Tools of the trade
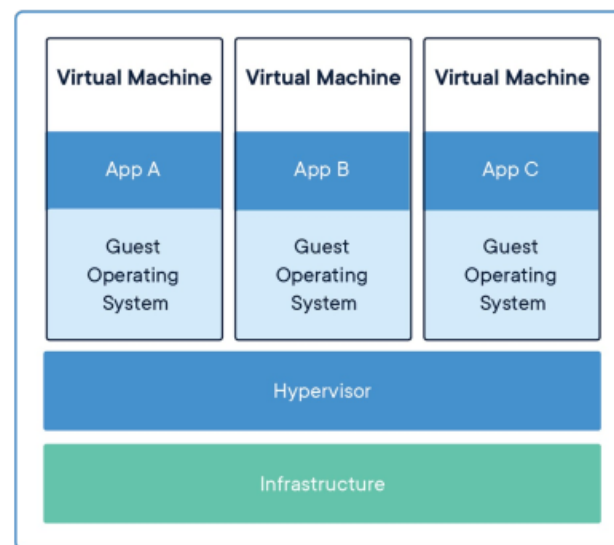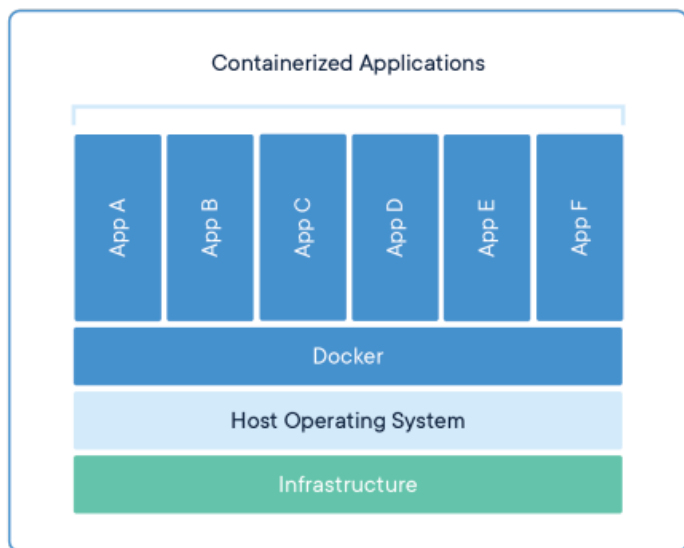
ComNetsEmu Network Emulator includes:
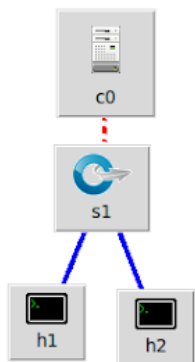
- **Mininet**
- **Docker**
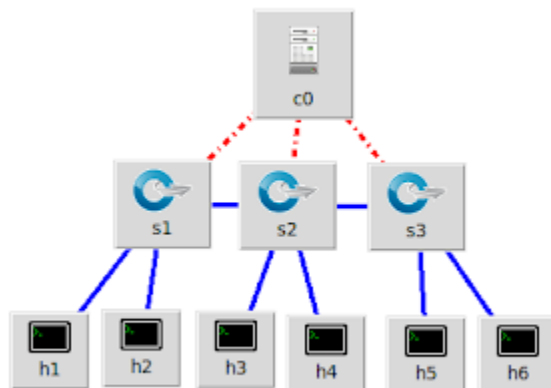- **RYU Controller (in Python)**

