The purpose of this program is to transfer a file from a client, through a server by means of DATA packets, and have the server write the file on it's side. It will then send an ACK packet to the client. Before I explain the core components of the program, I will provide starting commands.

```
./myserver server_port droppc
./myclient server_ip server_port MTU WINSZ in_file_path out_file_path
```

“myserver” starts the server. You need to do this *before* running the other command. In addition, *server_port* must be the same for both commands, as they need to connect across the same port.

Moving on to “myclient”, the *server_ip* must ALWAYS match the hardcoded IP in myserver.c. This can be changed manually, but otherwise, must be 127.0.0.1.

MTU is the maximum bytes that can be transferred across one **packet**. The **maximum MTU value** is **32768**, while the minimum is 194.

WINSZ is the size of the sliding window, or maximum number of packets that can be out at once.

in_file_path is the path to the first file, the one that will be duplicated.

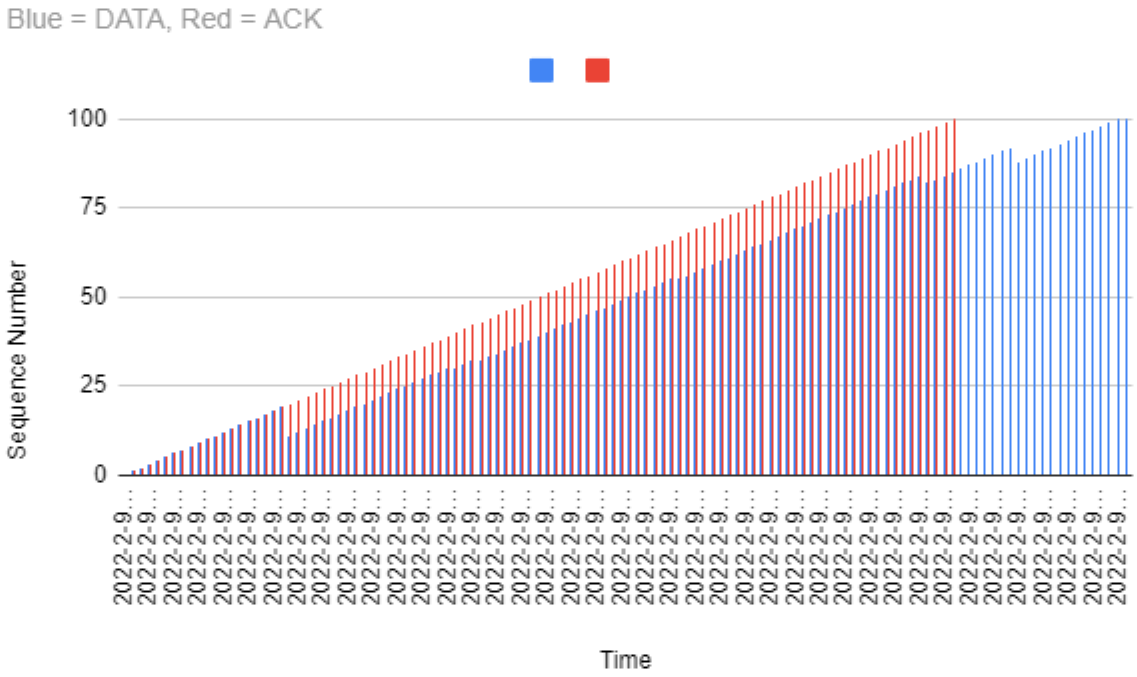
out_file_path is the name that the new, copied file will be given.

droppc is the chance for the server to drop packets. It’s mainly used for testing.

Finally, a **disclaimer. I based my code off the textbook we were assigned for our class, “UNIX Network Programming Volume 1, Third Edition: The Sockets Networking API”, and as such, the server code is mostly unchanged from the examples given in Chapter 8. We were permitted to do this.**

Additionally, I used this specific page to figure out how to print the current time and date: https://www.techiedelight.com/print-current-date-and-time-in-c/ .

Shortcoming: As I was unable to finish before the deadline, the file transfer is not reliable, and is highly prone to errors in the first packet and the last few packets.

