Лабораторная работа № 11

Тема: Сетевые сервисы на Linux. DHCP-сервер на linux.

Цель работы: Создать и настроить DHCP-сервер на базе операционной системы Linux.

Необходимое оборудование и программное обеспечение: Виртуальные машины под управлением Linux (CentOS, Ubuntu или др.).

Пример настройки серверов.

Тестовый стенд состоит и трех виртуальных машин на Centos 7.

R1:

Nic1 – NAT (что бы был доступ в Интернет)

Nic2 – внутренняя сеть (lan1) 192.168.13.0/24

R2:

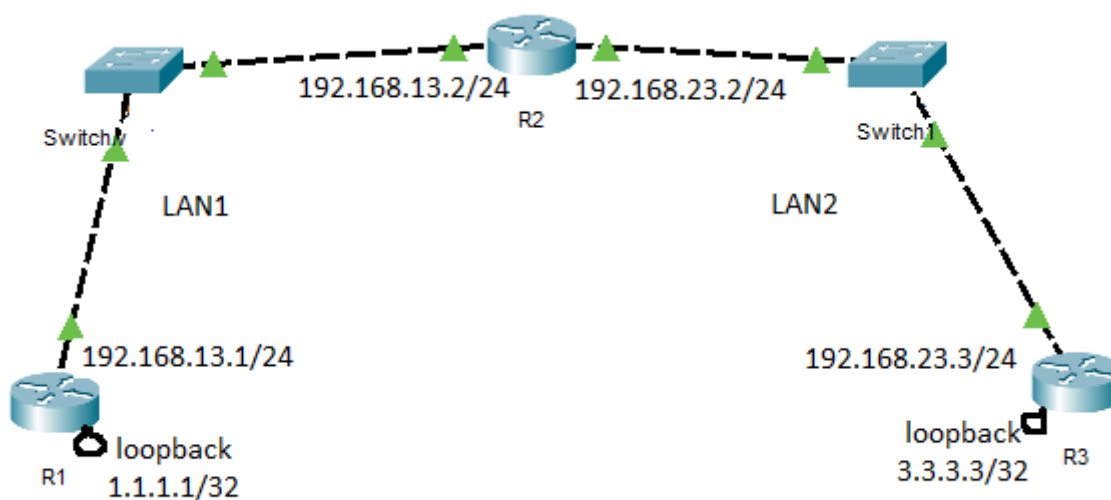Nic1 – NAT (что бы был доступ в Интернет)

Nic2 – внутренняя сеть (lan1) 192.168.13.2/24

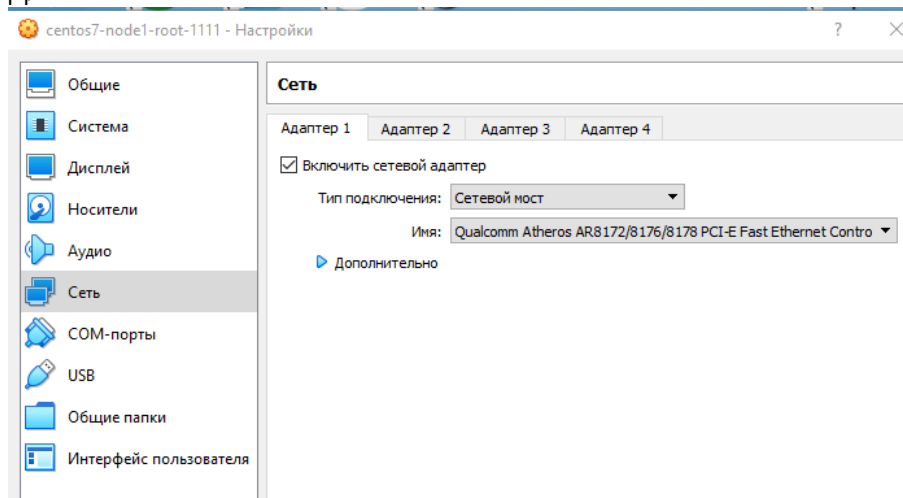Nic3 – внутренняя сеть (lan2) 192.168.23.2/24

