



# Chapter 2

## Entity Relationship Modeling

Department: Computer  
Course: DBMS  
Faculty: Sana Shaikh

## Learning Objectives:

- **Quick Recap**

- Entity Types and Entity Sets
- Domain of Attributes, Types of Attributes, Key attribute
- NULL Values
- Degree of a Relationship

## Learning Outcomes:

Students should be able to:

- Define the following terms: entities, attributes, domain, composite primary key, simple attribute, composite attribute, single-valued attributes, multi-valued attributes, and derived attributes.
- Understand the need of NULL values
- Apply Entity identifier constraints on relationships for any real world problems

# Quick Recap

- Data Model
- Data Model Types
- ER Model
- Basic components of ER Model
  - Entity
  - Attributes
  - Relationship

# Entity Types and Entity Sets

# Entity Types and Entity Sets

Entity Type Name:

EMPLOYEE

COMPANY

Name, Age, Salary

Name, Headquarters, President

Entity Set:  
(Extension)

$e_1$  •

(John Smith, 55, 80k)

$e_2$  •

(Fred Brown, 40, 30K)

$e_3$  •

(Judy Clark, 25, 20K)

⋮

$c_1$  •

(Sunco Oil, Houston, John Smith)

$c_2$  •

(Fast Computer, Dallas, Bob King)

⋮

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⋮

Entity

Entity Type

Entity Set

A thing in the real world with independent existence

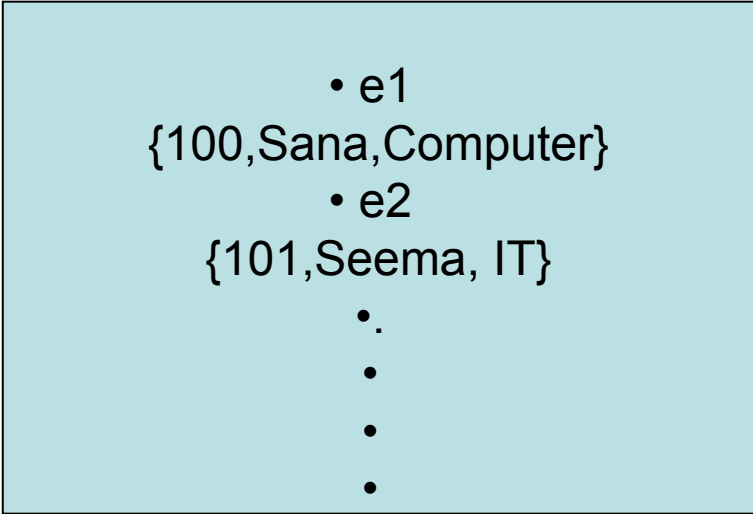
A category of a particular entity

Set of all entities of a particular entity type.

# Entity Types and Entity Sets

## Employee

**EmpID, Name, Branch**



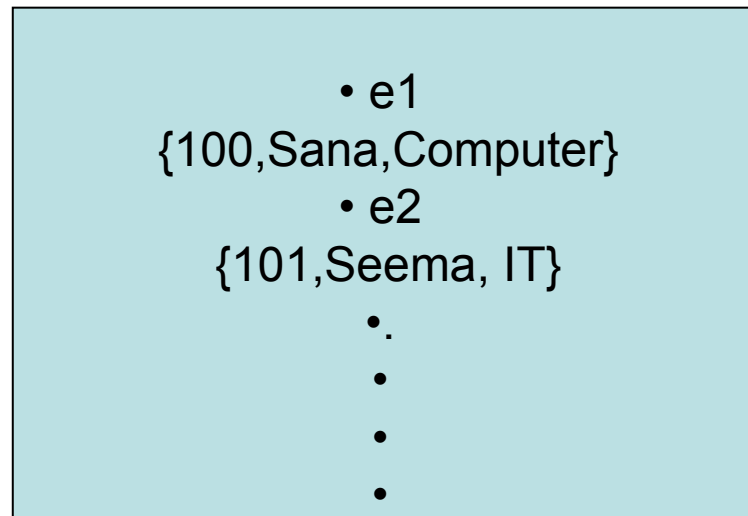
- e1  
{100,Sana,Computer}
- e2  
{101,Seema, IT}
- .
- 
- 
-

