CentOS 7 Server Install using bootable USB

In this tutorial, I will be demonstrating the creation of VirtualBox 6.1.2 virtual machine used to perform a server install using a bootable USB containing a CentOS 7 (release 8) minimal ISO image. Please note that my host machine is Windows 7 Pro SP1.

Refer to the prerequisites listed below to complete this tutorial.

Prerequisites

- VirtualBox 6.1.2 & VirtualBox 6.1.2 Extension Pack
- Bootable USB with CentOS 7 (release 8) minimal ISO image
- Active Internet Connection

For instructions on how to install VirtualBox 6.1.2 or create a CentOS 7 bootable USB, please refer to my other tutorials **VirtualBox Install**, here, and **Create a Bootable USB**, here.

Steps to complete tutorial:

1. Install VirtualBox 6.1.2
2. Create Bootable USB
3. Create virtual machine disk (VMDK) using bootable USB
4. Create virtual machine
    a. Name and OS
    b. Memory Size
    c. Attach virtual machine disk (VMDK) to VM
    d. Create Hard Disk for CentOS 7 installation
5. Install CentOS 7
6. Take Snapshot

Install VirtualBox 6.1.2

If you already have VirtualBox 6.1.2 installed, go to the next step. Otherwise, please see one of my other tutorials, **VirtualBox Install**, accessible here, where I demonstrate the installation of VirtualBox 6.1.2, as well as, the same version extension pack.

Create Bootable USB

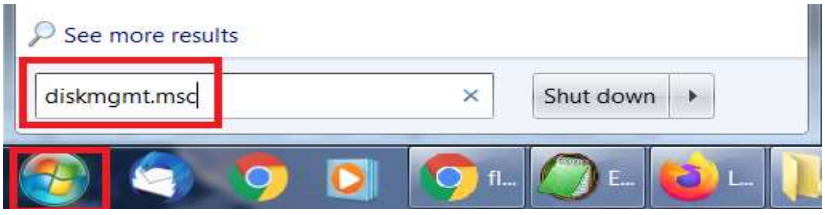
If you don't already have a CentOS 7 bootable USB, complete my other tutorial where I demonstrate the creation of a **CentOS 7 bootable USB**, accessible here.

Then, return here to complete this tutorial, using your newly created **CentOS 7 bootable USB**.

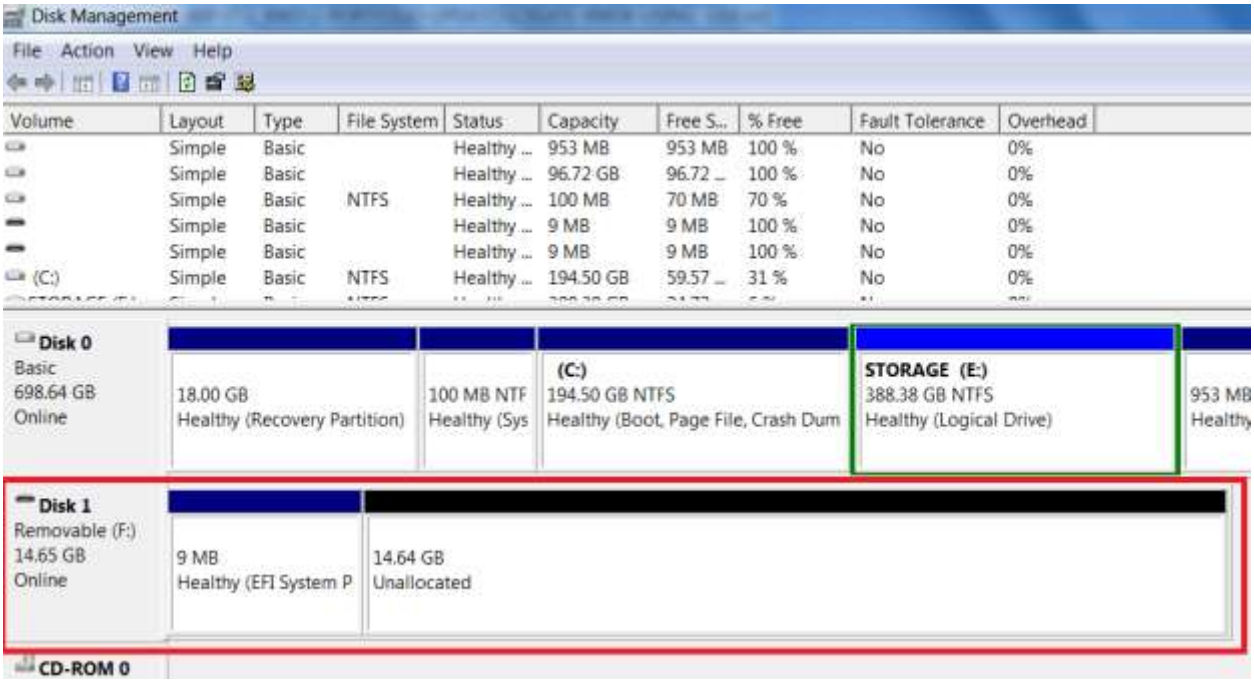
Create virtual machine disk (VMDK) using bootable USB

We will be using VirtualBox's **VBoxManage** command to create an image that represents our CentOS 7 bootable USB.

First, using the Windows Disk Management utility, **diskmgmt.msc**, we will identify the disk number of our bootable USB. To open the utility, click the Windows icon on your toolbar (bottom left), type **diskmgmt.msc** into the search box and hit the **Enter** key on your keyboard.

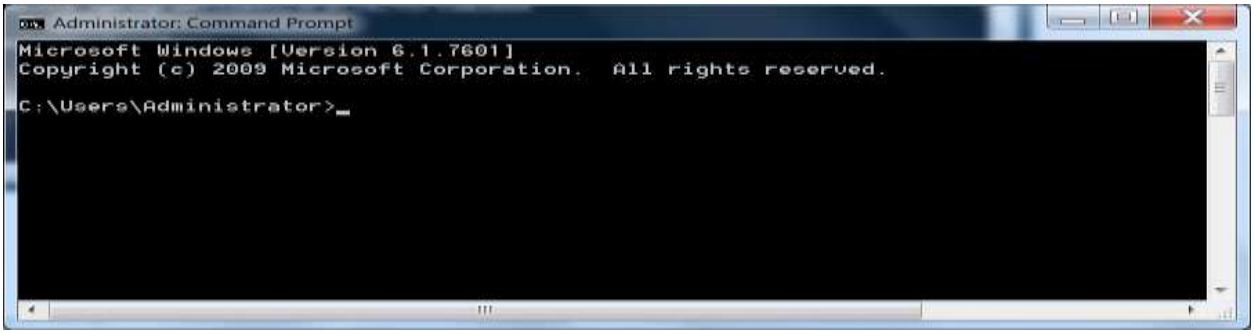


Look for your USB drive in the Disk Management window and note its disk number. In my case, it's Disk 1.



First, ensure **VirtualBox** is **closed**.

Next, open a Command Prompt as Administrator by pressing the Windows icon on your toolbar (bottom left), typing "**cmd**" in the search box, then, right-click the Command Prompt shortcut (**cmd.exe**) that appears in the result, and select **Run as administrator**.

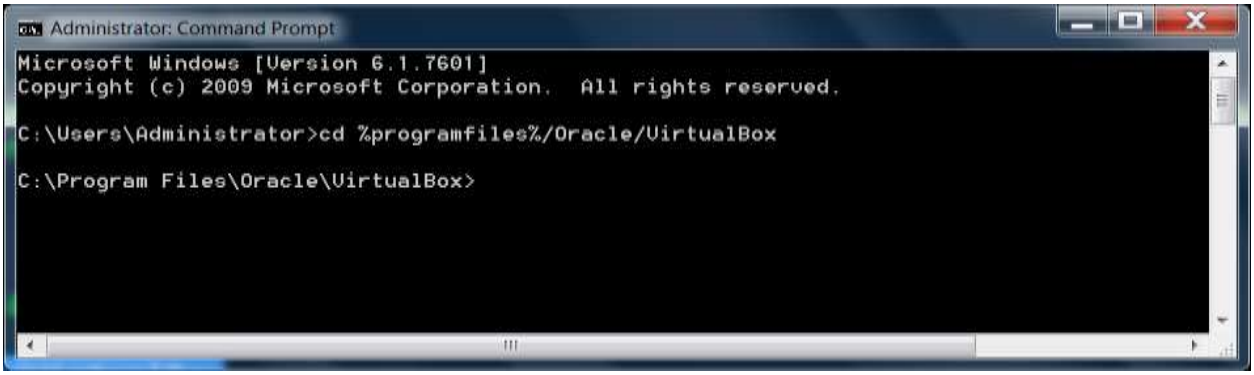


We will now need to navigate to Oracle VirtualBox's installation directory.

Please note, if you installed VirtualBox to a custom directory, change the command below to reflect your VirtualBox installation location.

Type the following command into the Command Prompt window and press **Enter**:

```
cd %programfiles%/Oracle/VirtualBox
```



Next, type the following command into the Command Prompt window, replacing **#** with the number of the disk you found in the Windows Disk Management utility.

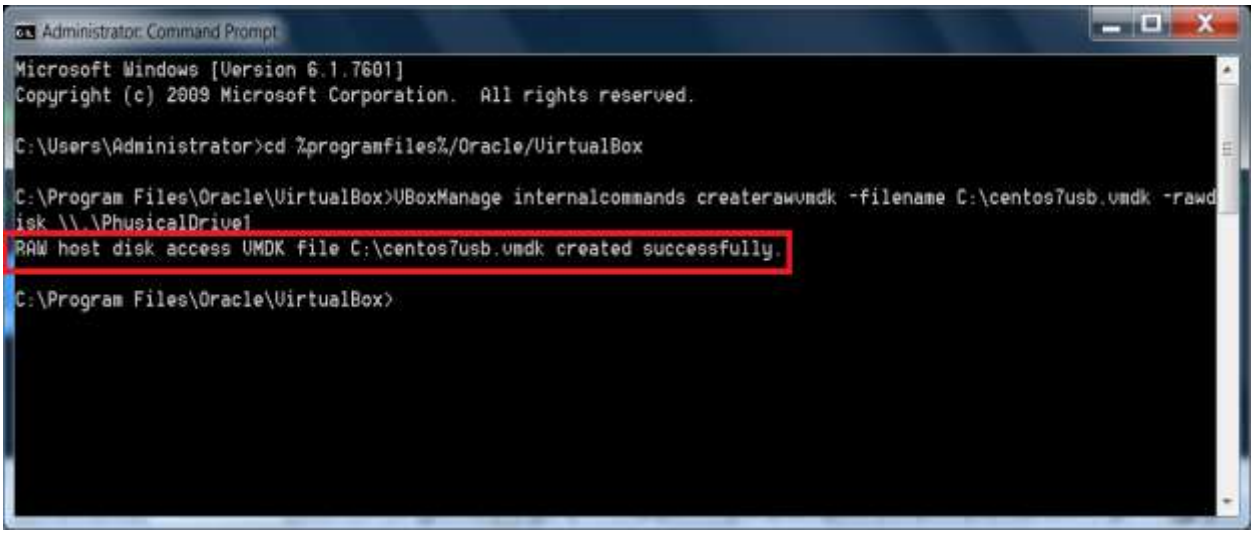
```
VBoxManage internalcommands createrawvmdk -filename C:\centos7usb.vmdk -rawdisk \\.\PhysicalDrive#
```

In my case, since my USB is disk **1** in the Windows Disk Management utility, I will type:

```
VBoxManage internalcommands createrawvmdk -filename C:\centos7usb.vmdk -rawdisk \\.\PhysicalDrive1
```

Ensure you have the correct disk **#** for your bootable USB and that the entire command is entered on one line, then, to execute, press **Enter**.

This command creates a virtual machine disk (**VMDK**) file that points to the physical drive you select. When you load the VMDK file as a drive in VirtualBox, VirtualBox will actually access the physical device (your **bootable USB**).



Please note where the newly created **.vmdk** file is stored on your system. I chose to store it in the root of my **C:** drive, but you can store it wherever you like. Just remember where it is stored for later in this tutorial.

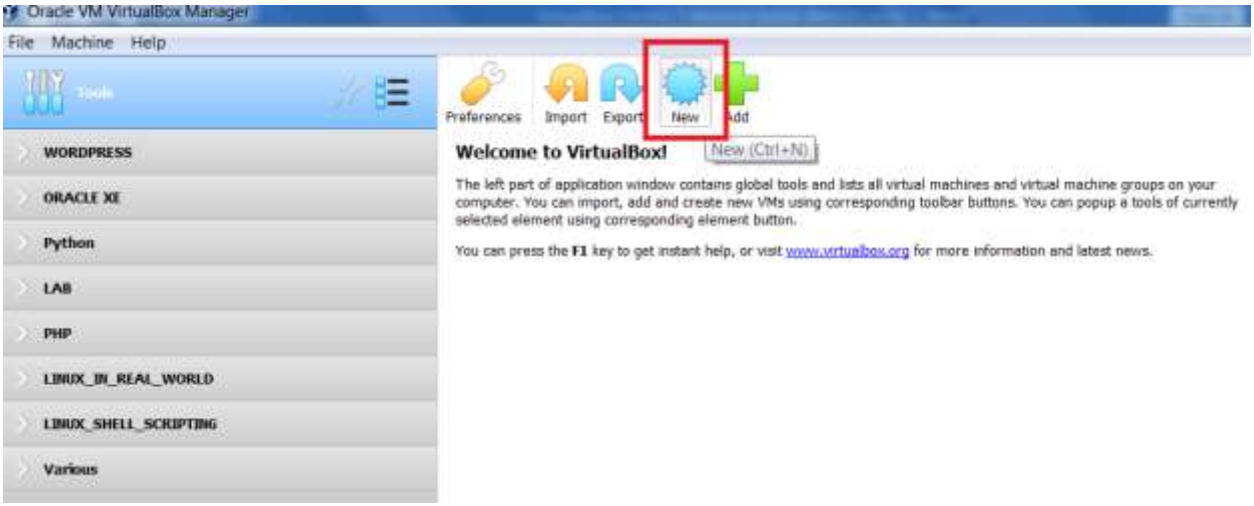
Create virtual machine

Now we are ready to create our virtual machine using our newly created image file, **C:\centos7usb.vmdk**, that points to our **CentOS 7 bootable USB**.

Before we begin, ensure your **CentOS 7 bootable USB** is inserted in one of your computer's USB ports.

Next, start **VirtualBox** and on the VirtualBox Manager interface, click the **New** button to start the creation of a new virtual machine.

*Please note that if you have just installed VirtualBox 6.1.2, you will only see **Tools** on the left-hand side of the VirtualBox Manager interface. I had already created a number of VMs (virtual machines) and grouped them.*



Name and OS

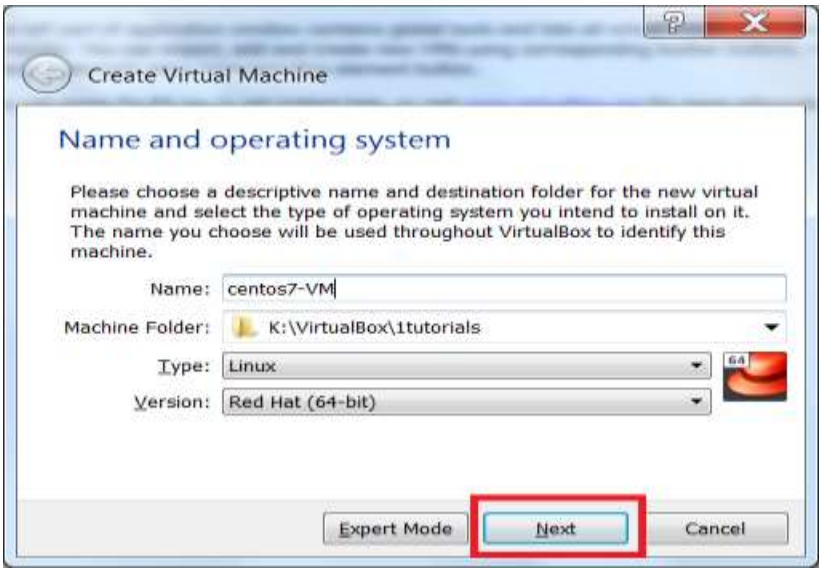
The "**Create Virtual Machine**" screen appears.

- Give your VM a name (I named my VM: **centos7-VM**)
- Choose where you want the machine created on your host system

*Please note, you can change the destination folder ("**Machine Folder**:"), if the default does not work for you.*

This will be where the virtual machine files are stored on your host system.

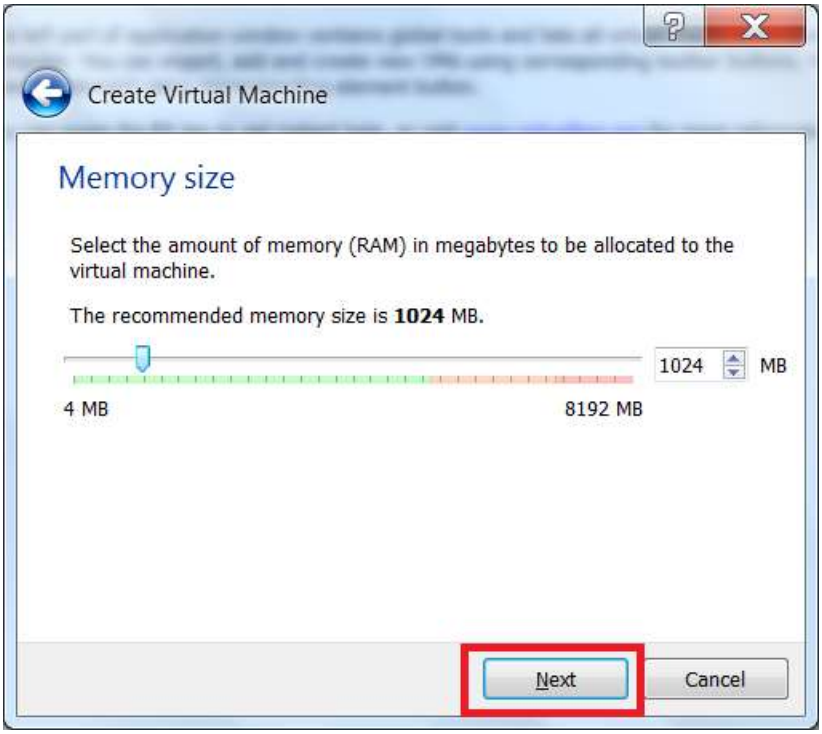
- Ensure **Type** is set to Linux and **Version** is set to Red Hat (64 bit), click **Next**



Memory Size

The next screen asks for the amount of memory (RAM) you wish to allocate to this machine.

