

Laboratoare Retelistica



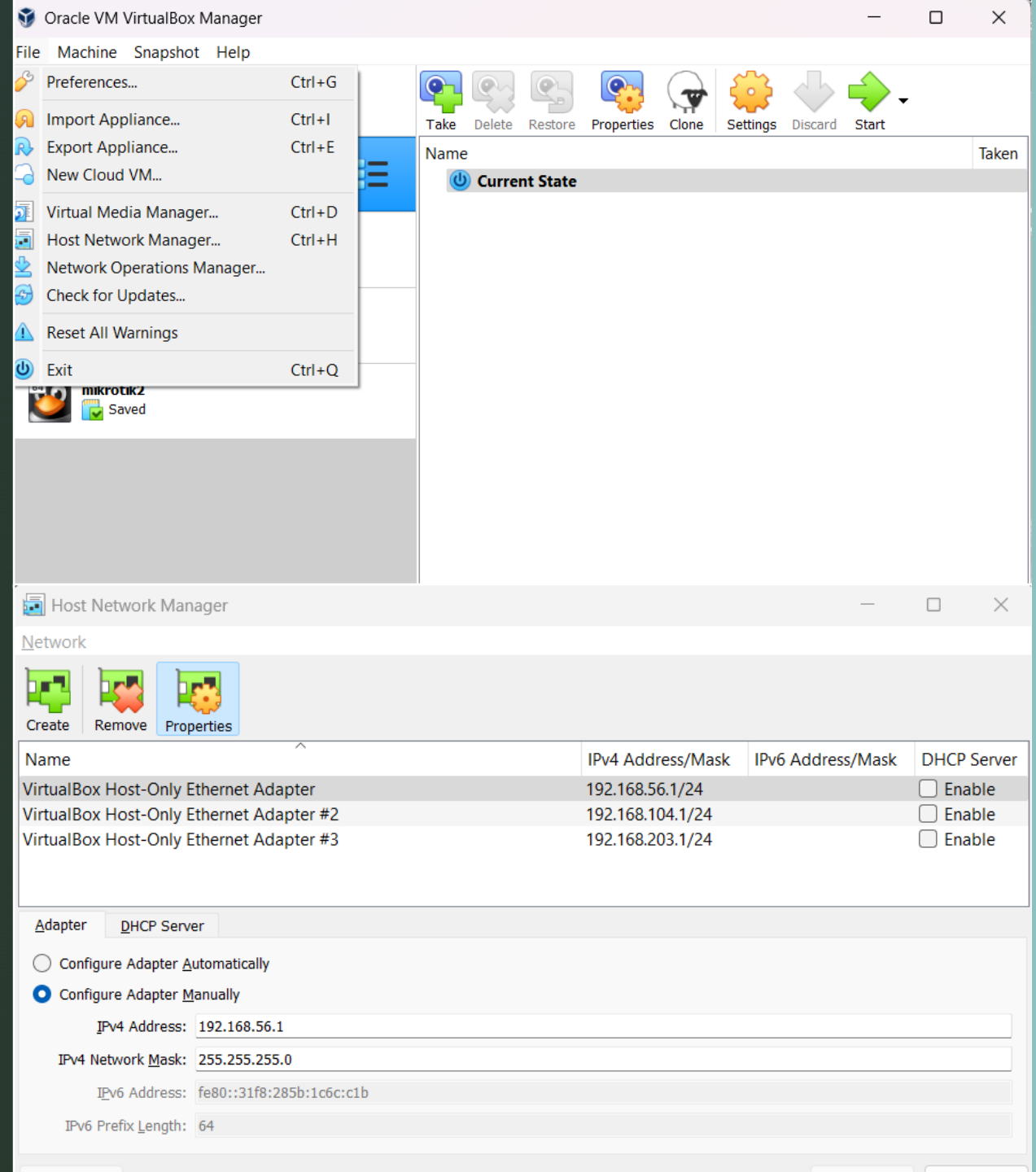
Setup VirtualBox Windows

Setare Adaptoare Virtuale

Mergem in meniul File si Selectam Host Network Manager

Aici facem Adaptoare prin apasarea butonului Create si debifam setarile de DHCP

Dupa ce am facut cateva adaptoare putem trece la crearea masini virtuale cu RouterOS



RouterOS VM Setup

- In Interfata principala VirtualBox apasam butonul New si ii dam un nume masinii (ex: MikroTik1) dupa care selectam sistemul de operare linux X64.
- In urmatoarea fereastra setam memoria alocata la 256 MB


← Create Virtual Machine

Name and operating system

Please choose a descriptive name and destination folder for the new virtual machine and select the type of operating system you intend to install on it. The name you choose will be used throughout VirtualBox to identify this machine.

Name:

Machine Folder:

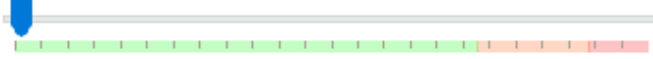
Type: 

Version:

Memory size

Select the amount of memory (RAM) in megabytes to be allocated to the virtual machine.

The recommended memory size is **512 MB**.

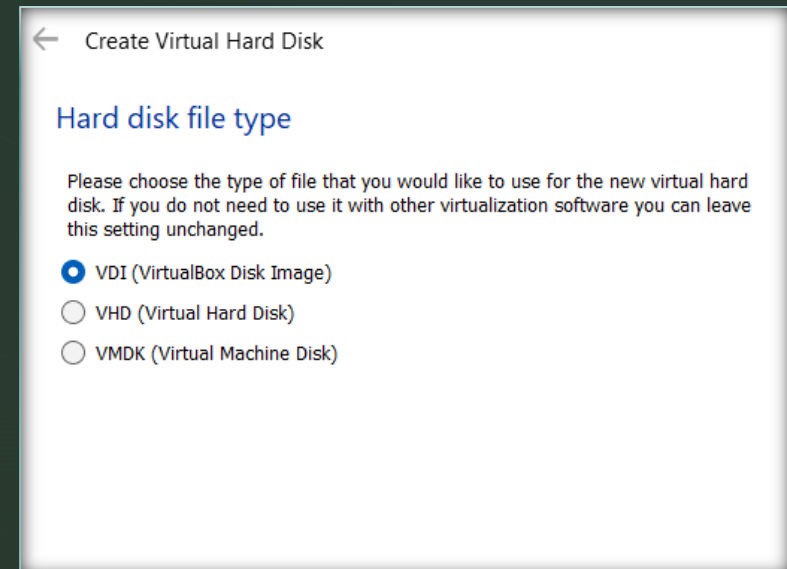
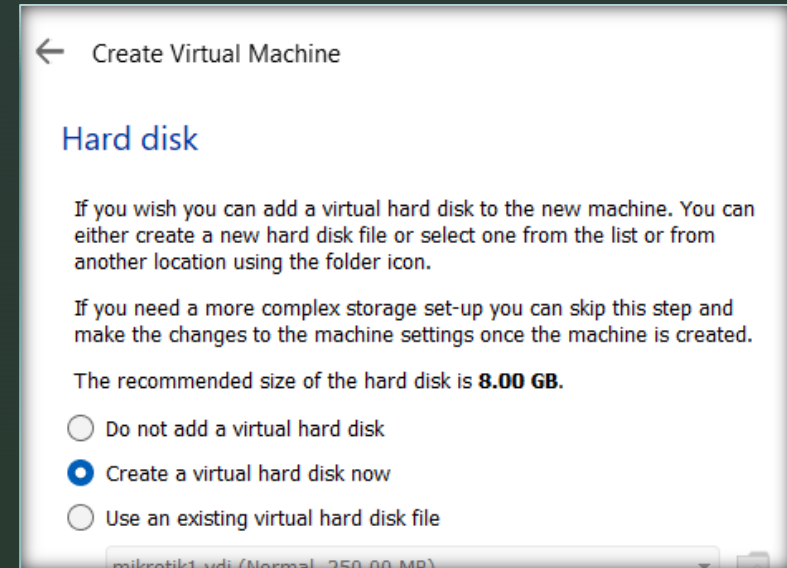
 MB

4 MB 24576 MB

RouterOS VM Setup

In urmatorul ecran putem face un disk de 200 MB

Cu alocare dinamica pentru a nu ocupa mai mult spatiu decat sunt date actuale.



RouterOS VM Setup

Storage on physical hard disk

Please choose whether the new virtual hard disk file should grow as it is used (dynamically allocated) or if it should be created at its maximum size (fixed size).

A **dynamically allocated** hard disk file will only use space on your physical hard disk as it fills up (up to a maximum **fixed size**), although it will not shrink again automatically when space on it is freed.

A **fixed size** hard disk file may take longer to create on some systems but is often faster to use.

- ☒ Dynamically allocated
☐ Fixed size

File location and size

Please type the name of the new virtual hard disk file into the box below or click on the folder icon to select a different folder to create the file in.

C:\Users\patri\VirtualBox VMs\Mikrotik\Mikrotik.vdi

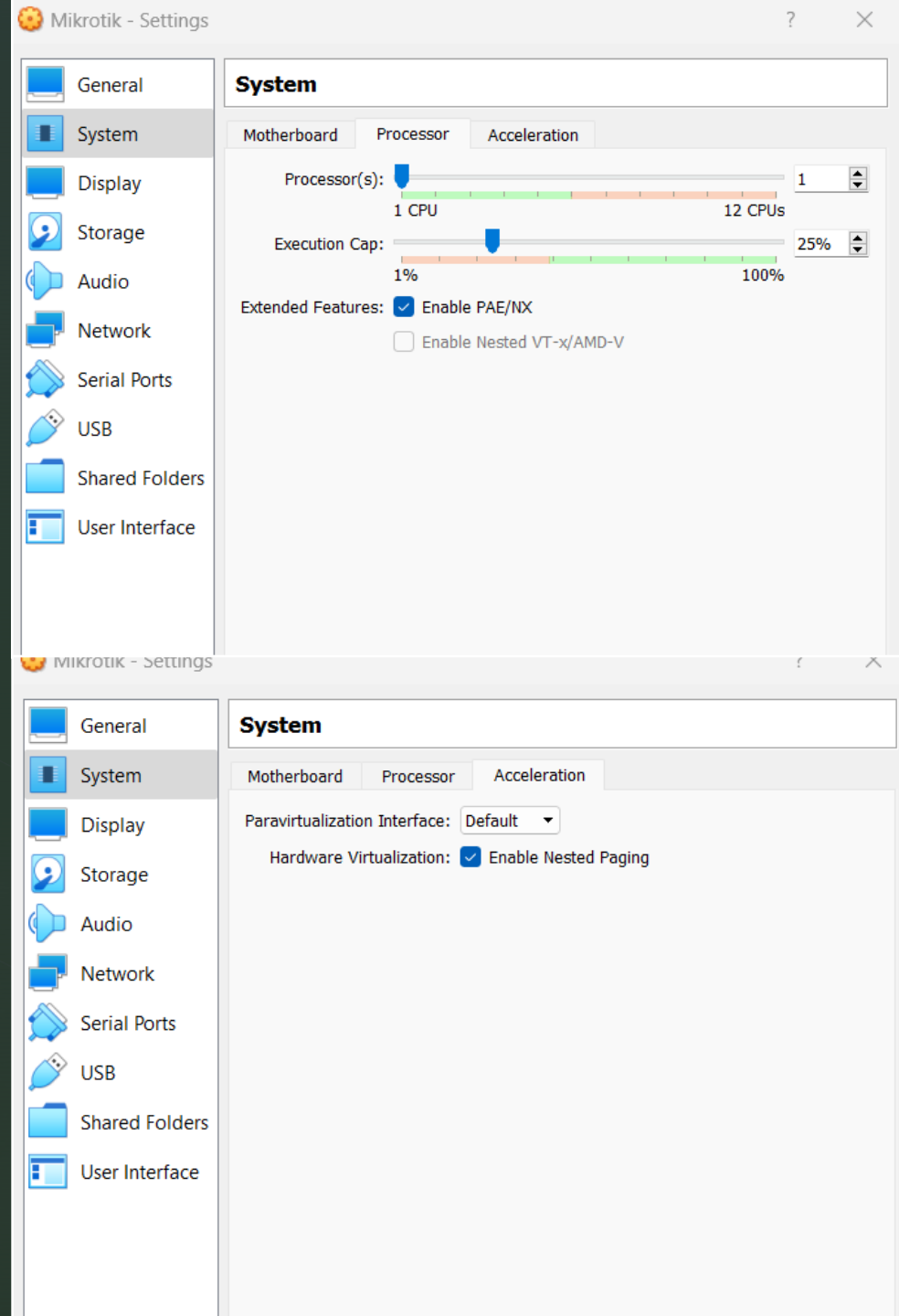


Select the size of the virtual hard disk in megabytes. This size is the limit on the amount of file data that a virtual machine will be able to store on the hard disk.



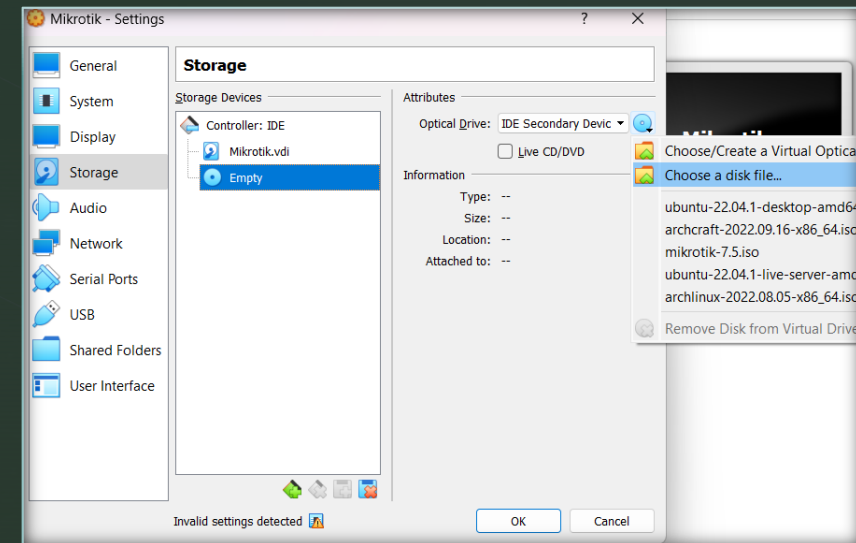
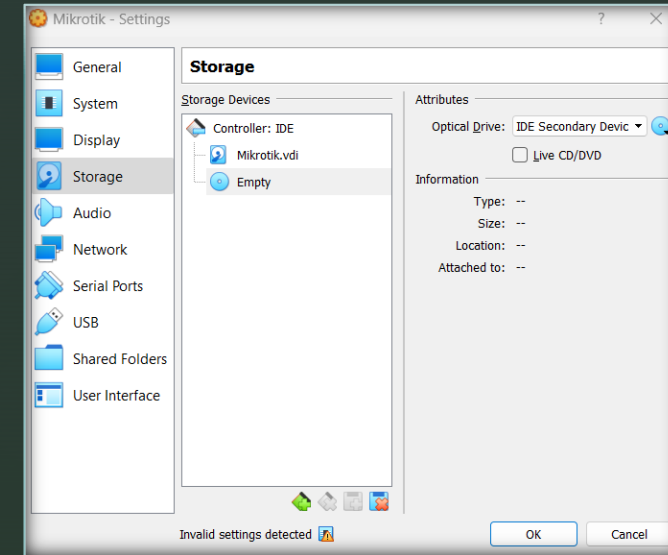
RouterOS VM Setup

- Dupa ce am facut configuratia de baza selectam setari fie prin click dreapta pe masina virtuala fie din meniul principal
- In System -> Processor putem sa mai limitam utilizarea procesorului la un procent mai mic pentru a conserva cat mai multe resurse.
- System -> Acceleration puteam sa folosim diferite tehnologi de virtualizare in cazul in care VM-ul se misca greu.



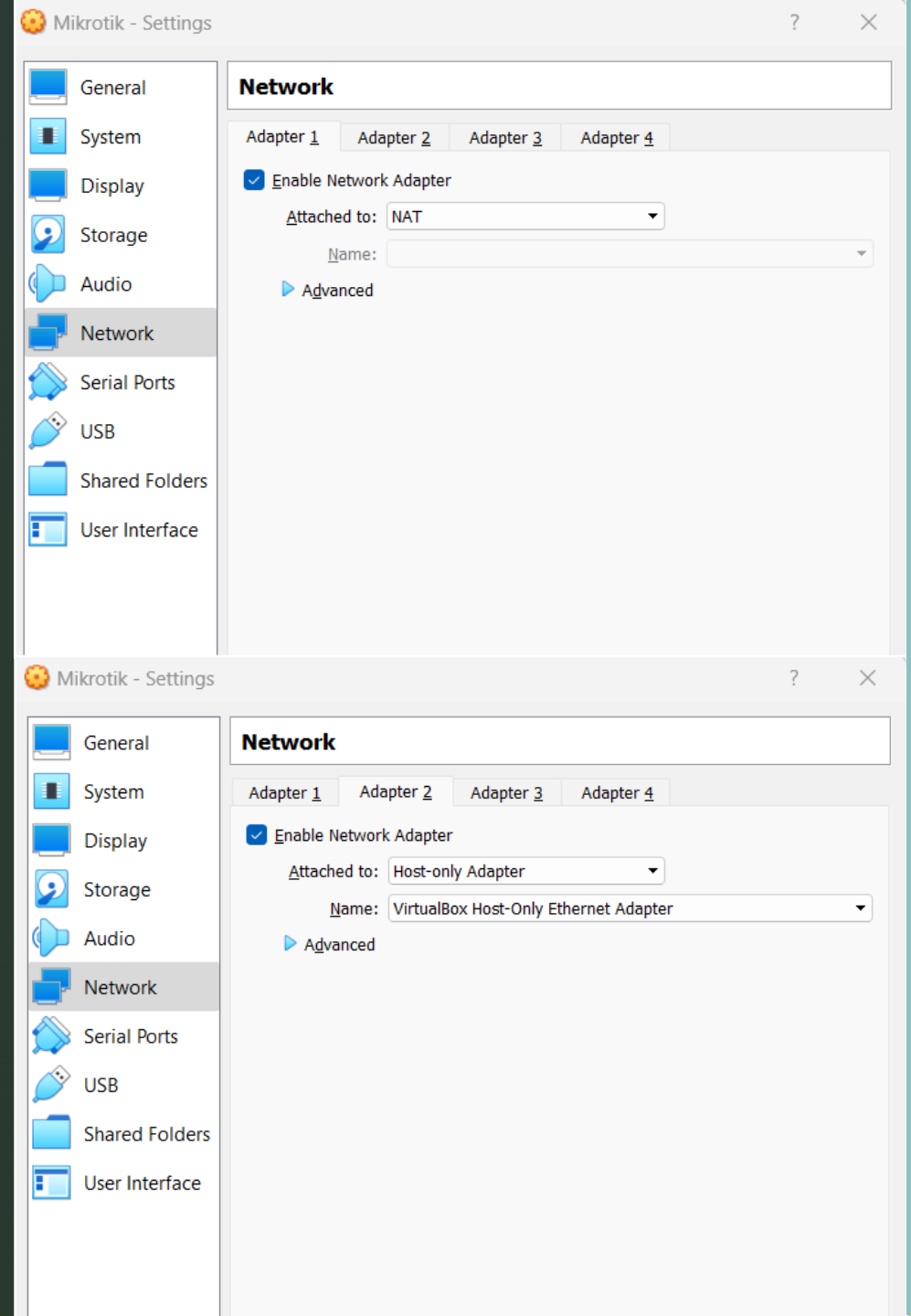
RouterOS VM Setup

- In meniul Storage incaram ISO-ul cu RouterOS



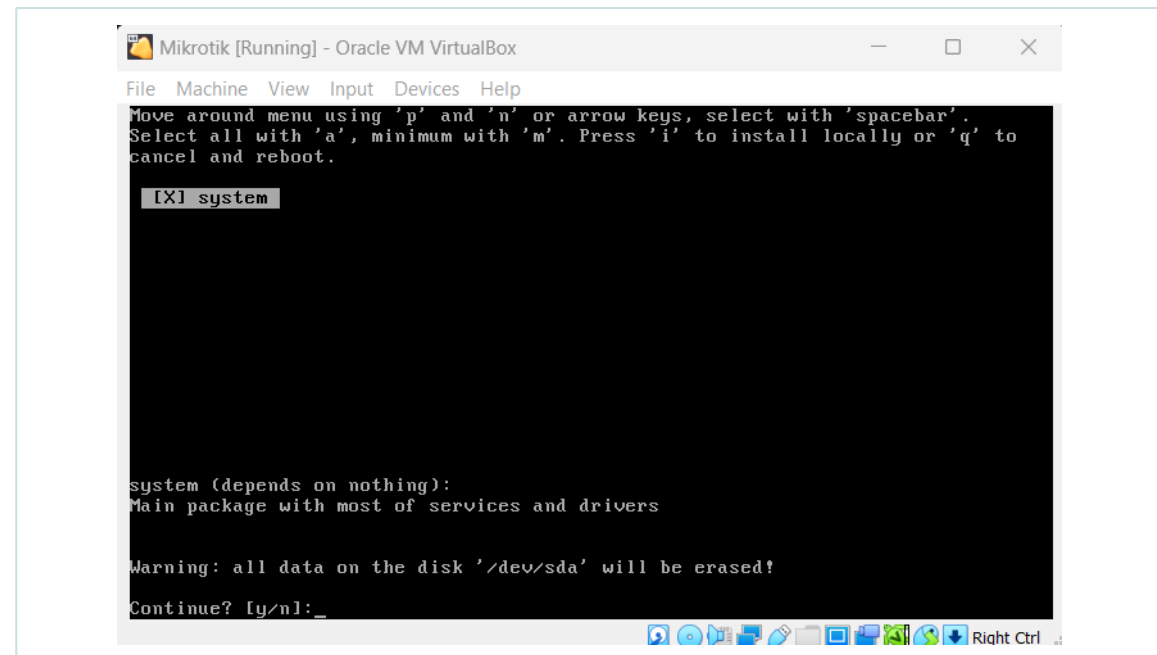
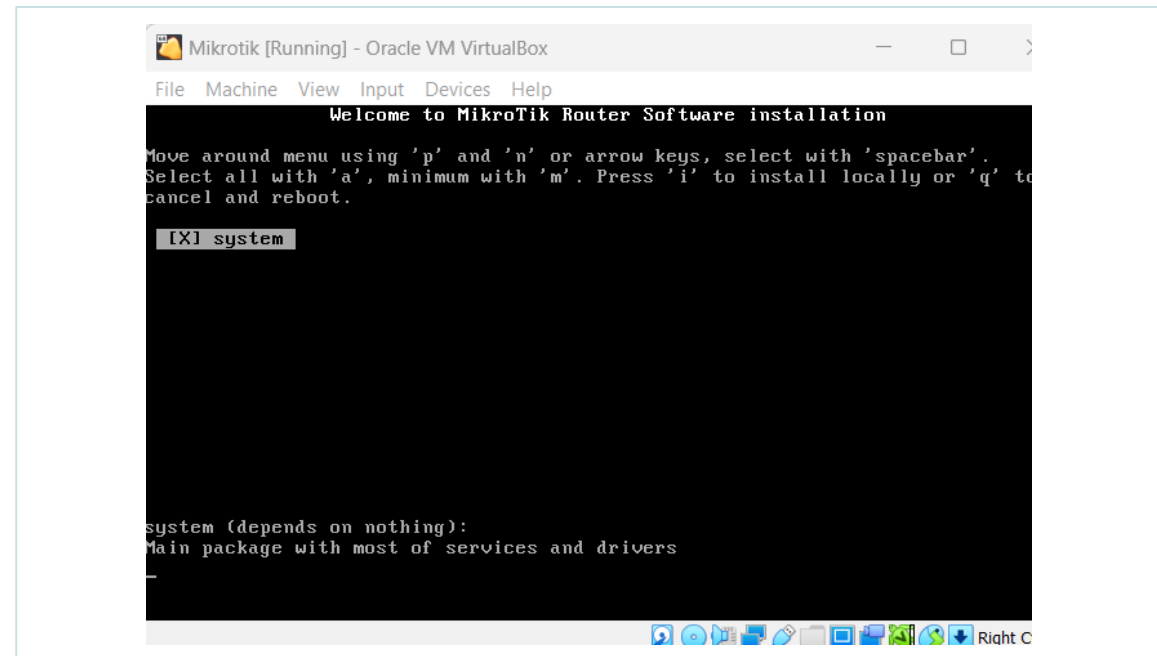
RouterOS VM Setup

- In Network setam primul adaptor fie in bridge sau in NAT (bridge cu adaptorul Wi-Fi sau ethernet va avea acces direct in reseaua locala, in cazul NAT va avea acces prin laptop)
- Al doilea adaptor il pune in Host-only Adapter si selectam adaptorul facut mai devreme
- Aceste adaptor face o retea interna izolata intre masinile virtuale.
- Dupa care putem salva setarile si porni masina virtuala.



RouterOS VM Setup

- Dupa ce pornim VM-ul va incepe porcesul de instalare, apasand "a" si apoi "i"
- Ne va informa ca tot disk-ul virtual va fi sters si instalat sistemul si noi putem accepta apasand "y"



