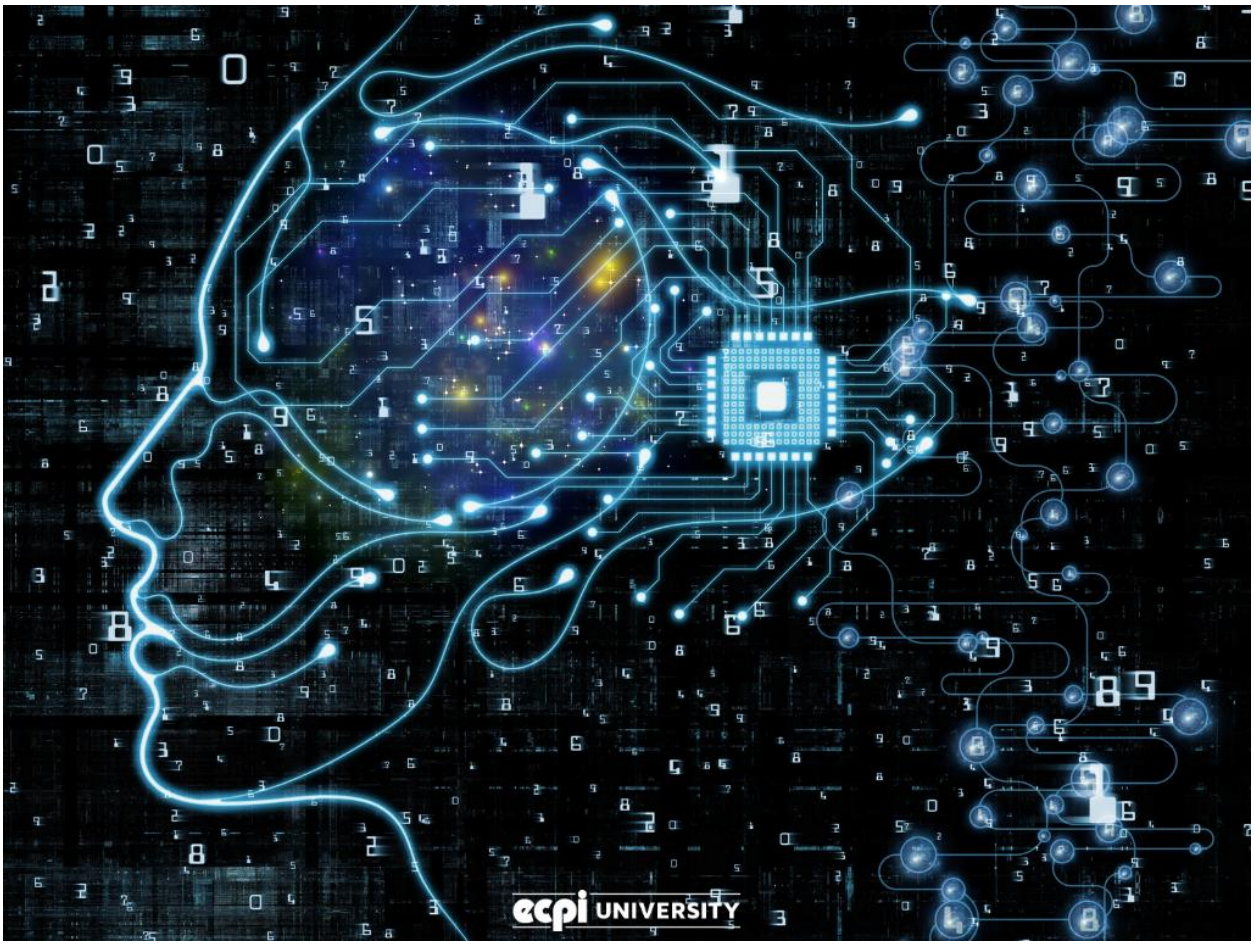

NETWORKING & VIRTUALIZATION

PROOF OF CONCEPT LINUX VIRTUAL NETWORK PROJECT

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Table of Contents

Introduction:

My new role is with a consultancy company named 'Consult & Connect Ltd'. The company provides networking consulting services to companies in Ireland. As my first proof of concept project, I am going to create a virtualized Linux network infrastructure based on the network of a new third-level college. This college is Dublin City College (DCC). To get a sense of how their new network and services will perform in a Linux environment, DCC has requested a virtualized environment. Through this assignment, I will be able to assess my understanding of virtualized network services like SSH.

PART 1: Virtual Linux Network and Web server setup

I have been contracted by Dublin City College (DCC) to install a prototype Linux Client/Server Web environment to demonstrate basic connectivity between the Linux Server & Client VMs. Also, I will demonstrate remote connectivity using an SSH terminal and configure basic security in the Linux environment.

IP ADDRESSING TABLE		
Server name	**Adapter 1 - enp0s3**	**Adapter 2 - enp0s8**
ubuntuserver	Static IP Address: 192.168.56.50	DHCP
ubuntuclient	Static IP Address: 192.168.56.60	DHCP

1.) Obtaining Linux updates - Update and upgrade the system using the relevant commands.

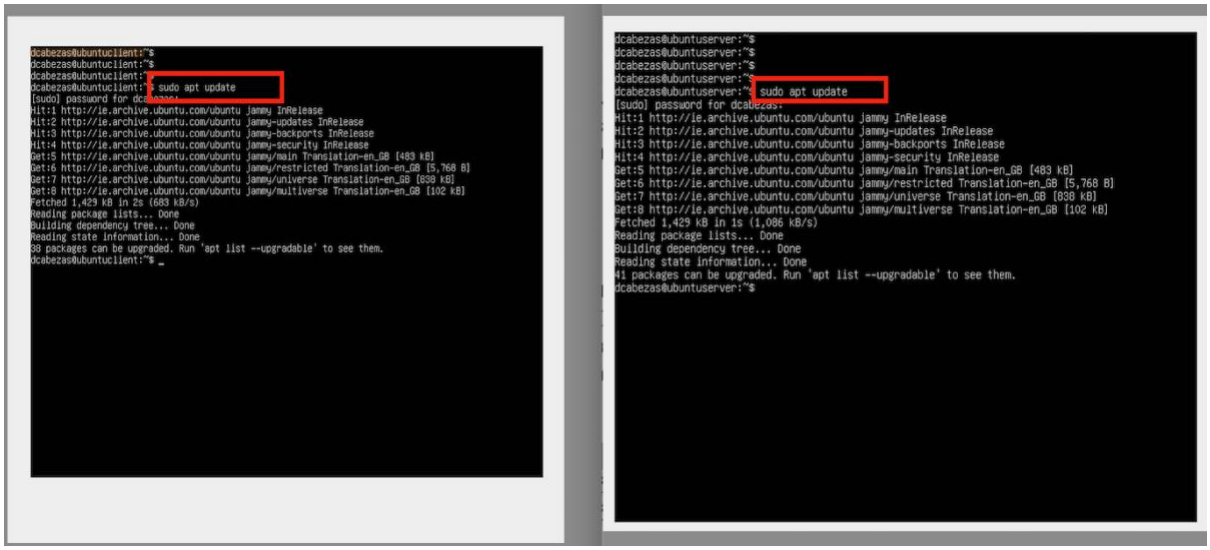

Image #1: updating the system with the command 'sudo apt update'.

