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CMPSCI 381 Lab 7
Due Date: 3/17/2016

Honor Code: *This work is my own unless otherwise cited.*

1) My client computer:
IP address: 141.195.226.107
TCP port number: 59051

Destination Computer (gaia.cs.umass.edu):
IP address: 128.119.245.12
TCP port number: 80

2) The sequence number of the TCP SYN segment that is used to initiate the TCP connection between the client computer and gais.cs.umass.edu is 0. You can see what identifies the segment as a SYN segment by digging into the flags field and observing the 1 in the SYN row.

3) The sequence number of the SYN ACK segment sent by gaia.cs.umass.edu to the client computer is 0. The value of the Acknowledgment field is 1, which was determined by gaia.cs.umass.edu having received a packet of length 0, with a seq value of 0. Thus the ack number is 1 since this is the very first message the server is acknowledging, and the message's length is zero. If you observe the flags field for this segment, you will see that there is not only a 1 in the SYN row, but also in the Acknowledgment row.

4) The sequence number of the TCP segment containing the HTTP POST command is 1.

5) Considering the TCP segment containing the HTTP POST command as the first segment in the TCP connection, the sequence numbers for the first six segments in the TCP connection are 1, 640, 2008, 3376, 4744, and 6112. The times(in seconds) when each segment was sent, the times when each segment was acknowledged, the RTT's of each segment, and the Estimated RTT values after the receipt of each ack are shown below:

Packet sent:	Time(sent)	Time(ack)	RTT	Estimated RTT
49	2.804095	2.842927	0.038832	0.038841
50	2.804368	2.843372	0.039004	0.038861375
51	2.804395	2.843472	0.039077	0.0388883281
52	2.804407	2.843499	0.039092	0.0389137871
53	2.804419	2.843524	0.039105	0.0389376887
54	2.804439	2.843549	0.03911	0.0389592276

7) The length of the six TCP segments in question 5 are listed below:

Packet 49: len = 639
Packet 50: len = 1368
Packet 51: len = 1368
Packet 52: len = 1368
Packet 53: len = 1368
Packet 54: len = 1368

8) The minimum amount of available buffer space advertised at the received for the entire trace is 28960. No this never throttles the sender.

9) The amount of data that the receiver typically acknowledges is 1368 bytes. However, there are certain cases where the receiver was acknowledging every other received segment. For example, packet number 90 has an ack value of 15688, and packet 93 (which was the next ack segment) has an ack value of 18424. The difference between these two values is 2736 which is equivalent to 2*1368. So this is a case where the receiver was ACKing every other received segment.

10) The throughput for the TCP connection is going to be equivalent to the ratio between the total amount of transmitted data, and the total amount of time for the transfer. We find the total amount of data transmitted by computing the difference between the seq number of the first TCP segment, and the seq number of the final ACK segment. This gives 152961 – 1 = 152960 bytes. Now to find the transmission time, we calculate the difference in time between the first TCP segment, and the final ACK segment. Packet 483 contained the final ACK segment, and had a time of 8.030352 seconds. Packet 49 was the first TCP segment involved in the transferring of data, and it occurred at a time of 2.804095 seconds. Thus the throughput is equivalent to:
(152960) / (8.030352 – 2.804095)
= 29,267.6002 bytes per second.