UNIT 1

Lecture 6

E R Model

Relationship

- A **relationship** is an association among several entities.
- For example, we can define a relationship that associates customer Hayes with loan L-15.
- This relationship specifies that Hayes is a customer with loan number L-15.

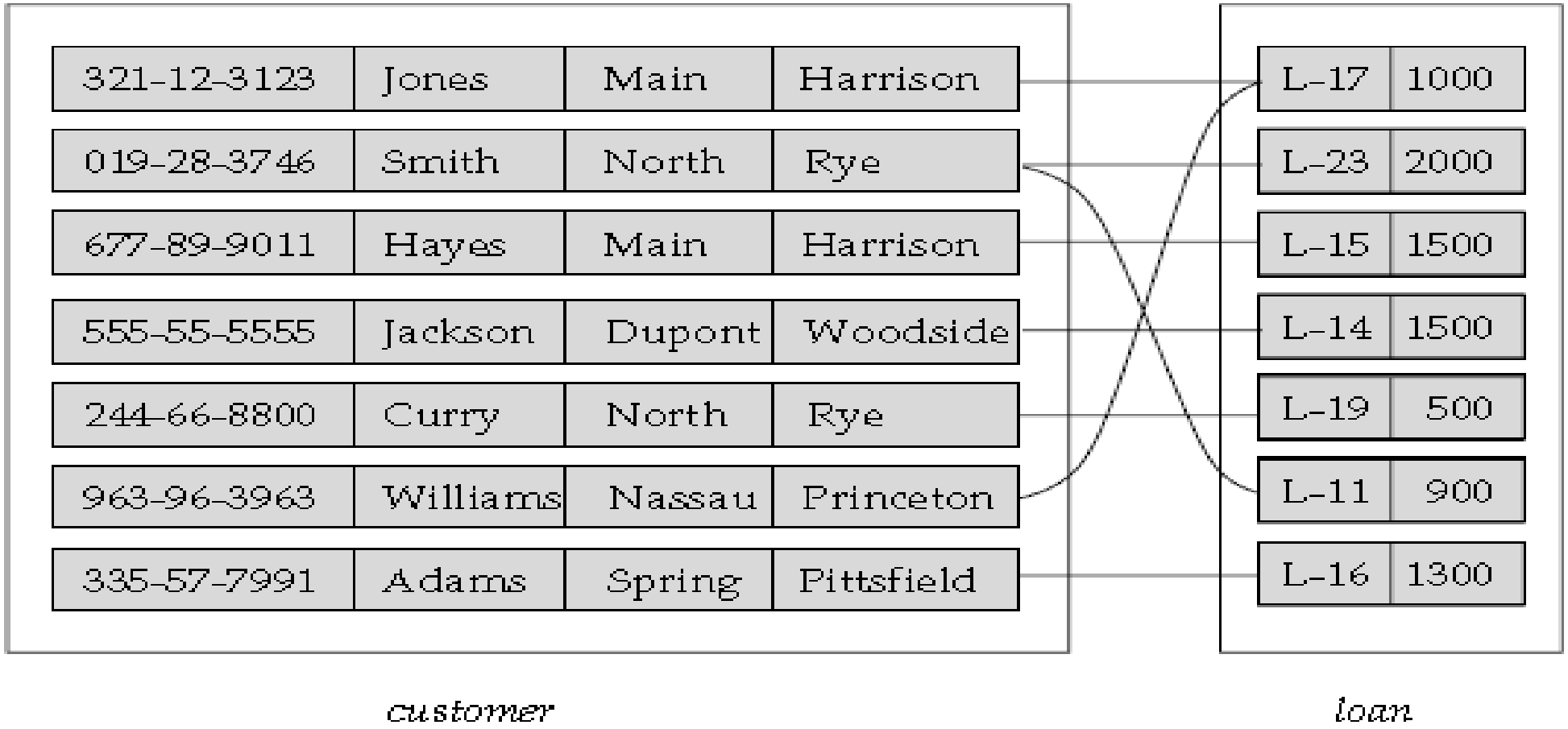
Relationship Set

- A **relationship set** is a set of relationships of the same type.
- Formally, it is a mathematical relation on $n \geq 2$ (possibly non-distinct) entity sets. If $E1, E2, \ldots, En$ are entity sets, then a relationship set R is a subset of

