UCS310
Database Management System

E-R Model

Lecture-12

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Recap

- Basics about the ER-Model
- Components ER data model
  - Entity sets,
  - relationship sets,
  - attributes

Attributes Types

- **Simple** vs **composite** attributes.
- **Single-valued** vs **multivalued** attributes
  - Example: multivalued attribute: *phone_numbers*
- **Stored** vs **Derived** attributes
  - Can be computed from other attributes
  - Example: age, given date_of_birth
- **Key** vs **Non-Key** attributes

Relationship

- Association among the entity
- An employee works for a department

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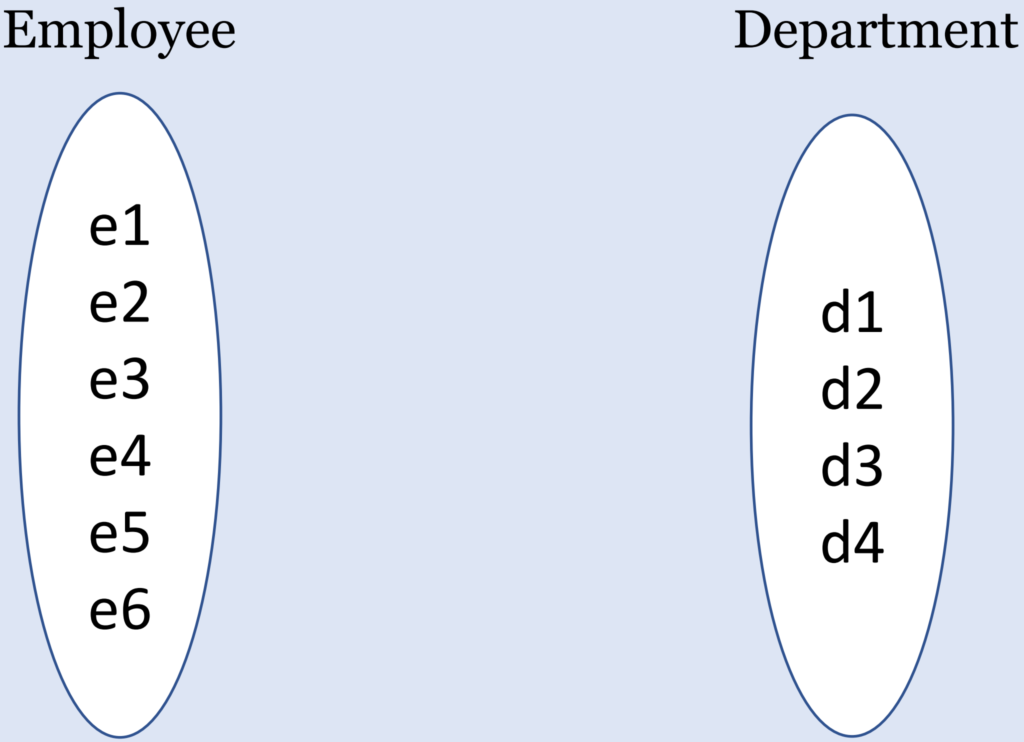


Employee

e1
e2
e3
e4
e5
e6

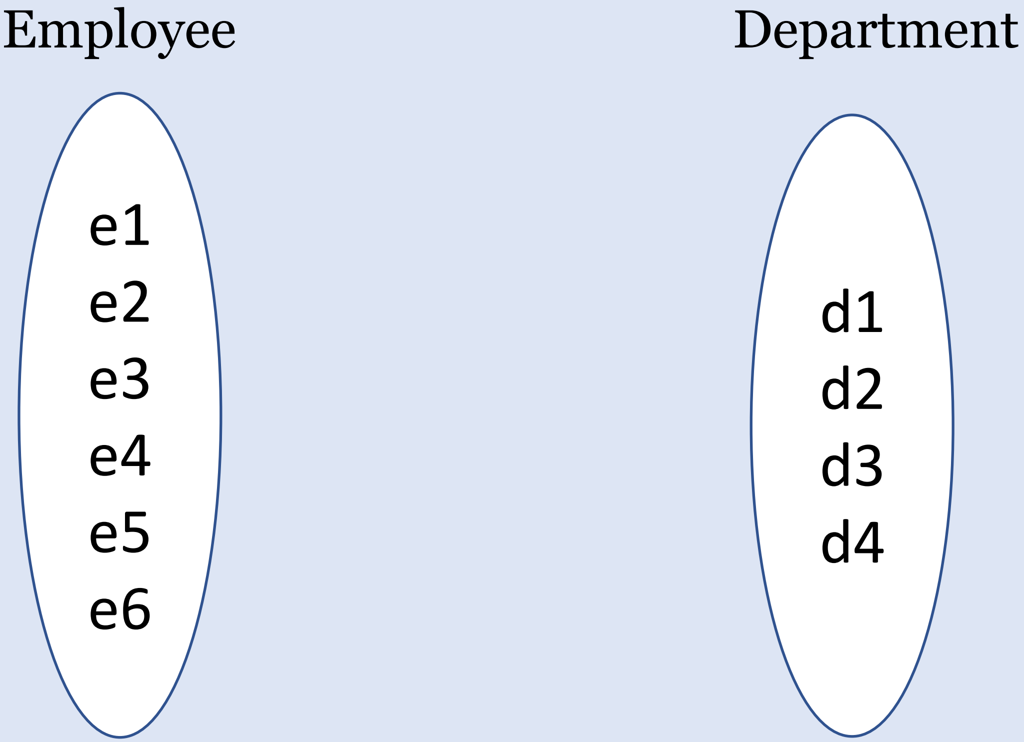
Department

d1
d2
d3
d4

Relationship

- Association among the entity
- An employee works for a department

- User Requirement
  - Every emp works for exactly one Dept, and
  - A dept can have many emps
  - New dept need not have any emp



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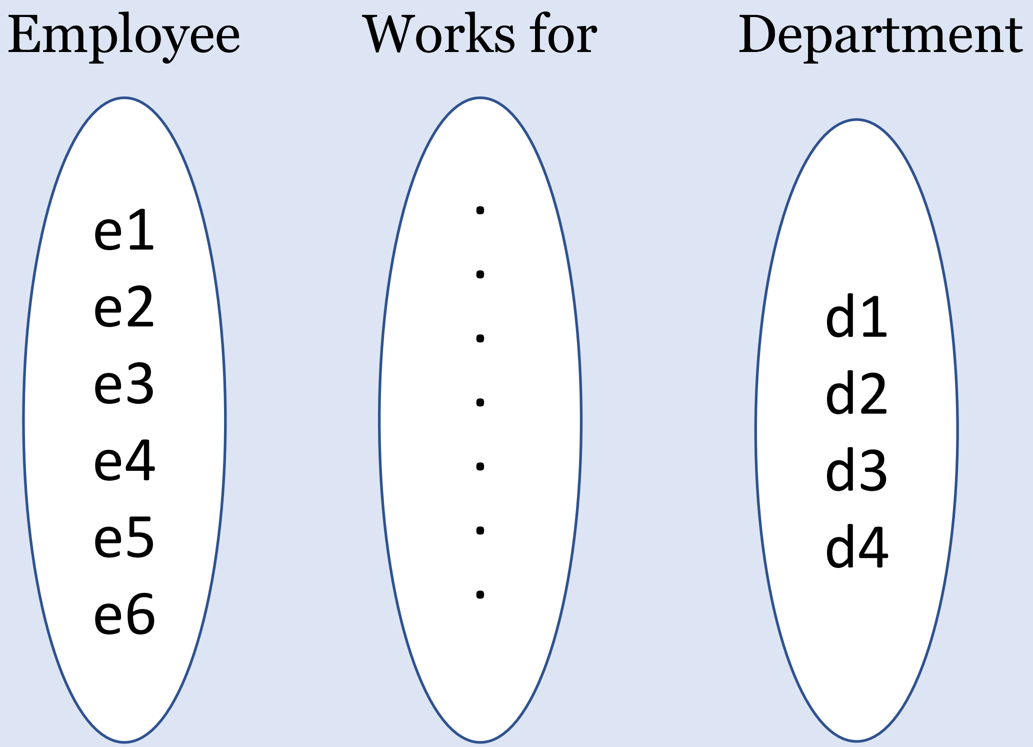

Employee

Works for

Department

e1
e2
e3
e4
e5
e6

.
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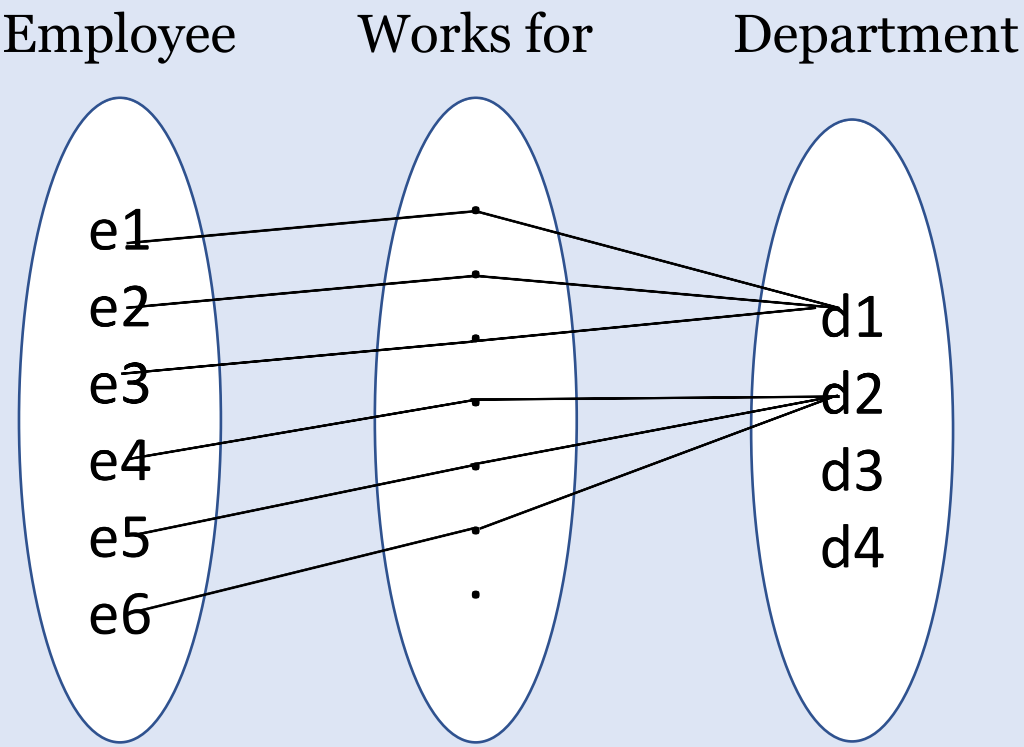

Degree

- How many entities set are participating
  - Employee and Department
  - Degree = 2

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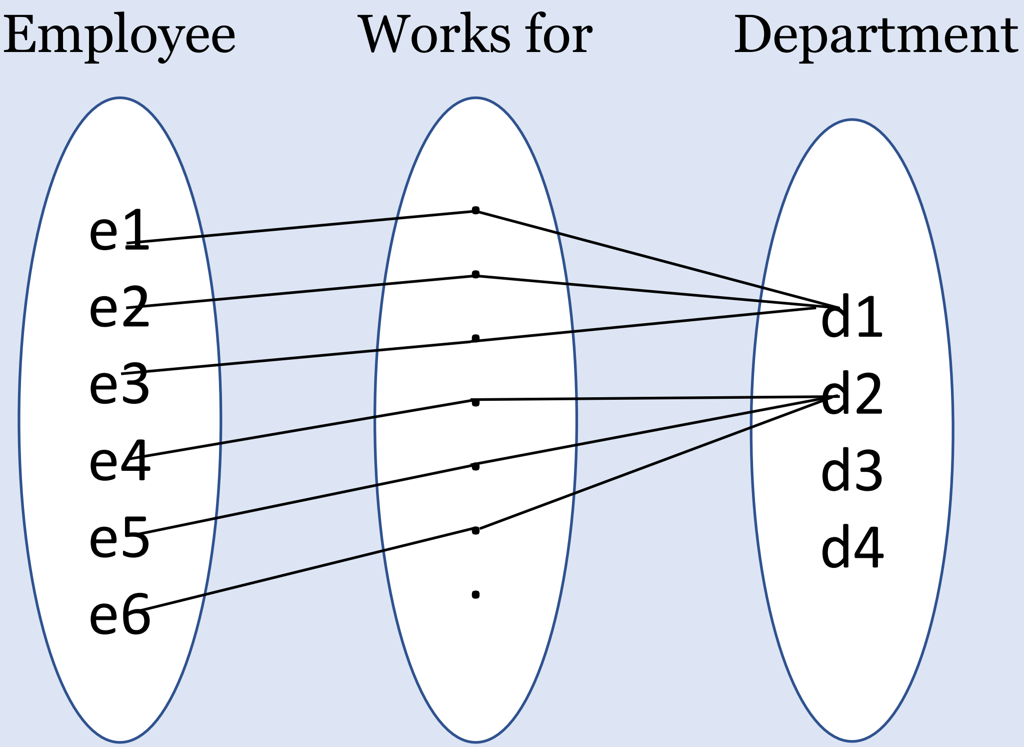

