LABORATORY 02 - OS SETUP, SHELL, AND NETWORK SUPPORT SOFTWARE - KNOWING CLOUD (AWS)

Laboratory 2 corresponding to the first term

Santiago Amaya Zapata

Julian Camilo Tinjacá Corredor

Escuela Colombiana de Ingeniería Julio Garavito

NETWORK ARCHITECTURE AND SERVICES

GROUP 3

Bogotá DC, Colombia

2025 - 2

Lab No.02 - OS SETUP, SHELL, AND NETWORK SUPPORT SOFTWARE

Objective

- Continue the installation of base operating systems.
- Understand the operation of networking tools.
- Learn about operating system administration using Shell programs.

Tools to be used

- Laboratory Computers
- Internet Access
- Virtualization Software
- Operating System Images
- Packet Tracer
- Wireshark

Introduction

Operating systems and network administration are fundamental pillars in the training of professionals in systems engineering and information technology. In today's business environment, IT infrastructure services range from physical and virtual workstations to specialized servers, all interconnected through networking devices that enable both local and global communication. For this reason, understanding the installation, configuration, and management of operating systems, as well as the use of networking and administrative tools, is essential to ensure the proper functioning and security of technological services.

This laboratory aims to familiarize students with the deployment of base operating systems and the use of support tools such as command interpreters (Shell), network simulators (Packet Tracer), and traffic analyzers (Wireshark). Additionally, it seeks to strengthen competencies in task automation through scripting, user and permission management, and the configuration of basic networking and file-sharing services. In this way, the laboratory integrates knowledge of software, networks, and virtualization into a practical context that simulates real corporate infrastructure scenarios.

Theoretical Framework

Operating Systems and Virtualization

An operating system (OS) is the software responsible for managing hardware resources and providing services to applications and users. Its installation and configuration are the first steps in building a technological infrastructure. In both academic and professional environments, systems such as Linux (Slackware, CentOS), Solaris, and Windows Server are commonly used, each with its own characteristics in terms of administration, security, and service support.

Virtualization, through tools such as VirtualBox or VMware, enables the deployment of multiple operating systems on a single physical machine, optimizing resources and facilitating experimentation without compromising the integrity of the host system.

Administration through Shell

The **Shell** is a command interpreter that allows direct interaction with the operating system, offering flexibility and control for administration tasks. Through scripting, it is possible to automate processes such as user creation, permission management, log file analysis, and directory organization. This automation capability is fundamental for system administrators, as it improves efficiency and reduces human error.

Networking and Simulation Tools

In networking, it is essential to understand connectivity fundamentals, protocols, and the devices involved in data transmission. Tools such as **Cisco Packet Tracer** allow the simulation of network topologies, configuration testing of routers and switches, and the analysis of information flow between devices. These simulators are especially useful for understanding data encapsulation in the different OSI model layers and the operation of protocols such as ICMP, DHCP, and DNS.

Traffic Analysis with Wireshark

Wireshark is a packet analyzer that allows real-time traffic inspection. It provides visibility into how data is encapsulated at each layer of the OSI/TCP-IP model and allows filtering to analyze specific protocols. Its use is essential for network troubleshooting, configuration validation, and understanding the structure of packets circulating through the network.

Network Services and File Sharing

A key service in corporate infrastructures is file sharing, which facilitates collaboration between users and departments. Protocols such as **SMB/SAMBA** provide this functionality in heterogeneous environments, integrating Windows, Linux, and Solaris systems. Correct

configuration of these services ensures availability, security, and efficiency in accessing shared resources.

Experiments

Experiments To build a technological infrastructure like the one presented in the previous diagram, it is necessary to have computers and servers with an installed operating system. It is also important to understand their operation from the system administrator's perspective and support automation processes. Below, different activities are proposed to explore this structure. 1. Getting to Know Packet Tracer

1. Getting to Know Packet Tracer

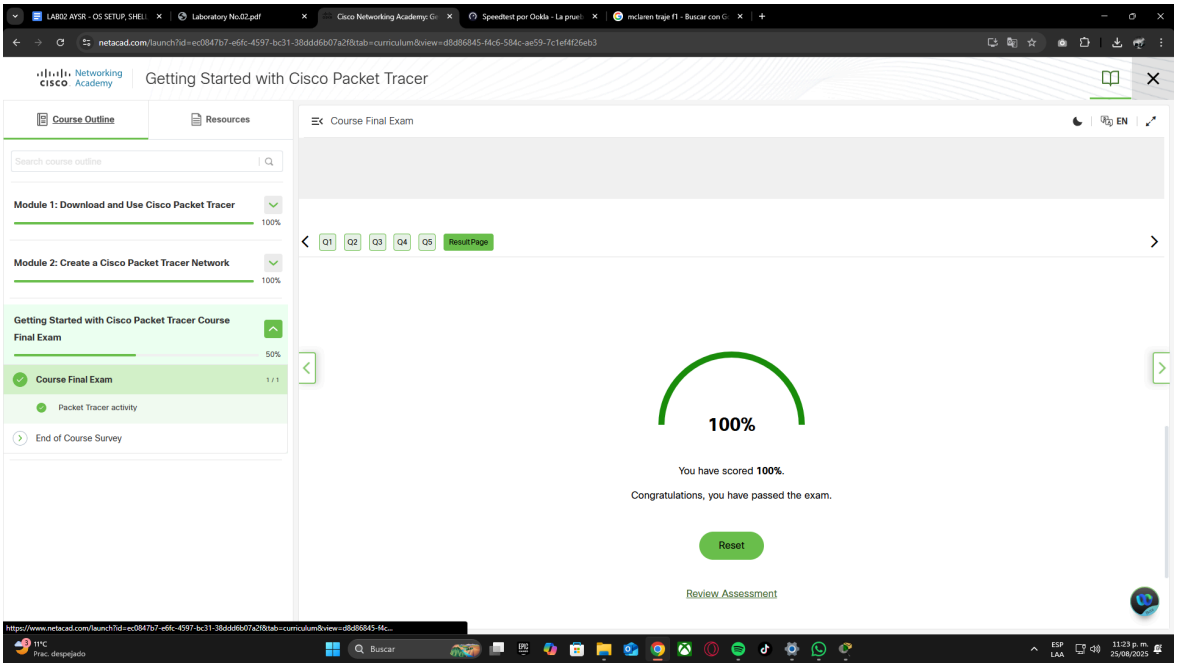
- Answer the following questions:

1. What version of Packet Tracer is available on the Cisco platform?
The Cisco platform offers Packet Tracer version 8.2.2

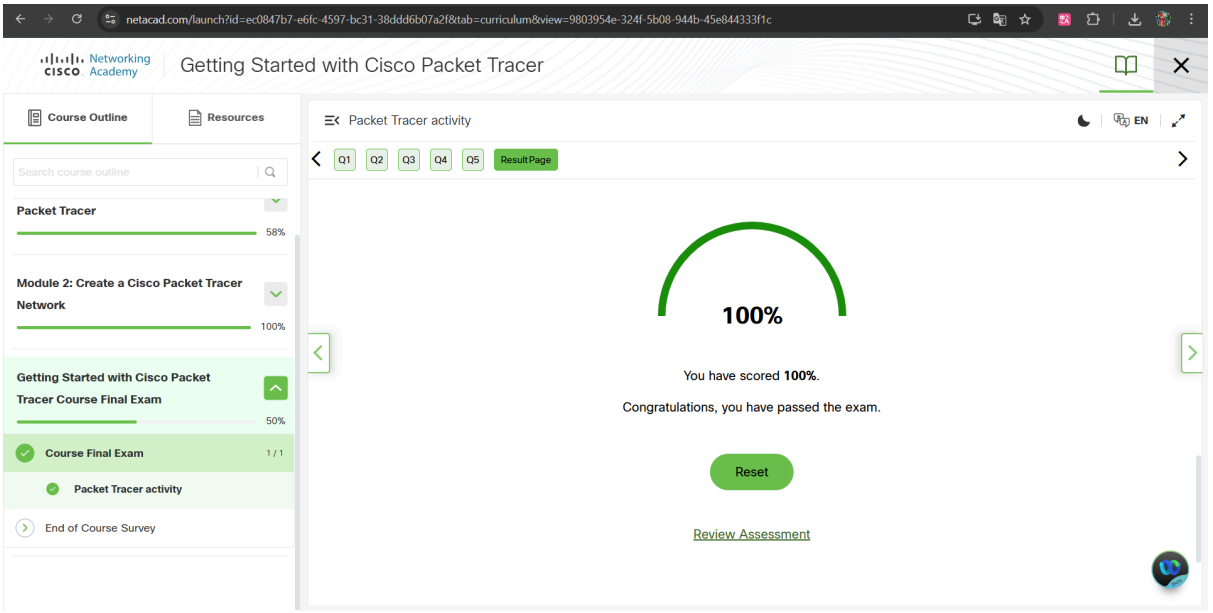
2. Through the Cisco platform, enroll in the course Getting Started with Cisco Packet Tracer. Create a video summarizing the first four chapters of the course. Maximum duration: 5 minutes.
This is the link on YouTube: https://youtu.be/mfP99NT-1ls

3. Complete the quiz "Introduction to Packet Tracer - PT Basics Quiz" from the course and take a screenshot of your quiz results.

Julian´s results of tests

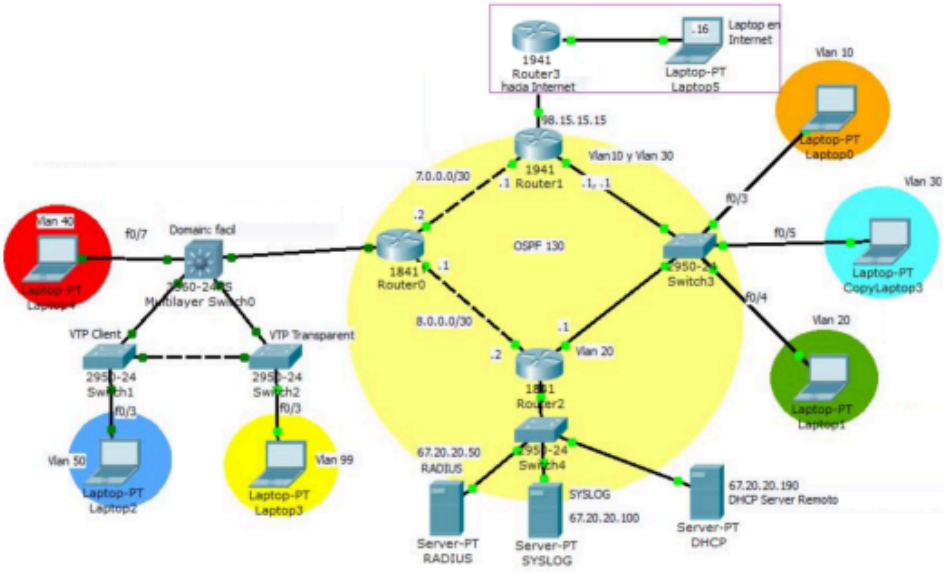


Santiago’s results of test



Note: Each student must complete the quiz individually.

- Using Packet Tracer, each student must create the network diagram shown below:

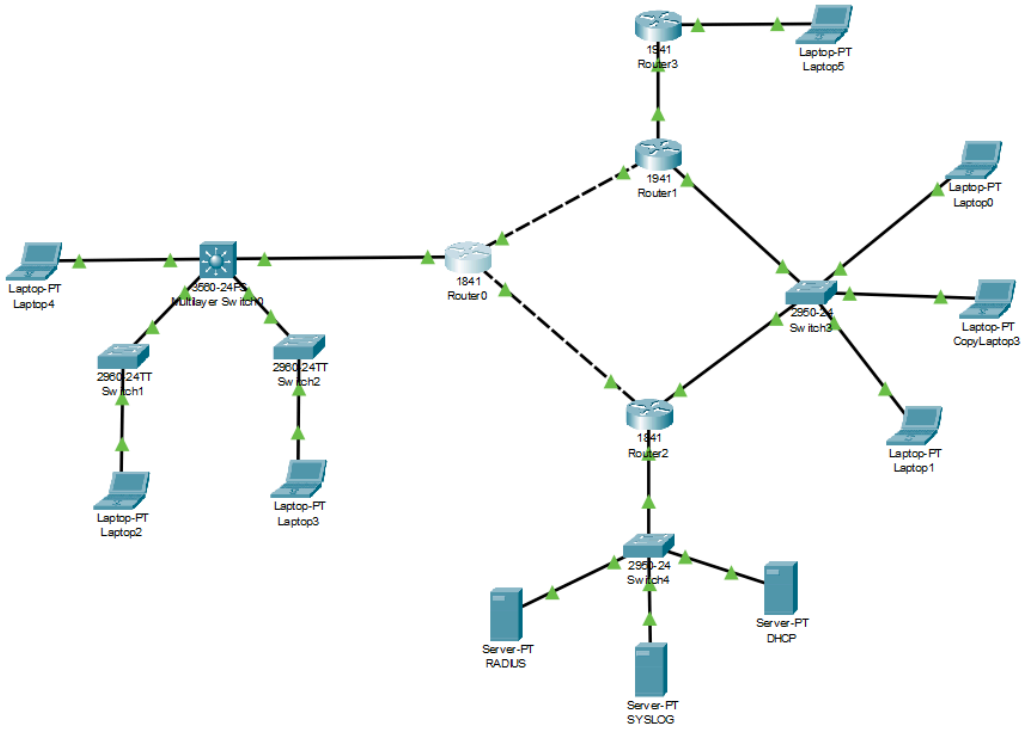


- Each student must build and submit the Packet Tracer file containing the network.

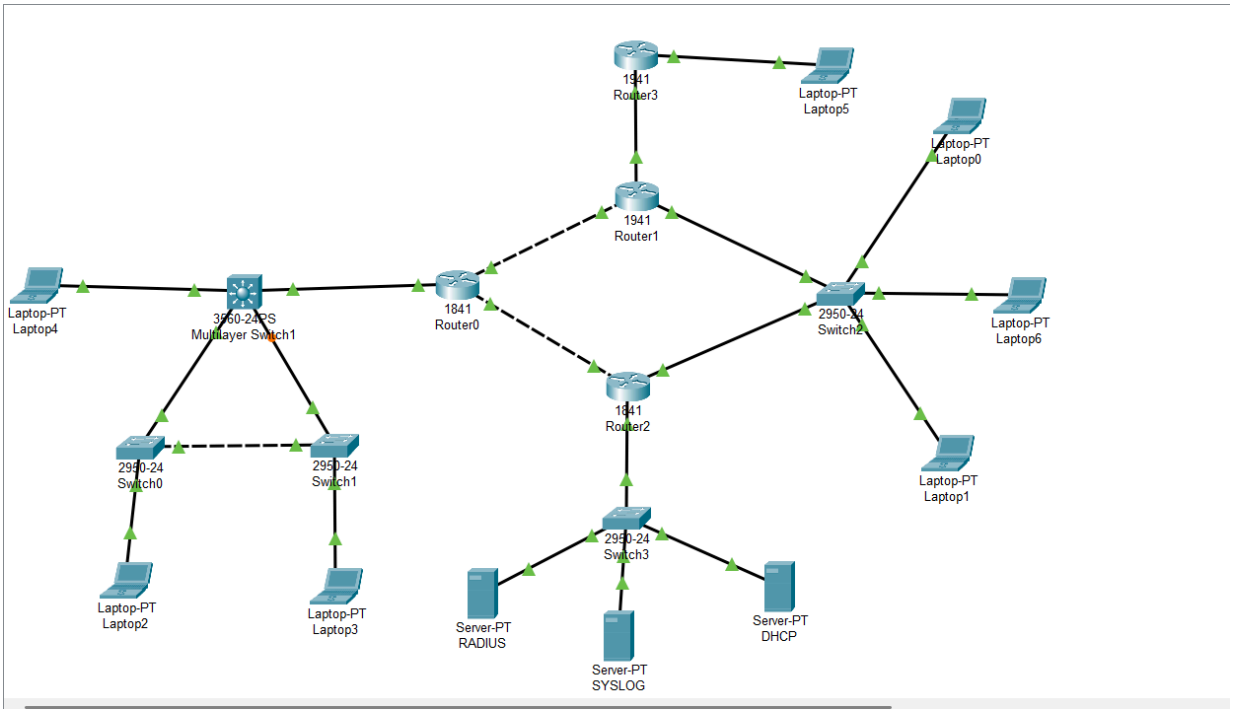
Diagrama Julián	31/08/2025 5:00 p. m.	Cisco Packet Tracer	98 KB
diagrama_de_red_santiago	31/08/2025 4:56 p. m.	Cisco Packet Tracer	456 KB

- Ignore the colors of the dots/rectangles that appear on the links (links refer to the connection lines between devices). The colors of these links will become important later, and we will review them at that time.

Julian´s screenshot:



Santiago´s screenshot



– The connections or links presented in the diagram are:

* Black-colored links correspond to Ethernet cables (Ethernet, FastEthernet, or GigaEthernet).

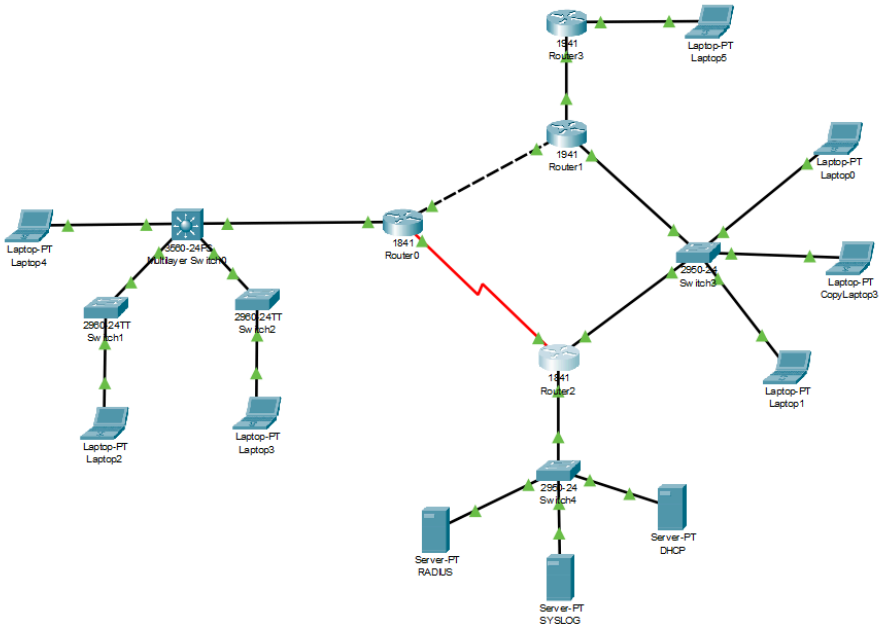
What do the solid black connections represent?:

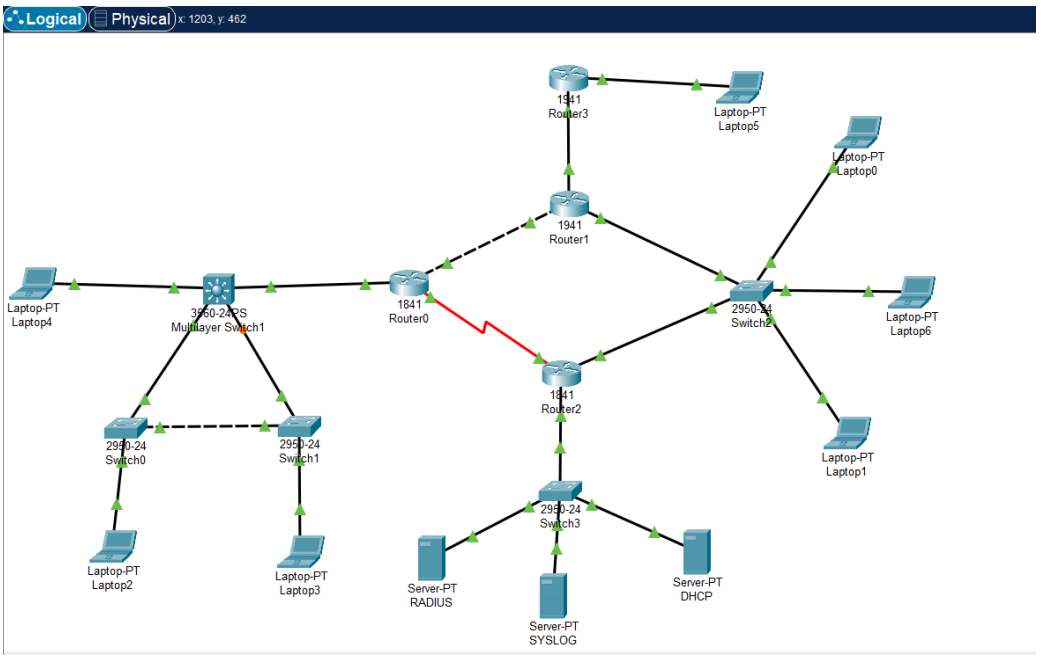
The solid black connections are called "Copper Straight-Through" and are used in local area networks to connect a computer to a network hub, such as a router or switch.

What do the dashed black connections represent?:
The dashed black connections are called "Copper Cross-Over" cables They are generally used to connect two devices of the same type, for example, PC to PC, or Switch to Switch.

* Modify the connection between Router0 and Router2 so that they use a serial cable for this connection (red-colored cables represent serial cables – typically used for WAN connections).

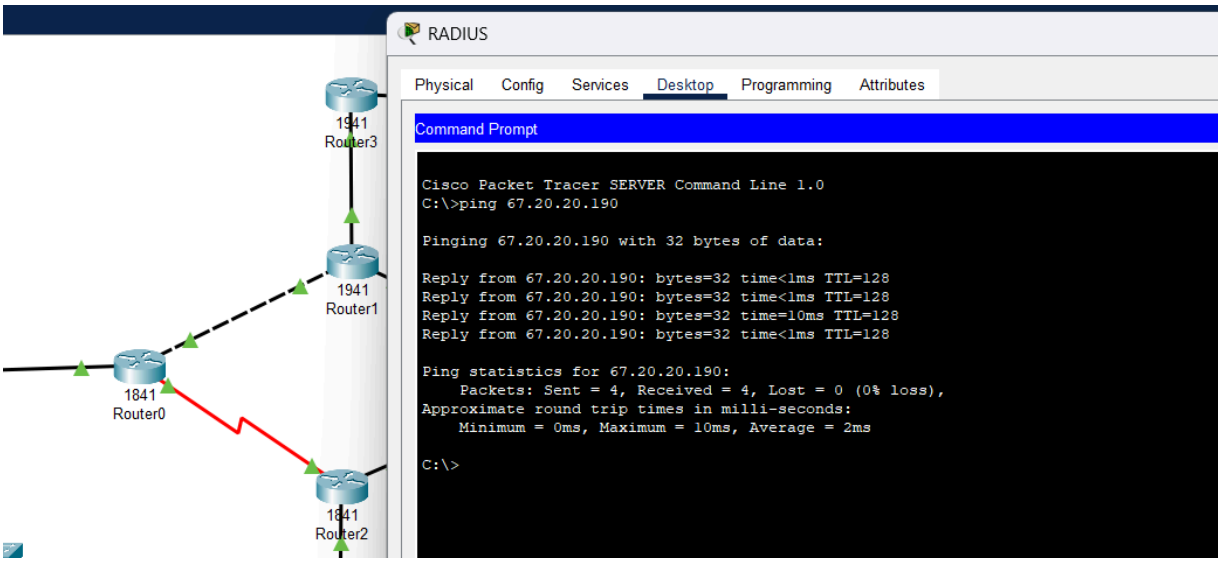
Here is the Images:





2. Tracking Messages with Packet Tracer

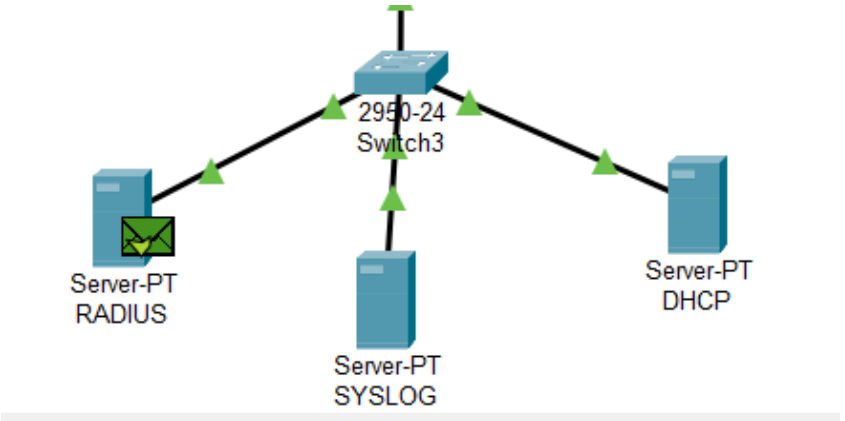
- Perform a ping from the RADIUS server to the DHCP server using Packet Tracer's simulation mode.



- Now, analyze the PDUs layer by layer (We have not yet covered the meaning of each one, but observe that they exist and that each layer adds information to the user data). Use the following guide as a reference:

Run the simulation and capture the traffic

- In the lower right corner of the PT interface, locate the toggle switch between Real-time and Simulation mode. Click on **Simulation mode**.
- Click the **Edit Filters** button and select only **ICMP**.
- Click on **Server-PT_RADIUS**. Go to the **Desktop** tab and open the **Command Prompt**. Enter the command `ping IP_SERVER-PT_DHCP`. Pressing the **Enter** key will initiate four ICMP echo requests. Minimize the PC configuration window. Two packets will appear in the **Event List**: the first **ICMP echo request** and an **ARP request**, which is needed to resolve the server's IP address to its hardware MAC address.
- Click the **Auto Capture / Play** button to run the simulation and capture events. Click **OK** when the "No More Events" message appears.



RADIUS

```
C:\>ping 67.20.20.190

Pinging 67.20.20.190 with 32 bytes of data:

Reply from 67.20.20.190: bytes=32 time=4ms TTL=128
Reply from 67.20.20.190: bytes=32 time=4ms TTL=128
Reply from 67.20.20.190: bytes=32 time=4ms TTL=128
Reply from 67.20.20.190: bytes=32 time=4ms TTL=128

Ping statistics for 67.20.20.190:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 4ms, Maximum = 4ms, Average = 4ms
```

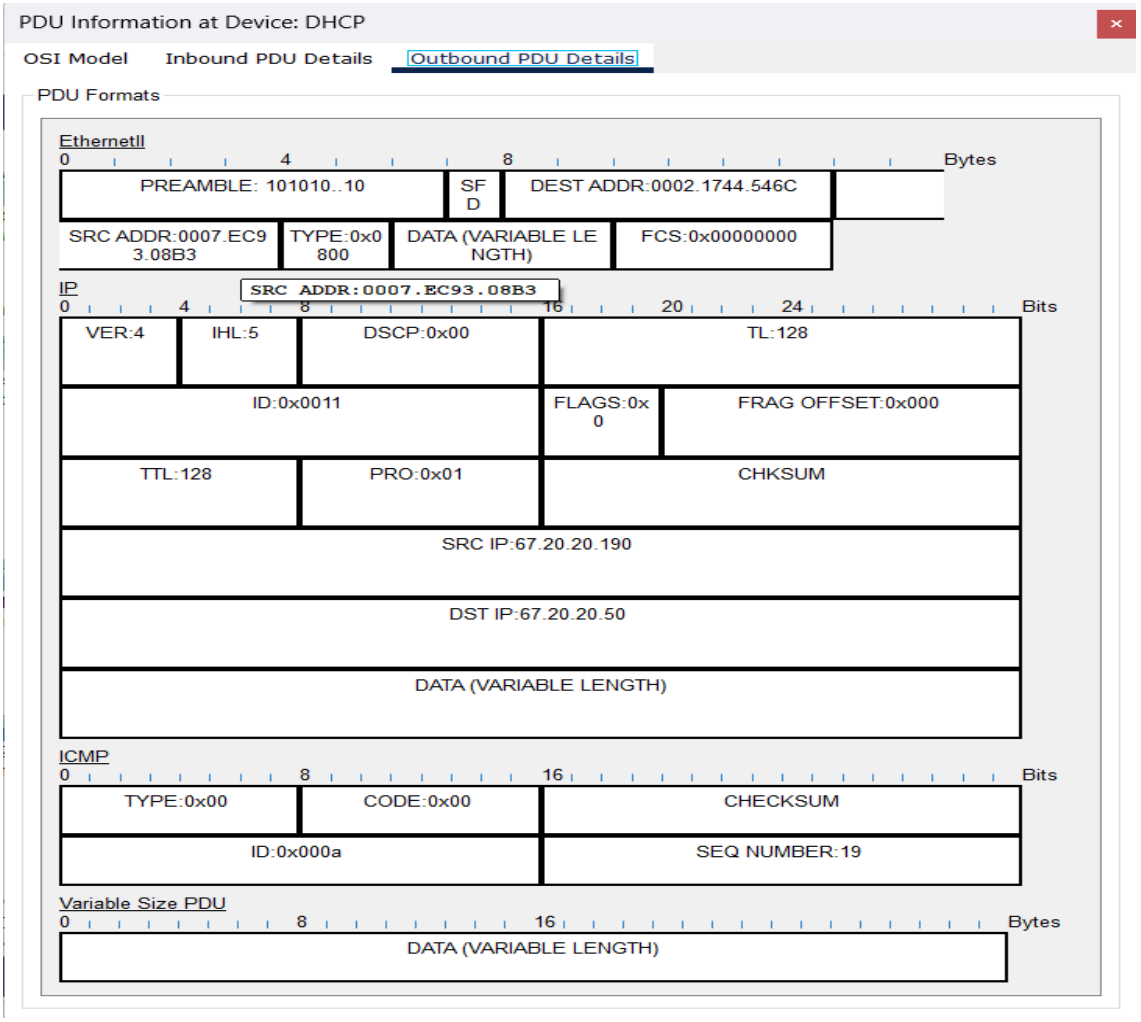
Simulation Panel

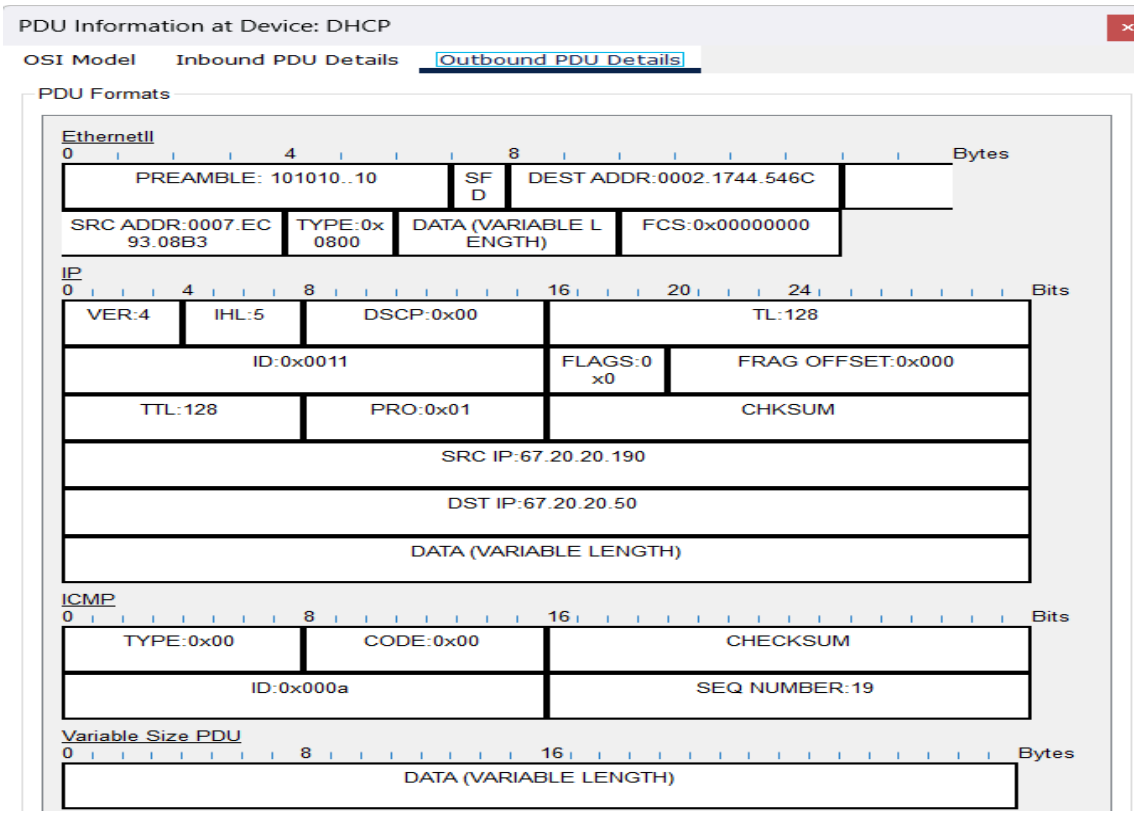
Event List

Vis.	Time(sec)	Last Device	At Device	Type
	0.000	--	RADIUS	ICMP
	0.001	RADIUS	Switch3	ICMP
	0.002	Switch3	DHCP	ICMP
	0.003	DHCP	Switch3	ICMP
	0.004	Switch3	RADIUS	ICMP
	1.004	--	RADIUS	ICMP
	1.005	RADIUS	Switch3	ICMP
	1.006	Switch3	DHCP	ICMP
	1.007	DHCP	Switch3	ICMP
	1.008	Switch3	RADIUS	ICMP
	2.010	--	RADIUS	ICMP
	2.011	RADIUS	Switch3	ICMP
	2.012	Switch3	DHCP	ICMP
	2.013	DHCP	Switch3	ICMP
	2.014	Switch3	RADIUS	ICMP
	3.014	--	RADIUS	ICMP
	3.015	RADIUS	Switch3	ICMP
	3.016	Switch3	DHCP	ICMP
	3.017	DHCP	Switch3	ICMP
Visible	3.018	Switch3	RADIUS	ICMP

Reset Simulation | Constant Delay | Captured to: 97.519 s

- Examine the content of the captured packets. Observe how the PDUs are built layer by layer.


PDU Information at Device: DHCP
OSI Model
Inbound PDU Details
Outbound PDU Details
PDU Formats
EthernetII
0
4
8
Bytes
PREAMBLE: 101010..10
SFD
DEST ADDR:0002.1744.546C
SRC ADDR:0007.EC93.08B3
TYPE:0x0800
DATA (VARIABLE LENGTH)
FCS:0x00000000
IP
SRC ADDR:0007.EC93.08B3
0
4
8
16
20
24
Bits
VER:4
IHL:5
DSCP:0x00
TL:128
ID:0x0011
FLAGS:0x0
FRAG OFFSET:0x000
TTL:128
PRO:0x01
CHKSUM
SRC IP:67.20.20.190
DST IP:67.20.20.50
DATA (VARIABLE LENGTH)
ICMP
0
8
16
Bits
TYPE:0x00
CODE:0x00
CHECKSUM
ID:0x000a
SEQ NUMBER:19
Variable Size PDU
0
8
16
Bytes
DATA (VARIABLE LENGTH)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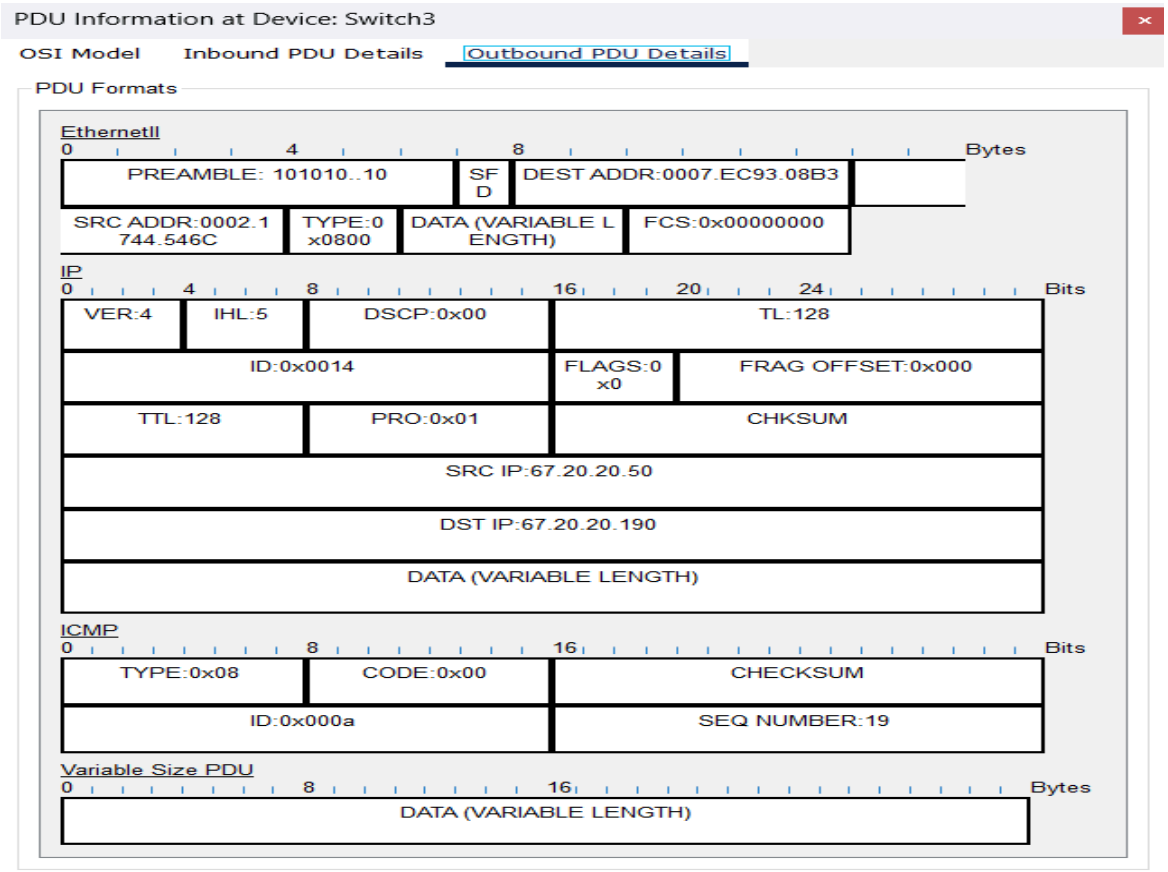
DEST ADDR:0002.1744.546C
SRC ADDR:0007.EC93.08B3
TYPE:0x0800
DATA (VARIABLE LENGTH)
FCS:0x00000000
IP
0
4
8
16
20
24
Bits
VER:4
IHL:5
DSCP:0x00
TL:128
ID:0x0011
FLAGS:0x0
FRAG OFFSET:0x000
TTL:128
PRO:0x01
CHKSUM
SRC IP:67.20.20.190
DST IP:67.20.20.50
DATA (VARIABLE LENGTH)
ICMP
0
8
16
Bits
TYPE:0x00
CODE:0x00
CHECKSUM
ID:0x000a
SEQ NUMBER:19
Variable Size PDU
0
8
16
Bytes
DATA (VARIABLE LENGTH)



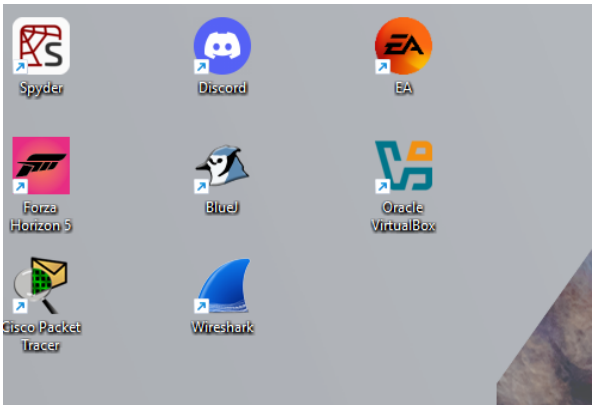
On The Real Network

Perform the following tests using the Wireshark tool.

1. Using Wireshark

Wireshark is a cross-platform tool used for analyzing network packets. Throughout this course, we will use it to observe real-time network traffic and examine how different protocols operate. For this reason:

- Install (if working from home) and run Wireshark on your computer.

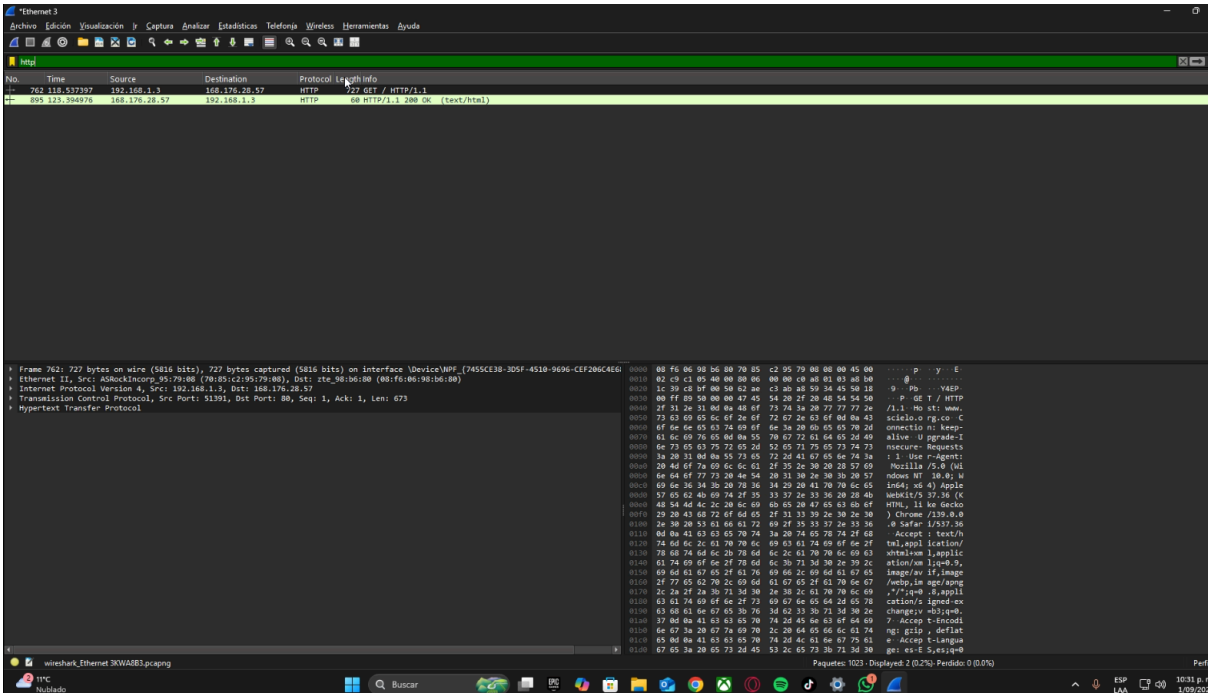


- Watch videos and read documentation about Wireshark's operation. What is Wireshark? : Wireshark is a free and source network protocol analyzer it allows users to capture and inspect data packets in real time providing detailed insights into how devices and protocols communicate across a network

- What does it mean for a network card to be in promiscuous mode? : Promiscuous mode allows a network card to capture all network traffic, not just the packets addressed to it

- Create a video explaining the different components of the interface, how to create filters, and their purpose. Provide examples. The video should be approximately 5 minutes long.
Here's the link to the video on YouTube: https://youtu.be/1DQG3OfQYWQ

- Perform a web query to http://www.scielo.org.co and capture the generated traffic. To do this, open your browser, start a Wireshark capture, visit the specified page, and then stop the capture.



- Analyze the data from one of the captured packets. Examine how each layer encapsulates the data, review the information displayed in different areas of the Wireshark interface, and take screenshots of the findings. (To facilitate the analysis, filter and locate a captured packet containing the word "GET").

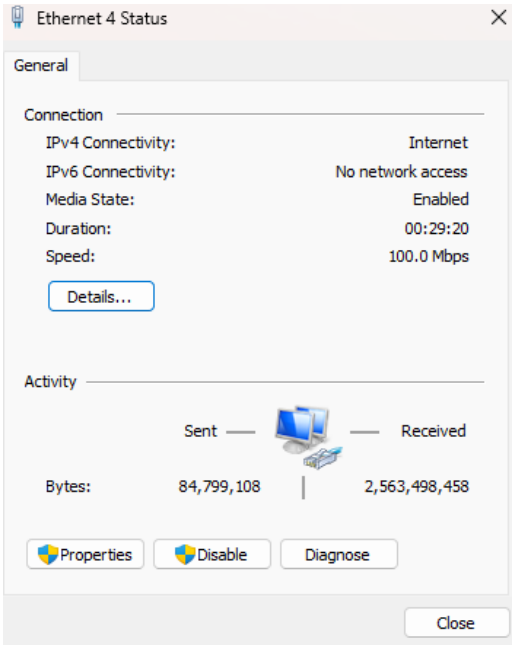
I applied the filter http.request.method == "GET" and selected one packet. The analysis shows:

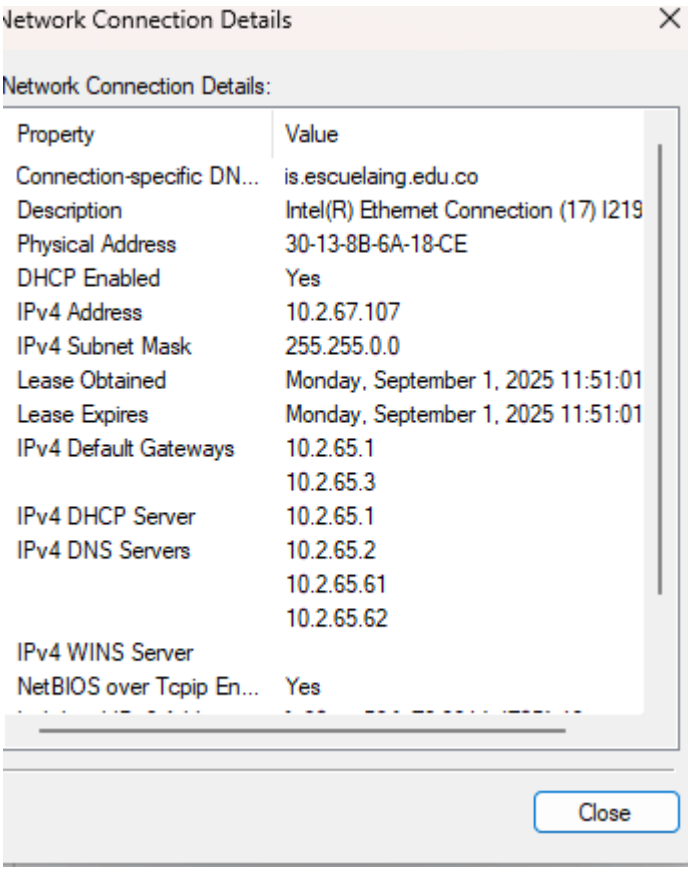
- **Ethernet**: source and destination MAC addresses.
- **IP**: source and destination IPs, responsible for addressing.
- **TCP**: source/destination ports, ensures reliable delivery.
- **HTTP**: the actual GET request with URL and headers.

2. Network Cards

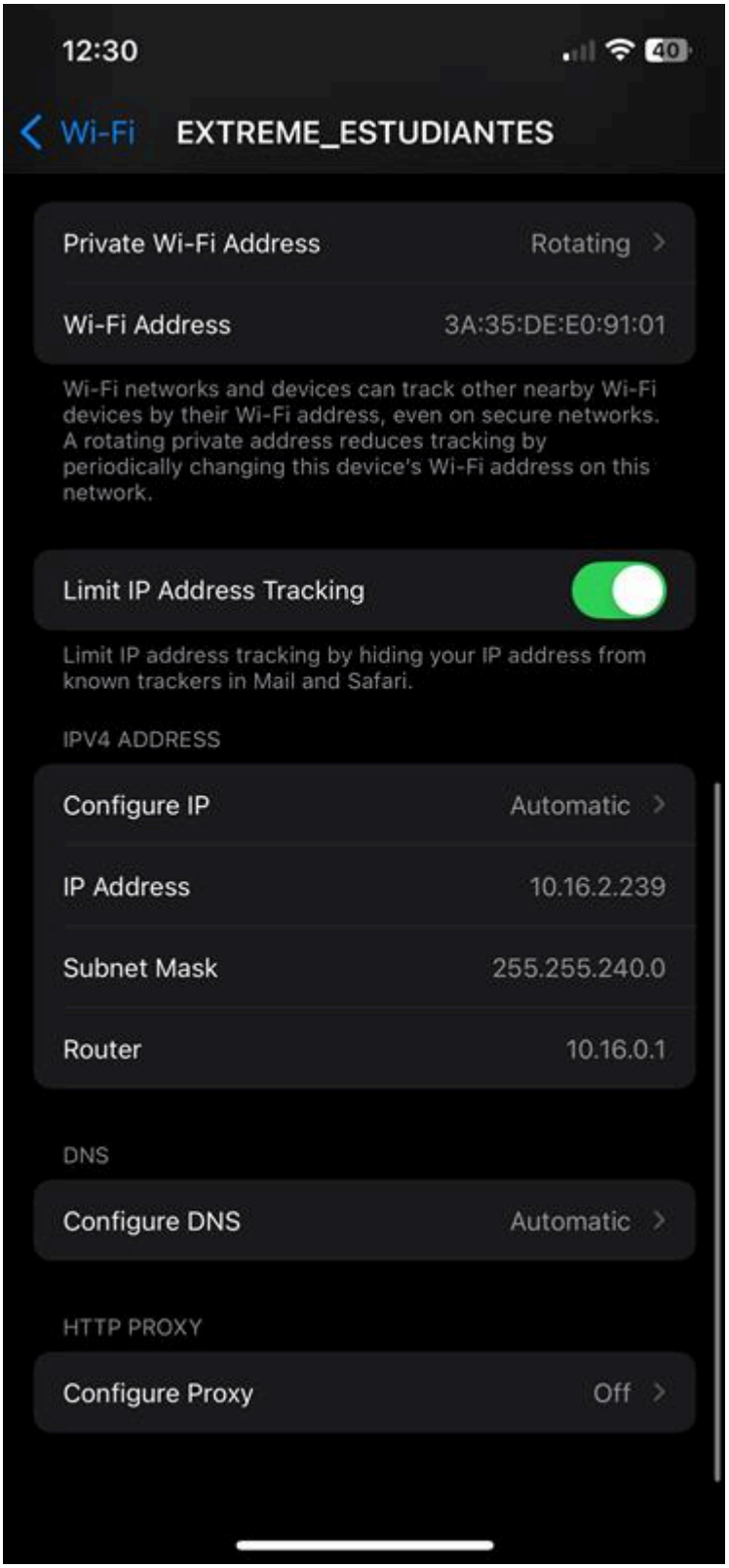
Explore the network cards of various devices. To do this, gather information on the network cards of the school's computers and at least three different devices (desktops, laptops, smartphones, tablets, gaming consoles, etc.) from each team member. Include details such as the manufacturer, model, speed, MAC address, IPv4 address, IPv6 address, and the number of transmitted and received bytes. For wireless network cards, also include connection speed and SSID. Next, retrieve the same information for two of your virtual machines and compare the results with the data from the host machines.

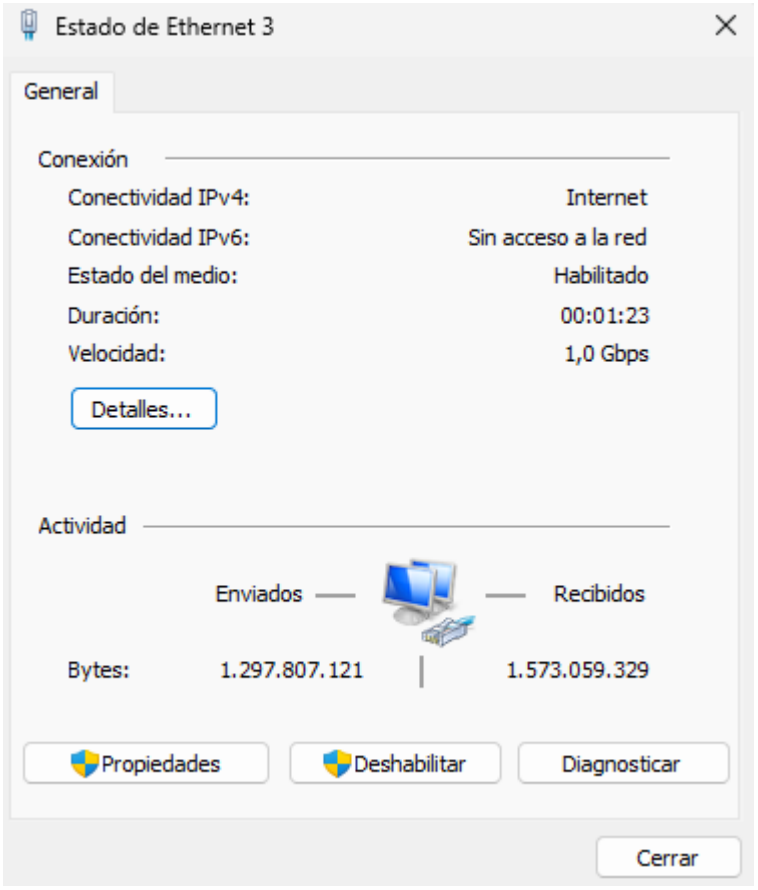
PC ECI:
Supplier: Intel (R) Ethernet Conection
Model: (17) I219-LM
Speed: 100. Mbps
MAC Address: 30-13-8B-6A-18-CE
IPv4 Address: 10.2.67.107
IPv6 Address: fe80::ee58.fc76:9314:d705%13
Bytes transferred and received: 84.799.108 / 2.563.498.458

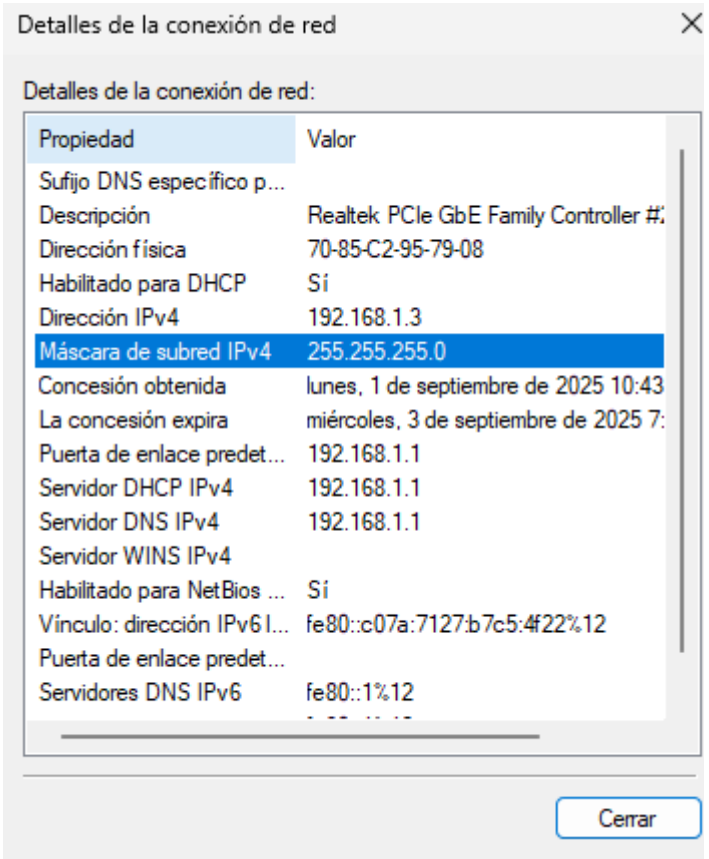




Julian´s Cellphone:
Supplier: Apple
Speed Connection: 91,3
Mac Address: 8A:67:18:62:B6:80
IPv4 Address: 10.16.2.239


12:30
40
Wi-Fi
EXTREME_ESTUDIANTES
Private Wi-Fi Address
Rotating
Wi-Fi Address
3A:35:DE:E0:91:01
Wi-Fi networks and devices can track other nearby Wi-Fi devices by their Wi-Fi address, even on secure networks. A rotating private address reduces tracking by periodically changing this device's Wi-Fi address on this network.
Limit IP Address Tracking
Limit IP address tracking by hiding your IP address from known trackers in Mail and Safari.
IPV4 ADDRESS
Configure IP
Automatic
IP Address
10.16.2.239
Subnet Mask
255.255.240.0
Router
10.16.0.1
DNS
Configure DNS
Automatic
HTTP PROXY
Configure Proxy
Off


Estado de Ethernet 3
General
Conexión
Conectividad IPv4: Internet
Conectividad IPv6: Sin acceso a la red
Estado del medio: Habilitado
Duración: 00:01:23
Velocidad: 1,0 Gbps
Detalles...
Actividad
Enviados
Recibidos
Bytes: 1.297.807.121 1.573.059.329
Propiedades
Deshabilitar
Diagnosticar
Cerrar


Detalles de la conexión de red
Detalles de la conexión de red:
Propiedad
Valor
Sufijo DNS específico p...
Descripción
Realtek PCIe GbE Family Controller #
Dirección física
70-85-C2-95-79-08
Habilitado para DHCP
Sí
Dirección IPv4
192.168.1.3
Máscara de subred IPv4
255.255.255.0
Concesión obtenida
lunes, 1 de septiembre de 2025 10:43
La concesión expira
miércoles, 3 de septiembre de 2025 7:
Puerta de enlace predet...
192.168.1.1
Servidor DHCP IPv4
192.168.1.1
Servidor DNS IPv4
192.168.1.1
Servidor WINS IPv4
Habilitado para NetBios ...
Sí
Vínculo: dirección IPv6 l...
fe80::c07a:7127:b7c5:4f22%12
Puerta de enlace predet...
Servidores DNS IPv6
fe80::1%12
Cerrar

Base Software

In an infrastructure, it is also essential to have programs that support the management of various operating system tasks. We will carry out activities designed to help you better understand the operating system and its administration.

1. Shell Programming - Unix

Using a virtual machine running Linux Slackware, Solaris, or CentOS (depending on the number of group members), develop the following applications. (Remember to document your code).

1.1. ”ls” Command

Create a shell script that lists the files in a given directory, including hidden ones, and allows:

- Sorting based on different criteria and displaying the count for each group:
– Most recent (should indicate how many files share the same date).
– Oldest (should indicate how many files share the same date).
– Size from largest to smallest (should indicate how many files share the same size).
– Size from smallest to largest (should indicate how many files share the same size).
– File type (File/Directory) (should indicate how many files belong to each type).
- Filtering options (allow selection of either the specified directory only or the directory along with its subdirectories):
– Starts with a given string.
– Ends with a given string.
– Contains a given string.

