IPv4 Addressing Project

NETW191 Course Project-

NETW191/60720

Akira Suain

Project Overview

- This project aims to provide a comprehensive understanding of IPv4 addressing and its practical applications within a virtualized networking environment. By engaging in this project, I sought to enhance my knowledge of IP address assignment, the mechanisms by which devices communicate using these addresses, and the processes involved in configuring and observing network settings through laboratory simulations. The project is structured to build foundational skills in network communication, troubleshooting, and documentation, which are essential for a career in information technology and networking. Through hands-on experience and practical exercises, I developed a deeper understanding of the principles of network communication and the practical skills necessary for configuring and troubleshooting IPv4 networks.

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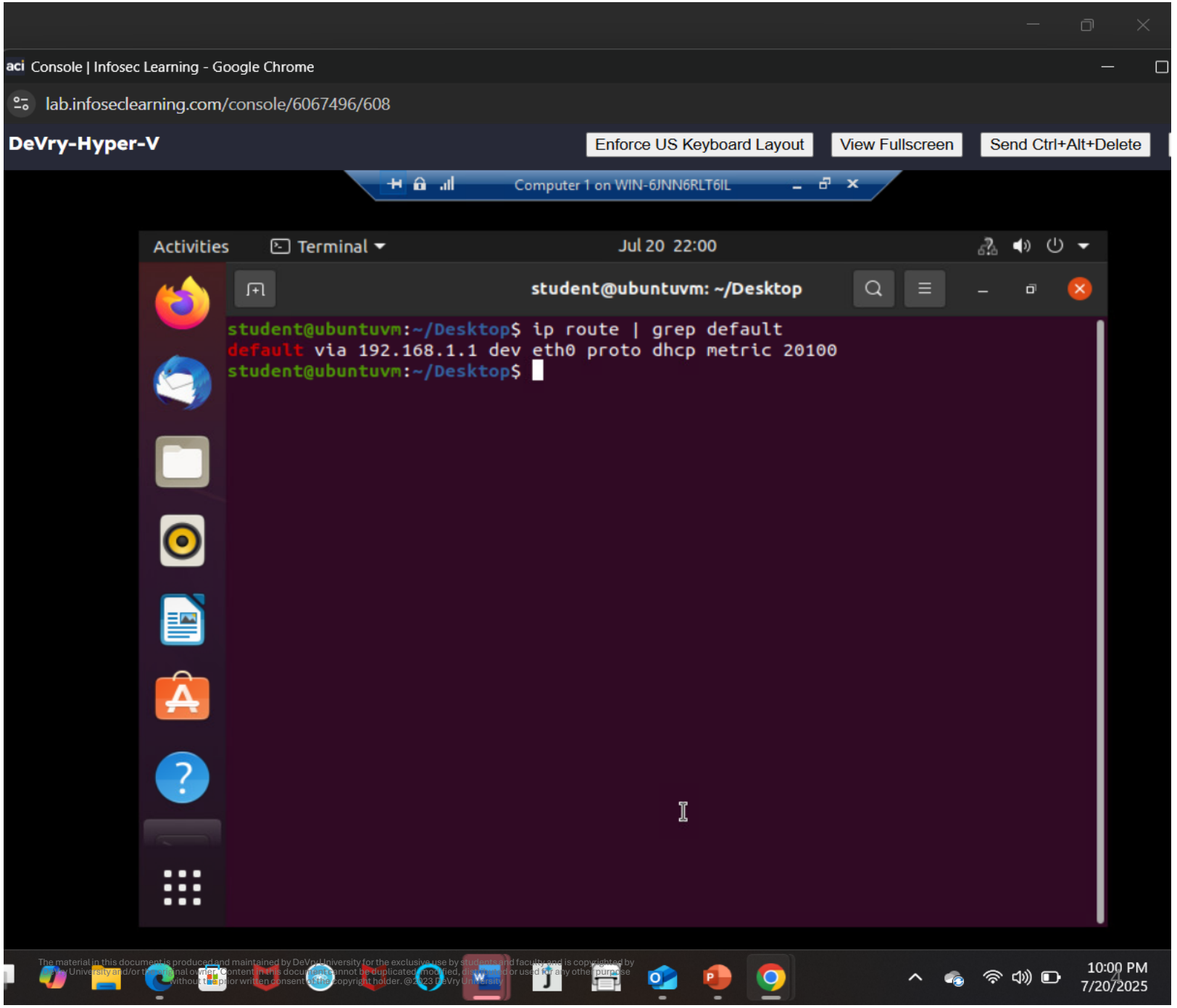
Module 2

