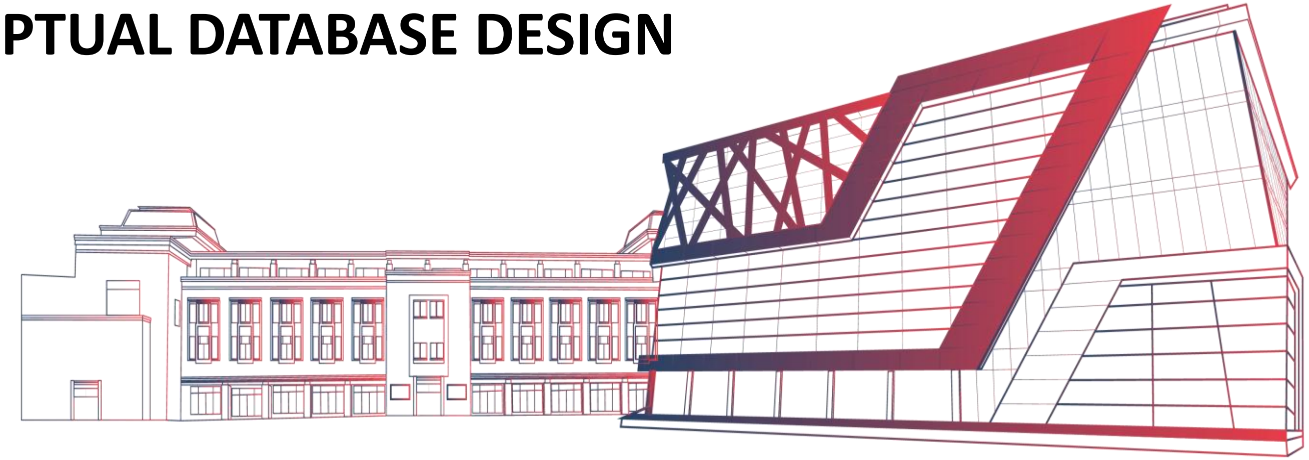
THE NORTHCAP UNIVERSITY

UNIT II

CONCEPTUAL DATABASE DESIGN



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Lecture 8

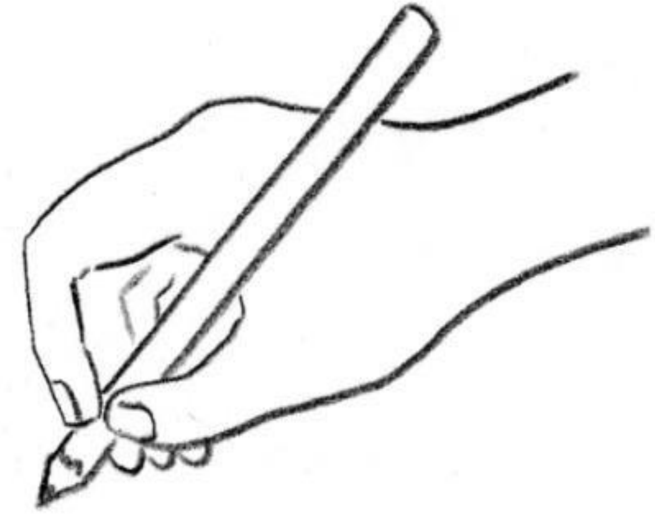
Extended Entity Relationship Model

Why EER??

THE ENTITY RELATIONSHIP MODEL IN ITS ORIGINAL FORM DID NOT SUPPORT THE SPECIALIZATION/ GENERALIZATION ABSTRACTIONS

Extended Entity Relationship (EER) Model

- EER is a high-level data model that incorporates the extensions to the original ER model.
- **It is a diagrammatic technique for displaying the following concepts**
  - **Sub Class and Super Class**
  - **Specialization and Generalization**
  - **Union or Category**
  - **Aggregation**



Subclasses & Superclasses

- **An entity type may have additional meaningful subgroupings of its entities**

  Example: EMPLOYEE may be further grouped into:

  - ❑ **SECRETARY, ENGINEER, TECHNICIAN**

    (Based on the EMPLOYEE's Job)

