

Sistemas Informáticos

UD6. Actividad 6

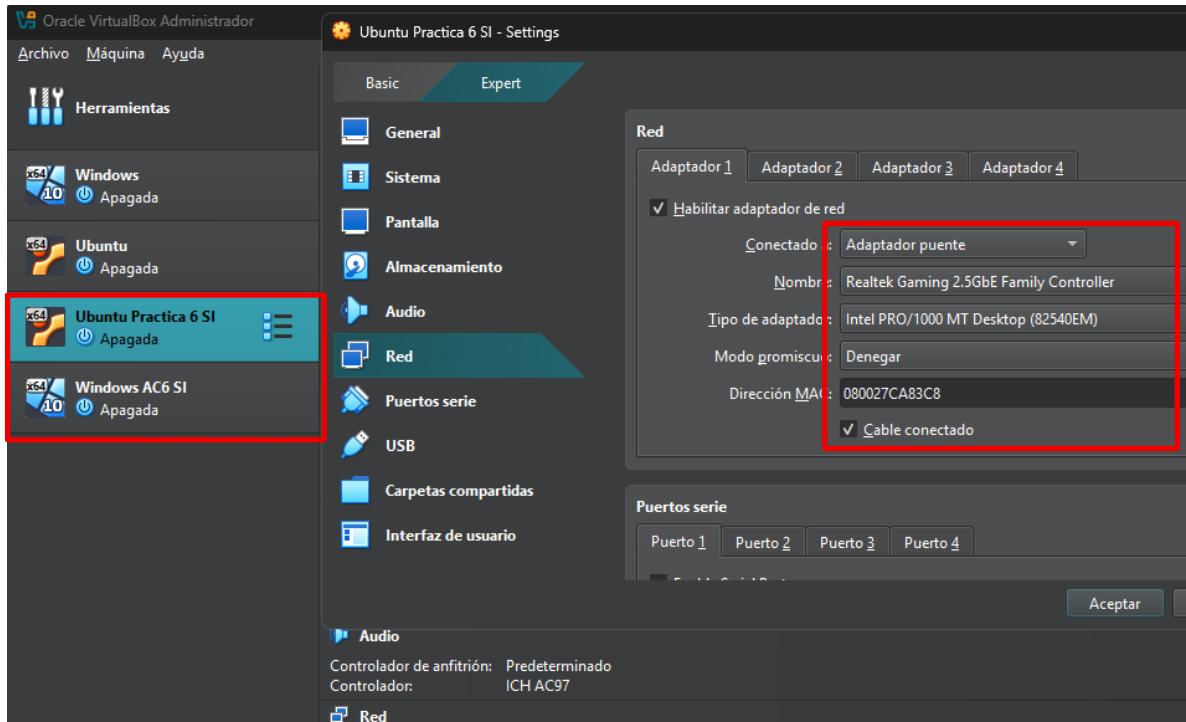
Diagnóstico de conectividad y
comandos de red Pavel Miron

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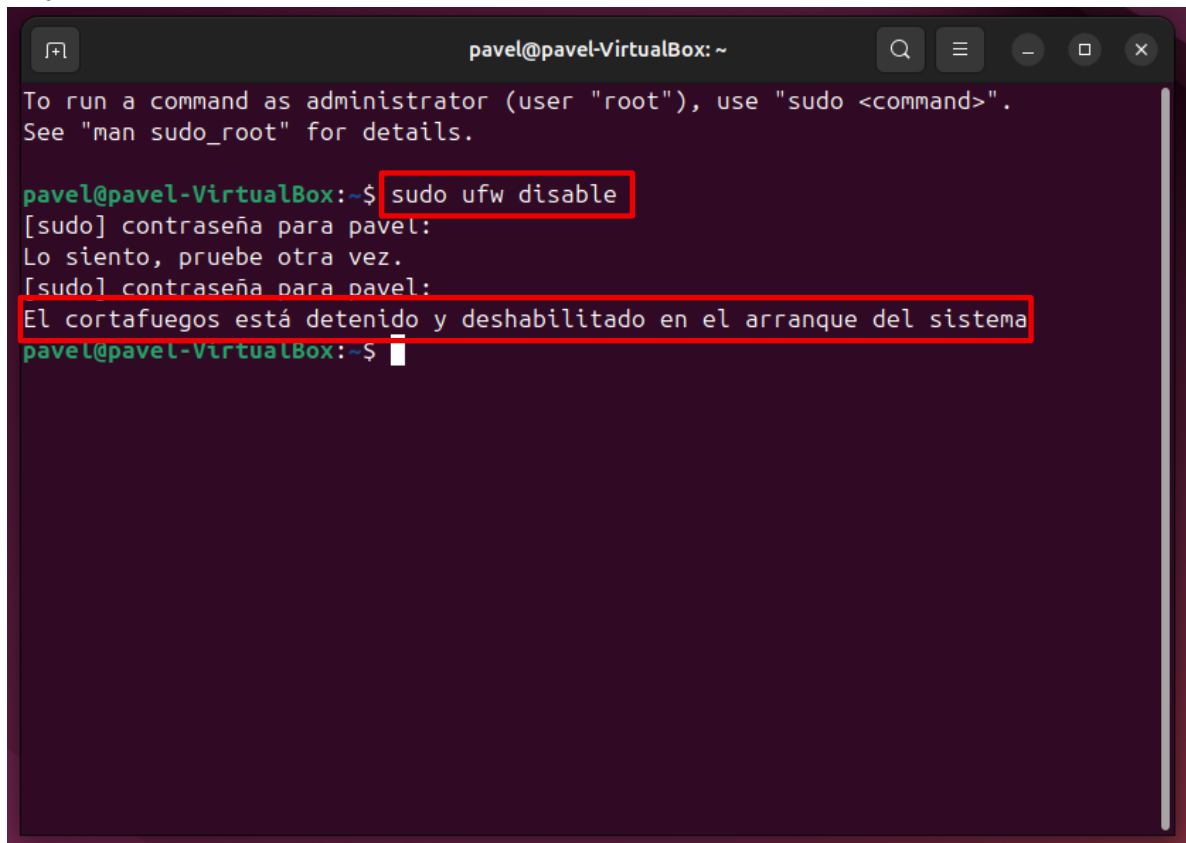
1. Configura ambas MVs en modo bridge.

Así en VirtualBox se puede cambiar la tipo de red de cada maquina como se puede ver esta en tipo puente o “Bridged”.

