PRN: 21070126039 Name: Jainil Patel Batch: AI/ML A2

CN LAB 5

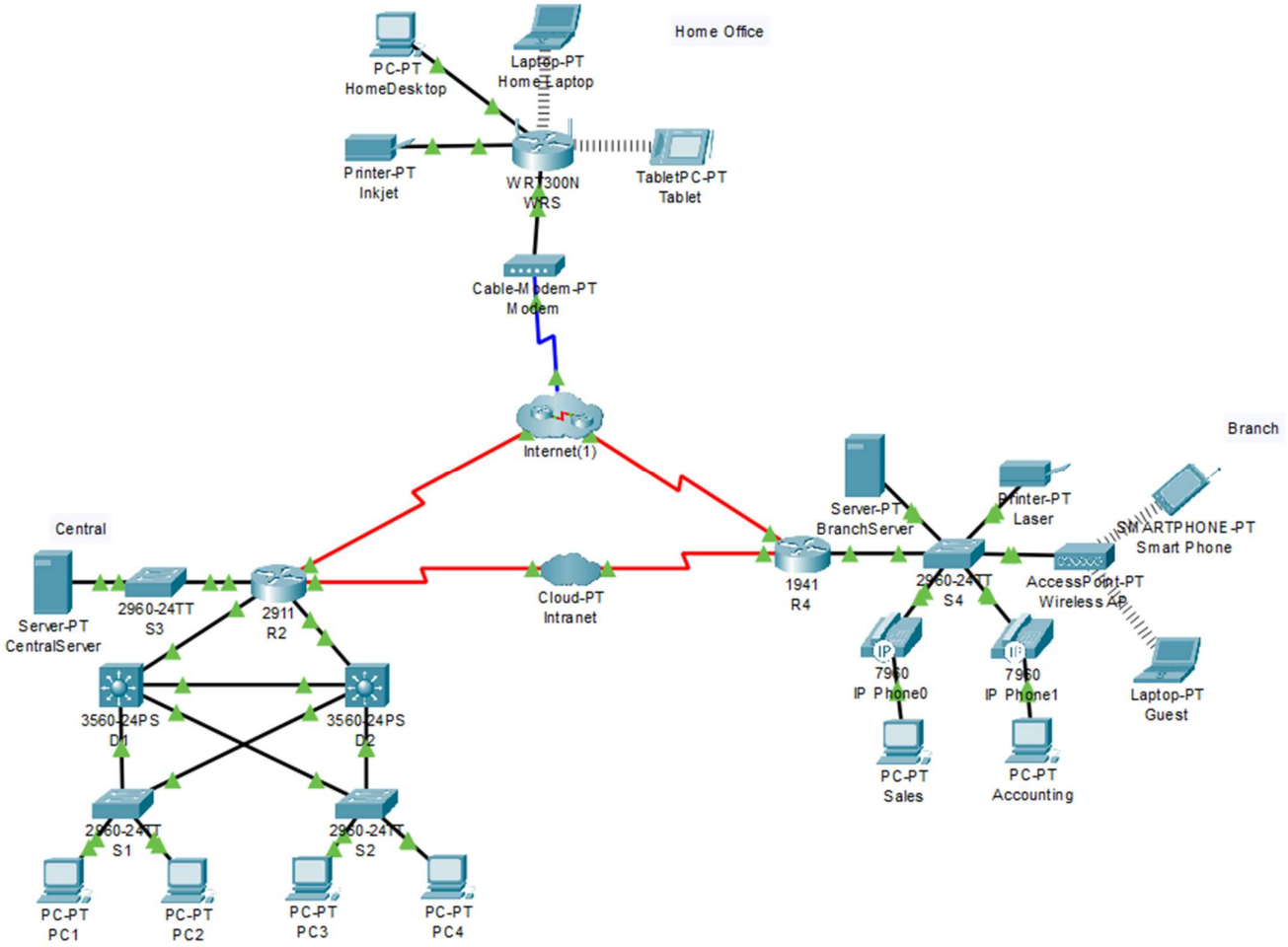
Create a Simple Network Using Packet Tracer. (Intranet, Internet, and Laptop/PC/Mobile devices)