# Entity Types and Entity Sets

- **Entity Type Name** : Employee

**EmpID, Name, Branch**

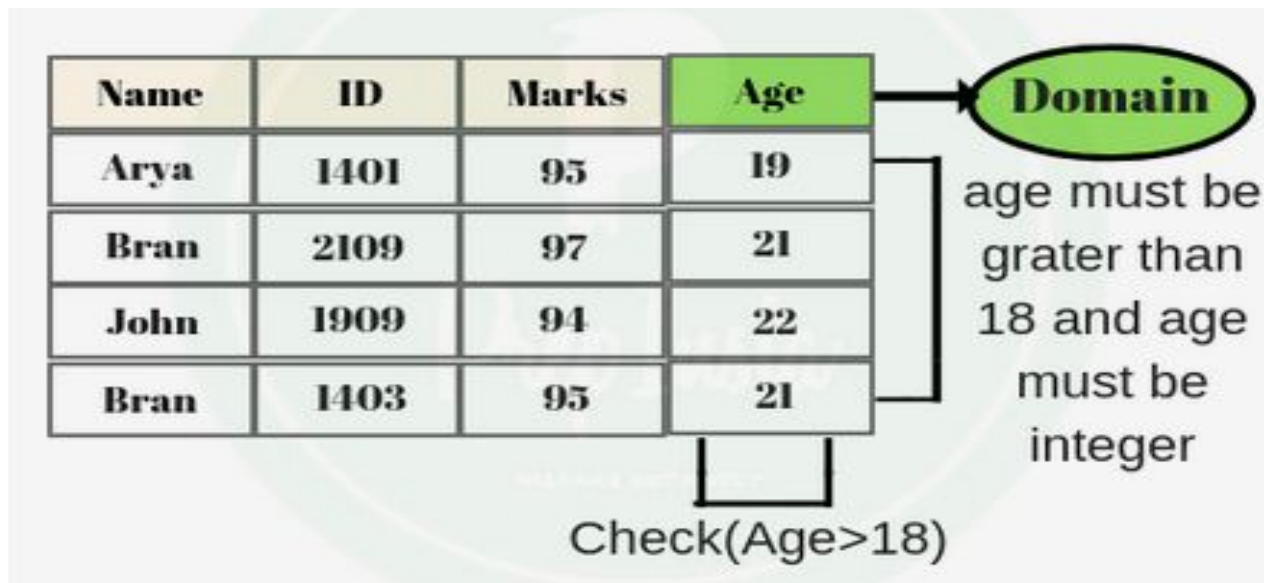
**Entity Set** □





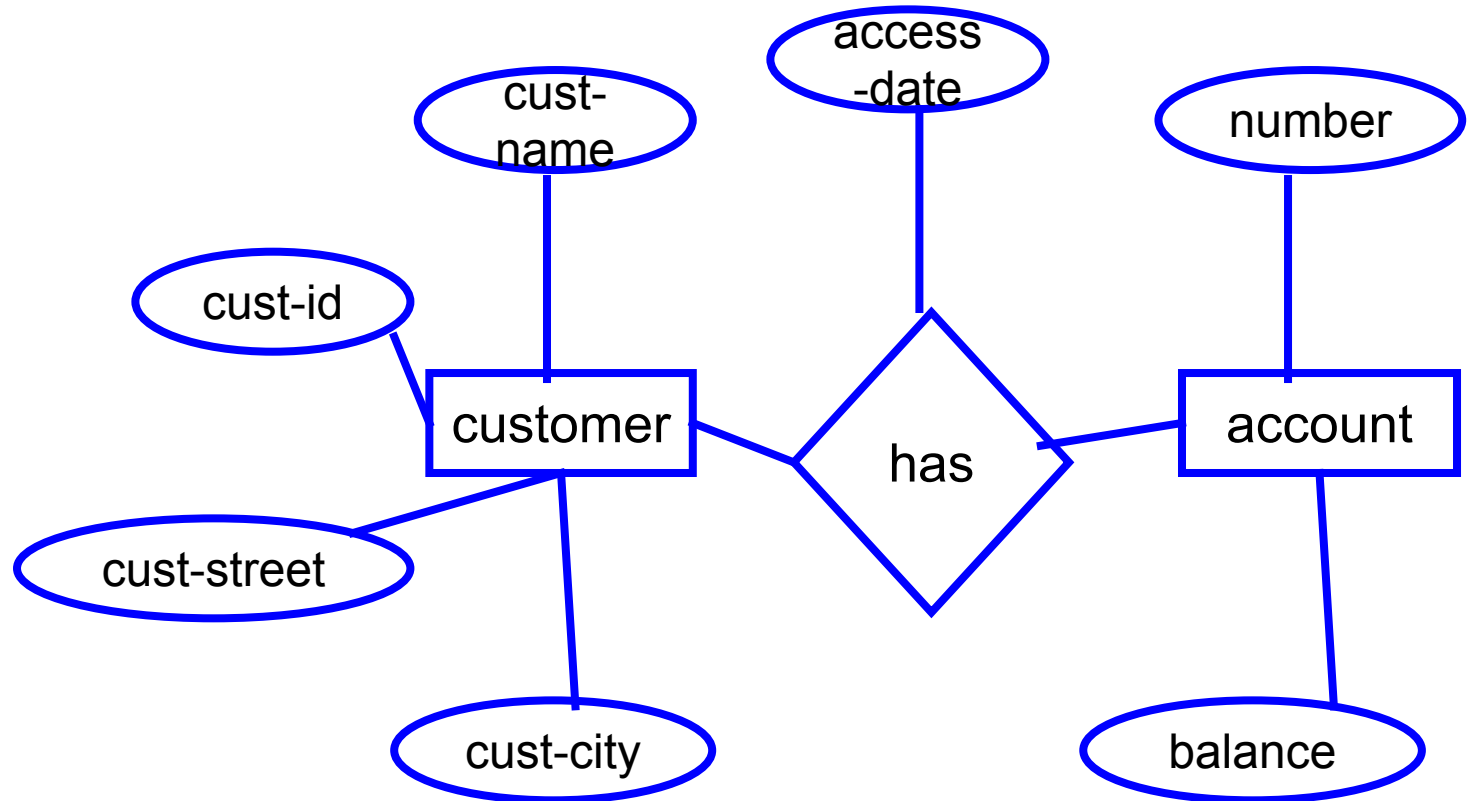
# Attribute Domain

- Every attribute has domain
- What is domain???
  - Attribute domains are rules that describe the legal values of a field type



