

山东大学 计算机科学与技术 学院

课程实验报告

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实验题目：机器人操作系统 ROS 自定义消息的发布和订阅		
实验学时：2	实验日期：20210510	
实验目的：机器人操作系统 ROS 应用, 学习发布者设计和订阅者设计, 熟悉自定义消息, 编写代码完成消息的发布和订阅。		
实验环境：Ubuntu 16 ROS		
<p>实验步骤：</p> <p>实验五：自定义消息的发布和订阅</p> <p>1. 发布者 (Publisher) 设计</p> <p>(1) 创建功能包</p> <p>使用命令 <code>cd ~/catkin_ws/src</code></p> <p>Catkin) <code>create_pkg learning_topic roscpp rospy std_msgs geometry_msgs turtlesim</code> 创建功能包 <code>learning_topic</code> 时使用了依赖 <code>roscpp, rospy, std_msgs, geometry_msgs, turtlesim</code> 等功能包,</p> <pre>liuxinyue@ubuntu:~\$ cd ~/catkin_ws/src liuxinyue@ubuntu:~/catkin_ws/src\$ catkin_create_pkg learning_topic roscpp rospy std_msgs geometry_msgs turtlesim Created file learning_topic/package.xml Created file learning_topic/CMakeLists.txt Created folder learning_topic/include/learning_topic Created folder learning_topic/src Successfully created files in /home/liuxinyue/catkin_ws/src/learning_topic. Please adjust the values in package.xml. liuxinyue@ubuntu:~/catkin_ws/src\$</pre>		
(2) 创建发布者 Publisher 程序, 进入 src 文件夹建立		

velocity_publisher.cpp 文件,然后输入 cpp 代码如下所示: 该代码能够让小海龟以 0.5 线速度 0.2 角速度运动。

```
#include <ros/ros.h>
#include <geometry_msgs/Twist.h>

int main(int argc, char **argv)
{
    // ROS节点初始化
    ros::init(argc, argv, "velocity_publisher");

    // 创建节点句柄
    ros::NodeHandle n;

    // 创建一个Publisher, 发布名为/turtle1/cmd_vel的topic, 消息类型为
    geometry_msgs::Twist, 队列长度10
    ros::Publisher turtle_vel_pub = n.advertise<geometry_msgs::Twist>("/
    turtle1/cmd_vel", 10);

    // 设置循环的频率
    ros::Rate loop_rate(10);

    int count = 0;
    while (ros::ok())
    {
        // 初始化geometry_msgs::Twist类型的消息
        geometry_msgs::Twist vel_msg;
        vel_msg.linear.x = 0.5;
        vel_msg.angular.z = 0.2;

        // 发布消息
        turtle_vel_pub.publish(vel_msg);
        ROS_INFO("Publish turtle velocity command[%0.2f m/s, %0.2f
        rad/s]", vel_msg.linear.x, vel_msg.angular.z);

        // 按照循环频率延时
        loop_rate.sleep();
    }

    return 0;
}
```

(3) 修改编译配置文件并编译功能包, 修改 CMakeFile 文件, 在合适的地方插入 add_executable(velocity_publisher src/velocity_publisher.cpp)

target_link_libraries(velocity_publisher \${catkin_LIBRARIES})

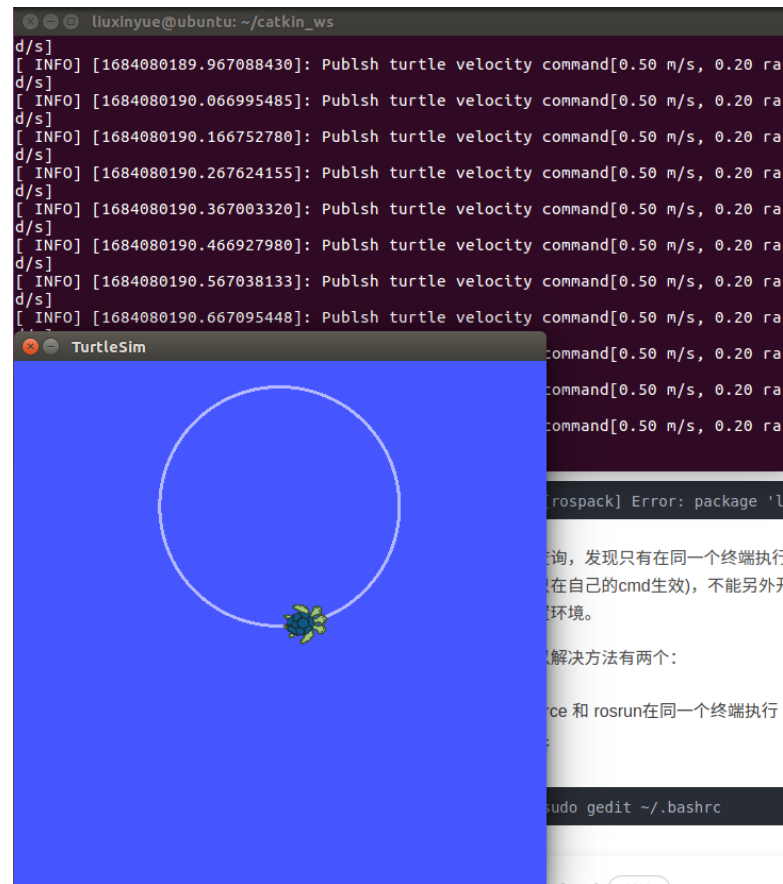
然后执行 catkin_make 语句, 结果如下所示

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

--> add_subdirectory(learning_topic)
-- Configuring done
-- Generating done
-- Build files have been written to: /home/liuxinyue/catkin_ws/build
####
#### Running command: "make -j2 -l2" in "/home/liuxinyue/catkin_ws/build"
####
Scanning dependencies of target velocity_publisher
[ 50%] Built target my_hello_world_node
[ 75%] Building CXX object learning_topic/CMakeFiles/velocity_publisher.dir/s
rc/velocity_publisher.cpp.o
[100%] Linking CXX executable /home/liuxinyue/catkin_ws/devel/lib/learning_to
pic/velocity_publisher
[100%] Built target velocity_publisher
liuxinyue@ubuntu:~/catkin_ws$
```

(4) 执行发布者 Publisher 程序, 打开终端输入

`roscore, rosrn turtlesim turtlesim_node rosrn`
`learning_topic velocity_publisher` 结果如下所示



(5) 编写发布者 Publisher python 程序, 在 `learning_topic` 文件夹中建立 `script` 文件夹, 在 `scripts` 文件夹中创建 `velocity_publisher.py` 文件, 记得修改文件配置, 如下所示:

```

import rospy
from geometry_msgs.msg import Twist

def velocity_publisher():
    # ROS节点初始化
    rospy.init_node('velocity_publisher', anonymous=True)

    # 创建一个Publisher, 发布名为/turtle1/cmd_vel的topic, 消息类型为geometry_msgs::Twist
    turtle_vel_pub = rospy.Publisher('/turtle1/cmd_vel', Twist, queue_size=10)

    # 设置循环的频率
    rate = rospy.Rate(10)

    while not rospy.is_shutdown():
        # 初始化geometry_msgs::Twist类型的消息
        vel_msg = Twist()
        vel_msg.linear.x = 0.5
        vel_msg.angular.z = 0.2

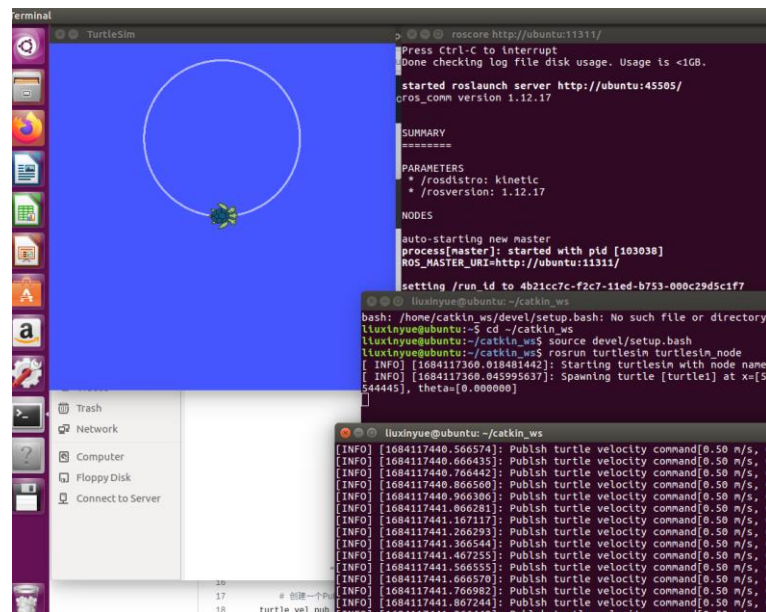
        # 发布消息
        turtle_vel_pub.publish(vel_msg)
        rospy.loginfo("Publish turtle velocity command[%0.2f m/s, %0.2f rad/s]",
                      vel_msg.linear.x, vel_msg.angular.z)

        # 按照循环频率延时
        rate.sleep()

if __name__ == '__main__':
    try:
        velocity_publisher()
    except rospy.ROSInterruptException:
        pass

```

(6) 执行发布者 Publisher 程序, 在终端输入 `roscore`, `roslaunch turtlesim turtlesim_node` `roslaunch learning_topic velocity_publisher.py` 得到结果如下所示:



2. 订阅者 (subscriber) 设计, 设计一个消息订阅者来接受 turtlesim 发布的消息

(1) 创建订阅者 subscriber 程序, 进入 src 文件夹, 建立

pose_subscriber.cpp 文件，内容如下：

```
pose_subscriber.cpp (~/.catkin_ws/src/learning_topic/src) - gedit
/*****
Copy
*****/
/**
 * 该例程将订阅/turtle1/pose话题，消息类型turtlesim::Pose
 */
#include <ros/ros.h>
#include "turtlesim/Pose.h"

// 接收到订阅的消息后，会进入消息回调函数
void poseCallback(const turtlesim::Pose::ConstPtr& msg)
{
    // 将接收到的消息打印出来
    ROS_INFO("Turtle pose: x:%0.6f, y:%0.6f", msg->x, msg->y);
}

int main(int argc, char **argv)
{
    // 初始化ROS节点
    ros::init(argc, argv, "pose_subscriber");

    // 创建节点句柄
    ros::NodeHandle n;

    // 创建一个Subscriber，订阅名为/turtle1/pose的topic，注册回调函数poseCallb
    ros::Subscriber pose_sub = n.subscribe("/turtle1/pose", 10, poseCallback);

