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Activity 3: Install SSH server on CentOS or RHEL 8

1. **Objectives:**

1.1 Install Community Enterprise OS or Red Hat Linux OS

1.2 Configure remote SSH connection from remote computer to CentOS/RHEL-8

2. **Discussion:**

CentOS vs. Debian: Overview

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.

CentOS vs. Debian: Architecture

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.

CentOS vs. Debian: Package Management

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/

Screenshot:

The fastest internet in the Philippines

WELCOME TO THE RISE MIRROR

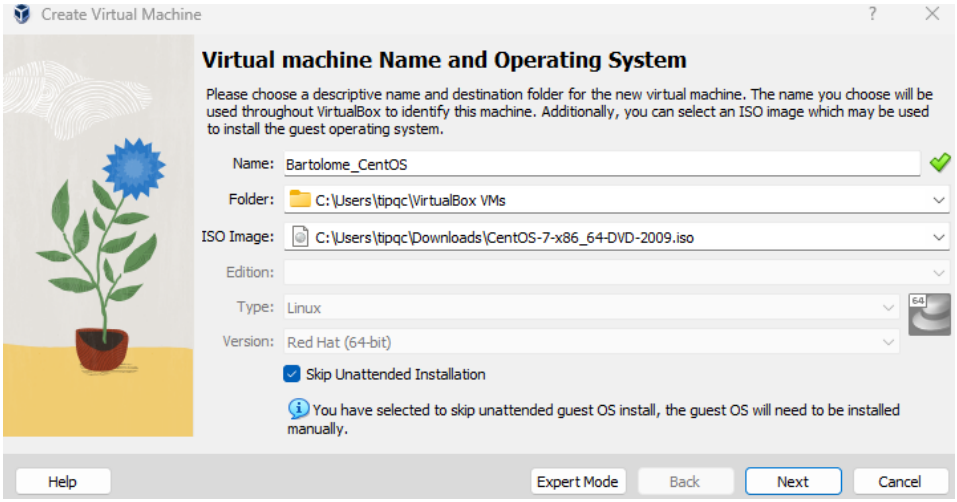
Files can be downloaded using http://mirror.rise.ph and ftp://mirror.rise.ph
Please Note: Mirror is currently undergoing maintenance so you may find some repositories are not up to date.

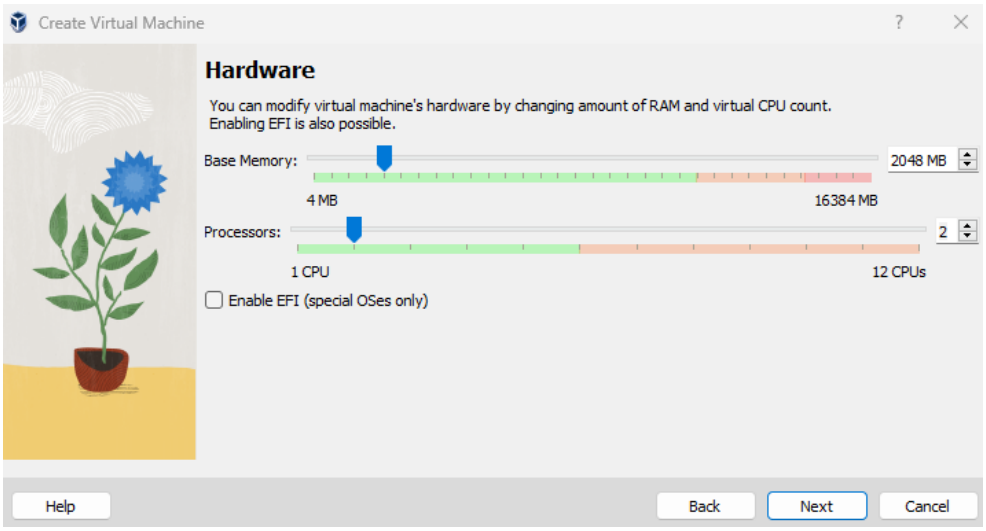
Directory: /centos/7.9.2009/isos/x86_64/

