

# CM1603 - Database Systems

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## Week 03 | Entity Relationship Diagrams – Part 2

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# Learning Outcomes

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- Covers LO1 for Module - Describe and evaluate underlying theory and principles of relational database management systems (RDBMS).
- Partially covers LO2 for Module – Analyses and apply database design and modelling methods for a given business case study
- On completion of this lecture, students are expected to be able to:
  - Identify key attributes
  - Identify relationship types
  - Draw a complete ER diagram

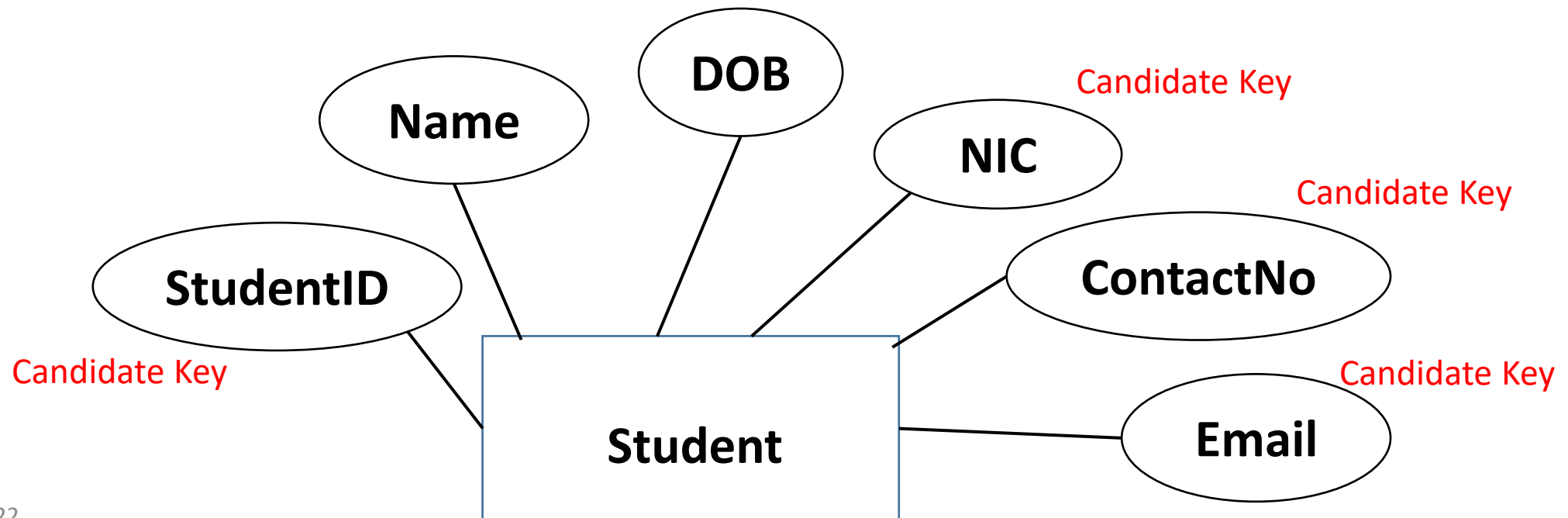
# Lesson Outline

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- Key Attributes
  - Candidate Key
  - Primary Key
- Relationship Attribute
- Degree of Relationship
  - Binary
  - Unary
  - Ternary
- Multiplicity Constraint
  - Cardinality Ratio (1:1, 1:m, m:n)
  - Participation Constraint (total, partial)

