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Course/Section: CPE232-CPE31S24	**Date Submitted:**
Instructor: Engr. Jonathan V. Taylar	**Semester and SY: 1st sem SY ‘22-’23**

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.

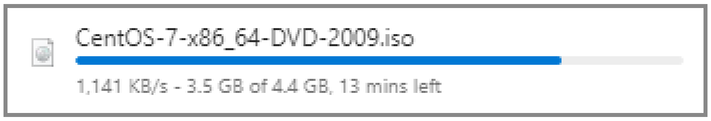
CentOS uses the RPM package format and YUM/DNF as the package manager.

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)

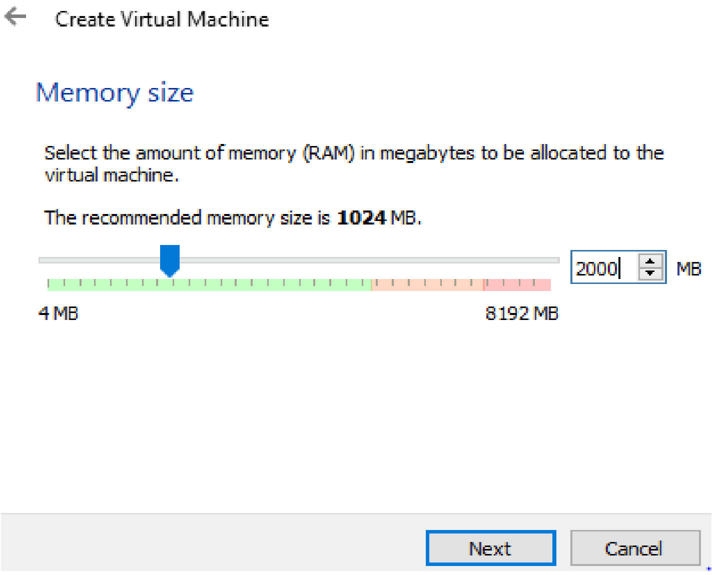
1. Download the image of the CentOS here: http://mirror.rise.ph/centos/7.9.2009/isos/x86_64/



CentOS-7-x86_64-DVD-2009.iso

1,141 KB/s - 3.5 GB of 4.4 GB, 13 mins left

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



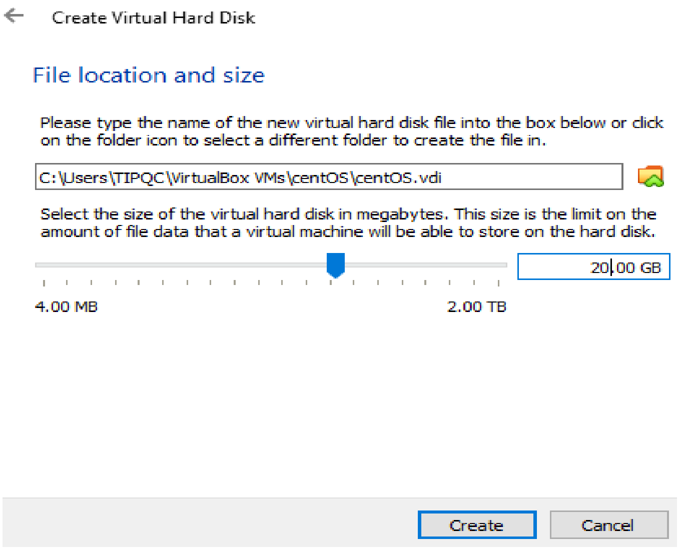
Create Virtual Machine

Memory size

Select the amount of memory (RAM) in megabytes to be allocated to the virtual machine.

The recommended memory size is **1024** MB.

2000 MB



Create Virtual Hard Disk

File location and size

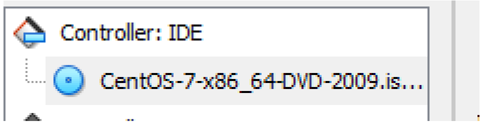
Please type the name of the new virtual hard disk file into the box below or click on the folder icon to select a different folder to create the file in.

C:\Users\TIPQC\VirtualBox VMs\centOS\centOS.vdi

Select the size of the virtual hard disk in megabytes. This size is the limit on the amount of file data that a virtual machine will be able to store on the hard disk.

