

Performance Analysis RockDB 분석

컴퓨터소프트웨어학부

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Perf

시행착오

사용한 옵션

분석 결과

시행착오 - 실험 방식

1. 100초, 300초, 600초 실행 후 전체 실행에 대한 performance sampling

너무 실험시간이 길어서 세 실험 모두 5개의 level을 다 사용하고 있었고, 따라서 각 실행의 결과가 거의 같았다. (이전의 latency 측정 실험 기준으로 대략 30초 이내로 모든 레벨을 사용하게 되었다.)

2. 25, 50, 75, 100초 실행 후 전체 실행에 대한 performance sampling

전체 실행에 대해서 샘플링한 것으로 인해 유의미한 performance pattern 이 가려졌고, 이로 인해 각 함수의 CPU Cycle 비율의 차이가 거의 없었다.

3. 100초 실행 중, 초반 10초, 후반 10초의 performance sampling

특정 구간의 performance pattern 을 볼 수 있으리라 기대했으나, 구간의 길이가 너무 길어서 이 역시 두 결과 간의 CPU Cycle 비율 차이가 거의 없었다.

사용한 옵션

1. 초반 측정

```
sudo perf record -g sleep 2  
sudo perf record -g sleep 10
```

2. 후반 90~100초 측정

```
sudo perf record -g -d 90000 sleep 10
```

3. 특정 symbol filter

```
sudo perf report --symbol-filter=[symbol_name]
```

이후 실험 결과는 총 100초 실행 중 초반 2초, 후반 2초 간의 performance pattern 을 측정한 기록이다.

0초~2초 --no-children

| | | | |
|-------|-----------------|--------------------------------|--|
| 9.19% | read_bottleneck | libc-2.27.so | [.] random_r |
| 7.78% | read_bottleneck | libc-2.27.so | [.] __random |
| 4.77% | read_bottleneck | read_bottleneck_breakdown_test | [.] main |
| 4.21% | rocksdb:low0 | [kernel.kallsyms] | [k] copy_user_enhanced_fast_string |
| 1.93% | rocksdb:low0 | libc-2.27.so | [.] __memmove_avx_unaligned_erms |
| 1.81% | read_bottleneck | libc-2.27.so | [.] rand |
| 1.70% | rocksdb:low0 | libc-2.27.so | [.] __memset_avx2_erms |
| 1.69% | read_bottleneck | [kernel.kallsyms] | [k] copy_user_enhanced_fast_string |
| 1.45% | read_bottleneck | read_bottleneck_breakdown_test | [.] rand@plt |
| 1.36% | rocksdb:low0 | libsnappy.so.1.1.7 | [.] snappy::internal::CompressFragment |
| 1.16% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::crc32c::crc32c_3way |
| 1.09% | read_bottleneck | libc-2.27.so | [.] cfree@GLIBC_2.2.5 |
| 1.08% | rocksdb:low0 | libc-2.27.so | [.] cfree@GLIBC_2.2.5 |
| 0.85% | read_bottleneck | [kernel.kallsyms] | [k] do_syscall_64 |
| 0.84% | read_bottleneck | libc-2.27.so | [.] __memmove_avx_unaligned_erms |
| 0.81% | read_bottleneck | [vdso] | [.] __vdso_clock_gettime |
| 0.76% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::IndexBlockIter::SeekImpl |
| 0.72% | rocksdb:low0 | [kernel.kallsyms] | [k] do_syscall_64 |
| 0.72% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::CompactionIterator::NextFromInput |
| 0.66% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::MemTable::KeyComparator::operator() |
| 0.61% | read_bottleneck | libc-2.27.so | [.] malloc |
| 0.61% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::crc32c::crc32c_3way |
| 0.60% | rocksdb:low0 | libc-2.27.so | [.] malloc |
| 0.53% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::(anonymous namespace)::BytewiseComparatorImpl::Compare |
| 0.51% | read_bottleneck | libc-2.27.so | [.] __memcmp_avx2_movbe |
| 0.48% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::MergingIterator::Next |
| 0.47% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::MemTable::KeyComparator::operator() |
| 0.43% | rocksdb:low0 | [kernel.kallsyms] | [k] __block_commit_write.isra.34 |
| 0.43% | rocksdb:low0 | libc-2.27.so | [.] __int_malloc |
| 0.42% | rocksdb:low0 | [kernel.kallsyms] | [k] radix_tree_next_chunk |
| 0.42% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::BlockIter<rocksdb::IndexValue>::CompareCurrentKey |
| 0.40% | read_bottleneck | libc-2.27.so | [.] __int_malloc |
| 0.39% | read_bottleneck | [kernel.kallsyms] | [k] __radix_tree_lookup |
| 0.38% | rocksdb:low0 | libstdc++.so.6.0.25 | [.] std::__cxx11::basic_string<char, std::char_traits<char>, std::allocator<char>> |
| 0.38% | read_bottleneck | [kernel.kallsyms] | [k] find_get_entry |
| 0.36% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTableIterator::status |
| 0.35% | read_bottleneck | [kernel.kallsyms] | [k] __entry_trampoline_start |
| 0.34% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::LRUHandleTable::FindPointer |

