Mawlana Bhashani Science and Technology University

Lab-Report

Report No: 06

Course code: ICT-4202

Course title: Wireless and Mobile Communication Lab

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Experiment No: 06

Experiment Name: Switching an interface to move a host around a network using mininet.

Objective:

One of Mininet's most powerful and useful features is that it uses Software Defined Networking. Using the OpenFlow protocol and related tools, switches can be programmed to do almost anything. OpenFlow makes emulators like Mininet much more useful, since network system designs, including custom packet forwarding with OpenFlow, can easily be transferred to hardware OpenFlow switches for line-rate operation. The objective of this experiment:

- Downloading and running mininet on virtual machine(VM)
- Switching an interface to move a host around the network
- Using mobility.py

Steps:

1. Creating network
2. Adding controller
3. Adding hosts
4. Configuring hosts
5. Starting controller
6. Starting 3 switches
7. Testing network
8. Testing connectivity
9. Identifying switch interface for host
10. Moving host to 3 switches respectively

Source Code:

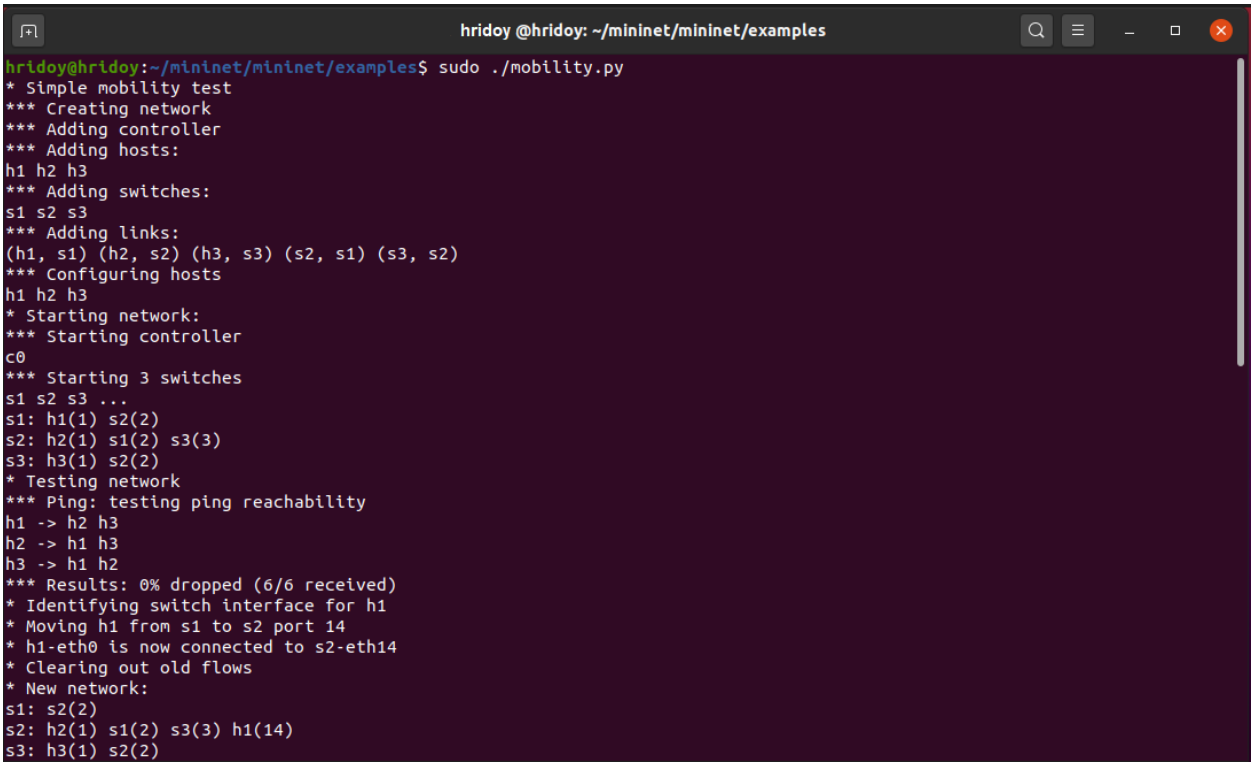
```
from mininet.node import OVSSwitch
from mininet.net import Mininet
from mininet.topo import LinearTopo
from mininet.log import info, output, warn, setLogLevel


from random import randint
```