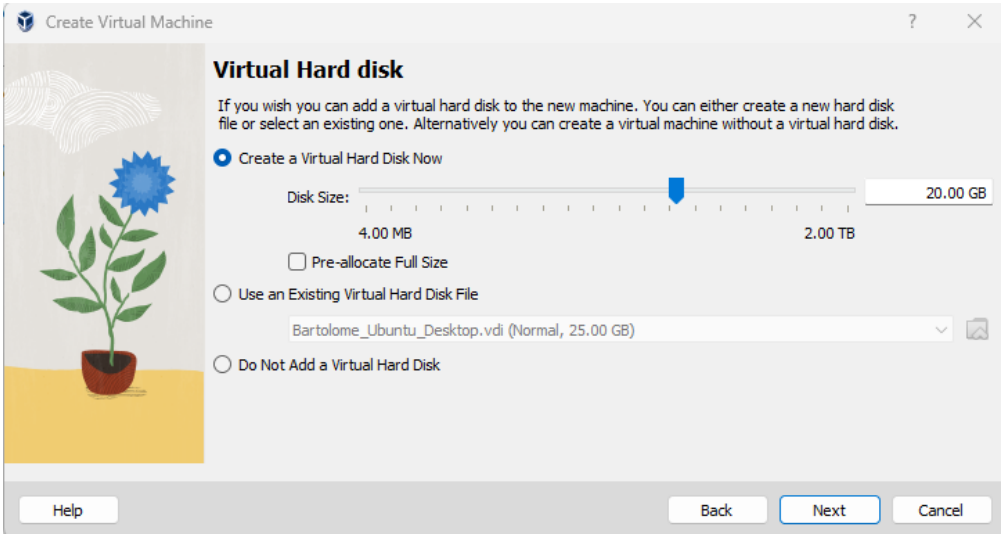
Name	Last modified	Size
Parent Directory		-
0_README.txt	2022-08-05 02:03	2.7K
CentOS-7-x86_64-DVD-..>	2020-11-04 19:37	4.4G
CentOS-7-x86_64-DVD-..>	2020-11-06 22:44	176K
CentOS-7-x86_64-DVD-..>	2022-07-26 23:10	4.4G
CentOS-7-x86_64-Ever..>	2020-11-02 23:18	9.5G
CentOS-7-x86_64-Ever..>	2020-11-06 22:44	381K

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

Screenshot:

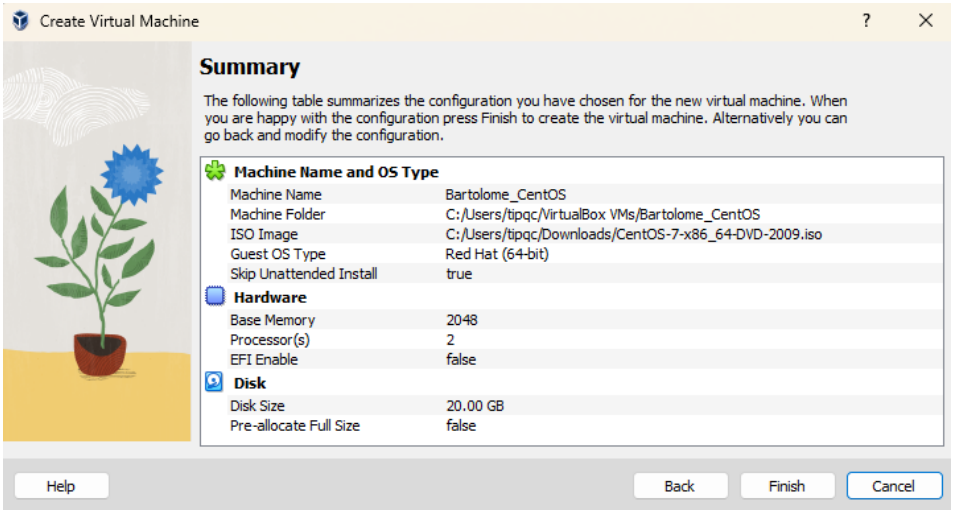






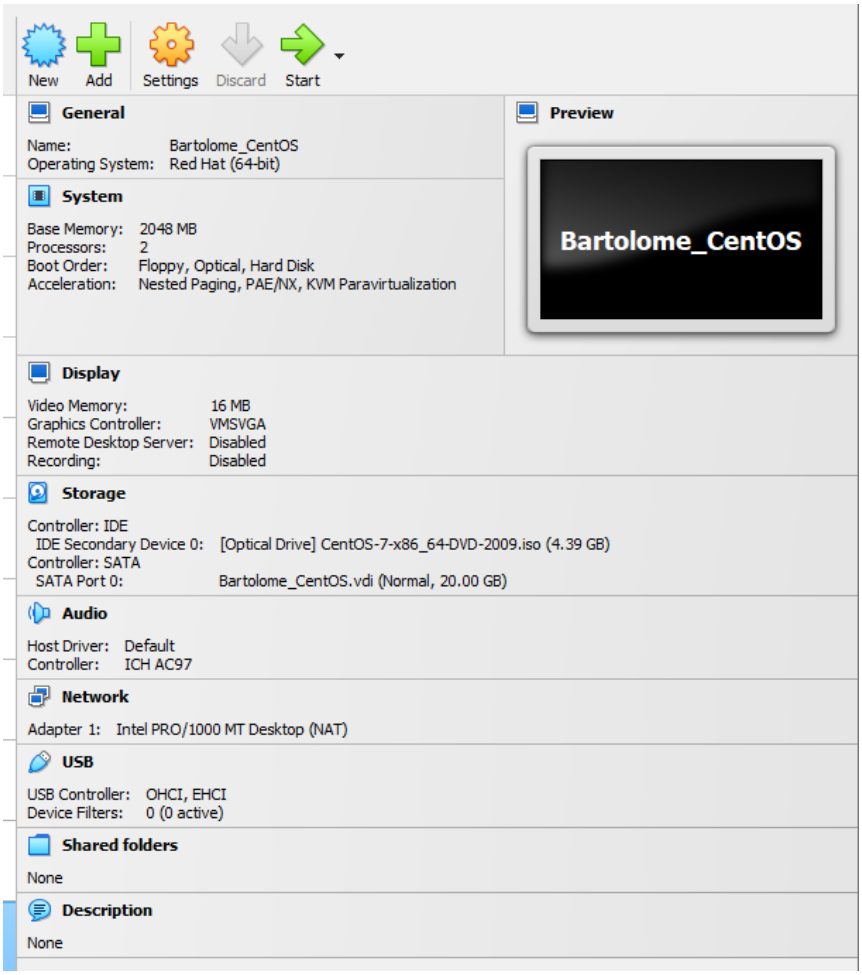
3. Install the downloaded image.

