

✍ By: Yashraj Maher

## Unit -1

- Intro to DBMS, Database system application purpose of Database system
- Adv. and Dis. Adv. of DBMS
- Schema
- Instance and database site
- database system utilities
- database architecture/ 3, 11 architecture

## Unit - 2

- Database users and admin responsibilities, structure of dbms
- types of data model, relation ER, object based overview of hierarchal and network data models
- phases of database design
- ER model entity
- entity set
- entity types
- attributes and types of attributes
- representation of ER (symbol)
- data association, attributes association and mapping cardinality
- constraints
  - key constraints
  - not null constraints
  - integrity constraints
  - referential constraints
  - unique constraints
  - domain check constraints
  - mapping constraints
- difference between dbms and rdbms
- data association and normalization techniques 1NF 2NF 3NF BCNF
- introduction to ddl,dml,creating tables
- insert data in tables
- retrieving data from table using (SELECT) statement and sorting data
- conversion function and conditional expressions
- aggregate data using group function
- displaying data from multiple tables
- sub queries
- set operations

### Q.1) Define Data

- Data refers to raw facts, figures, or information collected from various sources, which can be qualitative or quantitative. It serves as the foundation for analysis, decision-making, and deriving meaningful insights.

### Q.2) Real-life Example of a Database

- An example of a database is a hospital's patient management system. It stores and organizes patient records, including personal details, medical history, prescriptions, lab reports, and appointment schedules, allowing healthcare professionals to access and update information efficiently.

## Introduction

# Database

- DBMS is software used to manage a database (DB).
- A database is a collection of interrelated data used to retrieve, insert, and delete information.
- DBMS was created by Charles Bachman.
- A DBMS is a collection of programs that enables users to create and maintain databases.
- The DBMS is a general-purpose system facilitating the manipulation and sharing of databases among several users and applications.
- **Example:**
  - A company database organizes data about admins, employees, managers, clients, and janitors.
- Data is a group of measurements, observations, and descriptions used to convey information.
- DBMS stands for Database Management System.
- Database definition or descriptive information is stored by the DBMS in the form of a catalog or dictionary, called Metadata.
- DBMS is software used to manage databases.
  - Examples: Oracle, MySQL, XAMPP, etc.
- Data refers to raw facts that must be processed by humans or machines to derive meaning.
- Data is the plural form of "datum," derived from Latin.
- DBMS organizes data in the form of tables, schemas, views, and reports.
- **Syntax:**

```
CREATE DATABASE db_name;
```

- **Example:**

```
CREATE DATABASE hospital;
```

---

# Entity

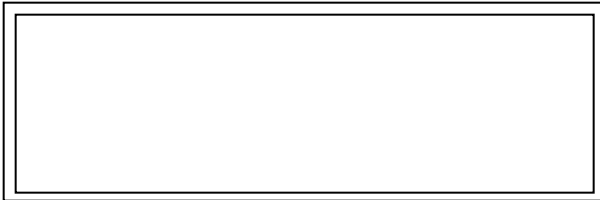
- An entity is represented



- In DBMS, an entity represents any real-world object, while an entity set refers to a group of similar entities.
- An entity is a thing or object in the real world recorded in the database and must be distinguishable to recognize it easily.
  - **Examples:** A student, employee, etc.
- All are Entities:

employee
employee_id
name
contact no.

