

Go to www.virtualbox.org and select [Downloads](#):

- [5.2 SDK \(5.2.24\)](#)
- **VirtualBox 5.2.24** (released January 15 2019)
 - [Windows hosts](#)
 - [OS X hosts](#)
 - [Solaris hosts](#)
 - Linux Hosts:
 - [Ubuntu 18.04 / 18.10 / Debian 10](#)
 - [Ubuntu 16.04](#) [32-bit](#) | [64-bit](#)
 - [Ubuntu 14.04 / 14.10 / 15.04](#) [32-bit](#) | [64-bit](#)
 - [Debian 9](#) [32-bit](#) | [64-bit](#)
 - [Debian 8](#) [32-bit](#) | [64-bit](#)
 - [openSUSE 15.0](#)
 - [openSUSE 13.2 / Leap 42](#) [32-bit](#) | [64-bit](#)
 - [Fedora 29](#)
 - [Fedora 26 / 27 / 28](#) [32-bit](#) | [64-bit](#)
 - [Oracle Linux 7 / Red Hat Enterprise Linux 7 / CentOS 7](#)
 - [Oracle Linux 6 / Red Hat Enterprise Linux 6 / CentOS 6](#) [32-bit](#) | [64-bit](#)
 - [All distributions](#) [32-bit](#) [64-bit](#)
 - [Extension Pack](#)
 - [Sources](#)
 - [MD5 checksums, SHA256 checksums](#)

Note:

- the OS on which you will install VirtualBox is called the *host OS*.
- the OS you will install on VirtualBox (later) is called the *guest OS*.

* These notes are based on VirtualBox 5.2.24 and CentOS 7 (ISO version 1804).

* I had issues with VirtualBox 6.0.2 and CentOS 7 (ISO version 1810), YMMV

Go to www.virtualbox.org and select [Downloads](#):

VirtualBox 5.2.18 platform packages

- [Windows hosts](#)
- [OS X hosts](#)
- [Linux distributions](#)
- [Solaris hosts](#)

The binaries are released under the terms of the GPL version 2.

See the [changelog](#) for what has changed.

You might want to compare the checksums to verify the integrity of downloaded packages. *The SHA256 checks*

- [SHA256 checksums](#), [MD5 checksums](#)

Note: After upgrading VirtualBox it is recommended to upgrade the guest additions as well.

VirtualBox 5.2.18 Oracle VM VirtualBox Extension Pack

- [All supported platforms](#)

Support for USB 2.0 and USB 3.0 devices, VirtualBox RDP, disk encryption, NVMe and PXE boot for Intel cards. Pack. The Extension Pack binaries are released under the [VirtualBox Personal Use and Evaluation License \(PUEL\)](#) *VirtualBox*.

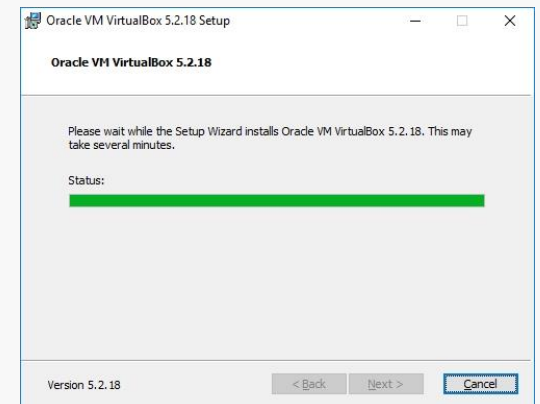
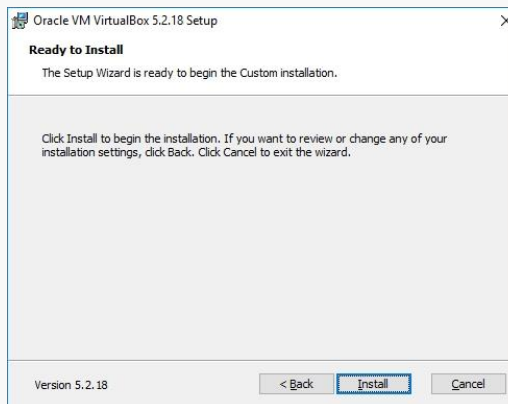
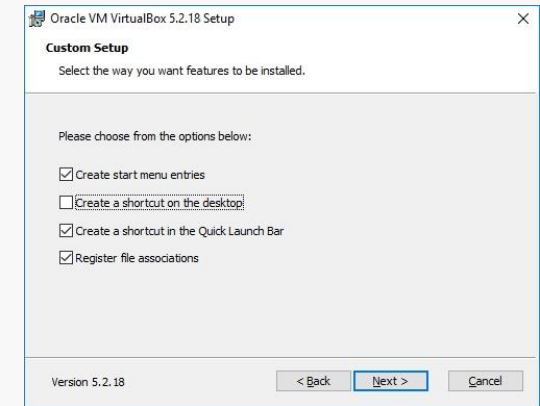
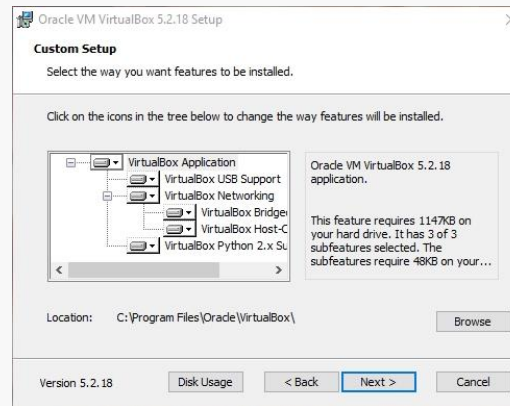
Download

- the current release* of VirtualBox for your Host OS
- the VirtualBox Extension Pack

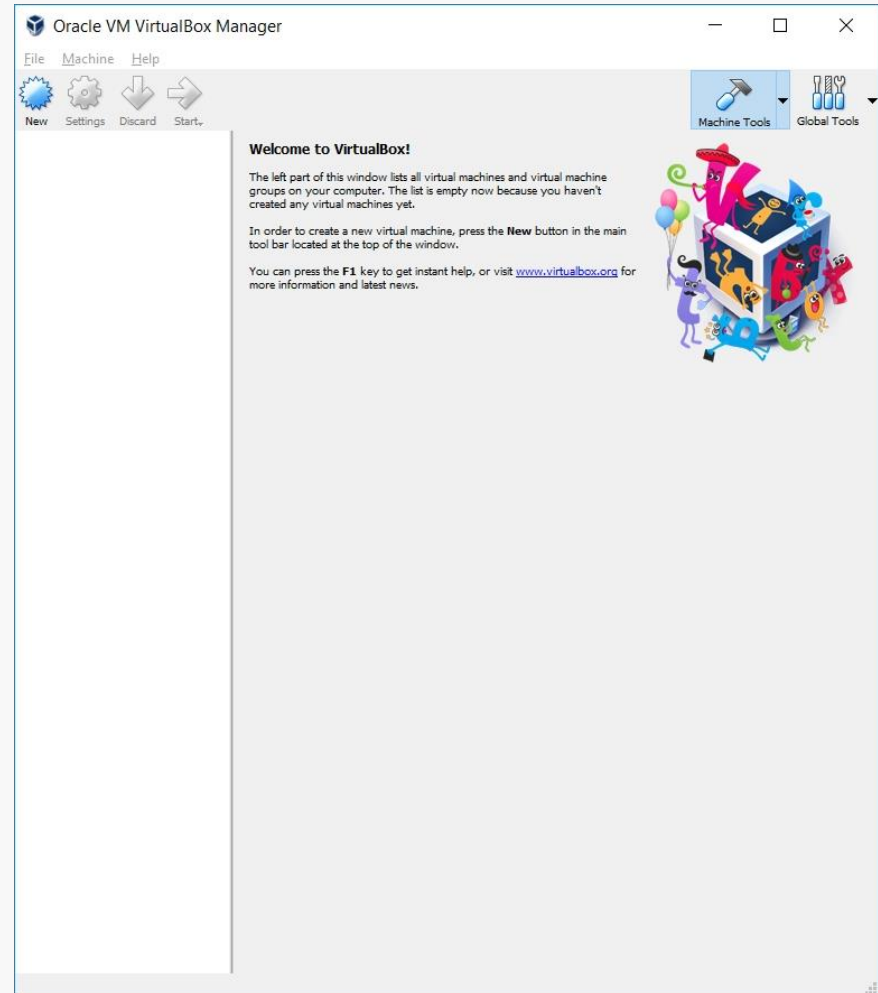
Pay attention to where these are saved on your machine.

* These notes are based on VirtualBox 5.2.24 and CentOS 7 (ISO version 1804).

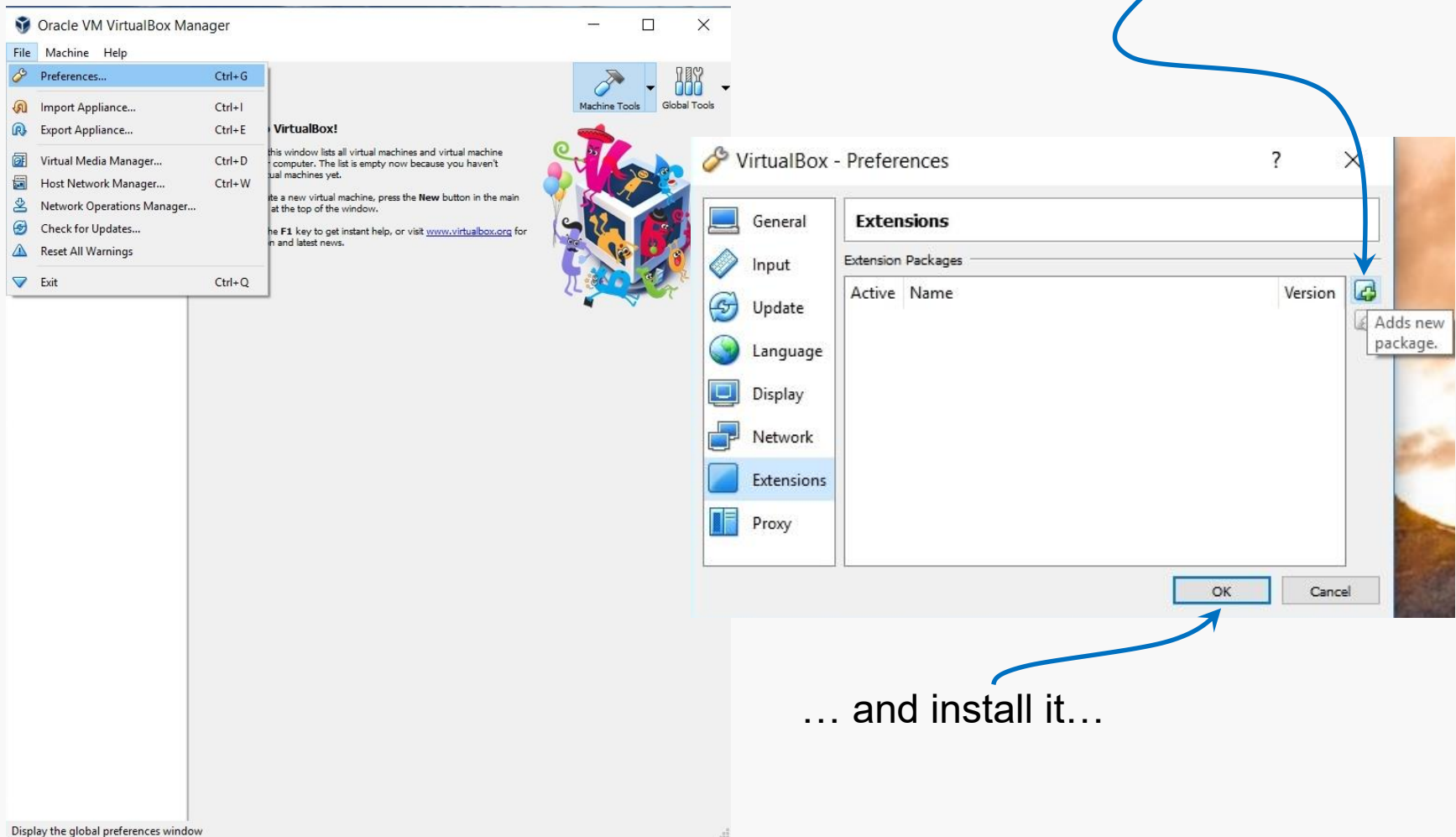
Run the VirtualBox installer. The first few screens are typical and probably do not require you to make any changes to the default options:



Once the base installation is complete, start VirtualBox:

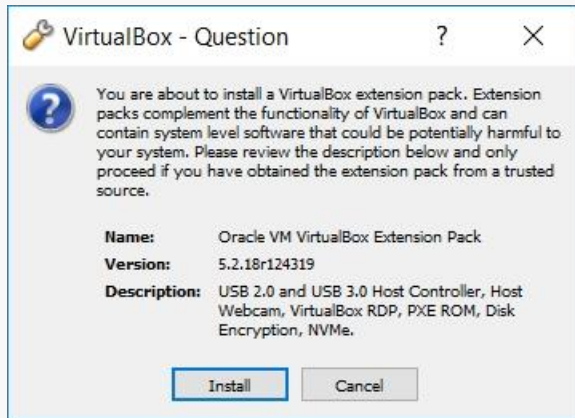


Select File/Preferences and select the Extension Pack file you downloaded:

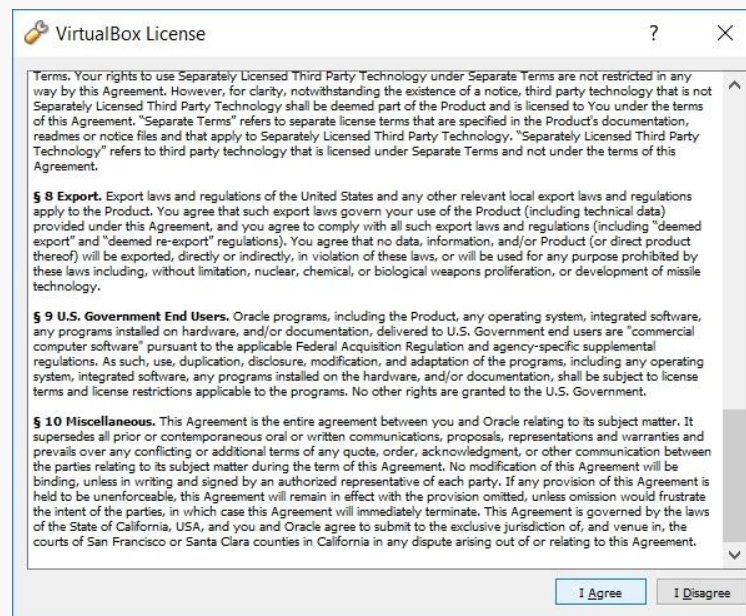


... and install it...

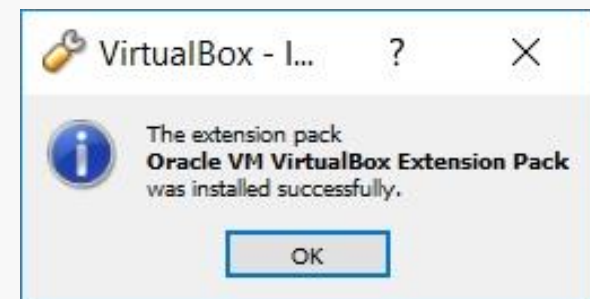
Authorize the installation ...



... accept the license ...

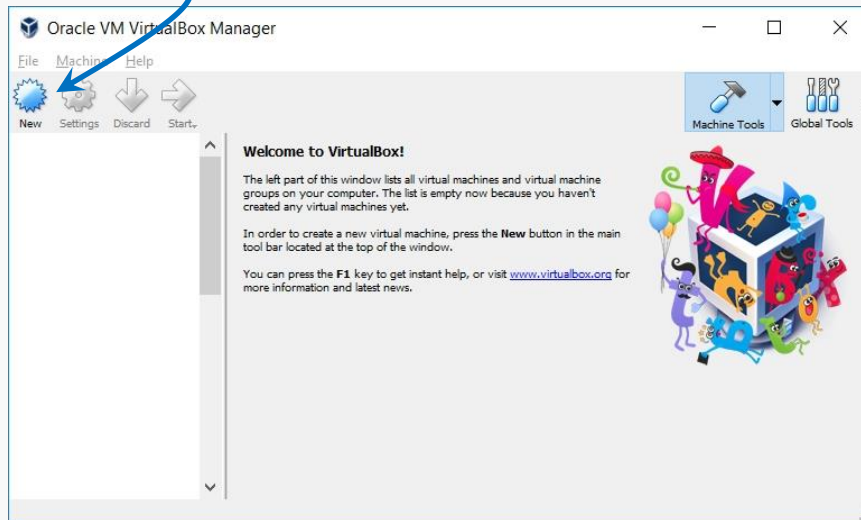


... and wait for ...

