

DADOS Flow Benchmark Report

2026-08-11

1M

metrics / second

1,789,189,552 total metrics · 30 minutes · 5 brokers · metrics/second

PERFORMANCE HIGHLIGHTS

STAGE	P50	P99	P99.99
Broker Time	766.4µs	1.6ms	2.1ms
DadosFlow Internal	410.7µs	685.8µs	869.9µs
Transmission Latency	643.1µs	1.2ms	1.3ms
Lightning Internal	255.5µs	339.0µs	2.0ms
Time to Query (~)	1.8ms	2.9ms	3.6ms
Query Execution Duration	2.6µs	964.9µs	2.0ms
Query Transmission Duration	43.9µs	487.1µs	2.0ms
Query Round-Trip	50.5µs	1.3ms	3.6ms
End-to-End (~)	2.0ms	3.5ms	5.5ms

(~) rows: convolution of per-stage distributions · stage correlation verified negligible

DATE 2026-08-11	INSTANCES broker=c7g.16xlarge, collector=r7g.16xlarge, dadosflow=c7g.16xlarge, lightning=r7g.16xlarge, publisher=c7g.16xlarge	BROKERS 5 brokers · 2 DADOS Flow · 1 Lightning
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RUN METADATA

Date: 2026-08-11

Workload: Target 1M metrics/second, scenario: baseline-proveit

Data window: Data captured over a 30 minutes window using the DADOS Flow collector. The first 10s of the run (cold-start ramp) are excluded from all statistics.

Percentiles: Computed over the full 30 minutes window, after the 10s cold-start exclusion.

Clocking: All instances co-located in the AWS cluster placement group. Sub-microsecond clock alignment via Amazon Time Sync Service (PTP).

TEST ENVIRONMENT

Instance type: AWS broker=c7g.16xlarge, collector=r7g.16xlarge, dadosflow=c7g.16xlarge, lightning=r7g.16xlarge, publisher=c7g.16xlarge

CPU: broker 64 vCPU (AWS Graviton3 (arm64)) · collector 64 vCPU (AWS Graviton3 (arm64)) · dadosflow 64 vCPU (AWS Graviton3 (arm64)) · lightning 64 vCPU (AWS Graviton3 (arm64)) · publisher 64 vCPU (AWS Graviton3 (arm64))

Memory: broker 128 GiB · collector 512 GiB · dadosflow 128 GiB · lightning 512 GiB · publisher 128 GiB

Networking: broker 30 Gbps · collector 30 Gbps · dadosflow 30 Gbps · lightning 30 Gbps · publisher 30 Gbps

EBS performance: broker 20 Gbps · collector 20 Gbps · dadosflow 20 Gbps · lightning 20 Gbps · publisher 20 Gbps

Storage model: EBS-only root

Platform: Nitro hypervisor/system, UEFI boot mode.

Topology: 5 broker(s), 2 DADOS Flow, 1 Lightning

Input source: Publishers replaying data from the PROVEIT virtual factory

LATENCY STAGE DEFINITIONS

Broker Time: Time from message publish, through the broker, to arrival in DADOS Flow.

DadosFlow Internal: Processing time inside the DADOS Flow process.

Transmission Latency: Time for the network call transmitting data from DADOS Flow to DADOS Lightning.

Lightning Internal: Processing time inside DADOS Lightning: batch conditioning, bloom build, and hot-tier ring push.

Time to Query (~): Total time from message publish to data becoming queryable in DADOS Lightning. The stages sit on different clock bases, so there is no per-message end-to-end measurement; the mean is exact (sum of stage means), and each percentile is the convolution of the per-stage distributions – the exact distribution of the sum when the stages are independent. Independence is verified, not assumed: the stages are measured to be uncorrelated across census buckets (see the summary note). Exact per-message e2e pending an in-band publisher-egress anchor.

Query Execution Duration: Time to execute the query inside the DADOS Lightning data server.

Query Transmission Duration: Query request/response time outside server-side query execution.

Query Round-Trip: Total query request round-trip: server execution plus query-side transmission.

End-to-End (~): Full pipeline from message publish to query result returned: the ingest path (Time to Query) plus the query round-trip. Convolution of the per-stage distributions, same method as Time to Query – the mean is exact, and the stages are verified uncorrelated across census buckets.

