RocksDB Festival

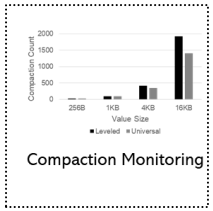
Supported by IITP, StarLab.

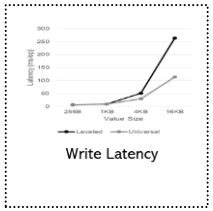
July 19, 2021

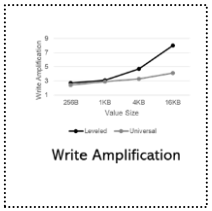
송인호, 한예진
inhoinno@dankook.ac.kr , hbb97225@naver.com
__TeamName__

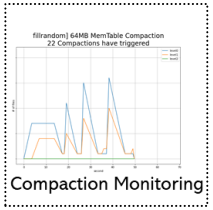
Contents

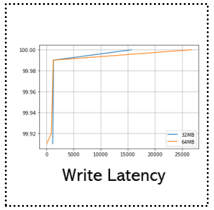
- 팀 소개
  - ✓ Compaction
  - ✓ Final Goal!
- Quantitative Analysis on RocksDB Compaction
  - ✓ Quantitative Analysis Final Goal
  - ✓ Leveled Compaction vs Universal Compaction
    - Key-Value size
    - MemTable size
- Next Week

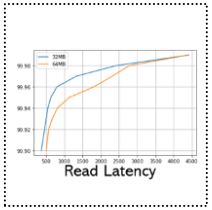












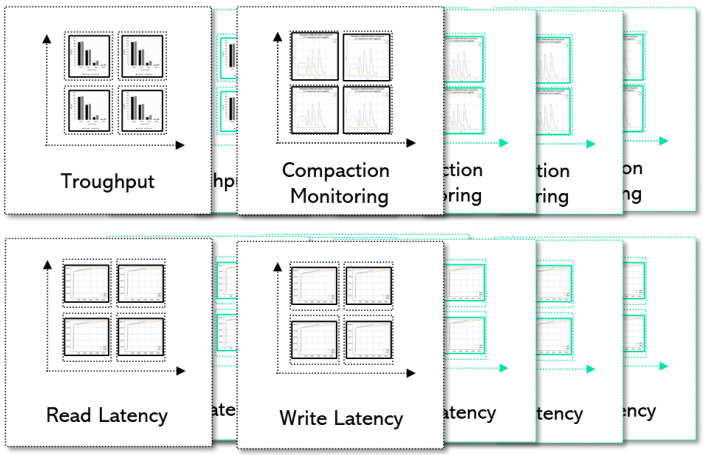
Team profile

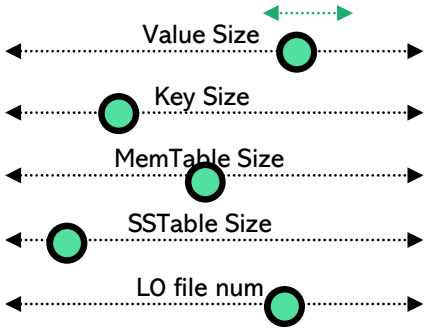
- 팀 소개 Compaction
  - ✓ 송인호 32152332
  - ✓ 한예진 3216????
- Final Goal
  - ✓ 2021 KSC 반도체학술대회 논문

Quantitative Analysis on RocksDB Compaction

- Quantitative Analysis on RocksDB Compaction (2week)
  - ✓ Final Goal

Leveled **vs** **Universal**



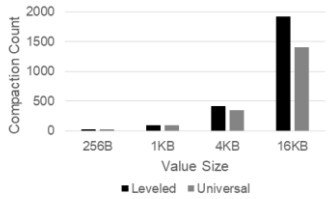


Scale-Out

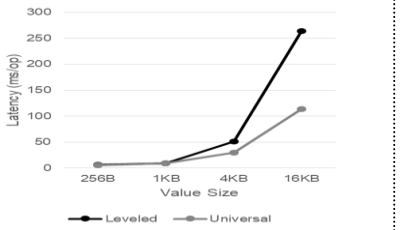
+BoLT
+Wicskey(blobDB)
+PebblesDB
...

- Compaction에 영향을 미치는 녀석들
  - ✓ #1 KV-Size
    - Various Key Size
      - Key: 16B, 32B, 64B, 128B
      - Value: 8K
      - fillrandom, readrandom, range query, 5000000
      - Leveled Compaction vs. Universal Compaction
      - Write Amplification
    - Various Value Size
      - Key: 16B
      - Value: 256B, 1KB, 4KB, 16KB
      - fillrandom, readrandom, range query, 5000000
      - Leveled Compaction vs. Universal Compaction
      - Write Amplification

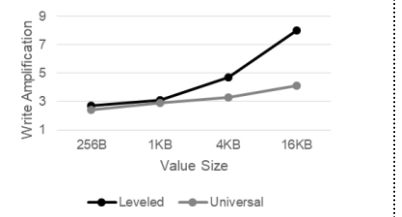
+YCSB Workload, compare Read/Space Amplification



