# Tencent Cloud Computing Ltd.

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TPC Benchmark™ DS

Full Disclosure Report

for

Tencent Cloud Data Lake Compute

(Dedicated cluster with 142 nodes)

using

Tencent Data Computing Platform SuperSQL v1.0

and

TencentOS Server 4.4

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**First Edition**

**April, 2026**

# First Edition – April, 2026

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Tencent Data Computing Platform SuperSQL is built on TEngine, a general-purpose, high-performance execution engine for large-scale data processing.

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# Abstract

This document contains the methodology and results of the TPC Benchmark™ DS (TPC-DS) test conducted in conformance with the requirements of the TPC-DS Standard Specification, Revision 4.0.0.

The test was conducted at a Scale Factor of 100000GB with 142 Tencent Cloud Data Lake Compute Cluster Node DLC-C32 running Tencent Data Computing Platform SuperSQL v1.0 on TencentOS Server 4.4.

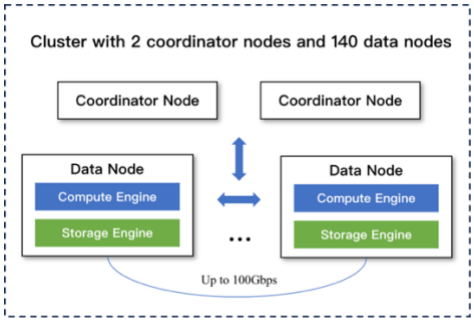
**Measured Configuration**

| Company Name | Cluster Node | Database Software | Operation System |
|---|---|---|---|
| Tencent Cloud Computing Ltd. | Tencent Cloud Data Lake Compute Cluster Node DLC-C32 | Tencent Data Computing Platform SuperSQL v1.0 | TencentOS Server 4.4 |

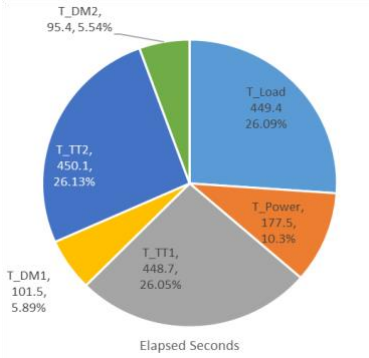
**TPC Benchmark™ DS Metrics**

| Total System Cost (CNY) | TPC-DS Throughput (QphDS@100000GB) | Price/Performance (CNY / kQphDS@100000) | Availability Date |
|---|---|---|---|
| **¥ 7,215,288** | **653,611,141** | **¥ 11.04** | **2026-09-30** |

| Tencent Cloud | Tencent Cloud<br>Data Lake Compute | | TPC-DS: 4.0.0<br>TPC-Pricing: 2.9.0<br>Report Date: 2026-04-19 | |
|---|---|---|---|---|
| Total System Cost | TPC-DS Throughput | Price / Performance | System Availability Date | |
| **¥ 7,215,288**<br>CNY | **653,611,141**<br>QphDS@100000GB | **¥ 11.04**<br>CNY/kQphDS@100000GB | **2026-09-30** | |
| Dataset Size[1] | Database Manager | Operation System | Other Software | Cluster |
| 100,000 GB | Tencent Data Computing Platform SuperSQL v1.0 | TencentOS Server 4.4 | N/A | Yes |




**Benchmarked Configuration**




**Elapsed Seconds**

| Load includes backup = No | RAID = RAID-10 |
|---|---|

| **System Configuration:** | **Tencent Data Computing Platform SuperSQL Cluster** |
|---|---|
| Servers: | 142 x DLC-C32 |
| Total Processors/Cores/Threads: | 4,544 vCPU |
| Total Memory: | 54,528 GB |
| Total Storage[2]: | 4,115,551.72 GB |
| Storage Ratio[3]: | 41.16 |
| **Server Configuration:** | **Per node** |
| Processors: | Intel Xeon 6983P-C |
| Memory: | 384 GB |
| Network: | Up to 100Gbps |
| Storage Device: | 4 x 7.68 TB NVME SSD Local Disk (data disk)<br>1 x 200 GB SSD Cloud Disk (system disk)<br>2 x 100 GB SSD Cloud Disk |

1. Dataset Size includes only raw data (i.e., no temp, index, redundant storage space, etc.).
2. Total Storage = 4,115,551.72 GB (1x 200 GB and 2 x 100 GB and 4x 7.68TB per node should be converted to base-2)
3. Storage Ratio = Total Storage / SF = 41.16

| Tencent Cloud | Tencent Cloud<br>Data Lake Compute | TPC-DS: 4.0.0<br>TPC-Pricing: 2.9.0<br>Report Date: 2026-04-19 |
|---|---|---|

| Description | Part Number | Src | Unit Price (CNY) | Qty | Ext. Price (CNY) | 1-Year Maint. (CNY) |
|---|---|---|---|---|---|---|
| **Tencent Cloud Data Lake Compute Cluster (1-Year Pre-Pay)** | | 1 | 7,156,800 | 1 | 7,156,800 | included |
| - DLC-C32 Node | | | included | 142 | | |
| - SSD Cloud Disk (1 x 200GB) | | | included | 142 | | |
| - SSD Cloud Disk (2 x 100GB) | | | included | 142 | | |
| - NVME Local Disk (4 x 7.68TB) | | | included | 142 | | |
| - Silver Fir Intelligent NIC | | | included | 142 | | |
| | **Licensed Software Services Sub-Total** | | | | **7,156,800** | **0** |
| **Other Components** | | | | | | |
| MacBook Pro 14 inch Apple M4Pro (includes 1 spares) | | 2 | 19,496 | 3 | 58,488 | |
| | **Other Components Sub-Total** | | | | **58,488** | **0** |

| | | |
|---|---|---|
| Source: 1 = Tencent Cloud, 2 = jd.com<br>All prices are based on 1-year pre-paid subscriptions.<br>**Audited by Doug Johnson, InfoSizing** | **1-Year Cost of Ownership:** | **7,215,288** |
| | **QphDS@100000GB:** | **653,611,141** |
| | **¥/kQphDS@100000GB:** | **11.04** |

Prices used in TPC benchmarks reflect the actual prices a customer would pay for a one-time purchase of the stated components. Individually negotiated discounts are not permitted. Special prices based on assumptions about past or future purchases are not permitted. All discounts reflect standard pricing policies for the listed components. For complete details, see the pricing sections of the TPC benchmark specifications. If you find that the stated prices are not available according to these terms, please inform at pricing@tpc.org. Thank you.

| Tencent Cloud | Tencent Cloud<br>Data Lake Compute | TPC-DS: 4.0.0<br>TPC-Pricing: 2.9.0<br>Report Date: 2026-04-19 |
|---|---|---|

**Metric Details**

| Name | Value | Description / Unit |
|---|---|---|
| SF | 100,000 | Scale Factor 100TB |
| S | 8 | Total Throughput Streams |
| Sq | 4 | Streams / Throughput Test |
| Q | 396 | Queries / Throughput Test |
| T_LD | 0.0050 | hours@100000 |
| T_PT | 0.1973 | hours@100000 |
| T_TT | 0.2497 | hours@100000 |
| T_DM | 0.0547 | hours@100000 |

**Secondary Metrics**

| Name | Value | Unit |
|---|---|---|
| T_Load | 449.4 | seconds@100000 |
| T_Power | 177.5 | seconds@100000 |
| T_TT1 | 448.7 | seconds@100000 |
| T_TT2 | 450.1 | seconds@100000 |
| T_DM1 | 101.5 | seconds@100000 |
| T_DM2 | 95.4 | seconds@100000 |

**Test Timeline**

| Test | Start Time | End Time | Seconds | hh:mm:ss |
|---|---|---|---|---|
| Load | 2026-04-18 20:49:25.908 | 2026-04-18 20:56:55.269 | 449.361 | 00:07:29 |
| Audit/Admin | 2026-04-18 20:56:55.276 | 2026-04-18 21:45:34.475 | 2919.2 | 00:48:39 |
| Power | 2026-04-18 21:45:34.498 | 2026-04-18 21:48:31.956 | 177.458 | 00:02:57 |
| TT-1 | 2026-04-18 21:48:31.999 | 2026-04-18 21:56:00.616 | 448.617 | 00:07:29 |
| DM-1 | 2026-04-18 21:56:00.653 | 2026-04-18 21:57:42.151 | 101.498 | 00:01:41 |
| TT-2 | 2026-04-18 21:57:42.187 | 2026-04-18 22:05:12.234 | 450.047 | 00:07:30 |
| DM-2 | 2026-04-18 22:05:12.271 | 2026-04-18 22:06:47.585 | 95.314 | 00:01:35 |

