SNS COLLEGE OF TECHNOLOGY

COIMBATORE

AN AUTONOMOUS INSTITUTION

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Approved by AICTE New Delhi & affiliated to the Anna University, Chennai

DEPARTMENT OF MCA

Course Name : 19CAT609 - DATA BASE MANAGEMENT SYSTEM

E-R model/Database Management System
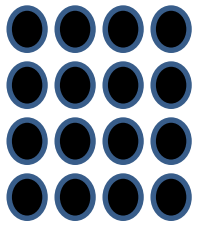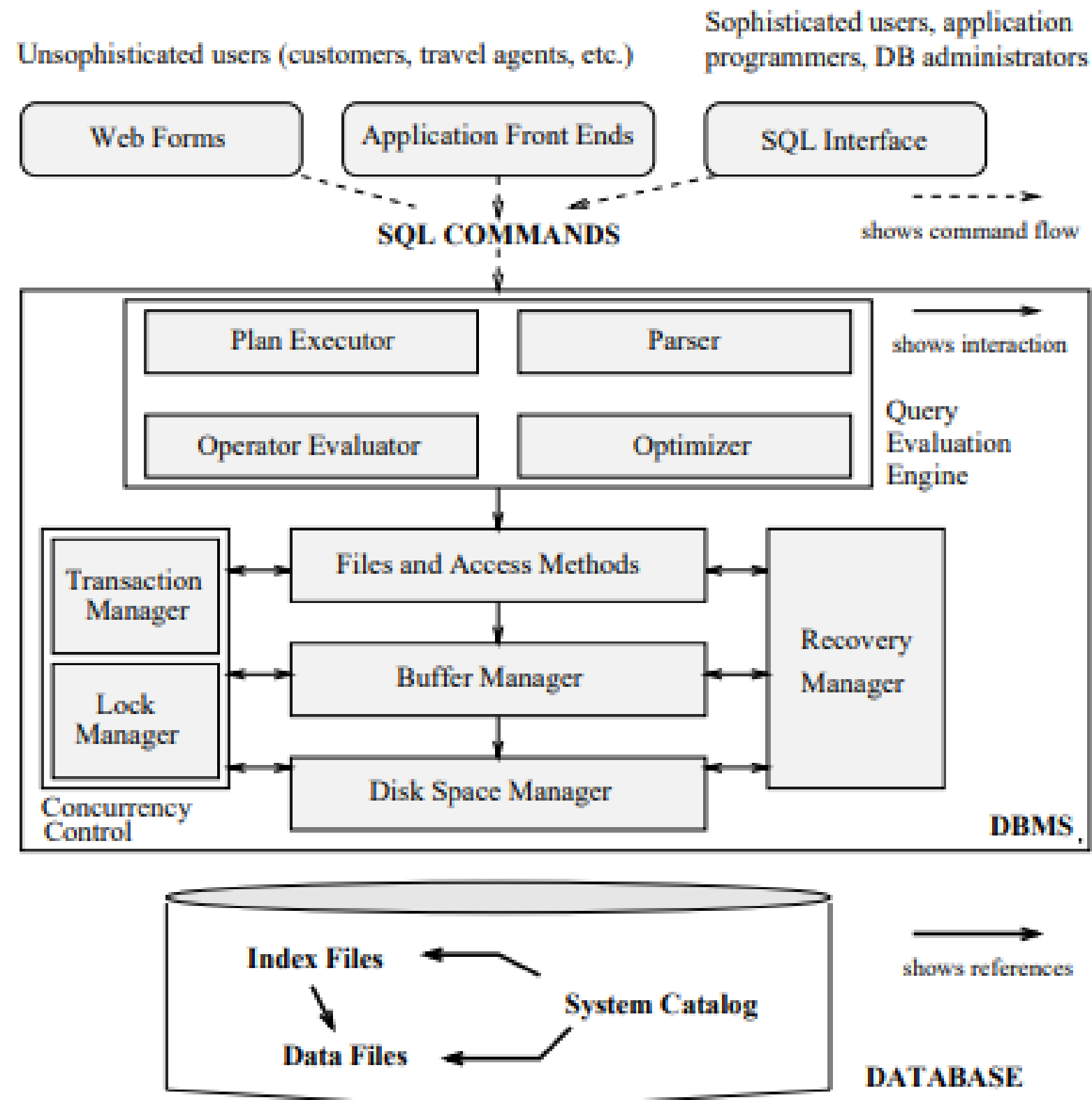/Dr.S.Sundararajan /MCA

Class : I Year / I Semester

Unit I - Introduction

Topic IV – E-R model

ER model

DBMS Architecture

Disk Space Manager
allocate, deallocate, read, and write pages through (routines provided by) this layer, called the

Buffer Manager
brings pages in from disk to main memory as needed in response to read requests

Transaction Manager
ensures that transactions request and release locks according to a suitable locking protocol and schedules the execution transactions

Lock Manager
which keeps track of requests for locks and grants locks on database objects when they become available
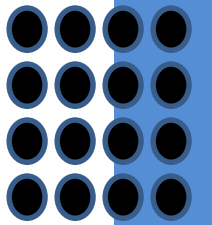
Recovery Manager
responsible for maintaining a log, and restoring the system to a consistent state after a crash

Execution Plan
A blueprint for evaluating a query, and is usually represented as a tree of relational operators

Query Optimizer
uses information about how the data is stored to produce an efficient execution plan for evaluating the query
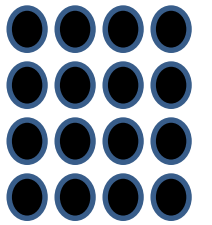
ER model

- ❏ ER model stands for an Entity-Relationship model. a high-level data model.

- ❏ Used to define the data elements and relationship for a specified system.

- ❏ It develops a conceptual design for the database. It also develops a very simple and easy to design view of data.

- ❏ In ER modeling, the database structure is portrayed as a diagram called an entity-relationship diagram.

- ❏ For example, In school database, the student will be an entity with attributes like address, name, id, age, etc. The address can be another entity with attributes like city, street name, pin code, etc and there will be a relationship between them.
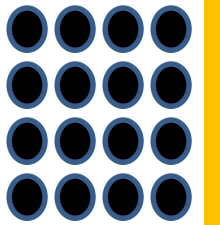
A graphical representation of **entities** and their **relationships** which helps in understanding data independent of the actual database implementation

Entity is a "thing" or "object" in the enterprise that is distinguishable from other objects

Relationships are the association of one entity with another entity.
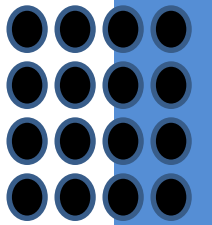
Components of ER - Example