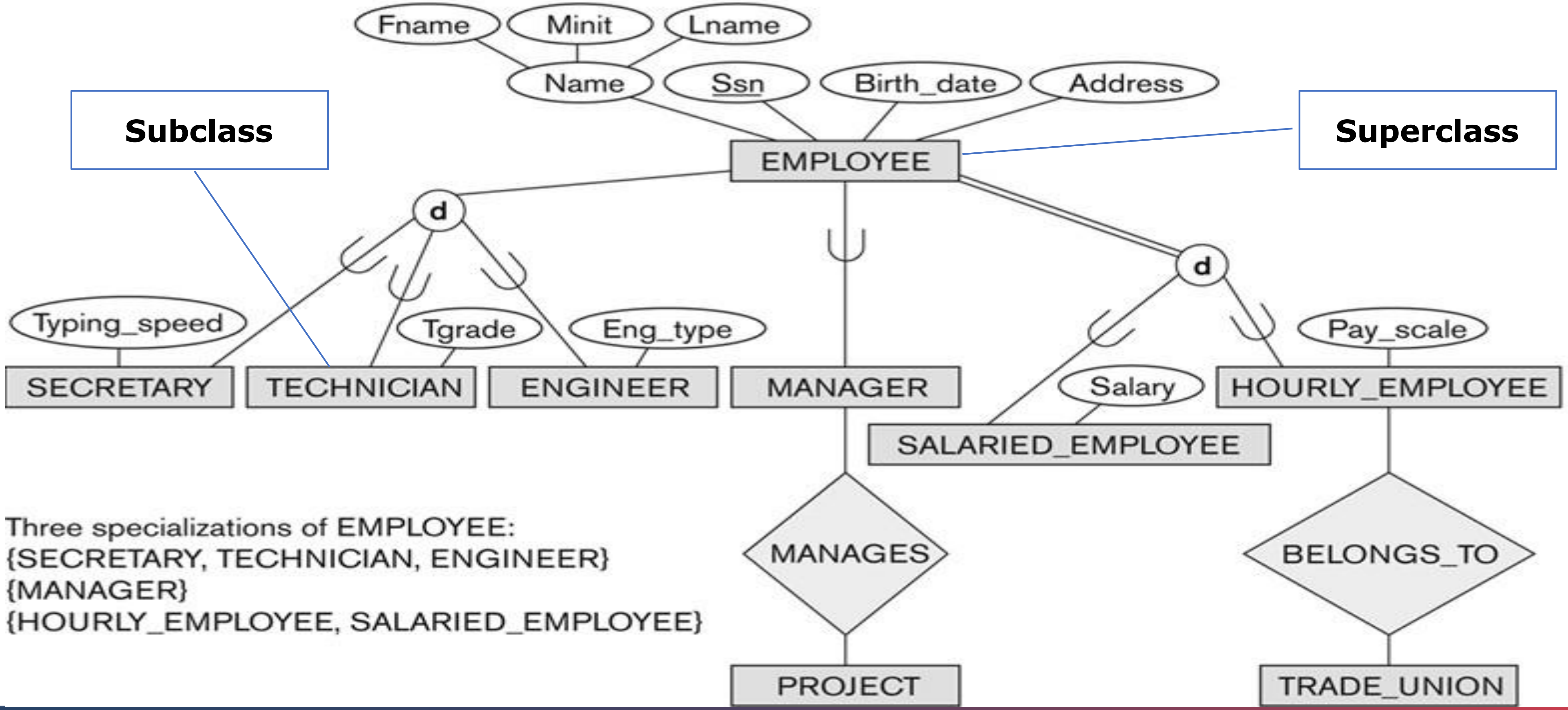
  - ❑ **MANAGER**

    (EMPLOYEEs who are managers)

  - ❑ **SALARIED_EMPLOYEE, HOURLY_EMPLOYEE**

    (Based on the EMPLOYEE's method of pay)

Example – Subclass & Superclass



Subclass

Superclass

Three specializations of EMPLOYEE:
{SECRETARY, TECHNICIAN, ENGINEER}
{MANAGER}
{HOURLY_EMPLOYEE, SALARIED_EMPLOYEE}

Subclass & Superclass (Cont.)

