在ROS下安装运行cartographer

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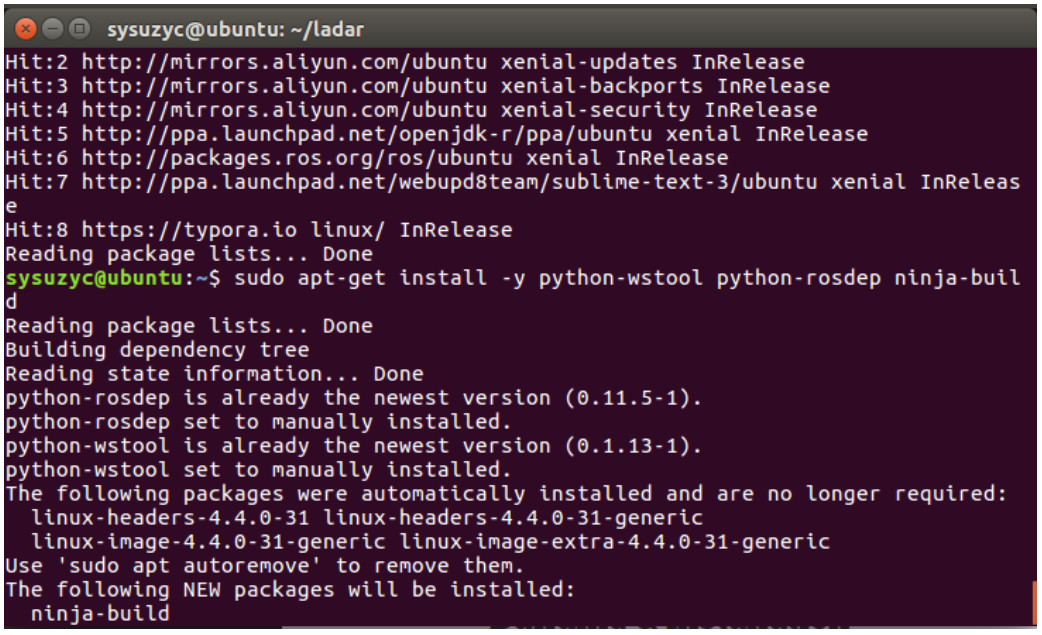
1、实验过程

Install wstool and rosdep

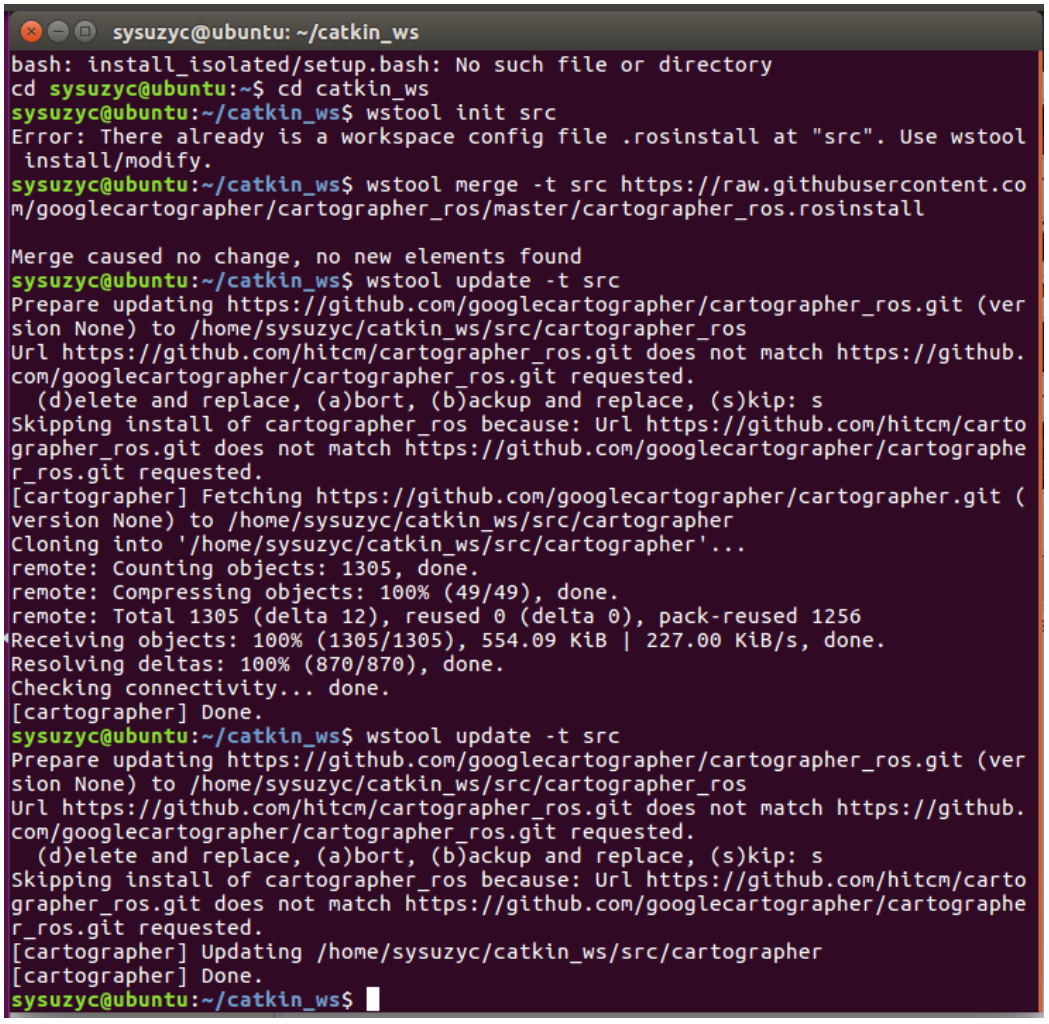
```
sudo apt-get update
sudo apt-get install -y python-wstool python-rosdep ninja-build
```