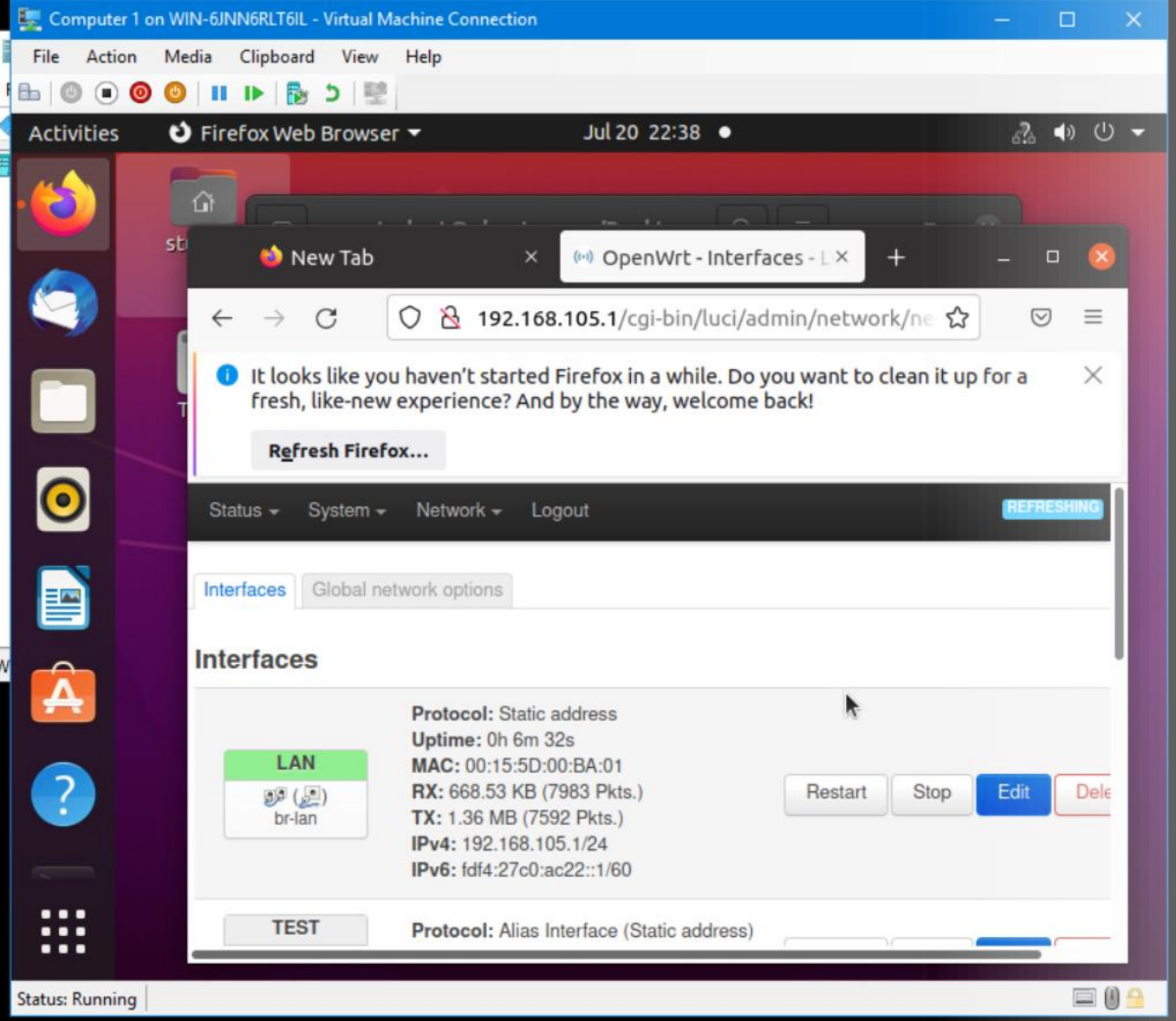
IPv4 Addressing

Preparation

THIS SCREENSHOT SHOULD INCLUDE THE TERMINAL WINDOW THAT SHOWS **THE DEFAULT GATEWAY IP ADDRESS**.

THIS SCREENSHOT SHOULD ALSO SHOW **THE DATE/TIME INFORMATION** ON TOP OF THE TERMINAL WINDOW.





IPv4 Address Assignment

- This screenshot should include **the Interfaces page** that shows the new IPv4 address on the LAN interface.

- This screenshot should also show **the date/time information** next to the Firefox Web Browser tab.

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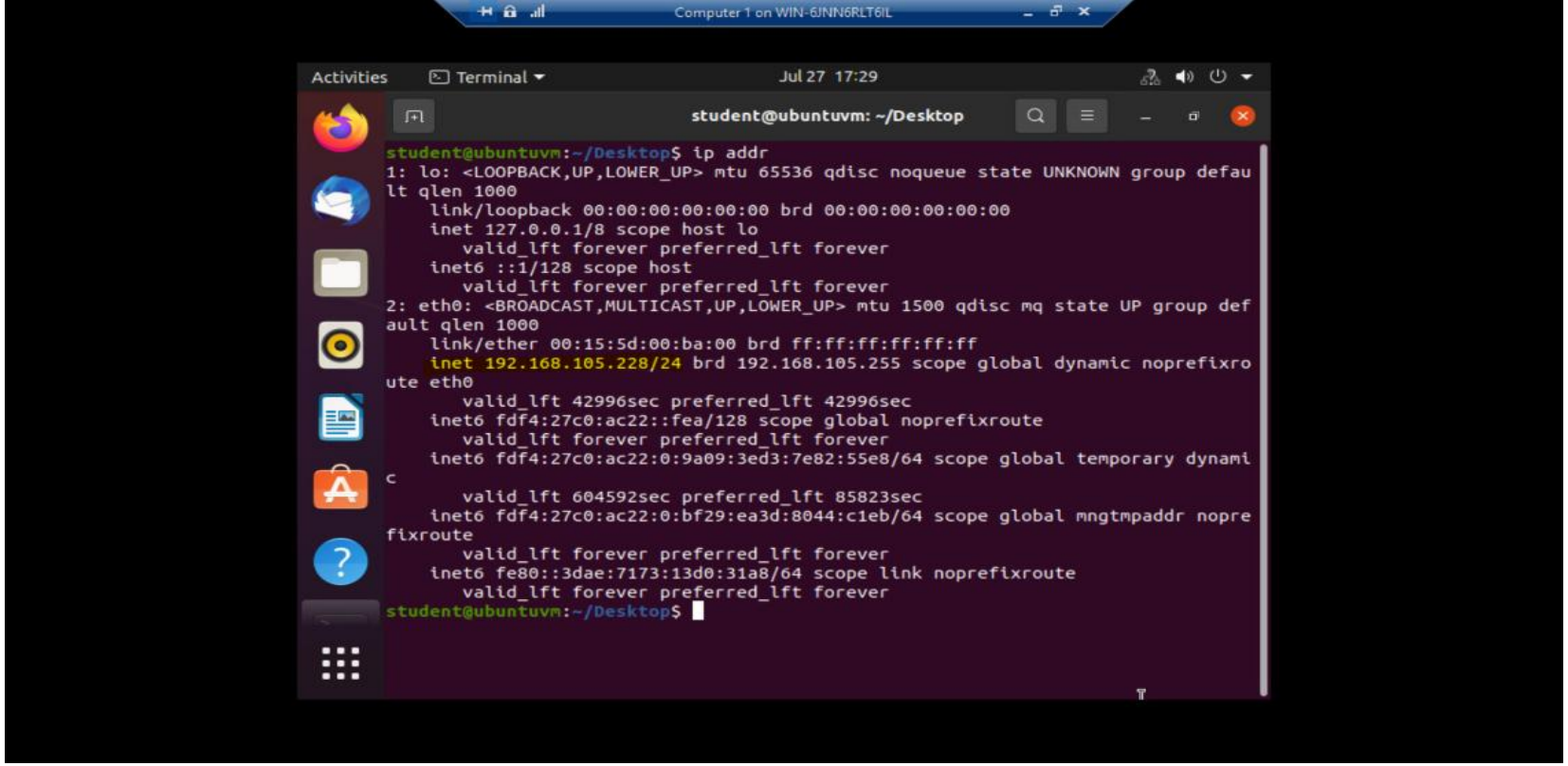
Module 3

