Chapter 4
Transaction Models

- Emerging Hardware Trends in Large-Scale Transaction Processing
- Transaction Basics and Distributed Transactions

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Emerging Hardware Trends

- OLTP databases for emerging hardware
- Non-volatile memory (NVM)
- Many-Core CPU Architecture

In Case of Non-Volatile Memory

- Experiments testing MySQL and H-Store
- Use NVM emulator
  - 2 times slower than DRAM
- YCSB benchmark with 3 workloads

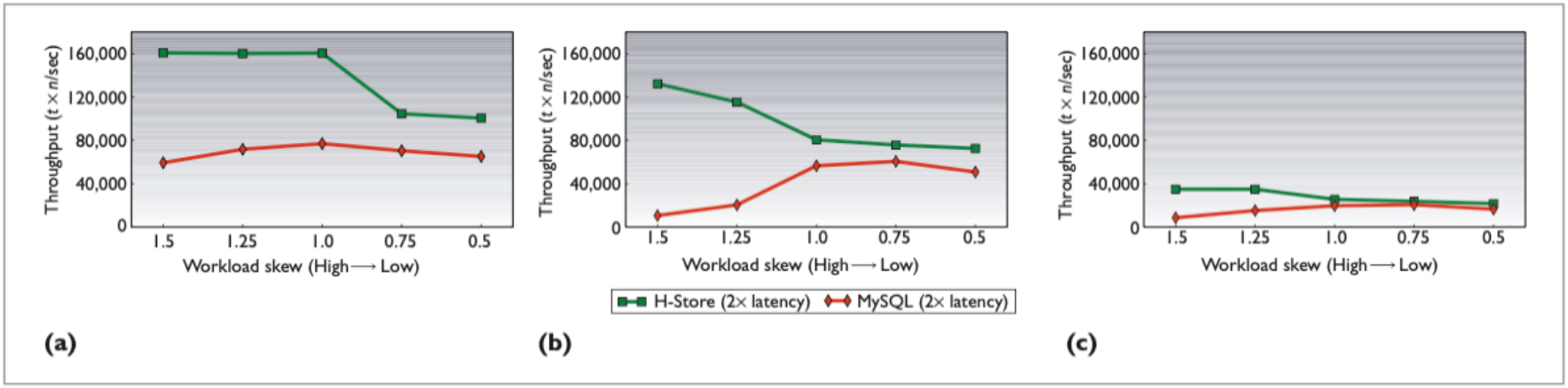
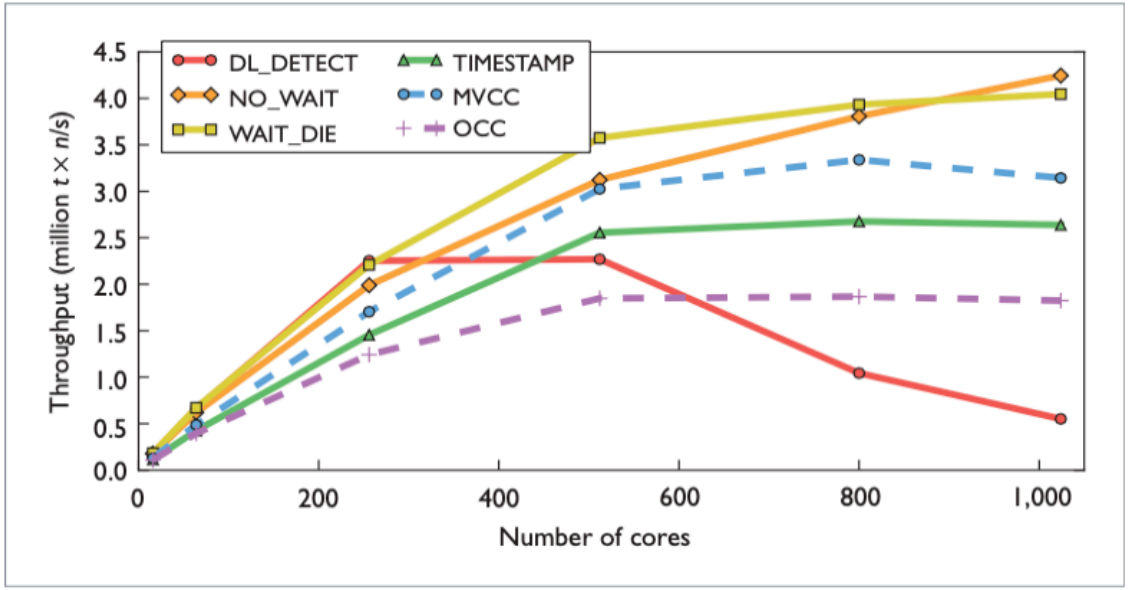


Figure 1. H-Store and MySQL running on Intel Lab's non-volatile memory (NVM) hardware emulator with an ×320-nanosecond read/write latency (2× the speed of DRAM). (a) Read-only, (b) read-heavy, and (c) write-heavy workloads.[9]

