DATABASE MANAGEMENT SYSTEM

INTRODUCTION TO DATABASES

- A database is an organized collection of data.
- A database is an electronic system that allows data to be easily accessed, manipulated and updated.
- A database is a collection of data that is stored in a computer system. Databases allow their users to enter, access, and analyze their data quickly and easily.

FILE-BASED VS DB-BASED SYSTEMS

FILE-BASED VS DB-BASED SYSTEMS

- File-based systems organize files on storage media (e.g., hard disks) and help retrieve files when needed. They consist of directories, folders, and files.

- File systems are suitable for managing small amounts of unstructured data.

- DB-based systems manage collections of related data using a database management system (DBMS). They provide efficient data retrieval, security, and backup features

- DBMS is designed for managing large amounts of structured data, and offers more advanced features for ensuring data integrity, security, and performance..

FEATURES OF DBMS

Query language: DBMS allows users to fetch data using SQL queries.

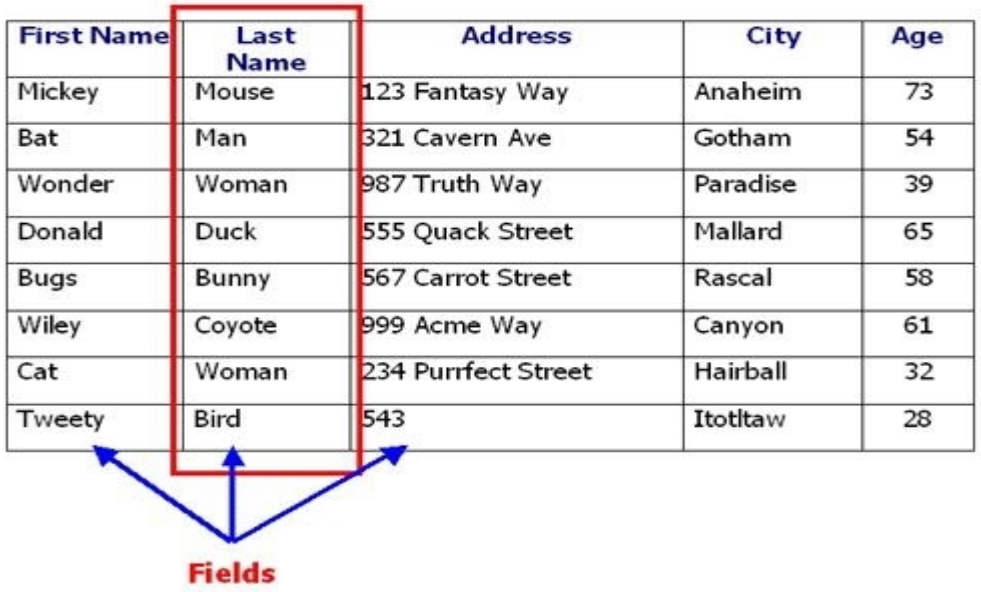
Report generator: DBMS generates reports from stored data.

Access security: DBMS ensures authorized access to data.

Backup & recovery: DBMS provides mechanisms to recover lost data.

FIELD

- A database field refers to a set of values arranged in a table and has the same data type. A field is also known as a column or attribute.
- Field: Represents a single piece of data (e.g., a person's name).



First Name	Last Name	Address	City	Age
Mickey	Mouse	123 Fantasy Way	Anaheim	73
Bat	Man	321 Cavern Ave	Gotham	54
Wonder	Woman	987 Truth Way	Paradise	39
Donald	Duck	555 Quack Street	Mallard	65
Bugs	Bunny	567 Carrot Street	Rascal	58
Wiley	Coyote	999 Acme Way	Canyon	61
Cat	Woman	234 Purrfect Street	Hairball	32
Tweety	Bird	543	Itotltaw	28

RECORD

- A collection of related fields (e.g., all details about a specific customer).
- A record is a collection of data that is organized in a group of fields within a table that are related to a particular topic or category.

