Computer Science & IT

Database Management System

Entity Relationship Model & Integrity constraints

Lecture No. 02

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Recap of Previous Lecture

- Topic: Relational model
- Topic: Integrity constraints

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Topics to be Covered

- Topic: ER model & ER diagram
- Topic: Terminologies related to ER model

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Topic : Entity-Relationship Model (ER-Model)

- ER Model is a high-level data model diagram which defines the conceptual view of the database (OR) that gives the graphical representation of the logical structure of the database.

- Entity-Relationship model is based on objects called entities, and relationship among these entities.

Topic : Entity

- An entity refers to any object having either a physical existence or a conceptual existence. For example, a school, a person, a house, a university, a company or a job.

Topic : Entity Set

An entity set is a collection or set of all entities of a particular entity type at any point in time.

"Student" Entity type

Roll_no	Name	Age
1	Ram	20
2	Shyam	19
3	Mohan	20
4	Arjun	19

This complete table is referred as "Student Entity Set" and each row represents an "entity".

Entity Set

Topic : Entity Set

An entity set is represented by a rectangle in ER diagram

{Entity Type}

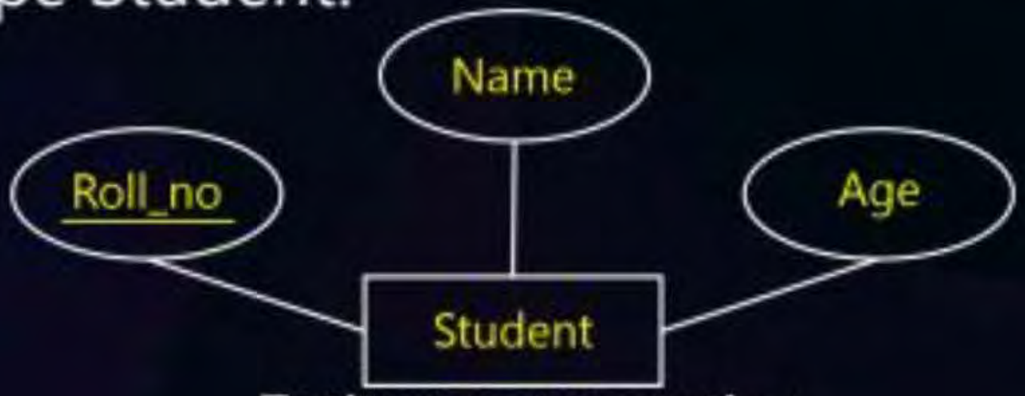
E.g.:-

Student

Topic : Attribute

- Each entity is identified uniquely by the values of its attributes.
- An attribute in an Entity-Relationship Model describes the properties or characteristics of an entity. It is represented by an oval or ellipse shape in the ER diagram. Every oval shape represents one attribute and is directly connected to its entity set which is rectangle in shape.

For example, roll_no, name, and age are the attributes which define entity type Student.



Entity representation

Roll_no	Name	Age
1	Ram	20
2	Shyam	19
3	Mohan	20
4	Arjun	19

Topic : Types of Attributes

i. Simple attribute

ii. Composite attribute

iii. Single-valued attribute

iv. Multi-valued attribute

v. Key attribute

vi. Derived attribute

vii. Partial key attribute

Topic : Types of Attributes

(i) **Simple Attributes:** An attribute which contains an atomic value and cannot be divided further is called a simple attribute. Example, Roll_no, Sex, etc.

(ii) **Composite attribute:** An attribute which can divided further. It is an attribute which is composed of several components. Example name, address, etc. Eg. Name = (f_name + M_name + l_name)

(iii) **Single-valued attribute:** An attribute which can have only one value.

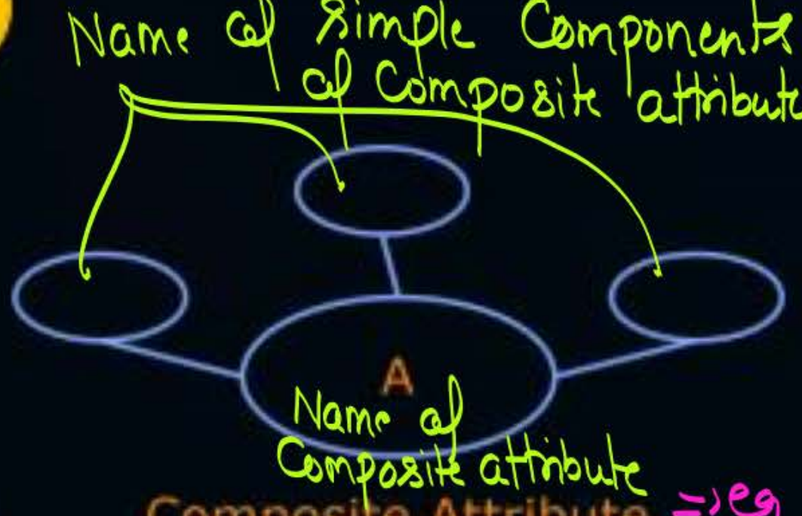
(iv) **Multi-valued attribute :** An attribute which may have multiple values (more than one value) Eg. (Phone_No.)