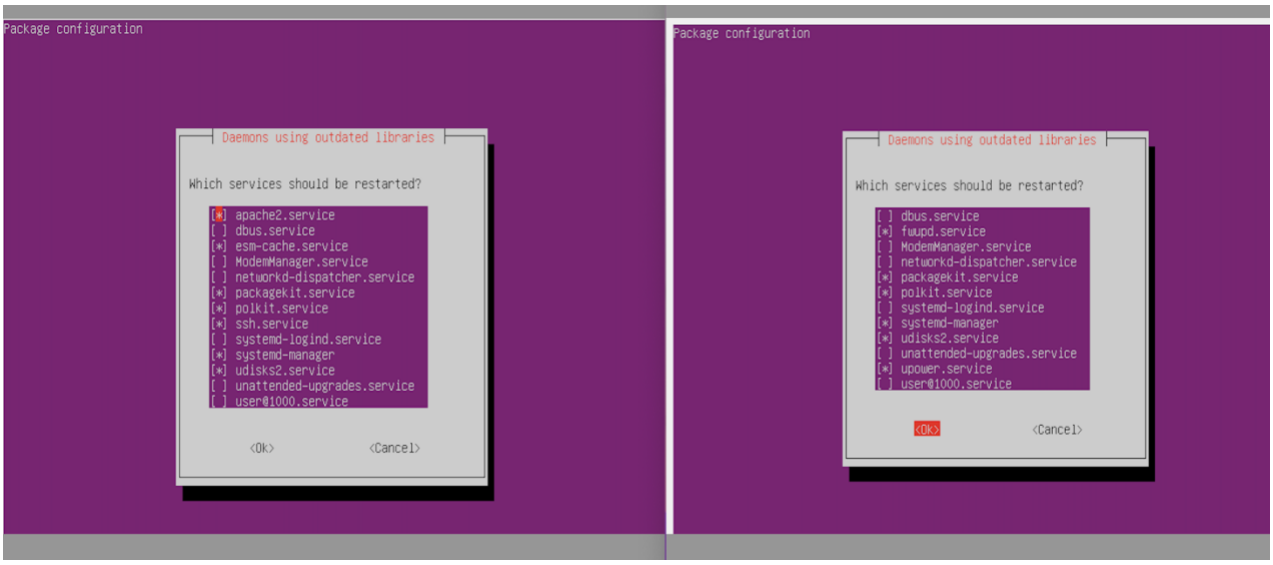

Image #2: system upgraded using the command 'sudo apt upgrade'.

2.) Testing Connectivity between both systems by pinging each internal IP address (192.168.56.x).

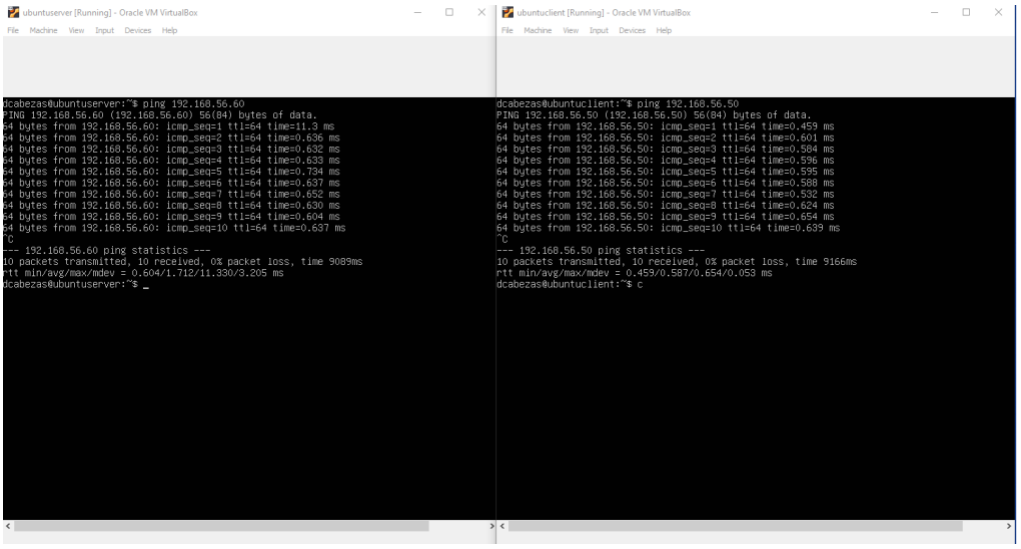

Image #3: pinging the two virtual machines after configuring static IP address for both.

3.) Using the client, test access to the 'DCC under construction' web page by opening the Lynx browser on the Linux client and accessing the web page that is hosted on the Ubuntu server.

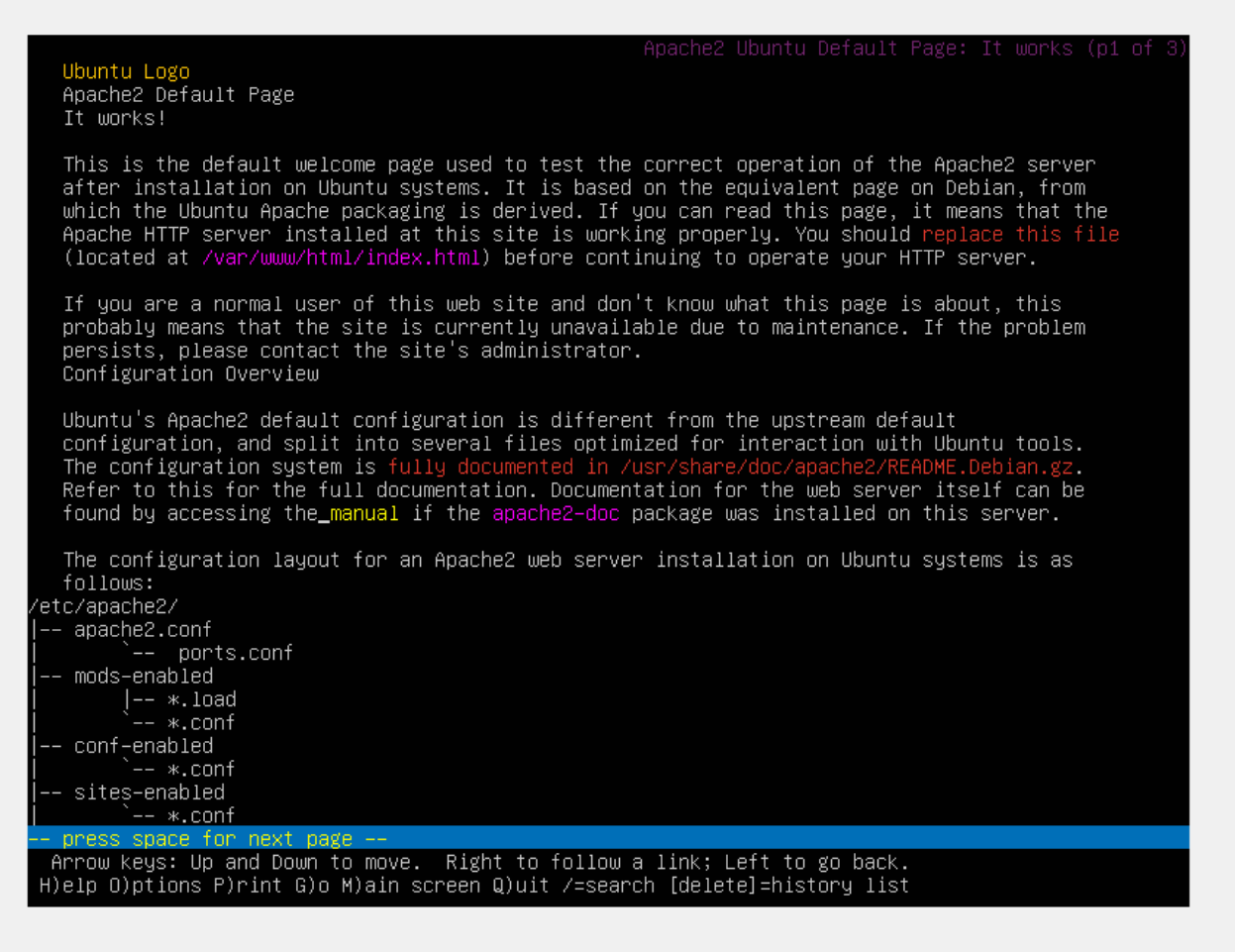

Image #4: Testing access to the DCC under construction from the client VM using Lynx browser.