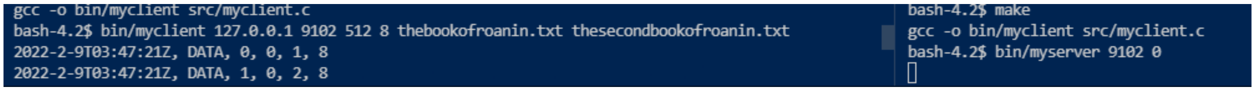


Requested chart.

Tests:

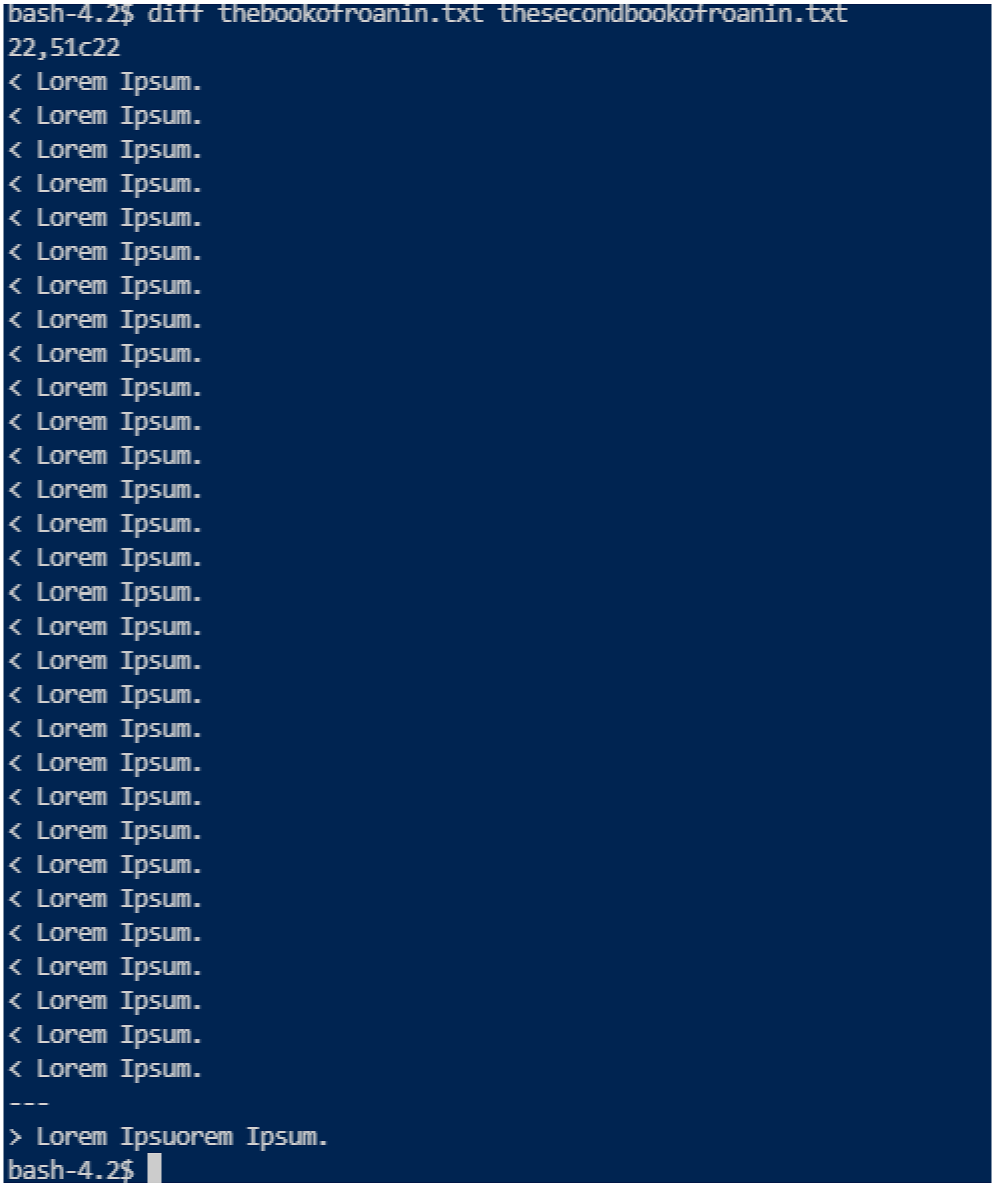
After Test 1, assume the same IP and Port is used until Test 5, which will be used for intentional errors. As such, the server command may not be shown again until then.

