SILK: Preventing Latency Spikes in Log-Structured Merge Key-Value Stores

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USENIX ATC 2019 Lighting Talks

Log-Structured Merge (LSM) KVs

- ✓ **Designed for write-heavy workloads**
- ✓ **Handle large-scale data**
- ✓ **Working set does not fit in RAM**

cassandra

LEVELDB

RocksDB

Log-Structured Merge (LSM) KVs

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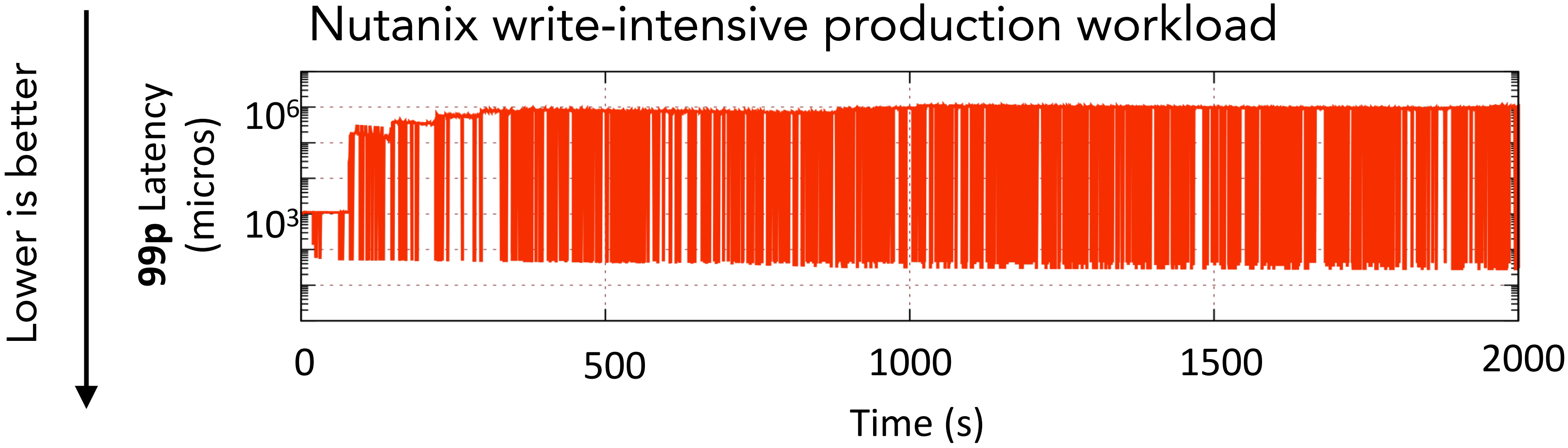
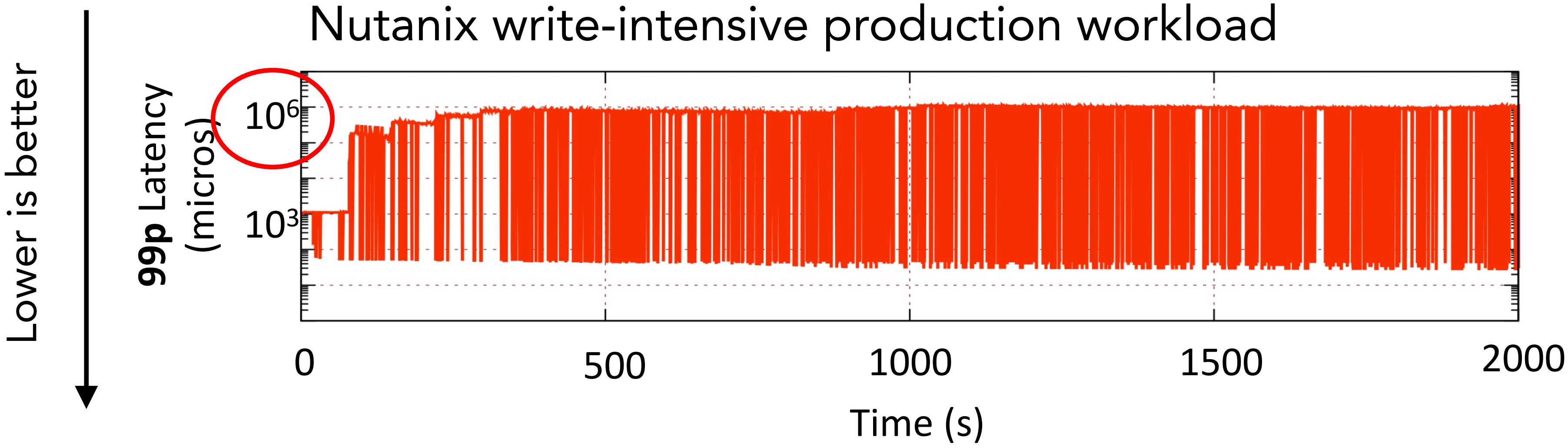
LSM KV Latency Spikes in RocksDB



