



SQL Introduction

MUKESH KUMAR

Basic before understanding SQL

- Database
- DBMS
- Data Models
- RDBMs

What is a Database

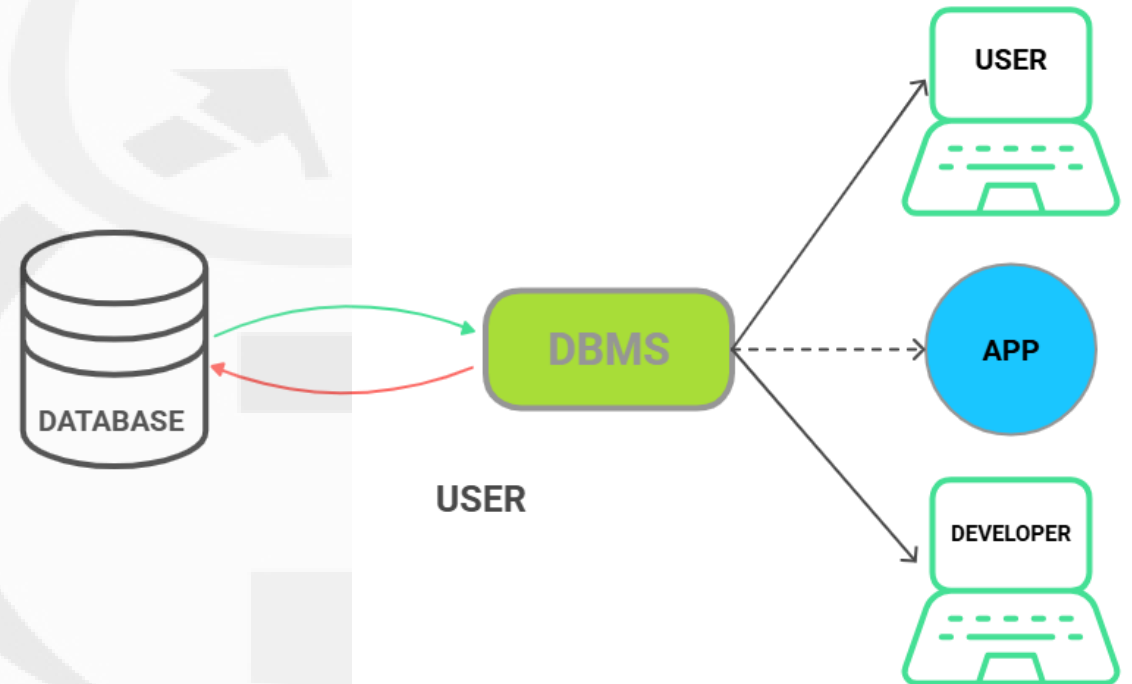
- A **database** is an organized **collection of data** that can be easily accessed, **managed**, and **retrieved** electronically.

Key Characteristics

- Stores data systematically (tables, files, documents, etc.)
- Allows retrieval of data through queries
- Can be managed by software like a DBMS or RDBMS
- Ensures data integrity, security, and consistency

What is DBMS

- A **Database Management System (DBMS)** is the **software application** used to manage databases.
- You connect to a DBMS to interact with the data.
- This software facilitates reading, updating data to and from DB



DBMS Softwares

ORACLE®
DATABASE

MySQL®

 **mongoDB**


Microsoft®
SQL Server®


MariaDB


PostgreSQL

 Microsoft®
Access

Data Models

- A **data model** is a **conceptual framework** that defines **how data is structured, stored, and related** in a database.
- Think of a data model as a **blueprint** or **map** for organizing and managing data.

Why Data Models Are Important:

- Ensure **consistency** and **clarity** in data storage
- Define **relationships** between data items
- Help in **designing databases** logically and physically
- Improve **data quality, integrity, and scalability**

Most popular data models

Model Type	Description	Example Use Case
Relational Model	Data in tables (rows & columns)	MySQL, PostgreSQL (most common)
Document Model	JSON-like documents	MongoDB (flexible structure)
Key-Value Model	Simple key → value pairs	Redis, DynamoDB (caching, config)
Graph Model	Nodes and edges (relationships)	Neo4j (social networks, fraud)
Column-Family	Columns grouped together by families	Cassandra (big data analytics)
Hierarchical Model	Tree-like parent-child structure	IBM IMS (older systems)
Network Model	Graph with multiple parent-child links	IDMS (legacy mainframe systems)

Where are these used

Model Type	Structure	Example DBs	Used In / Best For
Relational	Tables (rows & columns)	MySQL, PostgreSQL, Oracle	Traditional apps, ERP, banking, e-commerce
Document	JSON/BSON-like documents	MongoDB, CouchDB	Content management, catalogs, flexible schemas
Key-Value	Key → Value pairs	Redis, DynamoDB	Caching, session storage, fast lookups
Graph	Nodes and edges	Neo4j, ArangoDB	Social networks, recommendation engines
Column-Family	Column groups (wide tables)	Cassandra, HBase	Analytics, IoT, time-series data
Hierarchical	Tree-like (parent-child)	IBM IMS, XML DBs	Old mainframes, config files, file systems
Network	Graph-like, many-to-many relationships	IDMS, Integrated DBMS	Legacy telecom, manufacturing systems

Relational databases are still the most widely used type of database globally.

