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ER Modeling: Part II

Complete Course on Database Management System

Vishvadeep Gothi • Lesson 3 • June 20, 2023

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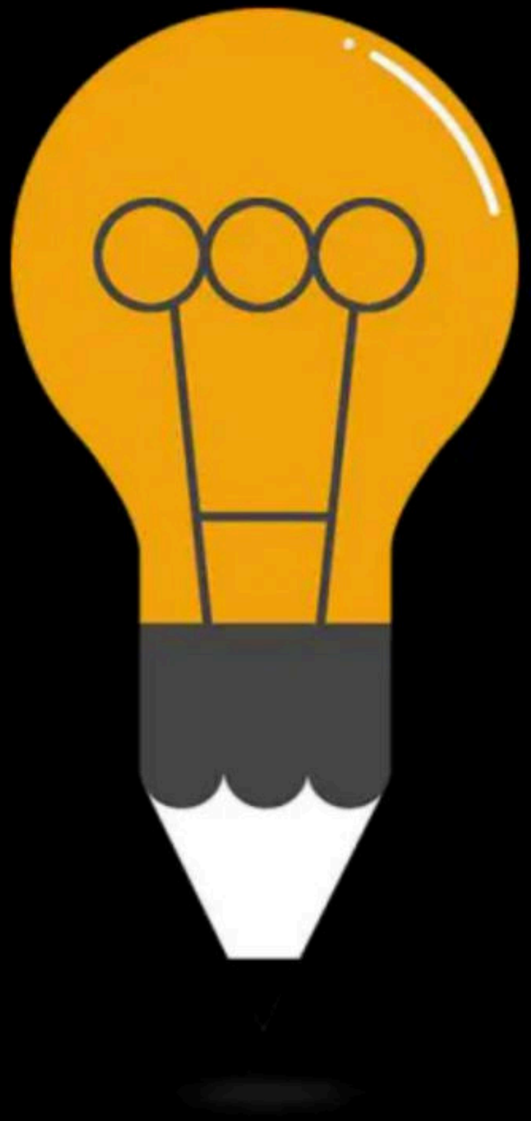

DBMS
Database Designing & E-R Modeling

By: Vishvadeep Gothi

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Entity-Relationship Model

The entity-relationship (E-R) data model consists of a collection of basic objects, called entities, and of relationships among these objects.

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Entity

Object in the real world that is distinguishable from another object

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Entity-Set

A collection of similar entities called an entity set

E-R model

Entity_set_name

1 teacher ⇒ entity

collectn of all teachers ⇒ Entity-set

ex:-

students

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Attribute

An entity is described using a set of attributes

ex:- entity-set ⇒ students

⇓

Attributes ⇒ Roll no

name

surname

dob

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Domain

A unique set of values permitted for an attribute

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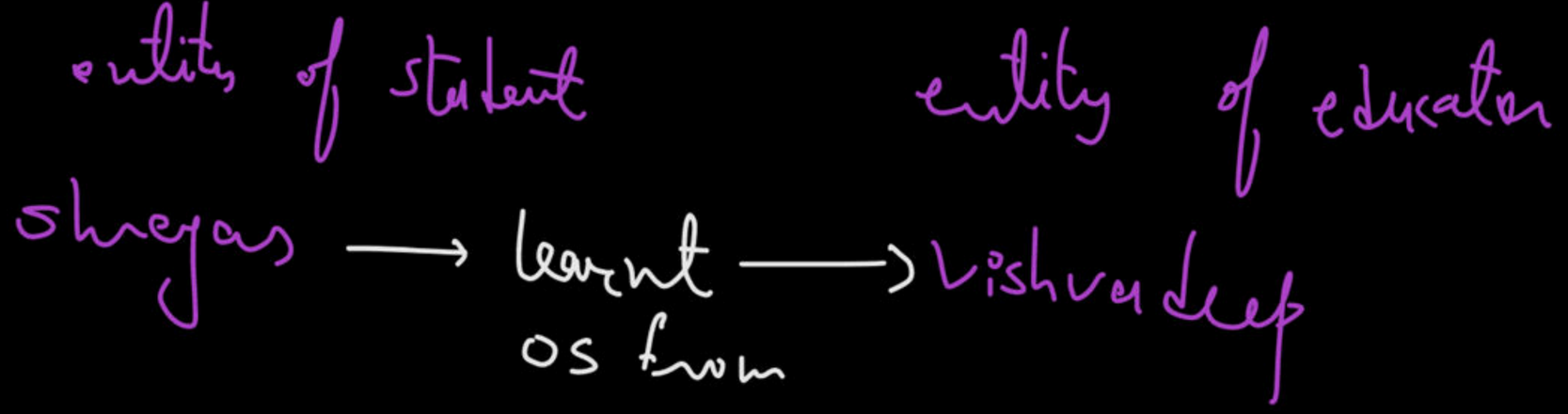
Relationship

An association among two or more entities



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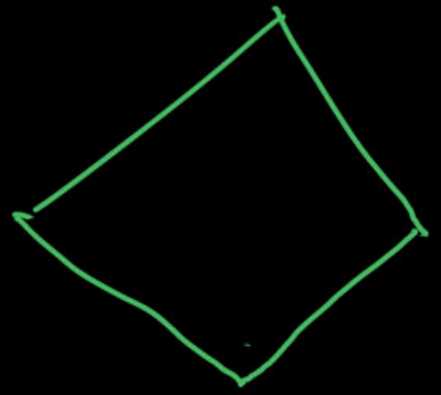
Relationship Set

A set of similar relationships



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Key

An attribute or set of attributes whose values can uniquely identify an entity in a set

ex:-

entity set :- student

Attributes :- Rno,
name,
dob,
fathername

ex:-

key :- ① Rno

② name fathername

Prime attribute / key attribute :-

All attributes which are part of key.

E-R Diagram

1. Entity set 
2. Relationship Set 
3. Attributes 

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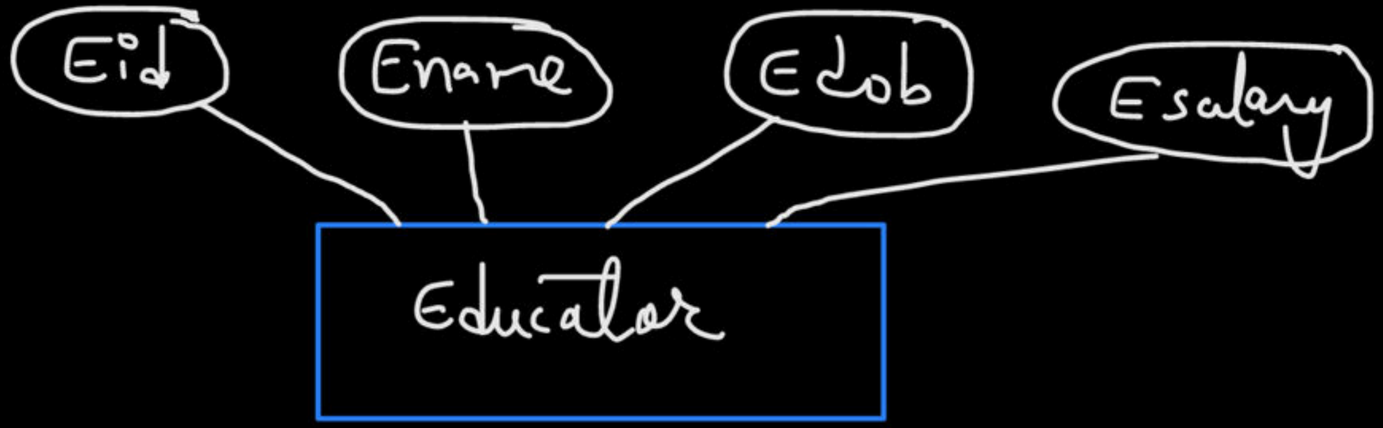
Educator Entity Set



