

Task2:

```
yahboom@VM:~/roscourse_ws$ colcon build --symlink-install
[0.368s] WARNING:colcon.colcon_core.package_identification:Failed to parse ROS package manifest in 'src/webcam': Error(s) in
package 'src/webcam/package.xml':
Invalid email "'mr_vincent_hu@163.com'" for person "yahboom"
Starting >>> webcam
Finished <<< webcam [1.51s]

Summary: 1 package finished [2.14s]
```

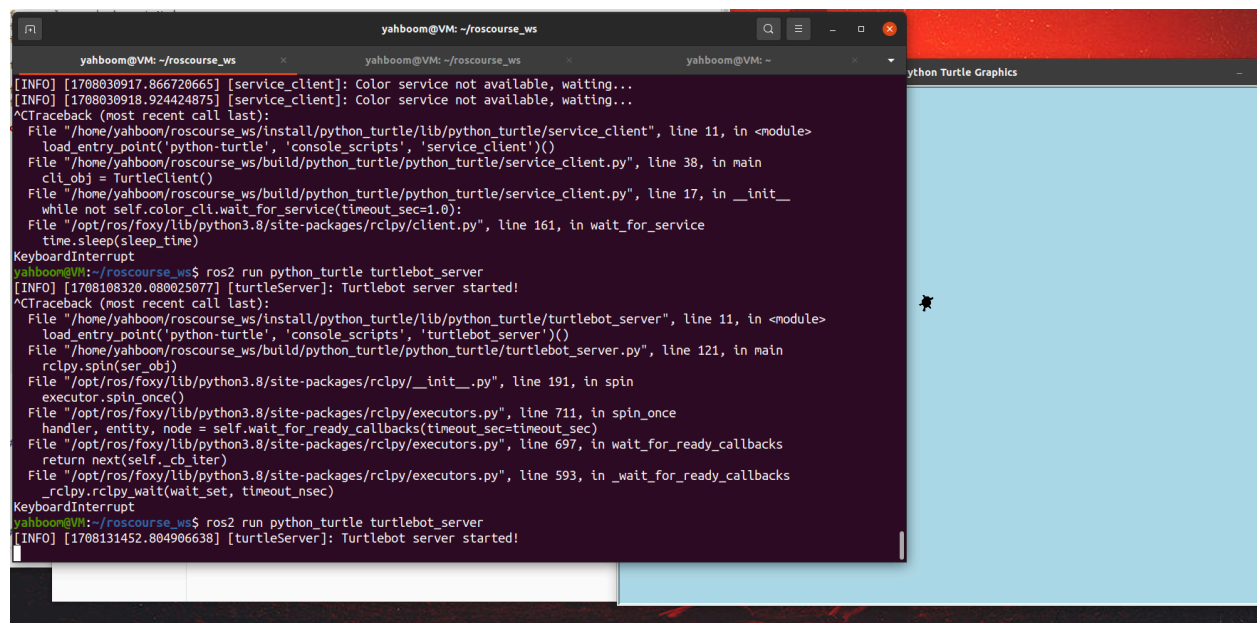
Task3:

```
yahboom@VM:~/roscourse_ws$ source ./install/setup.bash
yahboom@VM:~/roscourse_ws$ ros2 interface show turtle_interfaces/msg/TurtleMsg
string name
geometry_msgs/Pose turtle_pose
string color
yahboom@VM:~/roscourse_ws$ ros2 interface show turtle_interfaces/srv/SetPose
geometry_msgs/PoseStamped turtle_pose
---
int8 ret
yahboom@VM:~/roscourse_ws$ ros2 interface show turtle_interfaces/srv/SetColor
string color
---
int8 ret
```

Task4:

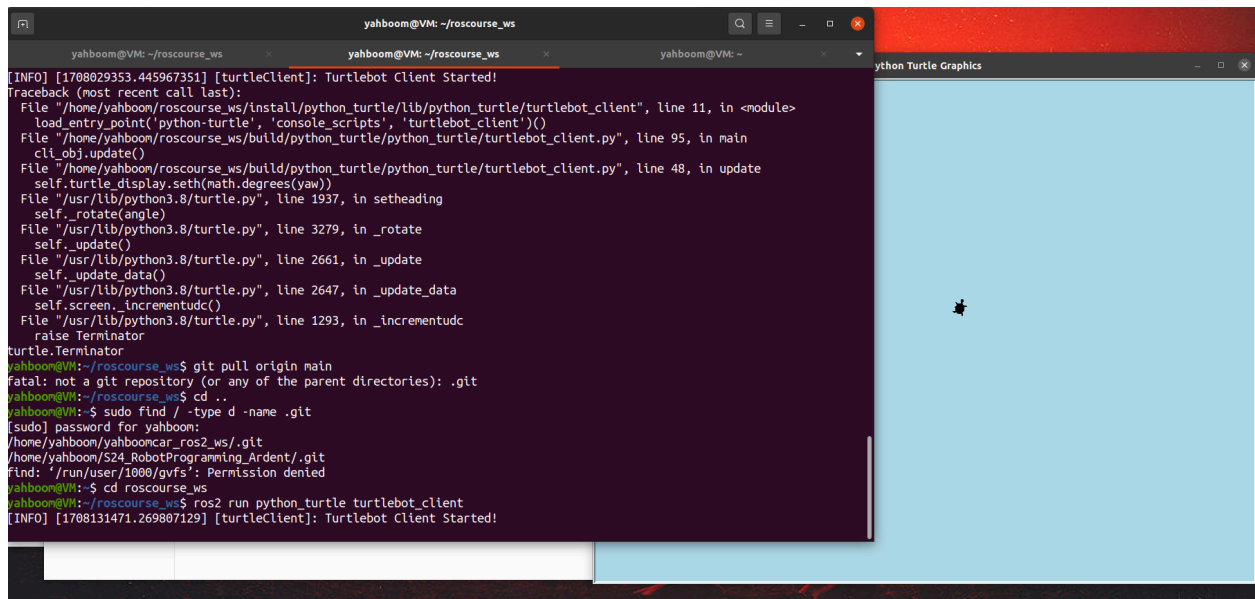
Step 7:

server:



```
yahboom@VM:~/roscourse_ws$ ros2 run python_turtle turtlebot_server
[INFO] [1708030917.866720665] [service_client]: Color service not available, waiting...
[INFO] [1708030918.924424875] [service_client]: Color service not available, waiting...
^CTraceback (most recent call last):
  File "/home/yahboom/roscourse_ws/install/python_turtle/lib/python_turtle/service_client", line 11, in <module>
    load_entry_point('python-turtle', 'console_scripts', 'service_client')()
  File "/home/yahboom/roscourse_ws/build/python_turtle/python_turtle/service_client.py", line 38, in main
    cli_obj = TurtleClient()
  File "/home/yahboom/roscourse_ws/build/python_turtle/python_turtle/service_client.py", line 17, in __init__
    while not self.color_cli.wait_for_service(timeout_sec=1.0):
  File "/opt/ros/foxy/lib/python3.8/site-packages/rclpy/client.py", line 161, in wait_for_service
    time.sleep(sleep_time)
KeyboardInterrupt
yahboom@VM:~/roscourse_ws$ ros2 run python_turtle turtlebot_server
[INFO] [1708108320.080025077] [turtleServer]: Turtlebot server started!
^CTraceback (most recent call last):
  File "/home/yahboom/roscourse_ws/install/python_turtle/lib/python_turtle/turtlebot_server", line 11, in <module>
    load_entry_point('python-turtle', 'console_scripts', 'turtlebot_server')()
  File "/home/yahboom/roscourse_ws/build/python_turtle/python_turtle/turtlebot_server.py", line 121, in main
    rclpy.spin(server_obj)
  File "/opt/ros/foxy/lib/python3.8/site-packages/rclpy/__init__.py", line 191, in spin
    executor.spin_once()
  File "/opt/ros/foxy/lib/python3.8/site-packages/rclpy/executors.py", line 711, in spin_once
    handler, entity, node = self.wait_for_ready_callbacks(timeout_sec=timeout_sec)
  File "/opt/ros/foxy/lib/python3.8/site-packages/rclpy/executors.py", line 697, in wait_for_ready_callbacks
    return next(self._cb_iter)
  File "/opt/ros/foxy/lib/python3.8/site-packages/rclpy/executors.py", line 593, in _wait_for_ready_callbacks
    _rclpy_rclpy_wait(wait_set, timeout_nsec)
_rclpy_rclpy_wait(wait_set, timeout_nsec)
KeyboardInterrupt
yahboom@VM:~/roscourse_ws$ ros2 run python_turtle turtlebot_server
[INFO] [1708131452.804906638] [turtleServer]: Turtlebot server started!
```

