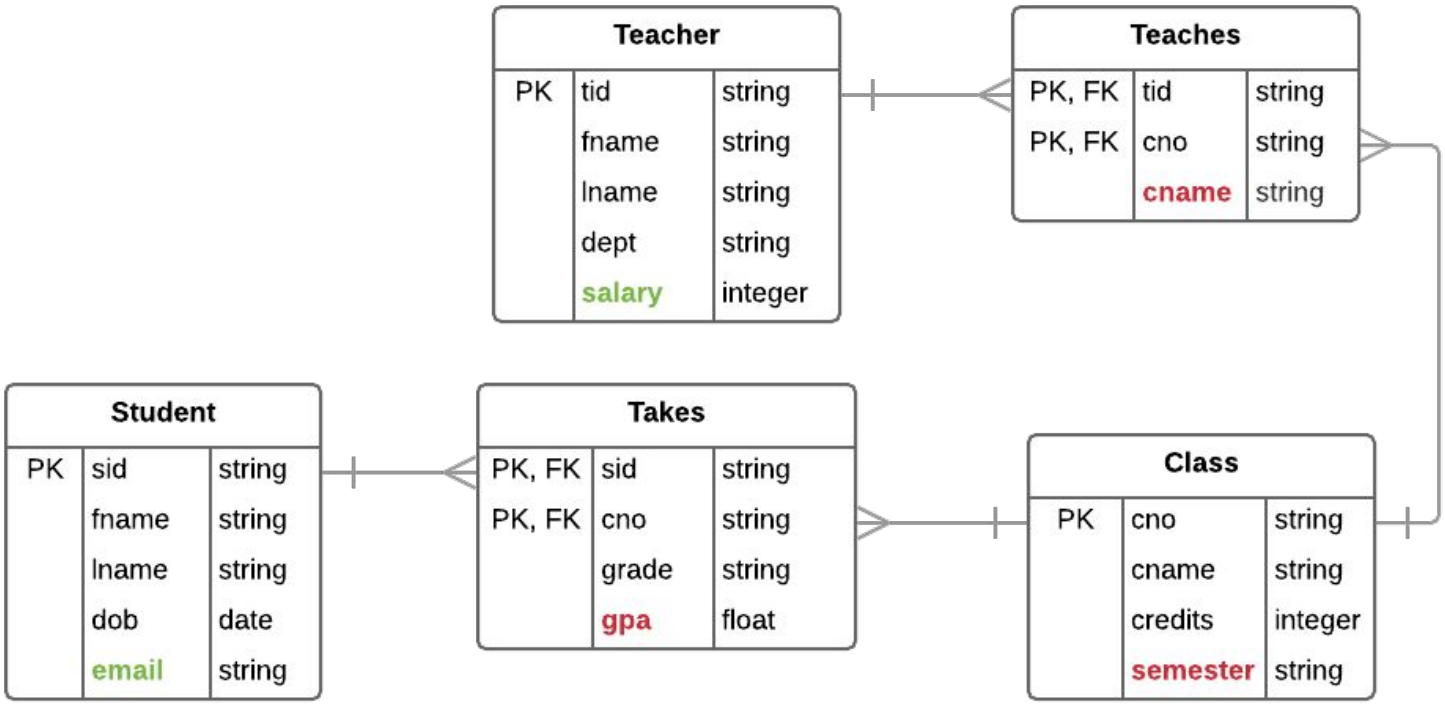
2NF: 1NF + all non-key attributes must be *functionally determined* by the *entire* primary key.

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

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

Formally:
$A_1, A_2, \ldots, A_n \rightarrow B_1, B_2, \ldots, B_n$

Normal Form Violations



Modeling Demo

Practice Problem

Construct a SQL query that finds all Takes records which violate referential integrity with its parent table Class.

Student(sid, fname, lname, dob)

Class(cno, cname, credits)

Teacher(tid, instructor, dept)

Takes(sid, cno, grade)

Teaches(tid, cno)

iClicker Question

Construct a SQL query that finds all Takes records which violate referential integrity with its parent table Class.

Student(sid, fname, lname, dob)

Class(cno, cname, credits)

Teacher(tid, instructor, dept)

Takes(sid, cno, grade)

Teaches(tid, cno)

What type of join is needed by this query?

A. Inner join
B. Outer join
C. Self join

Milestone 4

1) Requirements: assignment sheet

2) Design questions and/or concerns: sign-up sheet