4.) Using my Windows host operating system, test access to 'DCC under construction' web page by opening a web browser and accessing the 'DCC under construction' web page which is hosted on the Ubuntu server.

Image #5: Testing access to the DCC under construction from the HOST machine using Chrome browser.

5.) Pinging the IP address of ubuntuserver From a Windows host computer. While Wireshark is running on the host operating system, identify the ICMP traffic between your browser on your host operating system and the ubuntuserver webserver.

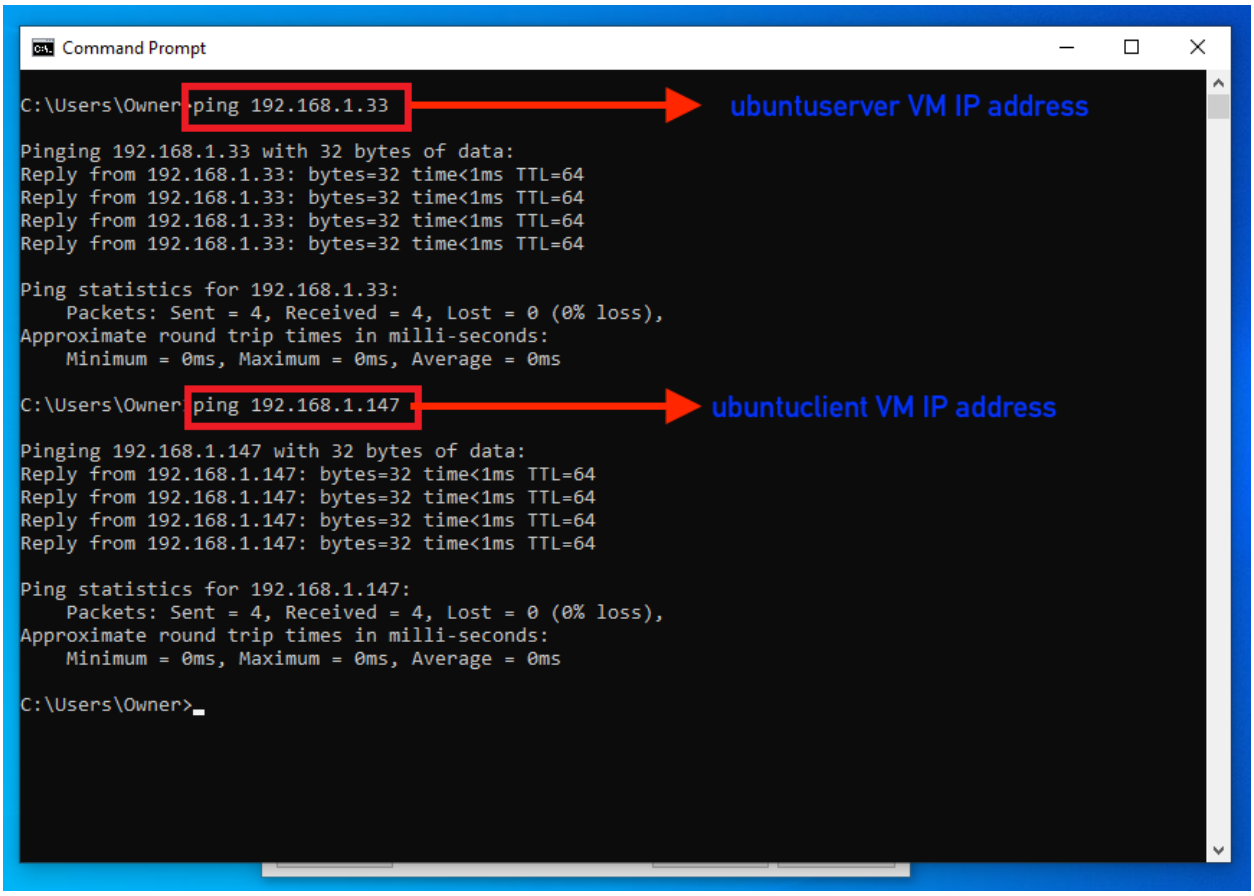

Image #6: Pinging from the host machine to the Ubuntu VMs.

6.) From your host computer, put the IP address of ubuntuserver into Chrome browser or whatever browser you use.

Utilizing Wireshark on your host operating system, ensure to take a print screen of the packet that shows the TCP/IP 3-way handshake that occurs while the HTTP contents (webpage) are transferred from the ubuntuserver server to client (your host operating system).

