HeterMM: Applying in-DRAM Index to Heterogeneous Memory-based Key-Value Stores

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Problems & Ideas

- Problems of key-value stores utilizing NVM:
  - How to be conveniently integrated into exiting systems?
  - How to fully leverage the superior performance of DRAM?
- Ideas: A general framework that could applies mature and well-designed DRAM indexes to heterogeneous memory-based KV stores while reserving their strengths.

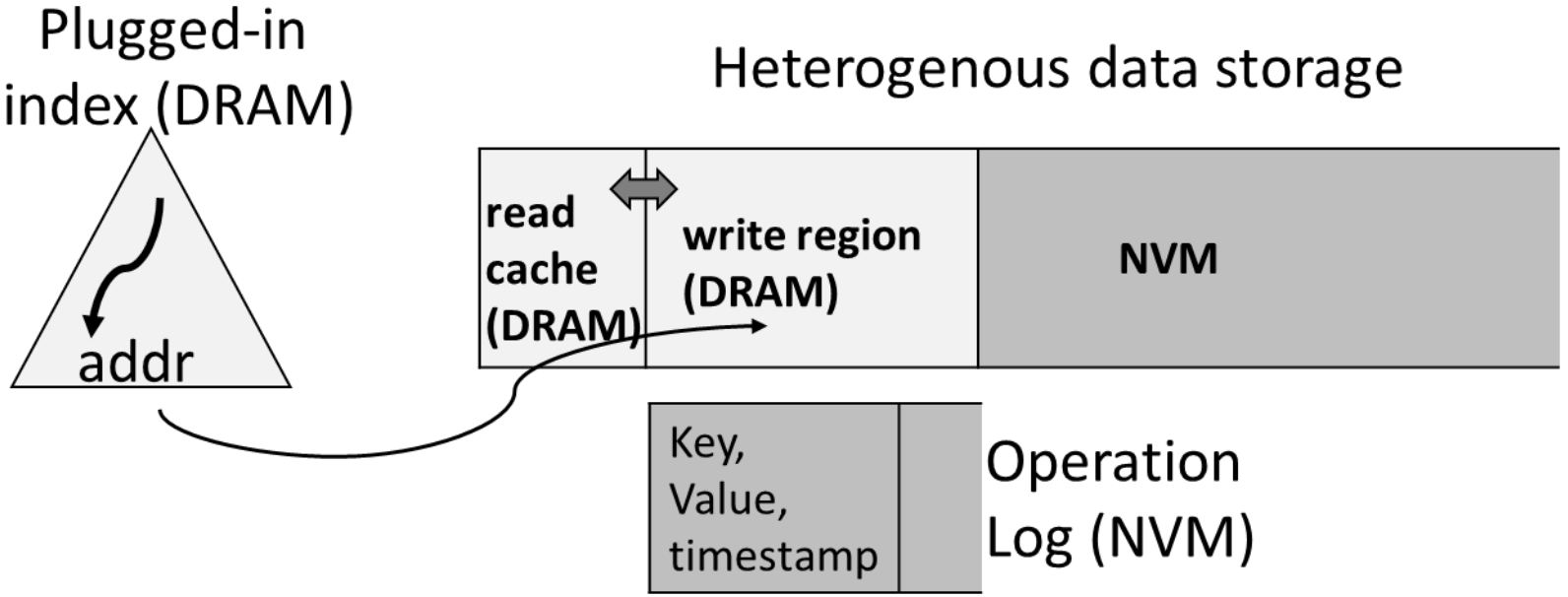

Fig1. Overview of the framework. It includes a pulgged-in in-DRAM index, a persist operation log, and a hotness-aware data storage in heterogenous memory enhanced with an adaptive read cache.

Experimental Results

- Experiments:
  - Combine HeterMM with different kinds of indexes, including CLHT, LFHT, and B+ tree.
- Results:
  - HeterMM could outperform the state-of-the-art index persist framework, TIPS, as HeterMM avoids random writes on NVM;
  - HeterMM could outperform state-of-the-art hybrid DRAM and NVM-based hash tables and B+~trees, including Halo and uTree, as HeterMM maintains the hot data in DRAM.

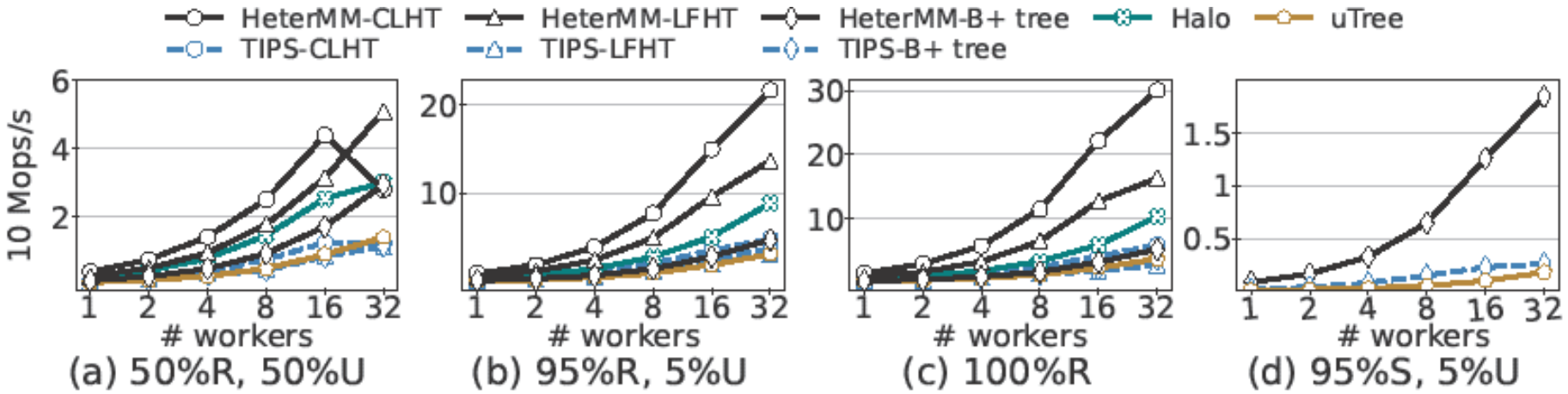

Fig2. Performance comparison among HeterMM-based systems and others.