LAB-4

LAB 4-1

A. Simple Proactive Hub Application

Testing:

B. Simple Switch Application (in built)

Testing:

C. Simple Switch with L3 Match Application

Testing -

```
student@VM2:~$ sudo ovs-ofctl -O OpenFlow13 dump-flows s1
 cookie=0x0, duration=3.634s, table=0, n_packets=0, n_bytes=0, priority=0 actions=CO
NTROLLER:65535
student@VM2:~$
student@VM2:~$ sudo ovs-ofctl -O OpenFlow13 dump-flows s1
 cookie=0x0, duration=21.235s, table=0, n_packets=6, n_bytes=588, priority=1,ip,nw_s
rc=10.0.0.1,nw_dst=10.0.0.2 actions=output:"s1-eth2"
 cookie=0x0, duration=21.232s, table=0, n_packets=6, n_bytes=588, priority=1,ip,nw_s
rc=10.0.0.2,nw_dst=10.0.0.1 actions=output:"s1-eth1"
 cookie=0x0, duration=35.632s, table=0, n_packets=10, n_bytes=644, priority=0 action
s=CONTROLLER:65535
student@VM2:~$
```

D. Simple Switch with L4 Match Application

Testing -

```
student@VM2:~$ sudo ovs-ofctl -O OpenFlow13 dump-flows s1
 cookie=0x0, duration=20.501s, table=0, n_packets=4, n_bytes=280, priority=0 actions
=CONTROLLER:65535
student@VM2:~$ sudo ovs-ofctl -O OpenFlow13 dump-flows s1
 cookie=0x0, duration=96.136s, table=0, n_packets=12, n_bytes=1176, priority=1,icmp,
nw_src=10.0.0.1,nw_dst=10.0.0.2 actions=output:"s1-eth2"
 cookie=0x0, duration=96.134s, table=0, n_packets=12, n_bytes=1176, priority=1,icmp,
nw_src=10.0.0.2,nw_dst=10.0.0.1 actions=output:"s1-eth1"
 cookie=0x0, duration=42.440s, table=0, n_packets=265313, n_bytes=11797820154, prior
ity=1,tcp,nw_src=10.0.0.1,nw_dst=10.0.0.2,tp_src=51582,tp_dst=5001 actions=output:"s
1-eth2"
 cookie=0x0, duration=42.430s, table=0, n_packets=246025, n_bytes=16238142, priority
=1,tcp,nw_src=10.0.0.2,nw_dst=10.0.0.1,tp_src=5001,tp_dst=51582 actions=output:"s1-e
th1"
 cookie=0x0, duration=191.935s, table=0, n_packets=22, n_bytes=1436, priority=0 acti
ons=CONTROLLER:65535
student@VM2:~$
```

E. Simple Switch with flow expiry (flow timeouts configured)

```
third_timeout=30, priority=1,in_port="s1-eth3",dl_src=00:00:00:00:00:03,dl_dst=00:00:00
pi :00:00:04 actions=output:"s1-eth4"
 t cookie=0x0, duration=87.168s, table=0, n_packets=18, n_bytes=1092, priority=0 actio
h3 ns=CONTROLLER:65535
h3 student@VM2:~$ sudo ovs-ofctl -O OpenFlow13 dump-flows s1
h2  cookie=0x0, duration=119.676s, table=0, n_packets=18, n_bytes=1092, priority=0 acti
h2 ons=CONTROLLER:65535
ts student@VM2:~$
   student@VM2:~$
```

LAB 4-2:

Get Statistics-

```
student@VM2:~$ curl -X GET http://localhost:8080/stats/flow/1
{"1": [{"priority": 1, "cookie": 0, "idle_timeout": 0, "hard_timeout": 0, "byte_count": 2
38, "duration_sec": 406, "duration_nsec": 87000000, "packet_count": 3, "length": 104, "fl
ags": 0, "actions": ["OUTPUT:1"], "match": {"in_port": 2, "dl_src": "00:00:00:00:00:02",
"dl_dst": "00:00:00:00:00:01"}, "table_id": 0}, {"priority": 1, "cookie": 0, "idle_timeou
t": 0, "hard_timeout": 0, "byte_count": 140, "duration_sec": 406, "duration_nsec": 860000
00, "packet_count": 2, "length": 104, "flags": 0, "actions": ["OUTPUT:2"], "match": {"in_
port": 1, "dl_src": "00:00:00:00:00:01", "dl_dst": "00:00:00:00:00:02"}, "table_id": 0},
{"priority": 1, "cookie": 0, "idle_timeout": 0, "hard_timeout": 0, "byte_count": 238, "du
ration_sec": 406, "duration_nsec": 73000000, "packet_count": 3, "length": 104, "flags": 0
, "actions": ["OUTPUT:1"], "match": {"in_port": 2, "dl_src": "00:00:00:00:00:03", "dl_dst
": "00:00:00:00:00:01"}, "table_id": 0}, {"priority": 1, "cookie": 0, "idle_timeout": 0,
"hard_timeout": 0, "byte_count": 140, "duration_sec": 406, "duration_nsec": 71000000, "pa
cket_count": 2, "length": 104, "flags": 0, "actions": ["OUTPUT:2"], "match": {"in_port":
1, "dl_src": "00:00:00:00:00:01", "dl_dst": "00:00:00:00:00:03"}, "table_id": 0}, {"prior
ity": 1, "cookie": 0, "idle_timeout": 0, "hard_timeout": 0, "byte_count": 238, "duration_
sec": 406, "duration_nsec": 55000000, "packet_count": 3, "length": 104, "flags": 0, "acti
ons": ["OUTPUT:1"], "match": {"in_port": 2, "dl_src": "00:00:00:00:00:04", "dl_dst": "00:
00:00:00:00:01"}, "table_id": 0}, {"priority": 1, "cookie": 0, "idle_timeout": 0, "hard_t
imeout": 0, "byte_count": 140, "duration_sec": 406, "duration_nsec": 53000000, "packet_co
unt": 2, "length": 104, "flags": 0, "actions": ["OUTPUT:2"], "match": {"in_port": 1, "dl_
src": "00:00:00:00:00:01", "dl_dst": "00:00:00:00:00:04"}, "table_id": 0}, {"priority": 0
, "cookie": 0, "idle_timeout": 0, "hard_timeout": 0, "byte_count": 2825, "duration_sec":
439, "duration_nsec": 750000000, "packet_count": 38, "length": 80, "flags": 0, "actions":
["OUTPUT:CONTROLLER"], "match": {}, "table_id": 0}]}student@VM2:~$
```

```
t": 2825, "duration_sec": 439, "duration_nsec": 750000000, "packet_count": 38, "leng
th": 80, "flags": 0, "actions": ["OUTPUT:CONTROLLER"], "match": {}, "table_id": 0}]}
student@VM2:~$
student@VM2:~$ curl -X GET http://localhost:8080/stats/port/1
{"1": [{"rx_packets": 0, "tx_packets": 0, "rx_bytes": 0, "tx_bytes": 0, "rx_dropped"
: 33, "tx_dropped": 0, "rx_errors": 0, "tx_errors": 0, "rx_frame_err": 0, "rx_over_e
rr": 0, "rx_crc_err": 0, "collisions": 0, "duration_sec": 605, "duration_nsec": 4040
00000, "port_no": "LOCAL"}, {"rx_packets": 26, "tx_packets": 71, "rx_bytes": 1976, "
tx_bytes": 6575, "rx_dropped": 0, "tx_dropped": 0, "rx_errors": 0, "tx_errors": 0, "
rx_frame_err": 0, "rx_over_err": 0, "rx_crc_err": 0, "collisions": 0, "duration_sec"
: 605, "duration_nsec": 430000000, "port_no": 1}, {"rx_packets": 65, "tx_packets": 4
6, "rx_bytes": 6024, "tx_bytes": 4556, "rx_dropped": 0, "tx_dropped": 0, "rx_errors"
: 0, "tx_errors": 0, "rx_frame_err": 0, "rx_over_err": 0, "rx_crc_err": 0, "collisio
ns": 0, "duration_sec": 605, "duration_nsec": 430000000, "port_no": 2}]}student@VM2:
~$
student@VM2:~$
```

Continue to next page

Example – Hub

```
mininet> pingall
*** Ping: testing ping reachability
h1 -> X X X
h2 -> X X X
h3 -> X X X
h4 -> X X X
*** Results: 100% dropped (0/12 received)
mininet> pingall
*** Ping: testing ping reachability
h1 -> h2 h3 h4
h2 -> h1 h3 h4
h3 -> h1 h2 h4
h4 -> h1 h2 h3
*** Results: 0% dropped (12/12 received)
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=0.252 ms
64 bytes from 10.0.0.2: icmp_seq=2 ttl=64 time=0.068 ms
64 bytes from 10.0.0.2: icmp_seq=3 ttl=64 time=0.066 ms
64 bytes from 10.0.0.2: icmp_seq=4 ttl=64 time=0.066 ms
64 bytes from 10.0.0.2: icmp_seq=5 ttl=64 time=0.067 ms
64 bytes from 10.0.0.2: icmp_seq=6 ttl=64 time=0.073 ms
^C
--- 10.0.0.2 ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5126ms
rtt min/avg/max/mdev = 0.066/0.098/0.252/0.068 ms
mininet>
```

Example – Switch

```
student@VM2:~$ sudo ovs-ofctl -O OpenFlow13 dump-flows s1
 cookie=0x0, duration=62.551s, table=0, n_packets=0, n_bytes=0, priority=100,dl_
dst=ff:ff:ff:ff:ff:ff actions=FLOOD
 cookie=0x0, duration=44.325s, table=0, n_packets=0, n_bytes=0, priority=100,dl_
dst=00:00:00:00:00:01 actions=output:"s1-eth1"
 cookie=0x0, duration=31.292s, table=0, n_packets=0, n_bytes=0, priority=100,dl_
dst=00:00:00:00:00:02 actions=output:"s1-eth2"
 cookie=0x0, duration=26.206s, table=0, n_packets=0, n_bytes=0, priority=100,dl_
dst=00:00:00:00:00:03 actions=output:"s1-eth3"
 cookie=0x0, duration=21.982s, table=0, n_packets=0, n_bytes=0, priority=100,dl_
dst=00:00:00:00:00:04 actions=output:"s1-eth4"
student@VM2:~$
```

```
OpenFlow13 --topo=single,4
*** 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
*** Adding switches:
s1
*** Adding links:
(h1, s1) (h2, s1) (h3, s1) (h4, s1)
*** Configuring hosts
h1 h2 h3 h4
*** Starting controller
c0
*** Starting 1 switches
s1 ...
*** Starting CLI:
mininet> pingall
*** Ping: testing ping reachability
h1 -> h2 h3 h4
h2 -> h1 h3 h4
h3 -> h1 h2 h4
h4 -> h1 h2 h3
*** Results: 0% dropped (12/12 received)
mininet>
```

Example – Multitable

```
*** Starting CLI:
mininet> pingall
*** Ping: testing ping reachability
h1 -> h2 h3 X
h2 -> h1 h3 X
h3 -> h1 h2 X
h4 -> X X X
*** Results: 50% dropped (6/12 received)
mininet>
```