

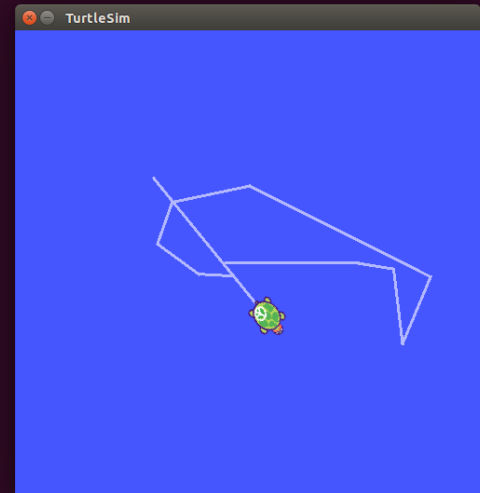
Output of Broadcaster Node shown below:

```
viki@c3po:~/catkin_ws/src/learning_tf$ roslaunch learning_tf start_demo.launch
... logging to /home/viki/.ros/log/5efd3380-ea13-11e6-be58-000c29d6a3b/roslaunch-c3po-20589.log
Checking log directory for disk usage. This may take awhile.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.

started roslaunch server http://c3po:41272/

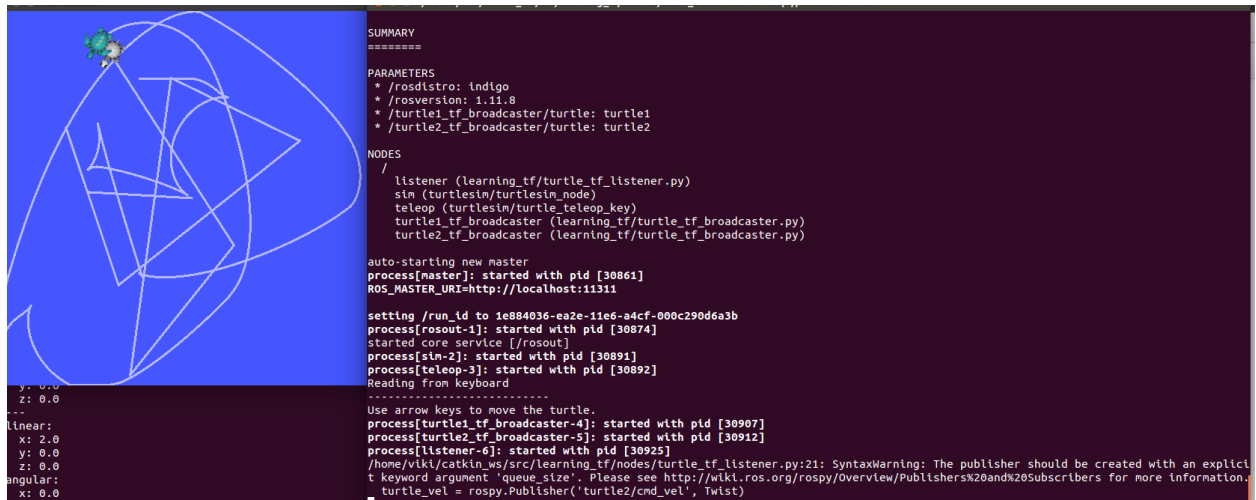
SUMMARY
  Terminal
PARAMETERS
 * /roscdistro: indigo
 * /rosversion: 1.11.8
 * /turtle1_tf_broadcaster/turtle: turtle1
 * /turtle2_tf_broadcaster/turtle: turtle2
NODES
 /
   sin (turtlesim/turtlesim_node)
   teleop (turtlesim/turtle_teleop_key)
   turtle1_tf_broadcaster (learning_tf/turtle_tf_broadcaster.py)
   turtle2_tf_broadcaster (learning_tf/turtle_tf_broadcaster.py)
auto-starting new master
process[master]: started with pid [20601]
ROS_MASTER_URI=http://localhost:11311

setting /run_id to 5efd3380-ea13-11e6-be58-000c29d6a3b
process[rosout-1]: started with pid [20614]
started core service [/rosout]
process[sin-2]: started with pid [20617]
process[teleop-3]: started with pid [20618]
process[turtle1_tf_broadcaster-4]: started with pid [20619]
Reading from keyboard
-----
Use arrow keys to move the turtle.
process[turtle2_tf_broadcaster-5]: started with pid [20646]
```



```
in RPY [0.000, -0.000, -3.010]
At time 1486128260.302
- Translation: [4.368, 9.442, 0.000]
- Rotation: in Quaternion [0.000, 0.000, 0.992, -0.130]
in RPY [0.000, -0.000, -2.882]
At time 1486128261.294
- Translation: [3.740, 8.401, 0.000]
- Rotation: in Quaternion [0.000, 0.000, 0.871, -0.492]
in RPY [0.000, -0.000, -2.114]
At time 1486128262.302
- Translation: [3.977, 7.795, 0.000]
- Rotation: in Quaternion [0.000, 0.000, -0.419, 0.908]
in RPY [0.000, -0.000, -0.866]
At time 1486128263.294
- Translation: [5.263, 6.284, 0.000]
- Rotation: in Quaternion [0.000, 0.000, -0.419, 0.908]
in RPY [0.000, -0.000, -0.866]
At time 1486128264.302
- Translation: [6.321, 5.041, 0.000]
- Rotation: in Quaternion [0.000, 0.000, -0.419, 0.908]
in RPY [0.000, -0.000, -0.866]
At time 1486128265.294
- Translation: [6.321, 5.041, 0.000]
- Rotation: in Quaternion [0.000, 0.000, -0.419, 0.908]
in RPY [0.000, -0.000, -0.866]
At time 1486128266.303
- Translation: [6.321, 5.041, 0.000]
- Rotation: in Quaternion [0.000, 0.000, -0.419, 0.908]
in RPY [0.000, -0.000, -0.866]
^CAt time 1486128266.574
- Translation: [6.321, 5.041, 0.000]
- Rotation: in Quaternion [0.000, 0.000, -0.419, 0.908]
in RPY [0.000, -0.000, -0.866]
viki@c3po:~$
```