Cardinality Ratio

- Max no of relationship in which an entity can participate
  - e1 can participate in one relationship Employee
  - Cardinality of Employee = 1
  - Cardinality of Department = N

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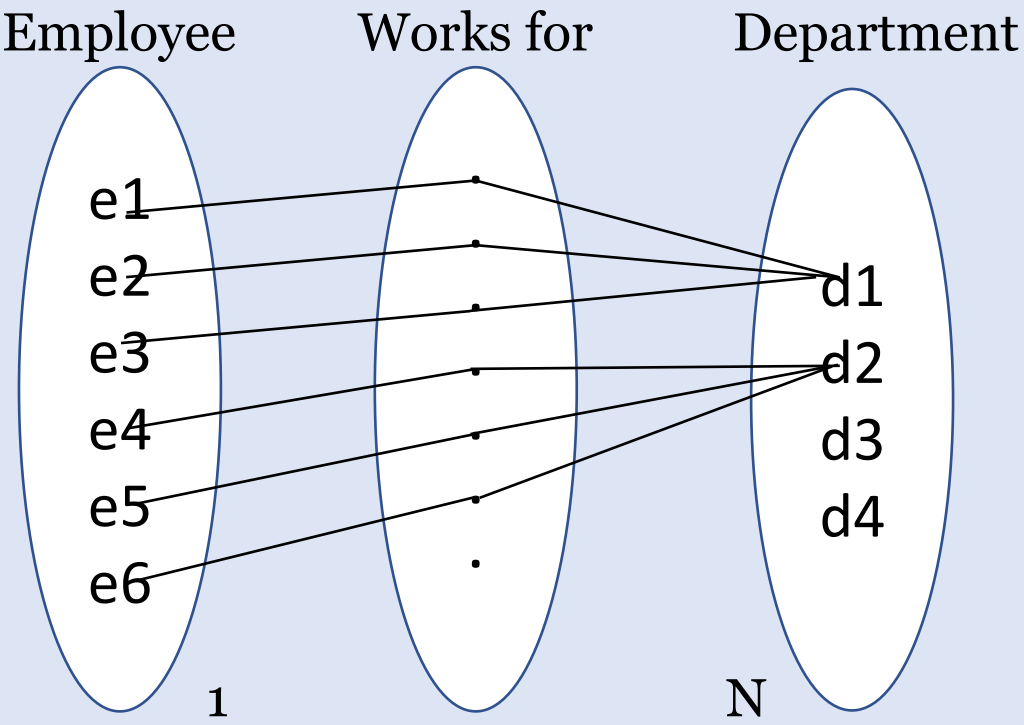

Participation or Existence

- Min no of relationship an entity can participate, i.e., min cardinality
  - Participate of Employee = 1
  - Participate of Department = 0

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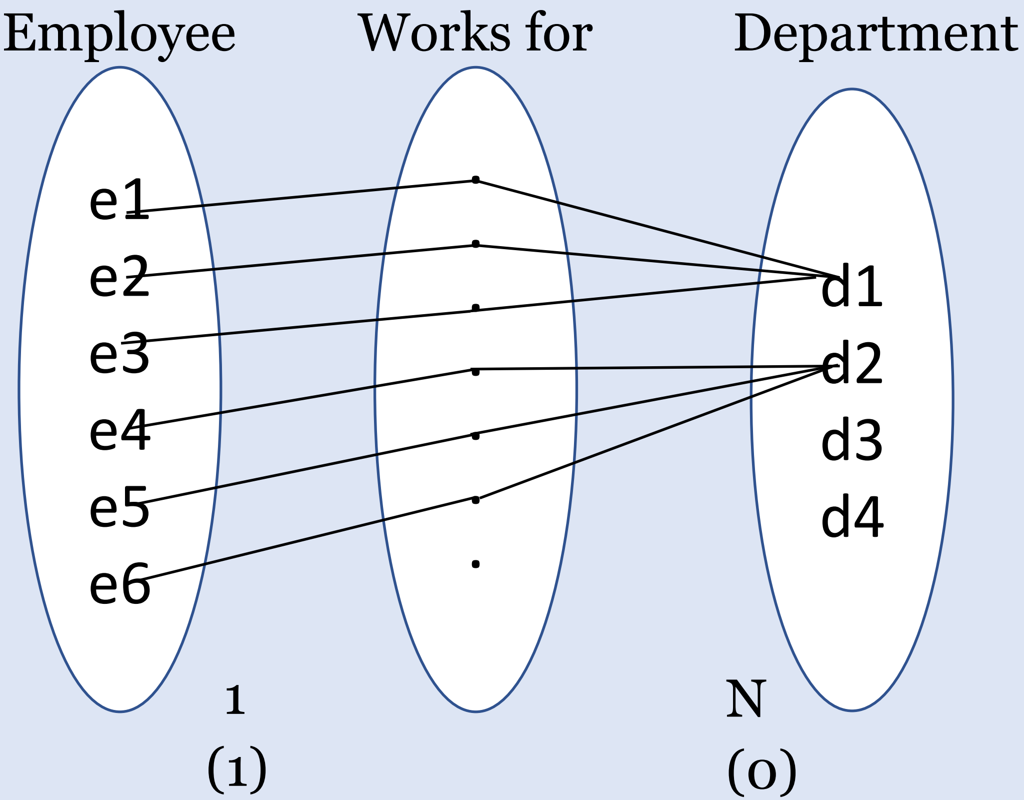
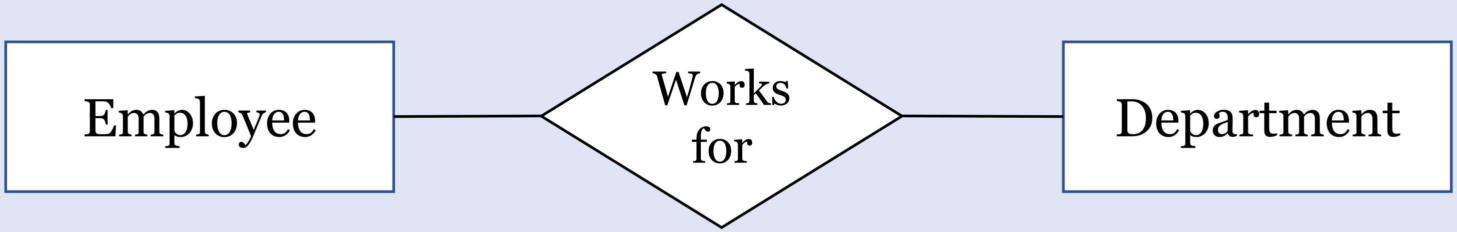


ER Diagram



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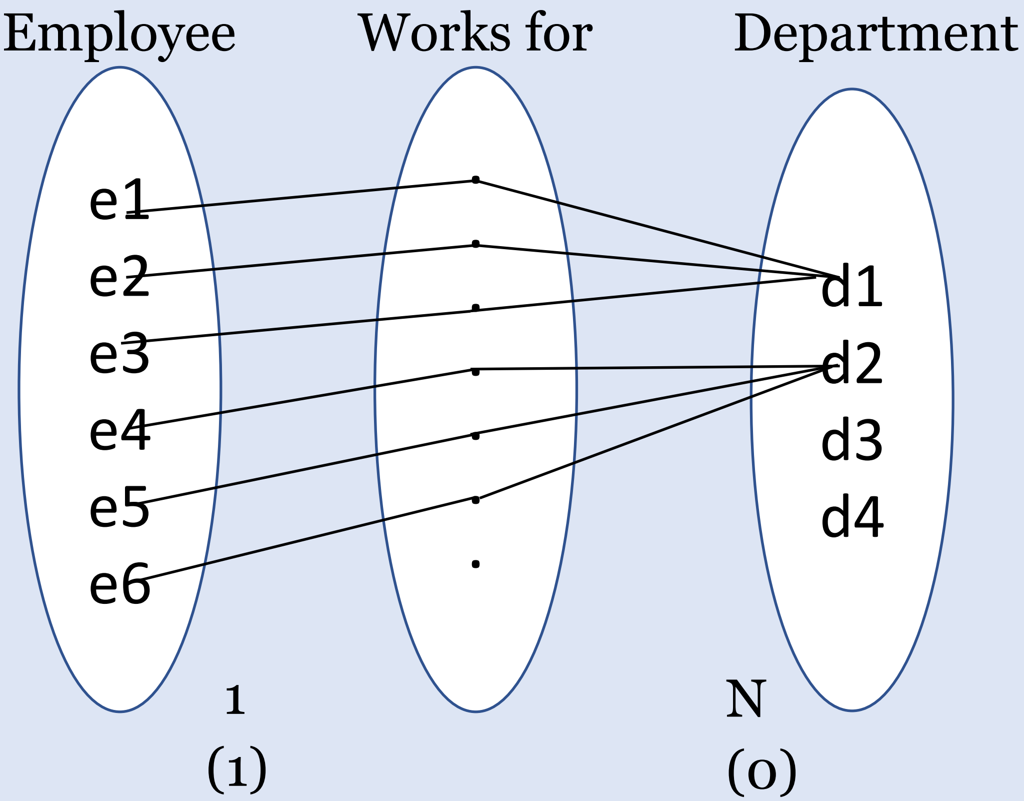
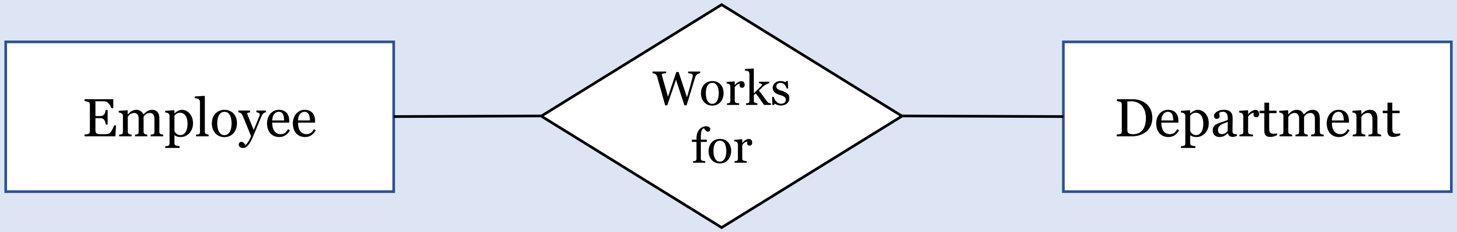


