

## Laporan dokumentasi pengerjaan tugas 2 Ros2 Bayucaraka 2024

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Didalam repositori yang sudah saya clone saat mengerjakan tugas 1, saya membuat folder baru bernama “tugas2” dan juga folder “src” didalamnya. Kemudian saya membuat package dengan command yang sama dan lalu mendownload 2 contoh publisher dan 1 contoh listener dengan command line berikut.

```
Wget -O publisher1.cpp
https://raw.githubusercontent.com/ros2/examples/foxy/rclcpp/topics/minimal\_publisher/ember\_function.cpp
```

```
Wget -O publisher2.cpp
https://raw.githubusercontent.com/ros2/examples/foxy/rclcpp/topics/minimal\_publisher/ember\_function.cpp
```

```
wget -O subscriber_main.cpp
https://raw.githubusercontent.com/ros2/examples/foxy/rclcpp/topics/minimal\_subscriber/member\_function.cpp
```

kemudian, kembali ke file tugas2 dan masuk ke visual studio code dengan tugas2 sebagai workspace nya. Pada file “package.xml”, lengkapi bagian description, maintainer, dan juga license. Kemudian tambahkan dependency “rclcpp” dan “std\_msgs” dibawah buildtool\_dependency dari “ament\_cmake”.

Setelah itu pada file CMakeLists.txt, saya menambahkan command “find\_package(rclcpp REQUIRED)” dan “find\_package(std\_msgs REQUIRED)” dibawah pencari package ament\_cmake. Selain itu, saya juga menambahkan perintah untuk cmake membuat executable publisher dan listener dengan line berikut.

```
add_executable(talker1 src/publisher1.cpp)
ament_target_dependencies(talker1 rclcpp std_msgs)
add_executable(talker2 src/publisher2.cpp)
ament_target_dependencies(talker2 rclcpp std_msgs)
add_executable(listener src/subscriber_main.cpp)
ament_target_dependencies(listener rclcpp std_msgs)
```

Terakhir, perintah install executable yang sudah dibuat agar perintah “ros2 run” dapat menemukan file executable nya.

```
install(TARGETS
  talker1
  talker2
  listener
```

```
DESTINATION lib/${PROJECT_NAME})
```

Setelah itu, waktunya mengubah file publisher. Saya mengubah nama topik menjadi “and\_operation” pada kedua publisher kemudian mengubah timer pada publisher pertama menjadi 2000ms dan publisher kedua menjadi 3000ms. Pada awalnya, saya menggunakan cara sebagai berikut untuk menentukan pesan yang akan dipublish oleh publisher

```
message.data = "publisher-1-(" + std::to_string(count_++ * 2) + " sec) → ";  
if((count_*2)%4 == 0){message.data += "false";} else {message.data += "true";}
```

(ganti 2 dengan 3 dan 4 dengan 6 untuk publisher kedua).

Namun, saya sadar jika saya tidak dapat memulai kedua publisher di saat yang bersamaan sehingga kedua publisher akan memiliki patokan waktu yang berbeda. Hal ini dapat membuat ketidaksinkronan waktu penerimaan data bagi subscriber sehingga saya memutuskan untuk menggunakan waktu dari node “this” untuk patokan waktu kedua publisher. Hal ini juga berarti saya harus mengganti sistem pergantian “false” dan “true” dengan variabel local privat tipe boolean sehingga tidak bergantung pada timer. Berikut implementasinya

```
MinimalPublisher()  
: Node("minimal_publisher"), count_(this->now().nanoseconds()/1000000000  
+ 2)  
{  
    publisher_ =  
this->create_publisher<std_msgs::msg::String>("and_operation", 10);  
    timer_ = this->create_wall_timer(  
        2000ms, std::bind(&MinimalPublisher::timer_callback, this));  
}
```

```
bool state = false;  
  
void timer_callback()  
{  
    auto message = std_msgs::msg::String();  
    message.data = "publisher-1-(" + std::to_string(count_) + " sec) → ";  
    count_+=2;  
    if(state){message.data += "true"; state = false;} else {message.data += "false"; state = true;}  
    RCLCPP_INFO(this->get_logger(), "%s", message.data.c_str());  
    publisher_>publish(message);  
}
```