First Name	Last Name	Address	City	Age
Mickey	Mouse	123 Fantasy Way	Anaheim	73
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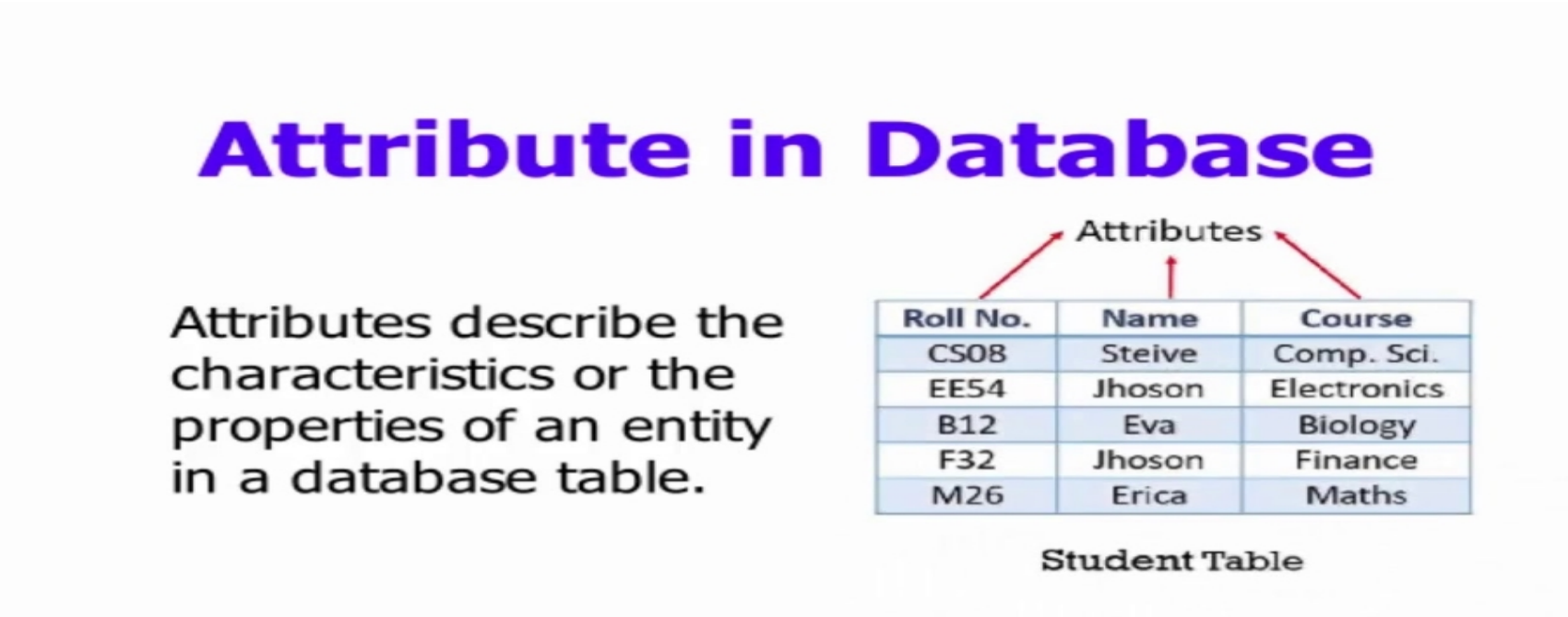
ATTRIBUTE

- An attribute is an identifying piece of information that serves to define further and expand the primary key.



RELATIONS IN DATABASE

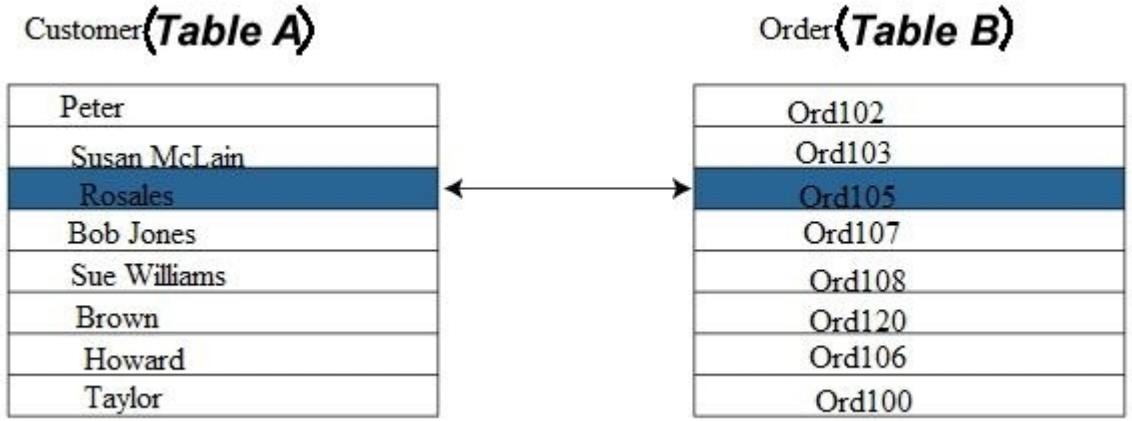
A relational database collects different types of data sets that use tables, records, and columns. It is used to create a well-defined relationship between database tables so that relational databases can be easily stored.

