Enhanced Entity Relationship Diagram - EER

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What is EER Diagram?

- It is a high-level data model that incorporates the extensions to the original ER model.

- With their enhanced features, you can plan databases more thoroughly by delving into the properties and constraints with more precision.

Concepts of EER Diagram

An EER diagram provides you with all the elements of an ER diagram while adding:

- Subclasses and superclasses.
- Specialization and generalization.
- Category or union types.
- Aggregation.

Example

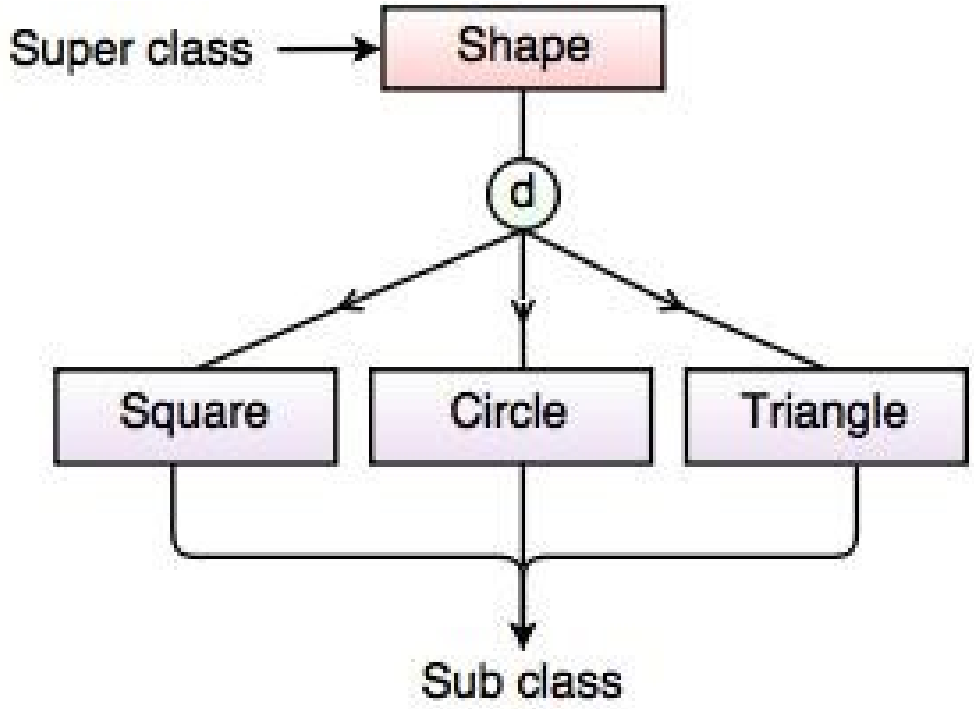
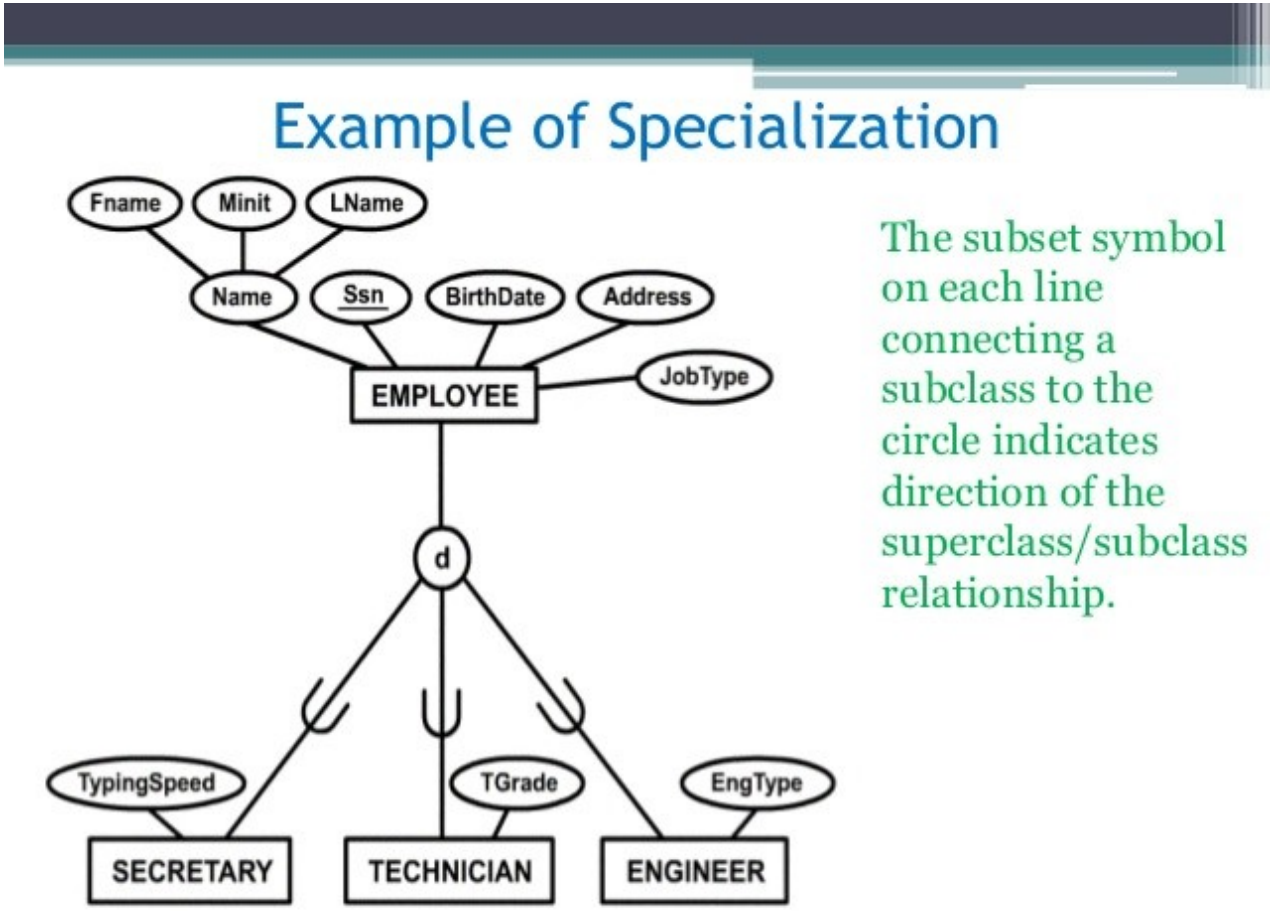


