

ROS

# Simulación con Turtlesim



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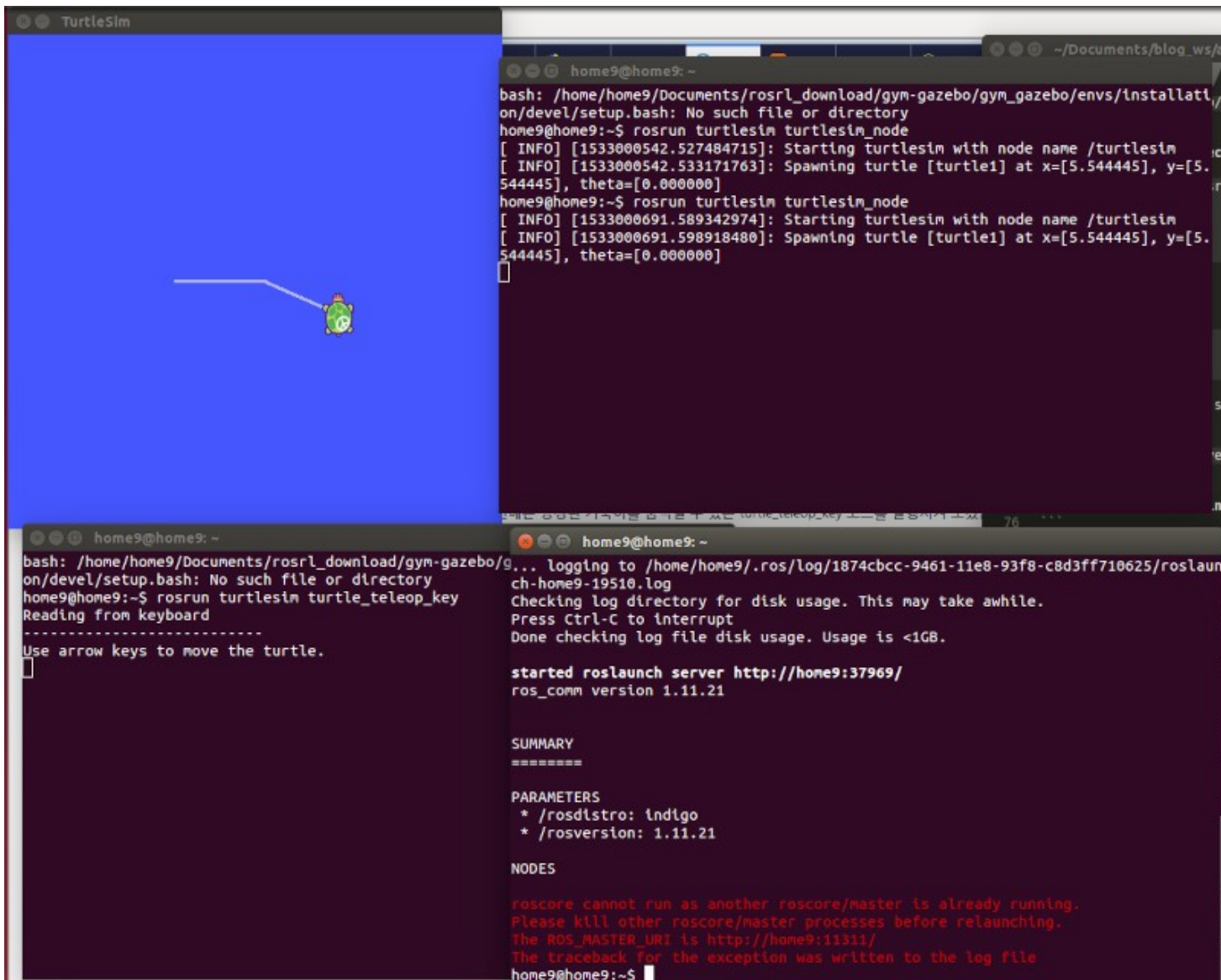
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Conceptos

# Turtlesim

- Es una aplicación de ejemplo para mostrar las características de ROS.



