4 Publisher

4.1 Publisher

Publisher, as the name suggests, plays the role of publishing news. The message here can be the sensor information transmitted by the lower computer to the upper computer, and then packaged and packaged by the upper computer and sent to the subscribers who have subscribed to the topic; it can also be the data of the upper computer after the operation is packaged and packaged and sent to the Subscribers to this topic.

4.2 Create workspace and topic package

4.2.1 Create a workspace

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

4.2.2 Compilation workspace

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

4.2.3 Update environment variables

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

4.2.4 Check environment variables

```
echo $ROS_PACKAGE_PATH
```

4.2.5 Create function package

```
cd ~/catkin_ws/src
catkin_create_pkg learning_topic std_msgs rospy roscpp geometry_msgs turtlesim
#Explanation: learning_topic is the name of the function package
```

4.2.6 Compile function package

```
cd ~/catkin_ws
catkin_make
source ~/catkin_ws/devel/setup.bash
```

4.3 create a publisher

4.3.1 Creation steps

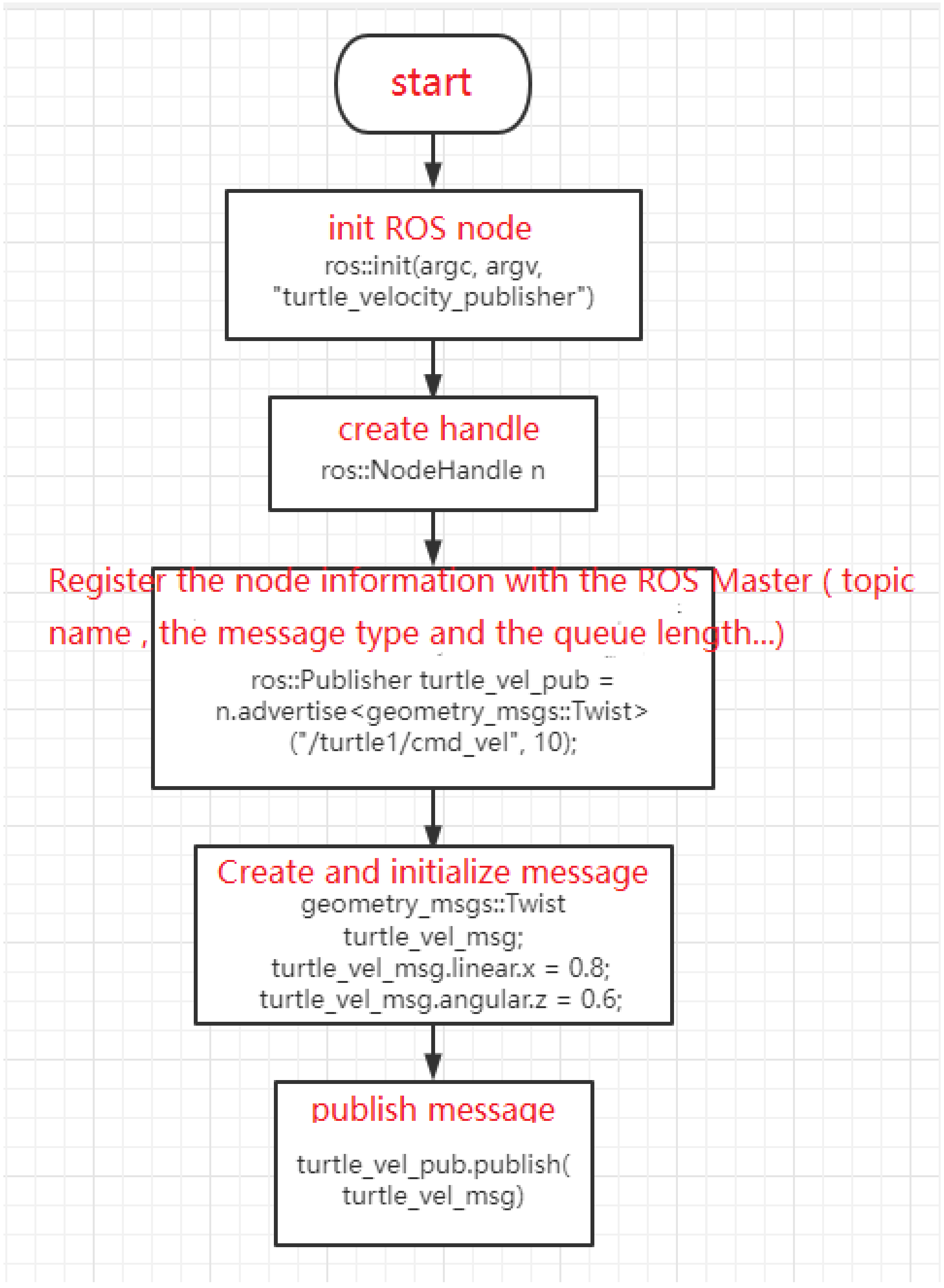
1. initialize the ROS node
2. create a handle
3. Register node information with ROS Master, including the topic name published, the message type in the topic, and the queue length
4. create and initialize message data
5. Send messages cyclically according to a certain frequency

