UNIVERSITÉ
DE REIMS
CHAMPAGNE-ARDENNE

Introduction to virtualization-VirtualBox

PRACTICAL WORK 1

TIZIANO NARDONE
UNIVERSITY OF REIMS | FRANCE

Table of Contents

I. First tests

1. Access network from guest

```
tub@ubuntu:~$ 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=113 time=45.8 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=113 time=43.2 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=113 time=40.2 ms
^C
```

2. IP addresses of host and guest

- Guest

```
inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic enp0s3
```

- Host

```
Ethernet adapter VirtualBox Host-Only Network:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::5:2d85:b6e7:9ac2%19
   IPv4 Address. . . . . . . . . . . : 192.168.56.1
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . :
```

```
Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . : univ-reims.fr
   Link-local IPv6 Address . . . . . : fe80::149a:a7d2:e63a:2ee1%9
   IPv4 Address. . . . . . . . . . . : 10.145.11.73
   Subnet Mask . . . . . . . . . . . : 255.255.224.0
   Default Gateway . . . . . . . . . : 10.145.31.254
```

3. Access between host and guest

- From host to guest -> not reachable

```
Pinging 10.0.2.15 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 10.0.2.15:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

- From guest to host -> reachable

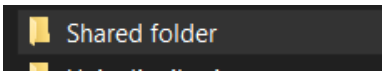
```
tub@ubuntu:~$ ping 10.145.11.73
PING 10.145.11.73 (10.145.11.73) 56(84) bytes of data.
64 bytes from 10.145.11.73: icmp_seq=1 ttl=127 time=1.00 ms
64 bytes from 10.145.11.73: icmp_seq=2 ttl=127 time=1.87 ms
64 bytes from 10.145.11.73: icmp_seq=3 ttl=127 time=1.84 ms
^C
--- 10.145.11.73 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2003ms
rtt min/avg/max/mdev = 1.001/1.570/1.870/0.402 ms
tub@ubuntu:~$
```

4. Installation web server

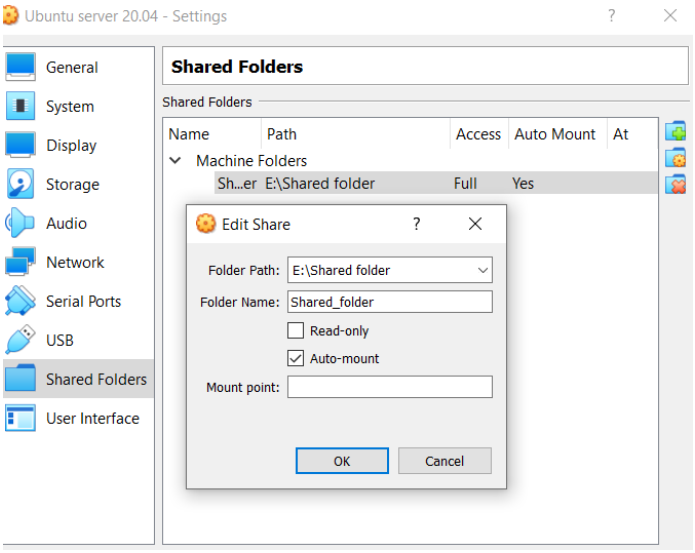
```
tub@ubuntu:~$ sudo apt-get install apache2
```

5. Multiple user access shared folder between Host & Guest

- Creation shared folder in host



- Configuration on VB



- New group on guest created (cat /etc/group)

```
vboxsf:x:117:tub
```

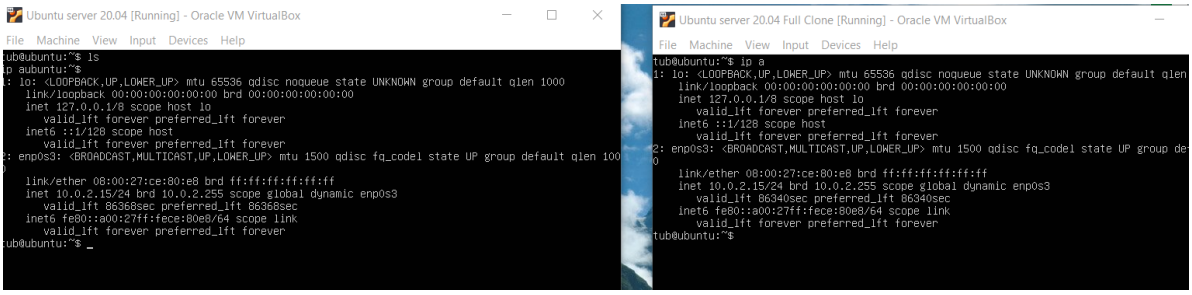
- Add users to the group -> usermod -a -G vboxsf user
- Go to the shared folder (cd /media)
- Check the right the group