Some are listed below:

- One to One relationship
- One to many or many to one relationship
- Many to many relationships

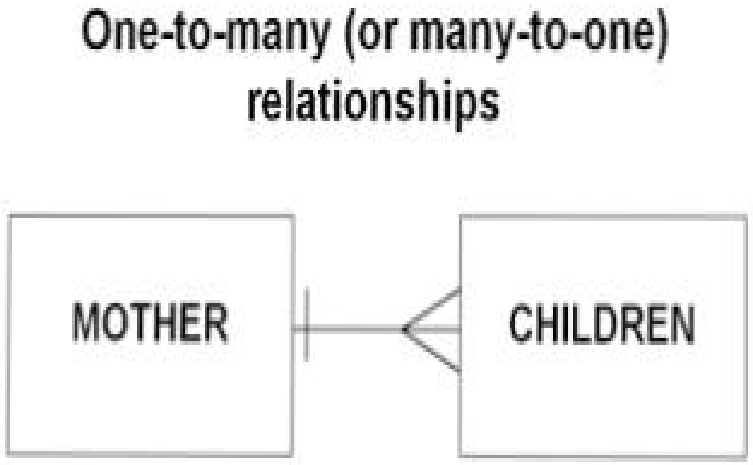
ONE TO ONE RELATIONSHIP (1:1)

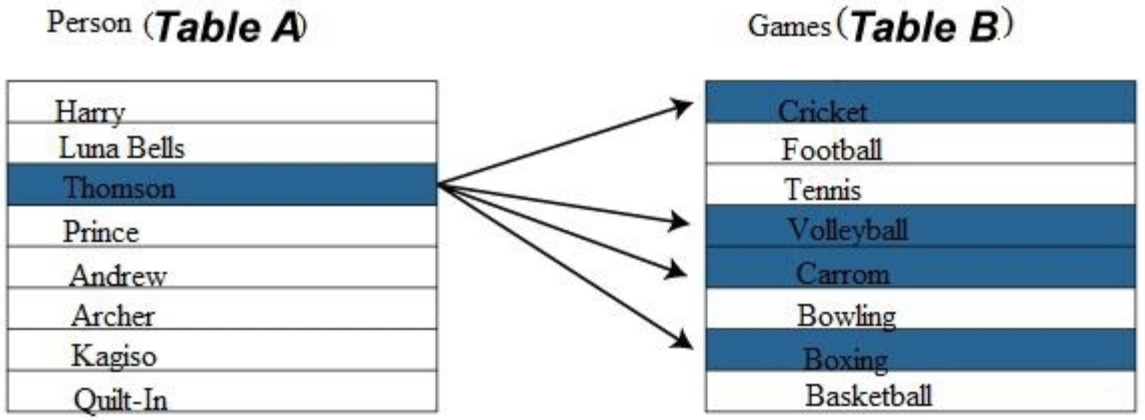
It is used to create a relationship between two tables in which a single row of the first table can only be related to one and only one records of a second table.



ONE TO MANY RELATIONSHIP

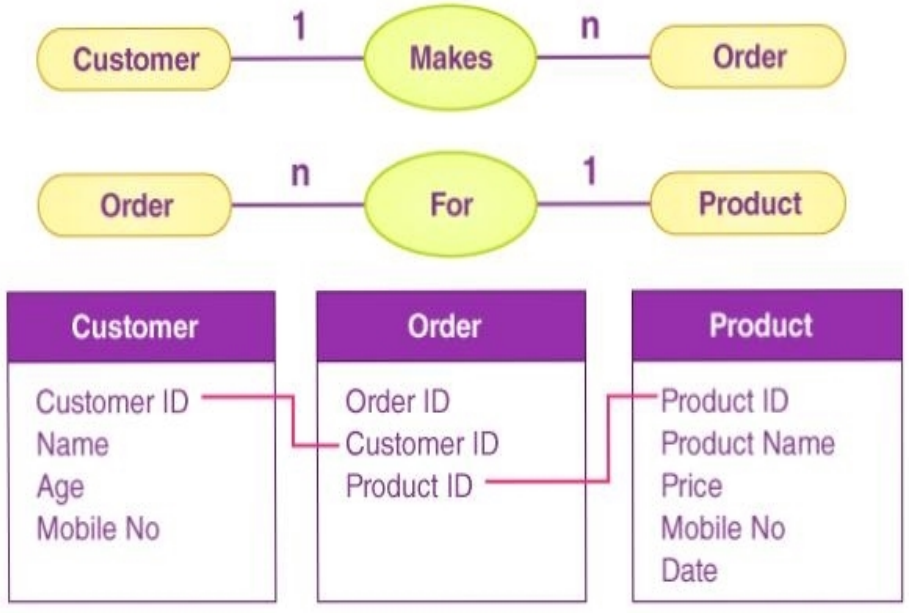
It is used to create a relationship between two tables. Any single rows of the first table can be related to one or more rows of the second tables, but the rows of second tables can only relate to the only row in the first table. It is also known as a many to one relationship.

