

# SQL School

## Quality Training Assured

### PostgreSQL DBA Training

Complete Practical; Real-time Job Oriented Training

|   | PLAN A           | PLAN B                           |
|---|------------------|----------------------------------|
| Description                                       | PostgreSQL DBA   | Azure Database<br>for PostgreSQL |
| Course Curriculum                                 | Chapters 1 to 18 | Chapters 1 to 27                 |
| PostgreSQL: Architecture, Configurations          | ✓                | ✓                                |
| PostgreSQL: SQL Queries and Sub Queries           | ✓                | ✓                                |
| PostgreSQL: Constraints, Keys, Joins & Views      | ✓                | ✓                                |
| PostgreSQL: Stored Procedures and Functions       | ✓                | ✓                                |
| PostgreSQL DBA: Lock Management, Tuning           | ✓                | ✓                                |
| PostgreSQL DBA: Backups and Restores              | ✓                | ✓                                |
| PostgreSQL DBA: HA DR with Replication            | ✓                | ✓                                |
| PostgreSQL DBA: HA DR with Log Shipping           | ✓                | ✓                                |
| PostgreSQL DBA: Security Management               | ✓                | ✓                                |
| PostgreSQL DBA: Service Packs, Maintenance        | ✓                | ✓                                |
| PostgreSQL DBA: Common Issues, Solutions          | ✓                | ✓                                |
| PostgreSQL in Azure: Configurations, Migrations   | X                | ✓                                |
| PostgreSQL in Azure: Server Modes, Hybrid Cloud   | X                | ✓                                |
| PostgreSQL in Azure: Maintenance and Tuning       | X                | ✓                                |
| PostgreSQL in Azure: Server Failover, Maintenance | X                | ✓                                |
| PostgreSQL in Azure: Security Management          | X                | ✓                                |
| <b>TOTAL DURATION</b>                             | 4 Weeks          | 6 Weeks                          |

Trainer : Mr. Sai Phanindra T : 16+ Yrs of Real-time Exp. Profile @ [linkedin.com/in/saiphanindra](https://linkedin.com/in/saiphanindra)

# PostgreSQL Training Course Plan

| Training Module                                      |                                   | Dur | Plan A | Plan B |
|--|-----------------------------------|-----|--------|--------|
| Part 1   | PostgreSQL DBA                    | 4 W | ✓      | ✓      |
| Part 2   | Azure Database for PostgreSQL DBA | 2 W | X      | ✓      |
| Total Duration [Including Real-time Project, Resume] |                                   | 4 W | 6 W    |        |

## Part 1: PostgreSQL DBA

Applicable for PostgreSQL DBA Plan A, B

### Chapter 1: Introduction & Installation

Database Basics and Database Types; OLTP, DWH, OLAP and HTAP; RDBMS : Need and Importance; PostgreSQL : Advantages, Usage; PostgreSQL as a Open Source; PostgreSQL : History and Versions; PostgreSQL : Real-time Usage; PostgreSQL : Windows, LINUX OS; PostgreSQL Installation in Windows; bin, data and PATH Concepts; PgAdmin4, Command Line Tools; Post Installation, Environment Variables; Path, bin and PGDATA Variables; Installation Verification Options;

### Chapter 2: SQL Basics, Linux Installation

Using PSShell and pgAdmin Tools; Creating and Connecting Databases; DDL, DML and SELECT Statements; Creating Tables and Data Inserts; IN, NOT IN, AND, BETWEEN Operators; DISTINCT, ORDER BY, LIKE, NOT LIKE; Order By, Basic Level Sub Queries; LIMIT, OFFSET and Column Aliases; UPDATE, DELETE & SELECT INTO; TRUNCATE, ALTER and DROP; PostgreSQL Installation in LINUX; PostgreSQL in RHEL & Ubuntu; sudo & yum For RPM Packages; apt install, apt update, systemctl;

### Chapter 3: PSQL Tool & Transactions

Using PSQL Shell Command Line; Creating Databases, Tables in PSQL; Connecting to Databases, Table List; Creating Tables with Schemas; Working with Default "Public" Schema; Aliasing : Table Level, Column Level; Table Imports and COPY Statement; Transactions : ACID Properties; Transaction Types and Options; BEGIN TRANSACTION and BEGIN; COMMIT and ROLLBACK Concepts; COMMIT WORK Statement; Verifying Transactions in Database; Advantages of Commit & Rollback;

