Lethe: A Tunable Delete-Aware LSM-Based Storage Engine

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log-structured merge-tree

cassandra

RocksDB

levelDB

WT

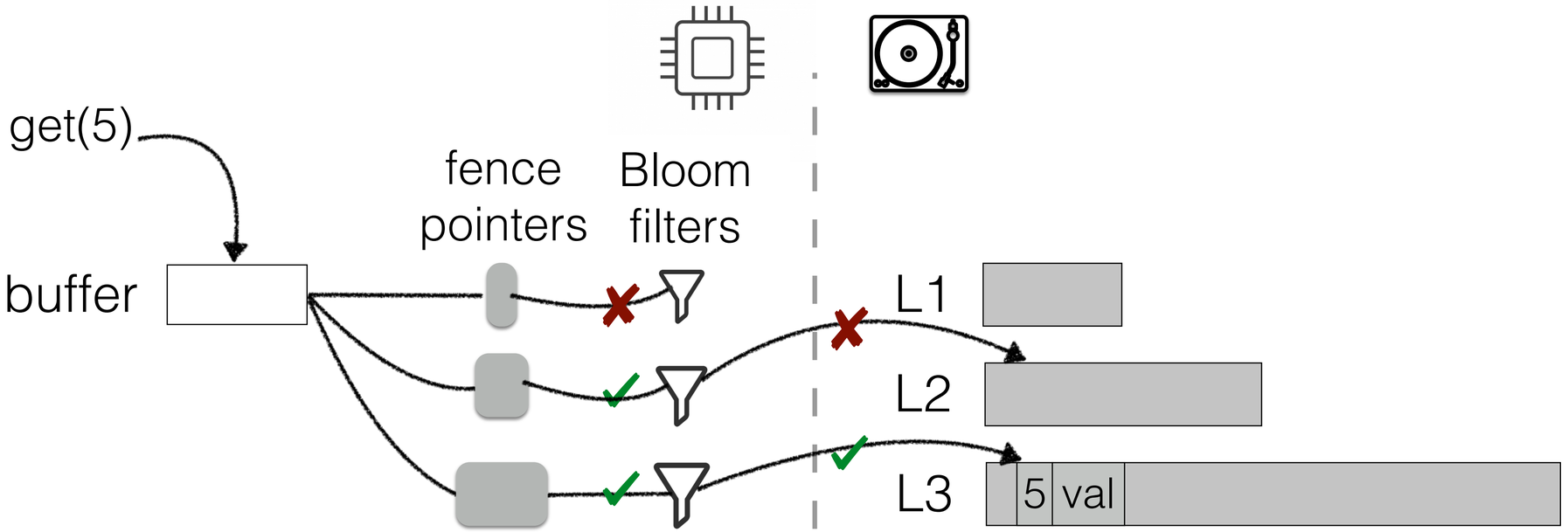
accumulo™

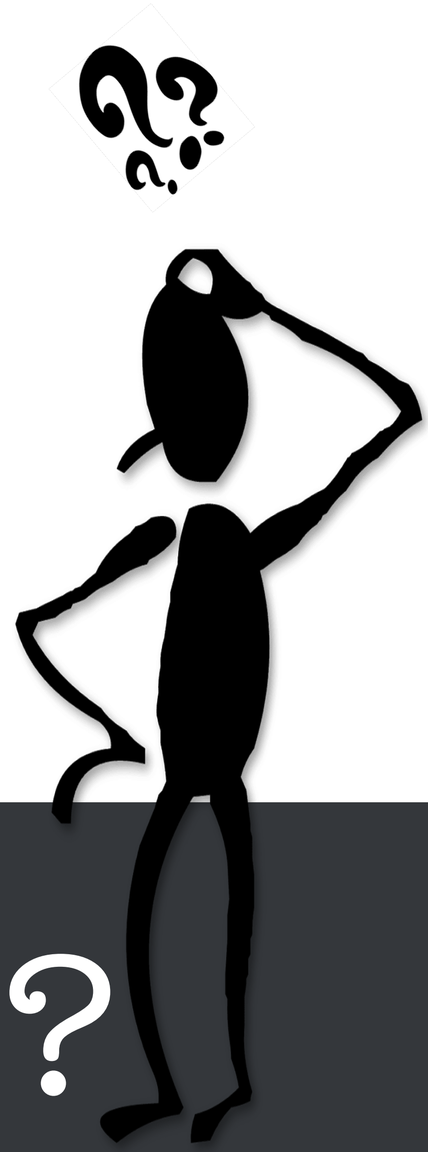
SQLite

APACHE HBASE

DynamoDB

log-structured merge-tree



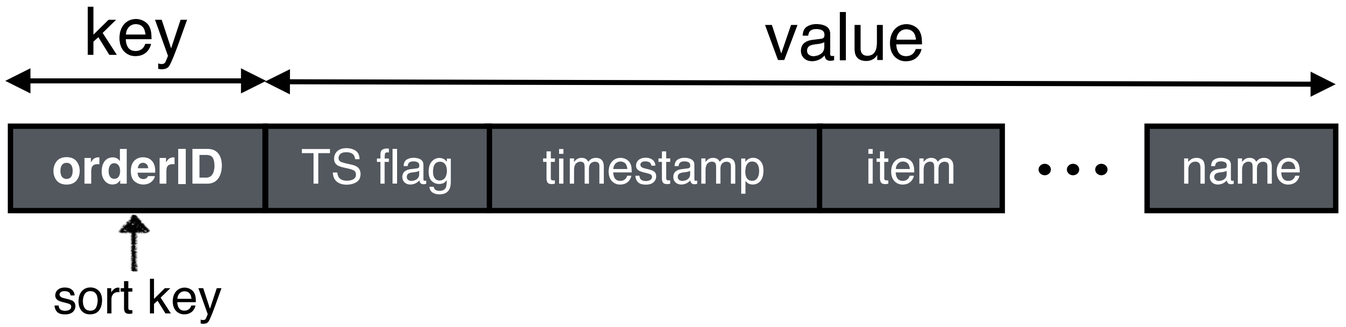


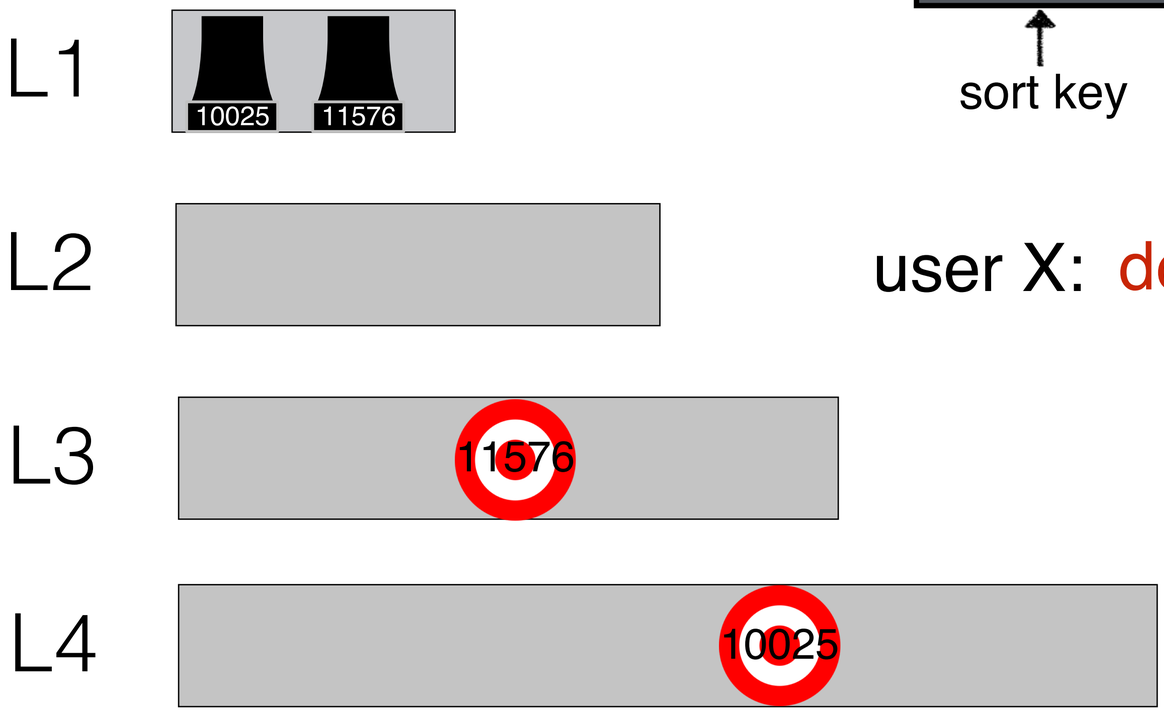
What about deletes?

