(Enhanced) Entity Relationship Modelling

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(Enhanced) Entity Relationship Modelling

- EER Modeling is important for new applications of database technology such as
  - Engineering design and manufacturing (CAD/CAM)
  - Geographical Information Systems (GIS)

Superclasses and Subclasses

- Subclasses and Superclasses
  - a subclass entity type is a specialised type of superclass entity type
  - a subclass entity type represents a subgrouping of superclass entity type's instances

  e.g. undergraduates and postgraduates are subclasses of the student superclass

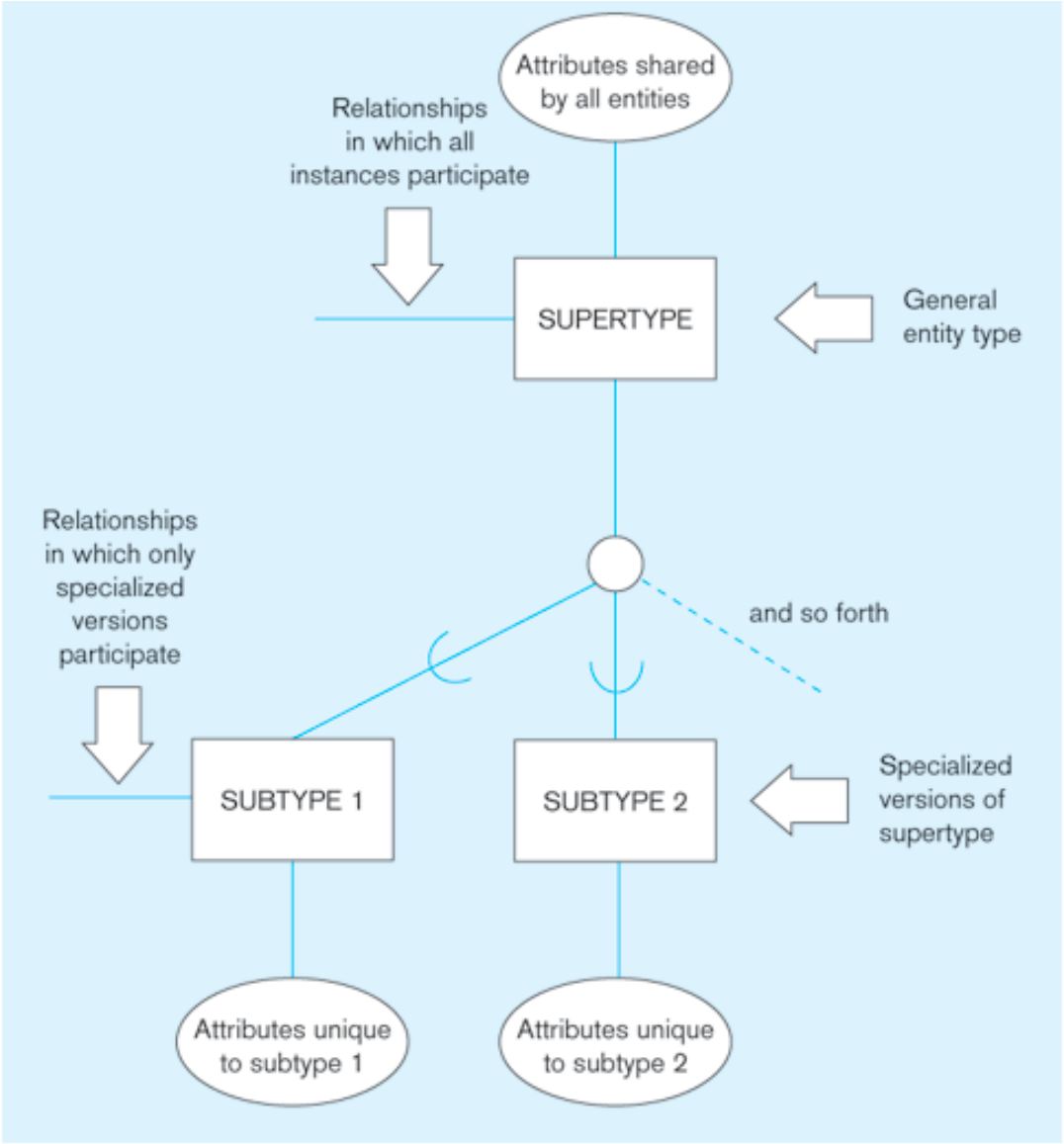
Superclasses and Subclasses

- The relationship between a superclass and any one of its subclasses is called **superclass/subclass** relationship.