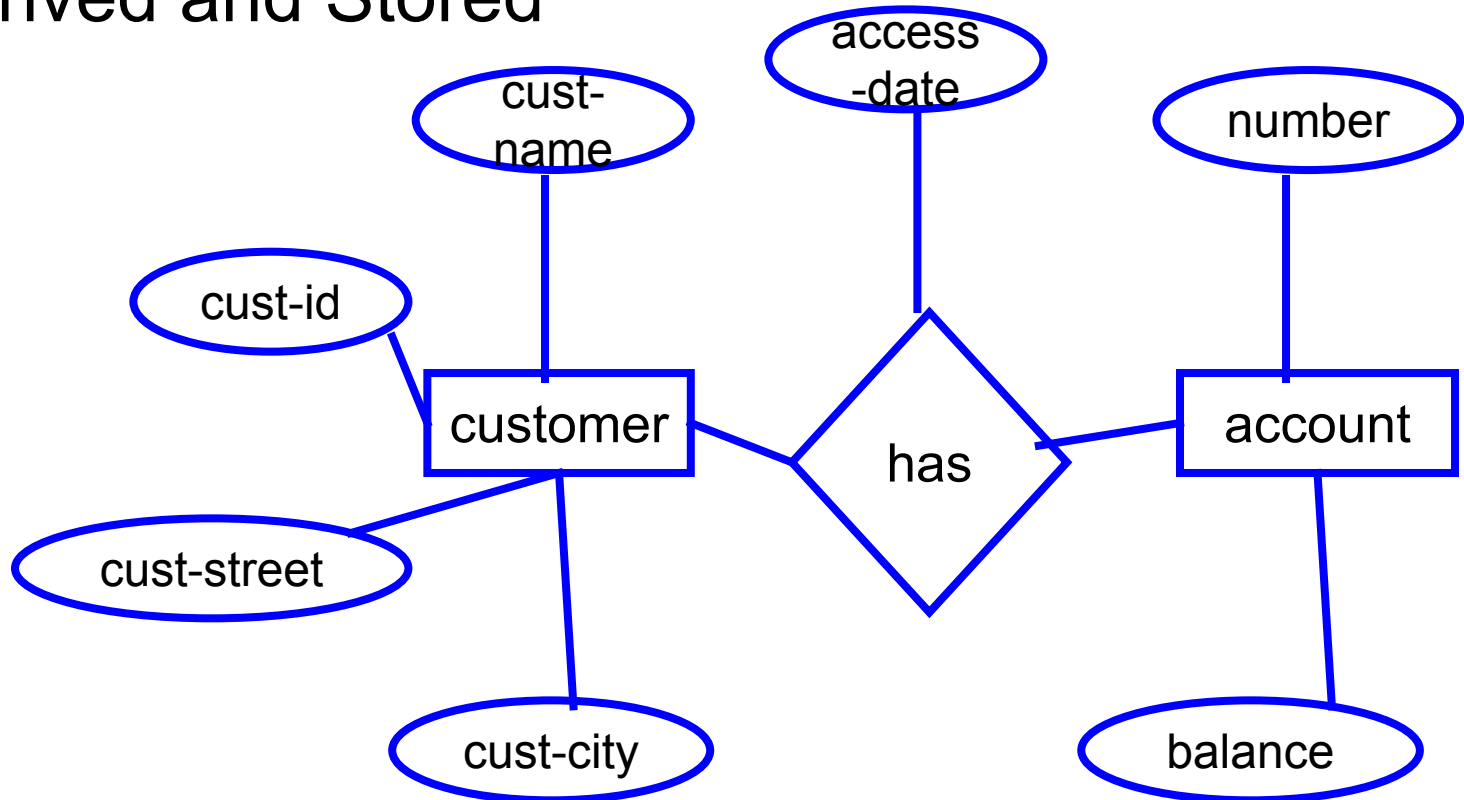
# Types of Attributes

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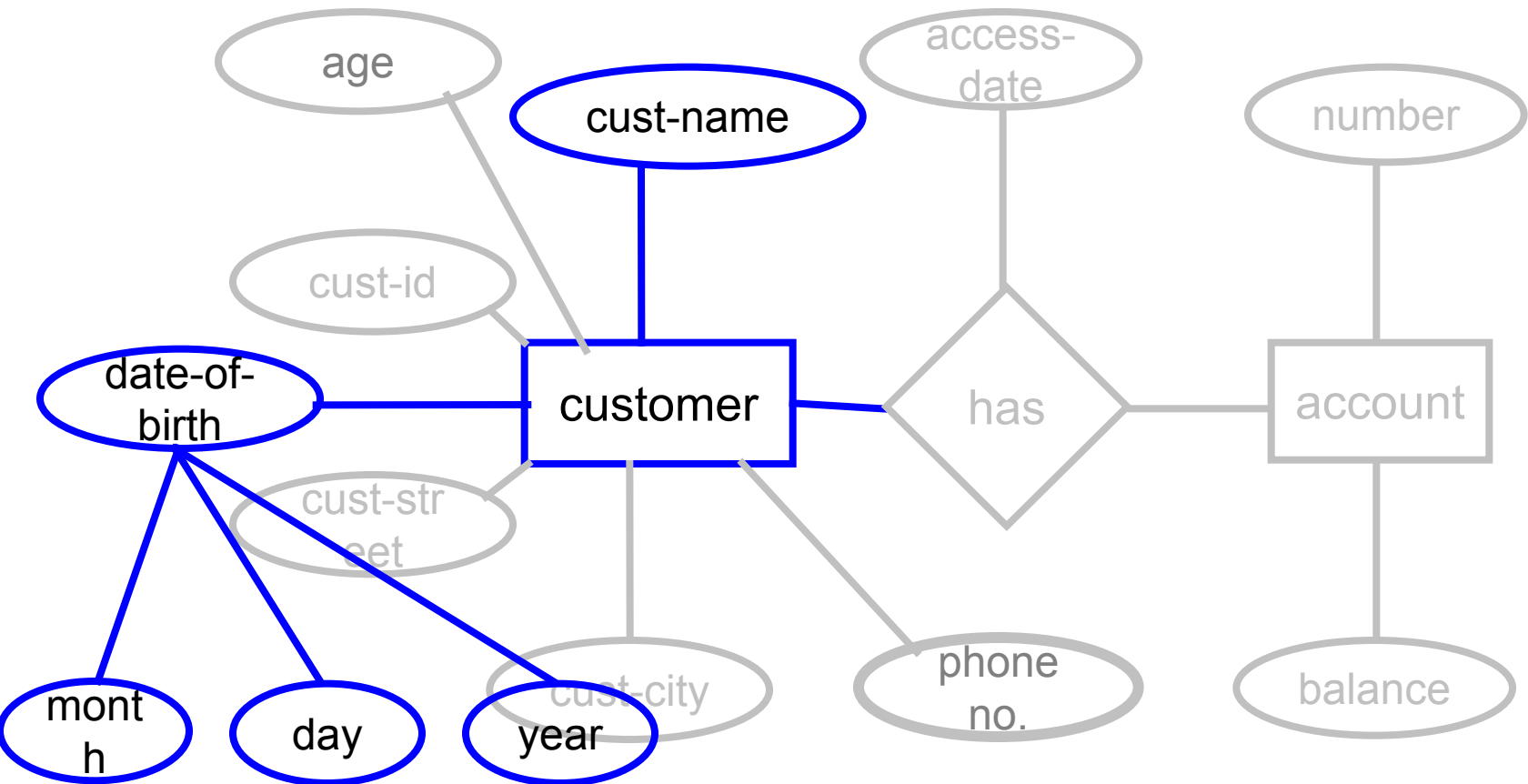