ER Diagram: Cardinality



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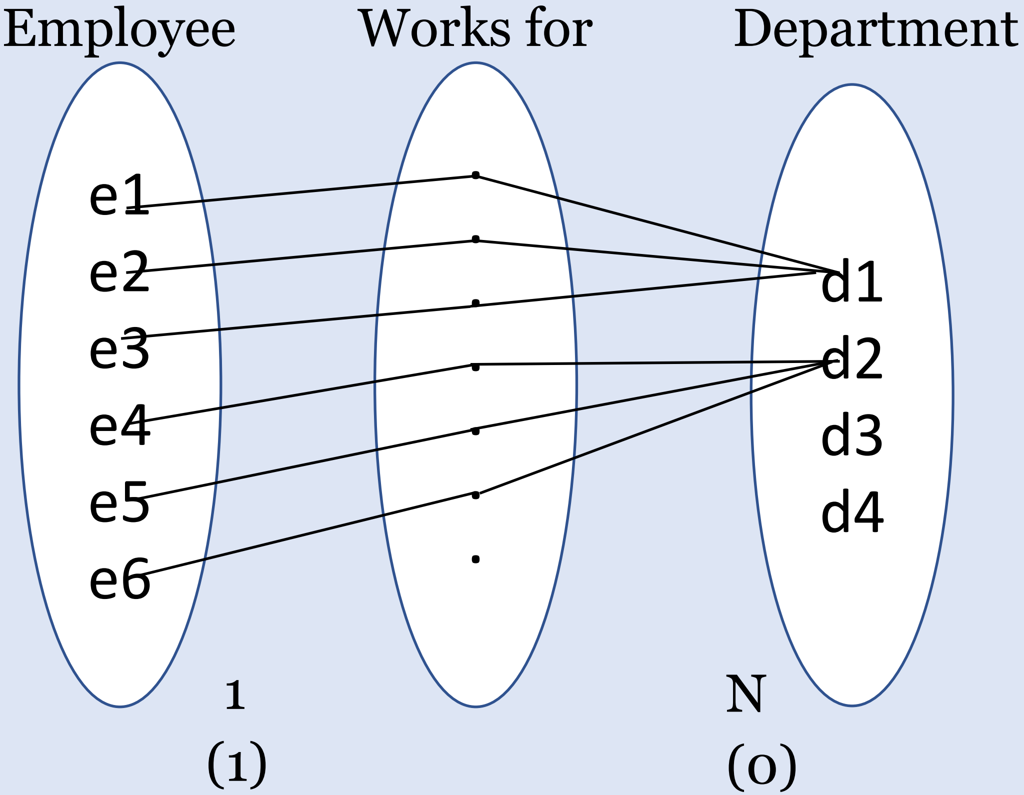

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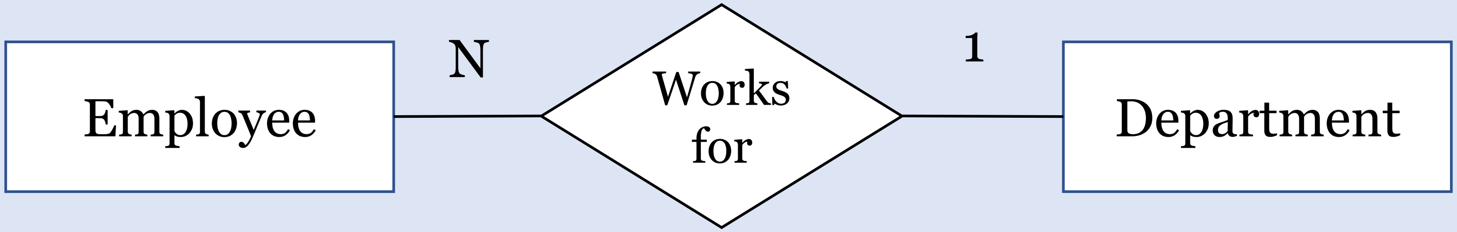

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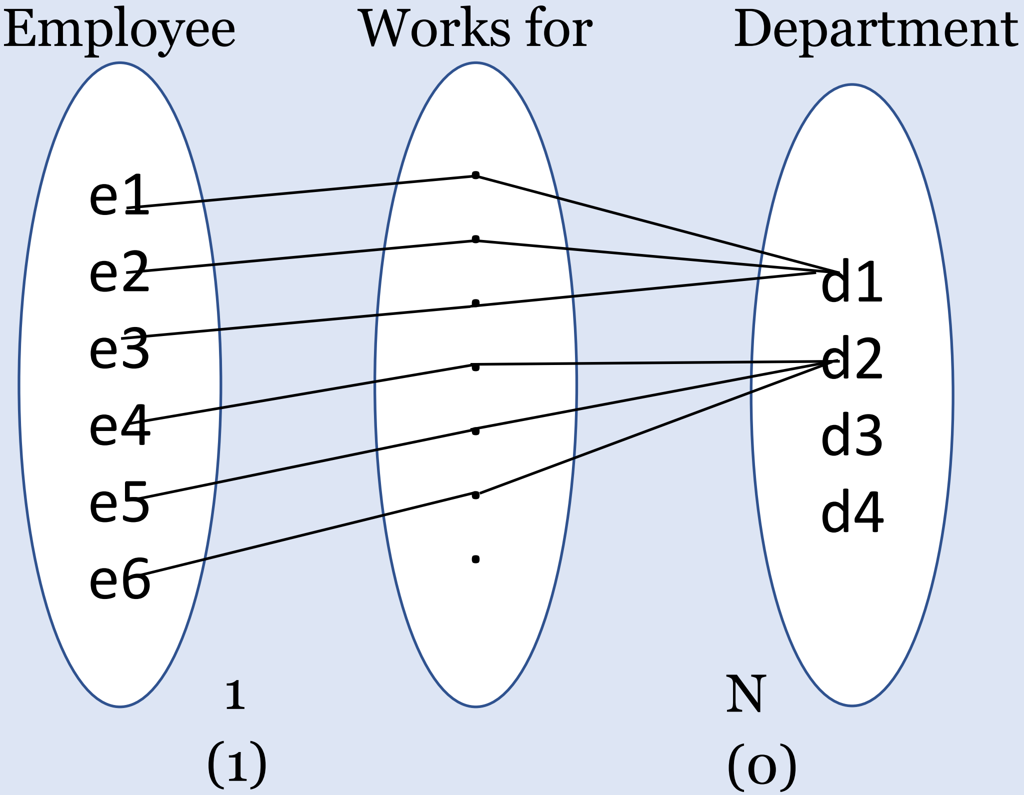
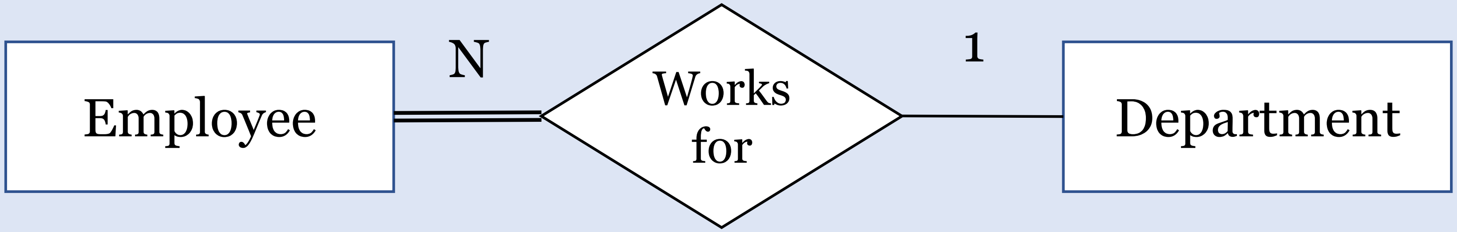


ER Diagram: Participation



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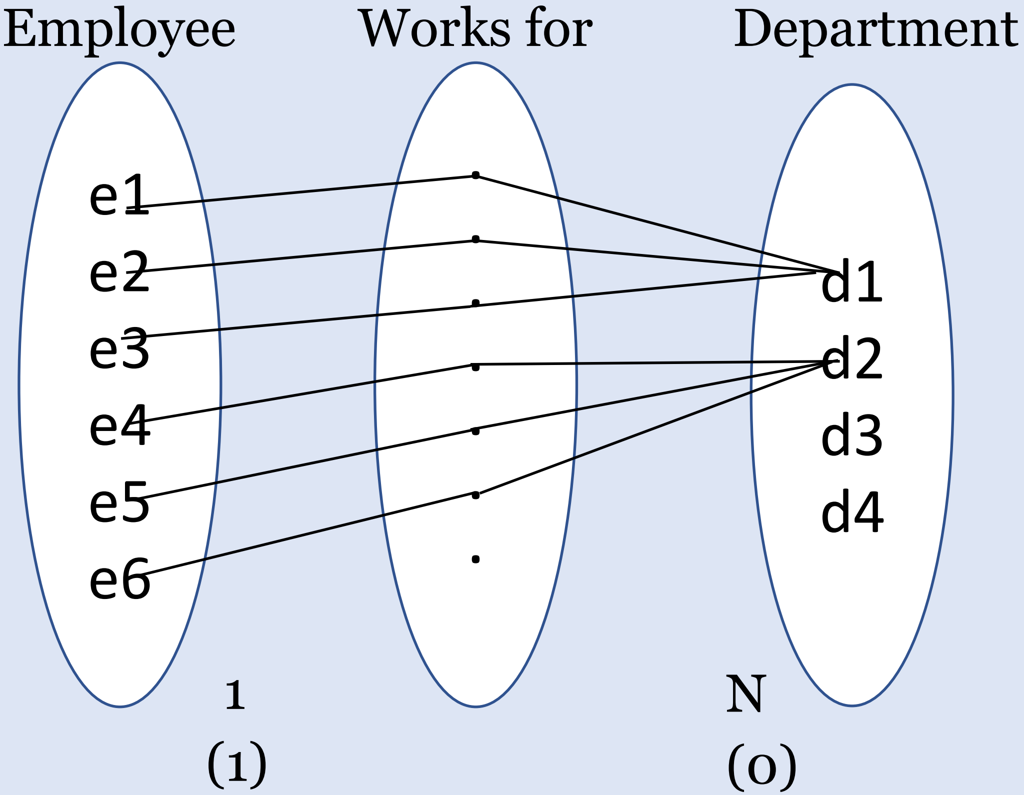
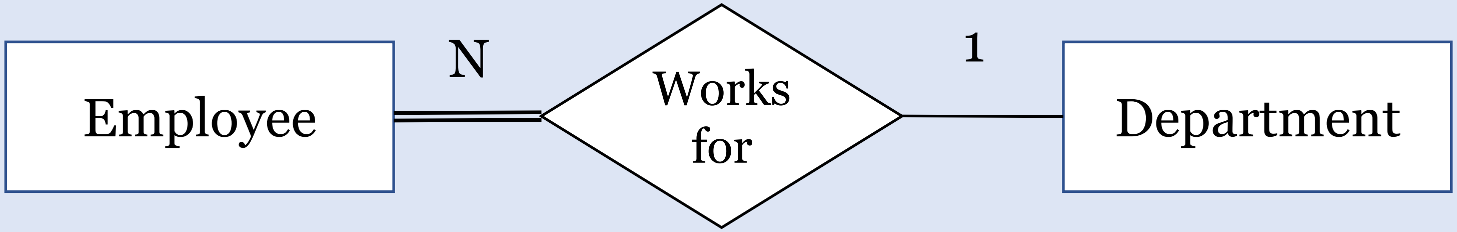


ER Diagram Representation



Cardinality/Single line/ double line representation

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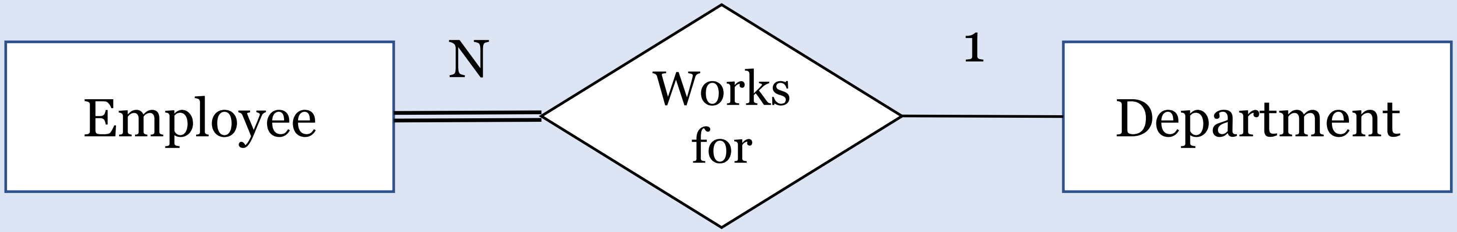

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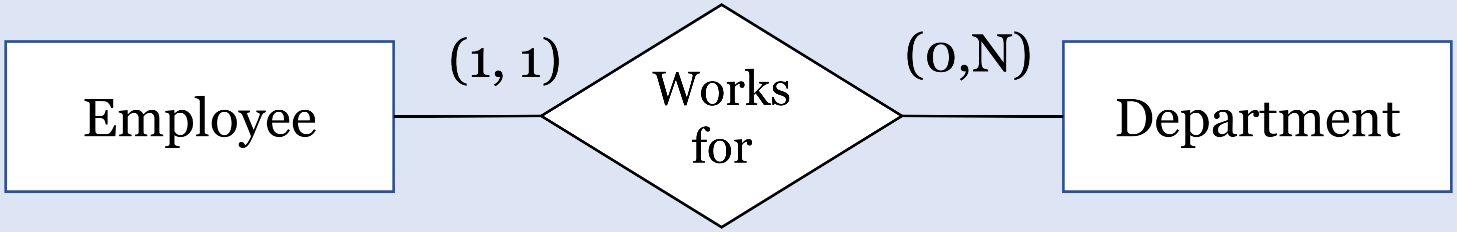
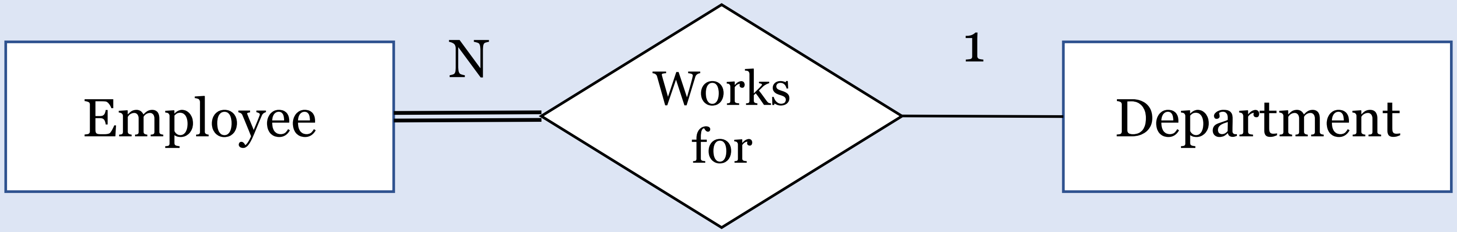


Min/Max representation

Relationship Many-to-One (M:1)



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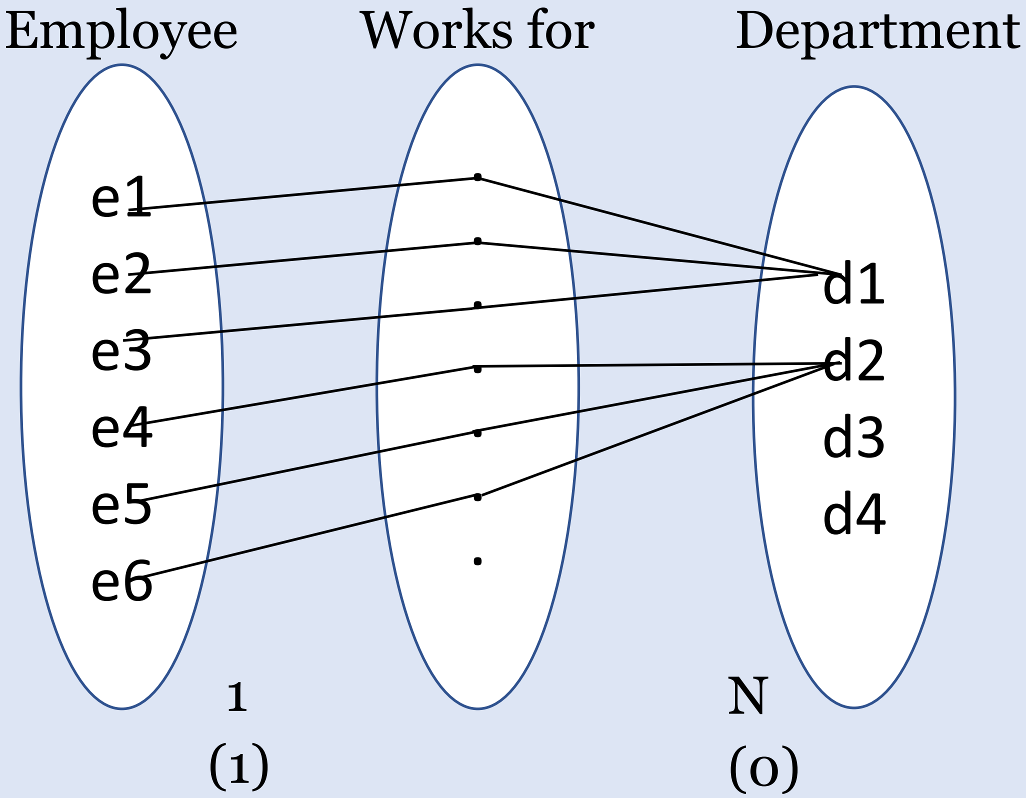
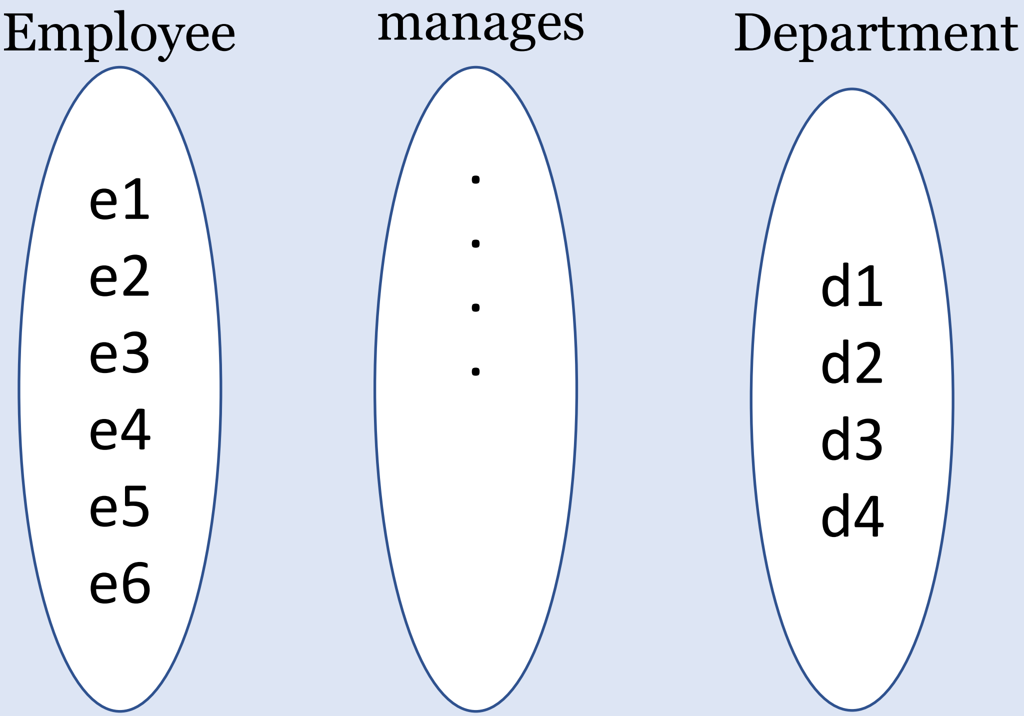


Relationship one-to-one (1:1)

- User Requirement
  - Every dept should have one manger
  - Only one employee manages a dept
  - An employee can manage only one dept



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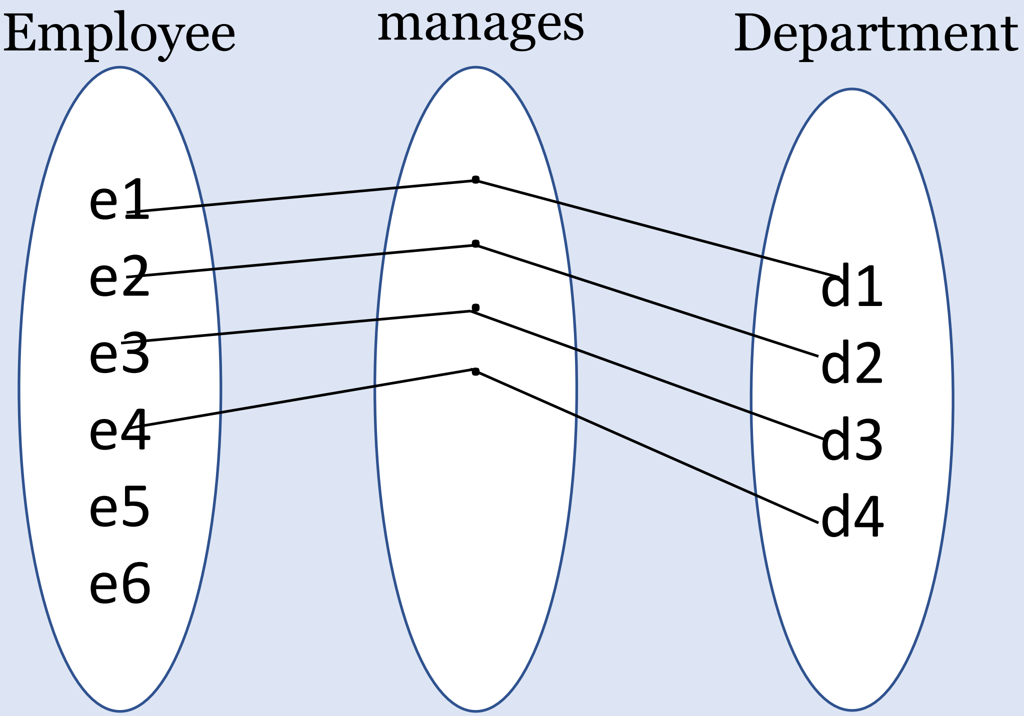

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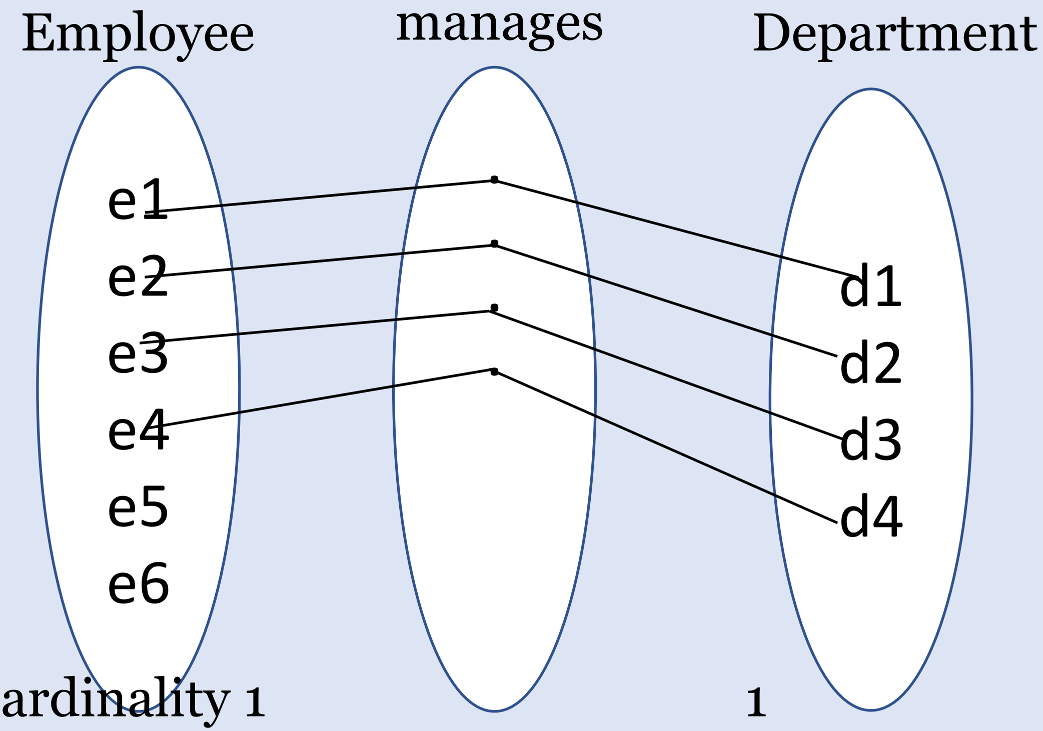
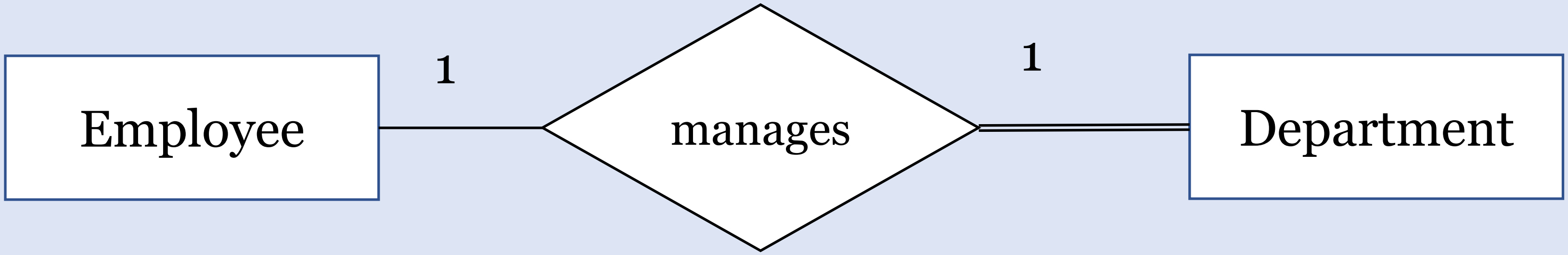


