Fundamentos de Redes de Datos
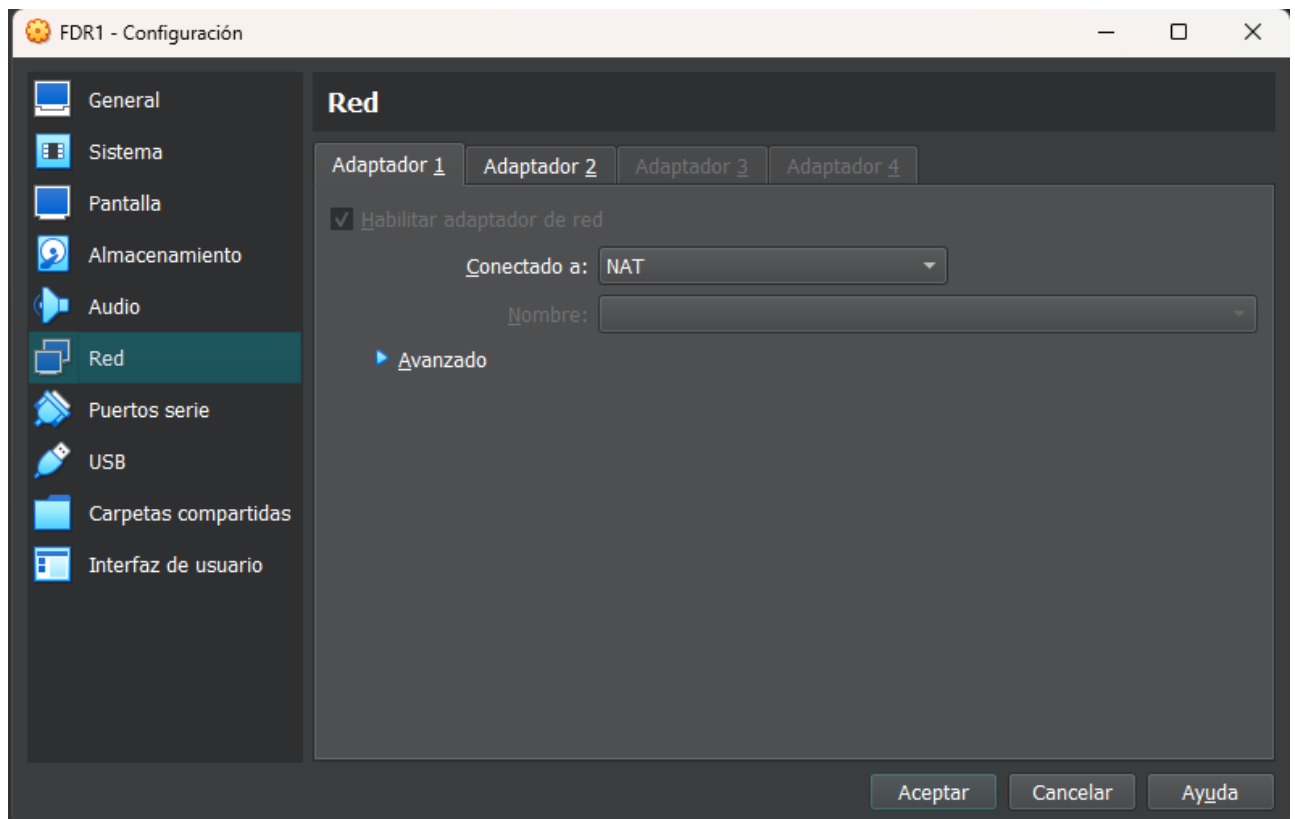
Práctica 6: Creación de redes LAN mediante herramientas de virtualización - Maquinas Virtuales

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6. Modo de red: NAT

Tarea 6.1

- Utilizando la máquina virtual FDR1, configúrale como tarjeta de red el segundo adaptador en modo NAT.

- Arranca la máquina virutal. Consulta y anota la dirección IP asignada a la tarjeta de red. Para consultar la configuración de las tarjetas de red en una máquina con sistema operativo Linux emplea el comando **ip** (**#ip a**). ¿Cumple con el esquema de numeración por defecto empleado por VirtualBox?

```
localhost:~ # 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
        valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP
 ↪   group default qlen 1000
    link/ether 08:00:27:69:fa:2b brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute eth0
        valid_lft 85911sec preferred_lft 85911sec
    inet6 fe80::e167:c6d8:d4b7:c78f/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
3: eth5: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP
 ↪   group default qlen 1000
    link/ether 08:00:27:12:03:cd brd ff:ff:ff:ff:ff:ff
    inet 10.0.3.15/24 brd 10.0.3.255 scope global dynamic noprefixroute eth5
        valid_lft 85911sec preferred_lft 85911sec
    inet6 fe80::6d09:b862:1296:65f/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
```

La IP es 10.03.15 porque hemos actividado la tarjeta 2 y el plan de direccionamiento se cumple.