# Types of Attributes

- Simple v/s Composite
- Single-valued v/s Multi-valued
- Derived and Stored



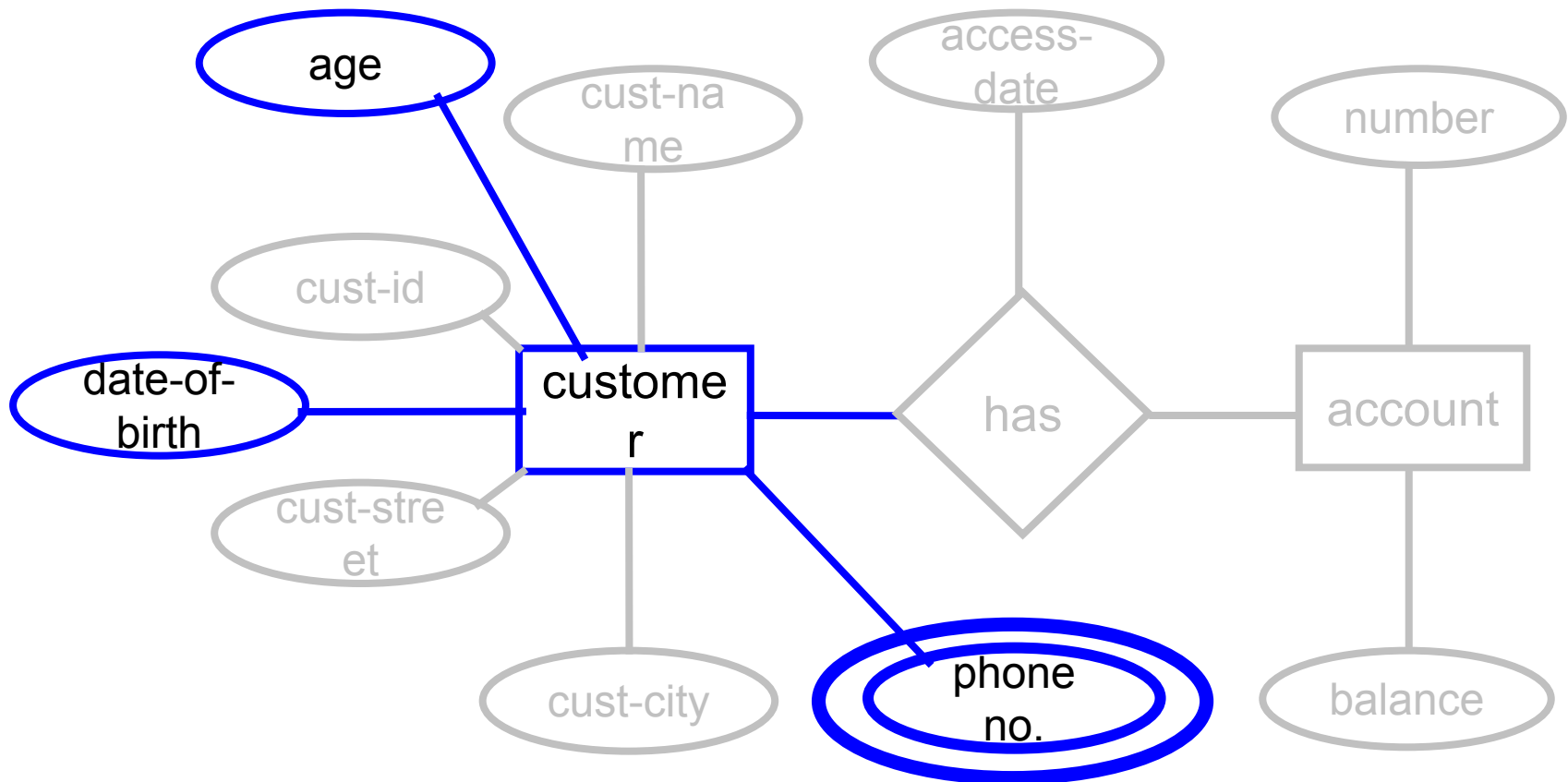
# Types of Attributes



**Simple & Composite Attribute**

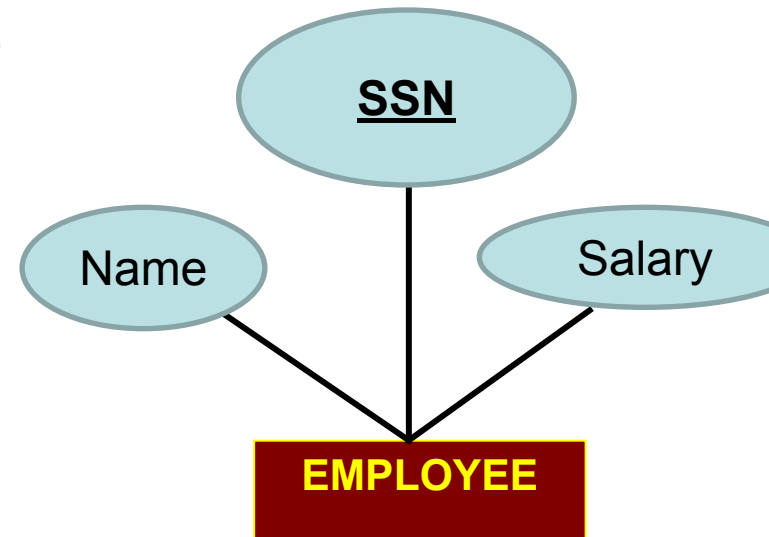
# Types of Attributes

- Single & Multi-valued (double ellipse)
- Stored & Derived (dashed ellipse)



# key attribute or Entity Identifier

- Key (or uniqueness) constraints are applied to entity types
- Key attribute values are distinct for each individual entity in the entity set
- A key attribute has its name underlined inside the oval
- Key must hold for entity type



# NULL Values

- A null is a value that is unavailable, unassigned, unknown, or inapplicable.
- A null is not the same as a zero or a blank space.
- Some entity may not have applicable value for an attribute.
- Eg. remarks

	category_id	category_name	remarks
▶	1	Comedy	Movies with humour
	2	Romantic	Love stories
	3	Epic	Story acient movies
	4	Horror	NULL
	5	Science Fiction	NULL
	6	Thriller	NULL
	7	Action	NULL



# NULL Values

More Examples of NULL values:

- unavailable - DOB
- unassigned - Moodle\_ID
- unknown - Hobbies
- inapplicable - Apartment\_no

# key attribute or Entity Identifier

- 2 Rules for creating Entity Identifier
  - can not be NULL
  - can not repeat
- Multiple keys are possible

STUDENT	Roll_No	Name	Class	Committee
	1	Sam	SE Comp	C1
	2	Ram	SE Comp	C2
	3	Jam	SE Comp	C1
	1	Sam	BE Comp	C2
	2	Mina	BE Comp	C3
	3	Hina	BE Comp	C3
	.....	....	...	....

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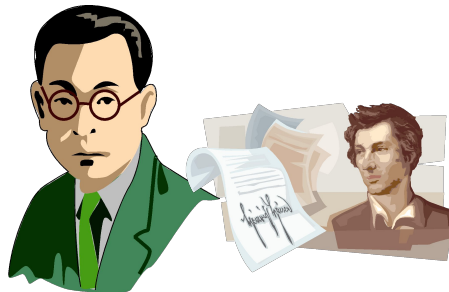
STUDENT

<u>Roll_No</u>	Name	<u>Class</u>	Committee
1	Sam	SE Comp	C1
2	Ram	SE Comp	C2
3	Jam	SE Comp	C1
1	Sam	BE Comp	C2
2	Mina	BE Comp	C3
3	Hina	BE Comp	C3
.....	....	...	....

- Composite attribute can be a Key attribute

# Relationships

- Associations between instances of one or more entity types that is of interest
- Given a name that describes its function.
  - relationship name is an active or a passive verb.



**Author**

**Relationship name:  
*writes***



**Book**

An author writes one or more books  
A book can be written by one or more authors.

# Degree of Relationships

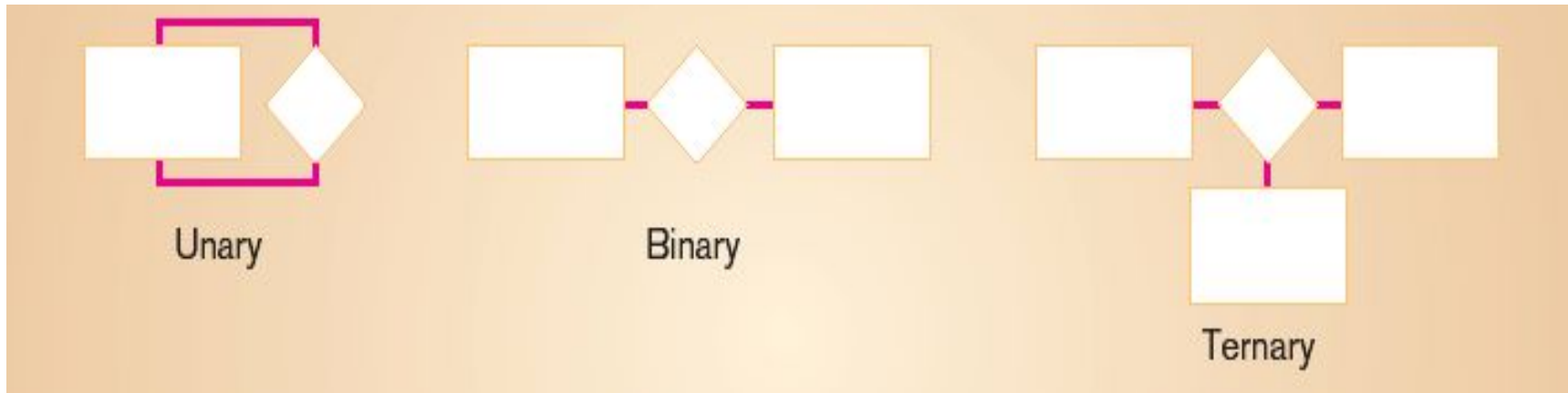
Degree: number of entity types that participate in a relationship

Three cases

**Unary:** between two instances of one entity type

**Binary:** between the instances of two entity types

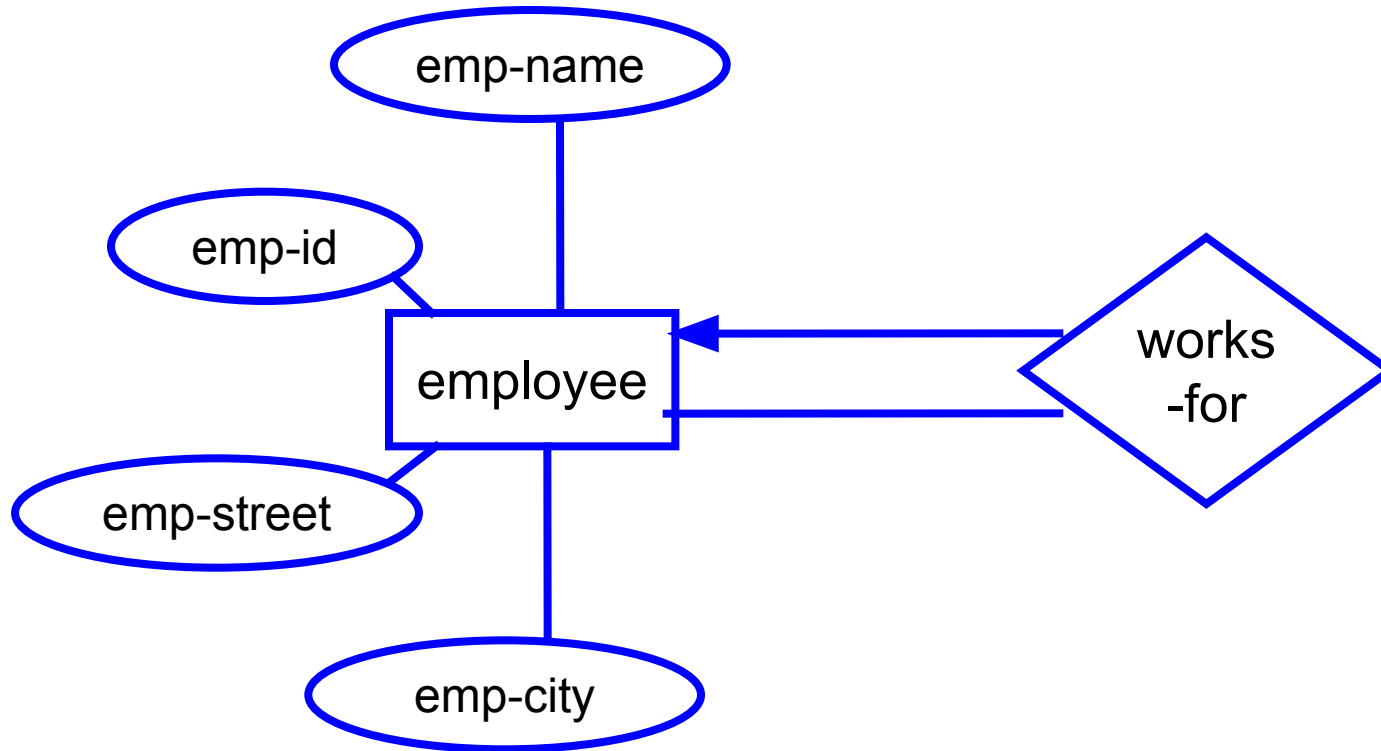
**Ternary:** among the instances of three entity types



