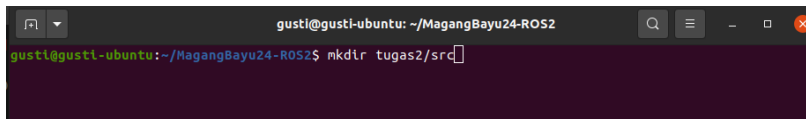


Nama : Gusti Gratia Delpiera

NRP : 5026231097

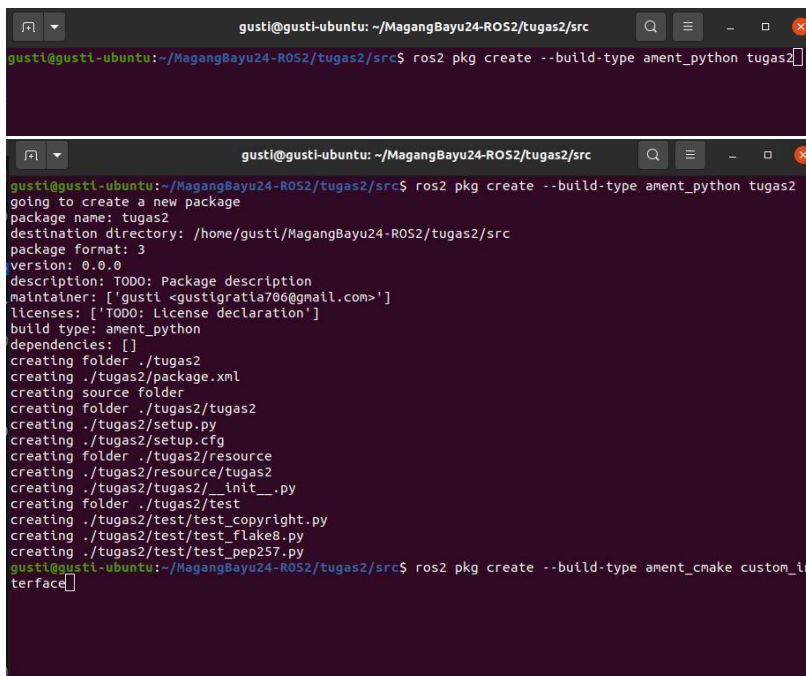
Laporan Penugasan 2

1. Langkah pertama setelah melakukan clone repository dengan menggunakan git clone, untuk mengerjakan penugasan ini adalah dengan membuat workspace, di sini saya membuat workspace bernama tugas2 dan juga direktori src



```
gusti@gusti-ubuntu: ~/MagangBayu24-ROS2
gusti@gusti-ubuntu:~/MagangBayu24-ROS2$ mkdir tugas2/src
```

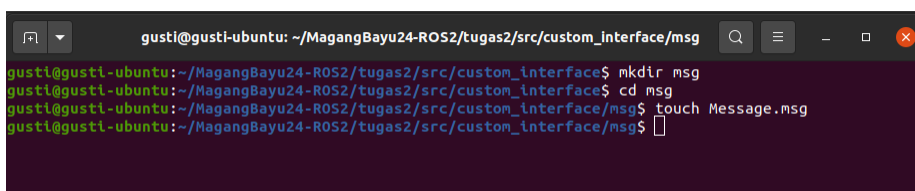
2. Langkah kedua yaitu dengan membuat packages yang diperlukan untuk tugas 1, saya membuat 2 package yaitu untuk publish dan subscribe dan untuk custom interface (custom message), dan disini saya menggunakan python.



```
gusti@gusti-ubuntu: ~/MagangBayu24-ROS2/tugas2/src
gusti@gusti-ubuntu:~/MagangBayu24-ROS2/tugas2/src$ ros2 pkg create --build-type ament_python tugas2

gusti@gusti-ubuntu: ~/MagangBayu24-ROS2/tugas2/src
gusti@gusti-ubuntu:~/MagangBayu24-ROS2/tugas2/src$ ros2 pkg create --build-type ament_python tugas2
going to create a new package
package name: tugas2
destination directory: /home/gusti/MagangBayu24-ROS2/tugas2/src
package format: 3
version: 0.0.0
description: TODO: Package description
maintainer: ['gusti <gustigratia706@gmail.com>']
licenses: ['TODO: License declaration']
build type: ament_python
dependencies: []
creating folder ./tugas2
creating ./tugas2/package.xml
creating source folder
creating folder ./tugas2/tugas2
creating ./tugas2/setup.py
creating ./tugas2/setup.cfg
creating folder ./tugas2/resource
creating ./tugas2/resource/tugas2
creating ./tugas2/tugas2/__init__.py
creating folder ./tugas2/test
creating ./tugas2/test/test_copyright.py
creating ./tugas2/test/test_flake8.py
creating ./tugas2/test/test_pep257.py
gusti@gusti-ubuntu:~/MagangBayu24-ROS2/tugas2/src$ ros2 pkg create --build-type ament_cmake custom_in
terface
```