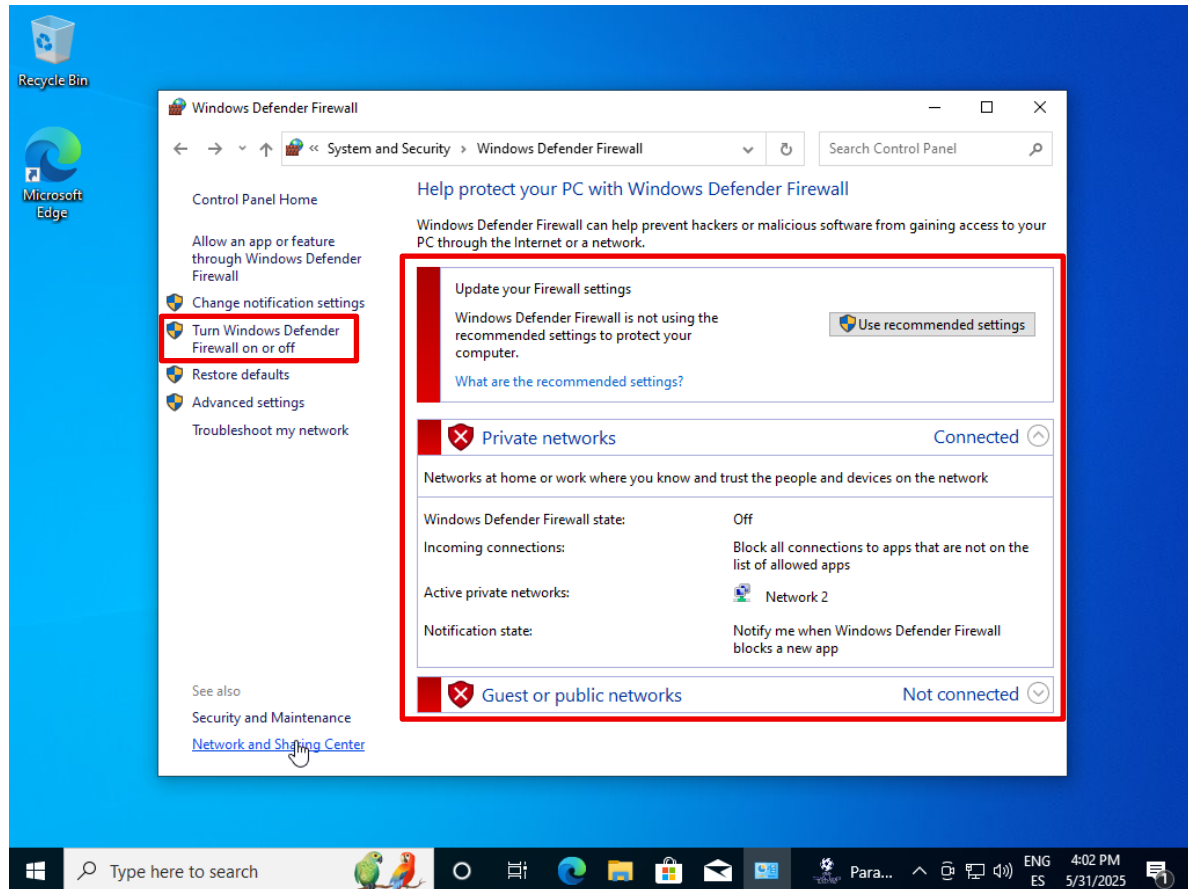


2. Desactiva el firewall temporalmente en las tres máquinas.

Linux



Windows



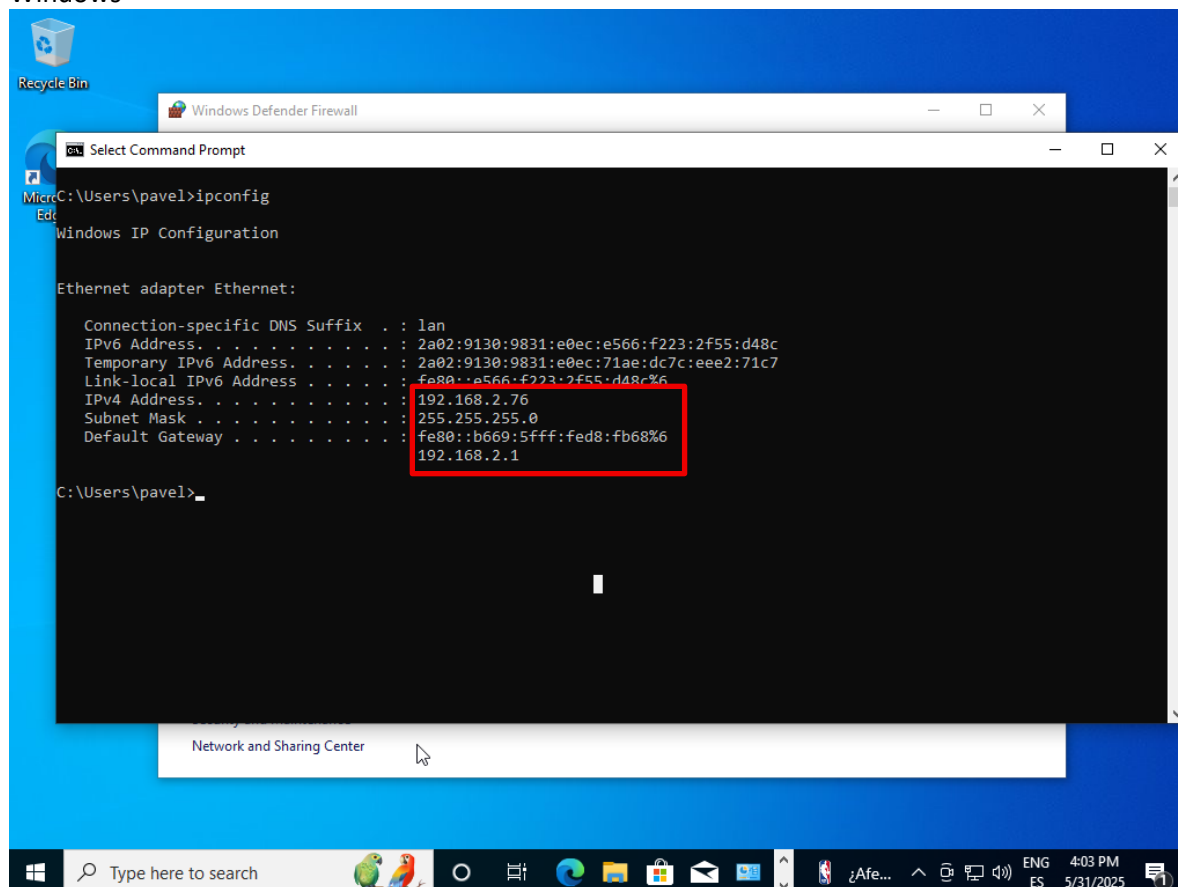
En control panel encontramos el firewall y lo apagamos.