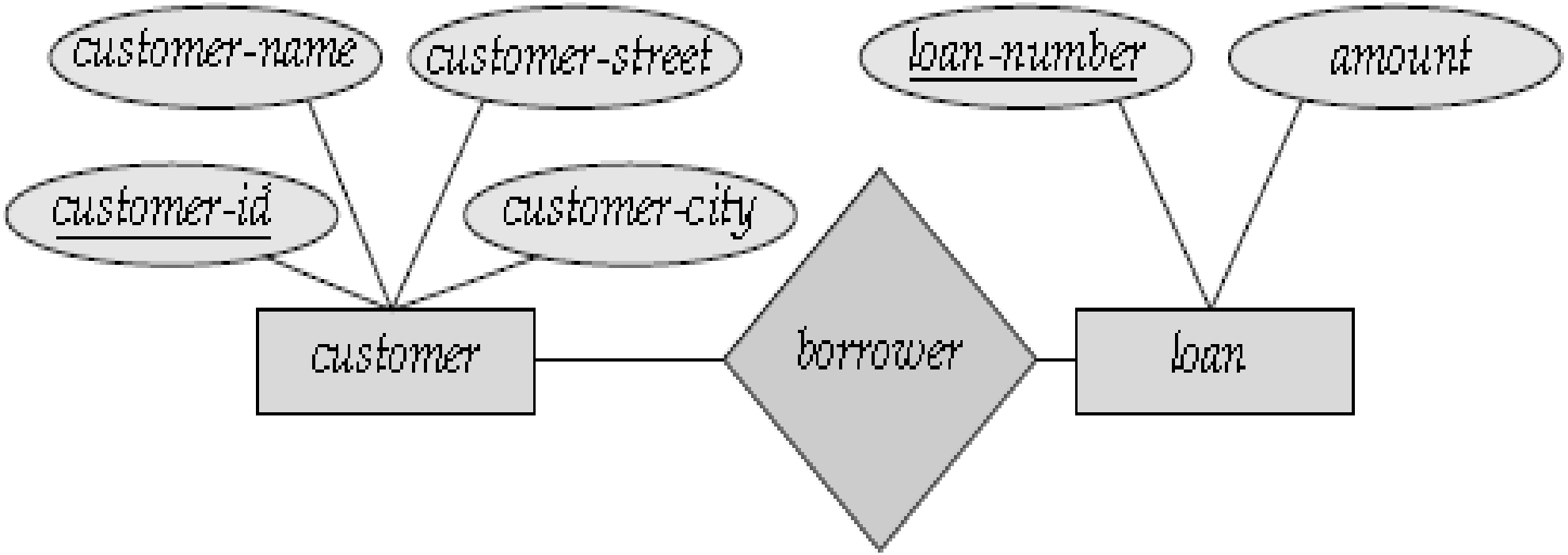
  $$\{(e1, e2, \ldots, en) \mid e1 \in E1, e2 \in E2, \ldots, en \in En\}$$

  where $(e1, e2, \ldots, en)$ is a relationship.
- Consider the two entity sets *customer* and *loan*. We define the relationship set *borrower* to denote the association between customers and the bank loans that the customers have.

Relationship Set (Borrower)



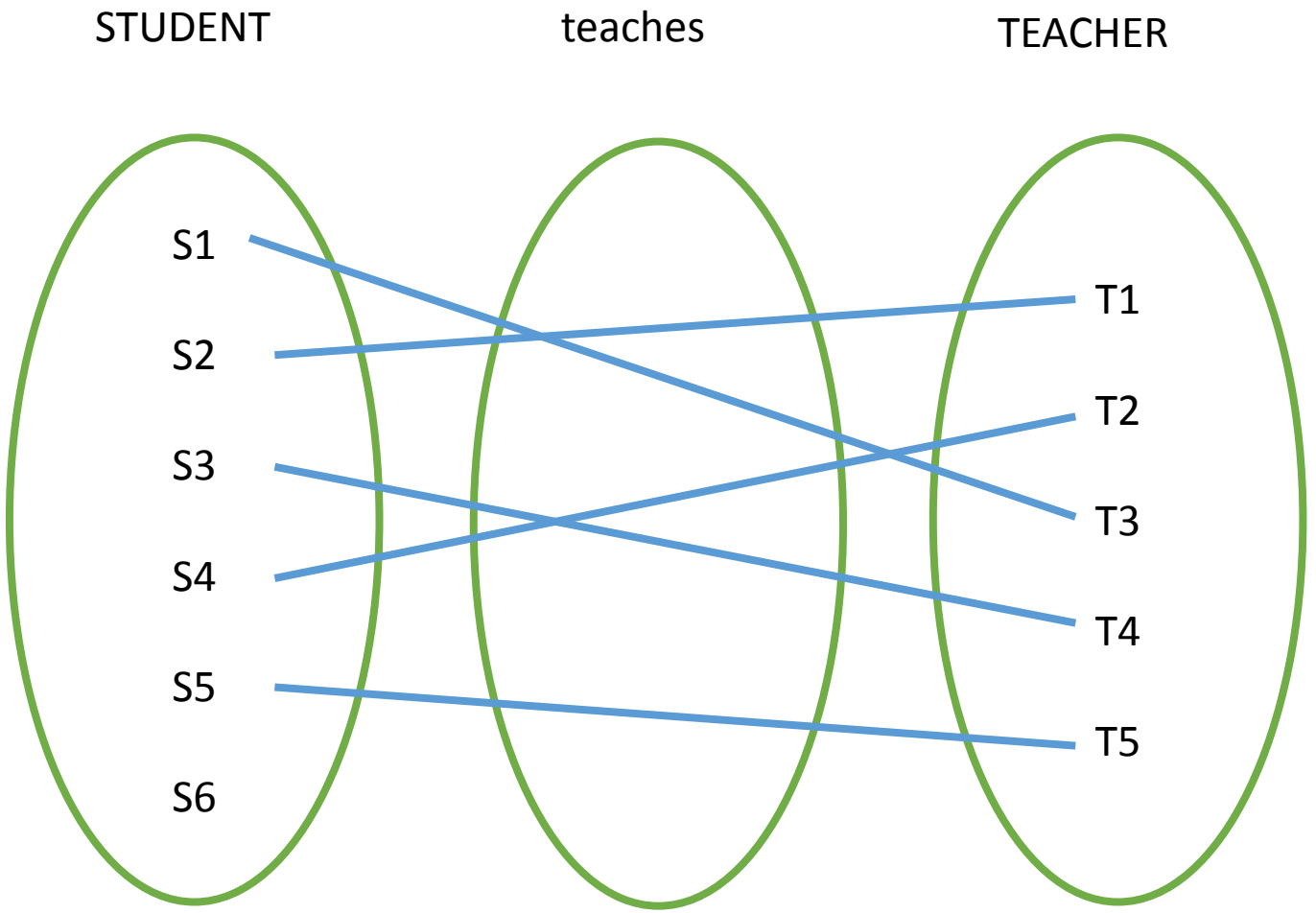
Relationship Set (Borrower)



