COMP9331 Lab4

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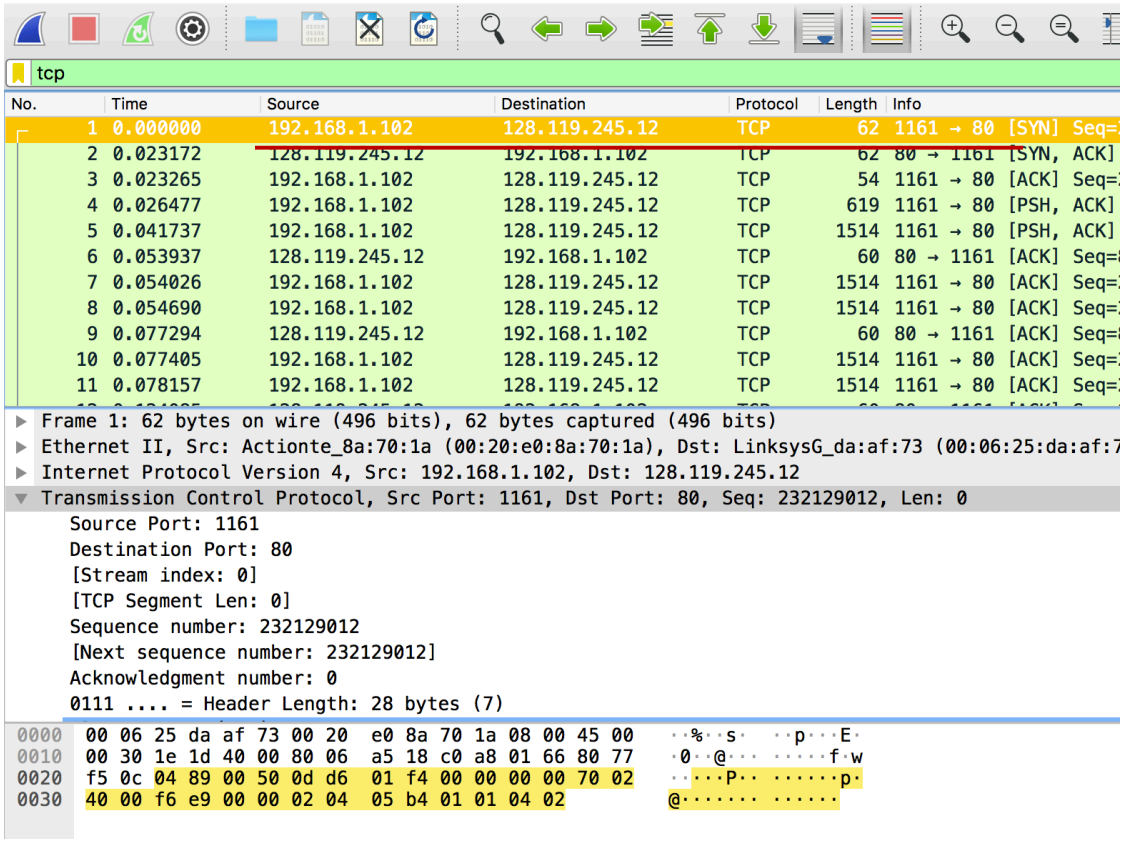
Exercise 1: Understanding TCP using Wireshark

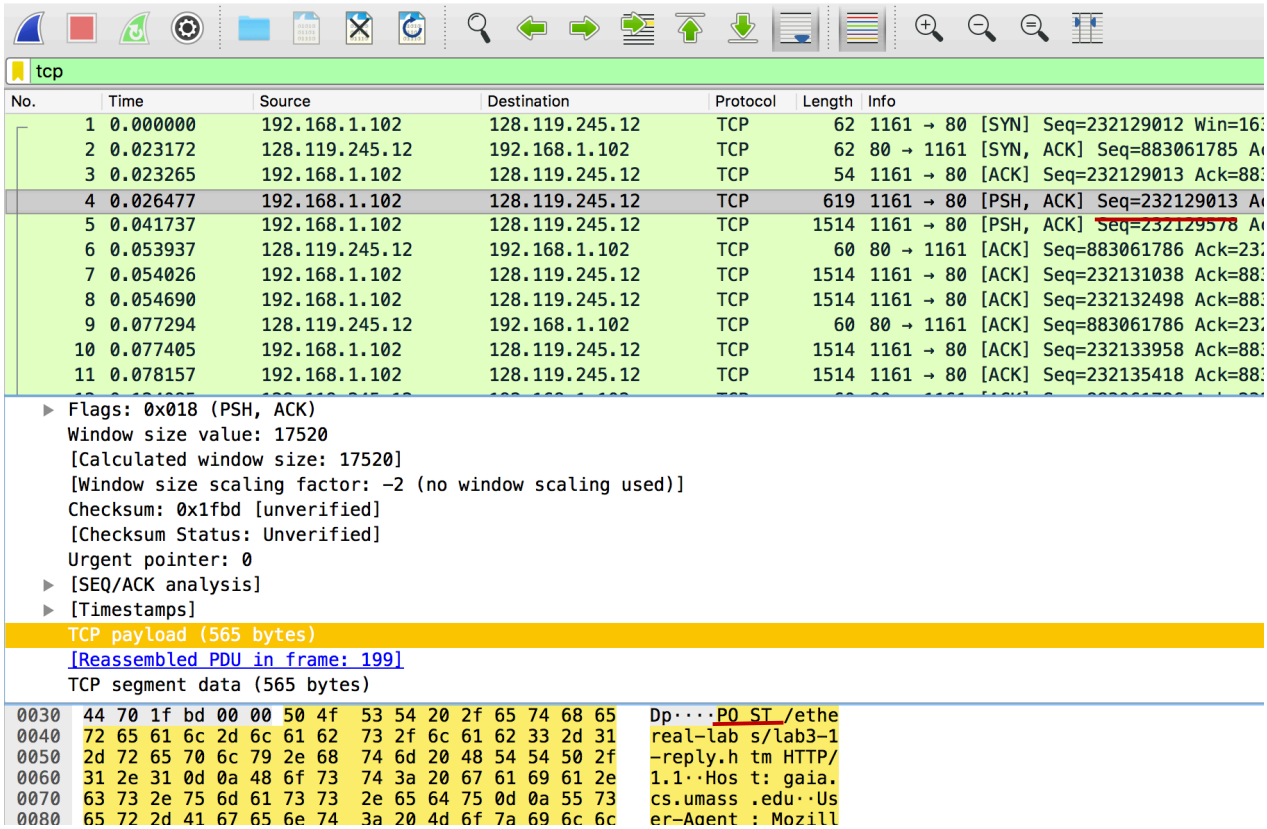
Question 1 . *What is the IP address of gaia.cs.umass.edu? On what port number is it sending and receiving TCP segments for this connection? What is the IP address and TCP port number used by the client computer (source) that is transferring the file to gaia.cs.umass.edu?*



The IP address of gaia.cs.unmass.edu is 128.119.245.12.
Sending and receiving TCP segments on port 80.
The IP address and TCP port used by the client computer is 192.186.1.102, port 1161.

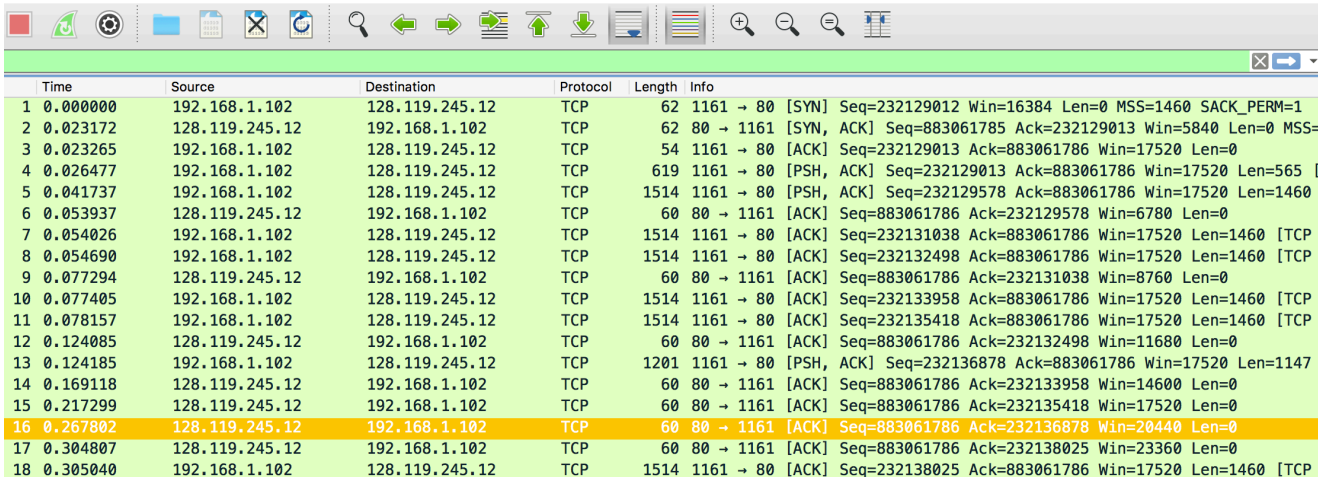
Question 2. *What is the sequence number of the TCP segment containing the HTTP POST command?*

The 4th segment contains the HTTP POST command and the sequence number is 232129013.



Question 3. *Consider the TCP segment containing the HTTP POST as the first segment in the TCP connection. What are the sequence numbers of the first six segments in the TCP connection from the client to the web server? At what time was each segment sent? When was the ACK for each segment received? Given the difference between when each TCP segment was sent, and when its acknowledgement was received, what is the RTT value for each of the six segments? What is the EstimatedRTT value after the receipt of each ACK?*

Seq number	TCP segment sent	ACK received	RTT	Estimated RTT
232129013	0.026477	0.053937	0.027460	0.027460
232129578	0.041737	0.077294	0.035557	0.028472
232131038	0.054026	0.124085	0.070059	0.033670
232132498	0.054690	0.169118	0.114428	0.043765
232133958	0.077405	0.217299	0.139894	0.055781
232135418	0.078157	0.267802	0.189645	0.072514



	Time	Source	Destination	Protocol	Length	Info
1	0.000000	192.168.1.102	128.119.245.12	TCP	62	1161 → 80 [SYN] Seq=232129012 Win=16384 Len=0 MSS=1460 SACK_PERM=1
2	0.023172	128.119.245.12	192.168.1.102	TCP	62	80 → 1161 [SYN, ACK] Seq=883061785 Ack=232129013 Win=5840 Len=0 MSS=
3	0.023265	192.168.1.102	128.119.245.12	TCP	54	1161 → 80 [ACK] Seq=232129013 Ack=883061786 Win=17520 Len=0
4	0.026477	192.168.1.102	128.119.245.12	TCP	619	1161 → 80 [PSH, ACK] Seq=232129013 Ack=883061786 Win=17520 Len=565 [
5	0.041737	192.168.1.102	128.119.245.12	TCP	1514	1161 → 80 [PSH, ACK] Seq=232129578 Ack=883061786 Win=17520 Len=1460
6	0.053937	128.119.245.12	192.168.1.102	TCP	60	80 → 1161 [ACK] Seq=883061786 Ack=232129578 Win=6780 Len=0
7	0.054026	192.168.1.102	128.119.245.12	TCP	1514	1161 → 80 [ACK] Seq=232131038 Ack=883061786 Win=17520 Len=1460 [TCP
8	0.054690	192.168.1.102	128.119.245.12	TCP	1514	1161 → 80 [ACK] Seq=232132498 Ack=883061786 Win=17520 Len=1460 [TCP
9	0.077294	128.119.245.12	192.168.1.102	TCP	60	80 → 1161 [ACK] Seq=883061786 Ack=232131038 Win=8760 Len=0
10	0.077405	192.168.1.102	128.119.245.12	TCP	1514	1161 → 80 [ACK] Seq=232133958 Ack=883061786 Win=17520 Len=1460 [TCP
11	0.078157	192.168.1.102	128.119.245.12	TCP	1514	1161 → 80 [ACK] Seq=232135418 Ack=883061786 Win=17520 Len=1460 [TCP
12	0.124085	128.119.245.12	192.168.1.102	TCP	60	80 → 1161 [ACK] Seq=883061786 Ack=232132498 Win=11680 Len=0
13	0.124185	192.168.1.102	128.119.245.12	TCP	1201	1161 → 80 [PSH, ACK] Seq=232136878 Ack=883061786 Win=17520 Len=1147
14	0.169118	128.119.245.12	192.168.1.102	TCP	60	80 → 1161 [ACK] Seq=883061786 Ack=232133958 Win=14600 Len=0
15	0.217299	128.119.245.12	192.168.1.102	TCP	60	80 → 1161 [ACK] Seq=883061786 Ack=232135418 Win=17520 Len=0
16	0.267802	128.119.245.12	192.168.1.102	TCP	60	80 → 1161 [ACK] Seq=883061786 Ack=232136878 Win=20440 Len=0
17	0.304807	128.119.245.12	192.168.1.102	TCP	60	80 → 1161 [ACK] Seq=883061786 Ack=232138025 Win=23360 Len=0
18	0.305040	192.168.1.102	128.119.245.12	TCP	1514	1161 → 80 [ACK] Seq=232138025 Ack=883061786 Win=17520 Len=1460 [TCP

Question 4. *What is the length of each of the first six TCP segments?*

Seq number	TCP segment length
232129013	565
232129578	1460
232131038	1460
232132498	1460
232133958	1460
232135418	1460

Question 5. *What is the minimum amount of available buffer space advertised at the receiver for the entire trace? Does the lack of receiver buffer space ever throttle the sender?*

The minimum amount of available buffer space is 5840 bytes.
As the buffer space is always larger than segment size, there is no lack of receiver buffer space ever throttle the sender.

Question 6. *Are there any retransmitted segments in the trace file? What did you check for (in the trace) in order to answer this question?*

I check if there are different packets with same sequence number.
And there is no retransmitted segment.

Question 7. *How much data does the receiver typically acknowledge in an ACK? Can you identify cases where the receiver is ACKing every other received segments.*

Typically, the receiver acknowledge that data length is 0 bytes.

Question 8. *What is the throughput (bytes transferred per unit time) for the TCP connection?*

The transfer time is 5.455830 – 0.026477 = 5.429353 sec
The total data is 232293103 - 232129013 = 164090 byte.
So the throughput is 164090 / 5.429353 = 30222.754 byte/sec

Exercise 2: TCP Connection Management

Question 1. *What is the sequence number of the TCP SYN segment that is used to initiate the TCP connection between the client computer and server?*

The sequence number is 2818463618.

Question 2. *What is the sequence number of the SYNACK segment sent by the server to the client computer in reply to the SYN? What is the value of the Acknowledgement field in the SYNACK segment? How did the server determine that value?*

The sequence number is 1247095790.
The value of the ACK field is 2818463619.
The sequence number of the SYN segment sent by the client is 2818463618, so the ACK of SYNACK should be 2818463618 + 1 = 2818463619

Question 3. *What is the sequence number of the ACK segment sent by the client computer in response to the SYNACK? What is the value of the Acknowledgment field in this ACK segment? Does this segment contain any data?*

The sequence number is 2818463619.
The value of the ACK field is 1247095791.
This segment doesn't contain any data.

Question 4. *Who has done the active close? client or the server? how you have determined this? What type of closure has been performed? 3 Segment (FIN/FINACK/ACK), 4 Segment (FIN/ACK/FIN/ACK) or Simultaneous close?*

The client and the server both close the connection.
The first FINACK is sent by the client.
The closure type is simultaneous close.

Question 5. *How many data bytes have been transferred from the client to the server and from the server to the client during the whole duration of the connection? What relationship does this have with the Initial Sequence Number and the final ACK received from the other side?*

The data transfer period is NO.298, 301, 302 and 303.
The sequence number of 298 is 2818463619 while ACK is 1247095791.
The sequence number of 303 is 2818463652 while ACK is 1274095831.
The data transfer from the client to the server is 2818463652–2818463619=33.
The data transfer from the server to the client is 1274095831–1247095791=40.
From the client to the server, the initial sequence number is 2818463618, and final ACK received from the other side is 2818463652. It is the data transferred add 1 byte SYN.
From the server to the client, the initial sequence number is 1247095790, and final ACK received from the other side is 1274095831. It is the data transferred add 1 byte SYN.