ERD(ENTITY RELATIONSHIP DIAGRAM)

Outline:

- What Entity relationship diagrams (ERD) are.
- What Entities in an ERD are?
- What Attributes in an ERD are?
- What Relationships in an ERD are?
- How to start an ERD .

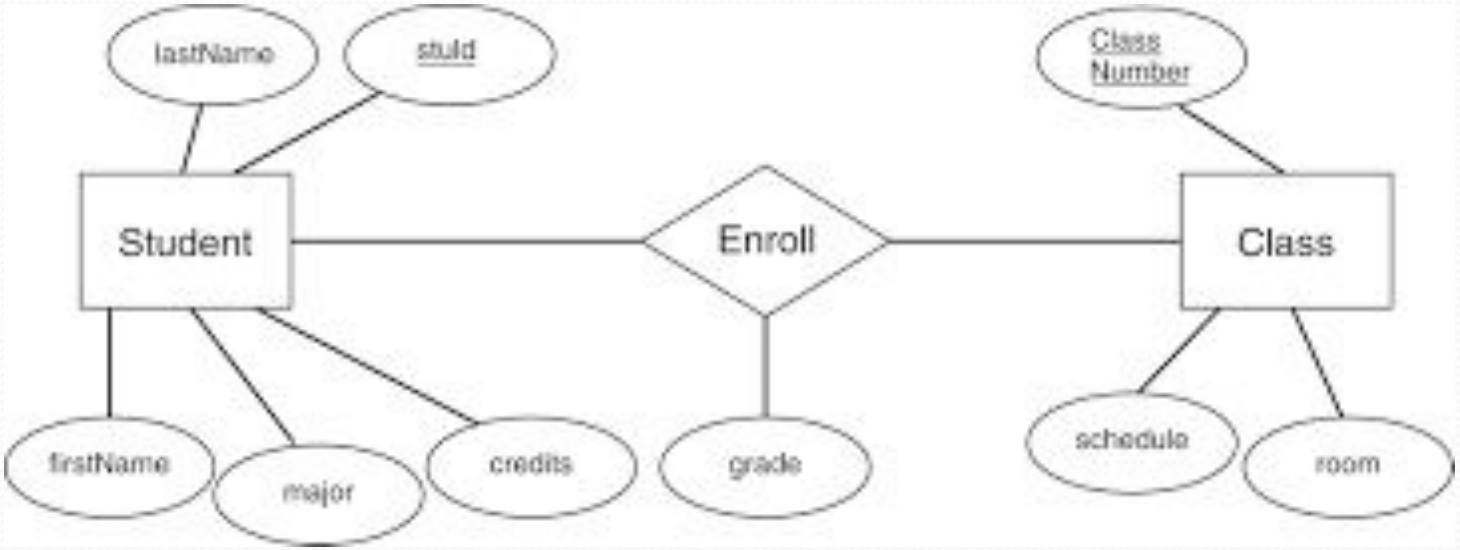
ERD

- ***Entity-Relationship Diagram (ERD)*** is a graphical representation of a Entity-Relationship Model.

- The purpose of an ERD is to **capture the richest possible understanding** of the meaning of data necessary for an information system or organization.

