

```

ubuntu@ubuntu:~/SimpleDropbox$
ubuntu@ubuntu:~$ mkdir SimpleDropbox
ubuntu@ubuntu:~$ cd SimpleDropbox
ubuntu@ubuntu:~/SimpleDropbox$
ubuntu@ubuntu:~/SimpleDropbox$ cd SimpleDropbox
bash: cd: SimpleDropbox: No such file or directory
ubuntu@ubuntu:~/SimpleDropbox$ ^C
ubuntu@ubuntu:~/SimpleDropbox$ ^C
ubuntu@ubuntu:~/SimpleDropbox$ nano dropbox_server.c
ubuntu@ubuntu:~/SimpleDropbox$ nano dropbox_client.c
ubuntu@ubuntu:~/SimpleDropbox$ nano test_client.sh
ubuntu@ubuntu:~/SimpleDropbox$ nano test_concurrent.sh
ubuntu@ubuntu:~/SimpleDropbox$ nano test_memory.sh
ubuntu@ubuntu:~/SimpleDropbox$ nano test_race.sh
ubuntu@ubuntu:~/SimpleDropbox$ nano test_race.sh
ubuntu@ubuntu:~/SimpleDropbox$ echo "This is a test file for Dropbox server" > test.txt
ubuntu@ubuntu:~/SimpleDropbox$ chmod +x *.sh
ubuntu@ubuntu:~/SimpleDropbox$ sudo apt install netcat-openbsd -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
netcat-openbsd is already the newest version (1.226-1ubuntu2).
netcat-openbsd set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
ubuntu@ubuntu:~/SimpleDropbox$ ^C

```

## Setting Up the Project and Compilation

- You created a directory named `SimpleDropbox` and navigated into it.
- You tried to enter a subdirectory with the same name, but it didn't exist (typo or misunderstanding).
- You created and edited several C and shell script files:
  - `dropbox_server.c`
  - `dropbox_client.c`
  - `test_client.sh`
  - `test_concurrent.sh`
  - `test_memory.sh`
  - `test_race.sh`
- You created a test file `test.txt` with sample content.
- You made all shell scripts executable using `chmod +x *.sh`.
- You installed `netcat-openbsd` (though it was already installed).
- You compiled the server and client programs with debugging and pthread support.
- You started the server, which began listening on port `8080`.

```
Processing triggers for libc-bin (2.15-0ubuntu0.14) ...
ubuntu@ubuntu:~/SimpleDropbox$ gcc -Wall -Wextra -pthread -g -o dropbox_server dropbox_server.c
ubuntu@ubuntu:~/SimpleDropbox$ gcc -Wall -Wextra -pthread -g -o dropbox_client dropbox_client.c
ubuntu@ubuntu:~/SimpleDropbox$ ls -la dropbox_server dropbox_client
-rwxrwxr-x 1 ubuntu ubuntu 33640 Oct 28 10:55 dropbox_client
-rwxrwxr-x 1 ubuntu ubuntu 51704 Oct 28 10:55 dropbox_server
ubuntu@ubuntu:~/SimpleDropbox$ chmod +x *.sh
ubuntu@ubuntu:~/SimpleDropbox$ ./dropbox_server
Server listening on port 8080
DEBUG: User 'hello' deleting file 'test.txt'
```

Activate  
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## Client Authentication and Login

- You ran the client and connected to the local server.
- The client presented a menu for login or signup.
- You chose **LOGIN** and entered:
  - Username: `hello`
  - Password: `hello1234`
- After successful login, you entered the `LIST` command, which showed:
  - No files stored yet.
  - Storage used: `0` bytes

```
Choose option (1 or 2): ^C
ubuntu@ubuntu:~/SimpleDropbox$ ./dropbox_client 127.0.0.1 8080

  📁 DROPBOX CLIENT v2.0
  Secure Cloud Storage

✅ Connected to Dropbox server!

  🔒 AUTHENTICATION

  1. LOGIN   - I have an account
  2. SIGNUP  - Create new account






Choose option (1 or 2): 1
Username: hello
Password: hello1234
```

Enter command: LIST

### YOUR FILES

Storage used: 0 bytes

### MAIN MENU

-  UPLOAD - Upload file to cloud storage
-  DOWNLOAD - Download file from storage
-  DELETE - Remove file from storage
-  LIST - View all your files
-  EXIT - Quit application






Enter command: UPLOAD test.txt

Uploading test.txt (39 bytes)...

