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The questions below address in the abstract issues in ER design that you'll be addressing concretely in your project ER design.

1. Give a real-world example of an enterprise in which an entity set is related to itself through two distinct relationship sets.

At a large corporation, there is an entity set of supervisors of differing class levels (specializations) A-C with A being the highest level. Supervisor class A could supervise both class B and class C supervisors and class B supervisors can supervise class C supervisors.

2. Consider two entity sets A and B that both have the attribute X (among others whose names are not relevant to this question).

(a) If the two Xs are completely unrelated, how should the design be improved?

X in each entity table should have distinct names so they are able to be differentiated.

(b) If the two Xs represent the same property and it is one that applies both to A and to B, how should the design be improved? Consider three subcases:

- X is the primary key for A but not B

This is a poor design. X should be removed from B and linked via an appropriate relationship set.

- X is the primary key for both A and B

An effective generalization/specispecialization hierarchy should be designed.

- X is not the primary key for A nor for B

Nothing to do to improve the design.

3. Suppose that we have a generalization/specialization hierarchy with A as the top-level of the hierarchy and B somewhere below. When (if ever) should a relationship set connect to B rather than A? Give both a general answer and an example.

If the mentioned relationship relates to all members of B but not to all members of A

If A is a person (with other specializations such as customer) and B is an employee with other relationships such as isManagedBy. Not all customers have managers but all employees have managers.

4. Consider the following two alternative ER designs:

- a ternary relationship set R that relates entity sets A, B, and C.

- a design in which R is replaced by an entity set E with E related to A, B, and C by 3 binary relationship sets RA, RB and RC , respectively.

Show instances of E, A, B, C, RA, RB , and RC that cannot be corresponding to any instance of A, B, C, and R. Note that these are entity and relationship sets and an instance of a set requires you to list the elements in that set.

Then explain what could be done to make them equivalent by fixing each of RA, RB and RC , to be 1-

1. m-m, 1-m, or m-1. How to set the primary keys for RA, RB , and RC ?

It is not possible to relate E to A, B, or C without RA, RB, and RC.

To make the statements equivalent, RA, RB, and RC, must all be m-1 from E.

