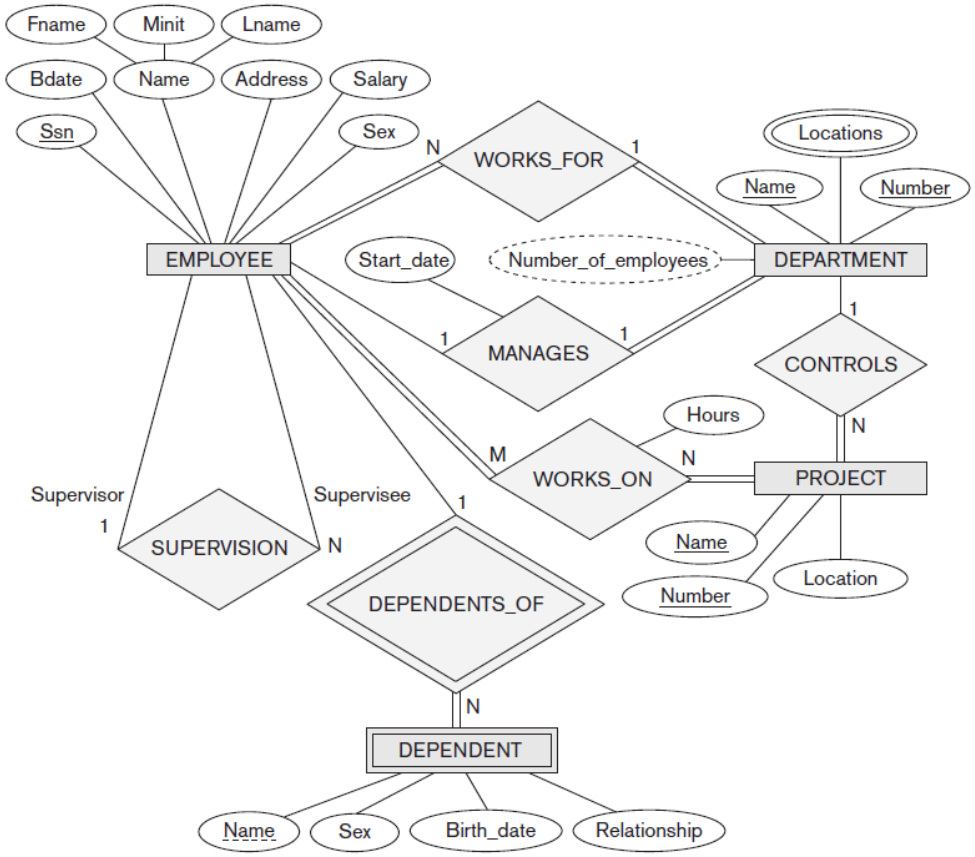
CS275 – Intro to Databases

ER to Relational Schema- *Chap. 9.1*

Mapping ER to Database Schema

Figure 9.1
The ER conceptual schema diagram for the COMPANY database.



Mapping ER to Database Schema

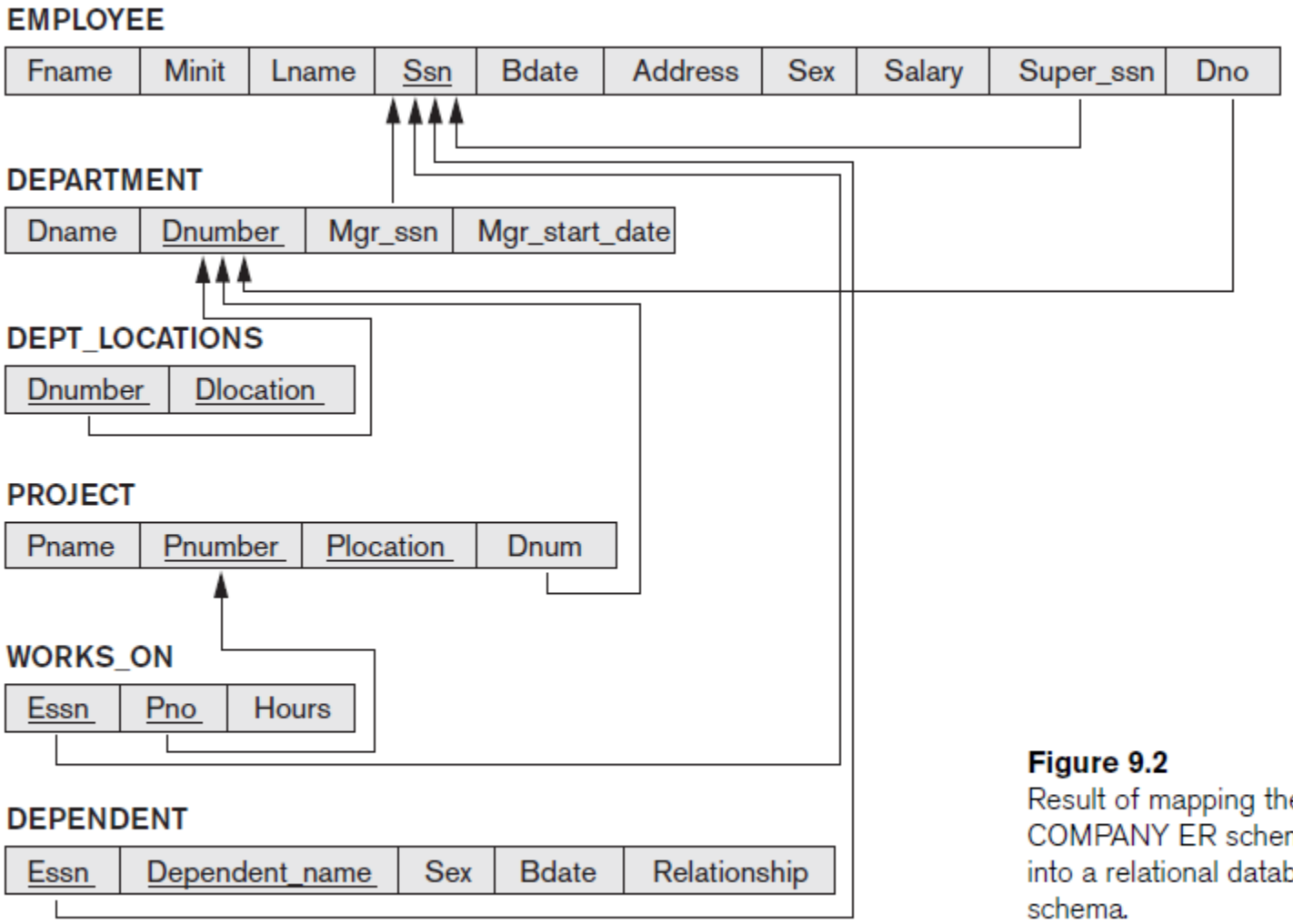


Figure 9.2
Result of mapping the COMPANY ER schema into a relational database schema.

