SYLLABUS

DATABASE TECHNOLOGIES · COURSE HANDOUT 2026

POSTGRESQL

PES . CONSTRAINTS . JSONB
CTES . WINDOWS . EXTENSIO
UUM . INDEXES . REPLICATIO

DURATION	LEVEL	MODULES	MODE
45 Hours	Intermediate to Advanced	8	Classroom · Online · Hybrid

01 COURSE OVERVIEW

A PostgreSQL course covering advanced SQL, data types, extensions and server operations. The course uses PostgreSQL as it is meant to be used: strong constraints, rich types, JSONB where appropriate, CTEs and window functions, plus operational reality — autovacuum, bloat, index types and replication.

Learners build a schema with constraints, tune a query workload and configure streaming replication.

WHO IT IS FOR

- Backend developers
- Data engineers
- Database administrators
- Analysts writing advanced SQL

PREREQUISITES

Basic SQL knowledge.

02 LEARNING OUTCOMES

01 Design schemas using constraints and domains.

02 Choose between relational and JSONB modelling.

03 Write advanced SQL with CTEs and window functions.

04 Select the right index type for a workload.

05 Read EXPLAIN ANALYZE output and fix plans.

06 Understand MVCC, vacuum and bloat.

07 Configure backups and streaming replication.

08 Use extensions such as PostGIS and pg_stat_statements.

03 MODULE STRUCTURE

8 MODULES

01 POSTGRESQL FOUNDATIONS

- Installation
- Clusters, databases, schemas
- Configuration
- psql
- Roles
- Extensions

02 DATA TYPES AND CONSTRAINTS

- Numeric and text types
- Enums
- Domains
- UUIDs
- Arrays
- Ranges
- Check and exclusion constraints

LAB

CONSTRAINED SCHEMA

03 ADVANCED SQL

- Joins and lateral joins
- Window functions
- Upserts
- CTEs and recursion
- Grouping sets
- Returning clauses

LAB

ANALYTICAL QUERIES

04 JSON AND FULL TEXT

- JSON vs JSONB
- Search vectors
- Trigram search
- Operators and indexing
- Ranking
- When not to use JSONB

05 INDEXES AND PLANNING

- B-tree, GIN, GiST, BRIN
- EXPLAIN ANALYZE
- Planner settings
- Partial and expression indexes
- Statistics

LAB

PLAN TUNING

06 TRANSACTIONS AND MVCC

- Isolation levels
- Row versions
- Autovacuum
- Bloat detection
- Locks
- Advisory locks

07 PROGRAMMABILITY

- Views and materialised views
- PL/pgSQL functions
- Triggers
- Partitioning
- Foreign data wrappers

08 OPERATIONS

- pg_dump and pg_basebackup
- WAL
- Point-in-time recovery
- Streaming replication
- Connection pooling
- Monitoring

PROJECT

TUNED, REPLICATED POSTGRESQL SETUP

04 ASSESSMENT & CERTIFICATION

Module assignments and labs	**25%**
Mini projects	**20%**
Internal assessments	**15%**
Final project and review	**40%**

CERTIFICATION

Learners who complete all modules, submit the final project and clear the review receive a course completion certificate from Kaizen Infinities Private Limited. Project work is documented for the learner's portfolio, and interview preparation is included in the closing sessions.

05 CAREER OUTCOMES

ROLES THIS PROGRAMME PREPARES FOR

POSTGRESQL DEVELOPER · **DATABASE ADMINISTRATOR** · **DATA ENGINEER** · **BACKEND ENGINEER** · **PLATFORM ENGINEER**

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