首先是对于在上一次的实验中安装的工具的初始化。



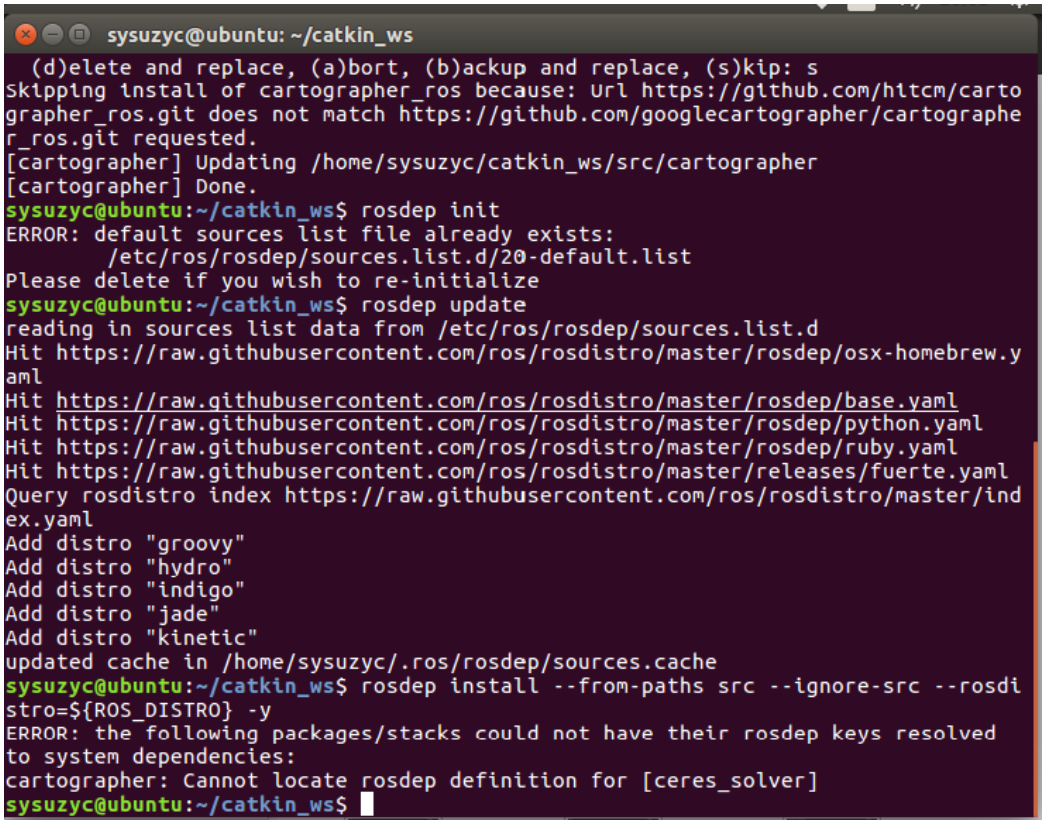
Create a new workspace in 'catkin_ws'

```
mkdir catkin_ws
cd catkin_ws
wstool init src
wstool merge -t src https://raw.githubusercontent.com/googlecartographer/cartographer_ros/master/cartographer_ros.ros
wstool update -t src
```



Install deb dependencies

```
rosdep init
rosdep update
rosdep install --from-paths src --ignore-src --rosdistro=${ROS_DISTRO} -y
```



Build and install

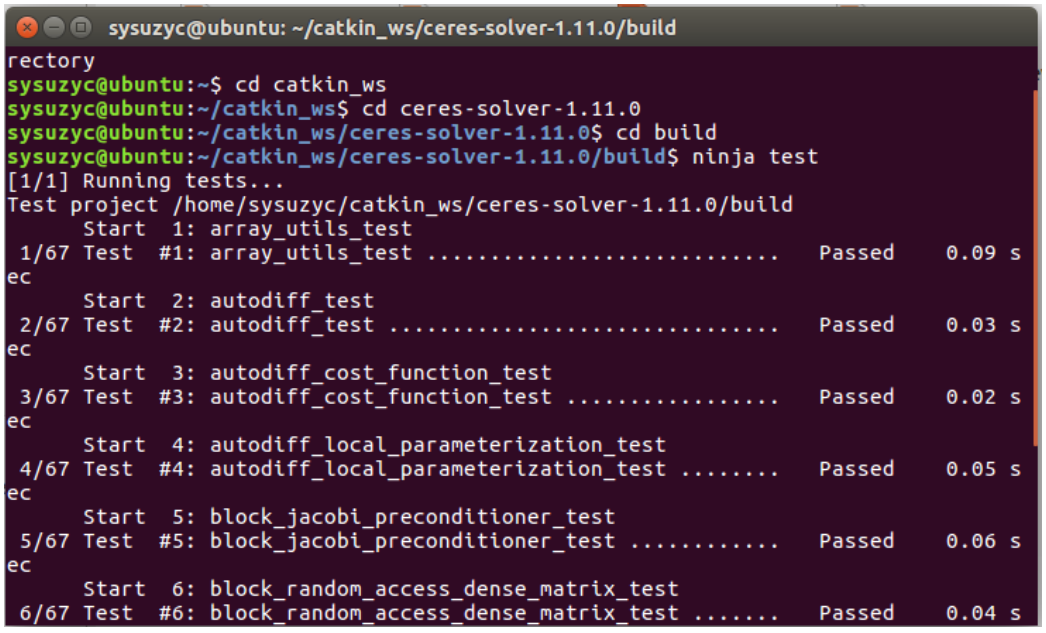
```
catkin_make_isolated --install --use-ninja
source install_isolated/setup.bash
```

