ROS2:
[Humble Hawksbill]

Installation:
https://docs.ros.org/en/humble/Installation.html
Needs Ubuntu-22.04

1. add the ROS 2 apt repository to your system.

   First ensure that the Ubuntu Universe repository is enabled.

   ```
   sudo apt install software-properties-common
   sudo add-apt-repository universe
   ```

2. Now add the ROS 2 GPG key with apt

   ```
   sudo curl -sSL https://raw.githubusercontent.com/ros/rosdistro/master/ros.key -o /usr/share/keyrings/ros-archive-keyring.gpg
   ```

3. Then add the repository to your sources list.

```
echo "deb [arch=$(dpkg --print-architecture) signed-by=/usr/share/keyrings/ros-archive-keyring.gpg] http://packages.ros.org/ros2/ubuntu $(. /etc/os-release && echo $UBUNTU_CODENAME) main" | sudo tee /etc/apt/sources.list.d/ros2.list > /dev/null
```

4. Ros Update

```
sudo apt update
sudo apt upgrade
```

5. INstall ros desktop (with GUI)

```
sudo apt install ros-iron-desktop
```

6. Setup env

```
# Replace ".bash" with your shell if you're not using bash
# Possible values are: setup.bash, setup.sh, setup.zsh
source /opt/ros/iron/setup.bash
```

7. Uninstall

   If you need to uninstall ROS 2 or switch to a source-based install once you have already installed from binaries, run the following command:

```
sudo apt remove ~nros-iron-* && sudo apt autoremove
```

   You may also want to remove the repository:

```
sudo rm /etc/apt/sources.list.d/ros2.list
sudo apt update
sudo apt autoremove
# Consider upgrading for packages previously shadowed.
sudo apt upgrade
```

Configuring env:
https://docs.ros.org/en/iron/Tutorials/Beginner-CLI-Tools/Configuring-ROS2-Environment.html#configuring-environment

Replace ".bash" with your shell if you're not using bash
Possible values are: setup.bash, setup.sh, setup.zsh

```
source /opt/ros/iron/setup.bash
echo "source /opt/ros/iron/setup.bash" >> ~/.bashrc
```

Check:

```
printenv | grep -i ROS
```

You should see:
ROS_VERSION=2
ROS_PYTHON_VERSION=3
ROS_DISTRO=iron

Turtlesim installation

```
sudo apt update

sudo apt install ros-iron-turtlesim
```

Check installation

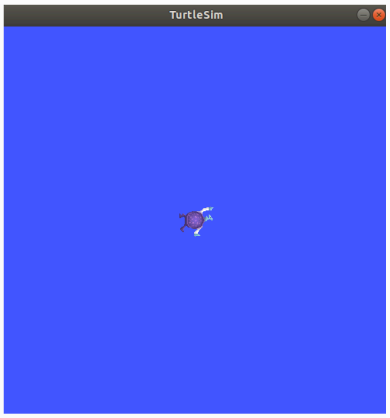
```
ros2 pkg executables turtlesim
```

Should return

```
turtlesim draw_square
turtlesim mimic
turtlesim turtle_teleop_key
turtlesim turtlesim_node
```

Start turtlesim:

```
ros2 run turtlesim turtlesim_node
```

Opens	In termial:
	[INFO] [turtlesim]: Starting turtlesim with node name /turtlesim [INFO] [turtlesim]: Spawning turtle [turtle1] at x=[5.544445], y=[5.544445], theta=[0.000000]

Close everything!!

Control the turtle using keyboard:

In 1st terminal, open turtlesim

```
ros2 run turtlesim turtlesim_node
```

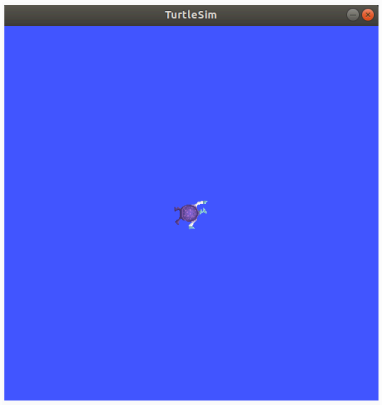
In 2nd terminal,

```
ros2 run turtlesim turtle_teleop_key
```

