Lab #1

Class: CECS 303 – Networks and Network Security
Instructor: Chris Samayoa
Due Date: February 4, 2022 by 9pm PST

Objective: Create a networked lab environment for use throughout the semester

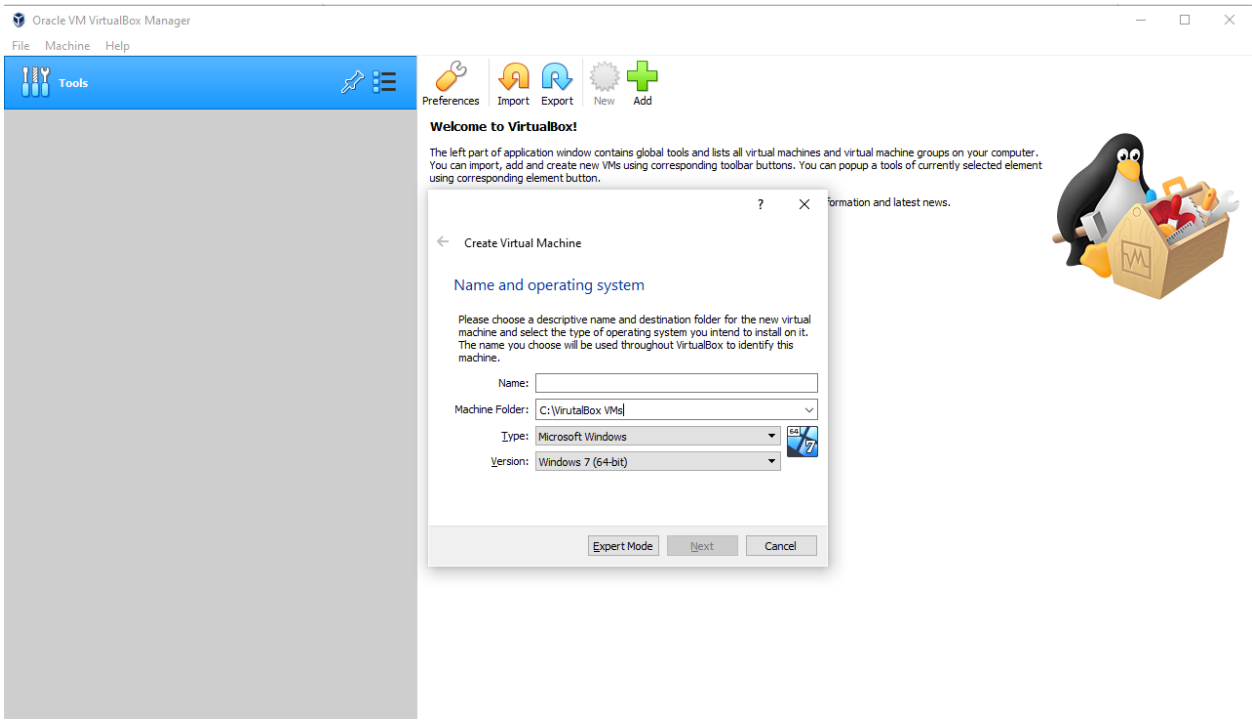
Links:

- VirtualBox: https://www.virtualbox.org/wiki/Downloads
- Ubuntu: https://ubuntu.com/download/server or https://ubuntu.com/download/desktop

Instructions (for server installation):

Prepare minimum of two Ubuntu instances using VirtualBox that can communicate over a local network

