kurguide Documentation

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mininet is a tool for virtualizing networks. We are going to virtualize an entire network as shown in the following figure.

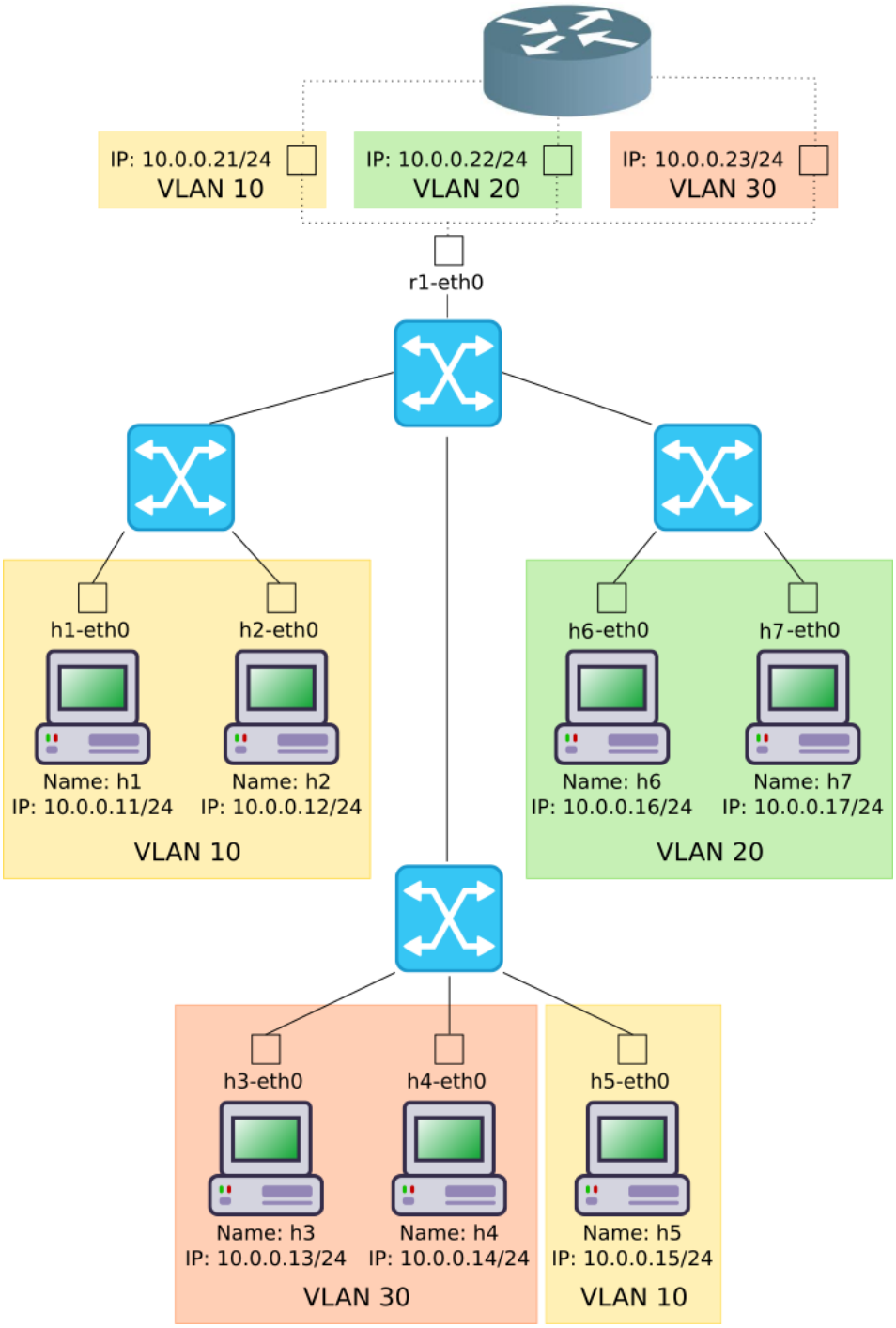
Please note that the address of the router varies from VLAN to VLAN as follows;

VLAN	IP Address
10	10.0.0.21
20	10.0.0.22
30	10.0.0.23

This tutorial will guide you through the installation, running and troubleshooting everything required for having a virtual network just like the one in the picture.

For quick starting a **VirtualBox**'s Virtual Machine with all that you will need was prepared and can be downloaded from here. The password is the password for the course, that you used to access ILIAS.

Note: Be aware that the **VirtualBox**'s VM is aprox. 1GB.


IP: 10.0.0.21/24
VLAN 10
IP: 10.0.0.22/24
VLAN 20
IP: 10.0.0.23/24
VLAN 30
r1-eth0
h1-eth0
h2-eth0
Name: h1
IP: 10.0.0.11/24
Name: h2
IP: 10.0.0.12/24
VLAN 10
h6-eth0
h7-eth0
Name: h6
IP: 10.0.0.16/24
Name: h7
IP: 10.0.0.17/24
VLAN 20
h3-eth0
h4-eth0
h5-eth0
Name: h3
IP: 10.0.0.13/24
Name: h4
IP: 10.0.0.14/24
VLAN 30
Name: h5
IP: 10.0.0.15/24
VLAN 10

CHAPTER 1

Installation

In order to run the provided **VirtualBox**'s VM first we need to install **VirtualBox** itself. Then import the VM. The following section will explain how to proceed.

1.1 Install Virtualbox

To install **VirutalBox** follow these steps;

- Click here.
- Download the installer matching your running operating system. For windows, click on **Windows hosts**.
- Once it finishes double click and follow the installation wirzard steps

1.2 Import Mininet's VM

First you will need to download the VM from here. The password is the password for the course, that you used to access ILIAS. Then open **VirtualBox** and click on **File > Import Appliance** or hit **Ctrl + i**. As shown in the following picture.