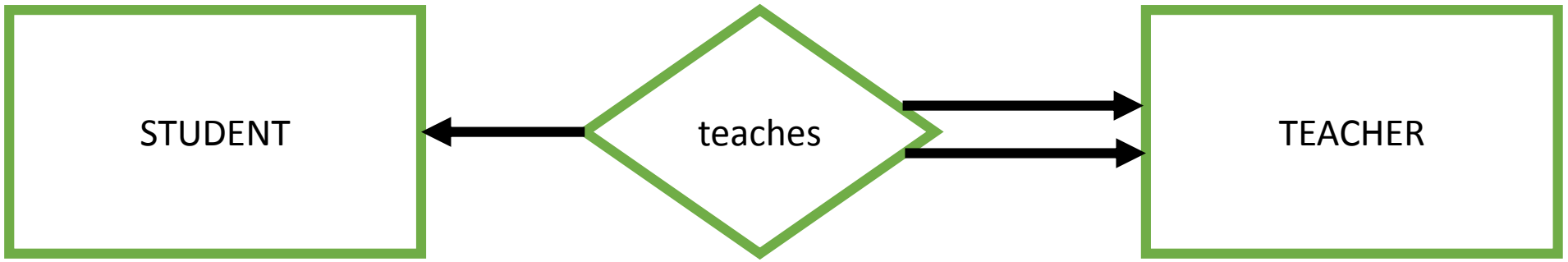
Participation

- The association between entity sets is referred to as **participation**; that is, the entity sets *E*1*, E*2*, . . .,En* **participate** in relationship set *R*.
- The participation of an entity set *E* in a relationship set *R* is said to be **total** if every entity in *E* participates in at least one relationship in *R*.
- If only some entities in *E* participate in relationships in *R*, the participation of entity set *E* in relationship *R* is said to be **partial**.

