

Computer Architecture - Hardware, Network and Software 1.0

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

Home Network Topology:

1. **ISP (Internet Service Provider):** This is where your internet connection originates from. It could be cable, fiber, DSL, or another type of connection.
2. **Modem:** This device connects your home network to the internet. It receives data from your ISP and converts it into a form that your network can use.
3. **Router:** The router is the central hub of your home network. It directs traffic between devices on your local network and between your local network and the internet.
4. **Switch (optional):** If you have many wired devices in your home, you may have a switch to connect them all to the router.
5. **Wireless Access Point (WAP):** This device provides wireless connectivity to devices in your home, allowing them to connect to your network without cables.
6. **Devices:** These are your computers, smartphones, tablets, smart home devices, etc., that connect to your network either wired or wirelessly.

Accessing the RPS Lab Environment:

To access the RPS (Remote Practice System) Lab environment, you typically need to follow these steps:

1. **Connect to your Home Network:** Ensure that your device (computer, laptop, etc.) is connected to your home network, either via Wi-Fi or Ethernet cable.
2. **VPN (Virtual Private Network):** Many lab environments require a VPN connection for security reasons. A VPN creates a secure, encrypted connection between your device and the lab's network, allowing you to access resources as if you were physically connected to that network.
3. **Credentials and Permissions:** You may need specific credentials (username, password) to log in to the lab environment. Additionally, your account might need appropriate permissions to access certain resources within the lab.
4. **Access Tools:** Once connected, you might use various tools such as remote desktop software or SSH (Secure Shell) to access servers or other devices within the lab environment.
5. **Work within the Lab Environment:** Once connected, you can perform tasks, experiments, or exercises within the lab environment as required.
6. **Log Out and Disconnect:** When you're finished working in the lab environment, remember to log out properly and disconnect from the VPN if necessary to ensure security and conserve resources.

This setup allows you to access the lab environment securely from your home network, enabling you to practice, learn, or work remotely.

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.

1. Parallel Computing:

Application: Weather Forecasting

Explanation: Weather forecasting involves complex mathematical models that simulate atmospheric conditions. These simulations require massive computational power to process data from various sources such as satellites, weather stations, and ocean buoys. Parallel computing is crucial in this context because it allows weather prediction models to divide the workload into smaller tasks that can be processed simultaneously by multiple processors or cores. Each processor works on a different part of the simulation, and the results are then combined to generate accurate forecasts. This parallel processing significantly reduces the time required for computations, enabling meteorologists to provide timely and reliable weather predictions.

Importance: Timely and accurate weather forecasts are essential for various industries and activities, including agriculture, transportation, energy, and emergency management. Parallel computing accelerates the modeling and simulation processes, allowing meteorologists to analyze vast amounts of data and generate forecasts faster. This, in turn, helps decision-makers and individuals make informed choices, mitigate risks, and plan for weather-related events more effectively.

2. Networked Systems:

Application: Online Retail

Explanation: In the context of online retail, networked systems play a crucial role in facilitating e-commerce operations. These systems encompass various components such as web servers, databases, inventory management systems, payment gateways, and customer relationship management (CRM) software. When a customer browses a website, adds items to their cart, and proceeds to checkout, their actions trigger interactions across multiple networked systems. For example, the web server serves web pages, the database retrieves product information, the inventory management system updates stock levels, the payment gateway processes transactions securely, and the CRM system records customer data and preferences. All these systems are interconnected through a network, enabling seamless communication and coordination of tasks to provide a smooth shopping experience for the customer.

Importance: Networked systems are essential for the functioning of online retail businesses as they support critical operations, including website accessibility, product availability, secure transactions, and customer service. By efficiently managing data flow and communication between different components, networked systems ensure that online retailers can serve customers effectively, process orders accurately, and maintain optimal performance even during peak demand periods. Additionally, these systems enable retailers to track inventory, analyze customer behavior, personalize recommendations, and improve overall business efficiency and profitability.

Top of Form