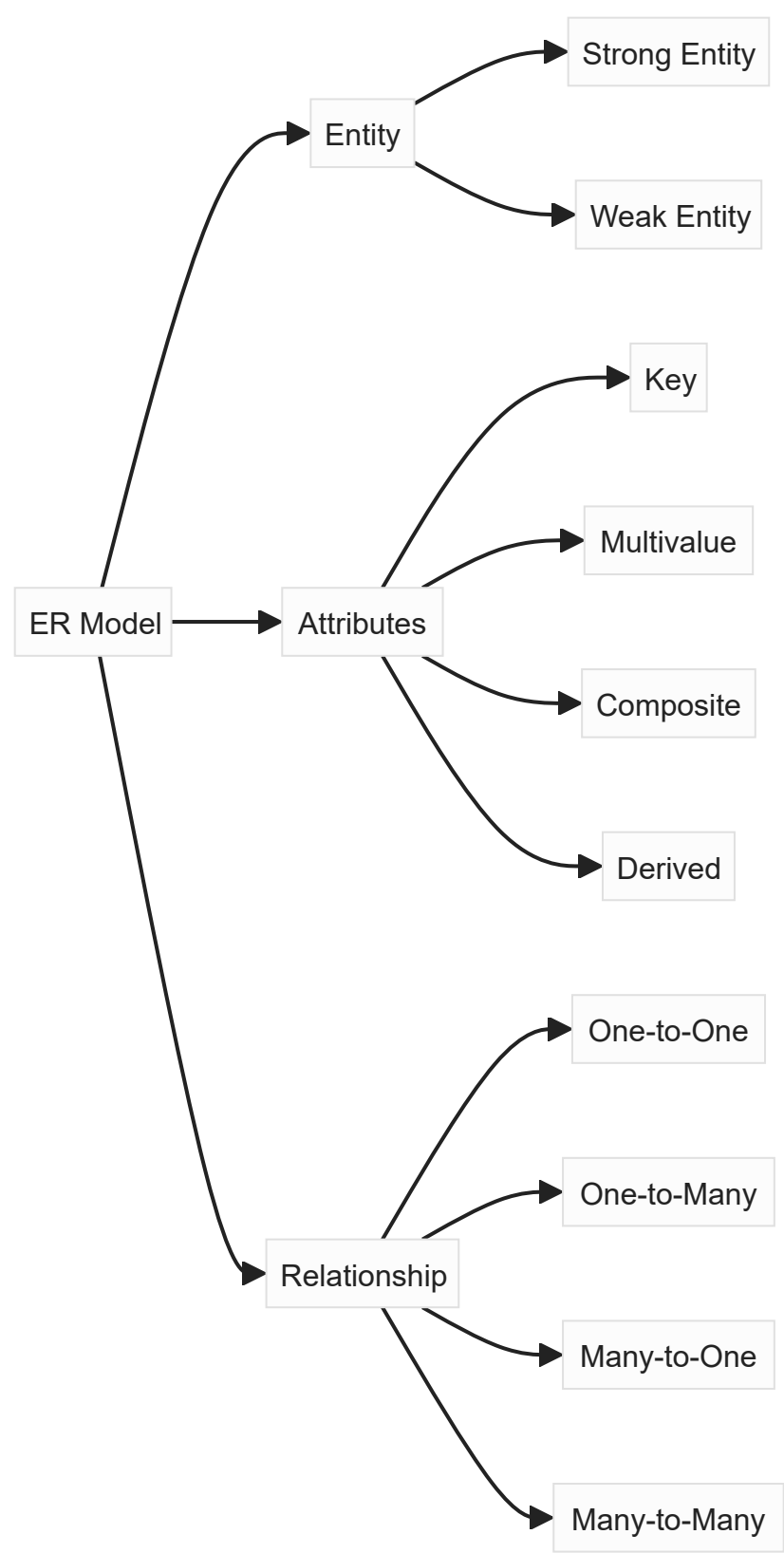
- A category or class of entities that share the same attributes is referred to as an entity kind.
- **Types of Entities:**
  1. **Strong Entity:**
    - Exists independently.
    - Each instance has a unique primary key.
  2. **Weak Entity:**
    - Cannot be uniquely identified by its attributes and relies on relationships with other entities.
    - **Visual Representation:**



- **Entity-Relationship Model (ER Model):**
  - Describes the structure of a database with the help of a diagram.

- Entities can have:
  - **Physical Existence:** e.g., A particular person, car, house, or employee.
  - **Conceptual Existence:** e.g., A company, job, or university course.

## ER Model

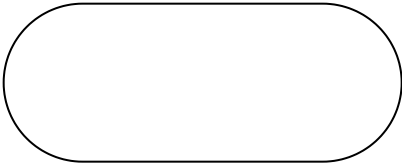


- ER Model is used to Model the logical view of the system from a Data perspective which consists of as followed symbols:

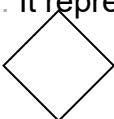
1. It represents Entities in the ER Model.



