School of Computing Science and Engineering

GALGOTIAS UNIVERSITY

Program: BCA

CourseCode:BCAC2102

CourseName:Database Management System

Lecture-12

Topic- E.R. Diagram

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Lecture-11(RECAP)

Lecture 11

Topic-Primary Keys

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What are Keys?

A DBMS key is an attribute or set of an attribute which helps you to identify a row(tuple) in a relation(table). They allow you to find the relation between two tables. Keys help you uniquely identify a row in a table by a combination of one or more columns in that table.

Example:

Employee ID	FirstName	LastName
11	Andrew	Johnson
22	Tom	Wood
33	Alex	Hale

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Why we need a Key?

Here, are reasons for using Keys in the DBMS system.

- Keys help you to identify any row of data in a table. In a real-world application, a table could contain thousands of records. Moreover, the records could be duplicated. Keys ensure that you can uniquely identify a table record despite these challenges.
- Allows you to establish a relationship between and identify the relation between tables
- Help you to enforce identity and integrity in the relationship.

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Various Keys in Database Management System

DBMS has folwing seven types of Keys each have their different functionality:

- Super Key
- Primary Key
- Candidate Key
- Alternate Key
- Foreign Key
- Compound Key
- Composite Key
- Surrogate Key

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What is the Super key?

A super key is a group of single or multiple keys which identifies rows in a table. A Super key may have additional attributes that are not needed for unique identification.

Example:

EmpSSN	EmpNum	Empname
9812345098	AB05	Shown
9876512345	AB06	Roslyn
199937890	AB07	James

In the above-given example, EmpSSN and EmpNum name are super keys

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What is a Primary Key?

A column or group of columns in a table which helps us to uniquely identifies every row in that table is called a primary key. This DBMS can't be a duplicate. The same value can't appear more than once in the table

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Rules for defining Primary key:

- Two rows can't have the same primary key value

- It must for every row to have a primary key value.

- The primary key field cannot be null.

- The value in a primary key column can never be modified or updated if any foreign key refers to that primary key.

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Example:

In the following example, <code>StudID</code> is a Primary Key.

StudID	Roll No	First Name	LastName	Email
1	11	Tom	Price	abc@gmail.com
2	12	Nick	Wright	xyz@gmail.com
3	13	Dana	Nutan	mno@yahoo.com

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What is a Candidate Key?

- A super key with no repeated attribute is called candidate key.

- The Primary key should be selected from the candidate keys. Every table must have at least a single candidate key.

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Properties of Candidate key:

- It must contain unique values

- Candidate key may have multiple attributes

- Must not contain null values

- It should contain minimum fields to ensure uniqueness

- Uniquely identify each record in a table

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Example: In the given table Stud ID, Roll No, and email are candidate keys which help us to uniquely identify the student record in the table.

StudID	Roll No	First Name	LastName	Email
1	11	Tom	Price	abc@gmail.com
2	12	Nick	Wright	xyz@gmail.com
3	13	Dana	Natan	mno@yahoo.com

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What is the Foreign key?

A foreign key is a column which is added to create a relationship with another table. Foreign keys help us to maintain data integrity and also allows navigation between two different instances of an entity. Every relationship in the model needs to be supported by a foreign key.

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Example:

DeptCode	DeptName
001	Science
002	English
005	Computer

Teacher ID	Fname	Lname
B002	David	Warner
B017	Sara	Joseph
B009	Mike	Brunton

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In this example, we have two table, teach and department in a school. However, there is no way to see which who work in which department.

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In this table, adding the foreign key in Deptcode to the Teacher name, we can create a relationship between the two tables.

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In this table, adding the foreign key in Deptcode to the Teacher name, we can create a relationship between the two tables.

Teacher ID	DeptCode	Fname	Lname
B002	002	David	Warner
B017	002	Sara	Joseph
B009	001	Mike	Brunton

This concept is also known as Referential Integrity.

