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On Main-memory Multicore Transaction Performance

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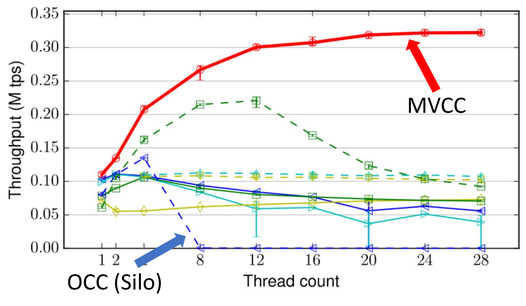
Non-CC factors have ***surprisingly*** large impact on transaction performance.

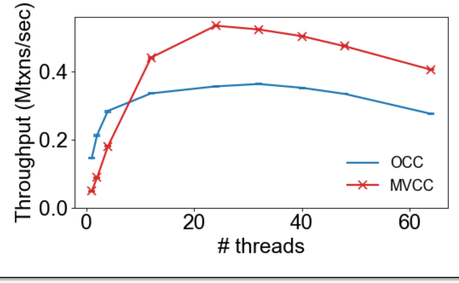
Background and Motivation

- Conventional wisdom suggests that OCC suffers from performance collapse under high contention.
- The collapse is viewed as a fundamental issue with OCC, and only alternative CC protocols can solve this issue.
- But these results aren't always reproducible.

High-contention TPC-C results in prior work [1]



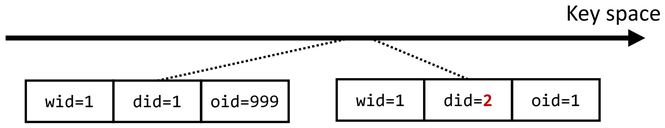
Same high-contention TPC-C measured on our system



What gives?

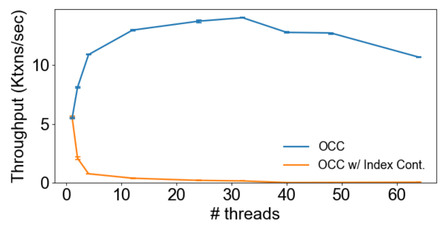
Index Contention in TPC-C

- We found an instance of index contention in TPC-C that caused the OCC performance collapse in many prior measurements.



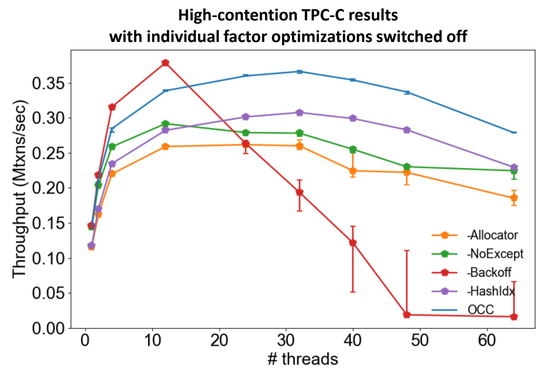
- The example above shows a common multi-part key used by TPC-C new-order table, where keys with different district IDs appear consecutive in the key space.
- This can lead to false-sharing of B-tree leaf nodes in these indexes, causing frequent phantom protection aborts, **starving** Delivery transactions!

Delivery transaction throughput in TPC-C full mix, high contention



Impact of Non-CC Factors

High-contention TPC-C results with individual factor optimizations switched off



Conclusion

- Many factors beyond concurrency control algorithms shape perceived performance of a transactional system.
- With good non-CC factor choices, OCC's performance does not collapse in a high contention TPC-C workload.
- Takeaway: One must be careful when drawing meaningful conclusions from cross-system comparisons or when implementing an alternative system from scratch based on its text description.

[1] Hyeontaek Lim, Michael Kaminsky, and David G. Andersen, *Cicada: Dependably fast multi-core in-Memory transactions*, SIGMOD'17