Compaction Monitoring

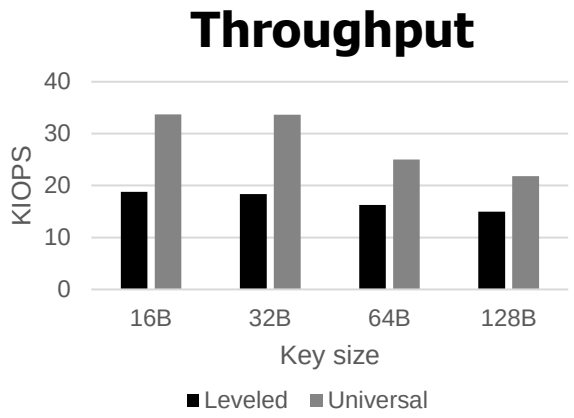


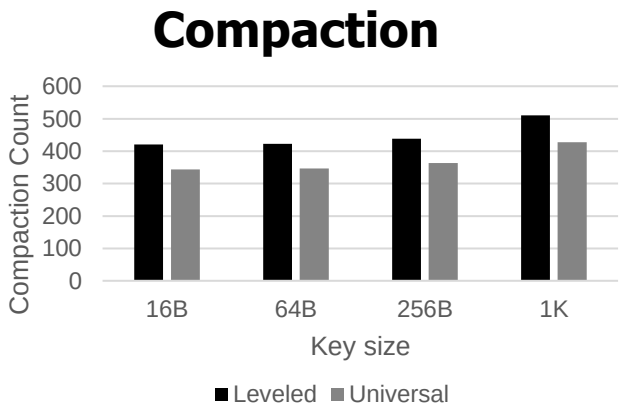
Write Latency

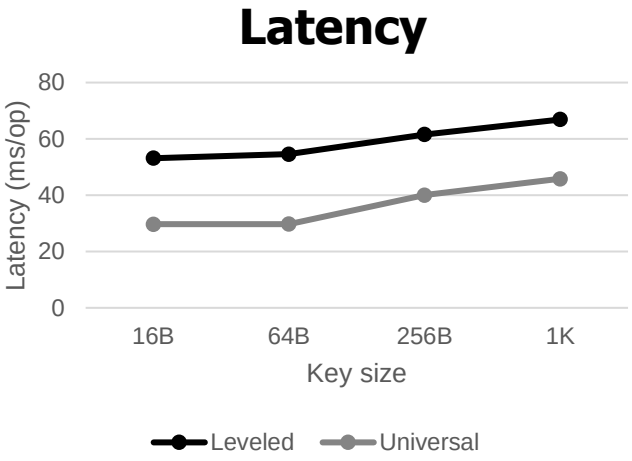


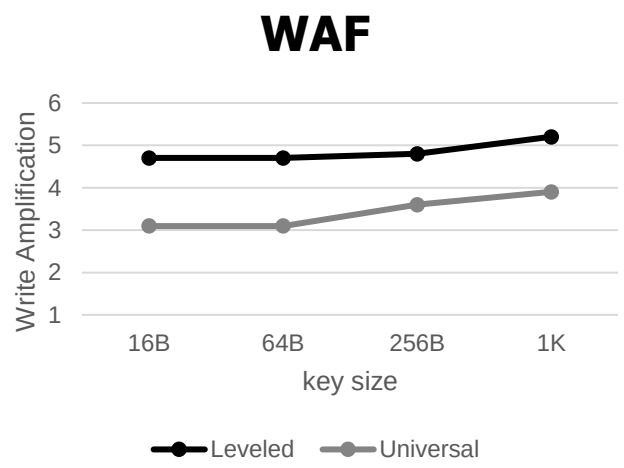
Write Amplification

- RocksDB::Compaction
  - ✓ Trial#3 Compaction on various Key size (random write)