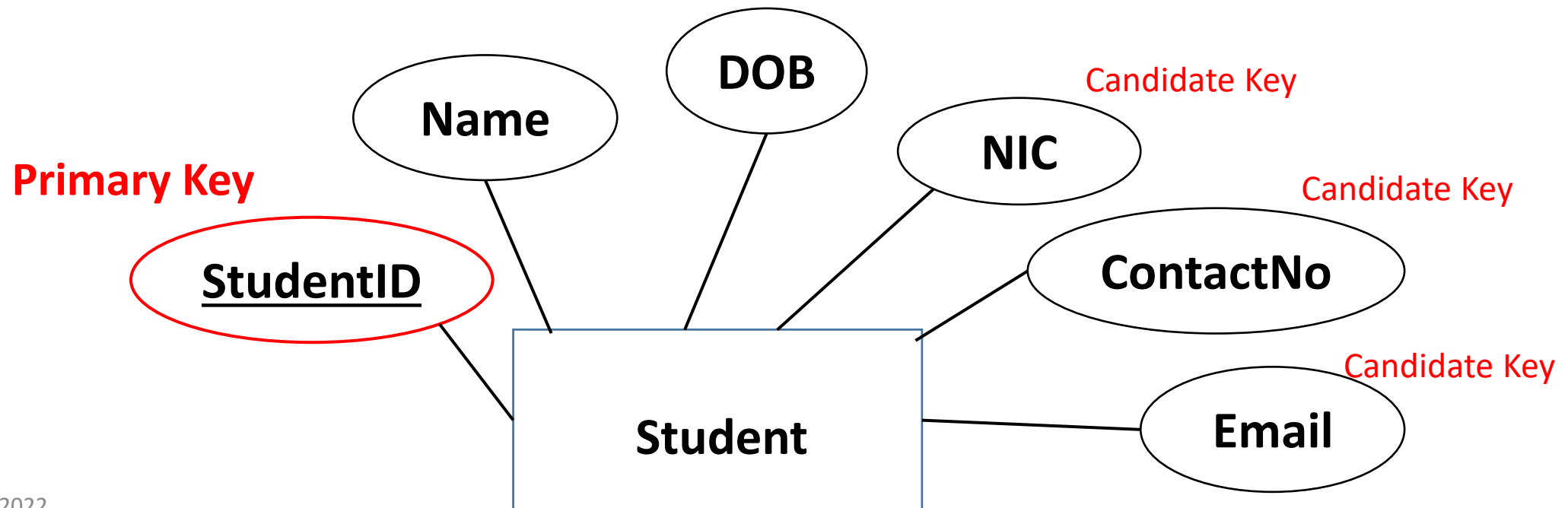
# Key Attributes

- Minimal set of attributes which uniquely identifies each entity occurrence in the entity set is called as Candidate Keys.
- There can be multiple candidate keys in an entity.



# Primary Key

- A selected candidate key is designated as the primary key.
- It helps to identify each entity occurrence uniquely.
- It is underlined.