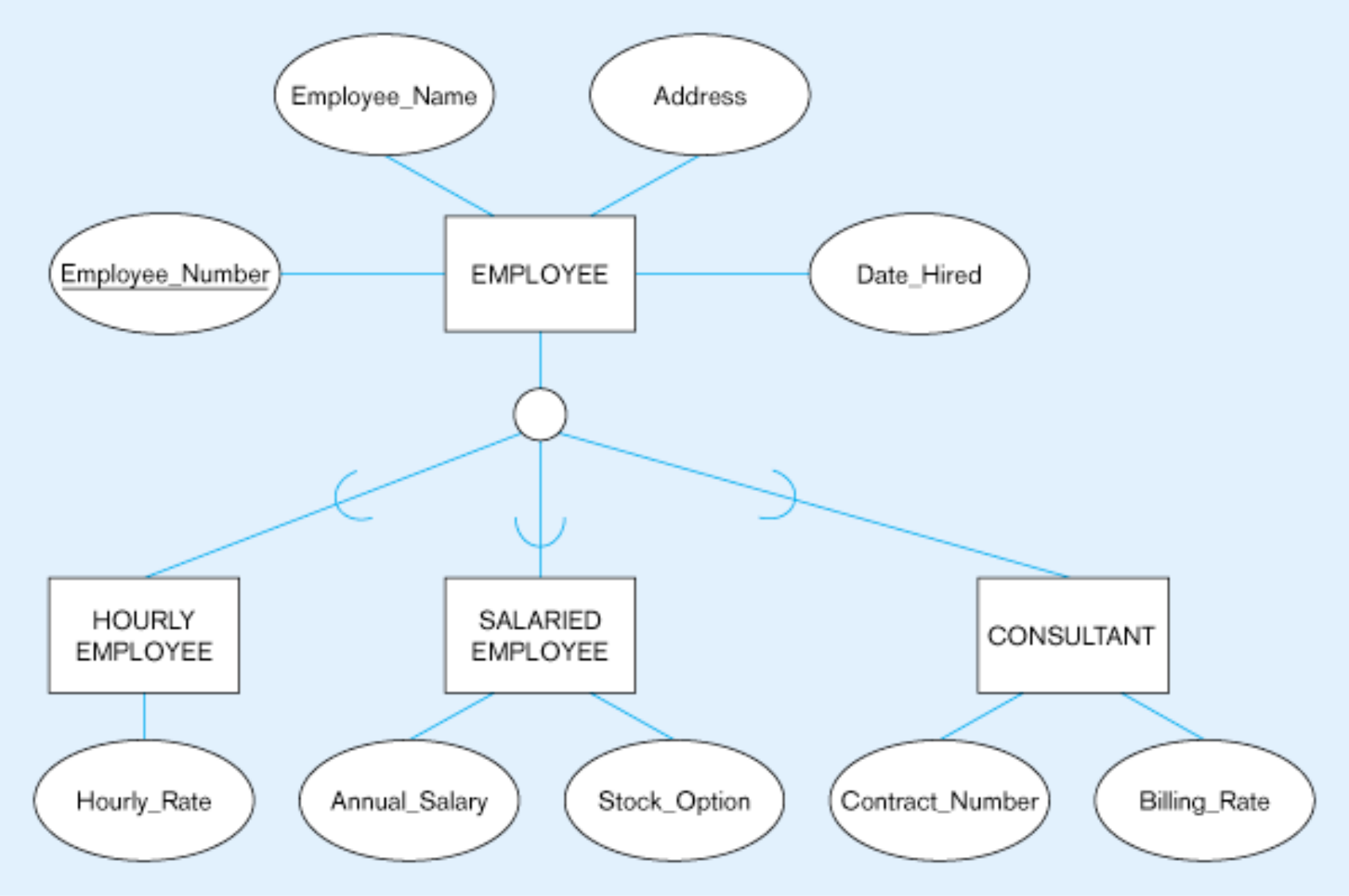
- **superclass/subclass** relationship is also called an **IS-A relationship**.

  e.g. Engineer is an employee.

Basic notation for supertype/subtype relationships- Traditional EER notation



Employee supertype with three subtypes



Inheritance

- An important concept associated with subclass is that of **type inheritance**.

- Since an entity in the sub class represents the same real world from the superclass, it should possess values for its specific attributes as well as values of its attributes as a member of the superclass.

Inheritance

- We say that an entity that is a member of a subclass inherits all the attributes of the entity as a member of the superclass.

