QEMU

PRACTICAL WORK 3

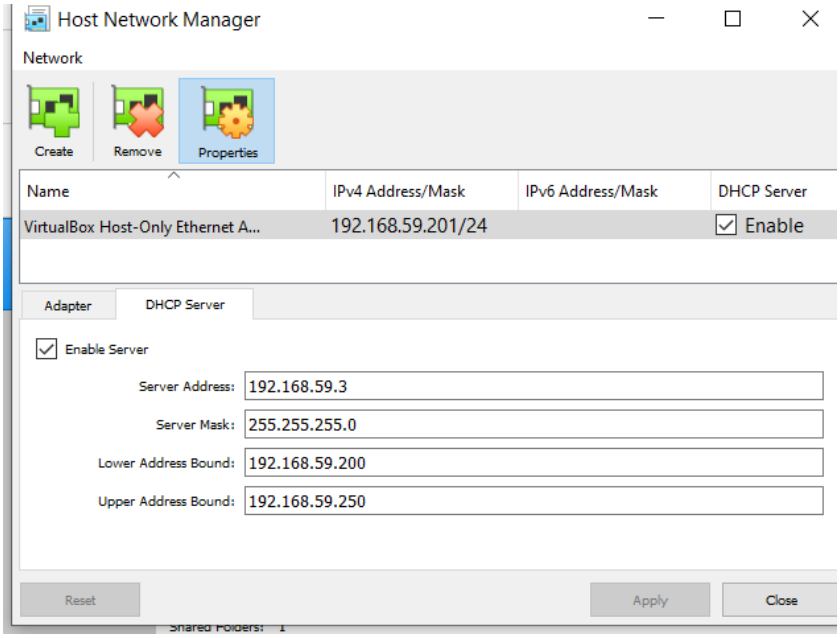
TIZIANO NARDONE
UNIVERSITY OF REIMS | FRANCE

Table of Contents

I. Basic configuration of the machine 2
II. Question 1: QEMU installation packages 2
III. Question 2: Installation Alpine image 2GB 2
1. Alpine iso download 2
2. Disk/relative image creation 2
IV. Question3: Starting up the VM 3
3. First launch with boot on ***cdrom*** (boot with -d option) 3
Alpine Linux installation workflow: 3
4. Second launch (after setting up the VM) 4
5. Test reseau (NAT -> worked) 4
6. IP addresses of the VM 4
V. Question 4: Ports forwarding 4
7. SSH service installation 4
8. Apache web server installation 4
9. VM launch with port 10022,10080 forwarded 4
SSH test: 4
HTTP test: 5
VI. Question 5: Launch of multiple Linked VM 5
10. Create a linked (rebase) VM 5
11. Test multiple linked VMs 6
VM2 -> It works: 6
VM3 -> It works: 6
VII. Question 6: 2 VM on the same network 6
12. Launch 2 VMs with SLIRP mode (mode user : default mode) 6
VM2 IP address: 6
VM3 IP address: 6
13. Launch 2 VMs on the same network 7

I. Basic configuration of the machine

- Create a linked clone of the distribution installed during the first practical work
- Network configuration
  - NAT + DHCP
  - Host only network + DHCP
    - 192.168.59.3/24 -> Config DHCP
    - Address ranges from 200 to 250



- **Since now the host is considered as the VM Ubuntu installed and not Windows OS**

II. Question 1: QEMU installation packages

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

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

```
tub@ubuntu:~$ sudo apt-get install qemu-system-x86
```

III. Question 2: Installation Alpine image 2GB

1. Alpine iso download

Address found on the website of Alpine (virtual version chosen)

```
tub@ubuntu:~$ curl -o alpine.iso https://dl-cdn.alpinelinux.org/alpine/v3.15/releases/x86_64/alpine-virt-3.15.0-x86_64.iso
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100 52.0M  100 52.0M    0     0  7991k      0  0:00:06  0:00:06 --:--:-- 10.8M
```

2. Disk/relative image creation

```
tub@ubuntu:~$ sudo qemu-img create -f qcow2 alpine.img 2G
Formatting 'alpine.img', fmt=qcow2 size=2147483648 cluster_size=65536 lazy_refcounts=off refcount_bits=16
```

