DBMS- Session2

Course Objective

- To understand and familiarize with Entity Relationship(ER) Model.

Session Objective

- Entity Relationship Model
- Types of Entities
- Types of Attributes
- Relationships
    - Degree of Relationships
    - Cardinality of Relationships

Entity-Relationship (ER) Model

- ER model helps to capture conceptual database design

- Adopts top-down approach

- Describes the functional data requirements of a real-world problem in the form of ER diagrams

- Consists of Attributes, Entities, Relationships, Identifiers

- UML class diagrams is representative of another way of displaying ER concepts

Entity and Attribute

Entities
- Entities are specific objects or things that are represented in the database.

  Example:
  The Student , the Book

Attributes
- Attributes are properties used to describe an entity.

  Example:
  STUDENT entity may have the attributes Name, Reg. no, Address,   Degree, BirthDate

- Each attribute has a value set associated with it.

  Example:
  Attribute Age associated with value ranges from 18 to 52, attribute   Department should have values 'CS', 'EE','ME','CV'

Types of Entities

Strong/Regular Entity

- It can exist independently of other types of entities
- It has its own unique identifier

  Example:

  The Student Entity can exist independent of any other entitles

Weak Entity

- It is dependent on a strong entity (identifying owner)…cannot exist on its own
- It does not have a unique identifier (only a partial identifier)

  Example:

  Nominee Entity cannot exist independent of Policy-Holder Entity

Types of attributes

- Simple Vs Composite

- Single valued Vs Multi-valued
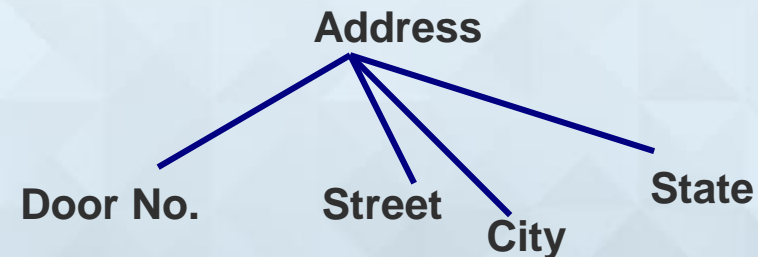
- ## Simple attribute

  An attribute, which cannot be sub-divided further components

  Example: Age, Sex. These attributes cannot be divided into subcomponents

- ## Composite attribute

  Attribute may be composed of several components

  Example: Address, Name. Address attributes can be composted of door no., street, city, state, whereas Name can compose of First Name, Last Name

Address

Door No.   **Street**   **City**   **State**

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Types of attributes   contd…

- ### Single valued attribute
  An attribute, which has only single atomic values

    Example:

    Age, DOB, Sex. These attribute values are single and atomic

- ### Multi-valued attribute
  An Attribute may have multiple values

    Example:

    Attribute Degree can have values 'B.Tech' and 'M.Tech', attribute hobby can have values 'playing cricket' and 'watching cricket'

- ### Key Attribute/Identifier
  An attribute of an entity type (Collection of similar entities) for which each entity must have a unique value is called a key attribute of the entity type.

    Example:

    EmployeeNo. of EMPLOYEE is key attribute

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Relationships

- A relationship relates two or more distinct entities with a specific meaning

    Shyam manages the Finance Department

- Relationships of the same type are grouped or typed into a relationship type

    Example:

    the MANAGES relationship type in which EMPLOYEEs and DEPARTMENTs participate

    the WORKSON relationship type in which EMPLOYEEs and PROJECTs participate

- Relationships can have attributes, which describe features pertaining to the association between the entities in the relationship

- Identifying relationship

    - links strong entities to weak entities

Degree of Relationships

Degree of a relationship is the number of entity types that participate in it.

- Unary relationship
- Binary relationship
- Ternary relationship

Unary relationship (degree 1)

- One entity related to another of the same entity type

Example: Employee Manages other Employee

Binary relationship (degree 2)

- Entities of two different types related to each other

Example: Supplier supplies Quotations

Ternary relationship (degree 3)

- Entities of three different types related to each other

Example: Parental relationship between mother, father and child

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Cardinality of Relationships

The number of entity instances that may participate in a relationship instance

One-to-one (1:1)

Each entity in the relationship will have exactly one related entity

One-to-many (1:N) or Many-to-one (N:1)

An entity on one side of the relationship can have many related entities, but an entity on the other side will have a maximum of one related entity

Many-to-many (M:N)

Entities on both sides of the relationship can have many related entities on the other side