Uploading: [  ] 100% (39 bytes)

✓ File uploaded successfully

### MAIN MENU

-  UPLOAD - Upload file to cloud storage
-  DOWNLOAD - Download file from storage
-  DELETE - Remove file from storage
-  LIST - View all your files
-  EXIT - Quit application

Enter command: LIST

### YOUR FILES

OK

Storage used: 39 bytes

test.txt (39 bytes)

```
Enter command: DOWNLOAD test.txt
Downloading test.txt...
Downloading: [ ] 0% (39/8231 bytes) ✓ File downloaded successfully

MAIN MENU
📁 UPLOAD - Upload file to cloud storage
📁 DOWNLOAD - Download file from storage
🗑 DELETE - Remove file from storage
📄 LIST - View all your files
🚪 EXIT - Quit application

Enter command: DELETE test.txt
✓ File deleted successfully
```

```
Server listening on port 8080
DEBUG: User 'hello' deleting file 'test.txt'
DEBUG: Handling delete for user 'hello', file 'test.txt'
DEBUG: Attempting to delete file: storage/hello/test.txt
DEBUG: user_remove_file returned: 0, removed size: 39
DEBUG: Delete completed successfully
DEBUG: Delete task completed successfully
```

- You used the `UPLOAD` command to upload `test.txt`.
- The file was successfully uploaded (39 bytes).
- You used `LIST` again to confirm the file was stored.
- You then downloaded the file using `DOWNLOAD test.txt`.
- Finally, you deleted the file using `DELETE test.txt`.

```
ubuntu@ubuntu:~$ cd ~/SimpleDropbox
ubuntu@ubuntu:~/SimpleDropbox$ {
  echo "LOGIN hello hello1234"
  sleep 1
  echo "LIST"
  sleep 1
} | nc localhost 8080
OK
Storage used: 0 bytes
END_OF_LIST
^Z
[1]+  Stopped                  { echo "LOGIN hello hello1234"; sleep 1; echo "LIST"; sleep 1; } | nc localhost 8080
```

```

) ...
ubuntu@ubuntu:~/SimpleDropbox$ echo "=== TEST 2: Concurrent Access ==="
./test_concurrent.sh
echo ""
=== TEST 2: Concurrent Access ===
=== Testing Multiple Clients ===
FATAL: ThreadSanitizer: unexpected memory mapping 0x6446debff000-0x6446dec01000
Starting multiple clients...
OK
Storage used: 49 bytes
test.txt (49 bytes)
END_OF_LIST
./test_concurrent.sh: line 15: kill: (9888) - No such process
=== Concurrent test completed ===

ubuntu@ubuntu:~/SimpleDropbox$ echo "=== TEST 3: Memory Leaks ==="
./test_memory.sh
=== TEST 3: Memory Leaks ===
=== Testing for Memory Leaks ===
==9910== Memcheck, a memory error detector
==9910== Copyright (C) 2002-2022, and GNU GPL'd, by Julian Seward et al.
==9910== Using Valgrind 3.22.0 and LibVEX; rerun with -h for copyright info

```

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## Server Logs and Concurrent Test

- The server logs show the deletion process for user `hello` and file `test.txt`.
- You tested the server using `netcat` to send login and list commands.
- You ran `test_concurrent.sh` to simulate multiple clients accessing the server simultaneously.
- A **ThreadSanitizer** error appeared, indicating a possible race condition or memory mapping issue.
- The test continued and showed a file listing, but a process kill failed (likely because the process had already ended).

```

ubuntu@ubuntu:~/SimpleDropbox$ ./test_memory.sh
=== Testing for Memory Leaks ===
==9929== Memcheck, a memory error detector
==9929== Copyright (C) 2002-2022, and GNU GPL'd, by Julian Seward et al.
==9929== Using Valgrind-3.22.0 and LibVEX; rerun with -h for copyright info
==9929== Command: ./dropbox_server
==9929==
bind: Address already in use
==9929==
==9929== HEAP SUMMARY:
==9929==    in use at exit: 2,560 bytes in 10 blocks
==9929==   total heap usage: 12 allocs, 2 frees, 4,056 bytes allocated
==9929==

```

## Memory Leak Test with Valgrind

- You ran `test_memory.sh` to check for memory leaks in the server.
- `valgrind` reported:
  - The server tried to bind to a port that was already in use.
  - Memory summary:
    - 2,560 bytes still in use at exit.
    - 10 memory blocks not freed.
    - 12 total allocations, only 2 freed.
- This indicates **memory leaks** that should be fixed (e.g., missing `free()` calls).