The image shows a screenshot of the TurtleSim application and its terminal output. The application window on the left displays a blue background with a small green turtle icon and a white line representing its trajectory. The terminal on the right shows the following output:

```
home9@home9: ~  
bash: /home/home9/Documents/rosrl_download/gym-gazebo/gym_gazebo/envs/installati  
on/devel/setup.bash: No such file or directory  
home9@home9:~$ rosrn turtlesim turtlesim_node  
[ INFO] [1533000542.527484715]: Starting turtlesim with node name /turtlesim  
[ INFO] [1533000542.533171763]: Spawning turtle [turtle1] at x=[5.544445], y=[5.  
544445], theta=[0.000000]  
home9@home9:~$ rosrn turtlesim turtlesim_node  
[ INFO] [1533000691.589342974]: Starting turtlesim with node name /turtlesim  
[ INFO] [1533000691.598918480]: Spawning turtle [turtle1] at x=[5.544445], y=[5.  
544445], theta=[0.000000]
```

Below this, another terminal window shows the output of the turtle teleop key command:

```
home9@home9: ~  
bash: /home/home9/Documents/rosrl_download/gym-gazebo/g... logging to /home/home9/.ros/log/1874cbcc-9461-11e8-93f8-c8d3ff710625/roslaun  
ch-home9-19510.log  
on/devel/setup.bash: No such file or directory  
home9@home9:~$ rosrn turtlesim turtle_teleop_key  
Reading from keyboard  
-----  
Use arrow keys to move the turtle.  
[
```

Finally, a third terminal window shows the output of the roslaunch command:

```
home9@home9: ~  
started roslaunch server http://home9:37969/  
ros_comm version 1.11.21  
  
SUMMARY  
-----  
  
PARAMETERS  
* /rostdistro: indigo  
* /rosversion: 1.11.21  
  
NODES  
  
roscore cannot run as another roscore/master is already running.  
Please kill other roscore/master processes before relaunching.  
The ROS_MASTER_URI is http://home9:11311/  
The traceback for the exception was written to the log file  
home9@home9:~$
```



# Instalación

# Instalación

- **sudo apt install ros-humble-turtlesim**

```
root@ubuntu:/home/rogelio# sudo apt install ros-humble-turtlesim
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
ros-humble-turtlesim is already the newest version (1.4.2-1jammy.20240219.090307).
0 upgraded, 0 newly installed, 0 to remove and 2 not upgraded.
root@ubuntu:/home/rogelio#
```

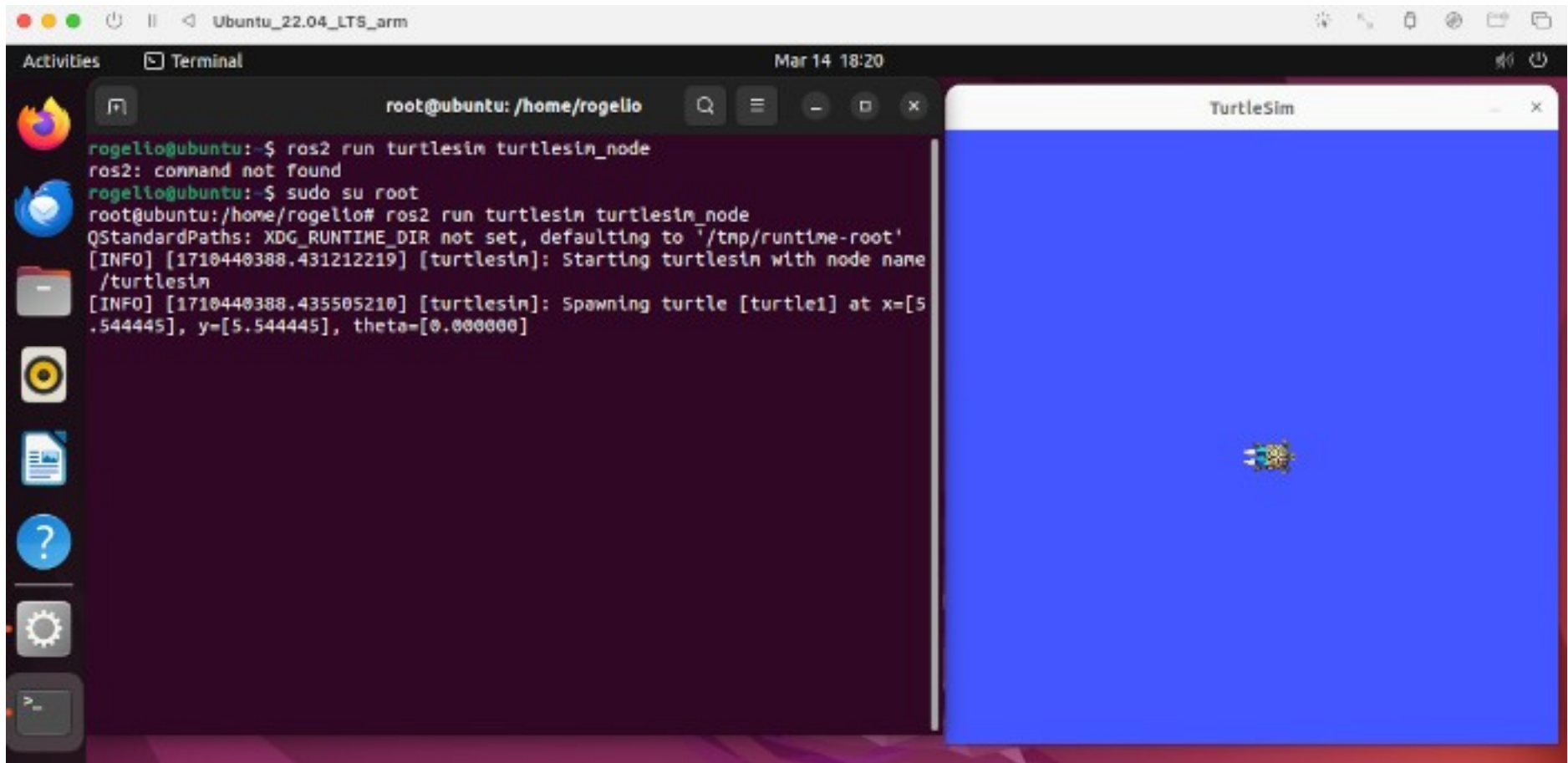
# Paquetes instalados

- **ros2 pkg executables turtlesim**

```
root@ubuntu:/home/rogerio# ros2 pkg executables turtlesim
turtlesim draw_square
turtlesim mimic
turtlesim turtle_teleop_key
turtlesim turtlesim_node
root@ubuntu:/home/rogerio#
```

# Arranque

- `ros2 run turtlesim turtlesim_node`



**Interacción**

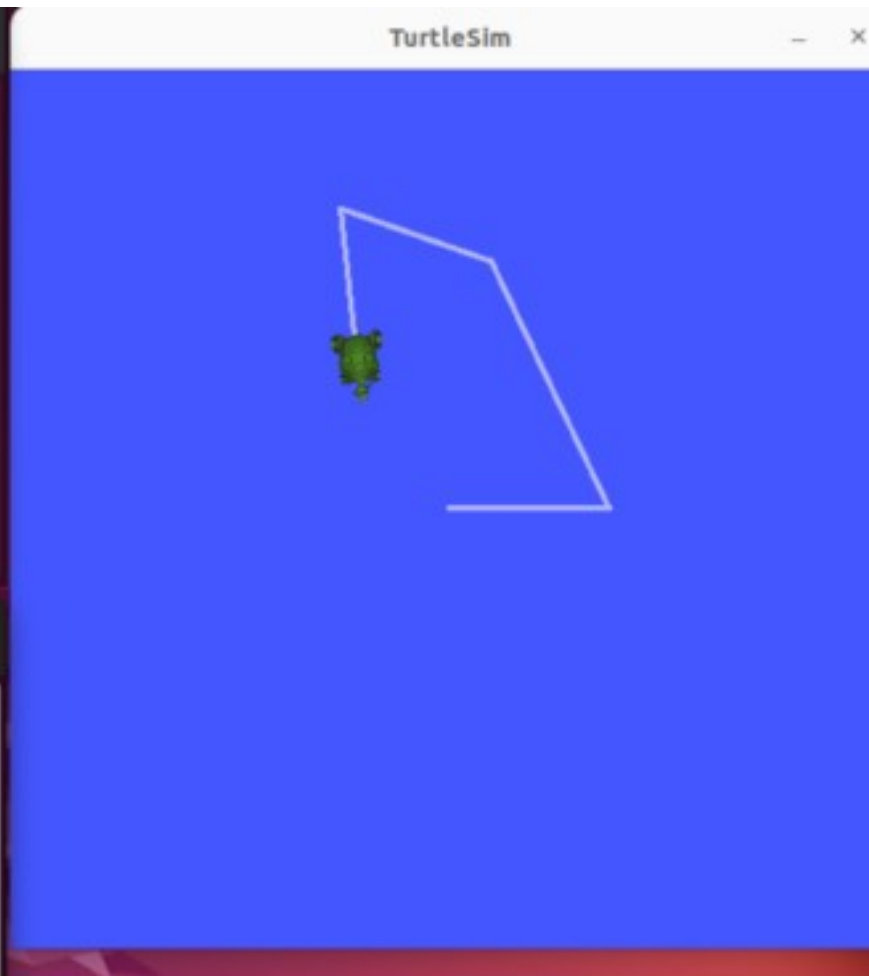


# Teleoperación

- `ros2 run turtlesim turtle_teleop_key`

```
root@ubuntu: /home/rogelio
root@ubuntu:/home/rogelio# ros2 run turtlesim turtlesim_node
QStandardPaths: XDG_RUNTIME_DIR not set, defaulting to '/tmp/runtime-root'
[INFO] [1710443005.747875612] [turtlesim]: Starting turtlesim with node name /turtlesim
[INFO] [1710443005.749624711] [turtlesim]: Spawning turtle [turtle1] at x=[5.544445], y=[5.544445], theta=[0.000000]
□

root@ubuntu: /home/rogelio
root@ubuntu:/home/rogelio# ros2 run turtlesim turtle_teleop_key
Reading from keyboard
-----
Use arrow keys to move the turtle.
Use G|B|V|C|D|E|R|T keys to rotate to absolute orientations. 'F' to cancel a rotation.
'Q' to quit.
```



# Nodos en ejecución:

- **ros2 node list**

```
root@ubuntu:/home/rogelio# ros2 node list
/teleop_turtle
/turtlesim
root@ubuntu:/home/rogelio#
```

# Parámetros asociados:

- **ros2 topic list**

```
root@ubuntu:/home/rogelio# ros2 topic list
/parameter_events
/rosout
/turtle1/cmd_vel
/turtle1/color_sensor
/turtle1/pose
root@ubuntu:/home/rogelio#
```

# Servicios:

- **ros2 service list**

```
root@ubuntu:/home/rogelio# ros2 service list
/clear
/kill
/reset
/spawn
/teleop_turtle/describe_parameters
/teleop_turtle/get_parameter_types
/teleop_turtle/get_parameters
/teleop_turtle/list_parameters
/teleop_turtle/set_parameters
/teleop_turtle/set_parameters_atomically
/turtle1/set_pen
/turtle1/teleport_absolute
/turtle1/teleport_relative
/turtlesim/describe_parameters
/turtlesim/get_parameter_types
/turtlesim/get_parameters
/turtlesim/list_parameters
/turtlesim/set_parameters
/turtlesim/set_parameters_atomically
root@ubuntu:/home/rogelio#
```

# Acciones:

- **ros2 action list**

```
root@ubuntu:/home/rogelio# ros2 action list
/turtle1/rotate_absolute
root@ubuntu:/home/rogelio#
```