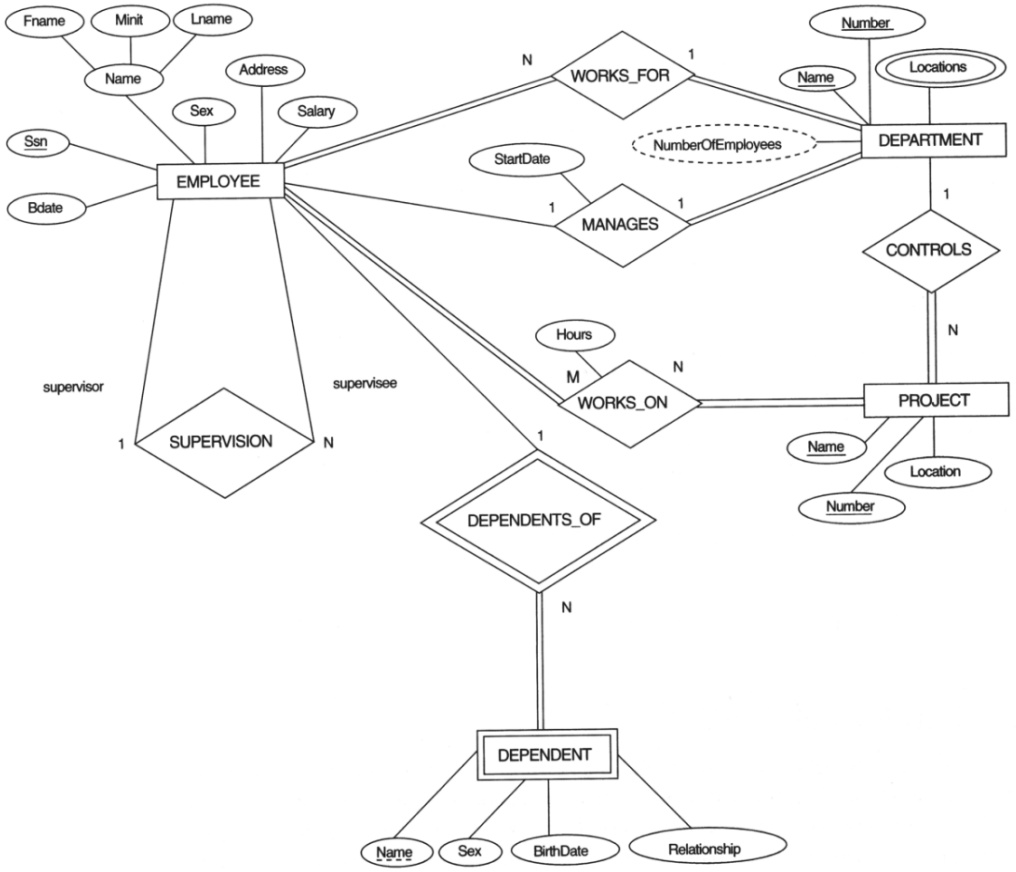
Review of Relational Schemas

- A relational schema R=R(A1, … An)
- **For this class, specify domain in schema**

Student(Name:string,
SSN:string,
HomePhone:string,
Address:string,
OfficePhone:string,
Bdate:date,
GPA:real)

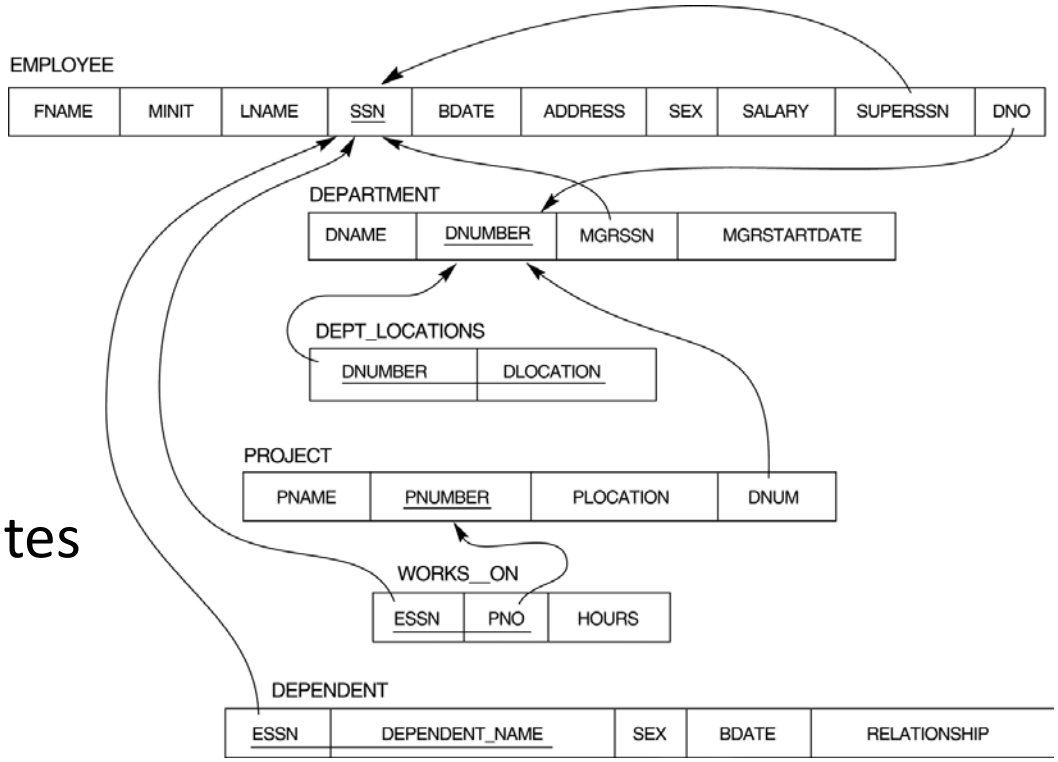
Mapping ER to Database Schema

- Fundamental building blocks in ER-diagrams:
  - Entities
    - Strong
    - weak
  - Attributes
    - Simple
    - Composite
    - Multi-valued
  - Relationships
    - Cardinality
    - participation



Mapping ER to Database Schema

- Fundamental building blocks in relational databases:
  - Tables
  - Attributes
    - Primary keys
    - Secondary keys
    - Foreign keys
    - Non-key attributes
  - Data types
    - …



Mapping ER to Database Schema

- Map entities and relationships from ER to tables in database schema
- Map attributes from ER to attributes in database schema