- Consulta y anota la dirección IP del anfitrión. **#ip a**

  192.168.56.1

- Haz un ping desde la máquina virtual anfitrión. ¿Ha tenido éxito?

```
localhost:/home/fdr1 # ping 192.168.56.1
PING 192.168.56.1 (192.168.56.1) 56(84) bytes of data.
64 bytes from 192.168.56.1: icmp_seq=1 ttl=127 time=5.85 ms
64 bytes from 192.168.56.1: icmp_seq=2 ttl=127 time=2.05 ms
64 bytes from 192.168.56.1: icmp_seq=3 ttl=127 time=1.81 ms
64 bytes from 192.168.56.1: icmp_seq=4 ttl=127 time=1.34 ms
64 bytes from 192.168.56.1: icmp_seq=5 ttl=127 time=1.18 ms
64 bytes from 192.168.56.1: icmp_seq=6 ttl=127 time=3.73 ms
64 bytes from 192.168.56.1: icmp_seq=7 ttl=127 time=1.96 ms
64 bytes from 192.168.56.1: icmp_seq=8 ttl=127 time=1.69 ms
64 bytes from 192.168.56.1: icmp_seq=9 ttl=127 time=1.30 ms
64 bytes from 192.168.56.1: icmp_seq=10 ttl=127 time=2.26 ms
64 bytes from 192.168.56.1: icmp_seq=11 ttl=127 time=2.07 ms
64 bytes from 192.168.56.1: icmp_seq=12 ttl=127 time=3.27 ms
^C
--- 192.168.56.1 ping statistics ---
12 packets transmitted, 12 received, 0% packet loss, time 11127ms
rtt min/avg/max/mdev = 1.182/2.374/5.845/1.274 ms
```

  En la máquina virtual si tenemos éxito.

- Haz un ping desde la máquina anfitrión a la máquina virtual. ¿Ha tenido éxito?

```
(base) PS C:\Users\fcoja> ping 10.0.3.15
```

```
Haciendo ping a 10.0.3.15 con 32 bytes de datos:
Tiempo de espera agotado para esta solicitud.
Tiempo de espera agotado para esta solicitud.
Tiempo de espera agotado para esta solicitud.
Tiempo de espera agotado para esta solicitud.

Estadísticas de ping para 10.0.3.15:
    Paquetes: enviados = 4, recibidos = 0, perdidos = 4
    (100% perdidos),
```

No hay conexión de fuera hacia dentro, que lo hacemos en modo NAT.

Tarea 6.2

- Instalar un servidor ssh en la máquina virtual FDR1. SSH *(Secure SHell)* es un servicio más avanzado que permite la conexión remota:

```
localhost:/home/fdr1 # zypper install openssh
Cargando datos del repositorio...
Leyendo los paquetes instalados...
'openssh' ya está instalado.
```

- Añadir la iniciación del servidor telnet al sistema de arranque:

```
localhost:/home/fdr1 # systemctl start sshd
localhost:/home/fdr1 # systemctl status sshd
  sshd.service - OpenSSH Daemon
     Loaded: loaded (/usr/lib/systemd/system/sshd.service; disabled; preset:
     ↪ disabled)
     Active: active (running) since Sat 2024-12-21 17:50:25 CET; 5s ago
    Process: 5551 ExecStartPre=/usr/sbin/sshd-gen-keys-start (code=exited,
     ↪ status=0/SUCCESS)
    Process: 5554 ExecStartPre=/usr/sbin/sshd -t $SSHD_OPTS (code=exited,
     ↪ status=0/SUCCESS)
   Main PID: 5556 (sshd)
      Tasks: 1
        CPU: 395ms
     CGroup: /system.slice/sshd.service
             5556 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

dic 21 17:50:25 localhost.localdomain systemd[1]: Starting OpenSSH Daemon...
dic 21 17:50:25 localhost.localdomain sshd-gen-keys-start[5551]: Checking for
 ↪ missing server keys in /etc/ssh
dic 21 17:50:25 localhost.localdomain sshd-gen-keys-start[5552]: ssh-keygen:
 ↪ generating new host keys: RSA EC>
dic 21 17:50:25 localhost.localdomain sshd[5556]: Server listening on 0.0.0.0
 ↪ port 22.
dic 21 17:50:25 localhost.localdomain sshd[5556]: Server listening on :: port
 ↪ 22.
dic 21 17:50:25 localhost.localdomain systemd[1]: Started OpenSSH Daemon.
```

```
localhost:/home/fdr1 # systemctl enable sshd
Created symlink /etc/systemd/system/multi-user.target.wants/sshd.service →
↪   /usr/lib/systemd/system/sshd.service.
```

- Emplear la opción de reenvío de puertos ofrecida por VirtualBox para permitir la conexión telnet a la máquina virtual desde la máquina anfitrión. El puerto TCP asociado al servicio ssh es el puerto 22

- ¿Cómo puedes comprobar la correcta ejecución de esta tarea?

```
localhost:/home/fdr1 # ssh fdr1@10.0.3.15
The authenticity of host '10.0.3.15 (10.0.3.15)' can't be established.
ED25519 key fingerprint is SHA256:Oi6r5AhwwO3K79WmnePAnaxCIUIVquCM9uwrz70J1yQ.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? y
Please type 'yes', 'no' or the fingerprint: yes
Warning: Permanently added '10.0.3.15' (ED25519) to the list of known hosts.
(fdr1@10.0.3.15) Password:
Have a lot of fun...
```

- Apaga la máquina virtual.

Tarea 7.1

- Crea una red NAT a la que se conectarán las máquinas virtuales FRD1 y FRD2 mediante su primer adaptador (deshabilita el segundo adaptador de red de FRD1, empleado en el apartado anterior).
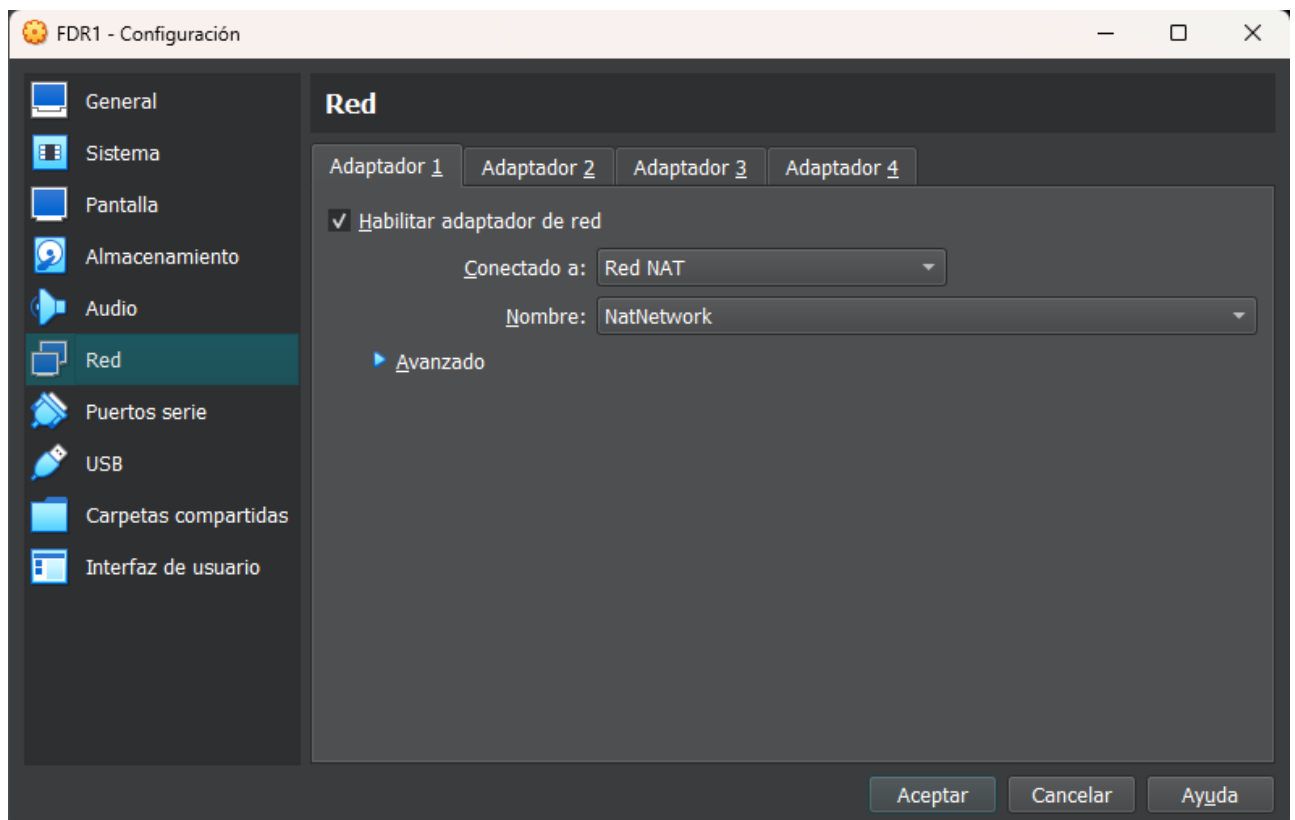
- Arranca ambas máquinas virtuales. Consulta y anota la dirección IP asignada a cada una de ellas.

```
fdr1@localhost:~> 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: eth2: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc pfifo_fast state
↪  DOWN group default qlen 1000
    link/ether 08:00:27:b6:b3:20 brd ff:ff:ff:ff:ff:ff
    altname enp0s3
3: ovs-system: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN group
↪  default qlen 1000
    link/ether 06:54:95:33:12:2f brd ff:ff:ff:ff:ff:ff
4: s1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UNKNOWN
↪  group default qlen 1000
    link/ether 82:60:53:d4:67:4a brd ff:ff:ff:ff:ff:ff
```

```
fdr2@localhost:~> 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: eth1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP
↪  group default qlen 1000
    link/ether 08:00:27:83:d1:0b brd ff:ff:ff:ff:ff:ff
    altname enp0s3
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute eth1
       valid_lft 437sec preferred_lft 437sec
    inet6 fe80::5ac8:3010:77f1:97ea/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
3: ovs-system: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN group default
↪  qlen 1000
    link/ether 96:02:a7:03:95:10 brd ff:ff:ff:ff:ff:ff
4: s1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UNKNOWN
↪  group default qlen 1000
    link/ether 82:60:53:d4:67:4a brd ff:ff:ff:ff:ff:ff
```