| Stream | Start Time | End Time | Seconds | hh:mm:ss |
|---|---|---|---|---|
| Power - 0 | 2026-04-18 21:45:34.498 | 2026-04-18 21:48:31.956 | 177.458 | 00:02:57 |
| TT-1 - 1 | 2026-04-18 21:48:31.999 | 2026-04-18 21:55:54.787 | 442.788 | 00:07:23 |
| TT-1 - 2 | 2026-04-18 21:48:31.999 | 2026-04-18 21:55:50.779 | 438.780 | 00:07:19 |
| TT-1 - 3 | 2026-04-18 21:48:32.000 | 2026-04-18 21:56:00.616 | 448.616 | 00:07:29 |
| TT-1 - 4 | 2026-04-18 21:48:32.000 | 2026-04-18 21:55:51.403 | 439.403 | 00:07:19 |
| DM-1 - 1 | 2026-04-18 21:56:00.653 | 2026-04-18 21:56:53.392 | 52.739 | 00:00:53 |
| DM-1 - 2 | 2026-04-18 21:56:53.409 | 2026-04-18 21:57:42.151 | 48.742 | 00:00:49 |
| TT-2 - 5 | 2026-04-18 21:57:42.187 | 2026-04-18 22:05:01.036 | 438.849 | 00:07:19 |
| TT-2 - 6 | 2026-04-18 21:57:42.187 | 2026-04-18 22:05:12.234 | 450.047 | 00:07:30 |
| TT-2 - 7 | 2026-04-18 21:57:42.187 | 2026-04-18 22:04:56.804 | 434.617 | 00:07:15 |
| TT-2 - 8 | 2026-04-18 21:57:42.187 | 2026-04-18 22:05:03.668 | 441.481 | 00:07:21 |
| DM-2 - 3 | 2026-04-18 22:05:12.271 | 2026-04-18 22:05:59.555 | 47.284 | 00:00:47 |
| DM-2 - 4 | 2026-04-18 22:05:59.573 | 2026-04-18 22:06:47.585 | 48.012 | 00:00:48 |