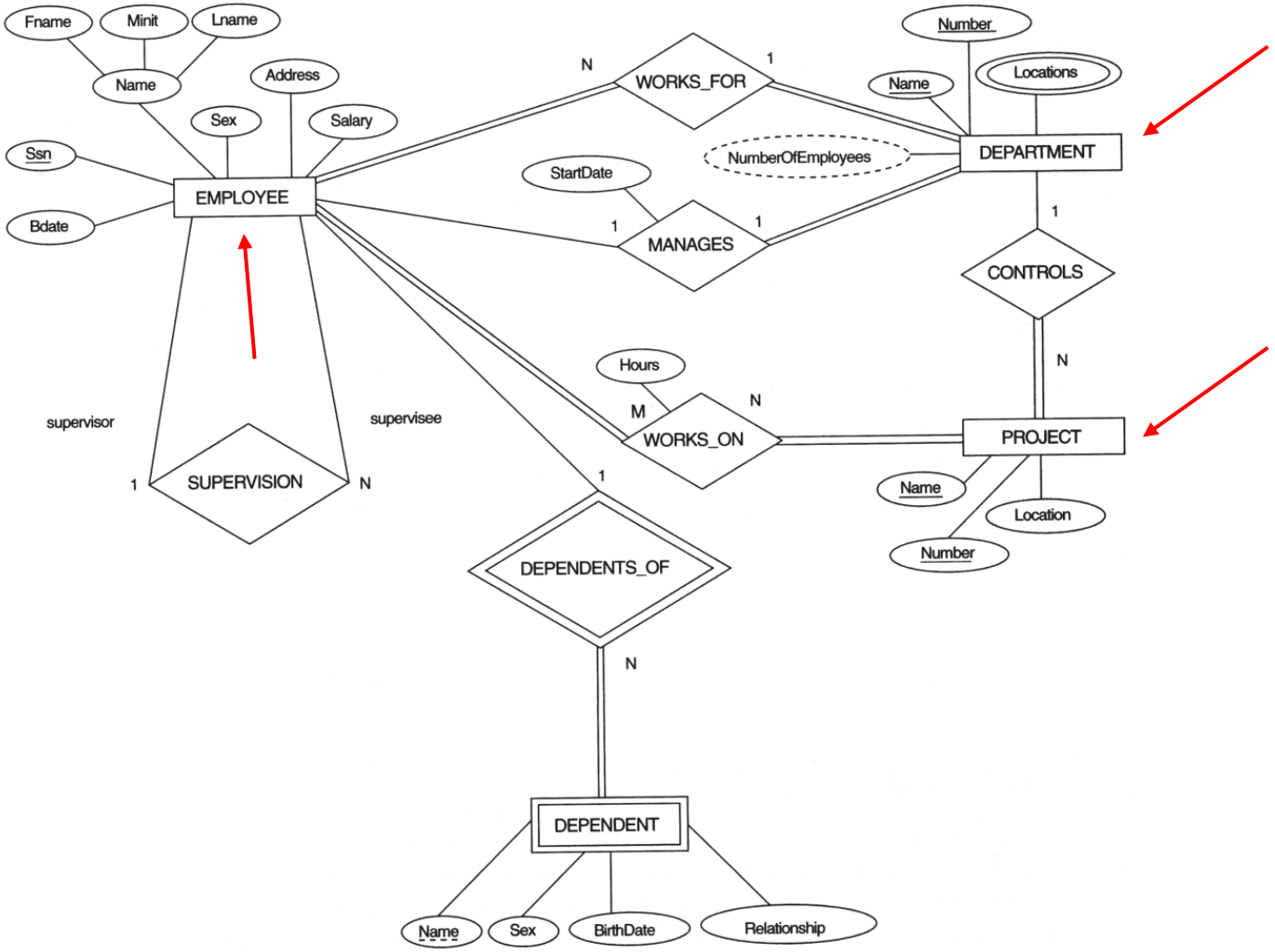
Mapping ER to Database Schema

- Mapping of entities
  - Regular
  - Weak
- Mapping of relationships
  - 1:1
  - 1:N
  - M:N
- Mapping of multivalued attributes
- Mapping of N-ary Relationship Types

Mapping of Regular Entities

- Create a table for each regular entity
- Use only simple attribute or the simple component of a composite attribute
- Determine a primary key
- If multiple keys, determine secondary keys
  - Can be useful for indexing

Example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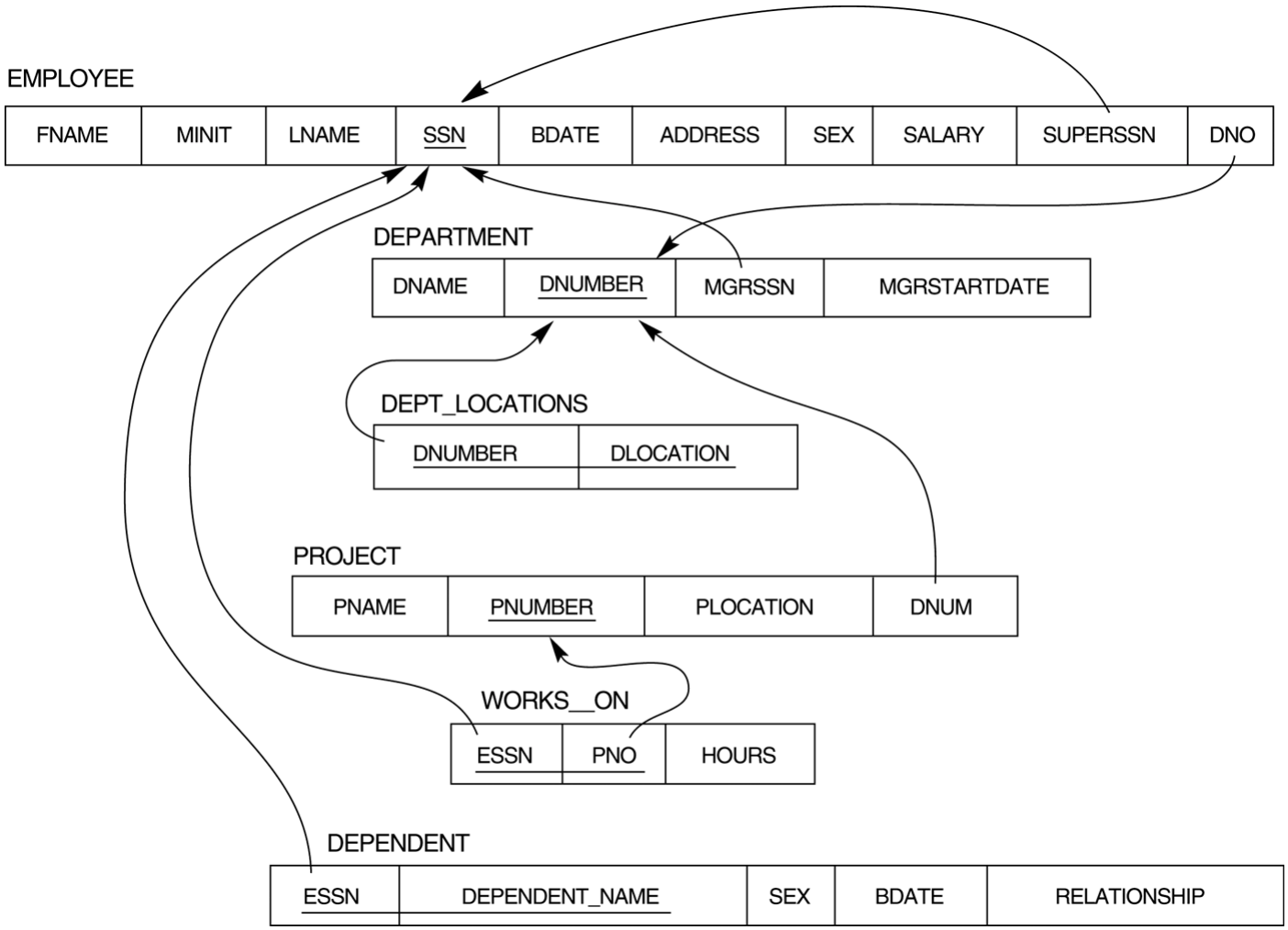
Example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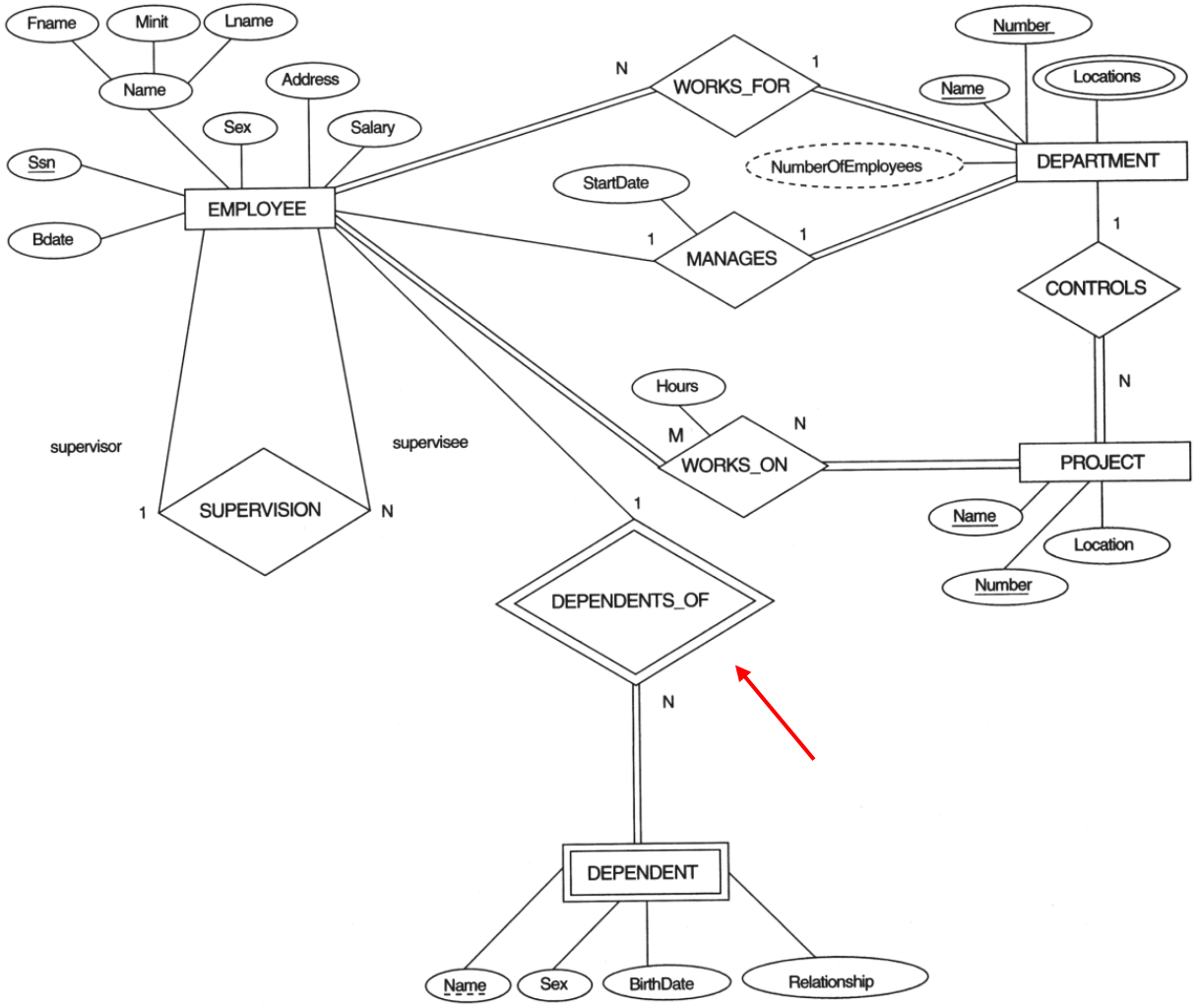
RELATIONSHIP

