#### 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.

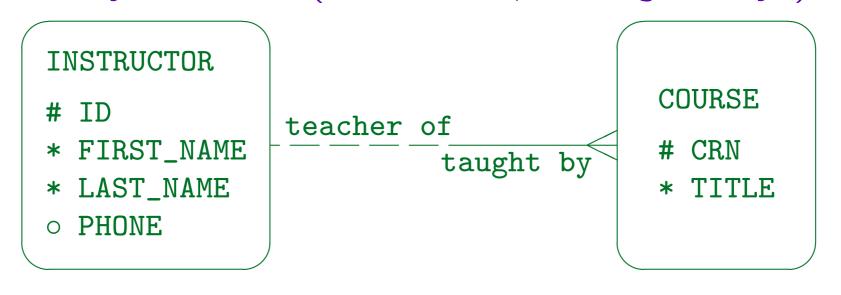
#### Objectives

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"):



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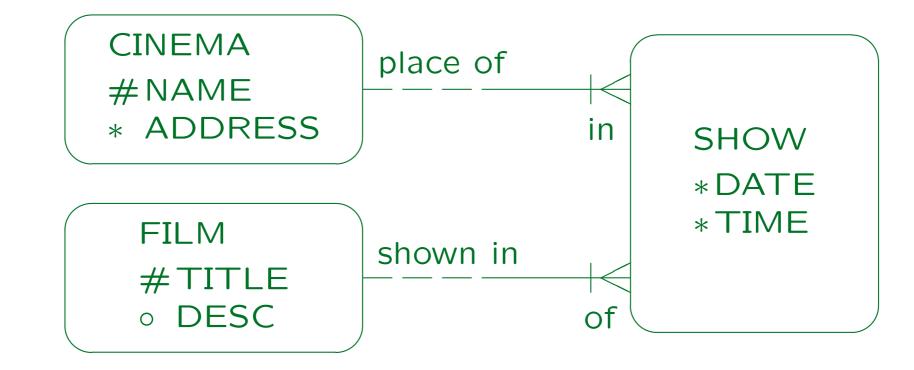
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# Keys (2)

- 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.

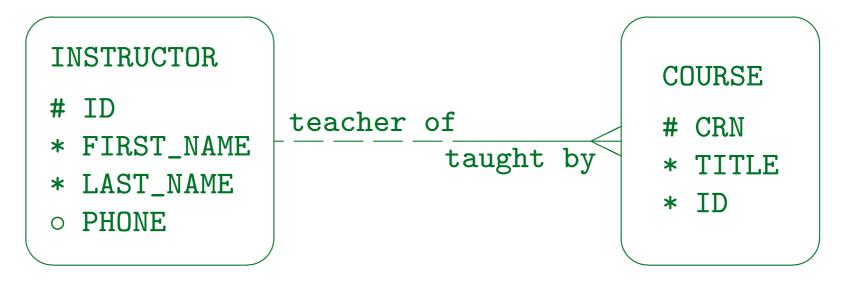


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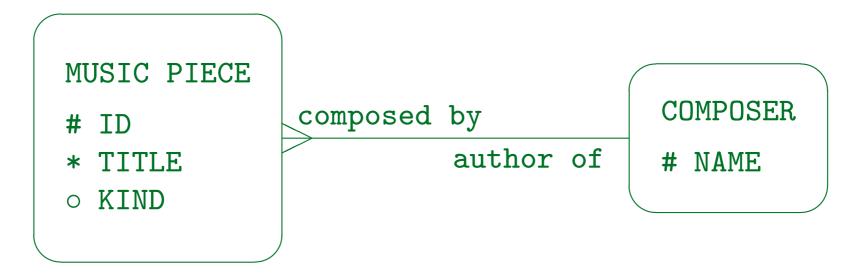
#### Explicit Foreign Keys

 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:

#### MUSIC PIECE

- # ID
- \* TITLE
- \* COMPOSER
- o KIND

#### 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)

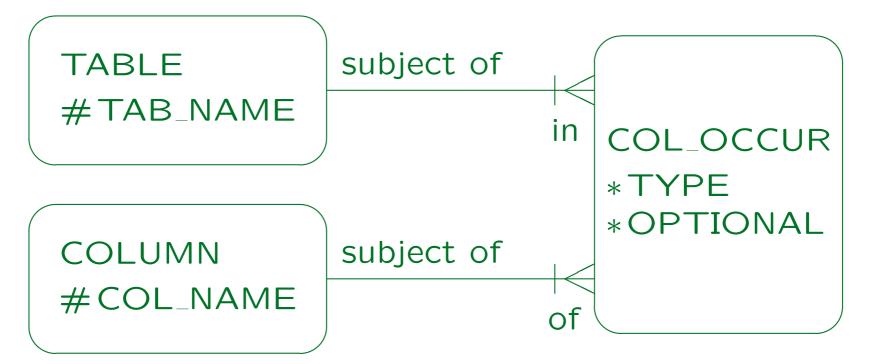
 Designer A proposes to use an entity type for tables and a weak entity type for columns:

TABLE composed of #COL\_NAME \* TYPE contained in OPTIONAL

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:

TABLE composed of #COL\_NAME \* TYPE contained in \*OPTIONAL

#### 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:

**TABLE** #TAB\_NAME \* NUM\_COLS

composed of

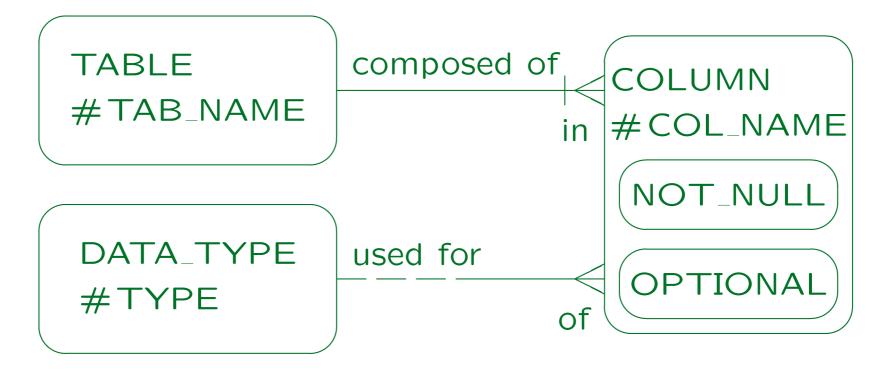
contained in

**COLUMN** #COL\_NAME TYPF

OPTIONAL

## A Small Data Dictionary (6)

• Designer E models the type as an entity:



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