Aim

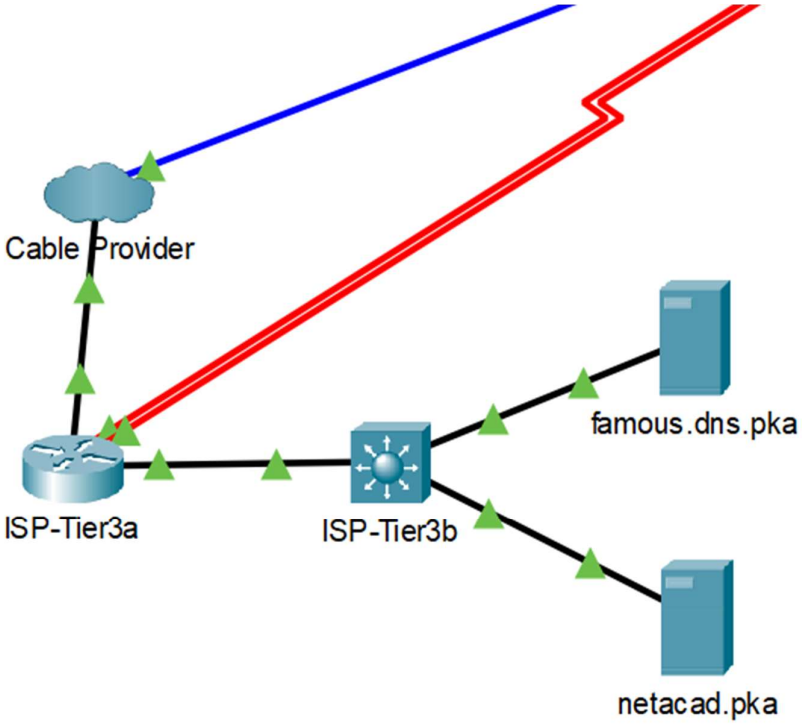
To help understand different network types (internet, intranet, and extranet) and practice simulating them using Packet Tracer.

Observations

Network:



Internet Cluster



Home Laptop

Physical | Config | Desktop | Programming | Attributes

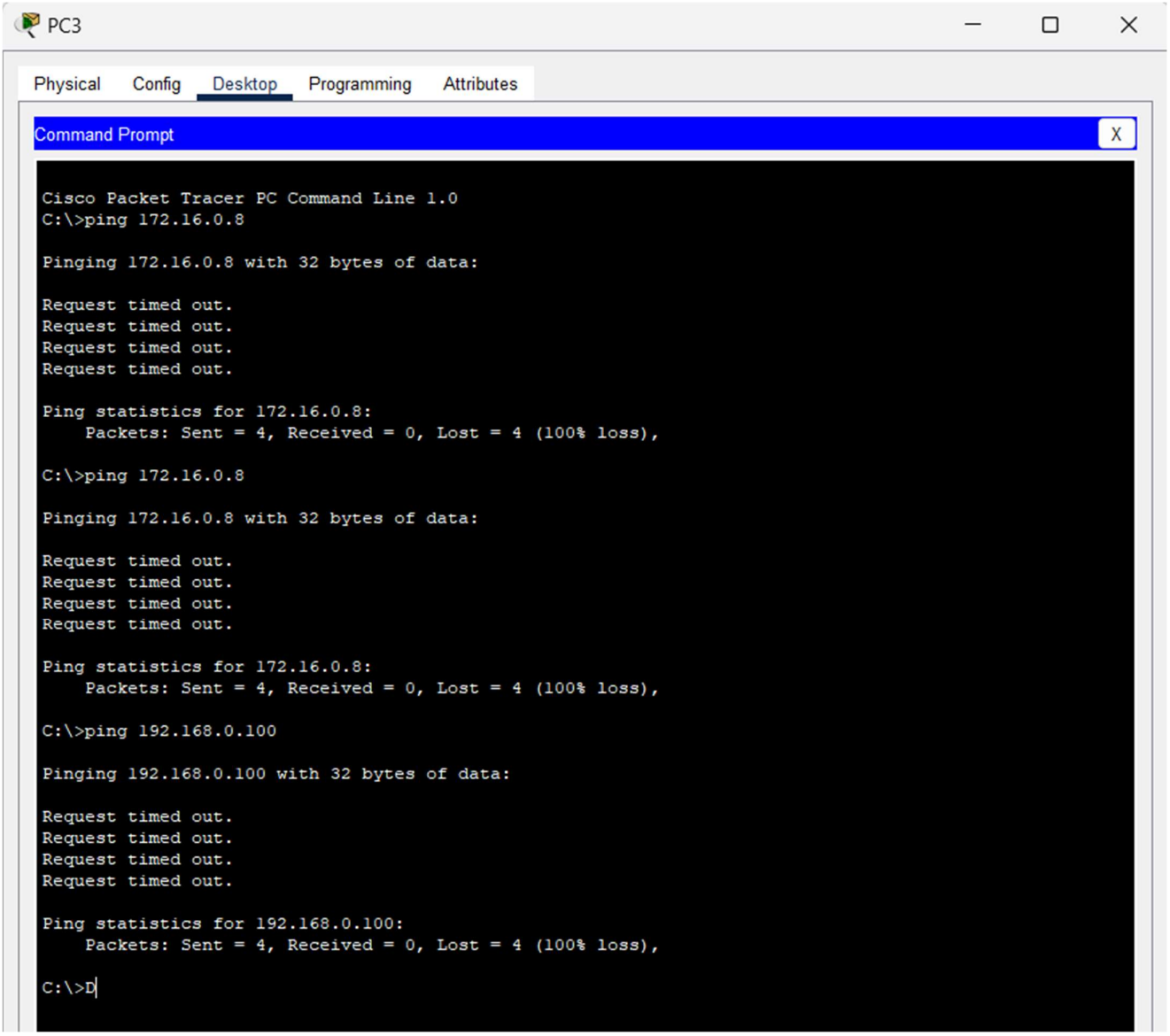
Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.3.04
C:\>ping 10.3.0.4

Pinging 10.3.0.4 with 32 bytes of data:

Reply from 10.3.0.4: bytes=32 time=33ms TTL=124
Reply from 10.3.0.4: bytes=32 time=49ms TTL=124
Reply from 10.3.0.4: bytes=32 time=44ms TTL=124
Reply from 10.3.0.4: bytes=32 time=24ms TTL=124

Ping statistics for 10.3.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 24ms, Maximum = 49ms, Average = 37ms
```

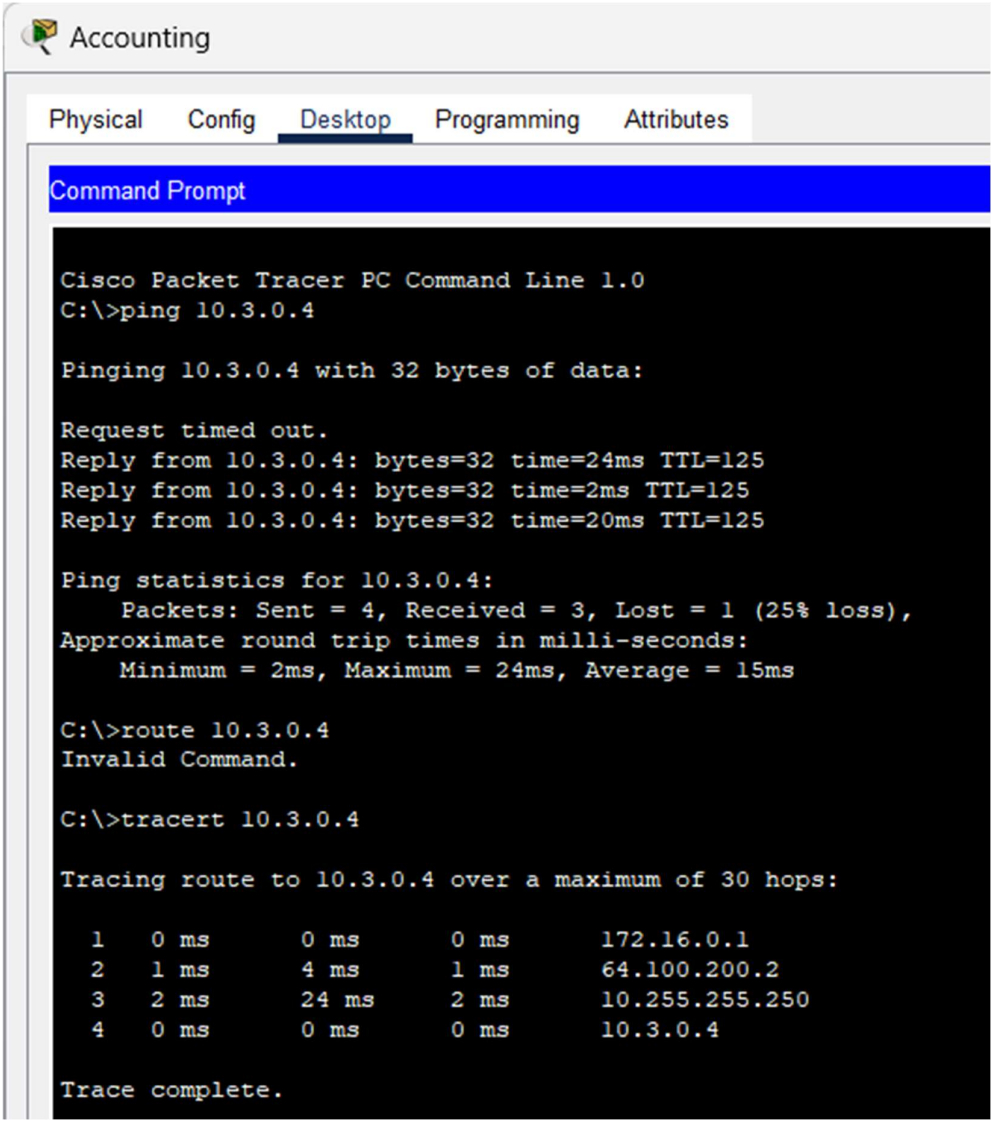
Home Laptop -> PC3