(v) **Key attribute :** An attribute which can identify all entities uniquely.

(vi) **Derived attribute :** An attribute whose value can be derived or found from any other attribute is known as derived attributes. {If D.O.B. is stored, then D.O.B is Stored attribute & Age is derived attribute}

(vii) **Partial key attribute :** An attribute which can identify a group of tuples.

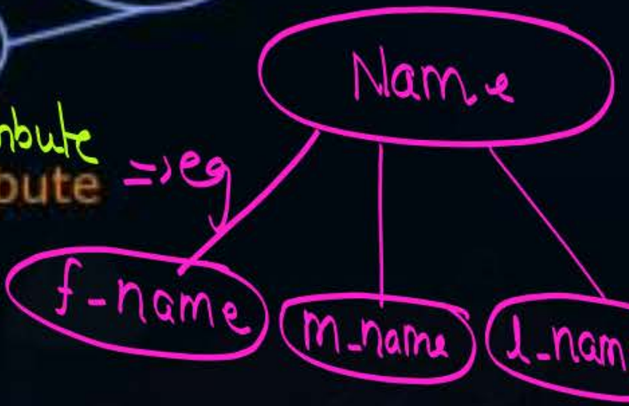
Topic : Types of Attributes



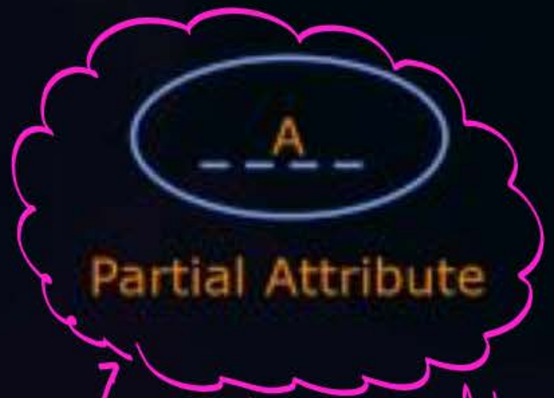
Attribute
(Simple + Single-valued)

Multivalued Attribute

Composite Attribute => eg



Key Attribute

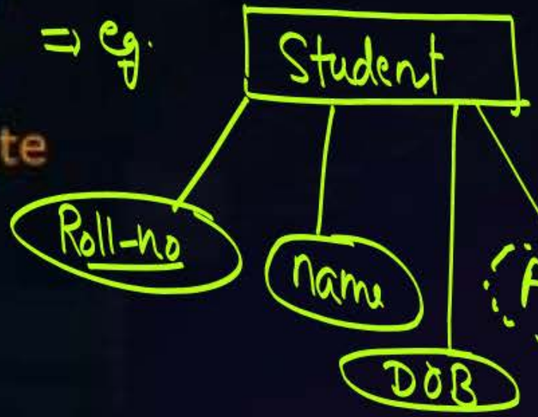


Partial Attribute

We will discuss, after discussion of "Weak entity type"

