EDB PostgreSQL Advanced Server V18

Duration: 5 days
Prerequisites: Working Knowledge of PostgreSQL

DAY 1 – PostgreSQL & EPAS Foundations

Module 1: Introduction to PostgreSQL & EPAS

- History of PostgreSQL
- Major Features
- New Features of PostgreSQL
- Multi Version Concurrency Control
- Write-Ahead Logging
- Architectural Overview
- Limits
- Evolution of PostgreSQL Versions
- Introduction to EPAS v18
- PostgreSQL Community vs EPAS
- ACID Properties

Module 2: PostgreSQL System Architecture

- Architectural Summary
- Shared Memory
- Statement Processing
- Utility Processes
- Disk Read Buffering
- Write Buffering
- Background Writer Cleaning Scan
- Commit & Checkpoint
- Physical Database Architecture
- Data Directory Layout
- Installation Directory Layout
- Page Layout
- Query Processing Lifecycle
- Parser, Planner and Executor
- WAL Internals
- FSM and Visibility Map
- TOAST Architecture

Module 3: Creating and Managing Databases

- Object Hierarchy
- Creating Databases
- Creating Schemas
- Schema Search Path
- Roles, Users & Groups
- Access Control

- Generated Columns
- Identity Columns
- Materialized Views
- Extensions
- Foreign Tables
- Storage Parameters

Module 4: Installation

- OS User & Permissions
- Installation
- Setting environment variables
- Clusters
- Creating a database cluster
- Starting and Stopping the Server
- (pg_ctl)
- Connect to the server using psql
- Installation

DAY 2 – Administration & SQL

Module 5: Configuration

- Setting PostgreSQL Parameters
- Access Control
- Connection Settings
- Security and Authentication Settings
- Memory Settings
- Query Planner Settings
- WAL Settings
- Background Writer Settings

Module 6: Log Management

- Where to Log
- When to Log
- What to Log
- CSV Logs
- Slow Query Logging
- Log Rotation
- Centralized Logging

Module 7: PSQL Commands

- Introduction
- Conventions

- Connecting to PostgreSQL
- PSQL Command Line Parameters
- Entering PSQL Commands
- PSQL Meta-Commands
- PSQL SET Parameters
- Information Commands

Module 8: pgAdmin & GUI Tools

- Registering a server
- Viewing and Editing Data
- Query Tool
- Databases
- Languages
- Schemas
- Domains
- Functions
- Sequences
- Tables
- Columns
- Constraints
- Indexes
- Maintenance
- Rules
- Triggers
- Types
- Views
- Table spaces
- Roles
- *pgAdmin 4 Overview*
- *Dashboard Monitoring*

Module 9: Tablespaces

- Tablespaces and Datafiles
- pg_global and pg_default
- Advantages of Tablespaces
- Creating Tablespaces
- Changing Default Tablespace
- Usage Example
- Altering Tablespaces
- Dropping Tablespaces

DAY 3 – Security, Backup & Recovery

Module 10: Security

- Authentication
- Authorization

- Levels of security
- pg_hba.conf file
- Users
- Object ownership
- Access control
- Application access parameters
- Row Level Security
- Column Level Security

Module 11: Backup and Recovery & Point-in Time Recovery

- Backup Types
- SQL Dump
- Cluster Dump
- Offline Copy Backup
- Continuous Archiving
- pg_basebackup
- Point-In Time Recovery
- pg_upgrade
- Hot Backup
- Incremental Backup Concepts
- Disaster Recovery Planning

Module 12: Postgres Data Dictionary

- The System Catalog Schema
- System Information views/tables
- System Information Functions
- pg_stat Views
- Catalog Relationships

Module 13: PostgreSQL API Connectivity

- Installing Third-Party Drivers
- Installation & Configuration of JDBC & ODBC Drivers
- Python Connectivity

DAY 4 – Performance, Maintenance & HA

Module 14: Performance Tuning

- Hardware Configuration
- OS Configuration
- Server Parameter Tuning
- Connection Settings
- Memory Parameters
- Memory settings for Planner
- WAL Parameters
- Explain Plan
- Explain Example

- Statistics Collection
- Indexes
- Examining Index Usage
- Tips for Inserting Large Amount of Data
- Partition Pruning
- Benchmarking using pgbench

Module 15: Routine Maintenance

- Explain and Explain Analyze
- Table Statistics
- Updating Planner Statistics
- Scheduling Auto Vacuum
- Preventing Transaction ID Wraparound Failures
- The Visibility Map
- Routine Reindexing
- Bloat Detection
- VACUUM FULL

Module 16: Replication & Failover

- Database High Availability
- Causes of Data Loss
- Plan for Common Errors
- Selection Criteria
- High Availability Options
- Hot Streaming Replication, Architecture and Setup
- Streaming Replication Example
- Synchronous Replication
- Logical Replication
- Replication Slots
- Failover & Switchover
- Read Replicas

DAY 5 – Advanced Features & Enterprise Workloads

Module 17: Table Partitioning

- Partitioning
- Partitioning Methods
- When to Partition
- Partitioning Setup
- Partitioning Example
- Partitioning and Constraint Exclusion

Module 18: Connection Pooling

- Pgpool-II
- Pgpool-II Features

- Install and Configure pgpool-II
- Pgpool II Modes
- Starting/Stopping pgpool-II
- Pgpool-II Example
- *pgBouncer*
- Connection Scaling
- Load Balancing

Module 19: Database Monitoring

- Database Statistics
- The Statistics Collector
- Database Statistic Tables
- Operating System Process Monitoring
- Current Sessions and Locks
- Log Slow Running Queries
- Disk Usage
- pg_stat_statements

Module 20: Migration

- Introduction to Migration Toolkit (Oracle/MSSQL to PostgreSQL)
- Migration Assessment
- Oracle Compatibility
- Demo - Migration from Oracle to PostgreSQL