Docker
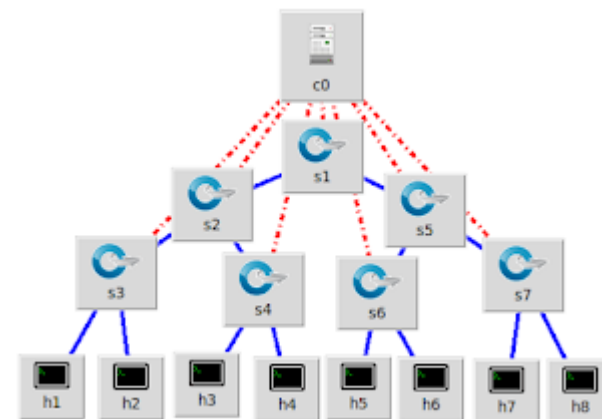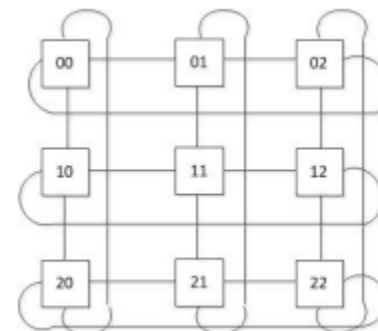

https://www.docker.com/resources/what-container

Mininet

mn --topo single,2

mn --topo linear,3,2

mn --topo tree,3,2

mn --topo torus,3,3

https://mininet.org/

Architecture

https://git.comnets.net/public-repo/comnetsemu
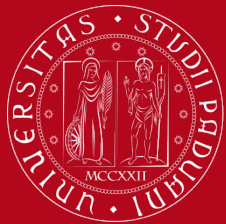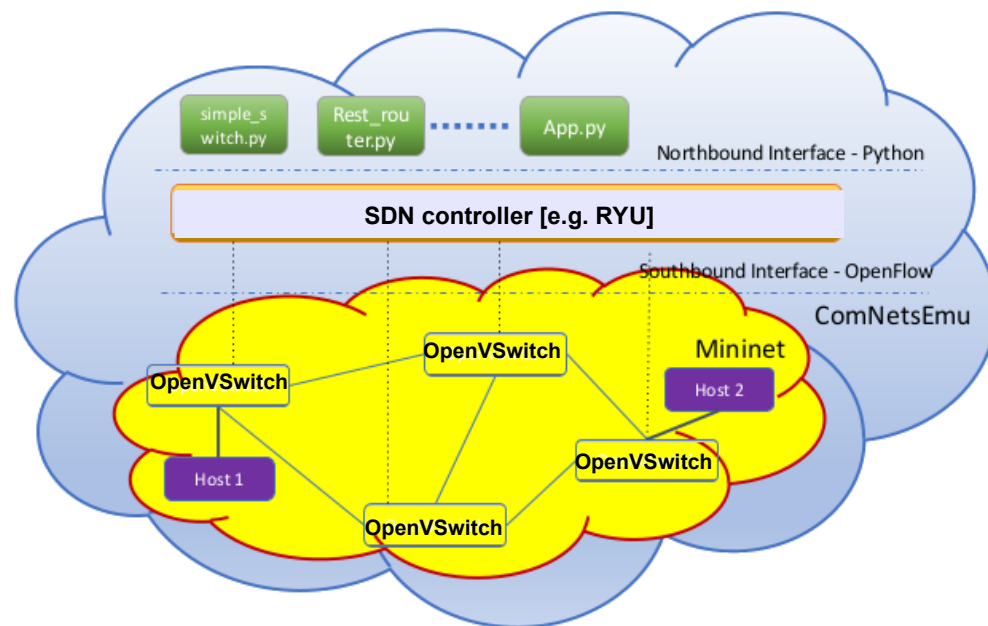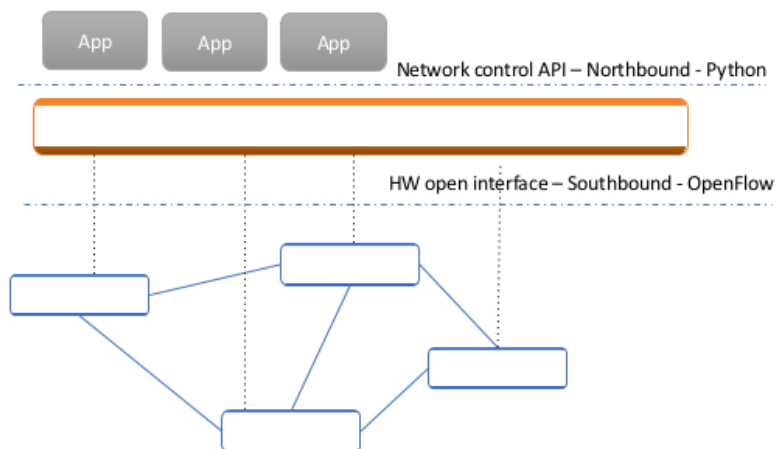
Exercise 1 – Simple network with simple controller