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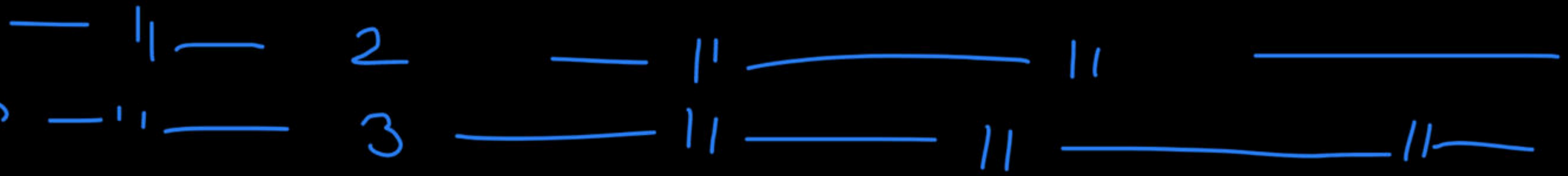
Types of Relationships

1. Unary → entities of only one entity set are involved in relationsh
2. Binary →
3. Ternary →



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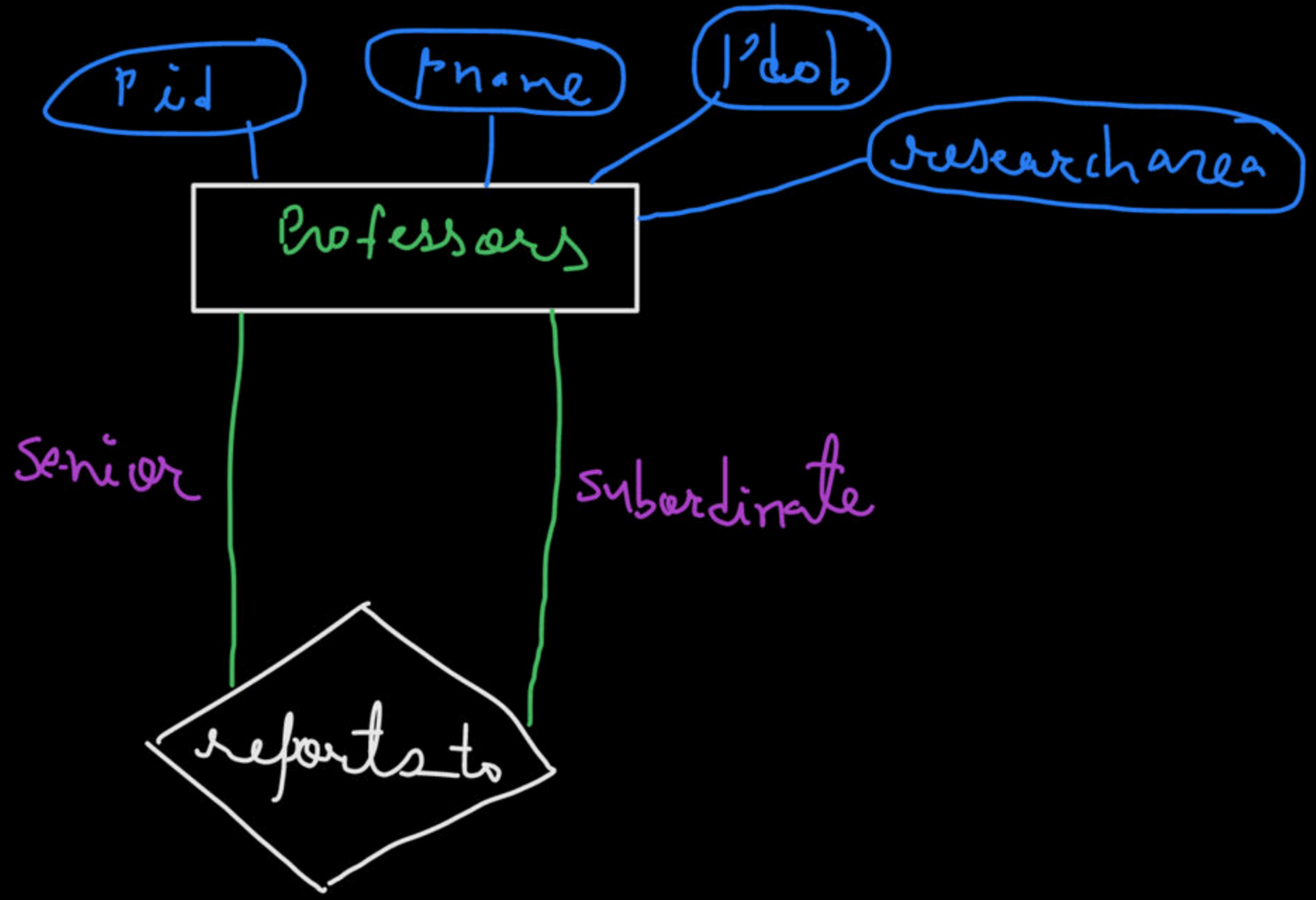
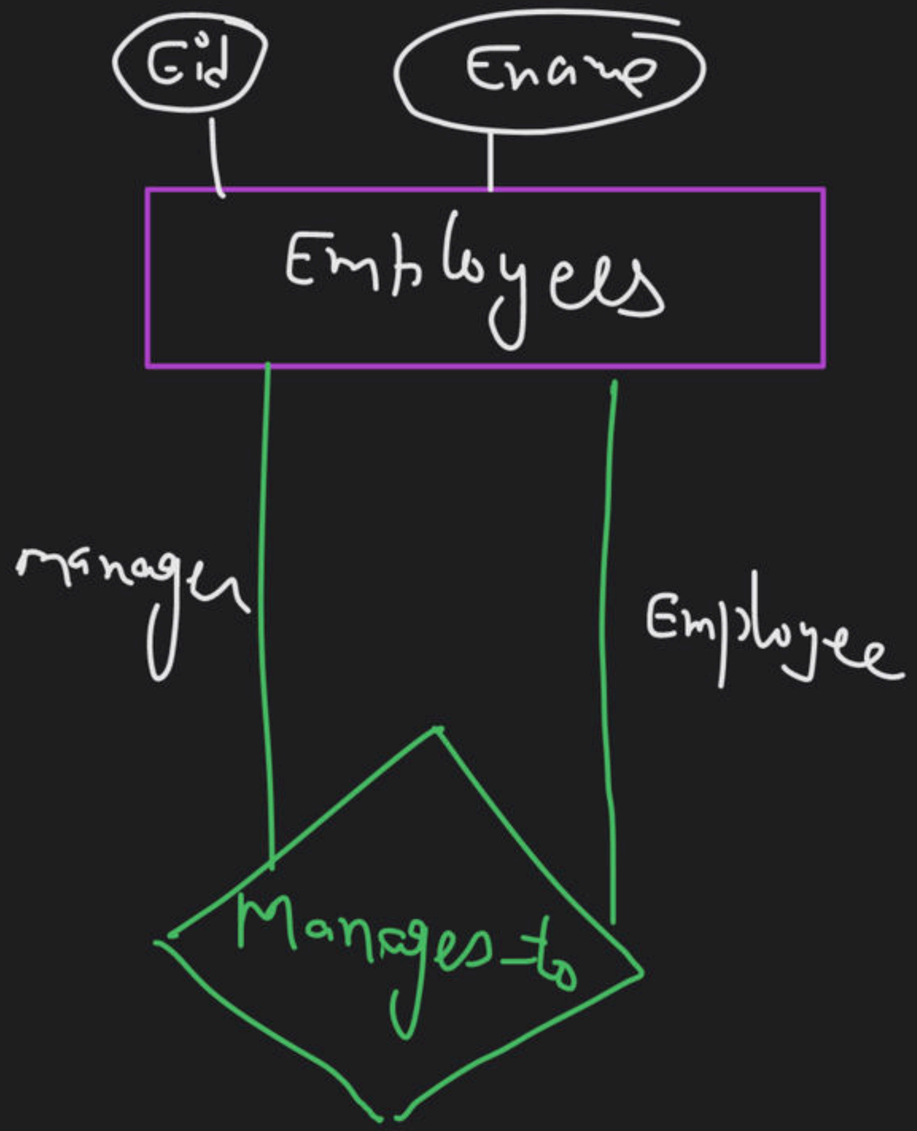
Unary Relationship





