Distributed Systems – Fault Tolerance

Lab 4

2022/2023

Database replication

Use a total order primitive (as resulting from Raft consensus) to replicate a transactional database server. Assume `txn-list-append` client request messages directed at any of the servers.

Steps

1. Implement a database server and test it with `--node-count 1`.
2. Build a naive replicated server that forwards and re-executes transactions at all servers. Test with variable latency and rate.
3. Order request messages (e.g., using the `lin-tso` service) and achieve a correct *active replication* strategy. Re-test with variable latency and rate.
4. Configure the database engine for deterministic execution. Re-test with variable latency and rate.
5. Implement a strategy that avoids re-executing the transaction in each server and allows non-deterministic execution.

Learning Outcomes Construct replicated services using a total order primitive. Discuss the limitations of active replication of transactional databases. Apply passive replication strategies in database replication.