EE450

Lab #4

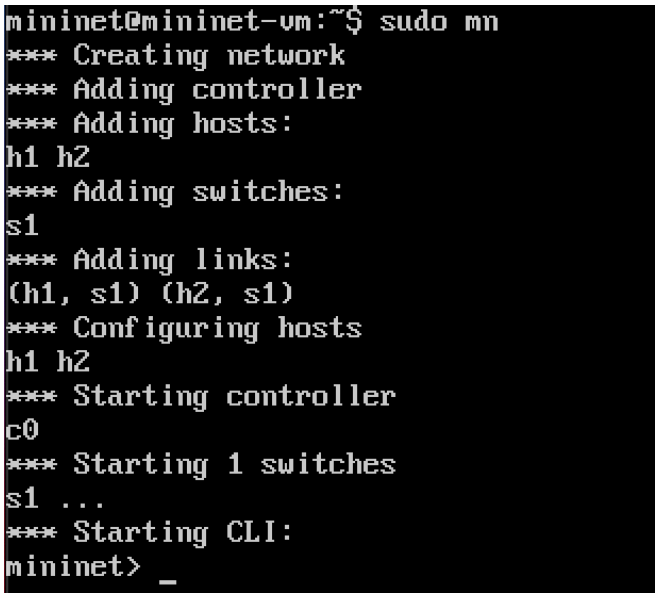
Name: Shih-Ju Hsu

Lab1

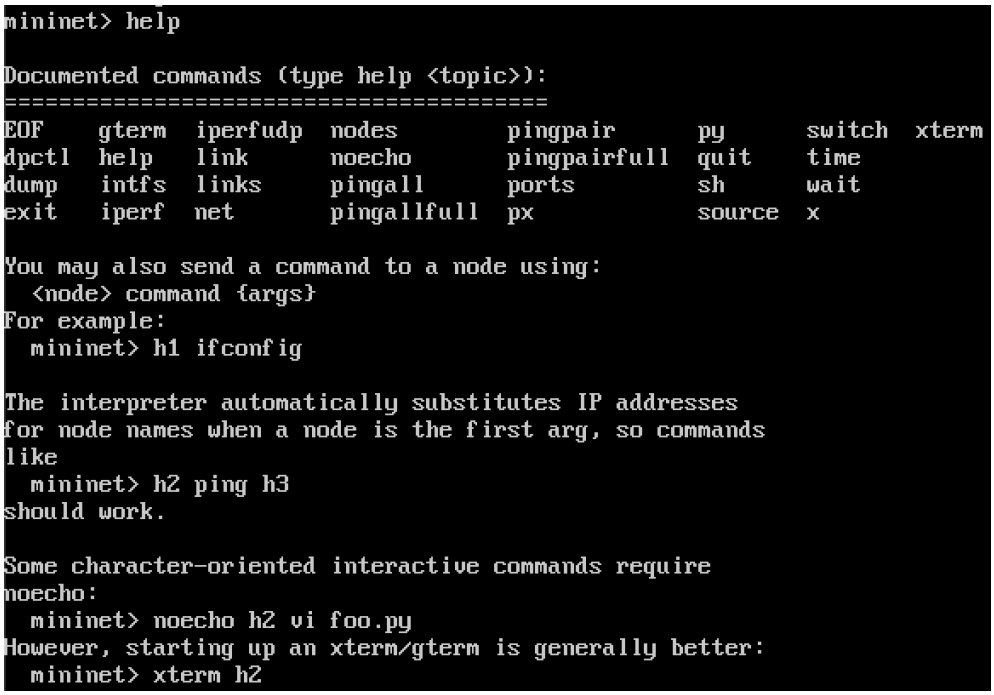
2

2.1

1.


mininet@mininet-vm:~$ sudo mn
*** 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>

2.


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

3.

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

4.

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

5.

```
mininet> h1 ifconfig
h1-eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.0.0.1  netmask 255.0.0.0  broadcast 10.255.255.255
        ether 4e:5a:44:2a:5a:8c  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
        loop  txqueuelen 1000  (Local Loopback)
        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
```

2.2

1.

```
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=3.26 ms
64 bytes from 10.0.0.2: icmp_seq=2 ttl=64 time=0.482 ms
64 bytes from 10.0.0.2: icmp_seq=3 ttl=64 time=0.128 ms
64 bytes from 10.0.0.2: icmp_seq=4 ttl=64 time=0.144 ms
^C
--- 10.0.0.2 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3056ms
rtt min/avg/max/mdev = 0.128/1.002/3.255/1.308 ms
```

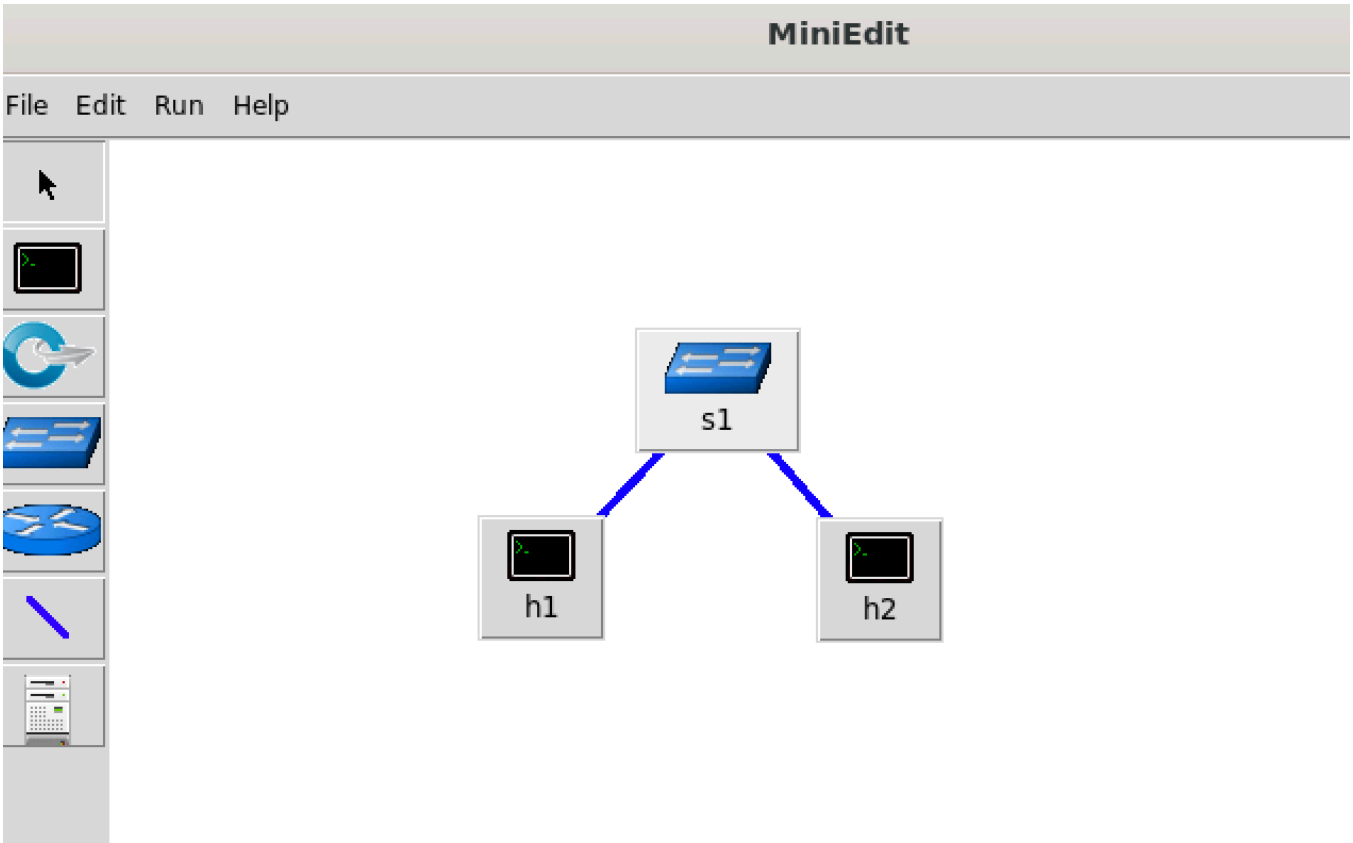
2.

```
mininet> exit
*** Stopping 1 controllers
c0
*** Stopping 2 links
..
*** Stopping 1 switches
s1
*** Stopping 2 hosts
h1 h2
*** Done
completed in 448.900 seconds
```

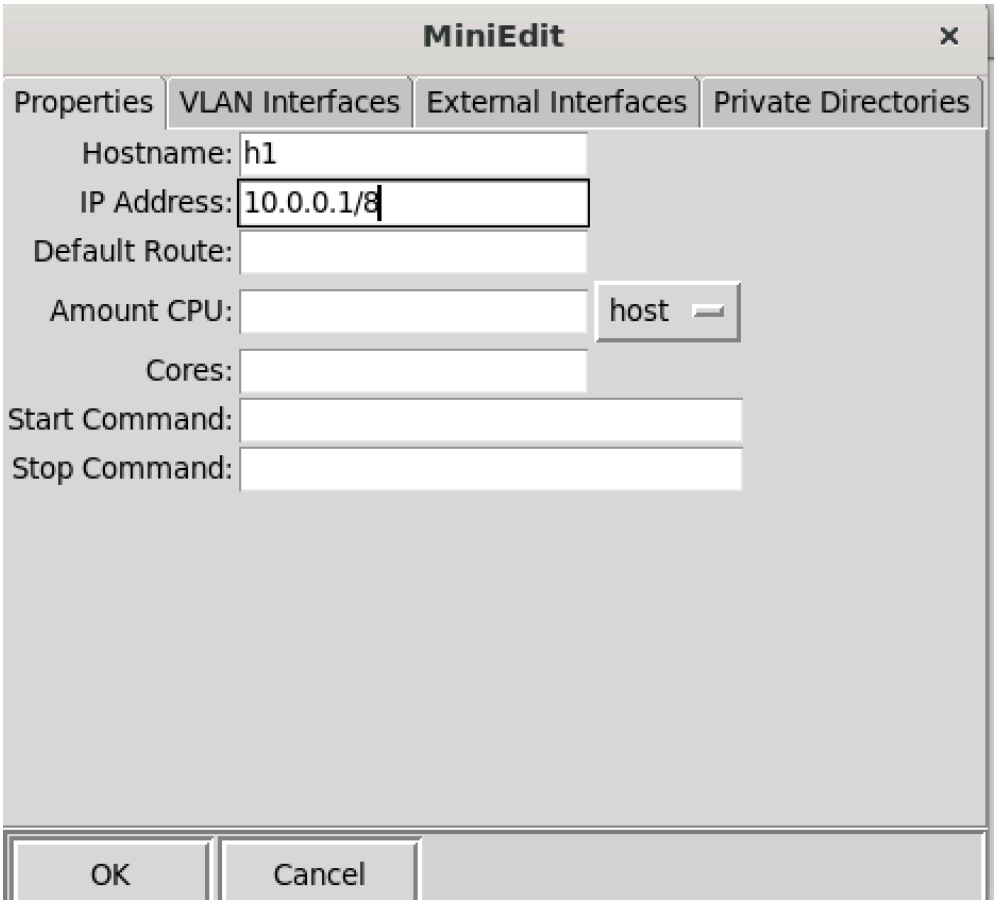
3

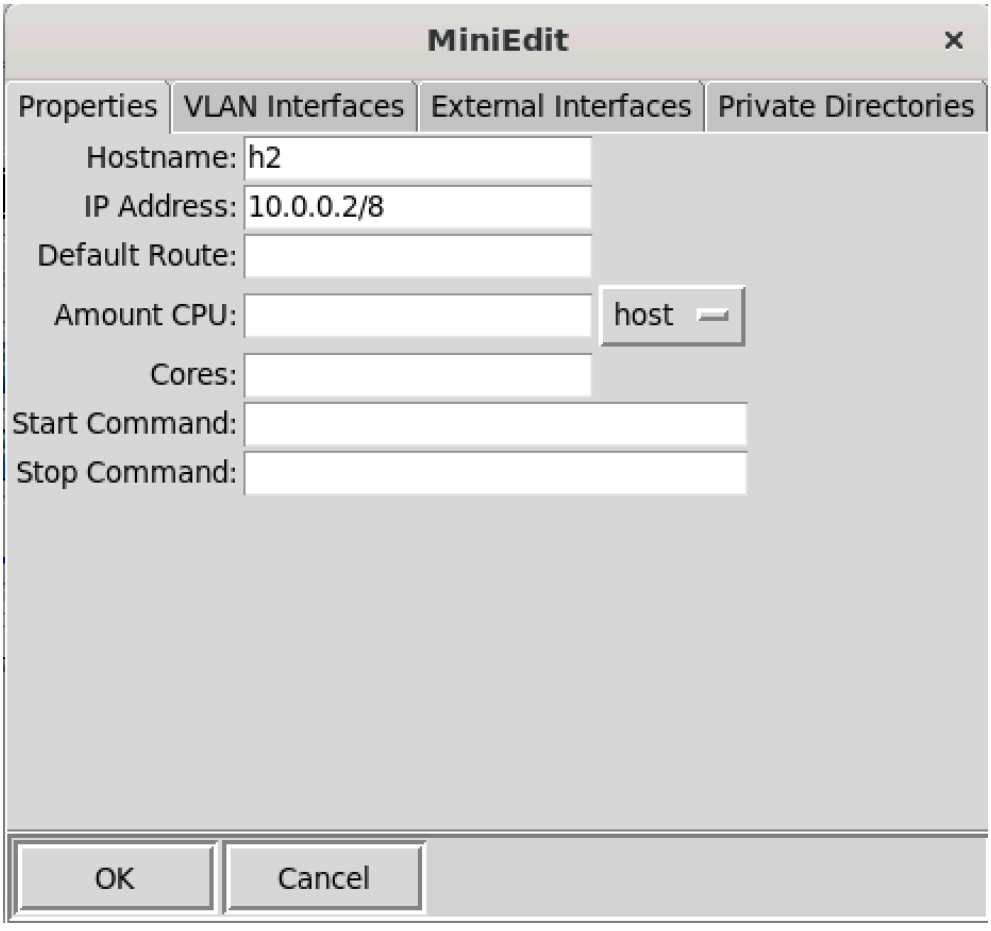
3.1

1.



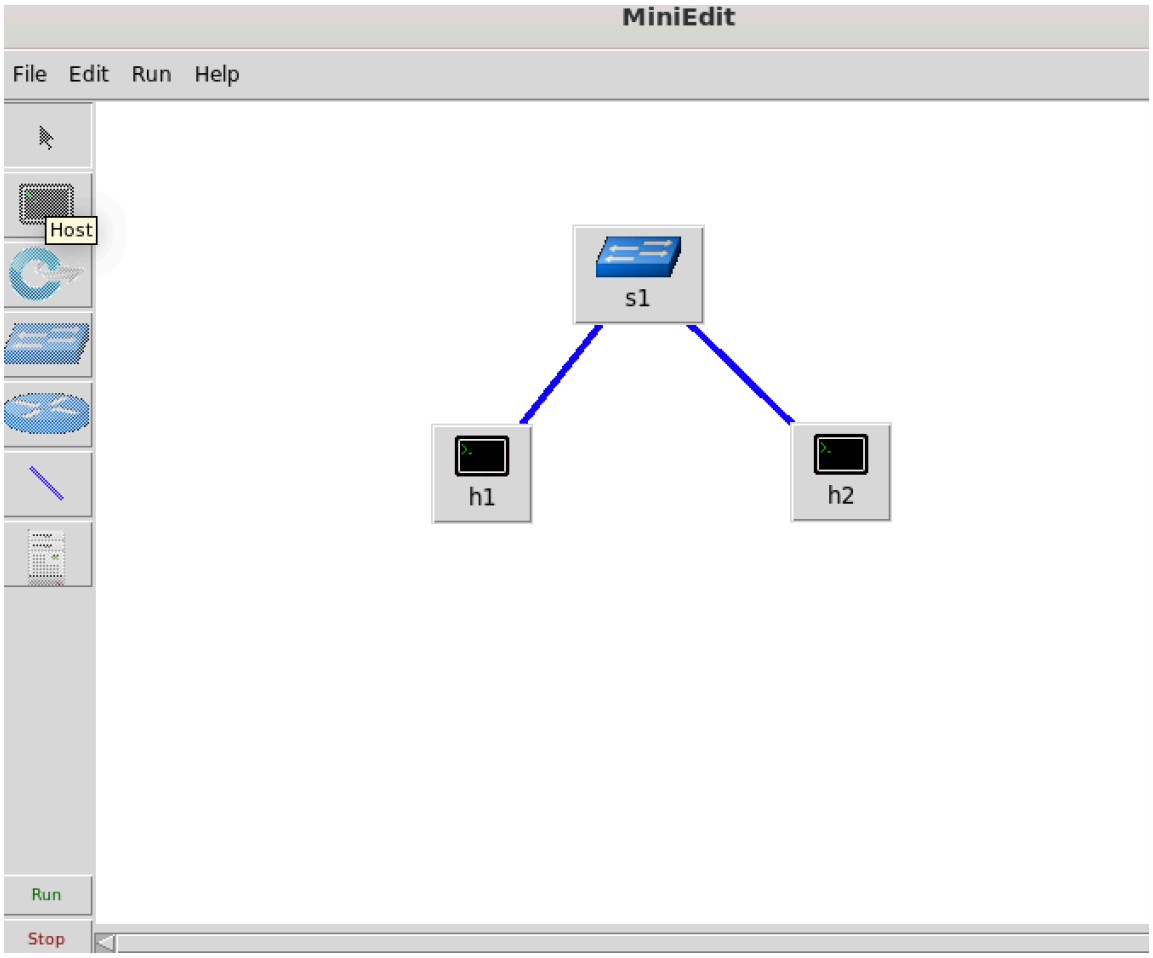
2.


MiniEdit
Properties
VLAN Interfaces
External Interfaces
Private Directories
Hostname: h1
IP Address: 10.0.0.1/8
Default Route:
Amount CPU:
host
Cores:
Start Command:
Stop Command:
OK
Cancel

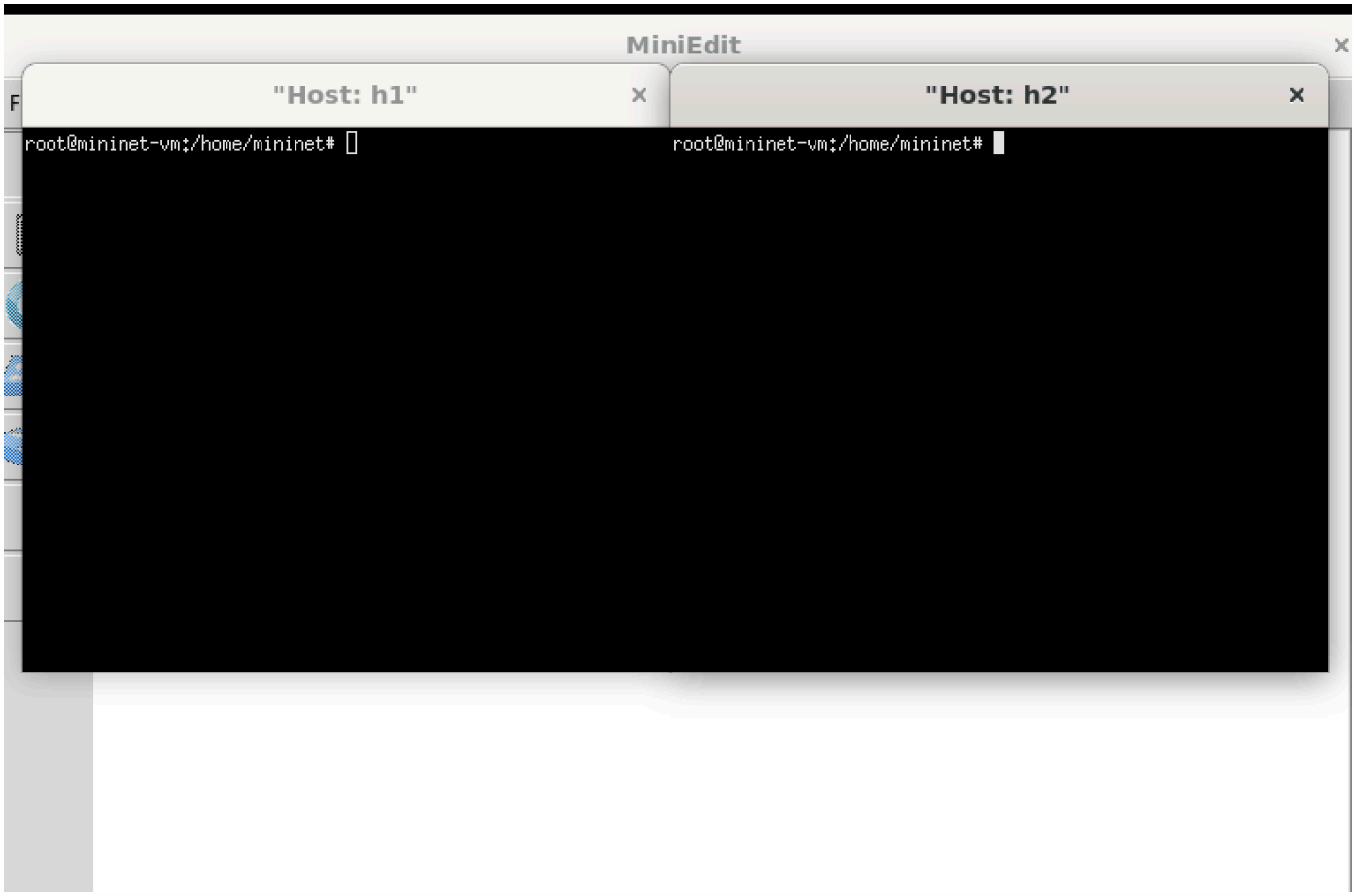

MiniEdit
Properties
VLAN Interfaces
External Interfaces
Private Directories
Hostname: h2
IP Address: 10.0.0.2/8
Default Route:
Amount CPU:
host
Cores:
Start Command:
Stop Command:
OK
Cancel

3.2

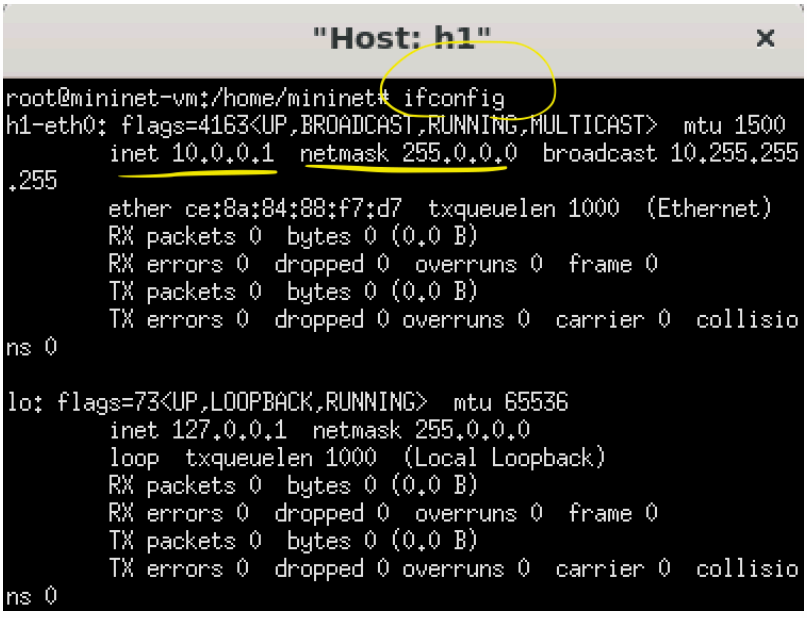
1.

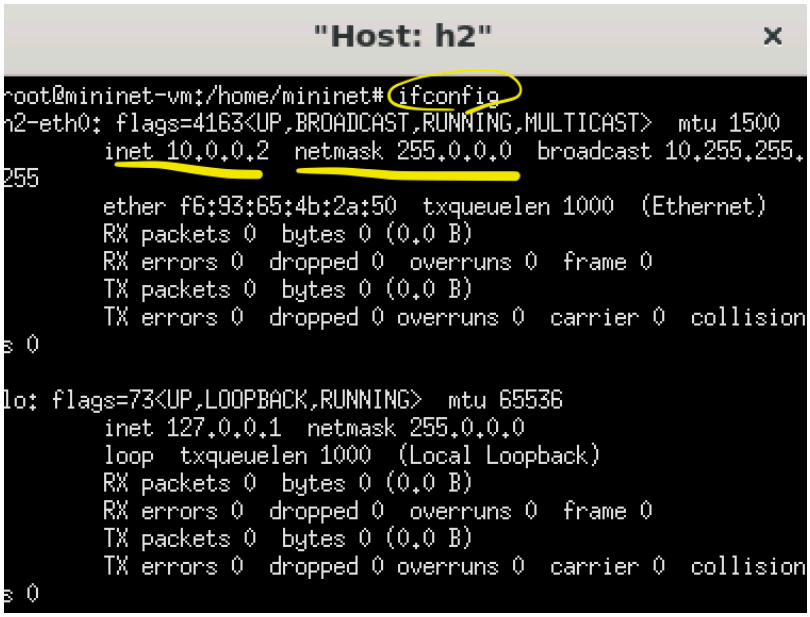


2.

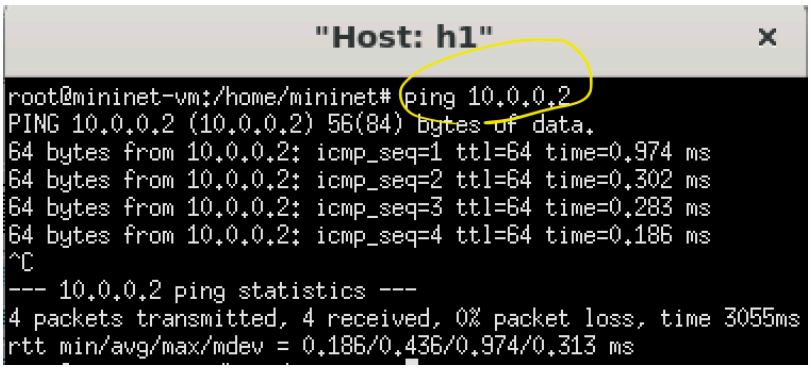

MiniEdit
"Host: h1"
"Host: h2"
root@mininet-vm:/home/mininet#
root@mininet-vm:/home/mininet#

3.


