Lab 4 Report: Network Communication

Locating IP Addresses of Devices in your Network

How many IPv4 addresses are assigned to the board? What is the IPv4 address assigned to the 'eth0' or Ethernet interface? What is the netmask of this address?
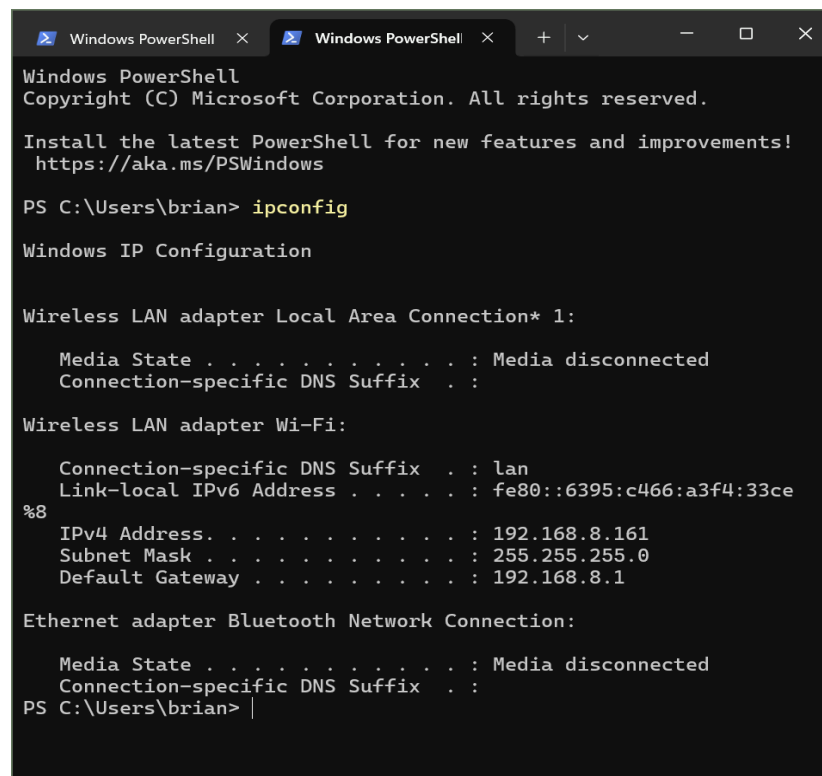Note: `eth0: 1` or `usb0` is a virtual interface through the USB cable. This assigns your board an IP address over USB. This is a static IP address, so you can always reach your board from this IP address over USB.
Answer: 2 IP addresses
  a. eth0
     i. Ipv4: 192.168.8.133
     ii. netmask 255.255.255.0
  b. lo: Loopback
     i. Ipv4: 127.0.0.1
     ii. Netmask: 255.0.0.0

On your computer, open a command prompt and run `$ ipconfig` on Windows and `$ ifconfig` on MAC/Linux (it may take a second to connect, so wait a minute and then run the command)
Question: How many IPv4 addresses are assigned to this machine? What IPv4 address has the same netmask as the PYNQ board?

Question: Below, compile all the IP addresses of the PYNQ boards in your group:
1. My PYNQ board:
    a. IPV4: 192.168.8.133
2. Partners PYNQ board:
    a. IPV4: 192.168.8.165

PYNQ-PYNQ Communication with Python

Go through and complete the code. Answer the following questions.

Question: What does `socket.SOCK_STREAM` mean (hint: search the documentation link in the notebook)?

Answer: socket.SOCKET_STREAM means establish a TCP connection.

Question: What is the order of operations for starting a client socket and sending a message?

Answer:
1. Initialize the socket object
2. Call the connect() object and pass in an IP address as a string and a listening port as an integer.
3. Use the sendall() function to send a byte literal b'..."
4. Close the socket with .close()

Question: What is the order of operations for starting a server socket and receiving a message?

Answer:

1. Initialize the socket object
2. Call the bind() object and pass in an IP address as a string and a listening port as an integer.
3. Use the listenI() function to begin listening on that port.
4. Call the accept() function to accept any message from a given IP address
5. Call recv(BUFFER_SIZE) and specify the buffer size in the parameter
5. Close the socket with .close()

Wireshark

Question: What is the sequence number of the TCP SYN segment that is used to initiate the TCP connection between the PYNQ board and the local machine? What is it in the segment that identifies the segment as a SYN segment?
Answer:
1. Sequence number for TCP SYN Segment(raw): 3485764467
2. Flags: 0x002 (SYN)

Question: Follow the Stream:
Answer: