

## Installing ROS

Unfortunately, ROS Kinetic does not fully support its software on OS X and Windows so we're going to have to create a VM and use Ubuntu through that.

### Creating VM

Step 1.

Download Ubuntu for OS X.

<https://www.ubuntu.com/download>

Step 2.

Download Oracle VM Virtual Box. Select Mac OS X (64-bit)

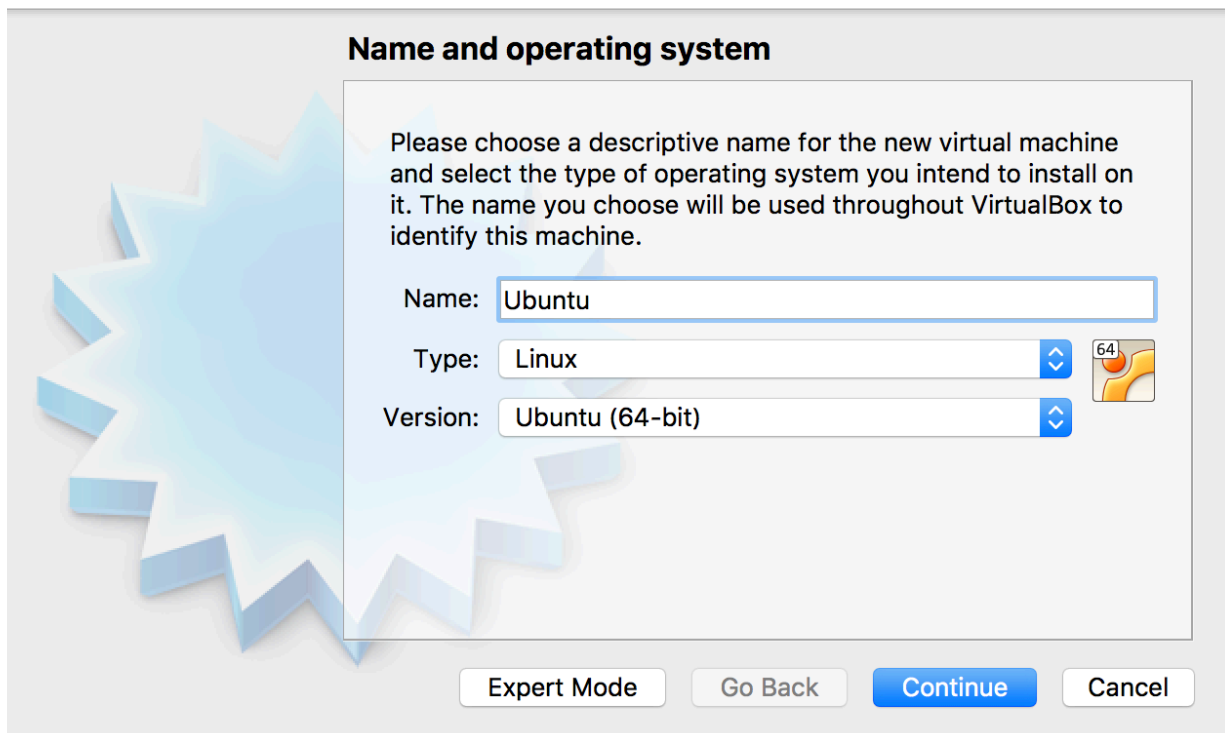
<http://www.oracle.com/technetwork/server-storage/virtualbox/downloads/index.html>

Step 3.

After VM download is complete, select installation file (VirtualBox.pkg) and follow the steps that appear.

Step 4.


Open the VM application and at the top left corner, select the New Button. You'll be asked to input a name and to select an operating system. We'll be naming our VM Ubuntu and the Type will be Linux and version Ubuntu (64-bit). (Note: if you insert the name Ubuntu, the Type and version will be selected for you). Click continue.



**Name and operating system**

Please choose a descriptive name for the new virtual machine and select the type of operating system you intend to install on it. The name you choose will be used throughout VirtualBox to identify this machine.

