Assignment 2

CL3001-Computer Networks Lab

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Overview

This report details the functionality and design of a basic client-server application implemented in C++ for the FAST Grading System. The server provides services for both students and teachers and allows an admin to manage records through a simple command-line interface.

Server Code Analysis

The server code consists of two main functionalities:

1. Admin Console: Allows an admin to manage teacher and student records.
2. Client Services: Manages separate services for student and teacher clients.

Admin Console

The admin console provides options to:

- Add a New Teacher: Appends a teacher's name to the teacher records file.
- Add a New Student: Appends a student's roll number to the student records file.
- View All Teachers: Reads and displays the names of all teachers from the records file.
- View All Students: Reads and displays the roll numbers of all students from the records file.
- Delete a Teacher: Removes a teacher's name from the records file.
- Delete a Student: Removes a student's roll number from the records file.

Functionality Breakdown:

- Password Authentication: The admin must enter a predefined password ("password") to access the system.
- CRUD Operations: The system performs Create, Read, Update, and Delete operations on the records files for teachers and students.

Client Services

The server handles student and teacher client requests on separate ports:

- Port 3001: For student services.
- Port 3002: For teacher services.

Functionality Breakdown:

- Student Service:
    - Prompts the student for their roll number.
    - Checks if the roll number exists in the student records file.
    - Responds with a success message if found, or an error message if not.
- Teacher Service:
    - Prompts the teacher for their name.
    - Checks if the name exists in the teacher records file.
    - Responds with a success message if found, or prompts to add the teacher if not found.

Server Code Structure:

- Uses process forking (`fork()`) to create separate processes for admin and client services.
- Utilizes sockets (`AF_INET`, `SOCK_STREAM`) for network communication.
- Binds sockets to specific ports and listens for incoming connections.
- Employs file I/O operations for record management (`ifstream`, `ofstream`).

Client Code Analysis

The client code allows users to connect to the server as either students or teachers and interact accordingly.

Functionality Breakdown:

- User Choice: Prompts the user to select their role (Student or Teacher).
- Student Client:
    - Connects to the server on port 3001.
    - Sends the roll number to the server.
    - Receives and displays the server response.
- Teacher Client:

- Connects to the server on port 3002.
- Sends the teacher name to the server.
- Receives and displays the server response.

Client Code Structure:

- Utilizes sockets to establish connections to the server.
- Handles user input and server communication.
- Clears buffers to ensure no residual data affects communication.

Conclusion

This client-server application provides a basic yet functional grading system, allowing an admin to manage records and clients to interact with the system based on their roles. The implementation includes robust handling of multiple clients using process forking and file-based storage for simplicity. Enhancements could include database integration, secure password storage, and more comprehensive error handling.