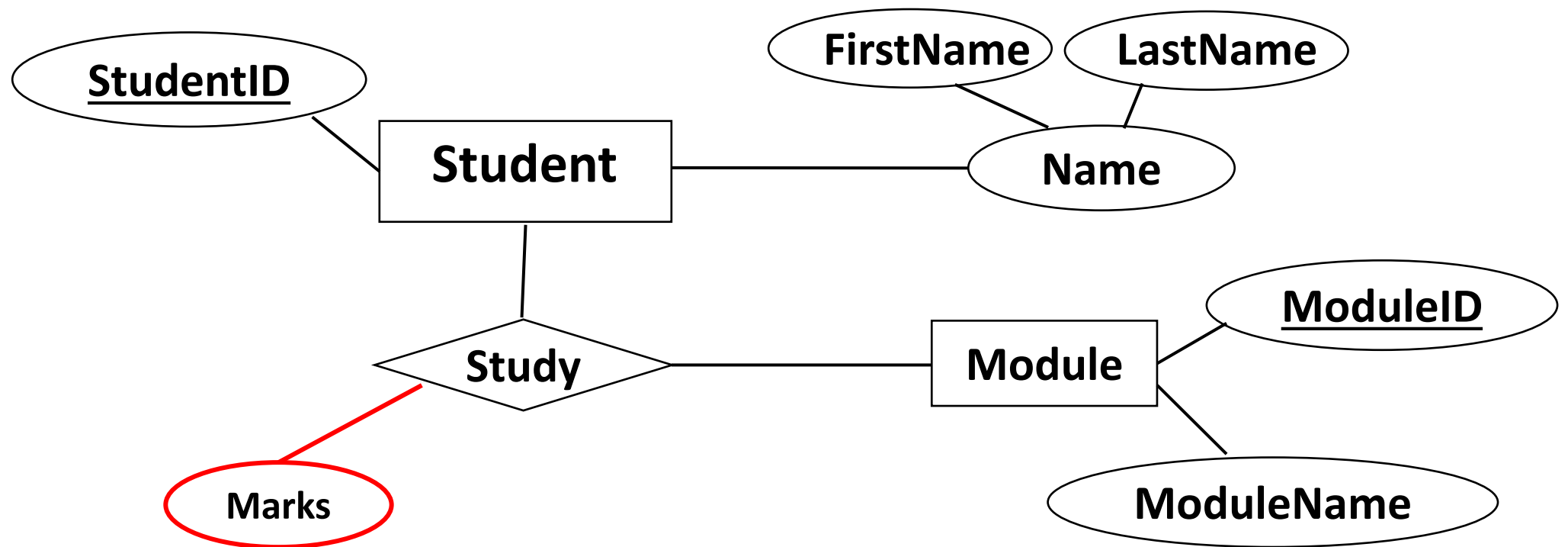
# Relationship Attribute

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- Also called as 'Descriptive Attribute'.
- Used to record information about the relationship rather than any one of the participating entities.
- This attribute is marked in the relationship.
- It may appear when two or more entities link together via a particular relationship.

# Relationship Attribute

- Eg: John's marks for the Database module is 80.



# Degree of a Relationship

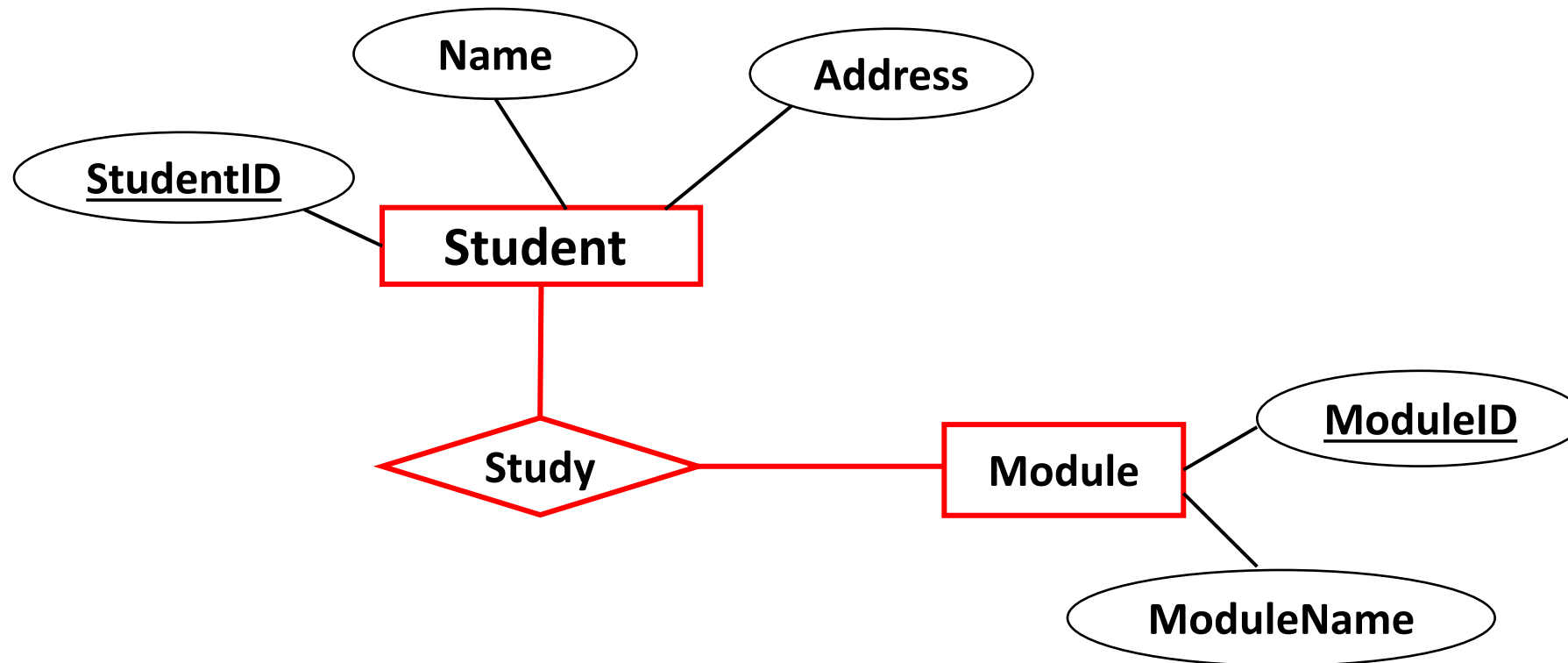
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- The number of participating entities in a relationship.
  - Unary Relationships
  - Binary Relationships
  - Ternary Relationships
  - Quaternary Relationships
  - N-ary Relationships



