

TERMINAL-1

```
dubuntu@dubuntu:~$ sudo pox/pox.py forwarding.loadbalancepox
POX 0.7.0 (gar) / Copyright 2011-2020 James McCauley, et al.
N= 5 K= 1
WARNING:version:Support for Python 3 is experimental.
INFO:core:POX 0.7.0 (gar) is up.
INFO:openflow.of_01:[00-00-00-00-00-01 4] connected
handle_ConnectionUP from dpid 1 00-00-00-00-00-01
sent ICMP actions
INFO:forwarding.loadbalancepox:[00-00-00-00-00-01 4] ready
s: received unknown packet from 00:00:00:00:01:ff to 33:33:ff:00:01:ff via port 5
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:01:ff to 33:33:ff:00:01:ff via port 5
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:01:ff to 33:33:ff:00:01:ff via port 2
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:01:ff to 33:33:ff:00:01:ff via port 2
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:01:ff to 33:33:00:00:00:16 via port 6
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:01:ff to 33:33:00:00:00:16 via port 6
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:01:ff to 33:33:00:00:00:16 via port 2
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:01:ff to 33:33:00:00:00:16 via port 2
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:01:ff to 33:33:00:00:00:16 via port 3
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:01:ff to 33:33:00:00:00:16 via port 3
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:01:ff to 33:33:00:00:00:16 via port 4
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:01:ff to 33:33:00:00:00:16 via port 4
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:01:ff to 33:33:ff:00:01:ff via port 6
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:01:ff to 33:33:ff:00:01:ff via port 6
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:01:ff to 33:33:00:00:00:16 via port 4
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:01:ff to 33:33:00:00:00:16 via port 4
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:01:ff to 33:33:00:00:00:02 via port 4
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:01:ff to 33:33:00:00:00:02 via port 4
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:00:06 to 33:33:00:00:00:16 via port 1
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:00:06 to 33:33:00:00:00:16 via port 1
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:00:06 to 33:33:00:00:00:02 via port 1
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:00:06 to 33:33:00:00:00:02 via port 1
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:01:ff to 33:33:00:00:00:16 via port 3
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:01:ff to 33:33:00:00:00:16 via port 3
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:01:ff to 33:33:00:00:00:02 via port 3
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:01:ff to 33:33:00:00:00:02 via port 3
```

[illegible]

[illegible]

[illegible]

s: received tcp packet from 00:00:00:00:01:ff to 00:00:00:00:00:04 via port 4
 adding TCP flow (10.0.0.1,10.0.1.1,22,53102) to t5
 s: received tcp packet from 00:00:00:00:01:ff to 00:00:00:00:00:04 via port 4
 adding TCP flow (10.0.0.1,10.0.1.1,22,53102) to t5

```
dubuntu@dubuntu: ~
s: received unknown packet from 00:00:00:00:01:ff to 33:33:00:00:00:02 via port 6
unknown packet type: 34525
s: received unknown packet from 00:00:00:00:01:ff to 33:33:00:00:00:02 via port 6
unknown packet type: 34525
s: received tcp packet from 00:00:00:00:00:06 to 00:00:00:00:01:ff via port 1
adding TCP flow (10.0.1.1,10.0.0.1,41190,22) to t1
s: received tcp packet from 00:00:00:00:00:06 to 00:00:00:00:01:ff via port 1
adding TCP flow (10.0.1.1,10.0.0.1,41190,22) to t1
s: received tcp packet from 00:00:00:00:01:ff to 00:00:00:00:00:04 via port 2
adding TCP flow (10.0.0.1,10.0.1.1,22,41190) to t5
s: received tcp packet from 00:00:00:00:01:ff to 00:00:00:00:00:04 via port 2
adding TCP flow (10.0.0.1,10.0.1.1,22,41190) to t5
s: received tcp packet from 00:00:00:00:00:06 to 00:00:00:00:01:ff via port 1
adding TCP flow (10.0.1.1,10.0.0.1,34754,22) to t2
s: received tcp packet from 00:00:00:00:00:06 to 00:00:00:00:01:ff via port 1
adding TCP flow (10.0.1.1,10.0.0.1,34754,22) to t2
s: received tcp packet from 00:00:00:00:01:ff to 00:00:00:00:00:04 via port 3
adding TCP flow (10.0.0.1,10.0.1.1,22,34754) to t4
s: received tcp packet from 00:00:00:00:01:ff to 00:00:00:00:00:04 via port 3
adding TCP flow (10.0.0.1,10.0.1.1,22,34754) to t4
s: received tcp packet from 00:00:00:00:00:06 to 00:00:00:00:01:ff via port 1
adding TCP flow (10.0.1.1,10.0.0.1,34756,22) to t2
s: received tcp packet from 00:00:00:00:00:06 to 00:00:00:00:01:ff via port 1
adding TCP flow (10.0.1.1,10.0.0.1,34756,22) to t2
s: received tcp packet from 00:00:00:00:01:ff to 00:00:00:00:00:04 via port 3
adding TCP flow (10.0.0.1,10.0.1.1,22,34756) to t5
s: received tcp packet from 00:00:00:00:01:ff to 00:00:00:00:00:04 via port 3
adding TCP flow (10.0.0.1,10.0.1.1,22,34756) to t5
s: received tcp packet from 00:00:00:00:00:06 to 00:00:00:00:01:ff via port 1
adding TCP flow (10.0.1.1,10.0.0.1,53084,22) to t4
s: received tcp packet from 00:00:00:00:00:06 to 00:00:00:00:01:ff via port 1
adding TCP flow (10.0.1.1,10.0.0.1,53084,22) to t4
s: received tcp packet from 00:00:00:00:01:ff to 00:00:00:00:00:04 via port 5
adding TCP flow (10.0.0.1,10.0.1.1,22,53084) to t2
s: received tcp packet from 00:00:00:00:01:ff to 00:00:00:00:00:04 via port 5
adding TCP flow (10.0.0.1,10.0.1.1,22,53084) to t2
s: received tcp packet from 00:00:00:00:00:06 to 00:00:00:00:01:ff via port 1
adding TCP flow (10.0.1.1,10.0.0.1,53096,22) to t3
s: received tcp packet from 00:00:00:00:00:06 to 00:00:00:00:01:ff via port 1
adding TCP flow (10.0.1.1,10.0.0.1,53096,22) to t3
s: received tcp packet from 00:00:00:00:01:ff to 00:00:00:00:00:04 via port 4
adding TCP flow (10.0.0.1,10.0.1.1,22,53096) to t2
s: received tcp packet from 00:00:00:00:01:ff to 00:00:00:00:00:04 via port 4
adding TCP flow (10.0.0.1,10.0.1.1,22,53096) to t2
s: received tcp packet from 00:00:00:00:00:06 to 00:00:00:00:01:ff via port 1
adding TCP flow (10.0.1.1,10.0.0.1,53102,22) to t3
```