```
tub@ubuntu:/media$ ls -al
total 8
drwxr-xr-x  3 root root   4096 Nov  9 13:00 .
drwxr-xr-x 20 root root   4096 Nov  9 09:32 ..
drwxrwx---  1 root vboxsf    0 Nov  9 13:09 sf_Shared_folder
tub@ubuntu:/media$
```

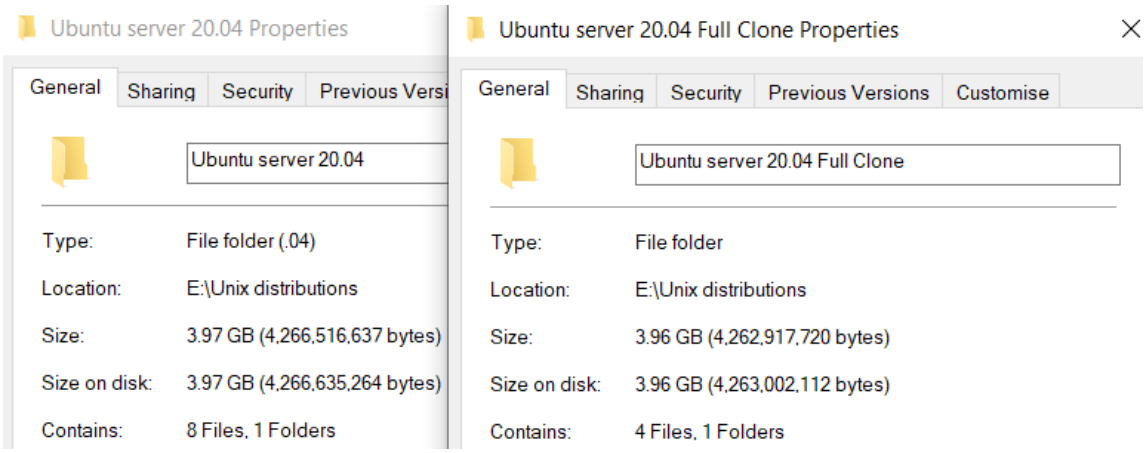
II. Machine duplication

6. Full clone

- The original and the cloned machine have the same MAC and IP address



- Plus, they have the same size

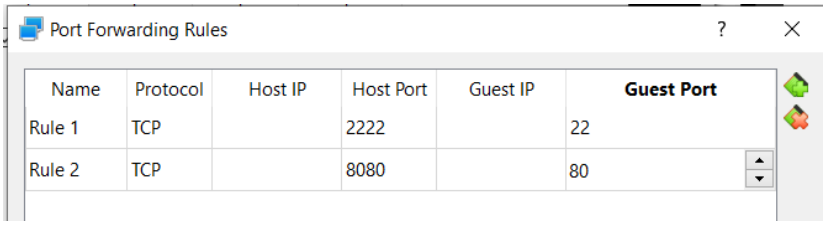


7. Linked clone

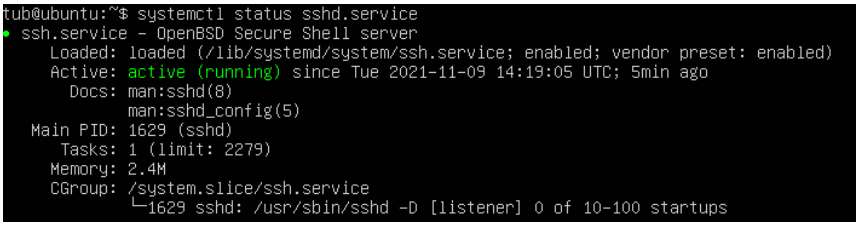
