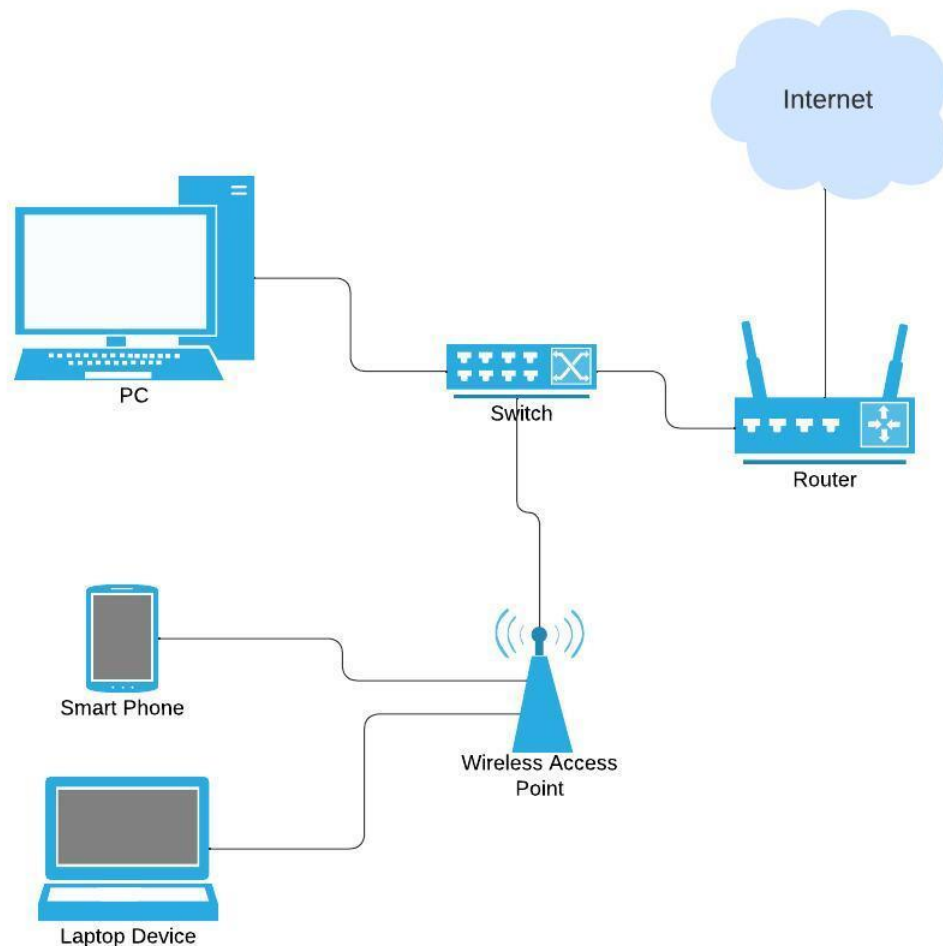**Assignment 1: Draw your Home Network Topology and explain how you are accessing the RPS Lab environment.**

Explanation of Components:

1. **ISP (Internet Service Provider):** Provides the internet connection.

2. **Modem:** Connects to the ISP and converts the internet signal into a usable form for the home network.

3. **Wireless Router:** Distributes the internet connection to various devices via both wired and wireless connections.

4.**Devices:** Various connected devices such as laptops, desktops, and smartphones.

5. **Switch:** Expands the wired connections available from the router.

6. **Server/VM Host:** A dedicated machine running virtual machines.

Accessing the Virtual Machine Environment:

-VM Host Setup: The server or a powerful desktop is set up with virtualization software such as VMware, VirtualBox, or a hypervisor like Proxmox or ESXi.

-Network Configuration:

Web Interfaces: Some virtualization platforms (like Proxmox) offer web-based management interfaces where you can manage and access VMs through a web browser.

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.

A real-world application that combines parallel computing and networked systems in the context of E-commerce is in the management of large-scale online retail platforms. Here's how this could work:

Real-time Inventory Management:

In E-commerce, especially for platforms with extensive product offerings and high transaction volumes, managing inventory in real-time is crucial. Parallel computing can be employed to process inventory updates and product availability across distributed databases or servers. Each server node can handle a subset of products or regions, with parallel processing ensuring that updates are made swiftly and accurately. Networked systems enable the seamless synchronization of inventory data across these distributed nodes, allowing customers to view accurate stock information in real-time.

Scalable Order Processing:

During peak shopping seasons or events, such as Black Friday or holiday sales, E-commerce platforms experience a surge in orders. Parallel computing techniques like load balancing and distributed processing can be utilized to scale order processing across multiple servers or clusters. Networked systems enable efficient communication and coordination between these processing units, ensuring that orders are processed quickly without overwhelming any single component of the system.

Fraud Detection and Security:

In E-commerce, detecting fraudulent activities in real-time is critical for preventing financial losses and ensuring customer trust. Parallel computing can be employed to analyze large volumes of transaction data concurrently, applying machine learning algorithms to identify patterns indicative of fraudulent behavior. Networked systems play a vital role in integrating various sources of data (e.g., payment gateways, user profiles) and distributing the computational workload across multiple servers for timely detection and response to security threats.

High-Performance Search and Content Delivery:

Efficient search functionality and content delivery are essential for a seamless user experience in E-commerce. Parallel computing techniques like distributed indexing and caching can optimize search operations and content retrieval. Networked systems facilitate the distribution of search queries and content requests to geographically dispersed servers or content delivery networks (CDNs), reducing latency and improving responsiveness for users worldwide.

By leveraging parallel computing and networked systems, E-commerce platforms can achieve high performance, scalability, and reliability, meeting the demands of a dynamic online retail environment while delivering a seamless and personalized shopping experience to customers.