Test 1, a simple file of hello worlds:



```
gcc -o bin/myclient src/myclient.c
bash-4.2$ bin/myclient 127.0.0.1 9102 512 8 thebookofroanin.txt thesecondbookofroanin.txt
2022-2-9T03:47:21Z, DATA, 0, 0, 1, 8
2022-2-9T03:47:21Z, DATA, 1, 0, 2, 8
```

```
bash-4.2$ make
gcc -o bin/myclient src/myclient.c
bash-4.2$ bin/myserver 9102 0
```



```
bash-4.2$ diff thebookofroanin.txt thesecondbookofroanin.txt
22,51c22
< Lorem Ipsum.
< Lorem Ipsum.
< Lorem Ipsum.
< Lorem Ipsum.
< Lorem Ipsum.
< Lorem Ipsum.
< Lorem Ipsum.
< Lorem Ipsum.
< Lorem Ipsum.
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< Lorem Ipsum.
< Lorem Ipsum.
< Lorem Ipsum.
---
> Lorem Ipsuorem Ipsum.
bash-4.2$
```
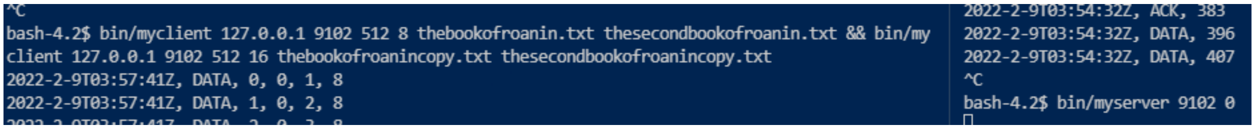
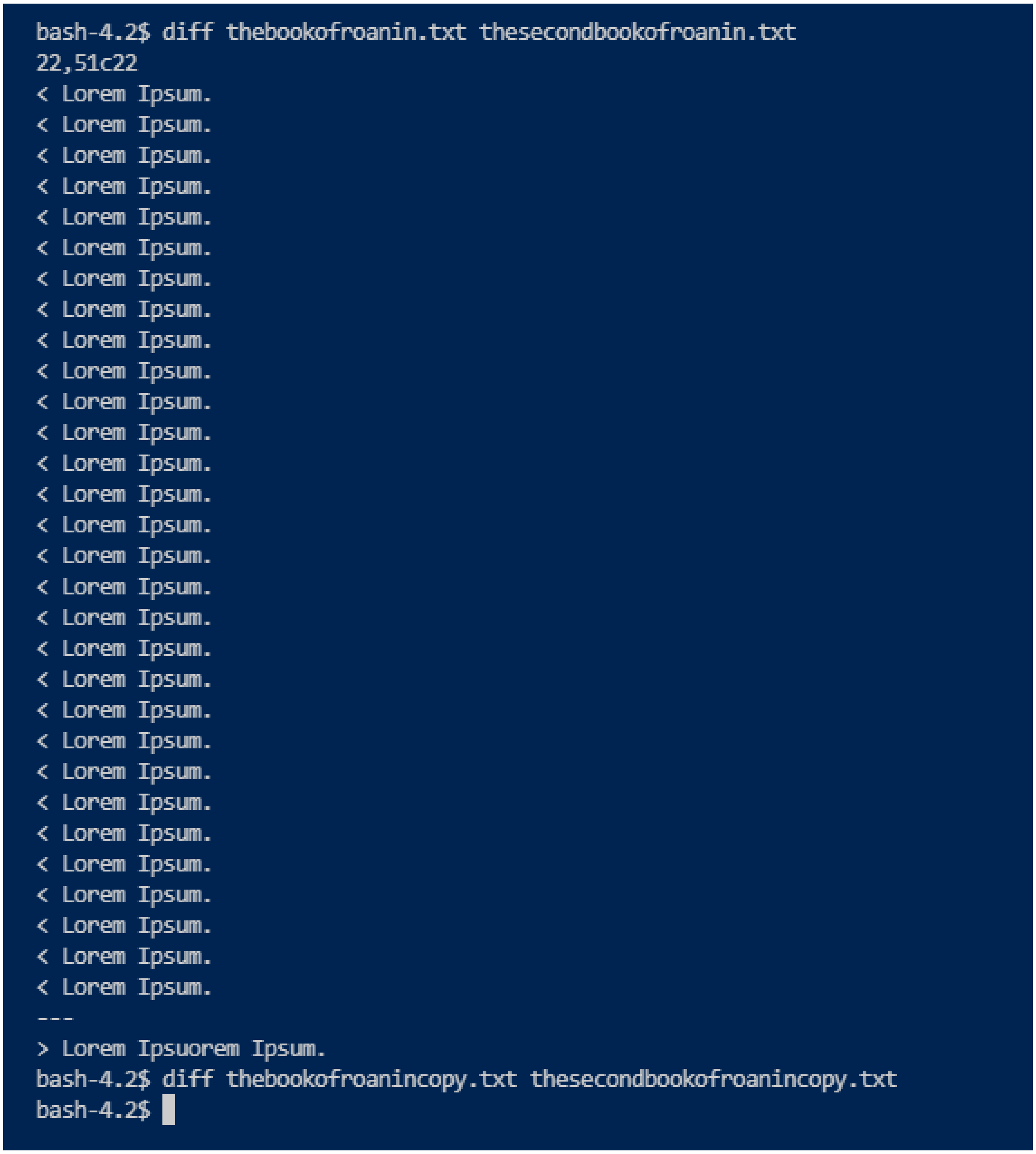