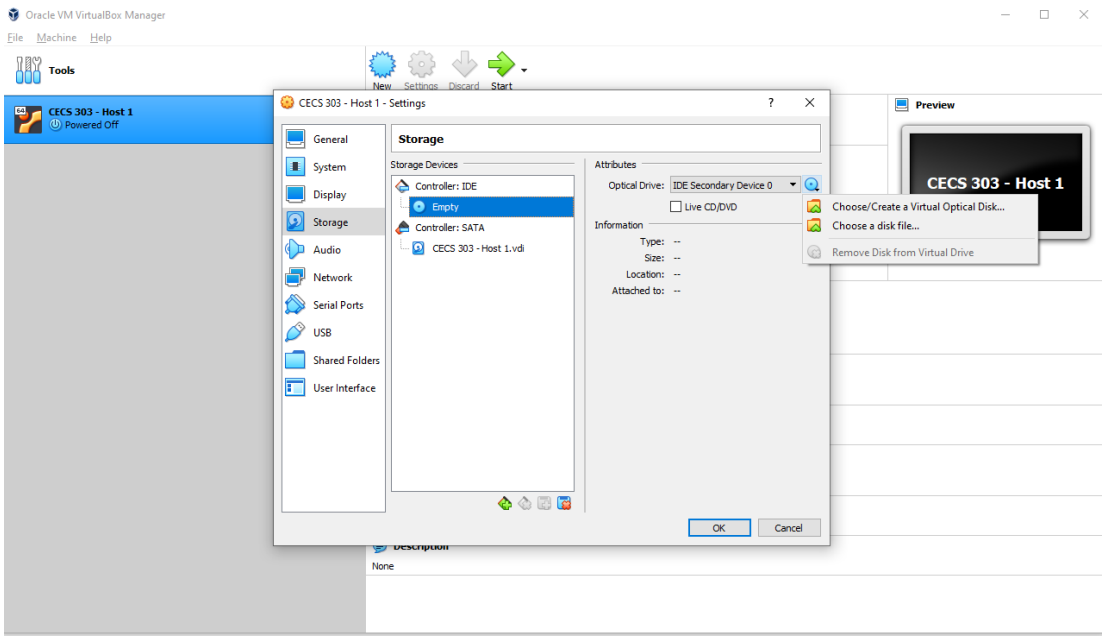
1. Download and install VirtualBox instance appropriate for your operating system
2. Download Ubuntu ISO (version 20.04 LTS)
    a. On the download page, select "Option 2 – Manual server installation"
3. Open VirtualBox application
    a. Select "Machine -> New" from top level menu
        i. Name: Provide unique name
        ii. Machine Folder: Leave default or choose a different location
        iii. Type: Linux
        iv. Version: Ubuntu (64-bit)



b.

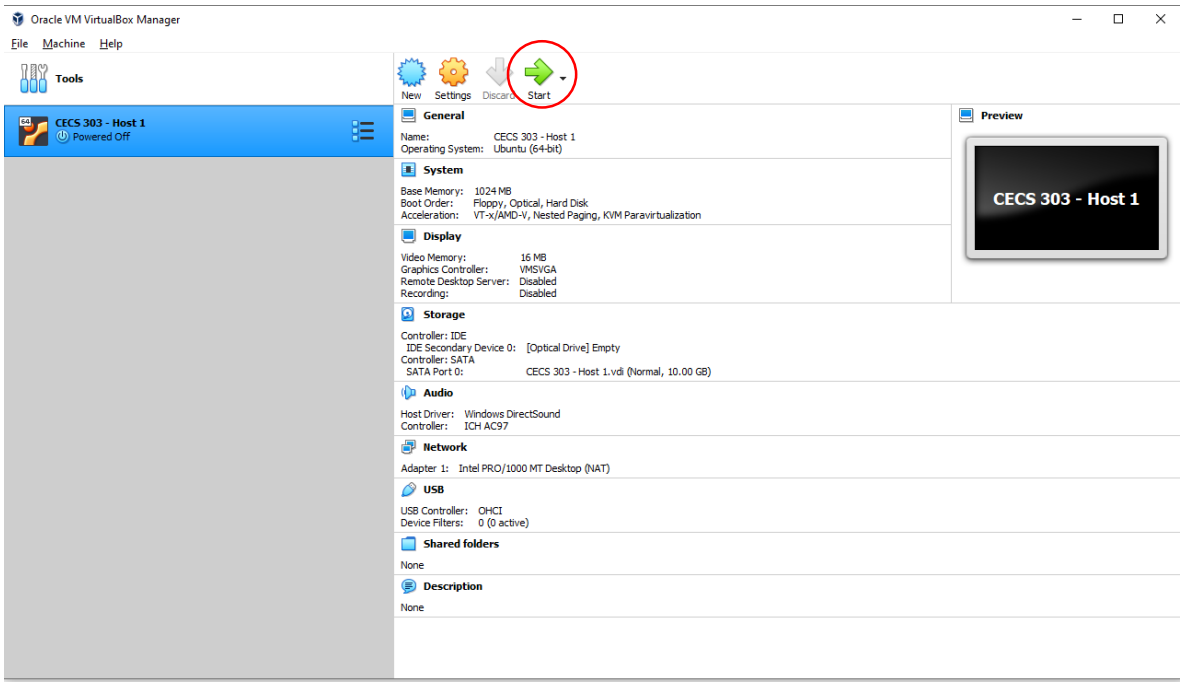
c. Memory Size: Default value is 1024
d. Create Virtual Hard Disk: Default size of 10gb is fine
e. Leave ‘Hard Disk File Type’ and ‘Storage on Physical Hard Disk’ at default values
f. Complete Setup