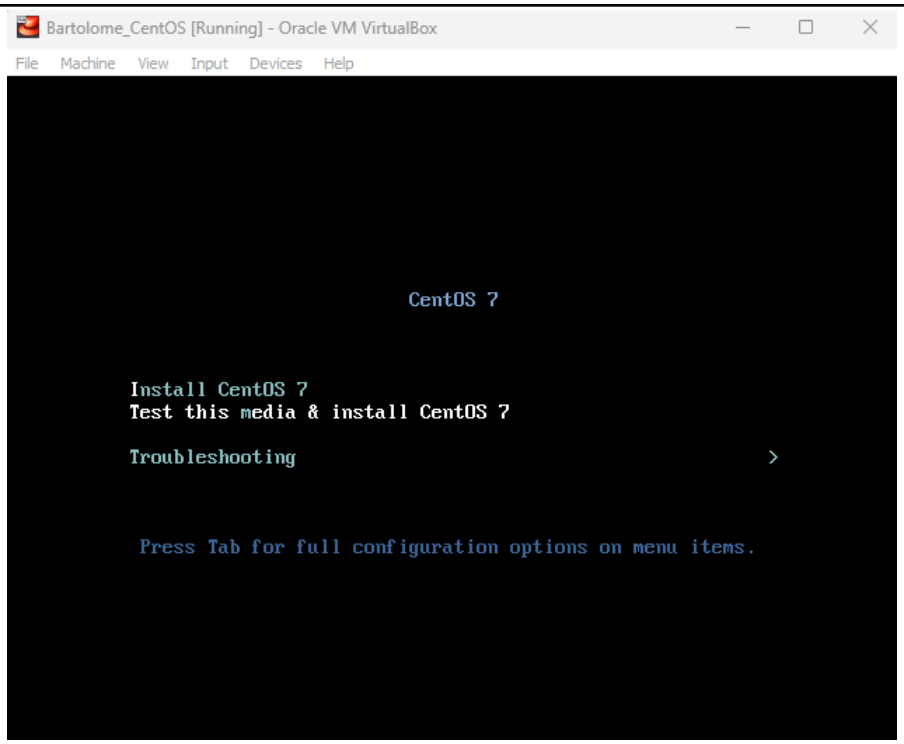
Screenshot:



4. Show evidence that the OS was installed already.

Screenshot:

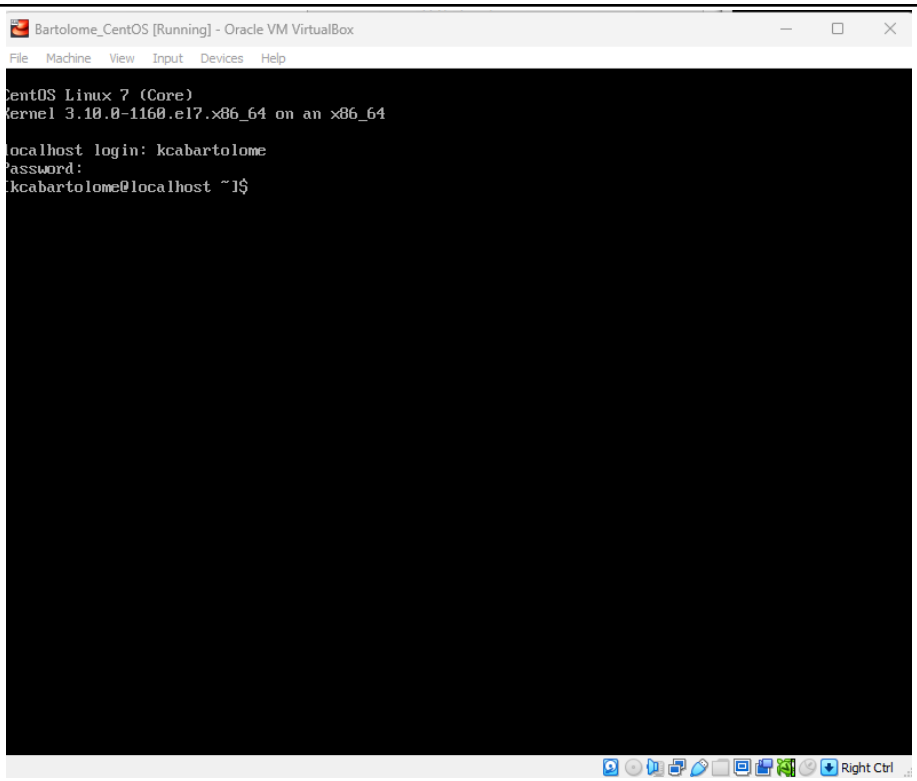


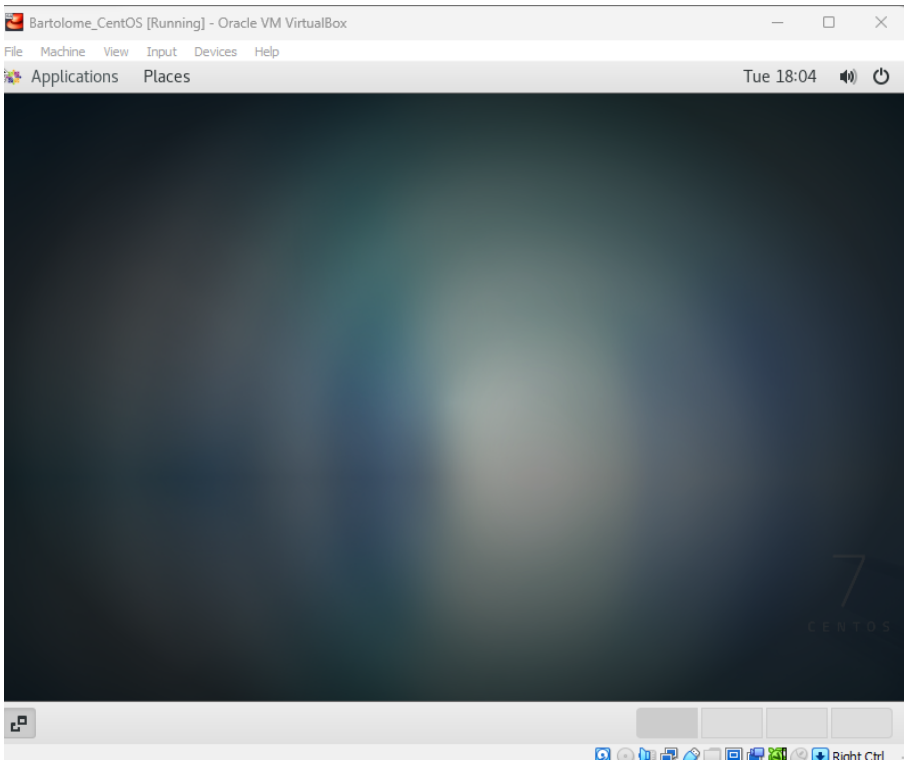



```
[  OK  ] Started Forward Password Requests to Plymouth Directory Watch.
[  OK  ] Reached target Basic System.
[    7.601231] [drm:vmw_host_log [vmwgfx]] *ERROR* Failed to send host log messa
ge.
[    7.603757] [drm:vmw_host_log [vmwgfx]] *ERROR* Failed to send host log messa
ge.
[   10.133781] dracut-initqueue[682]: mount: /dev/sr0 is write-protected, mounting read-only
[  OK  ] Started Show Plymouth Boot Screen.
[  OK  ] Reached target Paths.
[  OK  ] Started Forward Password Requests to Plymouth Directory Watch.
[  OK  ] Reached target Basic System.
[   10.133781] dracut-initqueue[682]: mount: /dev/sr0 is write-protected, mounting read-only
[  OK  ] Created slice system-checkisomd5.slice.
         Starting Media check on /dev/sr0...
/dev/sr0:   10dc6ce3d0098cb5c67356cca02b785d
Fragment sums: 81cf91b42222bd851b8b4bf68cda818796ae4e9c332b739175158d555f85
Fragment count: 20
Press [Esc] to abort check.
Checking: 100.0%

The media check is complete, the result is: PASS.

It is OK to use this media.
[  OK  ] Started Media check on /dev/sr0.
[  OK  ] Started Show Plymouth Boot Screen.
[  OK  ] Reached target Paths.
[  OK  ] Started Forward Password Requests to Plymouth Directory Watch.
[  OK  ] Reached target Basic System.
[   10.133781] dracut-initqueue[682]: mount: /dev/sr0 is write-protected, mounting read-only
[  OK  ] Started dracut initqueue hook.
[  OK  ] Reached target Remote File Systems (Pre).
[  OK  ] Reached target Remote File Systems.
         Starting dracut pre-mount hook...
[  OK  ] Started dracut pre-mount hook.
[  OK  ] Reached target Initrd Root File System.
         Starting Reload Configuration from the Real Root...
```

