

# Install ROS on Jetson Nano

To install ROS on Jetson Nano, follow these three steps:

**First step :** Download an Ubuntu Image.

**Second step :** Download the VirtualBox.

**Third step :** Install ROS on Jetson Nano.

## First step :

Download an Ubuntu Image

You can download an Ubuntu image [here](#). Make sure to save it to a memorable location on your PC! For this tutorial, we will use the Ubuntu 20.04 LTS release.

## Second step :

- **Download the VirtualBox**

On Mac OS or Windows you can download VirtualBox from the downloads page [here](#).

- **Create a new virtual machine**

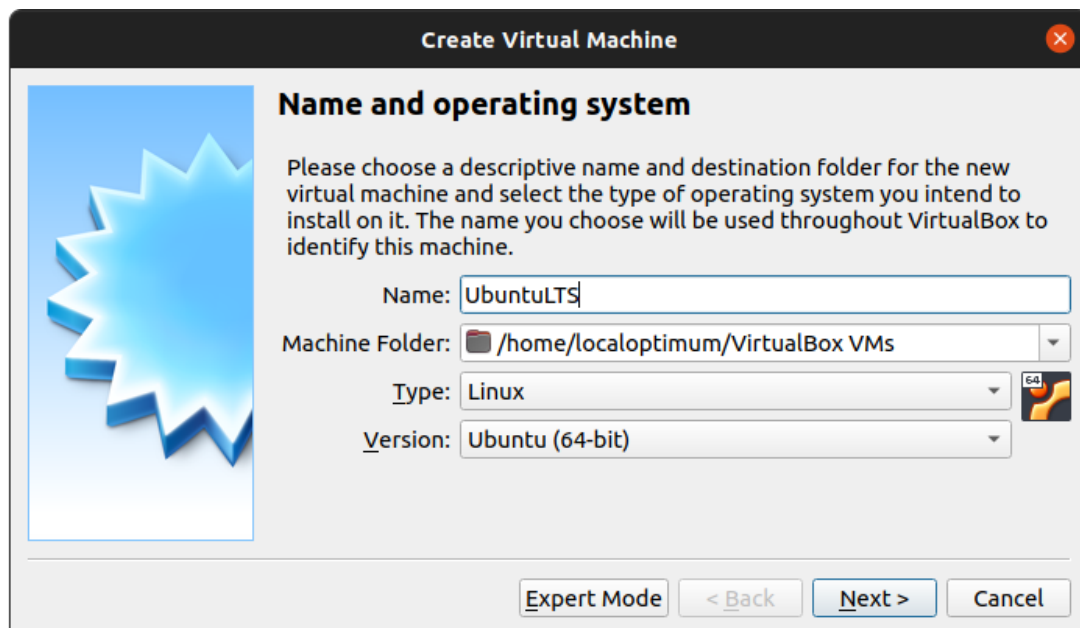
Click New to create a new virtual machine. Fill in the appropriate details:

Name: If you include the word Ubuntu in your name the Type and Version will auto-update.

Machine Folder: This is where your virtual machines will be stored so you can resume working on them whenever you like.

Type: Linux

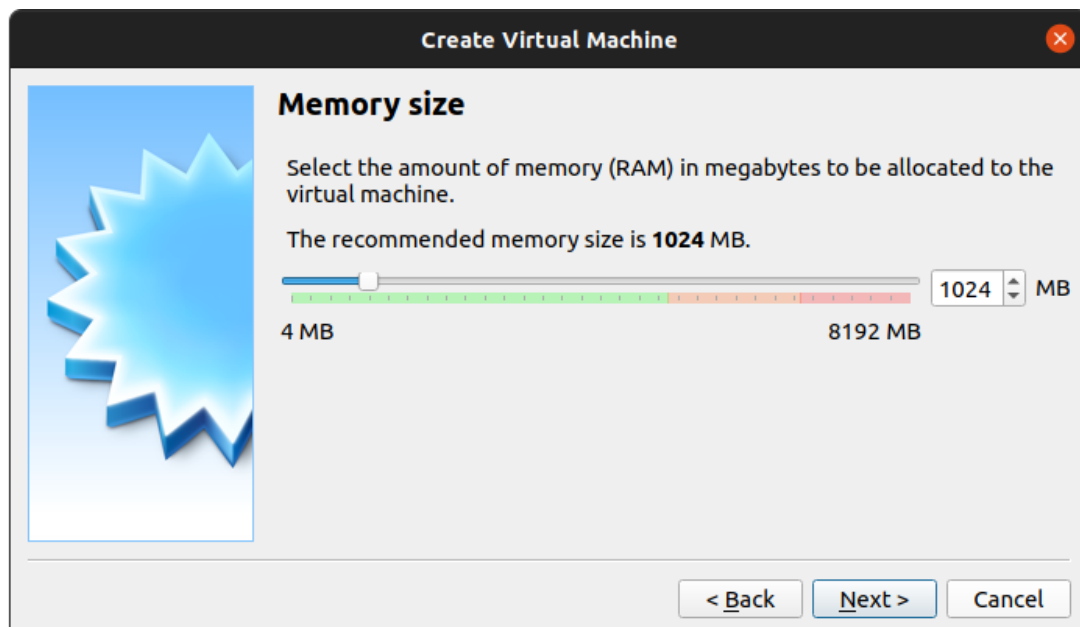
Version: Ubuntu (64-bit)



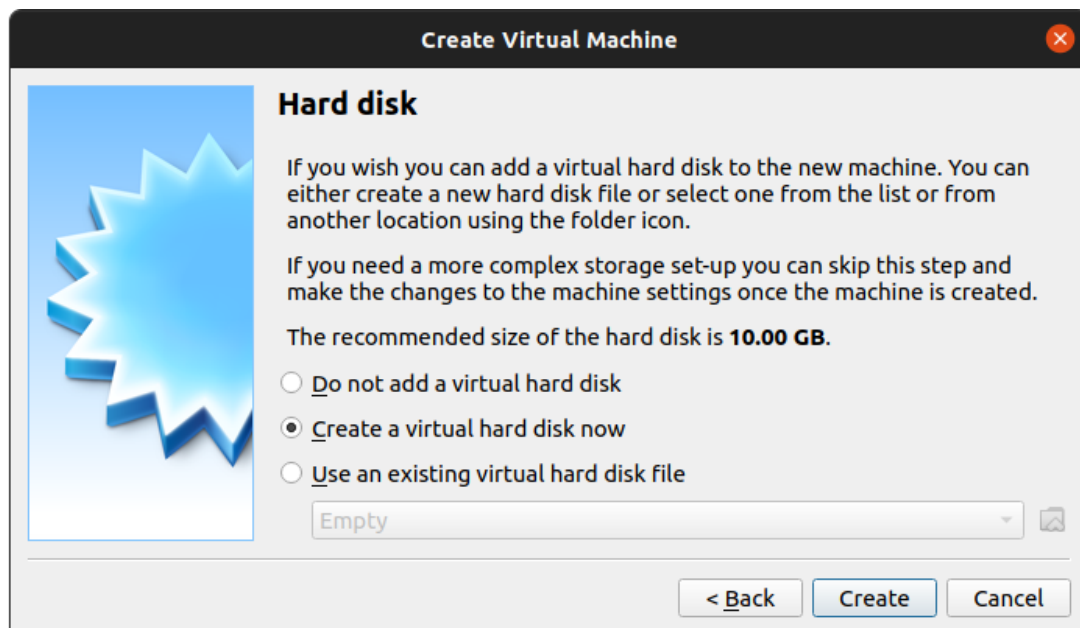
On the next screen, you will be able to select the amount of RAM from your main PC that the virtual machine will access. Be sure to remain inside the green bar to ensure you can continue to work outside of the VM whilst it's running!

