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Course Title	Simulation and Modeling	Date of experiment	20/01/2023
Course code	CSE3102	Date of submission	25/01/2023

Exercise in the lab

publisher.py

Code

Publisher.py

```
#!/usr/bin/env python3
import rospy
from std_msgs.msg import String
if __name__ == '__main__':
    rospy.init_node('publisher_node')
    pub = rospy.Publisher("/robot_publisher_node",String, queue_size=10)
    rate = rospy.Rate(2)
    while not rospy.is_shutdown():
        msg = String()
        msg.data = "Hi i am Harish and i am publishing"
        pub.publish(msg)
        rate.sleep()
    rospy.loginfo("Publisher Node stopped")
```

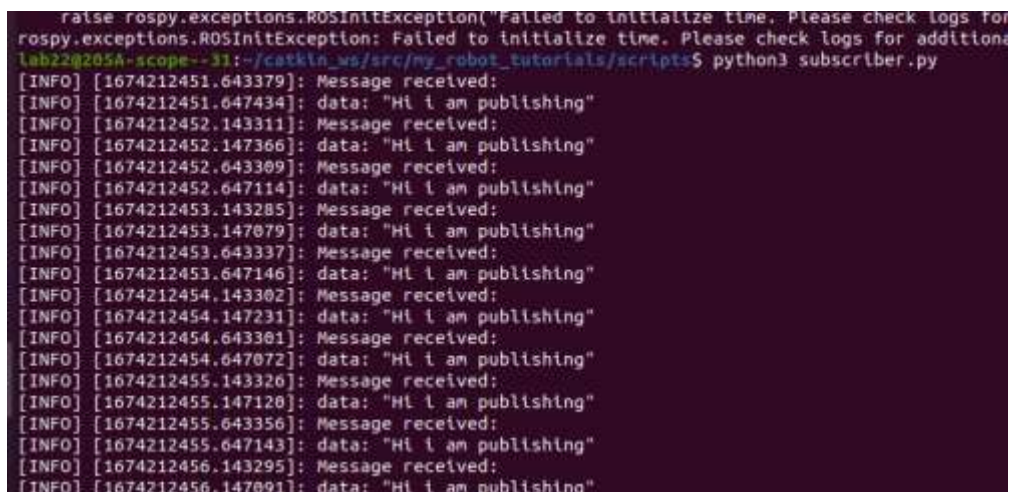
Subscribe.py

1) code

```
import rospy
from std_msgs.msg import String
def callback_receive_radio_data(msg):
    rospy.loginfo("Message received:")
    rospy.loginfo(msg)

if __name__ == '__main__':
    rospy.init_node('subscriber')
    sub = rospy.Subscriber("/robot_publisher_node", String, callback_receive_radio_data)
    rospy.spin()
```

Output

A terminal window with a dark background and light-colored text. It shows the output of running a ROS subscriber node. At the top, there's a red error message: 'raise rospy.exceptions.ROSInitException("Failed to initialize time. Please check logs for additional details.")' followed by 'rospy.exceptions.ROSInitException: Failed to initialize time. Please check logs for additional details.'. Below this, the command 'lab22@205A-scope--31:~/catkin_ws/src/my_robot_tutorials/scripts\$ python3 subscriber.py' is entered. The output consists of a series of log messages. Each message starts with '[INFO]' followed by a timestamp in brackets, then the text 'Message received:', and finally the data received in quotes. The data is 'Hi i am publishing' in every instance. The timestamps are sequential, starting from 1674212451.643379 and ending at 1674212456.147091.

```
raise rospy.exceptions.ROSInitException("Failed to initialize time. Please check logs for
rospy.exceptions.ROSInitException: Failed to initialize time. Please check logs for additional
lab22@205A-scope--31:~/catkin_ws/src/my_robot_tutorials/scripts$ python3 subscriber.py
[INFO] [1674212451.643379]: Message received:
[INFO] [1674212451.647434]: data: "Hi i am publishing"
[INFO] [1674212452.143311]: Message received:
[INFO] [1674212452.147366]: data: "Hi i am publishing"
[INFO] [1674212452.643309]: Message received:
[INFO] [1674212452.647114]: data: "Hi i am publishing"
[INFO] [1674212453.143285]: Message received:
[INFO] [1674212453.147079]: data: "Hi i am publishing"
[INFO] [1674212453.643337]: Message received:
[INFO] [1674212453.647146]: data: "Hi i am publishing"
[INFO] [1674212454.143302]: Message received:
[INFO] [1674212454.147231]: data: "Hi i am publishing"
[INFO] [1674212454.643301]: Message received:
[INFO] [1674212454.647072]: data: "Hi i am publishing"
[INFO] [1674212455.143326]: Message received:
[INFO] [1674212455.147120]: data: "Hi i am publishing"
[INFO] [1674212455.643356]: Message received:
[INFO] [1674212455.647143]: data: "Hi i am publishing"
[INFO] [1674212456.143295]: Message received:
[INFO] [1674212456.147091]: data: "Hi i am publishing"
```

1. Create one publisher and two subscribers

Code

Publisher.py

```
#!/usr/bin/env python3
import rospy
from std_msgs.msg import String
if __name__ == '__main__':
    rospy.init_node('publisher_node 1')
    pub = rospy.Publisher("/robot_publisher_node",String, queue_size=10)
    rate = rospy.Rate(2)
    while not rospy.is_shutdown():
        msg = String()
        msg.data = "Hi i am publishing"
        pub.publish(msg)
        rate.sleep()
    rospy.loginfo("Publisher Node stopped")
```

Subscriber-1.py

```
#!/usr/bin/env python3
import rospy
from std_msgs.msg import String
def callback_receive_radio_data(msg):
    rospy.loginfo("Message received:")
    rospy.loginfo(msg)
if __name__ == '__main__':
    rospy.init_node('subscriber-1')
    sub = rospy.Subscriber("/robot_publisher_node", String,
callback_receive_radio_data)
    rospy.spin()
```

Subscriber-2.py

```
#!/usr/bin/env python3
import rospy
from std_msgs.msg import String
def callback_receive_radio_data(msg):
    rospy.loginfo("Message received:")
    rospy.loginfo(msg)
if __name__ == '__main__':
    rospy.init_node('subscriber-2')
```

```
sub = rospy.Subscriber("/robot_publisher_node", String,
callback_receive_radio_data)
rospy.spin()
```

Screenshots of the terminal window

Subscriber - 1

```
harish@harish-virtual-machine:~/Harish_Simulation/src/Harish_robot_tutorial$ python3 subscriber-1.py
subscriber-1.py:10: UserWarning: 'subscriber-1' is not a legal ROS base name. This may cause problems with other ROS tools.
  rospy.init_node('subscriber-1')
[INFO] [1674653232.790092]: Message received and I am the first subscriber:
[INFO] [1674653232.793775]: data: "Hi I am publishing"
[INFO] [1674653233.291001]: Message received and I am the first subscriber:
[INFO] [1674653233.294542]: data: "Hi I am publishing"
[INFO] [1674653233.789256]: Message received and I am the first subscriber:
[INFO] [1674653233.791363]: data: "Hi I am publishing"
[INFO] [1674653234.289207]: Message received and I am the first subscriber:
[INFO] [1674653234.291944]: data: "Hi I am publishing"
[INFO] [1674653234.789523]: Message received and I am the first subscriber:
[INFO] [1674653234.793803]: data: "Hi I am publishing"
[INFO] [1674653235.289285]: Message received and I am the first subscriber:
[INFO] [1674653235.292774]: data: "Hi I am publishing"
[INFO] [1674653235.790327]: Message received and I am the first subscriber:
[INFO] [1674653235.794732]: data: "Hi I am publishing"
[INFO] [1674653236.288740]: Message received and I am the first subscriber:
[INFO] [1674653236.290341]: data: "Hi I am publishing"
[INFO] [1674653236.790493]: Message received and I am the first subscriber:
[INFO] [1674653236.795675]: data: "Hi I am publishing"
```

Subscriber – 2

```
harish@harish-virtual-machine:~/Harish_Simulation/src/Harish_robot_tutorials$ python3 subscriber-2.py
[INFO] [1674652997.362431]: Message received and I am the second subscriber:
[INFO] [1674652997.365777]: data: "Hi I am publishing"
[INFO] [1674652997.861842]: Message received and I am the second subscriber:
[INFO] [1674652997.864966]: data: "Hi I am publishing"
[INFO] [1674652998.361615]: Message received and I am the second subscriber:
[INFO] [1674652998.365288]: data: "Hi I am publishing"
[INFO] [1674652998.861692]: Message received and I am the second subscriber:
[INFO] [1674652998.864945]: data: "Hi I am publishing"
[INFO] [1674652999.362636]: Message received and I am the second subscriber:
[INFO] [1674652999.367325]: data: "Hi I am publishing"
[INFO] [1674652999.861911]: Message received and I am the second subscriber:
[INFO] [1674652999.865623]: data: "Hi I am publishing"
[INFO] [1674653000.361157]: Message received and I am the second subscriber:
[INFO] [1674653000.364835]: data: "Hi I am publishing"
[INFO] [1674653000.861706]: Message received and I am the second subscriber:
[INFO] [1674653000.867247]: data: "Hi I am publishing"
[INFO] [1674653001.361706]: Message received and I am the second subscriber:
[INFO] [1674653001.365098]: data: "Hi I am publishing"
```