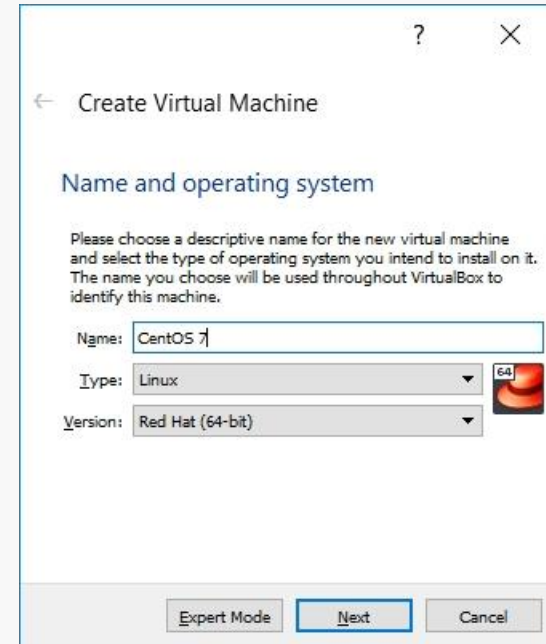


Restart VirtualBox.

Select New to create your virtual machine:

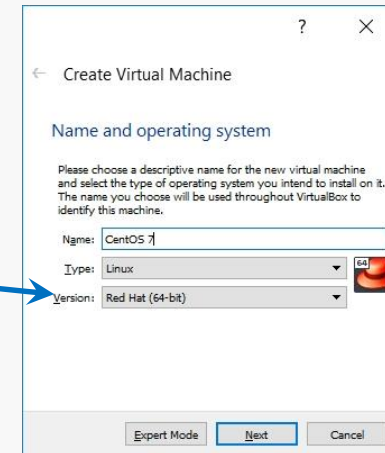


Enter a Name:



If you use a descriptive name for the VM, VirtualBox should auto-detect the proper OS type and Version.

What if you only have 32-bit options listed?



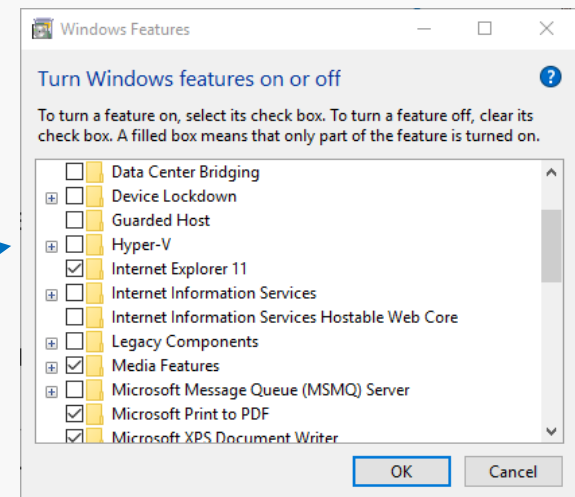
There are two likely possibilities:

Hardware virtualization support is not enabled on your system.

Reboot. Go into the BIOS and look for something like VT-X and turn it on.

You are running Win8 or Win10 Pro or Enterprise and Hyper-V is turned on.

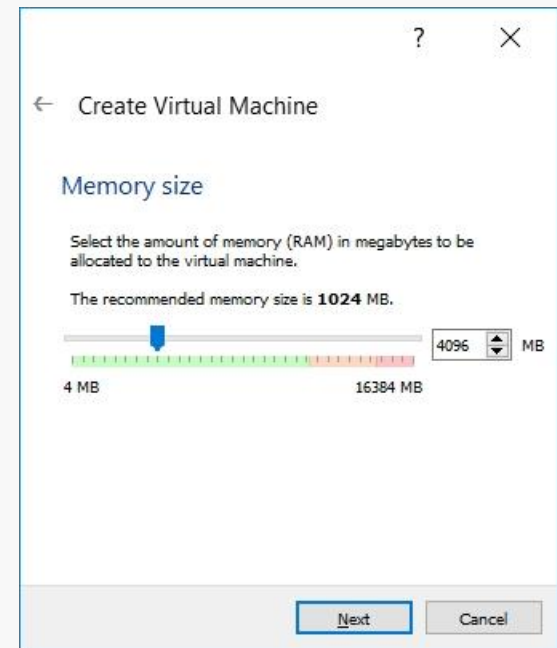
Go to "Turn Windows features on or off" and disable Hyper-V.



Specify the amount of memory you'll give the VM.

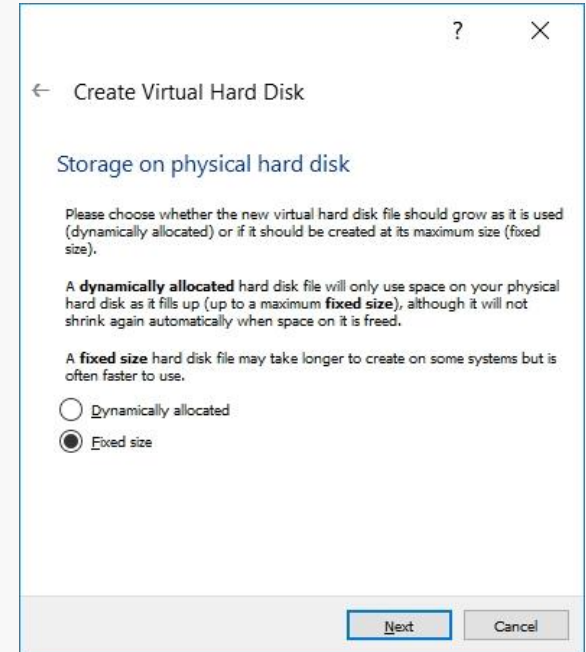
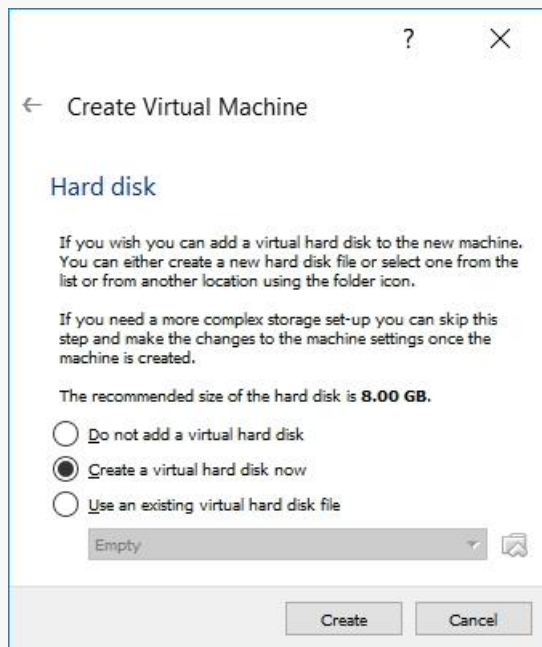
In this example, I'm installing on a host machine with 8GB of RAM; with less, I'd probably given the VM 1GB.

On my current working laptop, I have 16GB of RAM and gave my VM 4GB.



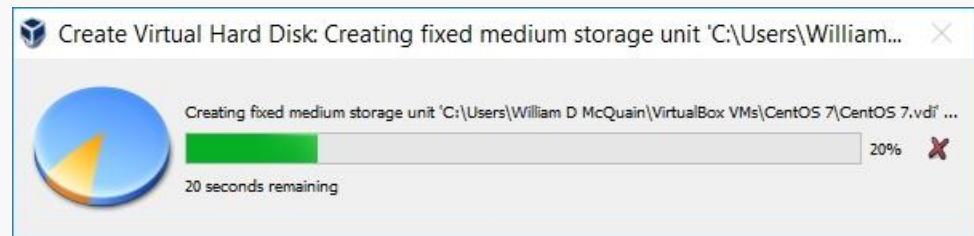
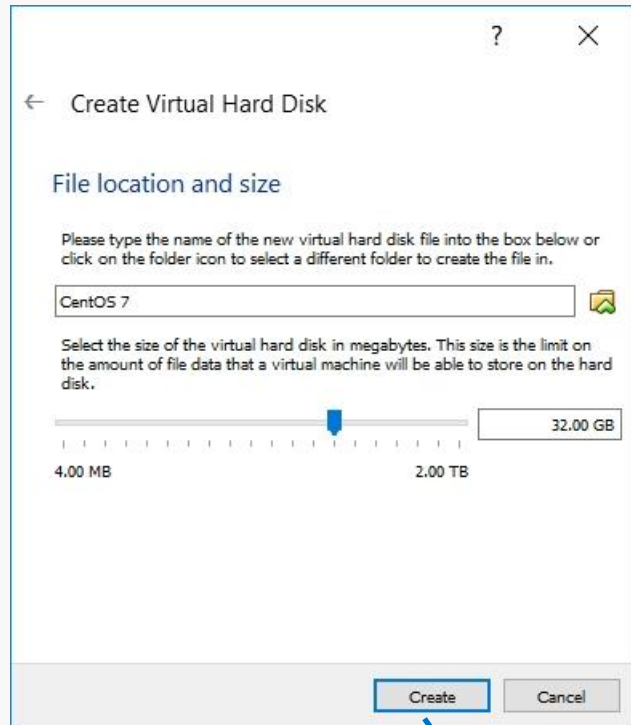
In the next dialog, select the option to create a new virtual hard drive now.

Take the default hard drive file type in the next dialog unless you're concerned about being compatible with some other virtualization tool like VMWare.



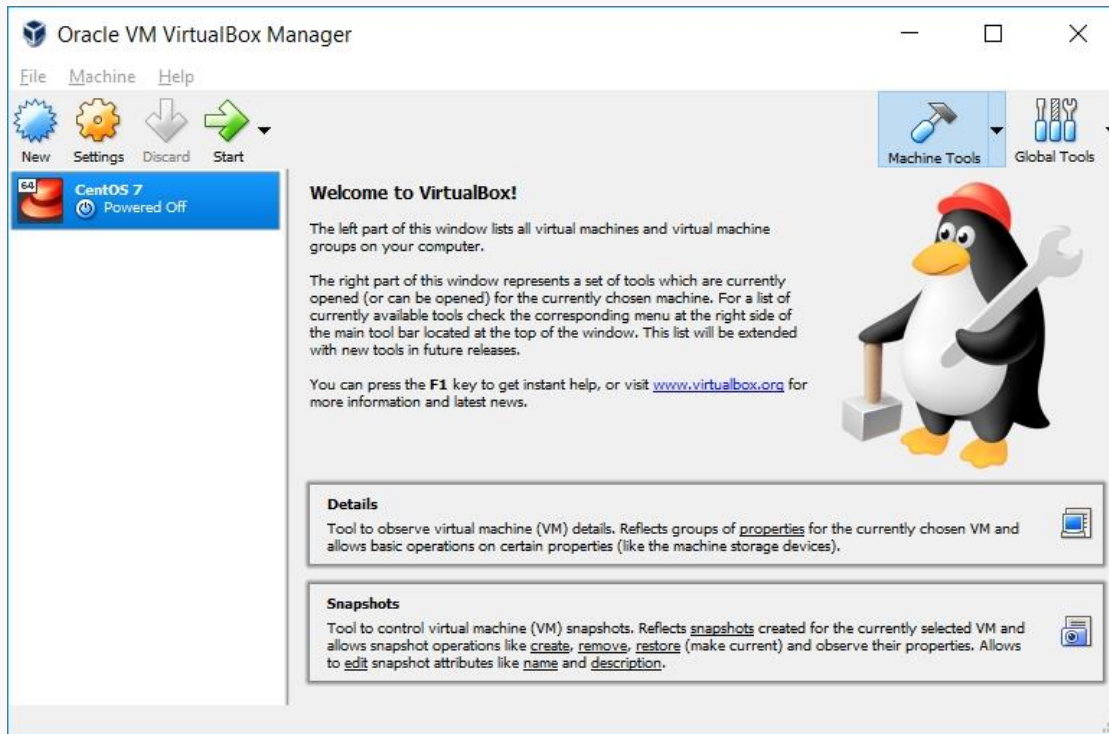
Next, I recommend choosing a fixed-size hard disk.

I generally make this 32GB, but make it smaller if you're short on space.

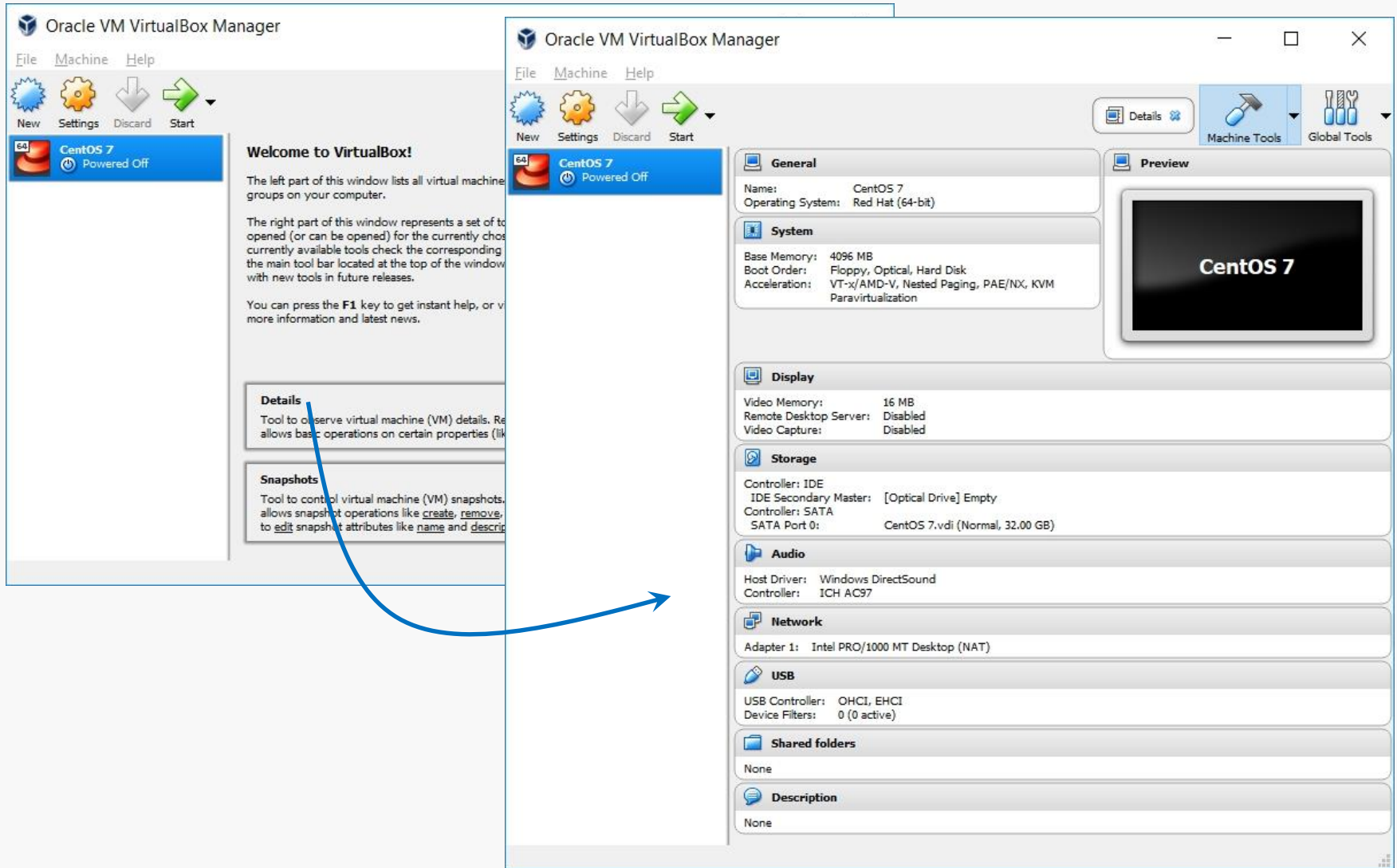


Now, you have an empty virtual machine/

That is, a formatted (virtual) hard disk and no OS installation on it.



