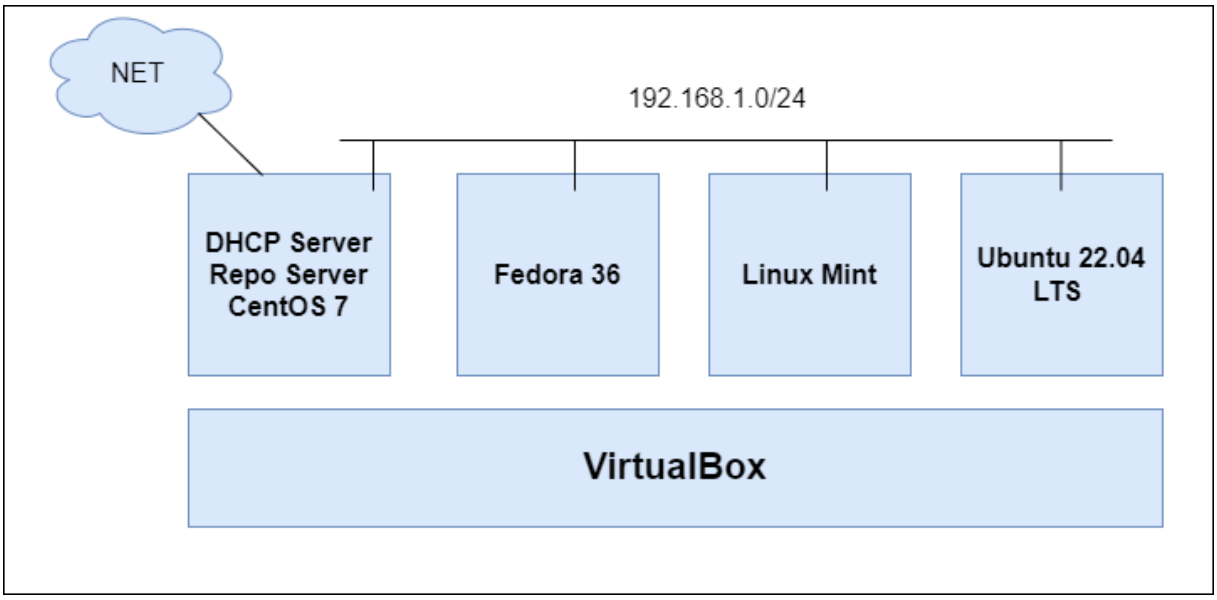
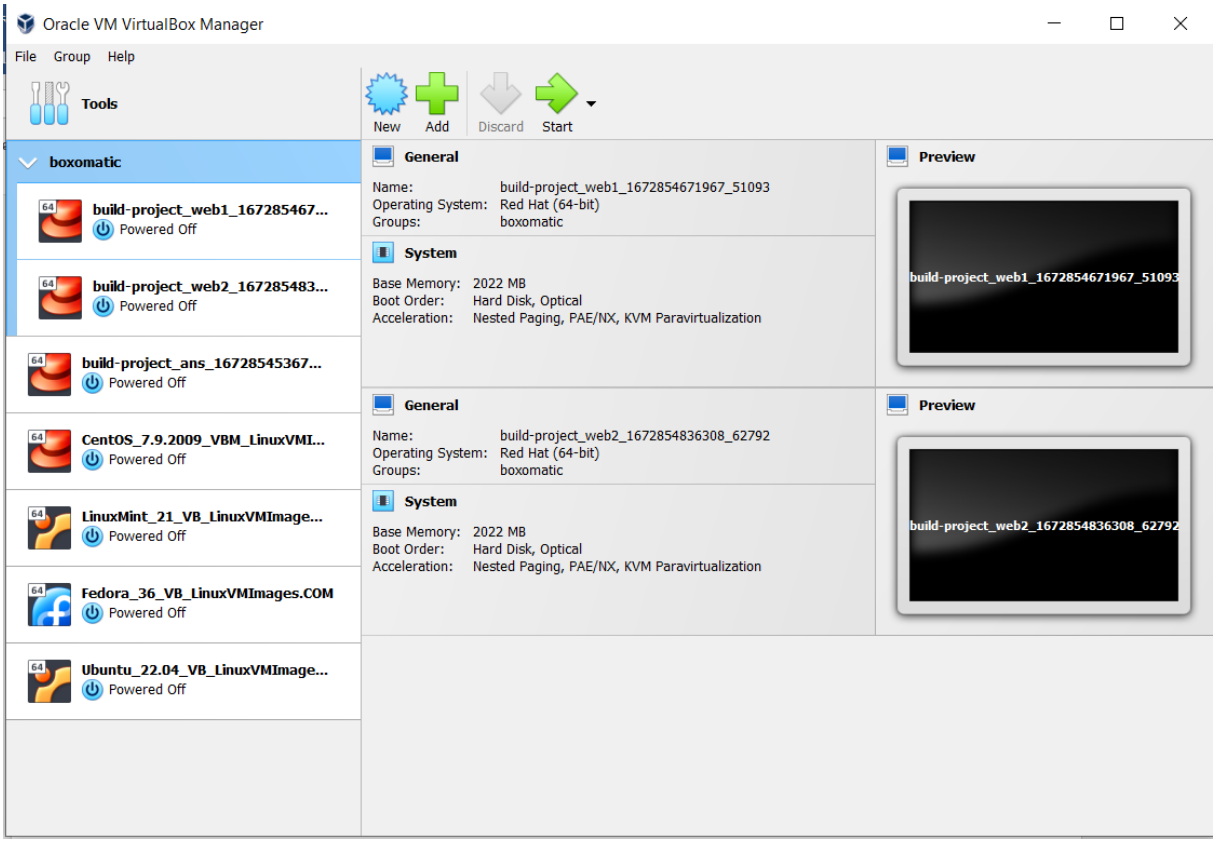
PROJECT DHCP