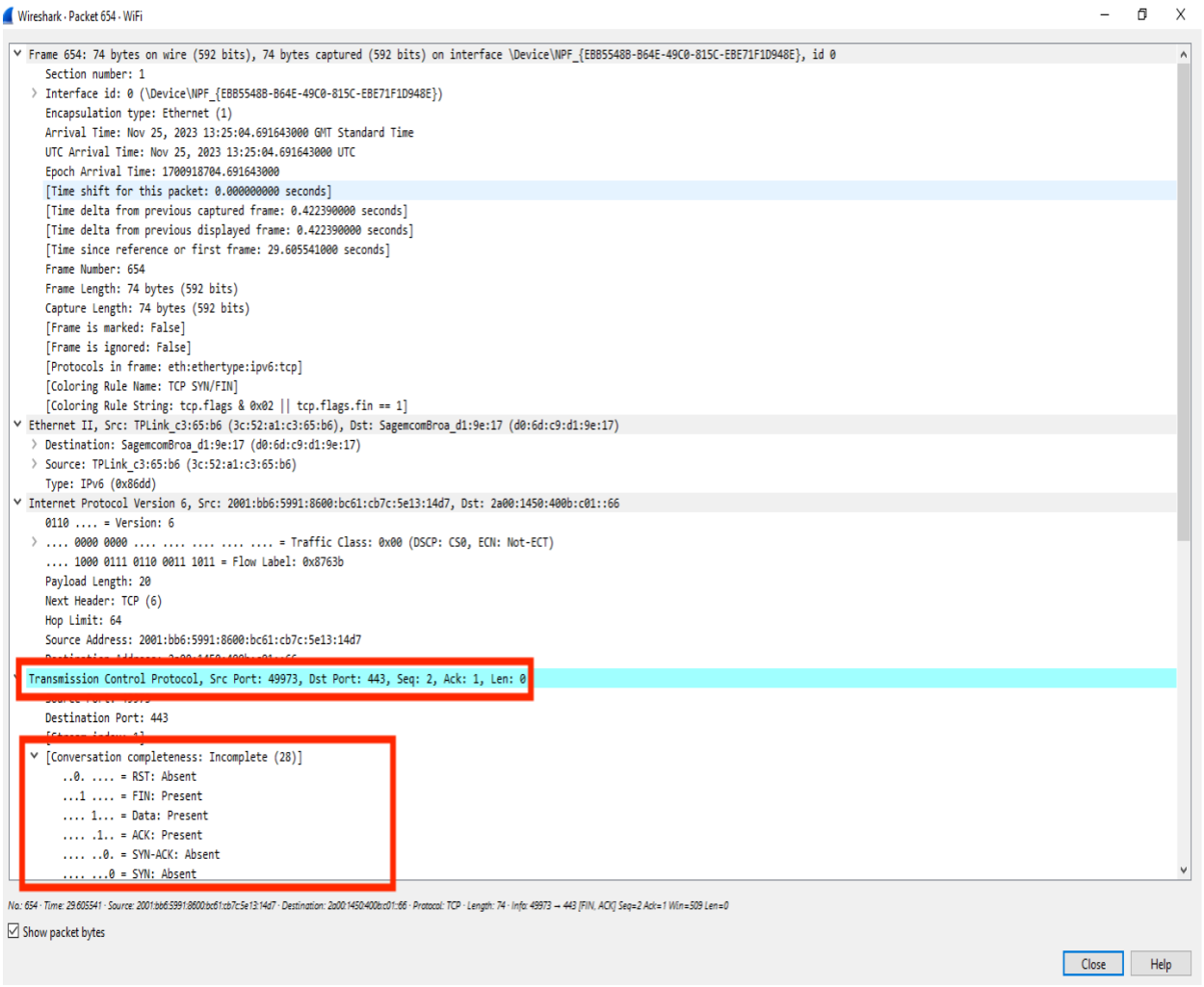

Image #7: The 3-way handshake.

PART 2: SSH

DCC would like you to install OpenSSH on the ubuntuserver and install the OpenSSH server on the ubuntuserver only.

7.) Show a print screen of your host operating system (using the SSH terminal through Putty logging into the ubuntuserver using SSH remotely.

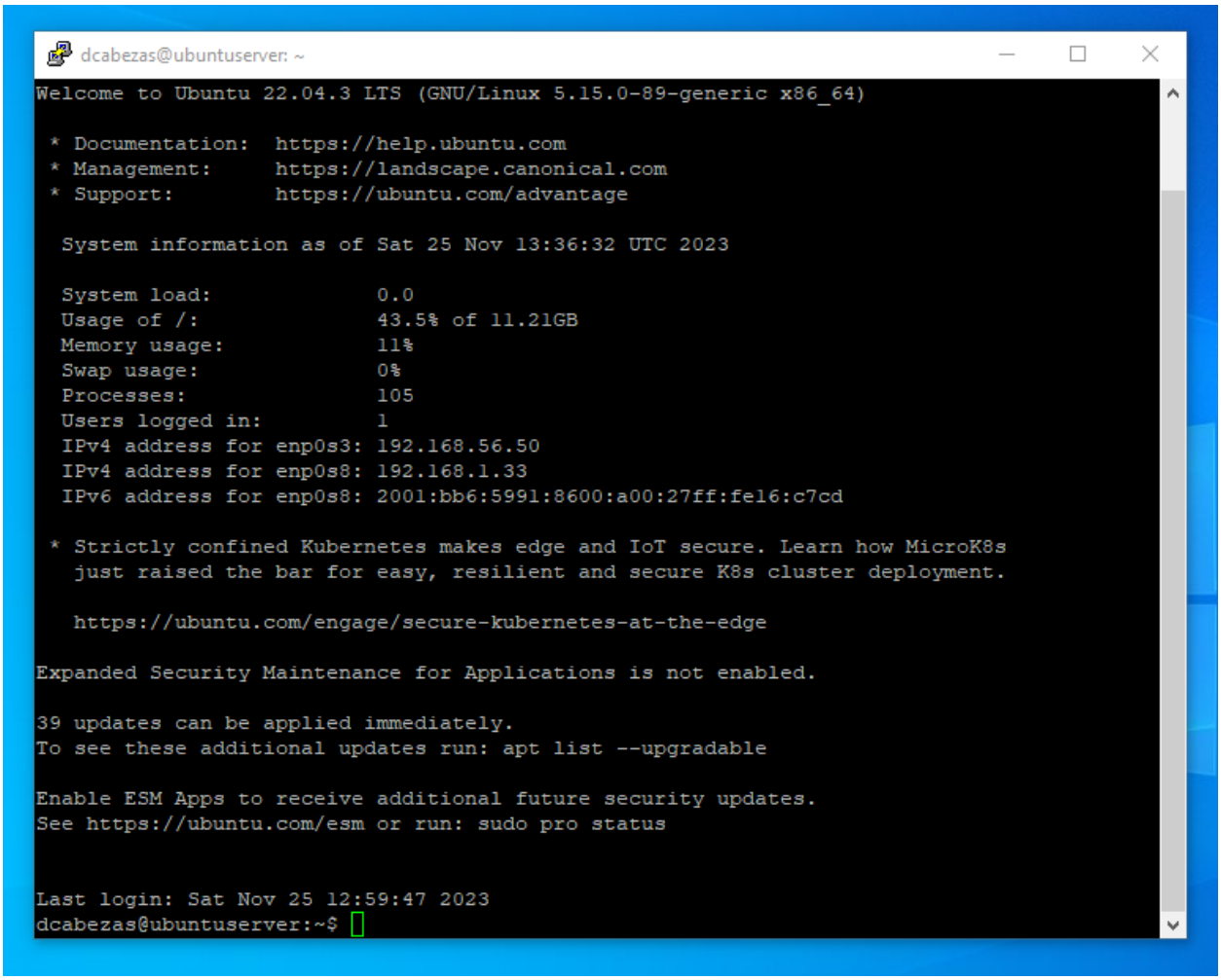

Image #8: Using the SSH terminal through Putty on Windows to remotely access to the ubuntu server VM.

8.) Utilizing Wireshark on your host operating system, show how the communication is encrypted between your client operating system and the ubuntuserver.