Note: If you select Expert Mode, you will be given the option to set all of these parameters in one go. Useful for future setups!

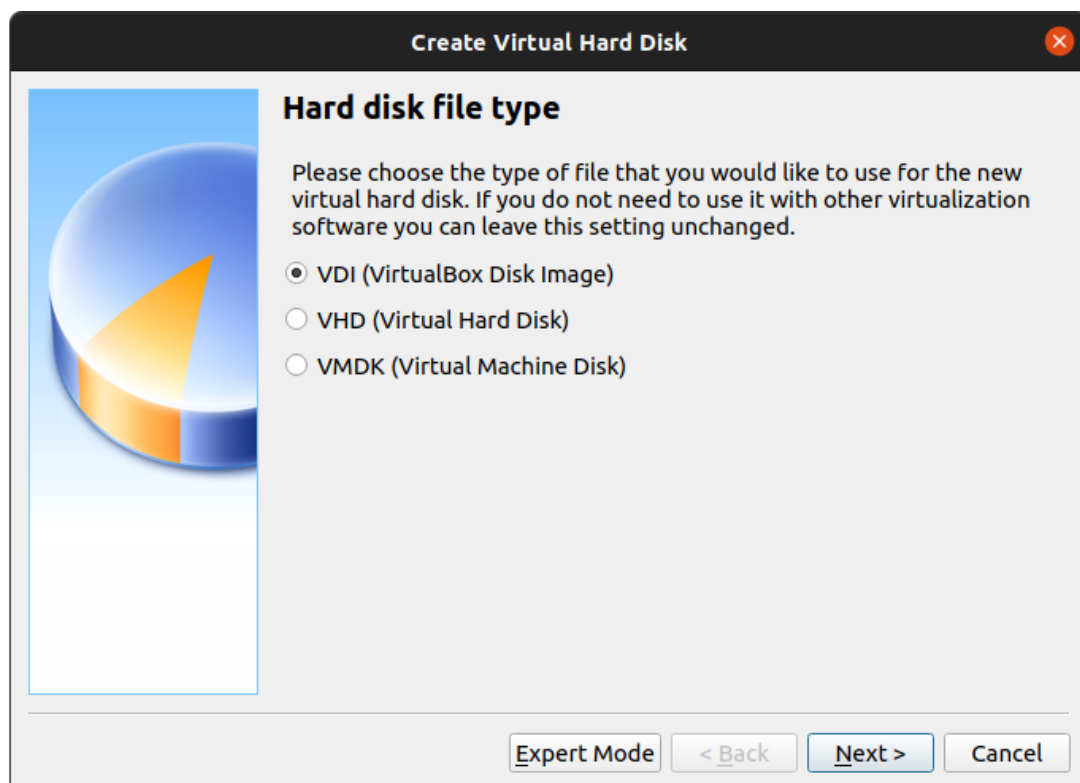
It's fine to use the default settings for now.



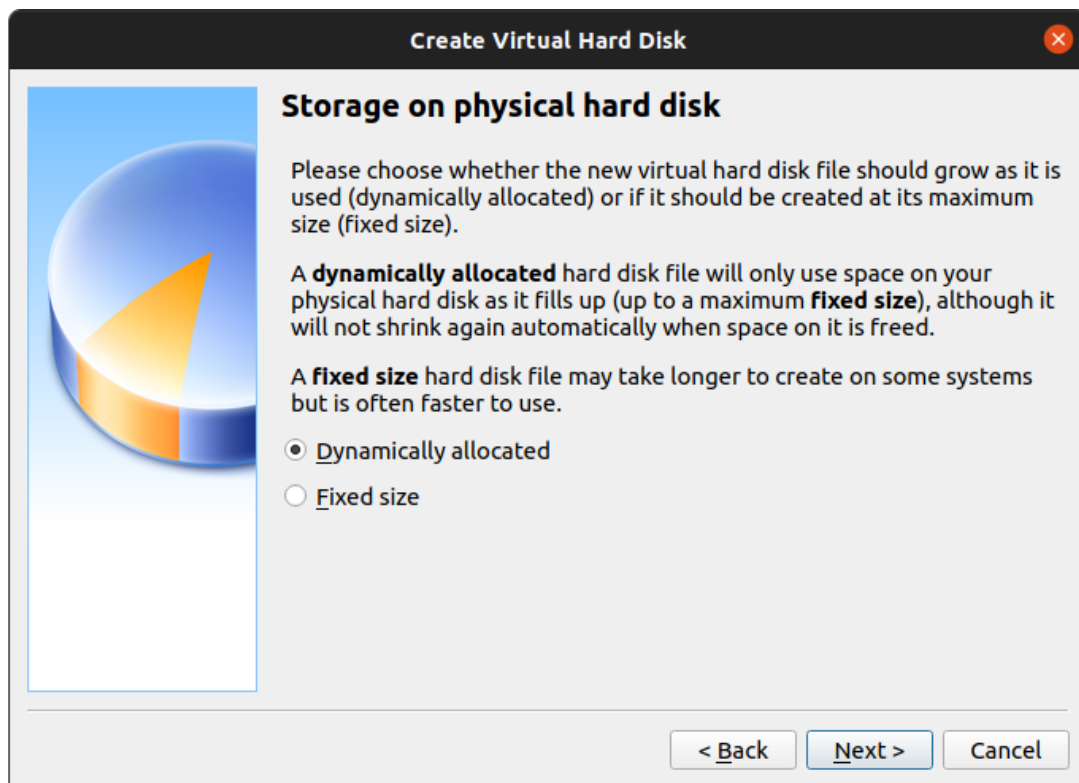
After that, you can select how much of your hard disk your VM will use.



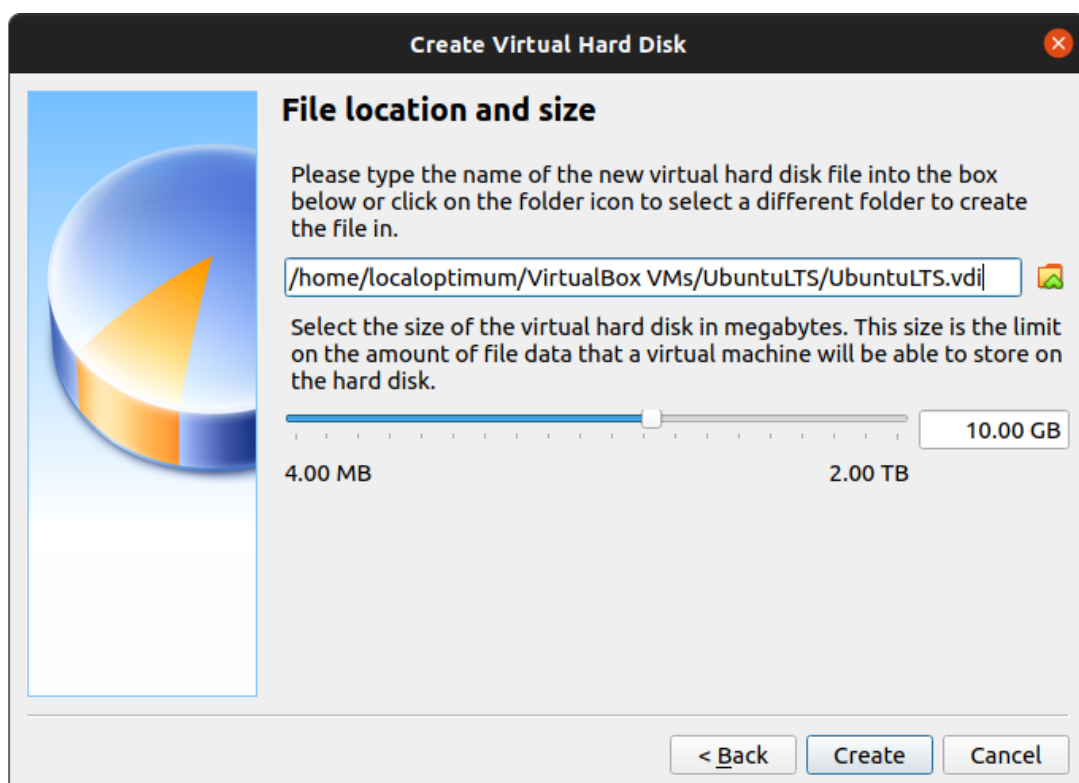
The type of hard disk depends on whether you use VirtualBox with other VM software. For now, we can leave this as a VDI.



