Lecture 5: Publisher Programming

Workspace

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

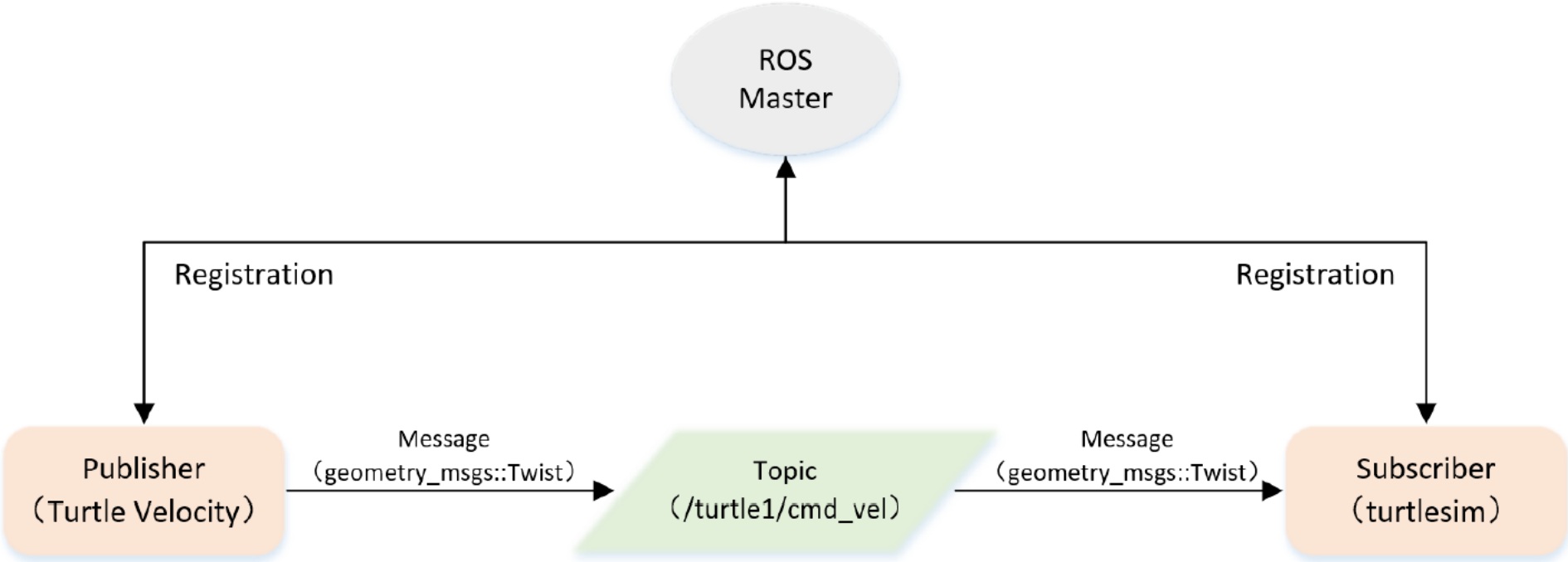
```
$ cd ~/catkin_ws/
$ catkin_make
```

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

```
$ echo $ROS_PACKAGE_PATH
```

```
→  ~ echo $ROS_PACKAGE_PATH
/home/hcx/catkin_ws/src:/opt/ros/indigo/share:/opt/ros/indigo/stacks
```