"Host: h1"
root@mininet-vm:/home/mininet# ifconfig
h1-eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
inet 10.0.0.1 netmask 255.0.0.0 broadcast 10.255.255.255
ether ce:8a:84:88:f7:d7 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
loop txqueuelen 1000 (Local Loopback)
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

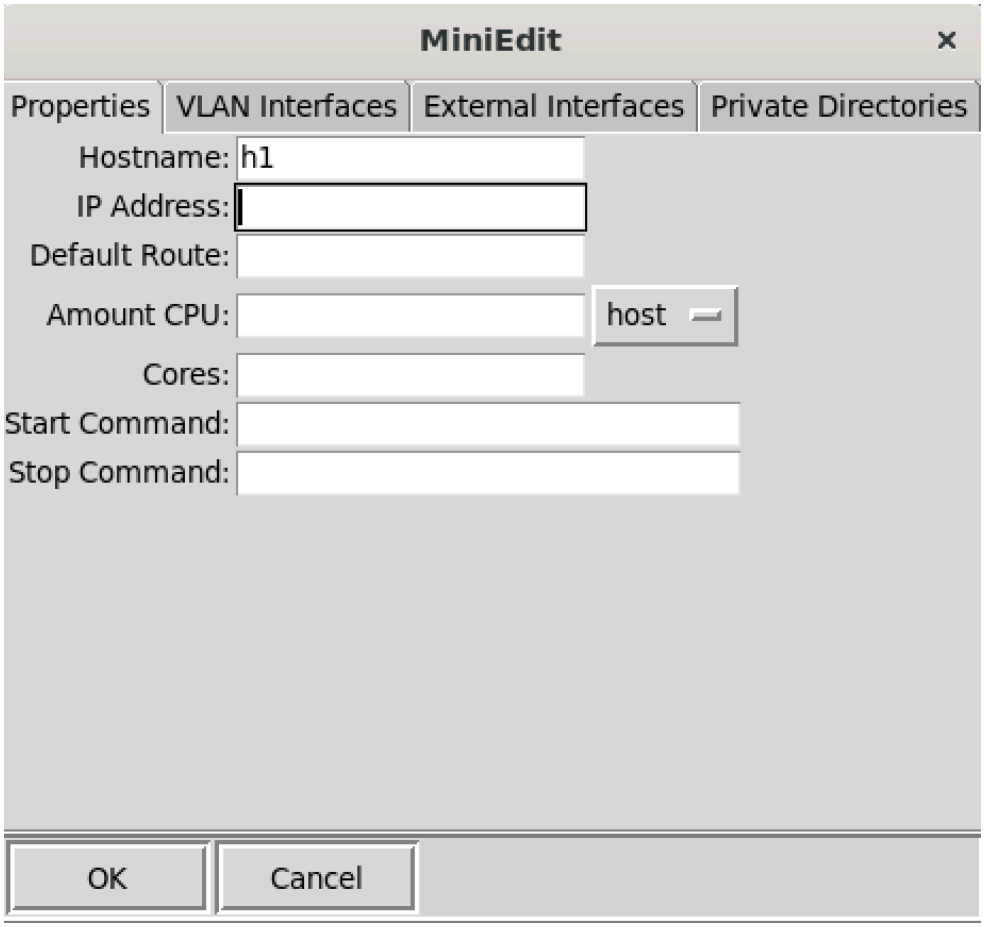

"Host: h2"
root@mininet-vm:/home/mininet# ifconfig
h2-eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
inet 10.0.0.2 netmask 255.0.0.0 broadcast 10.255.255.
255
ether f6:93:65:4b:2a:50 txqueuelen 1000 (Ethernet)
RX packets 0 bytes 0 (0.0 B)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 0 bytes 0 (0.0 B)
TX errors 0 dropped 0 overruns 0 carrier 0 collision
s 0
lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
inet 127.0.0.1 netmask 255.0.0.0
loop txqueuelen 1000 (Local Loopback)
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 collision
s 0

4.

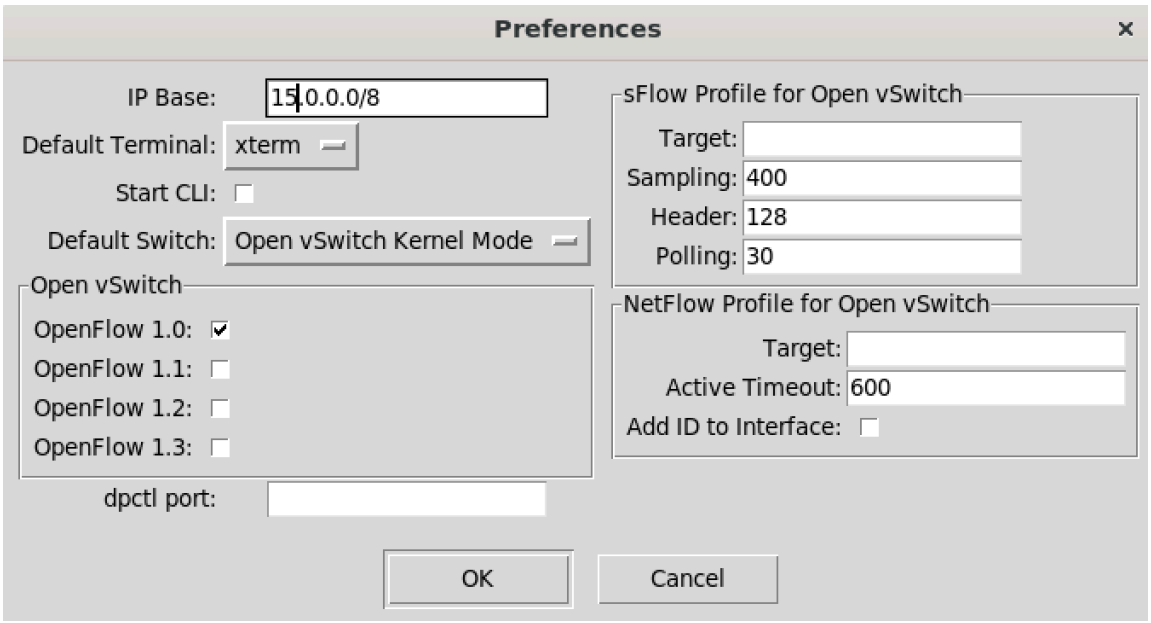

"Host: h1"
root@mininet-vm:/home/mininet# ping 10.0.0.2
PING 10.0.0.2 (10.0.0.2) 56(84) bytes of data.
64 bytes from 10.0.0.2: icmp_seq=1 ttl=64 time=0.974 ms
64 bytes from 10.0.0.2: icmp_seq=2 ttl=64 time=0.302 ms
64 bytes from 10.0.0.2: icmp_seq=3 ttl=64 time=0.283 ms
64 bytes from 10.0.0.2: icmp_seq=4 ttl=64 time=0.186 ms
^C
--- 10.0.0.2 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3055ms
rtt min/avg/max/mdev = 0.186/0.436/0.974/0.313 ms

3.3

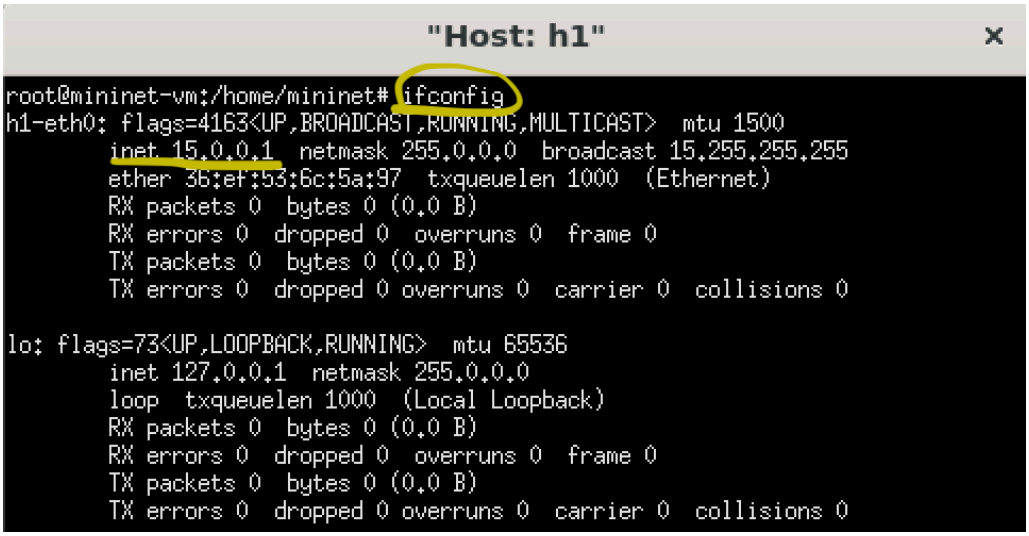
1.


MiniEdit
Properties
VLAN Interfaces
External Interfaces
Private Directories
Hostname:
h1
IP Address:
Default Route:
Amount CPU:
host
Cores:
Start Command:
Stop Command:
OK
Cancel

2.

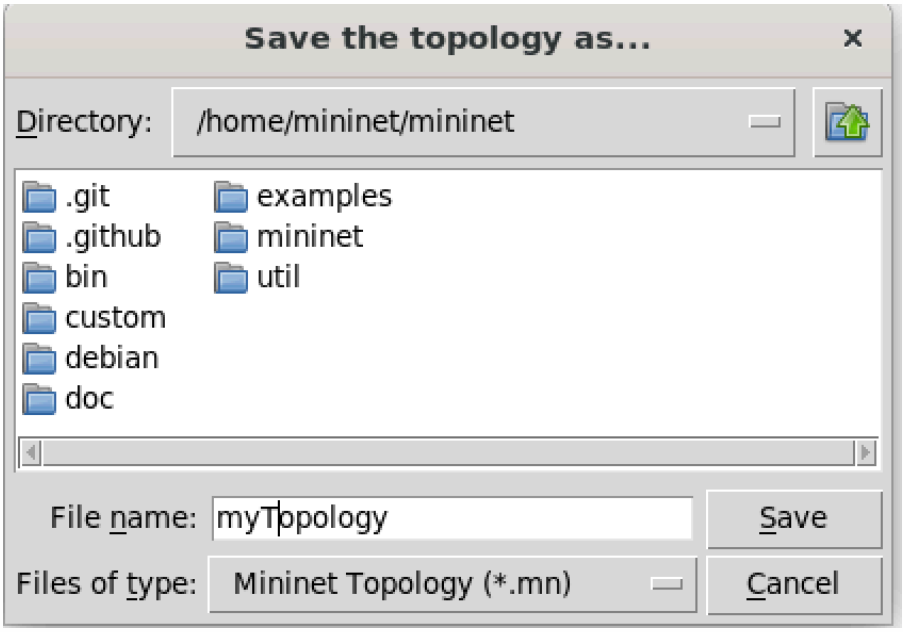

Preferences
IP Base:
15.0.0.0/8
Default Terminal:
xterm
Start CLI:
Default Switch:
Open vSwitch Kernel Mode
Open vSwitch
OpenFlow 1.0:
OpenFlow 1.1:
OpenFlow 1.2:
OpenFlow 1.3:
dpctl port:
sFlow Profile for Open vSwitch
Target:
Sampling:
400
Header:
128
Polling:
30
NetFlow Profile for Open vSwitch
Target:
Active Timeout:
600
Add ID to Interface:
OK
Cancel

3.

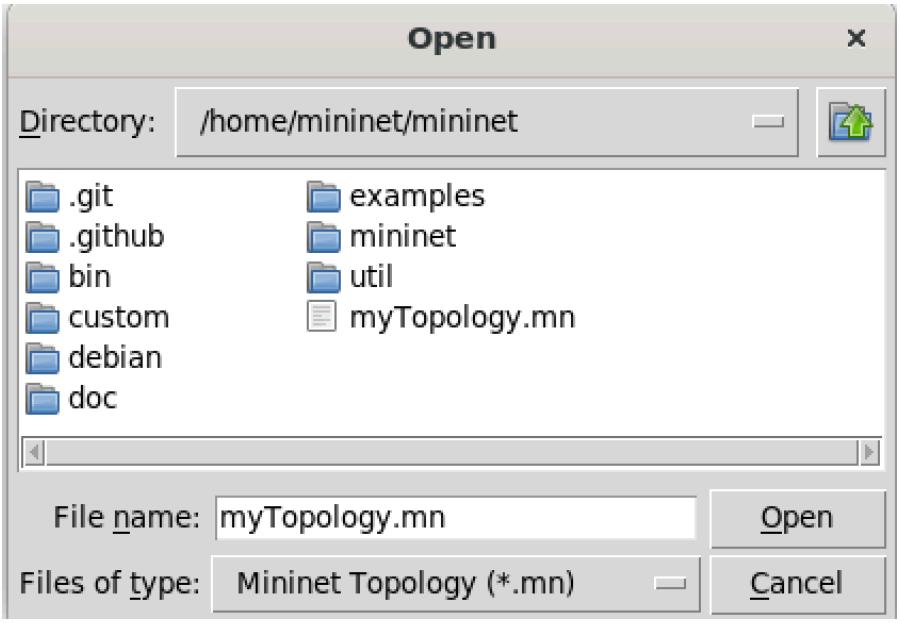

"Host: h1"
root@mininet-vm:/home/mininet# ifconfig
h1-eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
inet 15.0.0.1 netmask 255.0.0.0 broadcast 15.255.255.255
ether 36:ef:53:6c:5a:97 txqueuelen 1000 (Ethernet)
RX packets 0 bytes 0 (0.0 B)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 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
loop txqueuelen 1000 (Local Loopback)
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

3.4

1.


Save the topology as...
Directory:
/home/mininet/mininet
.git
.github
bin
custom
debian
doc
examples
mininet
util
File name:
myTopology
Save
Files of type:
Mininet Topology (*.mn)
Cancel

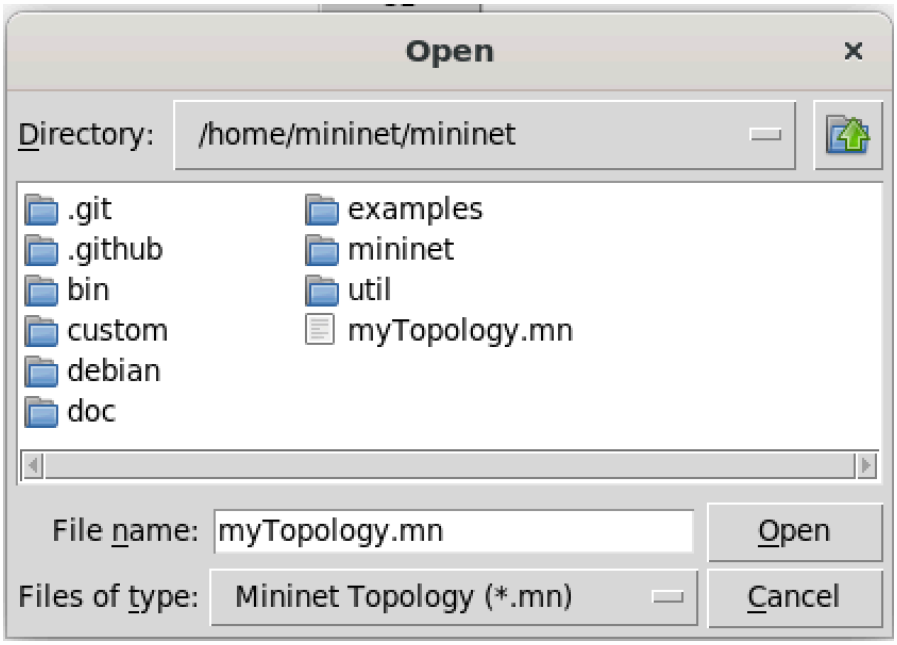
2.


Open
Directory:
/home/mininet/mininet
.git
.github
bin
custom
debian
doc
examples
mininet
util
myTopology.mn
File name:
myTopology.mn
Open
Files of type:
Mininet Topology (*.mn)
Cancel

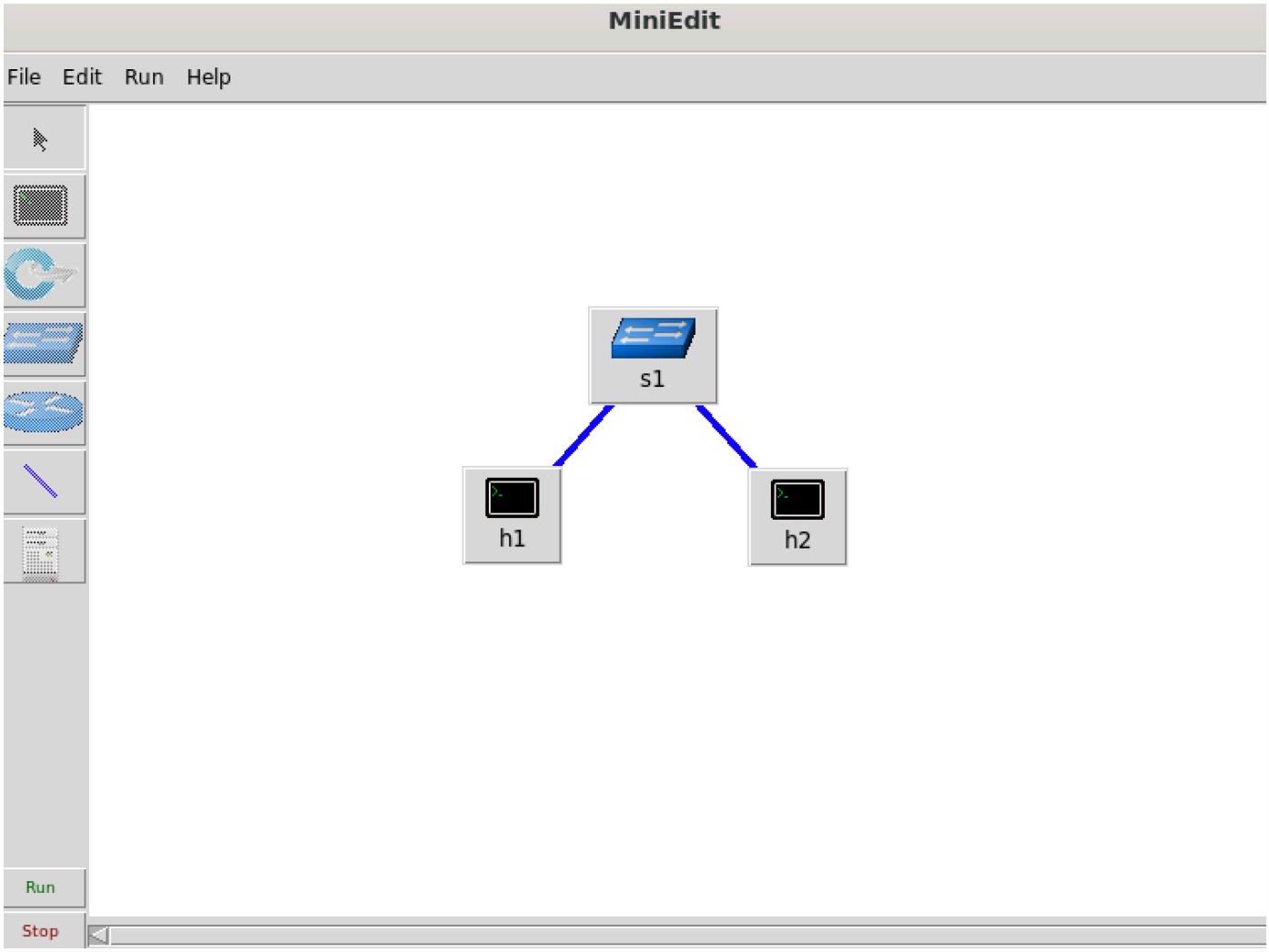
Lab2

2.

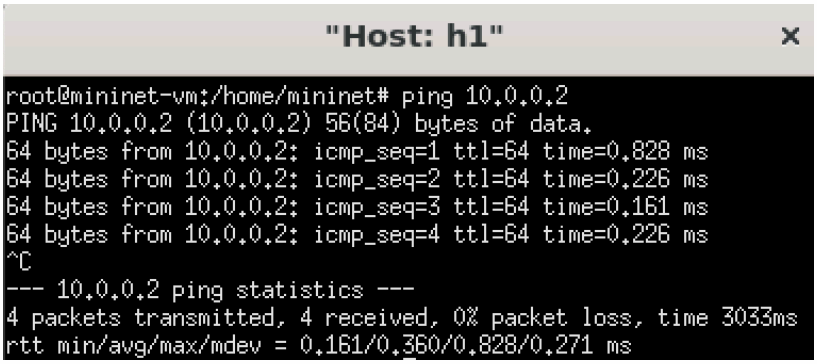
1.


Open
Directory:
/home/mininet/mininet
.git
.github
bin
custom
debian
doc
examples
mininet
util
myTopology.mn
File name:
myTopology.mn
Open
Files of type:
Mininet Topology (*.mn)
Cancel

2.


MiniEdit
File Edit Run Help
s1
h1
h2
Run
Stop

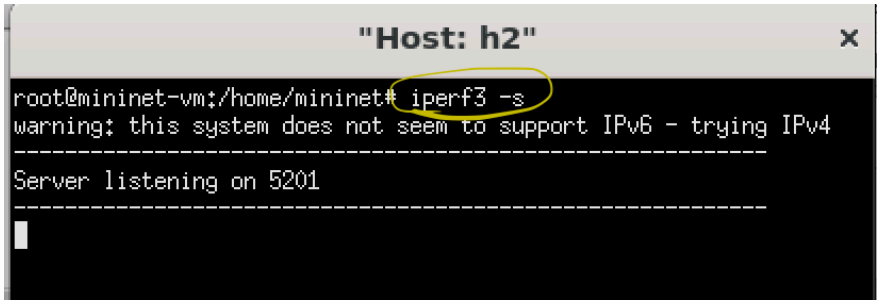
2.1


"Host: h1"
root@mininet-vm:/home/mininet# 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=0.828 ms
64 bytes from 10.0.0.2: icmp_seq=2 ttl=64 time=0.226 ms
64 bytes from 10.0.0.2: icmp_seq=3 ttl=64 time=0.161 ms
64 bytes from 10.0.0.2: icmp_seq=4 ttl=64 time=0.226 ms
^C
--- 10.0.0.2 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3033ms
rtt min/avg/max/mdev = 0.161/0.360/0.828/0.271 ms

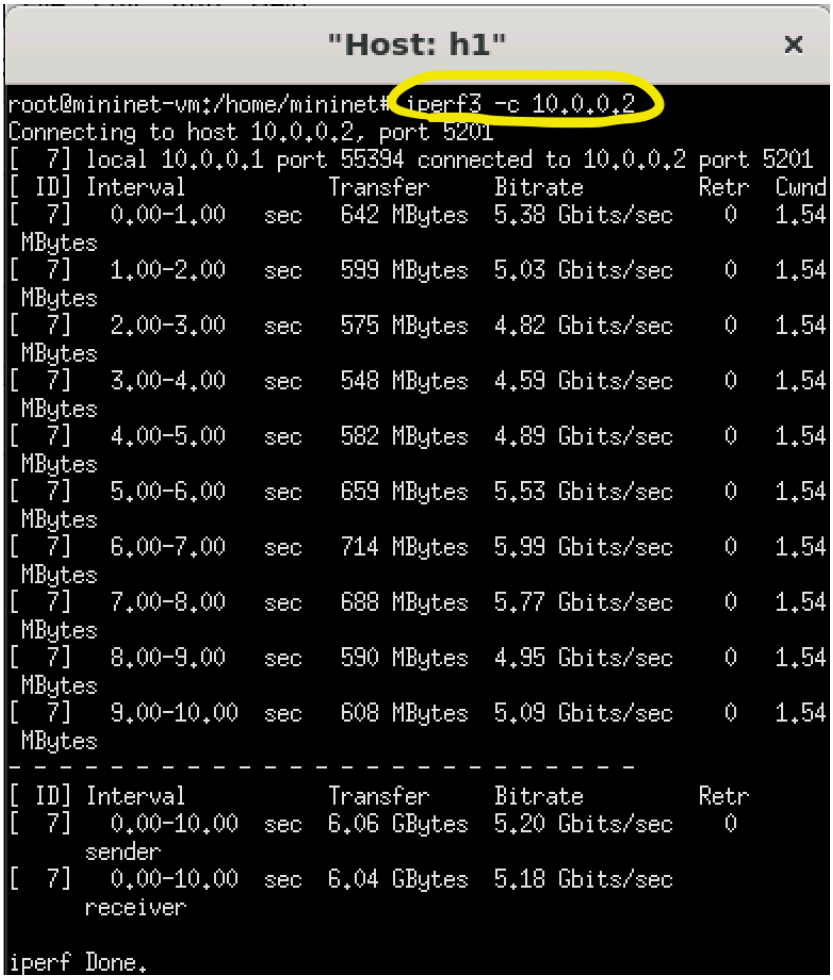
3.

3.1

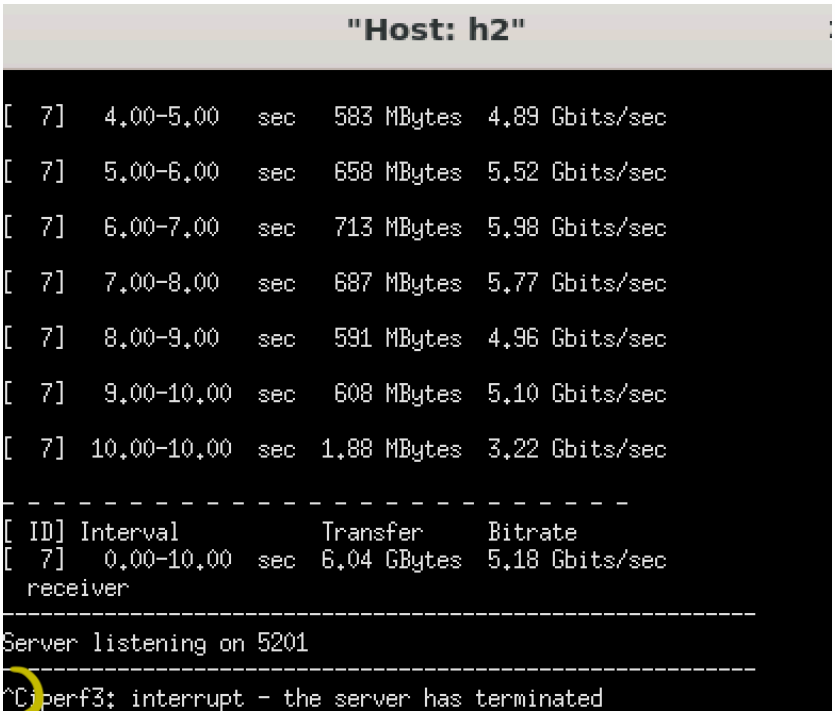
1.


"Host: h2"
root@mininet-vm:/home/mininet# iperf3 -s
warning: this system does not seem to support IPv6 - trying IPv4
Server listening on 5201

2.

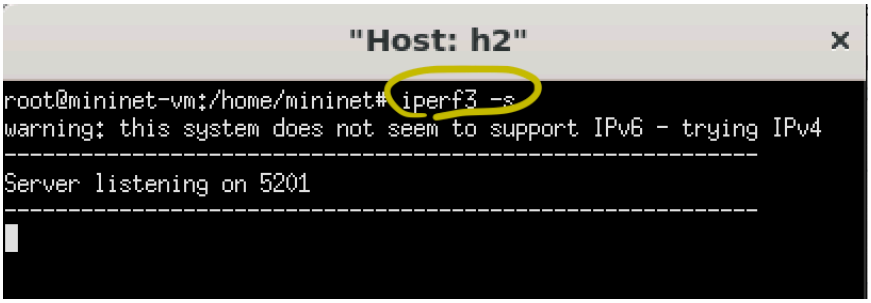

"Host: h1"
root@mininet-vm:/home/mininet# iperf3 -c 10.0.0.2
Connecting to host 10.0.0.2, port 5201
[7] local 10.0.0.1 port 55394 connected to 10.0.0.2 port 5201
[ID] Interval Transfer Bitrate Retr Cwnd
[7] 0.00-1.00 sec 642 MBytes 5.38 Gbits/sec 0 1.54 MBytes
[7] 1.00-2.00 sec 599 MBytes 5.03 Gbits/sec 0 1.54 MBytes
[7] 2.00-3.00 sec 575 MBytes 4.82 Gbits/sec 0 1.54 MBytes
[7] 3.00-4.00 sec 548 MBytes 4.59 Gbits/sec 0 1.54 MBytes
[7] 4.00-5.00 sec 582 MBytes 4.89 Gbits/sec 0 1.54 MBytes
[7] 5.00-6.00 sec 659 MBytes 5.53 Gbits/sec 0 1.54 MBytes
[7] 6.00-7.00 sec 714 MBytes 5.99 Gbits/sec 0 1.54 MBytes
[7] 7.00-8.00 sec 688 MBytes 5.77 Gbits/sec 0 1.54 MBytes
[7] 8.00-9.00 sec 590 MBytes 4.95 Gbits/sec 0 1.54 MBytes
[7] 9.00-10.00 sec 608 MBytes 5.09 Gbits/sec 0 1.54 MBytes
[ID] Interval Transfer Bitrate Retr
[7] 0.00-10.00 sec 6.06 GBytes 5.20 Gbits/sec 0 sender
[7] 0.00-10.00 sec 6.04 GBytes 5.18 Gbits/sec receiver
iperf Done.

3.

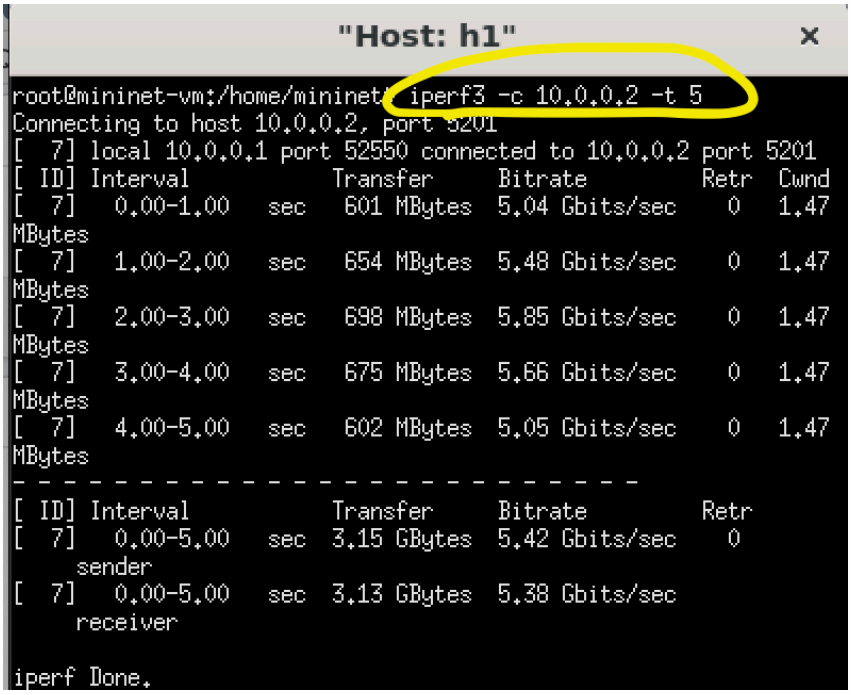

"Host: h2"
[7] 4.00-5.00 sec 583 MBytes 4.89 Gbits/sec
[7] 5.00-6.00 sec 658 MBytes 5.52 Gbits/sec
[7] 6.00-7.00 sec 713 MBytes 5.98 Gbits/sec
[7] 7.00-8.00 sec 687 MBytes 5.77 Gbits/sec
[7] 8.00-9.00 sec 591 MBytes 4.96 Gbits/sec
[7] 9.00-10.00 sec 608 MBytes 5.10 Gbits/sec
[7] 10.00-10.00 sec 1.88 MBytes 3.22 Gbits/sec
[ID] Interval Transfer Bitrate
[7] 0.00-10.00 sec 6.04 GBytes 5.18 Gbits/sec
receiver
Server listening on 5201
^Ciperf3: interrupt - the server has terminated

3.2

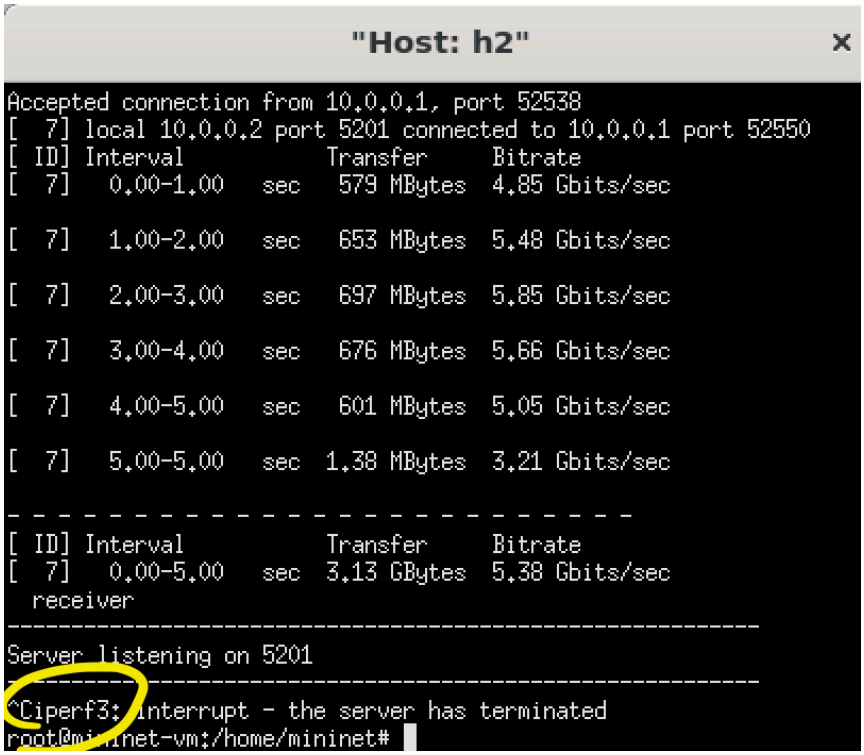
1.


"Host: h2"
root@mininet-vm:/home/mininet# iperf3 -s
warning: this system does not seem to support IPv6 - trying IPv4
Server listening on 5201

2.

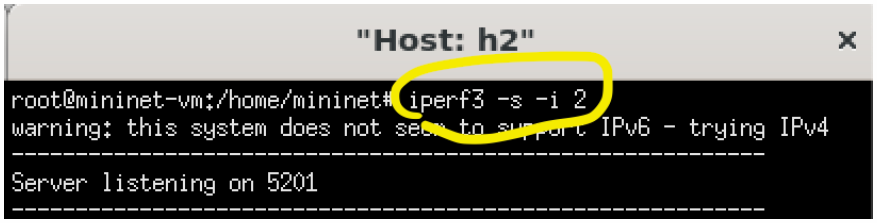

"Host: h1"
root@mininet-vm:/home/mininet# iperf3 -c 10.0.0.2 -t 5
Connecting to host 10.0.0.2, port 5201
[7] local 10.0.0.1 port 52550 connected to 10.0.0.2 port 5201
[ID] Interval Transfer Bitrate Retr Cwnd
[7] 0.00-1.00 sec 601 MBytes 5.04 Gbits/sec 0 1.47 MBytes
[7] 1.00-2.00 sec 654 MBytes 5.48 Gbits/sec 0 1.47 MBytes
[7] 2.00-3.00 sec 698 MBytes 5.85 Gbits/sec 0 1.47 MBytes
[7] 3.00-4.00 sec 675 MBytes 5.66 Gbits/sec 0 1.47 MBytes
[7] 4.00-5.00 sec 602 MBytes 5.05 Gbits/sec 0 1.47 MBytes
[ID] Interval Transfer Bitrate Retr
[7] 0.00-5.00 sec 3.15 GBytes 5.42 Gbits/sec 0 sender
[7] 0.00-5.00 sec 3.13 GBytes 5.38 Gbits/sec receiver
iperf Done.

3.

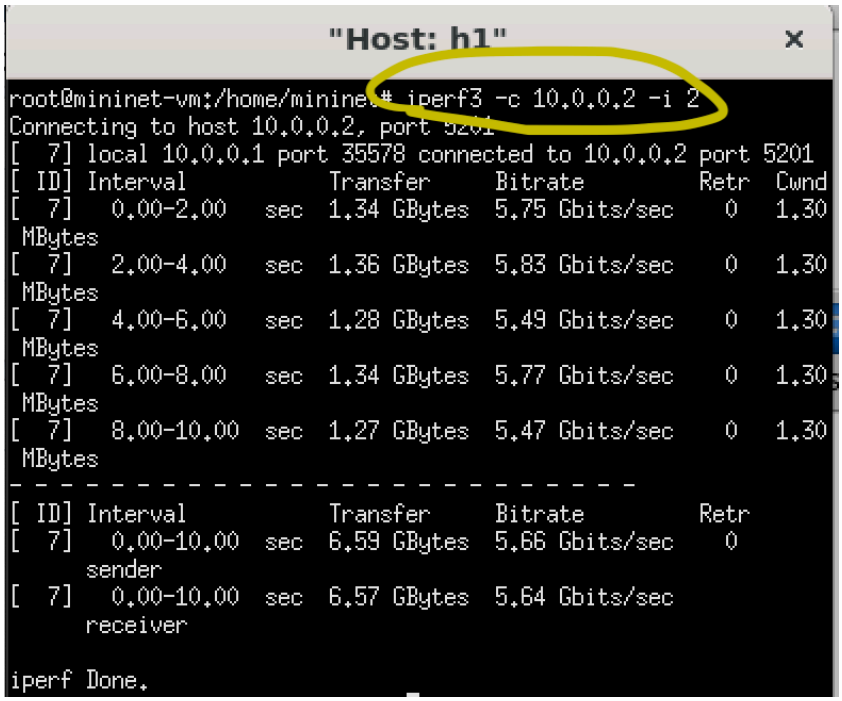

"Host: h2"
Accepted connection from 10.0.0.1, port 52538
[7] local 10.0.0.2 port 5201 connected to 10.0.0.1 port 52550
[ID] Interval Transfer Bitrate
[7] 0.00-1.00 sec 579 MBytes 4.85 Gbits/sec
[7] 1.00-2.00 sec 653 MBytes 5.48 Gbits/sec
[7] 2.00-3.00 sec 697 MBytes 5.85 Gbits/sec
[7] 3.00-4.00 sec 676 MBytes 5.66 Gbits/sec
[7] 4.00-5.00 sec 601 MBytes 5.05 Gbits/sec
[7] 5.00-5.00 sec 1.38 MBytes 3.21 Gbits/sec
[ID] Interval Transfer Bitrate
[7] 0.00-5.00 sec 3.13 GBytes 5.38 Gbits/sec
receiver
Server listening on 5201
^Ciperf3: interrupt - the server has terminated
root@mininet-vm:/home/mininet#

3.3

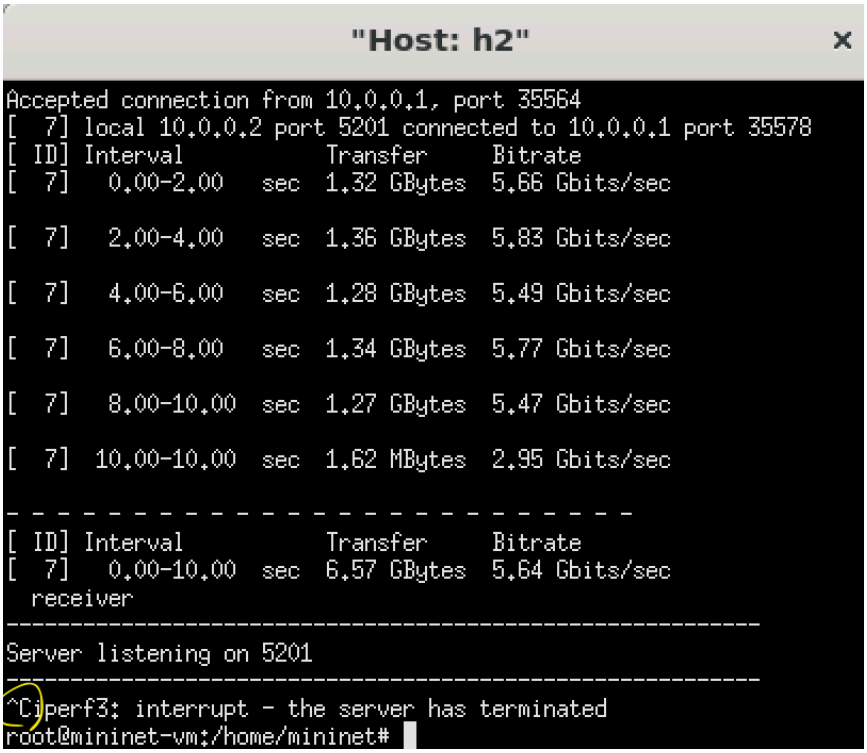
1.


"Host: h2"
root@mininet-vm:/home/mininet# iperf3 -s -i 2
warning: this system does not seem to support IPv6 - trying IPv4
Server listening on 5201

2.