Click on Details to bring up a more information about your empty VM:



There are a couple of crucial VM settings; right-click on your VM and bring up the Settings dialog:

Under General/Advanced, make the shared clipboard and Drag'n Drop Bidirectional.

Under Display, enable 3D Acceleration.

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

All our servers run CentOS 7.

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

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

Size:	4.16 GB (4,470,079,488 bytes)
Size on disk:	4.16 GB (4,470,079,488 bytes)

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

Disclaimer: the following notes illustrate one session installing CentOS 7 on VirtualBox 5.2.18, running on Windows 10 Enterprise, on a particular underlying hardware system. YMMV. Mine certainly has...

Go to centos.org, use the Get CentOS link at the top of the page, and select the link for the distribution option you want (I recommend DVD ISO):



CentOS GET CENTOS ABOUT ▾ COMMUNITY ▾ DOCUMENTATION ▾ HELP

Download CentOS

As you download and use CentOS Linux, the CentOS Project invites you to [be a part of the community as a contributor](#). There are many ways to contribute to the project, from documentation, QA, and testing to coding changes for [SIGs](#), providing mirroring or hosting, and helping other users.

DVD ISO **Everything ISO** **Minimal ISO**

ISOs are also available [via Torrent](#).

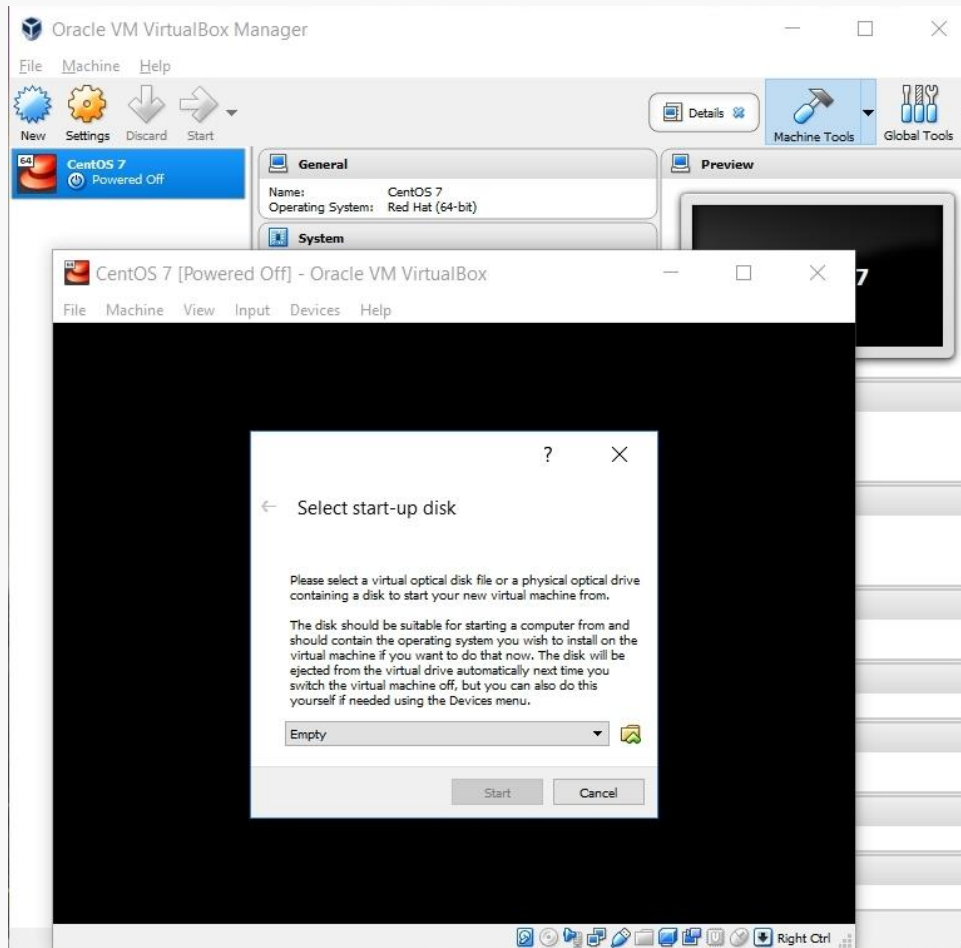
If the above is not for you, [alternative downloads](#) might be.

Choose a mirror for downloading; I'm using the 1804 ISO...

```
http://ftp.usf.edu/pub/centos/7/isos/x86_64/CentOS-7-x86_64-DVD-1804.iso
http://mirror.vcu.edu/pub/gnu_linux/centos/7/isos/x86_64/CentOS-7-x86_64-DVD-1804.iso
http://mirror.trouble-free.net/centos/7/isos/x86_64/CentOS-7-x86_64-DVD-1804.iso
http://centos.eecs.wsu.edu/7/isos/x86_64/CentOS-7-x86_64-DVD-1804.iso
http://mirror.atlanticmetro.net/centos/7/isos/x86_64/CentOS-7-x86_64-DVD-1804.iso
http://mirrors.rcs.alaska.edu/centos/7/isos/x86_64/CentOS-7-x86_64-DVD-1804.iso
http://mirrors.usc.edu/pub/linux/distributions/centos/7/isos/x86_64/CentOS-7-x86_64-DVD-1804.iso
http://mirror.net.cen.ct.gov/centos/7/isos/x86_64/CentOS-7-x86_64-DVD-1804.iso
http://repos.va.psychz.net/centos/7/isos/x86_64/CentOS-7-x86_64-DVD-1804.iso
http://mirror.clarkson.edu/centos/7/isos/x86_64/CentOS-7-x86_64-DVD-1804.iso
```

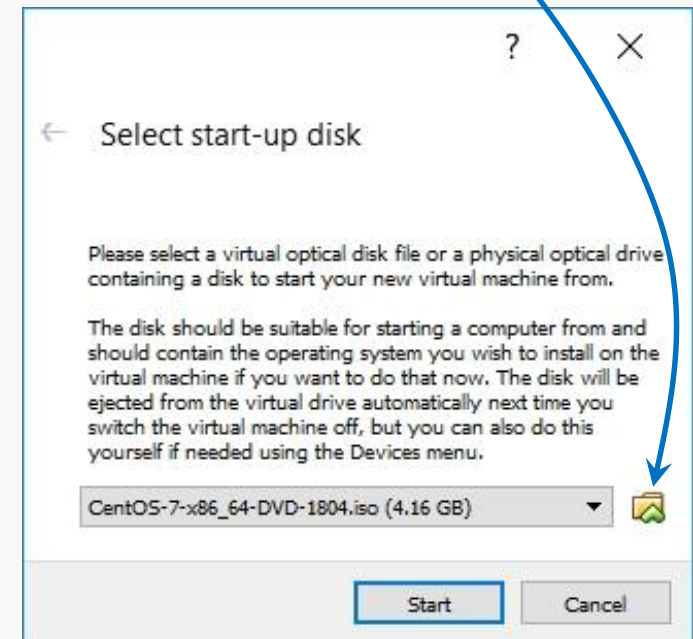
Select the VM and click Start.

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

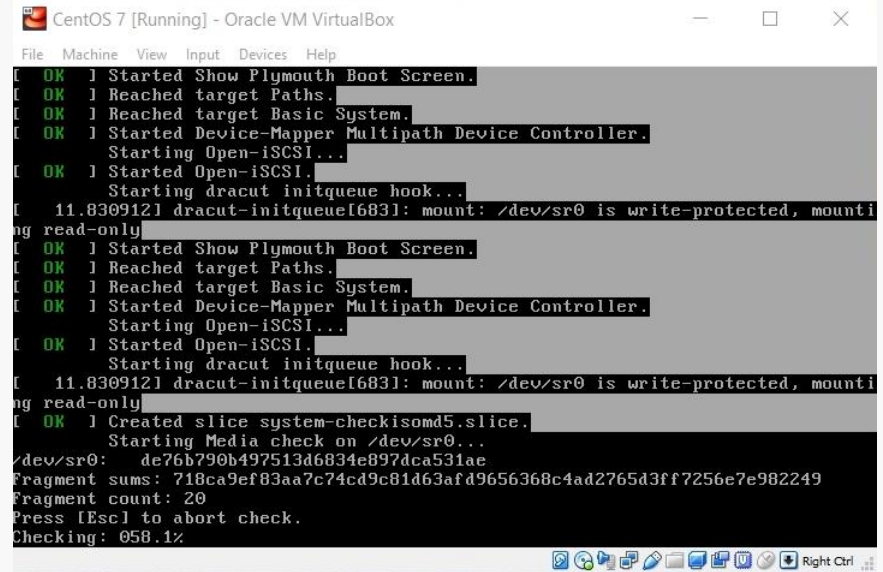
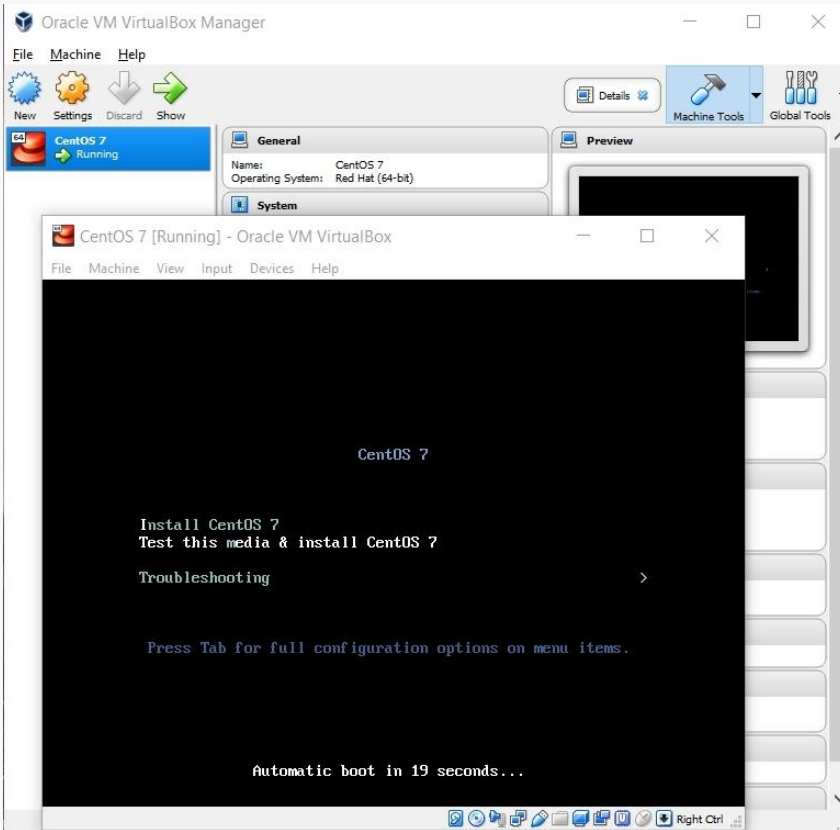


Click the folder icon.

Select your CentOS ISO file; then click Start...



The following sequence of screen shots are mostly self-explanatory...



Select Install CentOS 7...

... and it grinds away awhile...

Some basic settings need to be established:

Installation site

Initial software configuration

Language

CentOS 7 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

CENTOS 7 INSTALLATION

us Help

WELCOME TO CENTOS 7.

What language would you like to use during the installation process?

English English

Afrikaans Afrikaans

አማርኛ Amharic

العربية Arabic

অসমীয়া Assamese

Asturiano Asturian

Беларуская Belarusian

Български Bulgarian

বাংলা Bengali

Bosanski Bosnian

Català Catalan

Čeština Czech

Cymraeg Welsh

Dansk Danish

Deutsch German

Type here to search.

CentOS 7 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

CENTOS 7 INSTALLATION

us Help

INSTALLATION SUMMARY

LOCALIZATION

DATE & TIME
Americas/New York timezone

LANGUAGE SUPPORT
English (United States)

SOFTWARE

INSTALLATION SOURCE
Local media

SYSTEM

INSTALLATION DESTINATION
Automatic partitioning selected

NETWORK & HOST NAME
Not connected

KEYBOARD
English (US)

SOFTWARE SELECTION
Minimal Install

KDUMP
Kdump is enabled

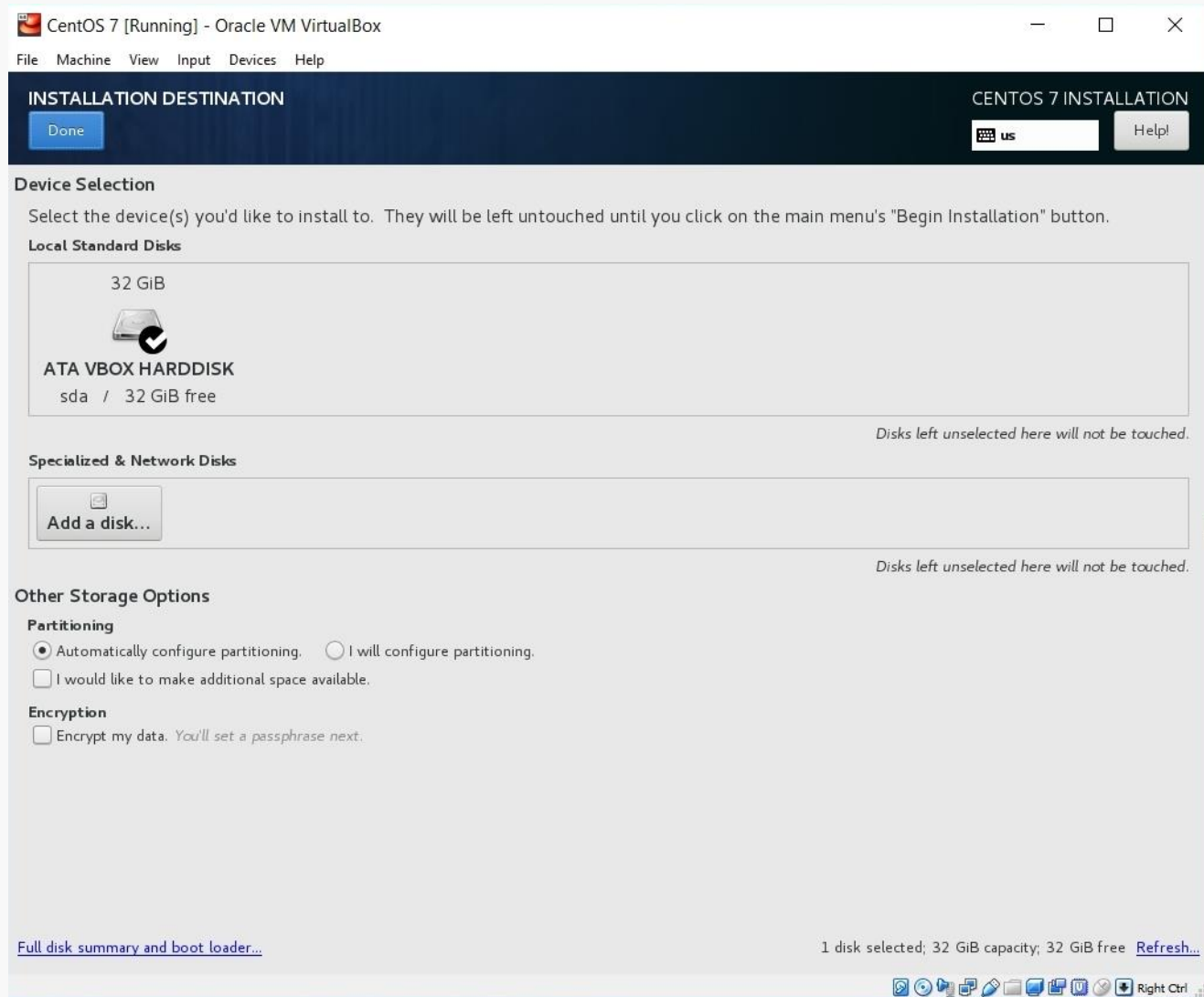
SECURITY POLICY
No profile selected

Quit Begin Installation

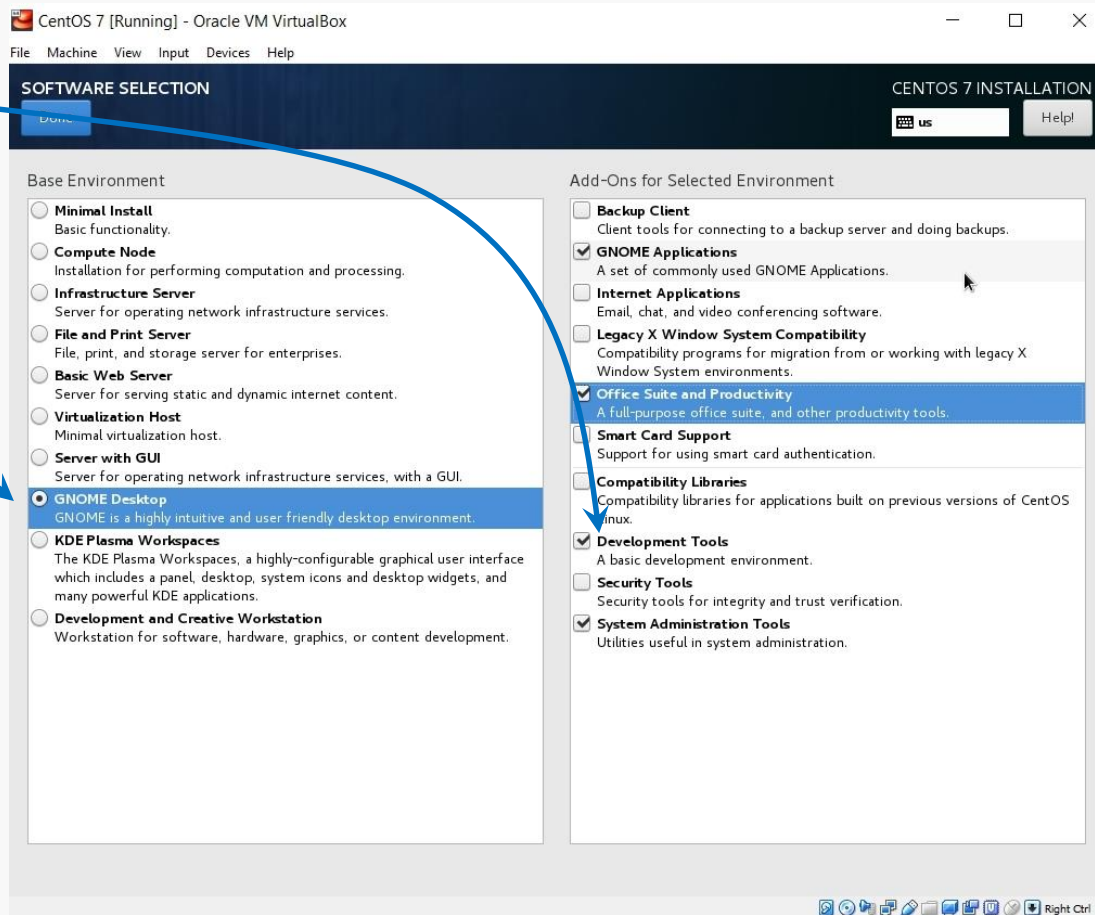
We won't touch your disks until you click 'Begin Installation'.

Please complete items marked with this icon before continuing to the next step.

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

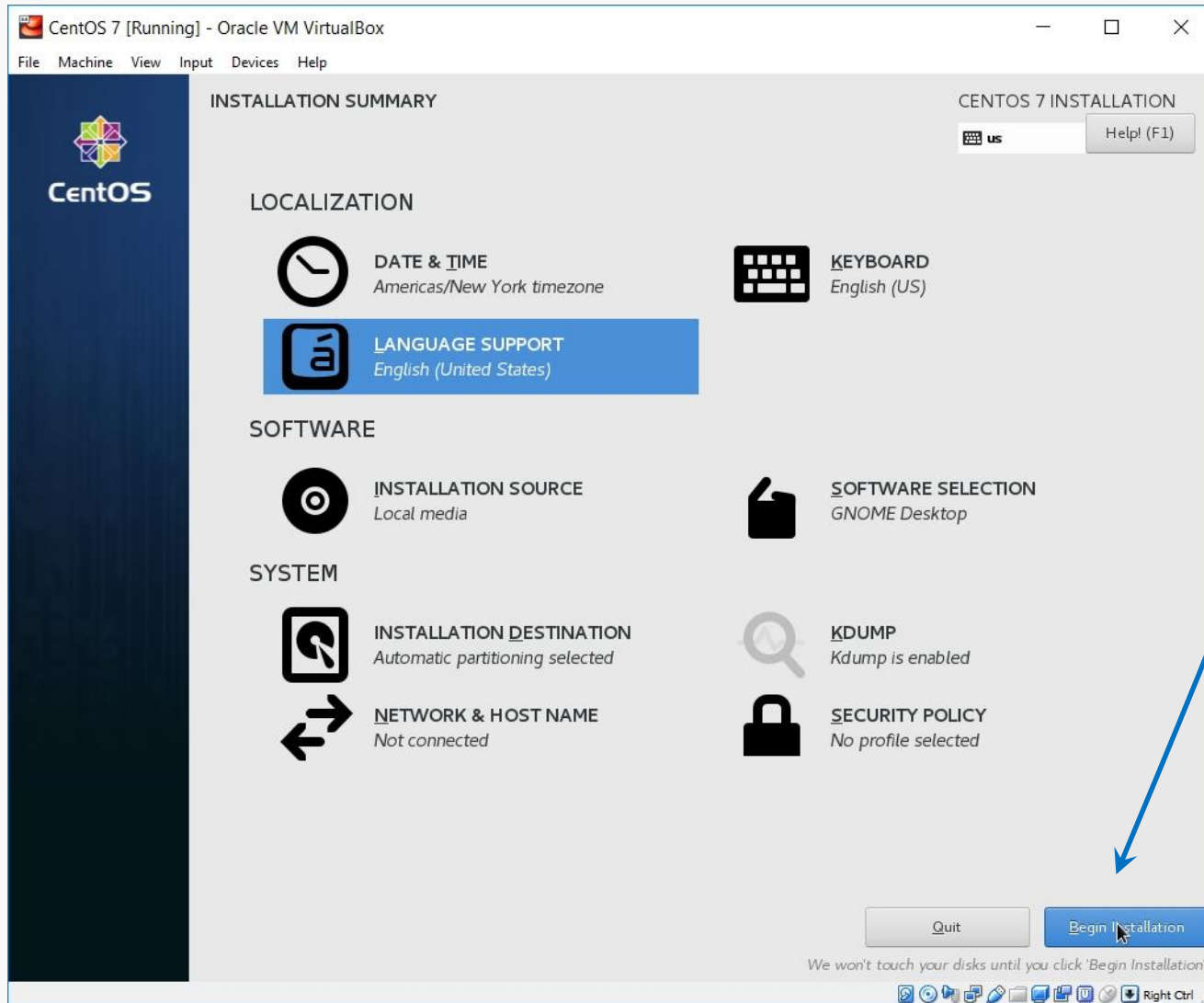


Here, I prefer the GNOME desktop and I want to be sure that I install the development tools (compiler, etc).

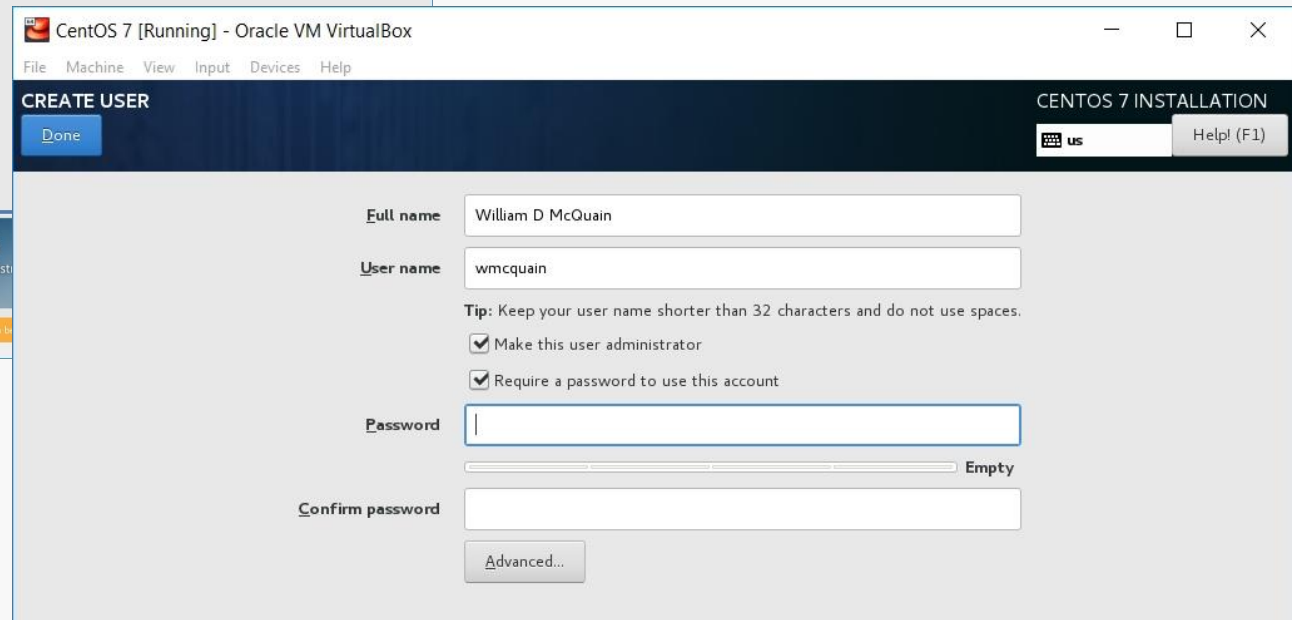
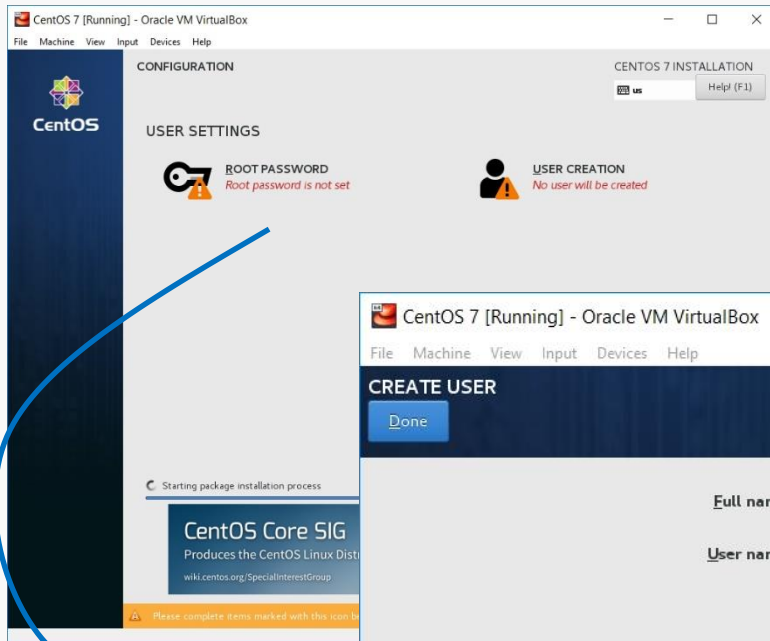


Make other choices as you like... more packages can be installed later.

Fire up the installation routine...



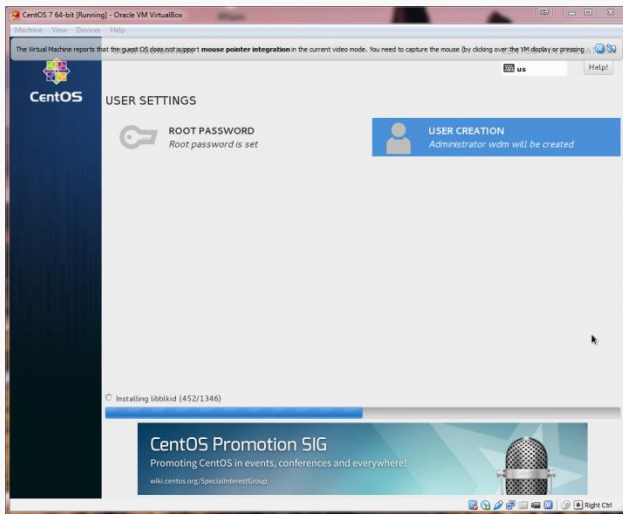
While the installation is running, set the password for the root (superuser) account.



root is the administrative account.

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

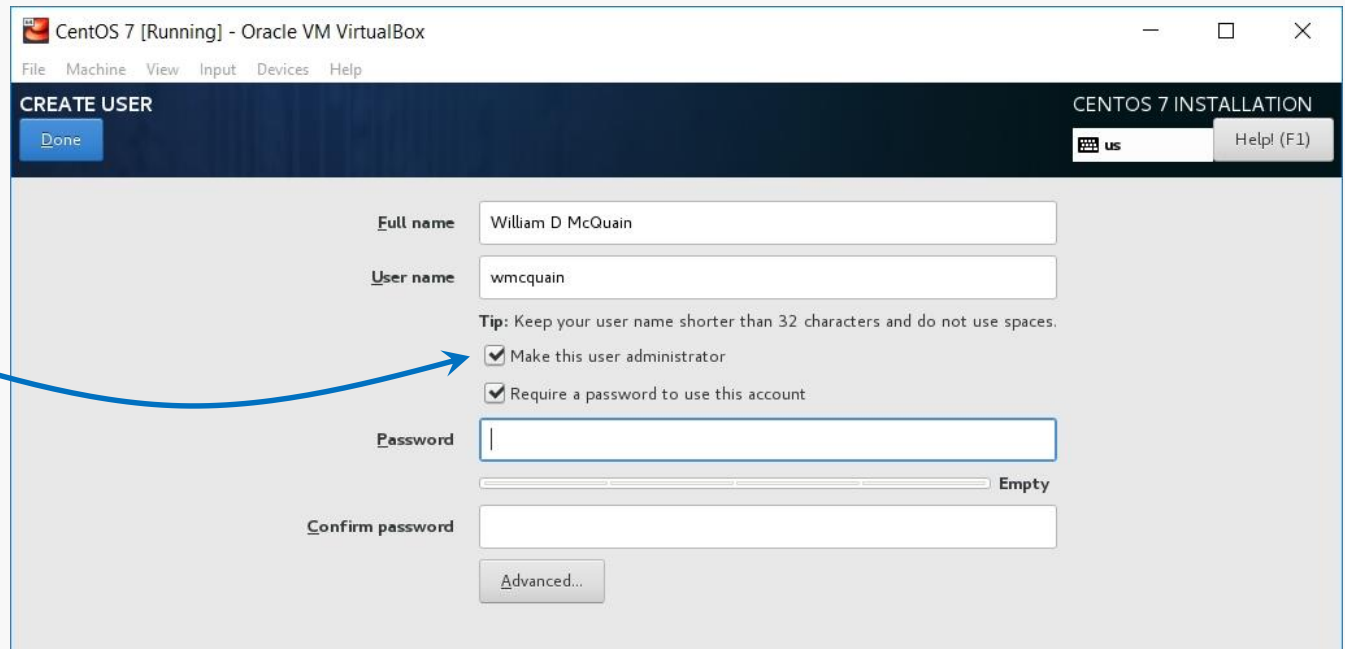
Do not forget this password!



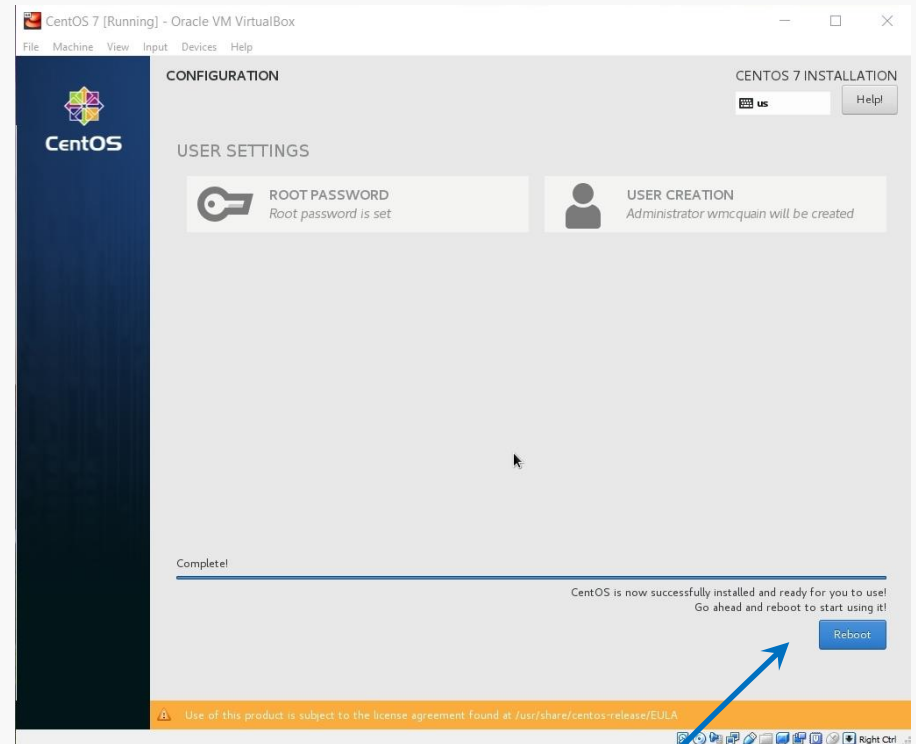
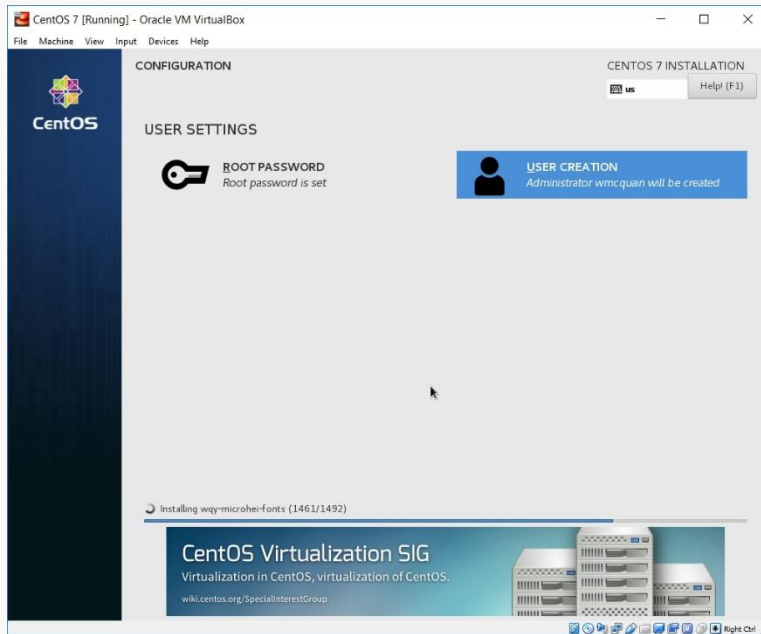
I also set up a user account for my personal use.



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).



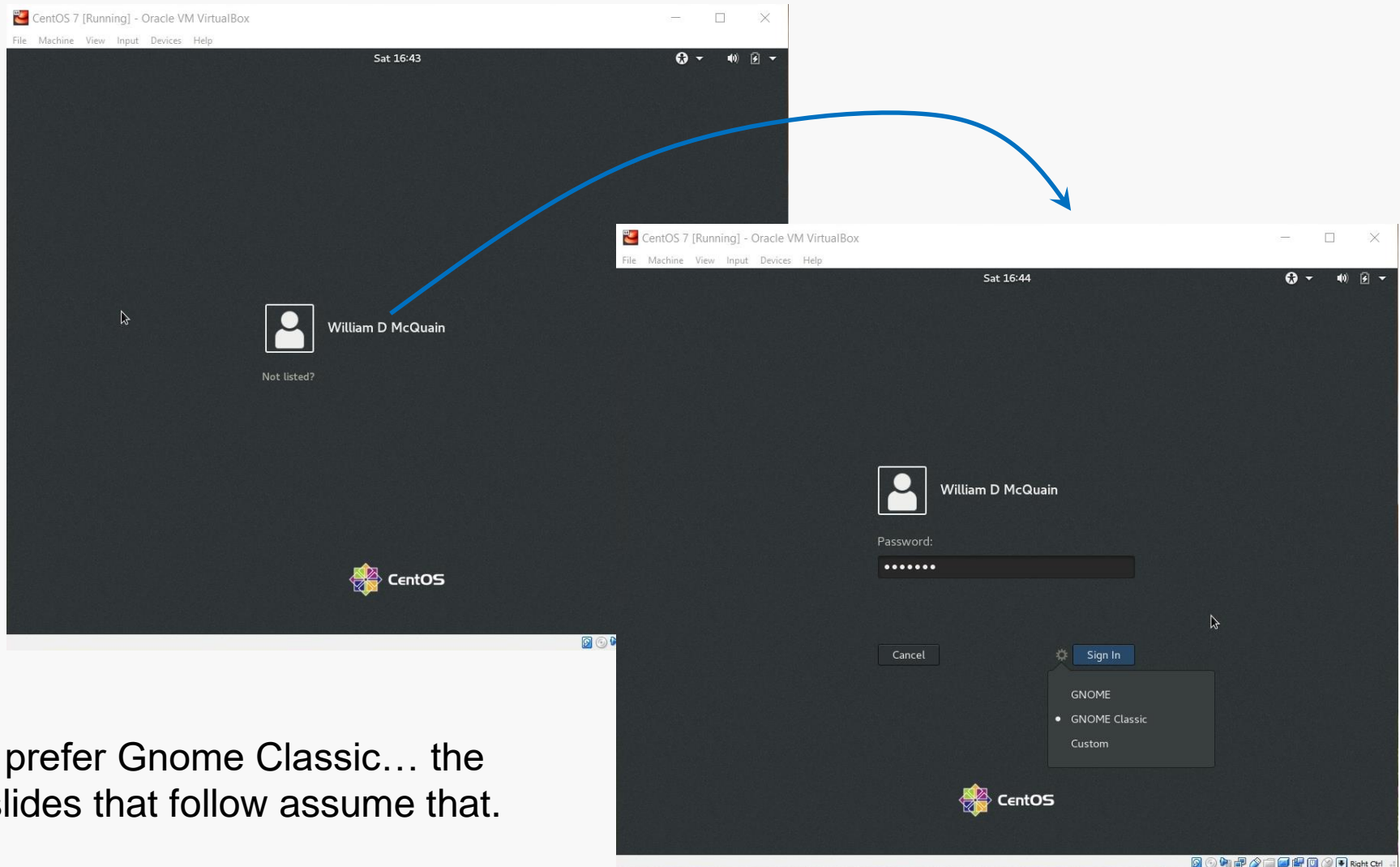
Now, you need to restart the virtual machine...

The restart will bring you to the license screens:

The image displays three overlapping screenshots of the CentOS 7 initial setup process in a VirtualBox environment. The top-left window shows the 'INITIAL SETUP' screen with 'LICENSING' selected and 'License not accepted'. The middle window shows the 'License Agreement' dialog with the 'CentOS 7 Linux EULA' text and a checked checkbox for 'I accept the license agreement.'. The bottom-right window shows the 'INITIAL SETUP' screen with 'LICENSING' selected and 'License accepted'.

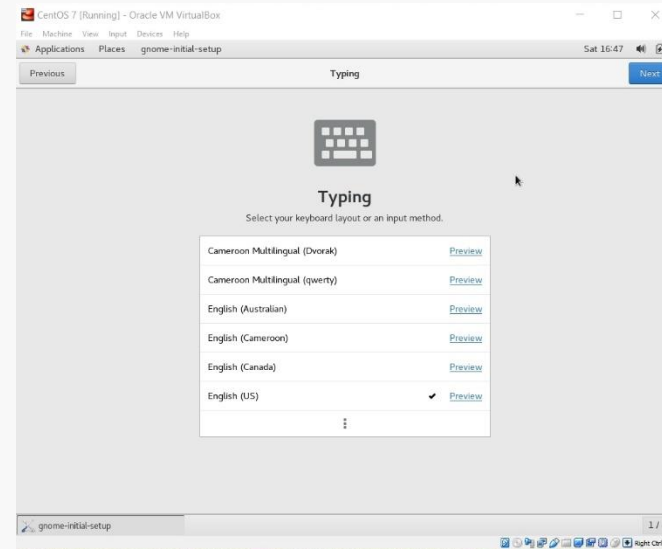
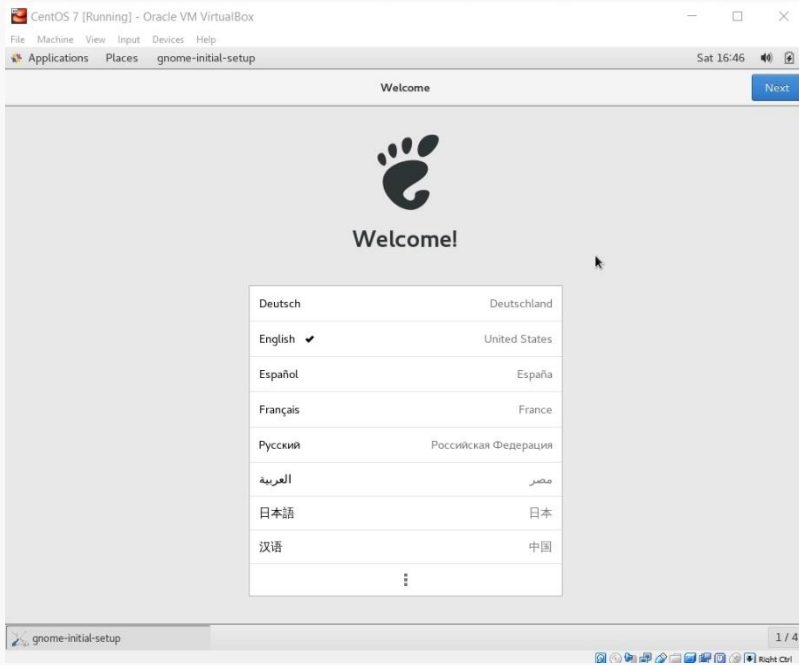
Skip network setup for now...

The restart will now bring you to the login screen:

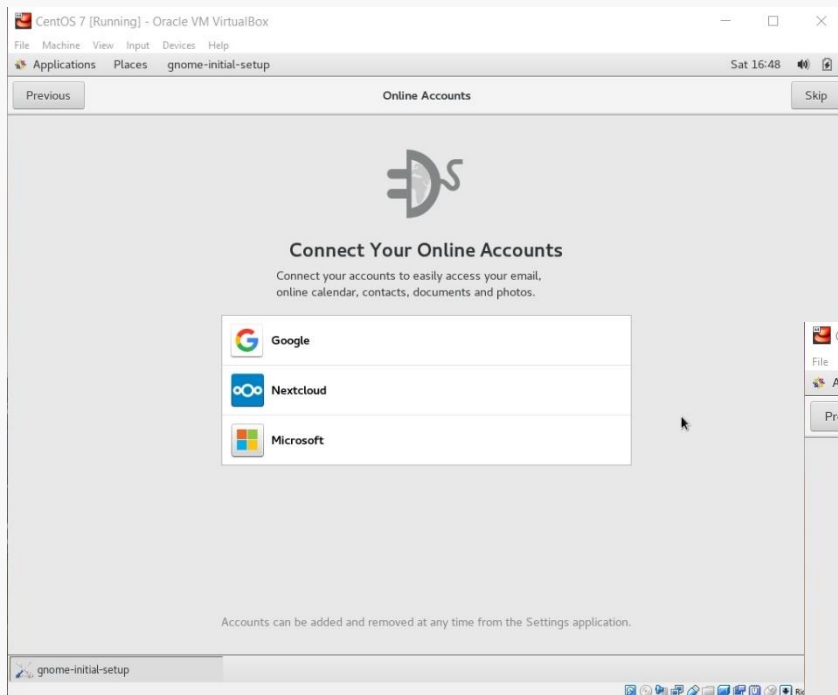


I prefer Gnome Classic... the slides that follow assume that.

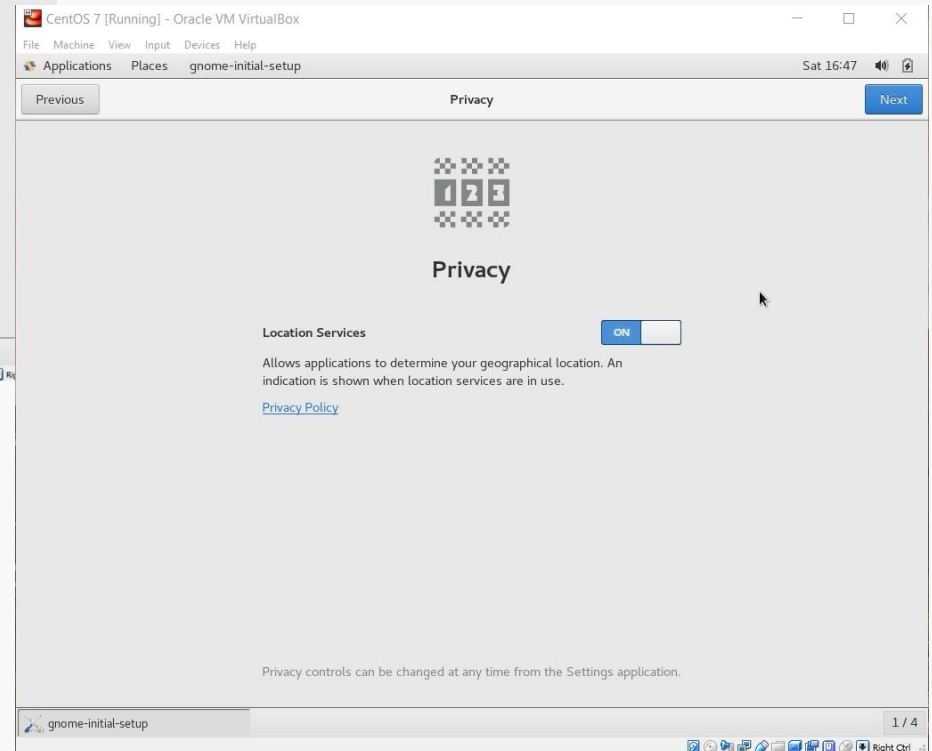
CentOS starts with some basic language and keyboard configuration:



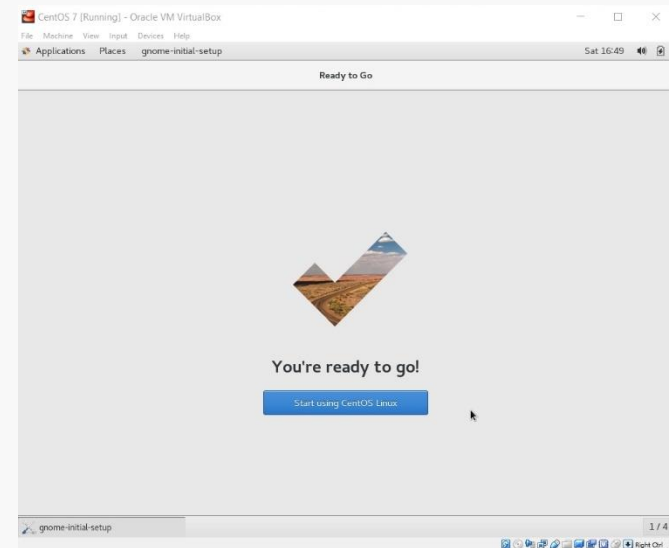
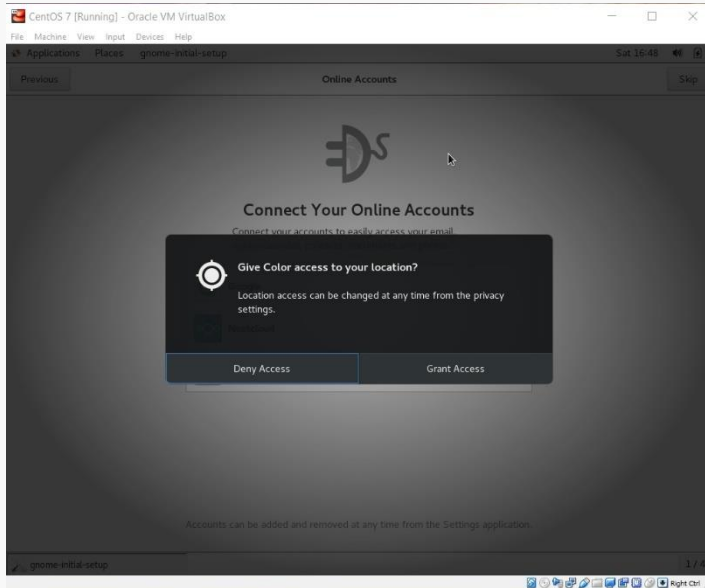
You may setup access to online accounts... or not...



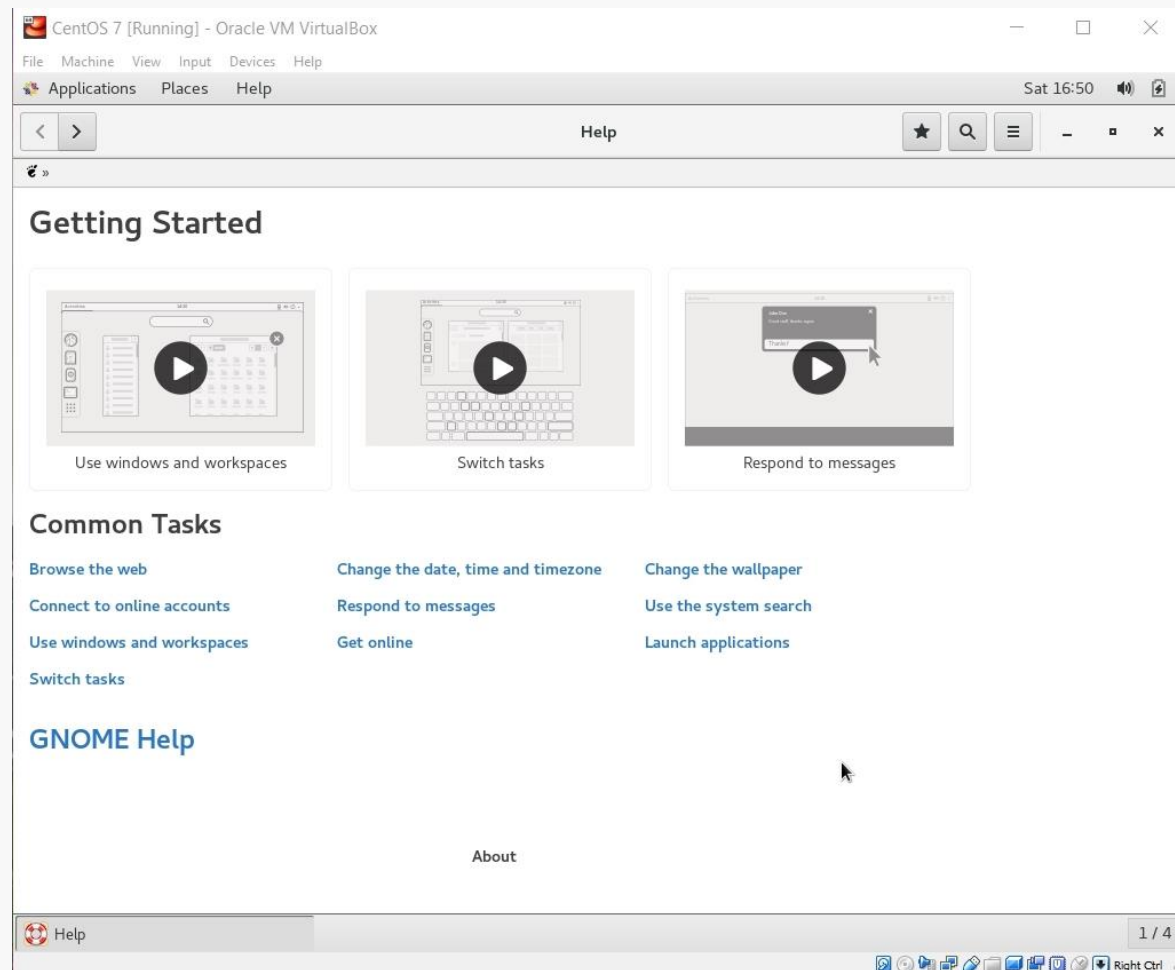
You may configure some privacy settings ...



Eventually you will reach completion:



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

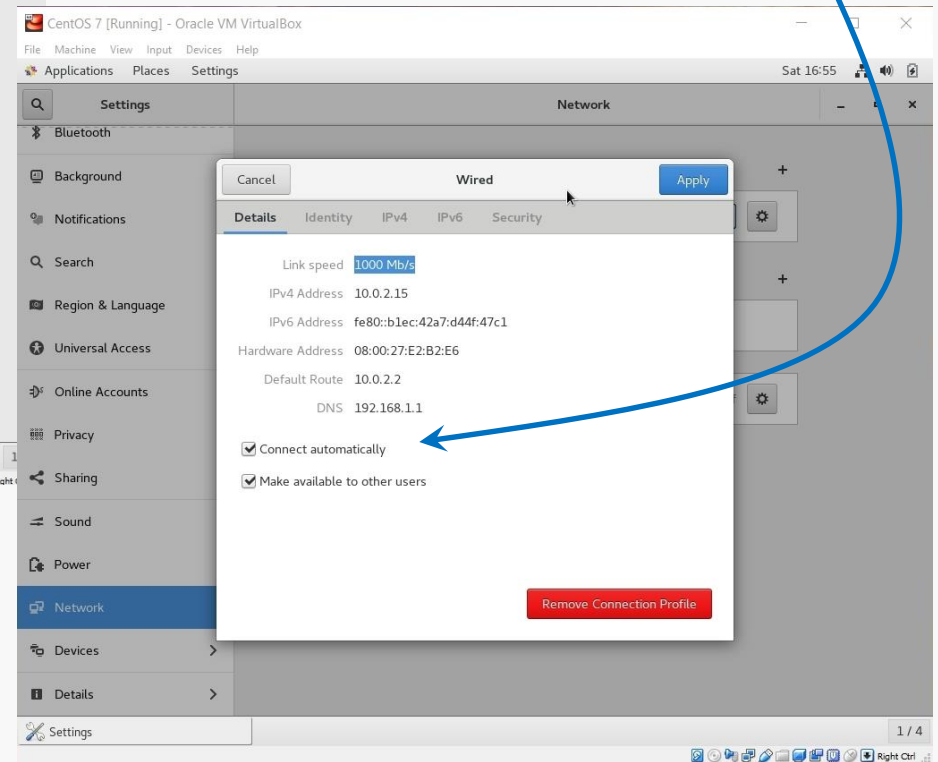
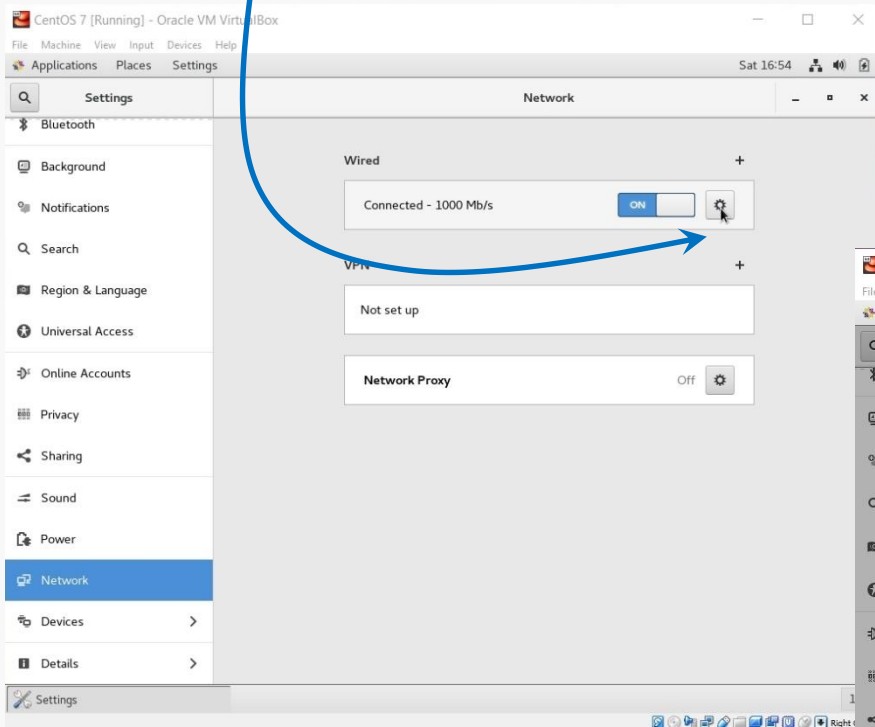


Ignore this or explore it, as you like... it's all available at any time.

Click the Network icon and turn on the network... the default settings are usually OK.

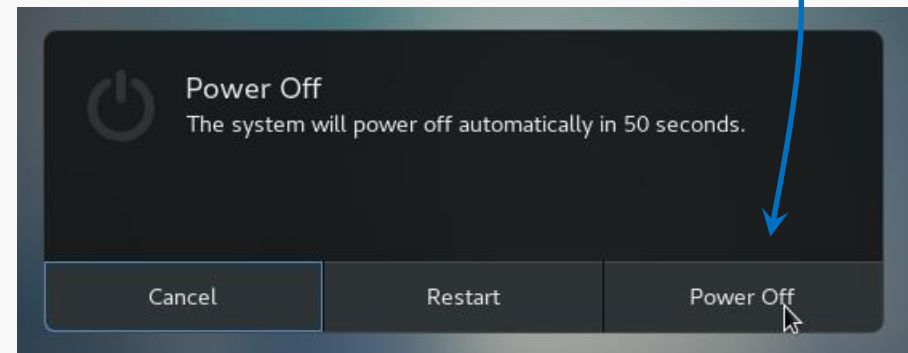
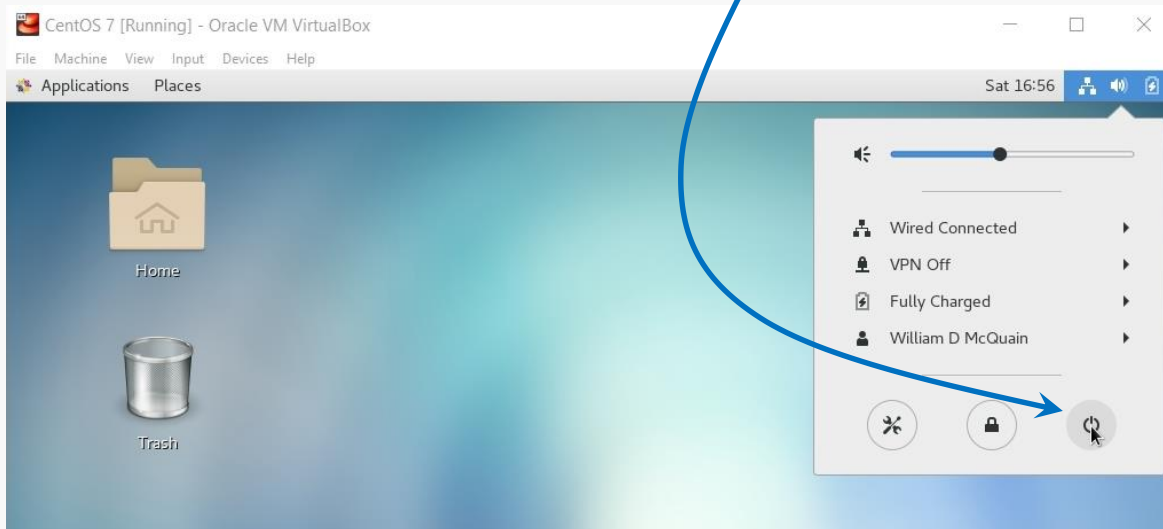
The image shows a CentOS 7 desktop environment within a VirtualBox window. The desktop background is blue with icons for Home, Trash, and a fully charged battery. A system tray at the bottom right shows the date and time as 'Sat 16:54'. A network status menu is open, showing 'Wired Off' and a 'Connect' button. A blue arrow points from the text above to the network icon in the system tray. To the right, the 'Settings' application is open to the 'Network' section, showing the 'Wired' network interface is 'Connected - 1000 Mb/s' and the 'ON' toggle is turned on. The 'VPN' section is 'Not set up' and the 'Network Proxy' is 'Off'.

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



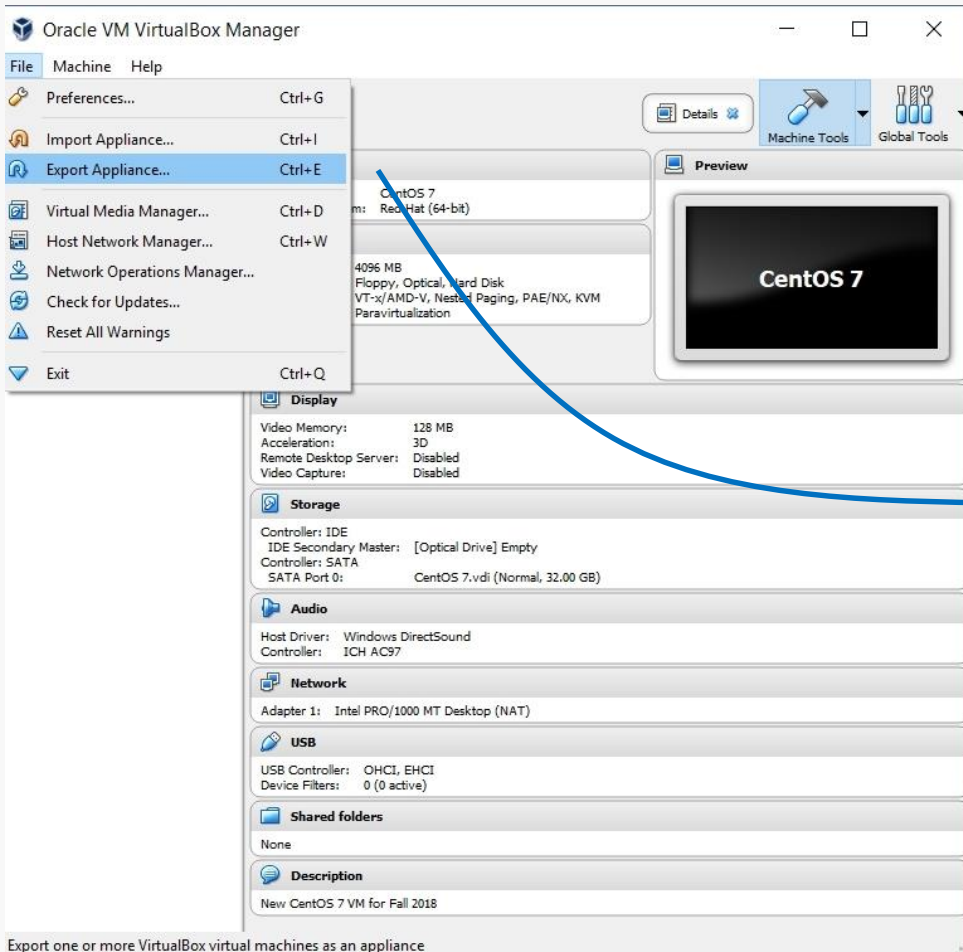
At this point, shut CentOS down.

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



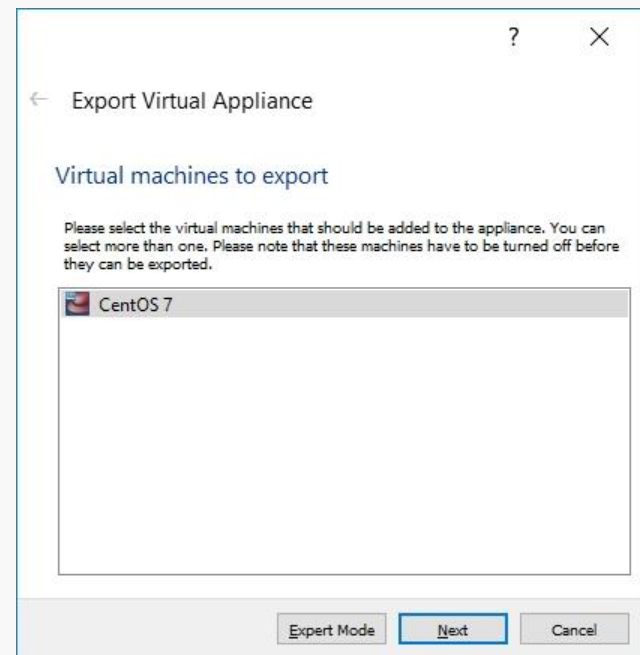
I recommend making a total backup of your virtual machine right now!

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

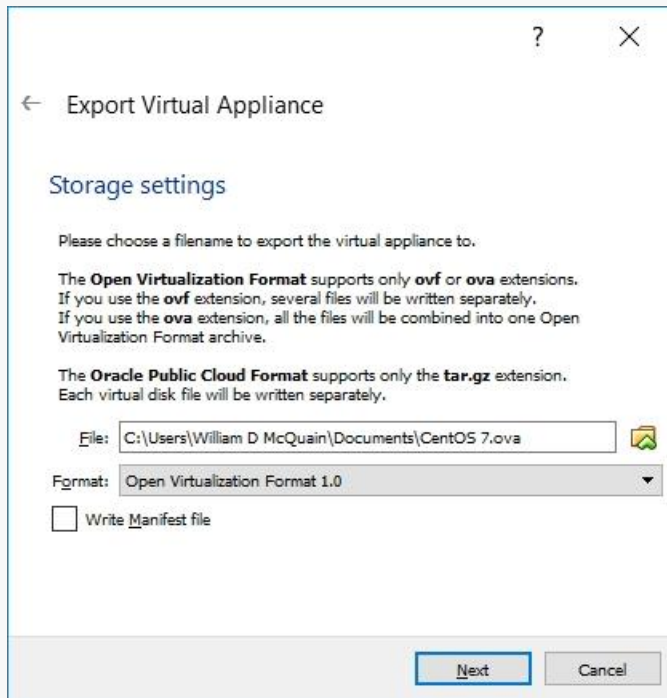


Do this with the VM shut down!

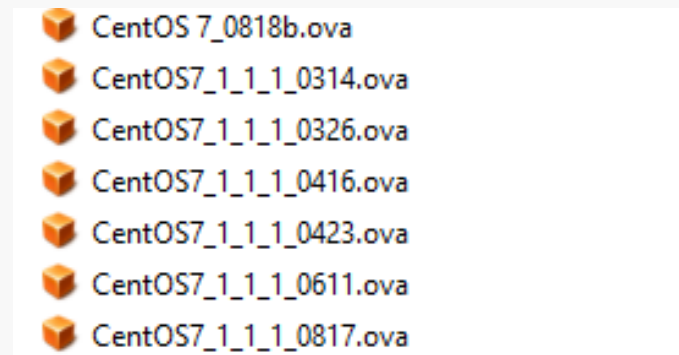
Do it frequently!



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



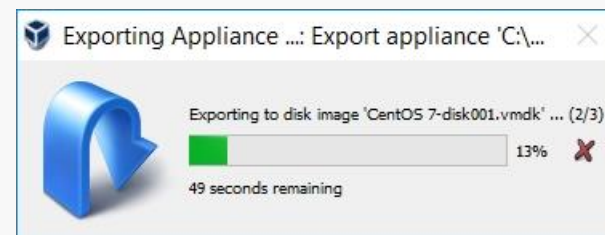
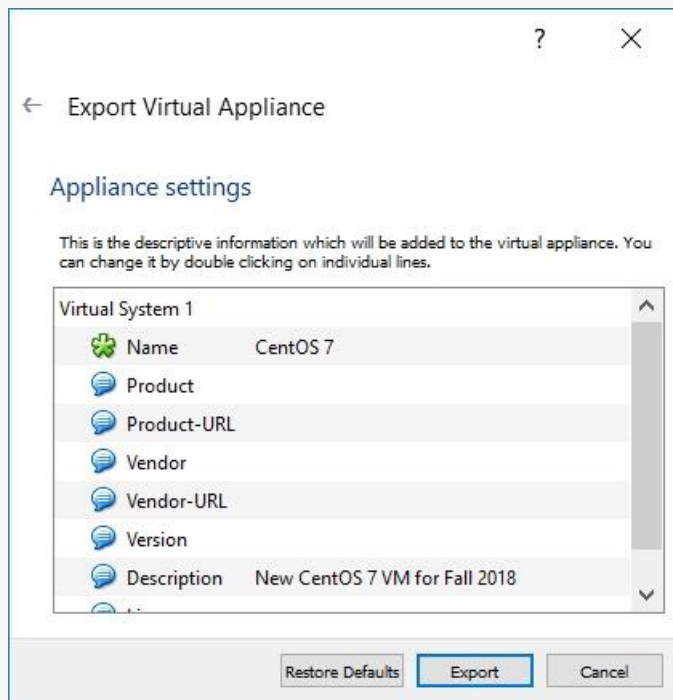
I suggest tagging the name with the date you made the backup... and keeping more than one backup around.



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

Just use the default settings and they will most likely suffice.



Back It Up!!

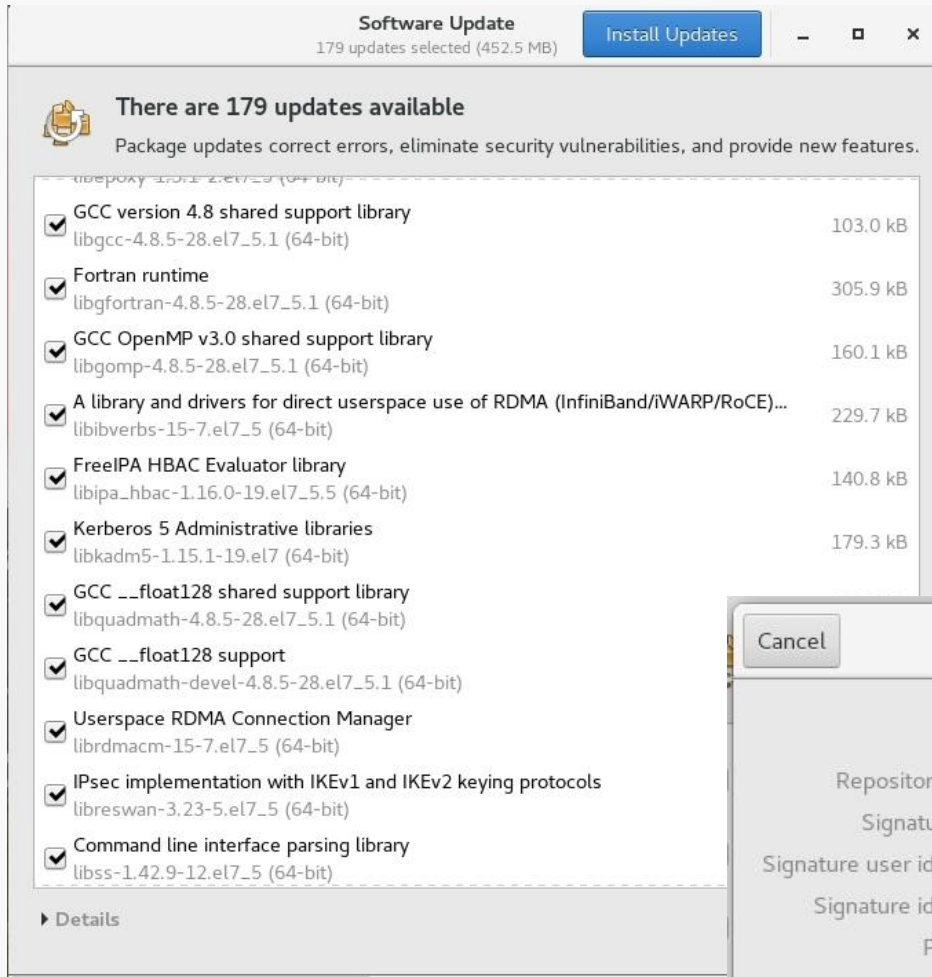
Restart your VM.

I recommend running a general software update at this point.

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



There will be a lot of available updates at this point... I'd just take all of them:

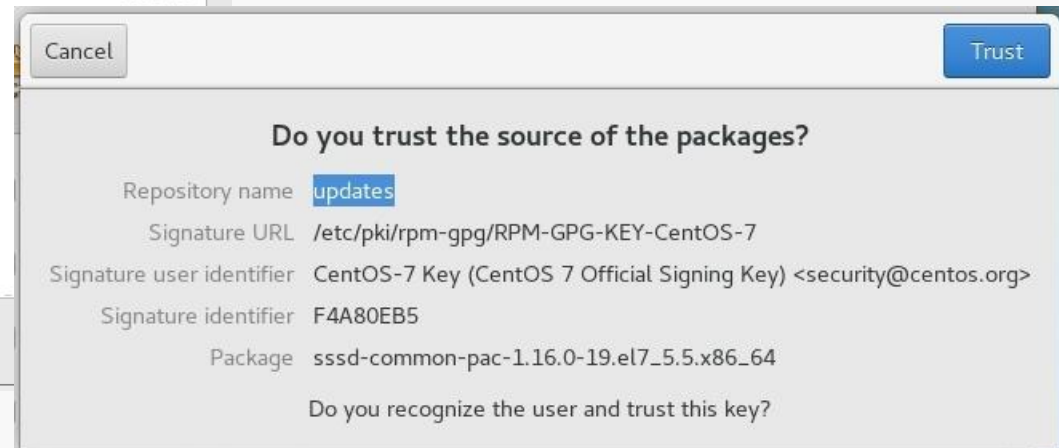


Software Update
179 updates selected (452.5 MB) Install Updates

There are 179 updates available
Package updates correct errors, eliminate security vulnerabilities, and provide new features.

<input checked="" type="checkbox"/> GCC version 4.8 shared support library libgcc-4.8.5-28.el7_5.1 (64-bit)	103.0 kB
<input checked="" type="checkbox"/> Fortran runtime libgfortran-4.8.5-28.el7_5.1 (64-bit)	305.9 kB
<input checked="" type="checkbox"/> GCC OpenMP v3.0 shared support library libgomp-4.8.5-28.el7_5.1 (64-bit)	160.1 kB
<input checked="" type="checkbox"/> A library and drivers for direct userspace use of RDMA (InfiniBand/iWARP/RoCE)...	229.7 kB
<input checked="" type="checkbox"/> libibverbs-15-7.el7_5 (64-bit)	229.7 kB
<input checked="" type="checkbox"/> FreeIPA HBAC Evaluator library libipa_hbac-1.16.0-19.el7_5.5 (64-bit)	140.8 kB
<input checked="" type="checkbox"/> Kerberos 5 Administrative libraries libkadm5-1.15.1-19.el7 (64-bit)	179.3 kB
<input checked="" type="checkbox"/> GCC __float128 shared support library libquadmath-4.8.5-28.el7_5.1 (64-bit)	
<input checked="" type="checkbox"/> GCC __float128 support libquadmath-devel-4.8.5-28.el7_5.1 (64-bit)	
<input checked="" type="checkbox"/> Userspace RDMA Connection Manager librdmacm-15-7.el7_5 (64-bit)	
<input checked="" type="checkbox"/> IPsec implementation with IKEv1 and IKEv2 keying protocols libreswan-3.23-5.el7_5 (64-bit)	
<input checked="" type="checkbox"/> Command line interface parsing library libsss-1.42.9-12.el7_5 (64-bit)	

► Details



Cancel Trust

Do you trust the source of the packages?

Repository name **updates**

Signature URL /etc/pki/rpm-gpg/RPM-GPG-KEY-CentOS-7

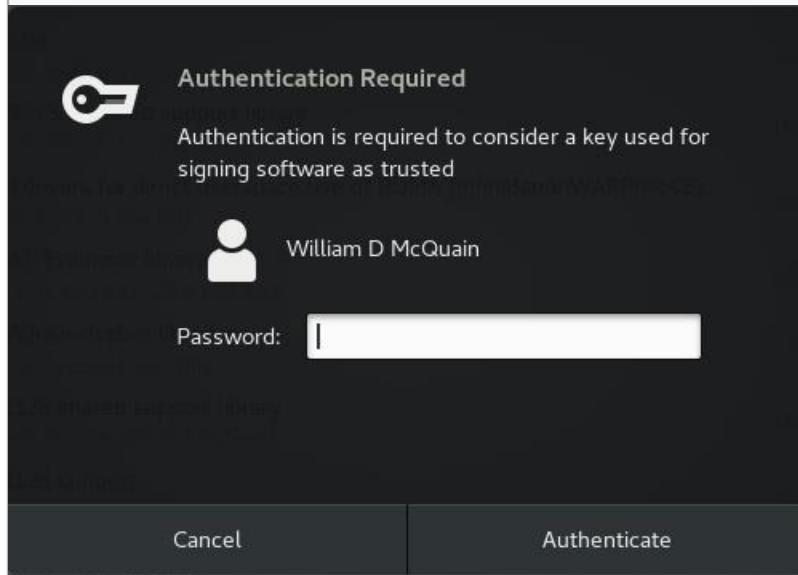
Signature user identifier CentOS-7 Key (CentOS 7 Official Signing Key) <security@centos.org>

Signature identifier F4A80EB5

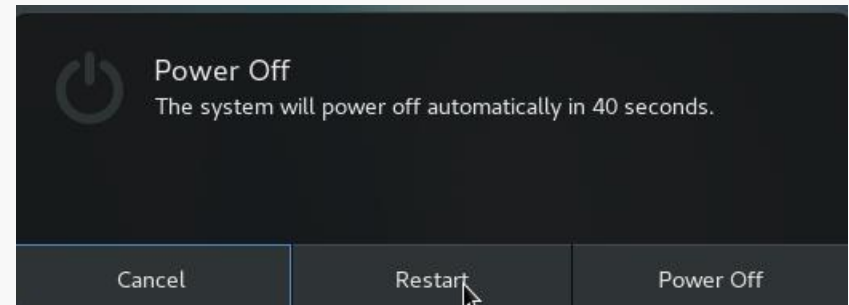
Package sssd-common-pac-1.16.0-19.el7_5.5.x86_64

Do you recognize the user and trust this key?

You'll have to use the root password again...



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.

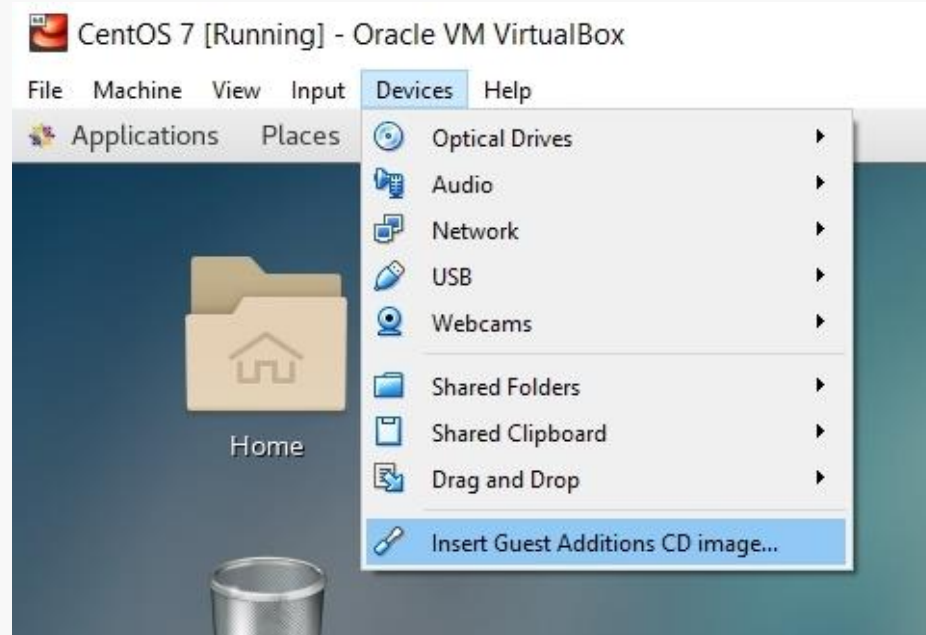
The VirtualBox Guest Additions provide additional functionality for your VM.

One note: until you install the VirtualBox Extension Pack (slide 5) and the Guest Additions, some things like mouse capture and scaled displays may not work.

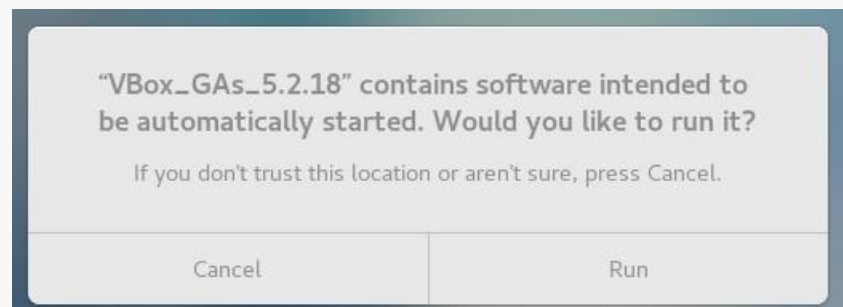
Another note: if you run the system updater or install other software on your VM, you may have to reinstall the Guest Additions.