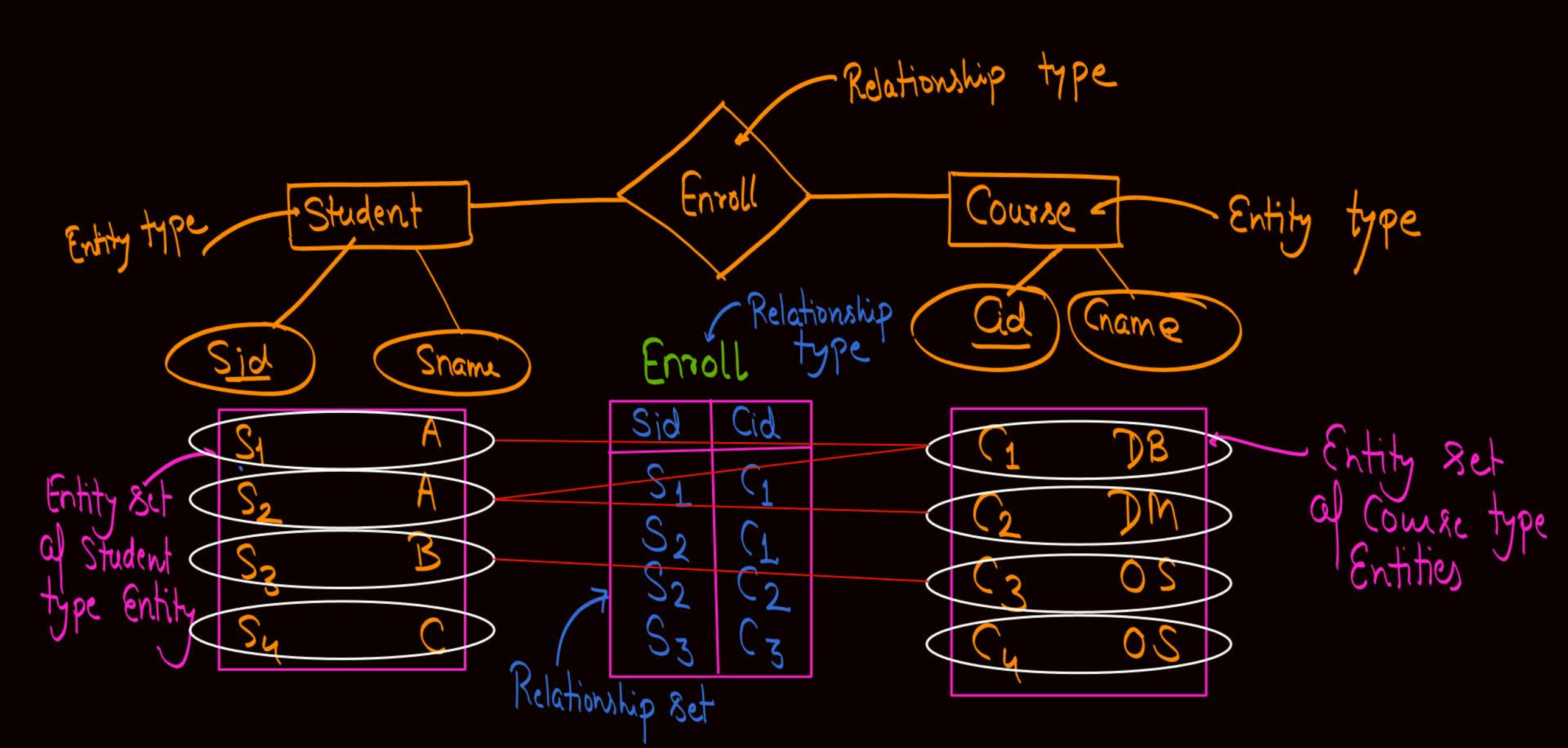
Derived Attribute

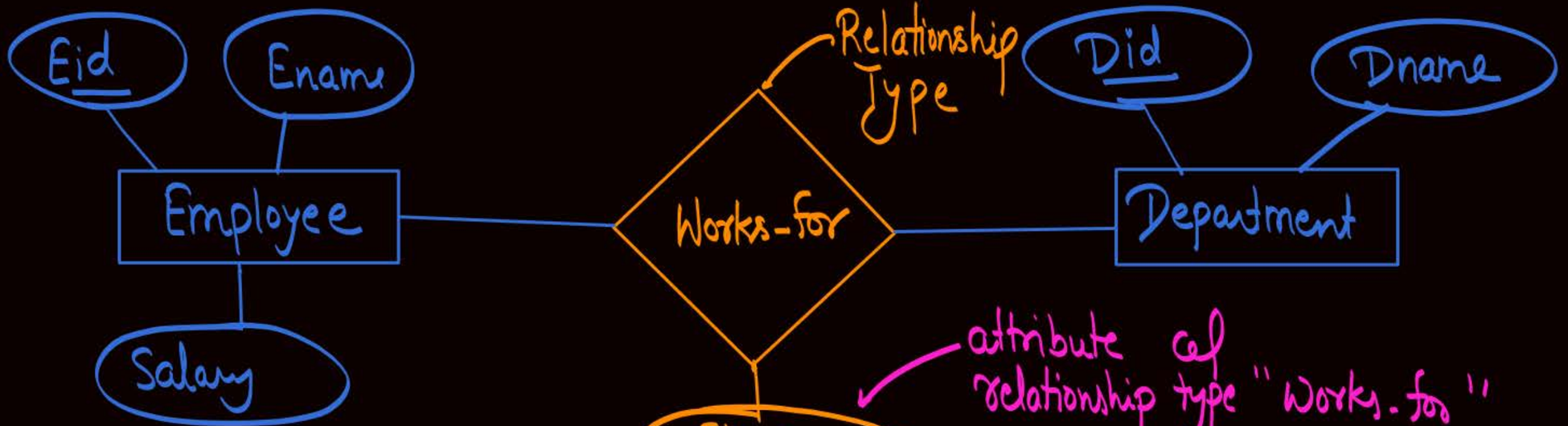
=> eg.



