Exploring the Transport Control Protocol

In this exercise, you will explore the behavior of TCP to gain an understanding of the concept of a TCP connection and message buffering as it applies to TCP data streams

Exercise 1: Understand Connections

Run 2 copies of the Networking workbench on your computer:

On 1 copy, set the program to client mode by selecting TCP🡪 TCP Active Open from the menu

On the other copy, set the program to server mode by selecting TCP🡪 TCP Passive Open from the menu

1. Create sockets at both the client (active) and server (passive) ends.
2. At the Active end, click on Connect.

What happens and why?

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1. Click on bind at the Passive end.
2. At the Active end, try to Connect again

What happens this time and why?

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1. Click on Listen then Accept at the Passive end.
2. At the Active end, try to Connect again

What happens and why?

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1. Close connections and sockets at both ends.
2. Repeat steps 2 and 4, and then, listen at the passive end.
3. At the Active end, try to Connect

What happens and why?

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1. Accept at the Passive end.

What happens and why?

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Given the results of the previous steps, what are the roles of the Listen and Accept primitives of TCP sockets?

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Why do you think might it be important to separate these 2 steps of connection establishment?

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Exercise 2: Understand Stream Behavior and Communication

Set the message to be sent from the Active end as “Hello” then send a packet to the Passive End

On Passive end, click on enable receiver.

In this step, was the message delivered exactly as it was sent?

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Using the Passive end, also set its message to be sent to “Hello”, then send it twice to the Active end.

On the Active end, click on Enable Receiver then observe what the message that was received.

What happens (what exactly is delivered to the application)?

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Recall your experiments on UDP communications before. How does it differ when calling the receive function after multiple packets have been sent?

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What does this tell you about the nature of TCP as stream-oriented communication protocol (2pts)?

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Close the connections and sockets on both copies of the workbench

Based on the tests done in the previous steps, fill in the in the table below with the correct TCP primitive sequence leading to successful receipt of data on both client and server. Add more rows to the table as necessary:

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| --- | --- | --- |
| Step # | Client | Server |
| 1 | Bind |  |
| 2 |  | Bind |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |