

## Exercises 02

### Relational Model, ER-Relational Mapping, SQL DDL

1. Describe each of the following core components of the relational model:

a. attribute

[\[show answer\]](#)

b. domain

[\[show answer\]](#)

c. relation schema

[\[show answer\]](#)

d. relational schema

[\[show answer\]](#)

e. tuple

[\[show answer\]](#)

f. relation

[\[show answer\]](#)

g. key

[\[show answer\]](#)

h. foreign key

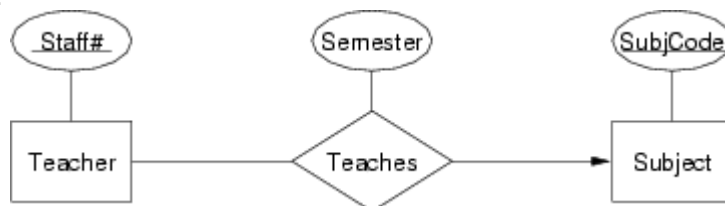
[\[show answer\]](#)

2. Why is it useful to first do an ER design and then convert this into a relational schema?

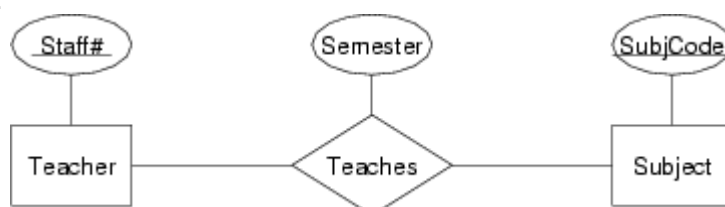
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3. Convert each of the following ER design fragments into a relational data model expressed as a box-and-arrow diagram:

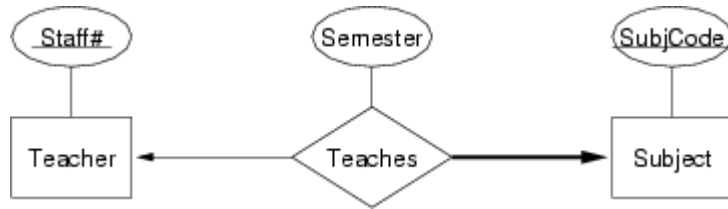
a.



b.

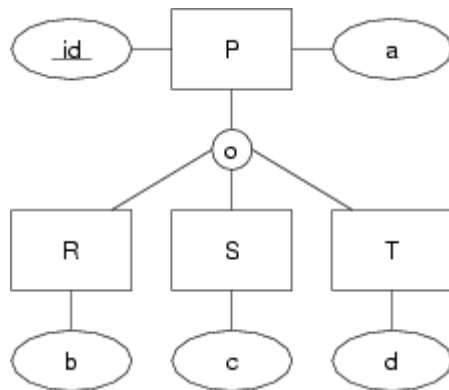


c.



[\[show answer\]](#)

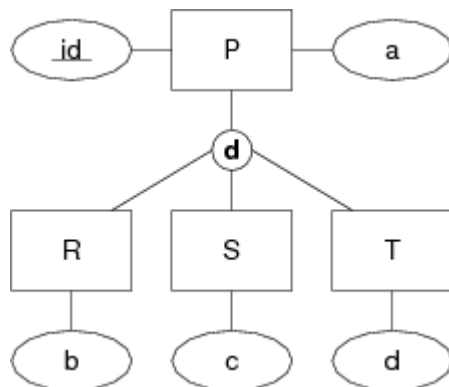
4. In the mapping from the ER model to the relational model, there are three different ways to map class hierarchies. Show each of them by giving the mapping for the following class hierarchy:



Use box-and-arrow diagrams for the relational models.

[\[show answer\]](#)

5. Now consider a variation on the above class hierarchy where the sub-classes are disjoint. Show the three possible mappings for the class hierarchy and discuss how effectively they represent the semantics of the disjoint sub-classes:



Use box-and-arrow diagrams for the relational models.

[\[show answer\]](#)

6. Discuss suitable SQL representations for each of the following attributes, including additional domain constraints where relevant:

a. people's names

[\[show answer\]](#)

b. addresses

[\[show answer\]](#)

c. gender

[\[show answer\]](#)

d. ages

[\[show answer\]](#)

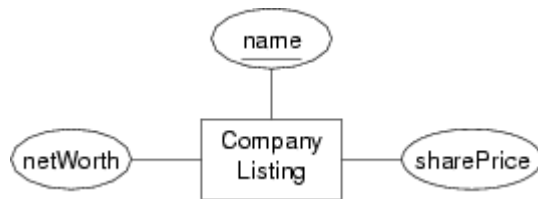
e. dollar values

[\[show answer\]](#)

f. masses of material

[\[show answer\]](#)

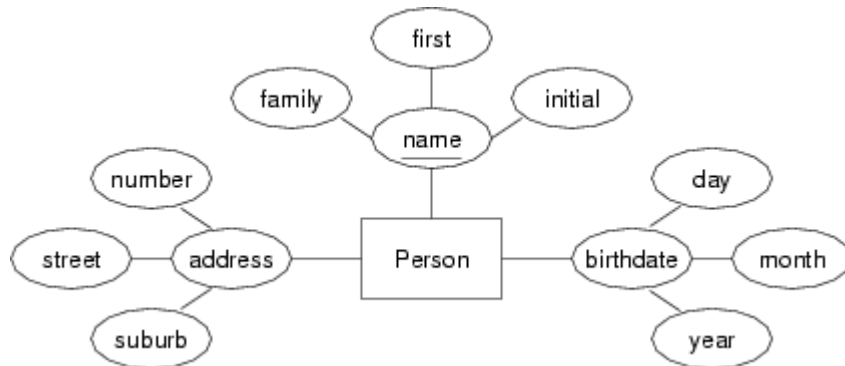
7. Convert the following entity into an SQL CREATE TABLE definition:



Give reasons for all choices of domain types.

[\[show answer\]](#)

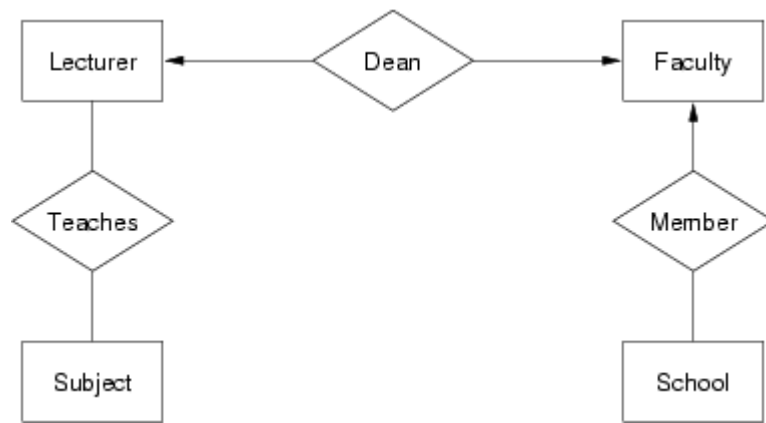
8. Convert the following entity into an SQL CREATE TABLE definition:



Give reasons for all choices of domain types.

[\[show answer\]](#)

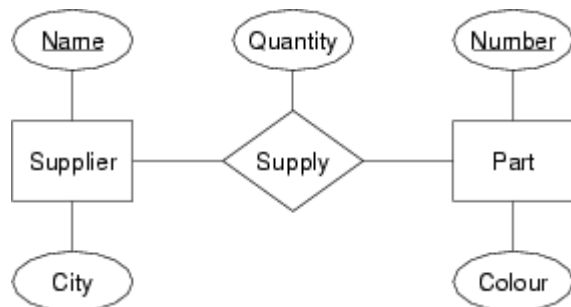
9. Convert the following ER design into a relational data model:



You can assume that each attributes contains (at least) a suitably-named attribute containing a unique identifying number (e.g. the Lecturer entity contains a LecID attribute).

[\[show answer\]](#)

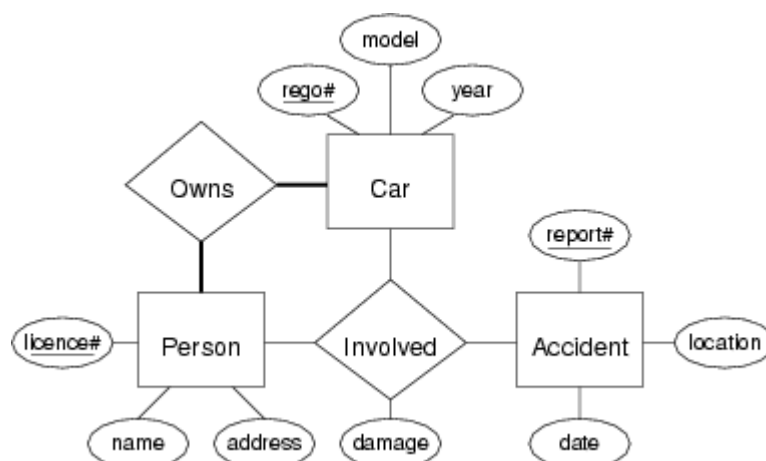
10. Convert the following ER design into an SQL schema:



Which elements of the ER design do not appear in the relational version?