# Ejecución de órdenes:

- Dibujar un círculo:
- `ros2 topic pub /turtle1/cmd_vel geometry_msgs/msg/Twist "linear:  
x: 2.0  
y: 0.0  
z: 0.0  
angular:  
x: 0.0  
y: 0.0  
z: 1.8"`

```
root@ubuntu:/home/rogerio# ros2 topic pub /turtle1/cmd_vel geometry_msgs/msg/  
Twist "linear:  
x: 2.0  
y: 0.0  
z: 0.0  
angular:  
x: 0.0  
y: 0.0  
z: 1.8"
```

# Ejecución de órdenes:

- Dibujar un círculo

```
[INFO] [1710444425.704094289] [turtlesim]: Spawning turtle [turtle1] at x=[5.544445], y=[5.544445], theta=[0.000000]
root@ubuntu:/home/rogelio# ros2 run turtlesim turtlesim_node
QStandardPaths: XDG_RUNTIME_DIR not set, defaulting to '/tmp/runtime-root'
[INFO] [1710444515.122268893] [turtlesim]: Starting turtlesim with node name /turtlesim
[INFO] [1710444515.124144078] [turtlesim]: Spawning turtle [turtle1] at x=[5.544445], y=[5.544445], theta=[0.000000]
```

```
root@ubuntu:/home/rogelio# ros2 topic pub /turtle1/cmd_vel geometry_msgs/msg/Twist "linear:
  x: 2.0
  y: 0.0
  z: 0.0
angular:
  x: 0.0
  y: 0.0
  z: 1.8"
2024-03-14 19:29:14.946 [RTSP_TRANSPORT_SHM Error] Failed init_port fastrtps_
port7417: open_and_lock_file failed -> Function open_port_internal
publisher: beginning loop
publishing #1: geometry_msgs.msg.Twist(linear=geometry_msgs.msg.Vector3(x=2.0
, y=0.0, z=0.0), angular=geometry_msgs.msg.Vector3(x=0.0, y=0.0, z=1.8))
publishing #2: geometry_msgs.msg.Twist(linear=geometry_msgs.msg.Vector3(x=2.0
, y=0.0, z=0.0), angular=geometry_msgs.msg.Vector3(x=0.0, y=0.0, z=1.8))
publishing #3: geometry_msgs.msg.Twist(linear=geometry_msgs.msg.Vector3(x=2.0
, y=0.0, z=0.0), angular=geometry_msgs.msg.Vector3(x=0.0, y=0.0, z=1.8))
publishing #4: geometry_msgs.msg.Twist(linear=geometry_msgs.msg.Vector3(x=2.0
, y=0.0, z=0.0), angular=geometry_msgs.msg.Vector3(x=0.0, y=0.0, z=1.8))
```