TERMINAL 1 *// create network*
sudo mn --topo single,3 --mac --switch ovsk --controller remote links

TERMINAL 2 *// sniff and visualize packets*
sudo tcpdump -s0 -i lo 'port 6653' -w test.pcap
wireshark test.cap

TERMINAL 3 *// start a RYU controller*
ryu-manager ryu.app.simple_switch_13

TERMINAL 4 *// dump flows table on switch s1*
sudo ovs-ofctl dump-flows s1

EXPERIMENT

Exercise 2 – Simple network with controller and STP

TERMINAL 1 // *create network*

sudo mn --topo single,3 --mac --switch ovsk --controller remote links
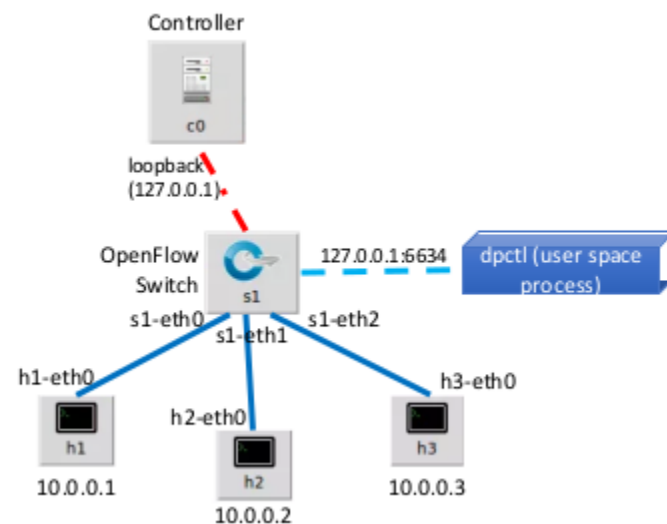
TERMINAL 2 // *sniff and visualize packets*

