

# ROS day1 hw2 보고서

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## 1. cpp패키지

### 1) publisher

두 노드 모두.hpp파일과.cpp파일을 분리하는 데 실패하여.cpp파일에 대해서만 작성했습니다.

발행자.cpp파일의 윗부분입니다. Rclcpp의 Node 클래스를 부모 클래스로 상속받아 자식 클래스인 Pub클래스를 만들고 생성자 함수를 정의했습니다.

```
8   #include "rclcpp/rclcpp.hpp"
9   #include "std_msgs/msg/string.hpp"
10  #include "std_msgs/msg/int32.hpp"
11  #include "std_msgs/msg/float64.hpp"
12
13  using namespace std::chrono_literals;
14
15  class Pub : public rclcpp::Node
16  {
17      public:
18          Pub() : Node("pub")
19          {
20              publisher1 = this->create_publisher<std_msgs::msg::String>("topicname", 10);
21              publisher2 = this->create_publisher<std_msgs::msg::Int32>("topicname_int", 30);
22              publisher3 = this->create_publisher<std_msgs::msg::Float64>("topicname_float", 30);
23              timer = this->create_wall_timer(1s, std::bind(&Pub::timer_callback, this));
24          }
25          int count=0;
```

다양한 자료형 통신을 위해서 기초 예제 코드를 참고해 int형, float형을 추가했고 각자 다른 발행자를 생성했습니다. 또한 topic 이름은 각각 다르게 만들어 서로 다른 자료형 간의 충돌이 없게끔 했습니다.

다음으로 아래 사진과 같이 일정 시간(1초)마다 메시지를 topic에 발행하게 하는 timer\_callback함수를 정의했습니다. int자료형과 float 자료형은 각각 메시지를 보낸 횟수와 횟수를 3으로 나눈 수를 발행하게 했습니다.

```

27     private:
28         rclcpp::TimerBase::SharedPtr timer;
29     void timer_callback()
30     {
31         auto msg1 = std_msgs::msg::String();
32         auto msg2 = std_msgs::msg::Int32();
33         auto msg3 = std_msgs::msg::Float64();
34         msg1.data = "Hello World: " + std::to_string(count++);
35         msg2.data = (count);
36         msg3.data = (count)/3;
37         RCLCPP_INFO(this->get_logger(), "Published message: '%s'", msg1.data.c_str());
38         RCLCPP_INFO(this->get_logger(), "Published message: '%d'", msg2.data);
39         RCLCPP_INFO(this->get_logger(), "Published message: '%f'", msg3.data);
40         publisher1->publish(msg1);
41         publisher2->publish(msg2);
42         publisher3->publish(msg3);
43     }
44     rclcpp::Publisher<std_msgs::msg::String>::SharedPtr publisher1;
45     rclcpp::Publisher<std_msgs::msg::Int32>::SharedPtr publisher2;
46     rclcpp::Publisher<std_msgs::msg::Float64>::SharedPtr publisher3;
47 };
48
49
50 int main(int argc, char **argv)
51 {
52     rclcpp::init(argc, argv);
53     auto node = std::make_shared<Pub>();
54     rclcpp::spin(node);
55     rclcpp::shutdown();
56     return 0;
57 }

```

## 2) subscriber

```

8   #include "rclcpp/rclcpp.hpp"
9   #include "std_msgs/msg/string.hpp"
10  #include "std_msgs/msg/int32.hpp"
11  #include "std_msgs/msg/float64.hpp"
12
13  ✓ class Sub : public rclcpp::Node
14  {
15      public:
16  ✓      Sub() : Node("sub")
17      {
18          subscriber1 = this ->create_subscription<std_msgs::msg::String>(
19              "topicname",
20              10,
21              std::bind(&Sub::topic_callback1, this, std::placeholders::_1));
22          subscriber2 = this ->create_subscription<std_msgs::msg::Int32>(
23              "topicname_int",
24              30,
25              std::bind(&Sub::topic_callback2, this, std::placeholders::_1));
26          subscriber3 = this ->create_subscription<std_msgs::msg::Float64>(
27              "topicname_float",
28              30,
29              std::bind(&Sub::topic_callback3, this, std::placeholders::_1));
30      }
31  }

```

Subscriber의 cpp부분입니다. 마찬가지로 생성자에서 subscriber 1, 2, 3의 topic을 다르게 하고 자료형을 변경했습니다.