本来按照google的官方网站的做法，是需要翻墙才可以的，不然的话，就会报错。但是如果不想翻墙的话，需要采用以下方法：

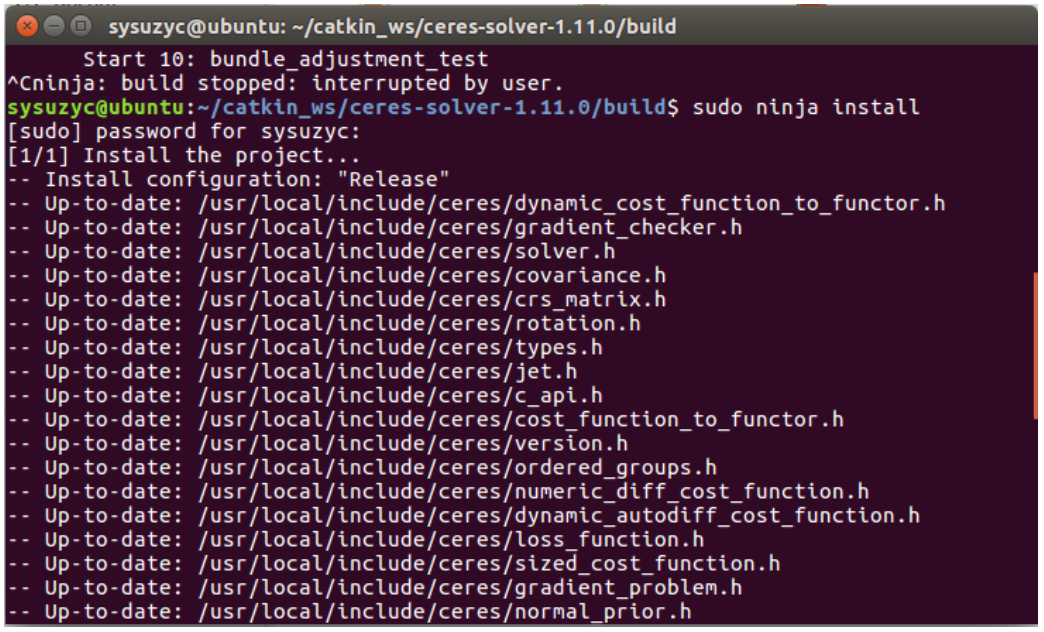
Build and install Ceres.

```
git clone https://ceres-solver.googlesource.com/ceres-solver
cd ceres-solver
mkdir build
cd build
cmake .. -G Ninja
ninja
ninja test
sudo ninja install
```