R3:
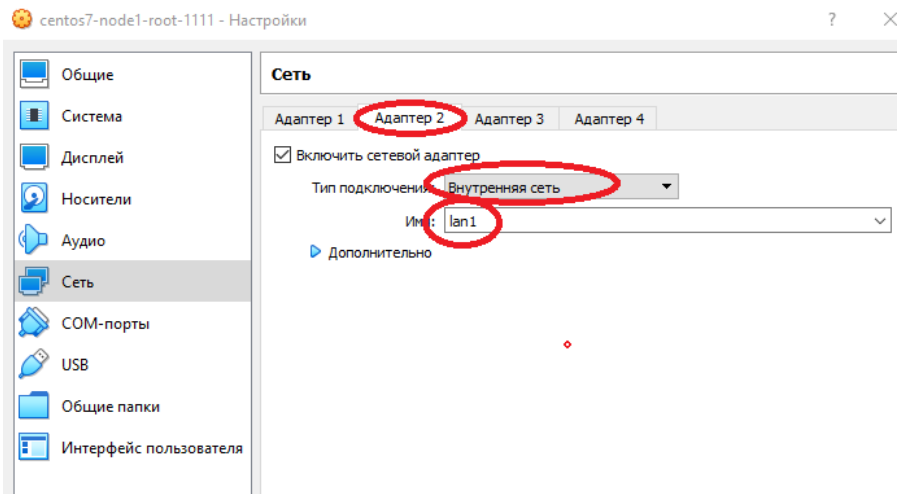
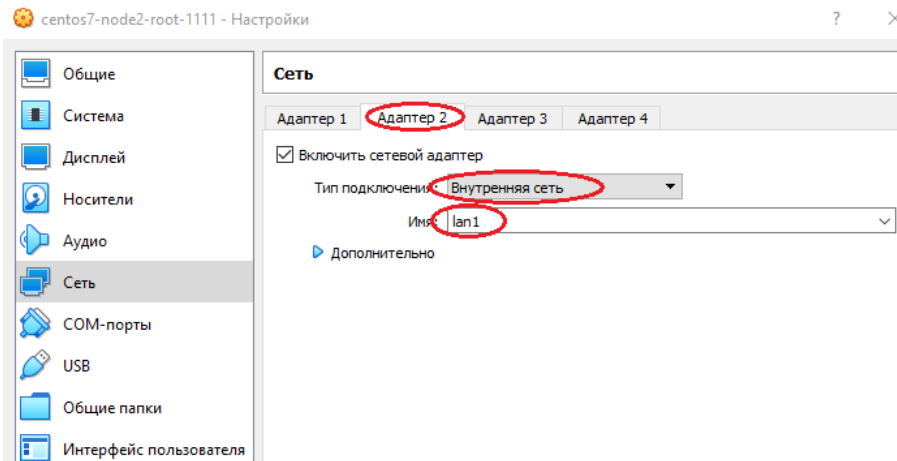Nic1 – NAT (что бы был доступ в Интернет)

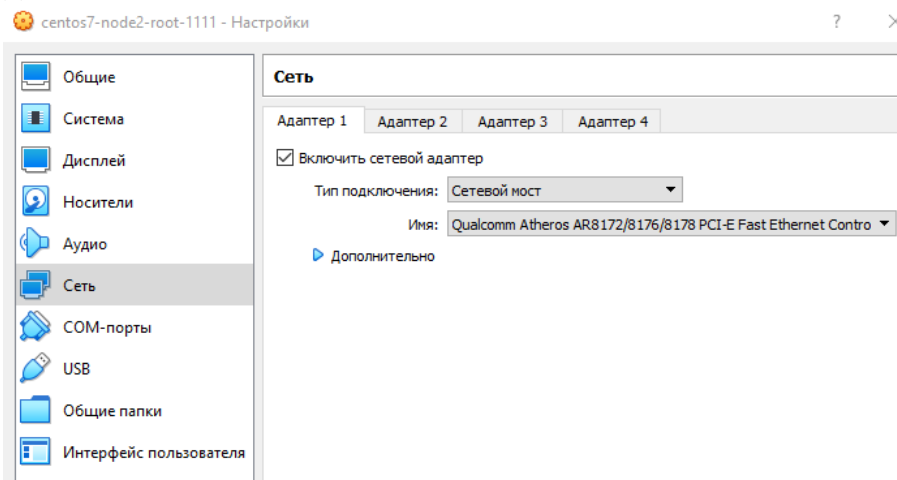Nic2 – внутренняя сеть (lan2) 192.168.23.0/24

Настройка сетевых адаптеров в Virtual Box.

