

CS2007-Asssignment-5

Topology Code :

```
from mininet.net import Mininet
from mininet.node import Controller, OVSController
from mininet.cli import CLI
from mininet.link import TCLink
from mininet.log import setLogLevel, info
```

```
net = Mininet()
```

```
h1 = net.addHost( 'h1' )
```

```
h2 = net.addHost( 'h2' )
```

```
h3 = net.addHost( 'h3' )
```

```
h4 = net.addHost( 'h4' )
```

```
h5 = net.addHost( 'h5' )
```

```
h6 = net.addHost( 'h6' )
```

```
s1 = net.addSwitch( 's1' )
```

```
s2 = net.addSwitch( 's2' )
```

```
s3 = net.addSwitch( 's3' )
```

```
net.addLink( h1, s1, bw=20, delay='10ms' )
```

```
net.addLink( h2, s1, bw=20, delay='10ms' )
```

```
net.addLink( h3, s2, bw=20, delay='10ms' )
```

```
net.addLink( h4, s2, bw=20, delay='10ms' )
```

```
net.addLink( h5, s3, bw=20, delay='10ms' )
```

```
net.addLink( h6, s3, bw=20, delay='10ms' )
```

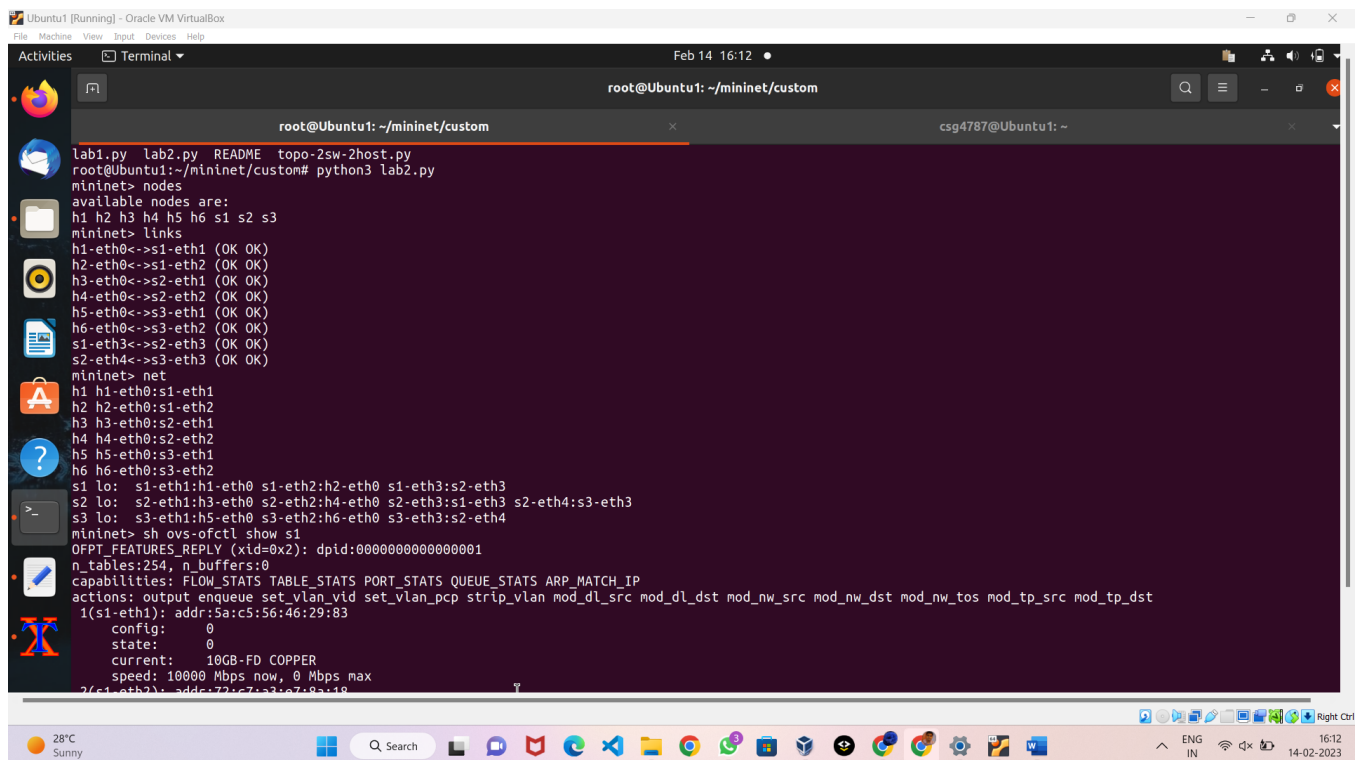
```
net.addLink( s1, s2, bw=50, delay='10ms' )
```

```
net.addLink( s2, s3, bw=50, delay='10ms' )
```

```
net.start()
```

```
CLI( net )
```

```
net.stop()
```



The screenshot shows a terminal window titled "Ubuntu1 [Running] - Oracle VM VirtualBox" with a date and time of "Feb 14 16:12". The terminal is running a script named "lab2.py" in the directory "~/mininet/custom". The script uses Mininet to create a network topology with three hosts (h1, h2, h3) and three switches (s1, s2, s3). The hosts are connected to the switches as follows: h1 to s1, h2 to s1, h3 to s2, h4 to s2, h5 to s3, and h6 to s3. The switches are connected to each other in a mesh topology: s1 to s2, s2 to s3, and s1 to s3. The script then starts the network and displays the status of the switches and links. The output shows that the network is successfully configured and running.

```
root@Ubuntu1: ~/mininet/custom
lab1.py lab2.py README topo-2sw-2host.py
root@Ubuntu1:~/mininet/custom# python3 lab2.py
mininet> nodes
available nodes are:
h1 h2 h3 h4 h5 h6 s1 s2 s3
mininet> links
h1-eth0<->s1-eth1 (OK OK)
h2-eth0<->s1-eth2 (OK OK)
h3-eth0<->s2-eth1 (OK OK)
h4-eth0<->s2-eth2 (OK OK)
h5-eth0<->s3-eth1 (OK OK)
h6-eth0<->s3-eth2 (OK OK)
s1-eth3<->s2-eth3 (OK OK)
s2-eth4<->s3-eth3 (OK OK)
mininet> net
h1 h1-eth0:s1-eth1
h2 h2-eth0:s1-eth2
h3 h3-eth0:s2-eth1
h4 h4-eth0:s2-eth2
h5 h5-eth0:s3-eth1
h6 h6-eth0:s3-eth2
s1 lo: s1-eth1:h1-eth0 s1-eth2:h2-eth0 s1-eth3:s2-eth3
s2 lo: s2-eth1:h3-eth0 s2-eth2:h4-eth0 s2-eth3:s1-eth3 s2-eth4:s3-eth3
s3 lo: s3-eth1:h5-eth0 s3-eth2:h6-eth0 s3-eth3:s2-eth4
mininet> sh ovs-ofctl show s1
DPID:0000000000000001
n_tables:254, n_buffers:0
capabilities: FLOW_STATS TABLE_STATS PORT_STATS QUEUE_STATS ARP_MATCH_IP
actions: output enqueue set_vlan_vid set_vlan_pcp strip_vlan mod_dl_src mod_dl_dst mod_nw_src mod_nw_dst mod_nw_tos mod_tp_src mod_tp_dst
1(s1-eth1): addr:5a:c5:56:46:29:83
config: 0
state: 0
current: 10GB-FD COPPER
speed: 10000 Mbps now, 0 Mbps max
2(s1-eth2): addr:72:c6:73:33:e7:83:18
```

```
Ubuntu1 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Feb 14 16:12
root@Ubuntu1: ~/mininet/custom
root@Ubuntu1: ~/mininet/custom
mininet> sh ovs-ofctl add-flow s1 priority=500,in_port=2,actions=output:1
mininet> sh ovs-ofctl dump-flows s1
cookie=0x0, duration=36.970s, table=0, n_packets=0, n_bytes=0, priority=500,in_port="s1-eth1" actions=output:"s1-eth2"
cookie=0x0, duration=22.308s, table=0, n_packets=0, n_bytes=0, priority=500,in_port="s1-eth2" actions=output:"s1-eth1"
mininet> pingall
*** Ping: testing ping reachability
h1 -> h2 X X X X
h2 -> h1 X X X X
h3 -> X X X X X
h4 -> X X X X X
h5 -> X X X X X
h6 -> X X X X X
*** Results: 93% dropped (2/30 received)
mininet> sh ovs-ofctl add-flow s2 priority=500,in_port=1,actions=output:2
mininet> sh ovs-ofctl add-flow s2 priority=500,in_port=2,actions=output:1
mininet> pingall
*** Ping: testing ping reachability
h1 -> h2 X X X X
h2 -> h1 X X X X
h3 -> X X h4 X X
h4 -> X X h3 X X
h5 -> X X X X X
h6 -> X X X X X
*** Results: 86% dropped (4/30 received)
mininet> sh ovs-ofctl add-flow s3 priority=500,in_port=1,actions=output:2
mininet> sh ovs-ofctl add-flow s3 priority=500,in_port=2,actions=output:1
mininet> pingall
*** Ping: testing ping reachability
h1 -> h2 X X X X