Then you can choose whether the hard disk is dynamically allocated (up to the limit we will set on the next screen), filling up as the VM requires it. Otherwise, we can tell it to allocate the full amount of memory right from the start. This will improve performance but may take up unnecessary space. We'll leave it as dynamically allocated for this tutorial.



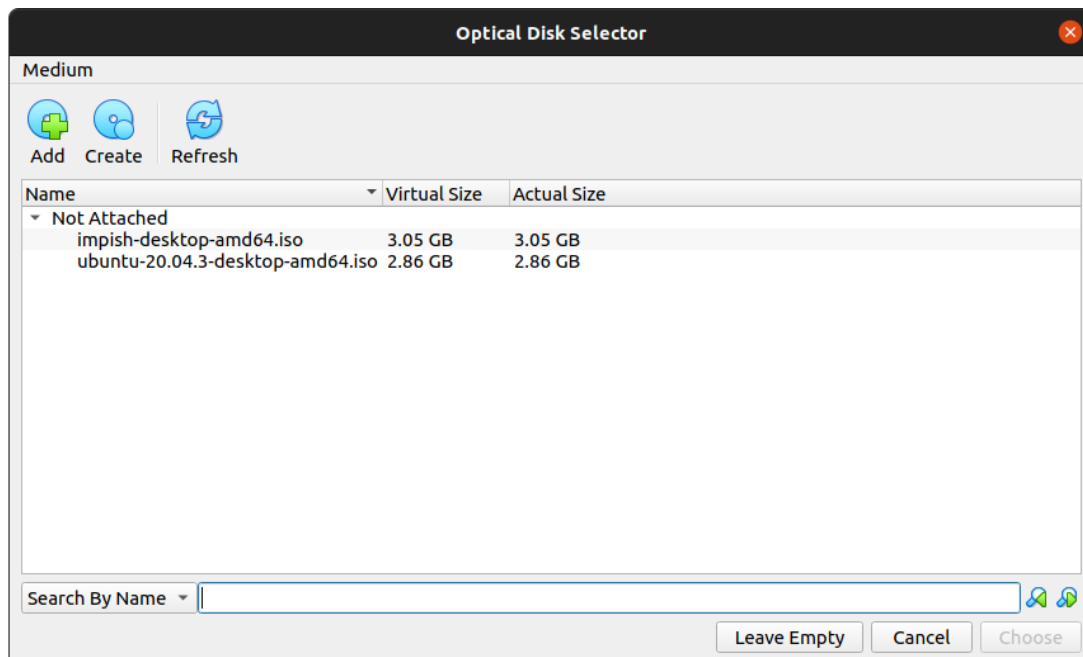
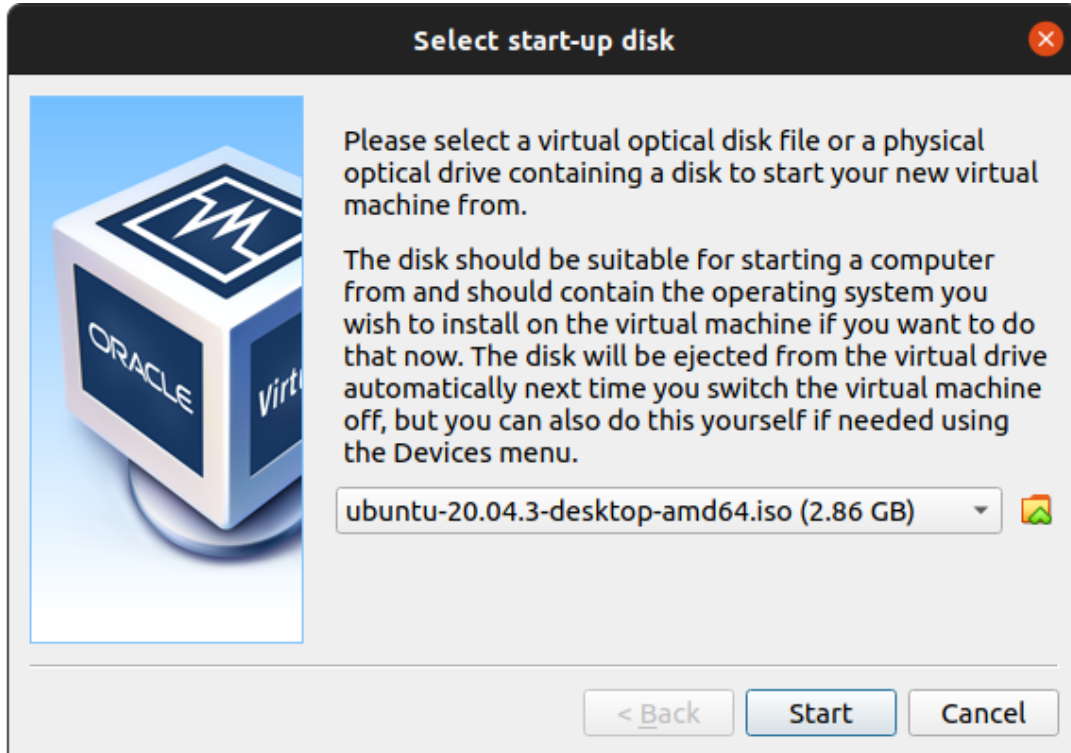
Finally you can set the maximum amount of memory your VM can access.



After this click Create to initialize the machine!

- Install your image

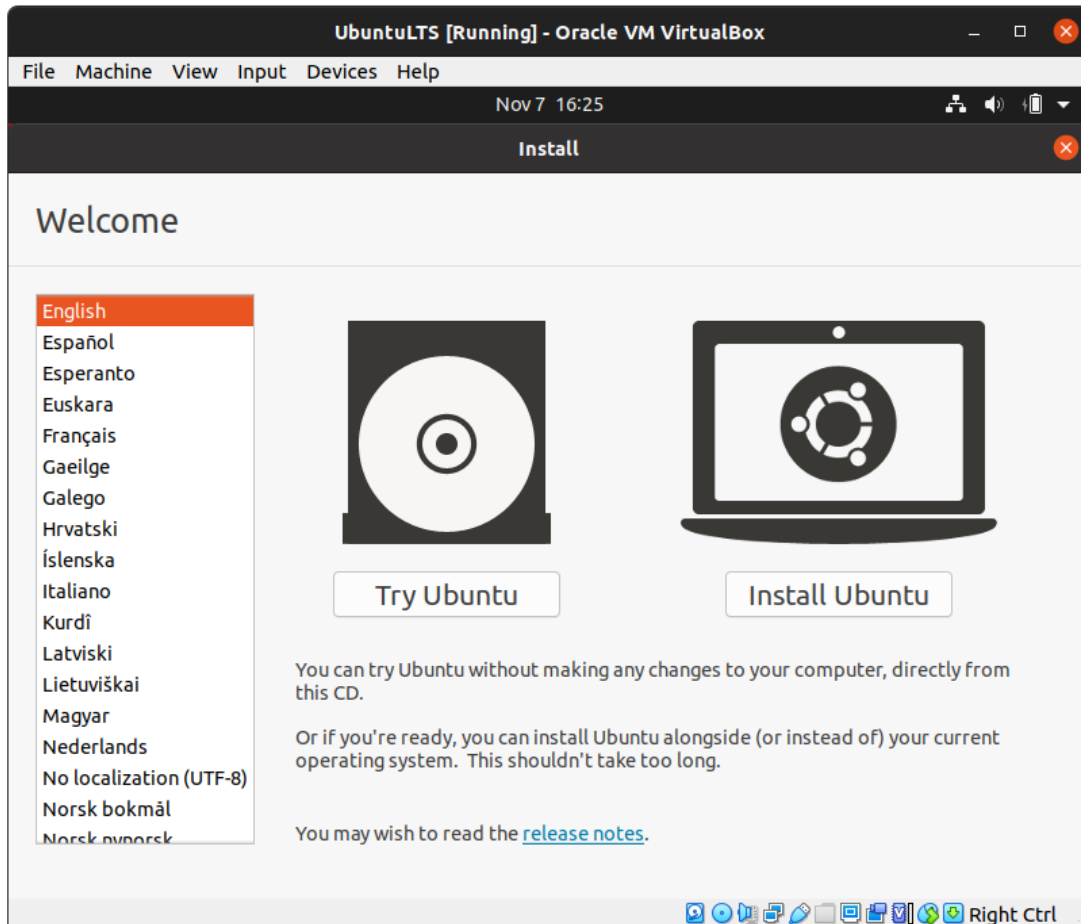
Click Start to launch the virtual machine. You will be prompted to select the start-up disk. Use the file icon to open the Optical disc selector and click Add to find your .iso file



Choose the disc image you want to use, then click Start on the start-up disc window.

Note: If you close this window before selecting an image you can still do so from the Devices menu at the top of the VM window.  
Select Devices > Optical Drives > Choose/Create a disc image...

Ubuntu desktop should now boot and display the installation menu.

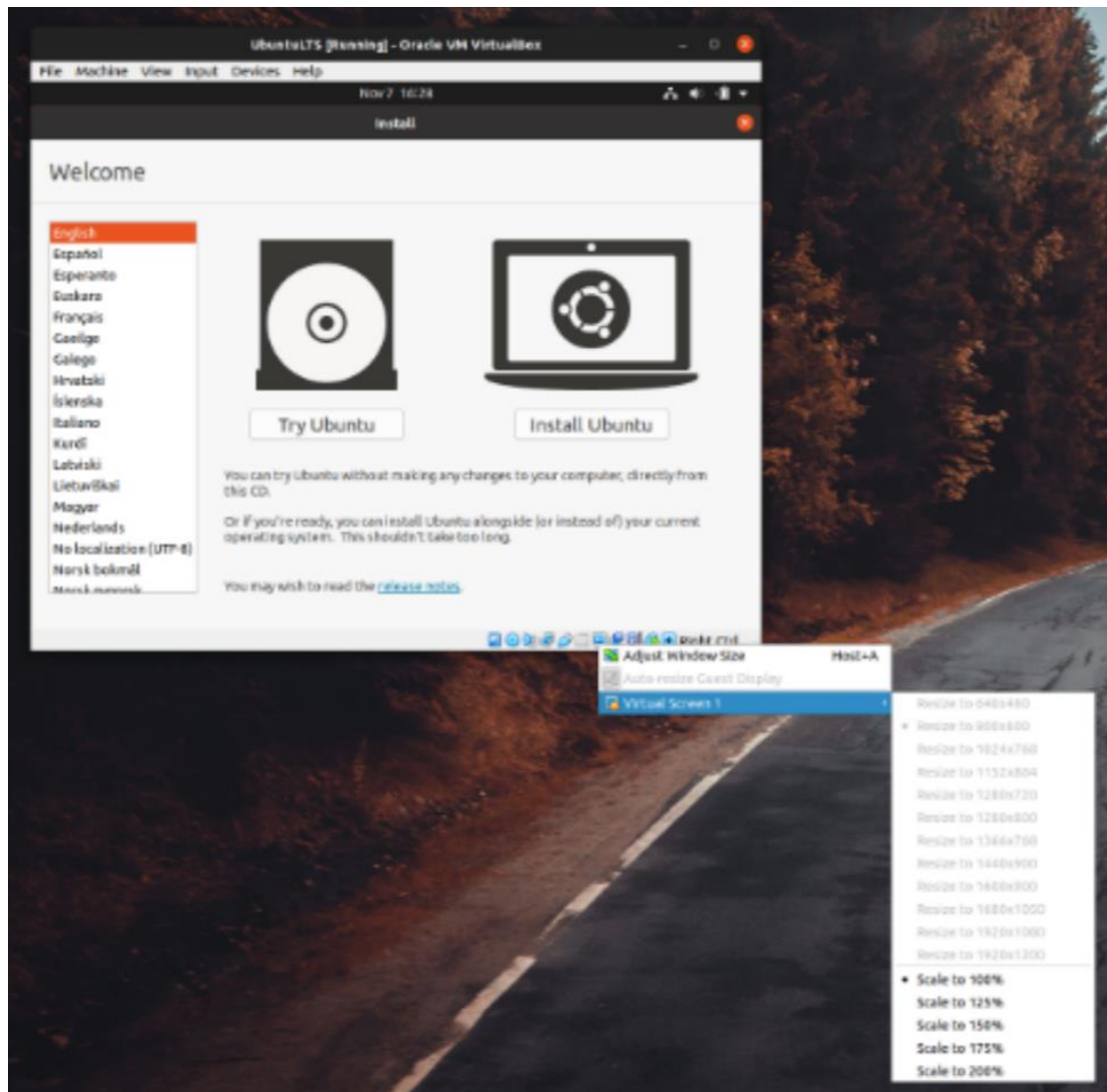


After this point you can follow the normal [installation flow](#) for Ubuntu Desktop.

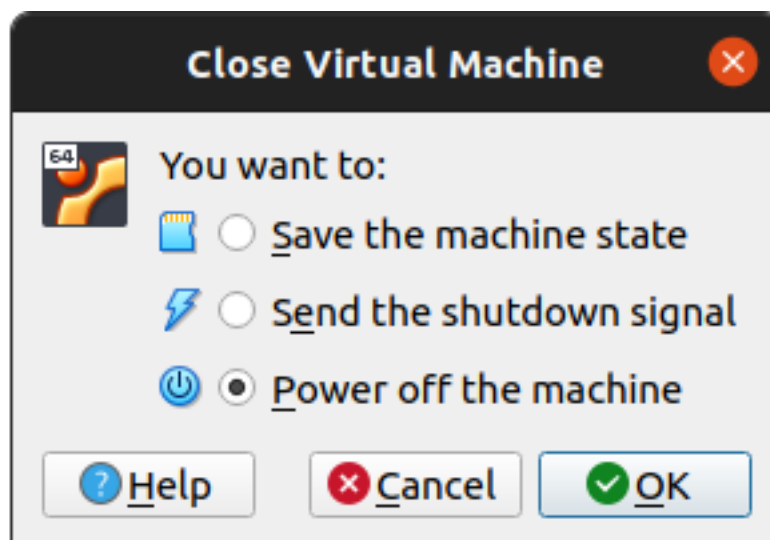
But there's one more thing to talk about before we move on!

### Changing the window resolution

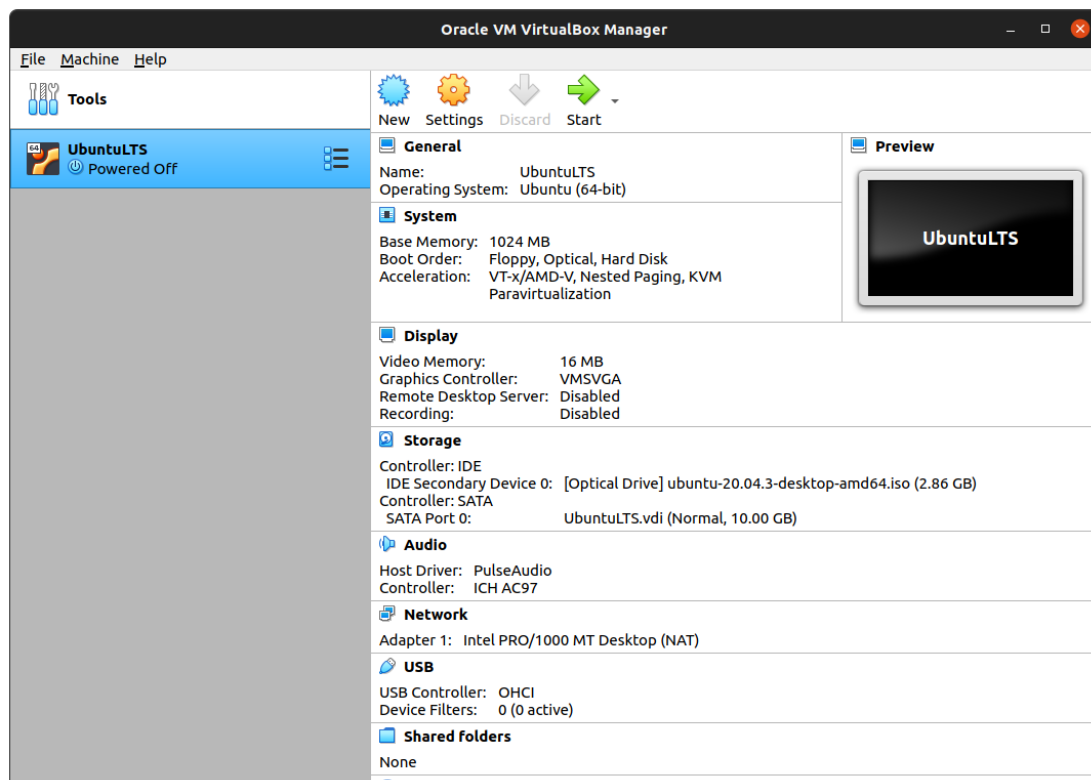
You'll notice that by default VirtualBox only displays at 800x600 resolution. But if you right click the Window in monitor icon at the bottom of the screen and select Virtual Screen 1, there are many more options available, but greyed out.



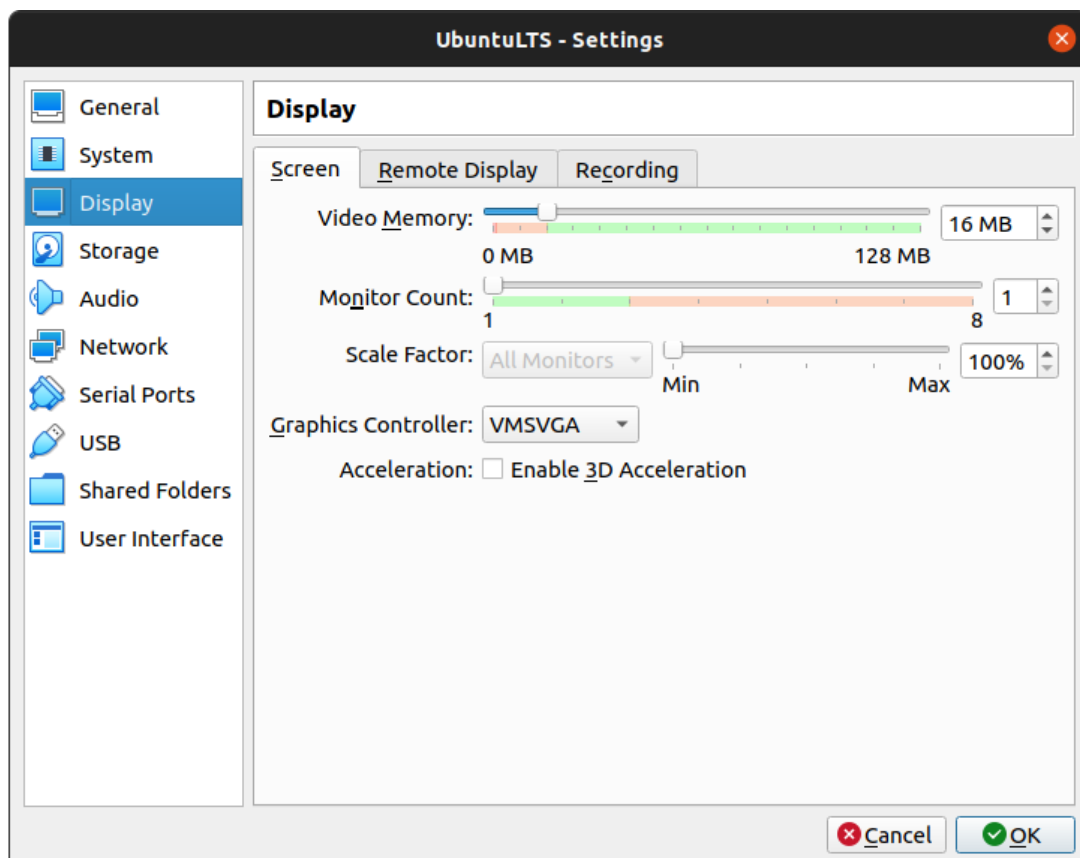
To resolve this we need to change some settings. Close the window and select Power off the machine.



Return to the manager window and select Settings.