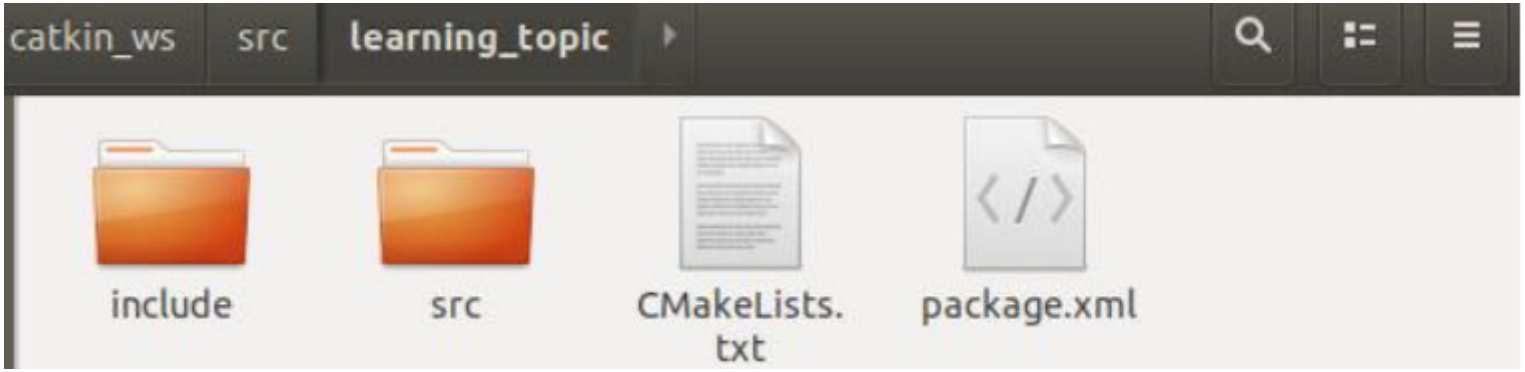
Topic


ROS
Master
Registration
Registration
Publisher
（Turtle Velocity）
Message
（geometry_msgs::Twist）
Topic
（/turtle1/cmd_vel）
Message
（geometry_msgs::Twist）
Subscriber
（turtlesim）

Build Package

$ cd ~/catkin_ws/src

$ catkin_create_pkg learning_topic roscpp rospy std_msgs geometry_msgs turtlesim



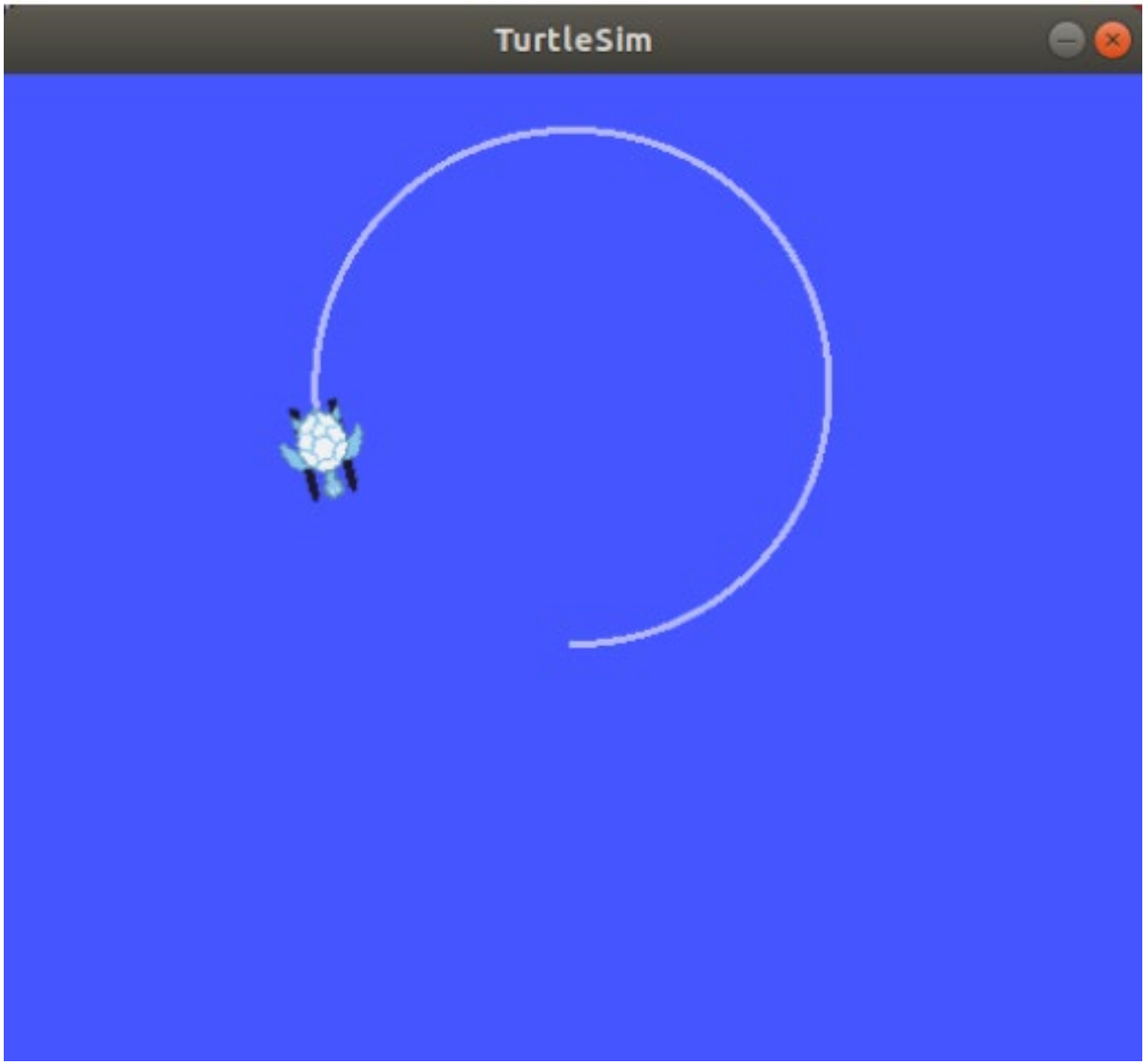
Compiling Code

```
## Declare a C++ executable
## With catkin_make all packages are built within a single CMake context
## The recommended prefix ensures that target names across packages don't collide
# add_executable(${PROJECT_NAME}_node src/learning_topic_node.cpp)

## Specify libraries to link a library or executable target against
# target_link_libraries(${PROJECT_NAME}_node
#   ${catkin_LIBRARIES}
# )

add_executable(velocity_publisher src/velocity_publisher.cpp)
target_link_libraries(velocity_publisher ${catkin_LIBRARIES})
```