Output of Listener:



The image shows a ROS environment with a turtle in a 2D plot and a terminal window displaying the output of a listener node. The terminal output includes the following information:

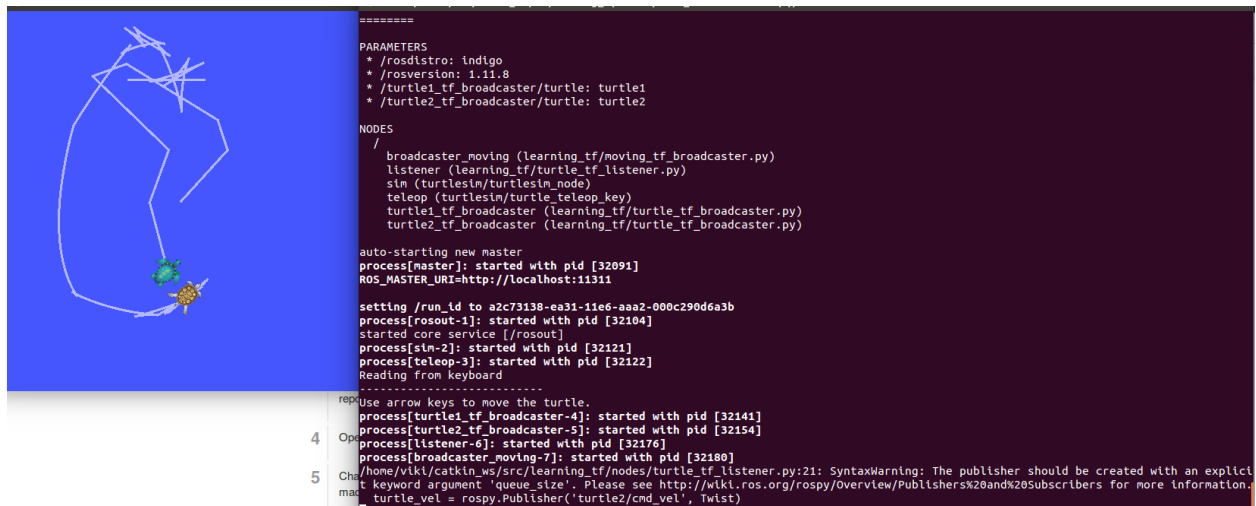
```
SUMMARY
=====
PARAMETERS
* /roslistro: indigo
* /rosversion: 1.11.8
* /turtle1_tf_broadcaster/turtle: turtle1
* /turtle2_tf_broadcaster/turtle: turtle2

NODES
/
  listener (learning_tf/turtle_tf_listener.py)
  sim (turtlesim/turtlesim_node)
  teleop (turtlesim/turtle_teleop_key)
  turtle1_tf_broadcaster (learning_tf/turtle_tf_broadcaster.py)
  turtle2_tf_broadcaster (learning_tf/turtle_tf_broadcaster.py)

auto-starting new master
process[master]: started with pid [30861]
ROS_MASTER_URI=http://localhost:11311

setting /run_id to 1e884036-ea2e-11e6-a4cf-000c290d6a3b
process[rosout-1]: started with pid [30874]
started core service [/rosout]
process[sim-2]: started with pid [30891]
process[teleop-3]: started with pid [30892]
Reading from keyboard
-----
Use arrow keys to move the turtle.
process[turtle1_tf_broadcaster-4]: started with pid [30907]
process[turtle2_tf_broadcaster-5]: started with pid [30912]
process[listener-6]: started with pid [30925]
/home/viki/catkin_ws/src/learning_tf/nodes/turtle_tf_listener.py:21: SyntaxWarning: The publisher should be created with an explicit keyword argument 'queue_size'. Please see http://wiki.ros.org/rospy/Overview/Publishers%20and%20Subscribers for more information.
  turtle_vel = rospy.Publisher('turtle2/cmd_vel', Twist)
```