IV. Question3: Starting up the VM

- 128 or 256 MB RAM
- French keyboard
- *user* network mode (no need to choose an option)

3. First launch with boot on *cdrom* (boot with -d option)

```
tub@ubuntu:~$ sudo qemu-system-x86_64 -m 256 -k fr -drive file=alpine.img,format=qcow2 -boot d -cdrom alpine.iso -nographic
```

Alpine Linux installation workflow:

- Keyboard :

```
Select keyboard layout: [none] fr
Select variant (or 'abort'): fr-azerty
```

- Hostname:

```
Enter system hostname (fully qualified form, e.g. 'foo.example.org') [localhost] alpine.vm
```

- Interfaces & network configuration:

```
Available interfaces are: eth0.
Enter '?' for help on bridges, bonding and vlans.
Which one do you want to initialize? (or '?' or 'done') [eth0]
Ip address for eth0? (or 'dhcp', 'none', '?') [dhcp]
Do you want to do any manual network configuration? (y/n) [n]
udhcpc: started, v1.34.1
udhcpc: broadcasting discover
udhcpc: broadcasting select for 10.0.2.15, server 10.0.2.2
udhcpc: lease of 10.0.2.15 obtained from 10.0.2.2, lease time 86400
```

- Password (AD) ->Proxy

```
HTTP/FTP proxy URL? (e.g. 'http://proxy:8080', or 'none') [none]
```

- Mirror – OpenSSH - SSH Keygen

```
Enter mirror number (1-58) or URL to add (or r/f/e/done) [1]
Added mirror dl-cdn.alpinelinux.org
Updating repository indexes... done.
Which SSH server? ('openssh', 'dropbear' or 'none') [openssh]
 * service sshd added to runlevel default
 * Caching service dependencies ...
 [ ok ]
ssh-keygen: generating new host keys: RSA DSA ECDSA ED25519
 * Starting sshd ...
 [ ok ]
```

- Disk installation -> ***poweroff*** the VM

```
Available disks are:
  sda   (2.1 GB ATA      QEMU HARDDISK   )
Which disk(s) would you like to use? (or '?' for help or 'none') [none] sda
The following disk is selected:
  sda   (2.1 GB ATA      QEMU HARDDISK   )
How would you like to use it? ('sys', 'data', 'crypt', 'lvm' or '?' for help) [?] sys
WARNING: The following disk(s) will be erased:
  sda   (2.1 GB ATA      QEMU HARDDISK   )
WARNING: Erase the above disk(s) and continue? (y/n) [n] y
Creating file systems...
Installing system on /dev/sda3:
/mnt/boot is device /dev/sda1
100% ==> initramfs: creating /boot/initramfs-virt
/boot is device /dev/sda1
```

4. Second launch (after setting up the VM)

```
tub@ubuntu:~$ sudo qemu-system-x86_64 -m 256 -k fr -drive file=alpine.img,format=qcow2 -nographic
```

5. Test reseau (NAT -> worked)

```
alpine:/etc# ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8): 56 data bytes
64 bytes from 8.8.8.8: seq=0 ttl=255 time=76.054 ms
64 bytes from 8.8.8.8: seq=1 ttl=255 time=65.008 ms
64 bytes from 8.8.8.8: seq=2 ttl=255 time=58.704 ms
```

6. IP addresses of the VM

```
alpine:/etc# 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 pfifo_fast state UP qlen 1000
    link/ether 52:54:00:12:34:56 brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 scope global eth0
       valid_lft forever preferred_lft forever
    inet6 fec0::5054:ff:fe12:3456/64 scope site dynamic flags 100
       valid_lft 86196sec preferred_lft 14196sec
    inet6 fe80::5054:ff:fe12:3456/64 scope link
       valid_lft forever preferred_lft forever
```

V. Question 4: Ports forwarding

7. SSH service installation

```
alpine:/etc# apk add openssh
OK: 55 MiB in 52 packages
```

- Check: service sshd status

8. Apache web server installation

```
alpine:/etc# apk add apache2
```

- Check : service apache2 status

9. VM launch with port 10022,10080 forwarded

```
tub@ubuntu:~$ sudo qemu-system-x86_64 \
> -k fr \
> -m 256 \
> -drive file=alpine.img,format=qcow2 \
> -nographic \
> -net nic \
> -net user,hostfwd=tcp::10022-:22,hostfwd=tcp::10080-:80
```