participation



participation



partial

total

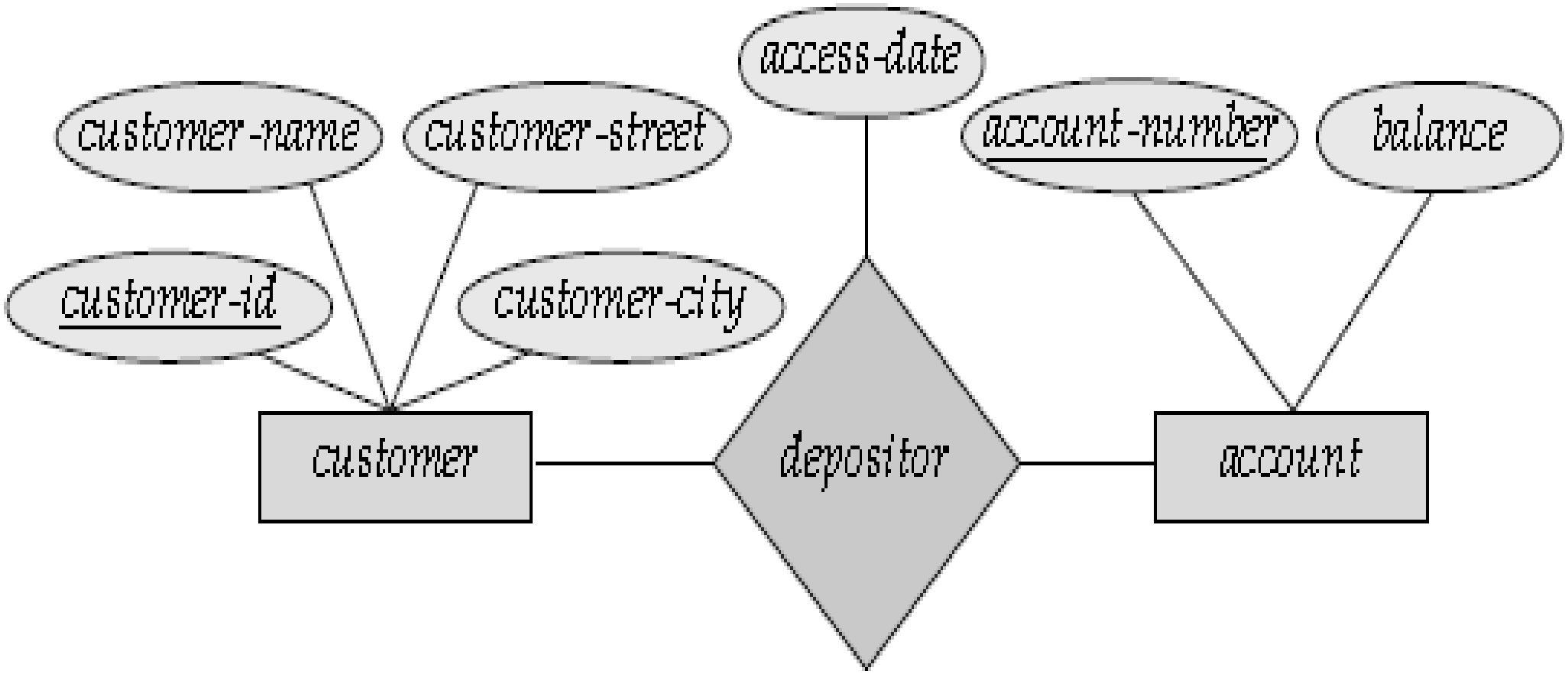
Relationship Instance

- A **relationship instance** in an E-R schema represents an association between the named entities in the real-world enterprise that is being modeled.
- For. E.g., the individual *customer* entity Hayes, who has customer identifier 677-89-9011, and the *loan* entity L-15 participate in a relationship instance of *borrower*.
- This relationship instance represents that, in the real-world enterprise, the person called Hayes who holds *customer-id* 677-89-9011 has taken the loan that is numbered L-15.

Descriptive Attribute

- A relationship may also have attributes called descriptive attributes.
- Consider a relationship set depositor with entity sets customer and account. We could associate the attribute access-date to that relationship to specify the most recent date on which a customer accessed an account.
- The depositor relationship among the entities corresponding to customer Jones and account A-217 has the value “23 May 2001” for attribute access-date, which means that the most recent date that Jones accessed account A-217 was 23 May 2001.