h2 -> h1 X X X X
h3 -> X X h4 X X
h4 -> X X h3 X X
h5 -> X X X X h6
h6 -> X X X X h5
*** Results: 90% dropped (6/30 received)
```

```
Ubuntu1 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Feb 14 16:12
root@Ubuntu1: ~/mininet/custom
root@Ubuntu1: ~/mininet/custom
h3 -> X X h4 X X
h4 -> X X h3 X X
h5 -> X X X X h6
h6 -> X X X X h5
*** Results: 80% dropped (6/30 received)
mininet> sh ovs-ofctl add-flow s1 priority=500,d1_type=0x800,nw_src=10.0.0.1/24,nw_dst=10.0.0.1/24,actions=normal
mininet> sh ovs-ofctl add-flow s1 arp,nw_dst=10.0.0.6,actions=output:1
mininet> pingall
*** Ping: testing ping reachability
h1 -> h2 X X X X
h2 -> h1 X X X X
h3 -> X X h4 X X
h4 -> X X h3 X X
h5 -> X X X X h6
h6 -> X X X X h5
*** Results: 80% dropped (6/30 received)
mininet> sh ovs-ofctl add-flow s1 priority=800,d1_type=0x800,nw_src=10.0.0.6,nw_dst=10.0.0.1/24,actions=mod_nw_tos:184,nor_mal
ovs-ofctl: 'add-flow' command takes at most 2 arguments
mininet> h1 ping h2
PING 10.0.0.2 (10.0.0.2) 56(84) bytes of data:
64 bytes from 10.0.0.2: icmp_seq=1 ttl=64 time=0.332 ms
64 bytes from 10.0.0.2: icmp_seq=2 ttl=64 time=0.103 ms
64 bytes from 10.0.0.2: icmp_seq=3 ttl=64 time=0.089 ms
^C
--- 10.0.0.2 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2040ms
rtt min/avg/max/mdev = 0.089/0.174/0.332/0.111 ms
mininet> exit
root@Ubuntu1: ~/mininet/custom# python3 lab2.py
mininet> sh ovs-ofctl add-flow s1 priority=500,d1_type=0x800,nw_src=10.0.0.1/24,nw_dst=10.0.0.6/24,actions=normal
mininet> sh ovs-ofctl add-flow s1 priority=800,d1_type=0x800,nw_src=10.0.0.6,nw_dst=10.0.0.1/24,actions=mod_nw_tos:184,nor_mal
ovs-ofctl: 'add-flow' command takes at most 2 arguments
mininet> sh ovs-ofctl add-flow s1 priority=800,d1_type=0x800,nw_src=10.0.0.6,nw_dst=10.0.0.1/24,actions=normal
mininet> xterm h1 h6
Error: Cannot connect to display
```

```
Activities Terminal Feb 14 15:34 root@alienx-VirtualBox: ~
rtt_min/avg/max/ndev = 0.053/0.454/8.352/1.649 ms
mininet> h3 ping h4
ping: h4: Temporary failure in name resolution
mininet> h2 ping h1
PING 10.0.0.1 (10.0.0.1) 56(84) bytes of data.