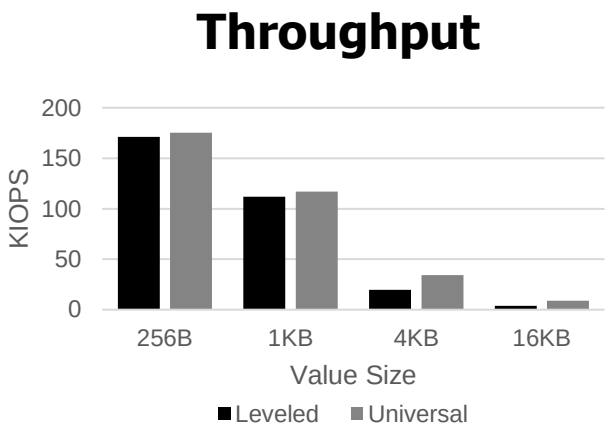


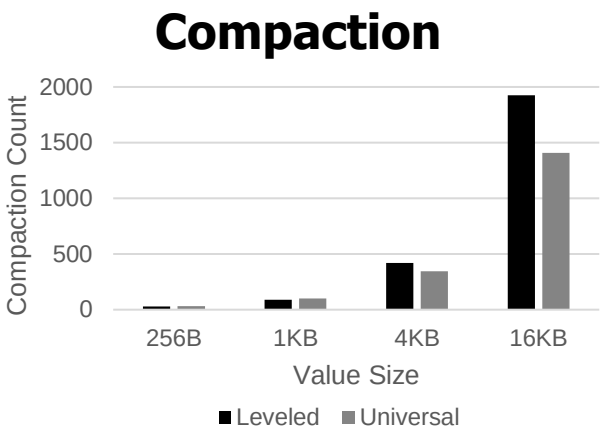


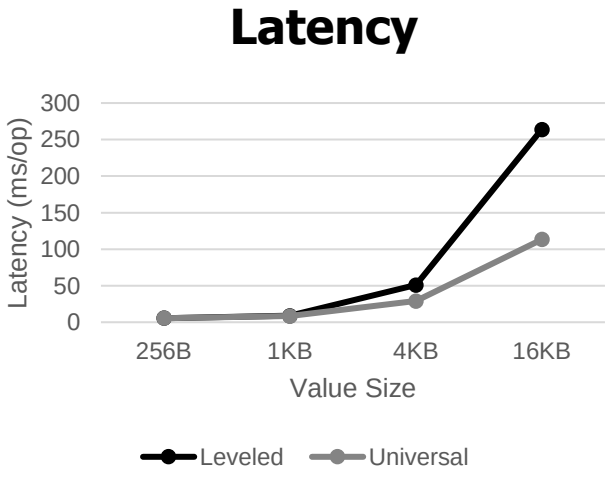


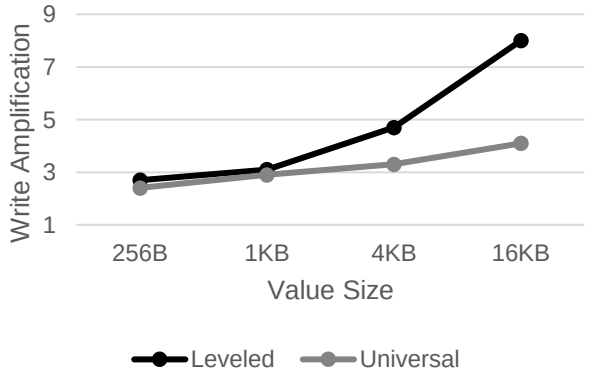


- RocksDB::Compaction
  - ✓ Trial#4 Compaction on various Value size (random write)

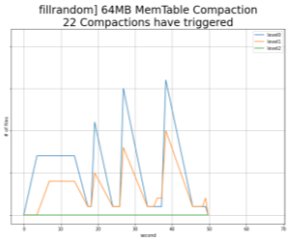




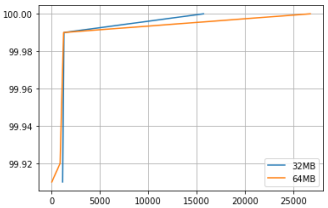




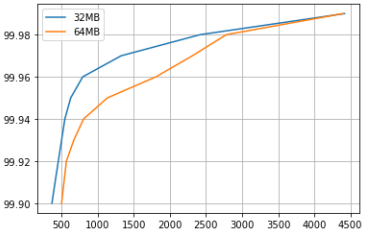
- Compaction에 영향을 미치는 녀석들
  - ✓ #2 MemTable, SSTable
    - Various MemTable + Various SST
      - 64MB, 32MB
      - fillrandom, readrandom, 16-512, 10000000
    - Various MemTable + 64MB SST
      - 64MB, 32MB, 16MB, 8MB, 4MB, 2MB
      - fillrandom, readrandom, 16-512, 10000000