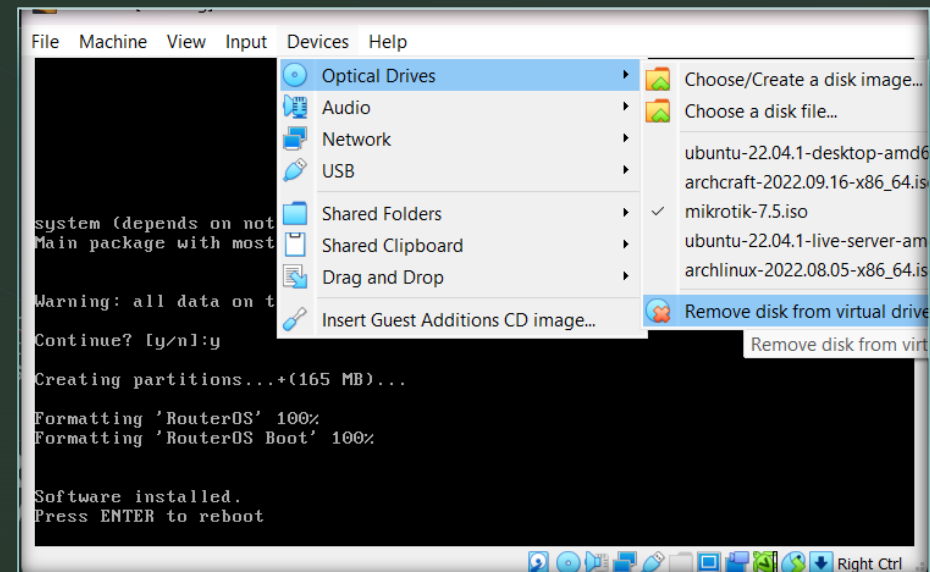
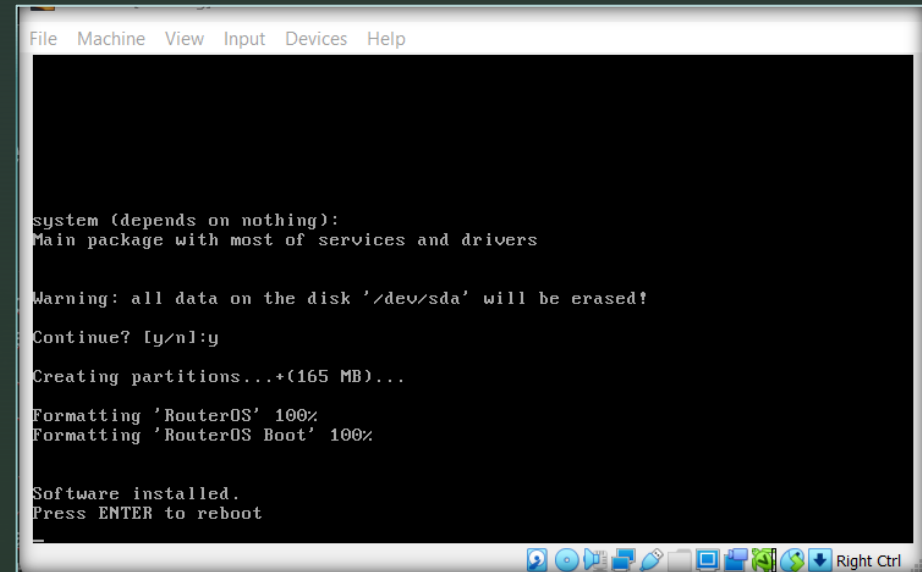


RouterOS VM Setup

Dupa instalare inainte de a da reboot trebuie sa scoatem ISO-ul mapat din VM.

Selectam Devices -> Optical Drives
-> Remove disk from virtual drive.

Si puteam apasa ENTER pentru a reporni sistemul.



RouterOS VM Setup

- Dupa reboot suntem prezentati cu interfata de login in care initial vom folosi username: "admin" si fara parola.
- Apoi introducem nua parola.

```
MikroTik Login: admin
Password:

MMM      MMM      KKK      TTTTTTTTTT      KKK
MMMM     MMMM     KKK      TTTTTTTTTT      KKK
MMM MMMM MMM III KKK KKK RRRRRR 000000 TTT III KKK KKK
MMM MM  MMM III KKKKK RRR RRR 000 000 TTT III KKKKK
MMM     MMM III KKK KKK RRRRRR 000 000 TTT III KKK KKK
MMM     MMM III KKK KKK RRR RRR 000000 TTT III KKK KKK

MikroTik RouterOS 7.5 (c) 1999-2022      https://www.mikrotik.com/

Do you want to see the software license? [Y/n]: _

MikroTik RouterOS 7.5 (c) 1999-2022      https://www.mikrotik.com/

Do you want to see the software license? [Y/n]: n

ROUTER HAS NO SOFTWARE KEY
-----
You have 23h48m to configure the router to be remotely accessible,
and to enter the key by pasting it in a Telnet window or in Winbox.
Turn off the device to stop the timer.
See www.mikrotik.com/key for more details.

Current installation "software ID": PLLY-DAJ2
Please press "Enter" to continue!

Change your password

new password> *****
repeat new password> *****
```

RouterOS VM Setup

- Acum trebuie sa luam setari dhcp pe prima interfata (WAN) folosind comanda “/ip/dhcp-client/add interface=ether1 disabled=no”
- Dupa care verificam cu comanda “/ip/address/print” si vedeam alocarea unui IP pe interfata ether1

```
Change your password
new password> *****
repeat new password> *****

Password changed
[admin@MikroTik] > /ip/dhcp-client/
[admin@MikroTik] /ip/dhcp-client> add interface=ether1 disabled=no
[admin@MikroTik] /ip/dhcp-client>
```

```
[admin@MikroTik] /ip/dhcp-client> /ip/address/
[admin@MikroTik] /ip/address> print
Flags: D - DYNAMIC
Columns: ADDRESS, NETWORK, INTERFACE
# ADDRESS NETWORK INTERFACE
0 D 10.0.2.15/24 10.0.2.0 ether1
[admin@MikroTik] /ip/address>
```

Linux VM Setup


- Pentru celalat VM am ales o distributie mai populara de linux numita Ubuntu care poate fi desktop sau server.
- Ca in cazul primului VM facem un nou setup si alocam resurse


← Create Virtual Machine

Name and operating system

Please choose a descriptive name and destination folder for the new virtual machine and select the type of operating system you intend to install on it. The name you choose will be used throughout VirtualBox to identify this machine.

Name:

Machine Folder:  ▾

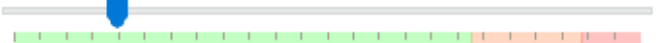
Type: ▾ 

Version: ▾

Memory size

Select the amount of memory (RAM) in megabytes to be allocated to the virtual machine.

