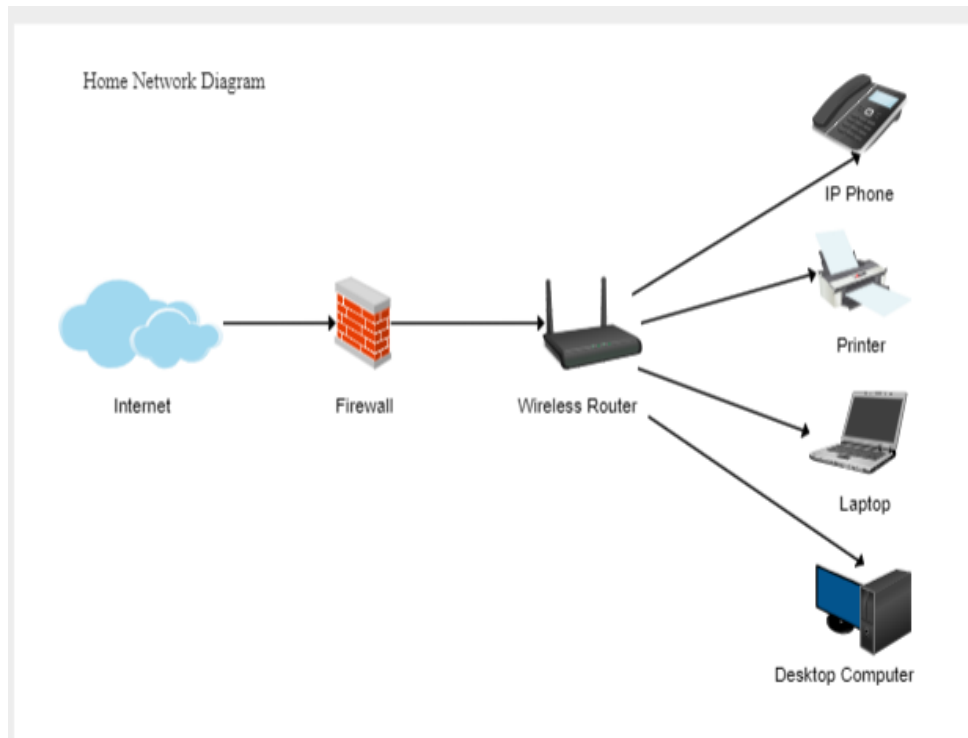


Draw your Home Network Topology and explain how you are accessing the Any(College lab , office lab) Lab environment.

Home Network Topology:



**ISP Router/Modem:** This is the gateway to the internet provided by your Internet Service Provider (ISP). It usually connects to the internet via a coaxial cable, DSL, or fiber-optic line.

**Wireless Router:** This device connects to the ISP router/modem and creates a local network within your home. It typically provides both wired and wireless connections to devices within your home.

**Desktop/Laptop Computers:** These are the devices you use for accessing the internet and other resources within your home network. They connect to the wireless router either via Wi-Fi or Ethernet cable.

**Smartphones/Tablets:** Similar to desktops and laptops, these devices connect to the wireless router via Wi-Fi for internet access.

**Smart Home Devices:** These include devices like smart TVs, smart speakers, thermostats, and security cameras that connect to your home network for internet access and communication.

**Accessing Lab Environments:**

To access lab environments remotely from your home network, you typically need to establish a secure connection to the lab network. Here's how you might do it:

Virtual Private Network (VPN): Many organizations, including colleges and offices, provide VPN access for remote workers or students. A VPN allows you to create a secure connection to the lab network over the internet. You would install VPN client software on your home computer or device and then connect to the VPN using your credentials. Once connected, your device will have an IP address on the lab network, allowing you to access resources as if you were physically connected to the lab network.

Remote Desktop Protocol (RDP) or SSH: Depending on the lab setup, you might use protocols like RDP (for Windows environments) or SSH (for Unix/Linux environments) to remotely access specific computers or servers within the lab network. You would use a remote desktop client or SSH client on your home computer to connect to the lab resources using their IP addresses or hostnames.

Web-based Interfaces: Some lab resources may be accessible through web-based interfaces. In this case, you would simply use a web browser on your home computer to access the lab resources by entering the appropriate URLs or IP addresses.

**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 for Parallel Computing: Weather Forecasting

Parallel computing plays a crucial role in weather forecasting, a complex process that involves running numerous simulations to predict future weather conditions accurately. Weather forecasting models require significant computational power to process vast amounts of data from various sources, such as satellites, weather stations, and ocean buoys, to generate forecasts.

Parallel computing enables weather forecasting agencies to divide the workload among multiple processors or nodes, allowing them to perform computations simultaneously. Each processor works on a different part of the simulation or processes different datasets concurrently, significantly reducing the time required to generate forecasts.

Parallel computing is essential in weather forecasting for several reasons:

**Speed and Efficiency:** Weather forecasting models involve complex mathematical calculations and simulations that require substantial computational resources. Parallel computing allows these computations to be performed simultaneously, reducing the time required to generate forecasts from hours to minutes or even seconds.

**Scalability:** As the volume of data and the complexity of weather models increase, parallel computing provides scalability by allowing additional processors or nodes to be added to the system. This scalability ensures that weather forecasting agencies can handle growing amounts of data and maintain the accuracy and timeliness of their forecasts.

**Accuracy:** Parallel computing enables weather forecasting models to incorporate more data and perform more detailed simulations, leading to more accurate forecasts. By dividing the workload among multiple processors, parallel computing allows for finer resolution and more comprehensive analysis of weather patterns, resulting in improved prediction accuracy.

Real-world Application for Networked Systems: Online Retail

Networked systems are fundamental to the operation of online retail platforms, where millions of users interact with e-commerce websites and applications to browse products, make purchases, and

track orders. These systems comprise a network of servers, databases, and other infrastructure components interconnected via the internet to deliver a seamless shopping experience to customers.

Networked systems are essential in online retail for several reasons:

**Scalability:** Online retail platforms must accommodate fluctuating levels of user traffic, especially during peak shopping seasons or promotional events. Networked systems allow retailers to scale their infrastructure dynamically by adding or removing servers and resources to meet demand while ensuring optimal performance and user experience.

**Reliability:** Networked systems enable redundancy and failover mechanisms to ensure high availability and reliability. By distributing resources across multiple servers and data centers, online retailers can mitigate the risk of system failures or downtime, ensuring uninterrupted service for customers.

**Data Management:** Networked systems facilitate the storage, retrieval, and processing of vast amounts of data generated by online retail transactions. This includes customer information, product catalogs, order histories, and inventory data, which must be managed efficiently to support personalized shopping experiences, targeted marketing campaigns, and inventory management.

**Security:** Networked systems play a critical role in securing online retail platforms against cyber threats, such as data breaches, fraud, and malware. This includes implementing encryption, firewalls, intrusion detection systems, and other security measures to protect sensitive customer data and transactional information.