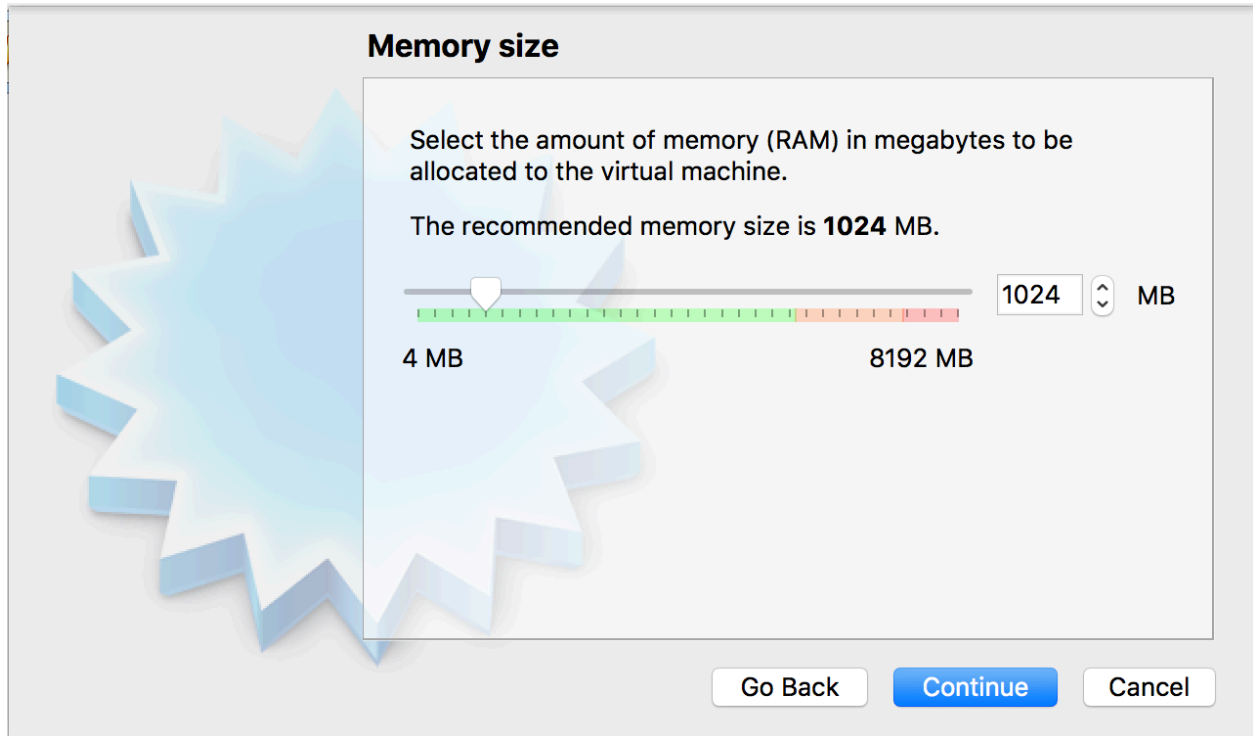
Name:

Type:  

Version:

Step 5.

Next, we select amount memory. I usually choose 8192 because we require a lot memory to install and use ROS. Then, click continue.