这一步得到的是ceres的建立和初始化，通过从导入对应的文件，可以很好的避免翻墙这种方法。结果也是比较正常的。



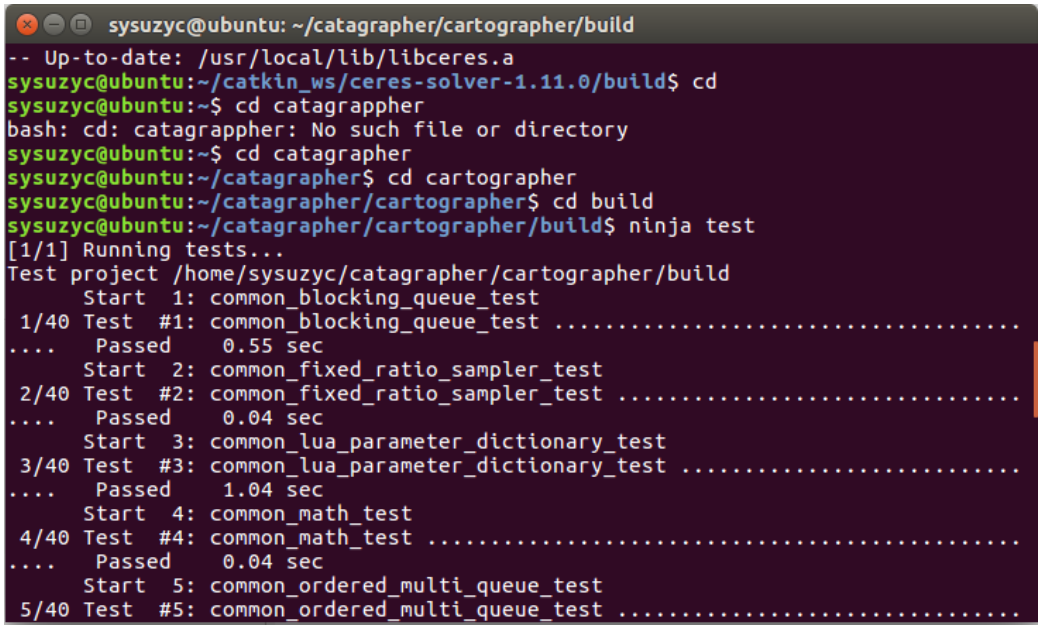
然后进行下最后一步，可以看到：



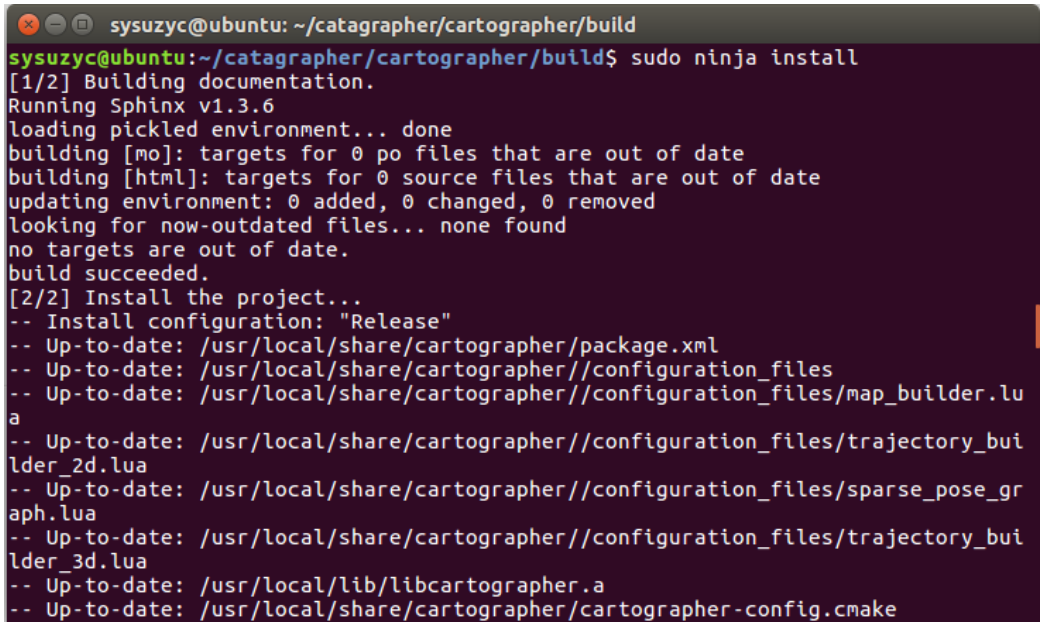
Build and install Cartographer

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

在自己下载的cartographer文件夹中，执行上述的命令，就可以很好的完成这次的实验了。



同样的最后的一步执行如下：



上面的命令执行完了之后，我们需要做的就是安装cartographer_ros。

为了安装的方便，我们都并没有下载到catkin_ws文件夹下面，所以，自己下载到任意路径之后，执行以下的操作。 cd catkin_ws/src git clone https://github.com/hitcm/artographer_ros.git cd catkin_ws catkin_make

```
/home/sysuzyc/catkin_ws/src/cartographer_ros/cartographer_ros/launch/demo_backpack
bash: install_isolated/setup.bash: No such file or directory
sysuzyc@ubuntu:~$ cd catkin_ws
sysuzyc@ubuntu:~/catkin_ws$ cd src
sysuzyc@ubuntu:~/catkin_ws/src$ cd
sysuzyc@ubuntu:~$ cd catkin_ws
sysuzyc@ubuntu:~/catkin_ws$ catkin_make
Base path: /home/sysuzyc/catkin_ws
Source space: /home/sysuzyc/catkin_ws/src
Build space: /home/sysuzyc/catkin_ws/build
Devel space: /home/sysuzyc/catkin_ws/devel
Install space: /home/sysuzyc/catkin_ws/install
####
#### Running command: "cmake /home/sysuzyc/catkin_ws/src -DCATKIN_DEVEL_PREFIX=/
home/sysuzyc/catkin_ws/devel -DCMAKE_INSTALL_PREFIX=/home/sysuzyc/catkin_ws/inst
all -G Unix Makefiles" in "/home/sysuzyc/catkin_ws/build"
####
-- Using CATKIN_DEVEL_PREFIX: /home/sysuzyc/catkin_ws/devel
-- Using CMAKE_PREFIX_PATH: /home/sysuzyc/catkin_ws/devel;/opt/ros/kinetic
-- This workspace overlays: /home/sysuzyc/catkin_ws/devel;/opt/ros/kinetic
-- Using PYTHON_EXECUTABLE: /usr/bin/python
-- Using Debian Python package layout
-- Using empy: /usr/bin/empy
-- Using CATKIN_ENABLE_TESTING: ON
-- Call enable_testing()
```