ER Diagram
- Entity sets
- Relation sets
- Attributes
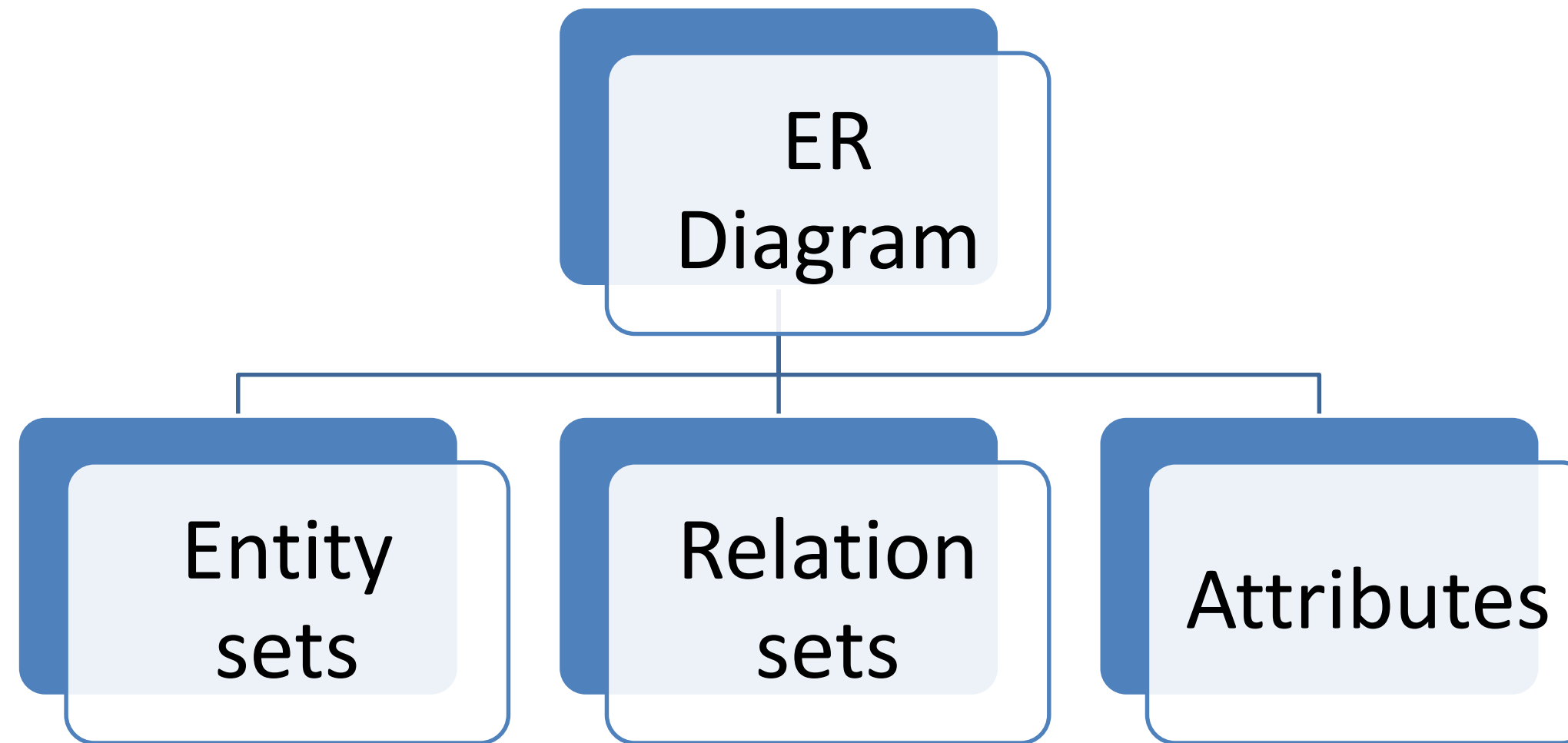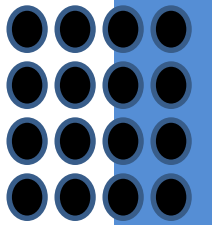
Entity sets
Person, place, object, event or concept about which data is to be maintained
Example: Car, Student

Relation sets
Association between the instances of one or more entity types
Example: Blue Car Belongs to Student Jack

Attributes
Property or characteristic of an entity
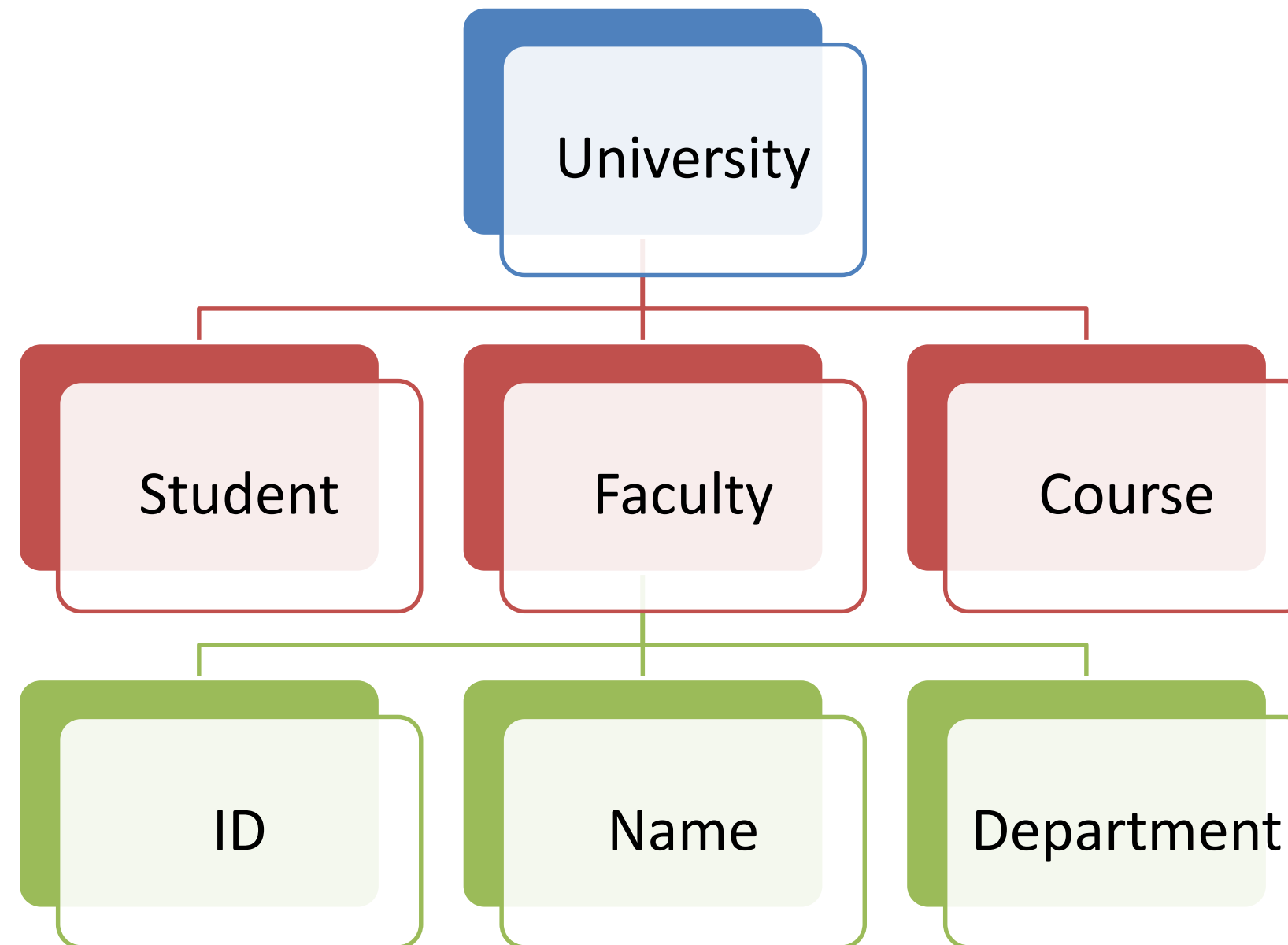Example: Color of car Entity
Name of Student Entity

Components of ER - Example

Database

Entity

Attributes

University

Student   Faculty   Course

ID   Name   Department

Relation – Faculty handles courses

October 13, 2023   E-R model/Database Management System /Dr.S.Sundararajan /MCA   Slide 7 of 31

❑ An entity can be place, person, object, event or a concept, which stores data in the database.

❑ The characteristics of entities are must have an attribute, and a unique key.

❑ Every entity is made up of some 'attributes' which represent that entity.

Examples of entities:
Person: Employee, Student, Patient
Place: Store, Building
Object: Machine, product, and Car
**Event:** Sale, Registration, Renewal
Concept: Account, Course

❑ Entity set: Student

❑ An entity set is a group of similar kind of entities.

❑ It may contain entities with attribute sharing similar values. Entities are represented by their properties, which also called attributes.

❑ All attributes have their separate values.

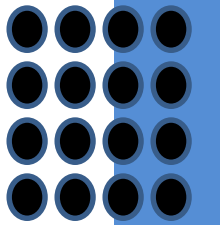❑ For example, a student entity may have a name, age, class, as attributes.
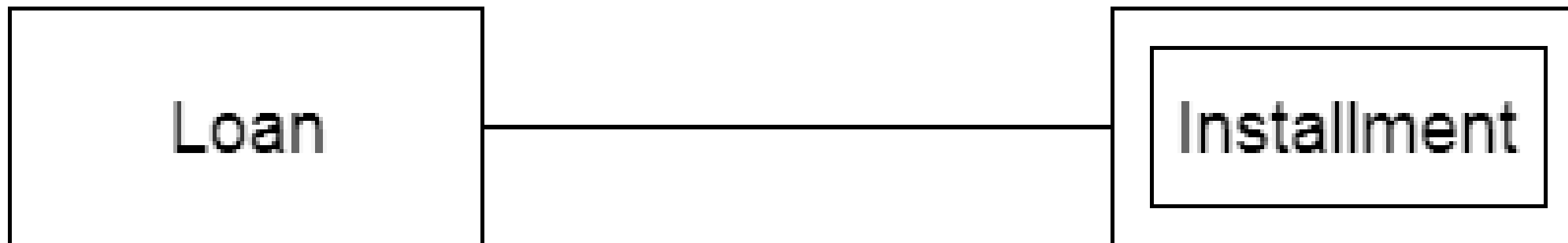
Component of ER Diagram

