Assignment #13

Due 05/04/2021

1. (**10 points**) Explain how select () call is used in socket programming.

   The select function allows you to check on several different sockets and do something based on whichever one is ready first. It allows you to implement an event driven design pattern when dealing multiple event sources.

2. (**10 points**) Explain differences between UNIX domain sockets and TCP sockets.

   A UNIX domain socket is an inter-process communication mechanism that allows bidirectional data exchange between processes running on the same machine while a TCP socket allow communication between processes over the network where usually these processes are not running on the same machine.

3. (**10 points**) Explain what can happen over time if both TCP-based and UDP-based flows are feeding into a router queue that is full.

   TCP-based: The packets are put into a receiver buffer and if the buffer is also full then the packets are dropped and lost.

   UDP-based: if the queue is full the packets are simply dropped and lost and no more packets will be getting sent until the queue frees up.

4. (**10 points**) Explain key differences between Slow Start phase and Congestion Avoidance phase of TCP.

   In the Slow Start phase after every RTT, the congestion window size increments exponentially while in the Congestion Avoidance phase the size of the cwnd (congestion window) increases by one.

5. (**10 points**) Explain what is really happening in Slow Start phase of TCP. What could be the replacement of Slow Start that also makes sense?

   Steps of the Slow Start phase:

   1) A sender attempts to communicate to a receiver where the sender sends a packet that contains a small congestion window determined by the sender's maximum window size.
   2) The receiver sends an acknowledgement packet with it's own window size.
   3) After receiving the acknowledgement packet, the sender keeps sending packets increasing the window size of each one. It keeps increasing until the receiver stops sending back acknowledgment packets or until either the sender's or receiver's window limit is reached.

   A replacement for Slow Start could be TCP splitting.