Concurrent Data Systems for Agents - End of Sem Update

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Problem Statement

In agentic scenarios, there are often N many commands requested to run on some shared state, where only one should “win” and commit to the DB.

Project Idea

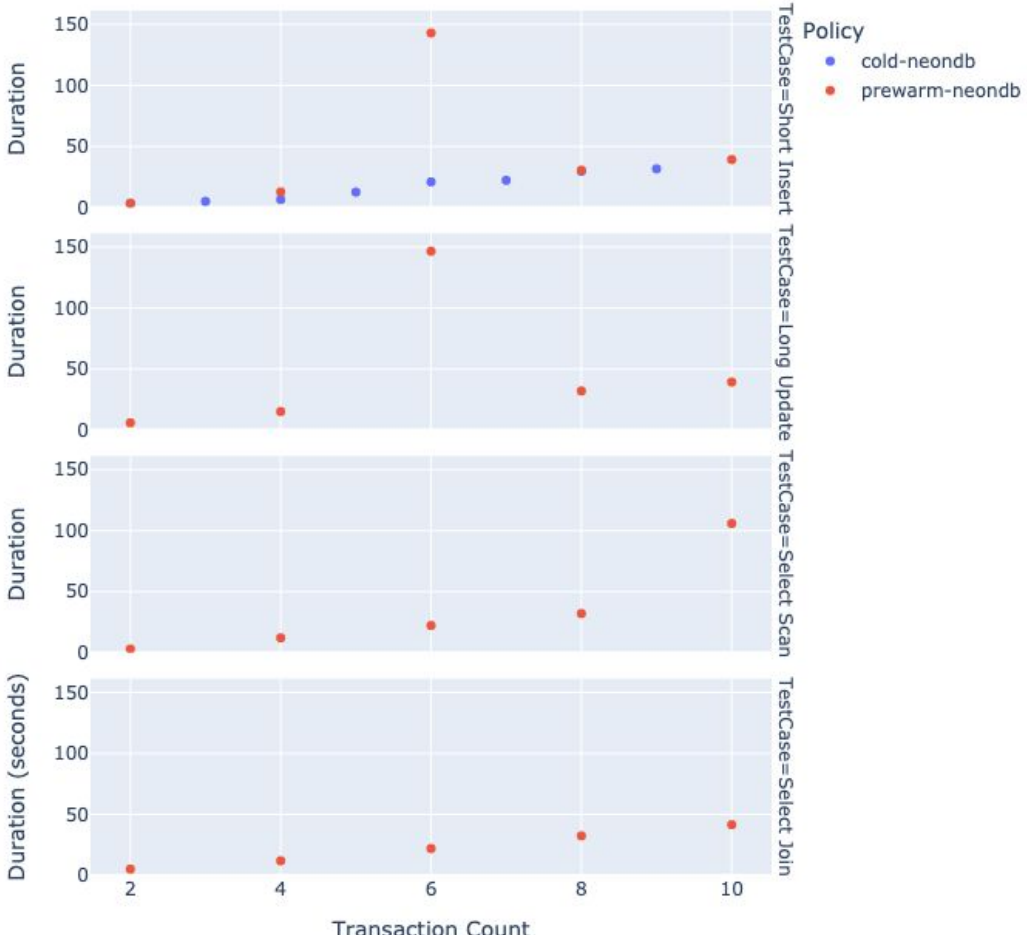
Performance benchmarks for serial/parallel handling of simultaneous transactions (Postgres, DuckDB), benchmarking on NeonDB using ntran.

