Database Management Systems

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Lecture Session-5

ER to Relational Mapping

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Mapping entity types

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1. Mapping of Regular Entity Types.

- For each regular (strong) entity type E in the ER schema, create a relation R that includes all the simple attributes of E.
- Choose one of the key attributes of E as the primary key for R.
- If the chosen key of E is composite, the set of simple attributes that form it will together form the primary key of R.

2. Mapping of Weak Entity Types

- For each weak entity type W in the ER schema with owner entity type E, create a relation R & include all simple attributes (or simple components of composite attributes) of W as attributes of R.
- Also, include as foreign key attributes of R the primary key attribute(s) of the relation(s) that correspond to the owner entity type(s).
- The primary key of R is the *combination of* the primary key(s) of the owner(s) and the partial key of the weak entity type W, if any.

Mapping Relationship types

3. Mapping of Binary 1:1 Relation Types

For each binary 1:1 relationship type R in the ER schema, identify the relations S and T that correspond to the entity types participating in R.

There are three possible approaches:

1. **Foreign Key approach:** Choose one of the relations-say S-and include a foreign key in S that refers to the primary key of T. It is better to choose an entity type with total participation in R in the role of S.
2. **Merged relation option:** An alternate mapping of a 1:1 relationship type is possible by merging the two entity types and the relationship into a single relation. This may be appropriate when both participations are total.
3. **Cross-reference or relationship relation option:** The third alternative is to set up a third relation R for the purpose of cross-referencing the primary keys of the two relations S and T representing the entity types.

4. Mapping of Binary 1:N Relationship Types.

- For each regular binary 1:N relationship type R, identify the relation S that represent the participating entity type at the N-side of the relationship type.
- Include as foreign key in S the primary key of the relation T that represents the other entity type participating in R.
- Include any simple attributes of the 1:N relation type as attributes of S.

5. Mapping of Binary M:N Relationship Types.

- For each regular binary M:N relationship type R, *create a new relation* S to represent R.
- Include as foreign key attributes in S the primary keys of the relations that represent the participating entity types; *their combination will form the primary key* of S.
- Also include any simple attributes of the M:N relationship type (or simple components of composite attributes) as attributes of S.

Mapping Multivalued attributes

6. Mapping of Multivalued attributes.

- For each multivalued attribute A, create a new relation R.
- This relation R will include an attribute corresponding to A, plus the primary key attribute K-as a foreign key in R-of the relation that represents the entity type of relationship type that has A as an attribute.
- The primary key of R is the combination of A and K. If the multivalued attribute is composite, we include its simple components.