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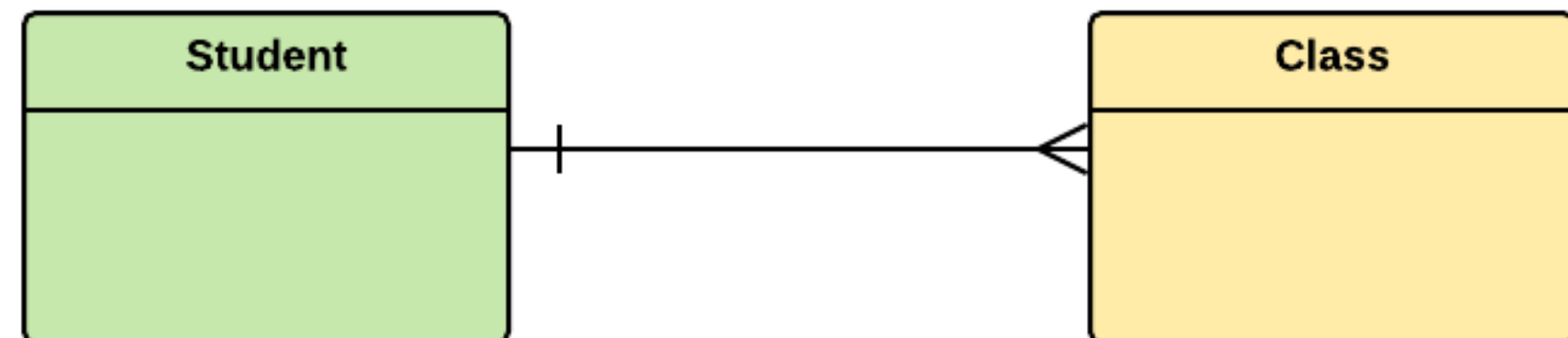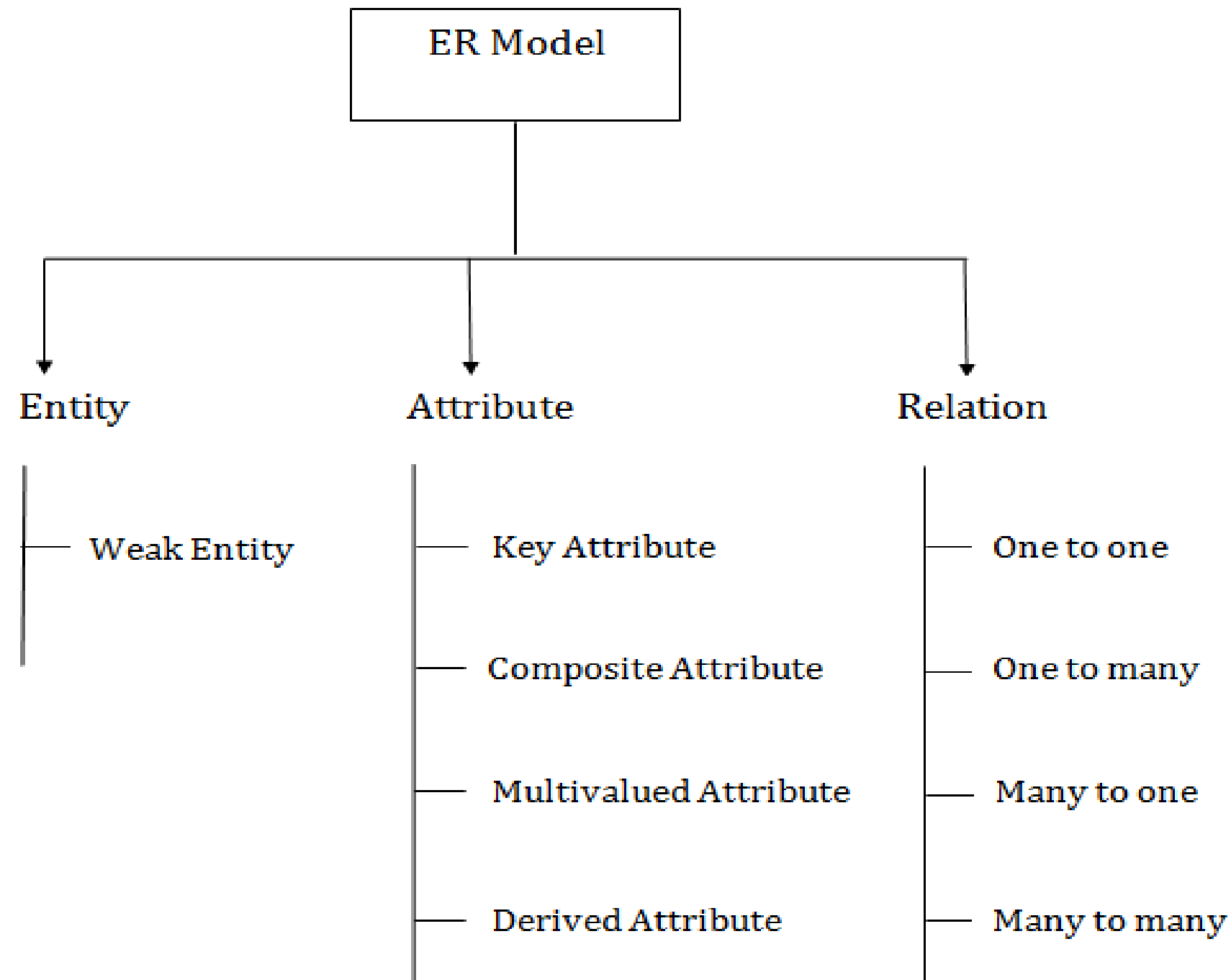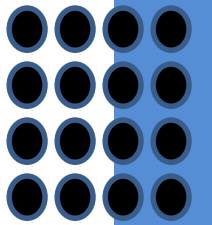
❑ An entity that depends on another entity called a weak entity.

❑ The weak entity doesn't contain any key attribute of its own.
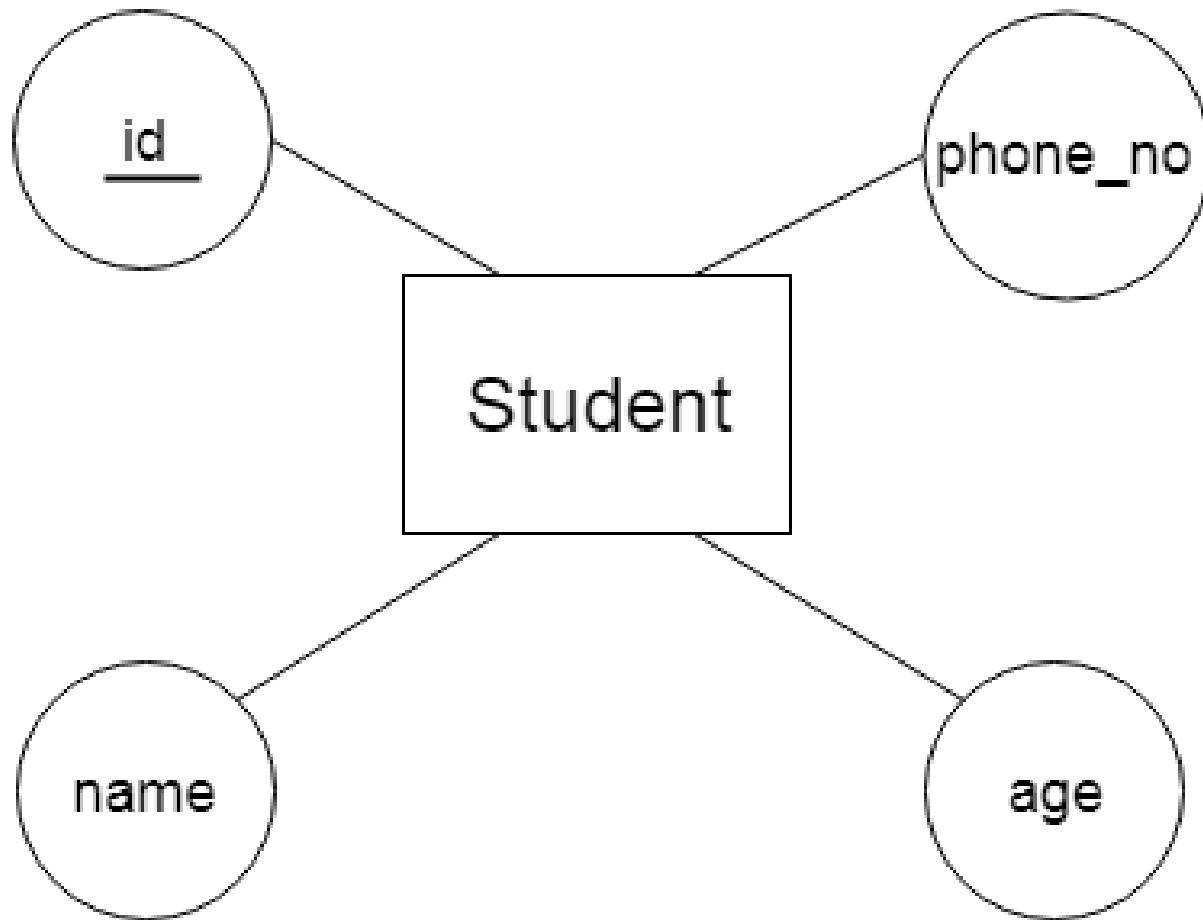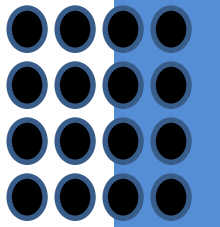
❑ The weak entity is represented by a double rectangle.

