Mawlana Bhashani Science and Technology University

Lab-Report

Report No: 01

Course Code: ICT-3208

Course Title: Computer Network Lab

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Submitted by

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Experiment No: 01

Experiment Name : Basic mininet commands

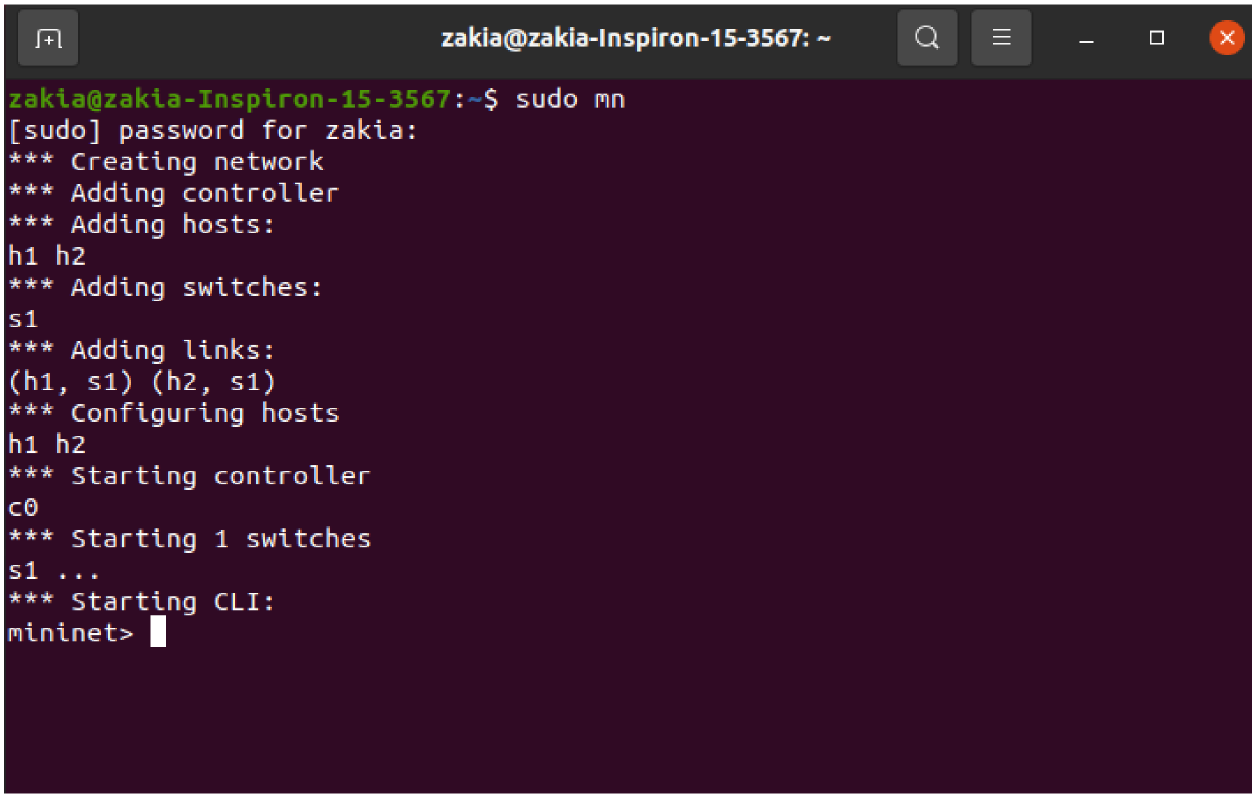
Create Virtual Network :

We will be using CLI (sudo mn command) to manage our virtual network. The default topology includes two hosts (h1,h2), OpenFlow Switch(s1) and OpenFlow controller(c0).

Interact with Hosts and Switches :

Start a minimal topology and enter the CLI :

$ sudo mn



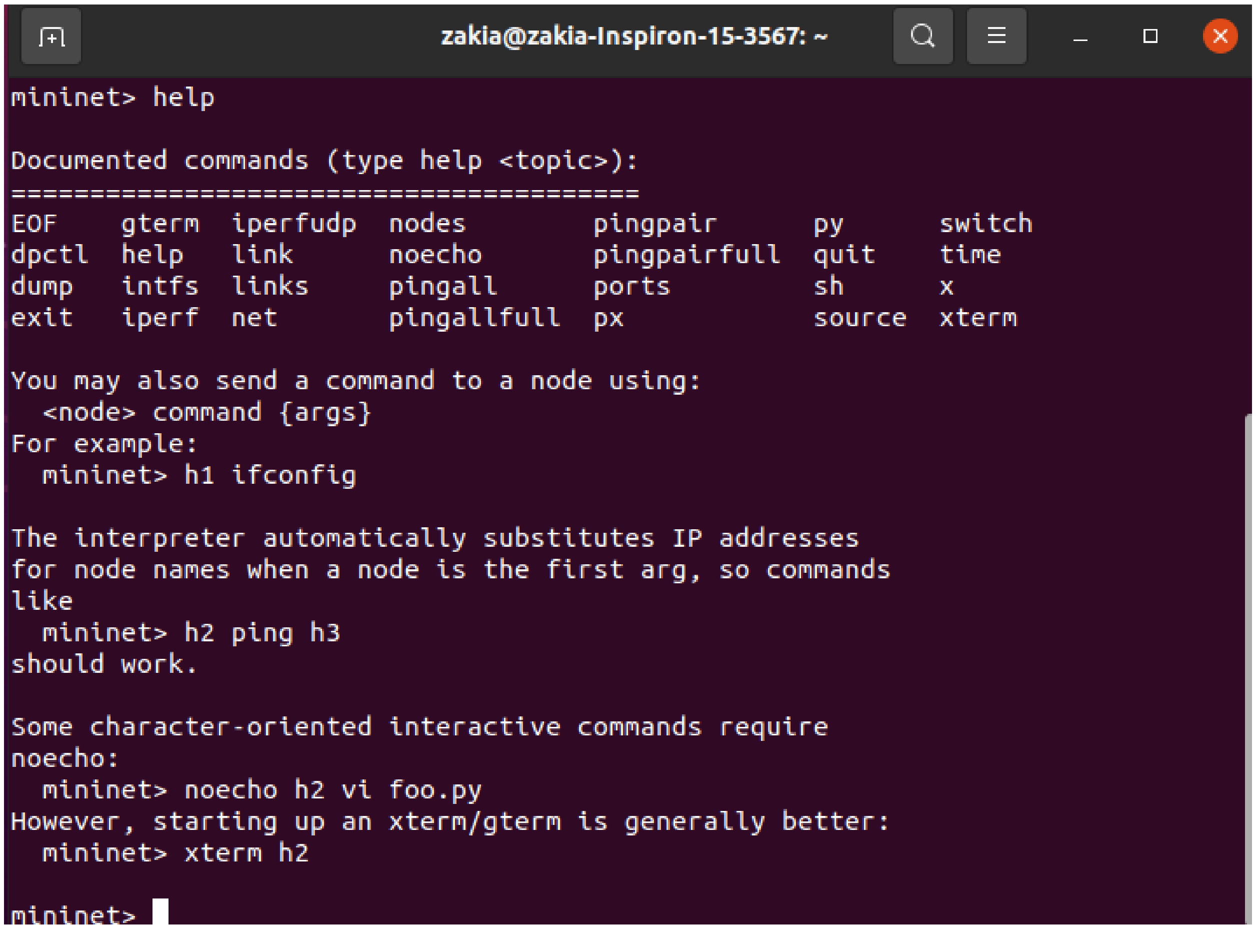
```
zakia@zakia-Inspiron-15-3567:~$ sudo mn
[sudo] password for zakia:
*** Creating network
*** Adding controller
*** Adding hosts:
h1 h2
*** Adding switches:
s1
*** Adding links:
(h1, s1) (h2, s1)
*** Configuring hosts
h1 h2
*** Starting controller
c0
*** Starting 1 switches
s1 ...
*** Starting CLI:
mininet>
```

When issuing the sudo mn command, Mininet initializes the topology and launches its command line interface which looks like this:

mininet >

Again Display Mininet CLI commands:

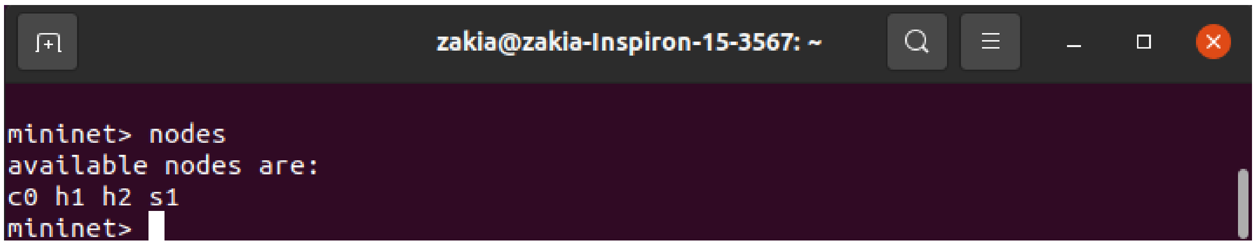
mininet> help



```
mininet> help

Documented commands (type help <topic>):
========================================
EOF    gterm  iperfudp  nodes        pingpair      py      switch
dpctl  help   link      noecho       pingpairfull  quit    time
dump   intfs  links     pingall      ports         sh      x
exit   iperf  net       pingallfull  px            source  xterm

You may also send a command to a node using:
  <node> command {args}
For example:
  mininet> h1 ifconfig

The interpreter automatically substitutes IP addresses
for node names when a node is the first arg, so commands
like
  mininet> h2 ping h3
should work.

Some character-oriented interactive commands require
noecho:
  mininet> noecho h2 vi foo.py
However, starting up an xterm/gterm is generally better:
  mininet> xterm h2

mininet>
```

To display the available nodes, type the following command:

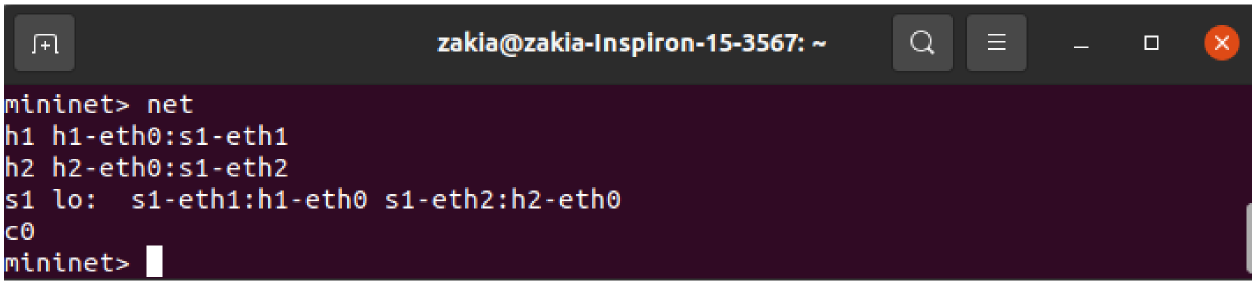
mininet> nodes



```
mininet> nodes
available nodes are:
c0 h1 h2 s1
mininet>
```

Display links:

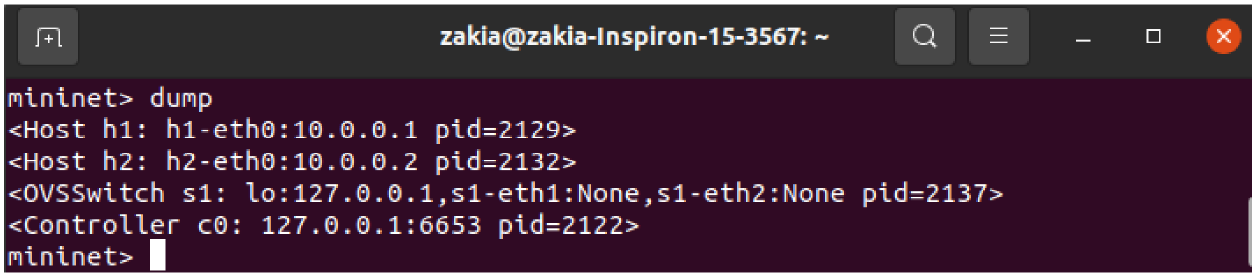
mininet> net



```
mininet> net
h1 h1-eth0:s1-eth1
h2 h2-eth0:s1-eth2
s1 lo:  s1-eth1:h1-eth0 s1-eth2:h2-eth0
c0
mininet>
```

Dump information about all nodes:

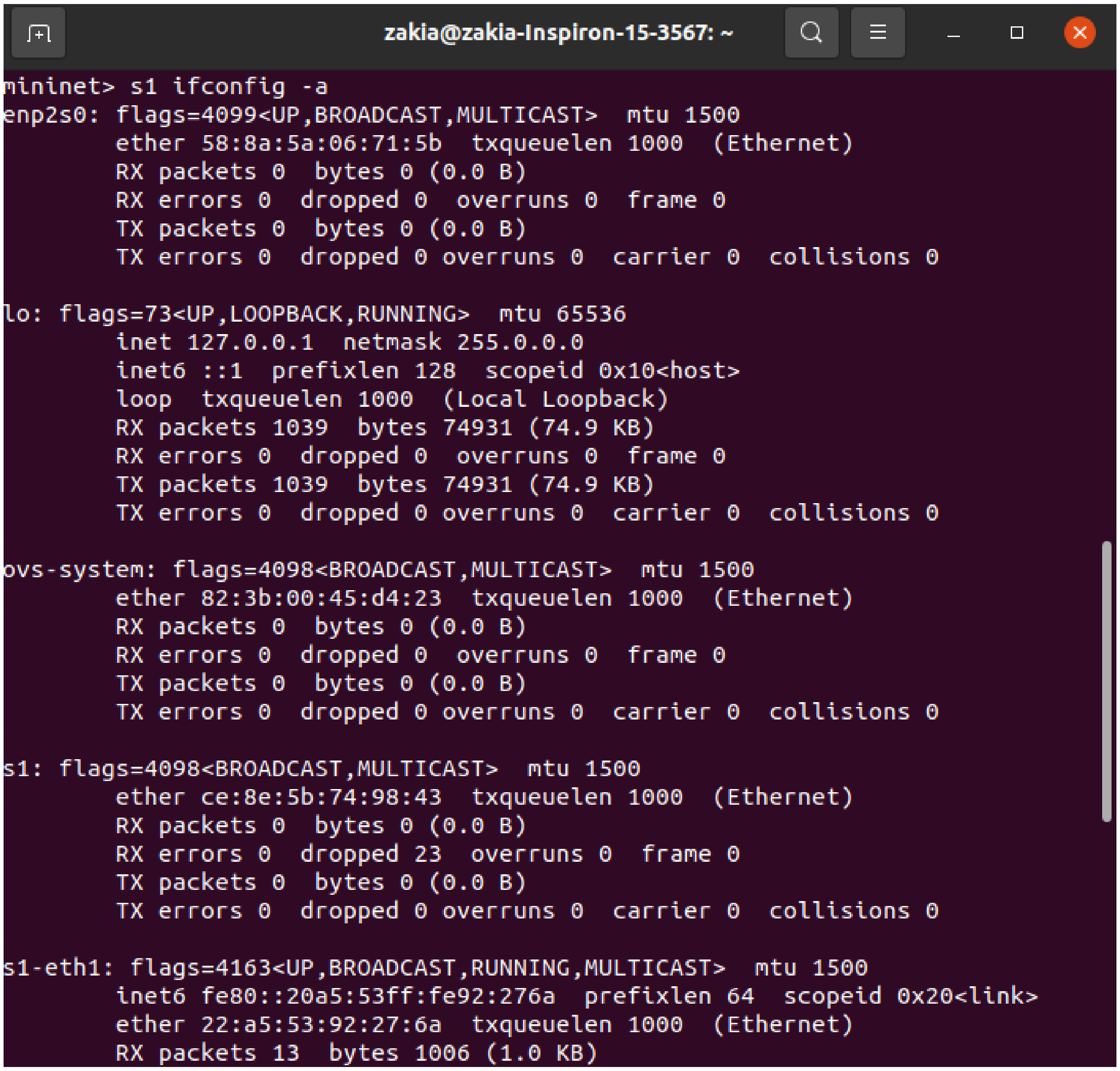
mininet> dump



```
mininet> dump
<Host h1: h1-eth0:10.0.0.1 pid=2129>
<Host h2: h2-eth0:10.0.0.2 pid=2132>
<OVSSwitch s1: lo:127.0.0.1,s1-eth1:None,s1-eth2:None pid=2137>
<Controller c0: 127.0.0.1:6653 pid=2122>
mininet>
```