Compaction Monitoring

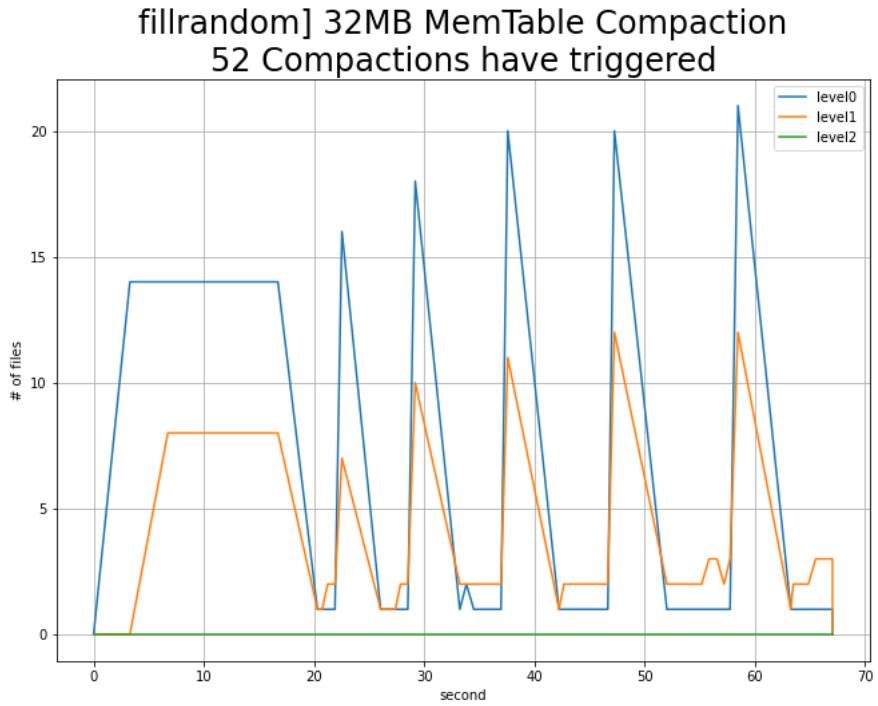


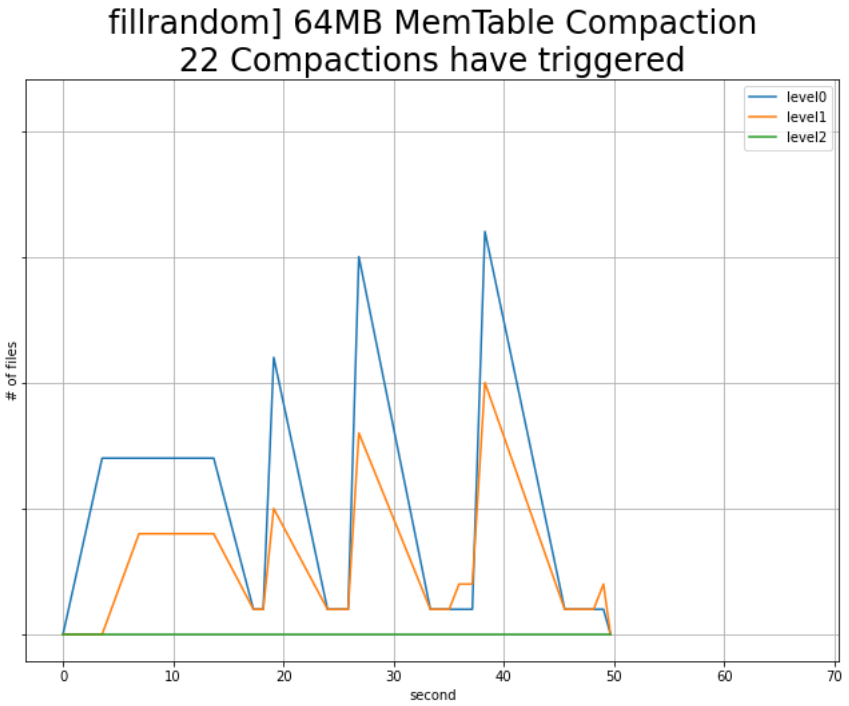
Write Latency



Read Latency

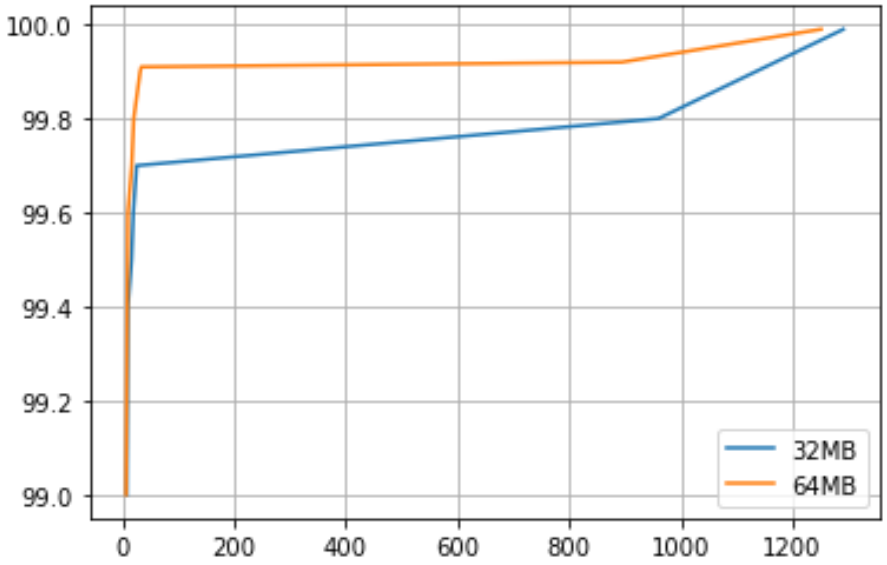
- Compaction::SSTable
  - ✓ Trial#1 Compaction on MemTable size&Target File Size (32MB vs 64MB)