Mapping of Weak Entities

- Create a table for each weak entity
- Use only simple attribute or the simple component of a composite attribute
- Include a foreign key attribute to owner entity
- Determine a primary key
  - Partial key plus foreign key to owner entity
- If the owner is also a weak entity, then append its owner's primary key

Example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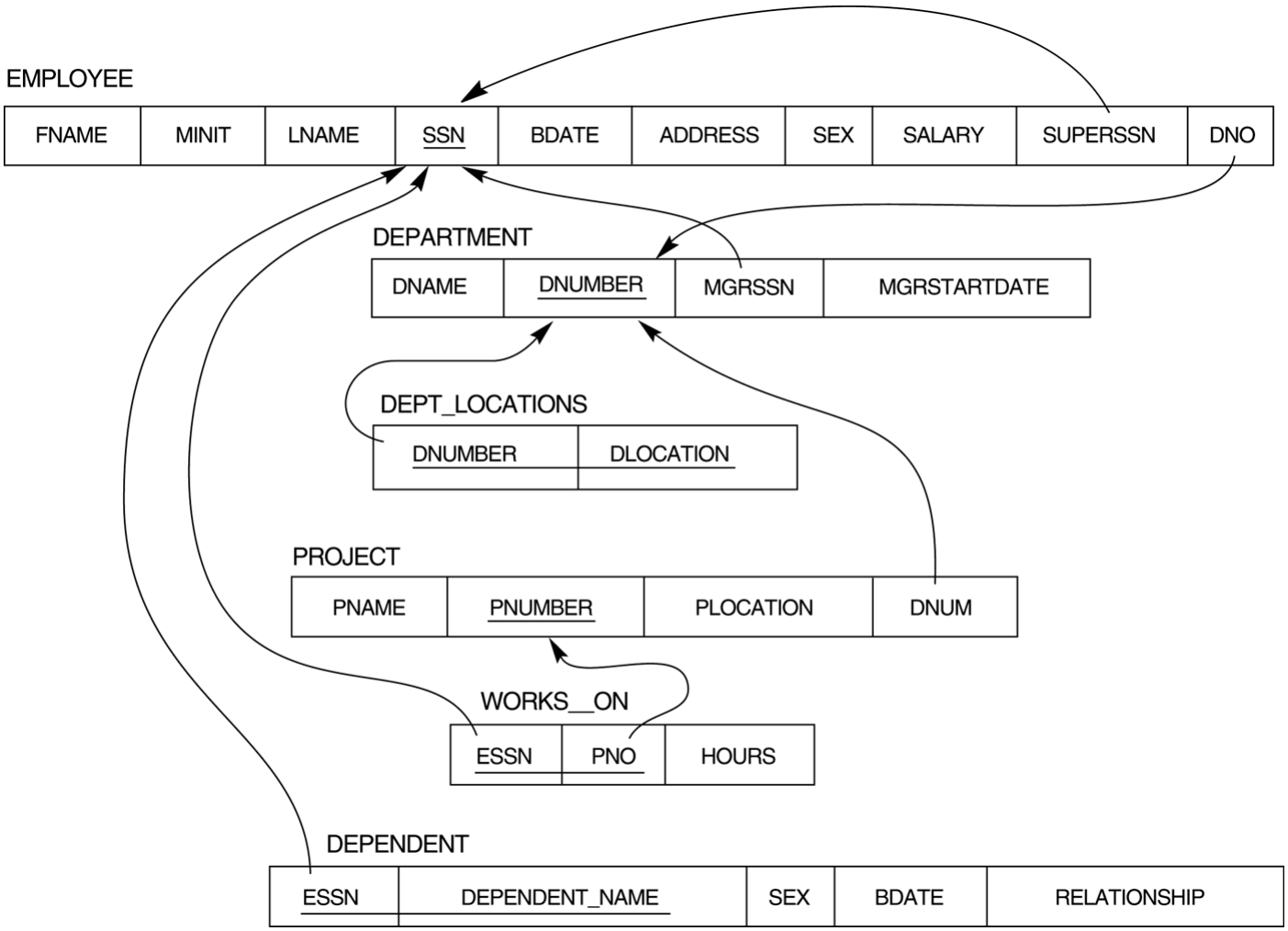
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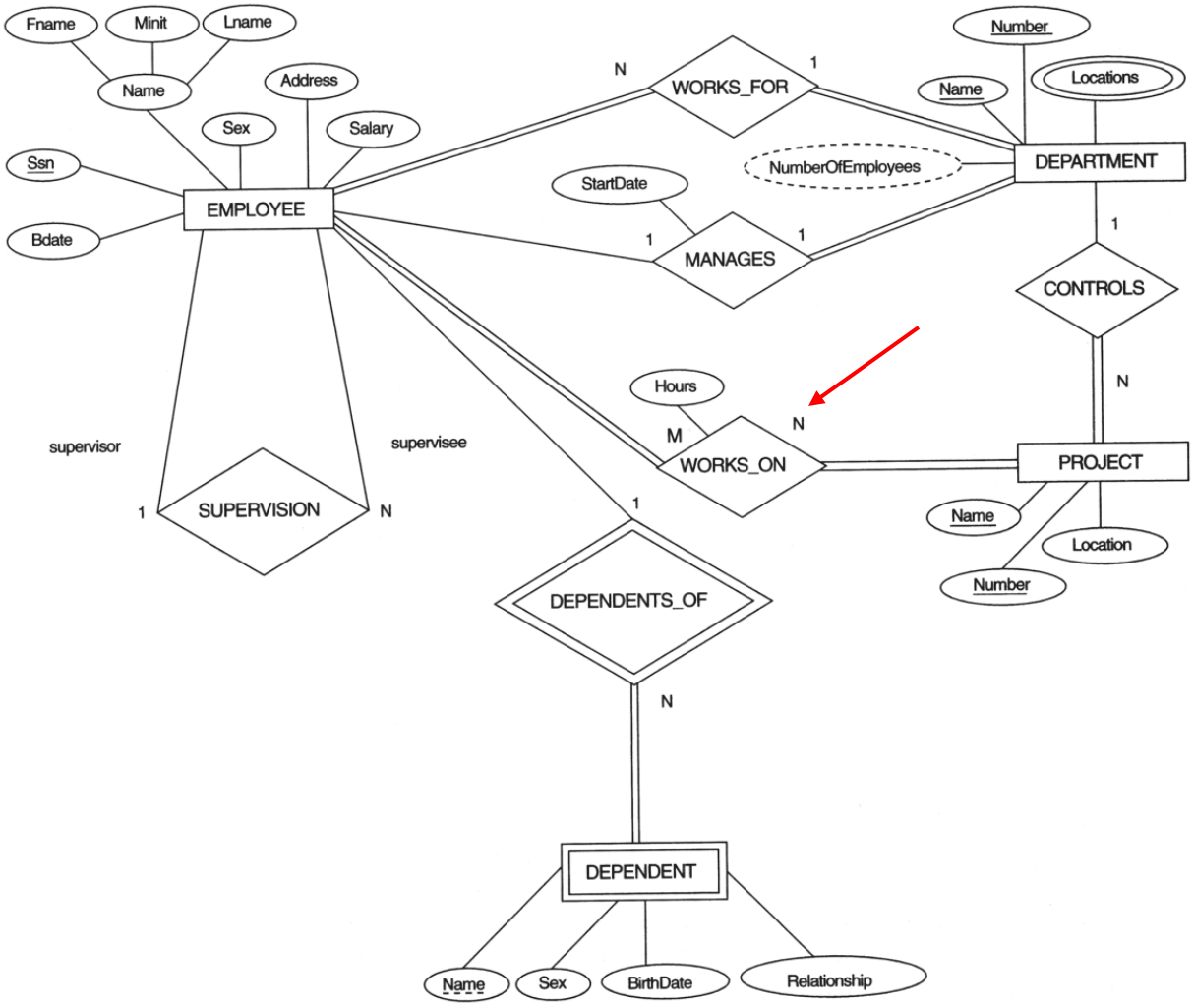
Mapping of M:N Relationship