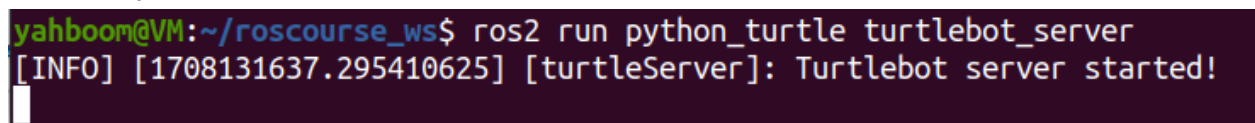
Client:



```
yahboom@VM: ~/roscourse_ws
[INFO] [1708029353.445967351] [turtleClient]: Turtlebot Client Started!
Traceback (most recent call last):
  File "/home/yahboom/roscourse_ws/install/python_turtle/lib/python_turtle/turtlebot_client", line 11, in <module>
    load_entry_point('python-turtle', 'console_scripts', 'turtlebot_client')()
  File "/home/yahboom/roscourse_ws/build/python_turtle/python_turtle/turtlebot_client.py", line 95, in main
    cli_obj.update()
  File "/home/yahboom/roscourse_ws/build/python_turtle/python_turtle/turtlebot_client.py", line 48, in update
    self.turtle.display.seth(math.degrees(yaw))
  File "/usr/lib/python3.8/turtle.py", line 1937, in setheading
    self._rotate(angle)
  File "/usr/lib/python3.8/turtle.py", line 3279, in _rotate
    self._update()
  File "/usr/lib/python3.8/turtle.py", line 2661, in _update
    self._update_data()
  File "/usr/lib/python3.8/turtle.py", line 2647, in _update_data
    self.screen._incrementtunc()
  File "/usr/lib/python3.8/turtle.py", line 1293, in _incrementtunc
    raise Terminator
turtle.Terminator
yahboom@VM:~/roscourse_ws$ git pull origin main
fatal: not a git repository (or any of the parent directories): .git
yahboom@VM:~/roscourse_ws$ cd ..
yahboom@VM:~/ $ sudo find / -type d -name .git
[sudo] password for yahboom:
/home/yahboom/yahboomcar_ros2_ws/.git
/home/yahboom/S24_RobotProgramming_Ardent/.git
find: '/run/user/1000/gvfs': Permission denied
yahboom@VM:~/ $ cd roscourse_ws
yahboom@VM:~/roscourse_ws$ ros2 run python_turtle turtlebot_client
[INFO] [1708131471.269807129] [turtleClient]: Turtlebot Client Started!
```