4. Change host network settings
    a. Select host
    b. Click ‘Machine -> Settings’
    c. Select ‘Network’ in left menu
    d. Change ‘Attached to:’ drop down menu to ‘Bridged Adapter’
        i. Ensure that your active network device is selected under ‘Name’
    e. Click ‘OK’ on bottom to close
5. Load ISO (Ubuntu) Image
    a. Go back to host settings
    b. Select ‘Storage’
        i. Click on the ‘Empty’ device and select the optical disk icon on the right
        ii. Select ‘Choose a disk file’ (see screenshot below)

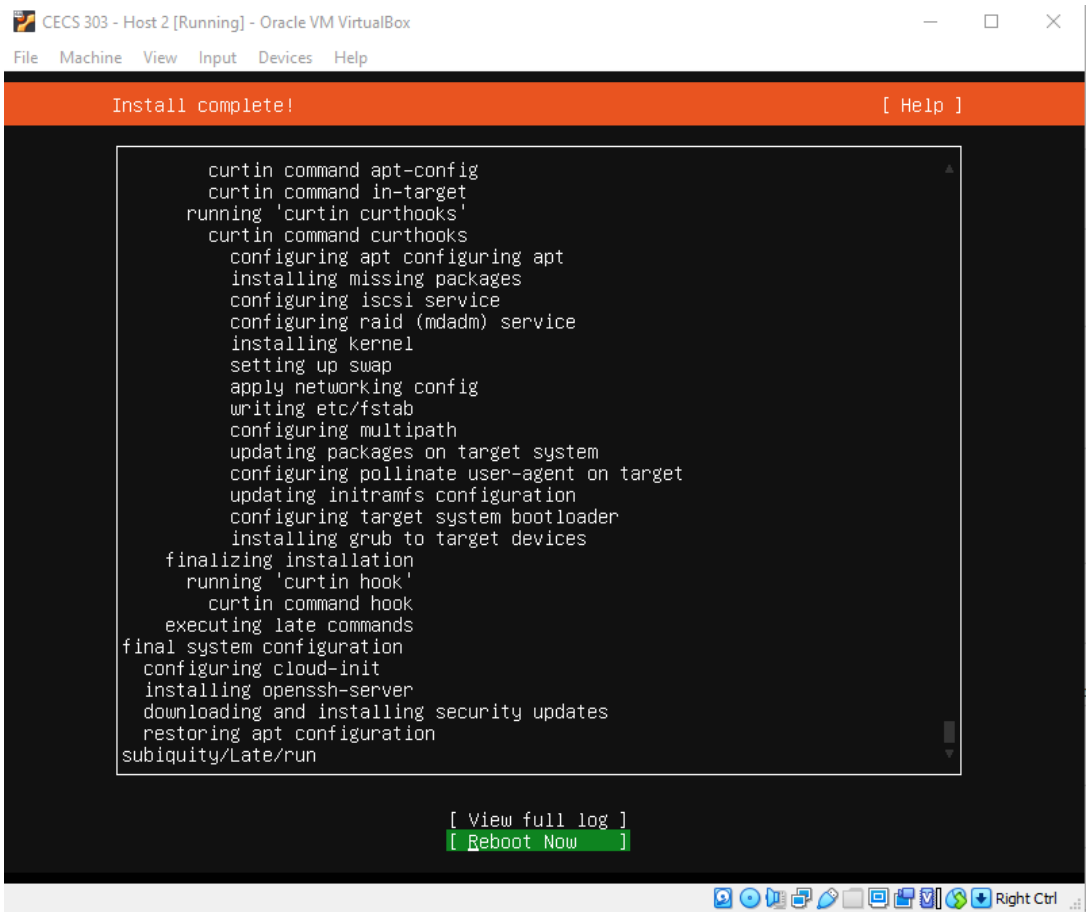
c. 

