



INSTITUTO POLITÉCNICO NACIONAL
ESCUELA SUPERIOR DE CÓMPUTO



SISTEMAS DISTRIBUIDOS

Alumno: Velasco Jiménez Luis Antonio

Grupo: 7CV3

Boleta: 2023630338

Tarea 1: Desarrollo e implementación en la nube de un proxy
HTTPS inverso con servidores HTTP

Fecha de Entrega: 10/Mar/2025

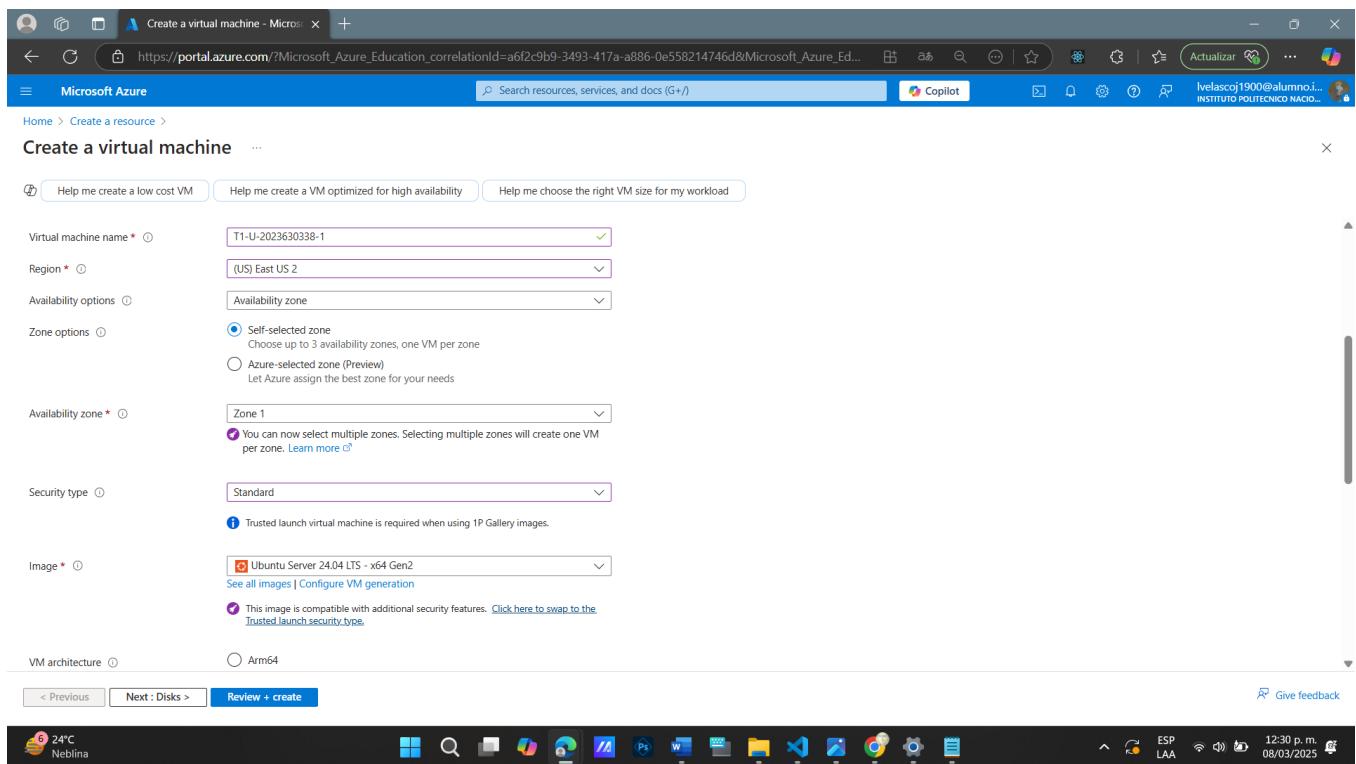
DESARROLLO

URL Conversación ChatGPT: <https://chatgpt.com/share/67cd4b3b-079c-8012-9995-ccc36deb7f95>

Ejecución del administrador de tráfico en Ubuntu

1. Creación de las máquinas virtuales en Ubuntu 24 B1s (1GB de RAM, 1CPU) y disco tipo HDD con 30 GB.

- En la siguiente imagen se muestra el nombre de la máquina virtual con el nombre requerido para la primera máquina virtual en Ubuntu, seguridad estándar, imagen del SO Ubuntu 24.



- En la siguiente imagen se puede ver el tamaño del disco requerido en la tarea.

The screenshot shows the 'Create a virtual machine' wizard on the 'Disk' configuration page. It includes fields for OS disk size (Image default (30 GiB)), OS disk type (Standard HDD (locally-redundant storage)), and other options like Key management (Platform-managed key) and Enable Ultra Disk compatibility. A note indicates that Encryption at host is not registered for the selected subscription. Below the disk configuration, there's a section for 'Data disks for T1-U-2023630338-1' where users can add or attach additional disks. At the bottom, there are navigation buttons: '< Previous', 'Next : Networking >', 'Review + create', and 'Give feedback'.

- En la siguiente imagen se puede ver los puertos de entrada que dejamos abiertos, que se específicamente se nos piden en el punto 3 de la tarea.

The screenshot shows the 'Create a virtual machine' wizard on the 'Networking' configuration page. It includes tabs for Basics, Disks, Networking, Management, Monitoring, Advanced, Tags, and Review + create. Under the Networking tab, it shows network interface settings: Virtual network (new) T1-U-2023630338-1-vnet, Subnet (new) default (10.0.0.0/24), and Public IP (new) T1-U-2023630338-1-ip. It also shows NIC network security group (Basic selected) and Public inbound ports (Allow selected ports). A note states: 'This will allow all IP addresses to access your virtual machine. This is only'. Navigation buttons include '< Previous', 'Next : Management >', 'Review + create', and 'Give feedback'.

- Se deshabilita el diagnóstico de arranque.

Create a virtual machine

Help me create a low cost VM Help me create a VM optimized for high availability Help me choose the right VM size for my workload

Basics Disks Networking Management **Monitoring** Advanced Tags Review + create

Configure monitoring options for your VM.

Alerts
Enable recommended alert rules

Diagnostics
Boot diagnostics Enable with managed storage account (recommended)
 Enable with custom storage account
 Disable

Enable OS guest diagnostics

Health
Enable application health monitoring

< Previous Next : Advanced > **Review + create** Give feedback

24°C Neblina 12:38 p.m. 08/03/2025

- Revisión antes de crear la máquina virtual

Create a virtual machine

Validation passed

Help me create a low cost VM Help me create a VM optimized for high availability Help me choose the right VM size for my workload

Basics

Subscription	Azure for Students
Resource group	(new) T1-U-2023630338-1_group
Virtual machine name	T1-U-2023630338-1
Region	East US 2
Availability options	Availability zone
Zone options	Self-selected zone
Availability zone	1
Security type	Standard
Image	Ubuntu Server 24.04 LTS - Gen2
VM architecture	x64
Size	Standard B1s (1 vcpus, 1 GiB memory)
Enable Hibernation	No
Authentication type	Password
Username	luisvela
Public inbound ports	HTTP, HTTPS, SSH
Azure Spot	No

Disks

OS disk size: Image default

< Previous Next > **Create** Download a template for automation Give feedback

24°C Neblina 12:44 p.m. 08/03/2025

Create a virtual machine - Microsoft Azure

Microsoft Azure

Home > Create a resource >

Create a virtual machine

Validation passed

Help me create a low cost VM | Help me create a VM optimized for high availability | Help me choose the right VM size for my workload

Disk

OS disk size	Image default
OS disk type	Standard HDD LRS
Use managed disks	Yes
Delete OS disk with VM	Enabled
Ephemeral OS disk	No

Networking

Virtual network	(new) T1-U-2023630338-1-vnet
Subnet	(new) default (10.0.0.0/24)
Public IP	(new) T1-U-2023630338-1-ip
Accelerated networking	Off
Place this virtual machine behind an existing load balancing solution?	No
Delete public IP and NIC when VM is deleted	Disabled

Management

Microsoft Defender for Cloud	Basic (free)
System assigned managed identity	Off
Login with Microsoft Entra ID	Off

< Previous | Next > | Create | Download a template for automation | Give feedback

6 24°C Nebulosa

12:44 p.m. 08/03/2025

2. Conexión a la primera máquina virtual en Ubuntu donde se ejecutará el AdministardorTrafico.java

- En la siguiente imagen podemos ver la conexión por SSH, se me olvido tomar captura, pero la IP pública era 128.85.128.68 la cual se puede ver en la imagen.

```
luisvela@T1-U-2023630338-1: ~ + ^
```

Instale la versión más reciente de PowerShell para obtener nuevas características y mejoras. <https://aka.ms/PSWindows>

```
PS C:\Users\luis Velasco> ssh luisvela@128.85.128.169
The authenticity of host '128.85.128.169 (128.85.128.169)' can't be established.
ED25519 key fingerprint is SHA256:8k5d/PasLlsLwHanGEEDSKrIXYWNNGZ0wf15EBWUyLE.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '128.85.128.169' (ED25519) to the list of known hosts.
luisvela@128.85.128.169's password:
Welcome to Ubuntu 24.04.2 LTS (GNU/Linux 6.8.0-1021-azure x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/pro

System information as of Sat Mar  8 18:56:14 UTC 2025

System load: 0.07      Processes:           112
Usage of /: 5.4% of 28.02GB  Users logged in:     0
Memory usage: 27%        IPv4 address for eth0: 10.0.0.4
Swap usage:  0%          
```

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See <https://ubuntu.com/esm> or run: sudo pro status

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

luisvela@T1-U-2023630338-1:~\$ |

USD/MXN -0.21%

12:56 p.m. 08/03/2025

- En la siguiente imagen ya solo se logra ver la información de la **segunda máquina virtual con Ubuntu**, ya que los pasos para crearla fueron los mismos.

T1-U-2023630338-2 Virtual machine

Overview

Essentials

Resource group (move) : T1-U-2023630338-1 group_03081259	Operating system : Linux
Status : Running	Size : Standard B1s (1 vcpu, 1 GiB memory)
Location : East US 2 (Zone 1)	Public IP address : 48.211.221.228
Subscription (move) : Azure for Students	Virtual network/subnet : T1-U-2023630338-2-vnet/default
Subscription ID : e1d319c4-9458-4992-b305-fe400976ae65	DNS name : Not configured
Availability zone : 1	Health state : -
Tags (edit) : Add tags	Time created : 3/8/2025, 7:05 PM UTC

Properties **Monitoring** **Capabilities (7)** **Recommendations** **Tutorials**

Virtual machine

Computer name : T1-U-2023630338-2	Networking
Operating system : Linux	Public IP address : 48.211.221.228 (Network interface t1-u-2023630338-2518_x1)
VM generation : V2	Public IP address (IPv6) : -
VM architecture : x64	Private IP address : 10.1.0.4
Agent status : Not Ready	Private IP address (IPv6) : -
Agent version : Unknown	Virtual network/subnet : T1-U-2023630338-2-vnet/default
Hibernation : Disabled	DNS name : Configure

- Conectándonos por SSH a la **segunda máquina virtual con Ubuntu**, cuya IP pública es 48.211.221.228

```

PS C:\Users\Luis Velasco> ssh luisvela2@48.211.221.228
The authenticity of host '48.211.221.228 (48.211.221.228)' can't be established.
ED25519 key fingerprint is SHA256:V9avq9hSnt4fDJuCPmFbj0R2SB1Rv5DlqaJ1LbVeujY.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '48.211.221.228' (ED25519) to the list of known hosts.
luisvela2@48.211.221.228's password:
Welcome to Ubuntu 24.04.2 LTS (GNU/Linux 6.8.0-1021-azure x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/pro

System information as of Sat Mar  8 19:16:44 UTC 2025

System load:  0.01      Processes:          109
Usage of /:   5.4% of 28.02GB  Users logged in:     0
Memory usage: 27%           IPv4 address for eth0: 10.1.0.4
Swap usage:   0%

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

luisvela2@T1-U-2023630338-2:~$ |

```

- En la siguiente imagen se ve la información general de la **tercera máquina virtual en Ubuntu** creada (no se ponen las capturas de la creación ya que el proceso es el mismo).

The screenshot shows the Microsoft Azure portal interface for a virtual machine named "T1-U-2023630338-3". The main content area displays the following details:

	Value
Resource group (move)	T1-U-2023630338-3 group
Status	: Running
Location	: East US 2 (Zone 1)
Subscription (move)	Azure for Students
Subscription ID	: e1d319c4-9458-4992-b305-fe400976ae65
Availability zone	: 1
Operating system	: Linux (ubuntu 24.04)
Size	: Standard B1s (1 vcpu, 1 GiB memory)
Public IP address	: 48.211.222.102
Virtual network/subnet	: T1-U-2023630338-3-vnet/default
DNS name	: Not configured
Health state	: -
Time created	: 3/8/2025, 7:19 PM UTC

The left sidebar shows the navigation menu for the virtual machine, including Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Connect, Networking (Network settings, Load balancing), Application security groups, Network manager, Settings, Availability + scale, Security, Backup + disaster recovery, Operations, Monitoring, Automation, and Help.

3. Abrir en la primera máquina virtual los puertos 80 y 443.

Este punto lo resolvimos desde que estábamos creando la primer maquina virtual de Ubuntu, se puede ver en las imágenes anteriores.

4. Abrir el puerto 8080 en la segunda máquina virtual y en la tercera máquina virtual.

- En las siguientes imágenes se puede observar cuando se crea la regla del puerto de entrada 8080 para la **segunda máquina virtual de Ubuntu**, así como la confirmación.

The screenshot shows the Azure portal interface for managing network settings. On the left, the navigation menu includes 'Virtual machines' and 'Networking'. Under 'Networking', 'Network settings' is selected. In the main content area, the 'T1-U-2023630338-2' virtual machine is selected. The 'Rules' section shows an 'Inbound port rules (4)' table with entries for SSH (port 22), Vnet inbound (port 65000), Azure Load Balancer inbound (port 65001), and Deny All inbound (port 65500). A new rule is being added on the right, titled 'Add inbound security rule'. The configuration is as follows:

Source	Any
Source port ranges	*
Destination	Any
Service	Custom
Destination port ranges	8080
Protocol	TCP
Action	Allow
Priority	310
Name	AllowAnyCustom8080Inbound

The 'Add' button is highlighted at the bottom of the dialog.