**Memory size**

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

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

4 MB 8192 MB

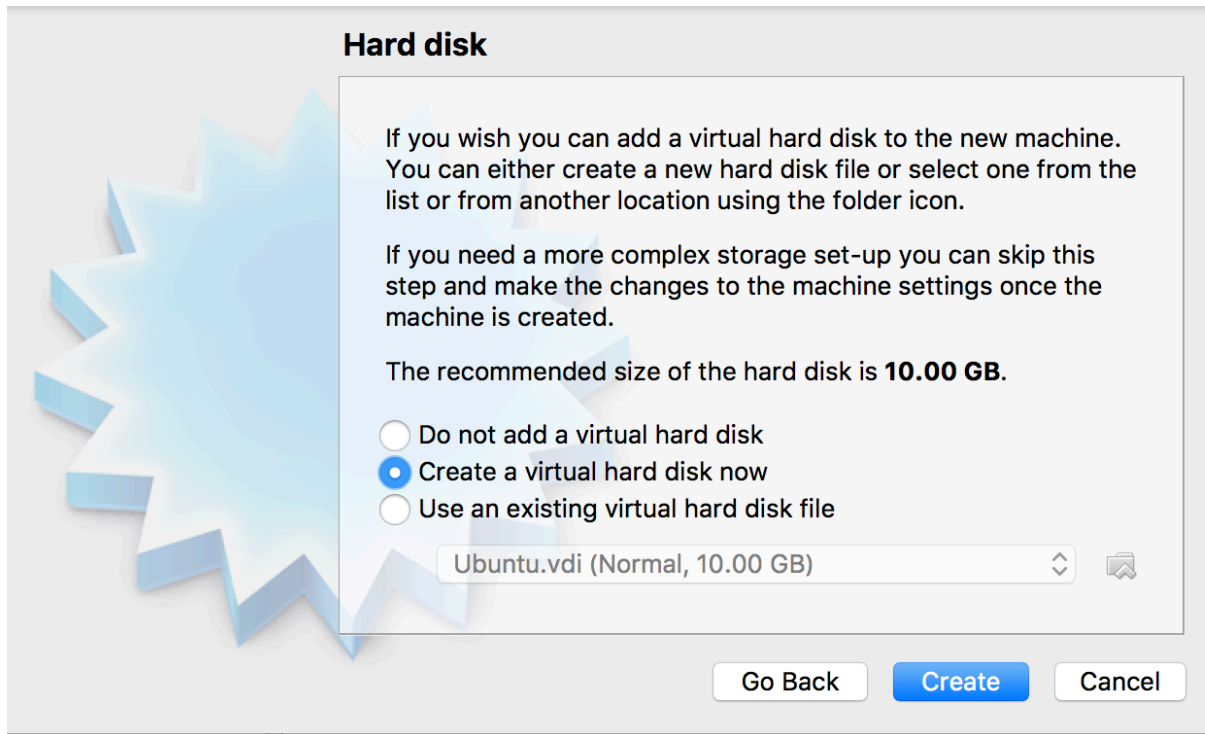
1024 MB

Go Back Continue Cancel

The dialog box features a large, stylized blue gear icon on the left. The main content area is a white rectangle with a thin border. It contains instructional text, a recommended value, a horizontal slider with a green-to-red gradient, and three buttons at the bottom. The slider has tick marks every 1024 MB, with '4 MB' at the start and '8192 MB' at the end. The current selection is '1024 MB', which is also shown in a text box to the right of the slider.