64 bytes from 10.0.0.1: icmp_seq=1 ttl=64 time=1.09 ms
64 bytes from 10.0.0.1: icmp_seq=2 ttl=64 time=0.082 ms
64 bytes from 10.0.0.1: icmp_seq=3 ttl=64 time=0.050 ms
64 bytes from 10.0.0.1: icmp_seq=4 ttl=64 time=0.049 ms
64 bytes from 10.0.0.1: icmp_seq=5 ttl=64 time=0.053 ms
64 bytes from 10.0.0.1: icmp_seq=6 ttl=64 time=0.046 ms
64 bytes from 10.0.0.1: icmp_seq=7 ttl=64 time=0.079 ms
64 bytes from 10.0.0.1: icmp_seq=8 ttl=64 time=0.054 ms
64 bytes from 10.0.0.1: icmp_seq=9 ttl=64 time=0.079 ms
^C
--- 10.0.0.1 ping statistics ---
9 packets transmitted, 9 received, 0% packet loss, time 8399ms
rtt_min/avg/max/ndev = 0.046/0.175/1.090/0.323 ms
mininet> h2 ping h0
ping: h0: Temporary failure in name resolution
mininet> h0 ping h5
ping: h5: Temporary failure in name resolution
mininet> h1 ping h3
ping: h3: Temporary failure in name resolution
mininet> py net.hosts
[<Host h1: h1-eth0:10.0.0.1 pId=3276>, <Host h2: h2-eth0:10.0.0.2 pId=3278>, <Host h3: h3-eth0:None pId=3350>, <Host h4: h4-eth0:None pId=3354>, <Host h5: h5-eth0:None pId=3358>, <Host h0: h0-eth0:None pId=3362>]
mininet> py h3.setIP('10.0.0.3')
mininet> py h4.setIP('10.0.0.4')
mininet> py h5.setIP('10.0.0.5')
mininet> py h0.setIP('10.0.0.6')
mininet> h3 ping h4
PING 10.0.0.4 (10.0.0.4) 56(84) bytes of data.
^C
--- 10.0.0.4 ping statistics ---
24 packets transmitted, 0 received, 100% packet loss, time 23566ms
mininet> h4 ping h3
PING 10.0.0.3 (10.0.0.3) 56(84) bytes of data.