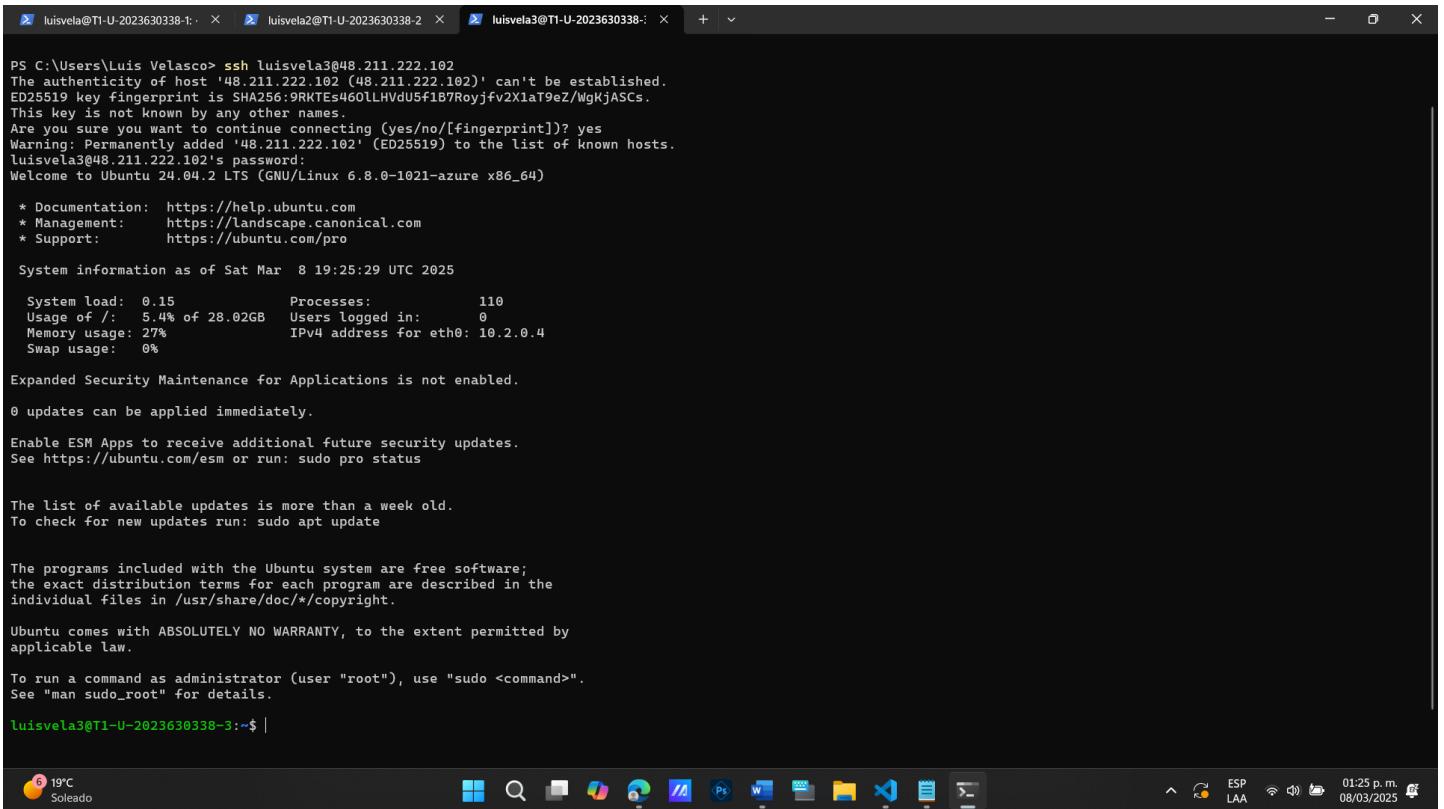
This screenshot shows the same Azure portal interface after the rule has been added. The 'Inbound port rules (5)' table now includes the new rule 'AllowAnyCustom8080Inbound' (Priority 310, Port 8080, TCP, Any, Any). The 'Create port rule' button is visible at the top right of the table area.

- En las siguientes imágenes se puede observar cuando se crea la regla del puerto de entrada 8080 para la tercera máquina virtual de Ubuntu, así como la confirmación.

The screenshot shows the Azure portal interface for managing a virtual machine named T1-U-2023630338-3. On the left, the 'Virtual machines' blade lists three instances: T1-U-2023630338-1, T1-U-2023630338-2, and T1-U-2023630338-3. The third instance is selected. In the center, the 'Network settings' section is displayed, showing details like the network interface (t1-u-2023630338-3505_z1), virtual network, and public IP address (48.211.222.102). On the right, a modal window titled 'Add inbound security rule' is open, allowing configuration of a new rule. The 'Source' dropdown is set to 'Any'. The 'Destination' dropdown is also set to 'Any'. The 'Service' dropdown is set to 'Custom'. The 'Destination port ranges' field is set to '8080'. The 'Protocol' dropdown has 'TCP' selected. The 'Action' dropdown has 'Allow' selected. The 'Priority' field is set to '310'. The 'Name' field contains 'AllowAnyCustom8080Inbound'. At the bottom of the modal are 'Add' and 'Cancel' buttons, along with a 'Give feedback' link.

This screenshot shows the same Azure portal interface after the rule has been added. The 'Rules' section now displays the newly created rule: 'AllowAnyCustom8080Inbound' with a priority of 310, configured to allow TCP traffic on port 8080 from any source to any destination. The rest of the interface remains consistent with the previous screenshot, showing the virtual machine's network configuration and the main virtual machine list.

- Conectándonos por SSH a la tercera máquina virtual en Ubuntu, cuya IP pública es 48.211.222.102



```

PS C:\Users\Luis Velasco> ssh luisvela3@48.211.222.102
The authenticity of host '48.211.222.102 (48.211.222.102)' can't be established.
ED25519 key fingerprint is SHA256:9RKTEs46OLHVdU5f1B7RoyjfV2XiaT9eZ/WgKjASCs.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '48.211.222.102' (ED25519) to the list of known hosts.
luisvela3@48.211.222.102's password:
Welcome to Ubuntu 24.04.2 LTS (GNU/Linux 6.8.0-1021-azure x86_64)

 * Documentation: https://help.ubuntu.com
 * Management: https://landscape.canonical.com
 * Support: https://ubuntu.com/pro

System information as of Sat Mar  8 19:25:29 UTC 2025

System load: 0.15      Processes:           110
Usage of /: 5.4% of 28.02GB   Users logged in:    0
Memory usage: 27%          IPv4 address for eth0: 10.2.0.4
Swap usage:  0%

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

The programs included with the Ubuntu system are free software;
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individual files in /usr/share/doc/*copyright.

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applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

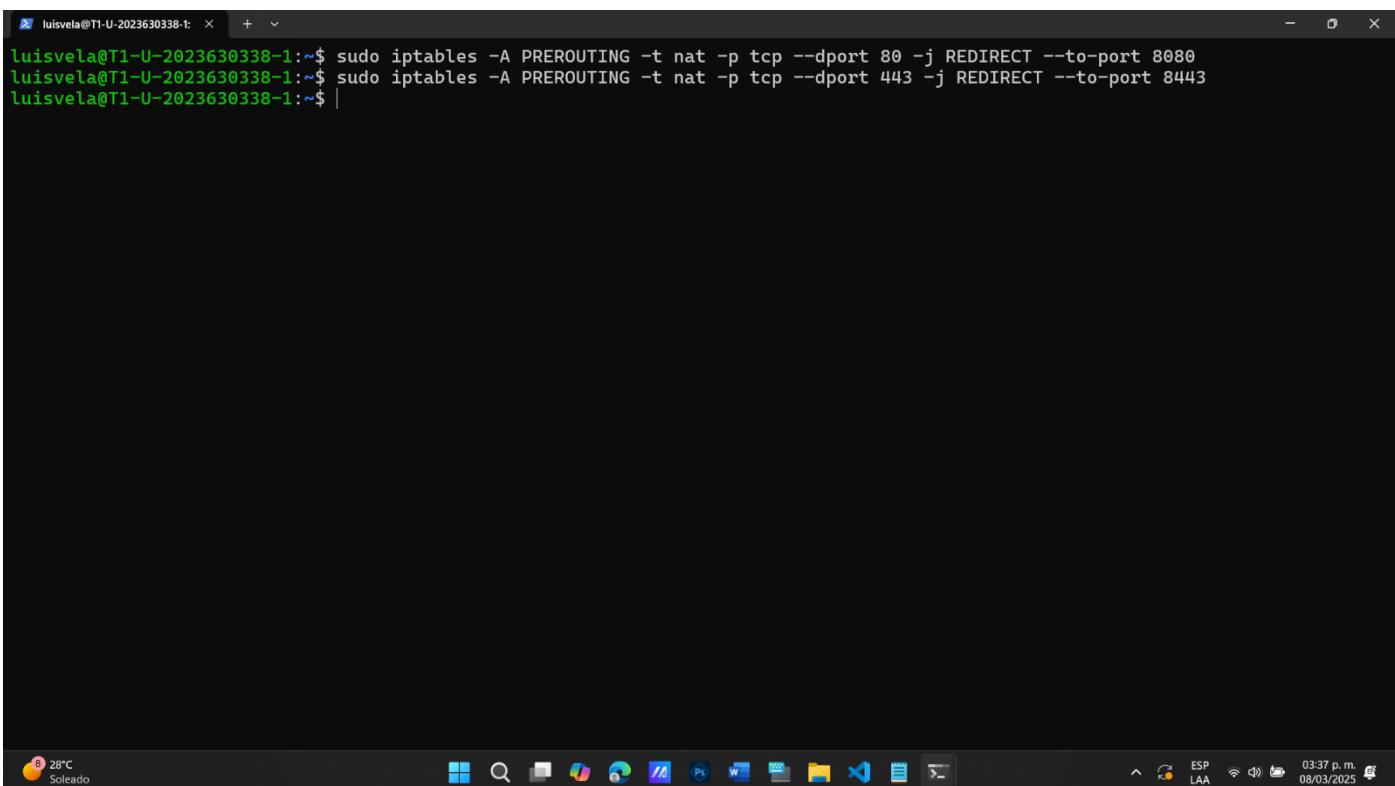
luisvela3@T1-U-2023630338-3:~$ |

```

5. En la primera máquina virtual mapear el puerto 80 al puerto 8080.

6. En la primera máquina virtual mapear el puerto 443 al puerto 8443.

- En la siguiente imagen se aplicamos el comando iptables para mapear los puertos en la primera máquina virtual con Ubuntu como se nos pide en los puntos 5 y 6.



```

luisvela@T1-U-2023630338-1:~$ sudo iptables -A PREROUTING -t nat -p tcp --dport 80 -j REDIRECT --to-port 8080
luisvela@T1-U-2023630338-1:~$ sudo iptables -A PREROUTING -t nat -p tcp --dport 443 -j REDIRECT --to-port 8443
luisvela@T1-U-2023630338-1:~$ |

```

- Ahora vamos a instalar openjdk17 ya que es el que me recomendó la línea de comandos al aplicar el comando java --version. Esto lo haremos para las 3 máquinas virtuales.

```

luisvela@T1-U-2023630338-1:~$ sudo apt install openjdk-17-jre-headless
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  alsamixer-conf alsamixer-common ca-certificates-java
  fontconfig-config fonts-dejavu-core fonts-dejavu-mono
  java-common libasound2-data libasound2t64
  libavahi-client3 libavahi-common-data libavahi-common3
  libcurl3 libcurl3-gnutls libfontconfig1 libgraphite2-3 libharfbuzz0b
  libjpeg-turbo8 libjpeg8 liblcms2-2 libpcssclite1
Suggested packages:
  default-jre alsamixer-utils libasound2-plugins cups-common
  liblcms2-utils pscsd libnss-mdns fonts-dejavu-extra
  fonts-ipafont-gothic fonts-ipafont-mincho
  fonts-wqy-microhei | fonts-wqy-zenhei fonts-indic
The following NEW packages will be installed:
  alsamixer-conf alsamixer-common ca-certificates-java
  fontconfig-config fonts-dejavu-core fonts-dejavu-mono
  java-common libasound2-data libasound2t64
  libavahi-client3 libavahi-common-data libavahi-common3
  libcurl3 libcurl3-gnutls libfontconfig1 libgraphite2-3 libharfbuzz0b
  libjpeg-turbo8 libjpeg8 liblcms2-2 libpcssclite1

luisvela@T1-U-2023630338-2:~$ sudo apt install openjdk-17-jre-headless
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  alsamixer-conf alsamixer-common ca-certificates-java
  fontconfig-config fonts-dejavu-core fonts-dejavu-mono
  java-common libasound2-data libasound2t64
  libavahi-client3 libavahi-common-data libavahi-common3
  libcurl3 libcurl3-gnutls libfontconfig1 libgraphite2-3 libharfbuzz0b
  libjpeg-turbo8 libjpeg8 liblcms2-2 libpcssclite1
Suggested packages:
  default-jre alsamixer-utils libasound2-plugins cups-common
  liblcms2-utils pscsd libnss-mdns fonts-dejavu-extra
  fonts-ipafont-gothic fonts-ipafont-mincho
  fonts-wqy-microhei | fonts-wqy-zenhei fonts-indic
The following NEW packages will be installed:
  alsamixer-conf alsamixer-common ca-certificates-java
  fontconfig-config fonts-dejavu-core fonts-dejavu-mono
  java-common libasound2-data libasound2t64
  libavahi-client3 libavahi-common-data libavahi-common3
  libcurl3 libcurl3-gnutls libfontconfig1 libgraphite2-3 libharfbuzz0b
  libjpeg-turbo8 libjpeg8 liblcms2-2 libpcssclite1

```

- Comprobando que se instaló correctamente en cada una de las VM, haciendo java --version.

```

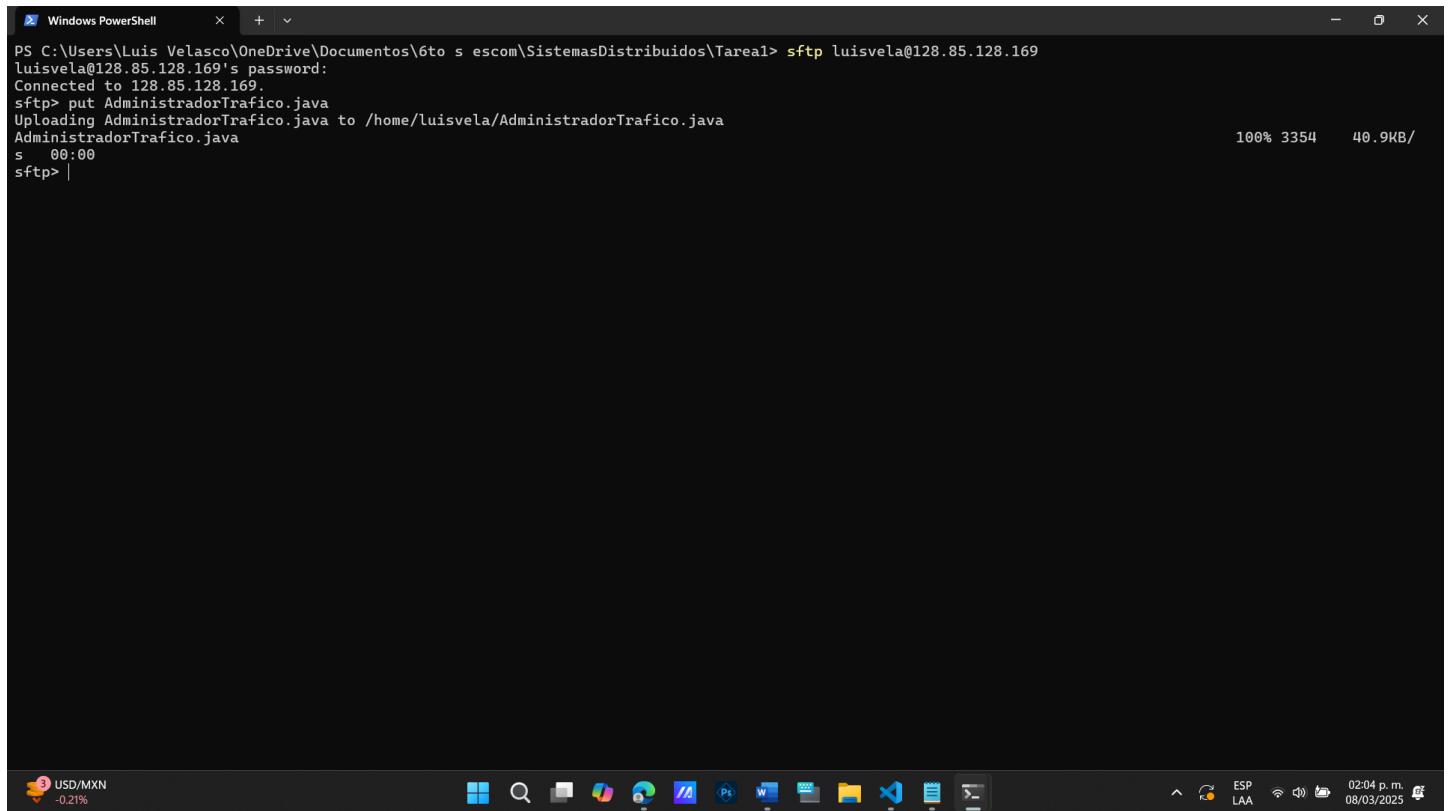
luisvela@T1-U-2023630338-1:~$ java --version
openjdk 17.0.14 2025-01-21
OpenJDK Runtime Environment (build 17.0.14+7-Ubuntu-124.04)
OpenJDK 64-Bit Server VM (build 17.0.14+7-Ubuntu-124.04, mixed mode, sharing)
luisvela@T1-U-2023630338-1:~$

luisvela@T1-U-2023630338-1:~$ java --version
openjdk 17.0.14 2025-01-21
OpenJDK Runtime Environment (build 17.0.14+7-Ubuntu-124.04)
OpenJDK 64-Bit Server VM (build 17.0.14+7-Ubuntu-124.04, mixed mode, sharing)
luisvela@T1-U-2023630338-1:~$

luisvela@T1-U-2023630338-2:~$ java --version
openjdk 17.0.14 2025-01-21
OpenJDK Runtime Environment (build 17.0.14+7-Ubuntu-124.04)
OpenJDK 64-Bit Server VM (build 17.0.14+7-Ubuntu-124.04, mixed mode, sharing)
luisvela@T1-U-2023630338-2:~|