    // 循环等待回调函数
    ros::spin();

    return 0;
}
```

(2) 修改编译配置文件并编译功能包，将如下的两个语句插入 CMakeFile.txt 文件，如下所示，然后运行 carkin_make

```

Open ▾
## Rename C++ executable without prefix
## The above recommended prefix causes long target names, the following rename
## target back to the shorter version for ease of user use
## e.g. "roslaunch someones_pkg node" instead of "roslaunch someones_pkg someones_pk
# set_target_properties(${PROJECT_NAME}_node PROPERTIES OUTPUT_NAME node PREFIXES "")

## Add cmake target dependencies of the executable
## same as for the library above
# add_dependencies(${PROJECT_NAME}_node ${${PROJECT_NAME}_EXPORTED_TARGETS} ${catkin_LIBRARIES})

## 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})
#####

liuxinyue@ubuntu: ~/catkin_ws
-- traversing 2 packages in topological order:
--   - hello_world
--   - learning_topic
--
-- ++ processing catkin package: 'hello_world'
-- ==> add_subdirectory(hello_world)
-- ++ processing catkin package: 'learning_topic'
-- ==> add_subdirectory(learning_topic)
-- Configuring done
-- Generating done
-- Build files have been written to: /home/liuxinyue/catkin_ws/build
####
#### Running command: "make -j2 -l2" in "/home/liuxinyue/catkin_ws/build"
####
Scanning dependencies of target pose_subscriber
[ 33%] Built target my_hello_world_node
[ 50%] Building CXX object learning_topic/CMakeFiles/pose_subscriber.dir/src/pose_subscriber.cpp.o
[ 83%] Built target velocity_publisher
[100%] Linking CXX executable /home/liuxinyue/catkin_ws/devel/lib/learning_topic/pose_subscriber
[100%] Built target pose_subscriber
liuxinyue@ubuntu:~/catkin_ws$

```

(3) 执行订阅者 subscriber 程序，打开终端输入 roscore

roslaunch turtlesim turtlesim_node

roslaunch learning_topic pose_subscriber, 法线 xy 没有变化，运行千米那的发布者节点，再看小海龟运动起来了。

```
liuxinyue@ubuntu: ~/catkin_ws
d/s]
[ INFO] [1684131372.952538575]: Publish turtle velocity command[0.50 m/s, 0.20
d/s]
[ INFO] [1684131373.052200892]: Publish turtle velocity command[0.50 m/s, 0.20
d/s]
[ INFO] [1684131373.152237515]: Publish turtle velocity command[0.50 m/s, 0.20
d/s]
[ INFO] [1684131373.257188511]: Publish turtle velocity command[0.50 m/s, 0.20
d/s]
[ INFO] [1684131373.353074422]: Publish turtle velocity command[0.50 m/s, 0.20
d/s]
[ INFO] [1684131373.452476435]: Publish turtle velocity command[0.50 m/s, 0.20
d/s]
[ INFO] [1684131373.552512071]: Publish turtle velocity command[0.50 m/s, 0.20
d/s]
[ INFO] [1684131373.652614605]: Publish turtle velocity command[0.50 m/s, 0.20
d/s]
[ INFO] [1684131373.752683658]: Publish turtle velocity command[0.50 m/s, 0.20
d/s]
[ INFO] [1684131373.852580540]: Publish turtle velocity command[0.50 m/s, 0.20
d/s]
[ INFO] [1684131373.952679527]: Publish turtle velocity command[0.50 m/s, 0.20
d/s]
liuxinyue@ubuntu: ~/catkin_ws
[ INFO] [1684131373.659865550]: Turtle pose: x:3.405988, y:9.346019
[ INFO] [1684131373.676351263]: Turtle pose: x:3.401834, y:9.339182
[ INFO] [1684131373.691133585]: Turtle pose: x:3.397702, y:9.332332
[ INFO] [1684131373.708290457]: Turtle pose: x:3.393591, y:9.325468
[ INFO] [1684131373.724714975]: Turtle pose: x:3.389503, y:9.318592
[ INFO] [1684131373.740534685]: Turtle pose: x:3.385437, y:9.311702
[ INFO] [1684131373.756131353]: Turtle pose: x:3.381393, y:9.304800
[ INFO] [1684131373.772053590]: Turtle pose: x:3.377371, y:9.297884
[ INFO] [1684131373.787987076]: Turtle pose: x:3.373371, y:9.290956
[ INFO] [1684131373.804181268]: Turtle pose: x:3.369393, y:9.284015
[ INFO] [1684131373.824008188]: Turtle pose: x:3.365438, y:9.277061
[ INFO] [1684131373.835972789]: Turtle pose: x:3.361504, y:9.270095
[ INFO] [1684131373.852172168]: Turtle pose: x:3.357593, y:9.263116
[ INFO] [1684131373.872685113]: Turtle pose: x:3.353705, y:9.256124
[ INFO] [1684131373.884254077]: Turtle pose: x:3.349838, y:9.249121
[ INFO] [1684131373.900776990]: Turtle pose: x:3.345995, y:9.242105
[ INFO] [1684131373.916490636]: Turtle pose: x:3.342174, y:9.235077
[ INFO] [1684131373.932244164]: Turtle pose: x:3.338375, y:9.228036
[ INFO] [1684131373.947958169]: Turtle pose: x:3.334599, y:9.220984
[ INFO] [1684131373.963642790]: Turtle pose: x:3.330845, y:9.213919
[ INFO] [1684131373.979804950]: Turtle pose: x:3.327114, y:9.206841
[ INFO] [1684131373.996573925]: Turtle pose: x:3.323406, y:9.199754
[ INFO] [1684131374.011705211]: Turtle pose: x:3.319720, y:9.192653
```

(4) 创建订阅者 subscriber 的 python 程序，进入 learning_topic 文件夹下的 scripts 文件夹，建立 pose_subscriber.py 文件，如下所示：

```
#!/usr/bin/env python
# -*- coding: utf-8 -*-

#####
##### Copyright 2020 GuYueHome (www.guyuehome.com). #####
#####

# 该例程将订阅/turtle1/pose话题，消息类型turtlesim::Pose

import rospy
from turtlesim.msg import Pose

def poseCallback(msg):
    rospy.logInfo("Turtle pose: x:%0.6f, y:%0.6f", msg.x, msg.y)

def pose_subscriber():
    # ROS节点初始化
    rospy.init_node('pose_subscriber', anonymous=True)

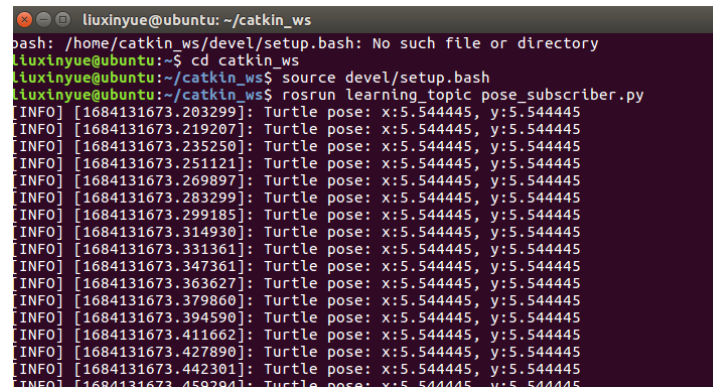
    # 创建一个Subscriber，订阅名为/turtle1/pose的topic，注册回调函数poseCal
    rospy.Subscriber("/turtle1/pose", Pose, poseCallback)

    # 循环等待回调函数
    rospy.spin()

if __name__ == '__main__':
    pose_subscriber()
```

(5) 执行订阅者 subscriber 程序，然后在终端输入 roscore

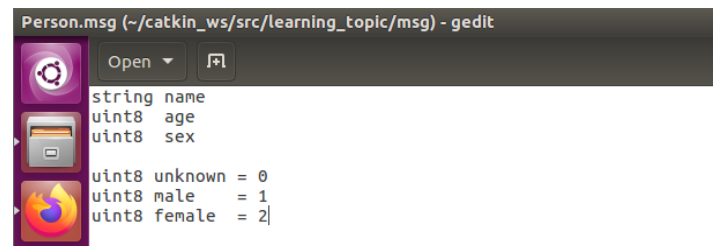
```
roslaunch turtlesim turtlesim_node
learning_topic pose_subscriber.py
```

A terminal window showing the execution of a ROS launch file. The prompt is 'liuxinyue@ubuntu: ~/catkin_ws'. The command 'roslaunch learning_topic pose_subscriber.py' has been executed. The output shows a series of INFO messages from the 'turtlesim' node, each reporting the turtle's pose (x, y coordinates) as 5.544445. The messages are timestamped with increasing values from 1684131673.203299 to 1684131673.459294.