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◢ Difference between Primary key & Foreign key

Primary Key	Foreign Key
Helps you to uniquely identify a record in the table.	It is a field in the table that is the primary key of another table.
Primary Key never accept null values.	A foreign key may accept multiple null values.
Primary key is a clustered index and data in the DBMS table are physically organized in the sequence of the clustered index.	A foreign key cannot automatically create an index, clustered or non-clustered. However, you can manually create an index on the foreign key.
You can have the single Primary key in a table.	You can have multiple foreign keys in a table.

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Summary

- A DBMS key is an attribute or set of an attribute which helps you to identify a row(tuple) in a relation(table)
- DBMS keys allow you to establish a relationship between and identify the relation between tables
- Seven Types of DBMS keys are Super, Primary, Candidate, Alternate, Foreign, Compound, Composite, and Surrogate Key.
- A super key is a group of single or multiple keys which identifies rows in a table.
- A column or group of columns in a table which helps us to uniquely identifies every row in that table is called a primary key
- All the keys which are not primary key are called an alternate key
- A super key with no repeated attribute is called candidate key
- A compound key is a key which has many fields which allow you to uniquely recognize a specific record
- A key which has multiple attributes to uniquely identify rows in a table is called a composite key
- An artificial key which aims to uniquely identify each record is called a surrogate key
- Primary Key never accept null values while a foreign key may accept multiple null values.

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Topic- Primary Keys

Objective :

To be familiar with Primary Keys

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Topic- ER-Diagram

Objective :

Understand ER-Diagram and How To Draw ERD?

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Topic- ER-Diagram

Objective :

Understand ER-Diagram and How To Draw ERD?

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Topic- ER-Diagram

Objective :

Understand ER-Diagram and How To Draw ERD?

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```
                        ┌──────────────┐
                        │   ER Model   │
                        └──────────────┘
                               │
        ┌──────────────────────┼──────────────────────┐
        ▼                      ▼                      ▼
     Entity               Attribute                Relation