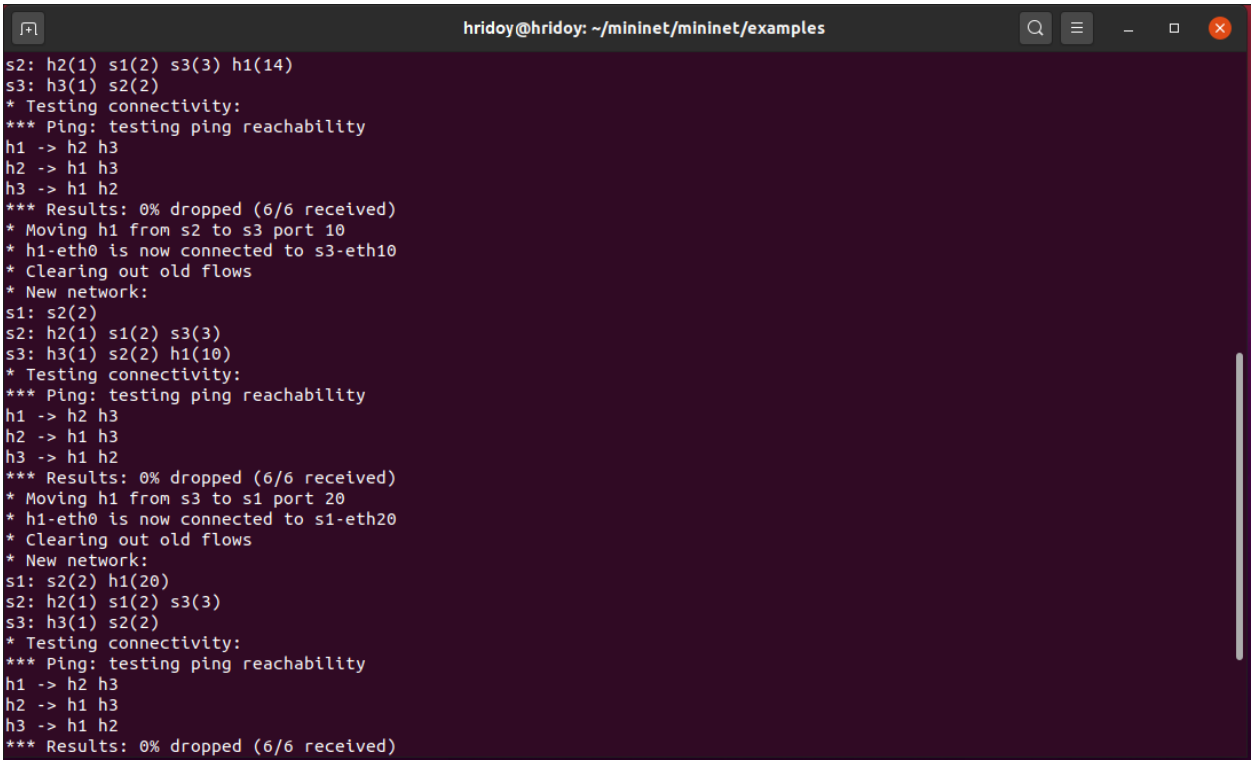
```
class MobilitySwitch( OVSSwitch ):
    "Switch that can reattach and rename interfaces"


    def delIntf( self, intf ):
        "Remove (and detach) an interface"
        port = self.ports[ intf ]
        del self.ports[ intf ]
        del self.intfs[ port ]
        del self.nameToIntf[ intf.name ]


    def addIntf( self, intf, rename=False, **kwargs ):
        "Add (and reparent) an interface"
        OVSSwitch.addIntf( self, intf, **kwargs )
        intf.node = self
        if rename:
            self.renameIntf( intf )


    def attach( self, intf ):
        "Attach an interface and set its port"
        port = self.ports[ intf ]
        if port:
            if self.isOldOVS():
                self.cmd( 'ovs-vsctl add-port', self, intf )
            else:
                self.cmd( 'ovs-vsctl add-port', self, intf,
                          '-- set Interface', intf,
                          'ofport_request=%s' % port )
            self.validatePort( intf )


    def validatePort( self, intf ):
        "Validate intf's OF port number"
        ofport = int( self.cmd( 'ovs-vsctl get Interface', intf,
                                'ofport' ) )
        if ofport != self.ports[ intf ]:
            warn( 'WARNING: ofport for', intf, 'is actually', ofport,
```