Reason	Explanation
Standardized	Use of SQL (Structured Query Language) is industry standard
Data integrity & ACID	Strong support for constraints, transactions, and consistency
Mature ecosystem	Decades of development, optimization, and tooling
Wide applicability	Work well for structured data: banking, HR, ERP, e-commerce, etc.
Broad support	Supported by many frameworks, languages, ORMs

Market Adoption

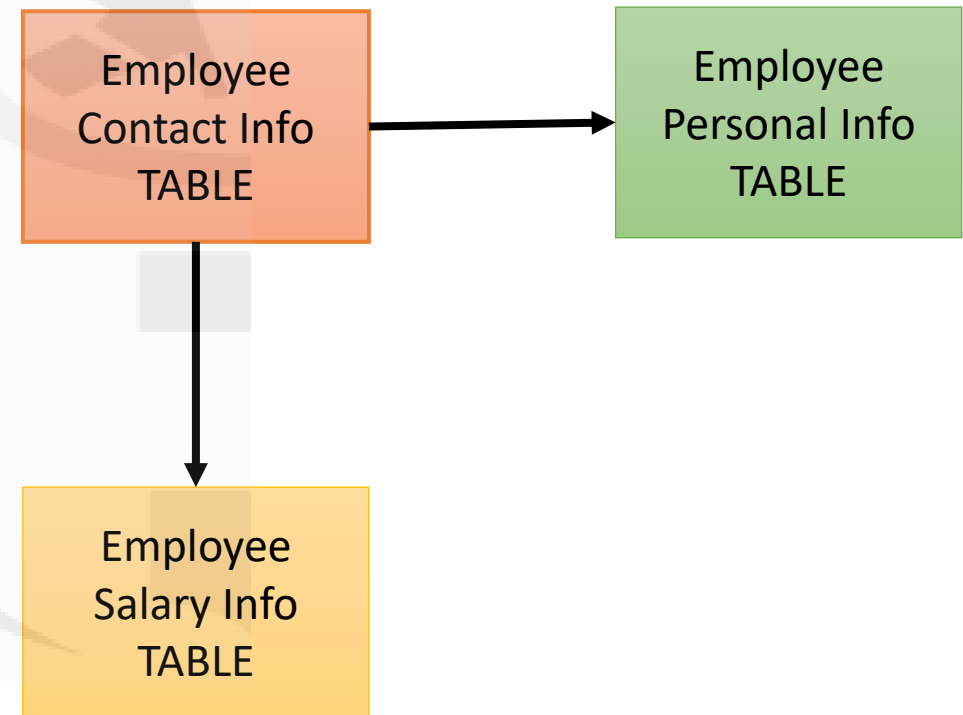
- **Used in ~70–80%** of traditional enterprise applications
- Dominant in **banking, government, finance, inventory, accounting,** etc.
- Examples like **MySQL, PostgreSQL, Oracle, and SQL Server** are among the top DBs



Understanding Relational Databases

Relational Databases

- **Relational databases** are a type of database where data is stored in **tables** that are **linked to each other using relationships**.
- Each **table** holds data about a specific type of object (e.g., customers, products, orders).



RDBMS

- RDBMS stands for Relational Database Management System.
- It is software used to store, manage, and retrieve data that is organized into tables (called relations) with rows and columns.

Example RDBMS Software

Software	Type
MySQL	Open-source
PostgreSQL	Open-source
Oracle Database	Commercial
Microsoft SQL Server	Commercial
MariaDB	Open-source

SQL

SQL is the language used to interact with these relational DBMS.

- **SQL** stands for **Structured Query Language** — it is the **standard language used to communicate with relational databases (RDBMS)**.
- Purpose of SQL:
- SQL is used to create, read, update, and delete data in relational databases — commonly known as CRUD operations.

What You Can Do with SQL

Operation	SQL Keyword	Purpose
Create Tables	CREATE TABLE	Define a new table
Insert Data	INSERT INTO	Add new data
Read Data	SELECT	Fetch data from tables
Update Data	UPDATE	Modify existing records
Delete Data	DELETE	Remove records
Filter Rows	WHERE	Add conditions to queries
Sort Results	ORDER BY	Sort data ascending or descending
Join Tables	JOIN	Combine rows from multiple tables

SQL Is Used In:

- MySQL
- PostgreSQL
- Oracle
- SQLite
- SQL Server
- All RDBMS systems use **SQL** or a dialect of it.

SQL Databases

The MySQL logo is displayed on a light orange rectangular background. It features the word "MySQL" in a sans-serif font, with "My" in white and "SQL" in orange.

MySQL

The PostgreSQL logo is displayed on a medium orange rectangular background. It features a circular icon with a white bird-like shape inside, followed by the text "PostgreSQL" in a white sans-serif font.

PostgreSQL

The Microsoft SQL Server logo is displayed on a yellow rectangular background. It features the text "Microsoft SQL Server" in an orange sans-serif font, with "Microsoft" on the top line and "SQL Server" on the bottom line.

Microsoft SQL Server

Examples of most popular SQL databases.

Summary

Feature	Description
Full Form	Structured Query Language
Invented By	IBM (1970s)
Used With	Relational databases (RDBMS)
Key Use Cases	CRUD operations, filtering, joining, aggregations
Standard Language	ANSI & ISO standard

SQL OR SEQUEL?

- SQL (Structured Query Language), sometimes pronounced SQUEL, is the standard language for working with relational database management systems (RDBMS).
- It is used to query (retrieve) and modify (insert, update, delete) data stored in these databases.

SQL OR SEQUEL?

- Originally developed at IBM in the 1970s as SQUEL (Structured English Query Language), the name was later shortened to SQL due to a trademark issue.
- While there's ongoing debate about the "correct" pronunciation, both SQL and SQUEL are widely used.
- It's important to note that non-relational (NoSQL) databases do not understand SQL and have their own query languages



MYSQL Vs MYSQUEL?

Both pronunciation are fine



SQL With MYSQL

We will learn SQL using MYSQL