Lab3 Report

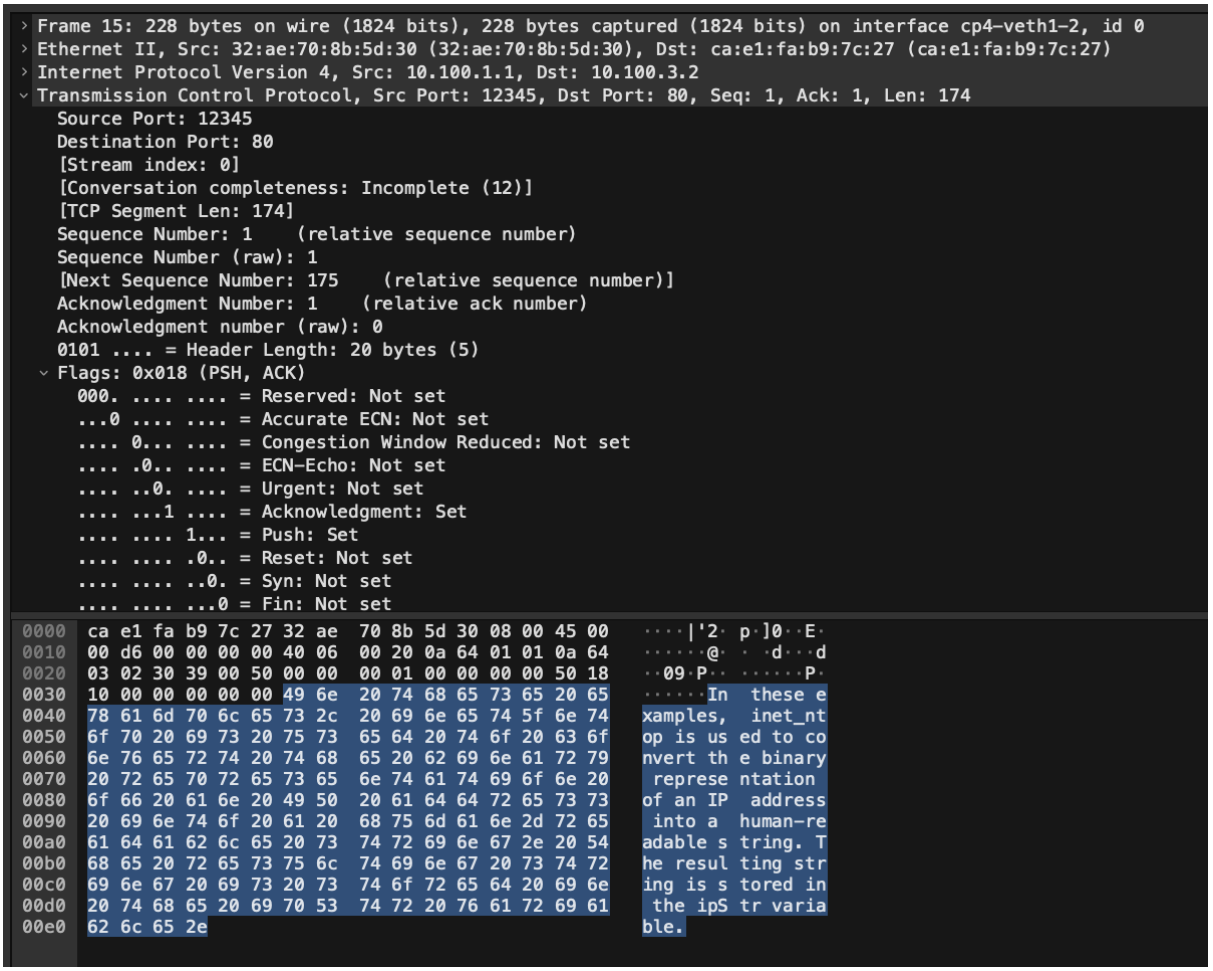
WT5

see the file WT5.txt

PT4

I separate the posix interface and the tcp machine code. The former is in the socket.cc and the later is in the tcp.cc. I implement the socket, listen, bind, accept and connect. But I haven't finished the write and read and close because of the lack of time. I will complete this later.

CP7



The tcp header start from the 35 byte. The first 2 bytes indicates the source port 12345, the later two is the destination 80. Then the four are the sequence number 1. After the four are the acknowledge number 1. Then the data offsets indicates the length of the tcp header. The the flags contains push, SYN,ACK and so on. Then are the window size and checksum.