### Chapter 4: Constraints, Keys

Constraints and Keys in PostGreSQL; Null and Not Null Constraints; Primary Key and Real-time Usage; Unique Key and Real-time Usage; Foreign Key Constraint, Relations; Entity Relationship (ER) Models; Check Constraint and Conditions; Identity Column and Seed, Increment; GENERATED ALWAYS AS IDENTITY; GENERATED BY DEFAULT AS IDENTITY; Custom Start and Increment Values; Composite Keys and Self References; Adding Keys to Existing Tables; SERIAL Data Type and Sequence;

## **Chapter 5: Join Queries in PostgreSQL**

Joins : Purpose and Types of Joins; INNER Join and Matching Data; OUTER Join Types in PostgreSQL; Left Outer Join and Real-time Usage; Right Outer Join and Real-time Usage; Full Outer Join and Real-time Usage; Cross Join and Comma (,) in Tables; Natural Joins with Common Columns; Natural Inner / Left / Right Outer Joins; USING Keyword for Table Joins; Self Joins and Table Aliasing in Joins; Hierarchical Data Reporting in Joins;

## **Chapter 6: Functions and Triggers**

PostgreSQL PL/pgSQL Programming; Stored Procedures Creation, Use; Functions and Types in PostgreSQL; Overloading Concepts in Functions; Dynamic Data Retrieval in PSQL; Internal Functions in PostgreSQL; Triggers and Callback Functions; Row Level, Statement Level Triggers; BEFORE and AFTER Triggers in PSQL; NEW and OLD System Tables; PLPGSQL and Trigger Functions; Triggers Rename and Retrieval;

## **Chapter 7: Server Architecture**

PostgreSQL Server Architecture; Server Process and Client Process; Postgres Program : Internal Process; Postmaster Process and forks; Background Process, Connections; Utility Processes: Bgwriter, WAL; Checkpointer and StatsCollector; Log Writer, Autovacuum Utilities; Memory Segments and Usage; Shared Buffer and WAL Buffer; Dirty Data and background writer; Background Process, Backend Process;

## **Chapter 8: Database Architecture**

Installation Directory Layout; bin, data, doc, include, installer; scripts, share, pgadmin directories; Database Directory Layout; Base, Log, commit\_ts, mem; notify, pg\_ident.conf, pg\_xact; Base Directory Layout, OID; Default Databases in Postgres; postgres, template0, template1; Tablespaces, Real-time Advantages; pg\_default, pg\_global tablespaces; Create, Modify, Audit Tablespaces;

## **Chapter 9: Clusters, Inheritance, COPY**

PostgreSQL Clusters and Real-time Use; Data Directory and Data Area; initdb command Usage, Executions; Default Databases and their Usage; Start \ Stop Cluster and Operations; postgresql.conf , pg\_ctl status; Shutdown: Fast, Smart, Linux; Reload and Restart Clusters; pg\_controldata, Logical Structure; Table Inheritance : Auto DML; Creating Master, Child Tables; Create Table as Table Option; Create Table as Table with Nodata;

## **Chapter 10: Security Management - 1**

PostgreSQL Security Management; Users; Roles and Logins For Security; Server Level, Database Level Security; Schema Level, Table, Object Security; Column Level, Row Level Security; PSQL Client Tool and its Usage; Postgres Super User, Connection Test; Public Schema and REVOKE Options; Revoke and Revoke All from Public; Role Management: Users, Logins; search\_path, sequence, defaults; Creating Logins without Passwords; pgAdmin Tool, Alter Role; ReadOnly;

## **Chapter 11: Security Management - 2;**

Column Level Security Implementation; Column Security with User Views; Column Security with Permissions; Column Encryptions, pgp\_sym Functions; pgp\_sym\_encrypt, pgp\_sym\_decrypt; Row Level Security (RLS) & Policies; ENABLE and DISABLE RLS Options; Alter User, bypassrls & All PUBLIC; pg\_hba.conf: Usage, Record Format; trust, password, md5, ident, peer; SHOW Command, Service Restarts; LINUX Users & Management Options; User DBs, Linux User Connections;