Since we are performing a minimal server install, 1024MB (1GB) of RAM is sufficient. Click **Next**



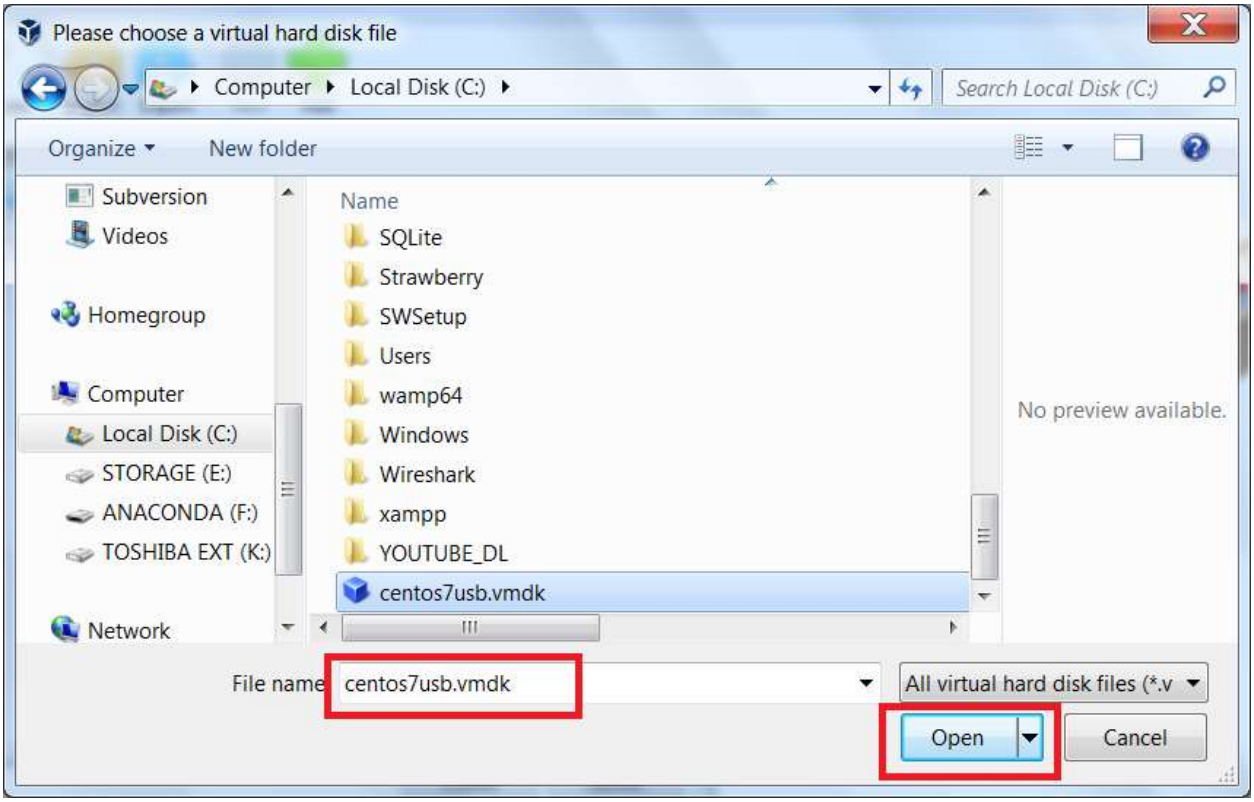
Attach virtual machine disk (VMDK) to VM

We will now need attach our newly created image file to the virtual machine.

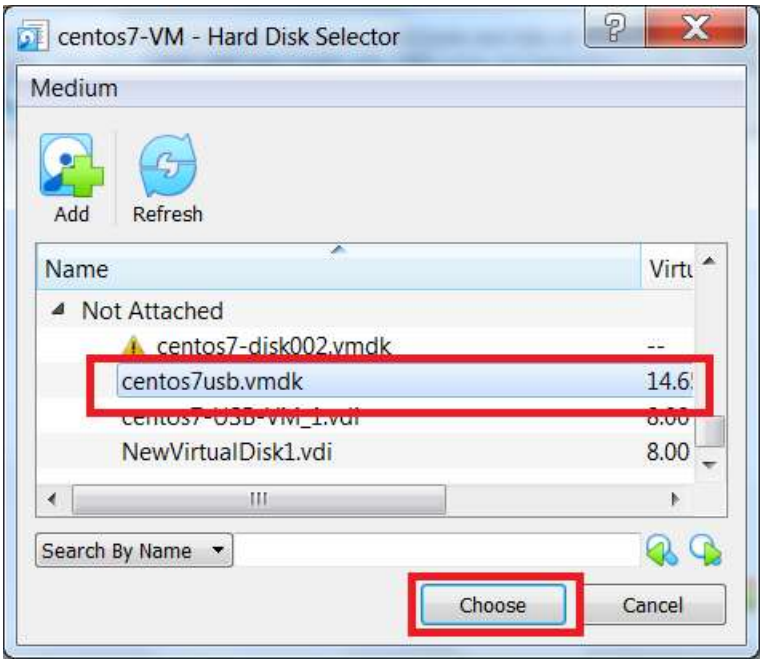
Ensure "**Use an existing virtual hard disk file**" is selected and click the browse icon to the right to locate your **.vmdk** file.

This will open VirtualBox's **Hard Disk Selector**. First, click **Add**

Browse to where you created the image file (in my case, **C:\centos7usb.vmdk**) that points to your CentOS 7 bootable USB, select it and click **Open**



Once you have added the image file, locate it using the scroll bar and click **choose**

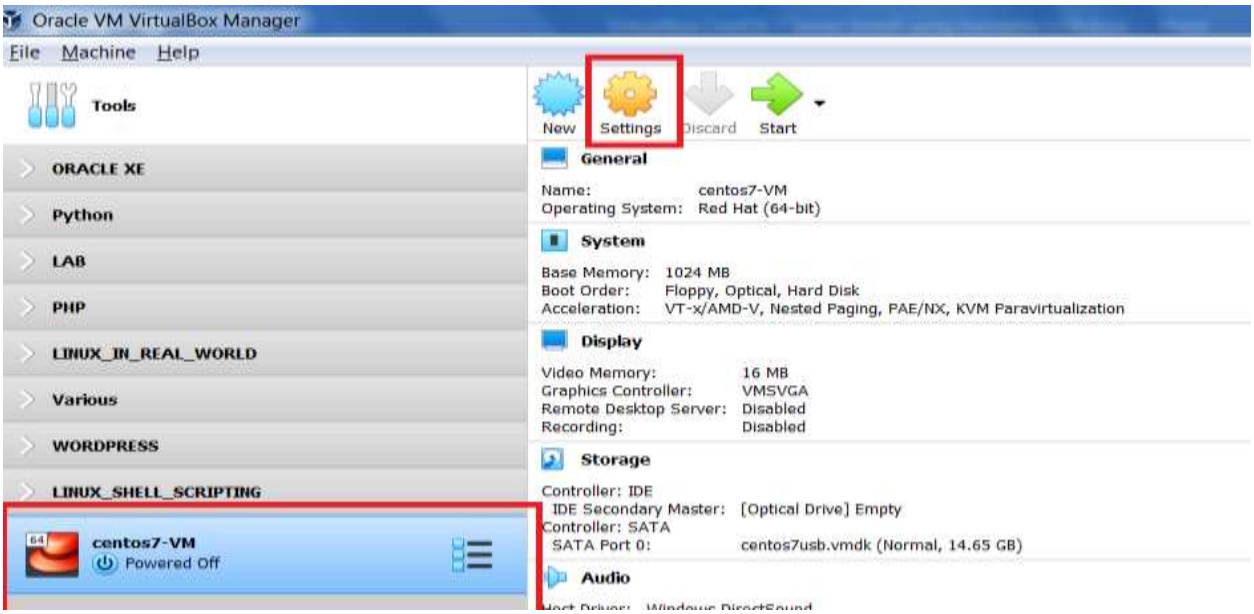


Now that we have selected our image file it will be used when we start the virtual machine.

To continue, click **Create**

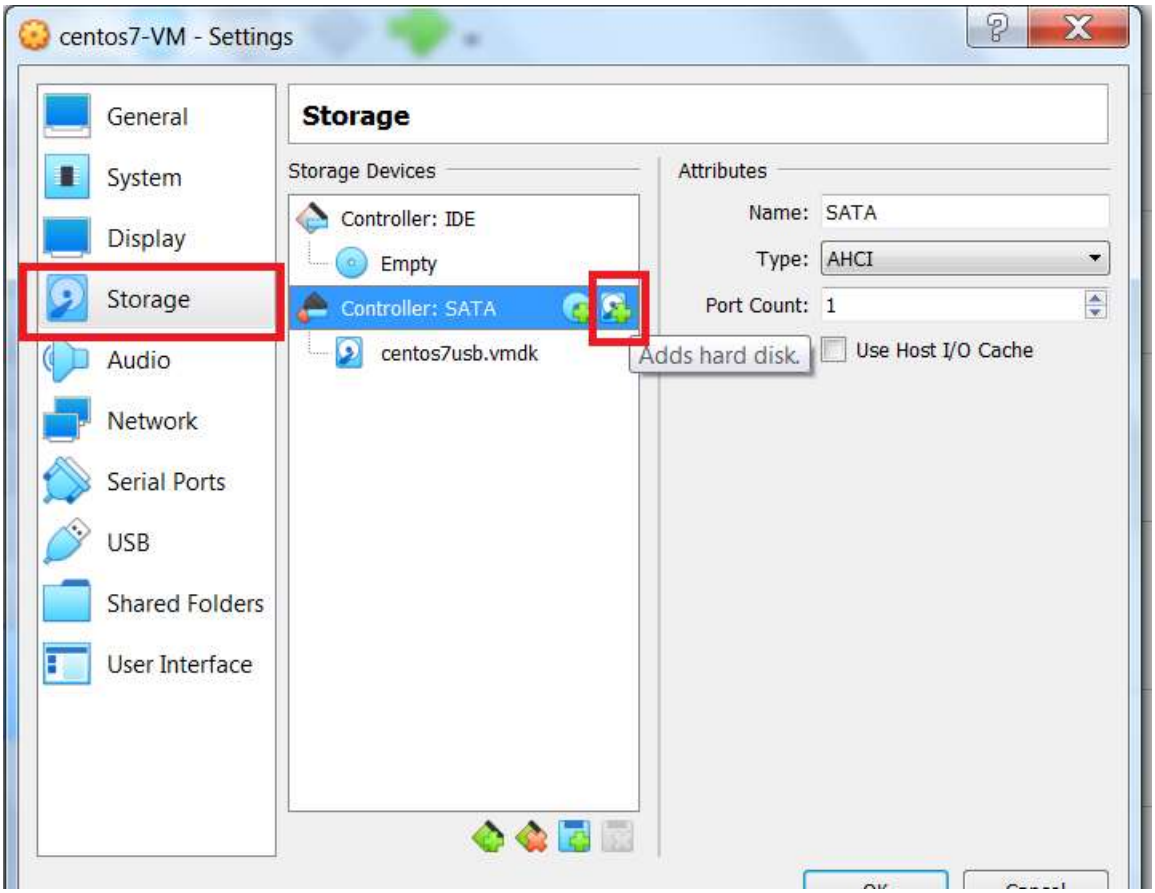
As you can see below, our **centos7-VM** virtual machine was successfully created.

Now we will need to add a virtual hard disk to act as our CentOS 7 installation location. To create a new virtual hard disk, from the VirtualBox Manager, ensure your VM is selected and click **Settings**



Create Hard Disk for CentOS 7 installation

In the **Settings** window, ensure the **Storage** tab is selected. Then, click the **Adds hard disk** button on **Controller: SATA**



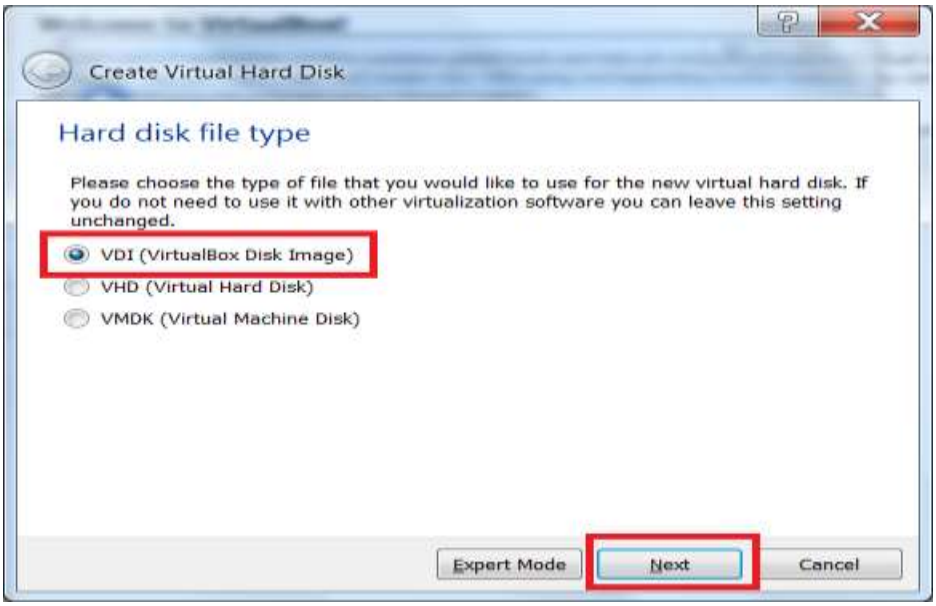
From the **Hard Disk Selector** screen, click **Create**

Now we must create a virtual hard disk where the operating system (CentOS 7) will be installed.

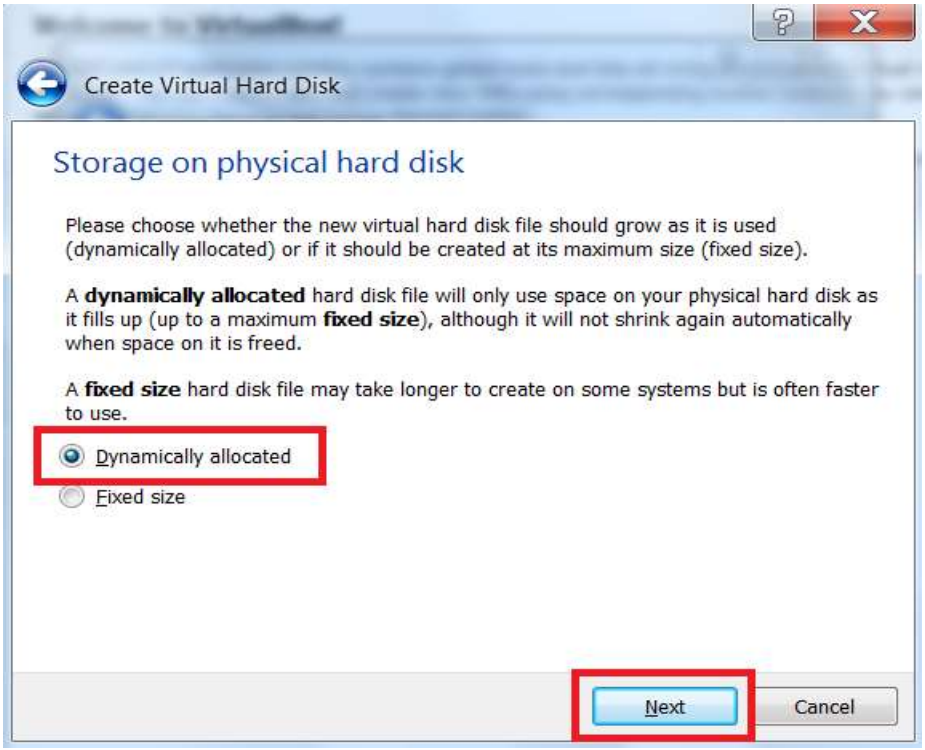
Note the recommended size (8 GB) of a virtual hard disk for CentOS 7. Click **Create**

Now, you will have to choose the type of virtual hard disk. Select **VDI** and click **Next**

- **VDI**: Oracle VirtualBox container format for guest hard disks.
- **VHD**: Microsoft container format
- **VMDK**: VMWare container format

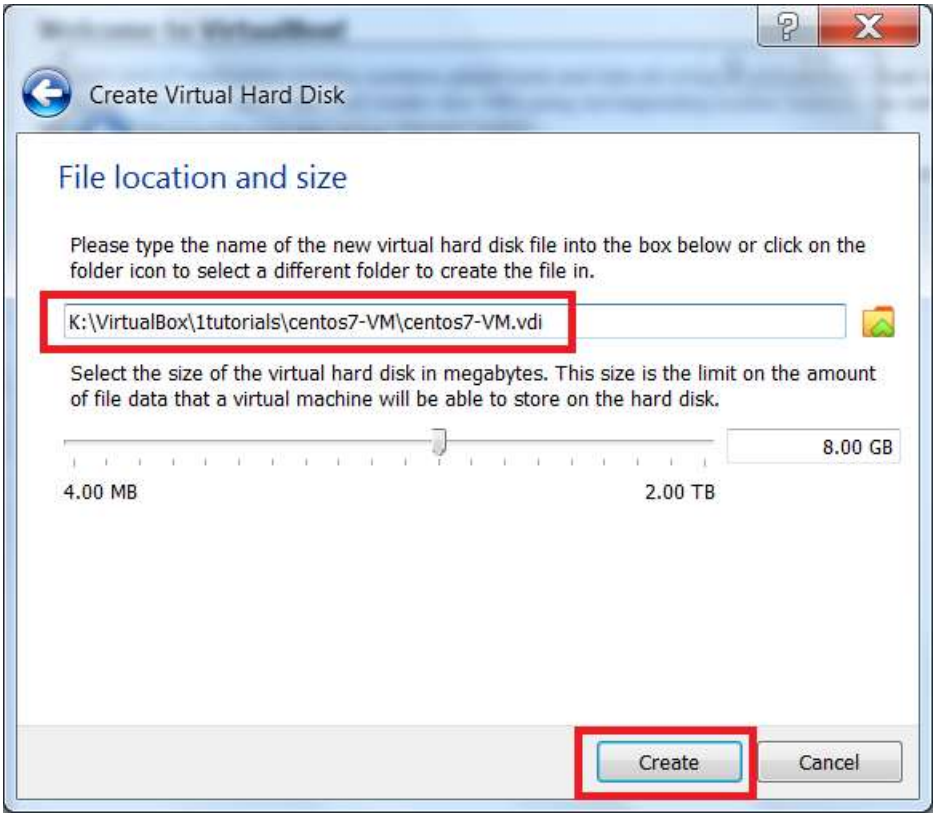


We can now choose whether the virtual hard disk takes up the size we allocate as needed (Dynamically allocated) or immediately (Fixed). To save space on my host system, I will be choosing "**Dynamically allocated**" and clicking **Next**

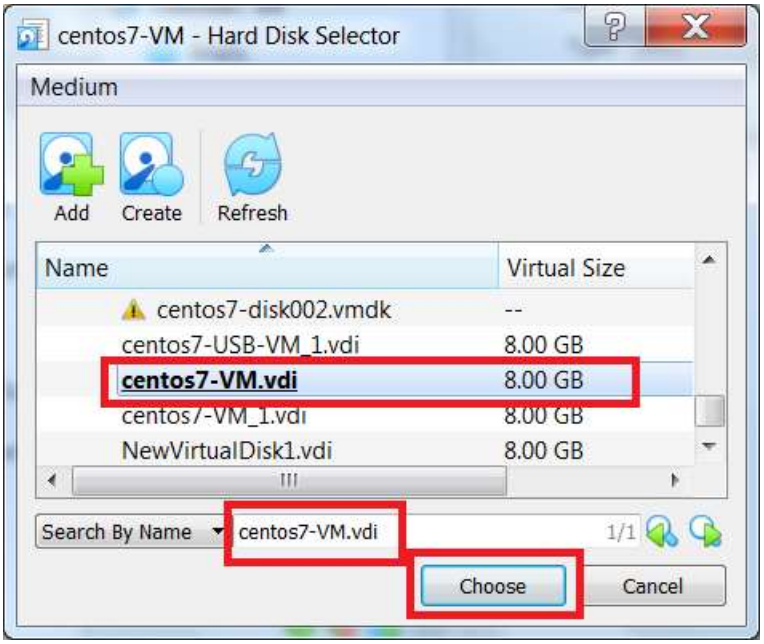


Here we can set the virtual hard disk size. Again, since we're performing a minimal install, 8.00GB is enough.