```
liuxinyue@ubuntu: ~/catkin_ws
bash: /home/catkin_ws/devel/setup.bash: No such file or directory
liuxinyue@ubuntu:~$ cd catkin_ws
liuxinyue@ubuntu:~/catkin_ws$ source devel/setup.bash
liuxinyue@ubuntu:~/catkin_ws$ roslaunch learning_topic pose_subscriber.py
[INFO] [1684131673.203299]: Turtle pose: x:5.544445, y:5.544445
[INFO] [1684131673.219207]: Turtle pose: x:5.544445, y:5.544445
[INFO] [1684131673.235250]: Turtle pose: x:5.544445, y:5.544445
[INFO] [1684131673.251121]: Turtle pose: x:5.544445, y:5.544445
[INFO] [1684131673.269897]: Turtle pose: x:5.544445, y:5.544445
[INFO] [1684131673.283299]: Turtle pose: x:5.544445, y:5.544445
[INFO] [1684131673.299185]: Turtle pose: x:5.544445, y:5.544445
[INFO] [1684131673.314930]: Turtle pose: x:5.544445, y:5.544445
[INFO] [1684131673.331361]: Turtle pose: x:5.544445, y:5.544445
[INFO] [1684131673.347361]: Turtle pose: x:5.544445, y:5.544445
[INFO] [1684131673.363627]: Turtle pose: x:5.544445, y:5.544445
[INFO] [1684131673.379860]: Turtle pose: x:5.544445, y:5.544445
[INFO] [1684131673.394590]: Turtle pose: x:5.544445, y:5.544445
[INFO] [1684131673.411662]: Turtle pose: x:5.544445, y:5.544445
[INFO] [1684131673.427890]: Turtle pose: x:5.544445, y:5.544445
[INFO] [1684131673.442301]: Turtle pose: x:5.544445, y:5.544445
[INFO] [1684131673.459294]: Turtle pose: x:5.544445, y:5.544445
```

3. 自定义消息类型

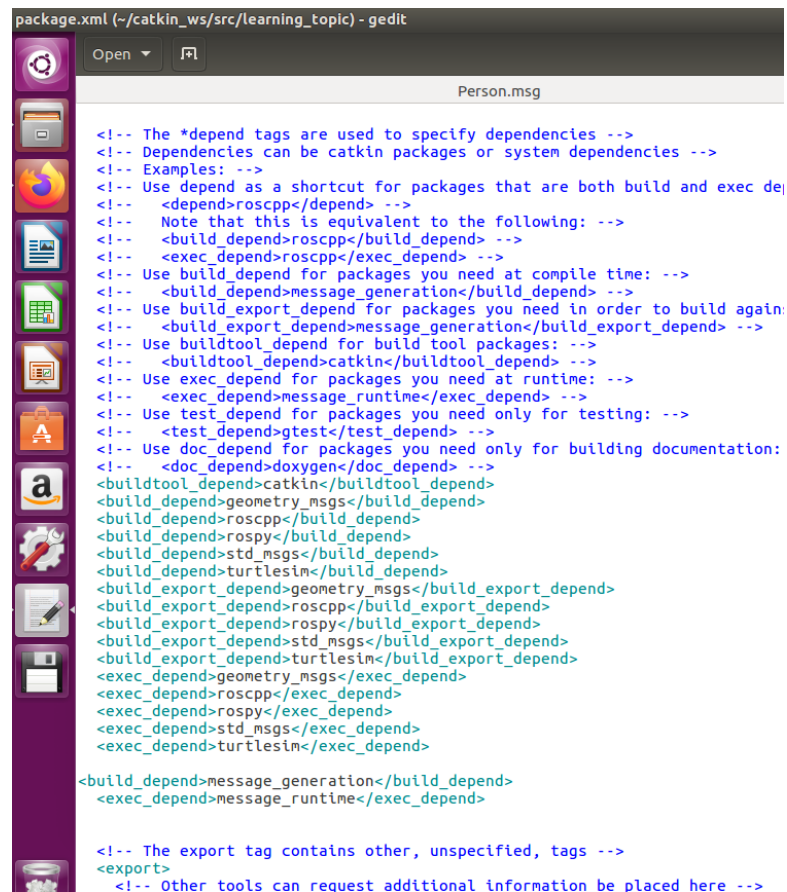
- (1) 自定义消息类型文件, 在 learning_topic 文件夹下建立 msg 文件夹, 自定义消息类型如下:

A screenshot of a text editor window titled 'Person.msg (~/.catkin_ws/src/learning_topic/msg) - gedit'. The editor shows the definition of a custom ROS message type. It starts with 'string name', followed by 'uint8 age' and 'uint8 sex'. Below these, there are three constant definitions: 'uint8 unknown = 0', 'uint8 male = 1', and 'uint8 female = 2'. The left sidebar shows icons for file operations and the file manager.

```
Person.msg (~/.catkin_ws/src/learning_topic/msg) - gedit
string name
uint8 age
uint8 sex

uint8 unknown = 0
uint8 male = 1
uint8 female = 2
```

- (2) 针对自定义消息类型文件添加功能包依赖和编译选项, 打开 learning_topic 文件夹下的 package.xml 文件, 确保文件中设置了如下的相关依赖:



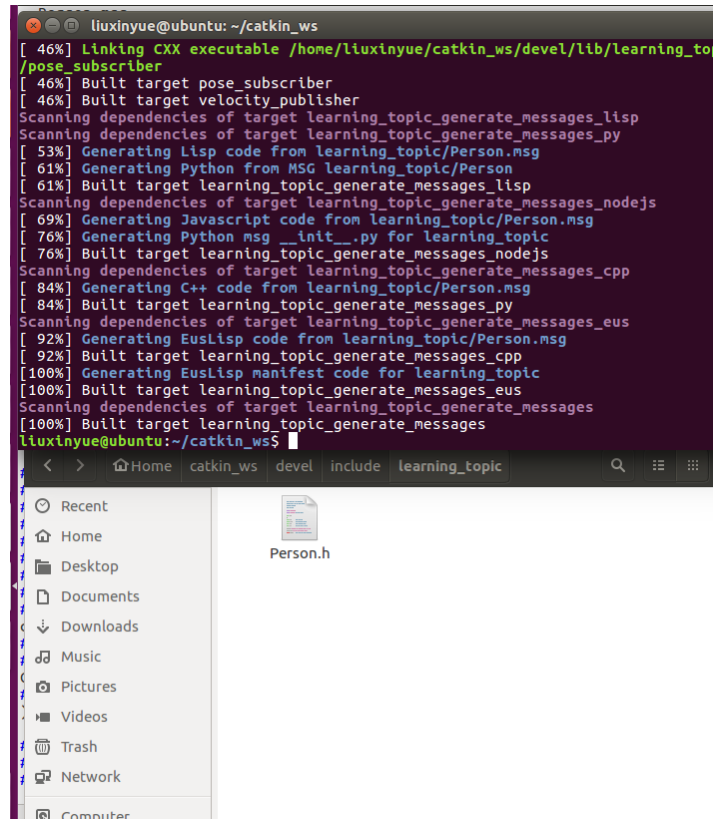
```
package.xml (~/.catkin_ws/src/learning_topic) - gedit
Person.msg