20.00 GB

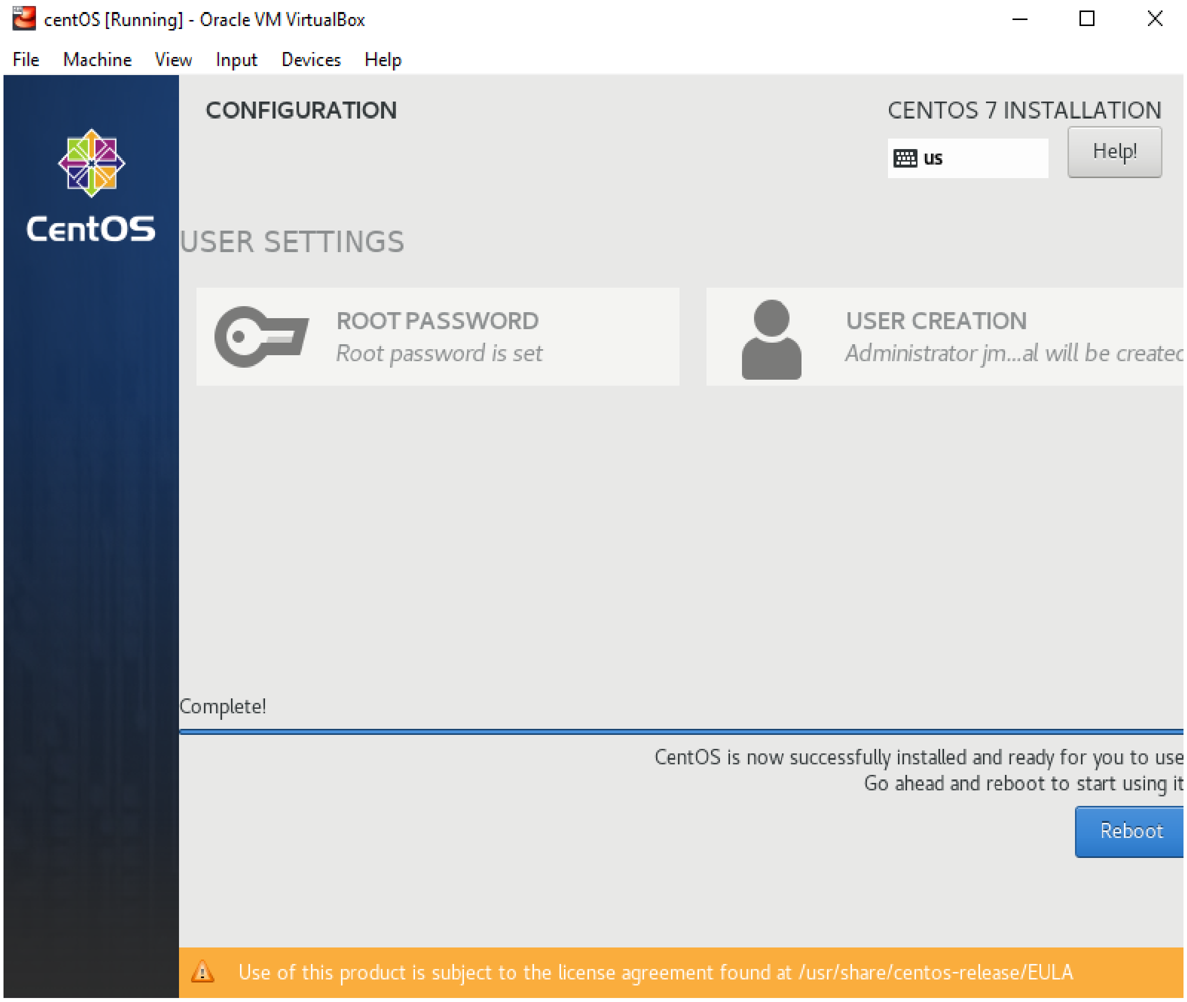
3. Install the downloaded image.



Controller: IDE

CentOS-7-x86_64-DVD-2009.is…

4. Show evidence that the OS was installed already.



CONFIGURATION

CENTOS 7 INSTALLATION

USER SETTINGS

ROOT PASSWORD
Root password is set

USER CREATION
Administrator jm...al will be createc

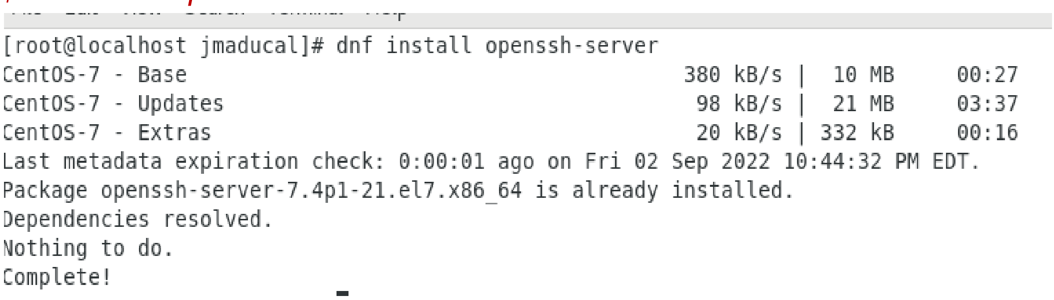
Complete!