[\[show answer\]](#)

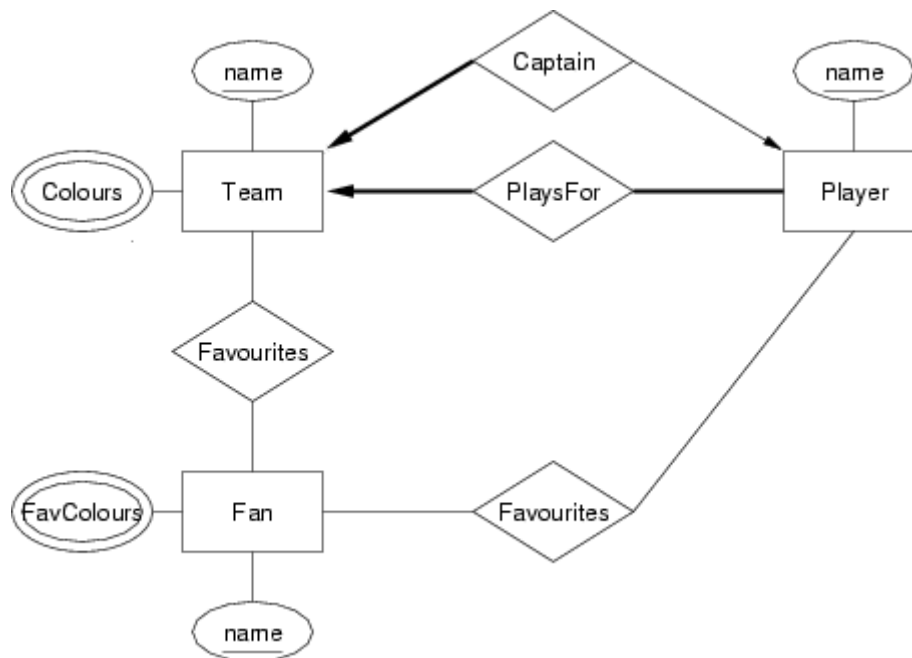
11. Convert the following ER design into a relational data model expressed first as a box-and-arrow diagram and then as a sequence of statements in the SQL data definition language:



Which elements of the ER design do not appear in the relational version?

[\[show answer\]](#)

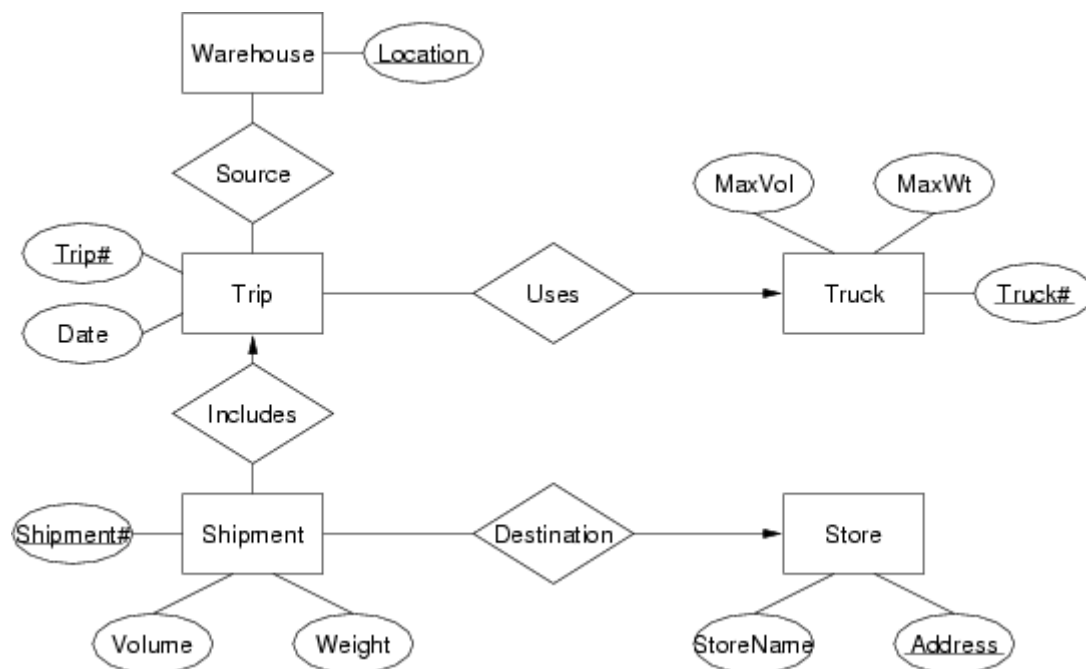
12. [Based on GUV 2.1.3] Convert the following ER design into a relational data model expressed first as a box-and-arrow diagram and then as a sequence of statements in the SQL data definition language:



Which elements of the ER design do not appear in the relational version?

[\[show answer\]](#)

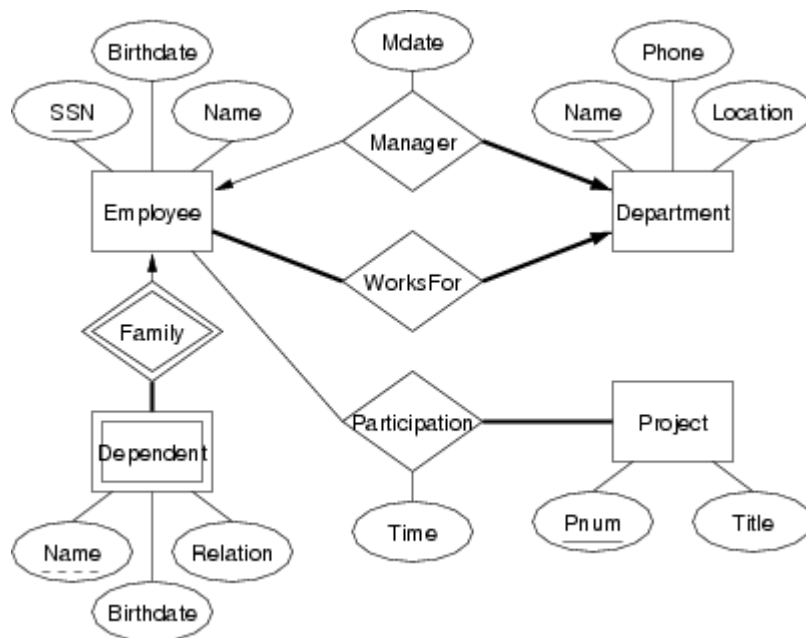
13. Convert the following ER design into a relational data model expressed first as a box-and-arrow diagram and then as a sequence of statements in the SQL data definition language:



Which elements of the ER design do not appear in the relational version?

[\[show answer\]](#)

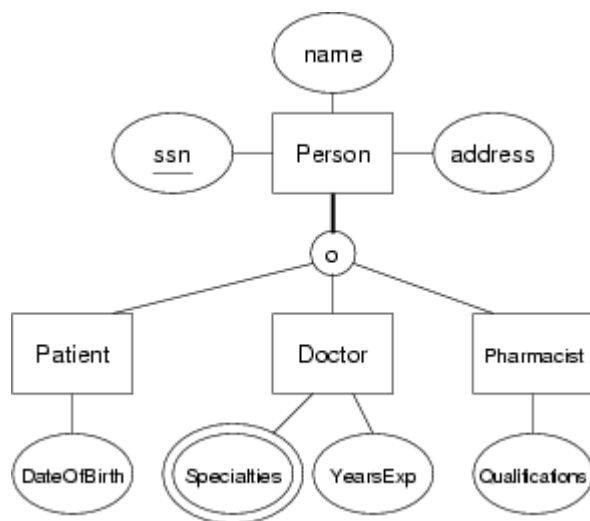
14. Convert the following ER design to relational form:



Which elements of the ER design do not appear in the relational version?