```

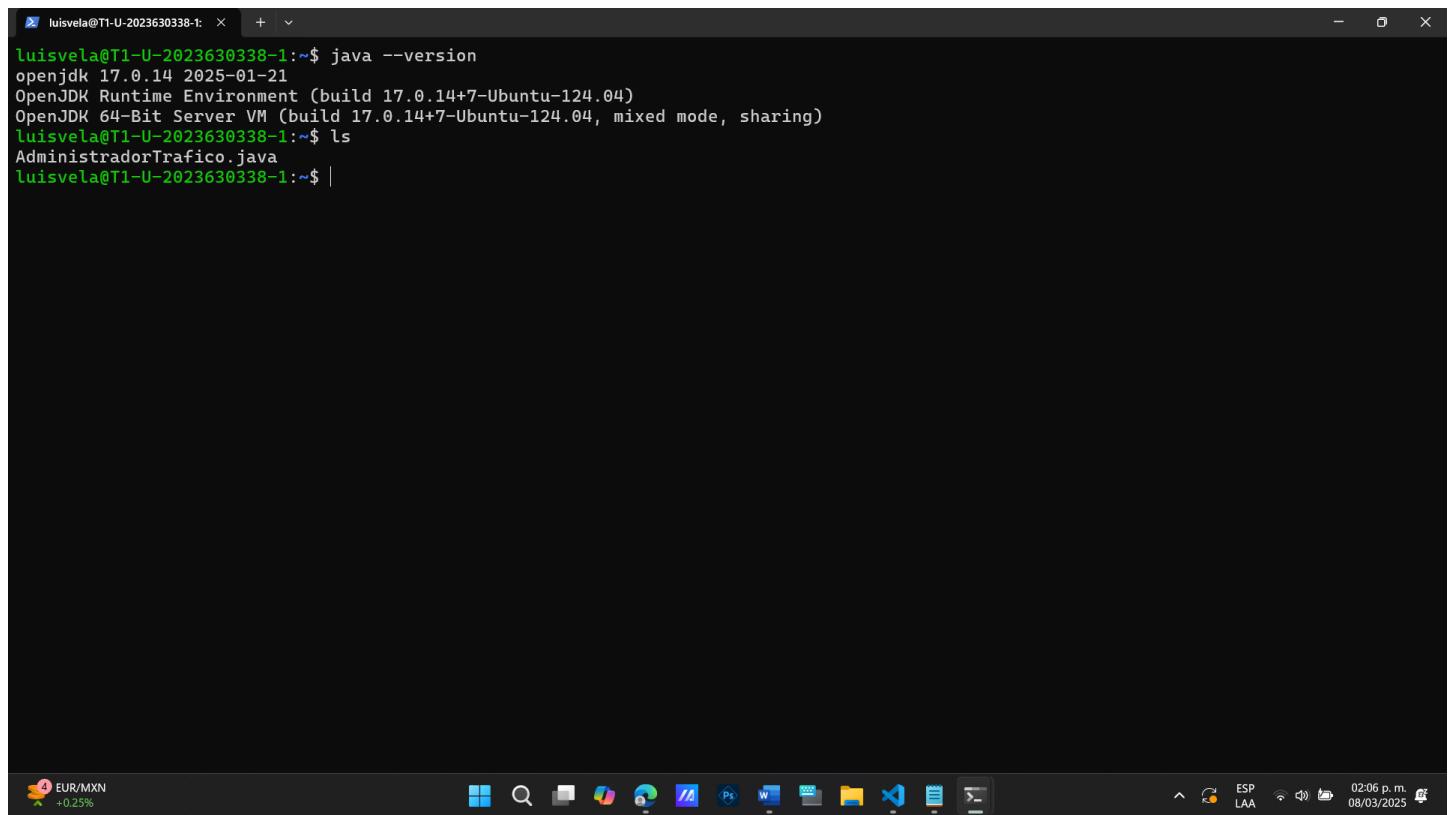
- Para la primera máquina virtual, nos conectamos con SFTP para mandar el AdministradorTrafico.java de la maquina local a la VM.



```
PS C:\Users\Luis Velasco\OneDrive\Documentos\6to semestre\Sistemas Distribuidos\Tarea1> sftp luisvela@128.85.128.169
luisvela@128.85.128.169's password:
Connected to 128.85.128.169.
sftp> put AdministradorTrafico.java
Uploading AdministradorTrafico.java to /home/luisvela/AdministradorTrafico.java
AdministradorTrafico.java
s 00:00
sftp> |
```

The screenshot shows a Windows PowerShell window titled "Windows PowerShell". The command `sftp luisvela@128.85.128.169` is run, followed by `put AdministradorTrafico.java`. The file is uploaded to the "/home/luisvela/" directory on the remote host. The progress bar indicates 100% completion at 40.9KB/s. The taskbar at the bottom shows various icons for Windows applications like File Explorer, Word, and Excel.

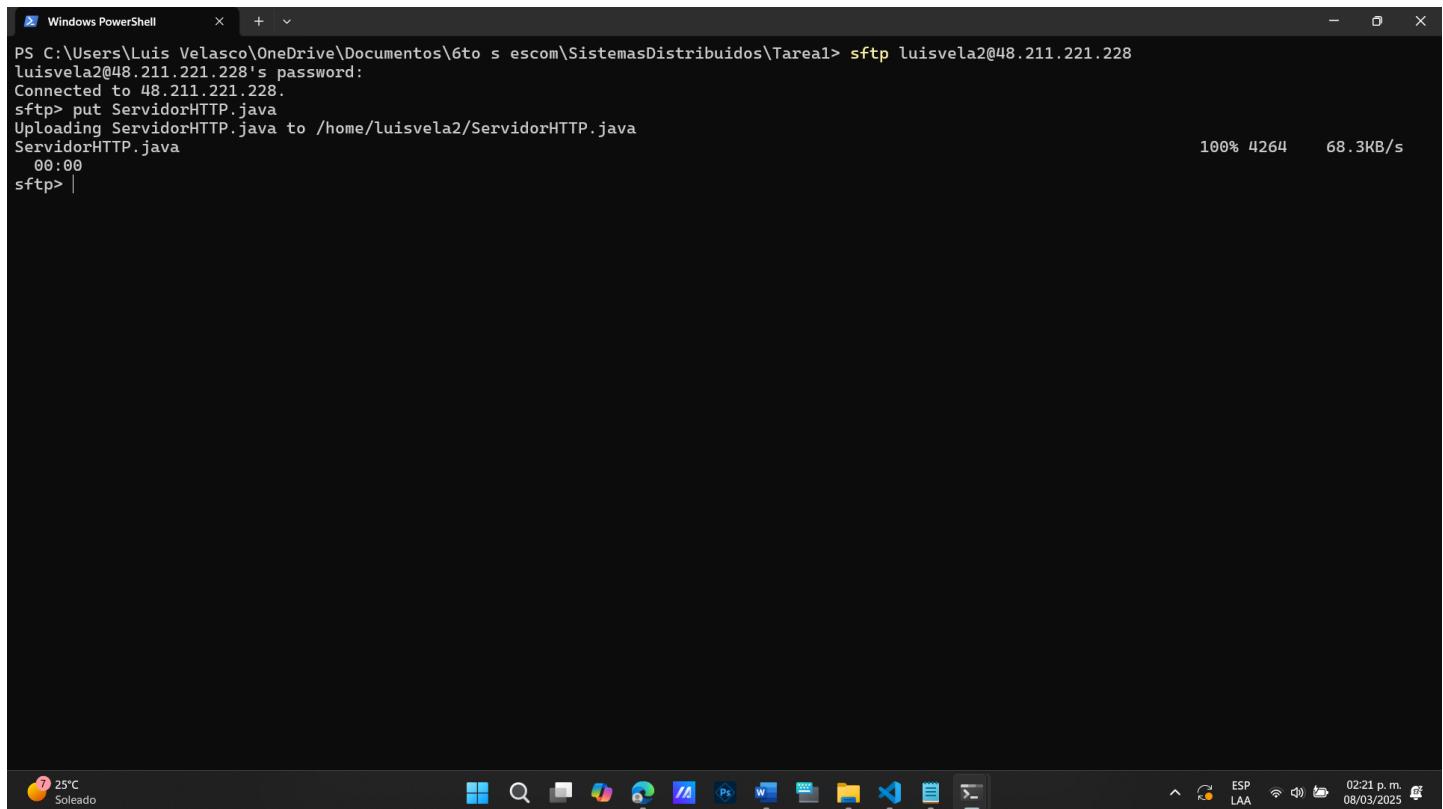
- Comprobando que el AdministradorTrafico.java llego, listándolo los archivos con el comando ls



```
luisvela@T1-U-2023630338-1:~$ java --version
openjdk 17.0.14 2025-01-21
OpenJDK Runtime Environment (build 17.0.14+7-Ubuntu-124.04)
OpenJDK 64-Bit Server VM (build 17.0.14+7-Ubuntu-124.04, mixed mode, sharing)
luisvela@T1-U-2023630338-1:~$ ls
AdministradorTrafico.java
luisvela@T1-U-2023630338-1:~$ |
```

The screenshot shows a Linux terminal window titled "luisvela@T1-U-2023630338-1:~\$". It first runs the `java --version` command to check the Java version. Then it runs the `ls` command, which lists the file "AdministradorTrafico.java" in the current directory. The taskbar at the bottom shows various icons for Linux applications like File Explorer, Word, and Excel.

- Para la **segunda máquina virtual**, nos conectamos con SFTP para mandar el ServidorHTTP.java de la maquina local a la VM

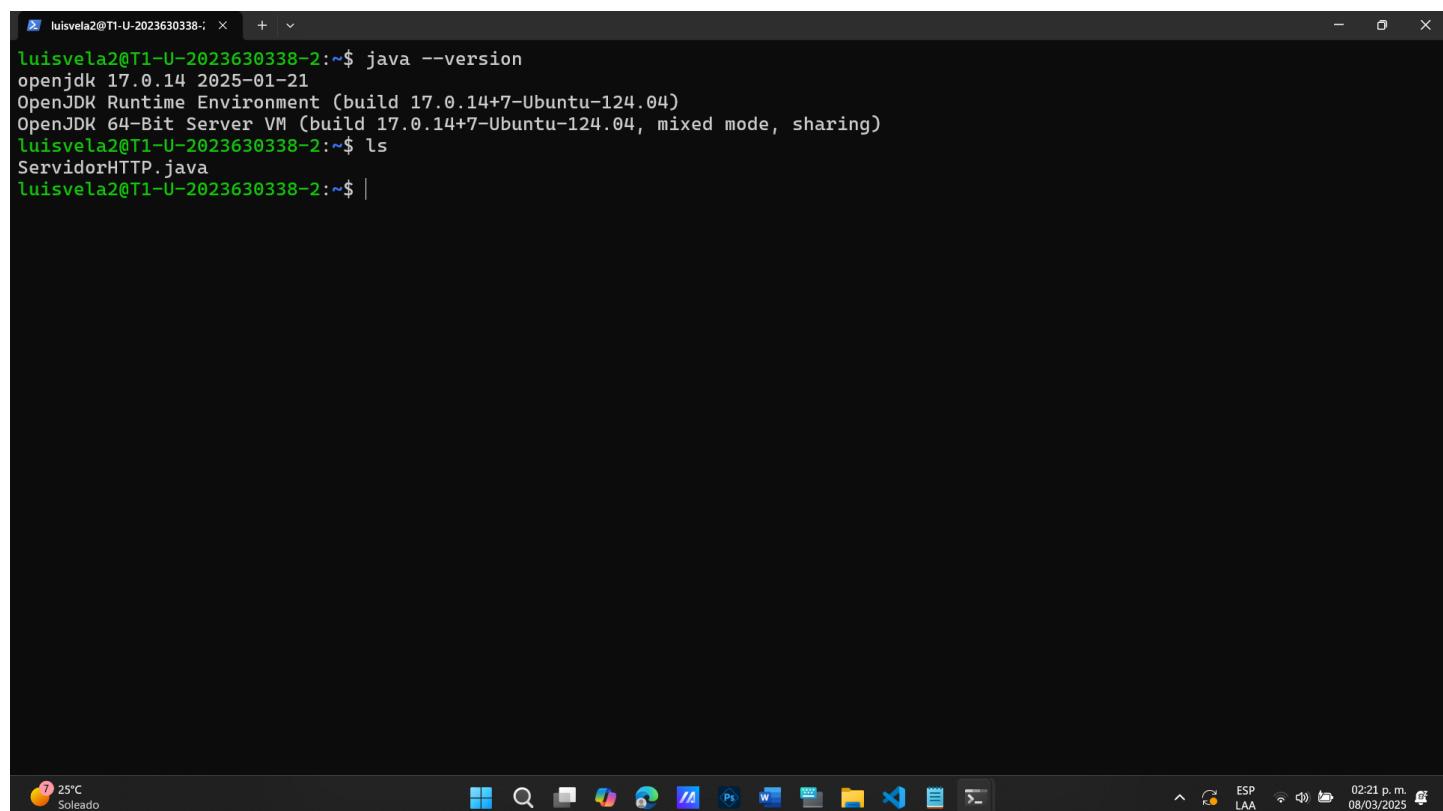


```
Windows PowerShell

PS C:\Users\Luis Velasco\OneDrive\Documentos\6to semestre\escom\SistemasDistribuidos\Tarea1> sftp luisvela2@48.211.221.228
luisvela2@48.211.221.228's password:
Connected to 48.211.221.228.
sftp> put ServidorHTTP.java
Uploading ServidorHTTP.java to /home/luisvela2/ServidorHTTP.java
ServidorHTTP.java
 00:00          100% 4264   68.3KB/s
sftp> |
```

The screenshot shows a Windows PowerShell window titled "Windows PowerShell". The command `sftp luisvela2@48.211.221.228` is run, followed by `put ServidorHTTP.java`. The progress bar indicates the upload is at 100% completion with a speed of 68.3KB/s. The status bar at the bottom shows system icons like battery level, signal strength, and date/time.