<!-- The *depend tags are used to specify dependencies -->
<!-- Dependencies can be catkin packages or system dependencies -->
<!-- Examples: -->
<!-- Use depend as a shortcut for packages that are both build and exec de
<!-- <depend>roscpp</depend> -->
<!-- Note that this is equivalent to the following: -->
<!-- <build_depend>roscpp</build_depend> -->
<!-- <exec_depend>roscpp</exec_depend> -->
<!-- Use build_depend for packages you need at compile time: -->
<!-- <build_depend>message_generation</build_depend> -->
<!-- Use build_export_depend for packages you need in order to build again:
<!-- <build_export_depend>message_generation</build_export_depend> -->
<!-- Use buildtool_depend for build tool packages: -->
<!-- <buildtool_depend>catkin</buildtool_depend> -->
<!-- Use exec_depend for packages you need at runtime: -->
<!-- <exec_depend>message_runtime</exec_depend> -->
<!-- Use test_depend for packages you need only for testing: -->
<!-- <test_depend>gtest</test_depend> -->
<!-- Use doc_depend for packages you need only for building documentation:
<!-- <doc_depend>doxygen</doc_depend> -->
<buildtool_depend>catkin</buildtool_depend>
<build_export_depend>geometry_msgs</build_export_depend>
<build_export_depend>roscpp</build_export_depend>
<build_export_depend>rospy</build_export_depend>
<build_export_depend>std_msgs</build_export_depend>
<build_export_depend>turtlesim</build_export_depend>
<build_export_depend>geometry_msgs</build_export_depend>
<build_export_depend>roscpp</build_export_depend>
<build_export_depend>rospy</build_export_depend>
<build_export_depend>std_msgs</build_export_depend>
<build_export_depend>turtlesim</build_export_depend>
<exec_depend>geometry_msgs</exec_depend>
<exec_depend>roscpp</exec_depend>
<exec_depend>rospy</exec_depend>
<exec_depend>std_msgs</exec_depend>
<exec_depend>turtlesim</exec_depend>

<build_depend>message_generation</build_depend>
<exec_depend>message_runtime</exec_depend>

<!-- The export tag contains other, unspecified, tags -->
<export>
  <!-- Other tools can request additional information be placed here -->
```

(3) 设计发布者 (publisher), 执行 catkin_make 命令, 通过编译结果如下所示, 可以在 catkin_ws 文件夹下 devel 文件夹下 include 文件夹下看到结果:



(4) 设计订阅者（subscriber），发布名为
person_publisher.cpp 内容：



订阅者文件名 `person_subscriber.cpp` 文件如下所示：



```
person_subscriber.cpp (~/.catkin_ws/src/learning_topic/src) - gedit
CMakeLists.txt
*****
Copyright 2020 GuYueHome (www.guyuehome.com).
*****
/**
 * 该例程将订阅/person_info话题，自定义消息类型learning_topic::Person
 */
#include <ros/ros.h>
#include "learning_topic/Person.h"

// 接收到订阅的消息后，会进入消息回调函数
void personInfoCallback(const learning_topic::Person::ConstPtr& msg)
{
    // 将接收到的消息打印出来
    ROS_INFO("Subscribe Person Info: name:%s age:%d sex:%d",
             msg->name.c_str(), msg->age, msg->sex);
}

int main(int argc, char **argv)
{
    // 初始化ROS节点
    ros::init(argc, argv, "person_subscriber");

    // 创建节点句柄
    ros::NodeHandle n;

    // 创建一个Subscriber，订阅名为/person_info的topic，注册回调函数personInfoCallback
    ros::Subscriber person_info_sub = n.subscribe("/person_info", 10, personInfoCallback);

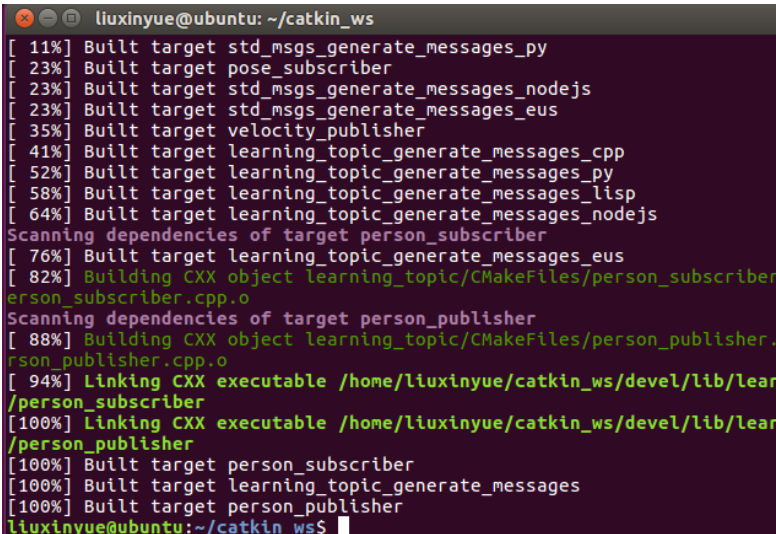
    // 循环等待回调函数
    ros::spin();

    return 0;
}
```

(5) 编译发布者 (Publisher) 和订阅者 (subscriber)，修改 `CMakeFile` 文件的配置，插入如下代码；运行 `catkin_make`

```
add_executable(person_publisher src/person_publisher.cpp)
target_link_libraries(person_publisher ${catkin_LIBRARIES})
add_dependencies(person_publisher ${PROJECT_NAME}_generate_messages_cpp)

add_executable(person_subscriber src/person_subscriber.cpp)
target_link_libraries(person_subscriber ${catkin_LIBRARIES})
add_dependencies(person_subscriber ${PROJECT_NAME}_generate_messages_cpp)
```



