Step 1 – Create Your ROS 2 Workspace

```
# Go to your home directory
cd ~

# Create a new directory called ros2_ws
mkdir -p ~/ros2_ws/src
```

Step 2 – Build the Empty Workspace

Even if src is empty, build it once to initialize the environment.

```
cd ~/ros2_ws
colcon build
```

You should see:

```
Starting >>> (empty)
Summary: 0 packages finished
```

Now **source** the setup file to make ROS 2 aware of your workspace:

```
source install/setup.bash
```

💡 *You must source this file every time you open a new terminal.*

To make it automatic, add this line to your ~/.bashrc:

```
echo "source ~/ros2_ws/install/setup.bash" >> ~/.bashrc
```

Step 3 – Create Your First ROS 2 Package

Now let's create a new package named **my_py_pkg** (Python package).

```
cd ~/ros2_ws/src
ros2 pkg create --build-type ament_python my_py_pkg
```

You should see:

```
Created package 'my_py_pkg'
```

📂 Package structure:

```
my_py_pkg/
 ├── package.xml
 ├── setup.py
 ├── my_py_pkg/
 │    └── __init__.py
 └── resource/
```

Step 4 – Create the Talker (Publisher Node)

Create the file:

```
cd ~/ros2_ws/src/my_py_pkg/my_py_pkg
nano talker.py
```

Code:

```
import rclpy
from rclpy.node import Node
from std_msgs.msg import String

class Talker(Node):
    def __init__(self):
        super().__init__('talker')
        self.publisher_ = self.create_publisher(String, 'chatter', 10)
        timer_period = 0.5  # seconds
        self.timer = self.create_timer(timer_period,
self.timer_callback)
        self.i = 0

    def timer_callback(self):
        msg = String()
        msg.data = f'Hello ROS 2 World: {self.i}'
```

```
        self.publisher_.publish(msg)
        self.get_logger().info(f'Publishing: "{msg.data}"')
        self.i += 1

def main(args=None):
    rclpy.init(args=args)
    node = Talker()
    rclpy.spin(node)
    node.destroy_node()
    rclpy.shutdown()

if __name__ == '__main__':
    main()
```

Step 5 – Create the Listener (Subscriber Node)

nano listener.py

Paste this code:

```
import rclpy
from rclpy.node import Node
from std_msgs.msg import String

class Listener(Node):
    def __init__(self):
        super().__init__('listener')
        self.subscription = self.create_subscription(
            String,
            'chatter',
            self.listener_callback,
            10)
        self.subscription  # prevent unused variable warning

    def listener_callback(self, msg):
        self.get_logger().info(f'I heard: "{msg.data}"')

def main(args=None):
```

```
    rclpy.init(args=args)
    node = Listener()
    rclpy.spin(node)
    node.destroy_node()
    rclpy.shutdown()

if __name__ == '__main__':
    main()
```

Step 6 – Register the Nodes in setup.py

Open setup.py:

```
nano ~/ros2_ws/src/my_py_pkg/setup.py
```

Find the section with entry_points and replace it with:

```
entry_points={
    'console_scripts': [
        'talker = my_py_pkg.talker:main',
        'listener = my_py_pkg.listener:main',
    ],
},
```

Save and close the file.

Step 7 – Build the Package

Go back to your workspace and build:

```
cd ~/ros2_ws
colcon build
```

Source the workspace:

```
source install/setup.bash
```

Step 8 – Run the Talker & Listener

In **Terminal 1**:

```
ros2 run my_py_pkg talker
```

You should see:

```
[INFO] Publishing: "Hello ROS 2 World: 0"
[INFO] Publishing: "Hello ROS 2 World: 1"
```

In **Terminal 2** (open a new one and source again):

```
source ~/ros2_ws/install/setup.bash
ros2 run my_py_pkg listener
```

You should see:

```
[INFO] I heard: "Hello ROS 2 World: 0"
[INFO] I heard: "Hello ROS 2 World: 1"
```