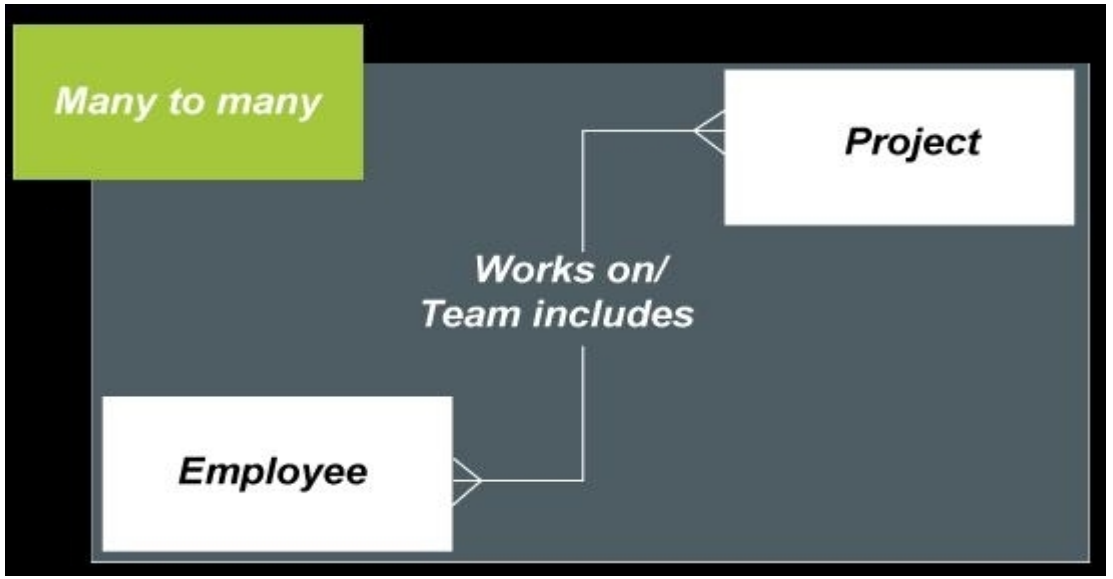




ONE TO MANY RELATIONSHIP

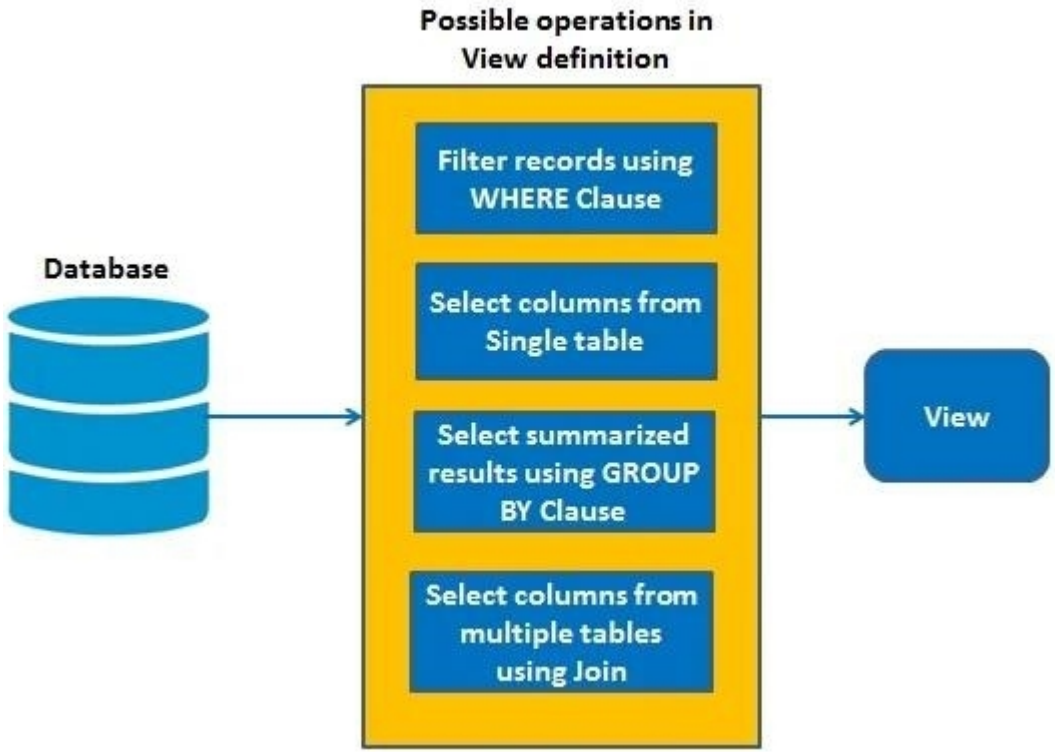
It is many to many relationships that create a relationship between two tables. Each record of the first table can relate to any records (or no records) in the second table. Similarly, each record of the second table can also relate to more than one record of the first table. It is also represented an N:N relationship.





