

TencentDB for PostgreSQL

Product Introduction

Product Documentation



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1. Introduction to PostgreSQL

PostgreSQL is one of the world's most powerful open source databases, supporting mainstream programming languages, including C, C++, Perl, Python, Java, TCL, PHP, etc. It can fully implement SQL specifications and support a wide range of data types, such as JSON data, IP data, and geometry data, which are not fully supported by most commercial databases. PostgreSQL has been developing rapidly in the past few years. It is now widely used in various industries including geospace, mobile applications and data analysis, and has become the first choice for many enterprise developers and innovative companies.

2. Introduction to TencentDB for PostgreSQL

TencentDB for PostgreSQL allows you to easily configure, work with and expand the PostgreSQL, one of the most powerful open-source databases, on the cloud. Tencent Cloud handles most complicated and time-consuming management works for you, such as installation of PostgreSQL software, storage management, high-availability replication, and data backup for disaster recovery. Therefore, you can focus on the development of business applications.

Currently, TencentDB for PostgreSQL 10, 11, 12, 13 and 14 are available.

Features

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Managed Deployment

You can launch a TencentDB for PostgreSQL instance and connect it to applications in minutes with no additional configuration required. The default configuration has universal parameters that can be modified at any time in the console. This eliminates laborious and complicated installation and configuration processes and improves your OPS efficiency.

Convenient Monitoring

TencentDB for PostgreSQL provides key operational metrics for PostgreSQL databases for free, including performance monitoring data such as CPU utilization, storage utilization, and I/O. You can view them in the console to quickly locate and resolve issues. In addition, customizable metric alarms are also available to allow you to stay on top of exceptions via email and SMS without needing to monitor your databases round the clock.

Ultra-high Performance

TencentDB for PostgreSQL provides a QPS at least 10 times that of SATA by using NVMe SSDs. It features a primary/standby deployment mode and enables sync replication by default; this enables you to avoid business interruptions and problems such as data corruption and loss.

Enhanced Security

Databases by default adopt a primary/standby strong sync mechanism with database instance availability of up to 99.95% and data reliability of up to 99.99999%.

The cluster scheduler of TencentDB for PostgreSQL will automatically restore a node when it fails to a previous point in time for failover and disaster recovery. You can also manually restore database data from backups in the console. For more information, please see [Backing up Data](#). Moreover, TencentDB provides multiple default layers of security protection for each database that does not need to be purchased separately.

Strong Scalability

TencentDB for PostgreSQL instances can be scaled in the Tencent Cloud console to meet your elastic business needs with no additional configuration needed. The scaling process won't change the IPs and settings of the original instances, and your business will be interrupted just for a second. If the existing instances cannot sustain your business, their capacity can be easily expanded to serve more end users with minor or no changes made to your business.

Strengths

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Powerful Features

Over the recent years, PostgreSQL has become the go-to open-source relational database for commercial use.

- PostgreSQL is released under a BSD-style license, which means there are no restrictions on using PostgreSQL.
- PostgreSQL supports C, C++, Java, PHP, Python, Perl, and other programming languages, making the development of your business easier and faster.
- PostgreSQL is the best open-source alternative to Oracle in terms of architecture, syntax, and data types.
- PostgreSQL is compatible with the SQL:2003 standard and supports the main features of SQL:2011.
- PostgreSQL supports the traditional SQL LIKE operator, the more recent SQL:1999 SIMILAR TO operator, and POSIX-style regular expressions.
- PostgreSQL supports rich data types, including geometry, network address, XML, JSON, RANGE, and array.
- PostgreSQL supports complex types (custom data types).
- PostgreSQL supports complex multi-table joins and join algorithms such as hash joins and merge joins.
- PostgreSQL has window functions that can perform real-time complex data analysis and processing, such as market analysis, financial statement creation, plan creation, and other day-to-day business tasks.
- PostgreSQL supports function indexes, partial (row) indexes, custom indexes, and full-text indexes.
- PostgreSQL features a multi-process architecture that makes it more stable, so that a single PostgreSQL database can achieve a high throughput.
- PostgreSQL supports powerful, high-performance extensions. For example, PostGIS is a database extension for geo-spatial data and provides additional support for geographic objects, allowing you to run location queries with SQL.
- PostgreSQL provides strong data consistency required for commercial use. With sync replication, it guarantees zero data loss and is even suitable for financial trading systems.

