

# Anti-Caching in Main Memory Database Systems

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# A bit of history...



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# 1974 – System R

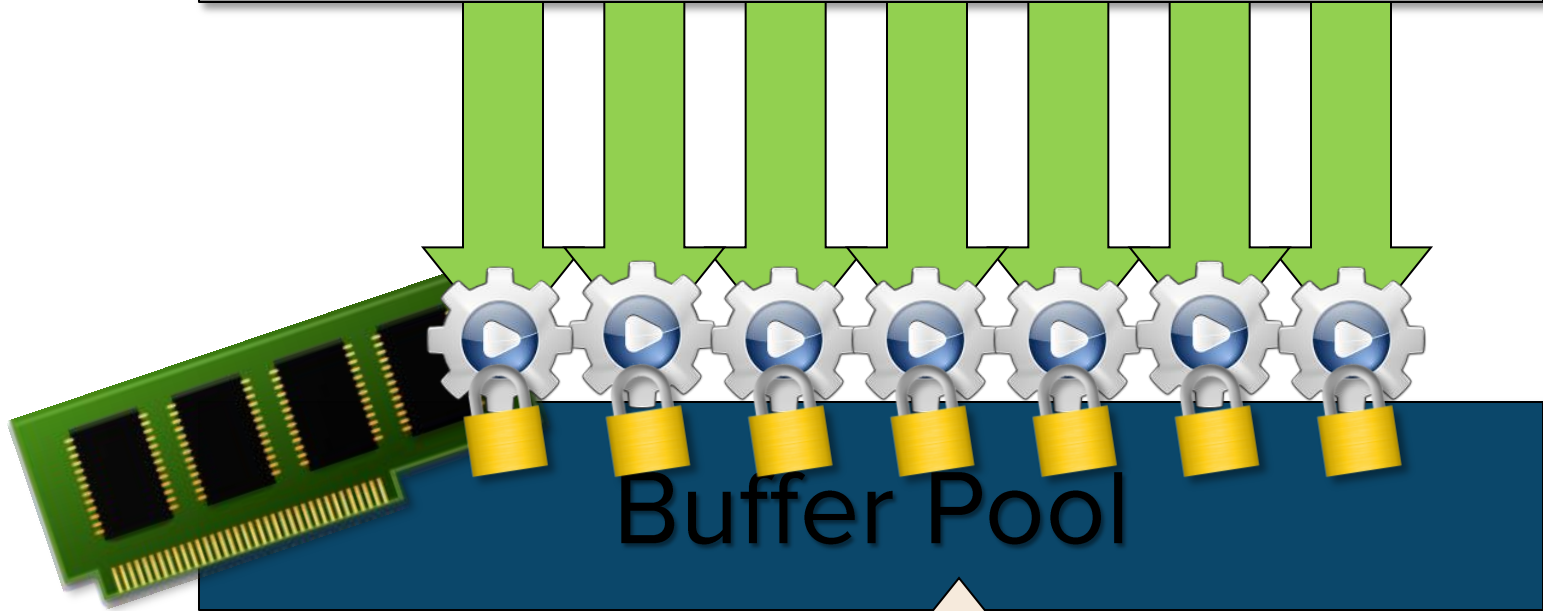
- query optimization
- recovery
- transaction serialization
  - lots of locks



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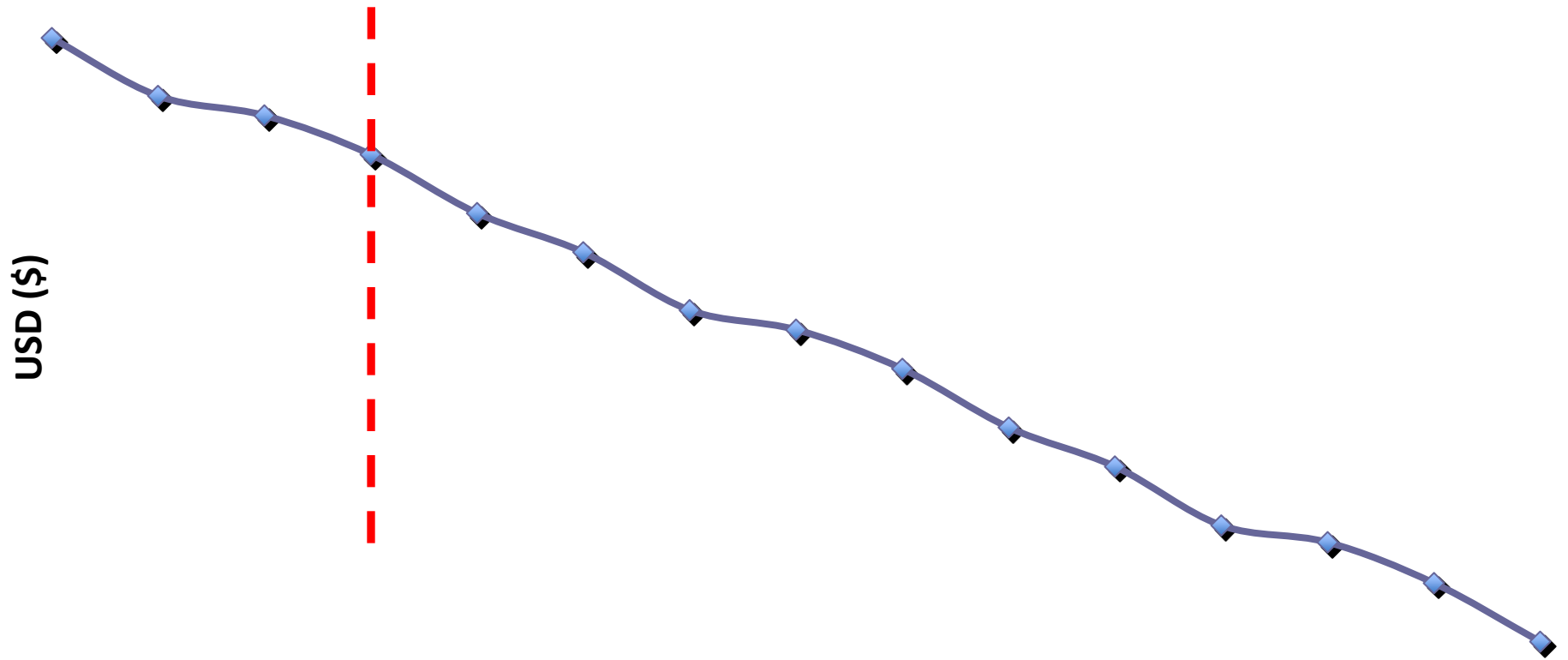


Application



Primary Storage

# Change is Good



source: <http://www.archivebuilders.com/whitepapers/22045p.pdf>



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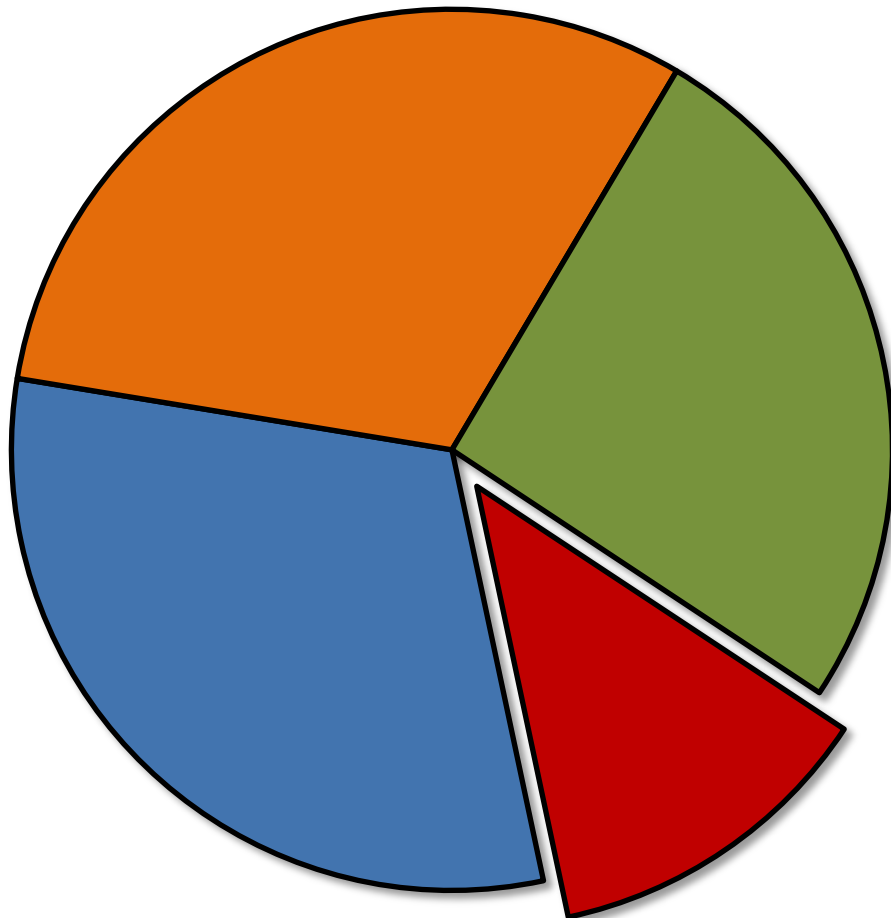


Great, that's what the buffer  
pool is for...right?



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- Buffer Pool
- Locking
- Recovery
- Real Work

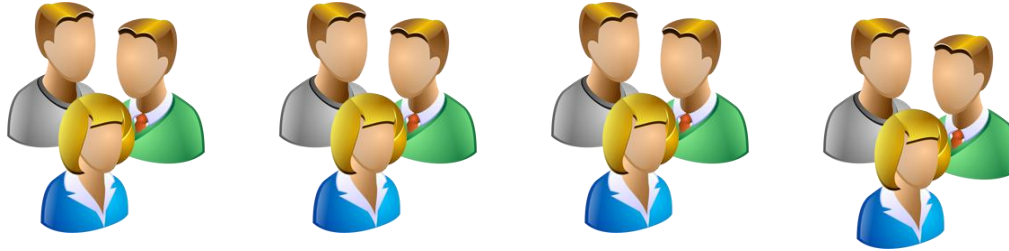
OLTP Through the Looking Glass,  
and What We Found There  
*SIGMOD '08, pp. 981-992, 2008.*



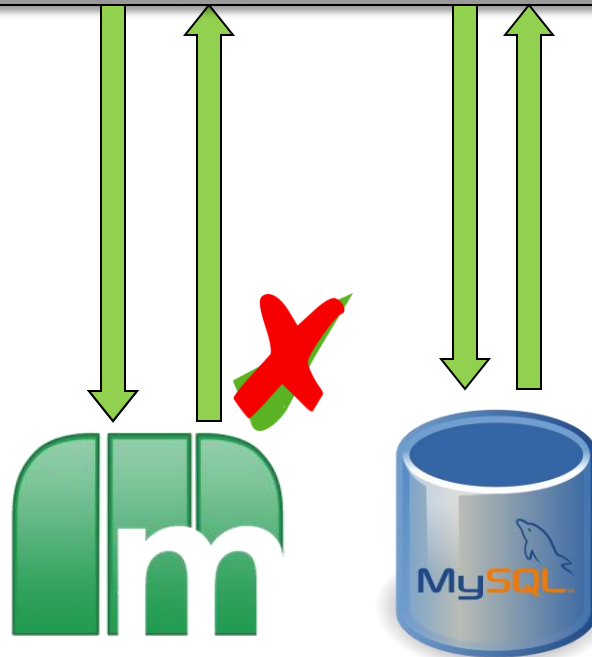
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# What to do with all this memory?



Application



Consistent?  
Updates?  
Writes?





# -Store

## Parallel Main Memory Transaction Processing System

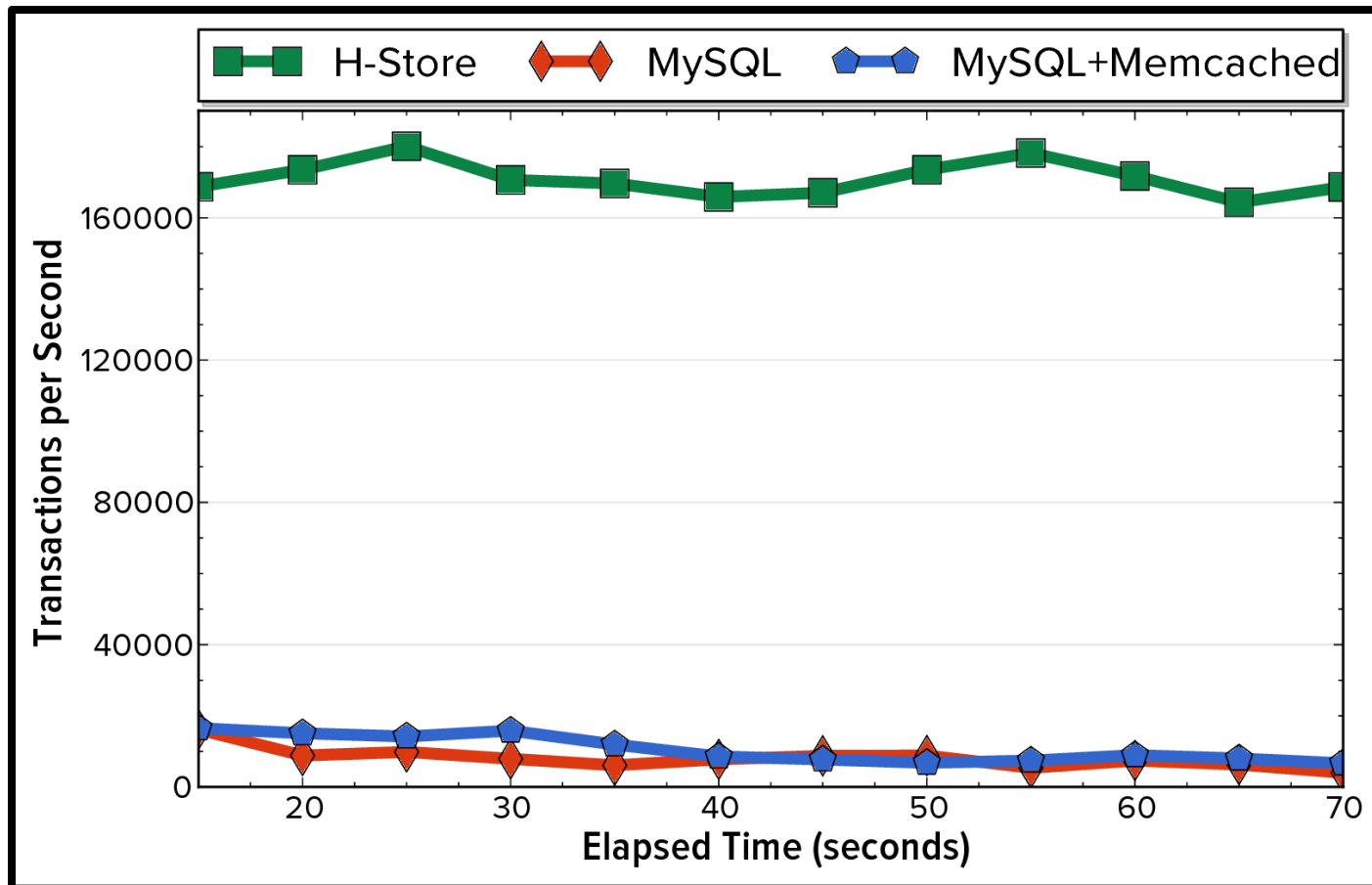
H-Store: A High-Performance, Distributed  
Main Memory Transaction Processing System  
*VLDB 2008.*



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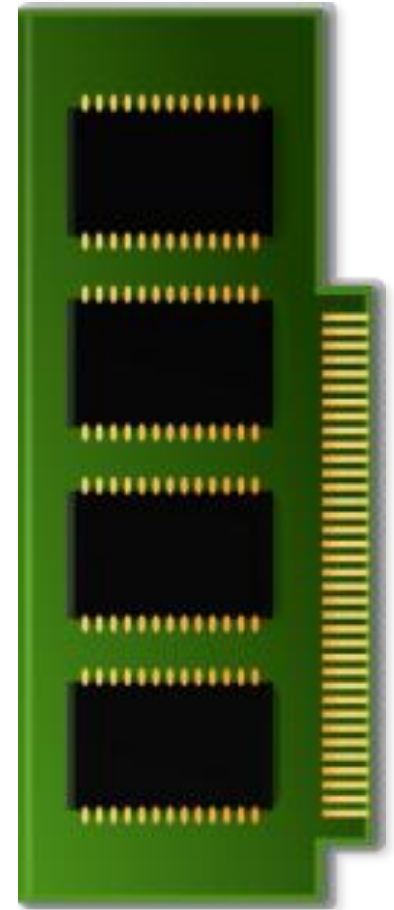
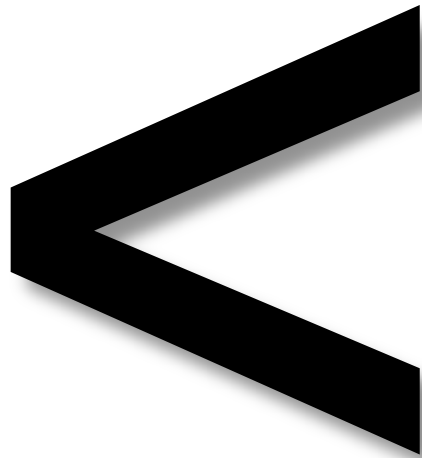