Fig. Super class/Sub class Relationship

A superclass/subclass EER diagram



Example

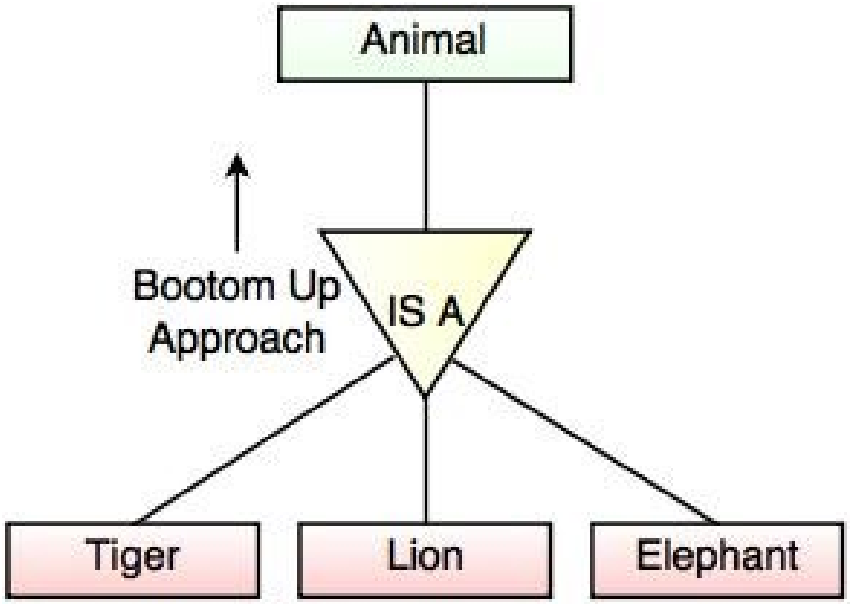


Fig. Generalization

In the above example, Tiger, Lion, Elephant can all be generalized as Animals.

Example

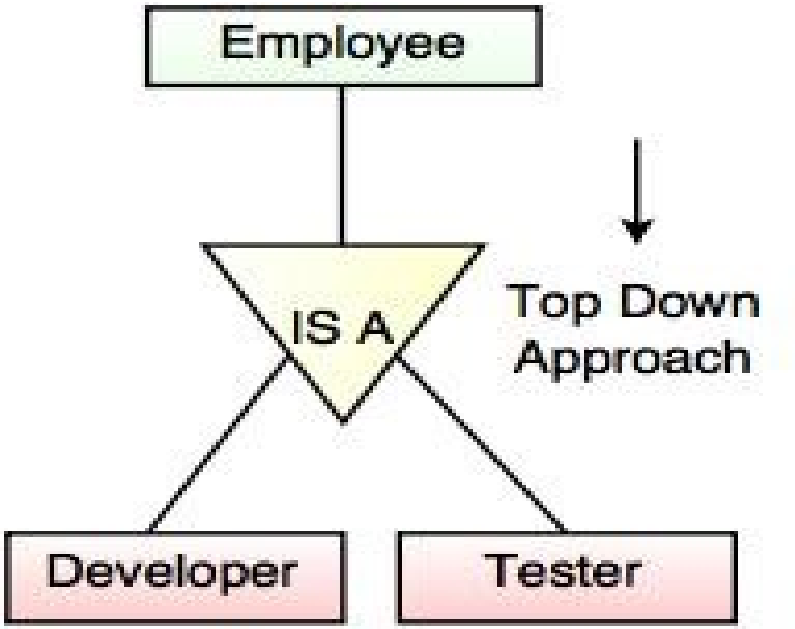


Fig. Specialization

Employee can be specialized as Developer or Tester, based on what role they play in an Organization.

Category or Union Type

- Category represents a single super class or sub class relationship with more than one super class.
- It can be a total or partial participation.
- With multiple inheritance the shared subclass inherits all the attributes of its superclasses

Example

- Car booking, Car owner can be a person, a bank (holds a possession on a Car) or a company. Category (sub class) → Owner is a subset of the union of the three super classes → Company, Bank, and Person. A Category member must exist in at least one of its super classes.

