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Session 10

1.

After completing the installation of the VM, add the `internal-network` with `sudo virsh attach-interface --type network --source internal-network --model virtio router --persistent`.

Add the following settings for the LAN-interface in `/etc/network/interfaces` on the router.

```
allow-hotplug enp7s0
iface enp7s0 inet dhcp
```

Next step is to setup a static IP-address, which is `192.168.1.254`, for the router within the config of the dhcp.

```
{
  "hw-address": "52:54:00:f0:35:36",
  "ip-address": "192.168.1.254"
}
```

```
router@router:~$ ip -c 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: enp1s0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 52:54:00:d3:f4:28 brd ff:ff:ff:ff:ff:ff
    inet 192.168.200.254/24 brd 192.168.200.255 scope global enp1s0
       valid_lft forever preferred_lft forever
    inet6 fe80::5054:ff:fed3:f428/64 scope link
       valid_lft forever preferred_lft forever
3: enp7s0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 52:54:00:f0:35:36 brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.254/24 brd 192.168.1.255 scope global dynamic enp7s0
       valid_lft 409sec preferred_lft 409sec
    inet6 fe80::5054:ff:fef0:3536/64 scope link
       valid_lft forever preferred_lft forever
```

2.

To allow forwarding on ipv4, edit `/etc/sysctl.conf` and uncomment `net.ipv4.ip_forward = 1`. Save the settings with `sudo sysctl -p`.

```
router@router:~$ sudo sysctl -p
net.ipv4.ip_forward = 1
```

Next is adding the NAT-rule and forwarding-rules.

```
iptables -t nat -A POSTROUTING -o enp1s0 -j MASQUERADE
iptables -A FORWARD -i enp7s0 -o enp1s0 -j ACCEPT
iptables -A FORWARD -i enp1s0 -o enp7s0 -m state --state RELATED,ESTABLISHED -j ACCEPT
```

Use `sudo netfilter-persistent save` to save the iptables and `sudo netfilter-persistent reload` to restart the service.

```
router@router:~$ sudo netfilter-persistent save
run-parts: executing /usr/share/netfilter-persistent/plugins.d/15-ip4tables save
run-parts: executing /usr/share/netfilter-persistent/plugins.d/25-ip6tables save
router@router:~$ sudo netfilter-persistent reload
run-parts: executing /usr/share/netfilter-persistent/plugins.d/15-ip4tables start
run-parts: executing /usr/share/netfilter-persistent/plugins.d/25-ip6tables start
```

3.

Logs of iptables `systemctl status iptables`

```
● netfilter-persistent.service - netfilter persistent configuration
     Loaded: loaded (/lib/systemd/system/netfilter-persistent.service; enabled;>
    Drop-In: /usr/lib/systemd/system/netfilter-persistent.service.d
             └─iptables.conf
     Active: active (exited) since Mon 2024-12-09 14:03:18 CET; 19h ago
       Docs: man:netfilter-persistent(8)
    Process: 253 ExecStart=/usr/sbin/netfilter-persistent start (code=exited, s>
   Main PID: 253 (code=exited, status=0/SUCCESS)
        CPU: 10ms

Dec 09 14:03:18 router netfilter-persistent[261]: run-parts: executing /usr/sha>
Dec 09 14:03:18 router systemd[1]: Starting netfilter-persistent.service - netf>
Dec 09 14:03:18 router netfilter-persistent[261]: run-parts: executing /usr/sha>
Dec 09 14:03:18 router systemd[1]: Finished netfilter-persistent.service - netf>
```

Iptables rules `iptables -t nat -L -n -v`

```
router@router:~$ sudo iptables -t nat -L -n -v
Chain PREROUTING (policy ACCEPT 0 packets, 0 bytes)
 pkts bytes target     prot opt in     out     source               destination

Chain INPUT (policy ACCEPT 0 packets, 0 bytes)
 pkts bytes target     prot opt in     out     source               destination

Chain OUTPUT (policy ACCEPT 0 packets, 0 bytes)
 pkts bytes target     prot opt in     out     source               destination

Chain POSTROUTING (policy ACCEPT 0 packets, 0 bytes)
 pkts bytes target     prot opt in     out     source               destination
    0     0 MASQUERADE  0    --  *      enp1s0  0.0.0.0/0            0.0.0.0/0
```

IPv4 forwarding status `sysctl net.ipv4.ip_forward`

```
router@router:~$ sudo sysctl net.ipv4.ip_forward
net.ipv4.ip_forward = 1
```

4.

Checking if the NAT is successful by pinging `8.8.8.8` on both clients.

- Client 1

```
client1@client1:~$ 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=55 time=3.99 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=55 time=4.25 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=55 time=4.31 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=55 time=4.27 ms
^C
--- 8.8.8.8 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3006ms
rtt min/avg/max/mdev = 3.990/4.205/4.311/0.126 ms
```

- Client 2

```
client2@client2:~$ 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=55 time=4.41 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=55 time=4.09 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=55 time=4.43 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=55 time=4.17 ms

--- 8.8.8.8 ping statistics ---^C
4 packets transmitted, 4 received, 0% packet loss, time 3006ms
rtt min/avg/max/mdev = 4.089/4.274/4.427/0.146 ms
```

5.

To be able to install packages, some changes have to be made in the `/etc/apt/sources.list`. Uncomment the first line and add the following:

```
#deb cdrom:[Debian GNU/Linux 12.8.0 _Bookworm_ - Official amd64 NETINST with fi>

deb http://deb.debian.org/debian/ bookworm main non-free-firmware
deb-src http://deb.debian.org/debian/ bookworm main non-free-firmware

deb http://security.debian.org/debian-security bookworm-security main non-free->
deb-src http://security.debian.org/debian-security bookworm-security main non-f>

# bookworm-updates, to get updates before a point release is made;
# see https://www.debian.org/doc/manuals/debian-reference/ch02.en.html#_updates>
deb http://deb.debian.org/debian/ bookworm-updates main non-free-firmware
deb-src http://deb.debian.org/debian/ bookworm-updates main non-free-firmware

# This system was installed using small removable media
# (e.g. netinst, live or single CD). The matching "deb cdrom"
# entries were disabled at the end of the installation process.
# For information about how to configure apt package sources,
# see the sources.list(5) manual.
```

Now `dnsutils` can be installed on both clients. Testing it with `google.com` gave the following results in both clients.

```
client1@client1:~$ nslookup google.com
Server:         192.168.1.2
Address:        192.168.1.2#53

Non-authoritative answer:
Name:   google.com
Address: 142.251.36.14
Name:   google.com
Address: 2a00:1450:400e:80f::200e
```

```
client2@client2:~$ nslookup google.com
Server:         192.168.1.2
Address:        192.168.1.2#53

Non-authoritative answer:
Name:   google.com
Address: 142.251.36.14
Name:   google.com
Address: 2a00:1450:400e:80f::200e
```