Cardinality 1 1

Participation (0) (1)

Relationship one-to-one (1:1)



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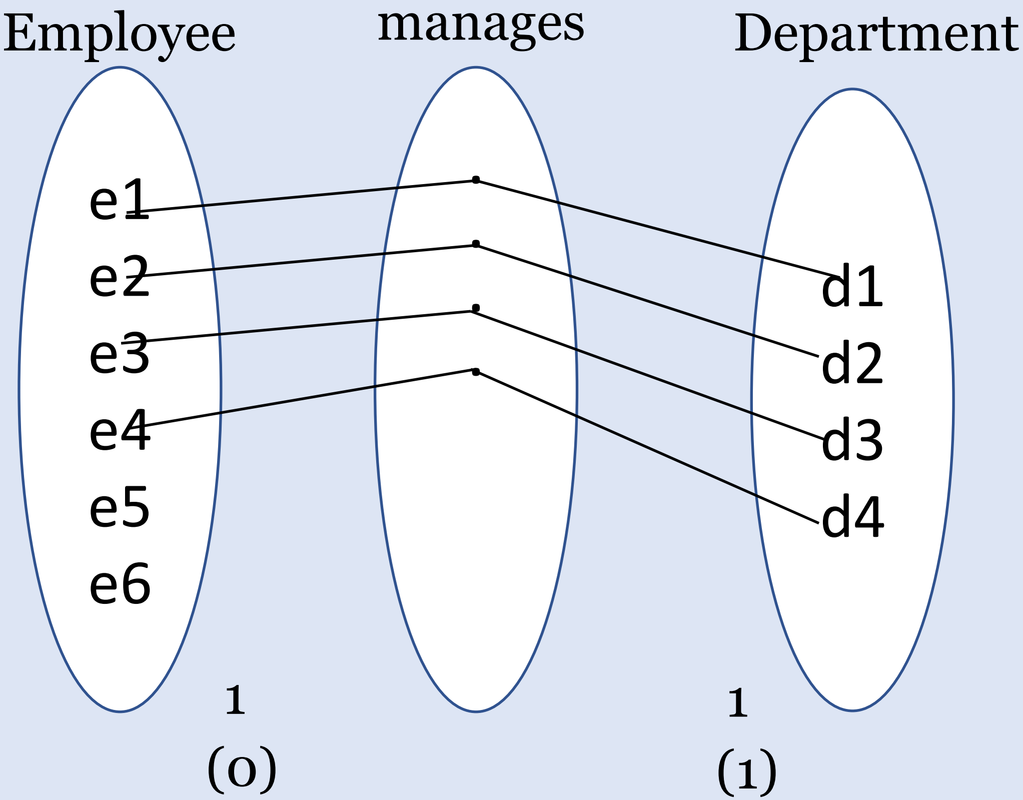

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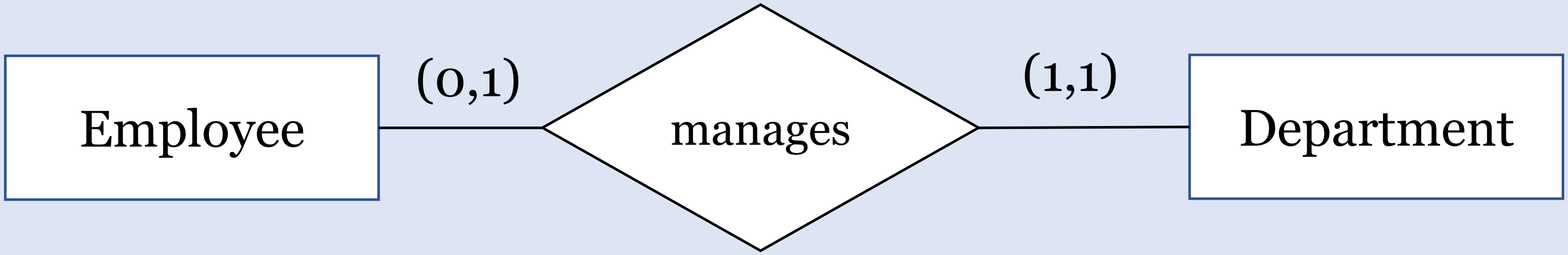

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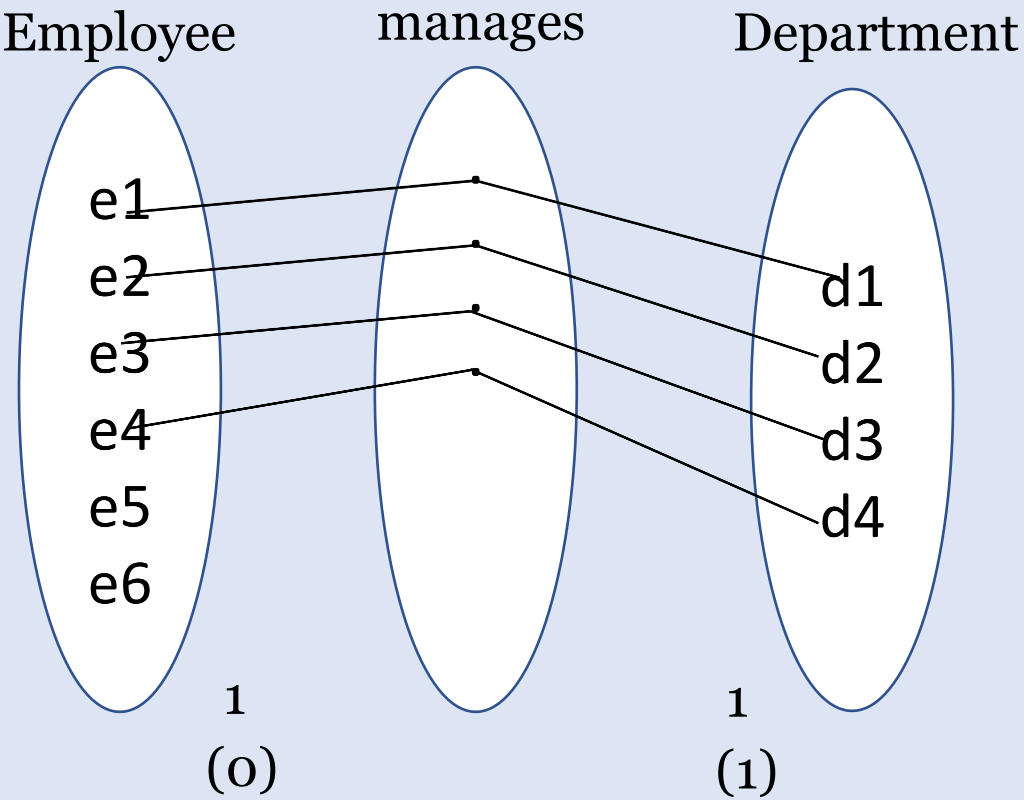
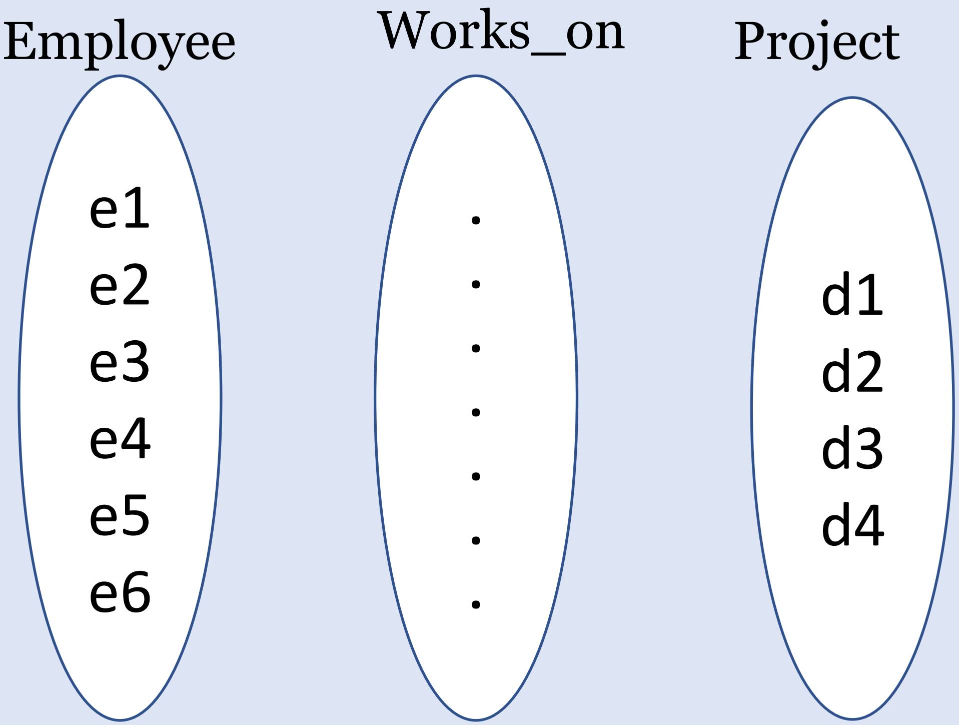


Relationship many-to-many (M:N)

- User Requirement
  - Every emp can work on at least one project
  - And on a project many employee can work



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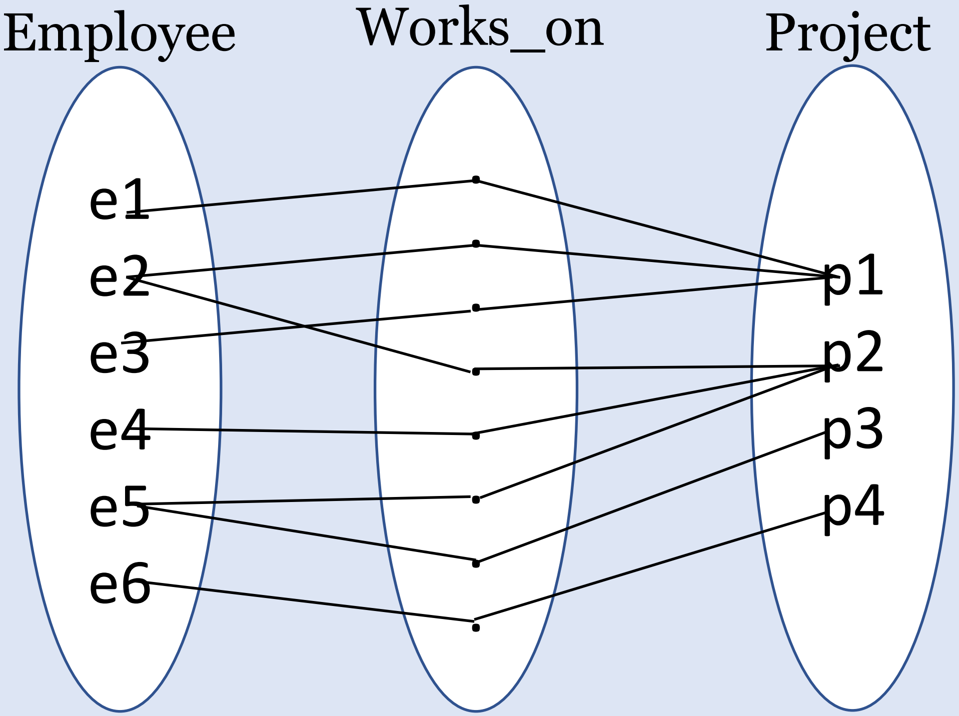

