Paul Babu

Late Days Used : 4

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Executive Summary

Assignment Overview

This project implements a distributed system using the Paxos protocol to achieve consensus across multiple server replicas. The aim is to keep all replicas in sync and ensure reliability, with a client application interacting with any of the five server instances.

Technical Impression

Development Experience

A major challenge was implementing the Paxos protocol, which ensures consensus among distributed servers even when some fail. Key tasks included managing the proposal, prepare, and accept phases while handling failures gracefully. This required robust coordination among proposers, acceptors, and learners to keep the system consistent and reliable.

Managing leaders and conducting leader elections for both proposers and acceptors was also crucial. We implemented dynamic leader assignments and periodic health checks to ensure the system could recover from failures and maintain a functioning leader at all times.

Thread Management and Logging

Concurrency was a significant concern, with thread-safe structures like ConcurrentHashMap used to handle simultaneous client interactions. Java RMI facilitated remote communication, requiring careful synchronization to avoid race conditions.

Effective logging was essential for tracking operations and diagnosing issues. A comprehensive logging system provided insights into the system’s behavior and helped address any problems promptly.

In summary, the project showcased the intricacies of distributed systems, focusing on consistency, leader management, and concurrent operations, all while leveraging the Paxos protocol for robust and scalable solutions.