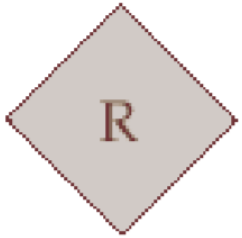

Entity Set


Attribute


Weak Entity Set

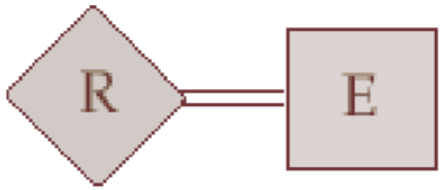

Multivalued Attribute




Relationship Set


Derived Attribute


Identifying Relationship Set for Weak Entity Set




Total Participation of Entity Set in Relationship


Primary Key


Discriminating Attribute of Weak Entity Set

# Entity and Attribute

- Entity
  - An object with a physical existence or conceptual existence
  - e.g. a person, a company
  - Notation
- Attributes
  - Properties that describe entities
  - e.g. Name of an employee
  - Notation

# Attribute
## - Simple vs. Composite attribute

- Simple (atomic) attribute
  - Attribute that are not divisible
  - e.g. SSN, ZIP code
  - Notation
- Composite Attribute
  - can be divided into smaller subparts
  - e.g. Address
  - Notation

# Attribute
## - Single value vs. Multivaled attribute

- Single-valued attribute
  - e.g. Age of a person
- Multivalued attribute
  - e.g. College degree
  - Notation

# Attribute
## - Stored vs. Derived attribute

- Stored attribute

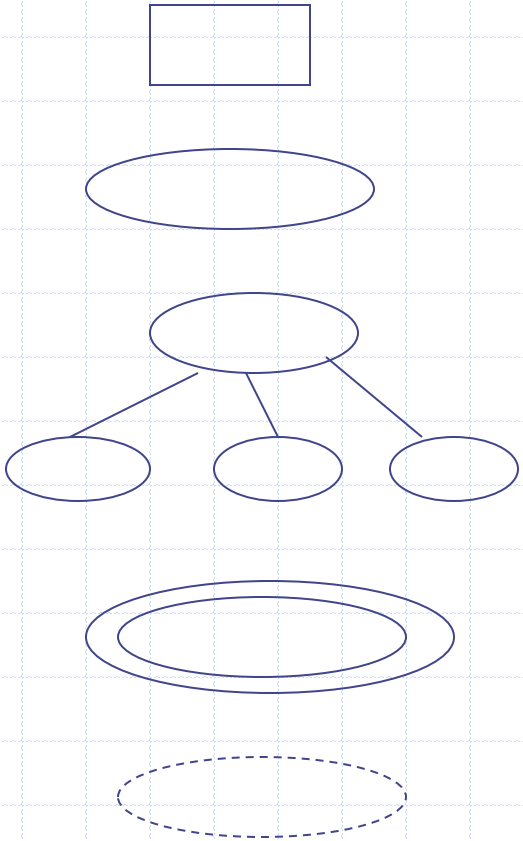
  e.g. birthDate

- Derived attribute
  - Derived from other attribute
  - e.g. age = current date – birthDate
  - Notation

# Entity types and entity sets

- Entity Type
  - Defines a collection of entities that have the same attributes.
  - e.g. employee
  - describe the schema or intension for a set of entities that share the same structure.
- Entity Set
  - The collection of all entities of a particular entity type in the database at any point in time is called an entity set.
  - e.g. a set of instances of employees.
  - Also called the extension of the entity type.

# ER Diagram For Entity and Attribute



Entity

Single Attribute

Composite Attribute

Multi-valued Attribute

Derived Attribute

# Key

- A key is an attribute or the combination of multiple attributes that can be used to distinguish one entity instance from other entity instances in an entity type.
  - (e.g. SSN of an employee)
- Composite Key: A set of attributes as the key of an entity.
- Key must be minimal
- Notations
- Composite attributes as a key

# Value Sets

- Value set (or domain of values):
- The set of values that may be assigned to the attribute for each individual entity
- e.g. age of employee:

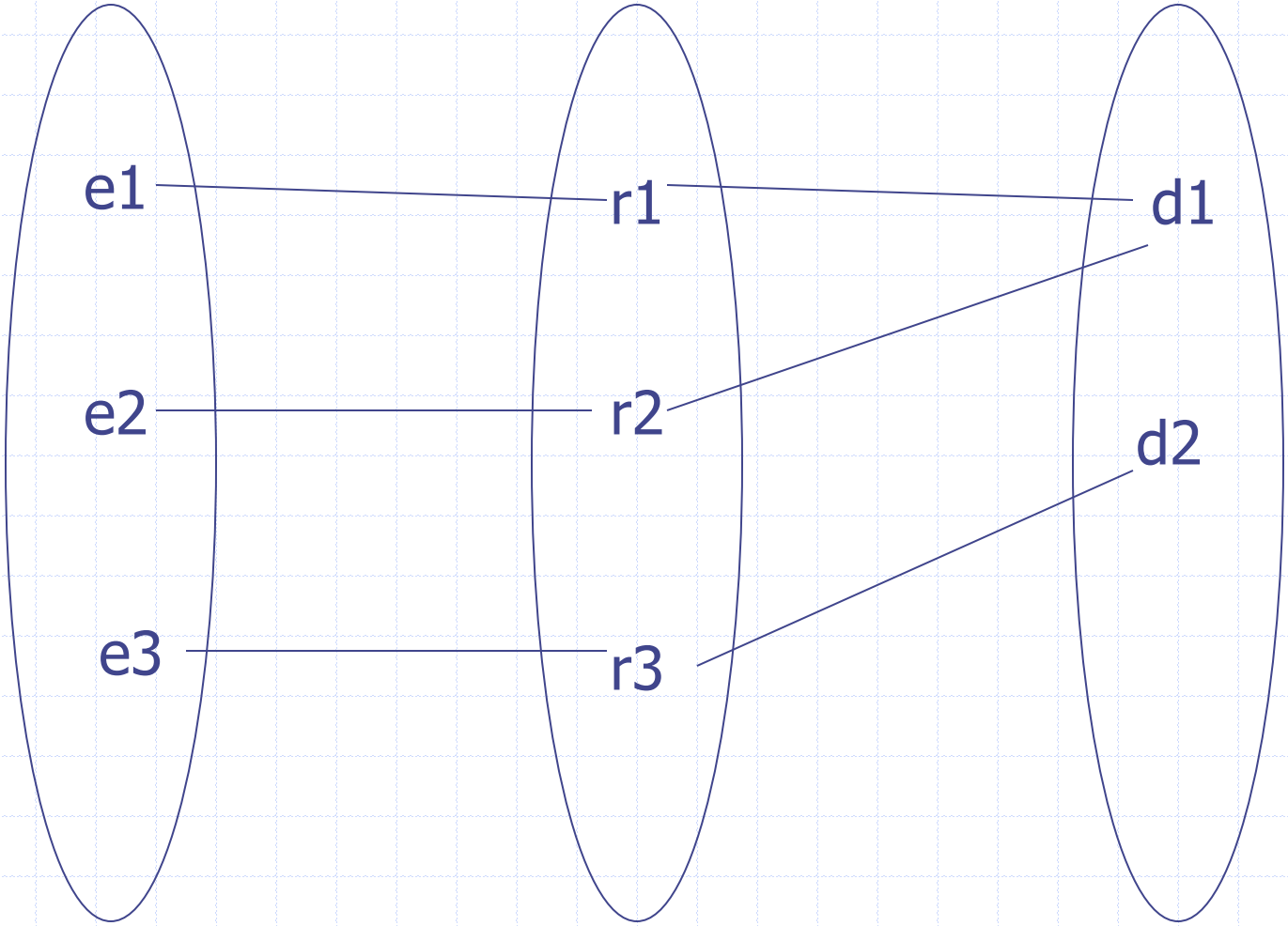
  value set: integer between 16 and 70
- Not displayed in ER diagram

# Relationship

- Relationship Type
  - Defines a set of associations among entity types
  - e.g. Employees work for a department.


- Relationship Instance
  - Instance of a relationship type that associates with entity instances.

# Example of Relationship Instance



# Structure Constraint

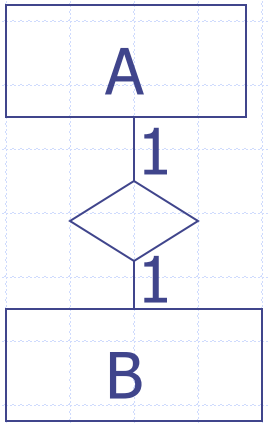
- Cardinality Ratios
- Participation or Optionality Constraints

# Cardinality Ratios for Binary Relationship

- Specify the the number of relationship instances that an entity can participate in.
- Possible cardinality ratios
  - 1:1 (one to one)
  - 1:N (one to many)
  - N:1 (many to one)
  - M:N (many to many)

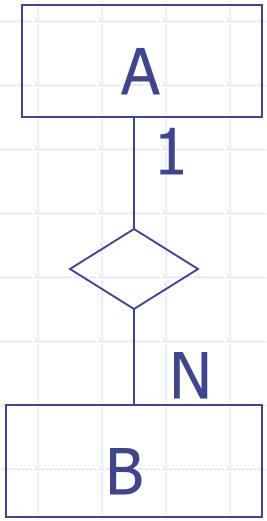
# Cardinality Ratio 1:1

- One instance of A can be associated with only one instance of B. One instance of B can be associated with only one instance of A.