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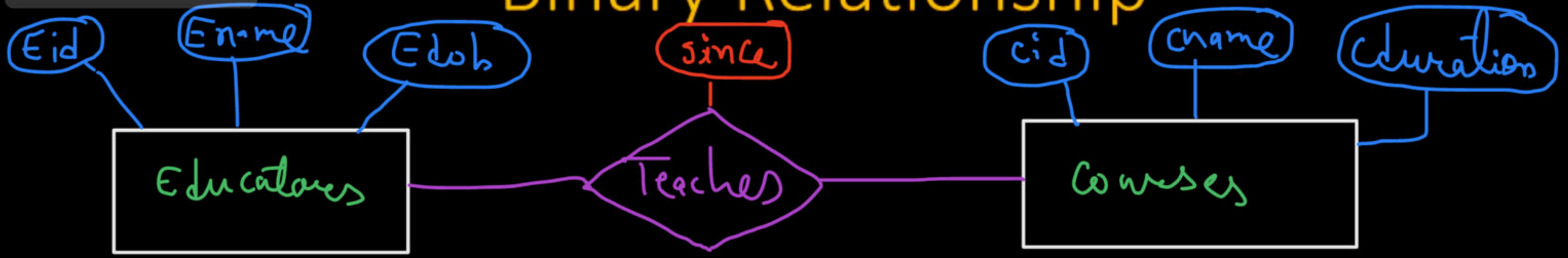
Binary Relationship



Descriptive Attribute

Attribute of relationship

ex:- since

in prev. relationship example

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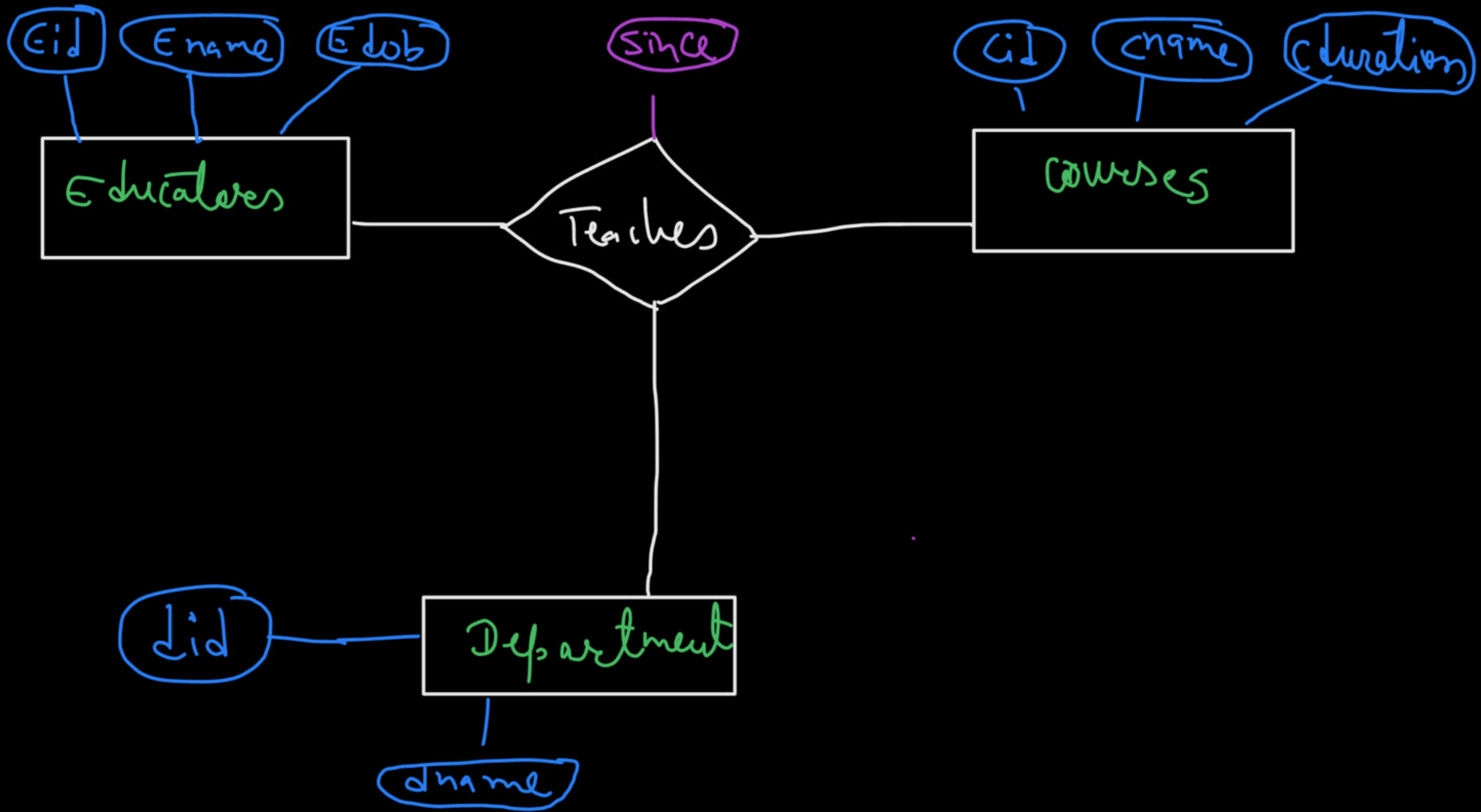
Ternary Relationship



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Mapping Cardinality

1. One to One
2. One to Many
3. Many to One
4. Many to Many

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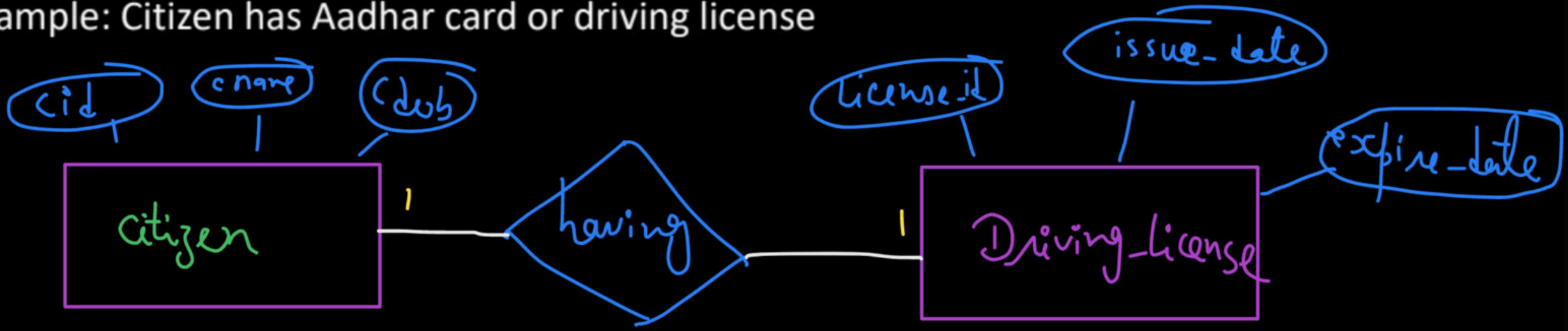
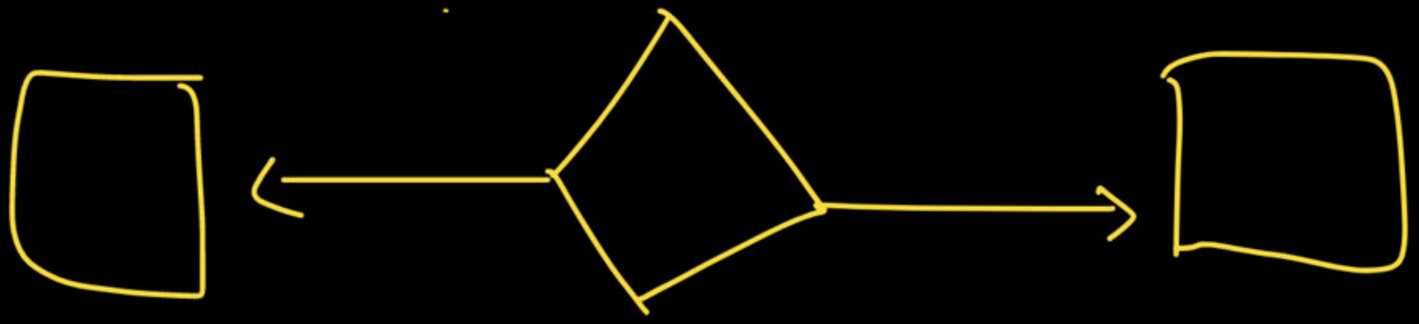
One-To-One

Example: Citizen has Aadhar card or driving license





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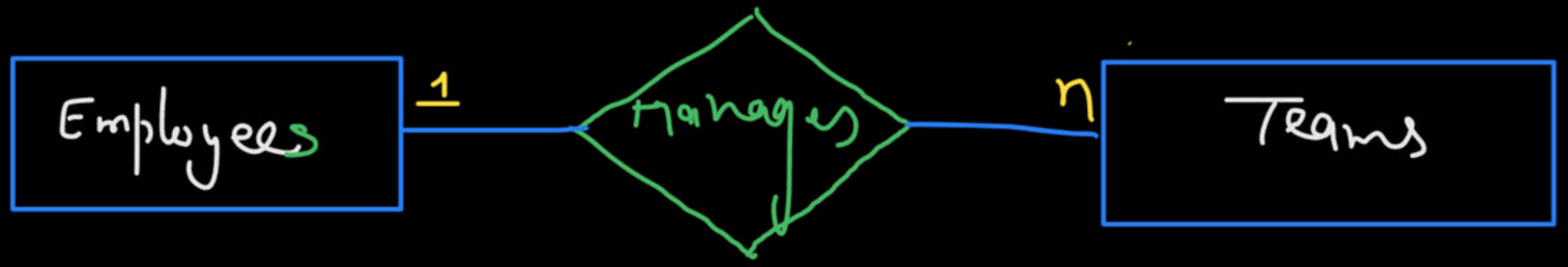
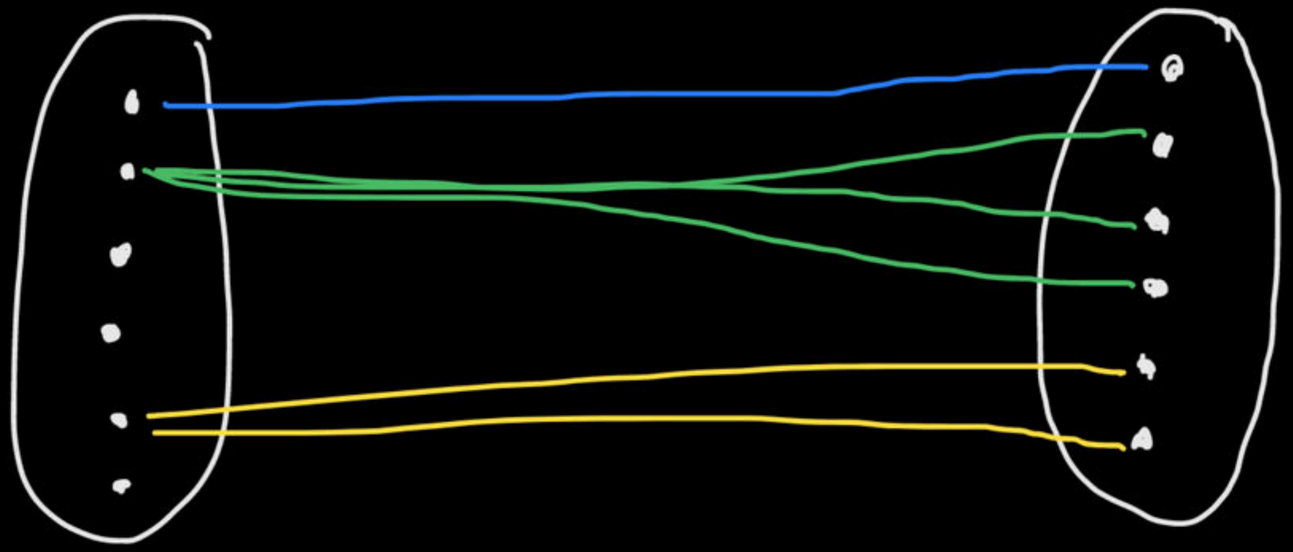
One-To-Many

Example: Employee manages teams





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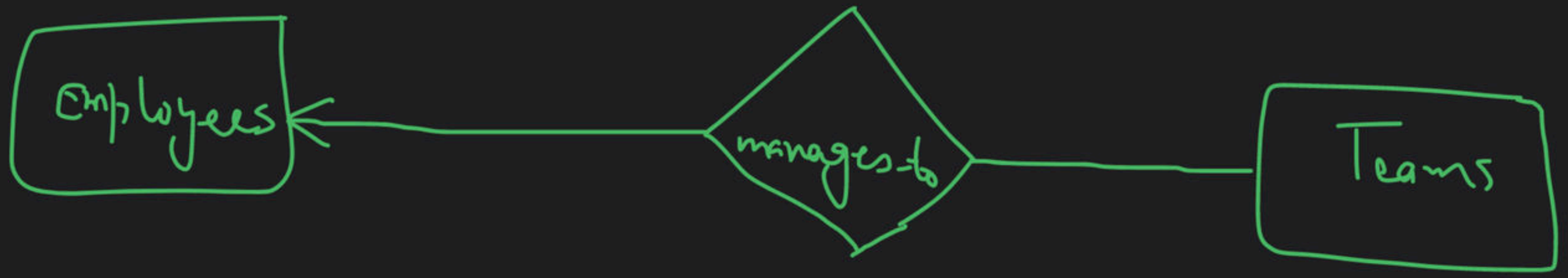
one - to - many



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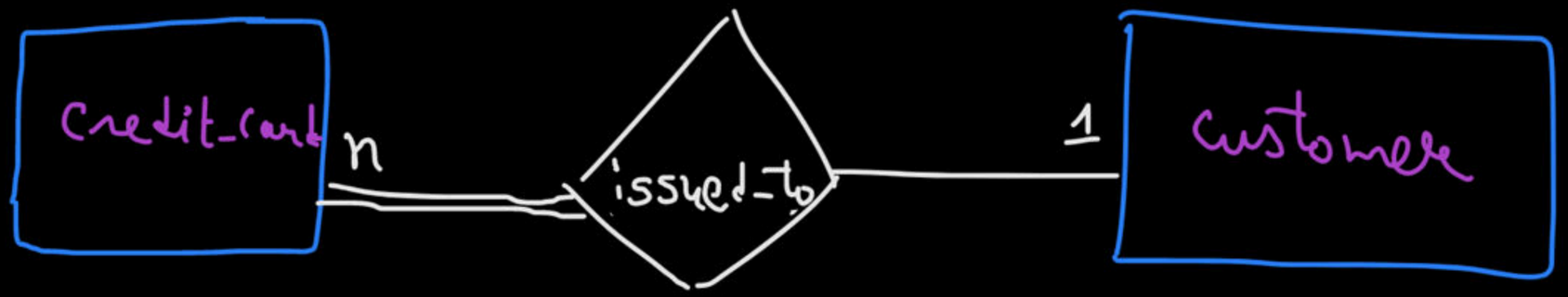
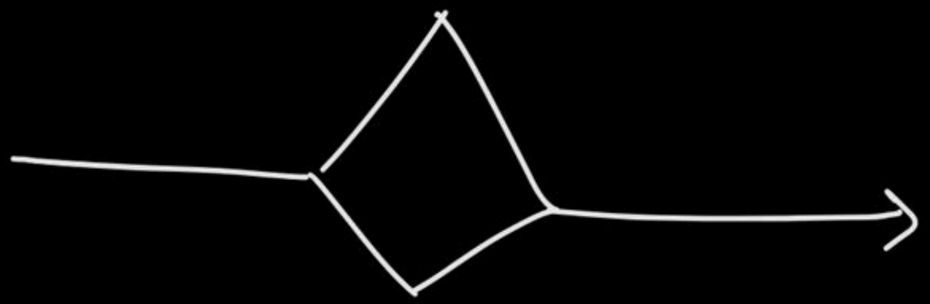
Many-To-One

credit_card

Example: ~~Bank Account~~ to Customer





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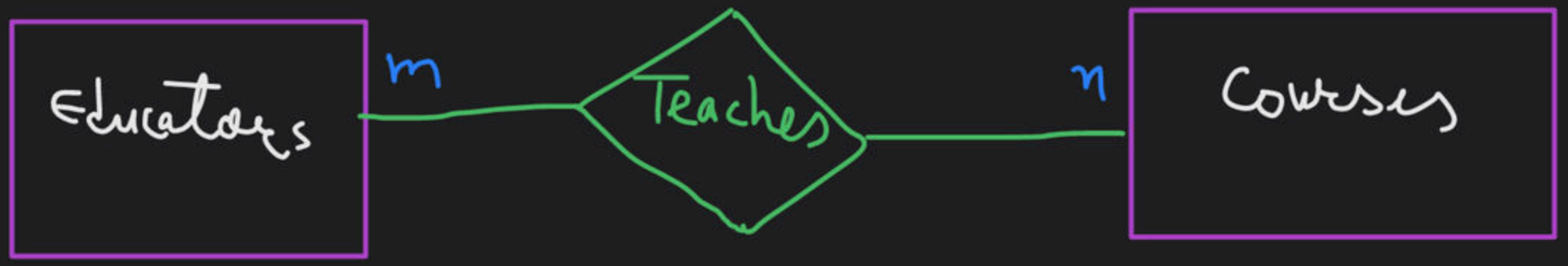
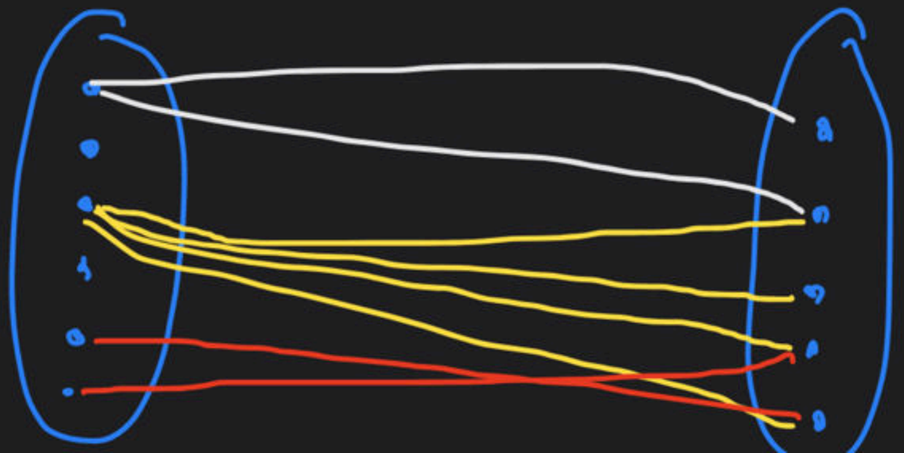
Many - to - Many

ex:- educator Teaches courses





Question GATE-2005

Consider the entities 'hotel room', and 'person' with a many to many relationship 'lodging' as shown below:

If we wish to store information about the rent payment to be made by person (s) occupying different hotel rooms, then this information should appear as an attribute of

A. Person
B. Hotel Room
C. Lodging
D. None of these

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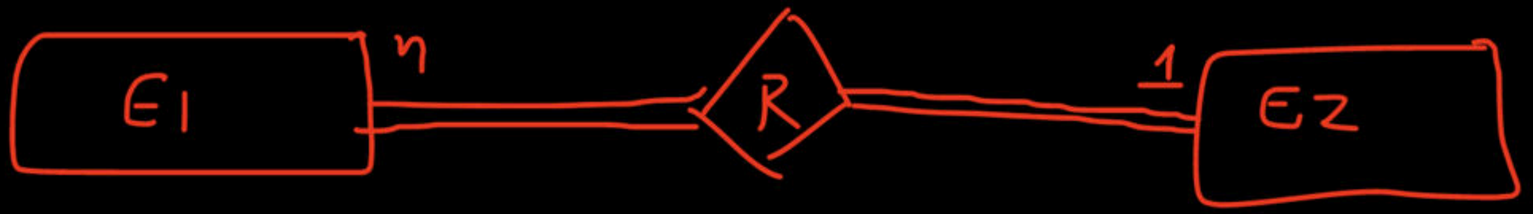
Question GATE-2018

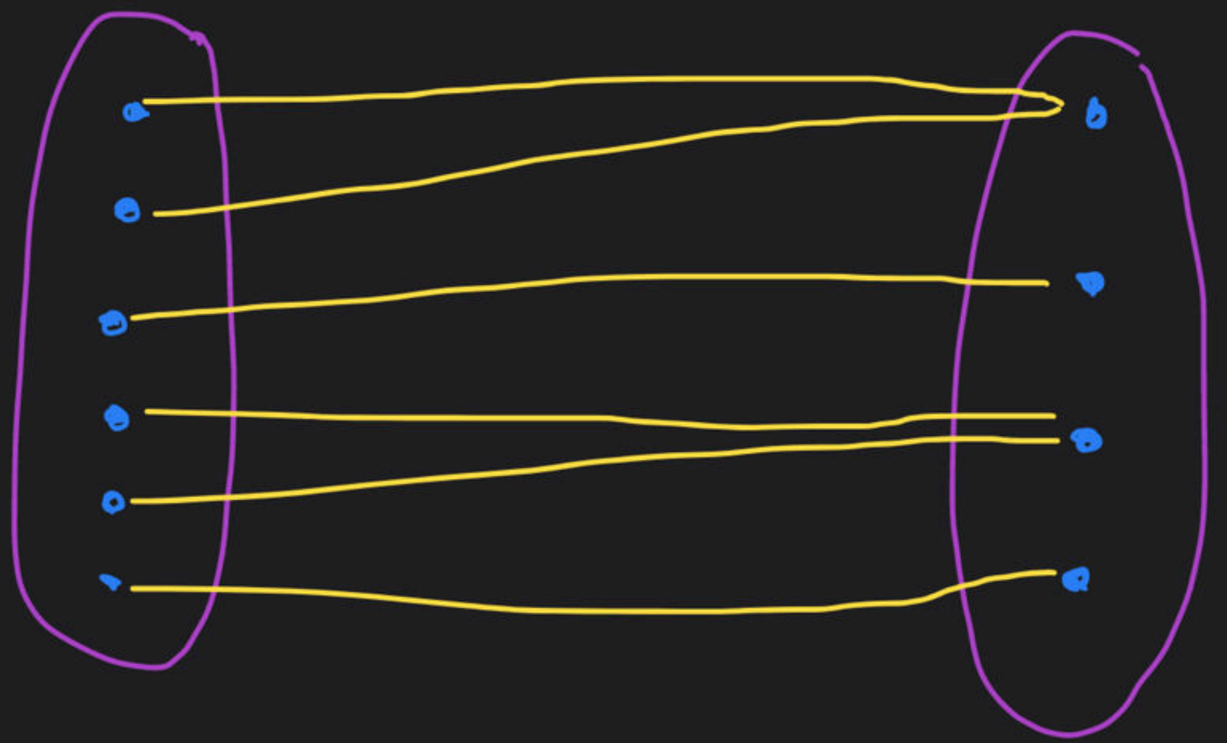
In an Entity-Relationship (ER) model, suppose R is a many-to-one relationship from entity set E1 to entity set E2. Assume that E1 and E2 participate totally in R and that the cardinality of E1 is greater than the cardinality of E2.

Which one of the following is true about R?

A. Every entity in E1 is associated with exactly one entity in E2
B. Some entity in E1 is associated with more than one entity in E2
C. Every entity in E2 is associated with exactly one entity in E1
D. Every entity in E2 is associated with at most one entity in E1

↳ no. of entities in entity set





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Participation Constraints

Specifies the presence of an entity when it is related to another entity in a relationship type

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Participation Constraints

Specifies the presence of an entity when it is related to another entity in a relationship type.