CentOS is now successfully installed and ready for you to use
Go ahead and reboot to start using it

Use of this product is subject to the license agreement found at /usr/share/centos-release/EULA

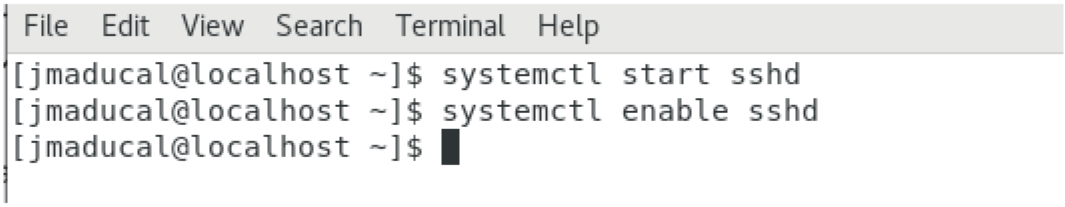
Task 2: Install the SSH server package *openssh*

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



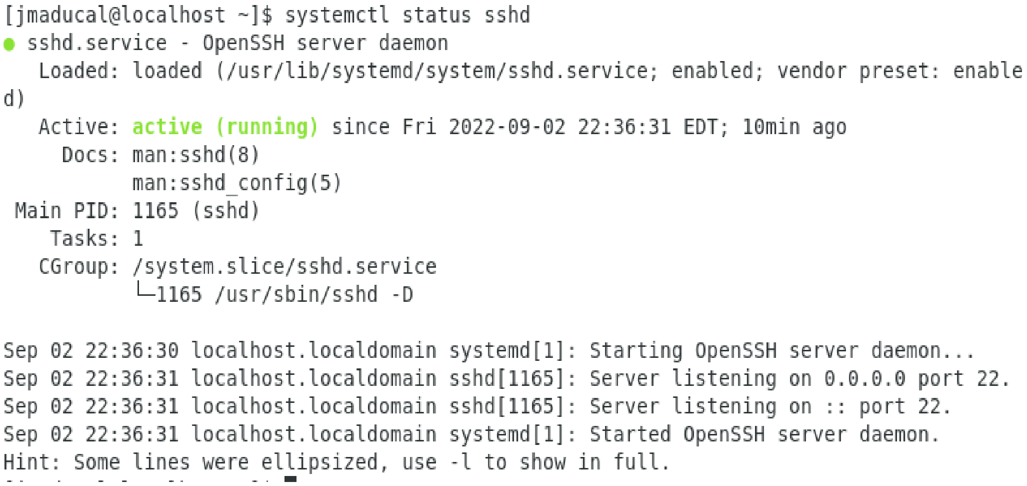
```
[root@localhost jmaducal]# dnf install openssh-server
CentOS-7 - Base                                  380 kB/s |  10 MB     00:27
CentOS-7 - Updates                                98 kB/s |  21 MB     03:37
CentOS-7 - Extras                                 20 kB/s | 332 kB     00:16
Last metadata expiration check: 0:00:01 ago on Fri 02 Sep 2022 10:44:32 PM EDT.
Package openssh-server-7.4p1-21.el7.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
```

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



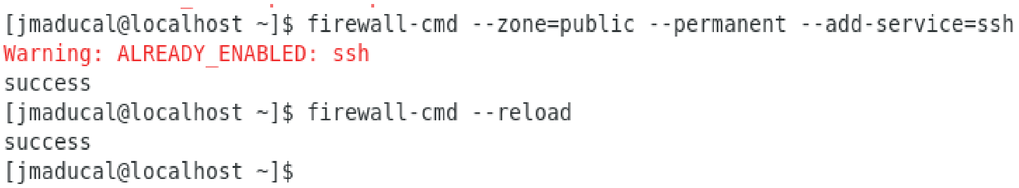
```
[jmaducal@localhost ~]$ systemctl start sshd
[jmaducal@localhost ~]$ systemctl enable sshd
[jmaducal@localhost ~]$ 
```