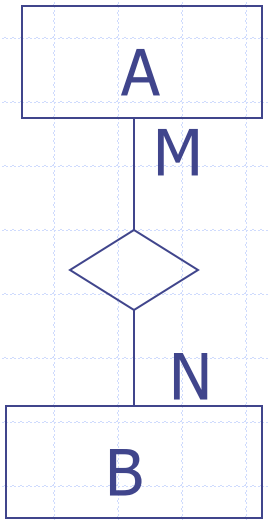
# Cardinality Ratio 1:N

- One instance of A can be associated with any number of instances of B
- One instance of B can be associate with only one instance of A



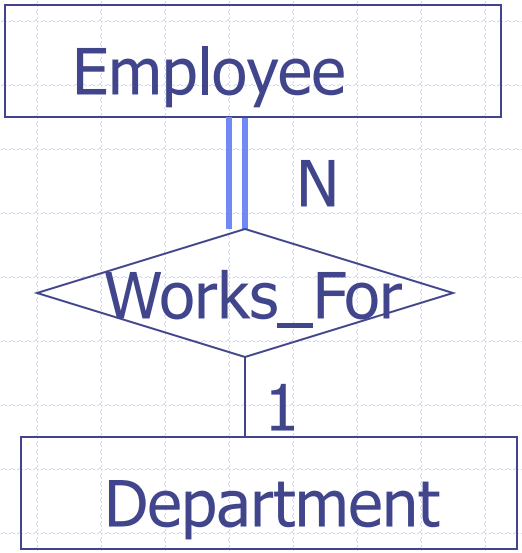
# Cardinality Ratio M:N

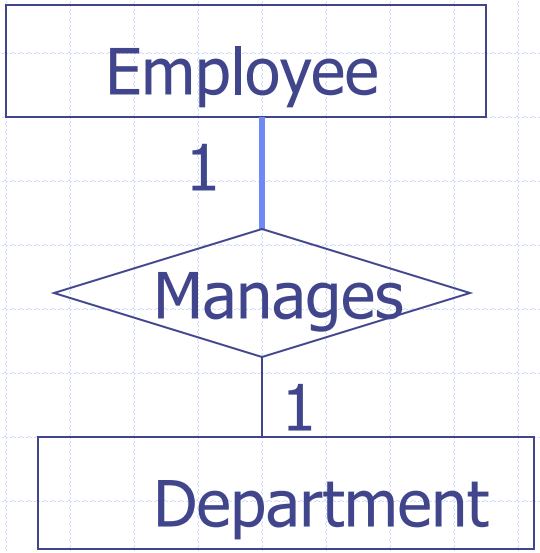
- One instance of A can be associated with any number of instances of B
- One instance of B can be associate with any number of instances of A



# Participation Constraints

- Total Participation (Existence dependency)
  - *Any* employee *must* work for one department.
- Partial Participation
  - *Some* of the employee entities manage department entities, but not necessary all.



