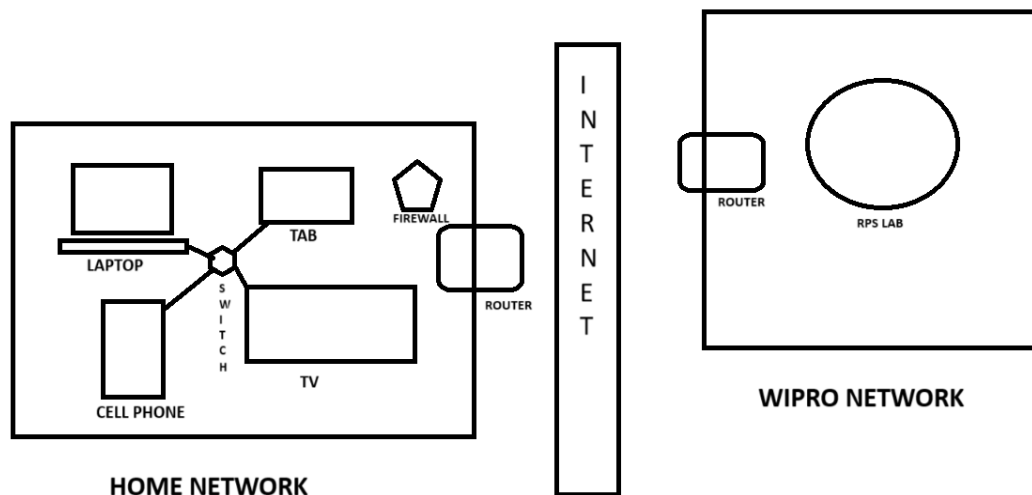# Day 1 Assignments

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

1.Modem: The connection from your Internet Service Provider (ISP) enters your home through a modem. This could be a cable modem, DSL modem, fiber optic ONT (Optical Network Terminal), or similar device.

2.Router: The modem connects to a router, which serves as the central hub of your home network. The router manages traffic between your local devices and the internet. It often includes Wi-Fi functionality for wireless devices.

3.Switches: For larger networks or when wired connections are preferred, switches may be used to connect multiple devices together. These devices allow for faster data transfer between devices on the same local network.

4.Devices: Various devices connect to the network, including computers, smartphones, tablets, smart TVs, gaming consoles, IoT devices, etc.

5.Remote Lab Environment: Accessing a remote lab environment typically involves connecting to a server or network of servers hosted elsewhere. This could be done through various means:a. VPN (Virtual Private Network): If the lab environment is behind a corporate firewall or otherwise not directly accessible from the public internet, a VPN connection may be required. A VPN creates a secure, encrypted connection to the lab network, allowing you to access resources as if you were physically present on the same network.b. Remote Desktop Protocol

(RDP): If the lab environment includes Windows servers or workstations, you might use RDP to connect to them remotely. RDP allows you to control a remote computer as if you were sitting in front of it, accessing its desktop interface and running applications.c. SSH (Secure Shell): For accessing Linux or Unix-based servers, SSH is commonly used. It provides a secure, encrypted connection to the command-line interface of a remote server, allowing you to execute commands and manage the system remotely.d. Web-based Interfaces: Some lab environments may provide web-based interfaces for accessing resources. This could include web consoles for managing virtual machines, web portals for accessing applications or services, etc.

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 leverages both parallel computing and networked systems is distributed data processing in a cloud computing environment.

Application: Large-scale data analysis platforms, such as Apache Hadoop and Apache Spark, utilize parallel computing and networked systems to process vast amounts of data efficiently.

How it works:

1. Parallel Computing: These platforms distribute data processing tasks across multiple computing nodes, enabling parallel execution of tasks. Each node operates independently, processing a subset of the data concurrently. Parallel computing allows for faster data processing compared to sequential processing, as the workload is divided among multiple processors.

2. Networked Systems: In a cloud computing environment, computing nodes are interconnected via a network. This network allows for communication and coordination between nodes during the data processing tasks. Data is distributed across the nodes, and intermediate results may be exchanged between nodes as needed.

Importance:

1. Scalability: By distributing data processing tasks across multiple nodes, these platforms can scale horizontally to handle increasing volumes of data. As the size of the dataset grows, additional computing nodes can be added to the cluster to maintain performance and meet processing deadlines.

2. Fault Tolerance: Networked systems provide resilience against hardware failures or node outages. Data is replicated across multiple nodes, and tasks can be rerouted to healthy nodes if a failure occurs. This fault tolerance ensures that data processing can continue uninterrupted, even in the presence of hardware failures.

3. Efficiency: Parallel computing and networked systems enable efficient utilization of resources in a distributed environment. Tasks are executed in parallel, maximizing computational throughput and reducing overall processing time. Additionally, data locality optimizations minimize network traffic by processing data on the nodes where it resides, further improving efficiency.

4. Cost-effectiveness: Cloud computing platforms offer pay-as-you-go pricing models, allowing organizations to scale their infrastructure based on demand. By leveraging parallel computing and networked systems, organizations can process large volumes of data cost-effectively, without the need for significant upfront investment in hardware infrastructure.

Overall, distributed data processing platforms demonstrate the importance of parallel computing and networked systems in enabling scalable, efficient, and fault-tolerant data analysis in modern computing environments.