Reducing the Storage Overhead of Main-Memory OLTP Databases with Hybrid Index
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Motivation

- Memory is still a limiting resource
- The high throughput and low latency of main-memory databases is only available if the working set fits in memory

Problem: index structures are too LARGE

Hybrid Index: a Dual-stage Design

Benefit 1: Space-Efficient
Most entries are stored in the more compact static-stage structure

Benefit 2: Skew-Aware
Hot and fresh entries are stored in dynamic stage for fast accesses while aged entries are migrated to static stage for occasional look-ups

Dynamic-to-Static Rules
Convert a dynamic data structure to a compact, read-optimized structure

Evaluation: Resource Saving + Capacity Expansion

Resource Saving
YCSB-based Micro-benchmark

Capacity Expansion
Full DBMS Evaluation

H-Store: an open-source, main-memory OLTP DBMS
Anti-caching: a database-managed tuple-level paging technique [VLDB’13]

Benchmark: TPC-C
8 server threads, 8 client threads
Memory Limit = 5GB
The benchmark executes for 12 minutes each run