

# 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?**
    - Almost every application (web, mobile, enterprise) uses a database.
    - SQL is the foundation of data storage, reporting, and analysis.
    - Required skill for **backend developers, data scientists, and software engineers**.
  - **Where are Databases & SQL used?**
    - Banking systems
    - E-commerce platforms
    - Social media applications
    - Healthcare records
    - 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

✦ Project → **Create a simple database for a library system**

---

### Week 2: SQL Basics – CRUD Operations

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

✦ Project → **Student database with CRUD operations**

---

### **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

✦ Project → **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)