scenario 1

poor read perf.

space amplification





user X: delete my order history

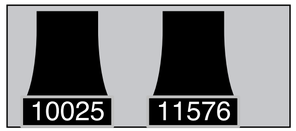
delete(10025)

delete(11567)

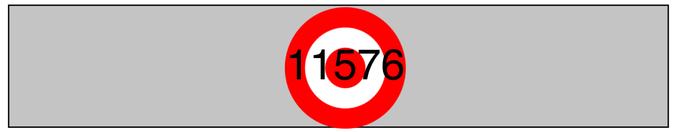
scenario 1

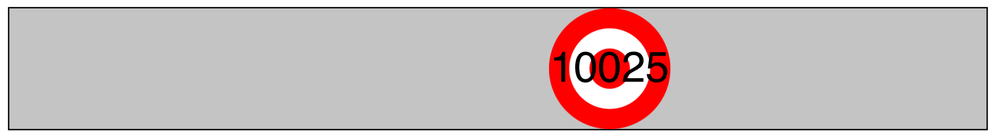
poor read perf.

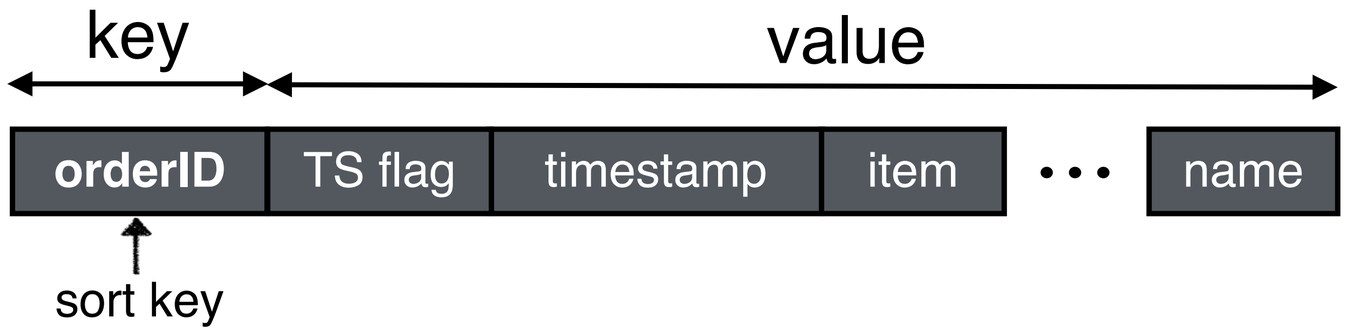
space amplification



L2



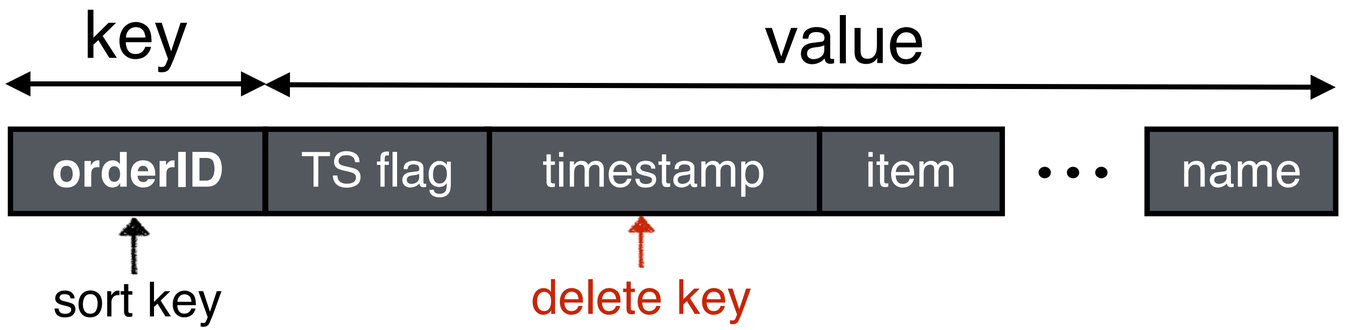


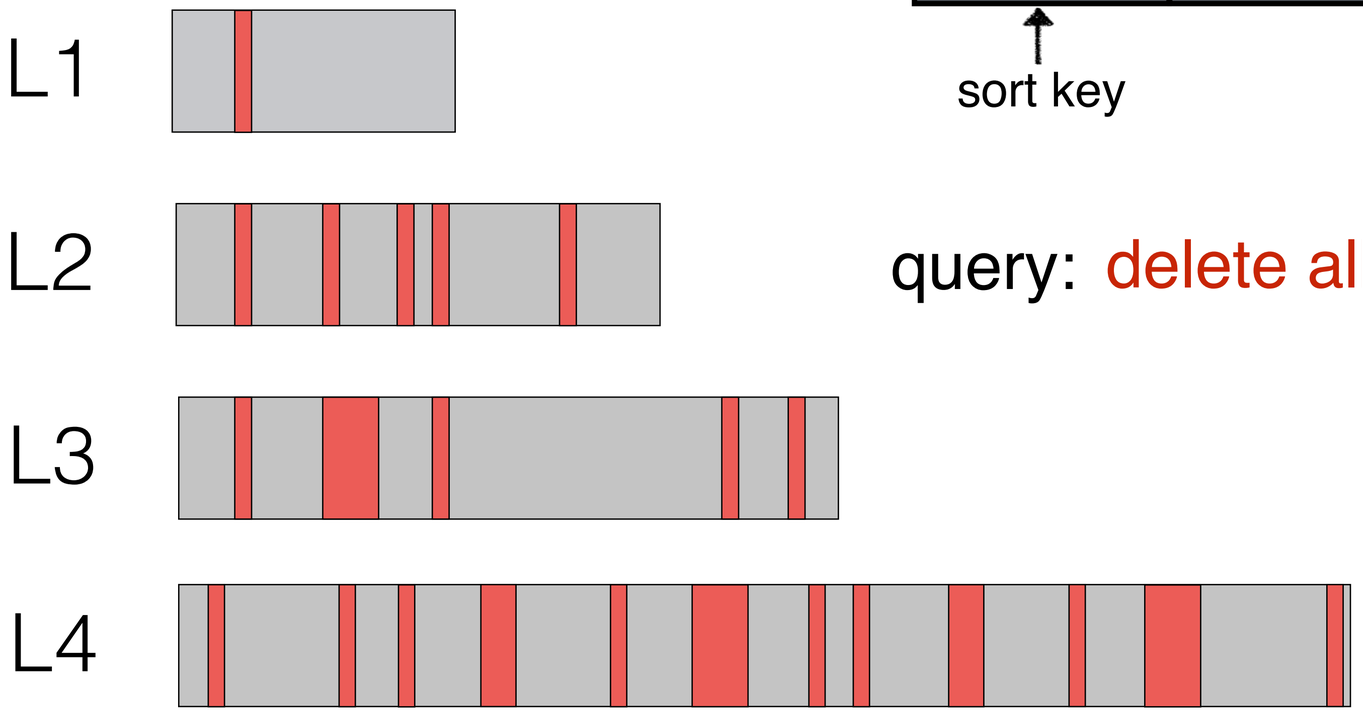


user X: delete my order history **within 5 days**

data privacy

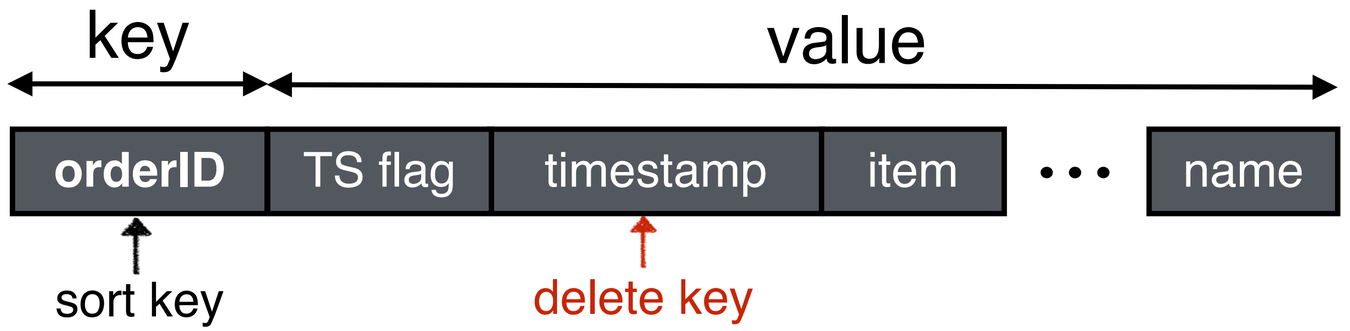