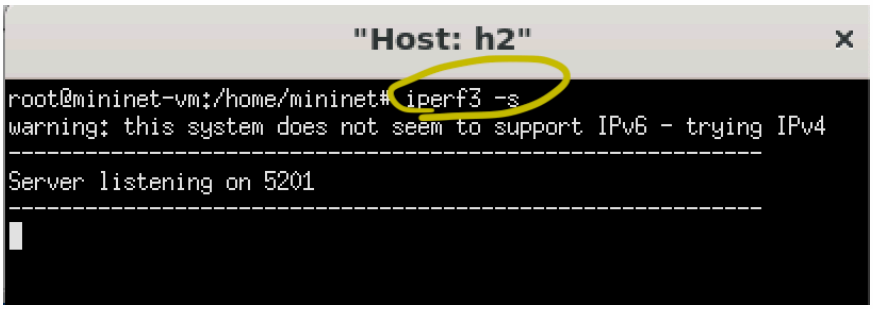

"Host: h1"
root@mininet-vm:/home/mininet# iperf3 -c 10.0.0.2 -i 2
Connecting to host 10.0.0.2, port 5201
[7] local 10.0.0.1 port 35578 connected to 10.0.0.2 port 5201
[ID] Interval Transfer Bitrate Retr Cwnd
[7] 0.00-2.00 sec 1.34 GBytes 5.75 Gbits/sec 0 1.30
MBytes
[7] 2.00-4.00 sec 1.36 GBytes 5.83 Gbits/sec 0 1.30
MBytes
[7] 4.00-6.00 sec 1.28 GBytes 5.49 Gbits/sec 0 1.30
MBytes
[7] 6.00-8.00 sec 1.34 GBytes 5.77 Gbits/sec 0 1.30
MBytes
[7] 8.00-10.00 sec 1.27 GBytes 5.47 Gbits/sec 0 1.30
MBytes
[ID] Interval Transfer Bitrate Retr
[7] 0.00-10.00 sec 6.59 GBytes 5.66 Gbits/sec 0
sender
[7] 0.00-10.00 sec 6.57 GBytes 5.64 Gbits/sec
receiver
iperf Done.

3.

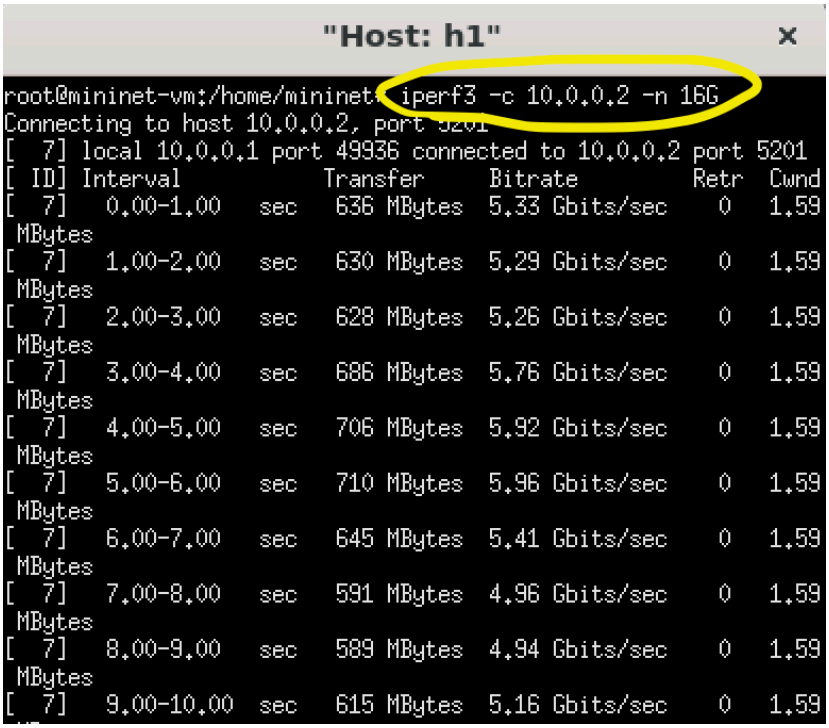

"Host: h2"
Accepted connection from 10.0.0.1, port 35564
[7] local 10.0.0.2 port 5201 connected to 10.0.0.1 port 35578
[ID] Interval Transfer Bitrate
[7] 0.00-2.00 sec 1.32 GBytes 5.66 Gbits/sec
[7] 2.00-4.00 sec 1.36 GBytes 5.83 Gbits/sec
[7] 4.00-6.00 sec 1.28 GBytes 5.49 Gbits/sec
[7] 6.00-8.00 sec 1.34 GBytes 5.77 Gbits/sec
[7] 8.00-10.00 sec 1.27 GBytes 5.47 Gbits/sec
[7] 10.00-10.00 sec 1.62 MBytes 2.95 Gbits/sec
[ID] Interval Transfer Bitrate
[7] 0.00-10.00 sec 6.57 GBytes 5.64 Gbits/sec
receiver
Server listening on 5201
^Ciperf3: interrupt - the server has terminated
root@mininet-vm:/home/mininet#

3.4

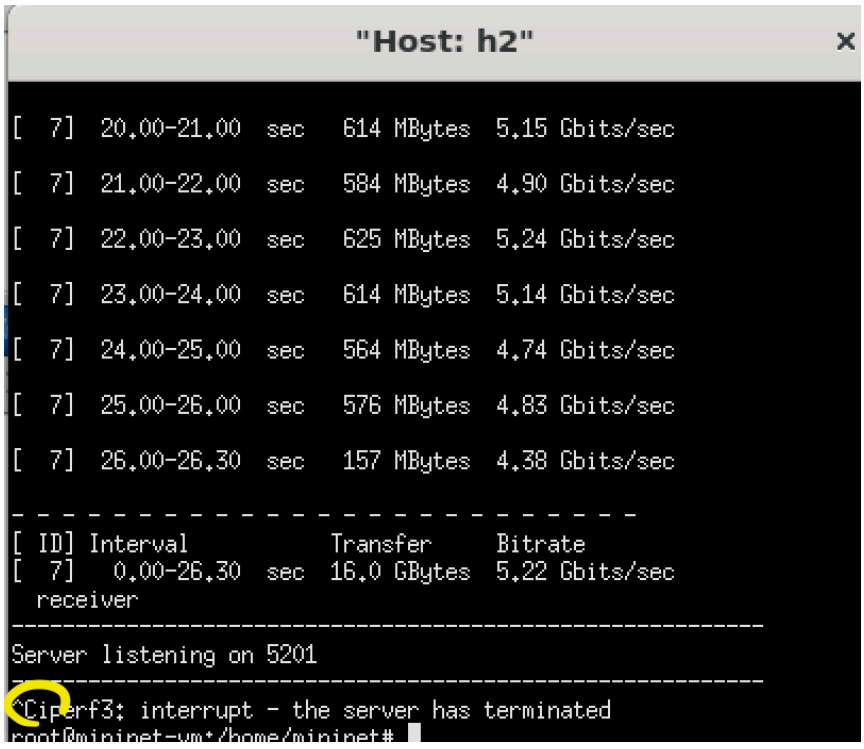
1.


"Host: h2"
root@mininet-vm:/home/mininet# iperf3 -s
warning: this system does not seem to support IPv6 - trying IPv4
Server listening on 5201

2.


"Host: h1"
root@mininet-vm:/home/mininet# iperf3 -c 10.0.0.2 -n 16G
Connecting to host 10.0.0.2, port 5201
[7] local 10.0.0.1 port 49936 connected to 10.0.0.2 port 5201
[ID] Interval Transfer Bitrate Retr Cwnd
[7] 0.00-1.00 sec 636 MBytes 5.33 Gbits/sec 0 1.59
MBytes
[7] 1.00-2.00 sec 630 MBytes 5.29 Gbits/sec 0 1.59
MBytes
[7] 2.00-3.00 sec 628 MBytes 5.26 Gbits/sec 0 1.59
MBytes
[7] 3.00-4.00 sec 686 MBytes 5.76 Gbits/sec 0 1.59
MBytes
[7] 4.00-5.00 sec 706 MBytes 5.92 Gbits/sec 0 1.59
MBytes
[7] 5.00-6.00 sec 710 MBytes 5.96 Gbits/sec 0 1.59
MBytes
[7] 6.00-7.00 sec 645 MBytes 5.41 Gbits/sec 0 1.59
MBytes
[7] 7.00-8.00 sec 591 MBytes 4.96 Gbits/sec 0 1.59
MBytes
[7] 8.00-9.00 sec 589 MBytes 4.94 Gbits/sec 0 1.59
MBytes
[7] 9.00-10.00 sec 615 MBytes 5.16 Gbits/sec 0 1.59

3.

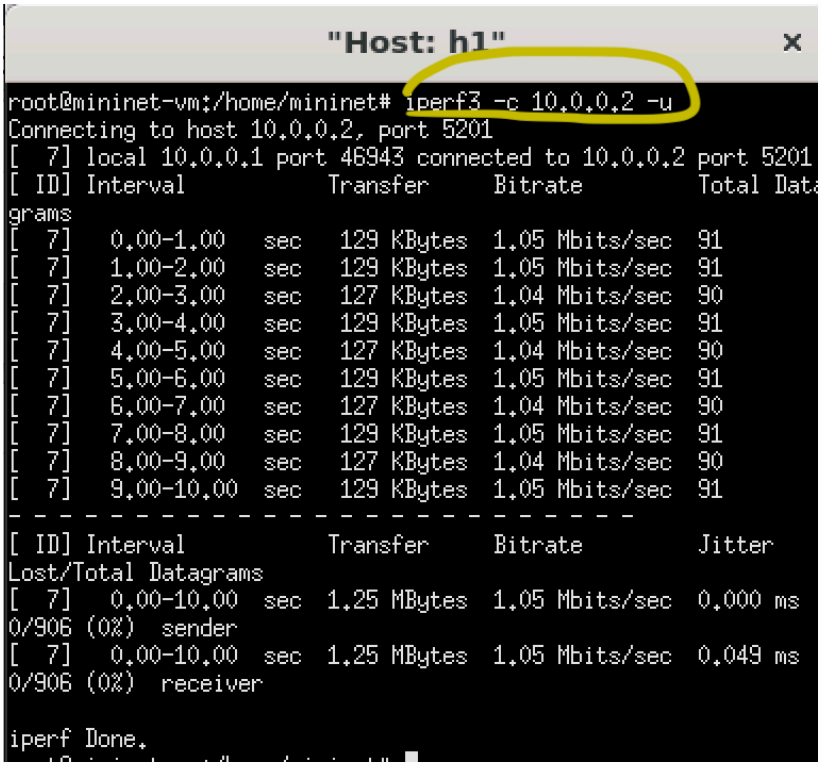

"Host: h2"
[7] 20.00-21.00 sec 614 MBytes 5.15 Gbits/sec
[7] 21.00-22.00 sec 584 MBytes 4.90 Gbits/sec
[7] 22.00-23.00 sec 625 MBytes 5.24 Gbits/sec
[7] 23.00-24.00 sec 614 MBytes 5.14 Gbits/sec
[7] 24.00-25.00 sec 564 MBytes 4.74 Gbits/sec
[7] 25.00-26.00 sec 576 MBytes 4.83 Gbits/sec
[7] 26.00-26.30 sec 157 MBytes 4.38 Gbits/sec
[ID] Interval Transfer Bitrate
[7] 0.00-26.30 sec 16.0 GBytes 5.22 Gbits/sec
receiver
Server listening on 5201
^Ciperf3: interrupt - the server has terminated

3.5

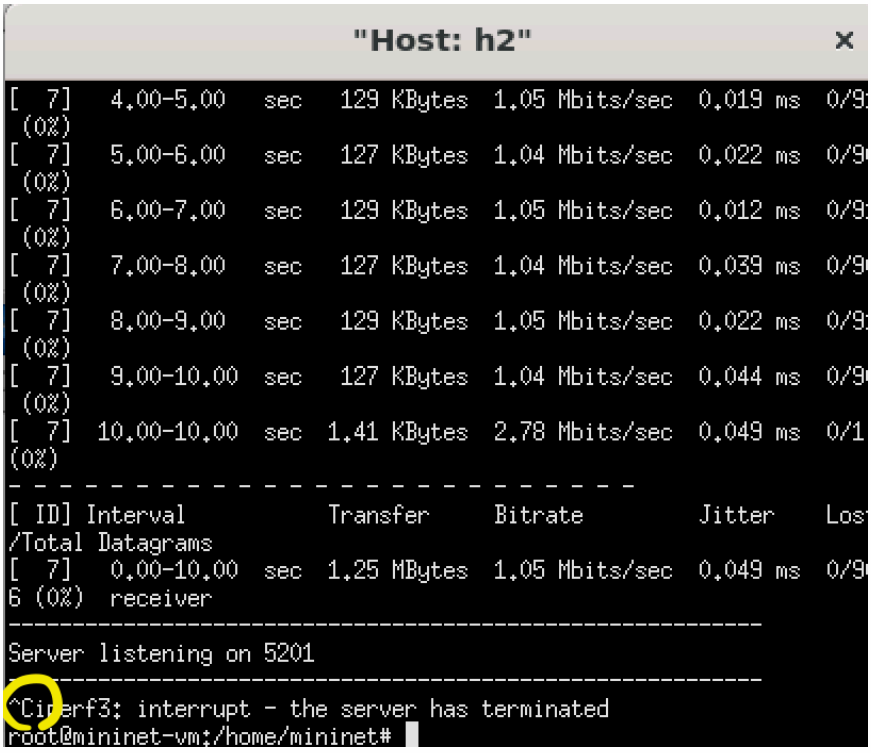
1.


"Host: h2"
root@mininet-vm:/home/mininet# iperf3 -s
Server listening on 5201

2.

