

CentOS 8 matches the department's servers, including the rlogin cluster, so that is what you should install.

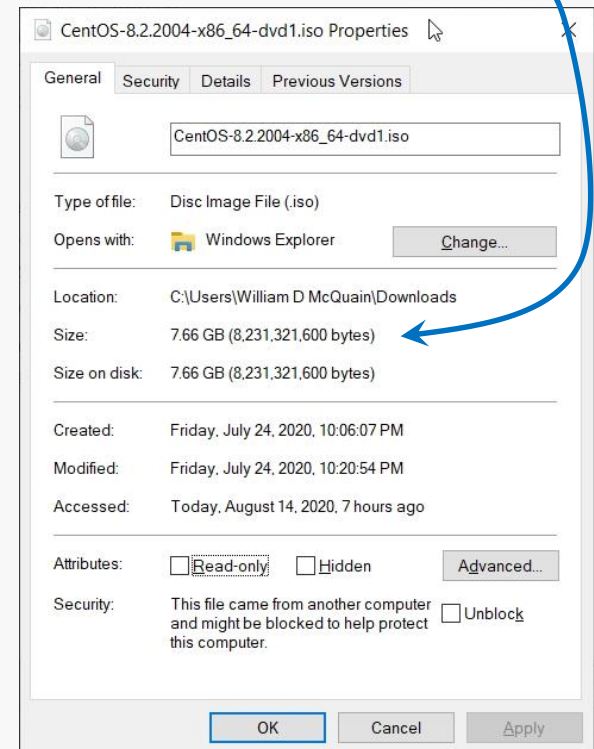
That's where we will evaluate all of your assignments.

When downloading an ISO for CentOS, be aware that the file is fairly large...

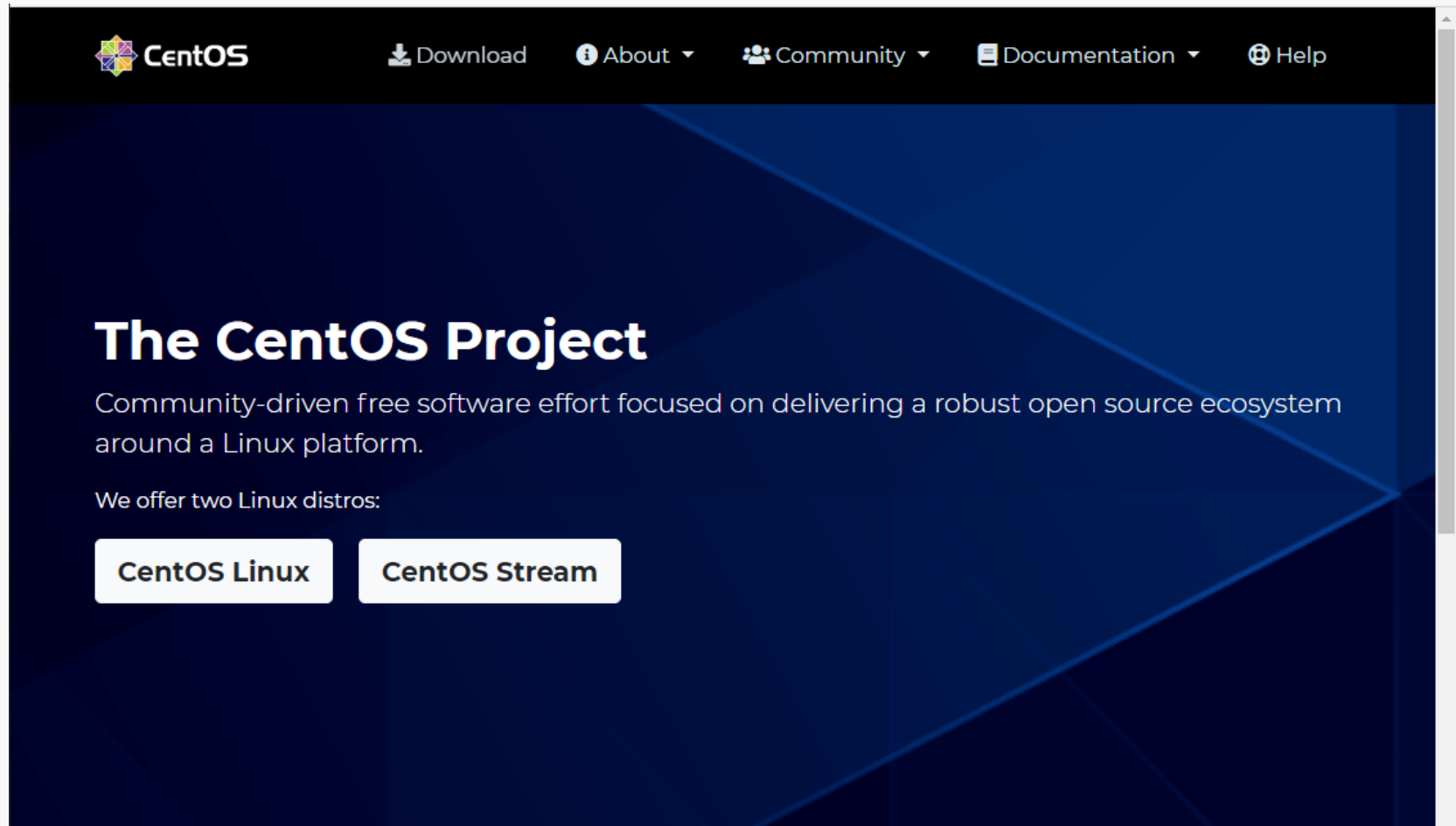
Be sure you've gotten all of it...

Disclaimer: the following notes illustrate one session installing CentOS 8 on VirtualBox 6.1.12, running on Windows 10 Enterprise, on a particular underlying hardware system.

YMMV. Mine certainly has...



Go to centos.org, and use the Download link.



Select the ISO distribution



CentOS Linux

8 (2004) 7 (2003) 6.10

ISO	Packages	Others
x86_64	RPMs	Cloud Containers Vagrant
ARM64 (aarch64)	RPMs	Cloud Containers Vagrant
IBM Power (ppc64le)	RPMs	Cloud Containers Vagrant

[Release Notes](#) [Release Email](#) [Documentation](#)

End-of-life

31 May 2029

The following notes assume that you have:

- installed VirtualBox
- created an empty VM

If you are preparing a USB flash drive for a dual-boot approach instead, you need to:

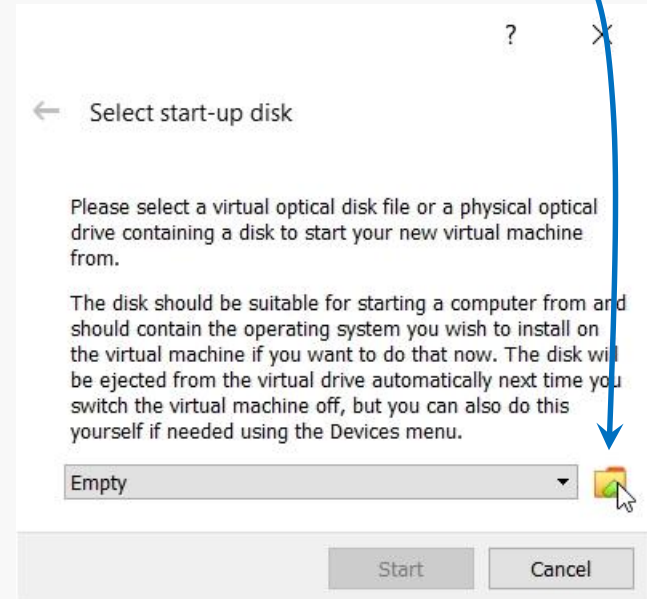
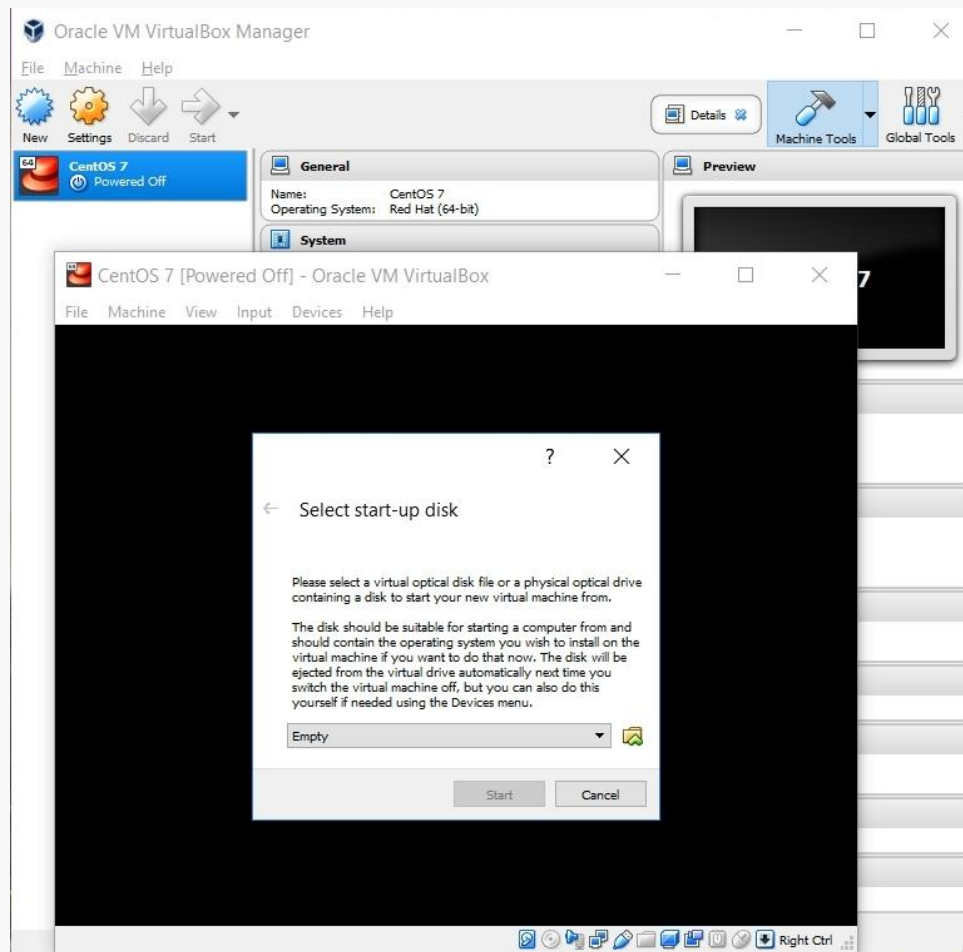
- prepare a bootable installation flash drive (or DVD) from the CentOS 8 ISO
- boot your computer from that installation medium
- **very carefully choose your second flash drive for the installation***
- follow the remaining slides to perform the installation
- skip the VirtualBox-specific slides

* If you choose your primary hard drive instead, you will destroy your host OS!

Select the VM and click Start.

VirtualBox will recognize the empty system and prompt you to select an installation disk.

Click the folder icon...



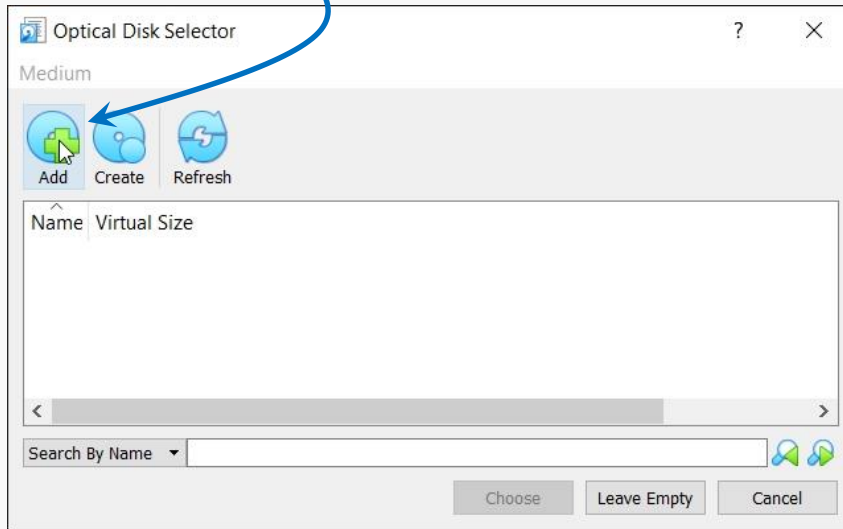
If you click your mouse within the window where CentOS is being installed:

- VirtualBox will capture your mouse and keyboard
- you can release them by pressing the Host key
- on Windows systems, that's the right-hand Control key (right-Ctrl)
- on Mac systems, that's the left Command key

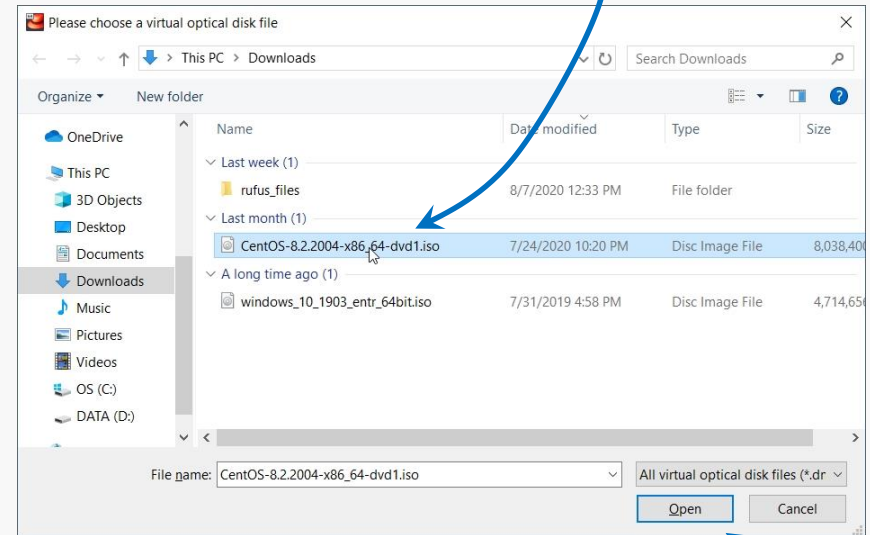
The mouse and keyboard might auto-release on modern systems.

Once you've installed the Guest Additions in your CentOS VM, they will.

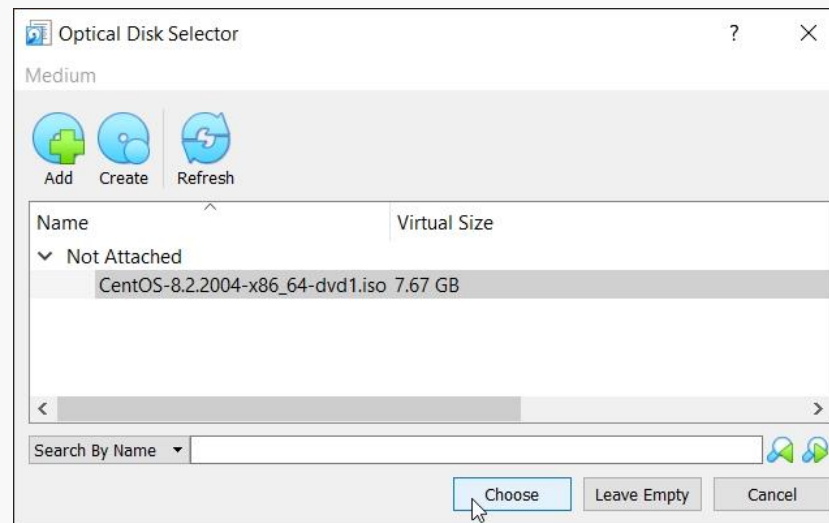
Select Add



Find the CentOS 8 ISO



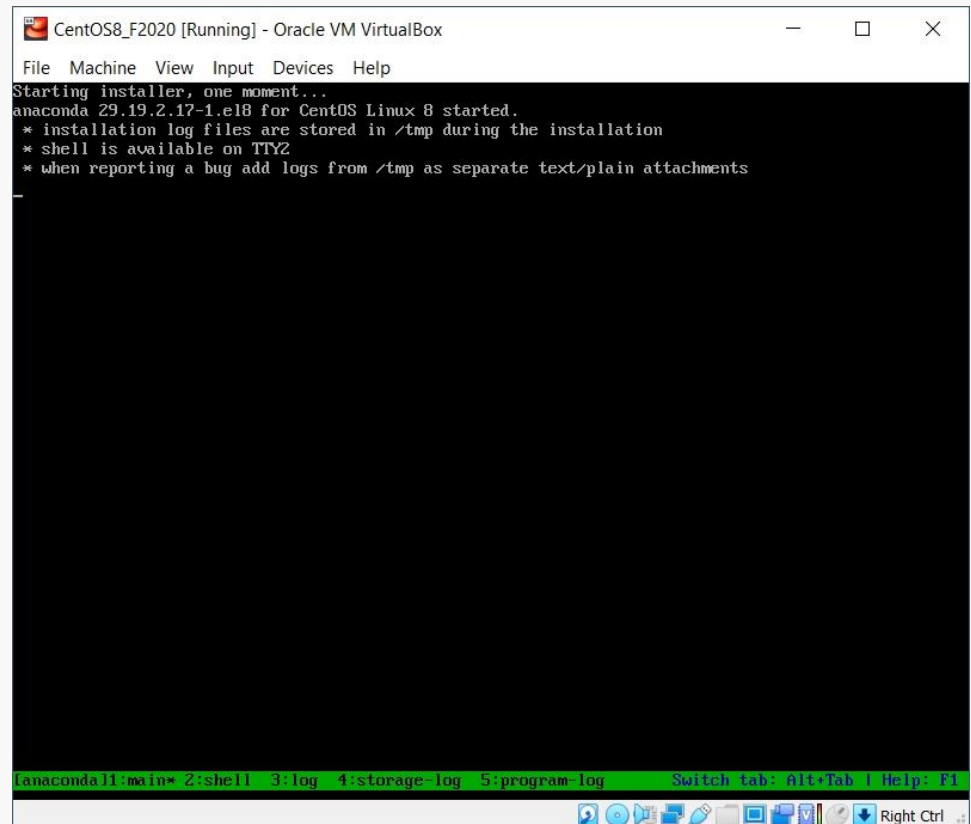
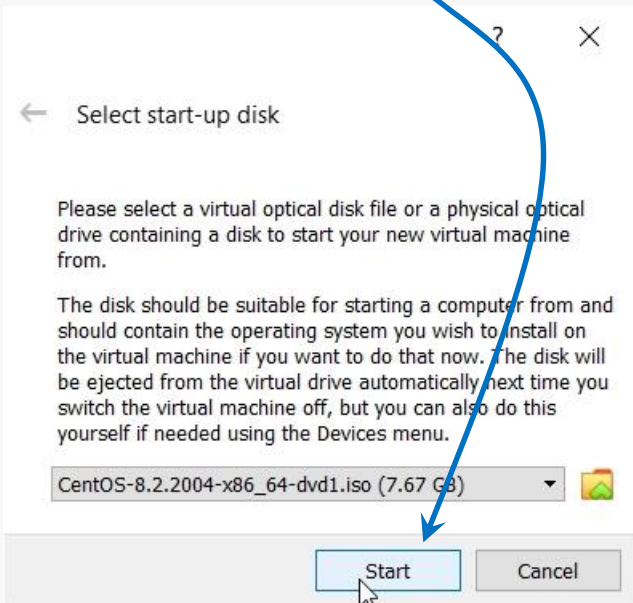
Click Open



Click Start

Select Install CentOS 8...

... and it grinds away awhile...