Attribute

❑ The attribute is used to describe the property of an entity. Eclipse is used to represent an attribute.

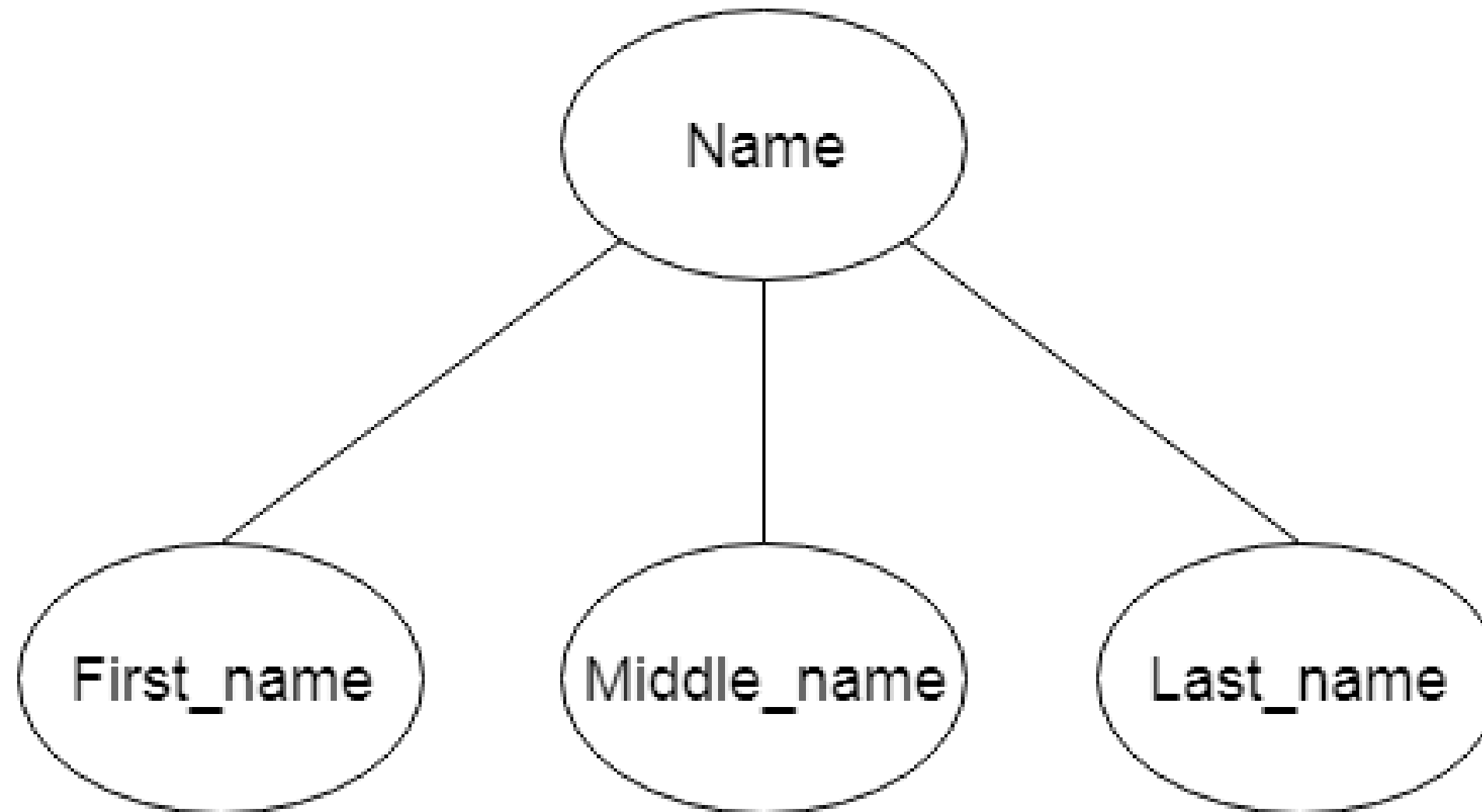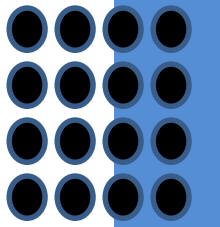❑ For example, id, age, contact number, name, etc. can be attributes of a student.
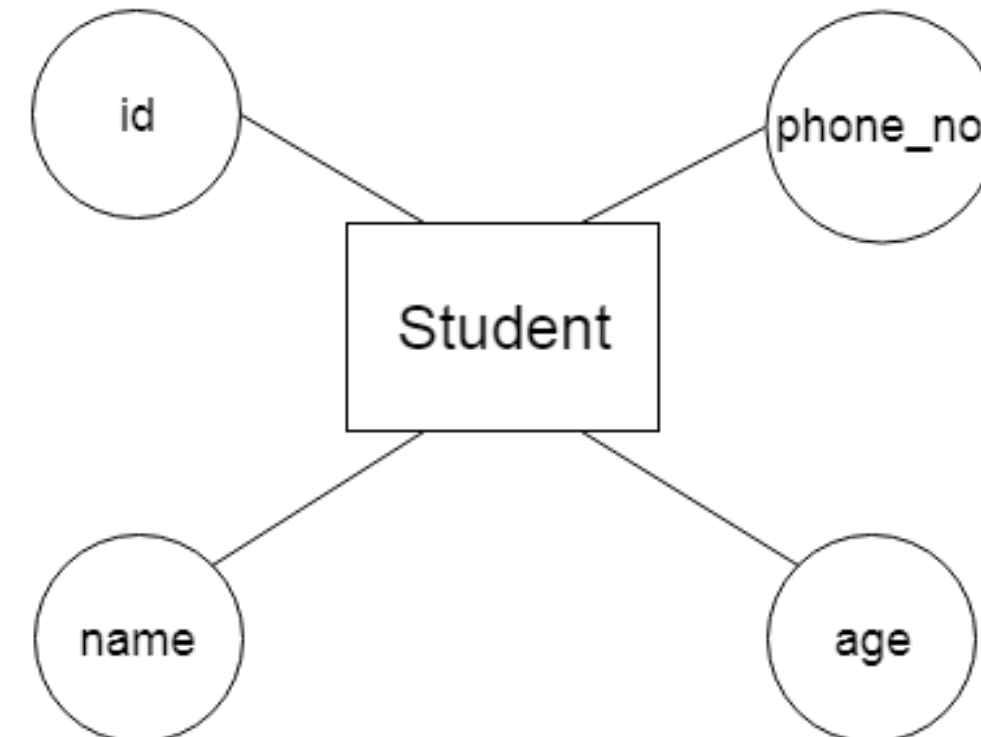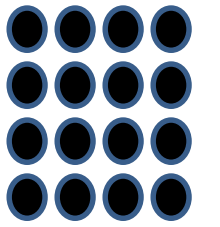
❑ The key attribute is used to represent the main characteristics of an entity. It represents a primary key. The key attribute is represented by an ellipse with the text underlined.

