Mininet and Openflow Demo

Install Mininet

- Open VirtualBox -> Ubuntu
- Install mininet:
  - sudo apt install mininet
  - After installation, try
    - $sudo mn –switch ovsbr
- Get and and run pox controller
  - cd ~
  - git clone http://github.com/noxrepo/pox
  - cd pox
  - git checkout dart
  - ./pox.py

Pox controller documentation: https://noxrepo.github.io/pox-doc/html/

Lab 1: Mininet Walkthrough

- Perform the steps at http://mininet.org/walkthrough
- Objective:
  - Understand how to use mininet
  - How to run a command on each host
  - Learn how to change network parameters in mininet
    - Link bandwidth, latency, topology, etc
  - Learn how to write python code for new topologies
    - Make sure that you understand the custom topology example

Some resources

- http://mininet.org/walkthrough/
- https://github.com/mininet/mininet/wiki/Introduction-to-Mininet

- https://conferences.sigcomm.org/sigcomm/2014/doc/slides/mininet-intro.pdf
- https://noxrepo.github.io/pox-doc/html/

Lab 2: Manually configure Openflow switches with **dpctl**

- Objectives
  - Understand how an Openflow switch behaves
  - Understand what an Openflow controller supposes to do to enable communication.

- **dpctl**: a command-line utility that sends openflow messages to a switch
  - View switch configuration and capability
  - View flow table entries
  - Add, delete, and modify flow table entries

– Useful tool for learning and debugging
  - Human faking an openflow controller

– '**man dpctl**' for more details

Lab 2: Manually configure Openflow switches with dpctl

- $ sudo mn --topo single,3 --mac --switch ovsk --controller remote
  - This creates a simple host with 3 switches, the mac addresses are assigned in a certain way, the switch is an Open vSwitch (software OpenFlow switch), controller is supposed to be at local host with port number 6653.
  - Mininet> net
  - Mininet> h1 ifconfig
  - Mininet> h2 ifconfig
  - The switch can be controlled at tcp:127.0.0.1:6654
- Mininet>pingall
  - This fails as the switch has nothing in its flow table

– Start another window do ‘man dpctl’ and ‘man ovs-dpctl’

– $ dpctl show tcp:127.0.0.1:6654

  - Tcp:127.0.0.1:6654 is the switch port for control

– $dpctl dump-flows tcp:127.0.0.1:6654

  - The flow table is empty

Lab 2: Manually configure Openflow switches with dpctl

- $dpctl add-flow tcp:127.0.0.1:6654 in_port=1,idle_timeout=1000,actions=output:2
- $dpctl add-flow tcp:127.0.0.1:6654 in_port=2,idle_timeout=1000,actions=output:1
- $dpctl dump-flows tcp:127.0.0.1:6654
- Mininet> pingall
  - H1 and h2 are now connected.
- – $dpctl dump-flows tcp:127.0.0.1:6654
  - Check the statistics
- – Mininet> s1 dpctl dump-flows tcp:127.0.0.1:6654

- – Continue the exercise to completely install flow table for all hosts.
- – Try the following:
- $dpctl add-flow tcp:127.0.0.1:6654 dl_dst=0:0:0:0:0:1,idle_timeout=1000,actions=output:1
- $dpctl add-flow tcp:127.0.0.1:6654 dl_dst=0:0:0:0:0:2,idle_timeout=1000,actions=output:2
- $dpctl add-flow tcp:127.0.0.1:6654 dl_dst=0:0:0:0:0:3,idle_timeout=1000,actions=output:3
- $dpctl dump-flows tcp:127.0.0.1:6654
- Mininet> pingall

Lab 2: Manually configure Openflow switches with dpctl

- Try the following:
- $dpctl add-flow tcp:127.0.0.1:6654 idle_timeout=1000,actions=flood
- Mininet> pingall

- $dpctl add-flow tcp:127.0.0.1:6634 dl_dst=ff:ff:ff:ff:ff:ff,idle_timeout=1000,actions=flood
- Mininet>pingall

- dpctl del-flows tcp:127:0.0.1:6634
- dpctl dump-flows tcp:127.0.0.1:6634
- $dpctl add-flow tcp:127.0.0.1:6634 dl_dst=ff:ff:ff:ff:ff:ff,idle_timeout=1000,actions=flood
- $dpctl add-flow tcp:127.0.0.1:6634 dl_dst=0:0:0:0:0:1,idle_timeout=1000,actions=output:1
- Mininet>pingall
- how to make the ping successful for one pair of hosts?