     ── Weak Entity        ── Key Attribute          ── One to one

                          ── Composite Attribute     ── One to many

                          ── Multivalued Attribute   ── Many to one

                          ── Derived Attribute       ── Many to many
```
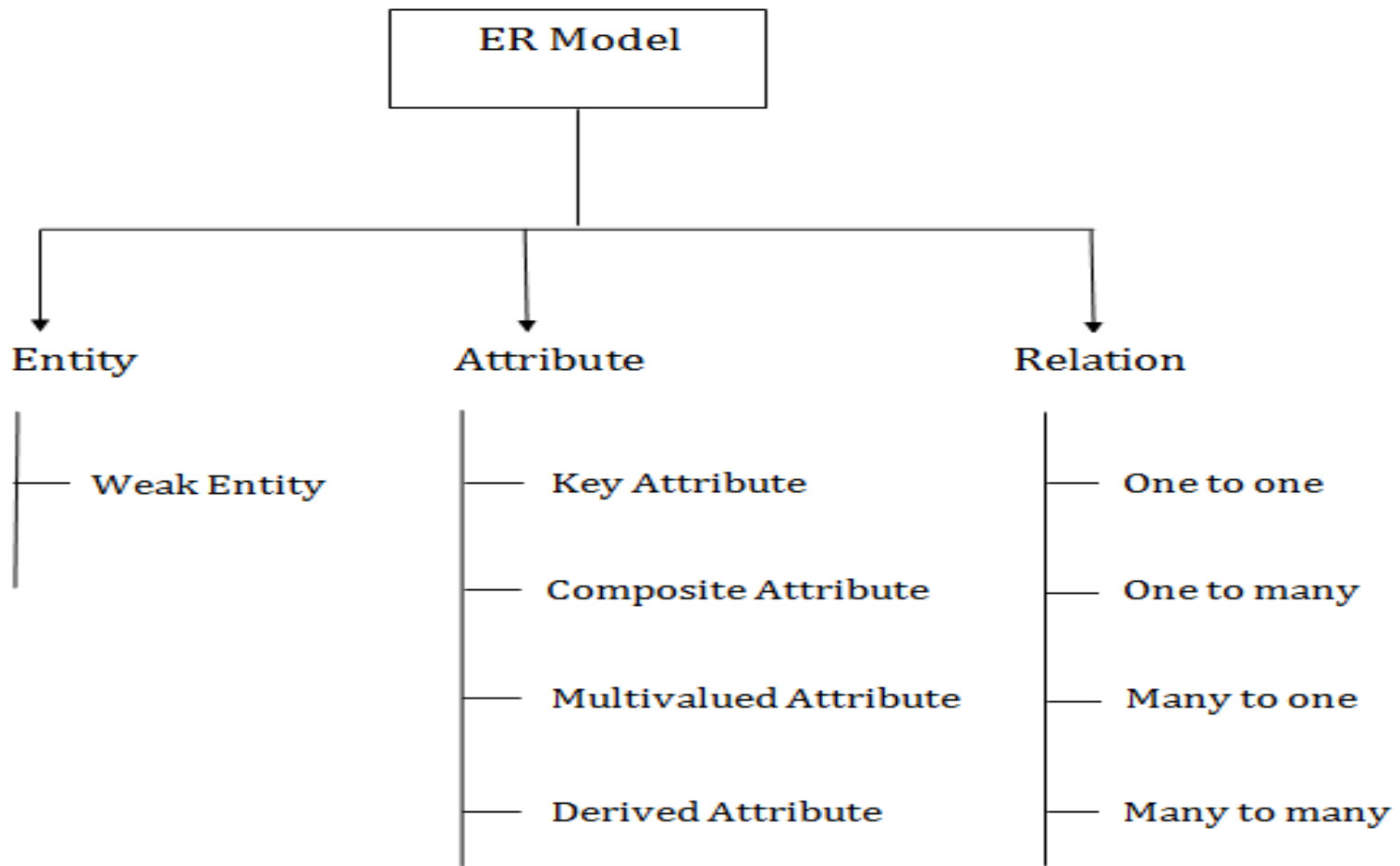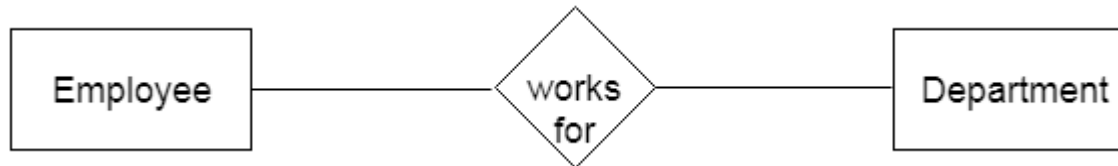
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1. Entity:

An entity may be any object, class, person or place. In the ER diagram, an entity can be represented as rectangles.

Consider an organization as an example- manager, product, employee, department etc. can be taken as an entity.

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┌────────────┐           ◇◇◇           ┌──────────────┐
│  Employee  │─────────  works  ─────────│  Department  │
│            │           for             │              │
└────────────┘           ◇◇◇           └──────────────┘
```

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1. a) **Weak Entity**

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.

Loan ————— Installment
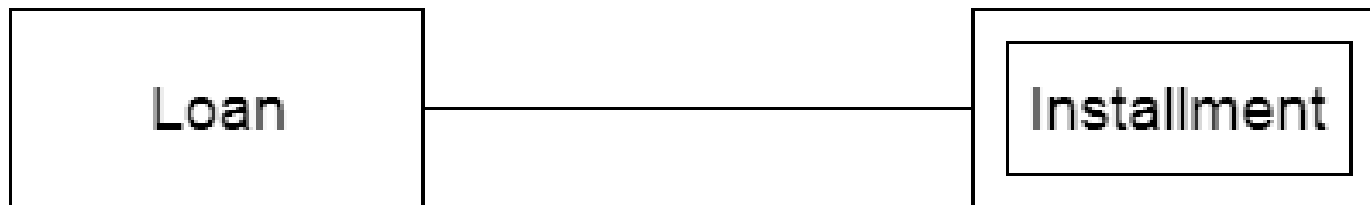
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2. Attribute

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

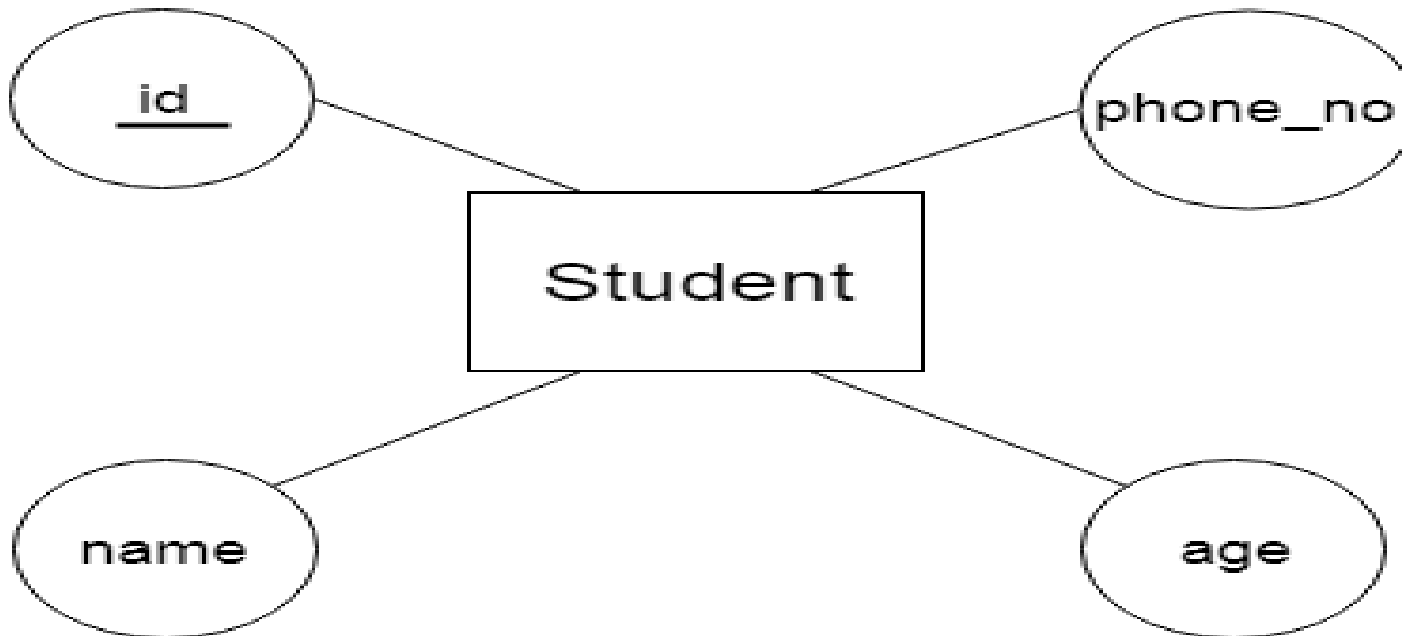**For example,** id, age, contact number, name, etc. can be attributes of a student.
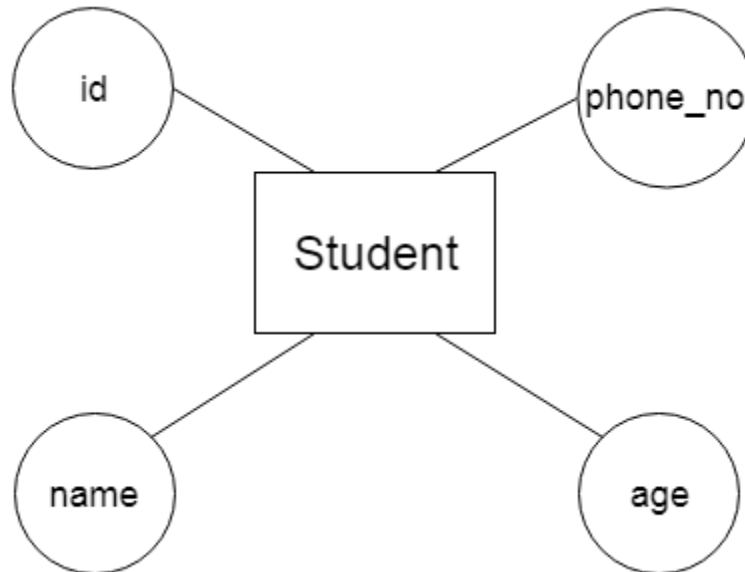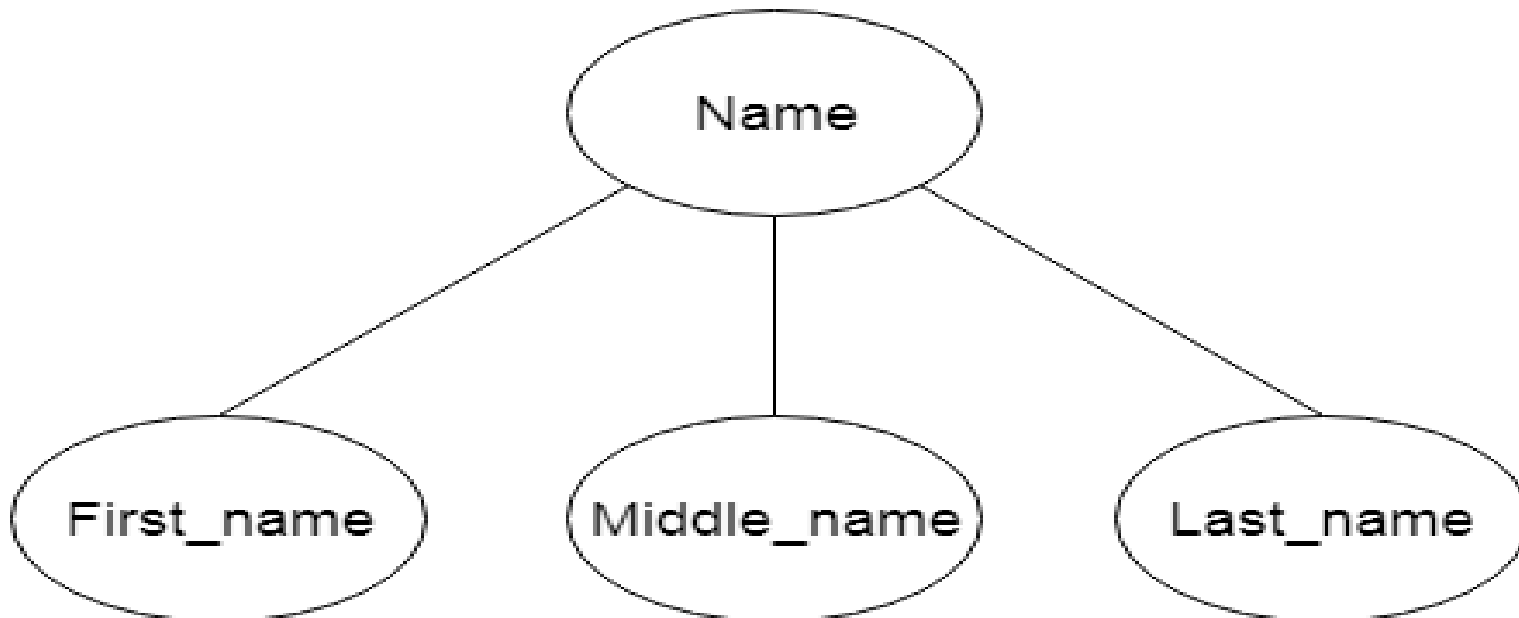
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2a. Key Attribute

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.

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2b. 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.
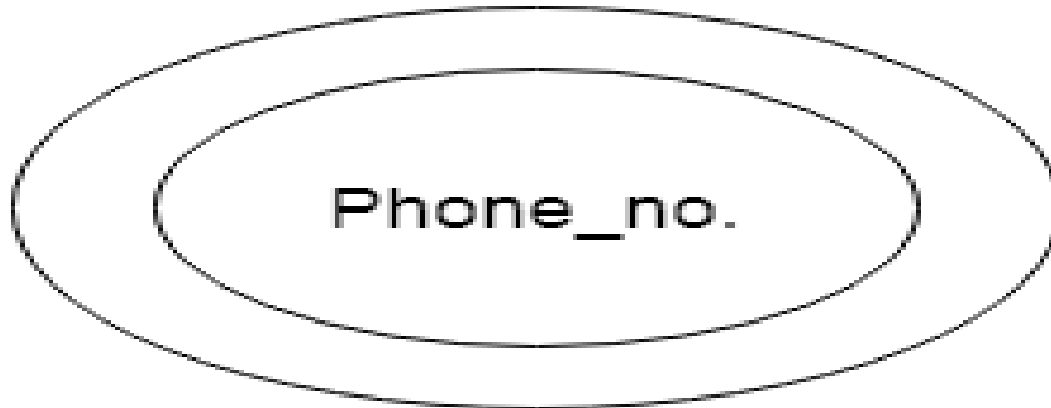
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2c. Multivalued Attribute

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.

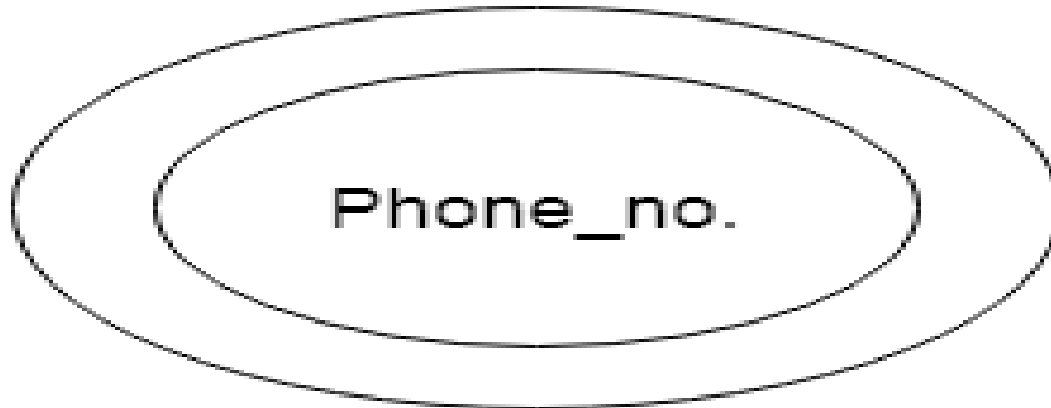- **For example,** a student can have more than one phone number.