아래 사진은 값을 받고 받았다는 메시지를 다시 출력하는 callback함수 1, 2, 3을 각각 정의한 부분입니다.

```

--
32  private:
33      void topic_callback1(const std_msgs::msg::String::SharedPtr msg1)
34      {
35          RCLCPP_INFO(this->get_logger(), "Received message: '%s'", msg1->data.c_str());
36      }
37      rclcpp::Subscription<std_msgs::msg::String>::SharedPtr subscriber1;
38
39      void topic_callback2(const std_msgs::msg::Int32::SharedPtr msg2)
40      {
41          RCLCPP_INFO(this->get_logger(), "Received message: '%d'", msg2->data);
42      }
43      rclcpp::Subscription<std_msgs::msg::Int32>::SharedPtr subscriber2;
44
45      void topic_callback3(const std_msgs::msg::Float64::SharedPtr msg3)
46      {
47          RCLCPP_INFO(this->get_logger(), "Received message: '%f'", msg3->data);
48      }
49      rclcpp::Subscription<std_msgs::msg::Float64>::SharedPtr subscriber3;
50
51  };
52

```

## 2. py패키지

### 1) Pub

```
1  import rclpy
2  from rclpy.node import Node
3  from std_msgs.msg import String
4  from std_msgs.msg import Int32
5  from std_msgs.msg import Float64
6
7
8  class HelloworldPublisher(Node):
9      def __init__(self):
10         super().__init__('helloworld_publisher')
11         self.helloworld_publisher1 = self.create_publisher(String, 'topicname', 10)
12         self.helloworld_publisher2 = self.create_publisher(Int32, 'topicname_int', 30)
13         self.helloworld_publisher3 = self.create_publisher(Float64, 'topicname_float', 30)
14         self.timer = self.create_timer(1, self.publish_helloworld_msg)
15         self.count=0
16
17     def publish_helloworld_msg(self):
18         msg1 = String()
19         msg2 = Int32()
20         msg3 = Float64()
21         msg1.data = 'Hello World: {}'.format(self.count)
22         msg2.data = self.count
23         msg3.data = self.count/3
24         self.helloworld_publisher1.publish(msg1)
25         self.helloworld_publisher2.publish(msg2)
26         self.helloworld_publisher3.publish(msg3)
27         self.get_logger().info('Published message: {}'.format(msg1.data))
28         self.get_logger().info('Published message: {}'.format(msg2.data))
29         self.get_logger().info('Published message: {}'.format(msg3.data))
30         self.count+=1
31
```

Pub.py 파일입니다. 마찬가지로 c++과 py패키지와 통신을 위해 쓰던 topicname을 그대로 사용했으며 자료형도 동일하게 설정 후 메시지를 발행하도록 했습니다.

## 2) sub

```
1  import rclpy
2  from rclpy.node import Node
3  from std_msgs.msg import String
4  from std_msgs.msg import Int32
5  from std_msgs.msg import Float64
6
7
8  ✓ class HelloworldSubscriber(Node):
9  ✓     def __init__(self):
10         super().__init__('helloworld_subscriber')
11         self.helloworld_subscriber1 = self.create_subscription(
12             String,
13             'topicname',
14             self.subscribe_topic_message,
15             10)
16         self.helloworld_subscriber2 = self.create_subscription(
17             Int32,
18             'topicname_int',
19             self.subscribe_topic_message,
20             30)
21         self.helloworld_subscriber3 = self.create_subscription(
22             Float64,
23             'topicname_float',
24             self.subscribe_topic_message,
25             30)
26
27     def subscribe_topic_message(self, msg):
28         self.get_logger().info('Received message: {0}'.format(msg.data))
29
```

Sub.py파일입니다. cpp에서와 마찬가지로 함수를 따로 구성하고 동일한 topicname과 자료형을 사용하게 설정했습니다.

## 3. 실행 화면

```
[INFO] [1757665877.496517147] [pub]: Published message: 'Hello World: 26'
[INFO] [1757665877.496606586] [pub]: Published message: '27'
[INFO] [1757665877.496616751] [pub]: Published message: '9.000000'
[INFO] [1757665878.496495235] [pub]: Published message: 'Hello World: 27'
[INFO] [1757665878.496577274] [pub]: Published message: '28'
[INFO] [1757665878.496587024] [pub]: Published message: '9.000000'
[INFO] [1757665879.496440618] [pub]: Published message: 'Hello World: 28'
[INFO] [1757665879.496481157] [pub]: Published message: '29'
[INFO] [1757665879.496789835] [pub]: Published message: '9.000000'
[INFO] [1757665880.496367509] [pub]: Published message: 'Hello World: 29'
[INFO] [1757665880.496455496] [pub]: Published message: '30'
[INFO] [1757665880.496465340] [pub]: Published message: '10.000000'
[INFO] [1757665881.496349785] [pub]: Published message: 'Hello World: 30'
[INFO] [1757665881.496536688] [pub]: Published message: '31'
[INFO] [1757665881.496557634] [pub]: Published message: '10.000000'
[INFO] [1757665882.496327171] [pub]: Published message: 'Hello World: 31'
[INFO] [1757665882.496414826] [pub]: Published message: '32'
[INFO] [1757665882.496423898] [pub]: Published message: '10.000000'
[INFO] [1757665883.496318697] [pub]: Published message: 'Hello World: 32'
[INFO] [1757665883.496408931] [pub]: Published message: '33'
[INFO] [1757665883.496418580] [pub]: Published message: '11.000000'
[INFO] [1757665884.496261512] [pub]: Published message: 'Hello World: 33'
[INFO] [1757665884.496350443] [pub]: Published message: '34'
[INFO] [1757665884.496362268] [pub]: Published message: '11.000000'
[INFO] [1757665885.496287776] [pub]: Published message: 'Hello World: 34'
[INFO] [1757665885.496293037] [pub]: Published message: '35'
[INFO] [1757665885.496304271] [pub]: Published message: '11.000000'
[INFO] [1757665886.496221280] [pub]: Published message: 'Hello World: 35'
[INFO] [1757665886.496330429] [pub]: Published message: '36'
[INFO] [1757665886.496349398] [pub]: Published message: '12.000000'
[INFO] [1757665887.49617134] [pub]: Published message: 'Hello World: 36'
[INFO] [1757665887.496269102] [pub]: Published message: '37'
[INFO] [1757665887.496279541] [pub]: Published message: '12.000000'
[INFO] [1757665888.496339430] [pub]: Published message: 'Hello World: 37'
[INFO] [1757665888.496461716] [pub]: Published message: '38'
[INFO] [1757665888.496487793] [pub]: Published message: '12.000000'
[INFO] [1757665889.496235372] [pub]: Published message: 'Hello World: 38'
[INFO] [1757665889.496519451] [pub]: Published message: '39'
[INFO] [1757665889.496548544] [pub]: Published message: '13.000000'
[INFO] [1757665890.496067654] [pub]: Published message: 'Hello World: 39'
[INFO] [1757665890.496175475] [pub]: Published message: '40'
[INFO] [1757665890.496201313] [pub]: Published message: '13.000000'
[INFO] [1757665891.495983417] [pub]: Published message: 'Hello World: 40'
[INFO] [1757665891.496602348] [pub]: Published message: '41'
[INFO] [1757665891.496670124] [pub]: Published message: '13.000000'

[INFO] [1757655380.612892075] [sub]: Received message: '17'
[INFO] [1757655380.612928631] [sub]: Received message: '5.000000'
[INFO] [1757655381.613050044] [sub]: Received message: 'Hello World: 17'
[INFO] [1757655381.613152632] [sub]: Received message: '18'
[INFO] [1757655381.613181564] [sub]: Received message: '6.000000'
^C[INFO] [1757655383.920775910] [rclcpp]: signal_handler(signum=2)
● yu@yu:~/colcon_ws$ ros2 run my_first_ros_rclpy_pkg sub
Package 'my_first_ros_rclpy_pkg' not found
● yu@yu:~/colcon_ws$ source install/local_setup.bash
● yu@yu:~/colcon_ws$ ros2 run my_first_ros_rclpy_pkg sub
[INFO] [1757665885.509680132] [helloworld_subscriber]: Received message: Hello World: 34
[INFO] [1757665885.510348117] [helloworld_subscriber]: Received message: 35
[INFO] [1757665885.510822011] [helloworld_subscriber]: Received message: 11
[INFO] [1757665886.497312403] [helloworld_subscriber]: Received message: Hello World: 35
[INFO] [1757665886.498201857] [helloworld_subscriber]: Received message: 36
[INFO] [1757665886.498781698] [helloworld_subscriber]: Received message: 12
[INFO] [1757665887.497866101] [helloworld_subscriber]: Received message: Hello World: 36
[INFO] [1757665887.498907225] [helloworld_subscriber]: Received message: 37
[INFO] [1757665887.500246106] [helloworld_subscriber]: Received message: 12
[INFO] [1757665888.497461687] [helloworld_subscriber]: Received message: Hello World: 37
[INFO] [1757665888.498036040] [helloworld_subscriber]: Received message: 38
[INFO] [1757665888.499002888] [helloworld_subscriber]: Received message: 12
[INFO] [1757665889.497655753] [helloworld_subscriber]: Received message: Hello World: 38
[INFO] [1757665889.498208025] [helloworld_subscriber]: Received message: 39
[INFO] [1757665889.498642363] [helloworld_subscriber]: Received message: 13
[INFO] [1757665890.497307777] [helloworld_subscriber]: Received message: Hello World: 39
[INFO] [1757665890.497866501] [helloworld_subscriber]: Received message: 40
[INFO] [1757665890.498304971] [helloworld_subscriber]: Received message: 13
[INFO] [1757665891.497611947] [helloworld_subscriber]: Received message: Hello World: 40
[INFO] [1757665891.498546261] [helloworld_subscriber]: Received message: 41
[INFO] [1757665891.499194337] [helloworld_subscriber]: Received message: 13
```