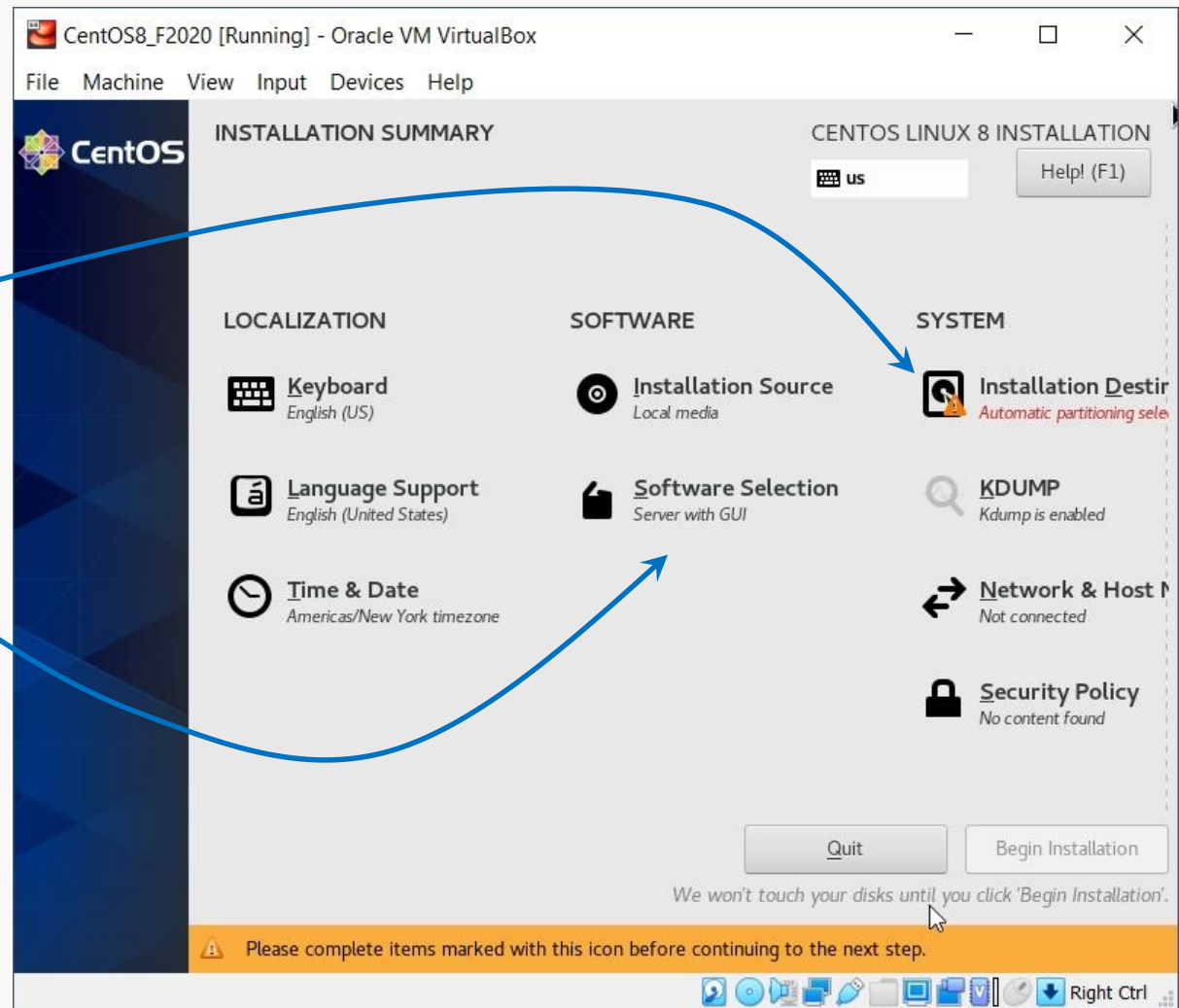


Some basic settings need to be established.

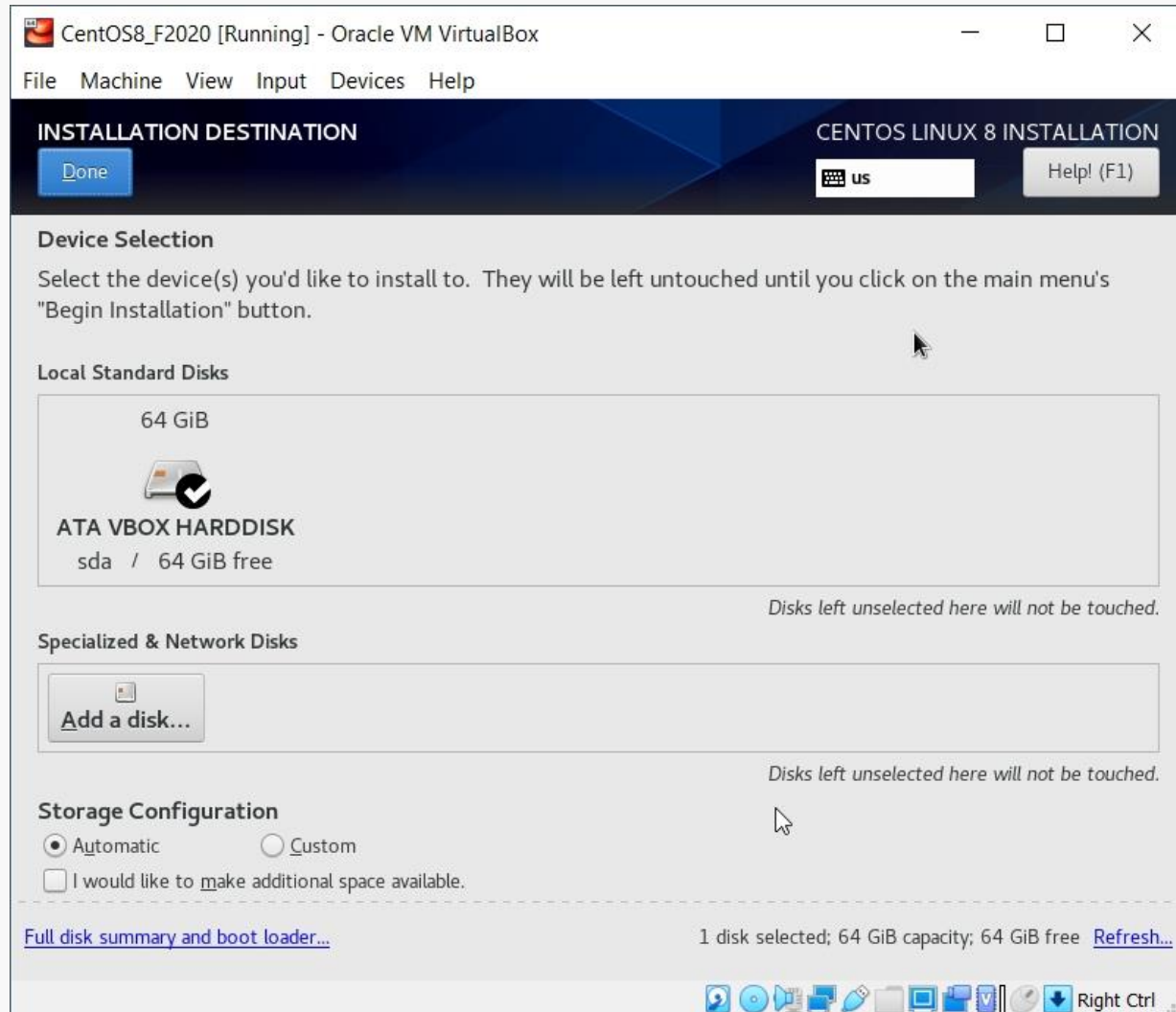
After confirming
Language and
Keyboard...

Installation
Destination

Software Selection



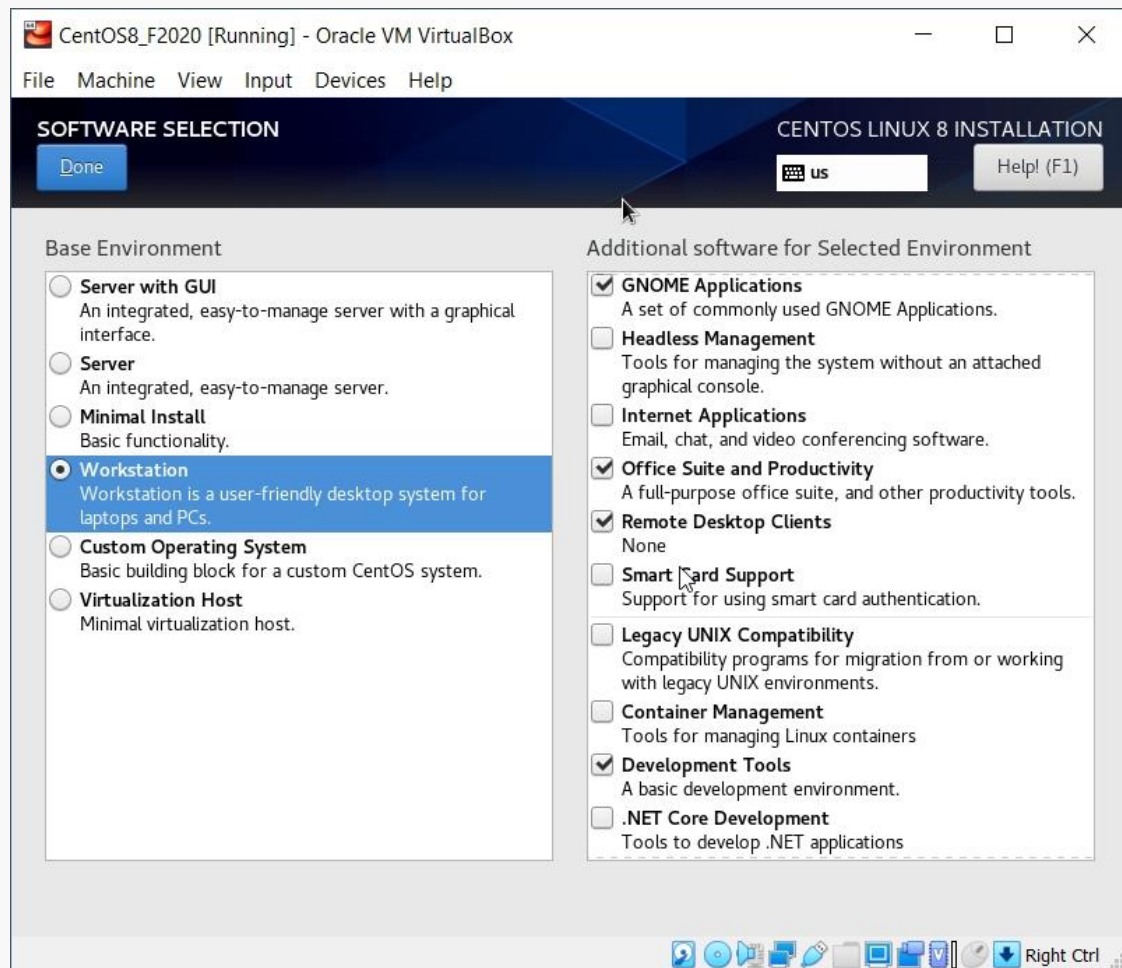
This will be the virtual harddrive you just created... take the defaults.



Be sure to choose Workstation and to install the Development Tools.

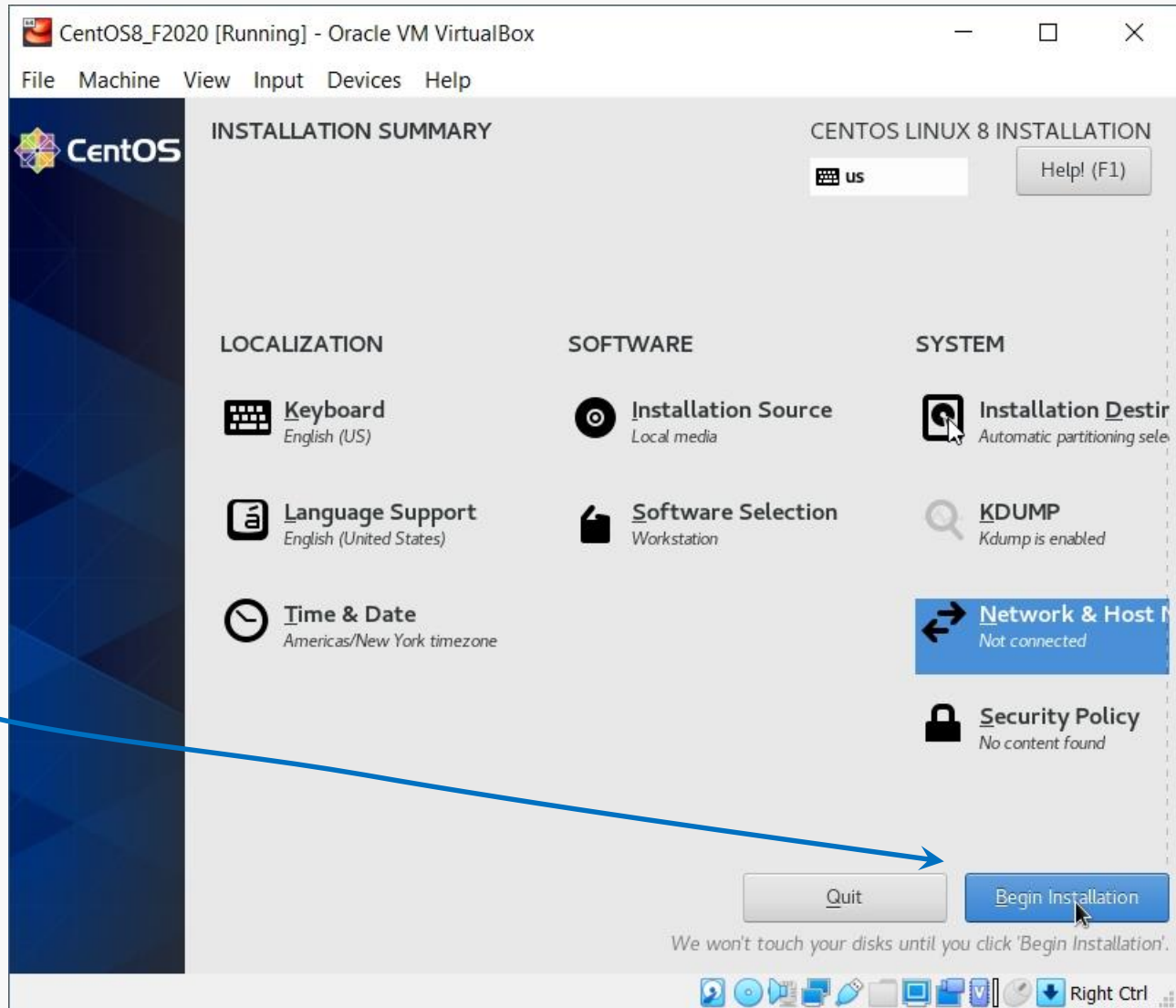
I also chose:

- GNOME desktop
- Office Suite
- Remote Desktop

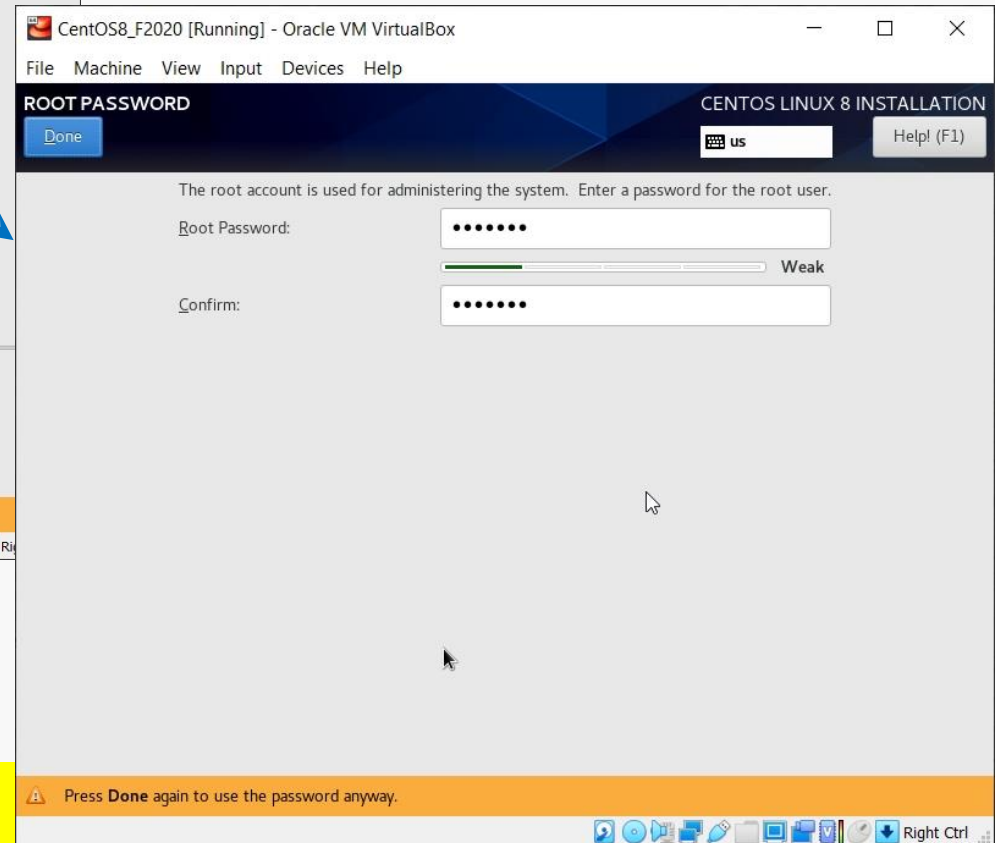
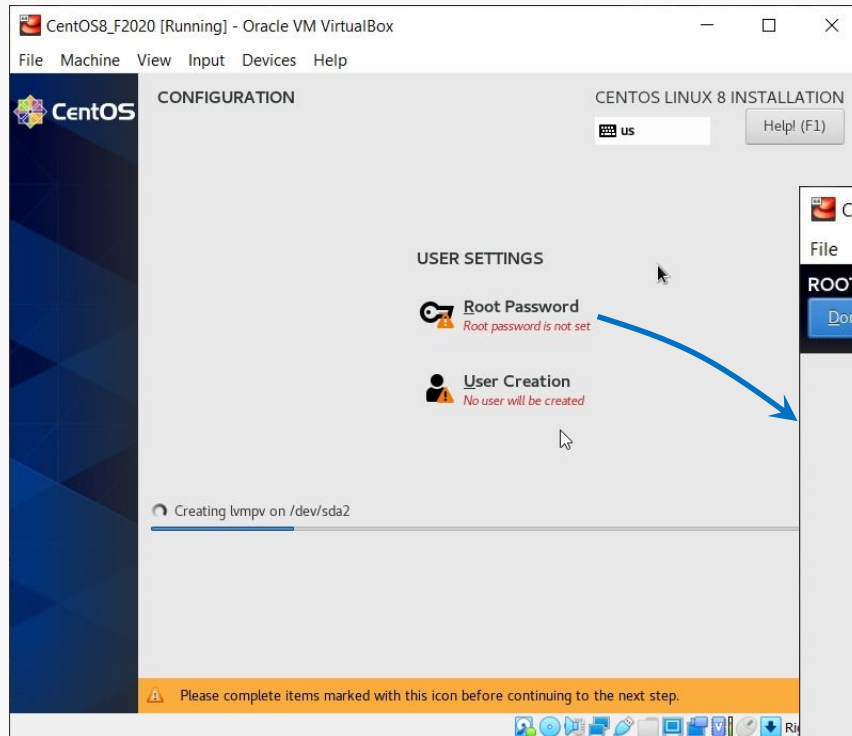


Make other choices as you like... more packages can be installed later.

Fire up the installation routine...



While the installation is running, set the password for the root (superuser) account.