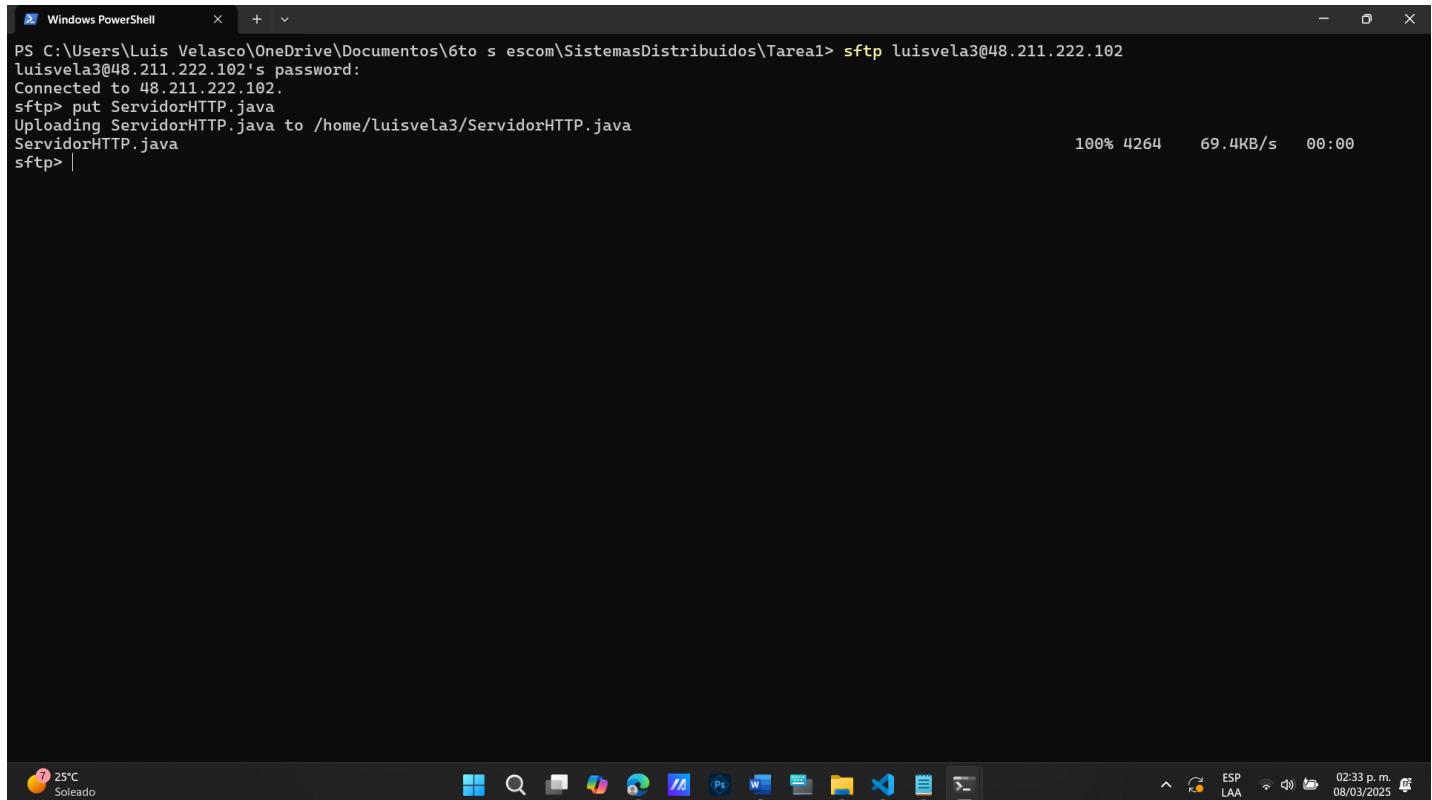
- Comprobando que el ServidorHTTP.java llego, listándolo los archivos con el comando ls



```
luisvela2@T1-U-2023630338-2:~$ java --version
openjdk 17.0.14 2025-01-21
OpenJDK Runtime Environment (build 17.0.14+7-Ubuntu-124.04)
OpenJDK 64-Bit Server VM (build 17.0.14+7-Ubuntu-124.04, mixed mode, sharing)
luisvela2@T1-U-2023630338-2:~$ ls
ServidorHTTP.java
luisvela2@T1-U-2023630338-2:~$ |
```

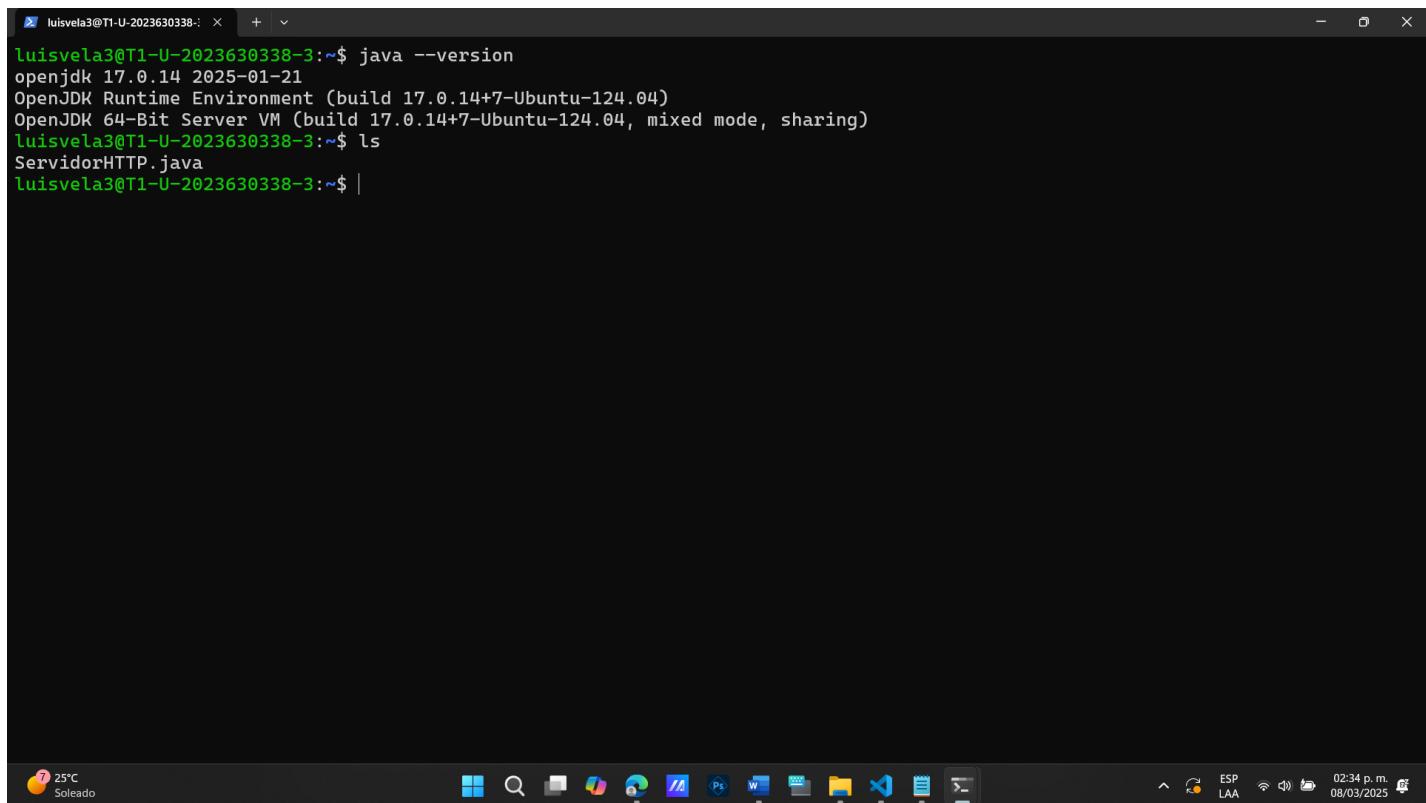
The screenshot shows a Linux terminal window titled "luisvela2@T1-U-2023630338-2:~\$". The user runs `java --version` and `ls` to list files. The output shows the Java version and the presence of the "ServidorHTTP.java" file. The status bar at the bottom shows system icons and the date/time.

- Para la **tercera máquina virtual**, nos conectamos con SFTP para mandar el ServidorHTTP.java de la maquina local a la VM



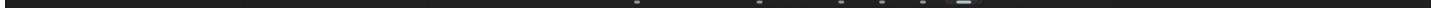
```
PS C:\Users\Luis Velasco\OneDrive\Documentos\6to s escom\SistemasDistribuidos\Tarea1> sftp luisvela3@48.211.222.102
luisvela3@48.211.222.102's password:
Connected to 48.211.222.102.
sftp> put ServidorHTTP.java
Uploading ServidorHTTP.java to /home/luisvela3/ServidorHTTP.java
ServidorHTTP.java                                         100% 4264      69.4KB/s   00:00
sftp> |
```

- Comprobando que el ServidorHTTP.java llego, listándolo los archivos con el comando ls



```
luisvela3@T1-U-2023630338-3:~$ java --version
openjdk 17.0.14 2025-01-21
OpenJDK Runtime Environment (build 17.0.14+7-Ubuntu-124.04)
OpenJDK 64-Bit Server VM (build 17.0.14+7-Ubuntu-124.04, mixed mode, sharing)
luisvela3@T1-U-2023630338-3:~$ ls
ServidorHTTP.java
luisvela3@T1-U-2023630338-3:~$ |
```

7. Ejecutar el programa ServidorHTTP.java en la segunda máquina virtual y en la tercera máquina virtual.



```
luisvela2@T1-U-2023630338-2:~$ ls
ServidorHTTP.java
luisvela2@T1-U-2023630338-2:~$ javac ServidorHTTP.java
luisvela2@T1-U-2023630338-2:~$ ls
'ServidorHTTP$Worker.class'  ServidorHTTP.java
  ServidorHTTP.class
luisvela2@T1-U-2023630338-2:~$ java ServidorHTTP
Servidor 1 HTTP en el puerto 8080

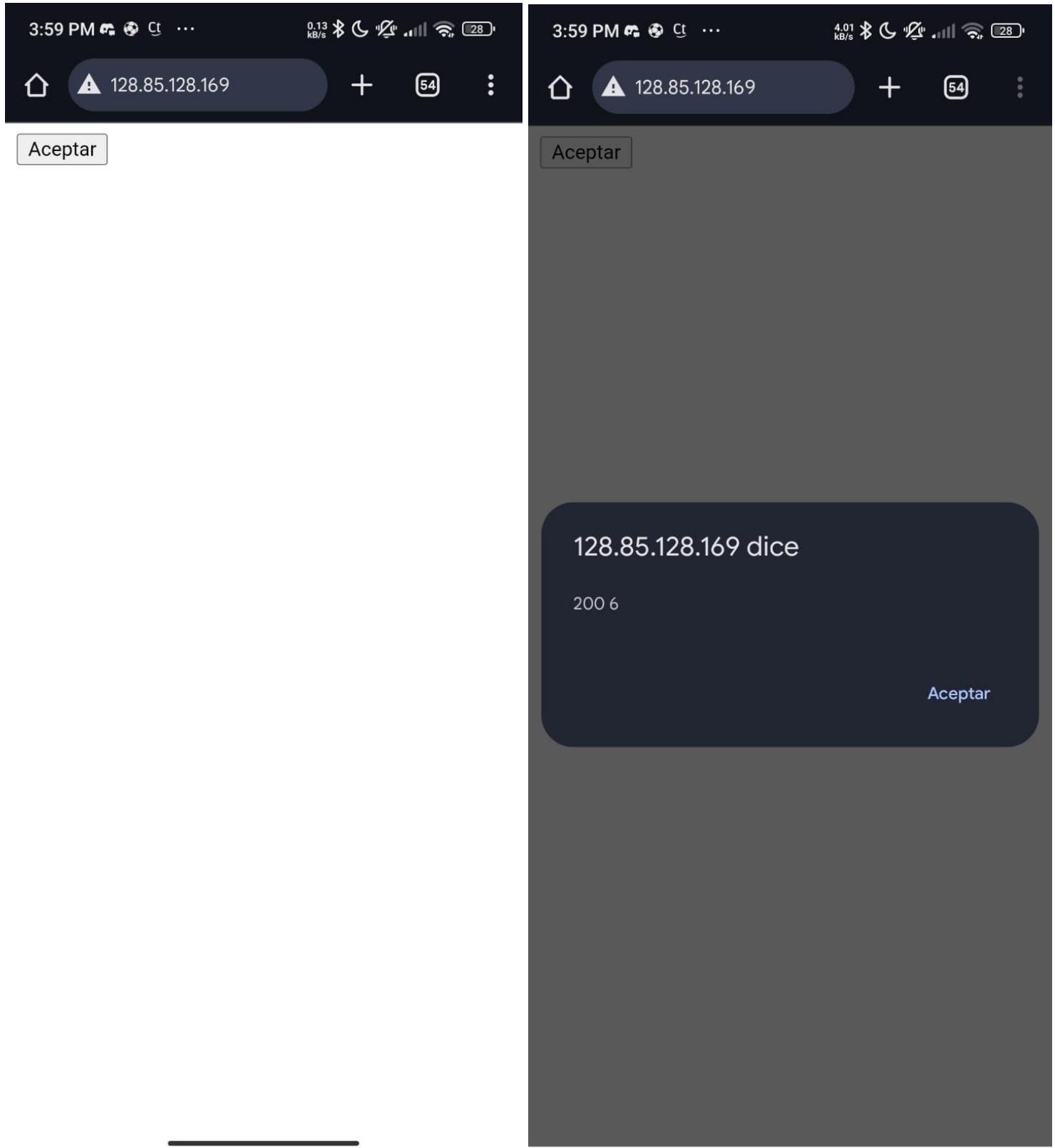
luisvela3@T1-U-2023630338-3:~$ ls
ServidorHTTP.java
luisvela3@T1-U-2023630338-3:~$ javac ServidorHTTP.java
luisvela3@T1-U-2023630338-3:~$ ls
'ServidorHTTP$Worker.class'  ServidorHTTP.java
  ServidorHTTP.class
luisvela3@T1-U-2023630338-3:~$ java ServidorHTTP
Servidor 2 HTTP en el puerto 8080
```

- Ejecutando el AdministradorTrafico.java en la primera máquina virtual.



```
luisvela@T1-U-2023630338-1:~$ javac AdministradorTrafico.java
luisvela@T1-U-2023630338-1:~$ java AdministradorTrafico 8080 48.211.221.228 8080 48.211.222.102 8080
Proxy en puerto: 8080
Servidor-1 en 48.211.221.228:8080
Servidor-2 en 48.211.222.102:8080
```

8. Ingresando la URL <http://128.85.128.169>, donde el dominio es la IP pública de la primera máquina virtual en donde se ejecutó el AdministradorTráfico.java.



- Así se ven las consolas de los servidores remotos 1 y 2:

```

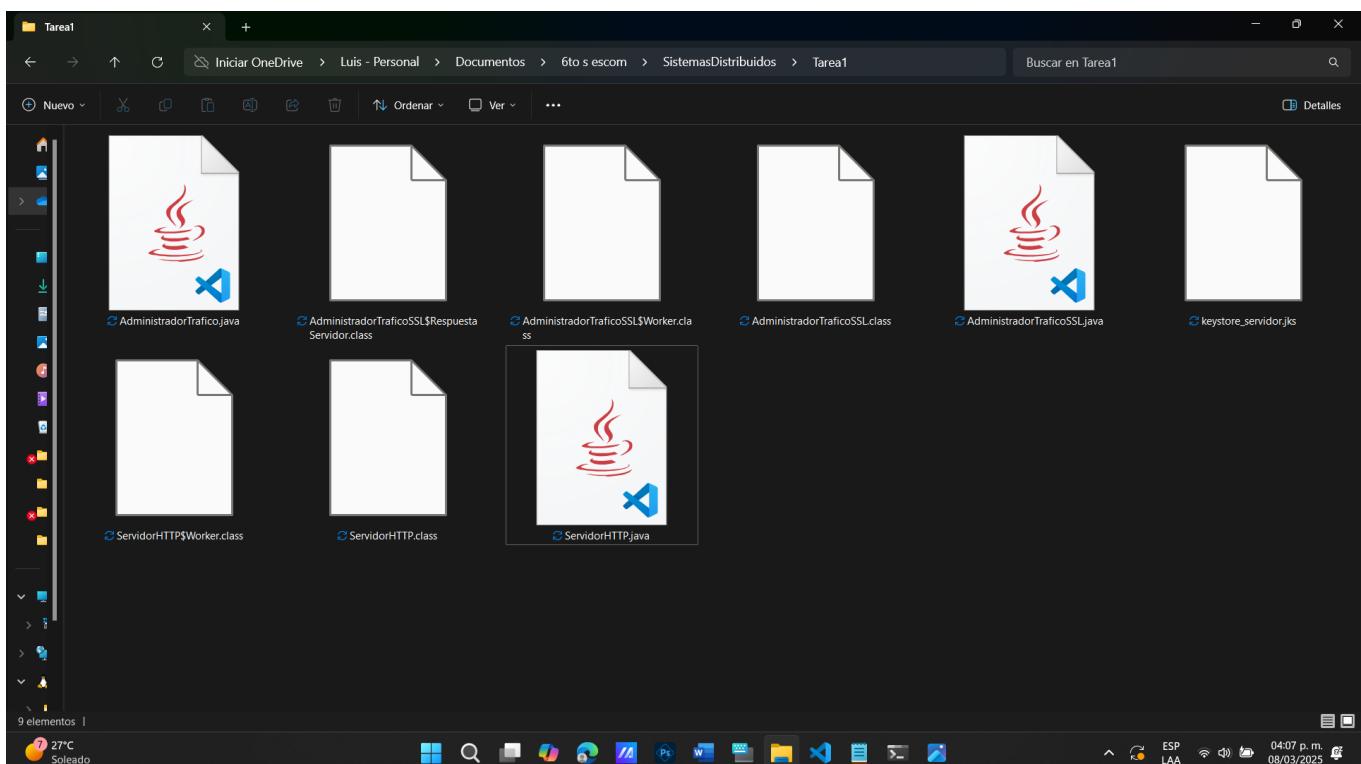
luisvela2@TI-U-2023630338-2:~$ java ServidorHTTP
Servidor 1 HTTP en el puerto 8080
Petición: GET / HTTP/1.1
Encabezado: Host: 128.85.128.169
Encabezado: Connection: keep-alive
Encabezado: Upgrade-Insecure-Requests: 1
Encabezado: User-Agent: Mozilla/5.0 (Linux; Android 10; K) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/133.0.0.0 Mobile Safari/537.36
Encabezado: Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.7
Encabezado: Accept-Encoding: gzip, deflate
Encabezado: Accept-Language: es-US,es-419;q=0.9,es;q=0.8,en;q=0.7
Encabezado:
Petición: GET /favicon.ico HTTP/1.1
Encabezado: Host: 128.85.128.169
Encabezado: Connection: keep-alive
Encabezado: User-Agent: Mozilla/5.0 (Linux; Android 10; K) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/133.0.0.0 Mobile Safari/537.36
Encabezado: Accept: image/avif,image/webp,image/apng,image/svg+xml,image/*,*/*;q=0.8
Encabezado: Referer: http://128.85.128.169/
Encabezado: Accept-Encoding: gzip, deflate
Encabezado: Accept-Language: es-US,es-419;q=0.9,es;q=0.8,en;q=0.7
Encabezado:
Petición: GET /suma?a=1&b=2&c=3 HTTP/1.1
Encabezado: Host: 128.85.128.169
Encabezado: Connection: keep-alive
Encabezado: User-Agent: Mozilla/5.0 (Linux; Android 10; K) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/133.0.0.0 Mobile Safari/537.36
Encabezado: Accept: */*
Encabezado: Referer: http://128.85.128.169/
Encabezado: Accept-Encoding: gzip, deflate
Encabezado: Accept-Language: es-US,es-419;q=0.9,es;q=0.8,en;q=0.7
Encabezado:
Petición: GET / HTTP/1.1
Encabezado: User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/90.0.4430.85 Safari/537.36 Edg/90.0.818.46
Encabezado: Accept-Encoding: gzip, deflate
Encabezado: Accept: */*

