Task 2

1. Use already created internal-network for three VMs (VM1-VM3). VM1 has NAT and internal, VM2, VM3 – internal only interfaces.

2. Install and configure DHCP server on VM1. (3 ways: using VBoxManage, DNSMASQ and ISC-DHSPSERVER). You should use at least 2 of them.

```
# If you want dnsmasq to change uid and gid to something other
# than the default, edit the following lines.
user=dnsmasq
group=dnsmasq

# If you want dnsmasq to listen for DHCP and DNS requests only on
# specified interfaces (and the loopback) give the name of the
# interface (eg eth0) here.
# Repeat the line for more than one interface.
interface=enp0s8
# Or you can specify which interface _not_ to listen on
#except-interface=
# Or which to listen on by address (remember to include 127.0.0.1 if
# you use this.)
#listen-address=
# If you want dnsmasq to provide only DNS service on an interface,
# configure it as shown above, and then use the following line to
# disable DHCP and TFTP on it.
#no-dhcp-interface=
```

```
# Same idea, but range rather then subnet
#domain=reserved.thekelleys.org.uk,192.68.3.100,192.168.3.200

# Uncomment this to enable the integrated DHCP server, you need
# to supply the range of addresses available for lease and optionally
# a lease time. If you have more than one network, you will need to
# repeat this for each network on which you want to supply DHCP
# service.
dhcp-range=192.168.30.50,192.168.30.150,12h

# This is an example of a DHCP range where the netmask is given. This
# is needed for networks we reach the dnsmasq DHCP server via a relay
# agent. If you don't know what a DHCP relay agent is, you probably
# don't need to worry about this.
#dhcp-range=192.168.0.50,192.168.0.150,255.255.255.0,12h
```

3. Check VM2 and VM3 for obtaining network addresses from DHCP server.

```
student@CsnKhai:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group defaul
t
    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 gr
oup default qlen 1000
    link/ether 08:00:27:6d:16:d3 brd ff:ff:ff:ff:ff:ff
    inet6 fe80::a00:27ff:fe6d:16d3/64 scope link
       valid_lft forever preferred_lft forever
student@CsnKhai:~$ _
```

```
student@CsnKhai:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group defaul
t
    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 gr
oup default qlen 1000
    link/ether 08:00:27:6d:16:d3 brd ff:ff:ff:ff:ff:ff
    inet 192.168.30.50/24 brd 192.168.30.255 scope global eth0
       valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fe6d:16d3/64 scope link
       valid_lft forever preferred_lft forever
student@CsnKhai:~$ _
```

4. Using existed network for three VMs (from p.1) install and configure DNS server on VM1. (You can use DNSMASQ, BIND9 or something else).

```
#nameserver 8.8.8.8
nameserver 127.0.0.1
~
~
```

```
# DHCP Client Configuration file.
#   see /usr/share/doc/dhclient/dhclient.conf.example
#   see dhclient.conf(5) man page
#
# Send client identifier as "hardware-type.link-layer address" (e.g. "1.c2.23.7d.c3.52.2c")
# Required in environments where a bridge might be clobbering the forwarded
# packet's MAC address (common in Wifi, Docsis, or ADSL bridging scenarios)
# see dhcp-options(5) man page for 'dhcp-client-identifier'
# see dhcp-eval(5) man page for 'hardware'
send dhcp-client-identifier = hardware;
prepend domain-name-servers 127.0.0.1;
~
```

```
[davig@oracle ~]$ sudo iptables -S
-P INPUT ACCEPT
-P FORWARD ACCEPT
-P OUTPUT ACCEPT
-A INPUT -m state --state RELATED,ESTABLISHED -j ACCEPT
-A INPUT -p icmp -j ACCEPT
-A INPUT -i lo -j ACCEPT
-A INPUT -p tcp -m state --state NEW -m tcp --dport 22 -j ACCEPT
-A INPUT -p tcp -m state --state NEW -m tcp --dport 80 -j ACCEPT
-A INPUT -j REJECT --reject-with icmp-host-prohibited
-A FORWARD -j REJECT --reject-with icmp-host-prohibited
-A FORWARD -i enp0s8 -o enp0s3 -m state --state RELATED,ESTABLISHED -j ACCEPT
-A FORWARD -i enp0s8 -o enp0s3 -j ACCEPT
[davig@oracle ~]$
```

5. Check VM2 and VM3 for gaining access to DNS server (naming services).

```
student@CsnKhai:~$ dig g.com

; <<>> DiG 9.9.5-3ubuntu0.5-Ubuntu <<>> g.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NXDOMAIN, id: 50009
;; flags: qr rd ra; QUERY: 1, ANSWER: 0, AUTHORITY: 1, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 512
;; QUESTION SECTION:
;g.com.                         IN      A

;; AUTHORITY SECTION:
com.                    888     IN      SOA     a.gtld-servers.net. nstld.verisi
gn-grs.com. 1657797588 1800 900 604800 86400

;; Query time: 27 msec
;; SERVER: 192.168.30.1#53(192.168.30.1)
;; WHEN: Thu Jul 14 11:20:22 UTC 2022
;; MSG SIZE  rcvd: 107

student@CsnKhai:~$
```

```
student@CsnKhai:~$ dig g.com

; <<>> DiG 9.9.5-3ubuntu0.5-Ubuntu <<>> g.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NXDOMAIN, id: 4030
;; flags: qr rd ra; QUERY: 1, ANSWER: 0, AUTHORITY: 1, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 512
;; QUESTION SECTION:
;g.com.                         IN      A

;; AUTHORITY SECTION:
com.                    611     IN      SOA     a.gtld-servers.net. nstld.verisi
gn-grs.com. 1657799683 1800 900 604800 86400

;; Query time: 29 msec
;; SERVER: 192.168.30.1#53(192.168.30.1)
;; WHEN: Thu Jul 14 12:00:02 UTC 2022
;; MSG SIZE  rcvd: 107

student@CsnKhai:~$
```