Kedua publisher telah jadi, sekarang waktunya memodifikasi file subscriber\_main.cpp. Langkah pertama adalah mengubah topik yang didengarkan ke “and\_operation”, kemudian untuk menentukan apakah kedua publisher mengirim pada detik yang sama dan memiliki value “state” yang sama, saya mencoba untuk menyimpan string dari publisher ke 1 pada variabel string

“pub1” dan string dari publisher ke 2 pada variabel string “pub2” yang masing masing saya declare di bagian private kelas turunan “MinimalSubscriber”. Pub1 dan pub2 saya definisikan sebagai “empty” dan akan diubah ketika ada data yang diterima oleh listener. Namun, saya mendapatkan error sebagai berikut ketika berusaha mem-build package saya.

```

Summary: 0 packages finished [4.05s]
1 package failed: and_publisher
1 package had stderr output: and_publisher
olel@olel-RDG-Flow-X16-G601RE-GV601RE:~/Projects/MagangBayu24-R0S2/tugas2$ colcon build
Starting >>> and_publisher
--- stderr: and_publisher
/home/olel/Projects/MagangBayu24-R0S2/tugas2/src/and_publisher/src/subscriber_main.cpp: In member function 'void MinimalSubscriber::topic_callback(std_msgs::msg::String_SharedPtr const&):
/home/olel/Projects/MagangBayu24-R0S2/tugas2/src/and_publisher/src/subscriber_main.cpp:39:37: error: passing 'const string' (aka 'const std::basic_string<char>') as 'this' argument discards qualifiers [-fpermissive]
   39 |         if(received[10] == '1') {pub1 = received;}
      |                                     ^
      |                                     |
      |                                     in file included from /usr/include/c++/9/string:55,
      |                                     from /usr/include/c++/9/stdexcept:39,
      |                                     from /usr/include/c++/9/array:39,
      |                                     from /usr/include/c++/9/tuple:39,
      |                                     from /usr/include/c++/9/bits/unique_ptr.h:37,
      |                                     from /usr/include/c++/9/memory:80,
      |                                     from /home/olel/Projects/MagangBayu24-R0S2/tugas2/src/and_publisher/src/subscriber_main.cpp:15:
/usr/include/c++/9/bits/basic_string.h:669:7: note: in call to 'std::basic_string<CharT, Traits, Allocator>::operator=(const std::basic_string<CharT, Traits, Allocator> const&)'
   669 |         operator=(const basic_string& __str)
      |         ^~~~~~
/home/olel/Projects/MagangBayu24-R0S2/tugas2/src/and_publisher/src/subscriber_main.cpp:40:42: error: passing 'const string' (aka 'const std::basic_string<char>') as 'this' argument discards qualifiers [-fpermissive]
   40 |         else if(received[10] == '2') {pub2 = received;}
      |                                     ^
      |                                     |
      |                                     in file included from /usr/include/c++/9/string:55,
      |                                     from /usr/include/c++/9/stdexcept:39,
      |                                     from /usr/include/c++/9/array:39,
      |                                     from /usr/include/c++/9/tuple:39,
      |                                     from /usr/include/c++/9/bits/unique_ptr.h:37,
      |                                     from /usr/include/c++/9/memory:80,
      |                                     from /home/olel/Projects/MagangBayu24-R0S2/tugas2/src/and_publisher/src/subscriber_main.cpp:15:
/usr/include/c++/9/bits/basic_string.h:669:7: note: in call to 'std::basic_string<CharT, Traits, Allocator>::operator=(const std::basic_string<CharT, Traits, Allocator> const&)'
   669 |         operator=(const basic_string& __str)
      |         ^~~~~~
make[2]: *** [CMakeFiles/listener.dir/build.make:63: CMakeFiles/listener.dir/src/subscriber_main.cpp.o] Error 1
make[1]: *** [CMakeFiles/Makefile2:82: CMakeFiles/listener.dir/all] Error 2
make: *** [Makefile:141: all] Error 2
---
Failed <<< and_publisher [2.86s, exited with code 2]

Summary: 0 packages finished [4.22s]
1 package failed: and_publisher
1 package had stderr output: and_publisher
olel@olel-RDG-Flow-X16-G601RE-GV601RE:~/Projects/MagangBayu24-R0S2/tugas2$