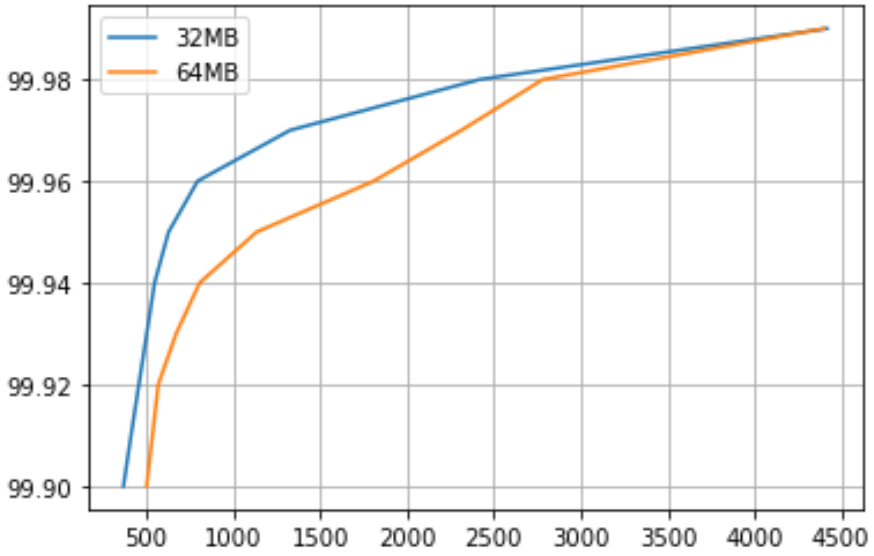


☞

- Compaction::SSTable
  - ✓ Trial#1 Compaction on MemTable size&Target File Size (32MB vs 64MB)



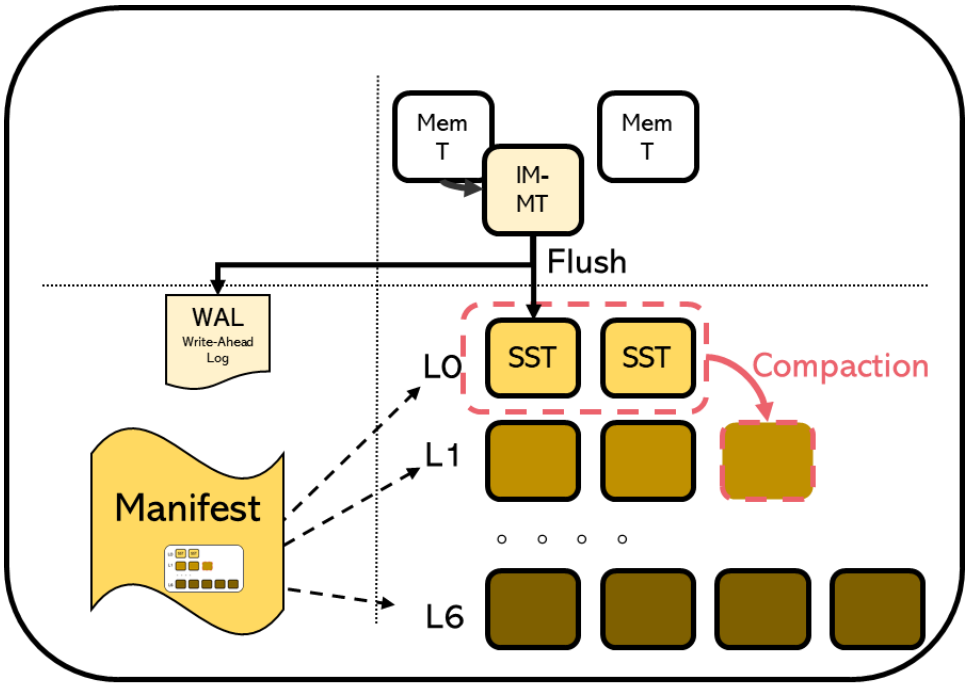
fillrandom] Write Latency (99%)

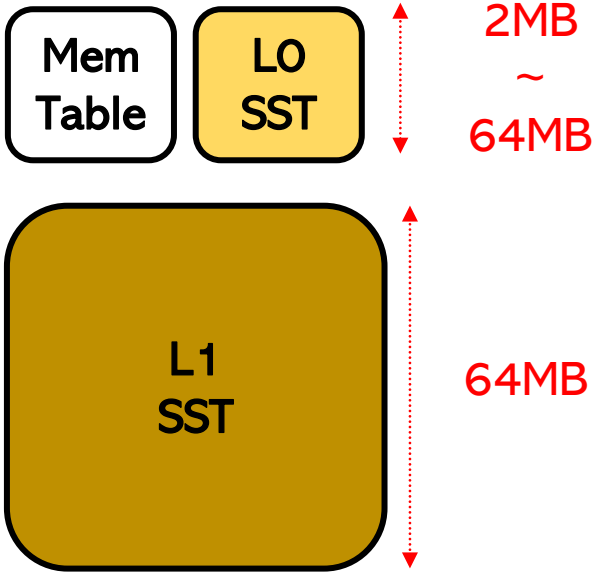


readrandom] Read Latency (99%)

