Efficient Use of Low Cost SSDs for Cost Effective Solid State Caches

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Solid State Cache (SSC)

- **Flash-based SSCs**
  - Successfully deployed in storage systems

- **Single-type SSC**
  - Several studies have focused only on single flash memory type SSC scheme
    - E.g., SLC, MLC based SSCs
    - OP-FCL[FAST12], FlashTier[EuroSys12], HyStore[ICS11], HybridStore[MASCOTS11]
  - Low price efficiency

**Our Focus: Hybrid SSC**
- Integrate SLC SSC and TLC SSC
- High performance per cost

Motivation

HySSC Overview

- SLC SSC + TLC SSC combined approach
- SLC SSC used as Read/Write Cache
- TLC SSC used as Read Only Cache

Data Migration from SLC to TLC

- Baseline Migration: all blocks can be migrated to TLC SSC
- Selective Migration: only clean blocks are migrated to TLC SSC

Our Solution: Hybrid Solid State Cache (HySSC)

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Performance Evaluation

- **HySSC Overview**
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Simulator: DiskSim + SSD Extension

- **HySSC**: SLC + TLC (16GB+16GB, OPS 10%)
- Single-type SSC: SLC, MLC, TLC (32GB, OPS 10%)
- See the paper for detailed configurations

Impact of Selective Migration

- Reduce average response time
- Improve lifetime of TLC SSC

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