Connectivity Test

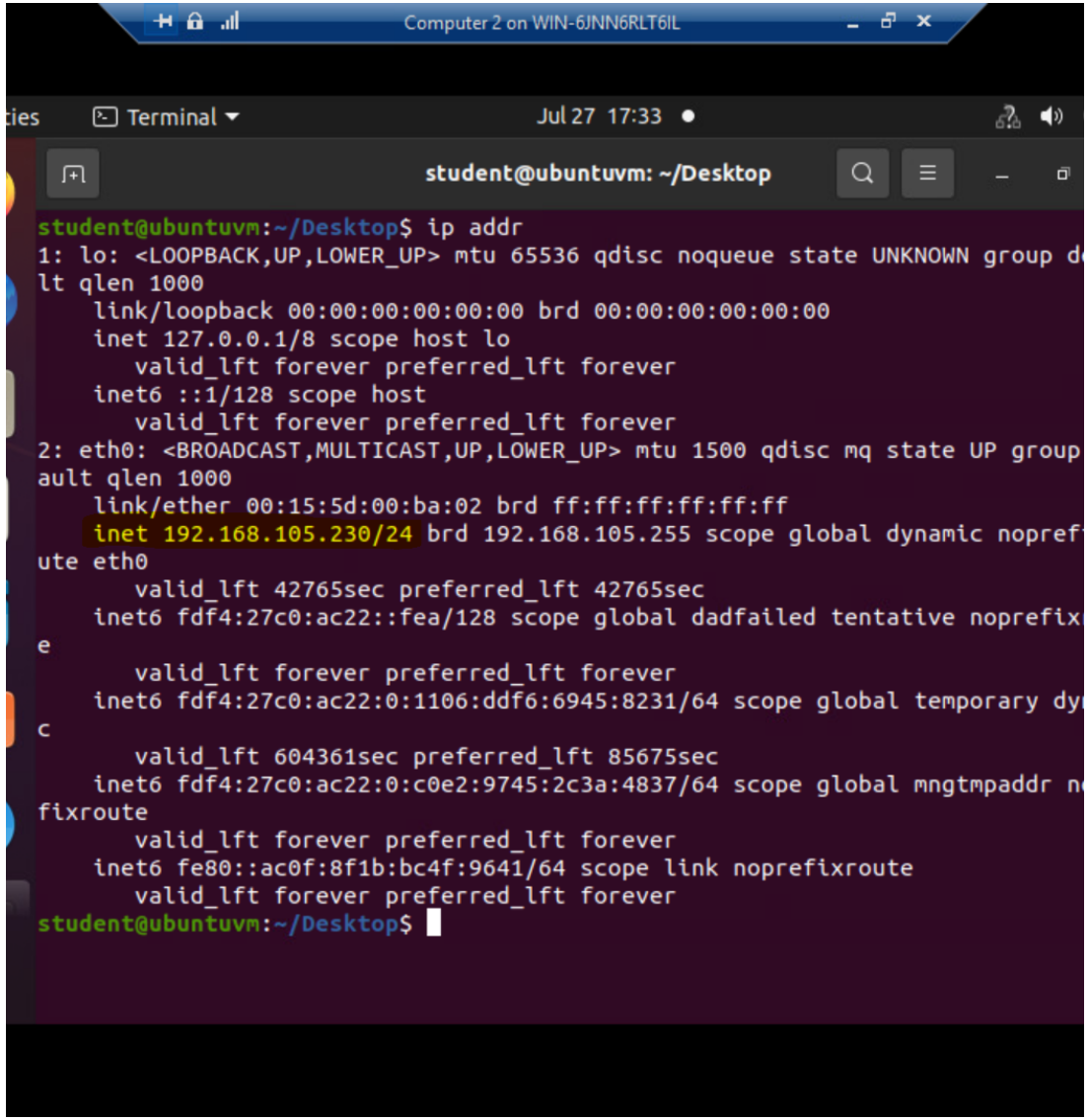


- Take a screenshot of **the Terminal window**.
- This screenshot should show **the IPv4 address of the *Computer 1* VM**.
- This screenshot should also show **the date/time information** on top of the Terminal window.