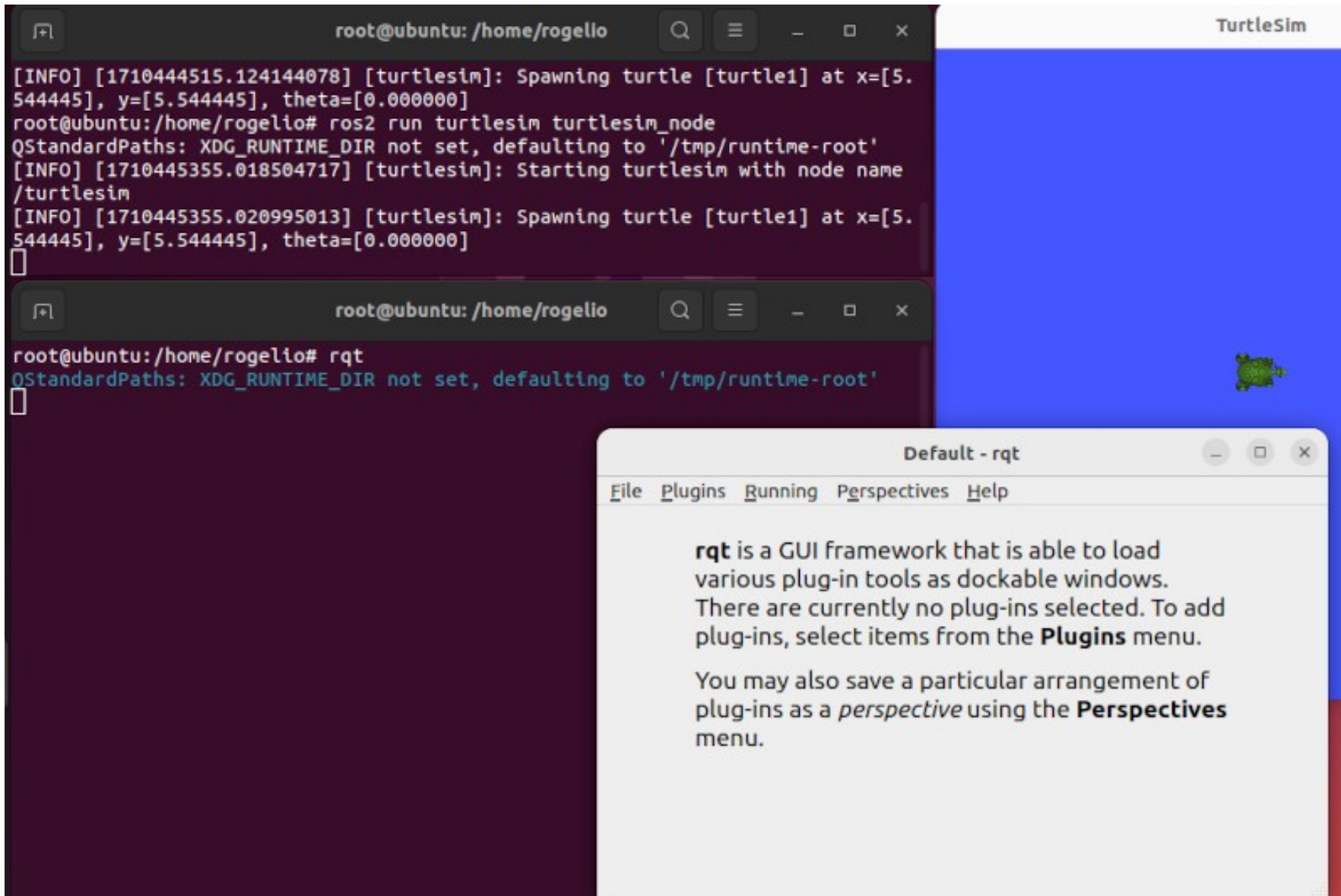
# Instalar “rqt”:

- `sudo apt install ~nros-humble-rqt*`



# Ejecutar “rqt”:

- rqt



```
root@ubuntu: /home/rogelio
[INFO] [1710444515.124144078] [turtlesim]: Spawning turtle [turtle1] at x=[5.544445], y=[5.544445], theta=[0.000000]
root@ubuntu:/home/rogelio# ros2 run turtlesim turtlesim_node
QStandardPaths: XDG_RUNTIME_DIR not set, defaulting to '/tmp/runtime-root'
[INFO] [1710445355.018504717] [turtlesim]: Starting turtlesim with node name /turtlesim
[INFO] [1710445355.020995013] [turtlesim]: Spawning turtle [turtle1] at x=[5.544445], y=[5.544445], theta=[0.000000]

```

TurtleSim

```
root@ubuntu:/home/rogelio# rqt
QStandardPaths: XDG_RUNTIME_DIR not set, defaulting to '/tmp/runtime-root'

```

Default - rqt

File Plugins Running Perspectives Help

**rqt** is a GUI framework that is able to load various plug-in tools as dockable windows. There are currently no plug-ins selected. To add plug-ins, select items from the **Plugins** menu.