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



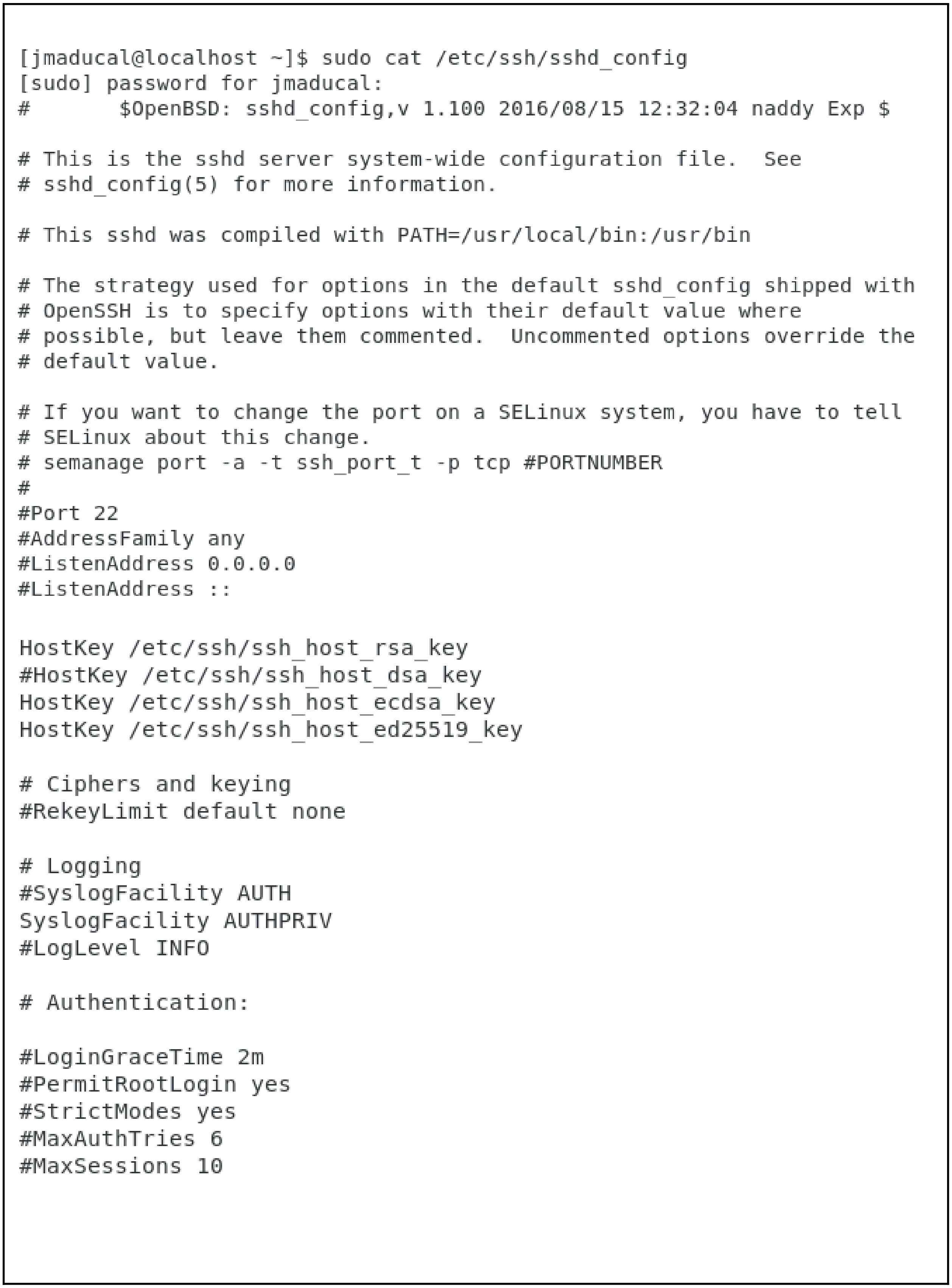
```
[jmaducal@localhost ~]$ systemctl status sshd
● sshd.service - OpenSSH server daemon
   Loaded: loaded (/usr/lib/systemd/system/sshd.service; enabled; vendor preset: enable
d)
   Active: active (running) since Fri 2022-09-02 22:36:31 EDT; 10min ago
     Docs: man:sshd(8)
           man:sshd_config(5)
 Main PID: 1165 (sshd)
    Tasks: 1
   CGroup: /system.slice/sshd.service
           └─1165 /usr/sbin/sshd -D

Sep 02 22:36:30 localhost.localdomain systemd[1]: Starting OpenSSH server daemon...
Sep 02 22:36:31 localhost.localdomain sshd[1165]: Server listening on 0.0.0.0 port 22.
Sep 02 22:36:31 localhost.localdomain sshd[1165]: Server listening on :: port 22.
Sep 02 22:36:31 localhost.localdomain systemd[1]: Started OpenSSH server daemon.
Hint: Some lines were ellipsized, use -l to show in full.
```

