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11/2/15

* TCP
  + Connection oriented
  + Reliable
  + Stream/byte - oriented
  + Full-duplex
  + Flow control
  + Error Control
* Header
  + 20-60 bytes
  + Source Port - 16 bits
  + Dest Port - 16 bits
  + Sequence Number - 32 bits
  + Acknowledgement number - 32 bits
  + Hlen - 4 bits - count by 4
  + Reserved - 6 bits
  + Flags - 6 bits
  + Window Size - 16 bits
  + Checksum - 16 bits
  + Urgent Pointer - 16 bits
  + Options and padding
* Connection Establishment
  + Pre
    - Server - listening (passive open)
    - Client - request a socket (active open)
  + 3 way handshake
    - Client sends a syn packet (includes ISN)
      * Initial sequence number
      * No Data
    - Server sends a syn + ack packet (include ISN)
      * Window Size
      * No Data
    - Client sends ack
      * May Include Data
      * Window Size
* Data Transfer
  + When we send always include ack (Piggybacking)
  + PSH - Immediately
  + URG - special data
    - Put the urgent data first
    - Urgent pointer - point to last byte of urgent
* Connection Termination
  + Three-way handshake
    - One side sends a FIN packet
    - other side sends a FIN ack
    - First side sends ack
* Connection Reset
  + Sent RST
    - Terminate Immediately
  + Abort existing connection
* Windows
  + Send
    - Open
    - Close
    - Shrink
  + Recv
    - Open
    - Close
  + Avoid Shrinking
* Silly Window Syndrome
  + Slow Sender
    - Naegles Solution
      * First byte send right away
      * Wait - max size
        + Ack
  + Slow Receiver
    - Clarks Solution
      * Max Size
      * Half the buffer
      * Delay ack 500 ms
* Ack Rules
  + Always Piggyback
  + Delay 1 Ack 500ms
  + 2nd Ack immediately
* Retransmission
  + After Timeout
  + After 3 duplicate
    - Acknowledgement (fast retransmit)
  + Deadlock - ack lost with rwnw -0