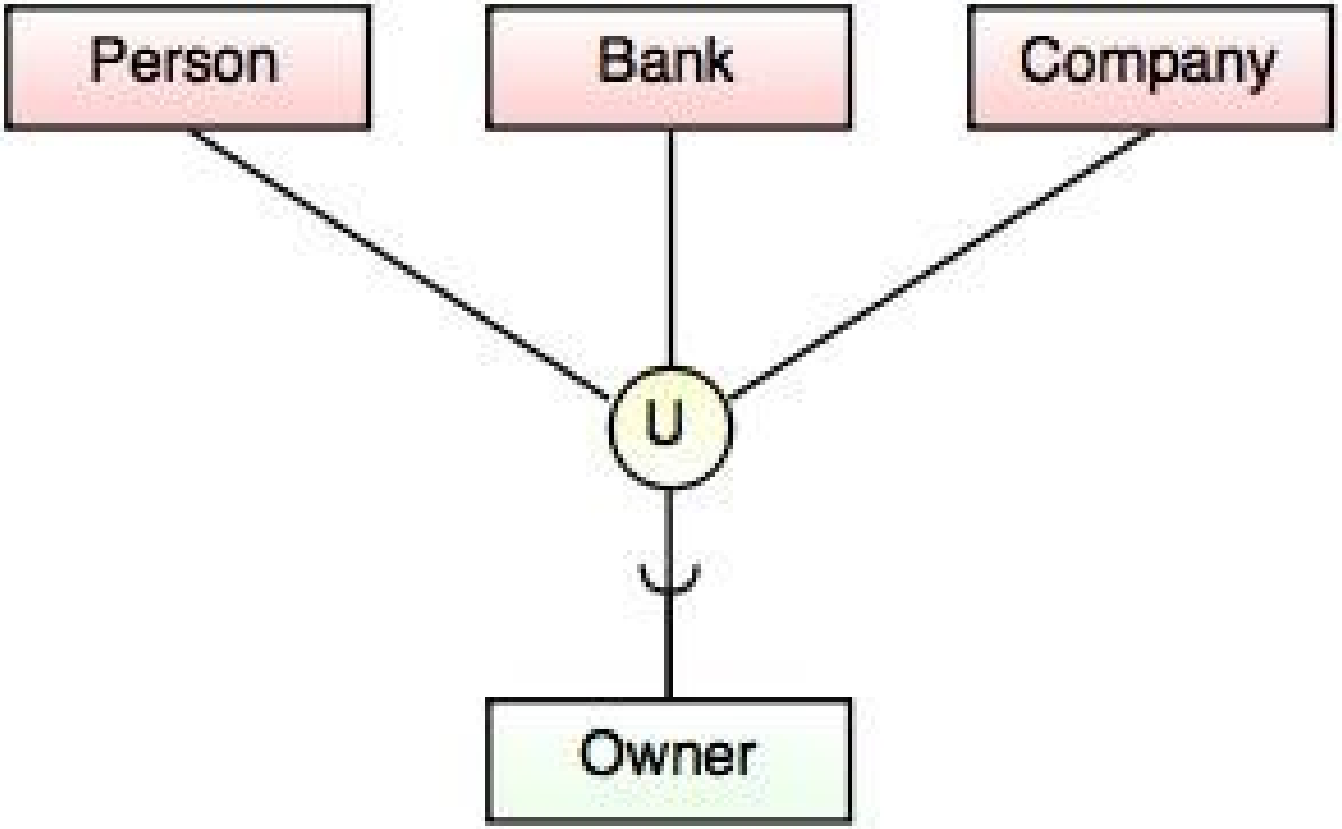
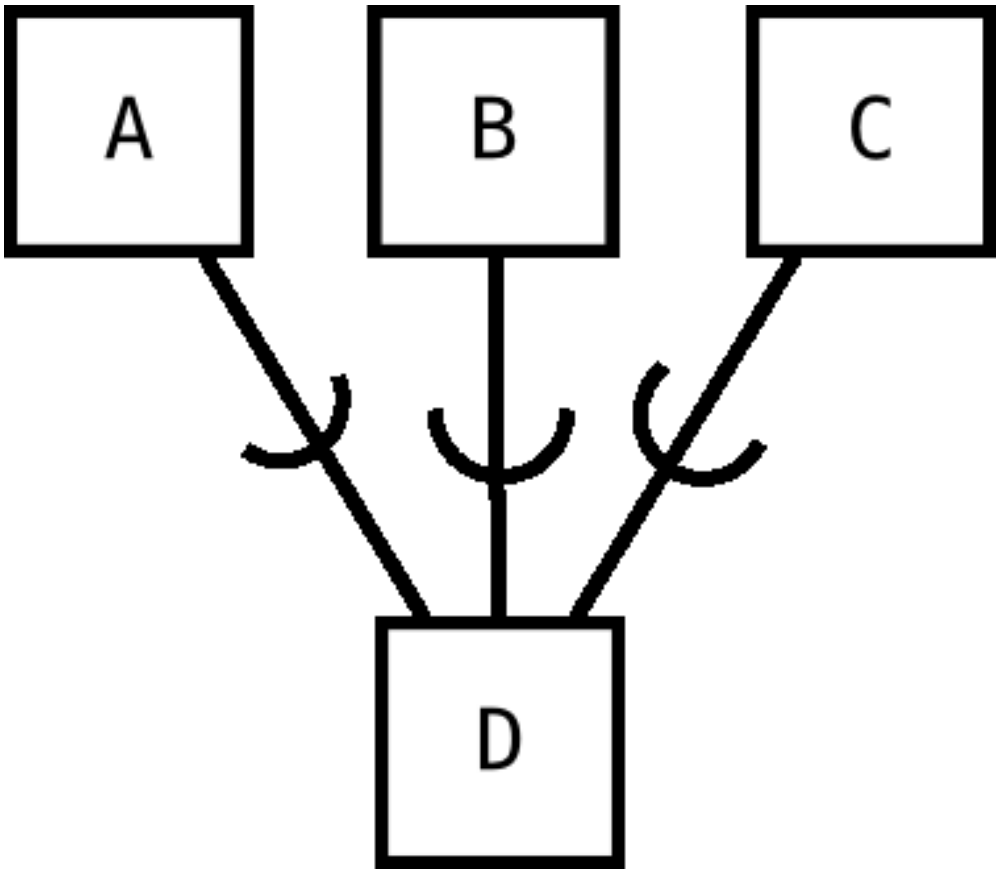


Fig. Categories (Union Type)