3. Langkah ketiga yaitu kita menuju ke package custom_interface yang baru saja kita buat, lalu menambahkan direktori baru yaitu msg, dan di dalam msg kita membuat file yang diberi nama "Message.msg" dan di dalam file tersebut kita akan menambahkan beberapa data yang akan kita gunakan untuk mengerjakan tugas 2. Di sini saya membuat 2 tipe data Boolean yang diberi nama data1 dan data2.



```
gusti@gusti-ubuntu: ~/MagangBayu24-ROS2/tugas2/src/custom_interface/msg
gusti@gusti-ubuntu:~/MagangBayu24-ROS2/tugas2/src/custom_interface$ mkdir msg
gusti@gusti-ubuntu:~/MagangBayu24-ROS2/tugas2/src/custom_interface$ cd msg
gusti@gusti-ubuntu:~/MagangBayu24-ROS2/tugas2/src/custom_interface/msg$ touch Message.msg
gusti@gusti-ubuntu:~/MagangBayu24-ROS2/tugas2/src/custom_interface/msg$
```

```
publisher_member_function.py Message.msg U x subscriber_member_function.py Num.msg CMakeLists.txt ...
tugas2 > src > custom_interface > msg > Message.msg
1 bool data1
2 bool data2
```

4. Langkah selanjutnya adalah dengan menambahkan beberapa hal berikut di file CMakeLists.txt dan package.xml

```
20
21 find_package(rosidl_default_generators REQUIRED)
22
23 rosidl_generate_interfaces(${PROJECT_NAME}
24   "msg/Message.msg"
25 )
26
11
12 <buildtool_depend>rosidl_default_generators</buildtool_depend>
13 <exec_depend>rosidl_default_runtime</exec_depend>
14 <member_of_group>rosidl_interface_packages</member_of_group>
15
```

5. Selanjutnya kita build package custom_interface pada terminal, sebelum melakukan build pastikan kita berada di direktori tugas2/src/:

```
gusti@gusti-ubuntu: ~/MagangBayu24-ROS2/tugas2/src
gusti@gusti-ubuntu: ~/MagangBayu24-ROS2/tugas2/src$ colcon build --packages-select custom_interface
Starting >>> custom_interface
Finished <<< custom_interface [3.69s]

Summary: 1 package finished [5.55s]
gusti@gusti-ubuntu: ~/MagangBayu24-ROS2/tugas2/src$
```

6. Langkah selanjutnya pada direktori tugas2/src/tugas2/tugas2, buat tiga file python:
- publisher1.py
 - publisher2.py
 - subscriber.py
7. Selanjutnya kita bisa beralih ke tugas2/src/tugas2 dan mengisi dependencies yang dibutuhkan pada package.xml serta mengisi setup.py

```
py Message.msg U CMakeLists.txt ../custom_interface U package.xml ../tugas2 U setup.py ../tugas2 U x
tugas2 > src > tugas2 > setup.py > ...
9 data_files=[
10   ('share/ament_index/resource_index/packages',
11    ['resource/' + package_name]),
12   ('share/' + package_name, ['package.xml']),
13 ],
14 install_requires=['setuptools'],
15 zip_safe=True,
16 maintainer='gusti',
17 maintainer_email='gustigratia706@gmail.com',
18 description='Publisher Subscriber 2',
19 license='Apache License 2.0',
20 tests_require=['pytest'],
21 entry_points={
22   'console_scripts': [
23     'talker1 = tugas2.publisher1:main',
24     'talker2 = tugas2.publisher2:main',
25     'listener = tugas2.subscriber:main',
26   ],
27 },
28 )
29
```

```

7   <maintainer email="gustigratia706@gmail.com">gusti</maintainer>
8   <license>Apache License 2.0</license>
9
10  <test_depend>ament_copyright</test_depend>
11  <test_depend>ament_flake8</test_depend>
12  <test_depend>ament_pep257</test_depend>
13  <test_depend>python3-pytest</test_depend>
14
15  <exec_depend>rcclpy</exec_depend>
16  <exec_depend>std_msgs</exec_depend>
17  <exec_depend>interfaces_custom</exec_depend>
18
19  <export>
20    <build_type>ament_python</build_type>
21  </export>
22 </package>

```

8. Pada file publisher1.py, saya mengimport rcclpy, node, std_msgs UInt32 dan custom message yang berupa package custom_interface yang baru kita buat. Setelah itu membuat object node yaitu MinimalPublisher dengan parameter (Message, 'topic1', 10) dan membuat timer_period 2 detik untuk mempublish, membuat fungsi timer_callback, dengan msg adalah custom message (Message) dan time adalah Unsigned integer 32 bit. Untuk file publisher1.py ini akan mempublish setiap 2 detik, maka time_period = 2

Karena pada ketentuan penugasan harus mempublish true dan false secara bergantian, maka disini saya membuat if condition, dimana jika self.i mod 4 == 0 maka data1 akan bernilai true, sedangkan jika tidak akan bernilai false, self.i disini akan berfungsi sebagai pencatat timer.

```

1  import rcclpy
2  from rcclpy.node import Node
3
4  from custom_interface.msg import Message
5  from std_msgs.msg import UInt32
6
7  class MinimalPublisher(Node):
8
9      def __init__(self):
10         super().__init__('minimal_publisher')
11         self.publisher_ = self.create_publisher(Message, 'topic1', 10)
12         timer_period = 2 # seconds
13         self.timer = self.create_timer(timer_period, self.timer_callback)
14         self.i = 0
15
16     def timer_callback(self):
17         msg = Message()
18         time = UInt32()
19         if self.i % 4 == 0:
20             msg.data1 = True
21         else:
22             msg.data1 = False
23         time.data = self.i
24         self.publisher_.publish(msg)
25         self.get_logger().info("Publisher - 1 - (%d sec) -> %s" % (time.data, msg.data1))
26         self.i += 2
27

```

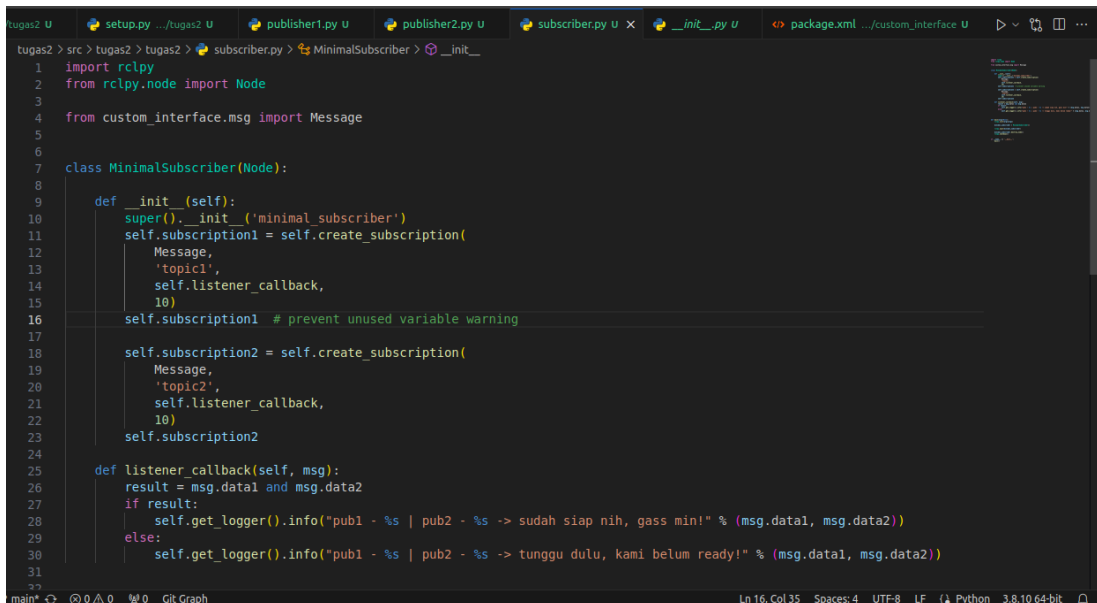
Setelah itu menambahkan function berikut :

```

29 def main(args=None):
30     rclpy.init(args=args)
31
32     minimal_publisher = MinimalPublisher()
33
34     rclpy.spin(minimal_publisher)
35
36
37     rclpy.shutdown()
38
39
40 if __name__ == '__main__':
41     main()