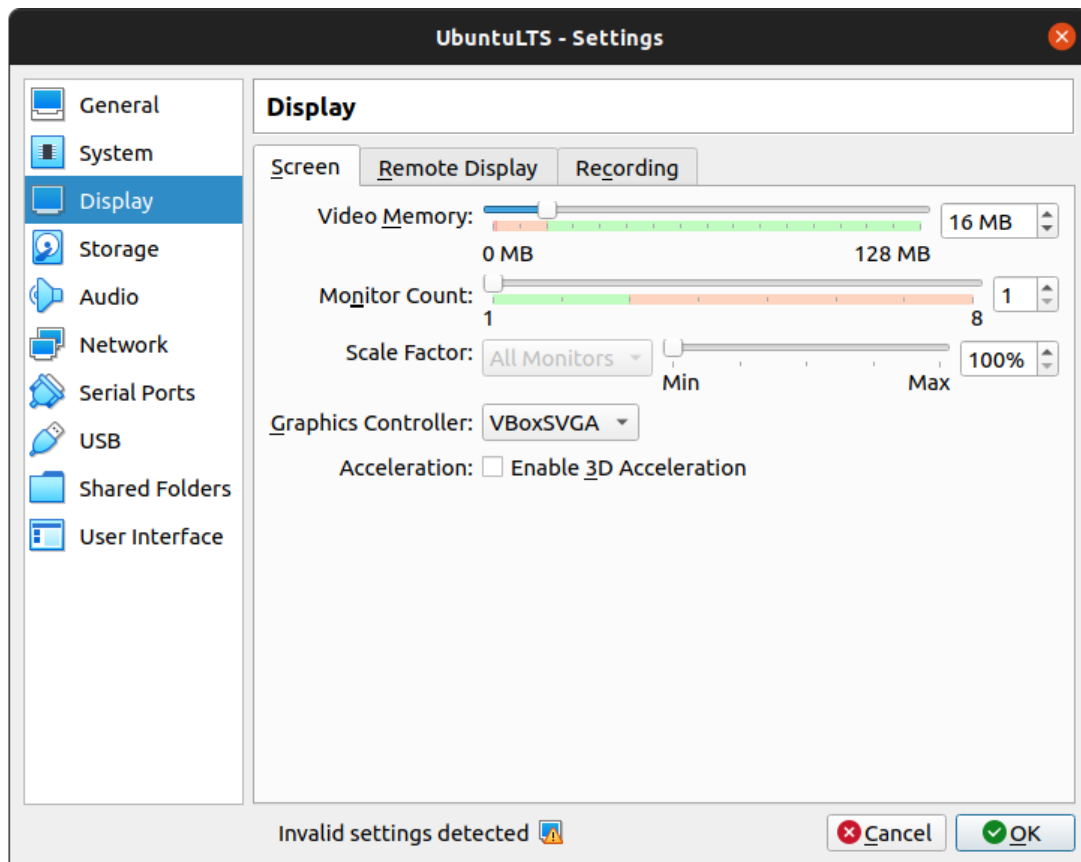


Then navigate to the Display tab.



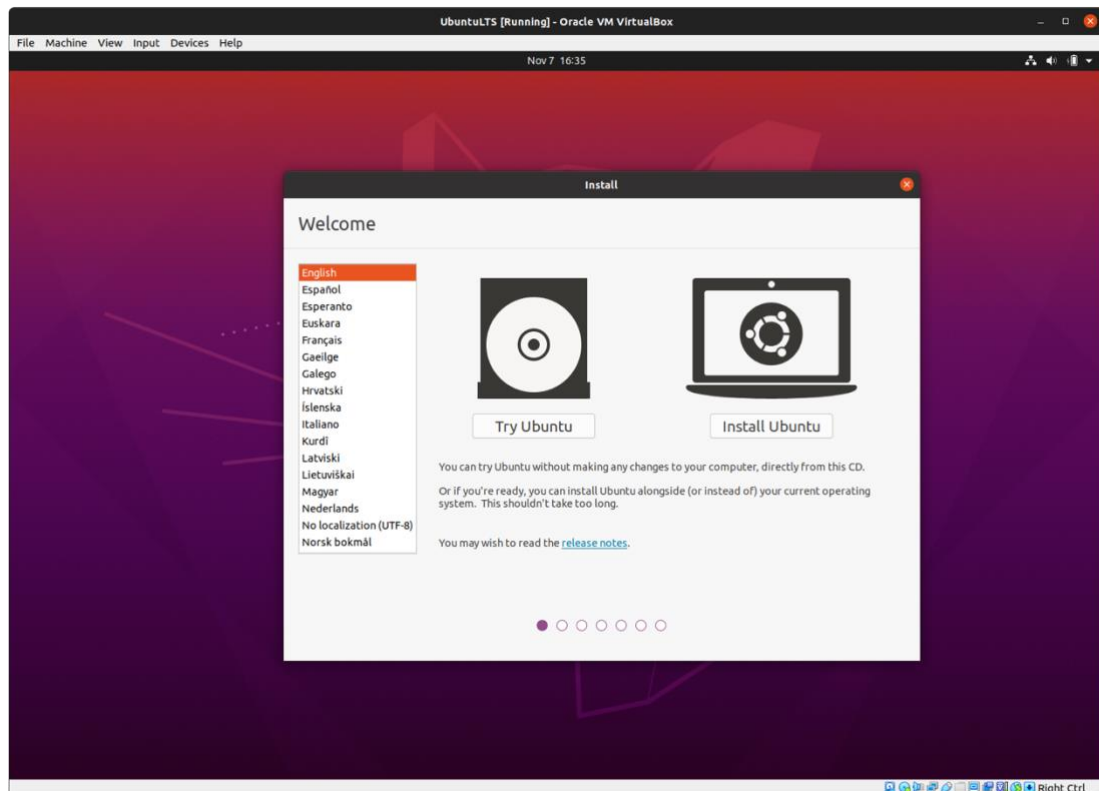


Change the Graphics Controller setting to VBoxSVGA and click OK (ignore the warning).



- Now restart your virtual machine.

Once Ubuntu has started, you should now be able to select all of the available resolutions from the virtual monitor menu, or simply resize the window to adjust the display.



That's the end of the primary tutorial. Congratulations, you now have Ubuntu running on a virtual machine!

What follows are some more advanced options if you'd like to explore VirtualBox further.

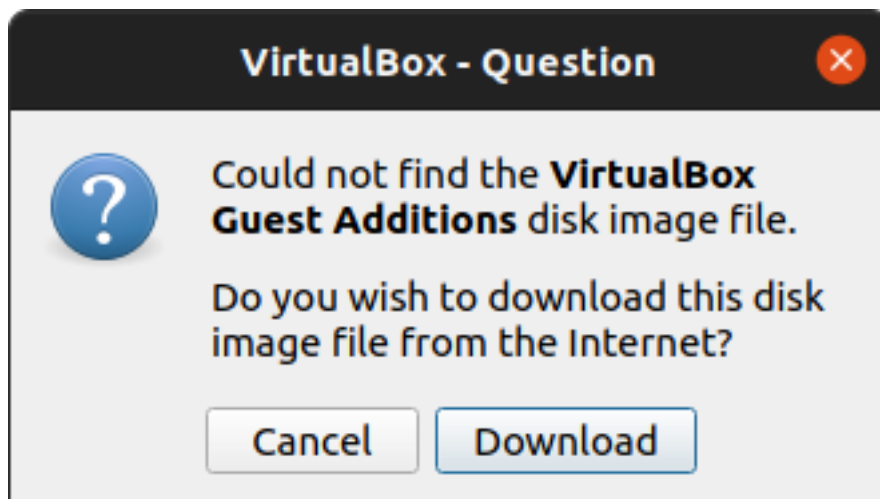
- [Installing Guest Additions](#)

Guest Additions is an extra piece of software that unlocks some more advanced features of VirtualBox. This includes better integration between your virtual machine and the host machine, as well as improved video support that enables the display resolution options when using VMSVGA.

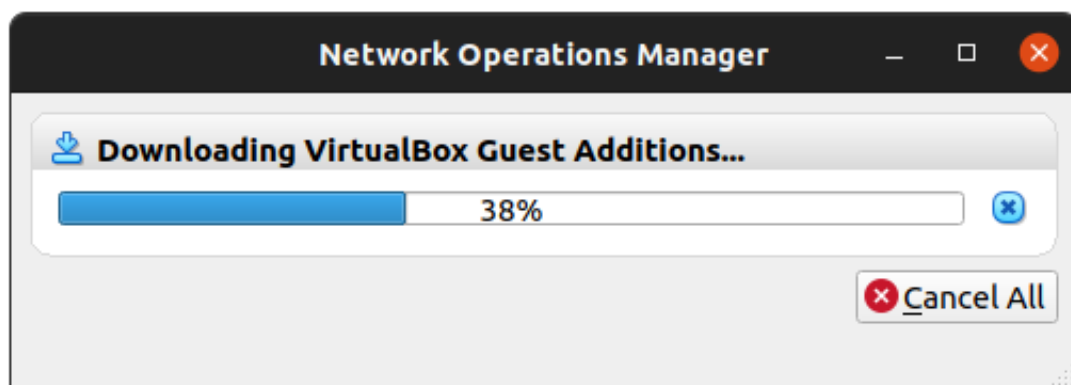
To install Guest Additions, you need to complete your installation of Ubuntu in your virtual machine and boot to the desktop.