2 Types:

1. Total Participation → all entities of an entity set are participating in a relationship
2. Partial Participation

⇓

not all entities are participating

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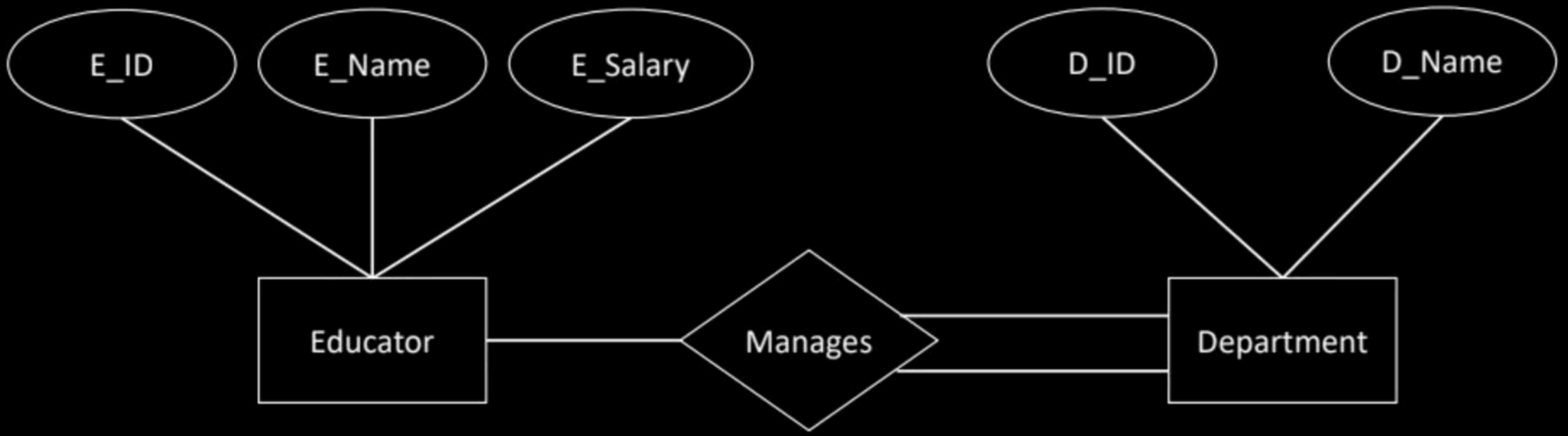
Participation Constraints



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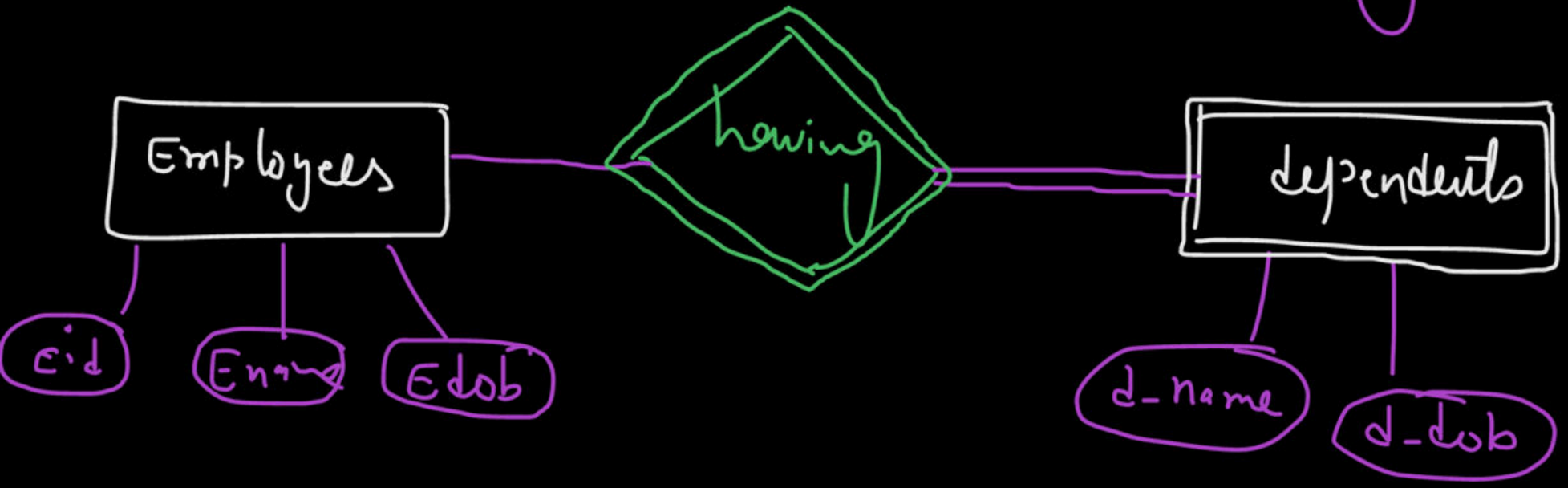
Weak or Strong Entity

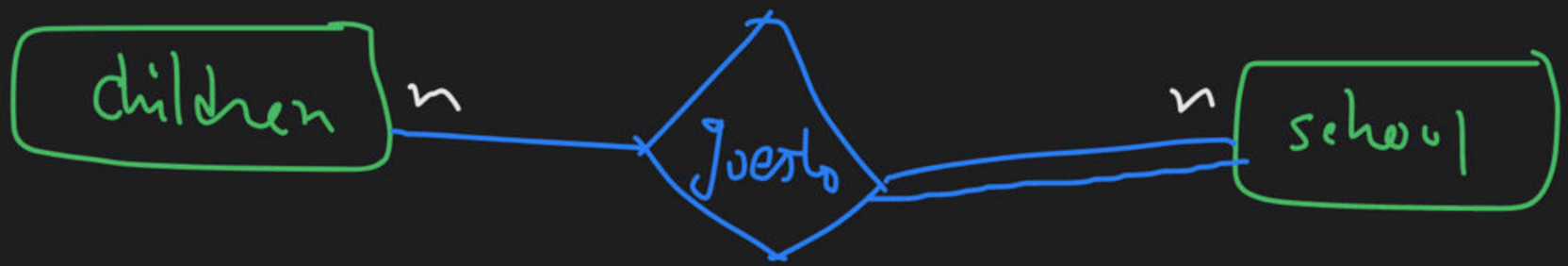
A weak entity is an entity that cannot be uniquely identified by its attributes alone

→ A weak entity set does not have key




Singers
m
Sung
n
Songs


Customers
m
buy
n
Products


children
n
goes to
n
school

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Extended E-R Features

- Specialization
- Generalization
- Higher- and lower-level entity sets
- Attribute inheritance
- Aggregation

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Specialization

The process of designating subgroupings within an entity set is called specialization.

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Generalization

This commonality can be expressed by generalization, which is a containment relationship that exists between a higher-level entity-set and one or more lower-level entity sets

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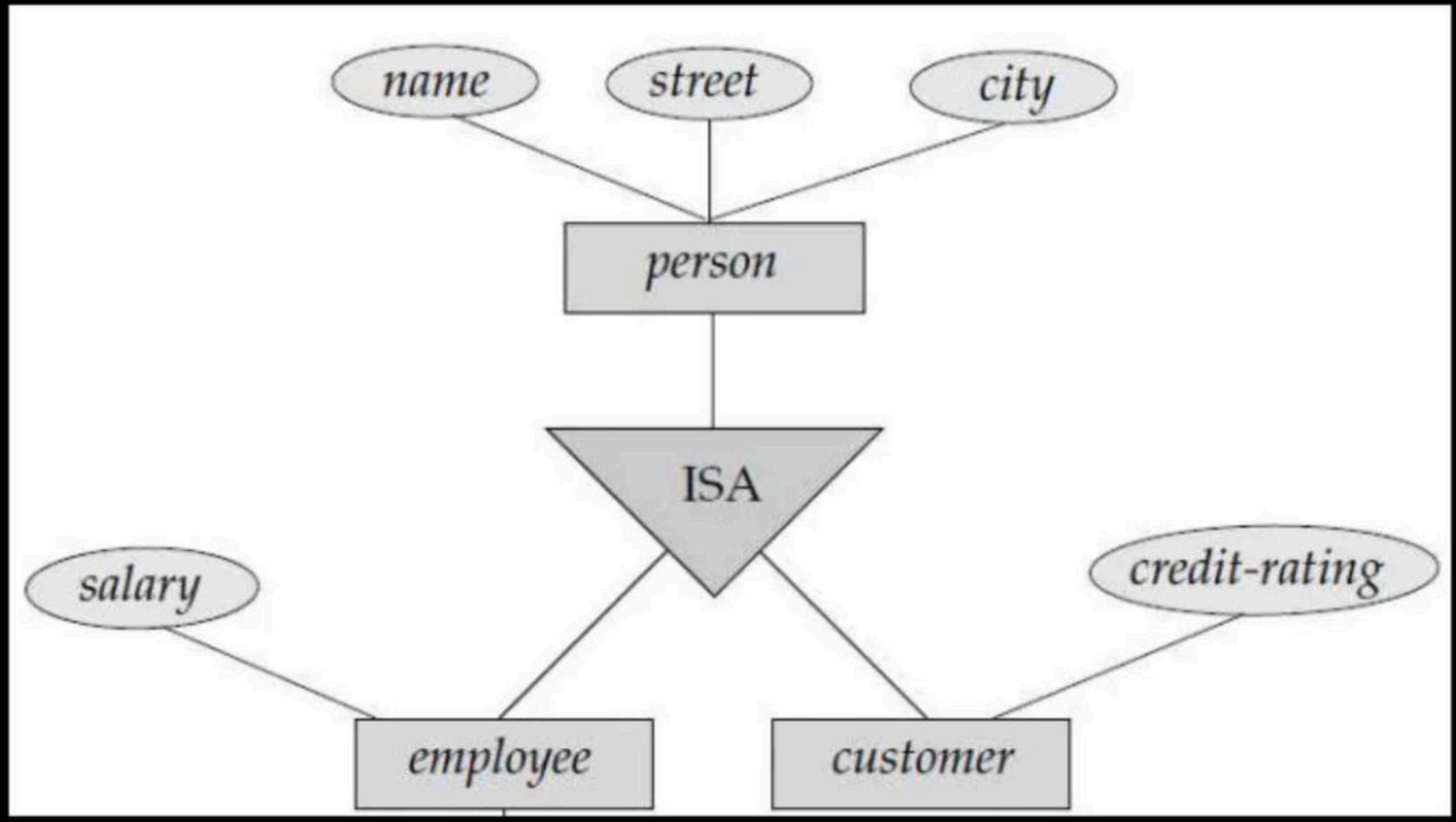
Generalization