The CD image is included in the VirtualBox installation package.

You must mount the CD image:

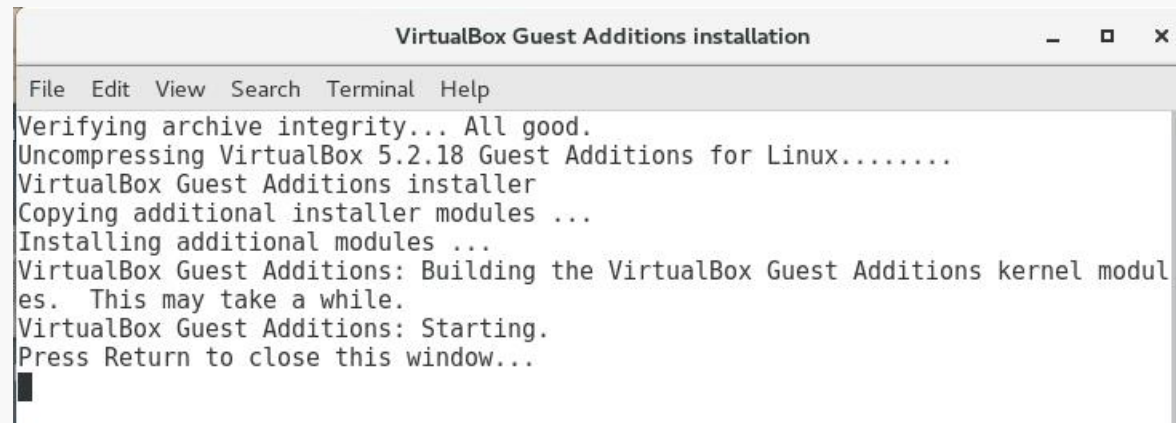


CentOS should recognize the installer once the image is mounted:



Pay attention to the console window during the installation.

If there are error messages, the Guest Addition may not have been installed properly.

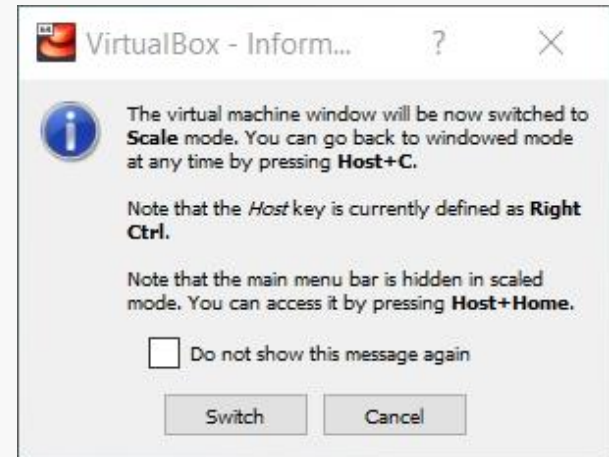
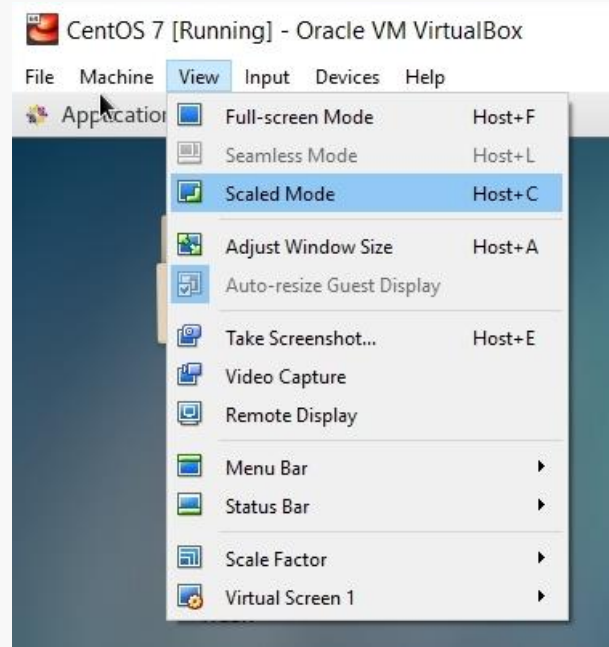


```
VirtualBox Guest Additions installation
File Edit View Search Terminal Help
Verifying archive integrity... All good.
Uncompressing VirtualBox 5.2.18 Guest Additions for Linux.....
VirtualBox Guest Additions installer
Copying additional installer modules ...
Installing additional modules ...
VirtualBox Guest Additions: Building the VirtualBox Guest Additions kernel modules. This may take a while.
VirtualBox Guest Additions: Starting.
Press Return to close this window...
█
```

Restart the VM again.

At this point, I often encounter problems... which are often resolved by performing several restarts of the VM...

Selecting Scaled Mode allows you to cleanly resize the VM window; I find this to be very handy:



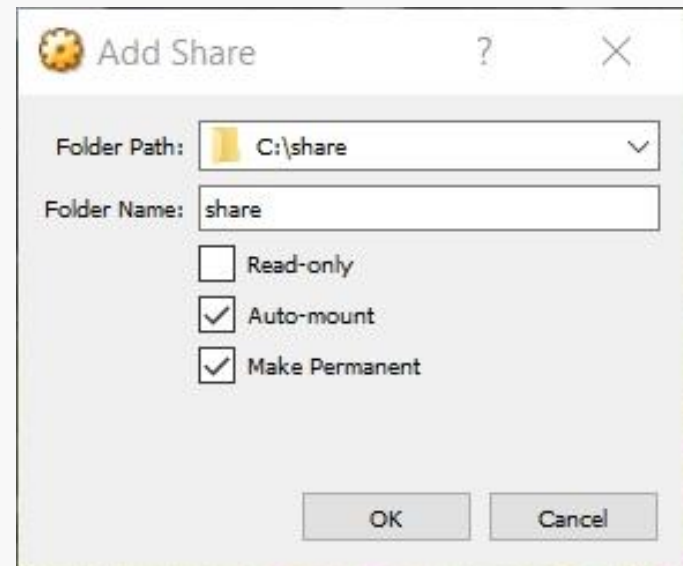
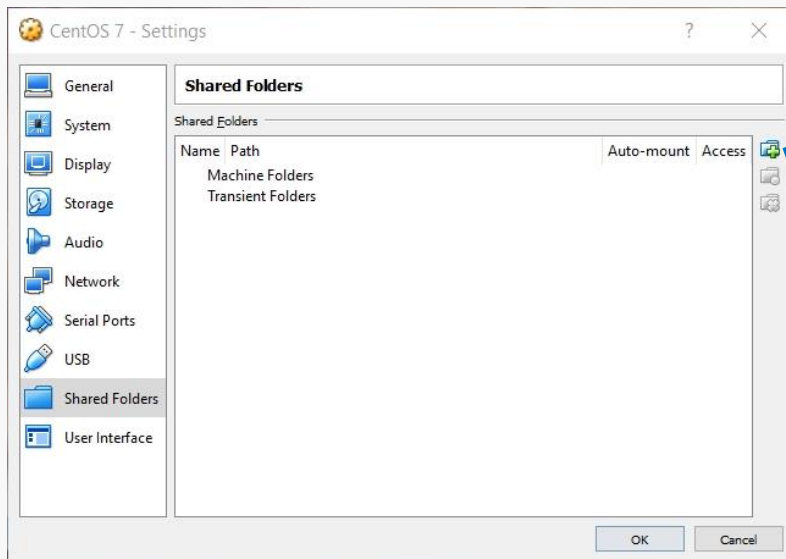
At this point, I sometimes encounter problems... which are often resolved by performing several restarts of the VM... however, the vast number of different video cards makes this a bit twitchy...

Sometimes, toggling back to regular mode and retrying scaling resolves issues.

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 C:\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:



Linux is somewhat unhappy with spaces in file/directory names...

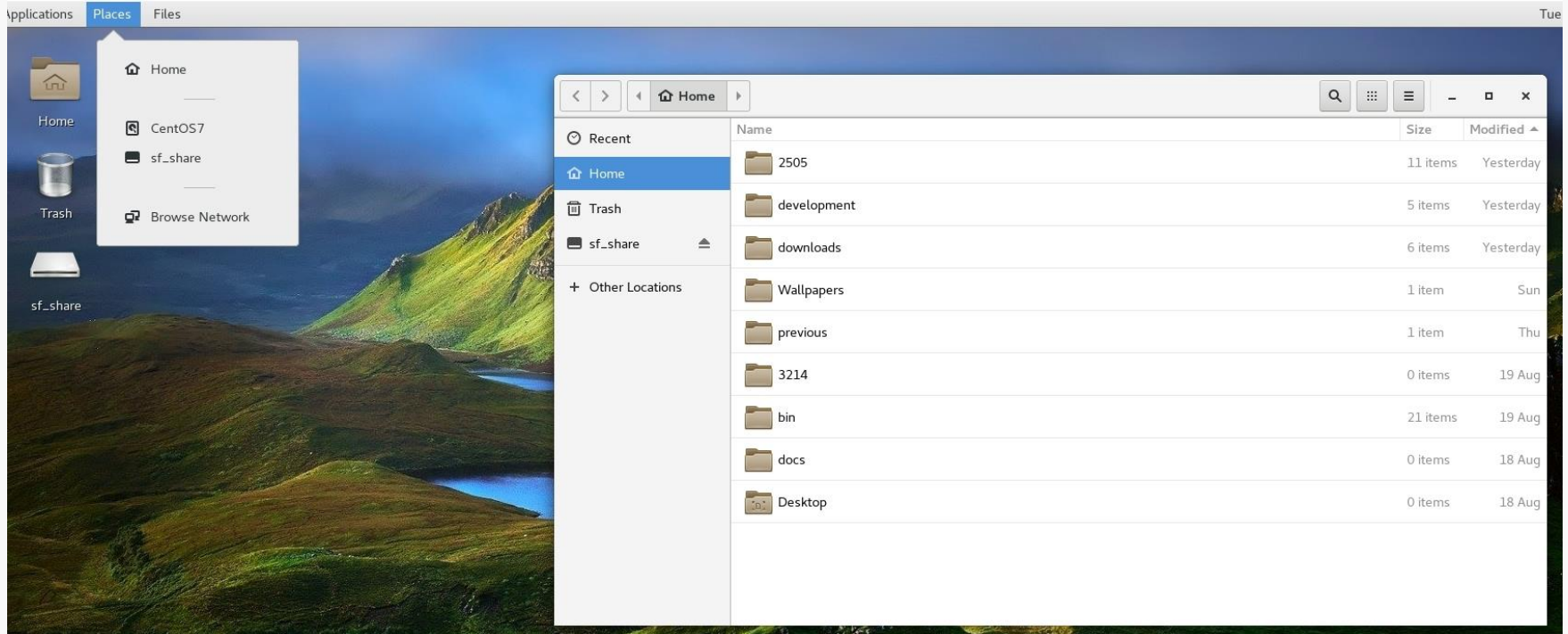
Then, in CentOS become root and execute the commands:

```
mkdir /media/windows-share  
mount.vboxsf share /media/windows-share
```

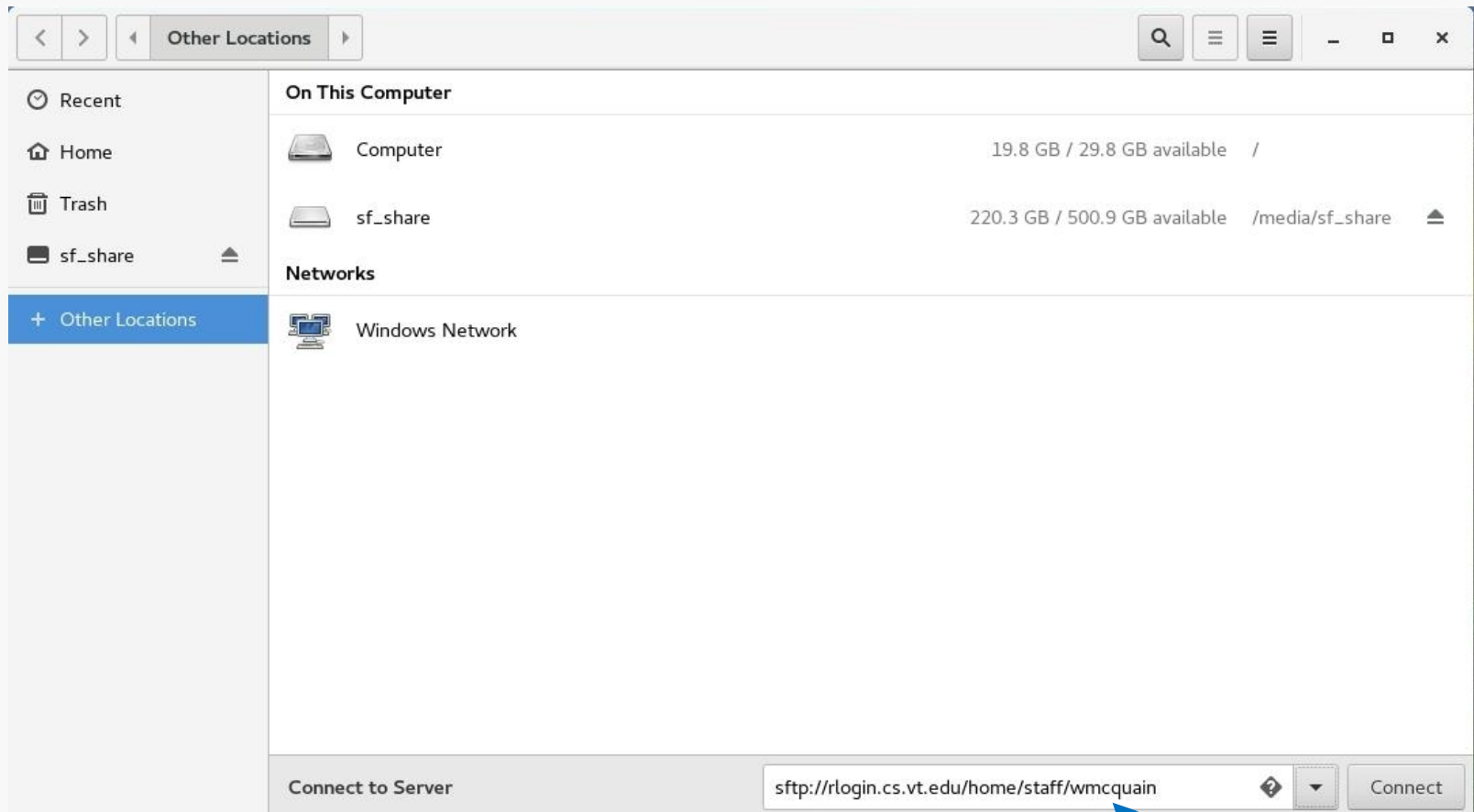
The first command creates a directory on your CentOS installation.

The second command links that directory to the one you selected earlier.

The Gnome desktop has a file manager, that is similar to those in Windows and OS X:



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



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

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:

```
[wmcquain@localhost ~]$ yum list installed gcc
Loaded plugins: fastestmirror, langpacks
Loading mirror speeds from cached hostfile
* base: mirror.es.its.nyu.edu
* extras: centos.mirror.constant.com
* updates: mirror.umd.edu
Installed Packages
gcc.x86_64      4.8.5-28.el7_5.1    @updates
[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.

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. See a good Linux reference or the man pages for full information.

```
[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.e17	epel	2.5 M
Installing for dependencies:				
geany-libgeany	x86_64	1.31-3.e17	epel	1.0 M
vte3	x86_64	0.36.5-1.e17	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:

```
1 #include <stdio.h>
2 #include <stdint.h>
3 #include <inttypes.h>
4 #include <stdbool.h>
5 #include <time.h>
6 #include <stdlib.h>
7
8 #include "CSet.h"
9 #include "TestCSet.h"
10
11 void Cset_Display(const Cset* const pset, FILE* Out);
12
13 int main(int argc, char** argv) {
14
15     FILE* Log = NULL;
16     unsigned int Seed;
17
18     if ( argc > 1 ) {
19         Seed = (unsigned int) time( NULL );
20         FILE* fp = fopen("Seed.txt", "w");
21         fprintf(fp, "%d\n", Seed);
22         fclose(fp);
23         Log = fopen("profSummary.txt", "w");
24         setProfMode();
25     }
26     else {
```

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]# sudo yum install glibc-devel.i686 libgcc.i686  
. . .
```