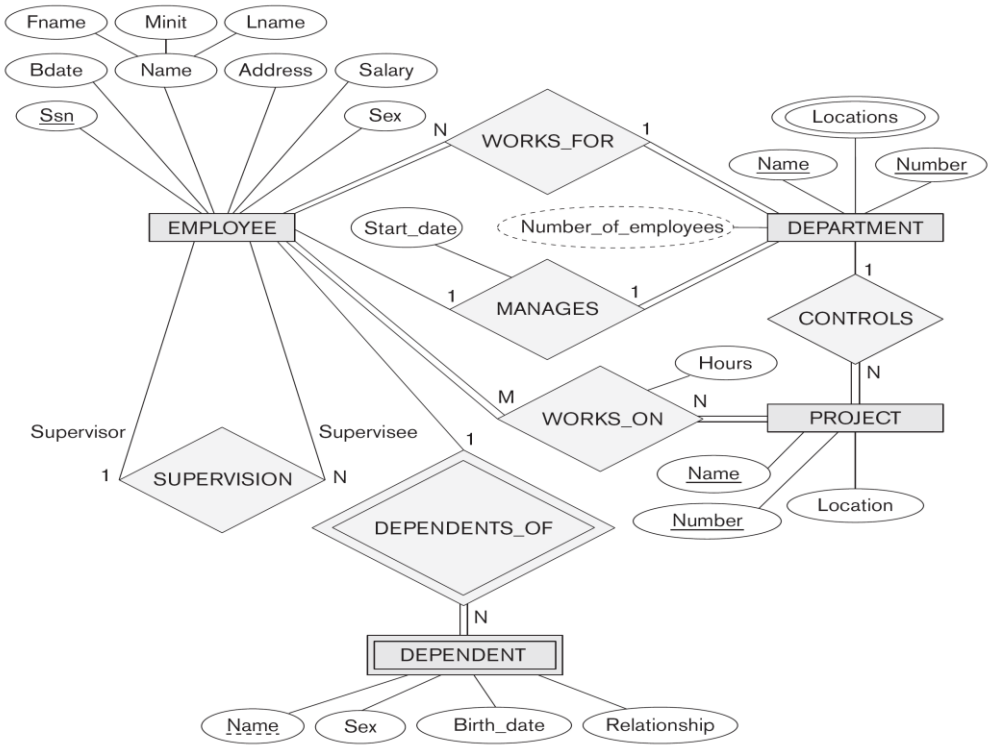


Figure 7.2
An ER schema diagram for the COMPANY database. The diagrammatic notation is introduced gradually throughout this chapter and is summarized in Figure 7.14.