Run Program

```
$ cd ~/catkin_ws
$ catkin_make
$ source devel/setup.bash
$ roscore
$ rosrun turtlesim turtlesim_node
$ rosrun learning_topic velocity_publisher
```

Circle

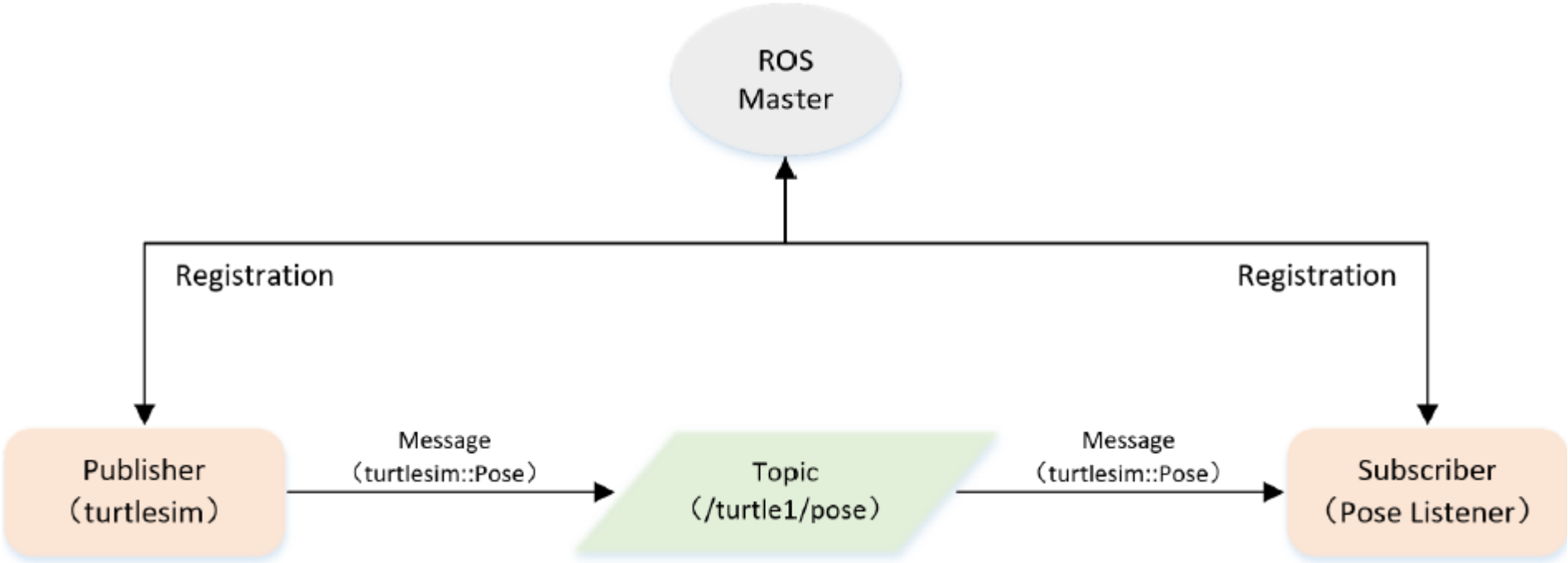


Python

```
ab@ab-c:~/catkin_ws/src$ catkin_create_pkg my_python rospy turtlesim
Created file my_python/package.xml
Created file my_python/CMakeLists.txt
Created folder my_python/src
Successfully created files in /home/ab/catkin_ws/src/my_python. Please adjust th
e values in package.xml.
ab@ab-c:~/catkin_ws/src$ sudo snap install code --classic
[sudo] password for ab:
snap "code" is already installed, see 'snap help refresh'
ab@ab-c:~/catkin_ws/src$ code .
```

Lecture 6: Subscriber Programming

Topic

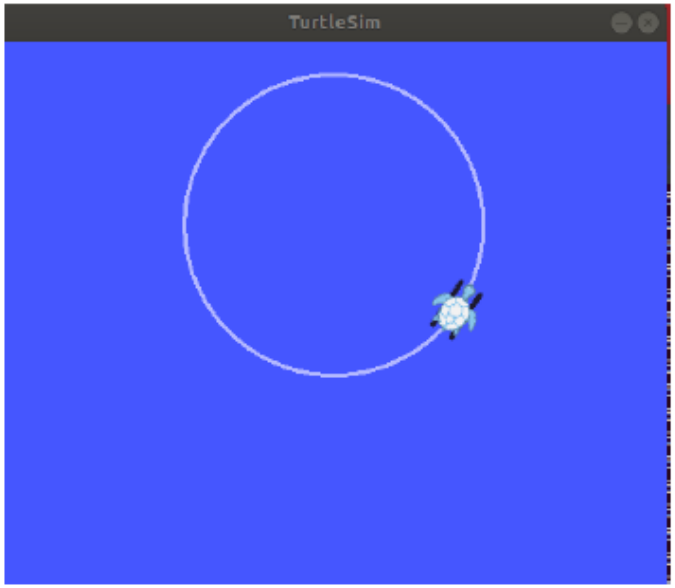

ROS
Master
Registration
Registration
Publisher
（turtlesim）
Message
（turtlesim::Pose）
Topic
（/turtle1/pose）
Message
（turtlesim::Pose）
Subscriber
（Pose Listener）

Compiling Code

```
## Declare a C++ executable
## With catkin_make all packages are built within a single CMake context
## The recommended prefix ensures that target names across packages don't collide
# add_executable(${PROJECT_NAME}_node src/learning_topic_node.cpp)

## Specify libraries to link a library or executable target against
# target_link_libraries(${PROJECT_NAME}_node
#   ${catkin_LIBRARIES}
# )

add_executable(velocity_publisher src/velocity_publisher.cpp)
target_link_libraries(velocity_publisher ${catkin_LIBRARIES})


add_executable(pose_subscriber src/pose_subscriber.cpp)
target_link_libraries(pose_subscriber ${catkin_LIBRARIES})
```

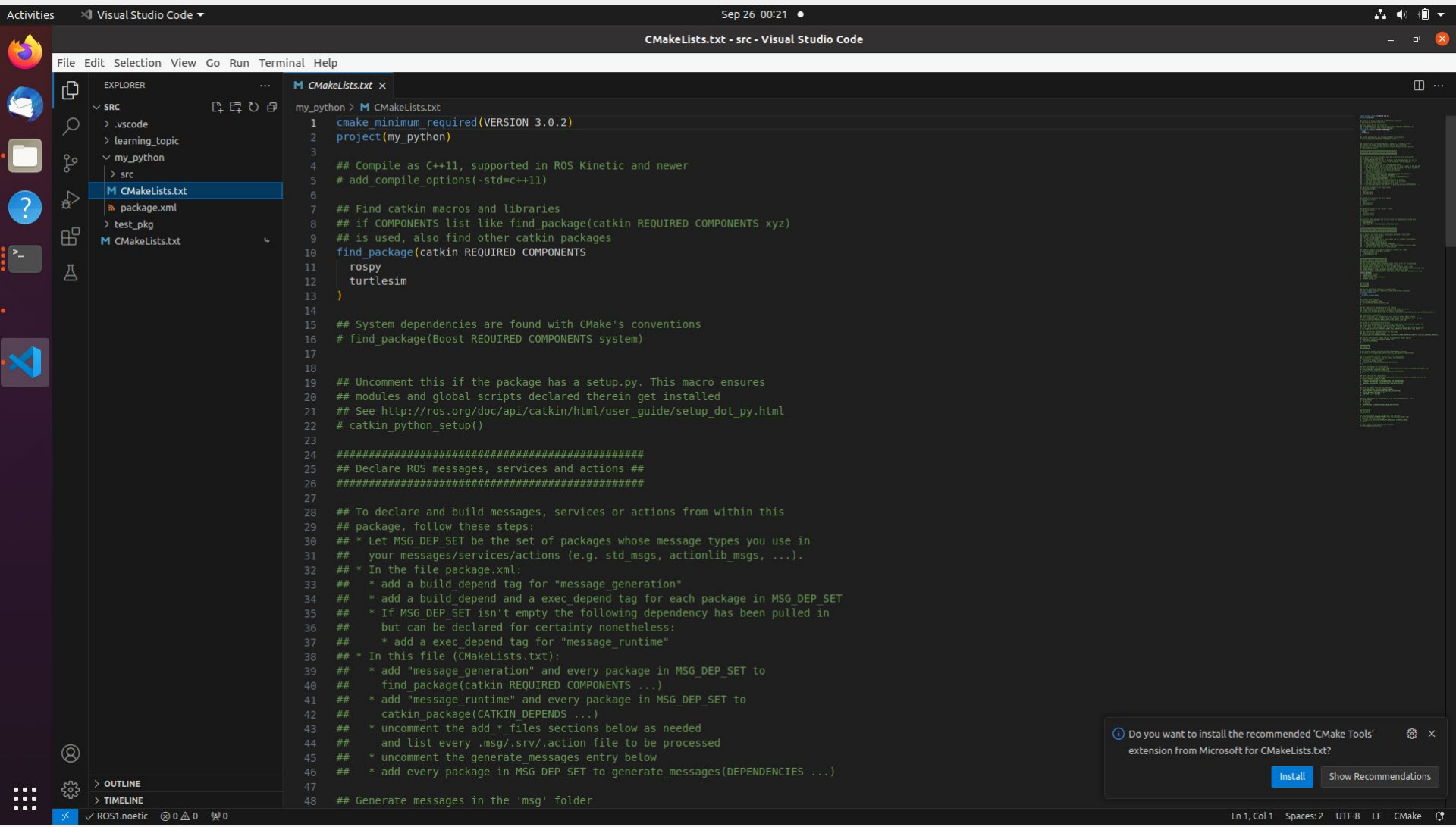
Run Program

```
$ cd ~/catkin_ws
$ catkin_make
$ source devel/setup.bash
$ roscore
$ rosrun turtlesim turtlesim_node
$ rosrun learning_topic velocity_publisher
```

