CSS 432 HW2 Discussion

Jay Hennen

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1 Stop and Wait Algorithm

The Stop and Wait algorithm is a special case of the sliding window algorithm, where the window on both the client and server is only 1 sequence number wide. The performance of the algorithm was relatively poor on both the 100Mbps network and the 1Gbps network, especially when compared to the Sliding Window algorithm.

One of the primary reasons why the Stop and Wait algorithm is so slow on both networks is due to the slower transmit rate of the packets. Each packet sent needs to be acknowledged before the next one is sent. Although the number of retransmits were very rare due to testing on a very clear line, the latency between when the packet is sent and the acknowledge received is still enough to increase the time to transmit all the packets considerably.

The 100Mbps Stop and Wait algorithm ran approximately an order of magnitude slower than the 1Gbps test. This is to be expected, as the latter network is an order of magnitude faster than the former. The RTT on the 1Gbps network is much lower than on the 100Mbps network and therefore you can send packets at a higher rate overall.

2 Sliding Window Algorithm

The Sliding Window Algorithm showed some interesting differences when being tested on the 100Mbps and 1Gbps links. When the window size was 1, the speed of the Sliding Window algorithm was close to the same as the Stop and Wait algorithm, as expected. However, as the window was widened, the benefits were considerably different.

On the 100Mbps link, Increasing the size of the window drastically reduced the execution time of the test, with the gains halting at window size 3. This is approximately equal to the number of packets that can be transmitted in the time it takes for an acknowledgment to return to the client, allowing it to move the window forward. As the window size increases from here there are no more gains, as there are only ever 3 packets on the link at a time.

On the 1Gbps link the initial gains were very similar, except for an unknown discrepancy in the rate of change between window sizes 2 and 3. In addition, the 1Gbps link seemed to find it's maximum speed at 4 packets, rather than 3 for the 100Mbps link. Aside from that, the behavior for larger window sizes were similar to each other.

For both links, once the send/receive window size reached the same value as the number of packets on the link at any given time, the data could be transmitted at the link's advertised data rate.