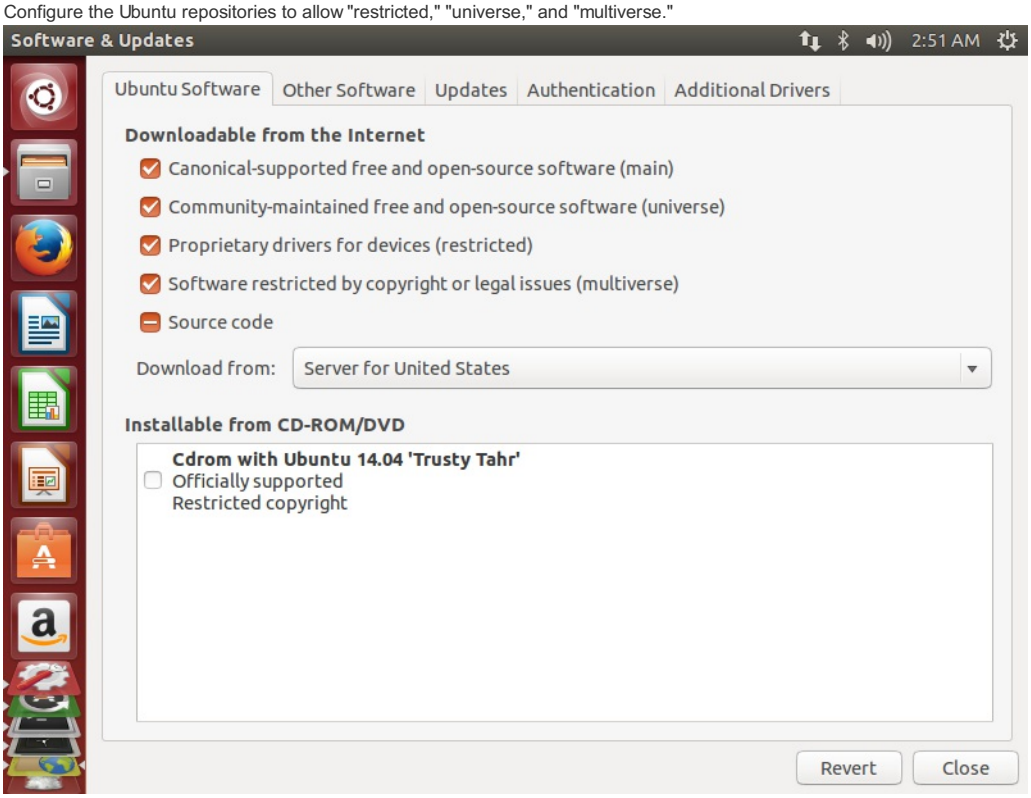
Install ROS

1. Configure Ubuntu repositories

Configure the Ubuntu repositories to allow "restricted," "universe," and "multiverse."



2. Setup your sources.list

Setup the computer to accept software from packages.ros.org. ROS Jade ONLY supports Trusty (14.04), Utopic (14.10) and Vivid (15.04) for debian packages.