- Haz un ping desde una máquina virtual de la red NAT a la máquina anfitrión. ¿Ha tenido éxito?

```
fdr2@localhost:~> ping 192.168.56.1
PING 192.168.56.1 (192.168.56.1) 56(84) bytes of data.
```

```
64 bytes from 192.168.56.1: icmp_seq=1 ttl=127 time=5.68 ms
64 bytes from 192.168.56.1: icmp_seq=2 ttl=127 time=2.09 ms
64 bytes from 192.168.56.1: icmp_seq=3 ttl=127 time=1.96 ms
64 bytes from 192.168.56.1: icmp_seq=4 ttl=127 time=2.26 ms
64 bytes from 192.168.56.1: icmp_seq=5 ttl=127 time=1.15 ms
64 bytes from 192.168.56.1: icmp_seq=6 ttl=127 time=1.37 ms
64 bytes from 192.168.56.1: icmp_seq=7 ttl=127 time=2.02 ms
^C
--- 192.168.56.1 ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 6015ms
rtt min/avg/max/mdev = 1.153/2.361/5.683/1.406 ms
```

- Haz un ping desde la máquina anfitrión a una máquina virtual de la red NAT. ¿Ha tenido éxito?

```
(base) PS C:\Users\fcoja> ping 10.0.2.15

Haciendo ping a 10.0.2.15 con 32 bytes de datos:
Tiempo de espera agotado para esta solicitud.
Tiempo de espera agotado para esta solicitud.
Tiempo de espera agotado para esta solicitud.
Tiempo de espera agotado para esta solicitud.

Estadísticas de ping para 10.0.2.15:
    Paquetes: enviados = 4, recibidos = 0, perdidos = 4
    (100% perdidos),
```

- Haz un ping desde una máquina virtual de la red NAT a otra. ¿Ha tenido éxito?

```
fdr2@localhost:~> ping 10.0.2.15
PING 10.0.2.15 (10.0.2.15) 56(84) bytes of data.
64 bytes from 10.0.2.15: icmp_seq=1 ttl=64 time=1.09 ms
64 bytes from 10.0.2.15: icmp_seq=2 ttl=64 time=0.387 ms
64 bytes from 10.0.2.15: icmp_seq=3 ttl=64 time=0.048 ms
64 bytes from 10.0.2.15: icmp_seq=4 ttl=64 time=0.050 ms
64 bytes from 10.0.2.15: icmp_seq=5 ttl=64 time=0.078 ms
64 bytes from 10.0.2.15: icmp_seq=6 ttl=64 time=0.114 ms
64 bytes from 10.0.2.15: icmp_seq=7 ttl=64 time=0.057 ms
64 bytes from 10.0.2.15: icmp_seq=8 ttl=64 time=0.071 ms
64 bytes from 10.0.2.15: icmp_seq=9 ttl=64 time=0.080 ms
^C
--- 10.0.2.15 ping statistics ---
9 packets transmitted, 9 received, 0% packet loss, time 8177ms
rtt min/avg/max/mdev = 0.048/0.219/1.086/0.322 ms
```

- Apaga ambas máquinas virtuales.

