Complete DBMS Learning Plan (PDF)

Start Date: July 15, 2025

Daily Study Time: 3 hours/day

Week 1: DBMS Fundamentals & Data Models (Jul 15 - Jul 21)

Topics:

- Introduction to DBMS

- DBMS vs File System

- Types of DBMS: Relational, Hierarchical, Network, NoSQL

- DBMS Architecture (1-tier, 2-tier, 3-tier)

- Data Models: Hierarchical, Network, Relational

Exercises:

> Compare DBMS with file systems

> Create a chart of DBMS types and examples

> Diagram a 3-tier DBMS architecture

Week 2: Relational Model & SQL Basics (Jul 22 - Jul 28)

Topics:

- Relational Model: Tuples, Attributes, Keys

- Entity-Relationship (ER) Model

- SQL Basics: SELECT, INSERT, UPDATE, DELETE

- Filtering (WHERE), sorting (ORDER BY), pattern matching (LIKE)

- Constraints: PRIMARY KEY, FOREIGN KEY, NOT NULL, UNIQUE

Exercises:

> Draw ER diagrams for a school/library/hospital

> Write SQL queries for inserting, updating, deleting data

Week 3: Advanced SQL + Normalization (Jul 29 - Aug 04)

Topics:

- SQL Joins: INNER, LEFT, RIGHT, FULL

- GROUP BY and Aggregate Functions

- Subqueries and Views

- Transactions: COMMIT, ROLLBACK, SAVEPOINT

- Normalization: 1NF, 2NF, 3NF, BCNF

Exercises:

> Practice joins with employee and department tables

> Normalize an unstructured table to 3NF

> Create views for summary reports

Week 4: Indexing, Query Optimization & Transactions (Aug 05 - Aug 11)

Topics:

- Indexing: B-trees and Hash indexing

- Query Processing and Optimization

- ACID Properties of Transactions

- Concurrency Control: Locking, Deadlocks

Exercises:

> Use EXPLAIN to analyze query performance

> Test transaction handling using COMMIT/ROLLBACK

> Compare query speed with and without indexing

Week 5: Storage, Recovery & NoSQL Intro (Aug 12 - Aug 18)

Topics:

- File Organization: Heap, Sequential, Hash

- RAID Levels Overview

- Backup and Recovery in DBMS

- NoSQL Introduction: Key-Value, Document, Column, Graph

- MongoDB Basics: Inserting and querying documents

Exercises:

> Compare relational vs NoSQL databases

> Backup and restore MySQL dumps

> Create and query documents in MongoDB

Week 6: Real-World Projects + Interview Prep (Aug 19 - Aug 25)

Topics:

- Mini Project: Library Management System

- Mini Project: Attendance Tracker

- Mini Project: Employee Leave Management

- Interview Prep: Indexing, Normalization, Transactions

- Mock Test & Summary Revision

Exercises:

> Build ER diagrams and schemas for mini-projects

> Write complete SQL scripts

> Review 20+ common interview questions

Recommended Tools & Resources

- Practice SQL: SQLZoo (https://sqlzoo.net)

- Advanced Queries: LeetCode SQL (https://leetcode.com/problemset/database/)

- SQL Tutorial: W3Schools SQL (https://www.w3schools.com/sql/)

- ER Diagram Tool: dbdiagram.io / Lucidchart

- NoSQL Practice: MongoDB Atlas (https://www.mongodb.com/cloud/atlas)

- MySQL / PostgreSQL for RDBMS practice