☞ **Read/Write latency Trade-off on MemTable Size**

- Compaction::SSTable
  - ✓ Trial#2 Compaction on MemTable size, but Target File Size 64MB (MemT=[2,4,8,16,32,64]MB, SST_Level1 = 64MB)

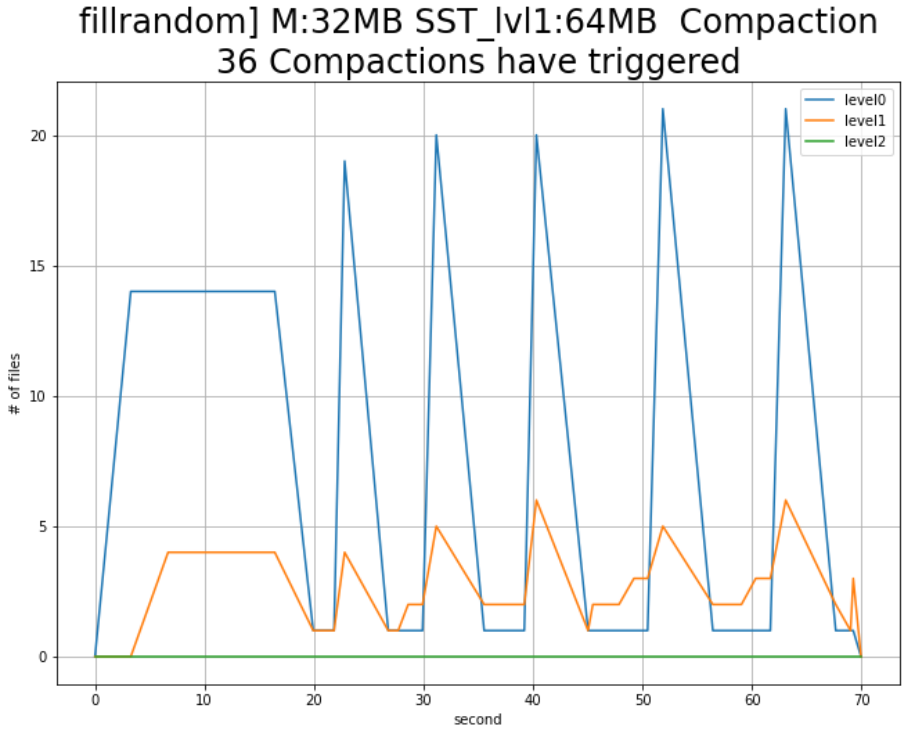


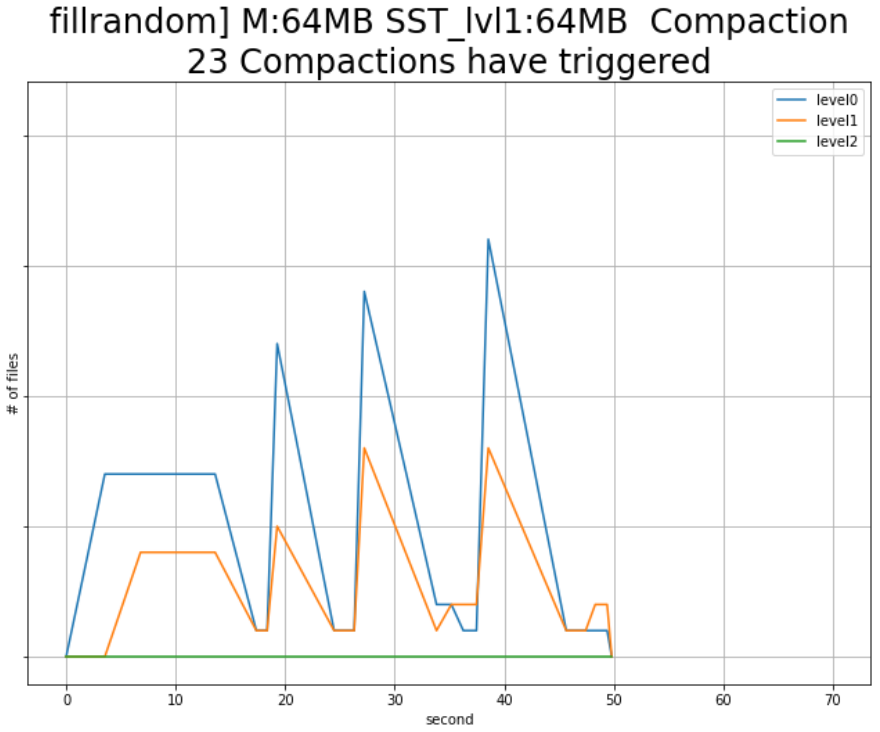


LSM Tree based KV Store

(levelDB , RocksDB)