```

luisvela3@TI-U-2023630338-3:~\$ java ServidorHTTP
Servidor 2 HTTP en el puerto 8080
Petición: GET / HTTP/1.0
Encabezado: User-Agent: Expans, a Palo Alto Networks company, searches across the global IPv4 space multiple times per day to identify customers' presences on the Internet. If you would like to be excluded from our scans, please send IP addresses/domains to: scaninfo@paloaltonetworks.com
Encabezado: Accept: */
Encabezado:
Petición: GET / HTTP/1.1
Encabezado: Host: 128.85.128.169
Encabezado: Connection: keep-alive
Encabezado: Upgrade-Insecure-Requests: 1
Encabezado: User-Agent: Mozilla/5.0 (Linux; Android 10; K) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/133.0.0.0 Mobile Safari/537.36
Encabezado: Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,*/*;q=0.8,application/signed-exchange;v=b3;q=0.7
Encabezado: Accept-Encoding: gzip, deflate
Encabezado: Accept-Language: es-US,es-419;q=0.9,es;q=0.8,en;q=0.7
Encabezado:
Petición: GET /favicon.ico HTTP/1.1
Encabezado: Host: 128.85.128.169
Encabezado: Connection: keep-alive
Encabezado: User-Agent: Mozilla/5.0 (Linux; Android 10; K) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/133.0.0.0 Mobile Safari/537.36
Encabezado: Accept: image/avif,image/webp,image/apng,image/svg+xml,image/*,*/*;q=0.8
Encabezado: Referer: http://128.85.128.169/
Encabezado: Accept-Encoding: gzip, deflate
Encabezado: Accept-Language: es-US,es-419;q=0.9,es;q=0.8,en;q=0.7
Encabezado:
Petición: GET /suma?a=1&b=2&c=3 HTTP/1.1
Encabezado: Host: 128.85.128.169
Encabezado: Connection: keep-alive
Encabezado: User-Agent: Mozilla/5.0 (Linux; Android 10; K) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/133.0.0.0 Mobile Safari/537.36
Encabezado: Accept: */*
Encabezado: Referer: http://128.85.128.169/
Encabezado: Accept-Encoding: gzip, deflate
Encabezado: Accept-Language: es-US,es-419;q=0.9,es;q=0.8,en;q=0.7
Encabezado:

9. Crear en la primera máquina virtual un keystore.

- Anteriormente, en mi máquina local yo ya había creado un keystore, el cual fue nombrado "keystore_servidor.jks"



- Lo recomendable es conectarme a la máquina virtual por SFTP y mandarle el archivo, que ya está en mi máquina local.

The screenshot shows a Windows desktop with two terminal windows side-by-side. The left terminal window is a Windows PowerShell session. It starts with the command `sftp luisvela@128.85.128.169`, followed by entering a password. Then, it lists files from a local directory and transfers them to a remote location via SFTP. The right terminal window is a Linux session on a machine named `T1-U-2023630338-1`. It shows the results of a `ls` command, listing several Java class files and a keystore file. The desktop taskbar at the bottom includes icons for File Explorer, Task View, Start, Search, Edge, File Explorer, Power, Task Manager, File Explorer, and Visual Studio Code. System tray icons show the date (08/03/2025), time (04:19 p.m.), battery level (ESP LAA), and signal strength.

```

Windows PowerShell
PS C:\Users\luis Velasco\OneDrive\Documentos\6to semestre\SistemasDistribuidos\tarea1> sftp luisvela@128.85.128.169
luisvela@128.85.128.169's password:
Connected to 128.85.128.169.
sftp> put keystore_servidor.jks
Uploading Keystore_servidor.jks to /home/luisvela/keystore_servidor.jks
keystore_servidor.jks                                100% 2772   48.3KB/s  00:00
sftp> put AdministradorTraficoSSL.java
Uploading AdministradorTraficoSSL.java to /home/luisvela/AdministradorTraficoSSL.java
AdministradorTraficoSSL.java                         100% 3834   69.3KB/s  00:00
sftp>
luisvela@T1-U-2023630338-1:~$ ls
'AdministradorTrafico$RespuestaServidor.class'
'AdministradorTrafico$Worker.class'
AdministradorTrafico.class
AdministradorTrafico.java
AdministradorTraficoSSL.java
keystore_servidor.jks
luisvela@T1-U-2023630338-1:~$ |

```

10. Modificar el servidor del proxy en el programa `AdministradorTrafico.java` para que utilice sockets seguros. El nuevo programa se llamará `AdministradorTraficoSSL.java`. Este programa deberá usar el keystore creado anteriormente y deberá usar el puerto 8443.

- En este punto, el programa fue modificado tal como se indica, el código será proporcionado en los documentos subidos en la tarea y en la conversación con la IA ChatGPT.

11. Ejecutar el programa AdministradorTraficoSSL.java en la primera máquina virtual.

```
luisvela@T1-U-2023630338-1:~$ javac AdministradorTraficoSSL.java
luisvela@T1-U-2023630338-1:~$ java AdministradorTraficoSSL 8443 48.211.221.228 8080 48.211.222.102 8080
Servidor HTTPS seguro ejecutando en el puerto: 8443

luisvela2@T1-U-2023630338-2:~$ java ServidorHTTP
Servidor 1 HTTP en el puerto 8080

luisvela3@T1-U-2023630338-3:~$ java ServidorHTTP
Servidor 2 HTTP en el puerto 8080
```

12. Ingresar la URL <https://128.85.128.169>, donde el dominio es la IP pública de la primera máquina virtual.

4:35 PM Ct ⚽ ...

0.17 kB/s ⚡ ⚪ 🔍 25°



https://128.85.128.169



54



4:36 PM Ct ⚽ ...

48.6 kB/s ⚡ ⚪ 🔍 25°



https://128.85.128.169



54



Aceptar



La conexión no es privada

Es posible que un atacante esté intentando robarte la información de **128.85.128.169** (por ejemplo, contraseñas, mensajes o tarjetas de crédito). [Obtén más información sobre esta advertencia](#)

NET::ERR_CERT_AUTHORITY_INVALID



[Activa la protección mejorada](#) para obtener el nivel más alto de seguridad de Chrome

Volver a un sitio seguro

Opciones avanzadas

4:36 PM Ct ...

48.6 kB/s ⚡ ⚡ 25%



https://128.85.128.169



54



Aceptar

- Así se ven las consolas de los servidores remotos 1 y 2.

```
luisvela2@T1-U-2023630338-2:~$ java ServidorHTTP
Servidor 1 HTTP en el puerto 8080
Petición: GET / HTTP/1.1
Encabezado: Host: 128.85.128.169
Encabezado: Connection: keep-alive
Encabezado: Cache-Control: max-age=0
Encabezado: sec-ch-ua: "Not(A:Brand";v="99", "Google Chrome";v="133", "Chromium";v="133"
Encabezado: sec-ch-ua-mobile: ?1
Encabezado: sec-ch-ua-platform: "Android"
Encabezado: Upgrade-Insecure-Requests: 1
Encabezado: User-Agent: Mozilla/5.0 (Linux; Android 10; K) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/133.0.0.0 Mobile Safari/537.36
Encabezado: Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.7
Encabezado: Sec-Fetch-Site: none
Encabezado: Sec-Fetch-Mode: navigate
Encabezado: Sec-Fetch-User: ?1
Encabezado: Sec-Fetch-Dest: document
Encabezado: Accept-Encoding: gzip, deflate, br, zstd
Encabezado: Accept-Language: es-US,es-419;q=0.9,es;q=0.8,en;q=0.7
Encabezado:
Petición: GET /favicon.ico HTTP/1.1
Encabezado: Host: 128.85.128.169
Encabezado: Connection: keep-alive
Encabezado: sec-ch-ua-platform: "Android"
Encabezado: User-Agent: Mozilla/5.0 (Linux; Android 10; K) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/133.0.0.0 Mobile Safari/537.36
Encabezado: sec-ch-ua: "Not(A:Brand";v="99", "Google Chrome";v="133", "Chromium";v="133"
Encabezado: sec-ch-ua-mobile: ?1
Encabezado: Accept: image/avif,image/webp,image/apng,image/svg+xml,image/*,*/*;q=0.8
Encabezado: Sec-Fetch-Site: same-origin
Encabezado: Sec-Fetch-Mode: no-cors
Encabezado: Sec-Fetch-Dest: image
Encabezado: Referer: https://128.85.128.169/
Encabezado: Accept-Encoding: gzip, deflate, br, zstd
Encabezado: Accept-Language: es-US,es-419;q=0.9,es;q=0.8,en;q=0.7
Encabezado:
Petición: GET / HTTP/1.1
Encabezado: Host: 128.85.128.169
Encabezado: Connection: keep-alive
Encabezado: sec-ch-ua: "Not(A:Brand";v="99", "Google Chrome";v="133", "Chromium";v="133"
luisvela3@T1-U-2023630338-3:~$ java ServidorHTTP
Servidor 2 HTTP en el puerto 8080
Petición: GET / HTTP/1.1
Encabezado: Host: 128.85.128.169
Encabezado: Connection: keep-alive
Encabezado: Cache-Control: max-age=0
Encabezado: sec-ch-ua: "Not(A:Brand";v="99", "Google Chrome";v="133", "Chromium";v="133"
Encabezado: sec-ch-ua-mobile: ?1
Encabezado: sec-ch-ua-platform: "Android"
Encabezado: Upgrade-Insecure-Requests: 1
Encabezado: User-Agent: Mozilla/5.0 (Linux; Android 10; K) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/133.0.0.0 Mobile Safari/537.36
Encabezado: Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.7
Encabezado: Sec-Fetch-Site: none
Encabezado: Sec-Fetch-Mode: navigate
Encabezado: Sec-Fetch-User: ?1
Encabezado: Sec-Fetch-Dest: document
Encabezado: Accept-Encoding: gzip, deflate, br, zstd
Encabezado: Accept-Language: es-US,es-419;q=0.9,es;q=0.8,en;q=0.7
Encabezado:
Petición: GET /favicon.ico HTTP/1.1
Encabezado: Host: 128.85.128.169
Encabezado: Connection: keep-alive
Encabezado: sec-ch-ua-platform: "Android"
Encabezado: User-Agent: Mozilla/5.0 (Linux; Android 10; K) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/133.0.0.0 Mobile Safari/537.36
Encabezado: sec-ch-ua: "Not(A:Brand";v="99", "Google Chrome";v="133", "Chromium";v="133"
Encabezado: sec-ch-ua-mobile: ?1
Encabezado: Accept: image/avif,image/webp,image/apng,image/svg+xml,image/*,*/*;q=0.8
Encabezado: Sec-Fetch-Site: same-origin
Encabezado: Sec-Fetch-Mode: no-cors
Encabezado: Sec-Fetch-Dest: image
Encabezado: Referer: https://128.85.128.169/
Encabezado: Accept-Encoding: gzip, deflate, br, zstd
Encabezado: Accept-Language: es-US,es-419;q=0.9,es;q=0.8,en;q=0.7
Encabezado:
Petición: GET / HTTP/1.1
Encabezado: Host: 128.85.128.169
Encabezado: Connection: keep-alive
Encabezado: sec-ch-ua: "Not(A:Brand";v="99", "Google Chrome";v="133", "Chromium";v="133"
Encabezado: sec-ch-ua-mobile: ?1
Encabezado: sec-ch-ua-platform: "Android"
Encabezado: Upgrade-Insecure-Requests: 1
Encabezado: User-Agent: Mozilla/5.0 (Linux; Android 10; K) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/133.0.0.0 Mobile Safari/537.36
Encabezado: Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.7
Encabezado: Sec-Fetch-Site: none
```

13. Eliminar la primera máquina virtual:

Microsoft Azure

Search resources, services, and docs (G+)

All resources

Instituto Politécnico Nacional (correo.ipn.mx)

Create Manage view Refresh Export to CSV Open query Assign tags Delete

Filter for any field... Subscription equals all Resource group equals all Type equals all Location equals all Add filter

Unsecure resources Recommendations 19 Changed resources

Name ↑	Type ↑	Resource group ↑
NetworkWatcher_eastus2	Network Watcher	NetworkWatcherRG
NetworkWatcher_mexicentral	Network Watcher	NetworkWatcherRG
T1-U-2023630338-1_OsDisk_1_28d085aa807e4bc6b6be79de4f4eb13d	Disk	T1-U-2023630338-1_GROUP
T1-U-2023630338-2_OsDisk_1_b568824c9fe24c3f839fea8dee26ee1f	Disk	T1-U-2023630338-1_GROUP_03081259
T1-U-2023630338-1	Virtual machine	T1-U-2023630338-1_group
t1-u-2023630338-1890_z1	Network Interface	T1-U-2023630338-1_group
T1-U-2023630338-1-nsg	Network security group	T1-U-2023630338-1_group
T1-U-2023630338-1-ip	Public IP address	T1-U-2023630338-1_group
T1-U-2023630338-1-vnet	Virtual network	T1-U-2023630338-1_group
T1-U-2023630338-2	Virtual machine	T1-U-2023630338-1_group_03081259
t1-u-2023630338-2518_z1	Network Interface	T1-U-2023630338-1_group_03081259
T1-U-2023630338-2-nsg	Network security group	T1-U-2023630338-1_group_03081259
T1-U-2023630338-2-ip	Public IP address	T1-U-2023630338-1_group_03081259
T1-U-2023630338-2-vnet	Virtual network	T1-U-2023630338-1_group_03081259

< Previous Page 1 of 1 Next > Showing 1 to 22 of 22 records.

Delete Resources

The selected resources along with their related resources and contents will be permanently deleted. If you are unsure of the selected resource dependencies, navigate to the individual resource page to perform the delete operation. More details of the resource dependencies are available in the manage experience.

Resources to be deleted (5)

Name	Resource type
T1-U-2023630338-1	Virtual machine
T1-U-2023630338-1_OsDisk_1_28d085aa807e4bc6b6be79de4f4eb13d	Disk
t1-u-2023630338-1890_z1	Network Interface
T1-U-2023630338-1-nsg	Network security group
T1-U-2023630338-1-ip	Public IP address

Apply force delete for selected Virtual machines and Virtual machine scale sets

Enter "delete" to confirm deletion *

delete

Delete Cancel

27°C Soleado

ESP LAA 04:46 p. m. 08/03/2025

Ejecución del administrador de tráfico en Windows

- Crear una máquina virtual con Windows Server 2016 B2s con 4 GB de RAM, 2CPU y disco HDD con 127 GB.
- En la siguiente imagen se puede ver la configuración de especificaciones básicas, como el nombre requerido "T1-W-2023630338-1", la imagen del SO, el tipo de seguridad, etc.