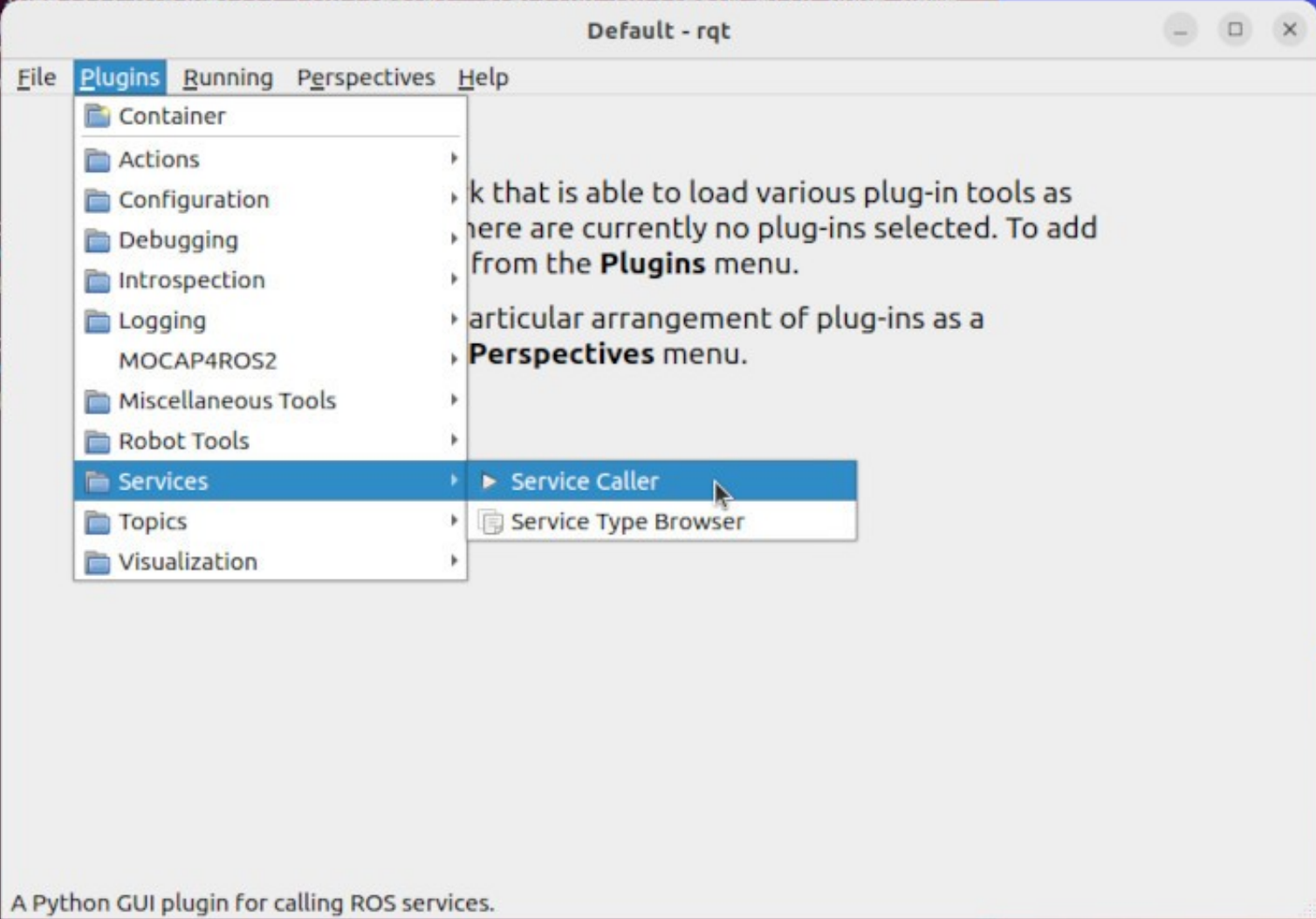
You may also save a particular arrangement of plug-ins as a *perspective* using the **Perspectives** menu.



