

PostgreSQL

Related Roadmaps

- ✔ MongoDB Roadmap
- ✔ Backend Roadmap

Introduction

- What are Relational Databases?
- RDBMS Benefits and Limitations
- PostgreSQL vs Other RDBMS
- PostgreSQL vs NoSQL Databases

- Using Docker
- Package Managers

- Managing Postgres
- Using `systemd`
 - Using `pg_ctl`
 - Using `pg_ctlcluster`

- Connect using `psql`
- Deployment in Cloud

Learn SQL Concepts

- DDL Queries

 - For Schemas
 - For Tables
 - Data Types
- DML Queries

 - Querying Data
 - Filtering Data
 - Modifying Data
 - Joining Tables
- Import / Export using `COPY`
- Advanced Topics

 - Transactions
 - CTE
 - Subqueries
 - Lateral Join
 - Grouping
 - Set Operations

- Replication
- Logical Replication
 - Streaming Replication

- Connection Pooling
- PgBouncer
 - PgBouncer Alternatives

Configuring PostgreSQL

- Reporting Logging and Statistics
- Following [postgres.conf](#) configurations and more
- Adding Extra Extensions

- Default Privileges
- Grant / Revoke
- Object Privileges

- Postgres Security Concepts
- Advanced Topics
 - Row-Level Security
 - SELinux

Develop Infrastructure Skills

- Kubernetes Deployment

 - Simple Stateful Setup
 - Helm
 - Operators
- Cluster Management

 - Patroni
 - Patroni Alternatives
- Upgrade Procedures

 - Using `pg_upgrade`
 - Using Logical Replication
- Backup / Recovery Tools

3rd Party

 - barman
 - WAL-G
 - pgbackrest
 - pg_probackup

Building Tools

 - pg_dump
 - pg_dumpall
 - pg_restore
 - pg_basebackup

Backup Validation Procedures
- Anonymization

 - PostgreSQL Anonymizer
- Load Balancing & Service Discovery

 - HAProxy
 - Consul
 - KeepAlived
 - Etcad
- Monitoring

 - Prometheus
 - Zabbix
 - check_pgactivity
 - temBoard
 - check_pgbackrest

Learn to Automate Routines

- Shell Scripts
 - Any Programming Language
 - Terraform
- Configuration Management
- Ansible
 - Salt
 - Chef
 - Puppet

Application Skills

- Migrations
 - Practical Patterns and Antipatterns
 - liquibase, sqitch, Bytebase, ora2pg etc
- Migration Tools
- Bulk Loading and Processing Data
 - Data Partitioning
 - Sharding Patterns
 - Data Normalization / Normal Forms
- Queues
 - Practical Patterns and Antipatterns
 - Skytools PGQ

Advanced Topics

- Low Level Internals
- Processes and memory architecture
 - Vacuum Processing
 - Buffer Management
 - Lock Management
 - Physical Storage and File Layout
 - System Catalog
- Fine Grained Tuning
- Per-user, Per-Database Settings
 - Storage Parameters
 - Workload-dependant tuning: OLTP, OLAP, HTAP
- Advanced SQL
- PL/pgSQL
 - Procedures and Functions
 - Triggers
 - Recursive CTE
 - Aggregate and window functions

Troubleshooting Techniques

- Postgres System Views

 - pg_stat_activity
 - pg_stat_statements
- Postgres Tools

 - pgcenter
- Query Analysis

 - EXPLAIN
 - Depesz
 - PEV2
 - Tensor
 - explain.dalibo.com
- Troubleshooting Methods

 - USE
 - RED
 - Golden Signals
- Operating System Tools

 - top
 - sysstat
 - iotop
- Profiling Tools

 - gdb
 - strace
 - ebpf
 - perf-tools
 - Core Dumps
- Log Analysis

 - pgBadger
 - pgCluu
 - awk
 - grep
 - sed

SQL Optimization Techniques

- B-Tree
 - Hash
 - GiST
- Indexes and their Usecases
- SP-GiST
 - GIN
 - BRIN

- Schema Design Patterns / Anti-patterns
- SQL Query Patterns / Anti-patterns

Get Involved in Development

- Mailing Lists
- Reviewing Patches
- Writing Patches

Keep Learning