scenario 2





query: delete all entries older than 7 days

scenario 2



L1

L2 query: delete all entries older than 7 days

L3 latency spikes superfluous I/Os

L4

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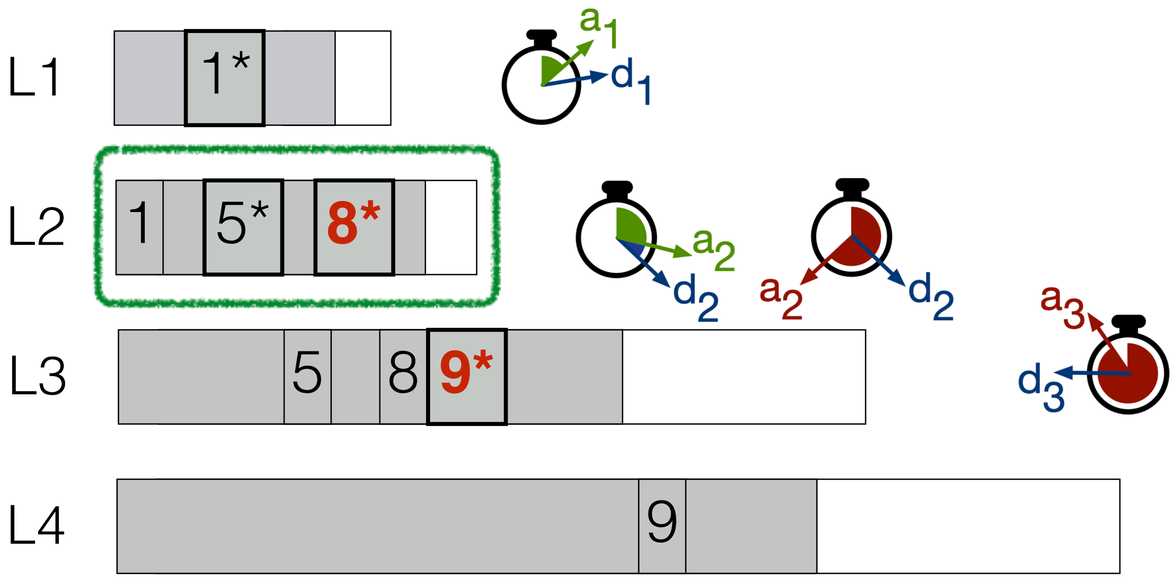