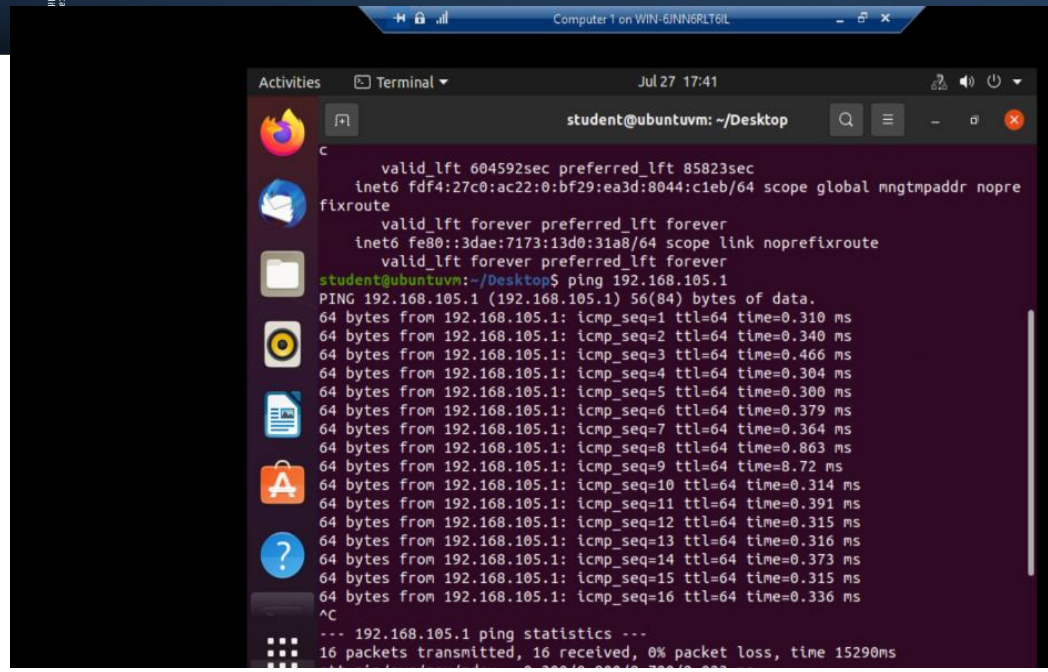
Dynamic IP Address Assignment

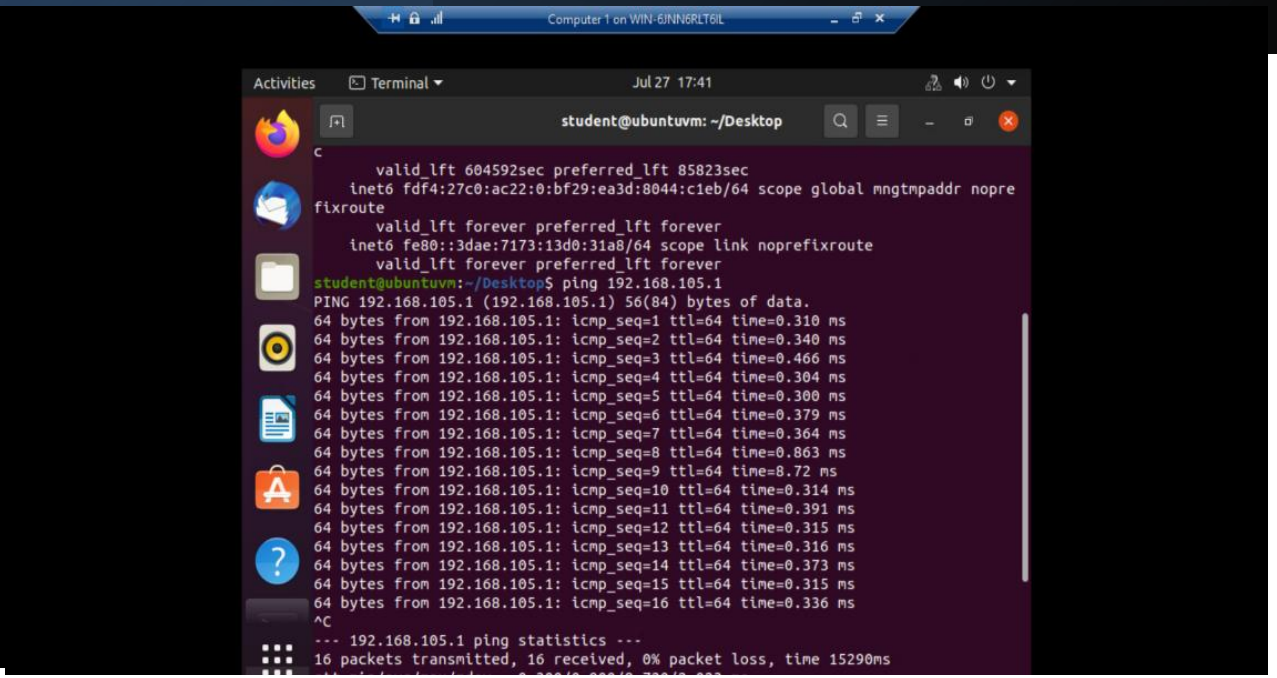
Dynamic IP Address Assignment

- Take a screenshot of **the Terminal window**.
- This screenshot should show **the IPv4 address of the *Computer 2* VM**.
- This screenshot should also show **the date/time information** on top of the Terminal window.

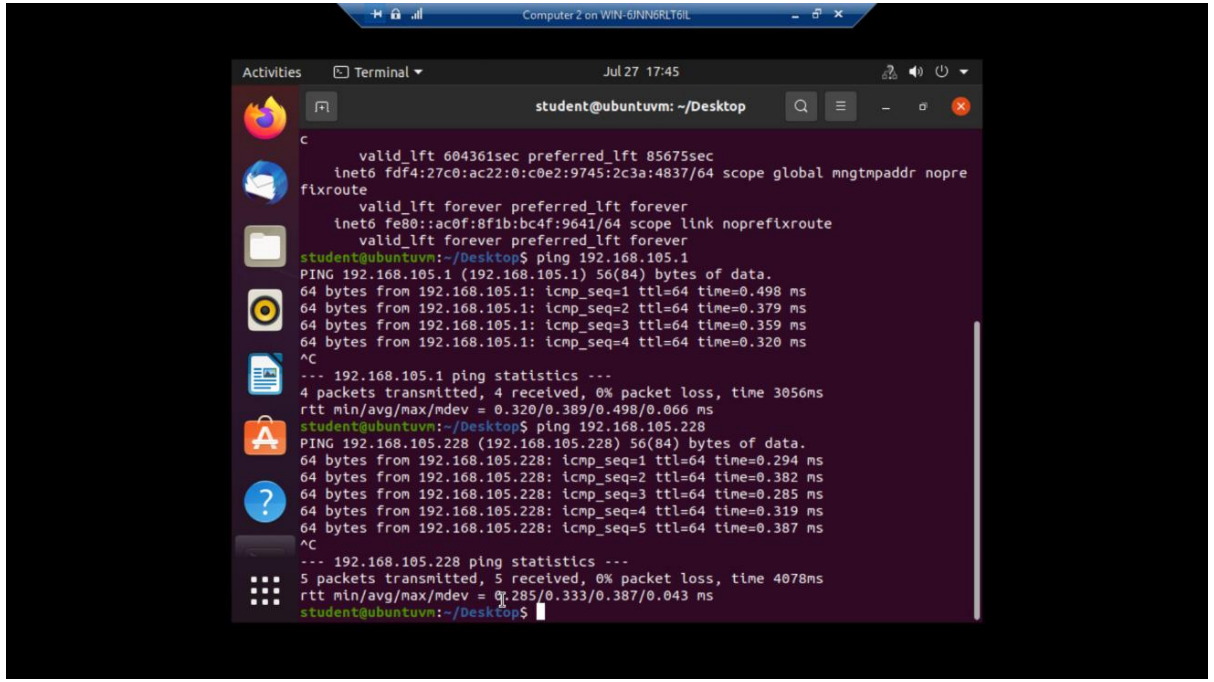


Connectivity Test





- Take a screenshot of **the Terminal window**.
- This screenshot should show 1) the connectivity test **FROM the *Computer 1* VM TO the *SOHO Router* VM**, and 2) the connectivity test **FROM the *Computer 1* VM TO the *Computer 2* VM**.
- This screenshot should also show **the date/time information** on top of the Terminal window.



- Take a screenshot of **the Terminal window**.
- This screenshot should show 1) the connectivity test **FROM the *Computer 2* VM TO the *SOHO Router* VM**, and 2) the connectivity test **FROM the *Computer 2* VM TO the *Computer 1* VM**.
- This screenshot should also show **the date/time information** on top of the Terminal window.

