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.

Objectives: From this lab we can learn:-

1. How to install mininet and use it
2. How to prototyping a large network on a single machine by mininet.

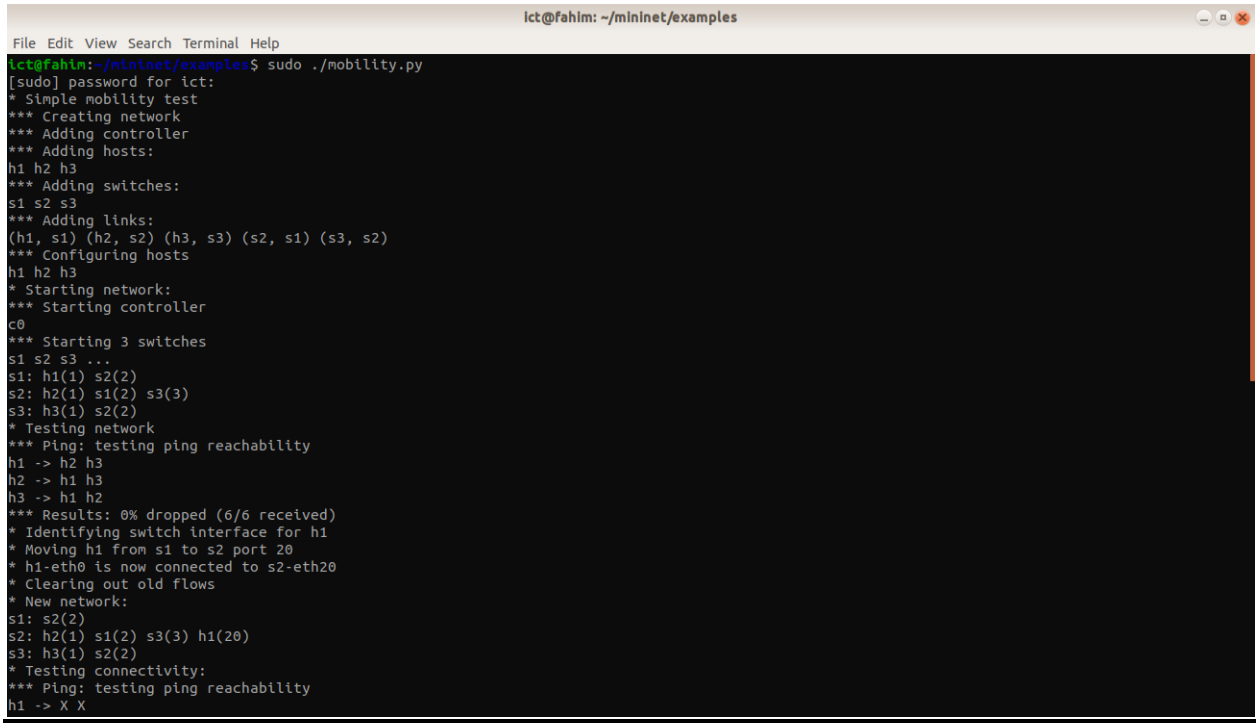
Source code:

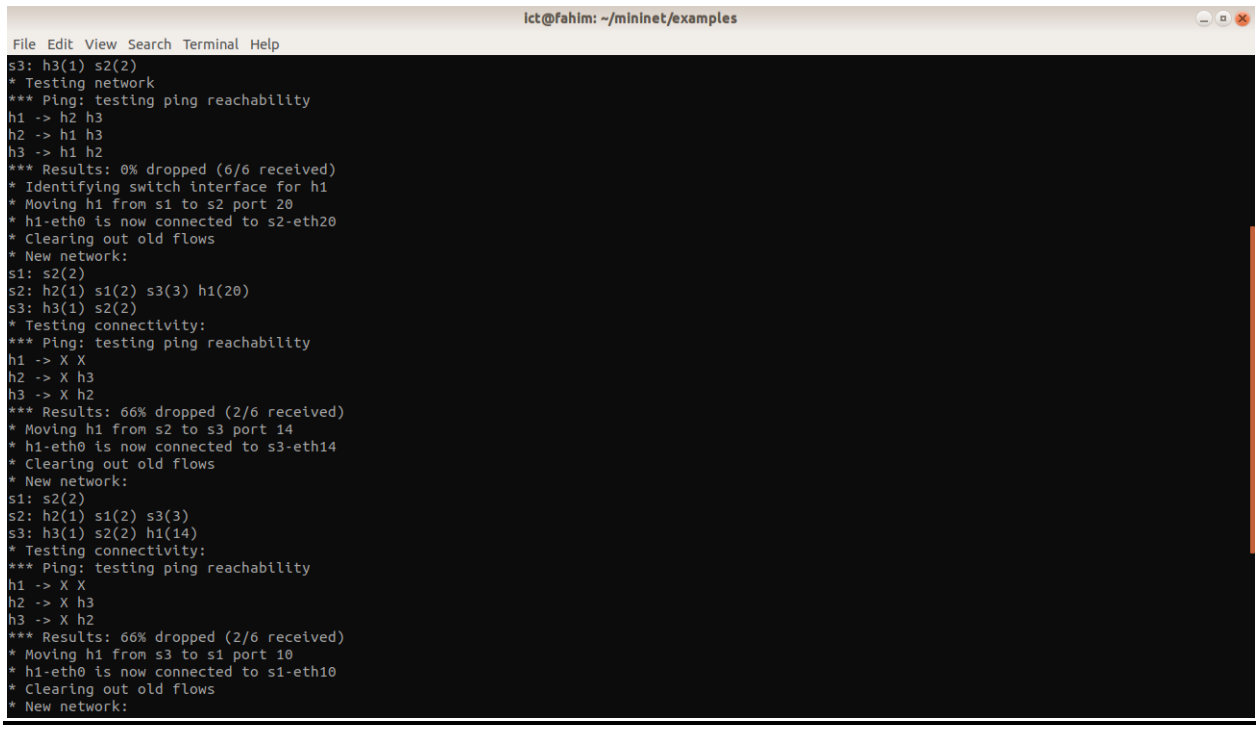
```
from mininet.net import Mininet
from mininet.node import OVSSwitch
from mininet.topo import LinearTopo
from mininet.log import info, output, warn, setLogLevel

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 )
```