Composite Attribute

An attribute that composed of many other attributes is known as a composite attribute. The composite attribute is represented by an ellipse, and those ellipses are connected with an ellipse.
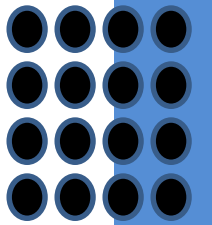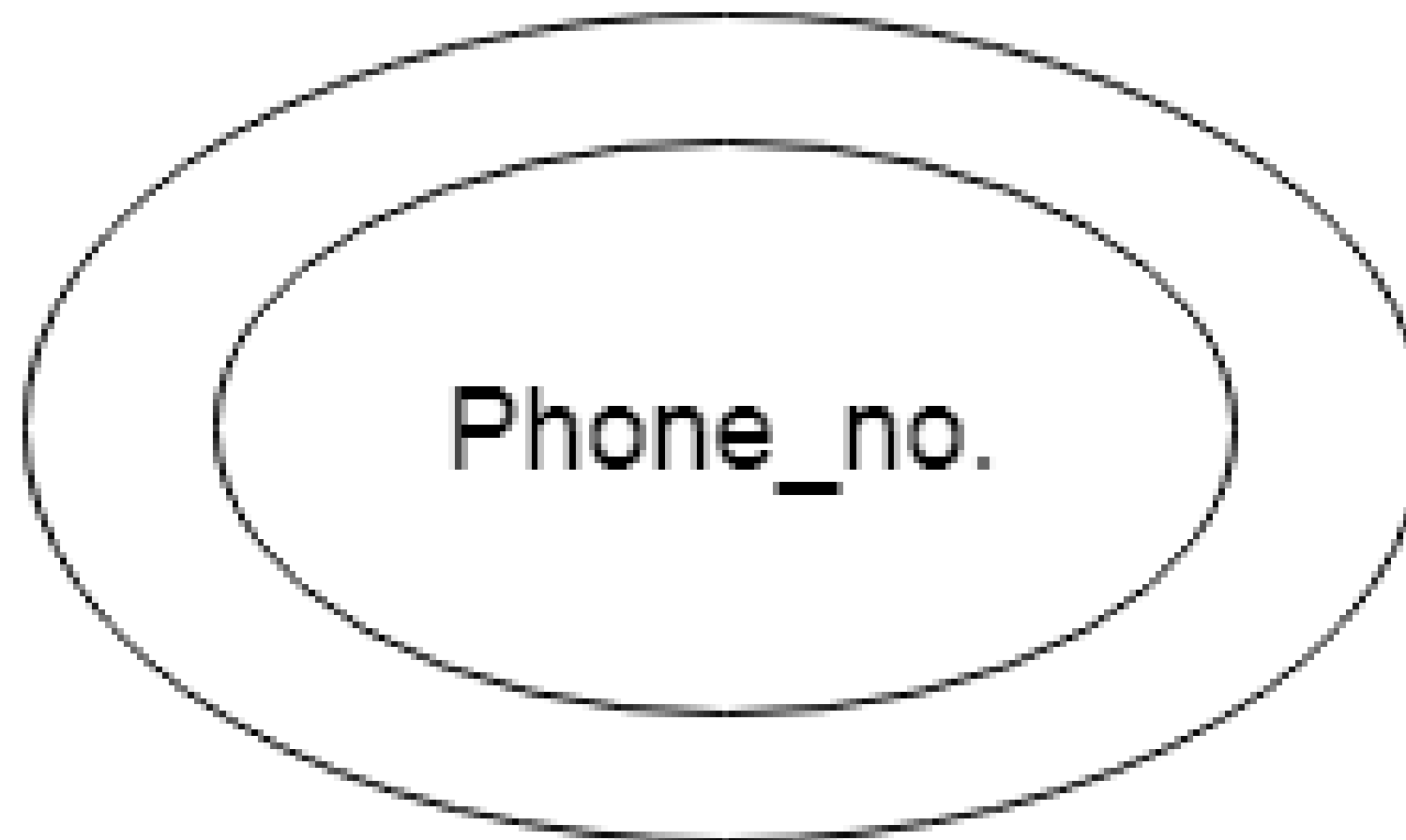
An attribute can have more than one value. These attributes are known as a multivalued attribute. The double oval is used to represent multivalued attribute.

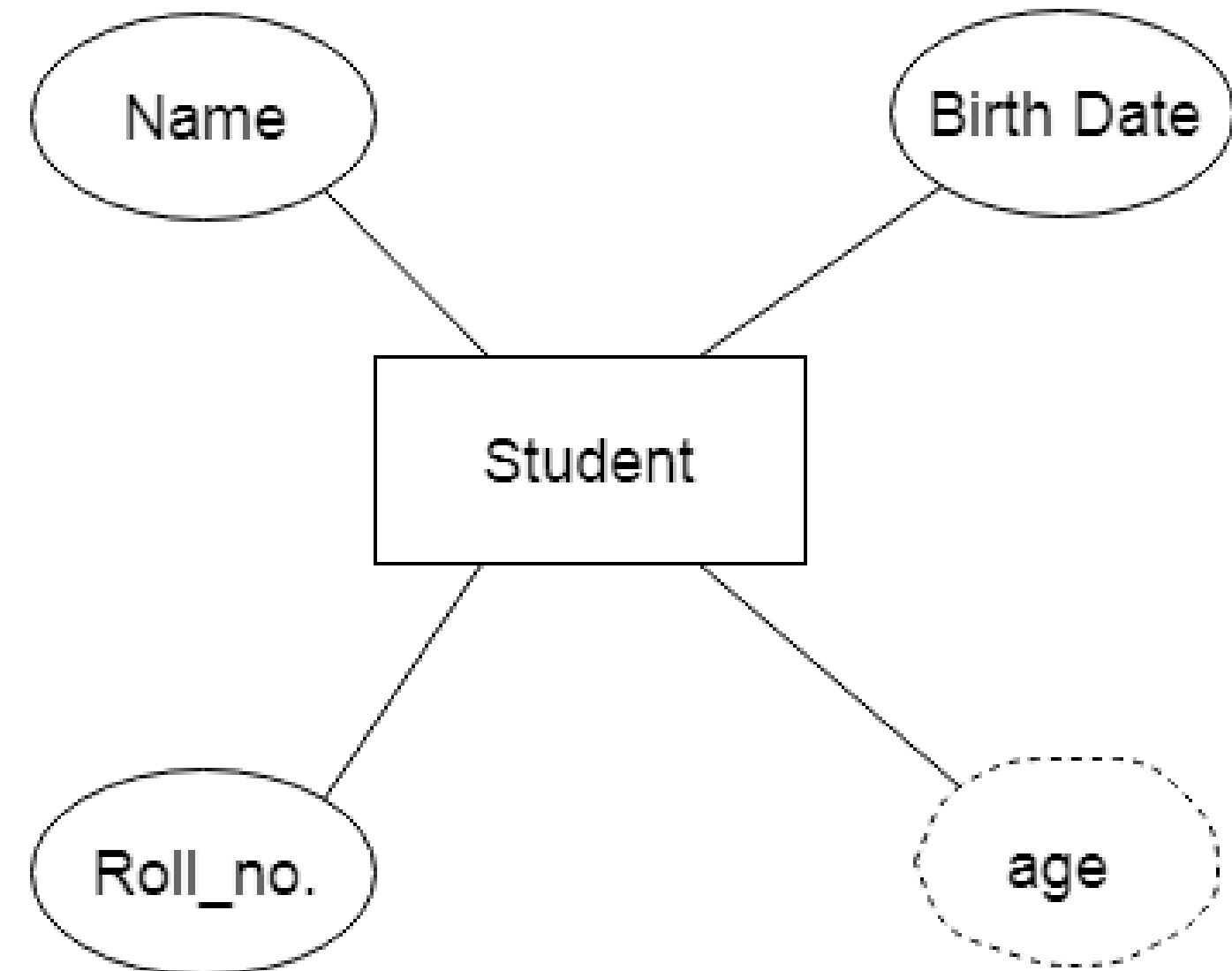**For example,** a student can have more than one phone number.

Derived Attribute

An attribute that can be derived from other attribute is known as a derived attribute. It can be represented by a dashed ellipse.
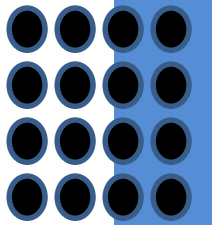
For example, A person's age changes over time and can be derived from another attribute like Date of birth.

- ❑ What are the entities and relationships in the enterprise?

- ❑ What information about these entities and relationships should we store in the database?

- ❑ What are the integrity constraints or business rules that hold?

- ❑ A database `schema' in the ER Model can be represented pictorially (ER diagrams).

- ❑ Can map an ER diagram into a relational schema?
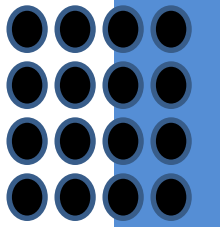
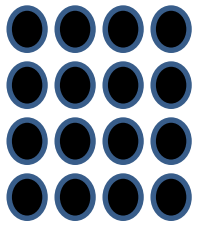❑ Key play an important role in the relational database.

❑ It is used to uniquely identify any record or row of data from the table.

❑ It is also used to establish and identify relationships between tables.

❑ For example: In Student table, ID is used as a key because it is unique for each student. In PERSON table, passport_number, license_number, SSN are keys since they are unique for each person.