```

Saya pun teringat pada saat mengerjakan tugas 1, saya juga mendapatkan error ketika menambahkan fungsi pada bagian private kelas listener. Saya mengambil asumsi bahwa kelas listener tidak boleh diberi variabel ataupun method tambahan lagi, saya pun mengubah pub1 dan pub2 menjadi global variabel. Saya tidak mendapatkan error yang sama lagi ketika mem-build package. Kemudian untuk implementasi operasi and kedua data, berikut detailnya

```

void topic_callback(const std_msgs::msg::String::SharedPtr msg) const
{
    std::string received = msg->data;
    if(received[10] == '1') {pub1 = received;}
    else if(received[10] == '2') {pub2 = received;}

    if(pub1 != "empty" && pub2 != "empty")
    {
        if(pub1.substr(12, 16) == pub2.substr(12, 16))
        {
            // std::cout << "update: Pub1: " << pub1 << " | Pub2: " << pub2 <<
std::endl;

```

```

// std::cout << "update: Pub1: " << pub1.substr(12, 16) << " |
Pub2: " << pub2.substr(12, 16) << std::endl;

// std::cout << "update: Pub1: " << pub1[33] << " | Pub2: " <<
pub2[33] << std::endl;

if(pub1[33] == pub2[33]) {std::cout<<"sudah siap nih, gass
min!\n";}

else {std::cout<<"tunggu dulu, kami belum ready!\n";}

}

}

// std::cout<<msg->data.c_str()<<std::endl;
// RCLCPP_INFO(this->get_logger(), "hoh '%s'", msg->data.c_str());
}