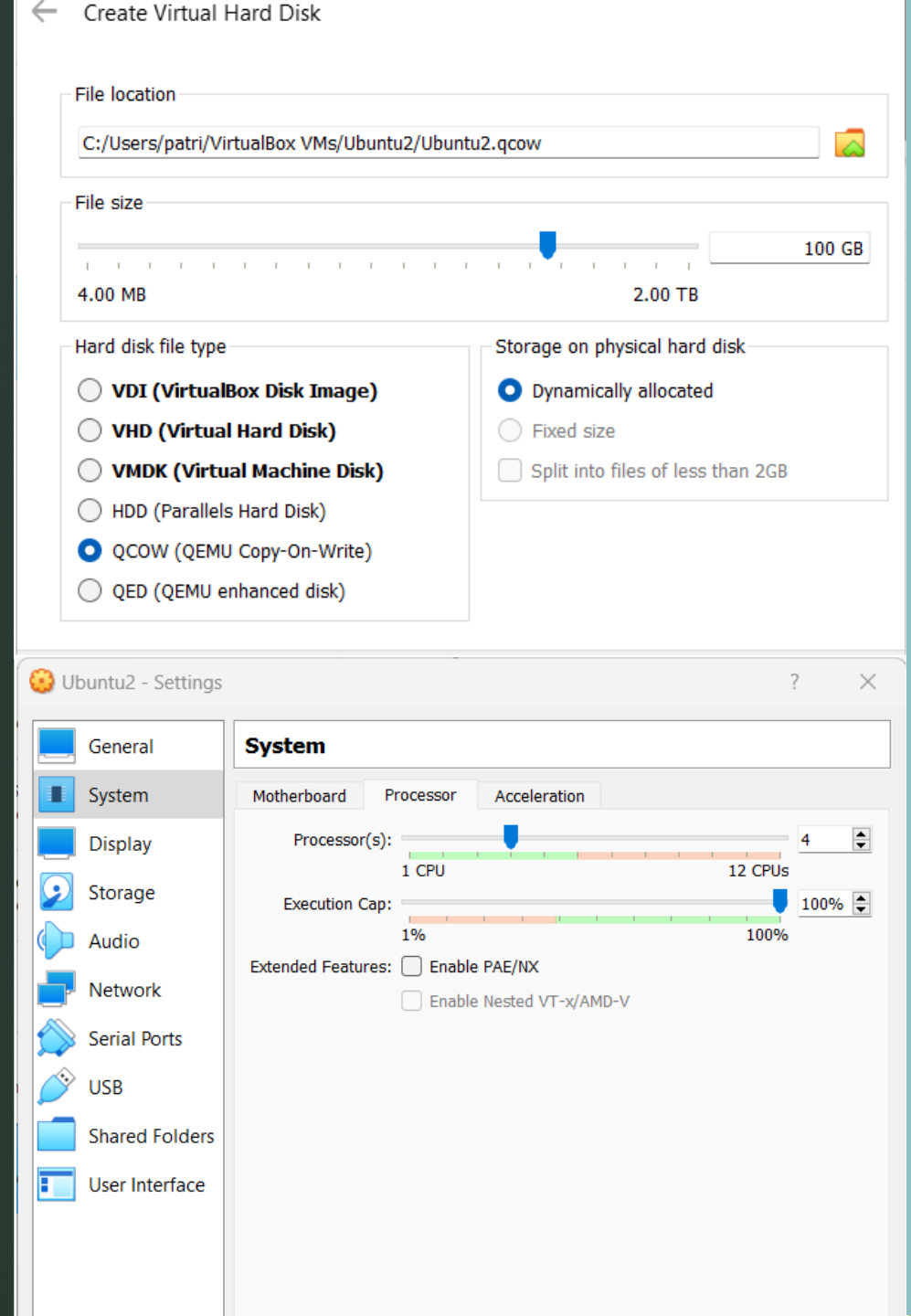
The recommended memory size is **1024** MB.

 MB

4 MB 24576 MB

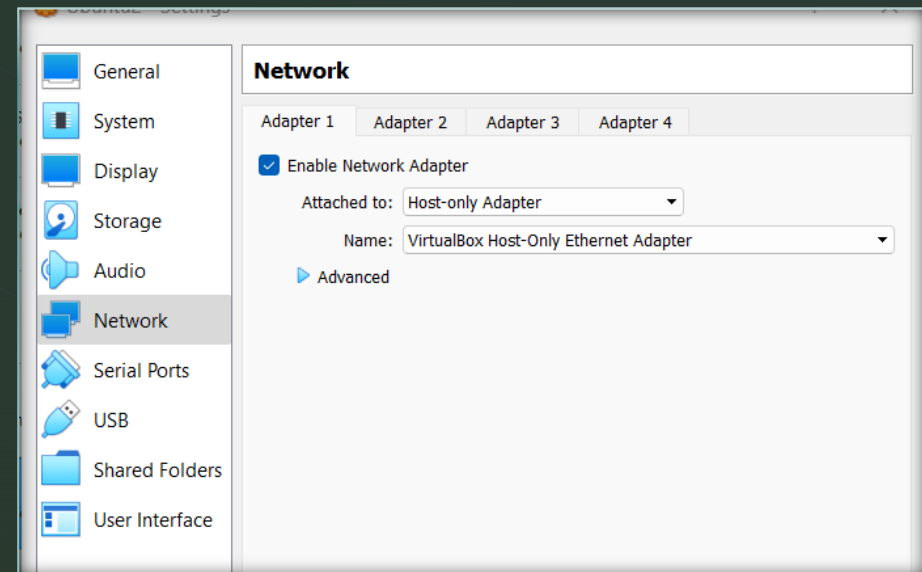
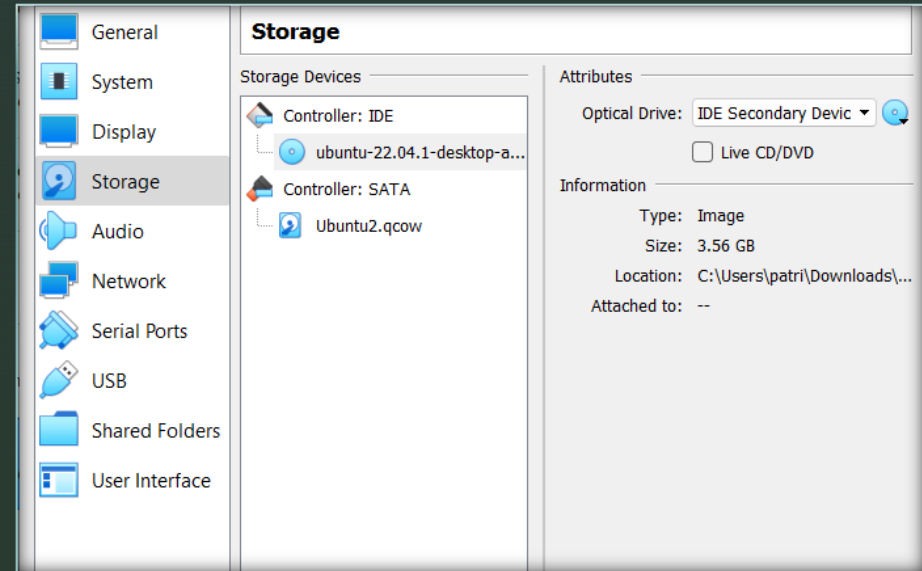
Linux VM Setup

