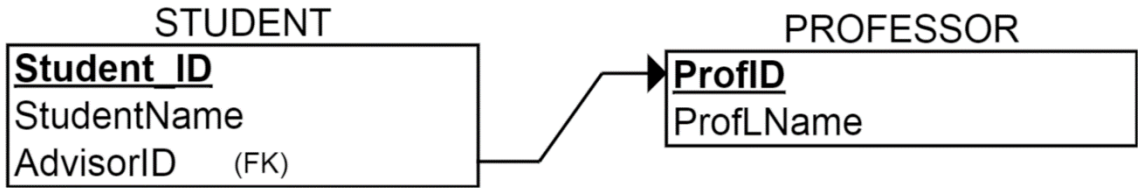
All of the exercises in this document were donated by Dr. Nenad Jukić, Professor of Information Systems and the Director of Business Intelligence and Data Warehousing Graduate Certificate Program at the Quinlan School of Business at Loyola University Chicago. The exercises are excerpts from the textbook, "Database Systems: Introduction to Databases and Data Warehouses": (http://www.amazon.com/Database-Systems-Introduction-Databases-Warehouses/dp/0132575671).

Please do not distribute the contents of these exercises under any circumstances. Doing so may require us to remove them from the course materials.

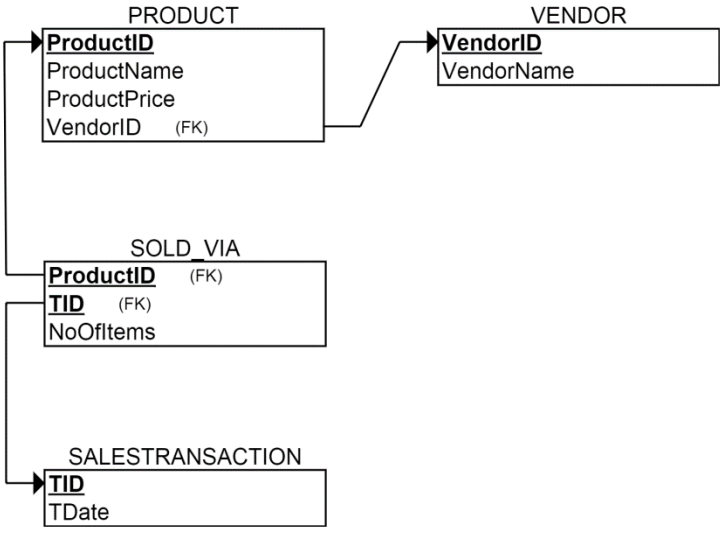
Relational Schema Exercises Answer Key

This is the answer key to the exercises in the "Relational Schema Exercises" document included with the course materials.

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. 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.

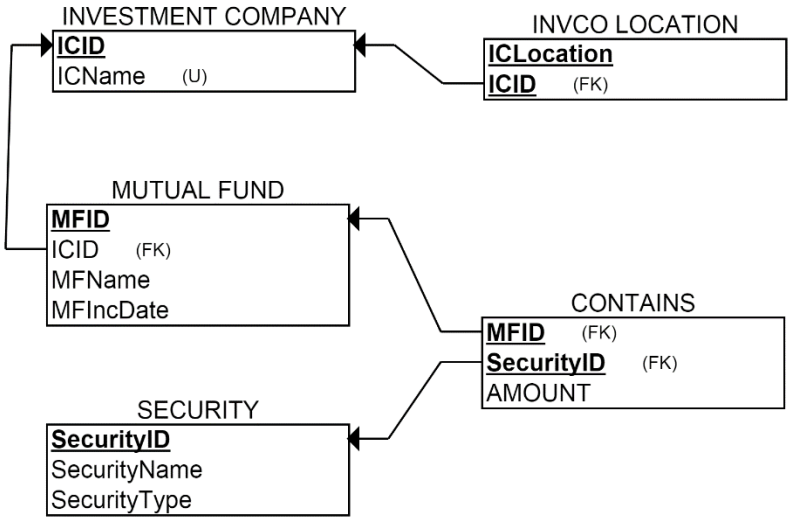


Exercise 3. The answer has to be Table B, because the (U) symbol next to attribute SSN in the relation EMPLOYEE indicates that each value in the SSN column has to be unique. There are two rows with the same vales in the SSN column of Table A.

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.