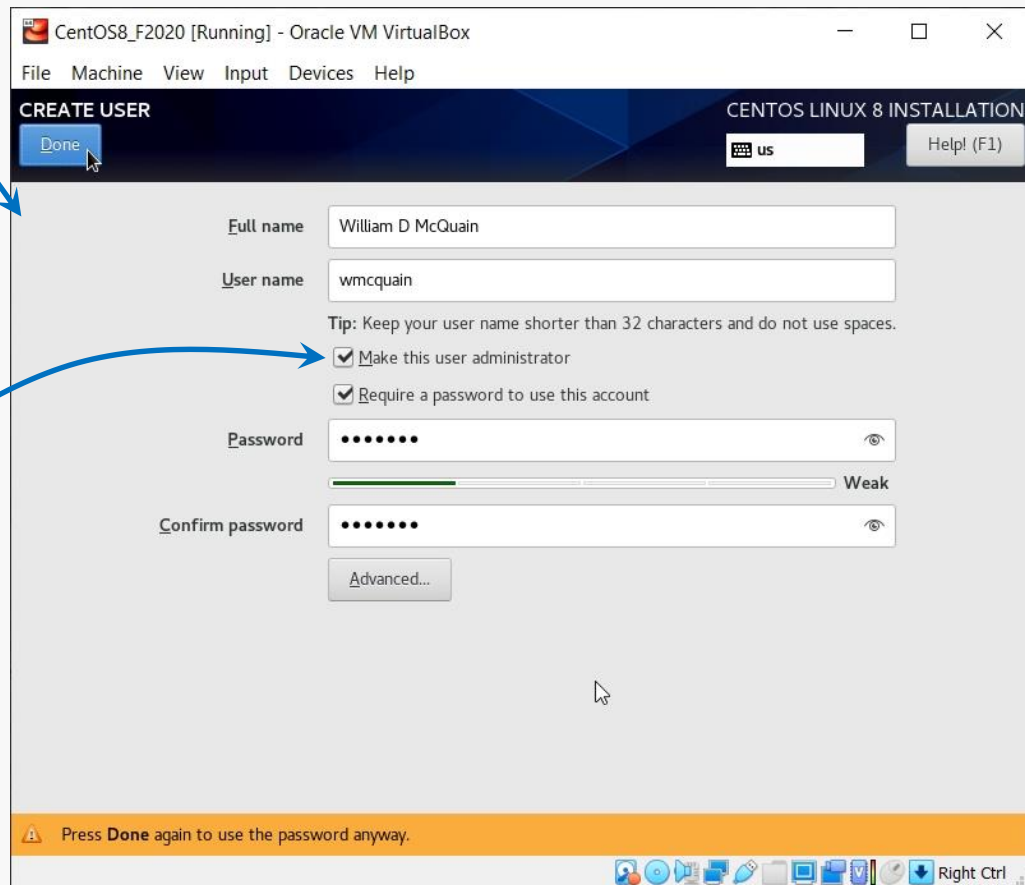
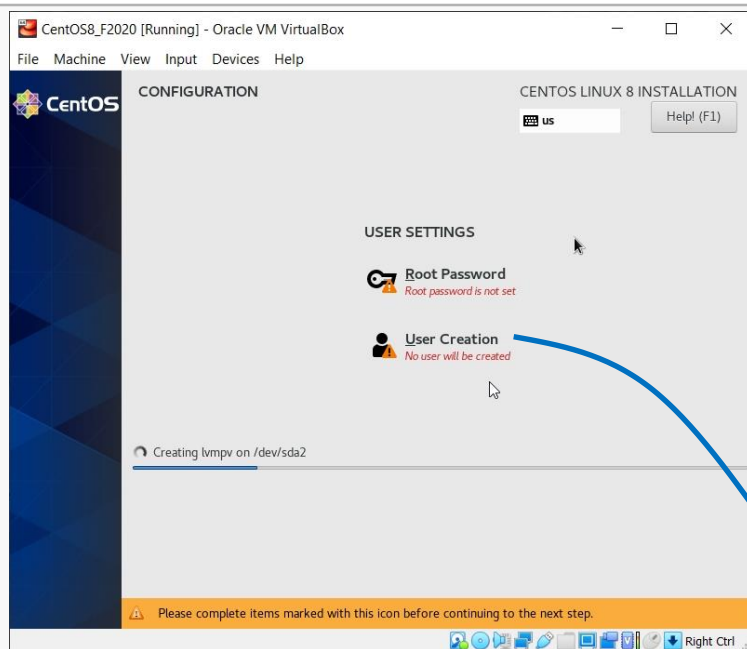
root is the administrative account.

You will use that for most software installs and some other activities.

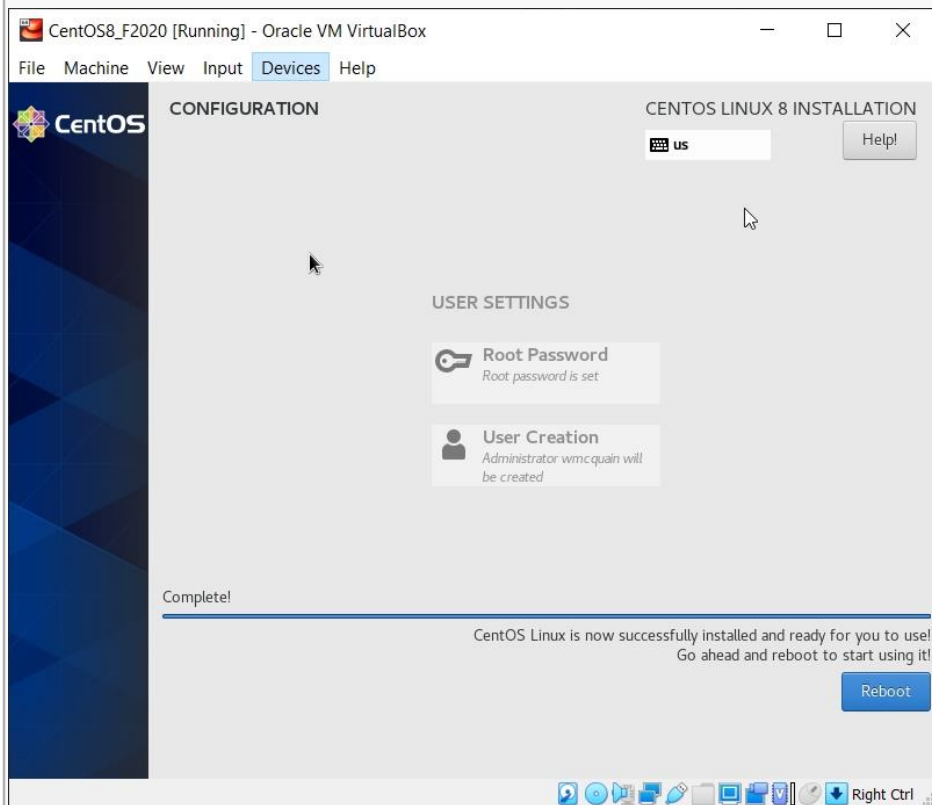
Do not forget this password!

I also set up a user account for my personal use.
I recommend using your PID for your User name... helps with rlogin later on.

Security advice notwithstanding, I prefer to run as an admin... this is NOT the same as being root.



Eventually you should see the completion screen (it takes awhile, depending on how many software packages you chose, the speed of your machine, etc).



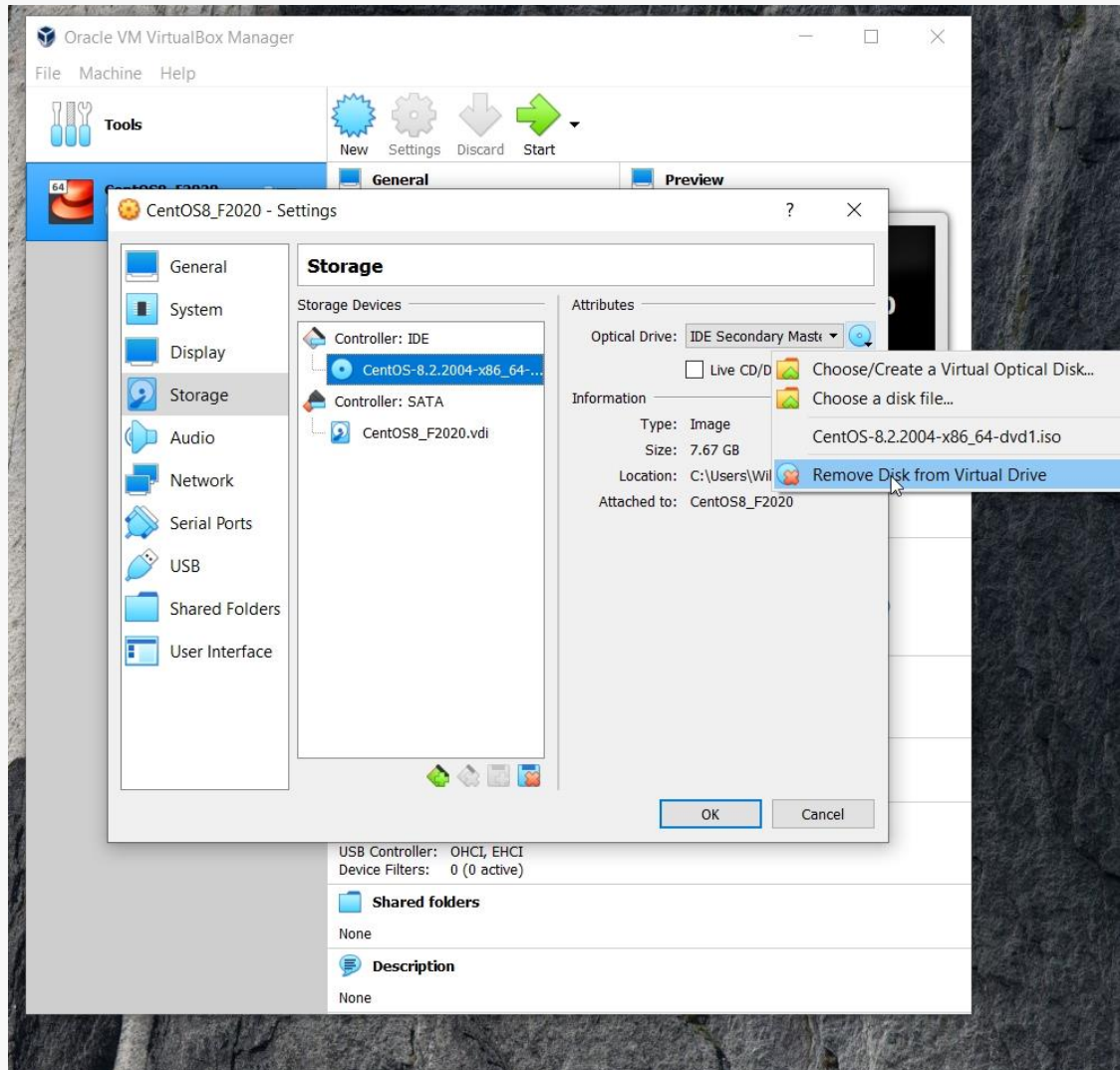
BEFORE you restart the virtual machine...

Before restarting the VM, you need to eject the CentOS 8 ISO:

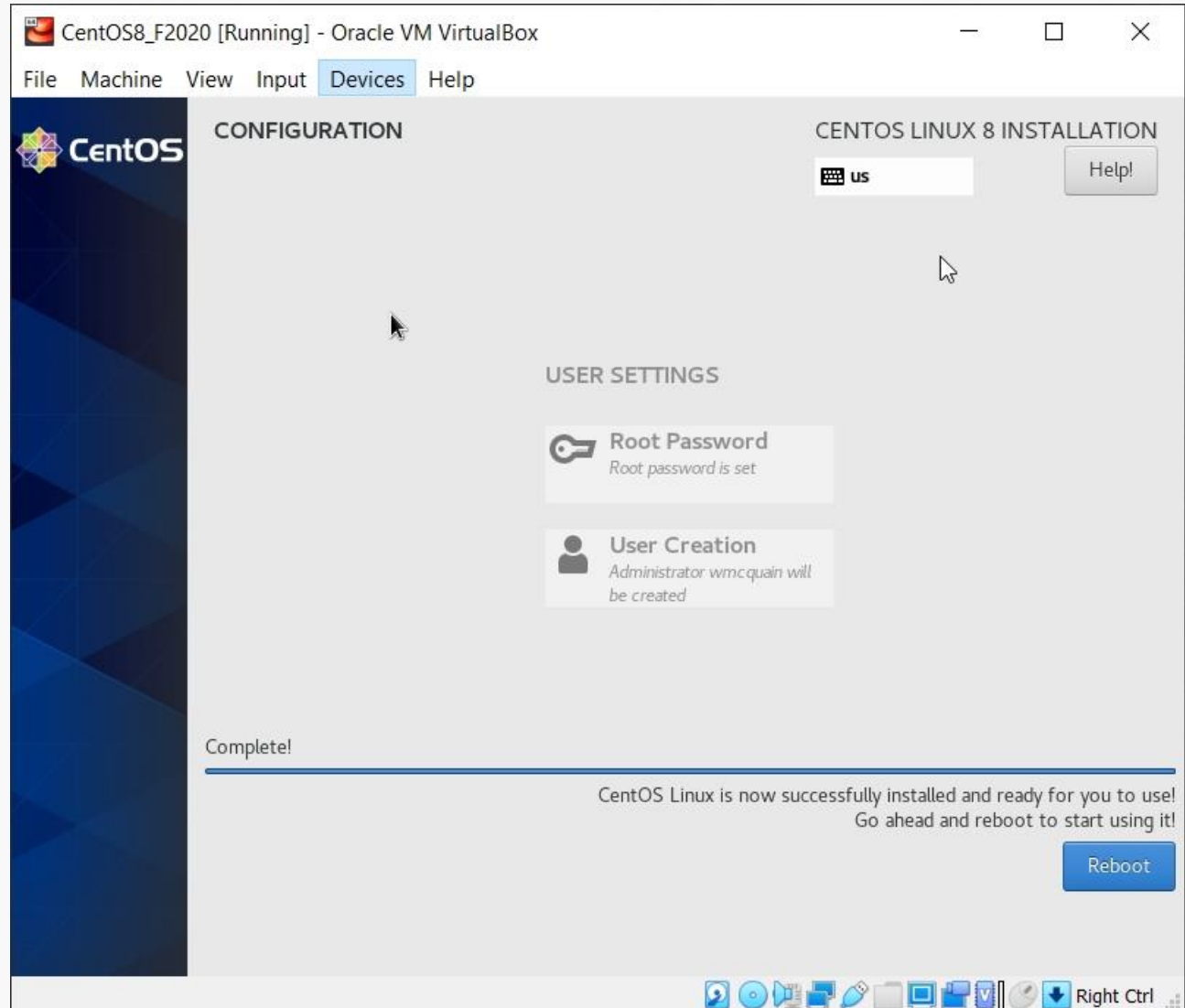
Don't close the VM...

In VirtualBox Manager:

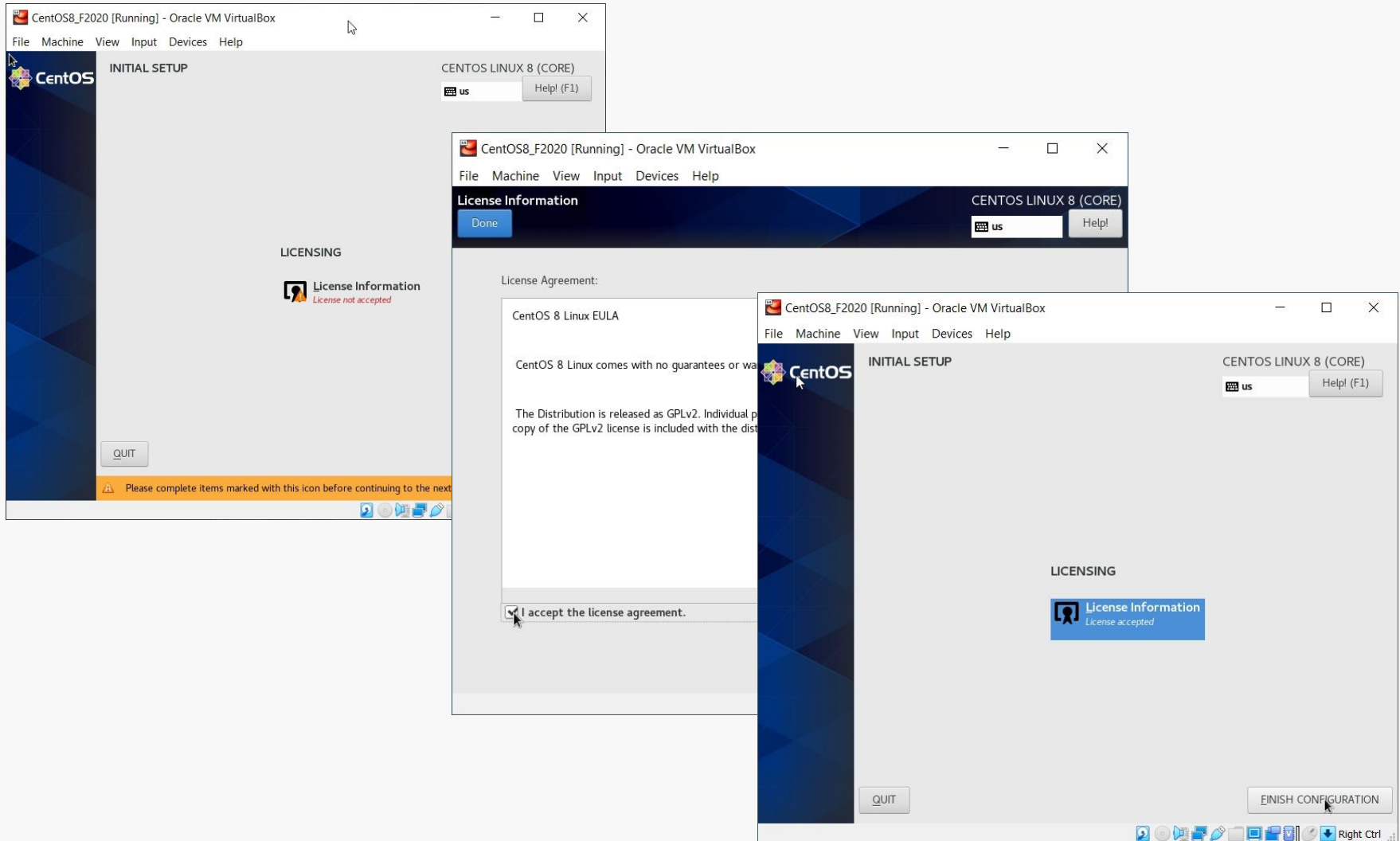
- goto Settings
- goto Storage
- select the optical drive
- click as shown
- Remove Disk from Virtual Drive



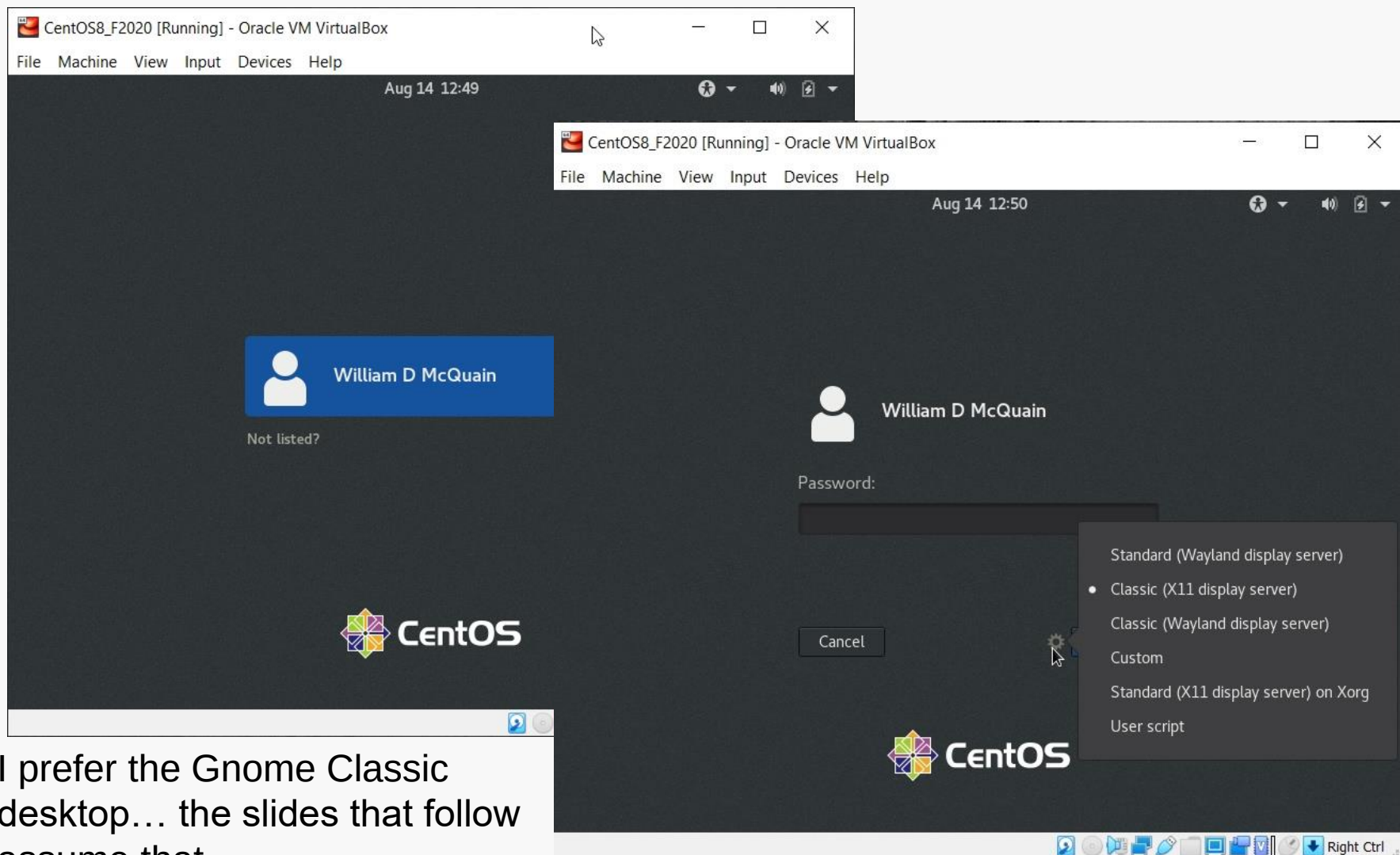
Now, choose Reboot...