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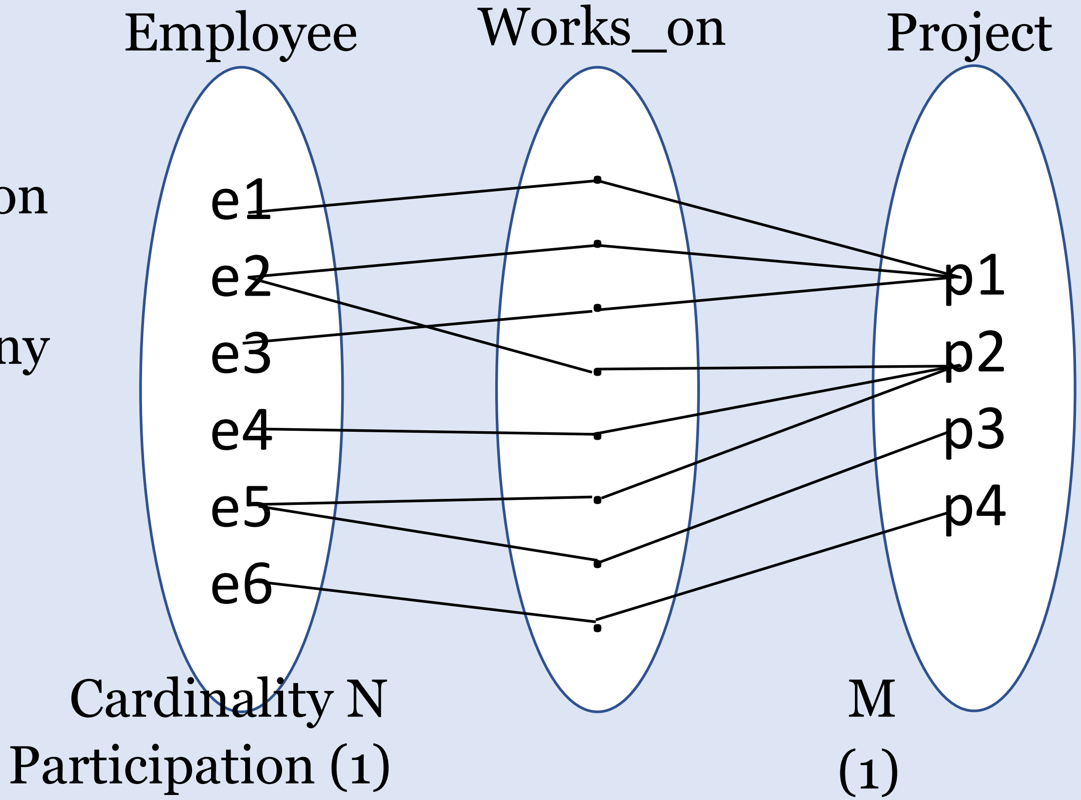
  - Degree = 2



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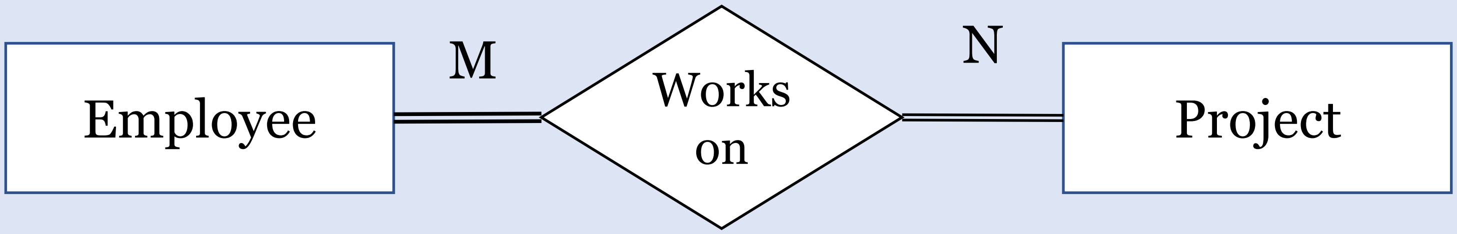

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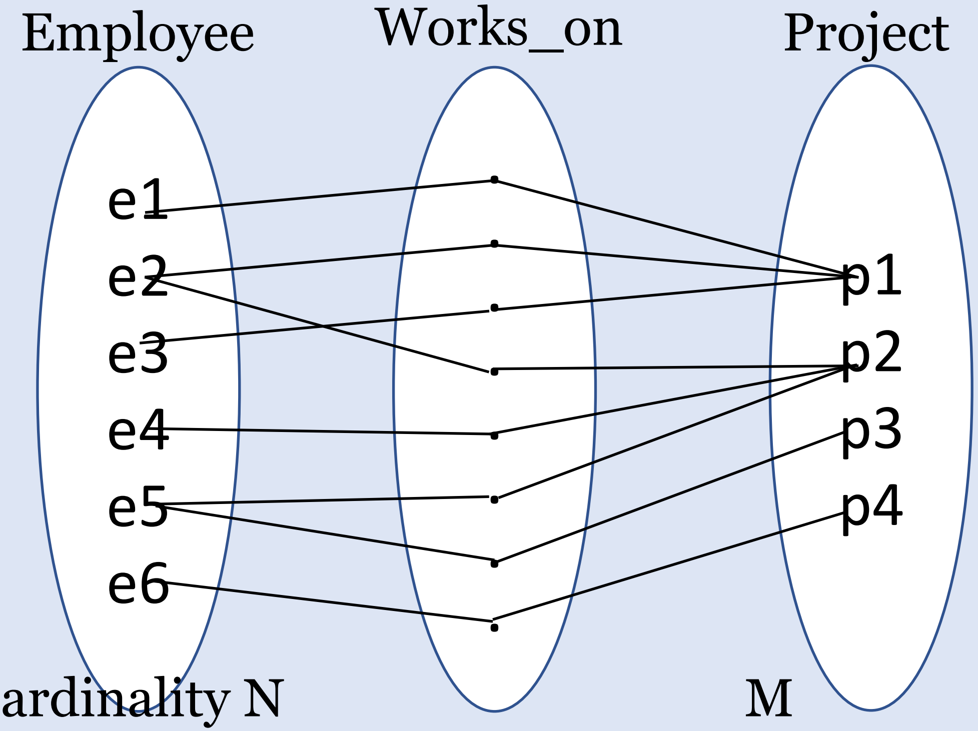
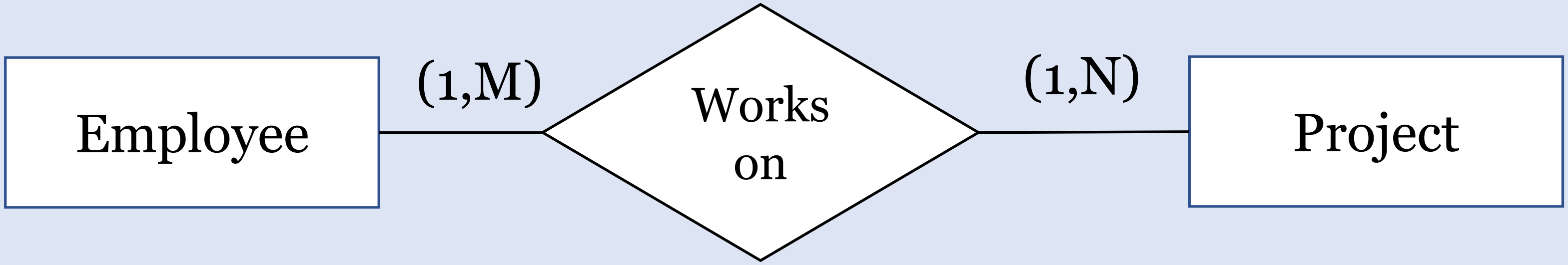


Cardinality N Participation (1)

M (1)

Relationship many-to-many (M:N)



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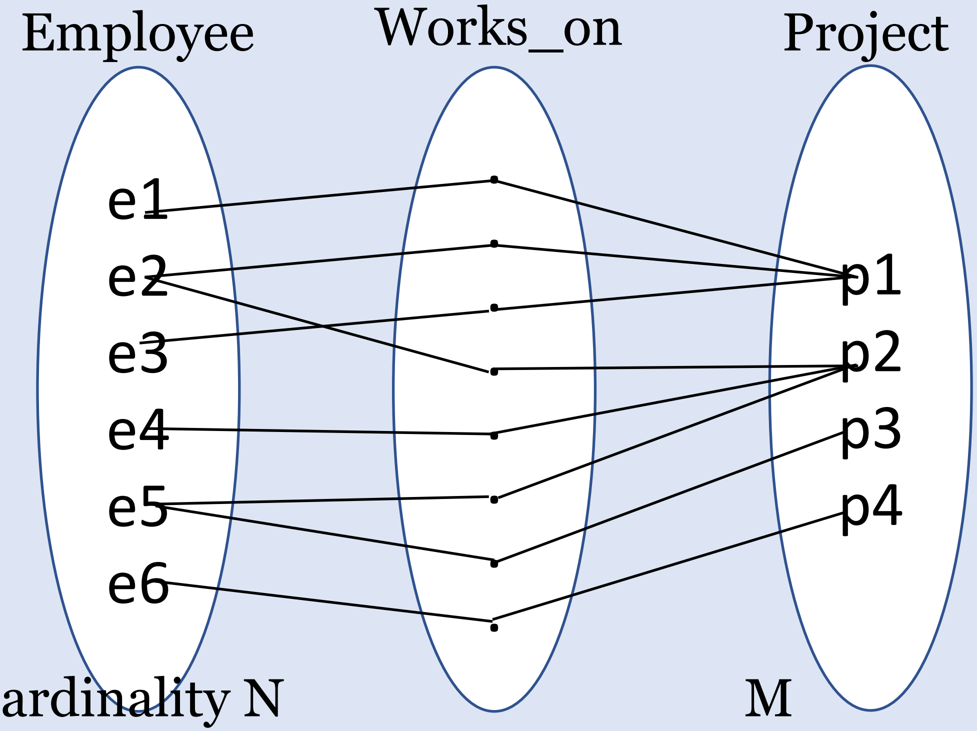
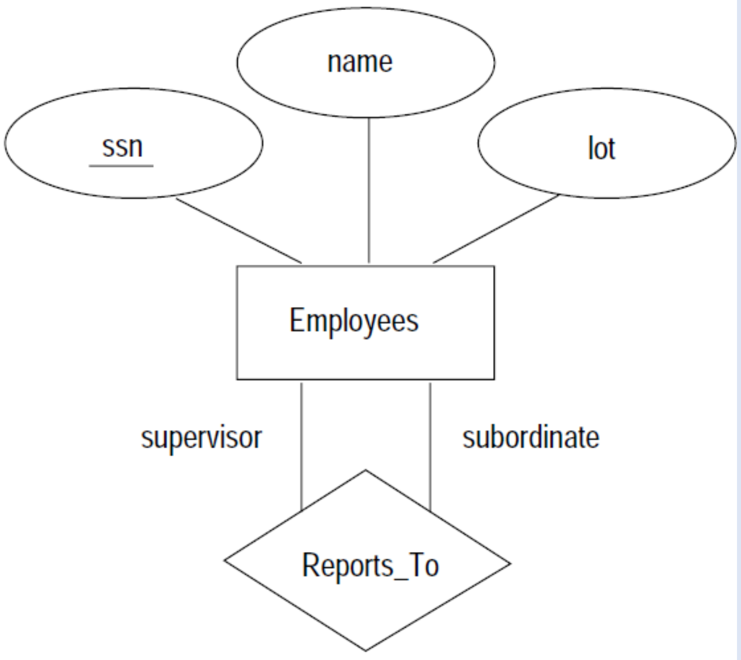


Cardinality N
Participation (1)

M
(1)

Roles

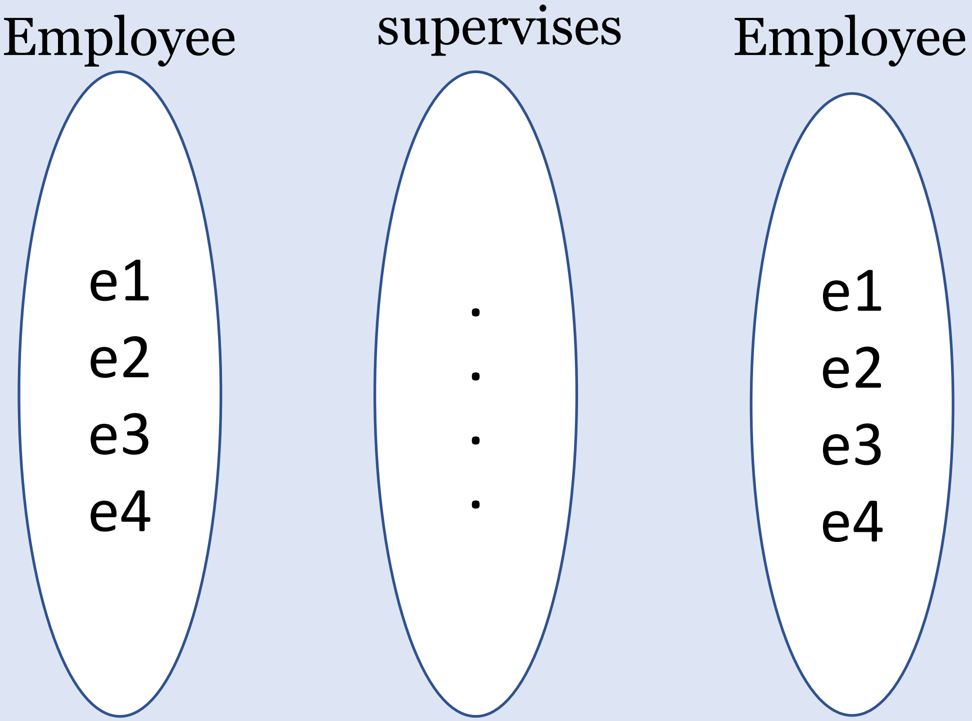
- Roles in E-R diagrams are indicated by labeling the lines that connect diamonds to rectangles
- Entity sets of a relationship need not be distinct
- A relationship might involve two entities in the same entity sets
    - Each occurrence of an entity set plays a “role” in the relationship



- Example: ***Reports_To*** relationship set
- Since employees report to other employees, every relationship in *Reports_To* is of the form (*emp*$_1$; *emp*$_2$), where both *emp*$_1$ and *emp*$_2$ are entities in Employees
- However, they play different **roles**:
    - *emp*$_1$ reports to the managing employee *emp*$_2$, which is reflected in the **role indicators** *supervisor* and *subordinate*

Recursive Relationship

- User Requirement
  - An emp is managing some other employee



Employee

supervises

Employee

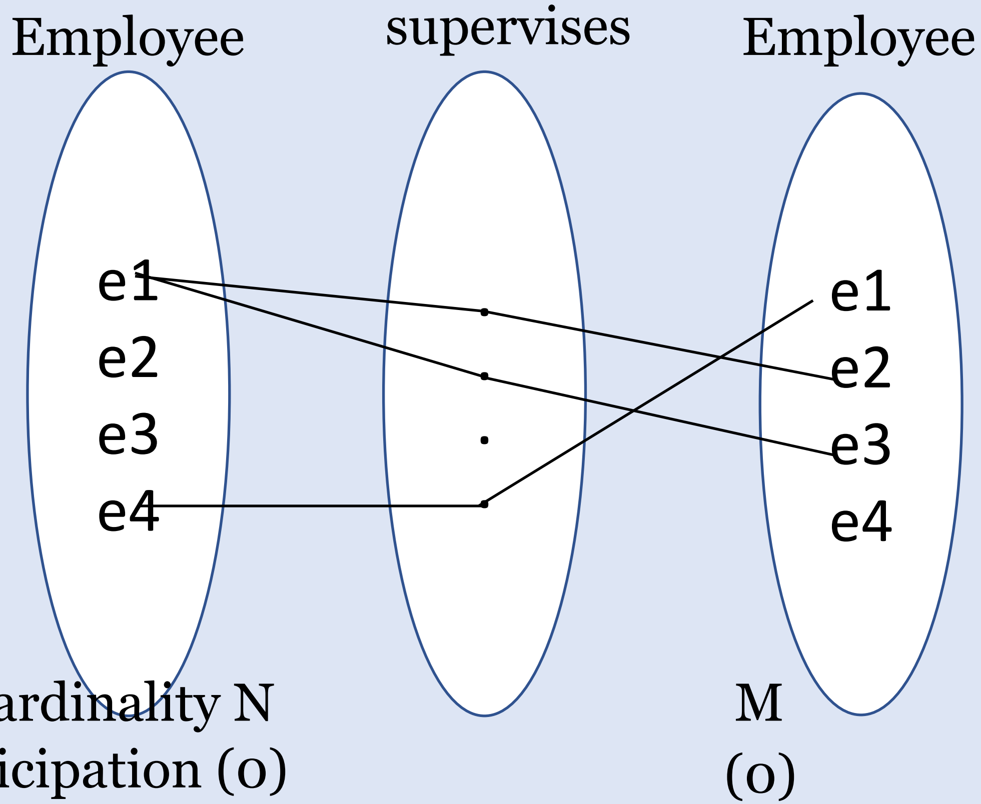
e1
e2
e3
e4

.
.
.
.

e1
e2
e3
e4

Recursive Relationship

- User Requirement
  - An emp is managing some other employee
  - Degree = 1



Employee

supervises

Employee

e1
e2
e3
e4

e1
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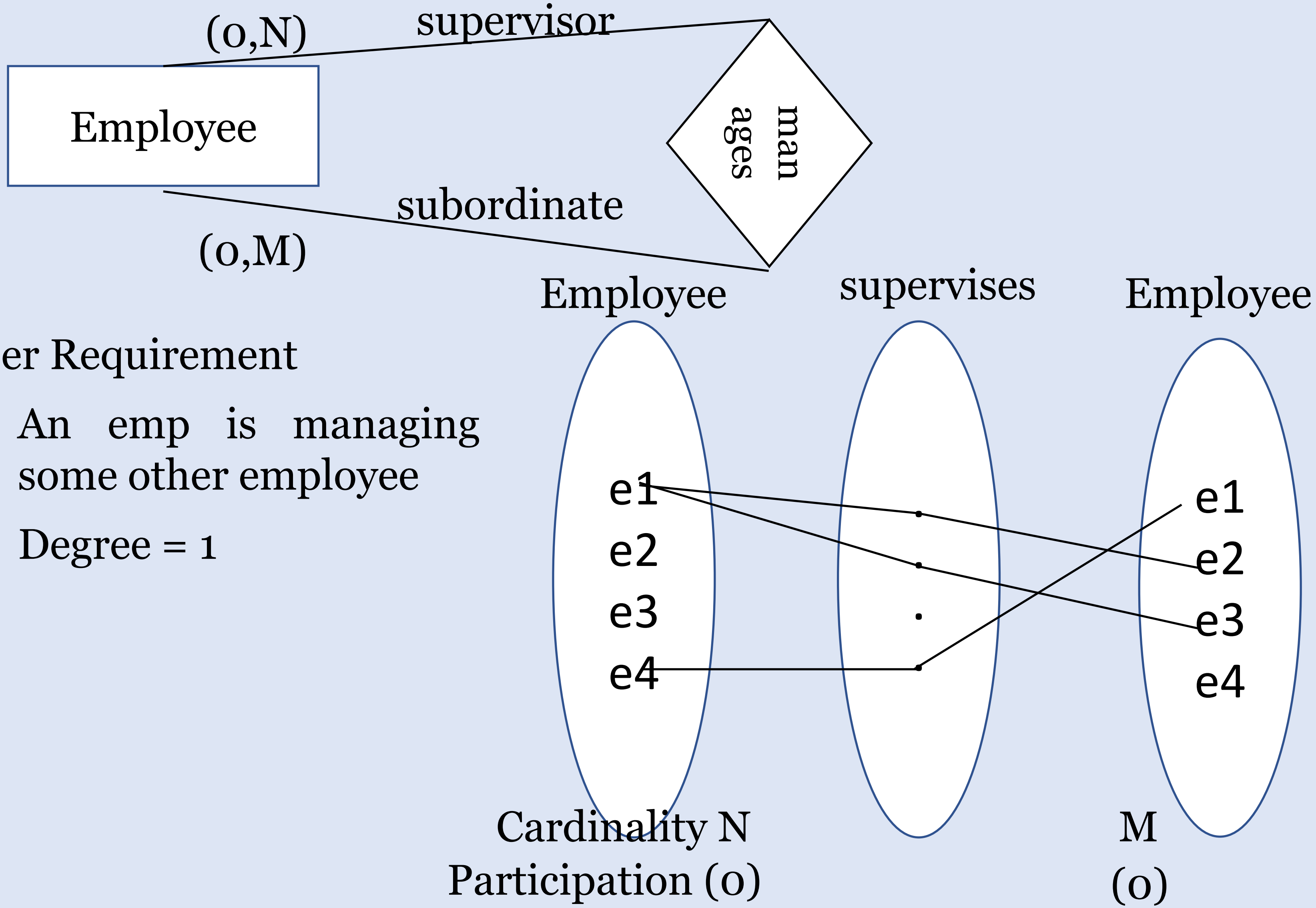
e4

Cardinality N
Participation (0)

M
(0)

Recursive Relationship



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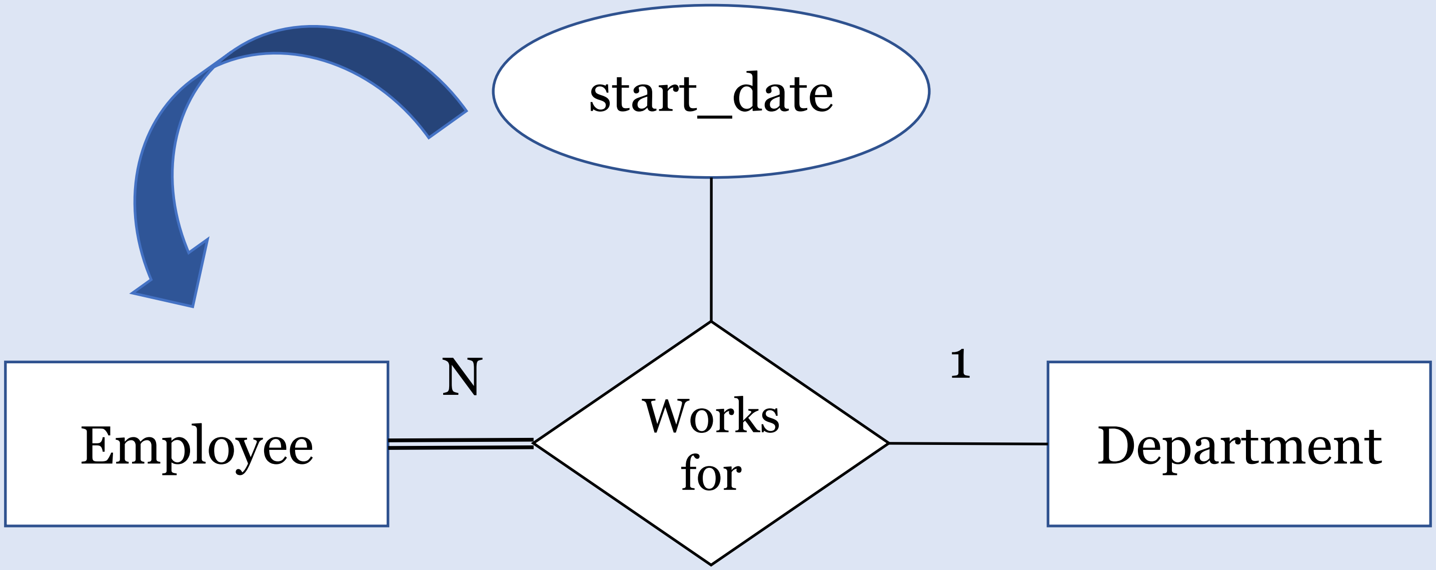
Attributes to Relationship