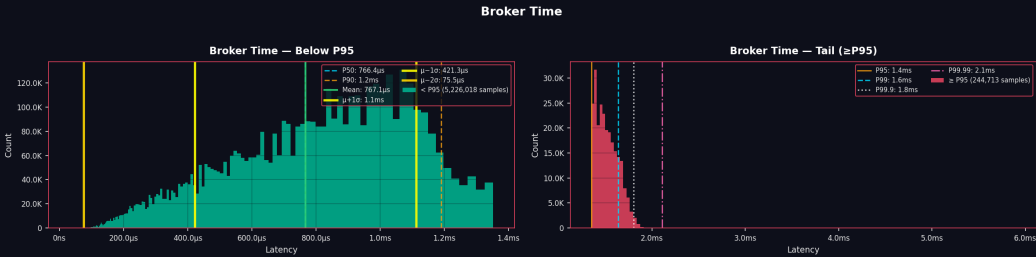
DADOS FLOW LATENCY STATISTICS

Method: HDR Histogram (hdrhistogram v7, Rust)
Precision: 3 significant figures | Max error: ±0.05% of value
Files: 23 parquet file(s) | Rows: 1,789,189,552
Duration: 30 minutes at 1M metrics/second

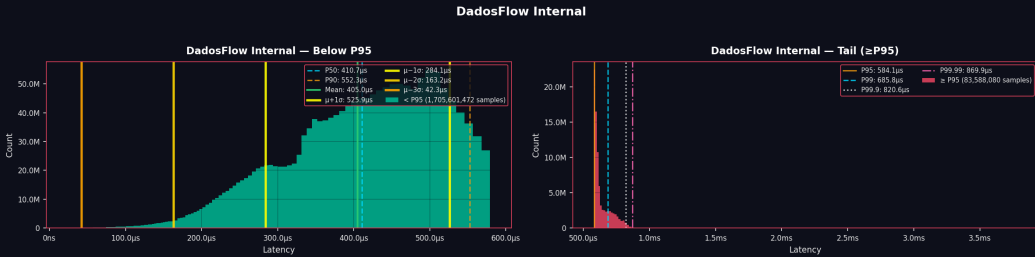
STAGE	MIN	MAX	MEAN	STD DEV	P50	P90	P95	P99	P99.9	P99.99	METHOD
Broker Time <i>dadosflow_ingress - publisher_egress</i>	33.0µs	6.0ms	767.1µs	345.8µs	766.4µs	1.2ms	1.4ms	1.6ms	1.8ms	2.1ms	exact
DadosFlow Internal <i>dadosflow_egress - dadosflow_ingress</i>	23.4µs	3.9ms	405.0µs	120.9µs	410.7µs	552.3µs	584.1µs	685.8µs	820.6µs	869.9µs	exact
Transmission Latency <i>lightning_ingress - dadosflow_egress</i>	42.0µs	4.6ms	647.2µs	302.0µs	643.1µs	1.1ms	1.1ms	1.2ms	1.3ms	1.3ms	exact
Lightning Internal <i>hot_tier_commit - handle_batch_entry</i>	5.0µs	2.2ms	219.0µs	96.3µs	255.5µs	311.5µs	319.2µs	339.0µs	430.3µs	2.0ms	exact
Time to Query (~) <i>broker_time + dadosflow_internal + flight_latency</i>	98.4µs	14.4ms	1.8ms	474.7µs	1.8ms	2.4ms	2.6ms	2.9ms	3.3ms	3.6ms	convolution
Query Execution Duration <i>sys_query_duration_us</i>	0ns	4.1ms	108.3µs	219.6µs	2.6µs	389.2µs	505.8µs	964.9µs	1.9ms	2.0ms	exact
Query Transmission Duration <i>sys_request_duration_us - sys_query_duration_us</i>	16.0µs	4.6ms	69.1µs	102.9µs	43.9µs	120.6µs	198.8µs	487.1µs	1.3ms	2.0ms	exact
Query Round-Trip <i>sys_request_duration_us</i>	16.0µs	5.1ms	176.8µs	275.7µs	50.5µs	484.9µs	763.8µs	1.3ms	2.0ms	3.6ms	exact
End-to-End (~) <i>(broker_time + dadosflow_internal + flight_latency) + sys_request_duration_us</i>	114.4µs	19.5ms	2.0ms	549.2µs	2.0ms	2.7ms	2.9ms	3.5ms	4.3ms	5.5ms	convolution

exact: directly measured HDR histogram (3 significant figures, max error ±0.05% of value). **convolution:** percentiles are the convolution of the per-stage distributions – the mean is exact, and stage correlation verified negligible.

