

Bridging Your Transitions from ROS 1 to ROS 2

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WHO, WHAT, WHY, W...

Overview

WHO cares

You run on ROS 1 now.

You(r boss) want to move to ROS 2.

WHAT is the bridge

Talks between ROS 1 and ROS 2

WHY would I bother

Stuff don't break while you port incrementally to ROS 2

Disclaimer:
I didn't write the bridge.
(I'm as newb as you.)

Outline

Built-in types

Matching custom types (automatically associated)

Non-matching custom types (NOT automatically associated)

HOW

Setup



A ROS 1 Robot
(e.g. VRX)



ROS 1 Melodic

ros1_bridge
↔



ROS 2 Dashing

Dockerfile



All code available: github.com/mabelzhang/ros1_bridge_sandbox

Part 1/3

BASICS: BUILT-IN TYPES

Use Case

If you only ever use built-in types. No custom types.

```
std_msgs  
sensor_msgs  
geometry_msgs  
std_srvs  
...
```

Built-in Types: Work Out of the Box

Install bridge:

```
$ sudo apt install ros-dashing-ros1-bridge
```

See all built-in types automatically bridged:

```
$ ros2 run ros1_bridge dynamic_bridge --print-pairs
```

Run bridge:

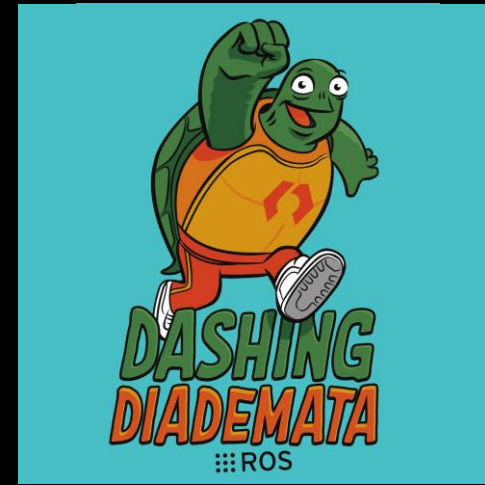
```
$ ros2 run ros1_bridge dynamic_bridge --bridge-all-topics
```

Demo: Built-in Types



ROS 1

sensor data
→



ROS 2

- World
 - Insert
 - GUI
 - Scene
 - Spherical Co...
 - Physics
 - Atmosphere
 - Wind
 - Models
 - Lights
- PropertyValue



Steps: 1 - Real Time Factor: 1.00 Sim Time: 3:43.315 Real Time: 3:47.274 Iterations: 2023315 FPS: 60.77 Reset Time

/opt/ros/melodic/share/... x Terminal x Terminal x

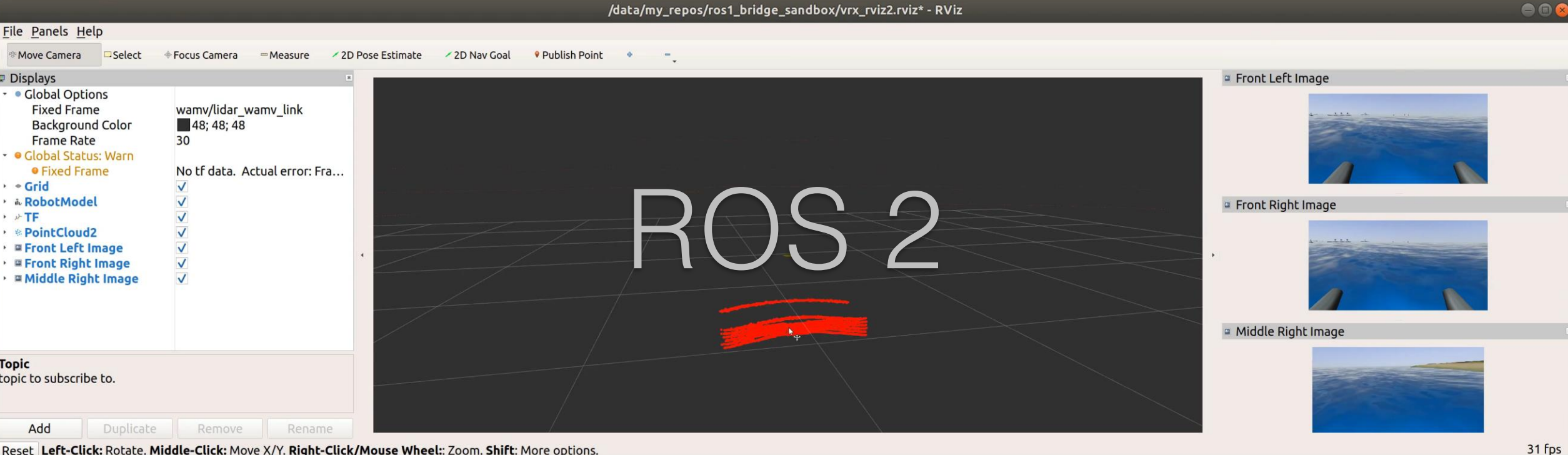
```
master@quiraing ros1 bridge sandbox$ ros2 run ros1_bridge dynamic_bridge --bridge-all-topics
```

bridge

colcon build [1/1 done]... x Terminal x Terminal x

```
master@quiraing ros2_msgs ws$ ros2 run bridge_msgs demo_vrx_read
```

ROS 2

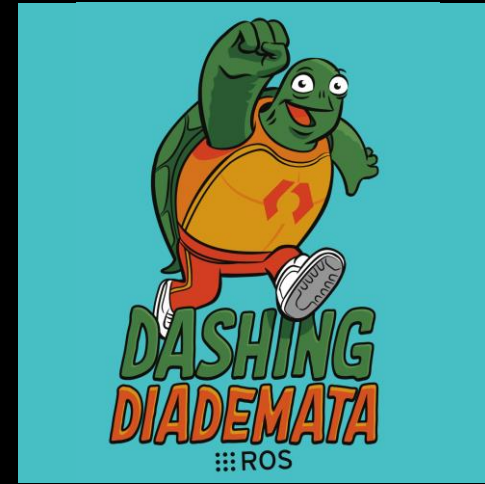


Demo: Built-in Types

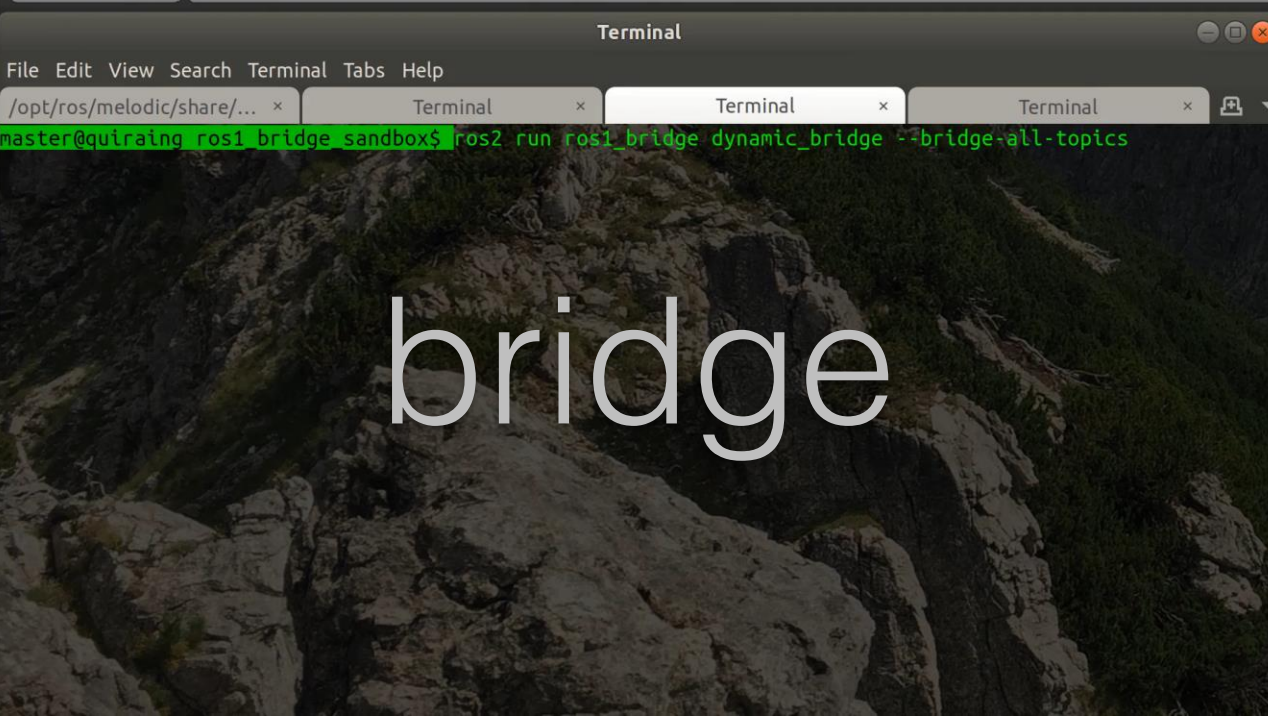
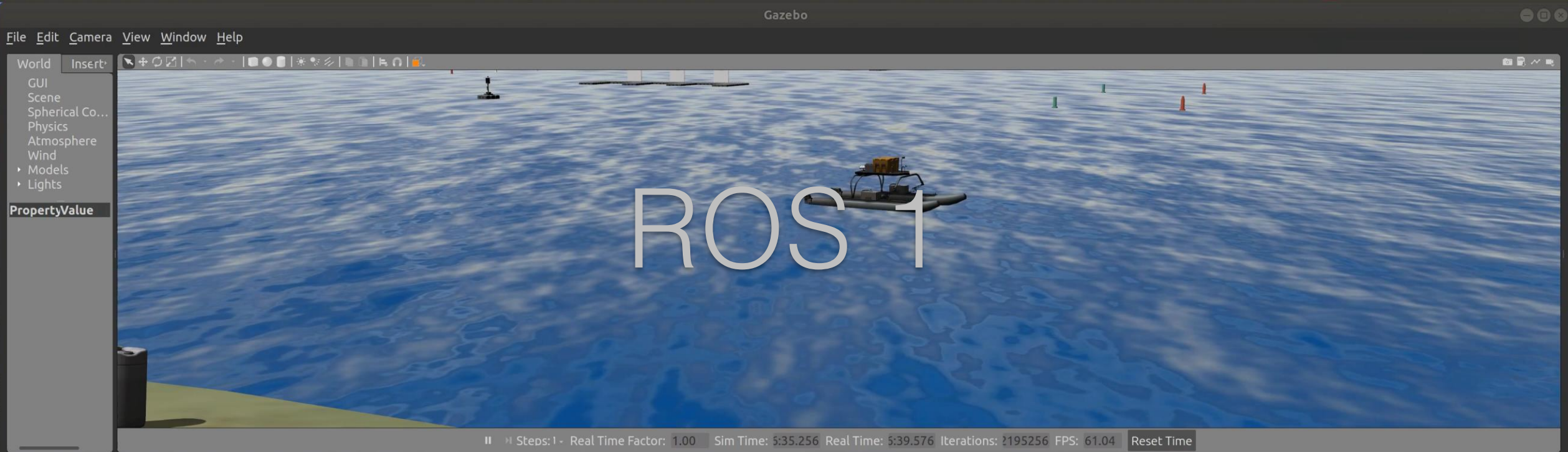


ROS 1

command
←



ROS 2



Part 2/3

INTERMEDIATE: CUSTOM TYPES, AUTO-ASSOCIATED

Use Case

If you define custom types, e.g.

```
JointCommand.msg:  
float64 position
```

Custom Types: Automatic association

Need to recompile bridge.

Easiest: automatic association between ROS 1 & 2 types

Conditions:

Package names end in `_msgs` in ROS 1, `_msgs` / `_interfaces` in ROS 2 AND

Message names match AND

Fields match

Custom Types: Compiling the Bridge

Key: Separate workspaces and separate shells,
for ROS 1, ROS 2, and bridge

```
[ ros1_bridge_ws/src/ros1_bridge  
  ros1_msgs_ws/src/bridge_msgs  
  ros2_msgs_ws/src/bridge_msgs
```

Compile and source each workspace in separate shells.

Custom Types: Compiling the Bridge

Shell 1: Build ROS 1 messages

```
$ . /opt/ros/melodic/setup.bash  
$ catkin_make_isolated --install  
$ . install_isolated/setup.bash
```

Shell 2: Build ROS 2 messages

```
$ . /opt/ros/dashing/setup.bash  
$ colcon build --packages-select bridge_msgs  
$ . install/local_setup.bash
```


Custom Types: Compiling the Bridge

Shell 3: Build bridge

```
$ . /opt/ros/melodic/setup.bash
$ . /opt/ros/dashing/setup.bash
$ . ../ros1_bridge_sandbox/ros1_msgs_ws/install_isolated/setup.bash
$ . ../ros1_bridge_sandbox/ros2_msgs_ws/install/local_setup.bash
$ colcon build --packages-select ros1_bridge --cmake-force-configure
$ . install/local_setup.bash
```

Verify custom messages are bridged:

```
$ ros2 run ros1_bridge dynamic_bridge --print-pairs | grep bridge_msgs
- 'bridge_msgs/JointCommand' (ROS 2) <=> 'bridge_msgs/JointCommand'
(ROS 1)
```

Instructions Available 

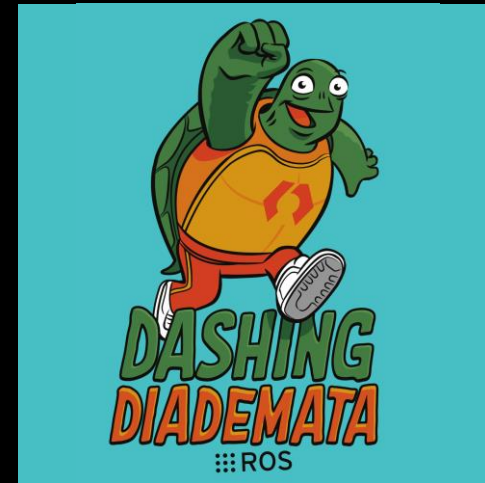
All code available: github.com/mabelzhang/ros1_bridge_sandbox

Demo: Custom Type



ROS 1

custom msg
→



ROS 2


```
Terminal
File Edit View Search Terminal Tabs Help
/opt/ros/mel... x Terminal x Terminal x bridge_msgs [... x
master@quiraing ros1_bridge_sandbox$ ros2 run ros1_bridge dynamic_bridg
e --bridge-all-topics
```

bridge

```
Terminal
File Edit View Search Terminal Tabs Help
Terminal x Terminal x
master@quiraing ros1_msgs_ws$ rosrn bridge_msgs ros1_pub.py
```

ROS 1
pub
custom

```
colcon build [1/1 done] [0 ongoing]
File Edit View Search Terminal Tabs Help
colcon build... x Terminal x Terminal x Terminal x
master@quiraing ros2_msgs_ws$ ros2 run bridge_msgs ros2_sub
```