[\[show answer\]](#)

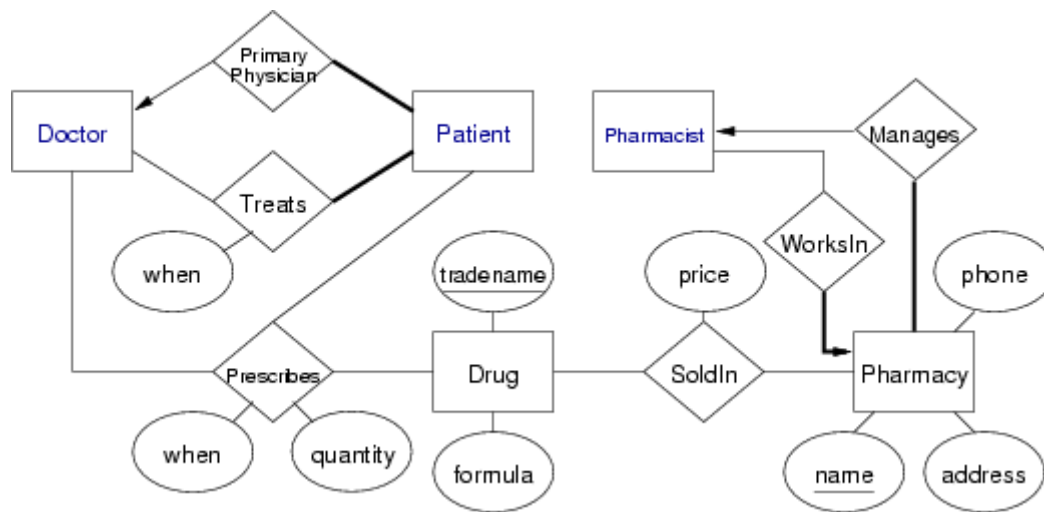
15. Using this version of the Person class hierarchy, from the Medical scenario described previously, convert the ER design to relational form as an SQL schema:



Give mappings using both the ER style and single-table-with-nulls style.

[\[show answer\]](#)

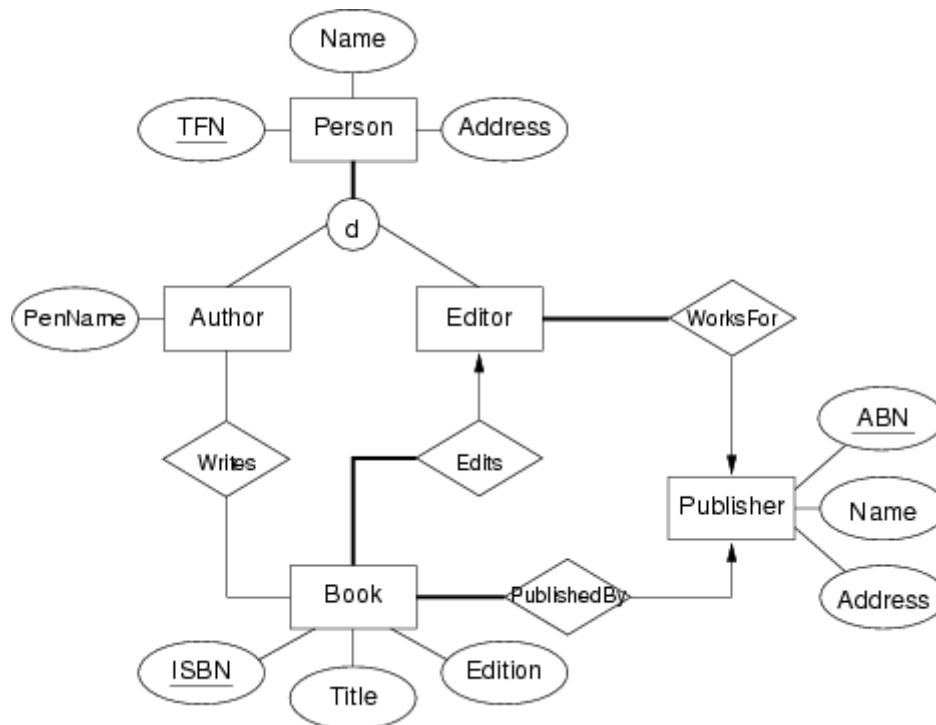
16. Convert this ER design for the medical scenario into relational form:



Assume that the Person classes are mapped using the ER-style mapping. Which elements of the ER design do not appear in the relational version?

[\[show answer\]](#)

17. Convert this ER design for the book publishing scenario into an SQL schema:



Give two versions, one using the ER-style mapping of subclasses, and the other using single-table-with-nulls mapping of subclasses.

[\[show answer\]](#)