

# Assignment 4

## Understanding network emulation software, Mininet

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Q1.

Python file :

```
from mininet.topo import Topo

class customTopo(Topo):

    def build(self):
        #Adding hosts and switches
        H1_S1 = self.addHost( 'h1' )
        H2_S1 = self.addHost( 'h2' )
        H3_S2 = self.addHost( 'h3' )
        H4_S2 = self.addHost( 'h4' )
        H5_S2 = self.addHost( 'h5' )
        H6_S3 = self.addHost( 'h6' )
        H7_S3 = self.addHost( 'h7' )
        H8_S3 = self.addHost( 'h8' )

        s1_Switch = self.addSwitch( 's1' )
        s2_Switch = self.addSwitch( 's2' )
        s3_Switch = self.addSwitch( 's3' )

        # Add links
        self.addLink( H1_S1, s1_Switch )
        self.addLink( s2_Switch, s1_Switch )
        self.addLink( H2_S1, s1_Switch )

        self.addLink( H3_S2, s2_Switch )
        self.addLink( s2_Switch, s3_Switch )
        self.addLink( H4_S2, s2_Switch )
        self.addLink( H5_S2, s2_Switch )

        self.addLink( H6_S3, s3_Switch )
        self.addLink( H7_S3, s3_Switch )
        self.addLink( H8_S3, s3_Switch )

topos = { 'mytopo': ( lambda: customTopo() ) }
```

```
$sudo mn --custom ~/mininet/custom/topo-3sw-8host.py --topo mytopo --mac
--switch ovsk --controller remote
```

```
mininet@mininet-vm: ~/mininet/custom
File Edit Tabs Help
mininet@mininet-vm:~/mininet/custom$ nano topo-3sw-8host.py
mininet@mininet-vm:~/mininet/custom$ sudo mn --custom ~/mininet/custom/topo-3sw-8host
.py --topo mytopo --mac --switch ovsk --controller remote
*** Creating network
*** Adding controller
Unable to contact the remote controller at 127.0.0.1:6653
Unable to contact the remote controller at 127.0.0.1:6633
Setting remote controller to 127.0.0.1:6653
*** Adding hosts:
h1 h2 h3 h4 h5 h6 h7 h8
*** Adding switches:
s1 s2 s3
*** Adding links:
(h1, s1) (h2, s1) (h3, s2) (h4, s2) (h5, s2) (h6, s3) (h7, s3) (h8, s3) (s2, s1) (s2,
s3)
*** Configuring hosts
h1 h2 h3 h4 h5 h6 h7 h8
*** Starting controller
c0
*** Starting 3 switches
s1 s2 s3 ...
*** Starting CLI:
mininet>
```

## net

```
File Edit Tabs Help
(s2, s3)
*** Configuring hosts
h1 h2 h3 h4 h5 h6 h7 h8
*** Starting controller
c0
*** Starting 3 switches
s1 s2 s3 ...
*** Starting CLI:
mininet> net
h1 h1-eth0:s1-eth1
h2 h2-eth0:s1-eth3
h3 h3-eth0:s2-eth2
h4 h4-eth0:s2-eth4
h5 h5-eth0:s2-eth5
h6 h6-eth0:s3-eth2
h7 h7-eth0:s3-eth3
h8 h8-eth0:s3-eth4
s1 lo: s1-eth1:h1-eth0 s1-eth2:s2-eth1 s1-eth3:h2-eth0
s2 lo: s2-eth1:s1-eth2 s2-eth2:h3-eth0 s2-eth3:s3-eth1 s2-eth4:h4-eth0 s2-eth5:h5-eth0
s3 lo: s3-eth1:s2-eth3 s3-eth2:h6-eth0 s3-eth3:h7-eth0 s3-eth4:h8-eth0
c0
mininet>
```

Q2.

a. **sudo tc qdisc add dev h1-eth0 root netem delay 100ms**

Delay = 100ms

To show delay : **tc qdisc show**

```
root@mininet-vn:/home/mininet# sudo tc qdisc add dev h1-eth0 root netem delay 100ms
root@mininet-vn:/home/mininet# tc qdisc show
qdisc noqueue 0: dev lo root refcnt 2
qdisc netem 8001: dev h1-eth0 root refcnt 2 limit 1000 delay 100.0ms
root@mininet-vn:/home/mininet#
```

b. **iperf -s**

```
root@mininet-vn:/home/mininet/mininet/custom# sudo tc qdisc add dev h1-eth0 root netem delay 100ms
Error: Exclusivity flag on, cannot modify.
root@mininet-vn:/home/mininet/mininet/custom# iperf -s
-----
Server listening on TCP port 5001
TCP window size: 85.3 KByte (default)
-----
```

**iperf -c 10.0.0.6**

```
mininet> h6 iperf -c 10.0.0.1
-----
Client connecting to 10.0.0.1, TCP port 5001
TCP window size: 85.3 KByte (default)
-----
[ 3] local 10.0.0.6 port 53334 connected with 10.0.0.1 port 5001
[ ID] Interval      Transfer    Bandwidth
[ 3] 0.0-10.0 sec  50.3 GBytes 43.2 Gbits/sec
mininet>
```

C.

```
mininet> xterm h1 h6
mininet> h1 tcpdump -i h1-eth0 -w h2_capture.pcap
tcpdump: listening on h1-eth0, link-type EN10MB (Ethernet), capture size 262144
bytes
```

d. Graph