```

Saya build semua dan coba jalankan dan alhasil semuanya berjalan lancar. Berikut hasil akhirnya

```

[INFO] [1705851259.325406320] [minimal_publisher]: publisher-1 (1705851259 sec) -> false
[INFO] [1705851261.325496107] [minimal_publisher]: publisher-1 (1705851261 sec) -> true
[INFO] [1705851263.325497634] [minimal_publisher]: publisher-1 (1705851263 sec) -> false
[INFO] [1705851265.325722195] [minimal_publisher]: publisher-1 (1705851265 sec) -> true
[INFO] [1705851267.325389173] [minimal_publisher]: publisher-1 (1705851267 sec) -> false
[INFO] [1705851269.325303861] [minimal_publisher]: publisher-1 (1705851269 sec) -> true
[INFO] [1705851271.325202997] [minimal_publisher]: publisher-1 (1705851271 sec) -> false
[INFO] [1705851273.325258014] [minimal_publisher]: publisher-1 (1705851273 sec) -> true
[INFO] [1705851275.325612467] [minimal_publisher]: publisher-1 (1705851275 sec) -> false
[INFO] [1705851277.325761261] [minimal_publisher]: publisher-1 (1705851277 sec) -> true
[INFO] [1705851279.325280003] [minimal_publisher]: publisher-1 (1705851279 sec) -> false
[INFO] [1705851281.325175352] [minimal_publisher]: publisher-1 (1705851281 sec) -> true
[INFO] [1705851283.325140469] [minimal_publisher]: publisher-1 (1705851283 sec) -> false
[INFO] [1705851285.325579856] [minimal_publisher]: publisher-1 (1705851285 sec) -> true
[INFO] [1705851287.325123012] [minimal_publisher]: publisher-1 (1705851287 sec) -> false
[INFO] [1705851289.325467641] [minimal_publisher]: publisher-1 (1705851289 sec) -> true
[INFO] [1705851291.325076497] [minimal_publisher]: publisher-1 (1705851291 sec) -> false
[INFO] [1705851293.325031209] [minimal_publisher]: publisher-1 (1705851293 sec) -> true
[INFO] [1705851295.325380130] [minimal_publisher]: publisher-1 (1705851295 sec) -> false
[INFO] [1705851297.325246329] [minimal_publisher]: publisher-1 (1705851297 sec) -> true
[INFO] [1705851299.325292763] [minimal_publisher]: publisher-1 (1705851299 sec) -> false
[INFO] [1705851301.325207676] [minimal_publisher]: publisher-1 (1705851301 sec) -> true
[INFO] [1705851303.324919275] [minimal_publisher]: publisher-1 (1705851303 sec) -> false
[INFO] [1705851305.324904278] [minimal_publisher]: publisher-1 (1705851305 sec) -> true

[INFO] [1705851234.713642897] [minimal_publisher]: publisher-2 (1705851234 sec) -> true
[INFO] [1705851237.713259556] [minimal_publisher]: publisher-2 (1705851237 sec) -> false
[INFO] [1705851240.713744580] [minimal_publisher]: publisher-2 (1705851240 sec) -> true
[INFO] [1705851243.713522441] [minimal_publisher]: publisher-2 (1705851243 sec) -> false
[INFO] [1705851246.713765621] [minimal_publisher]: publisher-2 (1705851246 sec) -> true
[INFO] [1705851249.713480321] [minimal_publisher]: publisher-2 (1705851249 sec) -> false
[INFO] [1705851252.713426547] [minimal_publisher]: publisher-2 (1705851252 sec) -> true
[INFO] [1705851255.713423698] [minimal_publisher]: publisher-2 (1705851255 sec) -> false
[INFO] [1705851258.713526043] [minimal_publisher]: publisher-2 (1705851258 sec) -> true
[INFO] [1705851261.713272422] [minimal_publisher]: publisher-2 (1705851261 sec) -> false
[INFO] [1705851264.713370270] [minimal_publisher]: publisher-2 (1705851264 sec) -> true
[INFO] [1705851267.713260735] [minimal_publisher]: publisher-2 (1705851267 sec) -> false
[INFO] [1705851270.713247205] [minimal_publisher]: publisher-2 (1705851270 sec) -> true
[INFO] [1705851273.713657854] [minimal_publisher]: publisher-2 (1705851273 sec) -> false
[INFO] [1705851276.713286731] [minimal_publisher]: publisher-2 (1705851276 sec) -> true
[INFO] [1705851279.713160354] [minimal_publisher]: publisher-2 (1705851279 sec) -> false
[INFO] [1705851282.713100273] [minimal_publisher]: publisher-2 (1705851282 sec) -> true
[INFO] [1705851285.713071742] [minimal_publisher]: publisher-2 (1705851285 sec) -> false
[INFO] [1705851288.712681729] [minimal_publisher]: publisher-2 (1705851288 sec) -> true
[INFO] [1705851291.713002584] [minimal_publisher]: publisher-2 (1705851291 sec) -> false
[INFO] [1705851294.713038327] [minimal_publisher]: publisher-2 (1705851294 sec) -> true
[INFO] [1705851297.712747291] [minimal_publisher]: publisher-2 (1705851297 sec) -> false
[INFO] [1705851300.712910627] [minimal_publisher]: publisher-2 (1705851300 sec) -> true
[INFO] [1705851303.712457969] [minimal_publisher]: publisher-2 (1705851303 sec) -> false

```