High Performance

PostgreSQL achieves high performance in OLAP or OLTP scenarios.

- PostgreSQL provides query optimizers comparable to those of commercial databases. It also supports common multi-table join queries (such as nested loop joins, hash joins, and sort-merge joins). For example, the performance of joining two tables, each with 100,000 rows, is 100 times faster than that of MySQL. With the capability of obtaining query results faster from more tables, you can make your analysis more accurate.

- PostgreSQL uses NVMe SSDs as the storage media with a QPS as high as 230,000. You can support more concurrent business requests with fewer databases.
- PostgreSQL supports a large number of performance profiles. You can view performance data such as the ongoing SQL queries, current lock waits, table scans, and index scans, which helps you quickly and accurately locate performance problems.
- TencentDB for PostgreSQL improves the performance of built-in operators by optimizing the PostgreSQL kernel, and provides a QPS at least ten times that of SATA by using ultra high-performance NVMe SSDs. It features a primary/standby deployment mode and enables sync replication by default. This helps you avoid business interruptions and problems such as data corruption and loss.

Convenient Management

You can launch a TencentDB for PostgreSQL instance and connect it to applications in minutes with no additional configuration required. The default configuration has universal parameters that can be modified at any time in the console. This eliminates laborious and complicated installation and configuration processes to improve your Ops efficiency.

Convenient Monitoring

TencentDB for PostgreSQL provides key operational metrics for PostgreSQL databases for free, including performance monitoring data such as CPU utilization, storage utilization, and I/O. You can view them in the console to quickly locate and resolve issues. In addition, customizable metric alarms are also available to allow you to stay on top of exceptions via email and SMS with no need to monitor your databases around the clock.

Strong Scalability

TencentDB for PostgreSQL instances can be scaled in the Tencent Cloud console to meet your elastic business needs with no additional configuration needed. The scaling process won't change the IPs and settings of the original instances, and your business will be interrupted just for a second. If the existing instances cannot sustain your business, their capacity can be easily expanded to serve more end users with minor or no changes made to your business.

High Availability

The cluster scheduler of TencentDB for PostgreSQL will automatically restore a node when it fails to a previous point in time for failover and disaster recovery. Moreover, it provides multiple default layers of security protection for each database that does not need to be purchased separately.

Use Cases

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Enterprise Databases

Applications such as ERP, trading systems and financial systems need to handle sensitive data such as fund and customer information. Therefore, they require no data loss and complex business logics. With PostgreSQL as the underlying storage system, you can achieve high availability with data consistency, and implement complex business logics with simple programming languages.

Applications with LBS

Large games, O2O and other applications need to support such capabilities as world map, nearby stores, distance between two points, etc. PostGIS provides additional support for geographic objects, allowing you to run location queries with SQL without the need of complex programming languages, so that you can simplify your business logics, easily implement LBS, and increase the user stickiness.

Data Warehouse and Big Data

With more data types and powerful computing capability, PostgreSQL makes it easier for you to build a data warehouse or a big data analytics platform, so as to maximize your business operation value.

Website or App Development

Featuring good performance and powerful capabilities, PostgreSQL can effectively improve website performance and reduce development difficulty.