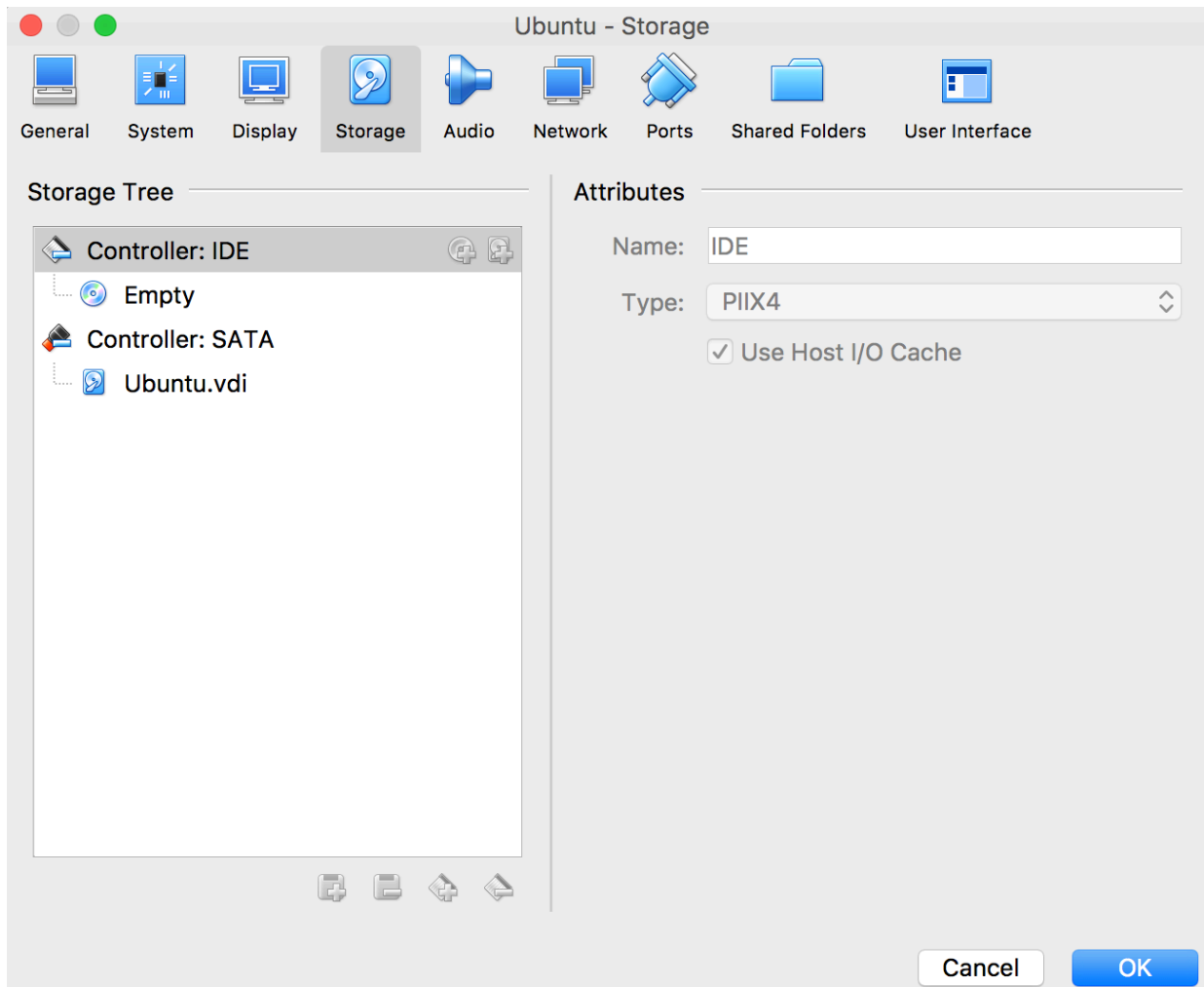
Step 6.

We need to add a virtual hard disk to our VM, here we select "Create a virtual hard disk now". Then a pop up will appear and we select, "Virtual Hard Disk Image" and we'll select "Dynamically allocated" as we want our hard disk to grow in size in case we need more space for our VM. Then we chose our OS size and we chose 10 GB.



Step 7.

We then need to click on the machine we created and add IDE controller this is where we put our Ubuntu source. From here we click “Settings” then select “Storage”.




On the left-hand side, there will be a dropdown called IDE Controller. Click on empty and on the right-hand side we add the source. We do that by selecting the “IDE Secondary Master”. and then the tiny disk beside it. Select “Choose a virtual CD/DVD disk file” and wherever you installed Ubuntu, navigate to that folder and select the dmg file.

Attributes

Optical Drive:

IDE Secondary Master



☐ Live CD/DVD

Information

Type: --

Size: --

Location: --

Attached to: --

Choose Virtual Optical Disk File...  
ubuntu-16.04.3-desktop-amd64.iso

Remove Disk from Virtual Drive

Step 7. Download extension package.