0초~2초_1 --children

| Children | Self | Command | Shared Object | Symbol |
|----------|-------|-----------------|--------------------------------|---|
| 26.13% | 4.77% | read bottleneck | read_bottleneck_breakdown_test | [.] main |
| 18.31% | 0.00% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::DBImpl::BackgroundCallCompaction |
| 17.72% | 0.00% | rocksdb:low0 | libc++.so.6.0.25 | [.] 0x0000000000bd6df |
| 17.72% | 0.00% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::ThreadPoolImpl::Impl::BGThreadWrapper |
| 17.72% | 0.00% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::DBImpl::BGWorkCompaction |
| 17.72% | 0.00% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::ThreadPoolImpl::Impl::BGThread |
| 16.81% | 0.00% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::DBImpl::BackgroundCompaction |
| 16.78% | 0.00% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::CompactionJob::Run |
| 16.60% | 0.29% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::CompactionJob::ProcessKeyValueCompaction |
| 15.07% | 0.07% | rocksdb:low0 | [kernel.kallsyms] | [k] entry_SYSCALL_64_after_hwframe |
| 14.99% | 0.72% | rocksdb:low0 | [kernel.kallsyms] | [k] do_syscall_64 |
| 11.93% | 0.00% | read bottleneck | [unknown] | [.] 0xb46ab06000000000 |
| 11.82% | 0.02% | read bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::TransactionBaseImpl::Get |
| 11.80% | 0.03% | read bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::TransactionBaseImpl::Get |
| 11.77% | 0.02% | read bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::TransactionBaseImpl::Get |
| 11.74% | 0.01% | read bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::WriteBatchWithIndex::GetFromBatchAndDB |
| 11.72% | 0.04% | read bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::WriteBatchWithIndex::GetFromBatchAndDB |
| 11.55% | 0.01% | read bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::DBImpl::Get |
| 11.55% | 0.00% | read bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::DBImpl::Get |
| 11.47% | 0.09% | read bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::DBImpl::GetImpl |
| 9.83% | 0.22% | read bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::Version::Get |
| 9.54% | 0.00% | read bottleneck | [unknown] | [.] 0x5541c6894d5641cf |
| 9.46% | 0.07% | read bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::PessimisticTransactionDB::Put |
| 9.21% | 9.19% | read bottleneck | libc-2.27.so | [.] __random_r |
| 9.13% | 0.09% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::CompactionIterator::Next |
| 9.00% | 0.20% | read bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::TableCache::Get |
| 8.64% | 0.33% | read bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTable::Get |
| 8.32% | 0.10% | read bottleneck | [kernel.kallsyms] | [k] entry_SYSCALL_64_after_hwframe |
| 8.20% | 0.85% | read bottleneck | [kernel.kallsyms] | [k] do_syscall_64 |
| 7.89% | 7.78% | read bottleneck | libc-2.27.so | [.] __random |
| 7.77% | 0.00% | rocksdb:low0 | libpthread-2.27.so | [.] __libc_write |
| 7.77% | 0.00% | rocksdb:low0 | [kernel.kallsyms] | [k] sys_write |
| 7.76% | 0.00% | rocksdb:low0 | [kernel.kallsyms] | [k] vfs_write |
| 7.76% | 0.00% | rocksdb:low0 | [kernel.kallsyms] | [k] __vfs_write |
| 7.76% | 0.00% | rocksdb:low0 | [kernel.kallsyms] | [k] new_sync_write |
| 7.76% | 0.00% | rocksdb:low0 | [kernel.kallsyms] | [k] ext4_file_write_iter |
| 7.76% | 0.00% | rocksdb:low0 | [kernel.kallsyms] | [k] __generic_file_write_iter |
| 7.68% | 0.05% | rocksdb:low0 | [kernel.kallsyms] | [k] generic_perform_write |