sudo tcpdump -s0 -i lo 'port 6653' -w test.pcap
wireshark test.cap

TERMINAL 3 // *start a RYU controller*

ryu-manager ryu.app.simple_switch_stp_13

TERMINAL 4 // *dump flows table on switch s1*

sudo ovs-ofctl dump-flows s1
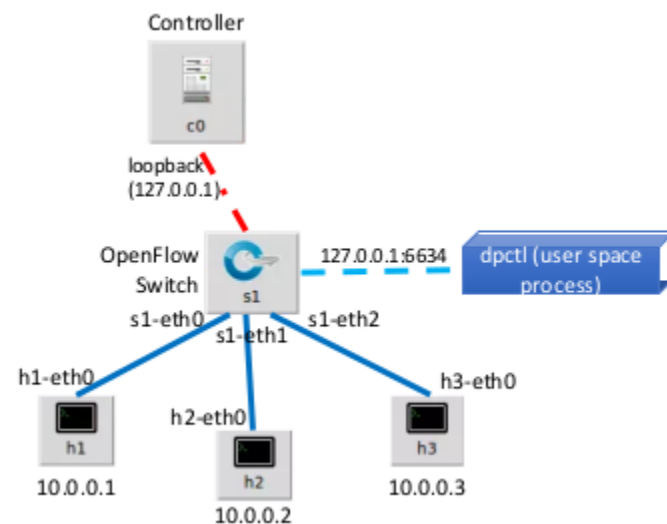
EXPERIMENT

Exercise 3– Simple network with REST API

TERMINAL 1 *// create network*

sudo mn --topo single,3 --mac --switch ovsk --controller remote links

TERMINAL 3 *// start a RYU controller*

ryu-manager ryu.app.simple_switch_rest_13

TERMINAL 4 *// dump flows table on switch s1*

sudo ovs-ofctl dump-flows s1

TERMINAL 5 *// interact with the switch*

curl -X GET http://127.0.0.1:8080/simpleswitch/mactable/0000000000000001

**curl -X PUT -d '{"mac" : "00:00:00:00:00:01", "port" : 1}' **

http://127.0.0.1:8080/simpleswitch/mactable/0000000000000001

EXPERIMENT

Exercise 4– A first example of SDN application: APP monitor

TERMINAL 1 *// create network*

sudo mn --topo single,3 --mac --switch ovsk --controller remote

links

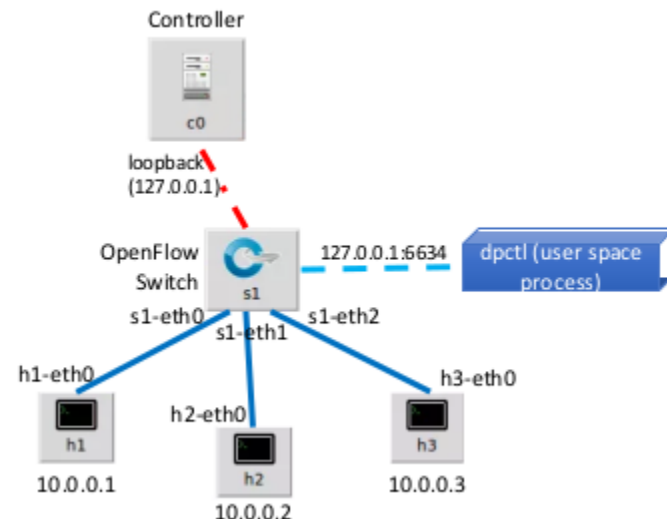TERMINAL 2 *// sniff and visualize packets*
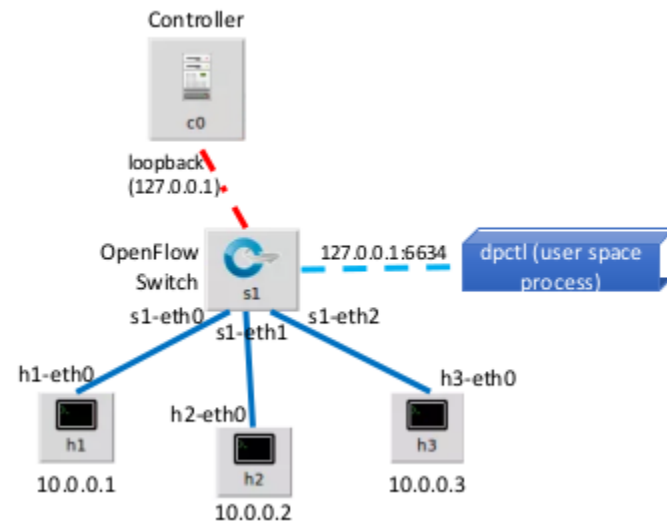
sudo tcpdump -i s1-eth2 -w test.pcap

TERMINAL 3 *// start a RYU controller*

ryu-manager ryu.app.simple_simple_monitor_13

TERMINAL 4 *// we want to trace all traffic in port s1-eth2*

sudo ovs-ofctl add-flow s1 in_port=2,actions=output:1,3

sudo ovs-ofctl add-flow s1 in_port=1,actions=output:2,3

EXPERIMENT