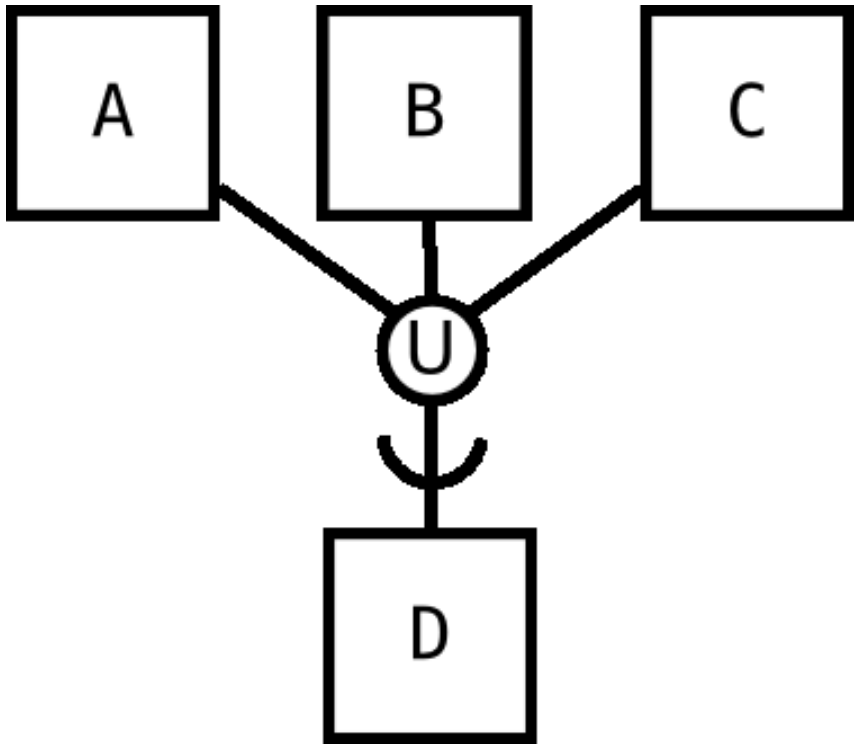
Total Participation



Total Participation

- An entity in D is also in A, B, and C.
- What if you want a “shared subclass” to be in *one of* its super classes—to inherit some of the attributes!
- This union type includes total participation.

Partial Participation



Partial Participation

- This union type is *partial*, shown with a single line, meaning an entity may be a member of type A without also having type D.
- If the union type were *total*, shown with a double line between D and the Ⓤ, every entity in one of the super classes would necessarily also be in D.

Example

- Consider “Owner” and “Registered Vehicle” as the two entities that have partial participation.
- “Owner” is a sub-class of the super-classes – Person, Company and Bank.
- Car and truck are the superclasses of “Registered Vehicle”.
- Draw an EER representing the union types for attributes “Owner” and “Registered Vehicle”.

