

# CSE 344 - Midterm Project Report

Arife Yurtseven ->210104004294

## Project Description and Purpose:

This project aims to develop a concurrent file system application. By establishing communication between the client and server, file operations are intended to be carried out concurrently. The purpose of the project is to enable multiple clients to access files simultaneously, thereby increasing efficiency and managing file operations through a central server.

Communication between the client and server is facilitated using FIFO. The client sends requests to the server via FIFO and receives responses from the server. The server, in turn, accepts requests from clients via FIFO and sends responses to clients through FIFO.

## Files Used in the Project:

**client.c:** Contains code for allowing the client to send requests to the server and receive responses.

**Fifostruct.h:** Defines two struct types, "struct response" and "struct request". These structures are created to store client information and responses received.

**server.c:** Handles parsing, control, and execution of requests received from clients.

**serverfunction.c:** Contains functions that perform the requested operations from the client.

## Client.c

**Signal Handling Function (handler):** The handler function is used to handle SIGINT and SIGTERM signals. SIGINT signal (Ctrl-C) sets the terminate flag to terminate the program. The SIGTERM signal is used in case the program is terminated by the server.

**Handling Responses from the Server:** Responses from the server are processed based on whether the queue is full or not. If the queue is full and the client has used the "tryConnect" option, the program terminates; otherwise, it goes into a

wait state. Waiting is done using a semaphore created for the client. When another client disconnects from the server, the server checks for any waiting clients, and if so, it calls `sem_post` on the semaphore in the queue of the first client, thereby stopping the waiting and starting the execution of commands.

**Creating FIFO:** A FIFO is created on the client side and used to communicate with the server. The PID of the server is used in this communication.

## **Fifostruct.h**

Contains macro definitions and structures for request and response used in `client.c` file. The request structure represents a client request, while the response structure represents the response received from the server. Both structures contain character arrays that hold the relevant data.

## **Server.c**

**FIFO and Client Communication:** The server serves clients via `server_fifo`. It receives client requests, processes them, and generates responses. Each client writes to its own `client_fifo` file to send messages to the server and receives responses.

**Signal Handling:** The server handles `SIGTERM`, `SIGUSR1`, and `SIGINT` signals. `SIGTERM` and `SIGINT` signals ensure proper shutdown of the server. The `SIGUSR1` signal closes all clients connected to the server in case of server shutdown.

**Client Addition/Removal:** The server receives requests from clients via `server_fifo`, reads client requests, and stores them in client arrays. Requests from clients are checked based on their PID to determine if they are already connected or waiting to connect.

**Execution of Client Requests:** The server creates a child and proceeds with the execution of commands. The server supports multiple clients simultaneously connecting to it. In this scenario, semaphores are used to regulate simultaneous access of multiple clients to the server. For example, writing to the log file should only be done by one process at a time. In this case, the `log_sem` semaphore is used to protect the critical section and ensure that only one process writes to the log file at a time.

## **serverfunction.c:**

Contains functions written to perform "list", "readF", "writeT", "upload", "download", "archServer", "killServer", and "quit" commands.

isValidNumber: Checks if a string is a valid number.

list\_op: Retrieves the list of files on the server.

readEntireFile and readSpecificLine: Reads the entire content of a specific file or a specific line.

writeTWithLine and writeTWithoutLine: Writes a string to a specific line or the end of a file.

upload\_op and download\_op: Used for uploading files to the server or downloading files from the server.

help\_op: Returns the help text for a specific command.

log\_print: Writes the commands sent by clients to a log file.

In summary, clients can send various commands to the server, and the server responds to these commands. The code manages file listing, reading, writing, uploading, downloading, and other functions. For example, the "list" command retrieves the list of current files on the server, while the "readF" command reads the content or a specific line of a file. The "writeT" command appends a string to a specific line or the end of a file. Additionally, the code includes functions to generate and send help texts and to write client commands to a log file. Thus, the code facilitates communication between the file server and clients, streamlining file operations.

## TEST

Que:

<pre>arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm\$ ./neHosClient Connect 166362 &gt;&gt; Waiting for Que... </pre>	<pre>arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm\$ ./neHosClient Connect 166362 &gt;&gt; Waiting for Que... Connection established. &gt;&gt;Enter the command:  </pre>	<pre>arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm\$ ./neHosClient Connect 166362 &gt;&gt; Waiting for Que... Connection established. &gt;&gt;Enter the command:  </pre>	<pre>arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm\$ ./neHosServer arife 2  Server Started PID 166362 Server is waiting for clients... &gt;&gt; Client PID 166404 connected as "client1" &gt;&gt; Client PID 166421 connected as "client2" Connection request PID 166429 . Que is full! </pre>
---	---	---	---

<pre>arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm\$ ./neHosClient Connect 166362 &gt;&gt; Waiting for Que... Connection established. &gt;&gt;Enter the command:  </pre>	<pre>arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm\$ ./neHosClient Connect 166362 &gt;&gt; Waiting for Que... Connection established. &gt;&gt;Enter the command: quit  Sending write request to server log file waiting for logfile ... logfile write request granted bye arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm\$  </pre>	<pre>arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm\$ ./neHosClient Connect 166362 &gt;&gt; Waiting for Que... Connection established. &gt;&gt;Enter the command:  </pre>	<pre>arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm\$ ./neHosServer arife 2  Server Started PID 166362 Server is waiting for clients... &gt;&gt; Client PID 166404 connected as "client1" &gt;&gt; Client PID 166421 connected as "client2" Connection request PID 166429 . Que is full! quit Client PID 166421 disconnected.. Client PID 166429 connected </pre>
---	---	---	---