위 사진은 파이썬 패키지인 pub node와 C++ 패키지인 helloworld\_subscriber node가 통신하는 부분입니다. Pub가 발행한 34번 메시지부터 읽어오는 것을 확인할 수 있습니다.

```
[INFO] [1757665958.112531580] [helloworld_publisher]: Published message: Hello World: 14
[INFO] [1757665957.113017258] [helloworld_publisher]: Published message: 14
[INFO] [1757665957.113309050] [helloworld_publisher]: Published message: 4.666666666666667
[INFO] [1757665958.112753059] [helloworld_publisher]: Published message: Hello World: 15
[INFO] [1757665958.113144684] [helloworld_publisher]: Published message: 15
[INFO] [1757665958.113475760] [helloworld_publisher]: Published message: 5.0
[INFO] [1757665959.112600556] [helloworld_publisher]: Published message: Hello World: 16
[INFO] [1757665959.113080084] [helloworld_publisher]: Published message: 16
[INFO] [1757665959.113412528] [helloworld_publisher]: Published message: 5.333333333333333
[INFO] [1757665960.112643850] [helloworld_publisher]: Published message: Hello World: 17
[INFO] [1757665960.113019451] [helloworld_publisher]: Published message: 17
[INFO] [1757665960.113342067] [helloworld_publisher]: Published message: 5.666666666666667
[INFO] [1757665961.112638926] [helloworld_publisher]: Published message: Hello World: 18
[INFO] [1757665961.113048495] [helloworld_publisher]: Published message: 18
[INFO] [1757665961.113393593] [helloworld_publisher]: Published message: 6.0
[INFO] [1757665962.113438499] [helloworld_publisher]: Published message: Hello World: 19
[INFO] [1757665962.113864302] [helloworld_publisher]: Published message: 19
[INFO] [1757665962.114227173] [helloworld_publisher]: Published message: 6.333333333333333
[INFO] [1757665963.112816657] [helloworld_publisher]: Published message: Hello World: 20
[INFO] [1757665963.113215693] [helloworld_publisher]: Published message: 20
[INFO] [1757665963.113925580] [helloworld_publisher]: Published message: 6.666666666666667
[INFO] [1757665964.112566873] [helloworld_publisher]: Published message: Hello World: 21
[INFO] [1757665964.113044046] [helloworld_publisher]: Published message: 21
[INFO] [1757665964.113438077] [helloworld_publisher]: Published message: 7.0
[INFO] [1757665965.113650033] [helloworld_publisher]: Published message: Hello World: 22
[INFO] [1757665965.114073568] [helloworld_publisher]: Published message: 22
[INFO] [1757665965.114414142] [helloworld_publisher]: Published message: 7.333333333333333

[INFO] [1757665951.112233797] [sub]: Received message: 'Hello World: 8'
[INFO] [1757665951.112418648] [sub]: Received message: '8'
[INFO] [1757665951.112455978] [sub]: Received message: '2.666667'
[INFO] [1757665952.112203104] [sub]: Received message: 'Hello World: 9'
[INFO] [1757665952.112304425] [sub]: Received message: '9'
