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COMP 431

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Homework 5

1. The client’s IP address is 10.0.0.7, and it is sending requests from port 63040.
2. The IP address for gaia.cs.umass.edu is 128.119.245.12, and it is sending and receiving from port 80.
3. Not using relative sequence numbers, but instead the actual, randomly-chosen numbers, the sequence number for the SYN segment used to initiate the TCP connection is 3807952962. What identifies this segment as a SYN segment is that the SYN flag bit was set to 1 in the segment header.
4. The sequence number of the SYN-ACK is 2535630326. The value of the acknowledgement field is 3807952963. The server determined this value from the sequence number of the next segment it expects to receive. This segment is identified as a SYN-ACK segment because both the SYN and ACK bits are set to 1 in the flag field of the header.
5. The sequence number of the segment containing the HTTP POST command is 3807952963.
6. EstimatedRTT was calculated using:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Seg. | 1 | 2 | 3 | 4 | 5 | 6 |
| Seq# | 3807952963 | 3807953618 | 3807955066 | 3807956514 | 3807957962 | 3807959410 |
| Seg sent | 4.964737 | 4.964849 | 4.964850 | 5.016837 | 5.031428 | 5.031428 |
| ACK recv’d | 5.016768 | 5.031350 | 5.033796 | 5.066489 | 5.079780 | 5.088948 |
| SampleRTT | 0.052031 | 0.066501 | 0.068946 | 0.049652 | 0.048352 | 0.057520 |
| EstimatedRTT | 0.052031 | 0.05383975 | 0.055728031 | 0.054968527 | 0.054141461 | 0.054563779 |

1. The length of each of the POST segment is 655 bytes (plus a 66-byte header,) and the next five segments are 1448 bytes each (plus 66-byte headers.)
2. The minimum amount of available buffer space advertised is 28,960 bytes as seen in the SYN-ACK segment. Since the window size increases throughout the trace, the lack of buffer never throttles the sender.
3. There are no retransmissions in the trace file, and I checked by looking at the sequence numbers for each segment sent by the sender and seeing that there were no two transmissions with the same sequence numbers, but rather they were always increasing.
4. Looking at the trace file, [FINISH]
5. The total data transmitted was 152,976 bytes (using the relative sequence numbers from the first segment transmitted to the last segment acknowledged,) and the time that elapsed from the first segment sent (4.964737 s) to the last acknowledgment (5.579551 s) was 0.614814 s. Therefore, the throughput was about 248.8 KBps.
6. If I had to guess, I would say that slowstart begins when the initial packet is sent at time t = 0s, and ends around time t = 0.29s since it appears that the number of segments sent in each pseudo-round doubles until that point, and after it seems to have more linear growth which is associated with congestion avoidance. This real data is quite similar from the idealized text data in that the segments in each round are not sent immediately one after the other, but instead there are some brief spaces of time between the segment transmissions within the same rounds. Additionally, it doesn’t appear that each transmission round is neatly doubling the segments send in slowstart or simply adding one to each round in congestion avoidance, but it appears rather to use a more dynamic version of the algorithm.

