

Display Changed IP Address of Mininet

mininet@mininet-vm:~\$ ifconfig

```
eth0   Link encap:Ethernet HWaddr 08:00:27:5f:6a:de
        inet addr:10.0.2.15 Bcast:10.0.2.255 Mask:255.255.255.0
        UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
        RX packets:58 errors:0 dropped:0 overruns:0 frame:0
        TX packets:237 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:18350 (18.3 KB) TX bytes:20878 (20.8 KB)

eth1   Link encap:Ethernet HWaddr 08:00:27:7a:3a:5a
        inet addr:192.168.106.101 Bcast:192.168.106.255 Mask:255.255.255.0
        UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
        RX packets:73 errors:0 dropped:0 overruns:0 frame:0
        TX packets:49 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:9543 (9.5 KB) TX bytes:6964 (6.9 KB)

lo     Link encap:Local Loopback
        inet addr:127.0.0.1 Mask:255.0.0.0
        UP LOOPBACK RUNNING MTU:65536 Metric:1
        RX packets:80 errors:0 dropped:0 overruns:0 frame:0
        TX packets:80 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
        RX bytes:6368 (6.3 KB) TX bytes:6368 (6.3 KB)
```

Display Changed IP Address of OPEN BSD

ifconfig

```
lo0: flags=8049<UP,LOOPBACK,RUNNING,MULTICAST> mtu 33192
    priority: 0
    groups: lo
    inet6 ::1 prefixlen 128
    inet6 fe80::1%lo0 prefixlen 64 scopeid 0x4
    inet 127.0.0.1 netmask 0xff000000

em0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
    lladdr 08:00:27:0d:49:c5
    priority: 0
    groups: egress
    media: Ethernet autoselect (1000baseT full-duplex)
    status: active
    inet6 fe80::a00:27ff:fe0d:49c5%em0 prefixlen 64 scopeid 0x1
    inet 10.0.2.15 netmask 0xfffff00 broadcast 10.0.2.255

em1: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
    lladdr 08:00:27:04:9c:50
    priority: 0
    media: Ethernet autoselect (1000baseT full-duplex)
    status: active
    inet6 fe80::a00:27ff:fe04:9c50%em1 prefixlen 64 scopeid 0x2
    inet 192.168.116.101 netmask 0xfffff00 broadcast 192.168.116.255

enc0: flags=0<>
    priority: 0
    groups: enc
    status: active
```

pflog0: flags=141<UP,RUNNING,PROMISC> mtu 33192
priority: 0
groups: pflog

Change IP Address of h1,h2

mininet> h1 ifconfig

h1-eth0 Link encap:Ethernet HWaddr a6:c8:63:33:78:00
inet addr:10.0.0.1 Bcast:10.255.255.255 Mask:255.0.0.0
inet6 addr: fe80::a4c8:63ff:fe33:7800/64 Scope:Link
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:5 errors:0 dropped:0 overruns:0 frame:0
TX packets:6 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:378 (378.0 B) TX bytes:468 (468.0 B)

lo Link encap:Local Loopback
inet addr:127.0.0.1 Mask:255.0.0.0
inet6 addr: ::1/128 Scope:Host
UP LOOPBACK RUNNING MTU:65536 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)

mininet> **h1 ifconfig h1-eth0 172.16.1.1 netmask 255.255.255.0**

mininet> h1 ifconfig

h1-eth0 Link encap:Ethernet HWaddr a6:c8:63:33:78:00
inet addr:172.16.1.1 Bcast:172.16.1.255 Mask:255.255.255.0
inet6 addr: fe80::a4c8:63ff:fe33:7800/64 Scope:Link
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:5 errors:0 dropped:0 overruns:0 frame:0
TX packets:6 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:378 (378.0 B) TX bytes:468 (468.0 B)

lo Link encap:Local Loopback
inet addr:127.0.0.1 Mask:255.0.0.0
inet6 addr: ::1/128 Scope:Host
UP LOOPBACK RUNNING MTU:65536 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)

Change IP Address of h1,h2

mininet> h2 ifconfig

h2-eth0 Link encap:Ethernet HWaddr f2:e7:e5:a5:b6:fb
inet addr:10.0.0.2 Bcast:10.255.255.255 Mask:255.0.0.0
inet6 addr: fe80::f0e7:e5ff:fea5:b6fb/64 Scope:Link
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:5 errors:0 dropped:0 overruns:0 frame:0
TX packets:6 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000