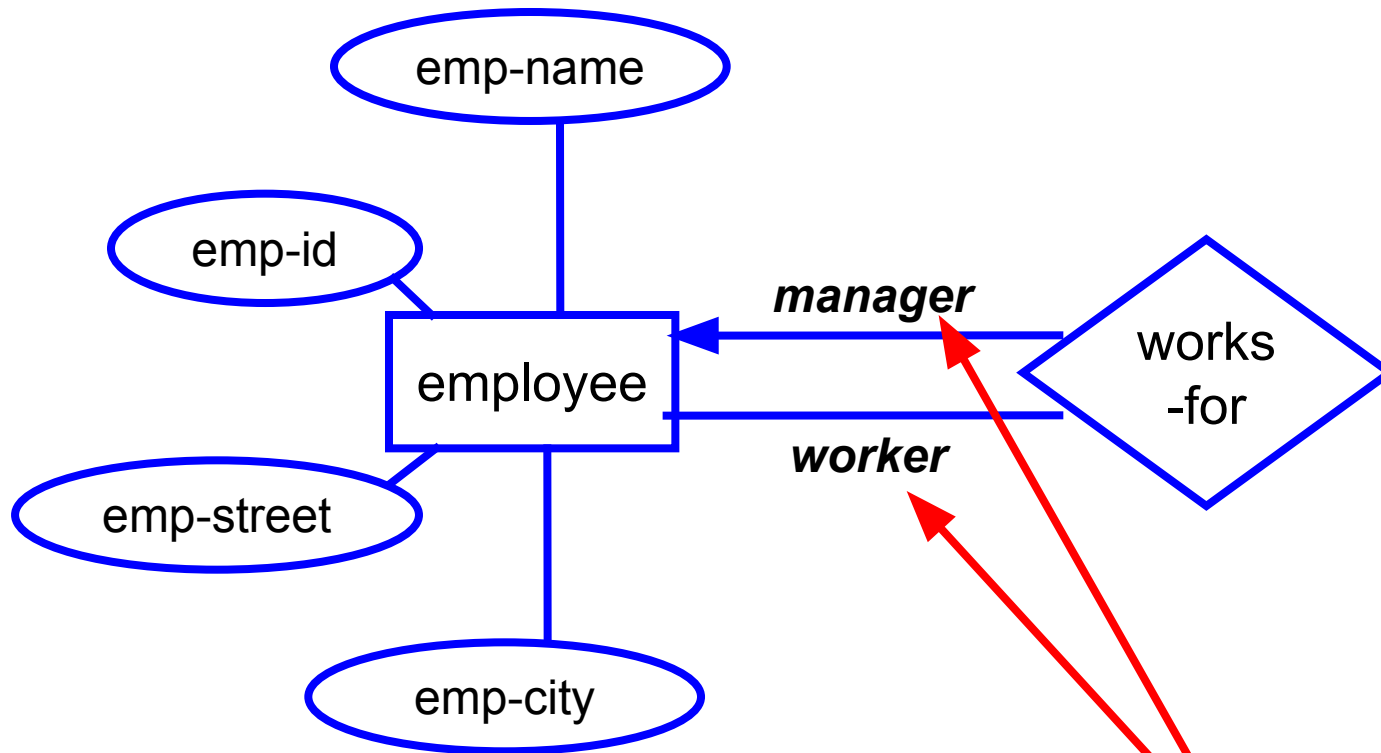
# Unary Relationship

- Sometimes a relationship associates an entity set to itself
- also known as Recursive relationships

# Unary Relationships



# Unary Relationships



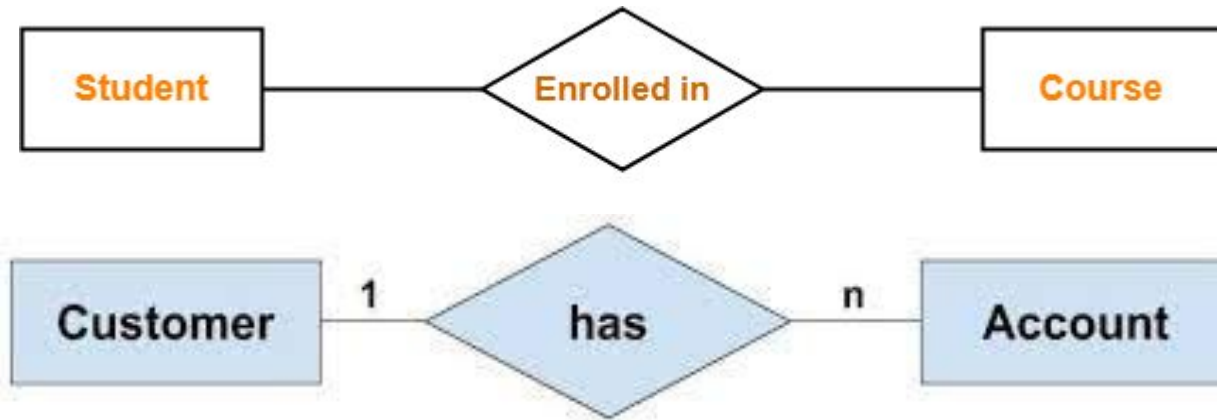
Must be declared with roles  
known as Role names