0초~2초_2 --children

| | | | | |
|-------|-------|-----------------|--------------------------------|--|
| 7.68% | 0.05% | rocksdb:low0 | [kernel.kallsyms] | [k] generic_perform_write |
| 7.42% | 0.48% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::MergingIterator::Next |
| 7.32% | 0.07% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::PessimisticTransaction::Commit |
| 6.24% | 0.20% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTableIterator::NextAndGetResult |
| 6.18% | 0.04% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::WriteCommittedTxn::CommitWithoutPrepareInternal |
| 5.98% | 0.10% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTableIterator::Next |
| 5.97% | 0.26% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::DBImpl::WriteImpl |
| 5.95% | 0.16% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::(anonymous namespace)::LevelIterator::NextAndGetResult |
| 5.55% | 0.13% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTableIterator::FindBlockForward |
| 4.99% | 0.08% | rocksdb:low0 | libpthread-2.27.so | [.] __libc_pread64 |
| 4.98% | 0.13% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTable::NewDataBlockIterator<rocksdb::DataBlockIter> |
| 4.72% | 0.04% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTableIterator::InitDataBlock |
| 4.69% | 0.04% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTable::RetrieveBlock<rocksdb::Block> |
| 4.63% | 0.25% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTableBuilder::Add |
| 4.62% | 0.15% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTable::NewDataBlockIterator<rocksdb::DataBlockIter> |
| 4.60% | 0.16% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTable::MaybeReadBlockAndLoadToCache<rocksdb::Block> |
| 4.53% | 0.06% | read_bottleneck | libpthread-2.27.so | [.] __libc_pread64 |
| 4.33% | 0.05% | read_bottleneck | libpthread-2.27.so | [.] __libc_write |
| 4.21% | 4.21% | rocksdb:low0 | [kernel.kallsyms] | [k] copy_user_enhanced_fast_string |
| 3.66% | 0.10% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTable::RetrieveBlock<rocksdb::Block> |
| 3.63% | 0.05% | read_bottleneck | [kernel.kallsyms] | [k] sys_write |
| 3.57% | 0.04% | rocksdb:low0 | [kernel.kallsyms] | [k] sys_pread64 |
| 3.48% | 0.04% | read_bottleneck | [kernel.kallsyms] | [k] sys_pread64 |
| 3.46% | 0.05% | read_bottleneck | [kernel.kallsyms] | [k] vfs_write |
| 3.39% | 0.04% | rocksdb:low0 | [kernel.kallsyms] | [k] vfs_read |
| 3.30% | 0.04% | read_bottleneck | [kernel.kallsyms] | [k] vfs_read |
| 3.26% | 0.00% | read_bottleneck | [kernel.kallsyms] | [k] __vfs_write |
| 3.25% | 0.03% | read_bottleneck | [kernel.kallsyms] | [k] new_sync_write |
| 3.21% | 0.04% | read_bottleneck | [kernel.kallsyms] | [k] ext4_file_write_iter |
| 3.15% | 0.00% | rocksdb:low0 | [kernel.kallsyms] | [k] __vfs_read |
| 3.14% | 0.03% | rocksdb:low0 | [kernel.kallsyms] | [k] new_sync_read |
| 3.13% | 0.02% | read_bottleneck | [kernel.kallsyms] | [k] __generic_file_write_iter |

90초~100초 --no-children

| Overhead | Command | Shared Object | Symbol |
|----------|-----------------|--------------------------------|--|
| 8.88% | read_bottleneck | libc-2.27.so | [.] __random_r |
| 7.66% | read_bottleneck | libc-2.27.so | [.] __random |
| 4.80% | read_bottleneck | read_bottleneck_breakdown_test | [.] main |
| 4.40% | rocksdb:low0 | [kernel.kallsyms] | [k] copy_user_enhanced_fast_string |
| 1.92% | rocksdb:low0 | libc-2.27.so | [.] __memmove_avx_unaligned_erms |
| 1.82% | read_bottleneck | libc-2.27.so | [.] rand |
| 1.68% | rocksdb:low0 | libc-2.27.so | [.] __memset_avx2_erms |
| 1.60% | read_bottleneck | [kernel.kallsyms] | [k] copy_user_enhanced_fast_string |
| 1.47% | read_bottleneck | read_bottleneck_breakdown_test | [.] rand@plt |
| 1.31% | rocksdb:low0 | libsnapy.so.1.1.7 | [.] snapy::internal::CompressFragment |
| 1.17% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::crc32c::crc32c_3way |
| 1.04% | rocksdb:low0 | libc-2.27.so | [.] cfree@GLIBC_2.2.5 |
| 0.97% | read_bottleneck | libc-2.27.so | [.] cfree@GLIBC_2.2.5 |
| 0.80% | read_bottleneck | [kernel.kallsyms] | [k] do_syscall_64 |
| 0.78% | read_bottleneck | [vdso] | [.] __vdso_clock_gettime |
| 0.75% | read_bottleneck | libc-2.27.so | [.] __memmove_avx_unaligned_erms |
| 0.75% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::IndexBlockIter::SeekImpl |
| 0.74% | rocksdb:low0 | [kernel.kallsyms] | [k] do_syscall_64 |
| 0.68% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::CompactionIterator::NextFromInput |
| 0.68% | rocksdb:low0 | libc-2.27.so | [.] malloc |
| 0.64% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::MemTable::KeyComparator::operator() |
| 0.58% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::crc32c::crc32c_3way |
| 0.55% | read_bottleneck | libc-2.27.so | [.] malloc |
| 0.55% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::MergingIterator::Next |
| 0.54% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::(anonymous namespace)::BytewiseComparatorImpl::Compare |
| 0.50% | read_bottleneck | libc-2.27.so | [.] __memcpy_avx2_movbe |
| 0.49% | rocksdb:low0 | [kernel.kallsyms] | [k] radix_tree_next_chunk |
| 0.48% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::MemTable::KeyComparator::operator() |
| 0.46% | rocksdb:low0 | libstdc++.so.6.0.25 | [.] std::_cxx11::basic_string<char, std::char_traits<char>, std::allocator<char> >:: |
| 0.46% | rocksdb:low0 | [kernel.kallsyms] | [k] __block_commit_write.isra.34 |
| 0.46% | rocksdb:low0 | libc-2.27.so | [.] __int_malloc |
| 0.43% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTableIterator::status |
| 0.41% | read_bottleneck | libc-2.27.so | [.] __int_malloc |
| 0.40% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::BlockBuilder::Add |
| 0.40% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::BlockIter<rocksdb::IndexValue>::CompareCurrentKey |
| 0.38% | read_bottleneck | [kernel.kallsyms] | [k] __radix_tree_lookup |
| 0.38% | read_bottleneck | [kernel.kallsyms] | [k] find_get_entry |