1. Introduction

In this project, we will build a simple virtual network with a server that acts as a DHCP server and Router. The network is shown below:



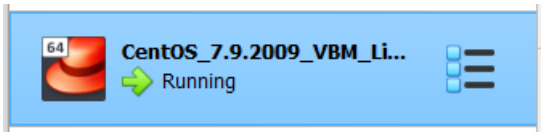
To succeed in this task, we will need: VirtualBox; virtual machines CentOS 7, Fedora 36, Linux Mint, and Ubuntu 22.04. The network will be IPv4 192.168.1.0/24. For our convenience, we will use already installed Linux images from https://www.linuxvmimages.com/. Let's get started!

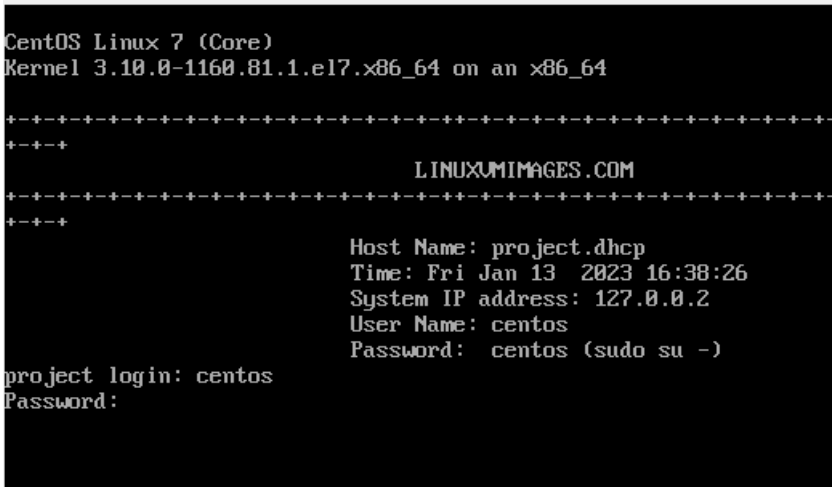


The imported images are: CentOS_7.9.2009_VBM_LinuxVMI, LinuxMint_21_V8_LinuxVMImage, Fedora_36_*, and Ubuntu_22.04_VB_Linux*.