Information Security

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1. Overview

TencentDB for PostgreSQL has passed and meets the security requirements of the following certifications:

- ISO22301 Certification
- ISO27001 Certification
- ISO20000 Certification
- ISO9001 Certification
- Trusted Cloud Service Certification
- Cybersecurity Classified Protection Certification (Level 3)
- STAR Certification

Some features of TencentDB for PostgreSQL are designed based on the following standards:

- GBT 20273-2006 Information Security Technology - Security Techniques Requirement for Database Management System (Level 2 or Above)
- JRT 0072-2012 Testing and Evaluation Guide for Classified Protection of Information System of Financial Industry (Level 4)

2. TencentDB for PostgreSQL Service Security Protection

2.1 Overview

Management and technical security requirements of TencentDB for PostgreSQL comply with China's Cybersecurity Classified Protection (Level 3). Some of the product features meet the standards of Classified Protection of Information System of Financial Industry (Level 4).

2.2 Internal personnel and system authentication

To improve the security of database server system and ensure the security of various OPS activities, Tencent Cloud has implemented a series of security reinforcement measures, including but not limited to:

- Tencent Cloud carries out identification and authentication for users who log in to the operating system and database system and guarantees the uniqueness of usernames.
- Usernames and passwords must be configured as required. A password must contain at least 8 characters of 3 types and should be changed regularly.

- The login failure processing mechanism can be enabled to take actions such as ending session, limiting the number of unauthorized login attempts, and automatically exiting in case of login failures.
- Access to the system during remote management is under monitoring by Tencent Enterprise IT, and internal risk management and audit are provided, with all sensitive operations encrypted.
- Two-Factor authentication (dynamic token and password) is required for database server admins when they log in to the OPS system.

2.3 Internal personnel and system access control

For TencentDB management systems and admins, a discretionary access control scheme is implemented, including but not limited to:

- Internal OPS staff and systems are controlled based on Tencent Cloud security policies (audit requirements are met).
- The granularity of a subject is down to user level, and that of an object to database table level.
- Strict code management and access control are implemented.
- High-risk systems can only be accessed over Tencent private network (development network), which is physically isolated from the internet.

2.4 Internal security audit

A comprehensive security audit and risk management mechanism is provided: audit features include but are not limited to audit for database operations, management system operations, file operations, external device operations, unauthorized external connections, IP address changes, and services and processes. The audit range covers each operating system user and database user in the server, with crucial security-related system events audited, such as Tencent Cloud admin behaviors, exceptional system resource usage, and use of important system commands. Audit records contain information like event date, time, type, subject ID, object ID, and result, and can be stored for over a year in a location with a higher level of security in order to avoid unexpected deletion, modification, or overwriting.

- Management system operation audit: Tencent Cloud keeps detailed logs of all operations in both internal and external management systems for effective risk traceability.
- Routine risk assessment: Tencent Cloud security team performs security assessment on database OPS management on a regular basis.

2.5 Internal intrusion prevention

Tencent Cloud takes multi-dimensional approaches to intrusion prevention for database servers:

- The intrusion detection system can defend against intrusions into database servers.
- Vulnerability scanning is deployed, and system security inspection is performed periodically.
- The device security management system is deployed, and the patch distributing module is enabled to update systems with patches timely.

- The operating system is installed on a minimal installation basis, with only necessary components and applications installed and unwanted services disabled.
- Reinforcement is implemented on other security configurations based on system type.

2.6 Backup and restore

TencentDB provides data backup and restoration features by default. Full backup is performed at 1:00 AM every day and retained for 7 days (features such as automatic backup, custom backup retention period, and COS backup service will be available in the future). The xlog files will be automatically backed up when you perform operations and retained for 7 days. The backup files can be downloaded in **Backup Management** on the instance management page in the console. Full backup files are in the backup list, and xlog files required for incremental backup are in the xlog list. Data can be restored through full backup and xlog files. For more information, please see [Restoring PostgreSQL Data on CVMs](#).

2.7 Secure reuse of objects

For returned or replaced devices, Tencent Cloud will clear the residual information promptly, so that the storage capacity (memory and disk) where the previous user's sensitive information such as authentication information, files, directories, and database records is stored will be released in time or completely cleared before the devices are reassigned to other users.

2.8 Non-Repudiation

Tencent Cloud's internal OPS personnel are required to go through a two-factor authentication and non-repudiation process when logging in to the system. All the personnel involved have signed a NDA.