Topic : Relationship in ER model

A Relationship Type represents the association between entity types. For example, 'Enrolled' is a relationship type that exists between entity type Student and Course. In ER diagram, the relationship type is represented by a diamond and connecting the entities with lines.


Relationship type
Enroll
Entity type
Student
Course
Entity type
Sid
Sname
Cid
Cname
Relationship type
Enroll
Sid
Cid
S1
A
S2
A
S3
B
S4
C
C1
DB
C2
DM
C3
OS
C4
OS
S1
C1
S2
C1
S2
C2
S3
C3
Entity set of Student type Entity
Relationship set
Entity set of Course type Entities



attribute of relationship type "Works-for"

it will be used to specify that since when the Employee is associated with that department

"Some times relationship type may have their own attributes"

{ Attributes of "relationship type" are called "descriptive attributes"

Topic : Descriptive attribute

- Descriptive attributes are use to provide the information related to relationship set.

It is not necessary for Every "relationship type" to have its own attribute

Topic : Degree of a Relationship

- The number of different entity type participating in a relationship is called the degree of a relationship.

Degree of a relationship = Number of entity sets participating in a relationship

Topic : Types of Relationship

On the basis of degree of a relationship set, a relationship set can be classified into the following types-

i. **Unary Relationship:** Unary relationship set is a relationship set where only one entity set participates in a relationship set. { Unary relationship is also known as "recursive" relationship }

ii. **Binary Relationship:** Binary relationship set is a relationship set where two entity sets participate in a relationship set.

iii. **Ternary Relationship:** Ternary relationship set is a relationship set where three entity sets participate in a relationship set.

iv. **N-ary Relationship:** N-ary relationship set is a relationship set where 'N' entity sets participate in a relationship set.

Topic : Unary Relationship

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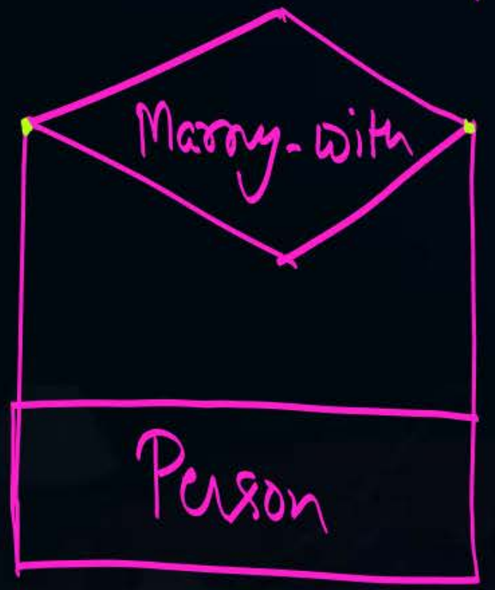
Unary relationship