The restart will bring you to the license screens:

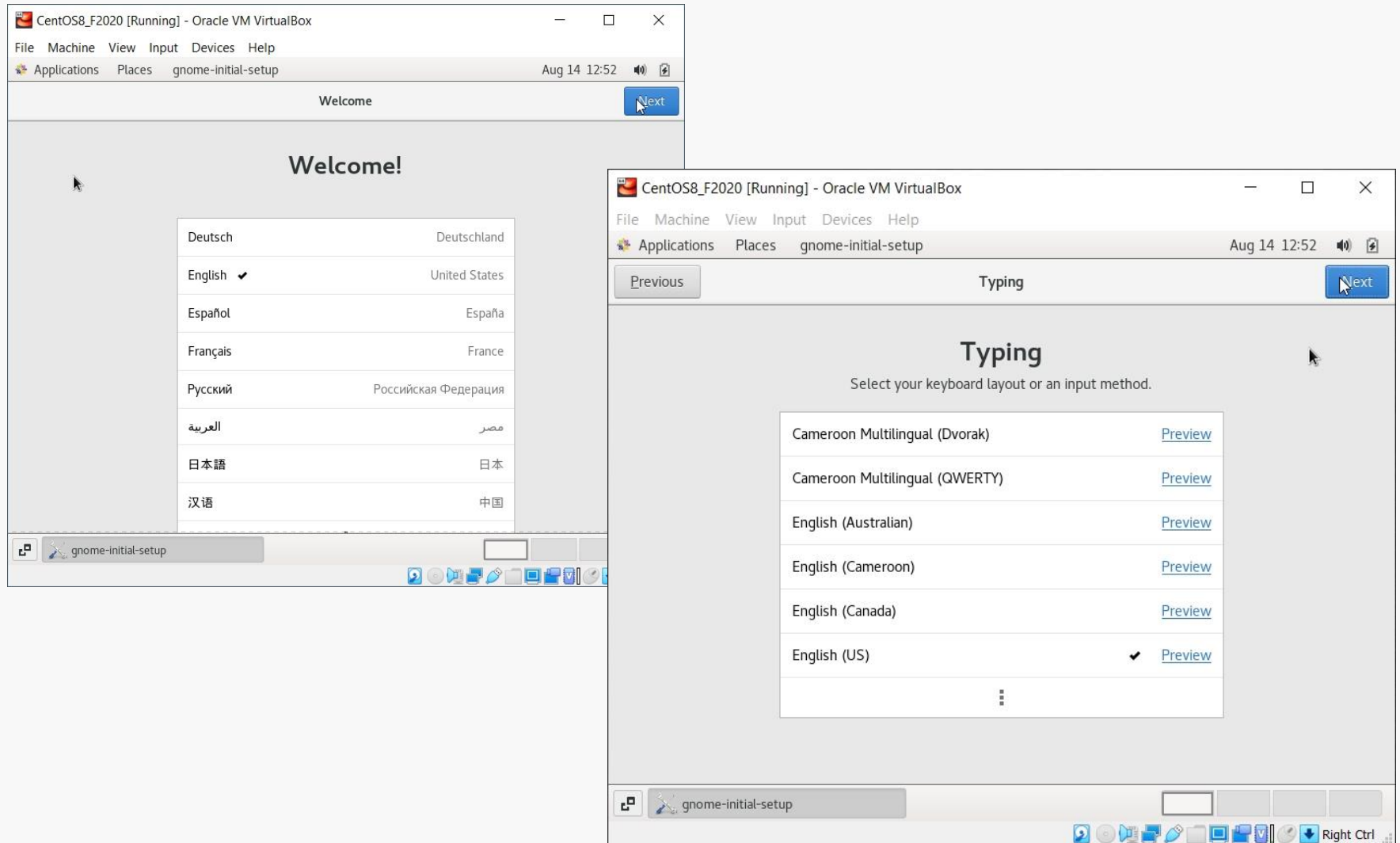


The restart will now bring you to the login screen:

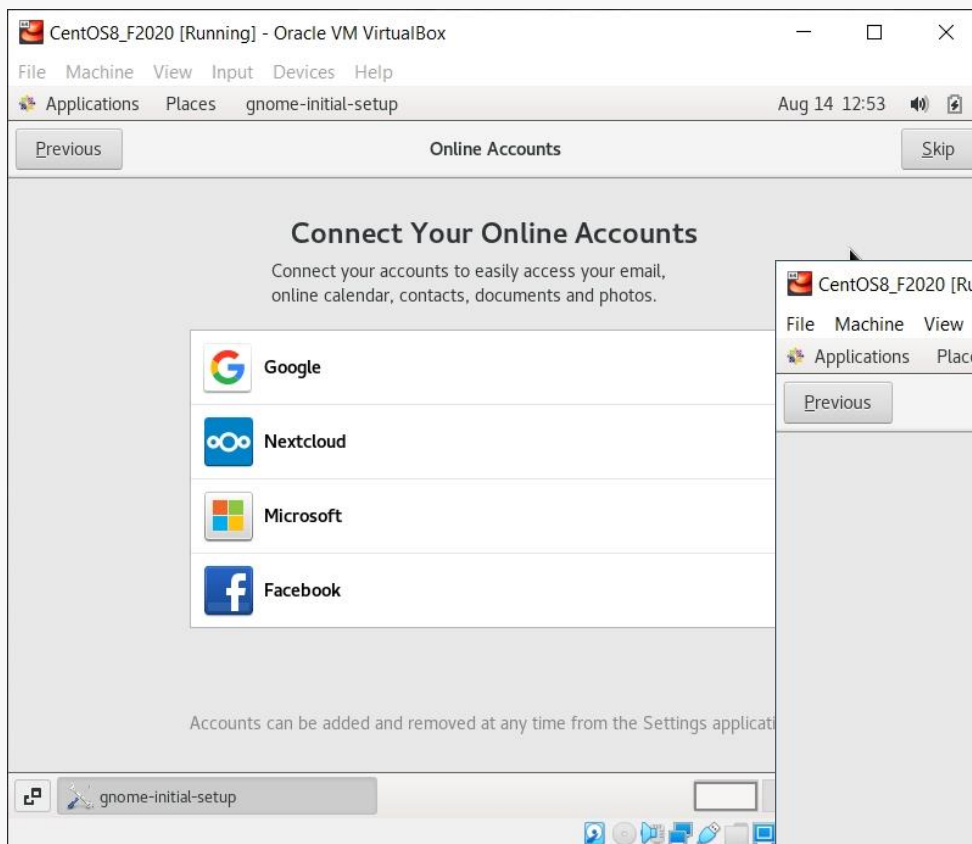


I prefer the Gnome Classic desktop... the slides that follow assume that.

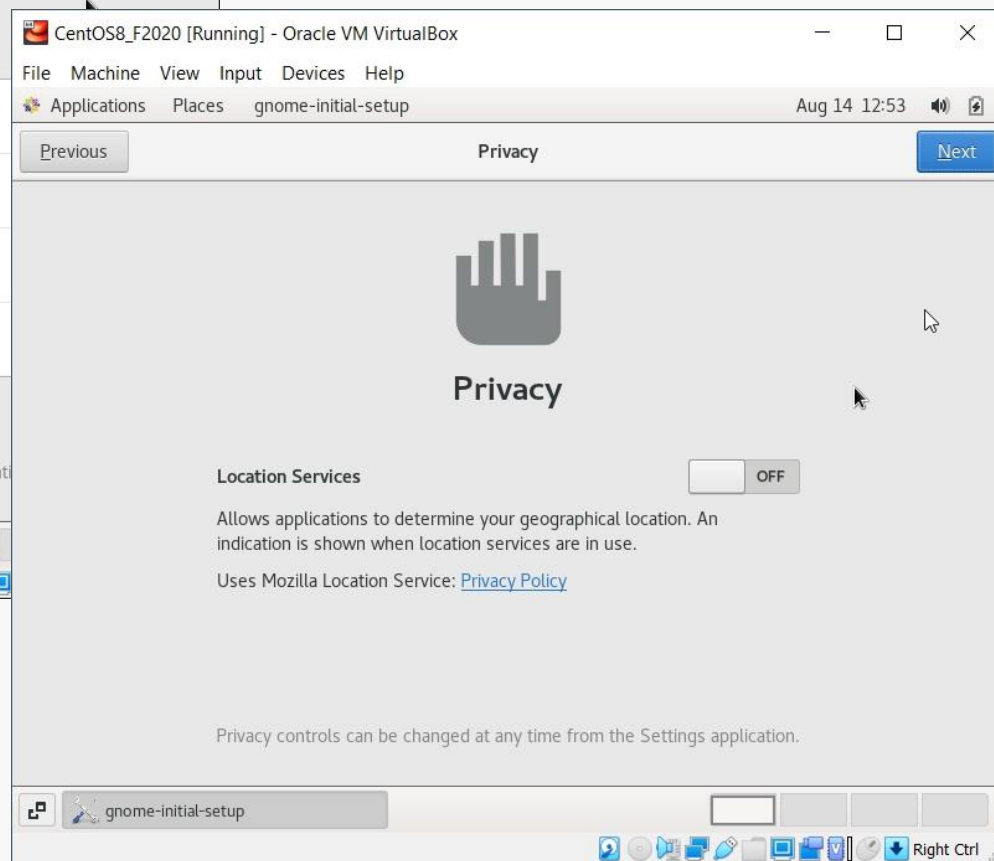
CentOS starts with some basic language and keyboard configuration:



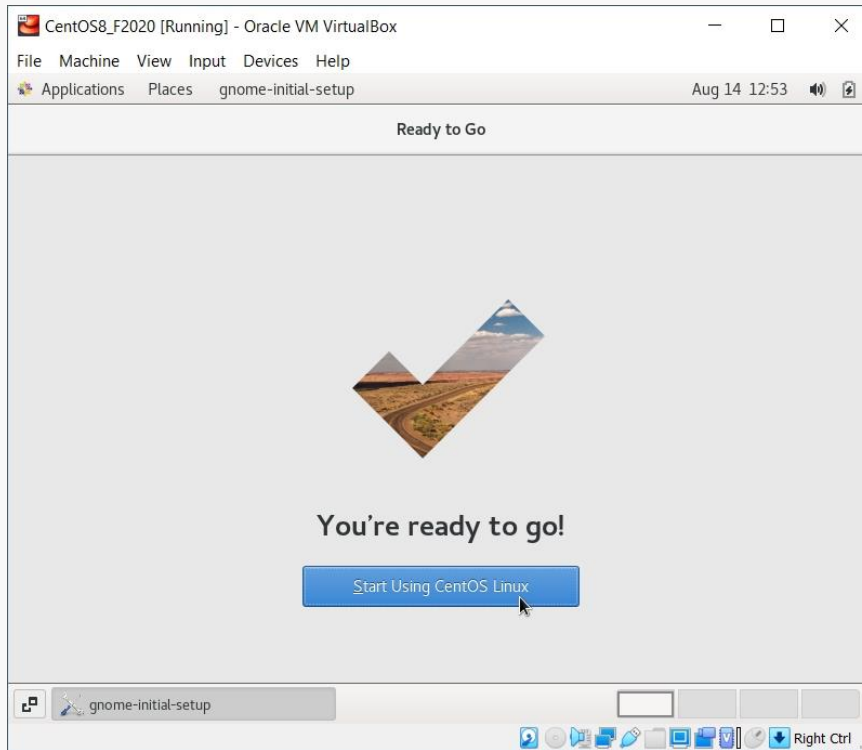
You may setup access to online accounts... or not...



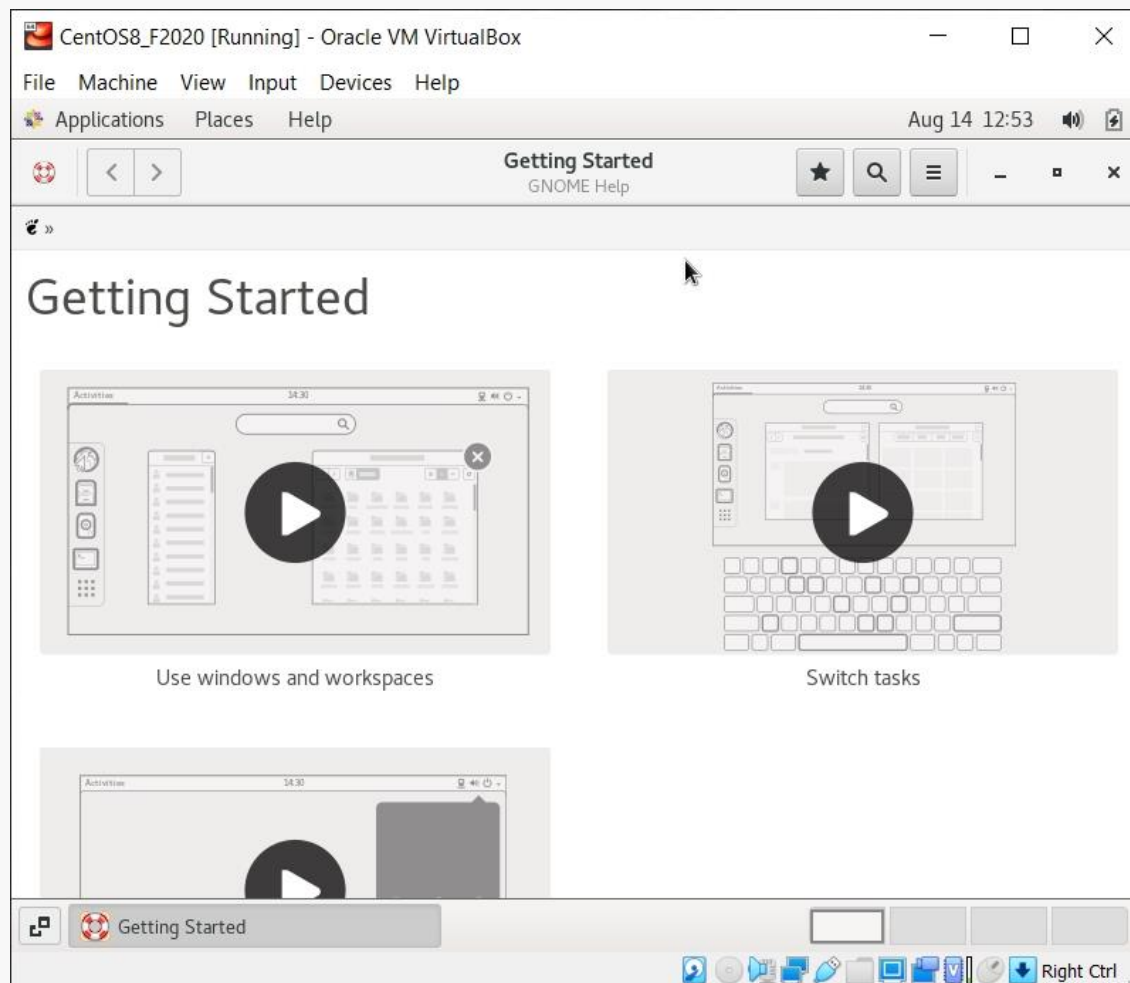
You may configure some privacy settings ...