- Facem un disk de ~100GB (este optional pasul de aici in forma avansata folosind imagine QCOW se poate face la fel ca in setup-ul de RouterOS)
- Dupa ce se face VM-ul intram in seatile acestuia si editam urmatoarele configuratii:
- - System -> Processor si alocam minim doua procesoare



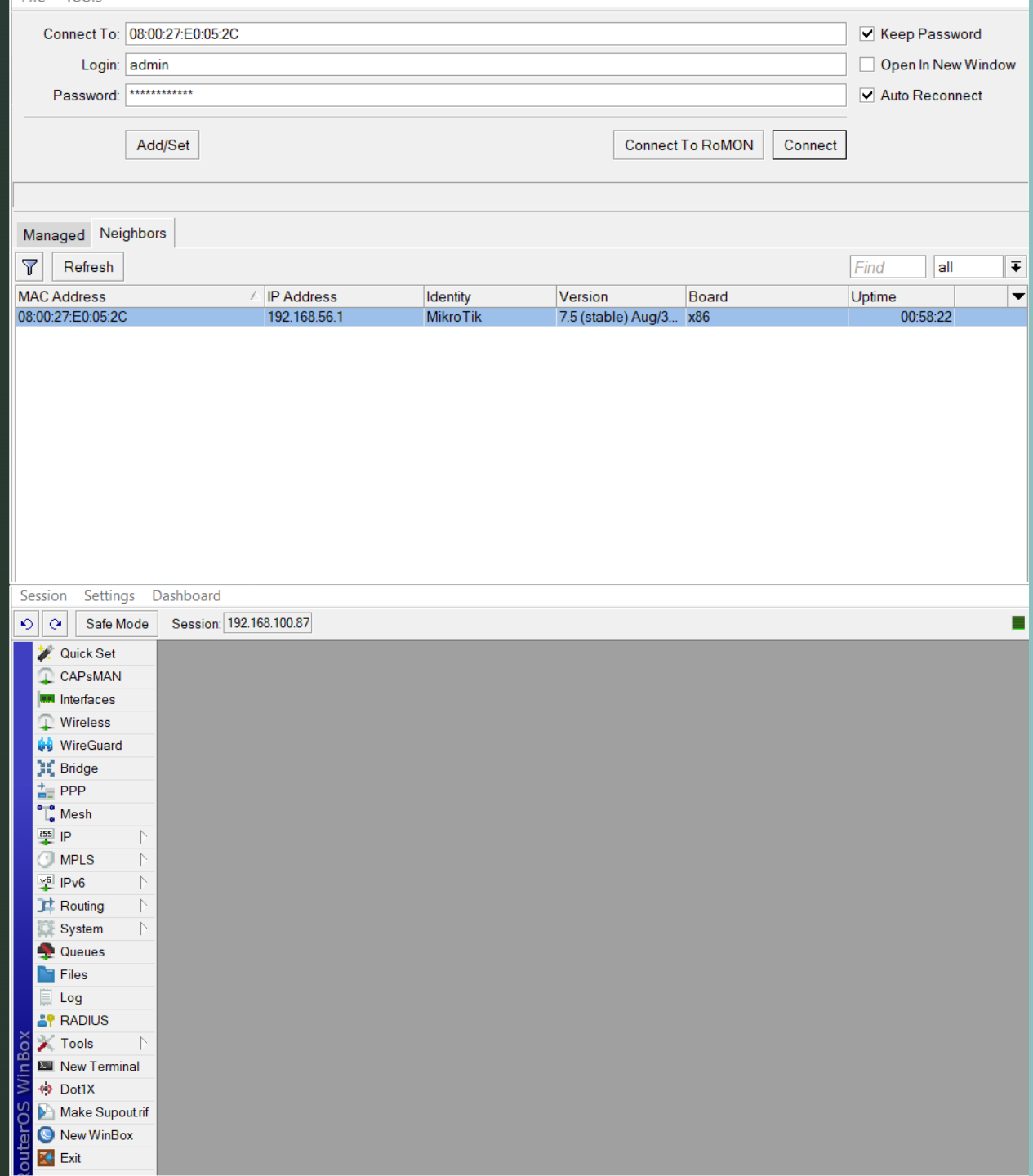
Linux VM Setup

- La storage selectam ISO-ul de Ubuntu descarcat.
- Iar in Netowrk setam primul adaptor in Host-only Adapter si alegem interfata facuta la inceput.
- Dupa care putem porni VM-ul si incepe instalarea.



LAN Setup

- Dupa instalarea standard al distributiei putem sa deschidem winbox pe care il descarcam de pe site-ul MikroTik.
- Si putem vedea routerul si loga in acesta folosind userul admin si parola stabilita.
- In cazul in care nu ne putem conecta prin NAT putem sa trecem intefata in modul bridge.



LAN Setup

Intrând în Quick Set vom face setup-ul pentru rețeaua locală (LAN)

Unde setăm adresa IP a interfeței (192.168.30.1)

Netmask (/24)

Activăm DHCP Server

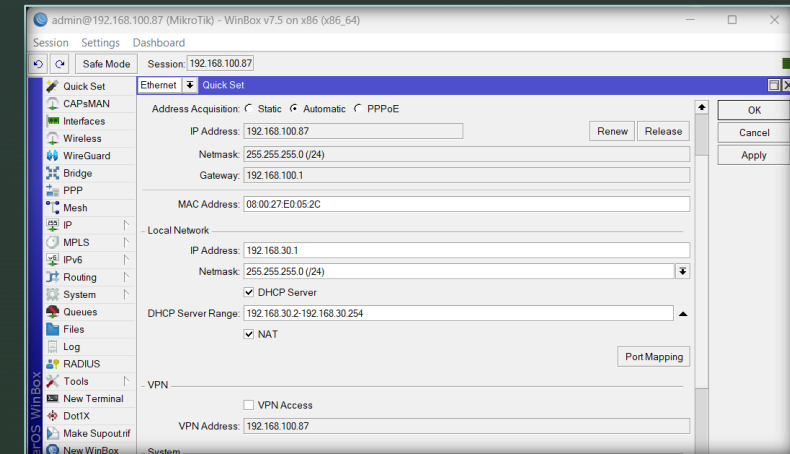
Setăm DHCP Server Range (192.168.30.2-192.168.30.254)

Și activăm opțiunea de NAT

După care putem da Apply

În mașina de Ubuntu putem rula comanda "ip a" pentru a vedea dacă avem asignată o adresă IP.