4.3.2 C++ language implementation

1. In the src folder of the function package, create a c++ file(the file suffix is .cpp) and name it turtle_velocity_publisher.cpp
2. copy and paste the program code below into the turtle_velocity_publisher.cpp file

```
/* Create a speed publisher for a baby turtle */
#include <ros/ros.h>
#include <geometry_msgs/Twist.h>
int  main(int argc, char  ** argv){

    ros::init(argc, argv, "turtle_velocity_publisher"); //ROS node
initialization

    ros::NodeHandle  n; //here is to create handle

    //Create a Publisher, publish a topic named /turtle1/cmd_vel, the message
type is geometry_msgs::Twist, and the queue length is 10
    ros::Publisher  turtle_vel_pub  =  n.advertise < geometry_msgs::Twist >
("/turtle1/cmd_vel", 10);

    ros::Rate  loop_rate(10); //Set the frequency of the loop

    while (ros::ok()){
            //Initialize the message to be published, the type must be
consistent with Publisher
        geometry_msgs::Twist  turtle_vel_msg;
        turtle_vel_msg.linear.x  =  0.8;
        turtle_vel_msg.angular.z  =  0.6;
        turtle_vel_pub.publish(turtle_vel_msg); // publish velocity message

        //Print the published speed content
        ROS_INFO("Publsh turtle velocity command[%0.2f m/s, %0.2f rad/s]",
turtle_vel_msg.linear.x, turtle_vel_msg.angular.z);

        loop_rate.sleep(); //Delay according to the loop frequency
    }
    return  0;
}
```

3. the program flow chart, which can be viewed corresponding to the content of 1.3.1


start
init ROS node
ros::init(argc, argv, "turtle_velocity_publisher")
create handle
ros::NodeHandle n
Register the node information with the ROS Master (topic name , the message type and the queue length...)
ros::Publisher turtle_vel_pub = n.advertise<geometry_msgs::Twist>("/turtle1/cmd_vel", 10);
Create and initialize message
geometry_msgs::Twist turtle_vel_msg;
turtle_vel_msg.linear.x = 0.8;
turtle_vel_msg.angular.z = 0.6;
publish message
turtle_vel_pub.publish(turtle_vel_msg)

4. configure in CMakelist.txt, under the build area, add the following content

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

5. Compile the code in the workspace directory

```
cd ~/catkin_ws
catkin_make
source devel/setup.bash #Environment variables need to be configured, otherwise
the system cannot find the running program
```

6. run the program

- run roscore

  ```
  roscore
  ```

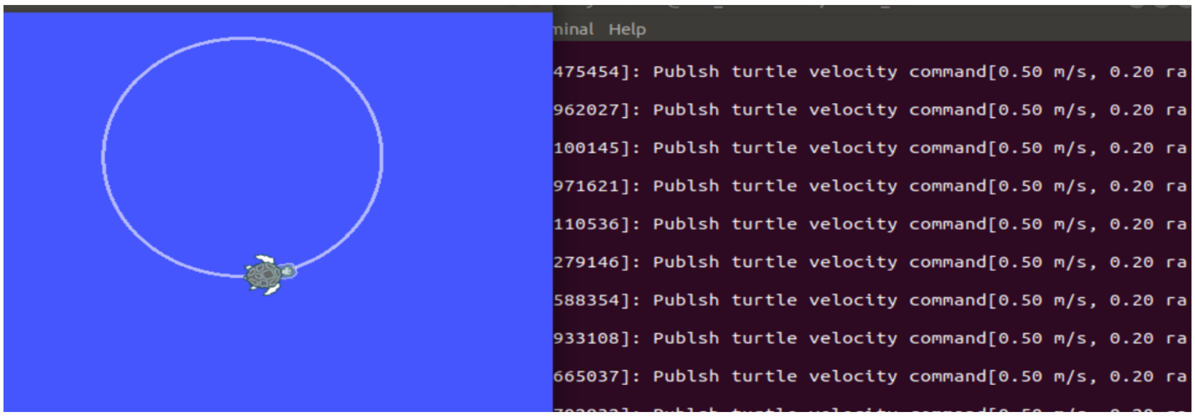
- Run the turtle node

  ```
  rosrun turtlesim turtlesim_node
  ```

- Run the publisher to continuously send the speed to the little turtle

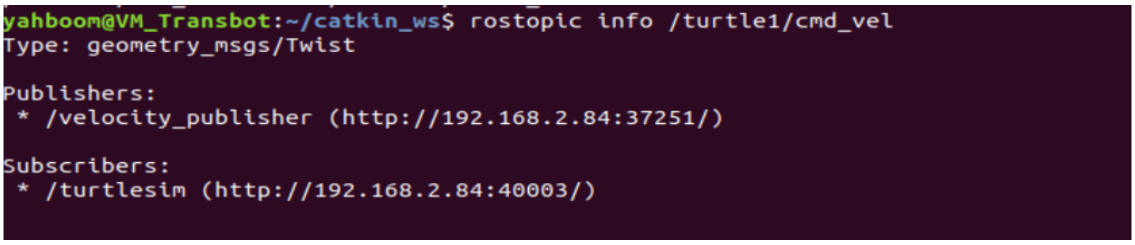
  ```
  rosrun learning_topic turtle_velocity_publisher
  ```

7. Screenshot of running effect



```
475454]: Publsh turtle velocity command[0.50 m/s, 0.20 ra
962027]: Publsh turtle velocity command[0.50 m/s, 0.20 ra
100145]: Publsh turtle velocity command[0.50 m/s, 0.20 ra
971621]: Publsh turtle velocity command[0.50 m/s, 0.20 ra
110536]: Publsh turtle velocity command[0.50 m/s, 0.20 ra
279146]: Publsh turtle velocity command[0.50 m/s, 0.20 ra
588354]: Publsh turtle velocity command[0.50 m/s, 0.20 ra
933108]: Publsh turtle velocity command[0.50 m/s, 0.20 ra
665037]: Publsh turtle velocity command[0.50 m/s, 0.20 ra
```

8. program operation instructions

- Enter rostopic list in the terminal to view the topic list and you will find the topic /turtle1/cmd_vel
- We use rostopic info /turtle1/cmd_vel to find out
- 

```
yahboom@VM_Transbot:~/catkin_ws$ rostopic info /turtle1/cmd_vel
Type: geometry_msgs/Twist

Publishers:
 * /velocity_publisher (http://192.168.2.84:37251/)

Subscribers:
 * /turtlesim (http://192.168.2.84:40003/)
```

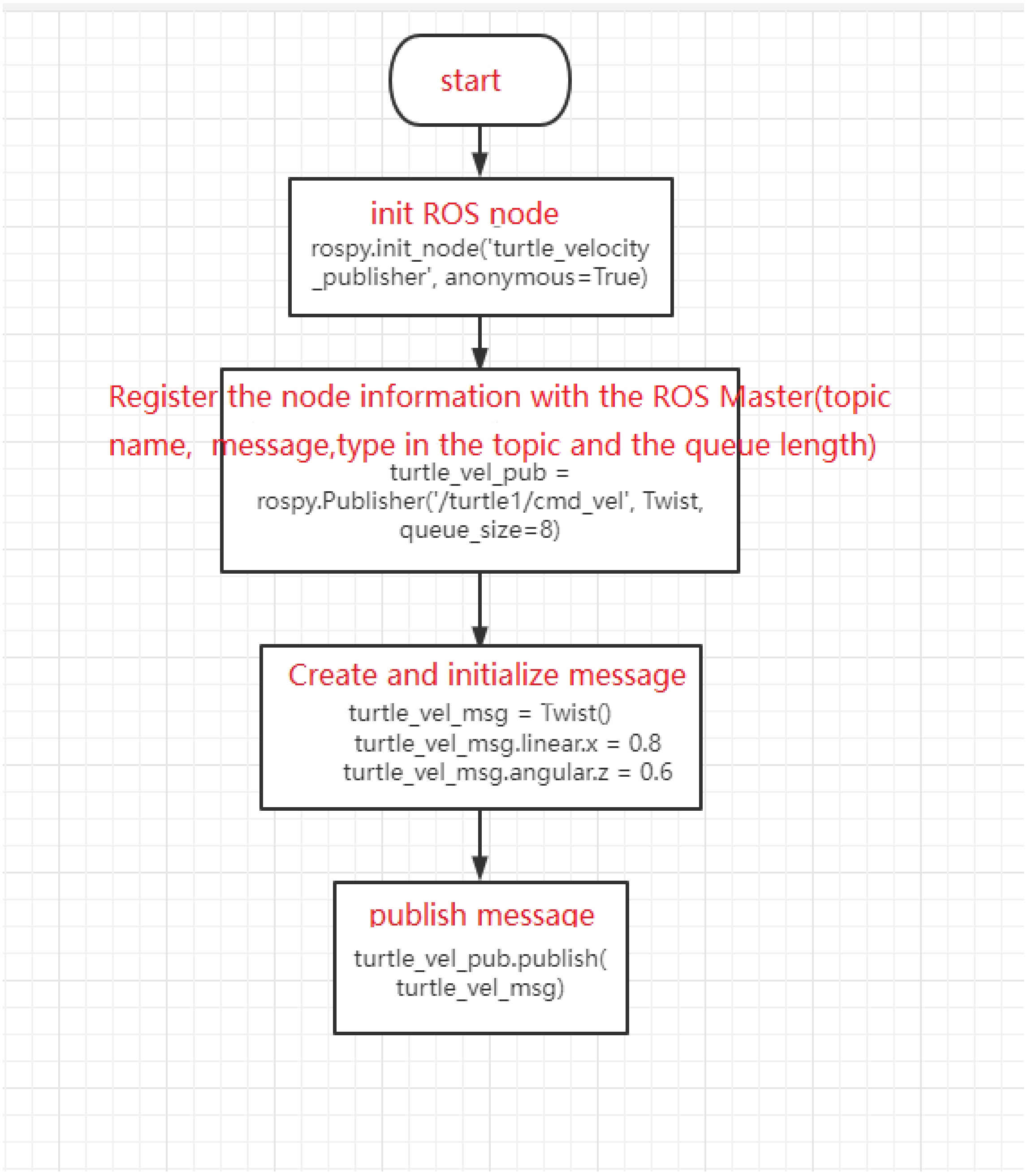
This shows that the little turtle is a subscription to the speed topic /turtle1/cmd_vel. Therefore, the publisher keeps sending speed data. After the little turtle receives it, it starts to move according to the speed.