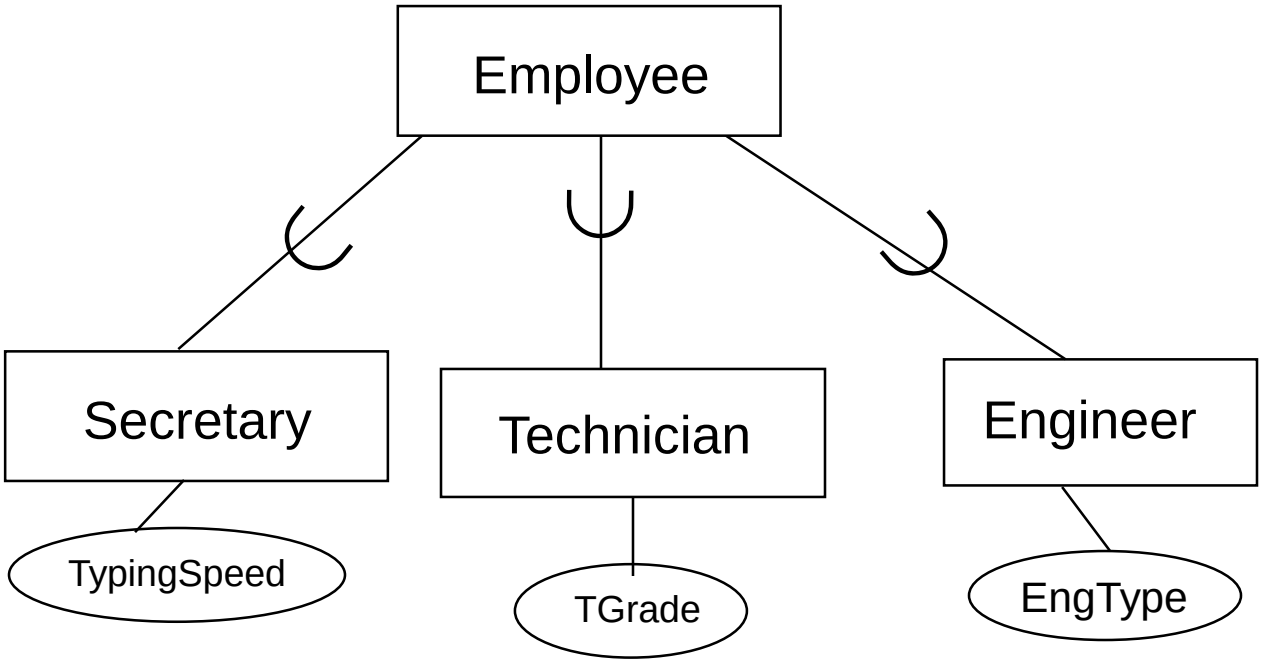
- The entity also inherits all the relationships in which the superclass participates.

Specialisation

- Specialisation
  - the process of defining a set of more specialised entity types of an entity type

    e.g. the set of subclasses {secretary, engineer, technician} is a specialization of the super class Employee.

Specialisation



Specialisation

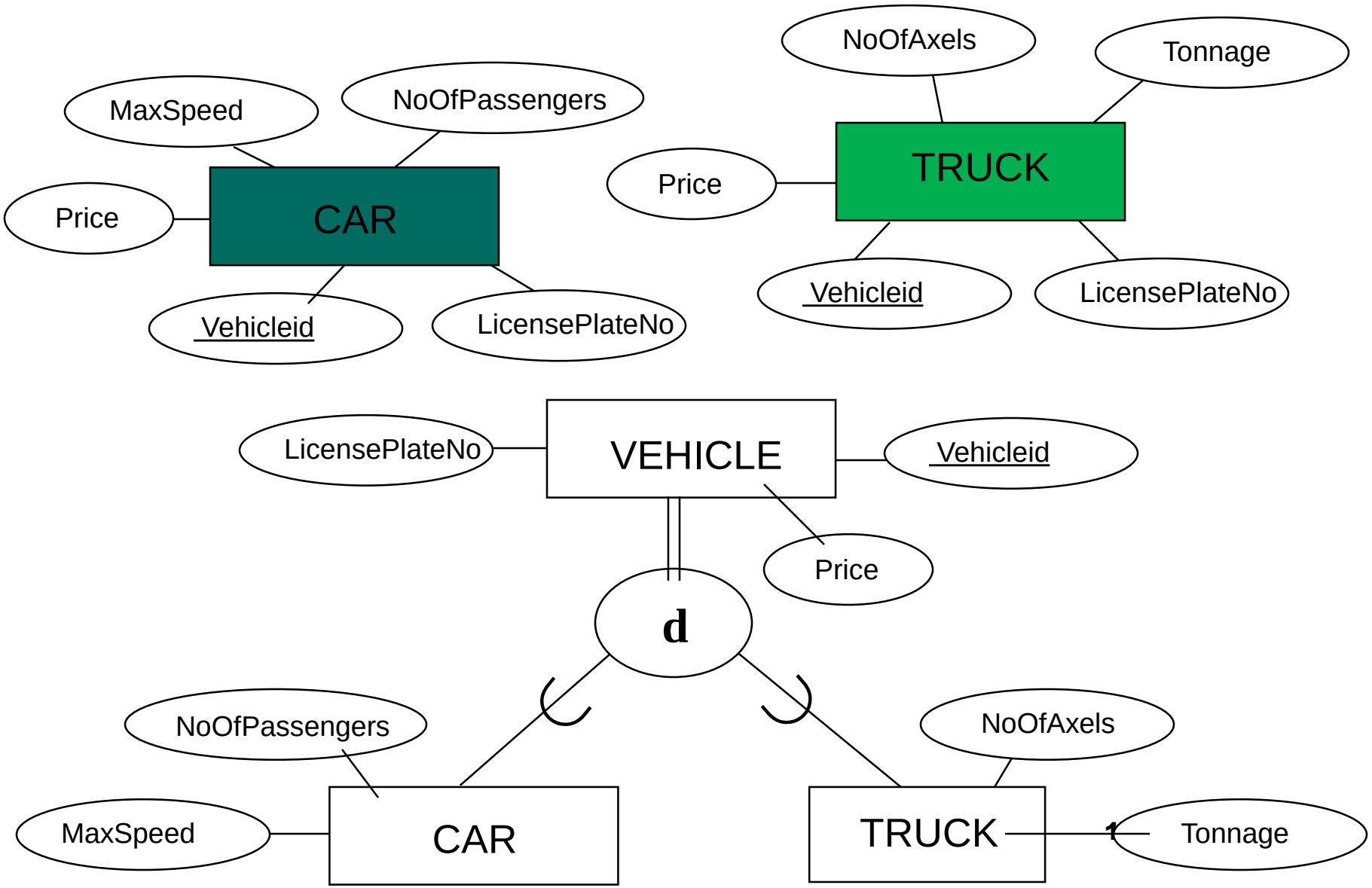
- Specialization process allows to do followings
  - Define a set of sub classes of an entity type.
  - Establish additional specific attributes with each subclass
  - Establish additional specific relationship types between each subclass and other entity types or other subclasses.

Generalisation

- Generalisation
  - The process of defining a generalised entity type from a set of entity types
  - Suppresses the differences among several entity types, identify their common features and generalize them into a single superclass.

  - Inverse of the specialization process.

Generalisation



Constraints on Specialisation & Generalisation

- **Disjointness**
  - *Overlap*

    the same entity instance may be a member of *more than one* subclass of the specialization

    (eg: a person is a student who is also a part-time employee - Both can function at the same time)

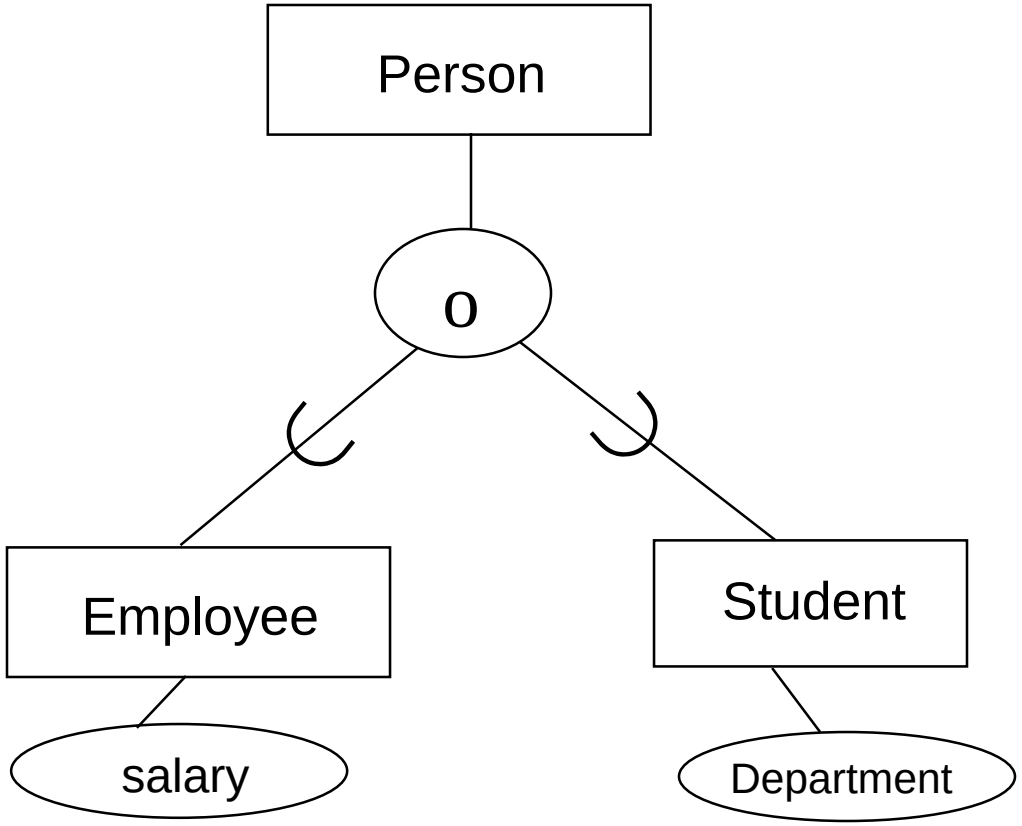
  - *Disjoint*

    the same entity instance may be a member of *only one* subclass of the specialization