RX bytes:378 (378.0 B) TX bytes:468 (468.0 B)

```
lo    Link encap:Local Loopback
      inet addr:127.0.0.1  Mask:255.0.0.0
      inet6 addr: ::1/128 Scope:Host
      UP LOOPBACK RUNNING  MTU:65536  Metric:1
      RX packets:0 errors:0 dropped:0 overruns:0 frame:0
      TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
      collisions:0 txqueuelen:0
      RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

```
mininet> h2 ifconfig h2-eth0 172.16.1.2 netmask 255.255.255.0
mininet> h2 ifconfig
h2-eth0  Link encap:Ethernet  HWaddr f2:e7:e5:a5:b6:fb
          inet addr:172.16.1.2  Bcast:172.16.1.255  Mask:255.255.255.0
          inet6 addr: fe80::f0e7:e5ff:fea5:b6fb/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:5 errors:0 dropped:0 overruns:0 frame:0
          TX packets:6 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:378 (378.0 B)  TX bytes:468 (468.0 B)
```

```
lo    Link encap:Local Loopback
      inet addr:127.0.0.1  Mask:255.0.0.0
      inet6 addr: ::1/128 Scope:Host
      UP LOOPBACK RUNNING  MTU:65536  Metric:1
      RX packets:0 errors:0 dropped:0 overruns:0 frame:0
      TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
      collisions:0 txqueuelen:0
      RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

Test Connectivity

```
mininet> pingall
*** Ping: testing ping reachability
h1 -> X
h2 -> X
*** Results: 100% dropped (0/2 received)
mininet> h1 ping 172.16.1.2
PING 172.16.1.2 (172.16.1.2) 56(84) bytes of data.
64 bytes from 172.16.1.2: icmp_req=1 ttl=64 time=3.36 ms
64 bytes from 172.16.1.2: icmp_req=2 ttl=64 time=0.044 ms
64 bytes from 172.16.1.2: icmp_req=3 ttl=64 time=0.035 ms
64 bytes from 172.16.1.2: icmp_req=4 ttl=64 time=0.035 ms
^C
--- 172.16.1.2 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 2999ms
rtt min/avg/max/mdev = 0.035/0.870/3.369/1.442 ms
mininet>
```

```
Activities Terminal Wed 12:00 mininet@mininet-vm: ~
mininet@mininet-vm: ~
File Edit View Search Terminal Tabs Help
Group6@group6d- mininet@mininet-vm: ~
mininet@mininet-vm:~$ ifconfig
eth0      Link encap:Ethernet  HWaddr 08:08:27:5f:6a:dc
          inet addr:10.0.2.15  Bcast:10.0.2.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:50 errors:0 dropped:0 overruns:0 frame:0
          TX packets:237 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:18350 (18.3 KB)  TX bytes:28876 (28.8 KB)

eth1      Link encap:Ethernet  HWaddr 08:08:27:7a:3a:5e
          inet addr:192.168.106.101  Bcast:192.168.106.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:73 errors:0 dropped:0 overruns:0 frame:0
          TX packets:49 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:9543 (9.5 KB)  TX bytes:6964 (6.9 KB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:88 errors:0 dropped:0 overruns:0 frame:0
          TX packets:88 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:6368 (6.3 KB)  TX bytes:6368 (6.3 KB)

mininet@mininet-vm:~$
```

```
Activities Terminal Wed 12:00 Group6
Group6@group6d~
File Edit View Search Terminal Tabs Help

Group6@group6d~
mininet@mininet-vm ~

[Group6@group6d ~]$ ssh -x root@192.168.116.101
root@192.168.116.101's password:
Last login: Tue Apr 29 18:36:50 2014 from 192.168.116.1
OpenBSD 5.4 (GENERIC) #37: Tue Jul 30 12:05:01 MDT 2013

Welcome to OpenBSD! The proactively secure Unix-like operating system.

Please use the sendbug(1) utility to report bugs in the system.
Before reporting a bug, please try to reproduce it with the latest
version of the code. With bug reports, please try to ensure that
enough information to reproduce the problem is enclosed, and if a
known fix for it exists, include that as well.

# ifconfig
lo0: flags=8049<UP,LOOPBACK,RUNNING,MULTICAST> mtu 33192
    priority: 0
    groups: lo
    inet6 ::1 prefixlen 128
    inet6 fe80::1%lo0 prefixlen 64 scopeid 0x4
    inet 127.0.0.1 netmask 0xffff0000
en0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
    lladdr 08:00:27:0d:49:c5
    priority: 0
    groups: egress
    media: Ethernet autoselect (1000baseT full-duplex)
    status: active
    inet6 fe80::a08:27ff:fe0d:49c5%en0 prefixlen 64 scopeid 0x1
    inet 10.0.2.15 netmask 0xfffff000 broadcast 10.0.2.255
en1: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
    lladdr 08:00:27:04:9c:50
    priority: 0
    media: Ethernet autoselect (1000baseT full-duplex)
    status: active
    inet6 fe80::a08:27ff:fe04:9c50%en1 prefixlen 64 scopeid 0x2
    inet 192.168.116.101 netmask 0xfffff000 broadcast 192.168.116.255
enc0: flags=0<>
    priority: 0
    groups: enc
    status: active
pflog0: flags=141<UP,RUNNING,PROMISC> mtu 33192
    priority: 0
    groups: pflog
#
```

```
Activities | Terminal | Wed 12:11 | mininet@mininet-vm: ~
mininet@mininet-vm: ~
File Edit View Search Terminal Tabs Help
mininet@mininet-vm: ~
*** Configuring hosts
h1 h2
*** Starting controller
*** Starting 1 switches
s1
*** Starting CLI:
mininet> h1 ifconfig 172.16.1.1
172.16.1.1: error fetching interface information: Device not found
mininet> clear
*** Unknown command: clear
mininet> h1 ifconfig
h1-eth0 Link encap:Ethernet HWaddr a6:c8:63:33:78:00
        inet addr:18.8.0.1 Bcast:10.255.255.255 Mask:255.0.0.0
        inet6 addr: fe80::a4c8:63ff:fe33:7888/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
        RX packets:5 errors:0 dropped:0 overruns:0 frame:0
        TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:370 (370.0 B) TX bytes:460 (460.0 B)

lo Link encap:Local Loopback
        inet addr:127.0.0.1 Mask:255.0.0.0
        inet6 addr: ::1/128 Scope:Host
        UP LOOPBACK RUNNING MTU:65536 Metric:1
        RX packets:0 errors:0 dropped:0 overruns:0 frame:0
        TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
        RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)

mininet> h1 ifconfig h1-eth0 172.16.1.1 netmask 255.255.255.0
mininet> h1 ifconfig
h1-eth0 Link encap:Ethernet HWaddr a6:c8:63:33:78:00
        inet addr:172.16.1.1 Bcast:172.16.1.255 Mask:255.255.255.0
        inet6 addr: fe80::a4c8:63ff:fe33:7888/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
        RX packets:5 errors:0 dropped:0 overruns:0 frame:0
        TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:370 (370.0 B) TX bytes:460 (460.0 B)

lo Link encap:Local Loopback
        inet addr:127.0.0.1 Mask:255.0.0.0
        inet6 addr: ::1/128 Scope:Host
        UP LOOPBACK RUNNING MTU:65536 Metric:1
        RX packets:0 errors:0 dropped:0 overruns:0 frame:0
        TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
        RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)

mininet> 
```

```
Activities Terminal Wed 12:14 mininet@mininet-vm: ~
File Edit View Search Terminal Tabs Help
Group6@group6d- mininet@mininet-vm: ~

mininet>
Interrupt
mininet> h2 ifconfig
h2-eth0 Link encap:Ethernet HWaddr f2:e7:a5:a5:b6:fb
        inet addr:10.0.0.2 Bcast:10.255.255.255 Mask:255.0.0.0
        inet6 addr: fe80::f0e7:a5ff:fea5:b6fb/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
        RX packets:5 errors:0 dropped:0 overruns:0 frame:0
        TX packets:6 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:378 (378.0 B) TX bytes:468 (468.0 B)

lo Link encap:Local Loopback
   inet addr:127.0.0.1 Mask:255.0.0.0
   inet6 addr: ::1/128 Scope:Host
   UP LOOPBACK RUNNING MTU:65536 Metric:1
   RX packets:0 errors:0 dropped:0 overruns:0 frame:0
   TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
   collisions:0 txqueuelen:0
   RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)

mininet>
Interrupt
mininet> h1 ifconfig h1-eth8 172.16.1.1 netmask 255.255.255.0
mininet> h2 ifconfig h1-eth8 172.16.1.2 netmask 255.255.255.0
STOCSIFADDR: No such device
h1-eth0: ERROR while getting interface flags: No such device
STOCSIFNETMASK: No such device
mininet> h2 ifconfig h2-eth0 172.16.1.2 netmask 255.255.255.0
mininet> h2 ifconfig
h2-eth0 Link encap:Ethernet HWaddr f2:e7:a5:a5:b6:fb
        inet addr:172.16.1.2 Bcast:172.16.1.255 Mask:255.255.255.0
        inet6 addr: fe80::f0e7:a5ff:fea5:b6fb/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
        RX packets:5 errors:0 dropped:0 overruns:0 frame:0
        TX packets:6 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:378 (378.0 B) TX bytes:468 (468.0 B)

lo Link encap:Local Loopback
   inet addr:127.0.0.1 Mask:255.0.0.0
   inet6 addr: ::1/128 Scope:Host
   UP LOOPBACK RUNNING MTU:65536 Metric:1
   RX packets:0 errors:0 dropped:0 overruns:0 frame:0
   TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
   collisions:0 txqueuelen:0
   RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)

mininet> 
```

```
Activities | Terminal Wed 12:16
mininet@mininet-vm: ~
File Edit View Search Terminal Tabs Help
Group0@group0: ~
mininet@mininet-vm: ~
h1-eth0:
  inet6 addr: ::1/128 Scope:Host
  UP LOOPBACK RUNNING MTU:65536 Metric:1
  RX packets:0 errors:0 dropped:0 overruns:0 frame:0
  TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
  collisions:0 txqueuelen:0
  RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)

mininet>
mininet> Interrupt
mininet> h1 ifconfig h1-eth0 172.16.1.1 netmask 255.255.255.0
mininet> h2 ifconfig h1-eth0 172.16.1.2 netmask 255.255.255.0
SIOCSIFADDR: No such device
h1-eth0: ERROR while getting interface flags: No such device
SIOCSIFNETMASK: No such device
mininet> h2 ifconfig h2-eth0 172.16.1.2 netmask 255.255.255.0
mininet> h2 ifconfig
h2-eth0:
  Link encap:Ethernet HWaddr 02:07:e5:a5:b6:fb
  inet addr:172.16.1.2 Bcast:172.16.1.255 Mask:255.255.255.0
  inet6 addr: fe80::f8e7:e5ff:fea5:b6fb/64 Scope:Link
  UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
  RX packets:5 errors:0 dropped:0 overruns:0 frame:0
  TX packets:6 errors:0 dropped:0 overruns:0 carrier:0
  collisions:0 txqueuelen:1000
  RX bytes:378 (378.0 B) TX bytes:468 (468.0 B)

lo:
  Link encap:Local Loopback
  inet addr:127.0.0.1 Mask:255.0.0.0
  inet6 addr: ::1/128 Scope:Host
  UP LOOPBACK RUNNING MTU:65536 Metric:1
  RX packets:0 errors:0 dropped:0 overruns:0 frame:0
  TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
  collisions:0 txqueuelen:0
  RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)

mininet> pingall
*** Ping: testing ping reachability
h1 -> X
h2 -> X
*** Results: 100% dropped (0/2 received)
mininet> h1 ping 172.16.1.2
PING 172.16.1.2 (172.16.1.2) 56(84) bytes of data:
64 bytes from 172.16.1.2: icmp_req=1 ttl=64 time=3.36 ms
64 bytes from 172.16.1.2: icmp_req=2 ttl=64 time=0.044 ms
64 bytes from 172.16.1.2: icmp_req=3 ttl=64 time=0.035 ms
64 bytes from 172.16.1.2: icmp_req=4 ttl=64 time=0.035 ms
^C
--- 172.16.1.2 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 2999ms
rtt min/avg/max/mdev = 0.035/0.076/3.369/1.442 ms
mininet>
```

Which configuration files in OpenBSD and Linux (Mininet VM) are used to save the IP address configuration between reboots?

Mininet: We can modify the files in the directory /etc/network

OpenBSD: We can modify the files in the directories /etc/hostname.em0 and /etc/hostname.em1

What are the default addresses assigned to hosts h1 and h2?

For host one it is h1=10.0.0.1

For host two it is h2=10.0.0.2

Change the IP address on host h1 to 172.16.1.1.

Change the IP address on host h2 to 172.16.1.2.

How did you make these changes?

The command used for host 1 is mininet> py h1.setIP('172.16.1.1',24)

The command used for host 2 is mininet> py h2.setIP('172.16.1.2',24)

Does "pingall" work? Why?

yes