Benchmarking or Benchmarketing ?

*Benchmarking is the practice of comparing **business processes** and **performance metrics** to industry bests and best practices from other companies. Dimensions typically measured are **quality**, **time** and **cost**.*

Source: Wikipedia

Benchmarking

Benchmarketing

*Benchmarketing is the practice of comparing **business processes** and **performance metrics** to industry bests and best practices from other companies **for marketing purpose**. Dimensions typically measured are **quality**, **time** and **cost**.*

Source: ChatGPT

The Return of the H2O.ai Database-like Ops Benchmark

Comparing InfluxDB, TimescaleDB, and QuestDB Time-Series Databases

4Bn rows/sec query benchmark: Clickhouse vs QuestDB vs Timescale

Timescale vs. Amazon RDS PostgreSQL: Up to 350x Faster Queries, 44 % Faster Ingest, 95 % Storage Savings for Time-Series Data

TimescaleDB vs. InfluxDB: Purpose Built Differently for Time-Series Data

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00 Misconception about Benchmarking

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Benchmarking is always about

Performance

Benchmarking

*Benchmarking is the practice of comparing business processes and performance metrics to industry bests and best practices from other companies. Dimensions typically measured are **quality**, **time** and **cost**.*

Source: Wikipedia

Benchmarking is about three things

Reliability
Performance
Cost

Benchmarking is mainly about two things

Reliability
Performance

01 Shortcomings with Benchmarking Strategies

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Biased Results

Knowledge disparity about all databases that are being benchmarked like

- Are best practices for these databases adopted ?
- Are these databases designed for this use-case ?
- Are configs for these databases set correctly ?

Non Reproducible Results

Missing mentions of parameters that may impact benchmarking results like

- Hardware specifications used.
- Cluster provisioning steps.
- Dataset used.

No Expert Review of Results

Most benchmarks are done in isolation.

- Before publishing the results, authors of these benchmarks should reach out to the subject-matter experts of each of these databases for reviewing the results.

02 Improvements with Benchmarking Strategies

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Benchmark only your database

Run benchmarks on various dimensions on

- Setups in various cloud providers with different cluster topologies.
- Different type and size of datasets.
- Read and write performance.

Benchmark as part of CI

Run benchmarks as part of continuous integration

- Use results to measure performance of each component of your database.
- Track regressions using this benchmarking suite.

03 Frameworks for Benchmarking

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TPC-C and TPC-H

Benchmark for OLTP and OLAP databases

- No centralized way of storing the results.

ClickBench

[Benchmark for OLAP databases]

Detailed Comparison

	ClickHouse (tuned) (c6a.metal, 500gb gp2)	StarRocks (c6a.metal, 500gb gp2)	Databend (c6a.metal, 500gb gp2)	ClickHouse (c6a.metal, 500gb gp2)	ClickHouse (m6i.32xlarge)	ClickHouse (web) (c6a.metal, 500gb gp2)
Load time:	137s (×414.75)	433s (×1312.12)	70s (×212.12)	140s (×423.01)	458s (×1387.02)	0s (×1.00)
Data size:	13.57 GiB (×1.46)	16.49 GiB (×1.78)	19.49 GiB (×2.10)	13.58 GiB (×1.46)	13.58 GiB (×1.46)	13.56 GiB (×1.46)
Q0.	0.00s (×1.08)	0.03s (×3.94)	0.00s (×1.21)	0.00s (×1.08)	0.01s (×1.48)	0.00s (×1.18)
Q1.	0.04s (×2.25)	0.03s (×2.00)	0.01s (×1.20)	0.01s (×1.10)	0.01s (×1.15)	0.01s (×1.15)
Q2.	0.04s (×2.45)	0.06s (×3.50)	0.02s (×1.54)	0.02s (×1.50)	0.02s (×1.30)	0.02s (×1.65)
Q3.	0.03s (×1.75)	0.06s (×3.50)	0.02s (×1.46)	0.02s (×1.60)	0.01s (×1.25)	0.02s (×1.65)
Q4.	0.09s (×1.10)	**0.08s (×1.00)**	0.25s (×2.84)	0.19s (×2.21)	0.15s (×1.80)	0.20s (×2.34)
Q5.	**0.12s (×1.00)**	0.21s (×1.69)	0.27s (×2.12)	0.40s (×3.15)	0.20s (×1.59)	0.45s (×3.56)
Q6.	0.02s (×2.15)	0.02s (×2.31)	0.01s (×1.91)	0.02s (×2.15)	0.02s (×2.00)	0.02s (×2.00)
Q7.	0.02s (×1.97)	0.04s (×2.99)	0.02s (×1.69)	0.03s (×2.09)	0.03s (×2.09)	0.02s (×2.03)
Q8.	0.14s (×1.13)	**0.12s (×1.00)**	0.29s (×2.29)	0.25s (×1.98)	0.31s (×2.48)	0.27s (×2.12)
Q9.	**0.27s (×1.00)**	0.70s (×2.54)	0.30s (×1.13)	0.27s (×1.01)	0.33s (×1.22)	0.27s (×1.00)
Q10.	0.06s (×1.17)	**0.05s (×1.00)**	0.29s (×4.94)	0.09s (×1.67)	0.10s (×1.83)	0.10s (×1.82)
Q11.	**0.06s (×1.00)**	0.06s (×1.06)	0.18s (×2.83)	0.10s (×1.65)	0.11s (×1.82)	0.09s (×1.52)
Q12.	**0.14s (×1.00)**	0.17s (×1.22)	0.29s (×2.04)	0.17s (×1.20)	0.19s (×1.39)	0.18s (×1.32)
Q13.	**0.18s (×1.00)**	0.23s (×1.29)	0.43s (×2.36)	0.21s (×1.18)	0.23s (×1.27)	0.24s (×1.37)
Q14.	**0.15s (×1.00)**	0.18s (×1.17)	0.27s (×1.73)	0.17s (×1.12)	0.18s (×1.18)	0.21s (×1.38)
Q15.	0.12s (×1.47)	**0.08s (×1.00)**	0.22s (×2.54)	0.14s (×1.69)	0.15s (×1.74)	0.12s (×1.48)
Q16.	0.32s (×1.08)	**0.30s (×1.00)**	0.48s (×1.58)	0.35s (×1.17)	0.45s (×1.49)	0.35s (×1.15)

