# Unzipping Baskets with TBB

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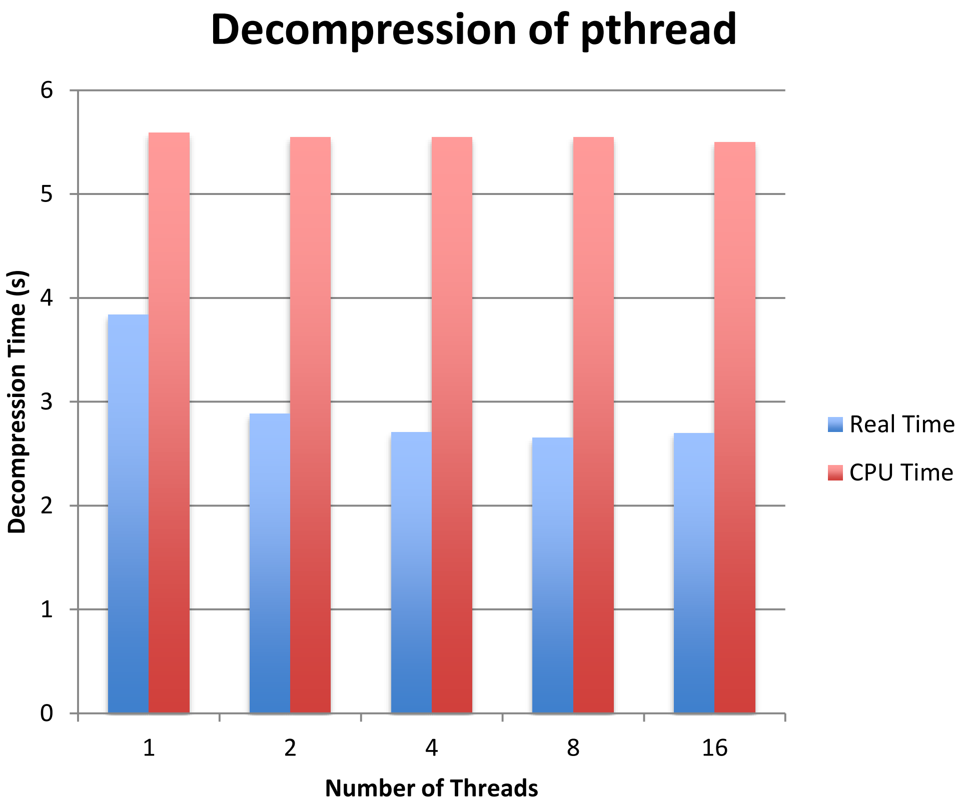
# Agenda

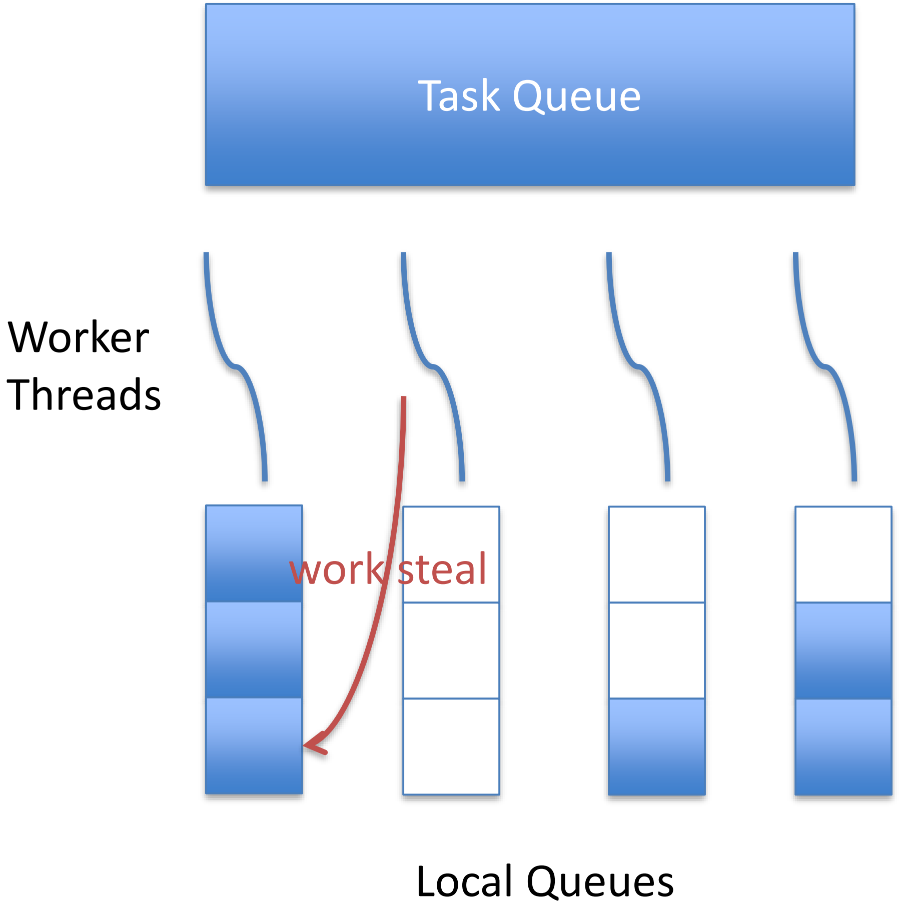
- Motivation
- Introduction of TBB
- Implementation
- Thoughts on Improvement
- Future work

# Motivation



- The experiment was run on 4-core VM.
- Pthread does not linearly scale decompression speed.
- Decompressing threads are competed for lock to update buffers and its status.