Eventually you will reach completion:

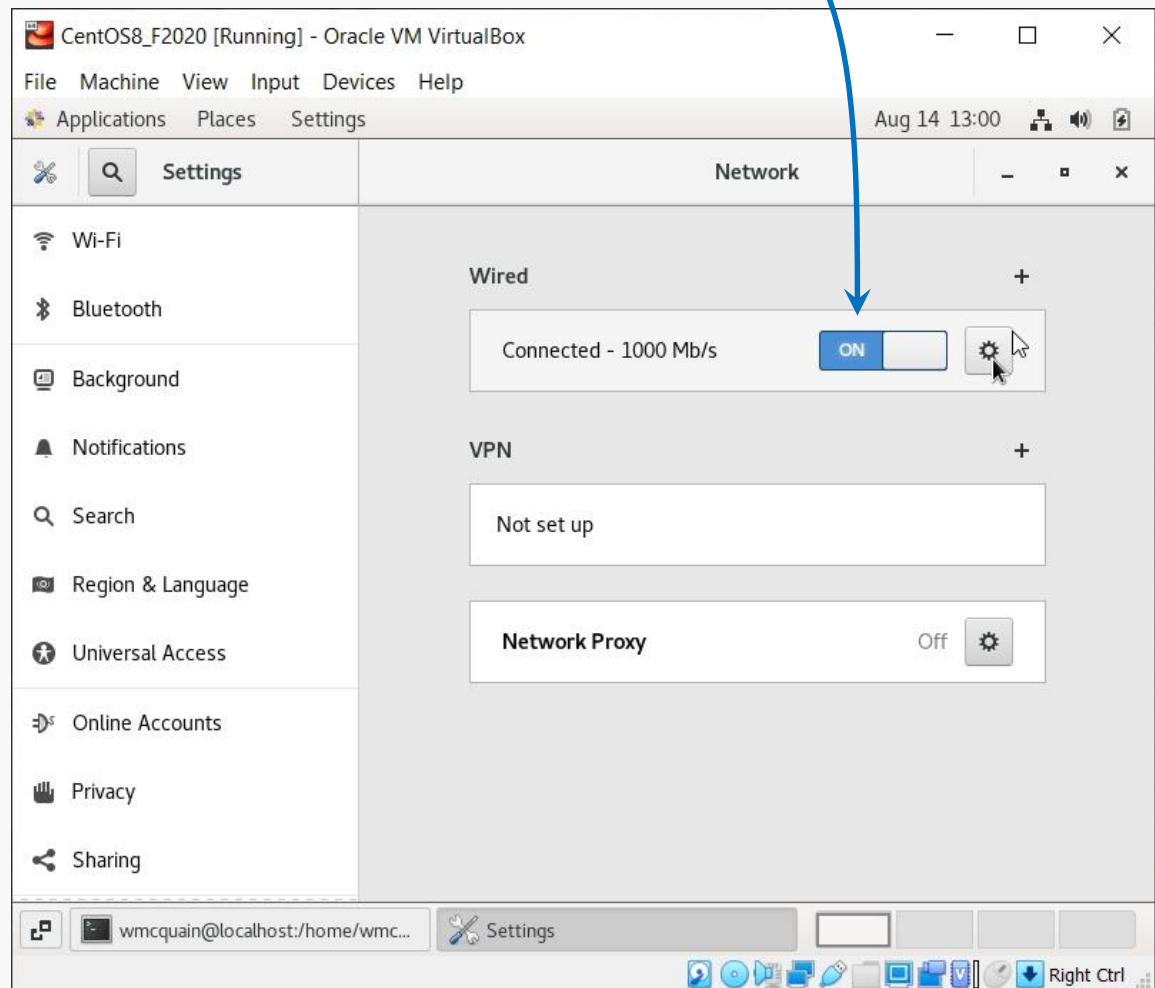
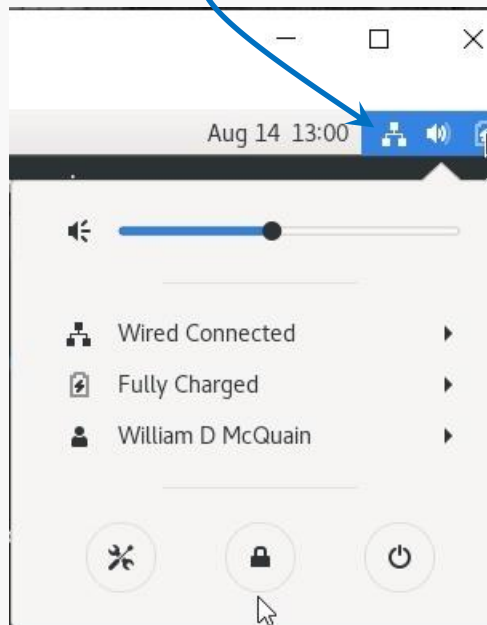


On first startup, you'll be offered help for the Linux environment:

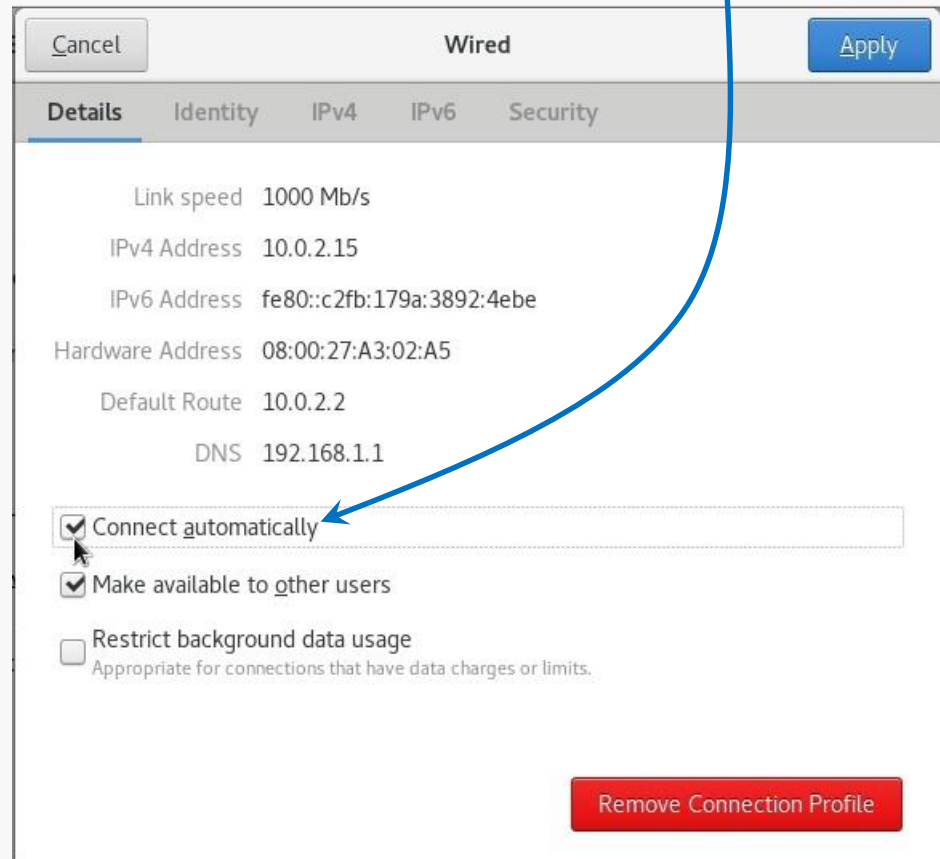
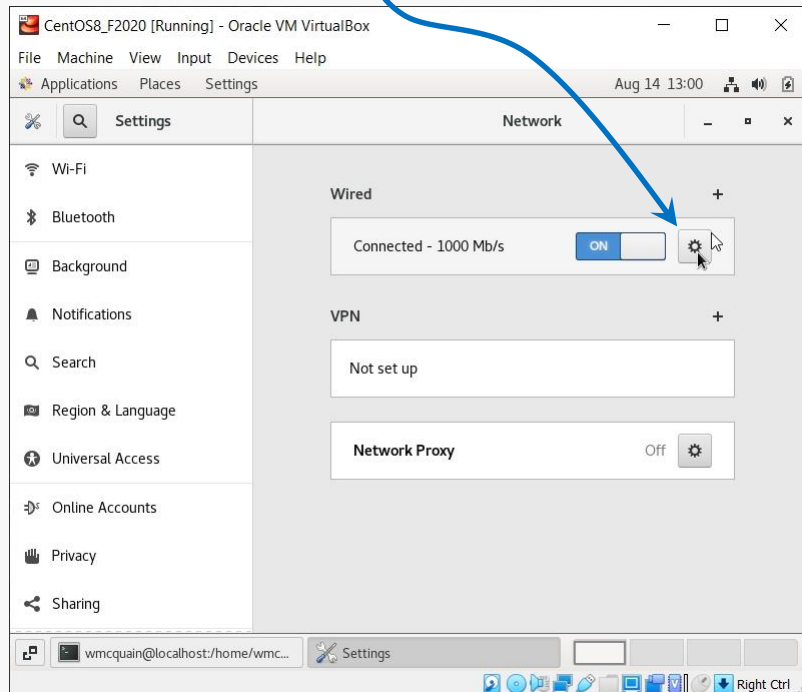


Ignore this or explore it, as you like... it's all available at any time.

Click the Network icon and turn on the network...



Click the gear icon for settings, and enable the network to be on automatically.



The VirtualBox Guest Additions provide additional functionality for your VM.

Guest Additions (should) enable the following features:

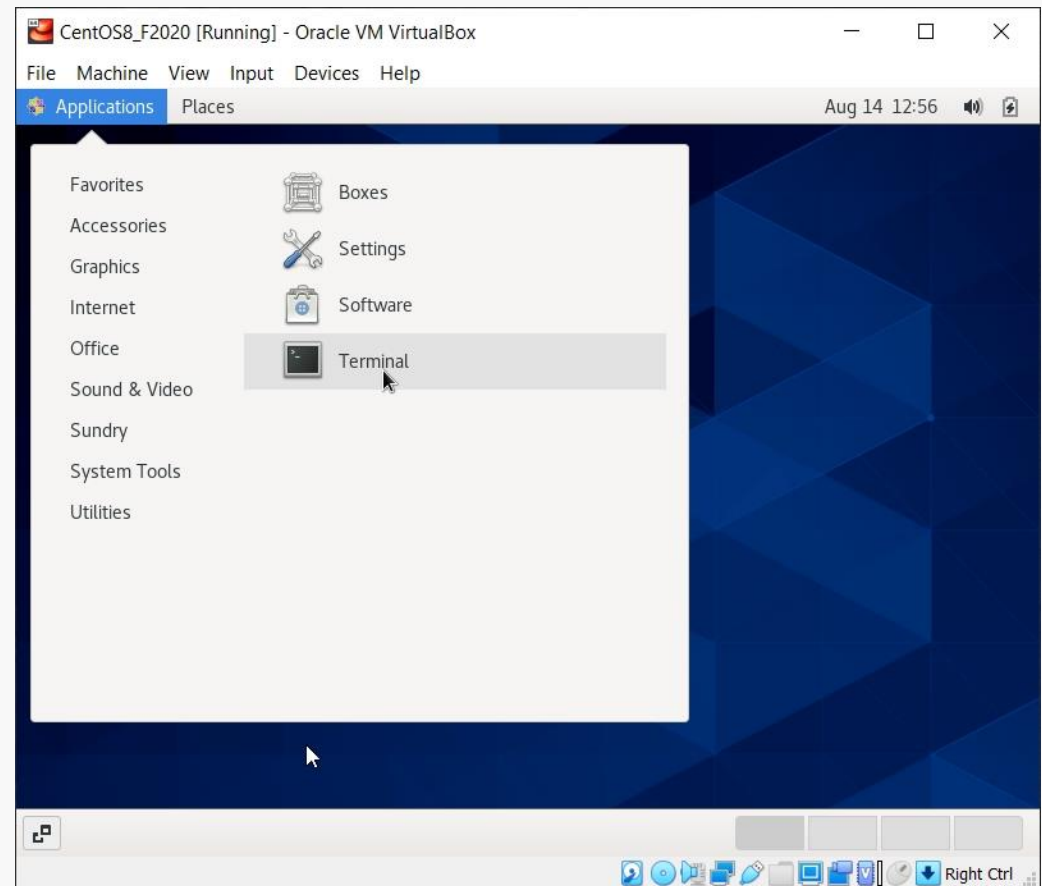
- auto-capture and auto-release for the mouse and keyboard
- the ability to rescale the VM display by just resizing its window
- the ability to create a directory on the host OS that is accessible to the VM
- drag and drop between host and VM
- shared clipboard between host and VM

Another note: if you run the system updater or install other software on your VM, you may have to reinstall the Guest Additions.

Note: many important CentOS features will not be available until this is done!

Unfortunately, I needed to install some additional software first...

Go to Applications/System Tools (or possibly Favorites), and start a Terminal session:



```
#782 wmcquain: ~> su
```

```
Password:
```

```
[root@centos8 ~]# yum install elfutils-libelf-devel
```

```
Last metadata expiration check: 0:01:03 ago on Fri 14 Aug 2020 01:01:43 PM EDT.
```

```
Dependencies resolved.
```

```
=====
```

Package	Architecture	Version	Repository	Size
---------	--------------	---------	------------	------

```
=====
```

```
Installing:
```

elfutils-libelf-devel	x86_64	0.178-7.el8	BaseOS	58 k
-----------------------	--------	-------------	--------	------

```
Installing dependencies:
```

zlib-devel	x86_64	1.2.11-13.el8	BaseOS	57 k
------------	--------	---------------	--------	------

```
...
```

```
Total download size: 115 k
```

```
Installed size: 171 k
```

```
Is this ok [y/N]: y
```

```
Downloading Packages:
```

```
(1/2): elfutils-libelf-devel-0.178-7.el8.x86_64.rpm 193 kB/s | 58 kB 00:00
```

```
(2/2): zlib-devel-1.2.11-13.el8.x86_64.rpm 189 kB/s | 57 kB 00:00
```

```
...
```

```
Installed:
```

```
elfutils-libelf-devel-0.178-7.el8.x86_64  zlib-devel-1.2.11-13.el8.x86_64
```

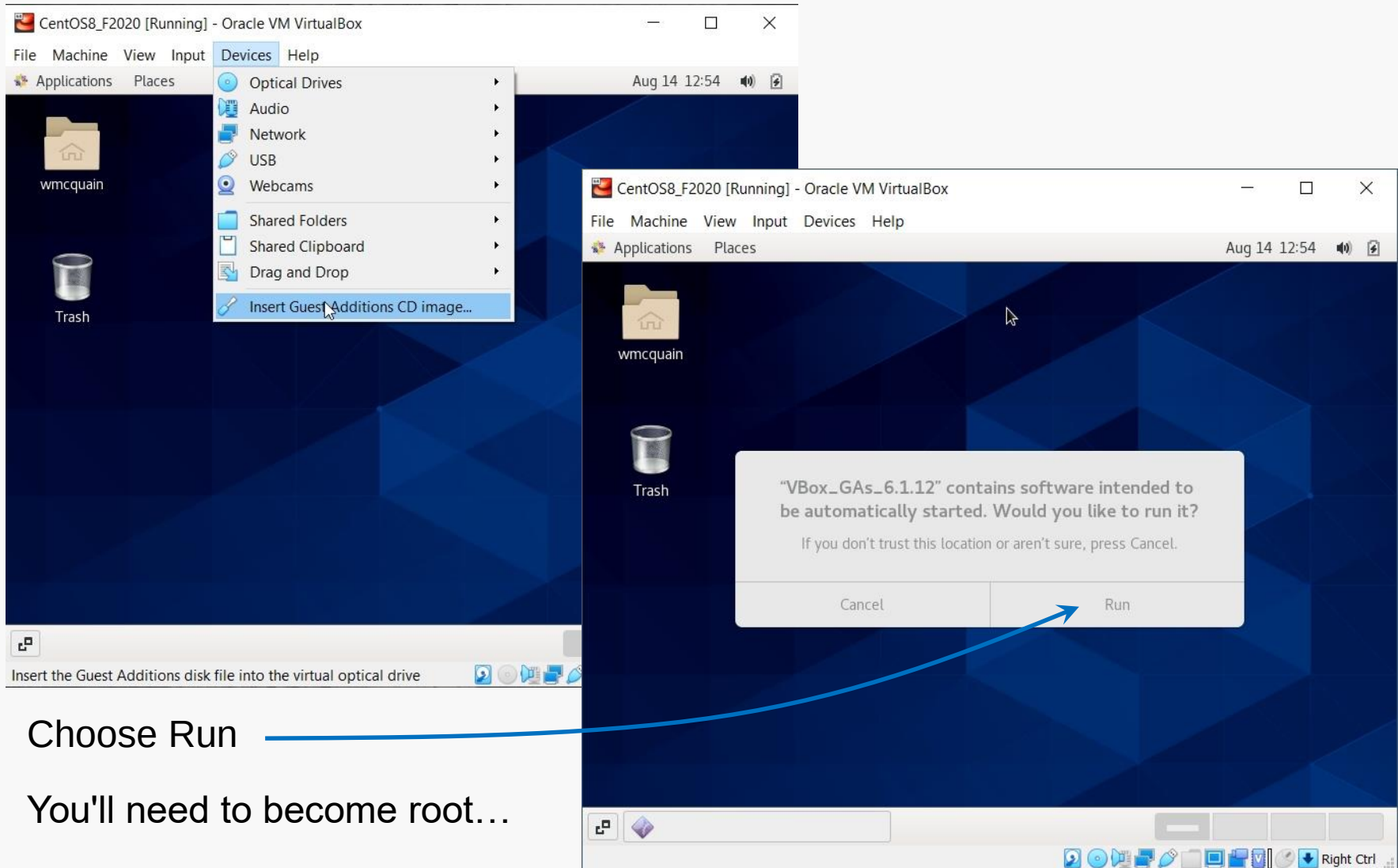
```
Complete!
```

```
[root@localhost wmcquain]# exit
```

You need to be `root` to install or update a package

Execute this
command

From the Devices menu in the VirtualBox Manage, insert the Guest Additions CD:

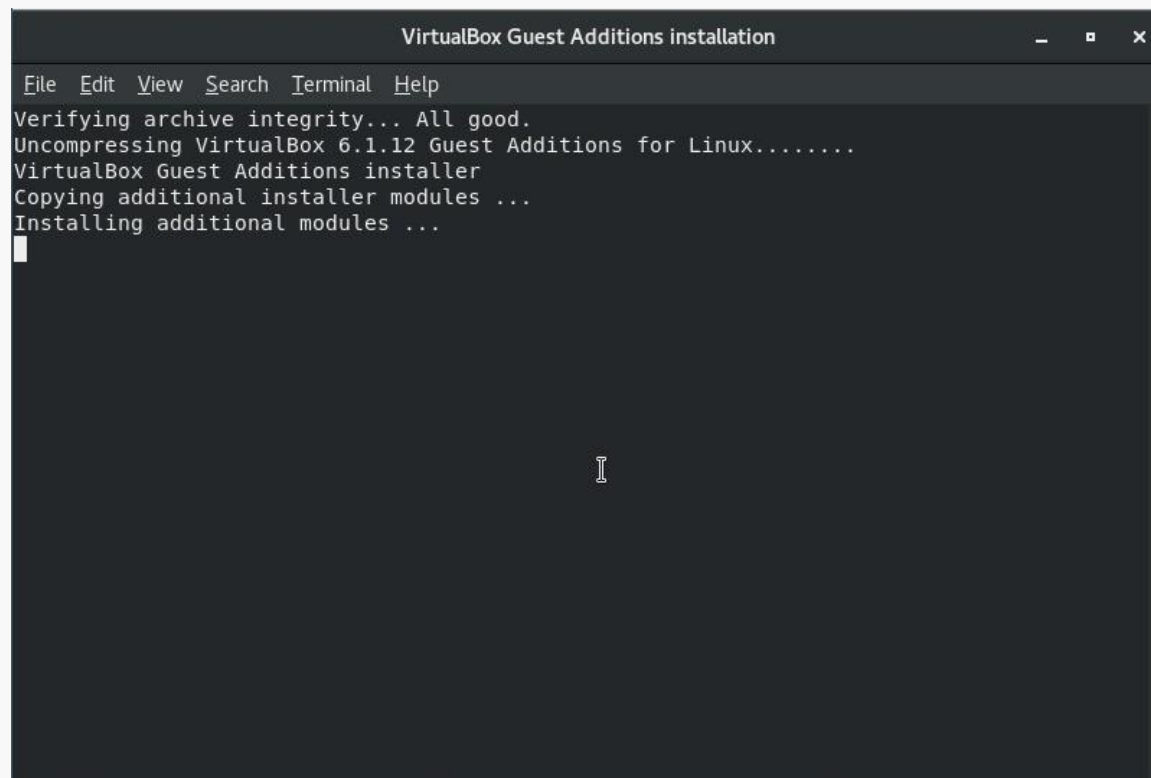


Choose Run

You'll need to become root...

The installation will start, and may take awhile...

...do not close the window until you get a message that it's done.

A screenshot of a terminal window titled "VirtualBox Guest Additions installation". The window has a menu bar with "File", "Edit", "View", "Search", "Terminal", and "Help". The terminal output shows the following steps: "Verifying archive integrity... All good.", "Uncompressing VirtualBox 6.1.12 Guest Additions for Linux.....", "VirtualBox Guest Additions installer", "Copying additional installer modules ...", and "Installing additional modules ...". A cursor is visible on the line "Installing additional modules ...".