Mapping n-ary relationships

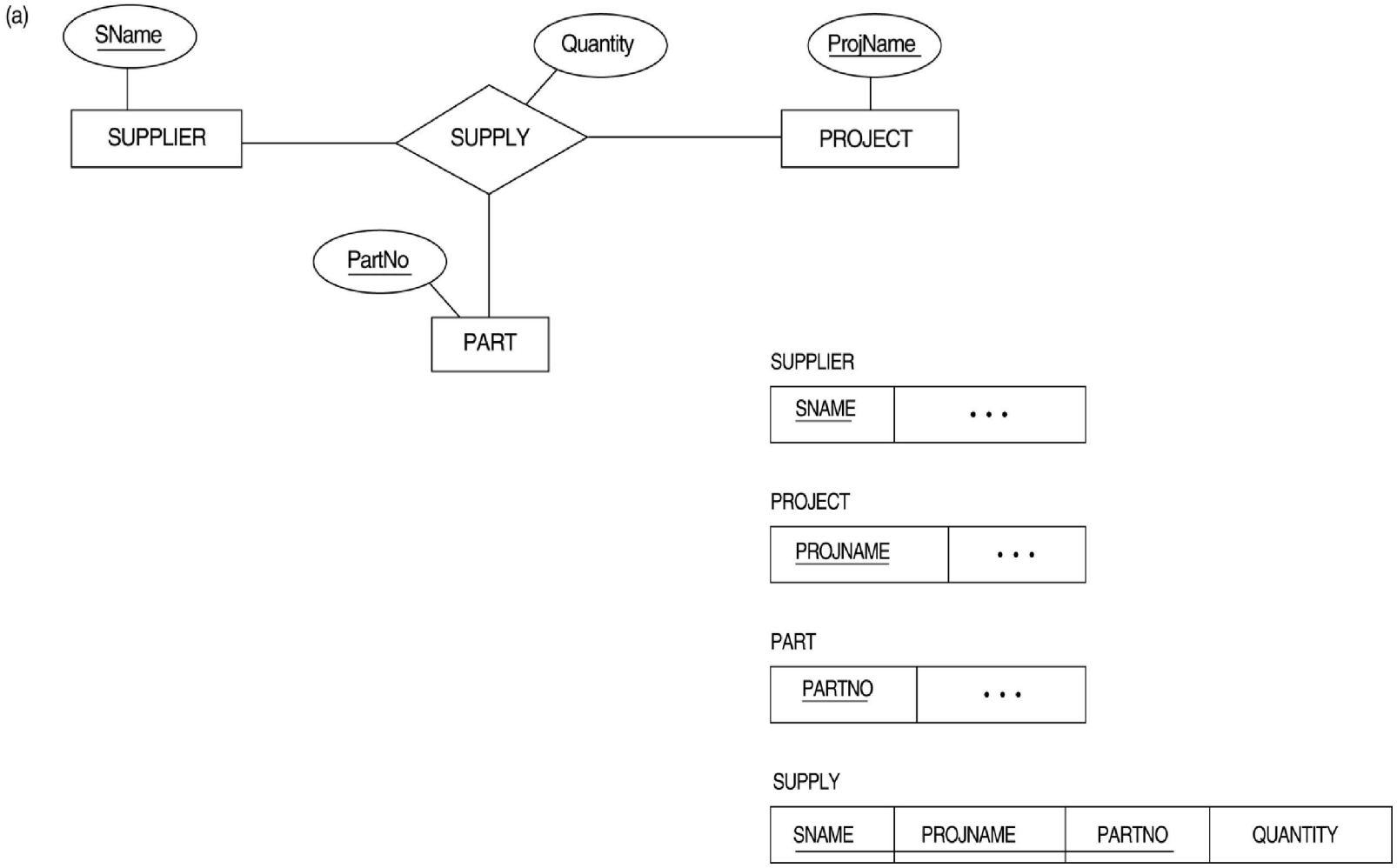
7. Mapping of N-ary Relationship Types.

- For each n-ary relationship type R, where n>2, create a new relationship S to represent R.
- Include as foreign key attributes in S the primary keys of the relations that represent the participating entity types.
- Also include any simple attributes of the n-ary relationship type (or simple components of composite attributes) as attributes of S.

Example: The relationship type SUPPY in the ER on the next slide.