^C
--- 10.0.0.3 ping statistics ---
24 packets transmitted, 0 received, 100% packet loss, time 23555ms
```

```
Activities Terminal Feb 14 15:33 root@alienx-VirtualBox: ~
alienx@alienx-VirtualBox:~$ sudo -l
[sudo] password for alienx:
root@alienx-VirtualBox:~# sudo mn
*** Creating network
*** Adding controller
*** Adding hosts:
h1 h2
*** Adding switches:
s1
*** Adding links:
(h1, s1) (h2, s1)
*** Configuring hosts
h1 h2
c0
*** Starting controller
c0
*** Starting 1 switches
s1
*** Starting CLI:
mininet> nodes
available nodes are:
c0 h1 h2 s1
mininet> py net.addHost('h3',ip='10.0.0.3')
<Host h3: pId=3350>
mininet> py net.addHost('h4',ip='10.0.0.4')
<Host h4: pId=3354>
mininet> py net.addHost('h5',ip='10.0.0.5')
<Host h5: pId=3358>
mininet> py net.addHost('h0',ip='10.0.0.6')
<Host h0: pId=3362>
mininet> py net.addSwitch('s2')
<OVSwitch s2: lo:127.0.0.1 pId=3378>
mininet> nodes
available nodes are:
c0 h1 h2 h3 h4 h5 h0 s1 s2
mininet> py net.addSwitch('s3')
<OVSwitch s3: lo:127.0.0.1 pId=3388>
mininet> nodes
available nodes are:
c0 h1 h2 h3 h4 h5 h0 s1 s2 s3
mininet> py net.addLink('h3', 's2', bw='20', delay='10ms')
<mininet.link.Link object at 0x7f0a7e3bca90>
mininet> py net.addLink('h4', 's2', bw='20', delay='10ms')
<mininet.link.Link object at 0x7f0a7e3bcc10>
mininet> py net.addLink('s1', 's2', bw='50', delay='10ms')
<mininet.link.Link object at 0x7f0a7e3bcd90>
mininet> links
```

```
Activities Terminal Feb 14 15:34 root@alienx-VirtualBox: ~
rtt min/avg/max/ndev = 0.053/0.454/8.352/1.649 ms
mininet> h3 ping h4
ping: h4: Temporary failure in name resolution
mininet> h2 ping h1
PING 10.0.0.1 (10.0.0.1) 56(84) bytes of data:
64 bytes from 10.0.0.1: icmp_seq=1 ttl=64 time=1.09 ms
64 bytes from 10.0.0.1: icmp_seq=2 ttl=64 time=0.082 ms
64 bytes from 10.0.0.1: icmp_seq=3 ttl=64 time=0.050 ms
64 bytes from 10.0.0.1: icmp_seq=4 ttl=64 time=0.049 ms
64 bytes from 10.0.0.1: icmp_seq=5 ttl=64 time=0.053 ms
64 bytes from 10.0.0.1: icmp_seq=6 ttl=64 time=0.046 ms
64 bytes from 10.0.0.1: icmp_seq=7 ttl=64 time=0.079 ms
64 bytes from 10.0.0.1: icmp_seq=8 ttl=64 time=0.054 ms
64 bytes from 10.0.0.1: icmp_seq=9 ttl=64 time=0.079 ms
^C
--- 10.0.0.1 ping statistics ---
9 packets transmitted, 9 received, 0% packet loss, time 8399ms
rtt min/avg/max/ndev = 0.046/0.175/1.090/0.323 ms
mininet> h3 ping h0
ping: h0: Temporary failure in name resolution
mininet> h0 ping h5
ping: h5: Temporary failure in name resolution
mininet> h1 ping h3
ping: h3: Temporary failure in name resolution
mininet> py net.hosts
[<Host h1: h1-eth0:10.0.0.1 pld=3276> , <Host h2: h2-eth0:10.0.0.2 pld=3278> , <Host h3: h3-eth0:None pld=3350> , <Host h4: h4-eth0:None pld=3354> , <Host h5: h5-eth0:None pld=3358> , <Host h0: h0-eth0:None pld=3362> ]
mininet> py h3.setIP('10.0.0.3')
mininet> py h4.setIP('10.0.0.4')
mininet> py h5.setIP('10.0.0.5')
mininet> py h0.setIP('10.0.0.6')
mininet> h3 ping h4
PING 10.0.0.4 (10.0.0.4) 56(84) bytes of data.
^C
--- 10.0.0.4 ping statistics ---
24 packets transmitted, 0 received, 100% packet loss, time 23566ms
mininet> h4 ping h3
PING 10.0.0.3 (10.0.0.3) 56(84) bytes of data.
^C
--- 10.0.0.3 ping statistics ---
24 packets transmitted, 0 received, 100% packet loss, time 23555ms
```