

CS469 Distributed Systems

Project Proposal

1 Overview

Over the remainder of the term you will work as part of a small group (minimum two, no more than three students) to put together the building blocks represented by the previous programming assignments to build a more complex distributed system. The project will be due the final week of the term on a date established by the instructor.

2 Requirements

Write a short proposal describing the distributed system you will design and build. The project should encompass at least a majority of topics covered in this course, which includes: distributed architecture; concurrent processes; network communication; virtualization; coordination; consistency and replication; and security.

Your project can be one of the following, or a project of similar scope and complexity of your choosing, subject to instructor approval:

- Build a three-tiered client-server system using a MySQL database server and a command-line client. The client must be authenticated using cryptographic methods without storing passwords (either encrypted or plain text). The application server authenticates the client and transforms RPC messages from the client into SQL commands for the MySQL server, then returns the results of database queries back to the client. The application server process should be replicated for fault tolerance.
- Build a replicated database server in which the server handles queries from the presentation tier (client) but periodically replicates the entire database to a separate server. For simplicity a single GDBM or SQLite database file can be used. How often to replicate should be a policy matter that is configurable by the server administrator. The client must be authenticated using cryptographic methods.
- Build a file server that exports some portion of the local file system to clients, but implements failover to a concurrent file server running either on the same machine but a different port, or on a different machine using the same port. The failover server address can be maintained in the client, but failover should be transparent to the user. The client must be authenticated using cryptographic methods.

- Build a media server that stores MP3 audio files that can be downloaded and played by a client. The server process should be replicated to provide fault tolerance, but the data does not need to be for this project. The client should be able to request a listing of available audio files then choose one to download. The client must be authenticated using cryptographic methods.

Note: if you choose this idea or similar, please make sure at least one team member is successfully able to build and run the code necessary to play the media, e.g., *playaudio.c* before submitting your proposal.

Your project must meet the following additional requirements:

- Your system architecture must use and demonstrate virtualization.
- Servers must be concurrent and create either new processes or threads to handle incoming client connections.
- All network communications must be encrypted.
- Clients must authenticate to servers using cryptographic methods.
- All servers must be written in C and run in a POSIX (Unix) environment. Clients may be written in C, C++, or Java and run in Unix, Windows, or the JVM. However, please obtain instructor approval prior to implementing a Windows client.

3 Deliverable

Submit a Word or PDF document containing at a minimum the following information:

- Names of the team members
- A one-or-two paragraph description of the proposed system's function and purpose.
- A brief description of how the following attributes will be established and maintained:
 - Distribution transparency
 - Distributed architecture (create a visual model of the system. A UML deployment diagram is preferred, if you are familiar with them)
 - Security, to include authentication and data confidentiality.
 - Replication of either processes or data. At least one is required.
 - Consistency (if replicating data)
 - Fault Tolerance. Your project must implement some method of fault tolerance, typically by replicating processes, data, or both.

4 Turn-In

Submit your project proposal as a Word or PDF document through the WorldClass assignment dropbox designated for your group no later than the due date specified in the weekly assignment.