Assignment 1& 2

# Assignment 1: Draw your Home Network Topology and explain how you are accessing the RPS Lab environment.

Home Network Topology:



Computer 1

Switch

RPS Cloud Lab

Switch

Router

Internet

Computer 2 Wifi Access Point Laptop

Internet Service Provider (ISP): This is the gateway to the internet for your home network. It provides you with an external IP address and connects you to the broader internet infrastructure.

Modem: Typically, your ISP provides you with a modem. This device translates the signals from your ISP into a form that your local network devices can understand. It's the bridge between your home network and the internet.

Router: The router manages the local network within your home. It assigns local IP addresses to devices connected to it, facilitates communication between these devices, and handles the routing of data between your home network and the internet.

WiFi Access Point: In many modern homes, the router also functions as a WiFi access point. It broadcasts a wireless signal, allowing devices like laptops, smartphones, tablets, and smart home devices to connect to the internet without requiring physical cables.

Devices: These are the endpoints in your home network. They include personal computers, laptops, smartphones, tablets, smart TVs, gaming consoles, smart home devices, and any other devices that connect to your home network either via WiFi or Ethernet cables.

Accessing the RPS Lab Environment:Assuming the RPS Lab environment is hosted remotely on a cloud platform, here's a detailed explanation of how you might access it from your home network:

Device: You'll use your personal computer or laptop to access the RPS Lab environment.

Internet Connection: Your home network provides the internet connection needed to access resources hosted on the cloud.

Router Configuration: Your router manages the traffic flow between your home network and the internet. You may need to configure port forwarding or firewall rules on your router to allow incoming connections to the RPS Lab environment, depending on the specific requirements of the setup.

VPN (Virtual Private Network): For added security, you might use a VPN to establish a secure, encrypted connection from your device to the cloud platform hosting the RPS Lab environment. This ensures that your data remains private and protected from eavesdropping or interception while traversing the internet.

Remote Access Protocol: Once connected to the cloud platform via VPN, you'll use a remote access protocol such as SSH (Secure Shell) or RDP (Remote Desktop Protocol) to connect to the servers or virtual machines hosting the RPS Lab environment. These protocols allow you to remotely access and control the resources within the lab environment as if you were physically present.

Cloud Provider's Infrastructure: Behind the scenes, the RPS Lab environment is hosted on servers or virtual machines provided by a cloud service provider. These resources are accessible over the internet and are managed by the cloud provider, ensuring high availability, scalability, and reliability of the lab environment.

By following these steps, you can securely access the RPS Lab environment hosted remotely on a cloud platform from your home network, enabling you to perform various tasks, experiments, or development work without the need for physical infrastructure.

# Assignment 2: Identify a real-world application for both parallel computing and networked systems. Explain how these technologies are used and why they are important in that context.

Real-world application that utilizes both parallel computing and networked systems: online multiplayer gaming.

Parallel Computing: In online multiplayer gaming, parallel computing is utilized to handle the vast amount of computations required to simulate the game world, including physics, graphics rendering, artificial intelligence, and player interactions. These computations are often performed in parallel across multiple CPU cores or GPU threads to ensure smooth gameplay and responsiveness.

Networked Systems: Networked systems enable multiple players to connect and interact within the game environment over the internet. This involves the exchange of data packets between players' devices and game servers, which coordinate gameplay, synchronize game state, and transmit updates in real-time.

How they are used:

Game Simulation: Parallel computing is employed to simulate the game world on each player's device or on dedicated game servers. This involves running multiple concurrent processes to handle different aspects of the game, such as physics calculations, rendering graphics, and managing non-player characters (NPCs).

Player Interactions: Networked systems facilitate communication between players' devices and game servers, allowing players to interact with each other in real-time. This includes actions such as movement, combat, chat messages, and trading items. Network

protocols like TCP/IP or UDP/IP are used to transmit data packets between players and servers.

Synchronization: To maintain consistency across all players' views of the game world, networked systems synchronize game state updates between clients and servers. This ensures that all players experience the same events simultaneously, even if they are physically located in different parts of the world. Techniques like client-side prediction and server reconciliation help minimize latency and ensure smooth gameplay.

Scalability: Parallel computing and networked systems enable online multiplayer games to scale to support thousands or even millions of concurrent players. Game servers can be deployed in data centers around the world to reduce latency and accommodate players from diverse geographical regions.

Why They Are Important:

Real-Time Interaction: Parallel computing and networked systems enable seamless real- time interaction between players in online multiplayer games, creating immersive and engaging gameplay experiences.

Scalability and Performance: By leveraging parallel computing and distributed network architectures, online multiplayer games can scale to support large player populations while maintaining high performance and responsiveness.

Global Accessibility: Networked systems make it possible for players from around the world to connect and play together in online multiplayer games, fostering a global community of gamers.

Reliability and Stability: Parallel computing and networked systems incorporate redundancy and fault tolerance mechanisms to ensure the reliability and stability of online multiplayer game servers, minimizing downtime and disruptions to gameplay.

In summary, parallel computing and networked systems play crucial roles in enabling the development and operation of online multiplayer games, facilitating real-time interaction, scalability, and global accessibility for players worldwide.