VIEWS

- A database view is a subset of a database and is based on a query that runs on one or more database tables
- Views are virtual tables created from existing tables.
- They allow users to see specific subsets of data without altering the original tables.

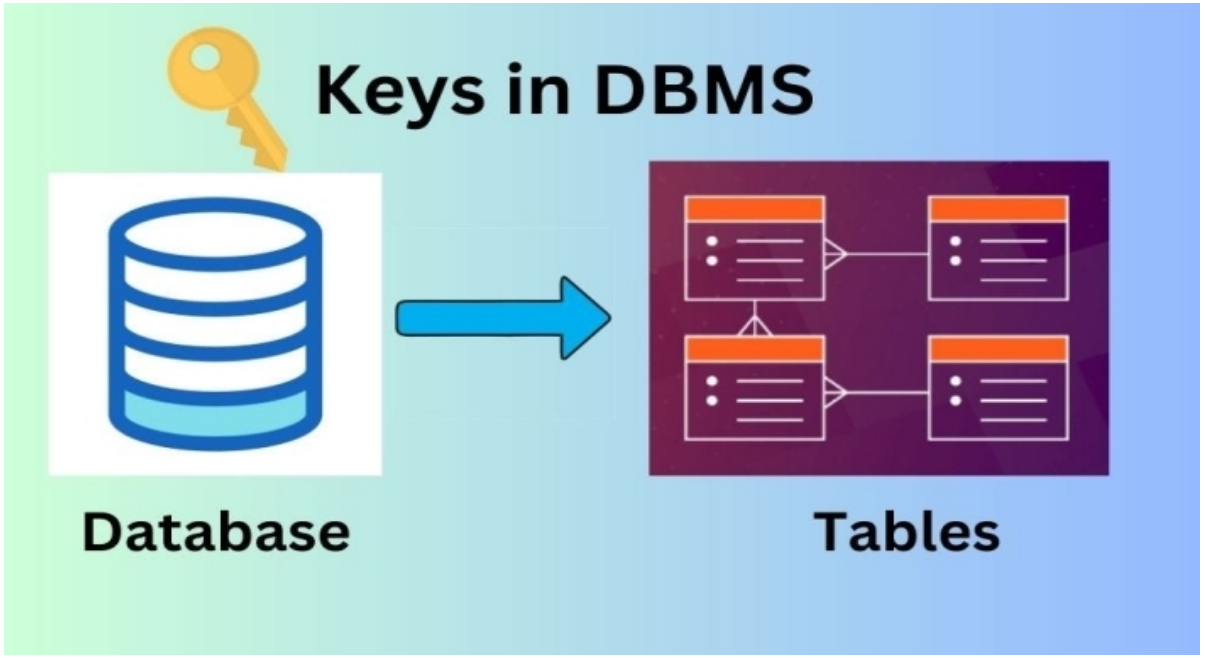


KEYS

A key refers to an attribute/a set of attributes that help us identify a row (or tuple) uniquely in a table (or relation).