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Generalization

This commonality can be expressed by generalization, which is a containment relationship that exists between a higher-level entity-set and one or more lower-level entity sets

1. Disjoint
2. Overlapping

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Generalization

Total generalization or specialization: Each higher-level entity must belong to a lower-level entity set

Partial generalization or specialization: Some higher-level entities may not belong to any lower-level entity set.

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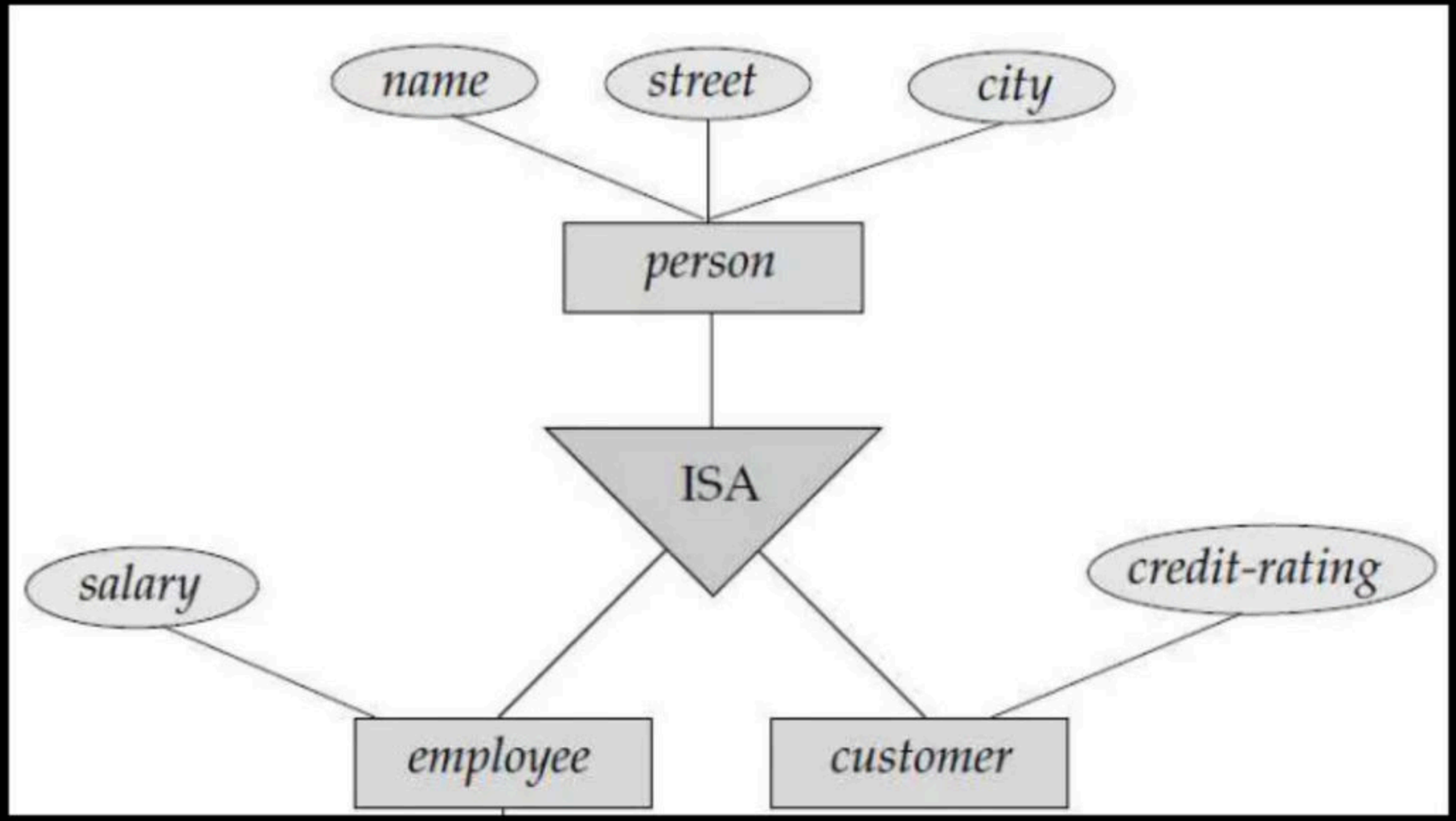
Attribute Inheritance



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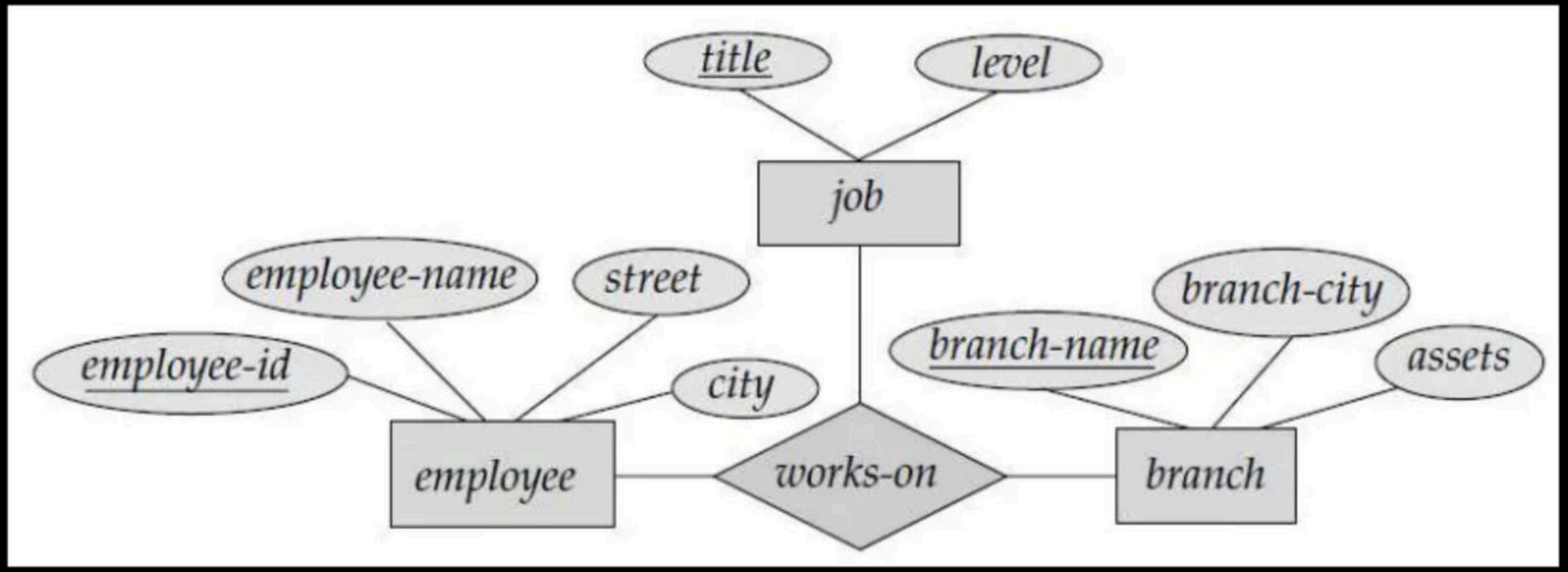
Aggregation

