1. Consider the following statements regarding the slow start phase of the TCP congestion control algorithm. Note that cwnd stands for the TCP congestion window, and MSS denotes the Maximum Segment Size. Which one of the following is False?[MSQ]

A) The cwnd increases by 2 MSS on every successful acknowledgement.
B) The cwnd approximately doubles on every successful acknowledgement.
C) The cwnd increases by 1 MSS every round trip time.
D) The cwnd approximately doubles every round trip time.

Answer:(A,B,C)
Explanation:

In Slow-start, the value of the Congestion Window will be increased by 1 MSS with each acknowledgement (ACK) received, effectively doubling the window size each round-trip time
Initially, TCP starts with a cwnd of 1 MSS. On every ack,
it increases cwnd by 1 MSS. That is, cwnd doubles every RTT.
Initially, it sends 1 segment. On ack, sends 2 segments.
After these 2 acks come back, it sends 4 segments etc.
TCP rate increases exponentially during a slow start.
Slow start continues till cwnd reaches the threshold.
After the threshold is reached, cwnd increases more slowly, by one 1 MSS every RTT.

2. Let the congestion window size of the TCP connection be 16 KB when a timeout occurs. The round trip time of a connection is 100 ms, and the maximum segment size is 2 KB. What is the time taken by the TCP connection to get back to the 16 KB congestion window?

A) 700 ms B) 600 ms C) 1000 ms D) 800 ms

Answer:(B)
Explanation:

Given that at the time of Time Out, the Congestion Window Size is 16KB and RTT = 100ms,
When Time Out occurs, for the next round of Slow Start,
Threshold = size of congestion window/2 => 8 kb.

Suppose we have a slow start ==>> 2KB｜4KB｜8KB｜ (As the threshold is reached, Additive increase starts) 10KB｜12KB｜14KB｜16 KB.
Here | (vertical line) represents RTT, so the total number of vertical lines is 6 X 100ms =>> 600 msec.

3. In the slow start phase of the TCP congestion control algorithm, the size of the congestion window

A) Does not increase B) Increases linearly

C) Increases quadratically D) Increases exponentially

Answer:(B)
Explanation:

Although the name is a slow start, during the slow start phase, the window size is increased by the number of segments acknowledged,
which means window size grows exponentially.
This happens until either an acknowledgement is not received for some segment or a predetermined threshold value is reached.

4. Consider an instance of TCP's additive increase multiplicative decrease(AIMD) algorithm where the window size at the start of the slow start phase is 1 MSS and the threshold at the start of the first transmission is 16 MSS. Assume that a timeout occurs during the seventh transmission. Find the congestion window size at the end of the 12th transmission.

A) 11 MSS B) 7 MSS C) 9 MSS D) 13 MSS

Answer:(A)
Explanation:

Given initial threshold = 16

At Time, t = 1, transmit congestion window size = 1 MSS (Slow start) ,
t = 2, ws = 2MSS (double the no. of ack.), t = 3, ws = 4MSS, t = 4, ws = 8 Mss t = 5, ws = 16 Mss
t = 6, ws = 17 (after threshold, now increase linearly (according to AIMD))
t = 7, transmit ws=18MSS, (but time out occur, resend 7th with window size starts with as slow start)
Hence new threshold = (congestion window size)/2 = 16/2 = 8
t = 8 transmit ws = 1MSS (since in the question, they are saying ss is starting from 1)
t = 9 transmit ws = 2MSS, t = 9 transmit ws = 4MSS, Time = 9 transmit ws = 8MSS,
t = 10 transmit ws = 9MSS (after threshold, now increase linearly (according to AIMD))
t = 11 transmit ws = 10MSS, t = 12 transmit ws = 11

5. On a TCP connection, the current congestion window size is Congestion Window = 5 KB. The window size advertised by the receiver is Advertise Window = 7 KB. The last byte sent by the sender is LastByteSent = 10240, and the last byte acknowledged by the receiver is LastByteAcked = 9192. The current window size at the sender is

A) 2048 bytes B) 4096 bytes

C) 5120 bytes D) 8192 bytes

Answer:(C)
Explanation:

Current Window Size / Sender's window size = min(congestion window, advertised window)
Therefore, Sender's window size = Min(5kb, 7kb) = 5kb = 5 x 210 byte = 5 x 1024 byte = 5120 bytes. There is no need to think about bytes sent and acknowledged.

6. Which one of the following statements is TRUE?[MSQ]

A) TCP guarantees a minimum communication rate.

B) TCP ensures in-order delivery.

C) TCP reacts to congestion by reducing the sender window size.

D) TCP employs retransmission to compensate for packet loss

Answer:(B,C,D)
Explanation:

A- FALSE: (TCP starts slow but doesn't guarantee minimum communication rate)
B- TRUE: (In TCP, Sequence numbers allow receivers to discard duplicate packets and properly sequence reordered packets.)
C- TRUE: (In TCP, When congestion is detected, the transmitter decreases the transmission rate by a multiplicative factor.)
D- TRUE: (In TCP, Acknowledgments allow senders to determine when to retransmit lost packets.)

7. Consider the following statements regarding TCP's congestion control phases. Which of these statements is/are true?

I. The size of the congestion window increases exponentially until it reaches a threshold (in the slow start algorithm).
II. In multiplicative decrease procedure, the threshold gets decreased to one-half of the previous window size.

A) Only I B) Only II

C) Both I & II D) None of these

Answer:(A)
Explanation:

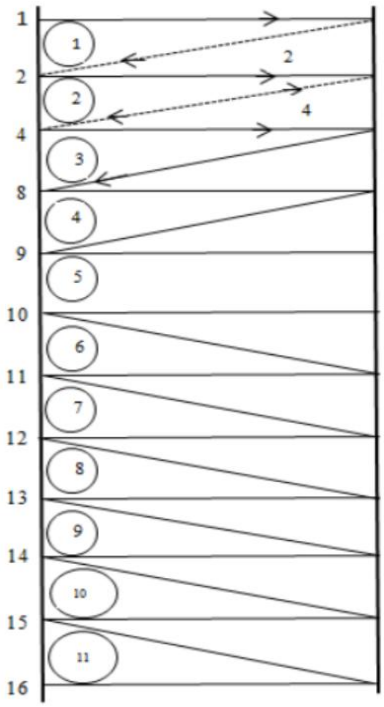
I - In the slow start algorithm, the size of the congestion window increases exponentially until it reaches a threshold. After this, it will increase additively, increasing one by one, till the timeout.

II - In multiplicative decrease, the threshold is one-half of the current congestion window size and not a previous window size.

8. If the receiver capacity is 16 mss. If the slow start phase starts with 1 mss and no congestion is detected until maximum receiver capacity is reached. After how many RTTs have reached maximum receiver capacity?

A) 8 B) 9 C) 10 D) 11

Answer:(D)
Explanation:
If no congestion is mentioned in the question.
Then, there is no need to consider the threshold.



9. Suppose the window size at the start of the slow start phase is 2 MSS and the threshold at the start of the first transmission is 16 MSS. Assume time out occurs during the sixth transmission. Suppose the Receiver window size is 22 MSS. Find the congestion window size at the end of the ninth transmission.

A) 11 MSS B) 2 MSS

C) 8 MSS D) 22 MSS

Answer:(C)
Explanation:

Given Threshold - 16 MSS, and at the 6th transmission, Timeout occurs.

2(1st transmission) - 4 - 8 - 16 (reach Threshold) - 18 - 20 (Timeout) -2 - 4 - 8(9th transmission)

10. In the TCP header, SYN=0 and ACK = 1 indicates? [MSQ]

A) Open connection packet

B) close connection packet

C) Data packet

D) Acknowledgement packet

Answer:(C,D)
Explanation:

SYN (synchronise) is used in conjunction with ACK to request or accept a connection.

SYN= 1 and ACK = 0, indicate a connection request(Request packet).
SYN= 1 and ACK = 1, indicate a connection accepted(Reply packet)
SYN= 0 and ACK = 1, is an acknowledgement(Pure ACK packet) and Data packet
SYN= 0 and ACK = 0, is not possible

11. Suppose the initial sequence number is 100, and it increases the counter by 4,64,000 for every 4 sec; how long does it take for the counter to wrap around?

A) 37,025 seconds B) 47,445 seconds

C) 37,142 seconds D) 57,025 seconds

Answer:(A)
Explanation:

In 4 secs, the counter increases by 4,64,000
for every 1 sec, the counter will increase by 4,64,000/ 4 = 1,16,000
The sequence no. is 32-bit long, and it can hold only 232 – 1.
So it takes (232 – 1)/(1,16,000) = 37025.58 seconds