- Create a table
- Include foreign key to the participating entities
  - These foreign keys form the primary key of the relationship

Example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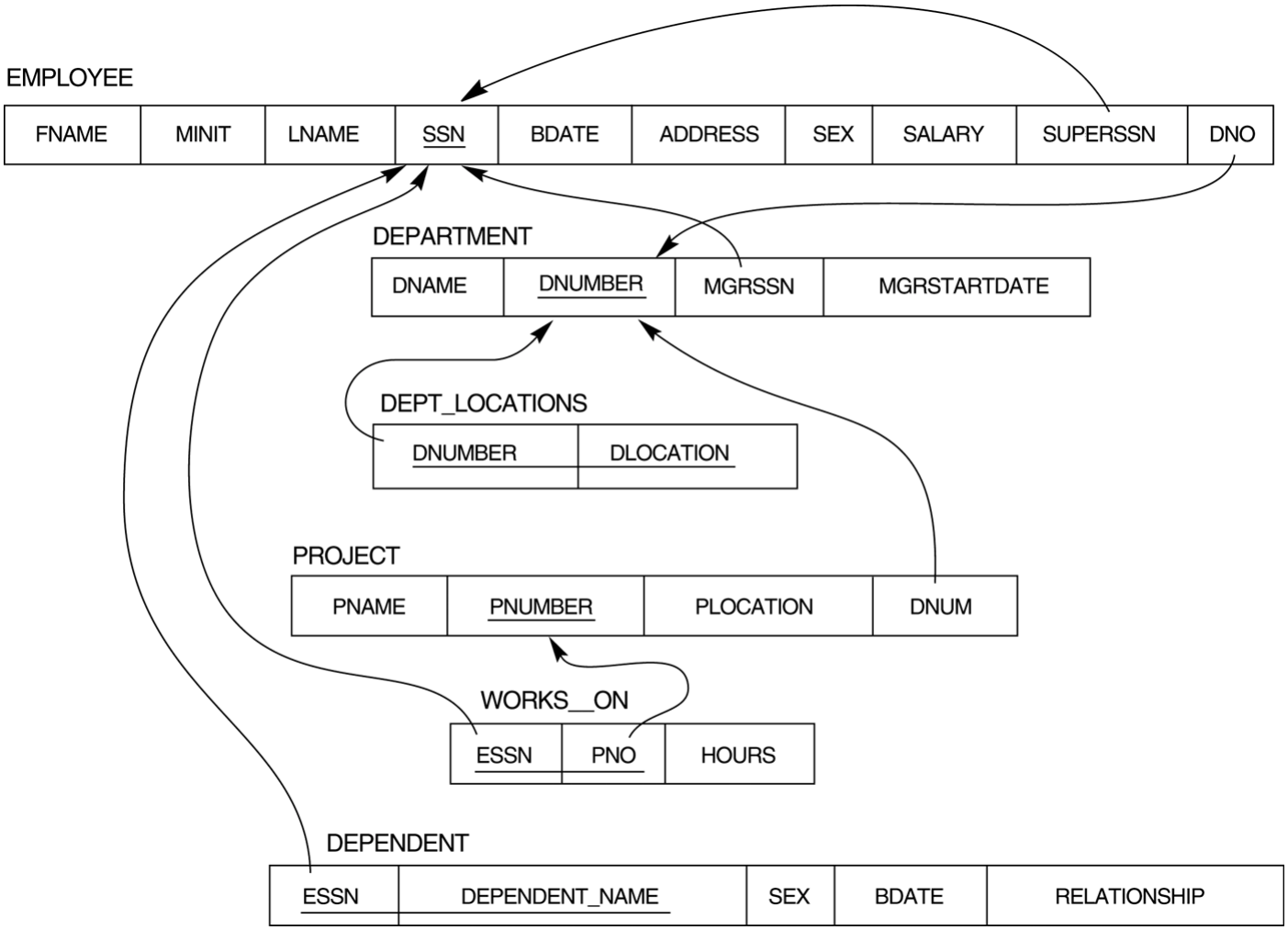
Example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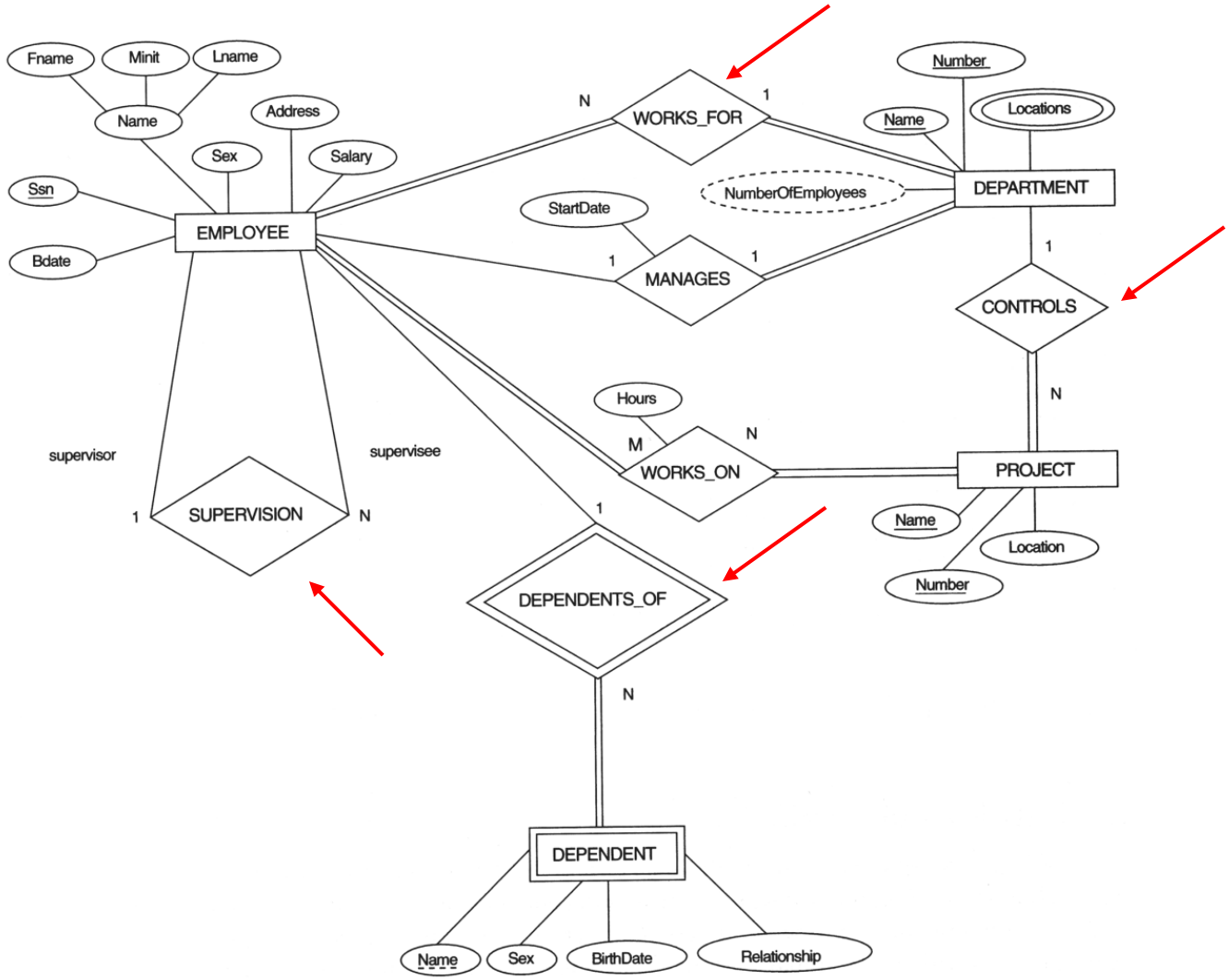
RELATIONSHIP

Mapping of 1:N Relationship

- Method 1:
  - Treat as M:N (is this a good way?)
- Method 2:
  - Make a foreign key for the entity on the N-side to point to the primary key of the entity on the 1-side.

Example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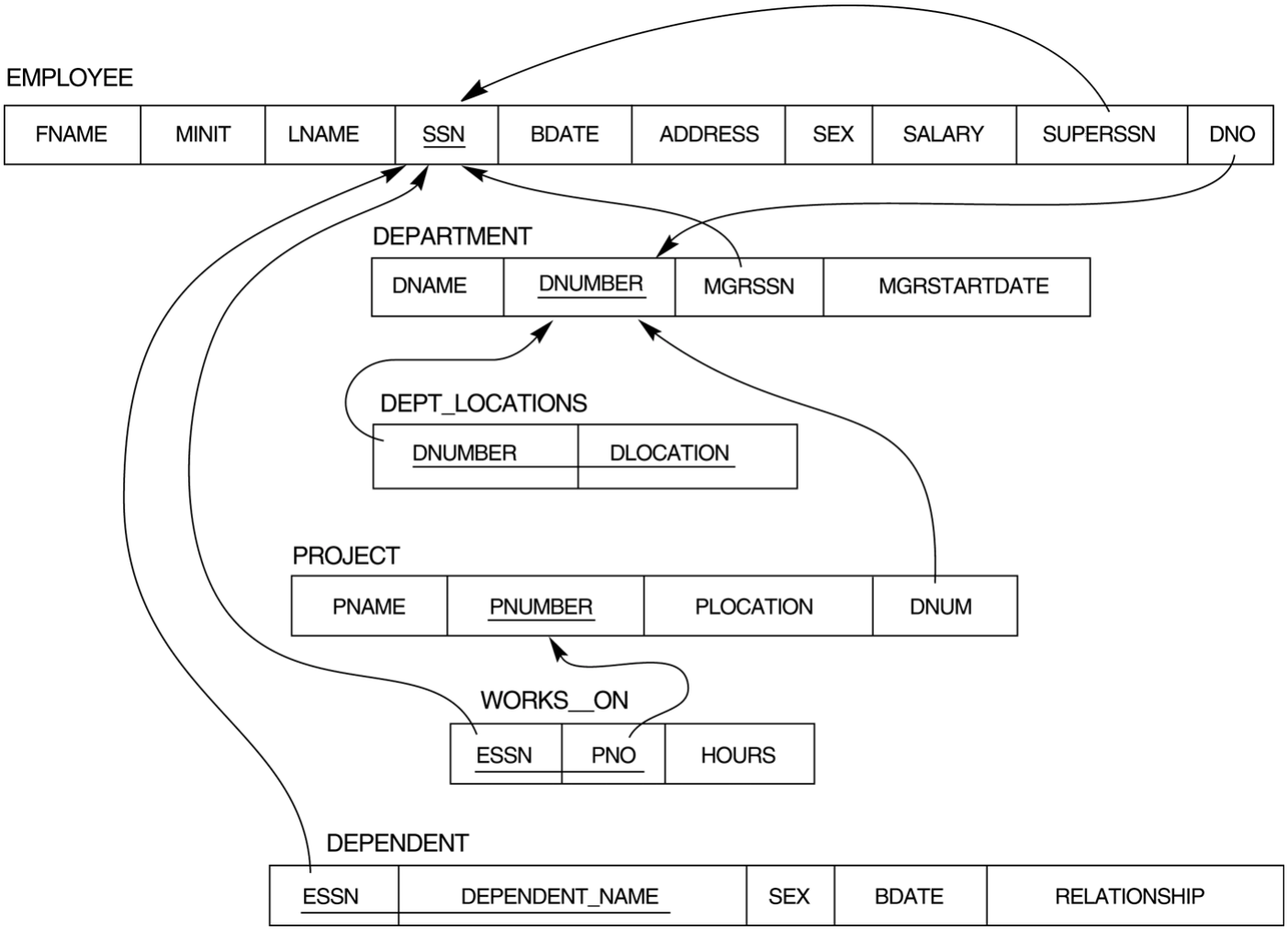
Example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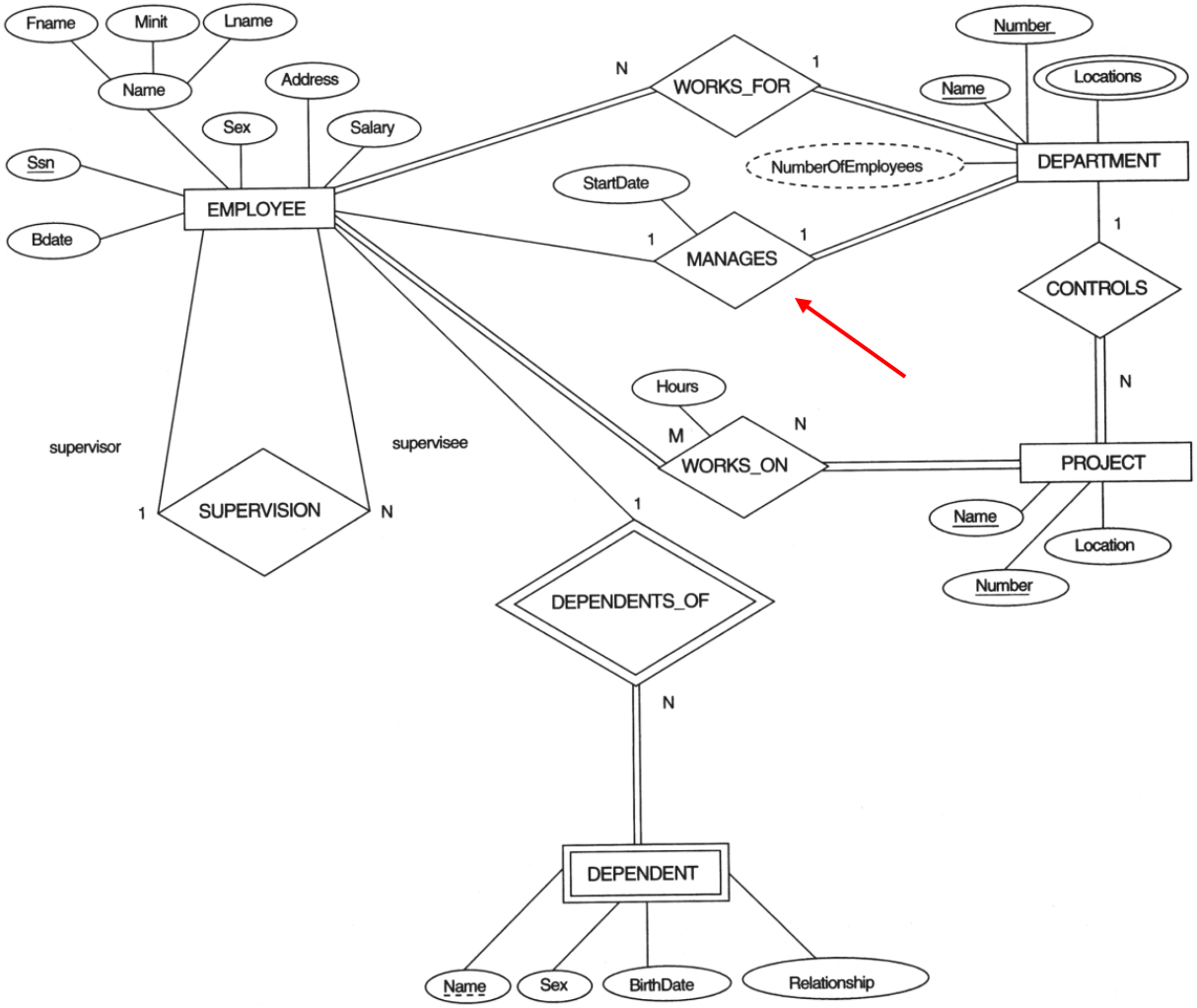
Mapping of 1:1 Relationship