The screenshot shows the 'Create a virtual machine' wizard in Microsoft Azure. The 'Instance details' step is selected. Key configuration options shown include:

- Virtual machine name:** T1-W-2023630338-1
- Region:** (US) East US 2
- Availability options:** Availability zone
- Zone options:** Self-selected zone (selected), choosing up to 3 availability zones, one VM per zone.
- Availability zone:** Zone 1
- Security type:** Standard
- Image:** Windows Server 2016 Datacenter - x64 Gen2

At the bottom, there are navigation buttons: < Previous, Next : Disks >, Review + create, and Give feedback. The taskbar at the bottom shows various pinned icons and the date/time: 05:08 p.m. 08/03/2025.

- En la siguiente imagen se ve la configuración del disco.

The screenshot shows the 'Create a virtual machine' wizard in Microsoft Azure, specifically the 'Review + create' step. The 'Data disks for T1-W-2023630338-1' section is visible. Key configuration options shown include:

- OS disk:** Image default (127 GiB), Standard HDD (locally-redundant storage)
- Encryption at host:** (unchecked) with a note: "Encryption at host is not registered for the selected subscription." (Learn more)
- Delete with VM:** (checked)
- Key management:** Platform-managed key
- Enable Ultra Disk compatibility:** (unchecked)

Below this, there's a table for 'Data disks' with columns: LUN, Name, Size (GiB), Disk type, Host caching, and Delete with VM. Buttons at the bottom include Create and attach a new disk, Attach an existing disk, < Previous, Next : Networking >, and Review + create. The taskbar at the bottom shows various pinned icons and the date/time: 05:09 p.m. 08/03/2025.

- En la siguiente imagen se ve la configuración de red.

The screenshot shows the 'Create a virtual machine' wizard in the Microsoft Azure portal. The current step is 'Network interface'. The configuration includes:

- Virtual network ***: (new) T1-W-202363038-1-vnet
- Subnet ***: (new) default (10.3.0.0/24)
- Public IP ***: (new) T1-W-202363038-1-ip
- NIC network security group**: Basic (selected)
- Public inbound ports ***: Allow selected ports (selected)
- Select inbound ports**: RDP (3389)

A warning message is displayed: **⚠ This will allow all IP addresses to access your virtual machine.** This is only recommended for testing. Use the Advanced controls in the Networking tab to create rules to limit inbound traffic to known IP addresses.

At the bottom, there are buttons for 'Delete public IP and NIC when VM is deallocated' (unchecked), '< Previous' and 'Next : Management >', and a 'Review + create' button.

- En la siguiente imagen, se muestra la configuración de administración, a la cual no le movimos nada.

The screenshot shows the 'Create a virtual machine' wizard in the Microsoft Azure portal. The current step is 'Administration'. The configuration includes:

- Identity**: Enable system assigned managed identity (unchecked)
- Microsoft Entra ID**: Login with Microsoft Entra ID (unchecked)
 - RBAC role assignment of Virtual Machine Administrator Login or Virtual Machine User Login is required when using Microsoft Entra ID login. [Learn more](#)
- Auto-shutdown**: Enable auto-shutdown (unchecked)
- Backup**: Enable backup (unchecked)

A warning message is displayed: **⚠ This image does not support Login with Microsoft Entra ID.**

Information about Microsoft Entra ID login: Microsoft Entra ID login now uses SSH certificate-based authentication. You will need to use an SSH client that supports OpenSSH certificates. You can use Azure CLI or Cloud Shell from the Azure Portal. [Learn more](#)

At the bottom, there are buttons for '< Previous' and 'Next : Monitoring >', and a 'Review + create' button.

- En la siguiente imagen, vemos la configuración de monitoreo a la cual le desactivamos el diagnóstico de arranque.

The screenshot shows the 'Monitoring' tab of the Azure VM creation wizard. Under 'Diagnostics', the 'Boot diagnostics' section has the 'Disable' option selected. Other sections like 'Health' and 'Logs' are also visible.

Monitoring

Configure monitoring options for your VM.

Alerts
Enable recommended alert rules

Diagnostics

Boot diagnostics Enable with managed storage account (recommended) Enable with custom storage account Disable

Enable OS guest diagnostics

Health
Enable application health monitoring

< Previous Next : Advanced > Review + create Give feedback

- En las siguientes imágenes veremos la configuración que establecimos, antes de crear la VM.

The screenshot shows the 'Basics' section of the Azure VM creation wizard. Validation has passed, and the configuration includes:

- Subscription: Azure for Students (new) T1-W-2023630338-1_group
- Resource group: T1-W-2023630338-1
- Virtual machine name: T1-W-2023630338-1
- Region: East US 2
- Availability options: Availability zone
- Zone options: Self-selected zone
- Availability zone: 1
- Security type: Standard
- Image: Windows Server 2016 Datacenter - Gen2
- VM architecture: x64
- Size: Standard B2s (2 vcpus, 4 GiB memory)
- Enable Hibernation: No
- Username: luisWin
- Public inbound ports: RDP
- Already have a Windows license?: No
- Azure Spot: No

Basics

Subscription	Azure for Students
Resource group	(new) T1-W-2023630338-1_group
Virtual machine name	T1-W-2023630338-1
Region	East US 2
Availability options	Availability zone
Zone options	Self-selected zone
Availability zone	1
Security type	Standard
Image	Windows Server 2016 Datacenter - Gen2
VM architecture	x64
Size	Standard B2s (2 vcpus, 4 GiB memory)
Enable Hibernation	No
Username	luisWin
Public inbound ports	RDP
Already have a Windows license?	No
Azure Spot	No

Disks

OS disk size	Image default
OS disk type	Standard HDD LRS

< Previous Next > Create Download a template for automation Give feedback

Create a virtual machine - Microsoft Azure

https://portal.azure.com/#create/Microsoft.VirtualMachine-ARM

Microsoft Azure

Validation passed

Help me create a low cost VM | Help me create a VM optimized for high availability | Help me choose the right VM size for my workload

Disk

OS disk size	Image default
OS disk type	Standard HDD LRS
Use managed disks	Yes
Delete OS disk with VM	Enabled
Ephemeral OS disk	No

Networking

Virtual network	(new) T1-W-2023630338-1-vnet
Subnet	(new) default (10.3.0.0/24)
Public IP	(new) T1-W-2023630338-1-ip
Accelerated networking	Off
Place this virtual machine behind an existing load balancing solution?	No
Delete public IP and NIC when VM is deleted	Disabled

Management

Microsoft Defender for Cloud	Basic (free)
System assigned managed identity	Off
Login with Microsoft Entra ID	Off

< Previous | Next > | Create | Download a template for automation | Give feedback

27°C Soleado | Windows Taskbar | 05:00 p.m. 08/03/2025

2. Abrir en la máquina virtual los puertos 80 y 443.

T1-W-2023630338-1 - Microsoft Azure

https://portal.azure.com/#@correo.ipn.mx/resource/subscriptions/e1d319c4-9458-4992-b305-fe400976ae65/resourceGroups/T1-W-...

Microsoft Azure

All resources | Network settings | Virtual machine

This is a new experience. Please provide feedback.

Rules | Collapse all

Created security rule
Successfully created security rule 'AllowAnyCustom443Inbound'.

Network security group T1-W-2023630338-1-nsg (attached to networkInterface: t1-w-2023630338-1904_z1)
Impacts 0 subnets, 1 network interfaces

+ Create port rule

Priority	Name	Port	Protocol	Source	Destination	Action
300	RDP	3389	TCP	Any	Any	Allow
310	AllowAnyCustom80Inbound	80	TCP	Any	Any	Allow
320	AllowAnyCustom443Inbound	443	TCP	Any	Any	Allow
65000	AllowVnetInbound	Any	Any	VirtualNetwork	VirtualNetwork	Allow
65001	AllowAzureLoadBalancerInbound	Any	Any	AzureLoadBalancer	Any	Allow
65500	DenyAllInbound	Any	Any	Any	Any	Deny

Page 1 of 1 | 06:44 p.m. 08/03/2025

- El próximo paso es descargar el archivo RDP que nos proporciona la instancia de la VM de Windows creada.

The screenshot shows the Microsoft Azure portal interface. At the top, there's a navigation bar with a user icon, a search bar, and various menu items. Below the navigation bar, the main content area displays a virtual machine named "T1-W-2023630338-1". On the left, a sidebar menu is open under the "Connect" section, listing various connection methods like Bastion, Windows Admin Center, Networking, Settings, etc. The "Native RDP" option is highlighted. It shows the "Connecting using" status, the Public IP address (172.206.3.133), and the port (3389). Below this, it says "Just-in-time policy: Unsupported by plan". At the bottom of this section, there are two buttons: "Select" and "Download RDP file". A "More ways to connect (4)" link is also present. The taskbar at the bottom of the screen shows various pinned icons and system status indicators.

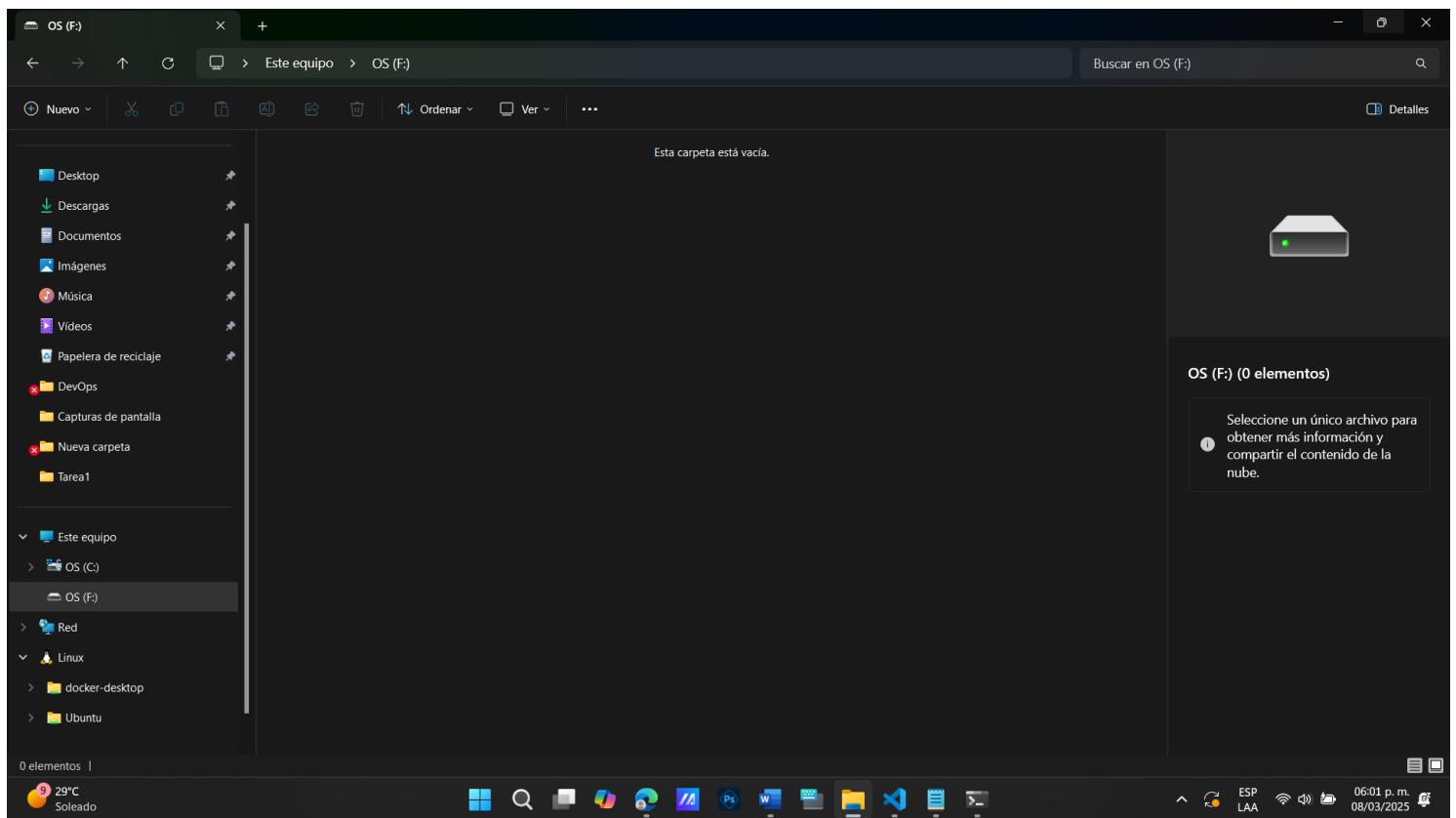
- Como siguiente paso, en una ventana de cmd,crearemos un directorio con el comando mkdir llamado “prueba” y después con el comando subst crearemos una unidad virtual F donde apuntará al directorio “prueba” previamente creado.

The screenshot shows a Windows Command Prompt window titled "Símbolo del sistema". Inside the window, the user has run the following commands:

```
C:\Users\Luis Velasco\OneDrive\Documentos\6to s escom\SistemasDistribuidos\Tareal>mkdir prueba
C:\Users\Luis Velasco\OneDrive\Documentos\6to s escom\SistemasDistribuidos\Tareal>subst f: prueba
C:\Users\Luis Velasco\OneDrive\Documentos\6to s escom\SistemasDistribuidos\Tareal>
```

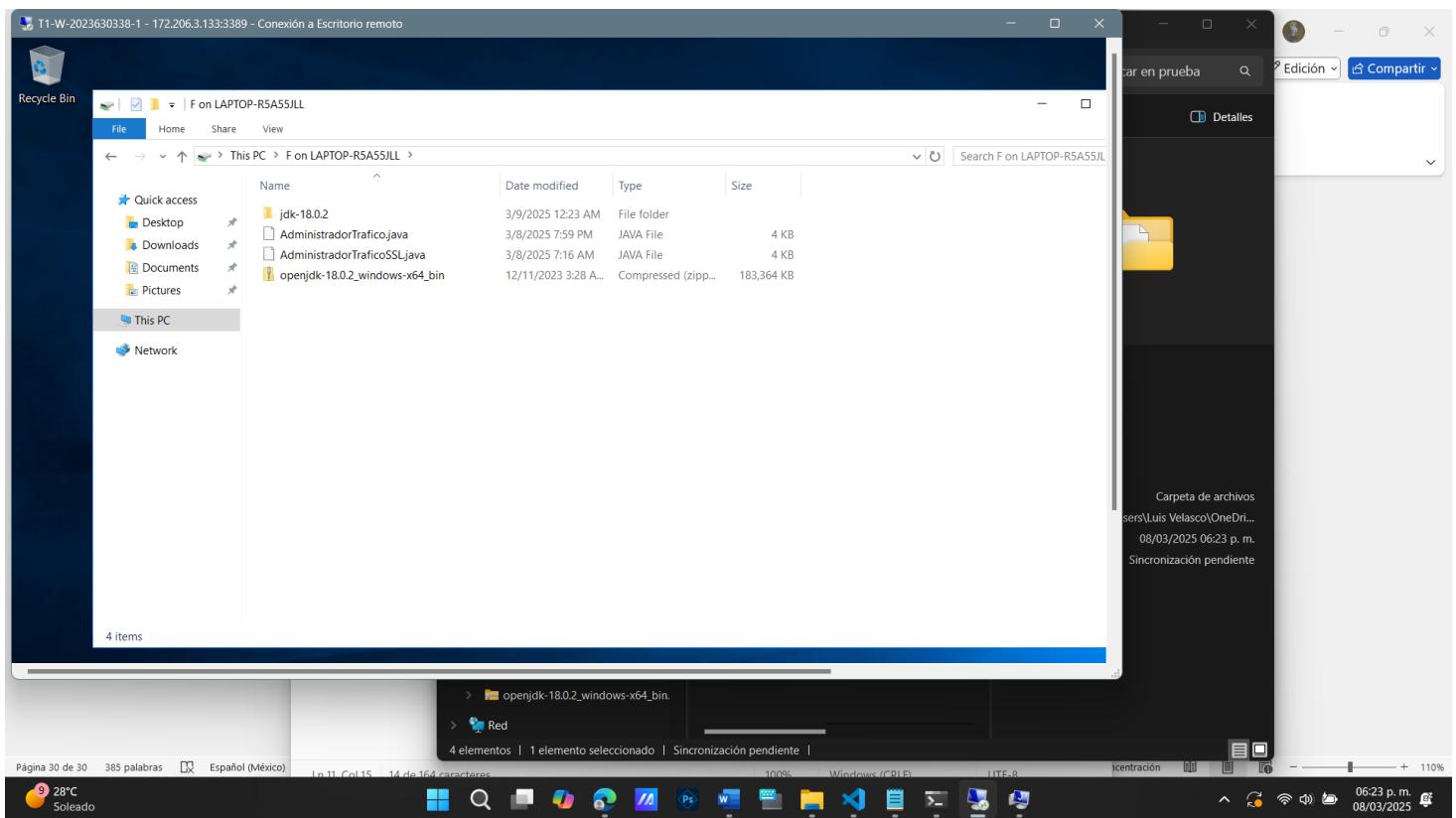
Below the command prompt, the Microsoft Azure portal sidebar is visible, showing the "Connect" section is selected. The taskbar at the bottom of the screen shows various pinned icons and system status indicators.