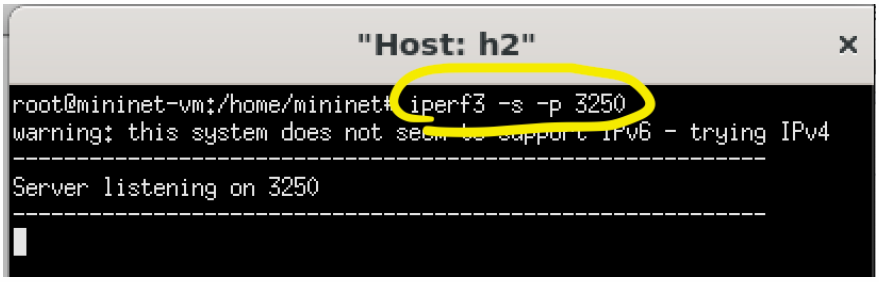

"Host: h1"
root@mininet-vm:/home/mininet# iperf3 -c 10.0.0.2 -u
Connecting to host 10.0.0.2, port 5201
[7] local 10.0.0.1 port 46943 connected to 10.0.0.2 port 5201
[ID] Interval Transfer Bitrate Total Datagrams
[7] 0.00-1.00 sec 129 KBytes 1.05 Mbits/sec 91
[7] 1.00-2.00 sec 129 KBytes 1.05 Mbits/sec 91
[7] 2.00-3.00 sec 127 KBytes 1.04 Mbits/sec 90
[7] 3.00-4.00 sec 129 KBytes 1.05 Mbits/sec 91
[7] 4.00-5.00 sec 127 KBytes 1.04 Mbits/sec 90
[7] 5.00-6.00 sec 129 KBytes 1.05 Mbits/sec 91
[7] 6.00-7.00 sec 127 KBytes 1.04 Mbits/sec 90
[7] 7.00-8.00 sec 129 KBytes 1.05 Mbits/sec 91
[7] 8.00-9.00 sec 127 KBytes 1.04 Mbits/sec 90
[7] 9.00-10.00 sec 129 KBytes 1.05 Mbits/sec 91
- -
[ID] Interval Transfer Bitrate Jitter Lost/Total Datagrams
[7] 0.00-10.00 sec 1.25 MBytes 1.05 Mbits/sec 0.000 ms 0/906 (0%) sender
[7] 0.00-10.00 sec 1.25 MBytes 1.05 Mbits/sec 0.049 ms 0/906 (0%) receiver
iperf Done.

3.

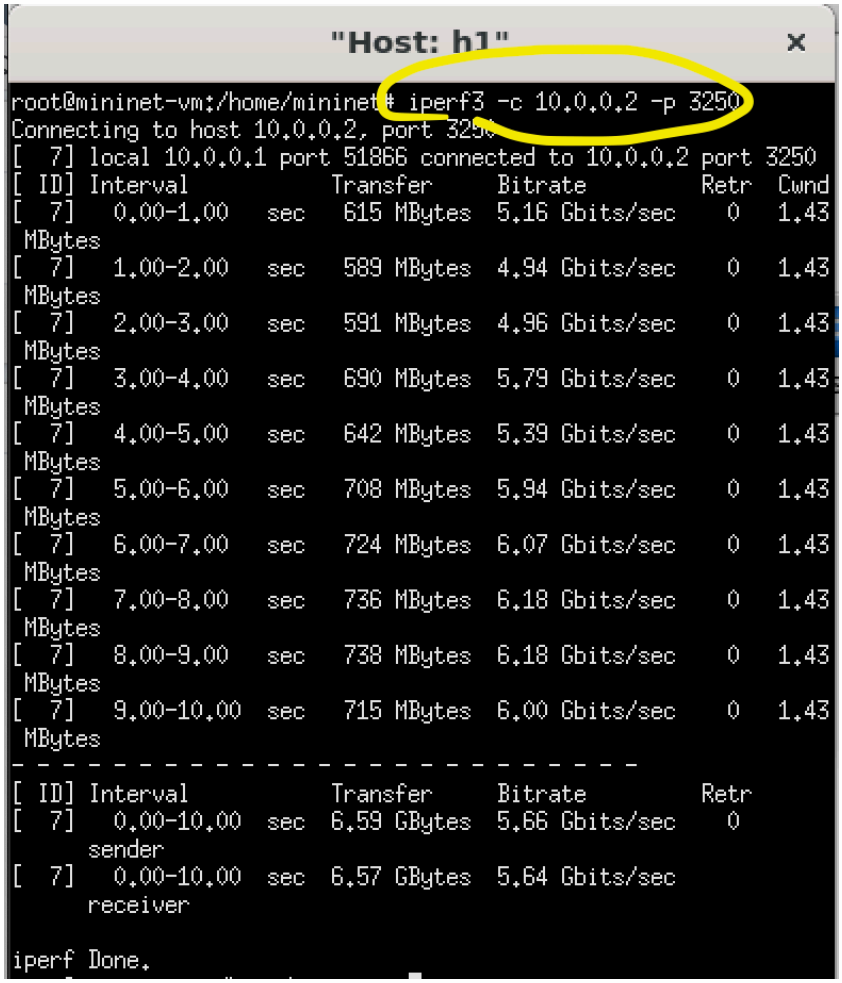

"Host: h2"
[7] 4.00-5.00 sec 129 KBytes 1.05 Mbits/sec 0.019 ms 0/91 (0%)
[7] 5.00-6.00 sec 127 KBytes 1.04 Mbits/sec 0.022 ms 0/90 (0%)
[7] 6.00-7.00 sec 129 KBytes 1.05 Mbits/sec 0.012 ms 0/91 (0%)
[7] 7.00-8.00 sec 127 KBytes 1.04 Mbits/sec 0.039 ms 0/90 (0%)
[7] 8.00-9.00 sec 129 KBytes 1.05 Mbits/sec 0.022 ms 0/91 (0%)
[7] 9.00-10.00 sec 127 KBytes 1.04 Mbits/sec 0.044 ms 0/90 (0%)
[7] 10.00-10.00 sec 1.41 KBytes 2.78 Mbits/sec 0.049 ms 0/1 (0%)
- -
[ID] Interval Transfer Bitrate Jitter Lost/Total Datagrams
[7] 0.00-10.00 sec 1.25 MBytes 1.05 Mbits/sec 0.049 ms 0/906 (0%) receiver
Server listening on 5201
^Ciperf3: interrupt - the server has terminated
root@mininet-vm:/home/mininet#

3.6

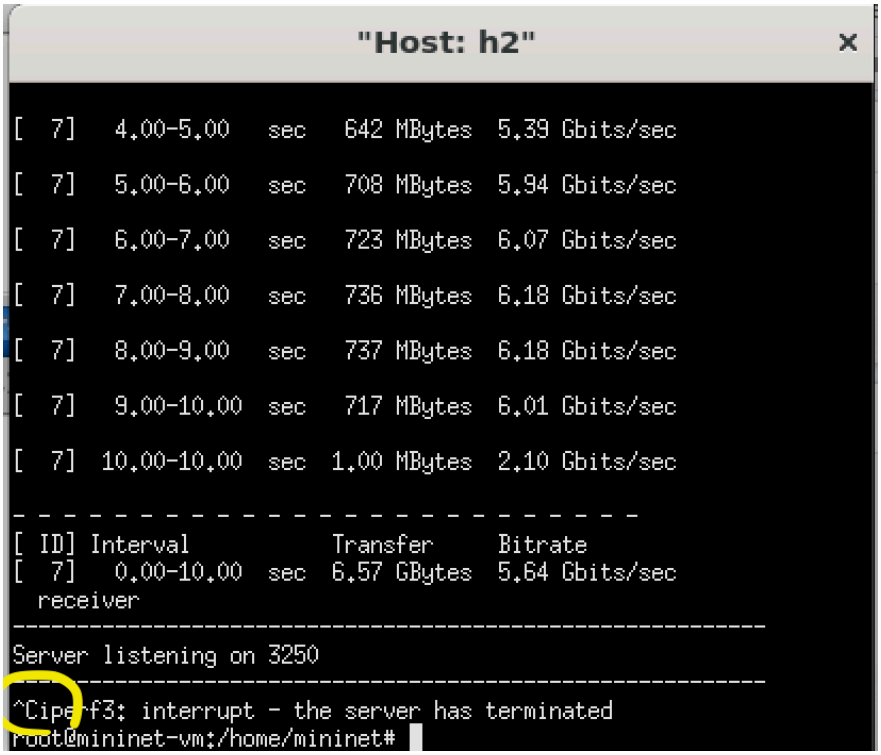
1.


"Host: h2"
root@mininet-vm:/home/mininet# iperf3 -s -p 3250
warning: this system does not seem to support IPv6 - trying IPv4
Server listening on 3250

2.

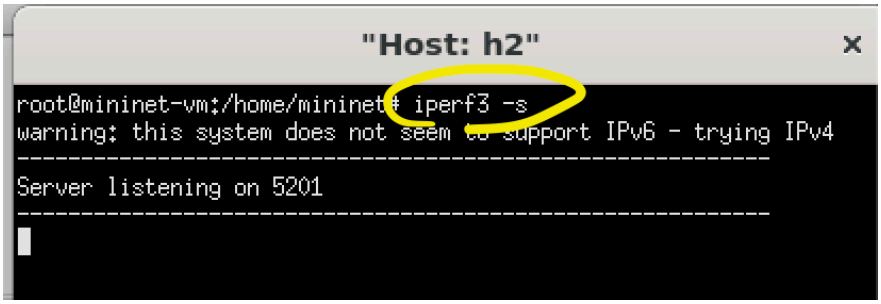

"Host: h1"
root@mininet-vm:/home/mininet# iperf3 -c 10.0.0.2 -p 3250
Connecting to host 10.0.0.2, port 3250
[7] local 10.0.0.1 port 51866 connected to 10.0.0.2 port 3250
[ID] Interval Transfer Bitrate Retr Cwnd
[7] 0.00-1.00 sec 615 MBytes 5.16 Gbits/sec 0 1.43 MBytes
[7] 1.00-2.00 sec 589 MBytes 4.94 Gbits/sec 0 1.43 MBytes
[7] 2.00-3.00 sec 591 MBytes 4.96 Gbits/sec 0 1.43 MBytes
[7] 3.00-4.00 sec 690 MBytes 5.79 Gbits/sec 0 1.43 MBytes
[7] 4.00-5.00 sec 642 MBytes 5.39 Gbits/sec 0 1.43 MBytes
[7] 5.00-6.00 sec 708 MBytes 5.94 Gbits/sec 0 1.43 MBytes
[7] 6.00-7.00 sec 724 MBytes 6.07 Gbits/sec 0 1.43 MBytes
[7] 7.00-8.00 sec 736 MBytes 6.18 Gbits/sec 0 1.43 MBytes
[7] 8.00-9.00 sec 738 MBytes 6.18 Gbits/sec 0 1.43 MBytes
[7] 9.00-10.00 sec 715 MBytes 6.00 Gbits/sec 0 1.43 MBytes
- -
[ID] Interval Transfer Bitrate Retr
[7] 0.00-10.00 sec 6.59 GBytes 5.66 Gbits/sec 0 sender
[7] 0.00-10.00 sec 6.57 GBytes 5.64 Gbits/sec receiver
iperf Done.

3.


"Host: h2"
[7] 4.00-5.00 sec 642 MBytes 5.39 Gbits/sec
[7] 5.00-6.00 sec 708 MBytes 5.94 Gbits/sec
[7] 6.00-7.00 sec 723 MBytes 6.07 Gbits/sec
[7] 7.00-8.00 sec 736 MBytes 6.18 Gbits/sec
[7] 8.00-9.00 sec 737 MBytes 6.18 Gbits/sec
[7] 9.00-10.00 sec 717 MBytes 6.01 Gbits/sec
[7] 10.00-10.00 sec 1.00 MBytes 2.10 Gbits/sec
[ID] Interval Transfer Bitrate
[7] 0.00-10.00 sec 6.57 GBytes 5.64 Gbits/sec
receiver
Server listening on 3250
^Ciperf3: interrupt - the server has terminated
root@mininet-vm:/home/mininet#

3.7

1.

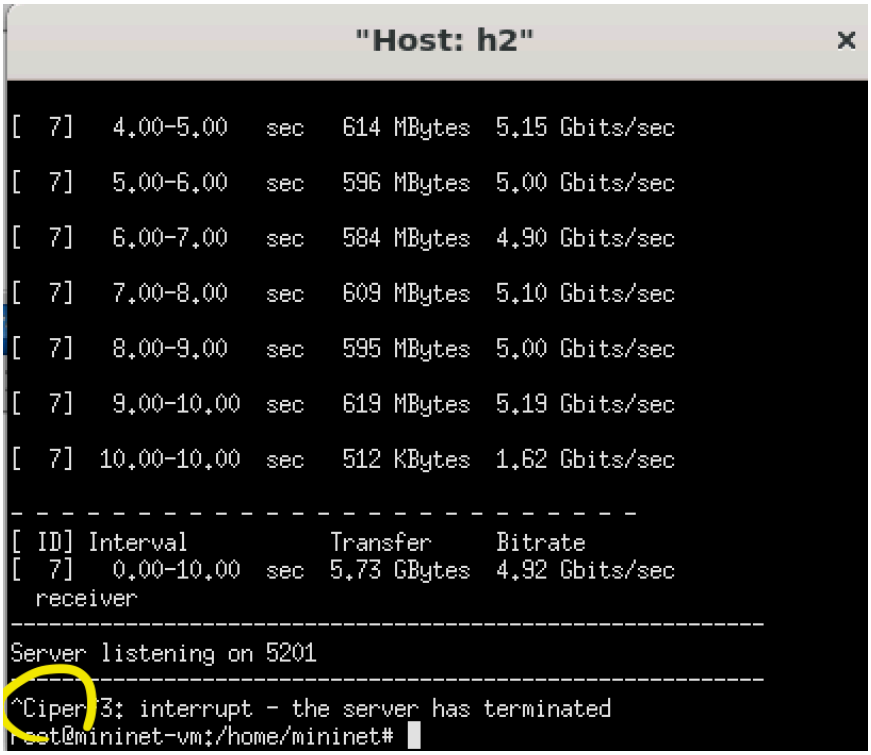

"Host: h2"
root@mininet-vm:/home/mininet# iperf3 -s
warning: this system does not seem to support IPv6 - trying IPv4
Server listening on 5201

2.