等这些语句运行完之后，看下catkin_ws的src文件夹下都有哪些内容：

```
sysuzyc@ubuntu:~/catkin_ws/src$ ls
cartographer  cartographer_ros  CMakeLists.txt
sysuzyc@ubuntu:~/catkin_ws/src$
```

如果是上面这些内容的话，那么结果就是正确的了。

Running the demos

```
# Download the 2D backpack example bag.
wget -P ~/Downloads https://storage.googleapis.com/cartographer-public-data/bags/backpack_2d/cartographer_paper_deuts

# Launch the 2D backpack demo.
roslaunch cartographer_ros demo_backpack_2d.launch bag_filename:=${HOME}/Downloads/cartographer_paper_deutsches_museu
```

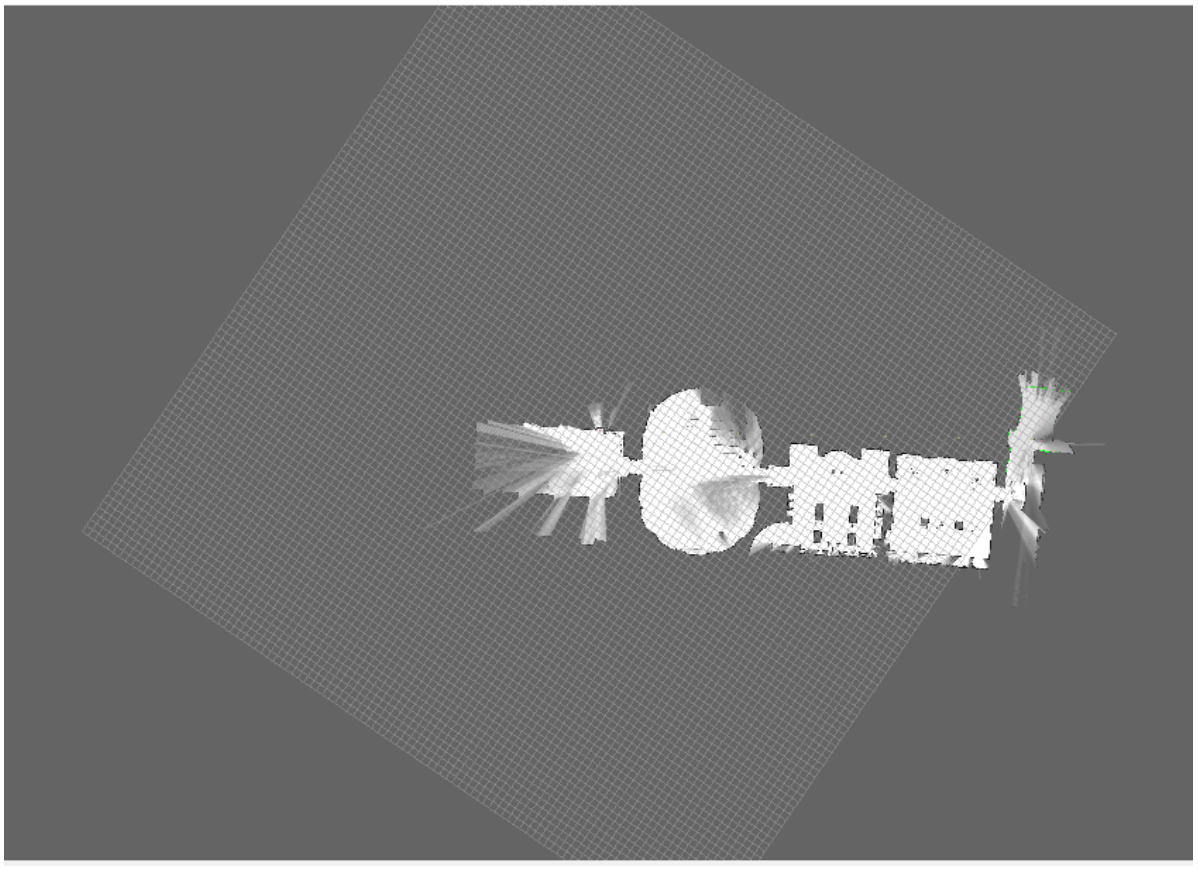
如果前面的步骤都是正确的话，这一步是可以正确的完成的。

初次运行如下所示：

```
/home/sysuzyc/catkin_ws/src/cartographer_ros/cartographer_ros/launch/demo_backpack
v
[ 55%] Built target cartographer_ros_msgs_generate_messages_nodejs
Scanning dependencies of target cartographer_ros_msgs_generate_messages_cpp
[ 58%] Generating C++ code from cartographer_ros_msgs/SubmapEntry.msg
[ 60%] Generating C++ code from cartographer_ros_msgs/TrajectorySubmapList.msg
[ 62%] Generating C++ code from cartographer_ros_msgs/SubmapList.msg
[ 65%] Generating C++ code from cartographer_ros_msgs/SubmapQuery.srv
[ 67%] Generating C++ code from cartographer_ros_msgs/FinishTrajectory.srv
[ 67%] Built target cartographer_ros_msgs_generate_messages_cpp
Scanning dependencies of target cartographer_ros_msgs_generate_messages
[ 67%] Built target cartographer_ros_msgs_generate_messages
Scanning dependencies of target cartographer_node
[ 69%] Building CXX object cartographer_ros/cartographer_ros/CMakeFiles/cartogra
pher_node.dir/src/cartographer_node_main.cc.o
Generating moc_submaps_display.cpp
[ 69%] Built target cartographer_rviz_submaps_visualization_automoc
[ 72%] Building CXX object cartographer_ros/cartographer_ros/CMakeFiles/cartogra
pher_node.dir/src/map_writer.cc.o
[ 74%] Building CXX object cartographer_ros/cartographer_ros/CMakeFiles/cartogra
pher_node.dir/src/msg_conversion.cc.o
Scanning dependencies of target cartographer_rviz_submaps_visualization
[ 76%] Building CXX object cartographer_ros/cartographer_rviz/CMakeFiles/cartogr
apher_rviz_submaps_visualization.dir/src/drawable_submap.cc.o
[ 79%] Building CXX object cartographer_ros/cartographer_ros/CMakeFiles/cartogra
```