- The Superclass-subclass relationship is also called IS-A relationship

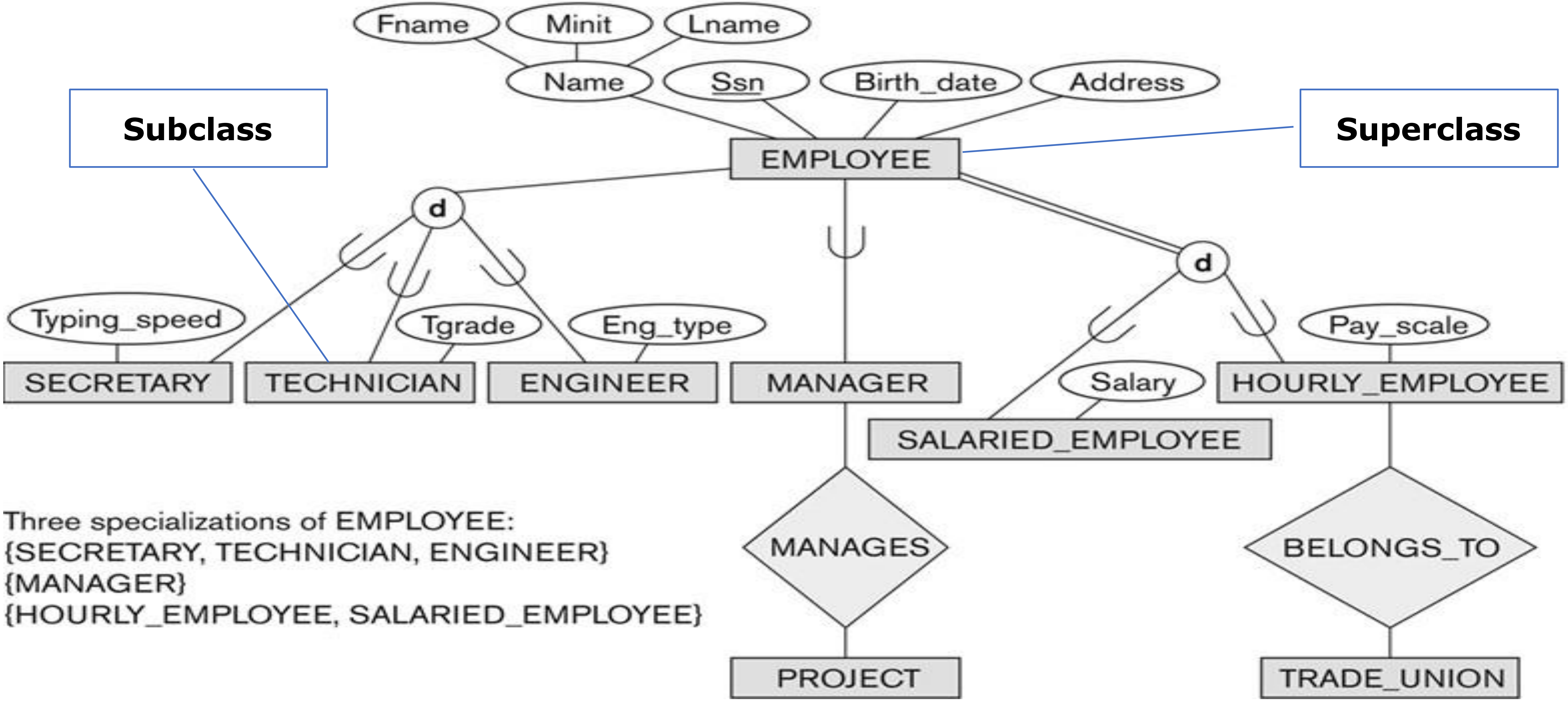
  Example: SECRETARY IS-A EMPLOYEE, TECHNICIAN IS-A EMPLOYEE

- **Note: An entity that is member of a subclass represents the same real-world entity as some member of the superclass:**
  - The subclass member is the same entity in a *distinct specific role*
  - An entity cannot exist in the database merely by being a member of a subclass; it must also be a member of the superclass
  - A member of the superclass can be optionally included as a member of any number of its subclasses

Example - Subclass & Superclass

- ►A salaried employee who is also an engineer belongs to the two subclasses:
  - ►ENGINEER, and
  - ►SALARIED_EMPLOYEE
- ►A salaried employee who is also an engineering manager belongs to the three subclasses:
  - ►MANAGER,
  - ►ENGINEER, and
  - ►SALARIED_EMPLOYEE

Example – Subclass & Superclass



Subclass

Superclass

Three specializations of EMPLOYEE:
{SECRETARY, TECHNICIAN, ENGINEER}
{MANAGER}
{HOURLY_EMPLOYEE, SALARIED_EMPLOYEE}