3. Visualiza las direcciones IP usando ipconfig (Windows) y ifconfig (Linux).

Linux

```
pavel@pavel-VirtualBox: ~
pavel@pavel-VirtualBox:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host noprefixroute
        valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:ca:83:c8 brd ff:ff:ff:ff:ff:ff
    inet 192.168.2.90/24 brd 192.168.2.255 scope global dynamic noprefixroute enp0s3
        valid_lft 85941sec preferred_lft 85941sec
    inet6 2a02:9130:9831:e0ec:be57:4133:ee58:232a/64 scope global temporary dynamic
        valid_lft 604342sec preferred_lft 85525sec
    inet6 2a02:9130:9831:e0ec:a00:27ff:feca:83c8/64 scope global dynamic mngtmdr
        valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:feca:83c8/64 scope link
        valid_lft forever preferred_lft forever
pavel@pavel-VirtualBox:~$
```

Windows



4. Realiza las siguientes pruebas de conectividad en ambos modos de red:

ping entre los tres equipos (máquina física y las dos VMs)

Maquina física a las maquinas virtuales:

```

Microsoft Windows [Version 10.0.26100.4061]
(c) Корпорация Майкрософт (Microsoft Corporation). Все права защищены.

C:\Users\cloud>ping 192.168.2.76

Обмен пакетами с 192.168.2.76 по с 32 байтами данных:
Ответ от 192.168.2.76: число байт=32 время=1мс TTL=128
Ответ от 192.168.2.76: число байт=32 время=1мс TTL=128
Ответ от 192.168.2.76: число байт=32 время<1мс TTL=128
Ответ от 192.168.2.76: число байт=32 время<1мс TTL=128

Статистика Ping для 192.168.2.76:
    Пакетов: отправлено = 4, получено = 4, потеряно = 0
    (0% потерь)
    Приблизительное время приема-передачи в мс:
    Минимальное = 0мсек, Максимальное = 1 мсек, Среднее = 0 мсек

C:\Users\cloud>

C:\Users\cloud>ping 192.168.2.90

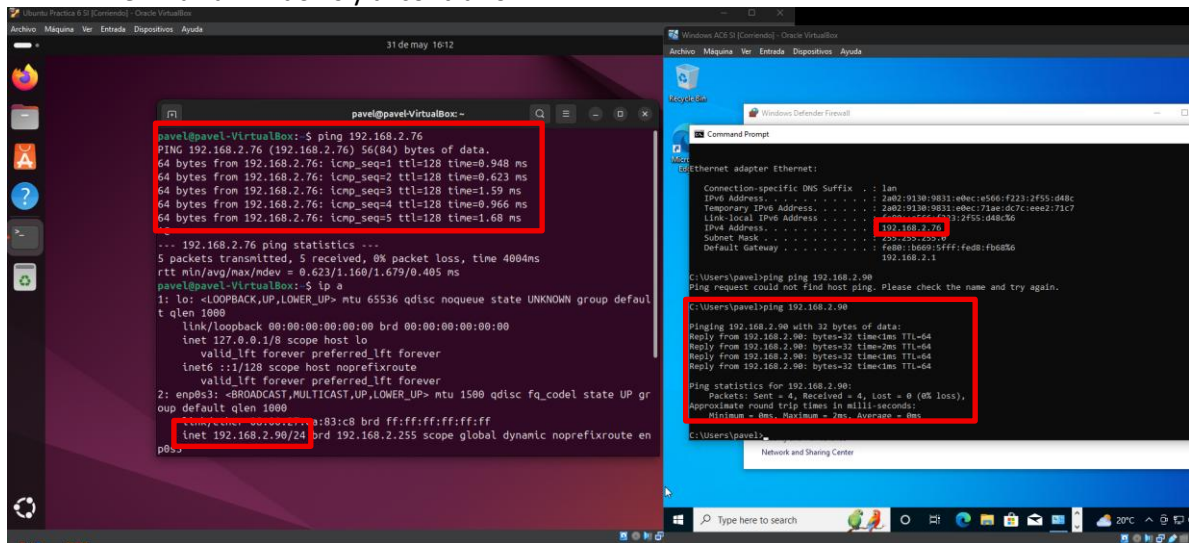
Обмен пакетами с 192.168.2.90 по с 32 байтами данных:
Ответ от 192.168.2.90: число байт=32 время<1мс TTL=64
Ответ от 192.168.2.90: число байт=32 время<1мс TTL=64
Ответ от 192.168.2.90: число байт=32 время=1мс TTL=64
Ответ от 192.168.2.90: число байт=32 время<1мс TTL=64

Статистика Ping для 192.168.2.90:
    Пакетов: отправлено = 4, получено = 4, потеряно = 0
    (0% потерь)
    Приблизительное время приема-передачи в мс:
    Минимальное = 0мсек, Максимальное = 1 мсек, Среднее = 0 мсек

C:\Users\cloud>
  
```

Perdon pero mi pc de casa esta en ruso, pero podemos ver el ping y la respuesta que caracteriza, y se entiende como la respuesta en español.

De Linux a Windows y al contrario:



The screenshot shows two windows side-by-side. The left window is a Linux terminal (Ubuntu 16.04) with the following output:

```
pavel@pavel-VirtualBox:~$ ping 192.168.2.76
PING 192.168.2.76 (192.168.2.76) 56(84) bytes of data:
64 bytes from 192.168.2.76: icmp_seq=1 ttl=128 time=0.948 ms
64 bytes from 192.168.2.76: icmp_seq=2 ttl=128 time=0.623 ms
64 bytes from 192.168.2.76: icmp_seq=3 ttl=128 time=1.59 ms
64 bytes from 192.168.2.76: icmp_seq=4 ttl=128 time=0.966 ms
64 bytes from 192.168.2.76: icmp_seq=5 ttl=128 time=1.68 ms
--- 192.168.2.76 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4004ms
rtt min/avg/max/mdev = 0.623/1.169/1.679/0.405 ms
pavel@pavel-VirtualBox:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host noprefixroute
        valid_lft forever preferred_lft forever
2: enp8s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:8a:83:c8 brd ff:ff:ff:ff:ff:ff
    inet 192.168.2.90/24 brd 192.168.2.255 scope global dynamic noprefixroute enp8s3
        valid_lft forever preferred_lft forever
    inet6 fe80::208:1450:4003:8111:2004/64 scope link
        valid_lft forever preferred_lft forever
```