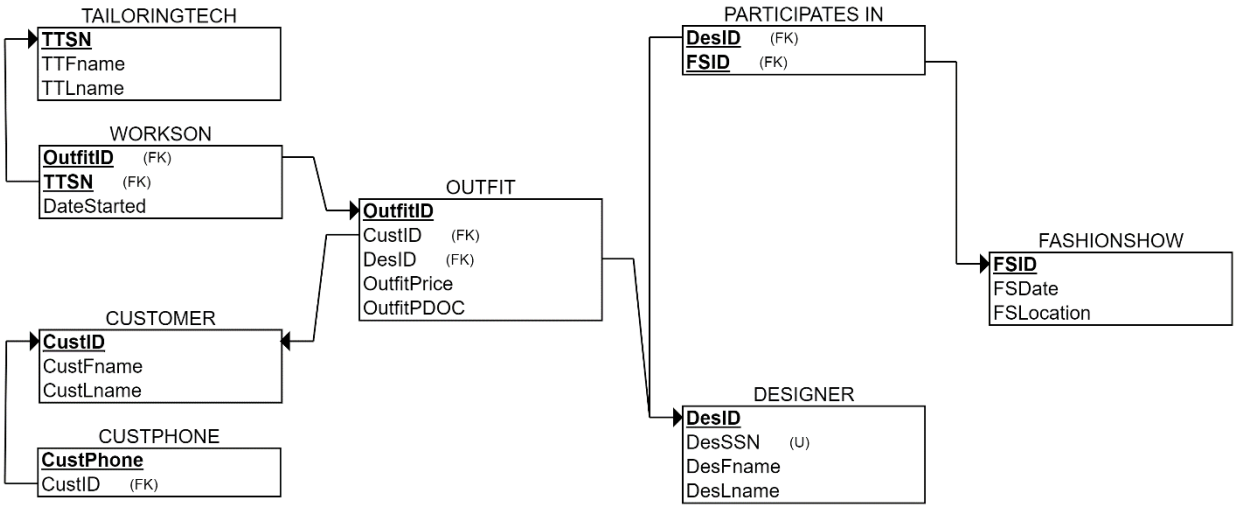
Exercise 4b. Information about vehicles is being tracked and will be made into a table called "VEHICLE" in a database. For each vehicle, the LPNumber (license plate number), State, Model, Make and Year is recorded and will be entered as a separate column. Each combination of values in the LPNumber and 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. Relational schema for Investco Scout's database:



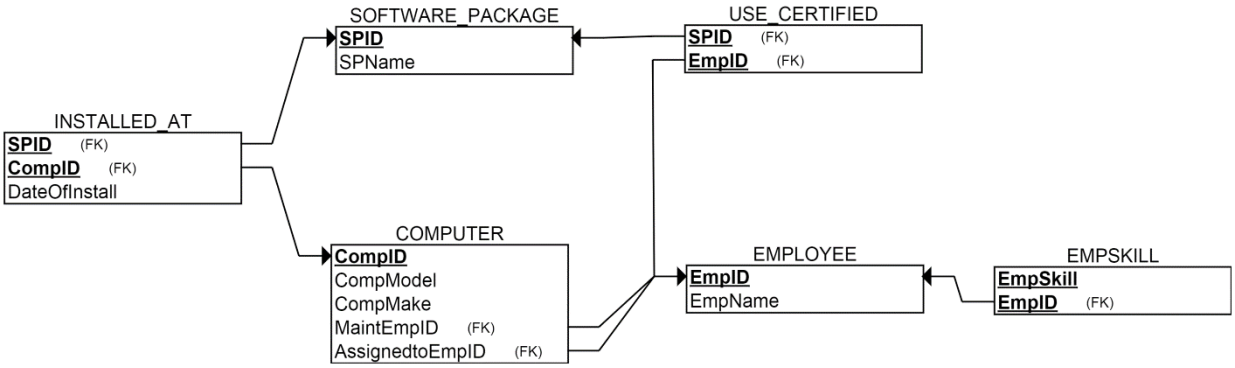
The many-to-many relationship between SECURITY and MUTUAL FUND in the ER diagram is kept track of through the CONTAINS relation/table. The ICID was chosen as the primary key for the relation/table INVESTMENT COMPANY, even though ICID and ICName are unique attributes (and therefore "candidate keys") according 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. 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 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. 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.