    (eg: An employee cant be both a secretary and an engineer - Both can't function at the same time)

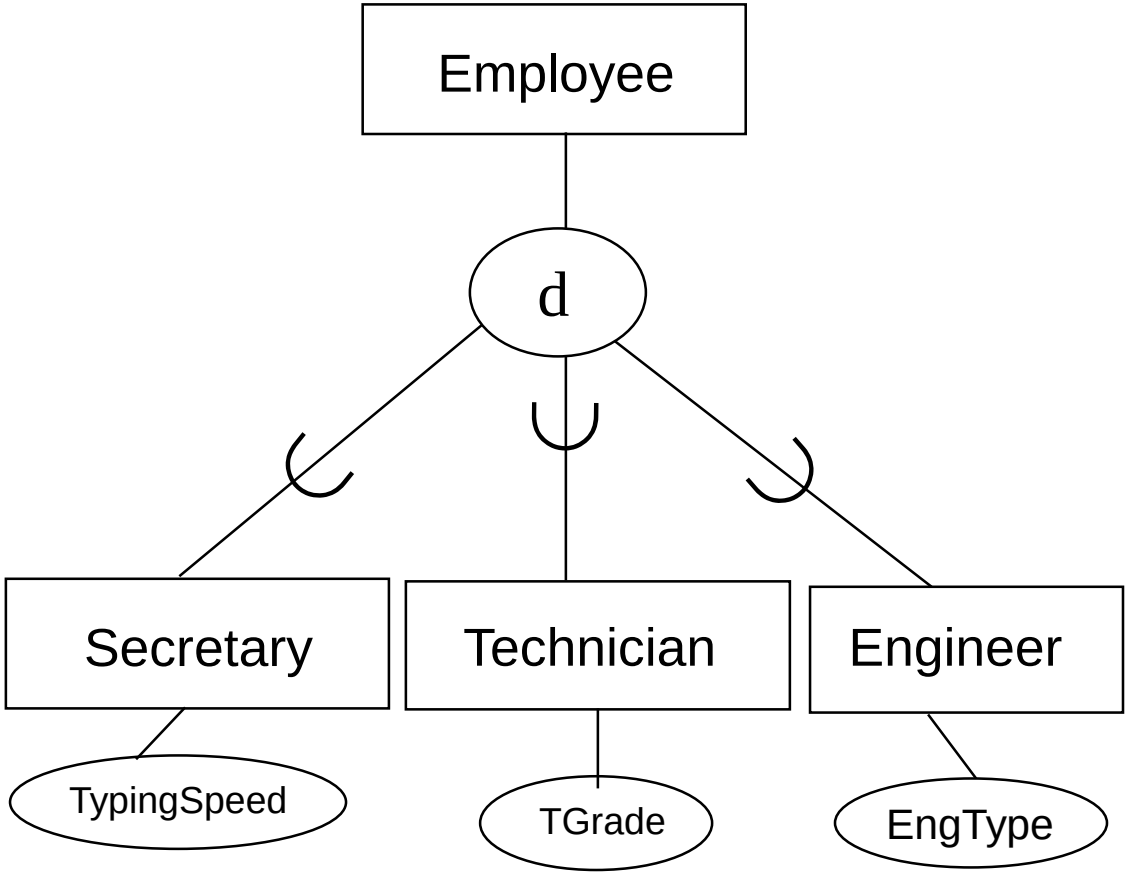
Constraints on Specialisation & Generalisation