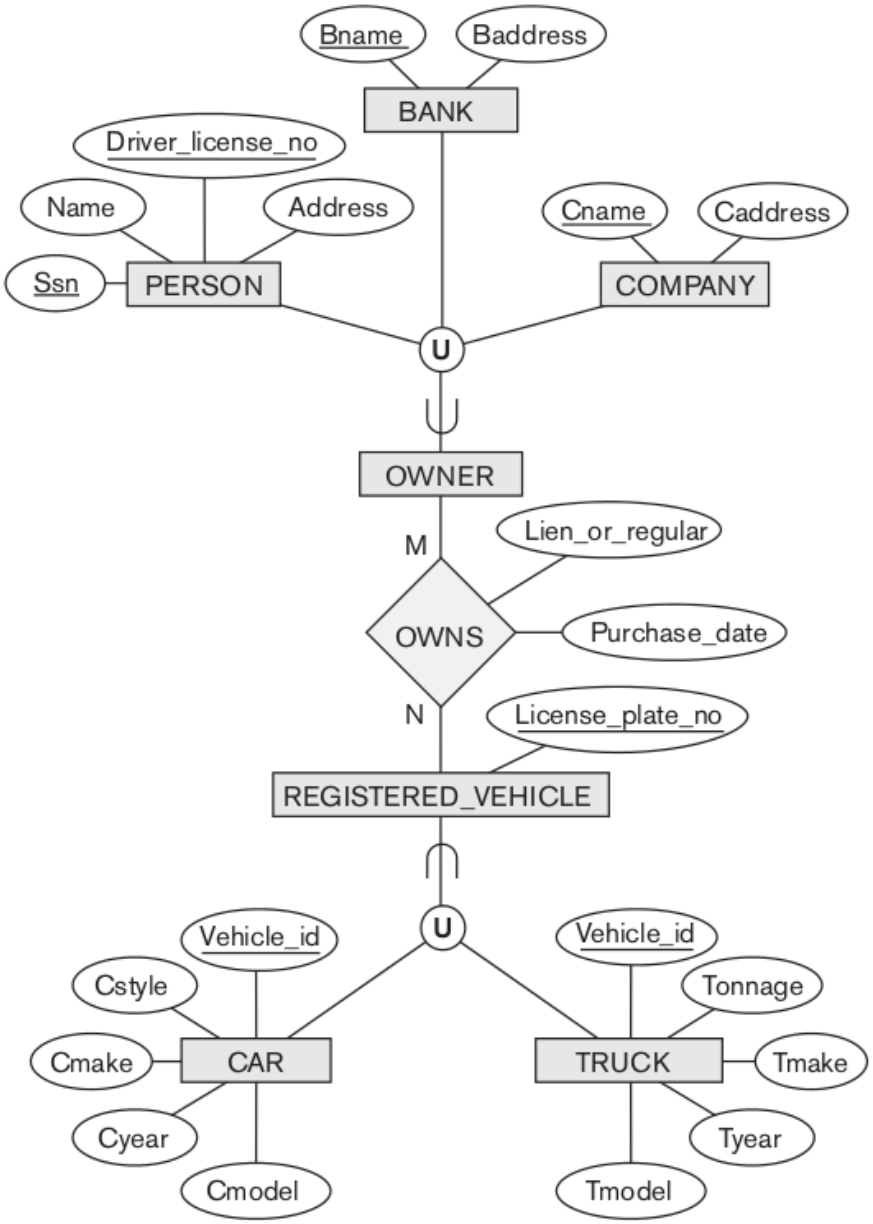


Figure 8.8
Two categories (union types): OWNER and REGISTERED_VEHICLE.

Aggregation

- Aggregation is a process that represent a relationship between a whole object and its component parts.
- It abstracts a relationship between objects and viewing the relationship as an object.
- It is a process when two entity is treated as a single entity.