LSM KV Latency Spikes in RocksDB



Latency spikes of up to 1s in write dominated workloads!

Latency in LSM KVs

☒ **LSM KVs suffer from high tail latency spikes.**

Latency spikes occur in **write-dominated workloads**.

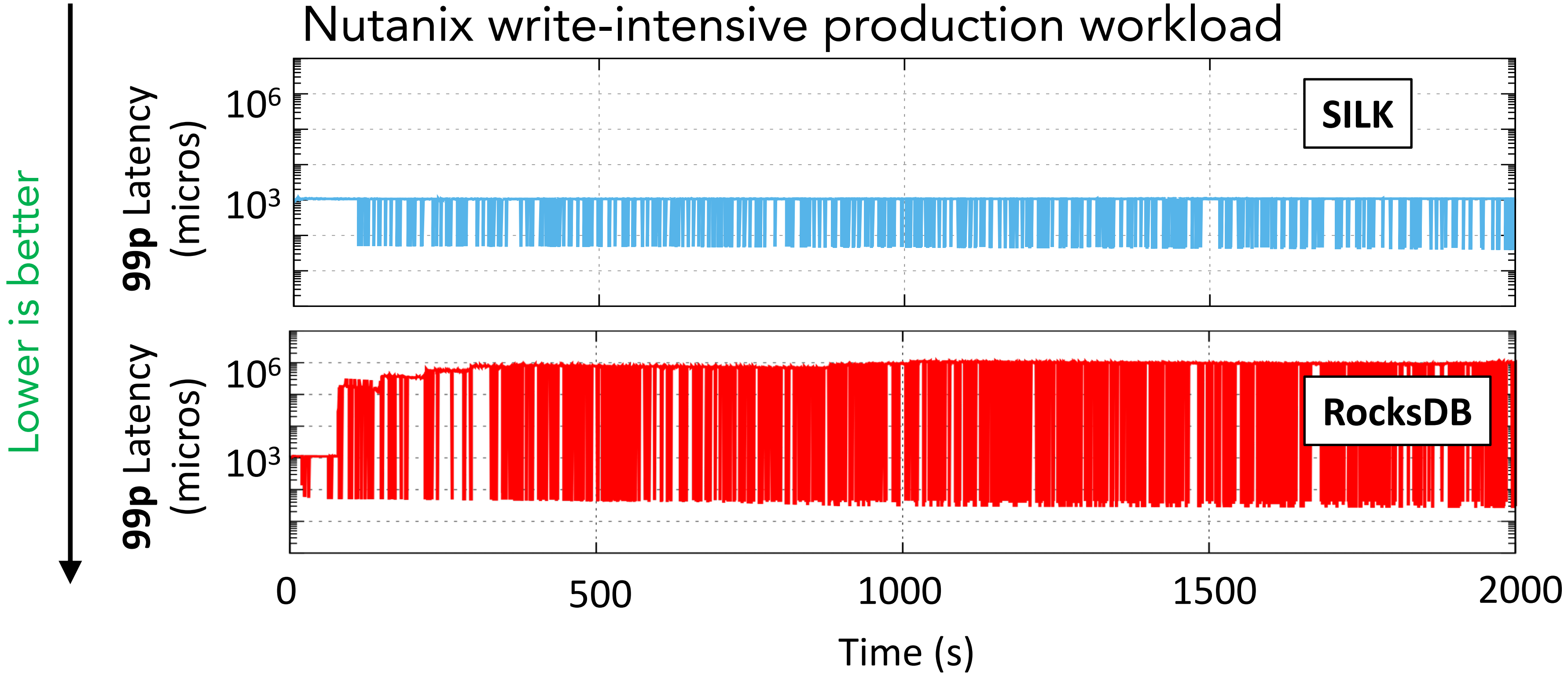
Why is this important?

