

# ROBOTIC OPERATING SYSTEMS AND ROBOT SIMULATIONS

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## Labsheet 2

1. Create a publisher node subscriber node to publishes consecutive integers on the topic counter at a rate of 2Hz and subscribe the count.

Code :

```
1  #!/usr/bin/env python3
2  # license removed for brevity
3  import rospy
4  from std_msgs.msg import String
5
6  def counter():
7      pub = rospy.Publisher('chatter', String, queue_size=10)
8      rospy.init_node('counter', anonymous=True)
9      rate = rospy.Rate(2) # 2 hz
10     x = 0
11     while not rospy.is_shutdown():
12         hello_str = "Counter no: %d" % x
13         rospy.loginfo(hello_str)
14         pub.publish(hello_str)
15         x+=1
16         rate.sleep()
17
18 if __name__ == '__main__':
19     try:
20         counter()
21     except rospy.ROSInterruptException:
22         pass
23
24
```

```
1  #!/usr/bin/env python3
2  import rospy
3  from std_msgs.msg import String
4
5  def callback(data):
6      rospy.loginfo(rospy.get_caller_id() + "Read %s", data.data)
7
8  def listener():
9      rospy.init_node('listener', anonymous=True)
10     rospy.Subscriber("chatter", String, callback)
11     rospy.spin()
12
13 if __name__ == '__main__':
14     listener()
15
```

```

giriirig@DESKTOP-07BKI3U:~$ ls
catkin_ws
giriirig@DESKTOP-07BKI3U:~$ cd catkin_ws/src
giriirig@DESKTOP-07BKI3U:~/catkin_ws/src$ catkin_create_pkg lab_2 std_msgs roscpp
Created file lab_2/package.xml
Created file lab_2/CMakeLists.txt
Created folder lab_2/include/lab_2
Created folder lab_2/src
Successfully created files in /home/giriirig/catkin_ws/src/lab_2. Please adjust the values in package.xml.
giriirig@DESKTOP-07BKI3U:~/catkin_ws/src$ cd lab_2/src/
giriirig@DESKTOP-07BKI3U:~/catkin_ws/src/lab_2/src$ ls
giriirig@DESKTOP-07BKI3U:~/catkin_ws/src/lab_2/src$ ls
giriirig@DESKTOP-07BKI3U:~/catkin_ws/src/lab_2/src$ mkdir scripts
giriirig@DESKTOP-07BKI3U:~/catkin_ws/src/lab_2/src$ cd ..
giriirig@DESKTOP-07BKI3U:~/catkin_ws/src/lab_2$ ls
CMakeLists.txt include package.xml scripts src
giriirig@DESKTOP-07BKI3U:~/catkin_ws/src/lab_2$ cd scripts
giriirig@DESKTOP-07BKI3U:~/catkin_ws/src/lab_2/scripts$ ls
publisher.py publisher.py:Zone.Identifier subscriber.py subscriber.py:Zone.Identifier
giriirig@DESKTOP-07BKI3U:~/catkin_ws/src/lab_2/scripts$ ls
publisher.py subscriber.py
giriirig@DESKTOP-07BKI3U:~/catkin_ws/src/lab_2/scripts$ chmod +x publisher.py
giriirig@DESKTOP-07BKI3U:~/catkin_ws/src/lab_2/scripts$ chmod +x subscriber.py
giriirig@DESKTOP-07BKI3U:~/catkin_ws/src/lab_2/scripts$ ls
publisher.py subscriber.py

```

```

giriirig@DESKTOP-07BKI3U:~/catkin_ws/src/lab_2/scripts$ rosrn lab_2 publisher.py
[INFO] [1728029863.886916]: Counter no: 0
[INFO] [1728029864.387881]: Counter no: 1
[INFO] [1728029864.887871]: Counter no: 2
[INFO] [1728029865.387820]: Counter no: 3
[INFO] [1728029865.887827]: Counter no: 4
[INFO] [1728029866.387836]: Counter no: 5
[INFO] [1728029866.888192]: Counter no: 6
[INFO] [1728029867.387913]: Counter no: 7
[INFO] [1728029867.888171]: Counter no: 8
[INFO] [1728029868.387851]: Counter no: 9
[INFO] [1728029868.887812]: Counter no: 10
[INFO] [1728029869.387717]: Counter no: 11
[INFO] [1728029869.887814]: Counter no: 12
[INFO] [1728029870.387760]: Counter no: 13

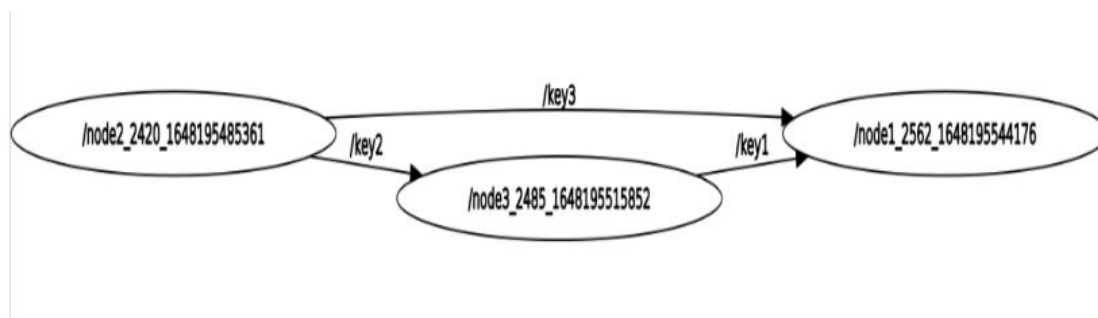
```

```

giriirig@DESKTOP-07BKI3U:~$ rosrn lab_2 subscriber.py
[INFO] [1728029889.390682]: /listener_1131_1728029888831Read Counter no: 51
[INFO] [1728029889.890996]: /listener_1131_1728029888831Read Counter no: 52
[INFO] [1728029890.391892]: /listener_1131_1728029888831Read Counter no: 53
[INFO] [1728029890.891941]: /listener_1131_1728029888831Read Counter no: 54
[INFO] [1728029891.391407]: /listener_1131_1728029888831Read Counter no: 55
[INFO] [1728029891.891577]: /listener_1131_1728029888831Read Counter no: 56
[INFO] [1728029892.391464]: /listener_1131_1728029888831Read Counter no: 57
[INFO] [1728029892.891971]: /listener_1131_1728029888831Read Counter no: 58
[INFO] [1728029893.391370]: /listener_1131_1728029888831Read Counter no: 59
[INFO] [1728029893.892103]: /listener_1131_1728029888831Read Counter no: 60
[INFO] [1728029894.391568]: /listener_1131_1728029888831Read Counter no: 61
[INFO] [1728029894.891714]: /listener_1131_1728029888831Read Counter no: 62
[INFO] [1728029895.391294]: /listener_1131_1728029888831Read Counter no: 63

```

## 2. Create a Communication System in ROS with multiple publisher and subscriber.



Key1-int Key2-float Key3-String

### Node 2

```
1  #!/usr/bin/env python3
2
3  import rospy
4  from std_msgs.msg import String, Float32
5
6  def Lefty():
7      key3 = rospy.Publisher('key3', String, queue_size=10)
8      key2 = rospy.Publisher('key2', Float32, queue_size=10)
9      rospy.init_node('Node 2', anonymous=True)
10     rate = rospy.Rate(2) # 2 hz
11     key_3 = "string"
12     key_2 = 2.2
13     while not rospy.is_shutdown():
14         key3.publish(key_3)
15         rospy.loginfo("Node 2 published %s to topic Key 3", key_3)
16         key2.publish(key_2)
17         rospy.loginfo("Node 2 published %f to topic Key 2", key_2)
18         rate.sleep()
19
20 if __name__ == '__main__':
21     try:
22         Lefty()
23     except rospy.ROSInterruptException:
24         pass
```

### Node 3

```
1  #!/usr/bin/env python3
2
3  import rospy
4  from std_msgs.msg import Int16, Float32
5
6  def callback(data):
7      rospy.loginfo("Node 3 Read from Node 2: %f", data.data)
8
9  def Middle():
10     key1 = rospy.Publisher('key1', Int16, queue_size=10)
11     rospy.init_node('Node 3', anonymous=True)
12     rate = rospy.Rate(2) # 2 hz
13     rospy.Subscriber("key2", Float32, callback)
14     key_1 = 111
15     while not rospy.is_shutdown():
16         key1.publish(key_1)
17         rospy.loginfo(f"Node 3 published {key_1} to topic Key 1")
18         rate.sleep()
19
20 if __name__ == '__main__':
21     try:
22         Middle()
23     except rospy.ROSInterruptException:
24         pass
```

## Node 1

```
1  #!/usr/bin/env python3
2  import rospy
3  from std_msgs.msg import String, Int16
4
5  def callback1(data):
6      rospy.loginfo("Node 1 Read %s from Node 2", data.data)
7
8  def callback2(data):
9      rospy.loginfo("Node 1 Read %d from Node 3", data.data)
10
11 def Righty():
12     rospy.init_node('Node 1', anonymous=True)
13     rospy.Subscriber("key3", String, callback1)
14     rospy.Subscriber("key1", Int16, callback2)
15     rospy.spin()
16
17 if __name__ == '__main__':
18     Righty()
19
```

## Launcher.launch

```
<launch>
<node pkg="lab_2" type="Lefty.py" name="Node 2" output="screen"/>
<node pkg="lab_2" type="MiddleGuy.py" name="Node 3" output="screen"/>
<node pkg="lab_2" type="Righty.py" name="Node 1" output="screen"/>
</launch>
```

## Output

```
giriirig@DESKTOP-07BKI3U:~/catkin_ws/src/lab_2/scripts$ roslaunch lab_2 launcher.launch
... logging to /home/giriirig/.ros/log/4906b30a-8270-11ef-9619-c3c73ab253e7/roslaunch-DESKTOP-07BKI3U-1480.log
Checking log directory for disk usage. This may take a while.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.

started roslaunch server http://DESKTOP-07BKI3U:43619/

SUMMARY
=====

PARAMETERS
* /rostdistro: noetic
* /rosversion: 1.16.0

NODES
/
  Node1 (lab_2/Righty.py)
  Node2 (lab_2/Lefty.py)
  Node3 (lab_2/MiddleGuy.py)

auto-starting new master
process[master]: started with pid [1488]
ROS_MASTER_URI=http://localhost:11311

setting /run_id to 4906b30a-8270-11ef-9619-c3c73ab253e7
process[rosout-1]: started with pid [1498]
started core service [/rosout]
process[Node2-2]: started with pid [1501]
process[Node3-3]: started with pid [1502]
process[Node1-4]: started with pid [1503]
```

## Output

```
[INFO] [1728060425.280989]: Node 2 published string to topic Key 3
[INFO] [1728060425.284112]: Node 2 published 2.200000 to topic Key 2
[INFO] [1728060425.302488]: Node 3 published 111 to topic Key 1
[INFO] [1728060425.782216]: Node 2 published string to topic Key 3
[INFO] [1728060425.783410]: Node 1 Read string from Node 2
[INFO] [1728060425.785468]: Node 2 published 2.200000 to topic Key 2
[INFO] [1728060425.786570]: Node 3 Read from Node 2: 2.200000
[INFO] [1728060425.800028]: Node 3 published 111 to topic Key 1
[INFO] [1728060425.800677]: Node 1 Read 111 from Node 3
[INFO] [1728060426.282054]: Node 2 published string to topic Key 3
[INFO] [1728060426.283433]: Node 1 Read string from Node 2
[INFO] [1728060426.288414]: Node 2 published 2.200000 to topic Key 2
[INFO] [1728060426.289097]: Node 3 Read from Node 2: 2.200000
[INFO] [1728060426.299682]: Node 3 published 111 to topic Key 1
[INFO] [1728060426.300629]: Node 1 Read 111 from Node 3
[INFO] [1728060426.781939]: Node 2 published string to topic Key 3
[INFO] [1728060426.782989]: Node 1 Read string from Node 2
[INFO] [1728060426.786292]: Node 2 published 2.200000 to topic Key 2
[INFO] [1728060426.786490]: Node 3 Read from Node 2: 2.200000
[INFO] [1728060426.799906]: Node 3 published 111 to topic Key 1
[INFO] [1728060426.801144]: Node 1 Read 111 from Node 3
[INFO] [1728060427.282181]: Node 2 published string to topic Key 3
[INFO] [1728060427.283400]: Node 1 Read string from Node 2
[INFO] [1728060427.285279]: Node 2 published 2.200000 to topic Key 2
[INFO] [1728060427.286100]: Node 3 Read from Node 2: 2.200000
```