



Linux Systems and Open Source Software

Robot Operating System (ROS)

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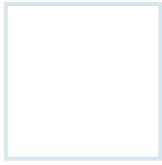
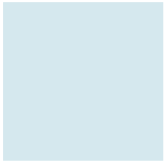
Lab (ROS)

- Core ROS Tutorials (Beginner Level)
 - Installing and Configuring Your ROS Environment
 - Creating a ROS Package
 - Building a ROS Package
 - Writing a Simple Publisher and Subscriber (Python)
 - Examining the Simple Publisher and Subscriber
 - rqt_graph



Lab (ROS2)

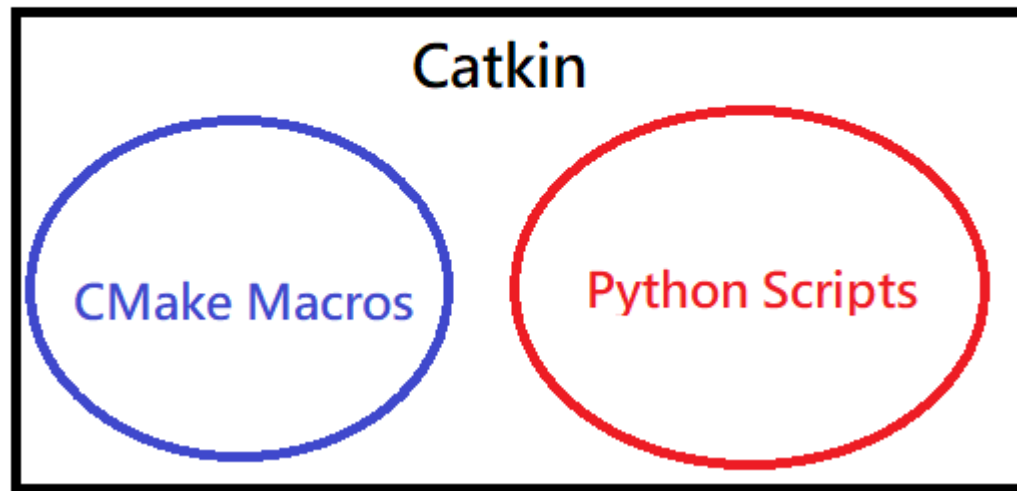
- Please follow the steps in the links below. (Do not follow page 4~11.)
 - [Writing a simple publisher and subscriber \(Python\)](#)
 - [rqt_graph](#)
- Then upload the similar screenshot on page 12 to moodle.
 - 1 terminal talker.
 - 1 terminal listener.
 - rqt_graph

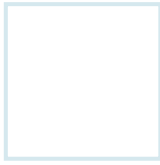
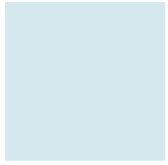


Catkin

- http://wiki.ros.org/catkin/conceptual_overview

Catkin - The official build system of ROS



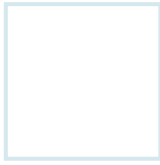


Create a ROS Workspace

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

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

```
$ catkin_make
```



Creating a catkin Package

```
$ cd ~/catkin_ws/src
```

```
$ catkin_create_pkg beginner_tutorials std_msgs rospy roscpp
```

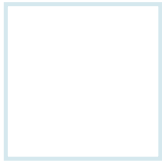
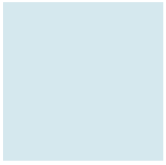


Building a catkin workspace and sourcing the setup file

```
$ cd ~/catkin_ws
```

```
$ catkin_make
```

```
$ . ~/catkin_ws/devel/setup.bash
```



package dependencies

```
$ roscd beginner_tutorials
```

```
$ cat package.xml
```




Download the code from github

```
$ roscd beginner_tutorials
```

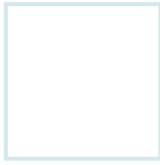
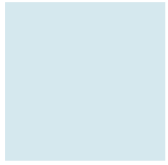
```
$ mkdir scripts
```

```
$ cd scripts/
```

```
$ wget https://raw.githubusercontent.com/ros/ros_tutorials/kinetic-devel/rospy_tutorials/001_talker_listener/talker.py
```

```
$ wget https://raw.githubusercontent.com/ros/ros_tutorials/kinetic-devel/rospy_tutorials/001_talker_listener/listener.py
```

```
$ chmod +x *.py
```



Building your nodes

```
$ cd ~/catkin_ws
```

```
$ catkin_make
```



Examining the Simple Publisher and Subscriber in **four** terminals

```
$ roscore
```

```
$ rosparam set enable_statistics true
```

```
$ cd ~/catkin_ws
```

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

```
$ rosrun beginner_tutorials talker.py
```

```
$ cd ~/catkin_ws
```

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

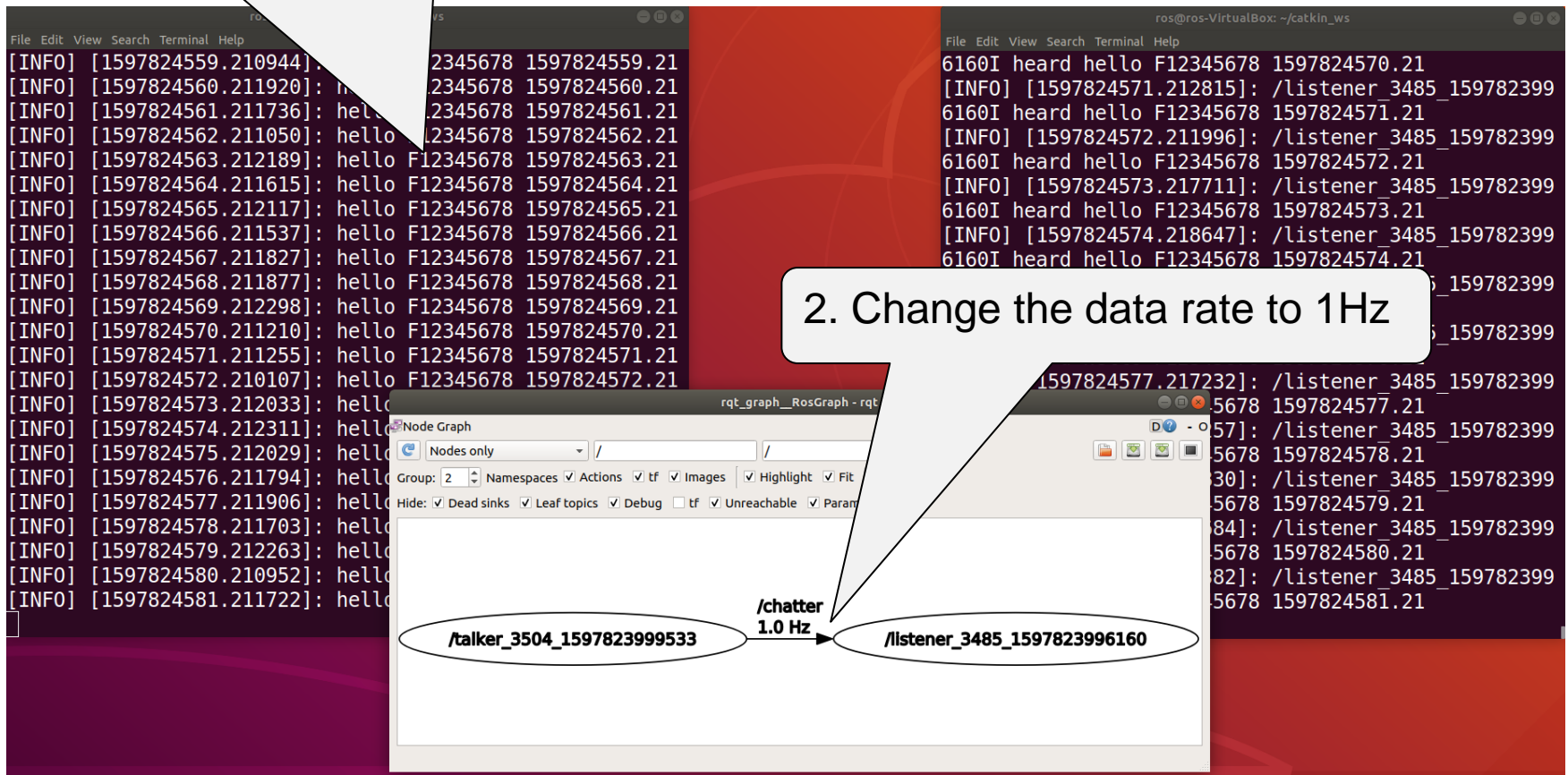
```
$ rosrun beginner_tutorials listener.py
```

```
$ rqt_graph
```



