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<b>Course/Section: CPE 232-CPE31S22</b>	<b>Date Submitted: August 30, 2022</b>
<b>Instructor: Dr. Jonathan Taylor</b>	<b>Semester and SY: 1st Sem 2022-2023</b>
<b>Activity 3: Install SSH server on CentOS or RHEL 8</b>	
<b>1. Objectives:</b> 1.1 Install Community Enterprise OS or Red Hat Linux OS 1.2 Configure remote SSH connection from remote computer to CentOS/RHEL-8	
<b>2. Discussion:</b>  <b>CentOS vs. Debian: Overview</b>  CentOS and Debian are Linux distributions that spawn from opposite ends of the candle.  CentOS is a free downstream rebuild of the commercial Red Hat Enterprise Linux distribution where, in contrast, Debian is the free upstream distribution that is the base for other distributions, including the Ubuntu Linux distribution.  As with many Linux distributions, CentOS and Debian are generally more alike than different; it isn't until we dig a little deeper that we find where they branch.  <b>CentOS vs. Debian: Architecture</b>  The available supported architectures can be the determining factor as to whether a distro is a viable option or not. Debian and CentOS are both very popular for x86_64/AMD64, but what other archs are supported by each?  Both Debian and CentOS support AArch64/ARM64, armhf/armhfp , i386 , ppc64el/ppc64le. (Note: armhf/armhfp and i386 are supported in CentOS 7 only.)  CentOS 7 additionally supports POWER9 while Debian and CentOS 8 do not. CentOS 7 focuses on the x86_64/AMD64 architecture with the other archs released through the AltArch SIG (Alternate Architecture Special Interest Group) with CentOS 8 supporting x86_64/AMD64, AArch64 and ppc64le equally.  Debian supports MIPSel, MIPS64el and s390x while CentOS does not. Much like CentOS 8, Debian does not favor one arch over another —all supported architectures are supported equally.  <b>CentOS vs. Debian: Package Management</b>  Most Linux distributions have some form of package manager nowadays, with some more complex and feature-rich than others.  CentOS uses the RPM package format and YUM/DNF as the package manager.  Debian uses the DEB package format and dpkg/APT as the package manager.	

Both offer full-feature package management with network-based repository support, dependency checking and resolution, etc.. If you're familiar with one but not the other, you may have a little trouble switching over, but they're not overwhelmingly different. They both have similar features, just available through a different interface.

### Task 1: Download the CentOS or RHEL-8 image (Create screenshots of the following)

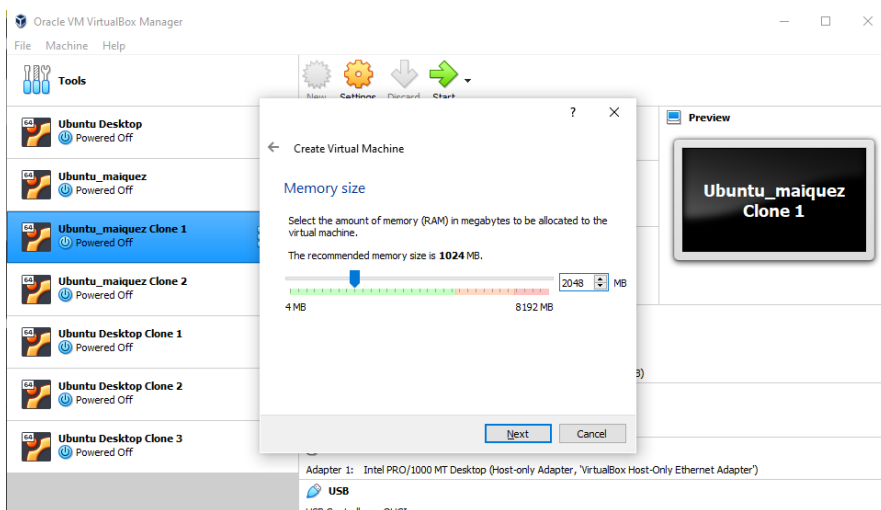
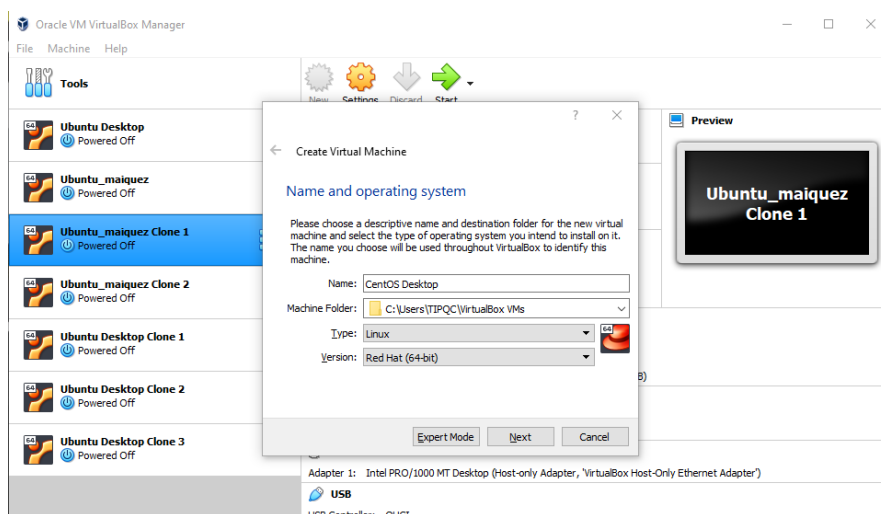
1. Download the image of the CentOS here:

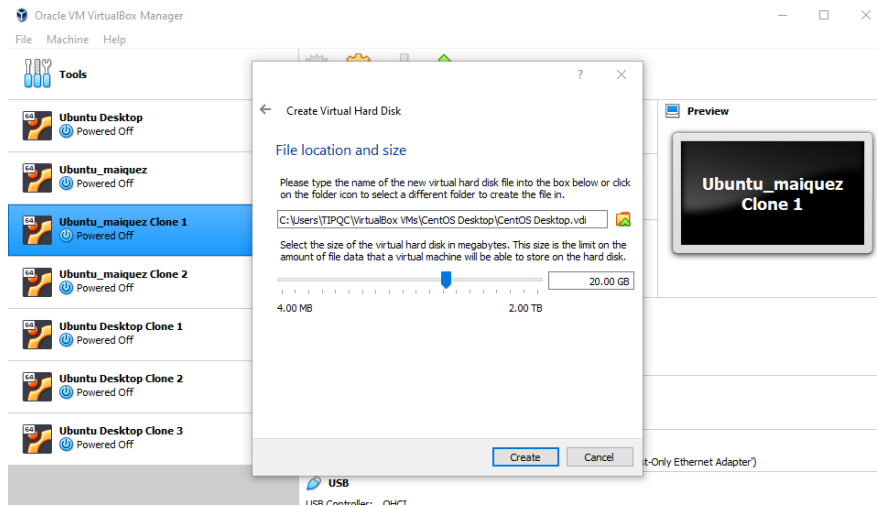
[http://mirror.rise.ph/centos/7.9.2009/isos/x86\\_64/](http://mirror.rise.ph/centos/7.9.2009/isos/x86_64/)

The following mirrors in your region should have the ISO images available:

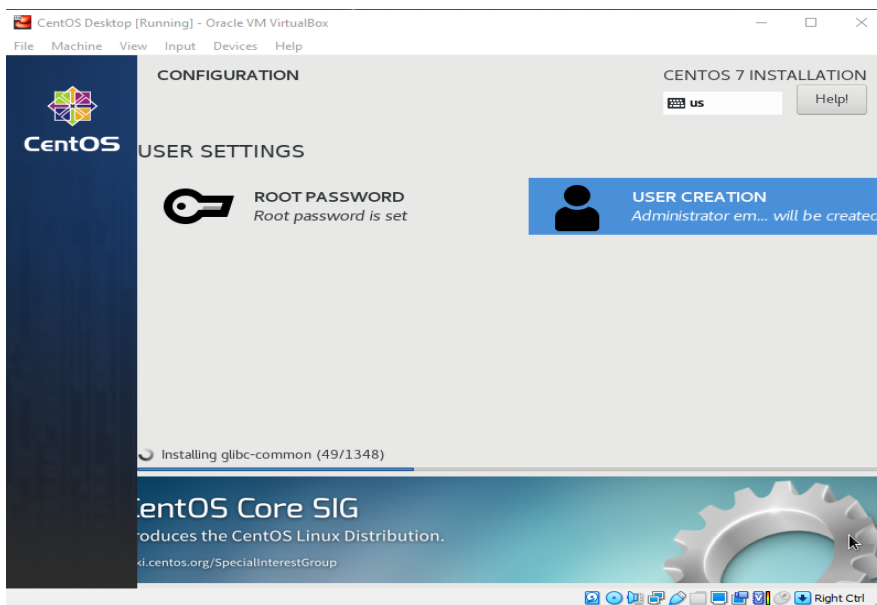
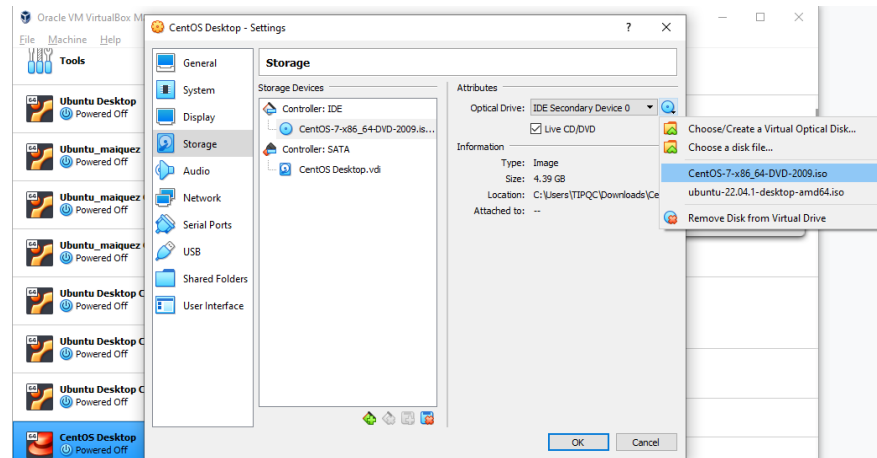
[http://mirror.rise.ph/centos/7.9.2009/isos/x86\\_64/](http://mirror.rise.ph/centos/7.9.2009/isos/x86_64/)

2. Create a VM machine with 2 Gb RAM and 20 Gb HD.

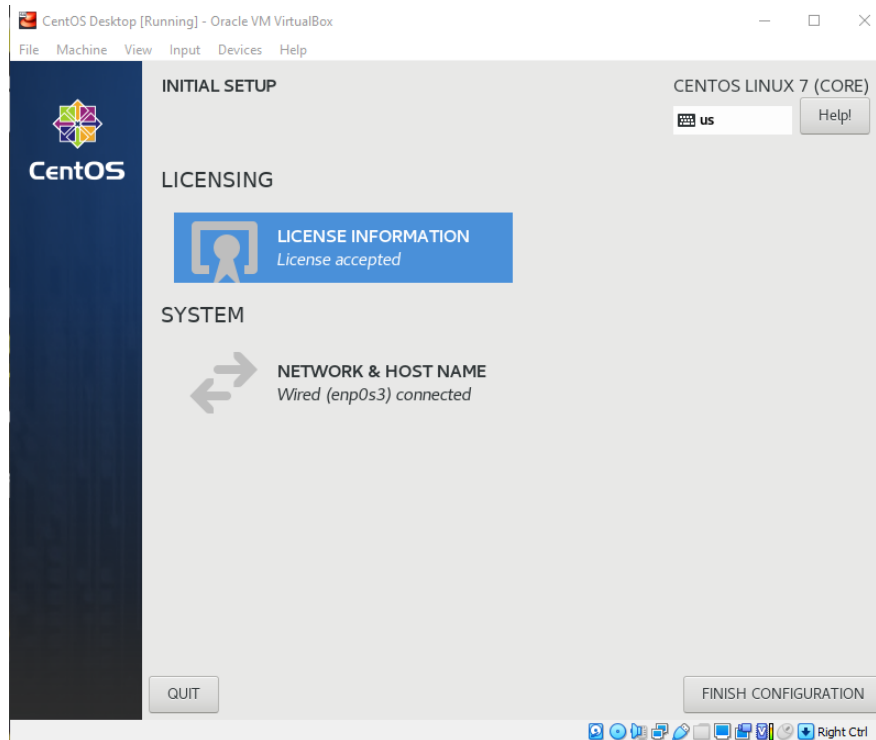




### 3. Install the downloaded image.

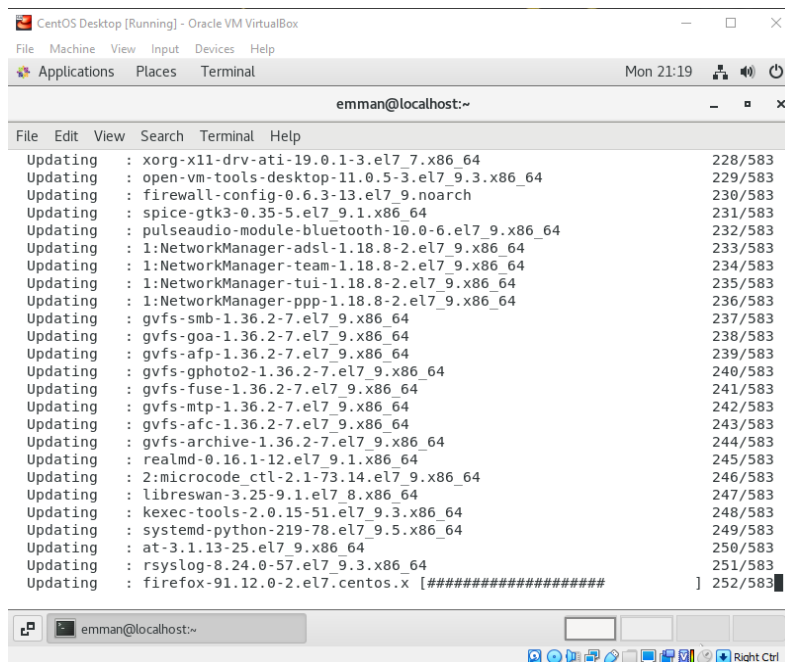


#### 4. Show evidence that the OS was installed already.

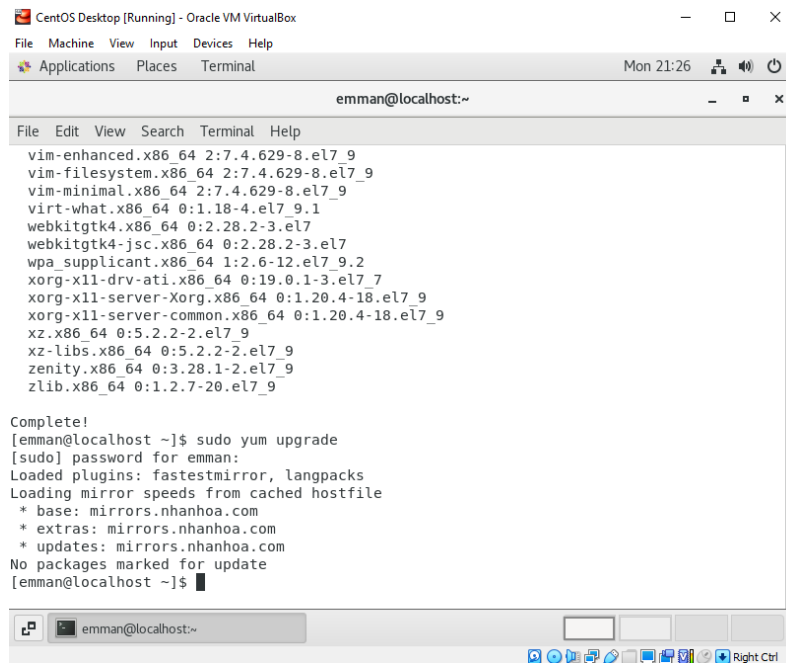


### Task 2: Install the SSH server package *openssh*

sudo yum update:



## sudo yum upgrade



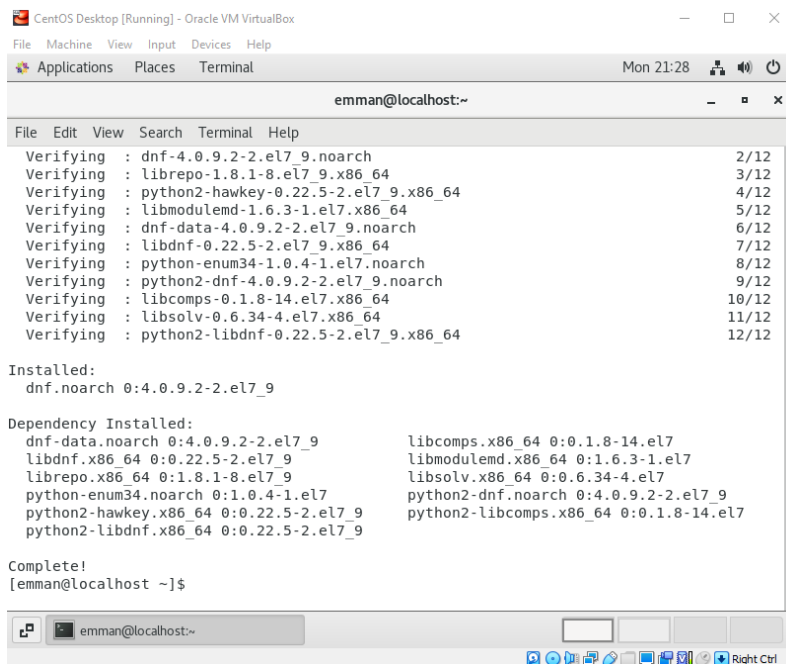
```
CentOS Desktop [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Applications Places Terminal
Mon 21:26

emman@localhost:~

File Edit View Search Terminal Help
vim-enhanced.x86_64 2:7.4.629-8.el7_9
vim-filesystem.x86_64 2:7.4.629-8.el7_9
vim-minimal.x86_64 2:7.4.629-8.el7_9
virt-what.x86_64 0:1.18-4.el7_9.1
webkitgtk4.x86_64 0:2.28.2-3.el7
webkitgtk4-jsc.x86_64 0:2.28.2-3.el7
wpa_supplicant.x86_64 1:2.6-12.el7_9.2
xorg-x11-drv-ati.x86_64 0:19.0.1-3.el7_7
xorg-x11-server-Xorg.x86_64 0:1.20.4-18.el7_9
xorg-x11-server-common.x86_64 0:1.20.4-18.el7_9
xz.x86_64 0:5.2.2-2.el7_9
xz-libs.x86_64 0:5.2.2-2.el7_9
zenity.x86_64 0:3.28.1-2.el7_9
zlib.x86_64 0:1.2.7-20.el7_9

Complete!
[emman@localhost ~]$ sudo yum upgrade
[sudo] password for emman:
Loaded plugins: fastestmirror, langpacks
Loading mirror speeds from cached hostfile
 * base: mirrors.nhanhoa.com
 * extras: mirrors.nhanhoa.com
 * updates: mirrors.nhanhoa.com
No packages marked for update
[emman@localhost ~]$
```

## sudo yum install dnf



```
CentOS Desktop [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Applications Places Terminal
Mon 21:28

emman@localhost:~

File Edit View Search Terminal Help
Verifying : dnf-4.0.9.2-2.el7_9.noarch 2/12
Verifying : librepo-1.8.1-8.el7_9.x86_64 3/12
Verifying : python2-hawkey-0.22.5-2.el7_9.x86_64 4/12
Verifying : libmodulemd-1.6.3-1.el7.x86_64 5/12
Verifying : dnf-data-4.0.9.2-2.el7_9.noarch 6/12
Verifying : libdnf-0.22.5-2.el7_9.x86_64 7/12
Verifying : python-enum34-1.0.4-1.el7.noarch 8/12
Verifying : python2-dnf-4.0.9.2-2.el7_9.noarch 9/12
Verifying : libcomps-0.1.8-14.el7.x86_64 10/12
Verifying : libsolv-0.6.34-4.el7.x86_64 11/12
Verifying : python2-libdnf-0.22.5-2.el7_9.x86_64 12/12

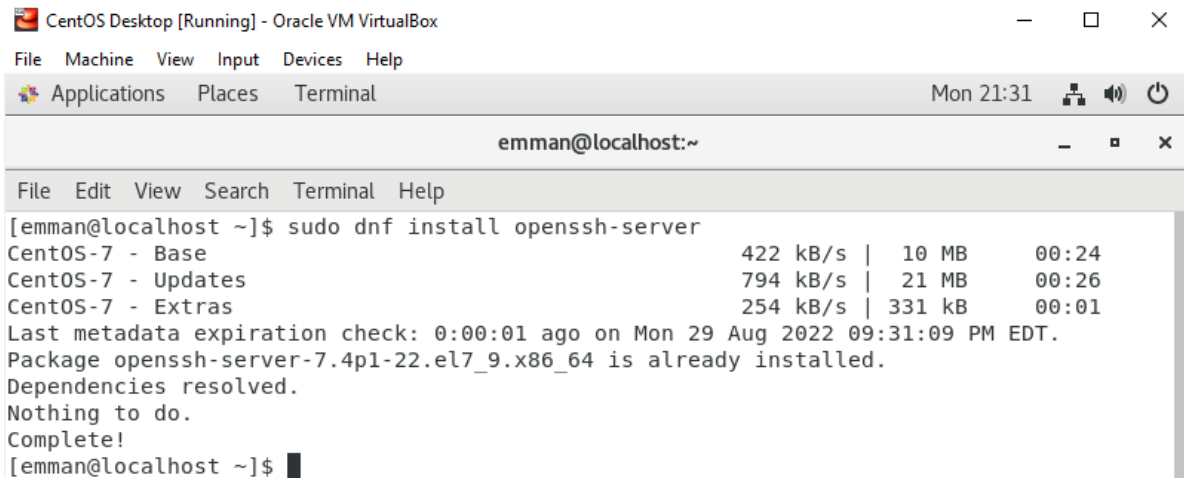
Installed:
dnf.noarch 0:4.0.9.2-2.el7_9

Dependency Installed:
dnf-data.noarch 0:4.0.9.2-2.el7_9 libcomps.x86_64 0:0.1.8-14.el7
libdnf.x86_64 0:0.22.5-2.el7_9 libmodulemd.x86_64 0:1.6.3-1.el7
librepo.x86_64 0:1.8.1-8.el7_9 libsolv.x86_64 0:0.6.34-4.el7
python-enum34.noarch 0:1.0.4-1.el7 python2-dnf.noarch 0:4.0.9.2-2.el7_9
python2-hawkey.x86_64 0:0.22.5-2.el7_9 python2-libcomps.x86_64 0:0.1.8-14.el7
python2-libdnf.x86_64 0:0.22.5-2.el7_9

Complete!
[emman@localhost ~]$
```