Relationship-set participating in relationship then aggregation is used

Aggregation



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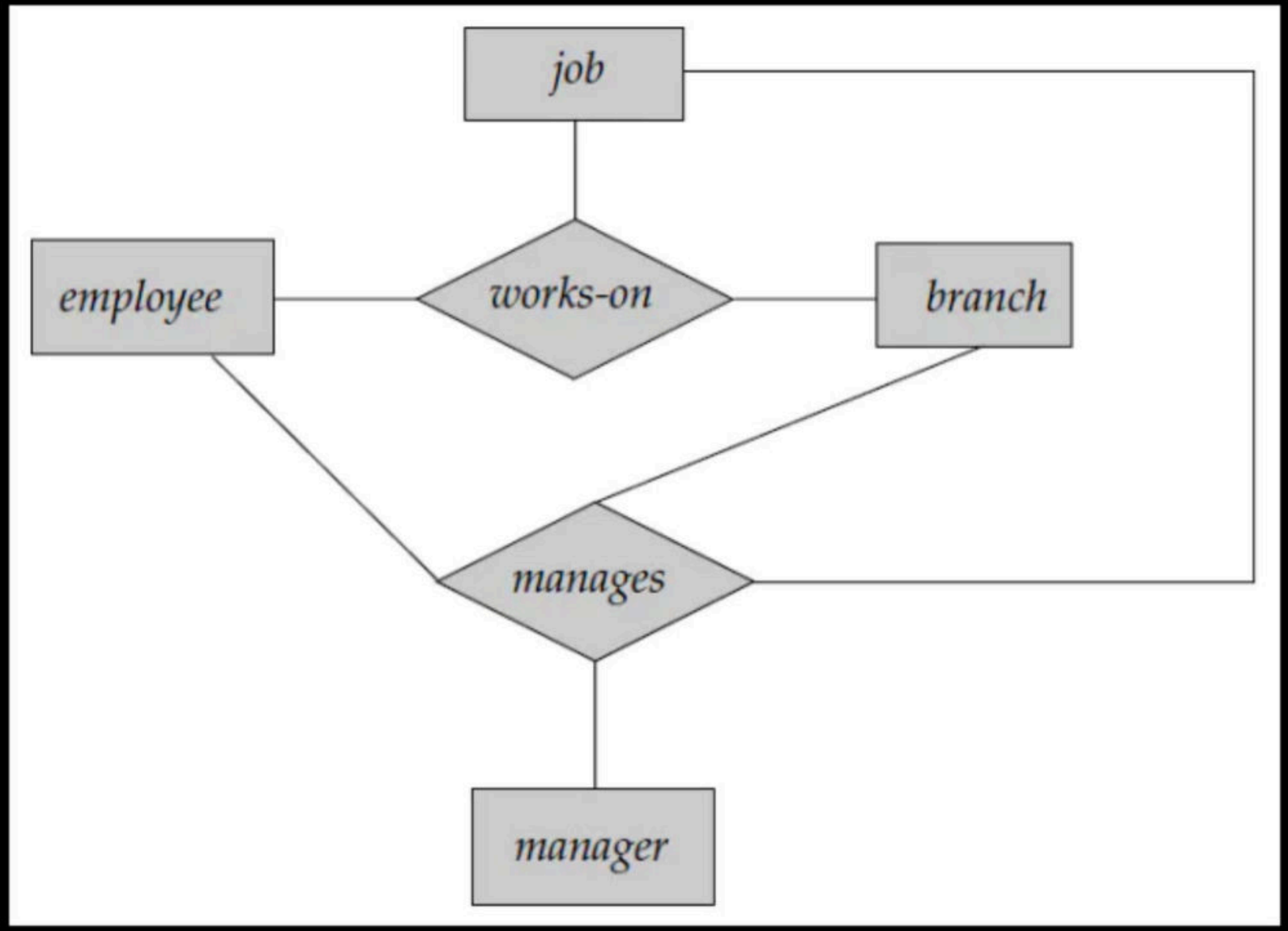
Aggregation



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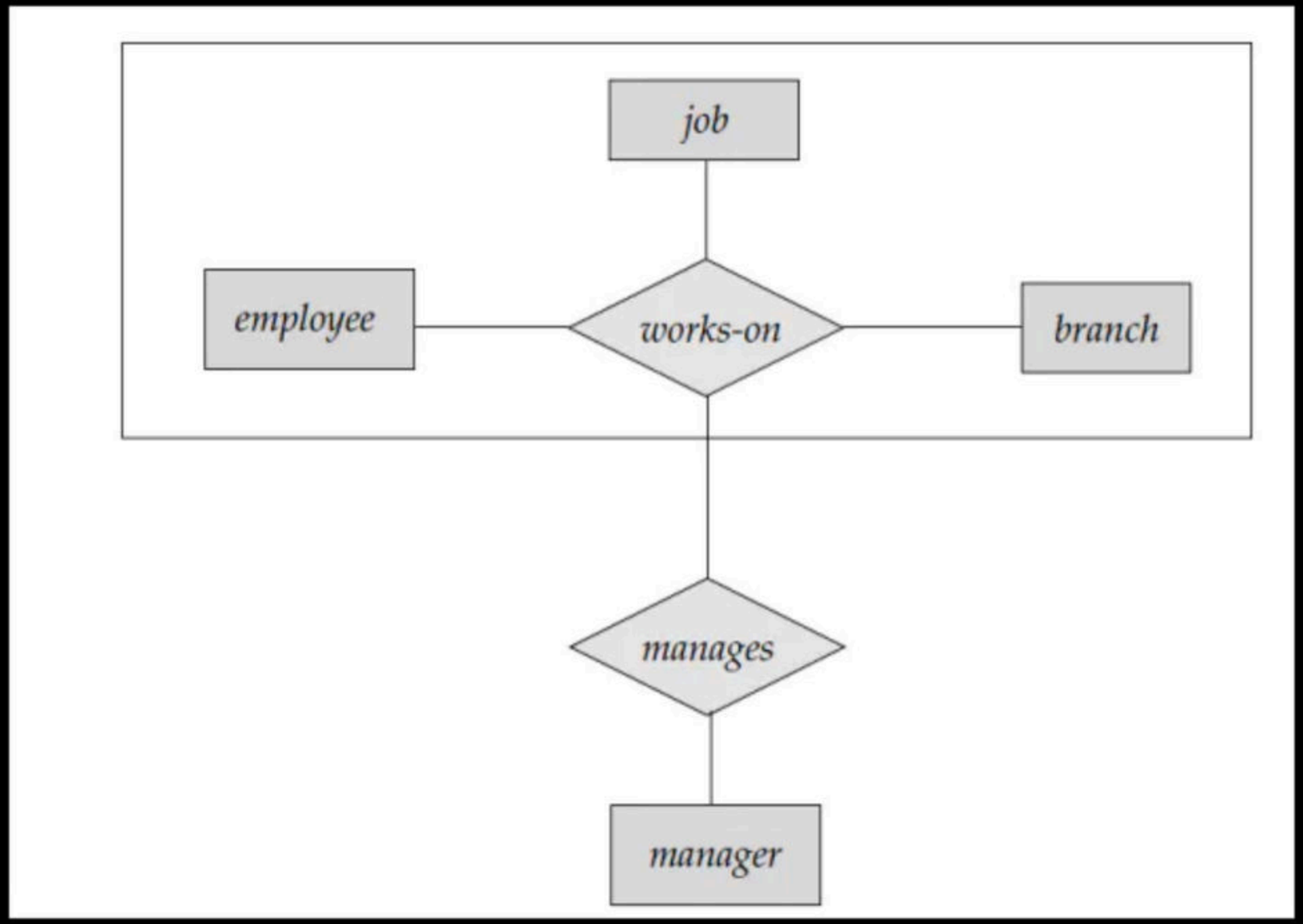
Aggregation



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Types of Attributes

1. Single valued vs Multivalued attributes
2. Simple vs Composite attributes
3. Given vs Derived attributes
4. Prime vs Non-prime attributes

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