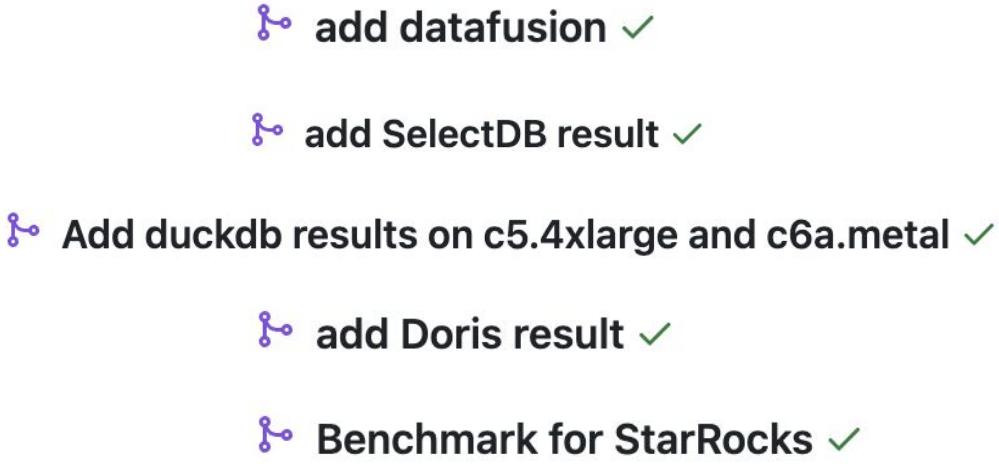
ClickBench

Handles the shortcomings of benchmarking strategies

- Easy to reproduce the results.
- Includes database provisioning steps.
- Includes hardware specifications.

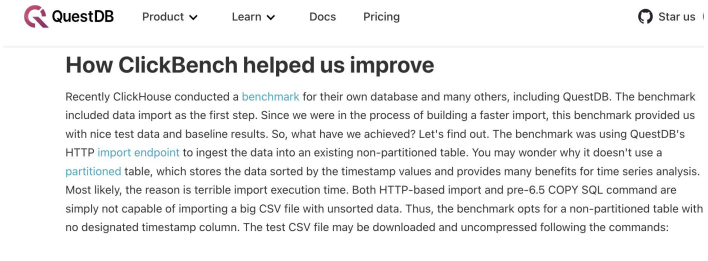
ClickBench

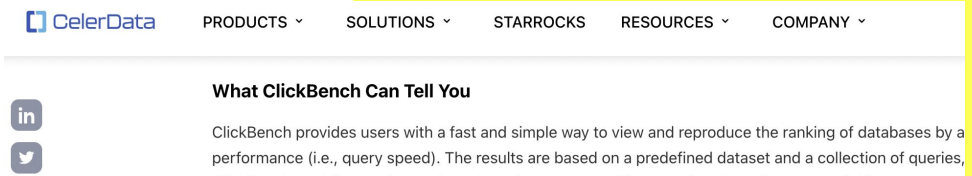
Various databases run clickbench and contributes results

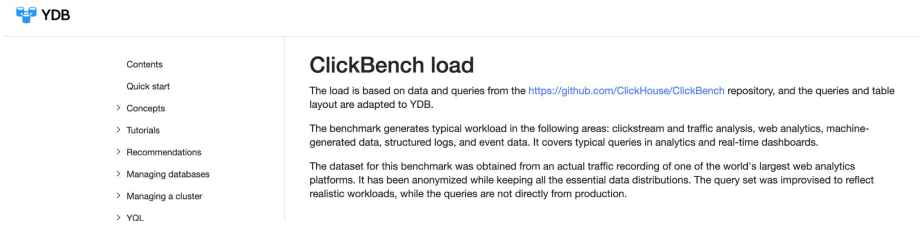


ClickBench

ClickBench helped other databases to improve







ClickBench

Various databases integrated ClickBench in their daily continuous integration runs

04 Takeaways

ClickHouse

Takeaways

- Every use-case is unique. Run your own benchmark.
- Not just performance, but reliability, scalability and security are equally important.

Thank you!