Concurrent Data Systems for Agents - End of Sem Update

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COMS6998 - Topics in Cloud Computing (F'24)

Problem Statement

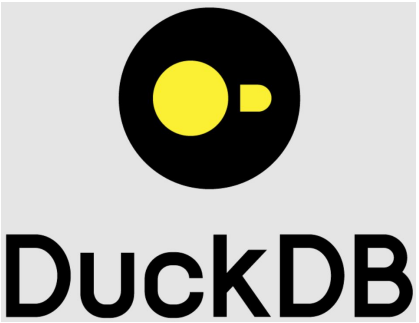
In agentic scenarios, there are often N many commands requested to run on some shared state, where only one should “win” and commit to the DB.

Project Idea

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

Systems Evaluated

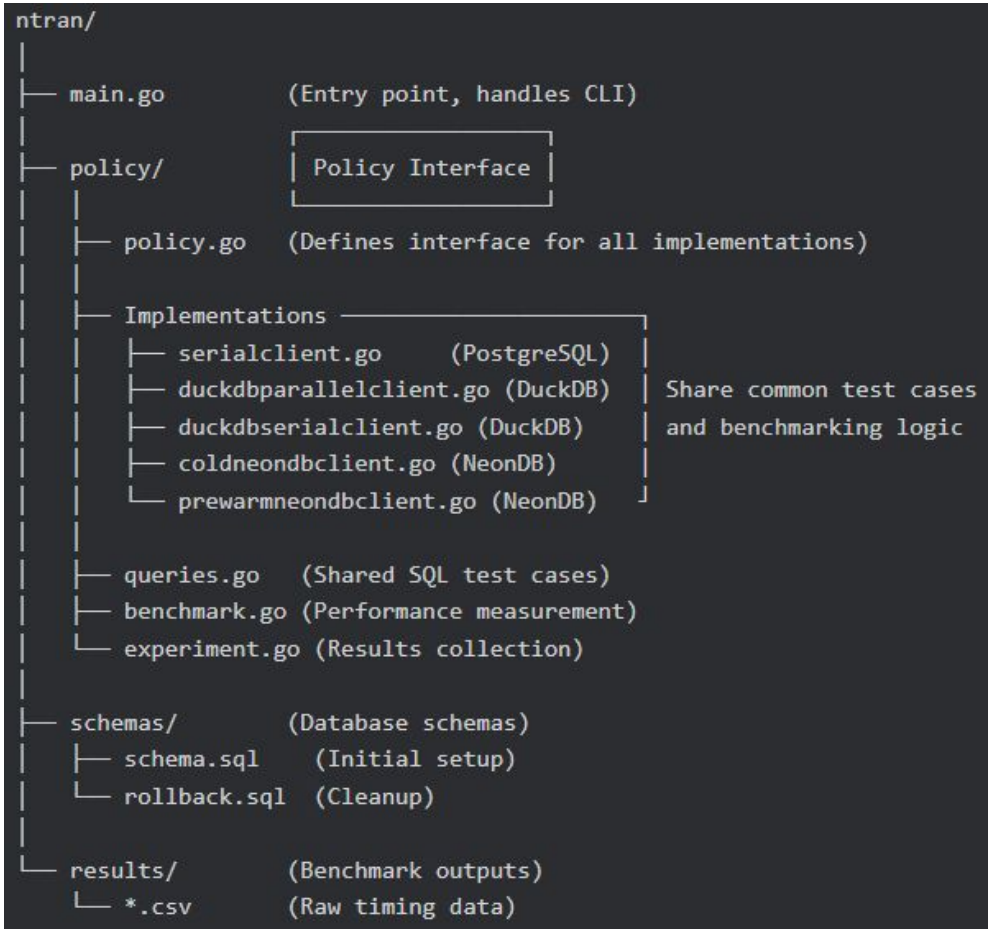
Serial transactions



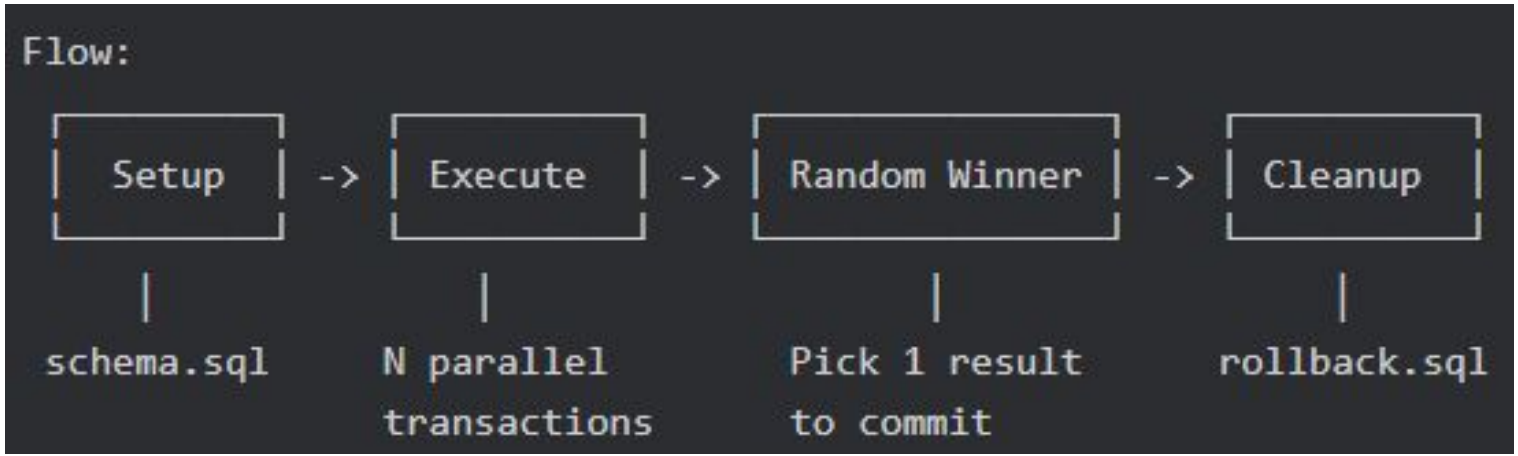
Serial and parallel transactions

Parallel transactions

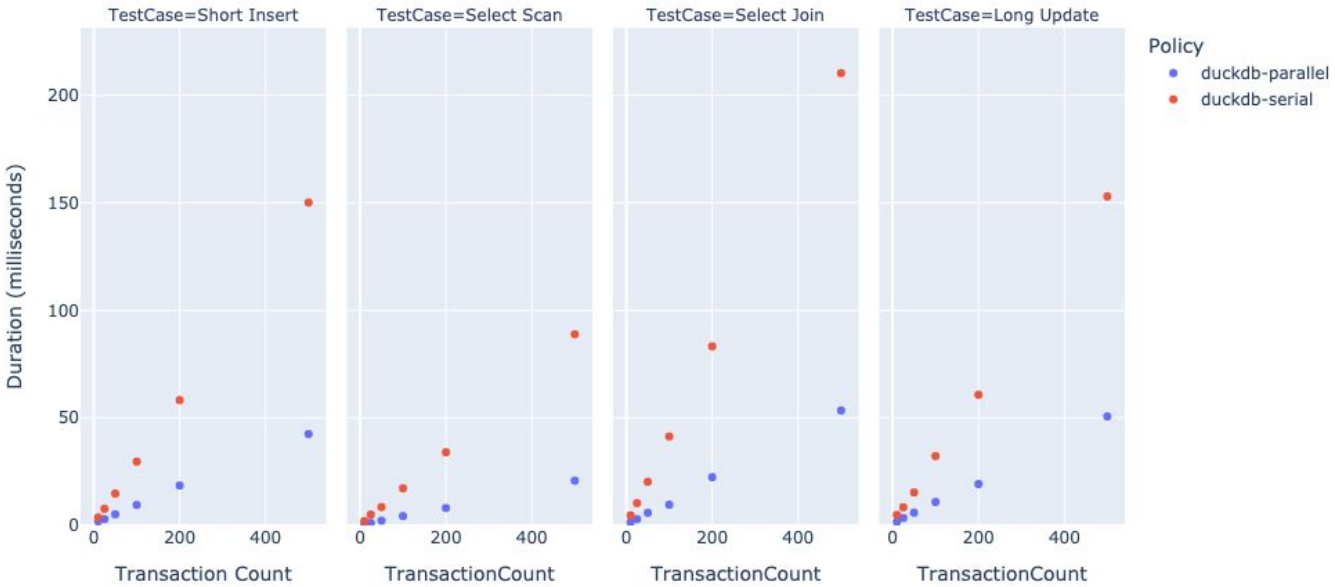
ntran System



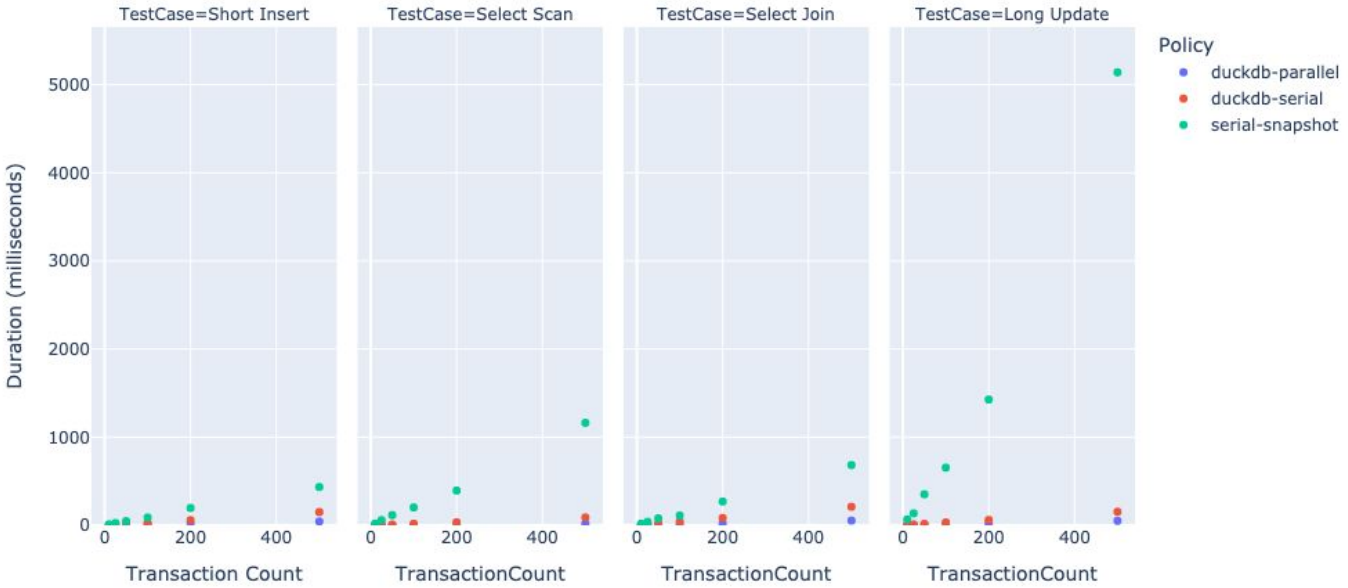
ntran Workflow