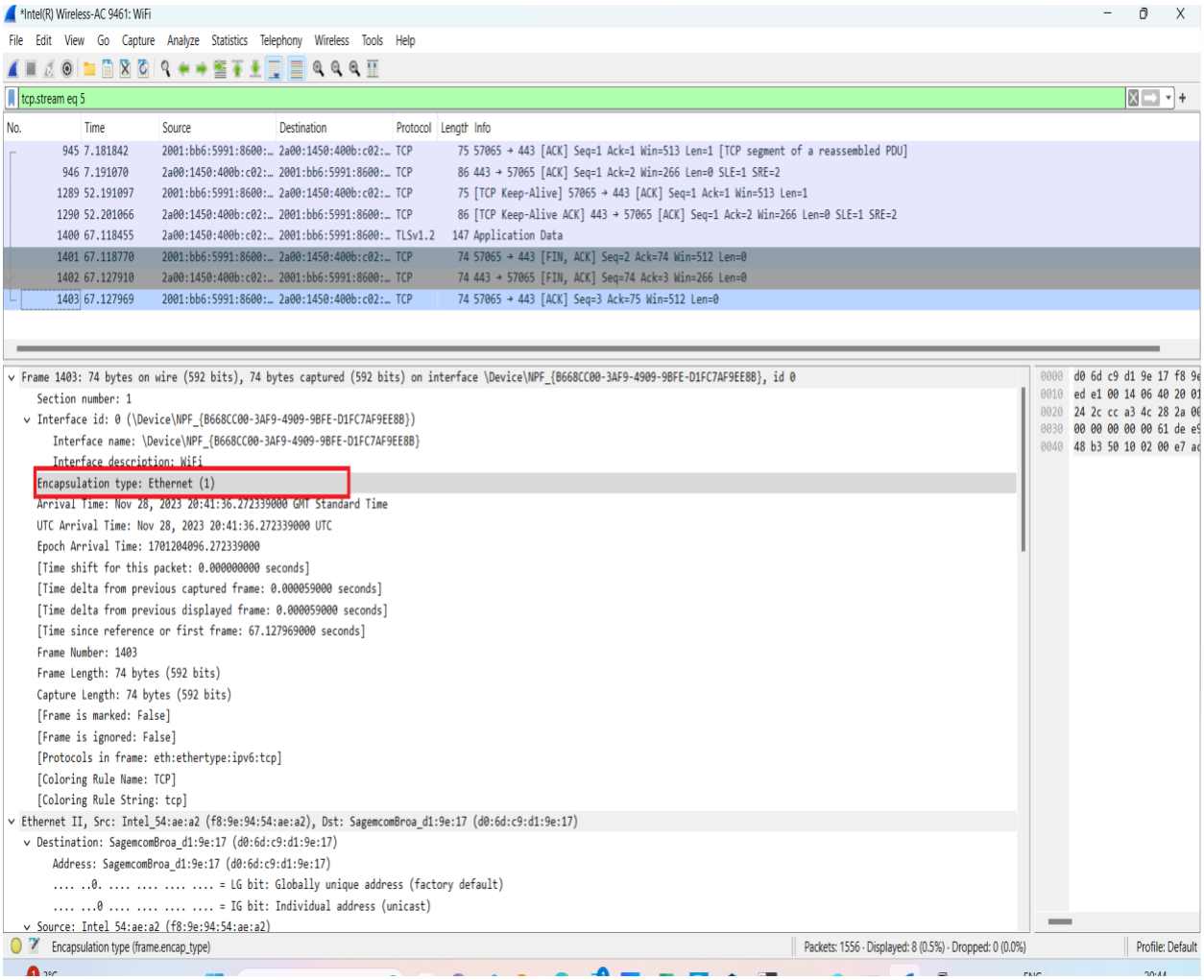

Image #9: Encrypted SSH communication between the client operating system and the ubuntuserver.

PART 3: FIREWALL

The default firewall configuration tool for Ubuntu is Uncomplicated Firewall (ufw) which is a utility that provides a user-friendly way to create an IPv4 host-based firewall. ufw by default is initially disabled.

9.) In this part your will configure the uncomplicated firewall to control the network traffic and demonstrate the uncomplicated firewall doing its job.

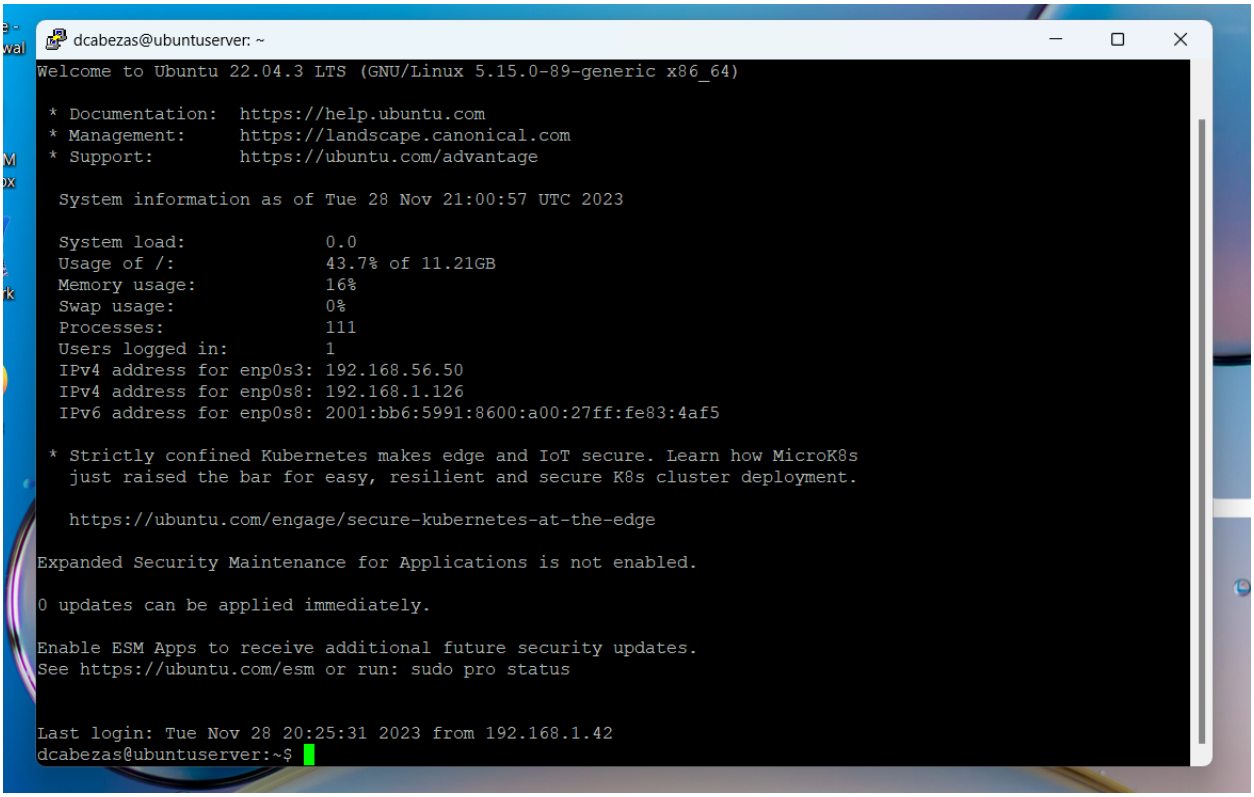

Image #10: SSH connection to ubuntu server machine using PUTTY before enabling ufw.

Image #11: enabling the uncomplicated firewall on ubuntuserver.