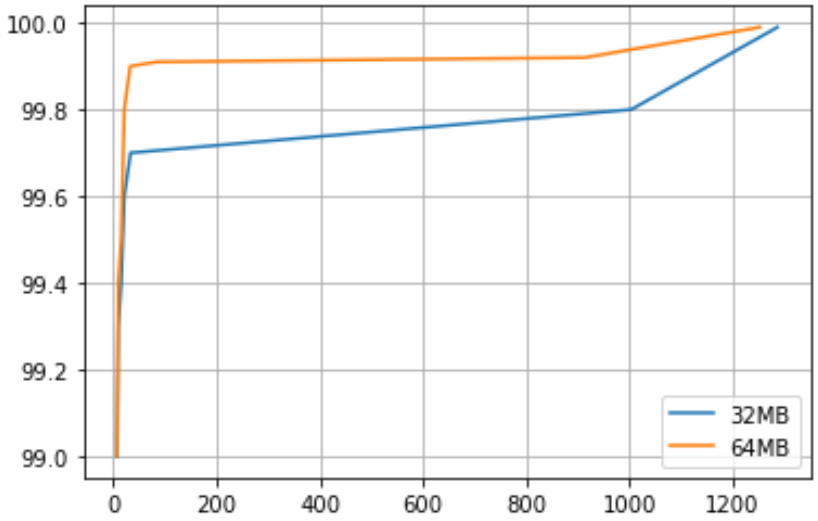
- Compaction::SSTable
  - ✓ Trial#2 Compaction on MemTable size, but Target File Size 64MB (MemT=[2,4,8,16,32,64]MB, SST_Level1 = 64MB)



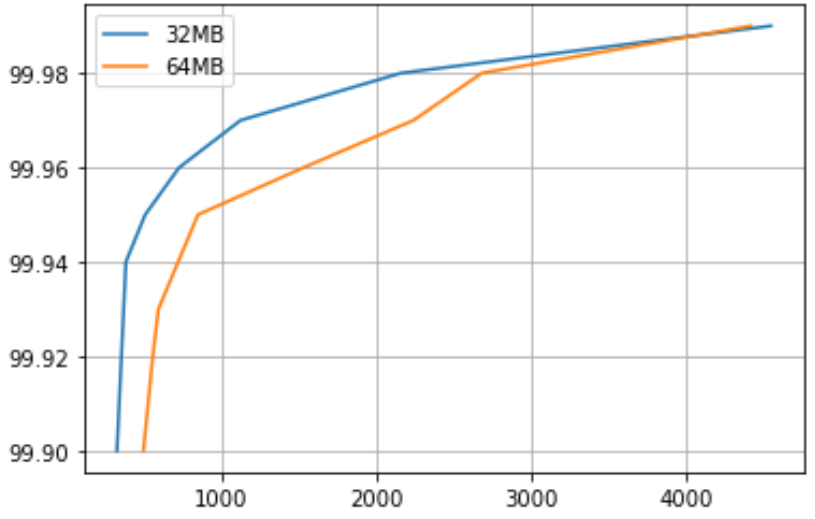


☞ **No difference between previous experiment**

- Compaction::SSTable
  - ✓ Trial#2 Compaction on MemTable size&Target File Size (32MB vs 64MB)



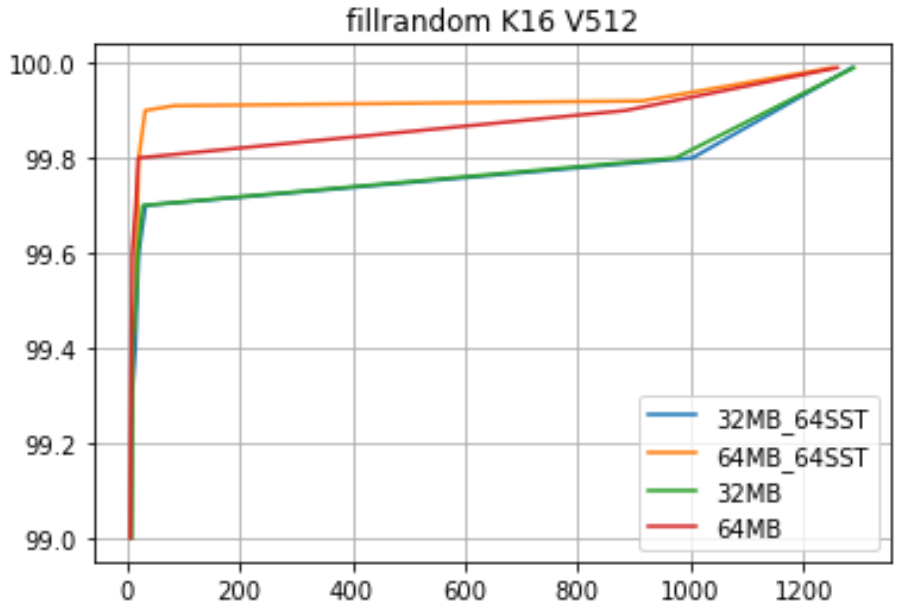
fillrandom] Write Latency (99%)



