



COMP 4981 ASSIGNMENT3 TEST AND VERIFICATION

Linux chat program

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Test Cases

Test 1 - Listen socket created

Definition: Listen socket is created and bound to the port

Test method: Use 'sudo lsof -i -P -n' command on terminal to check what port is open

Success Criteria: The result from the command displays 7000 as TCP listen port

Test result: Success

```
bigsaem@bigsaem-VirtualBox ~/Desktop/COMP4891
File Edit View Search Terminal Help
dnsmasq 1143 nobody 5u IPv4 20173 0t0 TCP 127.0.1.1:53 (LISTEN)
dnsmasq 1143 nobody 11u IPv4 39908 0t0 UDP *:51463
ntpd 1421 ntp 16u IPv6 21212 0t0 UDP *:123
ntpd 1421 ntp 17u IPv4 21215 0t0 UDP *:123
ntpd 1421 ntp 18u IPv4 21219 0t0 UDP 127.0.0.1:123
ntpd 1421 ntp 19u IPv4 164563 0t0 UDP 10.0.2.15:123
ntpd 1421 ntp 20u IPv6 21223 0t0 UDP [::1]:123
ntpd 1421 ntp 21u IPv6 164566 0t0 UDP [fe80::915c:3500:7423:c
244]:123
cupsd 2796 root 10u IPv6 29188 0t0 TCP [::1]:631 (LISTEN)
cupsd 2796 root 11u IPv4 29189 0t0 TCP 127.0.0.1:631 (LISTEN)
cups-brow 2797 root 8u IPv4 30255 0t0 UDP *:631
dhclient 9927 root 6u IPv4 163343 0t0 UDP *:68
server 17718 bigsaem 3u IPv4 320819 0t0 TCP *:7000 (LISTEN)
bigsaem@bigsaem-VirtualBox ~/Desktop/COMP4891 $
```

Test 2 - TCP connection established

Definition: TCP server successfully conducted 3way handshake

Test method: Use Wireshark to capture the handshake

Success Criteria: There are three packets captured for SYN, SYN-ACK and ACK

Test result: Success

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	127.0.0.1	127.0.0.1	TCP	74	59806 → 7000 [SYN] Seq=0
2	0.000008936	127.0.0.1	127.0.0.1	TCP	74	7000 → 59806 [SYN, ACK] S
3	0.000016058	127.0.0.1	127.0.0.1	TCP	66	59806 → 7000 [ACK] Seq=1

```
bigsaem@bigsaem-VirtualBox ~/Desktop/COMP4891 $ ./server
Remote Address: 127.0.0.1, port: 59806
```

Test 3 – Data received and sent to other clients

Definition: TCP server successfully receives data and delivers it to other clients

Test method:

1. Prepare one server and three clients
2. Connect each client to the server
3. Send a message from a client
4. Check Wireshark to check packet transmissions

Success Criteria: 3 data transmissions and 3 ACK observed on each port

Test result: Success

8	252.734045457	127.0.0.1	127.0.0.1	TCP	74	7000 → 59810	[SYN, ACK] Seq=0 Ack=1 Win=43690 Len=0 MSS=65495 SACK_P...
9	252.734052658	127.0.0.1	127.0.0.1	TCP	66	59810 → 7000	[ACK] Seq=1 Ack=0 Win=43776 Len=0 TSval=1031340852 TSec...
10	255.563330981	127.0.0.1	127.0.0.1	TCP	1090	59806 → 7000	[PSH, ACK] Seq=1 Ack=1 Win=43776 Len=1024 TSval=1031341...
11	255.563349261	127.0.0.1	127.0.0.1	TCP	66	7000 → 59806	[ACK] Seq=1 Ack=1025 Win=45824 Len=0 TSval=1031341559 T...
12	255.563407585	127.0.0.1	127.0.0.1	TCP	1120	7000 → 59808	[PSH, ACK] Seq=1 Ack=1 Win=43776 Len=1054 TSval=1031341...
13	255.563422381	127.0.0.1	127.0.0.1	TCP	1120	7000 → 59810	[PSH, ACK] Seq=1 Ack=1 Win=43776 Len=1054 TSval=1031341...
14	255.563464075	127.0.0.1	127.0.0.1	TCP	66	59808 → 7000	[ACK] Seq=1 Ack=1055 Win=45824 Len=0 TSval=1031341559 T...
15	255.563490950	127.0.0.1	127.0.0.1	TCP	66	59810 → 7000	[ACK] Seq=1 Ack=1055 Win=45824 Len=0 TSval=1031341559 T...

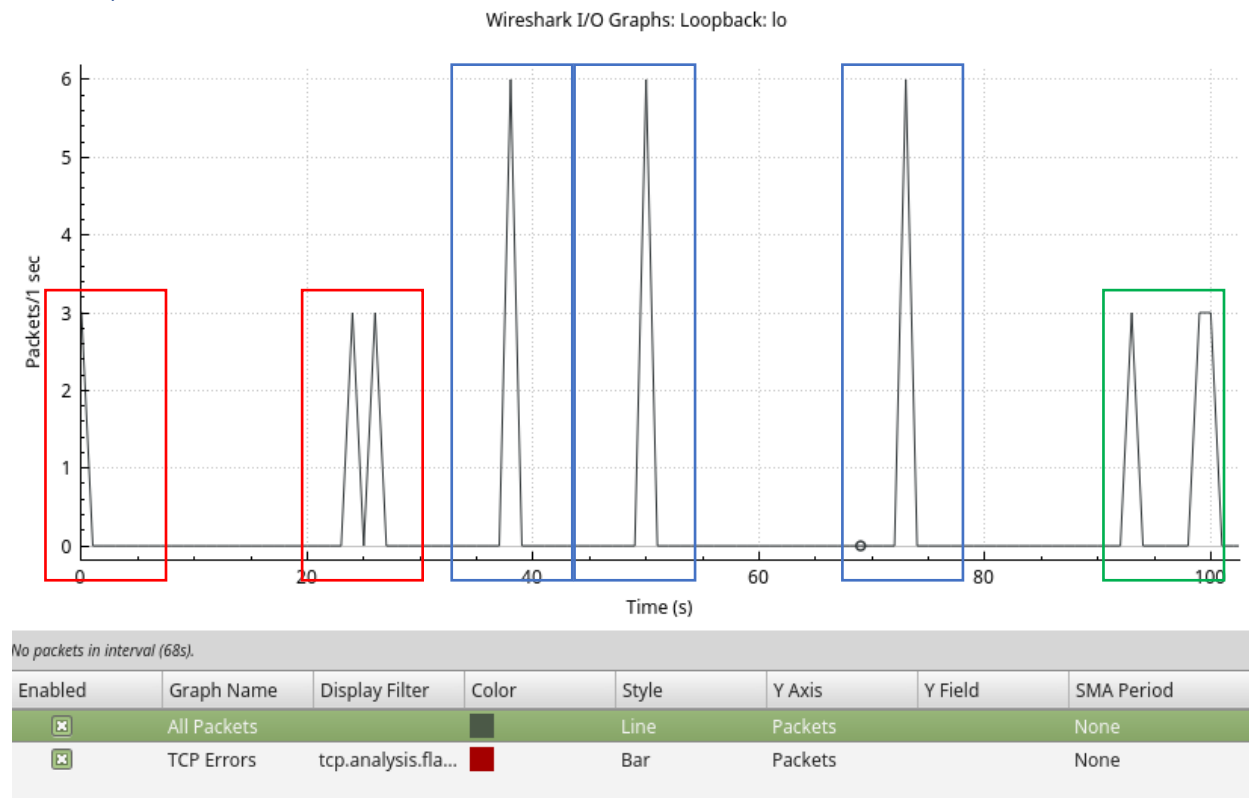
```
bigsaem@bigsaem-VirtualBox ~/Desktop/COMP4891
File Edit View Search Terminal Help
bigsaem@bigsaem-VirtualBox ~/Desktop/COMP4891 $ ./client localhost
Connected:      Server Name: localhost
                IP Address: 127.0.0.1
hi

bigsaem@bigsaem-VirtualBox ~/Desktop/COMP4891
File Edit View Search Terminal Help
^C
bigsaem@bigsaem-VirtualBox ~/Desktop/COMP4891 $ ./client localhost
Connected:      Server Name: localhost
                IP Address: 127.0.0.1
Client 0: hi

bigsaem@bigsaem-VirtualBox ~/Desktop/COMP4891
File Edit View Search Terminal Help
bigsaem@bigsaem-VirtualBox ~/Desktop/COMP4891 $ ./client localhost
Connected:      Server Name: localhost
                IP Address: 127.0.0.1
Client 0: hi
```

Observation & Verification

I.O Graphs

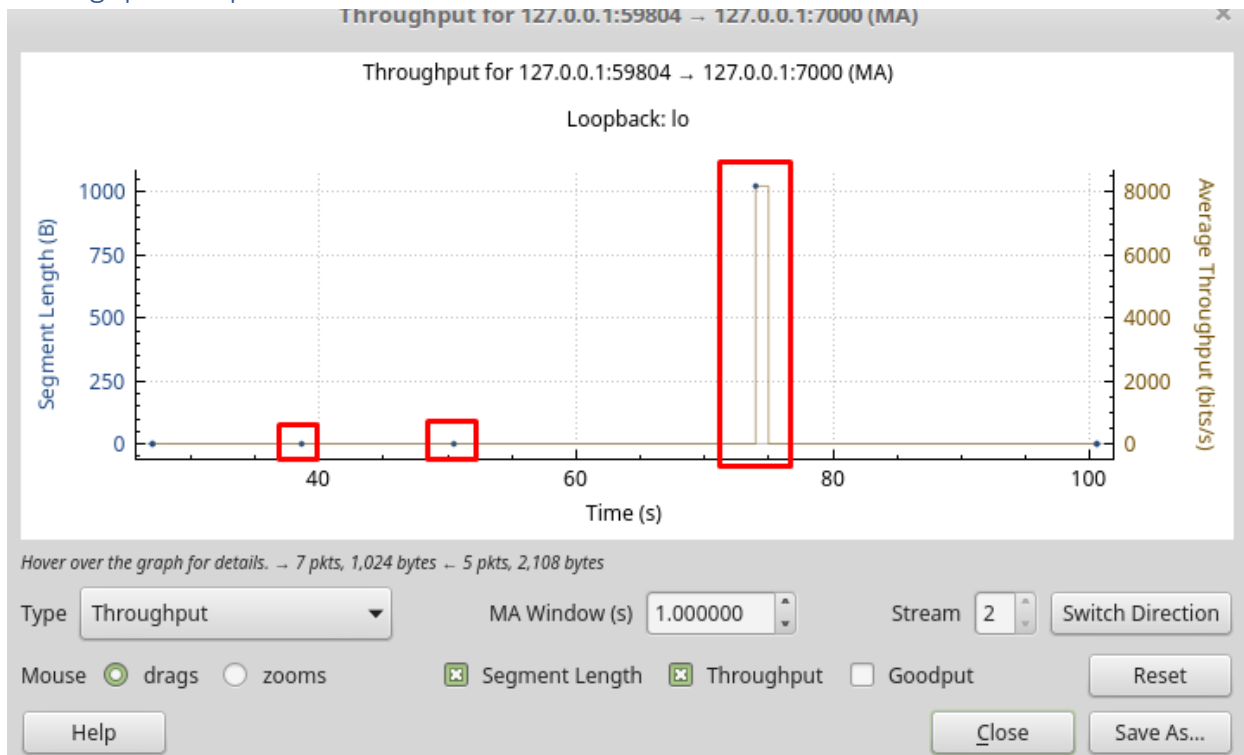


The read box indicates three-way handshakes (3packets per connection)

The blue box indicates data transmission (6 packets per message)

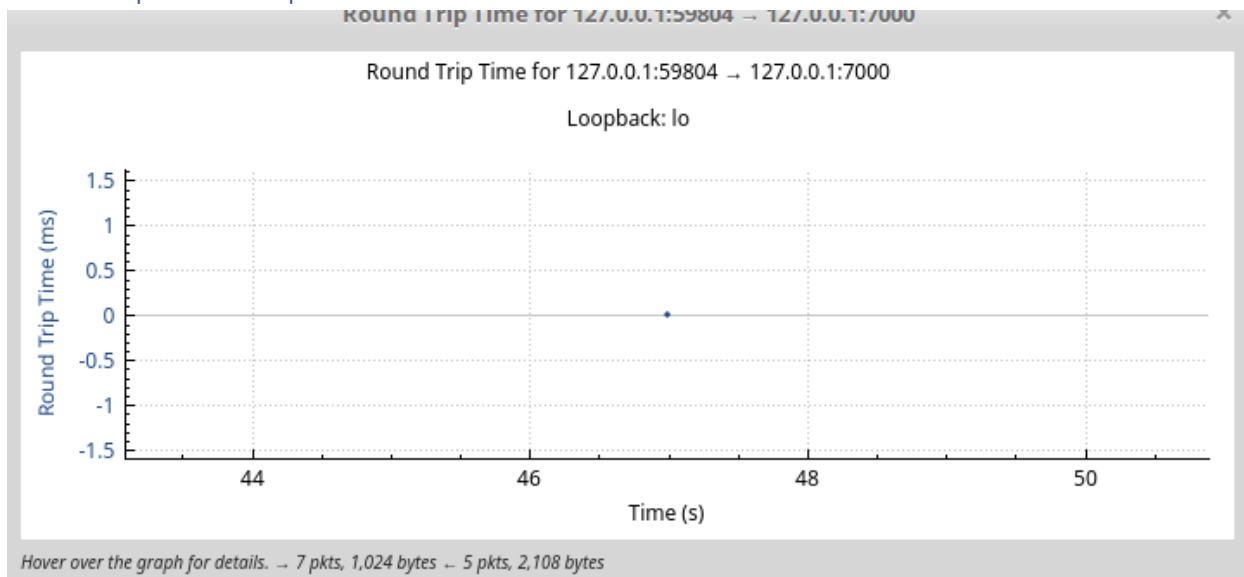
The green box indicates connection terminates (3packets per disconnection)

Throughput Graphs



By comparing this graph with the I/O graphs, it is observed that the red boxes are when data was being transmitted. Since the last message was longer than other messages, the third box on the right side shows the longer segment length and larger throughput.

Round Trip Time Graphs



Since the amount of data was small and it was conducted on localhost, the round trip was almost 0ms.