

Práctica 3

Tarea 1: Configuración del direccionamiento IP

Comandos para añadir las direcciones IP:

```
silviu@ubuntuvm:~$ sudo ip addr add 10.10.5.5/32 dev lo
[sudo] password for silviu:
silviu@ubuntuvm:~$ sudo ip addr add 3ff::5/122 dev ens33
silviu@ubuntuvm:~$ ip addr show
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
    inet 10.10.5.5/32 scope global lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 00:0c:29:1c:36:a2 brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.64.129/24 brd 192.168.64.255 scope global dynamic noprefixroute ens33
        valid_lft 1130sec preferred_lft 1130sec
    inet6 3ff::5/122 scope global
        valid_lft forever preferred_lft forever
    inet6 fe80::cbf2:802f:80cf:f186/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
```

Comandos para eliminar las direcciones IP:

```
silviu@ubuntuvm:~$ sudo ip addr del 10.10.5.5/32 dev lo
silviu@ubuntuvm:~$ sudo ip addr del 3ff::5/122 dev ens33
silviu@ubuntuvm:~$ ip addr show
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: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 00:0c:29:1c:36:a2 brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.64.129/24 brd 192.168.64.255 scope global dynamic noprefixroute ens33
        valid_lft 937sec preferred_lft 937sec
    inet6 fe80::cbf2:802f:80cf:f186/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
```

Tarea 2: Configuración de rutas estáticas

Ip addr show de ambas máquinas (a partir de ahora identificaremos la terminal de la izquierda como la de la máquina virtual VM1, y la de la derecha como la de VM2):

```
silviu@ubuntu:~$ ip addr show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default
    tqlen 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: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 00:0c:29:1c:36:a2 brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.64.129/24 brd 192.168.64.255 scope global dynamic noprefixroute
        valid_lft 1145sec preferred_lft 1145sec
    inet6 fe80::cbf2:802f:80cf:f186/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
silviu@ubuntu:~$
```

```
silviu@ubuntu:~$ ip addr show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default
    tqlen 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: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 00:0c:29:68:f1:15 brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.64.130/24 brd 192.168.64.255 scope global dynamic noprefixroute
        valid_lft 1122sec preferred_lft 1122sec
    inet6 fe80::a5d7:a48c:4c58:23ca/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
silviu@ubuntu:~$
```

Primero asignamos las direcciones indicadas:

```
silviu@ubuntu:~$ sudo ip addr add 10.10.1.1/32 dev lo
silviu@ubuntu:~$ ip addr show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default
    tqlen 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
    inet 10.10.1.1/32 scope global lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 00:0c:29:1c:36:a2 brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.64.129/24 brd 192.168.64.255 scope global dynamic noprefixroute
        valid_lft 1010sec preferred_lft 1010sec
    inet6 fe80::cbf2:802f:80cf:f186/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
silviu@ubuntu:~$
```

```
silviu@ubuntu:~$ sudo ip addr add 10.10.2.1/32 dev lo
silviu@ubuntu:~$ ip addr show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default
    tqlen 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
    inet 10.10.2.1/32 scope global lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 00:0c:29:68:f1:15 brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.64.130/24 brd 192.168.64.255 scope global dynamic noprefixroute
        valid_lft 925sec preferred_lft 925sec
    inet6 fe80::a5d7:a48c:4c58:23ca/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
silviu@ubuntu:~$
```

Después configuramos las rutas estáticas, siendo el próximo salto las direcciones IP obtenidas mediante el comando **ip addr show** (192.168.64.129 en el caso de VM1 y 192.168.64.130 en el caso de VM2). Mediante **ip route show** podemos ver que se han creado correctamente las rutas:

```
silviu@ubuntu:~$ sudo ip route add 10.10.2.1/32 via 192.168.64.129 dev ens33
silviu@ubuntu:~$ ip route show
default via 192.168.64.2 dev ens33 proto dhcp metric 100
10.10.2.1 via 192.168.64.129 dev ens33
169.254.0.0/16 dev ens33 scope link metric 1000
192.168.64.0/24 dev ens33 proto kernel scope link src 192.168.64.129 metric 100
silviu@ubuntu:~$
```

```
silviu@ubuntu:~$ sudo ip route add 10.10.1.1/32 via 192.168.64.130 dev ens33
silviu@ubuntu:~$ ip route show
default via 192.168.64.2 dev ens33 proto dhcp metric 100
10.10.1.1 via 192.168.64.130 dev ens33
169.254.0.0/16 dev ens33 scope link metric 1000
192.168.64.0/24 dev ens33 proto kernel scope link src 192.168.64.130 metric 100
silviu@ubuntu:~$
```