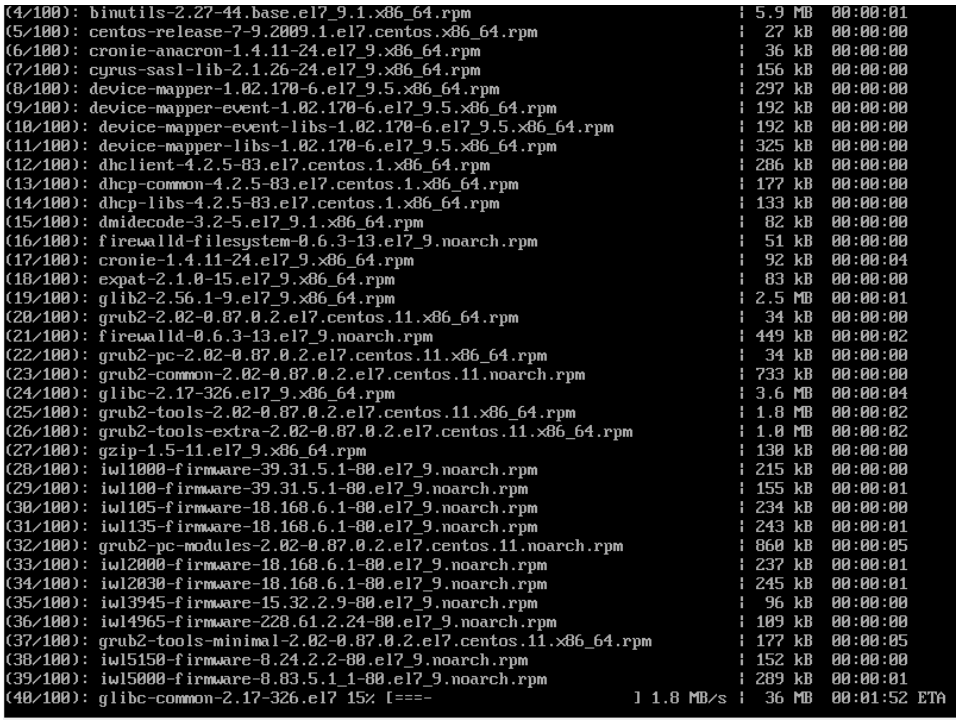
2. Configuration of The DHCP server and router

First, we start the CentOS server and enter the password and username **centos**.





After that, we enter root mode with the command "**su**" and update the system with the command "**yum update**":



Next, we reboot the system and install the DHCP server with the following command:

```
[root@centos7 centos]# yum install dhcp_
```

```
                          Password:  centos (sudo su -)
centos7 login: centos
Password:
Last login: Wed Jan 11 09:23:11 on tty1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
                        LINUXVMIMAGES.COM
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
                    User Name: centos
                    Password:  centos (sudo su -)
[centos@centos7 ~]$ su
Password:
[root@centos7 centos]# yum install dhcp
Loaded plugins: fastestmirror
Loading mirror speeds from cached hostfile
 * base: mirror.telepoint.bg
 * extras: mirror.telepoint.bg
 * updates: mirror.telepoint.bg
Resolving Dependencies
--> Running transaction check
---> Package dhcp.x86_64 12:4.2.5-83.el7.centos.1 will be installed
--> Finished Dependency Resolution

Dependencies Resolved

================================================================================
 Package          Arch              Version                     Repository     Size
================================================================================
Installing:
 dhcp             x86_64            12:4.2.5-83.el7.centos.1    updates       515 k

Transaction Summary
================================================================================
Install  1 Package

Total download size: 515 k
Installed size: 1.4 M
Is this ok [y/d/N]: y_
```