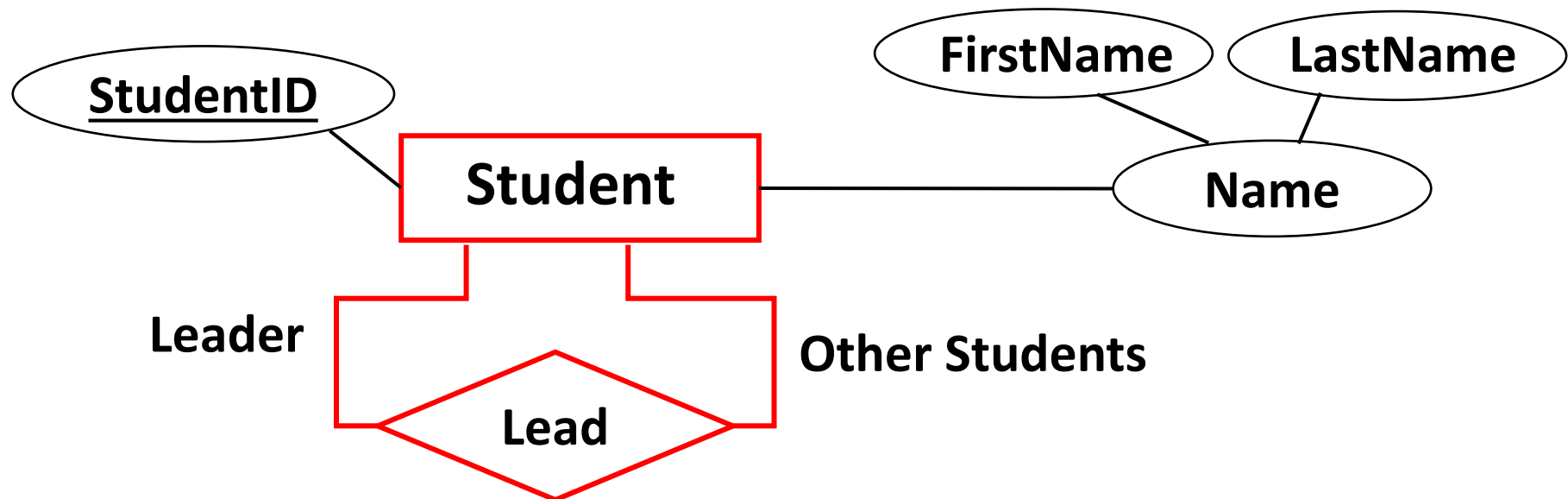
# Binary Relationship

- Two entities are connected in one relationship.