- The original and the cloned machine have the same MAC and IP address
- They have the same disk

III. Network

8. Port forwarding



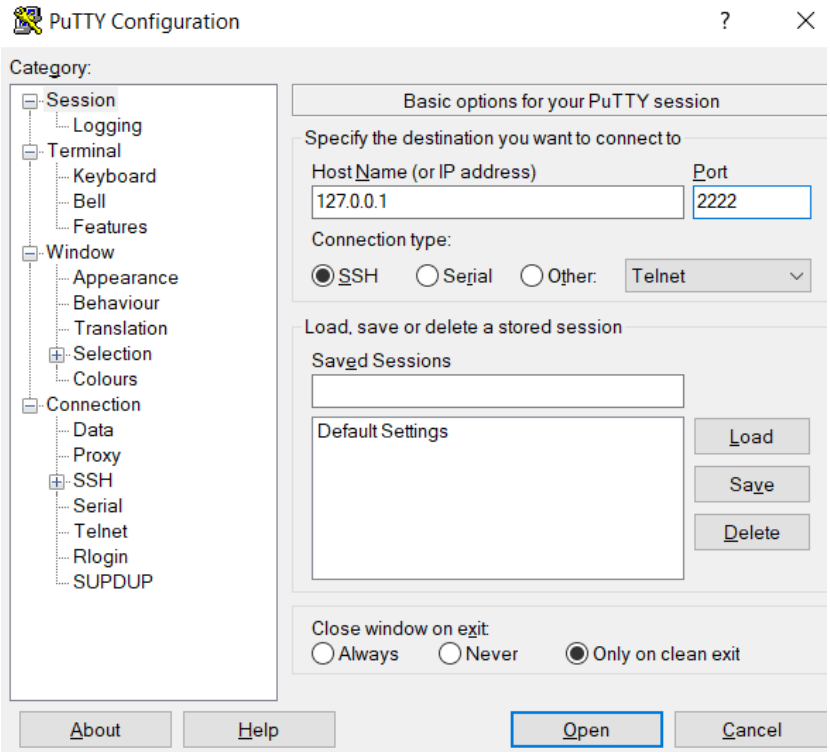
- Test guest connection on port 22
  - sudo apt-get install openssh-server
  - sudo systemctl status sshd.service



  - sudo apt-get install net-tools

- netstat -an | grep 22

- Test using Putty

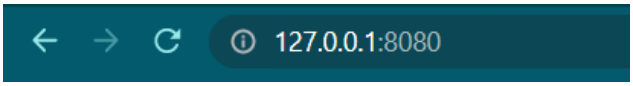


- Forwarding successful

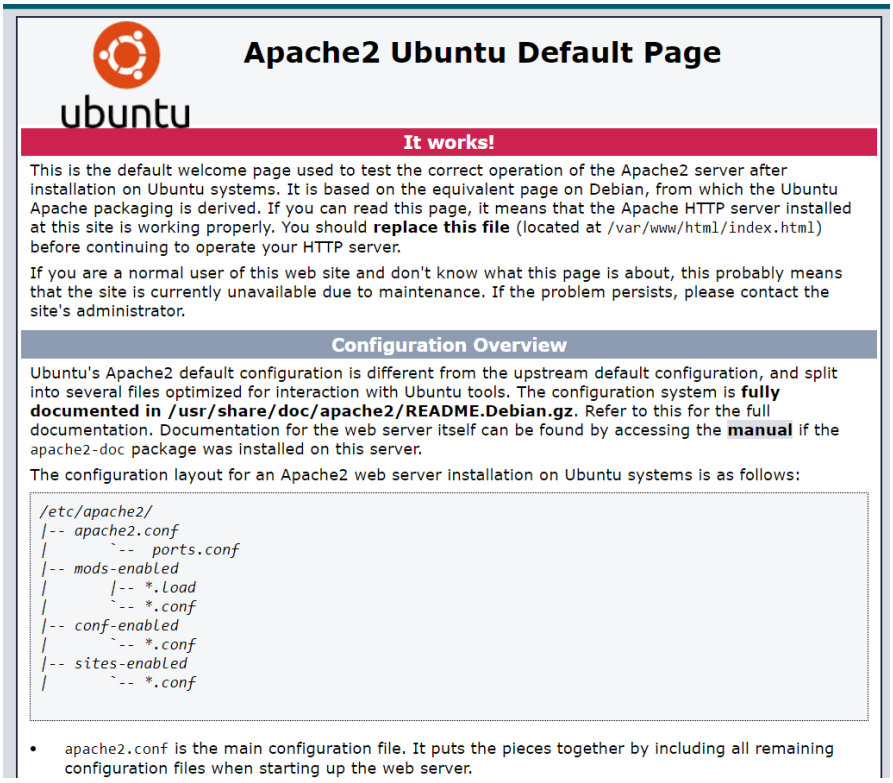
- Test guest connection on port 80

- netstat -an | grep 80