- ERDs are made from **Entities, Attributes, and Relations.**

University Entity-Relationship Diagram

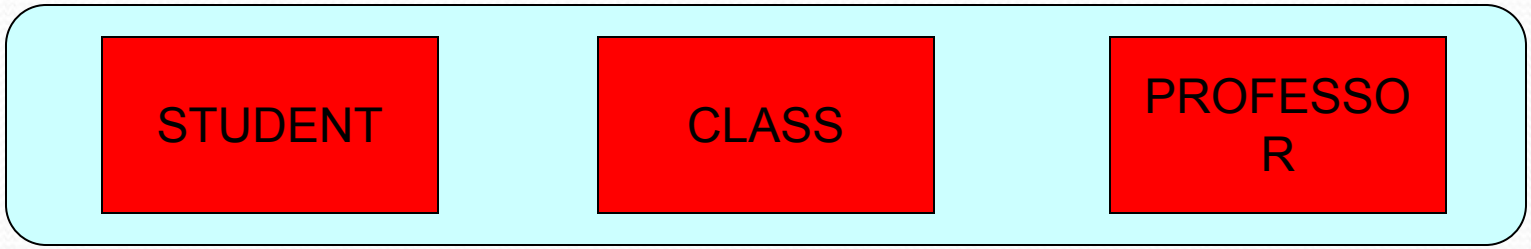


Entity

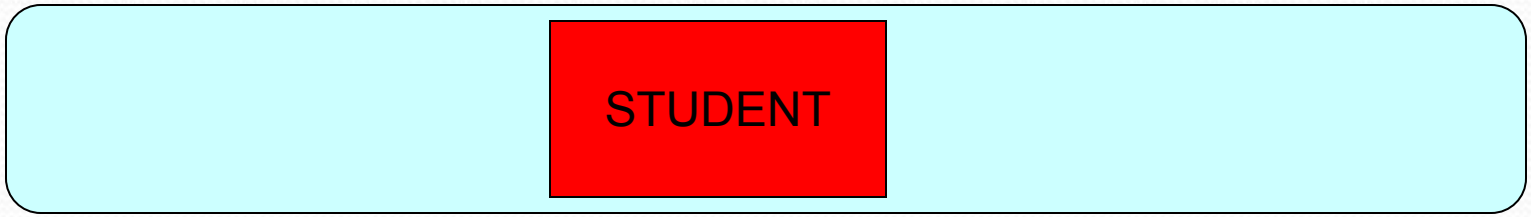
- What is an Entity?
- Has its own identity that distinguishes it from other entities.
  - Examples:
    - Person: PROFESSOR, STUDENT
    - Place: STORE, UNIVERSITY
    - Object: MACHINE, BUILDING
    - Event: SALE, REGISTRATION
    - Concept: ACCOUNT, COURSE

Entity
(Entity Type vs. Entity Instances)

- ***Entity Type*** is a collection of entities that share common properties or characteristics.



- ***Entity Instance*** is a single occurrence of an entity type.



  - Entities should always be placed in a rectangle!

Entity Types
(Naming Guidelines)

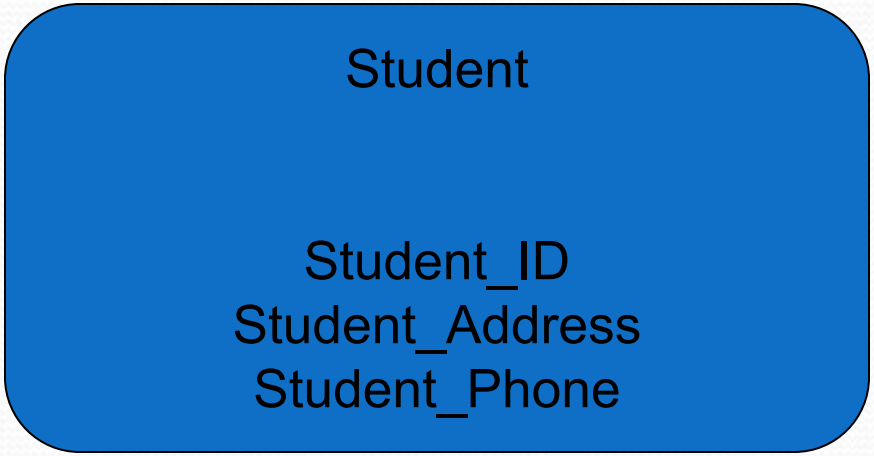
Entity type name should be:

- A ***singular noun*** and in ***capital letters***.
- ***Descriptive*** and ***specific*** to the organization.
- ***Concise***.

Attributes

- Each Entity has a set of Attributes
- ***Attribute*** is a property or characteristic of an entity that is of interest to the organization.
  - Example:
    - STUDENT: Student_ID, Student_Name, Phone_Number, Major

Attributes



Attributes
(Naming Guidelines)