Rosnode list

```
harish@harish-virtual-machine:~/Harish_Simulation/src/Harish_robot_tutorials$ rostopic list
/publisher_node 1
/rosout
/subscriber-1
/subscriber-2
harish@harish-virtual-machine:~/Harish_Simulation/src/Harish_robot_tutorials$
```

2. Create two publishers and two subscribers

Code

Publisher – 1

```
#!/usr/bin/env python3
import rospy
from std_msgs.msg import String
if __name__ == '__main__':
    rospy.init_node('publisher_node 1')
    pub = rospy.Publisher("/robot_publisher_node",String, queue_size=10)
    rate = rospy.Rate(2)
    while not rospy.is_shutdown():
        msg = String()
        msg.data = "Hi i am publisher 1"
        pub.publish(msg)
        rate.sleep()
    rospy.loginfo("Publisher Node stopped")
```

Publisher – 2

```
#!/usr/bin/env python3
import rospy
from std_msgs.msg import String
if __name__ == '__main__':
    rospy.init_node('publisher_node 2')
    pub = rospy.Publisher("/robot_publisher_node",String, queue_size=10)
    rate = rospy.Rate(2)
    while not rospy.is_shutdown():
        msg = String()
        msg.data = "Hi i am publisher 2"
        pub.publish(msg)
        rate.sleep()
    rospy.loginfo("Publisher Node stopped")
```

Subscriber – 1

```
#!/usr/bin/env python3
import rospy
from std_msgs.msg import String
def callback_receive_radio_data(msg):
    rospy.loginfo("Message received:")
    rospy.loginfo(msg)

if __name__ == '__main__':
    rospy.init_node('subscriber')
    sub = rospy.Subscriber("/robot_publisher_node", String,
callback_receive_radio_data)
    rospy.spin()
```

Subscriber – 2

```
#!/usr/bin/env python3
import rospy
from std_msgs.msg import String
def callback_receive_radio_data(msg):
    rospy.loginfo("Message received and i am the second subscriber:")
    rospy.loginfo(msg)

if __name__ == '__main__':
    rospy.init_node('subscriber-2')
    sub = rospy.Subscriber("/robot_publisher_node", String,
callback_receive_radio_data)
    rospy.spin()
```

Screenshots of terminal window

Publisher – 1

```
harish@harish-virtual-machine:~/harish_simulation/src/harish_robot_tutorials$ python3 publisher.py
publisher.py:5: UserWarning: 'publisher_node 1' is not a legal ROS base name. This may cause problems with other ROS tools.
  rospy.init_node('publisher_node 1')
[INFO] [1674655115.538335]: unable to register service [/publisher_node 1/get_logger] with master: 8080; parameter [/service] contains illegal chars
[INFO] [1674655115.538335]: unable to register service [/publisher_node 1/set_logger_level] with master: 8080; parameter [/service] contains illegal chars
```

Publisher – 2

```
harish@harish-virtual-machine:~/harish_simulation/src/harish_robot_tutorials$ python3 publisher-2.py
publisher-2.py:5: UserWarning: 'publisher_node 2' is not a legal ROS base name. This may cause problems with other ROS tools.
  rospy.init_node('publisher_node 2')
[INFO] [1674655115.534996]: unable to register service [/publisher_node 2/get_logger] with master: 8080; parameter [/service] contains illegal chars
[INFO] [1674655115.534996]: unable to register service [/publisher_node 2/set_logger_level] with master: 8080; parameter [/service] contains illegal chars
```