```
tub@ubuntu:~$ netstat -an | grep 80
tcp6       0      0 :::80                   :::*                    LISTEN
unix  2      [ ]         DGRAM                    26280    /run/user/1000/systemd/
```

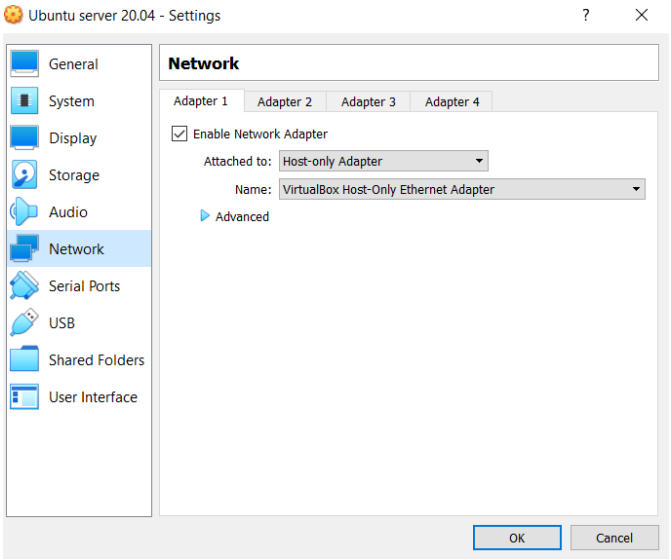


- Successful connection

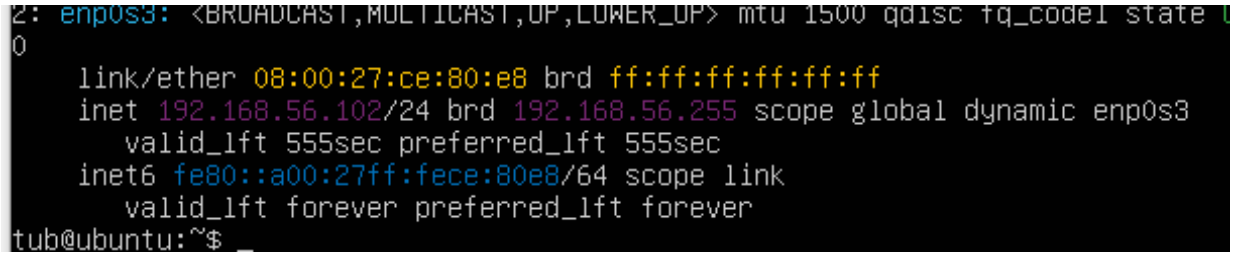


9. DHCP

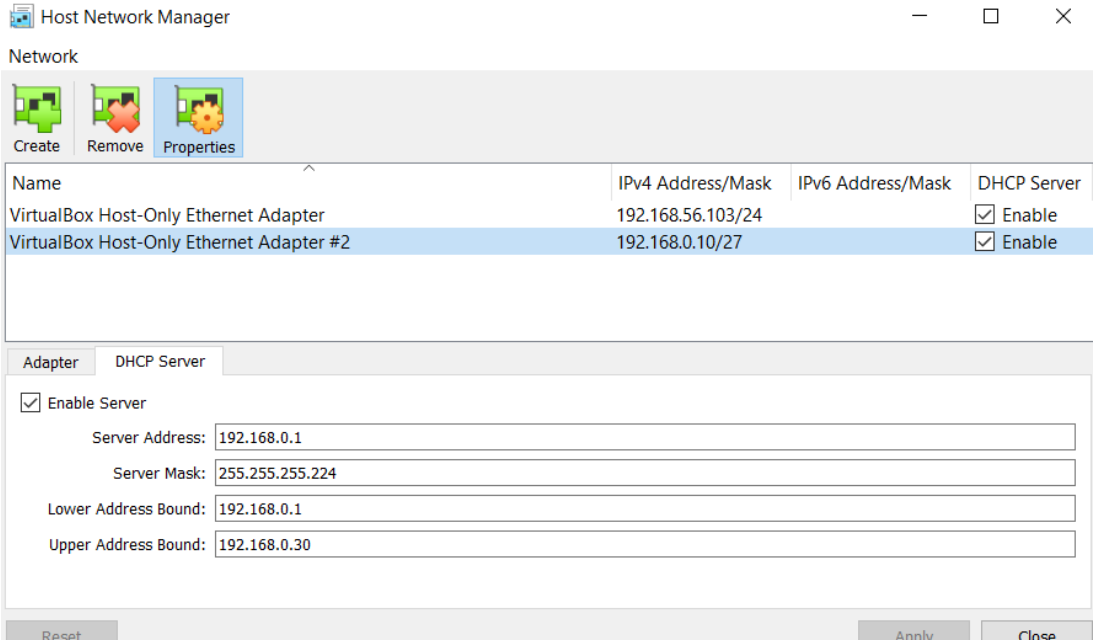
- Change Network from NAT to Host private network

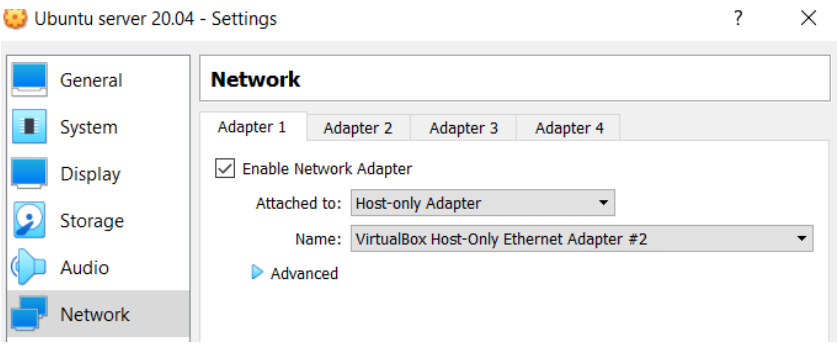


- The IP address of the guest is now : 192.168.56.102

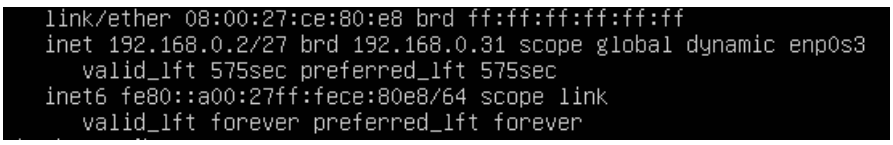


- Creating a new network to the DHCP server can deliver IP addresses between 192.168.0.1 – 192.168.0.30





- IP guest : 192.168.0.2



- IP host : 192.168.0.3