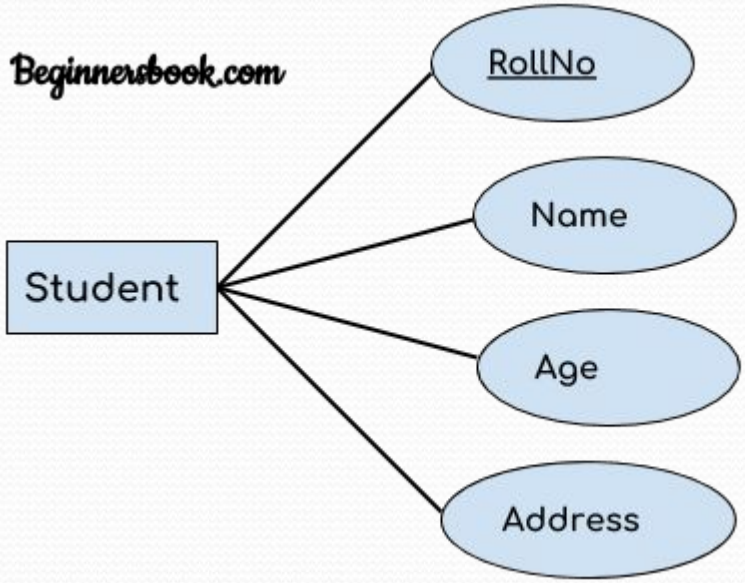
- ***An attribute name***:
  - Should be a *noun* and *capitalize the first letter of each word*. (Example: Student_ID.)
  - Should be *unique*.
  - Should follow a *standard format*. (Example: Student_GPA)
- Similar attributes of different entity types should use similar but distinguished names.
  - Example: Faculty_Residence_City_Name and Student_Residence_City_Name

There are four types of attributes:

1. Key attribute
2. Composite attribute
3. Multivalued attribute
4. Derived attribute

1. Key attribute:

- A key attribute can **uniquely identify** an entity from an entity set.
- **For example**, student roll number can uniquely identify a student from a set of students.
- Key attribute is represented by oval same as other attributes however the text of **key attribute is underlined**.

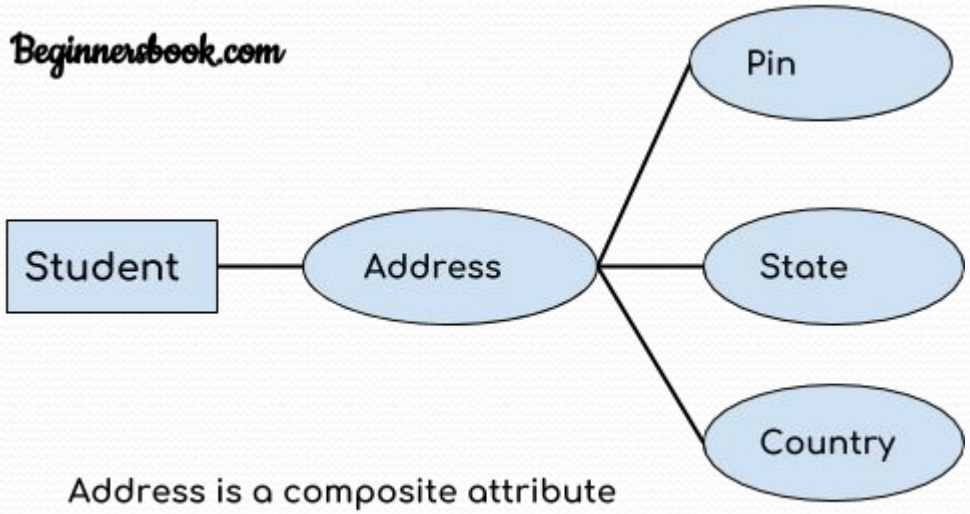


Criteria for Selecting Attributes

- Choose a candidate key that will **not change its value.**
- Choose a candidate key that has **valid values** and **not be null.**

2. Composite attribute:

- An attribute that is a **combination of other attributes** is known as composite attribute.
- **For example,** In student entity, the student address is a composite attribute as an address is composed of other attributes such as pin code, state, country.