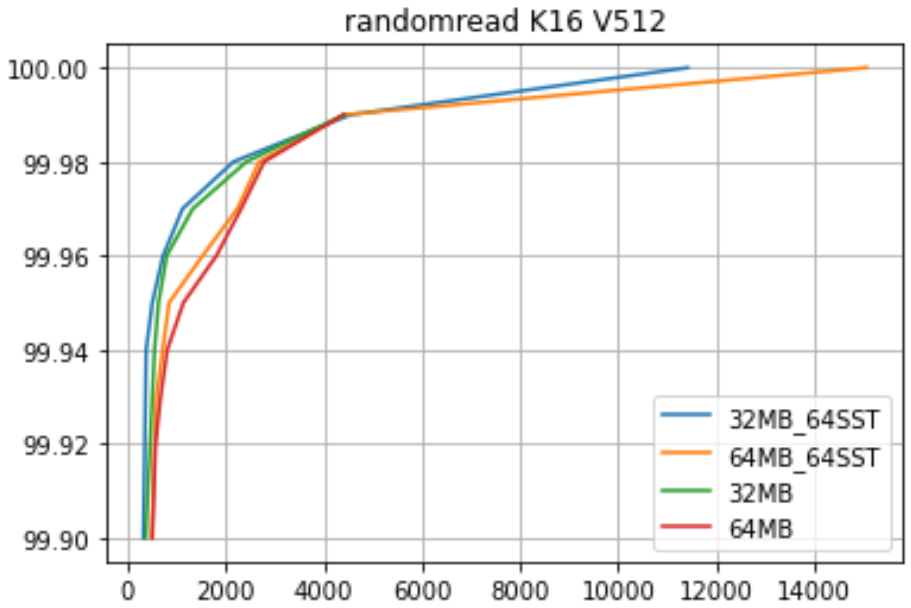
readrandom] Read Latency (99%)

☞ No difference between previous experiment

- Compaction::SSTable
  - ✓ Trial#1 vs Trial#2



fillrandom] Write Latency (99%)



readrandom] Read Latency (99%)

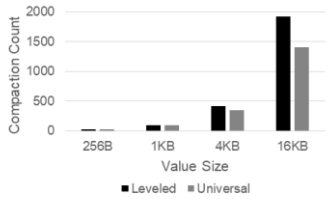
☞ ..? 😇

- Compaction에 영향을 미치는 녀석들
  - ✓ #1 KV-Size
    - Various Key Size
      - Key: 16B, 32B, 64B, 128B
      - Value: 8K
      - fillrandom, readrandom, range query, 5000000
      - Leveled Compaction vs. Universal Compaction
      - Write Amplification
    - Various Value Size
      - Key: 16B
      - Value: 256B, 1KB, 4KB, 16KB
      - fillrandom, readrandom, range query, 5000000
      - Leveled Compaction vs. Universal Compaction
      - Write Amplification

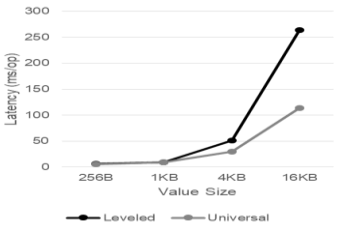
----------Next Week----------

+팀원간 measurement 공유

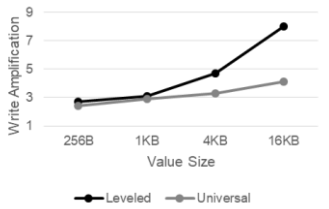
+YCSB Workload, compare Read/Space Amplification



Compaction Monitoring



Write Latency



Write Amplification

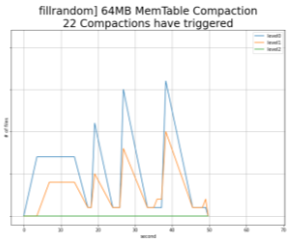
- Compaction에 영향을 미치는 녀석들
  - ✓ #2 MemTable, SSTable
    - Various MemTable + Various SST
      - 64MB, 32MB
      - fillrandom, readrandom, 16-512, 10000000
    - Various MemTable + 64MB SST
      - 64MB, 32MB, 16MB, 8MB, 4MB, 2MB
      - fillrandom, readrandom, 16-512, 10000000

----------Next Week----------

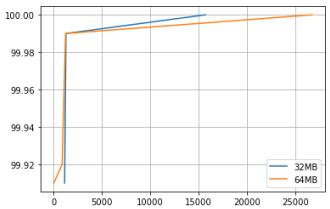
+팀원간 measurement 공유

- [NEW] level0_file_num_compaction_trigger
  - -1, 4, 8, 16
  - fillrandom, readrandom, 16-512, 10000000
  - YCSB Workload

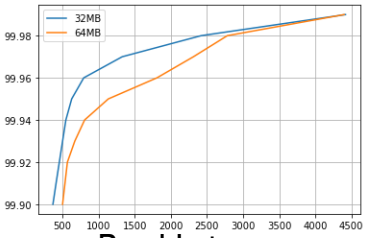
+YCSB Workload, apply different KV Size



Compaction Monitoring



Write Latency



Read Latency

Discussion