# rqt:

- **Seleccionar Plugins > Services > Service Caller**

```
[INFO] [1710444515.124144078] [turtlesim]: Spawning turtle [turtle1] at x=[5.544445], y=[5.544445], theta=[0.000000]
root@ubuntu:/home/rogelio# ros2 run turtlesim turtlesim_node
QStandardPaths: XDG_RUNTIME_DIR not set, defaulting to '/tmp/runtime-root'
[INFO] [1710445355.018504717] [turtlesim]: Starting turtlesim with node name /turtlesim
[INFO] [1710445355.018504717] [turtlesim]: Starting turtlesim with node name /turtlesim
```



The screenshot shows the rqt GUI window titled "Default - rqt". The "Plugins" menu is open, displaying a list of categories: Container, Actions, Configuration, Debugging, Introspection, Logging, MOCAP4ROS2, Miscellaneous Tools, Robot Tools, Services, Topics, and Visualization. The "Services" category is selected, and its sub-menu is visible, showing "Service Caller" and "Service Type Browser". The "Service Caller" option is highlighted by the mouse cursor. The background shows a terminal window with ROS2 output.

A Python GUI plugin for calling ROS services.



# rqt:

- Pantalla:

The image shows a terminal window in the background with the following text:

```
root@ubuntu: /home/rogello
[INFO] [1710444515.124144078] [turtlesim]: Spawning turtle [turtle1] at x=[5.544445], y=[5.544445], theta=[0.000000]
root@ubuntu: /home/rogello# ros2 run turtlesim turtlesim_node
QStandardPaths: XDG_RUNTIME_DIR not set, defaulting to '/tmp/runtime-root'
[INFO] [1710445355.018504717] [turtlesim]: Starting turtlesim with node name /turtlesim
[INFO] [1710445355.018504717] [turtlesim]: Starting turtlesim with node name /turtlesim
[INFO] [1710445355.018504717] [turtlesim]: Starting turtlesim with node name /turtlesim
```

In the foreground, there is an rqt window titled "Default - rqt". The "Service Caller" tab is active, showing the following details:

- Service: /clear
- Request table:

Topic	Type	Expression
/clear	std_srvs/srv/Empty	
- Response table:

Field	Type	Value
-------	------	-------



# Modelado:

- Ejecutar en terminal: `rqt_graph`

# Ejecución y Modelado:

The image displays a ROS2 environment with three terminal windows and a TurtleSim simulation window.

**Terminal 1:** Shows the execution of `ros2 run turtlesim turtlesim_node`. The output includes:  
QStandardPaths: XDG\_RUNTIME\_DIR not set, defaulting to '/tmp/runtime-root'  
[INFO] [1710526653.863343075] [turtlesim]: Starting turtlesim with node name /turtlesim  
[INFO] [1710526653.867908609] [turtlesim]: Spawning turtle [turtle1] at x=[5.544445], y=[5.544445], theta=[0.000000]

**Terminal 2:** Shows the execution of `rqt_graph`. The output includes:  
QStandardPaths: XDG\_RUNTIME\_DIR not set, defaulting to '/tmp/runtime-root'  
y=0.0, z=0.0), angular=geometry\_msgs.msg.Vector3(x=0.0, y=0.0, z=1.8))  
publishing #120: geometry\_msgs.msg.Twist(linear=geometry\_msgs.msg.Vector3(x=2.0, y=0.0, z=0.0), angular=geometry\_msgs.msg.Vector3(x=0.0, y=0.0, z=1.8))

**Terminal 3:** Shows the execution of `rqt_graph`. The output includes:  
QStandardPaths: XDG\_RUNTIME\_DIR not set, defaulting to '/tmp/runtime-root'

**TurtleSim Window:** Displays a green turtle on a blue background, moving in a circular path.

**rqt\_graph\_RosGraph - rqt Window:** Shows a Node Graph with the following structure:

```
graph LR; /turtle1[ /turtle1 ] --> /turtle1/cmd_vel[ /turtle1/cmd_vel ]; /turtle1/cmd_vel --> /turtlesim([ /turtlesim ])
```

The graph shows a node `/turtle1` containing a sub-node `/turtle1/cmd_vel`, which is connected to the `/turtlesim` node.



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