## Timing Intervals for Each Query (In Seconds)

| Query | Power | Throughput Test 1 | | | | | | | | | Throughput Test 2 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ID | Stream 0 | Stream 1 | Stream 2 | Stream 3 | Stream 4 | *Min* | *25th* | *Median* | *75th* | *Max* | Stream 5 | Stream 6 | Stream 7 | Stream 8 | *Min* | *25th* | *Median* | *75th* | *Max* |
| 1 | 0.4 | 0.4 | 0.7 | 0.7 | 0.6 | 0.40 | 0.55 | 0.65 | 0.70 | 0.70 | 1.2 | 0.5 | 0.7 | 3.5 | 0.50 | 0.65 | 0.95 | 1.78 | 3.50 |
| 2 | 1.2 | 2.3 | 3.0 | 2.8 | 2.9 | 2.30 | 2.68 | 2.85 | 2.93 | 3.00 | 3.1 | 2.4 | 2.2 | 1.9 | 1.90 | 2.13 | 2.30 | 2.58 | 3.10 |
| 3 | 0.8 | 3.4 | 2.2 | 1.6 | 1.4 | 1.40 | 1.55 | 1.90 | 2.50 | 3.40 | 1.9 | 1.8 | 2.7 | 1.9 | 1.80 | 1.88 | 1.90 | 2.10 | 2.70 |
| 4 | 9.1 | 14.7 | 16.2 | 24.1 | 14.6 | 14.60 | 14.68 | 15.45 | 18.18 | 24.10 | 20.0 | 20.3 | 16.9 | 21.1 | 16.90 | 19.23 | 20.15 | 20.50 | 21.10 |
| 5 | 1.0 | 4.6 | 3.3 | 1.7 | 4.4 | 1.70 | 2.90 | 3.85 | 4.45 | 4.60 | 2.7 | 4.8 | 11.8 | 2.6 | 2.60 | 2.68 | 3.75 | 6.55 | 11.80 |
| 6 | 0.3 | 1.3 | 0.5 | 1.0 | 0.3 | 0.30 | 0.45 | 0.75 | 1.08 | 1.30 | 0.4 | 2.3 | 0.5 | 0.3 | 0.30 | 0.38 | 0.45 | 0.95 | 2.30 |
| 7 | 1.5 | 2.7 | 2.9 | 3.6 | 9.7 | 2.70 | 2.85 | 3.25 | 5.13 | 9.70 | 5.2 | 3.7 | 3.6 | 4.1 | 3.60 | 3.68 | 3.90 | 4.38 | 5.20 |
| 8 | 0.3 | 2.0 | 0.5 | 0.5 | 0.5 | 0.50 | 0.50 | 0.50 | 0.88 | 2.00 | 0.4 | 1.2 | 3.0 | 0.8 | 0.40 | 0.70 | 1.00 | 1.65 | 3.00 |
| 9 | 4.5 | 12.0 | 10.2 | 14.3 | 11.9 | 10.20 | 11.48 | 11.95 | 12.58 | 14.30 | 15.4 | 11.8 | 13.5 | 15.1 | 11.80 | 13.08 | 14.30 | 15.18 | 15.40 |
| 10 | 0.6 | 0.6 | 1.6 | 1.6 | 1.2 | 0.60 | 1.05 | 1.40 | 1.60 | 1.60 | 1.0 | 1.1 | 0.7 | 1.8 | 0.70 | 0.93 | 1.05 | 1.28 | 1.80 |
| 11 | 5.4 | 19.0 | 18.8 | 10.6 | 11.6 | 10.60 | 11.35 | 15.20 | 18.85 | 19.00 | 15.6 | 12.4 | 13.1 | 10.7 | 10.70 | 11.98 | 12.75 | 13.73 | 15.60 |
| 12 | 0.2 | 0.9 | 0.6 | 0.2 | 0.5 | 0.20 | 0.43 | 0.55 | 0.68 | 0.90 | 0.2 | 1.1 | 0.6 | 0.7 | 0.20 | 0.50 | 0.65 | 0.80 | 1.10 |
| 13 | 1.1 | 1.3 | 1.5 | 2.3 | 1.5 | 1.30 | 1.45 | 1.50 | 1.70 | 2.30 | 1.7 | 1.4 | 2.5 | 1.5 | 1.40 | 1.48 | 1.60 | 1.90 | 2.50 |
| 14 | 6.3 | 11.7 | 13.6 | 18.4 | 12.6 | 11.70 | 12.38 | 13.10 | 14.80 | 18.40 | 7.6 | 10.4 | 10.3 | 12.0 | 7.60 | 9.63 | 10.35 | 10.80 | 12.00 |
| 15 | 0.4 | 0.6 | 1.6 | 1.1 | 1.1 | 0.60 | 0.98 | 1.10 | 1.23 | 1.60 | 0.8 | 1.2 | 0.8 | 0.5 | 0.50 | 0.73 | 0.80 | 0.90 | 1.20 |
| 16 | 2.0 | 2.3 | 1.5 | 1.2 | 0.4 | 0.40 | 1.00 | 1.35 | 1.70 | 2.30 | 1.1 | 1.9 | 1.5 | 2.6 | 1.10 | 1.40 | 1.70 | 2.08 | 2.60 |
| 17 | 1.0 | 3.7 | 5.4 | 5.2 | 2.3 | 2.30 | 3.35 | 4.45 | 5.25 | 5.40 | 2.4 | 1.0 | 2.0 | 2.3 | 1.00 | 1.75 | 2.15 | 2.33 | 2.40 |
| 18 | 2.0 | 2.3 | 4.0 | 2.5 | 3.2 | 2.30 | 2.45 | 2.85 | 3.40 | 4.00 | 3.8 | 3.3 | 2.4 | 2.5 | 2.40 | 2.48 | 2.90 | 3.43 | 3.80 |
| 19 | 0.4 | 0.5 | 0.3 | 1.1 | 0.6 | 0.30 | 0.45 | 0.55 | 0.73 | 1.10 | 0.4 | 0.8 | 0.6 | 1.7 | 0.40 | 0.55 | 0.70 | 1.03 | 1.70 |
| 20 | 0.2 | 0.8 | 1.1 | 2.8 | 0.6 | 0.60 | 0.75 | 0.95 | 1.53 | 2.80 | 0.6 | 0.2 | 2.1 | 0.3 | 0.20 | 0.28 | 0.45 | 0.98 | 2.10 |
| 21 | 0.2 | 0.3 | 0.5 | 0.4 | 0.4 | 0.30 | 0.38 | 0.40 | 0.43 | 0.50 | 0.4 | 1.1 | 0.4 | 0.3 | 0.30 | 0.38 | 0.40 | 0.58 | 1.10 |
| 22 | 0.3 | 2.5 | 0.8 | 0.7 | 0.6 | 0.60 | 0.68 | 0.75 | 1.23 | 2.50 | 0.4 | 0.8 | 0.3 | 0.8 | 0.30 | 0.38 | 0.60 | 0.80 | 0.80 |
| 23 | 12.7 | 46.2 | 39.1 | 54.1 | 36.9 | 36.90 | 38.55 | 42.65 | 48.18 | 54.10 | 32.4 | 47.6 | 38.0 | 41.7 | 32.40 | 36.60 | 39.85 | 43.18 | 47.60 |
| 24 | 4.5 | 22.8 | 18.1 | 14.5 | 13.9 | 13.90 | 14.35 | 16.30 | 19.28 | 22.80 | 15.7 | 14.3 | 19.9 | 14.9 | 14.30 | 14.75 | 15.30 | 16.75 | 19.90 |
| 25 | 0.7 | 1.7 | 1.0 | 1.6 | 1.8 | 1.00 | 1.45 | 1.65 | 1.73 | 1.80 | 1.4 | 0.6 | 1.2 | 1.6 | 0.60 | 1.05 | 1.30 | 1.45 | 1.60 |
| 26 | 1.0 | 2.5 | 2.4 | 2.1 | 3.6 | 2.10 | 2.33 | 2.45 | 2.78 | 3.60 | 2.9 | 3.0 | 2.3 | 4.2 | 2.30 | 2.75 | 2.95 | 3.30 | 4.20 |
| 27 | 1.3 | 2.5 | 3.0 | 3.5 | 2.7 | 2.50 | 2.65 | 2.85 | 3.13 | 3.50 | 2.7 | 4.2 | 2.4 | 2.5 | 2.40 | 2.48 | 2.60 | 3.08 | 4.20 |
| 28 | 3.5 | 4.7 | 4.1 | 4.1 | 8.1 | 4.10 | 4.10 | 4.40 | 5.55 | 8.10 | 6.2 | 5.1 | 5.6 | 4.6 | 4.60 | 4.98 | 5.35 | 5.75 | 6.20 |
| 29 | 1.2 | 2.9 | 4.3 | 5.1 | 3.1 | 2.90 | 3.05 | 3.70 | 4.50 | 5.10 | 3.2 | 4.0 | 3.0 | 7.0 | 3.00 | 3.15 | 3.60 | 4.75 | 7.00 |
| 30 | 0.4 | 0.7 | 1.1 | 0.8 | 1.2 | 0.70 | 0.78 | 0.95 | 1.13 | 1.20 | 1.2 | 0.8 | 0.6 | 0.9 | 0.60 | 0.75 | 0.85 | 0.98 | 1.20 |
| 31 | 1.6 | 4.2 | 6.8 | 3.5 | 5.2 | 3.50 | 4.03 | 4.70 | 5.60 | 6.80 | 3.2 | 5.6 | 5.9 | 1.7 | 1.70 | 2.83 | 4.40 | 5.68 | 5.90 |
| 32 | 0.2 | 0.3 | 0.3 | 0.2 | 0.3 | 0.20 | 0.28 | 0.30 | 0.30 | 0.30 | 0.3 | 0.5 | 0.3 | 0.9 | 0.30 | 0.30 | 0.40 | 0.60 | 0.90 |
| 33 | 1.2 | 1.0 | 0.9 | 1.5 | 0.9 | 0.90 | 0.90 | 0.95 | 1.13 | 1.50 | 1.7 | 2.5 | 1.2 | 1.5 | 1.20 | 1.43 | 1.60 | 1.90 | 2.50 |
| 34 | 1.1 | 2.9 | 2.9 | 2.1 | 3.4 | 2.10 | 2.70 | 2.90 | 3.03 | 3.40 | 1.8 | 2.8 | 2.6 | 4.1 | 1.80 | 2.40 | 2.70 | 3.13 | 4.10 |
| 35 | 1.2 | 3.8 | 2.1 | 1.2 | 1.8 | 1.20 | 1.65 | 1.95 | 2.53 | 3.80 | 3.2 | 2.3 | 1.7 | 2.3 | 1.70 | 2.15 | 2.30 | 2.53 | 3.20 |
| 36 | 1.0 | 2.3 | 2.8 | 4.2 | 2.9 | 2.30 | 2.68 | 2.85 | 3.23 | 4.20 | 4.8 | 3.1 | 1.8 | 5.6 | 1.80 | 2.78 | 3.95 | 5.00 | 5.60 |
| 37 | 0.4 | 1.1 | 0.8 | 1.1 | 0.8 | 0.80 | 0.80 | 0.95 | 1.10 | 1.10 | 0.9 | 1.0 | 2.7 | 0.7 | 0.70 | 0.85 | 0.95 | 1.43 | 2.70 |
| 38 | 2.4 | 2.9 | 5.3 | 7.6 | 4.6 | 2.90 | 4.18 | 4.95 | 5.88 | 7.60 | 3.3 | 4.6 | 4.4 | 3.6 | 3.30 | 3.53 | 4.00 | 4.45 | 4.60 |
| 39 | 3.4 | 0.8 | 7.0 | 1.4 | 1.5 | 0.80 | 1.25 | 1.45 | 2.88 | 7.00 | 2.4 | 0.9 | 0.8 | 1.9 | 0.80 | 0.88 | 1.40 | 2.03 | 2.40 |
| 40 | 0.5 | 0.9 | 0.8 | 0.5 | 0.9 | 0.50 | 0.73 | 0.85 | 0.90 | 0.90 | 0.7 | 0.4 | 1.2 | 0.8 | 0.40 | 0.63 | 0.75 | 0.90 | 1.20 |
| 41 | 0.1 | 0.1 | 0.2 | 0.8 | 0.4 | 0.10 | 0.18 | 0.30 | 0.50 | 0.80 | 1.2 | 0.2 | 0.8 | 0.3 | 0.20 | 0.28 | 0.55 | 0.90 | 1.20 |
| 42 | 0.2 | 0.7 | 0.7 | 0.6 | 0.4 | 0.40 | 0.55 | 0.65 | 0.70 | 0.70 | 1.0 | 0.6 | 0.3 | 0.4 | 0.30 | 0.38 | 0.50 | 0.70 | 1.00 |
| 43 | 0.7 | 2.2 | 2.9 | 1.1 | 0.8 | 0.80 | 1.03 | 1.65 | 2.38 | 2.90 | 2.1 | 1.4 | 2.1 | 1.8 | 1.40 | 1.70 | 1.95 | 2.10 | 2.10 |
| 44 | 1.3 | 2.1 | 3.8 | 1.9 | 4.9 | 1.90 | 2.05 | 2.95 | 4.08 | 4.90 | 4.2 | 3.2 | 2.1 | 4.9 | 2.10 | 2.93 | 3.70 | 4.38 | 4.90 |
| 45 | 0.4 | 0.9 | 1.0 | 0.7 | 1.1 | 0.70 | 0.85 | 0.95 | 1.03 | 1.10 | 0.8 | 0.9 | 0.8 | 0.8 | 0.80 | 0.80 | 0.80 | 0.83 | 0.90 |
| 46 | 1.3 | 2.7 | 3.1 | 2.5 | 2.6 | 2.50 | 2.58 | 2.65 | 2.80 | 3.10 | 1.8 | 2.2 | 2.0 | 2.9 | 1.80 | 1.95 | 2.10 | 2.38 | 2.90 |
| 47 | 4.2 | 9.5 | 8.8 | 9.5 | 10.5 | 8.80 | 9.33 | 9.50 | 9.75 | 10.50 | 10.2 | 8.7 | 10.8 | 9.0 | 8.70 | 8.93 | 9.60 | 10.35 | 10.80 |
| 48 | 0.9 | 1.1 | 1.3 | 1.7 | 1.2 | 1.10 | 1.18 | 1.25 | 1.40 | 1.70 | 1.1 | 1.4 | 1.9 | 1.2 | 1.10 | 1.18 | 1.30 | 1.53 | 1.90 |
| 49 | 1.0 | 1.8 | 2.0 | 1.1 | 2.4 | 1.10 | 1.63 | 1.90 | 2.10 | 2.40 | 2.8 | 2.2 | 2.8 | 2.5 | 2.20 | 2.43 | 2.65 | 2.80 | 2.80 |
| 50 | 2.2 | 7.7 | 6.6 | 9.0 | 9.3 | 6.60 | 7.43 | 8.35 | 9.08 | 9.30 | 7.1 | 7.7 | 8.0 | 9.1 | 7.10 | 7.55 | 7.85 | 8.28 | 9.10 |
| 51 | 0.9 | 2.8 | 2.4 | 1.8 | 4.8 | 1.80 | 2.25 | 2.60 | 3.30 | 4.80 | 2.4 | 4.0 | 1.8 | 2.4 | 1.80 | 2.25 | 2.40 | 2.80 | 4.00 |
| 52 | 0.2 | 1.3 | 0.7 | 0.8 | 0.6 | 0.60 | 0.68 | 0.75 | 0.93 | 1.30 | 0.9 | 0.7 | 1.2 | 0.4 | 0.40 | 0.63 | 0.80 | 0.98 | 1.20 |
| 53 | 0.7 | 1.6 | 1.6 | 2.1 | 1.4 | 1.40 | 1.55 | 1.60 | 1.73 | 2.10 | 2.1 | 1.9 | 1.8 | 2.8 | 1.80 | 1.88 | 2.00 | 2.28 | 2.80 |
| 54 | 0.8 | 7.4 | 3.7 | 1.2 | 1.9 | 1.20 | 1.73 | 2.80 | 4.63 | 7.40 | 1.1 | 1.7 | 1.2 | 1.9 | 1.10 | 1.18 | 1.45 | 1.75 | 1.90 |
| 55 | 0.2 | 0.3 | 1.9 | 0.5 | 0.9 | 0.30 | 0.45 | 0.70 | 1.15 | 1.90 | 1.3 | 0.2 | 0.3 | 1.6 | 0.20 | 0.28 | 0.80 | 1.38 | 1.60 |
| 56 | 0.7 | 1.4 | 3.3 | 0.7 | 1.9 | 0.70 | 1.23 | 1.65 | 2.25 | 3.30 | 1.8 | 2.3 | 2.2 | 1.3 | 1.30 | 1.68 | 2.00 | 2.23 | 2.30 |
| 57 | 2.4 | 4.8 | 4.9 | 4.5 | 6.1 | 4.50 | 4.73 | 4.85 | 5.20 | 6.10 | 5.9 | 5.6 | 6.2 | 9.6 | 5.60 | 5.83 | 6.05 | 7.05 | 9.60 |
| 58 | 0.4 | 0.9 | 0.6 | 0.9 | 0.7 | 0.60 | 0.68 | 0.80 | 0.90 | 0.90 | 1.3 | 1.0 | 0.5 | 0.7 | 0.50 | 0.65 | 0.85 | 1.08 | 1.30 |
| 59 | 7.7 | 24.1 | 20.8 | 21.6 | 34.9 | 20.80 | 21.40 | 22.85 | 26.80 | 34.90 | 27.7 | 22.5 | 25.0 | 29.4 | 22.50 | 24.38 | 26.35 | 28.13 | 29.40 |
| 60 | 1.3 | 2.1 | 3.4 | 0.8 | 0.6 | 0.60 | 0.75 | 1.45 | 2.43 | 3.40 | 1.2 | 0.6 | 1.0 | 1.0 | 0.60 | 0.90 | 1.00 | 1.05 | 1.20 |
| 61 | 1.1 | 0.8 | 1.6 | 0.6 | 1.4 | 0.60 | 0.75 | 1.10 | 1.45 | 1.60 | 1.9 | 0.6 | 0.7 | 0.6 | 0.60 | 0.60 | 0.65 | 1.00 | 1.90 |
| 62 | 1.1 | 4.4 | 2.4 | 2.0 | 2.3 | 2.00 | 2.23 | 2.35 | 2.90 | 4.40 | 1.8 | 2.7 | 2.1 | 1.8 | 1.80 | 1.80 | 1.95 | 2.25 | 2.70 |
| 63 | 0.6 | 1.1 | 3.5 | 2.0 | 2.0 | 1.10 | 1.78 | 2.00 | 2.38 | 3.50 | 2.0 | 1.8 | 1.8 | 0.9 | 0.90 | 1.58 | 1.80 | 1.85 | 2.00 |
| 64 | 7.1 | 17.8 | 15.6 | 13.0 | 11.3 | 11.30 | 12.58 | 14.30 | 16.15 | 17.80 | 20.5 | 15.9 | 16.4 | 16.6 | 15.90 | 16.28 | 16.50 | 17.58 | 20.50 |
| 65 | 2.0 | 6.2 | 5.9 | 5.4 | 5.4 | 5.40 | 5.40 | 5.65 | 5.98 | 6.20 | 5.9 | 5.6 | 5.9 | 5.3 | 5.30 | 5.53 | 5.75 | 5.90 | 5.90 |
| 66 | 1.0 | 1.1 | 1.5 | 2.2 | 2.1 | 1.10 | 1.40 | 1.80 | 2.13 | 2.20 | 1.0 | 1.3 | 1.5 | 1.2 | 1.00 | 1.15 | 1.25 | 1.35 | 1.50 |
| 67 | 5.5 | 14.1 | 13.3 | 15.5 | 13.5 | 13.30 | 13.45 | 13.80 | 14.45 | 15.50 | 13.7 | 12.7 | 11.9 | 15.0 | 11.90 | 12.50 | 13.20 | 14.03 | 15.00 |
| 68 | 1.0 | 1.2 | 1.3 | 1.7 | 1.4 | 1.20 | 1.28 | 1.35 | 1.48 | 1.70 | 1.8 | 1.3 | 1.4 | 2.1 | 1.30 | 1.38 | 1.60 | 1.88 | 2.10 |
| 69 | 0.4 | 0.7 | 1.4 | 1.9 | 0.8 | 0.70 | 0.78 | 1.10 | 1.53 | 1.90 | 1.8 | 0.4 | 1.1 | 1.7 | 0.40 | 0.93 | 1.40 | 1.73 | 1.80 |
| 70 | 3.9 | 12.4 | 12.3 | 11.9 | 11.9 | 11.90 | 11.90 | 12.10 | 12.33 | 12.40 | 14.8 | 4.9 | 19.4 | 13.5 | 4.90 | 11.35 | 14.15 | 15.95 | 19.40 |
| 71 | 0.7 | 1.1 | 3.8 | 1.2 | 0.9 | 0.90 | 1.05 | 1.15 | 1.85 | 3.80 | 1.6 | 1.2 | 1.5 | 4.8 | 1.20 | 1.43 | 1.55 | 2.40 | 4.80 |
| 72 | 1.7 | 3.5 | 3.5 | 4.1 | 3.4 | 3.40 | 3.48 | 3.50 | 3.65 | 4.10 | 6.6 | 6.7 | 6.5 | 4.2 | 4.20 | 5.93 | 6.55 | 6.63 | 6.70 |
| 73 | 0.5 | 1.1 | 0.6 | 1.1 | 6.7 | 0.60 | 0.98 | 1.10 | 2.50 | 6.70 | 1.7 | 1.4 | 0.8 | 0.7 | 0.70 | 0.78 | 1.10 | 1.48 | 1.70 |
| 74 | 4.0 | 10.7 | 16.4 | 8.7 | 24.2 | 8.70 | 10.20 | 13.55 | 18.35 | 24.20 | 17.5 | 13.3 | 17.7 | 14.8 | 13.30 | 14.43 | 16.15 | 17.55 | 17.70 |
| 75 | 6.0 | 16.3 | 12.1 | 17.0 | 15.4 | 12.10 | 14.58 | 15.85 | 16.48 | 17.00 | 11.0 | 13.2 | 14.3 | 11.1 | 11.00 | 11.08 | 12.15 | 13.48 | 14.30 |
| 76 | 1.8 | 4.9 | 4.2 | 2.5 | 3.9 | 2.50 | 3.55 | 4.05 | 4.38 | 4.90 | 5.5 | 3.4 | 3.7 | 3.4 | 3.40 | 3.40 | 3.55 | 4.15 | 5.50 |
| 77 | 0.5 | 0.9 | 1.1 | 0.7 | 1.7 | 0.70 | 0.85 | 1.00 | 1.25 | 1.70 | 3.3 | 1.0 | 0.6 | 0.8 | 0.60 | 0.75 | 0.90 | 1.58 | 3.30 |
| 78 | 8.0 | 17.1 | 6.8 | 14.6 | 6.8 | 6.80 | 6.80 | 10.70 | 15.23 | 17.10 | 8.6 | 19.8 | 7.4 | 5.3 | 5.30 | 6.88 | 8.00 | 11.40 | 19.80 |
| 79 | 1.5 | 4.5 | 6.1 | 2.3 | 4.4 | 2.30 | 3.88 | 4.45 | 4.90 | 6.10 | 8.0 | 8.1 | 3.3 | 4.9 | 3.30 | 4.50 | 6.45 | 8.03 | 8.10 |
| 80 | 1.5 | 2.5 | 2.4 | 2.2 | 3.4 | 2.20 | 2.35 | 2.45 | 2.73 | 3.40 | 2.7 | 6.7 | 4.7 | 3.0 | 2.70 | 2.93 | 3.85 | 5.20 | 6.70 |
| 81 | 0.4 | 1.3 | 0.9 | 0.8 | 0.8 | 0.80 | 0.80 | 0.85 | 1.00 | 1.30 | 1.3 | 0.6 | 0.7 | 0.8 | 0.60 | 0.68 | 0.75 | 0.93 | 1.30 |
| 82 | 0.5 | 0.8 | 0.7 | 12.5 | 6.4 | 0.70 | 0.78 | 3.60 | 7.93 | 12.50 | 0.6 | 9.8 | 0.8 | 0.9 | 0.60 | 0.75 | 0.85 | 3.13 | 9.80 |
| 83 | 0.4 | 3.2 | 1.0 | 0.8 | 0.7 | 0.70 | 0.78 | 0.90 | 1.55 | 3.20 | 0.6 | 0.5 | 1.1 | 1.3 | 0.50 | 0.58 | 0.85 | 1.15 | 1.30 |
| 84 | 0.4 | 1.0 | 0.7 | 0.8 | 1.0 | 0.70 | 0.78 | 0.90 | 1.00 | 1.00 | 1.1 | 0.6 | 0.7 | 1.4 | 0.60 | 0.68 | 0.90 | 1.18 | 1.40 |
| 85 | 0.8 | 1.9 | 1.6 | 1.5 | 1.5 | 1.50 | 1.50 | 1.55 | 1.68 | 1.90 | 1.4 | 1.7 | 1.3 | 1.5 | 1.30 | 1.38 | 1.45 | 1.55 | 1.70 |
| 86 | 1.5 | 2.8 | 3.0 | 6.2 | 3.4 | 2.80 | 2.95 | 3.20 | 4.10 | 6.20 | 3.1 | 4.4 | 2.7 | 3.1 | 2.70 | 3.00 | 3.10 | 3.43 | 4.40 |
| 87 | 2.3 | 3.2 | 6.1 | 7.4 | 3.3 | 3.20 | 3.28 | 4.70 | 6.43 | 7.40 | 3.7 | 3.6 | 3.8 | 3.6 | 3.60 | 3.60 | 3.65 | 3.73 | 3.80 |
| 88 | 6.0 | 7.4 | 7.4 | 4.8 | 6.8 | 4.80 | 6.30 | 7.10 | 7.40 | 7.40 | 4.4 | 10.3 | 6.3 | 5.8 | 4.40 | 5.45 | 6.05 | 7.30 | 10.30 |
| 89 | 0.8 | 1.8 | 1.5 | 2.6 | 1.2 | 1.20 | 1.43 | 1.65 | 2.00 | 2.60 | 1.7 | 2.8 | 3.1 | 2.7 | 1.70 | 2.45 | 2.75 | 2.88 | 3.10 |
| 90 | 0.6 | 0.7 | 0.7 | 0.7 | 0.9 | 0.70 | 0.70 | 0.70 | 0.75 | 0.90 | 1.4 | 0.9 | 1.3 | 1.0 | 0.90 | 0.98 | 1.15 | 1.33 | 1.40 |
| 91 | 0.3 | 0.4 | 0.4 | 2.6 | 0.4 | 0.40 | 0.40 | 0.40 | 0.95 | 2.60 | 2.8 | 0.3 | 0.4 | 0.3 | 0.30 | 0.30 | 0.35 | 1.00 | 2.80 |
| 92 | 0.2 | 0.2 | 0.3 | 0.2 | 0.4 | 0.20 | 0.20 | 0.25 | 0.33 | 0.40 | 0.2 | 0.3 | 0.3 | 0.5 | 0.20 | 0.28 | 0.30 | 0.35 | 0.50 |
| 93 | 3.3 | 10.0 | 16.3 | 9.8 | 9.0 | 9.00 | 9.60 | 9.90 | 11.58 | 16.30 | 11.6 | 19.6 | 12.9 | 16.8 | 11.60 | 12.58 | 14.85 | 17.50 | 19.60 |
| 94 | 1.5 | 6.2 | 2.8 | 3.2 | 2.8 | 2.80 | 2.80 | 3.00 | 3.95 | 6.20 | 3.3 | 2.3 | 4.8 | 3.3 | 2.30 | 3.05 | 3.30 | 3.68 | 4.80 |
| 95 | 2.7 | 4.8 | 5.4 | 4.8 | 7.5 | 4.80 | 4.80 | 5.10 | 5.93 | 7.50 | 5.2 | 6.5 | 4.9 | 6.6 | 4.90 | 5.13 | 5.85 | 6.53 | 6.60 |
| 96 | 1.0 | 1.2 | 1.8 | 1.4 | 1.8 | 1.20 | 1.35 | 1.60 | 1.80 | 1.80 | 1.3 | 1.2 | 1.4 | 1.8 | 1.20 | 1.28 | 1.35 | 1.50 | 1.80 |
| 97 | 1.7 | 4.2 | 4.0 | 5.8 | 3.8 | 3.80 | 3.95 | 4.10 | 4.60 | 5.80 | 3.4 | 4.1 | 4.6 | 4.4 | 3.40 | 3.93 | 4.25 | 4.45 | 4.60 |
| 98 | 0.3 | 0.6 | 0.8 | 0.5 | 1.3 | 0.50 | 0.58 | 0.70 | 0.93 | 1.30 | 1.1 | 0.8 | 0.5 | 0.8 | 0.50 | 0.73 | 0.80 | 0.88 | 1.10 |
| 99 | 2.1 | 3.5 | 4.5 | 4.3 | 4.0 | 3.50 | 3.88 | 4.15 | 4.35 | 4.50 | 11.4 | 4.3 | 4.1 | 4.0 | 4.00 | 4.08 | 4.20 | 6.08 | 11.40 |

**Timing Intervals for Each Refresh Function (In Seconds)**

| Function | DM-1 | | DM-2 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ID | Run 1 | Run 2 | Run 3 | Run 4 | *Min* | *25th* | *Median* | *75th* | *Max* |
| DF_CS | 3.6 | 3.5 | 3.7 | 3.6 | 3.50 | 3.58 | 3.60 | 3.63 | 3.70 |
| DF_I | 4.7 | 4.8 | 4.9 | 4.8 | 4.70 | 4.78 | 4.80 | 4.83 | 4.90 |
| DF_SS | 19.1 | 15.4 | 14.2 | 15.0 | 14.20 | 14.80 | 15.20 | 16.33 | 19.10 |
| DF_WS | 20.4 | 19.8 | 19.4 | 19.7 | 19.40 | 19.63 | 19.75 | 19.95 | 20.40 |
| LF_CR | 1.7 | 1.3 | 1.6 | 1.6 | 1.30 | 1.53 | 1.60 | 1.63 | 1.70 |
| LF_CS | 3.6 | 4.3 | 3.2 | 3.6 | 3.20 | 3.50 | 3.60 | 3.78 | 4.30 |
| LF_I | 0.9 | 1.7 | 0.8 | 0.9 | 0.80 | 0.88 | 0.90 | 1.10 | 1.70 |
| LF_SR | 1.7 | 1.6 | 1.7 | 1.7 | 1.60 | 1.68 | 1.70 | 1.70 | 1.70 |
| LF_SS | 3.2 | 3.5 | 3.7 | 3.1 | 3.10 | 3.18 | 3.35 | 3.55 | 3.70 |
| LF_WR | 1.2 | 1.5 | 1.2 | 1.3 | 1.20 | 1.20 | 1.25 | 1.35 | 1.50 |
| LF_WS | 3.1 | 2.7 | 3.1 | 2.9 | 2.70 | 2.85 | 3.00 | 3.10 | 3.10 |

# Preface

## TPC Benchmark™ DS Overview

The TPC Benchmark™ DS (TPC-DS) is a decision support benchmark that models several generally applicable aspects of a decision support system, including queries and data maintenance. The benchmark provides are presentative evaluation of performance as a general purpose decision support system.

This benchmark illustrates decision support systems that:

- Examine large volumes of data;
- Give answers to real-world business questions;
- Execute queries of various operational requirements and complexities (e.g., ad-hoc, reporting, iterative OLAP, data mining);
- Are characterized by high CPU and IO load;
- Are periodically synchronized with source OLTP databases through database maintenance functions.
- Run on “Big Data” solutions, such as RDBMS as well as Hadoop/Spark based systems.

A benchmark result measures query response time in single user mode, query throughput in multi user mode and data maintenance performance for a given hardware, operating system, and data processing system configuration under a controlled, complex, multi-user decision support workload.

The purpose of TPC benchmarks is to provide relevant, objective performance data to industry users. To achieve that purpose, TPC benchmark specifications require benchmark tests be implemented with systems, products, technologies and pricing that:

a) Are generally available to users;
b) Are relevant to the market segment that the individual TPC benchmark models or represents (e.g., TPC-DS models and represents complex, high data volume, decision support environments);
c) Would plausibly be implemented by a significant number of users in the market segment modeled or represented by the benchmark.

In keeping with these requirements, the TPC-DS database must be implemented using commercially available data processing software, and its queries must be executed via SQL interface. The use of new systems, products, technologies (hardware or software) and pricing is encouraged so long as they meet the requirements above. Specifically prohibited are benchmark systems, products, technologies or pricing (hereafter referred to as "implementations") whose primary purpose is performance optimization of TPC benchmark results without any corresponding applicability to real-world applications and environments. In other words, all "benchmark special" implementations, which improve benchmark results but not real-world performance or pricing, are prohibited.

TPC benchmark results are expected to be accurate representations of system performance. Therefore, there are specific guidelines that are expected to be followed when measuring those results. The approach or methodology to be used in the measurements are either explicitly described in the specification or left to the discretion of the test sponsor.

When not described in the specification, the methodologies and approaches used must meet the following requirements:

- The approach is an accepted engineering practice or standard;
- The approach does not enhance the result;
- Equipment used in measuring the results is calibrated according to established quality standards;
- Fidelity and candor is maintained in reporting any anomalies in the results, even if not specified in the benchmark requirements.

Further information is available at http://www.tpc.org/

# General Items

## 0.1 Test Sponsor

*A statement identifying the benchmark sponsor(s) and other participating companies must be provided.*

This benchmark was sponsored by Tencent Cloud Computing Ltd.

## 0.2 Parameter Settings

*Settings must be provided for all customer-tunable parameters and options which have been changed from the defaults found in actual products, including by not limited to:*

- *Database Tuning Options*
- *Optimizer/Query execution options*
- *Query processing tool/language configuration parameters*
- *Recovery/commit options*
- *Consistency/locking options*
- *Operating system and configuration parameters*
- *Configuration parameters and options for any other software component incorporated into the pricing structure*
- *Compiler optimization options*

*This requirement can be satisfied by providing a full list of all parameters and options, as long as all those which have been modified from their default values have been clearly identified and these parameters and options are only set once.*

The Supporting File Archive contains the Operating System and DBMS parameters used in this benchmark.