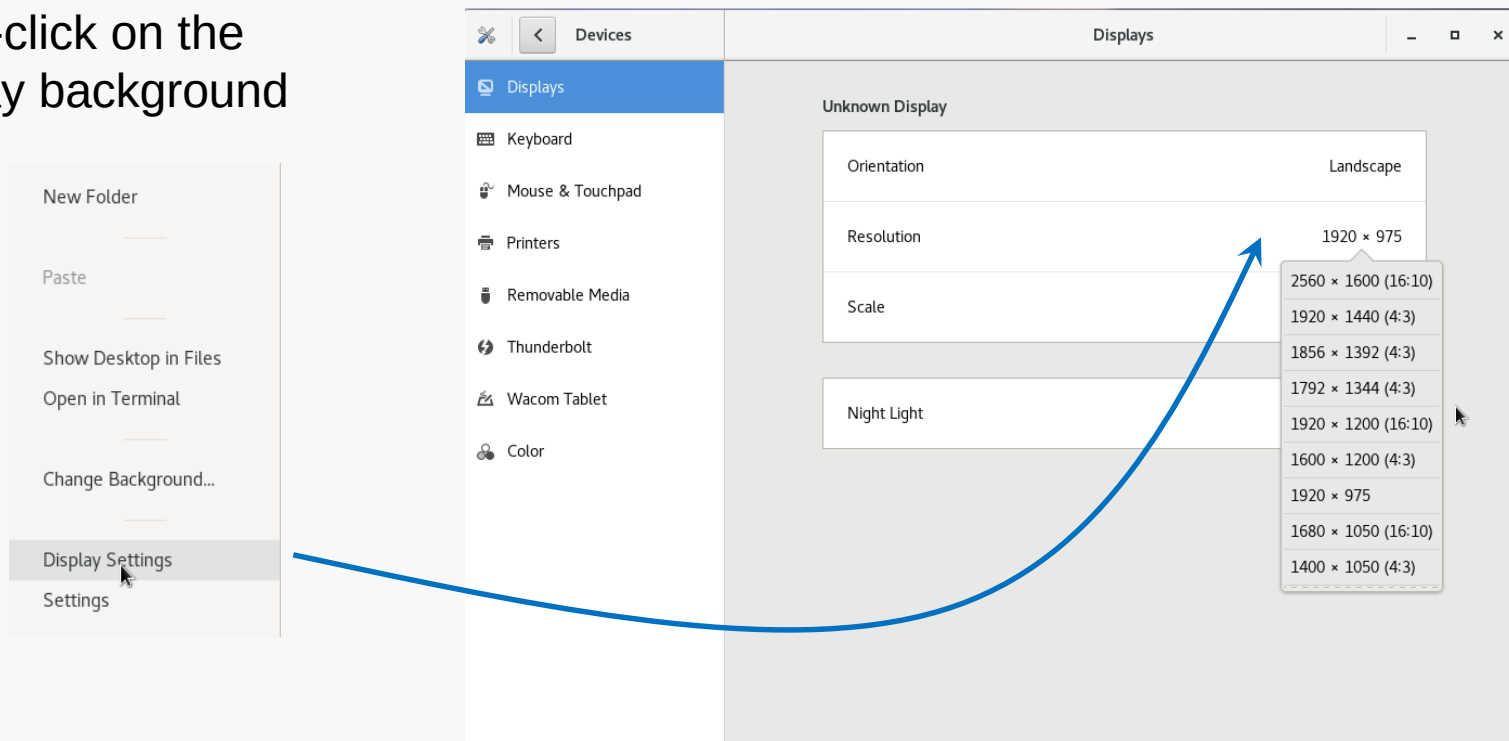
```
VirtualBox Guest Additions installation
File Edit View Search Terminal Help
Verifying archive integrity... All good.
Uncompressing VirtualBox 6.1.12 Guest Additions for Linux.....
VirtualBox Guest Additions installer
Copying additional installer modules ...
Installing additional modules ...
```

This WILL fail if you haven't installed the libraries described earlier.

You can now resize the VirtualBox window and the display should adjust.

This may be a good time to adjust your display resolution.

Right-click on the display background



At this point, I sometimes encounter problems... which are often resolved by performing several restarts of the VM... however, the vast number of different video cards makes this a bit twitchy...

The mouse and keyboard capture feature should now be automatic.

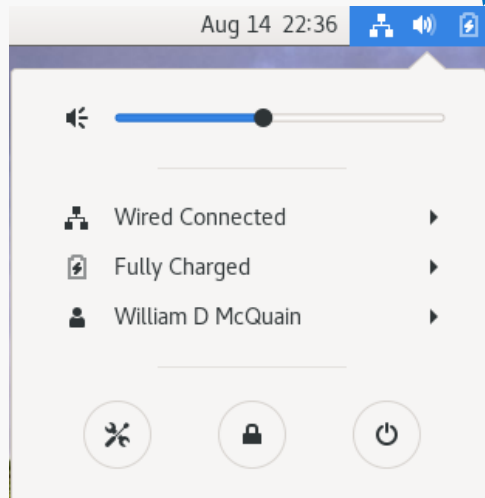
No more Right-Ctrl to release them (in most cases).

You now have the ability to create a shared folder with your host OS.

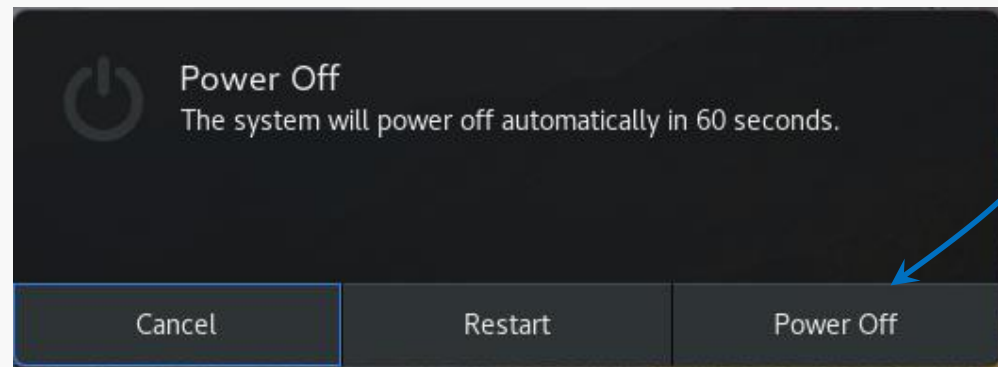
That will be described shortly...

At this point, shut CentOS down **properly**.

Click the battery icon



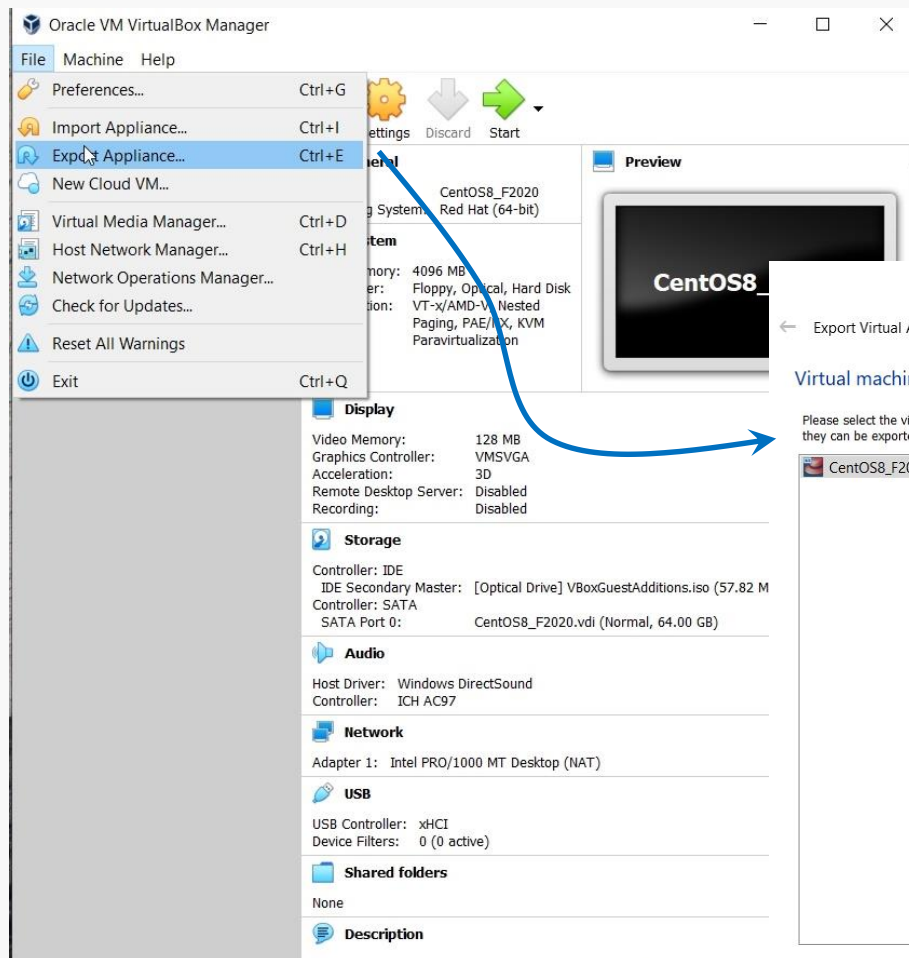
Click Power Off



It is VITAL to always shutdown correctly... improper shutdowns may render the VM unbootable!

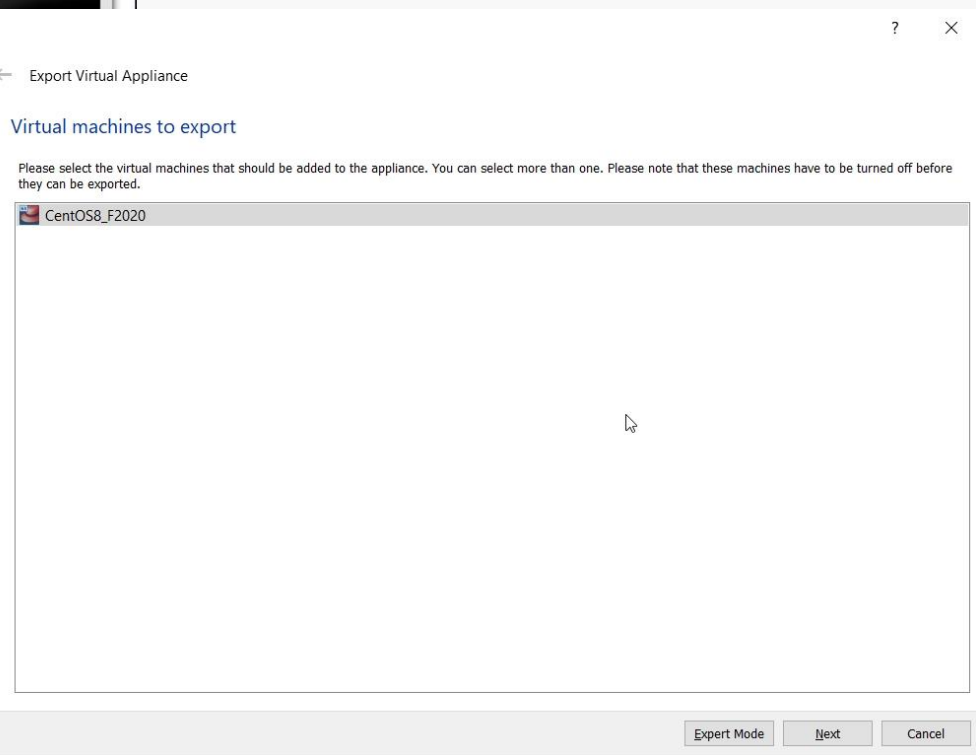
I recommend making a total backup of your virtual machine right now!

This gives you an emergency, pristine VM when things go wrong...



Do this with the VM shut down!

Do it frequently!



The process creates a single file backup of your entire VM.

← Export Virtual Appliance

Appliance settings

Please choose a format to export the virtual appliance to.

The **Open Virtualization Format** supports only **ovf** or **ova** extensions. If you use the **ovf** extension, several files will be written separately. If you use the **ova** extension, all the files will be combined into one Open Virtualization Format archive.

The **Oracle Cloud Infrastructure** format supports exporting to remote cloud servers only. Main virtual disk of each selected machine will be uploaded to remote server.

Format: Open Virtualization Format 1.0

Please choose a filename to export the virtual appliance to. Besides that you can specify a certain amount of options which affects the size and content of resulting archive.

File: C:\Users\William D McQuain\Documents\CentOS8_F2020.ova

MAC Address Policy: Include only NAT network adapter MAC addresses

Additionally: ☒ Write Manifest file
☐ Include ISO image files

Next Cancel

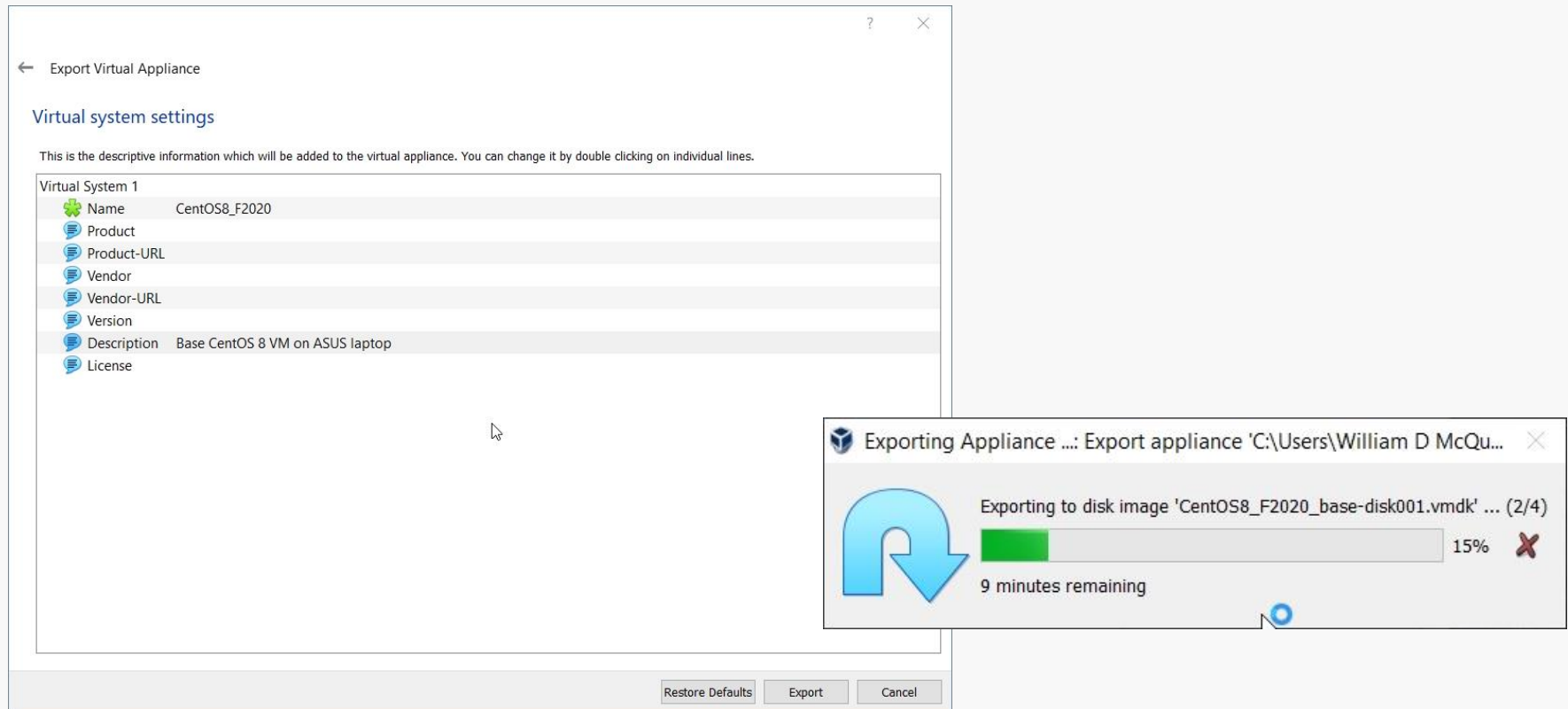
I suggest tagging the name with the date you made the backup... and keeping more than one backup around.

I suggest copying the backup file to another device for safe keeping.

You can:

- use Import Appliance to reload this if your VM is damaged later
- copy this to another computer and import it to a VirtualBox installation there

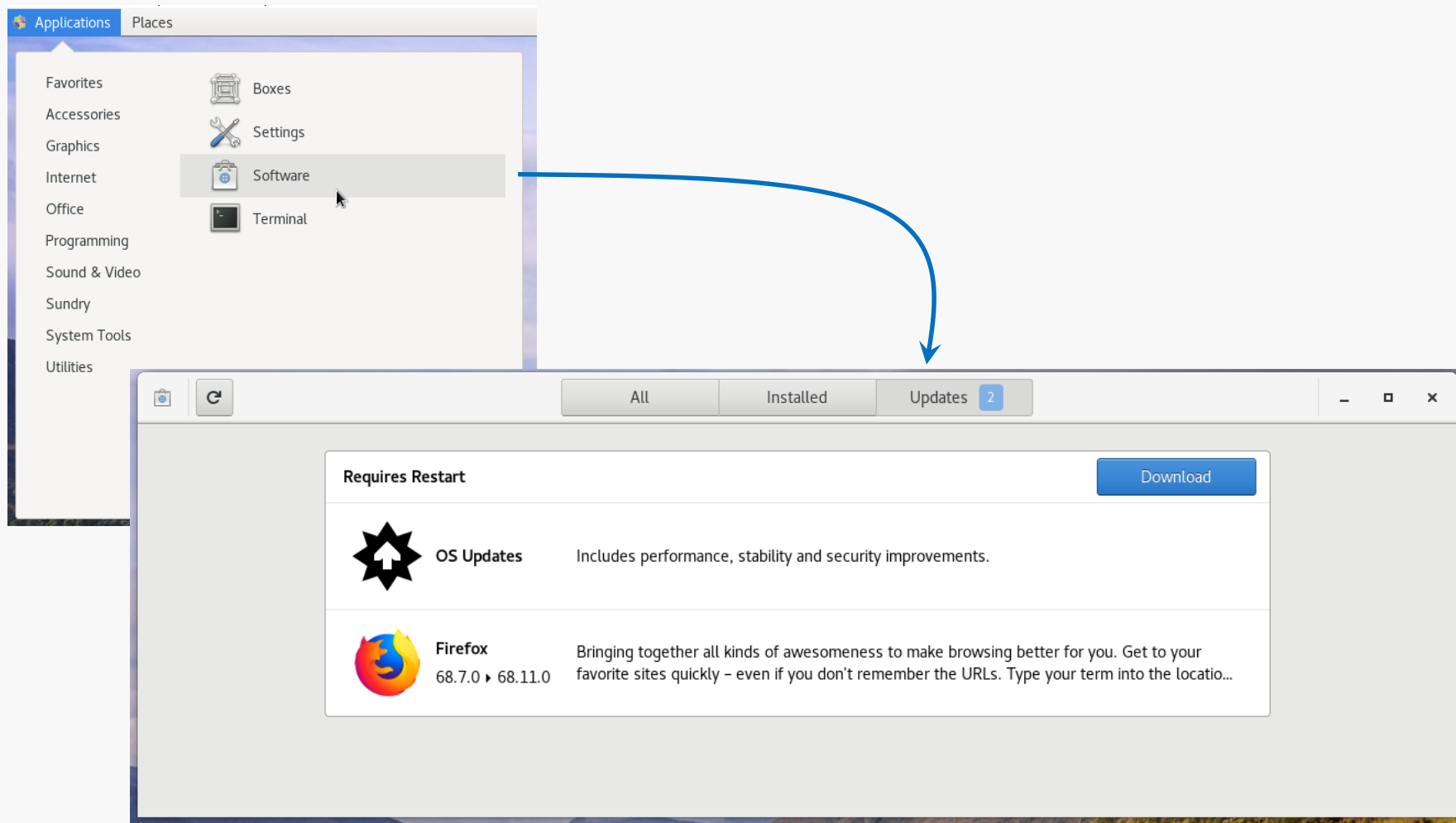
The default settings will suffice, but I usually add a Description.



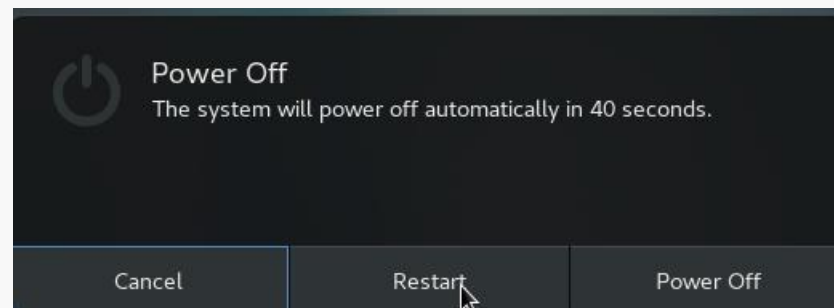
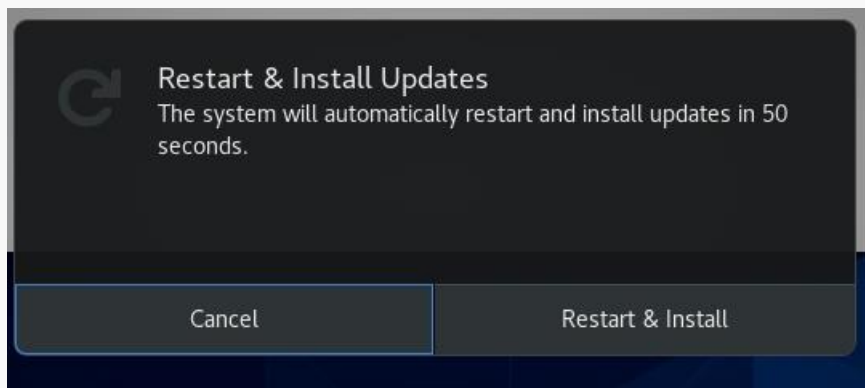
Back It Up!!

I recommend running a general software update at this point.

Go to the Application/System Tools menu and pick Software...



Restart after the updates complete...



And... I recommend making another full backup of your VM at this point.

This is a better starting option if things go wrong later.

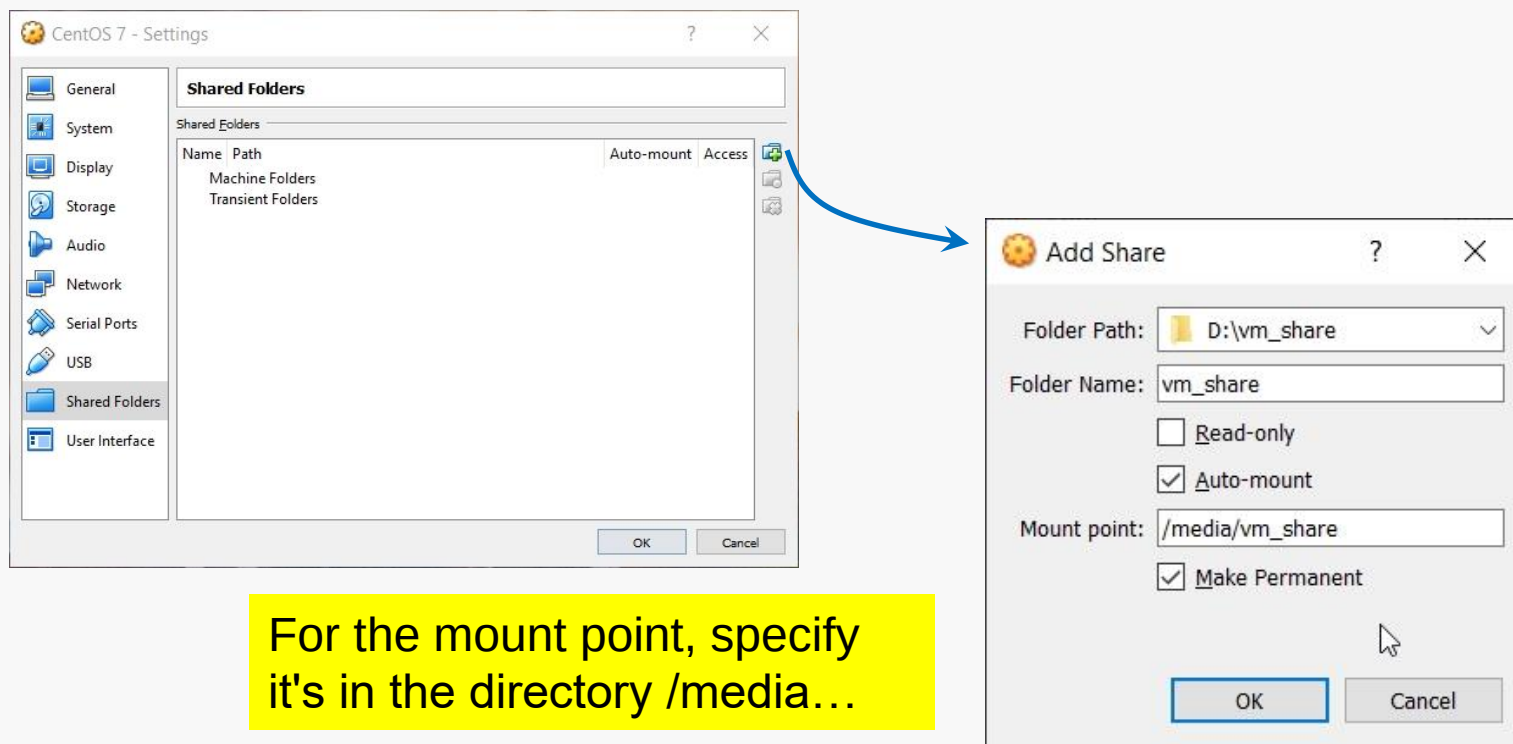
If everything seems to still work:

Back It Up Again!!

The most efficient way to transfer files between your VM and the host OS is to set up a shared folder that both OSes can see.

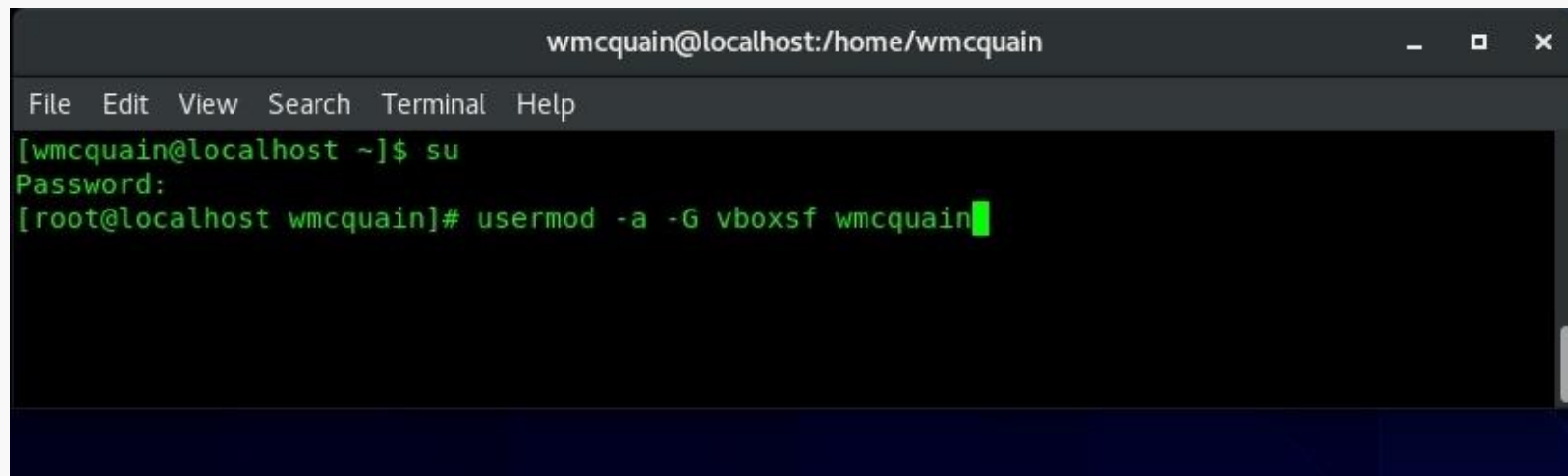
Pick the folder you want to share; I'll use D:\vm_share on my Windows 10 host.

In the VirtualBox Manager, click on Shared Folders and select the Add Folder button, then enter the path to the shared folder and make it permanent:



Back in your CentOS VM, you need to add yourself to a Linux group.

Become root and do this (with YOUR username):

A terminal window titled 'wmcquain@localhost:/home/wmcquain' with a menu bar (File, Edit, View, Search, Terminal, Help). The terminal shows the user 'wmcquain' running 'su' to become root. After entering the password, the root prompt appears. The user then runs 'usermod -a -G vboxsf wmcquain' to add the user to the 'vboxsf' group. A green cursor is visible at the end of the command line.

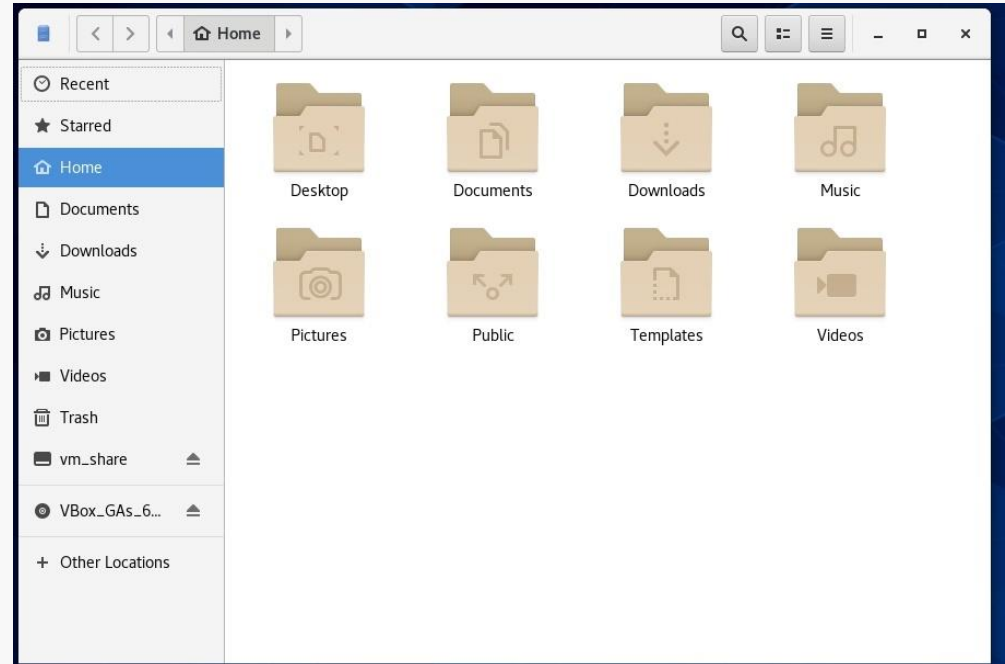
```
wmcquain@localhost:/home/wmcquain
File Edit View Search Terminal Help
[wmcquain@localhost ~]$ su
Password:
[root@localhost wmcquain]# usermod -a -G vboxsf wmcquain
```

If the auto-mount feature doesn't seem to be working, become root execute:

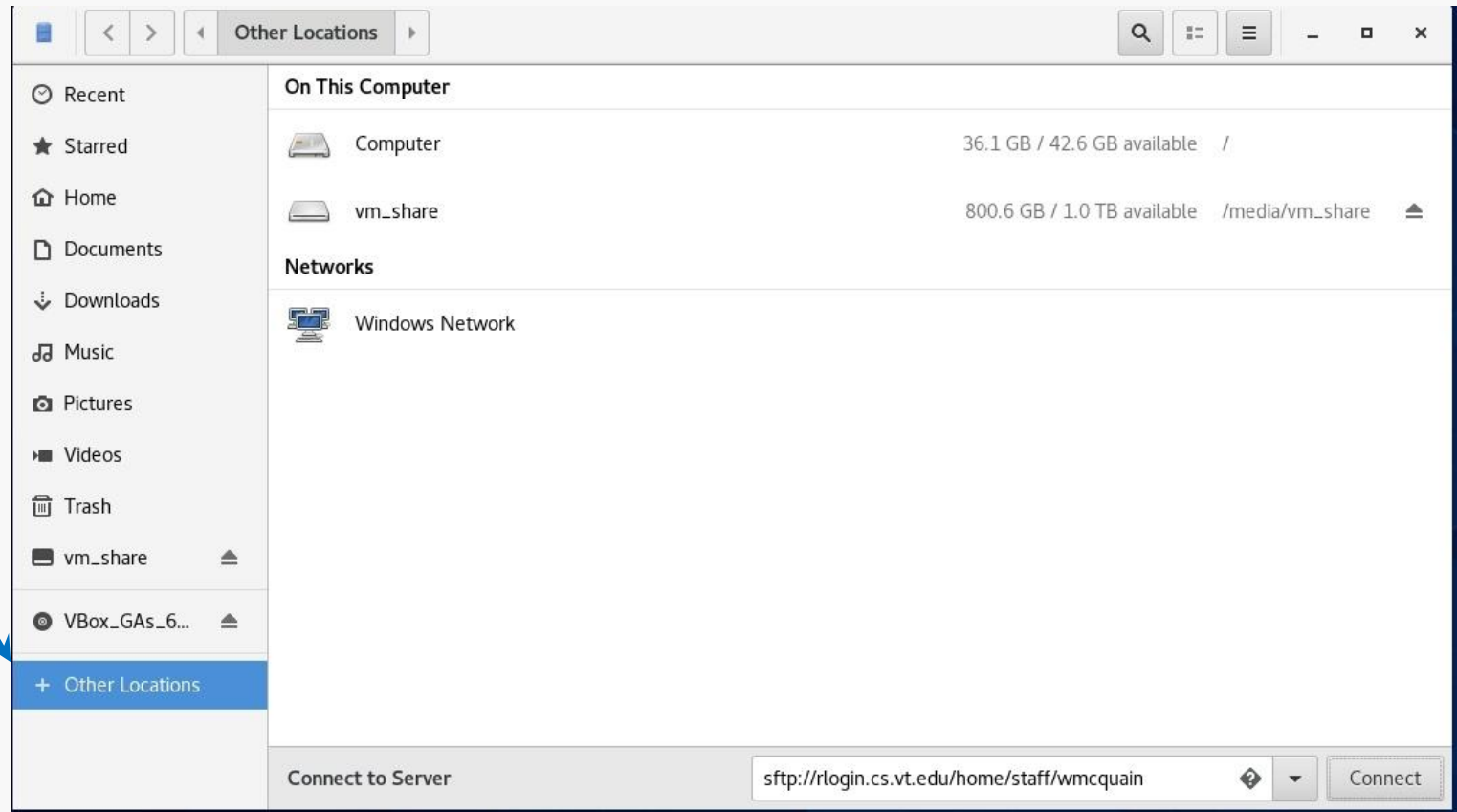
```
mount.vboxsf share /media/vm_share
```

Of course, substitute the folder name you chose for `vm_share`.

The Gnome desktop has a file manager, that is similar to those in Windows and OS X. Go to Places/Home:

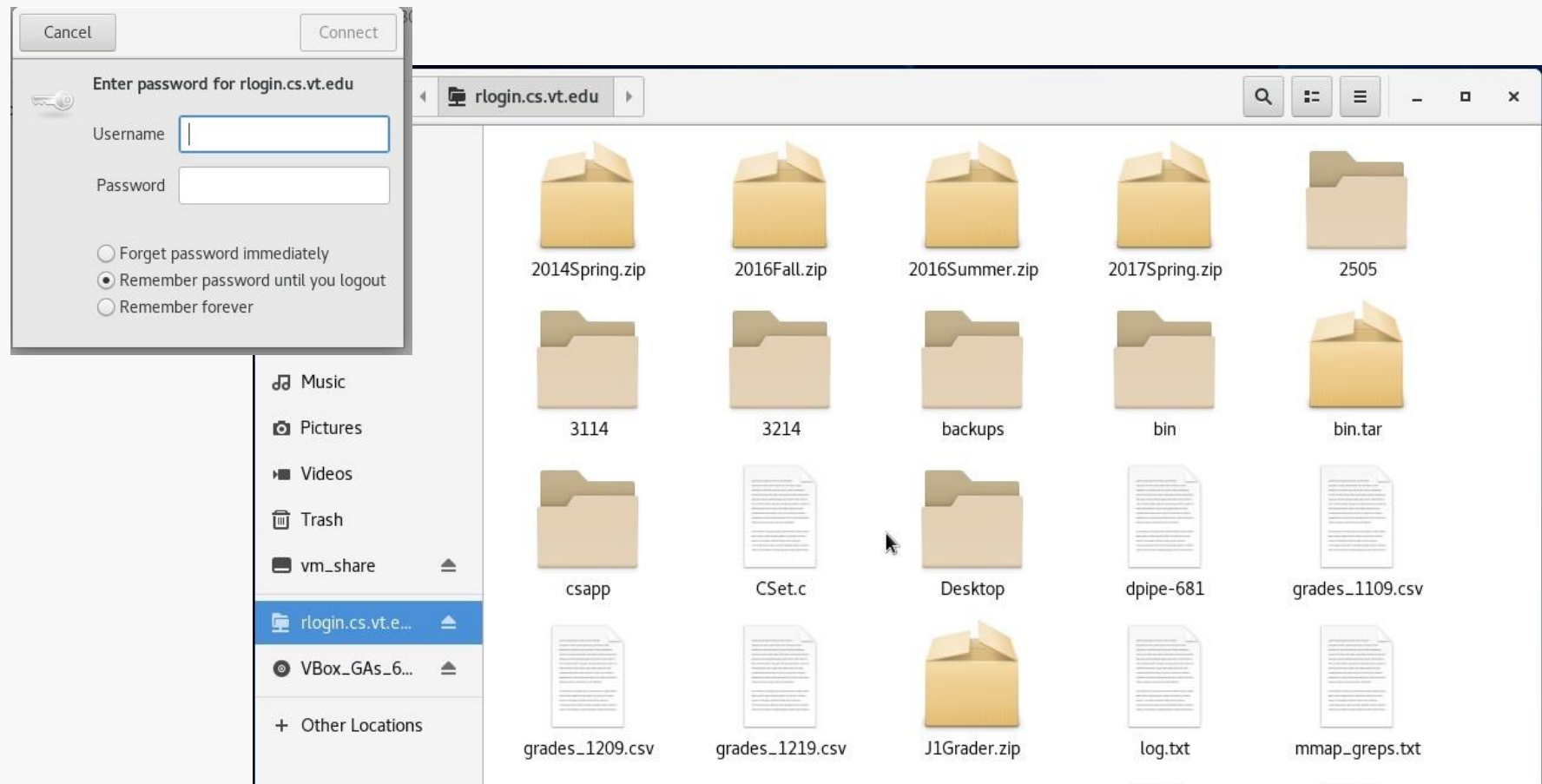


The Gnome File tool provides drag-and-drop file transfers with remote hosts:



Note how I am including the path to my rlogin home directory

After logging in to the remote host...

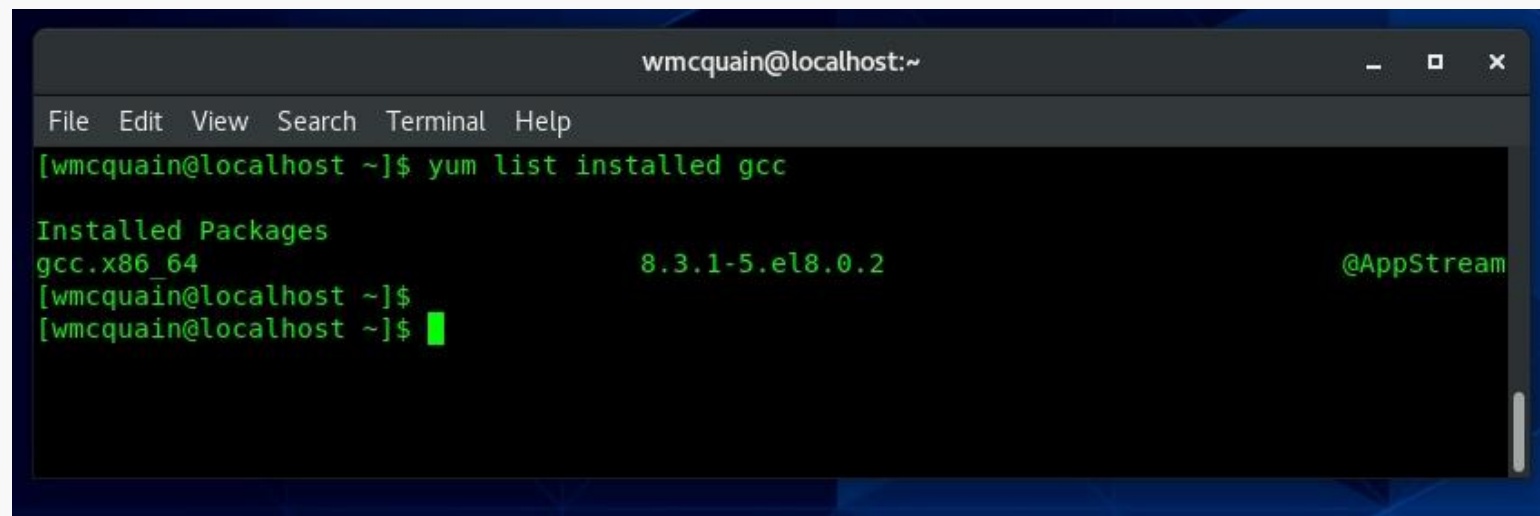


... now I have access to my home directory on rlogin.