- Verificando que la unidad virtual se creó, en el administrador de archivos de Windows.

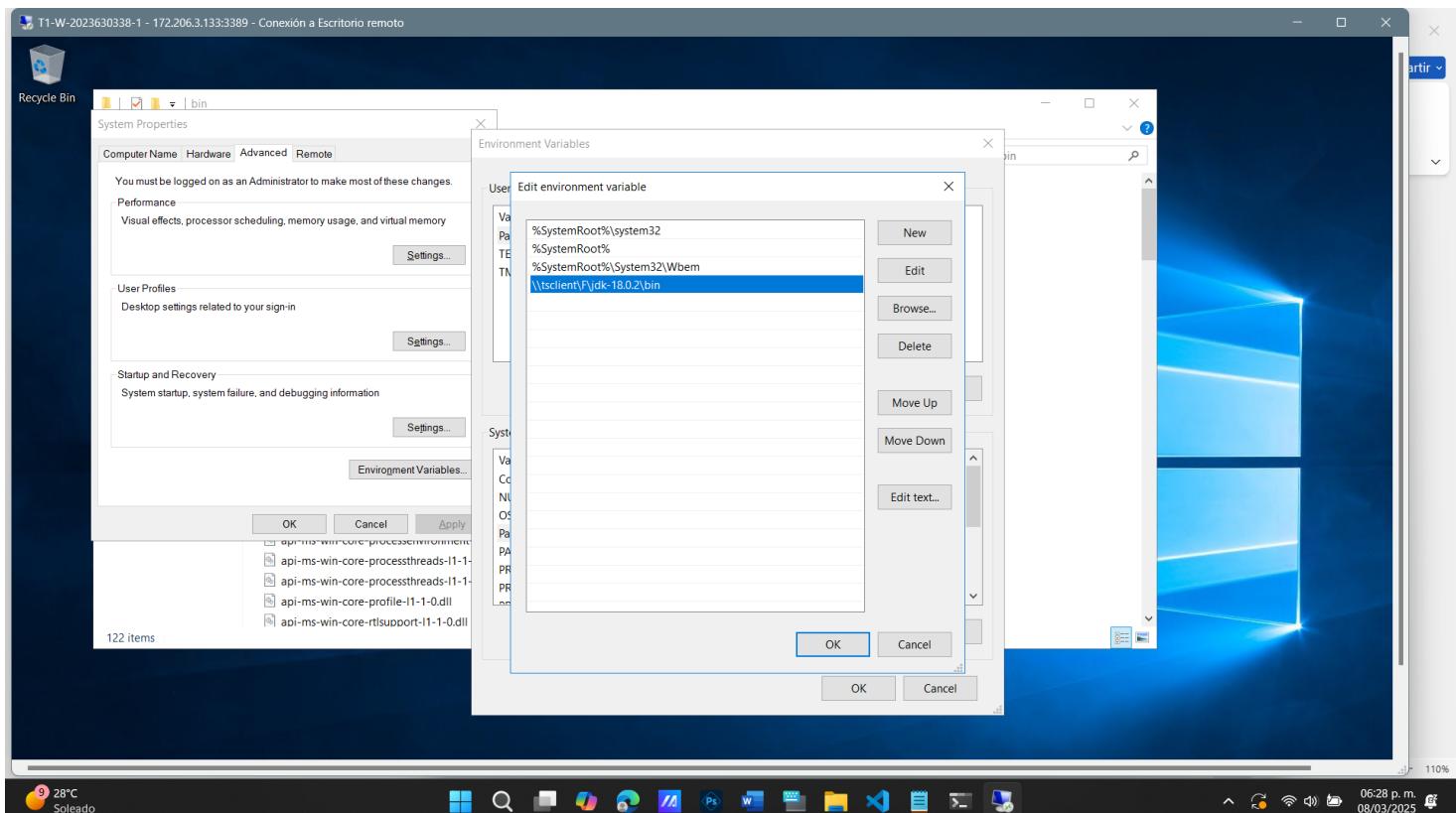


- Modificando el archivo RDP que descargamos antes, en la pestaña “Recursos Locales”, abriendo las opciones de la casilla “Unidades” y seleccionando la unidad de disco F creada previamente.

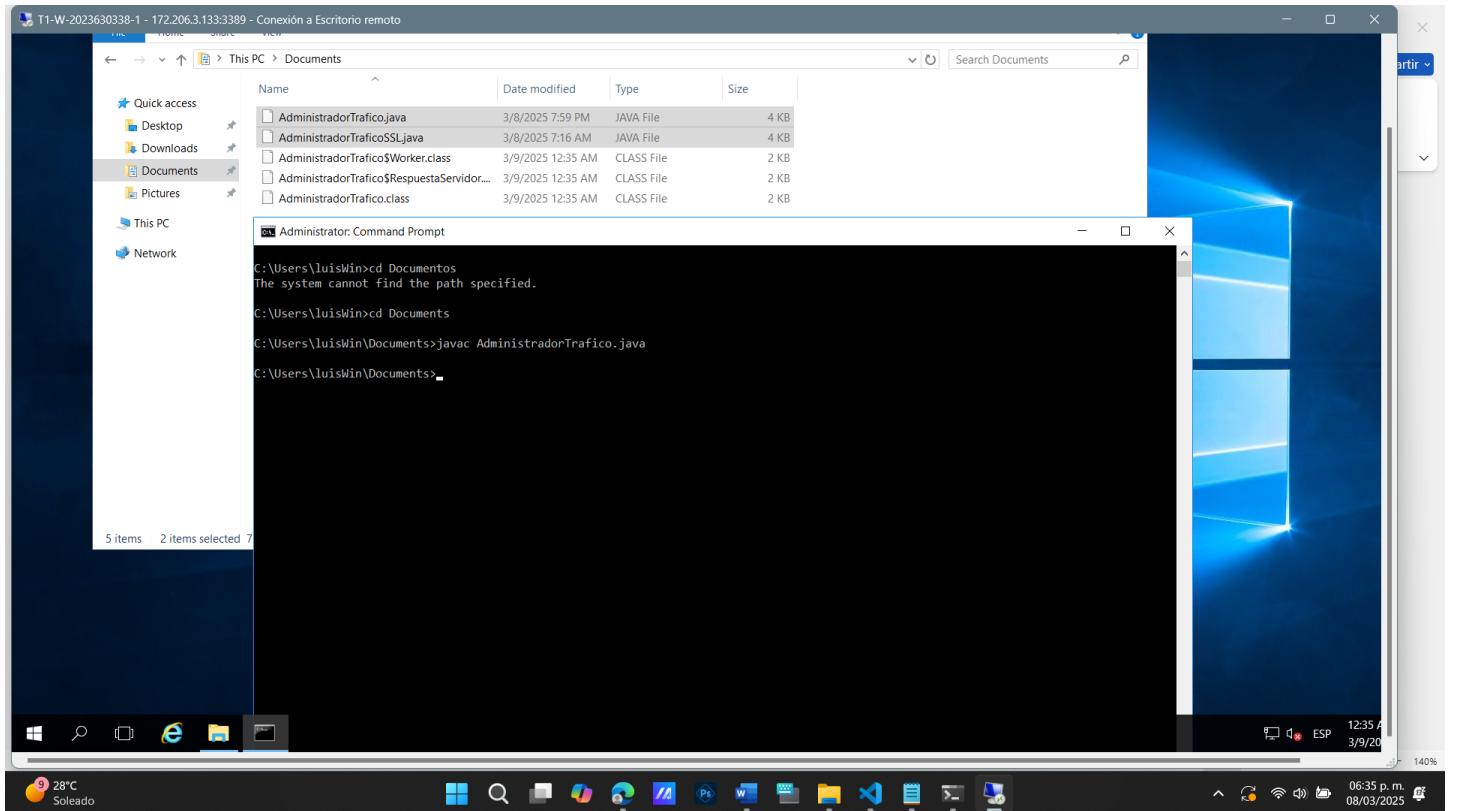
- En la carpeta de nuestro local, vamos a copiar el AdministradorTrafico.java, AdministradorTraficoSSL.java y el jdk-18.0.2, y en la VM se visualizarán:



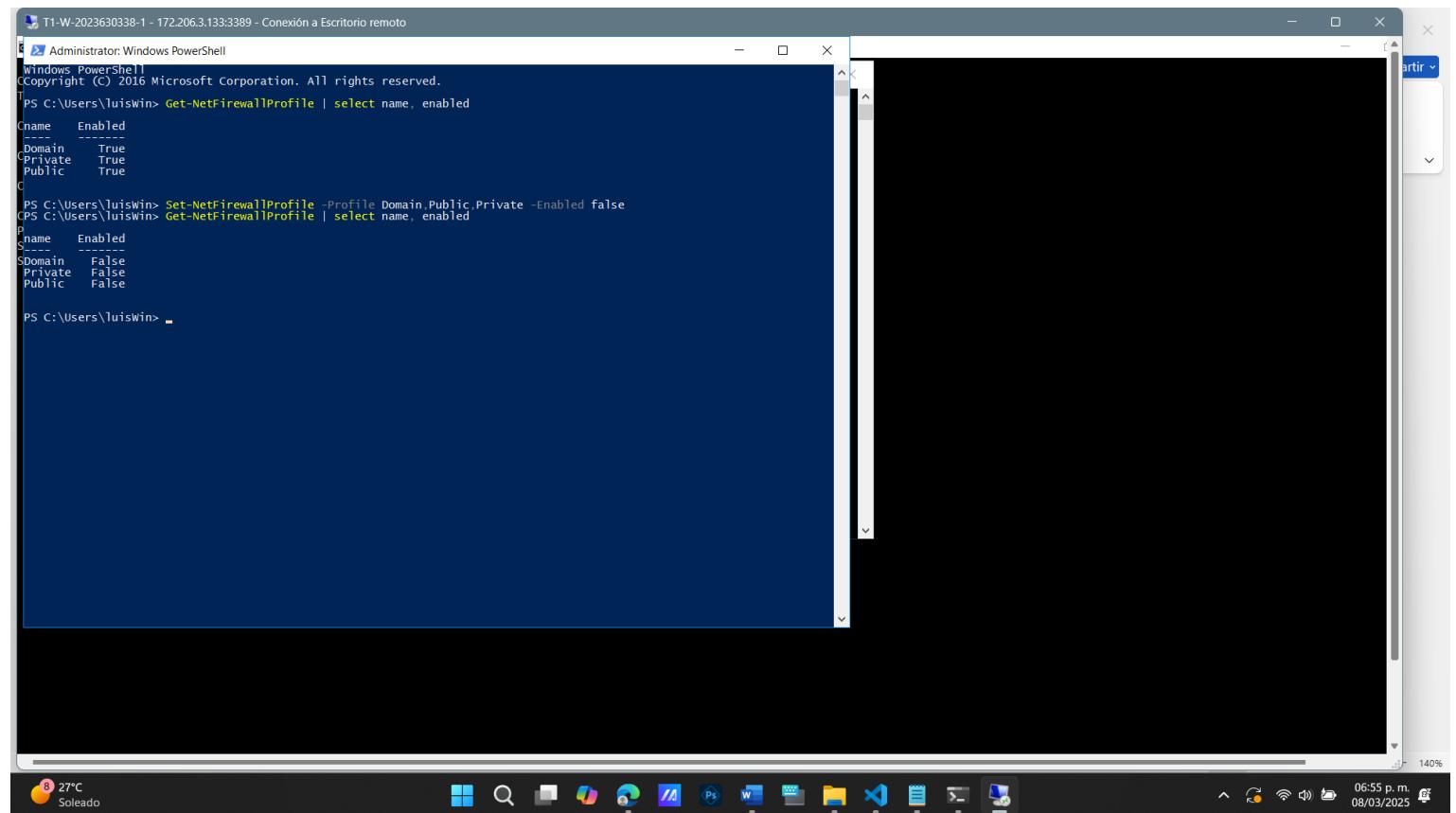
- Agregando la ruta del directorio "bin" a la variable de entorno path de la VM



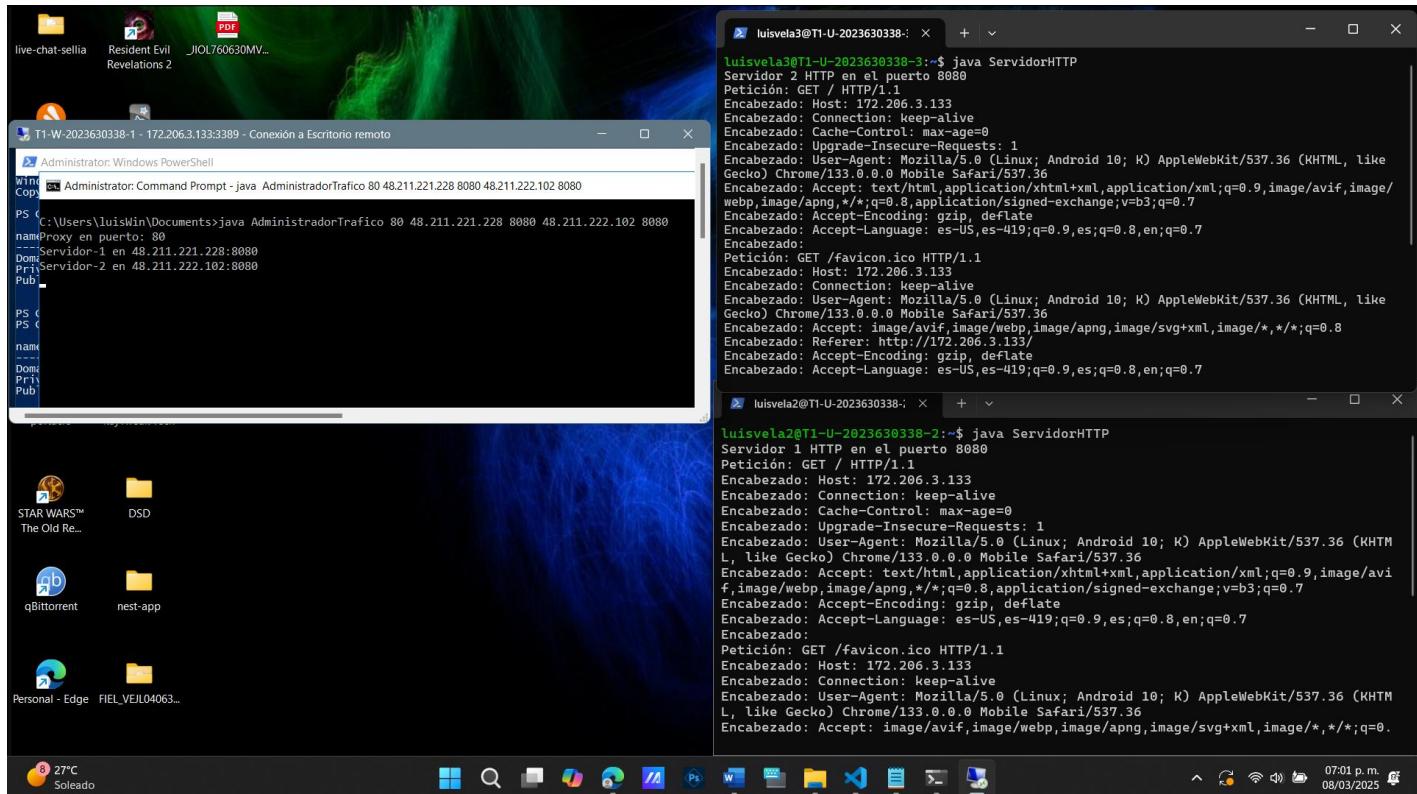
- Compilando el AdministradorTrafico.java



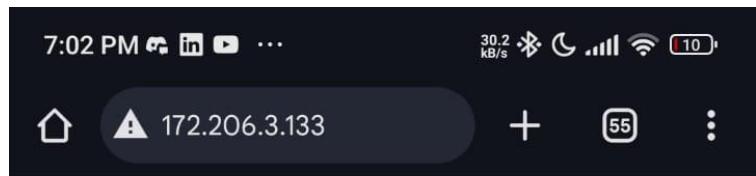
- Como último paso, se desactivará en una venta de PowerShell el firewall de Windows ya que suele bloquear el tráfico de red.