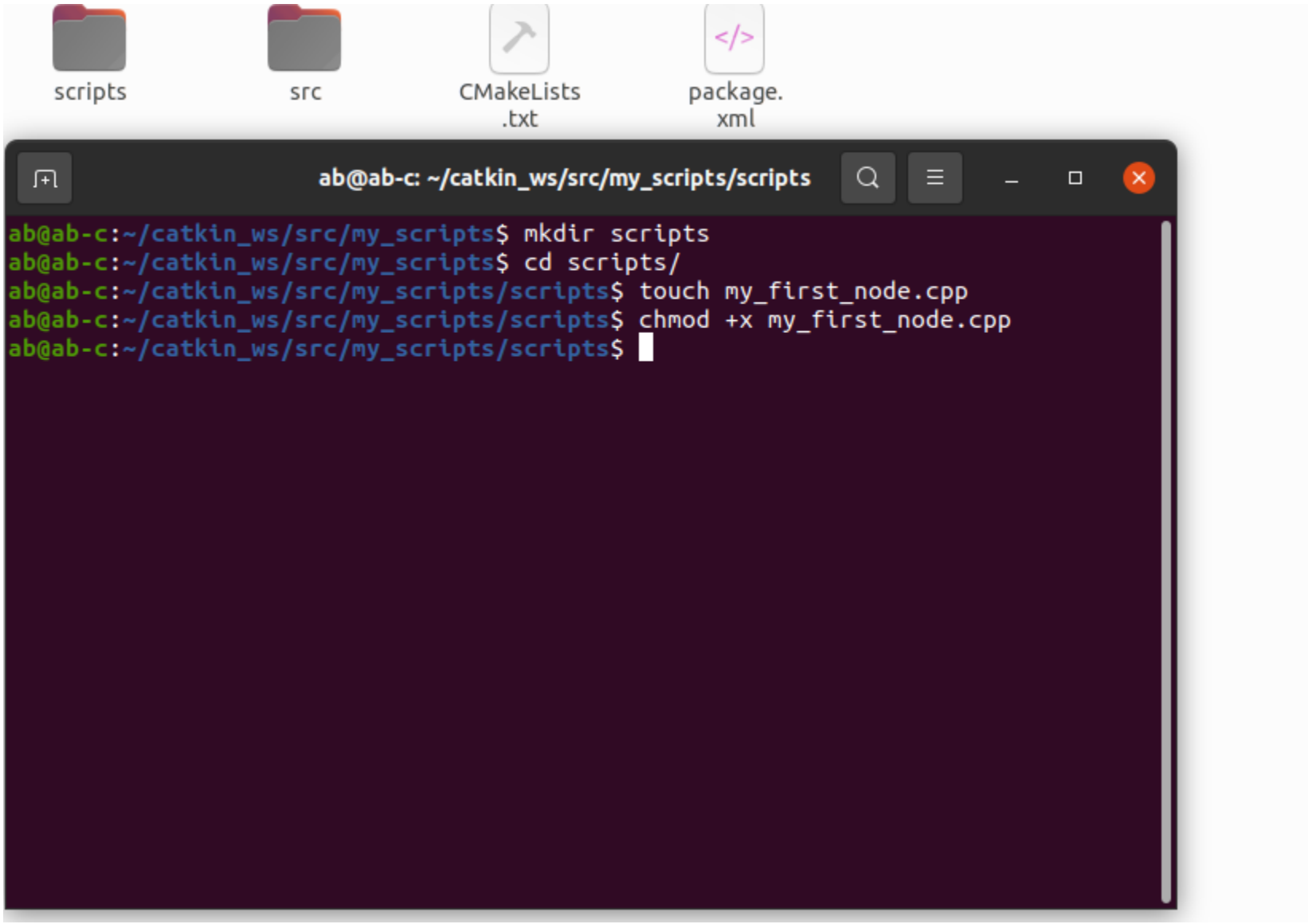


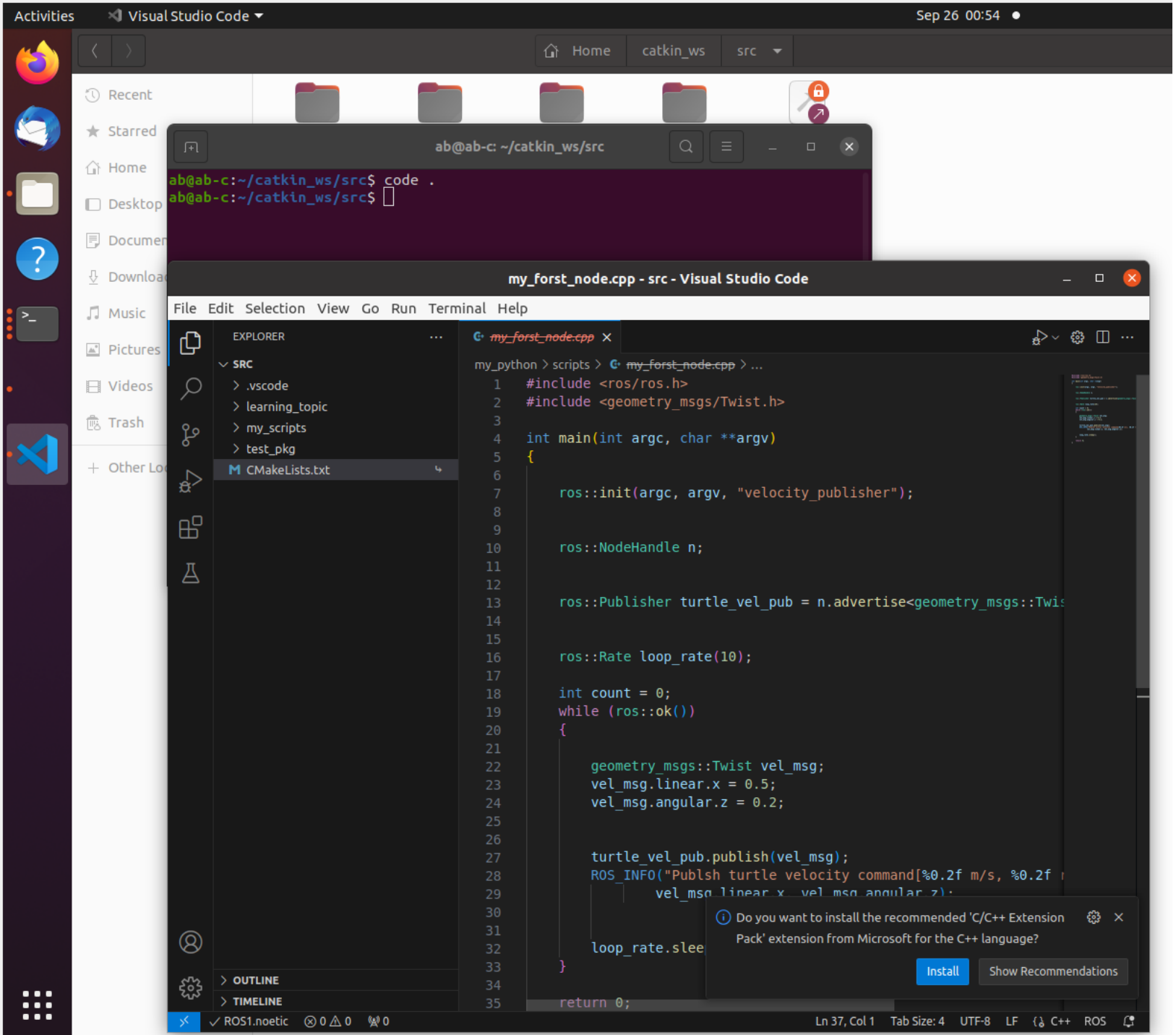

```
hcx@hcx-vpc:~/catkin_ws$ rosrun learning_topic pose_subscriber
[ INFO] [1562211557.322259871]: Turtle pose: x:6.389005, y:10.396028
[ INFO] [1562211557.339097278]: Turtle pose: x:6.381475, y:10.398730
[ INFO] [1562211557.354512018]: Turtle pose: x:6.373938, y:10.401410
[ INFO] [1562211557.370549572]: Turtle pose: x:6.366391, y:10.404065
[ INFO] [1562211557.387085434]: Turtle pose: x:6.358836, y:10.406695
[ INFO] [1562211557.402710847]: Turtle pose: x:6.351273, y:10.409303
[ INFO] [1562211557.418887039]: Turtle pose: x:6.343701, y:10.411885
[ INFO] [1562211557.434469988]: Turtle pose: x:6.336121, y:10.414443
[ INFO] [1562211557.450210135]: Turtle pose: x:6.328533, y:10.416977
[ INFO] [1562211557.465994903]: Turtle pose: x:6.320937, y:10.419487
[ INFO] [1562211557.482173454]: Turtle pose: x:6.313333, y:10.421972
```

Python


Activities
Visual Studio Code
Sep 26 00:21
CMakeLists.txt - src - Visual Studio Code
File Edit Selection View Go Run Terminal Help
EXPLORER
SRC
.vscode
learning_topic
my_python
src
CMakeLists.txt
package.xml