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

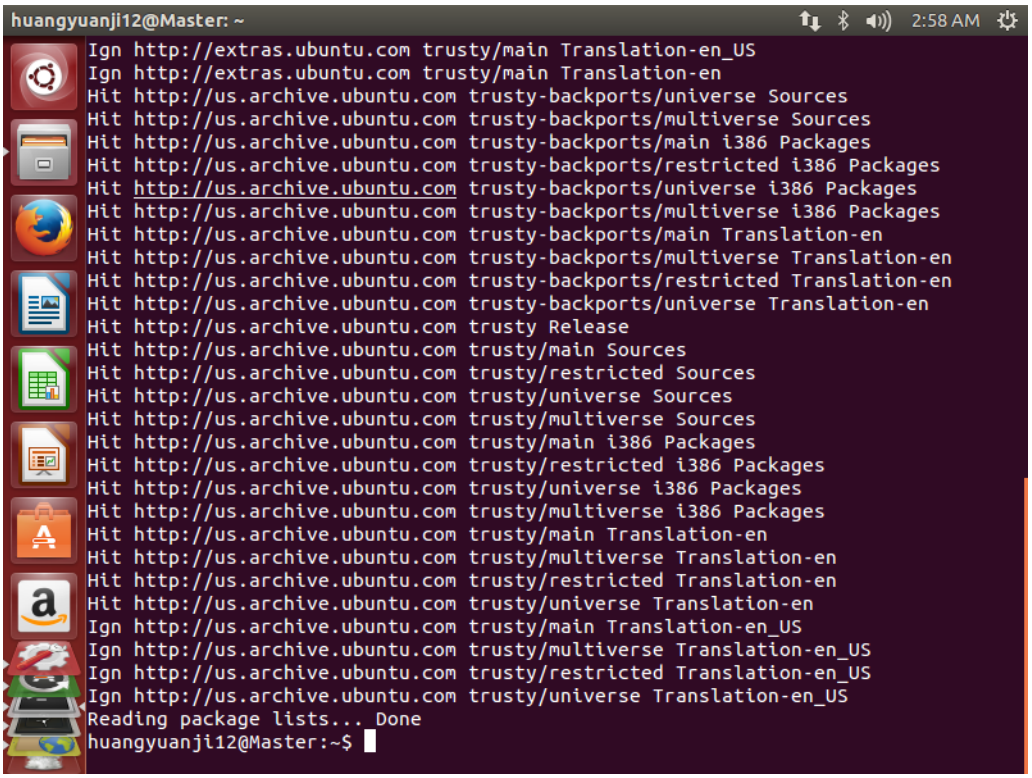
3. Set up your keys

```
sudo apt-key adv --keyserver hkp://ha.pool.sks-keyservers.net:80 --recv-key 0xB01FA116
```

4. Installation

First, make sure Debian package index is up-to-date:

```
sudo apt-get update
```



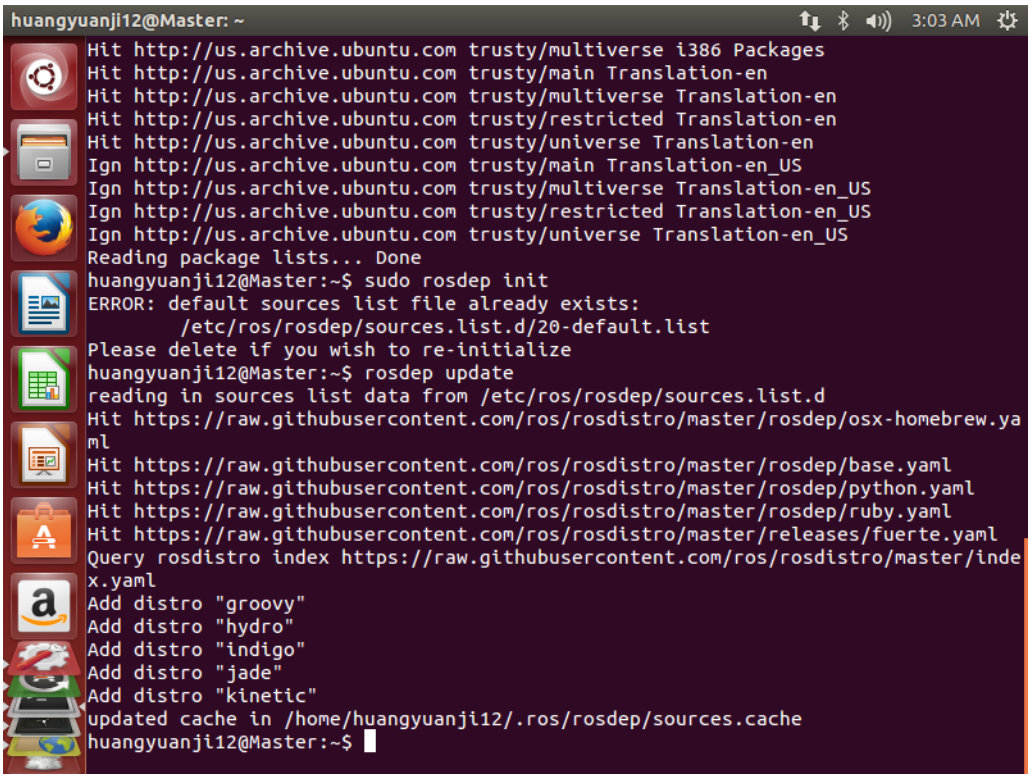
Then we can start the ROS, full version is recommended to be download:

```
sudo apt-get install ros-jade-desktop-full
```

5. init rosdep

Before you can use ROS, you will need to initialize rosdep. rosdep enables you to easily install system dependencies for source you want to compile and is required to run some core components in ROS.

```
sudo rosdep init
rosdep update
```



6. Environment setup

It's convenient if the ROS environment variables are automatically added to your bash session every time a new shell is launched:

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

If you have more than one ROS distribution installed, ~/.bashrc must only source the setup.bash for the version you are currently using.