```

9. Pada file publisher2.py berisi kurang lebih sama dengan publisher1.py, perbedaannya hanya terletak pada message data yang di assign, pada publisher1.py saya assign nilai Boolean pada msg.data1, sedangkan pada file ini saya assign nilai Boolean pada msg.data2. Selain itu, nama topic untuk file ini adalah 'topic2'
10. Kemudian pada file subscriber.py, perbedaannya adalah saya membuat node tetapi berupa subscriber dan saya membuat 2 subscription, yaitu subscription1 dan subscription2 dengan masing masing akan subscribe ke topic1 dan topic2. Kemudian saya membuat function listener_callback dan membuat conditional if, jika msg.data1 dan msg.data2 bernilai true maka akan mencetak "sudah ready nih, gass min!", jika false, maka akan mencetak "tunggu dulu, kami belum ready!".



```

tugas2 > src > tugas2 > subscriber.py > MinimalSubscriber > __init__
1 import rclpy
2 from rclpy.node import Node
3
4 from custom_interface.msg import Message
5
6
7 class MinimalSubscriber(Node):
8
9     def __init__(self):
10         super().__init__('minimal_subscriber')
11         self.subscription1 = self.create_subscription(
12             Message,
13             'topic1',
14             self.listener_callback,
15             10)
16         self.subscription1 # prevent unused variable warning
17
18         self.subscription2 = self.create_subscription(
19             Message,
20             'topic2',
21             self.listener_callback,
22             10)
23         self.subscription2
24
25     def listener_callback(self, msg):
26         result = msg.data1 and msg.data2
27         if result:
28             self.get_logger().info("pub1 - %s | pub2 - %s -> sudah siap nih, gass min!" % (msg.data1, msg.data2))
29         else:
30             self.get_logger().info("pub1 - %s | pub2 - %s -> tunggu dulu, kami belum ready!" % (msg.data1, msg.data2))
31
32

```

Kemudian menambahkan function main :

```

33
34
35 def main(args=None):
36     rclpy.init(args=args)
37
38     minimal_subscriber = MinimalSubscriber()
39
40     rclpy.spin(minimal_subscriber)
41
42     minimal_subscriber.destroy_node()
43     rclpy.shutdown()
44
45
46 if __name__ == '__main__':
47     main()

```

11. Langkah selanjutnya adalah kita build dan run apa yang sudah kita buat, sebelum run, pastikan sudah melakukan source install/setup.bash

```

gusti@gusti-ubuntu: ~/MagangBayu24-ROS2/tugas2/src
gusti@gusti-ubuntu: ~/MagangBayu24-ROS2/tugas2/src$ colcon build --packages-select tugas2
Starting >>> tugas2
Finished <<< tugas2 [1.23s]

Summary: 1 package finished [3.09s]
gusti@gusti-ubuntu: ~/MagangBayu24-ROS2/tugas2/src$ 