## Help





<pre>arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm\$ ./neHosClient Connect 171284 &gt;&gt; Waiting for Que... Connection established. &gt;&gt;Enter the command: help  Available comments are : help, list, readF, writeT, upload, download,archServer, quit, killServer &gt;&gt;Enter the command:  </pre>	<pre>arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm\$ ./neHosServer arife 2  Server Started PID 171284 Server is waiting for clients... &gt;&gt; Client PID 171317 connected as "client1" help </pre>
--	---

write

```
>>Enter the command: writeT a.txt al  
The given string is written to the fi  
le  
>>Enter the command: readF a.txt  
al  
>>Enter the command: writeT a.txt den  
eme  
The given string is written to the fi  
le  
>>Enter the command: writeT a.txt tes  
t
```

List:

```
>>Enter the command: list  
a.txt  
log_164678.txt  
log_166156.txt  
log_166362.txt
```

Ad	Değiştirme tarihi	Tür
 a.txt	5.05.2024 11:42	Metin Belgesi
 log_164678.txt	5.05.2024 11:37	Metin Belgesi
 log_166156.txt	5.05.2024 11:38	Metin Belgesi
 log_166362.txt	5.05.2024 11:42	Metin Belgesi

readF

```
>>Enter the command: readF a.txt 2
deneme






>>Enter the command: readF a.txt
test
deneme
cse
>>Enter the command: 
```

```
>>Enter the command: readF a.txt 2
deneme
```

Dosya      Düzenle      Görünüm

test  
deneme  
cse

## DOWNLOAD

Ad	Değiştirme tarihi	Tür
 a.txt	5.05.2024 11:43	Metin Belgesi
 log_164678.txt	5.05.2024 11:37	Metin Belgesi
 log_166156.txt	5.05.2024 11:38	Metin Belgesi
 log_166362.txt	5.05.2024 11:44	Metin Belgesi
 deneme.txt	5.05.2024 11:45	Metin Belgesi

Delete arife directory

```
>>Enter the command: download deneme.txt

File has been downloaded.
>>Enter the command: 
```

## Download

Ad	Değiştirme tarihi	Tür
arife	5.05.2024 11:46	Dosya klasörü
client.c	5.05.2024 11:29	C Dosyası
deneme.txt	5.05.2024 11:46	Metin Belgesi
Fifostruct.h	5.05.2024 08:03	C Header Kaynak
Makefile	5.05.2024 11:32	Dosya
neHosClient	5.05.2024 11:30	Dosya

## UPLOAD

Ad	Değiştirme tarihi	Tür
arife	5.05.2024 11:46	Dosya klasörü
client.c	5.05.2024 11:29	C Dosyası
deneme.txt	5.05.2024 11:46	Metin Belgesi
Fifostruct.h	5.05.2024 08:03	C Header Kaynak
Makefile	5.05.2024 11:32	Dosya
neHosClient	5.05.2024 11:30	Dosya
neHosServer	5.05.2024 11:30	Dosya
server.c	5.05.2024 11:29	C Dosyası
serverfunction.c	5.05.2024 11:29	C Dosyası
test.txt	5.05.2024 11:45	Metin Belgesi

```
File has been downloaded.
>>Enter the command: upload test.txt

file transfer request received. Beginning file transfer:
>>Enter the command: █
```

a.txt	5.05.2024 11:43	Metin Belgesi
log_164678.txt	5.05.2024 11:37	Metin Belgesi
log_166156.txt	5.05.2024 11:38	Metin Belgesi
log_166362.txt	5.05.2024 11:50	Metin Belgesi
test.txt	Tür: Metin Belgesi Boyut: 527 bayt	5.05.2024 11:50 Metin Belgesi

## Killserver

```
Connection established.
>>Enter the command:
Server is terminated, bye
arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm$ █

Connection established.
>>Enter the command: quit

Sending write request to server log file
waiting for logfile ...
logfile write request granted
bye
arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm$ ./neHosClient Connect 166362
>> Waiting for Que...
Server is terminated, bye
arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm$ █

>>Enter the command: readF a.txt
test
deneme
cse
>>Enter the command: upload deneme.txt

This command is not available, type help to see available ones.
>>Enter the command: download deneme.txt

File has been downloaded.
>>Enter the command: upload test.txt

file transfer request received. Beginning file transfer:
>>Enter the command: killServer

Server is terminated, bye
arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm$ █

readF
a.txt
2
tokens[2]: a.txt
token 1: a.txt
buffer: test

buffer: deneme

readF
a.txt
download
deneme.txt
upload
test.txt
Connection request PID 169456 . Queue is full!
killServer
Kill signal is received from Client PID 166404... Terminating...
Bye
arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm$ █
```

## CTRL C

```
Arife_Yurtseven_midterm$ ./neHosClient Connect 169841
>> Waiting for Que...
Connection established.
>>Enter the command: ^C

Sending write request to server log file
waiting for logfile ...
logfile write request granted
bye
arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm$ █

arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm$ ./neHosServer arife 2

Server Started PID 169841
Server is waiting for clients...
>> Client PID 169875 connected as "client1"
quit
Client PID 169875 disconnected..
█
```

Server ctrl c and try connect



```
arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm$ ./neHosClient tryConnect 170218
>> Waiting for Que...
Que is full. Terminating...
arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm$ []

arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm$ ./neHosClient Connect 170218
>> Waiting for Que...
Connection established.
>>Enter the command:
Server is terminated, bye
arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm$ []

arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm$ ./neHosClient Connect 170218
>> Waiting for Que...
Connection established.
>>Enter the command:
Server is terminated, bye
arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm$ []

arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm$ ./neHosServer arife 2
Server Started PID 170218
Server is waiting for clients...
>> Client PID 170250 connected as "client1"
>> Client PID 170288 connected as "client2"
Connection request PID 170327 . Que is full!
^C
SIGINT is received. Terminating...

arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm$ []
```