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

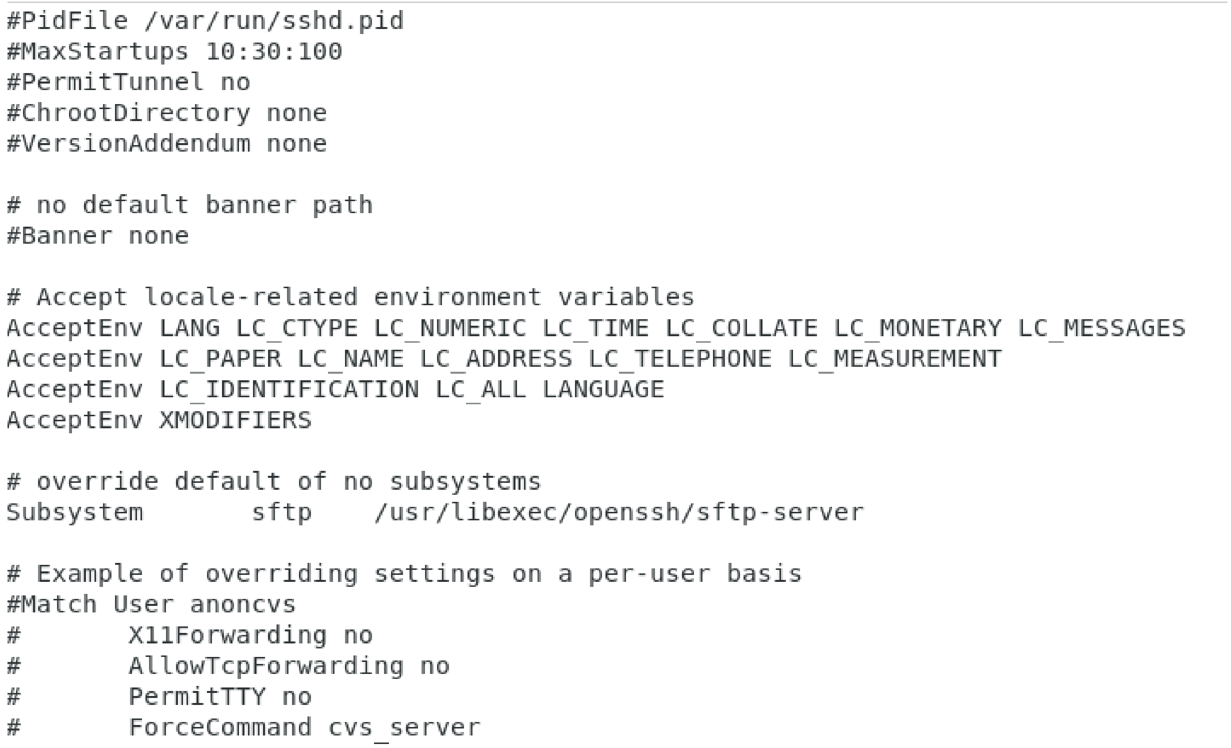


```
[jmaducal@localhost ~]$ firewall-cmd --zone=public --permanent --add-service=ssh
Warning: ALREADY_ENABLED: ssh
success
[jmaducal@localhost ~]$ firewall-cmd --reload
success
[jmaducal@localhost ~]$
```