As you use your CentOS system, you'll probably discover new tools you'd like that are not included by default.

In most cases, if you know the name of the software package you'd like to install, you can do so by running the `yum` tool. `yum` has many options and you should skim its man page.

For instance, we can use `yum` to determine what version of a package is installed:

A terminal window titled 'wmcquain@localhost:~' with a menu bar (File, Edit, View, Search, Terminal, Help). The command '[wmcquain@localhost ~]\$ yum list installed gcc' has been executed. The output shows 'Installed Packages' with a table listing 'gcc.x86_64' at version '8.3.1-5.el8.0.2' from the '@AppStream' repository. The prompt returns to '[wmcquain@localhost ~]\$' after the command.

```
wmcquain@localhost:~  
File Edit View Search Terminal Help  
[wmcquain@localhost ~]$ yum list installed gcc  
  
Installed Packages  
gcc.x86_64                        8.3.1-5.el8.0.2                  @AppStream  
[wmcquain@localhost ~]$  
[wmcquain@localhost ~]$
```

We can use `yum` to install or update a package:

```
[wdm@Centos65 ~]$ yum install tree
...
You need to be root to perform this command.
[wdm@Centos65 ~]$ su
Password:
```

```
[wmcquain@localhost ~]$ su
Password:
[root@localhost wmcquain]# yum install tree
```

```
...
Resolving Dependencies
```

```
...
Dependencies Resolved
```

```
...
Transaction Summary
```

```
=====
```

```
Install 1 Package
```

```
Total download size: 46 k
```

```
Installed size: 87 k
```

```
Is this ok [y/d/N]: y
```

You need to be
`root` to install or
update a package:

Now I am `root` ...
bwa ha ha!

`yum` has determined what
needs to be installed,
shown me that info, and
now wants confirmation...

We can use `yum` to install or update a package:

```
...  
Downloading packages:  
tree-1.6.0-10.el7.x86_64.rpm | 46 kB 00:00:00  
Running transaction check  
Running transaction test  
Transaction test succeeded  
Running transaction  
Installing : tree-1.6.0-10.el7.x86_64 1/1  
Verifying : tree-1.6.0-10.el7.x86_64 1/1  
  
Installed:  
tree.x86_64 0:1.6.0-10.el7  
  
Complete!  
[root@localhost wmcquain]# exit
```

`yum` triggers the installation..

Now I will cease to be `root` ...
that much privilege can be
dangerous.

I've noticed that CentOS 8 actually includes the `tree` command by default.

Sometimes `yum` cannot find a package:

```
root@localhost wmcquain]# yum install geany
Loaded plugins: fastestmirror, langpacks
Loading mirror speeds from cached hostfile
* base: mirror.es.its.nyu.edu
* extras: mirror.team-cymru.com
* updates: mirror.math.princeton.edu
No package geany available.
Error: Nothing to do
```

`yum` queries a collection of online repositories... in this case it doesn't find the package I wanted.

It's possible to direct `yum` to search additional repositories...

```
[root@localhost wmcquain]# yum install epel-release
```

```
...
```

```
Resolving Dependencies
```

```
...
```

```
Dependencies Resolved
```

```
=====
```

Package	Arch	Version	Repository	Size
---------	------	---------	------------	------

```
=====
```

```
Installing:
```

epel-release	noarch	7-11	extras	15 k
--------------	--------	------	--------	------

```
Transaction Summary
```

```
=====
```

```
Install 1 Package
```

```
Total download size: 15 k
```

```
Installed size: 24 k
```

```
Is this ok [y/d/N]: y
```

```
Downloading packages:
```

```
...
```

Here, I'm adding another common repository to those `yum` queries by default.


```
root@localhost wmcquain]# yum install geany
```

```
...
```

```
Dependencies Resolved
```

Here, I'm installing a programmer's editor, geany.

```
=====
Package                Arch    Version    Repository  Size
=====
```

```
Installing:
```

```
geany                  x86_64  1.31-3.el7  epel        2.5 M
```

```
Installing for dependencies:
```

```
geany-libgeany
```

```
                  x86_64  1.31-3.el7  epel        1.0 M
```

```
vte3                   x86_64  0.36.5-1.el7 base        337 k
```

```
Transaction Summary
```

```
=====
Install 1 Package (+2 Dependent packages)
```

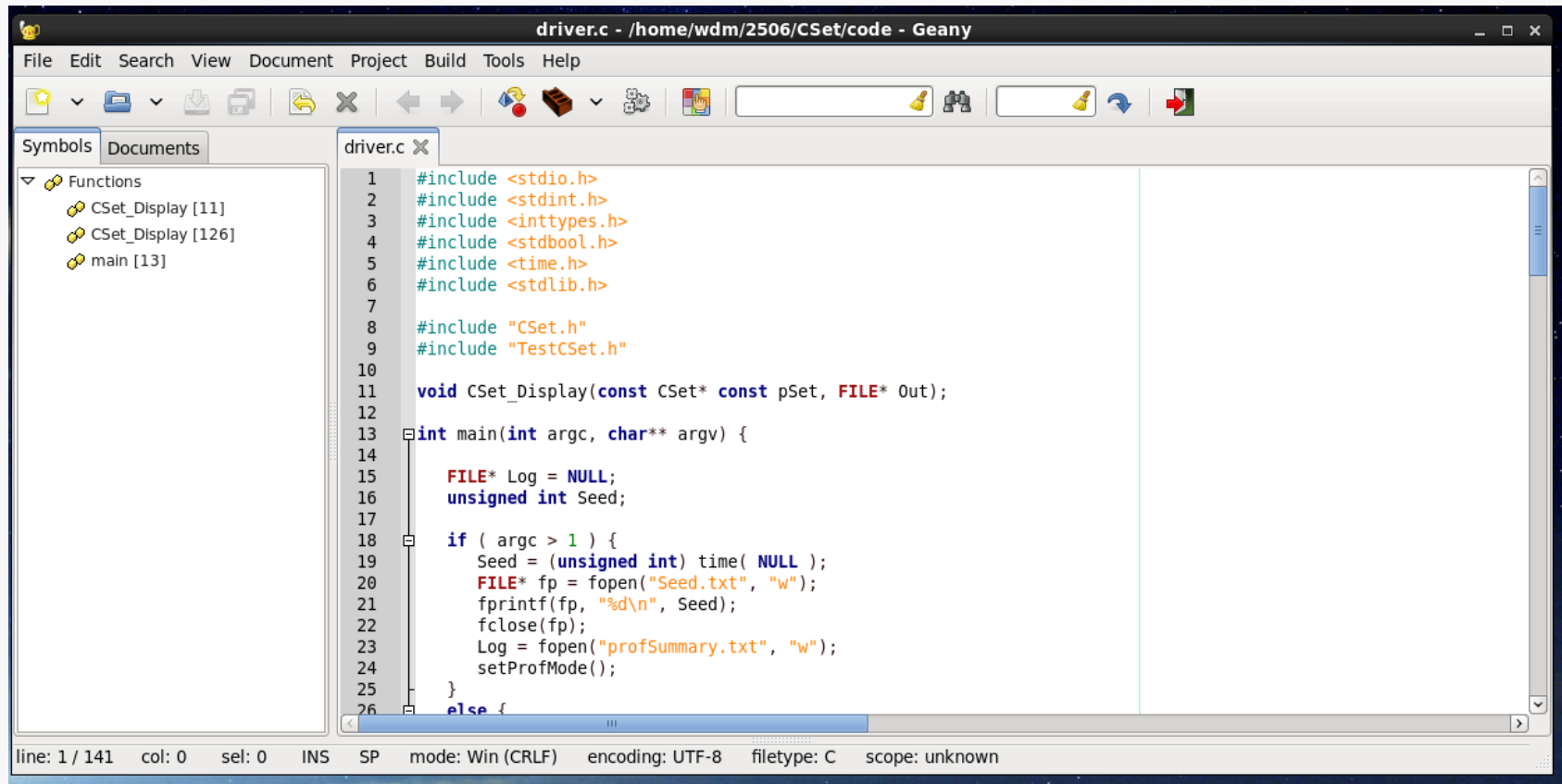
```
Total download size: 3.8 M
```

```
Installed size: 13 M
```

```
Is this ok [y/d/N]: y
```

```
...
```

geany is a programmer-oriented editor:



It's my (current) favorite text editor for programming on Linux.

It's also available for Windows.

By default, 64-bit Linux distros do not install some libraries that are needed in order to compile 32-bit binaries.

We may want that capability later on. The following worked for me:

```
root@localhost wmcquain]# yum install glibc-devel.i686 libgcc.i686
```

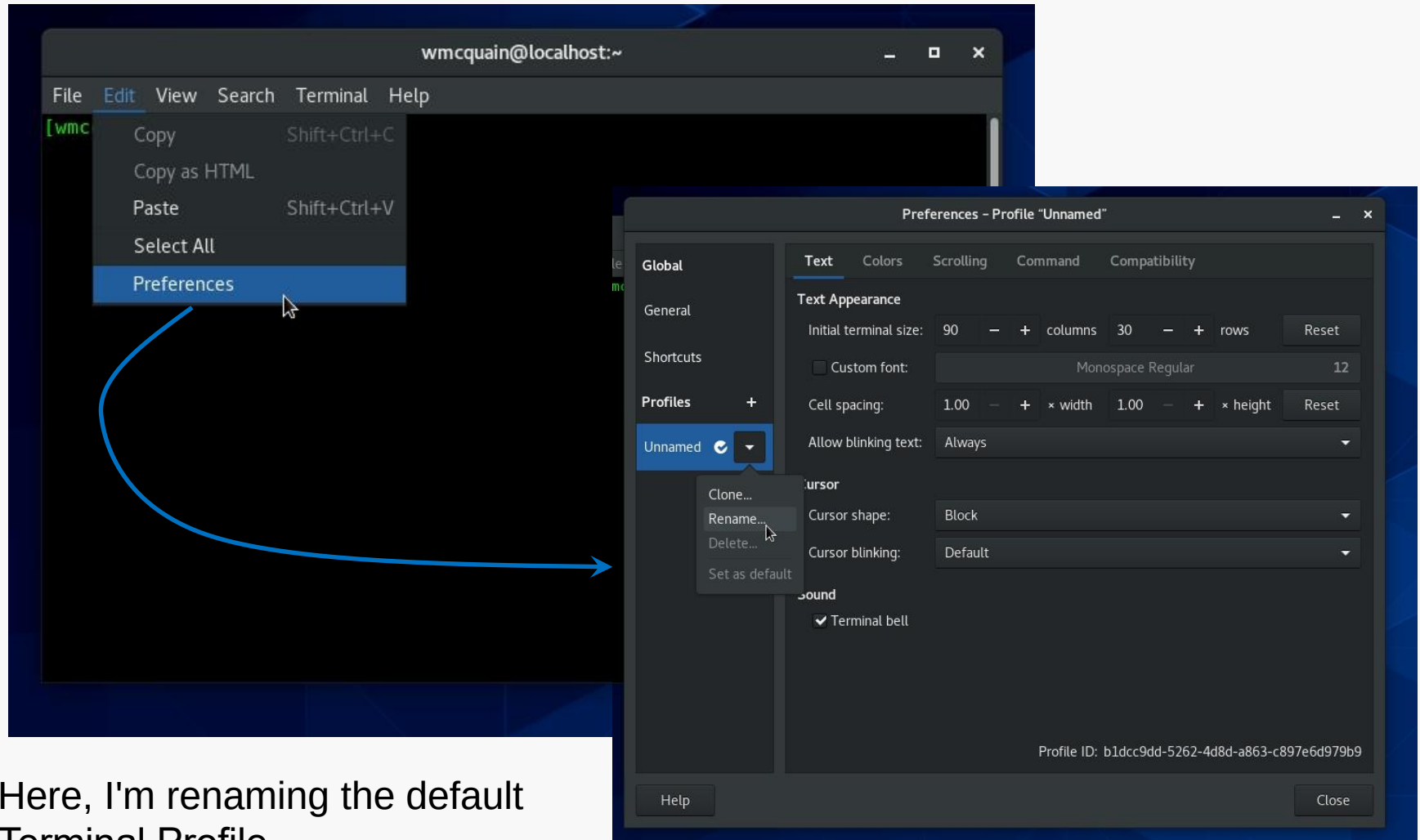
```
...
```

Others have reported success with:

```
root@localhost wmcquain]# yum install glibc-devel.i686 libgcc.i686 libstdc++-devel.i686 ncurses-  
devel.i686
```

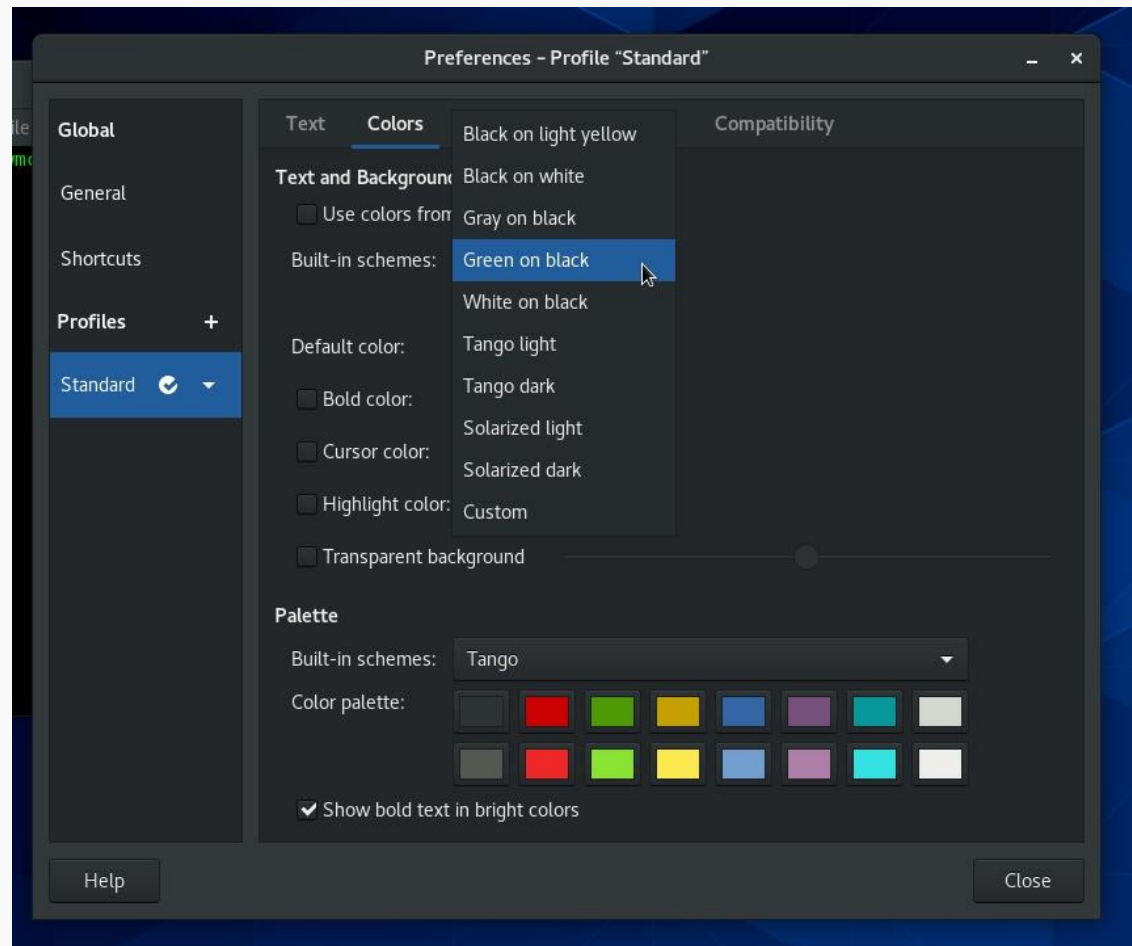
```
...
```

The Terminal application provides some options for customization:



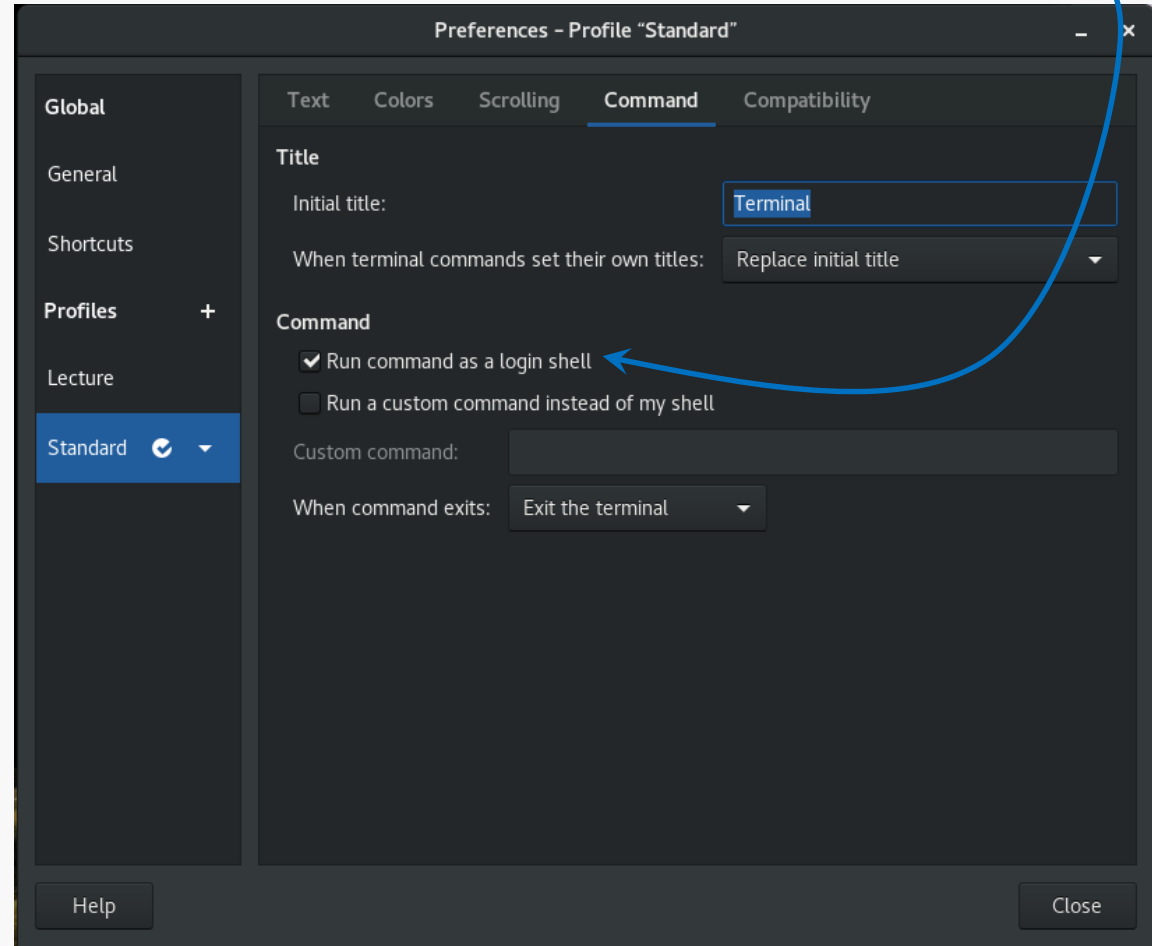
Here, I'm renaming the default Terminal Profile...

As you may have noticed, I prefer to reset the Terminal colors:



I also reset the default number of rows and columns... feel free to experiment.

Go to the Command tab and enable "Run command as a login shell":



This makes sure that configuration changes in `.bashrc` and `.bash_profile` take effect when you open a new terminal session.