CSE 344 - Midterm Project Report

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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:

```
arife@LAPTOP-SRROEDP3:~/210104004294
_Arife_Yurtseven_midterm$ ./neHosCli
ent Connect 166362
>> Waiting for Que...
Connection established.
>>Enter the command: quit
                                                                                                                                                                                                                                        arife@LAPTOP-SRROEDP3:~/21010400429
4_Arife_Yurtseven_midterm$ ./neHosS
erver arife 2
    rife@LAPTOP-SRROEDP3:~/210104004294
                                                                                                                                                            arife@LAPTOP-SRROEDP3:~/210104004294
   rife Yurtseven midterm$ ./neHosClien
                                                                                                                                                            Arife Yurtseven midterm$ ./neHosClien
t Connect 166362
>> Waiting for Que...
Connection established.
>>Enter the command:
                                                                                                                                                           t Connect 166362
>> Waiting for Que...
Connection established.
>>Enter the command:
                                                                                                                                                                                                                                        Server Started PID 166362
Server is waiting for clients...
>> Client PID 166404 connected as "
client1"
                                                                                Sending write request to server log
                                                                                                                                                                                                                                         >> Client PID 166421 connected as " client2"
                                                                                waiting for logfile ...
logfile write request granted
                                                                                                                                                                                                                                         Connection request PID 166429 . Que
                                                                             bye
arife@LAPTOP-SRROEDP3:~/210104004294
_Arife_Yurtseven_midterm$
                                                                                                                                                                                                                                         quit
                                                                                                                                                                                                                                         Client PID 166421 disconnected..
Client PID 166429 connected
```

Help

```
arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm$ ./neHosClient Connect 171284

>> Waiting for Que...
Connection established.
>>Enter the command: help

Available comments are : help, list, readF, writeT, upload, download,archServer, quit, killServer
>>Enter the command:

| arife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm$ ./neHosClient Connected a rife@LAPTOP-SRROEDP3:~/210104004294_Arife_Yurtseven_midterm$ ./neHosClient Connected n_midterm$ ./neHosServer arife 2

Server Started PID 171284

Server is waiting for clients...
>> Client PID 171317 connected as "client1" help

| help
```

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:

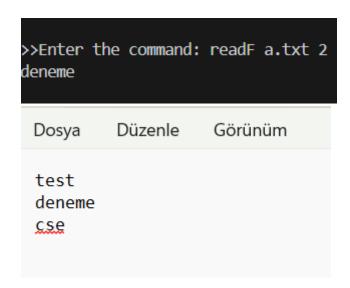
>>Enter the command:	list
a.txt	
log_164678.txt	
log_166156.txt	
log_166362.txt	

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:
```



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: txt	download	deneme.
File has been downloa >>Enter the command:		

Ad	Değiştirme tarihi
a.txt	5.05.2024 11:43
log_164678.txt	5.05.2024 11:37
log_166156.txt	5.05.2024 11:38
log_166362.txt	5.05.2024 11:46

Download

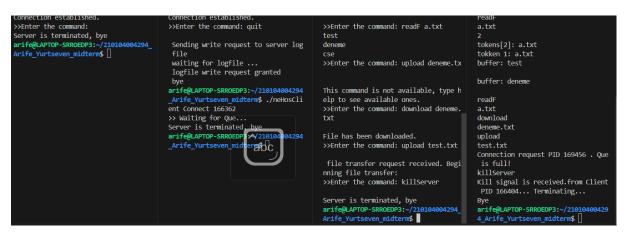
Ad	Değiştirme tarihi	Tür
arife arife	5.05.2024 11:46	Dosya klasörü
client.c	5.05.2024 11:29	C Dosyası
deneme.txt	5.05.2024 11:46	Metin Belgesi
C Fifostruct.h	5.05.2024 08:03	C Header Kaynal
Makefile	5.05.2024 11:32	Dosya
neHosClient	5.05.2024 11:30	Dosya

UPLOAD

Ad	Değiştirme tarihi	Tür
arife 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
C 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. a.txt 5.05.2024 11:43 Metin Belgesi >>Enter the command: upload test.txt log 164678.txt 5.05.2024 11:37 Metin Belaesi log_166156.txt 5.05.2024 11:38 Metin Belgesi file transfer request received. Begi log_166362.txt 5.05.2024 11:50 Metin Belgesi nning file transfer: >>Enter the command: test.txt Tür. Metin Belgesi 5.05.2024 11:50 Metin Belgesi

Killserver



CTRL C

```
Arife Yurtseven midterm$ ./neHosClien
                                          arife@LAPTOP-SRROEDP3:~/21010400429
t Connect 169841
>> Waiting for Que...
                                          4 Arife Yurtseven midterm$ ./neHosS
Connection established.
                                          erver arife 2
>>Enter the command: ^C
 Sending write request to server log
                                          Server Started PID 169841
                                          Server is waiting for clients...
 waiting for logfile ...
                                          >> Client PID 169875 connected as "
 logfile write request granted
                                          client1"
                                          quit
                                          Client PID 169875 disconnected..
arife@LAPTOP-SRROEDP3:~/210104004294
Arife Yurtseven midterm$
```

Server crtl c and try connect

arife@LAPTOP-SRROEDP3:~/210104004294_
Arife_Yurtseven_midterm\$./neHosClien
t tryConnect 170218
>> Waiting for Que...
Que is full. Terminating...
arife@LAPTOP-SRROEDP3:~/210104004294_
Arife_Yurtseven_midterm\$ []

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

arife@LAPTOP-SRROEDP3:~/210104084294_
Arife_Yurtseven_midterm\$./neHosClien
t Connect 170218
>> Waiting for Que...
Connection established.
>>Enter the command:
Server is terminated, bye
arife@LAPTOP-SRROEDP3:~/210104004294_
Arife_Yurtseven_midterm\$ []

arife@LAPTOP-SRROEDP3:~/21010400429
4_Arife Yurtseven_midterm\$./neHosS
erver 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:~/21010400429 4_Arife_Yurtseven_midterm\$