Subscriber – 1

```
subscriber-1.py:10: UserWarning: 'subscriber-1' is not a legal ROS base name. This may cause problems with other ROS tools.
  rospy.init_node('subscriber-1')
[INFO] [1674655115.316307]: Message received and I am the first subscriber:
[INFO] [1674655115.319617]: data: "Hi I am publisher 1"
[INFO] [1674655115.534996]: Message received and I am the first subscriber:
[INFO] [1674655115.538335]: data: "Hi I am publisher 2"
[INFO] [1674655115.816567]: Message received and I am the first subscriber:
[INFO] [1674655115.819811]: data: "Hi I am publisher 1"
[INFO] [1674655116.034216]: Message received and I am the first subscriber:
[INFO] [1674655116.037591]: data: "Hi I am publisher 2"
[INFO] [1674655116.315604]: Message received and I am the first subscriber:
[INFO] [1674655116.319105]: data: "Hi I am publisher 1"
[INFO] [1674655116.535239]: Message received and I am the first subscriber:
[INFO] [1674655116.538628]: data: "Hi I am publisher 2"
[INFO] [1674655116.816556]: Message received and I am the first subscriber:
[INFO] [1674655116.820297]: data: "Hi I am publisher 1"
[INFO] [1674655117.034706]: Message received and I am the first subscriber:
[INFO] [1674655117.039298]: data: "Hi I am publisher 2"
[INFO] [1674655117.316951]: Message received and I am the first subscriber:
[INFO] [1674655117.319952]: data: "Hi I am publisher 1"
```

Subscriber – 2

```
harish@harish-virtual-machine:~/harish_simulation/src/harish_robot_tutorials$ python3 subscriber-2.py
subscriber-2.py:10: UserWarning: 'subscriber-2' is not a legal ROS base name. This may cause problems with other ROS tools.
  rospy.init_node('subscriber-2')
[INFO] [1674655131.316921]: Message received and I am the second subscriber:
[INFO] [1674655131.322626]: data: "Hi I am publisher 1"
[INFO] [1674655131.535867]: Message received and I am the second subscriber:
[INFO] [1674655131.540145]: data: "Hi I am publisher 2"
[INFO] [1674655131.817062]: Message received and I am the second subscriber:
[INFO] [1674655131.822385]: data: "Hi I am publisher 1"
[INFO] [1674655132.034649]: Message received and I am the second subscriber:
[INFO] [1674655132.040394]: data: "Hi I am publisher 2"
[INFO] [1674655132.316858]: Message received and I am the second subscriber:
[INFO] [1674655132.322478]: data: "Hi I am publisher 1"
[INFO] [1674655132.535306]: Message received and I am the second subscriber:
[INFO] [1674655132.540354]: data: "Hi I am publisher 2"
[INFO] [1674655132.816472]: Message received and I am the second subscriber:
[INFO] [1674655132.822196]: data: "Hi I am publisher 1"
[INFO] [1674655133.034851]: Message received and I am the second subscriber:
[INFO] [1674655133.039815]: data: "Hi I am publisher 2"
[INFO] [1674655133.316705]: Message received and I am the second subscriber:
[INFO] [1674655133.322113]: data: "Hi I am publisher 1"
```

Rosnode list

```
harish@harish-virtual-machine:~/Harish_Simulation/src/Harish_robot_tutorials$ rosnodetool list
/publisher_node 1
/publisher_node 2
/rosout
/subscriber-1
/subscriber-2
harish@harish-virtual-machine:~/Harish_Simulation/src/Harish_robot_tutorials$
```


3. Try with different data type

I. Integer 32(INT32)

Publisher.py

```
#!/usr/bin/env python3
import rospy
from std_msgs.msg import Int32
if __name__ == '__main__':
    rospy.init_node('publisher_node 1')
    pub = rospy.Publisher("/robot_publisher_node", Int32, queue_size=10)
    rate = rospy.Rate(2)
    while not rospy.is_shutdown():
        msg = Int32()
        msg.data = 11
        pub.publish(msg)
        rate.sleep()
    rospy.loginfo("Publisher Node stopped")
```

Subscriber.py

```
#!/usr/bin/env python3
import rospy
from std_msgs.msg import Int32
def callback_receive_radio_data(msg):
    rospy.loginfo("Message received:")
    rospy.loginfo(msg)
if __name__ == '__main__':
    rospy.init_node('subscriber')
    sub = rospy.Subscriber("/robot_publisher_node", Int32,
callback_receive_radio_data)
    rospy.spin()
```