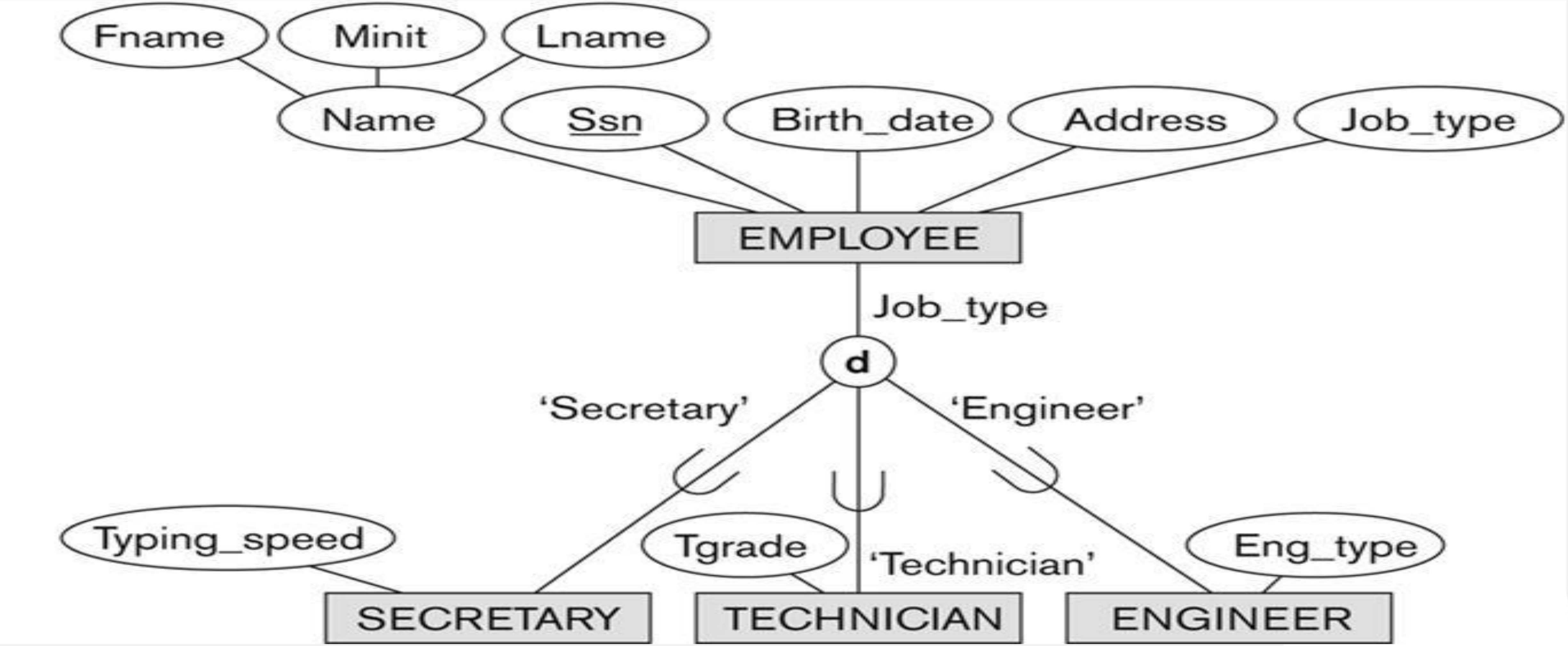
Attribute Inheritance in Superclass/ Subclass Relationships

- An entity that is member of a subclass *inherits*
  - All attributes of the entity as a member of the superclass
  - All relationships of the entity as a member of the superclass
- Example: SECRETARY (as well as TECHNICIAN and ENGINEER) inherit the attributes Name, SSN, …, from EMPLOYEE

Specialization

- **Specialization** is the process of defining a set of subclasses of a superclass
- The set of subclasses is based upon some **distinguishing characteristics** of the entities in the superclass
  - **Example: {SECRETARY, ENGINEER, TECHNICIAN} is a specialization of EMPLOYEE based upon *job type.***
- **May have several specializations of the same superclass**

Representing Specialization – Attribute Defined on Job-type

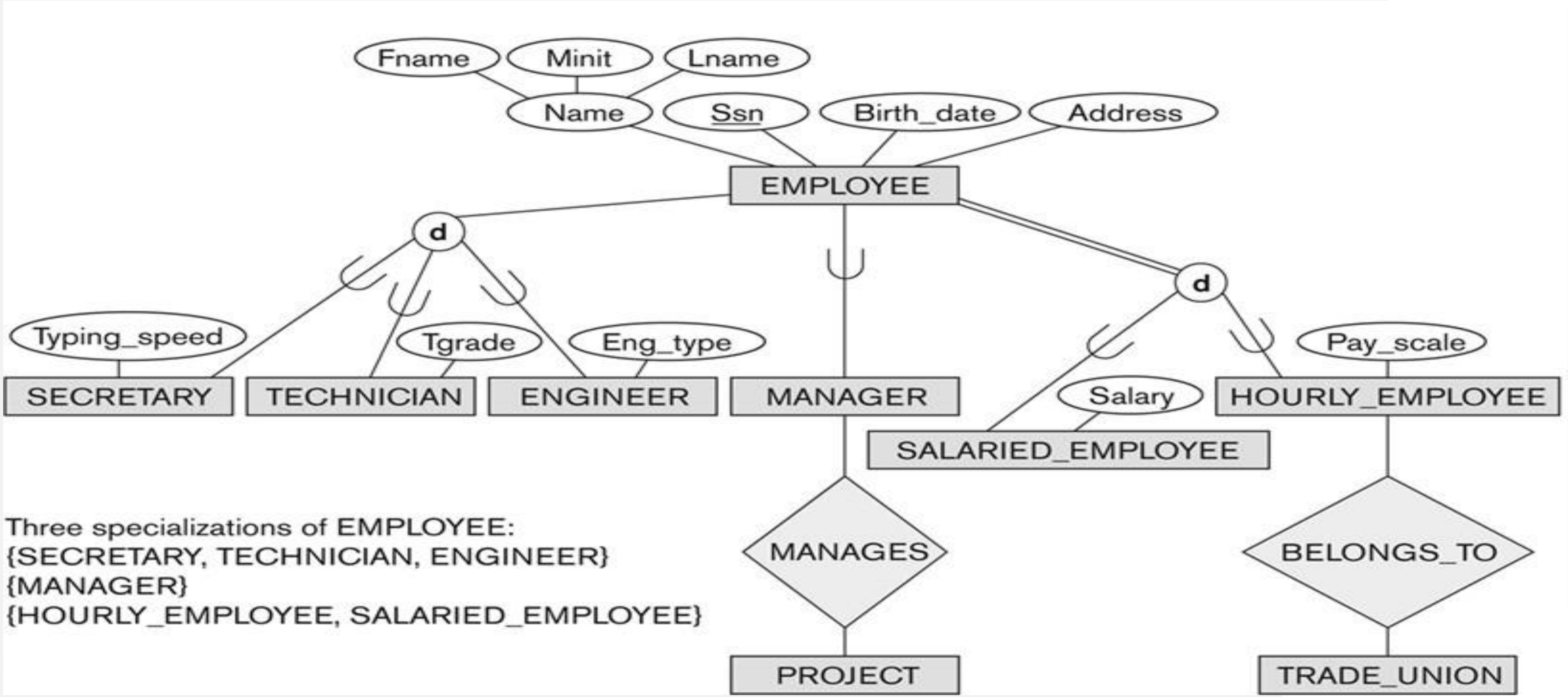


Specialization (Cont.)

Example: Another specialization of EMPLOYEE based on *method of pay* is {SALARIED_EMPLOYEE, HOURLY_EMPLOYEE}.

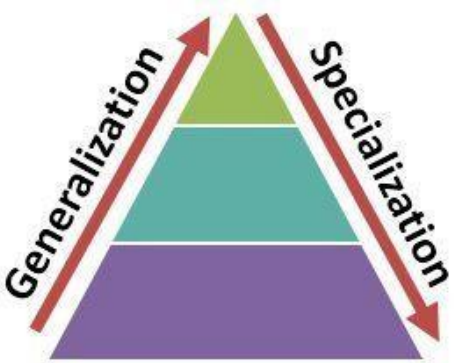
- Attributes of a subclass are called *specific* or *local* attributes.
  - For example, the attribute TypingSpeed of SECRETARY
- The subclass can also participate in specific relationship types.
  - For example, a relationship BELONGS_TO of HOURLY_EMPLOYEE

Specialization (Cont.)