## 0.3 Configuration Diagrams

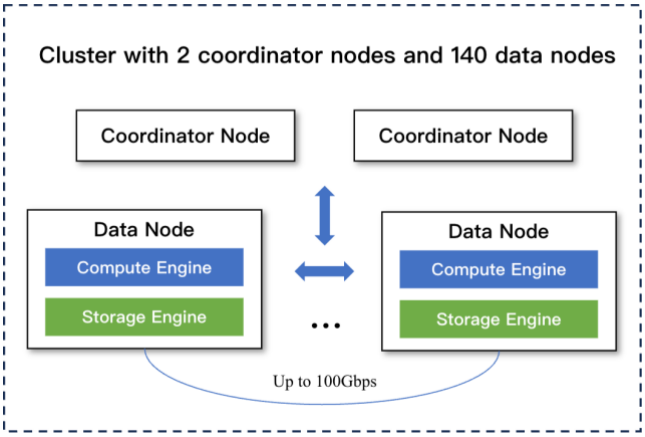
*Diagrams of both measured and priced configurations must be provided, accompanied by a description of the differences. This includes, but is not limited to:*

- *Number and type of processors*
- *Size of allocated memory, and any specific mapping/partitioning of memory unique to the test. Number and type of disk units (and controllers, if applicable).*
- *Number of channels or bus connections to disk units, including their protocol type.*
- *Number of LAN (e.g. Ethernet) Connections, including routers, workstations, terminals, etc., that were physically used in the test or are incorporated into the pricing structure.*
- *Type and the run-time execution location of software components (e.g., DBMS, query processing tools/languages, middle-ware components, software drivers, etc.).*

## Measured Configuration

Following is an illustration of the measured configuration.

**Figure 0.3: Diagram of the Measured Configuration**




- The Coordinator Node receives requests and dispatches them to the DataNodes.
- The Data Node executes the queries.

The following table shows the configuration of the measured system.

**Table 0.3: Configuration of the measured system**

| Configuration | Coordinator Node | Data Node |
|---|---|---|
| instance Count | 2 | 140 |
| Server | DLC - C32 | |
| vCPU | 32 | |
| Processor Model | Intel Xeon 6983P-C | |
| Memory | 384 GB | |
| Storage | 4 x 7.68 TB NVME SSD Local Disk (data disk)<br>1 x 200 GB SSD Cloud Disk (system disk)<br>2 x 100 GB SSD Cloud Disk | |
| Network | Bandwidth：Up to 100Gbps | |

## Priced Configuration

There are no differences between the priced and measured configurations.

# Clause 2: Logical Database Design Related Items

## 2.1 Database Definition Statements

*Listings must be provided for the DDL scripts and must include all table definition statements and all other statements used to set up the test and qualification databases.*

The Supporting File Archive contains the table definitions and all other statements used to set up the test and qualification databases.

## 2.2 Physical Organization

*The physical organization of tables and indices within the test and qualification databases must be disclosed. If the column ordering of any table is different from that specified in Clause2.3 or 2.4, it must be noted.*

No column ordering was changed.

## 2.3 Horizontal Partitioning

*If any directives to DDLs are used to horizontally partition tables and rows in the test and qualification databases, these directives, DDLs, and other details necessary to replicate the partitioning behavior must be disclosed.*

No horizontal partition was used.

## 2.4 Replication

*Any replication of physical objects must be disclosed and must conform to the requirements of Clause 2.5.3.*

No physical object was replicated.

# Clause 3: Scaling and Database Population

## 3.1 Initial Cardinality of Tables

*The cardinality (e.g., the number of rows) of each table of the test database, as it existed at the completion of the database load (see Clause 7.1.2) must be disclosed.*

Table 3.1 lists the cardinality of each table as they existed upon completion of the build.

**Table 3.1 Initial Number of Rows**

| Table Name | Row Count |
|---|---|
| call_center | 60 |
| catalog_page | 50,000 |
| catalog_returns | 14,406,729,114 |
| catalog_sales | 144,015,126,395 |
| customer | 100,000,000 |
| customer_address | 50,000,000 |
| customer_demographics | 1,920,800 |
| date_dim | 73,049 |
| household_demographics | 7,200 |
| income_band | 20 |
| inventory | 1,965,337,830 |
| item | 502,000 |
| promotion | 2,500 |
| reason | 75 |
| ship_mode | 20 |
| store | 1,902 |
| store_returns | 28,790,725,340 |
| store_sales | 288,002,102,598 |
| time_dim | 86,400 |
| warehouse | 30 |
| web_page | 5,004 |
| web_returns | 7,198,390,746 |
| web_sales | 71,995,771,148 |
| web_site | 96 |

## 3.2 Distribution of Tables and Logs Across Media

*The distribution of tables and logs across all media must be explicitly described using a format similar to that shown in the following example for both the tested and priced systems.*

**Table 3.2 Distribution of Tables and Logs**

| Server Node | Disk Type | Disk drive | Description of Content |
|---|---|---|---|
| 1-142 | SSD Cloud Disk | /dev/vda1<br>/dev/vdb<br>/dev/vdc | Operating system, root |
| | Local NVMe | /dev/md10<br>(/dev/nvme[0-3]n1) (Soft raid 10) | SuperSQL, logs, tables, temp files, swap |

## 3.3 Mapping of Database Partitions/Replications

*The mapping of database partitions/replications must be explicitly described.*

Neither database partitions nor replications are mapped to specific devices.

## 3.4 Implementation of RAID

*Implementations may use some form of RAID. The RAID level used must be disclosed for each device. If RAID is used in an implementation, the logical intent of its use must be disclosed*

For each node, a soft RAID10 volume is created on 4 PCIe NVMe drives using the mdadm command and all SuperSQL data is stored in this volume.

## 3.5 DBGEN Modifications

*The version number (i.e., the major revision number, the minor revision number, and third tier number) of dsdgen must be disclosed. Any modifications to the dsdgen source code (see Appendix B:) must be disclosed. In the event that a program other than dsdgen was used to populate the database, it must be disclosed in its entirety.*

Dsdgen version 4.0.0 was used.

One changes were made to the dsdgen tool.

1. Added `-fcommon` compiler flag for GCC12 compatibility.

Detailed modifications are disclosed in Supporting File Archive (Clause_4/patches).

## 3.6 Database Load time

*The database load time for the test database (see Clause 7.4.3.7) must be disclosed.*

The database load time was 449.4 seconds.

## 3.7 Data Storage Ratio

*The data storage ratio must be disclosed. It is computed by dividing the total data storage of the priced configuration (expressed in GB) by SF corresponding to the scale factor chosen for the test database as defined in Clause 3.1. The ratio must be reported to the nearest 1/100th, rounded up. For example, a system configured with 96 disks of 2.1 GB capacity for a 100GB test database has a data storage ratio of 2.02.*

Total Storage Capacity (142 Local nodes) = 4,115,551.72 GB (1 x 200 GB and 2 x 100 GB and 4 x 7.68TB per node should be converted to base-2)

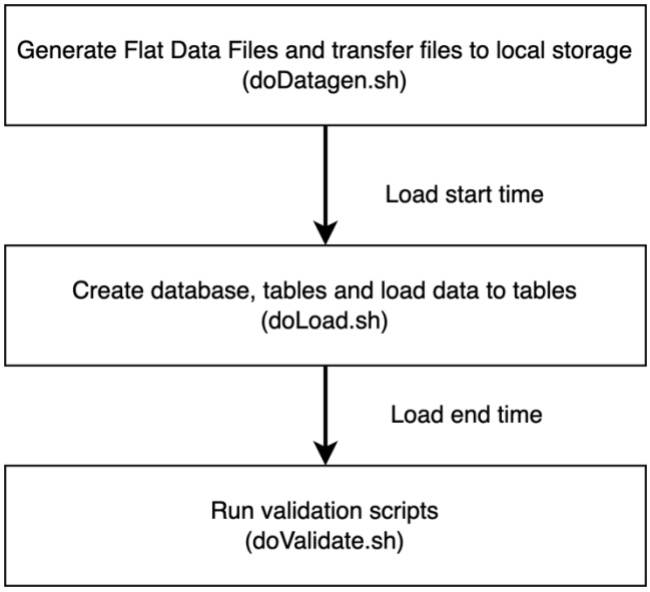
The data storage ratio is 4,115,551.72 GB / 100,000 GB= 41.16

## 3.8 Database Load Mechanism Details and Illustration

*The details of the database load must be disclosed, including a block diagram illustrating the overall process. Disclosure of the load procedure includes all steps, scripts, input and configuration files required to completely reproduce the test and qualification databases.*

The tables were loaded as shown in Figure 3.8. All of the related source code and scripts are included in the Supporting Files.

**Figure 3.8: Block Diagram of Database Load Process**




The final database load time is (load end time − load start time).

## 3.9 Qualification Database Configuration

*Any differences between the configuration of the qualification database and the test database must be disclosed.*

The qualification database is created using the same scripts as the test database with the following exceptions:

- The Scale factor is adjusted to 1GB

All of the related source code and scripts are included in the Supporting Files.

# Clause 4 and 5: Query and Data Maintenance Related Items

## 4.1 Query Language

*The query language used to implement the queries must be identified.*

SQL was the query language used to implement the queries.

## 4.2 Verifying Method of Random Number Generation

*The method of verification for the random number generation must be described unless the supplied dsdgen and dsqgen were used.*

TPC-supplied dsdgen version 4.0.0 and dsqgen version 4.0.0 were used

## 4.3 Generating Values for Substitution Parameters

*The method used to generate values for substitution parameters must be disclosed. The version number (i.e., the major revision number, the minor revision number, and third tier number) of dsqgen must be disclosed.*

TPC supplied dsqgen version 4.0.0 was used to generate the substitution parameters:

```
./dsqgen  -streams $stream -input ../query_templates/templates.lst -directory ../query_templates -dialect supersql -
scale $TPCDS_SCALE -rngseed $SEED -verbose y -output_dir $STREAM_TMP
```

## 4.4 Query Text and Output Data from Qualification Database

*The executable query text used for query validation must be disclosed along with the corresponding output data generated during the execution of the query text against the qualification database. If minor modifications have been applied to any functional query definitions or approved variants in order to obtain executable query text, these modifications must be disclosed and justified. The justification for a particular minor query modification can apply collectively to all queries for which it has been used. The output data for the power and Throughput Tests must be made available electronically upon request.*

Supporting Files Archive contains the actual query text and query output. Following are the modifications to the query.

