Assignment 1: Write the network terminologies with example

**Network:** A collection of interconnected devices that can communicate with each other. These devices can be computers, printers, servers, smartphones, tablets, etc.

Types of Network Terminologies are:-

1. Node
2. Protocol
3. IP Address
4. LAN (Local Area Network)
5. WAN (Wide Area Network)
6. VPN (Virtual Area Network)
7. Internet
8. Intranet
9. Router
10. Firewall
11. Switch

**Node:** Any device connected to a network is called a node.

**Protocol:** A set of rules and standards that define how devices on a network communicate with each other. It's like a common language that all devices understand. There are many different protocols, each with its own purpose. Some common protocols include TCP/IP (Transmission Control Protocol/Internet Protocol), HTTP (Hypertext Transfer Protocol), and SMTP (Simple Mail Transfer Protocol).

**IP Address:** A unique numerical identifier assigned to each device on a network. It's like a home address for your device on the network. An IP address allows other devices to find and communicate with your device.

**LAN (Local Area Network):** A network that covers a small geographic area, such as a home, office, or school. Devices on a LAN are typically connected by cables or Wi-Fi.

**WAN (Wide Area Network):** A network that covers a large geographic area, such as a city, state, or country. WANs are often used to connect LANs together. The internet is the largest WAN in the world.

**VPN (Virtual Private Network):** A secure connection that allows you to access a private network over the public internet. VPNs are often used by businesses to allow employees to connect to the company network from home or while traveling.

**Internet:** A global network of interconnected computer networks. The internet allows devices all over the world to communicate with each other.

**Intranet:** A private network that is only accessible to a specific group of people, such as the employees of a company. Intranets are often used to share company resources and information.

**Router:** A device that directs traffic between different networks. Routers are used to connect LANs to WANs, such as the internet.

**Firewall:** A security device that monitors incoming and outgoing traffic on a network. Firewalls are used to block unwanted traffic and protect your network from attacks.

**Switch:** A device that connects devices on a LAN. Switches are used to improve the performance of a network by reducing traffic congestion.

Assignment 2: Draw your Home Network Topology and explain how you are accessing the RPS Lab environment.

Network Topology: Network topology refers to the way that devices and connections are arranged in a network.

It Define Two Main Aspect:

Physical Topology: This describes the physical layout of the network, including the physical placement of devices (like computers, routers, switches) and how they are connected with cables or wireless signals.

**Logical Topology:** This describes how data flows through the network, regardless of the physical connections.

There are Different Type of Network Topology:

* **Bus Topology:** All devices are connected to a single central cable.
* **Star Topology:** Devices are connected to a central hub or switch.
* **Mesh Topology:** Devices connect to each other dynamically, creating multiple pathways for data flow
* **Ring:** Devices are connected in a closed loop, where data travels from one device to the next.

**Typical Home Network Topology**

A common home network might consist of the following devices:

* **Internet Service Provider (ISP):** This company provides your internet access. Their equipment is usually located outside your home.
* **Modem:** This device receives the internet signal from your ISP and converts it into a format that your home network can use.
* **Router:** This device directs traffic between your home network and the internet. It also assigns IP addresses to devices on your network.
* **Wireless Access Point (Optional):** This device allows you to connect to the network wirelessly with Wi-Fi enabled devices like laptops, phones, and tablets.
* **Wired Devices (Optional):** Some devices like desktops or gaming consoles might be directly connected to the router using ethernet cables for a faster and more stable connection.

**Accessing RPS Lab Environment**

There are a couple of ways someone might access a remote lab environment like RPS Lab:

* **Web-based Portal:** The lab might be accessible through a web browser. In this case, the user would need to log in to the portal using a username and password provided by the institution.
* **VPN Connection:** The user might need to establish a VPN connection to the lab's network. This would typically require installing VPN software on their device and using login credentials provided by the institution.

Internet

|

(ISP)

|

Modem

|

Router

|

(Wired Devices)

|

Switch (Optional)

|

(Wired Devices) / \ (Wireless Devices)

| |

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| Wi-Fi |

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Laptops, Tablets, Smartphones

Accessing the RPS Lab Environment

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Assignment 3: 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

**Real-World Application: Weather Forecasting**

Weather forecasting is a prime example where both parallel computing and networked systems play crucial roles in delivering faster, more accurate forecasts.

**Networked Systems in Action:**

* **Data Collection:** A vast network of weather stations around the globe constantly collects real-time data on temperature, pressure, humidity, wind speed, and direction. These stations are connected through communication networks, transmitting the data to central servers.
* **Data Sharing and Integration:** The collected weather data isn't limited to individual stations. Networked systems allow for sharing this data between different weather agencies and research institutions. This collaborative approach provides a more comprehensive picture of global weather patterns.

**Parallel Computing Takes Over:**

* **Complex Weather Models:** Modern weather forecasting relies on sophisticated computer models that simulate atmospheric conditions. These models involve solving massive sets of equations that account for various factors influencing weather. Parallel computing comes into play here. By distributing these complex calculations across multiple processors or computers working in parallel, the models run significantly faster.
* **Faster Simulations, More Accurate Forecasts:** Running weather models on a single computer could take hours or even days. Parallel computing allows these models to run much faster, enabling meteorologists to generate forecasts with less time lag and improve their accuracy.

**Why They Matter:**

* **Timely Warnings:** Faster processing through parallel computing allows for quicker analysis of weather data. This translates to issuing timely warnings about severe weather events like storms, floods, or heatwaves, giving people time to prepare and potentially saving lives.
* **Improved Decision Making:** Accurate weather forecasts are crucial for various sectors, from agriculture planning and disaster management to aviation and energy production. Networked systems ensure wider access to this data, enabling better-informed decisions across different industries.
* **Enhanced Research and Development:** Networked data sharing allows weather researchers to analyze vast datasets and develop more sophisticated models. This continuous improvement leads to even more accurate forecasts in the future.

In conclusion, weather forecasting exemplifies the power of combining networked systems and parallel computing. Networked systems ensure data collection and sharing on a global scale, while parallel computing tackles the immense computational needs of complex weather simulations. This synergy helps us understand and predict weather patterns better, ultimately keeping us safe and prepared for the forces of nature.