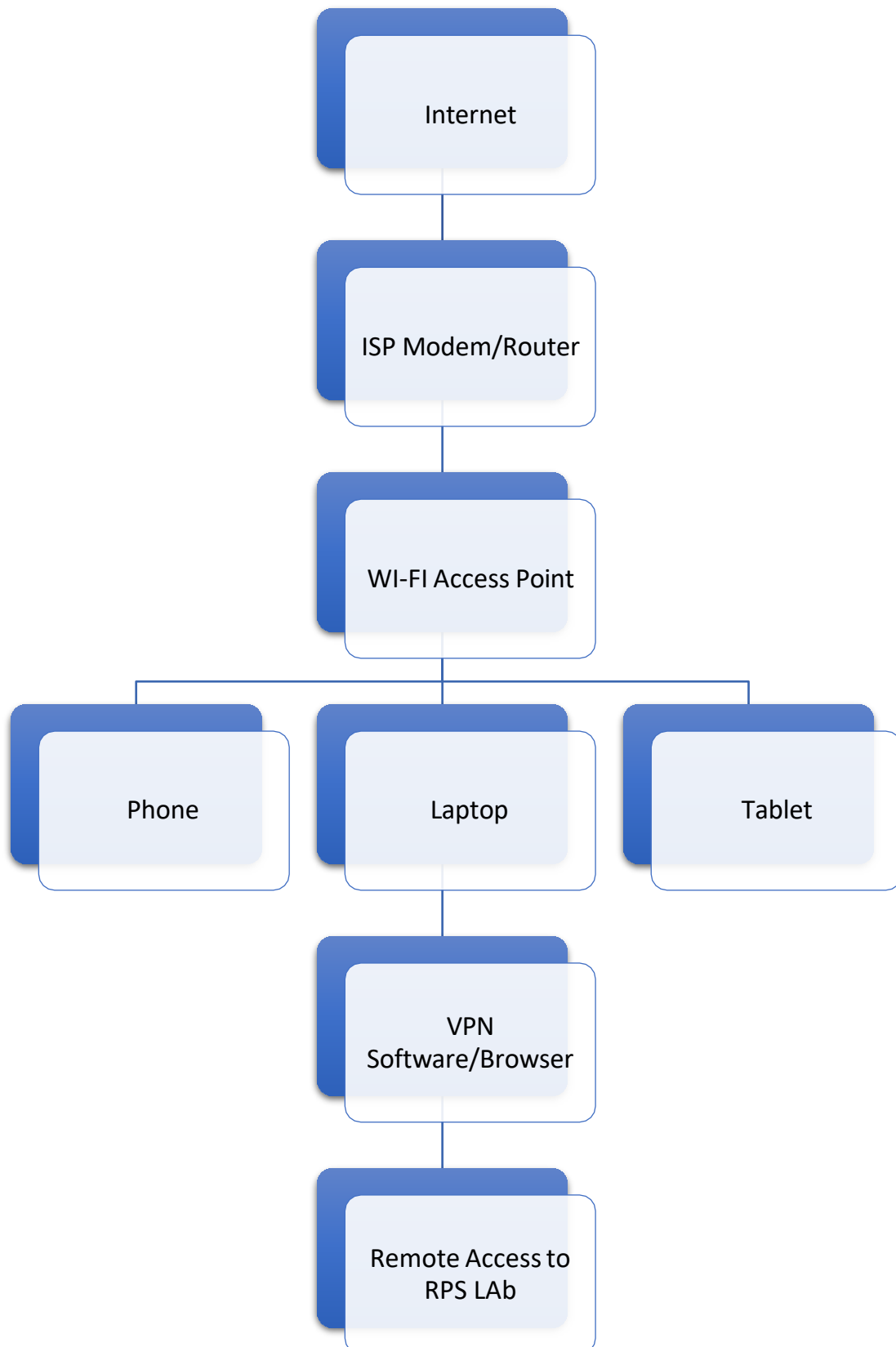## Assignments:

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

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.

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

Solution:

```
                    ┌─────────────┐
                    │  Internet   │
                    └──────┬──────┘
                           │
                    ┌──────┴──────┐
                    │ ISP Modem/  │
                    │   Router    │
                    └──────┬──────┘
                           │
                    ┌──────┴──────┐
                    │   WI-FI     │
                    │ Access Point│
                    └──────┬──────┘
             ┌─────────────┼─────────────┐
        ┌────┴────┐   ┌────┴────┐   ┌────┴────┐
        │  Phone  │   │ Laptop  │   │ Tablet  │
        └─────────┘   └────┬────┘   └─────────┘
                           │
                    ┌──────┴──────┐
                    │     VPN     │
                    │ Software/   │
                    │  Browser    │
                    └──────┬──────┘
                           │
                    ┌──────┴──────┐
                    │ Remote      │
                    │ Access to   │
                    │ RPS LAb     │
                    └─────────────┘
```

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.

Solution:

Application: Online Streaming Platforms (e.g., Netflix, YouTube)

How Parallel Computing is Used:

- When a video is uploaded, it must be encoded into multiple formats and resolutions (e.g., 240p, 720p, 4K) to support different devices and bandwidths.

- This encoding process is CPU/GPU-intensive and is done using parallel computing — multiple servers work simultaneously on different parts of the video to speed up processing.

- Recommendation engines (e.g., Netflix's algorithm) also use parallel computing to analyze user behavior and content in real-time using machine learning models.

How Networked Systems are Used:

- Content is stored in data centers and delivered to users through a Content Delivery Network (CDN) — a global network of interconnected servers.

- When you stream a video, the nearest CDN node delivers content to minimize buffering.

- User requests, video analytics, and personalized recommendations rely on continuous communication across a global network of services.

Why These Technologies Are Important:

- User Experience: Fast encoding and low-latency delivery ensure smooth playback, even during peak traffic.

- Scalability: Parallel computing allows the platform to handle millions of users and vast video libraries efficiently.

- Personalization: Real-time analytics and recommendations enhance user engagement.

- Reliability: Networked systems provide fault tolerance and uninterrupted access across the globe.

1. Networked Systems Example: Online Banking Systems

How it's used:

- Online banking is built on networked systems where customer devices (phones, computers) connect to bank servers through the internet.

- Servers are often distributed across multiple locations for better reliability and faster response (cloud-based systems).

- Secure protocols (like HTTPS, VPNs, multi-factor authentication) are used to ensure data is transmitted safely over the network.

Why it's important:

- **Availability:** Customers expect 24/7 access to their accounts from anywhere.

- **Security:** Financial transactions must be protected from hackers and fraud.

- **Scalability:** Banks must handle millions of users performing transactions simultaneously.

Technology	Application	Importance
Parallel Computing	Weather Forecasting	Speed and accuracy in predictions
Networked Systems	Online Banking	Secure, scalable, and always-available service