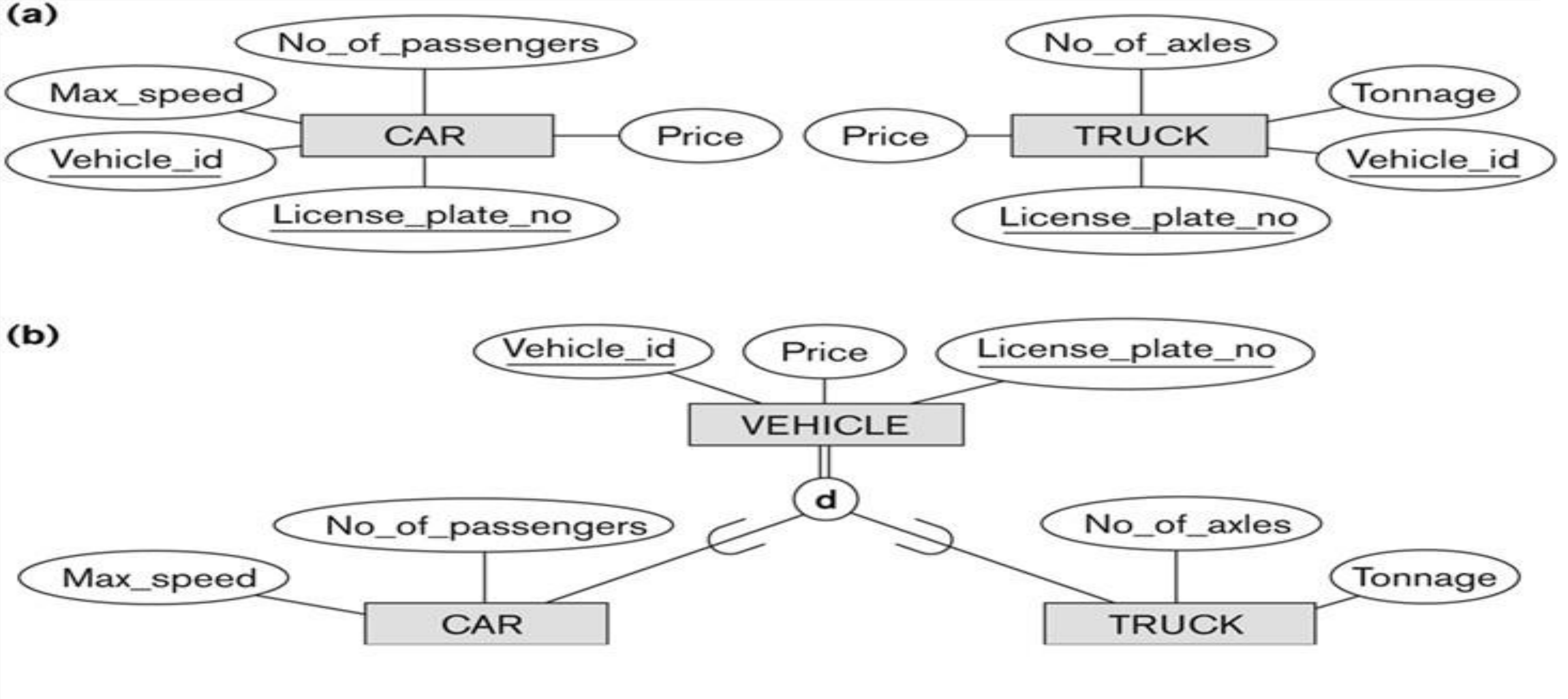
Three specializations of EMPLOYEE:
{SECRETARY, TECHNICIAN, ENGINEER}
{MANAGER}
{HOURLY_EMPLOYEE, SALARIED_EMPLOYEE}

Generalization



- **Generalization is the reverse of the specialization process**
- Several classes with common features are generalized into a superclass (original classes become its subclasses)
- **Example: CAR, TRUCK generalized into VEHICLE;**
  - both CAR, TRUCK become subclasses of the superclass VEHICLE.
  - We can view {CAR, TRUCK} as a specialization of VEHICLE
  - Alternatively, we can view VEHICLE as a generalization of CAR and TRUCK

Generalization Example



Generalization. (a) Two entity types, CAR and TRUCK.
(b) Generalizing CAR and TRUCK into the superclass VEHICLE.

Data Modeling – Generalization & Specialization

- A superclass or subclass represents a collection (or set or grouping) of entities
- It also represents a particular *type of entity*
- We can call all entity types (and their corresponding collections) ***classes***, whether they are entity types, superclasses or subclasses

Thanks!!