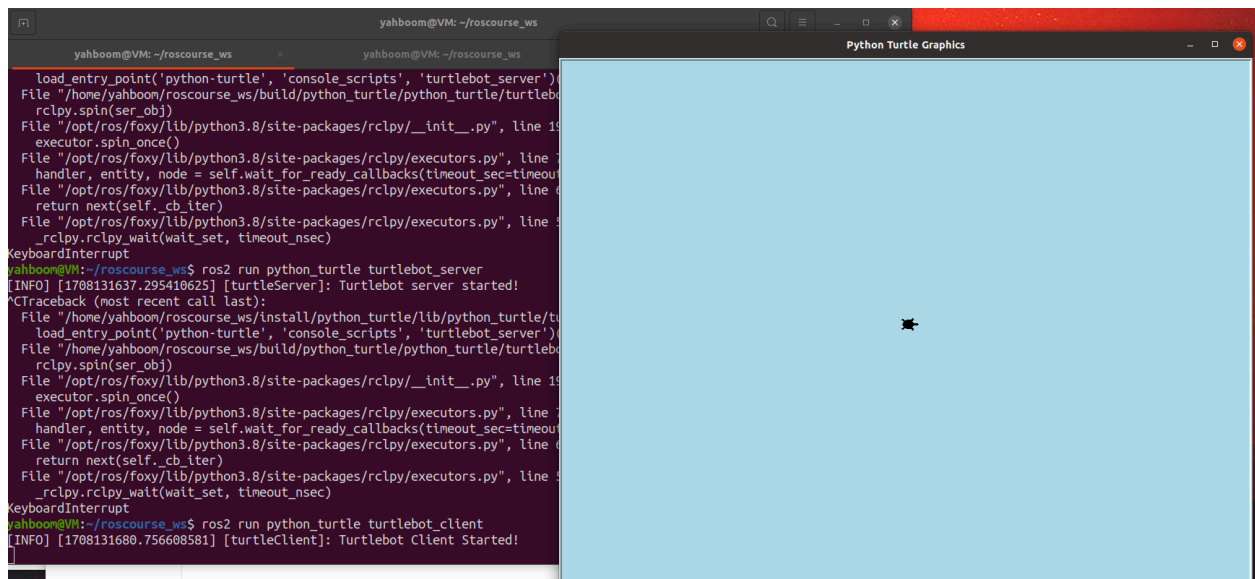
Step16:

ros2 run python_turtle turtlebot_server



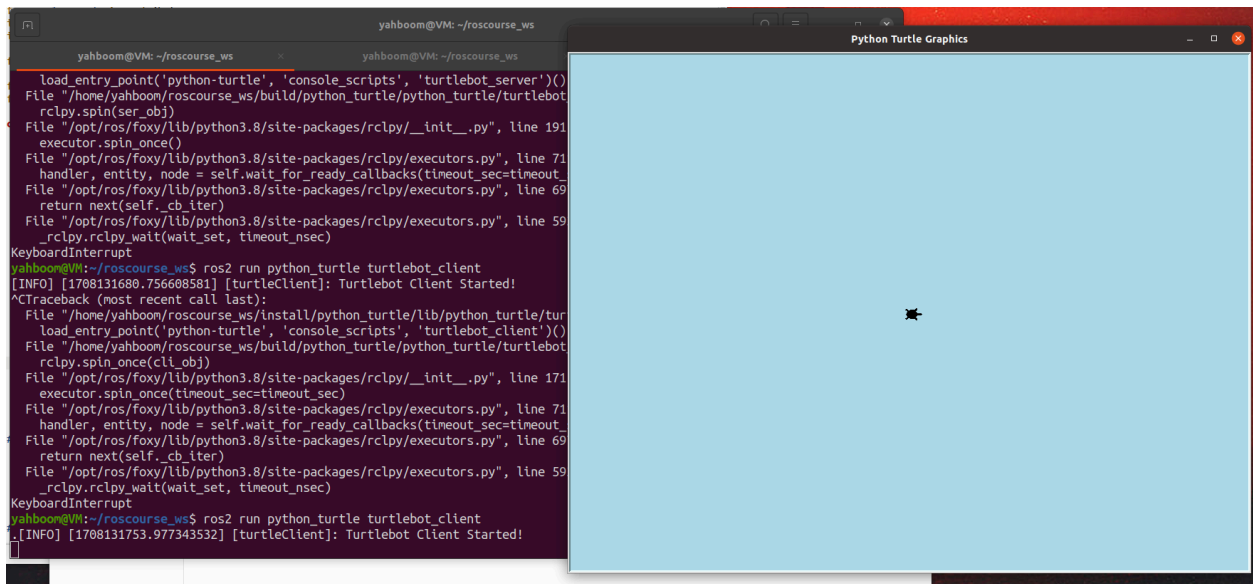
```
yahboom@VM:~/roscourse_ws$ ros2 run python_turtle turtlebot_server
[INFO] [1708131637.295410625] [turtleServer]: Turtlebot server started!
```