4.3.3 Python language implementation

1. In the function package directory, create a new folder scripts, and then create a new python file(file suffix .py) in the scripts folder, named turtle_velocity_publisher.py
2. copy and paste the program code below into the turtle_velocity_publisher.py file

```
#!/usr/bin/env python
# -*- coding: utf-8 -*-
# This routine will publish turtle1/cmd_vel topic, message type
geometry_msgs::Twist

import  rospy
from  geometry_msgs.msg import Twist

def turtle_velocity_publisher():

    rospy.init_node('turtle_velocity_publisher', anonymous = True) # ROS node
initialization

    # Create a small turtle speed publisher, publish a topic named
/turtle1/cmd_vel, the message type is geometry_msgs::Twist, and 8 represents the
message queue length
    turtle_vel_pub  =  rospy.Publisher('/turtle1/cmd_vel', Twist, queue_size =
8)


    rate = rospy.Rate(10) # set the frequency of the loop

    while  not  rospy.is_shutdown():
        # Initialize a message of type geometry_msgs::Twist
        turtle_vel_msg  =  Twist()
        turtle_vel_msg.linear.x  =  0.8
        turtle_vel_msg.angular.z  =  0.6

        # make an announcement
        turtle_vel_pub.publish(turtle_vel_msg)
        rospy.loginfo("linear is :%0.2f m/s, angular is :%0.2f rad/s",
                turtle_vel_msg.linear.x, turtle_vel_msg.angular.z)


        rate.sleep() # Delay according to the loop frequency

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

3. program flow chart


start
init ROS node
rospy.init_node('turtle_velocity_publisher', anonymous=True)
Register the node information with the ROS Master(topic name, message,type in the topic and the queue length)
turtle_vel_pub = rospy.Publisher('/turtle1/cmd_vel', Twist, queue_size=8)
Create and initialize message
turtle_vel_msg = Twist()
turtle_vel_msg.linear.x = 0.8
turtle_vel_msg.angular.z = 0.6
publish message
turtle_vel_pub.publish(turtle_vel_msg)

4. run the program

- run roscore

```
roscore
```

- Run the turtle node

```
rosrun turtlesim turtlesim_node
```

- Run the publisher to continuously send the speed to the little turtle

```
rosrun learning_topic turtle_velocity_publisher.py
```

Note: Before running, you need to add executable permissions to turtle_velocity_publisher.py, open the terminal in the turtle_velocity_publisher.py folder,

```
sudo chmod a+x turtle_velocity_publisher.py
```

All pythons need to add execute file permissions, **otherwise an error will be reported!**

5. Refer to 1.3.2 for operation effect and program description.