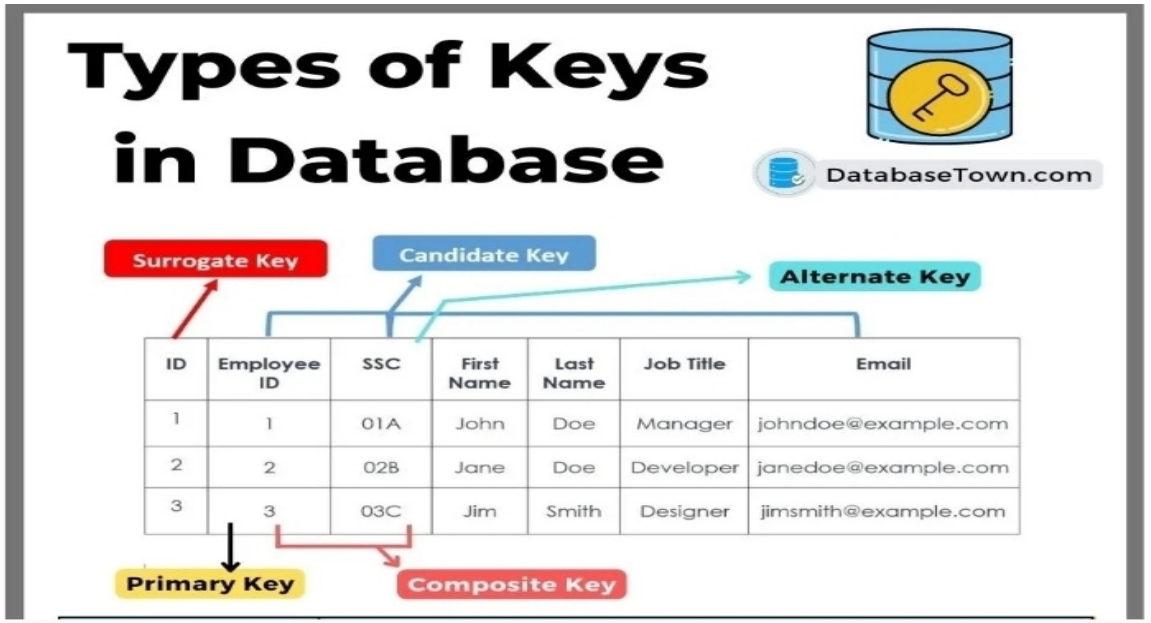
There are many types of keys in database , some important are following:

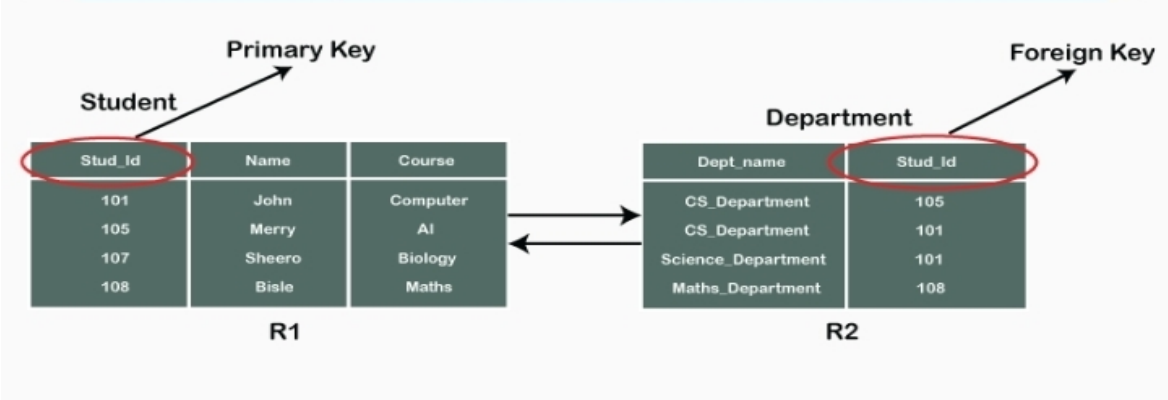
- Primary key
- Secondary key
- Candidate key
- Composite key
- Foreign key



