ClickHouse vs. Snowflake Benchmark Analysis

ClickHouse

EXECUTIVE SUMMARY

Overview

Our benchmark analysis demonstrates that ClickHouse Cloud outperforms Snowflake across all critical dimensions for real-time analytics: speed of data ingestion, query latency, and cost.

Objective

Reports from customers have indicated that migrating real-time analytics workloads from Snowflake to ClickHouse Cloud has not only increased query performance but also reduced expenses for their businesses. Thus, the objective of our benchmark analysis is to deeply understand and outline the differences and similarities between ClickHouse Cloud and Snowflake for real-time analytics. We compare the performance and cost of both systems.

Approach

We benchmark, in ClickHouse Cloud and Snowflake, a set of real-time analytics queries that are representative of many real-time data applications. The cost is recorded for running each benchmark test, considering data loading and storage. Finally, this expense analysis is projected and compared for a production environment and workload.

Results

ClickHouse Cloud provides significant performance and cost improvements compared to Snowflake for real-time analytics use cases.

Querying

ClickHouse Cloud querying speeds are 2x faster compared to Snowflake

Compression

ClickHouse Cloud results in 38% better data compression than Snowflake

Cost

ClickHouse Cloud is 3-5x more cost effective than Snowflake in production

Querying

ClickHouse Cloud querying speeds are 2x faster compared to Snowflake.

- ClickHouse Cloud is **2-3x faster for hot queries** than Snowflake based on mean performance, where Snowflake has more vCPUs and is configured with an equivalent optimized clustering key.
- ClickHouse Cloud is **1.5-2x faster for cold queries** than Snowflake based on mean performance, where Snowflake has more vCPUs and is configured with an equivalent optimized clustering key.
- Query accelerating features such as Snowflake's materialized views and ClickHouse's projections and materialized views offer strong performance gains for queries. Nonetheless, we observed that the mean performance for Snowflake materialized views is **1.5x slower** than ClickHouse Cloud with equivalent optimizations. Note that projections and materialized views are available with ClickHouse Cloud out-of-the-box. Materialized views in Snowflake, in contrast, require a higher pricing tier and increased costs.
- For Snowflake to be competitive with ClickHouse on query performance, clustering is required - based on our tests, queries are **6-10x times slower** in Snowflake otherwise. Clustering in Snowflake incurs additional costs as well. These Snowflake costs are nondeterministic and difficult to estimate. In contrast, ClickHouse Cloud does not charge for the use of equivalent features.

Compression

ClickHouse Cloud results in 38% better data compression than Snowflake.

- ClickHouse Cloud offers up to **38% better compression** than Snowflake with clustering enabled for query performance.
- Irrespective of query performance, selecting the most optimal clustering key for compression in Snowflake still underperforms relative to ClickHouse by **almost 20%**.
- Our results show that the best-performing clustering key for Snowflake, with respect to compression, did not result in the best Snowflake query performance. Snowflake users are therefore presented with a tradeoff – optimize for compression (and thus storage costs) or have faster queries. This is not the case with ClickHouse Cloud.

Cost

ClickHouse Cloud is 3-5x more cost-effective than Snowflake in production.

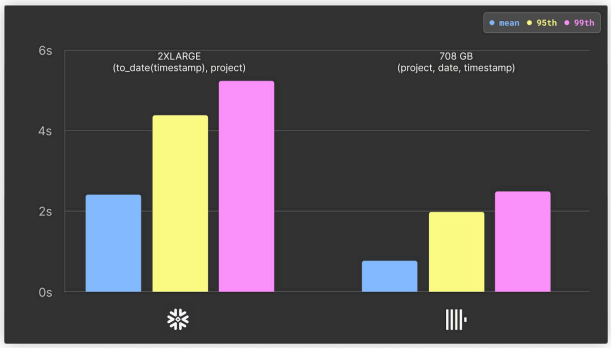
For a production system

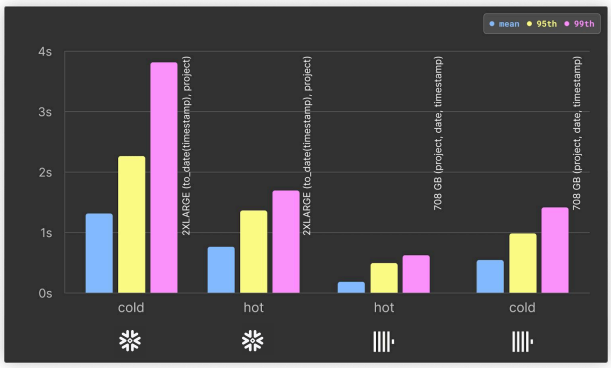
- Snowflake is at a minimum **3x more expensive** than ClickHouse Cloud when projecting costs of a production workload running our benchmark queries. →

- Snowflake is **5x more expensive** than ClickHouse Cloud for production workloads with comparable performance to ClickHouse Cloud.

To run our benchmarks

- Snowflake is at a minimum **5x more expensive** than ClickHouse Cloud to load data.
- Snowflake is at a minimum **7x more expensive** than ClickHouse Cloud in querying costs, with Snowflake queries running in tens of seconds, and ClickHouse Cloud queries returning in seconds or less. To bring Snowflake to comparable query performance, Snowflake is 15 times more expensive than ClickHouse Cloud.





See our detailed analysis in Benchmarks and Cost Analysis for more information.

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