After requesting the directory to analyze, create a menu with the options listed above. The script should remain in the menu until the user chooses to exit. It should also clear the screen before displaying results, and if the output is too extensive, it should be paginated.

In /scripts/listar.sh

1.2. File Search and Viewing Commands

Create a shell script that, through a menu (which will remain active until the user chooses to exit), allows the following actions:

- Search for a file or part of a filename within a specified directory. The output should display the locations and names of the found files, as well as the total number of occurrences.
- Search for a word or partial word within a given file. The output should show the found word, the lines where it appears, and the total number of occurrences.
- Search for a file or part of a filename within a given directory, and once found, search for a word or partial word within that file. The output should list, for each found file, the line number where the word appears and the total number of occurrences.
- Count the number of lines in a file.
- Display the first n lines of a given file.
- Display the last n lines of a given file.

In /scripts/file_search.sh

1.3. Log File Review

Write a shell script that:

- Clears the screen.
- Displays a menu allowing the user to perform one of the following actions:
- Show the last 15 lines of 3 log files that contain general system activity data.
- Filter those 15 lines from the same log files to display only those containing a specific word.

Now, answer the following questions:

- What are log files?
- What types of logs are present in the operating systems you installed?
- What is syslog? What does this standard define? Do the logs you found in the operating systems follow this standard?

In /scripts/log_file.sh

1.4. User Creation

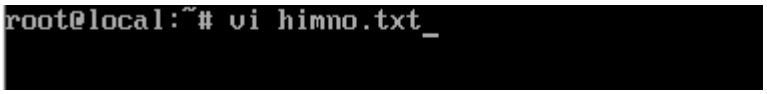
Write a shell script that automates the user, group, and permission creation process from the previous lab. The script should prompt for all required information via the command line and follow this format:

$ newuser alice developers "Alice Developer" /home/alice /bin/bash 700 770 755
$ newgroup developers 1001

In /scripts/new_user.sh and /scripts/new_group.sh

2. VI Editor in Linux/Unix

- Use the VI editor to create a file. Document the commands used.



- Enter the following text and document the commands used.

Note: Each line of text should be on a separate line in the editor, meaning you must press the ENTER key at the end of each line.

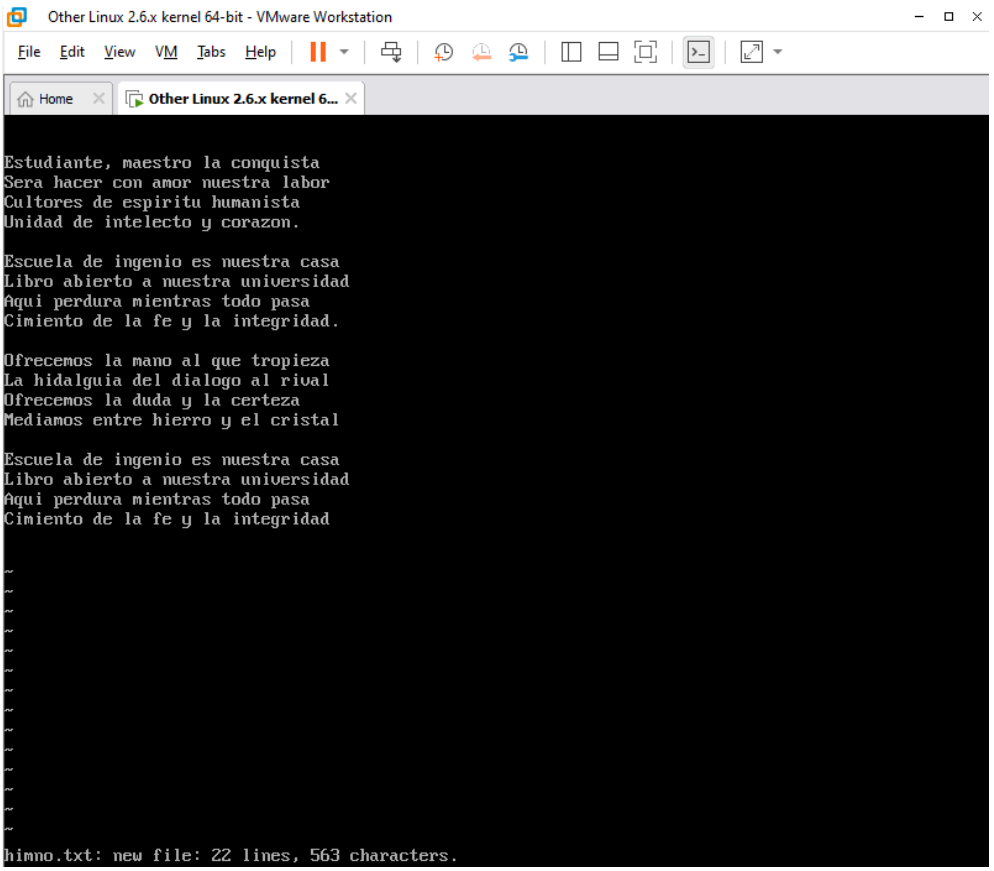
HIMNO DE LA ESCUELA
Estudiante, maestro la conquista
Será hacer con amor nuestra labor
Cultores de espíritu humanista
Unidad de intelecto y corazón.

Escuela de ingenio es nuestra casa
Libro abierto a nuestra universidad
Aquí perdura mientras todo pasa
Cimiento de la fe y la integridad.

Ofrecemos la mano al que tropieza
La hidalguía del diálogo al rival
Ofrecemos la duda y la certeza
Mediamos entre hierro y el cristal.

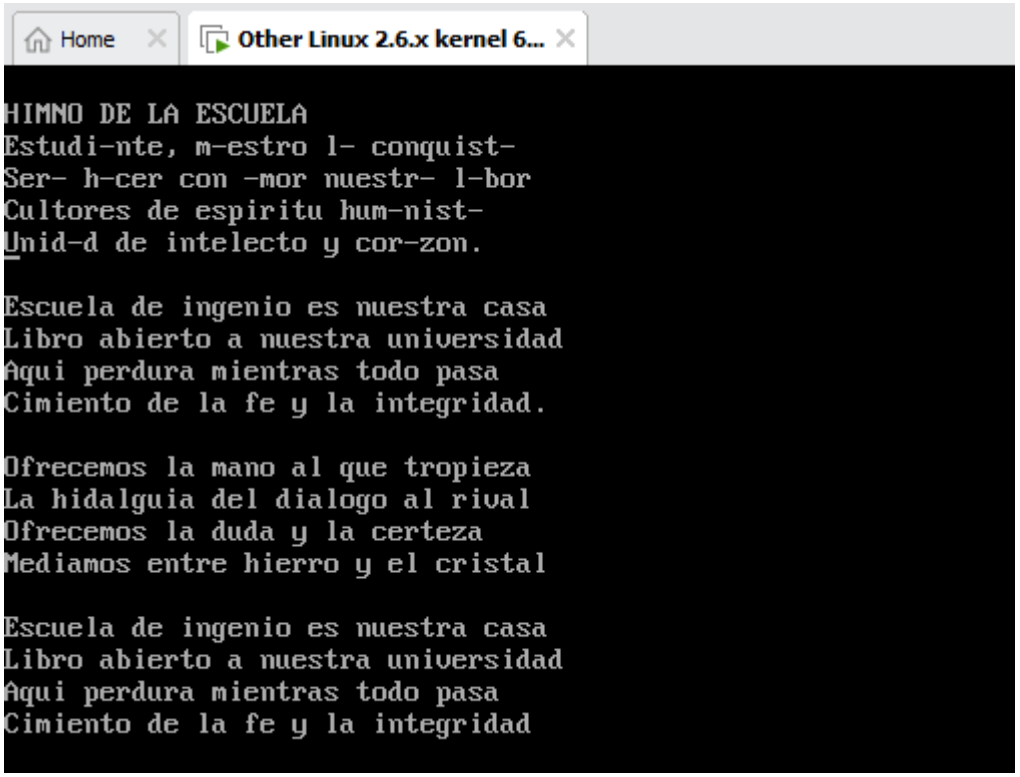
Escuela de ingenio es nuestra casa
Libro abierto a nuestra universidad
Aquí perdura mientras todo pasa
Cimiento de la fe y la integridad.

- Save the work without exiting the editor.



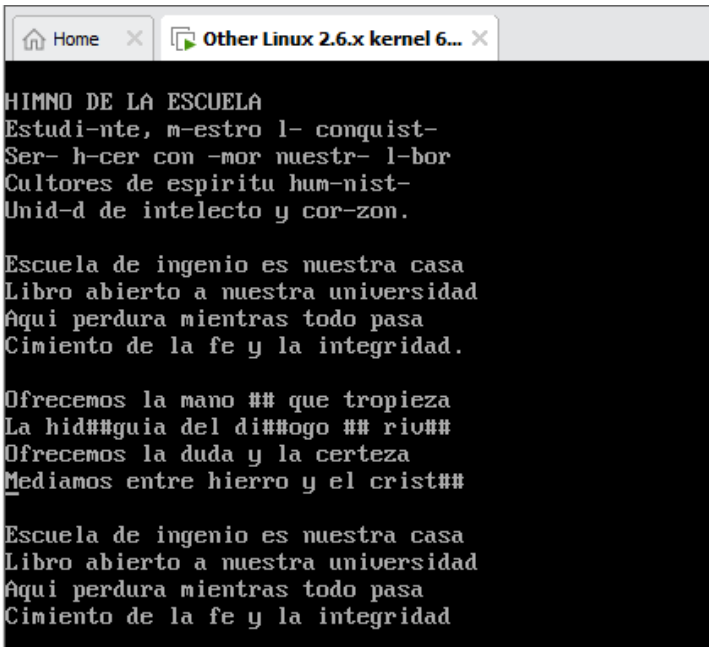
- Replace all occurrences of the letter ‘a’ in the first paragraph with the symbol -.

```
:1,6s/a/-/g_
```



- Replace every instance of the word “al” throughout the text with the symbols ##.

```
:%s/al/##/g_
```

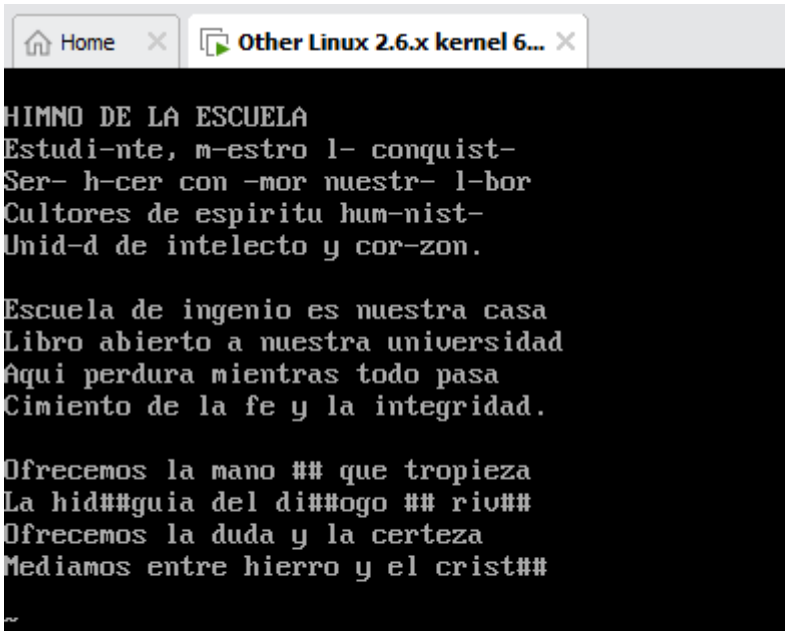


- What command can be used to delete a word in VI?

The command dw can be used to delete a word in VI.

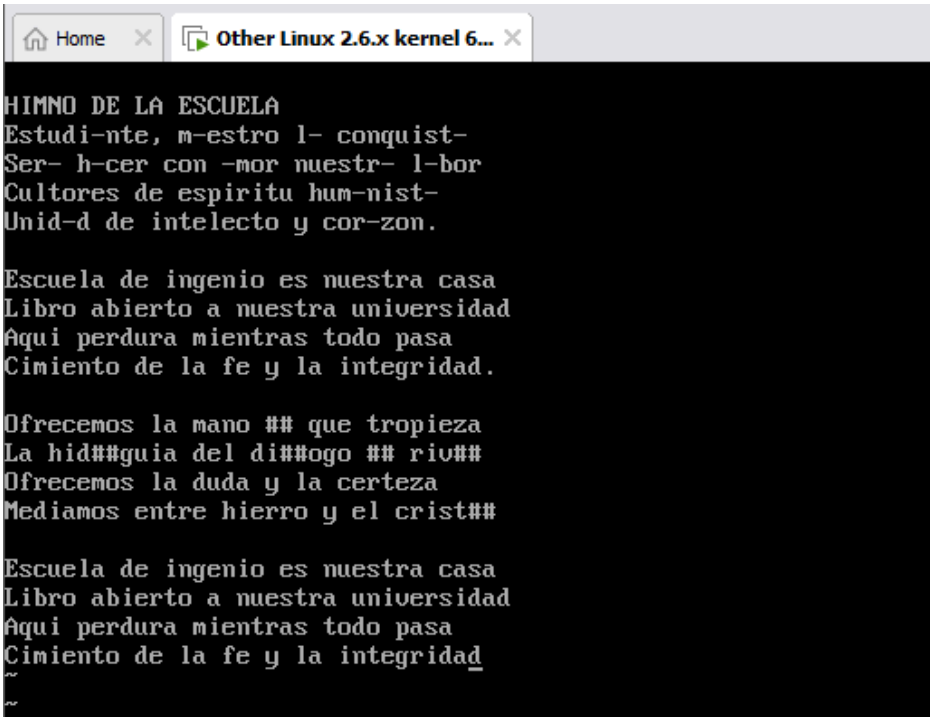
- Delete the last four lines of the document using a single command.

```
:$-3,$d
```



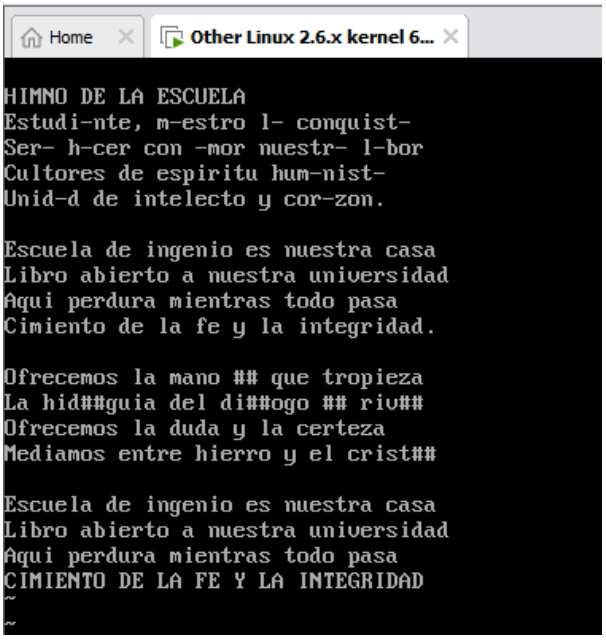
- Undo the previous command.

```
:u
```



- Convert the last line of the document to uppercase.

```
:$s/.*/\U&/
```



- Copy the last two lines of the second paragraph to the end of the file.
  Use ‘{‘ and ‘}’ to navigate

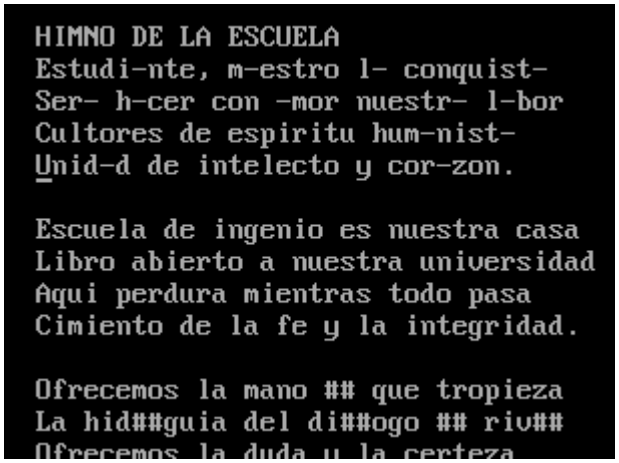
```
HIMNO DE LA ESCUELA
Estudi-nte, m-estro l- conquist-
Ser- h-cer con -mor nuestr- l-bor
Cultores de espiritu hum-nist-
Unid-d de intelecto y cor-zon.

Escuela de ingenio es nuestra casa
Libro abierto a nuestra universidad
Aqui perdura mientras todo pasa
Cimiento de la fe y la integridad.

Ofrecemos la mano ## que tropieza
La hid##guia del di##ogo ## riv##
Ofrecemos la duda y la certeza
Mediamos entre hierro y el crist##

Escuela de ingenio es nuestra casa
Libro abierto a nuestra universidad
Aqui perdura mientras todo pasa
CIMIENTO DE LA FE Y LA INTEGRIDAD
Ofrecemos la duda y la certeza
Mediamos entre hierro y el crist##
~
~
~
~
```

- Search for the word ”Escuela” within the text.

```
~
/Escuela_
```

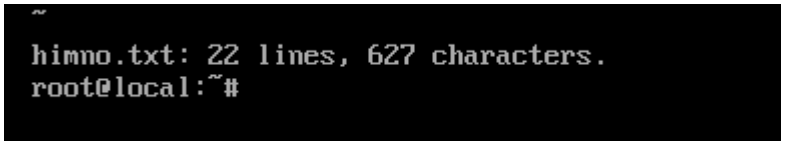
```
HIMNO DE LA ESCUELA
Estudi-nte, m-estro l- conquist-
Ser- h-cer con -mor nuestr- l-bor
Cultores de espiritu hum-nist-
Unid-d de intelecto y cor-zon.

Escuela de ingenio es nuestra casa
Libro abierto a nuestra universidad
Aqui perdura mientras todo pasa
Cimiento de la fe y la integridad.

Ofrecemos la mano ## que tropieza
La hid##guia del di##ogo ## riv##
Ofrecemos la duda y la certeza
Mediamos entre hierro y el crist##

Escuela de ingenio es nuestra casa
Libro abierto a nuestra universidad
Aqui perdura mientras todo pasa
CIMIENTO DE LA FE Y LA INTEGRIDAD
Ofrecemos la duda y la certeza
Mediamos entre hierro y el crist##
~
~
~
~
~
~
~
~
~
~
~
~
~
~
Search wrapped
```

- Move to line 5 of the text using a command.

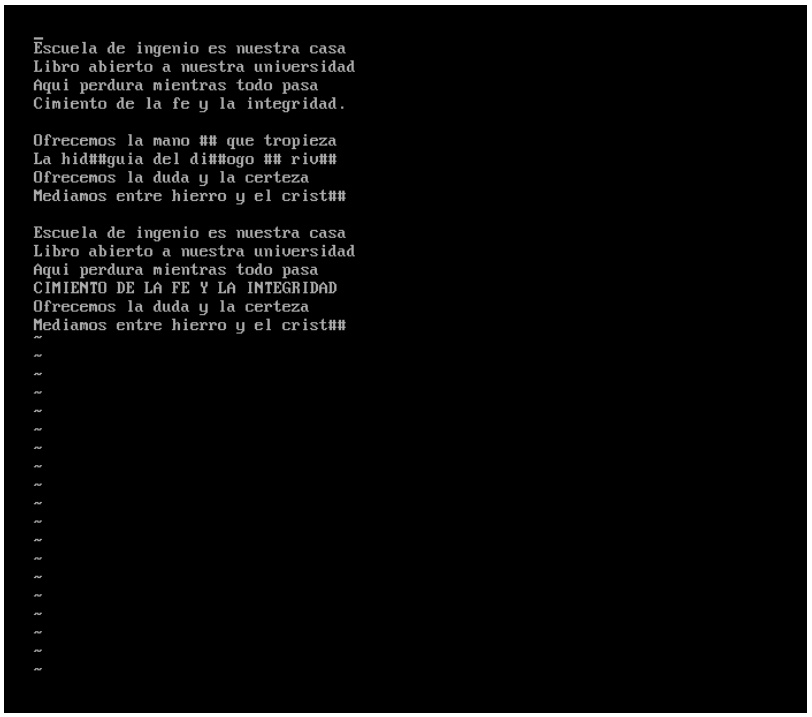


- Create a summary table with VI commands.