KEYS

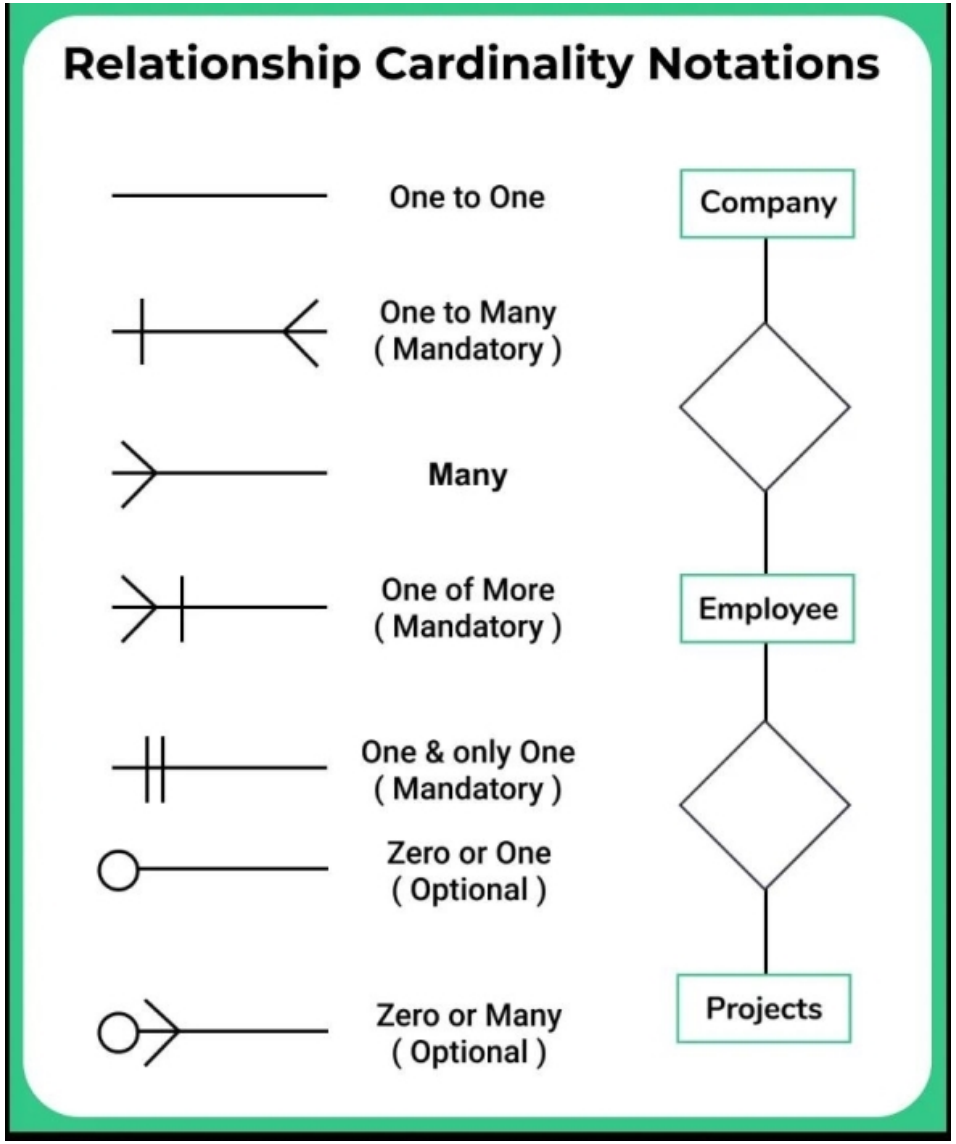
- **Primary Key**: Uniquely identifies each row in a table.
- **Secondary Key**: A secondary key is an additional key, or alternate key, which can be use in addition to the primary key to locate specific data.
- **Foreign Key:** Links data between tables.
- **Candidate Key:** A potential primary key.
- **Composite Key:** A combination of attributes forming a unique key.