Outputs:

```
kali@LAPTOP-256480PU:/mnt/c/Users/Hanish$ ros2 run turtlesim turtlesim_node
QStandardPaths: wrong permissions on runtime directory /run/user/1000/, 0755 instead of 0700
[INFO] [1711995852.904207256] [turtlesim]: Starting turtlesim with node name /turtlesim
[INFO] [1711995852.911798939] [turtlesim]: Spawning turtle [turtle1] at x=[5.544445], y=[5.544445], theta=[0.000000]
```

```
kali@LAPTOP-256480PU:/mnt/c/Users/Hanish$ 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.
```



Useful commands:

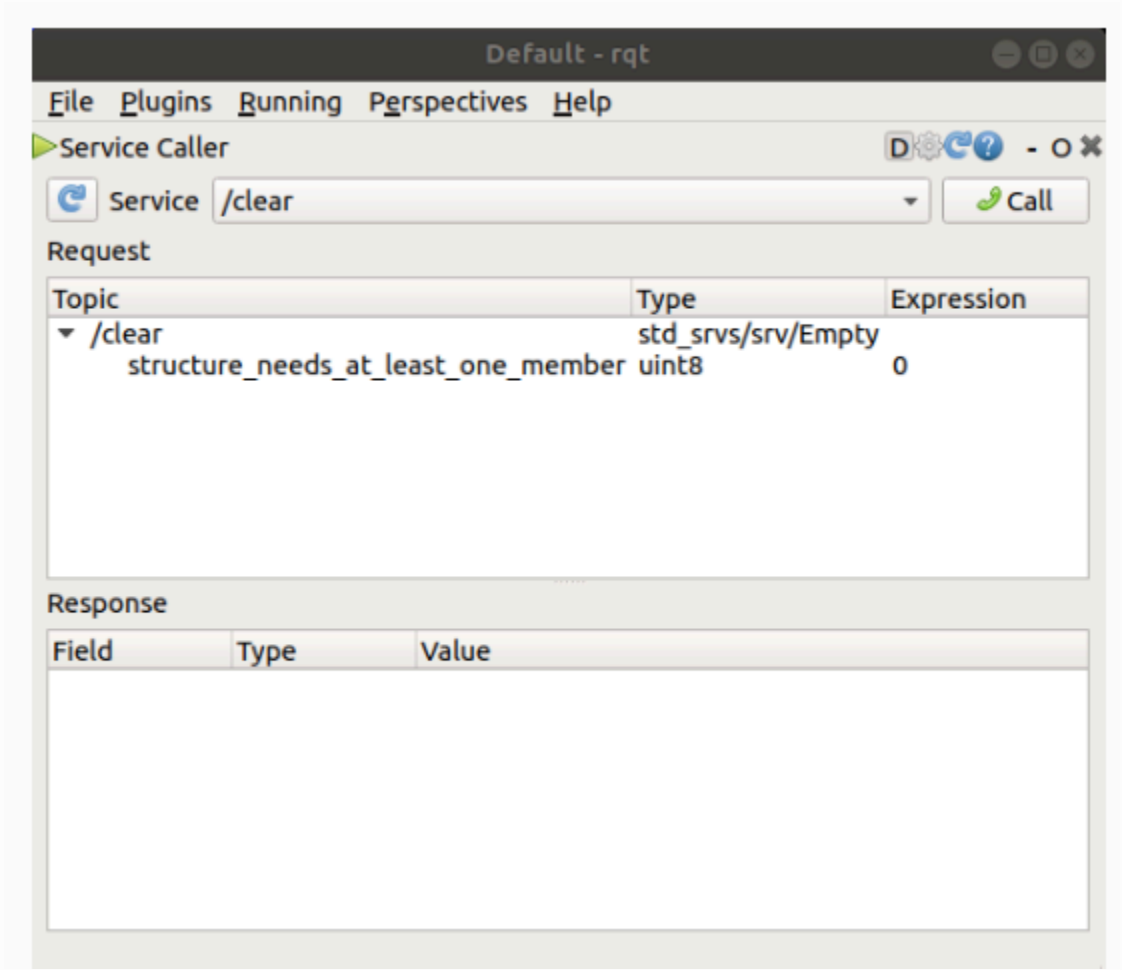
```
ros2 node list
ros2 topic list
ros2 service list
ros2 action list
```

RQT
Installation:

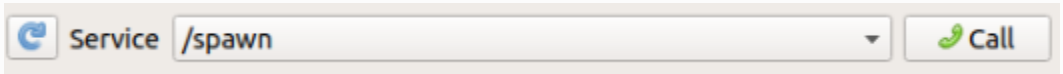
```
sudo apt update

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

Run rqt

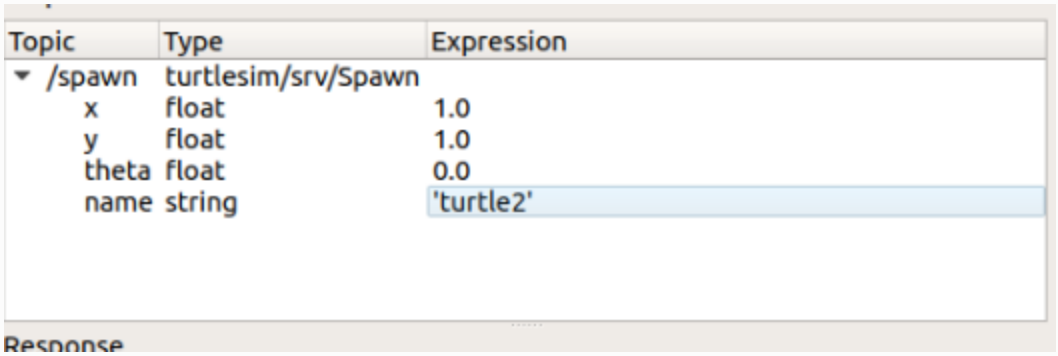
```
rqt
```



Example:
/spawn service



Rename ‘name’



To spawn `turtle2`, you then need to call the service by clicking the **Call**

Refresh the service list in rqt, you will also see that now there are services related to the new turtle, /turtle2/..., in addition to /turtle1/....

Remapping:

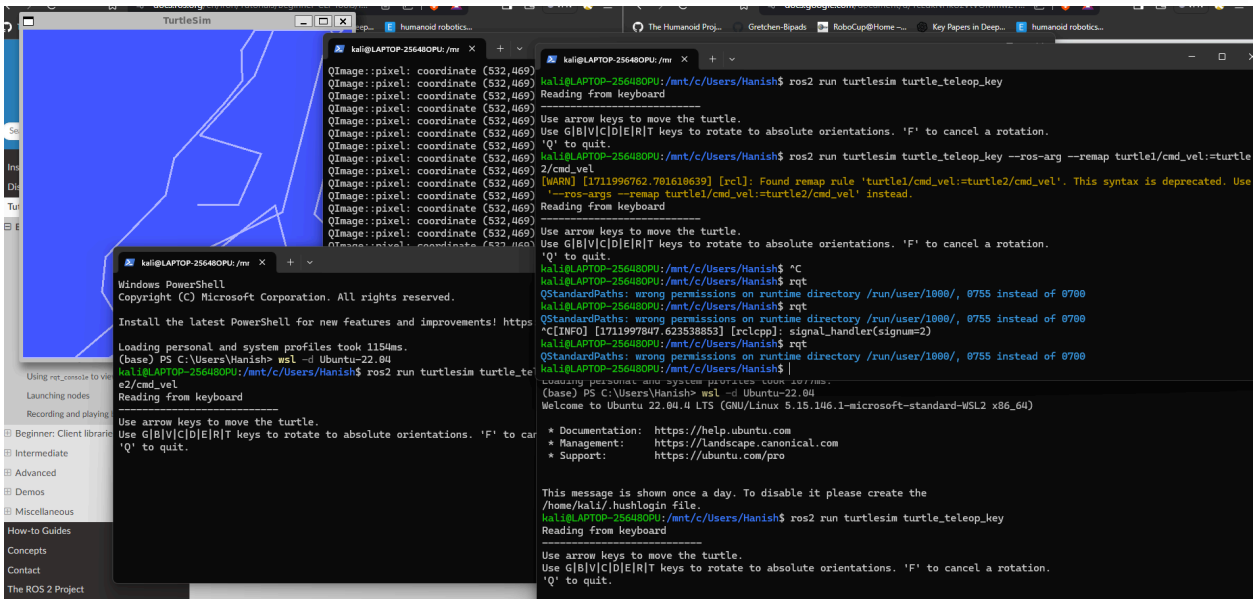
Creating (or rather copying) teleop node from `turtle1` in order to control `turtle2`

`remapping the cmd_vel topic.`

```
ros2 run turtlesim turtle_teleop_key --ros-args --remap turtle1/cmd_vel:=turtle2/cmd_vel
```

Now, you can move `turtle2` when this terminal is active, and `turtle1` when the other terminal running `turtle_teleop_key` is active.

Example desktop structure:)



‘Ctrl + c’ to exit