One to One
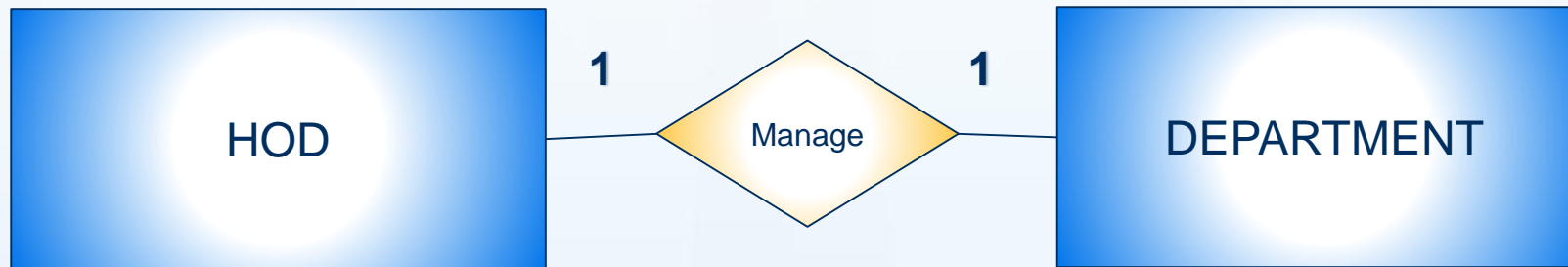
- A HOD manages one Department.
- Each Department is managed by one HOD