SSH test:

- Create a new user

```
alpine:~$ adduser talp
```

- Install sudo package

```
alpine:~$ apk add sudo
```

- Edit /etc/sudoers file **(visudo /etc/sudoers)** to uncomment the **wheel group**

```
alpine:~$ visudo /etc/sudoers
```

```
## Uncomment to allow members of gr
  %wheel ALL=(ALL) ALL
```

- Add new user to the group wheel

```
alpine:~$ addgroup talp wheel
```

- Forward test with SSH

```
tub@ubuntu:~$ ssh talp@localhost -p10022
```

HTTP test:

```
tub@ubuntu:~$ curl http://127.0.0.1:10080
<html><body><h1>It works!</h1></body></html>
```

VI. Question 5: Launch of multiple Linked VM

10. Create a linked (rebase) VM

```
tub@ubuntu:~$ qemu-img create -f qcow2 -b alpine.img linked-alpine2.img
Formatting 'linked-alpine2.img', fmt=qcow2 size=2147483648 backing_file=a
ts=16
tub@ubuntu:~$ ls
alpine.img  alpine.iso  linked-alpine2.img
tub@ubuntu:~$ qemu-img info alpine.img
image: alpine.img
file format: qcow2
virtual size: 2 GiB (2147483648 bytes)
disk size: 158 MiB
cluster_size: 65536
Format specific information:
    compat: 1.1
    lazy refcounts: false
    refcount bits: 16
    corrupt: false
tub@ubuntu:~$ qemu-img info linked-alpine2.img
image: linked-alpine2.img
file format: qcow2
virtual size: 2 GiB (2147483648 bytes)
disk size: 196 KiB
cluster_size: 65536
backing file: alpine.img
Format specific information:
    compat: 1.1
    lazy refcounts: false
    refcount bits: 16
    corrupt: false
tub@ubuntu:~$
```

```
tub@ubuntu:~$ qemu-img create -f qcow2 -b alpine.img linked-alpine3.img
Formatting 'linked-alpine3.img', fmt=qcow2 size=2147483648 backing_file=
ts=16
tub@ubuntu:~$ ls -lh
total 211M
-rw-r--r-- 1 root root 158M Nov 27 17:40 alpine.img
-rw-rw-r-- 1 tub  tub   52M Nov 27 13:21 alpine.iso
-rw-r--r-- 1 tub  tub  193K Nov 27 17:51 linked-alpine2.img
-rw-r--r-- 1 tub  tub  193K Nov 27 17:52 linked-alpine3.img
```

11. Test multiple linked VMs

VM2 -> It works:

```
tub@ubuntu:~$ sudo qemu-system-x86_64 \
> -m 256 \
> -k fr \
> -drive file=linked-alpine2.img,format=qcow2 \
> -nographic \
> -net nic \
> -net user,hostfwd=tcp::12022-:22,hostfwd=tcp::12080-:80
```

```
tub@ubuntu:~$ curl localhost:12080
<html><body><h1>It works!</h1></body></html>
```

VM3 -> It works:

```
tub@ubuntu:~$ sudo qemu-system-x86_64 \
> -m 256 \
> -k fr \
> -drive file=linked-alpine3.img,format=qcow2 \
> -nographic \
> -net nic \
> -net user,hostfwd=tcp::13022-:22,hostfwd=tcp::13080-:80
```

```
tub@ubuntu:~$ curl localhost:13080
<html><body><h1>It works!</h1></body></html>
```

VII. Question 6: 2 VM on the same network

12. Launch 2 VMs with SLIRP mode (mode user : default mode)

VM2 IP address:

```
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdis
    link/ether 52:54:00:12:34:56 brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 scope global eth0
       valid_lft forever preferred_lft forever
```

VM3 IP address:

```
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdis
    link/ether 52:54:00:12:34:56 brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 scope global eth0
       valid_lft forever preferred_lft forever
```

13. Launch 2 VMs on the same network