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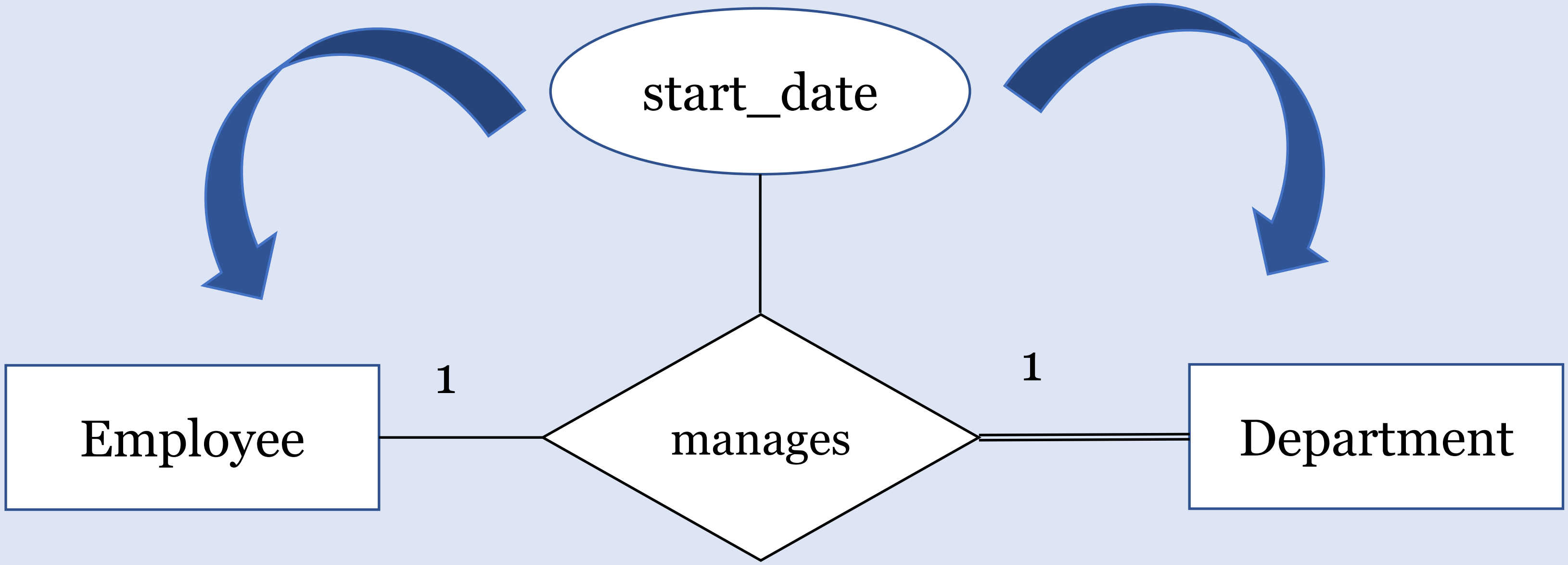

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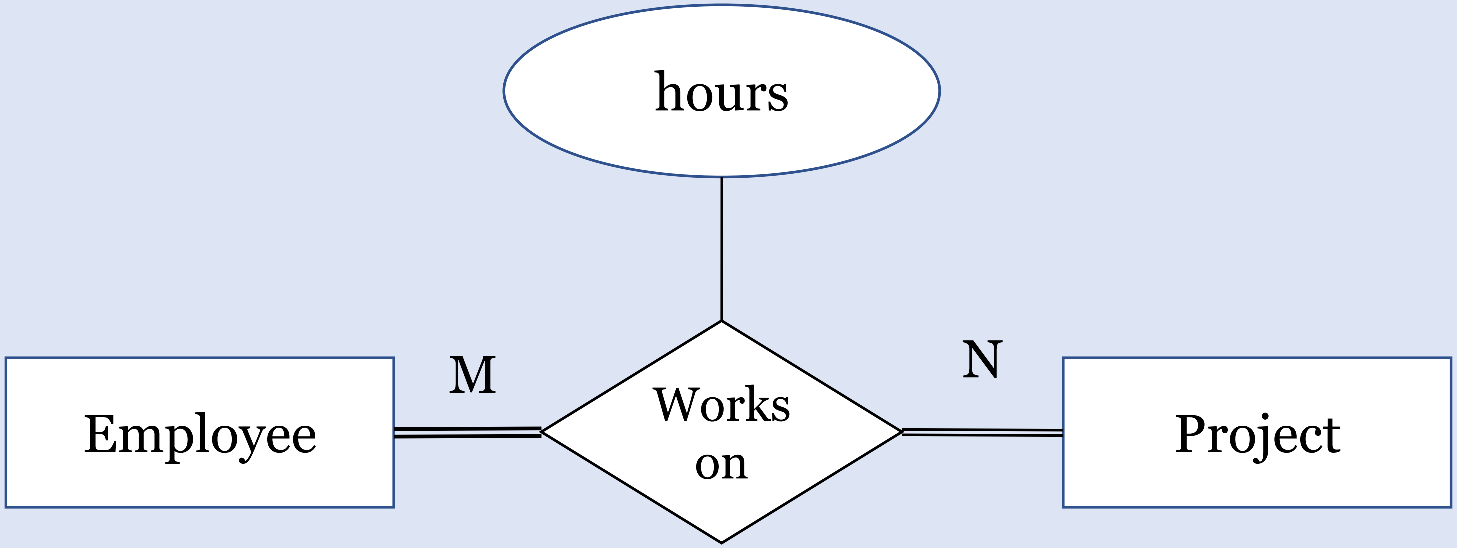
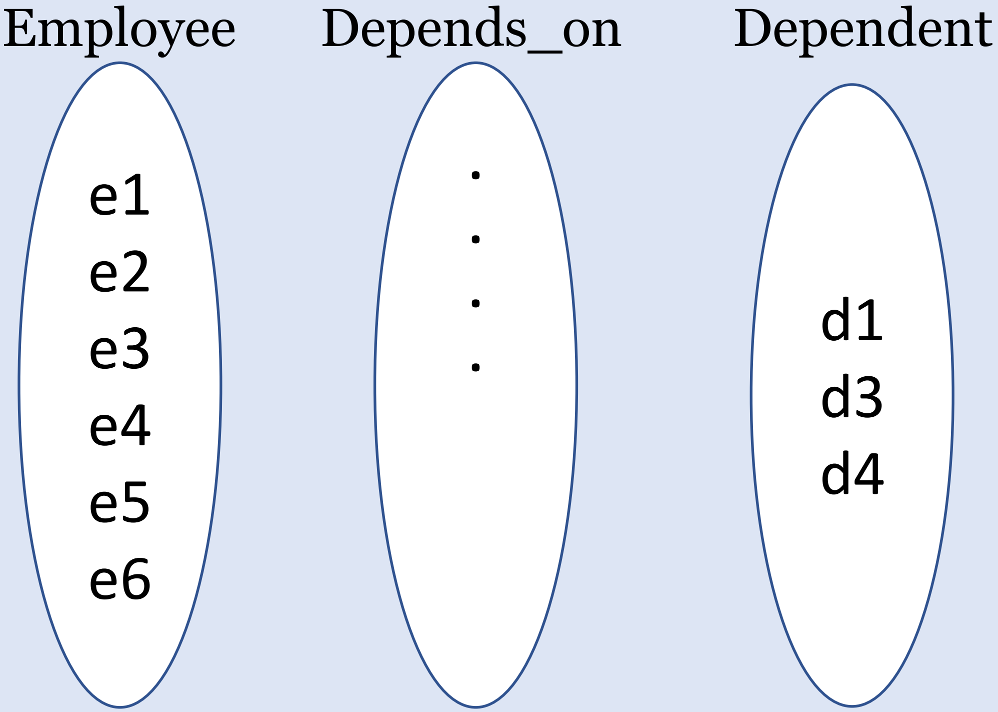
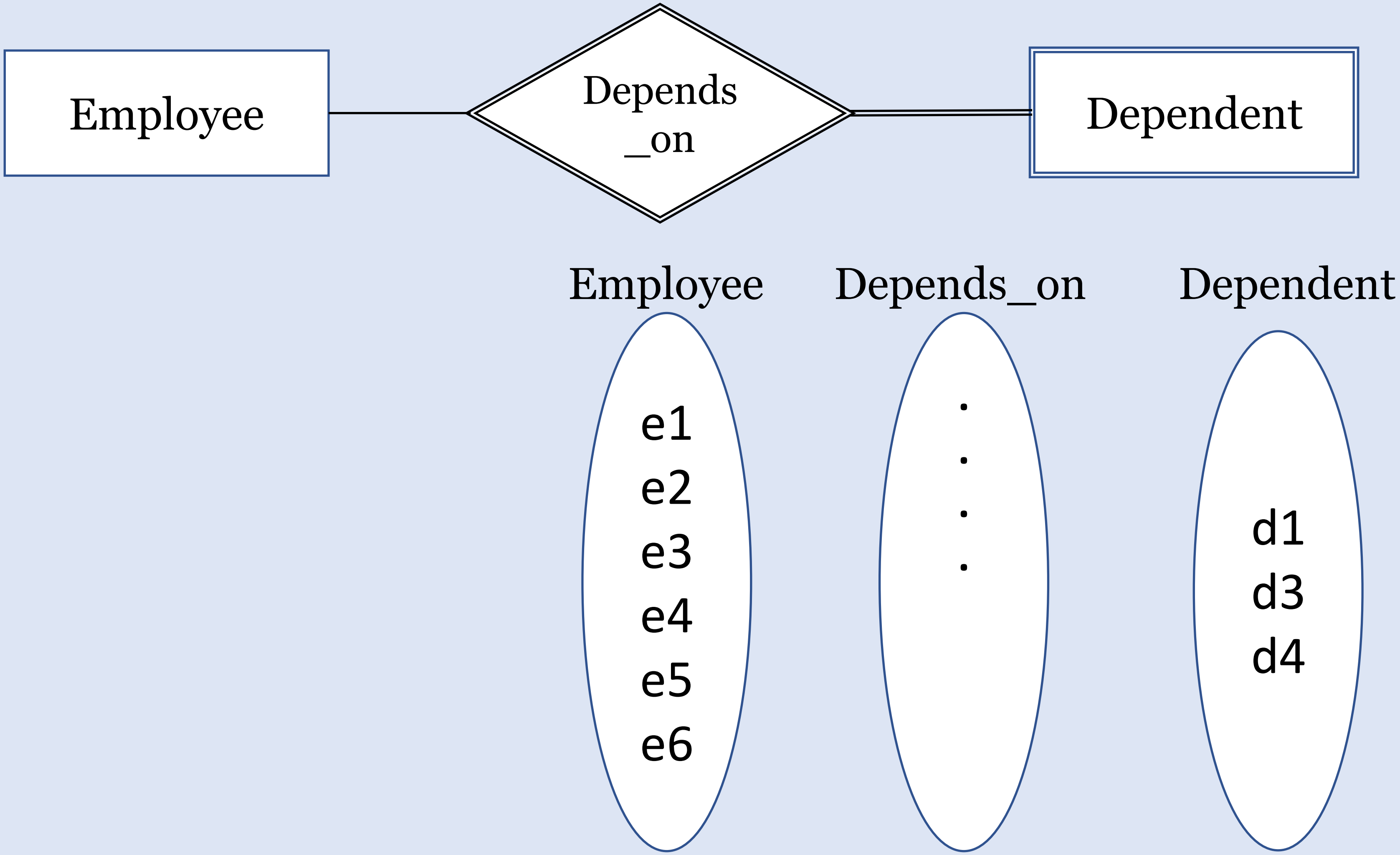


Strong vs Weak Entity



Identifying Relationship

Strong vs Weak Entity



Identifying Relationship

Thanks!