Types of key

Keys

Primary Key

Condidate Key

Super Key

Foreign Key

Alternate Key

Composite Key

Artificial Key

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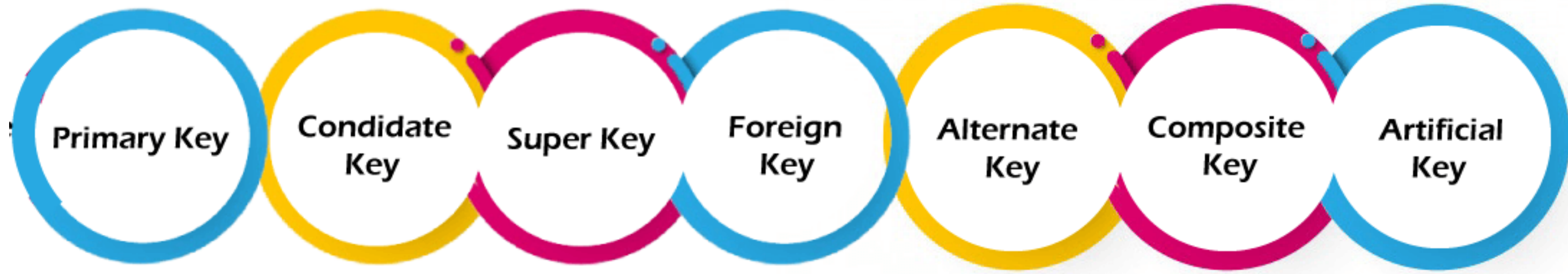
Primary key

❑ It is the first key which is used to identify one and only one instance of an entity uniquely.
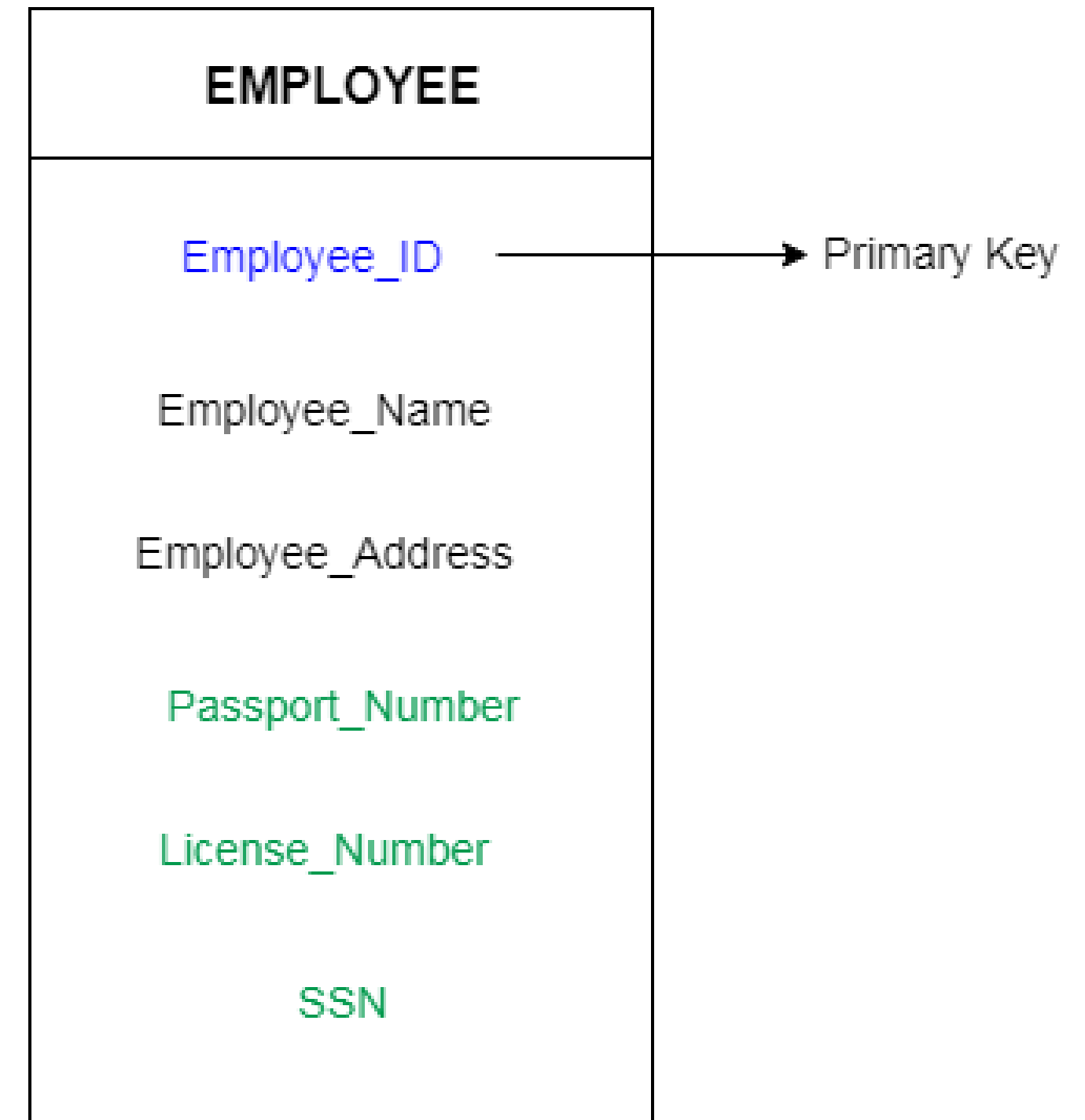
❑ An entity can contain multiple keys as we saw in EMPLOYEE table. The key which is most suitable from those lists become a primary key.
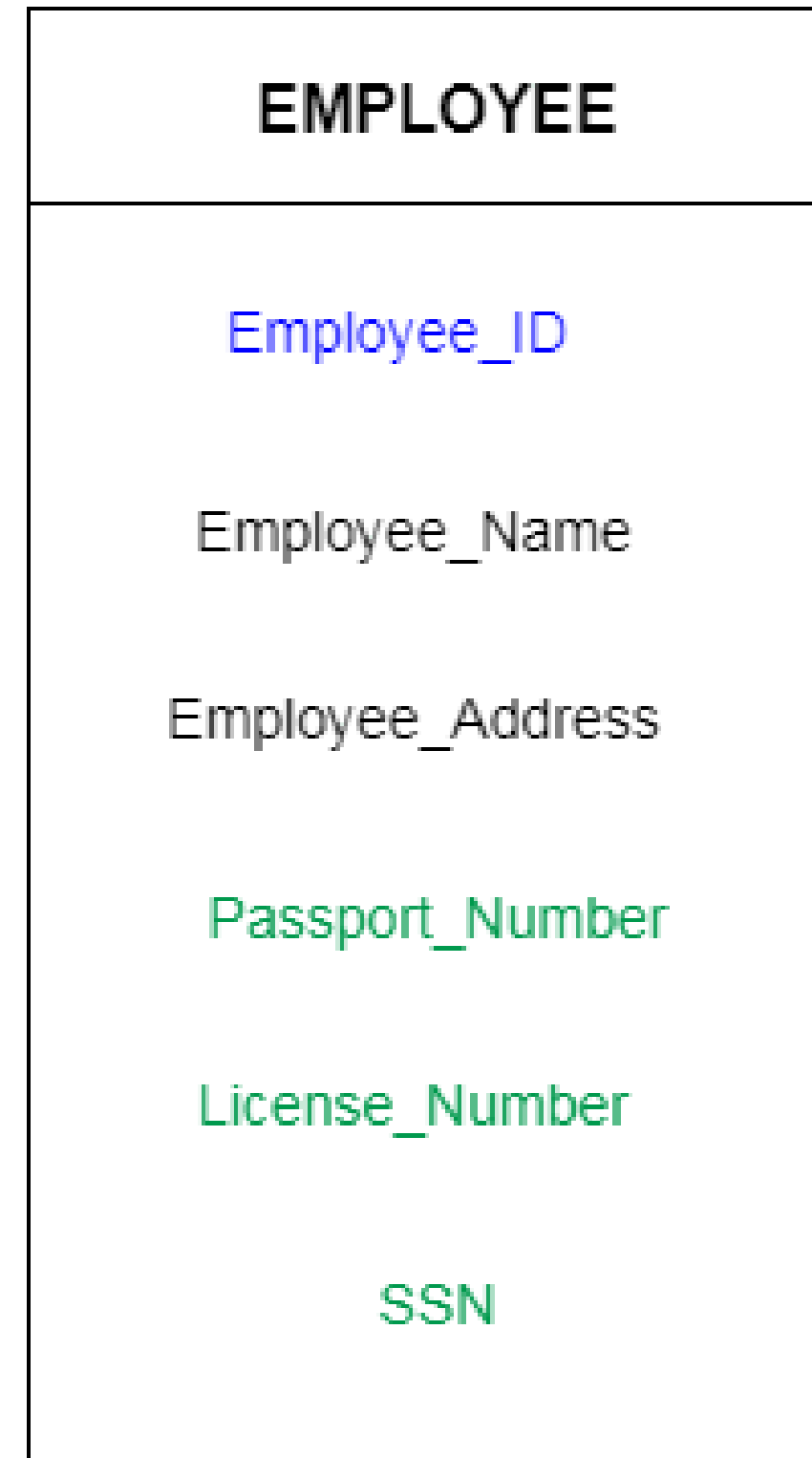
EMPLOYEE

Employee_ID ──────────────► Primary Key

Employee_Name

Employee_Address

Passport_Number

License_Number

SSN

❑ A candidate key is an attribute or set of an attribute which can uniquely identify a tuple.

