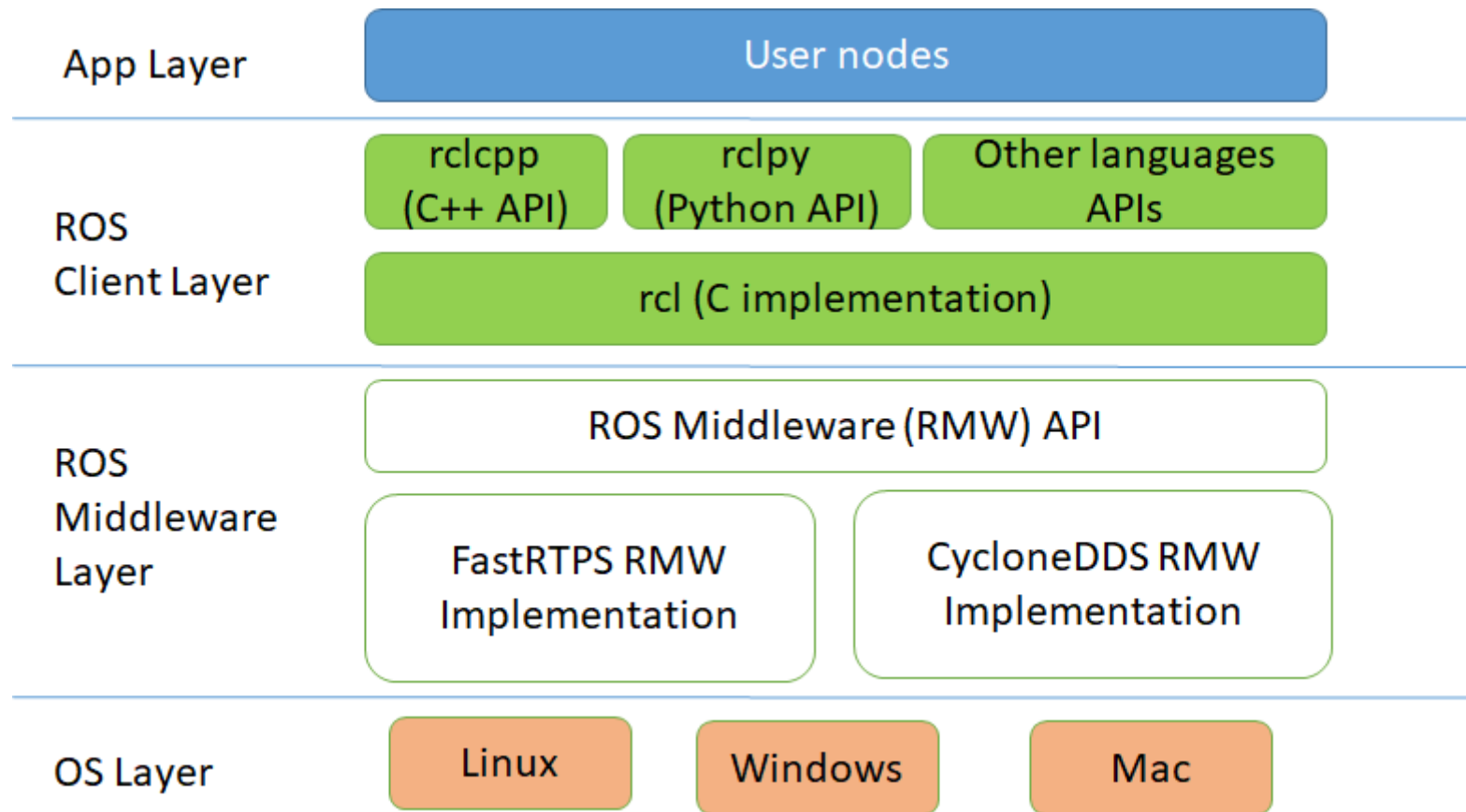


# ROS 2

Setup ROS 2 on Virtual Ubuntu OS

<https://docs.ros.org/en/galactic/Installation.html>

Thong LT



<https://aws.amazon.com/blogs/robotics/ros2-foxy-fitzroy-robot-development/>

**Nodes**

**Topics**

**Services**

**Parameter server**

# Install packets

## 1. Install ros2 foxy

- Ubuntu Linux - Focal Fossa (20.04) 64-bit

**-Step1.**

<https://docs.ros.org/en/galactic/Installation/Ubuntu-Development-Setup.html>

**-Step2.**

<https://docs.ros.org/en/galactic/Installation/Ubuntu-Install-Debians.html>

```
sudo apt install ros-galactic-desktop  
source /opt/ros/galactic/setup.bash
```

## 2. Install packets in C++ (rclcpp)

## 3. Install packets for testing

```
source /opt/ros/galactic/setup.bash  
ros2 run demo_nodes_cpp talker
```

```
source /opt/ros/galactic/setup.bash  
ros2 run demo_nodes_py listener
```

# Cli on ros 2

- ros2 node list
- node info <node\_name>

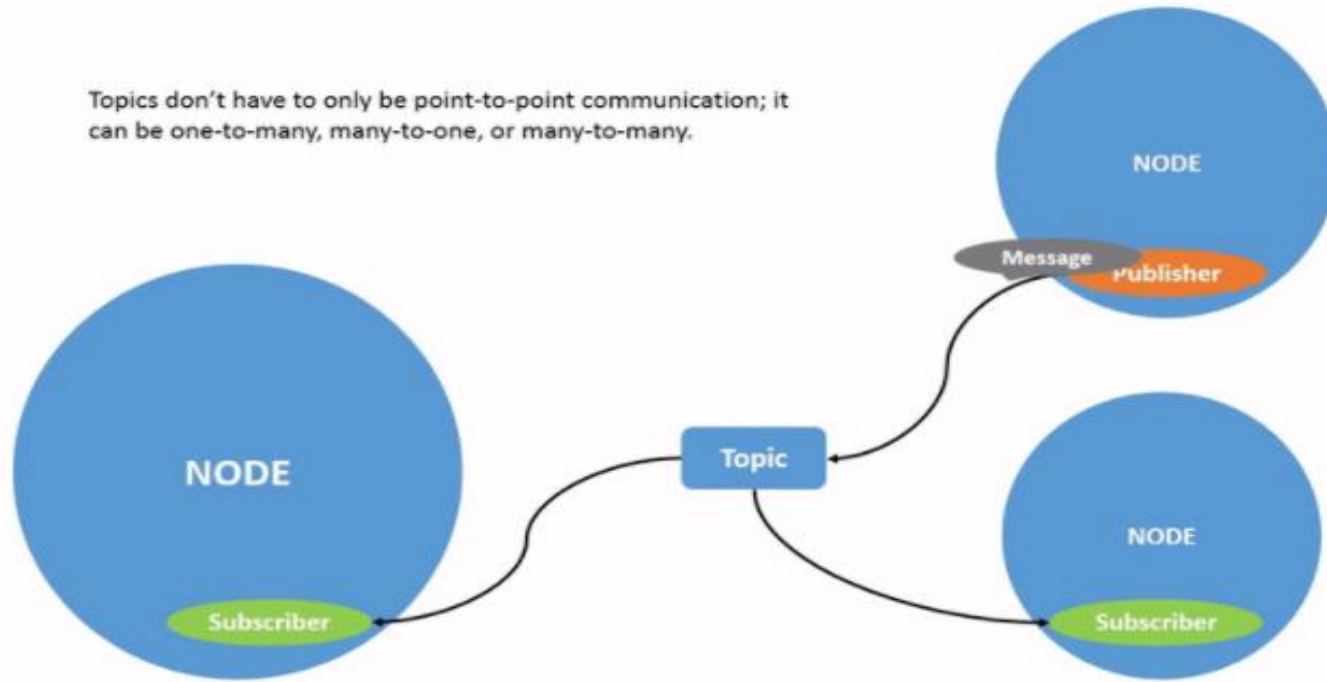
```
thonglt@thonglt-virtual-machine:~/ros2_galactic$ ros2 node list
/talker
thonglt@thonglt-virtual-machine:~/ros2_galactic$ ros2 node info talker
Unable to find node 'talker'
thonglt@thonglt-virtual-machine:~/ros2_galactic$ ros2 node info /talker
/talker
Subscribers:
  /parameter_events: rcl_interfaces/msg/ParameterEvent
Publishers:
  /chatter: std_msgs/msg/String
  /parameter_events: rcl_interfaces/msg/ParameterEvent
  /rosout: rcl_interfaces/msg/Log
Service Servers:
  /talker/describe_parameters: rcl_interfaces/srv/DescribeParameters
  /talker/get_parameter_types: rcl_interfaces/srv/GetParameterTypes
  /talker/get_parameters: rcl_interfaces/srv/GetParameters
  /talker/list_parameters: rcl_interfaces/srv/ListParameters
  /talker/set_parameters: rcl_interfaces/srv/SetParameters
  /talker/set_parameters_atomically: rcl_interfaces/srv/SetParametersAtomically
Service Clients:

Action Servers:

Action Clients:

thonglt@thonglt-virtual-machine:~/ros2_galactic$
```