TERMINAL-2

```
dubuntu@dubuntu:~/mininet/custom$ sudo python2.7 loadbalance.py
*** errRun: ['which', 'mnexec']
/usr/bin/mnexec
0*** errRun: ['which', 'ifconfig']
/usr/sbin/ifconfig
0_popen ['mnexec', '-cd', 'env', 'PS1=\x7f', 'bash', '--norc', '--noediting', '-is', 'mininet:c'] 5900*** c : ('unset HISTFILE;
stty -echo; set +m')
unset HISTFILE; stty -echo; set +m
*** c : ('echo A | telnet -e A 127.0.0.1 6633',)
Telnet escape character is 'A'.
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is 'A'.

telnet> Connection closed.
*** errRun: ['grep', '-c', 'processor', '/proc/cpuinfo']
1
0*** Setting resource limits
*** Creating network
*** Adding controller
_popen ['mnexec', '-cd', 'env', 'PS1=\x7f', 'bash', '--norc', '--noediting', '-is', 'mininet:c0'] 5905*** c0 : ('unset HISTFILE;
stty -echo; set +m')
unset HISTFILE; stty -echo; set +m
*** c0 : ('echo A | telnet -e A 127.0.0.1 6653',)
Telnet escape character is 'A'.
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Trying 127.0.0.1...
telnet: Unable to connect to remote host: Connection refused
Unable to contact the remote controller at 127.0.0.1:6653
*** c0 : ('echo A | telnet -e A 127.0.0.1 6633',)
Telnet escape character is 'A'.
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is 'A'.

telnet> Connection closed.
Connecting to remote controller at 127.0.0.1:6633
*** Adding hosts:
*** errRun: ['which', 'mnexec']
/usr/bin/mnexec
0*** errRun: ['which', 'ifconfig']
/usr/sbin/ifconfig
0_popen ['mnexec', '-cdn', 'env', 'PS1=\x7f', 'bash', '--norc', '--noediting', '-is', 'mininet:h1'] 5913*** h1 : ('unset
HISTFILE; stty -echo; set +m',)
unset HISTFILE; stty -echo; set +m
h1_popen ['mnexec', '-cdn', 'env', 'PS1=\x7f', 'bash', '--norc', '--noediting', '-is', 'mininet:h2'] 5915*** h2 : ('unset
HISTFILE; stty -echo; set +m',)
unset HISTFILE; stty -echo; set +m
h2_popen ['mnexec', '-cdn', 'env', 'PS1=\x7f', 'bash', '--norc', '--noediting', '-is', 'mininet:h3'] 5917*** h3 : ('unset
HISTFILE; stty -echo; set +m',)
unset HISTFILE; stty -echo; set +m
h3_popen ['mnexec', '-cdn', 'env', 'PS1=\x7f', 'bash', '--norc', '--noediting', '-is', 'mininet:h4'] 5919*** h4 : ('unset
HISTFILE; stty -echo; set +m',)
unset HISTFILE; stty -echo; set +m
h4_popen ['mnexec', '-cdn', 'env', 'PS1=\x7f', 'bash', '--norc', '--noediting', '-is', 'mininet:h5'] 5921*** h5 : ('unset
HISTFILE; stty -echo; set +m',)
unset HISTFILE; stty -echo; set +m
h5_popen ['mnexec', '-cdn', 'env', 'PS1=\x7f', 'bash', '--norc', '--noediting', '-is', 'mininet:r'] 5923*** r : ('unset
HISTFILE; stty -echo; set +m',)
unset HISTFILE; stty -echo; set +m
r_popen ['mnexec', '-cdn', 'env', 'PS1=\x7f', 'bash', '--norc', '--noediting', '-is', 'mininet:t1'] 5925*** t1 : ('unset
HISTFILE; stty -echo; set +m',)
unset HISTFILE; stty -echo; set +m
t1_popen ['mnexec', '-cdn', 'env', 'PS1=\x7f', 'bash', '--norc', '--noediting', '-is', 'mininet:t2'] 5927*** t2 : ('unset
HISTFILE; stty -echo; set +m',)
unset HISTFILE; stty -echo; set +m
t2_popen ['mnexec', '-cdn', 'env', 'PS1=\x7f', 'bash', '--norc', '--noediting', '-is', 'mininet:t3'] 5929*** t3 : ('unset
HISTFILE; stty -echo; set +m',)
unset HISTFILE; stty -echo; set +m
t3_popen ['mnexec', '-cdn', 'env', 'PS1=\x7f', 'bash', '--norc', '--noediting', '-is', 'mininet:t4'] 5931*** t4 : ('unset
HISTFILE; stty -echo; set +m',)
unset HISTFILE; stty -echo; set +m
t4_popen ['mnexec', '-cdn', 'env', 'PS1=\x7f', 'bash', '--norc', '--noediting', '-is', 'mininet:t5'] 5933*** t5 : ('unset
HISTFILE; stty -echo; set +m',)
unset HISTFILE; stty -echo; set +m
t5
*** Adding switches:
*** errRun: ['which', 'ovs-vsctl']
/usr/bin/ovs-vsctl
0*** errRun: ['ovs-vsctl', '-t', '1', 'show']
76b9ff99-1818-4ccf-a30d-7e85c421590d
ovs_version: "2.13.8"
0*** errRun: ['ovs-vsctl', '--version']
ovs-vsctl (Open vSwitch) 2.13.8
DB Schema 8.2.0
0_popen ['mnexec', '-cd', 'env', 'PS1=\x7f', 'bash', '--norc', '--noediting', '-is', 'mininet:s'] 5938*** s : ('unset HISTFILE;
stty -echo; set +m',)
unset HISTFILE; stty -echo; set +m

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added intf lo (0) to node s
*** s : ('ifconfig', 'lo', 'up')
s
*** Adding links:
*** h1 : ('ip link add name h1-eth0 address c2:61:67:4e:cb:45 type veth peer name r-eth1 address d6:e6:21:a3:b7:e0
netns 5923',)

added intf h1-eth0 (0) to node h1
moving h1-eth0 into namespace for h1
*** h1 : ('ifconfig', 'h1-eth0', 'up')
*** h1 : ('ethtool -K', <TCIntf h1-eth0>, 'gro', 'off', 'tx', 'on', 'rx', 'on')

added intf r-eth1 (1) to node r
moving r-eth1 into namespace for r
*** r : ('ifconfig', 'r-eth1', 'up')
*** r : ('ethtool -K', <TCIntf r-eth1>, 'gro', 'off', 'tx', 'on', 'rx', 'on')
(h1, r) *** h2 : ('ip link add name h2-eth0 address 02:f8:8c:8b:4e:67 type veth peer name r-eth2 address
3a:08:5a:2e:2b:3a netns 5923',)

added intf h2-eth0 (0) to node h2
moving h2-eth0 into namespace for h2
*** h2 : ('ifconfig', 'h2-eth0', 'up')
*** h2 : ('ethtool -K', <TCIntf h2-eth0>, 'gro', 'off', 'tx', 'on', 'rx', 'on')

added intf r-eth2 (2) to node r
moving r-eth2 into namespace for r
*** r : ('ifconfig', 'r-eth2', 'up')
*** r : ('ethtool -K', <TCIntf r-eth2>, 'gro', 'off', 'tx', 'on', 'rx', 'on')
(h2, r) *** h3 : ('ip link add name h3-eth0 address 12:96:5b:8f:51:86 type veth peer name r-eth3 address
c2:bb:0a:de:07:ec netns 5923',)

added intf h3-eth0 (0) to node h3
moving h3-eth0 into namespace for h3
*** h3 : ('ifconfig', 'h3-eth0', 'up')
*** h3 : ('ethtool -K', <TCIntf h3-eth0>, 'gro', 'off', 'tx', 'on', 'rx', 'on')

added intf r-eth3 (3) to node r
moving r-eth3 into namespace for r
*** r : ('ifconfig', 'r-eth3', 'up')
*** r : ('ethtool -K', <TCIntf r-eth3>, 'gro', 'off', 'tx', 'on', 'rx', 'on')
(h3, r) *** h4 : ('ip link add name h4-eth0 address 0a:5d:4d:45:48:ed type veth peer name r-eth4 address
c2:ad:70:3c:d3:7c netns 5923',)

added intf h4-eth0 (0) to node h4
moving h4-eth0 into namespace for h4
*** h4 : ('ifconfig', 'h4-eth0', 'up')
*** h4 : ('ethtool -K', <TCIntf h4-eth0>, 'gro', 'off', 'tx', 'on', 'rx', 'on')

added intf r-eth4 (4) to node r
moving r-eth4 into namespace for r
*** r : ('ifconfig', 'r-eth4', 'up')
*** r : ('ethtool -K', <TCIntf r-eth4>, 'gro', 'off', 'tx', 'on', 'rx', 'on')
(h4, r) *** h5 : ('ip link add name h5-eth0 address aa:ca:3a:07:a3:8e type veth peer name r-eth5 address
ae:aa:1b:3a:b6:48 netns 5923',)

added intf h5-eth0 (0) to node h5
moving h5-eth0 into namespace for h5
*** h5 : ('ifconfig', 'h5-eth0', 'up')
*** h5 : ('ethtool -K', <TCIntf h5-eth0>, 'gro', 'off', 'tx', 'on', 'rx', 'on')

added intf r-eth5 (5) to node r
moving r-eth5 into namespace for r
*** r : ('ifconfig', 'r-eth5', 'up')

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*** r : ('ethtool -K', <TCIntf r-eth5>, 'gro', 'off', 'tx', 'on', 'rx', 'on')
(h5, r) *** r : ('ip link add name r-eth0 address 2a:71:0a:9a:11:e2 type veth peer name s-eth1 address 76:6d:9a:7f:60:b7
netns 5938',)

added intf r-eth0 (0) to node r
moving r-eth0 into namespace for r
*** r : ('ifconfig', 'r-eth0', 'up')
*** r : ('ethtool -K', <TCIntf r-eth0>, 'gro', 'off', 'tx', 'on', 'rx', 'on')

added intf s-eth1 (1) to node s
*** s : ('ifconfig', 's-eth1', 'up')
*** s : ('ethtool -K', <TCIntf s-eth1>, 'gro', 'off', 'tx', 'on', 'rx', 'on')
(r, s) *** t1 : ('ip link add name t1-eth0 address ee:22:9a:96:f8:a3 type veth peer name s-eth2 address f2:9b:e3:4d:88:33
netns 5938',)

added intf t1-eth0 (0) to node t1
moving t1-eth0 into namespace for t1
*** t1 : ('ifconfig', 't1-eth0', 'up')
*** t1 : ('ethtool -K', <TCIntf t1-eth0>, 'gro', 'off', 'tx', 'on', 'rx', 'on')

added intf s-eth2 (2) to node s
*** s : ('ifconfig', 's-eth2', 'up')
*** s : ('ethtool -K', <TCIntf s-eth2>, 'gro', 'off', 'tx', 'on', 'rx', 'on')
(t1, s) *** t2 : ('ip link add name t2-eth0 address f6:37:d5:c4:50:2a type veth peer name s-eth3 address ba:13:fa:cf:e9:0c
netns 5938',)

added intf t2-eth0 (0) to node t2
moving t2-eth0 into namespace for t2
*** t2 : ('ifconfig', 't2-eth0', 'up')
*** t2 : ('ethtool -K', <TCIntf t2-eth0>, 'gro', 'off', 'tx', 'on', 'rx', 'on')

added intf s-eth3 (3) to node s
*** s : ('ifconfig', 's-eth3', 'up')
*** s : ('ethtool -K', <TCIntf s-eth3>, 'gro', 'off', 'tx', 'on', 'rx', 'on')
(t2, s) *** t3 : ('ip link add name t3-eth0 address a6:3d:df:9c:c3:c0 type veth peer name s-eth4 address 0e:0b:ab:f0:66:8f
netns 5938',)

added intf t3-eth0 (0) to node t3
moving t3-eth0 into namespace for t3
*** t3 : ('ifconfig', 't3-eth0', 'up')
*** t3 : ('ethtool -K', <TCIntf t3-eth0>, 'gro', 'off', 'tx', 'on', 'rx', 'on')

added intf s-eth4 (4) to node s
*** s : ('ifconfig', 's-eth4', 'up')
*** s : ('ethtool -K', <TCIntf s-eth4>, 'gro', 'off', 'tx', 'on', 'rx', 'on')
(t3, s) *** t4 : ('ip link add name t4-eth0 address 56:e7:c7:3e:82:9c type veth peer name s-eth5 address
9e:9e:08:2c:44:2a netns 5938',)

added intf t4-eth0 (0) to node t4
moving t4-eth0 into namespace for t4
*** t4 : ('ifconfig', 't4-eth0', 'up')
*** t4 : ('ethtool -K', <TCIntf t4-eth0>, 'gro', 'off', 'tx', 'on', 'rx', 'on')

added intf s-eth5 (5) to node s
*** s : ('ifconfig', 's-eth5', 'up')
*** s : ('ethtool -K', <TCIntf s-eth5>, 'gro', 'off', 'tx', 'on', 'rx', 'on')
(t4, s) *** t5 : ('ip link add name t5-eth0 address b6:7a:a7:f4:d3:b5 type veth peer name s-eth6 address
26:d8:da:80:64:14 netns 5938',)

added intf t5-eth0 (0) to node t5
moving t5-eth0 into namespace for t5
*** t5 : ('ifconfig', 't5-eth0', 'up')
*** t5 : ('ethtool -K', <TCIntf t5-eth0>, 'gro', 'off', 'tx', 'on', 'rx', 'on')

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added intf s-eth6 (6) to node s
*** s : ('ifconfig', 's-eth6', 'up')
*** s : ('ethtool -K', '<TCIntf s-eth6>', 'gro', 'off', 'tx', 'on', 'rx', 'on')
(t5, s)
*** Configuring hosts
h1 *** h1 : ('ifconfig', 'h1-eth0', 'down')
*** h1 : ('ifconfig', 'h1-eth0', 'hw', 'ether', '00:00:00:00:00:01')
*** h1 : ('ifconfig', 'h1-eth0', 'up')
*** h1 : ('ifconfig', 'h1-eth0', '10.0.0.1/8', 'up')
*** h1 : ('ifconfig lo up',)
h2 *** h2 : ('ifconfig', 'h2-eth0', 'down')
*** h2 : ('ifconfig', 'h2-eth0', 'hw', 'ether', '00:00:00:00:00:02')
*** h2 : ('ifconfig', 'h2-eth0', 'up')
*** h2 : ('ifconfig', 'h2-eth0', '10.0.0.2/8', 'up')
*** h2 : ('ifconfig lo up',)
h3 *** h3 : ('ifconfig', 'h3-eth0', 'down')
*** h3 : ('ifconfig', 'h3-eth0', 'hw', 'ether', '00:00:00:00:00:03')
*** h3 : ('ifconfig', 'h3-eth0', 'up')
*** h3 : ('ifconfig', 'h3-eth0', '10.0.0.3/8', 'up')
*** h3 : ('ifconfig lo up',)
h4 *** h4 : ('ifconfig', 'h4-eth0', 'down')
*** h4 : ('ifconfig', 'h4-eth0', 'hw', 'ether', '00:00:00:00:00:04')
*** h4 : ('ifconfig', 'h4-eth0', 'up')
*** h4 : ('ifconfig', 'h4-eth0', '10.0.0.4/8', 'up')
*** h4 : ('ifconfig lo up',)
h5 *** h5 : ('ifconfig', 'h5-eth0', 'down')
*** h5 : ('ifconfig', 'h5-eth0', 'hw', 'ether', '00:00:00:00:00:05')
*** h5 : ('ifconfig', 'h5-eth0', 'up')
*** h5 : ('ifconfig', 'h5-eth0', '10.0.0.5/8', 'up')
*** h5 : ('ifconfig lo up',)
r *** r : ('ifconfig', 'r-eth0', 'down')
*** r : ('ifconfig', 'r-eth0', 'hw', 'ether', '00:00:00:00:00:06')
*** r : ('ifconfig', 'r-eth0', 'up')
*** r : ('ifconfig', 'r-eth0', '10.0.0.6/8', 'up')
*** r : ('ifconfig lo up',)
t1 *** t1 : ('ifconfig', 't1-eth0', 'down')
*** t1 : ('ifconfig', 't1-eth0', 'hw', 'ether', '00:00:00:00:01:ff')
*** t1 : ('ifconfig', 't1-eth0', 'up')
*** t1 : ('ifconfig', 't1-eth0', '10.0.0.7/8', 'up')
*** t1 : ('ifconfig lo up',)
t2 *** t2 : ('ifconfig', 't2-eth0', 'down')
*** t2 : ('ifconfig', 't2-eth0', 'hw', 'ether', '00:00:00:00:01:ff')
*** t2 : ('ifconfig', 't2-eth0', 'up')
*** t2 : ('ifconfig', 't2-eth0', '10.0.0.8/8', 'up')
*** t2 : ('ifconfig lo up',)
t3 *** t3 : ('ifconfig', 't3-eth0', 'down')
*** t3 : ('ifconfig', 't3-eth0', 'hw', 'ether', '00:00:00:00:01:ff')
*** t3 : ('ifconfig', 't3-eth0', 'up')
*** t3 : ('ifconfig', 't3-eth0', '10.0.0.9/8', 'up')
*** t3 : ('ifconfig lo up',)
t4 *** t4 : ('ifconfig', 't4-eth0', 'down')
*** t4 : ('ifconfig', 't4-eth0', 'hw', 'ether', '00:00:00:00:01:ff')
*** t4 : ('ifconfig', 't4-eth0', 'up')
*** t4 : ('ifconfig', 't4-eth0', '10.0.0.10/8', 'up')
*** t4 : ('ifconfig lo up',)
t5 *** t5 : ('ifconfig', 't5-eth0', 'down')
*** t5 : ('ifconfig', 't5-eth0', 'hw', 'ether', '00:00:00:00:01:ff')
*** t5 : ('ifconfig', 't5-eth0', 'up')
*** t5 : ('ifconfig', 't5-eth0', '10.0.0.11/8', 'up')
*** t5 : ('ifconfig lo up',)

```

```

_popen ['mnexec', '-cd', 'env', 'PS1=\x7f', 'bash', '--norc', '--noediting', '-is', 'mininet:c'] 6068*** c : ('unset HISTFILE;
stty -echo; set +m'.)
unset HISTFILE; stty -echo; set +m
*** c : ('echo A | telnet -e A 127.0.0.1 6633'.)
Telnet escape character is 'A'.
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is 'A'.

telnet> Connection closed.
*** Starting controller
c0 c
*** Starting 1 switches
s ...*** errRun: ovs-vsctl -- --id=@sc0 create Controller target="tcp:127.0.0.1:6633" max_backoff=1000 -- --id=@sc
create Controller target="tcp:127.0.0.1:6633" max_backoff=1000 -- --if-exists del-br s -- add-br s -- set bridge s
controller=[@sc0,@sc] other_config:datapath-id=0000000000000001 fail_mode=secure other-config:disable-in-
band=true other-config:dp-desc=s -- add-port s s-eth1 -- set Interface s-eth1 ofport_request=1 -- add-port s s-eth2 -- set
Interface s-eth2 ofport_request=2 -- add-port s s-eth3 -- set Interface s-eth3 ofport_request=3 -- add-port s s-eth4 -- set
Interface s-eth4 ofport_request=4 -- add-port s s-eth5 -- set Interface s-eth5 ofport_request=5 -- add-port s s-eth6 -- set
Interface s-eth6 ofport_request=6
2f2022a1-70d1-4664-bcb5-4c58cfebc286
d25473e7-d5f8-49f1-835f-32a6d4614eac
0*** s : ('ifconfig', 's-eth1', 'up')
*** s : ('ethtool -K', <TCIntf s-eth1>, 'gro', 'off', 'tx', 'on', 'rx', 'on')
*** s : ('ifconfig', 's-eth2', 'up')
*** s : ('ethtool -K', <TCIntf s-eth2>, 'gro', 'off', 'tx', 'on', 'rx', 'on')
*** s : ('ifconfig', 's-eth3', 'up')
*** s : ('ethtool -K', <TCIntf s-eth3>, 'gro', 'off', 'tx', 'on', 'rx', 'on')
*** s : ('ifconfig', 's-eth4', 'up')
*** s : ('ethtool -K', <TCIntf s-eth4>, 'gro', 'off', 'tx', 'on', 'rx', 'on')
*** s : ('ifconfig', 's-eth5', 'up')
*** s : ('ethtool -K', <TCIntf s-eth5>, 'gro', 'off', 'tx', 'on', 'rx', 'on')
*** s : ('ifconfig', 's-eth6', 'up')
*** s : ('ethtool -K', <TCIntf s-eth6>, 'gro', 'off', 'tx', 'on', 'rx', 'on')

*** h1 : ('ifconfig h1-eth0 10.0.1.1/24',)
*** h1 : ('ip route add to default via 10.0.1.2 dev h1-eth0',)
*** h2 : ('ifconfig h2-eth0 10.0.2.1/24',)
*** h2 : ('ip route add to default via 10.0.2.2 dev h2-eth0',)
*** h3 : ('ifconfig h3-eth0 10.0.3.1/24',)
*** h3 : ('ip route add to default via 10.0.3.2 dev h3-eth0',)
*** h4 : ('ifconfig h4-eth0 10.0.4.1/24',)
*** h4 : ('ip route add to default via 10.0.4.2 dev h4-eth0',)
*** h5 : ('ifconfig h5-eth0 10.0.5.1/24',)
*** h5 : ('ip route add to default via 10.0.5.2 dev h5-eth0',)
*** r : ('ifconfig r-eth1 10.0.1.2/24',)
*** r : ('ifconfig r-eth2 10.0.2.2/24',)
*** r : ('ifconfig r-eth3 10.0.3.2/24',)
*** r : ('ifconfig r-eth4 10.0.4.2/24',)
*** r : ('ifconfig r-eth5 10.0.5.2/24',)
*** r : ('sysctl net.ipv4.ip_forward=1',)
net.ipv4.ip_forward = 1
*** r : ('ifconfig r-eth0 10.0.0.2/24',)
*** r : ('arp -s 10.0.0.1 00:00:00:00:01:ff',)
*** t1 : ('ifconfig t1-eth0 10.0.0.1/24',)
*** t1 : ('ip route add to default via 10.0.0.2 dev t1-eth0',)
*** t1 : ('arp -s 10.0.0.2 00:00:00:00:00:04',)
*** t1 : ('/usr/sbin/sshd',)
*** t2 : ('ifconfig t2-eth0 10.0.0.1/24',)
*** t2 : ('ip route add to default via 10.0.0.2 dev t2-eth0',)
*** t2 : ('arp -s 10.0.0.2 00:00:00:00:00:04',)
*** t2 : ('/usr/sbin/sshd',)
*** t3 : ('ifconfig t3-eth0 10.0.0.1/24',)

```

```

*** t3 : ('ip route add to default via 10.0.0.2 dev t3-eth0',)
*** t3 : ('arp -s 10.0.0.2 00:00:00:00:00:04',)
*** t3 : ('usr/sbin/sshd',)
*** t4 : ('ifconfig t4-eth0 10.0.0.1/24',)
*** t4 : ('ip route add to default via 10.0.0.2 dev t4-eth0',)
*** t4 : ('arp -s 10.0.0.2 00:00:00:00:00:04',)
*** t4 : ('usr/sbin/sshd',)
*** t5 : ('ifconfig t5-eth0 10.0.0.1/24',)
*** t5 : ('ip route add to default via 10.0.0.2 dev t5-eth0',)
*** t5 : ('arp -s 10.0.0.2 00:00:00:00:00:04',)
*** t5 : ('usr/sbin/sshd',)
*** Starting CLI:
*** errRun: ['stty', 'echo', 'sane', 'intr', '^C']
  Omininet> h1 ssh 10.0.0.1 ifconfig
*** errRun: ['stty', '-icanon', 'min', '1']
  0^CsendInt: writing chr(3)

```

```

mininet> h1 ssh 10.0.0.1 ifconfig
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```

```

mininet> h1 ssh 10.0.0.1 ifconfig
*** errRun: ['stty', '-icanon', 'min', '1']
  0^CsendInt: writing chr(3)

```

```

mininet> sh ovs-ofctl dump-flows s

```

```

cookie=0x0, duration=74.074s, table=0, n_packets=0, n_bytes=0, icmp,in_port="s-eth1" actions=output:"s-eth2"
cookie=0x0, duration=74.074s, table=0, n_packets=0, n_bytes=0, icmp,in_port="s-eth2" actions=output:"s-eth1"
cookie=0x0, duration=50.774s, table=0, n_packets=2, n_bytes=148,
tcp,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:01:ff,nw_src=10.0.1.1,nw_dst=10.0.0.1,tp_src=46256,tp_dst=22
actions=output:"s-eth2"
cookie=0x0, duration=50.774s, table=0, n_packets=0, n_bytes=0,
tcp,dl_src=00:00:00:00:01:ff,dl_dst=00:00:00:00:00:06,nw_src=10.0.0.1,nw_dst=10.0.1.1,tp_src=22,tp_dst=46256
actions=output:"s-eth1"
cookie=0x0, duration=49.745s, table=0, n_packets=6, n_bytes=444,
tcp,dl_src=00:00:00:00:01:ff,dl_dst=00:00:00:00:00:04,nw_src=10.0.0.1,nw_dst=10.0.1.1,tp_src=22,tp_dst=46256
actions=output:"s-eth3"

```

[illegible]

```
cookie=0x0, duration=26.998s, table=0, n_packets=1, n_bytes=74,  
tcp,d_l_src=00:00:00:00:00:06,d_l_dst=00:00:00:00:01:ff,nw_src=10.0.1.1,nw_dst=10.0.0.1,tp_src=53084,tp_dst=22  
actions=output:"s-eth5"  
cookie=0x0, duration=26.998s, table=0, n_packets=0, n_bytes=0,  
tcp,d_l_src=00:00:00:00:00:01:ff,d_l_dst=00:00:00:00:00:06,nw_src=10.0.0.1,nw_dst=10.0.1.1,tp_src=22,tp_dst=53084  
actions=output:"s-eth1"  
cookie=0x0, duration=25.968s, table=0, n_packets=4, n_bytes=296,  
tcp,d_l_src=00:00:00:00:00:04,d_l_dst=00:00:00:00:00:04,nw_src=10.0.0.1,nw_dst=10.0.1.1,tp_src=22,tp_dst=53084  
actions=output:"s-eth3"  
cookie=0x0, duration=25.968s, table=0, n_packets=0, n_bytes=0,  
tcp,d_l_src=00:00:00:00:00:04,d_l_dst=00:00:00:00:01:ff,nw_src=10.0.1.1,nw_dst=10.0.0.1,tp_src=53084,tp_dst=22  
actions=output:"s-eth1"  
cookie=0x0, duration=23.584s, table=0, n_packets=1, n_bytes=74,  
tcp,d_l_src=00:00:00:00:00:06,d_l_dst=00:00:00:00:01:ff,nw_src=10.0.1.1,nw_dst=10.0.0.1,tp_src=53096,tp_dst=22  
actions=output:"s-eth4"  
cookie=0x0, duration=23.584s, table=0, n_packets=0, n_bytes=0,  
tcp,d_l_src=00:00:00:00:01:ff,d_l_dst=00:00:00:00:00:06,nw_src=10.0.0.1,nw_dst=10.0.1.1,tp_src=22,tp_dst=53096  
actions=output:"s-eth1"  
cookie=0x0, duration=22.576s, table=0, n_packets=4, n_bytes=296,  
tcp,d_l_src=00:00:00:00:01:ff,d_l_dst=00:00:00:00:00:04,nw_src=10.0.0.1,nw_dst=10.0.1.1,tp_src=22,tp_dst=53096  
actions=output:"s-eth3"  
cookie=0x0, duration=22.576s, table=0, n_packets=0, n_bytes=0,  
tcp,d_l_src=00:00:00:00:00:04,d_l_dst=00:00:00:00:01:ff,nw_src=10.0.1.1,nw_dst=10.0.0.1,tp_src=53096,tp_dst=22  
actions=output:"s-eth1"  
cookie=0x0, duration=20.768s, table=0, n_packets=1, n_bytes=74,  
tcp,d_l_src=00:00:00:00:00:06,d_l_dst=00:00:00:00:01:ff,nw_src=10.0.1.1,nw_dst=10.0.0.1,tp_src=53102,tp_dst=22  
actions=output:"s-eth4"  
cookie=0x0, duration=20.768s, table=0, n_packets=0, n_bytes=0,  
tcp,d_l_src=00:00:00:00:01:ff,d_l_dst=00:00:00:00:00:06,nw_src=10.0.0.1,nw_dst=10.0.1.1,tp_src=22,tp_dst=53102  
actions=output:"s-eth1"  
cookie=0x0, duration=19.760s, table=0, n_packets=4, n_bytes=296,  
tcp,d_l_src=00:00:00:00:00:01:ff,d_l_dst=00:00:00:00:00:04,nw_src=10.0.0.1,nw_dst=10.0.1.1,tp_src=22,tp_dst=53102  
actions=output:"s-eth6"  
cookie=0x0, duration=19.760s, table=0, n_packets=0, n_bytes=0,  
tcp,d_l_src=00:00:00:00:00:04,d_l_dst=00:00:00:00:01:ff,nw_src=10.0.1.1,nw_dst=10.0.0.1,tp_src=53102,tp_dst=22  
actions=output:"s-eth1"  
mininet>
```

```
Activities Terminal Apr 14 14:51 dubuntu@dubuntu: ~/mininet/custom

0xCsendInt: writing chr(3)

mininet> h1 ssh 10.0.0.1 ifconfig
*** errRun: ['stty', '-icanon', 'min', '1']
0xCsendInt: writing chr(3)

mininet> h1 ssh 10.0.0.1 ifconfig
*** errRun: ['stty', '-icanon', 'min', '1']
0xCsendInt: writing chr(3)

mininet> h1 ssh 10.0.0.1 ifconfig
*** errRun: ['stty', '-icanon', 'min', '1']
0xCsendInt: writing chr(3)

mininet> h1 ssh 10.0.0.1 ifconfig
*** errRun: ['stty', '-icanon', 'min', '1']
0xCsendInt: writing chr(3)

mininet> sh ovs-ofctl dump-flows s
cookie=0x0, duration=74.074s, table=0, n_packets=0, n_bytes=0, icmp,in_port="s-eth1" actions=output:"s-eth2"
cookie=0x0, duration=74.074s, table=0, n_packets=0, n_bytes=0, icmp,in_port="s-eth2" actions=output:"s-eth1"
cookie=0x0, duration=50.774s, table=0, n_packets=2, n_bytes=148, tcp,d_l_src=00:00:00:00:00:06,d_l_dst=00:00:00:00:01:ff,nw_src=10.0.1.1,nw_dst=10.0.0.1,tp_src=46256,tp_dst=22 actions=output:"s-eth2"
cookie=0x0, duration=50.774s, table=0, n_packets=0, n_bytes=0, tcp,d_l_src=00:00:00:00:01:ff,d_l_dst=00:00:00:00:00:06,nw_src=10.0.0.1,nw_dst=10.0.1.1,tp_src=22,tp_dst=46256 actions=output:"s-eth1"
cookie=0x0, duration=49.745s, table=0, n_packets=6, n_bytes=444, tcp,d_l_src=00:00:00:00:01:ff,d_l_dst=00:00:00:00:00:04,nw_src=10.0.0.1,nw_dst=10.0.1.1,tp_src=22,tp_dst=46256 actions=output:"s-eth3"
cookie=0x0, duration=49.745s, table=0, n_packets=0, n_bytes=0, tcp,d_l_src=00:00:00:00:00:04,d_l_dst=00:00:00:00:01:ff,nw_src=10.0.1.1,nw_dst=10.0.0.1,tp_src=46256,tp_dst=22 actions=output:"s-eth1"
cookie=0x0, duration=45.702s, table=0, n_packets=1, n_bytes=74, tcp,d_l_src=00:00:00:00:00:06,d_l_dst=00:00:00:00:01:ff,nw_src=10.0.1.1,nw_dst=10.0.0.1,tp_src=41180,tp_dst=22 actions=output:"s-eth2"
cookie=0x0, duration=45.702s, table=0, n_packets=0, n_bytes=0, tcp,d_l_src=00:00:00:00:01:ff,d_l_dst=00:00:00:00:00:06,nw_src=10.0.0.1,nw_dst=10.0.1.1,tp_src=22,tp_dst=41180 actions=output:"s-eth1"
cookie=0x0, duration=44.688s, table=0, n_packets=5, n_bytes=370, tcp,d_l_src=00:00:00:00:01:ff,d_l_dst=00:00:00:00:00:04,nw_src=10.0.0.1,nw_dst=10.0.1.1,tp_src=41180,tp_dst=41180 actions=output:"s-eth4"
cookie=0x0, duration=44.688s, table=0, n_packets=0, n_bytes=0, tcp,d_l_src=00:00:00:00:00:04,d_l_dst=00:00:00:00:01:ff,nw_src=10.0.1.1,nw_dst=10.0.0.1,tp_src=41180,tp_dst=22 actions=output:"s-eth1"
cookie=0x0, duration=42.928s, table=0, n_packets=1, n_bytes=74, tcp,d_l_src=00:00:00:00:00:06,d_l_dst=00:00:00:00:01:ff,nw_src=10.0.1.1,nw_dst=10.0.0.1,tp_src=41186,tp_dst=22 actions=output:"s-eth2"
cookie=0x0, duration=42.928s, table=0, n_packets=0, n_bytes=0, tcp,d_l_src=00:00:00:00:01:ff,d_l_dst=00:00:00:00:00:06,nw_src=10.0.0.1,nw_dst=10.0.1.1,tp_src=22,tp_dst=41186 actions=output:"s-eth1"
cookie=0x0, duration=41.904s, table=0, n_packets=5, n_bytes=370, tcp,d_l_src=00:00:00:00:01:ff,d_l_dst=00:00:00:00:00:04,nw_src=10.0.0.1,nw_dst=10.0.1.1,tp_src=41186,tp_dst=41186 actions=output:"s-eth4"
cookie=0x0, duration=41.904s, table=0, n_packets=0, n_bytes=0, tcp,d_l_src=00:00:00:00:00:04,d_l_dst=00:00:00:00:01:ff,nw_src=10.0.1.1,nw_dst=10.0.0.1,tp_src=41186,tp_dst=22 actions=output:"s-eth1"
cookie=0x0, duration=38.565s, table=0, n_packets=1, n_bytes=74, tcp,d_l_src=00:00:00:00:00:06,d_l_dst=00:00:00:00:01:ff,nw_src=10.0.1.1,nw_dst=10.0.0.1,tp_src=41186,tp_dst=22 actions=output:"s-eth1"
```

```
Activities Terminal Apr 14 14:52 dubuntu@dubuntu: ~/mininet/custom dubuntu@dubuntu: ~

cookie=0x0, duration=29.232s, table=0, n_packets=4, n_bytes=296, tcp,d_l_src=00:00:00:00:01:ff,d_l_dst=00:00:00:00:00:04,nw_src=10.0.0.1,nw_dst=10.0.1.1,tp_src=22,tp_dst=34756 actions=output:"s-eth6"
cookie=0x0, duration=29.232s, table=0, n_packets=0, n_bytes=0, tcp,d_l_src=00:00:00:00:00:04,d_l_dst=00:00:00:00:01:ff,nw_src=10.0.1.1,nw_dst=10.0.0.1,tp_src=34756,tp_dst=22 actions=output:"s-eth1"
cookie=0x0, duration=26.998s, table=0, n_packets=1, n_bytes=74, tcp,d_l_src=00:00:00:00:00:06,d_l_dst=00:00:00:00:01:ff,nw_src=10.0.0.1,nw_dst=10.0.1.1,tp_src=53084,tp_dst=22 actions=output:"s-eth5"
cookie=0x0, duration=26.998s, table=0, n_packets=0, n_bytes=0, tcp,d_l_src=00:00:00:00:01:ff,d_l_dst=00:00:00:00:00:06,nw_src=10.0.0.1,nw_dst=10.0.1.1,tp_src=53084,tp_dst=22 actions=output:"s-eth1"
cookie=0x0, duration=25.968s, table=0, n_packets=4, n_bytes=296, tcp,d_l_src=00:00:00:00:01:ff,d_l_dst=00:00:00:00:00:06,nw_src=10.0.0.1,nw_dst=10.0.1.1,tp_src=22,tp_dst=53084 actions=output:"s-eth3"
cookie=0x0, duration=25.968s, table=0, n_packets=0, n_bytes=0, tcp,d_l_src=00:00:00:00:00:04,d_l_dst=00:00:00:00:01:ff,nw_src=10.0.1.1,nw_dst=10.0.0.1,tp_src=53084,tp_dst=22 actions=output:"s-eth1"
cookie=0x0, duration=23.584s, table=0, n_packets=1, n_bytes=74, tcp,d_l_src=00:00:00:00:01:ff,d_l_dst=00:00:00:00:00:06,nw_src=10.0.1.1,nw_dst=10.0.1.1,tp_src=53096,tp_dst=22 actions=output:"s-eth4"
cookie=0x0, duration=23.584s, table=0, n_packets=0, n_bytes=0, tcp,d_l_src=00:00:00:00:01:ff,d_l_dst=00:00:00:00:00:06,nw_src=10.0.0.1,nw_dst=10.0.1.1,tp_src=53096,tp_dst=22 actions=output:"s-eth1"
cookie=0x0, duration=22.576s, table=0, n_packets=4, n_bytes=296, tcp,d_l_src=00:00:00:00:01:ff,d_l_dst=00:00:00:00:00:04,nw_src=10.0.0.1,nw_dst=10.0.1.1,tp_src=22,tp_dst=53096 actions=output:"s-eth3"
cookie=0x0, duration=22.576s, table=0, n_packets=0, n_bytes=0, tcp,d_l_src=00:00:00:00:00:04,d_l_dst=00:00:00:00:01:ff,nw_src=10.0.1.1,nw_dst=10.0.0.1,tp_src=53096,tp_dst=22 actions=output:"s-eth1"
cookie=0x0, duration=20.768s, table=0, n_packets=1, n_bytes=74, tcp,d_l_src=00:00:00:00:01:ff,d_l_dst=00:00:00:00:00:06,nw_src=10.0.0.1,nw_dst=10.0.1.1,tp_src=53102,tp_dst=22 actions=output:"s-eth4"
cookie=0x0, duration=20.768s, table=0, n_packets=0, n_bytes=0, tcp,d_l_src=00:00:00:00:01:ff,d_l_dst=00:00:00:00:00:06,nw_src=10.0.0.1,nw_dst=10.0.1.1,tp_src=53102,tp_dst=22 actions=output:"s-eth1"
cookie=0x0, duration=19.760s, table=0, n_packets=4, n_bytes=296, tcp,d_l_src=00:00:00:00:01:ff,d_l_dst=00:00:00:00:00:04,nw_src=10.0.0.1,nw_dst=10.0.1.1,tp_src=22,tp_dst=53102 actions=output:"s-eth6"
cookie=0x0, duration=19.760s, table=0, n_packets=0, n_bytes=0, tcp,d_l_src=00:00:00:00:00:04,d_l_dst=00:00:00:00:01:ff,nw_src=10.0.1.1,nw_dst=10.0.0.1,tp_src=53102,tp_dst=22 actions=output:"s-eth1"

mininet>
```