Show the runtime result & Upload to Moodle

1. Put your Student ID as the message



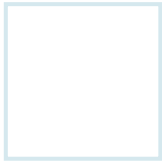
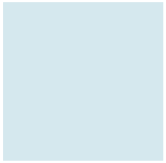
The screenshot displays a ROS environment with a terminal window on the left and a Node Graph window on the right. The terminal window shows a series of log messages from a listener node, including timestamps and topic names. The Node Graph window shows a graph with two nodes: `/talker_3504_1597823999533` and `/listener_3485_1597823996160`, connected by a topic `/chatter` with a data rate of `1.0 Hz`. A callout box points to the `1.0 Hz` data rate, indicating a change to 1Hz.

```

[INFO] [1597824559.210944]: hello F12345678 1597824559.21
[INFO] [1597824560.211920]: hello F12345678 1597824560.21
[INFO] [1597824561.211736]: hello F12345678 1597824561.21
[INFO] [1597824562.211050]: hello F12345678 1597824562.21
[INFO] [1597824563.212189]: hello F12345678 1597824563.21
[INFO] [1597824564.211615]: hello F12345678 1597824564.21
[INFO] [1597824565.212117]: hello F12345678 1597824565.21
[INFO] [1597824566.211537]: hello F12345678 1597824566.21
[INFO] [1597824567.211827]: hello F12345678 1597824567.21
[INFO] [1597824568.211877]: hello F12345678 1597824568.21
[INFO] [1597824569.212298]: hello F12345678 1597824569.21
[INFO] [1597824570.211210]: hello F12345678 1597824570.21
[INFO] [1597824571.211255]: hello F12345678 1597824571.21
[INFO] [1597824572.210107]: hello F12345678 1597824572.21
[INFO] [1597824573.212033]: hello F12345678 1597824573.21
[INFO] [1597824574.212311]: hello F12345678 1597824574.21
[INFO] [1597824575.212029]: hello F12345678 1597824575.21
[INFO] [1597824576.211794]: hello F12345678 1597824576.21
[INFO] [1597824577.211906]: hello F12345678 1597824577.21
[INFO] [1597824578.211703]: hello F12345678 1597824578.21
[INFO] [1597824579.212263]: hello F12345678 1597824579.21
[INFO] [1597824580.210952]: hello F12345678 1597824580.21
[INFO] [1597824581.211722]: hello F12345678 1597824581.21
  
```

```

graph LR
    talker["/talker_3504_1597823999533"] -- "/chatter 1.0 Hz" --> listener["/listener_3485_1597823996160"]
  
```

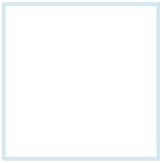
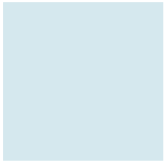


Hint: Modify “talker.py”

```

1 import rospy
2 from std_msgs.msg import String
3
4 def talker():
5     pub = rospy.Publisher('chatter', String, queue_size=10)
6     rospy.init_node('talker', anonymous=True)
7     rate = rospy.Rate(10) # 10hz
8     while not rospy.is_shutdown():
9         hello_str = "hello world %s" % rospy.get_time()
10        rospy.loginfo(hello_str)
11        pub.publish(hello_str)
12        rate.sleep()
13
14 if __name__ == '__main__':
15     try:
16         talker()
17     except rospy.ROSInterruptException:
18         pass

```



QUESTIONS