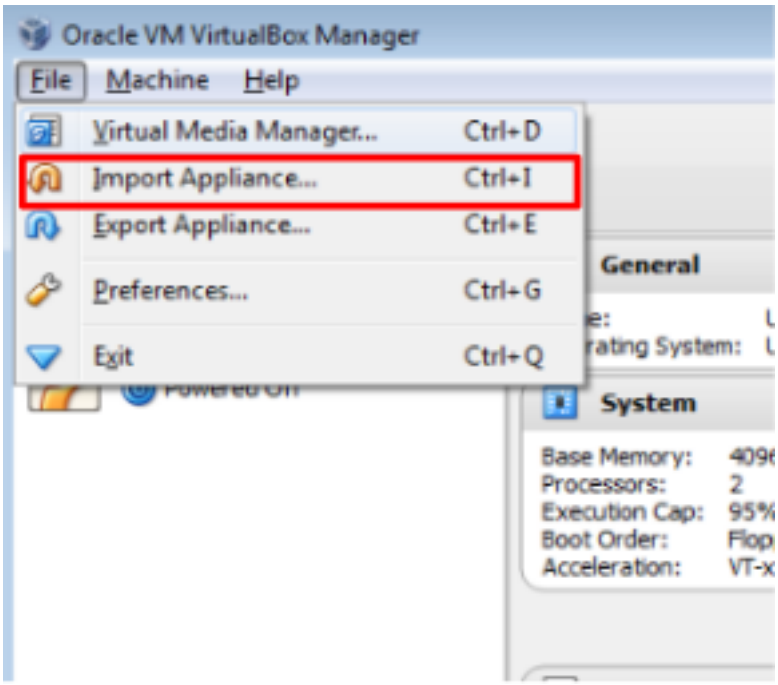
Click on **browse** icon as shown in the following picture.

Select the download VM and click **open** as in the following image.

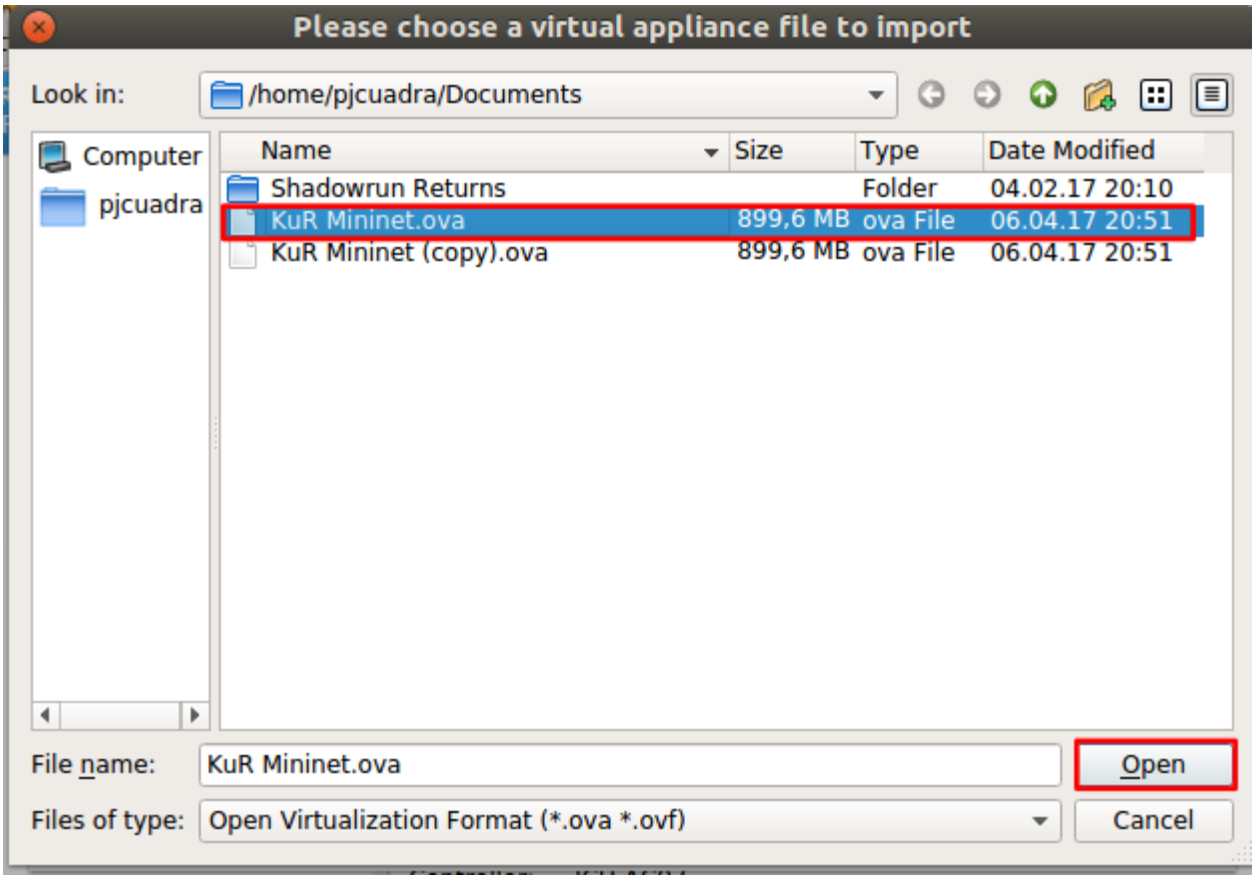
Then click **Next** as in the following picture.