Connectivity Test

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Module 4

IP Subnetting and Loopback Interfaces

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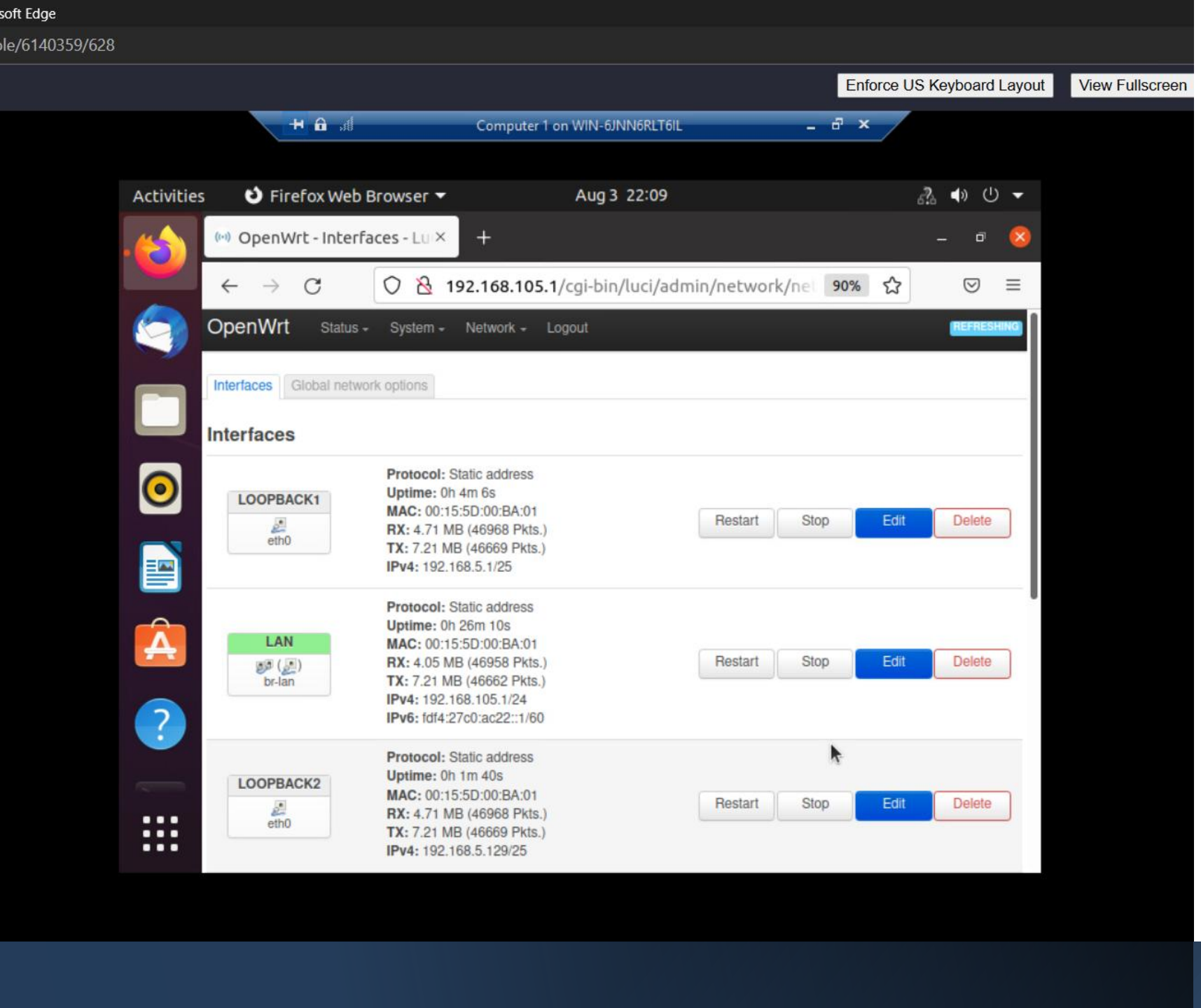
- PROFESSOR: Ethan Brady

Subnet ID	Network Mask (/prefix)	Network Mask (Dotted decimal)	Network Address	First Usable Host Address	Last Usable Host Address	Broadcast Address
0	/25	**255.255.255.128**	192.168.5.0	192.168.5.1	**192.168.5.126**	192.168.5.127
1	**/25**	255.255.255.128	**192.168.5.128**	192.168.5.129	192.168.5.254	**192.168.5.255**

IP Subnetting

- This table should include two /25 subnets, listing
- Subnet notation
- Network address
- First usable host address
- Last usable host address
- Broadcast address



Loopback Interfaces

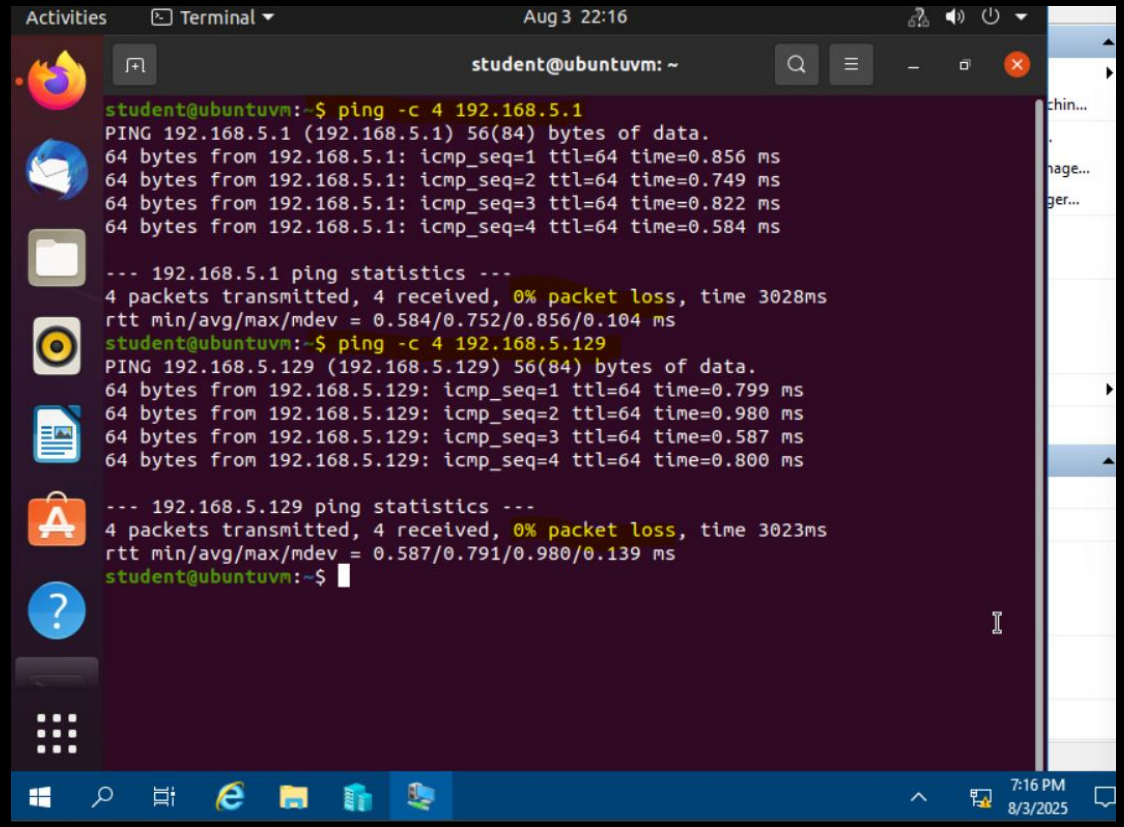
- This screenshot should show **both Loopback1 and Loopback2 interfaces** and their correct **IPv4 addresses**.