One to Many

It reflects business rule that one entity is associated with many number of same entity.

```
┌─────────────┐          ╱◇╲          ┌─────────────┐
│             │    1    ╱ Has ╲    N   │             │
│   Subject   │────────◇       ◇───────│  Offerings  │
│             │         ╲     ╱        │             │
└─────────────┘          ╲◇╱           └─────────────┘
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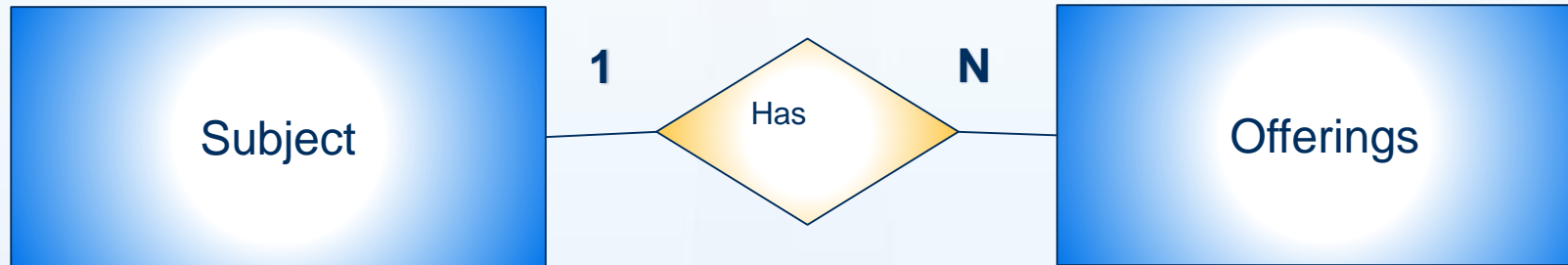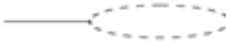
- A Subject can be offered many times
- Each Offering belongs to one Subject

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Many to Many
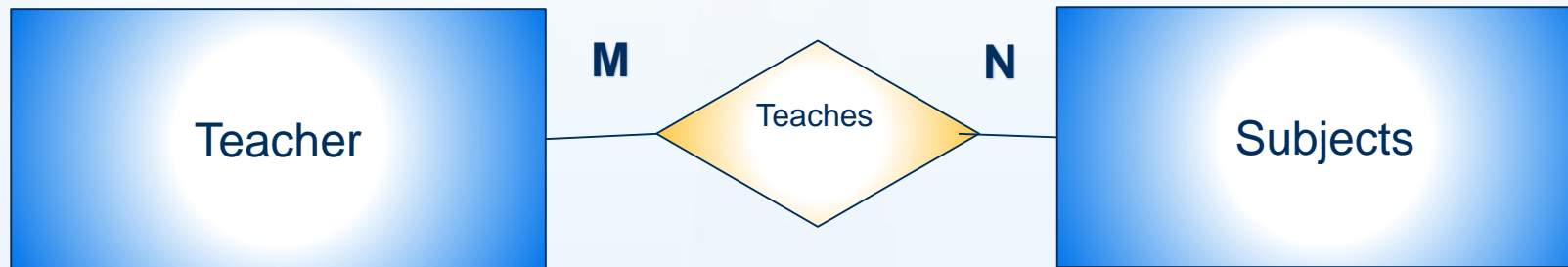
- A Teacher can teach many different Subjects
- Each Subject can be taught by many Teacher

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ER Notations

| Symbol	Meaning
☐	Entity
☐	Weak Entity
◇	Relationship
◈	Indentifying Relationship
◯	Attribute
◯	Key Attribute
◎	Multivalued Attribute
	Composite Attribute
⬭	Derived Attribute
E_1 — R = E_2	Total Participation of E_2 in R
E_1 —1— R —N— E_2	Cardinality Ratio 1 : N for E_1:E_2 in R
R —(min, max)— E	Structural Constraint (min, max) on Participation of E in R

Entity and Attributes representation using ER notation
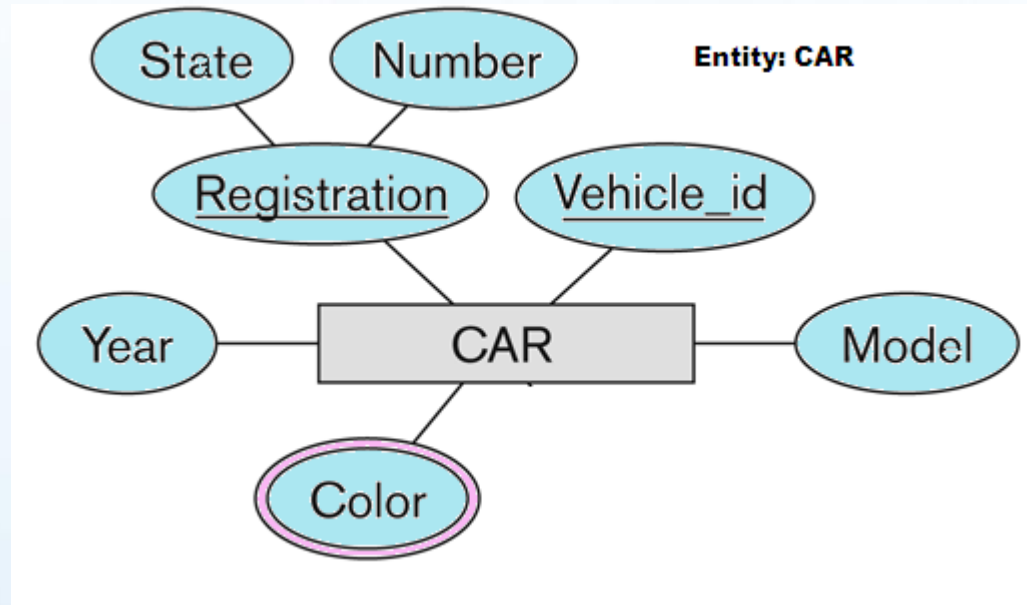
Entity is represented using Rectangle, attributes are represented with ellipse and key attributes/identifiers are underlined

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Relationships representation using ER notation
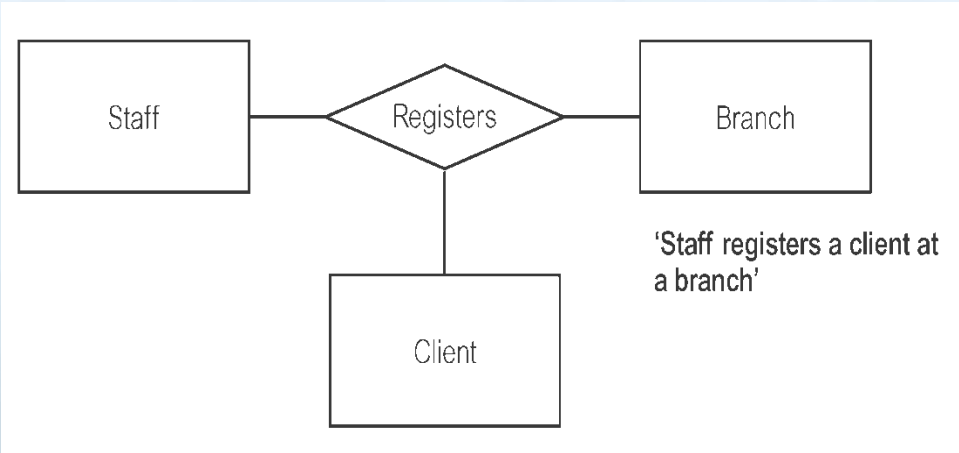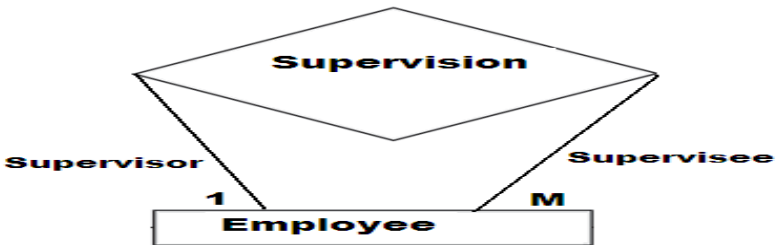
Case study

Objective:

To make the participants familiarize with ER-Diagrams.

Activity on ER
diagram