

Relational Schema Exercises Answer

The arrow goes from the table that has a foreign key to the table where the key comes from (so the arrow points to the primary key).

Try to design a database so that each table has a unified theme with a unique identifier on each row that is consistent with that theme.

Whenever you have a 1:Many relationship, the relation mapped from the entity on the Many side of the relationship should get a foreign key that corresponds to the primary key of the relation on the 1 side of the relationship. This is because you would have to have duplicate values of the unique identifier of the entity on the 1 side in the table that represents the entity on the Many side.

An example is the description of the database in Question 5 of the relational Schema exercise said:

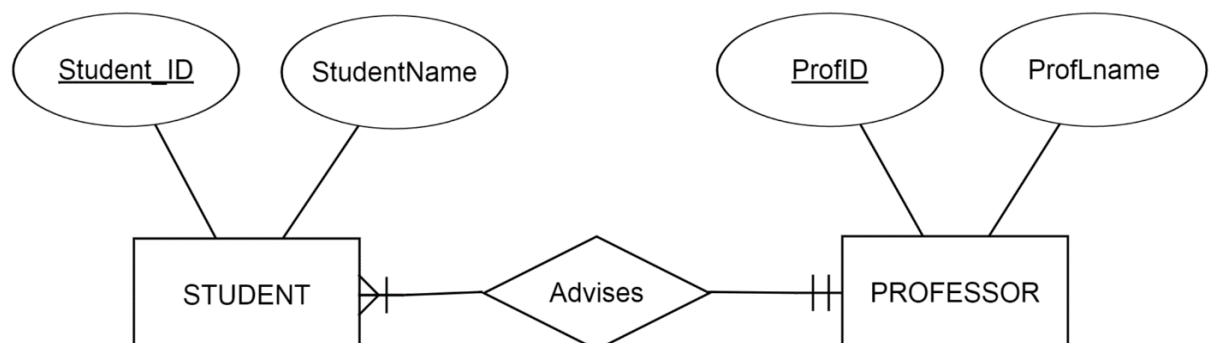
"Investment companies can manage multiple mutual funds. Investco Scout will not keep track of investment companies that do not manage any mutual funds. A mutual fund is managed by one investment company."

Thus, there is a 1:Many relationship between investment companies (1) and mutual funds (many), and there should be a foreign key in the mutual funds table that points to the primary key in the investment company table.

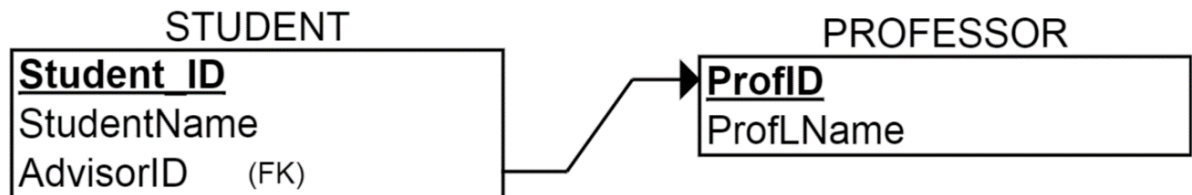
Whenever you have a 1:1 relationship, by the way, it doesn't matter which table has the primary vs. foreign key. Whenever you have a Many:Many relationship, on the other hand, recall that you will need a separate linking table that will have two foreign keys corresponding to the primary keys of the tables that represent the entities in the Many:Many relationship.

In general when you are mapping relational schemas to ER diagrams, each "regular" entity in the ER diagram becomes a relation/table in the relational schema, and each "regular" attribute of an entity in the ER diagram becomes an attribute/field of a relation/table in the relational schema. "Not regular" entities and relationships may need additional properties or special treatment. Don't forget to use foreign keys to connect relations/tables to one another.

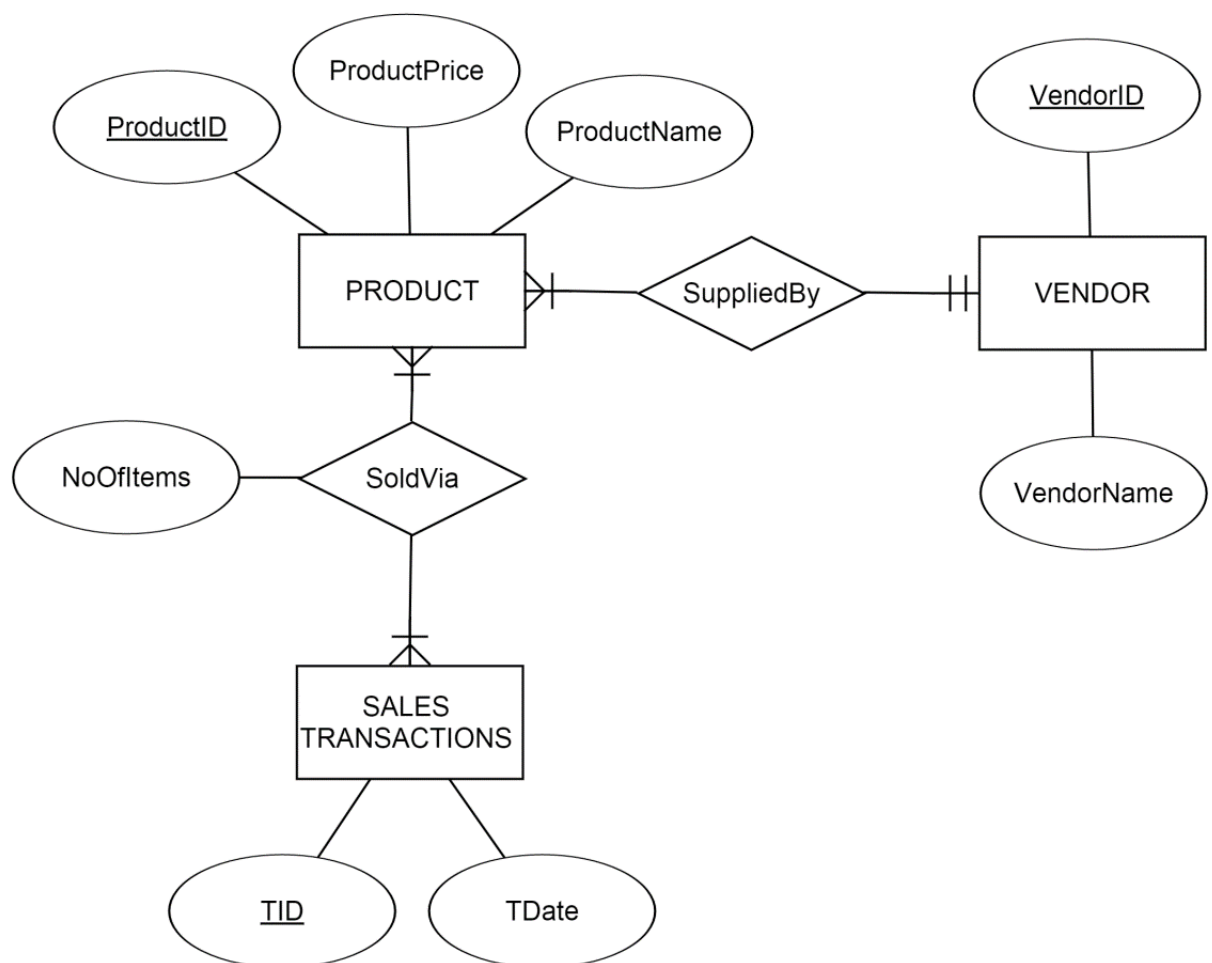
Exercise 1. Make a relational schema that represents data and relationships depicted in this diagram:



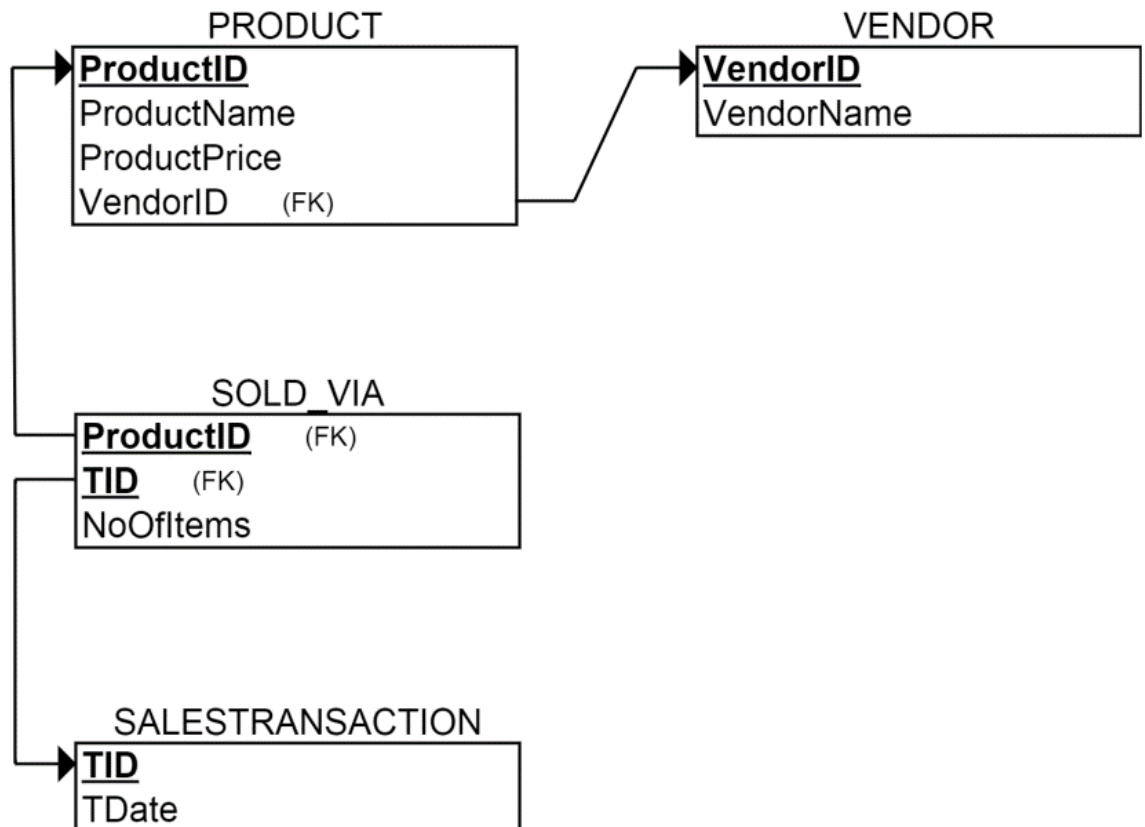
Exercise 1. In this example, the foreign key “AdvisorID” in relation STUDENT is renamed and not the exact same name as the primary key “ProfID” in the relation PROFESSOR. It was renamed to better illustrate the role of a professor ID to a student.



Exercise 2. Make a relational schema that represents data and relationships depicted in this diagram:



Exercise 2. Notice that in order to represent the many-to-many relationship between products and sales transactions, a SOLD_VIA linking table (or relation) had to be included with the two foreign keys ProductID and TID acting as a composite primary key. Since the relationship between products and vendors was not many-to-many (each product was supplied by exactly one vendor), no linking table (or relation) was required to represent that relationship.



Exercise 3. Which table of data (Table A or Table B) corresponds with the relation depicted below?

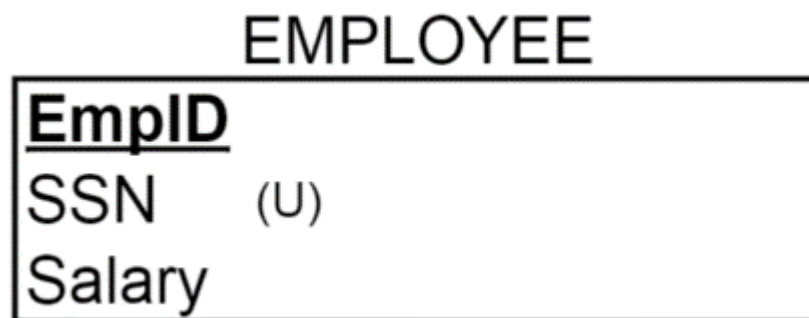


Table A:

<u>EmpID</u>	SSN	Salary
1243	111-11-1111	\$75,000
2345	222-22-2222	\$50,000
3456	333-33-3333	\$50,000
1324	222-22-2222	\$70,000

