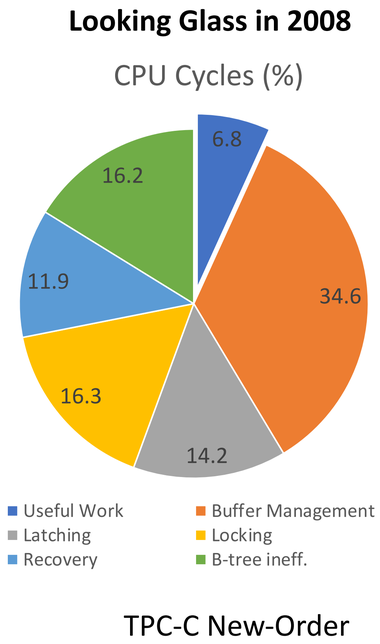
OLTP Through the Looking Glass 16 Years Later

Xinjing Zhou, Viktor Leis, Xiangyao Yu, Michael Stonebraker

Massachusetts Institute of Technology

CIDR 2025 Paper

Background and Motivation

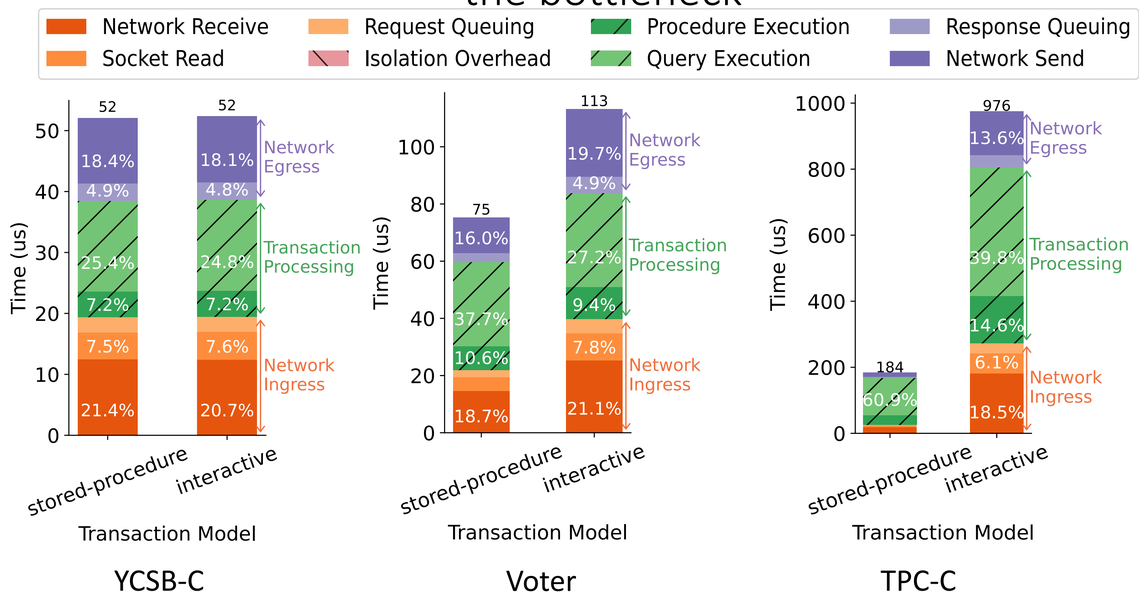


TPC-C New-Order

- Many new OLTP engines since then: VoltDB/H-Store, Hyper, Hekaton, LeanStore...
- Caveats of previous research:
  - **Assume stored-procedure and ignore OS network stack**
  - **Assume stored-procedure is not malicious**
- We perform looking glass 2.0 on VoltDB that studies
  - Entire stack for both stored-procedure and interactive transaction
  - The cost of isolated procedure execution.

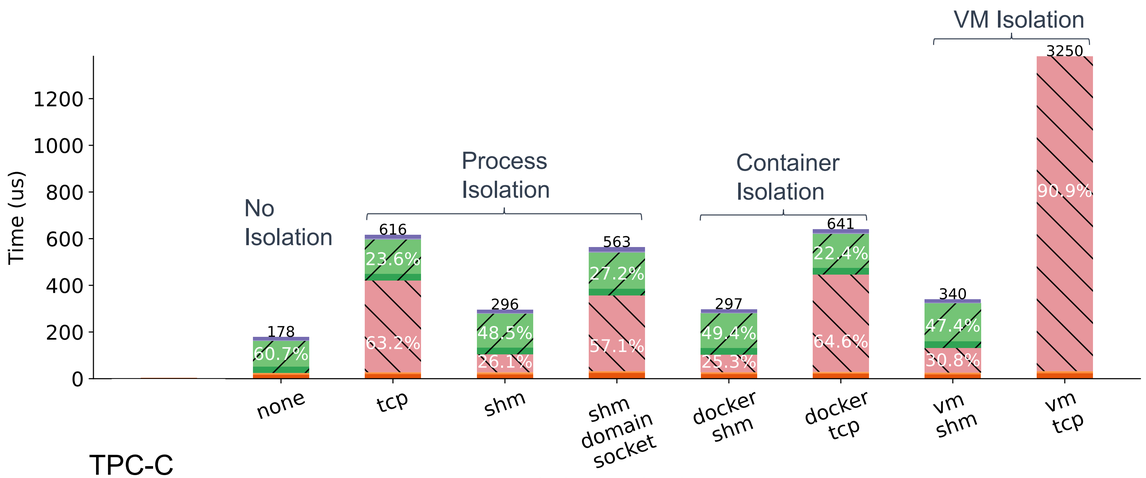
Finding #1: No-Isolation Case

Server-side CPU-time Breakdown, Communication is the bottleneck



Finding #2 : Isolation Case

Communication for Isolation is the bottleneck



TPC-C

What's Next?

- **Need an easier-to-use kernel bypass framework to make impact in databases:** DPDK + User-space Networking (F-stack) helps reducing the overhead by 85% at the cost of portability, debuggability, and maintainability.
- **The trade-off space of security, ease-of-use, and performance for transaction model is under-explored.**