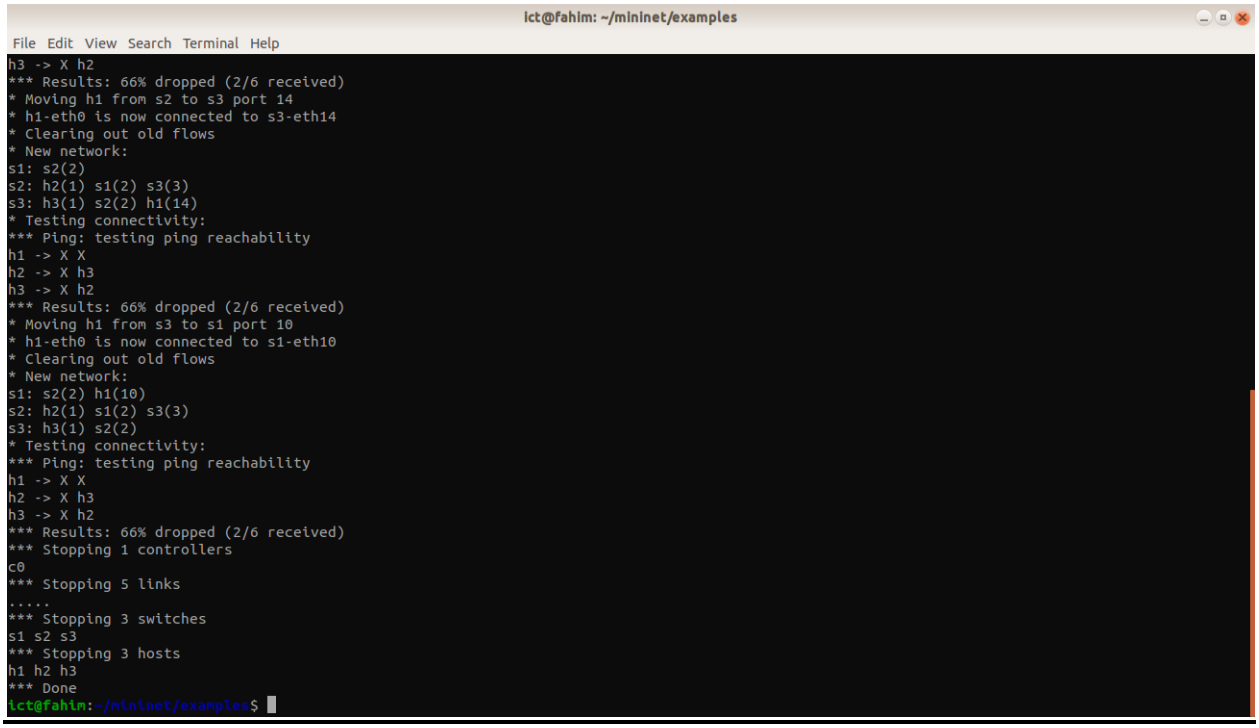
```
            else:
                self.cmd( 'ovs-vsctl add-port', self, intf,
                          '-- set Interface', intf,
                          'ofport_request=%s' % port )
            self.validatePort( intf )

    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:


ict@fahim: ~/mininet/examples
File Edit View Search Terminal Help
ict@fahim:~/mininet/examples$ sudo ./mobility.py
[sudo] password for ict:
* 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 20
* h1-eth0 is now connected to s2-eth20
* Clearing out old flows
* New network:
s1: s2(2)
s2: h2(1) s1(2) s3(3) h1(20)
s3: h3(1) s2(2)
* Testing connectivity:
*** Ping: testing ping reachability
h1 -> X X


ict@fahim: ~/mininet/examples
File Edit View Search Terminal Help
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 20
* h1-eth0 is now connected to s2-eth20
* Clearing out old flows
* New network:
s1: s2(2)
s2: h2(1) s1(2) s3(3) h1(20)
s3: h3(1) s2(2)
* Testing connectivity:
*** Ping: testing ping reachability
h1 -> X X
h2 -> X h3
h3 -> X h2
*** Results: 66% dropped (2/6 received)
* Moving h1 from s2 to s3 port 14
* h1-eth0 is now connected to s3-eth14
* Clearing out old flows
* New network:
s1: s2(2)
s2: h2(1) s1(2) s3(3)
s3: h3(1) s2(2) h1(14)
* Testing connectivity:
*** Ping: testing ping reachability
h1 -> X X
h2 -> X h3
h3 -> X h2
*** Results: 66% dropped (2/6 received)
* Moving h1 from s3 to s1 port 10
* h1-eth0 is now connected to s1-eth10
* Clearing out old flows
* New network:



Conclusion:

Mininet is a software that emulates virtual network environment with OpenFlow support. It is great for learning, prototyping and testing SDN features and applications.From the lab, We check simple mobility test by mininet. h1,h2,h3 are hosts and s1,s2,s3 are switches. We move a host from s1 to s2, s2 to s3, and then back to s1.Thus we check simple mobility test among the hosts.