Later e open the configuration file with text-editor vim:

```
[root@project centos]# vim /etc/dhcp/dhcpd.conf
```

Insert the following content:

```
#
# DHCP Server Configuration file.
#   see /usr/share/doc/dhcp*/dhcpd.conf.example
#   see dhcpd.conf(5) man page
#



default-lease-time 600;
max-lease-time 6000;
option broadcast-address 192.168.1.255;
option domain-search "project.dhcp";
ddns-update-style none;
authoritative;

subnet 192.168.1.0 netmask 255.255.255.0 {
       range 192.168.1.2 192.168.1.100;
       option routers 192.168.1.1;
       option subnet-mask 255.255.255.0;
       option domain-name-servers 8.8.8.8, 8.8.4.4;
}
~
```

Save the file and close with "**:wq".**

Configuration of the firewall:

```
[root@centosstream9 centos]# firewall-cmd --add-service=dhcp --permanent
success
[root@centosstream9 centos]# firewall-cmd --reload
success
[root@centosstream9 centos]# firewall-cmd --list-services
cockpit dhcp dhcpv6-client ssh
```

DHCP Server uses UDP ports 67 and 68, where port 67 is used to initiate communication between the client and server on the network. If port 67 is used by another application, DHCP will fail to function. Clients use port 68.

Later we add the special network function “masquerade” in the firewall. With the help of this function, server CentOS can act as a Router:

```
[root@project centos]# firewall-cmd --add-masquerade --permanent
```

Don’t forget to add a static IPv4 address to the CentOS server with nmtui.

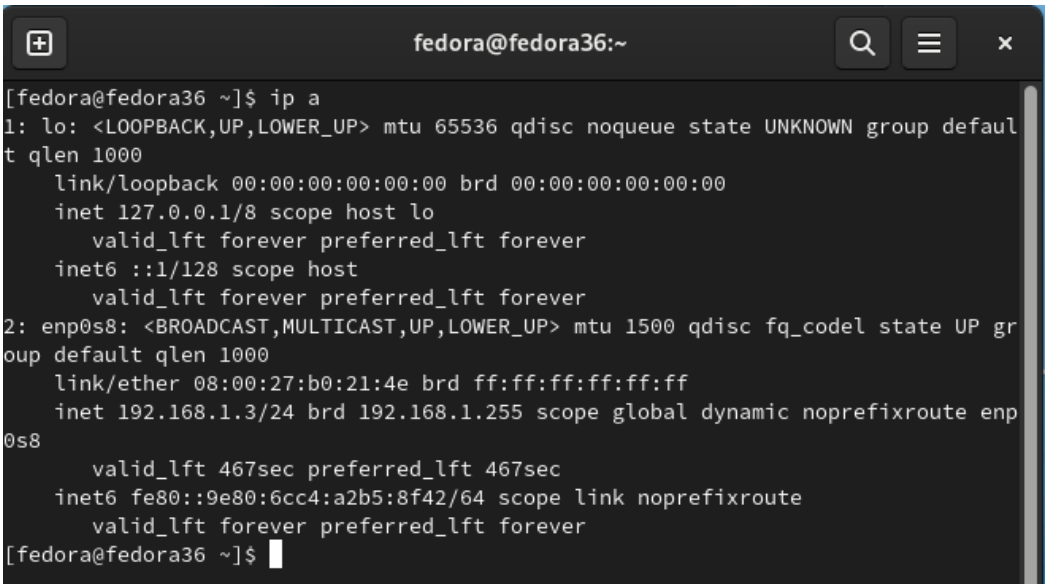
```
[root@project centos]# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1
000
    link/ether 08:00:27:6b:ef:34 brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 brd 10.0.2.255 scope global noprefixroute dynamic enp0s3
       valid_lft 84139sec preferred_lft 84139sec
    inet6 fe80::d9cc:97f9:a5b0:386d/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 1
000
    link/ether 08:00:27:35:29:28 brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.1/24 brd 192.168.1.255 scope global noprefixroute enp0s8
       valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fe35:2928/64 scope link
       valid_lft forever preferred_lft forever
[root@project centos]#
```