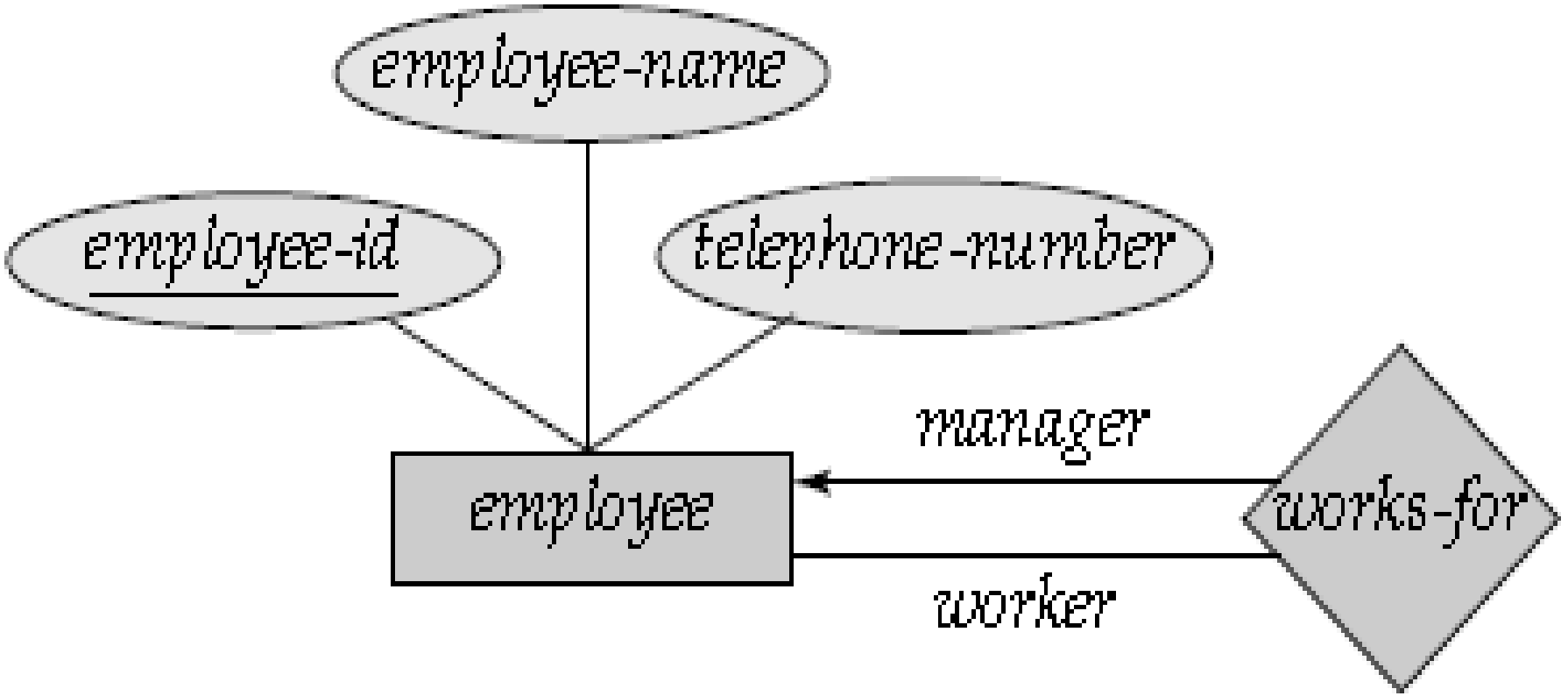
Descriptive Attribute



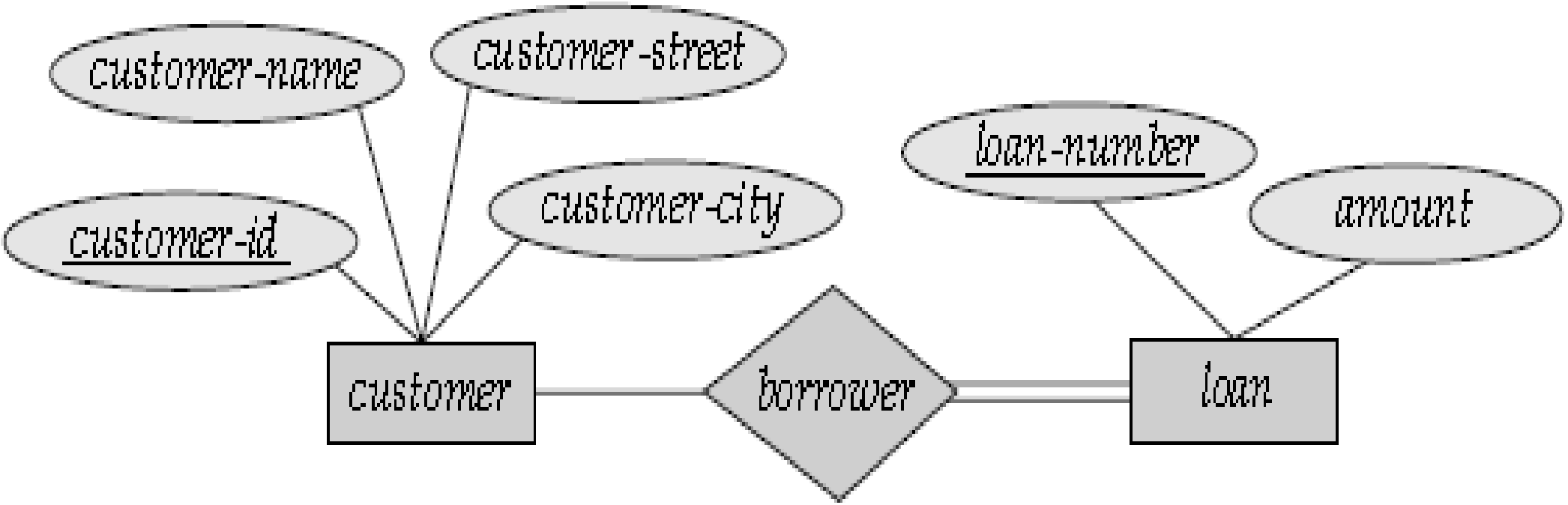
Degree

- The number of entity sets that participate in a relationship set is called the **degree** of the relationship set.
- A unary relationship set is of degree 1;
- A binary relationship set is of degree 2;
- A ternary relationship set is of degree 3.

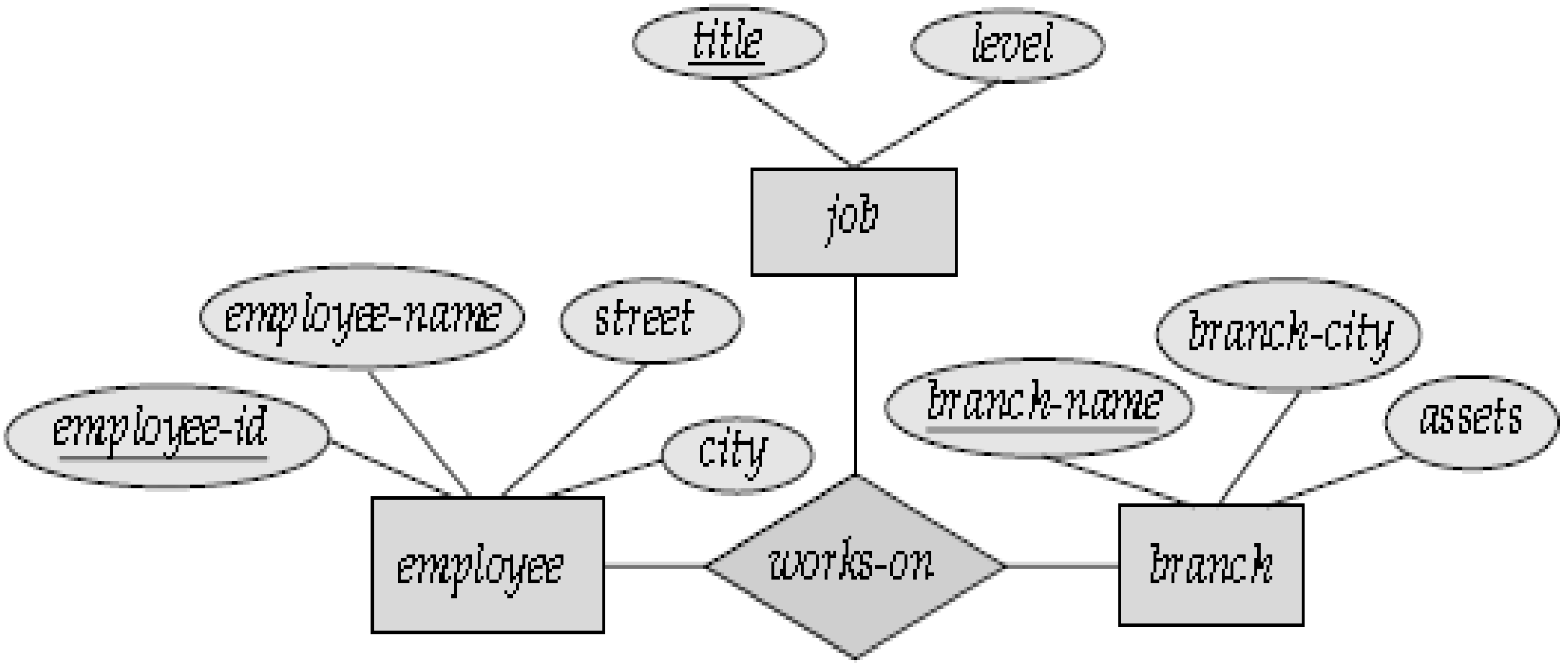
Unary Relationship (n = 1)