1. Install the ssh server package *openssh* by using the *dnf* command:

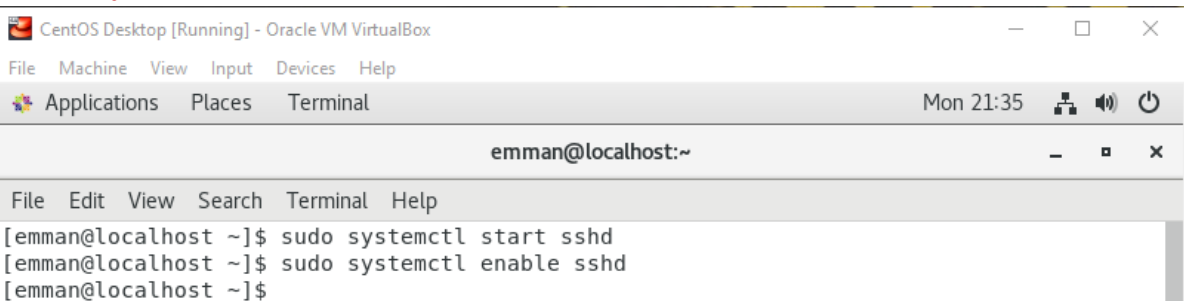
*\$ dnf install openssh-server*



```
CentOS Desktop [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Applications Places Terminal Mon 21:31
emman@localhost:~
File Edit View Search Terminal Help
[emman@localhost ~]$ sudo dnf install openssh-server
CentOS-7 - Base 422 kB/s | 10 MB 00:24
CentOS-7 - Updates 794 kB/s | 21 MB 00:26
CentOS-7 - Extras 254 kB/s | 331 kB 00:01
Last metadata expiration check: 0:00:01 ago on Mon 29 Aug 2022 09:31:09 PM EDT.
Package openssh-server-7.4p1-22.el7_9.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[emman@localhost ~]$
```

2. Start the *sshd* daemon and set to start after reboot:

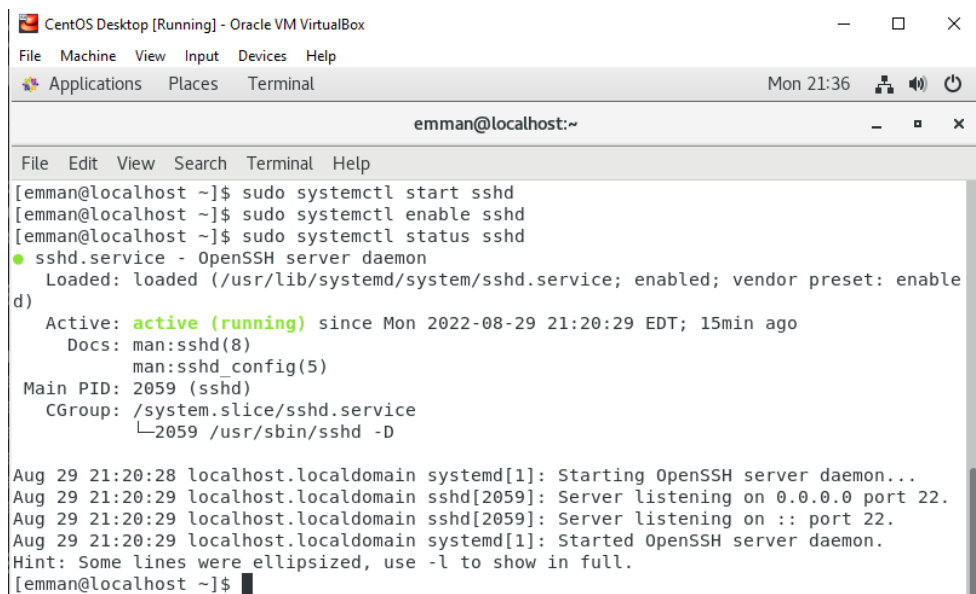
*\$ systemctl start sshd*



```
CentOS Desktop [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Applications Places Terminal Mon 21:35
emman@localhost:~
File Edit View Search Terminal Help
[emman@localhost ~]$ sudo systemctl start sshd
[emman@localhost ~]$ sudo systemctl enable sshd
[emman@localhost ~]$
```

