
Course: *Databases and Data Warehousing*

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Homework Assignment I

Assigned : *5:45 PM, 30th August*

Deadline : *11:55 PM, 5th September*

1. Explain the following terms briefly along with an **example**: attribute, domain, entity, relationship, entity set, relationship set, one-to-many relationship, many-to-many relationship, participation constraint, and weak entity set. (5 Points)

Sol:

Attribute - a property or description of an entity. A toy department employee entity could have attributes describing the employee's name, salary, and years of service.

Domain - a set of possible values for an attribute.

Entity - an object in the real world that is distinguishable from other objects such as the green dragon toy. **Relationship** - an association among two or more entities.

Relationship - The way 2 or more entities are linked.

Entity set - a collection of similar entities such as all of the toys in the toy department.

Relationship set - a collection of similar relationships

One-to-many relationship - a key constraint that indicates that one entity can be associated with many of another entity. An example of a one-to-many relationship is when an employee can work for only one department, and a department can have many employees.

Many-to-many relationship - a key constraint that indicates that many of one entity can be associated with many of another entity. An example of a many-to-many relationship is employees and their hobbies: a person can have many different hobbies, and many people can have the same hobby.

Participation constraint - a participation constraint determines whether relationships must involve certain entities. An example is if every department entity has a manager entity. Participation constraints can either be total or

partial. A total participation constraint says that every department has a manager. A partial participation constraint says that every employee does not have to be a manager.

Weak entity set - an entity that cannot be identified uniquely without considering some primary key attributes of another identifying owner entity. An example is including Dependent information for employees for insurance purposes.

2. Consider two entity sets A and B that both have the attribute X (among others whose names are not relevant to this question). **(5 Points)**

1. If the two Xs are completely unrelated, how should the design be improved? **Basically it is not creating any problem**
2. 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
when "X" attribute in two entities represent the same property that applies to both to A and to B .we can use Referential integrity (foreign key) . eg:- foreign key in B ("X") Referencing primary key in A "X"
 - X is the primary key for both A and B
it would be better to combine the table and make it as single table if the table has small number of attributes.
 - X is not the primary key for A nor for B
if "X" is a non key in both relation A and B. there is a high chance of Data redundancy. ofcourse two tables can have same column name. But if they represent same property, they should be connected either way and unique

3. Answer the following questions **(5 Points)**

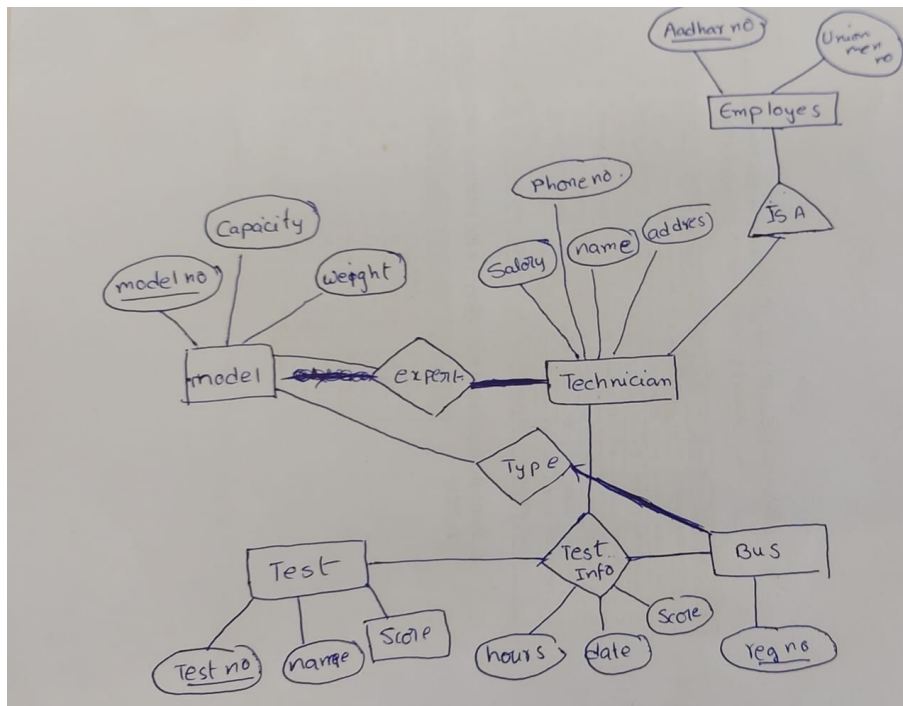
- Does it make sense for a weak entity to participate in one to one relationship with a strong entity? If not answer why it doesn't make sense.
No it doesn't make sense because both can be merged in that case.
- We can convert any weak entity set to a strong entity set by simply adding appropriate attributes. Why, then, do we have weak entity sets?