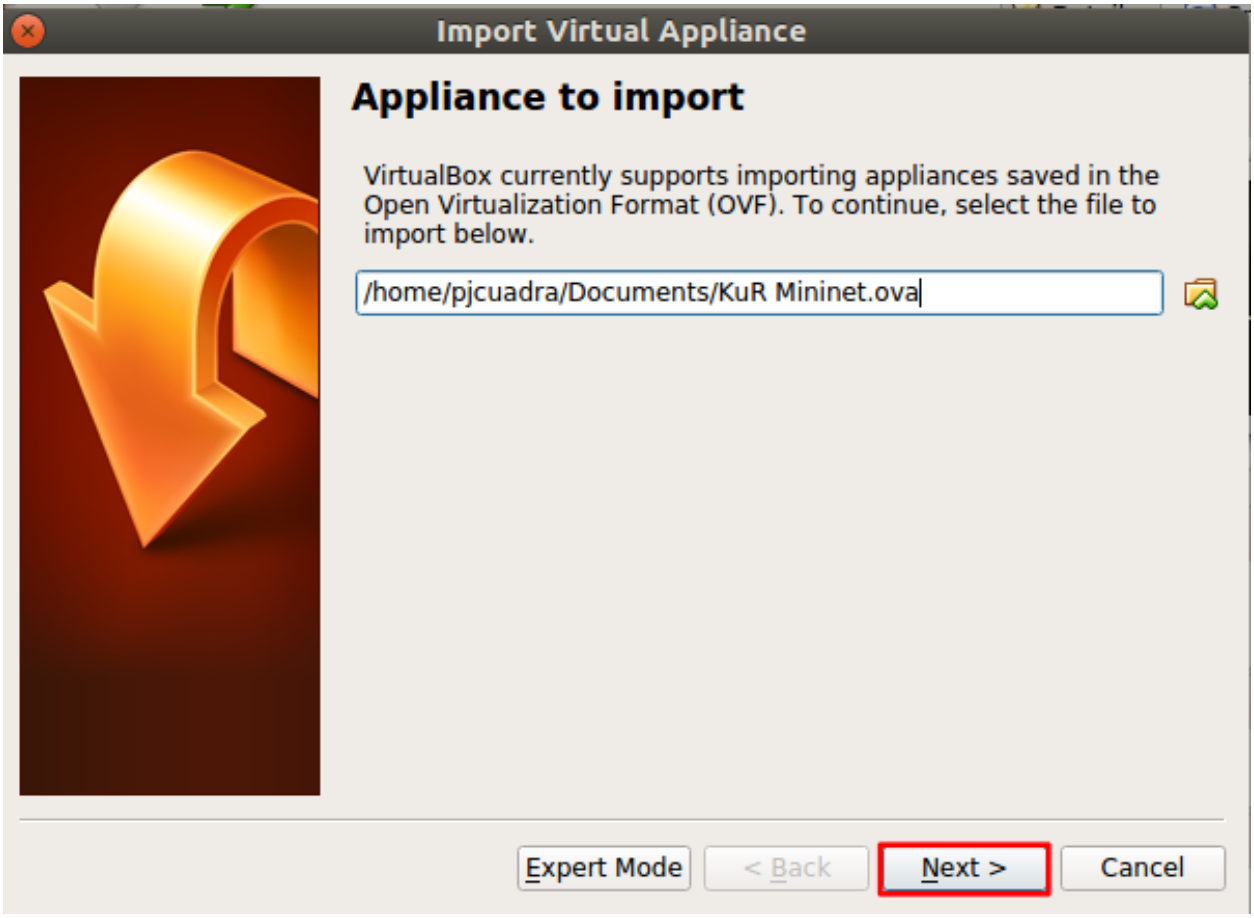
And finally click **Import**.

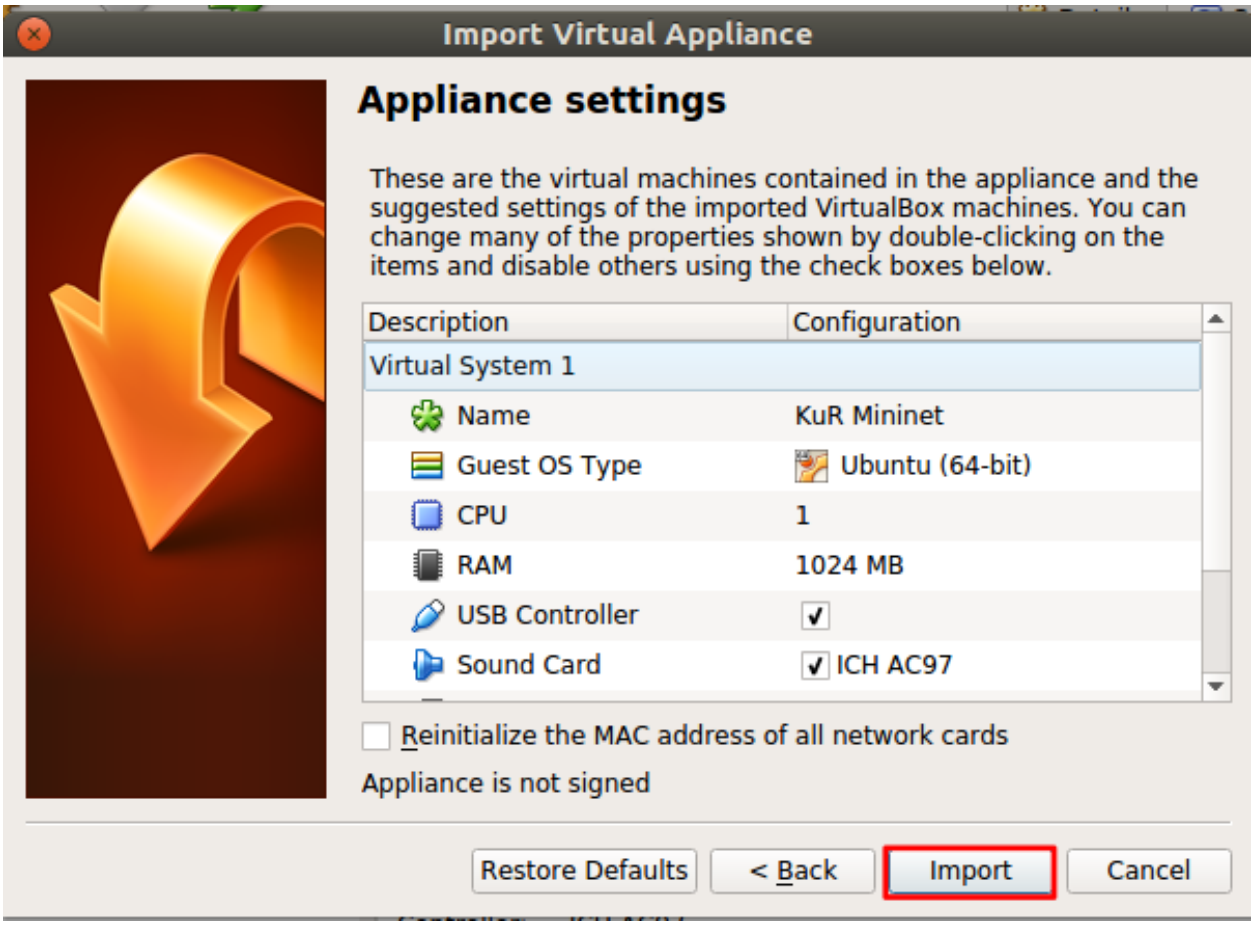
Wait for the VM to get imported, as shown in the following picture.

