

# The Dirty-Block Index

Today – 4:15PM – Session 3A

**Vivek Seshadri**

**Abhishek Bhowmick • Onur Mutlu**

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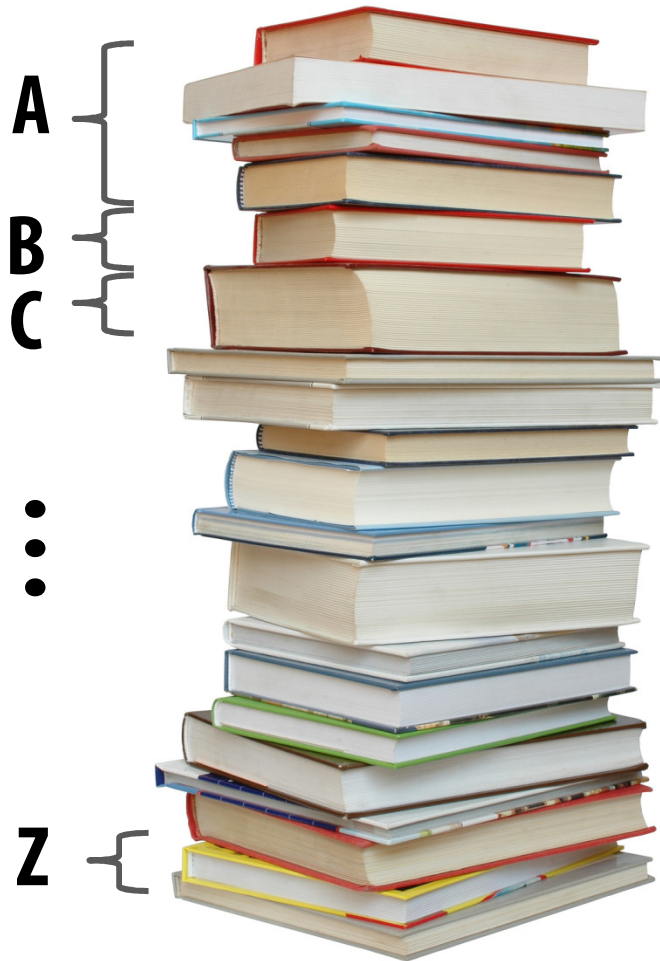
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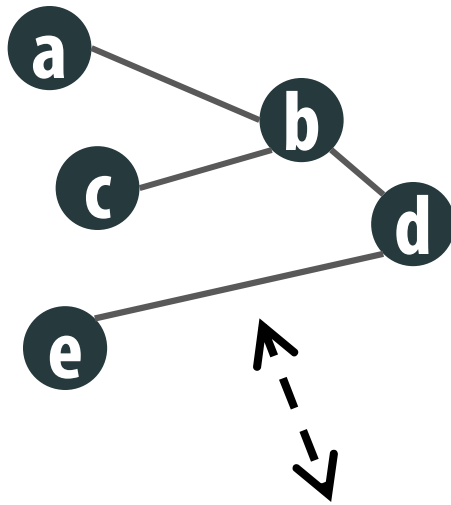
# Mismatch: Representation and Query

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# Mismatch: Representation and Query



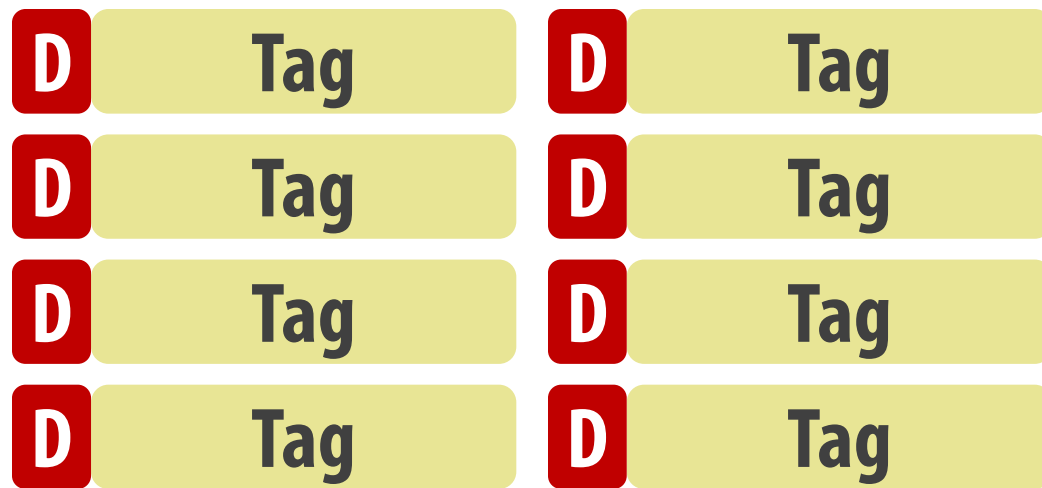
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**List all edges  
adjacent to  
vertex 'a'**

# Mismatch: Representation and Query

## Cache Tag Store



**Dirty Bit**



**List all dirty  
blocks of  
DRAM row R.**

**Is block X  
dirty?**

# Dirty-Block Index

## Cache Tag Store

Tag	Tag
Tag	Tag
Tag	Tag
Tag	Tag

**DBI**

**List all dirty  
blocks of  
DRAM row R.**

**Is block X  
dirty?**

# Many Optimizations

1. **DRAM-aware writeback**
2. **Bypassing cache lookups**
3. **Reducing ECC overhead**
4. **Efficient cache flushing**
5. **Load balancing memory accesses**
6. **Bulk DMA**
7. **Efficient write scheduling**
- ...



**DBI**

# Many Optimizations

1. DRAM-aware writeback
2. Bypassing cache lookups
3. Reducing ECC overhead

**DBI**

**31% performance over baseline**  
**6% over best previous mechanism**  
**8% cache area reduction**

...

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