CSCI 5105, Spring 2022
(Introduction to Distributed Systems)

Programming Assignment 3

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Project Design Document:

Status: Complete

Design Goal

The goal of this project is to design a implement a simple Distributed File System where multiple clients can share files together. The files would be replicated to multiple servers for increased performance and availability.

Working Components

Note: All implementations of the client, file server and coordinator nodes are done in Java

Coordinator

The coordinator node is a multithreaded file server which is a special server designated for handling other file server operations. The coordinator server is responsible for assembling a quorum of read and write servers based on a command line parameter specified at the time the coordinator is run. Once a consensus is reached within the quorum of read/write servers, a particular operation (read/write) can be carried out. The coordinator will impose sequential consistency to ensure writes done in a sequence are also read in the same sequence by clients.

File Server

A file server is a server which contains replicas of files. In a system, there are multiple file servers out of which one of them is designated to be the coordinator server, which gathers information to form quorum for reading and writing operations on arbitrarily selected file servers. In this project implementation example, 7 file servers have been used.

Client

A client is a simple Java class which is used to send out read/write requests to the group of servers assembled in the system. A client request can go to any random file server, but the request is acknowledged only when a certain subset of replicas (file servers) agree that they have most up-to-date data available in them. Multiple clients can concurrently try to read or write content to any of the file servers, but after all the operations the coordinator needs to ensure that up-to-date data is available on all replicas.