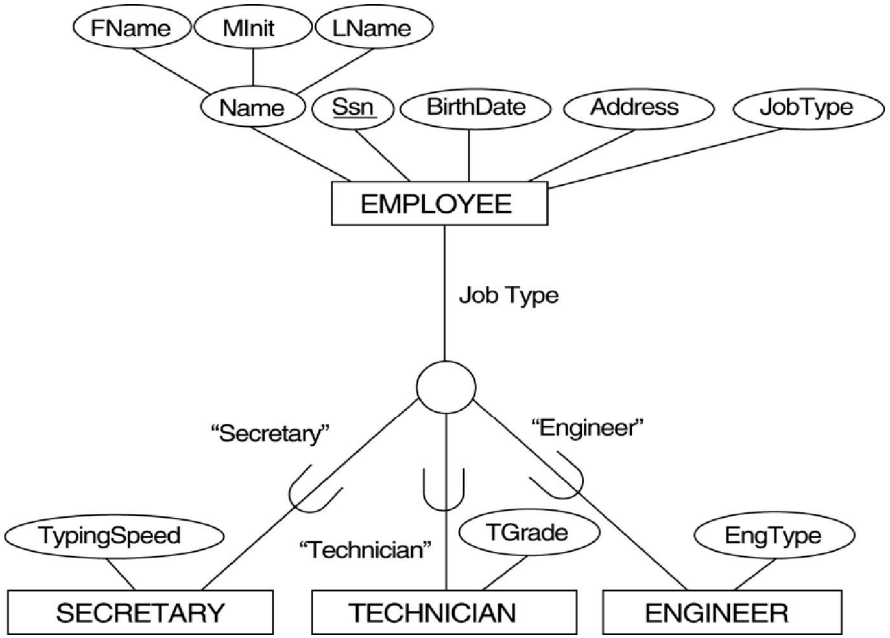
- This can be mapped to the relation SUPPLY shown in the relational schema, whose primary key is the combination of the three foreign keys {SNAME, PARTNO, PROJNAME}

Mapping Class hierarchies



Mapping Class hierarchies

8. Options for Mapping Specialization or Generalization.
    - Option 8A: Multiple relations-Superclass and subclasses
    - Option 8B: Multiple relations-Subclass relations only



Option 8A: Multiple relations-Superclass and subclasses

(a)

EMPLOYEE

SSN	FName	MInit	LName	BirthDate	Address	JobType

SECRETARY

SSN	TypingSpeed

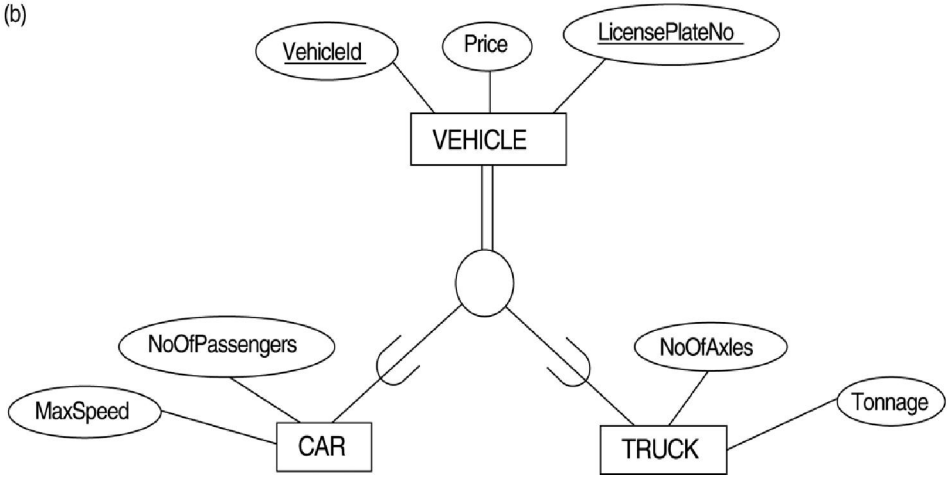
TECHNICIAN

SSN	TGrade

ENGINEER

SSN	EngType

(b)



