



MAPPING ERD INTO RELATIONAL DATABASE SCHEMA

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Relational Database Design Using ER-to-Relational Mapping

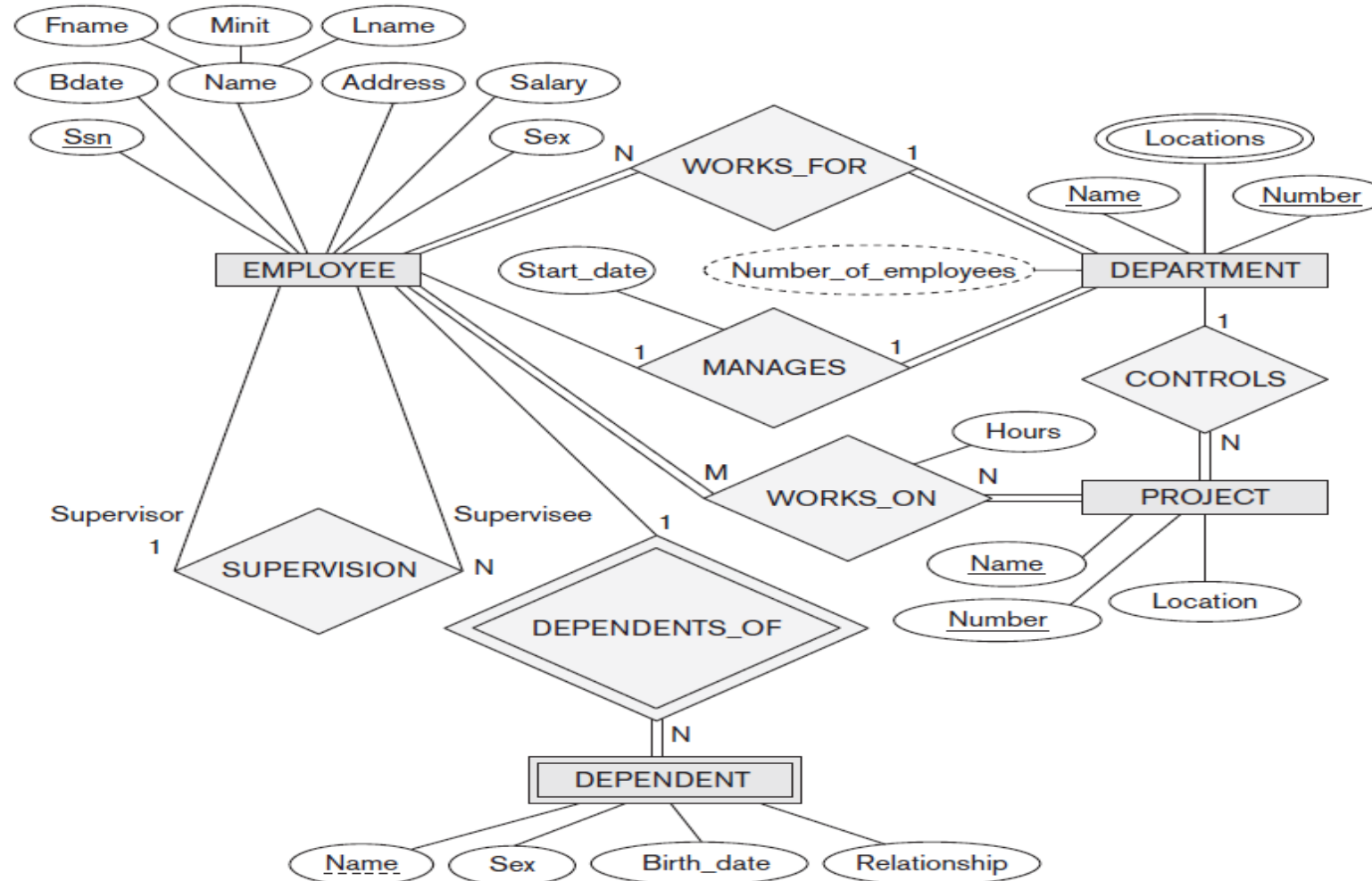
- After drawing the conceptual ER schema, the next step is to convert/map it into a relational database schema.



ER-to-Relational Mapping Example

Figure 9.1

The ER conceptual schema diagram for the COMPANY database.



ER-to-Relational Mapping Algorithm

■ Step 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 .*
- *Include only the simple component attributes of a composite attribute.*
- *Choose one of the key attributes of E as the primary key for R .*
- *If the chosen key of E is a composite, then the set of simple attributes that form it will together form the primary key of R .*

Step 1

- *Entity relations after step 1 for company ER schema.*

(a) **EMPLOYEE**

Fname	Minit	Lname	<u>Ssn</u>	Bdate	Address	Sex	Salary
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DEPARTMENT

Dname	<u>Dnumber</u>
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PROJECT

Pname	<u>Pnumber</u>	Plocation
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ER-to-Relational Mapping Algorithm

■ Step 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 .
- *include as foreign key attributes of R , the primary key attribute(s) of the relation(s) that correspond to the owner entity type(s)*
 - This takes care of mapping the identifying relationship type of W .
- ***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.*

Step 2

- Additional *weak entity* relation after step 2 for the company example.