❑ The remaining attributes except for primary key are considered as a candidate key. The candidate keys are as strong as the primary key.

❑ For example: In the EMPLOYEE table, Rest of the attributes like SSN, Passport_Number, and License_Number, etc. are considered as a candidate key.
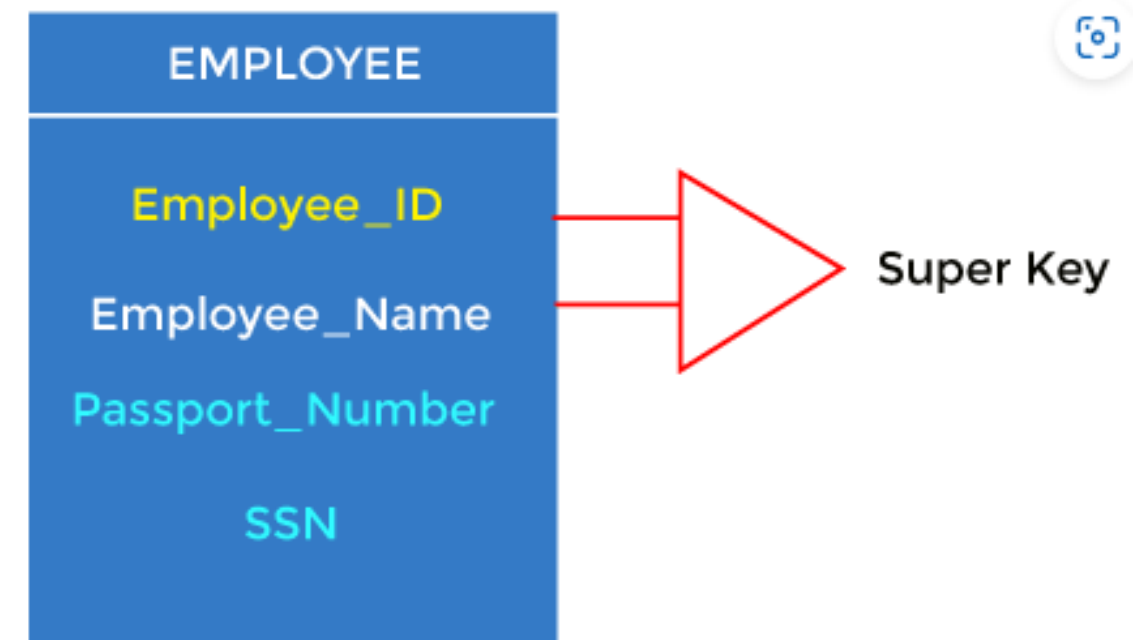
EMPLOYEE

Employee_ID

Employee_Name

Employee_Address

Passport_Number

License_Number

SSN

Candidate Key

Super Key

❑ Super key is a set of an attribute which can uniquely identify a tuple.

❑ Super key is a superset of a candidate key.

❑ For example: In the above EMPLOYEE table, for(EMPLOEE_ID, EMPLOYEE_NAME) the name of two employees can be the same, but their EMPLYEE_ID can't be the same.

❑ Hence, this combination can also be a key.

❑ The super key would be EMPLOYEE-ID, (EMPLOYEE_ID, EMPLOYEE-NAME), etc.

Foreign key

❑ Foreign keys are the column of the table which is used to point to the primary key of another table.

❑ In a company, every employee works in a specific department, and employee and department are two different entities

❑ We add the primary key of the DEPARTMENT table, Department_Id as a new attribute in the EMPLOYEE table.

❑ Now in the EMPLOYEE table, Department_Id is the foreign key, and both the tables are related.

EMPLOYEE
Employee_ID
Employee_Name
Passport_Number
License_Number
SSN
Department_ID

DEPARTMENT
Department_ID
Department_Name
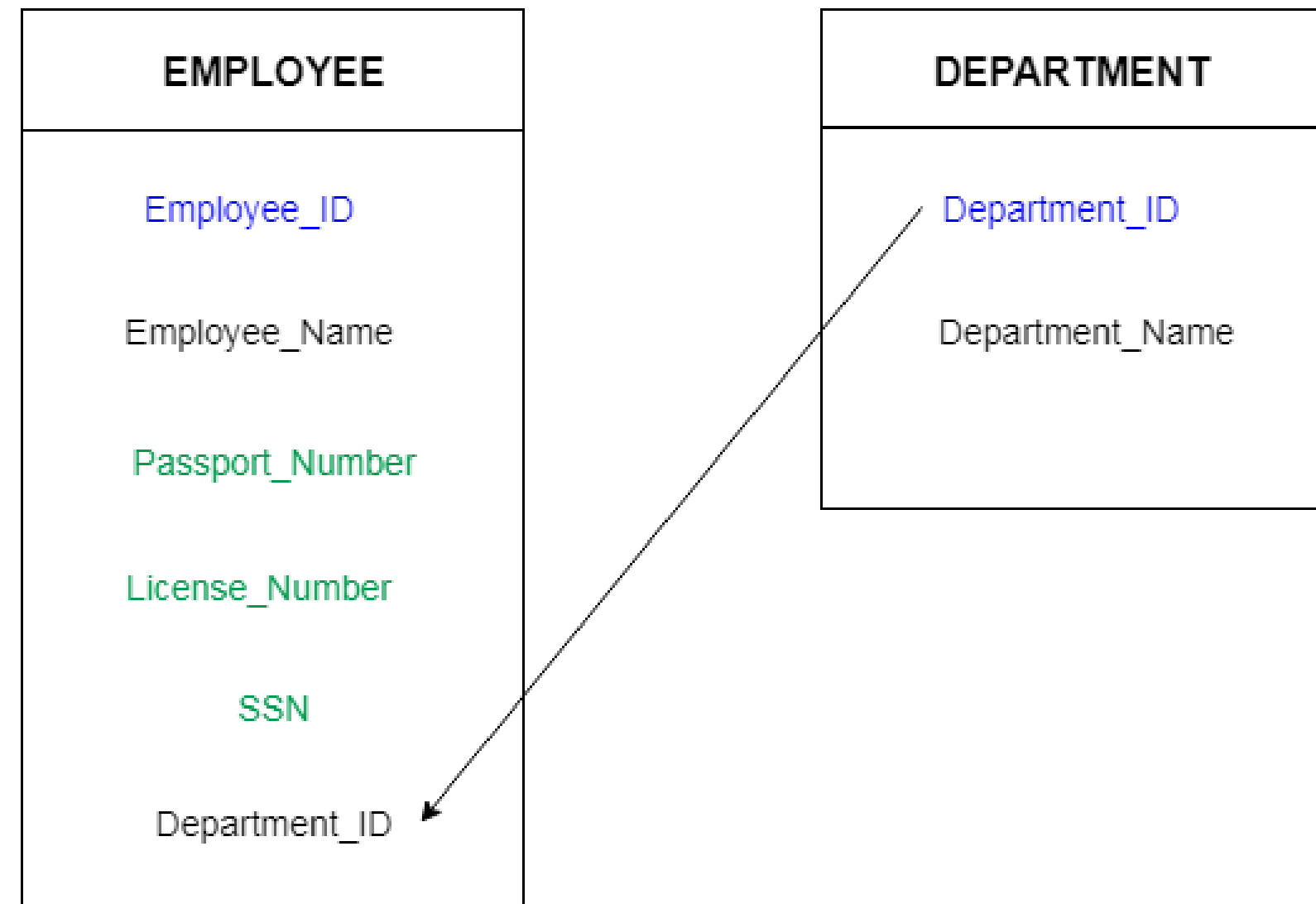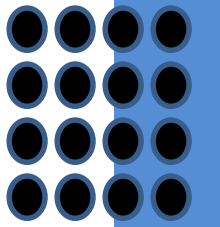
❑ A relationship is used to describe the relation between entities.