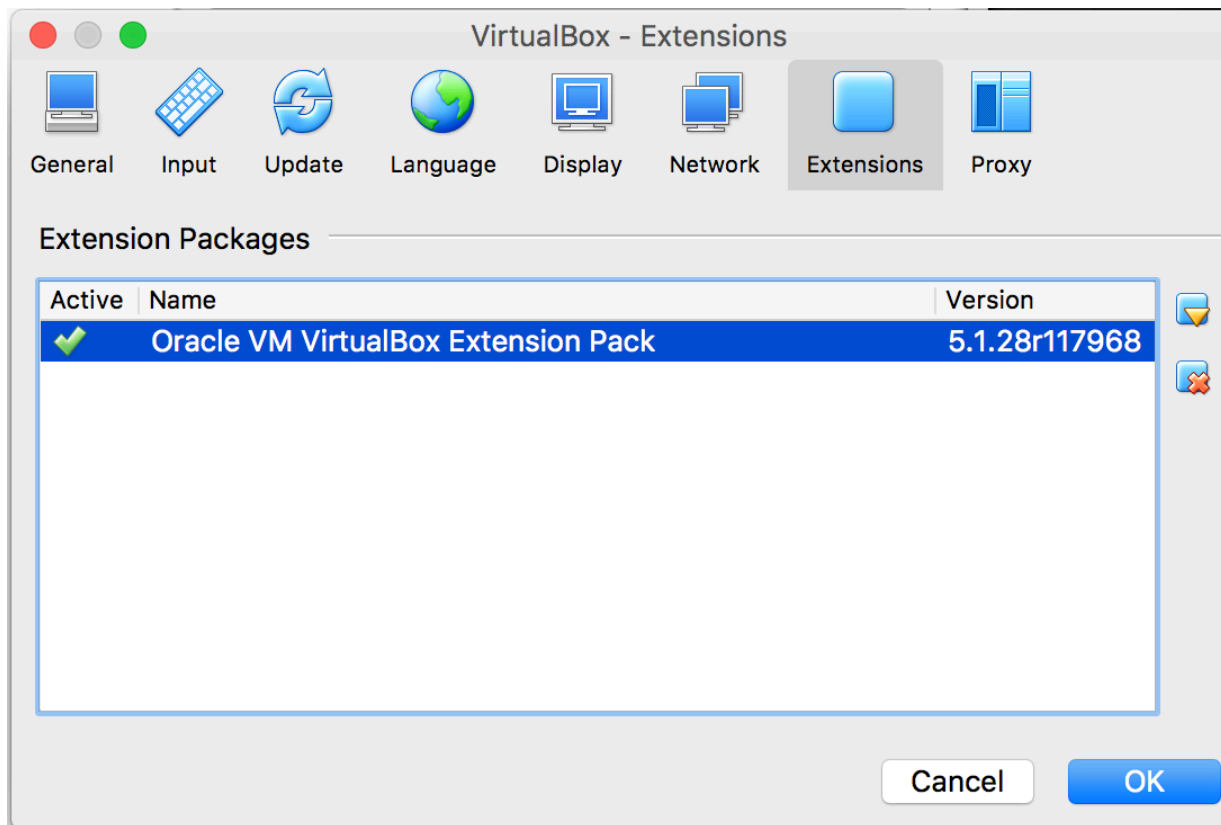
This package will allow you to easily use your usb devices with your vm. Follow this link,

<https://www.virtualbox.org/wiki/Downloads>

and click 'All supported platforms button'. And an extpack should download.

Step 8.

In the vm, select 'Preferences'. From there, select 'Extension' tab and click the little down arrow button. There you will add the package you just download. Once, complete select Ok and Start your VM.



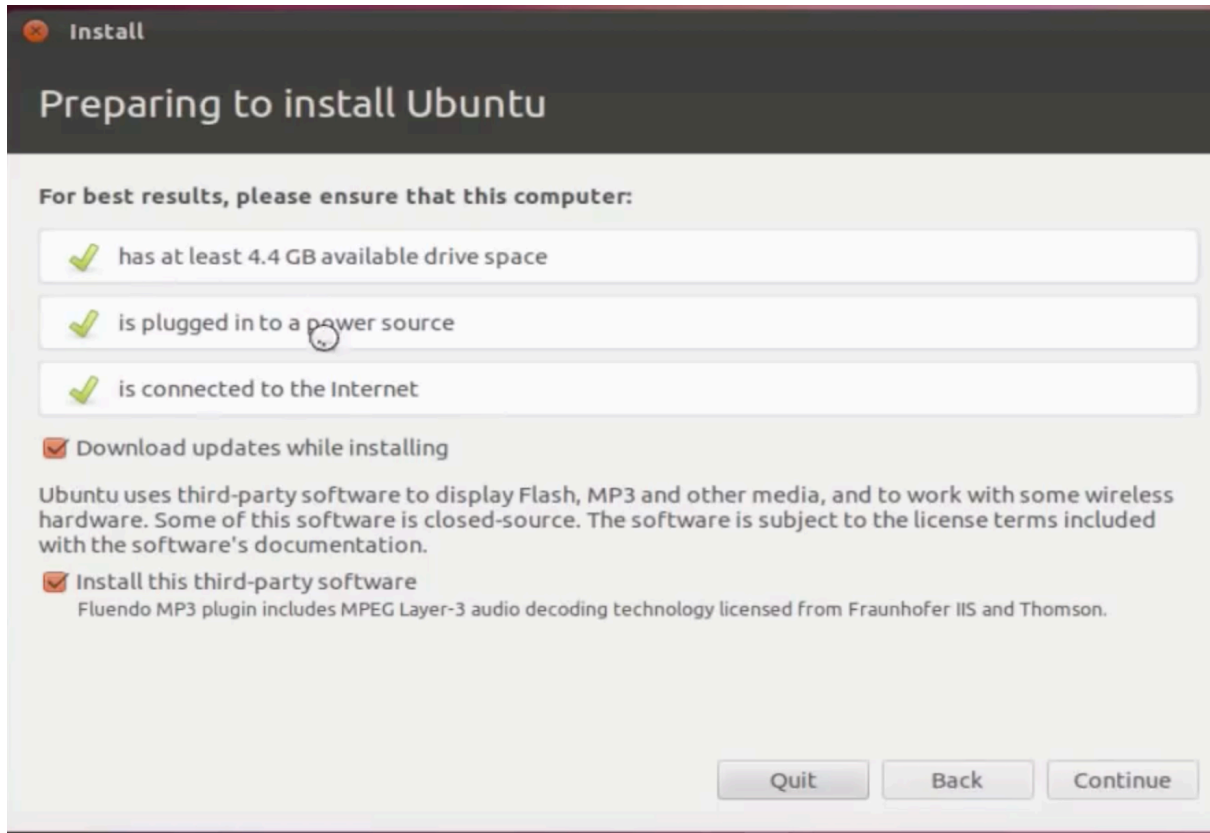
## Installing Ubuntu

Step 1.

Once Ubuntu is running on your VM, the first pop-up will ask you to select how you want to use Ubuntu. Select "Install Ubuntu"

Step 2.

Then, "In preparing to install Ubuntu" select all check-boxes. Click "Continue" and select "Install now".



Step 3.

Ubuntu will then require you to input your options and settings, such as general location, language, user name and password. Then Ubuntu will then install. Once complete Ubuntu will require you to reboot, select “Restart Now” and you’ll have a VM version on your MAC.

### Installing ROS

Step 1.

Select terminal. Click on “Search computer icon” and type in “Terminal”.

Step 2.

Step up your sources.list

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

Step 3.

Step up your keys

```
sudo apt-key adv --keyserver hkp://ha.pool.sks-keyservers.net:80 --recv-key 421C365BD9FF1F717815A3895523BA  
EEB01FA116
```

Step 4.

Install ROS

```
sudo apt-get update
```

Desktop Full Install

```
sudo apt-get install ros-kinetic-desktop-ful
```

if this step doesn't work, your missing certain GPG keys. To fix that we must follow the following.

Step 4.1

First add the webupd8 repository for this program

```
sudo add-apt-repository ppa:webupd8team/y-ppa-manager
```

Step 4.2

Update your software list and install Y-PPA-Manager:

```
sudo apt-get update  
sudo apt-get install y-ppa-manager
```

Step 4.3

```
y-ppa-manager
```

Step 4.4

When the main y-ppa-manager window appears, click on "Advanced."

Step 4.5

From the list of advanced tasks, select "Try to import all missing GPG keys" and click

Step 5.

Initialize rosdep



```
sudo rosdep init  
rosdep update
```

## Step 6

Set up environment

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

Note: whenever you need to update your environment, you must type in the following command

```
source /opt/ros/kinetic/setup.bash
```

## Step 7 Dependencies for building packages

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

Now you should have ROS working on your system ☺

### Create a Workspace

Step 1. Create and build catkin workspace. Catkin is the official build system of ROS. So this is where you can modify, build, and install catkin packages

```
$ mkdir -p ~/catkin_ws/src  
$ cd ~/catkin_ws/  
$ catkin_make
```

Step 2. Before continuing you must source your new setup.\*sh file. (This will be done everytime you start ROS or you can add it to your source file\*)

```
$ source devel/setup.bash
```

Step 3. Check if workspace is properly overlapped with the scripted file

```
$ echo $ROS_PACKAGE_PATH
```

```
/home/youruser/catkin_ws/src:/opt/ros/kinetic/share
```