CSCI 5673 - Assignment 4 - Performance Report

Observations:

Scenario 1: Average response time for each client function when all replicas run normally (no failures).

- **Sub-Scenario 1: Run one instance of the seller and one instance of the buyer.**

    Average response time: 10 Milliseconds for buyer and seller
    Average server throughput: 298 requests per second for buyer and seller

- **Scenario 2: Run concurrently ten instances of buyers and ten instances of sellers.**

    Average response time: 13 Milliseconds for buyer and seller
    Average server throughput: 270 requests per second for buyer and seller

- **Scenario 3: Run 100 instances of buyers and 100 instances of sellers concurrently.**

    Average response time: 120 Milliseconds for buyer and seller
    Average server throughput: 180 requests per second for buyer and seller

Explanation:

Sub-Scenario 1 gives the best performance since it's just one instance of the seller and buyer client connected to the server. The server was able to handle most of the requests in a few seconds, and the response time was relatively much quicker.

We could see some small lag when running ten instances of the buyer and ten instances of the seller concurrently, and the server took some time to handle all the requests.

For Scenario 3, using threads to handle 100 * 2 clients, we saw that the server took around 4 - 7 seconds to complete one run (ie, 1000 function calls) for measuring throughput.

Scenario 2: Average response time for each client function when one server-side sellers interface replica and one server-side buyers interface to which some of the clients are connected fail.

- **Sub-Scenario 1: Run one instance of the seller and one instance of the buyer.**

    Average response time: 12 Milliseconds for buyer and seller
    Average server throughput: 301 requests per second for buyer and seller

- **Scenario 2: Run concurrently ten instances of buyers and ten instances of sellers.**

    Average response time: 117 Milliseconds for buyer and seller
    Average server throughput: 250 requests per second for buyer and seller

- **Scenario 3: Run 100 instances of buyers and 100 instances of sellers concurrently.**

    Average response time: 150 Milliseconds for buyer and seller
    Average server throughput: 165 requests per second for buyer and seller

Explanation:

Sub-Scenario 1 performs slightly worse than Scenario 1 - Sub-Scenario 1 since some client connections failed with timeout. For the same reason, we see a longer lag while running ten and a hundred buyer and seller instances concurrently.

Scenario 3: Average response time for each client function when one product database replica (not the leader) fails.

- **Sub-Scenario 1: Run one instance of the seller and one instance of the buyer.**

    Average response time: 11 Milliseconds for buyer and seller
    Average server throughput: 312 requests per second for buyer and seller

- **Scenario 2: Run concurrently ten instances of buyers and ten instances of sellers.**

    Average response time: 13 Milliseconds for buyer and seller
    Average server throughput: 220 requests per second for buyer and seller

- **Scenario 3: Run 100 instances of buyers and 100 instances of sellers concurrently.**

    Average response time: 190 Milliseconds for buyer and seller
    Average server throughput: 150 requests per second for buyer and seller

Explanation:

Like Scenario 1, Sub-Scenario 1 performs best since the situations are similar. The product DB's master didn't fail, so no time was wasted in an election.

We could see some lag when running ten and a hundred instances of the buyer and seller instances concurrently, and the server took some time to handle all the requests. This might be for a similar reason as Scenario 1, Sub-Scenario 2&3

Scenario 4:Average response time for each client function when the product database replica acting as leader fails.

- **Sub-Scenario 1: Run one instance of the seller and one instance of the buyer.**

    Average response time: 13 Milliseconds for buyer and seller
    Average server throughput: 280 requests per second for buyer and seller

- **Scenario 2: Run concurrently ten instances of buyers and ten instances of sellers.**

    Average response time: 20 Milliseconds for buyer and seller
    Average server throughput: 266 requests per second for buyer and seller

- **Scenario 3: Run 100 instances of buyers and 100 instances of sellers concurrently.**

    Average response time: 147 Milliseconds for buyer and seller
    Average server throughput: 145 requests per second for buyer and seller

Explanation:

Sub-Scenario 1 performs slightly worse than Scenario 3 - Sub-Scenario 1 Since the product DB's master failed, there will be some delay because of the election.

For the same reason, we see a longer lag while running ten and a hundred buyer and seller instances concurrently.

Overall Explanation:

When a connection is established with no failures, the performance of Scenario 1 is similar to our previous assignment. However, we see slightly worse performance in Scenario 2 since some client connection failures resulted in connection retry. In Scenario 3, since the Product DB's Master node did not fail, there was not much impact on the performance since there was no election (which causes downtime) in the Product DB cluster. But in Scenario 4, since there was a Master node failure in Product DB, there was a downtime to conduct the election, which impacted the performance.