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1. What is an IP address and what is it used for?

IP addresses are identifiers that uniquely identify devices on the internet or local network, this allows devices to communicate with each other over a network.

2. What is the difference between a local IP address and a global one?

Global IP Addresses (Public IP Addresses) are used over the internet to identify unique systems or devices, Local IP Addresses are to identify devices in a private network.

3. On the computer/internet connection that you are currently using:
    a. What is your global IP number?
    b. What is your local IP number?

Global IP Address: 192.168.50.210, Local IP: 99.230.245.190

4. What is the difference between a dynamic IP and a static IP?

Dynamic IP addresses are assigned by the network whenever they connect to the network. Static IP Addresses are IP Addresses that do not change, therefore remain static. Dynamic IP Addresses are considered more secure than static IP addresses due to the fact that their IP Address alters over time, therefore, creating a level of protection for the user but due to this there are use case situations where Static IP's are preferred Such As:

- Better DNS Support & Server Hosting: You wouldn't want your IP address to randomly change making it harder for customers to find you are using a Dynamic IP Address
- Easy to access via remote systems

5. What is port forwarding?

Port forwarding is enabling a Port Number locally to become accessible to devices on the Global Network, So if your global IP address (in my case) is 192.168.50.210 and I have a device with Port number 2345 for example, when we receive a package we would only see our port number 2345, from that point on it would get sent to a socket corresponding to that port number.

6. What is a socket?

Sockets each have a corresponding port number and are basically just an ending to two programs communicating with each other over a network. So if any device from the Global network sends a package to 192:168.50.210:2345 it will be sent through to it's corresponding "Socket" this makes it so that the network can clearly define where the package will be sent to.

7. What is the difference between a socket and a port?

A port is an internal address within a Local network that identifies devices, but sockets contain the information of both the IP Address and a Port Number(basically an IP Address + Port Number = Socket) **BUT** are not considered connections, instead, they are endpoints to connections, furthermore, sockets do not need to be TCP based (but often is the case) it's just that if the Socket connection is running on TCP, the connecting socket must also be TCP (Endpoint protocol must be the same)

8. Investigate the commonly used port numbers. How you might select a relatively unused port number?

Checking Iana (The Internet Assigned Numbers Authority) a "Administration function of the internet that keeps track of IP Addresses, Domain names and protocol parameters identifiers" we can check the link https://www.iana.org/assignments/service-names-port-numbers/service-names-port-numbers.xhtml?search=unassigned for already assigned port numbers, searching unassigned in the search bar we can find unassigned port numbers and their corresponding protocol.

9. What is the OSI model?

OSI Model (Open System Interconnection Model) is a framework for how applications communicate with each other. The OSI Model can be depicted by 7 Layers each to help identity levels of communication within a network, Split between Physical, Data Link, Network, Transport, Session, Presentation, Application. (From Bottom to Top)

10. Wherein the OSI model do you suppose that us game developers will be working?

The Network Layer as it is responsible for: Establishing a logical connection between nodes, Data Forwarding, Routing, and Delivering Error Support. In General is responsible for transmitting data packets to computers/nodes, providing data routing, and switching for creating paths for communication.

11. What is TCP?

TCP (Transmission Control Protocol) is one of the Internet Protocols much like the OSI Model is split into layers to Define levels of communication, in this case, Process/Application, Transport, Internet and Network Access, TCP.

Quickly: The application layer gets data from the program the user and sends data to the Transport Layer through Ports (Example HTTP: 80), the transport layer turns the data into packets with headers giving the receiving device instructions to build the packets properly. The packets individually take the shortest route to the receiving device through the Internet layer with an attached Origin and Destination IP Address, Finally, the information arrives at the Networking layer which is responsible for defining devices on the same network.

12. What is UDP?

UDP (User Datagram Protocol) is also one of the Internet Protocols and is also split into layers, Application, Transport, Network, Link, and Physical. UDP is a lightweight connectionless protocol meaning that there is no need to have a connection established with a receiver before sending out data and also does not provide error corrections making it an unreliable protocol, But it's packets are smaller (UDP: 8 Bytes, TCP: 20 Bytes)

13. When is TCP best used?

TCP is best used in applications where the reliability of packets being in the correction order are import, File Transferring, Emails, and Web Browsing.

14. When is UDP best used?

UDP is best used where speed is more important, Video Streaming, Online Gaming.

Sources:

https://www.researchgate.net/publication/329698255_Performance_Comparison_between_TCP_and_UDP_Protocols_in_Different_Simulation_Scenarios

https://www.avast.com/c-ip-address-public-vs-private#:~:text=A%20public%20IP%20address%20is,internet%20service%20provider%20(ISP).&text=Using%20a%20public%20IP%20address,giving%20out%20your%20home%20address.

https://users.cs.duke.edu/~chase/ocps214/sixup/razor-transport-tcp.pdf

https://www.vpnmentor.com/blog/tcp-vs-udp/#:~:text=TCP%20is%20used%20in%20applications,live%20streaming%2C%20and%20online%20gaming.

http://blog.icat.ac.in/basics-of-game-networking

https://www.geeksforgeeks.org/difference-between-socket-and-port/#:~:text=A%20port%20is%20a%20logical,needs%20to%20consume%20the%20packet.

http://www.steves-internet-guide.com/tcpip-ports-sockets/

https://www.youtube.com/watch?v=07nCGqksZyE

https://www.youtube.com/watch?v=Vdc8TCESIg8

https://www.youtube.com/watch?v=PpsEaqJV_A0