**Lab 2: Publisher/Subscribers**

**I. Objectives**

* Learn how to create an rqt graph
* Create your own publisher and subscriber node

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1. **Recreate a Graph: (10 points)**
   1. Here is a graph that shows some nodes run with names changed. Your goal is to get the same. You’ll need to start with 4 nodes. Two of those nodes are from the turtlesim package, and two are from nodes you have already written. No need to write any new code here, you just have to start the nodes from your terminal, using the appropriate commands.   
      Text

      Description automatically generated with medium confidence
   2. In a pdf file, turn in the image of the rqt graph that you created, as well as the terminal commands that you used to create the graph.
2. **Publisher/Subscriber: (30 points)**
   1. Here is a representation of the graph you should get at the end. The blue boxes are nodes and the green boxes are topics. **Diagram

      Description automatically generated**
   2. You will create two nodes from scratch. In the first one you’ll have 1 publisher, and in the second one, one publisher and one subscriber.
      1. The number\_publisher node publishes a number (always the same number) on the “/number” topic, with the existing type example\_interfaces/msg/Int64.
      2. The number\_counter node subscribes to the “/number” topic. It keeps a counter variable. Every time a new number is received, it’s added to the counter. The node also has a publisher on the “/number\_count” topic. When the counter is updated, the publisher directly publishes the new value on the topic.
   3. Hints:
      1. Check what to put into the example\_interfaces/msg/Int64 with the “ros2 interface show’ command line tool
      2. In the number\_counter node, the publisher will publish messages directly from the subscriber callback.

An additional five points will be allocated in each homework assignment for style: Make sure your code is commented, neat, and variable names make sense. You should consult the Python style guide <https://peps.python.org/pep-0008/> as well as the ROS2 style guide: <https://docs.ros.org/en/rolling/The-ROS2-Project/Contributing/Code-Style-Language-Versions.html#python>.

**What to turn in**

* In a single zip file named DirectoryID\_Lab2.zip,
  + A pdf file named Lab2.pdf that contains your answers for questions 1, and the terminal commands you used to run question 2.
  + Your python node files (i.e., number\_publisher.py and number\_counter.py) for question 2.
  + A video showing you going through all two homework questions named Lab2\_walkthrough.