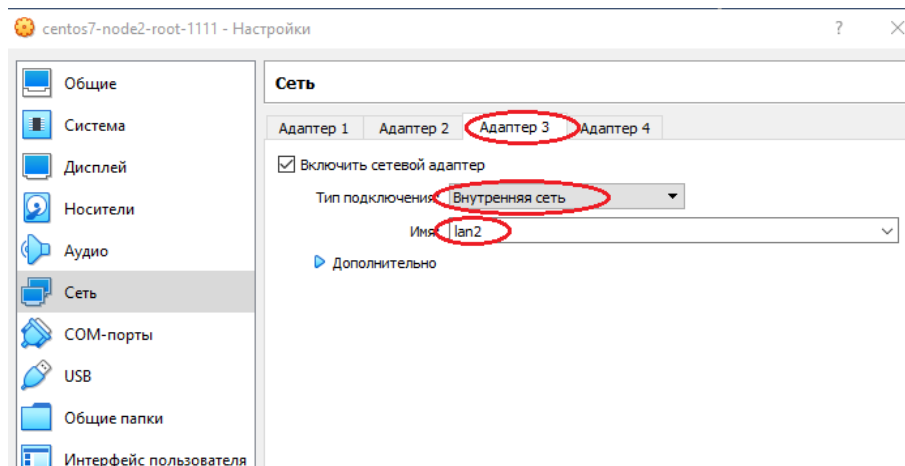Для R1:

Для R2:

Для R3:
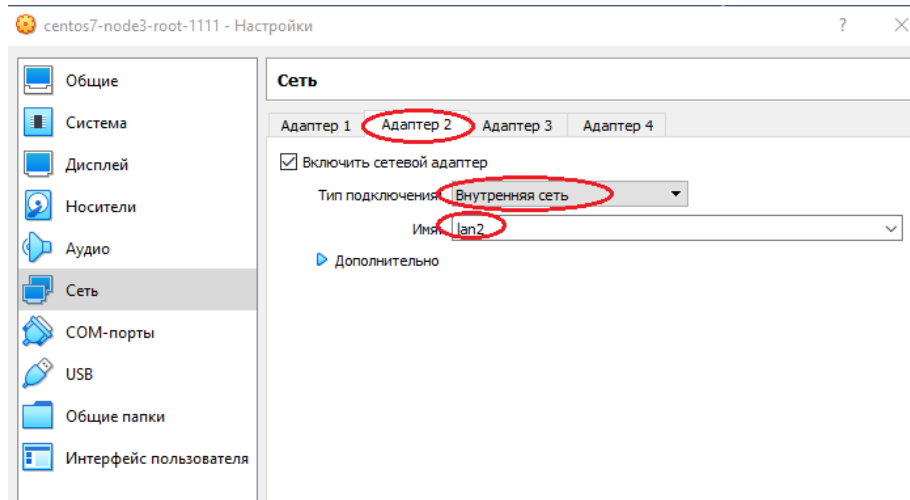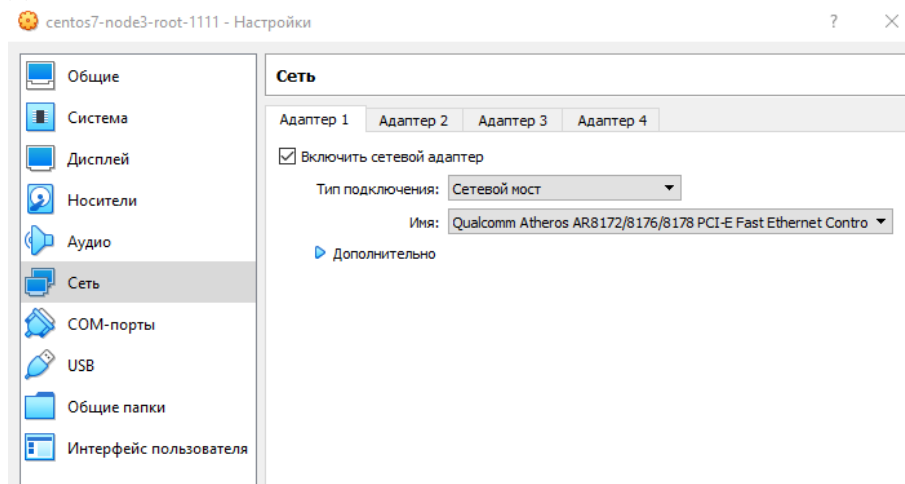
Для R2 (DHCP-сервер)**:**
Для удобства нужно задать имена серверов с помощью команды:

hostnamectl set-hostname **r2**

Сервер. Назначаем статические IP-адреса. На интерфейсы.

Создание конф. файлов интерфейсов

nano /etc/sysconfig/network-scripts/ifcfg-enp0s8

DEVICE=enp0s8
BOOTPROTO=static
IPADDR=192.168.13.2
NETMASK=255.255.255.0
ONBOOT=yes
NM_CONTROLLED=yes

nano /etc/sysconfig/network-scripts/ifcfg-enp0s9

DEVICE=enp0s9
BOOTPROTO=static
IPADDR=192.168.23.2
NETMASK=255.255.255.0
ONBOOT=yes
NM_CONTROLLED=yes

```
  GNU nano 2.3.1      Файл: /etc/sysconfig/network-scripts/ifcfg-enp0s9

DEVICE=enp0s9
BOOTPROTO=static
IPADDR=192.168.23.2
NETMASK=255.255.255.0
ONBOOT=yes
NM_CONTROLLED=yes
```

Перезапускаем сетевую службу и проверяем:

systemctl restart NetworkManager

ip a


```
[root@localhost ~]# systemctl restart NetworkManager
[root@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: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group defau
lt qlen 1000
    link/ether 08:00:27:73:b7:b8 brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.73/24 brd 192.168.1.255 scope global noprefixroute dynamic enp0s3
       valid_lft 86400sec preferred_lft 86400sec
    inet6 fe80::1639:b6b1:2b15:bbc2/64 scope link tentative noprefixroute dadfailed
       valid_lft forever preferred_lft forever
    inet6 fe80::313b:96dd:9b0c:7f5e/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
3: enp0s8: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group defau
lt qlen 1000
    link/ether 08:00:27:9a:ae:ac brd ff:ff:ff:ff:ff:ff
    inet 192.168.13.2/24 brd 192.168.13.255 scope global noprefixroute enp0s8
       valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fe9a:aeac/64 scope link
       valid_lft forever preferred_lft forever
4: enp0s9: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group defau
lt qlen 1000
    link/ether 08:00:27:1a:3e:40 brd ff:ff:ff:ff:ff:ff
    inet 192.168.23.2/24 brd 192.168.23.255 scope global noprefixroute enp0s9
       valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fe1a:3e40/64 scope link
       valid_lft forever preferred_lft forever
[root@localhost ~]#
```

Установка и настройка DHCP

Yum install dhcp

Nano /etc/dhcp/dhcpd.conf

# Сеть 1
subnet 192.168.13.0 netmask 255.255.255.0 {
    range 192.168.13.100 192.168.13.200;
    option routers 192.168.13.2;
    option domain-name-servers 8.8.8.8;
}

# Сеть 2
subnet 192.168.23.0 netmask 255.255.255.0 {
   range 192.168.23.100 192.168.23.200;
   option routers 192.168.23.2;
   option domain-name-servers 8.8.8.8;
}

```
  GNU nano 2.3.1               File: /etc/dhcp/dhcpd.conf

#
# DHCP Server Configuration file.
#    see /usr/share/doc/dhcp*/dhcpd.conf.example
#    see dhcpd.conf(5) man page
#
# Сеть 1
subnet 192.168.13.0 netmask 255.255.255.0 {
    range 192.168.13.100 192.168.13.200;
    option routers 192.168.13.2;
    option domain-name-servers 8.8.8.8;
}

# Сеть 2
subnet 192.168.23.0 netmask 255.255.255.0 {
    range 192.168.23.100 192.168.23.200;
    option routers 192.168.23.2;
    option domain-name-servers 8.8.8.8;
}
```