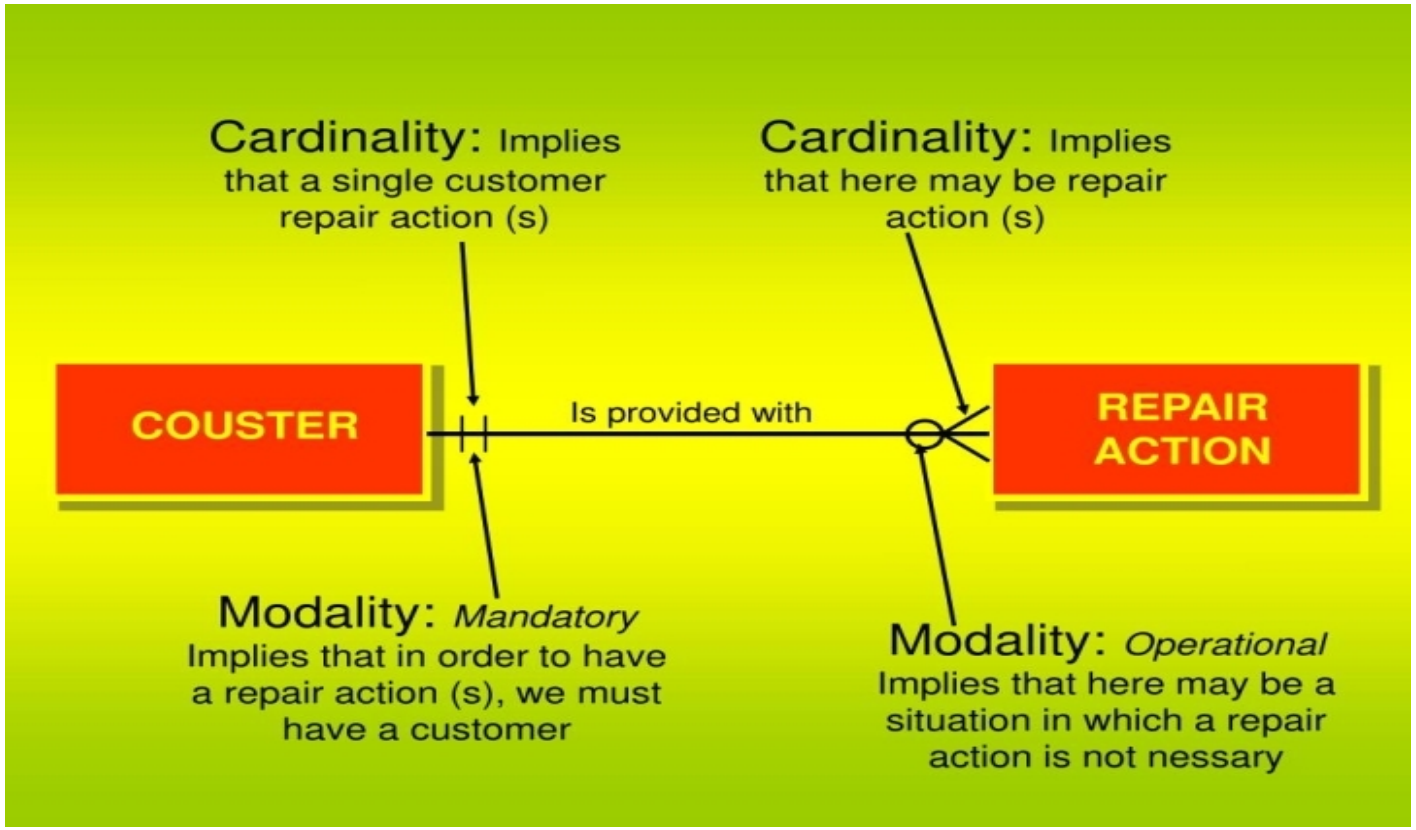
CARDINALITY

- Describes the relationship between tables (e.g., one-to-one, one-to-many).
- Data cardinality refers to the uniqueness of the values contained in a database column.



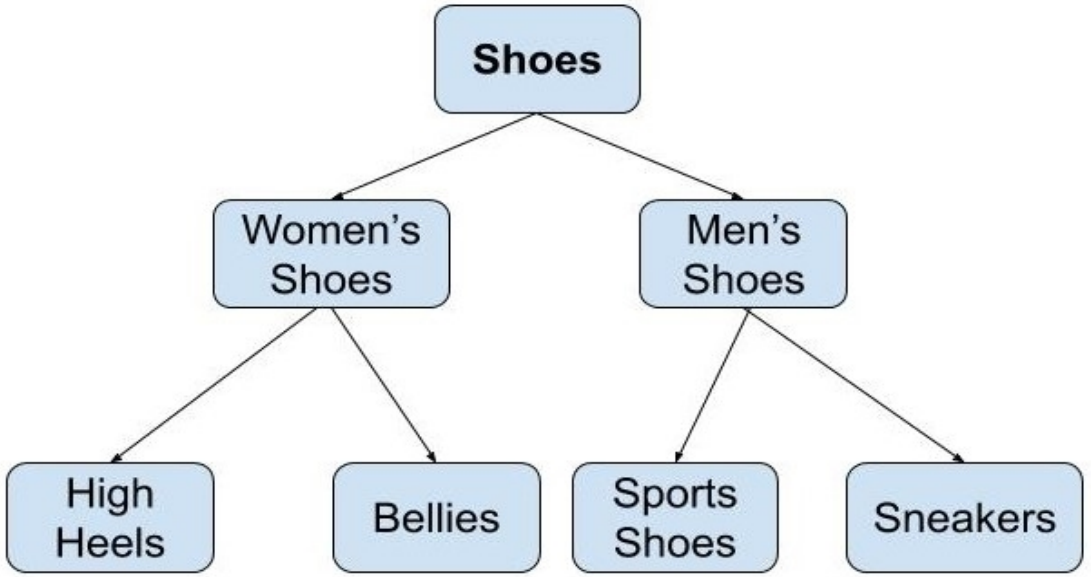
MODALITY

- Specifies whether a relationship is mandatory or optional .
- Modality depicts whether an entities role in a relationship is mandatory or optional.



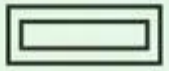
DATA MODELING

Data modeling is the process of diagramming data flows.



ERD(ENTITY RELATIONSHIP DIAGRAM)

An ERD visualizes the relationships between entities like people, things, or concepts in a database.

Figures	Symbols	Represents
Rectangle		Entities in ER Model
Ellipse		Attributes in ER Model
Diamond		Relationships among Entities
Line		Attributes to Entities and Entity Sets with Other Relationship Types
Double Ellipse		Multi-Valued Attributes
Double Rectangle		Weak Entity

EXAMPLE OF ERD