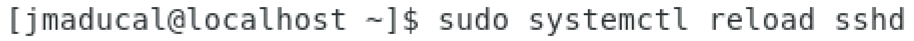
5. Locate the ssh server man config file /*etc/ssh/sshd_config* and perform custom configuration. Every time you make any change to the /*etc/ssh/sshd-config* configuration file reload the *sshd* service to apply changes:
   $ systemctl reload sshd



```
[jmaducal@localhost ~]$ sudo cat /etc/ssh/sshd_config
[sudo] password for jmaducal:
#       $OpenBSD: sshd_config,v 1.100 2016/08/15 12:32:04 naddy Exp $

# This is the sshd server system-wide configuration file.  See
# sshd_config(5) for more information.

# This sshd was compiled with PATH=/usr/local/bin:/usr/bin

# The strategy used for options in the default sshd_config shipped with
# OpenSSH is to specify options with their default value where
# possible, but leave them commented.  Uncommented options override the
# default value.

# If you want to change the port on a SELinux system, you have to tell
# SELinux about this change.
# semanage port -a -t ssh_port_t -p tcp #PORTNUMBER
#
#Port 22
#AddressFamily any
#ListenAddress 0.0.0.0
#ListenAddress ::

HostKey /etc/ssh/ssh_host_rsa_key
#HostKey /etc/ssh/ssh_host_dsa_key
HostKey /etc/ssh/ssh_host_ecdsa_key
HostKey /etc/ssh/ssh_host_ed25519_key

# Ciphers and keying
#RekeyLimit default none

# Logging
#SyslogFacility AUTH
SyslogFacility AUTHPRIV
#LogLevel INFO

# Authentication:

#LoginGraceTime 2m
#PermitRootLogin yes
#StrictModes yes
#MaxAuthTries 6
#MaxSessions 10
```



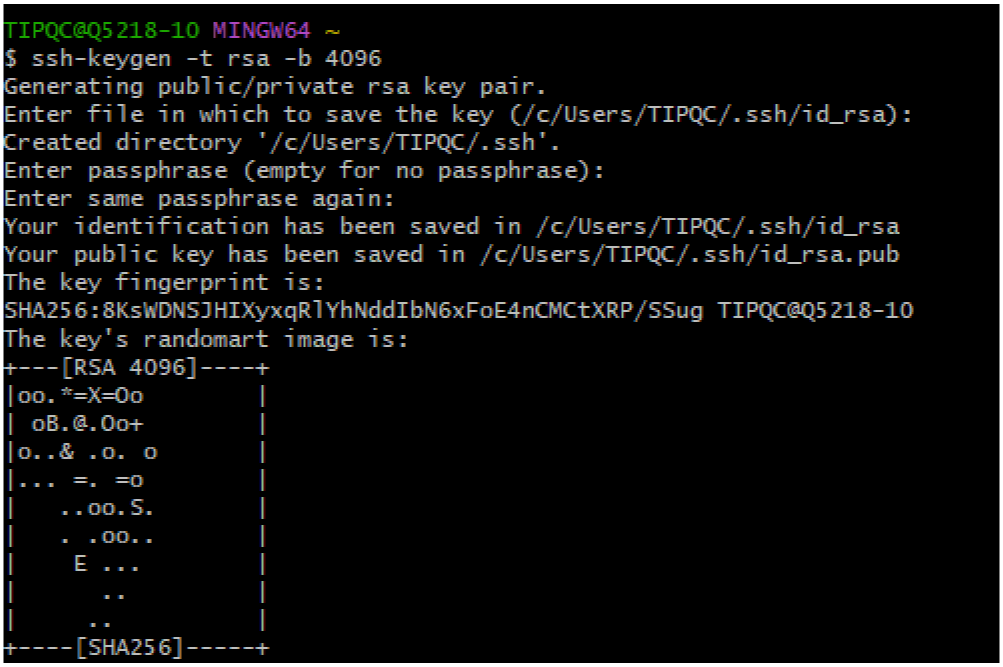
```
#PidFile /var/run/sshd.pid
#MaxStartups 10:30:100
#PermitTunnel no
#ChrootDirectory none
#VersionAddendum none

# 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
```



```
[jmaducal@localhost ~]$ sudo systemctl reload sshd
```