Note it's name and storage location. We will need the disk name for the next step. Click **Create**



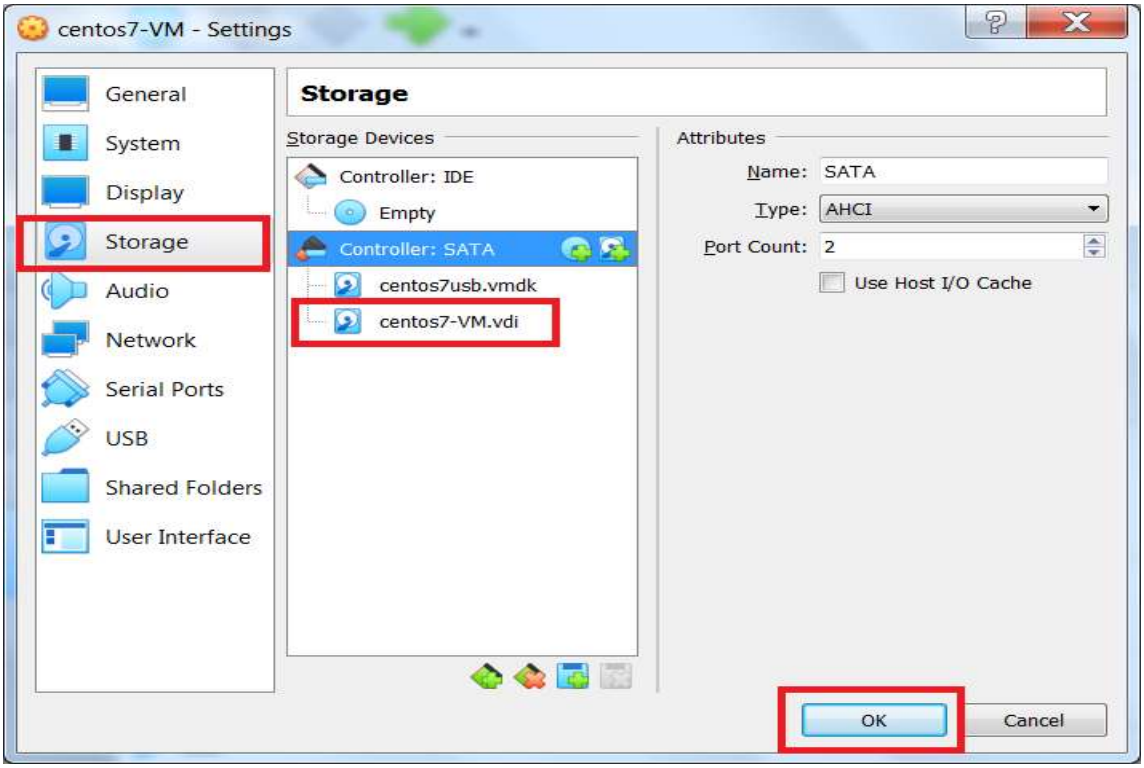
Back on the **Hard Disk Selector** screen, enter the newly created disk name in the search box and click **Choose**



After adding a virtual hard disk as our **CentOS 7** install location, we are now ready to begin the installation.

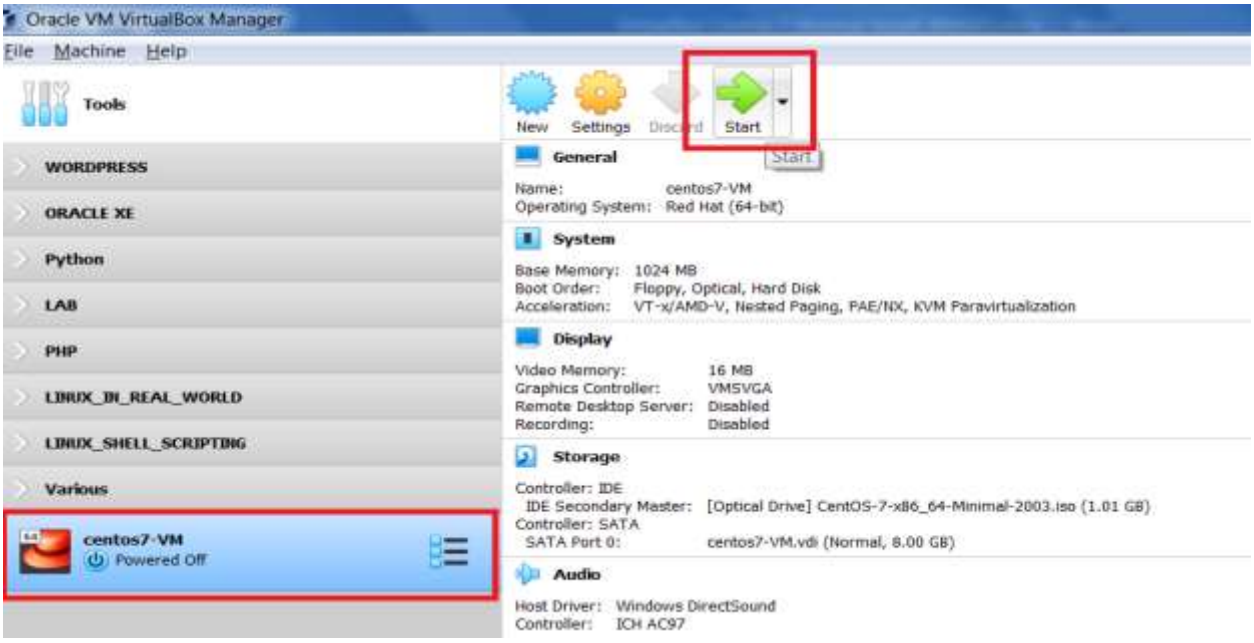
Please note that, under **Controller: SATA**, the .vmdk file (**centos7usb.vmdk**) pointing to the bootable USB **MUST** be first in the list, followed by the virtual hard disk (**centos7-VM.vdi**) being used as the CentOS 7 install location.

To continue, click **OK**.

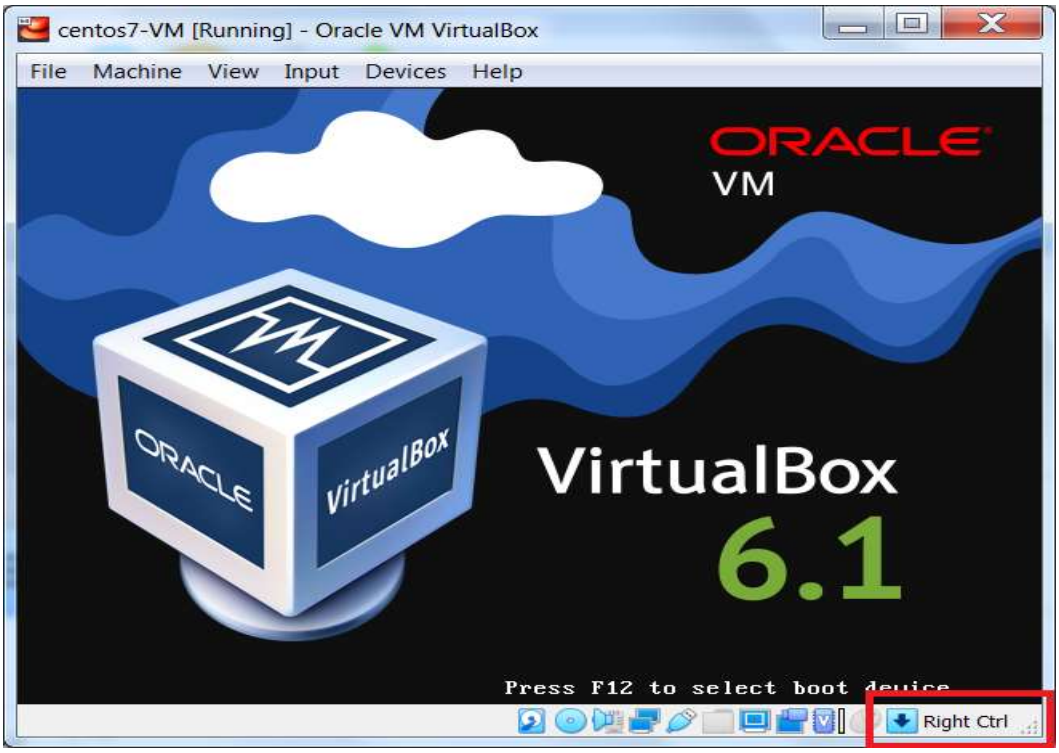


Install CentOS 7

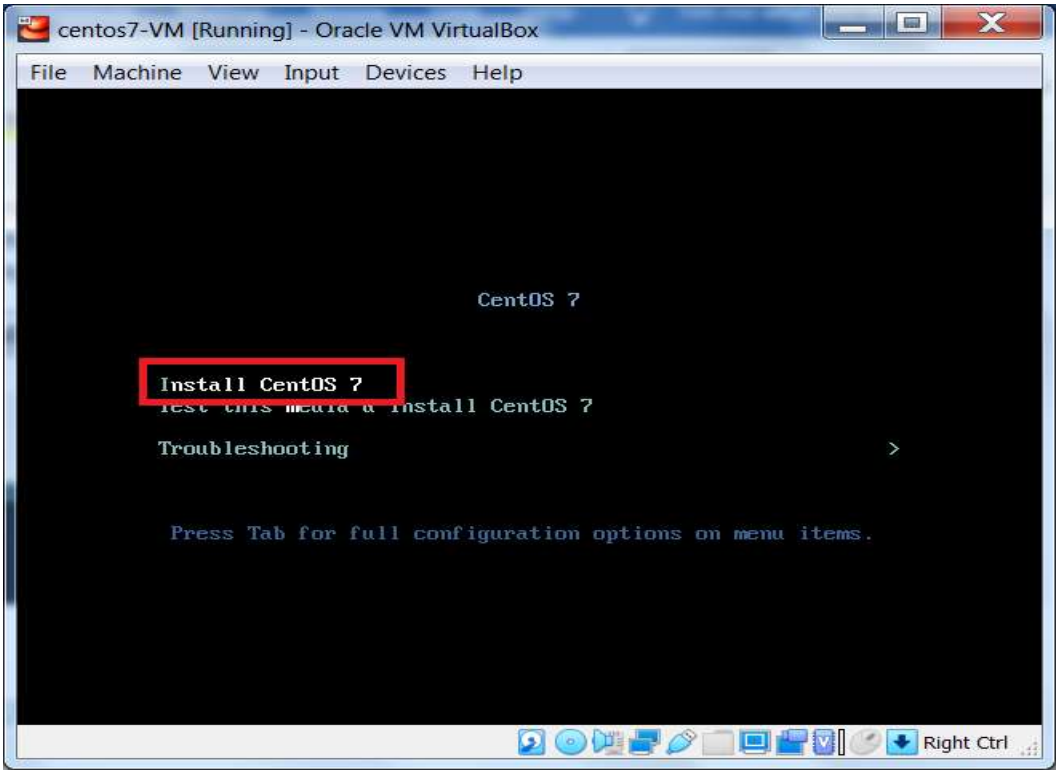
On the VirtualBox Manager Interface, ensure your new VM is selected and click **Start**



Friendly Reminder: During installation, if at any time you need to exit the **guest** (virtual machine) interface and return to the **host** machine interface, hit your **Host key** (for Windows 7, it's the **right Ctrl key**). Check the bottom right-hand corner of the virtual machine's interface (see image below).

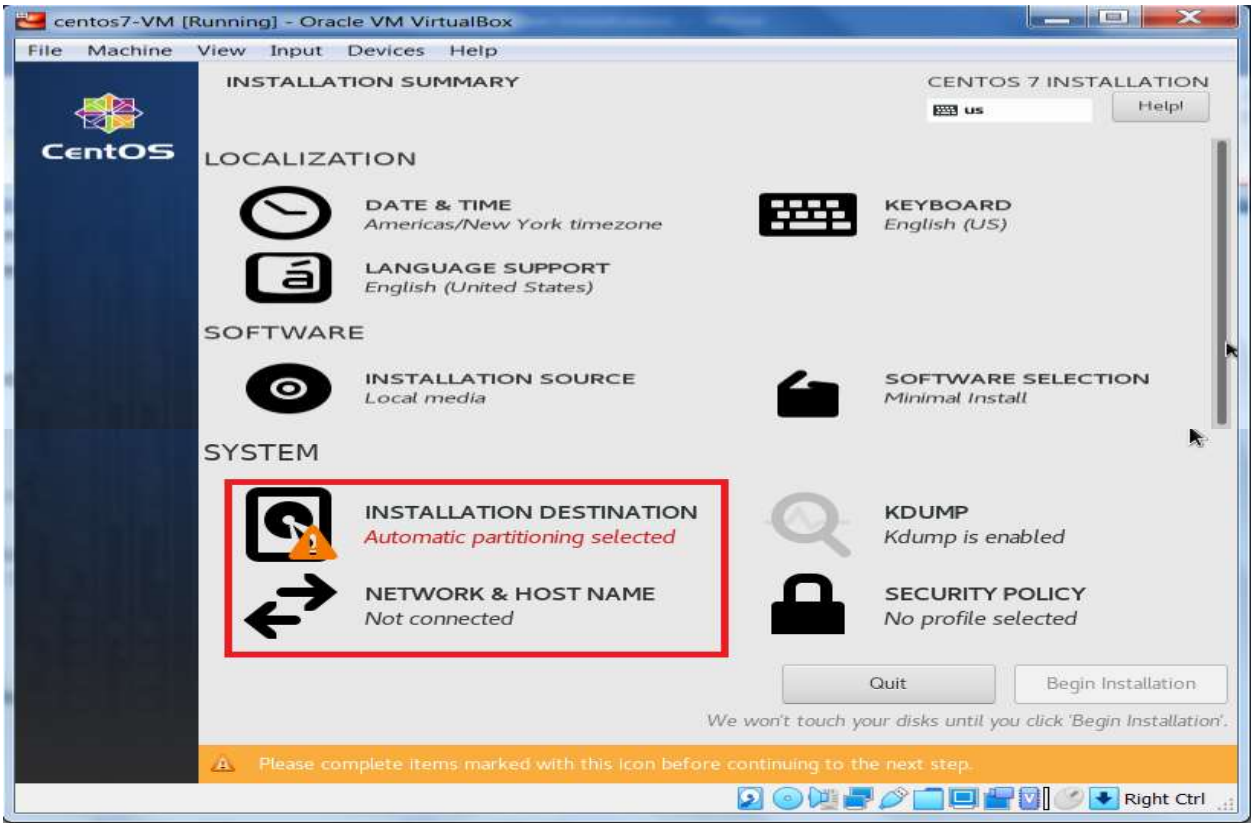


Navigate up to "**Install CentOS 7**" and hit **Enter** to begin the installation.



Select your desired language and click **Continue**

On the **Installation Summary** page, we need to configure a few settings before we can begin the installation.



Localization:
timezone, keyboard and language
Software:
Installation source and software selection
System:
Installation destination (includes partitioning)
Network & Host name
KDump & Security Policy

Please note that before we begin making the required pre-installation configuration changes, I will be referring to the items listed on the "**Installation Summary**" page (see items above OR image below). Also, if the correct item value is already set, you do not need to change it.

According to my "**Installation Summary**" page, only two items need to be configured. Under the "**System**" section, they are "**Installation Destination**" and "**Network & Host Name**".

If your "**Installation Summary**" page is the **same** as mine, please skip to the System section.

If your "**Installation Summary**" page is **different** than mine, links to each section are available here:

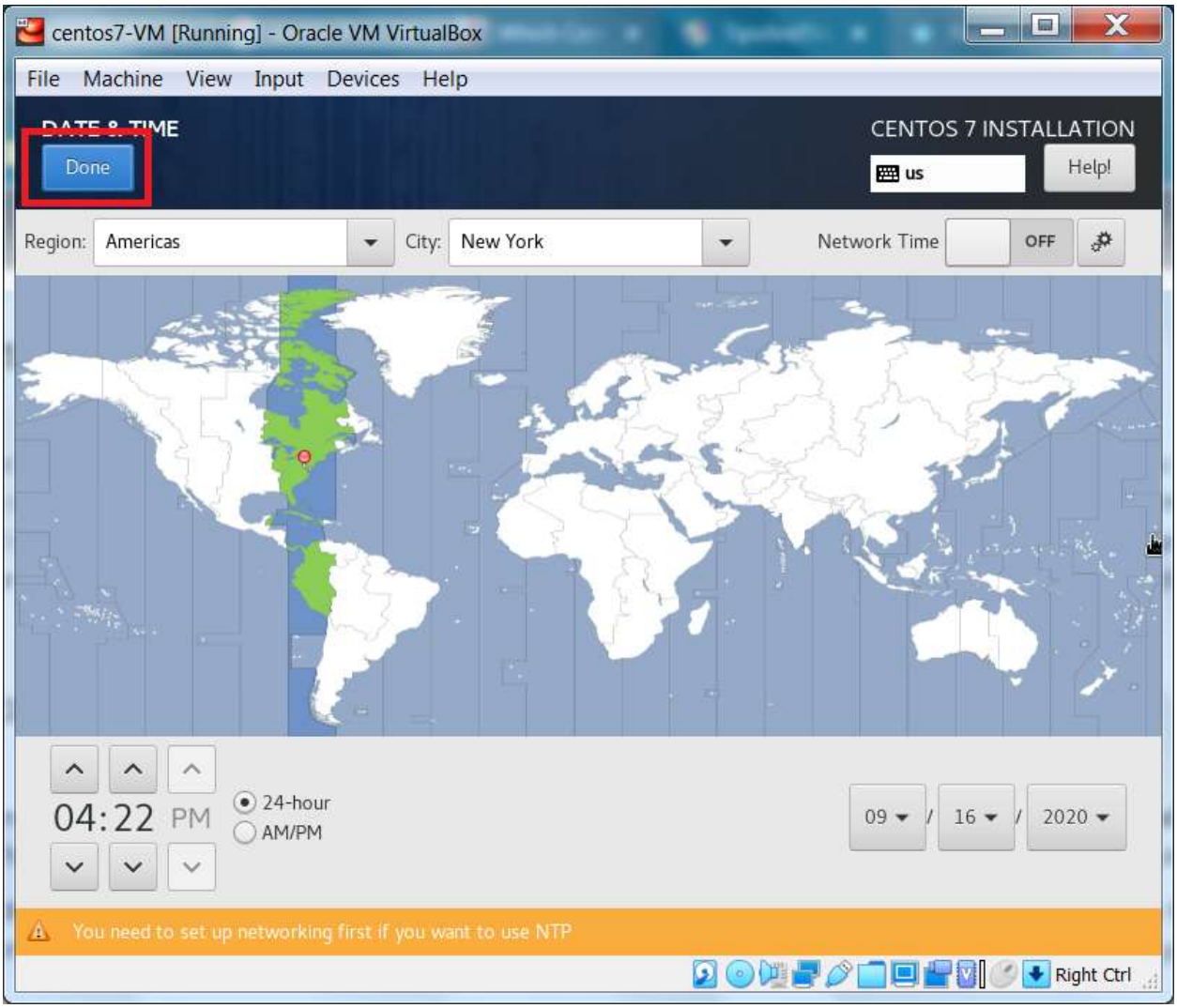
Localization, Software and System

To be thorough, we will go through each configuration screen for every item that is listed on the "**Installation Summary**" page. That way you will become familiar with a CentOS 7 installation.

Localization

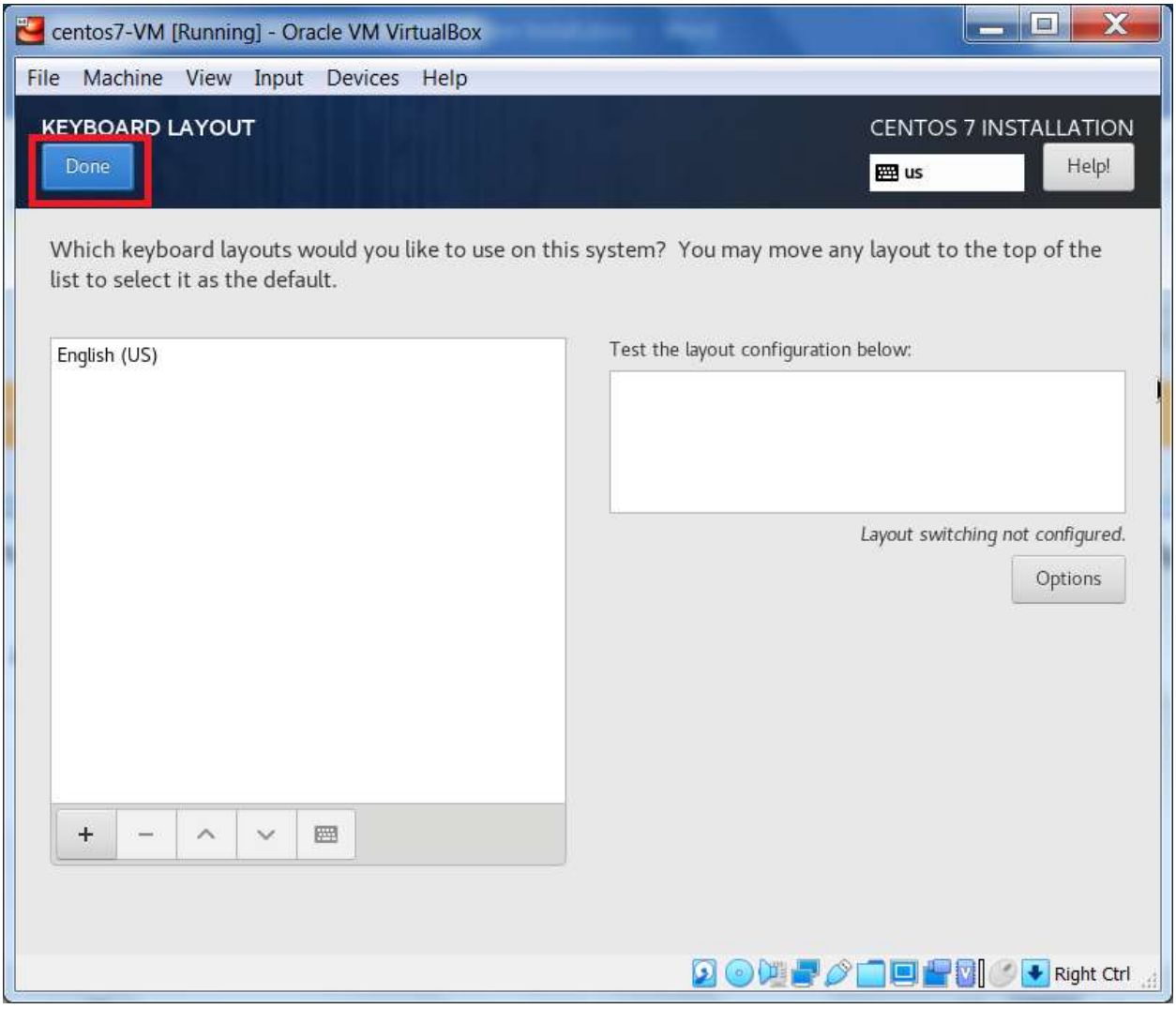
To set your timezone, from the "**Installation Summary**" page, click "**Date & Time**".

Make your change, if needed, and click **Done**.



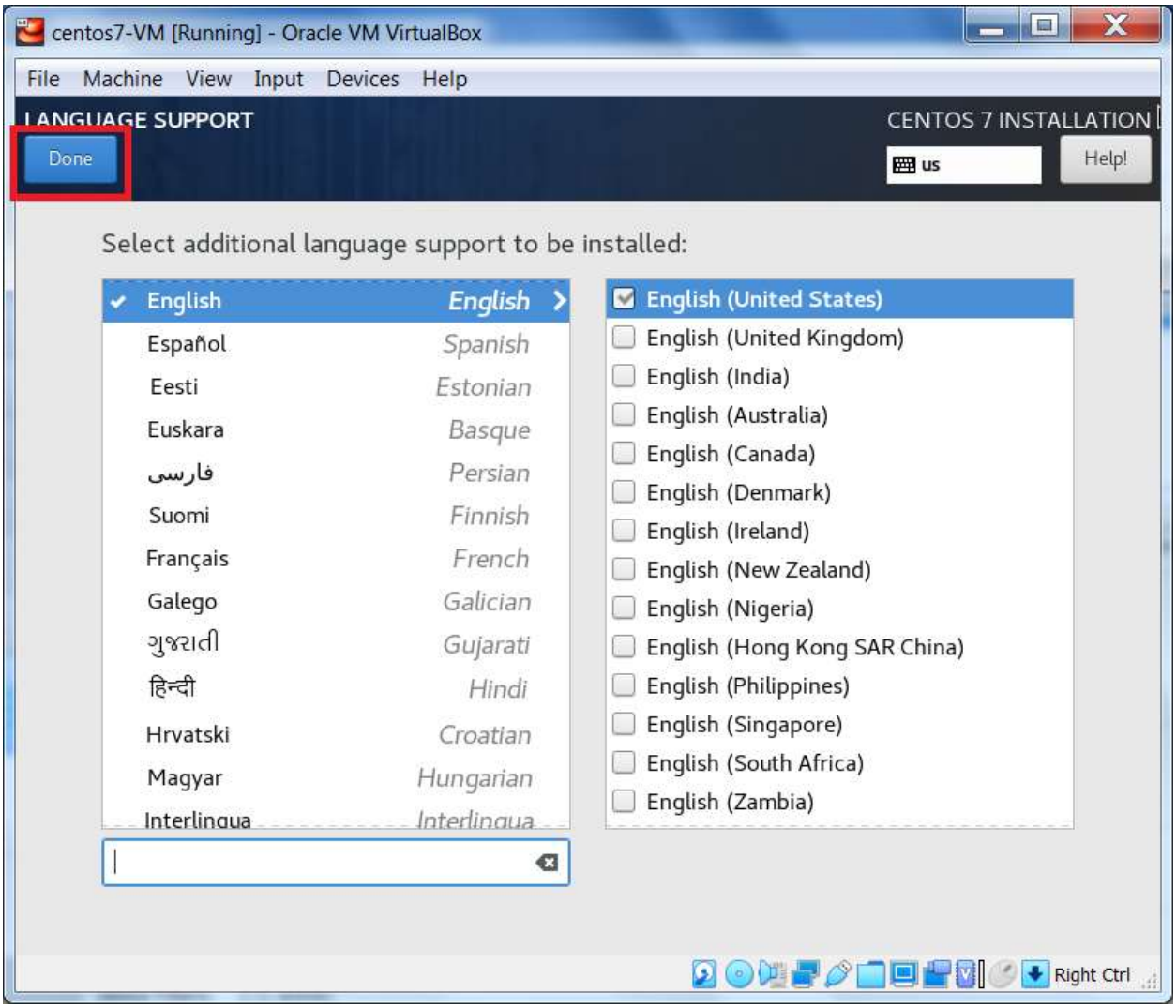
To set your keyboard, from the "**Installation Summary**" page, click "**Keyboard**".

Make your change, if needed, and click **Done**.



To set your language, or to add language support, from the "**Installation Summary**" page, click "**Language Support**".

If needed, set your language and add support for other languages and click **Done**.

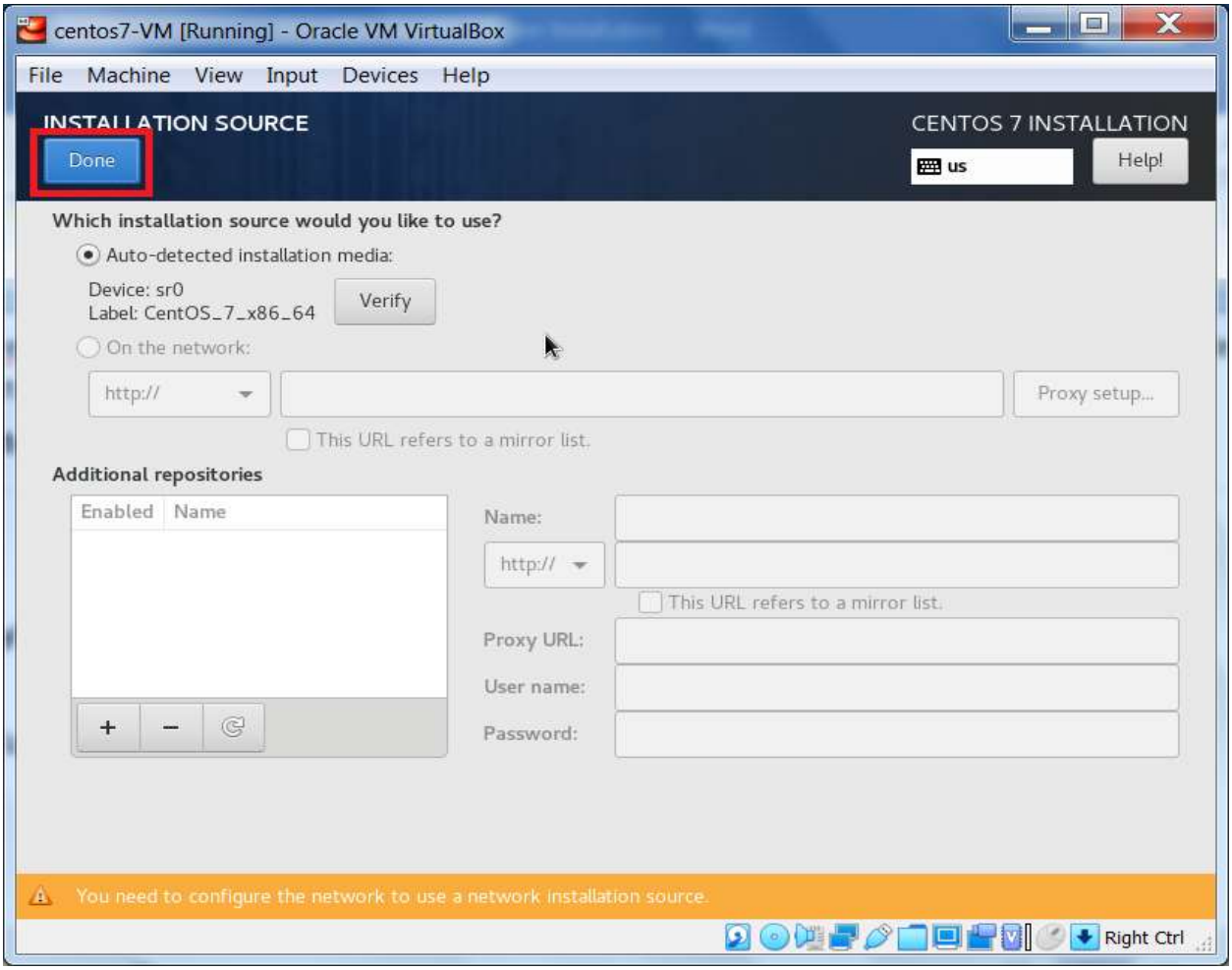


Software

Next, from the "**Installation Summary**" page, under "**Software**", click "**Installation Source**".

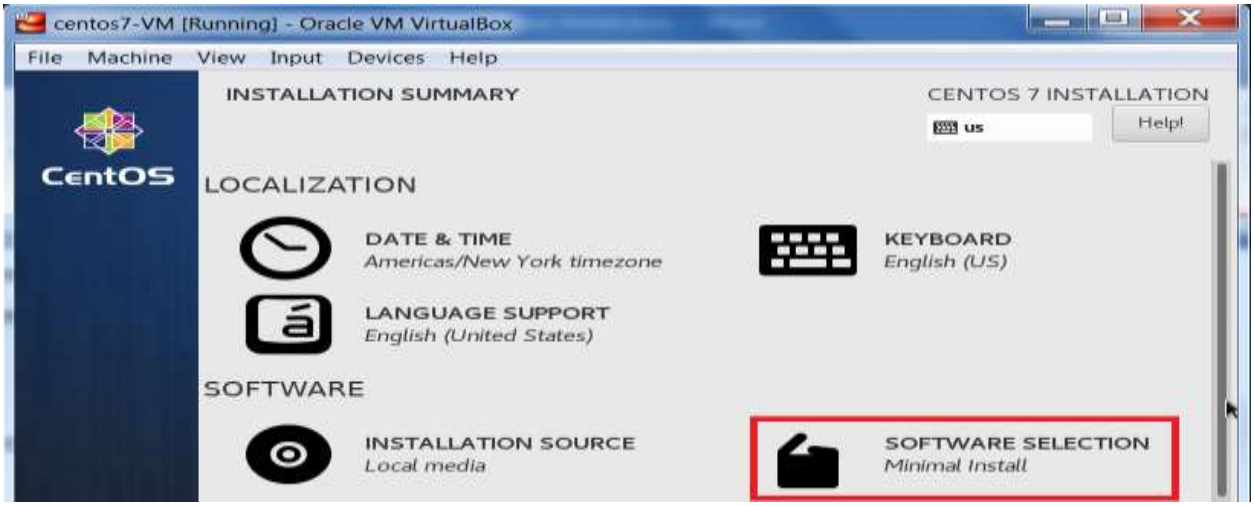
If needed, make your changes and click **Done**.

*In my case, the "**Installation Source**" was auto-detected as local media. This means the **centos7usb.vmdk** image file, attached to my virtual machine and linked to my **CentOS 7 bootable USB** is being recognized as the installation source.*



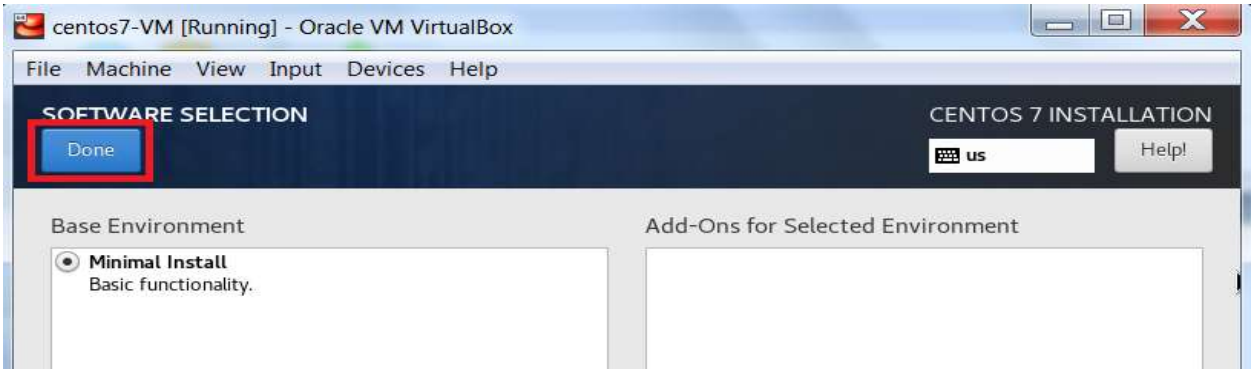
Since we are using a CentOS 7 minimal ISO image, the "**Software Selection**" is set to "**Minimal Install**".

But, again, to be thorough, from the "**Installation Summary**" page, under "**Software**", click "**Software Selection**"



Only the packages for a **CentOS 7 Minimal Install** are included in the minimal ISO image we are using.

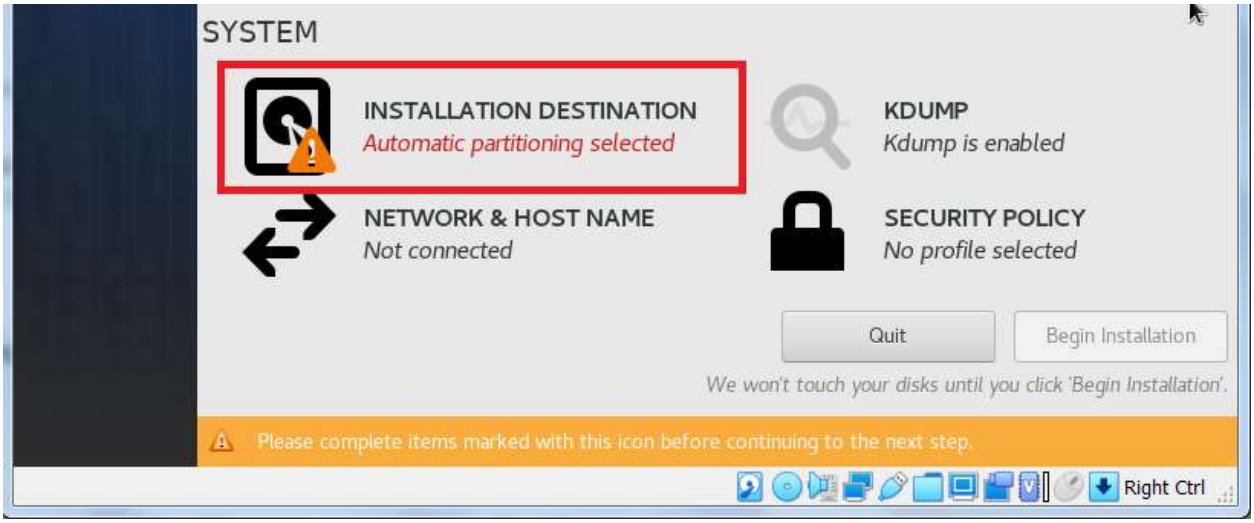
To continue, click **Done**.



System

Please note that the following CentOS 7 pre-installation configuration is **required**.

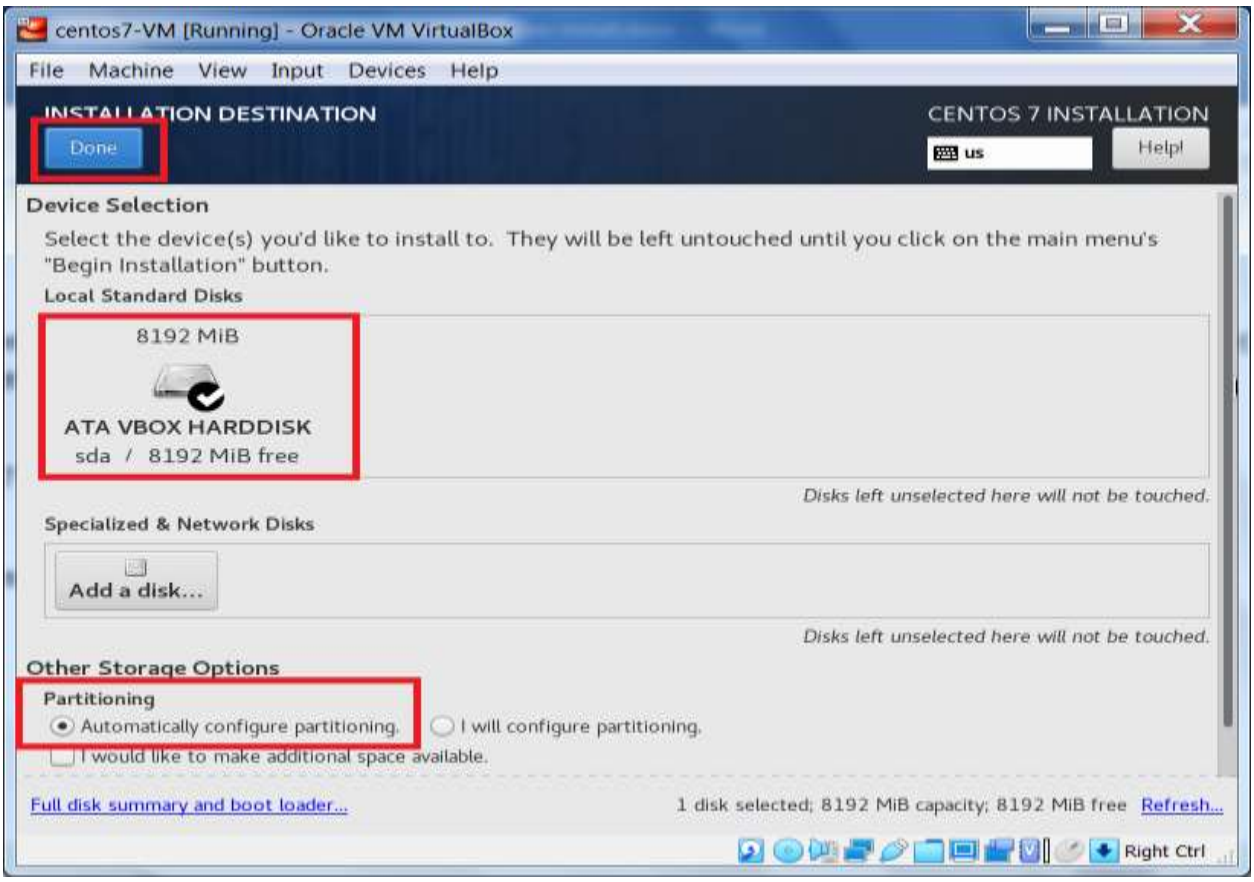
From the "**Installation Summary**" page, under "**System**", click "**Installation Destination**".



Ensure the virtual hard disk we added while creating the virtual machine has been detected and that "**Automatically configure partitioning**" is selected. When finished, click **Done**.

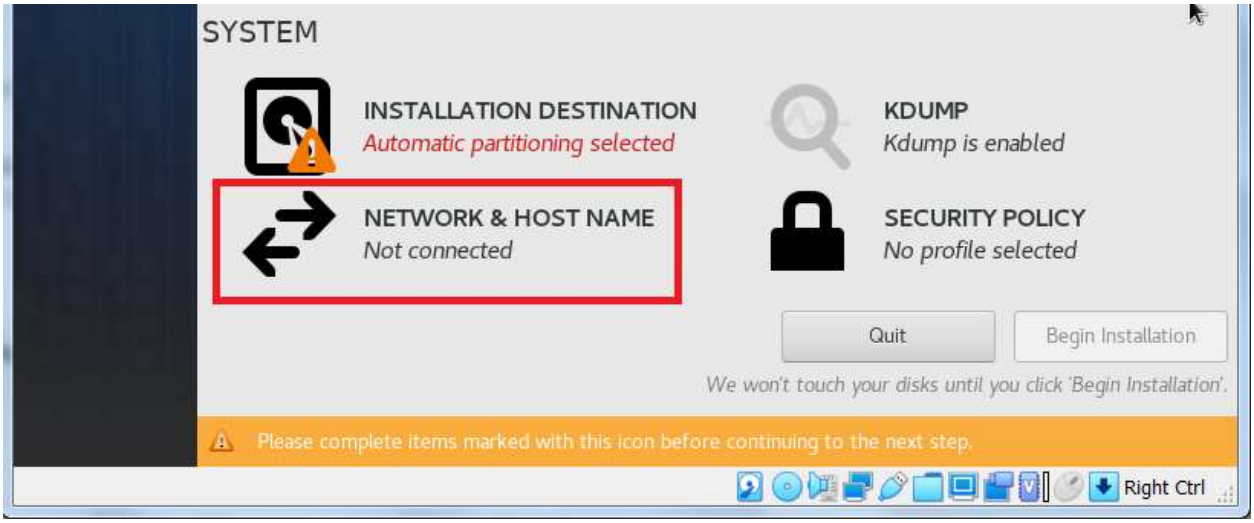
For this tutorial, we will not be manually creating our partitions. This will be done automatically for us.

*The **/boot**, **/** (root) and **swap** partitions will be created. The / (root) and swap partitions will reside in separate **LVM** logical volumes using the **xfs** file system, while, the /boot partition will also use the **xfs** file system but will be on a standard partition.*



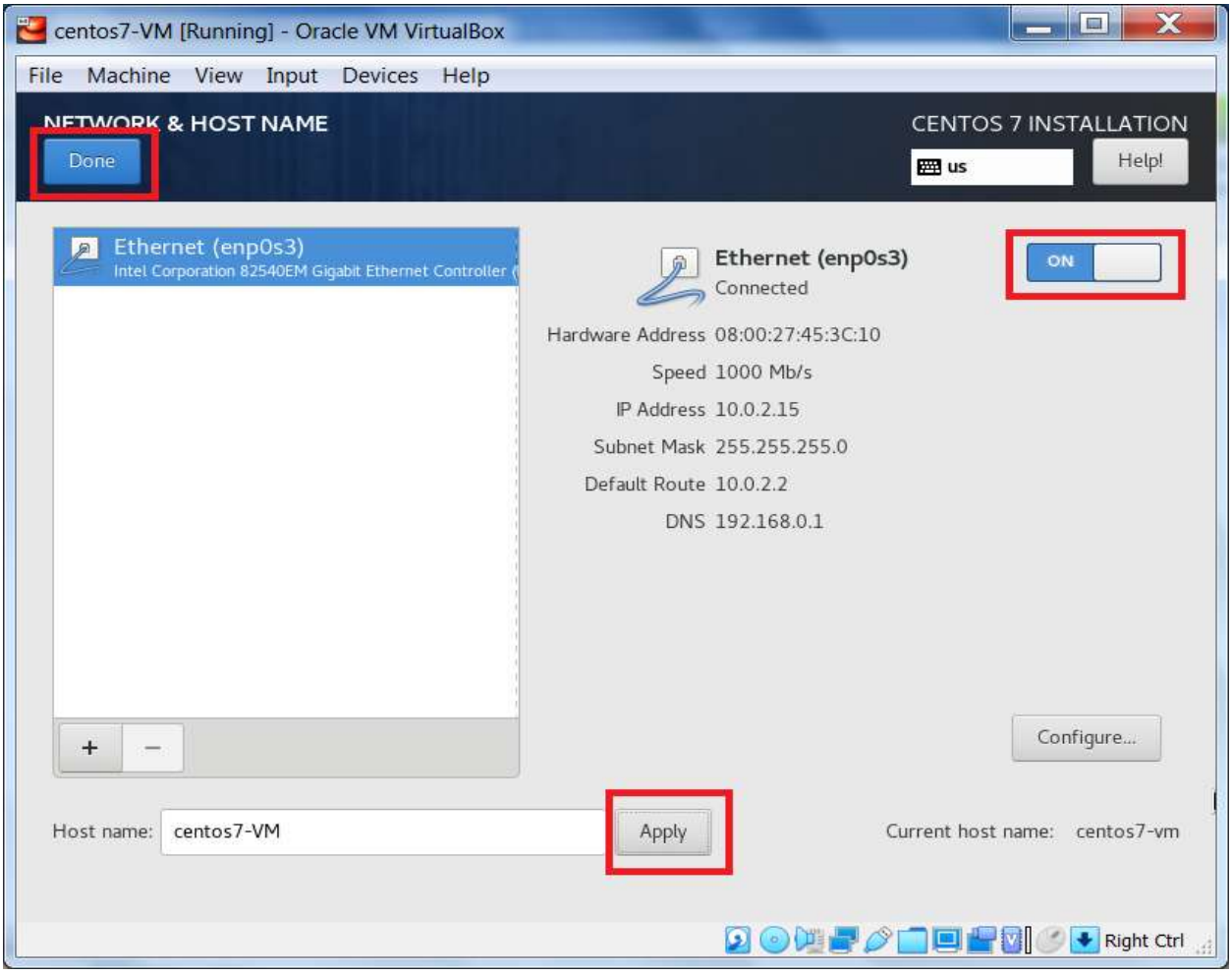
Please note that the following CentOS 7 pre-installation configuration is **required**.

From the "**Installation Summary**" page, under "**System**", click "**Network & Host Name**".



We will have to configure our IP address information and hostname. First, ensure the network adapter is selected and enable it by changing the toggle switch, on the right, from OFF to **ON**. This will ensure that our VM receives an IP address, subnet mask and default gateway from VirtualBox's DHCP service (usually 10.0.2.15 /24).

Second, enter the host name. To keep it simple, I entered "**centos7-VM**" and clicked **Apply**. Finally, click **Done**.



For this tutorial, we will leave "**KDump**" enabled. To be thorough, let's open the configuration screen.

From the "**Installation Summary**" page, under "**System**", click "**KDump**"

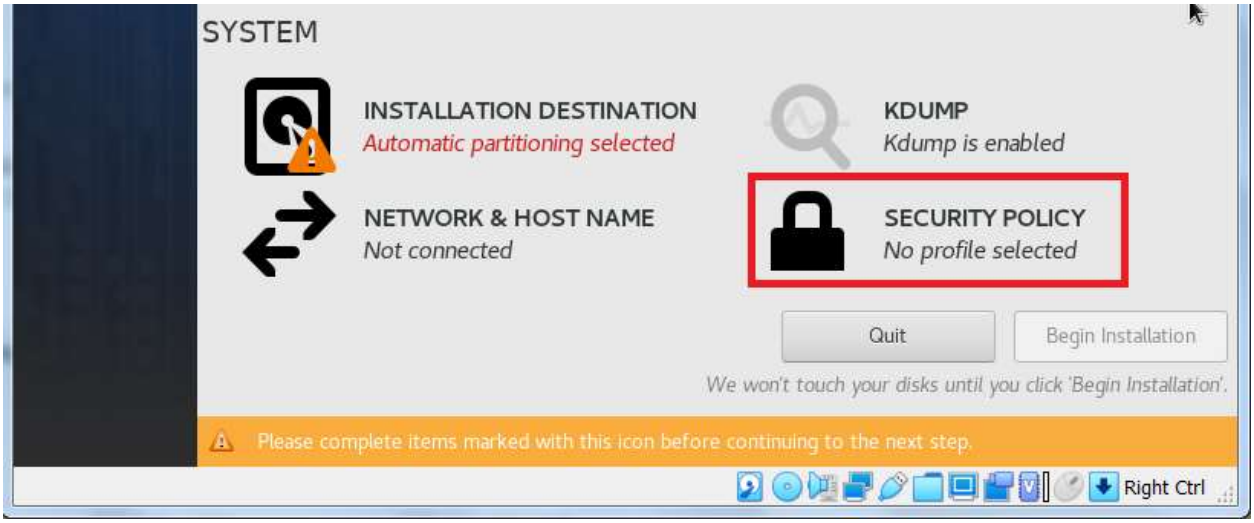
KDump *captures information during a kernel crash and the information can be used to determine the cause.*

When you are done, click **Done**

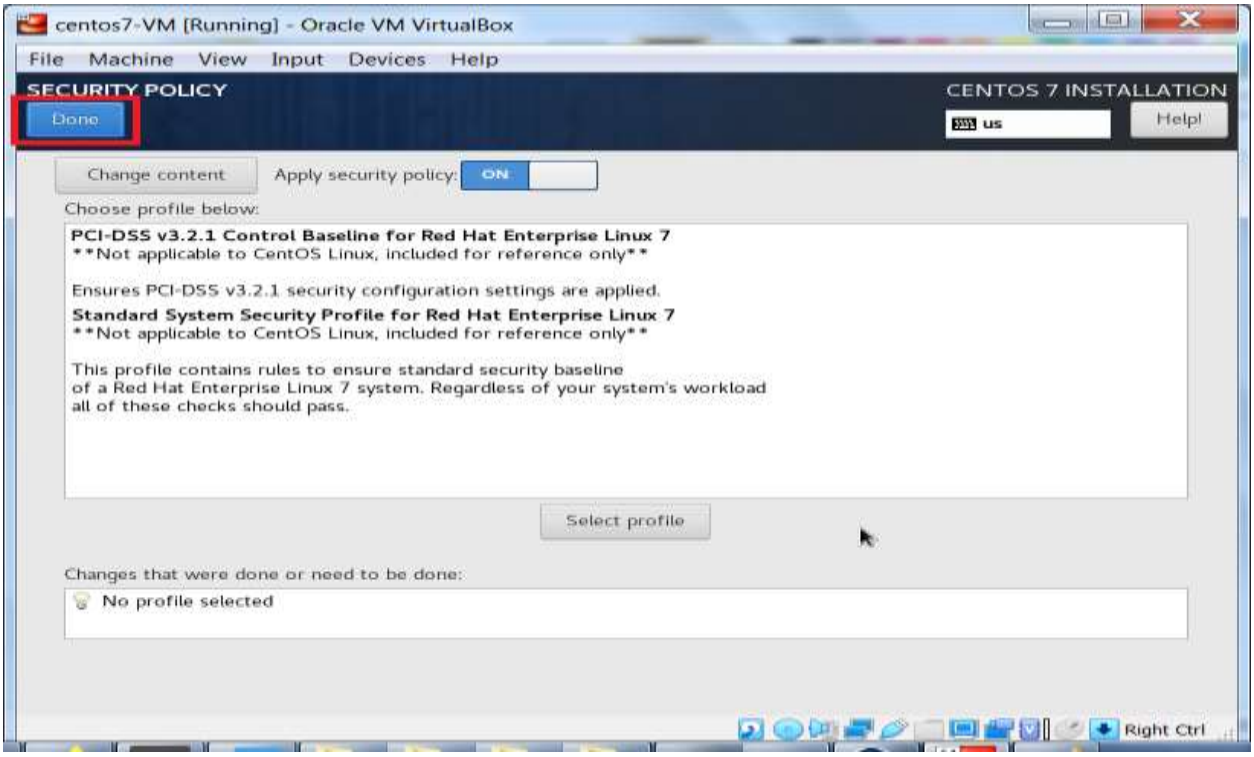
We will not be setting a **Security Policy**. Again, to be thorough, let's open the configuration screen.

From the "**Installation Summary**" page, under "**System**", click "**Security Policy**"

*When no **security policy** is set, the **sshd** and **firewalld** services are active, and running. Remote access using **ssh** is allowed through the firewall.*

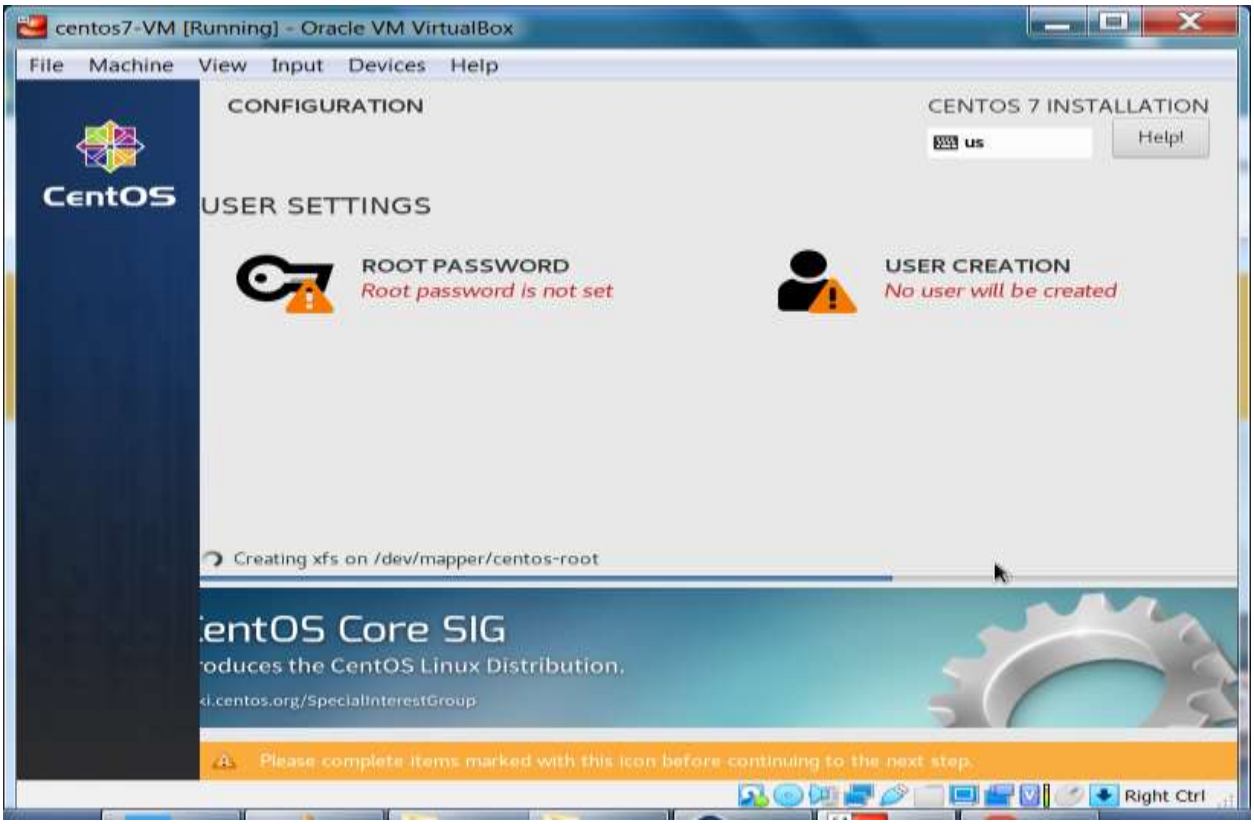


When you are done, click **Done**

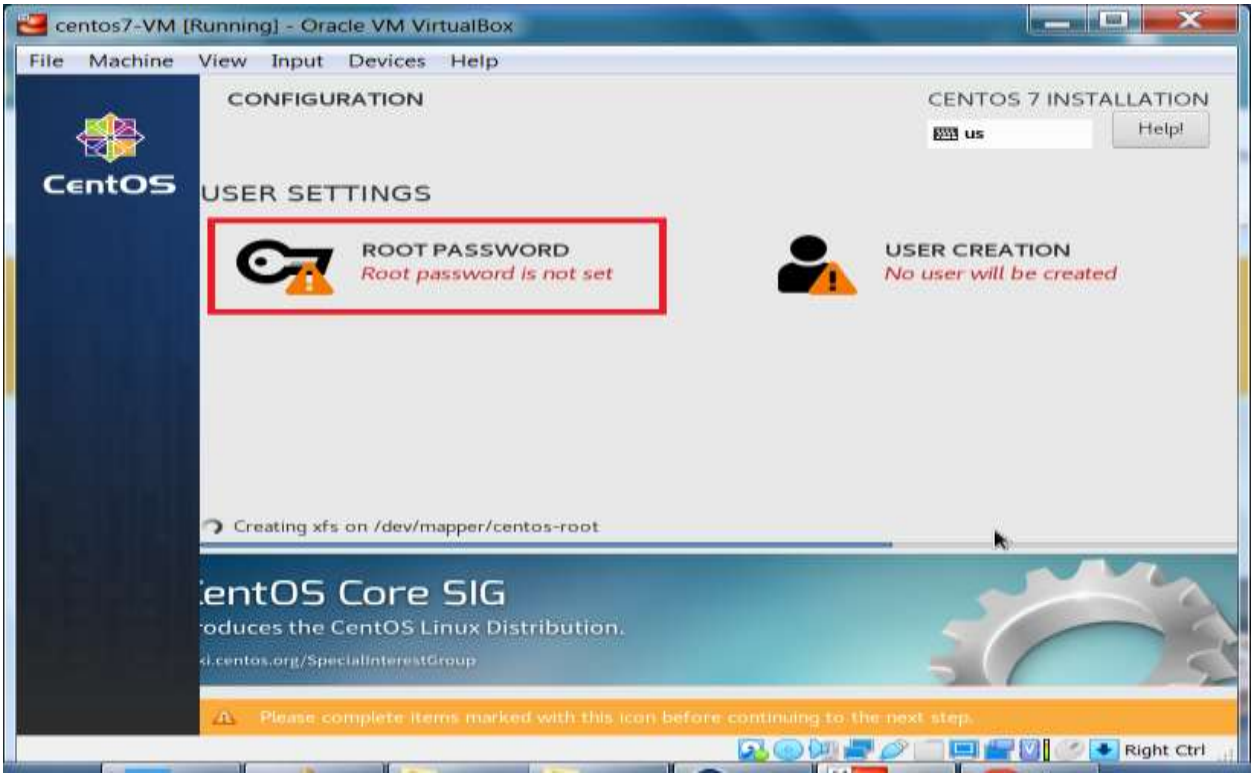


We are now ready to begin the installation of CentOS 7. Click "**Begin Installation**"

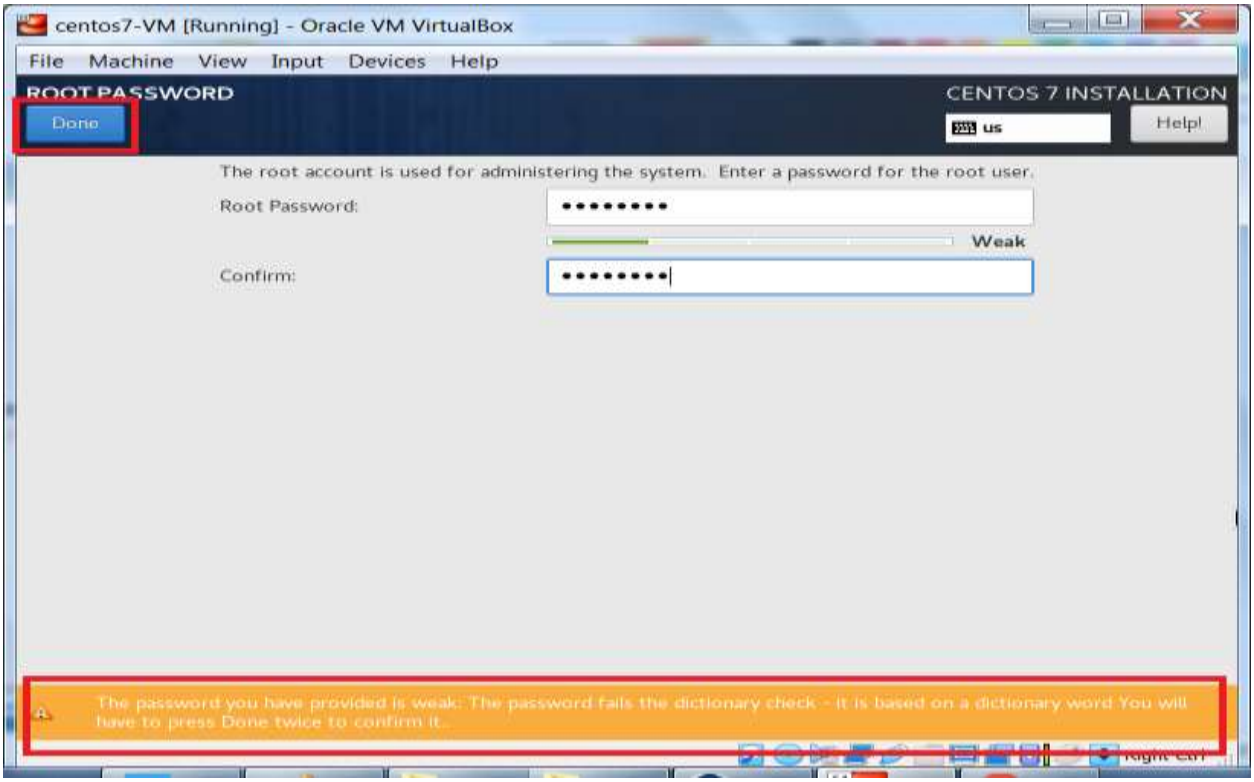
The installation has begun. We will need to set the root user's password, as well as, create a non-root user.



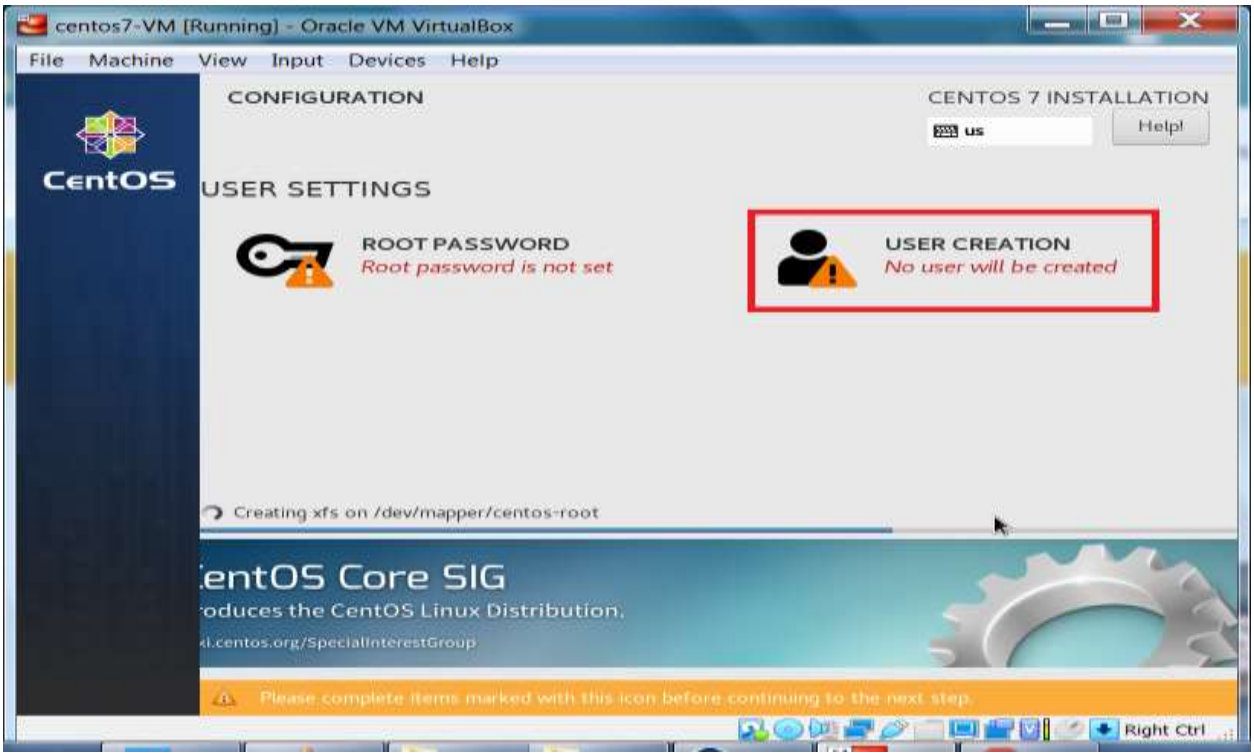
First, to set the root user's password, click **Root Password**



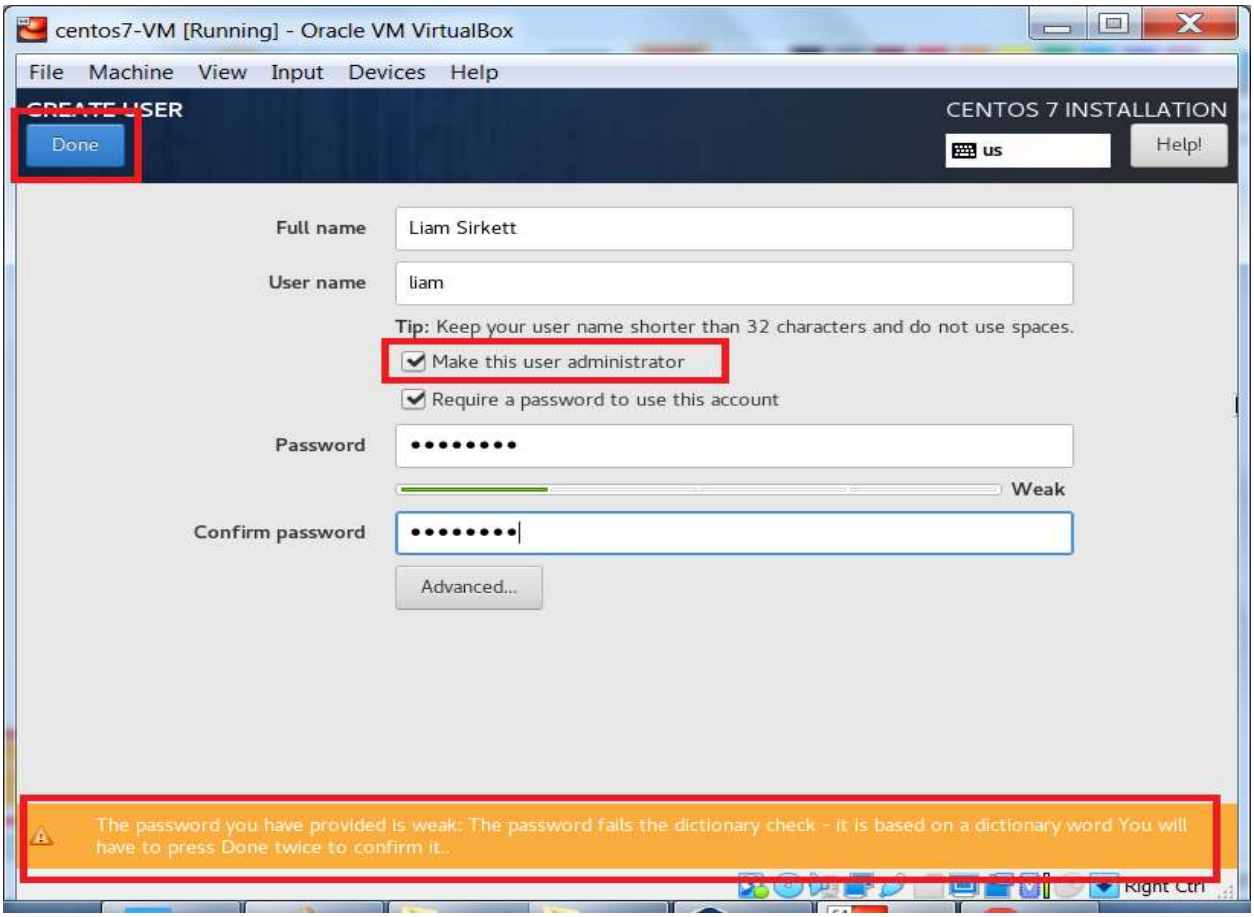
Enter the root user's password and click **Done**. Notice the warning message at the bottom of the screen. This is because I used a weak password. To bypass this warning, all we have to do is click **Done**, twice.



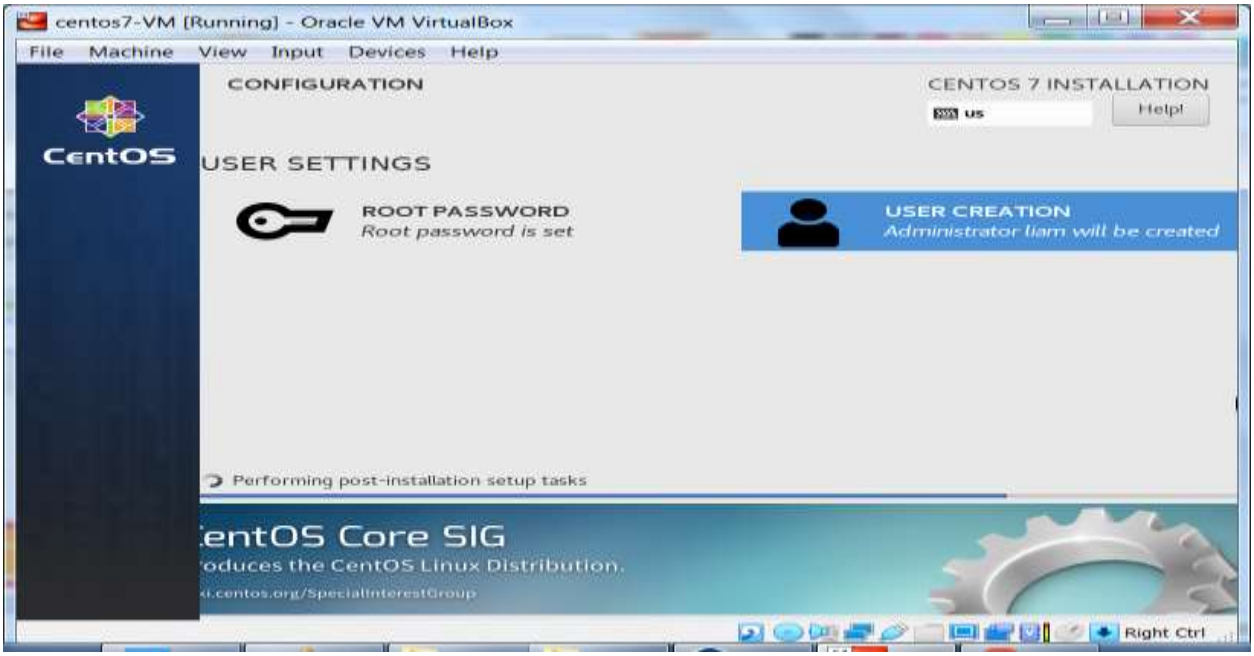
Now, to create a non-root user, click **User Creation**.