Tarea 8.1

- En la máquina virtual FRD1, cambia el modo de red el primer interfaz y configúralo en modo Adaptador Puente o modo Bridge.
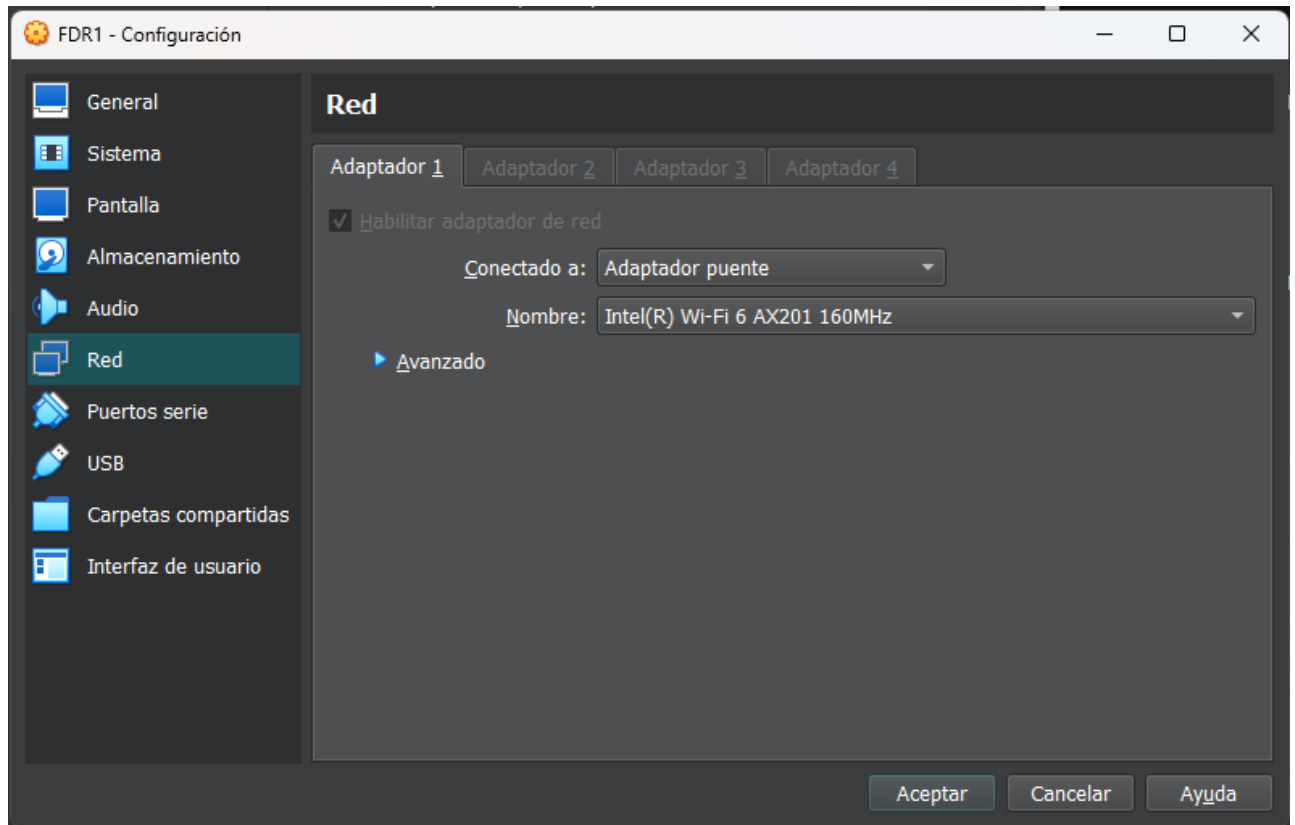
- Arranca la máquina virtual y averigua la dirección IP de la tarjeta. ¿Cómo crees que ha obtenido la máquina virtual dicha dirección IP?

```
fdr1@localhost:~> 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: eth2: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP
 ↪   group default qlen 1000
    link/ether 08:00:27:b6:b3:20 brd ff:ff:ff:ff:ff:ff
    altname enp0s3
    inet 192.168.18.24/24 brd 192.168.18.255 scope global dynamic
       ↪   noprefixroute eth2
       valid_lft 3596sec preferred_lft 3596sec
    inet6 fe80::3058:70d4:6136:4738/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
3: ovs-system: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN group
 ↪   default qlen 1000
    link/ether e2:80:dd:ce:26:94 brd ff:ff:ff:ff:ff:ff
4: s1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UNKNOWN
 ↪   group default qlen 1000
    link/ether 82:60:53:d4:67:4a brd ff:ff:ff:ff:ff:ff
```

- Haz un ping de la máquina virtual a la máquina anfitriona. ¿Ha tenido éxito?

```
fdr1@localhost:~> ping 192.168.56.1
PING 192.168.56.1 (192.168.56.1) 56(84) bytes of data.
^C
--- 192.168.56.1 ping statistics ---
14 packets transmitted, 0 received, 100% packet loss, time 13319ms
```

  No funciona bien, lo más probable es que sea por el Firewall.

- Haz un ping de la máquina anfitriona a la máquina virtual. ¿Ha tenido éxito?

```
(base) PS C:\Users\fcoja> ping 192.168.18.24

Haciendo ping a 192.168.18.24 con 32 bytes de datos:
Respuesta desde 192.168.18.24: bytes=32 tiempo<1m TTL=64
Respuesta desde 192.168.18.24: bytes=32 tiempo<1m TTL=64
Respuesta desde 192.168.18.24: bytes=32 tiempo=1ms TTL=64
Respuesta desde 192.168.18.24: bytes=32 tiempo<1m TTL=64

Estadísticas de ping para 192.168.18.24:
    Paquetes: enviados = 4, recibidos = 4, perdidos = 0
    (0% perdidos),
Tiempos aproximados de ida y vuelta en milisegundos:
    Mínimo = 0ms, Máximo = 1ms, Media = 0ms
```

  Aquí si funciona.

- Apaga la máquina virtual FRD1

Tarea 9.1

- Crea una red interna a la que estén conectadas las máquinas virtuales FRD1 y FRD2 usando su primer interfaz de red.