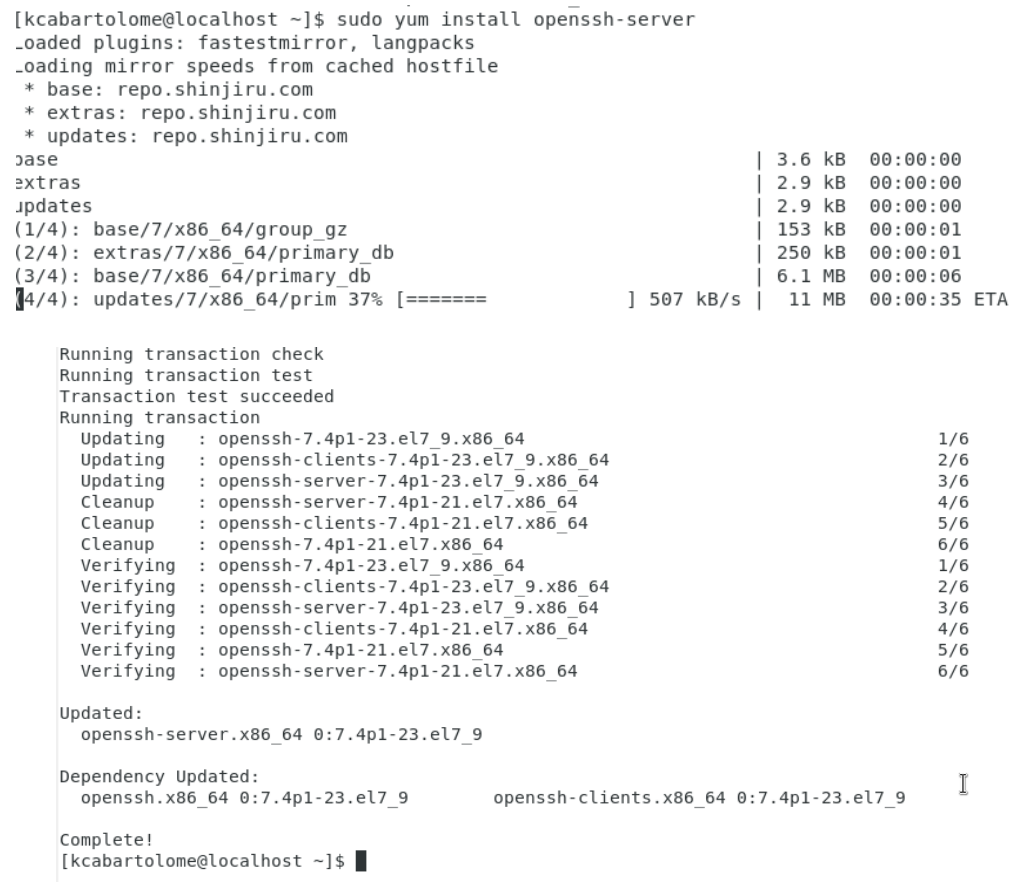

Bartolome_CentOS [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
CentOS Linux 7 (Core)
Kernel 3.10.0-1160.el7.x86_64 on an x86_64
localhost login: kcabartolome
Password:
[kcabartolome@localhost ~]$
Right Ctrl


Bartolome_CentOS [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Applications Places
Tue 18:04
Right Ctrl

Task 2: Install the SSH server package *openssh*

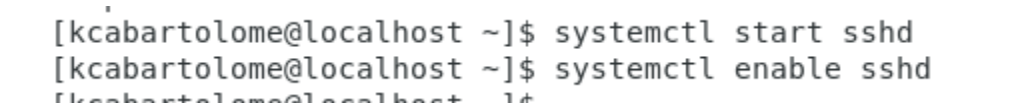
1. Install the ssh server package *openssh* by using the *dnf* command:
   $ dnf install openssh-server