From there, select **Devices > Insert Guest Additions CD**.

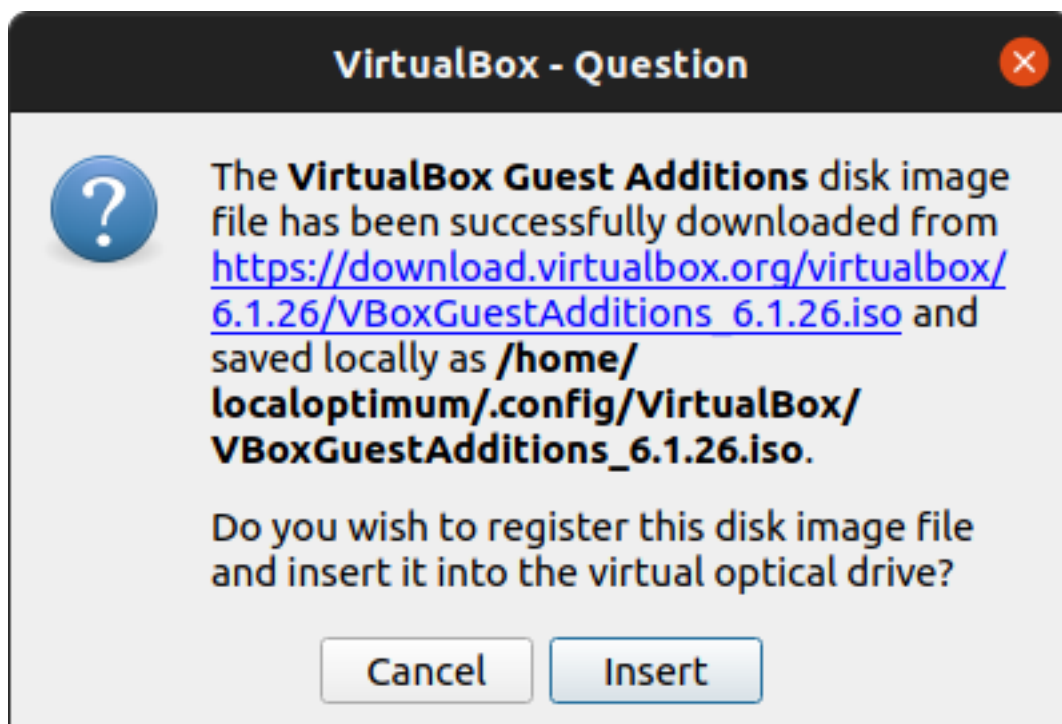
This will prompt you to download the Guest Additions disk image file.



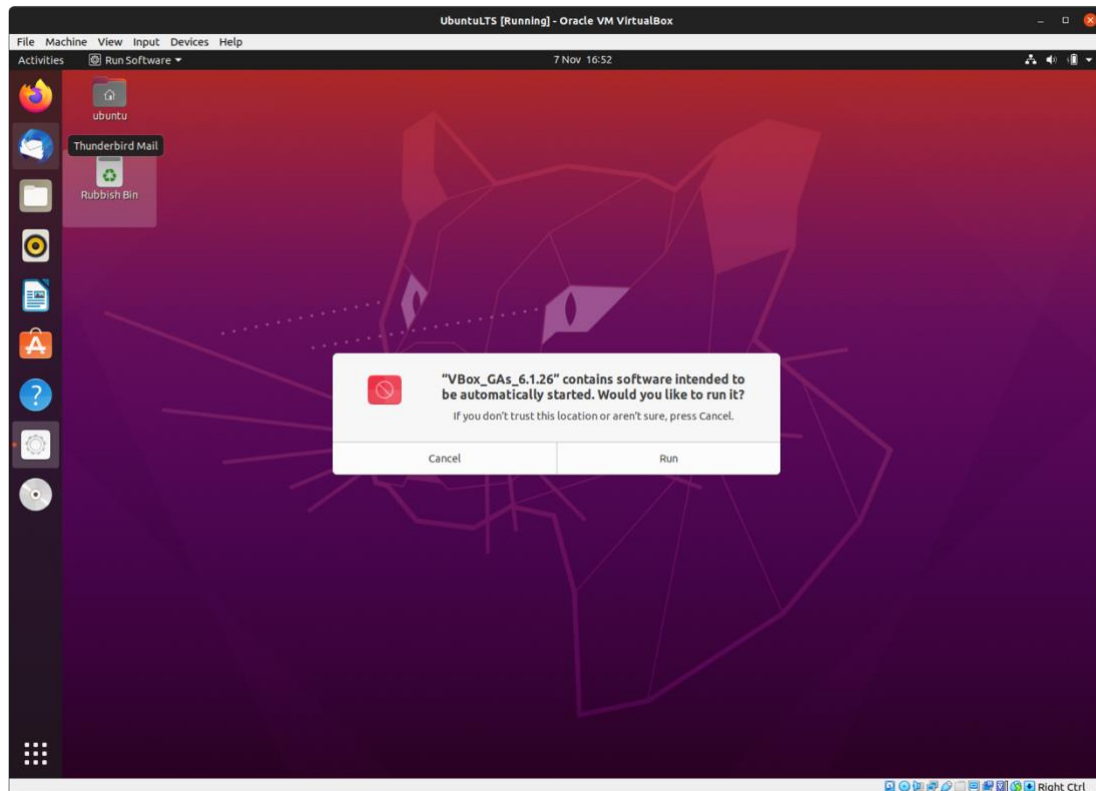
Click Download.



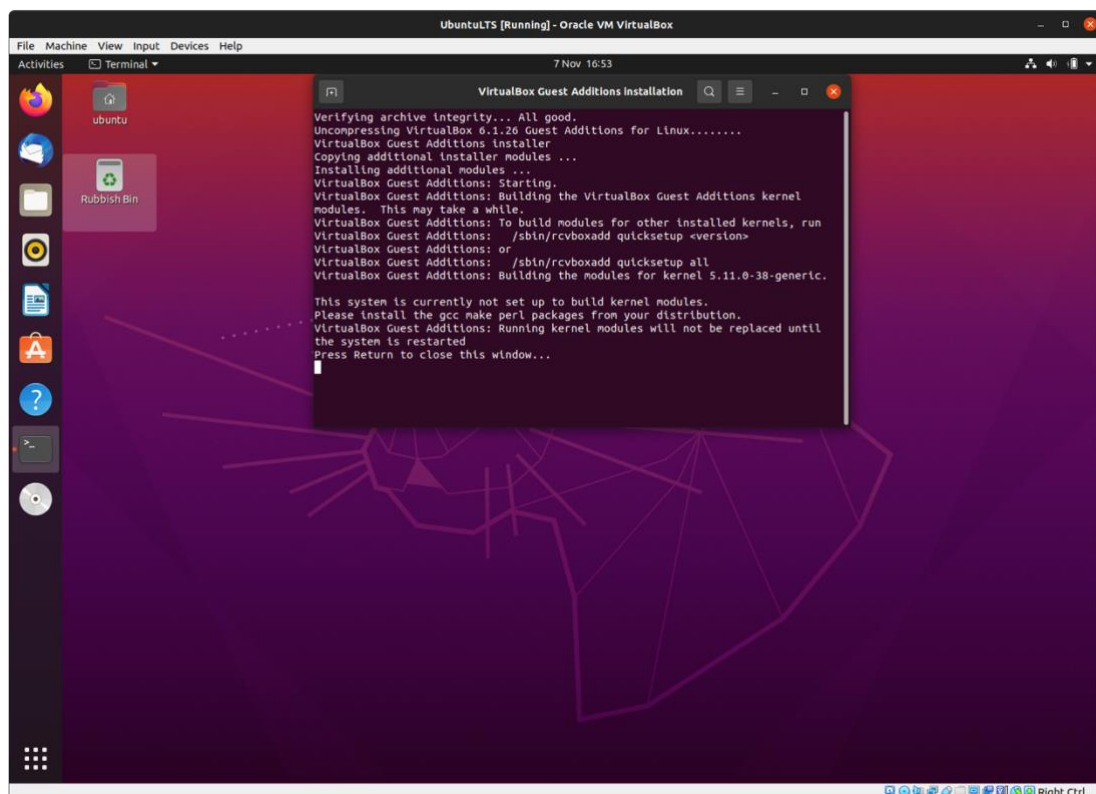
Then click Insert.