- Arranca las 2 máquinas y asígnales manualmente la siguiente dirección IP: **192.168.8.1/24** a FRD1, **192.168.8.2/24** a FRD2.

```
localhost:/home/fdr1 # ip addr add 192.168.8.2/24 dev eth2
localhost:/home/fdr1 # 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: eth2: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP
↪  group default qlen 1000
```

```
    link/ether 08:00:27:b6:b3:20 brd ff:ff:ff:ff:ff:ff
    altname enp0s3
    inet 192.168.8.2/24 scope global eth2
       valid_lft forever preferred_lft forever
    inet6 fe80::3058:70d4:6136:4738/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
3: ovs-system: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN group default
↪  qlen 1000
    link/ether 4a:aa:37:b7:13:8b brd ff:ff:ff:ff:ff:ff
4: s1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UNKNOWN
↪  group default qlen 1000
    link/ether 82:60:53:d4:67:4a brd ff:ff:ff:ff:ff:ff
```

```
localhost:/home/fdr2 # ip addr add 192.168.8.1/24 dev eth1
localhost:/home/fdr2 # 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: eth1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP
↪  group default qlen 1000
    link/ether 08:00:27:83:d1:0b brd ff:ff:ff:ff:ff:ff
    altname enp0s3
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute eth1
       valid_lft 491sec preferred_lft 491sec
    inet 192.168.8.1/24 scope global eth1
       valid_lft forever preferred_lft forever
    inet6 fe80::5ac8:3010:77f1:97ea/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
3: ovs-system: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN group default
↪  qlen 1000
    link/ether a6:b0:e0:9e:a0:4c brd ff:ff:ff:ff:ff:ff
4: s1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UNKNOWN
↪  group default qlen 1000
    link/ether 82:60:53:d4:67:4a brd ff:ff:ff:ff:ff:ff
```

- Haz un ping entre las máquinas virtuales de la red interna. ¿Ha tenido éxito?

```
localhost:/home/fdr1 # ping 192.168.8.2
PING 192.168.8.2 (192.168.8.2) 56(84) bytes of data.
64 bytes from 192.168.8.2: icmp_seq=1 ttl=64 time=1.83 ms
64 bytes from 192.168.8.2: icmp_seq=2 ttl=64 time=0.039 ms
64 bytes from 192.168.8.2: icmp_seq=3 ttl=64 time=0.049 ms
64 bytes from 192.168.8.2: icmp_seq=4 ttl=64 time=0.044 ms
64 bytes from 192.168.8.2: icmp_seq=5 ttl=64 time=0.046 ms
64 bytes from 192.168.8.2: icmp_seq=6 ttl=64 time=0.171 ms
64 bytes from 192.168.8.2: icmp_seq=7 ttl=64 time=0.105 ms
```

```
64 bytes from 192.168.8.2: icmp_seq=8 ttl=64 time=0.044 ms
64 bytes from 192.168.8.2: icmp_seq=9 ttl=64 time=0.063 ms
64 bytes from 192.168.8.2: icmp_seq=10 ttl=64 time=0.053 ms
^C
--- 192.168.8.2 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9183ms
rtt min/avg/max/mdev = 0.039/0.244/1.829/0.529 ms
```

```
localhost:/home/fdr2 # ping 192.168.8.1
PING 192.168.8.1 (192.168.8.1) 56(84) bytes of data.
64 bytes from 192.168.8.1: icmp_seq=1 ttl=64 time=0.809 ms
64 bytes from 192.168.8.1: icmp_seq=2 ttl=64 time=0.067 ms
64 bytes from 192.168.8.1: icmp_seq=3 ttl=64 time=0.048 ms
64 bytes from 192.168.8.1: icmp_seq=4 ttl=64 time=0.087 ms
64 bytes from 192.168.8.1: icmp_seq=5 ttl=64 time=0.067 ms
64 bytes from 192.168.8.1: icmp_seq=6 ttl=64 time=0.063 ms
64 bytes from 192.168.8.1: icmp_seq=7 ttl=64 time=0.045 ms
64 bytes from 192.168.8.1: icmp_seq=8 ttl=64 time=0.054 ms
64 bytes from 192.168.8.1: icmp_seq=9 ttl=64 time=0.066 ms
64 bytes from 192.168.8.1: icmp_seq=10 ttl=64 time=0.062 ms
^C
--- 192.168.8.1 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9207ms
rtt min/avg/max/mdev = 0.045/0.136/0.809/0.224 ms
```

Ha habido éxito.

- En la máquina FRD1 añade un segundo interfaz de red en modo NAT. Arranca de nuevo la máquina y vuelve a configurar la tarjeta de red que pertenece a la red interna. Comprueba la conectividad de esta máquina con la máquina anfitrión y con el exterior. ¿Has tenido éxito?

```
localhost:/home/fdr1 # ip addr add 192.168.8.1/24 dev eth1
localhost:/home/fdr1 # exit
exit
fdr1@localhost:~> ping 192.168.56.1
PING 192.168.56.1 (192.168.56.1) 56(84) bytes of data.
64 bytes from 192.168.56.1: icmp_seq=1 ttl=127 time=4.76 ms
64 bytes from 192.168.56.1: icmp_seq=2 ttl=127 time=0.944 ms
64 bytes from 192.168.56.1: icmp_seq=3 ttl=127 time=3.81 ms
64 bytes from 192.168.56.1: icmp_seq=4 ttl=127 time=0.979 ms
64 bytes from 192.168.56.1: icmp_seq=5 ttl=127 time=0.998 ms
64 bytes from 192.168.56.1: icmp_seq=6 ttl=127 time=1.03 ms
^C
--- 192.168.56.1 ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5007ms
rtt min/avg/max/mdev = 0.944/2.086/4.761/1.579 ms
```

De la máquina al anfitrión si funciona.

```
fdr1@localhost:~> ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=246 time=17.4 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=246 time=13.9 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=246 time=14.9 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=246 time=16.8 ms
64 bytes from 8.8.8.8: icmp_seq=5 ttl=246 time=13.9 ms
64 bytes from 8.8.8.8: icmp_seq=6 ttl=246 time=16.8 ms
^C
--- 8.8.8.8 ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5008ms
rtt min/avg/max/mdev = 13.867/15.604/17.436/1.447 ms
```

De la máquina al exterior también funciona.