Final touch the systemd and we are ready for the show:

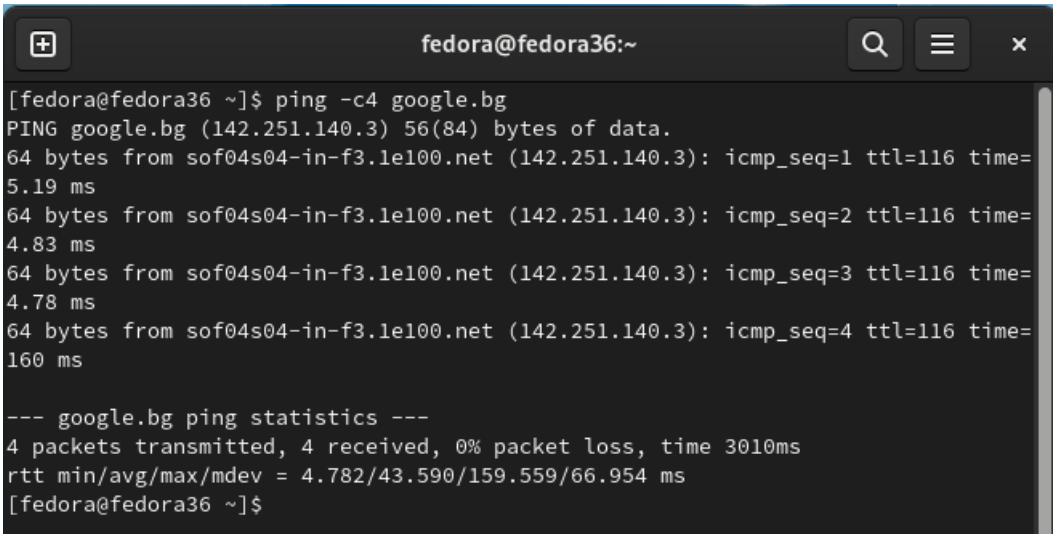
```
[root@project centos]# systemctl enable dhcpd
[root@project centos]# systemctl start dhcpd
[root@project centos]# systemctl status dhcpd
● dhcpd.service - DHCPv4 Server Daemon
   Loaded: loaded (/usr/lib/systemd/system/dhcpd.service; enabled; vendor preset: disabled)
   Active: active (running) since Fri 2023-01-13 16:38:34 EET; 40min ago
     Docs: man:dhcpd(8)
           man:dhcpd.conf(5)
 Main PID: 1290 (dhcpd)
   Status: "Dispatching packets..."
   CGroup: /system.slice/dhcpd.service
           └─1290 /usr/sbin/dhcpd -f -cf /etc/dhcp/dhcpd.conf -user dhcpd -group dhcpd --no-pid

Jan 13 16:38:34 project.dhcp dhcpd[1290]: Sending on   LPF/enp0s8/08:00:27:35:29:28/192.168.1.0/24
Jan 13 16:38:34 project.dhcp dhcpd[1290]:
Jan 13 16:38:34 project.dhcp dhcpd[1290]: No subnet declaration for enp0s3 (10.0.2.15).
Jan 13 16:38:34 project.dhcp dhcpd[1290]: ** Ignoring requests on enp0s3.  If this is not what
Jan 13 16:38:34 project.dhcp dhcpd[1290]:    you want, please write a subnet declaration
Jan 13 16:38:34 project.dhcp dhcpd[1290]:    in your dhcpd.conf file for the network segment
Jan 13 16:38:34 project.dhcp dhcpd[1290]:    to which interface enp0s3 is attached. **
Jan 13 16:38:34 project.dhcp dhcpd[1290]:
Jan 13 16:38:34 project.dhcp dhcpd[1290]: Sending on   Socket/fallback/fallback-net
Jan 13 16:38:34 project.dhcp systemd[1]: Started DHCPv4 Server Daemon.
[root@project centos]# _
```