Enter the non-root user's details. Next, check the box to **Make this user an administrator** and click **Done**. Again, notice the warning message at the bottom of the screen. This is because I used a weak password. To bypass this warning, all we have to do is click **Done**, twice.



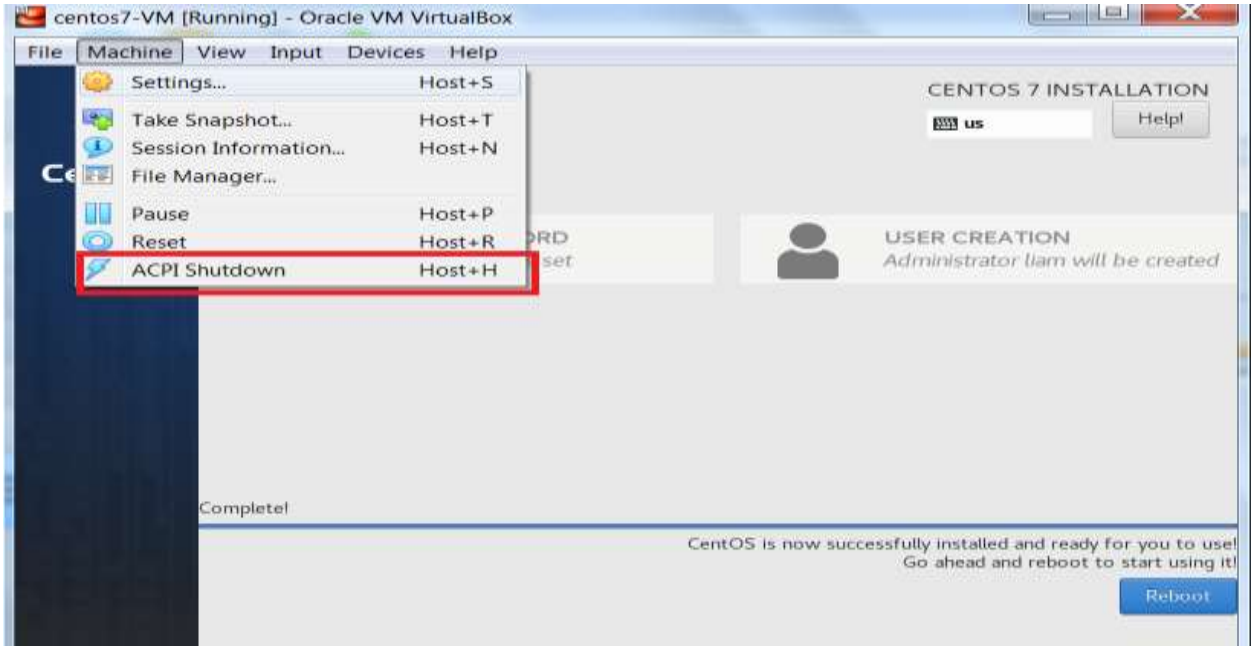
Since we are installing a minimal version of CentOS 7, the installation process will not take very long (15 – 20 min)



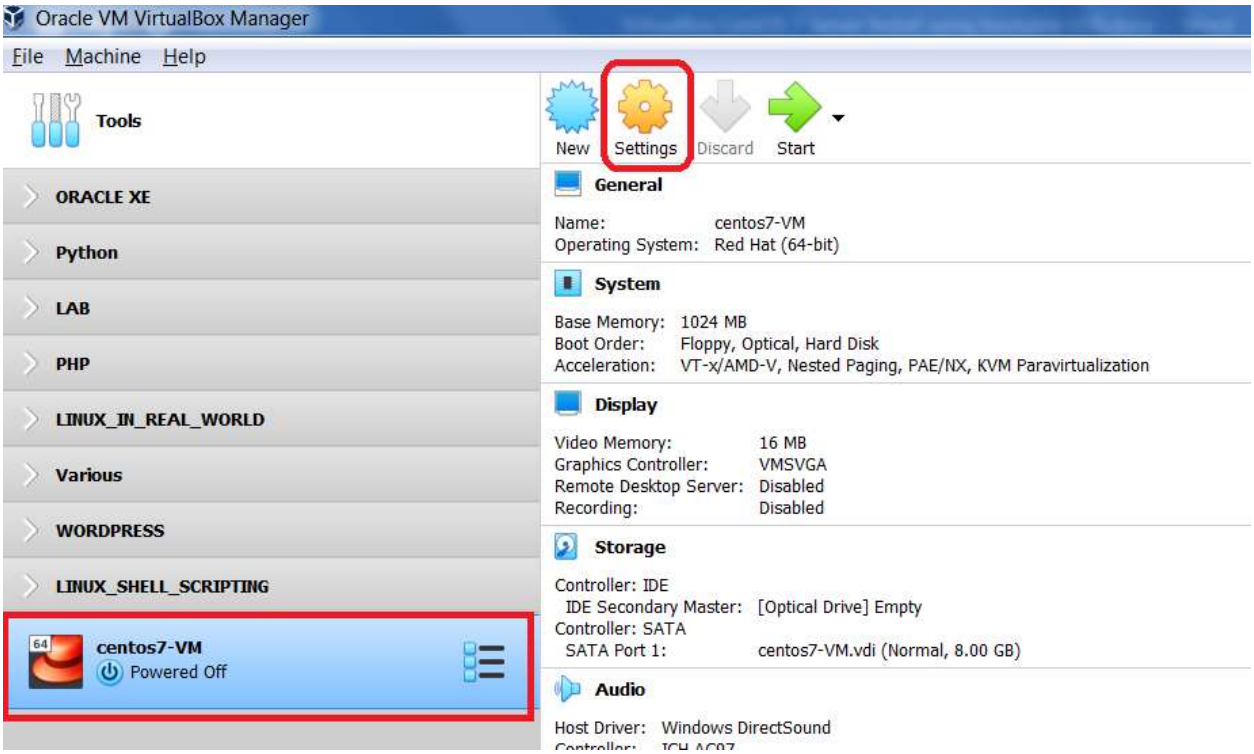
Once the installation has completed, we will first have to remove the image file linked to our bootable USB to ensure that we boot to our installed system and not begin the installation again.

From the running VM's window, exit the **guest** (virtual machine) interface and return to the **host** machine's interface, by hitting your Host key (for Windows 7, it's my **right Ctrl key**)

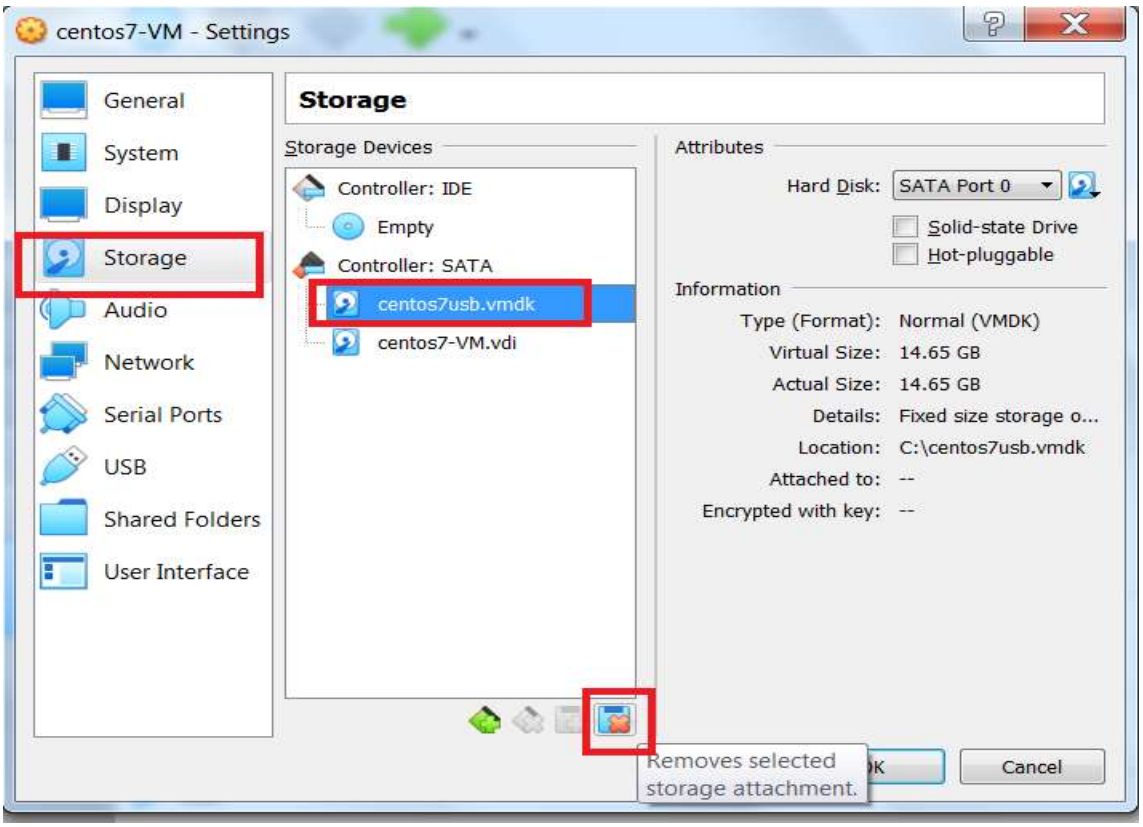
Now from the **Machine** menu item, click **ACPI Shutdown** to stop the VM.



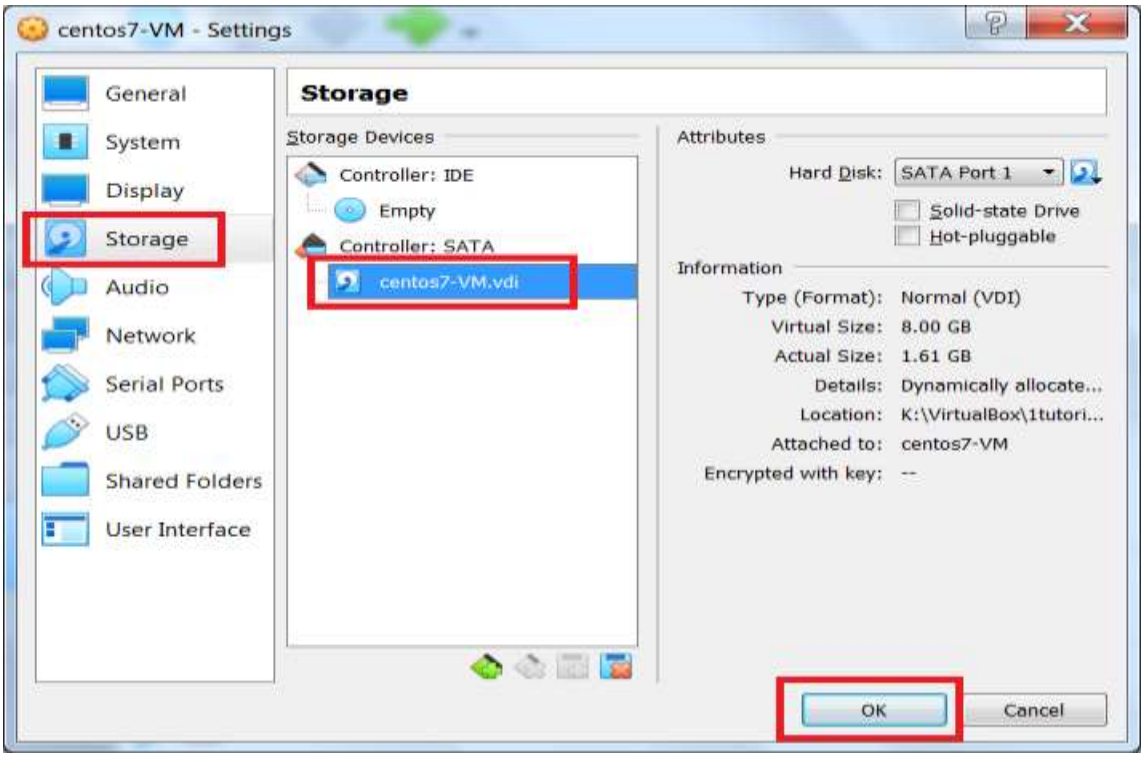
Once the virtual machine has stopped, ensure your VM is selected and click **Settings**



Select the Storage tab, and remove the image linked to your bootable USB by clicking the icon that **Removes selected storage attachment**.

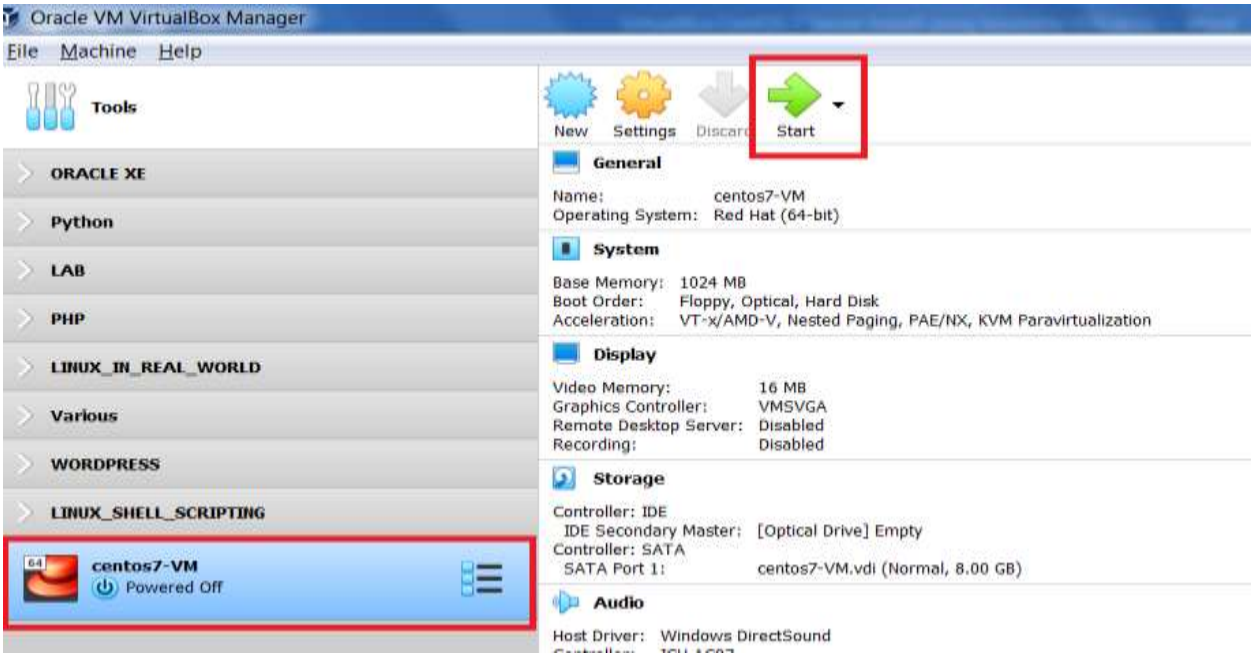


The image linked to your bootable USB has been successfully removed. To continue, click **OK**

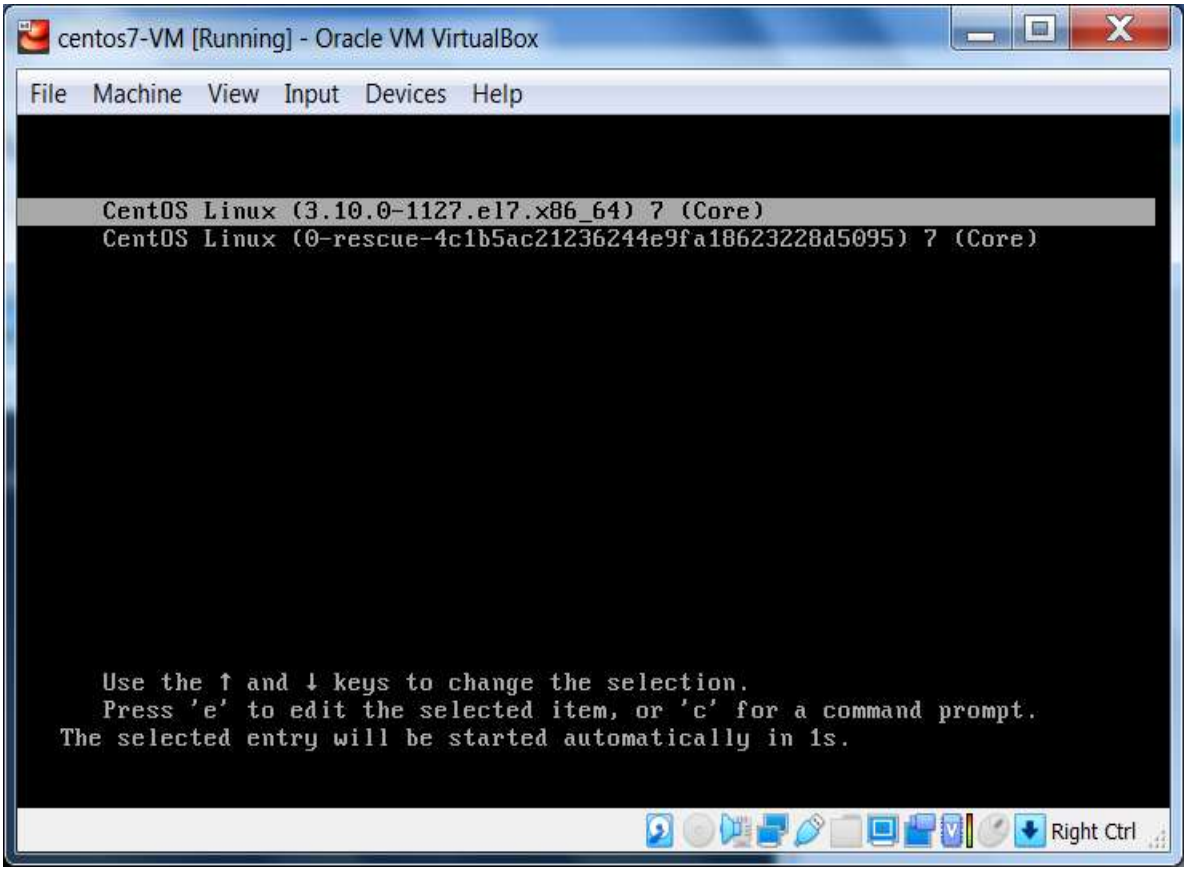


Now that we only have the virtual hard disk that contains the CentOS 7 installation, we can start the VM.