```

```

gusti@gusti-ubuntu: ~/MagangBayu24-ROS2/tugas2/src
gusti@gusti-ubuntu: ~/MagangBayu24-ROS2/tugas2/src$ source install/setup.bash
gusti@gusti-ubuntu: ~/MagangBayu24-ROS2/tugas2/src$ ros2 run tugas2 talker1
[INFO] [1706004847.095976749]: [minimal_publisher]: Publisher - 1 - (0 sec) -> True
[INFO] [1706004849.057696482]: [minimal_publisher]: Publisher - 1 - (2 sec) -> False
[INFO] [1706004851.057709206]: [minimal_publisher]: Publisher - 1 - (4 sec) -> True
[INFO] [1706004853.057021856]: [minimal_publisher]: Publisher - 1 - (6 sec) -> False
[INFO] [1706004855.057753323]: [minimal_publisher]: Publisher - 1 - (8 sec) -> True
[INFO] [1706004857.057331427]: [minimal_publisher]: Publisher - 1 - (10 sec) -> False
[INFO] [1706004859.057629431]: [minimal_publisher]: Publisher - 1 - (12 sec) -> True
[INFO] [1706004861.057748978]: [minimal_publisher]: Publisher - 1 - (14 sec) -> False
[INFO] [1706004863.057795328]: [minimal_publisher]: Publisher - 1 - (16 sec) -> True
[INFO] [1706004865.057827363]: [minimal_publisher]: Publisher - 1 - (18 sec) -> False
[INFO] [1706004867.057624671]: [minimal_publisher]: Publisher - 1 - (20 sec) -> True
[INFO] [1706004869.057688841]: [minimal_publisher]: Publisher - 1 - (22 sec) -> False
[INFO] [1706004871.057289034]: [minimal_publisher]: Publisher - 1 - (24 sec) -> True
[INFO] [1706004873.057565460]: [minimal_publisher]: Publisher - 1 - (26 sec) -> False
[INFO] [1706004875.057628467]: [minimal_publisher]: Publisher - 1 - (28 sec) -> True
[INFO] [1706004877.057501558]: [minimal_publisher]: Publisher - 1 - (30 sec) -> False
[INFO] [1706004879.057230349]: [minimal_publisher]: Publisher - 1 - (32 sec) -> True
[INFO] [1706004881.057616144]: [minimal_publisher]: Publisher - 1 - (34 sec) -> False
[INFO] [1706004883.055480708]: [minimal_publisher]: Publisher - 1 - (36 sec) -> True
[INFO] [1706004885.057380444]: [minimal_publisher]: Publisher - 1 - (38 sec) -> False
[INFO] [1706004887.057338684]: [minimal_publisher]: Publisher - 1 - (40 sec) -> True
[INFO] [1706004889.055313930]: [minimal_publisher]: Publisher - 1 - (42 sec) -> False
[INFO] [1706004891.057935153]: [minimal_publisher]: Publisher - 1 - (44 sec) -> True
[INFO] [1706004893.057635314]: [minimal_publisher]: Publisher - 1 - (46 sec) -> False
[INFO] [1706004895.057777282]: [minimal_publisher]: Publisher - 1 - (48 sec) -> True
[INFO] [1706004897.057413775]: [minimal_publisher]: Publisher - 1 - (50 sec) -> False
[INFO] [1706004899.057312738]: [minimal_publisher]: Publisher - 1 - (52 sec) -> True
[INFO] [1706004901.057599822]: [minimal_publisher]: Publisher - 1 - (54 sec) -> False
[INFO] [1706004903.057641462]: [minimal_publisher]: Publisher - 1 - (56 sec) -> True
[INFO] [1706004905.057713791]: [minimal_publisher]: Publisher - 1 - (58 sec) -> False

