GEBZE TECHNİCAL UNIVERSITY  
  
CSE344

## System Programming

# Homework 2 Report

### How to Run?

Open the terminal and navigate to the source directory. Then, compile the program by typing “**make**” and execute it using “**./ipc <number>**”. Once executed, the program will produce output as specified by its functionality. To clean up generated files, use “**make clean**”, which will remove the executable and any temporary files. Make clean is necessary to run again.

### Server Part

1. **Client Connection Management**:
   * The server accepts incoming connections from multiple clients via named pipes (FIFOs).
   * It maintains two queues, namely the waiting list and connected list, to manage client connections.
   * When a client attempts to connect, the server enqueues it into the waiting list if the maximum client limit is reached. Upon connection, the client is moved to the connected list.
2. **Request Processing**:
   * Upon receiving requests from clients, the server processes them concurrently using forked processes.
   * Supported client requests include file listing, file reading, file writing, file uploading, file downloading, server archiving, and server shutdown.
   * Each request is handled in a separate child process, ensuring concurrent access to file resources.
3. **Inter-Process Communication**:
   * Named pipes (FIFOs) are utilized for bidirectional communication between the server and clients.
   * The server reads requests from client FIFOs and sends responses back accordingly.
4. **Error Handling**:
   * The server implements robust error handling mechanisms to manage exceptional conditions such as file I/O errors, memory allocation failures, and communication errors.
   * It ensures graceful termination in response to termination signals (e.g., SIGINT) and handles forced termination (e.g., SIGKILL) if necessary.
5. **Startup and Shutdown**:
   * Upon startup, the server initializes necessary resources, including creating a FIFO for communication and directories for file storage.
   * During shutdown, the server cleans up resources, removes the FIFO, and terminates gracefully.

### Client Part

The client component of the concurrent file access system interacts with the server to perform various file operations. Below are the key responsibilities and functionalities of the client:

1. **Connection Establishment**:
   * The client establishes a connection with the server by creating a named pipe (FIFO) for communication.
   * Upon successful connection, the client communicates with the server to initiate file operations.
2. **Request Generation**:
   * The client generates requests for file operations such as file listing, file reading, file writing, file uploading, file downloading, server archiving, and server shutdown.
   * Requests are formulated based on user input or application logic and sent to the server via the FIFO.
3. **Response Handling**:
   * Upon receiving responses from the server, the client processes them accordingly.
   * Responses may include file contents, success or failure messages, or status updates.
4. **User Interaction**:
   * The client provides a user interface (CLI or GUI) for users to input commands and view responses.
   * Users interact with the client to perform file operations and receive feedback on their actions.
5. **Error Handling**:
   * The client implements error handling mechanisms to handle exceptions and notify users of any encountered errors during file operations.
   * It ensures a seamless user experience by providing informative error messages and recovery options when possible.

### Output

A screenshot of a computer

Description automatically generated