OpenWRT Buildroot

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1 Task 1

- OpenWRT Virtual Box VM Installation guide is studied
- OpenWRT is installed to Virtual Box VM
- OpenWRT VM networking is configured: 2x Network Interfaces are configured in VM

Figure 1: Create Virtual Disk Image

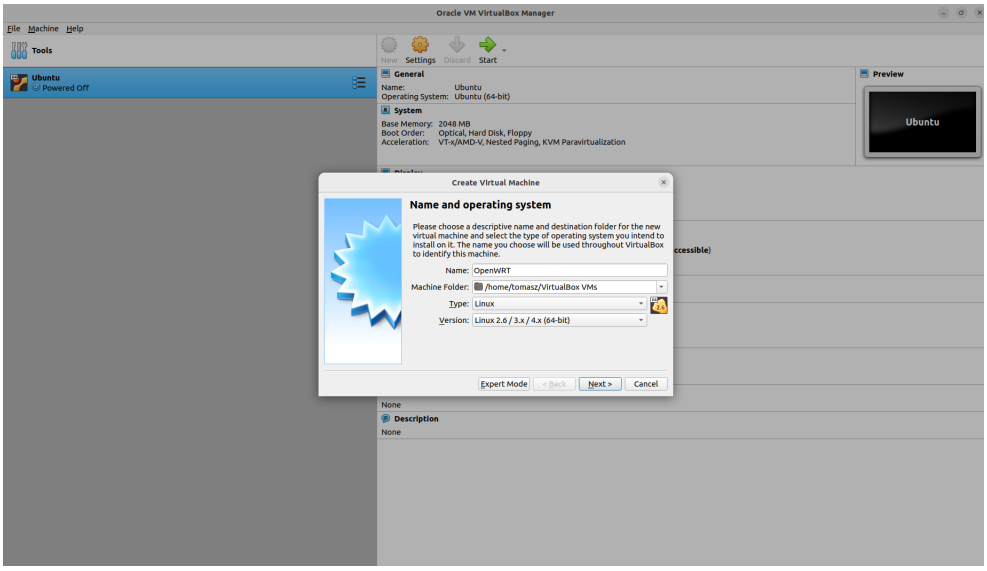

Figure 2: Choosing operating system in new VM

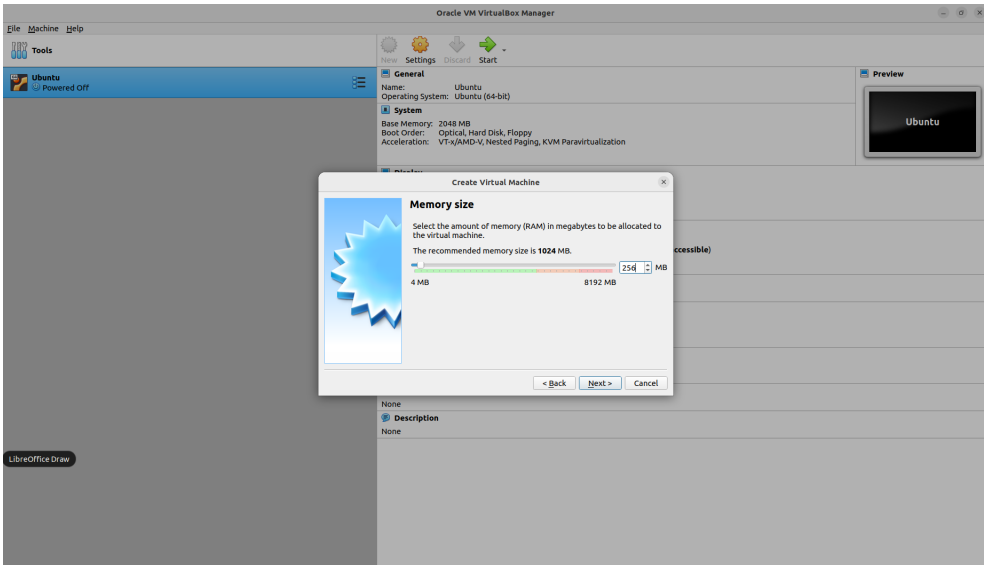

Figure 3: Choosing RAM memory. According to installation guide 128 Mb is enough. In the newly created machine 256 Mb RAM has been chosen

After creation of virtual machine, network adapters have been configured:

- Adapter 1 is bridged adapter,
- Adapter 2 is host-only network adapter. Host-only adapter was created during configuration of VM with ubuntu. DHCP server option has been enabled

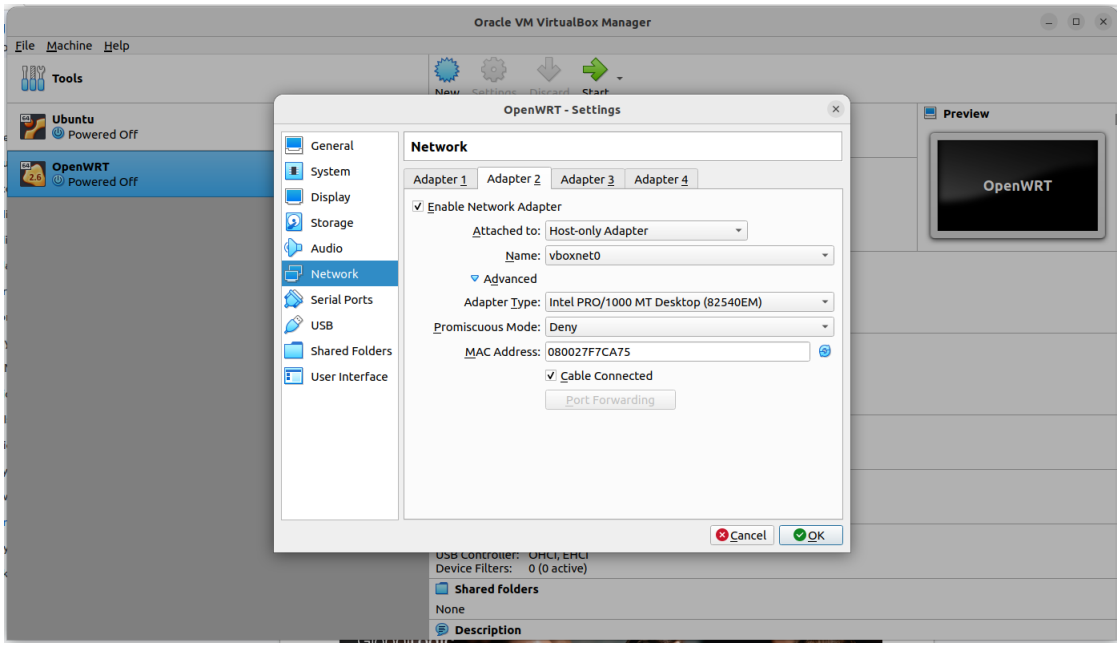

Figure 4: Network adapters configuraion on VM

2 Task 2

Configuration of network adapters on OpenWRT OS

2.1 Configuration of network adapters

In a file */etc/config/network* following changes have been introduced:

```
config interface 'loopback'
        option device 'lo'
        option proto 'static'
        option ipaddr '127.0.0.1'
        option netmask '255.0.0.0'

config globals 'globals'
        option ula_prefix 'fd58:78f9:3e75::/48'

config device
        option name 'public-adapter'
        option type 'bridge'
        list ports 'eth0'

config interface 'lan'
        option device 'public-adapter'
        option proto 'dhcp'

config interface 'lan_host'
        option ifname 'eth1'
        option proto 'dhcp'


- /etc/config/network 1/25 4%
```

Figure 5: Network section configuration

Both network adapters will use DHCP (IP address is not binded statically). Public adapter is bound to interface *eth*0. Host only adapter is bound to interface *eth*1

After changes in */etc/config/network* network adapter have been restarted with following commands:

/etc/init.d/network restart

2.2 Public Network Adapter (eth0)

To check correctness of configuration few test have been made.

2.2.1 uci show network.lan

```
root@OpenWrt:/# uci show network.lan
network.lan=interface
network.lan.device='public-adapter'
network.lan.proto='dhcp'
root@OpenWrt:/#
```

Figure 6: UCI show output for network.lan

2.2.2 ip a

```
root@OpenWrt:/# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN 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: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel master public
-adapter state UP qlen 1000
    link/ether 08:00:27:80:6c:b6 brd ff:ff:ff:ff:ff:ff
3: eth1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP qlen
 1000
    link/ether 08:00:27:73:e6:39 brd ff:ff:ff:ff:ff:ff
    inet 192.168.56.106/24 brd 192.168.56.255 scope global eth1
       valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fe73:e639/64 scope link
       valid_lft forever preferred_lft forever
5: public-adapter: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue stat
e UP qlen 1000
    link/ether 08:00:27:80:6c:b6 brd ff:ff:ff:ff:ff:ff
    inet 192.168.0.190/24 brd 192.168.0.255 scope global public-adapter
       valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fe80:6cb6/64 scope link
       valid_lft forever preferred_lft forever
root@OpenWrt:/#
```

Figure 7: Output of ip -a

- Public adapter has following ip address: 192.168.56.190
- Network address 192.168.56.0/24
- IP address has been allocated dynamically

2.2.3 ifconfig -a

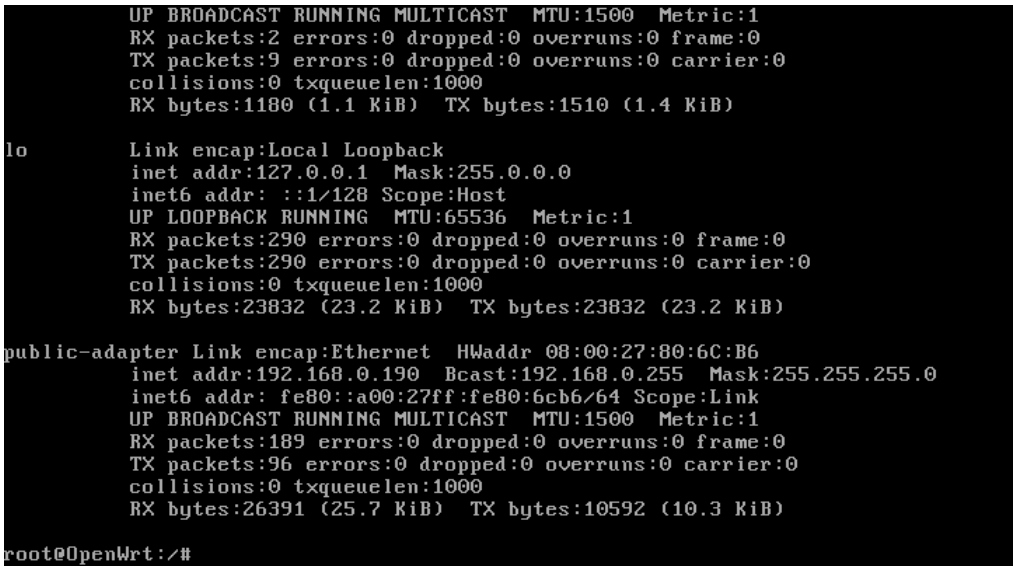

Figure 8: Output of ifconfig -a

- Public adapter has following ip address: 192.168.56.190
- Network address 192.168.56.0/24
- IP address has been allocated dynamically

2.2.4 ping 8.8.8.8

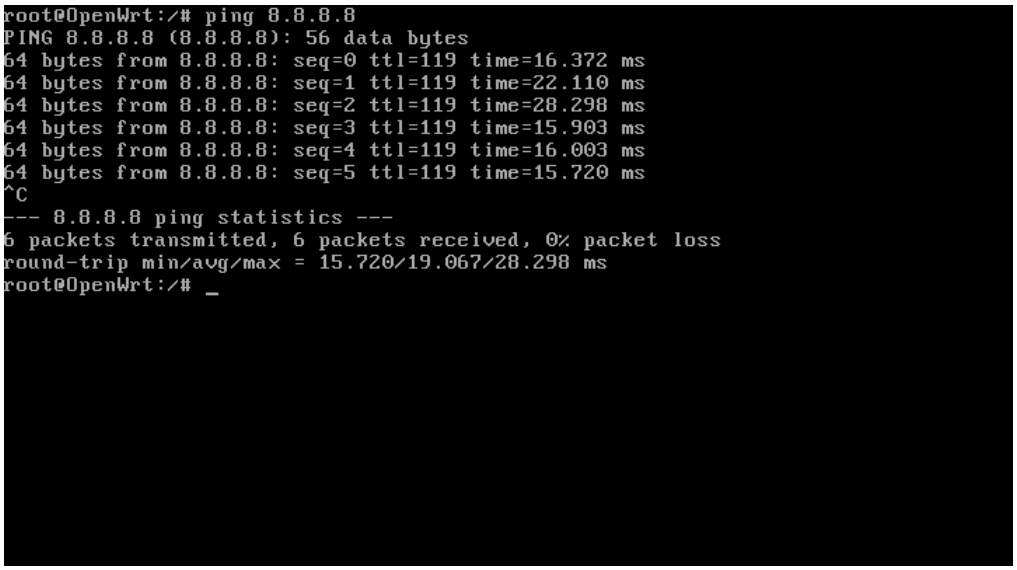

Figure 9: Output of ping 8.8.8.8

To check correctness of network connection, few packet has been sent to ip address 8.8.8.8. Answers from 8.8.8.8 have been received. Network adatper eth0 is assumed to work correctly.

2.2.5 netstat -rn

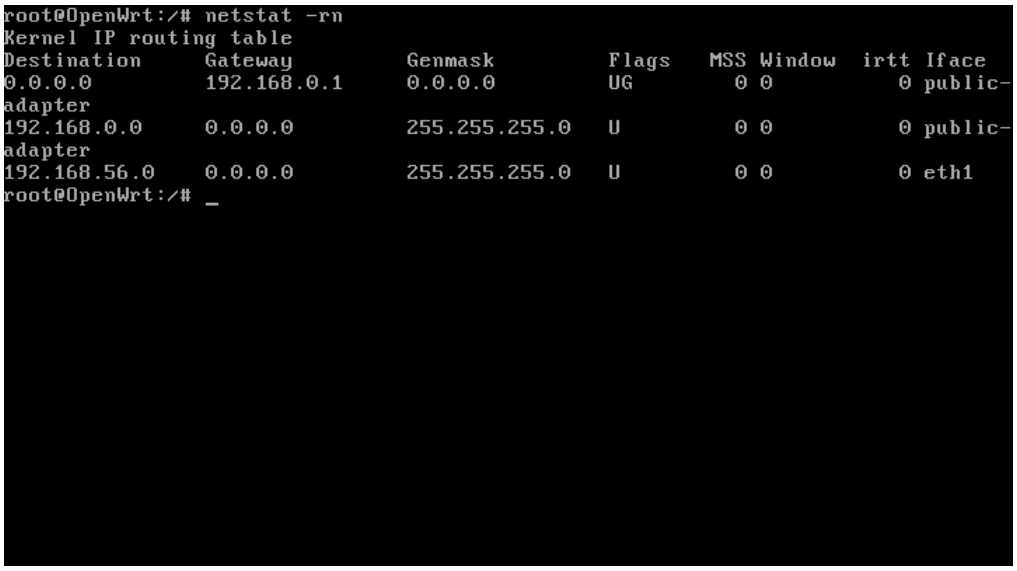

Figure 10: Output of netstat -rn

- For all network adapters Gateway, Netmask have been given

2.3 Host-only Network Adapter (eth1)

2.3.1 uci show network.host_lan

Figure 11: UCI show output for network.lan_host

2.3.2 ip a

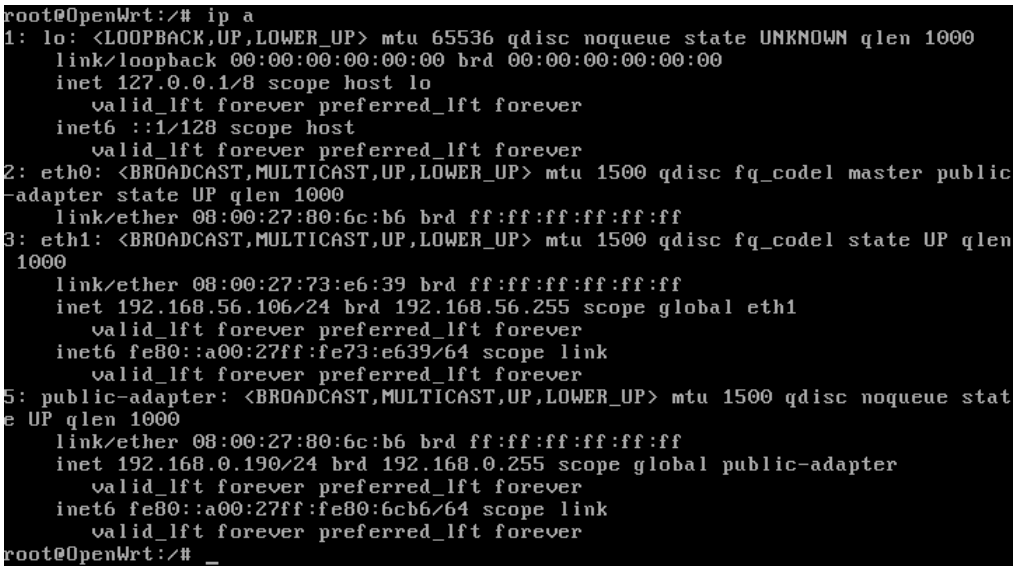

Figure 12: Output of ip -a

- Public adapter has following ip address: 192.168.56.190
- Network address 192.168.56.0/24
- IP address has been allocated dynamically

2.3.3 ifconfig -a

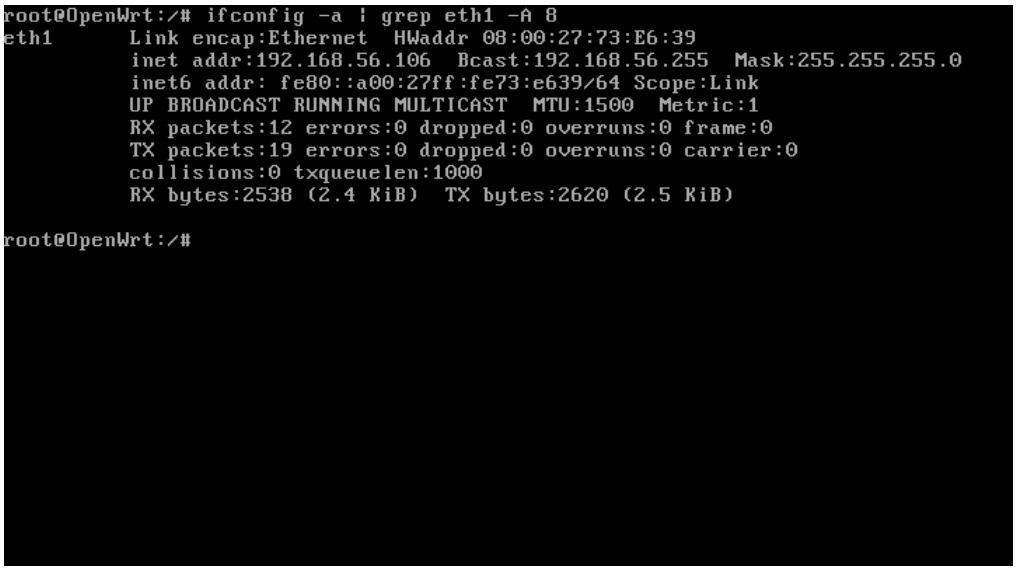

Figure 13: Output of ifconfig -a

2.3.4 ping 192.168.56.1

```
root@OpenWrt:/# ping 192.168.56.1
PING 192.168.56.1 (192.168.56.1): 56 data bytes
64 bytes from 192.168.56.1: seq=0 ttl=64 time=1.368 ms
64 bytes from 192.168.56.1: seq=1 ttl=64 time=0.931 ms
64 bytes from 192.168.56.1: seq=2 ttl=64 time=0.933 ms
64 bytes from 192.168.56.1: seq=3 ttl=64 time=0.928 ms
64 bytes from 192.168.56.1: seq=4 ttl=64 time=0.871 ms
64 bytes from 192.168.56.1: seq=5 ttl=64 time=1.003 ms
^C
--- 192.168.56.1 ping statistics ---
6 packets transmitted, 6 packets received, 0% packet loss
round-trip min/avg/max = 0.871/1.005/1.368 ms
root@OpenWrt:/#
```

Figure 14: Output of ping 192.168.56.1

2.4 Configuration of firewall

2.4.1 Firewall configuration

```
config defaults
        option syn_flood        1
        option input            REJECT
        option output           ACCEPT
        option forward          REJECT
# Uncomment this line to disable ipv6 rules
#       option disable_ipv6     1

config zone
        option name host
        option network lan_host
        option input 'ACCEPT'
        option output 'ACCEPT'
        option forward 'ACCEPT'

config zone
        option name             lan
        list   network          'lan'
        option input            ACCEPT
        option output           ACCEPT
        option forward          ACCEPT

config zone
        option name             wan
I /etc/config/firewall [Modified] 14/196 7%
```

Figure 15: Firewall configuration

After changing */etc/config/firewall*, firewall has been restarted with following command:

/etc/init.d/firewall restart

2.4.2 uci show firewall.@zones[0]

```
root@tomasz_openwrt:/# uci show firewall.@zone[0]
firewall.cfg02dc81=zone
firewall.cfg02dc81.name='host'
firewall.cfg02dc81.network='lan_host'
firewall.cfg02dc81.input='ACCEPT'
firewall.cfg02dc81.output='ACCEPT'
firewall.cfg02dc81.forward='ACCEPT'
root@tomasz_openwrt:/#
```

Figure 16: Show firewall configuration

3 Task 3

3.1 Password change

```
root@OpenWrt:/# passwd
Changing password for root
New password:
Retype password:
passwd: password for root changed by root
root@OpenWrt:/#
```

Figure 17: Change password for root user

3.2 Log in to OpenWRT VM via SSH

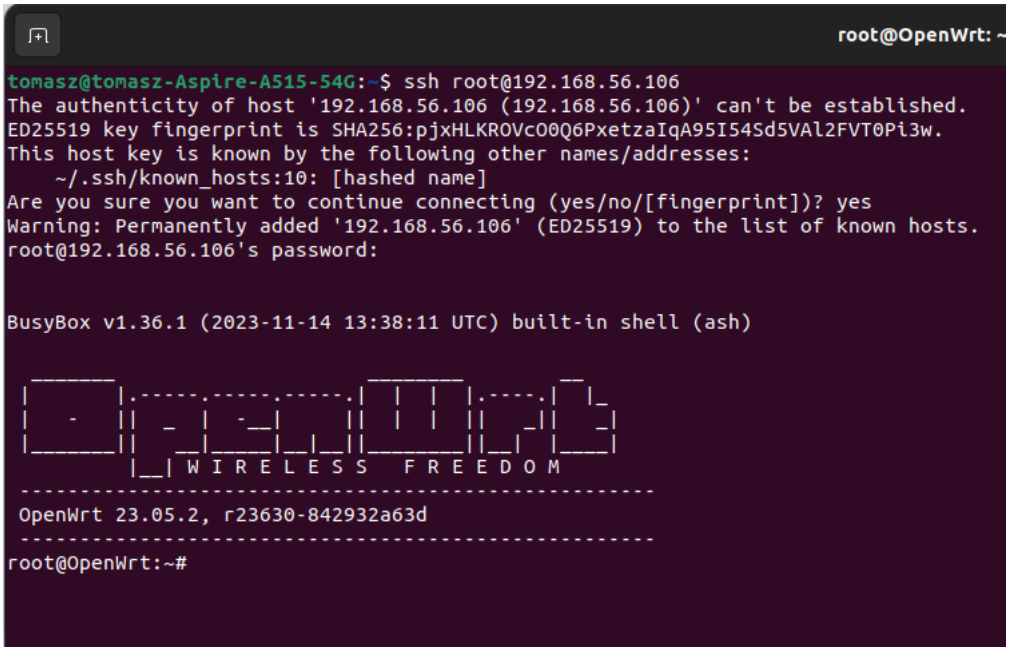

Figure 18: Log in to OpenWRT VM via SSH

SSH connection with OpenWRT VM has been succesfully established.

3.3 Hostname change

3.3.1 Set new hostname

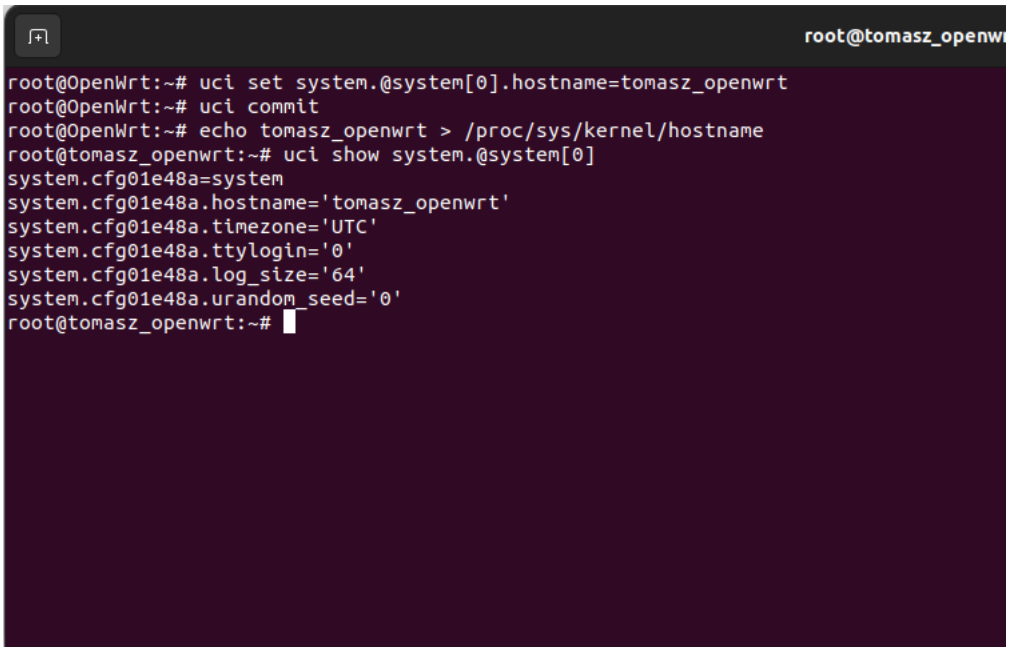

Figure 19: Set new hostname

3.3.2 Check new hostname

Hostname has been checked with 2 methods:

- uci show system
- cat /proc/sys/kernel/hostname

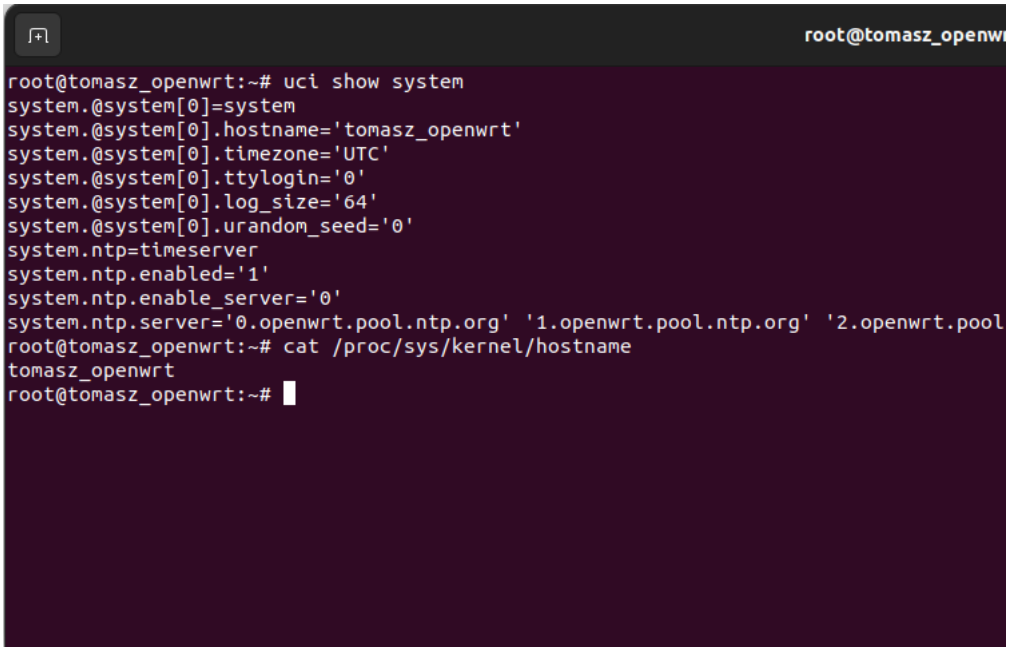

Figure 20: Check new hostname

For both methods we obtain information that new hostname is:

tomasz_openwrt

4 Task 4

4.1 Update list of OpenWRT packages

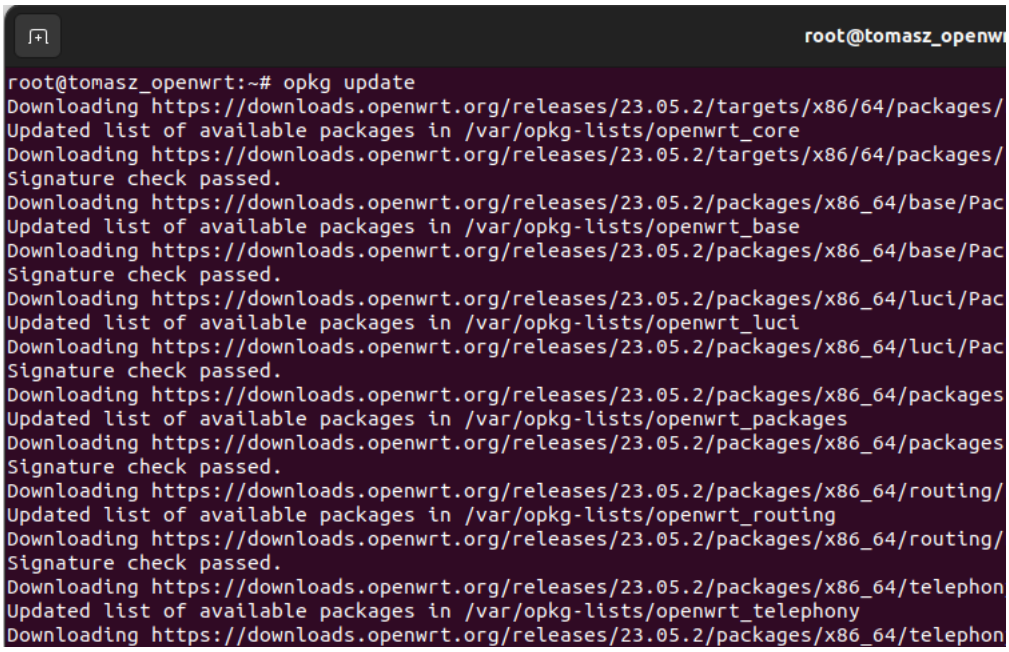

Figure 21: Update list of OpenWRT packages

4.2 Provide list of available and installed packages

Following commands have been used:

- opkg list, to list all avalaible packages
- opkg list-installed, to list all installed packages

Output has been saved to following files:

- available.txt with list of all available packages
- installed.txt with list of all installed packages

Files have been provided on the disk.

5 Task 5

5.1 Nmap installing

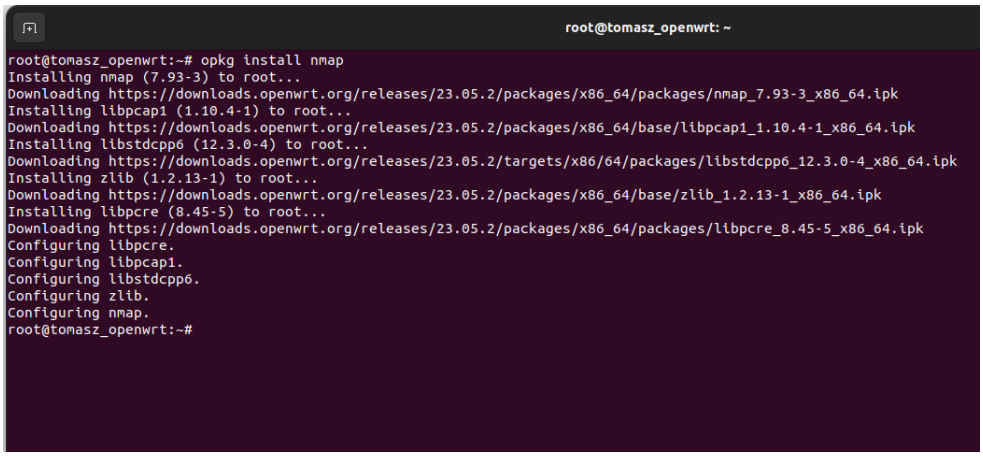

Figure 22: Install nmap

5.2 Scan 192.168.56.1 with nmap

- 2 ports are opened:
  - 23/tcp, service telnet server
  - 80/tcp, service http server

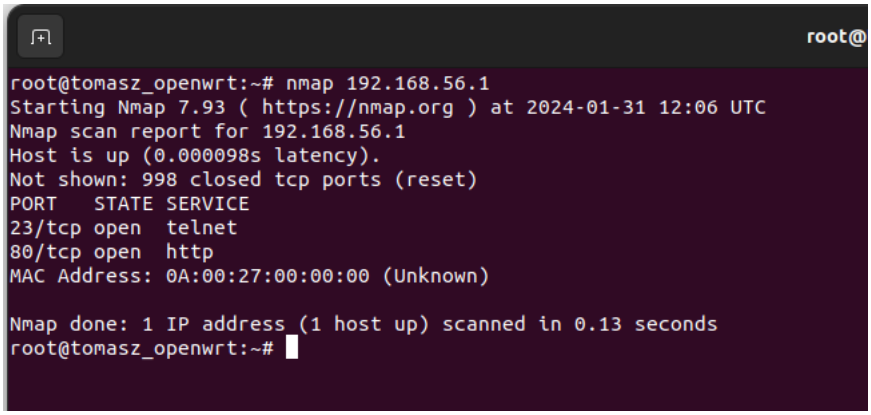

Figure 23: Network scanning

5.3 Scan 192.168.0.1 with nmap

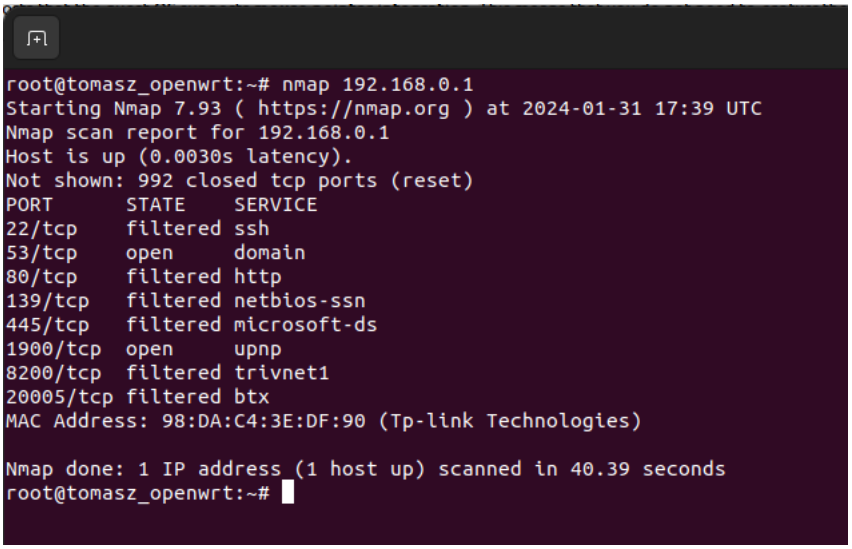

Figure 24: Network scanning