90초~100초_1 --children

| Children | Self | Command | Shared Object | Symbol |
|----------|-------|-----------------|--------------------------------|---|
| 25.14% | 4.80% | read_bottleneck | read_bottleneck_breakdown_test | [.] main |
| 19.62% | 0.00% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::DBImpl::BackgroundCallCompaction |
| 18.82% | 0.00% | rocksdb:low0 | libstdc++.so.6.0.25 | [.] 0x00000000000bd6df |
| 18.82% | 0.00% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::ThreadPoolImpl::Impl::BGThreadWrapper |
| 18.82% | 0.00% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::ThreadPoolImpl::Impl::BGThread |
| 18.82% | 0.00% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::DBImpl::BGWorkCompaction |
| 18.08% | 0.00% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::DBImpl::BackgroundCompaction |
| 18.05% | 0.00% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::CompactionJob::Run |
| 17.86% | 0.28% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::CompactionJob::ProcessKeyValueCompaction |
| 15.48% | 0.06% | rocksdb:low0 | [kernel.kallsyms] | [k] entry_SYSCALL_64_after_hwframe |
| 15.40% | 0.74% | rocksdb:low0 | [kernel.kallsyms] | [k] do_syscall_64 |
| 11.49% | 0.00% | read_bottleneck | [unknown] | [.] 0x46e5106000000000 |
| 11.38% | 0.02% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::TransactionBaseImpl::Get |
| 11.36% | 0.02% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::TransactionBaseImpl::Get |
| 11.33% | 0.02% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::TransactionBaseImpl::Get |
| 11.30% | 0.01% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::WriteBatchWithIndex::GetFromBatchAndDB |
| 11.29% | 0.07% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::WriteBatchWithIndex::GetFromBatchAndDB |
| 11.11% | 0.01% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::DBImpl::Get |
| 11.10% | 0.01% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::DBImpl::Get |
| 11.02% | 0.09% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::DBImpl::GetImpl |
| 9.89% | 0.10% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::CompactionIterator::Next |
| 9.40% | 0.22% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::Version::Get |
| 9.02% | 0.00% | read_bottleneck | [unknown] | [.] 0x5541c6894d5641cf |
| 8.90% | 8.88% | read_bottleneck | libc-2.27.so | [.] __random_r |
| 8.90% | 0.06% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::PessimisticTransactionDB::Put |
| 8.61% | 0.17% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::TableCache::Get |
| 8.26% | 0.29% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTable::Get |
| 8.17% | 0.55% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::MergingIterator::Next |
| 7.93% | 0.10% | read_bottleneck | [kernel.kallsyms] | [k] entry_SYSCALL_64_after_hwframe |
| 7.91% | 0.00% | rocksdb:low0 | libpthread-2.27.so | [.] __libc_write |
| 7.91% | 0.00% | rocksdb:low0 | [kernel.kallsyms] | [k] sys_write |
| 7.91% | 0.00% | rocksdb:low0 | [kernel.kallsyms] | [k] vfs_write |
| 7.91% | 0.00% | rocksdb:low0 | [kernel.kallsyms] | [k] __vfs_write |
| 7.91% | 0.00% | rocksdb:low0 | [kernel.kallsyms] | [k] new_sync_write |
| 7.90% | 0.00% | rocksdb:low0 | [kernel.kallsyms] | [k] ext4_file_write_iter |
| 7.90% | 0.00% | rocksdb:low0 | [kernel.kallsyms] | [k] __generic_file_write_iter |
| 7.82% | 0.80% | read_bottleneck | [kernel.kallsyms] | [k] do_syscall_64 |

90초~100초_2 --children

| | | | | |
|-------|-------|-----------------|--------------------------------|--|
| 7.82% | 0.80% | read_bottleneck | [kernel.kallsyms] | [k] do_syscall_64 |
| 7.82% | 0.05% | rocksdb:low0 | [kernel.kallsyms] | [k] generic_perform_write |
| 7.75% | 7.66% | read_bottleneck | libc-2.27.so | [.] __random |
| 6.96% | 0.06% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::PessimisticTransaction::Commit |
| 6.86% | 0.23% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTableIterator::NextAndGetResult |
| 6.57% | 0.10% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTableIterator::Next |
| 6.52% | 0.15% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::(anonymous namespace)::LevelIterator::NextAndGetResult |
| 6.15% | 0.17% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTableIterator::FindBlockForward |
| 5.88% | 0.04% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::WriteCommittedTxn::CommitWithoutPrepareInternal |
| 5.65% | 0.26% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::DBImpl::WriteImpl |
| 5.28% | 0.08% | rocksdb:low0 | libpthread-2.27.so | [.] __libc_pread64 |
| 5.16% | 0.08% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTableIterator::InitDataBlock |
| 5.10% | 0.28% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTableBuilder::Add |
| 5.01% | 0.23% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTable::NewDataBlockIterator<rocksdb::DataBlockIter> |
| 4.77% | 0.12% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTable::NewDataBlockIterator<rocksdb::DataBlockIter> |
| 4.49% | 0.04% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTable::RetrieveBlock<rocksdb::Block> |
| 4.40% | 4.40% | rocksdb:low0 | [kernel.kallsyms] | [k] copy_user_enhanced_fast_string |
| 4.40% | 0.18% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTable::MaybeReadBlockAndLoadToCache<rocksdb::Block> |
| 4.35% | 0.05% | read_bottleneck | libpthread-2.27.so | [.] __libc_pread64 |
| 4.09% | 0.03% | read_bottleneck | libpthread-2.27.so | [.] __libc_write |
| 3.87% | 0.13% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTable::RetrieveBlock<rocksdb::Block> |
| 3.82% | 0.07% | rocksdb:low0 | [kernel.kallsyms] | [k] sys_pread64 |
| 3.60% | 0.04% | rocksdb:low0 | [kernel.kallsyms] | [k] vfs_read |
| 3.45% | 0.04% | read_bottleneck | [kernel.kallsyms] | [k] sys_write |
| 3.34% | 0.04% | read_bottleneck | [kernel.kallsyms] | [k] sys_pread64 |
| 3.34% | 0.00% | rocksdb:low0 | [kernel.kallsyms] | [k] __vfs_read |
| 3.33% | 0.04% | rocksdb:low0 | [kernel.kallsyms] | [k] new_sync_read |
| 3.29% | 0.04% | read_bottleneck | [kernel.kallsyms] | [k] vfs_write |
| 3.29% | 0.03% | rocksdb:low0 | [kernel.kallsyms] | [k] ext4_file_read_iter |
| 3.23% | 0.23% | rocksdb:low0 | [kernel.kallsyms] | [k] generic_file_read_iter |
| 3.16% | 0.03% | read_bottleneck | [kernel.kallsyms] | [k] vfs_read |

90초~92초_1 --no-children

| Overhead | Command | Shared Object | Symbol |
|----------|-----------------|--------------------------------|--|
| 9.13% | read_bottleneck | libc-2.27.so | [.] random_r |
| 7.82% | read_bottleneck | libc-2.27.so | [.] __random |
| 4.86% | read_bottleneck | read_bottleneck_breakdown_test | [.] main |
| 4.52% | rocksdb:low0 | [kernel.kallsyms] | [k] copy_user_enhanced_fast_string |
| 1.95% | rocksdb:low0 | libc-2.27.so | [.] __memmove_avx_unaligned_erms |
| 1.84% | read_bottleneck | libc-2.27.so | [.] rand |
| 1.66% | rocksdb:low0 | libc-2.27.so | [.] __memset_avx2_erms |
| 1.66% | read_bottleneck | [kernel.kallsyms] | [k] copy_user_enhanced_fast_string |
| 1.48% | read_bottleneck | read_bottleneck_breakdown_test | [.] rand@plt |
| 1.38% | rocksdb:low0 | libsnappy.so.1.1.7 | [.] snappy::internal::CompressFragment |
| 1.24% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::crc32c::crc32c_3way |
| 1.07% | rocksdb:low0 | libc-2.27.so | [.] cfree@GLIBC_2.2.5 |
| 0.99% | read_bottleneck | libc-2.27.so | [.] cfree@GLIBC_2.2.5 |
| 0.85% | read_bottleneck | [kernel.kallsyms] | [k] do_syscall_64 |
| 0.80% | read_bottleneck | [vdso] | [.] __vdso_clock_gettime |
| 0.79% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::IndexBlockIter::SeekImpl |
| 0.77% | read_bottleneck | libc-2.27.so | [.] __memmove_avx_unaligned_erms |
| 0.75% | rocksdb:low0 | [kernel.kallsyms] | [k] do_syscall_64 |
| 0.68% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::CompactionIterator::NextFromInput |
| 0.66% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::MemTable::KeyComparator::operator() |
| 0.64% | rocksdb:low0 | libc-2.27.so | [.] malloc |
| 0.59% | read_bottleneck | libc-2.27.so | [.] malloc |
| 0.56% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::crc32c::crc32c_3way |
| 0.55% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::(anonymous namespace)::BytewiseComparatorImpl::Compare |
| 0.51% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::MergingIterator::Next |
| 0.51% | read_bottleneck | libc-2.27.so | [.] __memcmp_avx2_movbe |
| 0.49% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::MemTable::KeyComparator::operator() |
| 0.45% | rocksdb:low0 | [kernel.kallsyms] | [k] __block_commit_write.isra.34 |
| 0.44% | rocksdb:low0 | libc-2.27.so | [.] _int_malloc |
| 0.42% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::BlockIter<rocksdb::IndexValue>::CompareCurrentKey |
| 0.41% | read_bottleneck | libc-2.27.so | [.] _int_malloc |
| 0.40% | read_bottleneck | [kernel.kallsyms] | [k] __radix_tree_lookup |
| 0.39% | rocksdb:low0 | libstdc++.so.6.0.25 | [.] std::_cxx11::basic_string<char, std::char_traits<char>, std::allocator<char> >::_M_replace |
| 0.38% | rocksdb:low0 | [kernel.kallsyms] | [k] radix_tree_next_chunk |
| 0.38% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::LRUHandleTable::FindPointer |
| 0.38% | read_bottleneck | [kernel.kallsyms] | [k] find_get_entry |
| 0.37% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTableIterator::status |