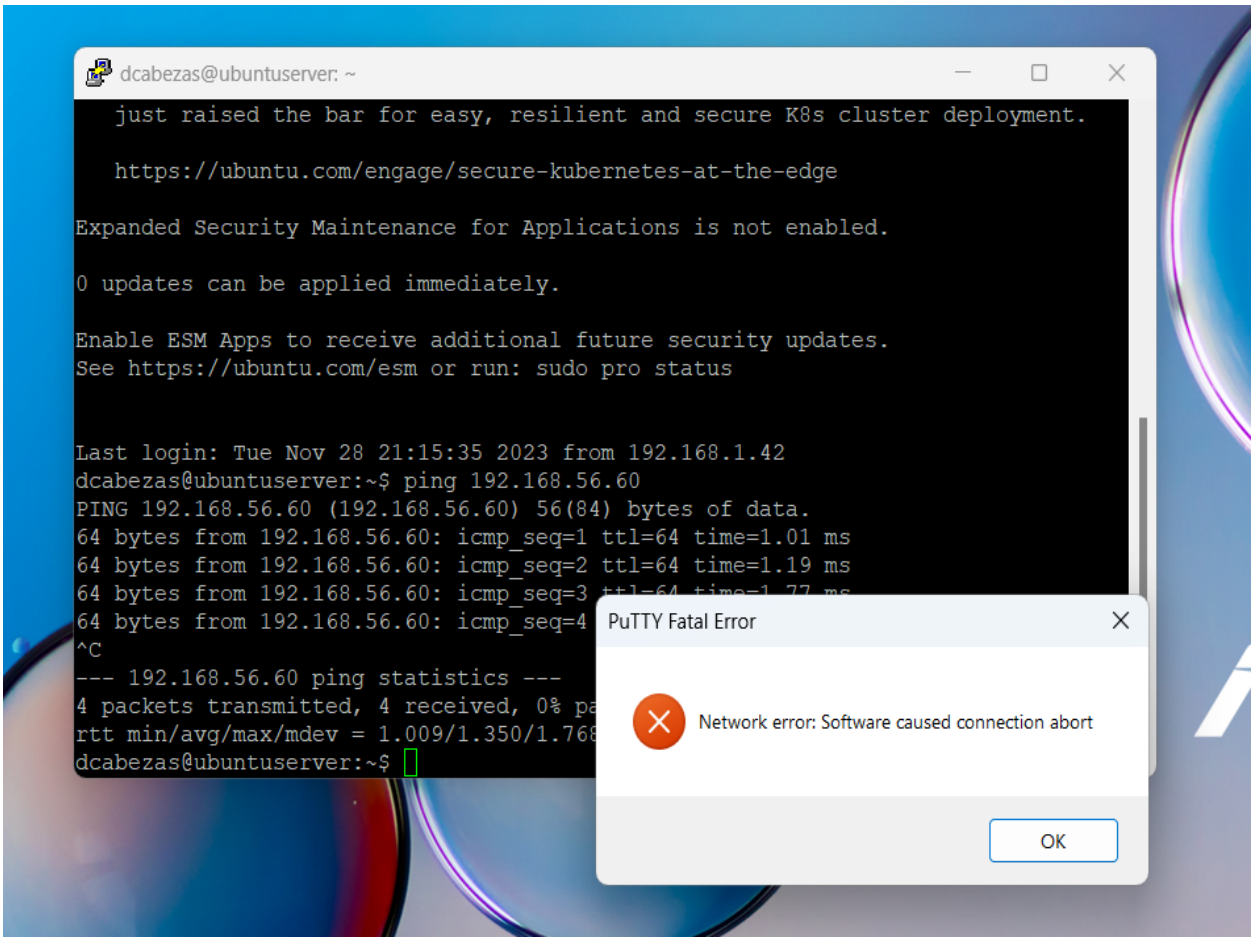

Image #12: SSH connection ended by enabling the uncomplicated firewall on ubuntuserver.

PART 4: IP ADDRESS & HOSTNAME MANAGEMENT

10.) IP address configuration – use nano to edit the Netplan file.

Configure both computers as shown here:

IP ADDRESSING TABLE		
Server name	**Adapter 1 - enp0s3**	**Adapter 2 - enp0s8**
ubuntuserver	Static IP Address: 192.168.56.100	DHCP
ubuntuclient	Static IP Address: 192.168.56.125	DHCP

Edit the necessary configuration file (or files) to make these changes permanent. Use PING to demonstrate that these are the correct addresses and show that you have connectivity between these two Linux VMs.

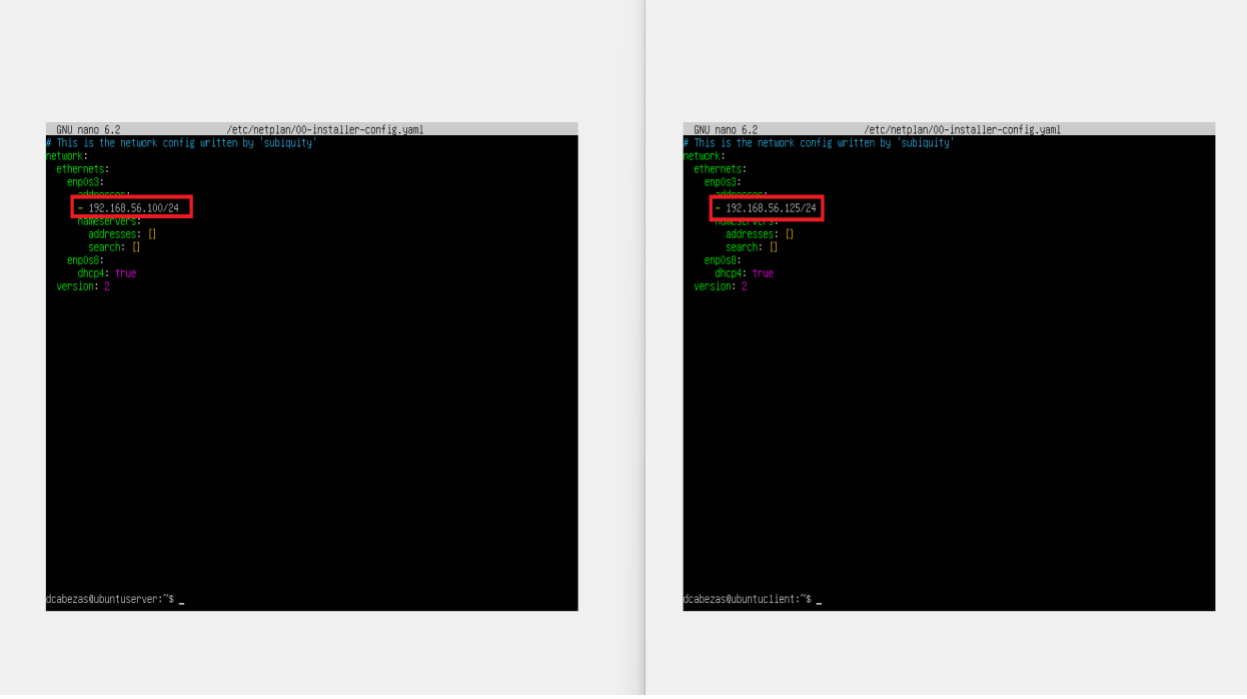

Image #13: Using nano to edit the netplan file to configure static IP address for the VMs. (Mike, 2023)

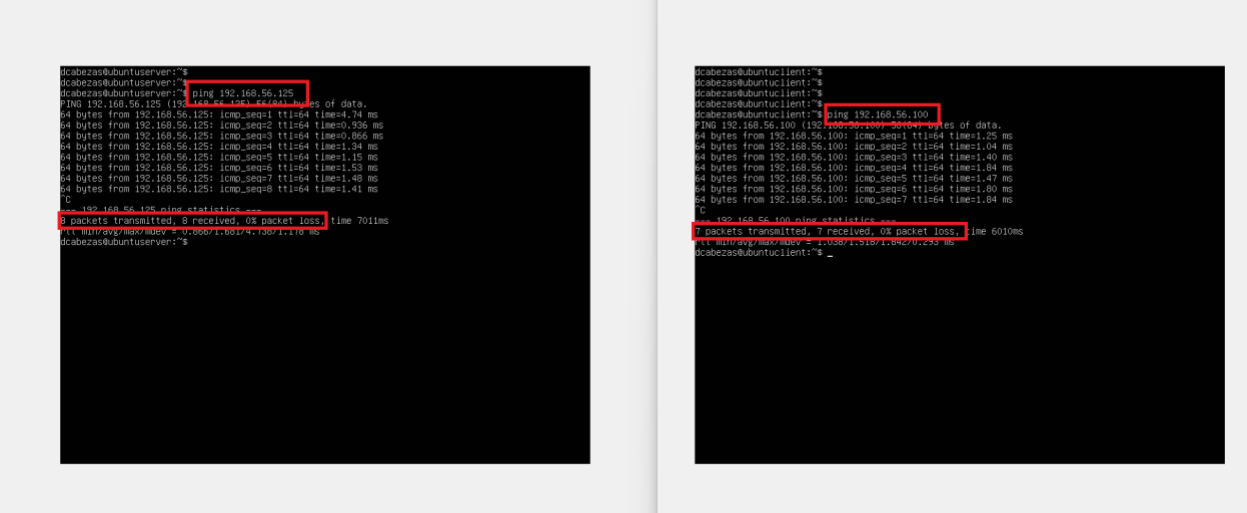

Image #14: New static IP address for the VMs. (Mike, 2023)

11.) Rename hostname(s) DCC needs you to rename ubuntuserver.