Test 2, the same test as before, but with two clients.:



```
^C
bash-4.2$ bin/myclient 127.0.0.1 9102 512 8 thebookofroanin.txt thesecondbookofroanin.txt && bin/my
client 127.0.0.1 9102 512 16 thebookofroanincopy.txt thesecondbookofroanincopy.txt
2022-2-9T03:57:41Z, DATA, 0, 0, 1, 8
2022-2-9T03:57:41Z, DATA, 1, 0, 2, 8
2022-2-9T03:57:41Z, DATA, 2, 0, 3, 8
```

```
2022-2-9T03:54:32Z, ACK, 383
2022-2-9T03:54:32Z, DATA, 396
2022-2-9T03:54:32Z, DATA, 407
^C
bash-4.2$ bin/myserver 9102 0
```



```
bash-4.2$ diff thebookofroanin.txt thesecondbookofroanin.txt
22,51c22
< Lorem Ipsum.
< Lorem Ipsum.
< Lorem Ipsum.
< Lorem Ipsum.
< Lorem Ipsum.
< Lorem Ipsum.
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< Lorem Ipsum.
< Lorem Ipsum.
< Lorem Ipsum.
< Lorem Ipsum.
---
> Lorem Ipsuorem Ipsum.
bash-4.2$ diff thebookofroanincopy.txt thesecondbookofroanincopy.txt
bash-4.2$
```
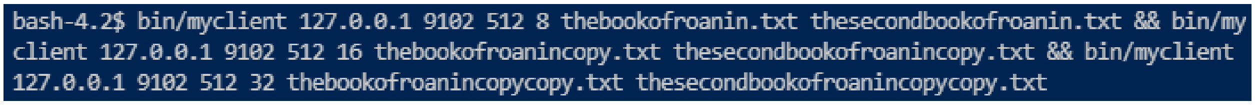
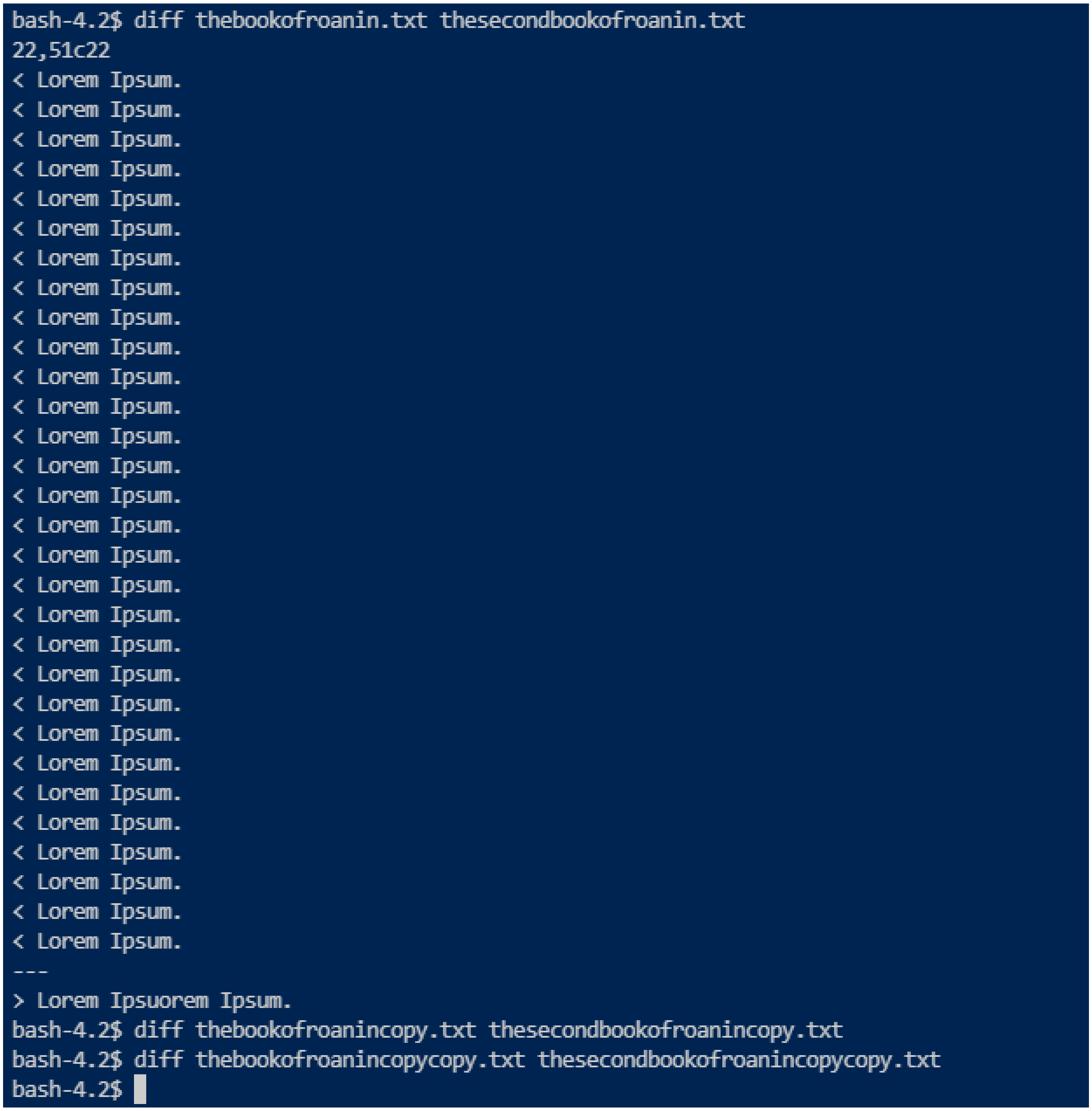

Test 3, the same test as before, but with 3 clients:



```
bash-4.2$ bin/myclient 127.0.0.1 9102 512 8 thebookofroanin.txt thesecondbookofroanin.txt && bin/my
client 127.0.0.1 9102 512 16 thebookofroanincopy.txt thesecondbookofroanincopy.txt && bin/myclient
127.0.0.1 9102 512 32 thebookofroanincopycopy.txt thesecondbookofroanincopycopy.txt
```



```
bash-4.2$ diff thebookofroanin.txt thesecondbookofroanin.txt
22,51c22
< Lorem Ipsum.
< Lorem Ipsum.
< Lorem Ipsum.
< Lorem Ipsum.
< Lorem Ipsum.
< Lorem Ipsum.
< Lorem Ipsum.
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< Lorem Ipsum.
< Lorem Ipsum.
< Lorem Ipsum.
---
> Lorem Ipsuorem Ipsum.
bash-4.2$ diff thebookofroanincopy.txt thesecondbookofroanincopy.txt
bash-4.2$ diff thebookofroanincopycopy.txt thesecondbookofroanincopycopy.txt
bash-4.2$ 
```
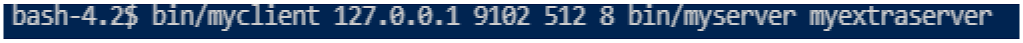
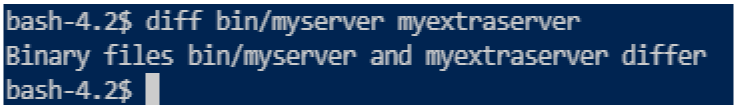

Test 4, the binary file used for the server, myserver:



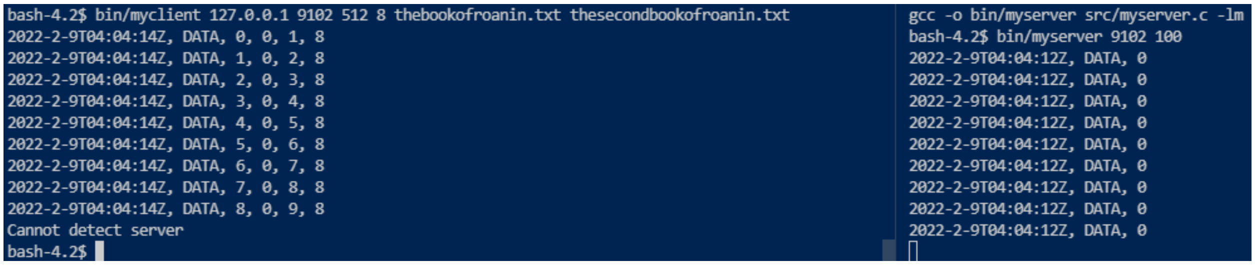
```
bash-4.2$ bin/myclient 127.0.0.1 9102 512 8 bin/myserver myextraserver
```



```
bash-4.2$ diff bin/myserver myextraserver
Binary files bin/myserver and myextraserver differ
bash-4.2$
```

Test 5: Intentional errors.

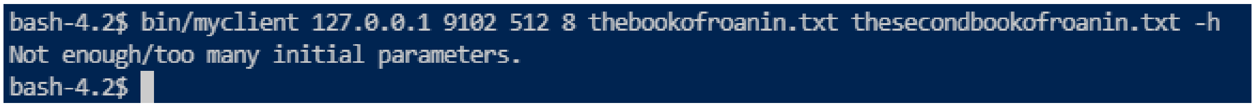
Test 5.1, droppc of 100.



```
bash-4.2$ bin/myclient 127.0.0.1 9102 512 8 thebookofroanin.txt thesecondbookofroanin.txt
2022-2-9T04:04:14Z, DATA, 0, 0, 1, 8
2022-2-9T04:04:14Z, DATA, 1, 0, 2, 8
2022-2-9T04:04:14Z, DATA, 2, 0, 3, 8
2022-2-9T04:04:14Z, DATA, 3, 0, 4, 8
2022-2-9T04:04:14Z, DATA, 4, 0, 5, 8
2022-2-9T04:04:14Z, DATA, 5, 0, 6, 8
2022-2-9T04:04:14Z, DATA, 6, 0, 7, 8
2022-2-9T04:04:14Z, DATA, 7, 0, 8, 8
2022-2-9T04:04:14Z, DATA, 8, 0, 9, 8
Cannot detect server
bash-4.2$
```

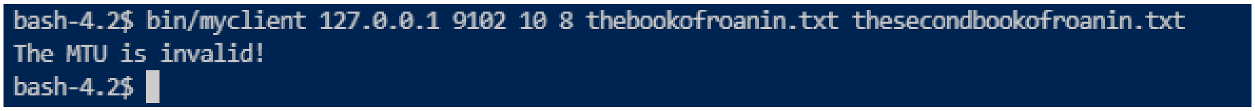
```
gcc -o bin/myserver src/myserver.c -lm
bash-4.2$ bin/myserver 9102 100
2022-2-9T04:04:12Z, DATA, 0
2022-2-9T04:04:12Z, DATA, 0
2022-2-9T04:04:12Z, DATA, 0
2022-2-9T04:04:12Z, DATA, 0
2022-2-9T04:04:12Z, DATA, 0
2022-2-9T04:04:12Z, DATA, 0
2022-2-9T04:04:12Z, DATA, 0
2022-2-9T04:04:12Z, DATA, 0
2022-2-9T04:04:12Z, DATA, 0
```

Test 5.2, incorrect number of arguments into client.



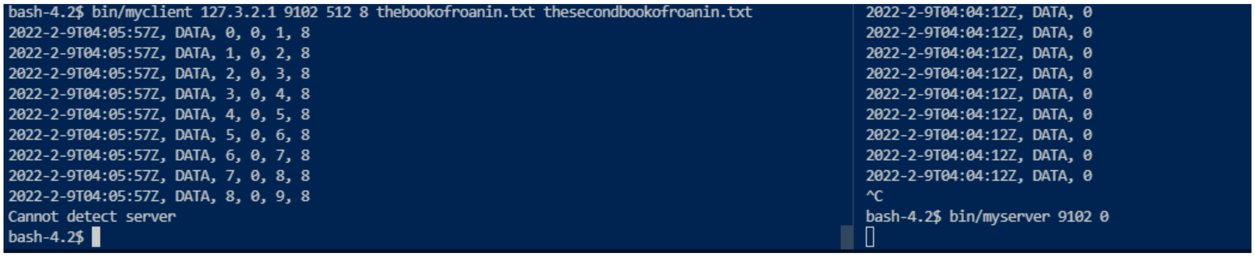
```
bash-4.2$ bin/myclient 127.0.0.1 9102 512 8 thebookofroanin.txt thesecondbookofroanin.txt -h
Not enough/too many initial parameters.
bash-4.2$
```

Test 5.3, MTU size of 10.



```
bash-4.2$ bin/myclient 127.0.0.1 9102 10 8 thebookofroanin.txt thesecondbookofroanin.txt
The MTU is invalid!
bash-4.2$
```

Test 5.4 incorrect IP address.



```
bash-4.2$ bin/myclient 127.3.2.1 9102 512 8 thebookofroanin.txt thesecondbookofroanin.txt
2022-2-9T04:05:57Z, DATA, 0, 0, 1, 8
2022-2-9T04:05:57Z, DATA, 1, 0, 2, 8
2022-2-9T04:05:57Z, DATA, 2, 0, 3, 8
2022-2-9T04:05:57Z, DATA, 3, 0, 4, 8
2022-2-9T04:05:57Z, DATA, 4, 0, 5, 8
2022-2-9T04:05:57Z, DATA, 5, 0, 6, 8
2022-2-9T04:05:57Z, DATA, 6, 0, 7, 8
2022-2-9T04:05:57Z, DATA, 7, 0, 8, 8
2022-2-9T04:05:57Z, DATA, 8, 0, 9, 8
Cannot detect server
bash-4.2$
```

```
2022-2-9T04:04:12Z, DATA, 0
2022-2-9T04:04:12Z, DATA, 0
2022-2-9T04:04:12Z, DATA, 0
2022-2-9T04:04:12Z, DATA, 0
2022-2-9T04:04:12Z, DATA, 0
2022-2-9T04:04:12Z, DATA, 0
2022-2-9T04:04:12Z, DATA, 0
2022-2-9T04:04:12Z, DATA, 0
2022-2-9T04:04:12Z, DATA, 0
^C
bash-4.2$ bin/myserver 9102 0
```