The right window is a Windows Command Prompt showing the IP configuration and a ping test:

```
C:\Users\pavel> ipconfig
Ethernet adapter Ethernet:

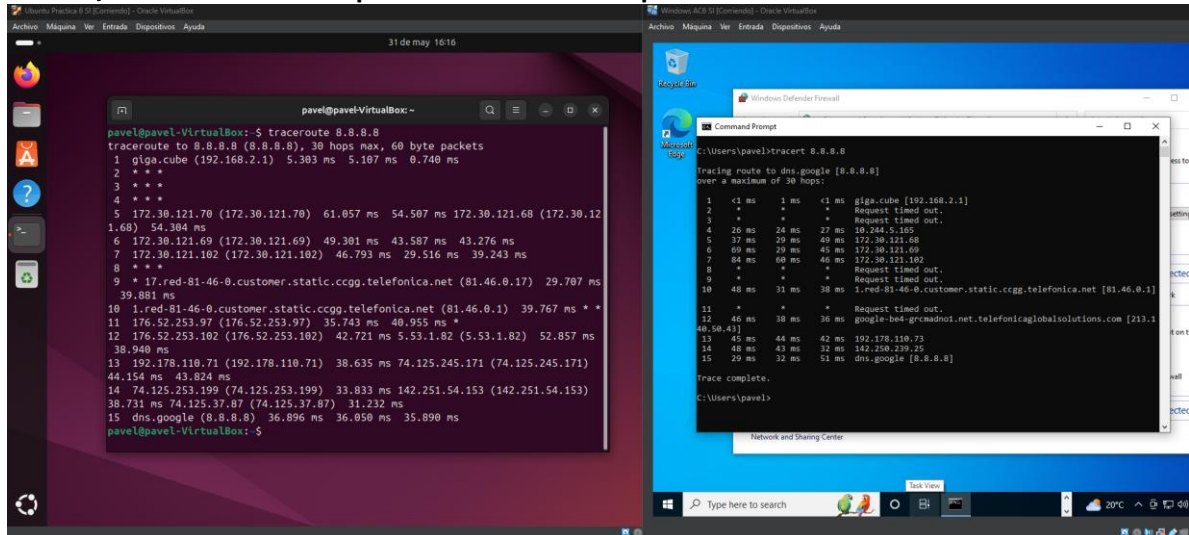
Connection-specific DNS Suffix . : lan
IPv6 Address. . . . . : 2A02:9130:9831:ebec:f566:f223:2f55:d48c
Temporary IPv6 Address. . . . . : 2A02:9130:9831:ebec:71ae:dc7c:eee2:71c7
Link-local IPv6 Address . . . . . : fe80::208:1450:4003:8111:2f55:d48c
IPv4 Address. . . . . : 192.168.2.76
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : fe80::b669:5fff:fed8:f668

C:\Users\pavel> ping 192.168.2.90
Ping request could not find host ping. Please check the name and try again.

C:\Users\pavel> ping 192.168.2.90
Pinging 192.168.2.90 with 32 bytes of data:
Reply from 192.168.2.90: bytes=32 time=2ms TTL=64
Reply from 192.168.2.90: bytes=32 time=1ms TTL=64
Reply from 192.168.2.90: bytes=32 time=1ms TTL=64
Reply from 192.168.2.90: bytes=32 time=1ms TTL=64

Ping statistics for 192.168.2.90:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 2ms, Average = 1ms
```

tracert / traceroute a una IP pública desde cada máquina



The screenshot shows two windows side-by-side. The left window is a Linux terminal (Ubuntu 16.04) with the following output:

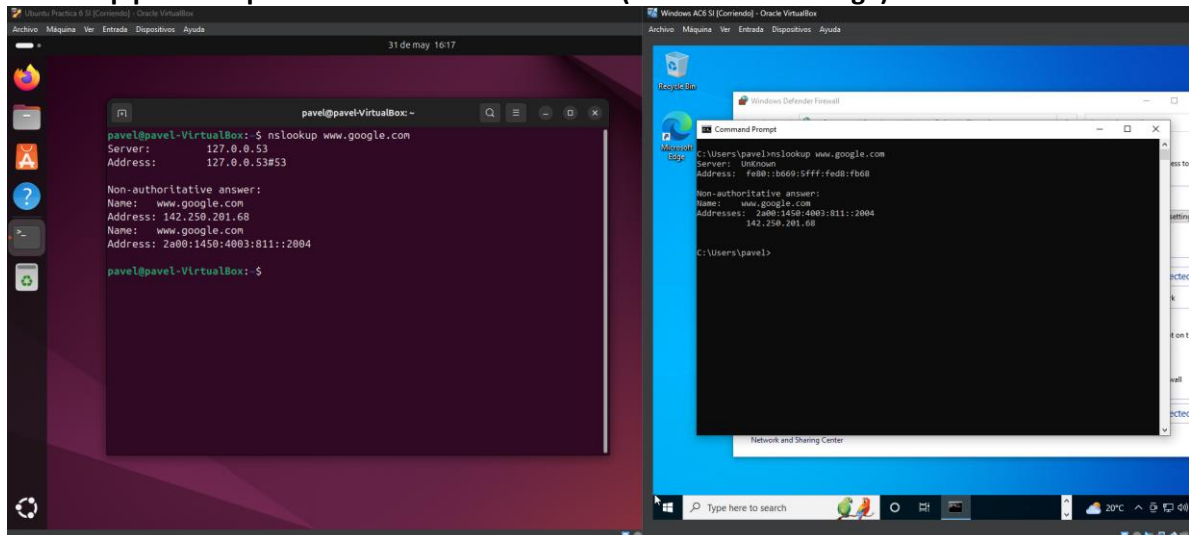
```
pavel@pavel-VirtualBox:~$ traceroute 8.8.8.8
traceroute to 8.8.8.8 (8.8.8.8), 30 hops max, 60 byte packets
 1  giga.cube (192.168.2.1)  5.393 ms  5.187 ms  0.740 ms
 2  * * *
 3  * * *
 4  * * *
 5  172.30.121.70 (172.30.121.70)  61.057 ms  54.507 ms  172.30.121.68 (172.30.121.68)  54.304 ms
 6  172.30.121.69 (172.30.121.69)  49.301 ms  43.587 ms  43.276 ms
 7  172.30.121.102 (172.30.121.102)  46.793 ms  29.516 ms  39.243 ms
 8  * * *
 9  * 17-red-81-46-0.customer.static.ccg.telefonica.net (81.46.0.17)  29.787 ms  39.881 ms
10  1-red-81-46-0.customer.static.ccg.telefonica.net (81.46.0.1)  39.767 ms * *
11  176.52.253.97 (176.52.253.97)  35.743 ms  40.955 ms *
12  176.52.253.102 (176.52.253.102)  42.721 ms  5.53.1.82 (5.53.1.82)  52.857 ms  38.940 ms
13  192.178.110.71 (192.178.110.71)  38.635 ms  74.125.245.171 (74.125.245.171)  44.154 ms  43.824 ms
14  74.125.253.199 (74.125.253.199)  33.833 ms  142.251.54.153 (142.251.54.153)  38.731 ms  74.125.37.87 (74.125.37.87)  31.232 ms
15  dns.google (8.8.8.8)  36.896 ms  36.050 ms  35.890 ms
pavel@pavel-VirtualBox:~$
```

