

PostgreSQL Essentials

A Hands-On Introduction to Modern Relational Databases

Program Overview

This 8-week training program offers a foundational and practical journey into PostgreSQL. Whether you're new to databases or want to deepen your SQL and data management skills, this course is designed to make you confident in designing, querying, and administering relational data using one of the most powerful open-source database systems.

Week 1 - Introduction to PostgreSQL & Installation

- What is PostgreSQL? History and use cases
- PostgreSQL architecture: processes, memory, storage
- Installing PostgreSQL on Linux/macOS/Windows
- Introduction to psql and pgAdmin
- Creating your first database and connecting to it

Week 2 - Understanding the Relational Model & SQL Basics

- Tables, rows, and columns
- Primary keys, foreign keys, and constraints
- Data types and NULL behavior
- Basic SQL operations: SELECT, INSERT, UPDATE, DELETE
- Filtering with WHERE, sorting with ORDER BY

Week 3 - Querying Data Effectively

- Aggregate functions: COUNT, SUM, AVG, MAX, MIN
- Grouping with GROUP BY, filtering with HAVING
- Joins: INNER JOIN, LEFT JOIN, RIGHT JOIN, FULL JOIN
- Aliases and expressions
- Writing clear, readable SQL

Week 4 - Schema Design & Table Management

- Normalization basics (1NF, 2NF, 3NF)

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- Creating and altering tables
- Using sequences and auto-incrementing primary keys
- Constraints: UNIQUE, CHECK, DEFAULT
- Dropping and renaming tables and columns

Week 5 - Indexes, Views, and Functions

- Introduction to indexing: btree, hash, GIN, BRIN
- When to use and not to use indexes
- Creating and using views
- Simple SQL functions and expressions
- Case study: optimizing a slow query

Week 6 - Transactions and Data Integrity

- What is a transaction? COMMIT and ROLLBACK
- Understanding ACID properties
- Isolation levels and concurrency
- Using BEGIN, SAVEPOINT, RELEASE
- Error handling with transactions

Week 7 - User Management and Security

- Creating users and assigning roles
- Granting and revoking privileges (GRANT, REVOKE)
- Object-level and schema-level permissions
- Password authentication and pg_hba.conf basics
- Security best practices for developers

Week 8 - Backup, Restore & Working with External Data

- Logical backups using pg_dump and pg_restore
- Using psql for simple exports and imports

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- Exporting to and importing from CSV
- Introduction to foreign data wrappers (FDW)
- Wrap-up: best practices & Q&A