The disc will appear inside your virtual desktop and you will be prompted to run the software.

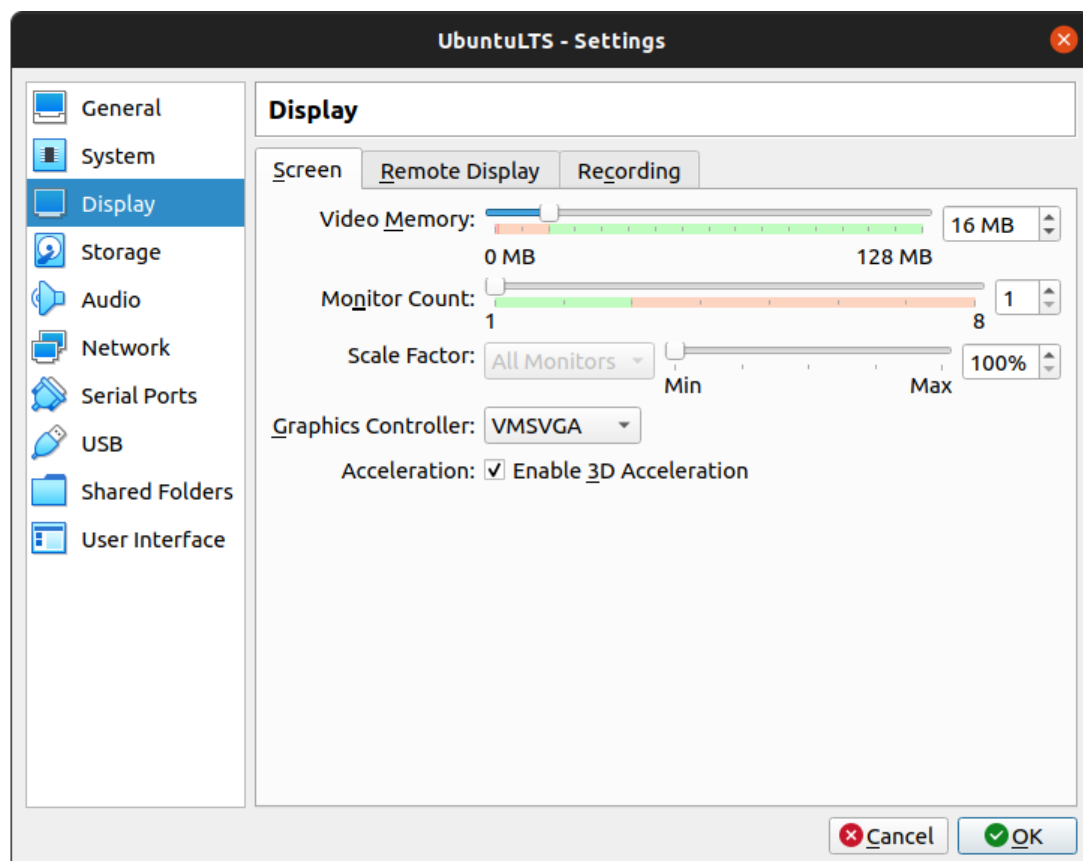


Enter your password to install it.



Once this is complete, you will need to restart your virtual machine for the new features to take effect.

Close the machine, but *before* you start it up again, return to the Settings menu and change the Graphics Controller back to VMSVGA and Enable 3D Acceleration. This will improve the performance of your virtual machine by taking advantage of your PC's 3D hardware and allow you to resize your desktop resolution!



Another feature this unlocks is the shared clipboard, which you can activate in Devices > Shared Clipboard. This will allow you to copy and paste between your virtual and host machines, useful when you want to copy outputs from one device to the other.

### Third step : Install ROS on Jetson Nano.

#### Directions

In the Start Menu, go to **Preferences -> Software & Updates**. Then click on it.

Make sure **main, universe, restricted, and multiverse** are all checked. Then close the window.

Now open up a new terminal window, and type (or copy and paste) the following command:

```
sudo sh -c 'echo "deb http://packages.ros.org/ros/ubuntu $(lsb_release -sc) main" > /etc/apt/sources.list.d/ros-latest.list'
```

The command above sets your computer up to accept software from packages.ros.org.

Now we need to set up the secure keys so that our system accepts what we are going to download.

For the next step, update the package list on your system.

```
sudo apt update
```

Now type:

```
sudo apt-key adv --keyserver 'hkp://keyserver.ubuntu.com:80' --recv-key C1CF6E31E6BADE8868B172B4F42ED6FBAB17C654
```

Now do a full desktop install of ROS. The command below installs all the software, tools, algorithms, and robot simulators for ROS. After you type the command and press Enter, press Y and hit Enter when asked if you want to continue. It will take a while to download all this stuff, so feel free to take a break while ROS downloads to your system.

```
sudo apt-get update
```

```
sudo apt install ros-melodic-desktop-full
```

Type **Y** and press Enter to complete the installation.

Set up the environment variables.

```
echo "source /opt/ros/melodic/setup.bash" >> ~/.bashrc
```

```
source ~/.bashrc
```

Note that anytime you want to see what environment variables ROS is using, you can type the following command:

`export | grep ROS`

This command will show you the ROS distribution you are using, the version of Python ROS is using, and a bunch of other stuff.

The two key variables are as follows:

ROS\_MASTER\_URI: Shows the URL where the roscore is in execution. This is often your own local computer.

ROS\_PACKAGE\_PATH: Shows the path on your computer where the ROS packages are.

Install some other tools that you will work with in ROS. After you type the command below, press Y and Enter to complete the download process.

`sudo apt install python-rosdep python-rosinstall python-rosinstall-generator python-wstool build-essential`

Press **Y** and hit Enter.

Now initialize rosdep. This is a tool that is required before you can use ROS.

`sudo apt install python-rosdep`

`sudo rosdep init`

`rosdep update`

Here is the last step of the installation process. Check which version of ROS you have installed. If you see your ROS version as the output, congratulations you have successfully installed ROS!

`rosversion -d`

## Resource :

<https://ubuntu.com/tutorials/how-to-run-ubuntu-desktop-on-a-virtual-machine-using-virtualbox#1-overview>

<https://automaticaddison.com/how-to-install-ros-melodic-on-the-nvidia-jetson-nano>