# Thread Building Block (TBB)

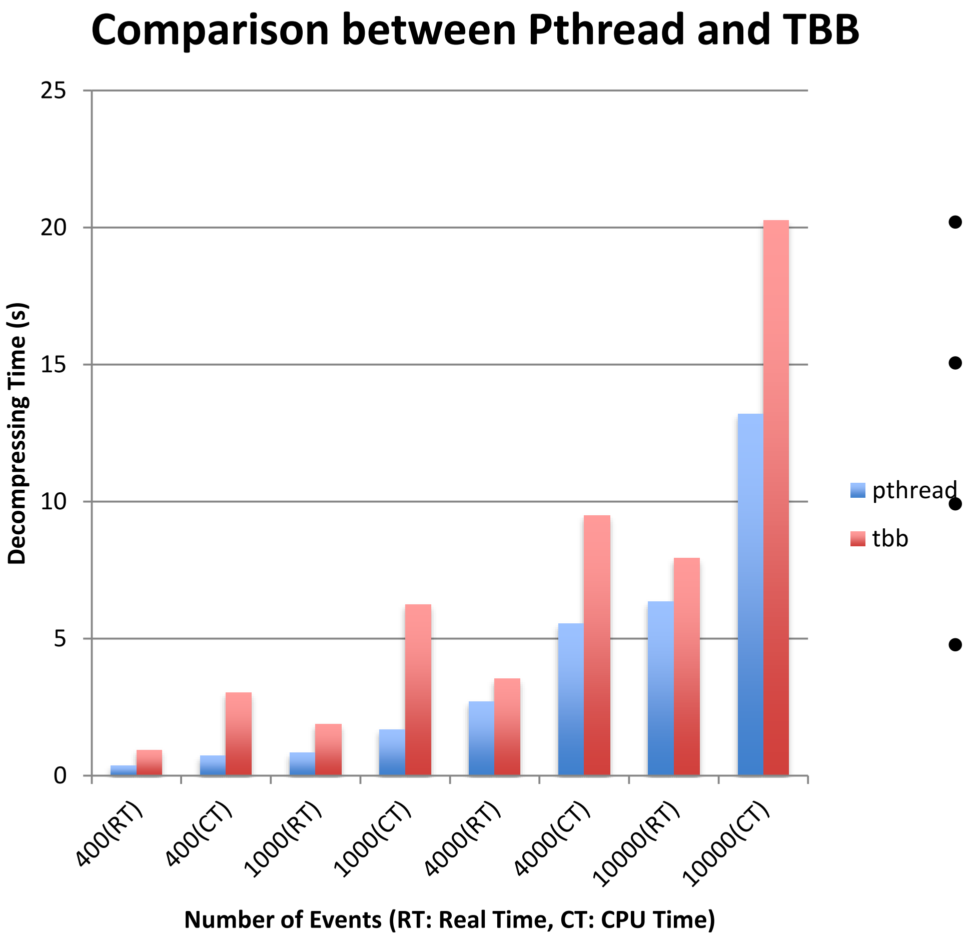


- TBB is a C++ template designed by Intel for parallel programming on multicore processors.
- It adopts work stealing mechanism.

# Implementation

- Each task is dedicated to decompressing a single basket.
- Using unlimited cache to hold unzipped buffers.
  - Removed (*fTotalUnzipBytes* < *fUnzipBufferSize*)
- Creating TBB tasks when cache miss happens in the main thread.

# Performance between Pthread and TBB



- The experiment was run on 4-core VM.
- Current implementation of TBB is slower than Pthread.
- Benchmark with more events seem close the gap.
- 4000 Events: 1.71x CPU Time
  10000 Events: 1.54x CPU Time

# Thoughts on Improvement(I)

- In Pthread implementation, the main thread decompress baskets in three scenarios:
  - Basket size is too small (< 256 bytes)
  - Basket size is too large (> 4*fUnzipBufferSize)
  - Cache miss occurs
- In TBB, a task could compact multiple small baskets together.

# Thoughts on Improvement(II)

- In Pthread implementation, when cache miss happens, a background thread pick up a zipped basket to work on.
- In TBB, when cache miss happens, UnzipCacheTBB function repeatedly creates tasks for the same baskets.
- Need to find a good spot for the function to avoid unnecessary task overhead.

# Thoughts on Improvement(III)

- In Pthread implementation, the background threads pick up the baskets which are close to the requested basket (determined by fLastReadPos).
- In TBB, tasks are randomly appended to the queue, executing sequence is undetermined.

# Future Work

- Dynamically assign baskets to a task.
- Minimizing the number of tasks created.
- Assigning different priorities to different tasks.

# Questions ?