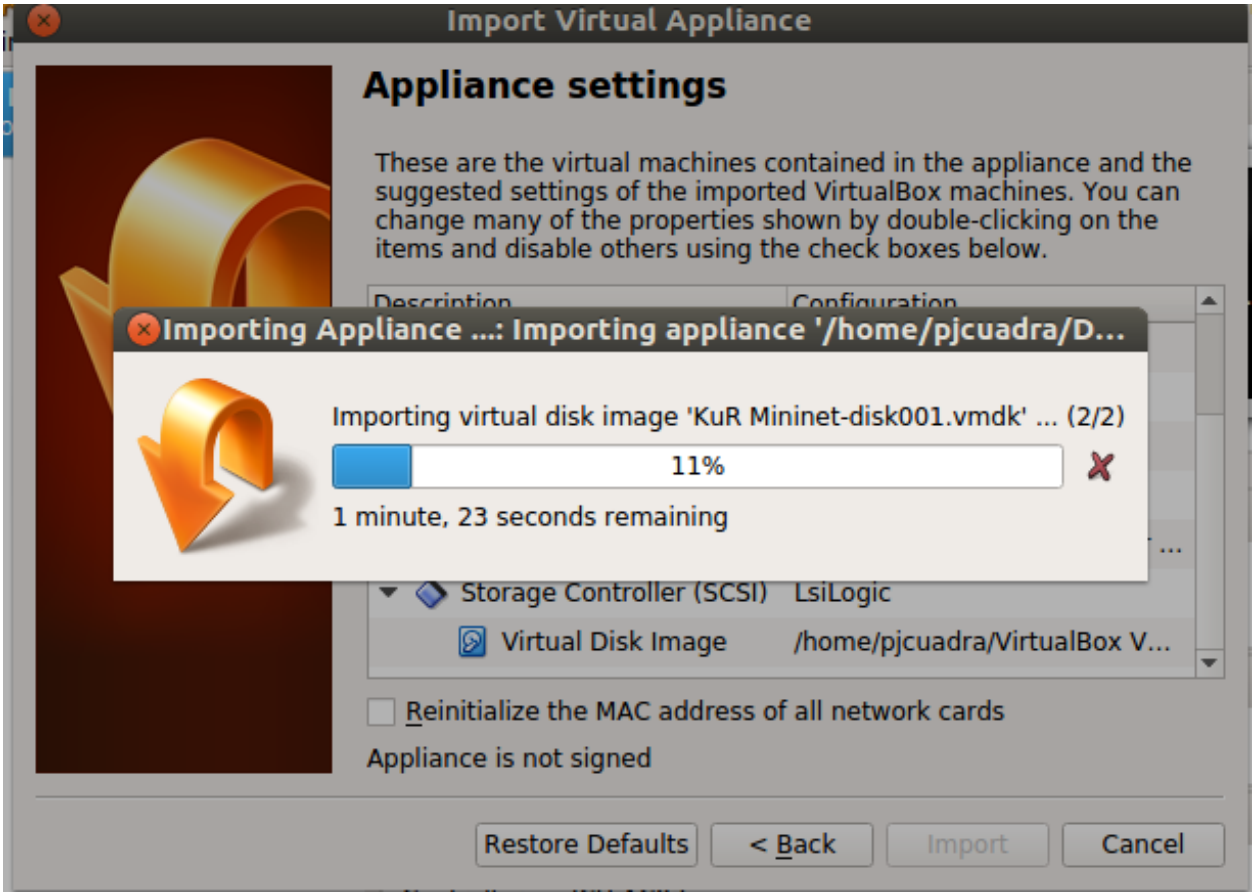

Oracle VM VirtualBox Manager
File
Machine
Help
Virtual Media Manager... Ctrl+D
Import Appliance... Ctrl+I
Export Appliance... Ctrl+E
Preferences... Ctrl+G
Exit Ctrl+Q
General
System
Base Memory:
Processors: 2
Execution Cap:
Boot Order:
Acceleration:

Import Virtual Appliance
Appliance to import
VirtualBox currently supports importing appliances saved in the Open Virtualization Format (OVF). To continue, select the file to import below.
Expert Mode
< Back
Next >
Cancel


Please choose a virtual appliance file to import
Look in:
/home/pjcuadra/Documents
Computer
pjcuadra
Name
Size
Type
Date Modified
Shadowrun Returns
Folder
04.02.17 20:10
KuR Mininet.ova
899,6 MB
ova File
06.04.17 20:51
KuR Mininet (copy).ova
899,6 MB
ova File
06.04.17 20:51
File name:
KuR Mininet.ova
Open
Files of type:
Open Virtualization Format (*.ova *.ovf)
Cancel


Import Virtual Appliance
Appliance to import
VirtualBox currently supports importing appliances saved in the Open Virtualization Format (OVF). To continue, select the file to import below.
/home/pjcuadra/Documents/KuR Mininet.ova
Expert Mode
< Back
Next >
Cancel