test_pkg
CMakeLists.txt
OUTLINE
TIMELINE
CMakeLists.txt
my_python > CMakeLists.txt
1 cmake_minimum_required(VERSION 3.0.2)
2 project(my_python)
3
4 ## Compile as C++11, supported in ROS Kinetic and newer
5 # add_compile_options(-std=c++11)
6
7 ## Find catkin macros and libraries
8 ## if COMPONENTS list like find_package(catkin REQUIRED COMPONENTS xyz)
9 ## is used, also find other catkin packages
10 find_package(catkin REQUIRED COMPONENTS
11 rospy
12 turtlesim
13)
14
15 ## System dependencies are found with CMake's conventions
16 # find_package(Boost REQUIRED COMPONENTS system)
17
18
19 ## Uncomment this if the package has a setup.py. This macro ensures
20 ## modules and global scripts declared therein get installed
21 ## See http://ros.org/doc/api/catkin/html/user_guide/setup_dot_py.html
22 # catkin_python_setup()
23
24 ##
25 ## Declare ROS messages, services and actions ##
26 ##
27
28 ## To declare and build messages, services or actions from within this
29 ## package, follow these steps:
30 ## * Let MSG_DEP_SET be the set of packages whose message types you use in
31 ## your messages/services/actions (e.g. std_msgs, actionlib_msgs, ...).
32 ## * In the file package.xml:
33 ## * add a build_depend tag for "message_generation"
34 ## * add a build_depend and a exec_depend tag for each package in MSG_DEP_SET
35 ## * If MSG_DEP_SET isn't empty the following dependency has been pulled in
36 ## but can be declared for certainty nonetheless:
37 ## * add a exec_depend tag for "message_runtime"
38 ## * In this file (CMakeLists.txt):
39 ## * add "message_generation" and every package in MSG_DEP_SET to
40 ## find_package(catkin REQUIRED COMPONENTS ...)
41 ## * add "message_runtime" and every package in MSG_DEP_SET to
42 ## catkin_package(CATKIN_DEPENDS ...)
43 ## * uncomment the add_*_files sections below as needed
44 ## and list every .msg/.srv/.action file to be processed
45 ## * uncomment the generate_messages entry below
46 ## * add every package in MSG_DEP_SET to generate_messages(DEPENDENCIES ...)
47
48 ## Generate messages in the 'msg' folder
Do you want to install the recommended 'CMake Tools' extension from Microsoft for CMakeLists.txt?
Install
Show Recommendations
ROS1.noetic
Ln 1, Col 1
Spaces: 2
UTF-8
LF
CMake