The right window is a Windows Command Prompt showing the traceroute to 8.8.8.8:

```
C:\Users\pavel> tracert 8.8.8.8
Tracing route to dns.google [8.8.8.8]
over a maximum of 30 hops:
  0  0 ms  0 ms  0 ms  giga.cube [192.168.2.1]
  1  * * * Request timed out.
  2  * * * Request timed out.
  3  * * * Request timed out.
  4  26 ms  24 ms  27 ms  10.244.5.165
  5  37 ms  29 ms  40 ms  172.30.121.68
  6  69 ms  29 ms  45 ms  172.30.121.69
  7  84 ms  60 ms  46 ms  172.30.121.102
  8  * * * Request timed out.
  9  * * * Request timed out.
10  48 ms  31 ms  38 ms  1-red-81-46-0.customer.static.ccg.telefonica.net [81.46.0.17]
11  * * * Request timed out.
12  46 ms  38 ms  36 ms  google-be4-grcndns.net.telefonica.com [213.149.58.41]
13  45 ms  44 ms  42 ms  192.178.110.71
14  48 ms  43 ms  32 ms  74.125.253.199
15  29 ms  32 ms  51 ms  dns.google [8.8.8.8]

Trace complete.
C:\Users\pavel>
```

nslookup para comprobar resolución de nombres (solo en modo bridge)



The screenshot shows two windows side-by-side. The left window is a Linux terminal (Ubuntu 16.04) with the following output:

```
pavel@pavel-VirtualBox:~$ nslookup www.google.com
Server: 127.0.0.53
Address: 127.0.0.53#53

Non-authoritative answer:
Name: www.google.com
Address: 142.250.201.68
Name: www.google.com
Address: 2a00:1450:4003:8111:2004

pavel@pavel-VirtualBox:~$
```

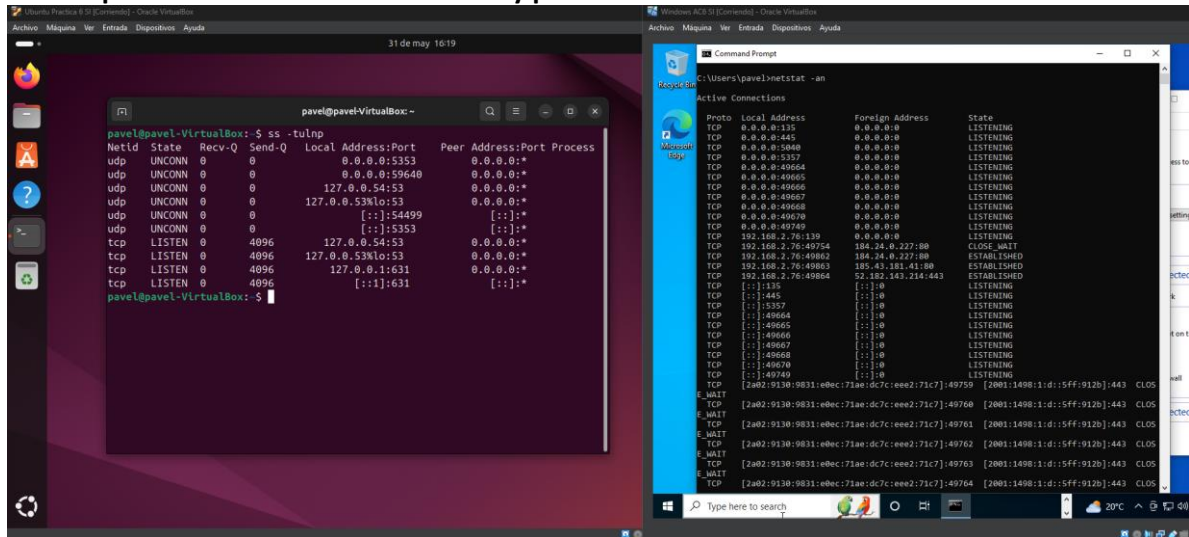
The right window is a Windows Command Prompt showing the nslookup results for google.com:

```
C:\Users\pavel> nslookup www.google.com
Server: Unknown
Address: fe80::b669:5fff:fed8:f668

Non-authoritative answer:
Name: www.google.com
Addresses: 2a00:1450:4003:8111:2004
142.250.201.68

C:\Users\pavel>
```

netstat para observar conexiones activas y puertos abiertos



Linux Terminal Output (ss -tulnp):

NetId	State	Recv-Q	Send-Q	Local Address:Port	Peer Address:Port	Process
udp	UNCONN	0	0	0.0.0.0:5353	0.0.0.0:*	
udp	UNCONN	0	0	0.0.0.0:59640	0.0.0.0:*	
udp	UNCONN	0	0	127.0.0.54:53	0.0.0.0:*	
udp	UNCONN	0	0	127.0.0.53%lo:53	0.0.0.0:*	
udp	UNCONN	0	0	:::54499	:::*	
udp	UNCONN	0	0	:::5353	:::*	
tcp	LISTEN	0	4096	127.0.0.54:53	0.0.0.0:*	
tcp	LISTEN	0	4096	127.0.0.53%lo:53	0.0.0.0:*	
tcp	LISTEN	0	4096	127.0.0.1:631	0.0.0.0:*	
tcp	LISTEN	0	4096	:::1:631	:::*	

Windows Command Prompt Output (netstat -an):

Proto	Local Address	Foreign Address	State
TCP	0.0.0.0:135	0.0.0.0:0	LISTENING
TCP	0.0.0.0:445	0.0.0.0:0	LISTENING
TCP	0.0.0.0:5040	0.0.0.0:0	LISTENING
TCP	0.0.0.0:5357	0.0.0.0:0	LISTENING
TCP	0.0.0.0:49664	0.0.0.0:0	LISTENING
TCP	0.0.0.0:49665	0.0.0.0:0	LISTENING
TCP	0.0.0.0:49666	0.0.0.0:0	LISTENING
TCP	0.0.0.0:49667	0.0.0.0:0	LISTENING
TCP	0.0.0.0:49668	0.0.0.0:0	LISTENING
TCP	0.0.0.0:49670	0.0.0.0:0	LISTENING
TCP	0.0.0.0:49749	0.0.0.0:0	LISTENING
TCP	192.168.2.76:139	0.0.0.0:0	LISTENING
TCP	192.168.2.76:40754	184.24.0.227:80	CLOSE_WAIT
TCP	192.168.2.76:49882	184.24.0.227:80	ESTABLISHED
TCP	192.168.2.76:49883	189.43.181.41:80	ESTABLISHED
TCP	192.168.2.76:49884	52.182.161.214:443	ESTABLISHED
TCP	:::135	:::0	LISTENING
TCP	:::445	:::0	LISTENING
TCP	:::5357	:::0	LISTENING
TCP	:::49664	:::0	LISTENING
TCP	:::49665	:::0	LISTENING
TCP	:::49666	:::0	LISTENING
TCP	:::49667	:::0	LISTENING
TCP	:::49668	:::0	LISTENING
TCP	:::49670	:::0	LISTENING
TCP	:::49749	:::0	LISTENING
TCP	[2a02:9130:9831::e8ec:71ae:dc7c:eee2:71c7]:49759	[2001:1408:1d:5fff:912b]:443	CLOS
TCP	[2a02:9130:9831::e8ec:71ae:dc7c:eee2:71c7]:49760	[2001:1408:1d:5fff:912b]:443	CLOS
TCP	[2a02:9130:9831::e8ec:71ae:dc7c:eee2:71c7]:49761	[2001:1408:1d:5fff:912b]:443	CLOS
TCP	[2a02:9130:9831::e8ec:71ae:dc7c:eee2:71c7]:49762	[2001:1408:1d:5fff:912b]:443	CLOS
TCP	[2a02:9130:9831::e8ec:71ae:dc7c:eee2:71c7]:49763	[2001:1408:1d:5fff:912b]:443	CLOS
TCP	[2a02:9130:9831::e8ec:71ae:dc7c:eee2:71c7]:49764	[2001:1408:1d:5fff:912b]:443	CLOS