Binary Relationship (n=2)



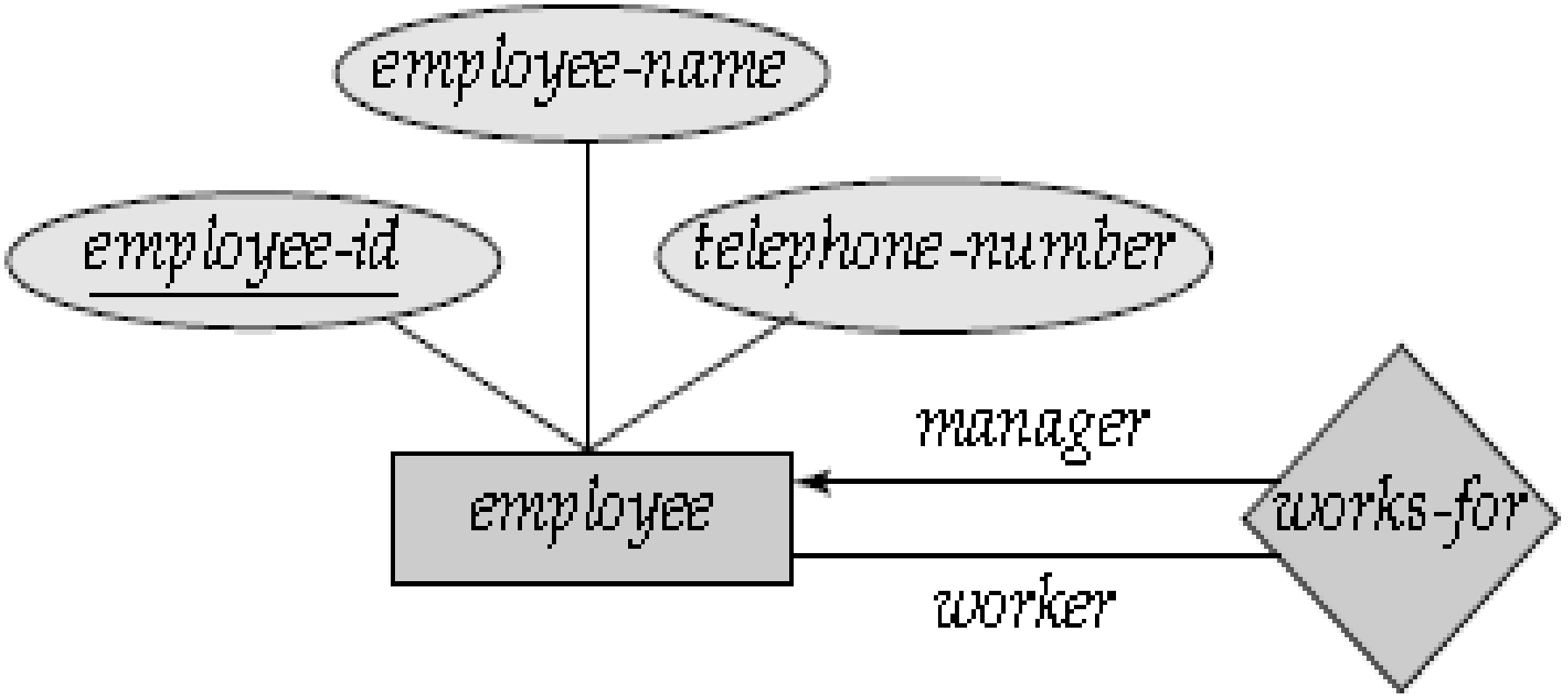
Ternary Relationship (n=3)



Role

- The function that an entity plays in a relationship is called that entity's **role**.
- Since entity sets participating in a relationship set are generally distinct, roles are implicit and are not usually specified. However, they are useful when the meaning of a relationship needs clarification. Such is the case when the entity sets of a relationship set are not distinct; that is, the same entity set participates in a relationship set more than once, in different roles.
- In this type of relationship set, sometimes called a **recursive** relationship set, explicit role names are necessary to specify how an entity participates in a relationship instance.