```
C:\>tracert 10.3.0.4

Tracing route to 10.3.0.4 over a maximum of 30 hops:

  1    34 ms     5 ms      12 ms     192.168.0.1
  2    *         *         *         Request timed out.
  3    *         *         *         Request timed out.
  4    *         *         *         Request timed out.
  5    15 ms     36 ms     23 ms     10.3.0.4
```

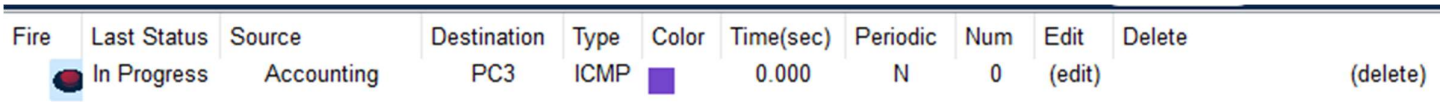
Home Laptop -> PC3



PC3 to Accounting and PC3 to Home Laptop



Accounting -> PC3



I tried ping and tracert commands from a PC to a PC (every possible combination), from each LAN – Home office, Branch and Central after the found following observations:

- Home office
  - Device used -> Home Laptop
  - I observed that Home laptop is successfully able to ping and get route to PC3 of Central Server.
  - Also, Home laptop is not able to send packets to Accounting PC of Branch sever.
- Branch Server
  - Device used -> Accounting PC
  - I observed that Accounting laptop is successfully able to ping and get route to PC3 of Central Server.
  - Also, Accounting laptop is not able to send packets to Home Laptop of Home office.
- Central Server

- Device used -> PC3
- I observed that PC3 is not able to send packets(ping) to Home Laptop of Home office and Accounting PC of Branch sever.

Self-Assessment

1. What are some challenges associated with managing and securing a WAN compared to a LAN?

   Managing and securing a Wide Area Network (WAN) compared to a Local Area Network (LAN) presents a set of unique challenges due to the differences in scale, geographic distribution, and connectivity.

   - Geographic Scope: WANs cover larger geographical areas, often spanning across multiple cities, countries, or even continents. This vast reach makes it more challenging to monitor and manage network resources, as physical distances can lead to delays, connectivity issues, and inconsistent performance.
   - Latency and Bandwidth: WANs typically have higher latency and lower bandwidth compared to LANs. This can impact application performance, especially for real-time applications like video conferencing or online gaming. Ensuring optimal performance across such distances is a constant challenge.
   - Reliability: WANs can be more susceptible to outages due to the involvement of multiple service providers, routers, and intermediate nodes. Ensuring high availability and redundancy to mitigate potential downtime becomes critical.
   - Security: WANs are more exposed to external threats compared to LANs, which are generally protected by the organization's internal security measures. WANs traverse public networks and may require additional security measures such as encryption, firewalls, intrusion detection systems, and virtual private networks (VPNs) to safeguard data in transit.
   - Complexity: WANs involve a higher level of complexity due to the involvement of various networking technologies, protocols, and service providers. Coordinating and troubleshooting across this complex ecosystem requires more advanced skills and tools.
   - Costs: WANs can be more expensive to maintain due to the need for leased lines, service subscriptions, and equipment costs. Organizations must carefully balance costs with the required performance and security levels.
   - Scalability: As organizations grow, WANs need to accommodate more users, locations, and applications. Scaling a WAN can be intricate, requiring careful planning to ensure seamless expansion without compromising performance or security.
   - Data Integrity: Data integrity can be more challenging to maintain in a WAN environment. Data packets may encounter issues like packet loss or corruption during transit. Implementing error detection and correction mechanisms becomes crucial to ensure data accuracy.
   - Regulatory Compliance: When data crosses jurisdictional boundaries in a WAN, it may

need to comply with various regulatory frameworks. Managing compliance and data sovereignty can be complex, particularly when dealing with data stored or transmitted across different regions.