- This screenshot should also show **the date/time information** on top of the desktop window.

Connectivity Tests

- This screenshot should show **two successful ping tests**:
  - **from** the Computer 1 VM **to** the Loopback 1 interface
  - **from** the Computer 1 VM **to** the Loopback 2 interface

- This screenshot should also show **the date/time information** on top of the desktop window.



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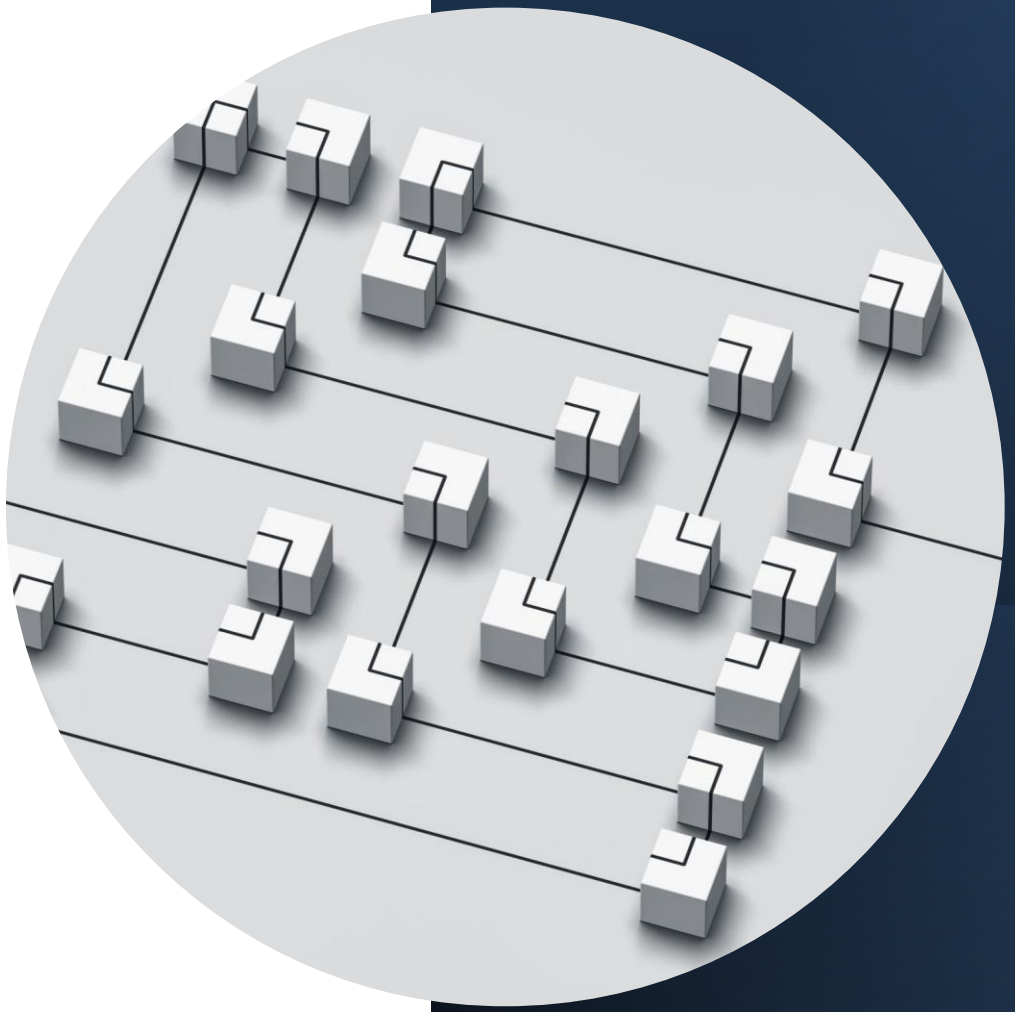
Module 5

Visio Network Diagram



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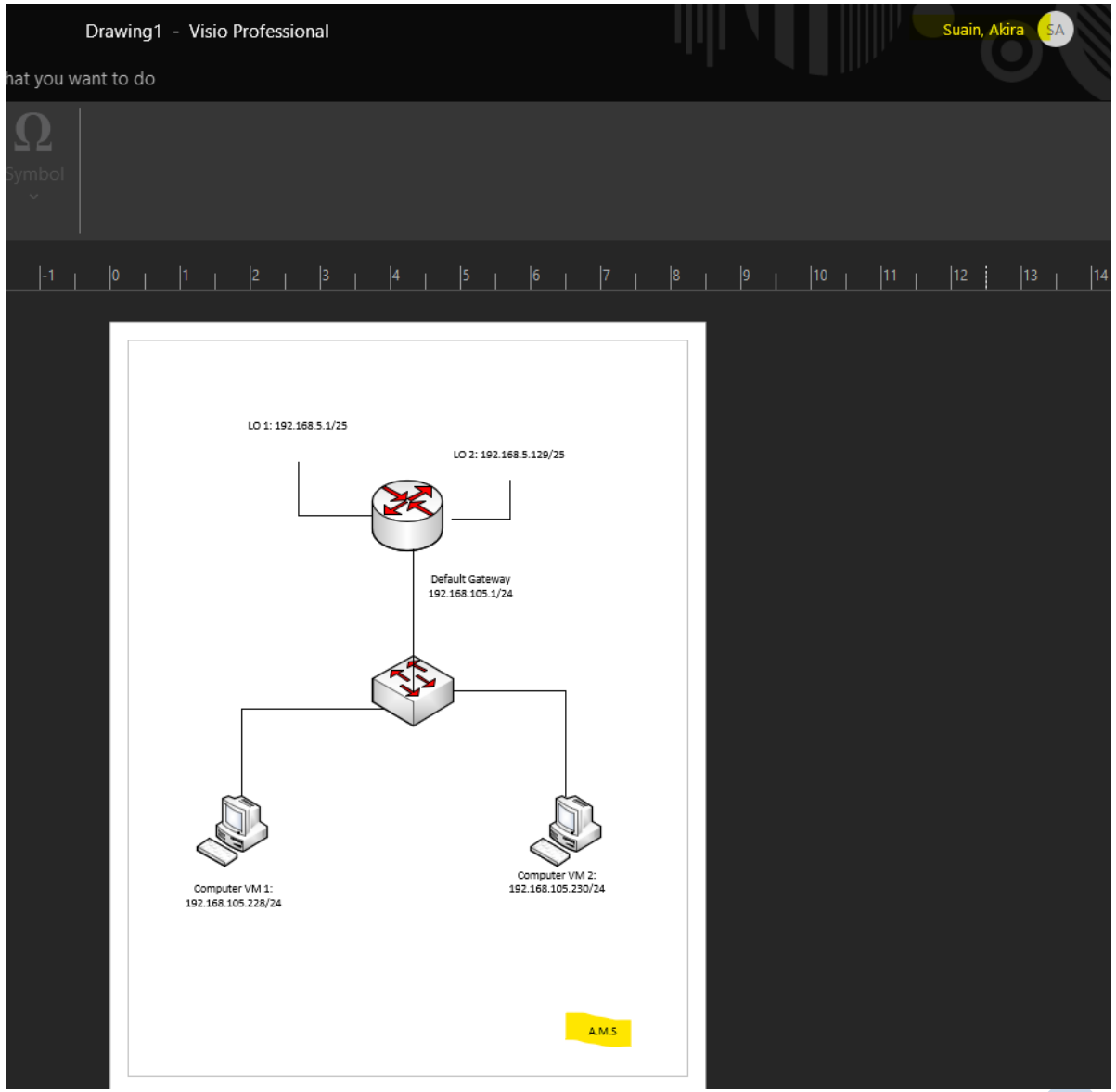
Microsoft Visio Network Diagram

This diagram should illustrate **the interconnection** of the Computer 1 VM, the Computer 2 VM, and the SOHO Router VM along with proper **IP addresses** and **labeling**.

This diagram should also show **your initials** in the bottom right corner.



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Module 6

SOHO Wireless Network Security

Introduction

This module took me through the core areas of networking in a way that built each concept on top of the last, moving from the basics into more advanced, real-world applications. I started with the fundamentals — network types, hardware, and topologies — then worked into wireless networking and security, with a strong focus on best practices like WPA2-PSK (AES) encryption. From there, I explored configuration choices, troubleshooting steps, and strategies for optimizing performance. The content didn't just stop at theory; I applied each topic through practice scenarios that mirrored workplace challenges.

The major steps I followed included:

1. Grasping Core Networking Concepts– Laying a solid foundation of terms, models, and hardware functions.
2. Understanding Network Design & Devices – Seeing how different components and layouts serve different needs.
3. 3Wireless Networking & Security Setup – Choosing and applying the right encryption and authentication methods.
4. Advanced Configuration – Adjusting settings to match real-world demands for stability and security.
5. Troubleshooting – Building a step-by-step process to diagnose and fix connection or performance issues.
6. Performance and Recovery Planning– Learning how to keep a network healthy and respond quickly to outages.
7. Practical Application – Putting it all together in scenarios that required me to think, adapt, and act like I would on the job.

SOHO Wireless Network Security 1 of 3

- 1. What are the factory default username and password of a TP-Link router? Why is it important to change the default username and password of a SOHO router?
- Answer:
  - Default username/password: Admin
  - As this is a default password, it is required to be changes as the password is simple and easy to not only guess but find using the internet. Making it easily accessible to everyone.

- 2. To protect a SOHO wireless network with a small number of devices, which address management method provides more control, configuring the device IP addresses manually (static IP) or using a DHCP server (dynamic IP)? Why?
- Answer:
  - For a small, fixed SOHO network, static IPs give more control by locking each device to a set address, making access more predictable and easier to secure. DHCP is simpler but can assign addresses to unapproved devices unless paired with stronger controls.

- 3. What does MAC filtering do? If needed, when would you use deny filtering rules and when would you use allow filtering rules? What happens to devices that want to connect, if the “Allow the stations specified by any enabled entries in the list to access” function is enabled but there are no entries in the list?
- Answer:
  - MAC filtering controls which devices can join a network by checking their unique MAC addresses. Deny rules block specific devices while allowing all others, making them useful for quickly excluding problem clients from an otherwise open network. Allow rules only let listed devices connect, ideal for small, fixed groups of approved devices. If the “Allow…specified entries” option is enabled but the list is empty, no devices will be permitted to connect at all.-(DeVry University, 2021, 13:42)
- 4. What wireless security settings are displayed on the Wireless Security page? Which one is recommended by the vendor? Why?
- Answer
  - The Wireless Security setting includes options to disable security, use WPA/WPA2-Personal (with a pre-shared passphrase), WPA/WPA2-Enterprise (with a RADIUS server), or WEP security. For strong network protection, it is strongly recommended to enable wireless security and select WPA2-PSK with AES encryption, as WPA2 with AES provides the highest level of security among these choices.

SOHO Wireless Network Security 2 of 3

SOHO Wireless Network Security 3 of 3

- 5. Among the configurations you explored in this module, which one is a true security function? Why?
- Answer: WPA2-PSK with AES is the real security function here — it locks down your Wi-Fi with strong encryption, keeps intruders out with a shared passphrase, and stands as the most secure choice for home or small-business networks.

- 6. What would you do to protect your wireless network at home? Why?
- Answer: I'd protect my home Wi-Fi with WPA2-PSK (AES), a strong custom password, regular firmware updates, and by turning off remote management — a solid mix of smart security and easy upkeep.

Challenge Faced

Module 2: IPv4 Addressing

- Ensuring Correct IP Addressing: Configuring correct IPv4 addresses without any typos was a significant challenge.
- Capturing Accurate Screenshots: Taking accurate screenshots that included the necessary date and time information was essential for documentation purposes.
- Troubleshooting Network Interface and Connectivity Issues: Addressing network interface and connectivity issues required careful attention and problem-solving skills.

Module 3: Connectivity Test

- VM Initialization Order: The SOHO Router VM had to be started before the client VMs to ensure DHCP services were available.
- IP Address Retrieval Issues: Occasionally, IP addresses didn't display correctly, requiring manual interface reset using specific commands.
- Terminal Navigation: Identifying the correct *inet* entry in the terminal output required attention to detail.

Module 4: IP Subnetting and Loopback Interfaces

- Ensuring Correct IP Addressing for Loopback Interfaces: Configuring the correct IP addresses for loopback interfaces was a challenge.
- Troubleshooting Failed Ping Responses: Addressing misconfigured routes or interfaces that led to failed ping responses required troubleshooting skills.
- Navigating Virtual Environments and Terminal Commands: Accurately navigating virtual environments and using terminal commands was essential.

