Assignment 1:

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

(RPS): The RPS provides internet access to your home
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'   V
Modem
(The device that connects to your ISP)
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|
|
'   V
Router
(Connects to the modem, creating a local network)
|
|
|
'   V
Switches/Access Points
(wired or wireless connections)
|
|
|
'   V
Devices
(computers, smartphones, tablets, smart TVs, or IoT devices connect to the router)
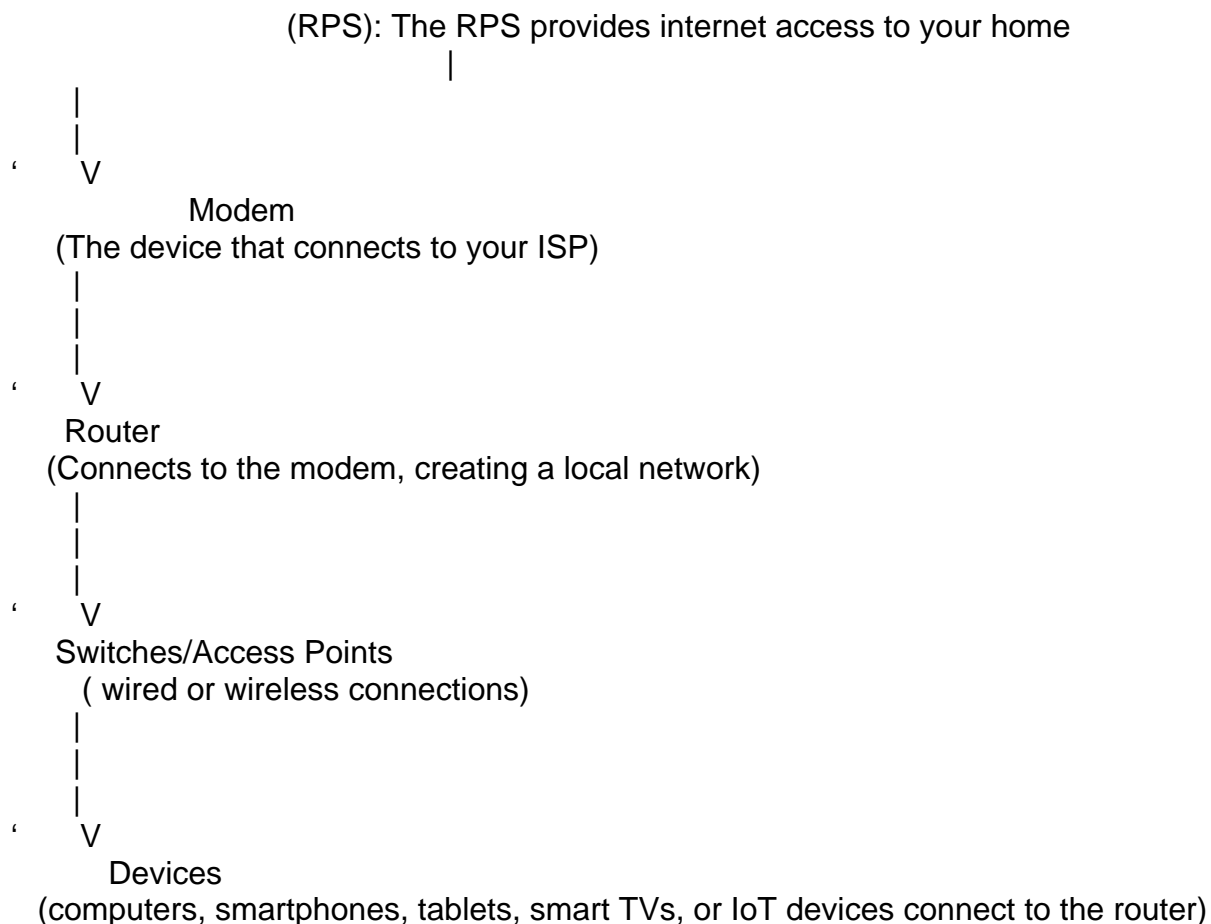
Assignment 2: Identify a real-world application for both parallel computing and networked systems. Explain how these technologies are used and why they are important in that context.

1] Real-World Application for Parallel Computing: Genomic Data Analysis

Parallel computing is crucial in genomic data analysis, especially in bioinformatics and genomics research.
The analysis of genomic data requires significant computational power due to the sheer volume of data generated from sequencing human genomes and other biological datasets.

How It's Used:
Parallel computing is used to speed up various genomic analysis tasks, such as sequence alignment, genome assembly, and variant detection.
Techniques like MapReduce, Hadoop, and Apache Spark enable distributed processing of large datasets.
Bioinformatics researchers often use high-performance computing clusters or
cloud-based resources to run these computations in parallel, dramatically reducing analysis time.
Why It's Important:
The ability to process genomic data quickly and accurately is crucial for advancing personalized medicine,

understanding genetic diseases,
and conducting large-scale genetic studies. Parallel computing allows researchers to analyze entire genomes rapidly, leading to faster breakthroughs in medical research and more efficient healthcare solutions.

2] Real-World Application for Networked Systems: Smart Grids
Smart grids represent an innovative application of networked systems in the energy sector.
A smart grid is a modernized electrical grid that incorporates digital technology to monitor, control, and optimize the production, distribution, and consumption of electricity.

How It's Used: Networked systems in smart grids connect various components of the electrical grid, including power plants,
substations, transformers, and end-users. Sensors and smart meters gather real-time data on electricity usage,
and this information is transmitted across a network to a central control system. Grid operators use this data to manage
energy distribution efficiently, detect faults, and ensure grid stability.

Why It's Important: Smart grids are essential for increasing energy efficiency, integrating renewable energy sources,
and improving grid resilience. By leveraging networked systems, smart grids can balance electricity supply and demand,
detect and respond to outages more quickly, and facilitate the integration of distributed energy resources like solar panels and wind
turbines. This networked approach enables a more sustainable and reliable energy infrastructure.