```
Ethernet adapter VirtualBox Host-Only Network #2:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::3030:700d:7e25:49e9%76
   IPv4 Address. . . . . . . . . . . : 192.168.0.3
   Subnet Mask . . . . . . . . . . . : 255.255.255.224
   Default Gateway . . . . . . . . . :
```

10. Bridge

- Bridge NAT mode
  - Host to guest > **unreachable**
  - Guest to host > **reachable**
  - Guest to internet **> reachable**
  - Guest to guest > **unreachable (… ?)**
- Full Bridge mode
  - Host to guest > **reachable**
  - Guest to host > **unreachable**
  - Guest to internet > **reachable**
  - Guest to guest > **reachable**
- Private Bridge mode
  - Host to guest > **reachable**
  - Guest to host > un**reachable**
  - Guest to internet > un**reachable**
  - Guest to guest > **reachable**

11. Network mount

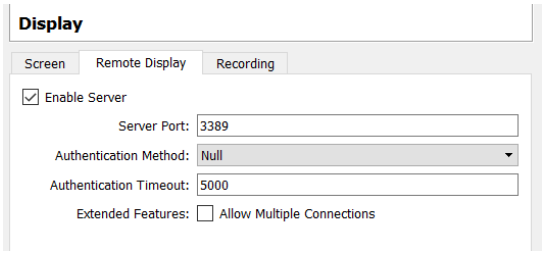
- The guest has 2 network adapters (NAT + Private Bridge)
- -> Edit Yaml file & write the command (sudo netplan apply):