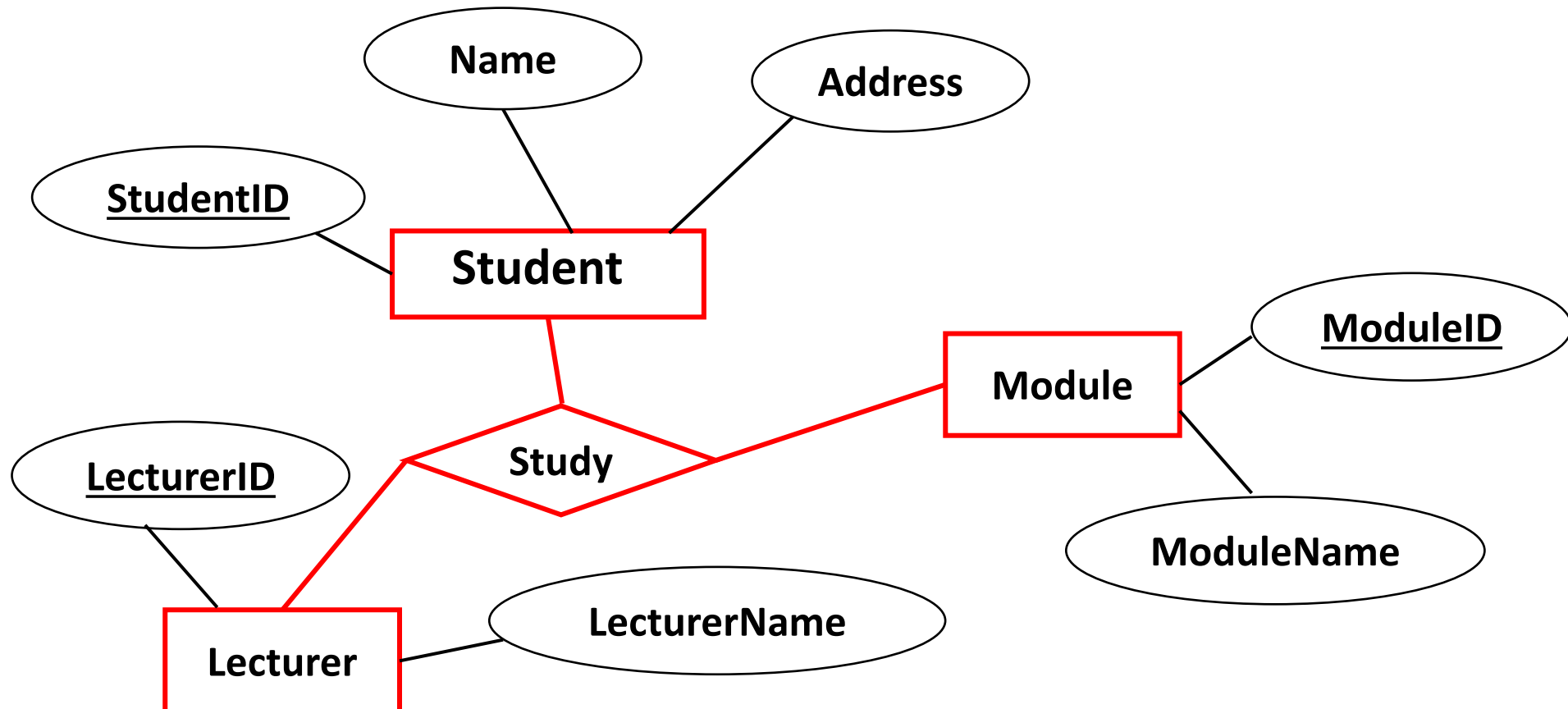
# Unary Relationship

- Also called as 'Recursive Relationships' or 'Self-Referencing Relationship'.
- An entity has a relationship to itself.
- A relationship type where the same entity type participates more than once in different roles.