### **Chapter 12: Backup & Restore - 1**

Backups: Types, Levels in Postgres; Logical and Physical Backups; Backup Tools: pg\_dump, pg\_dumpall; Online Backups, Offline Backups; Logical Backups : Single Table; Multiple Tables, Single Database; Logical Backup Options, Usage; Backups using pgAdmin Tool; TAR, TXT, SQL Formats, Verification; pg\_restore and psql app Usage; Big Database Backups and Restores; Partial Backups and Restores; Restore DB with Auto Create;

### **Chapter 13: Backup & Restore - 2**

Physical Backups in Real-time, Usage; Offline Backups with Database Clusters; tar files: Windows & Linux Environments; Online Backups and Continuous Archival; Auto Archival Process in LINUX OS; wal\_level and archive\_mode Options; archive\_command with File Formats; WAL Archival Process with LINUX OS; Point In Time Recovery (PITR) in Ubuntu; pg\_switch\_all, pg\_basebackup Utilities; Physical Backups, Continuous Archival; sudo Users for WAL Archival, Permissions; nano and vi for Config Edits, Precautions;

### **Chapter 14: Performance Tuning - 1**

Indexes : Purpose and Query Executions; Single Column Index and Real-time Use; Multi Column Index and Real-time Use; Unique Indexes and Data Retrieval; Implicit Indexes and Index Expressions; Index-Only Scans and Covering Indexes; Index Types: btree, Hash, GiST, SP-Gist; GIN and BRIN: Real-time Usage; Index Recommendations in Real-time; Views : Creation and Usage in PSQL; DML Operation on Tables with Views; Temporary View and Temporary Tables; Materialized Views and Real-time Use;

### **Chapter 15: Performance Tuning - 2**

Table Partitions & Performance Benefits; Table Inheritance For Table Partitioning; Data Routing Functions and Triggers; Full Text Search (FTS), Keyword Indexes; Document: TSVector, TSQuery Usage; to\_tsvector and to\_tsquery Options; Single Term Search, Multi Term Search; Word Statistics, pg\_available\_extensions; CTE: Common Table Expressions, Usage; Real-time Scenarios for CTE Usage; Recursive CTEs, Recursive Views; ReIndexing Strategies: Table Level; Schema Level, DB Level ReIndexing;

### **Chapter 16: Performance Tuning - 3**

Table Clusters in Postgres, Usage; Index, Table & Database Level Clusters; Performance Advantages with Clusters; Maintenance Tasks : Planner Statistics; Updating Statistics, Analyse Query Plans; Vacuum Options, Analyse Command; AutoVacuum Program, Query Costs; Page Count, Row Count and Seq Cost; Vacuum and Vacuum Full Programs; Visibility Map File (VSM) and its Use; Free Space Map File (FSM) and its Use; TOAST and AccessExclusiveLock; VacuumDB Command : Clean, Analyze;

### **Chapter 17: Lock, Database Migrations**

Transactions and Lock Management; Table Level Locks, Row Level Locks; Query Blocking and Deadlocks; Advisory Locks and Metadata Locks; Lock Queue, Lock Management Options; Page Locks, Shared and Exclusive Locks; TXD\_CURRENT and pg\_stat\_activity; pg\_cancel\_backend, pg\_terminate\_backend; PG\_LOCKS and TIMEOUT Options; Database Migrations with PostgreSQL; SQL Server Migrations to PostgreSQL; Database Migration Tools, Schema Check; Data Type Mapping, Pipe/TCP Connections;

### **Chapter 18: HA-DR with Postgres**

High Availability and Disaster Recovery; PostgreSQL Replication, Advantages; wal sender, wal receiver, startup; pg\_hba.conf Entries for repl host; pg\_basebackup & Fault Tolerance; Single and Multi Master Replication; recovery.conf file & configurations; primary\_conninfo & standby\_mode; Log Shipping Options with Replication; Replication Setup Validations; grep sender, grep receiver, grep startup; pg\_stat\_replication, PID Audits; Real-time Considerations with HADR;

## **Part 2: Azure Database for PostgreSQL DBA**

Applicable for PostgreSQL DBA Plan B

### **Chapter 19: Azure Database For PostgreSQL**

Azure Databases for PostgreSQL; Relational Database as a Service; PostgreSQL Community Edition; Advantages, Implementation Options; Deployment Models in Azure; Single Server, Flexible Server; HyperScale (Citus) Options; Azure (Cloud) Operations; PaaS, SaaS and IaaS Options; Azure Cloud Configurations; Azure Resources and Groups; Need for DBaaS in Azure; Database As a Service Advantages;

### **Chapter 20: Azure Fundamentals**

Azure Resources and Services; Azure Resources and Services; Azure Storage Account & Use; Azure Blob Storage Containers; LRS, GRS and RA-GRS Options; Hot and Cold Data Storage; Creating Azure File Shares; Azure Active Directory (AAD); AAD Services and Options; Creating Users and Groups; Ownerships and Group Permissions; App Registrations - Service Principals; Service Principal Tokens and IAM;

### **Chapter 21: PostgreSQL Server, DB in Azure**

Relational Database as a Service; Creating Resource Groups in Azure; Creating PostgreSQL Server in Azure; Flexible Server Deployment Options; Server Name, Location, Versions; Compute and Storage Options; Administrator Account & Privileges; Connection Information in Azure; Firewall Configuration Options; psql Connections to Azure PostgreSQL; Database and Table Creations; Test Data Insertions and Queries; OnPremise Versus Azure Differences;

### **Chapter 22: PostgreSQL DB Migrations**

Database Assessment Options; Migrating OnPremise DB to Azure; Migrating PostgreSQL to Azure SQL; Using DMS [Data Movement Service]; Working with Hyperscale Server; Microsoft Virtual Networks & VPN; Network Security Group (NSG) for DMS; Vcore Purchasing with PostgreSQL; Server Level and DB Level

Firewalls; Migrating Schema using Bash Commands; Dropping the Foreign Keys for Migration; Trigger Management Options for DMA; DMS Instance Provision with CLI;

### **Chapter 23: DB Backups and Restores**

Automated Backups in Azure; Manual Backup Configurations; Backup History and Maintenance; Backup Types and Retention; Backup History Purge in Azure; Backup Audits and Monitoring; Single / Multiple DB Backups; Restore Database (PITR) Options; Manual Restores with PostgreSQL; Long Term Retention Options; Recovery of Lost Databases; Re-Restoring DBs in Azure;

### **Chapter 24: Monitoring and Tuning**

Enabling Data Collection in Azure; PostgreSQL Server Parameters; pg\_qs.query\_capture\_mode; pgms\_wait\_sampling.query\_capture\_mode; Query Performance Insights; Query Metrics and Visualizations; Long Running Queries, Troubleshooting; Wait Statistics and Server Dashboards; Performance Recommendations; Query Execution Plans & EXPLAIN; Index Recommendations and Stats; Differences with On-Premise;

### **Chapter 25: Security Management**

Using Identity & Access Management; PostgreSQL Server Level Security; PostgreSQL Database Level Security; PostgreSQL Object Level Security; PostgreSQL Data Level Security; Vulnerability Assessment (VA); Transparent Data Encryption (TDE); SSL Configuration and Protection; Firewall Security and Network; Security Baselines and Controls; Security Strategy in PostgreSQL; Differences with On-Premise;

### **Chapter 26: HA & DR Concepts**

High Availability Concepts (HA); Disaster Recovery Concepts (DR); HA DR during High Usage Periods; HA DR during Planned Maintenance; Automated and Manual Failover; Force Failover & Connection Switch; Configure Hyperscale Citus For HA DR; Enabling High Availability with Worker; Coordinator Status and Availability; Data Distribution Options; HA DR Strategy in PostgreSQL; Differences with On-Premises

### **Chapter 27: Planned Maintenance**

Automated Patching in Azure; Service Features, S/W Updates; Planned Maintenance: Duration; Planned Maintenance: Impact; Alerts and Notifications in Azure; Event Types and Action Groups; Alert Rules and Pricing Options; Cancel / Postpone Maintenance; Retry Logic with Planned Maintenance; Troubleshoot Connection Issues; Transient Errors and Solutions; Persistent Errors and Solutions; Real-time Recommendations;

