# **Databases & SQL – Complete Course Roadmap**

## 1. Introduction & Description

#### • What is a Database?

A database is an organized collection of data that can be easily accessed, managed, and updated.

#### • What is SQL?

SQL (Structured Query Language) is a standard language for storing, retrieving, and managing data in relational databases.

### Why learn Databases & SQL?

- o Almost every application (web, mobile, enterprise) uses a database.
- o SQL is the foundation of data storage, reporting, and analysis.
- o Required skill for backend developers, data scientists, and software engineers.

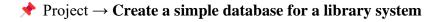
#### Where are Databases & SQL used?

- Banking systems
- E-commerce platforms
- Social media applications
- o Healthcare records
- o Business analytics

#### 2. 8-Week Learning Roadmap

#### Week 1: Introduction to Databases

- Types of databases (Relational vs NoSQL)
- Database management systems (DBMS vs RDBMS)
- Installing MySQL / PostgreSQL
- SQL basics & queries



## **Week 2: SQL Basics – CRUD Operations**

- Creating databases & tables
- Insert, Update, Delete data
- SELECT statements
- WHERE clause with operators

## Week 3: Filtering & Sorting Data

- ORDER BY
- DISTINCT keyword
- LIMIT keyword
- BETWEEN, LIKE, IN operators
- **→** Project → Filter and sort customer orders in an e-commerce DB

## Week 4: Relationships & Joins

- Primary & foreign keys
- One-to-one, one-to-many, many-to-many relationships
- INNER JOIN, LEFT JOIN, RIGHT JOIN, FULL JOIN
- **★** Project → Create a database for an online store with product-order relationships

### Week 5: Aggregations & Grouping

- COUNT, SUM, AVG, MIN, MAX
- GROUP BY & HAVING clauses
- Nested queries
- ightharpoonup Project ightharpoonup Analyze sales data using aggregation queries

## Week 6: Advanced SQL Concepts

- Subqueries & nested SELECT
- UNION & INTERSECT
- Indexing for performance
- Transactions & ACID properties
- **→** Project → Banking system database with transactions

## Week 7: Views, Stored Procedures & Functions

- Creating and using Views
- Stored procedures (CREATE PROCEDURE)
- SQL Functions (built-in & user-defined)
- Triggers (automating tasks)
- **→** Project → Build stored procedures for payroll management

# **Week 8: Final Capstone Project**

Bring everything together into one project:

**★** Capstone → Complete University Management System (students, courses, grades, attendance) with advanced SQL queries

#### 3. Interview Prep (Common Questions)

- What is the difference between SQL and NoSQL databases?
- Explain the difference between DBMS and RDBMS.
- What are primary keys and foreign keys?
- What is a JOIN? Name its types.
- Difference between WHERE and HAVING.
- What is indexing in SQL?
- Explain ACID properties.
- What is the difference between DELETE, TRUNCATE, and DROP?

#### 4. Resources

- MySQL Docs: https://dev.mysql.com/doc
- PostgreSQL Docs: https://www.postgresql.org/docs
- W3Schools SQL Tutorial
- FreeCodeCamp SQL Course
- "SQL For Data Analysis" (Udemy/YouTube tutorials)