```
# This is the network config written
network:
  ethernets:
    enp0s3:
      dhcp4: true
    enp0s8:
      dhcp4: true
  version: 2
```

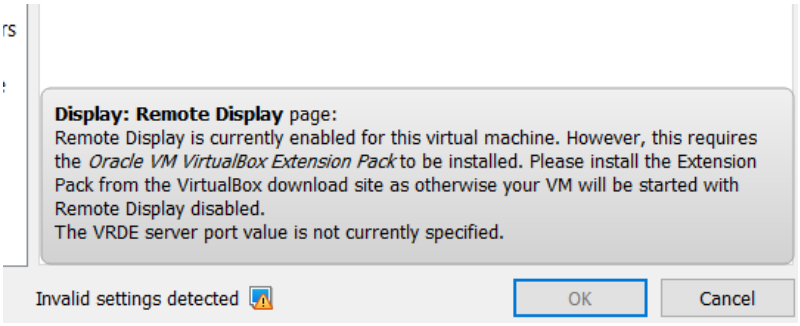
```
ub@ubuntu:~$ ip -c -h a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 100
0
    link/ether 08:00:27:ce:80:e8 brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic enp0s3
       valid_lft 86258sec preferred_lft 86258sec
    inet6 fe80::a00:27ff:fece:80e8/64 scope link
       valid_lft forever preferred_lft forever
3: enp0s8: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 100
0
    link/ether 08:00:27:5d:14:ef brd ff:ff:ff:ff:ff:ff
    inet 192.168.56.104/24 brd 192.168.56.255 scope global dynamic enp0s8
       valid_lft 458sec preferred_lft 458sec
    inet6 fe80::a00:27ff:fe5d:14ef/64 scope link
       valid_lft forever preferred_lft forever
ub@ubuntu:~$ _
```

12. Access to the guest

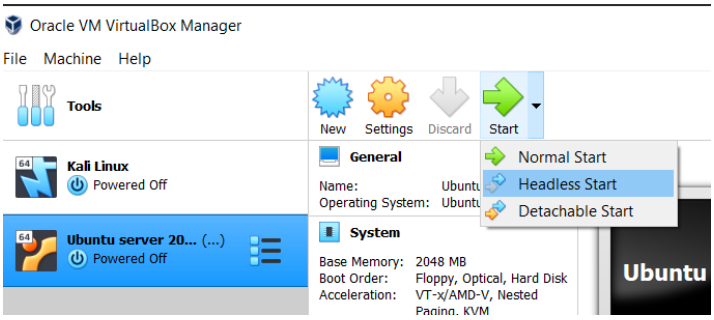
- From the Hypervisor using RDP
  - Enable Remote Display on VB



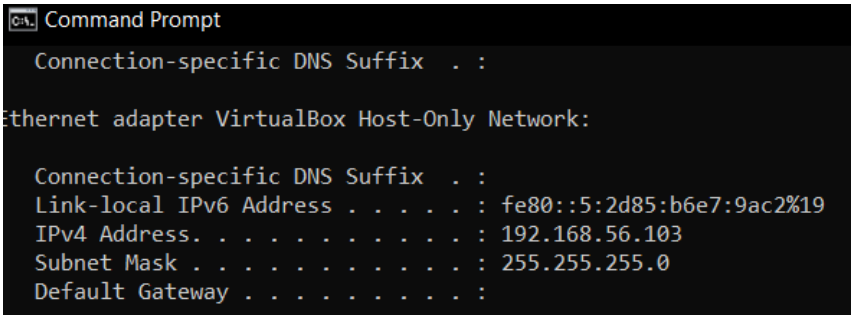
  - Download & install VB extension pack



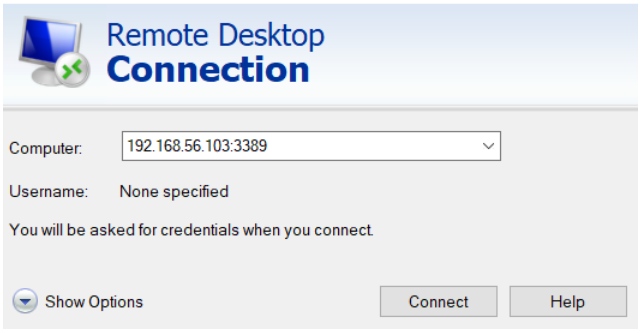
  - Start the guest in Headless mode



  - Check the IP address of the adapter of the Host-Only network



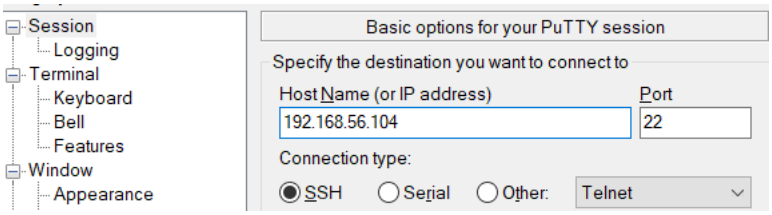
  - Connect to the guest terminal using Remote Desktop Connection



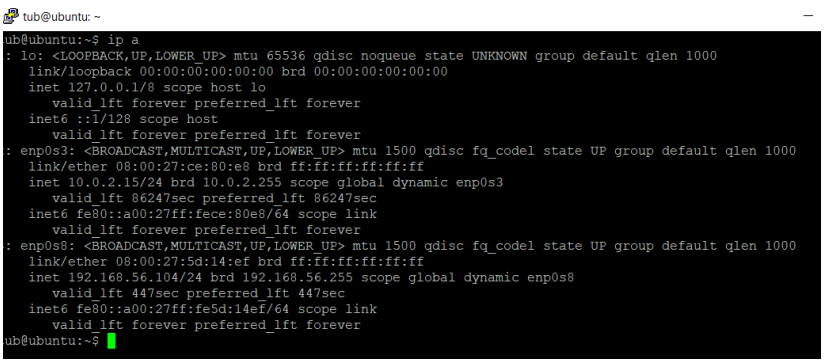
- Successful connection