5. Elige 2 comandos adicionales de red entre: route, netsh, arp, net, ip route show.

arp -a (Windows)

Muestra la caché ARP (traducción IP ↔ MAC).

```
C:\Users\pavel>arp -a

Interface: 192.168.2.76 --- 0x6
    Internet Address      Physical Address         Type
192.168.2.1              b4-69-5f-d8-fb-68       dynamic
192.168.2.10             d8-bb-c1-d2-d6-3e       dynamic
192.168.2.90             08-00-27-ca-83-c8       dynamic
192.168.2.255            ff-ff-ff-ff-ff-ff       static
224.0.0.2                01-00-5e-00-00-02       static
224.0.0.22               01-00-5e-00-00-16       static
224.0.0.251              01-00-5e-00-00-fb       static
224.0.0.252              01-00-5e-00-00-fc       static
239.255.255.250          01-00-5e-7f-ff-fa       static
255.255.255.255          ff-ff-ff-ff-ff-ff       static

C:\Users\pavel>
```

ip route show (Linux)

Muestra tabla de enrutamiento.

```
pavel@pavel-VirtualBox:~$ ip route show
default via 192.168.2.1 dev enp0s3 proto dhcp src 192.168.2.90 metric 100
192.168.2.0/24 dev enp0s3 proto kernel scope link src 192.168.2.90 metric 100
pavel@pavel-VirtualBox:~$
```


6. Para cada uno de ellos:

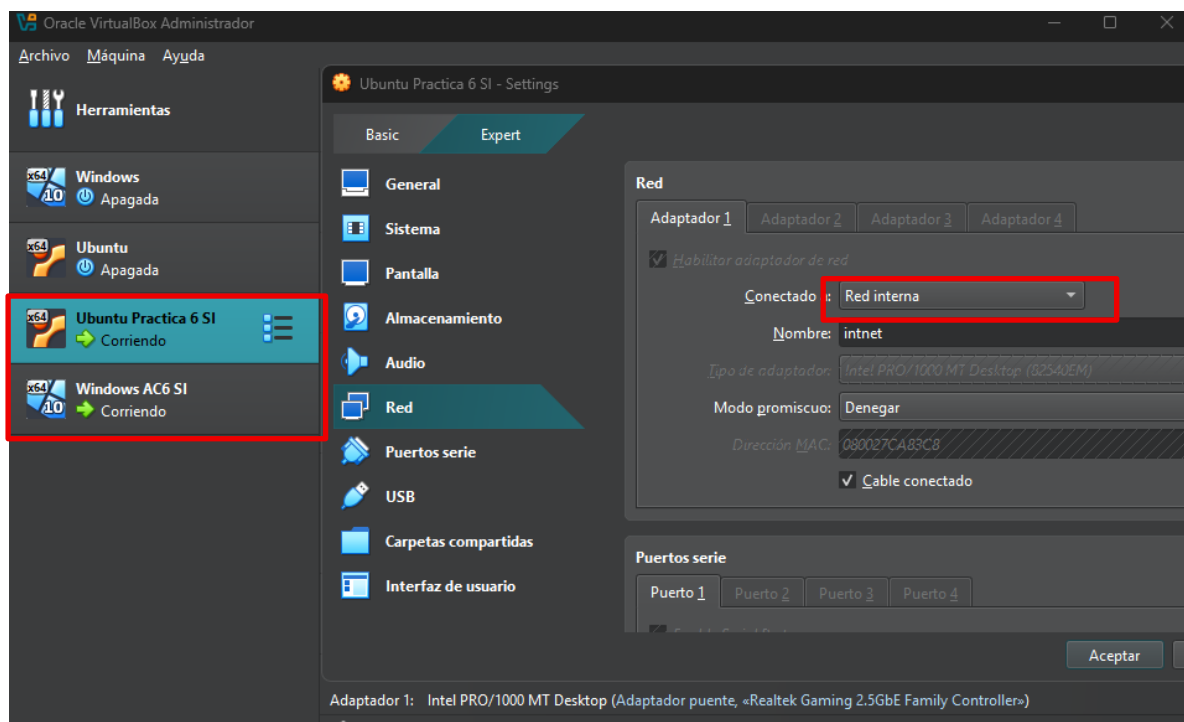
1. ARP

- **Función:** Muestra la caché ARP (traducción IP ↔ MAC).
- **Ejemplo real:** `arp -a`
- **Caso ficticio:** Verificar si una IP responde pero su dirección MAC es incorrecta (posible spoofing).