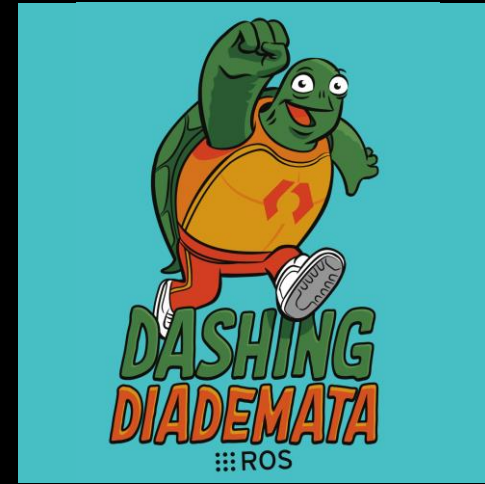
ROS 2
sub
custom

Demo: Custom Type

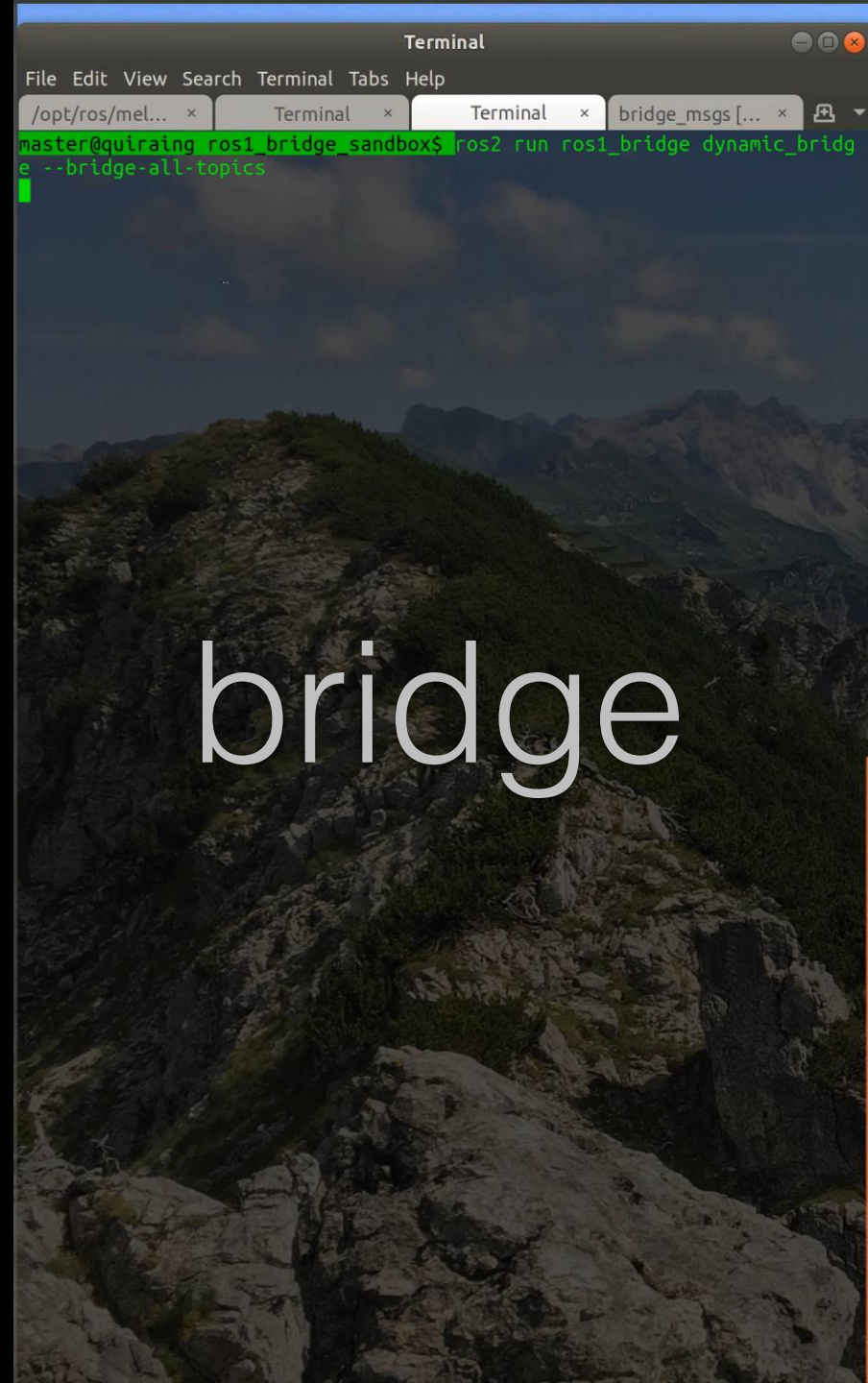


ROS 1

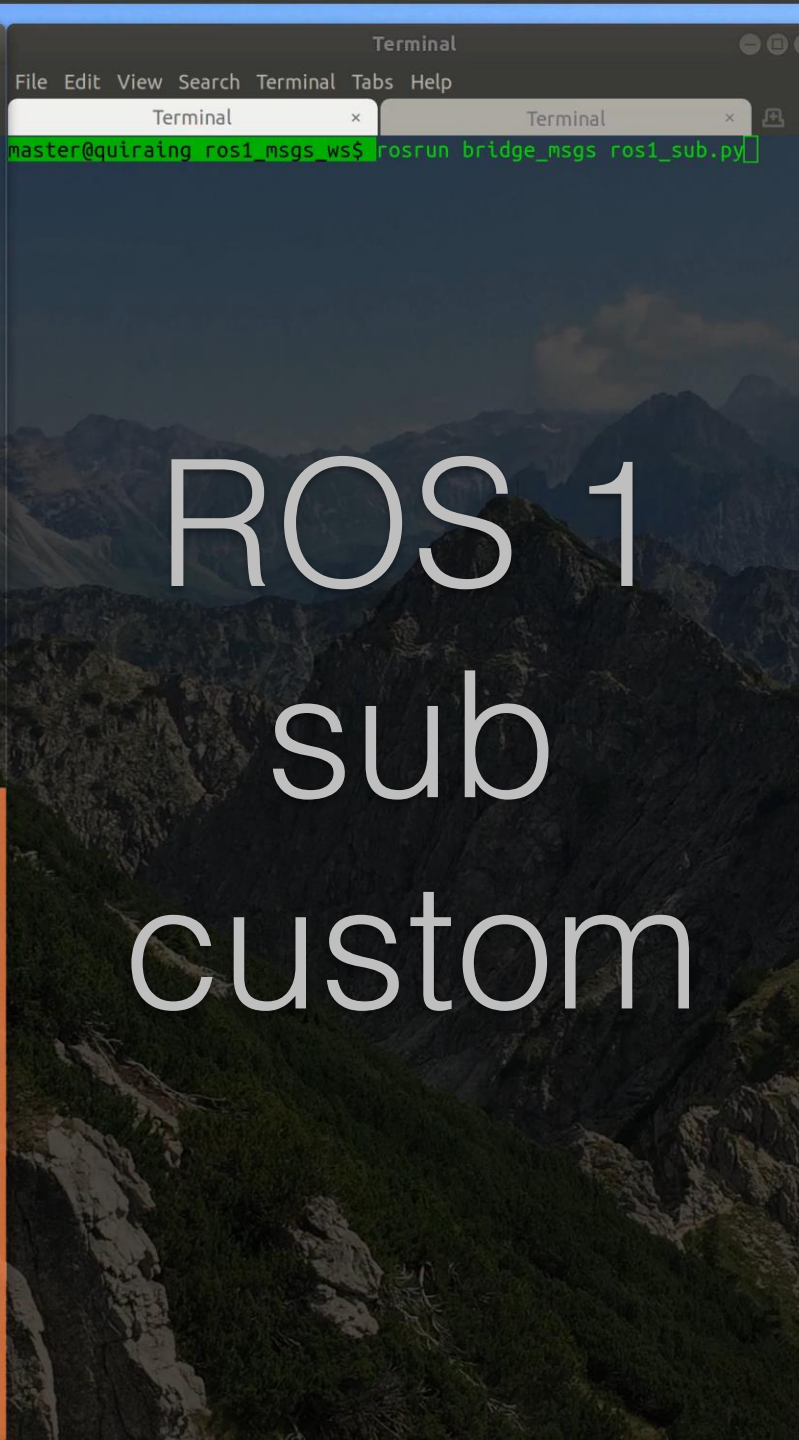
custom msg
←



ROS 2



bridge



ROS 1
sub
custom



ROS 2
pub
custom

Part 3/3

**IF YOU MUST:
CUSTOM MAPPINGS, NOT AUTO-ASSOCIATED**

Use Case

If message types cannot have matching names and fields, e.g. /rosout:

rosgraph_msgs/Log.msg:

Header header

byte level

string name

string msg

string file

string function

uint32 line

string[] topics



rcl_interfaces/Log.msg:

**builtin_interfaces/Time
stamp**

uint8 level

string name

string msg

string file

string function

uint32 line

Define Custom Mapping in YAML

```
rcl_interfaces/mapping_rules.yaml:
```

```
-
```

```
  ros1_package_name: 'rosgraph_msgs'
  ros1_message_name: 'Log'
  ros2_package_name: 'rcl_interfaces'
  ros2_message_name: 'Log'
  fields_1_to_2:
    header.stamp: 'stamp'
    level: 'level'
    name: 'name'
    msg: 'msg'
    file: 'file'
    function: 'function'
    line: 'line'
```

Define Custom Mapping in YAML

```
rcl_interfaces/CMakeLists.txt:
```

```
install(FILES mapping_rules.yaml DESTINATION  
share/${PROJECT_NAME})
```

```
rcl_interfaces/package.xml:
```

```
<export>
```

```
  <ros1_bridge mapping_rules="mapping_rules.yaml"/>
```

```
</export>
```

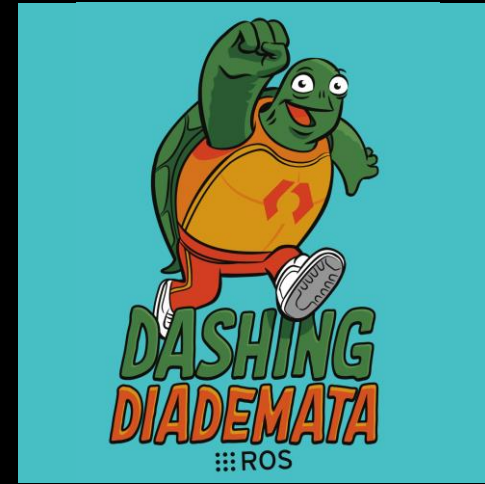
Recompile package; recompile bridge as before.

Demo: Custom YAML Mapping



ROS 1

/rosout



ROS 2



A terminal window titled 'Terminal' with tabs for '/opt/ros/mel...', 'Terminal', 'Terminal', and 'bridge_msgs [...]'. The command prompt is 'master@quiraing ros1_bridge_sandbox\$' and the command entered is 'ros2 run ros1_bridge dynamic_bridge --bridge-all-topics'.

bridge



A terminal window titled 'Terminal' with tabs for 'Terminal' and 'Terminal'. The command prompt is 'master@quiraing ros1_msgs_ws\$' and the command entered is 'roslaunch bridge_msgs ros1_sub.py'.

ROS 1 sub



A terminal window titled 'Terminal' with tabs for 'File', 'Edit', 'View', 'Search', 'Terminal', and 'Help'. The command prompt is 'master@quiraing bridge_msgs\$' and the command entered is 'ros2 topic list'.

ROS 2 custom YAML



A terminal window titled 'colcon build [1/1 done] [0 ongoing]' with tabs for 'colcon build...', 'Terminal', 'Terminal', and 'Terminal'. The command prompt is 'master@quiraing ros2_msgs_ws\$' and the command entered is 'ros2 run bridge_msgs ros2_pub'.

ROS 2 pub

A FEW NOTES

A Few Notes

`echo` alone does not suffice. Write a subscriber.

Use `--bridge-all-topics` to guarantee bridging.

If cannot get dynamic bridge to work, try static bridge `simple_bridge.cpp` in `ros1_bridge`.

Migration guide from ROS 1 to ROS 2

<https://index.ros.org/doc/ros2/Contributing/Migration-Guide/>

Thank you.