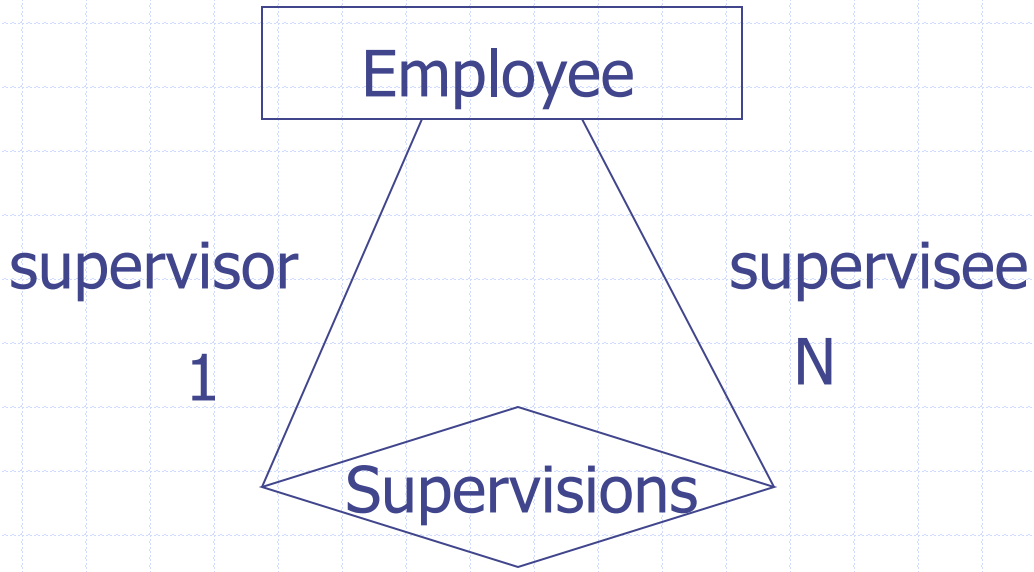
# Relationship role name

- Each entity type that participates in a relationship type plays a particular role.
- Role name: signify the rule that a participating entity from the entity type plays in each relationship instance.
- e.g. employee plays the role of worker

  department plays the role of employer.

# Recursive Relationship

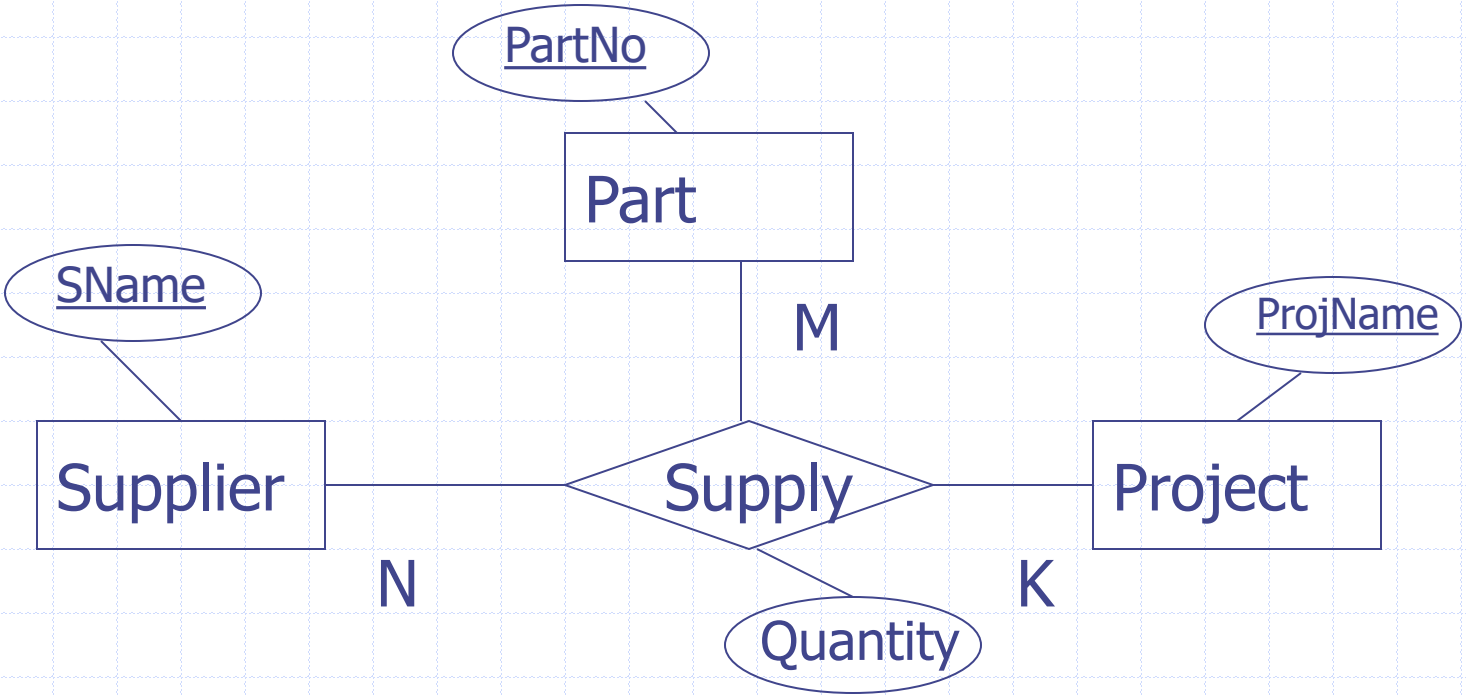
The Same entity type participates more than once in a relationship type in different roles.



# Weak Entity

- Figure
- Does not have key attributes of its own.
- Has total participation constraints
- Partial Key: Unique identifier of a weak entity that can be used to distinguished from other weak entities related to the same owner entity

# Non-Binary Relationship




A ternary relationship