Output

```
harishgharish-virtual-machine:~/Harish_Simulation/src/Harish_robot_tutorials$ python3 subscriber.py
[INFO] [1674659597.254822]: Message received:
[INFO] [1674659597.257629]: data: 11
[INFO] [1674659597.754081]: Message received:
[INFO] [1674659597.757371]: data: 11
[INFO] [1674659598.253631]: Message received:
[INFO] [1674659598.257303]: data: 11
[INFO] [1674659598.753737]: Message received:
[INFO] [1674659598.757435]: data: 11
[INFO] [1674659599.254643]: Message received:
[INFO] [1674659599.258054]: data: 11
[INFO] [1674659599.754158]: Message received:
[INFO] [1674659599.757568]: data: 11
[INFO] [1674659600.254629]: Message received:
[INFO] [1674659600.258210]: data: 11
[INFO] [1674659600.754287]: Message received:
[INFO] [1674659600.758021]: data: 11
```

II. Time

Seconds and the nano seconds are published.

Publisher.py

```
#!/usr/bin/env python3
import rospy
from std_msgs.msg import Time
if __name__ == '__main__':
    rospy.init_node('publisher_node 1')
    pub = rospy.Publisher("/robot_publisher_node", Time, queue_size=10)
    rate = rospy.Rate(2)
    while not rospy.is_shutdown():
        msg = rospy.get_rostime()
        pub.publish(msg)
        rate.sleep()
    rospy.loginfo("Publisher Node stopped")
```

Subscriber.py

```
#!/usr/bin/env python3
import rospy
from std_msgs.msg import Time
def callback_receive_radio_data(msg):
    rospy.loginfo("Message received:")
    rospy.loginfo(msg)
if __name__ == '__main__':
    rospy.init_node('subscriber')
    sub = rospy.Subscriber("/robot_publisher_node", Time, callback_receive_radio_data)
    rospy.spin()
```

Output

```
^Charish@harish-virtual-machine:~/Harish_Simulation/src/Harish_robot_tutorials$ python3 subscriber.py
[INFO] [1674660361.563614]: Message received:
[INFO] [1674660361.567743]: data:
  secs: 1674660361
  nsecs: 562416076
[INFO] [1674660362.062485]: Message received:
[INFO] [1674660362.065993]: data:
  secs: 1674660362
  nsecs: 61533689
[INFO] [1674660362.562419]: Message received:
[INFO] [1674660362.565399]: data:
  secs: 1674660362
  nsecs: 561559200
[INFO] [1674660363.063873]: Message received:
[INFO] [1674660363.067997]: data:
  secs: 1674660363
  nsecs: 62886238
[INFO] [1674660363.562550]: Message received:
[INFO] [1674660363.565859]: data:
  secs: 1674660363
  nsecs: 561542987
```

4. Check the rqt_graph

Code

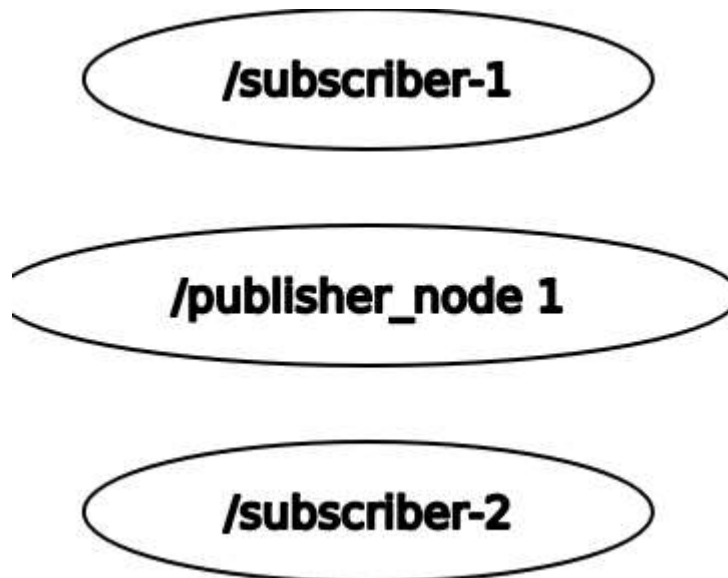
```
harish@harish-virtual-machine:~/Harish_Simulation/src/Harish_robot_tutorials$ rosrn rqt_graph rqt_graph
```

How the ros graph appears in the window



For problem 1

Saved as a png file and took screenshot and pasted here



For problem 2

Saved as a png file and took screenshot and pasted here