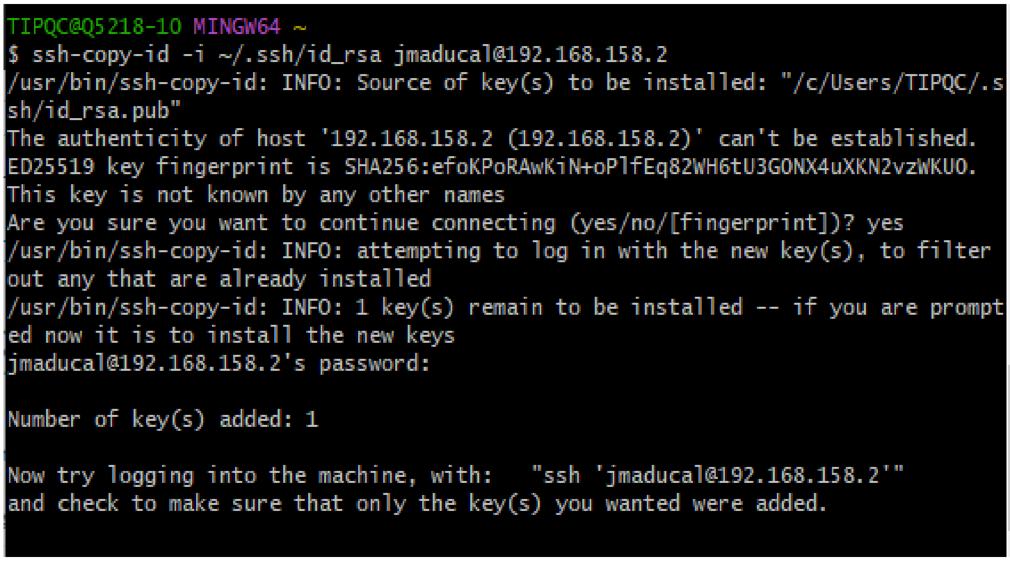
Task 3: Copy the Public Key to CentOS

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



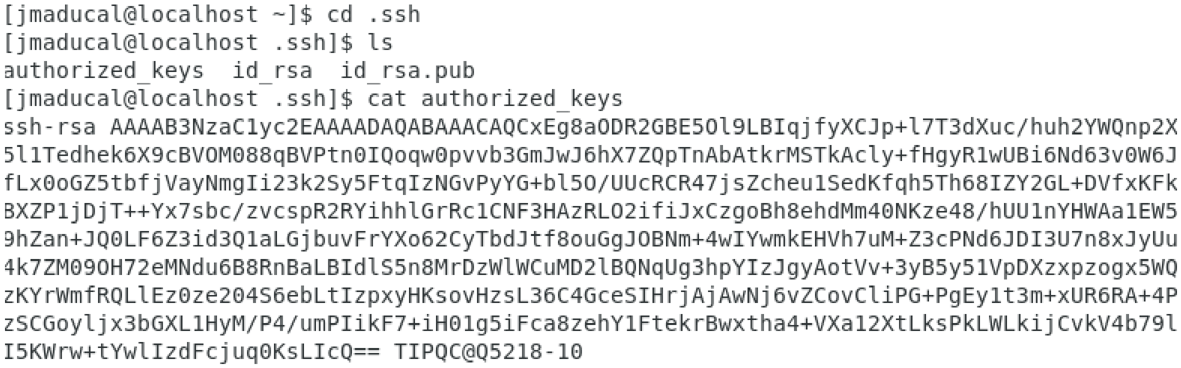
```
TIPQC@Q5218-10 MINGW64 ~
$ ssh-keygen -t rsa -b 4096
Generating public/private rsa key pair.
Enter file in which to save the key (/c/Users/TIPQC/.ssh/id_rsa):
Created directory '/c/Users/TIPQC/.ssh'.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /c/Users/TIPQC/.ssh/id_rsa
Your public key has been saved in /c/Users/TIPQC/.ssh/id_rsa.pub
The key fingerprint is:
SHA256:8KsWDNSJHIXyxqRlYhNddIbN6xFoE4nCMCtXRP/SSug TIPQC@Q5218-10
The key's randomart image is:
+---[RSA 4096]----+
|oo.*=X=Oo        |
| oB.@.Oo+        |
|o..& .o. o       |
|... =. =o        |
|   ..oo.S.       |
|   . .oo..       |
|    E ...        |
|      ..         |
|     ..          |
+----[SHA256]-----+
```

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



```
TIPQC@Q5218-10 MINGW64 ~
$ ssh-copy-id -i ~/.ssh/id_rsa jmaducal@192.168.158.2
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/c/Users/TIPQC/.s
sh/id_rsa.pub"
The authenticity of host '192.168.158.2 (192.168.158.2)' can't be established.
ED25519 key fingerprint is SHA256:efoKPoRAwKiN+oPlfEq82WH6tU3GONX4uXKN2vzWKUO.
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
jmaducal@192.168.158.2's password:

Number of key(s) added: 1

Now try logging into the machine, with:   "ssh 'jmaducal@192.168.158.2'"
and check to make sure that only the key(s) you wanted were added.
```