Give it the new name web-server-your last three digits of your student number. For example. You also need to rename ubuntuclient. Give it the new name web-client-123 Note: the 123 is last 3 digits again of your student number.

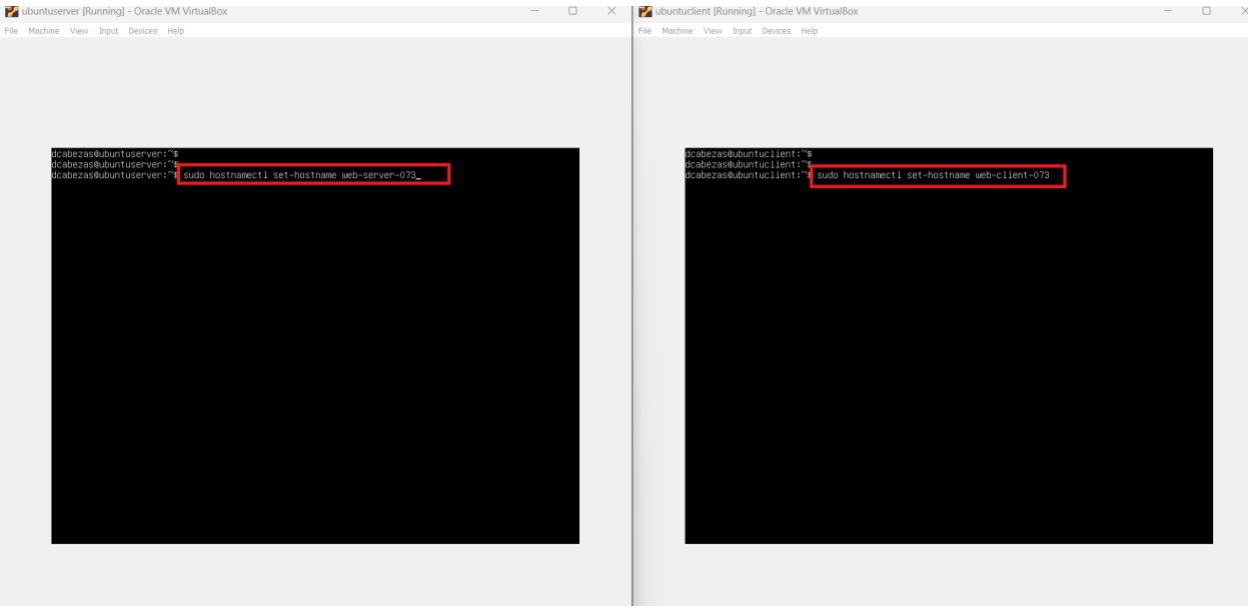

Image #15: Changing hostnames of the VMs. (R2Schools, 2021)

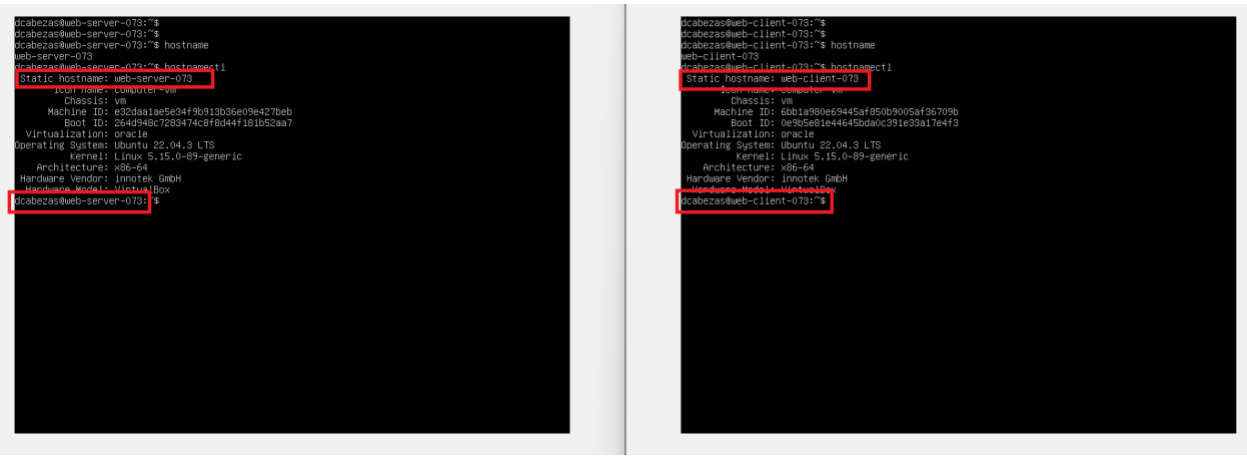

Image #16: Hostnames of the VMs changed. (R2Schools, 2021)

PART 5: RESEARCH AND CHALLENGE ACTIVITIES

12.) Linux shell scripting Backup.sh.

DCC would like advice and help with automating backing up of their Apache webserver files. Create a folder called Server-Data on your Ubuntu server VM. Create three simple text files called DATA1, DATA2, and DATA3 and add them to the folder. Write your name into each of these files. Use a text editor to create a Linux BASH shell script that backs up these three files every day a noon.

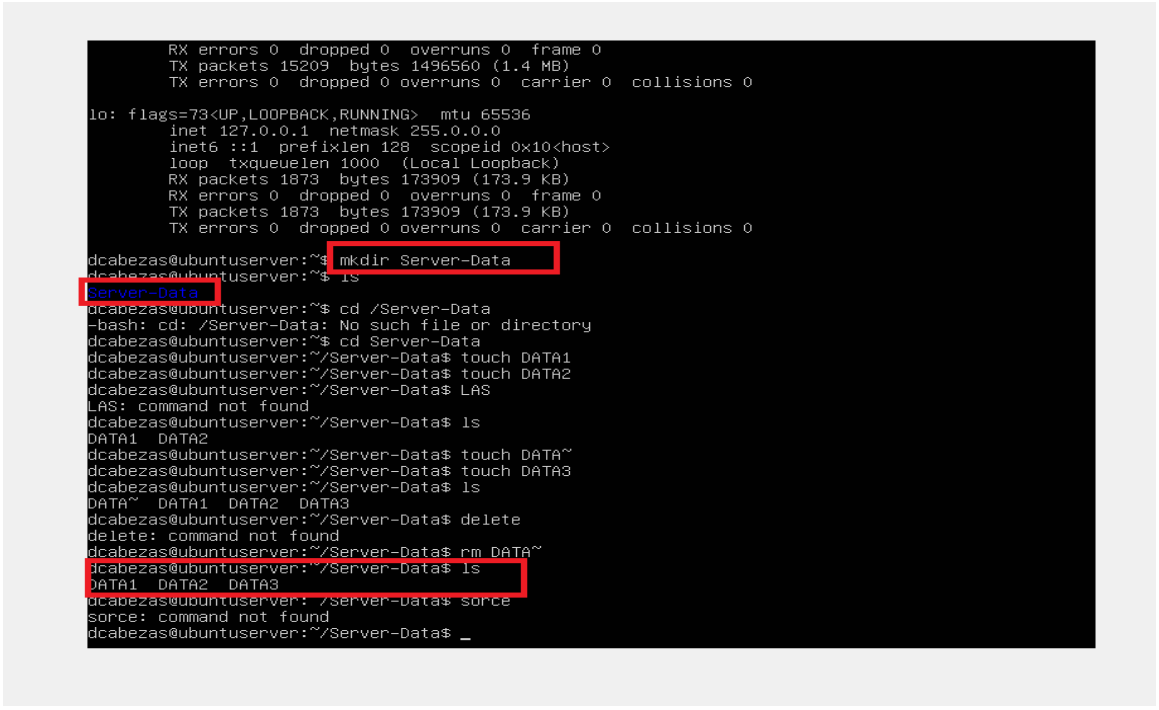

Image #17: creating folder and files to be backup. (Gite, 2023) (Core, 2023)