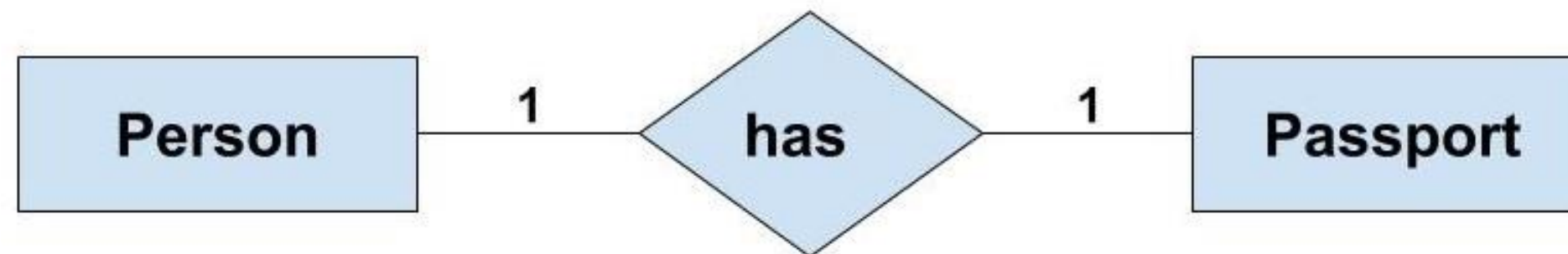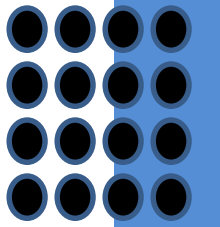❑ Diamond or rhombus is used to represent the relationship.

Teacher — teaches — Student
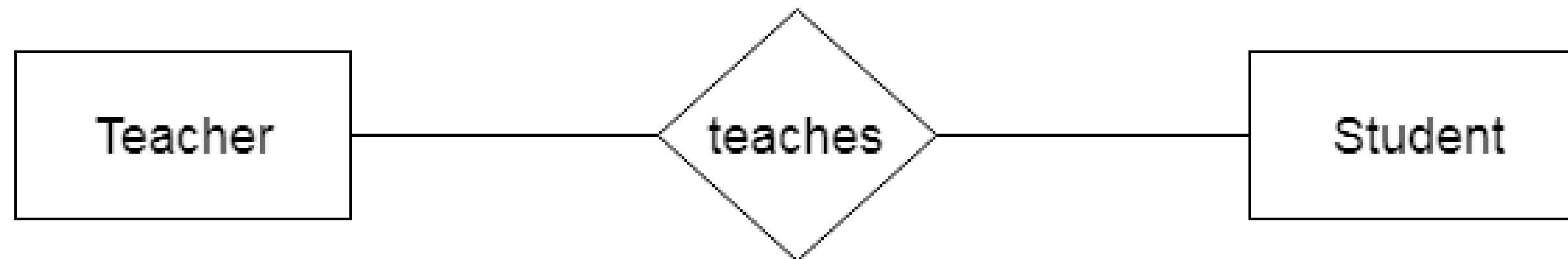
Relationship – One to One

❑ When only one instance of an entity is associated with the relationship, then it is known as one to one relationship.

❑ For example, A female can marry to one male, and a male can marry to one female.

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❑ When only one instance of the entity on the left, and more than one instance of an entity on the right associates with the relationship then this is known as a one-to-many relationship.

❑ For example, Scientist can invent many inventions, but the invention is done by the only specific scientist.

❑ When more than one instance of the entity on the left, and only one instance of an entity on the right associates with the relationship then it is known as a many-to-one relationship.

❑ For example, Student enrols for only one course, but a course can have many students.
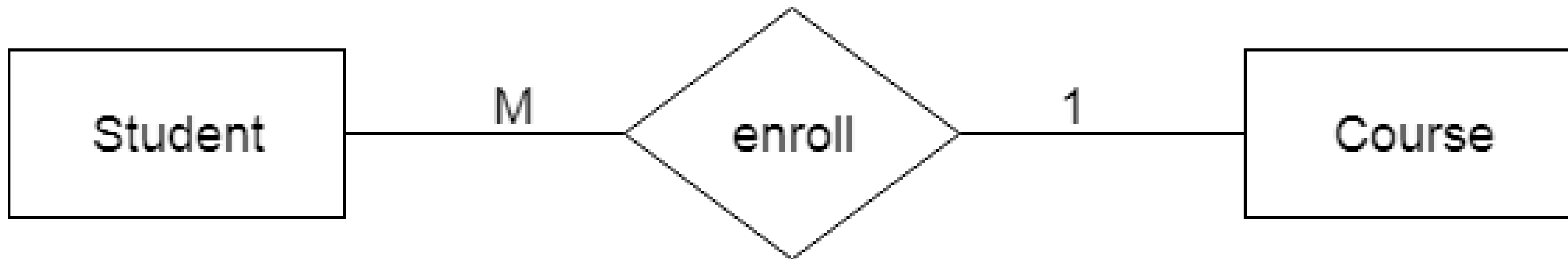
❑ When more than one instance of the entity on the left, and more than one instance of an entity on the right associates with the relationship then it is known as a many-to-many relationship.

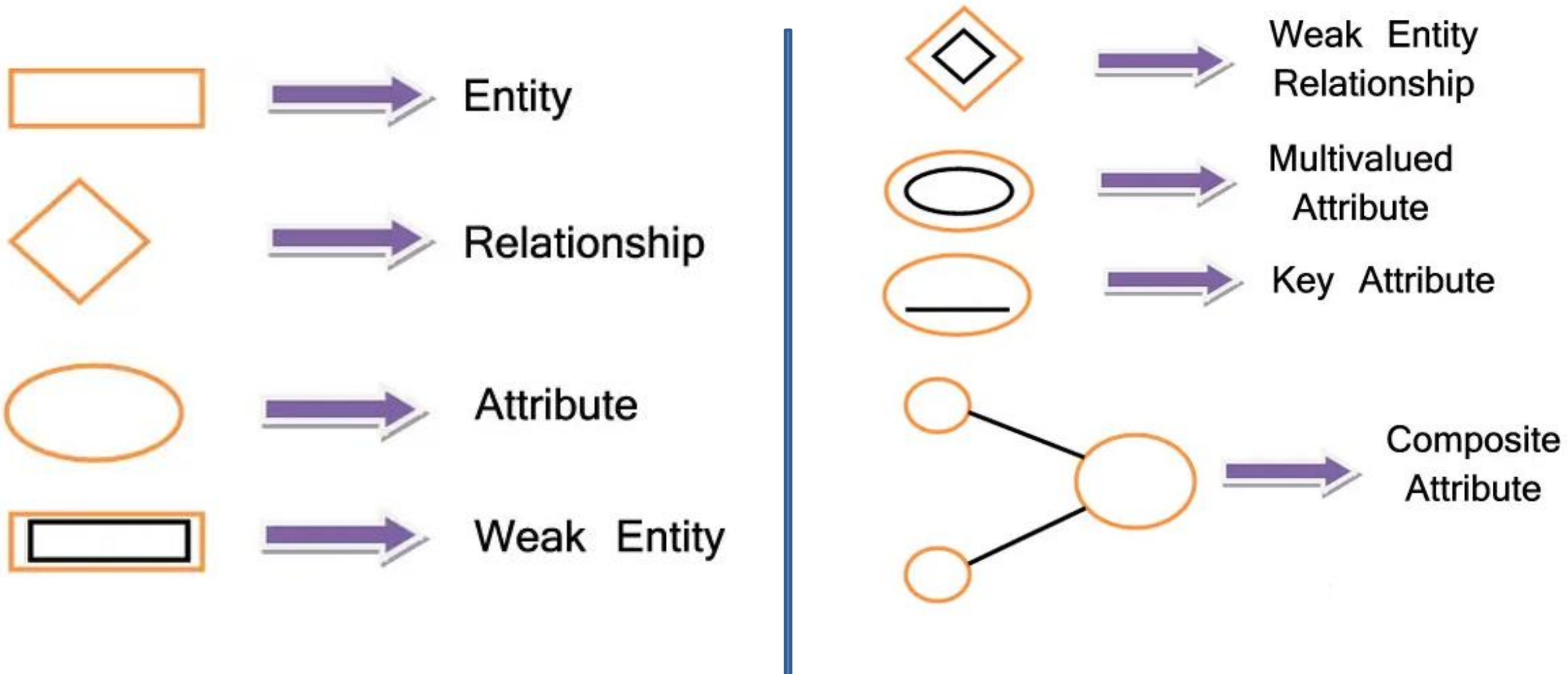❑ For example, Employee can assign by many projects and project can have many employees.

In ER diagram, many notations are used to express the cardinality. These notations are as follows:

Reference

WEB RESORUCES
https://www.javatpoint.com/dbms-er-model-concept

THANK YOU

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