KiWi

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KiWi

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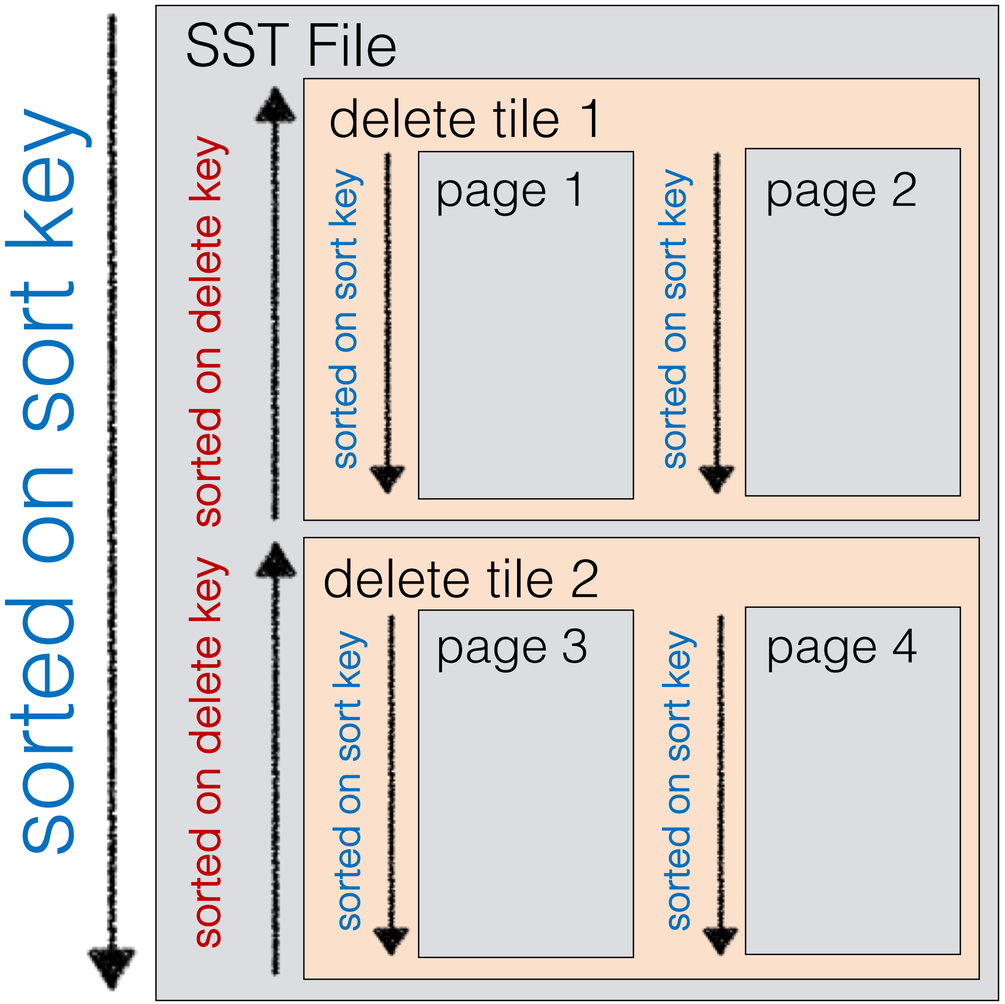
FADE


sorted on sort key
SST File
sorted on delete key
delete tile 1
sorted on sort key
page 1
sorted on sort key
page 2
sorted on delete key
delete tile 2
sorted on sort key
page 3
sorted on sort key
page 4

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