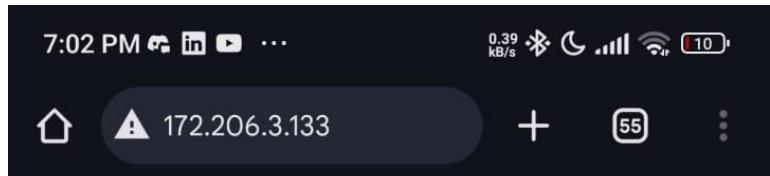
3. Ejecutar el programa AdministradorTrafico.java en la máquina virtual. El programa deberá usar el puerto 80



4. Ingresar la URL <http://172.206.3.133>, donde el host es la IP pública de la máquina virtual de Windows donde esta corriendo el Administrador de Tráfico.



Aceptar



Aceptar

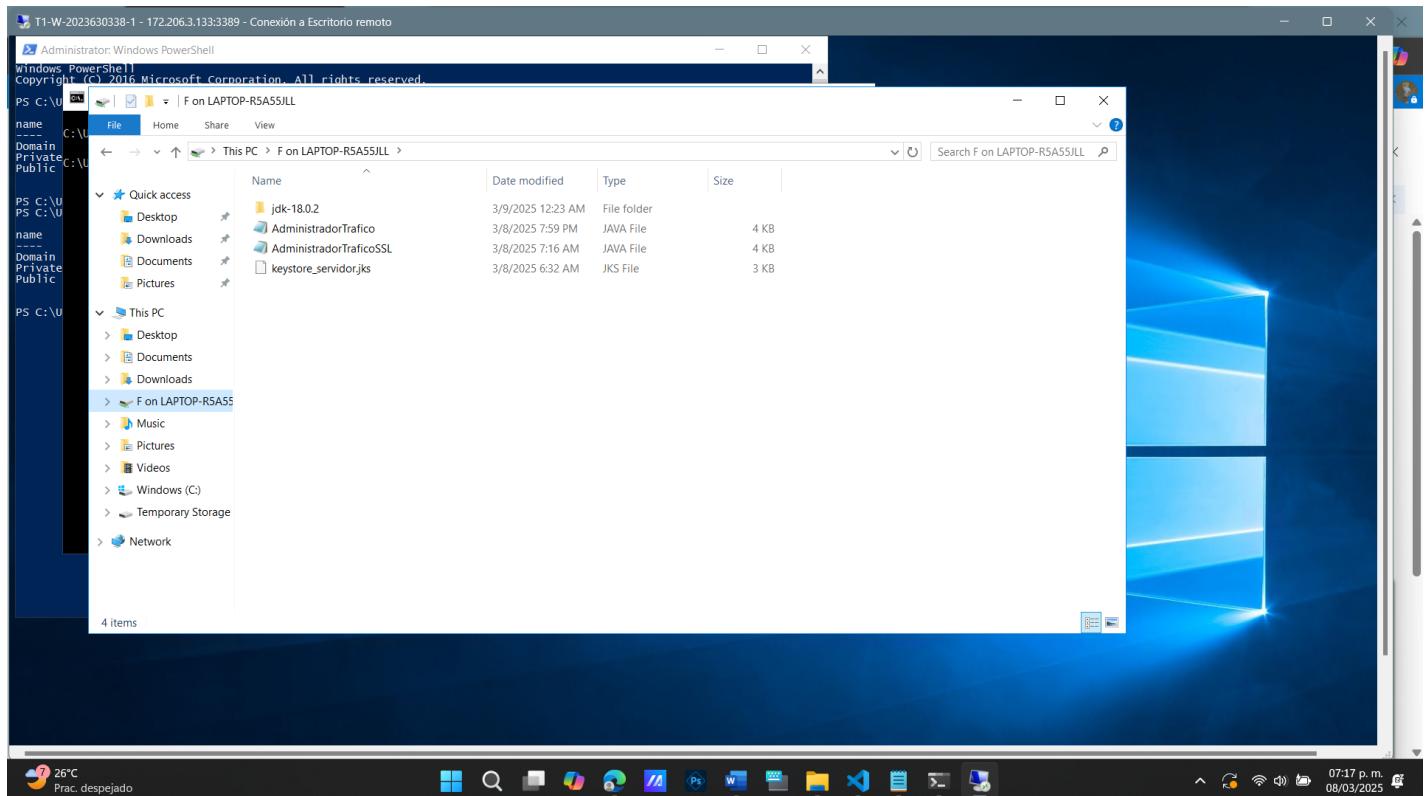
172.206.3.133 dice

200 6

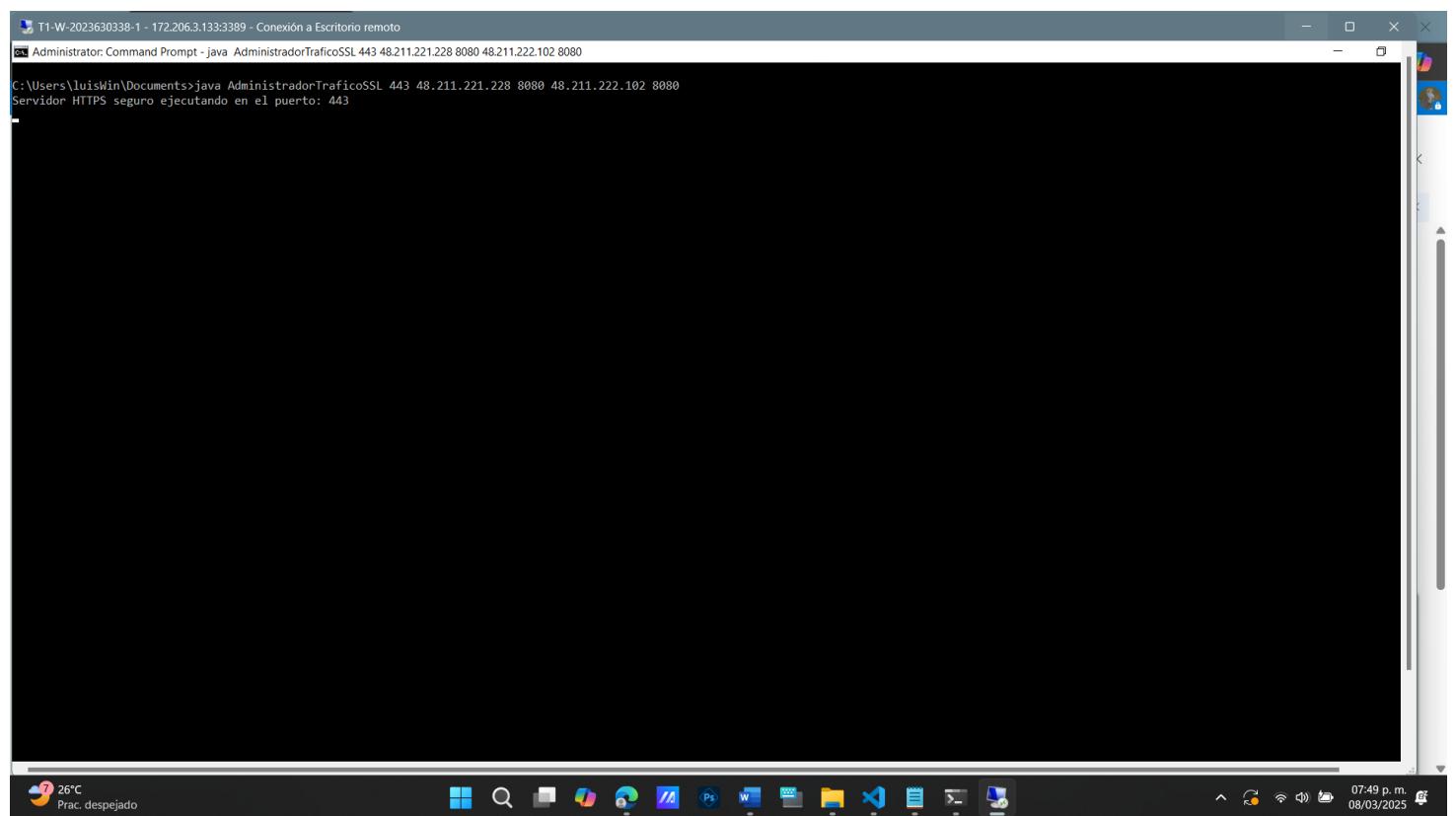
Aceptar

5. Crear en la máquina virtual un keystore (keystore_servidor.jks).

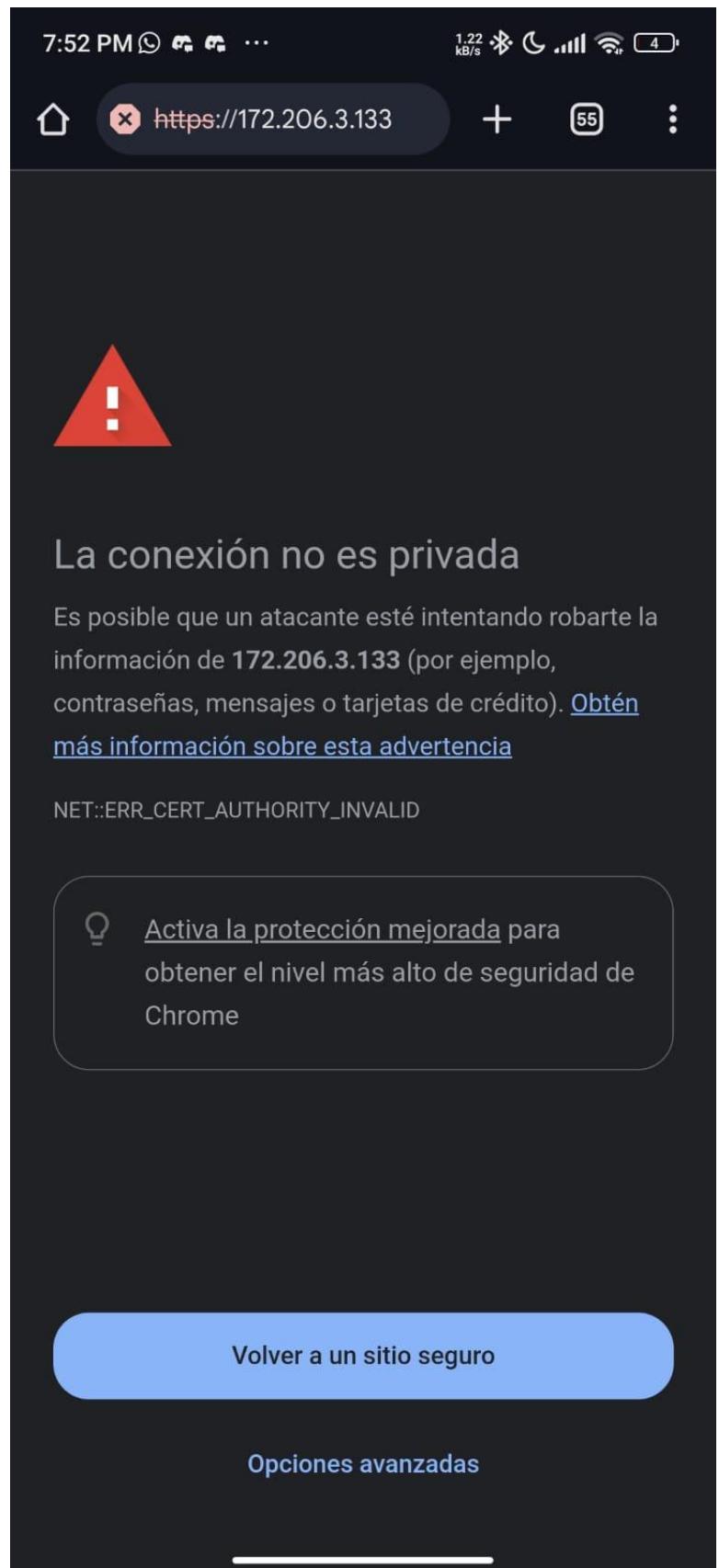
- Ya que ya tenía un keystore creado anteriormente, lo usare aquí, entonces copiare el archivo a la carpeta "prueba" en mi local, para que pueda verlo en la VM.



6. Ejecutar el programa AdministradorTraficoSSL.java en la VM.



7. Ingresar la URL <https://172.206.3.133>, donde el host es la IP pública de la máquina virtual de Windows donde está corriendo el Administrador de Tráfico SSL.



7:52 PM ☀️ 🌐 ⏱

1.43 kB/s 🔍 4G



https://172.206.3.133



55



Aceptar

172.206.3.133 dice

200 6

Aceptar

8. Eliminar las 3 máquinas virtuales y todos los recursos asociados.

The screenshot shows the Microsoft Azure portal interface. On the left, there's a list of resources under 'All resources' for 'Instituto Politecnico Nacional'. On the right, a 'Delete Resources' dialog is open, listing 16 resources to be deleted. The resources include Network security groups, Virtual machines, Public IP addresses, Network Watchers, and Network interfaces. A checkbox for applying force delete is checked, and a text input field contains the word 'delete'.

Delete Resources

The selected resources along with their related resources and contents will be permanently deleted. If you are unsure of the selected resource dependencies, navigate to the individual resource page to perform the delete operation. More details of the resource dependencies are available in the manage experience.

Resources to be deleted (16)

Name	Resource type	Remove
fits-example-nsg	Network security gr...	Remove
T1-U-2023630338-2	Virtual machine	Remove
T1-U-2023630338-2-ip	Public IP address	Remove
T1-U-2023630338-2-nsg	Network security gr...	Remove
t1-u-2023630338-2-vnet	Network Interface	Remove
t1-u-2023630338-2518_z1	Network Interface	Remove
T1-U-2023630338-2-ip	Disk	Remove
T1-U-2023630338-2-nsg	Virtual machine	Remove
T1-U-2023630338-3	Public IP address	Remove
T1-U-2023630338-3-ip	Network security group	Remove
T1-U-2023630338-3-nsg	Network Interface	Remove
T1-U-2023630338-3-vnet	Disk	Remove
26°C	Virtual machine	Remove
Prac. despejado	Public IP address	Remove
26°C	Network security group	Remove

Apply force delete for selected Virtual machines and Virtual machine scale sets ⓘ

Enter "delete" to confirm deletion *

Delete **Cancel**

< Previous Page 1 of 1 Next > Showing 1 to 24 of 24 records.

CONCLUSIONES

Me gustaría dividir mis conclusiones en dos partes; la primera parte, primero que nada he aprendido algunas cosas nuevas que no sabía antes, por ejemplo, el como mandar archivos a las VM con SFTP, ya que yo acostumbraba, por ejemplo en instancias de EC2 de AWS, a abrir el servicio de CloudShell y en la consola y simplemente cargar el recurso y ya; también he reflexionado acerca de cómo el prompt engineering se vuelve cada día más importante, tanto como los programadores y la gente que no programa tanto, debido a la eficiencia que es casi imposible de implementar en proyectos.

Y la segunda parte de mis conclusiones se basan en errores, no tanto relacionados al desarrollo de la práctica, si no a aspectos como que algunas de mis capturas de pantalla se ven unas en diferente orden, ya que en algunos puntos empecé a hacer lo que ya sabía y luego leía en los requerimientos que tenía que hacer algo más como establecer reglas para los puertos de entradas; no es algo que afecte a la práctica, pero me gustaría mantener ese orden.