90초~92초_2 --no-children

```
0.34% read_bottleneck read_bottleneck_breakdown_test [.] rocksdb::BlockFetcher::ReadBlockContents
0.33% rocksdb:low0 read_bottleneck_breakdown_test [.] rocksdb::BlockBuilder::Add
0.32% read_bottleneck [kernel.kallsyms] [k] __entry_trampoline_start
0.32% rocksdb:low0 read_bottleneck_breakdown_test [.] rocksdb::CompactionJob::ProcessKeyValueCompaction
0.31% read_bottleneck [kernel.kallsyms] [k] syscall_return_via_sysret
0.31% read_bottleneck read_bottleneck_breakdown_test [.] rocksdb::BlockBasedTable::Get
0.30% rocksdb:low0 [kernel.kallsyms] [k] crc32c_pcl_intel_update
0.30% read_bottleneck read_bottleneck_breakdown_test [.] rocksdb::Status::operator=
0.30% rocksdb:low0 [kernel.kallsyms] [k] __entry_trampoline_start
0.30% rocksdb:low0 [kernel.kallsyms] [k] get_page_from_freelist
0.28% rocksdb:low0 [kernel.kallsyms] [k] find_get_entry
0.27% read_bottleneck [vdso] [.] __vdso_gettimeofday
0.26% rocksdb:low0 read_bottleneck_breakdown_test [.] rocksdb::BlockBasedTableBuilder::Add
0.26% rocksdb:low0 read_bottleneck_breakdown_test [.] rocksdb::BlockFetcher::ReadBlockContents
0.26% rocksdb:high0 libc-2.27.so [.] __memmove_avx_unaligned_erms
0.26% read_bottleneck read_bottleneck_breakdown_test [.] rocksdb::InlineSkipList<rocksdb::MemTableRep::KeyComparator const&>::RecomputeSpliceLevels
0.26% rocksdb:low0 [vdso] [.] __vdso_gettimeofday
0.25% rocksdb:low0 [kernel.kallsyms] [k] syscall_return_via_sysret
0.25% read_bottleneck read_bottleneck_breakdown_test [.] rocksdb::DBImpl::WriteImpl
0.24% read_bottleneck read_bottleneck_breakdown_test [.] rocksdb::HistogramBucketMapper::IndexForValue
0.24% rocksdb:low0 read_bottleneck_breakdown_test [.] rocksdb::HistogramBucketMapper::IndexForValue
0.24% read_bottleneck read_bottleneck_breakdown_test [.] rocksdb::Env::Default
0.24% rocksdb:low0 libstdc++.so.6.0.25 [.] std::__cxx11::basic_string<char, std::char_traits<char>, std::allocator<char> >::_M_append
0.24% read_bottleneck read_bottleneck_breakdown_test [.] rocksdb::Version::Get
0.23% read_bottleneck libc-2.27.so [.] __clock_gettime
0.23% read_bottleneck read_bottleneck_breakdown_test [.] rocksdb::(anonymous namespace)::PosixEnv::NowNanos
0.22% rocksdb:low0 [kernel.kallsyms] [k] generic_file_read_iter
0.22% read_bottleneck read_bottleneck_breakdown_test [.] rocksdb::LRUHandleTable::FindPointer
0.22% rocksdb:low0 read_bottleneck_breakdown_test [.] rocksdb::RandomAccessFileReader::Read
0.21% read_bottleneck libpthread-2.27.so [.] __pthread_mutex_lock
0.21% rocksdb:low0 [kernel.kallsyms] [k] release_pages
0.21% rocksdb:low0 read_bottleneck_breakdown_test [.] rocksdb::BlockBasedTableIterator::NextAndGetResult
0.20% rocksdb:low0 [kernel.kallsyms] [k] __radix_tree_lookup
```


