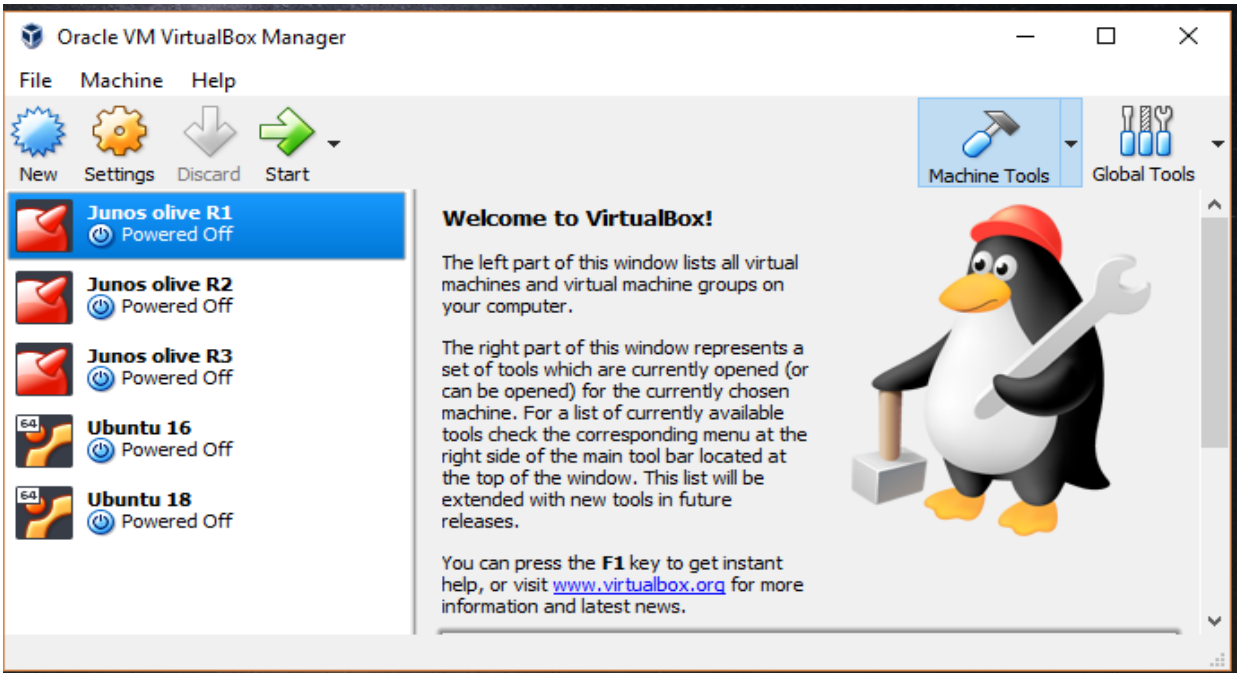
LAB 1: Setting up tools required for SDN LAB

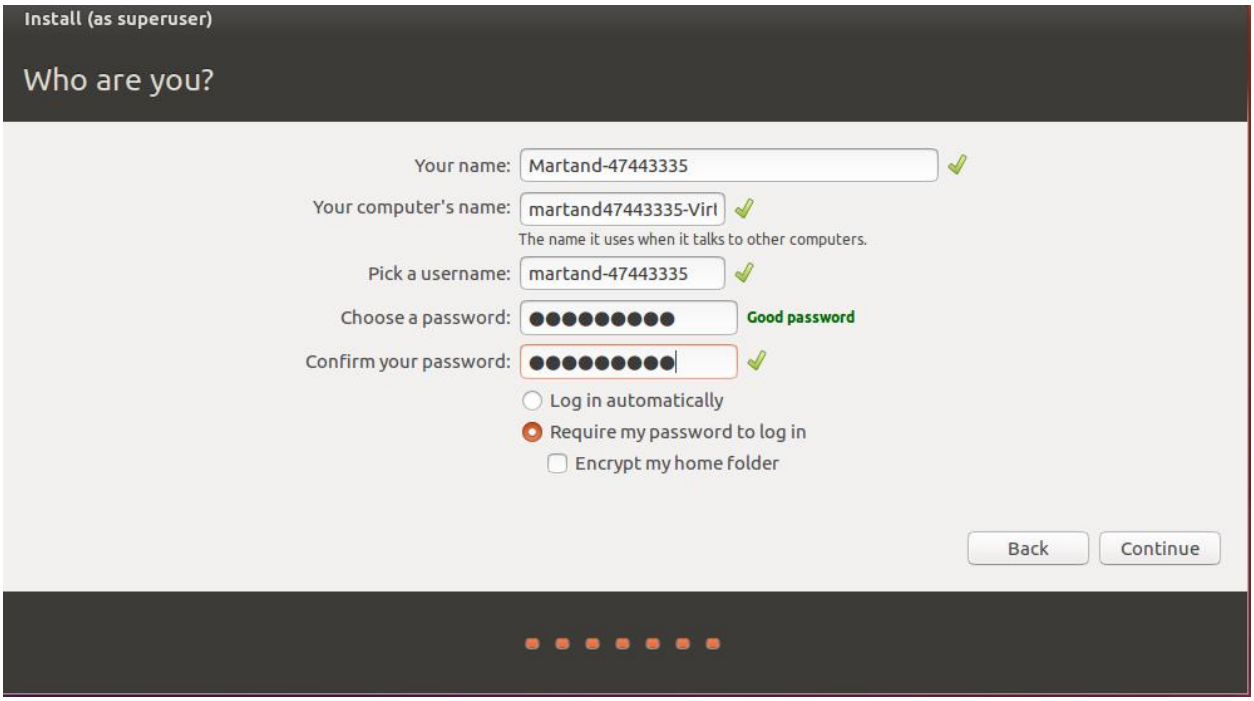
The first lab of your SDN subject will be of setting up the LAB environment for SDN subject and the upcoming labs. For the labs you will require the following tools installed into your Ubuntu Virtual Machine.