```
liuxinyue@ubuntu: ~/.catkin_ws
[ 11%] Built target std_msgs_generate_messages_py
[ 23%] Built target pose_subscriber
[ 23%] Built target std_msgs_generate_messages_nodejs
[ 23%] Built target std_msgs_generate_messages_eus
[ 35%] Built target velocity_publisher
[ 41%] Built target learning_topic_generate_messages_cpp
[ 52%] Built target learning_topic_generate_messages_py
[ 58%] Built target learning_topic_generate_messages_lisp
[ 64%] Built target learning_topic_generate_messages_nodejs
Scanning dependencies of target person_subscriber
[ 76%] Built target learning_topic_generate_messages_eus
[ 82%] Building CXX object learning_topic/CMakeFiles/person_subscriber
person_subscriber.cpp.o
Scanning dependencies of target person_publisher
[ 88%] Building CXX object learning_topic/CMakeFiles/person_publisher
person_publisher.cpp.o
[ 94%] Linking CXX executable /home/liuxinyue/catkin_ws/devel/lib/learn
/person_subscriber
[100%] Linking CXX executable /home/liuxinyue/catkin_ws/devel/lib/learn
/person_publisher
[100%] Built target person_subscriber
[100%] Built target learning_topic_generate_messages
[100%] Built target person_publisher
liuxinyue@ubuntu: ~/.catkin_ws$
```

(6) 执行发布者 (Publisher) 和订阅者 (subscriber), 输入

roscore, rosrn learning_topic

person_publisher, rosrn learning_topic

person_subscriber 结果如下

```
roscore http://ubuntu:11311/
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.

started roslaunch server http://ubuntu:35027/

liuxinyue@ubuntu: ~/catkin_ws
bash: /home/catkin_ws/devel/setup.bash: No such file or directory
liuxinyue@ubuntu:~$ cd ~/catkin_ws
liuxinyue@ubuntu:~/catkin_ws$ source devel/setup.bash
liuxinyue@ubuntu:~/catkin_ws$ rosrn learning_topic person_publisher
[ INFO] [1684132942.534083905]: Publish Person Info: name:Tom age:18
[ INFO] [1684132943.534169960]: Publish Person Info: name:Tom age:18
[ INFO] [1684132944.534473972]: Publish Person Info: name:Tom age:18
[ INFO] [1684132945.534484384]: Publish Person Info: name:Tom age:18
[ INFO] [1684132946.536259979]: Publish Person Info: name:Tom age:18
[ INFO] [1684132947.535159136]: Publish Person Info: name:Tom age:18
[ INFO] [1684132948.534403831]: Publish Person Info: name:Tom age:18
[ INFO] [1684132949.534418980]: Publish Person Info: name:Tom age:18
[ INFO] [1684132950.534301313]: Publish Person Info: name:Tom age:18
liuxinyue@ubuntu:~/catkin_ws
bash: /home/catkin_ws/devel/setup.bash: No such file or directory
liuxinyue@ubuntu:~$ cd ~/catkin_ws
liuxinyue@ubuntu:~/catkin_ws$ source devel/setup.bash
liuxinyue@ubuntu:~/catkin_ws$ rosrn learning_topic person_subscriber
[ INFO] [1684132989.536411166]: Subscribe Person Info: name:Tom age:18
[ INFO] [1684132990.535501684]: Subscribe Person Info: name:Tom age:18
[ INFO] [1684132991.535739677]: Subscribe Person Info: name:Tom age:18
[ INFO] [1684132992.534809464]: Subscribe Person Info: name:Tom age:18
[ INFO] [1684132993.535621231]: Subscribe Person Info: name:Tom age:18
[ INFO] [1684132994.534950179]: Subscribe Person Info: name:Tom age:18
[ INFO] [1684132995.535419114]: Subscribe Person Info: name:Tom age:18
[ INFO] [1684132996.535387014]: Subscribe Person Info: name:Tom age:18
[ INFO] [1684132997.535097736]: Subscribe Person Info: name:Tom age:18
```

然后使用 Python 来实现, 编写 person_publisher.py 文件和 person_subscriber.py 文件, 如下所示:

```

person_publisher.py (~/.catkin_ws/src/learning_topic/scripts) - gedit
Open  [icon]

#!/usr/bin/env python
# -*- coding: utf-8 -*-

#####
##### Copyright 2020 GuYueHome (www.guyuehome.com). #####
#####

# 该例程将发布/person_info话题，自定义消息类型learning_topic::Person

import rospy
from learning_topic.msg import Person

def velocity_publisher():
    # ROS节点初始化
    rospy.init_node('person_publisher', anonymous=True)

    # 创建一个Publisher，发布名为/person_info的topic，消息类型为learning_topic::Person
    person_info_pub = rospy.Publisher('/person_info', Person, queue_size=10)

    # 设置循环的频率
    rate = rospy.Rate(10)

    while not rospy.is_shutdown():
        # 初始化learning_topic::Person类型的消息
        person_msg = Person()
        person_msg.name = "Tom";
        person_msg.age = 18;
        person_msg.sex = Person.male;

        # 发布消息
        person_info_pub.publish(person_msg)
        rospy.loginfo("Publish person message[%s, %d, %d]",
                      person_msg.name, person_msg.age, person_msg.sex)

        # 按照循环频率延时
        rate.sleep()

if __name__ == '__main__':
    try:
        velocity_publisher()
    except rospy.ROSInterruptException:
        pass

```

