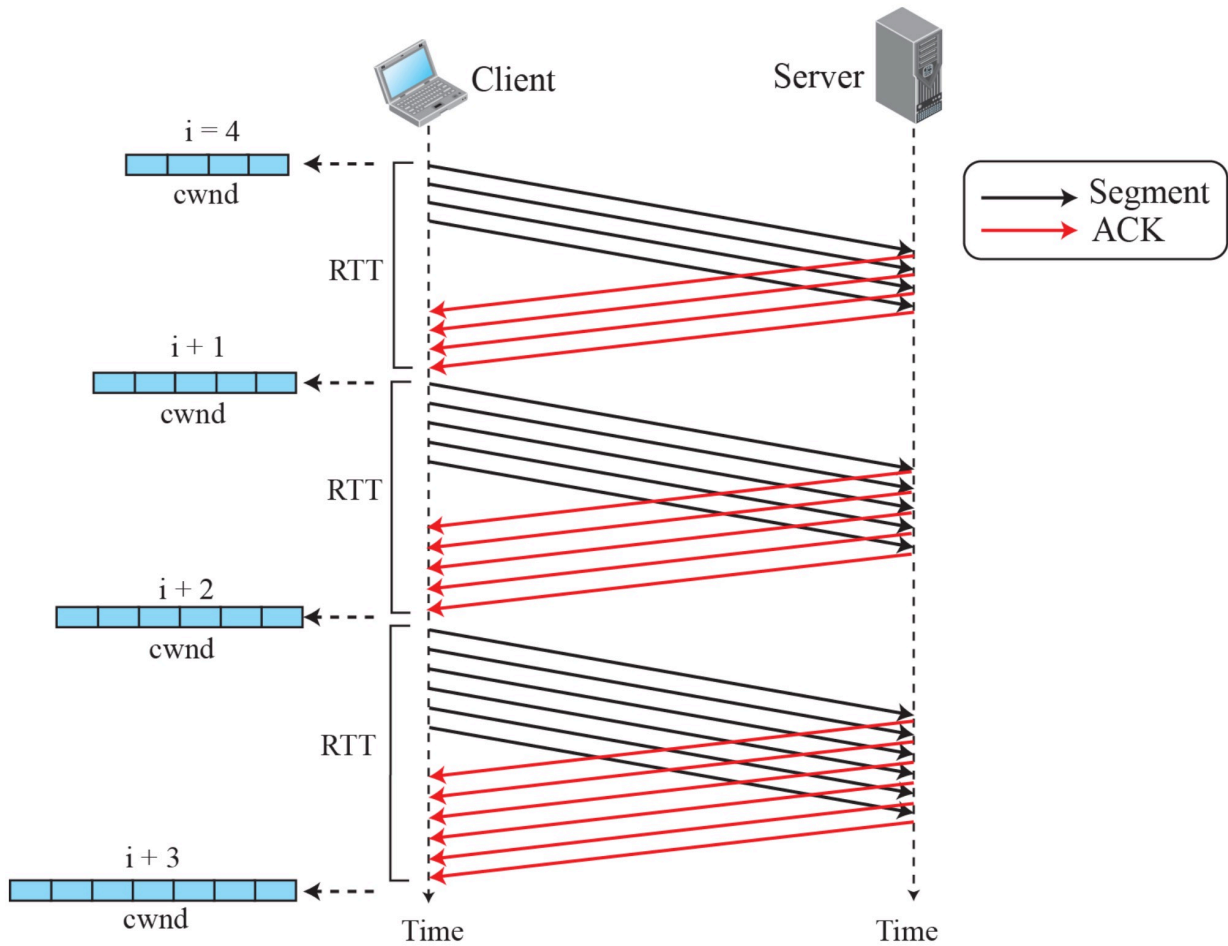


# CN Assignment III

1. With a diagram, explain the congestion avoidance phase of TCP Congestion Control.

In the congestion avoidance algorithm, the size of the congestion window increases additively until congestion is detected.



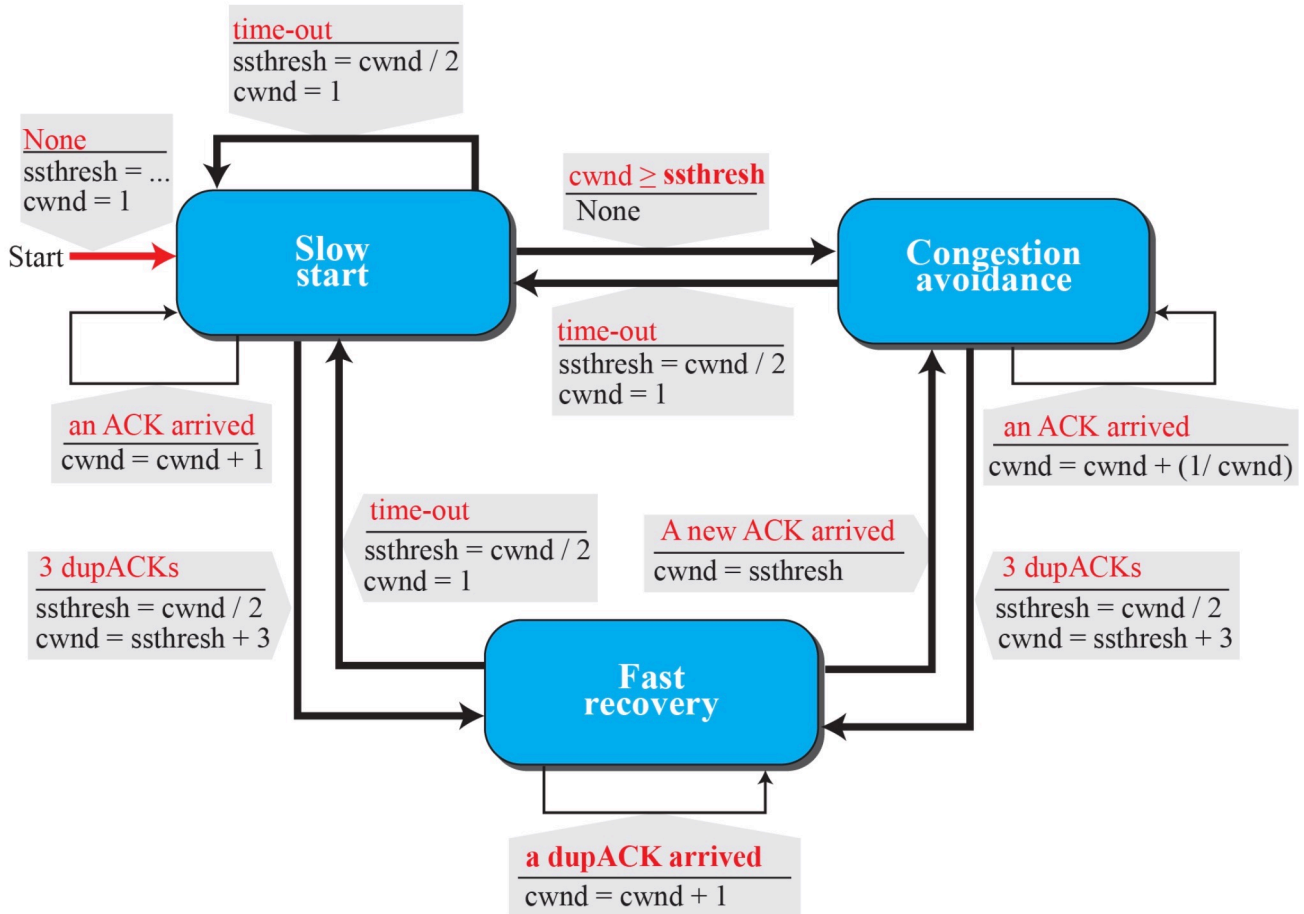
When the size of the congestion window reaches the slow-start threshold, the slow-start (exponential increase) phase stops and the additive phase begins.

Each time the whole window of segments is acknowledged (one round), the size of the size of the congestion window is increased by 1.

Congestion avoidance algorithm is usually applied when the size of the congestion control window is much greater than one.

After the sender has received acknowledgments for a complete window size of segments, the size of the window is increased by one segment.

2. With a FSM, explain Reno TCP.



TCP Reno requires that we receive immediate acknowledgement whenever a segment is received.

Reno uses an algorithm called 'Fast Re-Transmit', Whenever we receive 3 duplicate **ACK's** we take it as a sign that the segment was lost, so we re-transmit the segment without waiting for timeout. Thus we manage to re-transmit the segment with the pipe almost full.

After a packet loss, Reno does not reduce the congestion window to 1.

Each time we receive 3 duplicate **ACK's** we take that to mean that the segment was lost and we re-transmit the segment immediately and enter 'Fast- Recovery'

Set **ssthresh** to half the current window size and also set **CWD** to the same value.

For each duplicate **ACK** receive increase **CWD** by one. If the increase **CWD** is greater than the amount of data in the pipe then transmit a new segment else wait.

If there are **W** segments in the window and one is lost, the we will receive **(W-1)** duplicate **ACK's**. Since **CWD** is reduced to **W/2**, therefore half a window of data is acknowledged before we can send a new segment.

Once we re- transmit a segment, we would have to wait for at least one RTT before we would receive a fresh acknowledgement.

Whenever we receive a fresh ACK we reduce the **CWND** to **ssthresh**.

If we had previously received **(W-1)** duplicate **ACK's** then at this point we should have exactly **W/2** segments in the pipe which is equal to what we set the **CWND** to be at the end of fast recovery.

3. With a diagram, explain the sending of the request packet in the setup phase of the virtual circuit approach.
  
4. A datagram contains 8000 bytes of data and no options. This datagram is fragmented into Three fragments consisting of 3400 bytes, 2600 and 2000 bytes respectively. The fragment containing 2600 bytes is further fragmented into two fragments consisting of 1800 bytes and 800 bytes respectively. Draw a neat diagram representing the fragmentation. Show the values of all the fields which are relevant to fragmentation.
  
5. An organization is granted a block of addresses with the beginning address 14.24.74.0/24. The organization needs to have 3 sub-blocks of addresses to use in its three subnets: one sub-block of 10 addresses, one sub-block of 20 addresses, and one sub-block of 40 addresses. Design the sub-blocks.