3. Confirm that the sshd daemon is up and running:

*\$ systemctl status sshd*



```
CentOS Desktop [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Applications Places Terminal Mon 21:36
emman@localhost:~
File Edit View Search Terminal Help
[emman@localhost ~]$ sudo systemctl start sshd
[emman@localhost ~]$ sudo systemctl enable sshd
[emman@localhost ~]$ sudo systemctl status sshd
● sshd.service - OpenSSH server daemon
   Loaded: loaded (/usr/lib/systemd/system/ssh.service; enabled; vendor preset: enable
   d)
   Active: active (running) since Mon 2022-08-29 21:20:29 EDT; 15min ago
     Docs: man:sshd(8)
           man:sshd_config(5)
   Main PID: 2059 (sshd)
    CGroup: /system.slice/ssh.service
            └─2059 /usr/sbin/sshd -D

Aug 29 21:20:28 localhost.localdomain systemd[1]: Starting OpenSSH server daemon...
Aug 29 21:20:29 localhost.localdomain sshd[2059]: Server listening on 0.0.0.0 port 22.
Aug 29 21:20:29 localhost.localdomain sshd[2059]: Server listening on :: port 22.
Aug 29 21:20:29 localhost.localdomain systemd[1]: Started OpenSSH server daemon.
Hint: Some lines were ellipsized, use -l to show in full.
[emman@localhost ~]$
```

4. Open the SSH port 22 to allow incoming traffic:

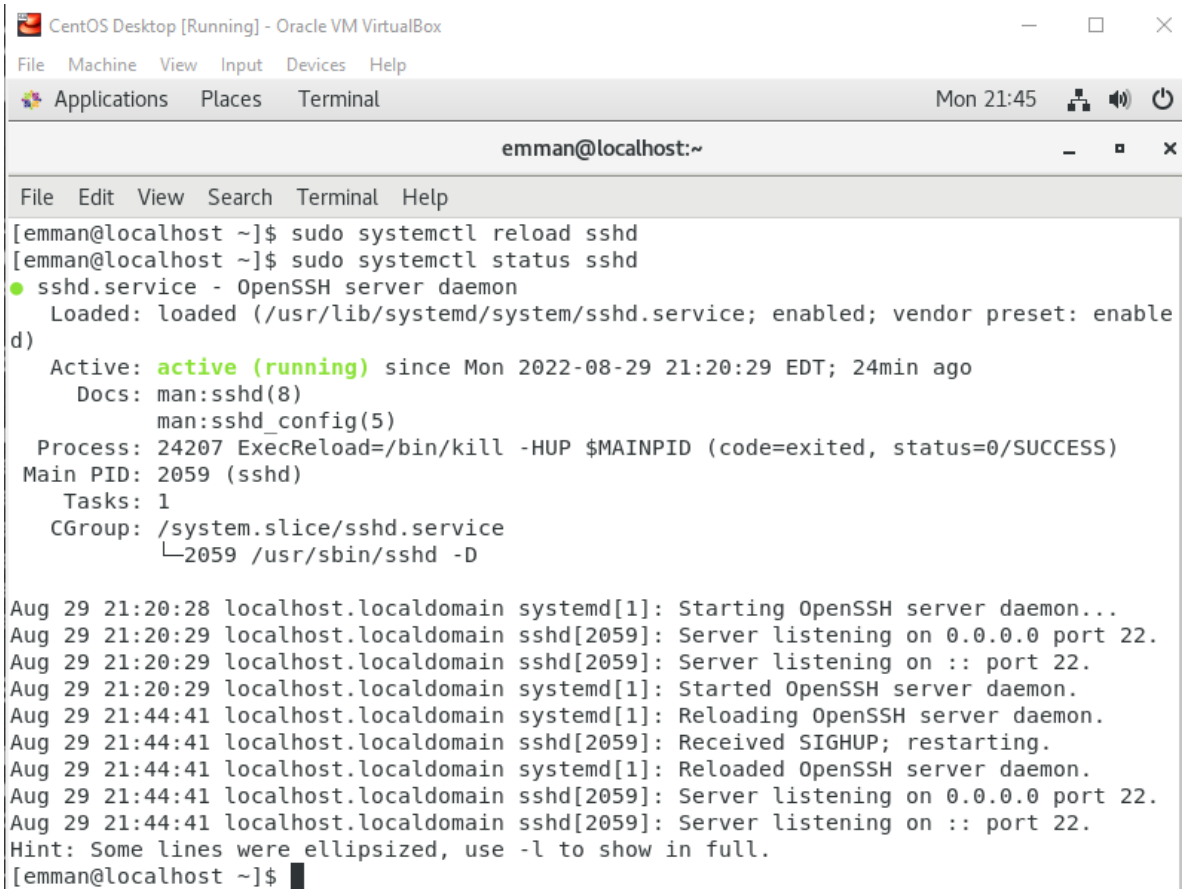
```
$ firewall-cmd --zone=public --permanent --add-service=ssh  
$ firewall-cmd --reload
```



```
CentOS Desktop [Running] - Oracle VM VirtualBox  
File Machine View Input Devices Help  
Applications Places Terminal Mon 21:41  
emman@localhost:~  
File Edit View Search Terminal Help  
[emman@localhost ~]$ sudo firewall-cmd --zone=public --permanent --add-service=ssh  
Warning: ALREADY_ENABLED: ssh  
success  
[emman@localhost ~]$ sudo firewall-cmd --reload  
success  
[emman@localhost ~]$
```

5. Locate the ssh server man config file */etc/ssh/sshd\_config* and perform custom configuration. Every time you make any change to the */etc/ssh/sshd-config* configuration file reload the *sshd* service to apply changes:

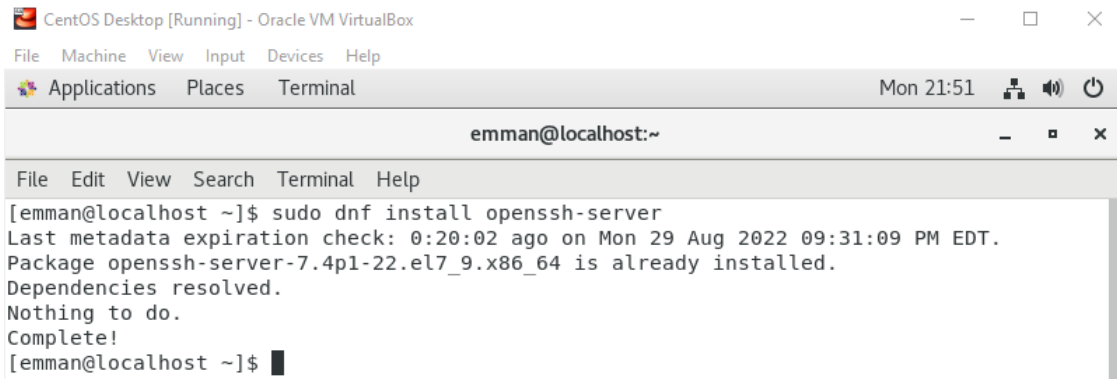
```
$ systemctl reload sshd
```



```
CentOS Desktop [Running] - Oracle VM VirtualBox  
File Machine View Input Devices Help  
Applications Places Terminal Mon 21:45  
emman@localhost:~  
File Edit View Search Terminal Help  
[emman@localhost ~]$ sudo systemctl reload sshd  
[emman@localhost ~]$ sudo systemctl status sshd  
● sshd.service - OpenSSH server daemon  
   Loaded: loaded (/usr/lib/systemd/system/sshd.service; enabled; vendor preset: enable  
d)  
   Active: active (running) since Mon 2022-08-29 21:20:29 EDT; 24min ago  
     Docs: man:sshd(8)  
           man:sshd_config(5)  
  Process: 24207 ExecReload=/bin/kill -HUP $MAINPID (code=exited, status=0/SUCCESS)  
 Main PID: 2059 (sshd)  
    Tasks: 1  
   CGroup: /system.slice/sshd.service  
           └─2059 /usr/sbin/sshd -D  
  
Aug 29 21:20:28 localhost.localdomain systemd[1]: Starting OpenSSH server daemon...  
Aug 29 21:20:29 localhost.localdomain sshd[2059]: Server listening on 0.0.0.0 port 22.  
Aug 29 21:20:29 localhost.localdomain sshd[2059]: Server listening on :: port 22.  
Aug 29 21:20:29 localhost.localdomain systemd[1]: Started OpenSSH server daemon.  
Aug 29 21:44:41 localhost.localdomain systemd[1]: Reloading OpenSSH server daemon.  
Aug 29 21:44:41 localhost.localdomain sshd[2059]: Received SIGHUP; restarting.  
Aug 29 21:44:41 localhost.localdomain systemd[1]: Reloaded OpenSSH server daemon.  
Aug 29 21:44:41 localhost.localdomain sshd[2059]: Server listening on 0.0.0.0 port 22.  
Aug 29 21:44:41 localhost.localdomain sshd[2059]: Server listening on :: port 22.  
Hint: Some lines were ellipsized, use -l to show in full.  
[emman@localhost ~]$
```

### Task 3: Copy the Public Key to CentOS

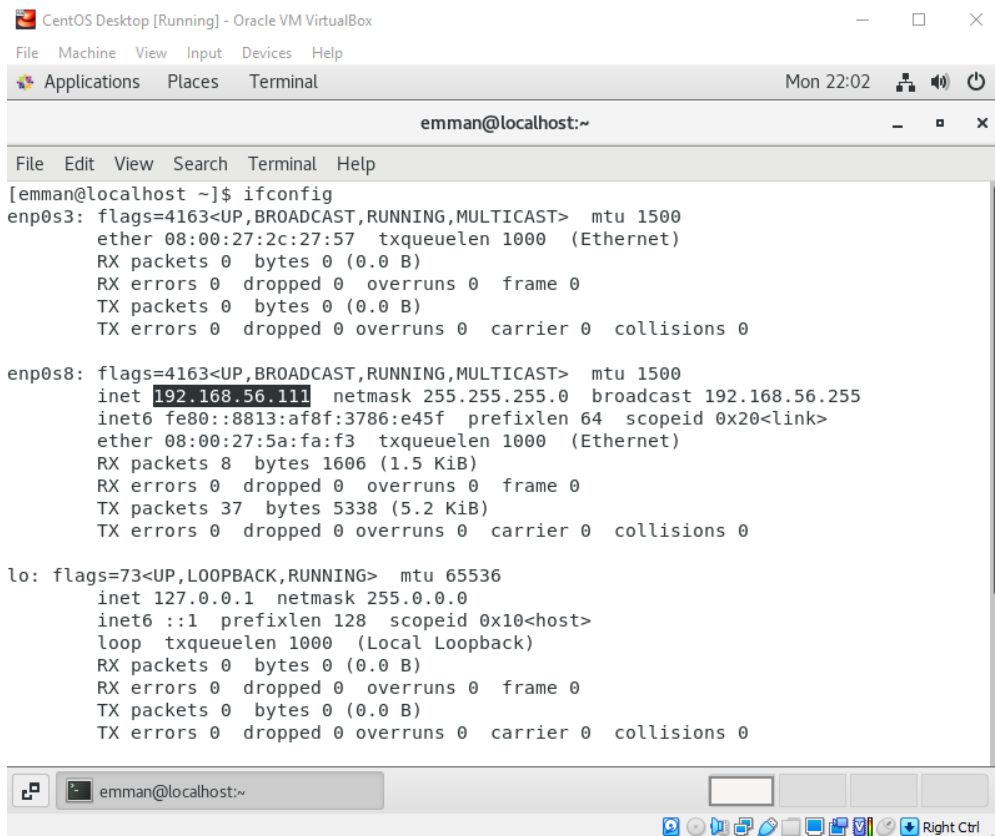
1. Make sure that **ssh** is installed on the local machine.



```
CentOS Desktop [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Applications Places Terminal Mon 21:51
emman@localhost:~
File Edit View Search Terminal Help
[emman@localhost ~]$ sudo dnf install openssh-server
Last metadata expiration check: 0:20:02 ago on Mon 29 Aug 2022 09:31:09 PM EDT.
Package openssh-server-7.4p1-22.el7_9.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[emman@localhost ~]$
```

