TencentDB for PostgreSQL

Performance White Paper

Product Documentation

Contents

Performance White Paper
Test Methods

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Test Tool

Sysbench is an open-source, modular, cross-platform multi-threaded benchmark test tool tailored for online transaction processing (OLTP) scenarios. Sysbench can evaluate and test the performance of database core parameters under high load conditions.

In a standard OLTP read-write scenario of SysBench, a transaction contains 18 read-write SQL statements.

In a standard OLTP read-only scenario of SysBench, a transaction contains 14 read SQL statements (10 primary key point queries, 4 range queries).

In a standard OLTP write-only scenario of SysBench, a transaction contains 4 write SQL statements (2 UPDATE statements, 1 DELETE statement, 1 INSERT statement).

SysBench version 1.1.0 is used for this stress test. For more information, see the official document for Sysbench.

Test Environment

This document describes the environment used for the performance test of TencentDB for PostgreSQL.

Region/AZ: Beijing - Beijing Zone 7

Client: CVM Standard S6 (16 cores, 32GB, SSD cloud disk) 5Mbps

Client OS: 64-bit TencentOS Server 2.6 (Final)

Network: Both the CVM and TencentDB for PostgreSQL instances use the Virtual Private Cloud (VPC) and are in the same subnet

The information on the TencentDB for PostgreSQL instances tested is as follows:

Storage type: General - local high-performance SSD disk

Instance architecture: Dual-machine high availability (one primary and one secondary) - read-write instance

Instance version: V14.2

Primary-replica replication mode: Asynchronous replication

Test Metrics

This document describes test metrics for the performance test of TencentDB for PostgreSQL.

Metrics	Definition

TPS (Transactions Per Second)	The number of transactions executed per second by the database, based on the number of successful COMMITs.
QPS (Queries Per Second)	The number of SQL statements executed per second by the database, including INSERT, SELECT, UPDATE, DELETE, and COMMIT.
Concurrency	The number of concurrent requests initiated by the client during performance test.

Description of SysBench Parameters

pgsql-host: The private network address of the TencentDB for PostgreSQL instance

pgsql-port: The port number of the TencentDB for PostgreSQL instance

pgsql-user: The username of the TencentDB for PostgreSQL instance

pgsql-password: The password of the above username

pgsql-db: The database name

table-size: The data size of a single table

tables: The total number of tables

threads: The number of concurrent threads

time: Running time

Test Method

Note:

Replace XXX in the following command with the private network address, port number, username, user password, database name of the TencentDB for PostgreSQL test instance, as well as the single-table data size and total number of tables for the corresponding test scenario. For a detailed description of parameters, refer to the Description of SysBench Parameters.

The steps to test the oltp_write_only scenario using Sysbench are as follows. To test oltp_read_only and oltp_read_write, simply replace the corresponding Lua model scenario file:

1. Prepare data

```
sysbench /usr/local/share/sysbench/oltp_write_only.lua --db-driver=pgsql  --pgsql-host=XXX  --pgsql-port=XXX --pgsql-user=XXX  --pgsql-password=XXX  --pgsql-db=XXX --table-size=XXX --tables=XXX   prepare
```

2. Run the command to perform stress test

```
sysbench /usr/local/shareping
```

```
sysbench/oltp_write_only.lua --db-driver=pgsql --pgsql-host=XXX  --pgsql-port=XXX -
-pgsql-user=XXX  --pgsql-password=XXX  --pgsql-db=XXX --table-size=XXX --tables=XXX
--threads=XXX --time=XXX --report-interval=1 run
```

3. Clear the data

```
sysbench /usr/local/share/sysbench/oltp_write_only.lua --db-driver=pgsql  --pgsql-
host=XXX  --pgsql-port=XXX --pgsql-user=XXX  --pgsql-password=XXX  --pgsql-db=XXX --
table-size=XXX --tables=XXX cleanup
```

Test Results

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This document will verify the performance data of TencentDB for PostgreSQL in write-only, read-only and read-write scenarios of Sysbench.

Scenario 1: Full Cache

In the full cache scenario, all data can be stored in the cache, so there is no need to read or write the disk to update the cache during the query process.

Write-only

Instance specifications	Concurrency	Single-table data size (table_size)	Total number of tables (tables)	QPS	TPS
1-core 2 GB memory	32	25000	64	21308.50	3551.41
4-core 16 GB memory	32	25000	64	139100.86	23183.37
8-core 32 GB memory	64	25000	64	219394.80	36565.50
48-core 480 GB memory	512	25000	256	357198.25	59531.89

Read-only

Instance specifications	Concurrency	Single-table data size (table_size)	Total number of tables (tables)	QPS	TPS
1-core 2 GB memory	32	25000	64	26327.01	1645.44
4-core 16 GB memory	32	25000	64	111475.78	6967.24

| 8-core 32 GB memory | 64 | 25000 | 64 | 179257.13 | 11203.57 |
| 48-core 480 GB memory | 512 | 25000 | 256 | 346572.52 | 21660.78 |

Read-write

Instance specifications	Concurrency	Single-table data size (table_size)	Total number of tables (tables)	QPS	TPS
1-core 2 GB memory	32	25000	64	17282.27	864.11
4-core 16 GB memory	32	25000	64	80646.27	4032.31
8-core 32 GB memory	64	25000	64	115549.05	5777.44
48-core 480 GB memory	256	25000	256	173502.17	8675.04

Scenario 2: Big Dataset

In the big dataset scenario, all data cannot be stored in the cache (the data size is more than twice the memory size), so the disk needs to be read and written to update the cache during the query process.

Write-only

Instance specifications	Concurrency	Single-table data size (table_size)	Total number of tables (tables)	QPS	TPS
1-core 2 GB memory	32	10000000	64	16973.36	2828.89
4-core 16 GB memory	32	10000000	64	64245.25	10707.54
8-core 32 GB	64	10000000	64	100686.77	16781.13

memory					
48-core 480 GB memory	256	10000000	640	125237.97	20873.00

Read-only

Instance specifications	Concurrency	Single-table data size (table_size)	Total number of tables (tables)	QPS	TPS
1-core 2 GB memory	32	10000000	64	14407.49	900.47
4-core 16 GB memory	32	10000000	64	58952.38	3684.52
8-core 32 GB memory	64	10000000	64	87727.56	5482.97
48-core 480 GB memory	512	10000000	640	137603.21	8600.20

Read-write

Instance specifications	Concurrency	Single-table data size (table_size)	Total number of tables (tables)	QPS	TPS
1-core 2 GB memory	32	10000000	64	13655.23	682.76
4-core 16 GB memory	32	10000000	64	58426.87	2921.34
8-core 32 GB memory	64	10000000	64	80741.40	4037.07
48-core 480 GB memory	256	10000000	640	114922.98	5746.15