Module 5: Visio Network Diagram

- Symbol Selection in Visio: Choosing the correct network icons and aligning them properly required attention to detail and familiarity with Visio's interface
- Connection Accuracy: Ensuring that each device was logically and correctly connected to the router involved troubleshooting the layout and link placement
- Labeling and Readability: Balancing technical precision with visual clarity was a challenge, especially when labeling devices and connections.

Module 6: SOHO Wireless Network Security

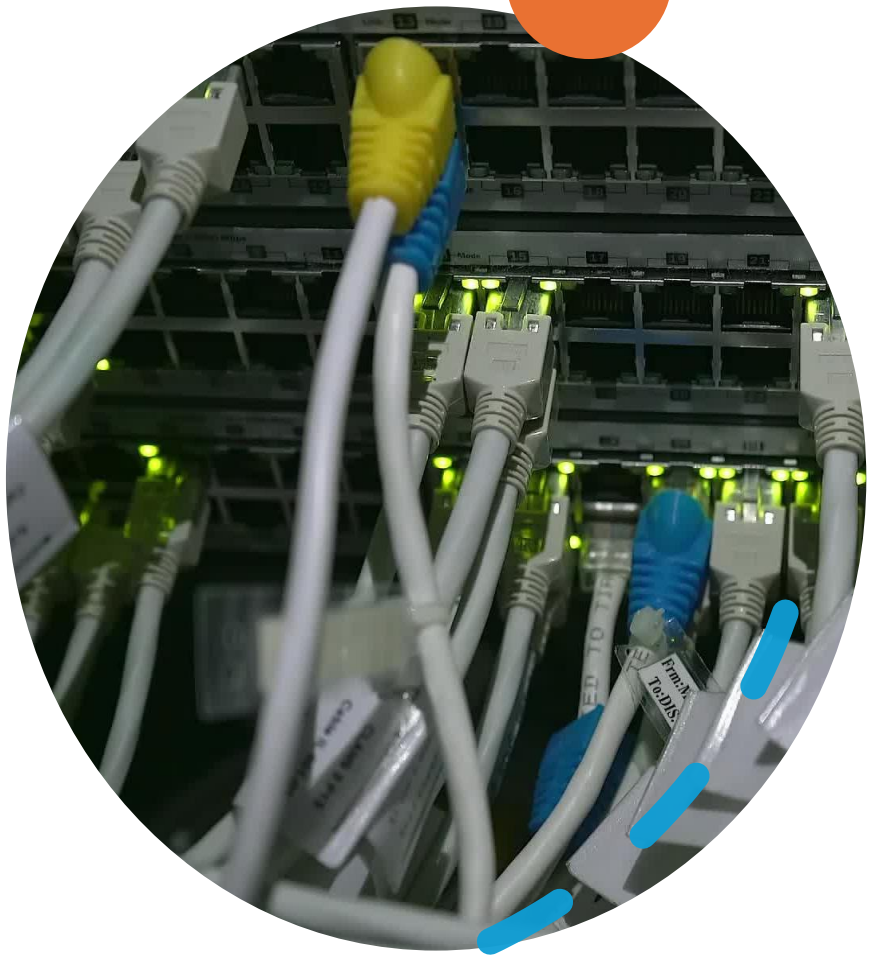
- Configuring Security Settings: Ensuring that the correct security settings were applied to the SOHO wireless network was a challenge.
- Troubleshooting Connectivity Issues: Addressing connectivity issues that arose during the configuration process required careful attention and problem-solving skills.
- Documenting Configuration Steps: Accurately documenting the configuration steps and ensuring that all relevant details were captured was essential.

Career Skills Gained

- Basic Networking Troubleshooting: Developed skills in identifying and resolving network issues through hands-on practice with terminal commands and IP configuration.
- Virtual Lab Navigation: Gained experience in navigating and configuring virtual environments, which is essential for modern IT roles.
- Real-World Command-Line Usage: Practiced using command-line interface (CLI) tools to manage and troubleshoot network settings.
- Professional Technical Reporting: Enhanced documentation skills by capturing and presenting technical results in a professional format.
- Network Configuration: Acquired hands-on experience with DHCP setup and IP address verification, which are critical for network administration.
- Troubleshooting: Applied command-line tools to resolve network interface issues, improving problem-solving skills.
- Documentation: Captured and recorded IP configurations for project reporting, enhancing technical writing abilities.
- Virtualization Proficiency: Operated multiple virtual machines (VMs) and managed virtual network environments, which is valuable for IT and network management.
- IP Subnetting Proficiency: Developed a strong understanding of subnetting and its application in real-world scenarios.
- Technical Documentation: Practiced creating professional-grade network diagrams using Microsoft Visio, a valuable skill in IT and network administration.
- Attention to Detail: Improved focus on accuracy, layout, and presentation, which are critical traits in both customer-facing and technical roles.
- Tool Proficiency: Gained hands-on experience with Visio, adding to your toolkit for roles in logistics, IT support, and systems analysis.
- Network Security Configuration: Learned to configure security settings for a SOHO wireless network, which is essential for protecting network integrity.
- Troubleshooting Connectivity Issues: Developed problem-solving skills by addressing connectivity issues during the configuration process.
- Documentation: Accurately documented configuration steps and ensured that all relevant details were captured, enhancing technical writing abilities.
- Router Configuration: Gained hands-on experience with configuring loopback interfaces and route tables on routers.
- Connectivity Testing: Used tools like ping to validate network paths, enhancing troubleshooting skills.
- Documentation: Captured and presented technical results in a professional format, improving technical reporting skills.

Conclusion

- Throughout this project, I gained a comprehensive understanding of IPv4 addressing and its practical applications within a virtualized networking environment. By engaging in various modules, I enhanced my knowledge of IP address assignment, the mechanisms by which devices communicate using these addresses, and the processes involved in configuring and observing network settings through laboratory simulations.
- The project allowed me to develop foundational skills in network communication, troubleshooting, and documentation, which are essential for a career in information technology and networking. I successfully implemented IPv4 addressing on a SOHO router, configured dynamic IP address assignments, and verified connectivity between devices. Additionally, I explored subnetting and loopback interfaces, created detailed network diagrams using Microsoft Visio, and implemented wireless network security measures.
- One of the key takeaways from this project is the importance of accuracy and attention to detail in network configuration and documentation. The hands-on experience provided valuable insights into real-world networking challenges and the practical skills necessary to address them. By working through various scenarios, I developed a deeper understanding of how different network components interact and the significance of proper configuration in maintaining a stable and functional network.
- Overall, this project has equipped me with the technical knowledge and practical skills required to excel in the field of networking. I am now more confident in my ability to design, implement, and troubleshoot network solutions, and I am well-prepared to tackle future challenges in my career.



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