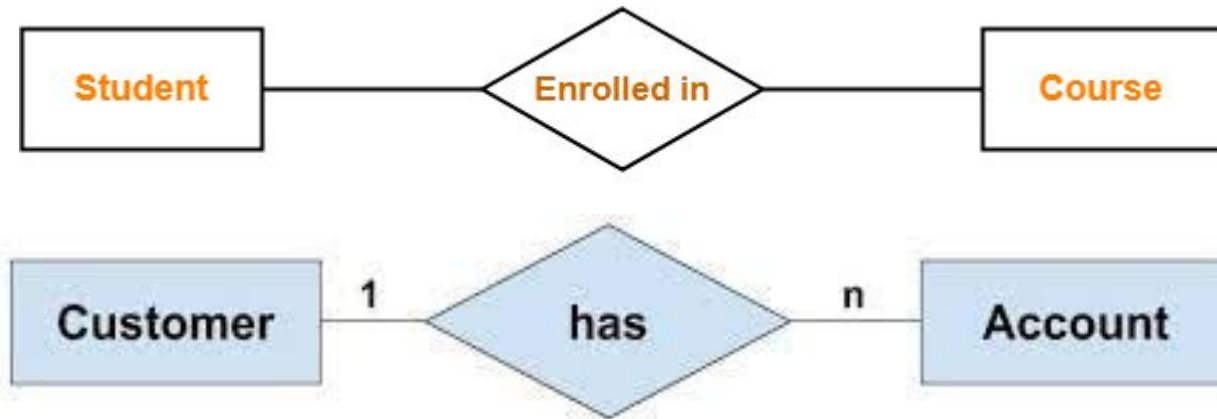
# Binary Relationship



# Binary Relationship

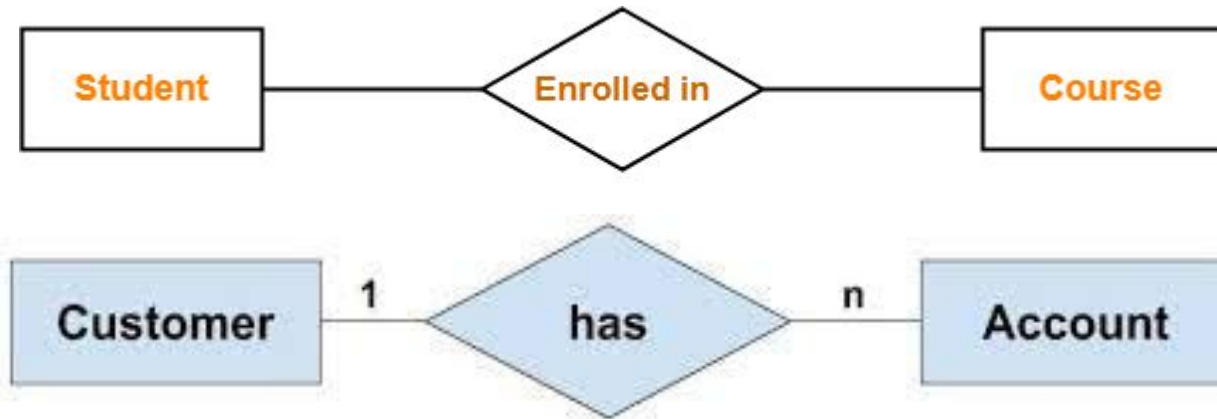


# Binary Relationship

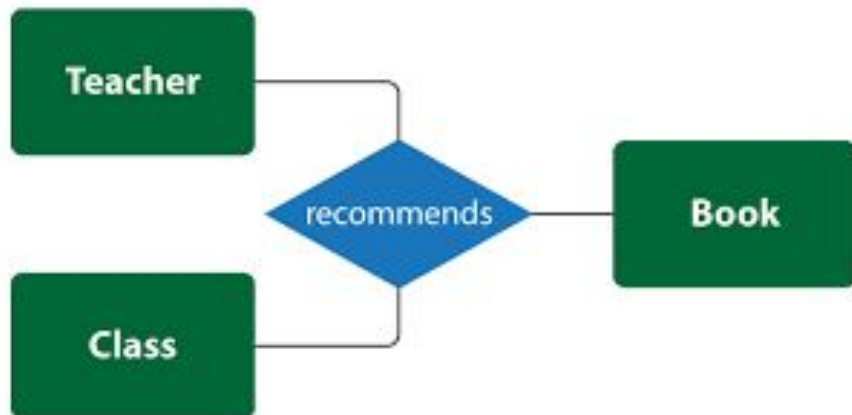


# Ternary Relationship

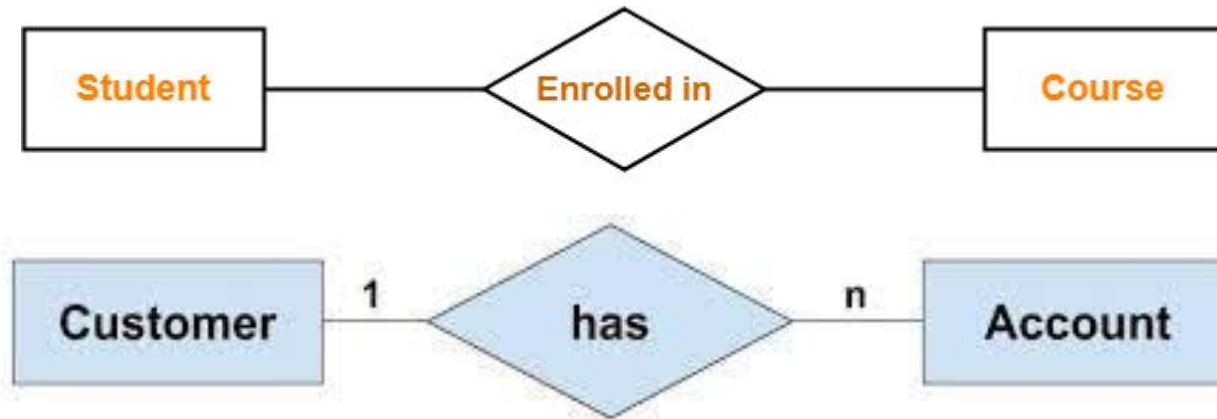
# Binary Relationship



# Ternary Relationship



# Binary Relationship



# Ternary Relationship