90초~92초_1 --children

| Children | Self | Command | Shared Object | Symbol |
|----------|-------|-----------------|--------------------------------|---|
| 25.53% | 4.86% | read_bottleneck | read_bottleneck_breakdown_test | [.] main |
| 18.83% | 0.00% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::DBImpl::BackgroundCallCompaction |
| 18.11% | 0.00% | rocksdb:low0 | libstdc++.so.6.0.25 | [.] 0x00000000000bd6df |
| 18.11% | 0.00% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::ThreadPoolImpl::Impl::BGThreadWrapper |
| 18.11% | 0.00% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::ThreadPoolImpl::Impl::BGThread |
| 18.11% | 0.00% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::DBImpl::BGWorkCompaction |
| 17.26% | 0.00% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::DBImpl::BackgroundCompaction |
| 17.23% | 0.00% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::CompactionJob::Run |
| 17.03% | 0.32% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::CompactionJob::ProcessKeyValueCompaction |
| 15.62% | 0.07% | rocksdb:low0 | [kernel.kallsyms] | [k] entry_SYSCALL_64_after_hwframe |
| 15.54% | 0.75% | rocksdb:low0 | [kernel.kallsyms] | [k] do_syscall_64 |
| 11.73% | 0.00% | read_bottleneck | [unknown] | [.] 0x81bcc06000000000 |
| 11.60% | 0.02% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::TransactionBaseImpl::Get |
| 11.58% | 0.03% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::TransactionBaseImpl::Get |
| 11.55% | 0.03% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::TransactionBaseImpl::Get |
| 11.52% | 0.01% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::WriteBatchWithIndex::GetFromBatchAndDB |
| 11.50% | 0.06% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::WriteBatchWithIndex::GetFromBatchAndDB |
| 11.34% | 0.01% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::DBImpl::Get |
| 11.32% | 0.01% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::DBImpl::Get |
| 11.25% | 0.09% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::DBImpl::GetImpl |
| 9.69% | 0.24% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::Version::Get |
| 9.46% | 0.08% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::CompactionIterator::Next |
| 9.15% | 9.13% | read_bottleneck | libc-2.27.so | [.] __random_r |
| 9.11% | 0.00% | read_bottleneck | [unknown] | [.] 0x5541c6894d5641cf |
| 8.96% | 0.06% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::PessimisticTransactionDB::Put |
| 8.87% | 0.16% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::TableCache::Get |
| 8.56% | 0.31% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTable::Get |
| 8.06% | 0.09% | read_bottleneck | [kernel.kallsyms] | [k] entry_SYSCALL_64_after_hwframe |
| 8.01% | 0.00% | rocksdb:low0 | libpthread-2.27.so | [.] __libc_write |
| 8.01% | 0.00% | rocksdb:low0 | [kernel.kallsyms] | [k] sys_write |
| 8.00% | 0.00% | rocksdb:low0 | [kernel.kallsyms] | [k] vfs_write |
| 8.00% | 0.00% | rocksdb:low0 | [kernel.kallsyms] | [k] __vfs_write |
| 8.00% | 0.00% | rocksdb:low0 | [kernel.kallsyms] | [k] new_sync_write |
| 8.00% | 0.00% | rocksdb:low0 | [kernel.kallsyms] | [k] ext4_file_write_iter |
| 8.00% | 0.00% | rocksdb:low0 | [kernel.kallsyms] | [k] __generic_file_write_iter |
| 7.96% | 0.85% | read_bottleneck | [kernel.kallsyms] | [k] do_syscall_64 |
| 7.92% | 7.82% | read_bottleneck | libc-2.27.so | [.] __random |

90초~92초_2 --children

| | | | | |
|-------|-------|-----------------|--------------------------------|--|
| 7.92% | 0.05% | rocksdb:low0 | [kernel.kallsyms] | [k] generic_perform_write |
| 7.86% | 0.51% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::MergingIterator::Next |
| 6.93% | 0.06% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::PessimisticTransaction::Commit |
| 6.67% | 0.21% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTableIterator::NextAndGetResult |
| 6.40% | 0.11% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTableIterator::Next |
| 6.31% | 0.13% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::(anonymous namespace)::LevelIterator::NextAndGetResult |
| 5.93% | 0.15% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTableIterator::FindBlockForward |
| 5.84% | 0.04% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::WriteCommittedTxn::CommitWithoutPrepareInternal |
| 5.64% | 0.25% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::DBImpl::WriteImpl |
| 5.27% | 0.08% | rocksdb:low0 | libpthread-2.27.so | [.] __libc_pread64 |
| 5.04% | 0.05% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTableIterator::InitDataBlock |
| 4.91% | 0.17% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTable::NewDataBlockIterator<rocksdb::DataBlockIter> |
| 4.88% | 0.11% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTable::NewDataBlockIterator<rocksdb::DataBlockIter> |
| 4.64% | 0.26% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTableBuilder::Add |
| 4.62% | 0.05% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTable::RetrieveBlock<rocksdb::Block> |
| 4.53% | 4.52% | rocksdb:low0 | [kernel.kallsyms] | [k] copy_user_enhanced_fast_string |
| 4.52% | 0.19% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTable::MaybeReadBlockAndLoadToCache<rocksdb::Block> |
| 4.47% | 0.04% | read_bottleneck | libpthread-2.27.so | [.] __libc_pread64 |
| 4.08% | 0.03% | read_bottleneck | libpthread-2.27.so | [.] __libc_write |
| 3.94% | 0.11% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::BlockBasedTable::RetrieveBlock<rocksdb::Block> |
| 3.78% | 0.06% | rocksdb:low0 | [kernel.kallsyms] | [k] sys_pread64 |
| 3.57% | 0.04% | rocksdb:low0 | [kernel.kallsyms] | [k] vfs_read |
| 3.45% | 0.04% | read_bottleneck | [kernel.kallsyms] | [k] sys_write |
| 3.43% | 0.04% | read_bottleneck | [kernel.kallsyms] | [k] sys_pread64 |
| 3.34% | 0.00% | rocksdb:low0 | [kernel.kallsyms] | [k] __vfs_read |
| 3.33% | 0.03% | rocksdb:low0 | [kernel.kallsyms] | [k] new_sync_read |
| 3.30% | 0.03% | rocksdb:low0 | [kernel.kallsyms] | [k] ext4_file_read_iter |
| 3.30% | 0.03% | read_bottleneck | [kernel.kallsyms] | [k] vfs_write |
| 3.25% | 0.22% | rocksdb:low0 | [kernel.kallsyms] | [k] generic_file_read_iter |
| 3.25% | 0.04% | read_bottleneck | [kernel.kallsyms] | [k] vfs_read |
| 3.15% | 0.00% | read_bottleneck | [kernel.kallsyms] | [k] vfs_write |
| 3.15% | 0.01% | read_bottleneck | [kernel.kallsyms] | [k] new_sync_write |