Comanda "ping 8.8.8.8" și "ping google.ro" pentru a vedea că avem acces la internet.



```
abaddon@abaddon-VirtualBox:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group
    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 fq_codel state
    up default qlen 1000
    link/ether 08:00:27:dd:74:16 brd ff:ff:ff:ff:ff:ff
    inet 192.168.30.254/24 brd 192.168.30.255 scope global dynamic nopref
    enp0s3
        valid_lft 570sec preferred_lft 570sec
    inet6 fe80::5300:580b:1b71:c3c7/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
abaddon@abaddon-VirtualBox:~$ 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=57 time=37.6 ms
^C
--- 8.8.8.8 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 37.639/37.639/37.639/0.000 ms
abaddon@abaddon-VirtualBox:~$ ping google.ro
PING google.ro (142.250.180.195) 56(84) bytes of data.
64 bytes from bud02s33-in-f3.1e100.net (142.250.180.195): icmp_seq=1 ttl=5
=47.2 ms
^C
--- google.ro ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 47.232/47.232/47.232/0.000 ms
abaddon@abaddon-VirtualBox:~$
```

Crearea bridge-ului in Ubuntu

- Intram in terminal si trecem ca utilizator root folosind comanda “sudo su”
- Dupa care editam fisierul cu comanda “nano /home/abaddon# nano /etc/netplan/01-network-manager-all.yaml”
- Atentie! Fisierul de tip yam trebuie formatat cu identari corect.
- Primul pas fiind sa trecem interfata fara dhcp pentru ca aceasta functie va fi luata de bridge-ul pe care il vom face.

```
GNU nano 6.2 /etc/netplan/01-network-man
# Let NetworkManager manage all devices on this s
network:
  version: 2
  renderer: NetworkManager
```

```
GNU nano 6.2 /etc/netplan/01-network-manager-all.yaml
# Let NetworkManager manage all devices on this system
network:
  version: 2
  renderer: NetworkManager

ethernets:
  enp0s3:
    dhcp4: false
```


Crearea bridge-ului in Ubuntu

- Putem testa dupa salvarea fisierului configul cu comanda “netplan try” si verificam ca intrefata nu mai are asignat un ip cu comanda “ip addr show <interface>”
- Dupa care adaugam interfata de bridge cu slave enp0s3 in cazul meu si cu dhcp activat.
- Testam cu comenzile “ping” si “ip” cum am facut mai devreme sa verificam conectivitatea.

```
abaddon@abaddon-VirtualBox:~$ ip addr show enp0s3
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:dd:74:16 brd ff:ff:ff:ff:ff:ff
    inet 169.254.1.60/16 brd 169.254.255.255 scope link noprefixroute enp0s3
        valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fedd:7416/64 scope link
        valid_lft forever preferred_lft forever
```

```
GNU nano 6.2
# Let NetworkManager manage all devices on this system
network:
  version: 2
  renderer: NetworkManager
# adaugam interfata in netplan pentru a modifica setarile acesteia
ethernets:
  enp0s3:
    dhcp4: no
# facem o interfata de tip bridge si asignam ca slave enp0s3
bridges:
  br0:
    dhcp4: yes
    interfaces:
      - enp0s3
```

```
root@abaddon-VirtualBox:/home/abaddon# 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=114 time=72.1 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=114 time=75.7 ms
^C
--- 8.8.8.8 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1009ms
rtt min/avg/max/mdev = 72.087/73.912/75.737/1.825 ms
root@abaddon-VirtualBox:/home/abaddon#
```


Instalare LXC/LXD

- Instalarea in ubuntu verisunile noi care foloses snap se va insatala lxd din snap cu comanda “snap install lxd”
- Dupa care trebuie sa facem initializarea lxd-ului cu comanda “lxd init” cu setarile din imaginea alaturata singura modificare din setup-ul default este aceea de create bridge no on loc de yes si sa foloseasca un bridge existent yes in loc de no, apoi setarea br0 la host interface

```
root@abaddon-VirtualBox:/home/abaddon# snap install lxd
lxd 5.6-794016a from Canonical✓ installed
```

```
root@abaddon-VirtualBox:/home/abaddon# lxd init
Would you like to use LXD clustering? (yes/no) [default=no]: no
Do you want to configure a new storage pool? (yes/no) [default=yes]: yes
Name of the new storage pool [default=default]: default
Name of the storage backend to use (lvm, zfs, btrfs, ceph, cephobject, dir) [default=zfs]: zfs
Would you like to create a new zfs dataset under rpool/lxd? (yes/no) [default=yes]: yes
Would you like to connect to a MAAS server? (yes/no) [default=no]: no
Would you like to create a new local network bridge? (yes/no) [default=yes]: no
Would you like to configure LXD to use an existing bridge or host interface? (yes/no) [default=no]: yes
Name of the existing bridge or host interface: br0
Would you like the LXD server to be available over the network? (yes/no) [default=no]: no
Would you like stale cached images to be updated automatically? (yes/no) [default=yes]:
Would you like a YAML "lxd init" preseed to be printed? (yes/no) [default=no]: no
```

Instalare LXC/LXD

- Pentru a putea access un container folosim comanda

“lxc exec <container_name> -- bash”

- si verificam conectivitatea in interiorul acestuia.

```
root@abaddon-VirtualBox:/home/abaddon# lxc exec tst -- bash
root@tst:~# ping google.ro
PING google.ro (142.250.180.3) 56(84) bytes of data.
64 bytes from lhr25s32-in-f3.1e100.net (142.250.180.3): icmp_seq=1 ttl=56 time=118 ms
^C
--- google.ro ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 117.871/117.871/117.871/0.000 ms
```

Instalare LXC/LXD

- Pornim un container de test cu comanda “lxc launch ubuntu test”
- Dupa care putem verifica cu comadna “lxc list” ca ruleaza containerul si are asignata o adresa ip de la router.

```
root@abaddon-VirtualBox:/home/abaddon# lxc launch ubuntu tst
Creating tst
The local image 'ubuntu' couldn't be found, trying 'ubuntu:' instead.
Retrieving image: rootfs: 12% (334.86kB/s)
Retrieving image: rootfs: 31% (288.18kB/s)
Starting tst
root@abaddon-VirtualBox:/home/abaddon#
```

```
root@abaddon-VirtualBox:/home/abaddon# lxc list
+-----+-----+-----+-----+-----+-----+
| NAME | STATE | IPV4 | IPV6 | TYPE | SNAPSHOTS |
+-----+-----+-----+-----+-----+-----+
| tst  | RUNNING | 192.168.88.253 (eth0) |  | CONTAINER | 0 |
+-----+-----+-----+-----+-----+-----+
```