2. Using the command **ssh-copy-id**, connect your local machine to CentOS.

```
[emman@localhost ~]$ sudo dnf install net-tools
Last metadata expiration check: 0:21:52 ago on Mon 29 Aug 2022 09:31:09 PM EDT.
Package net-tools-2.0-0.25.20131004git.el7.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[emman@localhost ~]$
```



```
CentOS Desktop [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Applications Places Terminal Mon 22:02
emman@localhost:~
File Edit View Search Terminal Help
[emman@localhost ~]$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    ether 08:00:27:2c:27:57 txqueuelen 1000 (Ethernet)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

enp0s8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.56.111 netmask 255.255.255.0 broadcast 192.168.56.255
    inet6 fe80::8813:af8f:3786:e45f prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:5a:fa:f3 txqueuelen 1000 (Ethernet)
    RX packets 8 bytes 1606 (1.5 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 37 bytes 5338 (5.2 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```



MINGW64: c:/Users/TIPQC

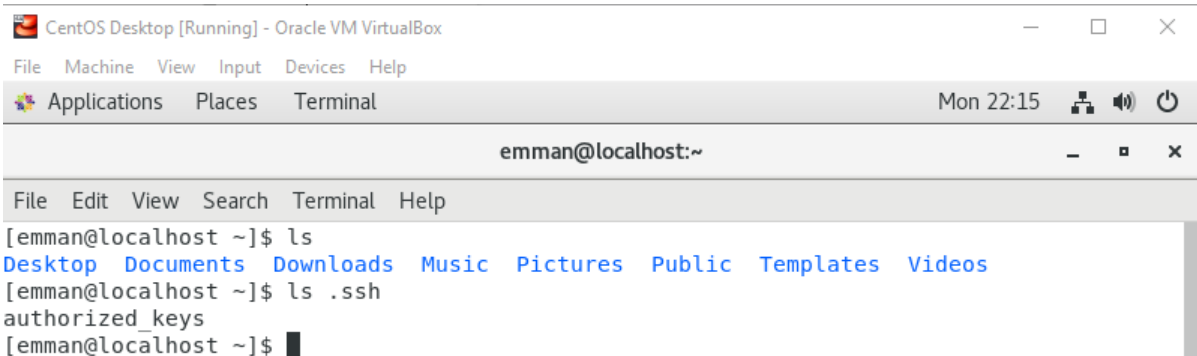
```
TIPQC@Q5202-30 MINGW64 ~
$ ssh-copy-id emman@192.168.56.111
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/c/Users/TIPQC/.ssh/id_rsa.pub"
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to install the new keys
emman@192.168.56.111's password:

Number of key(s) added: 1

Now try logging into the machine, with: "ssh 'emman@192.168.56.111'"
and check to make sure that only the key(s) you wanted were added.

TIPQC@Q5202-30 MINGW64 ~
$
```

3. On CentOS, verify that you have the *authorized\_keys*.



The screenshot shows a window titled "CentOS Desktop [Running] - Oracle VM VirtualBox". Inside the window, there is a terminal application. The terminal prompt is "emman@localhost:~". The user has entered the command "ls" and the output shows a list of directories: "Desktop Documents Downloads Music Pictures Public Templates Videos". Then, the user has entered the command "ls .ssh" and the output shows "authorized\_keys".

#### Task 4: Verify ssh remote connection

1. Using your local machine, connect to CentOS using ssh.

```
emman@localhost:~
TIPQC@Q5202-30 MINGW64 ~
$ ssh emman@192.168.56.111
```

2. Show evidence that you are connected.

```
emman@localhost:~
TIPQC@Q5202-30 MINGW64 ~
$ ssh emman@192.168.56.111
Last login: Mon Aug 29 22:18:37 2022 from 192.168.56.1
[emman@localhost ~]$ |
```

**Reflections:**

Answer the following:

1. What do you think we should look for in choosing the best distribution between Debian and Red Hat Linux distributions?

I would advise using one of the four primary Linux distributions, namely Red Hat, CentOS, Debian, or Ubuntu. The maintainability, continuity, stability, and security of this proposition are its pillars. Large communities or businesses support each of the aforementioned distributions. To conclude, for me, I chose Red Hat because of better support for long-term apps. With an enterprise distro, you get patches, updates, upgrades, expert technical support, and access to training and tutorials.

2. What are the main differences between Debian and Red Hat Linux distributions?

Red Hat is an MNC company whose intention is to profit based on every package sold. The other one, Debian, is founded and developed by SPI(Software in the Public Interest), which is a non-profit organization.