Overlap

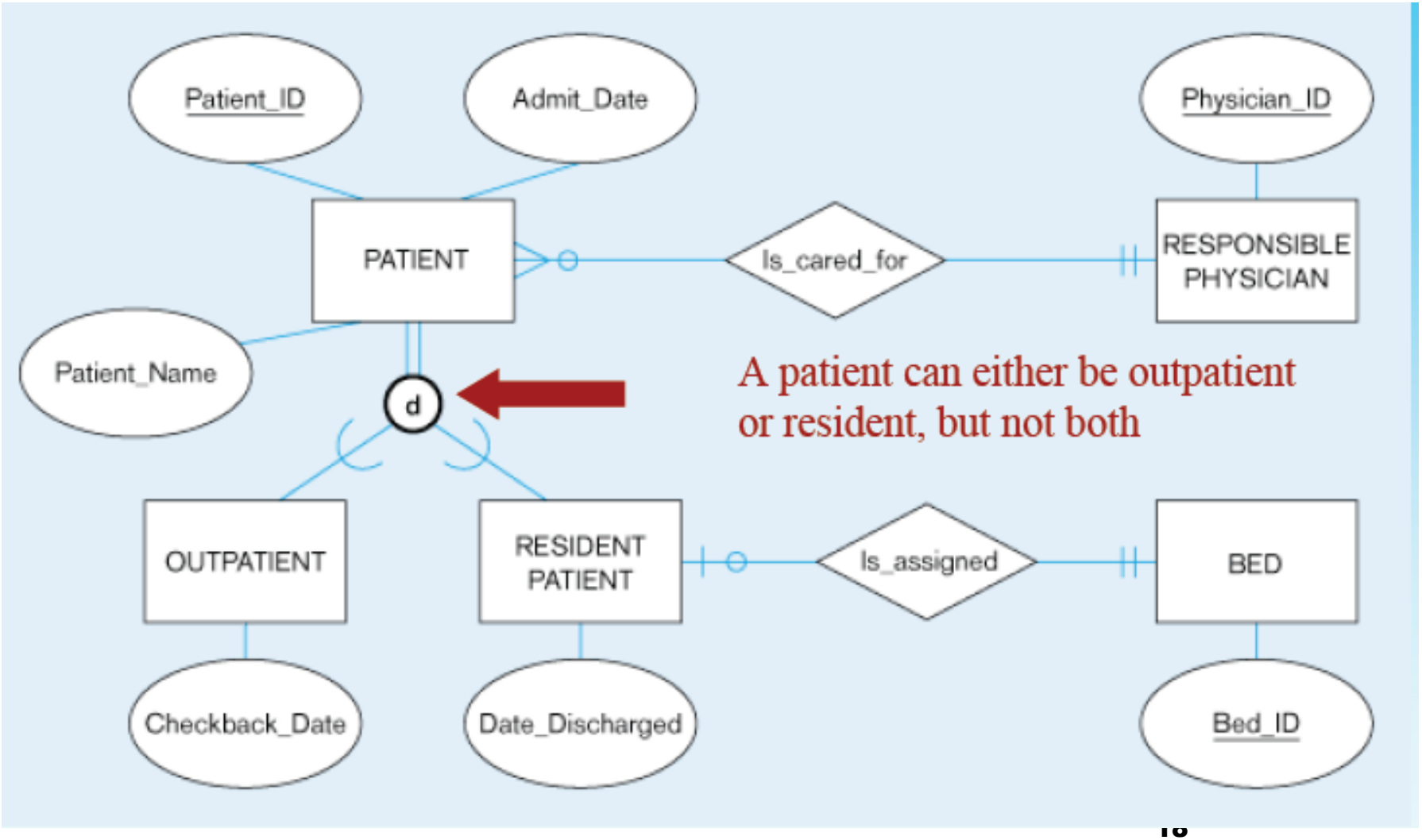


Constraints on Specialisation & Generalisation

Disjoint



Disjoint rule



Constraints on Specialisation & Generalisation

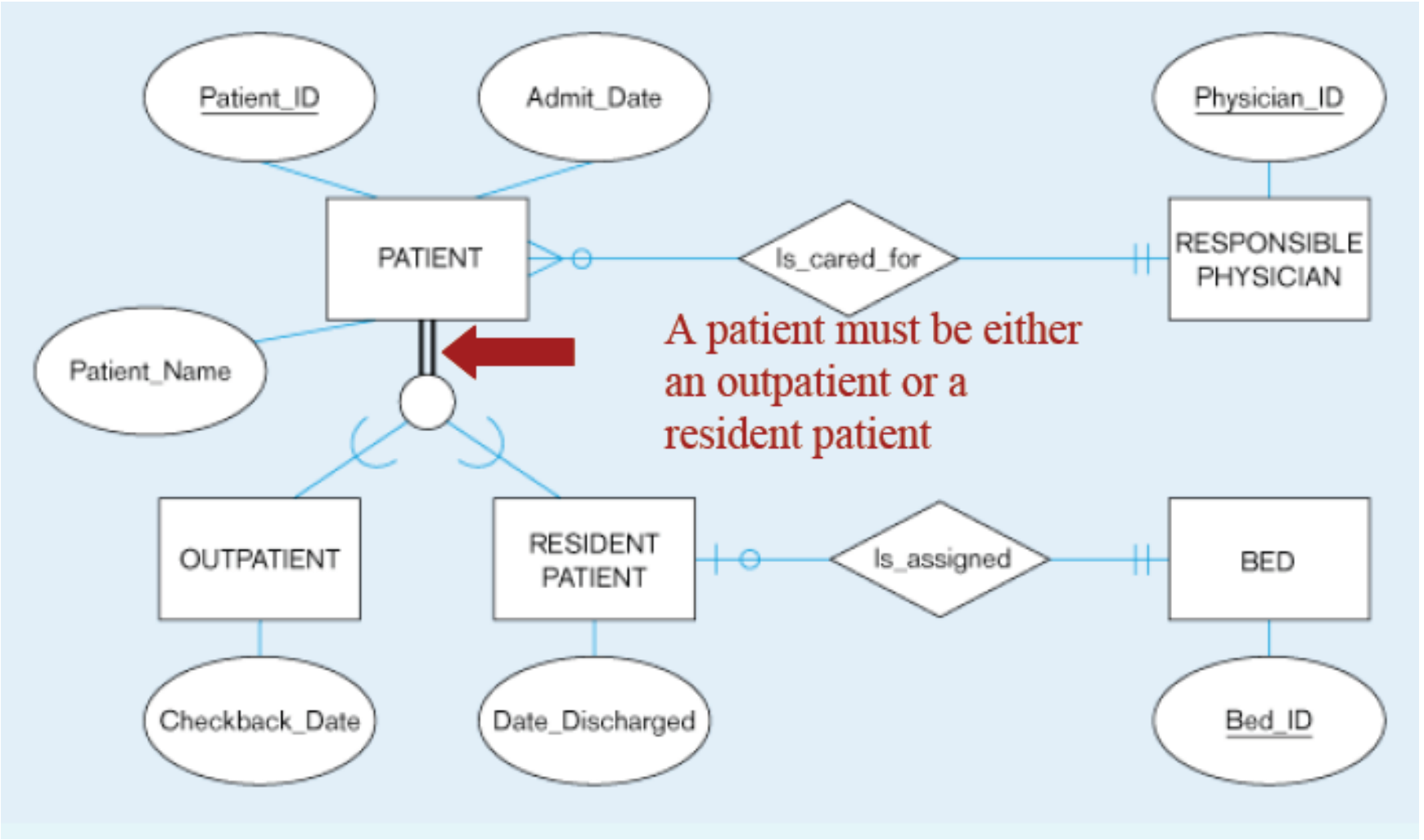
- **Completeness**
  - *Total*

    every entity instance in the superclass *must be* a member of some subclass in the specialization

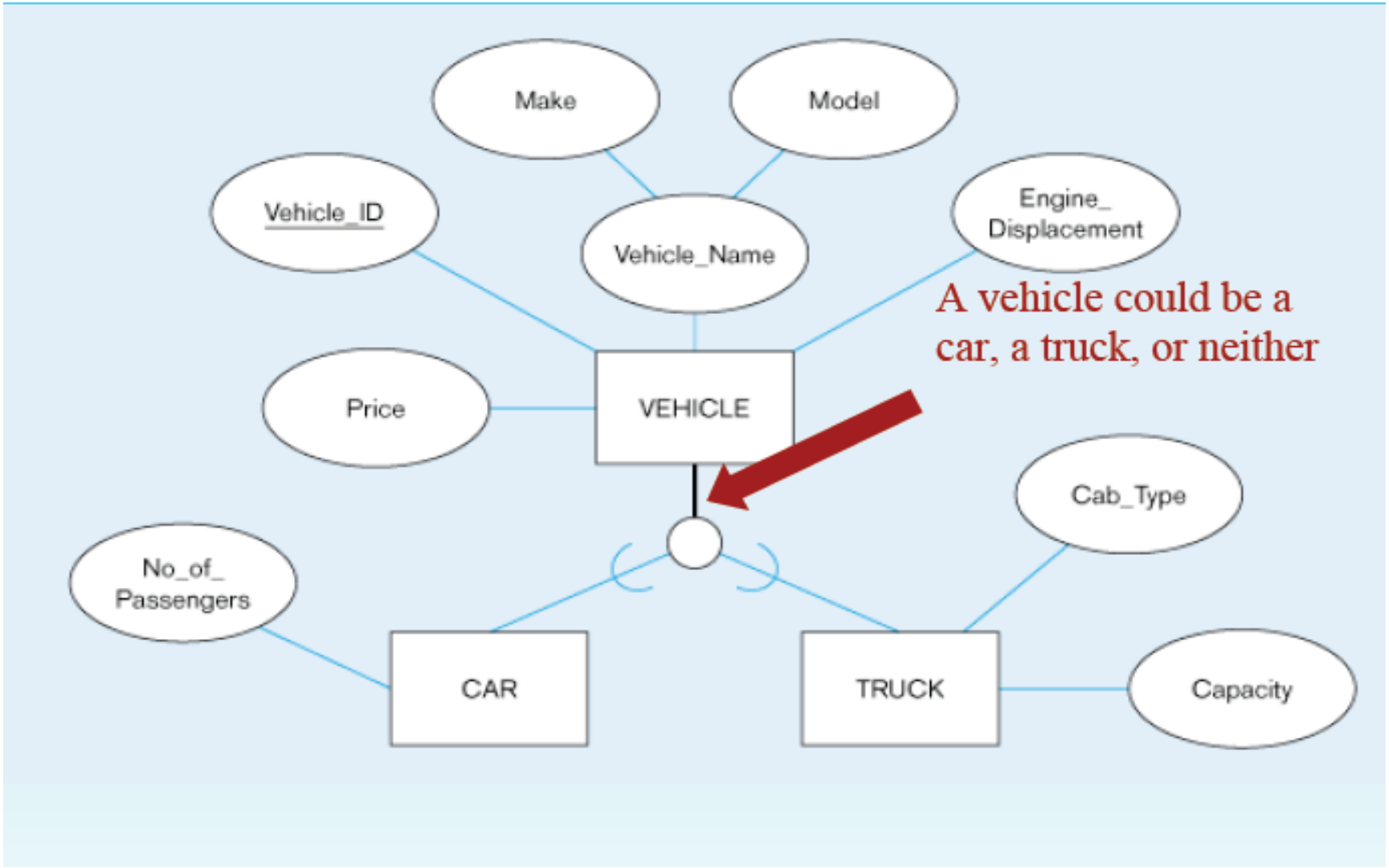
  - *Partial*

    an entity instance in the superclass need not be a member of any subclass in the specialisation

Examples of completeness constraints
Total specialization rule



Partial specialization rule

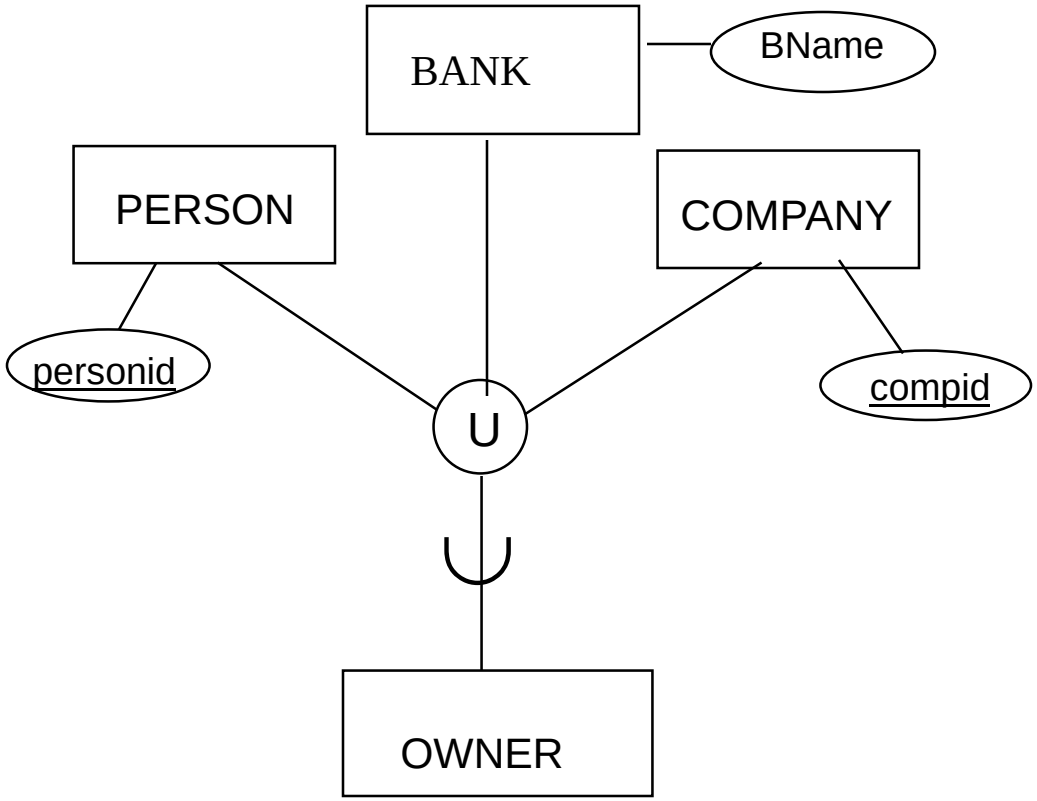


Constraints on Specialisation & Generalisation

- Disjointness and completeness are independent and therefore we have the following four possible constraints on specialisation
  - Disjoint, total
  - Disjoint, partial
  - Overlapping, total
  - Overlapping, partial

Category

- A category is a subclass of the union of two or more superclasses that can have different keys because they can be of different entity types.



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