# Ternary Relationship

- Three entities are connected to a particular relationship.



# Multiplicity Constraint

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- Main type of constraint on a relationship is called multiplicity.
- Multiplicity is made up of two types of restrictions on relationships:
  - Cardinality
  - Participation
- Represents policies (called *business rules*) established by user or company.

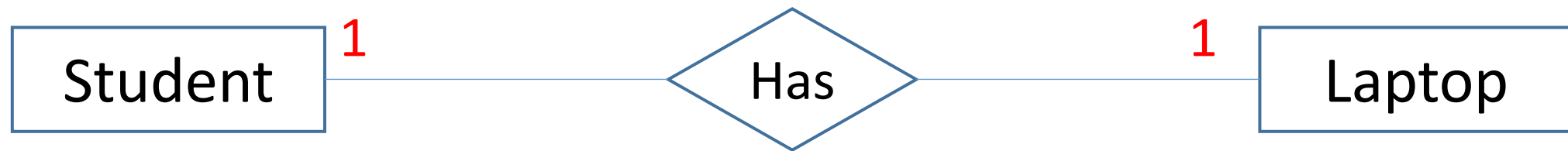
# Cardinality

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- The maximum number of possible occurrences of an entity type that may relate to a single occurrence of an associated entity type through a particular relationship.
- There are 3 types of Cardinality Ratios:
  - One to one (1:1)
  - One to many (1:m)
  - Many to many (m:n)

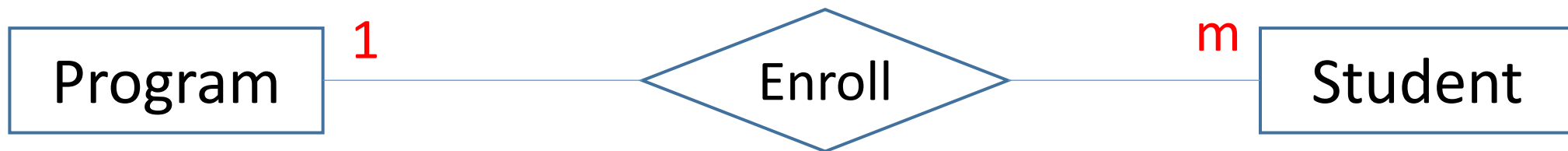
# One to One (1: 1)

- **ONE** entity occurrence relates to **ONLY ONE** occurrence of the associated entity.
- Eg: Assume that each student has only one laptop, and each laptop belongs to only one student.



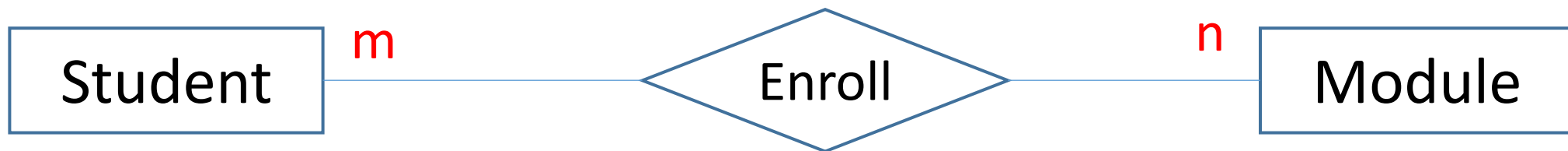
# One to Many (1 : m)

- **ONE** entity occurrence relates to **MANY** occurrences of the associated entity.
- Eg: Each student can enroll for one program, but each program can have many students.



# Many to Many (m : n)

- **MANY** entity occurrence relate to **MANY** occurrences of the associated entity.
- Eg: Each student can enroll for many modules, and each module can have many students.





