

Part 1: Databases (Weeks 9-10)

Week 9: Relational Database Fundamentals & SQL Basics

- **Day 1:** What is a Relational Database? (Tables, Columns, Rows, Primary Keys, Foreign Keys). Intro to SQL. Basic SELECT queries. *Lab: Connect to a sample database and run simple SELECTs.*
- **Day 2:** Data Manipulation Language (DML): INSERT, UPDATE, DELETE. *Lab: Practice adding, modifying, and removing data.*
- **Day 3:** Database Design Principles: Normalization (1NF, 2NF). Why structure matters. *Activity: Design a simple schema for a small application (e.g., blog posts).*
- **Day 4:** Querying Related Data: SQL JOIN types (INNER, LEFT). *Lab: Write queries joining multiple tables.*
- **Day 5:** Aggregating Data: COUNT, SUM, AVG, MIN, MAX, GROUP BY, HAVING. *Lab: Write queries to summarize data. Kick off CRUD project: Finalize schema.*

Week 10: Database Administration & SRE Concerns

- **Day 6:** Basic DB Admin: User accounts, permissions/privileges. SRE Perspective: Why database availability and performance are critical.
- **Day 7: Performance Tuning Fundamentals - Indexes & Query Execution**
 - Focus on index types, creation, and benefits
 - Understanding execution plans and query lifecycle
 - Index design principles and implementation
 - Analyzing and optimizing basic queries
- **Day 8: Advanced Performance Tuning & Monitoring**
 - Query optimization beyond indexes
 - Database configuration parameters
 - Monitoring and diagnostics tools
 - Database maintenance operations
 - Performance tuning in production environments
- **Day 9:** Reliability - Backups: Why backups are essential. Types of backups (full, incremental)
- **Day 10:** Reliability - Replication Introduction: Basic concept (master-slave/primary-replica). High Availability overview. *Discussion: How replication helps reliability.*

Part 2: Cloud Fundamentals (Weeks 11-12)

Week 11: Core Cloud Concepts & Services

- **Day 11:** What is Cloud Computing? (IaaS, PaaS, SaaS). Overview of a chosen provider (e.g., AWS). Key benefits (scalability, elasticity). Cost Management Introduction.
- **Day 12:** Core Compute & Storage: Virtual Machines (e.g., EC2), Object Storage (e.g., S3). *Lab: Launch a basic VM instance.*
- **Day 13:** Cloud Networking: Virtual Private Cloud (VPC), Subnets, Security Groups/Firewalls. *Lab: Set up a basic VPC and configure security group rules to allow specific traffic (e.g., SSH, HTTP).*
- **Day 14:** Identity & Access Management (IAM): Users, Groups, Roles, Policies. Principle of Least Privilege. *Lab: Create an IAM user with limited permissions.*
- **Day 15:** Cloud Monitoring & Logging: Importance of observability. Overview of native monitoring services (e.g., CloudWatch). *Lab Kick-off: Plan the deployment of a simple web application.*

Week 12: Cloud Deployment & Best Practices

- **Day 16:** Deploying to the Cloud: Manually deploying the simple web application onto the VM created earlier. Accessing the application.
- **Day 17:** Centralized Logging: Configuring the application or VM agent to send logs to the cloud provider's logging service (e.g., CloudWatch Logs). *Lab: View and search application logs in the central service.*
- **Day 18:** Ephemeral Infrastructure: Concept of treating infrastructure as disposable and rebuildable. Brief introduction to Infrastructure as Code (IaC) - what it is, why it's used.
- **Day 19:** Cost Management Practice: Using the cloud provider's tools to view costs. Setting up billing alerts or budgets. *Discussion: Common cost pitfalls.*
- **Day 20:** Final Lab Review & Cloud Certification Path: Review the deployed application and logging setup. Discuss next steps and the value of foundational cloud certifications (e.g., AWS Cloud Practitioner, Azure Fundamentals). Recap Month 3.