The following MQM are used:

- Use vendor-specific syntax of date expressions (MQM f.1).
  - Q5
  - Q12
  - Q16
  - Q20
  - Q21
  - Q32
  - Q37
  - Q40
  - Q77
  - Q80
  - Q82
  - Q92
  - Q94
  - Q95

    - Q98
- Add table alias for sub queries (MQM e.4).
    - Q2
    - Q14
    - Q23
    - Q49
    - Q64
- Use vendor-specific syntax for string concatenation (MQM c.3).
    - Q5
    - Q66
    - Q80
    - Q84
- Query results are inserted into an internal table (Clause 4.2.5) .
    - Q34 with internal table named q34_result_[s] (stream[s])
    - Q39 with internal table named q39_result_[s] (stream[s])
    - Q64 with internal table named q64_result_[s] (stream[s])
    - Q71 with internal table named q71_result_[s] (stream[s])
    - Q98 with internal table named q98_result_[s] (stream[s])

The Supporting Files Archive contains the full set of executable query text template used in the test.

## 4.5 Query Substitution Parameters and Seeds Used

*All the query substitution parameters used during the performance test must be disclosed in tabular format, along with the seeds used to generate these parameters.*

The Supporting Files Archive contains the query substitution parameters and seed used in the test.

## 4.6 Refresh Setting

*All query and refresh session initialization parameters, settings and commands must be disclosed.*

The Supporting Files Archive contains the query and scripts, along with initialization parameters and settings.

## 4.7 Source Code of Refresh Functions

*The details of how the data maintenance functions were implemented must be disclosed (including source code of any non-commercial program used).*

The Supporting Files Archive contains the source code implementing the refresh functions.

## 4.8 Staging Area

*Any object created in the staging area (see Clause 5.1.8 for definition and usage restrictions) used to implement the data maintenance functions must be disclosed. Also, any disk storage used for the staging area must be priced, and any mapping or virtualization of disk storage must be disclosed.*

No staging area was used.

# Clause 6: Data Persistence Properties Related Items

*The results of the data accessibility tests must be disclosed along with a description of how the data accessibility requirements were met.*

The data accessibility test was performed by failing the local storage of one node. This failure was induced during the execution of the first data maintenance test. The storage on each nodes made of 4 PCIE NVME. The storage failure was simulated by removing access to 1 of the PCIE NVME. The Supporting Files Archive contains the logs of status before and after the storage failures.

# Clause 7: Performance Metrics and Execution Rules Related Items

## 7.1 System Activity

*Any system activity on the SUT that takes place between the conclusion of the load test and the beginning of the performance test must be fully disclosed including listings of scripts or command logs.*

The only activity between the end of the load test and the beginning of the performance test was the generation of the executable query text and the execution of audit scripts.

## 7.2 Test Steps

*The details of the steps followed to implement the performance test must be disclosed.*

The Supporting Files Archive contains the scripts and logs.

## 7.3 Timing Intervals for Each Query and Refresh Function

*The timing intervals defined in Clause 7 must be disclosed.*

See the Executive Summary at the beginning of this report.

## 7.4 Throughput Test Result

*For each Throughput Test, the minimum, the 25th percentile, the median, the 75th percentile, and the maximum times for each query shall be reported.*

See the Executive Summary at the beginning of this report.

## 7.5 Time for Each Stream

*The start time and finish time for each query stream must be reported.*

See the Executive Summary at the beginning of this report.

## 7.6 Time for Each Refresh Function

*The start time and finish time for each data maintenance function in the refresh run must be reported for the Throughput Tests*

See the Executive Summary at the beginning of this report.

## 7.7 Performance Metrics

*The computed performance metric, related numerical quantities and the price/performance metric must be reported.*

QphDS@100000GB = 653,611,141

See the Executive Summary at the beginning of this report for more detail.

# Clause 8: SUT and Driver Implementation Related Items

## 8.1 Driver

*A detailed textual description of how the driver performs its functions, how its various components interact and any product functionalities or environmental settings on which it relies must be provided. All related source code, scripts and configuration files must be disclosed. The information provided should be sufficient for an independent reconstruction of the driver.*

Mysql client v8.0.44 was used to submit the queries. It connects to the SuperSQL instance.

The command run a SQL file

```
cat $STREAM_DIR/query_$query.sql | mysql -h"${SERVER_HOST}" -u"${USER}" -P"${QUERY_PORT}"
-p${PASSWORD} -D"${DATABASE}" --comments -vvv >>${RESULT_DIR}/q${query}.out 2>&1
```

The command run a SQL command:

```
mysql -h"${host}" -P"${port}" -p"${PASSWORD}" -D"tpcds" -vvv -e "SQL command"
```

The SuperSQL instance accepts SQL queries from the client and processes the queries. All queries are compiled on the Coordinator Node and then dispatched to the data nodes as distributed tasks. When the tasks finish, their results are collected by the Coordinator Node which sends the query output to the client.

The Supporting Files Archive contains all the command, scripts and logs.

## 8.2 Implementation Specific Layer (ISL)

*If an implementation specific layer is used, then a detailed description of how it performs its functions, how its various components interact and any product functionalities or environmental setting on which it relies must be provided. All related source code, scripts and configuration files must be disclosed. The information provided should be sufficient for an independent reconstruction of the implementation specific layer.*

No Implementation Specific Layer was used.

## 8.3 Profile-Directed Optimization

*If profile-directed optimization as described in Clause 7.2.10 is used, such use must be disclosed. In particular, the procedure and any scripts used to perform the optimization must be disclosed.*

Profile-directed optimization was not used.

# Clause 9: Pricing Related Items

## 9.1 Hardware and Software Used

*A detailed list of hardware and software used in the priced system must be reported. The rules for pricing are included in the current revision of the TPC Pricing Specification located on the TPC website (http://www.tpc.org)*

A detailed list of all licensed services, hardware and software, is provided in the Executive Summary of this report.

## 9.2 Availability Date

*The System Availability Date (see Clause 7.6.5) must be the single availability date reported on the first page of the executive summary. The full disclosure report must report Availability Dates individually for at least each of the categories for which a pricing subtotal must be. All Availability Dates required to be reported must be disclosed to a precision of 1 day, but the precise format is left to the test sponsor.*

The total system is available as of the date of this report.

## 9.3 Country-Specific Pricing

*Additional Clause 7 related items may be included in the full disclosure report for each country specific priced configuration.*

The configuration is priced for the Chinese market.

# Clause 11: Audit Related Items

## Auditor’s Information and Attestation Letter

*The auditor's agency name, address, phone number, and attestation letter with a brief audit summary report indicating compliance must be included in the full disclosure report. A statement should be included specifying whom to contact in order to obtain further information regarding the audit process.*

This benchmark was audited by: Doug Johnson, of InfoSizing.

InfoSizing
The Right Metric For Sizing IT

TPC
Certified Auditor

Zhe Chen
No.16, Gaoxin South 10th Road, Nanshan District,
Shenzhen, Guangdong, China

July 26, 2026

I verified the TPC Benchmark™ DS v4.0.0 performance of the following configuration:

| | |
|---|---|
| Platform: | Tencent Cloud Data Lake Compute (Dedicated cluster w/ 142 nodes) |
| Operating System: | TencentOS Server 4.4 |
| Database Manager: | Tencent Data Computing Platform SuperSQL v1.0 |

The results were:

| | | |
|---|---|---|
| **Performance Metric** | **653,611,141** | **QphDS@100000** |
| Secondary Metrics | | |
| $T_{Load}$ | 449.4 | seconds@100000 |
| $T_{Power}$ | 177.5 | seconds@100000 |
| $T_{TT1}$ | 448.7 | seconds@100000 |
| $T_{TT2}$ | 450.1 | seconds@100000 |
| $T_{DM1}$ | 101.5 | seconds@100000 |
| $T_{DM2}$ | 95.4 | seconds@100000 |

| **System Under Test** | **Tencent Cloud Data Lake Compute (142 nodes) with:** | | |
|---|---|---|---|
| CPUs | 1x Intel® Xeon® 6983P-C (all nodes) | | |
| Memory | 384 GiB (all nodes) | | |
| Storage | ***Qty*** | ***Size*** | ***Type*** |
| | 1 | 200 GB | SSD Cloud Disk (all nodes) |
| | 2 | 100 GB | SSC Cloud Disk (all nodes) |
| | 4 | 7.68 TB | NVMe SSD Local Disk (all nodes) |

In my opinion, these performance results were produced in compliance with the TPC requirements for the benchmark.

The following verification items were given special attention:

- The database records were defined with the proper layout and size.
- The database population was generated using DSDGen v4.0.0
- The database was properly scaled to 100,000 GB and populated accordingly.

