

PostgreSQL Database Administration

Course Duration: 40 Hours (5 Days)

Overview

The PostgreSQL Database Administration course is a comprehensive guide designed to equip learners with the skills necessary to manage and maintain PostgreSQL databases effectively. This course covers everything from the basics of PostgreSQL Server and its advanced features to Client-server architecture, Installation, Configuration, and Security. Participants will dive into various aspects of database administration, such as Server control, Metadata, Transactions, Concurrency control, and Performance tuning. They will also learn about Table partitioning, using extensions, and implementing robust Security measures to protect data. Moreover, the course provides practical lessons on Monitoring, Diagnosis, Regular maintenance, Backup and recovery, Data movement, and Replication. With a focus on real-world applications, it includes best practices for upgrading and migrating databases, such as transitioning from Oracle to PostgreSQL using tools like Ora2PG. By completing this course, learners will gain the knowledge and hands-on experience to become proficient PostgreSQL Database Administrators, ensuring the integrity, reliability, and high performance of database systems.

Audience Profile

The PostgreSQL Database Administration course is tailored for IT professionals seeking to master database management and advanced Postgres features. Target Audience and Job Roles:

- Database Administrators (DBAs)
- System Administrators managing database servers
- IT Professionals looking to transition into database roles
- Developers who need to understand the backend database management
- Data Analysts requiring knowledge of database administration for complex querying
- Technical Project Managers overseeing database projects
- DevOps Engineers involved in CI/CD processes requiring database integration
- Software Architects designing systems with PostgreSQL databases
- Data Scientists needing to manage and query large datasets
- Business Intelligence Professionals seeking to understand the database layer
- Database Migration Specialists
- IT Consultants providing solutions on database architectures
- Cloud Database Specialists managing cloud-based PostgreSQL instances

Course Syllabus

Module 1- Introduction to PostgreSQL Server and Advance Features

Module 2- Postgres Client Server Architecture

Module 3- Getting Started

- Installing the PostgreSQL Server
- Setting Environment Variables

- Creating a Cluster
- Running Server

Module 4

- Configuring of PostgreSQL Server
- Connection Settings
- Security and Authentication
- Resource Settings
- WAL
- Error Reporting and Logging
- Auto vacuum
- Runtime Statistics, etc.

Module 5- Server Control

- Postgres hosed based access configuration
- Multiple server installation on one machine
- Remote connection establishment

Module 6- Client and Tools

- Introduction To PSQL
- Commands and Parameters
- Using graphical administration tools- pgAdmin 4
- Installation
- Binary path setting
- Remote server connection

Module 7- Creating and Managing Databases

- Object Hierarchy
- Databases and Schemas
- Tablespaces
- Exploring Databases
- Locating the database server's message log
- Locating the database's system identifier
- Listing databases on this database server
- How much disk space does a table use?
- Which are my biggest tables?

Module 8- Obtaining Metadata

Module 9- Transactions & Concurrency Control

Module 10- Database Administration

- Performing actions on many tables

- Writing a script
- Adding/removing schemas
- Moving objects between schemas
- Adding/removing tablespaces
- Moving objects between tablespaces
- Using materialized views

Module 11- Table Partitioning

- Range Partitioning
- List Partitioning

Module 12- Extensions

- Accessing objects in other PostgreSQL databases (postgres_fdw, dblink)
- File_fdw, hstore, citext, etc.

Module 13-Security

- User Management
- Superuser
- Roles and Users
- Groups and Access Control
- Ownership, Etc.
- Preventing Connections
- Checking secure password
- Auditing Changes
- Encrypting Sensitive data

Module 14- Monitoring and Diagnosis

- Real-time viewing using pgAdmin
- Checking whether a user is connected
- Checking which queries are running
- Checking which queries are active or blocked
- Knowing who is blocking a query
- Killing a specific session
- Knowing when a table was last used
- Usage of disk space by temporary data
- Understanding why queries slow down
- Producing a daily summary of log file errors
- Analysing the real-time performance of your queries

Module 15- Performance and Concurrency

- Find and Tune Slow Running Queries
- Collecting regular statistics from pg_stat* views
- Finding out what makes SQL slow

- Speeding up queries without rewriting them
- Discovering why a query is not using an index
- Forcing a query to use an index

Module 16- Regular Maintenance

- Controlling automatic database maintenance
- Removing issues that cause bloat
- Identifying and fixing bloated tables and indexes
- Monitoring and tuning vacuum
- Updating Table Statistics
- Vacuuming
- Re-indexing

Module 17- Backup and Recovery

- Planning backups
- Backup Types
- Logical
- Pg_dump
- Pg_dumpall
- Physical
- Standalone hot physical database backup
- Hot physical backup and continuous archiving
- PgBaseBackup
- Restore
- Pg_restore
- Recovery to a point in time
- Restore Physical Backup
- Recovery of a dropped/damaged table
- Recovery of a dropped/damaged database

Module 18- Moving Data

- Exporting/Importing Data To/From A Flat File

Module 19- Replication and Upgrades

- Replication
- Replication best practices
- Streaming Replication
- Implement Hot Standby
- Replication Slots
- Logical Replication
- repmgr
- Handling Switchover & Failover
- Upgrading Best Practices



step forward

- Upgrading - minor releases
- Upgrading - major release(pg_upgrade)
- Migration from Oracle to Postgres using Ora2PG (introduction)