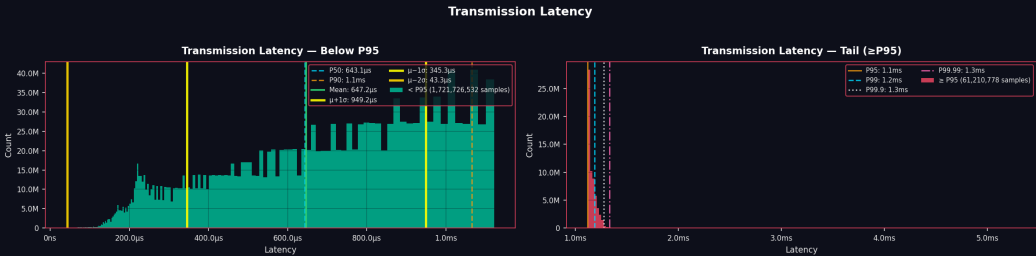
1) LATENCY HISTOGRAMS
BROKER TIME



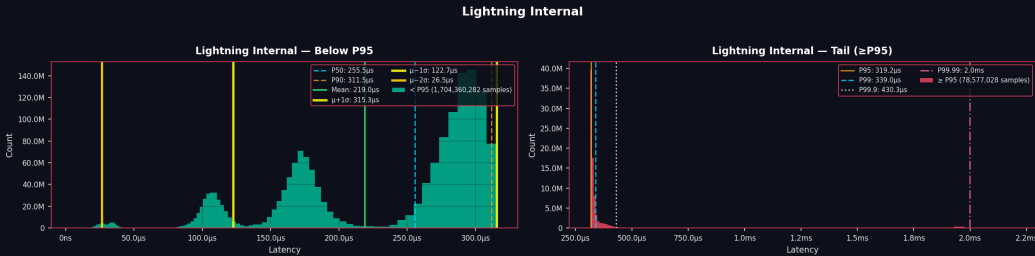
DADOSFLOW INTERNAL



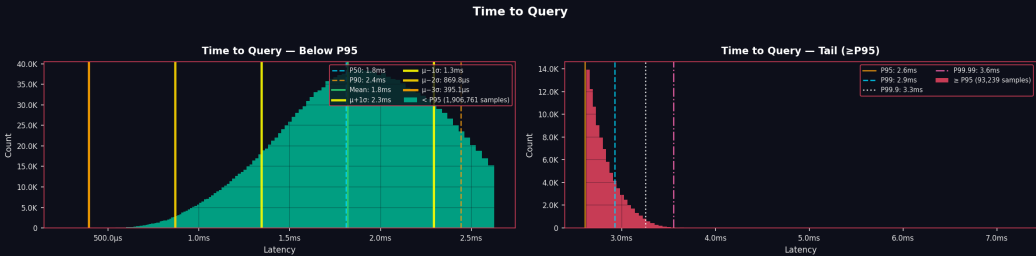
TRANSMISSION LATENCY



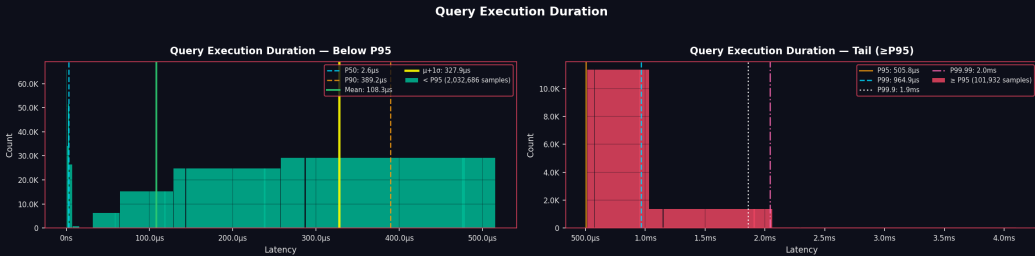
LIGHTNING INTERNAL



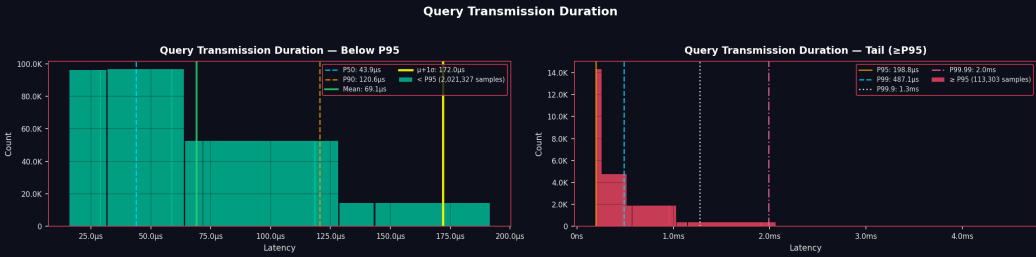
TIME TO QUERY (~)



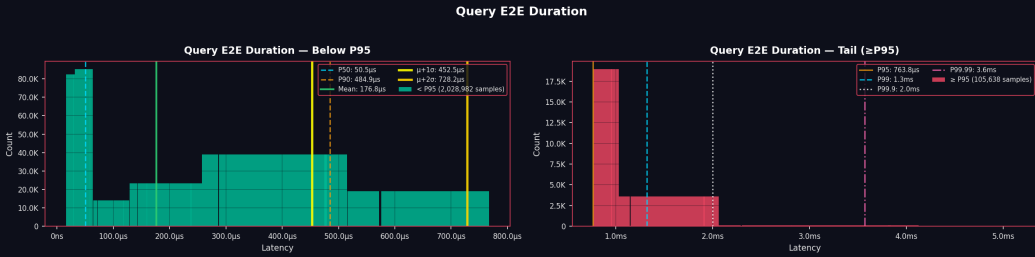
QUERY EXECUTION DURATION



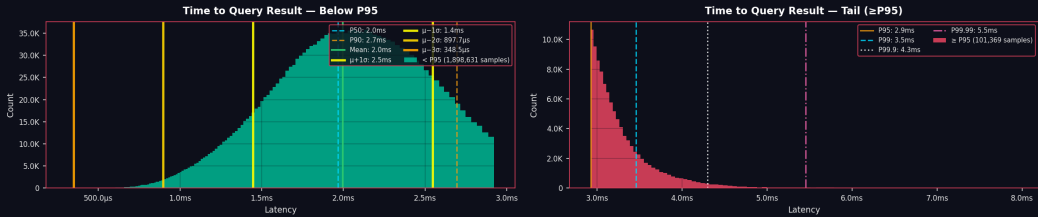
QUERY TRANSMISSION DURATION



QUERY ROUND-TRIP

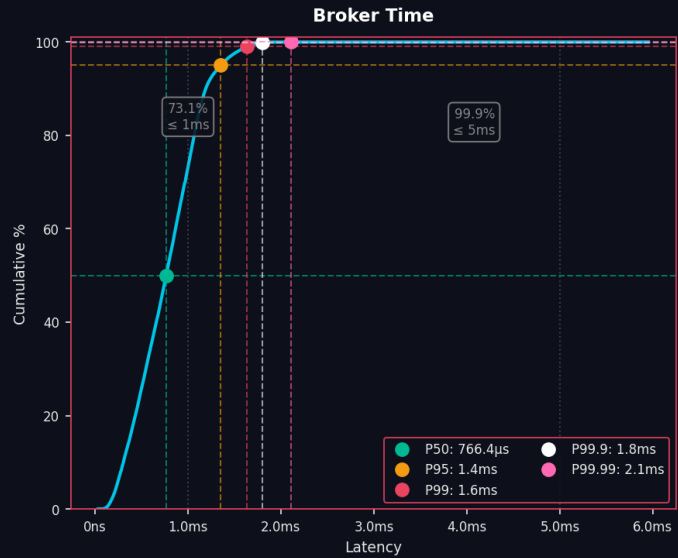


Time to Query Result

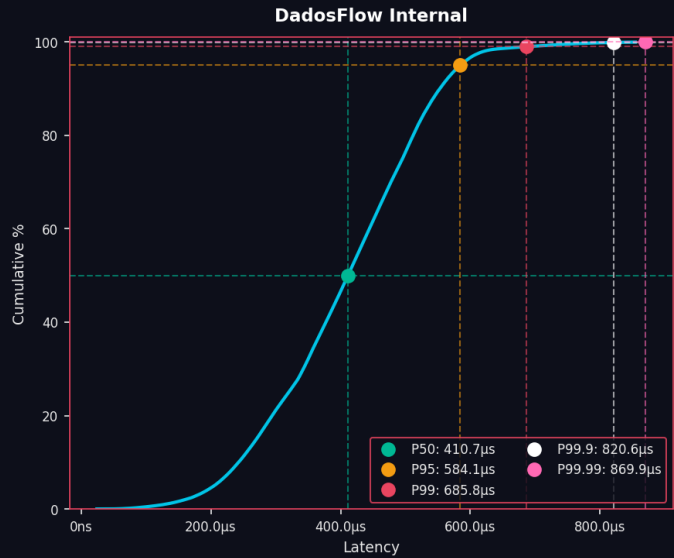


2) LATENCY CUMULATIVE DISTRIBUTION FUNCTIONS

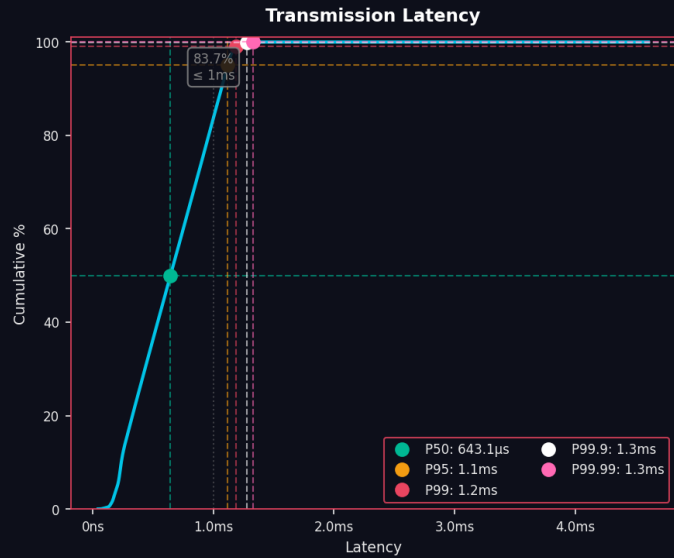
BROKER TIME



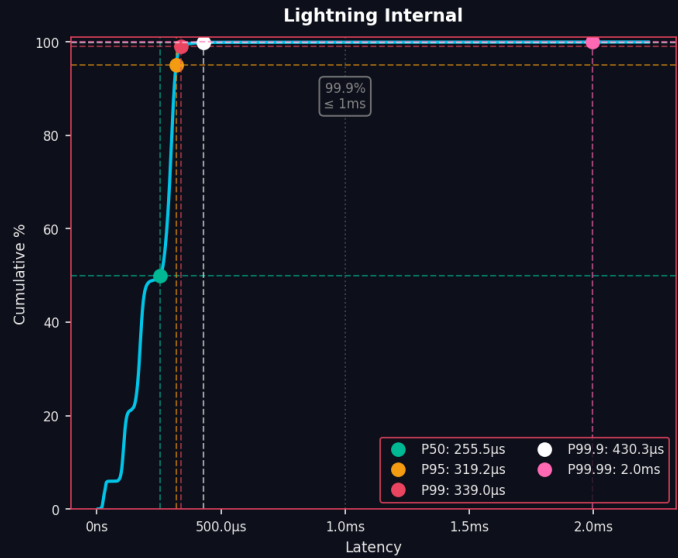
DADOSFLOW INTERNAL



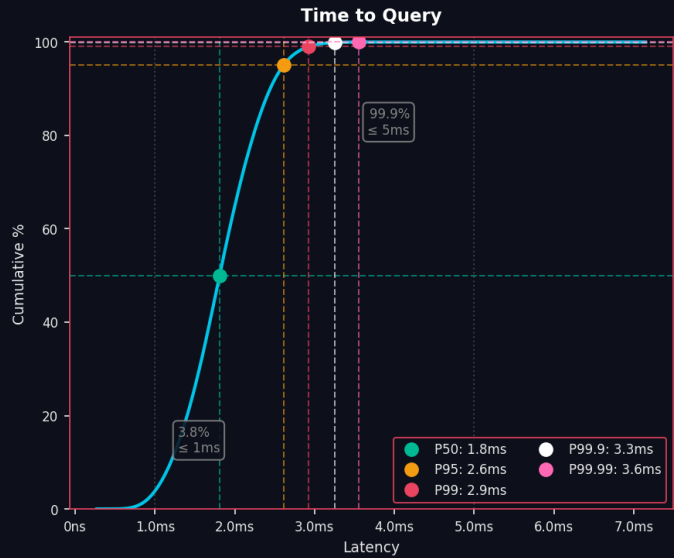
TRANSMISSION LATENCY



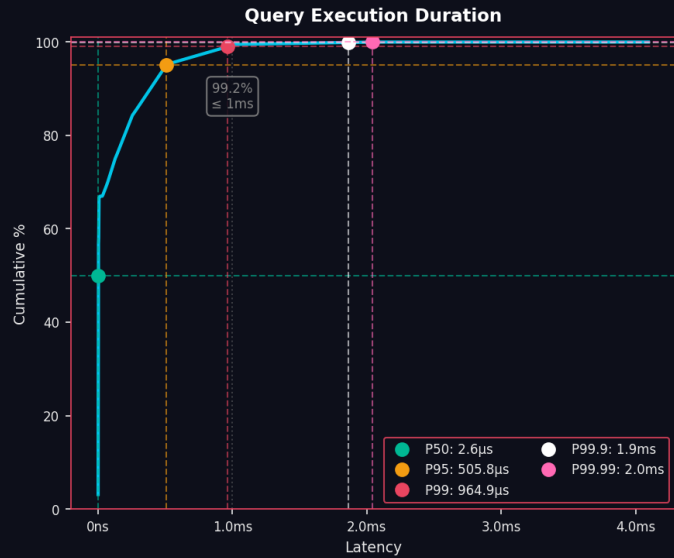
LIGHTNING INTERNAL



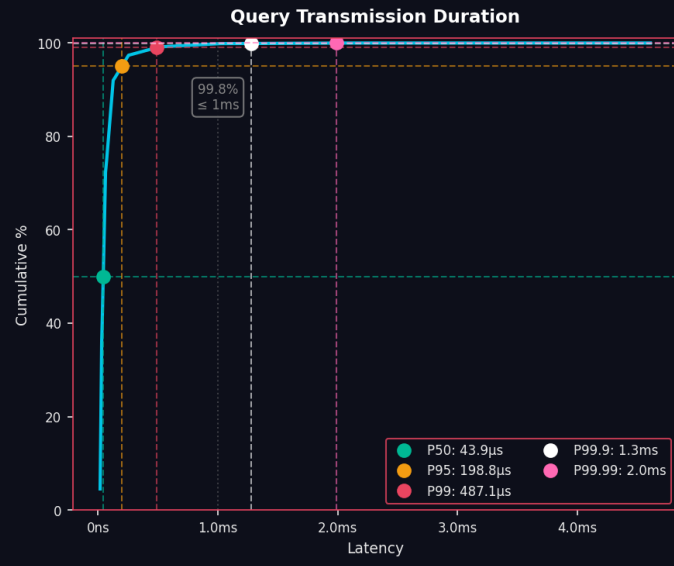
TIME TO QUERY (~)



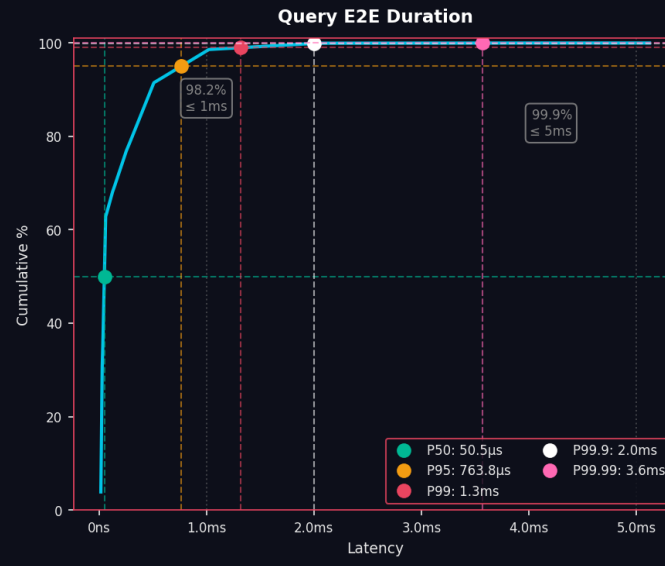
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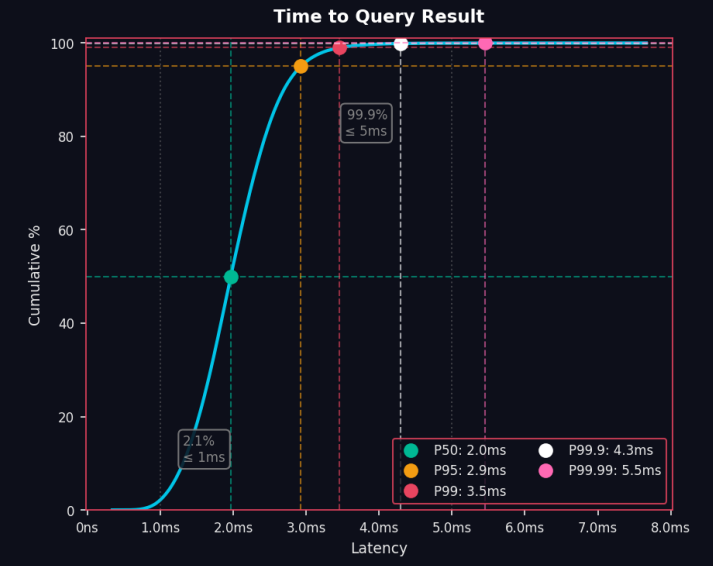
QUERY TRANSMISSION DURATION



QUERY ROUND-TRIP

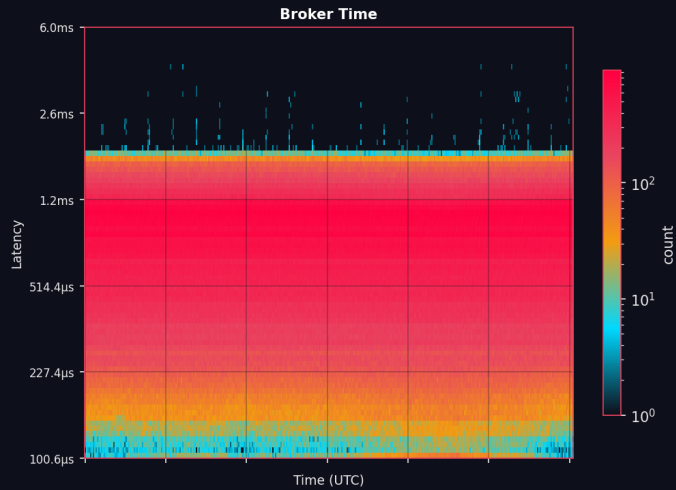


END-TO-END (~)

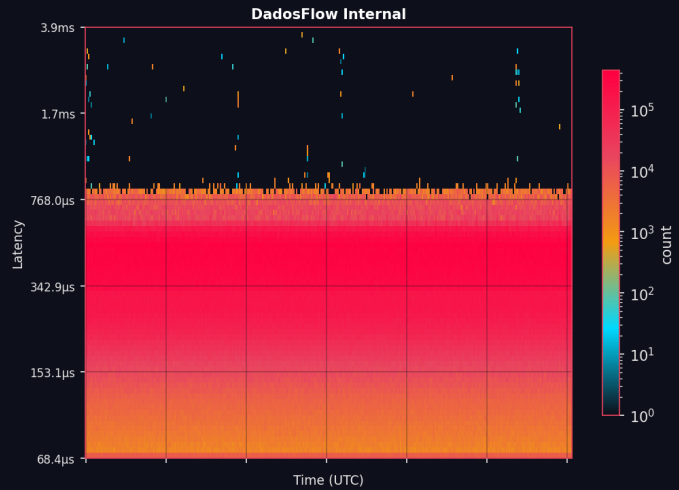


3) LATENCY HEATMAPS

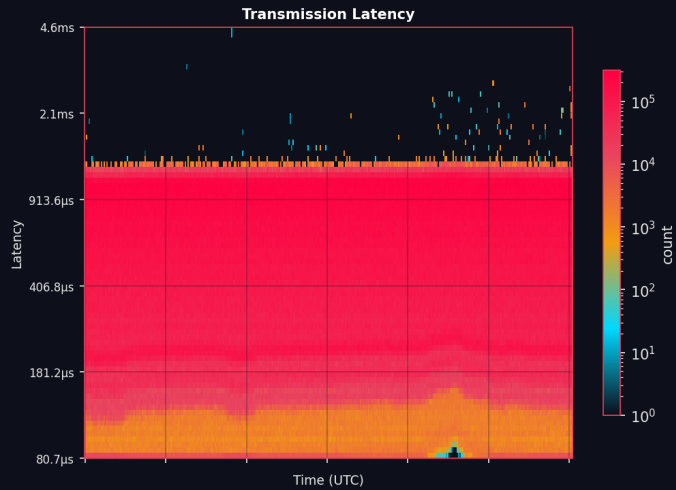
BROKER TIME



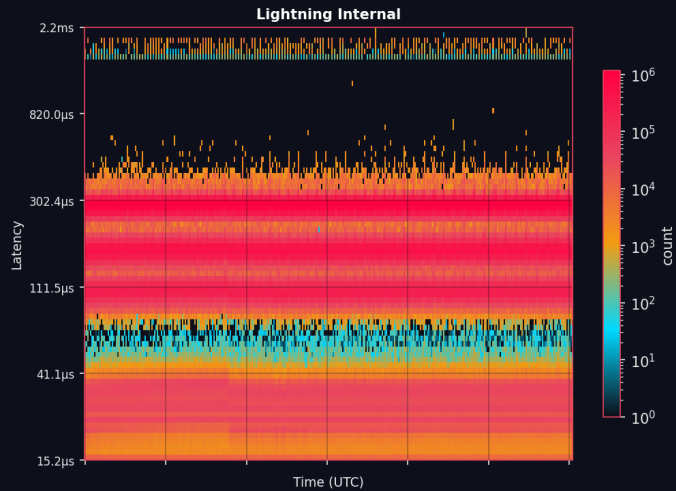
DADOSFLOW INTERNAL



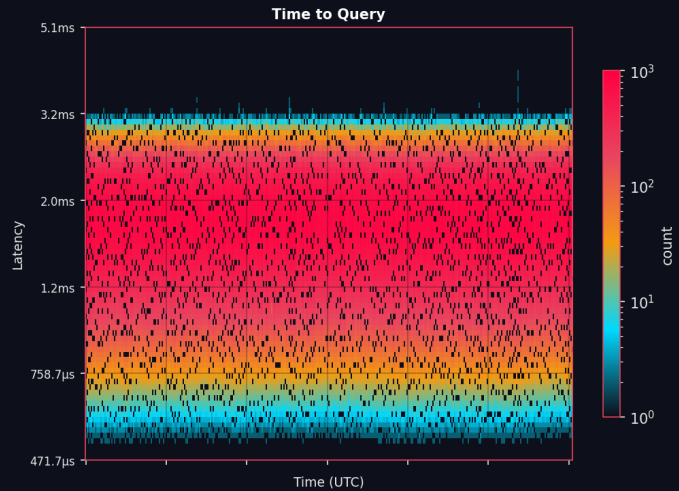
