

New York University Computer Science Department Courant Institute of Mathematical Sciences

Course Title: Data Communications & Networks
Instructor: Jean-Claude Franchitti

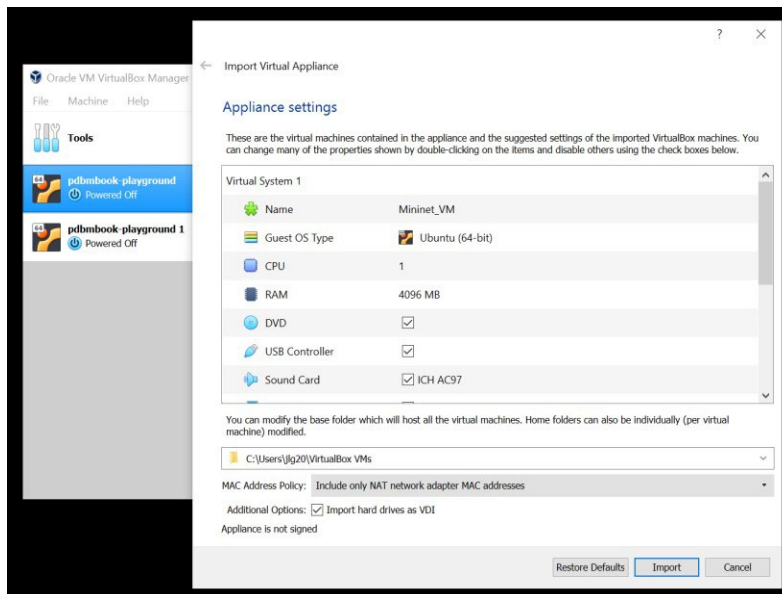
Course Number: CSCI-GA.2662-001
Session: 12

Assignment 8: Final Project Support Documentation

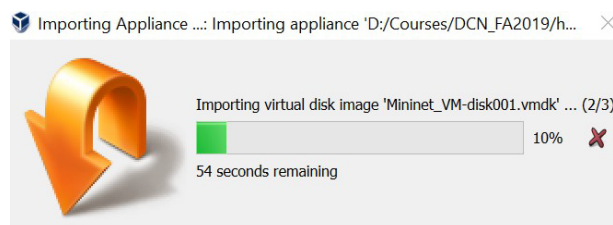
Virtual Box Software Instructions

Oracle Virtual Box v6.0

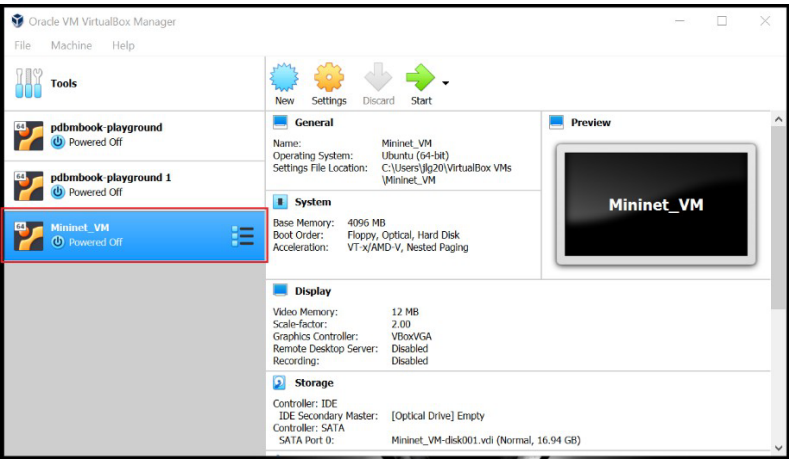
1. Double-click on the Mininet_VM.ova file → it should launch Oracle VM VirtualBox Manager
2. Should get prompted to import the virtual appliance, and so click “Import”:



3. Will get a status bar:

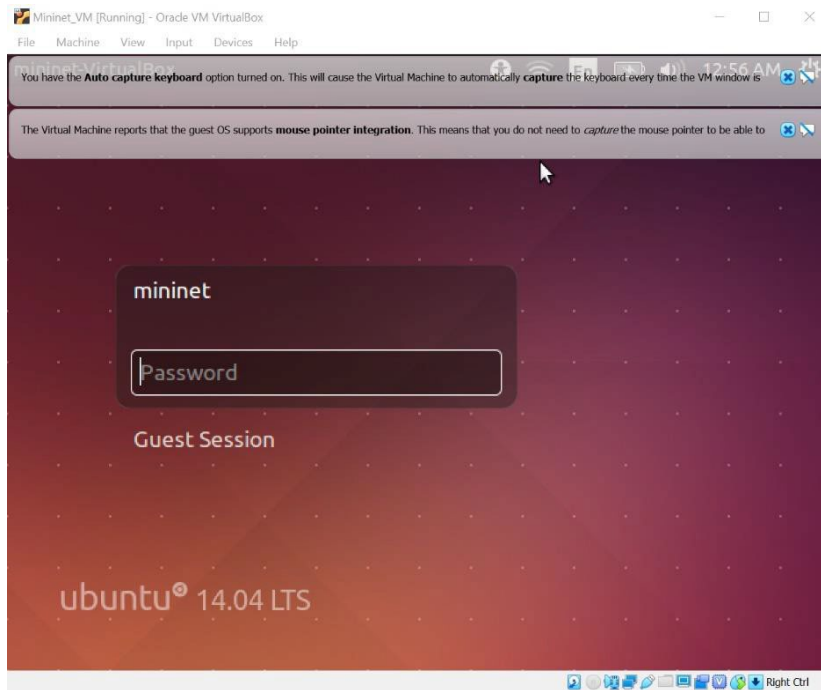


4. After the virtual appliance imports, it should be listed in the Oracle VM VirtualBox Manager:



5. Double-click on the Mininet_VM virtual appliance to launch it (the username and password are provided in the homework specification):

NOTE: if prompted to update Ubuntu, click “Don’t Upgrade”.



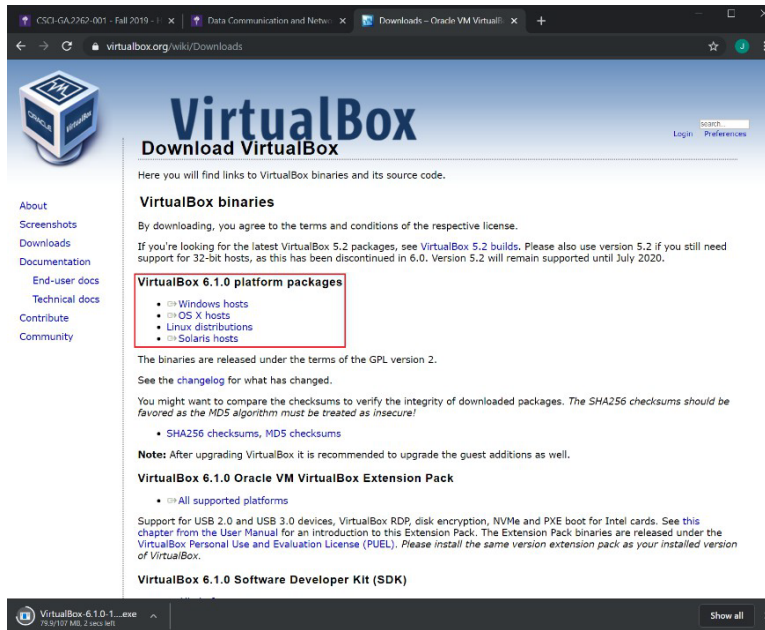
6. After logging in, all necessary software is provided.

