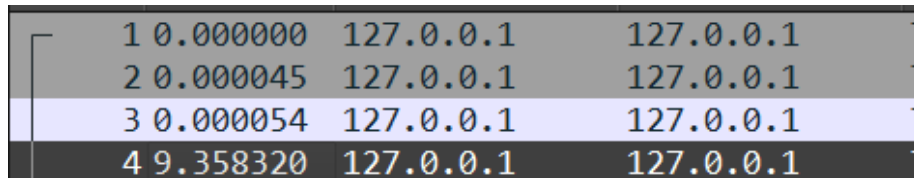# Assignment 3 - Networks

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Networks Laboratory

1. What are the source and destination IP addresses and ports? Share the screenshots to justify your answer.

   Client Address: 127.0.0.1
   Server Address: 127.0.0.1
   Port: 8080

Figure 1: IP Addresses and Ports Screenshot

2. Inspect the Three-way handshaking procedure and capture all packets exchanged for it. Attach the necessary screenshots to demonstrate it.

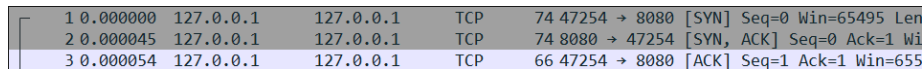   **SYN:** Packet 1 (Client → Server)

   - Time: 0.000000, Seq=0

   SYN-ACK: Packet 2 (Server → Client)

   - Time: 0.000045, Seq=0, Ack=1

   ACK: Packet 3 (Client → Server)

   - Time: 0.000054, Seq=1, Ack=1

Figure 2: Three-way Handshaking Screenshot

3. Inspect the connection closure procedure and capture all packets exchanged for it.

   FIN, ACK: Packet 14 (Client $\rightarrow$ Server)

   - Seq=334, Ack=1

   FIN, ACK: Packet 15 (Server $\rightarrow$ Client)

   - Seq=1, Ack=335

   ACK: Packet 16 (Client $\rightarrow$ Server)

   - Seq=335, Ack=2

```
14 12.721349 127.0.0.1     127.0.0.1     TCP     66 47254 → 8080 [FIN, ACK] Seq=334 Ack=1
15 12.722555 127.0.0.1     127.0.0.1     TCP     66 8080 → 47254 [FIN, ACK] Seq=1 Ack=335
16 12.722628 127.0.0.1     127.0.0.1     TCP     66 47254 → 8080 [ACK] Seq=335 Ack=2 Win=6
```

Figure 3: Connection Closure Screenshot

4. Inspect the traffics and count the number of packets exchanged for the transfer of a file(related to data only) between client and server. Plot a graph 'file size vs the number of packets' clearly based on your observation.

   - Initial packet: 26 bytes (packet 4)
   - Three 100-byte packets (packets 6, 8, 10)
   - Final packet: 7 bytes (packet 12)
   - Total packets for data: 5 packets
   - Total data transferred: 333 bytes

5. Measure the total time taken for the file transfer, its encryption and send back it from server to the client. Plot a graph 'file size vs time' clearly based on your observation.

   Start time: 0.000000
   First data packet: 9.358320
   Last data packet: 12.720939
   Connection closure: 12.722628
   Total time 12.72 seconds

6. Calculate the average size packet exchanged during the data communication? Take reference of the plotted graph in the above question.

   - 1 packet of 26 bytes
   - 3 packets of 100 bytes each
   - 1 packet of 7 bytes
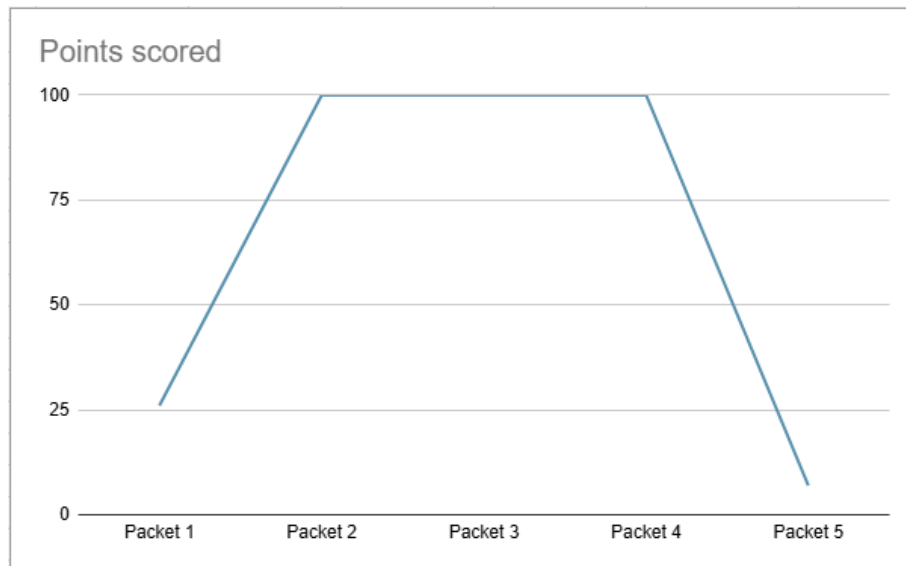   - Average size = (26 + 300 + 7) / 5 = 66.6 bytes
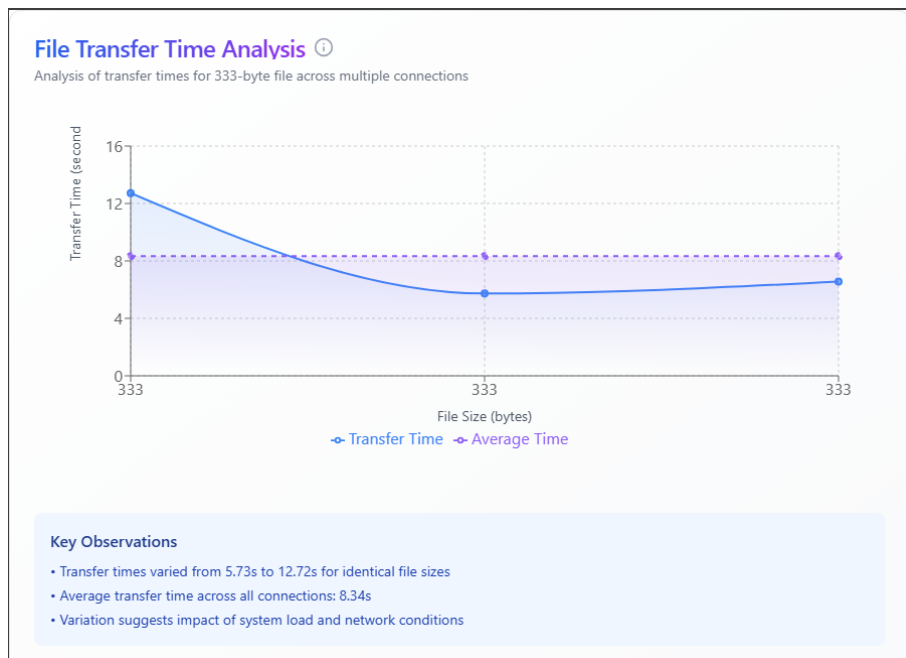
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Figure 4: File Size vs Number of Packets Graph

Figure 5: File Size vs Time Graph

Figure 6: terminal for packet capture

Figure 7: Terminal for client

Figure 8: Terminal for server

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