

TCP SOCKETS

Part-2: Wireshark Analysis

1) What are the source and destination IP addresses and ports ?

No.	Time	Source	Destination	Protocol	Length	Info
7	8.543250	127.0.0.1	127.0.0.1	TCP	74	43132 → 20000 [SYN] Seq=0 Win=65495 Len=0 MSS=65495 SACK_PERM TSval=1965468203
8	8.543266	127.0.0.1	127.0.0.1	TCP	74	20000 → 43132 [SYN, ACK] Seq=0 Ack=1 Win=65483 Len=0 MSS=65495 SACK_PERM TSval=1965468203
9	8.543284	127.0.0.1	127.0.0.1	TCP	66	43132 → 20000 [ACK] Seq=1 Ack=1 Win=65536 Len=0 TSval=1965468203 TSecr=1965468203
10	8.543384	127.0.0.1	127.0.0.1	TCP	86	20000 → 43132 [PSH, ACK] Seq=1 Ack=1 Win=65536 Len=20 TSval=1965468203 TSecr=1965468203
11	8.543395	127.0.0.1	127.0.0.1	TCP	66	43132 → 20000 [ACK] Seq=1 Ack=21 Win=65536 Len=0 TSval=1965468203 TSecr=1965468203
12	8.543468	127.0.0.1	127.0.0.1	TCP	86	43132 → 20000 [PSH, ACK] Seq=1 Ack=21 Win=65536 Len=20 TSval=1965468203 TSecr=1965468203
13	8.543476	127.0.0.1	127.0.0.1	TCP	66	20000 → 43132 [ACK] Seq=21 Ack=21 Win=65536 Len=0 TSval=1965468203 TSecr=1965468203
14	14.793258	127.0.0.1	127.0.0.1	TCP	92	43132 → 20000 [PSH, ACK] Seq=21 Ack=21 Win=65536 Len=26 TSval=1965474453 TSecr=1965474453
15	14.793279	127.0.0.1	127.0.0.1	TCP	66	20000 → 43132 [ACK] Seq=21 Ack=47 Win=65536 Len=0 TSval=1965474453 TSecr=1965474453
16	14.793374	127.0.0.1	127.0.0.1	TCP	86	20000 → 43132 [PSH, ACK] Seq=21 Ack=47 Win=65536 Len=20 TSval=1965474453 TSecr=1965474453
17	14.793481	127.0.0.1	127.0.0.1	TCP	72	43132 → 20000 [PSH, ACK] Seq=47 Ack=41 Win=65536 Len=6 TSval=1965474453 TSecr=1965474453
18	14.834150	127.0.0.1	127.0.0.1	TCP	66	20000 → 43132 [ACK] Seq=41 Ack=53 Win=65536 Len=0 TSval=1965474494 TSecr=1965474494
19	14.834181	127.0.0.1	127.0.0.1	TCP	88	43132 → 20000 [PSH, ACK] Seq=53 Ack=41 Win=65536 Len=22 TSval=1965474494 TSecr=1965474494
20	14.834197	127.0.0.1	127.0.0.1	TCP	66	20000 → 43132 [ACK] Seq=41 Ack=75 Win=65536 Len=0 TSval=1965474494 TSecr=1965474494

▶ Frame 26: 66 bytes on wire (528 bits), 66 bytes captured (528 bits) on interface 0
 ▶ Ethernet II, Src: 00:00:00:00:00:00 (00:00:00:00:00:00), Dst: 00:00:00:00:00:00
 ▶ Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1
 ▶ Transmission Control Protocol, Src Port: 43132, Dst Port: 20000, Seq: 92, Ack: 53, Win: 65536, Len: 22

Source and Destination IP Addresses and Ports:

- **Source IP Address:** 127.0.0.1
- **Destination IP Address:** 127.0.0.1

If packet from server to client

- **Source Port:** 2000
- **Destination Port:** 43132

If packet from client to server

- **Source Port:** 43132
- **Destination Port:** 2000

2) Three-way handshaking procedure and capture all packets exchanged

No.	Time	Source	Destination	Protocol	Length	Info
7	8.543250	127.0.0.1	127.0.0.1	TCP	74	43132 → 20000 [SYN] Seq=0 Win=65495 Len=0 MSS=65495 SACK_PERM TSval=1965468203...
8	8.543266	127.0.0.1	127.0.0.1	TCP	74	20000 → 43132 [SYN, ACK] Seq=0 Ack=1 Win=65483 Len=0 MSS=65495 SACK_PERM TSval=...
9	8.543284	127.0.0.1	127.0.0.1	TCP	66	43132 → 20000 [ACK] Seq=1 Ack=1 Win=65536 Len=0 TSval=1965468203 TSecr=1965468...
10	8.543384	127.0.0.1	127.0.0.1	TCP	86	20000 → 43132 [PSH, ACK] Seq=1 Ack=1 Win=65536 Len=20 TSval=1965468203 TSecr=1...
11	8.543395	127.0.0.1	127.0.0.1	TCP	66	43132 → 20000 [ACK] Seq=1 Ack=21 Win=65536 Len=0 TSval=1965468203 TSecr=196546...
12	8.543468	127.0.0.1	127.0.0.1	TCP	86	43132 → 20000 [PSH, ACK] Seq=1 Ack=21 Win=65536 Len=20 TSval=1965468203 TSecr=...
13	8.543476	127.0.0.1	127.0.0.1	TCP	66	20000 → 43132 [ACK] Seq=21 Ack=21 Win=65536 Len=0 TSval=1965468203 TSecr=19654...
14	14.793258	127.0.0.1	127.0.0.1	TCP	92	43132 → 20000 [PSH, ACK] Seq=21 Ack=21 Win=65536 Len=26 TSval=1965474453 TSecr=...
15	14.793279	127.0.0.1	127.0.0.1	TCP	66	20000 → 43132 [ACK] Seq=21 Ack=47 Win=65536 Len=0 TSval=1965474453 TSecr=19654...
16	14.793374	127.0.0.1	127.0.0.1	TCP	86	20000 → 43132 [PSH, ACK] Seq=21 Ack=47 Win=65536 Len=20 TSval=1965474453 TSecr=...
17	14.793481	127.0.0.1	127.0.0.1	TCP	72	43132 → 20000 [PSH, ACK] Seq=47 Ack=41 Win=65536 Len=6 TSval=1965474453 TSecr=...
18	14.834150	127.0.0.1	127.0.0.1	TCP	66	20000 → 43132 [ACK] Seq=41 Ack=53 Win=65536 Len=0 TSval=1965474494 TSecr=19654...
19	14.834181	127.0.0.1	127.0.0.1	TCP	88	43132 → 20000 [PSH, ACK] Seq=53 Ack=41 Win=65536 Len=22 TSval=1965474494 TSecr=...
20	14.834197	127.0.0.1	127.0.0.1	TCP	66	20000 → 43132 [ACK] Seq=41 Ack=75 Win=65536 Len=0 TSval=1965474494 TSecr=19654...

Frame 7: 74 bytes on wire (592 bits), 74 bytes captured (592 bits)
Ethernet II, Src: 00:00:00:00:00:00 (00:00:00:00:00:00), Dst: 00:00:00:00:00:00
Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1
Transmission Control Protocol, Src Port: 43132, Dst Port: 20000, Seq: 0, Len: 0

Sequence Number of 1st packet = 15754323

Sequence Number of 2nd packet = 232898707

First three packets are the packets for Three-way Handshaking .

3) connection closure procedure

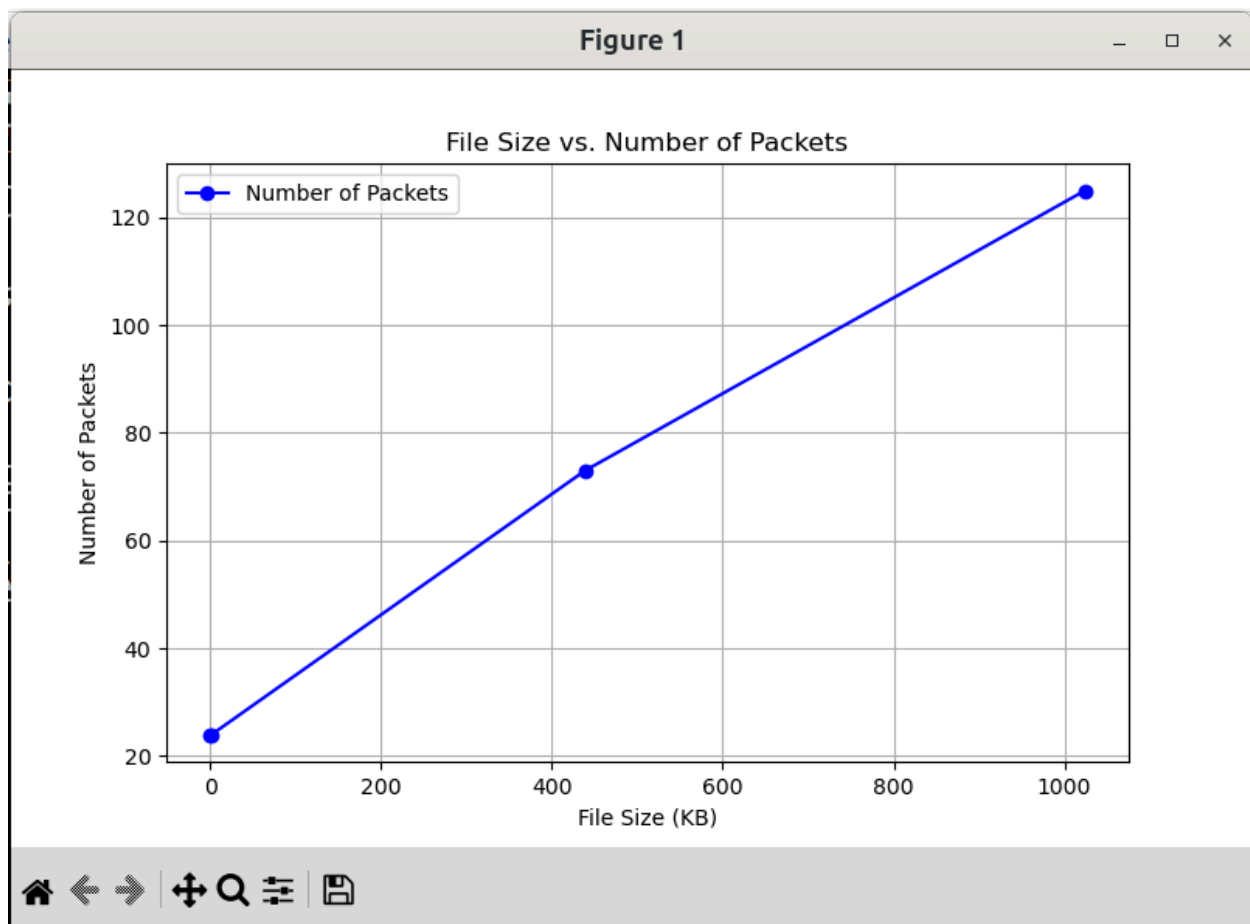
No.	Time	Source	Destination	Protocol	Length	Info
10	8.543384	127.0.0.1	127.0.0.1	TCP	86	20000 → 43132 [PSH, ACK] Seq=1 Ack=1 Win=65536 Len=20 TSval=1965468203 TSecr=1965468203
11	8.543395	127.0.0.1	127.0.0.1	TCP	66	43132 → 20000 [ACK] Seq=1 Ack=21 Win=65536 Len=0 TSval=1965468203 TSecr=1965468203
12	8.543468	127.0.0.1	127.0.0.1	TCP	86	43132 → 20000 [PSH, ACK] Seq=1 Ack=21 Win=65536 Len=20 TSval=1965468203 TSecr=1965468203
13	8.543476	127.0.0.1	127.0.0.1	TCP	66	20000 → 43132 [ACK] Seq=21 Ack=21 Win=65536 Len=0 TSval=1965468203 TSecr=1965468203
14	14.793258	127.0.0.1	127.0.0.1	TCP	92	43132 → 20000 [PSH, ACK] Seq=21 Ack=21 Win=65536 Len=26 TSval=1965474453 TSecr=1965468203
15	14.793279	127.0.0.1	127.0.0.1	TCP	66	20000 → 43132 [ACK] Seq=21 Ack=47 Win=65536 Len=0 TSval=1965474453 TSecr=1965474453
16	14.793374	127.0.0.1	127.0.0.1	TCP	86	20000 → 43132 [PSH, ACK] Seq=21 Ack=47 Win=65536 Len=20 TSval=1965474453 TSecr=1965474453
17	14.793481	127.0.0.1	127.0.0.1	TCP	72	43132 → 20000 [PSH, ACK] Seq=47 Ack=41 Win=65536 Len=6 TSval=1965474453 TSecr=1965474453
18	14.834150	127.0.0.1	127.0.0.1	TCP	66	20000 → 43132 [ACK] Seq=41 Ack=53 Win=65536 Len=0 TSval=1965474494 TSecr=1965474453
19	14.834181	127.0.0.1	127.0.0.1	TCP	88	43132 → 20000 [PSH, ACK] Seq=53 Ack=41 Win=65536 Len=22 TSval=1965474494 TSecr=1965474494
20	14.834197	127.0.0.1	127.0.0.1	TCP	66	20000 → 43132 [ACK] Seq=41 Ack=75 Win=65536 Len=0 TSval=1965474494 TSecr=1965474494
21	14.834878	127.0.0.1	127.0.0.1	TCP	84	20000 → 43132 [PSH, ACK] Seq=41 Ack=75 Win=65536 Len=18 TSval=1965474494 TSecr=1965474494
22	14.835026	127.0.0.1	127.0.0.1	TCP	83	43132 → 20000 [PSH, ACK] Seq=75 Ack=59 Win=65536 Len=17 TSval=1965474494 TSecr=1965474494
23	14.835262	127.0.0.1	127.0.0.1	TCP	72	20000 → 43132 [PSH, ACK] Seq=59 Ack=92 Win=65536 Len=6 TSval=1965474495 TSecr=1965474494
24	14.876084	127.0.0.1	127.0.0.1	TCP	66	43132 → 20000 [ACK] Seq=92 Ack=65 Win=65536 Len=0 TSval=1965474536 TSecr=1965474495
25	14.876116	127.0.0.1	127.0.0.1	TCP	88	20000 → 43132 [PSH, ACK] Seq=65 Ack=92 Win=65536 Len=22 TSval=1965474536 TSecr=1965474536
26	14.876128	127.0.0.1	127.0.0.1	TCP	66	43132 → 20000 [ACK] Seq=92 Ack=87 Win=65536 Len=0 TSval=1965474536 TSecr=1965474536
27	15.901085	127.0.0.1	127.0.0.1	TCP	72	43132 → 20000 [PSH, ACK] Seq=92 Ack=87 Win=65536 Len=6 TSval=1965475561 TSecr=1965474536
28	15.901133	127.0.0.1	127.0.0.1	TCP	66	20000 → 43132 [FIN, ACK] Seq=87 Ack=98 Win=65536 Len=0 TSval=1965475561 TSecr=1965475561
29	15.902048	127.0.0.1	127.0.0.1	TCP	66	43132 → 20000 [FIN, ACK] Seq=98 Ack=88 Win=65536 Len=0 TSval=1965475562 TSecr=1965475561
30	15.902091	127.0.0.1	127.0.0.1	TCP	66	20000 → 43132 [ACK] Seq=88 Ack=99 Win=65536 Len=0 TSval=1965475562 TSecr=1965475562

Sequence Number: 87 (relative sequence number)
[Next Sequence Number: 88 (relative sequence number)]
Acknowledgment Number: 98 (relative ack number)
Acknowledgment number (raw): 15754421
1800 = Header Length: 32 bytes (8)
Flags: 0x011 (FIN, ACK)
000 = Reserved: Not set
...0 = Accurate ECN: Not set
...0 = Congestion Window Reduced: Not set
...0 = ECN-Echo: Not set
...0 = Urgent: Not set
...1 = Acknowledgment: Set
...0 = Push: Not set
...0 = Reset: Not set
...0 = Syn: Not set
...1 = Fin: Set
[TCP Flags:A...]
Window: 512
[Calculated window size: 65536]
[Window size scaling factor: 128]
Checksum: 0xfe28 [unverified]
[Checksum Status: Unverified]

Last three packets are the packets for Closure Procedure.

4)

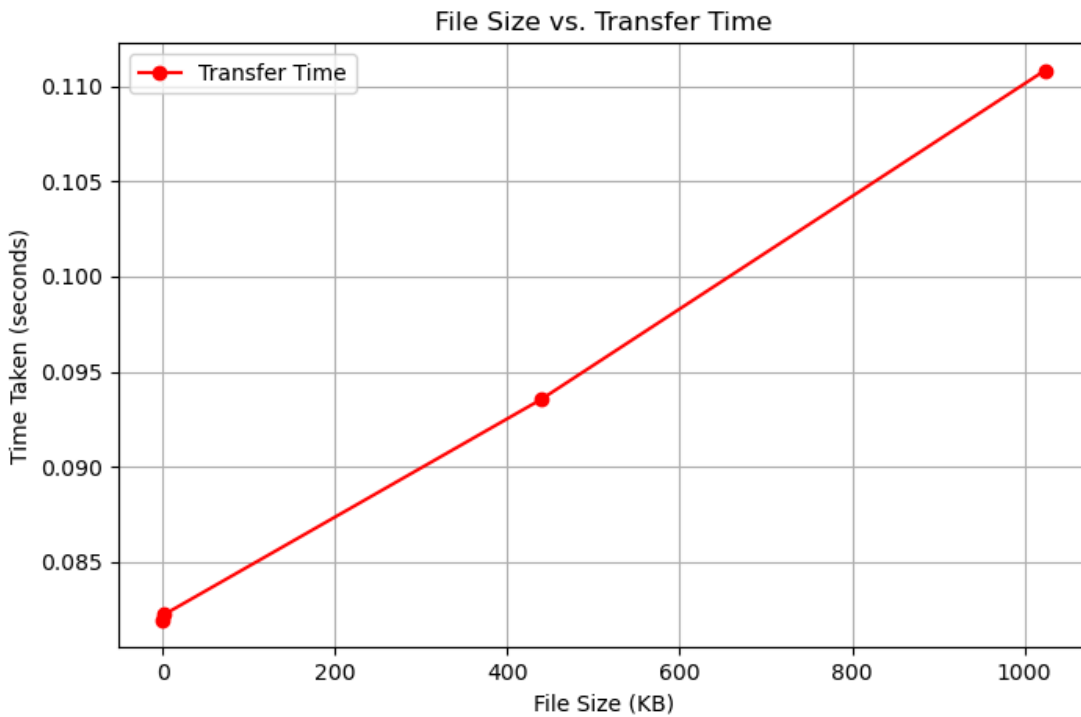
File Size	Number of Packets
13 bytes	24
2 kB	24
439 kB	73
1MB	125



5)

File Size	Start Time	End Time	Total Time
13 bytes	18.865929	18.947889	0.081960
2 kB	21.209978	21.292203	0.082225
439 kB	25.149639	25.243167	0.093528
1MB	25.895709	26.006558	0.110849

Figure 1



6) average size packet exchanged during the data communication ≈ 10.0099 kB/Package