[INFO] [1757665952.112418356] [sub]: Received message: '3.000000'
[INFO] [1757665953.113492028] [sub]: Received message: 'Hello World: 10'
[INFO] [1757665953.113540694] [sub]: Received message: '10'
[INFO] [1757665953.113571856] [sub]: Received message: '3.333333'
[INFO] [1757665954.113452561] [sub]: Received message: 'Hello World: 11'
[INFO] [1757665954.113530650] [sub]: Received message: '11'
[INFO] [1757665954.113559044] [sub]: Received message: '3.666667'
[INFO] [1757665955.112335411] [sub]: Received message: 'Hello World: 12'
[INFO] [1757665955.112458591] [sub]: Received message: '12'
[INFO] [1757665955.112490399] [sub]: Received message: '4.000000'
[INFO] [1757665956.112180875] [sub]: Received message: 'Hello World: 13'
[INFO] [1757665956.112298391] [sub]: Received message: '13'
[INFO] [1757665956.11235408] [sub]: Received message: '4.333333'
[INFO] [1757665957.112170577] [sub]: Received message: 'Hello World: 14'
[INFO] [1757665957.112274077] [sub]: Received message: '14'
[INFO] [1757665957.112303004] [sub]: Received message: '4.666667'
[INFO] [1757665958.112338062] [sub]: Received message: 'Hello World: 15'
[INFO] [1757665958.112493030] [sub]: Received message: '15'
[INFO] [1757665958.112522041] [sub]: Received message: '5.000000'
[INFO] [1757665959.112188085] [sub]: Received message: 'Hello World: 16'
[INFO] [1757665959.112295338] [sub]: Received message: '16'
[INFO] [1757665959.112324106] [sub]: Received message: '5.333333'
[INFO] [1757665960.112361487] [sub]: Received message: 'Hello World: 17'
[INFO] [1757665960.112457222] [sub]: Received message: '17'
[INFO] [1757665960.112487273] [sub]: Received message: '5.666667'
[INFO] [1757665961.112353763] [sub]: Received message: 'Hello World: 18'
[INFO] [1757665961.112454492] [sub]: Received message: '18'
[INFO] [1757665961.112484419] [sub]: Received message: '6.000000'
[INFO] [1757665962.113124493] [sub]: Received message: 'Hello World: 19'
[INFO] [1757665962.113228047] [sub]: Received message: '19'
[INFO] [1757665962.11259715] [sub]: Received message: '6.333333'
[INFO] [1757665963.112491870] [sub]: Received message: 'Hello World: 20'
[INFO] [1757665963.112608151] [sub]: Received message: '20'
[INFO] [1757665963.112639135] [sub]: Received message: '6.666667'
[INFO] [1757665964.112247781] [sub]: Received message: 'Hello World: 21'
[INFO] [1757665964.112346409] [sub]: Received message: '21'
[INFO] [1757665964.112374539] [sub]: Received message: '7.000000'
[INFO] [1757665965.113370469] [sub]: Received message: 'Hello World: 22'
[INFO] [1757665965.113480722] [sub]: Received message: '22'
[INFO] [1757665965.113509018] [sub]: Received message: '7.333333'
```

C++ 패키지 helloworld\_publisher node와 파이썬 패키지 sub node가 통신하는 부분입니다.