2. It represents Attributes in the ER Model.

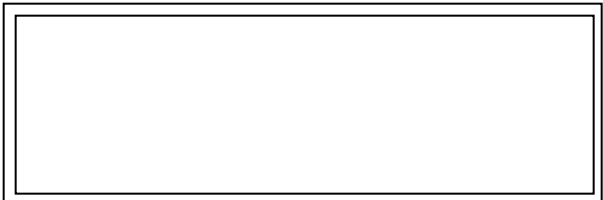


3. It represents Relationship among entities.

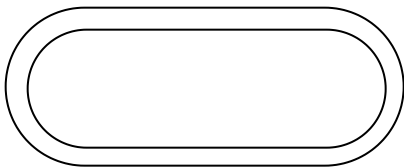


4. Attributes to Entities and Entity sets with other relationship types.

5. It represents Weak Entity.



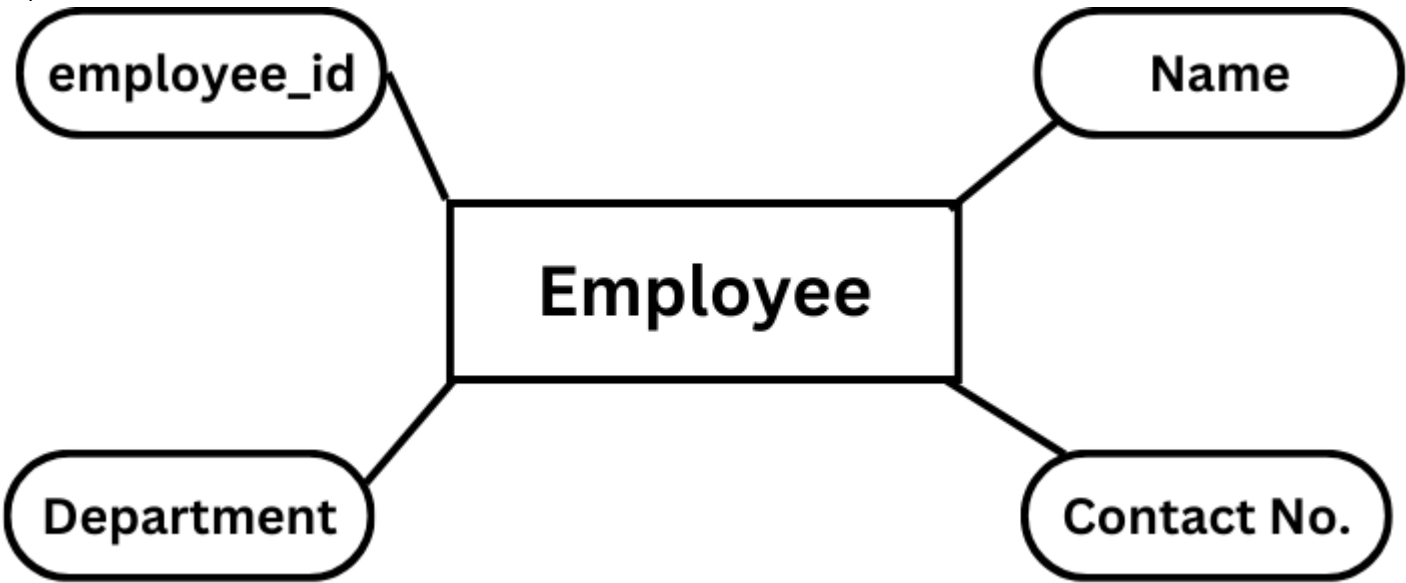
6. It represents Multivalued Attributes.



Q) What is entity and attributes with examples ?

- An Entity is a thing or object in real world they are recorded in the DB and must be distinguish it easy recognize from the group.
  - For Example: Student, Employee etc.
- An Attribute is a property or characteristic of an entity that describes its features or quantity.
- For Example: Student is Entity in College Database and Student has name, roll no. etc as attributes.

Q) ER Model



Q) Blueprint meaning in DBMS.

- In Database management system, a blueprint is a file that define the structure of a database, including its tables, columns, forms and procedure.

## Schema

- **Syntax:**

```
CREATE SCHEMA schema_name;
```

- **Example:**

```
CREATE SCHEMA hospital;
```

- Database schema is a logical representation of data that shows how a data, in a database should be stored logically.
- A Schema in DBMS in a blueprint that defines how data is organized, structured & related in Database the description of a Database is called DB schema which not specified during DB design & is not changed frequently most data models have certain convention for displaying schema as a diagram. A Displayed schema is called schema diagram.
- A schema is a collection of data object like tables, triggers etc.
- The Schema is connected with a user which is know as the schema owner.
- To create schema in SQL server use that 'CREATE SCHEMA' statement.

## Advantages and Disadvantages of DBMS

Advantages	Disadvantages
i. Simplicity	Maintenance Problem
ii. Structural Independence	The Maintenance of Relational DB becomes difficult over time due to the increase in the data.
iii. Ease of Use	Cost
iv. Query Capability	Physical Storage
v. Few Relational DB has limits fields, length which cannot be exited.	Complexity in Structure, Decrease in Performance overtime.