- Method 1:
  - Treat as M:N (is this a good way?)
- Method 2:
  - Treat as 1:N (is this a good way?)
- Method 3:
  - Make a foreign key in one entity to the primary key of another entity (is this a good way?)
  - Put all attributes of the relationship to the table describing the entity with the foreign key

Example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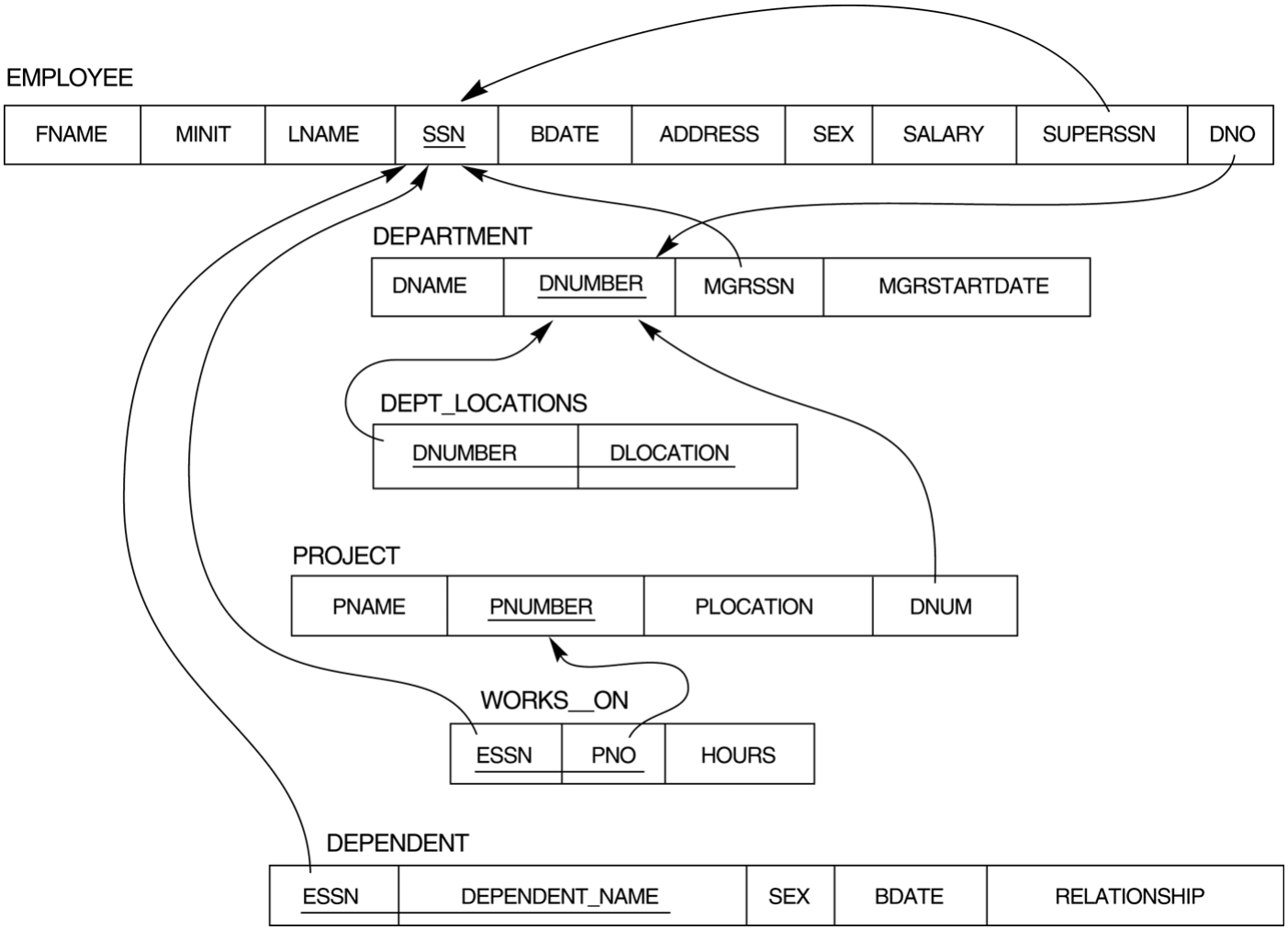
Example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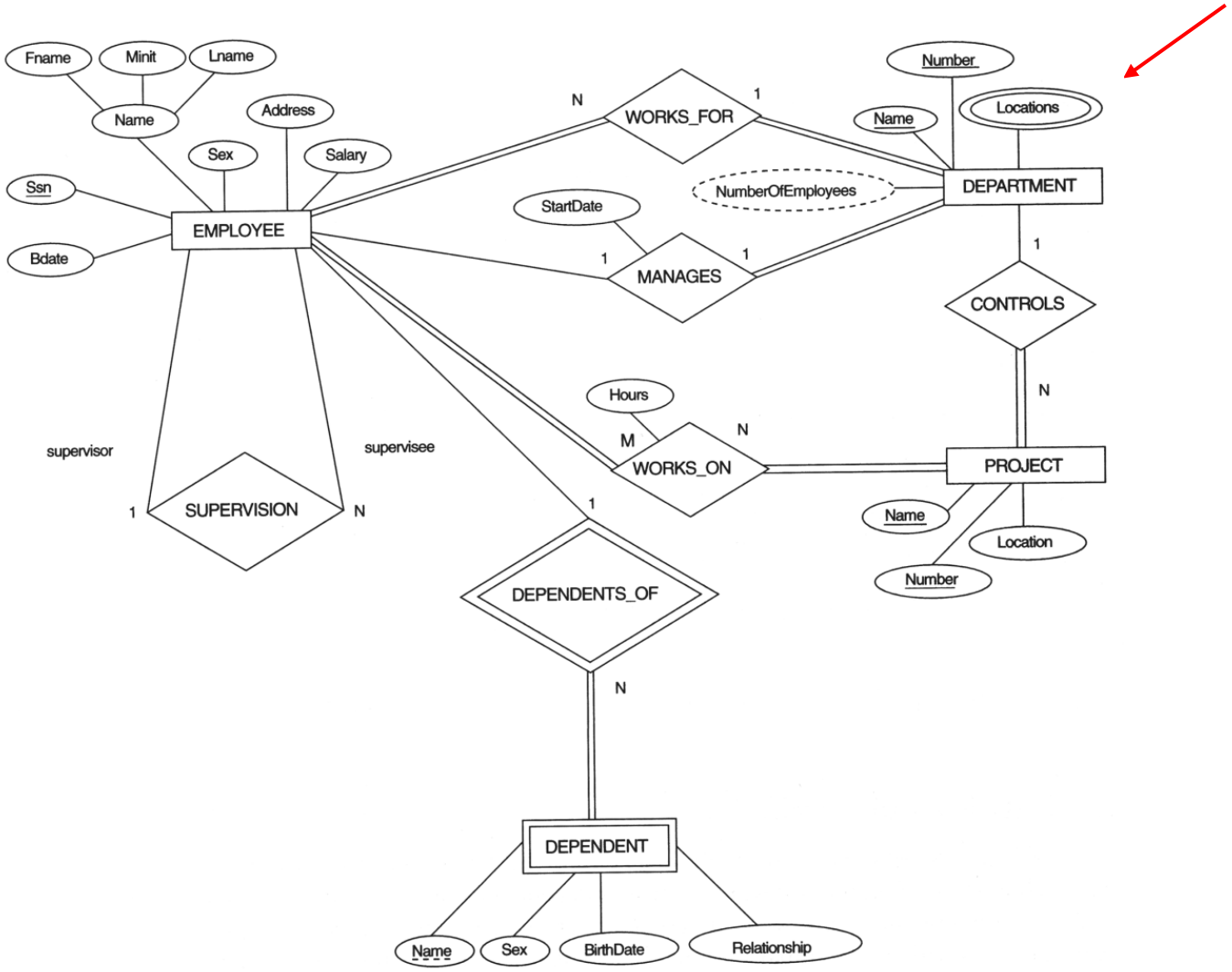
Mapping of Multivalued Attribute

- Create a table for each such attribute
  - Make a foreign key to the entity which this attribute belongs
  - Combine the foreign key and the attribute itself as the primary key of the table

Example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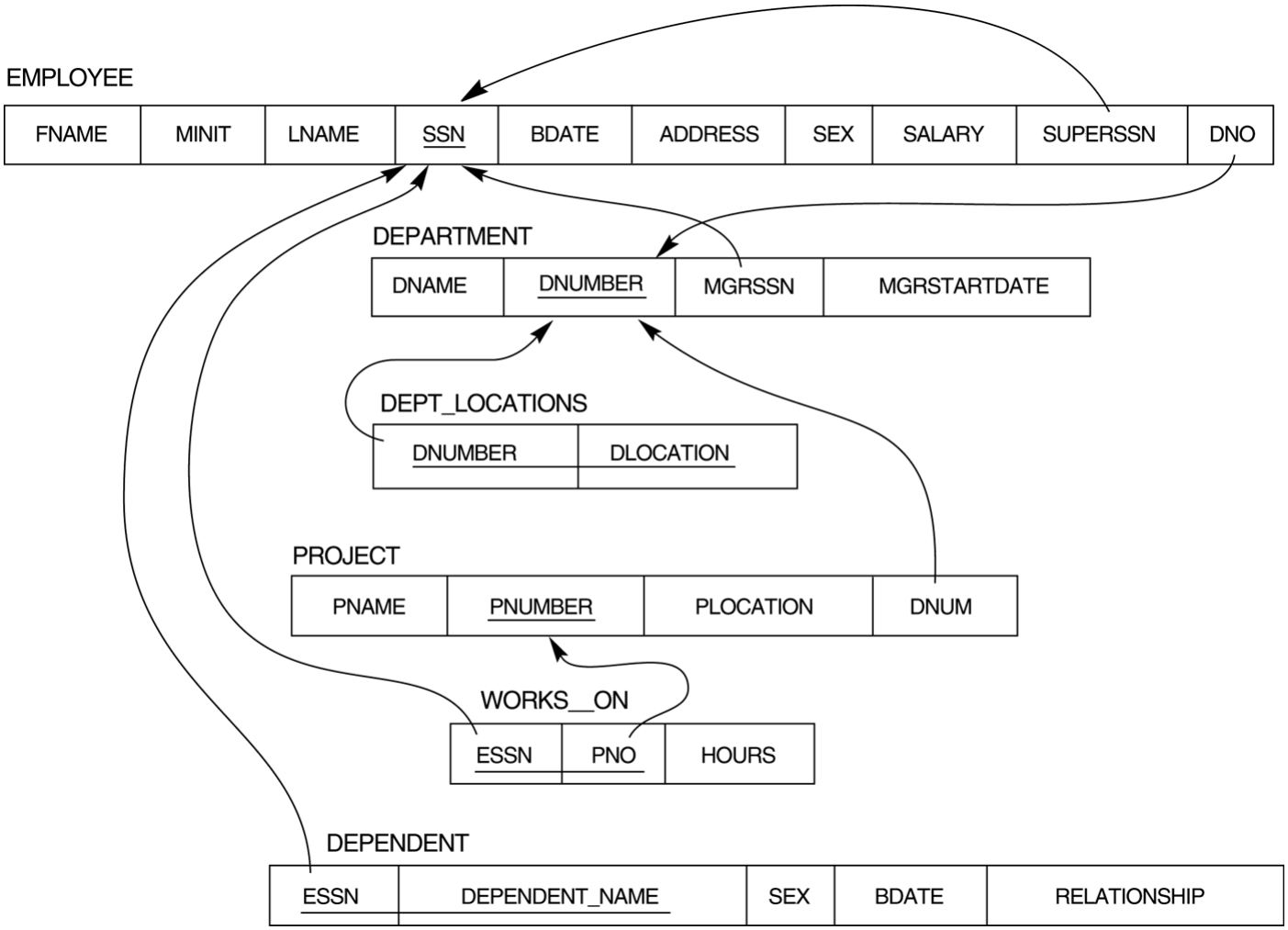
Example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Mapping of N-ary Attribute

- Like binary relationship
  - Create a table
  - Make foreign key attributes to each of the participating entity
  - Combine these foreign keys to form the primary key

Discussion and Summary of Mapping for ER Model Constructs

Table 9.1 Correspondence between ER and Relational Models

ER MODEL	RELATIONAL MODEL
Entity type	*Entity* relation
1:1 or 1:N relationship type	Foreign key (or *relationship* relation)
M:N relationship type	*Relationship* relation and *two* foreign keys
n-ary relationship type	*Relationship* relation and *n* foreign keys
Simple attribute	Attribute
Composite attribute	Set of simple component attributes
Multivalued attribute	Relation and foreign key
Value set	Domain
Key attribute	Primary (or secondary) key