Our DHCP and Router server is ready! Let’s start for example the VM machine Fedora and watch what will happen:

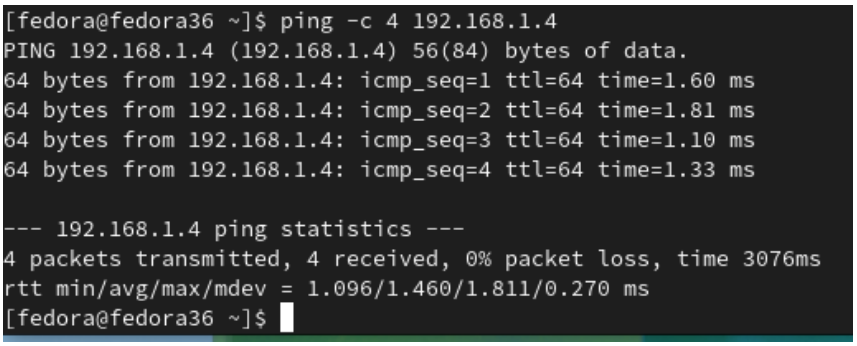
```
[root@project centos]# systemctl status dhcpd
● dhcpd.service - DHCPv4 Server Daemon
   Loaded: loaded (/usr/lib/systemd/system/dhcpd.service; enabled; vendor preset: disabled)
   Active: active (running) since Fri 2023-01-13 16:38:34 EET; 45min ago
     Docs: man:dhcpd(8)
           man:dhcpd.conf(5)
 Main PID: 1290 (dhcpd)
   Status: "Dispatching packets..."
   CGroup: /system.slice/dhcpd.service
           └─1290 /usr/sbin/dhcpd -f -cf /etc/dhcp/dhcpd.conf -user dhcpd -group dhcpd --no-pid

Jan 13 16:38:34 project.dhcp dhcpd[1290]: No subnet declaration for enp0s3 (10.0.2.15).
Jan 13 16:38:34 project.dhcp dhcpd[1290]: ** Ignoring requests on enp0s3.  If this is not what
Jan 13 16:38:34 project.dhcp dhcpd[1290]:    you want, please write a subnet declaration
Jan 13 16:38:34 project.dhcp dhcpd[1290]:    in your dhcpd.conf file for the network segment
Jan 13 16:38:34 project.dhcp dhcpd[1290]:    to which interface enp0s3 is attached. **
Jan 13 16:38:34 project.dhcp dhcpd[1290]:
Jan 13 16:38:34 project.dhcp dhcpd[1290]: Sending on   Socket/fallback/fallback-net
Jan 13 16:38:34 project.dhcp systemd[1]: Started DHCPv4 Server Daemon.
Jan 13 17:24:07 project.dhcp dhcpd[1290]: DHCPREQUEST for 192.168.1.3 from 08:00:27:b0:21:4e v...0s8
Jan 13 17:24:07 project.dhcp dhcpd[1290]: DHCPACK on 192.168.1.3 to 08:00:27:b0:21:4e (fedora3...0s8
Hint: Some lines were ellipsized, use -l to show in full.
[root@project centos]#
```



Everything seems according to plan! Let's check will, if can Fedora reach google.bg



Yeaah! That's awesome! Let's see if Fedora can communicate with Ubuntu VM. The IP address of Ubuntu machine is 192.168.1.4:



Everything is according to plan!

This is it! I hope you like it and see you soon!