- MiniNet - MiniNet creates a realistic virtual network, running real kernel, switch and application code, on a single machine (VM, cloud or native), in seconds.
- Wireshark - https://www.wireshark.org/
- Ostinato Traffic Generator - https://ostinato.org/
- iPerf: Measure Performance (Bandwidth, Delay Jitter, packet loss) - https://sourceforge.net/projects/iperf/
- MiniNAM - A network Animator to visualize realtime packet flows in MiniNet. (https://github.com/uccmisl/MiniNAM)

Getting started with setting up the LAB environment, first you will need to download Ubuntu 16.04 ISO(http://releases.ubuntu.com/16.04/) and create its virtual machine through Virtual box installer.



Complete the installation of the Ubuntu VM and set your Name as “NAME_SMU-ID”.



Ubuntu 16.04 official repository has the stable releases for the tools as Openvswwitch (2.5.4), Wireshark (2.2.6) and Iperf (2.0.5). Mininet will be installed from script ad RYU controller will be installed from pip.

To get started, we need to run two commands for updating the current Ubuntu 16.04 version. So, we need to run:

sudo apt-get update

sudo apt-get upgrade

Now, we will start with installing the tools needed for the lab,

1. OpenvSwitch

Openvswitch is a virtual switch which is used in automation of virtual environment in protocol such as OpenFlow. It is supported to work within the hypervisor providing the communication between VM and the OS.

Ubuntu has repository for the Openswitch, so to install Openvswitch run the following command:

sudo apt-get install openvswitch-switch

To verify : **ovs-vsctl --version** (Paste a screenshot of it)

2. Wireshark

We need wireshark to capture packets and to examine them. To install, run the following command:

sudo apt-get install wireshark

To verify and run wireshark;

sudo wireshark (Paste screenshot of it)

3. Iperf

Iperf is a tool used to generate traffic and then measure the maximum achievable bandwidth between two hosts. The way it works is, we set one host as server and other as client and by generating traffic, it measures delay and time and inputs the bandwidth. To install iperf run the following commands:

Sudo apt-get install iperf

To verify;

Iperf --version (paste screenshot of it)

4. RYU controller

Ryu Controller is an open, software-defined networking (SDN) Controller designed to increase the agility of the network by making it easy to manage and adapt how traffic is handled. In SD environment, it communicates with the router and switches using southbound APIs and with the applications using northbound APIs. To install run following command;

Sudo pip3 install ryu

To verify;

ryu-manager –version (Paste screenshot of it)

When we install RYU using pip, we will get a message saying pip command not found. Then we must install pip library first. For doing so run following commands and then install RYU controller.

Sudo apt-get install python3-pip

To run ryu-manager;

ryu-manager ryu.app.example_switch_13

5. Mininet

We will use github to clone and install Mininet. Use following commands to install Mininet.

git clone git://github.com/mininet/mininet (If get git library not available install it)

cd mininet

git tag (To view the available versions in git)

git checkout 2.2.2 (Make sure you install 2.2.2 version)

cd ..

mininet/util/install.sh --help

mininet/util/install.sh -n

To verify version;

Sudo mn --version (Paste screenshot of it)

6. MiniNAM

MiniNAM is a GUI tool written in Python2.7 with Tkinter and Mininet's Python API. This means that it requires a DISPLAY environment to run. Also make sure to have Tkinter imaging installed:

sudo apt-get install python-imaging python-imaging-tk

git clone https://github.com/uccmisl/MiniNAM.git

Note that to run MiniNAM, first we have to go to the directory where MinNAM folder is installed otherwise it will keep giving you error that directory is not present.

7. Miniedit (Optional)

The Mininet network simulator includes MiniEdit, a simple GUI editor for Mininet. MiniEdit is an experimental tool created to demonstrate how Mininet can be extended. Miniedit will already be installed when we first install Mininet. To run Miniedit;

Sudo mininet/examples/miniedit.py (Paste a screenshot of it)

This will open GUI where you can create your own custom topology with switches, router and controller.

Once everything is installed, we can begin with the labs.

1. In one terminal, open ryu controller and paste the screenshot of it.

2. In second terminal, create a custom topology using CLI;
sudo mn --controller=remote,ip=127.0.0.1 --mac --switch=ovsk,protocols=OpenFlow13 --topo=single,4
(Paste screenshot of it)

This conclude your Lab 1 of SDN course.