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
Log-Structured Merge (LSM) KVs

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LSM KV Latency Spikes in RocksDB

Nutanix write-intensive production workload

Lower is better

99p Latency (micros)
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

Nutanix write-intensive production workload

Lower is better

SILK

RocksDB

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Lower is better

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