Запускаем службу и убеждаемся что демон работает:

systemctl enable dhcpd

systemctl start dhcpd

systemctl status dhcpd

```
[root@r2 ~]# systemctl enable dhcpd
[root@r2 ~]# systemctl start dhcpd
[root@r2 ~]# systemctl status dhcpd
● dhcpd.service - DHCPv4 Server Daemon
   Loaded: loaded (/usr/lib/systemd/system/dhcpd.service; enabled; vendor preset: disabled)
   Active: active (running) since Сб 2024-03-16 22:19:34 +05; 12min ago
     Docs: man:dhcpd(8)
           man:dhcpd.conf(5)
 Main PID: 1079 (dhcpd)
   Status: "Dispatching packets..."
   CGroup: /system.slice/dhcpd.service
           └─1079 /usr/sbin/dhcpd -f -cf /etc/dhcp/dhcpd.conf -user dhcpd -group dhcpd -...

мар 16 22:19:34 localhost.localdomain dhcpd[1079]: Sending on    LPF/enp0s8/08:00:27:...4
мар 16 22:19:34 localhost.localdomain dhcpd[1079]:
мар 16 22:19:34 localhost.localdomain dhcpd[1079]: No subnet declaration for enp0s3 ....
мар 16 22:19:34 localhost.localdomain dhcpd[1079]: ** Ignoring requests on enp0s3.   ...t
мар 16 22:19:34 localhost.localdomain dhcpd[1079]:    you want, please write a subne...n
мар 16 22:19:34 localhost.localdomain systemd[1]: Started DHCPv4 Server Daemon.
мар 16 22:19:34 localhost.localdomain dhcpd[1079]:    in your dhcpd.conf file for th...t
мар 16 22:19:34 localhost.localdomain dhcpd[1079]:    to which interface enp0s3 is a...*
мар 16 22:19:34 localhost.localdomain dhcpd[1079]:
мар 16 22:19:34 localhost.localdomain dhcpd[1079]: Sending on    Socket/fallback/fall...t
Hint: Some lines were ellipsized, use -l to show in full.
[root@r2 ~]#
```

Настройка интерфейсов клиентов (r1, r3)

Ip a

```
[root@r1 ~]# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group defaul
t 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: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP
group default qlen 1000
    link/ether 08:00:27:6f:cc:1e brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.75/24 brd 192.168.1.255 scope global noprefixroute dynamic en
p0s3
       valid_lft 84846sec preferred_lft 84846sec
    inet6 fe80::1639:b6b1:2b15:bbc2/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
3: enp0s8: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP
group default qlen 1000
    link/ether 08:00:27:00:ff:5d brd ff:ff:ff:ff:ff:ff
    inet6 fe80::1ff2:a7da:c495:46e0/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
[root@r1 ~]# /etc/sysconfig/network-scripts/ifcfg-enp0s8
```

Создание конфигурационного файла интерфейса:

nano /etc/sysconfig/network-scripts/ifcfg-enp0s8

BOOTPROTO=dhcp
NAME=enp0s8
DEVICE=enp0s8
ONBOOT=yes
NM_CONTROLLED=yes

```
  GNU nano 2.3.1                    File: ifcfg-enp0s8

BOOTPROTO=dhcp
NAME=enp0s8
DEVICE=enp0s8
ONBOOT=yes
NM_CONTROLLED=yes
```

Перезапускаем сетевую службу и проверяем:

```
[root@r1 ~]# systemctl restart NetworkManager
[root@r1 ~]# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group defaul
t 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: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP
group default qlen 1000
    link/ether 08:00:27:6f:cc:1e brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.75/24 brd 192.168.1.255 scope global noprefixroute dynamic en
p0s3
       valid_lft 86396sec preferred_lft 86396sec
    inet6 fe80::1639:b6b1:2b15:bbc2/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
3: enp0s8: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP
group default qlen 1000
    link/ether 08:00:27:00:ff:5d brd ff:ff:ff:ff:ff:ff
    inet 192.168.13.100/24 brd 192.168.13.255 scope global noprefixroute dynamic
 enp0s8
       valid_lft 43197sec preferred_lft 43197sec
    inet6 fe80::a00:27ff:fe00:ff5d/64 scope link
       valid_lft forever preferred_lft forever
[root@r1 ~]#
```

Настройки интерфейса получены.