Unary Relationship (Recursive Relationship)

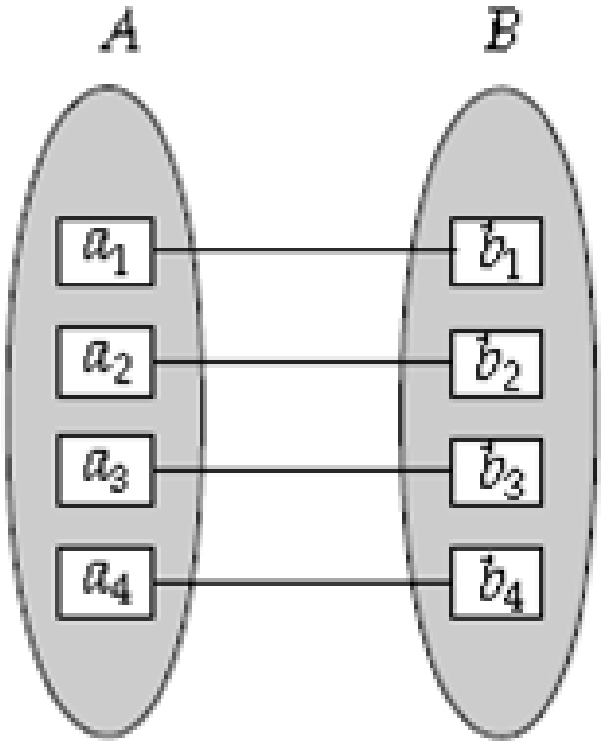


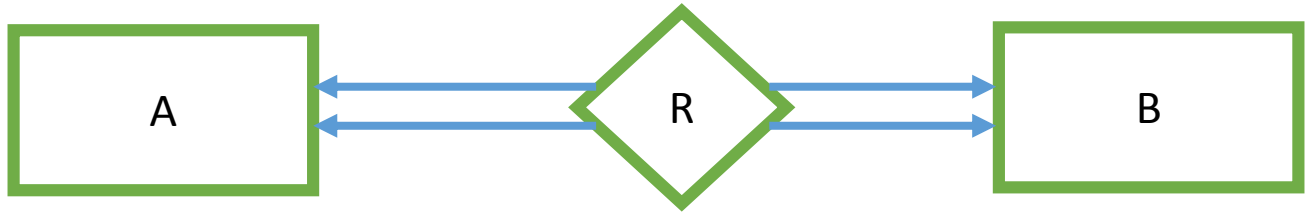
Mapping Cardinalities (Cardinality Ratio)

- **Mapping cardinalities**, or cardinality ratios, express the number of entities to which another entity can be associated via a relationship set.
- Mapping cardinalities are most useful in describing binary relationship sets, although they can contribute to the description of relationship sets that involve more than two entity sets.
- For a binary relationship set *R* between entity sets *A* and *B*, the mapping cardinality must be one of the following:
  - One to one (1:1)
  - One to many (1:M)
  - Many to one (M:1)
  - Many to many (M:N)

One to one

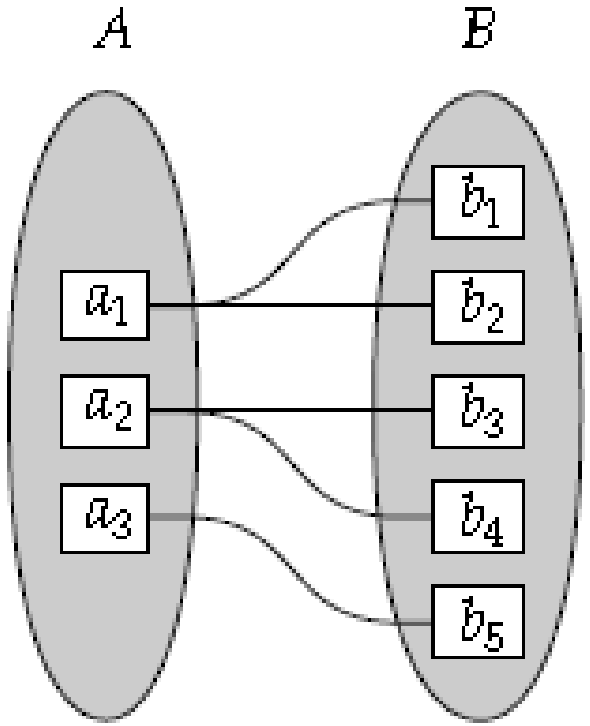
- An entity in *A* is associated with *at most* one entity in *B*, and an entity in *B* is associated with *at most* one entity in *A*.

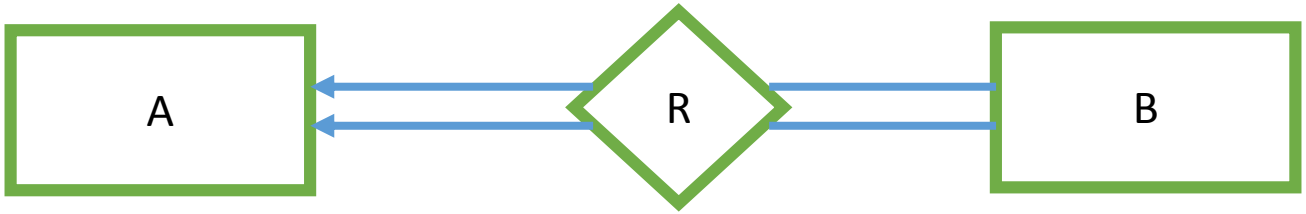




One to many

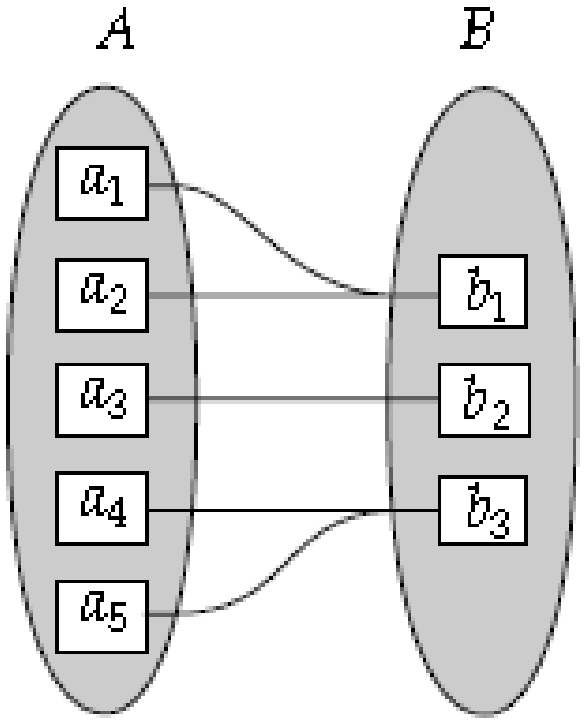
- An entity in *A* is associated with any number (zero or more) of entities in *B*. An entity in *B*, however, can be associated with *at most* one entity in *A*.

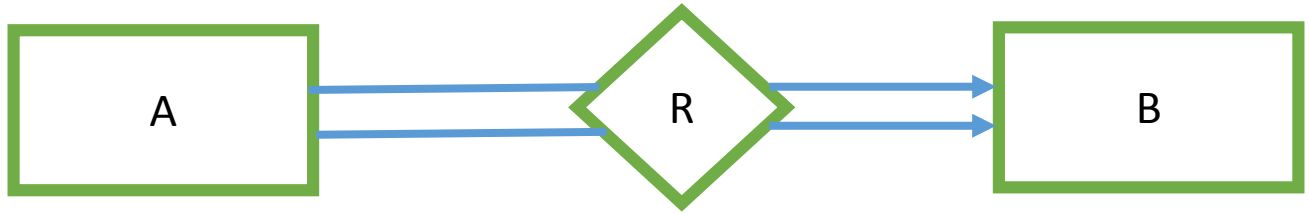




Many to one

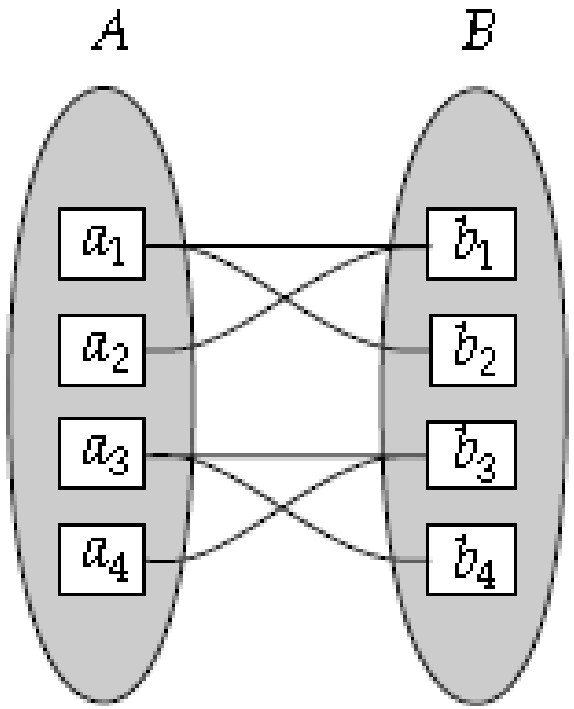
- An entity in *A* is associated with *at most* one entity in *B*. An entity in *B*, however, can be associated with any number (zero or more) of entities in *A*.

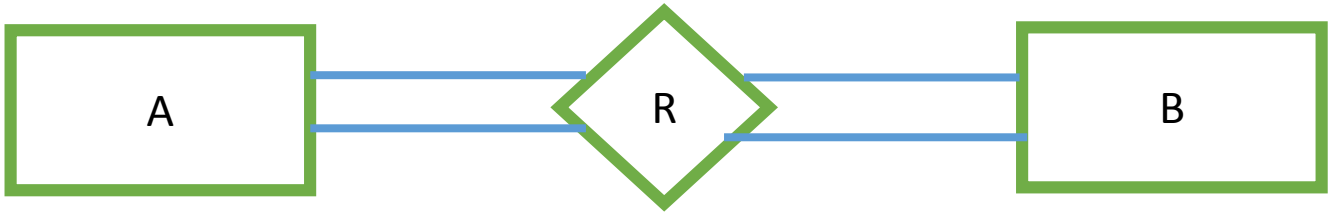




Many to many

- An entity in *A* is associated with any number (zero or more) of entities in *B*, and an entity in *B* is associated with any number (zero or more) of entities in *A*.





University Questions

1. Write short notes on
   a) Participation Constraints
   b) Mapping Cardinality (Cardinality Ratio)
2. What is the degree of relationship? Explain recursive relationship with example.

For Video lecture on this topic please subscribe to my youtube channel.

The link for my youtube channel is

https://www.youtube.com/channel/UCRWGtE76JlTp1iim6aOTRuw?sub_confirmation=1