Screenshot:



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

Screenshot:



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

Screenshot:

```
[kcabartolome@localhost ~]$ 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 Tue 2023-09-05 18:10:28 PST; 1min 47s ago
     Docs: man:sshd(8)
           man:sshd_config(5)
 Main PID: 10374 (sshd)
   CGroup: /system.slice/sshd.service
           └─10374 /usr/sbin/sshd -D

Sep 05 18:10:28 localhost.localdomain systemd[1]: Starting OpenSSH server daemon...
Sep 05 18:10:28 localhost.localdomain sshd[10374]: Server listening on 0.0.0.0 port 22.
Sep 05 18:10:28 localhost.localdomain sshd[10374]: Server listening on :: port 22.
Sep 05 18:10:28 localhost.localdomain systemd[1]: Started OpenSSH server daemon.
```

4. Open the SSH port 22 to allow incoming traffic:
   $ firewall-cmd --zone=public --permanent --add-service=ssh
   $ firewall-cmd --reload

Screenshot:

```
[kcabartolome@localhost ~]$ firewall-cmd --zone=public --permanent --add-service=ssh
Warning: ALREADY_ENABLED: ssh
success
[kcabartolome@localhost ~]$ firewall-cmd --reload
success
[kcabartolome@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

Screenshot:

```
 GNU nano 2.3.1            File: /etc/ssh/sshd_config

# no default banner path
#Banner none

# Accept locale-related environment variables
AcceptEnv LANG LC_CTYPE LC_NUMERIC LC_TIME LC_COLLATE LC_MONETARY LC_MESSAGES
AcceptEnv LC_PAPER LC_NAME LC_ADDRESS LC_TELEPHONE LC_MEASUREMENT
AcceptEnv LC_IDENTIFICATION LC_ALL LANGUAGE
AcceptEnv XMODIFIERS

# override default of no subsystems
Subsystem       sftp    /usr/libexec/openssh/sftp-server

# Example of overriding settings on a per-user basis
#Match User anoncvs
#       X11Forwarding no
#       AllowTcpForwarding no
#       PermitTTY no
#       ForceCommand cvs server
```

```
[kcabartolome@localhost ~]$ systemctl reload sshd
```

Task 3: Copy the Public Key to CentOS

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

Screenshot:

```
[kcabartolome@localhost ~]$ 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 Tue 2023-09-05 18:10:28 PST; 1min 47s ago
     Docs: man:sshd(8)
           man:sshd_config(5)
 Main PID: 10374 (sshd)
   CGroup: /system.slice/sshd.service
           └─10374 /usr/sbin/sshd -D

Sep 05 18:10:28 localhost.localdomain systemd[1]: Starting OpenSSH server daemon...
Sep 05 18:10:28 localhost.localdomain sshd[10374]: Server listening on 0.0.0.0 port 22.
Sep 05 18:10:28 localhost.localdomain sshd[10374]: Server listening on :: port 22.
Sep 05 18:10:28 localhost.localdomain systemd[1]: Started OpenSSH server daemon.
```

```
kenworkstation@kenworkstation:~$ sudo apt install openssh-server
[sudo] password for kenworkstation:
Sorry, try again.
[sudo] password for kenworkstation:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
openssh-server is already the newest version (1:8.9p1-3ubuntu0.3).
0 upgraded, 0 newly installed, 0 to remove and 6 not upgraded.
```

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

Screenshot:

```
[kcabartolome@localhost ~]$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.56.114  netmask 255.255.255.0  broadcast 192.168.56.255
        inet6 fe80::cc70:c524:f504:7911  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:8b:2d:da  txqueuelen 1000  (Ethernet)
        RX packets 14  bytes 2903 (2.8 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 27  bytes 4558 (4.4 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

```
kenworkstation@kenworkstation:~$ ssh-copy-id kcabartolome@192.168.56.114
The authenticity of host '192.168.56.114 (192.168.56.114)' can't be established.
ED25519 key fingerprint is SHA256:MD5NxHfLrDxAkJH/ei/3xUT5AvyDmWS3/cgCXhU0YdE.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
/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 prompt
ed now it is to install the new keys
kcabartolome@192.168.56.114's password:

Number of key(s) added: 1

Now try logging into the machine, with:   "ssh 'kcabartolome@192.168.56.114'"
and check to make sure that only the key(s) you wanted were added.
```

3. On CentOS, verify that you have the *authorized_keys*.

```
[kcabartolome@localhost ~]$ ls .ssh
authorized keys
```

Task 4: Verify ssh remote connection

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

```
kenworkstation@kenworkstation:~$ ssh kcabartolome@192.168.56.114
Last login: Tue Sep  5 22:28:03 2023
[kcabartolome@localhost ~]$ logout
Connection to 192.168.56.114 closed.
```

```
kenworkstation@kenworkstation:~$ ssh kcabartolome@centos
The authenticity of host 'centos (192.168.56.114)' can't be established.
ED25519 key fingerprint is SHA256:MD5NxHfLrDxAkJH/ei/3xUT5AvyDmWS3/cgCXhU0YdE.
This host key is known by the following other names/addresses:
    ~/.ssh/known_hosts:12: [hashed name]
Are you sure you want to continue connecting (yes/no/[fingerprint])? y
Please type 'yes', 'no' or the fingerprint: yes
Warning: Permanently added 'centos' (ED25519) to the list of known hosts.
Last login: Tue Sep  5 22:36:07 2023 from 192.168.56.110
[kcabartolome@localhost ~]$ logout
Connection to centos closed.
```

2. Show evidence that you are connected.

```
kenworkstation@kenworkstation:~$ ping centos
PING centos (192.168.56.114) 56(84) bytes of data.
64 bytes from centos (192.168.56.114): icmp_seq=1 ttl=64 time=0.198 ms
64 bytes from centos (192.168.56.114): icmp_seq=2 ttl=64 time=0.213 ms
64 bytes from centos (192.168.56.114): icmp_seq=3 ttl=64 time=0.207 ms
64 bytes from centos (192.168.56.114): icmp_seq=4 ttl=64 time=0.202 ms
64 bytes from centos (192.168.56.114): icmp_seq=5 ttl=64 time=0.221 ms
^C
--- centos ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4105ms
rtt min/avg/max/mdev = 0.198/0.208/0.221/0.008 ms
```

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?

Answer: When it comes to picking either Debian and Red Hat Linux as a distribution, we must first look at what they offer for the consumer. The user must delegate what they have to prioritize such as their packaging management, architecture and cost. User experience is also a factor wherein if a user requires a distribution's offerings, then that is a priority. Other factors will be the following. First, Debian is quite known for its stability. They are commonly used in production servers such as website content and application. Debian offers major version upgrades, although quite complex. Red Hat on the other hand is used in an enterprise environment, wherein they store programs for a user or department. They have more updated softwares and more functions built in the system. However these two offer for their consumer.

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

Answer: Their main differences come from what these distributions can provide overall. In architecture, they are quite similar, however Red Hat's version can run POWER9 while the others can't. Debian can support MIPSel and s390x. For package management, Red Hat uses RPM package format (yum/dnf), while Debian uses DEB package format (dpkg/apt). They work similarly from each other, although only works on their respective distribution. In filesystems, Red Hat uses XFS. Debian on the other hand uses EXT4. Even though they're different, they can support other file systems such as ext2/3, NFSv3/4, and more. Last but not the least is support. Red Hat accepts bug reports submitted by users (community-supported), while Debian utilizes a bug tracker that will track these errors. Keep in mind that for a RHEL-compatible distribution, Red Hat is a primary choice, but if other-wise, Debian is also a viable option.