- Save the work and exit the editor.



- Reopen the file and delete the first five lines.



- Exit the file without saving.

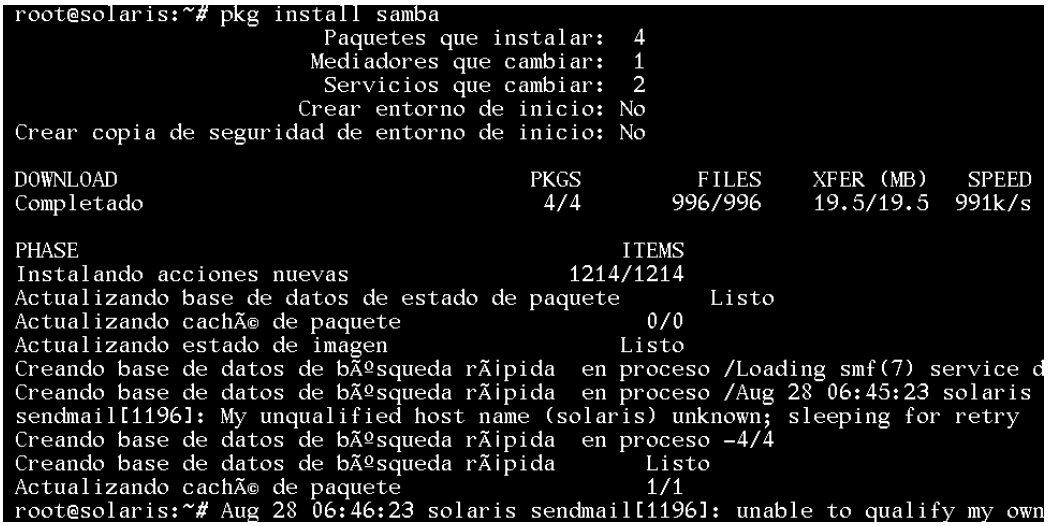
3. Virtual Machine Deployment

For the semester project, two virtual machines of each installed operating system will be required, except for Windows Server without GUI and Android. Create the new virtual machines and verify that they can communicate with each other and access the internet.

4. File Sharing

One of the key services in a business environment is shared file systems, where employees can store files and share them with their workgroups. The task for this session is to configure a file server on Solaris using SMB/SAMBA to enable file sharing between the three operating systems (Linux Slackware, Solaris, and Windows). For groups of three students, also include CentOS in the configuration.

pkg install samba



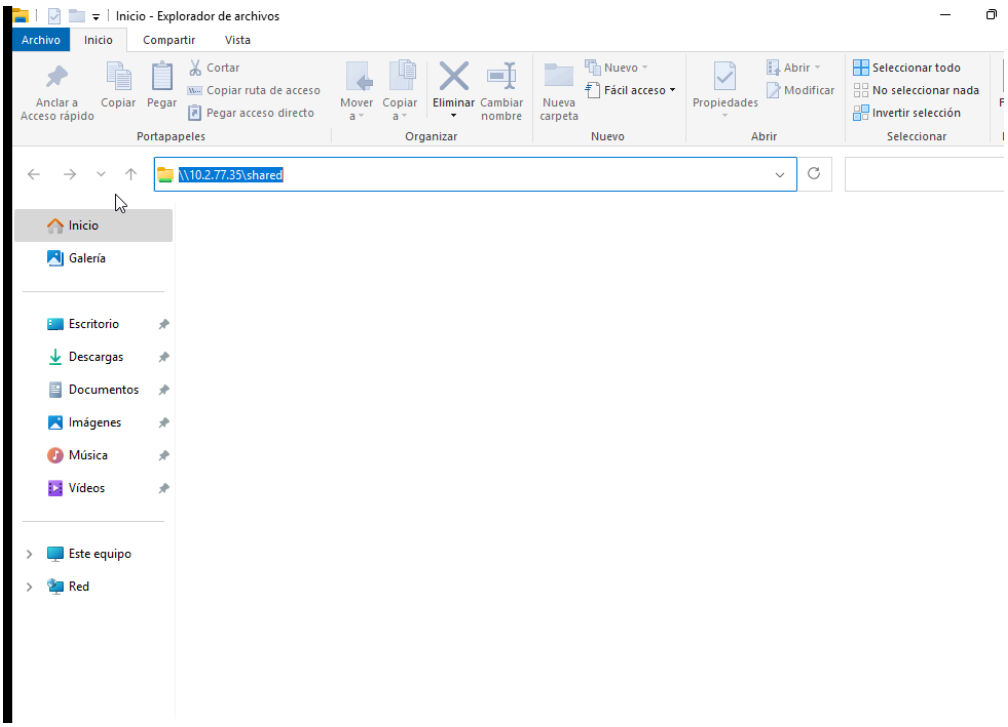
```
root@solaris:~# cat /etc/samba/smb.conf
[global]
        workgroup = WORKGROUP
        server string = Solaris File Server
        security = user
        map to guest = Bad User
        dns proxy = no

[shared]
        path = /path/to/shared/directory
        valid users = @users
        read only = no
        guest ok = yes
root@solaris:~#
```

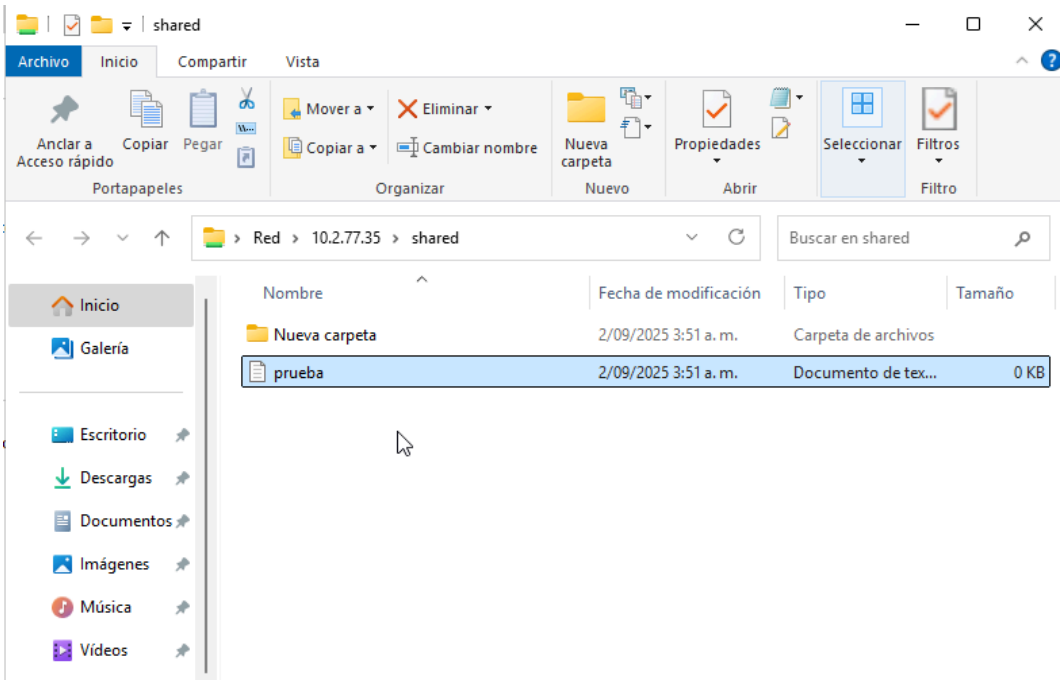
```
root@solaris:~# mkdir -p /path/to/shared/directory
root@solaris:~# chmod -R 0777 /path/to/shared/directory
root@solaris:~#
```

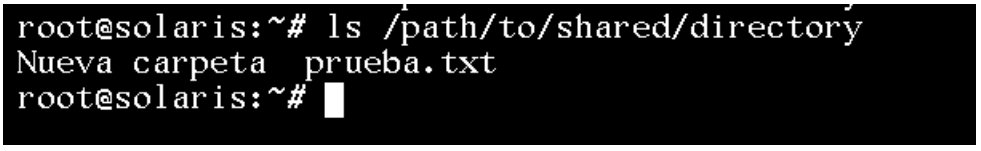
```
root@solaris:~# smbpasswd -a claudia
New SMB password:
Retype new SMB password:
Added user claudia.
root@solaris:~#
```

```
root@solaris:~# smbpasswd -e claudia
Enabled user claudia.
root@solaris:~#
```

```
root@solaris:~# svcadm enable samba
root@solaris:~# svcs -xv samba
svc:/network/samba:default (SMB file server)
 Estado: online desde 28 de agosto de 2025,  7:22:27 -05
   Consulte: man -M /usr/share/man -s 4 smb.conf
   Consulte: man -M /usr/share/man -s 1m smbsmbd
   Consulte: /var/svc/log/network-samba:default.log
Impacto: ninguno.
root@solaris:~#
```


Inicio - Explorador de archivos
Archivo
Inicio
Compartir
Vista
Anclar a Acceso rápido
Copiar
Pegar
Cortar
Copiar ruta de acceso
Pegar acceso directo
Portapapeles
Mover a
Copiar a
Eliminar
Cambiar nombre
Organizar
Nueva carpeta
Nuevo
Fácil acceso
Nuevo
Propiedades
Abrir
Modificar
Abrir
Seleccionar todo
No seleccionar nada
Invertir selección
Seleccionar
\\10.2.77.35\shared
Inicio
Galería
Escritorio
Descargas
Documentos
Imágenes
Música
Vídeos
Este equipo
Red


shared
Archivo
Inicio
Compartir
Vista
Anclar a Acceso rápido
Copiar
Pegar
Mover a
Copiar a
Eliminar
Cambiar nombre
Organizar
Nueva carpeta
Nuevo
Propiedades
Abrir
Seleccionar
Filtros
Filtro
Portapapeles
Red
10.2.77.35
shared
Buscar en shared
Inicio
Galería
Escritorio
Descargas
Documentos
Imágenes
Música
Vídeos
Nombre
Fecha de modificación
Tipo
Tamaño
Nueva carpeta
2/09/2025 3:51 a. m.
Carpeta de archivos
prueba
2/09/2025 3:51 a. m.
Documento de tex...
0 KB


root@solaris:~# ls /path/to/shared/directory
Nueva carpeta prueba.txt
root@solaris:~#

```
  GNU nano 6.0                        /etc/slackpkg/slackpkg.conf
# Usually slackpkg can automagically discover this variable. If you want
# to override the discovered variable, then uncomment this line and edit
# as needed
#SLACKKEY="Slackware Linux Project <security@slackware.com>"

# Downloaded files will be in the TEMP directory:
TEMP=/var/cache/packages

# Package lists, file lists, and others will be stored in WORKDIR:
WORKDIR=/var/lib/slackpkg

# Special options for wget (default is WGETFLAGS="--passive-ftp")
WGETFLAGS="--passive-ftp"

# If DELALL is "on", all downloaded files will be removed after install.
DELALL=on

# If CHECKMD5 is "on", the system will check the md5sums of all packages before
# install/upgrade/reinstall is performed.
CHECKMD5=off

# If CHECKGPG is "on", the system will verify the GPG signature of each package
# before install/upgrade/reinstall is performed.
CHECKGPG=off

# If CHECKSIZE is "on", the system will check if we have sufficient disk
# space to install selected package. This make upgrade/install safer, but
# will also slow down the upgrade/install process.
CHECKSIZE=off

# PRIORITY sets the download priority. slackpkg will try to found the
# package first in the first value, then the second one, through all
# values in list.
                              [ Wrote 157 lines ]
^G Help       ^O Write Out  ^W Where Is   ^K Cut        ^T Execute    ^C Location   M-U Undo
^X Exit       ^R Read File  ^\ Replace    ^U Paste      ^J Justify    ^_ Go To Line M-E Redo
```

```
  GNU nano 6.0                        /etc/slackpkg/mirrors                        Modified
# list is not guaranteed to be up-to-date
#
# AUSTRALIA (AU)
# ftp://ftp.cc.swin.edu.au/slackware/slackware64-15.0/
# http://ftp.cc.swin.edu.au/slackware/slackware64-15.0/
# ftp://ftp.iinet.net.au/pub/slackware/slackware64-15.0/
# http://ftp.iinet.net.au/pub/slackware/slackware64-15.0/
# ftp://mirror.as24220.net/pub/slackware/slackware64-15.0/
# http://mirror.as24220.net/pub/slackware/slackware64-15.0/
# ftp://mirror.internode.on.net/.pub2/slackware/slackware64-15.0/
# http://mirror.internode.on.net/pub/slackware/slackware64-15.0/
# AUSTRIA (AT)
# http://gd.tuwien.ac.at/opsys/linux/freesoftware.com/slackware64-15.0/
# BELARUS (BY)
# ftp://mirror.datacenter.by/pub/slackware/slackware64-15.0/
# http://mirror.datacenter.by/pub/slackware/slackware64-15.0/
# BRAZIL (BR)
_ftp://ftp.slackware-brasil.com.br/slackware64-15.0/
# http://ftp.slackware-brasil.com.br/slackware64-15.0/
# BULGARIA (BG)
# ftp://mirrors.unixsol.org/slackware/slackware64-15.0/
# http://mirrors.unixsol.org/slackware/slackware64-15.0/
# CANADA (CA)
# ftp://mirror.csclub.uwaterloo.ca/slackware/slackware64-15.0/
# http://mirror.csclub.uwaterloo.ca/slackware/slackware64-15.0/
# ftp://mirror.its.dal.ca/slackware/slackware64-15.0/
# http://mirror.its.dal.ca/slackware/slackware64-15.0/
# CHINA (CN)
# http://mirrors.163.com/slackware/slackware64-15.0/
# http://mirrors.ustc.edu.cn/slackware/slackware64-15.0/
# COSTA RICA (CR)
# ftp://mirrors.ucr.ac.cr/slackware/slackware64-15.0/
# http://mirrors.ucr.ac.cr/slackware/slackware64-15.0/

^G Help       ^O Write Out  ^W Where Is   ^K Cut        ^T Execute    ^C Location   M-U Undo
^X Exit       ^R Read File  ^\ Replace    ^U Paste      ^J Justify    ^_ Go To Line M-E Redo
```

Second part - knowing cloud

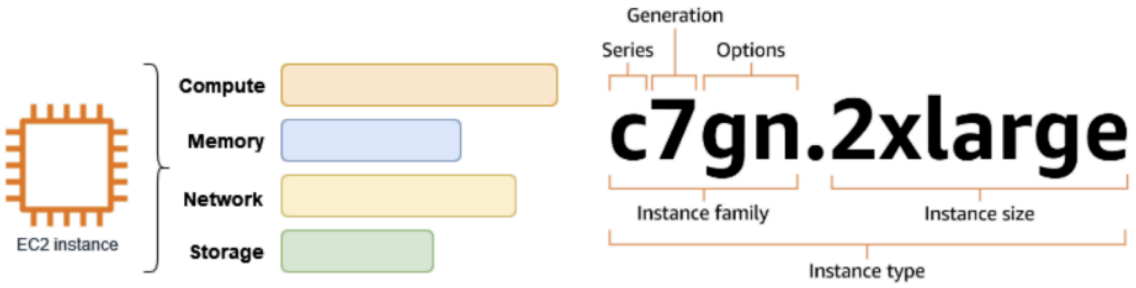
What is cloud computing?

Cloud computing is the on-demand delivery of computing power, databases, storage, applications, and other IT resources through a cloud services platform via the Internet with pay-as-you-go pricing. Whether you're running applications that share photos with millions of mobile device users or supporting your company's core operations, a cloud services platform provides fast access to flexible, low-cost IT resources. With cloud computing, you don't need to make large upfront investments in hardware and spend a lot of time on the tedious task of managing that hardware. Instead, you can provision exactly the type and size of computing resources you need to power your brilliant new idea or manage your IT department. You can access as many resources as you need, almost instantly, and pay only for what you use. Cloud computing provides an easy way to access servers, storage, databases, and a wide range of application services over the Internet. A cloud services platform such as Amazon Web Services owns and maintains the network-connected hardware required for these application services, while you provision and use what you need through a web application.

Elastic Compute Cloud

What is Amazon EC2?

Amazon Elastic Compute Cloud (Amazon EC2) provides on-demand, scalable computing capacity in the Amazon Web Services (AWS) Cloud. Using Amazon EC2 reduces hardware costs so you can develop and deploy applications faster. You can use Amazon EC2 to launch as many or as few virtual servers as you need, configure security and networking, and manage storage. You can add capacity (scale up) to handle compute-heavy tasks, such as monthly or yearly processes, or spikes in website traffic. When usage decreases, you can reduce capacity (scale down) again. An EC2 instance is a virtual server in the AWS Cloud. When you launch an EC2 instance, the instance type that you specify determines the hardware available to your instance. Each instance type offers a different balance of compute, memory, network, and storage resources. For more information, see the Amazon EC2 Instance Types Guide.



1. What are the main features of Amazon EC2?

Amazon EC2 (Elastic Compute Cloud) is the most widely used cloud computing service on AWS. Its main features are:

- Elasticity: You can launch and stop instances in minutes, scaling up or down based on demand.

- Variety of instance types: It offers many instance types (optimized for CPU, memory, GPU, storage, etc.).

- Pay as you go: You pay only for the time you use them (On-Demand, Reserved, Spot Instances).

- Choice of OS: You can run Linux, Windows, or even custom images (AMIs).

- Networking & Security: Configuration of VPCs, Security Groups, Elastic IPs, and load balancers.

- Storage Options: Integration with EBS (Elastic Block Store), S3, and ephemeral storage.

- Monitoring & Management: Connection to CloudWatch for metrics and alarms, and to Systems Manager for management.

2. What services can be used with Amazon EC2?

EC2 integrates with many AWS services. Some of the most important:

- Amazon EBS (Elastic Block Store): For persistent disks attached to instances.

- Amazon S3: For bulk and cost-effective data storage and retrieval.

- Amazon RDS / DynamoDB: Managed databases that you can use alongside your application on EC2.

- Elastic Load Balancing (ELB): Distributes traffic across multiple EC2 instances.

- Amazon VPC: To define the network where your instances will be located.

- AWS CloudWatch: For monitoring and metrics for your instances.

- IAM (Identity and Access Management): To manage permissions and roles for secure access to EC2 and other resources.

- AWS Auto Scaling: Automatically scales the number of instances based on load.

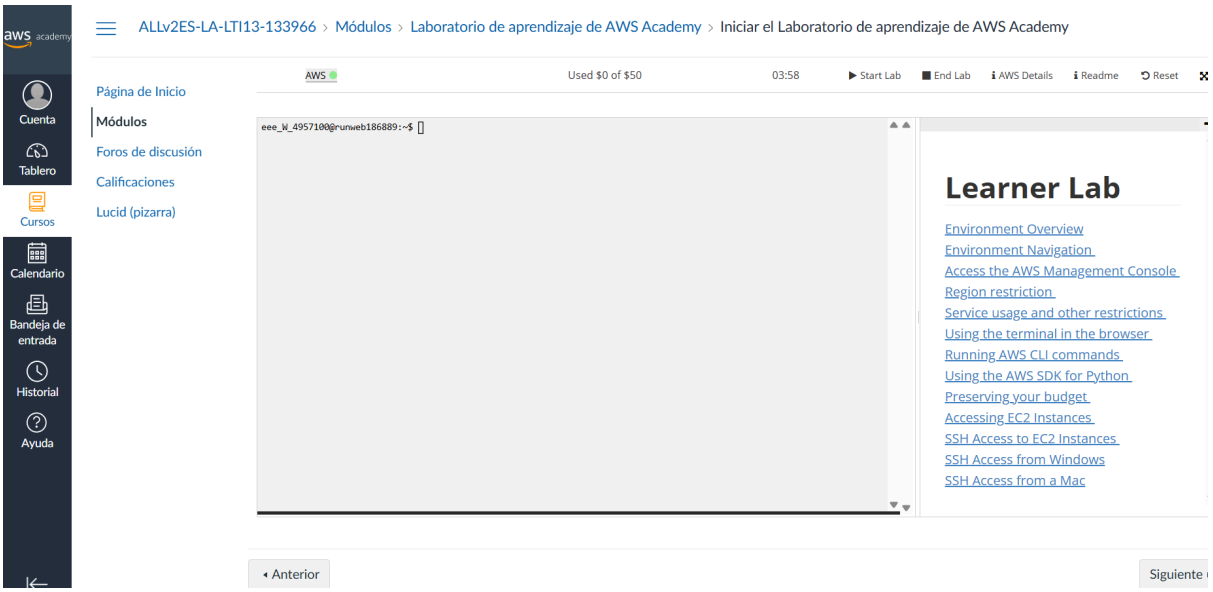
Step 1: Launch an instance

You can launch an EC2 instance using the AWS Management Console as described in the following procedure. This tutorial is intended to help you quickly launch your first instance, so it doesn't cover all possible options.

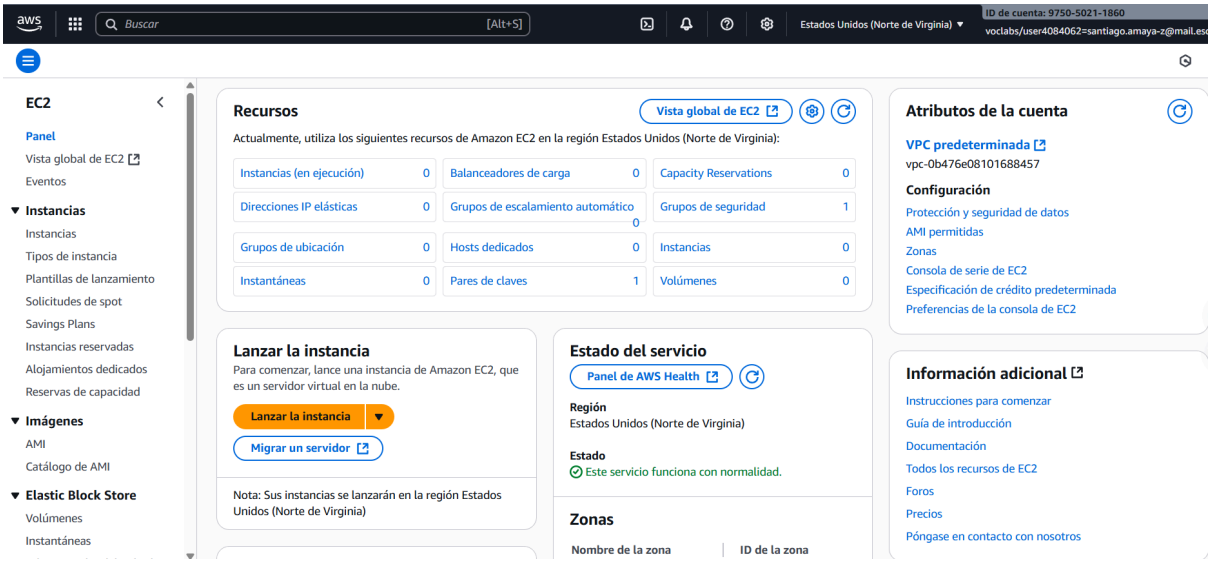
To launch an instance

1. Open the Amazon EC2 console

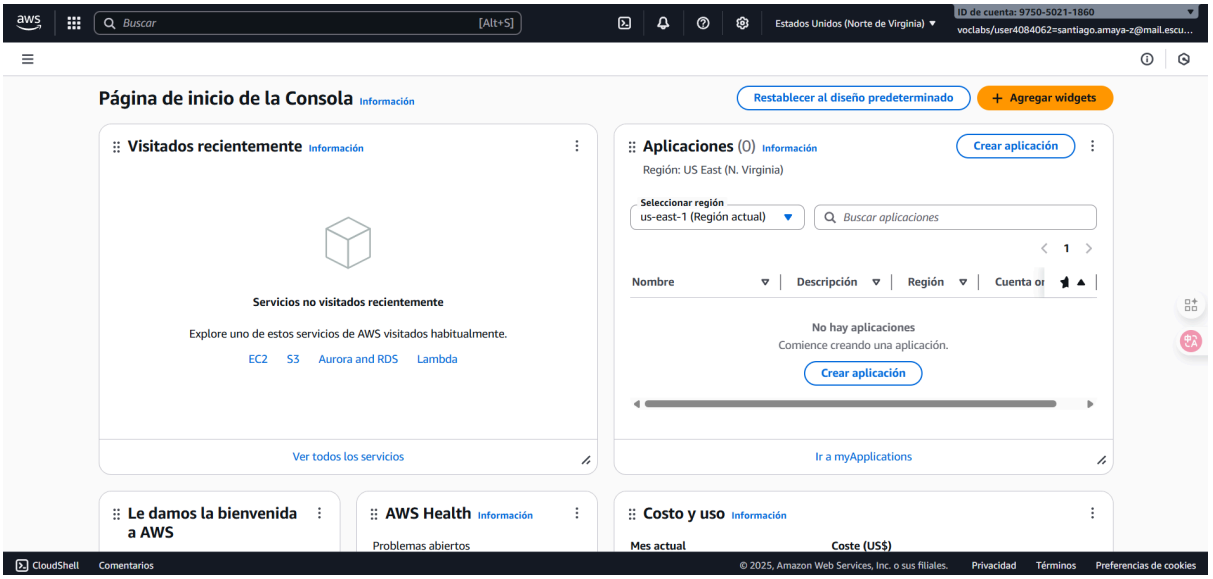
First, we access from AWS Academy Learner Lab, click on "Start Lab", and then press the green AWS button



In the search bar above we look for Amazon EC2 Console

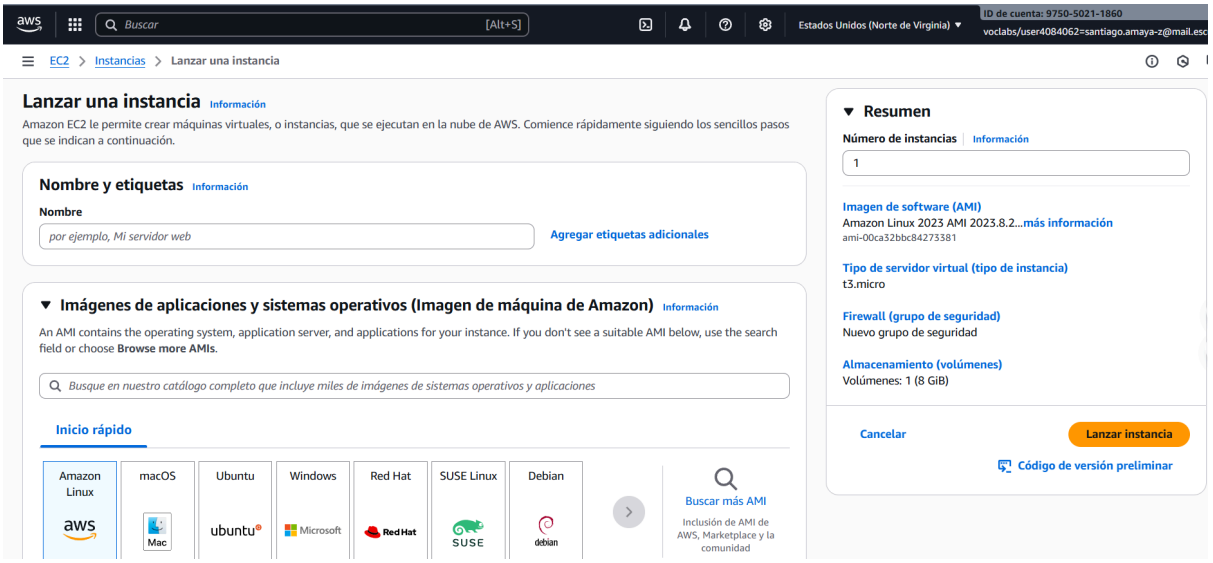


2. In the navigation bar at the top of the screen, we display the current AWS Region — for example, Ohio. You can use the selected Region, or optionally select a Region that is closer to you.

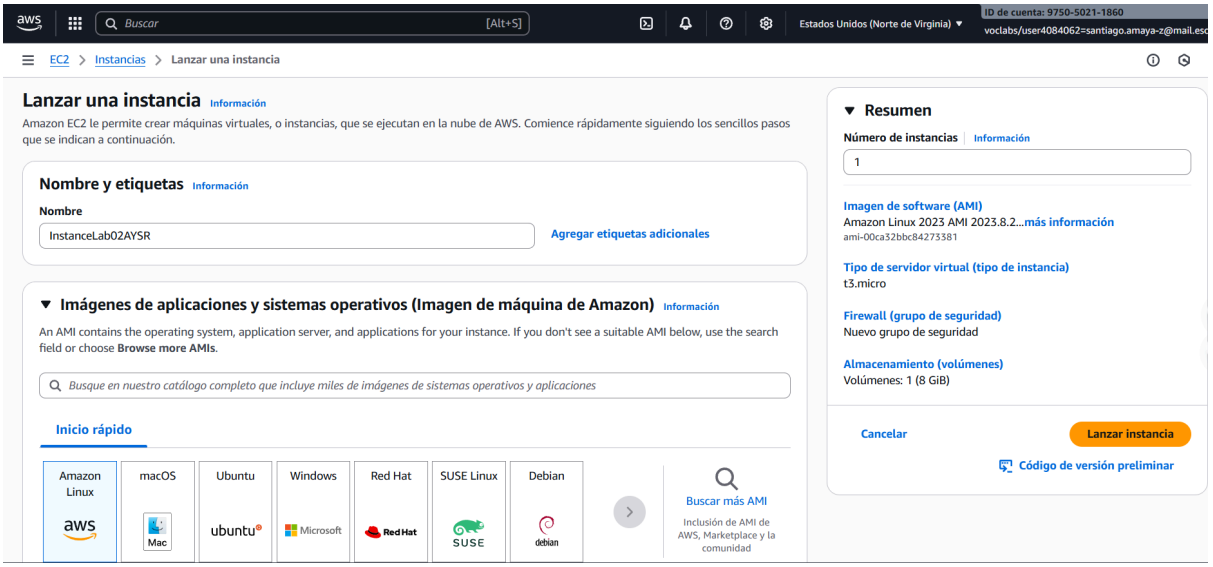


We chose N. Virginia (us-east-1)

3. From the EC2 console dashboard, in the Launch instance pane, choose Launch instance.

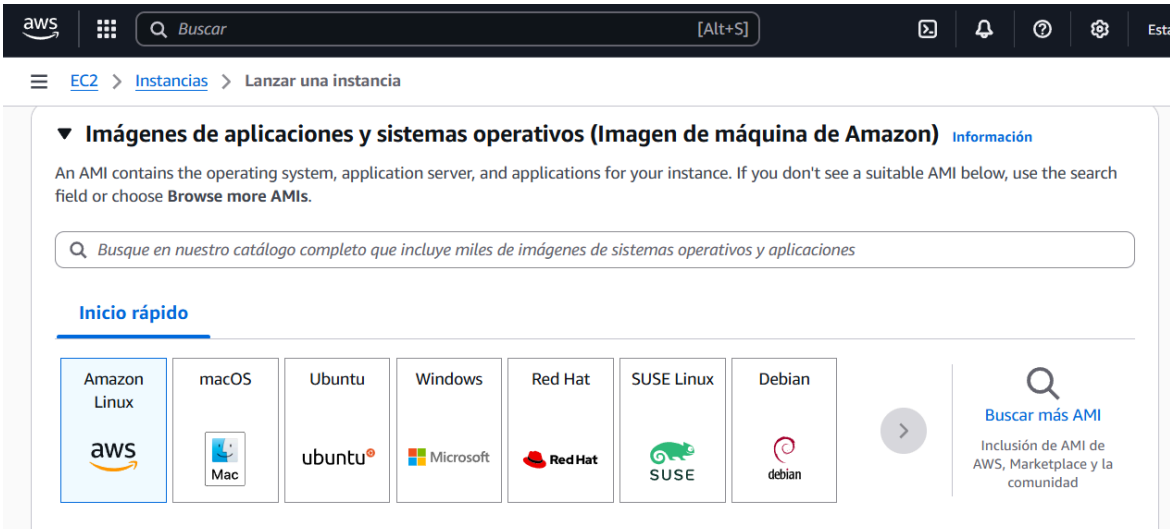


4. Under Name and tags, for Name, enter a descriptive name for your instance.



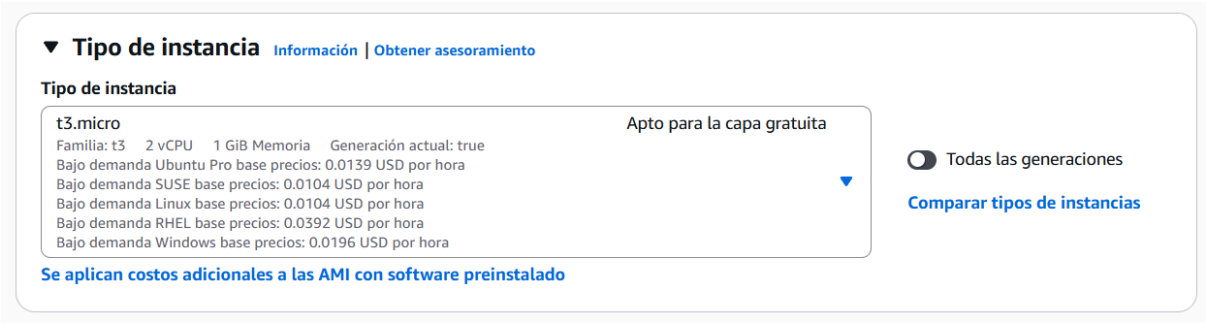
5. Under Application and OS Images (Amazon Machine Image), do the following:

a. Choose Quick Start, and then choose the operating system (OS) for your instance. For your first Linux instance, we recommend that you choose Amazon Linux.

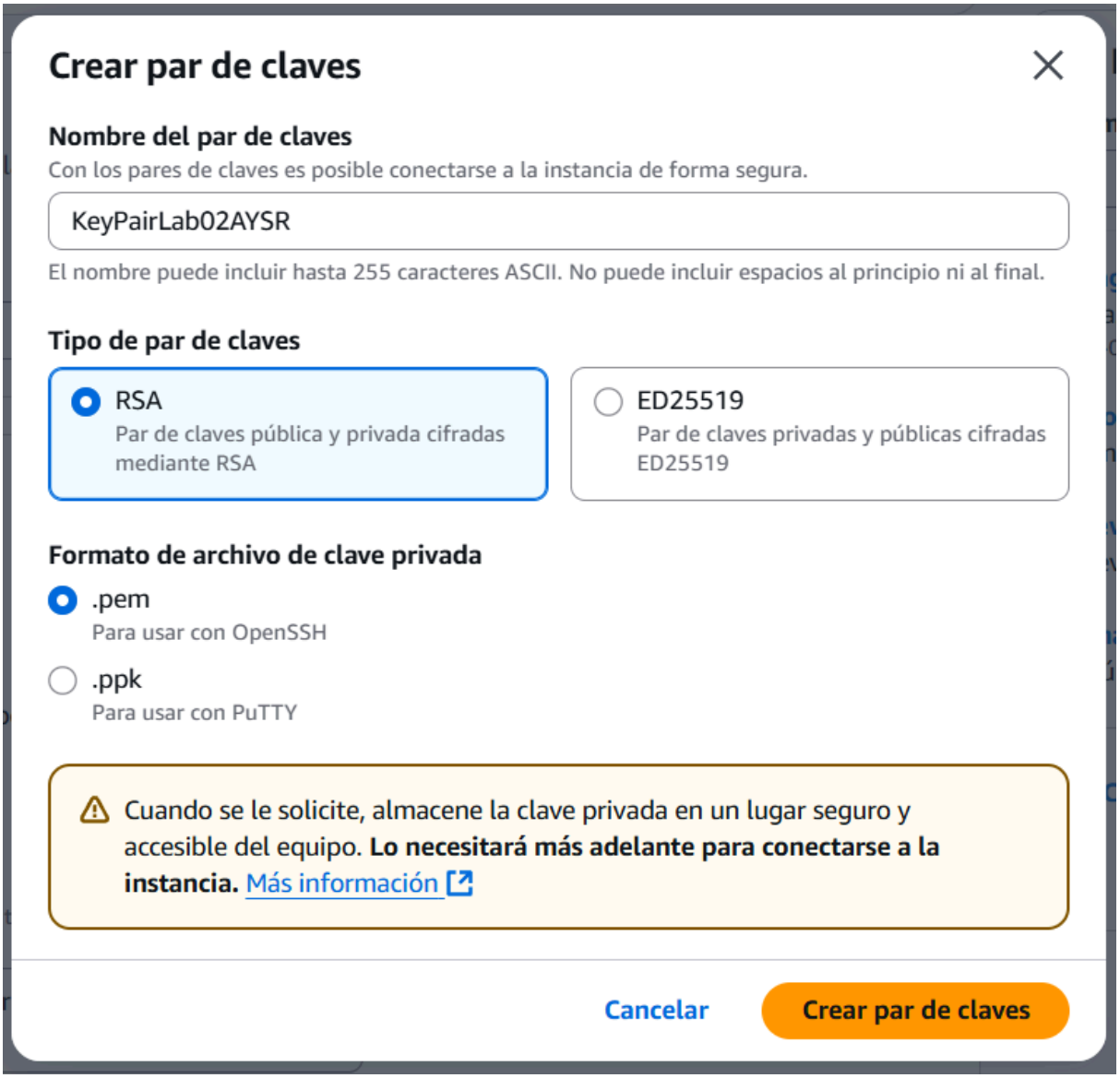


b. From Amazon Machine Image (AMI), select an AMI that is marked Free Tier eligible.