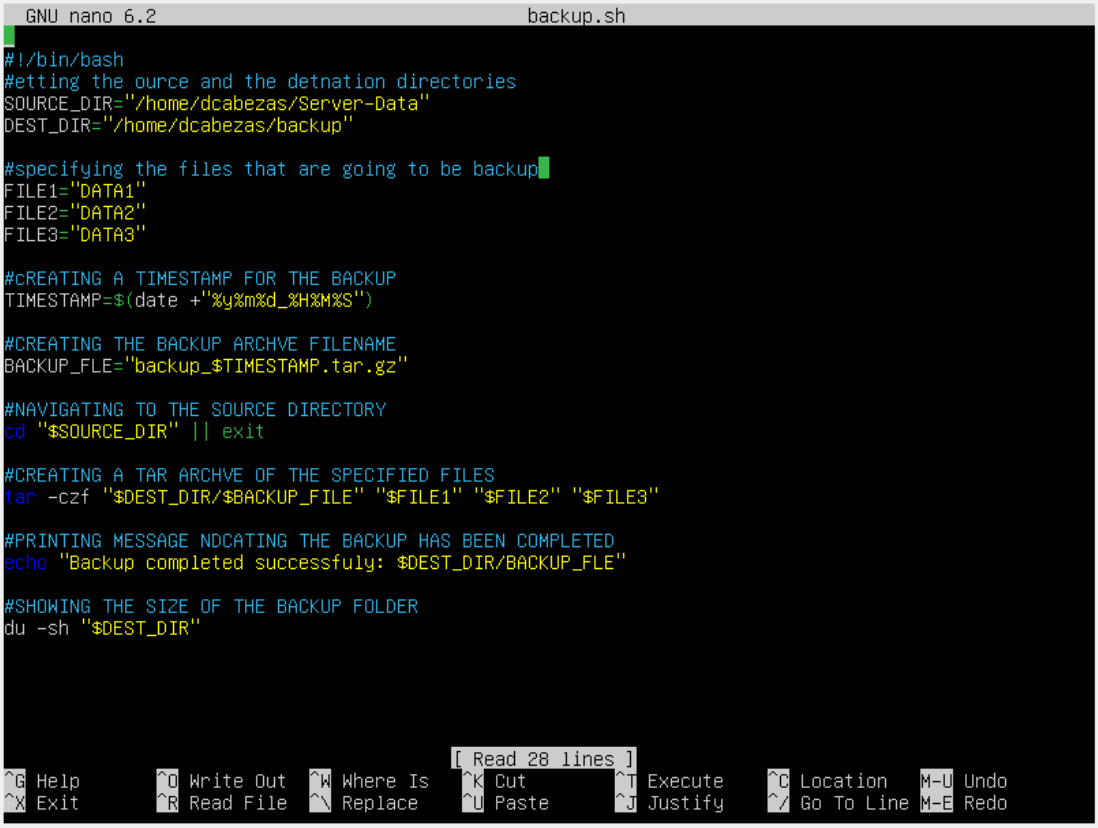

Image #18: Script to backup the folder along with its files. (Ubuntu, 2023)

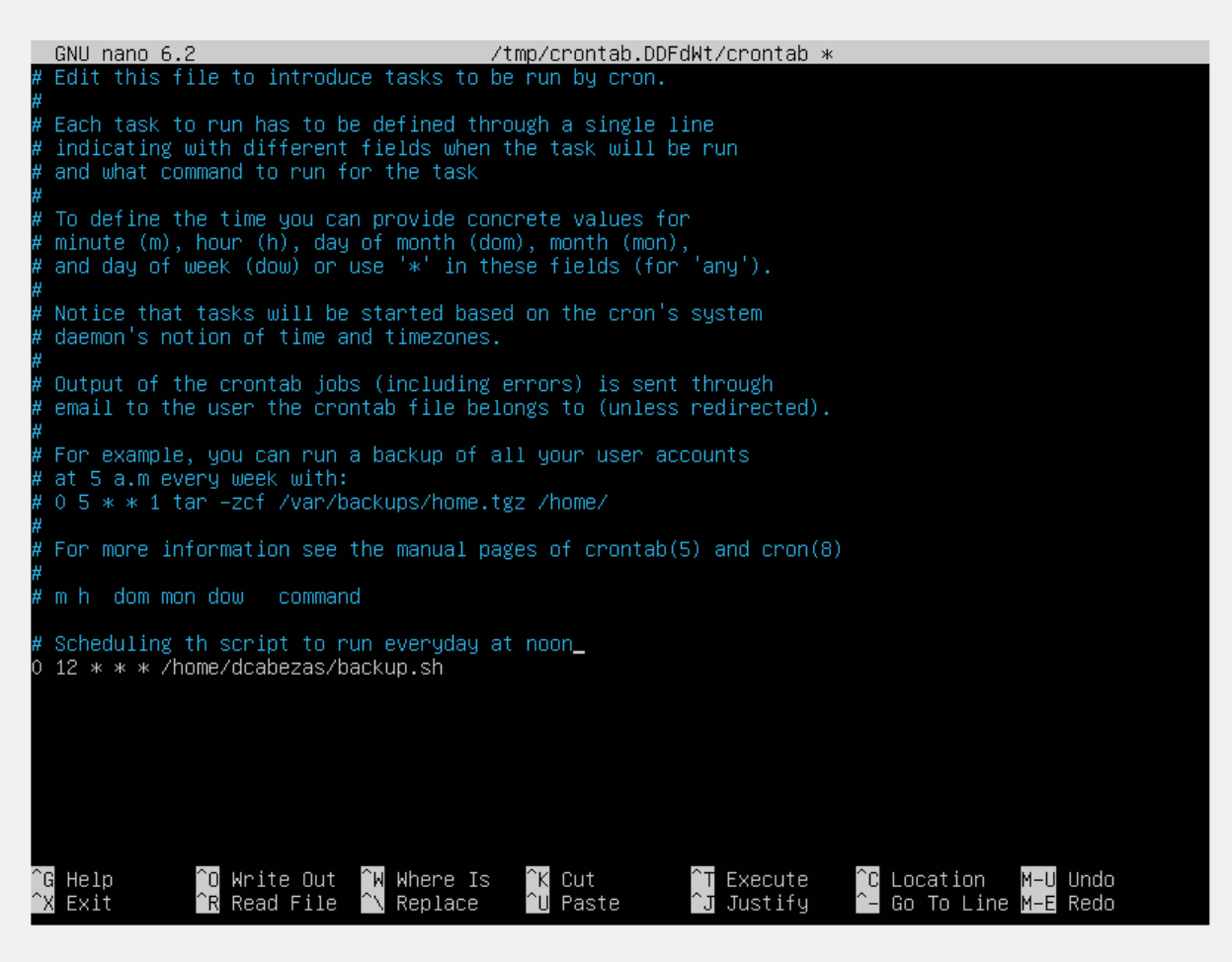

Image #19: Crating a crontab for the script to run every day at noon.

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