Design

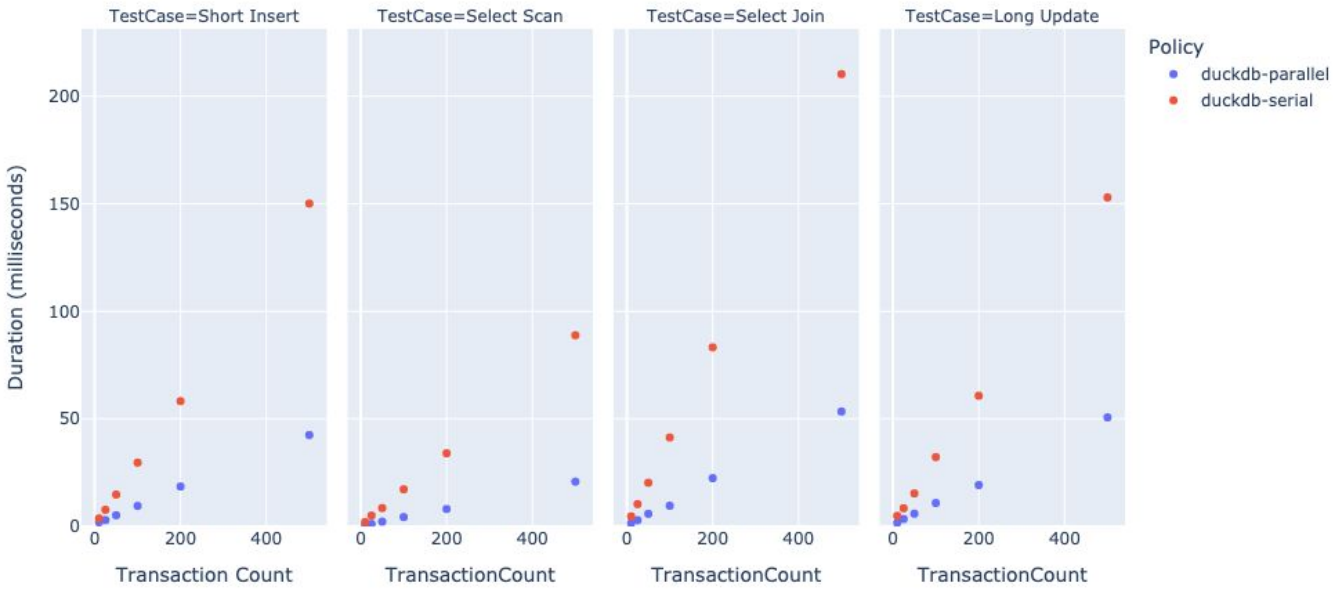
- Serial
- DuckDB (serial, parallel)
- NeonDB

Implementation

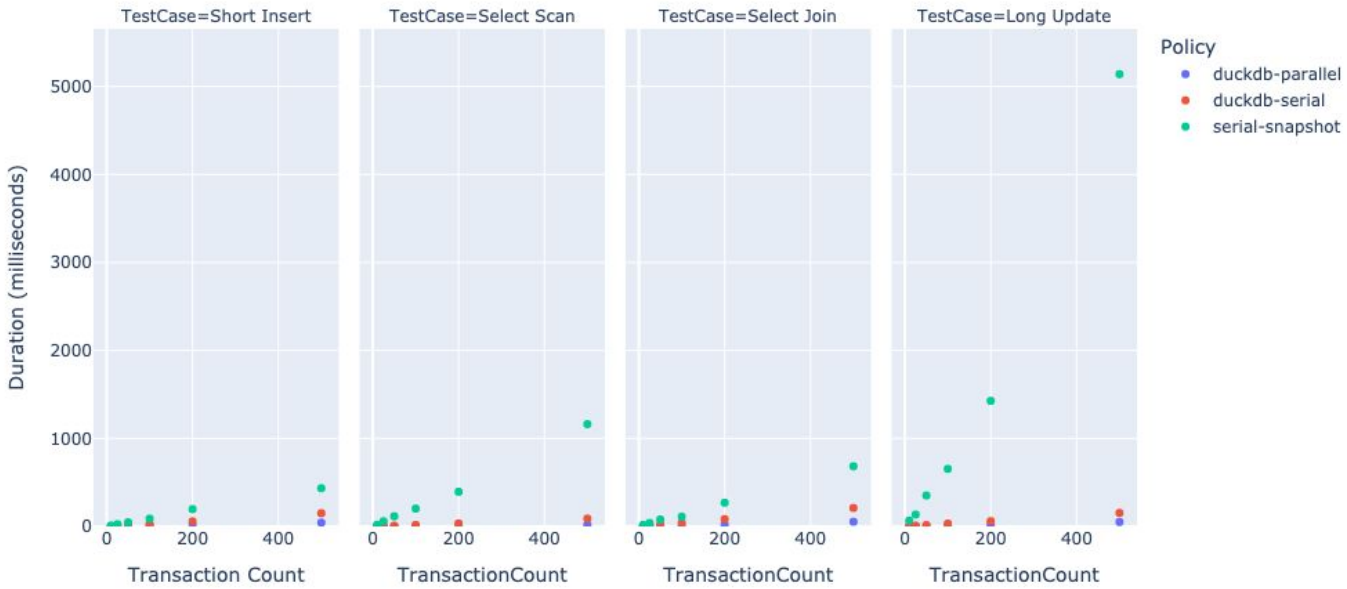
- Shared sql statements throughout all policies
- General ntran design (with the different policies)


Policy
cold-neondb
prewarm-neondb
TestCase=Short Insert
TestCase=Long Update
TestCase=Select Scan
TestCase=Select Join
Duration
Duration (seconds)
0
50
100
150
2
4
6
8
10
Transaction Count

Results - DuckDB



Results - DuckDB vs pSQL (Serial)



Key Findings + Limitations

- DuckDB COW issue within the driver, elaborate/reword, requires DuckDB driver update
- Neon concurrency limit (Free tier)
- Neon doesn’t yet allow managing branches in parallel
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- (Nikhil)