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

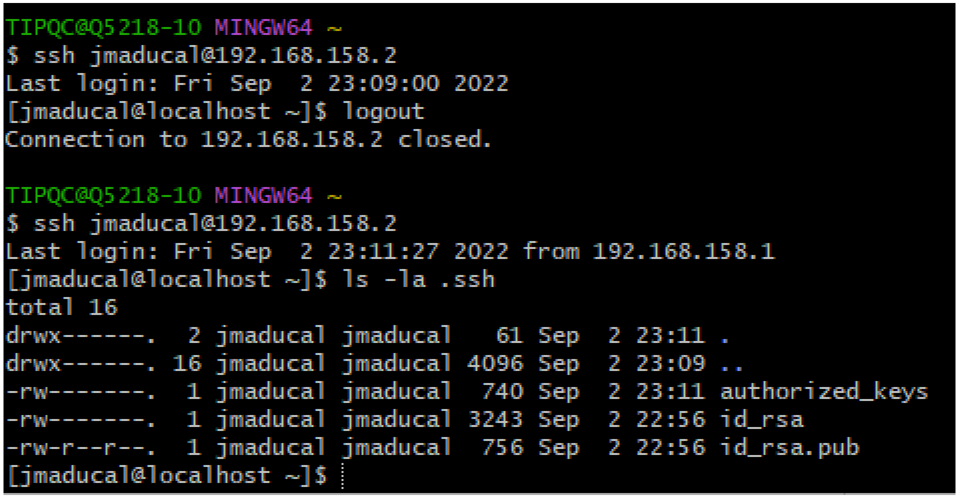


```
[jmaducal@localhost ~]$ cd .ssh
[jmaducal@localhost .ssh]$ ls
authorized_keys  id_rsa  id_rsa.pub
[jmaducal@localhost .ssh]$ cat authorized_keys
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAACAQCxEg8aODR2GBE5Ol9LBIqjfyXCJp+l7T3dXuc/huh2YWQnp2X
5l1Tedhek6X9cBVOM088qBVPtn0IQoqw0pvvb3GmJwJ6hX7ZQpTnAbAtkrMSTkAcly+fHgyR1wUBi6Nd63v0W6J
fLx0oGZ5tbfjVayNmgIi23k2Sy5FtqIzNGvPyYG+bl5O/UUcRCR47jsZcheu1SedKfqh5Th68IZY2GL+DVfxKFk
BXZP1jDjT++Yx7sbc/zvcspR2RYihhlGrRc1CNF3HAzRLO2ifiJxCzgoBh8ehdMm40NKze48/hUU1nYHWAa1EW5
9hZan+JQ0LF6Z3id3Q1aLGjbuvFrYXo62CyTbdJtf8ouGgJOBNm+4wIYwmkEHVh7uM+Z3cPNd6JDI3U7n8xJyUu
4k7ZM09OH72eMNdu6B8RnBaLBIdlS5n8MrDzWlWCuMD2lBQNqUg3hpYIzJgyAotVv+3yB5y51VpDXzxpzogx5WQ
zKYrWmfRQLlEz0ze204S6ebLtIzpxyHKsovHzsL36C4GceSIHrjAjAwNj6vZCovCliPG+PgEy1t3m+xUR6RA+4P
zSCGoyljx3bGXL1HyM/P4/umPIikF7+iH01g5iFca8zehY1FtekrBwxtha4+VXa12XtLksPkLWLkijCvkV4b79l
I5KWrw+tYwlIzdFcjuq0KsLIcQ== TIPQC@Q5218-10
```

Task 4: Verify ssh remote connection

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

2. Show evidence that you are connected.



```
TIPQC@Q5218-10 MINGW64 ~
$ ssh jmaducal@192.168.158.2
Last login: Fri Sep  2 23:09:00 2022
[jmaducal@localhost ~]$ logout
Connection to 192.168.158.2 closed.

TIPQC@Q5218-10 MINGW64 ~
$ ssh jmaducal@192.168.158.2
Last login: Fri Sep  2 23:11:27 2022 from 192.168.158.1
[jmaducal@localhost ~]$ ls -la .ssh
total 16
drwx------.  2 jmaducal jmaducal   61 Sep  2 23:11 .
drwx------. 16 jmaducal jmaducal 4096 Sep  2 23:09 ..
-rw-------.  1 jmaducal jmaducal  740 Sep  2 23:11 authorized_keys
-rw-------.  1 jmaducal jmaducal 3243 Sep  2 22:56 id_rsa
-rw-r--r--.  1 jmaducal jmaducal  756 Sep  2 22:56 id_rsa.pub
[jmaducal@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?
   RedHat and Debian are both Linux distributions but they have differences and uniqueness. Redhat is known and widely used in servers and debian is next to RedHat. Debian provides more packages roughly around 80% more than RedHat provides to its users.

2. What are the main differences between Debian and Red Hat Linux distributions?
   In terms of package, Red hat uses .rpm packages while the debian uses .deb packages. RedHat uses the yum dependency solver while Debian uses apt-get dependency solver. RedHat is Commercial Linux Distribution and Debian is not.