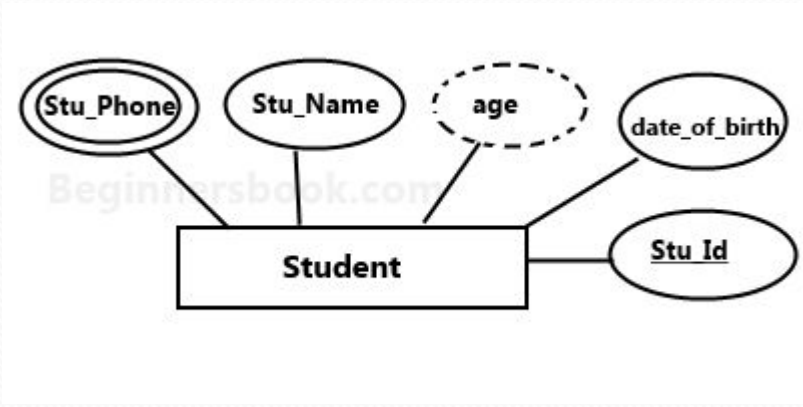
Address is a composite attribute

3. Multivalued attribute:

An attribute that can **hold multiple values** is known as multivalued attribute.
It is represented with **double ovals** in an ER Diagram.
For example – A person can have more than one phone numbers so the phone number attribute is multivalued.

4. Derived attribute:

A derived attribute is one whose value is **dynamic and derived from another attribute.**
It is represented by **dashed oval** in an ER Diagram.
For example – Person age is a derived attribute as it changes over time and can be derived from another attribute (Date of birth).



Relationships

- **Relationships** are associations between one or more entity types.
- ***The degree of a relationship*** = is the number of entity types that participate in a relationship.
  - There are 4 common relationships:
    1. One to One
    2. One to Many
    3. Many to One
    4. Many to Many

Relationships
(Naming Guidelines)

- A relationship/Cardinality name should:
  - Be a verb phrase, such as Is_assigned_to.
  - Avoid vague names, such as “Has”.

1. One to One Relationship

- When a **single instance of an entity is associated with a single instance of another entity** then it is called one to one relationship.
- **For example**, a person has only one passport and a passport is given to one person.

2. One to Many Relationship

- When a **single instance of an entity is associated with more than one instances** of another entity then it is called one to many relationship.
- **For example** – a customer can place many orders but a order cannot be placed by many customers.

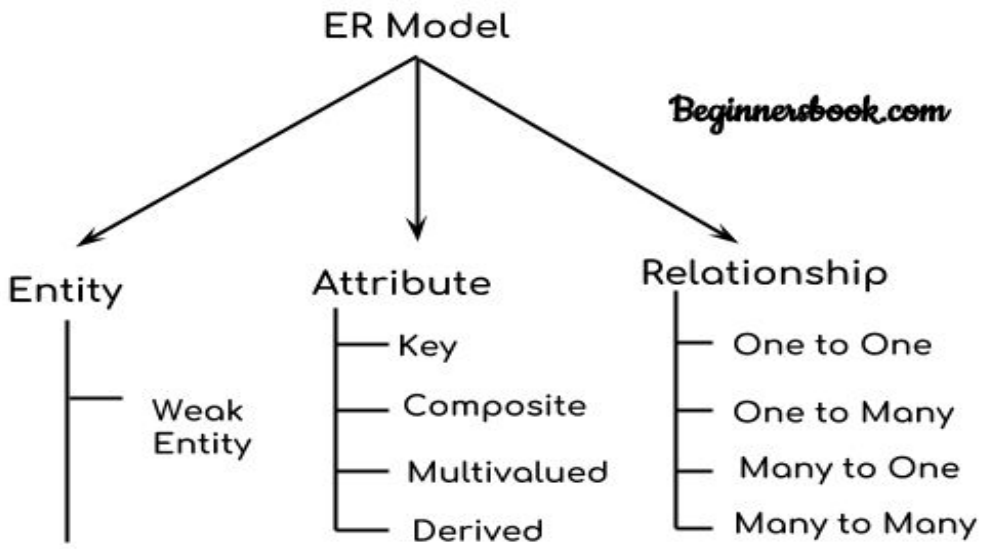
3. Many to One Relationship

- When **more than one instances of an entity is associated with a single instance of another entity** then it is called many to one relationship.
- **For example –** many students can study in a single college but a student cannot study in many colleges at the same time.

4. Many to Many Relationship

- When **more than one instances of an entity is associated with more than one instances of another entity** then it is called many to many relationship.
- **For example**, a can be assigned to many projects and a project can be assigned to many students.

Components of a ER Diagram



Following are the main components and its symbols in ER Diagrams:

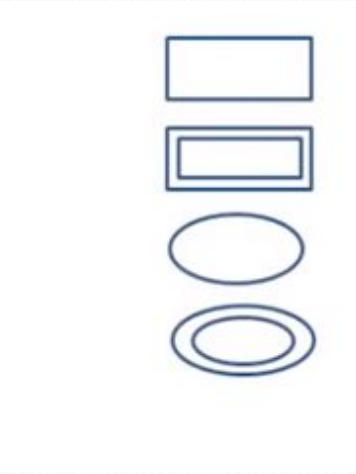
- **Rectangles:** This Entity Relationship Diagram symbol represents entity types
- **Ellipses :** Symbol represent attributes
- **Diamonds:** This symbol represents relationship types
- **Lines:** It links attributes to entity types and entity types with other relationship types
- **Primary key:** attributes are underlined
- **Double Ellipses:** Represent multi-valued attributes

ER Diagram Symbols

Questions over ERD?

QUESTIONS

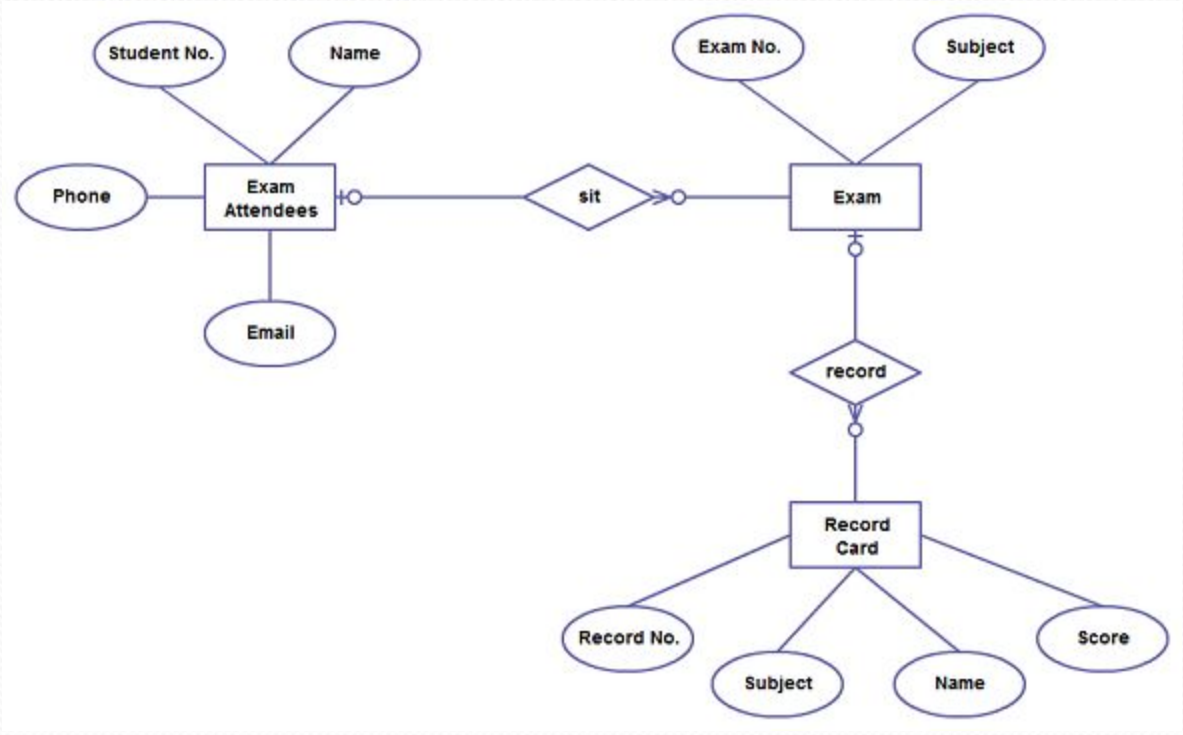
1. Define the Entities.
2. Define the Relationships.
3. How to Add attributes to the relationships.
4. How to Add cardinality to the relationships.



H/W:
DRAW ER DIAGRAM FOR HOSPITAL MANAGEMENT SYSTEM
ENTITIES ARE PATIENT,HOSPITAL,DOCTOR,REPORTS

Draw ER diagram for Exam database
Entities are Student,Exam,Results

C/W:
Draw ER DIAGRAM for company database ,Entities are Login,employee,department


Student No.
Name
Exam No.
Subject
Phone
Exam Attendees
sit
Exam
Email
record
Record Card
Record No.
Subject
Name
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