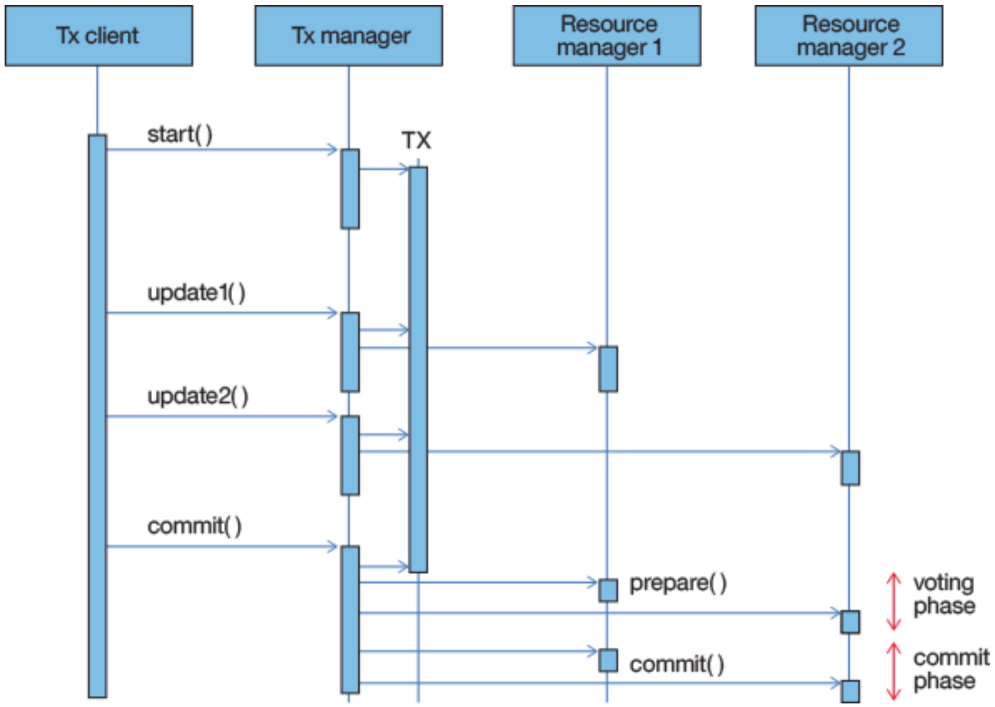
In Case of Multi-Core CPUs

- DBx1000 DBMS with CPU simulator
- Comparison of the concurrency control schemes



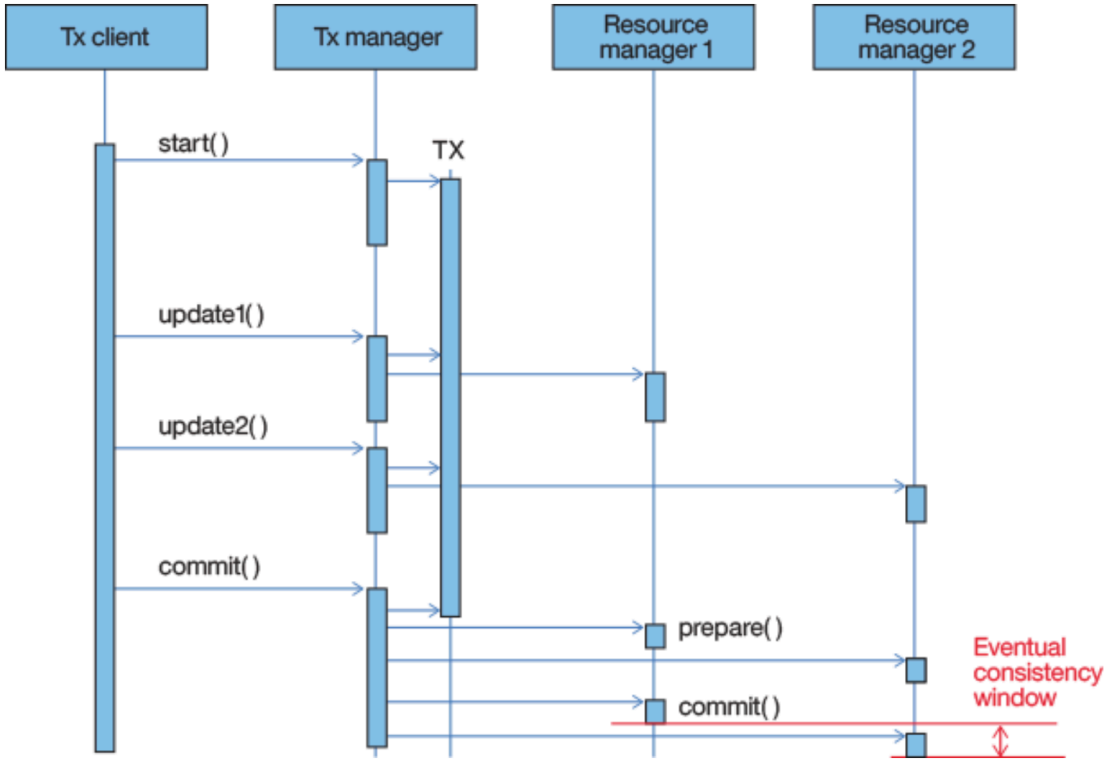
Distributed Transactions in a Cluster

- Distributed Transactions with Two-Phase Commit



Distributed Transaction in a Cluster

- In a real-world example
  - *Window of inconsistency*
  - *TX Manager outages*



Reference & To-read List

- Reference
  - Pavlo, Andrew. **"Emerging hardware trends in large-scale transaction processing."** *IEEE Internet Computing* 19.3 (2015): 68-71.

- To-read list
  - Arulraj, Joy, Andrew Pavlo, and Subramanya R. Dulloor. **"Let's talk about storage & recovery methods for non-volatile memory database systems."** *Proceedings of the 2015 ACM SIGMOD International Conference on Management of Data*. 2015.
  - DeBrabant, Justin, et al. **"Anti-caching: A new approach to database management system architecture."** *Proceedings of the VLDB Endowment* 6.14 (2013): 1942-1953.
  - Yu, Xiangyao, et al. **"Staring into the abyss: An evaluation of concurrency control with one thousand cores."** (2014).