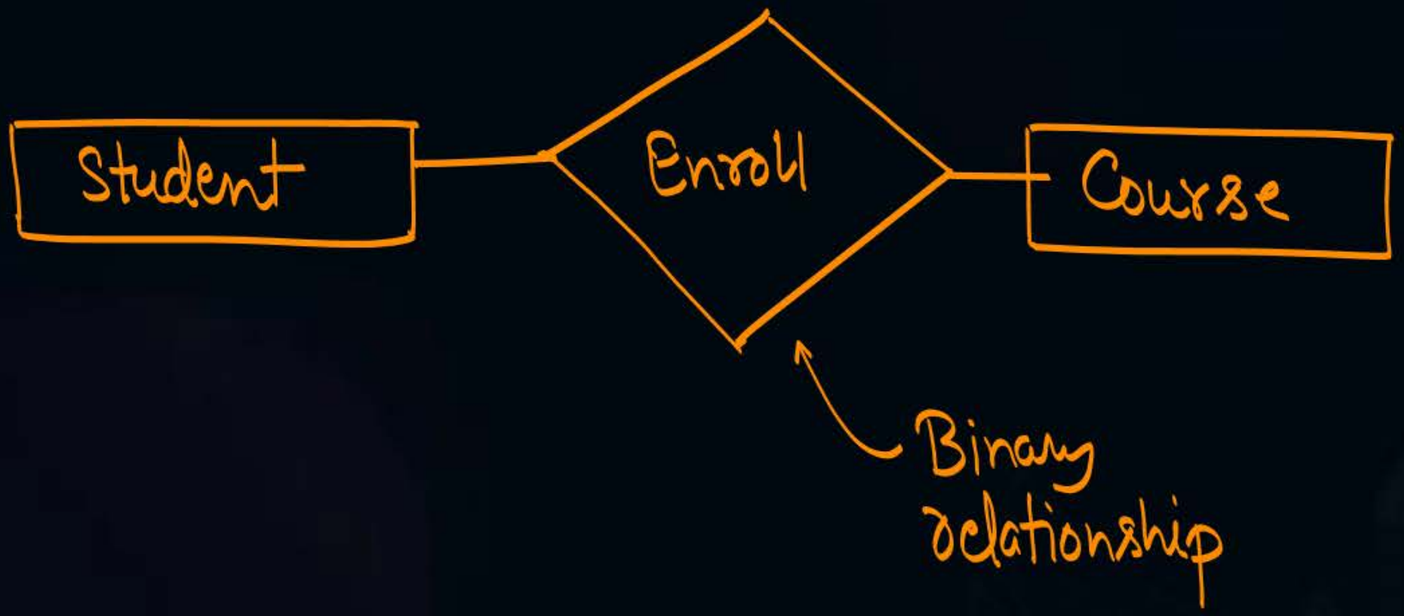


Only one Entity type "Person" is participating in relationship type "Marry-with"

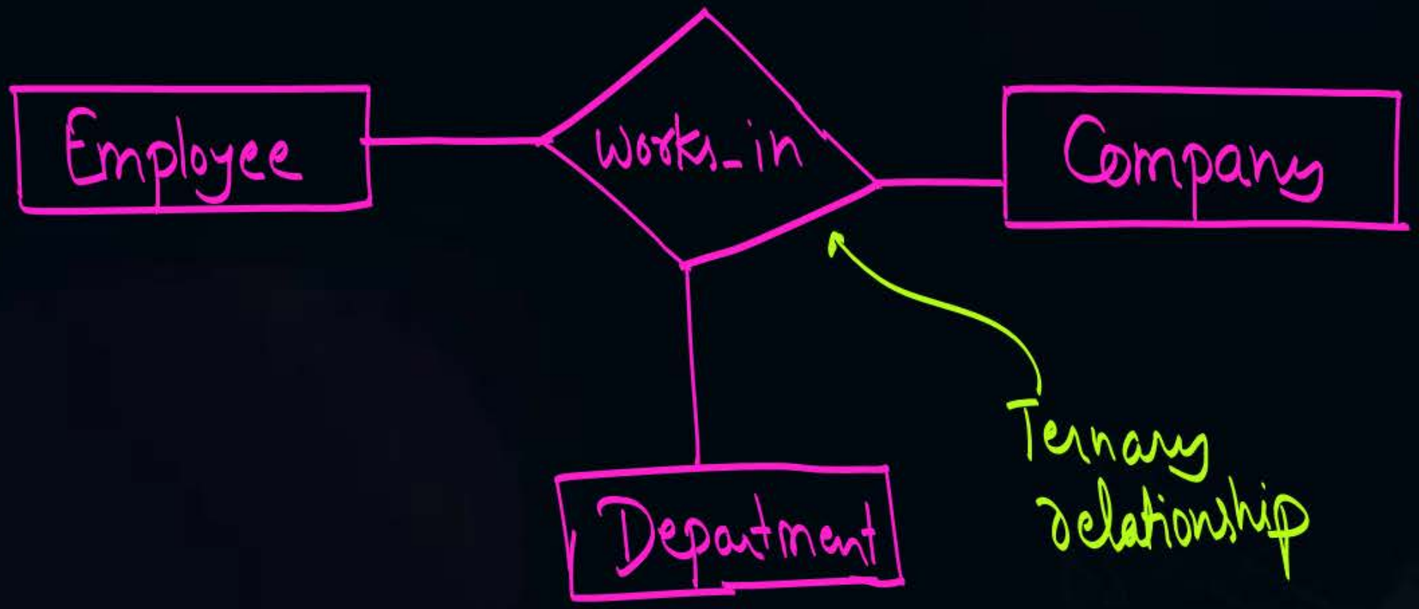
∴ "Marry-with" is a Unary Relationship

Topic : Binary Relationship

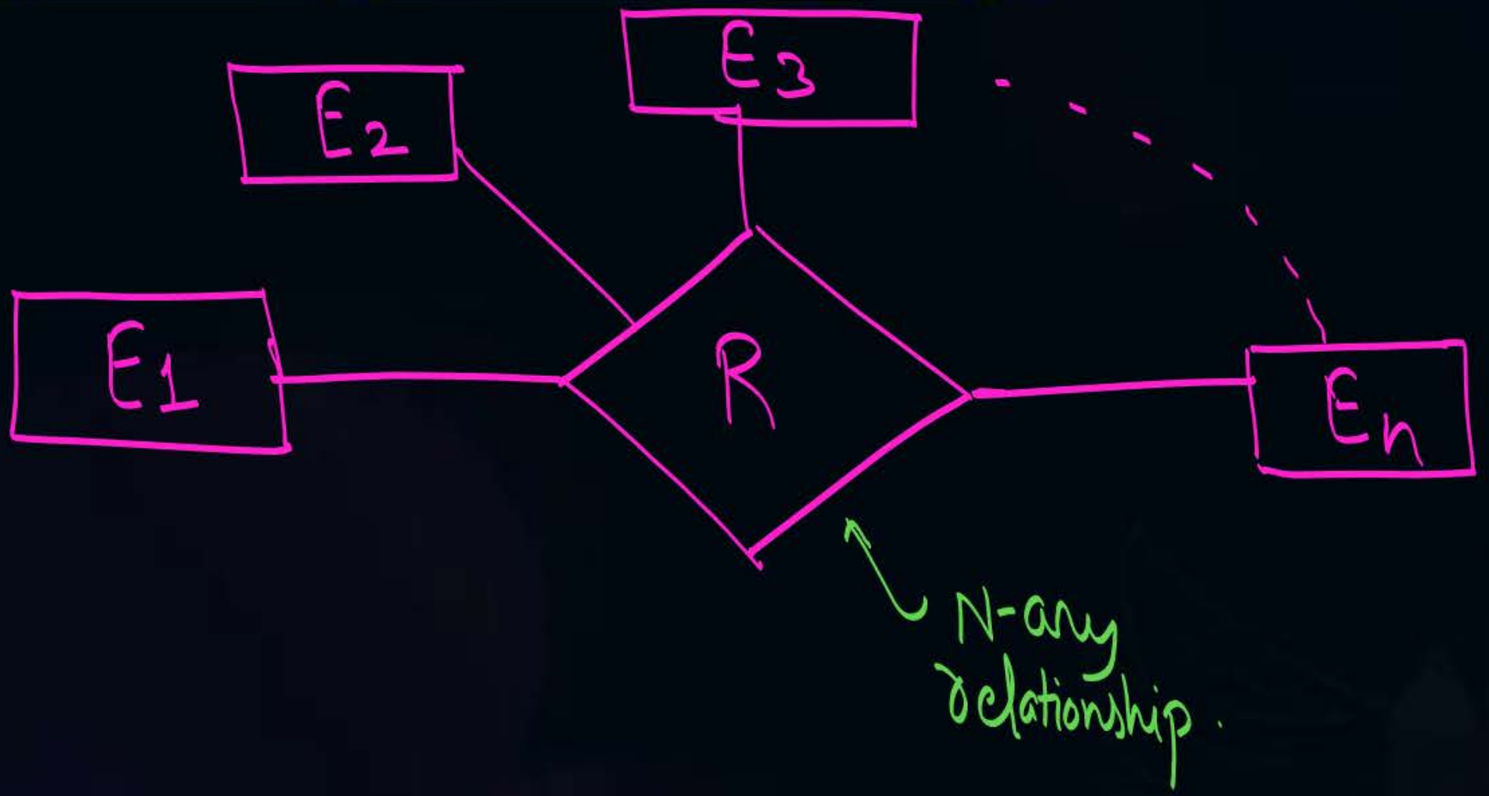
eg:



Topic : Ternary Relationship



Topic : N-ary Relationship



Topic : Participation constraints

- There are two types of participation constraints :
  1. Total participation
  2. Partial participation