```

```
gusti@gusti-ubuntu: ~/MagangBayu24-ROS2/tugas2/src
gusti@gusti-ubuntu: ~/MagangBayu24-ROS2/tugas2/src$ source install/setup.bash
gusti@gusti-ubuntu: ~/MagangBayu24-ROS2/tugas2/src$ ros2 run tugas2 talker2
[INFO] [1706004882.540098815] [minimal_publisher]: Publisher - 2 - (0 sec) -> True
[INFO] [1706004885.523320292] [minimal_publisher]: Publisher - 2 - (3 sec) -> False
[INFO] [1706004888.523031307] [minimal_publisher]: Publisher - 2 - (6 sec) -> True
[INFO] [1706004891.523281776] [minimal_publisher]: Publisher - 2 - (9 sec) -> False
[INFO] [1706004894.521122521] [minimal_publisher]: Publisher - 2 - (12 sec) -> True
[INFO] [1706004897.523740539] [minimal_publisher]: Publisher - 2 - (15 sec) -> False
[INFO] [1706004900.523517664] [minimal_publisher]: Publisher - 2 - (18 sec) -> True
[INFO] [1706004903.522865616] [minimal_publisher]: Publisher - 2 - (21 sec) -> False
[INFO] [1706004906.523685488] [minimal_publisher]: Publisher - 2 - (24 sec) -> True
[INFO] [1706004909.521283119] [minimal_publisher]: Publisher - 2 - (27 sec) -> False
[INFO] [1706004912.522196282] [minimal_publisher]: Publisher - 2 - (30 sec) -> True
[INFO] [1706004915.523239293] [minimal_publisher]: Publisher - 2 - (33 sec) -> False
[INFO] [1706004918.521255886] [minimal_publisher]: Publisher - 2 - (36 sec) -> True
[INFO] [1706004921.522765767] [minimal_publisher]: Publisher - 2 - (39 sec) -> False
[INFO] [1706004924.523346199] [minimal_publisher]: Publisher - 2 - (42 sec) -> True
```

```
gusti@gusti-ubuntu: ~/MagangBayu24-ROS2/tugas2/src
gusti@gusti-ubuntu: ~/MagangBayu24-ROS2/tugas2/src$ ros2 run tugas2 listener2
[INFO] [1706004921.058537305] [minimal_subscriber]: pub1 - False | pub2 - False -> tunggu dulu, kami belum ready!
[INFO] [1706004921.523593893] [minimal_subscriber]: pub1 - False | pub2 - False -> tunggu dulu, kami belum ready!
[INFO] [1706004923.058081735] [minimal_subscriber]: pub1 - True | pub2 - False -> tunggu dulu, kami belum ready!
[INFO] [1706004924.524324956] [minimal_subscriber]: pub1 - False | pub2 - True -> tunggu dulu, kami belum ready!
[INFO] [1706004925.058419652] [minimal_subscriber]: pub1 - False | pub2 - False -> tunggu dulu, kami belum ready!
[INFO] [1706004927.057788034] [minimal_subscriber]: pub1 - True | pub2 - False -> tunggu dulu, kami belum ready!
[INFO] [1706004927.525563807] [minimal_subscriber]: pub1 - False | pub2 - False -> tunggu dulu, kami belum ready!
[INFO] [1706004929.058335230] [minimal_subscriber]: pub1 - False | pub2 - False -> tunggu dulu, kami belum ready!
[INFO] [1706004930.523894510] [minimal_subscriber]: pub1 - False | pub2 - True -> tunggu dulu, kami belum ready!
[INFO] [1706004931.058553598] [minimal_subscriber]: pub1 - True | pub2 - False -> tunggu dulu, kami belum ready!
[INFO] [1706004933.057979159] [minimal_subscriber]: pub1 - False | pub2 - False -> tunggu dulu, kami belum ready!
[INFO] [1706004933.521799857] [minimal_subscriber]: pub1 - False | pub2 - False -> tunggu dulu, kami belum ready!
[INFO] [1706004935.056372781] [minimal_subscriber]: pub1 - True | pub2 - False -> tunggu dulu, kami belum ready!
[INFO] [1706004936.524018902] [minimal_subscriber]: pub1 - False | pub2 - True -> tunggu dulu, kami belum ready!
[INFO] [1706004937.058734489] [minimal_subscriber]: pub1 - False | pub2 - False -> tunggu dulu, kami belum ready!
```