If you just want to change the environment of your current shell, you can type:

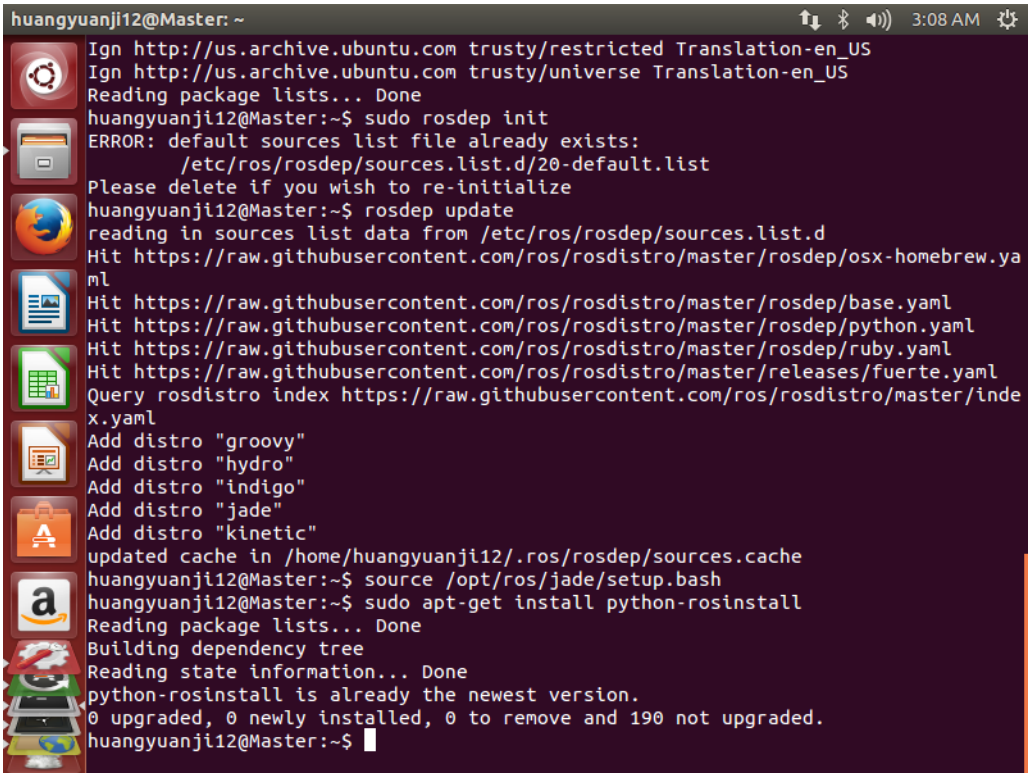
```
source /opt/ros/jade/setup.bash
```

7. Getting rosinstall

rosinstall is a frequently used command-line tool in ROS that is distributed separately. It enables you to easily download many source trees for ROS packages with one command.