(b) **DEPENDENT**

<u>Essn</u>	<u>Dependent_name</u>	Sex	Bdate	Relationship
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ER-to-Relational Mapping Algorithm

- **Step 3: Mapping of Binary 1:1 Relationship Types.**
 - *Choose one of the relations— S , say—and include as a foreign key in S the primary key of T .*
- **Step 4: Mapping of Binary 1:N Relationship Types.**
 - *Include the primary key of the 1-side relation as a foreign key in the N-side relation.*
- **Step 5: Mapping of Binary M:N Relationship Types**
 - *For each 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 .*

Step 5

- *Additional relationship relations after step 5.*

(c) **WORKS_ON**

<u>Essn</u>	<u>Pno</u>	Hours
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ER-to-Relational Mapping Algorithm

■ Step 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 of the relation that represents the entity type as a foreign key in R .*

■ Step 7: Mapping of N-ary Relationship Types.

- *For each n -ary relationship type R , where $n > 2$, create a new relationship relation S to represent R .*
- *Include as foreign key attributes in S the primary keys of the relations that represent the participating entity types.*

Step 6

- *Additional relationship relations after step 6.*

(d) **DEPT_LOCATIONS**

<u>Dnumber</u>	<u>Dlocation</u>
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ER-to-Relational Mapping - Solution

Following is the result of mapping ER schema of the company database into a relational schema:

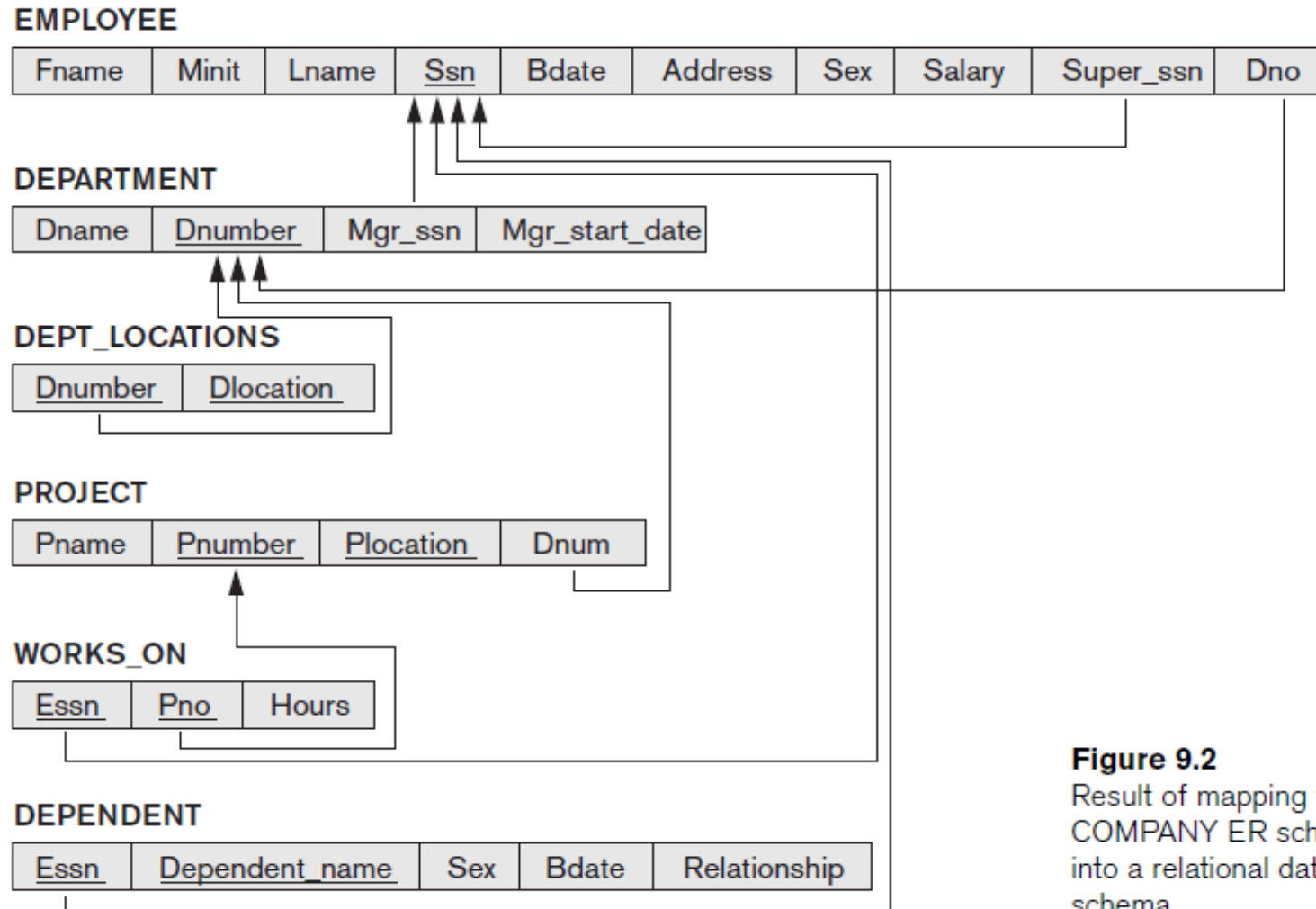


Figure 9.2
Result of mapping the
COMPANY ER schema
into a relational database
schema.



References

Elmasri. Fundamentals of Database System. 7th Ed.