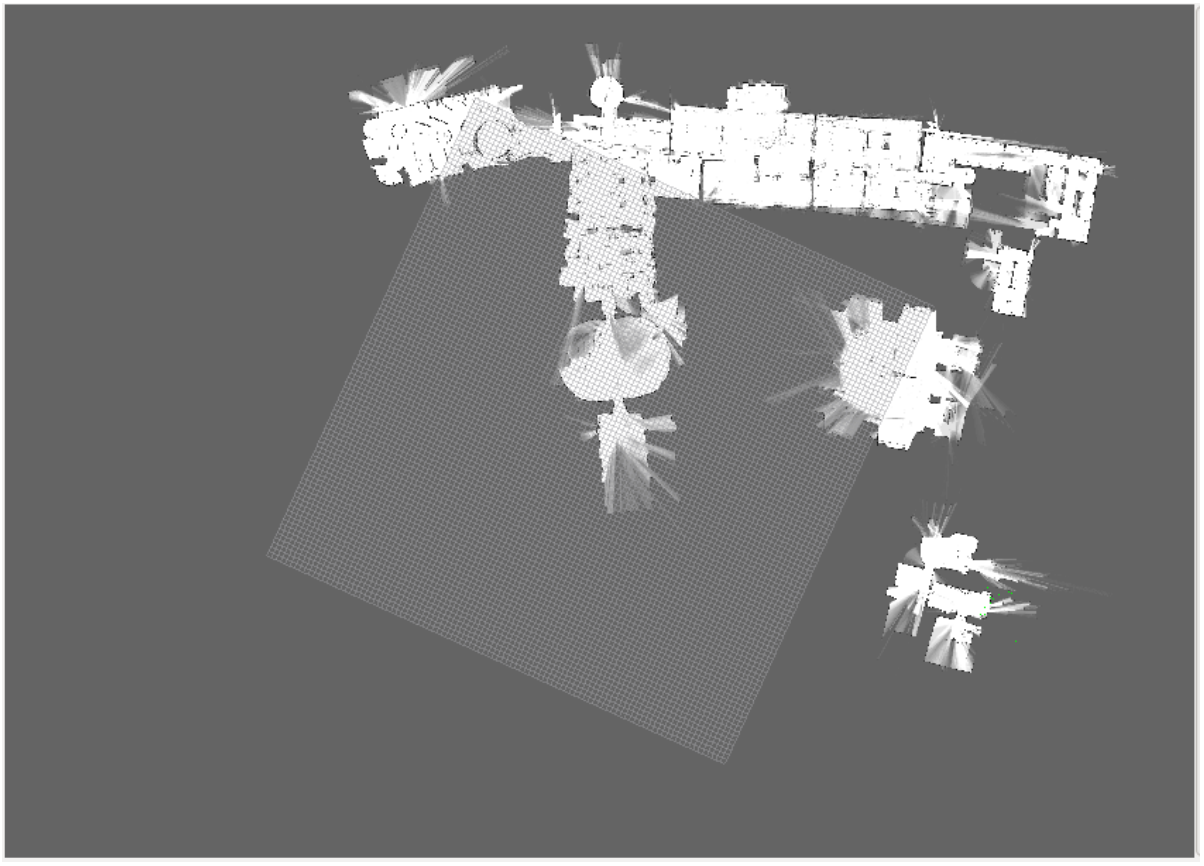
```
/home/sysuzyc/catkin_ws/src/cartographer_ros/cartographer_ros/launch/demo_backpack
[ INFO] [1478595719.160346201, 1432647136.963191257]: I1108 17:01:59.000000  357
0 cartographer_node_main.cc:615] horizontal_laser_link rate: 36.93 Hz 2.71e-02 s
 +/- 2.48e-03 s (pulsed at 49.14% real time)
[ INFO] [1478595719.184786934, 1432647136.963191257]: I1108 17:01:59.000000  357
0 cartographer_node_main.cc:615] imu_link rate: 249.93 Hz 4.00e-03 s +/- 3.09e-0
3 s (pulsed at 47.55% real time)
[ INFO] [1478595723.539416748, 1432647141.665800835]: I1108 17:02:03.000000  357
0 submaps.cc:176] Added submap 22
[ INFO] [1478595732.518586920, 1432647150.543806973]: I1108 17:02:12.000000  357
0 motion_filter.cc:42] Motion filter reduced the number of scans to 49.325%.
[ INFO] [1478595733.745852833, 1432647151.717114429]: I1108 17:02:13.000000  357
0 submaps.cc:176] Added submap 23
[ INFO] [1478595734.193480519, 1432647152.292945283]: I1108 17:02:14.000000  357
0 cartographer_node_main.cc:615] horizontal_laser_link rate: 36.77 Hz 2.72e-02 s
 +/- 2.46e-03 s (pulsed at 54.73% real time)
[ INFO] [1478595734.196917853, 1432647152.292945283]: I1108 17:02:14.000000  357
0 cartographer_node_main.cc:615] imu_link rate: 241.86 Hz 4.13e-03 s +/- 4.72e-0
3 s (pulsed at 54.80% real time)
[ INFO] [1478595738.524541139, 1432647156.650366421]: I1108 17:02:18.000000  357
0 submaps.cc:176] Added submap 24
[ INFO] [1478595744.272144581, 1432647162.146078383]: I1108 17:02:24.000000  357
0 submaps.cc:176] Added submap 25
[ INFO] [1478595748.625981412, 1432647166.747786785]: I1108 17:02:28.000000  357
0 motion_filter.cc:42] Motion filter reduced the number of scans to 49.6222%.
```

看到结果如下所示：



这个是最开始的界面图。

下面的是运行了半个小时之后的效果图：



所以，结果是正确的。

2、实验感想

这次的实验其实是比较麻烦的，主要是需要翻墙才可以进行那一步操作，如果不翻墙的话，是不可以的，所以，我们需要找对方法来替代那一步对应的操作。所以，这里是比较麻烦的。然后，虽然过程比较坎坷，但是最终还是做出来了。看到这些图片的时候，还是比较开心的。毕竟自己调了一天了，还是没有调通，最后在师兄的指导下，改正了错误，才终于搞好了。也是不容易啊！最后，还是比较开心自己能够搞出来这个东西啦~