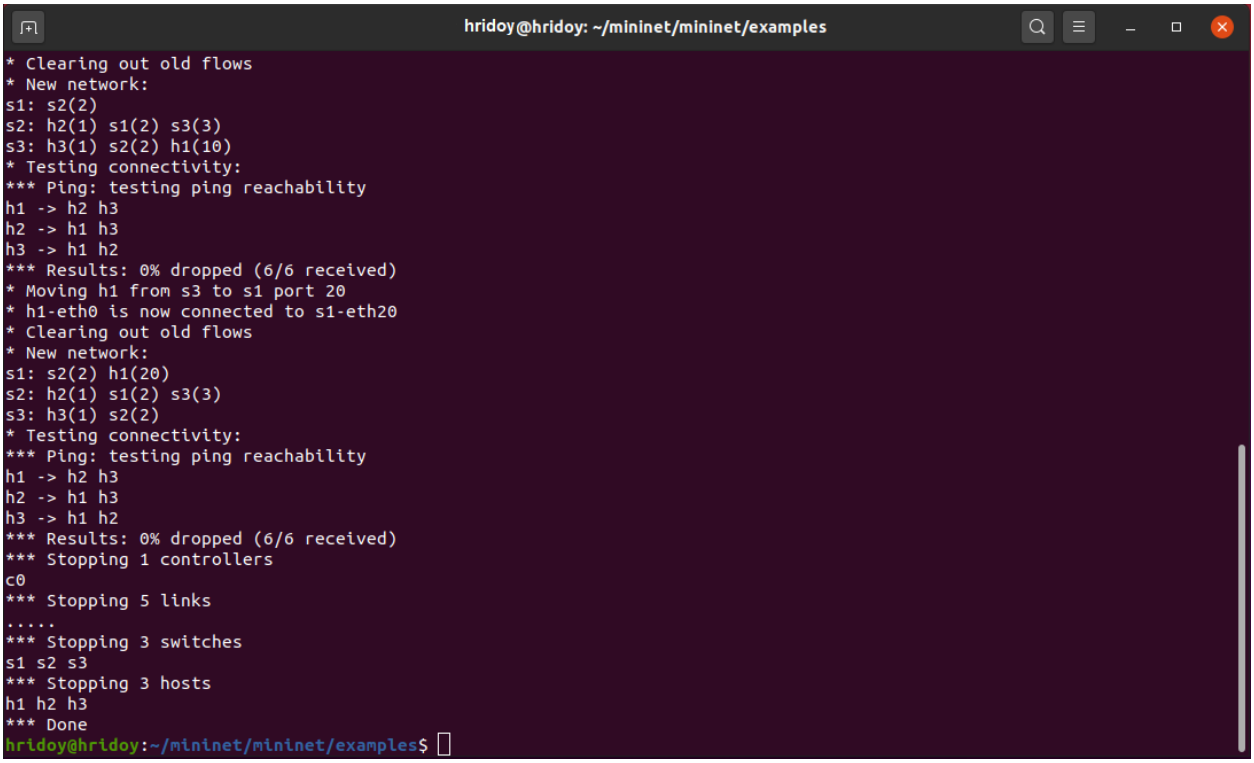
```
                '\n' )

    def renameIntf( self, intf, newname='' ):
        "Rename an interface (to its canonical name)"
        intf.ifconfig( 'down' )
        if not newname:
            newname = '%s-eth%d' % ( self.name, self.ports[ intf ] )
        intf.cmd( 'ip link set', intf, 'name', newname )
        del self.nameToIntf[ intf.name ]
        intf.name = newname
        self.nameToIntf[ intf.name ] = intf
        intf.ifconfig( 'up' )

    def moveIntf( self, intf, switch, port=None, rename=True ):
        "Move one of our interfaces to another switch"
        self.detach( intf )
        self.delIntf( intf )
        switch.addIntf( intf, port=port, rename=rename )
        switch.attach( intf )



def printConnections( switches ):
    "Compactly print connected nodes to each switch"
    for sw in switches:
        output( '%s: ' % sw )
        for intf in sw.intfList():
            link = intf.link
            if link:
                intf1, intf2 = link.intf1, link.intf2
                remote = intf1 if intf1.node != sw else intf2
                output( '%s(%s) ' % ( remote.node, sw.ports[ intf ] ) )
        output( '\n' )



def moveHost( host, oldSwitch, newSwitch, newPort=None ):
    "Move a host from old switch to new switch"
    hintf, sintf = host.connectionsTo( oldSwitch )[ 0 ]
```

```
    oldSwitch.moveIntf( sintf, newSwitch, port=newPort )
    return hintf, sintf



def mobilityTest():
    "A simple test of mobility"
    info( '* Simple mobility test\n' )
    net = Mininet( topo=LinearTopo( 3 ), switch=MobilitySwitch )
    info( '* Starting network:\n' )
    net.start()
    printConnections( net.switches )
    info( '* Testing network\n' )
    net.pingAll()
    info( '* Identifying switch interface for h1\n' )
    h1, old = net.get( 'h1', 's1' )
    for s in 2, 3, 1:
        new = net[ 's%d' % s ]
        port = randint( 10, 20 )
        info( '* Moving', h1, 'from', old, 'to', new, 'port', port, '\n' )
        hintf, sintf = moveHost( h1, old, new, newPort=port )
        info( '*', hintf, 'is now connected to', sintf, '\n' )
        info( '* Clearing out old flows\n' )
        for sw in net.switches:
            sw.dpctl( 'del-flows' )
        info( '* New network:\n' )
        printConnections( net.switches )
        info( '* Testing connectivity:\n' )
        net.pingAll()
        old = new
    net.stop()


if __name__ == '__main__':
    setLogLevel( 'info' )
    mobilityTest()
```