ros2 run python_turtle turtlebot_client



```
yahboom@VM:~/roscourse_ws
load_entry_point('python-turtle', 'console_scripts', 'turtlebot_server')
File "/home/yahboom/roscourse_ws/build/python_turtle/python_turtle/turtlebot_server.py", line 11, in <module>
    rclpy.spin(server_obj)
File "/opt/ros/foxy/lib/python3.8/site-packages/rclpy/_init_.py", line 19, in spin
    executor.spin_once()
File "/opt/ros/foxy/lib/python3.8/site-packages/rclpy/executors.py", line 77, in spin_once
    handler, entity, node = self.wait_for_ready_callbacks(timeout_sec=timeout_sec)
File "/opt/ros/foxy/lib/python3.8/site-packages/rclpy/executors.py", line 45, in wait_for_ready_callbacks
    return next(self._cb_iter)
File "/opt/ros/foxy/lib/python3.8/site-packages/rclpy/executors.py", line 45, in wait_for_ready_callbacks
    rclpy.rclpy_wait(wait_set, timeout_nsec)
KeyboardInterrupt
yahboom@VM:~/roscourse_ws$ ros2 run python_turtle turtlebot_server
[INFO] [1708131637.295410625] [turtleServer]: Turtlebot server started!
KeyboardInterrupt
yahboom@VM:~/roscourse_ws$ ros2 run python_turtle turtlebot_client
[INFO] [1708131680.756608581] [turtleClient]: Turtlebot Client Started!
```

ros2 run python_turtle service_client



The screenshot shows a terminal window on the left and a Python Turtle Graphics window on the right. The terminal window has three tabs, all titled 'yahboom@VM: ~/roscourse_ws'. The active tab shows the following text:

```
load_entry_point('python-turtle', 'console_scripts', 'turtlebot_server')()
File "/home/yahboom/roscourse_ws/build/python_turtle/python_turtle/turtlebot
rcldpy.spin_once(ser_obj)
File "/opt/ros/foxy/lib/python3.8/site-packages/rcldpy/__init__.py", line 191
executor.spin_once()
File "/opt/ros/foxy/lib/python3.8/site-packages/rcldpy/executors.py", line 71
handler, entity, node = self.wait_for_ready_callbacks(timeout_sec=timeout_
File "/opt/ros/foxy/lib/python3.8/site-packages/rcldpy/executors.py", line 69
return next(self.cb_iter)
File "/opt/ros/foxy/lib/python3.8/site-packages/rcldpy/executors.py", line 59
rcldpy.rcldpy.wait(wait_set, timeout_nsec)
KeyboardInterrupt
yahboom@VM:~/roscourse_ws$ ros2 run python_turtle turtlebot_client
[INFO] [1708131680.756608581] [turtleClient]: Turtlebot Client Started!
^C
Traceback (most recent call last):
  File "/home/yahboom/roscourse_ws/install/python_turtle/lib/python_turtle/tur
load_entry_point('python-turtle', 'console_scripts', 'turtlebot_client')()
File "/home/yahboom/roscourse_ws/build/python_turtle/python_turtle/turtlebot
rcldpy.spin_once(cli_obj)
File "/opt/ros/foxy/lib/python3.8/site-packages/rcldpy/__init__.py", line 171
executor.spin_once(timeout_sec=timeout_sec)
File "/opt/ros/foxy/lib/python3.8/site-packages/rcldpy/executors.py", line 71
handler, entity, node = self.wait_for_ready_callbacks(timeout_sec=timeout_
File "/opt/ros/foxy/lib/python3.8/site-packages/rcldpy/executors.py", line 69
return next(self.cb_iter)
File "/opt/ros/foxy/lib/python3.8/site-packages/rcldpy/executors.py", line 59
rcldpy.rcldpy.wait(wait_set, timeout_nsec)
KeyboardInterrupt
yahboom@VM:~/roscourse_ws$ ros2 run python_turtle turtlebot_client
[INFO] [1708131753.977343532] [turtleClient]: Turtlebot Client Started!
```

The Python Turtle Graphics window is titled 'Python Turtle Graphics' and shows a blank light blue canvas with a small black cursor in the center.