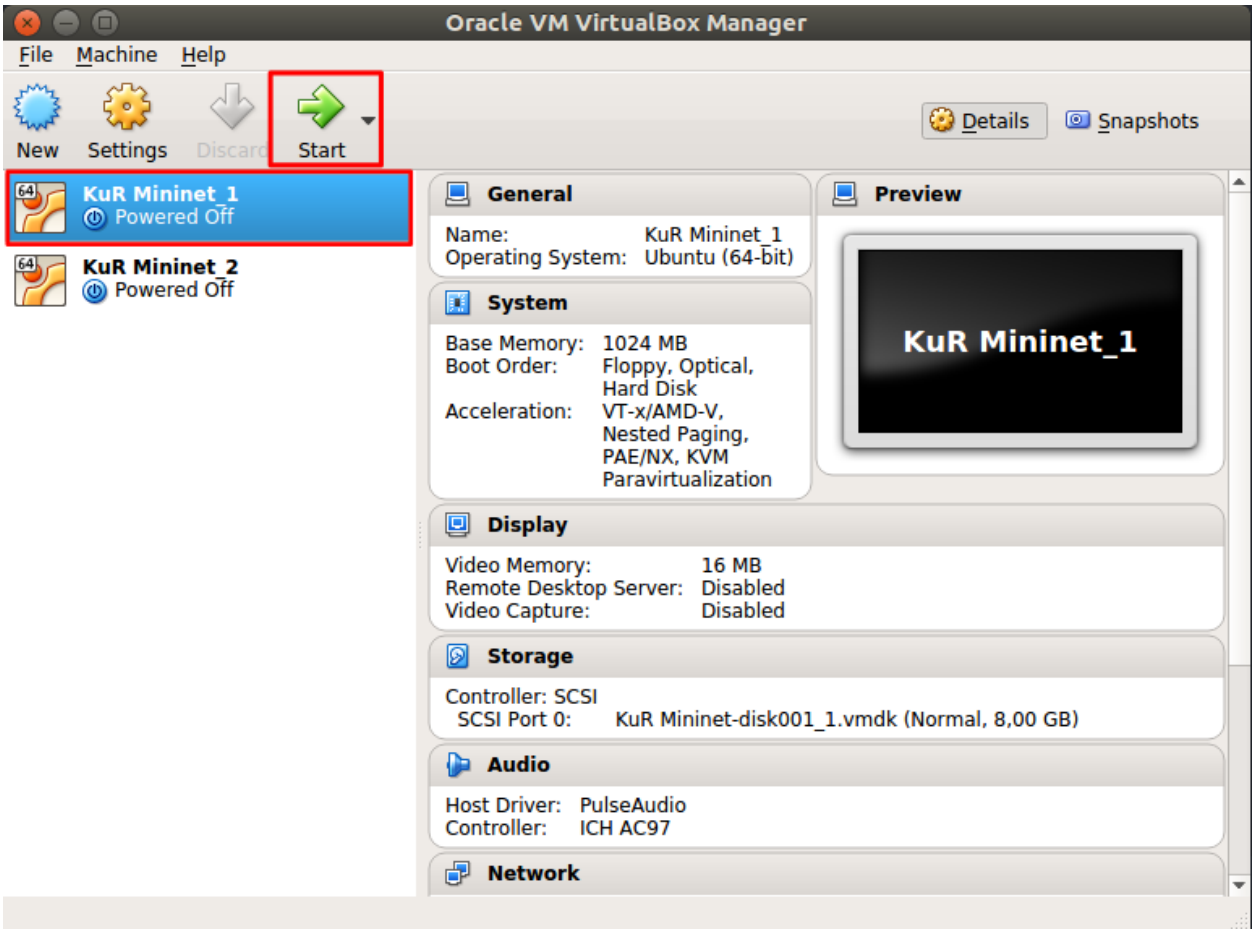

Import Virtual Appliance
Appliance settings
These are the virtual machines contained in the appliance and the suggested settings of the imported VirtualBox machines. You can change many of the properties shown by double-clicking on the items and disable others using the check boxes below.
Description
Configuration
Virtual System 1
Name
KuR Mininet
Guest OS Type
Ubuntu (64-bit)
CPU
1
RAM
1024 MB
USB Controller
Sound Card
ICH AC97
Reinitialize the MAC address of all network cards
Appliance is not signed
Restore Defaults
< Back
Import
Cancel


Import Virtual Appliance
Appliance settings
These are the virtual machines contained in the appliance and the suggested settings of the imported VirtualBox machines. You can change many of the properties shown by double-clicking on the items and disable others using the check boxes below.
Description
Configuration
Importing Appliance ...: Importing appliance '/home/pjcuadra/D...
Importing virtual disk image 'KuR Mininet-disk001.vmdk' ... (2/2)
11%
1 minute, 23 seconds remaining
Storage Controller (SCSI)
LsiLogic
Virtual Disk Image
/home/pjcuadra/VirtualBox V...
Reinitialize the MAC address of all network cards
Appliance is not signed
Restore Defaults
< Back
Import
Cancel

CHAPTER 2

Start Mininet's VM

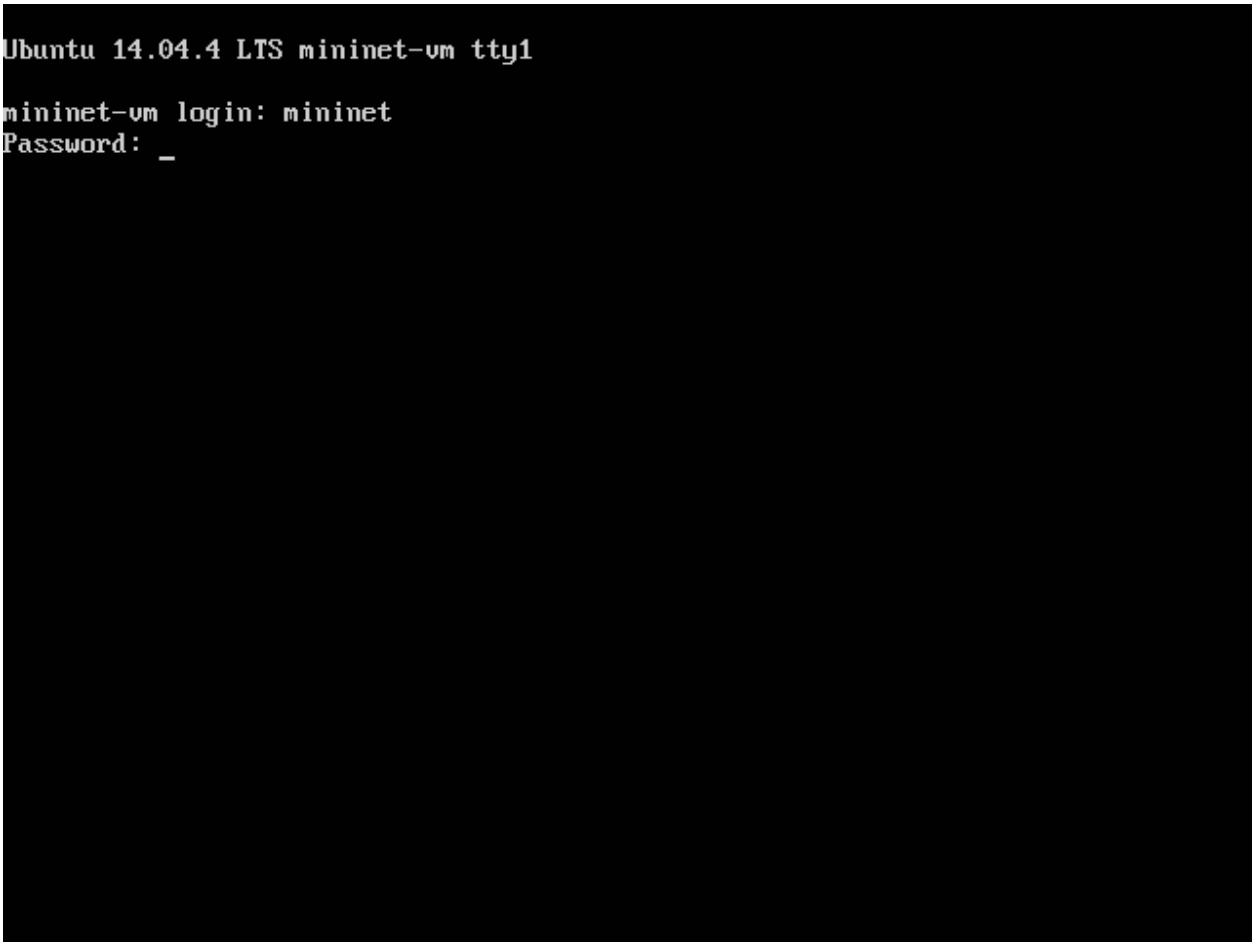
Once the VM is imported, start the VM by selecting the VM from **VirtualBox** list and click on start as shown below.