# Participation Constraint

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- Determines whether all or only some entity occurrences participate in a given relationship.
- There are two types of participation constraints.
  - Total participation
  - Partial participation

# Total Participation

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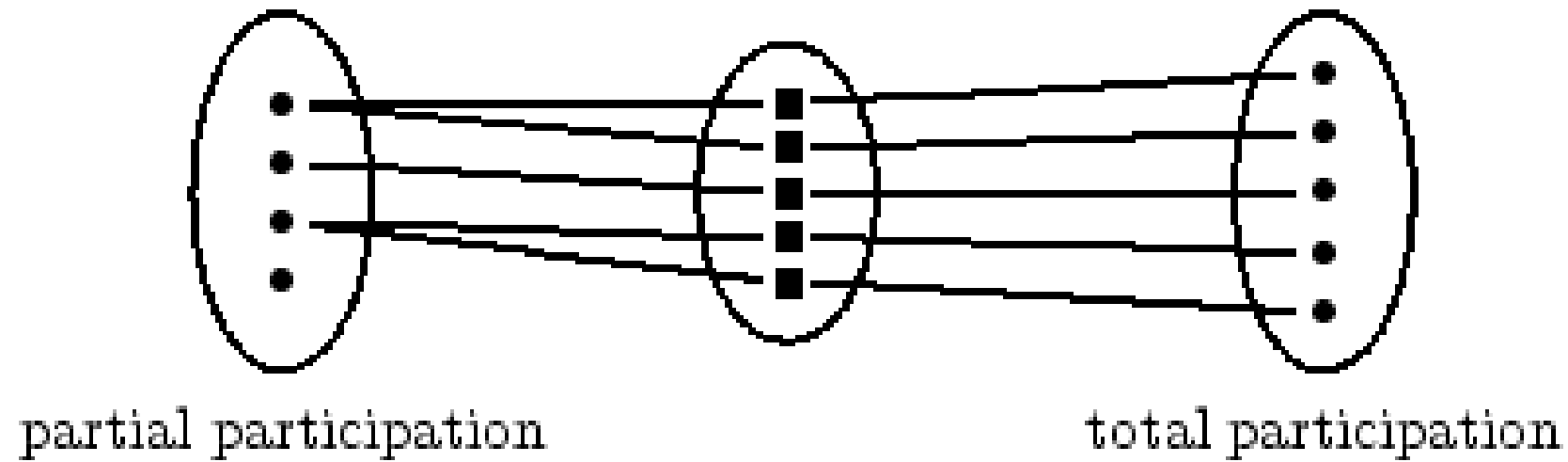
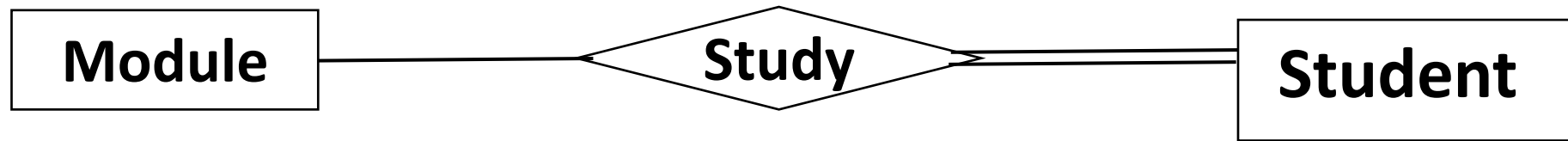
- Each entity occurrence in the entity set **must participate** in the relationship.
- Displayed by double lines.
- Also called existence dependency.
- Eg: Each student must enroll for modules.  
The participation of student is **total** (mandatory).

# Partial Participation

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- An entity occurrence in the entity set **MAY or MAY NOT participate** in the relationship.
- Only some or part of the entity occurrences participate in the relationship.
- Displayed by a single line.
- Eg: There may be modules which are not selected by any student.  
Number of students enrolled for those modules is zero.  
The participation of the module is **partial** (optional).

# Participation Constraint Example



# Thank you

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