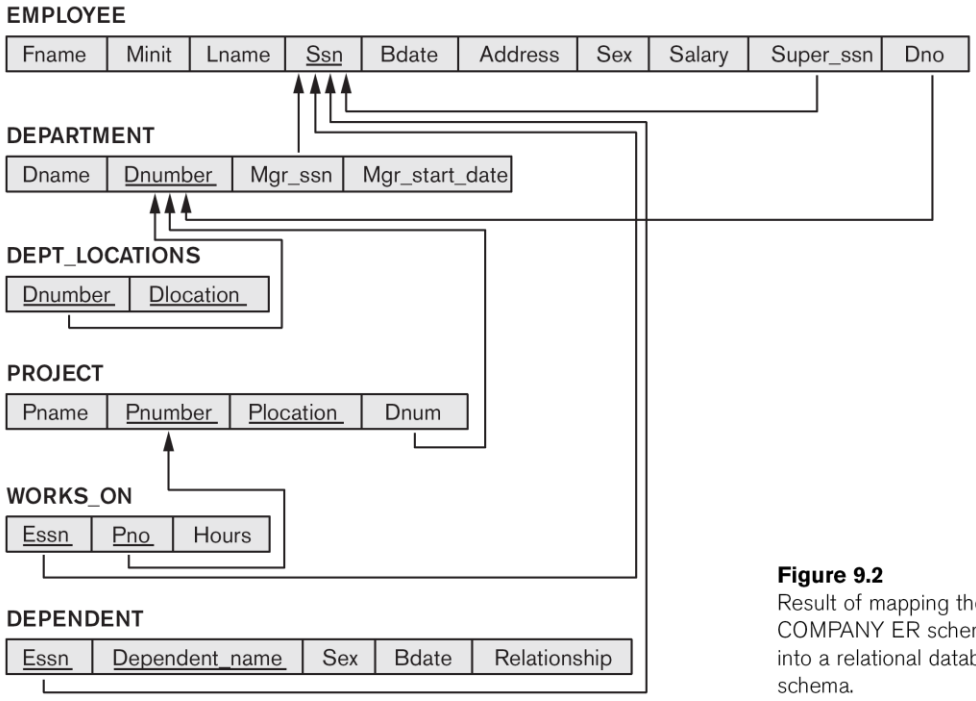


Figure 9.2
Result of mapping the COMPANY ER schema into a relational database schema.

ER-to-Relational Mapping Algorithm

Step 1: Mapping Regular (Strong) Entity Types

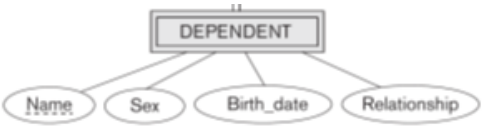
- Each strong entity becomes a relation (table).
- All simple attributes of the entity become columns in the table.
- The primary key (PK) of the table is the key attribute of the entity.
- Multivalued attributes are excluded and handled separately (see Step 5

EMPLOYEE

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary

Step 2: Mapping Weak Entity Types

- Each weak entity becomes a separate table.
- The table includes all attributes of the weak entity.
- The primary key is a composite key consisting of:
  - The discriminator (partial key) of the weak entity.
  - The PK of the owning strong entity (as a foreign key).



DEPENDENT

Essn	Dependent_name	Sex	Bdate	Relationship

Step 3: Mapping Binary 1:N Relationship Types

- A 1:N relationship is mapped by:
  - Adding the PK of the '1' side entity as a foreign key (FK) to the table on the 'N' side.
  - Relationship attributes (if any) are added to the same table on the 'N' side.

DEPARTMENT

Dname	Dnumber	Mgr_ssn	Mgr_start_date

PROJECT

Pname	Pnumber	Plocation	Dnum

Step 4: Mapping Binary M:N Relationship Types

- Each M:N relationship becomes a new relation.
- The new table includes:
  - The PKs of the participating entities as FKs (and together they form the composite PK).
  - Any attributes of the relationship.

WORKS_ON

Essn	Pno	Hours

Step 5: Mapping Multivalued Attributes

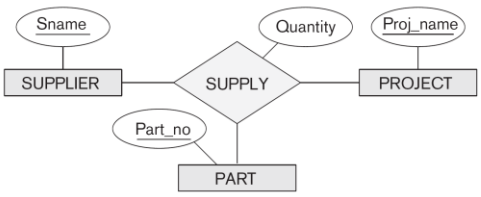
- Each multivalued attribute becomes a separate table.
- The new table includes:
  - The multivalued attribute.
  - The PK of the owning entity.
- The composite PK is formed from both of the above.

DEPT_LOCATIONS

Dnumber	Dlocation

Step 6: Mapping N-ary Relationship Types

- Each N-ary relationship (involving more than two entities) becomes a separate table.
- The new table includes:
  - The PKs of all participating entities as FKs (together forming the composite PK).
  - Any attributes of the relationship.



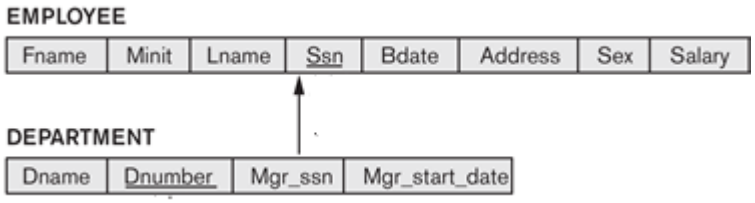
SUPPLY

Sname	Proj_name	Part_no	Quantity

Step 7: Mapping Binary 1:1 Relationship Types

- Depends on participation constraints:
  - Partial : Total → Add the PK of the partial side as an FK in the total side's table.
  - Total : Total → Merge both entities and the relationship into a single table.
  - Partial : Partial → Create a separate table for the relationship, as with M:N mapping.

Partial: --------- Total:========



Important Notes

- When a PK is moved from one table to another (e.g., for relationships), it becomes a foreign key (FK).
- Relationship attributes must be moved to the same table where the FK is placed.