Topic : Total participation

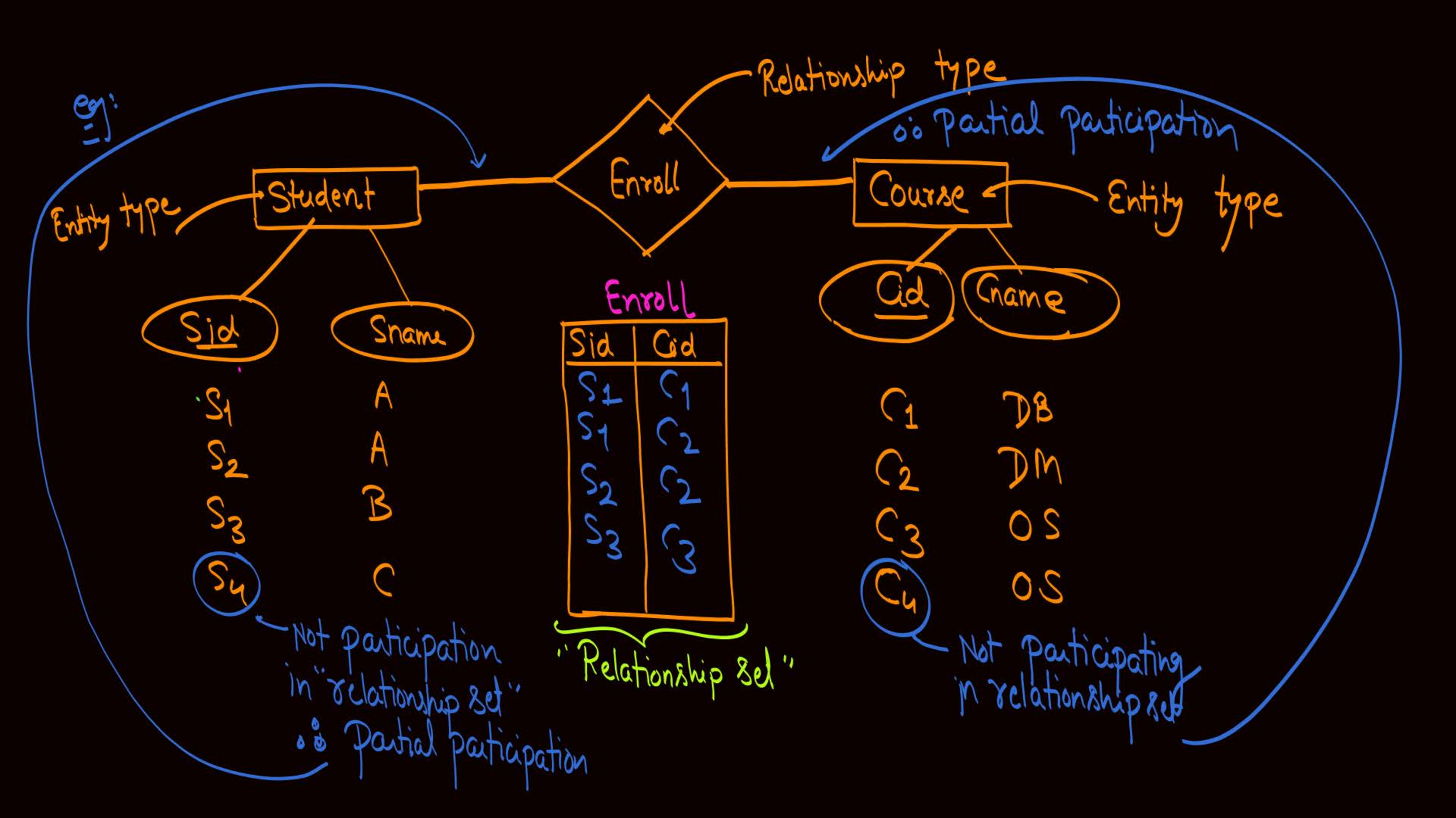
- If every entity of an entity set participate in the relationship set, then that entity set is said to have total participation.
- Total participation of an entity set in a relationship set is denoted by double line