Comprobamos la conectividad realizando un **ping** a las rutas creadas:

```
silviu@ubuntu:~$ ping 10.10.2.1
PING 10.10.2.1 (10.10.2.1) 56(84) bytes of data.
64 bytes from 10.10.2.1: icmp_seq=1 ttl=64 time=1.33 ms
64 bytes from 10.10.2.1: icmp_seq=2 ttl=64 time=0.587 ms
64 bytes from 10.10.2.1: icmp_seq=3 ttl=64 time=0.470 ms
64 bytes from 10.10.2.1: icmp_seq=4 ttl=64 time=0.520 ms
64 bytes from 10.10.2.1: icmp_seq=5 ttl=64 time=0.833 ms
^C
--- 10.10.2.1 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4074ms
rtt min/avg/max/mdev = 0.470/0.748/1.334/0.318 ms
silviu@ubuntu:~$
```

```
silviu@ubuntu:~$ ping 10.10.1.1
PING 10.10.1.1 (10.10.1.1) 56(84) bytes of data.
64 bytes from 10.10.1.1: icmp_seq=1 ttl=64 time=0.779 ms
64 bytes from 10.10.1.1: icmp_seq=2 ttl=64 time=0.552 ms
64 bytes from 10.10.1.1: icmp_seq=3 ttl=64 time=0.404 ms
^C
--- 10.10.1.1 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2053ms
rtt min/avg/max/mdev = 0.404/0.578/0.779/0.154 ms
silviu@ubuntu:~$
```

Eliminamos las rutas en ambos casos y mediante el comando **ip route show** nos aseguramos de que se han borrado correctamente. Si volvemos a realizar los mismos pings, observamos que ya no hay conectividad por dichas rutas:

```
silviu@ubuntu:~$ ip route show
default via 192.168.64.2 dev ens33 proto dhcp metric 100
10.10.2.1 via 192.168.64.129 dev ens33
169.254.0.0/16 dev ens33 scope link metric 1000
192.168.64.0/24 dev ens33 proto kernel scope link src 192.168.64.129 metric 100
silviu@ubuntu:~$ sudo ip route del 10.10.2.1/32 via 192.168.64.129 dev ens33
silviu@ubuntu:~$ ip route show
default via 192.168.64.2 dev ens33 proto dhcp metric 100
169.254.0.0/16 dev ens33 scope link metric 1000
192.168.64.0/24 dev ens33 proto kernel scope link src 192.168.64.129 metric 100
silviu@ubuntu:~$ ping 10.10.2.1
PING 10.10.2.1 (10.10.2.1) 56(84) bytes of data.
^C
--- 10.10.2.1 ping statistics ---
5 packets transmitted, 0 received, 100% packet loss, time 4104ms
silviu@ubuntu:~$
```

```
silviu@ubuntu:~$ ip route show
default via 192.168.64.2 dev ens33 proto dhcp metric 100
10.10.1.1 via 192.168.64.130 dev ens33
169.254.0.0/16 dev ens33 scope link metric 1000
192.168.64.0/24 dev ens33 proto kernel scope link src 192.168.64.130 metric 100
silviu@ubuntu:~$ sudo ip route del 10.10.1.1/32 via 192.168.64.130 dev ens33
silviu@ubuntu:~$ ip route show
default via 192.168.64.2 dev ens33 proto dhcp metric 100
169.254.0.0/16 dev ens33 scope link metric 1000
192.168.64.0/24 dev ens33 proto kernel scope link src 192.168.64.130 metric 100
silviu@ubuntu:~$ ping 10.10.1.1
PING 10.10.1.1 (10.10.1.1) 56(84) bytes of data.
^C
--- 10.10.1.1 ping statistics ---
4 packets transmitted, 0 received, 100% packet loss, time 3059ms
silviu@ubuntu:~$
```

Tarea 3: Configuración de protocolos de encaminamiento

Las redes 10.10.1.1/32 y 10.10.2.1/32 ya están definidas en las interfaces de *loopback* de ambas máquinas en el apartado anterior.

Editamos el archivo de configuración *zebra.conf*, en la ruta *etc/quagga* de ambas VDI's, con su respectiva enumeración de las interfaces. Para ver las interfaces utilizamos el comando **ip link show**, o a través de **ip addr show**:

```
silviu@ubuntuvm:~$ ip link show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN mode DEFAULT
    group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP mode
    DEFAULT group default qlen 1000
    link/ether 00:0c:29:1c:36:a2 brd ff:ff:ff:ff:ff:ff
    altname enp2s1
```

```
silviu@ubuntuvm: /etc/quagga
interface lo
interface ens33

"zebra.conf" 2L, 29C written      2,15      All
```

He utilizado la siguiente configuración (entre otras) para el archivo *ospfd.conf*, sin embargo, las rutas dinámicas no se han visto reflejadas en el contenido de la tabla de rutas después de activar el demonio del protocolo *ospfd* y *zebra*:

```
silviu@ubuntuvm: /etc
hostname ospfd1
router ospf
passive-interface lo
passive-interface ens33
router-id 192.168.64.129
network 192.168.64.0/24 area 0.0.0.1
network 10.10.1.0/32 area 0.0.0.1

"quagga/ospfd.conf" 7L, 174C      3,1      All

silviu@ubuntuvm: /etc
hostname ospfd2
router ospf
passive-interface lo
passive-interface ens33
router-id 192.168.64.130
network 192.168.64.0/24 area 0.0.0.1
network 10.10.2.0/32 area 0.0.0.1

"quagga/ospfd.conf" 7L, 174C      7,1      All
```