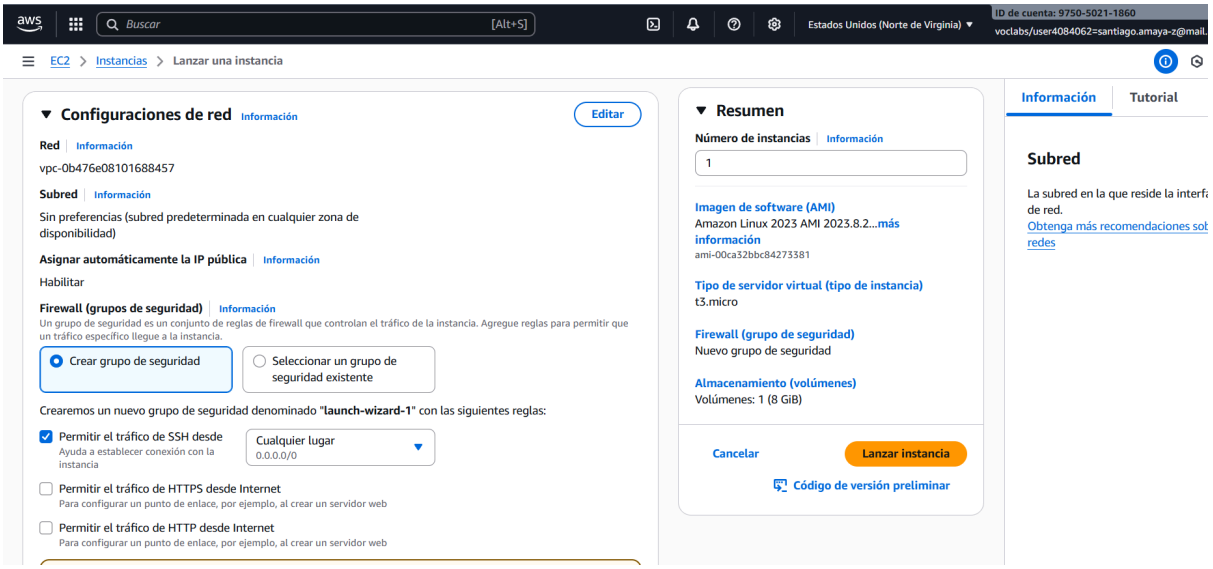
6. Under Instance type, for Instance type, select an instance type that is marked Free Tier eligible.



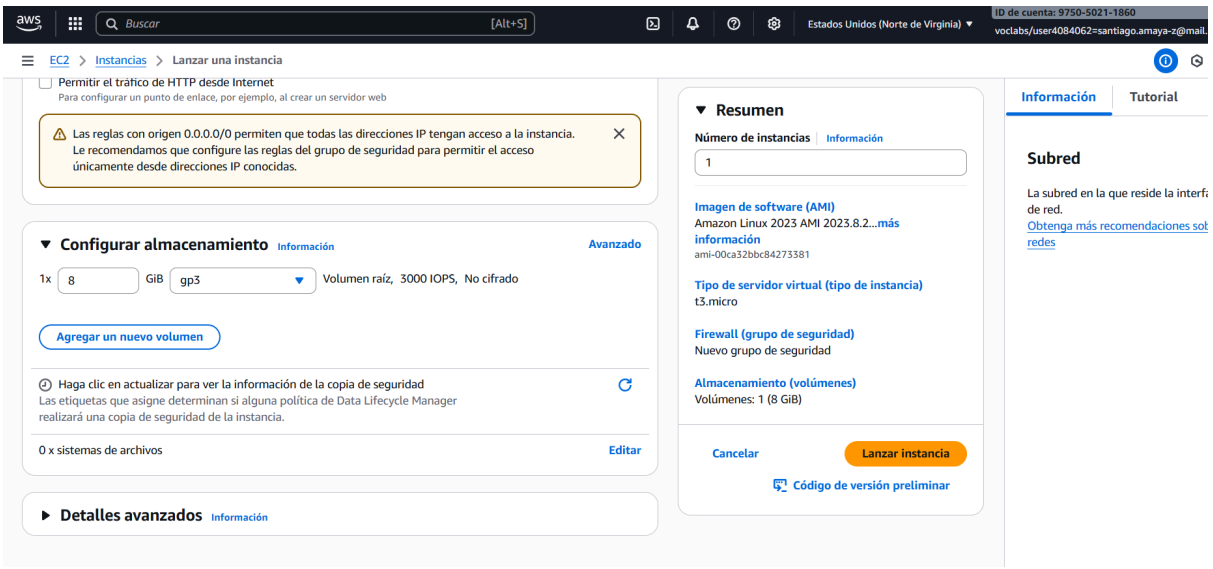
7. Under Key pair (login), for Key pair name, choose an existing key pair or choose Create new key pair to create your first key pair.



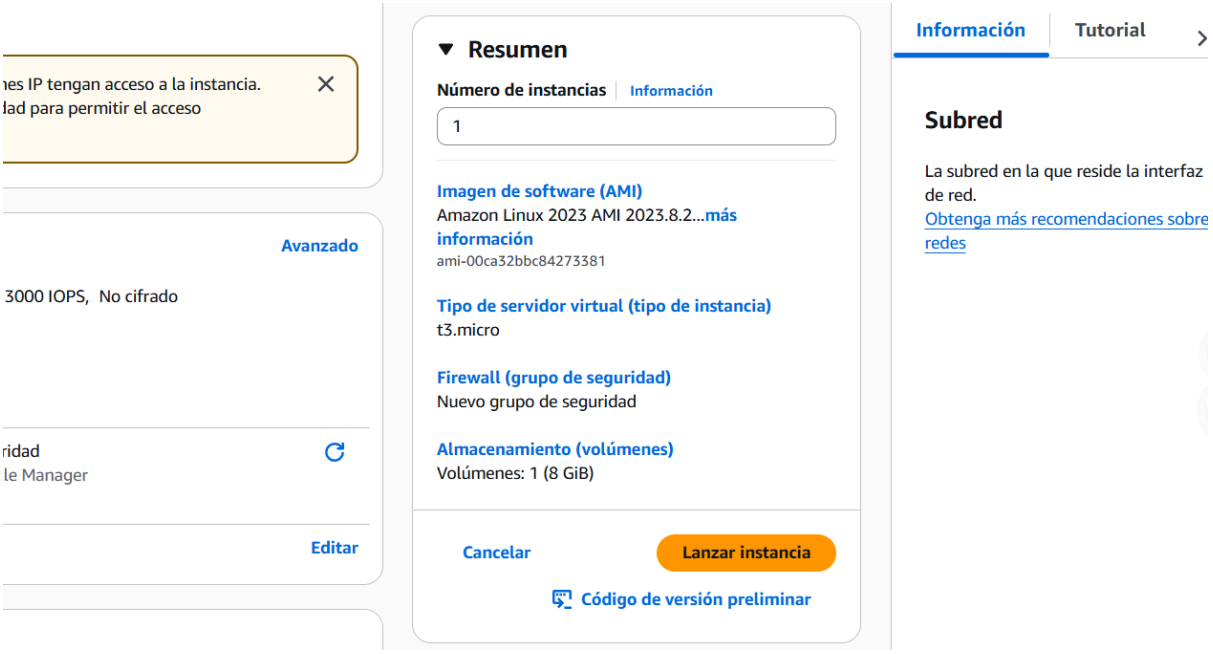
8. Under Network settings, notice that we selected your default VPC, selected the option to use the default subnet in an Availability Zone that we choose for you, and configured a security group with a rule that allows connections to your instance from anywhere (0.0.0.0/0)



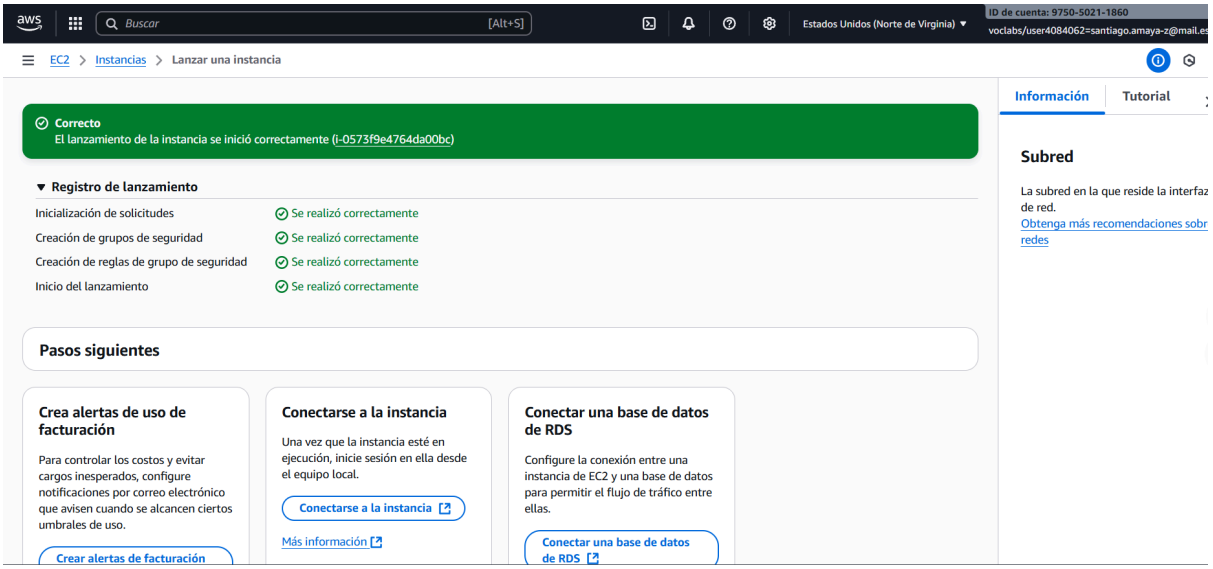
9. Under Configure storage, notice that we configured a root volume but no data volumes. This is sufficient for test purposes.



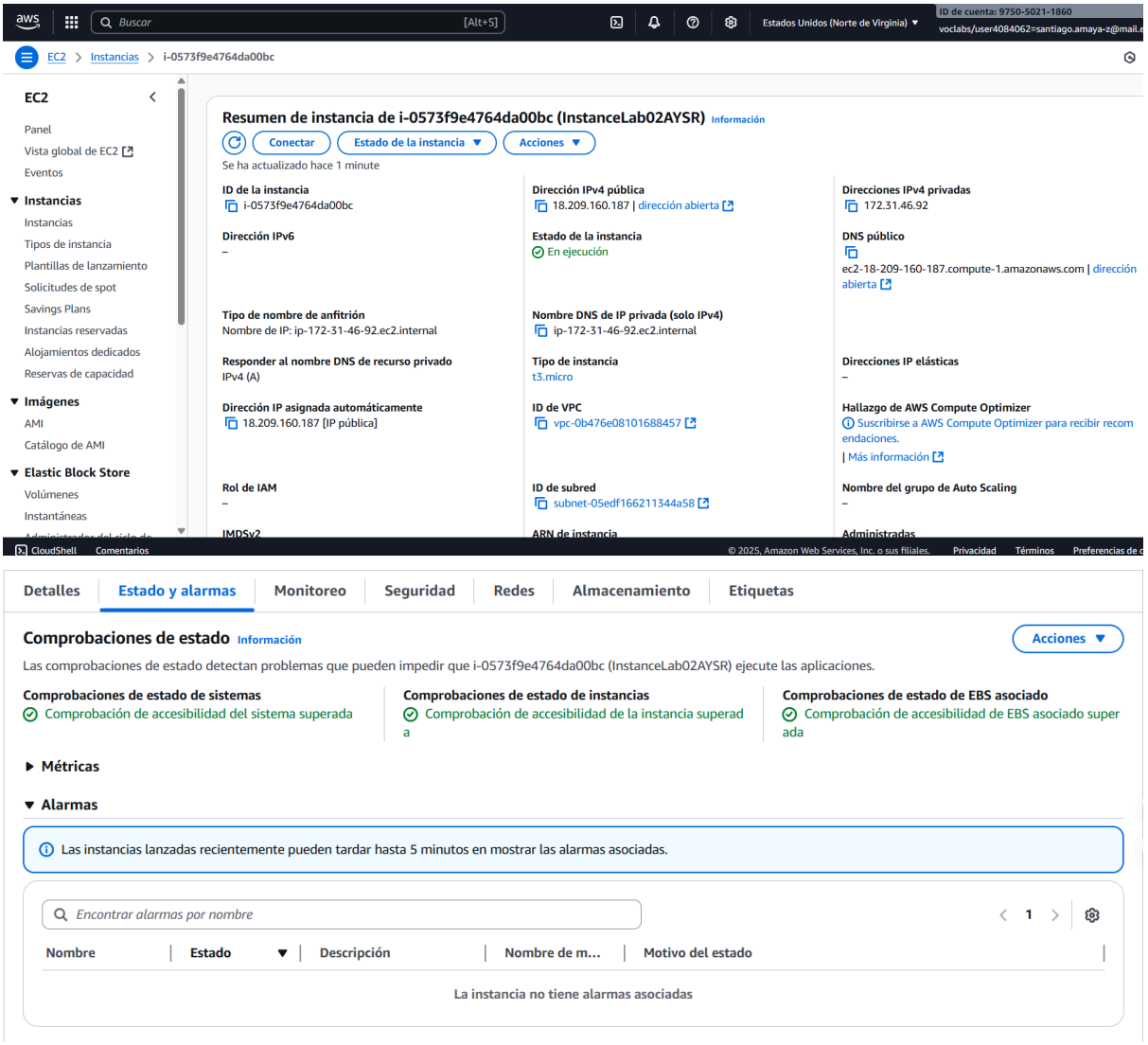
10.Review a summary of your instance configuration in the Summary panel, and when you're ready, choose Launch instance.



11. If the launch is successful, choose the ID of the instance from the Success notification to open the Instances page and monitor the status of the launch.

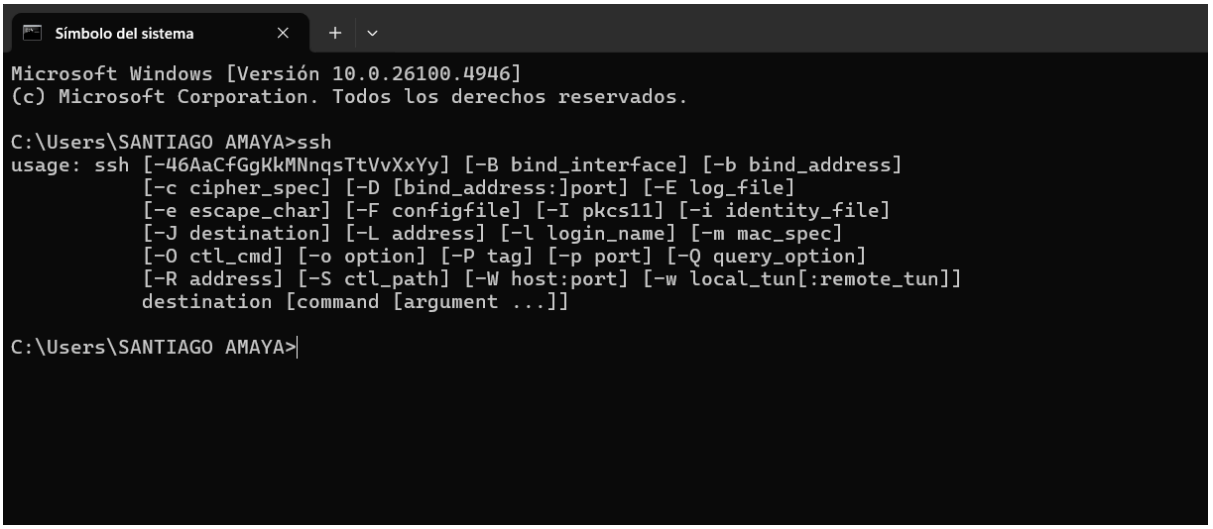


12.Select the checkbox for the instance. The initial instance state is pending. After the instance starts, its state changes to running. Choose the Status and alarms tab. After your instance passes its status checks, it is ready to receive connection requests



Step 2: Connect to your instance

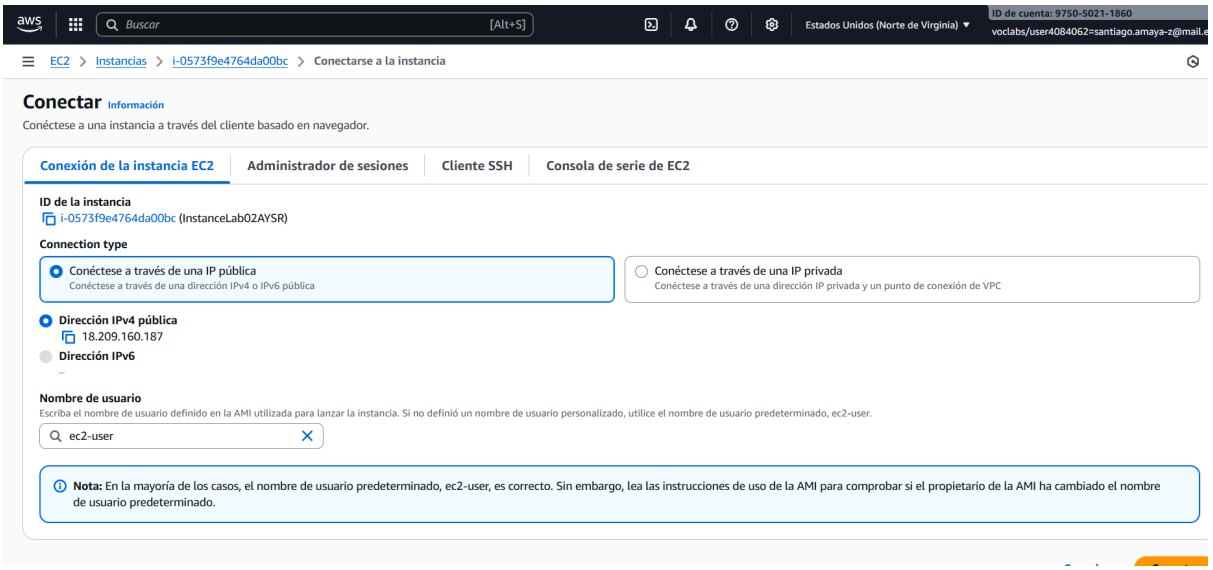
You can connect to your Linux instance using any SSH client. If you are running Windows on your computer, open a terminal and run the ssh command to verify that you have an SSH client installed. If the command is not found, install OpenSSH for Windows.



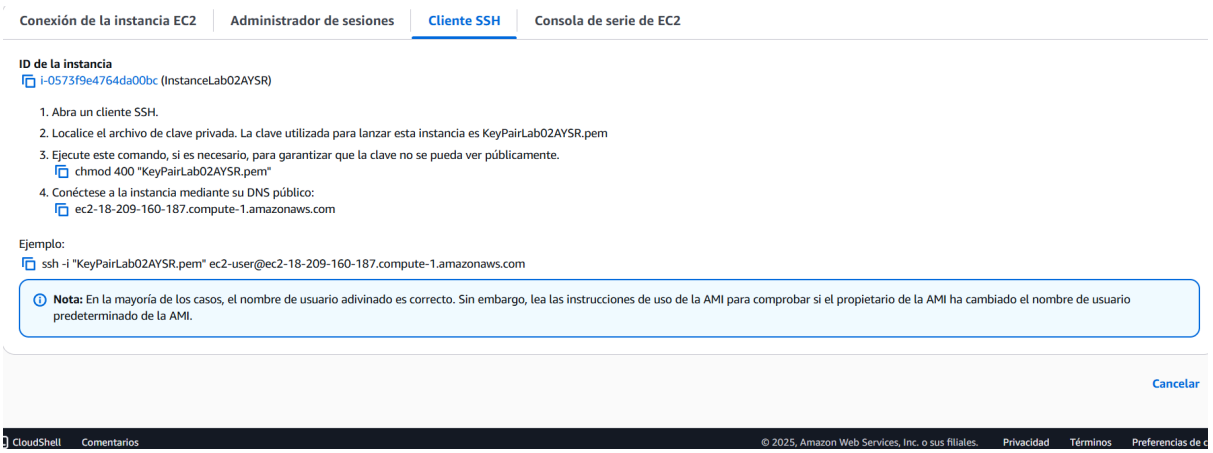
To connect to your instance using SSH

1. In the navigation pane, choose Instances.

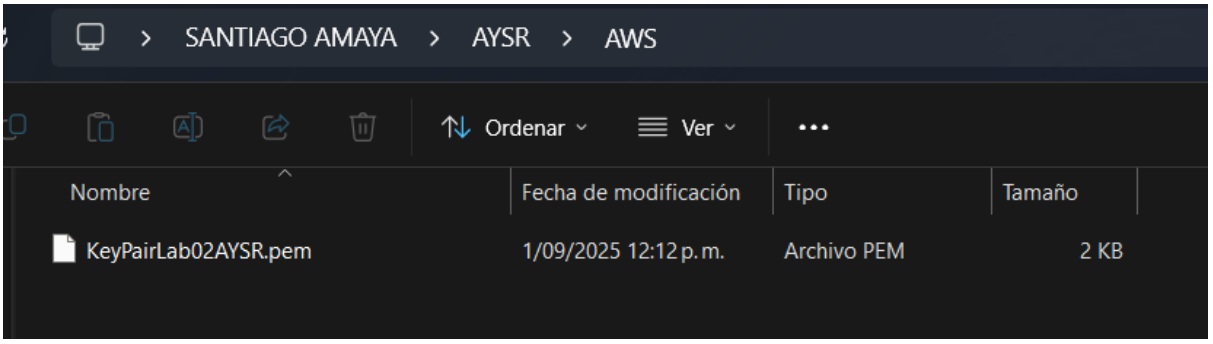
2. Select the instance and then choose Connect.



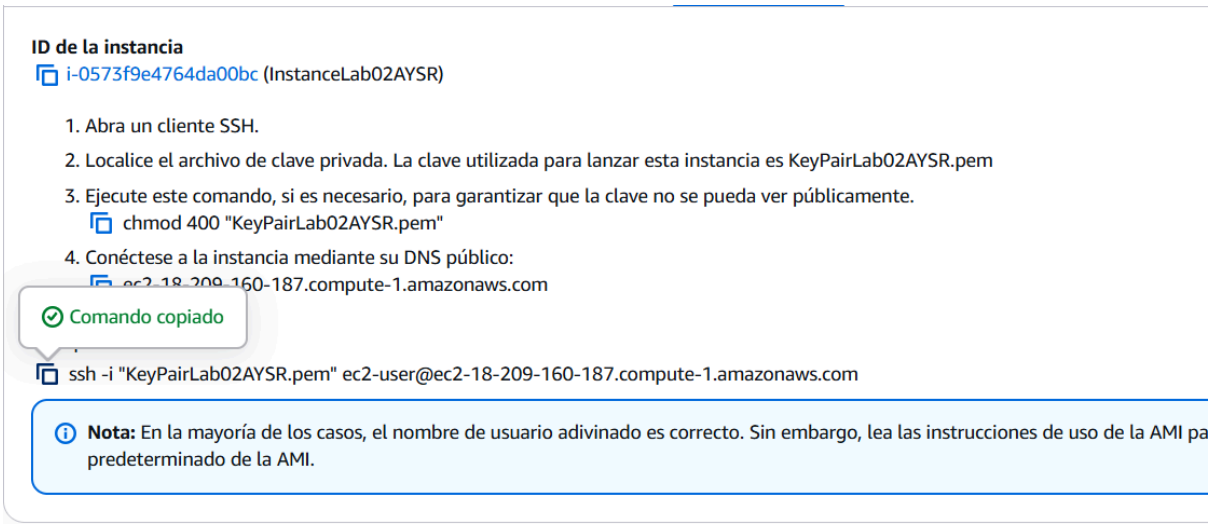
3. On the Connect to instance page, choose the SSH client tab.



4. (Optional) If you created a key pair when you launched the instance and downloaded the private key (.pem file) to a computer running Linux or macOS, run the example chmod command to set the permissions for your private key.
I'm working from Windows, just have it in an easy-to-locate folder



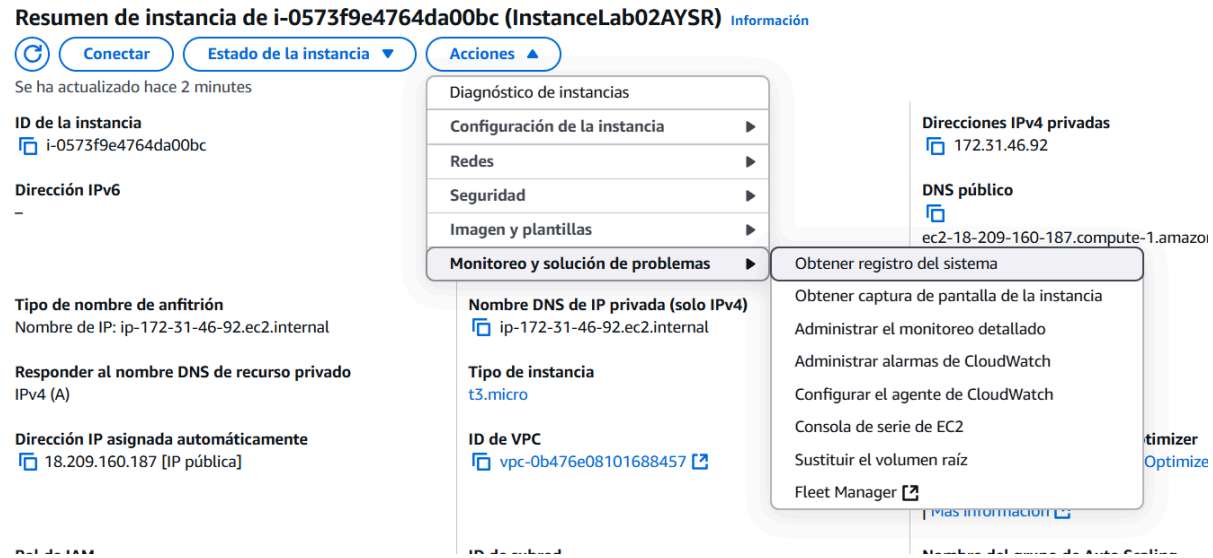
5. Copy the example SSH command. The following is an example, where key-pair-name.pem is the name of your private key file, ec2-user is the username associated with the image, and the string after the @ symbol is the public DNS name of the instance. ssh -i key-pair-name.pem ec2-user@ec2-198-51-100-1.us-east-2.compute.amazonaws.com

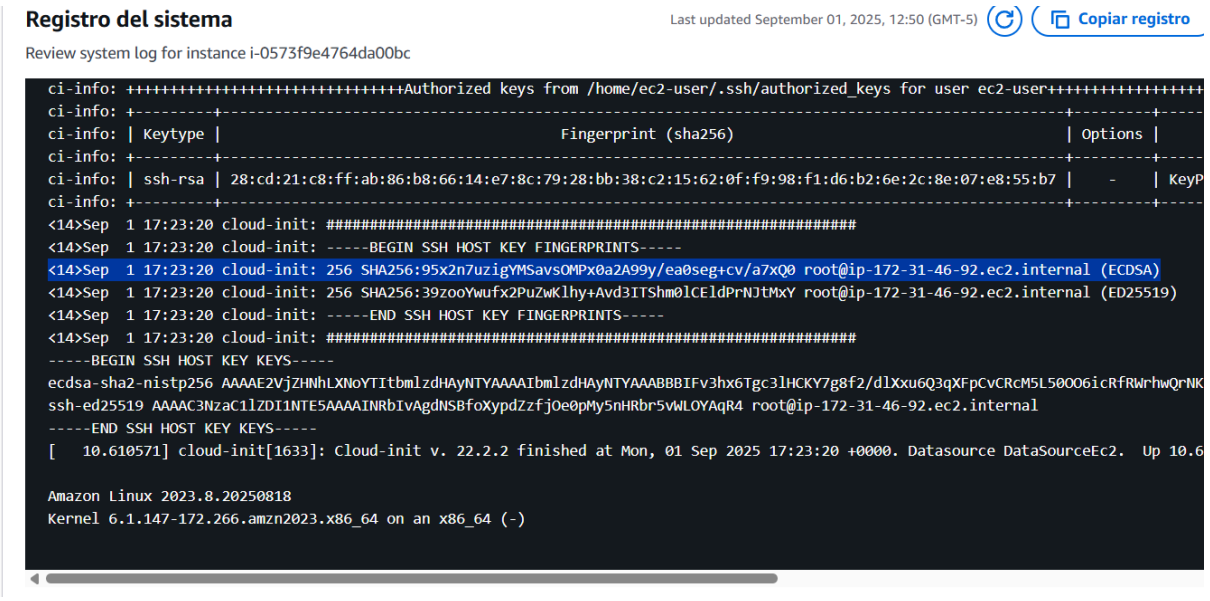


ssh -i "KeyPairLab02AYSR.pem"
ec2-user@ec2-18-209-160-187.compute-1.amazonaws.com

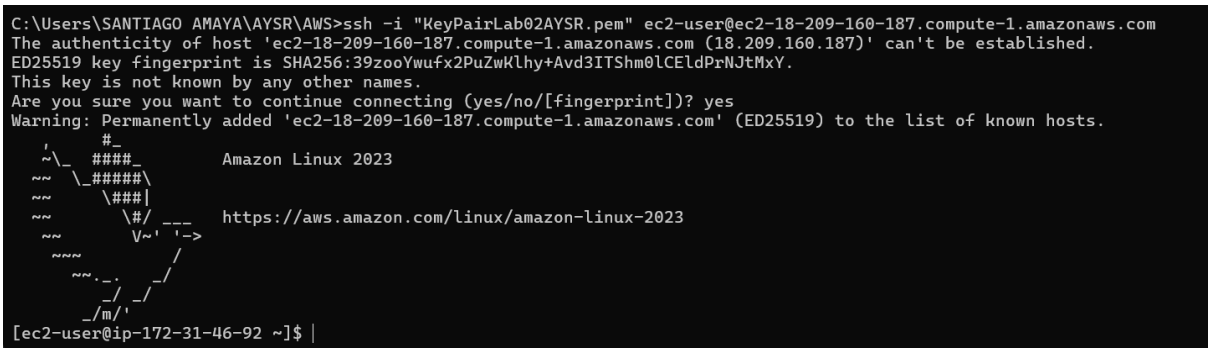
6. In a terminal window on your computer, run the ssh command that you saved in the previous step. If the private key file is not in the current directory, you must specify the fully-qualified path to the key file in this command. The following is an example response: The authenticity of host 'ec2-198-51-100-1.us-east-2.compute.amazonaws.com (198-51-100-1)' can't be established. ECDSA key fingerprint is l4UB/neBad9tvkgJf1QZWxheQmR59WgrgzEimCG6kZY. Are you sure you want to continue connecting (yes/no)?

7. (Optional) Verify that the fingerprint in the security alert matches the instance fingerprint contained in the console output when you first start an instance. To get the console output, choose Actions, Monitor and troubleshoot, Get system log. If the fingerprints don't match, someone might be attempting a man-in-the-middle attack. If they match, continue to the next step.





8. Enter yes.



Next steps

After you start your instance, you might want to explore the following next steps:

- What is the difference between stopping, terminating, and restarting an EC2 instance?
Stopping → The instance is shut down, but the EBS root volume remains, and you can start it again later. (AWS Console or CLI).

Terminating → The instance is permanently deleted, including the root volume (unless you disabled “Delete on Termination”). Data is lost. (AWS Console or CLI).

Restarting → Similar to rebooting a physical machine. The instance stops and starts again, but the instance ID stays the same. (AWS Console or CLI).

- What role does an AMI (Amazon Machine Image) play when launching an instance?

An **AMI** is like a template. It contains:

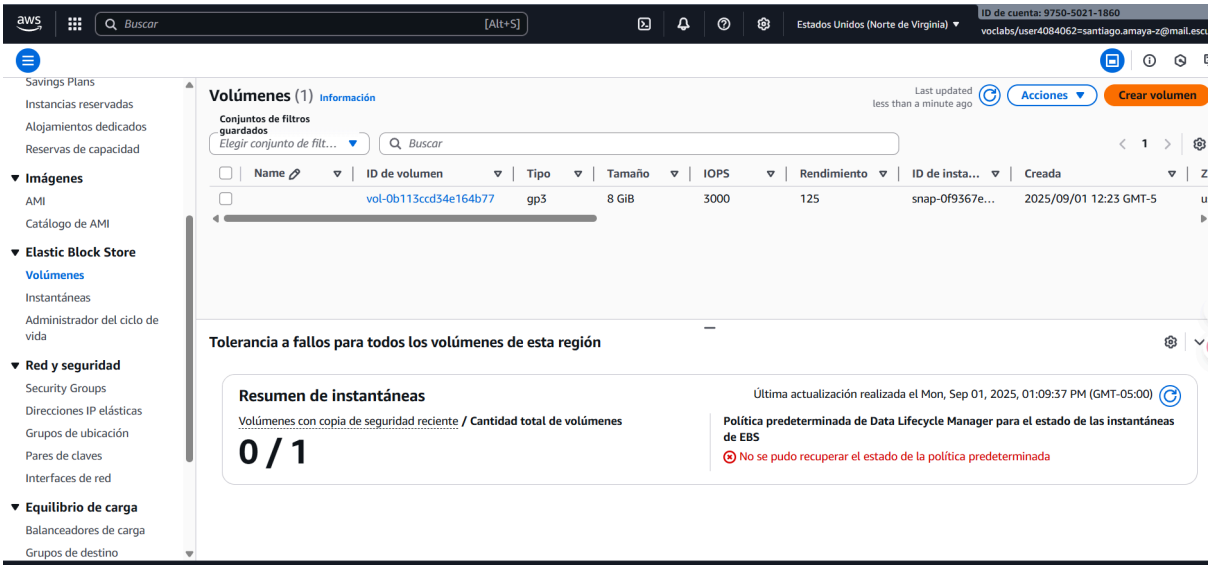
- The operating system
- Pre-installed software (if any)
- Configuration and permissions

When you launch an EC2 instance, you pick an AMI as the base image.

- In what cases would it be advisable to choose an AMI other than the default Amazon Linux AMI?

- When you need a **different OS** (e.g., Ubuntu, Windows, Red Hat, Debian).
- When you need **specialized software preinstalled** (e.g., a database, machine learning stack, or security tools).
- When using a **custom AMI** your team created for consistency.

- How to add and attach volumes, distinguish between EBS and ephemeral storage?
EBS (Elastic Block Store): Persistent storage, survives stop/start, behaves like a hard drive.
Ephemeral (Instance Store): Temporary storage, data is lost when instance stops or terminates.



- How to execute remote commands without SSH?
You can use:

- **AWS Systems Manager (SSM) Session Manager** → lets you run commands without SSH.
- **AWS CLI** with SSM plugin.

- What steps are required to attach an additional EBS volume to an existing Linux instance?
In AWS Console -> EC2 -> Volumes -> Create volume, attach the volume to the target instance. In the instance (Linux terminal), check device (lsblk), format (sudo mkfs -t ext4 /dev/xvdf), next Mount:
sudo mkdir /data
sudo mount /dev/xvdf /data

- What happens to the data on an EBS volume when the instance is stopped or terminated?
When is stopped: Data is preserved. You only pay for storage.
When is terminated: By default, the root EBS volume is deleted. Additional attached volumes are preserved unless you selected “Delete on termination”

- Will the shell we configured in linux Slackware work in the instance we created? What do I need to change? Test its functionality.
The default EC2 Amazon Linux instance usually comes with bash or sh. Since the shell we previously configured in Linux Slackware was sh, it will still work in the new instance because sh is also available on Amazon Linux.

Test its functionality
First we copy the script in the EC2 Console. To do this, we must go to the website and search for the public IP that was assigned to the instance.

```
PS C:\Users\SANTIAGO AMAYA\aysr\aws> scp -i "KeyPairLab02AYSR.pem" listar.sh ec2-user@18.209.160.187:~
The authenticity of host '18.209.160.187 (18.209.160.187)' can't be established.
ED25519 key fingerprint is SHA256:39zooYwufx2PuZwKlhy+Avd3ITShm0lCEldPrNJtMxY.
This host key is known by the following other names/addresses:
    C:\Users\SANTIAGO AMAYA/.ssh/known_hosts:1: ec2-18-209-160-187.compute-1.amazonaws.com
Are you sure you want to continue connecting (yes/no/[fingerprint])?
Please type 'yes', 'no' or the fingerprint:
Warning: Permanently added '18.209.160.187' (ED25519) to the list of known hosts.
listar.sh                     100% 6961    66.0KB/s   00:00
PS C:\Users\SANTIAGO AMAYA\aysr\aws>
```

Now, in the EC2 Console we can see the script:

```
[ec2-user@ip-172-31-46-92 ~]$ ls
listar.sh
[ec2-user@ip-172-31-46-92 ~]$
```

We give it execution permissions and then create some files to test.

```
[ec2-user@ip-172-31-46-92 ~]$ chmod +x listar.sh
[ec2-user@ip-172-31-46-92 ~]$ ./listar.sh /etc
-bash: ./listar.sh: cannot execute: required file not found
[ec2-user@ip-172-31-46-92 ~]$ echo "This is a test file
in EC2" > test_file.txt
[ec2-user@ip-172-31-46-92 ~]$ mkdir -p ~/documents
[ec2-user@ip-172-31-46-92 ~]$ echo "Secret document in EC2" > ~/documents/secret.txt
[ec2-user@ip-172-31-46-92 ~]$
```

When copying the shell to the EC2 console, the file was uploaded in CRLF format from Windows, therefore, we must convert it to Unix format to be able to execute it.

```
[ec2-user@ip-172-31-46-92 ~]$ sudo yum install -y dos2unix
Amazon Linux 2023 Kernel Livepatch repository                                                    174 kB/s |  19 kB     00:00
Dependencies resolved.
================================================================================================================================================
 Package                       Architecture                 Version                                  Repository                            Size
================================================================================================================================================
Installing:
 dos2unix                      x86_64                       7.4.2-2.amzn2023.0.2                     amazonlinux                          236 k

Transaction Summary
================================================================================================================================================
Install  1 Package

Total download size: 236 k
Installed size: 692 k
Downloading Packages:
dos2unix-7.4.2-2.amzn2023.0.2.x86_64.rpm                                         5.8 MB/s | 236 kB     00:00
------------------------------------------------------------------------------------------------------------------------------------------------
Total                                                                            2.2 MB/s | 236 kB     00:00
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing        :                                                                                                                      1/1
  Installing       : dos2unix-7.4.2-2.amzn2023.0.2.x86_64                                                                                 1/1
  Running scriptlet: dos2unix-7.4.2-2.amzn2023.0.2.x86_64                                                                                 1/1
  Verifying        : dos2unix-7.4.2-2.amzn2023.0.2.x86_64                                                                                 1/1

Installed:
  dos2unix-7.4.2-2.amzn2023.0.2.x86_64

Complete!
[ec2-user@ip-172-31-46-92 ~]$
```

We run the shell and see that it works correctly on Amazon Linux.

```
[ec2-user@ip-172-31-46-92 ~]$ ./listar.sh documents
Menu
1. Sort by feature
2. Sort by conditions
3. Finish
Enter an option:
```

```
[ec2-user@ip-172-31-46-92 ~]$ ./listar.sh documents
Menu
1. Sort by feature
2. Sort by conditions
3. Finish
Enter an option: 1
1. Sort files by most recent
2. Sort files by Oldest
3. Sort files from largest to smallest size
4. Sort files from smallest to largest size
5. Sort files by file type
Enter an option: 1
```

```
total 4
-rw-r--r--. 1 ec2-user ec2-user 23 Sep  1 18:51 secret.txt
(END)
```

As we use a student account in AWS Learned Lab, after the time range given to us when clicking on "Start Lab" or if we click on "End Lab", the instance will be deleted and we will have to create it again if necessary later.