ACEing the Bufferpool Management Paradigm for Modern Storage Devices

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SSD Properties
- no mechanical movement
- fast access
- low energy
- high chip density
- fast access
- high internal parallelism
- high write cost

Bufferpool Design Space
- replacement algorithm informs both policies
- red denotes new components

Asymmetry/Concurrency-Aware (ACE) Bufferpool
- Always flush multiple dirty pages to amortize the high write cost
- Evict multiple pages to enable concurrent prefetching
- works with any replacement algorithm & prefetcher

ACE in Action: An Example ($k_w = 3$, $n_e = 3$)

ACE: Performance Evaluation
- ACE improves latency
- Higher gain for high asymmetry & more writes
- ACE achieves 1.3X speedup for mixed TPC-C