Output:


hridoy @hridoy: ~/mininet/mininet/examples
hridoy@hridoy:~/mininet/mininet/examples$ sudo ./mobility.py
* Simple mobility test
*** Creating network
*** Adding controller
*** Adding hosts:
h1 h2 h3
*** Adding switches:
s1 s2 s3
*** Adding links:
(h1, s1) (h2, s2) (h3, s3) (s2, s1) (s3, s2)
*** Configuring hosts
h1 h2 h3
* Starting network:
*** Starting controller
c0
*** Starting 3 switches
s1 s2 s3 ...
s1: h1(1) s2(2)
s2: h2(1) s1(2) s3(3)
s3: h3(1) s2(2)
* Testing network
*** Ping: testing ping reachability
h1 -> h2 h3
h2 -> h1 h3
h3 -> h1 h2
*** Results: 0% dropped (6/6 received)
* Identifying switch interface for h1
* Moving h1 from s1 to s2 port 14
* h1-eth0 is now connected to s2-eth14
* Clearing out old flows
* New network:
s1: s2(2)
s2: h2(1) s1(2) s3(3) h1(14)
s3: h3(1) s2(2)


hridoy@hridoy: ~/mininet/mininet/examples
s2: h2(1) s1(2) s3(3) h1(14)
s3: h3(1) s2(2)
* Testing connectivity:
*** Ping: testing ping reachability
h1 -> h2 h3
h2 -> h1 h3
h3 -> h1 h2
*** Results: 0% dropped (6/6 received)
* Moving h1 from s2 to s3 port 10
* h1-eth0 is now connected to s3-eth10
* Clearing out old flows
* New network:
s1: s2(2)
s2: h2(1) s1(2) s3(3)
s3: h3(1) s2(2) h1(10)
* Testing connectivity:
*** Ping: testing ping reachability
h1 -> h2 h3
h2 -> h1 h3
h3 -> h1 h2
*** Results: 0% dropped (6/6 received)
* Moving h1 from s3 to s1 port 20
* h1-eth0 is now connected to s1-eth20
* Clearing out old flows
* New network:
s1: s2(2) h1(20)
s2: h2(1) s1(2) s3(3)
s3: h3(1) s2(2)
* Testing connectivity:
*** Ping: testing ping reachability
h1 -> h2 h3
h2 -> h1 h3
h3 -> h1 h2
*** Results: 0% dropped (6/6 received)



Conclusion:

Mininet enable us to quickly create, interact with, customize and share a software defined network prototype, and provides a smooth path to running on hardware. Using mininet in this experiment, a host in the newtwork was switching from one switch to another in different ports with 0% drop. The host was switching and it shows us how the wifi mobility works.