63 Lourdes Dr. | Leominster, MA 01453 | 978-343-6562 | www.sizing.com

- The primary and secondary metrics were correctly measured and reported.
- The query templates were produced using approved minor query modifications.
- The query substitution parameters were generated using DSQGen v4.0.0.
- The execution of the queries against the qualification database produced compliant output.
- The tests were driven and sequenced according to the requirements.
- Each throughput test comprised # query streams.
- The execution times for queries and data maintenance functions were correctly measured and reported.
- The data accessibility test was performed and verified.
- The system pricing was verified for major components and maintenance.
- The major pages from the FDR were verified for accuracy.

Additional Audit Notes:

None.

Respectfully Yours,

Doug Johnson, Certified TPC Auditor

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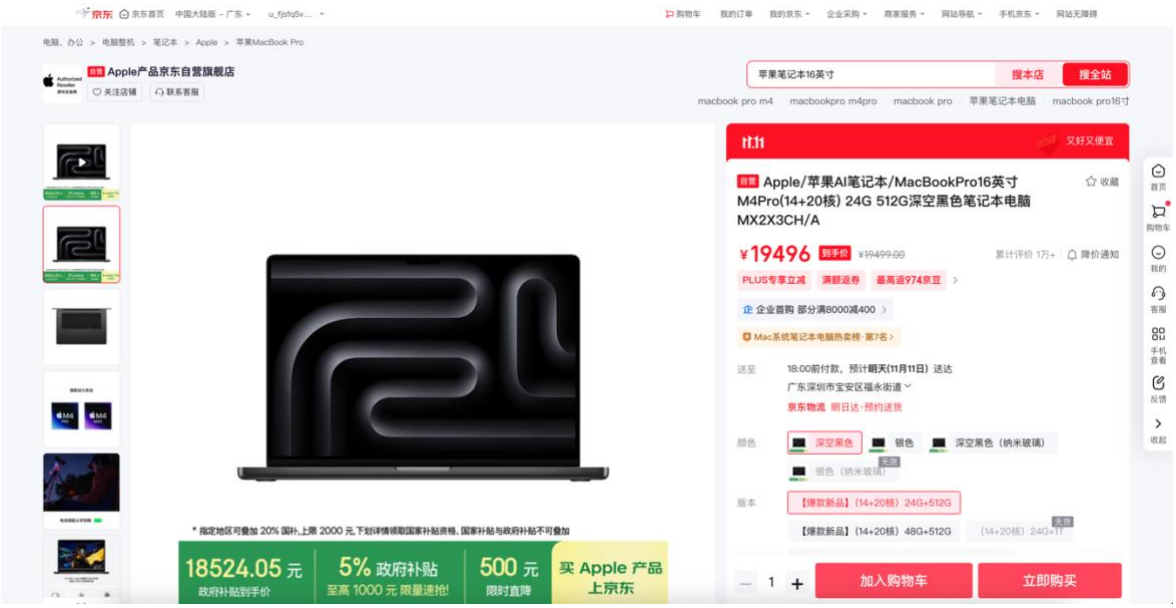
# Supporting Files Index

| Clause | Description | Archive File Pathname |
|---|---|---|
| $root | End-to-end execution script. | run.log |
| General | Compile tpcds | General/compile_tpcds.sh<br>General/DSGen-software-code-4.0.0<br>General/0E7BC862-D16B-490F-9F88-13AE23BFDA04-TPC-DS-Tool.zip |
| | Run all test | General/common.sh<br>General/config.sh<br>General/hosts<br>General/runall.sh |
| | Scripts for get q34 / q39/ q64 / q71 / q98 results, sort stream outputs and get QphH result | General/get_q34_result.sh<br>General/get_q39_result.sh<br>General/get_q64_result.sh<br>General/get_q71_result.sh<br>General/get_q98_result.sh<br>General/result_report.sh |
| Clause 3 | Tools for data generation<br>(including base table and table for maintenance) | Clause_3/doDatagen.sh<br>Clause_3/gen-tpcds-mt-data.sh<br>Clause_3/gen-tpcds-data.sh<br>Clause_3/logs/doGenData.log<br>Clause_3/dsdgen_version.out |
| | Scripts, SQL and logs for load base tables (Specifically, create_tpcds_ddl.schedule is for creating base/foreign tables, loading data to base tables and analyzing base tables, all tasks are scheduled in parallel) | Clause_3/doLoad.sh<br>Clause_3/sqls/create_tpcds_ddl.schedule<br>Clause_3/sqls/import_tpcds_job.schedule<br>Clause_3/sqls/analyze_tpcds_job.schedule<br>Clause_3/sqls/tpcds_import_sql/*<br>Clause_3/sqls/output/*<br>Clause_3/logs/create_tpcds_tables.out<br>Clause_3/logs/load_tpcds.out<br>Clause_3/logs/load_tpcds_time.log |
| | Scripts and SQL for validation and log files | Clause_3/doValidate.sh<br>Clause_3/sqls/Validate_Data.sql<br>Clause_3/sqls/create_tpcds_vld_ddl.schedule<br>Clause_3/sqls/import_tpcds_vld_job.schedule<br>Clause_3/sqls/vld_import_sql/*<br>Clause_3/sqls/Check_Insert.sql<br>Clause_3/logs/Check_Insert.log<br>Clause_3/sqls/Check_RI.sql<br>Clause_3/logs/Check_RI.log<br>Clause_3/sqls/count_tables.sql<br>Clause_3/sqls/desc_tables.sql<br>Clause_3/logs/row_count.out<br>Clause_3/logs/table_schema_after_test.out<br>Clause_3/logs/table_schema.out<br>Clause_3/logs/dsqgen_version.out<br>Clause_3/logs/create_table.log<br>Clause_3/logs/validate_data.log |
| | Scripts and SQL for qualification | Clause_3/sqls/qual_import_sql/*<br>Clause_3/sqls/create_tpcds_qual_ddl.schedule<br>Clause_3/sqls/import_tpcds_qual_job.schedule |
| | pre-generated SQL to data maintenance and output | Clause_3/mtsqls/*<br>Clause_3/logs/fetch_*.out |

| | | |
|---|---|---|
| Clause 4 | The script to execute qualification test and log file | Clause_4/doQualification_test.sh<br>Clause_4/logs/qualification.log<br>Clause_4/sqls/analyze_tables.sql<br>Clause_4/logs/qual_load.out<br>Clause_4/sqls/count_tables.sql<br>Clause_4/logs/qual_row_count.out<br>Clause_4/sqls/desc_tables.sql<br>Clause_4/logs/qual_table_schema.out<br>Clause_4/logs/query_*.err |
| | SQL for qualification queries | Clause_4/queries |
| | Output from executing qualification queries | Clause_4/output/query_*.out |
| | Query templates modify and DSGen tool modify | Clause_4/patches/query_templates.patch<br>Clause_4/patches/fix_generate_update_table_bug.patch |
| Clause 5 | Data maintenance execution scripts and logs files for each stream [s] | Clause_5/doRefresh.sh<br>Clause_5/refresh.sh<br>Clause_5/logs/mt_[r]_time.log<br>Clause_5/logs/refresh_[s]_timing.log |
| | SQL scripts for DM functions for stream [s] | Clause_5/mtsqls_[s]/LF*.sql<br>Clause_5/mtsqls_[s]/DF*.sql<br>Clause_5/mtsqls_[s]/ddl.sql |
| | Output from executing DM functions | Clause_5/output/*.out |
| | Raw data files for maintenance | Clause_5/data/delete_[s].dat<br>Clause_5/data/inventory_delete_[s].dat |
| | MT function and data verification sqls and outputs | Clause_5/doVerify_mt.sh<br>Clause_5/logs/run_verify_mt_[s].log<br>Clause_5/mtsqls_[s]/fetch*.sql<br>Clause_5/mtsqls_[s]/verify*.sql<br>Clause_5/mtsqls_[s]/count_mt_tables.sql<br>Clause_5/output/mt_verify/*.out |
| Clause 6 | Data accessibility test scripts, logs and output files | Clause_6/data_access.sh<br>Clause_6/data_access_test.log<br>Clause_6/data_disk_remove.out<br>Clause_6 /data_disk_status_fail.out<br>Clause_6 /data_disk_status_good.out |
| Clause 7 | Performance test scripts and logs | Clause_7/doQueryGen.sh<br>Clause_7/generate_queries.log<br>Clause_7/doPower.sh<br>Clause_7/doTT.sh<br>Clause_7/doStream.sh<br>Clause_7/logs/pt_time.log<br>Clause_7/logs/tt_[r]_time.log<br>Clause_7/logs/stream_[s]_time.log<br>Clause_7/streams.map |
| | Query text for query [q] in stream [s] | Clause_7/stream[s]/query_[q].sql |
| | Output of query [q] in stream [s] | Clause_7/stream_[s]_out/q[q].out |
| Clause 8 | System and database config | Clause_8/collect_system_profiles.sh<br>Clause_8/logs/collect_system_profiles.log<br>Clause_8/system_profiles/* |

# Appendix A: Purchase Page of Creating Tencent Cloud Data Lake Compute Cluster with 1-Year Subscription

# Appendix B: Third Party Price Quotes

MacBook Pro 14 inch Apple M4Pro (Original Chinese version)