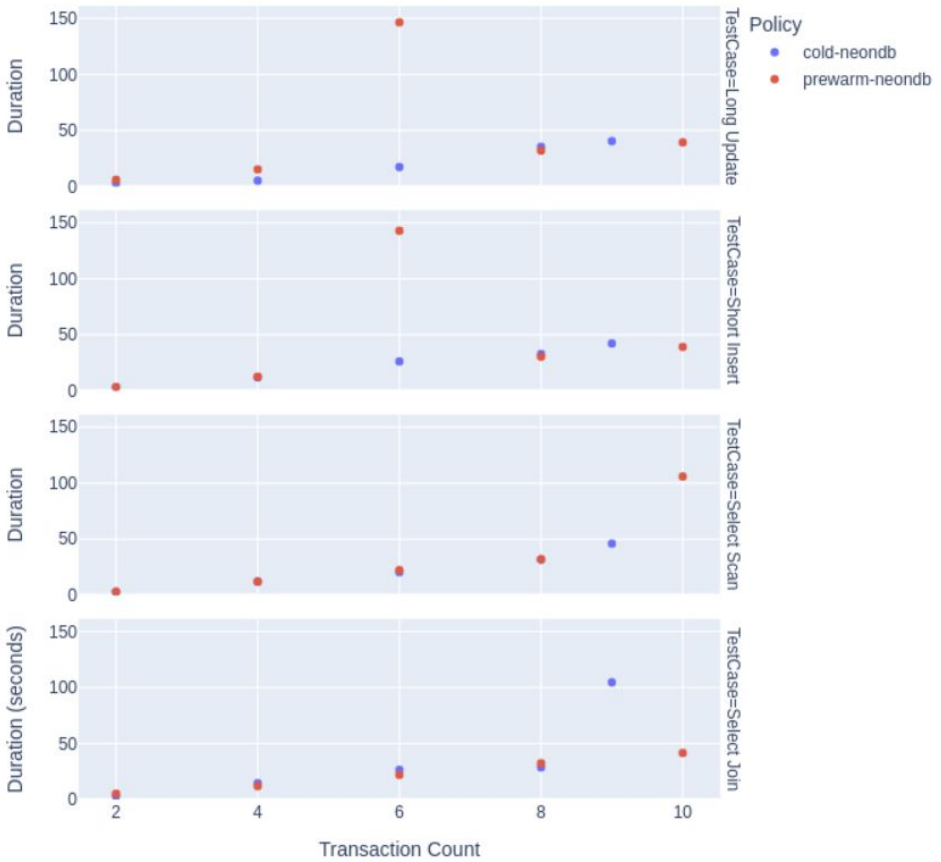
Results - DuckDB



Results - DuckDB vs pSQL (Serial)



Results - NeonDB



Key Findings + Limitations

- Findings
  - 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
- Artifacts
  - Benchmark results
  - ntran
- Future facing
  - Run Neon experiments with N>10
  - Further standardize testing environment