# Part 3: Design Reviews

**References:**


- Teorey: Database Modeling & Design, 3rd Edition.
  Morgan Kaufmann, 1999, ISBN 1-55860-500-2, ca. $32.
- Elmasri/Navathe: Fundamentals of Database Systems, 2nd Ed.,
  Appendix A, "Alternative Diagrammatic Notations".
- Rauh/Stickel: Konzeptuelle Datenmodellierung (in German), Teubner, 1997.
- Kemper/Eickler: Datenbanksysteme (in German), Ch. 2, Oldenbourg, 1997.
- Graeme C. Simsion, Graham C. Witt: Data Modeling Essentials, 2nd Edition.
  Coriolis, 2001, ISBN 1-57610-872-4, 459 pages.






## Objectives

After completing this chapter, you should be able to:

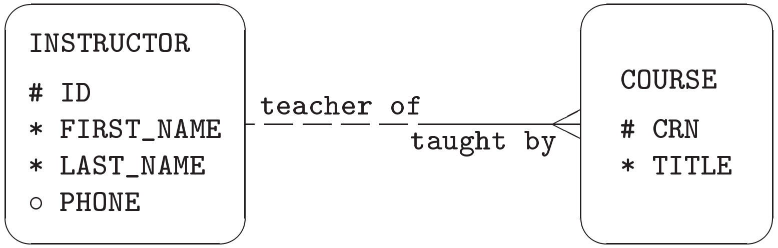
- analyze given ER-diagrams for errors.
- check given ER-diagrams for equivalence.
- compare given ER-diagrams, describe advantages and disadvantages, or questions about the domain of discourse that help to decide between them.





## Keys (1)

- Three designers get into a discussion about the right key(s) for instructors.
- Designer A proposes to use an artificial number to identify instructor (attribute `ID`, "surrogate key"):





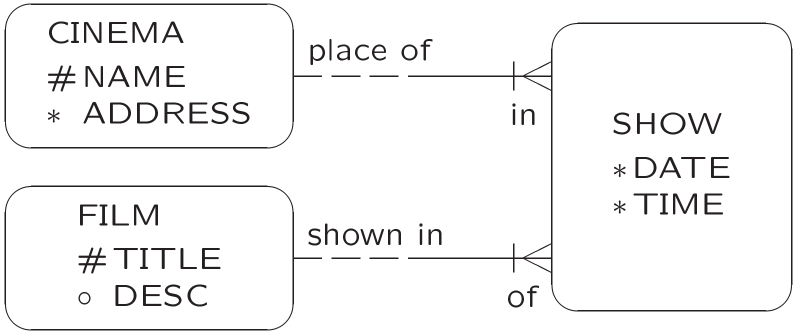



## Keys (2)

- Designer B agrees in principle, but proposes to declare in addition "`FIRST_NAME`" and "`LAST_NAME`" as alternate key.
- Designer C wants to go even further and remove the artificial `ID`, and use `FIRST_NAME` and `LAST_NAME` together as primary key.
- How would your evaluation of the solutions change if we have to find keys for students, not instructors (e.g. "student is enrolled in program of study")?

# Keys (3)

- Do you see any problem with this model for the cinema program in a city? The same cinema can show the same film several times.

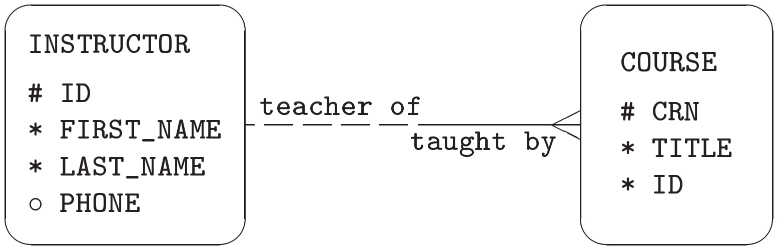







# Explicit Foreign Keys

- Coming back to the “instructor teaches course” example, designer D says that it is necessary to put the instructor ID into the course entity type:

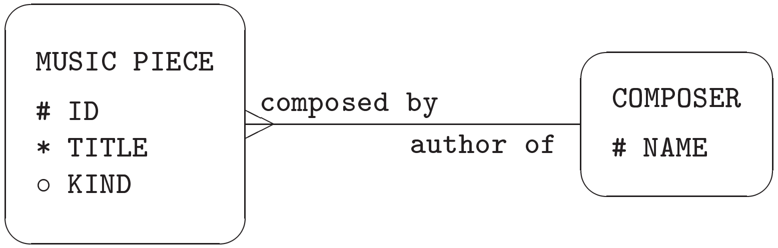







# Attribute vs. Entity (1)

- In order to store information about music pieces and their composers, designer A comes up with the following schema:








# Attribute vs. Entity (2)

- Designer B says that it would be easier to put the composer name as an attribute into the music piece entity type:

# A Small Data Dictionary (1)

- A simple data dictionary of an RDBMS has to be modelled. It must be able to answer at least the following questions:
  - ◇ Which tables exist?
  - ◇ What are the columns of a given table?
  - ◇ What is the data type of a column in a table?
  - ◇ Is a column in a table optional?

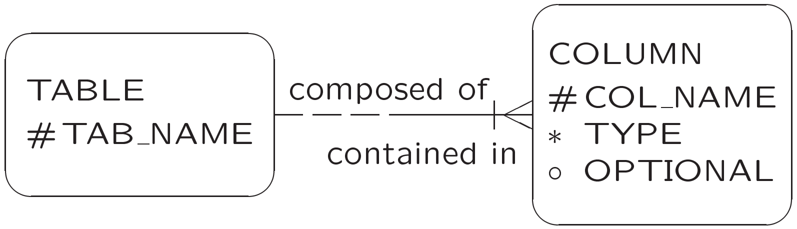
    I.e. does it accept null values?
- Different tables can have columns with the same name (with possibly different types/optionality).





# A Small Data Dictionary (2)

- Designer A proposes to use an entity type for tables and a weak entity type for columns:



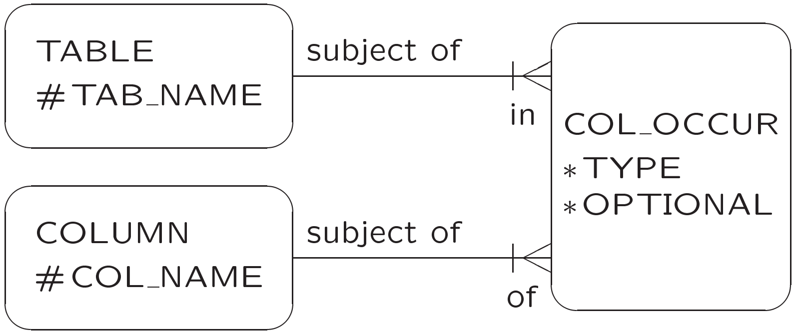

- The attribute "OPTIONAL" is constrained to permit only values "Y" and "N".





# A Small Data Dictionary (3)

- Designer B uses an association entity (he wanted a many-to-many relationship with attributes):

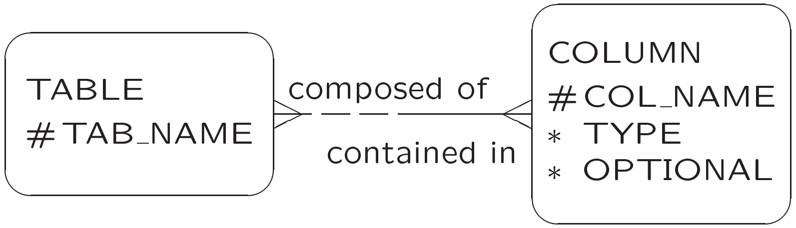






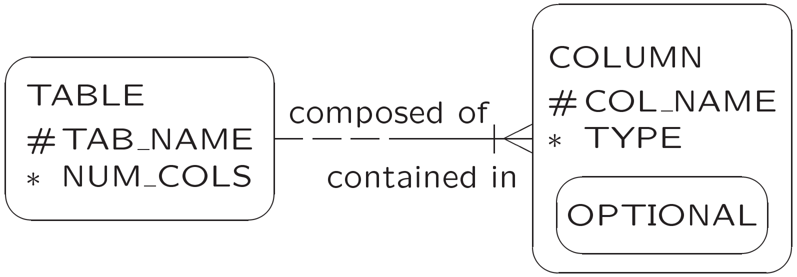

# A Small Data Dictionary (4)

- Designer C uses a many-to-many relationship and no weak entity:



# A Small Data Dictionary (5)

- The solution of Designer D is similar to the first one, but he stores the number of columns of a table and also uses a subtype for the optional columns:








# A Small Data Dictionary (6)

- Designer E models the type as an entity: