

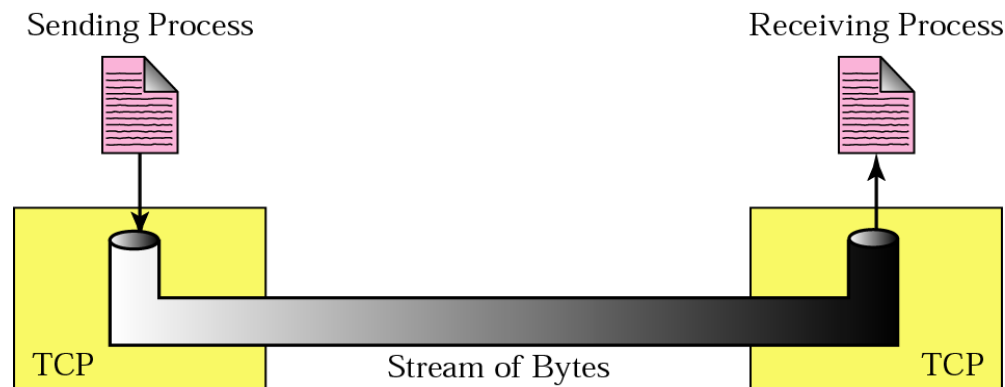
TCP: Flow and Error Control

Required reading:
Kurose 3.5.3, 3.5.4, 3.5.5

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TCP Stream Delivery

- TCP Stream Delivery** – unlike UDP, TCP is a **'stream-oriented' protocol**
- TCP allows sending process to deliver data as a stream of bytes and receiving process to obtain data as a stream of bytes
 - TCP creates an environment in which the two processes seem to be connected by an imaginary 'tube' – sending process writes into the 'tube' and receiving process reads from the 'tube'



TCP Buffers

TCP Sending and Receiving Buffers

TCP needs buffers for storage – sending and receiving processes may not produce and consume data at the same speed (e.g., receiving application or CPU may be busy with some other task)

- **one sending + one receiving buffer for each direction**
- sending buffer has 3 types of locations:
 - 1) locations that can be filled by sending process (W)
 - 2) bytes to be sent (P)
 - 3) bytes that have been sent but not yet acknowledged (B)
- receiving buffer has 2 types of locations:
 - 1) locations to be filled by bytes received from the network (W)
 - 2) bytes to be consumed by receiving process (P)