Oracle Virtual Box v6.1

1. Under “Software Required” from the homework specification, click on the “Oracle VirtualBox” link that will launch the <https://www.virtualbox.org/> website.
2. Click on the “Download VirtualBox 6.1” button:



3. Select the version for the appropriate host operating system to begin the download. These instructions use “Windows hosts”:



4. Click on the VirtualBox executable that was downloaded to launch the installer and follow the install wizard:



5. Repeat the steps above under "Oracle VirtualBox v6.0". The Mininet_VM.ova file works in both versions 6.0 and 6.1.

Connecting to the Mininet_VM from the host computer:

1. Launch the Mininet VM in the Oracle VirtualBox.
2. On the left of the Ubuntu screen, there are a series of buttons. Click on button “Search your computer and online sources” (tis is the top button).
3. In the main window, a list of applications will be displayed. Click on “Terminal”.
4. Once a Terminal window launches, at the command prompt, type “ifconfig” and click “Enter”
5. Open a command prompt in the host computer. Try to ssh to the IP address that was obtained running ifconfig in the VM. Below, trying the “SSH” command results in a “Connection timed out” error. Doing a simple “ping” also results in a “Request timed out” error. If you see this, then you will need to configure the Oracle VirtualBox to allow connections to it.

```
CA: Command Prompt
Microsoft Windows [Version 10.0.17763.864]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\jlg20>ssh 10.0.2.15
ssh: connect to host 10.0.2.15 port 22: Connection timed out

C:\Users\jlg20>ping 10.0.2.15

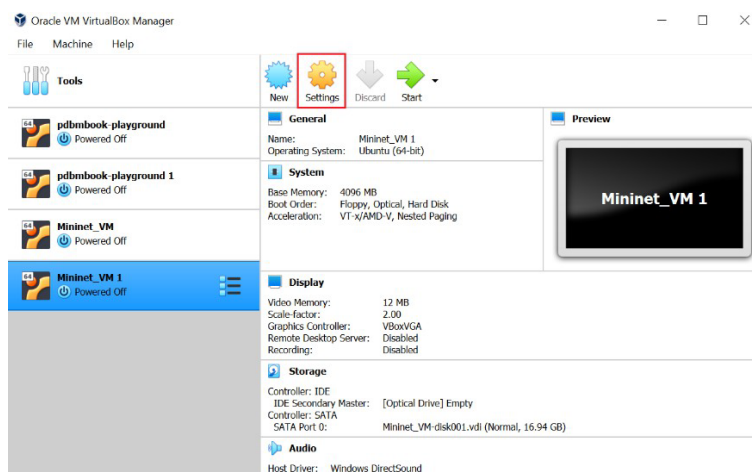
Pinging 10.0.2.15 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 10.0.2.15:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

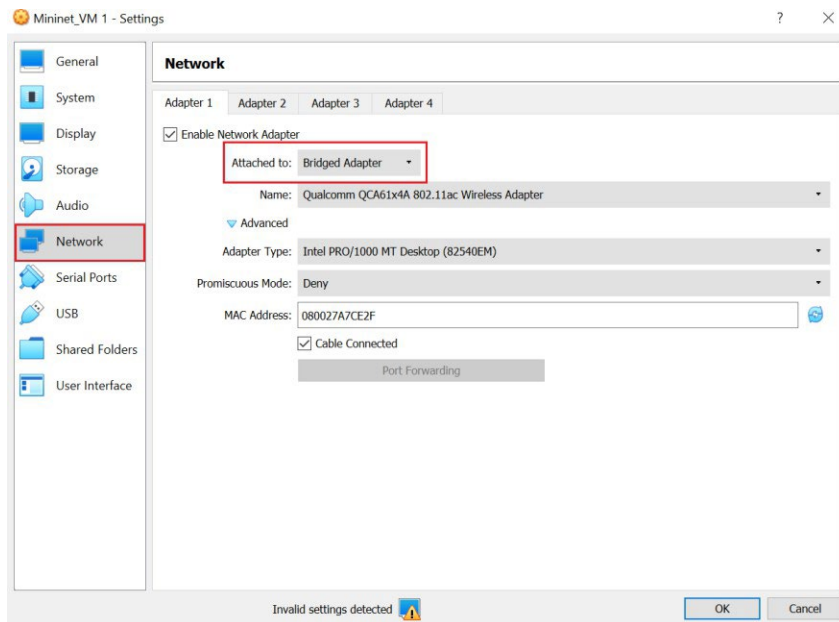
C:\Users\jlg20>
```

To connect to the Mininet VM, you will likely need to configure the Oracle VirtualBox to enable SSH connections. For the steps below, make sure that the Mininet VM is powered down.

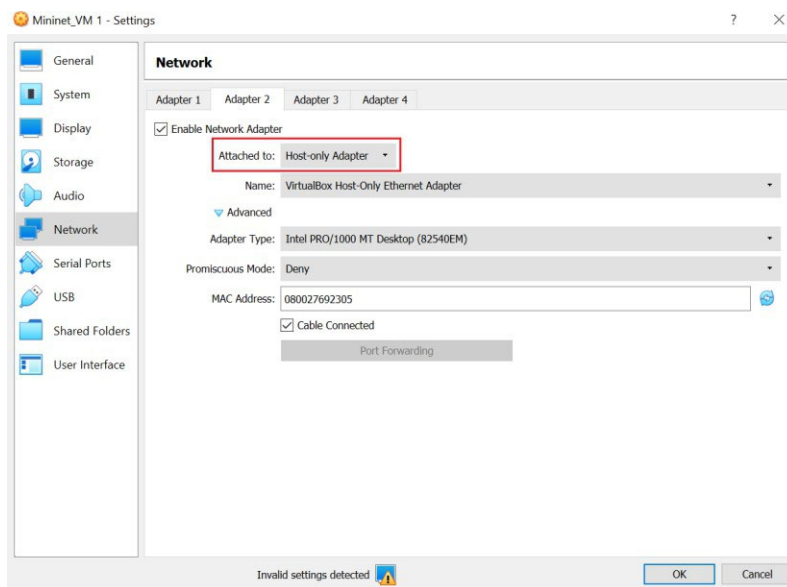
6. Click Settings in the Oracle VirtualBox:



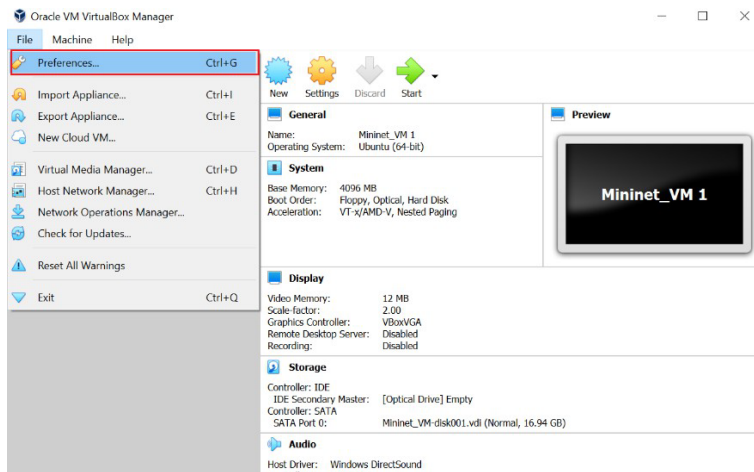
- Click on “Network” in the left frame, and under the “Adapter 1” tab, select “Bridged Adapter” for the “Enabled Network Adapter”:



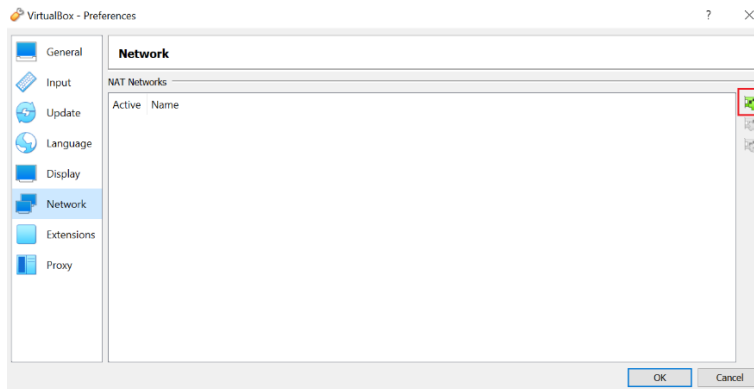
- Click on the “Adapter 2” tab and select “Host-only Adapter” for “Enable Network Adapter”:



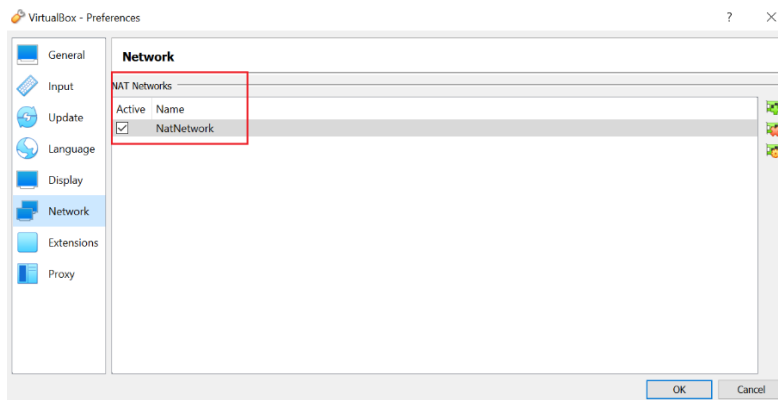
7. Go back to the Oracle VirtualBox main window, and click File → Preferences:



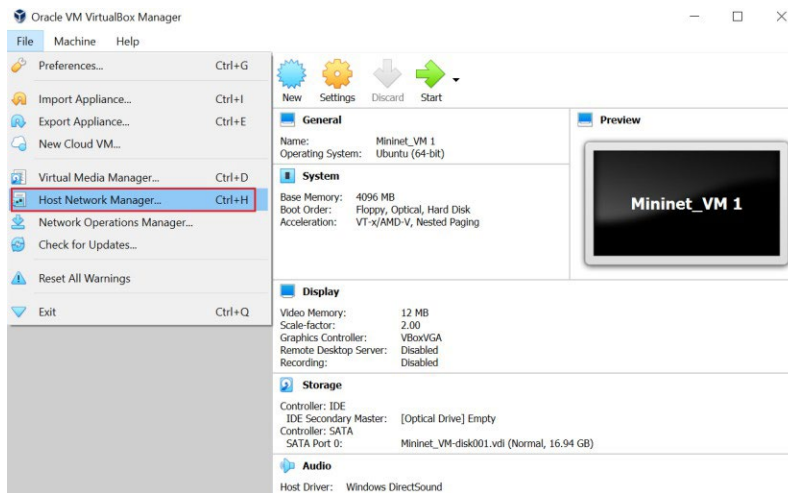
8. Click on “Network” from the left frame:



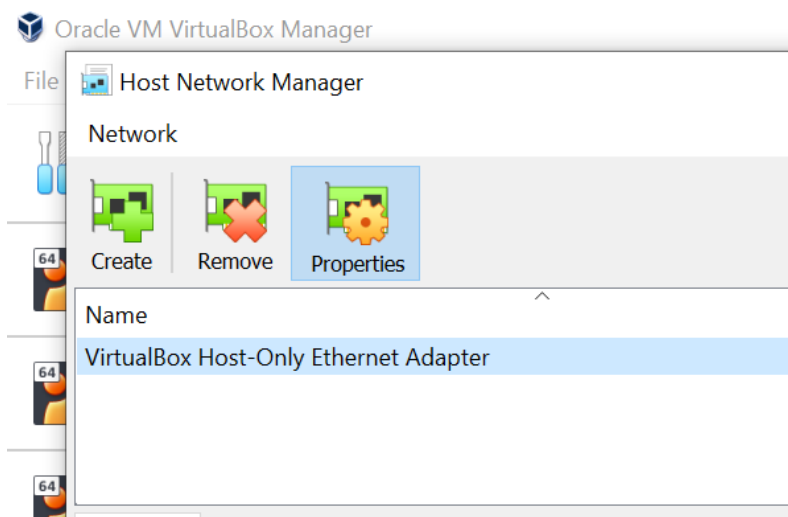
9. In the previous step, there is no “Nat Network” listed in the main frame. To add a Nat Network, click on the green ‘+’ button to the upper right of the main frame. A Nat Network will appear and will be configured (confirm by double-clicking on it):



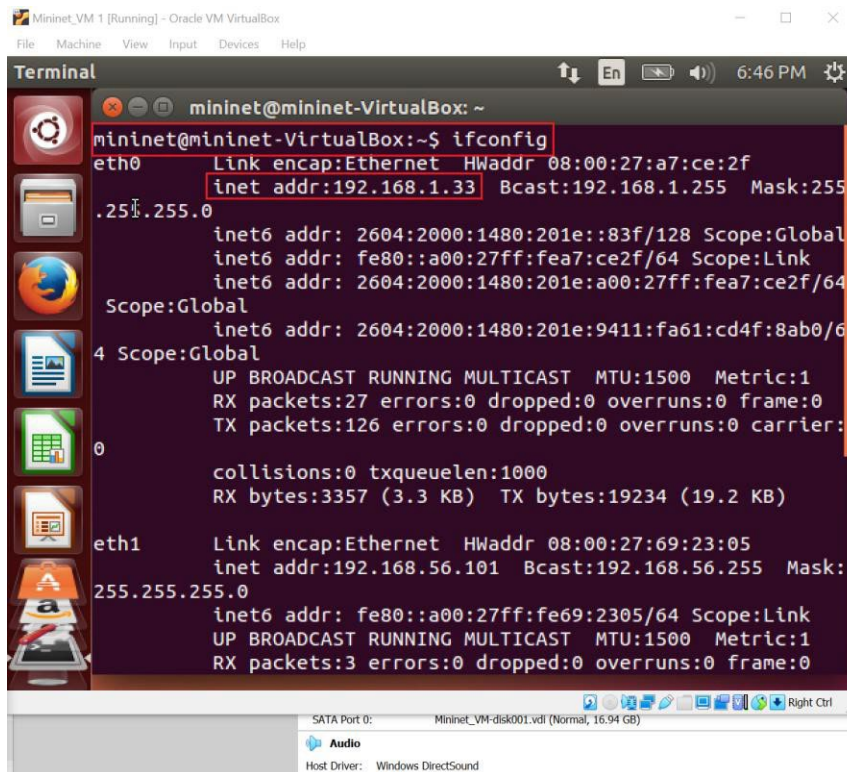
10. From File, select “Host Network Manager”:



11. Confirm the Host-Only is configured with your local host machine IP address by double-clicking on “VirtualBox Host-Only Ethernet Adapter” to view the configurations:

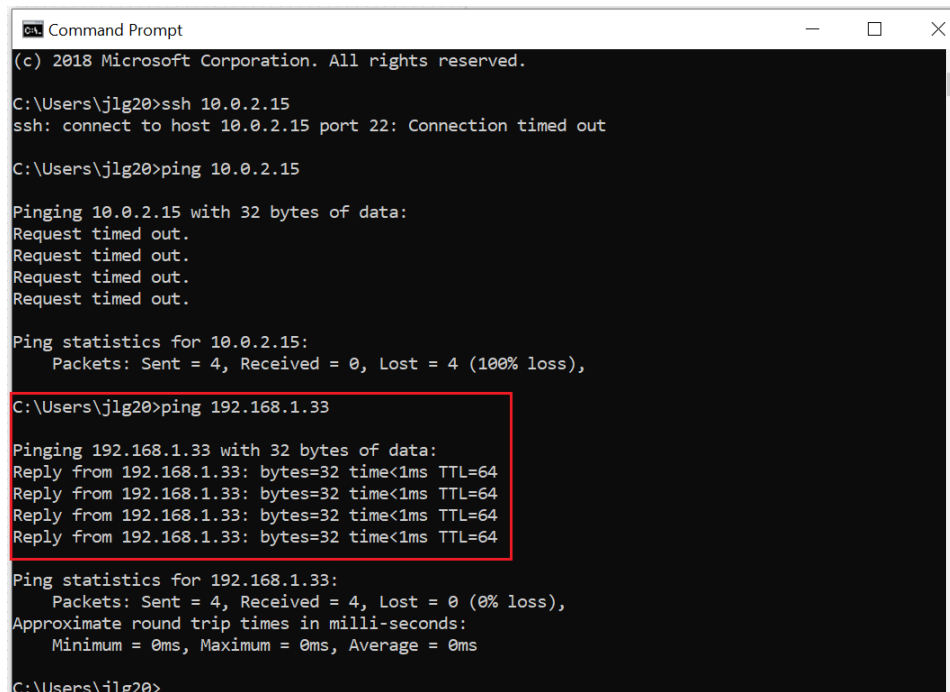


12. Now that the network settings are configured, launch Mininet_VM within Oracle VirtualBox. Run the “ifconfig” command to obtain the IP address to connect to:



```
mininet@mininet-VirtualBox: ~  
mininet@mininet-VirtualBox:~$ ifconfig  
eth0      Link encap:Ethernet  HWaddr 08:00:27:a7:ce:2f  
          inet addr:192.168.1.33  Bcast:192.168.1.255  Mask:255.255.255.0  
          inet6 addr: 2604:2000:1480:201e::83f/128 Scope:Global  
          inet6 addr: fe80::a00:27ff:fea7:ce2f/64 Scope:Link  
          inet6 addr: 2604:2000:1480:201e:a00:27ff:fea7:ce2f/64 Scope:Global  
          inet6 addr: 2604:2000:1480:201e:9411:fa61:cd4f:8ab0/64 Scope:Global  
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1  
          RX packets:27 errors:0 dropped:0 overruns:0 frame:0  
          TX packets:126 errors:0 dropped:0 overruns:0 carrier:0  
          collisions:0 txqueuelen:1000  
          RX bytes:3357 (3.3 KB)  TX bytes:19234 (19.2 KB)  
  
eth1      Link encap:Ethernet  HWaddr 08:00:27:69:23:05  
          inet addr:192.168.56.101  Bcast:192.168.56.255  Mask:255.255.255.0  
          inet6 addr: fe80::a00:27ff:fe69:2305/64 Scope:Link  
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1  
          RX packets:3 errors:0 dropped:0 overruns:0 frame:0
```