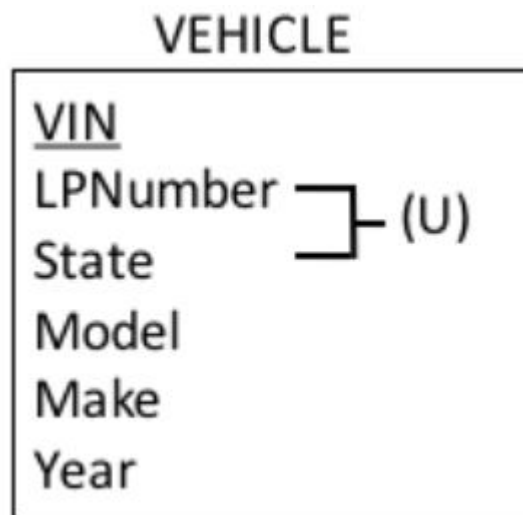
Table B:

<u>EmpID</u>	SSN	Salary
4536	111-11-1111	\$75,000
6645	222-22-2222	\$50,000
8867	333-33-3333	\$90,000
2134	444-44-4444	\$70,000

Exercise 3. The answer has to be Table B, because the (U) symbol next to attribute SSN in the relation EMPLOYEE indicates that each value in the SSN column has to be unique. There are two rows with the same values in the SSN column of Table A.

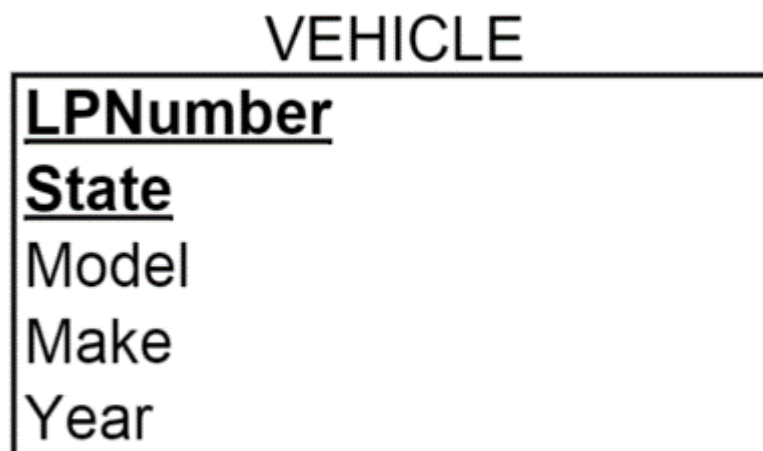
Exercise 4a. Describe in the words the data that would be contained in a table made to reflect the

relation depicted below?



Exercise 4a. Information about vehicles is being tracked and will be made into a table called “VEHICLE” in a database. For each vehicle, the VIN, LPNumber (license plate number), State, Model, Make and Year is recorded and will be entered as a separate column. Each value entered into a row of the VIN column will be unique. Each combination of values in the LPNumber and State columns will be unique, but each value in the LPNumber or State columns, on their own, does not have to be unique. Values in the Model, Make, and Year columns do not have to be unique. The VIN will serve as the primary key.