Example

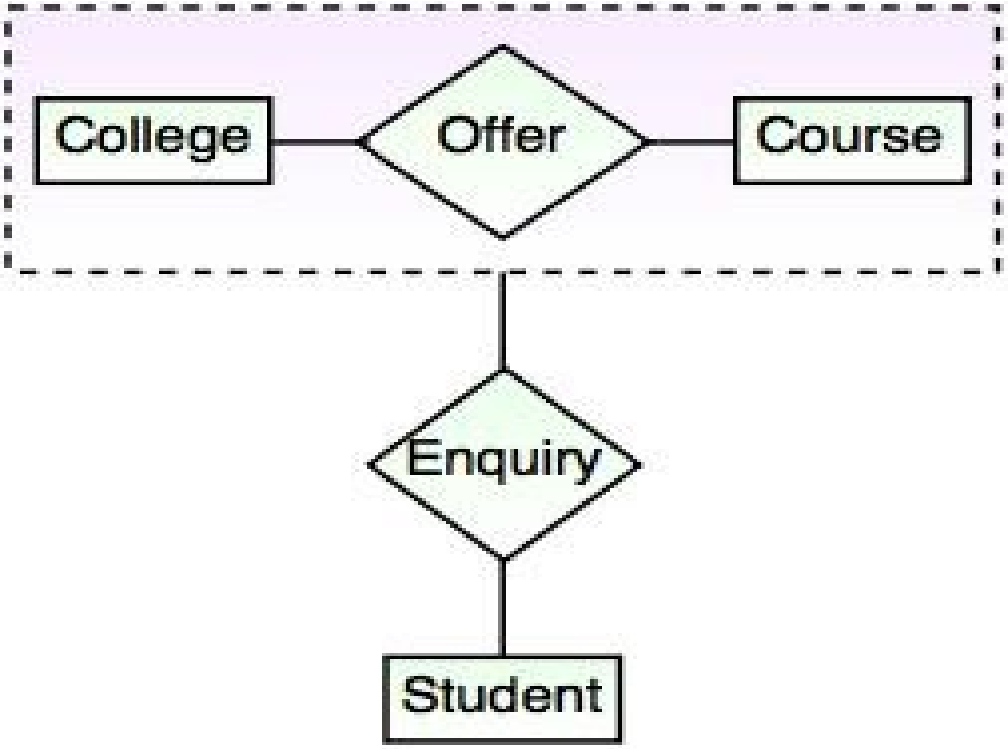


Fig. Aggregation

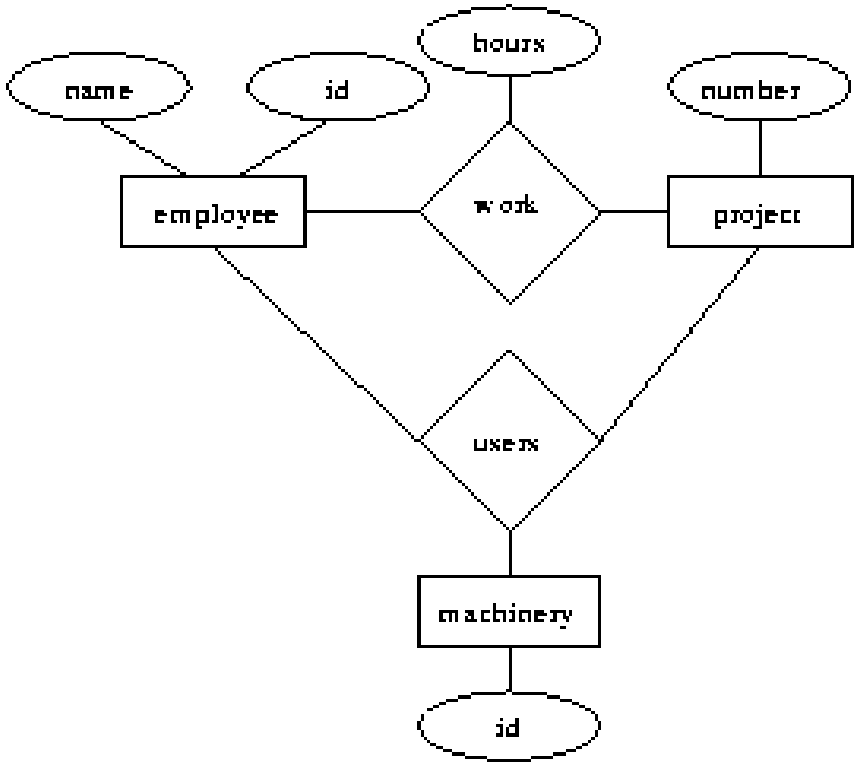
Why do we need Aggregation?

- The E-R model cannot express relationships among relationships.

- When would we need such a thing?

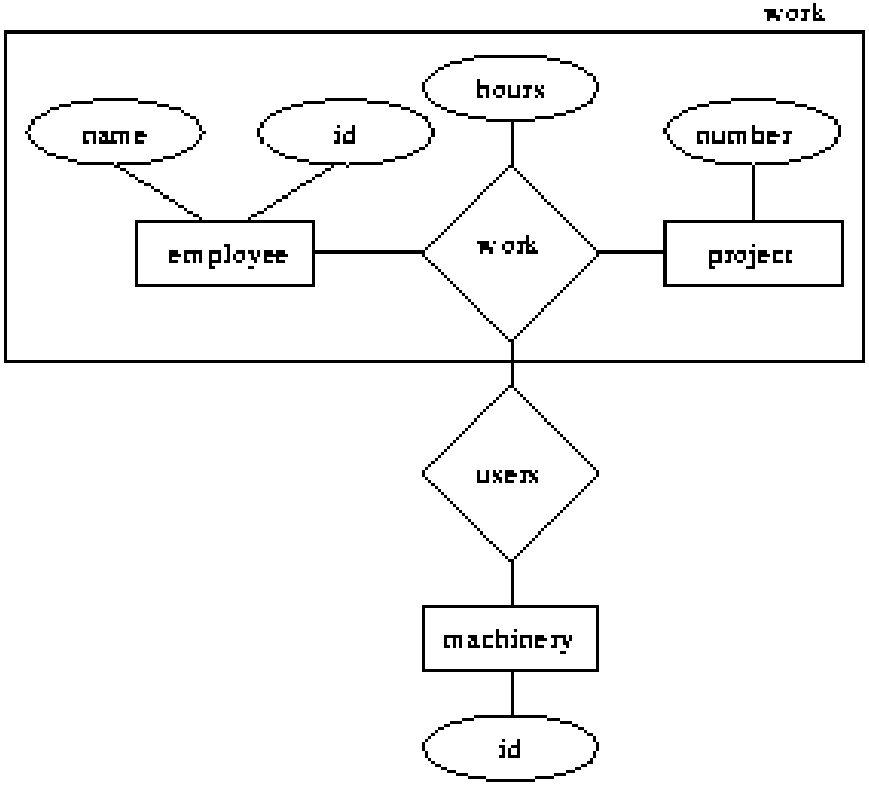
Example Scenario

- Consider a DB with information about employees who work on a particular project and use a number of machines doing that work.



