COMP 4981
Computer Systems Technology, Data Communications and Internetworking Option
Jan 2024

This is an individual assignment.

Objective

- This assignment aims to design and implement a remote shell application using TCP/IP networking in C17.
- This application will consist of a server capable of handling multiple client connections and executing commands sent by clients and a client that sends commands to the server and displays the results.

Learning Outcomes

- Apply network programming concepts using sockets and TCP connections.
- Implement process forking and exec calls for command execution.
- Handle standard input, output, and error redirection for commands.
- Design and develop a client-server application architecture.
- Understand and practice good coding practices in C17.

Details

- Develop a remote shell client and server in C17.
- Functionality:
    - Server accepts connections from multiple clients.
    - Client connects to the server and sends commands.
    - Server parses commands, forks, executes commands, and sends output back.
    - Client displays output and exit code, prompts for next command.
- Bonus Features:
    - ***(these are all server-side)***
    - Support I/O redirection using <, >, and >> symbols.
    - Background tasks (&)
    - Piping (|)
    - Signal handling (e.g., Ctrl+C)
- Testing: Implement a rigorous testing plan to ensure functionality and edge cases.

Constraints

- Follow the guidelines.

- Must run on macOS, Linux, and FreeBSD with GCC and Clang compilers.

Resources

- Beej's Guide to Network Programming
- Advanced Programming in the UNIX Environment, 3rd Edition
- Online C17 Standard Documentation

Submission

- Follow the assignment submission [requirements](#).
- Be sure you are aware of the [late submission policy](#).

Note: Please strictly adhere to the submission requirements to ensure you don't lose any marks.

Evaluation

Topic	Value
Client	30%
Server	30%
Design	20%
Testing	20%
Total	**100**

Hints

- Break down the project into smaller, manageable tasks.
- Start with a basic implementation and gradually add features.
- Use debugging tools and print statements to troubleshoot issues.
- Test your application in different environments to ensure compatibility.