Scripts


scripts
src
CMakeLists
.txt
package.
xml
ab@ab-c: ~/catkin_ws/src/my_scripts/scripts
ab@ab-c:~/catkin_ws/src/my_scripts$ mkdir scripts
ab@ab-c:~/catkin_ws/src/my_scripts$ cd scripts/
ab@ab-c:~/catkin_ws/src/my_scripts/scripts$ touch my_first_node.cpp
ab@ab-c:~/catkin_ws/src/my_scripts/scripts$ chmod +x my_first_node.cpp
ab@ab-c:~/catkin_ws/src/my_scripts/scripts$


Activities
Visual Studio Code
Sep 26 00:54
Home
catkin_ws
src
Recent
Starred
Home
Desktop
Documer
Downloa
Music
Pictures
Videos
Trash
Other Lo
ab@ab-c: ~/catkin_ws/src
ab@ab-c:~/catkin_ws/src$ code .
ab@ab-c:~/catkin_ws/src$
my_forst_node.cpp - src - Visual Studio Code
File Edit Selection View Go Run Terminal Help
EXPLORER
SRC
.vscode
learning_topic
my_scripts
test_pkg
CMakeLists.txt
OUTLINE
TIMELINE
my_forst_node.cpp
my_python > scripts > my_forst_node.cpp > ...
#include <ros/ros.h>
#include <geometry_msgs/Twist.h>
int main(int argc, char **argv)
{
ros::init(argc, argv, "velocity_publisher");
ros::NodeHandle n;
ros::Publisher turtle_vel_pub = n.advertise<geometry_msgs::Twis
ros::Rate loop_rate(10);
int count = 0;
while (ros::ok())
{
geometry_msgs::Twist vel_msg;
vel_msg.linear.x = 0.5;
vel_msg.angular.z = 0.2;
turtle_vel_pub.publish(vel_msg);
ROS_INFO("Publsh turtle velocity command[%0.2f m/s, %0.2f
vel_msg.linear.x, vel_msg.angular.z);
loop_rate.slee
}
return 0;
Do you want to install the recommended 'C/C++ Extension Pack' extension from Microsoft for the C++ language?
Install
Show Recommendations
ROS1.noetic
Ln 37, Col 1
Tab Size: 4
UTF-8
LF
C++
ROS

Reference

✓ Download link

✓ Language:

English, Chinese, Japanese, Korean

"ROS Robot Programming"

A Handbook is written by TurtleBot3 Developers

Reference

- R. Siegwart, I. R. Nourbakhsh, D. Scaramuzza. Introduction to Autonomous Mobile Robots. MIT Press, 2nd Edition, 2011, ISBN-10: 0262015358.
- Y. Pyo, H. Cho, R. Jung, and T. Lim, ROS Robot Programming, ROBOTIS Co., Ltd., 2017, ISBN 979-11-962307-1-5
- J. O'Kane, A Gentle Introduction to ROS, CreateSpace Independent Publishing Platform, 2013, ISBN-13: 978-1492143239