Output of Moving Frame:



The image shows a ROS environment with a turtle in a 2D plot and a terminal window displaying the output of a moving frame node. The terminal output includes the following information:

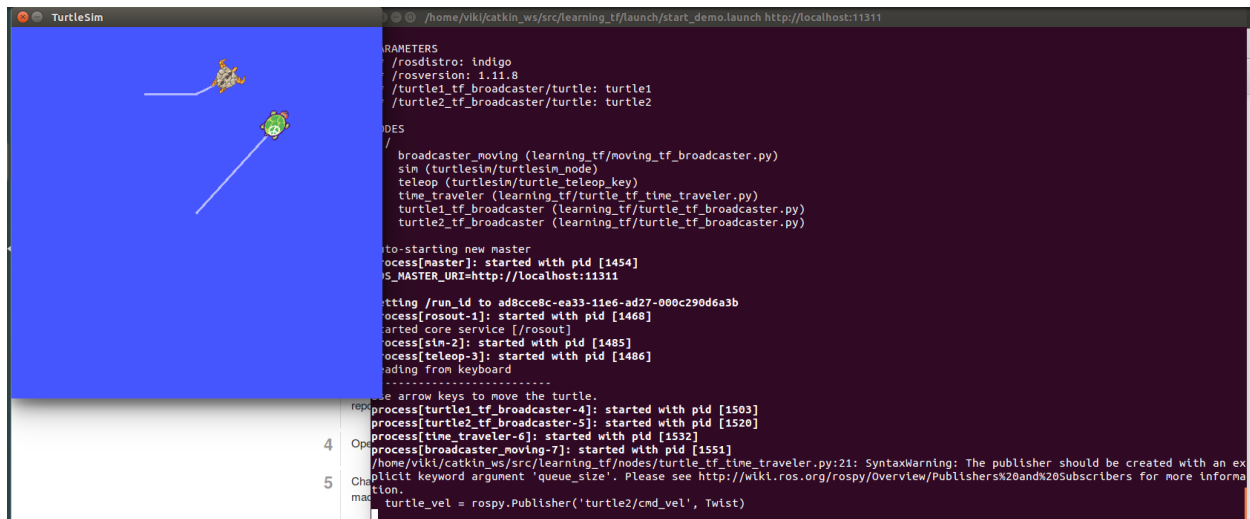
```
PARAMETERS
* /roslistro: indigo
* /rosversion: 1.11.8
* /turtle1_tf_broadcaster/turtle: turtle1
* /turtle2_tf_broadcaster/turtle: turtle2

NODES
/
  broadcaster_moving (learning_tf/moving_tf_broadcaster.py)
  listener (learning_tf/turtle_tf_listener.py)
  sim (turtlesim/turtlesim_node)
  teleop (turtlesim/turtle_teleop_key)
  turtle1_tf_broadcaster (learning_tf/turtle_tf_broadcaster.py)
  turtle2_tf_broadcaster (learning_tf/turtle_tf_broadcaster.py)

auto-starting new master
process[master]: started with pid [32091]
ROS_MASTER_URI=http://localhost:11311

setting /run_id to a2c73138-ea31-11e6-aaa2-000c290d6a3b
process[rosout-1]: started with pid [32104]
started core service [/rosout]
process[sim-2]: started with pid [32121]
process[teleop-3]: started with pid [32122]
Reading from keyboard
-----
Use arrow keys to move the turtle.
process[turtle1_tf_broadcaster-4]: started with pid [32141]
process[turtle2_tf_broadcaster-5]: started with pid [32154]
process[listener-6]: started with pid [32176]
process[broadcaster_moving-7]: started with pid [32180]
/home/viki/catkin_ws/src/learning_tf/nodes/turtle_tf_listener.py:21: SyntaxWarning: The publisher should be created with an explicit keyword argument 'queue_size'. Please see http://wiki.ros.org/rospy/Overview/Publishers%20and%20Subscribers for more information.
  turtle_vel = rospy.Publisher('turtle2/cmd_vel', Twist)
```