# YCSB, Update-Heavy, data < memory



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# Anti-Caching in H-Store

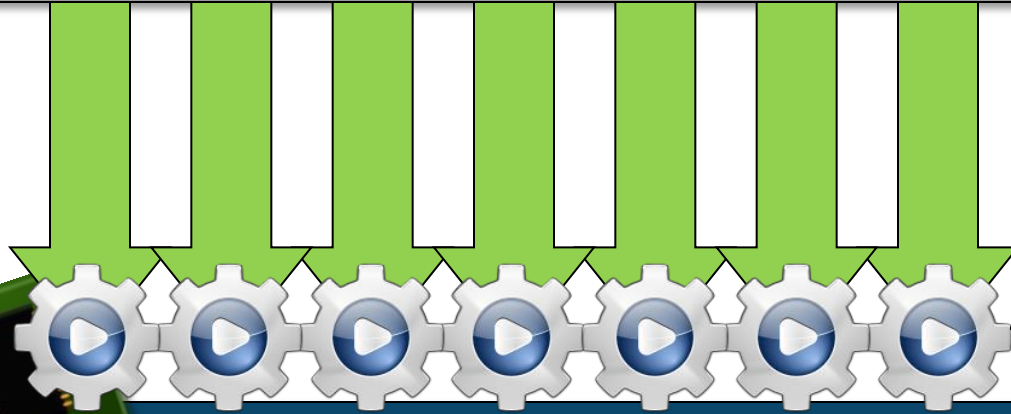
- Memory becomes primary storage for “hot” data
- “Cold” data is *evicted* to disk in blocks, fetched when requested by a transaction
- Still no locks/latches



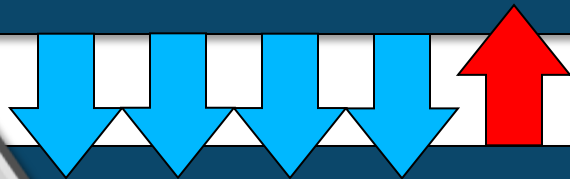
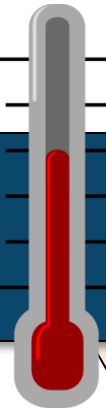
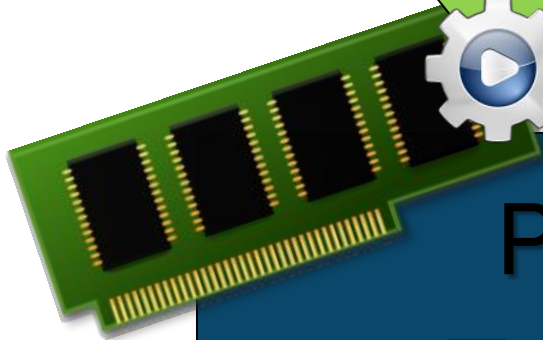
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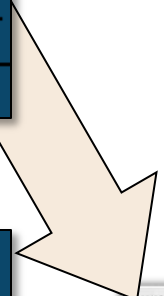
# Application