---

## Database Schema

---

- The skeleton of the DB is created by the attributes and this skeleton is named schema.
  - The schema mentions the logical constraints like table, primary\_id etc. it doesn't represent data type of the attributes.
- 

## Applications of DBMS

---

- Enterprise Information
    - Sales, accounting, human resources, online retails, manufacturing.
  - Airlines
    - Reservation and Schedules
  - Telecommunication
    - Postpaid, Prepaid, Bill Maintenance
  - University
    - It maintains information about student course, loans, banking, transactions, enroll, student grades, stuff roles.
  - Banking and Finance Sector
    - Banks maintaining the customer details, accounts, banking transactions, credit card transactions.
    - Finance: Storing information about sales and holding, purchasing of finance stock and bonds.
  - Social Media Sites
    - By filling the required details we are able to access social media platform, many users signup daily or websites such as facebook, discord , reddit, X, bereal etc. All the information related to the users are stored and maintained with the help of DBMS.
  - Manufacturing
    - Manufacturing companies make products and sell them on a daily basis.
    - To keep records of all of those details DBMS is used.
    - The DBMS is playing a very important role in each and every field.
- 

## Instance

---

Example:  
Rollno int  
name varchar(20)  
DOB  
Pin  
Address

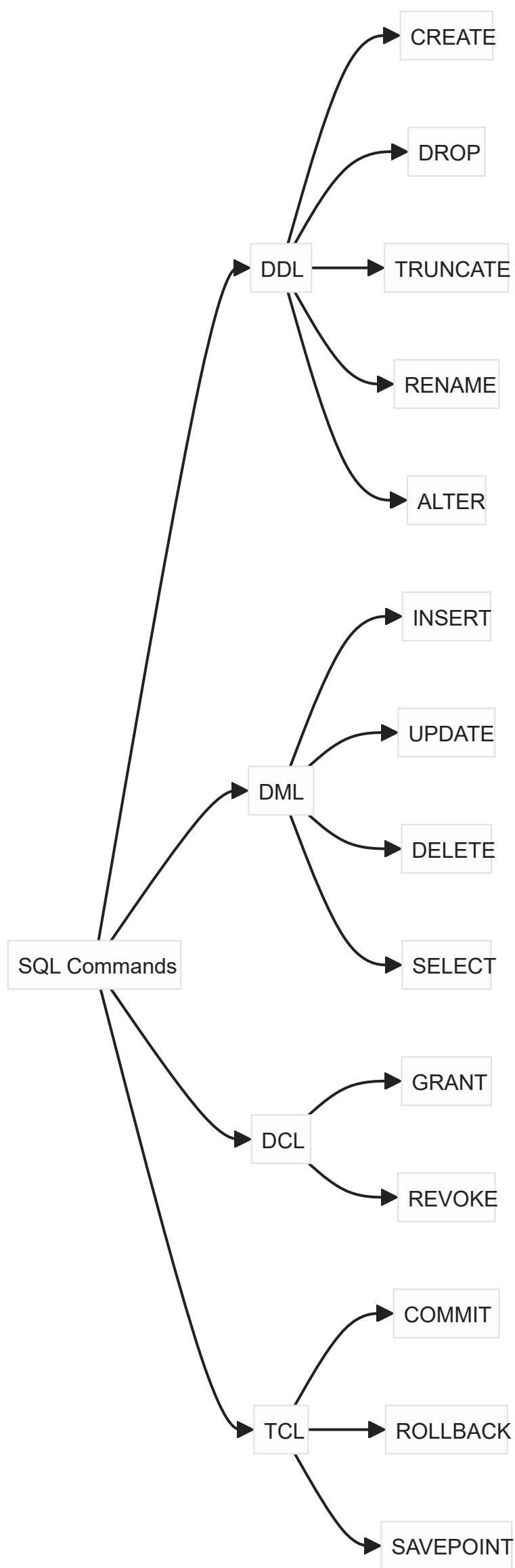
- The Collection of information is stored at a particular moment is called as an Instance.
  - Instance changes when addition, delete, updating but if you searching then it cannot change instances.
- 

## Introduction to SQL Commands

---

- The SQL commands are instructions used to communicate with database, its also used to perform specific task, functions and Queries of data.
  - There are four types of SQL commands
- 

## SQL Commands Flowchart



- It can perform several task like create table, delete, update, truncate table, modify the table, set permissions for users.

## Create

- The create command is used to create new table in the database also it can create database.
- Syntax for creating database

```
CREATE DATABASE db_name;
```

- Syntax for creating table

```
```sql
CREATE TABLE tb_name(
    column1_name datatype,
```

```
column2_name datatype  
);
```

- Example for creating table

```
CREATE TABLE student_data(  
    Rno int,  
    Name varchar(20),  
    DOB date,  
    Pin int,  
    Address text,  
    email text  
);
```

#### Drop

– Syntax

```
```sql  
DROP TABLE tb_name;
```