Option 8B: Multiple relations-Subclass relations only

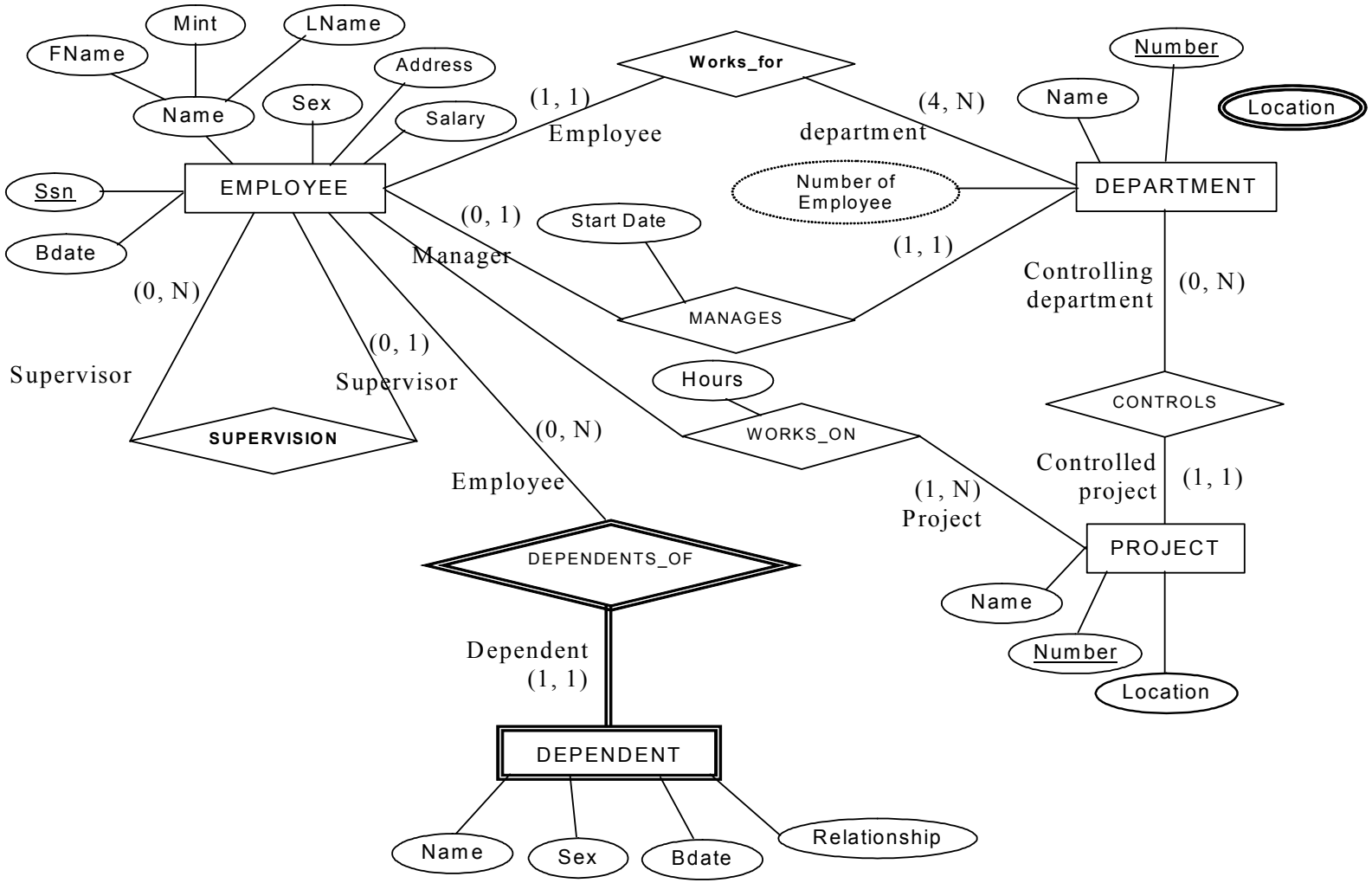
(b) CAR

VehicleId	LicensePlateNo	Price	MaxSpeed	NoOfPassengers

TRUCK

VehicleId	LicensePlateNo	Price	NoOfAxles	

ER-Diagram for Company Database



ER-Relational mapping for Company Database

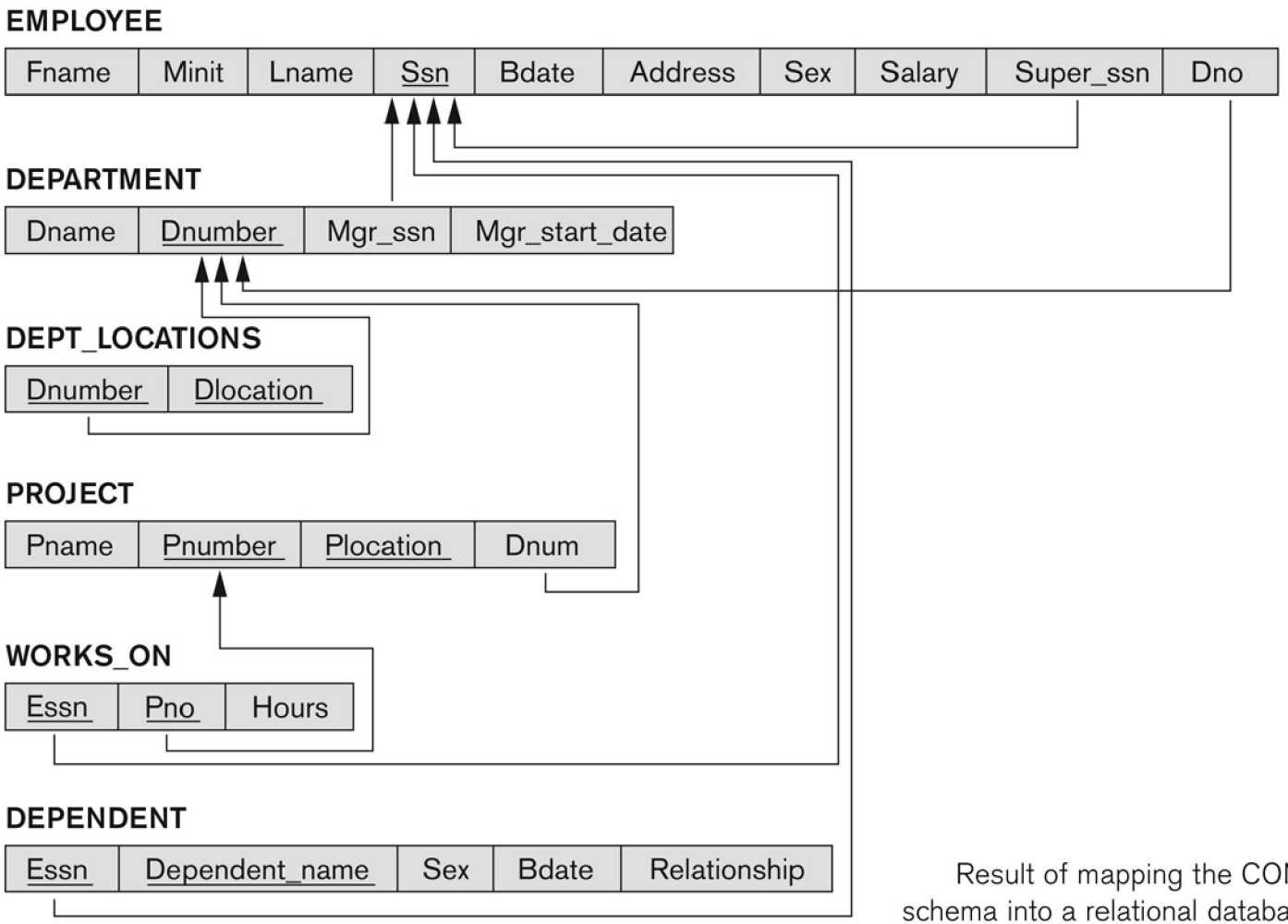


Figure 7.2
Result of mapping the COMPANY ER schema into a relational database schema.

Summary

- ✓ *We have learnt the rules and guidelines for mapping ER to Relational model.*
- ✓ *Rules for mapping Entity types*
- ✓ *Rules for mapping Relationships*
- ✓ *Rules for mapping Class hierarchies*