d. Navigate to and select Ubuntu ISO installation file downloaded earlier

6. Start the host

a. 

7. Proceed with installing the Ubuntu operating system
    a. For the purposes of this lab the defaults work
    b. You'll need to configure a host name, username, and password
        i. BE SURE TO TAKE NOTE OF USERNAME and PASSWORD USED

c. I recommend installing the OpenSSH server when prompted as it is a good tool to familiarize yourself with
d. There is no need to select additional packages to install when prompted
e. Allow updates to finish installing before selecting 'Reboot Now'
i. 

f. Once the installation is complete you will need to shut down the virtual machine in order for the Ubuntu ISO to unmount
    i. Click 'File -> Close' and select 'Power off the machine'
8. Start Host again and login with username and password
9. Run command "sudo apt install net-tools"
    a. Once this is complete, you should be able to reach the internet
    b. Test by using ping
        i. e.g. "ping –c 4 google.com" and ensure you receive a response

ii.

```
user1@cecshost1:~$ ping -c 4 google.com
PING google.com (142.250.68.14) 56(84) bytes of data.
64 bytes from lax17s44-in-f14.1e100.net (142.250.68.14): icmp_seq=1 ttl=115 time=13.1 ms
64 bytes from lax17s44-in-f14.1e100.net (142.250.68.14): icmp_seq=2 ttl=115 time=12.8 ms
64 bytes from lax17s44-in-f14.1e100.net (142.250.68.14): icmp_seq=3 ttl=115 time=10.6 ms
64 bytes from lax17s44-in-f14.1e100.net (142.250.68.14): icmp_seq=4 ttl=115 time=11.1 ms

--- google.com ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3005ms
rtt min/avg/max/mdev = 10.584/11.919/13.121/1.085 ms
user1@cecshost1:~$ _
```