TRANSMISSION LATENCY



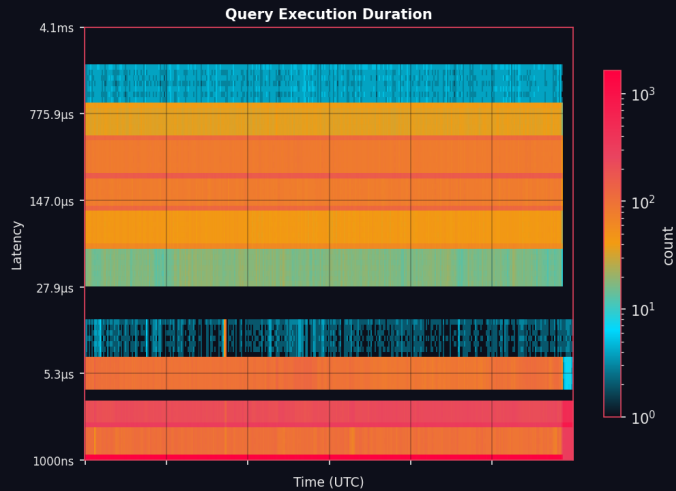
LIGHTNING INTERNAL



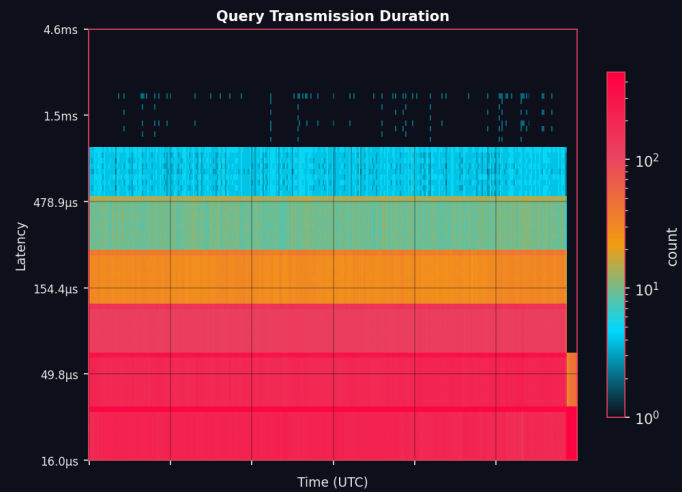
TIME TO QUERY (~)



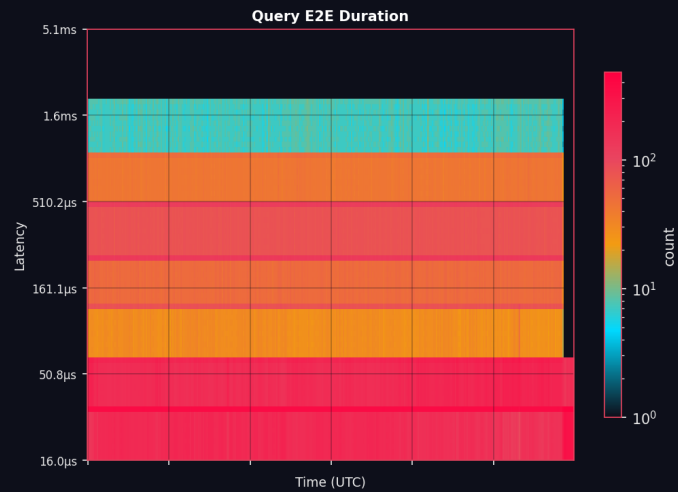
QUERY EXECUTION DURATION



QUERY TRANSMISSION DURATION



QUERY ROUND-TRIP



END-TO-END (~)