- Comprueba la conectividad desde FRD2 con la máquina anfitrión y con el exterior. ¿Has tenido éxito? Si la respuesta es negativa, qué deberías hacer para que tuviera éxito.

De internet al anfitrión no va a haber conectividad. Estamos haciendo **ping** a una red que no está conectada ya que no le hemos dado su *gateway*. Deberíamos configurar su máquina virtual añadiendo su *gateway* y en FDR1 activar su funcionamiento como router.

- Apaga las máquinas virtuales.

Tarea 10.1

- Crea un adaptador virtual Host-Only y configúralo para que se le asigne la dirección IP 192.168.9.10/24. Configura el servidor DHCP para que asigne direcciones pertenecientes a la red 192.168.9.0/24 a partir de la dirección 192.168.9.101
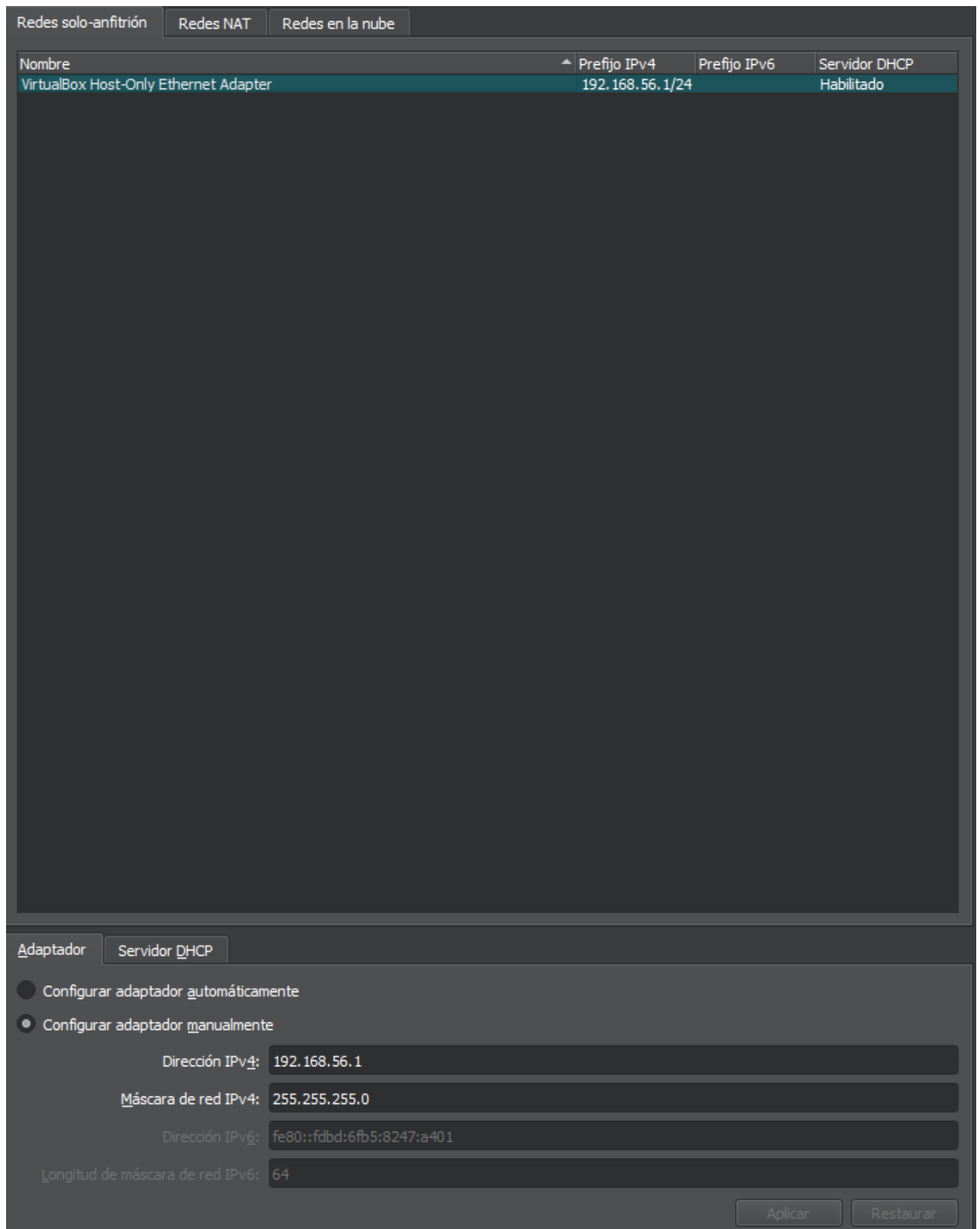
- Deshabilita la configuración de interfaces de red empleadas en apartados anteriores. Ahora, crea una red de modo Host-Only a la que estén conectadas las máquinas virtuales FRD1, FRD2 y el propio anfitrión.