Though weak entity set can be converted into strong entity set by simply adding appropriate attributes, this approach results in the redundant storage of primary key. Also, weak entity is required to represent the dependence relationship logically.

4. JIO institute AIDS frequent travelers have been complaining to the state's transport authority about the poor organization at the bus station in Vashi. As a result, the officials have decided that all information related to the station should be organized using a DBMS, and you've been hired to design the database. Your first task is to organize the information about all the buses that are stationed and maintained at the station. The relevant information is as follows: **(10 Points)**

- Every bus has a registration number, and each bus is of a specific model. The station accommodates a number of bus models, and each model is identified by a model number and has a capacity.
- A number of technicians work at the bus station. You need to store the name, aadhar number, address, phone number, and salary of each technician.
- Each technician is an expert on one or more bus model(s), and his or her expertise may overlap with that of other technicians. This information about technicians must also be recorded.
- All the station employees (including technicians) belong to a union. You must store the union membership number of each employee. You can assume that each employee is uniquely identified by the aadhar number.
- The bus station has a number of tests that are used periodically to ensure that the buses are in a good condition. Each test has a test number, a name, and a maximum possible score.
- The Road Transport Authority (RTA) requires the station to keep track of each time that a given bus is tested with a given test by a given technician. For each testing event, the information needed is the date, the number of hours the technician spent doing the test, and the score that the bus received on the test.

1. Draw an ER diagram for the above database. Be sure to indicate the various attributes of each entity and relationship set; also specify the key and participation constraints for each relationship set.

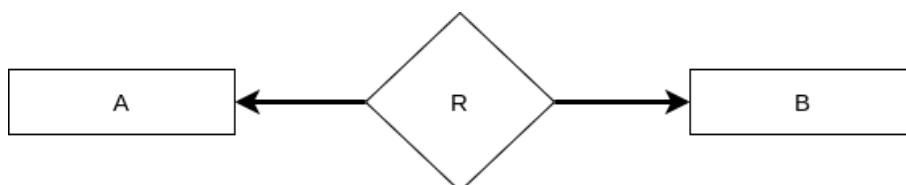


2. A regulation is passed by RTA that only a technician who is an expert in a bus's model is eligible to conduct the test on it. How can this constraint be expressed in the ER diagram? Explain.

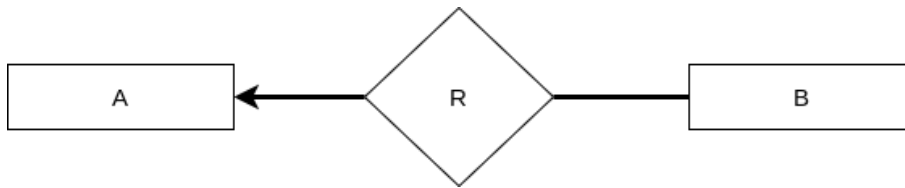
You cannot note the expert technician constraint the RTA requires in an ER diagram. There is no notation for equivalence in an ER diagram and this is what is needed: the Expert relation must be equivalent to the Type relation.

5. Translate the given E-R diagrams (thick lines indicating total participation) to an ideal relational schema (with minimal tables and without redundancy) (7 Points)

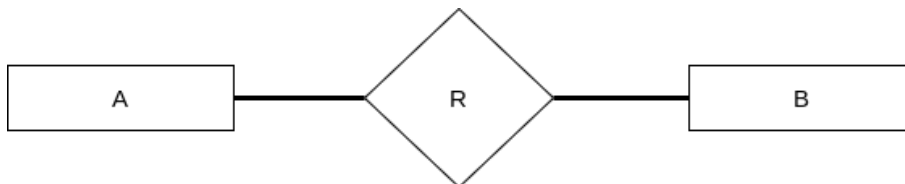
- Case 1:



- Case 2:



- Case 3:



- Also comment on what has to be done when there is partial participation from any one of the sides or both and why?

[Refer page 270 Section 6.7.6.](#)