Аналогично настраиваем третью машину и проверяем:

```
[root@r3 ~]# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group defaul
t 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: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP
group default qlen 1000
    link/ether 08:00:27:66:3e:03 brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.63/24 brd 192.168.1.255 scope global noprefixroute dynamic en
p0s3
       valid_lft 86398sec preferred_lft 86398sec
    inet6 fe80::313b:96dd:9b0c:7f5e/64 scope link tentative noprefixroute dadfai
led
       valid_lft forever preferred_lft forever
    inet6 fe80::1639:b6b1:2b15:bbc2/64 scope link tentative noprefixroute dadfai
led
       valid_lft forever preferred_lft forever
    inet6 fe80::e37:1f08:58a5:2f9c/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
3: enp0s8: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP
group default qlen 1000
    link/ether 08:00:27:5c:31:3c brd ff:ff:ff:ff:ff:ff
    inet 192.168.23.100/24 brd 192.168.23.255 scope global noprefixroute dynamic
 enp0s8
       valid_lft 42950sec preferred_lft 42950sec
    inet6 fe80::fa21:bfc4:5e60:c745/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
[root@r3 ~]#
```

```
[root@r2 ~]# ping 192.168.13.100
PING 192.168.13.100 (192.168.13.100) 56(84) bytes of data.
64 bytes from 192.168.13.100: icmp_seq=1 ttl=64 time=4.77 ms
64 bytes from 192.168.13.100: icmp_seq=2 ttl=64 time=3.19 ms
64 bytes from 192.168.13.100: icmp_seq=3 ttl=64 time=1.96 ms
^C
--- 192.168.13.100 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2005ms
rtt min/avg/max/mdev = 1.965/3.310/4.773/1.151 ms
[root@r2 ~]# ping 192.168.23.100
PING 192.168.23.100 (192.168.23.100) 56(84) bytes of data.
64 bytes from 192.168.23.100: icmp_seq=1 ttl=64 time=3.42 ms
64 bytes from 192.168.23.100: icmp_seq=2 ttl=64 time=4.46 ms
64 bytes from 192.168.23.100: icmp_seq=3 ttl=64 time=2.58 ms
^C
--- 192.168.23.100 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2004ms
rtt min/avg/max/mdev = 2.581/3.492/4.468/0.773 ms
[root@r2 ~]#
```

Задание:

1. Собрать стенд из 3-х виртуальных машин, согласно схеме и вашего варианта задания. Имена хостов должны содержать ваше имя на латинице, например: stepan-r1 или ravhat-r2.

2. Настроить DHCP – сервер.

3. Настроить интерфейсы DHCP-клиентов на получение настроек от сервера.

4. Проверить связность командой ping или mtr.

№ варианта	LAN 1	LAN 2
1	192.168.10.0/24	192.168.20.0/24
2	192.168.30.0/24	192.168.40.0/24
3	192.168.50.0/24	192.168.60.0/24
4	192.168.70.0/24	192.168.80.0/24
5	192.168.90.0/24	192.168.100.0/24
6	192.168.110.0/24	192.168.120.0/24
7	192.168.130.0/24	192.168.140.0/24
8	192.168.150.0/24	192.168.160.0/24
9	192.168.170.0/24	192.168.180.0/24
10	192.168.190.0/24	192.168.200.0/24
11	192.168.210.0/24	192.168.220.0/24
12	192.168.230.0/24	192.168.240.0/24

13	192.168.10.0/24	192.168.20.0/24
14	192.168.30.0/24	192.168.40.0/24
15	192.168.50.0/24	192.168.60.0/24
16	192.168.70.0/24	192.168.80.0/24
17	192.168.90.0/24	192.168.100.0/24
18	192.168.110.0/24	192.168.120.0/24
19	192.168.130.0/24	192.168.140.0/24
20	192.168.150.0/24	192.168.160.0/24