10. Run command 'ifconfig' and take note of your host's IP address

a.

```
user1@cecshost1:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.4.46  netmask 255.255.252.0  broadcast 192.168.7.255
        inet6 fe80::a00:27ff:fe12:cbcd  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:12:cb:cd  txqueuelen 1000  (Ethernet)
        RX packets 50  bytes 13795 (13.7 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 50  bytes 5557 (5.5 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

b. e.g. This host has an IP address of 192.168.4.46

Configure second host using the same instructions as above

1. Don't forgot to modify network adapter and mount the Ubuntu ISO as instructed above
2. Ensure a different host name is used during installation
3. User name can be the same or different (up to you)
4. Ensure during installation that a different IP address is assigned to the second host

DNS Queries:

The 'dig' command in Linux is useful to gather DNS information. Please pick a domain (e.g. csulb.edu) and run the following commands to familiarize yourself with the type of information publicly available about a domain:

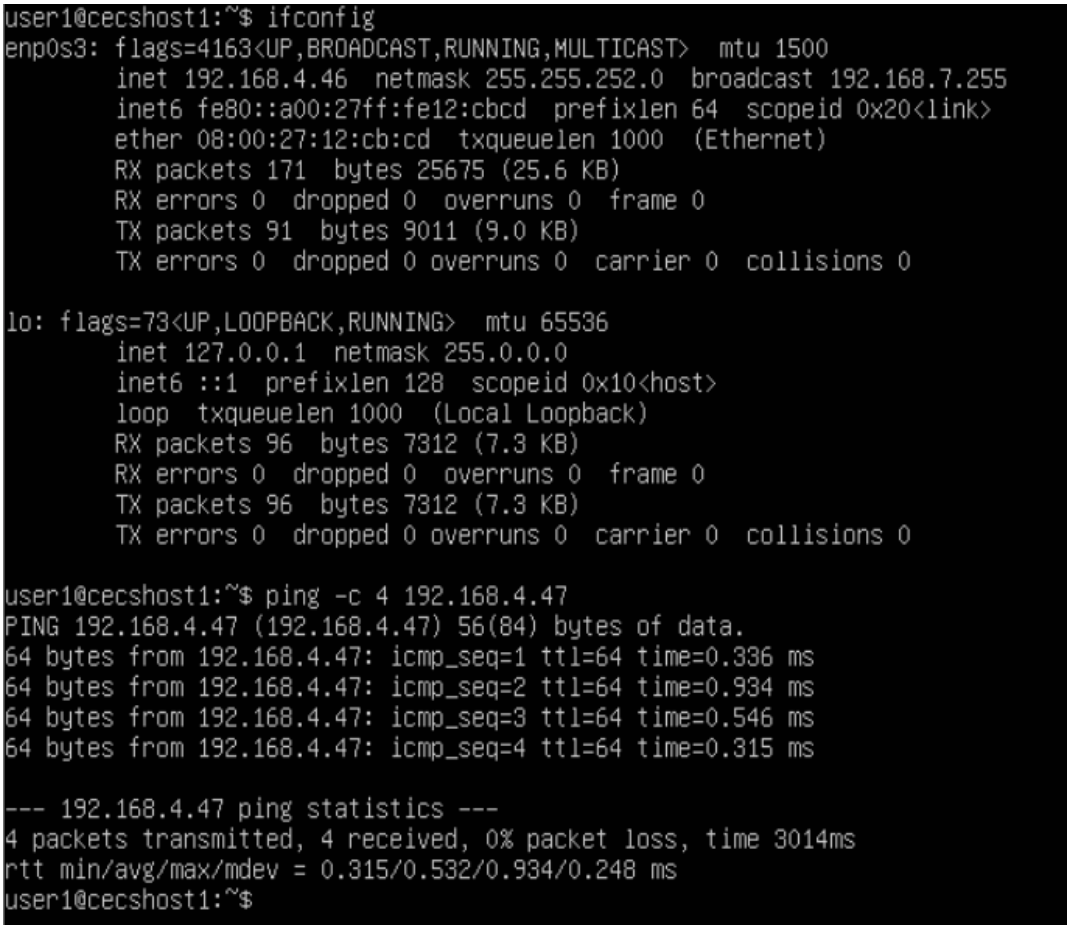
1. Find the domain's primary IP address(es): dig <domain-name.com> (e.g. 'dig csulb.edu')
    a. Check to see if the www subdomain returns a different IP address than the domain itself (e.g. 'dig www.csulb.edu)

    b. Try to find other subdomains associated with the domain (e.g. mail, owa, smtp, ftp, etc.)
2. Find the domain's mail server by using the MX command: dig <domain-name.com> MX
    a. The MX record in DNS tells other mail servers where to send email for a particular domain
3. Lookup the domain's assigned name servers: dig <domain-name.com> NS
    a. The list that comes up are all the servers responsible for keeping up-to-date DNS records for the domain
4. Lookup some of the reverse DNS records for one or more of the IP addresses you are able to identify: dig –x <IP address> (e.g. 'dig –x 134.139.19.17')
    a. In the example provided above 134.139.19.17 is the IP address for csulb.edu
    b. Reverse DNS entries can provide further information regarding who owns or uses an IP address

Deliverables (submit via BeachBoard)

1. Screenshot of 'ifconfig' command output from both hosts
2. Screenshot of each host successfully pinging the other
    a. e.g. "ping –c 4 <host ip address>"

Example:



Screenshots from both hosts should be shown

3. Screenshots of dig command for MX record and at least one reverse DNS search

Note: Command “shutdown now” will cleanly shut down virtual machines when you are done working with them