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?
Answer: IP address of gaia.cs.umass.edu is 128.119.245.12
Using port number 1161 and 80 sending and receiving TCP segments
Client Computer IP : 192.168.1.102 TCP port number used by client is : 1161

Question 2. What is the sequence number of the TCP segment containing the HTTP POST command?
Note that in order to find the POST command, you'll need to dig into the packet content field at the bottom of the Ethereal window, looking for a segment with a "POST" within its DATA field.
Answer: Sequence number: 232293053

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 (including the segment containing the HTTP POST) sent from the client to the web server (Do not consider the ACKs received from the server as part of these six segments)?
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 (see relevant parts of Section 3.5 or lecture slides) after the receipt of each ACK? Assume that the initial value of *EstimatedRTT* is equal to the measured RTT (*SampleRTT*) for the first segment, and then is computed using the *EstimatedRTT* equation for all subsequent segments. Set alpha to 0.125.

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

Sequence numbers of first six segments in TCP:

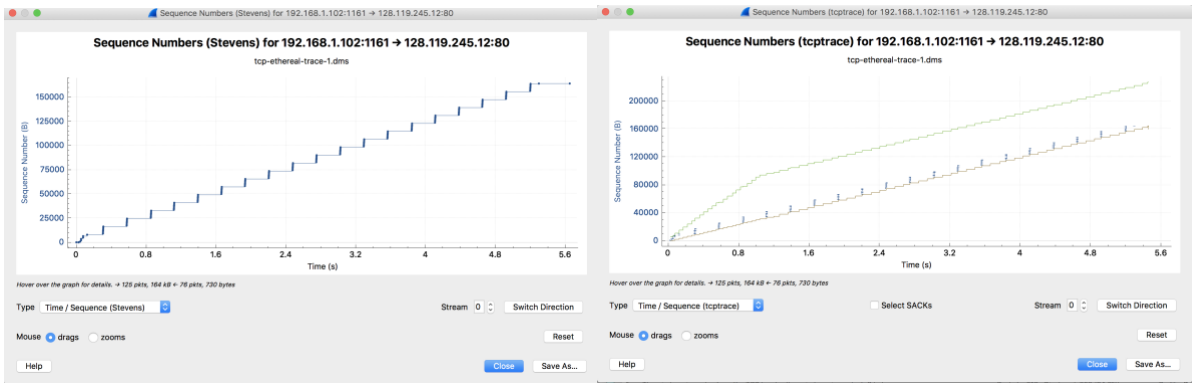
Answer for Q3 and Q4 :

	Sequence numbers (from client to web server)	Time: segment sent	Time: ACK received	RTT	EstRTT	Length Of segment
1	232129013	0.026477	0.053937	0.027460	0.027460	565
2	232129578	0.041737	0.077294	0.035557	0.028472	1460
3	232131038	0.054026	0.124085	0.070059	0.033670	1460
4	232132498	0.054690	0.169118	0.114428	0.043765	1460
5	232133958	0.077405	0.217299	0.139894	0.055781	1460
6	232135418	0.078157	0.267802	0.189645	0.072514	1460

EstimatedRTT=0.875*EstimatedRTT + 0.125*SampleRTT

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?
Answer: Minimum amount of available buffer at receiver(server) is 5840 bytes (window size)
And it does not throttle the sender(client) . The sender is never throttled due to lacking of receiver buffer space in this case, see that the buffer space always larger than segment size.

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?
Answer: No there is no retransmitted segments in the trace file.
I check for if there any packets with same sequence number at different time.
And I didn't find any. All sequence number of segment increasing respect to time.



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 segment?
Answer: By inspecting all the acks, most of them acknowledged 1460 bytes.

So the typically acknowledge in ACK is 1460 bytes

The difference between the acknowledged sequence numbers of two consecutive ACKs indicates the data received by the server between these two ACKs. By inspecting the amount of acknowledged data by each ACK, there are cases where the receiver is ACKing every other segment.

For example, segment of No. 80 acknowledged data with 2920 bytes = 1460*2 bytes.

For example, ack of No.6 and ack No.9 reflect reviver is ACKing segment of the first segment.

Ack No.6 : 232129578

Ack No.9 : 232131038

The difference between No.9 and No.6 is 232131038 – 232129578 = 1460

Which reflect that receiver is ACKing the first segment(No.5.length = 1460).

Question 8. What is the throughput (bytes transferred per unit time) for the TCP connection? Explain how you calculated this value?

Answer:

TCP throughput depends on the selection of average time period. One of common throughput computation which in this case, It can be select as the average time period as the whole connection time.

TCP throughput is calculated as the ratio between the total amount data and the total transmission time.

$$R = \frac{Total\ Data}{Total\ Time}$$

Total Data is 164090 byte

Total Time is 5.455830 – 0.026477 =5.429353 sec

Throughput R = 30222 byte/sec