Topics don't have to only be point-to-point communication; it can be one-to-many, many-to-one, or many-to-many.



# rclcpp

- `ros2 node list`
- `ros2 node info <node_name>`

# rclcpp

## How to create an example

<https://docs.ros.org/en/galactic/Tutorials/Writing-A-Simple-Cpp-Service-And-Client.html>

## installing system dependencies.

<http://wiki.ros.org/rosdep>

<http://wiki.ros.org/rosdep/Tutorials/How%20to%20add%20a%20system%20dependency>

<https://colcon.readthedocs.io/en/released/>

## ROS 2 package and packets in workpaces

<https://docs.ros.org/en/foxy/Tutorials/Creating-Your-First-ROS2-Package.html>

## Example at

<https://github.com/ros2/examples/tree/master/rclcpp>

<https://roboticsbackend.com/create-a-ros2-cpp-package/>



# colcon

- <https://colcon.readthedocs.io/en/released/user/quick-start.html>

```
$ mkdir -p /tmp/workspace/src      # Make a workspace directory with a src subdirectory
$ cd /tmp/workspace                # Change directory to the workspace root
$ <...>                           # Populate the `src` directory with packages
$ colcon list                      # List all packages in the workspace
$ colcon graph                    # List all packages in the workspace in topological order
                                # and visualize their dependencies

$ colcon build                    # Build all packages in the workspace
$ colcon test                     # Test all packages in the workspace
$ colcon test-result --all        # Enumerate all test results
$ . install/local_setup.bash      # Setup the environment to use the built packages
$ <...>                           # Use the built packages
```

# Build an example

```
thonglt@thonglt-virtual-machine:~/ros2_galactic$ ls
build  install  log  ros2.repos  src
thonglt@thonglt-virtual-machine:~/ros2_galactic$
thonglt@thonglt-virtual-machine:~/ros2_galactic$ pwd
/home/thonglt/ros2_galactic
thonglt@thonglt-virtual-machine:~/ros2_galactic$ ls
build  install  log  ros2.repos  src
thonglt@thonglt-virtual-machine:~/ros2_galactic$ ls src/
ament  eclipse-cyclonedds  eclipse-iceoryx  eProsima  osrf  ros  ros2  ros-perception
thonglt@thonglt-virtual-machine:~/ros2_galactic$
```

- <https://github.com/ros2/examples>
- Step1: cd src
- Step2:

# Build an example

**Step1:** `cd src`

**Step2:** `git clone https://github.com/ros2/examples`

**Step3:** `cd ..`

**Step4:** `colcon list | grep "examples"`

**Step5:** `colcon build --packages-select src/ros2/examples/rclcpp/services/minimal_client`

**Step6:** `ros2 run demo_nodes_cpp minimal_client`