Symbol 분석

| Children | Self | Command | Shared Object | Symbol |
|----------|-------|-----------------|--------------------------------|---|
| 9.97% | 0.22% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::Version::Get |
| 0.33% | 0.01% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::MemTableListVersion::Get |
| 0.33% | 0.02% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::MemTableListVersion::GetFromList |

| Children | Self | Command | Shared Object | Symbol |
|----------|-------|-----------------|--------------------------------|---|
| 9.99% | 0.24% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::Version::Get |
| 0.31% | 0.00% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::MemTableListVersion::Get |
| 0.31% | 0.01% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::MemTableListVersion::GetFromList |
| 0.00% | 0.00% | rocksdb:high0 | read_bottleneck_breakdown_test | [.] rocksdb::Version::GetTableProperties |
| 0.00% | 0.00% | rocksdb:low0 | read_bottleneck_breakdown_test | [.] rocksdb::MemTableListVersion::GetEarliestSequenceNumber |

Symbol 분석

| Children | Self | Command | Shared Object | Symbol |
|----------|-------|---|---|--|
| | | | | |
| 1.78% | 0.80% | read_bottleneck | read_bottleneck_breakdown_test | [.] rocksdb::IndexBlockIter::SeekImpl |
| | | | | |
| | | --0.98%-- | rocksdb::IndexBlockIter::SeekImpl | |
| | | | | |
| | | | --0.62%-- | rocksdb::BlockIter<rocksdb::IndexValue>::CompareCurrentKey |
| | | | | |
| | | --0.80%-- | 0x409d106000000000 | |
| | | main | | |
| | | rocksdb::TransactionBaseImpl::Get | | |
| | | rocksdb::TransactionBaseImpl::Get | | |
| | | rocksdb::TransactionBaseImpl::Get | | |
| | | rocksdb::WriteBatchWithIndex::GetFromBatchAndDB | | |
| | | rocksdb::WriteBatchWithIndex::GetFromBatchAndDB | | |
| | | rocksdb::DBImpl::Get | | |
| | | rocksdb::DBImpl::Get | | |
| | | rocksdb::DBImpl::GetImpl | | |
| | | rocksdb::Version::Get | | |
| | | rocksdb::TableCache::Get | | |
| | | rocksdb::BlockBasedTable::Get | | |
| | | | | |
| | | --0.79%-- | rocksdb::BlockIter<rocksdb::IndexValue>::Seek | |
| | | | rocksdb::IndexBlockIter::SeekImpl | |

분석 결과

1. 초반 N초와 후반 N초의 기록 간의 차이는 compaction의 유무 이외에는 크게 발견되지 않았다.

총 실행의 CPU Cycle에서 차지하는 비율이 각 함수마다 크게 달라지지 않았고, 비율의 순위도 크게 변동되지 않았다.

2. GET 함수의 내용 중 가장 높은 비율을 차지하는 부분은 SST File에서 탐색하는 부분이었으며, 이는 SST File에서 탐색하면서 참조하는 Data Block의 수가 많기 때문인 것으로 추측된다.

또한, Data Block을 탐색하면서 sequence number는 사용하지 않고, user key만을 사용하는 것으로 파악되었다. Sequence number는 key value를 찾은 후 이를 validate하는 과정에서 사용되고 있었다.

To Do

해결해야 할 문제
질문

해결해야 할 문제 및 질문

1. 여러 방식으로 실험을 했음에도 유의미한 차이가 나타나지 않았는데 저희가 놓친 부분이 있나요?
혹시 CPU Cycle 비율이 아닌 다른 척도를 확인해야 하나요?
2. 지금의 저희의 가설으로는 sequence number 를 더 활용해서 데이터 블록을 탐색하는 횟수를 줄이는 것이 성능 개선의 방법일 것이라고 생각합니다. 혹시 이런 방향성이 맞을까요?

THANK YOU!

감사합니다!