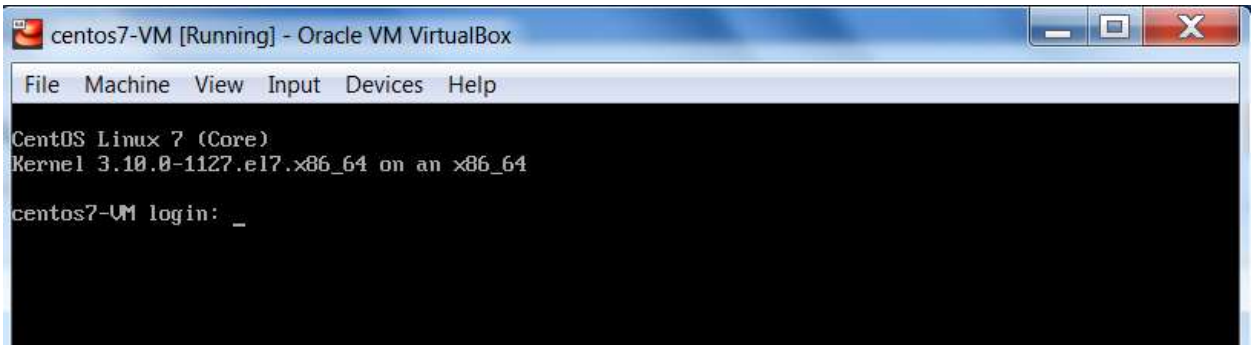
From the VirtualBox Manager interface, ensure your new VM is selected and click **Start**



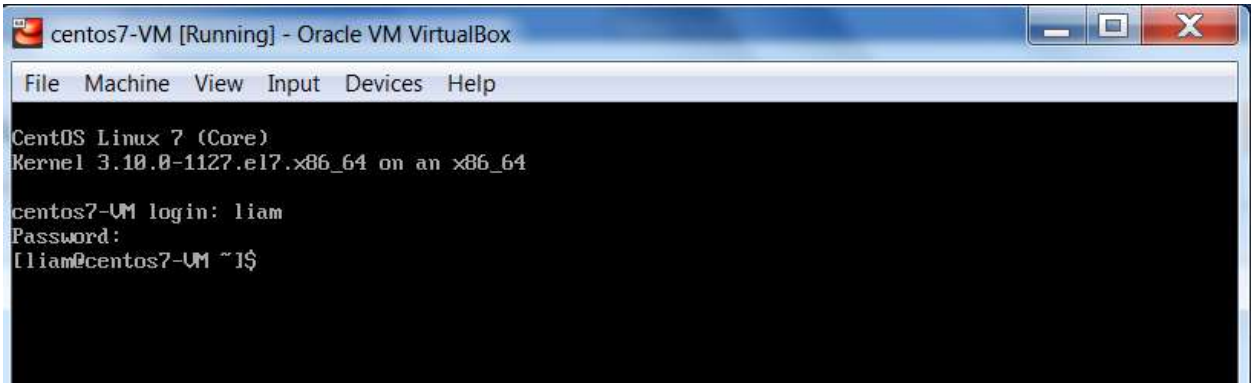
CentOS 7 is starting and we are seeing the kernel being used during the boot process.



Our CentOS 7 VM has started successfully and we see the login screen.



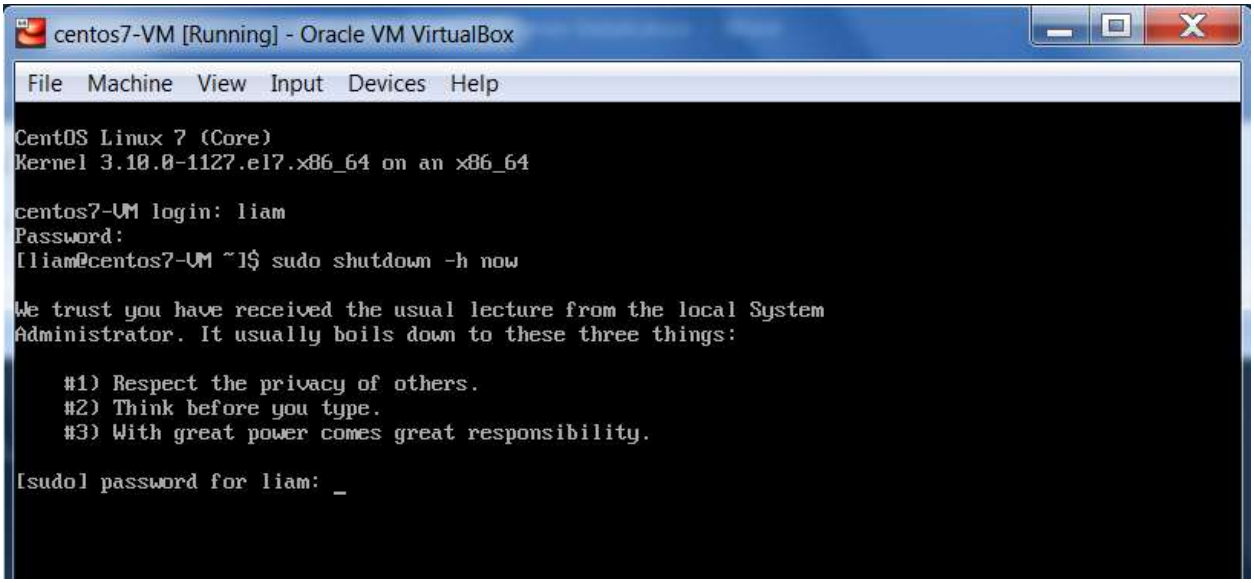
At the login screen, enter the username, and password, of the non-root user you created during the installation.



We have logged in successfully. Now, we will shutdown the virtual machine.

To do this, the non-root user (in my case, **liam**) must have **sudo** ("**superuser do**") privileges. Since we set this non-root user to be an administrator, this non-root user has **sudo** privileges and can execute the following command:

```
sudo shutdown -h now
```

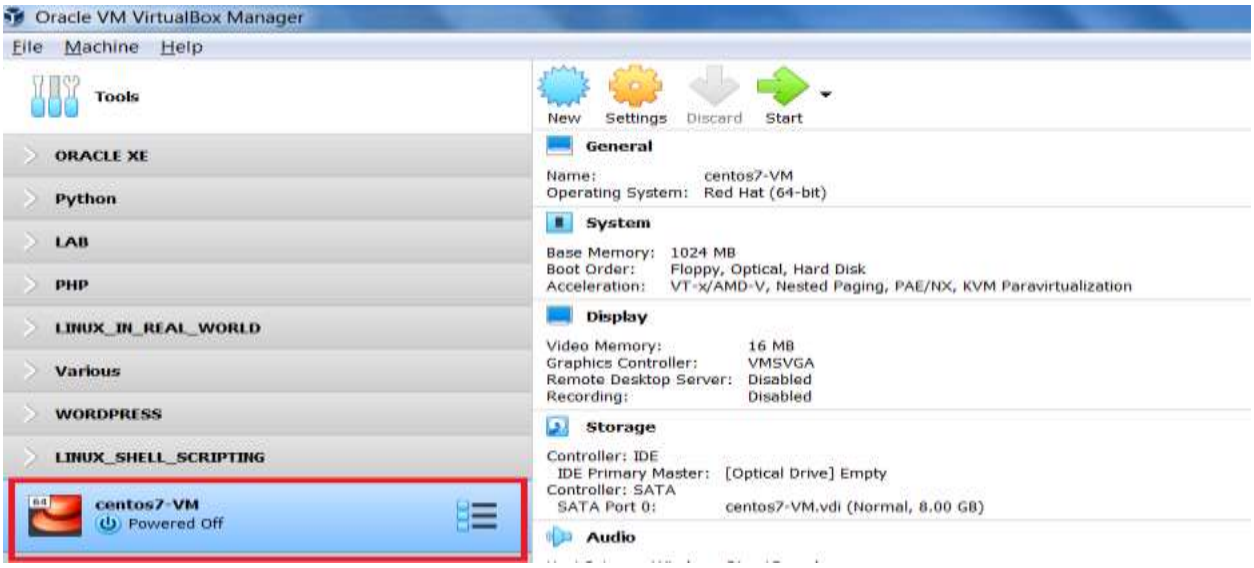


We are prompted for the non-root user's password to confirm that we want to execute this command. What we are doing is executing a command with the privileges of the **root** user.

Again, this is the reason we set our non-root user to be an administrator, so that the user has **sudo** privileges and can execute commands normally only executable by the **root** user.

To reiterate, the command, **sudo** ("**superuser do**"), is allowing your logged in user, who is a non-root user, to execute the command, **shutdown**, which can only be executed with the privileges of the **root** user.

Finally, after executing the command, the virtual machine will shutdown and we can return to VirtualBox Manager.

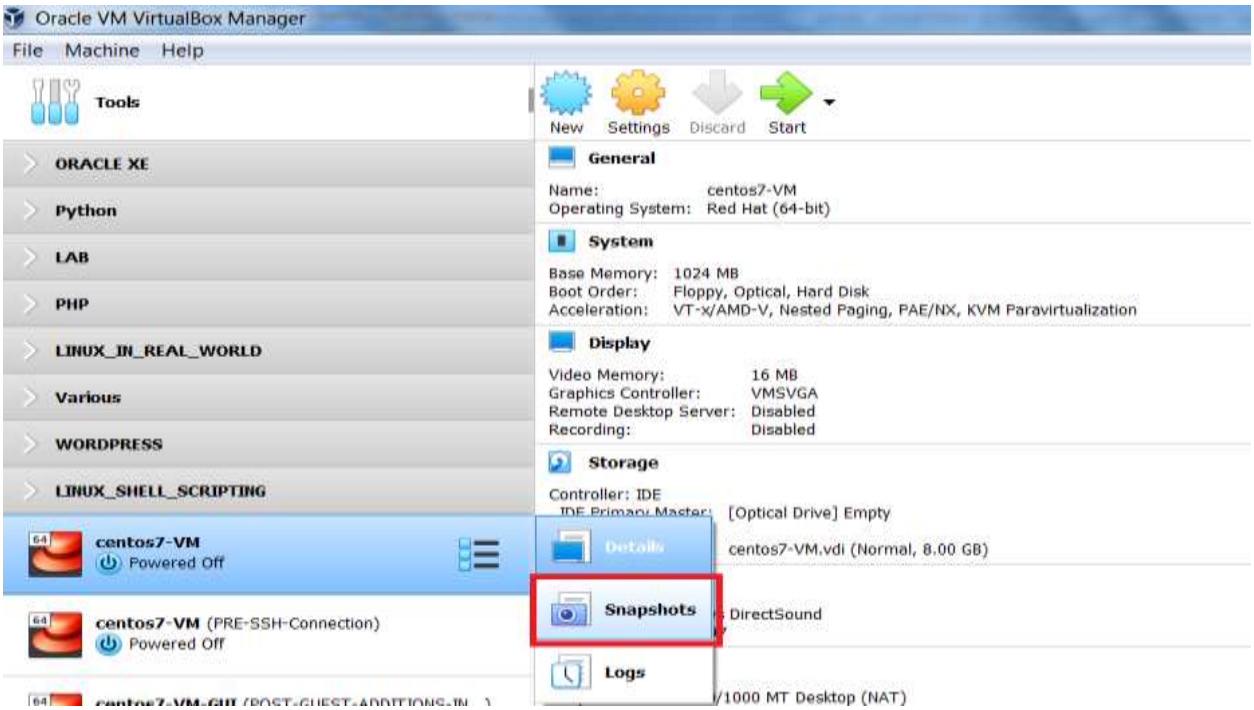


We have successfully installed a minimal version of **CentOS 7 (release 8)** in a **VirtualBox 6.1.2** virtual machine, using a bootable USB.

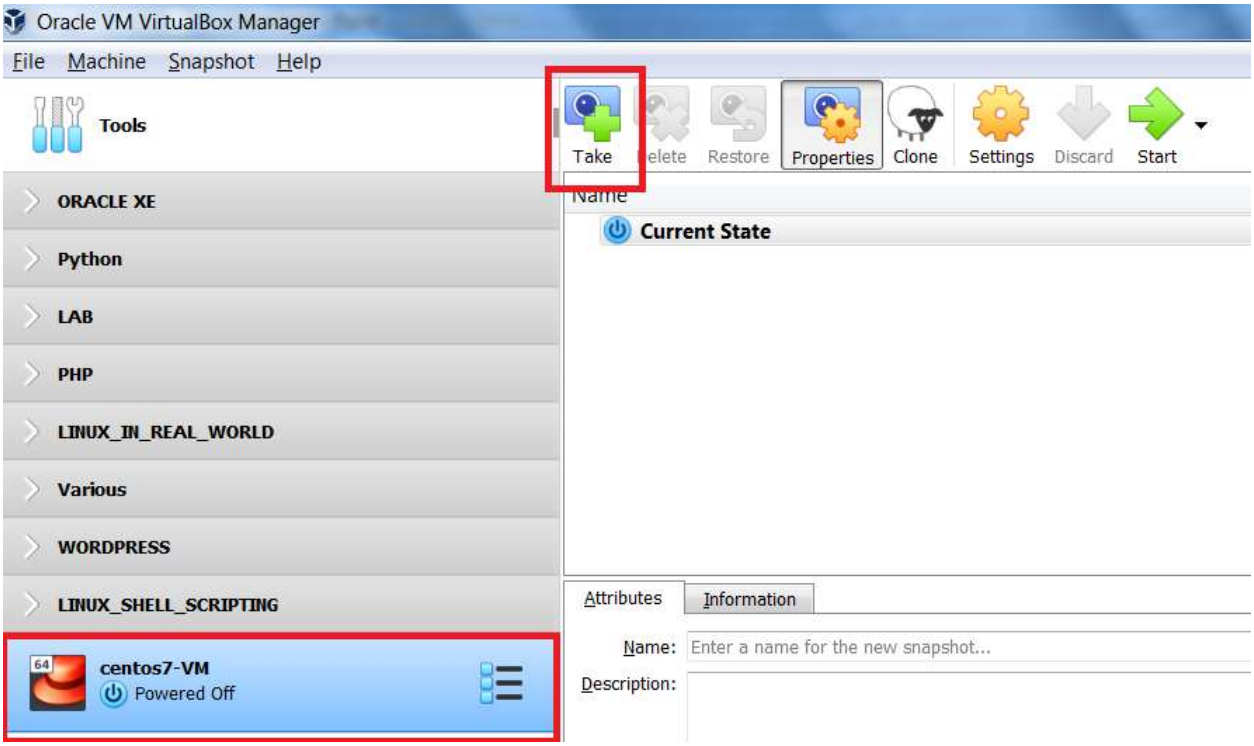
Take Snapshot

To be on the safe side. After I have successfully completed a task, such as installing or updating a VM, I like taking a snapshot to preserve the virtual machine's state. That way I ensure, in the future, if the VM stops responding, or behaving as it should, I can always revert back to that snapshot. For further information on **VirtualBox Snapshots**, refer to the docs, here.

In the VirtualBox Manager interface, we are currently in **Details** view. To switch to **Snapshots** view, click the list icon next to the virtual machine name, and select **Snapshots**.



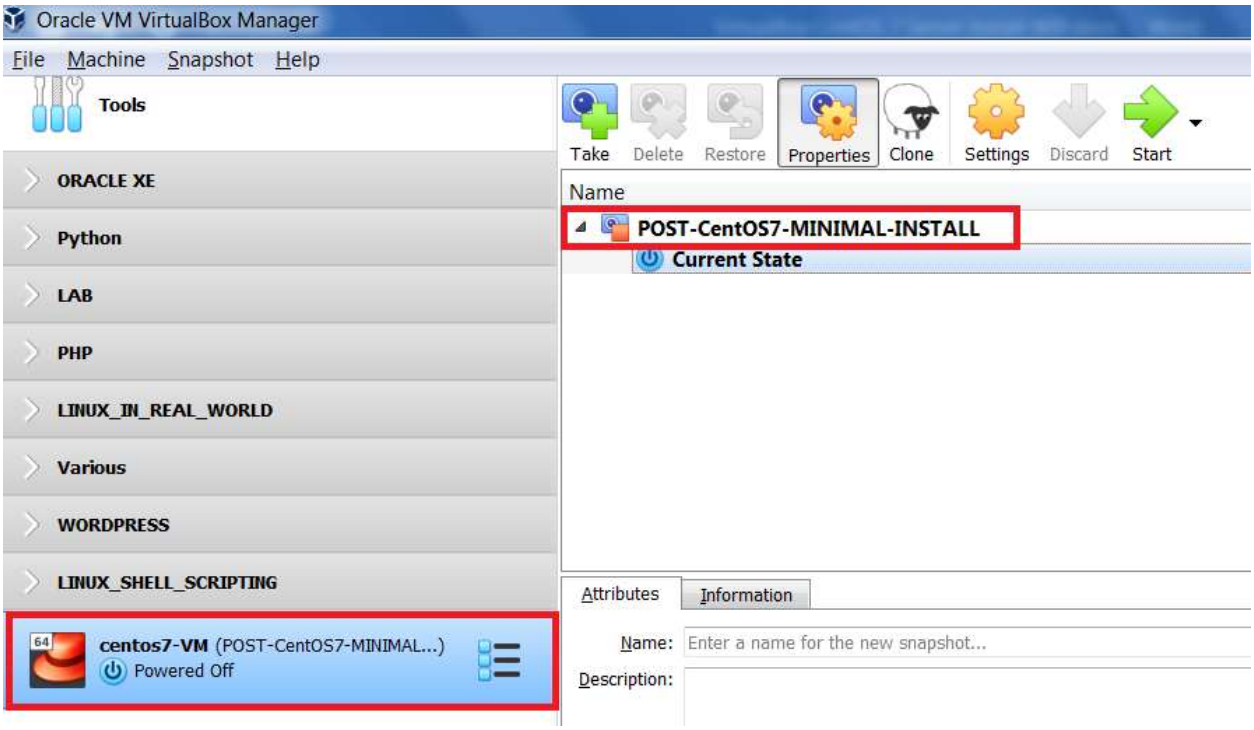
To take a snapshot, on the VirtualBox Manager Interface, ensure your VM is selected and click **Take**



Enter a name for the snapshot, as well as, a short description, then, click **OK**

I've taken a snapshot "**POST-CentOS7-MINIMAL-INSTALL**" to ensure that I have a starting point to revert back to, if needed.

We have successfully taken a snapshot and ensure that we can always revert back to a working virtual machine with a minimal version of **CentOS 7 (release 8)** installed.



Hopefully, you've enjoyed completing this tutorial and found it helpful.

After completing this tutorial, if you decide that you would like, or need, a desktop environment, you should consider the **MATE Desktop**. It uses minimal system resources.

I have another tutorial that demonstrates the installation of the **MATE Desktop** on a **CentOS 7 minimal install VM**. It can be accessed **here**.

My main Tutorials page can be accessed **here**, (Linux, PowerShell, Shell Scripting, Vagrant, Docker) while my VirtualBox specific tutorials can be accessed **here**.

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