- Arranca las 2 máquinas virtuales y anota las direcciones IP de cada una de ellas.

```
fdr1@localhost:~> ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qle
    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: eth2: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group d
        link/ether 08:00:27:b6:b3:20 brd ff:ff:ff:ff:ff:ff
        altname enp0s3
        inet 192.168.56.101/24 brd 192.168.56.255 scope global dynamic noprefixroute eth2
            valid_lft 511sec preferred_lft 511sec
        inet6 fe80::3058:70d4:6136:4738/64 scope link noprefixroute
            valid_lft forever preferred_lft forever
3: ovs-system: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN group default qle
        link/ether 96:db:ee:33:8a:a8 brd ff:ff:ff:ff:ff:ff
4: s1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UNKNOWN group d
        link/ether 82:60:53:d4:67:4a brd ff:ff:ff:ff:ff:ff
```

```
fdr2@localhost:~> 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: eth1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP
 ↪   group default qlen 1000
        link/ether 08:00:27:83:d1:0b brd ff:ff:ff:ff:ff:ff
        altname enp0s3
        inet 192.168.56.102/24 brd 192.168.56.255 scope global dynamic
         ↪   noprefixroute eth1
            valid_lft 474sec preferred_lft 474sec
        inet6 fe80::5ac8:3010:77f1:97ea/64 scope link noprefixroute
            valid_lft forever preferred_lft forever
3: ovs-system: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN group
 ↪   default qlen 1000
        link/ether 82:18:21:63:60:05 brd ff:ff:ff:ff:ff:ff
4: s1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UNKNOWN
 ↪   group default qlen 1000
        link/ether 82:60:53:d4:67:4a brd ff:ff:ff:ff:ff:ff
```

- Haz un ping entre las máquinas virtuales de la red interna. ¿Han tenido éxito?

```
fdr1@localhost:~> ping 192.168.56.102
PING 192.168.56.102 (192.168.56.102) 56(84) bytes of data.
64 bytes from 192.168.56.102: icmp_seq=1 ttl=64 time=5.73 ms
64 bytes from 192.168.56.102: icmp_seq=2 ttl=64 time=1.29 ms
64 bytes from 192.168.56.102: icmp_seq=3 ttl=64 time=2.45 ms
64 bytes from 192.168.56.102: icmp_seq=4 ttl=64 time=1.03 ms
64 bytes from 192.168.56.102: icmp_seq=5 ttl=64 time=2.09 ms
64 bytes from 192.168.56.102: icmp_seq=6 ttl=64 time=1.99 ms
64 bytes from 192.168.56.102: icmp_seq=7 ttl=64 time=1.87 ms
^C
```

```
--- 192.168.56.102 ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 6021ms
rtt min/avg/max/mdev = 1.034/2.350/5.730/1.449 ms
```

```
fdr2@localhost:~> ping 192.168.56.101
PING 192.168.56.101 (192.168.56.101) 56(84) bytes of data.
64 bytes from 192.168.56.101: icmp_seq=1 ttl=64 time=3.32 ms
64 bytes from 192.168.56.101: icmp_seq=2 ttl=64 time=2.20 ms
64 bytes from 192.168.56.101: icmp_seq=3 ttl=64 time=2.19 ms
64 bytes from 192.168.56.101: icmp_seq=4 ttl=64 time=1.95 ms
64 bytes from 192.168.56.101: icmp_seq=5 ttl=64 time=2.28 ms
64 bytes from 192.168.56.101: icmp_seq=6 ttl=64 time=1.46 ms
64 bytes from 192.168.56.101: icmp_seq=7 ttl=64 time=1.56 ms
^C
--- 192.168.56.101 ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 6019ms
rtt min/avg/max/mdev = 1.455/2.136/3.322/0.569 ms
```

Se han conectado correctamente.

- Haz un ping entre FRD1 y el interfaz de red Host-Only. ¿Han tenido éxito?

```
fdr1@localhost:~> ping 192.168.56.1
PING 192.168.56.1 (192.168.56.1) 56(84) bytes of data.
64 bytes from 192.168.56.1: icmp_seq=1 ttl=128 time=4.49 ms
64 bytes from 192.168.56.1: icmp_seq=2 ttl=128 time=0.988 ms
64 bytes from 192.168.56.1: icmp_seq=3 ttl=128 time=1.09 ms
64 bytes from 192.168.56.1: icmp_seq=4 ttl=128 time=1.05 ms
64 bytes from 192.168.56.1: icmp_seq=5 ttl=128 time=1.02 ms
64 bytes from 192.168.56.1: icmp_seq=6 ttl=128 time=1.22 ms
64 bytes from 192.168.56.1: icmp_seq=7 ttl=128 time=0.573 ms
^C
--- 192.168.56.1 ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 6036ms
rtt min/avg/max/mdev = 0.573/1.490/4.486/1.236 ms
```

Ha funcionado correctamente ya que FDR1 está conectada a la misma red Host-Only.

- Haz un ping entre FRD1 y la tarjeta física del equipo anfitrión ¿Ha tenido éxito? Aquí no tiene éxito porque no tiene acceso a la red externa.