Networking Labs

ECE

ING4 (SI)

2018/2019

Network Virtualization With VMware Workstation

Session Requirements:

- Please work in pairs!
- Each group shall submit one single report. **Same groups shall be maintained during the semester.**
- The report shall be submitted on the campus page ONLY.
- **Only PDF format is accepted** (3 points penalty for other formats)
- Late reports are penalized (3 points per day)
- Answer all the numbered questions
- The deadline for submitting the reports is
  - **14 January 2019 by midnight for group 3**
  - **15 January 2019 by midnight for groups 2 and 5**
  - **17 January 2019 by midnight for group 1**

Network virtualization with VMware Workstation

Create a virtual machine with the following settings:

1. Operating system: Ubuntu 16.4 (LTS) or a later version
2. Disk space: 10 GB or more
3. Memory: 1256 MB or more

Part 1: NAT mode

- In this first part, you shall configure the Network adapter into NAT mode
- Power on the virtual machine

1. What is the IP configuration of the host machine (IP address, subnet mask, default gateway)? (on the enabled NAT-mode-virtual-network and the host network)
2. What is the IP configuration of the virtual machine (IP address, subnet mask, default gateway)?
3. Conclude
4. From which DHCP server, the IP address of the virtual machine is obtained? Give the IP address of the DHCP server.
5. What is the IP address of the NAT device?

Install Wireshark on the host machine

Install (using apt-get or other package managers) Wireshark on the virtual machine (Appendix A may be useful)

Capture the DHCP traffic with Wireshark on the Network interface of the virtual machine by executing the following steps (you can alternatively use suitable commands)

a) Disconnect the virtual machine (from the network),
b) Run Wireshark as root (command: **sudo Wireshark &**)
c) Start the traffic capture
d) Reconnect the virtual machine
e) Wait few seconds (until the machine obtains an IP address)
f) Stop the traffic capture

6. Analyze the DHCP traffic (**provide a sequence diagram**)

- Do the necessary steps so that you can obtain the following messages during the DHCP exchange: DHCP Discover, DHCP Offer, DHCP Request, DHCP ACK
- Give the IP addresses, MAC addresses, ports and protocols used in each of the above packets

Capture the DHCP traffic with Wireshark on the active network interface (Ethernet or Wireless) of the host machine on the host network. You can execute the following steps or alternatively use suitable commands)

a) Disconnect the host machine,
b) Run Wireshark
c) Start the traffic capture
d) Reconnect the host machine
e) Wait few seconds (until the machine obtains an IP address)
f) Stop the traffic capture

7. Analyze the DHCP traffic

    a) Illustrate the exchange of the following messages using a sequence diagram: DHCP Discover, DHCP Offer, DHCP Request, DHCP ACK
    b) Give the IP addresses, MAC addresses, ports and transport protocol used for this configuration purpose

Launch a new traffic capturing with Wiresharк (on the host and virtual machines)

From the virtual machine, visit http://www.oracle.com

8. Analyze and comment the impact of having a NAT device by observing the used IP addresses and the ports in the corresponding packets on both machines (provide necessary screenshots)

Part 2: Host-Only mode

- In this part, you shall set the Network adapter to **Host-Only** mode (By default **VMNet1** is configured in **Host-Only** mode in VMWare)
- Restart the virtual machine

9. What is the IP configuration of the host machine (IP address, subnet mask, default gateway)? (on the virtual network and the host network)
10. What is the IP configuration of the virtual machine (IP address, subnet mask, default gateway)?
11. From which DHCP server, the IP address of the virtual machine is obtained?

Visit http://www.oracle.com from the VM

12. Comment and conclude.

Part 3: Bridged mode

- In this third part, you shall configure the Network adapter in Bridged mode (By default, in VMware, **VMNet0** is configured on **Bridged** mode)
- Restart the virtual machine

13. Give the IP address, subnet mask and default gateway configuration of the host machine?

14. Give the IP address, subnet mask and default gateway configuration of the virtual machine?

15. Compare and comment

16. Which DHCP server had been used to configure the IP address of the virtual machine? Give the IP address of this DHCP server

Disconnect the host machine from the host network for few minutes. Then reconnect it

17. What is the new IP configuration of the host machine?

18. Conclude

Disconnect the virtual machine for few minutes. Then reconnect it

19. What is the new IP configuration of the virtual machine?

20. Conclude (on the DHCP lease)

Appendix A

To install wireshark on the virtual machine, you MAY need to update the file **sources.list** under **/etc/apt** by adding the following lines:

- deb http://fr.archive.ubuntu.com/ubuntu **[X]** universe
- deb-src http://fr.archive.ubuntu.com/ubuntu **[X]** universe

X is the name of Ubuntu release

Example for Ubuntu 10.10 (maverick), type in a terminal:

- echo deb http://fr.archive.ubuntu.com/ubuntu **maverick** universe >> /etc/apt/sources.list
- echo 'deb-src http://fr.archive.ubuntu.com/ubuntu **maverick** universe' >> /etc/apt/sources.list

Then update apt-get by typing

apt-get update

finally install wireshark by typing

apt-get install wireshark.