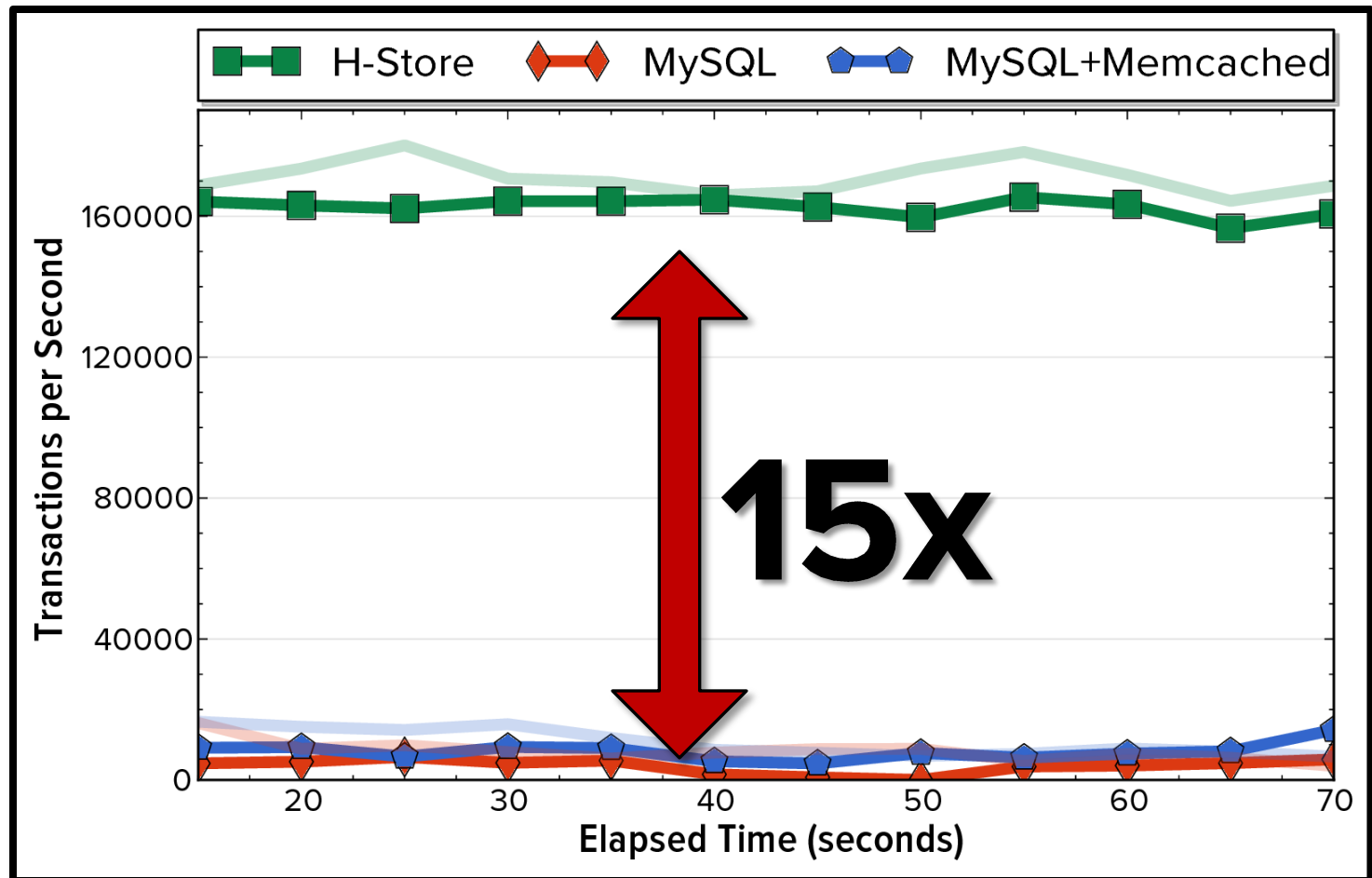
## Primary Storage



## Anti-Cache



# YCSB, Update-Heavy, data > memory



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# The New Traditional Wisdom



+

Anti-  
Caching



+

Buffer  
Pool



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# Future Work

- Alternative eviction strategies
- Larger-than-memory queries
- New hardware
  - flash, persistent memory



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# The Team



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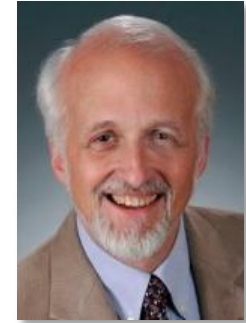
Andy  
**Pavlo**  
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Stephen  
**Tu**  
(MIT)



Mike  
**Stonebraker**  
(MIT)



Stan  
**Zdonik**  
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Anti-Caching: A New Approach to  
Database Management System Architecture  
*In Preparation.*



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# Questions?

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