2. IP Route Show (Linux)

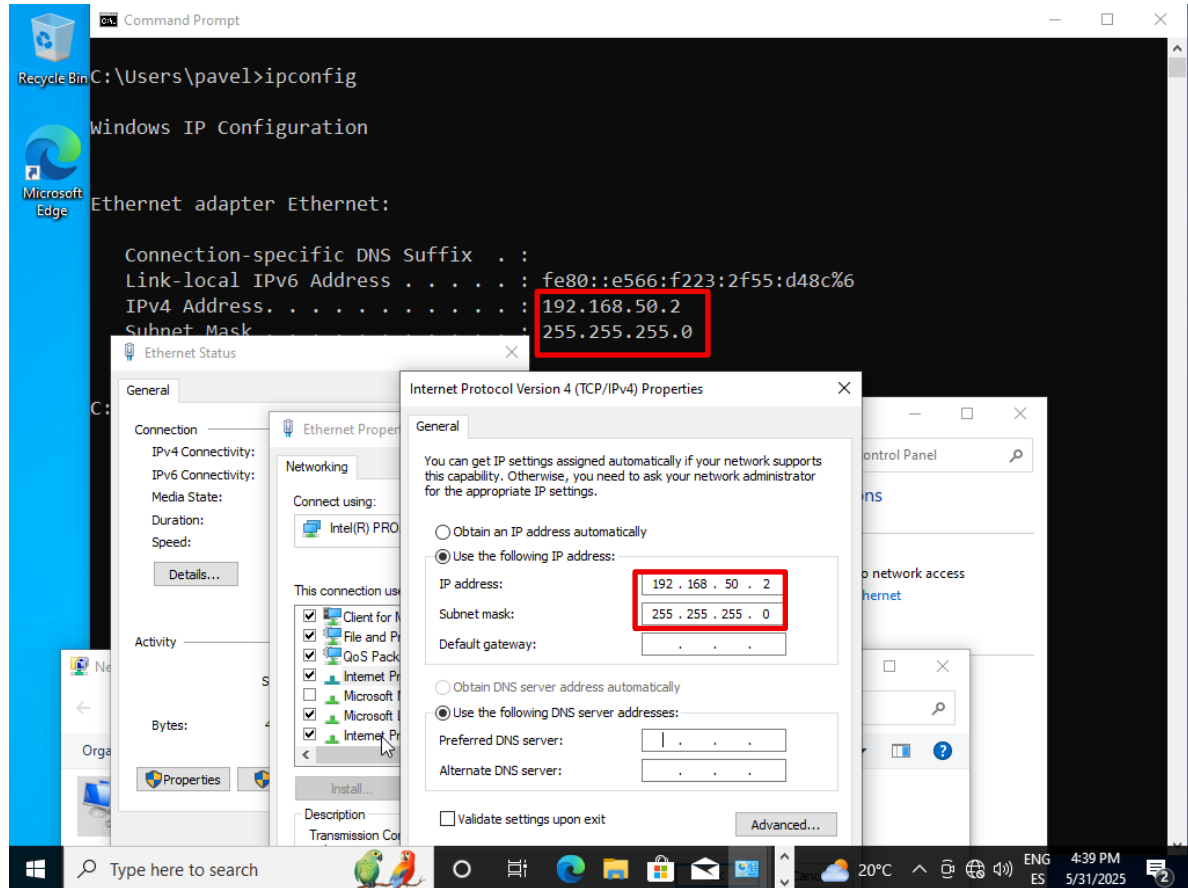
- **Función:** Muestra tabla de enrutamiento.
- **Ejemplo real:** `ip route show`
- **Caso ficticio:** Comprobar si una ruta predeterminada está mal configurada y bloquea el acceso a Internet.

7. A continuación, cambia la configuración a red interna y repite las mismas pruebas.



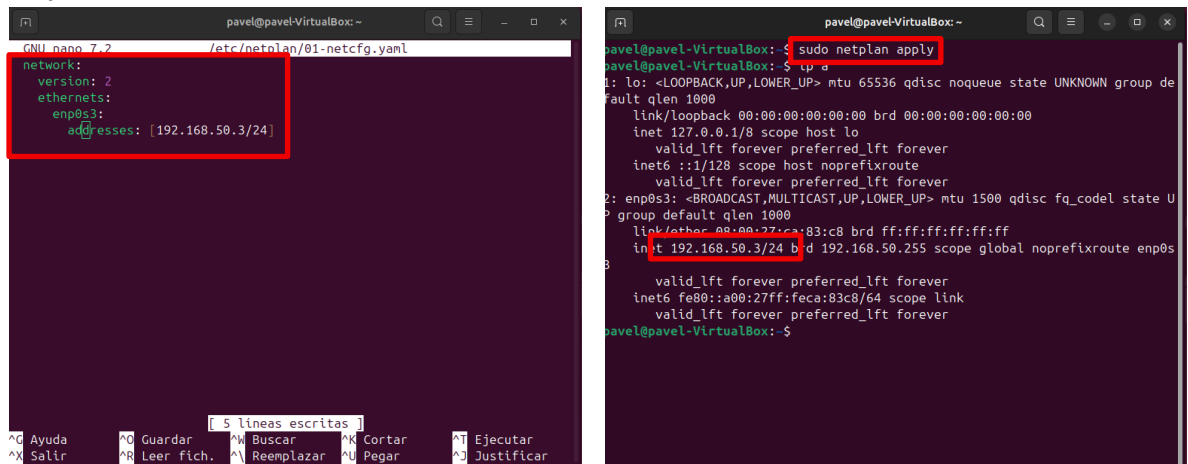
Como no hay servidor DHCP en red interna, se debe asignar IPs manualmente en ambas VM's para que puedan comunicarse entre ellas.

Windows:



Lo hacemos por el panel de control, entramos en los ajustes de la conexión y asignamos la ip 192.168.50.2

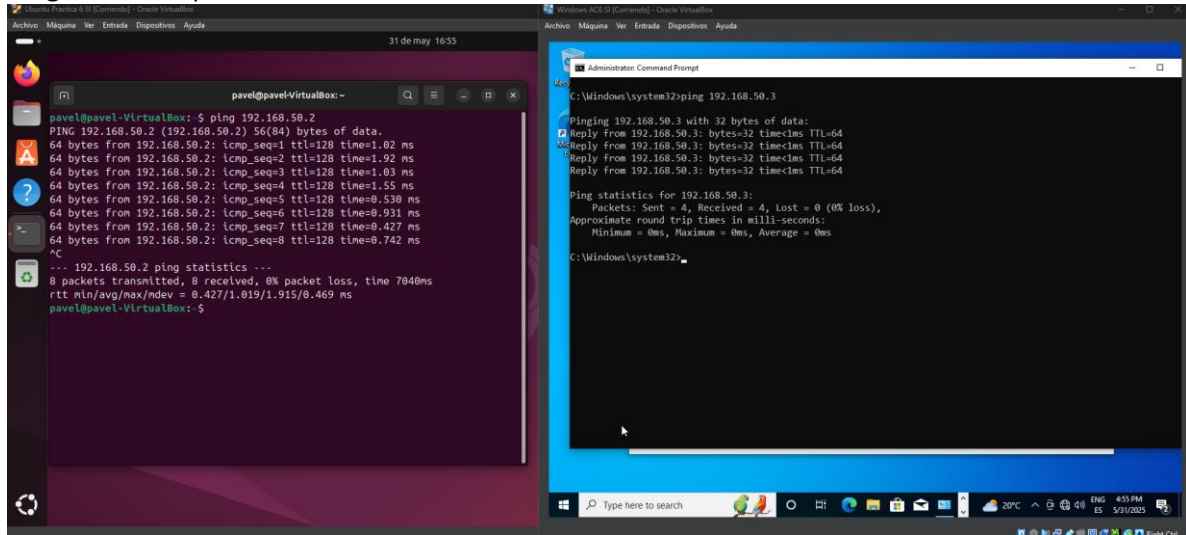
Linux:



En Linux tenemos que configurar un fichero de manera como esta en la captura y después aplicar

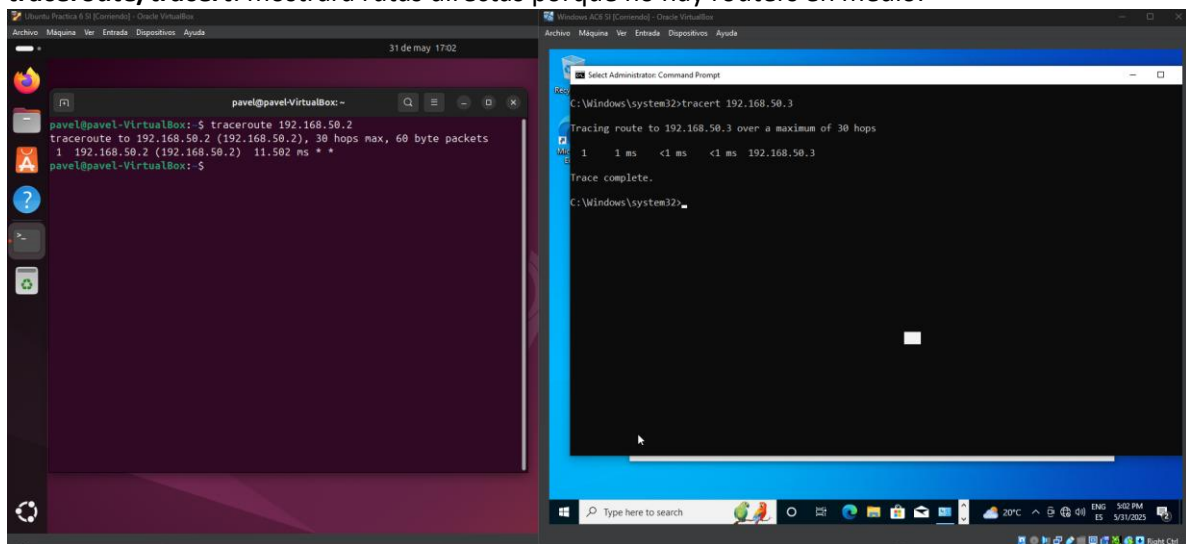
los cambios con “sudo netplan apply”

Ping: entre maquinas



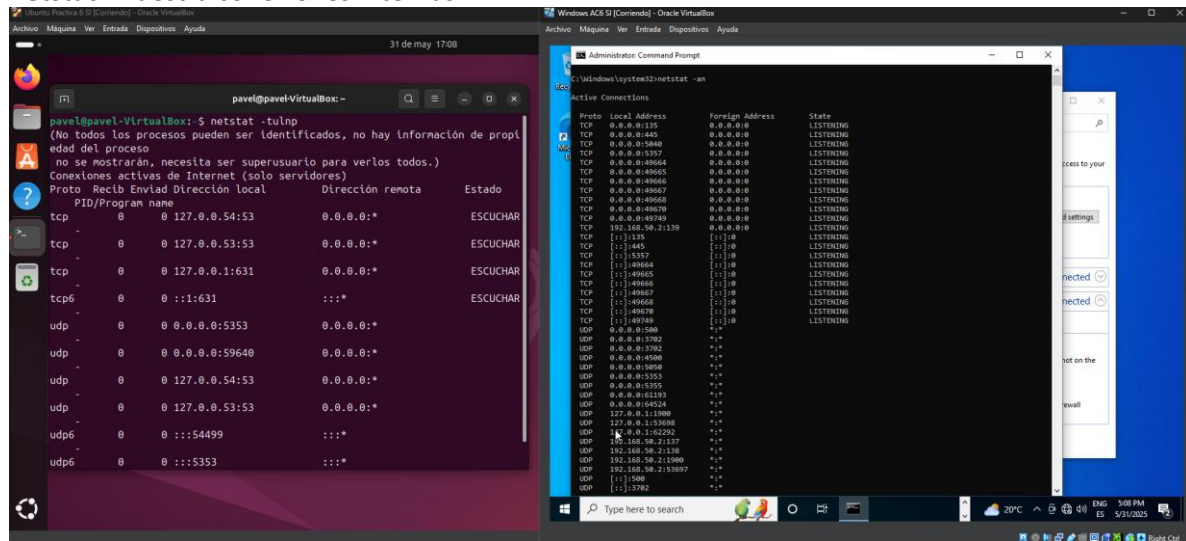
The image shows two terminal windows side-by-side. The left window is a Linux terminal (Ubuntu) with the prompt 'pavel@pavel-VirtualBox:~\$'. It shows the command 'ping 192.168.50.2' being executed, resulting in 8 successful pings with varying times (e.g., 1.02 ms, 1.92 ms, 1.03 ms, 1.55 ms, 0.530 ms, 0.931 ms, 0.427 ms, 0.742 ms). The right window is a Windows Command Prompt (Administrator) with the prompt 'C:\Windows\system32>'. It shows the command 'ping 192.168.50.3' being executed, resulting in 4 successful pings with a time of 0 ms each. The ping statistics for 192.168.50.3 show: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Minimum = 0ms, Maximum = 0ms, Average = 0ms.

tracert/traceroute: mostrará rutas directas porque no hay routers en medio.



The image shows two terminal windows side-by-side. The left window is a Linux terminal (Ubuntu) with the prompt 'pavel@pavel-VirtualBox:~\$'. It shows the command 'traceroute 192.168.50.2' being executed, resulting in a single hop to 192.168.50.2 with a time of 11.502 ms. The right window is a Windows Command Prompt (Administrator) with the prompt 'C:\Windows\system32>'. It shows the command 'tracert 192.168.50.3' being executed, resulting in a single hop to 192.168.50.3 with a time of 1 ms. The traceroute is complete.

netstat: muestra conexiones internas.



No funcionará en modo interno:

- **nslookup y acceso a Internet:** No hay salida a Internet ni servidor DNS disponible, por lo que no se puede resolver nombres de dominio ni acceder a sitios web externos.
- **traceroute a IPs públicas:** Al no haber una puerta de enlace o router en la red interna, no se puede rastrear rutas hacia direcciones externas.

8. Documenta todos los resultados en un informe breve.

Se cambiaron dos máquinas virtuales a modo de red interna con IPs manuales en el mismo rango y se repitieron pruebas de conectividad. El ping entre ellas fue exitoso, confirmando comunicación local. Traceroute mostró rutas directas sin saltos, y netstat indicó puertos y conexiones locales activos. Sin embargo, nslookup y accesos a IPs públicas fallaron, porque la red interna no tiene acceso a Internet ni servidores DNS.