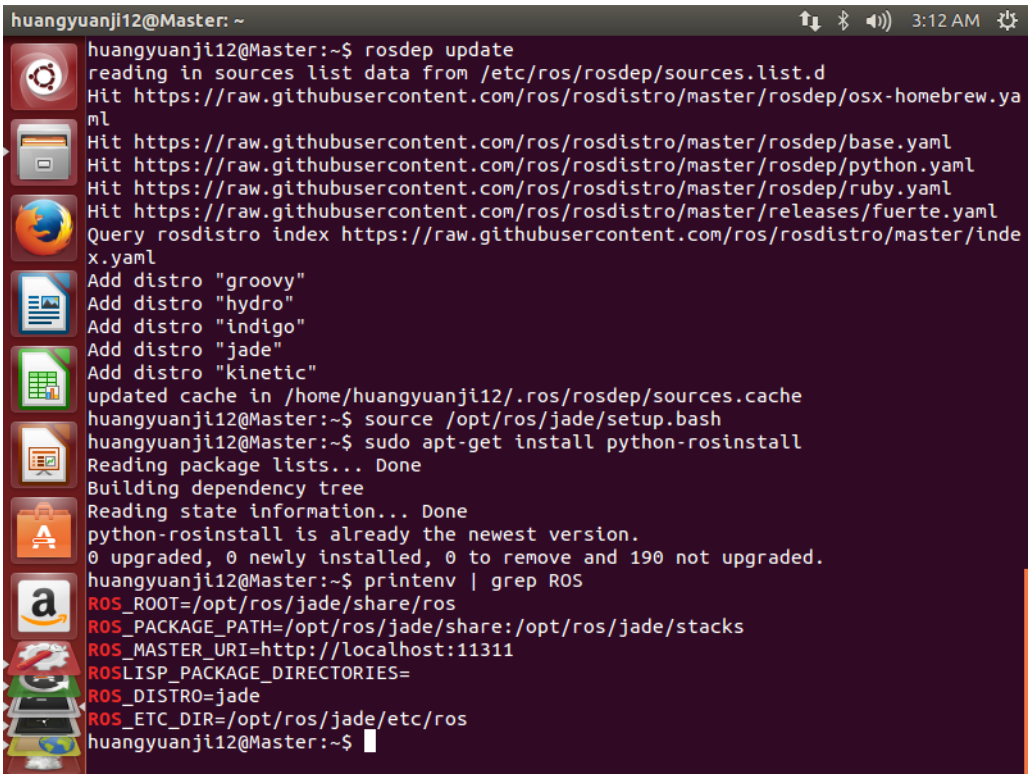
To install this tool on Ubuntu, run:

```
sudo apt-get install python-rosinstall
```



Now the ROS has been installed, using the command to make sure that your enviroment has been properly setup:

```
$ printenv | grep ROS
```



Install cartographer

1. Install ceres solver-1.11.0

Beacuse of the failure in installing ceres solver by the following command

```
catkin_make_isolated --install --use-ninja
```

We need to install the ceres solver in the very first from github:

```
git clone https://github.com/hitcm/ceres-solver-1.11.0.git
cd ceres-solver-1.11.0/build
cmake ..
make -j
sudo make install
```

But during the installation, the system shutdown when using the command

```
make -j
```

so we use make instead of make -j

2. Install cartographer

In this step, we can also get the sourse code from github

```
git clone https://github.com/hitcm/cartographer.git
cd cartographer/build
cmake .. -G Ninja
ninja
ninja test
sudo ninja install
```

3. Install cartographer-ros

download the cartographer-ros in catkin_ws/src

```
git clone https://github.com/hitcm/cartographer_ros.git
```

4. Running the demos

Now that Cartographer and Cartographer's ROS integration are installed, download the example bags to a known location and run the demos.

```
wget -P ~/Downloads https://storage.googleapis.com/cartographer-public-data/bags/backpack_2d/cartographer_paper_deutsches_museum.bag
wget -P ~/Downloads https://storage.googleapis.com/cartographer-public-data/bags/backpack_3d/cartographer_3d_deutsches_museum.bag
```

Use the following commands to run the demos.

```
roslaunch cartographer_ros demo_backpack_2d.launch bag_filename:=${HOME}/Downloads/cartographer_paper_deutsches_museum.bag
roslaunch cartographer_ros demo_backpack_3d.launch bag_filename:=${HOME}/Downloads/cartographer_3d_deutsches_museum.bag
```

Before running demos, use the following command to modify localhost in the .bashrc using gedit.

```
cd
gedit ~/.bashrc
```

.bashrc

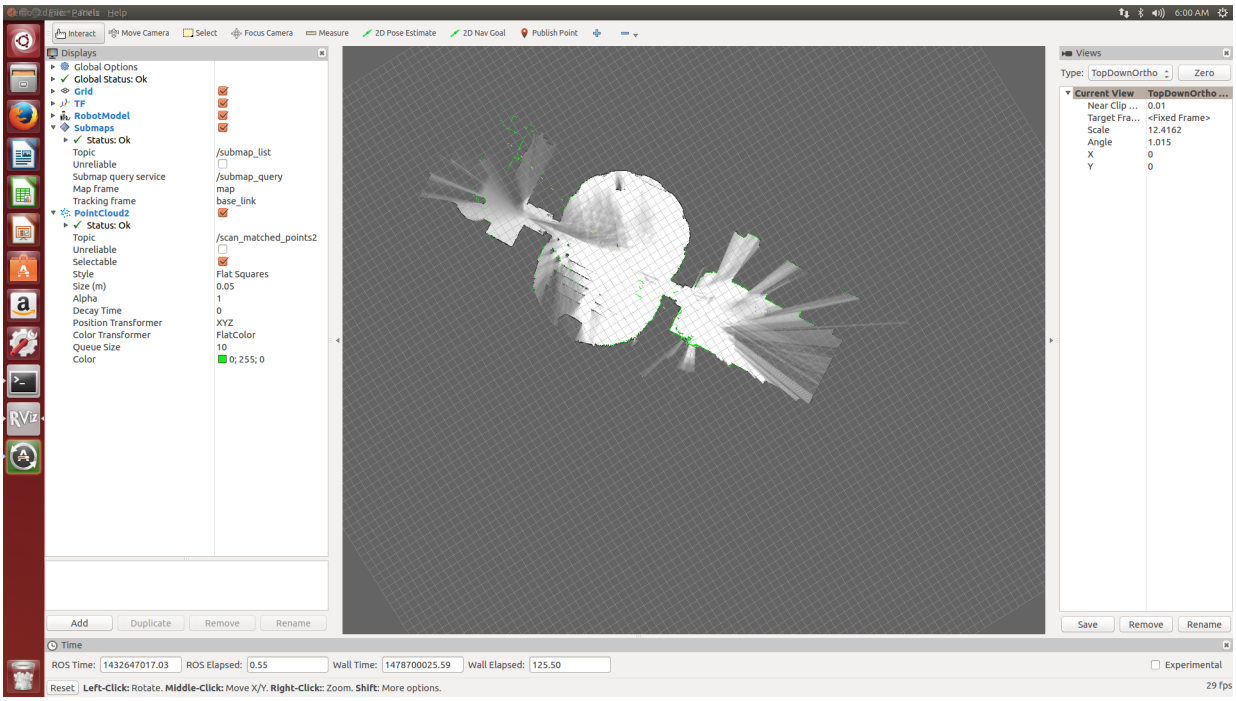
```
echo error)" "$(history|tail -n1|sed -e '\''s/^\s*[0-9]\+\s*//;s/[;&|]\s*alert
$//'\'')"'

# Alias definitions.
# You may want to put all your additions into a separate file like
# ~/.bash_aliases, instead of adding them here directly.
# See /usr/share/doc/bash-doc/examples in the bash-doc package.

if [ -f ~/.bash_aliases ]; then
    . ~/.bash_aliases
fi

# enable programmable completion features (you don't need to enable
# this, if it's already enabled in /etc/bash.bashrc and /etc/profile
# sources /etc/bash.bashrc).
if ! shopt -oq posix; then
  if [ -f /usr/share/bash-completion/bash_completion ]; then
    . /usr/share/bash-completion/bash_completion
  elif [ -f /etc/bash_completion ]; then
    . /etc/bash_completion
  fi
fi

source ~/catkin_ws/devel/setup.bash
export ROS_HOSTNAME=localhost
export ROS_MASTER_URI=http://localhost:11311
```

We need to confirm we can ping to localhost.

```
ping localhost
```

```
huangyuanji12@Master:~$ ping localhost
PING localhost.localdomain (127.0.0.1) 56(84) bytes of data.
64 bytes from ip6-localhost (127.0.0.1): icmp_seq=1 ttl=64 time=0.008 ms
64 bytes from ip6-localhost (127.0.0.1): icmp_seq=2 ttl=64 time=0.045 ms
64 bytes from ip6-localhost (127.0.0.1): icmp_seq=3 ttl=64 time=0.051 ms
64 bytes from ip6-localhost (127.0.0.1): icmp_seq=4 ttl=64 time=0.027 ms
^Z
[1]+  Stopped                 ping localhost
huangyuanji12@Master:~$
```

Running the 2D demos



Finally we have installed the ROS and cartographer.