Output of Time-Traveler;



```
PARAMETERS
  /roscpp: indigo
  /rosversion: 1.11.8
  /turtle1_tf_broadcaster/turtle: turtle1
  /turtle2_tf_broadcaster/turtle: turtle2

NODES
  /
    broadcaster_moving (learning_tf/moving_tf_broadcaster.py)
    sim (turtlesim/turtlesim_node)
    teleop (turtlesim/turtle_teleop_key)
    time_traveler (learning_tf/turtle_tf_time_traveler.py)
    turtle1_tf_broadcaster (learning_tf/turtle_tf_broadcaster.py)
    turtle2_tf_broadcaster (learning_tf/turtle_tf_broadcaster.py)

auto-starting new master
process[master]: started with pid [1454]
ROS_MASTER_URI=http://localhost:11311

setting /run_id to ad8cce8c-ea33-11e6-ad27-000c290d6a3b
process[rosout-1]: started with pid [1468]
started core service [/rosout]
process[sim-2]: started with pid [1485]
process[teleop-3]: started with pid [1486]
reading from keyboard
-----
Use arrow keys to move the turtle.
process[turtle1_tf_broadcaster-4]: started with pid [1503]
process[turtle2_tf_broadcaster-5]: started with pid [1520]
process[time_traveler-6]: started with pid [1532]
process[broadcaster_moving-7]: started with pid [1551]
/home/viki/catkin_ws/src/learning_tf/nodes/turtle_tf_time_traveler.py:21: SyntaxWarning: The publisher should be created with an explicit keyword argument 'queue_size'. Please see http://wiki.ros.org/rospy/overview/Publishers%20and%20Subscribers for more information.
  turtle_vel = rospy.Publisher('turtle2/cmd_vel', Twist)
```

Parameter Script Output:

```
CHMakeLists.txt package.xml param_talker.launch param_talker.py
viki@c3po:~/catkin_ws/src/parameters_tutorial$ roslaunch param_talker.launch
... logging to /home/viki/.ros/log/0156d196-ea36-11e6-a3e3-000c290d6a3b/roslaunch-c3po-2354.log
Checking log directory for disk usage. This may take awhile.
Press Ctrl-C to interrupt
Please see file disk usage. Usage is <1GB.

started roslaunch server http://c3po:58258/

SUMMARY
=====

PARAMETERS
 * /foo/gains/D: 3.0
 * /foo/gains/I: 2.0
 * /foo/gains/P: 1.0
 * /foo/param_talker/topic_name: chatter
 * /foo/to delete: Delete Me
 * /foo/utterance: I followed the Tu...
 * /global_example: global value
 * /roscpp: indigo
 * /rosversion: 1.11.8

NODES
  /foo/
    param_talker (rospy_tutorials/param_talker.py)

auto-starting new master
process[master]: started with pid [2368]
ROS_MASTER_URI=http://localhost:11311

setting /run_id to 0156d196-ea36-11e6-a3e3-000c290d6a3b
process[rosout-1]: started with pid [2381]
started core service [/rosout]
process[foo/param_talker-2]: started with pid [2391]
[INFO] [WallTime: 1486142836.458595] /global_example is global value
[INFO] [WallTime: 1486142836.462110] /foo/utterance is I followed the Tutorial Correctly! YAYYYYYY
[INFO] [WallTime: 1486142836.469385] /foo/param_talker/topic_name is chatter
[INFO] [WallTime: 1486142836.471611] /foo/default_param is default_value
[INFO] [WallTime: 1486142836.474755] gains are 1.0, 2.0, 3.0
[INFO] [WallTime: 1486142836.475099] setting parameters...
[INFO] [WallTime: 1486142836.490645] ...parameters have been set
[INFO] [WallTime: 1486142836.497582] deleted /foo/to_delete parameter
[INFO] [WallTime: 1486142836.499432] found global_example parameter under key: /global_example
[INFO] [WallTime: 1486142836.502096] I followed the Tutorial Correctly! YAYYYYYY
[INFO] [WallTime: 1486142837.504616] I followed the Tutorial Correctly! YAYYYYYY
[INFO] [WallTime: 1486142838.508054] I followed the Tutorial Correctly! YAYYYYYY
```