CHAPTER 3

Log into Mininet's VM

Once the VM is started login into the linux system with the username and password **mininet**. As shown in the picture below.



Note: While you type the password no characters are actually shown on screen. After you finish typing the password just hit `Enter`.

After you login the graphical environment should launch. It look like the following picture.

CHAPTER 4

Start/Stop the Virtual Network

In order to start the virtualized network you will need to execute the **Start Netz** script by double click it, as shown below.

Note: By double click the script it seems that nothing happens but in the background the network is already running. Don't worry the network will only will be started just once, no matter how many times you run the script.

You can stop any time the network if you like by double clicking the **Stop Netz** script, shown below.

h1 Console
Stop Netz
h2 Console
Chromium Web Brow...
h3 Console
h4 Console
h5 Console
h6 Console
h7 Console
Start Netz
LXDE
Lightweight X11 Desktop Environment
11:15

CHAPTER 5

Running command on Host

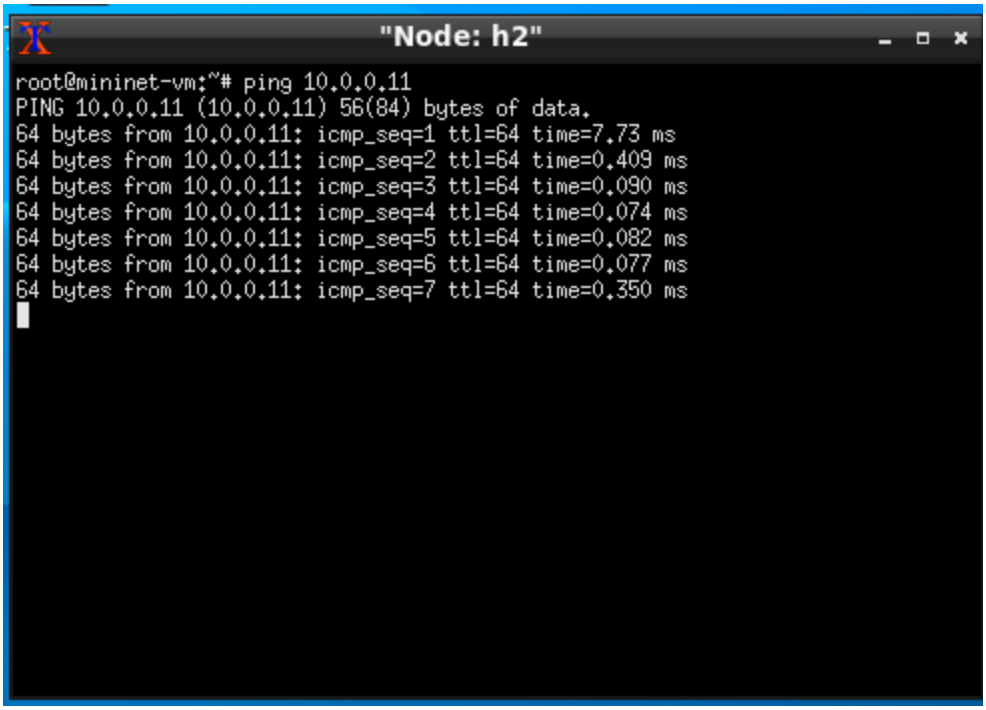
For running a command on one host you just need to open the host's console. For easy access shortcuts have been created to access every host console. For instance, if you want to access h2's console double click it shortcut as shown below.

A window as the one shown below will open.

Now, for instance, you can ping another host by running;

```
ping 10.0.0.11
```

It should look like;


"Node: h2"
root@mininet-vm:~# ping 10.0.0.11
PING 10.0.0.11 (10.0.0.11) 56(84) bytes of data.
64 bytes from 10.0.0.11: icmp_seq=1 ttl=64 time=7.73 ms
64 bytes from 10.0.0.11: icmp_seq=2 ttl=64 time=0.409 ms
64 bytes from 10.0.0.11: icmp_seq=3 ttl=64 time=0.090 ms
64 bytes from 10.0.0.11: icmp_seq=4 ttl=64 time=0.074 ms
64 bytes from 10.0.0.11: icmp_seq=5 ttl=64 time=0.082 ms
64 bytes from 10.0.0.11: icmp_seq=6 ttl=64 time=0.077 ms
64 bytes from 10.0.0.11: icmp_seq=7 ttl=64 time=0.350 ms

