

The left terminal window shows the Mininet environment setup. It includes commands to create a VM, install dependencies, and start the network. The right terminal window shows the execution of the `iperf` test, which fails with a `ConnectionRefusedError` because the firewall is blocking the connection.

```
mininet@mininet-vm: ~/pox/pox/misc
File Edit Tabs Help
mininet@mininet-vm:~/shared/cse150/lab3$ mv lab3controller.py ~/pox/pox/misc
mv: cannot stat 'lab3controller.py': No such file or directory
mininet@mininet-vm:~/shared/cse150/lab3$ ls
lab3.zip
mininet@mininet-vm:~/shared/cse150/lab3$ cd ~/pox/pox/misc
mininet@mininet-vm:~/pox/pox/misc$ ls
cbench.py  init.pyc  mac_blocker.py  telnetd
full_payload.py  ip_loadbalancer.py  nat.py
gephi_topo.py  lab3controller.pyc  of_tutorial.py
init.py  lab3controller.pyc  pidfile.py
mininet@mininet-vm:~/pox/pox/misc$ vim lab3controller.py
mininet@mininet-vm:~/pox/pox/misc$ ls
cbench.py  init.pyc  mac_blocker.py  telnetd
full_payload.py  ip_loadbalancer.py  nat.py
gephi_topo.py  lab3controller.pyc  of_tutorial.py
init.py  lab3controller.pyc  pidfile.py
mininet@mininet-vm:~/pox/pox/misc$ sudo ~/pox/pox.py misc.lab3controller
POX 0.2.0 (carp) / Copyright 2011-2013 James McCauley, et al.
INFO:core:POX 0.2.0 (carp) is up.
INFO:openflow.of_01:[00-00-00-00-00-02 2] connected
INFO:openflow.of_01:[00-00-00-00-00-03 1] connected
INFO:openflow.of_01:[None 3] closed
INFO:openflow.of_01:[00-00-00-00-00-01 4] connected
mininet@mininet-vm:~$
Interrupt
mininet> exit
mininet@mininet-vm:~$ sudo python ~/lab3.py
mininet> iperf
*** Iperf: testing TCP bandwidth between h1 and h4
no route to 10.0.1.40:
Kernel IP routing table
Destination      Gateway         Genmask         Flags Metric Ref    Use Iface
10.0.1.0         *              255.255.255.0  U         0      0      0 h1-eth0
Traceback (most recent call last):
  File "/home/mininet/lab3.py", line 34, in <module>
    configure()
  File "/home/mininet/lab3.py", line 28, in configure
    CLI(net)
  File "build/bdist.linux-i686/egg/mininet/cli.py", line 68, in __init__
  File "build/bdist.linux-i686/egg/mininet/cli.py", line 101, in run
  File "/usr/lib/python2.7/cmd.py", line 142, in cmdloop
    stop = self.onecmd(line)
  File "/usr/lib/python2.7/cmd.py", line 221, in onecmd
    return func(arg)
  File "build/bdist.linux-i686/egg/mininet/cli.py", line 216, in do_iperf
  File "build/bdist.linux-i686/egg/mininet/net.py", line 764, in iperf
Exception: Could not connect to iperf on port 5001
mininet@mininet-vm:~$
```

Iperf:

The firewall has not been properly written and the firewall is unable to handle the TCP packets.

The left terminal window shows the Mininet environment setup, similar to the first image. The right terminal window shows the execution of the `pingall` test, which fails with a `ConnectionRefusedError` because the firewall is blocking the connection.

```
mininet@mininet-vm: ~/pox/pox/misc
File Edit Tabs Help
gephi_topo.py  lab3controller.pyc  of_tutorial.py
init.py  lab3controller.pyc  pidfile.py
mininet@mininet-vm:~/pox/pox/misc$ sudo ~/pox/pox.py misc.lab3controller
POX 0.2.0 (carp) / Copyright 2011-2013 James McCauley, et al.
INFO:core:POX 0.2.0 (carp) is up.
INFO:openflow.of_01:[00-00-00-00-00-02 2] connected
INFO:openflow.of_01:[00-00-00-00-00-03 1] connected
INFO:openflow.of_01:[None 3] closed
INFO:openflow.of_01:[00-00-00-00-00-01 4] connected
INFO:core:Going down...
INFO:openflow.of_01:[00-00-00-00-00-01 4] disconnected
INFO:openflow.of_01:[00-00-00-00-00-02 2] disconnected
INFO:openflow.of_01:[00-00-00-00-00-03 1] disconnected
INFO:core:Down.
mininet@mininet-vm:~/pox/pox/misc$ vim lab3controller.py
mininet@mininet-vm:~/pox/pox/misc$ sudo ~/pox/pox.py misc.lab3controller
POX 0.2.0 (carp) / Copyright 2011-2013 James McCauley, et al.
INFO:core:POX 0.2.0 (carp) is up.
INFO:openflow.of_01:[00-00-00-00-00-03 1] connected
INFO:openflow.of_01:[00-00-00-00-00-02 2] connected
INFO:openflow.of_01:[00-00-00-00-00-01 3] connected
INFO:openflow.of_01:[None 4] closed
INFO:openflow.of_01:[None 5] closed
mininet@mininet-vm:~$
10.0.1.0 * 255.255.255.0 U 0 0 0 h1-eth0
Traceback (most recent call last):
  File "/home/mininet/lab3.py", line 34, in <module>
    configure()
  File "/home/mininet/lab3.py", line 28, in configure
    CLI(net)
  File "build/bdist.linux-i686/egg/mininet/cli.py", line 68, in __init__
  File "build/bdist.linux-i686/egg/mininet/cli.py", line 101, in run
  File "/usr/lib/python2.7/cmd.py", line 142, in cmdloop
    stop = self.onecmd(line)
  File "/usr/lib/python2.7/cmd.py", line 221, in onecmd
    return func(arg)
  File "build/bdist.linux-i686/egg/mininet/cli.py", line 216, in do_iperf
  File "build/bdist.linux-i686/egg/mininet/net.py", line 764, in iperf
Exception: Could not connect to iperf on port 5001
mininet@mininet-vm:~$ sudo python ~/lab3.py
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:

The firewall was unable to block the other ports for ports 1 and 4 to send packets to one another.

The left terminal window shows the Mininet environment setup, similar to the previous images. The right terminal window shows the execution of the `dpctl dump-flows` command, which displays the network flow paths within the topology.

```
mininet@mininet-vm: ~/pox/pox/misc
File Edit Tabs Help
gephi_topo.py  lab3controller.pyc  of_tutorial.py
init.py  lab3controller.pyc  pidfile.py
mininet@mininet-vm:~/pox/pox/misc$ sudo ~/pox/pox.py misc.lab3controller
POX 0.2.0 (carp) / Copyright 2011-2013 James McCauley, et al.
INFO:core:POX 0.2.0 (carp) is up.
INFO:openflow.of_01:[00-00-00-00-00-02 2] connected
INFO:openflow.of_01:[00-00-00-00-00-03 1] connected
INFO:openflow.of_01:[None 3] closed
INFO:openflow.of_01:[00-00-00-00-00-01 4] connected
INFO:core:Going down...
INFO:openflow.of_01:[00-00-00-00-00-01 4] disconnected
INFO:openflow.of_01:[00-00-00-00-00-02 2] disconnected
INFO:openflow.of_01:[00-00-00-00-00-03 1] disconnected
INFO:core:Down.
mininet@mininet-vm:~/pox/pox/misc$ vim lab3controller.py
mininet@mininet-vm:~/pox/pox/misc$ sudo ~/pox/pox.py misc.lab3controller
POX 0.2.0 (carp) / Copyright 2011-2013 James McCauley, et al.
INFO:core:POX 0.2.0 (carp) is up.
INFO:openflow.of_01:[00-00-00-00-00-03 1] connected
INFO:openflow.of_01:[00-00-00-00-00-02 2] connected
INFO:openflow.of_01:[00-00-00-00-00-01 3] connected
INFO:openflow.of_01:[None 4] closed
INFO:openflow.of_01:[None 5] closed
mininet@mininet-vm:~$
stop = self.onecmd(line)
return func(arg)
File "/usr/lib/python2.7/cmd.py", line 221, in onecmd
  File "build/bdist.linux-i686/egg/mininet/cli.py", line 216, in do_iperf
  File "build/bdist.linux-i686/egg/mininet/net.py", line 764, in iperf
Exception: Could not connect to iperf on port 5001
mininet@mininet-vm:~$ sudo python ~/lab3.py
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> dpctl
*** Unknown command: dpctl
mininet> dpctl dump-flows
*** Unknown command: dpctl dump-flows
mininet> dpctl
usage: dpctl command [arg1] [arg2] ...
mininet> dpctl dump-flows
*** s1 -----
NXST FLOW reply (xid=0x4):
mininet>
```

Dpctl dump-flows:

The dpctl dump-flow command shows the different data flow paths within the topology.