- Cannot provide SLA guarantees to clients.
- Unpredictable performance when connecting LSM in larger pipelines.

Our Contribution: The SILK LSM KV

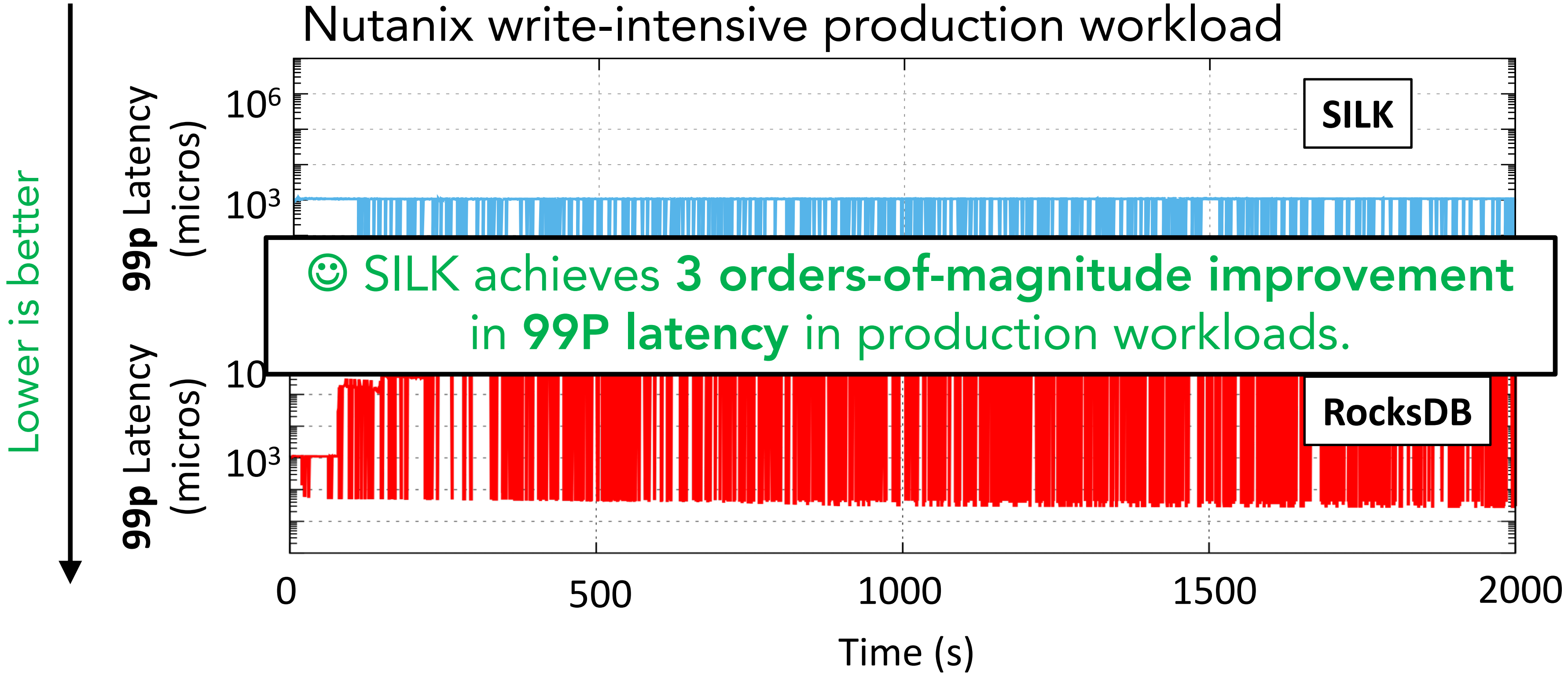
- ✓ **Solves latency spike problem for write-heavy workloads.**
- ✓ **No negative side-effects for other workloads.**
- ✓ **SILK introduces the notion of an I/O scheduler for LSM KVs.**

SILK vs RocksDB Tail Latency 99P



SILK vs RocksDB Tail Latency 99P

Nutanix write-intensive production workload



☺ SILK achieves **3 orders-of-magnitude improvement** in **99P latency** in production workloads.

Find out more in the talk

Thursday, July 11 4:35 pm – 5:55 pm

Track II Key-Value Stores