CHAPTER 6

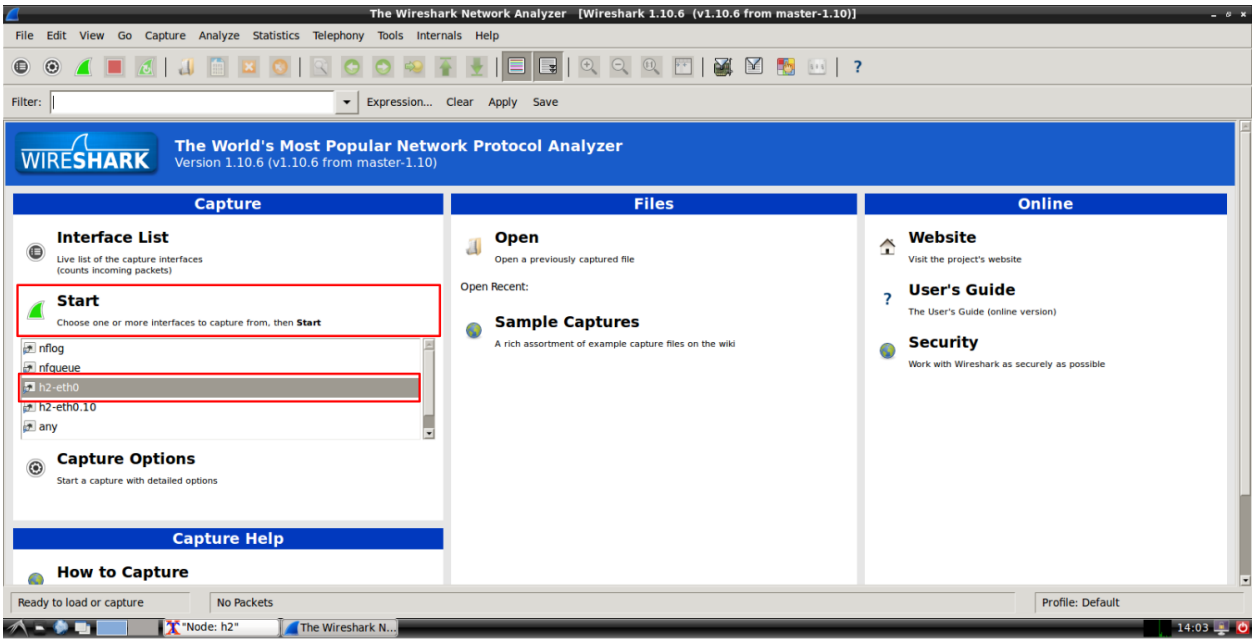
Running Wireshark

If you want to sniff a network interface of a host you'll have to run Wireshark on that host. For example, for sniffing `h2-eth0` you should open **h2** console as *Running command on Host*.

```
wireshark
```

Note: A warning might pop-up. Just click **Ok** and continue.

Select the `h2-eth0` interface and click on start as shown below.



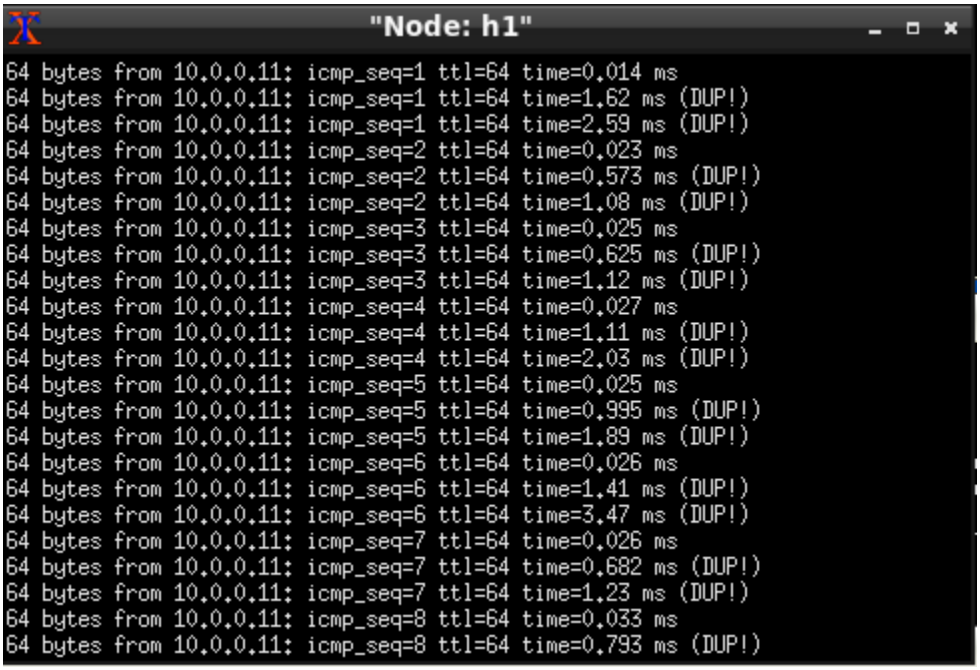
That's it! You are sniffing the `h2-eth0` interface.

Note: You can open as many consoles you like for every host.

CHAPTER 7

Ping the Broadcast Address

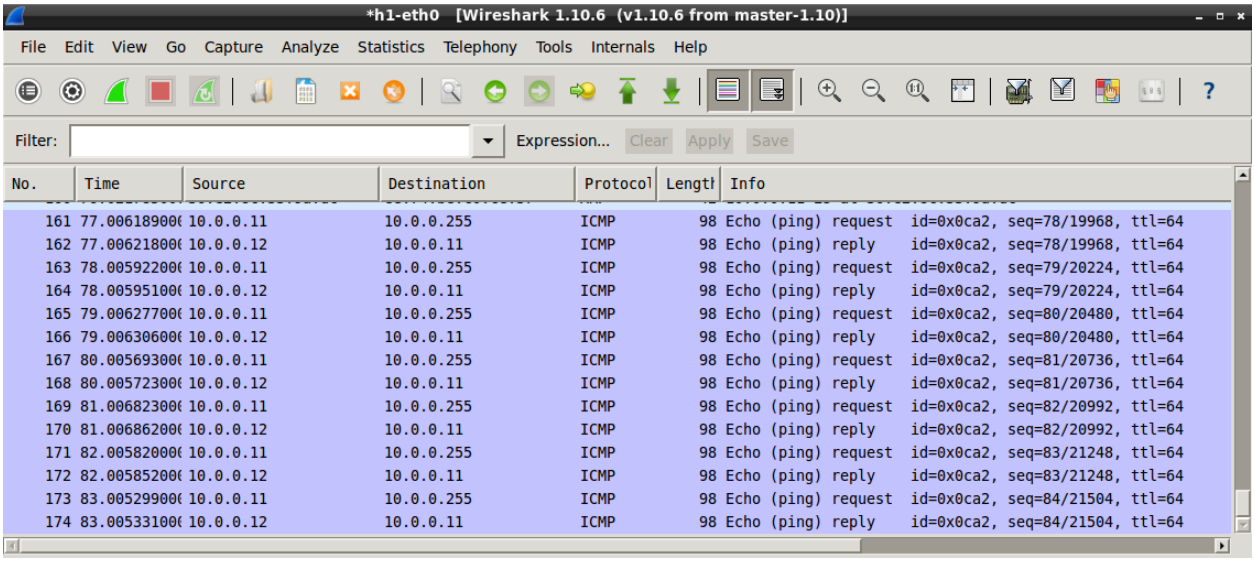
When you ping to the Broadcast Address, normally, the command's output shows all the responding host's IP Addresses. Because of the simulation of the network `ping`'s output shows only the own IP Address. (We haven't found a fix yet)



To find the Hosts' response you can use Wireshark. Start Wireshark like in *Running Wireshark*. By running;

```
ping -b <broadcast-address>
```