## **Resume, Project Oriented FAQs and Solutions**

**Email :** contact@sqlschool.com

**Call Us (India) :** 24 x 7

+91 9666 44 0801

+91 9666 64 0801

**Skype:** SQL School Training Institute

**Website:** www.sqlschool.com

**Trainer Contact:**

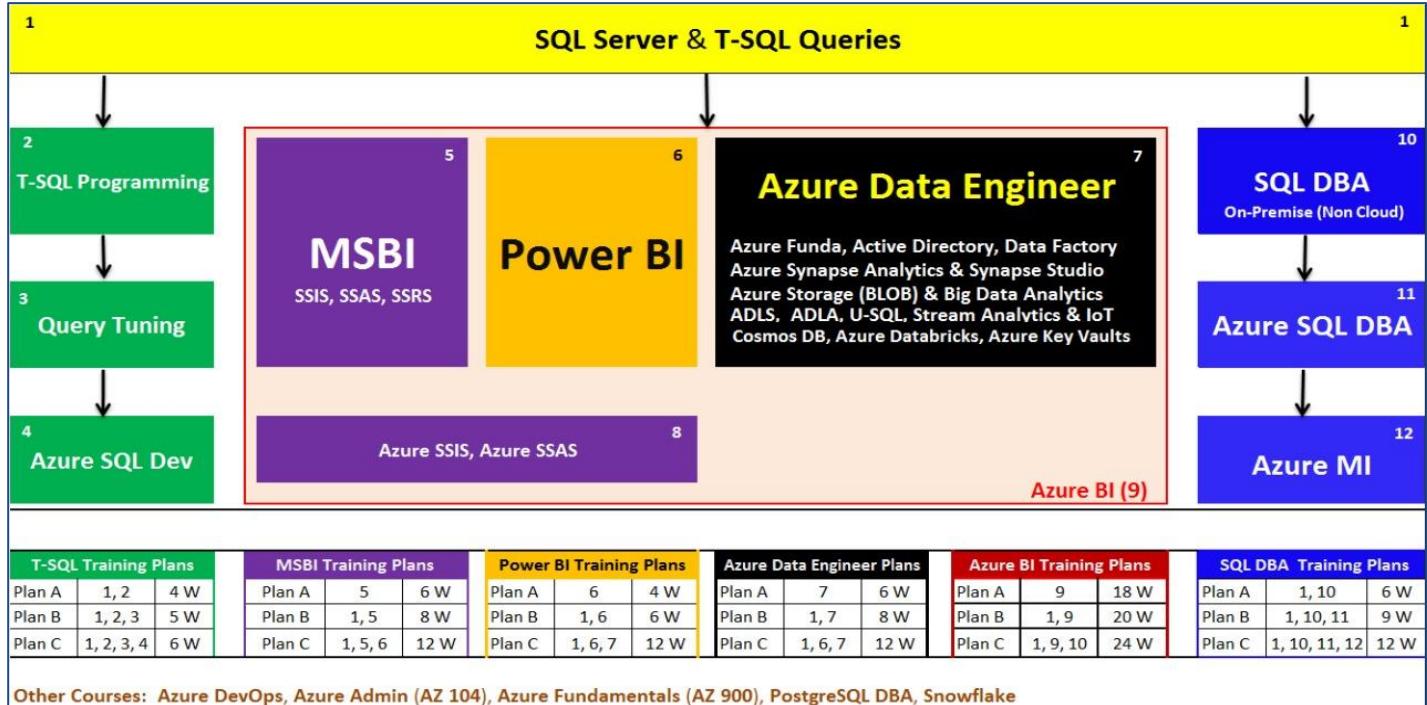
saiphanindrait@gmail.com

+91 9030040801

**Call Us (USA / Canada) :** 24 x 7

+1 956.825.0401

## Courses From SQL School :



## Training Modes:



Trainer Profile :

<http://linkedin.com/in/saiphanindra>

Register today for free demo at :

<https://sqlschool.com/Register.html>

**Website:**

<https://sqlschool.com/>