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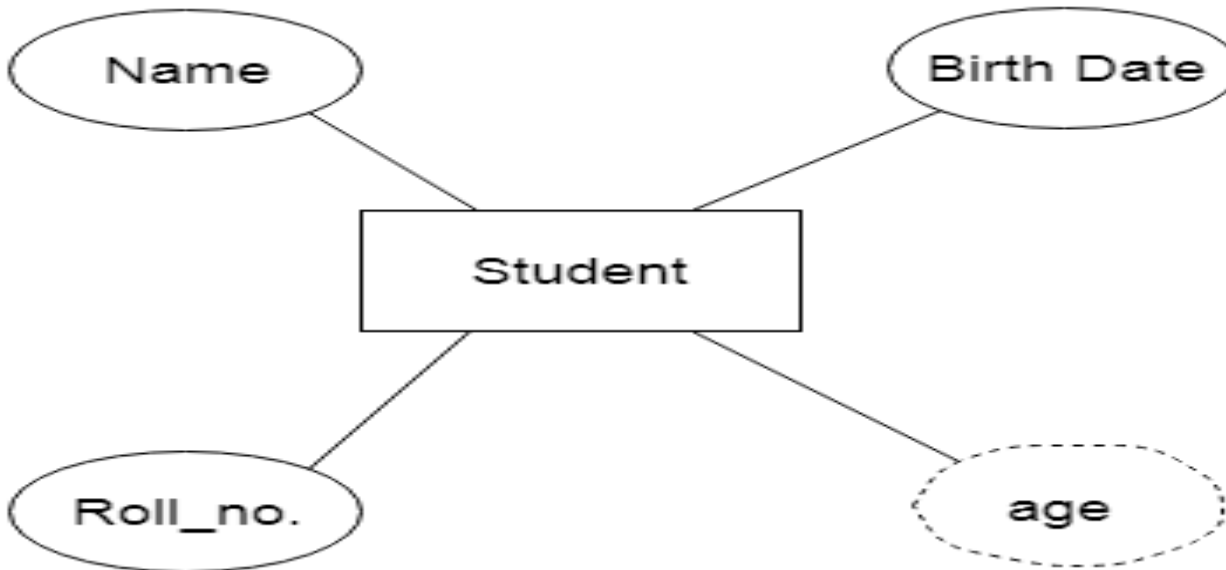- **For example,** a student can have more than one phone number.

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Phone_no.

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2d. 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.

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3. Relationship

A relationship is used to describe the relation between entities.
Diamond or rhombus is used to represent the relationship.

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Types of relationship are as follows:

a) <u>One-to-One Relationship</u>

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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Types of relationship are as follows:

b. One-to-many relationship

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.

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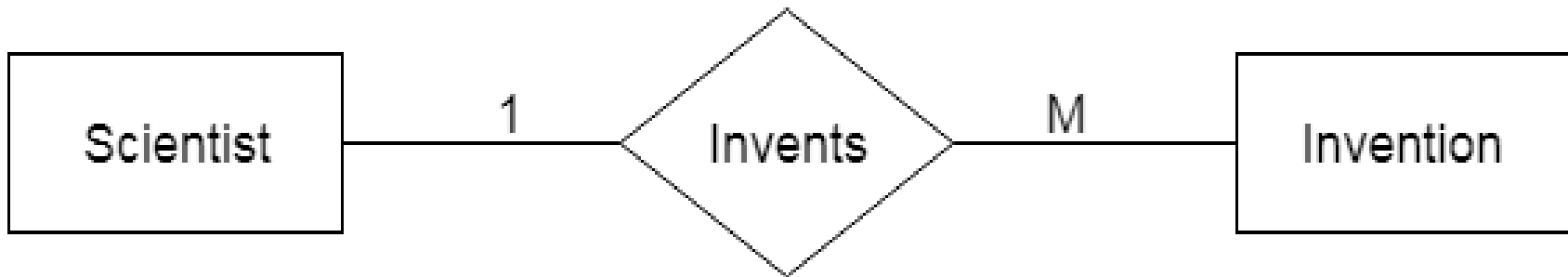
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Types of relationship are as follows:

c) **Many-to-one relationship:-**

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 enrolls for only one course, but a course can have many students.

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d) **Many-to-many relationship**

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.

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(Assignment)

1. Construct an E-R diagram for a Library.

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(Assignment)

1. Compare Primary keys with Foreign Keys with necessary Example.