CP8

I use stop and wait method to address packet loss and poor network condition

use tc-netm to implement a delay and loss rate network. And the send host and receive host code is accordingly in the send.cpp and recv.cpp. The script code is in cp4.txt in checkpoint fold. I attach a screenshot below.

vnetUtils > helper > $ cp4.sh

```
1  #!/bin/bash
2  sudo bash ./execNS cp4-ns1 tshark -i cp4-veth1-2 -c 200 -w ns1.pcap &
3  sudo bash ./execNS cp4-ns4 tshark -i cp4-veth4-3 -c 200 -w ns4.pcap &
4  sudo bash ./execNS cp4-ns1 tc qdisc add dev cp4-veth1-2 root netem delay 200ms loss10%
5  sudo bash ./execNS cp4-ns1 /lab-netstack-premium-master/lab3/send cp4-veth1-2 > 1.txt &
6  sudo bash ./execNS cp4-ns2 /lab-netstack-premium-master/lab3/host cp4-veth2-1 cp4-veth2-3 > 2.txt &
7  sudo bash ./execNS cp4-ns3 /lab-netstack-premium-master/lab3/host cp4-veth3-2 cp4-veth3-4 > 3.txt &
8  sudo bash ./execNS cp4-ns4 /lab-netstack-premium-master/lab3/recv cp4-veth4-3 > 4.txt &
9
```

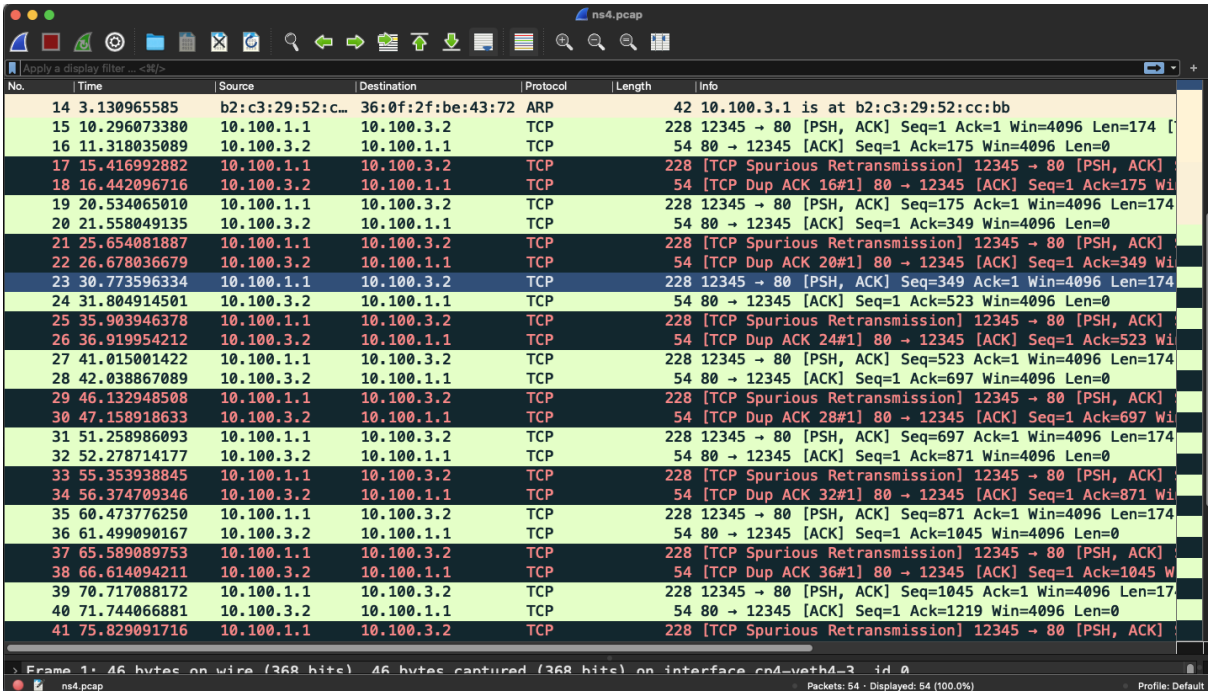
Here are the wireshark trace in host1(send) and host4(receive)

ns1.pcap

No.	Time	Source	Destination	Protocol	Length	Info
14	3.157102751	8a:90:c6:f3:7…	4a:95:9b:9a:c1:43	ARP	42	10.100.1.2 is at 8a:90:c6:f3:7c:57
15	9.055051796	10.100.1.1	10.100.3.2	TCP	228	12345 → 80 [PSH, ACK] Seq=1 Ack=1 Win=4096 Len=174
16	13.375102298	10.100.3.2	10.100.1.1	TCP	54	80 → 12345 [ACK] Seq=1 Ack=175 Win=4096 Len=0
17	14.078889590	10.100.1.1	10.100.3.2	TCP	228	[TCP Spurious Retransmission] 12345 → 80 [PSH, ACK]
18	18.494113592	10.100.3.2	10.100.1.1	TCP	54	[TCP Dup ACK 16#1] 80 → 12345 [ACK] Seq=1 Ack=175 Wi
19	19.101922300	10.100.1.1	10.100.3.2	TCP	228	12345 → 80 [PSH, ACK] Seq=175 Ack=1 Win=4096 Len=174
20	23.610103553	10.100.3.2	10.100.1.1	TCP	54	80 → 12345 [ACK] Seq=1 Ack=349 Win=4096 Len=0
21	24.124076803	10.100.1.1	10.100.3.2	TCP	228	[TCP Spurious Retransmission] 12345 → 80 [PSH, ACK]
22	28.733980249	10.100.3.2	10.100.1.1	TCP	54	[TCP Dup ACK 20#1] 80 → 12345 [ACK] Seq=1 Ack=349 Wi
23	29.148983583	10.100.1.1	10.100.3.2	TCP	228	12345 → 80 [PSH, ACK] Seq=349 Ack=1 Win=4096 Len=174
24	33.850086335	10.100.3.2	10.100.1.1	TCP	54	80 → 12345 [ACK] Seq=1 Ack=523 Win=4096 Len=0
25	34.177950377	10.100.1.1	10.100.3.2	TCP	228	[TCP Spurious Retransmission] 12345 → 80 [PSH, ACK]
26	38.976719837	10.100.3.2	10.100.1.1	TCP	54	[TCP Dup ACK 24#1] 80 → 12345 [ACK] Seq=1 Ack=523 Wi
27	39.201938212	10.100.1.1	10.100.3.2	TCP	228	12345 → 80 [PSH, ACK] Seq=523 Ack=1 Win=4096 Len=174
28	44.093706590	10.100.3.2	10.100.1.1	TCP	54	80 → 12345 [ACK] Seq=1 Ack=697 Win=4096 Len=0
29	44.224787298	10.100.1.1	10.100.3.2	TCP	228	[TCP Spurious Retransmission] 12345 → 80 [PSH, ACK]
30	49.210830425	10.100.3.2	10.100.1.1	TCP	54	[TCP Dup ACK 28#1] 80 → 12345 [ACK] Seq=1 Ack=697 Wi
31	49.243789592	10.100.1.1	10.100.3.2	TCP	228	12345 → 80 [PSH, ACK] Seq=697 Ack=1 Win=4096 Len=174
32	54.263666386	10.100.1.1	10.100.3.2	TCP	228	[TCP Retransmission] 12345 → 80 [PSH, ACK] Seq=697 A
33	54.328754011	10.100.3.2	10.100.1.1	TCP	54	80 → 12345 [ACK] Seq=1 Ack=871 Win=4096 Len=0
34	58.425818374	10.100.3.2	10.100.1.1	TCP	54	[TCP Dup ACK 33#1] 80 → 12345 [ACK] Seq=1 Ack=871 Wi
35	59.286885458	10.100.1.1	10.100.3.2	TCP	228	12345 → 80 [PSH, ACK] Seq=871 Ack=1 Win=4096 Len=174
36	63.545098751	10.100.3.2	10.100.1.1	TCP	54	80 → 12345 [ACK] Seq=1 Ack=1045 Win=4096 Len=0
37	64.307692085	10.100.1.1	10.100.3.2	TCP	228	[TCP Spurious Retransmission] 12345 → 80 [PSH, ACK]
38	68.674105962	10.100.3.2	10.100.1.1	TCP	54	[TCP Dup ACK 36#1] 80 → 12345 [ACK] Seq=1 Ack=1045 W
39	69.327830754	10.100.1.1	10.100.3.2	TCP	228	12345 → 80 [PSH, ACK] Seq=1045 Ack=1 Win=4096 Len=17
40	73.788133673	10.100.3.2	10.100.1.1	TCP	54	80 → 12345 [ACK] Seq=1 Ack=1219 Win=4096 Len=0
41	74.355670715	10.100.1.1	10.100.3.2	TCP	228	[TCP Spurious Retransmission] 12345 → 80 [PSH, ACK]

Frame 1: 46 bytes on wire (368 bits), 46 bytes captured (368 bits) on interface cp4-veth1-2, id 0

ns1.pcap Packets: 54 · Displayed: 54 (100.0%) Profile: Default


ns4.pcap
Apply a display filter ... <⌘/>
No. Time Source Destination Protocol Length Info
14 3.130965585 b2:c3:29:52:c… 36:0f:2f:be:43:72 ARP 42 10.100.3.1 is at b2:c3:29:52:cc:bb
15 10.296073380 10.100.1.1 10.100.3.2 TCP 228 12345 → 80 [PSH, ACK] Seq=1 Ack=1 Win=4096 Len=174
16 11.318035089 10.100.3.2 10.100.1.1 TCP 54 80 → 12345 [ACK] Seq=1 Ack=175 Win=4096 Len=0
17 15.416992882 10.100.1.1 10.100.3.2 TCP 228 [TCP Spurious Retransmission] 12345 → 80 [PSH, ACK]
18 16.442096716 10.100.3.2 10.100.1.1 TCP 54 [TCP Dup ACK 16#1] 80 → 12345 [ACK] Seq=1 Ack=175 Wi
19 20.534065010 10.100.1.1 10.100.3.2 TCP 228 12345 → 80 [PSH, ACK] Seq=175 Ack=1 Win=4096 Len=174
20 21.558049135 10.100.3.2 10.100.1.1 TCP 54 80 → 12345 [ACK] Seq=1 Ack=349 Win=4096 Len=0
21 25.654081887 10.100.1.1 10.100.3.2 TCP 228 [TCP Spurious Retransmission] 12345 → 80 [PSH, ACK]
22 26.678036679 10.100.3.2 10.100.1.1 TCP 54 [TCP Dup ACK 20#1] 80 → 12345 [ACK] Seq=1 Ack=349 Wi
23 30.773596334 10.100.1.1 10.100.3.2 TCP 228 12345 → 80 [PSH, ACK] Seq=349 Ack=1 Win=4096 Len=174
24 31.804914501 10.100.3.2 10.100.1.1 TCP 54 80 → 12345 [ACK] Seq=1 Ack=523 Win=4096 Len=0
25 35.903946378 10.100.1.1 10.100.3.2 TCP 228 [TCP Spurious Retransmission] 12345 → 80 [PSH, ACK]
26 36.919954212 10.100.3.2 10.100.1.1 TCP 54 [TCP Dup ACK 24#1] 80 → 12345 [ACK] Seq=1 Ack=523 Wi
27 41.015001422 10.100.1.1 10.100.3.2 TCP 228 12345 → 80 [PSH, ACK] Seq=523 Ack=1 Win=4096 Len=174
28 42.038867089 10.100.3.2 10.100.1.1 TCP 54 80 → 12345 [ACK] Seq=1 Ack=697 Win=4096 Len=0
29 46.132948508 10.100.1.1 10.100.3.2 TCP 228 [TCP Spurious Retransmission] 12345 → 80 [PSH, ACK]
30 47.158918633 10.100.3.2 10.100.1.1 TCP 54 [TCP Dup ACK 28#1] 80 → 12345 [ACK] Seq=1 Ack=697 Wi
31 51.258986093 10.100.1.1 10.100.3.2 TCP 228 12345 → 80 [PSH, ACK] Seq=697 Ack=1 Win=4096 Len=174
32 52.278714177 10.100.3.2 10.100.1.1 TCP 54 80 → 12345 [ACK] Seq=1 Ack=871 Win=4096 Len=0
33 55.353938845 10.100.1.1 10.100.3.2 TCP 228 [TCP Spurious Retransmission] 12345 → 80 [PSH, ACK]
34 56.374709346 10.100.3.2 10.100.1.1 TCP 54 [TCP Dup ACK 32#1] 80 → 12345 [ACK] Seq=1 Ack=871 Wi
35 60.473776250 10.100.1.1 10.100.3.2 TCP 228 12345 → 80 [PSH, ACK] Seq=871 Ack=1 Win=4096 Len=174
36 61.499090167 10.100.3.2 10.100.1.1 TCP 54 80 → 12345 [ACK] Seq=1 Ack=1045 Win=4096 Len=0
37 65.589089753 10.100.1.1 10.100.3.2 TCP 228 [TCP Spurious Retransmission] 12345 → 80 [PSH, ACK]
38 66.614094211 10.100.3.2 10.100.1.1 TCP 54 [TCP Dup ACK 36#1] 80 → 12345 [ACK] Seq=1 Ack=1045 W
39 70.717088172 10.100.1.1 10.100.3.2 TCP 228 12345 → 80 [PSH, ACK] Seq=1045 Ack=1 Win=4096 Len=17
40 71.744066881 10.100.3.2 10.100.1.1 TCP 54 80 → 12345 [ACK] Seq=1 Ack=1219 Win=4096 Len=0
41 75.829091716 10.100.1.1 10.100.3.2 TCP 228 [TCP Spurious Retransmission] 12345 → 80 [PSH, ACK]
Frame 1: 46 bytes on wire (368 bits), 46 bytes captured (368 bits) on interface cn4-veth4-3, id 0
ns4.pcap
Packets: 54 · Displayed: 54 (100.0%)
Profile: Default