If the first string typed into the Mininet CLI is a host, switch or controller name, the command is executed on that node. Run a command on a host process:

mininet> s1 ifconfig -a



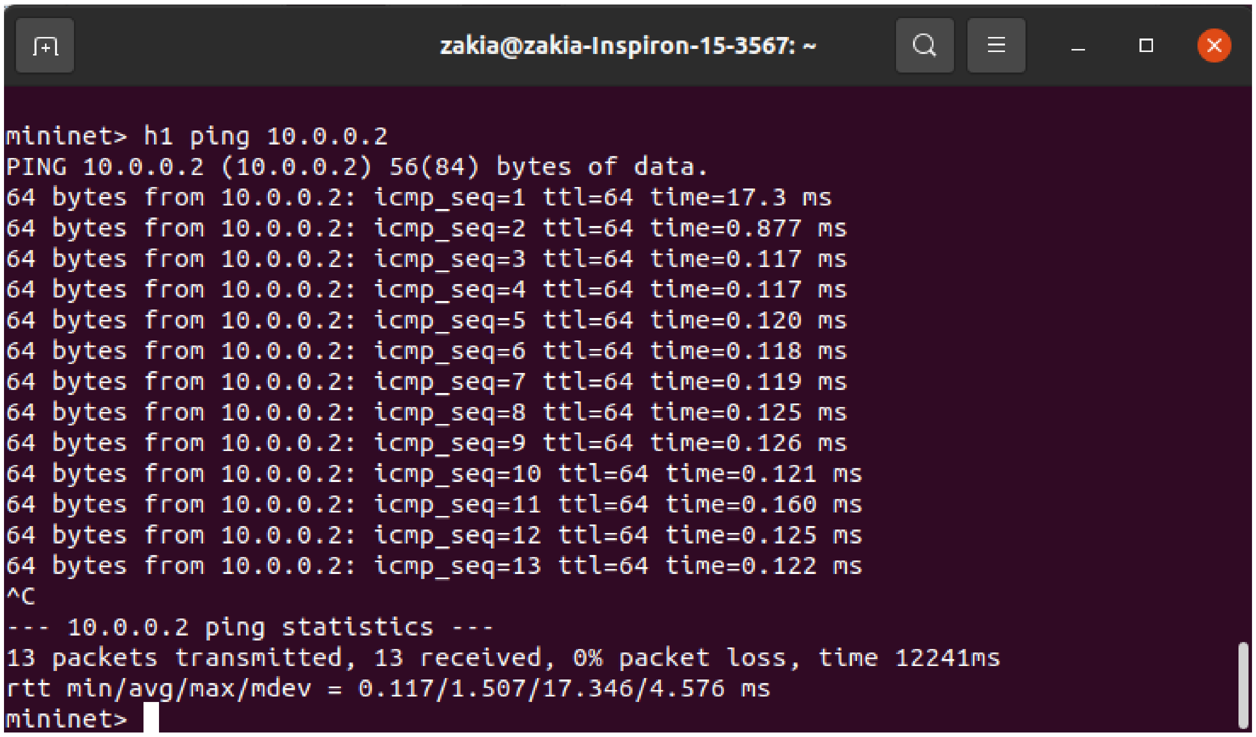
```
mininet> s1 ifconfig -a
enp2s0: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        ether 58:8a:5a:06:71:5b  txqueuelen 1000  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 1039  bytes 74931 (74.9 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1039  bytes 74931 (74.9 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

ovs-system: flags=4098<BROADCAST,MULTICAST>  mtu 1500
        ether 82:3b:00:45:d4:23  txqueuelen 1000  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

s1: flags=4098<BROADCAST,MULTICAST>  mtu 1500
        ether ce:8e:5b:74:98:43  txqueuelen 1000  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 23  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

s1-eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet6 fe80::20a5:53ff:fe92:276a  prefixlen 64  scopeid 0x20<link>
        ether 22:a5:53:92:27:6a  txqueuelen 1000  (Ethernet)
        RX packets 13  bytes 1006 (1.0 KB)
```

This command executes the ifconfig Linux command on host h1. The command shows host h1's interfaces. The display indicates that host h1 has an interface h1- eth0 configured with IP address 10.0.0.1, and another interface lo configured with IP address 127.0.0.1

Test connectivity :

Mininet's default topology assigns the IP addresses 10.0.0.1/8 and 10.0.0.2/8 to host h1 and host h2 respectively. To test connectivity between them, you can use the command ping. The command shown below:

mininet> h1 ping 10.0.0.2

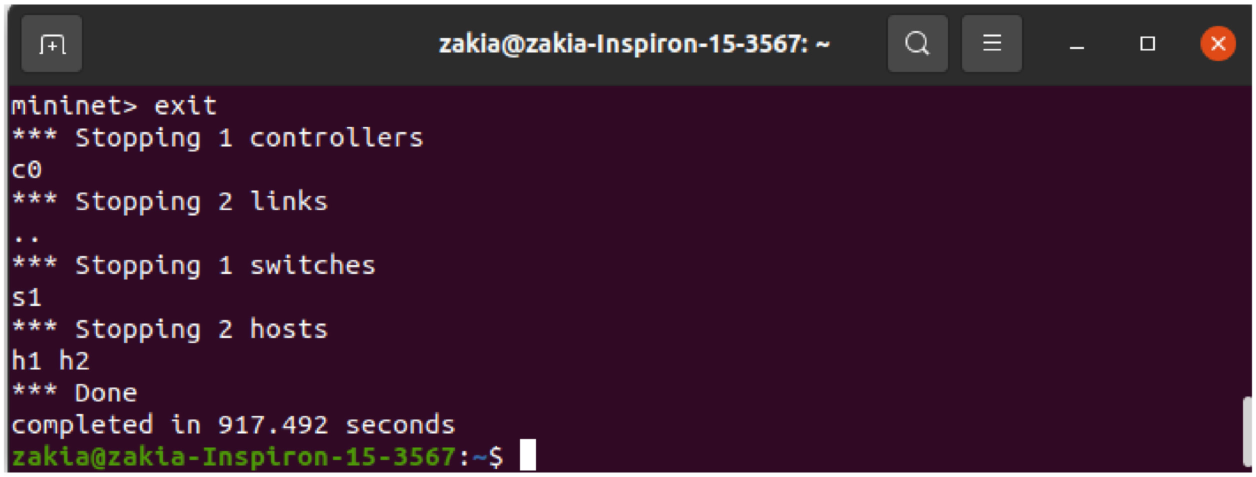

zakia@zakia-Inspiron-15-3567: ~

```
mininet> h1 ping 10.0.0.2
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=17.3 ms
64 bytes from 10.0.0.2: icmp_seq=2 ttl=64 time=0.877 ms
64 bytes from 10.0.0.2: icmp_seq=3 ttl=64 time=0.117 ms
64 bytes from 10.0.0.2: icmp_seq=4 ttl=64 time=0.117 ms
64 bytes from 10.0.0.2: icmp_seq=5 ttl=64 time=0.120 ms
64 bytes from 10.0.0.2: icmp_seq=6 ttl=64 time=0.118 ms
64 bytes from 10.0.0.2: icmp_seq=7 ttl=64 time=0.119 ms
64 bytes from 10.0.0.2: icmp_seq=8 ttl=64 time=0.125 ms
64 bytes from 10.0.0.2: icmp_seq=9 ttl=64 time=0.126 ms
64 bytes from 10.0.0.2: icmp_seq=10 ttl=64 time=0.121 ms
64 bytes from 10.0.0.2: icmp_seq=11 ttl=64 time=0.160 ms
64 bytes from 10.0.0.2: icmp_seq=12 ttl=64 time=0.125 ms
64 bytes from 10.0.0.2: icmp_seq=13 ttl=64 time=0.122 ms
^C
--- 10.0.0.2 ping statistics ---
13 packets transmitted, 13 received, 0% packet loss, time 12241ms
rtt min/avg/max/mdev = 0.117/1.507/17.346/4.576 ms
mininet> 
```

This command tests the connectivity between host h1 and host h2. To stop the test, press Ctrl+c .

Stop the emulation by typing the following command:

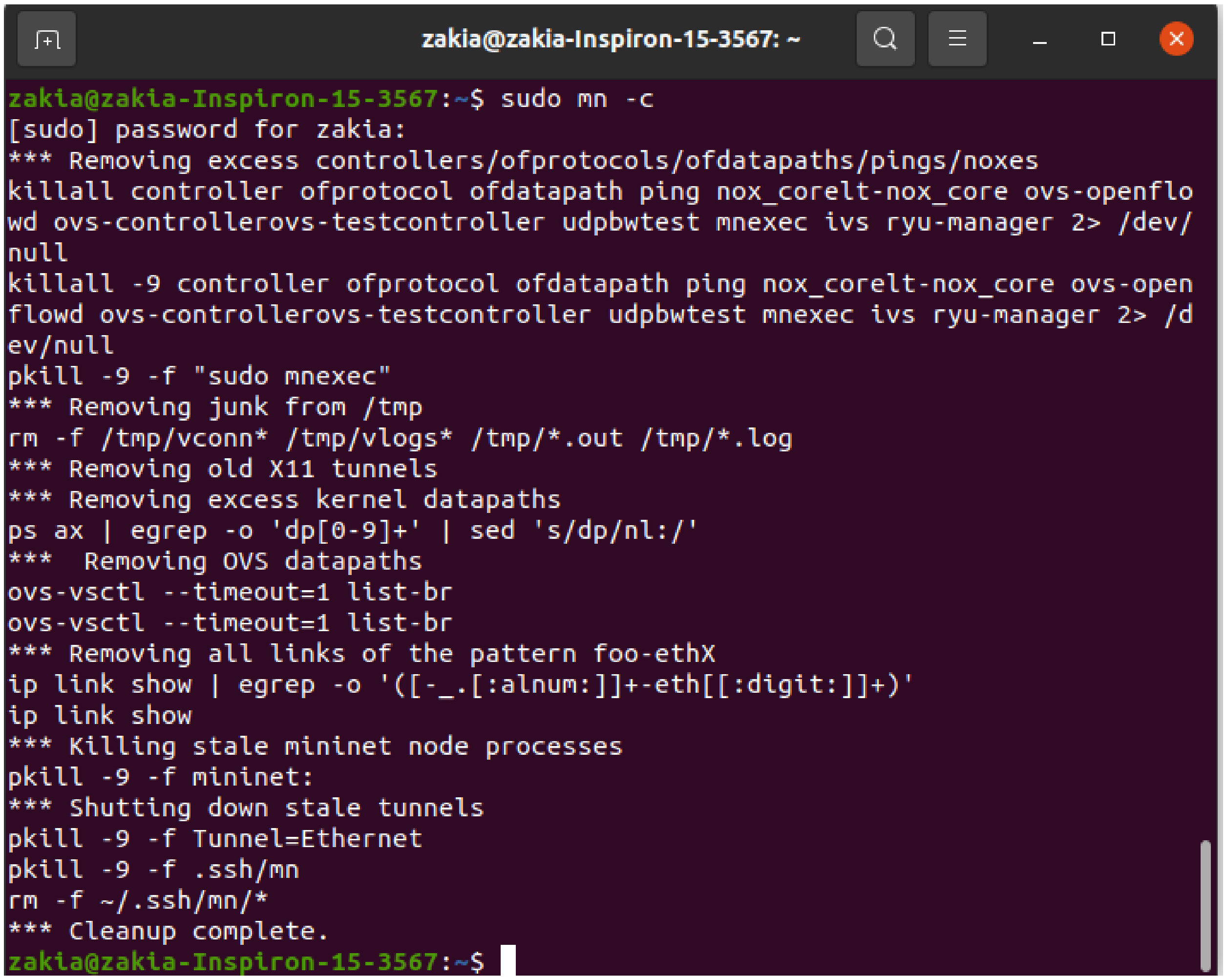
mininet> exit


zakia@zakia-Inspiron-15-3567: ~

```
mininet> exit
*** Stopping 1 controllers
c0
*** Stopping 2 links
..
*** Stopping 1 switches
s1
*** Stopping 2 hosts
h1 h2
*** Done
completed in 917.492 seconds
zakia@zakia-Inspiron-15-3567:~$ 
```

Mininet crashes for some reason, clean it up by the following command:

$ sudo mn -c



```
zakia@zakia-Inspiron-15-3567:~$ sudo mn -c
[sudo] password for zakia:
*** Removing excess controllers/ofprotocols/ofdatapaths/pings/noxes
killall controller ofprotocol ofdatapath ping nox_corelt-nox_core ovs-openflo
wd ovs-controllerovs-testcontroller udpbwtest mnexec ivs ryu-manager 2> /dev/
null
killall -9 controller ofprotocol ofdatapath ping nox_corelt-nox_core ovs-open
flowd ovs-controllerovs-testcontroller udpbwtest mnexec ivs ryu-manager 2> /d
ev/null
pkill -9 -f "sudo mnexec"
*** Removing junk from /tmp
rm -f /tmp/vconn* /tmp/vlogs* /tmp/*.out /tmp/*.log
*** Removing old X11 tunnels
*** Removing excess kernel datapaths
ps ax | egrep -o 'dp[0-9]+' | sed 's/dp/nl:/'
***  Removing OVS datapaths
ovs-vsctl --timeout=1 list-br
ovs-vsctl --timeout=1 list-br
*** Removing all links of the pattern foo-ethX
ip link show | egrep -o '([-_.[:alnum:]]+-eth[[:digit:]]+)'
ip link show
*** Killing stale mininet node processes
pkill -9 -f mininet:
*** Shutting down stale tunnels
pkill -9 -f Tunnel=Ethernet
pkill -9 -f .ssh/mn
rm -f ~/.ssh/mn/*
*** Cleanup complete.
zakia@zakia-Inspiron-15-3567:~$
```

Discussion :

Mininet is a network emulator which creates realistic virtual network . From this lab how to install mininet successfully . And I have also learn the basic command and procedure of mininet from this lab.