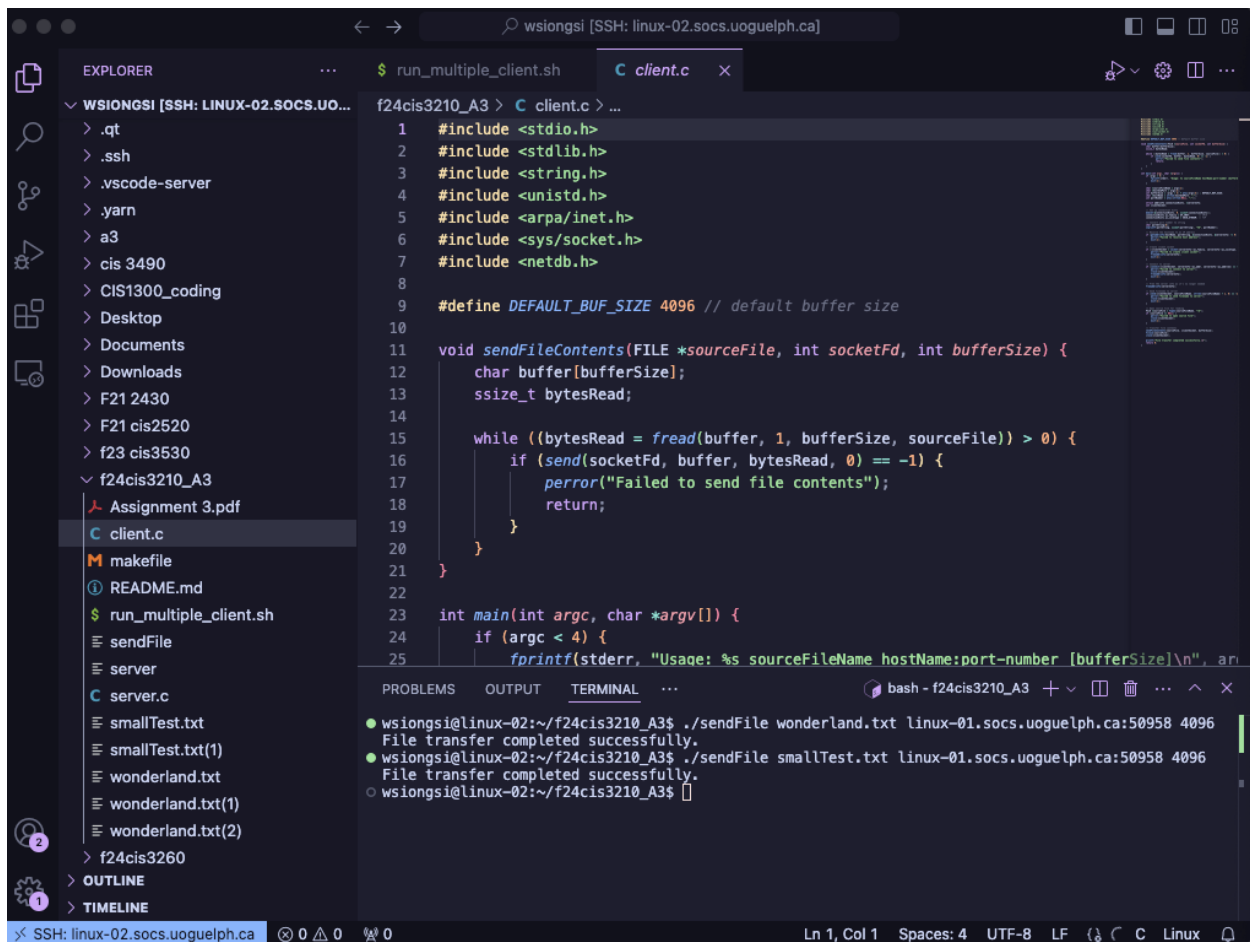


William Siong
CIS*3210
A3 – TCP client and server

Test Results

- For this test scenario, I ran the server on the server on linux-01.socs.uoguelph.ca and the client on linux-02.socs.uoguelph.ca
- In the screenshots below you can see that both test files was sent from the client to the server successfully.
- And they were renamed to avoid duplicates



The screenshot displays a VS Code editor window with a file explorer on the left and a code editor in the center. The file explorer shows a project structure with files like `client.c`, `makefile`, and `run_multiple_client.sh`. The code editor shows the content of `client.c`, which includes headers for `stdio.h`, `stdlib.h`, `string.h`, `unistd.h`, `arpa/inet.h`, `sys/socket.h`, and `netdb.h`. It defines a default buffer size of 4096 and implements a `sendFileContents` function that reads a file and sends its contents over a socket. The `main` function checks for correct argument usage and calls `sendFileContents` to send `wonderland.txt` and `smallTest.txt` to the server at `linux-01.socs.uoguelph.ca:50958`.

The terminal at the bottom shows the execution of the client program. It runs `./sendFile wonderland.txt linux-01.socs.uoguelph.ca:50958 4096` and `./sendFile smallTest.txt linux-01.socs.uoguelph.ca:50958 4096`, both of which complete successfully. The prompt then returns to the user.

```
f24cis3210_A3 > C client.c > ...
1  #include <stdio.h>
2  #include <stdlib.h>
3  #include <string.h>
4  #include <unistd.h>
5  #include <arpa/inet.h>
6  #include <sys/socket.h>
7  #include <netdb.h>
8
9  #define DEFAULT_BUF_SIZE 4096 // default buffer size
10
11 void sendFileContents(FILE *sourceFile, int socketFd, int bufferSize) {
12     char buffer[bufferSize];
13     ssize_t bytesRead;
14
15     while ((bytesRead = fread(buffer, 1, bufferSize, sourceFile)) > 0) {
16         if (send(socketFd, buffer, bytesRead, 0) == -1) {
17             perror("Failed to send file contents");
18             return;
19         }
20     }
21 }
22
23 int main(int argc, char *argv[]) {
24     if (argc < 4) {
25         fprintf(stderr, "Usage: %s sourceFileName hostName:port-number [bufferSize]\n", ar
26     }
27 }
```

```
bash - f24cis3210_A3
● wsiongsi@linux-02:~/f24cis3210_A3$ ./sendFile wonderland.txt linux-01.socs.uoguelph.ca:50958 4096
File transfer completed successfully.
● wsiongsi@linux-02:~/f24cis3210_A3$ ./sendFile smallTest.txt linux-01.socs.uoguelph.ca:50958 4096
File transfer completed successfully.
○ wsiongsi@linux-02:~/f24cis3210_A3$
```

wsiongsi [SSH: linux-01.socs.uoguelph.ca]

EXPLORER

WSIONGSI [SSH: LIN...]

Desktop

Documents

Downloads

F21 2430

F21 cis2520

f23 cis3530

f24cis3210_A3

Assignment 3.pdf

client.c

makefile

README.md

run_multiple

sendFile

server

server.c

smallTest.txt

smallTest.txt(1)

wonderland.txt

wonderland.txt(1)

wonderland.txt(2)

f24cis3260

Music

OUTLINE

TIMELINE

The active editor cannot provide timeline information.

run_multiple

~/f24cis3210_A3/README.md

Show All Commands

Go to File

Find in Files

Toggle Full Screen

Show Settings

PROBLEMS

OUTPUT

TERMINAL

./server - f24cis3210_A3

wsiongsi@linux-01:~/f24cis3210_A3\$./server 50958 4096

Server listening on port 50958 with buffer size 4096

Connected to client: 131.104.48.83

Received file: wonderland.txt(1)

Total size: 169855 bytes

Connected to client: 131.104.48.83

Received file: wonderland.txt(2)

Total size: 169855 bytes

Connected to client: 131.104.48.83

Received file: smallTest.txt(1)

Total size: 55 bytes

SSH: linux-01.socs.uoguelph.ca

For each environment, record the following:

Ping time - let the ping utility do at least 20 pings, record the stats (round-trip min/avg/max/stddev, packet loss rate).

```
File transfer completed successfully.
wsiongsi@linux-02:~/f24cis3210_A3$ ping -c 20 linux-01.socs.uoguelph.ca
PING linux-01.socs.uoguelph.ca (131.104.48.82) 56(84) bytes of data:
64 bytes from linux-01.socs.uoguelph.ca (131.104.48.82): icmp_seq=1 ttl=64 time=0.451 ms
64 bytes from linux-01.socs.uoguelph.ca (131.104.48.82): icmp_seq=2 ttl=64 time=0.389 ms
64 bytes from linux-01.socs.uoguelph.ca (131.104.48.82): icmp_seq=3 ttl=64 time=0.548 ms
64 bytes from linux-01.socs.uoguelph.ca (131.104.48.82): icmp_seq=4 ttl=64 time=0.271 ms
64 bytes from linux-01.socs.uoguelph.ca (131.104.48.82): icmp_seq=5 ttl=64 time=0.374 ms
64 bytes from linux-01.socs.uoguelph.ca (131.104.48.82): icmp_seq=6 ttl=64 time=0.354 ms
64 bytes from linux-01.socs.uoguelph.ca (131.104.48.82): icmp_seq=7 ttl=64 time=0.262 ms
64 bytes from linux-01.socs.uoguelph.ca (131.104.48.82): icmp_seq=8 ttl=64 time=0.326 ms
64 bytes from linux-01.socs.uoguelph.ca (131.104.48.82): icmp_seq=9 ttl=64 time=0.261 ms
64 bytes from linux-01.socs.uoguelph.ca (131.104.48.82): icmp_seq=10 ttl=64 time=0.479 ms
64 bytes from linux-01.socs.uoguelph.ca (131.104.48.82): icmp_seq=11 ttl=64 time=0.408 ms
64 bytes from linux-01.socs.uoguelph.ca (131.104.48.82): icmp_seq=12 ttl=64 time=0.395 ms
64 bytes from linux-01.socs.uoguelph.ca (131.104.48.82): icmp_seq=13 ttl=64 time=0.465 ms
64 bytes from linux-01.socs.uoguelph.ca (131.104.48.82): icmp_seq=14 ttl=64 time=0.487 ms
64 bytes from linux-01.socs.uoguelph.ca (131.104.48.82): icmp_seq=15 ttl=64 time=0.507 ms
64 bytes from linux-01.socs.uoguelph.ca (131.104.48.82): icmp_seq=16 ttl=64 time=0.512 ms
64 bytes from linux-01.socs.uoguelph.ca (131.104.48.82): icmp_seq=17 ttl=64 time=0.448 ms
64 bytes from linux-01.socs.uoguelph.ca (131.104.48.82): icmp_seq=18 ttl=64 time=0.377 ms
64 bytes from linux-01.socs.uoguelph.ca (131.104.48.82): icmp_seq=19 ttl=64 time=0.460 ms
64 bytes from linux-01.socs.uoguelph.ca (131.104.48.82): icmp_seq=20 ttl=64 time=0.562 ms

--- linux-01.socs.uoguelph.ca ping statistics ---
20 packets transmitted, 20 received, 0% packet loss, time 19051ms
rtt min/avg/max/mdev = 0.261/0.416/0.562/0.088 ms
wsiongsi@linux-02:~/f24cis3210_A3$
```

The average, minimum, and maximum time that your code took to do the transfer. Do at least 20 file transfers, use the same file each time. A test file will be provided to you.

The min/max/average transfer rates.

```
$ transfer_test.sh
1  #!/bin/bash
2
3  FILE="smallTest.txt"
4  SERVER="linux-01.socs.uoguelph.ca:50958"
5  BUFFER_SIZE=4096
6  NUM_TRANSFERS=20
7  TIMES=()
8
9  for i in $(seq 1 $NUM_TRANSFERS); do
10     START=$(date +%s%N) # Start time in nanoseconds
11     ./sendFile "$FILE" "$SERVER" "$BUFFER_SIZE"
12     END=$(date +%s%N) # End time in nanoseconds
13     TIME=$((END - START))
14     TIMES+=($TIME)
15     echo "Transfer $i took $((TIME / 1000000)) ms"
16 done
17
18 # Calculate min, max, and average transfer times
19 MIN=${TIMES[0]}
20 MAX=${TIMES[0]}
21 SUM=0
22
23 for TIME in "${TIMES[@]"; do
24     (( TIME < MIN )) && MIN=$TIME
25     (( TIME > MAX )) && MAX=$TIME
26     SUM=$((SUM + TIME))
27 done
28
29 AVG=$((SUM / NUM_TRANSFERS))
30
31 echo "Minimum time: $((MIN / 1000000)) ms"
32 echo "Maximum time: $((MAX / 1000000)) ms"
33 echo "Average time: $((AVG / 1000000)) ms"
34
```

```
● wsiongsi@linux-02:~/f24cis3210_A3$ ./transfer_test.sh
File transfer completed successfully.
Transfer 1 took 6 ms
File transfer completed successfully.
Transfer 2 took 6 ms
File transfer completed successfully.
Transfer 3 took 12 ms
File transfer completed successfully.
Transfer 4 took 17 ms
File transfer completed successfully.
Transfer 5 took 14 ms
File transfer completed successfully.
Transfer 6 took 7 ms
File transfer completed successfully.
Transfer 7 took 8 ms
File transfer completed successfully.
Transfer 8 took 7 ms
File transfer completed successfully.
Transfer 9 took 1014 ms
File transfer completed successfully.
Transfer 10 took 10 ms
File transfer completed successfully.
Transfer 11 took 9 ms
File transfer completed successfully.
Transfer 12 took 6 ms
File transfer completed successfully.
Transfer 13 took 6 ms
File transfer completed successfully.
Transfer 14 took 6 ms
File transfer completed successfully.
Transfer 15 took 8 ms
File transfer completed successfully.
Transfer 16 took 1013 ms
File transfer completed successfully.
Transfer 17 took 7 ms
File transfer completed successfully.
Transfer 18 took 19 ms
File transfer completed successfully.
Transfer 19 took 8 ms
File transfer completed successfully.
Transfer 20 took 9 ms
Minimum time: 6 ms
Maximum time: 1014 ms
Average time: 110 ms
○ wsiongsi@linux-02:~/f24cis3210_A3$ █
```