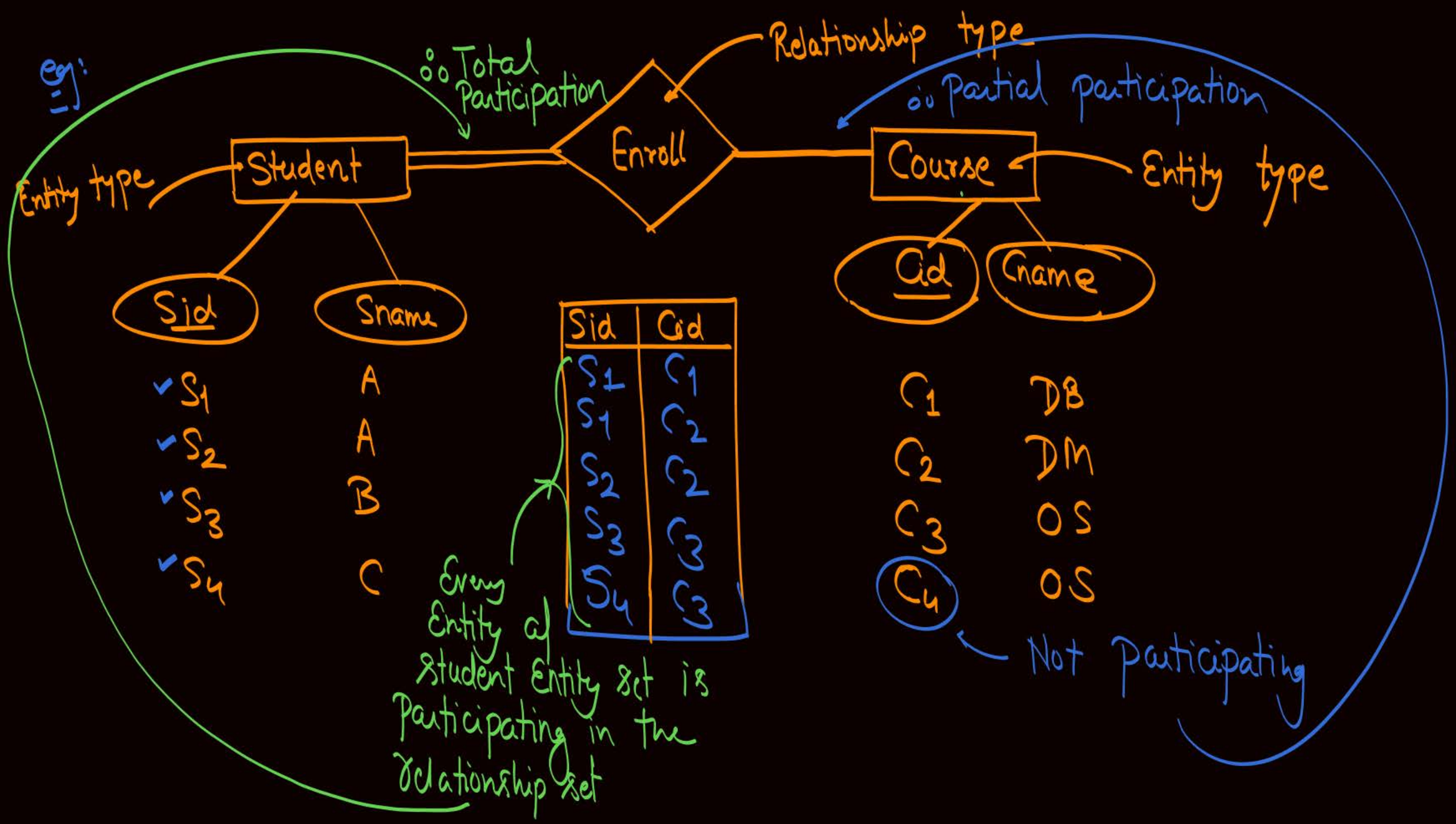
Single line
∴ Partial Participation of E_1 in relationship R

it represent total participation { it represent that Every Entity of Entity Set E_2 Will Participate in relationship R }

Topic : Partial participation

- If at least one entity of entity set is not participating in the relationship set, then that entity set is said to have partial participation.
- Partial participation of an entity set in a relationship set is denoted by single line.


eg:
Relationship type
∴ Partial participation
Entity type
Student
Enroll
Course
Entity type
Sid
Sname
Cid
Cname
S1
S2
S3
S4
A
A
B
C
C1
C2
C3
C4
DB
DM
OS
OS
Enroll
Sid | Cid
S1 | C1
S1 | C2
S2 | C2
S3 | C3
"Relationship set"
Not participation in "relationship set"
∴ Partial participation
Not participating in relationship set


eg:
Total Participation
Relationship type
Partial participation
Entity type
Student
Enroll
Course
Entity type
Sid
Sname
Cid
Cname
S1
S2
S3
S4
A
A
B
C
Sid | Cid
S1 | C1
S1 | C2
S2 | C2
S3 | C3
S4 | C3
C1 DB
C2 DM
C3 OS
C4 OS
Every Entity of Student Entity set is Participating in the Relationship set
Not Participating

H.W.:-

1. Read about mapping Cardinalities (or Cardinality ratio)
   - (1) One - one
   - (2) One to Many
   - (3) Many to One
   - (4) Many to Many
2. "Min-Max" notation w.r.t Cardinality ratio

2 mins Summary

Topic ER model & ER diagram

Topic Terminologies in ER diagram

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THANK - YOU

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