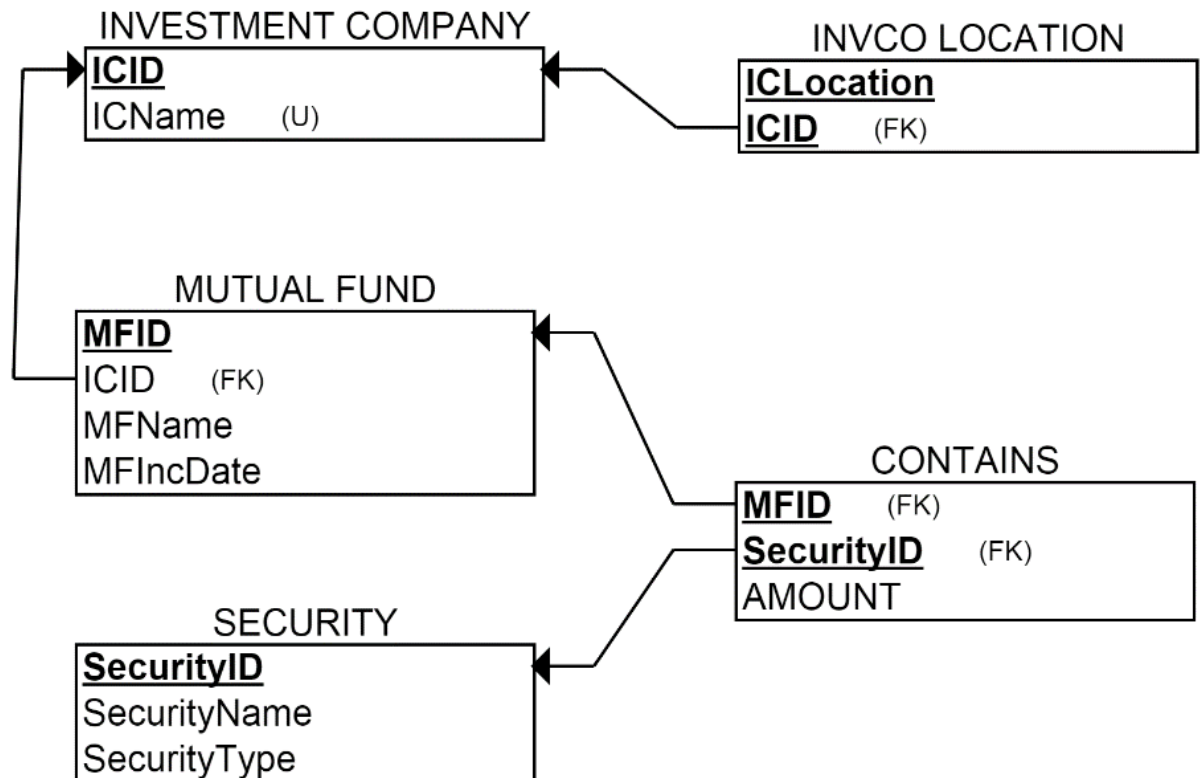
Exercise 4b. Describe in the words the data that would be contained in a table made to reflect the relation depicted below?



Exercise 4b. Information about vehicles is being tracked and will be made into a table called “VEHICLE” in a database. For each vehicle, the LPNumber (license plate number), State, Model, Make and Year is recorded and will be entered as a separate column. Each combination of values in the LPNumber and State columns will be unique, but each value in the LPNumber or State columns, on their own, does not have to be unique. Values in the Model, Make, and Year columns do not have to be unique. LPNumber and State will act as a composite primary key.

Exercise 5. Create a relational schema for a database that will hold the information depicted in Exercise 3 of the Entity Relationship Diagram Exercises (which asks you to make an ER diagram for Investco Scout's database).

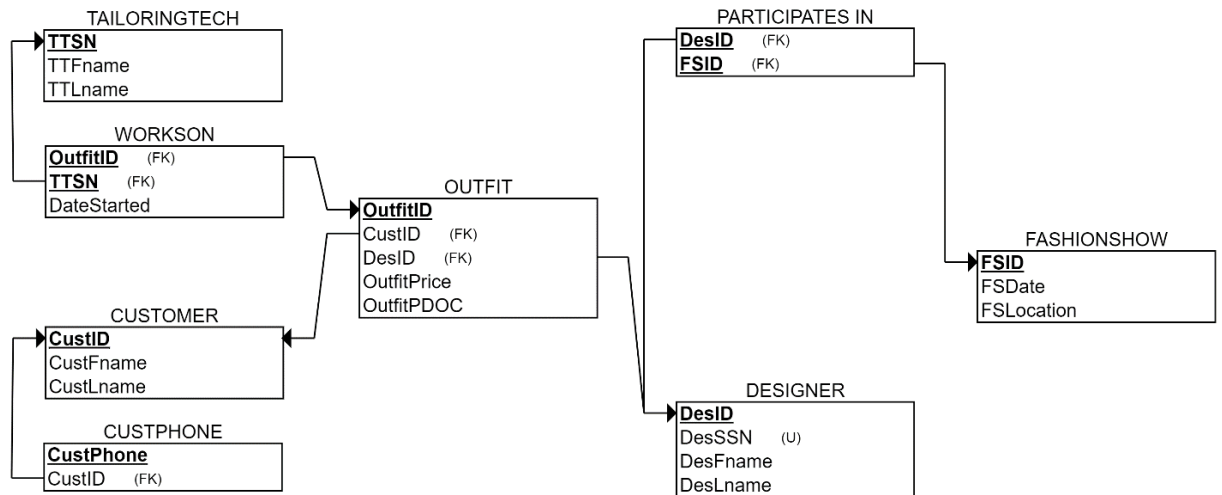
Exercise 5. Relational schema for Investco Scout's database:



The many-to-many relationship between SECURITY and MUTUAL FUND in the ER diagram is kept track of through the CONTAINS relation/table. The ICID was chosen as the primary key for the relation/table INVESTMENT COMPANY, even though ICID and ICName are unique attributes (and therefore "candidate keys") according to the ER diagram. The multiple locations recorded for each investment company are recorded in their own table so that a copy of ICName doesn't have to be repeated each time another company location is added (which is what would happen if ICLocation was included in the INVESTMENT COMPANY relation/table instead).

Exercise 6. Create a relational schema for a database that will hold the information depicted in Exercise 4 of the Entity Relationship Diagram Exercises (which asks you to make an ER diagram for Snooty Fashion's database).

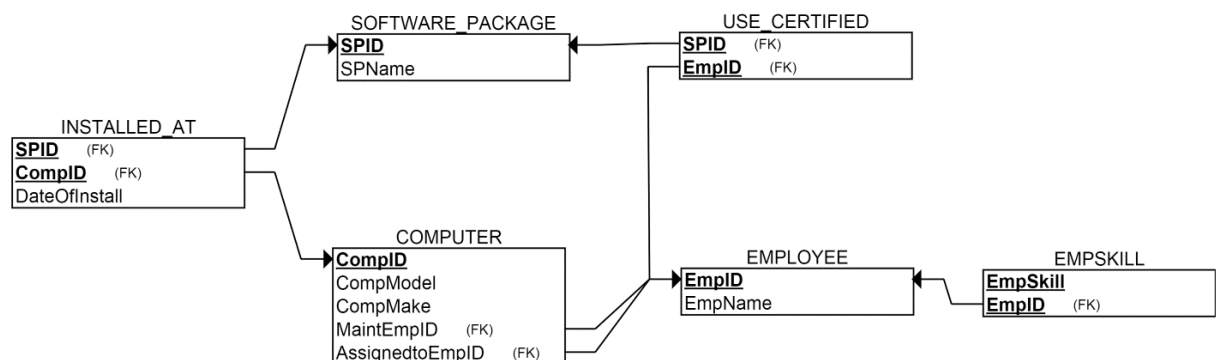
Exercise 6. Relational schema for Snooty Fashion's database:



The many-to-many relationship between DESIGNER and FASHIONSHOW in the ER diagram is kept track of through the PARTICIPATES relation/table. The DesID was chosen as the primary key for the relation/table DESIGNER, even though DesID and DesSSN are unique attributes (and therefore “candidate keys”) according to the ER diagram. The multiple phone numbers recorded for each customer are recorded in their own table so that a copy of CustName doesn’t have to be repeated each time another customer’s phone number is added (which is what would happen if CustPhone was included in the CUSTOMER relation/table instead). The TTName attribute of the TAILORING TECHNICIAN entity and the DesName attribute of DESIGNER entity in the ER diagram will not be recorded explicitly, because they can be derived through the recorded TTFname/TTLname or DesFname/DesLname attributes/fields.

Exercise 7. Create a relational schema for a database that will hold the information depicted in Exercise 5 of the Entity Relationship Diagram Exercises (which asks you to interpret the ER diagram for ExoProtect’s database).

Exercise 7. Relational schema for ExoProtect’s database:



All the many-to-many relationships in the ER diagram are represented with linking relations/tables. The multiple skills recorded for each employee are recorded in their own table so that a copy of EmpName doesn’t have to be repeated each time an employee’s skill is added (which is what would happen if EmpSkill was included in the EMPLOYEE relation/table instead). Both relationships depicted in the ER diagram between the entities COMPUTER and EMPLOYEE are included in the relational schema via the MaintEmpID and AssignedtoEmpID foreign keys of the COMPUTER relation/table. The No of Installations attribute of the SOFTWARE PACKAGE entity in the ER diagram is not recorded explicitly, because it can be derived through counting the recorded installation dates.