```
tub@ubuntu:~$ pwd
/home/tub
ip aubuntu:~$
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 fq_codel state UP group default qlen 100
0
    link/ether 08:00:27:ce:80:e8 brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic enp0s3
       valid_lft 86359sec preferred_lft 86359sec
    inet6 fe80::a00:27ff:fece:80e8/64 scope link
       valid_lft forever preferred_lft forever
3: enp0s8: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 100
0
    link/ether 08:00:27:5d:14:ef brd ff:ff:ff:ff:ff:ff
    inet 192.168.56.104/24 brd 192.168.56.255 scope global dynamic enp0s8
       valid_lft 559sec preferred_lft 559sec
    inet6 fe80::a00:27ff:fe5d:14ef/64 scope link
       valid_lft forever preferred_lft forever
tub@ubuntu:~$
```

- SSH connection to access to guest
  - Make sure that SSH service is running on the guest
  - Run the guest in headless mode
  - Use PuTTy to connect to the guest with SSH and IP address of the guest



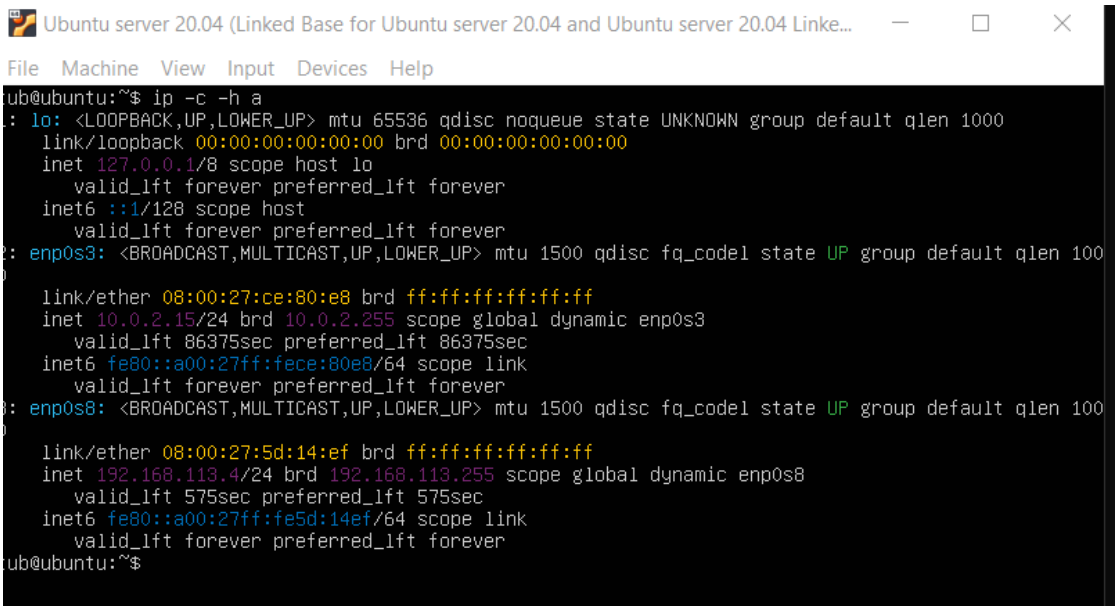
- Successful connection



UNIVERSITÉ DE REIMS CHAMPAGNE-ARDENNE

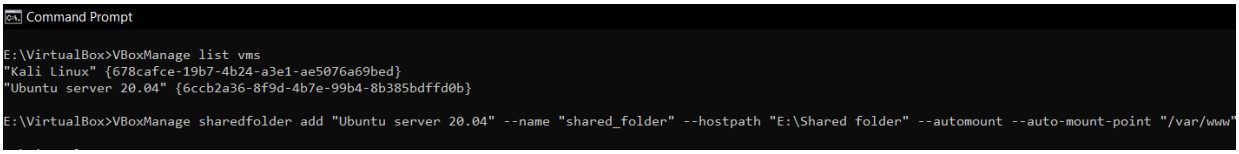
13. Starting without terminal

- Make sure a web server is running on the guest
- Configure a static IP address on the guest and power it off

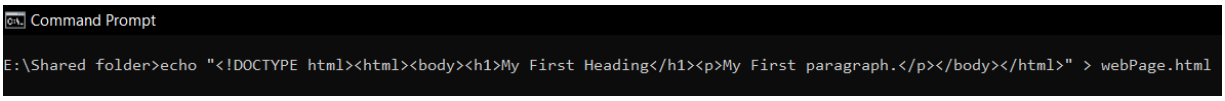


ALL following instructions must be executed with the command line :

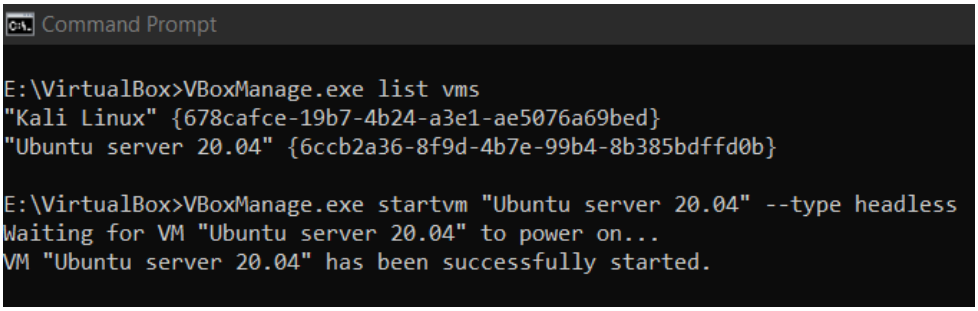
- Set up a shared folder between host and guest



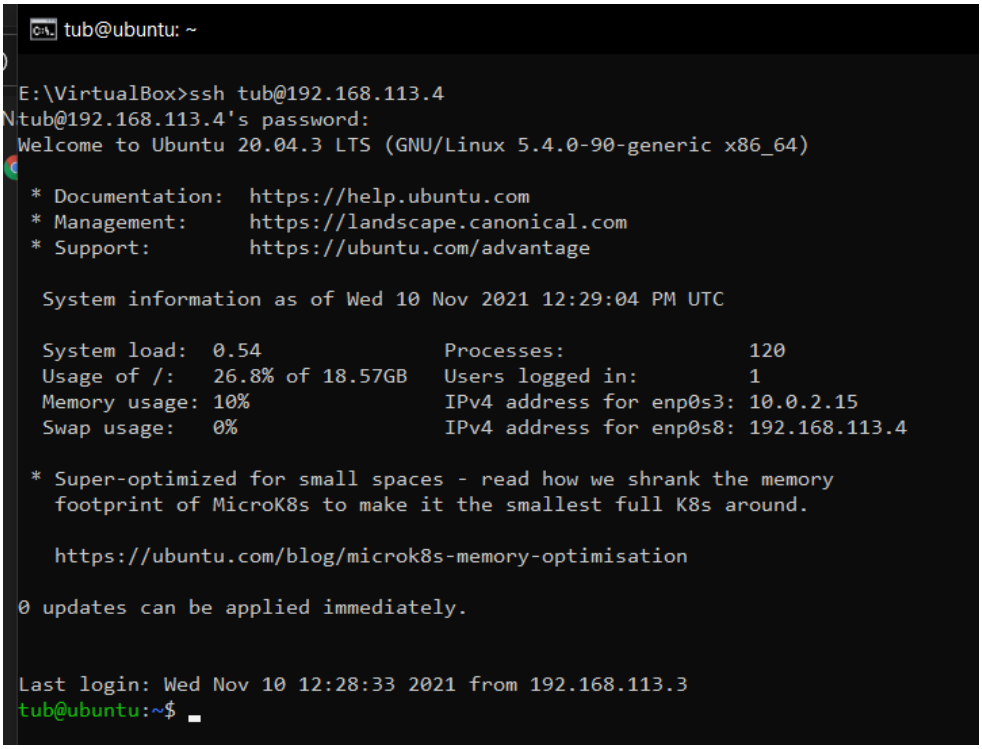
- Add an HTML file inside the folder



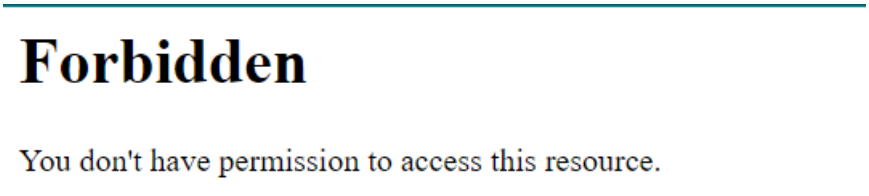
- Start up the VM guest with the command line



- Test the SSH connection



- Test access to HTML file (Permissions problem)



- Power off the guest