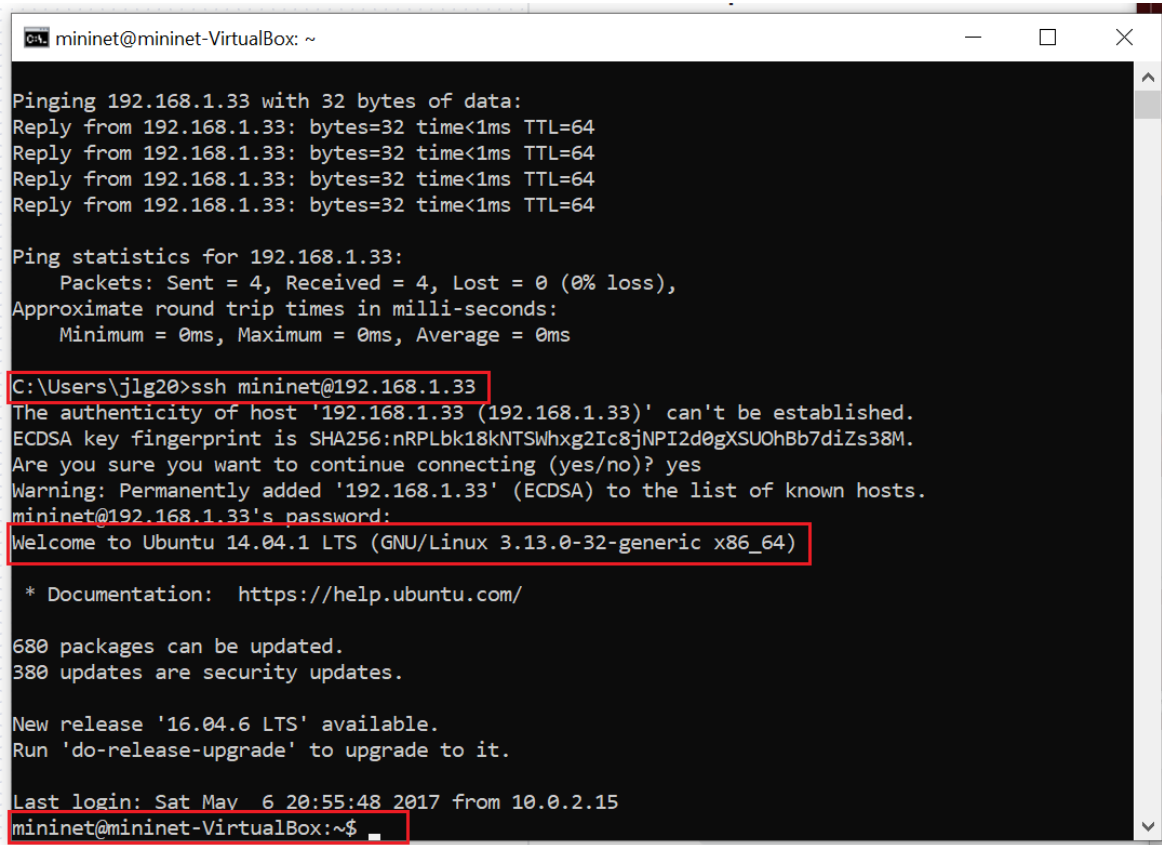
13. Try the ping command as did in step 5 above. This time, you should get a “Reply from ...”



```
Command Prompt  
(c) 2018 Microsoft Corporation. All rights reserved.  
  
C:\Users\jlg20>ssh 10.0.2.15  
ssh: connect to host 10.0.2.15 port 22: Connection timed out  
  
C:\Users\jlg20>ping 10.0.2.15  
  
Pinging 10.0.2.15 with 32 bytes of data:  
Request timed out.  
Request timed out.  
Request timed out.  
Request timed out.  
  
Ping statistics for 10.0.2.15:  
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),  
  
C:\Users\jlg20>ping 192.168.1.33  
  
Pinging 192.168.1.33 with 32 bytes of data:  
Reply from 192.168.1.33: bytes=32 time<1ms TTL=64  
Reply from 192.168.1.33: bytes=32 time<1ms TTL=64  
Reply from 192.168.1.33: bytes=32 time<1ms TTL=64  
Reply from 192.168.1.33: bytes=32 time<1ms TTL=64  
  
Ping statistics for 192.168.1.33:  
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
    Approximate round trip times in milli-seconds:  
        Minimum = 0ms, Maximum = 0ms, Average = 0ms  
  
C:\Users\jlg20>
```

14. After getting a successful ping, retry the SSH command. The SSH command to use is:

```
ssh mininet@<IP_ADDRESS>
```



```
mininet@mininet-VirtualBox: ~  
  
Pinging 192.168.1.33 with 32 bytes of data:  
Reply from 192.168.1.33: bytes=32 time<1ms TTL=64  
Reply from 192.168.1.33: bytes=32 time<1ms TTL=64  
Reply from 192.168.1.33: bytes=32 time<1ms TTL=64  
Reply from 192.168.1.33: bytes=32 time<1ms TTL=64  
  
Ping statistics for 192.168.1.33:  
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
Approximate round trip times in milli-seconds:  
    Minimum = 0ms, Maximum = 0ms, Average = 0ms  
  
C:\Users\jlg20>ssh mininet@192.168.1.33  
The authenticity of host '192.168.1.33 (192.168.1.33)' can't be established.  
ECDSA key fingerprint is SHA256:nRPLbk18kNTSWhxg2Ic8jNPI2d0gXSUOhBb7diZs38M.  
Are you sure you want to continue connecting (yes/no)? yes  
Warning: Permanently added '192.168.1.33' (ECDSA) to the list of known hosts.  
mininet@192.168.1.33's password:  
Welcome to Ubuntu 14.04.1 LTS (GNU/Linux 3.13.0-32-generic x86_64)  
  
* Documentation:  https://help.ubuntu.com/  
  
680 packages can be updated.  
380 updates are security updates.  
  
New release '16.04.6 LTS' available.  
Run 'do-release-upgrade' to upgrade to it.  
  
Last login: Sat May  6 20:55:48 2017 from 10.0.2.15  
mininet@mininet-VirtualBox:~$
```

15. In the command prompt, after a successful SSH connection, the directory structure should match the files in the VM:

