

# Computer Architecture

## Assignment-1

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



**Connectivity:** Ensure that your home network is connected to the internet and that you have a stable internet connection.

**VPN (Virtual Private Network):** If the RPS Lab requires a secure connection, you may need to connect to a VPN provided by your institution or the lab itself. A VPN encrypts your internet traffic and routes it through a secure server before accessing the lab environment, ensuring confidentiality and security.

**Access Credentials:** You'll likely need specific credentials (such as a username and password) provided by the RPS Lab administrator to access the lab environment.

Remote Desktop Protocol (RDP) or SSH: Depending on the nature of the lab environment, you may access it using Remote Desktop Protocol (RDP) for Windows-based environments or Secure Shell (SSH) for Unix/Linux-based environments. These protocols allow you to remotely connect to and control a computer or server in the lab environment as if you were physically present.

Access Controls: Once connected, you may need to navigate through access controls, such as firewalls or authentication mechanisms, to gain access to specific resources or experiments within the lab environment.

By following these steps, you can securely access and interact with the RPS Lab environment from your home network, allowing you to perform experiments, conduct research, or access resources 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.**

### **Parallel computing**

Parallel computing is a computing architecture that divides a problem into smaller tasks and runs them concurrently. It has the ability to process multiple tasks simultaneously, making it significantly faster than a sequential computer. Parallel computing helps to solve large, complex problems in a much shorter time.

### **Making Predictions in Agriculture**

In agriculture, parallel computing is used to analyse data and make predictions that can improve crop yields and efficiency. For instance, by analysing weather data, soil conditions, and other factors, farmers can make informed decisions about when to plant, irrigate, and harvest crops.

Parallel computing makes it possible to process this data quickly and accurately. For example, a supercomputer could analyse data from thousands of weather stations, satellite images, and soil samples to predict the optimal planting time for a particular crop.

### **Video Post-Production Effects**

Parallel computing plays a significant role in the field of video post-production effects. These effects, which include 3D animation, colour grading, and visual effects (VFX), require a high level of computational power. Sequential computing, which processes one task at a time, is often inadequate for these tasks due to their complexity.

By dividing these tasks into smaller sub-tasks and processing them simultaneously, parallel computing drastically reduces the time required for rendering and processing video effects. Film studios use supercomputers and render farms (networks of computers) to quickly create stunning visual effects and animation sequences. Without parallel computing, the impressive visual effects we see in blockbuster movies and high-quality video games would be nearly impossible to achieve in practical timeframes.

### **Networked Systems.**

Networked systems refer to interconnected components, devices, or entities that communicate and collaborate with each other over a network. A networked system typically involves multiple nodes (such as computers, servers, routers, and other devices) that are linked together through communication channels, such as wired or wireless connections, to enable data exchange, resource sharing, and coordinated functionality.

here are some real-time examples of networked systems:

#### **Online Gaming Platforms:**

Platforms like Xbox Live, PlayStation Network, and Steam enable players to connect in real-time over the internet, engage in multiplayer games, communicate via voice chat, and compete globally.

#### **Video Conferencing Tools:**

Applications such as Zoom, Microsoft Teams, and Google Meet facilitate real-time video and audio communication, allowing users to conduct virtual meetings, conferences, and webinars with participants from different locations.

#### **Social Media Platforms:**

Platforms like Facebook, Twitter, and Instagram operate as networked systems where users can share updates, messages, photos, and videos instantly with their networks of friends or followers.

#### **Stock Market Trading Systems:**

Trading platforms and stock exchanges utilize networked systems to enable real-time trading, market data analysis, order execution, and price updates, allowing investors to make informed decisions based on up-to-date information.

**Real-Time Collaboration Tools:**

Tools such as Microsoft 365, Google Workspace, and Slack provide real-time collaboration features like document editing, instant messaging, file sharing, and project management, enabling teams to work together efficiently regardless of location.

**Online Banking and Payment Systems:**

Banking and payment platforms like PayPal, Venmo, and online banking portals use networked systems to facilitate real-time fund transfers, transactions, account management, and financial notifications between users and financial institutions.