```

person_subscriber.py (~/.catkin_ws/src/learning_topic/scripts) - gedit
Open  [icon]

#!/usr/bin/env python
# -*- coding: utf-8 -*-

#####
##### Copyright 2020 GuYueHome (www.guyuehome.com). #####
#####

# 该例程将订阅/person_info话题，自定义消息类型learning_topic::Person

import rospy
from learning_topic.msg import Person

def personInfoCallback(msg):
    rospy.loginfo("Subscribe Person Info: name:%s age:%d sex:%d",
                  msg.name, msg.age, msg.sex)

def person_subscriber():
    # ROS节点初始化
    rospy.init_node('person_subscriber', anonymous=True)

    # 创建一个Subscriber，订阅名为/person_info的topic，注册回调函数personInfoCallback
    rospy.Subscriber("/person_info", Person, personInfoCallback)

    # 循环等待回调函数
    rospy.spin()

if __name__ == '__main__':
    person_subscriber()

```

之后输入 `roscore` , `roslaunch learning_topic`
`person_publisher.py` , `roslaunch learning_topic`
`person_subscriber.py`

```
liuxinyue@ubuntu: ~/catkin_ws
bash: /home/catkin_ws/devel/setup.bash: No such file or directory
liuxinyue@ubuntu:~$ cd ~/catkin_ws
liuxinyue@ubuntu:~/catkin_ws$ source devel/setup.bash
liuxinyue@ubuntu:~/catkin_ws$ roslaunch learning_topic person_publisher.py
[INFO] [1684133468.307565]: Publish person message[Tom, 18, 1]
[INFO] [1684133468.408884]: Publish person message[Tom, 18, 1]
[INFO] [1684133468.507837]: Publish person message[Tom, 18, 1]
[INFO] [1684133468.608871]: Publish person message[Tom, 18, 1]
[INFO] [1684133468.708738]: Publish person message[Tom, 18, 1]
[INFO] [1684133468.808741]: Publish person message[Tom, 18, 1]
[INFO] [1684133468.908195]: Publish person message[Tom, 18, 1]
[INFO] [1684133469.008648]: Publish person message[Tom, 18, 1]
[INFO] [1684133469.108876]: Publish person message[Tom, 18, 1]
[INFO] [1684133469.208852]: Publish person message[Tom, 18, 1]
[INFO] [1684133469.308704]: Publish person message[Tom, 18, 1]
[INFO] [1684133469.407733]: Publish person message[Tom, 18, 1]
[INFO] [1684133469.508353]: Publish person message[Tom, 18, 1]
[INFO] [1684133469.608315]: Publish person message[Tom, 18, 1]
[INFO] [1684133469.708450]: Publish person message[Tom, 18, 1]
[INFO] [1684133469.808350]: Publish person message[Tom, 18, 1]
[INFO] [1684133469.908349]: Publish person message[Tom, 18, 1]
[INFO] [1684133470.008274]: Publish person message[Tom, 18, 1]
[INFO] [1684133470.108220]: Publish person message[Tom, 18, 1]
liuxinyue@ubuntu:~/catkin_ws
bash: /home/catkin_ws/devel/setup.bash: No such file or directory
liuxinyue@ubuntu:~$ cd ~/catkin_ws
liuxinyue@ubuntu:~/catkin_ws$ source devel/setup.bash
liuxinyue@ubuntu:~/catkin_ws$ roslaunch learning_topic person_subscriber.py
[INFO] [1684133514.110167]: Subscribe Person Info: name:Tom age:18 sex:1
[INFO] [1684133514.210696]: Subscribe Person Info: name:Tom age:18 sex:1
[INFO] [1684133514.309847]: Subscribe Person Info: name:Tom age:18 sex:1
[INFO] [1684133514.409950]: Subscribe Person Info: name:Tom age:18 sex:1
[INFO] [1684133514.509582]: Subscribe Person Info: name:Tom age:18 sex:1
[INFO] [1684133514.609637]: Subscribe Person Info: name:Tom age:18 sex:1
[INFO] [1684133514.709135]: Subscribe Person Info: name:Tom age:18 sex:1
[INFO] [1684133514.810685]: Subscribe Person Info: name:Tom age:18 sex:1
[INFO] [1684133514.910039]: Subscribe Person Info: name:Tom age:18 sex:1
[INFO] [1684133515.010379]: Subscribe Person Info: name:Tom age:18 sex:1
[INFO] [1684133515.109318]: Subscribe Person Info: name:Tom age:18 sex:1
[INFO] [1684133515.211076]: Subscribe Person Info: name:Tom age:18 sex:1
[INFO] [1684133515.310623]: Subscribe Person Info: name:Tom age:18 sex:1
[INFO] [1684133515.409720]: Subscribe Person Info: name:Tom age:18 sex:1
[INFO] [1684133515.509958]: Subscribe Person Info: name:Tom age:18 sex:1
[INFO] [1684133515.609781]: Subscribe Person Info: name:Tom age:18 sex:1
[INFO] [1684133515.708784]: Subscribe Person Info: name:Tom age:18 sex:1
[INFO] [1684133515.809187]: Subscribe Person Info: name:Tom age:18 sex:1
[INFO] [1684133515.909139]: Subscribe Person Info: name:Tom age:18 sex:1
[INFO] [1684133516.009160]: Subscribe Person Info: name:Tom age:18 sex:1
```