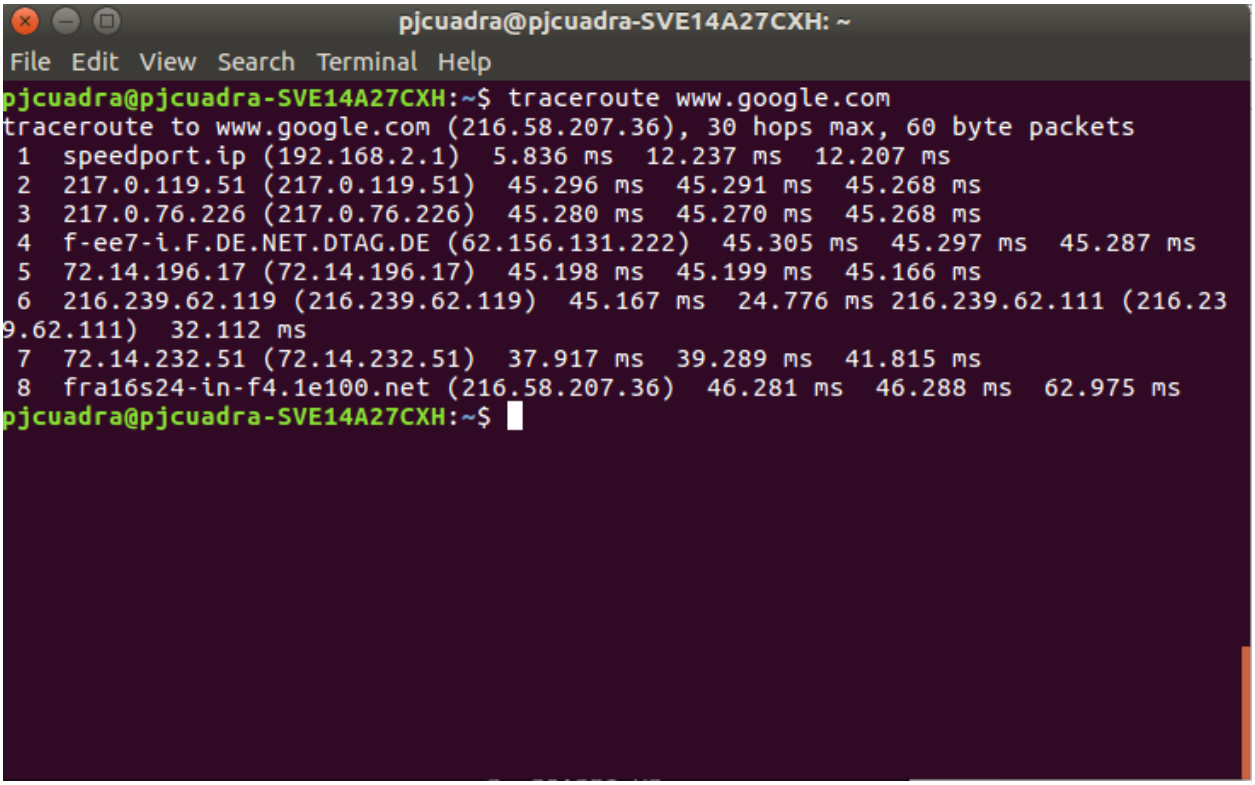
Now you can see the IP addresses of the responding host with Wireshark as shown in the following picture.


*h1-eth0 [Wireshark 1.10.6 (v1.10.6 from master-1.10)]
File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help
Filter:
Expression... Clear Apply Save
No. Time Source Destination Protocol Lengtl Info
161 77.00618900(10.0.0.11 10.0.0.255 ICMP 98 Echo (ping) request id=0x0ca2, seq=78/19968, ttl=64
162 77.00621800(10.0.0.12 10.0.0.11 ICMP 98 Echo (ping) reply id=0x0ca2, seq=78/19968, ttl=64
163 78.00592200(10.0.0.11 10.0.0.255 ICMP 98 Echo (ping) request id=0x0ca2, seq=79/20224, ttl=64
164 78.00595100(10.0.0.12 10.0.0.11 ICMP 98 Echo (ping) reply id=0x0ca2, seq=79/20224, ttl=64
165 79.00627700(10.0.0.11 10.0.0.255 ICMP 98 Echo (ping) request id=0x0ca2, seq=80/20480, ttl=64
166 79.00630600(10.0.0.12 10.0.0.11 ICMP 98 Echo (ping) reply id=0x0ca2, seq=80/20480, ttl=64
167 80.00569300(10.0.0.11 10.0.0.255 ICMP 98 Echo (ping) request id=0x0ca2, seq=81/20736, ttl=64
168 80.00572300(10.0.0.12 10.0.0.11 ICMP 98 Echo (ping) reply id=0x0ca2, seq=81/20736, ttl=64
169 81.00682300(10.0.0.11 10.0.0.255 ICMP 98 Echo (ping) request id=0x0ca2, seq=82/20992, ttl=64
170 81.00686200(10.0.0.12 10.0.0.11 ICMP 98 Echo (ping) reply id=0x0ca2, seq=82/20992, ttl=64
171 82.00582000(10.0.0.11 10.0.0.255 ICMP 98 Echo (ping) request id=0x0ca2, seq=83/21248, ttl=64
172 82.00585200(10.0.0.12 10.0.0.11 ICMP 98 Echo (ping) reply id=0x0ca2, seq=83/21248, ttl=64
173 83.00529900(10.0.0.11 10.0.0.255 ICMP 98 Echo (ping) request id=0x0ca2, seq=84/21504, ttl=64
174 83.00533100(10.0.0.12 10.0.0.11 ICMP 98 Echo (ping) reply id=0x0ca2, seq=84/21504, ttl=64

CHAPTER 8

Tracing

`traceroute` allows you to see the hops and their IP addresses on the way to the provided host. More about `traceroute` can be found in https://de.wikipedia.org/wiki/Traceroute and https://linux.die.net/man/8/traceroute. The following picture shows an example of a typical `traceroute` run.



CHAPTER 9

Troubleshooting

- If you double click on a console script and it doesn't open maybe the network hasn't been started yet or you stopped it. Just start it as explained in *Start/Stop the Virtual Network*.
- If the mininet does not start, check if in the BIOS Configurtaion the CPU support for Virtualization is turned on. The names for the Intel and AMD features are 'Intel VT' and 'AMD-V'