- Relationship sets *work* and *uses* could be combined into a single set. However, they shouldn't be, as this would obscure the logical structure of this scheme.
- The solution is to use **aggregation**.
- An abstraction through which relationships are treated as higher-level entities.

- For our example, we treat the relationship set *work* and the entity sets *employee* and *project* as a higher-level **entity set** called *work*.

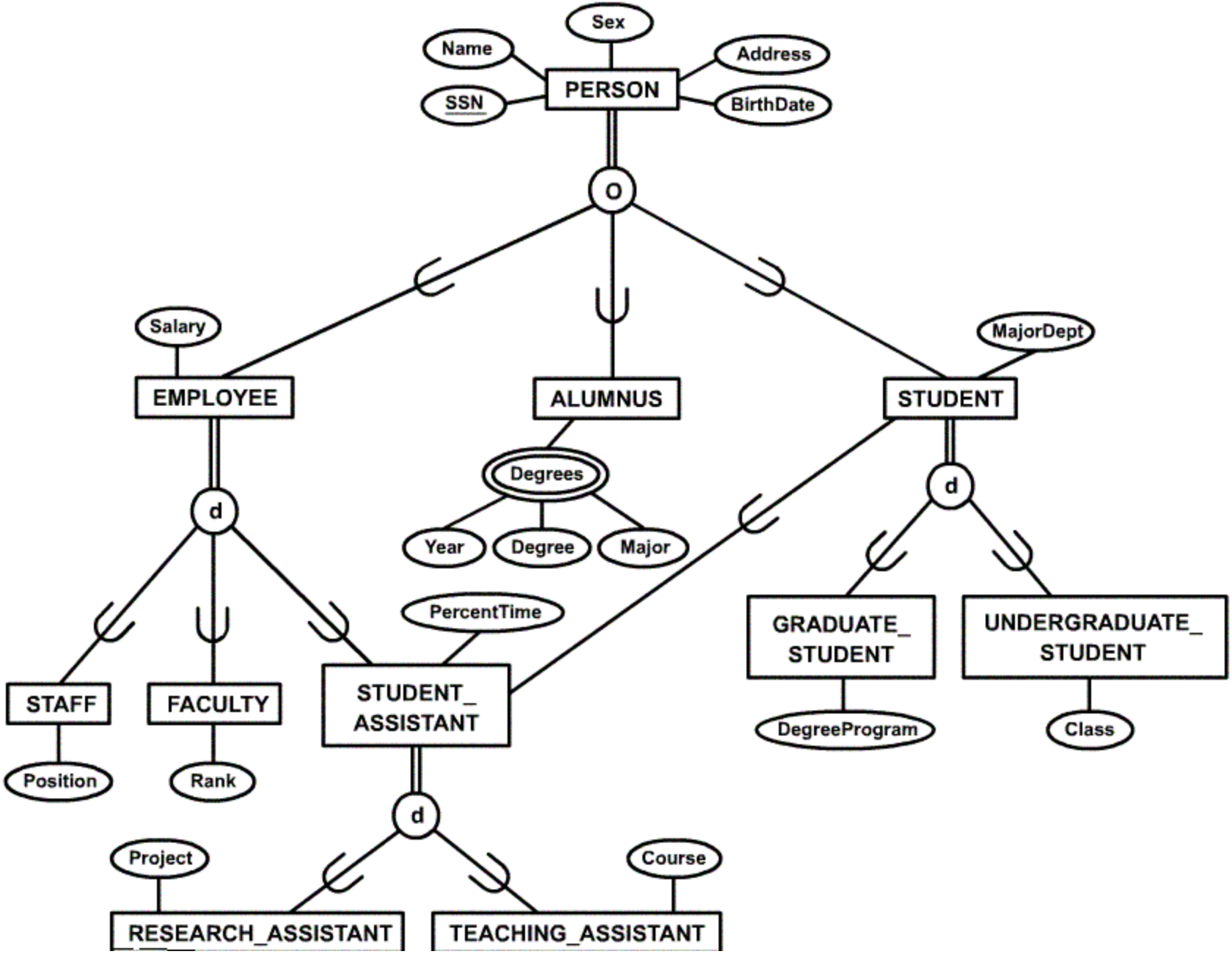


Aggregation

- Aggregation is a process when relation between two entities is treated as a **single entity**.

Example of EER Diagrams

- Explain the following EER Diagram.
- Describe each entity and its superclass and subclass.
- Explain the specialization and generalization concepts.
- Figure out the total and partial participation.
- Also, try and add an "Aggregation".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TEACHING_ASSISTANT