"Host: h1"
root@mininet-vm:/home/mininet# iperf3 -c 10.0.0.2 -J

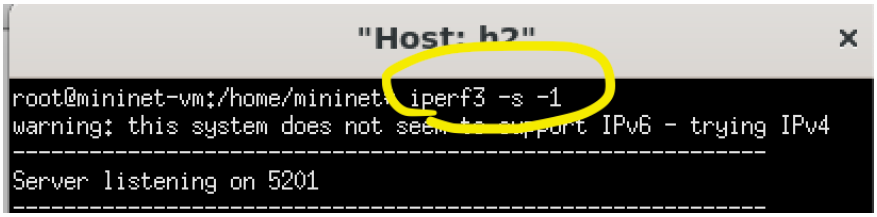

"Host: h1"
root@mininet-vm:/home/mininet# iperf3 -c 10.0.0.2 -J > test_res
ults.json

3.

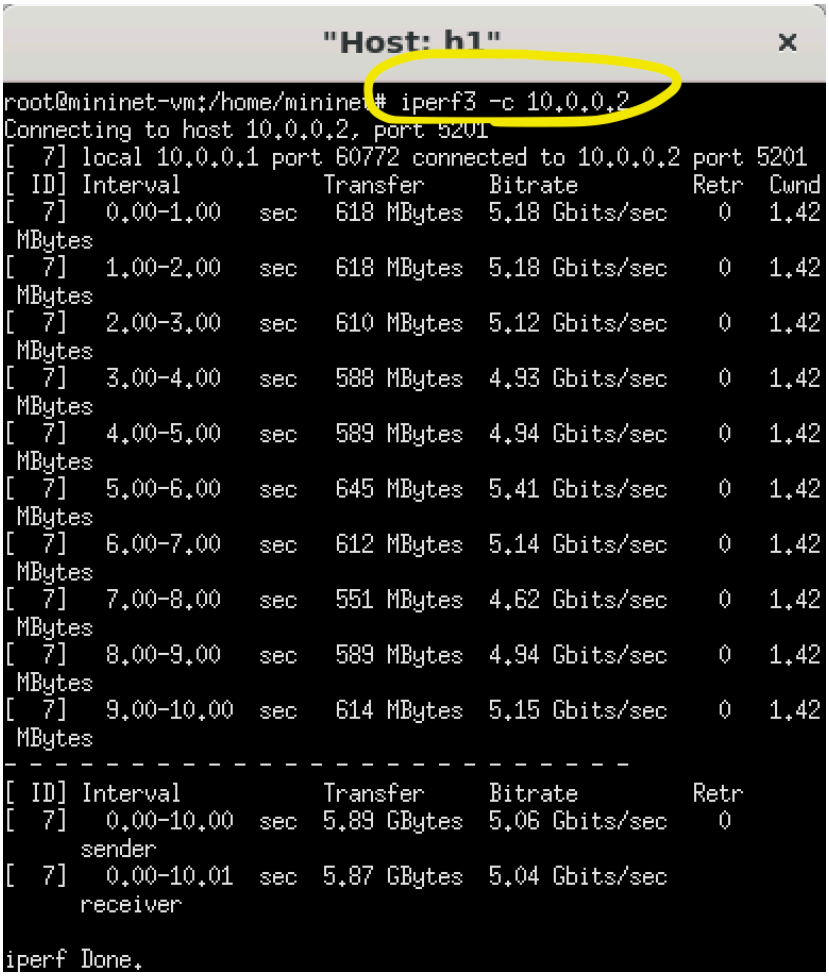

"Host: h2"
[7] 4.00-5.00 sec 614 MBytes 5.15 Gbits/sec
[7] 5.00-6.00 sec 596 MBytes 5.00 Gbits/sec
[7] 6.00-7.00 sec 584 MBytes 4.90 Gbits/sec
[7] 7.00-8.00 sec 609 MBytes 5.10 Gbits/sec
[7] 8.00-9.00 sec 595 MBytes 5.00 Gbits/sec
[7] 9.00-10.00 sec 619 MBytes 5.19 Gbits/sec
[7] 10.00-10.00 sec 512 KBytes 1.62 Gbits/sec
[ID] Interval Transfer Bitrate
[7] 0.00-10.00 sec 5.73 GBytes 4.92 Gbits/sec
receiver
Server listening on 5201
^Ciperf3: interrupt - the server has terminated
root@mininet-vm:/home/mininet#

3.8

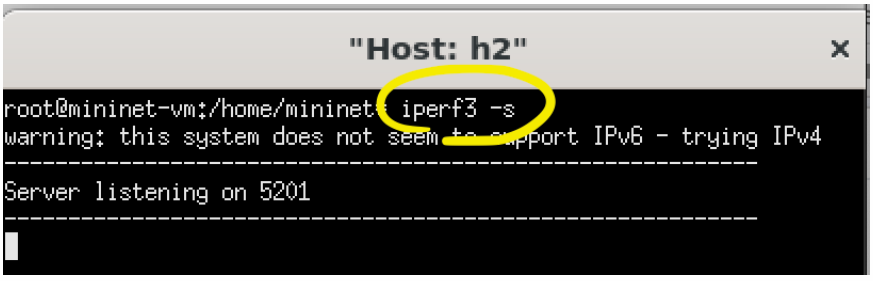
1.


root@mininet-vm:/home/mininet# iperf3 -s -1
warning: this system does not seem to support IPv6 - trying IPv4
Server listening on 5201

2.


"Host: h1"
root@mininet-vm:/home/mininet# iperf3 -c 10.0.0.2
Connecting to host 10.0.0.2, port 5201
[7] local 10.0.0.1 port 60772 connected to 10.0.0.2 port 5201
[ID] Interval Transfer Bitrate Retr Cwnd
[7] 0.00-1.00 sec 618 MBytes 5.18 Gbits/sec 0 1.42 MBytes
[7] 1.00-2.00 sec 618 MBytes 5.18 Gbits/sec 0 1.42 MBytes
[7] 2.00-3.00 sec 610 MBytes 5.12 Gbits/sec 0 1.42 MBytes
[7] 3.00-4.00 sec 588 MBytes 4.93 Gbits/sec 0 1.42 MBytes
[7] 4.00-5.00 sec 589 MBytes 4.94 Gbits/sec 0 1.42 MBytes
[7] 5.00-6.00 sec 645 MBytes 5.41 Gbits/sec 0 1.42 MBytes
[7] 6.00-7.00 sec 612 MBytes 5.14 Gbits/sec 0 1.42 MBytes
[7] 7.00-8.00 sec 551 MBytes 4.62 Gbits/sec 0 1.42 MBytes
[7] 8.00-9.00 sec 589 MBytes 4.94 Gbits/sec 0 1.42 MBytes
[7] 9.00-10.00 sec 614 MBytes 5.15 Gbits/sec 0 1.42 MBytes
[ID] Interval Transfer Bitrate Retr
[7] 0.00-10.00 sec 5.89 GBytes 5.06 Gbits/sec 0 sender
[7] 0.00-10.01 sec 5.87 GBytes 5.04 Gbits/sec receiver
iperf Done.

3.

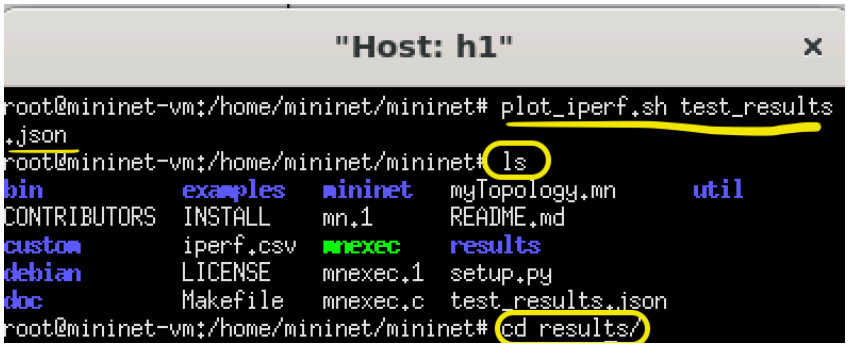

"Host: h2"
root@mininet-vm:/home/mininet# iperf3 -s
warning: this system does not seem to support IPv6 - trying IPv4
Server listening on 5201

4.

1.


"Host: h1"
root@mininet-vm:/home/mininet# iperf3 -c 10.0.0.2 -J > test_results.json

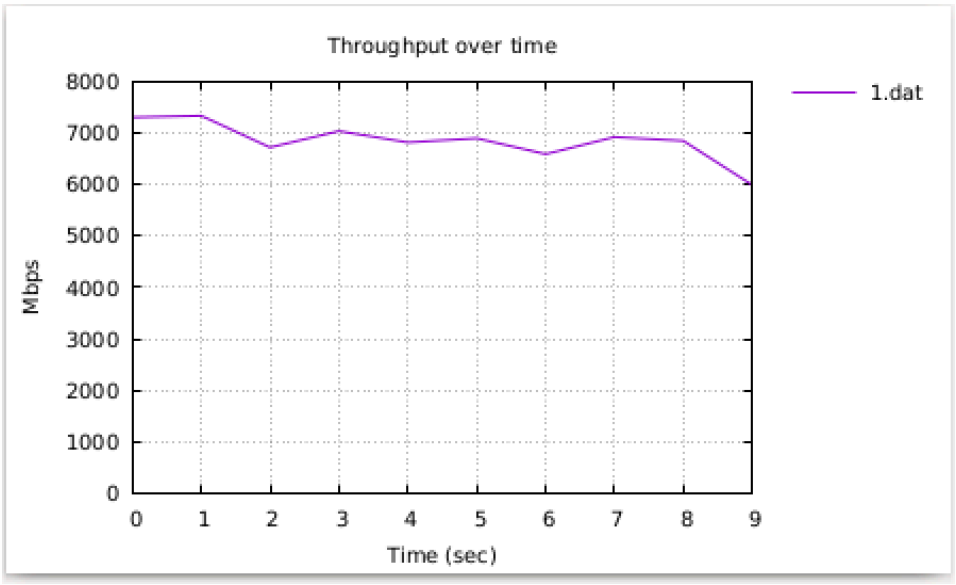
2.


"Host: h1"
root@mininet-vm:/home/mininet/mininet# plot_iperf.sh test_results.json
root@mininet-vm:/home/mininet/mininet# ls
bin examples mininet myTopology.mn util
CONTRIBUTORS INSTALL mn.1 README.md
custom iperf.csv mnexec results
debian LICENSE mnexec.1 setup.py
doc Makefile mnexec.c test_results.json
root@mininet-vm:/home/mininet/mininet# cd results/

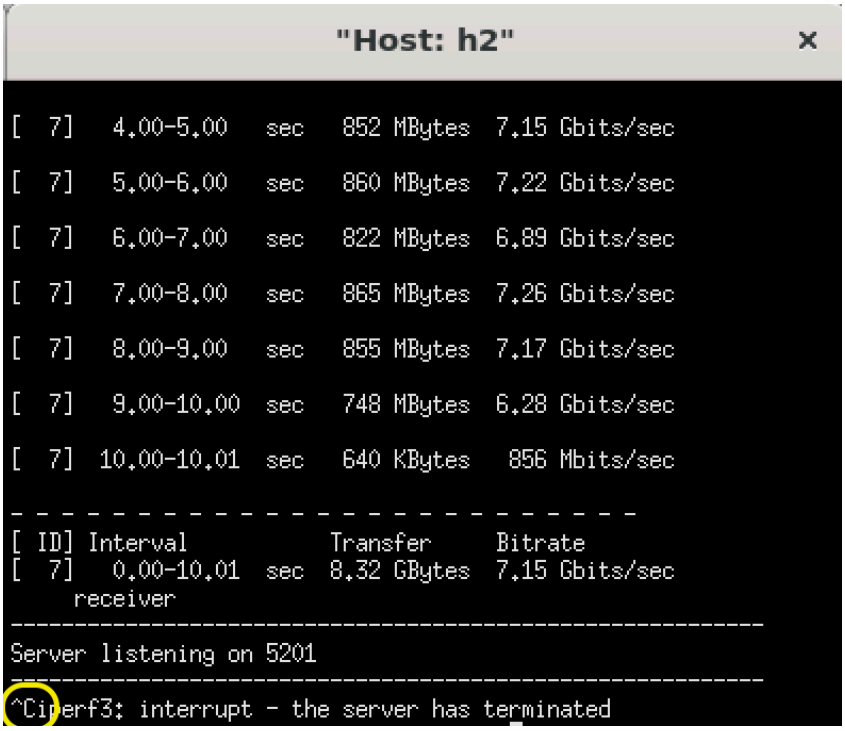
3.


"Host: h1"
root@mininet-vm:/home/mininet/mininet/results# xdg-open throughput.pdf

4.


Throughput over time
1.dat
Mbps
Time (sec)
8000
7000
6000
5000
4000
3000
2000
1000
0
0
1
2
3
4
5
6
7
8
9

5.


"Host: h2"
[7] 4.00-5.00 sec 852 MBytes 7.15 Gbits/sec
[7] 5.00-6.00 sec 860 MBytes 7.22 Gbits/sec
[7] 6.00-7.00 sec 822 MBytes 6.89 Gbits/sec
[7] 7.00-8.00 sec 865 MBytes 7.26 Gbits/sec
[7] 8.00-9.00 sec 855 MBytes 7.17 Gbits/sec
[7] 9.00-10.00 sec 748 MBytes 6.28 Gbits/sec
[7] 10.00-10.01 sec 640 KBytes 856 Mbits/sec
[ID] Interval Transfer Bitrate
[7] 0.00-10.01 sec 8.32 GBytes 7.15 Gbits/sec
receiver
Server listening on 5201
^Ciperf3: interrupt - the server has terminated

Conclusion

The first lab gave us an introduction of mininet and how to utilize this tool. With mininet, we can easily create virtual networks for testing and development. The second lab taught us how to use iperf3 command with specified flags for measuring network performance. Finally, we use the generated results to plot a throughput over time line chart.