- Network Monitoring and Troubleshooting: Diagnosing and resolving issues in a WAN is more complicated due to the distributed nature of the network. Identifying the source of a problem requires collaboration between teams at different locations and the use of sophisticated monitoring tools.
- Quality of Service (QoS): Prioritizing and ensuring consistent QoS for different applications across a WAN can be challenging. Organizations need to define and enforce QoS policies to guarantee optimal performance for critical applications.

In summary, managing and securing a WAN involves addressing challenges related to distance, connectivity, performance, security, complexity, and regulatory considerations. Organizations must implement robust strategies and technologies to effectively manage and safeguard their WAN infrastructure while ensuring reliable and secure connectivity for their users and applications.

2. List the limitations or constraints that you faced of simulating WAN networks in Packet Tracer?

Certainly, here are some limitations and constraints you might encounter when simulating Wide Area Network (WAN) networks in Packet Tracer:

- Scale and Realism: Packet Tracer is designed primarily for educational purposes and small-scale simulations. Simulating large-scale WANs with numerous devices and complex topologies might not be realistic due to hardware and software limitations.
- Limited Protocol Support: While Packet Tracer supports a wide range of networking protocols, it might lack support for certain advanced WAN-specific protocols or features that are essential in real-world scenarios.
- Network Performance: Simulating WANs in Packet Tracer might not accurately represent real-world network performance, especially in terms of latency, bandwidth limitations, and other WAN-specific characteristics.
- Lack of Real Data Traffic: Packet Tracer's simulations often lack actual data traffic flows that occur in real networks. This can impact the accuracy of assessing network behavior under different conditions.
- Limited Device Options: Packet Tracer might not have the full range of devices and hardware commonly used in real WAN networks, which could limit the accuracy of your simulation.
- Security and Encryptions: Simulating WAN security features and encryption protocols might be limited in Packet Tracer, making it difficult to fully replicate the security measures needed in real WAN environments.
- Dynamic Routing Complexity: Simulating dynamic routing protocols in complex WAN scenarios might be challenging, and the behavior might not match real-world implementations.
- Limited WAN Link Emulation: While Packet Tracer allows link bandwidth configuration, it

might not fully capture the nuances of real WAN links with varying latency, jitter, and quality of service (QoS) characteristics.

- Interoperability with Other Tools: Packet Tracer might not seamlessly integrate with other network simulation or emulation tools, limiting your ability to create comprehensive multi-tool simulations.
- Advanced Network Services: Certain advanced network services, such as Quality of Service (QoS), Multi-Protocol Label Switching (MPLS), and advanced WAN optimization techniques, might not be fully supported or accurately represented.
- Real Hardware Considerations: Simulating WANs in Packet Tracer doesn't take into account the physical hardware constraints and considerations that impact real-world WAN design and implementation.
- Geographic Accuracy: Packet Tracer doesn't necessarily reflect the geographic and physical realities of WAN links, which can be crucial for understanding factors like cable lengths and signal propagation.

In summary, while Packet Tracer is a valuable tool for learning and basic network simulations, it might not fully capture the complexities and challenges of simulating large-scale, real-world WAN networks. It's important to consider these limitations and use Packet Tracer as a supplement to other tools and resources when exploring WAN concepts.

Conclusion:

In this experiment I learnt, how to make cluster in a network in Cisco Packet Tracer and How to use server and found some insights for the given network.