

Creating a Publisher and Subscriber Nodes using Python

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Before starting, please complete [this tutorial](#)

Writing the Publisher Node

1. First, type the following command then click enter.

```
cd /home/youruser/catkin_ws/src/beginner_tutorials/
```

Hint: Don't forget to replace the word "youruser" in the previous command with youruser.

A terminal window screenshot showing the command execution. The prompt is 'hind@hind-virtual-machine: ~/catkin_ws/src/beginner_tutorials'. The command entered is 'cd /home/hind/catkin_ws/src/beginner_tutorials/' and the output is 'hind@hind-virtual-machine: ~/catkin_ws/src/beginner_tutorials\$'.

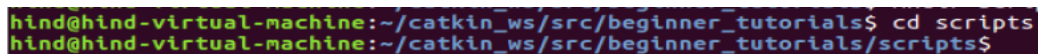
2. Then, type the following command then click enter.

```
mkdir scripts
```

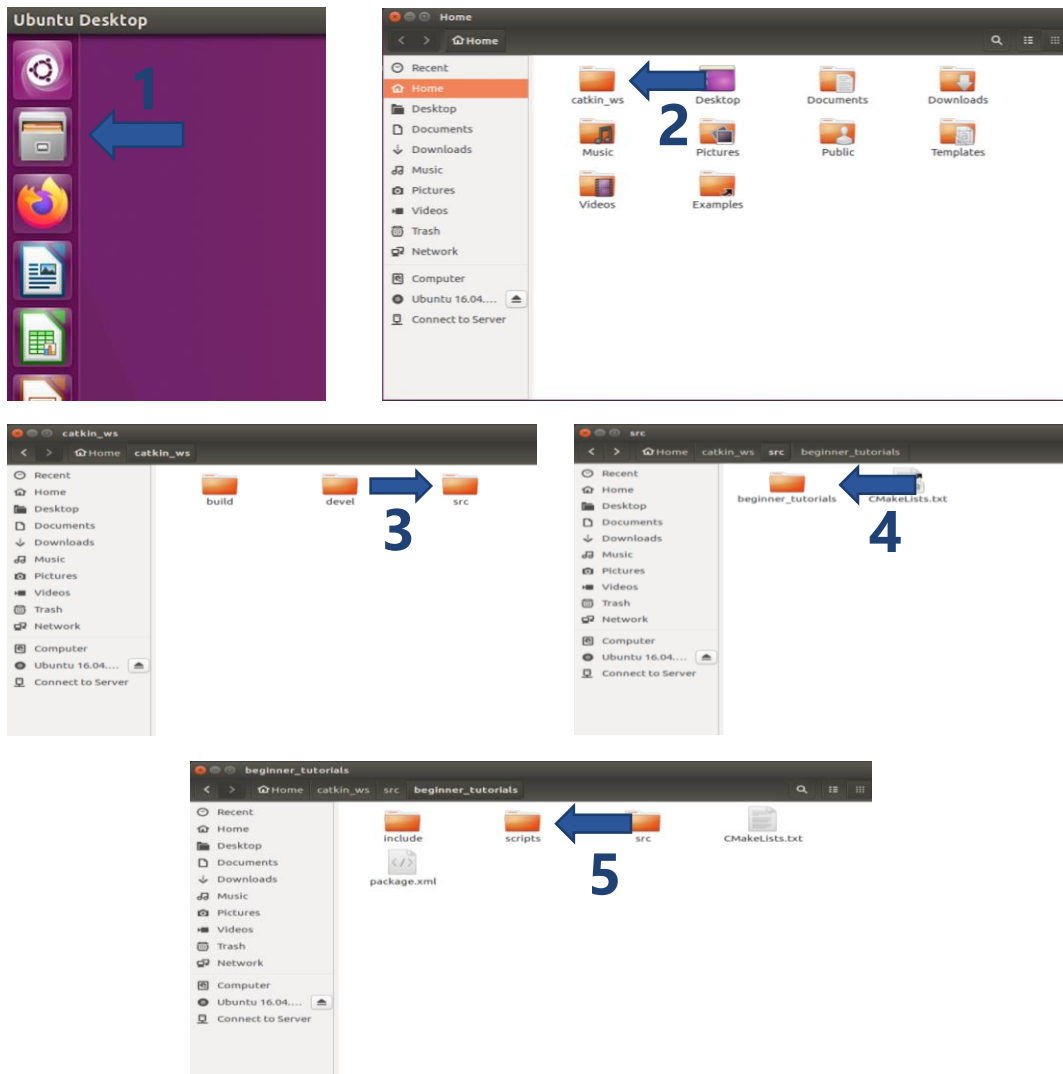
A terminal window screenshot showing the command execution. The prompt is 'hind@hind-virtual-machine: ~/catkin_ws/src/beginner_tutorials\$'. The command entered is 'mkdir scripts' and the output is 'hind@hind-virtual-machine: ~/catkin_ws/src/beginner_tutorials\$'.

3. After that, type the following command then click enter.

```
cd scripts
```

A terminal window screenshot showing the command execution. The prompt is 'hind@hind-virtual-machine: ~/catkin_ws/src/beginner_tutorials\$'. The command entered is 'cd scripts' and the output is 'hind@hind-virtual-machine: ~/catkin_ws/src/beginner_tutorials/scripts\$'.

4. Now click the second icon. Then open the catkin_ws package and follow the steps in the following pictures.



After open scripts package, create a new document and rename it to "talker.py". Then click [here](#) and copy the code and paste it in the "talker.py".

5. Next, return to the terminal and type the following command then click enter.

```
wget https://raw.githubusercontent.com/ros/ros_tutorials/kinetic-devel/rospy_tutorials/001_talker_listener/talker.py
```

```
hind@hind-virtual-machine:~/catkin_ws/src/beginner_tutorials/scripts$ wget https://raw.githubusercontent.com/ros/ros_tutorials/kinetic-devel/rospy_tutorials/001_talker_listener/talker.py
--2020-07-10 03:01:49-- https://raw.githubusercontent.com/ros/ros_tutorials/kinetic-devel/rospy_tutorials/001_talker_listener/talker.py
Resolving raw.githubusercontent.com (raw.githubusercontent.com)... 151.101.36.133
Connecting to raw.githubusercontent.com (raw.githubusercontent.com)|151.101.36.133|:443... connected.
HTTP request sent, awaiting response... 301 Moved Permanently
Location: https://raw.githubusercontent.com/ros/ros_tutorials/kinetic-devel/rospy_tutorials/001_talker_listener/talker.py [following]
--2020-07-10 03:01:50-- https://raw.githubusercontent.com/ros/ros_tutorials/kinetic-devel/rospy_tutorials/001_talker_listener/talker.py
Resolving raw.githubusercontent.com (raw.githubusercontent.com)... 151.101.36.133
Connecting to raw.githubusercontent.com (raw.githubusercontent.com)|151.101.36.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 2217 (2.2K) [text/plain]
Saving to: 'talker.py.1'

talker.py.1      100%[=====] 2.17K  --.-KB/s   in 0s
2020-07-10 03:01:51 (16.0 MB/s) - 'talker.py.1' saved [2217/2217]

hind@hind-virtual-machine:~/catkin_ws/src/beginner_tutorials/scripts$
```

6. Finally, type the following command then click enter.

```
chmod +x talker.py
```

```
hind@hind-virtual-machine:~/catkin_ws/src/beginner_tutorials/scripts$ chmod +x talker.py
hind@hind-virtual-machine:~/catkin_ws/src/beginner_tutorials/scripts$
```

Writing the Subscriber Node

1. Like the steps of creating a "talker.py" file in step 4, create a new document, and rename it to "listener.py". Then click [here](#) and copy the code and paste it in the "listener.py".
2. Next, type the following command then click enter.

```
wget https://raw.githubusercontent.com/ros/ros_tutorials/kinetic-devel/rospy_tutorials/001_talker_listener/listener.py
```

```
hind@hind-virtual-machine:~/catkin_ws/src/beginner_tutorials/scripts$ wget https://raw.githu
b.com/ros/ros_tutorials/kinetic-devel/rospy_tutorials/001_talker_listener/listener.py
--2020-07-10 03:21:22-- https://raw.githubusercontent.com/ros/ros_tutorials/kinetic-devel/rospy_tutori
als/001_talker_listener/listener.py
Resolving raw.githubusercontent.com (raw.githubusercontent.com)... 151.101.36.133
Connecting to raw.githubusercontent.com (raw.githubusercontent.com)|151.101.36.133|:443... connected.
HTTP request sent, awaiting response... 301 Moved Permanently
Location: https://raw.githubusercontent.com/ros/ros_tutorials/kinetic-devel/rospy_tutorials/
001_talker_listener/listener.py [following]
--2020-07-10 03:21:23-- https://raw.githubusercontent.com/ros/ros_tutorials/kinetic-devel/r
ospy_tutorials/001_talker_listener/listener.py
Resolving raw.githubusercontent.com (raw.githubusercontent.com)... 151.101.36.133
Connecting to raw.githubusercontent.com (raw.githubusercontent.com)|151.101.36.133|:443... c
onected.
HTTP request sent, awaiting response... 200 OK
Length: 2406 (2.3K) [text/plain]
Saving to: 'listener.py.1'

listener.py.1      100%[=====] 2.35K  --.-KB/s   in 0s
2020-07-10 03:21:23 (10.6 MB/s) - 'listener.py.1' saved [2406/2406]
```

3. After that, type the following command then click enter.

```
chmod +x listener.py
```

```
hind@hind-virtual-machine:~/catkin_ws/src/beginner_tutorials/scripts$ chmod +x listener.py
hind@hind-virtual-machine:~/catkin_ws/src/beginner_tutorials/scripts$
```

4. Now open "CMakeLists.txt" that exists in the beginner_tutorials folder and add the following command then click save.

```
catkin_install_python(PROGRAMS scripts/talker.py scripts/listener.py
DESTINATION ${CATKIN_PACKAGE_BIN_DESTINATION} )
```

```
CMakeLists.txt (~/.catkin_ws/src/beginner_tutorials) - gedit
Open [ ] Save
#####
## Testing ##
#####

## Add gtest based cpp test target and link libraries
# catkin_add_gtest(${PROJECT_NAME}-test test/
test_beginner_tutorials.cpp)
# if(TARGET ${PROJECT_NAME}-test)
#   target_link_libraries(${PROJECT_NAME}-test ${PROJECT_NAME})
# endif()

## Add folders to be run by python nosetests
# catkin_add_nosetests(test)
catkin_install_python(PROGRAMS scripts/talker.py scripts/
listener.py
DESTINATION ${CATKIN_PACKAGE_BIN_DESTINATION}
)
CMake Tab Width: 8 Ln 197, Col 14 INS
```

Building your nodes

1. First, type (or copy and paste) the following command then click enter.

```
cd ~/catkin_ws
```

```
hind@hind-virtual-machine:~$ cd ~/catkin_ws
hind@hind-virtual-machine:~/catkin_ws$
```

2. Then, type the following command then click enter.

```
catkin_make
```

```
hind@hind-virtual-machine:~/catkin_ws$ catkin_make
Base path: /home/hind/catkin_ws
Source space: /home/hind/catkin_ws/src
Build space: /home/hind/catkin_ws/build
Devel space: /home/hind/catkin_ws/devel
Install space: /home/hind/catkin_ws/install
####
#### Running command: "make cmake_check_build_system" in "/home/hind/catkin_ws/build"
####
-- Using CATKIN_DEVEL_PREFIX: /home/hind/catkin_ws/devel
-- Using CMAKE_PREFIX_PATH: /opt/ros/kinetic
-- This workspace overlays: /opt/ros/kinetic
-- Found PythonInterp: /usr/bin/python2 (found suitable version "2.7.12", minimum required is "2")
-- Using PYTHON_EXECUTABLE: /usr/bin/python2
-- Using Debian Python package layout
-- Using empy: /usr/bin/empy
-- Using CATKIN_ENABLE_TESTING: ON
-- Call enable_testing()
-- Using CATKIN_TEST_RESULTS_DIR: /home/hind/catkin_ws/build/test_results
-- Found gtest sources under '/usr/src/gmock': gtests will be built
-- Found gmock sources under '/usr/src/gmock': gmock will be built
-- Found PythonInterp: /usr/bin/python2 (found version "2.7.12")
-- Using Python nosetests: /usr/bin/nosetests-2.7
-- catkin 0.7.20
-- BUILD_SHARED_LIBS is on
-- BUILD_SHARED_LIBS is on
--
-- traversing 1 packages in topological order:
-- - beginner_tutorials
--
-- +++ processing catkin package: 'beginner_tutorials'
-- ==> add_subdirectory(beginner_tutorials)
-- Configuring done
-- Generating done
-- Build files have been written to: /home/hind/catkin_ws/build
####
#### Running command: "make -j2 -l2" in "/home/hind/catkin_ws/build"
####
hind@hind-virtual-machine:~/catkin_ws$
```

Running the Publisher

1. Open a new terminal and type the following command then click enter.

```
roscore
```

```
hind@hind-virtual-machine: ~
hind@hind-virtual-machine:~$ roscore
... logging to /home/hind/.ros/log/84c41e32-c244-11ea-9edc-000c298af7fe/roslaunc
h-hind-virtual-machine-5128.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://hind-virtual-machine:33491/
ros_comm version 1.12.14

SUMMARY
=====
PARAMETERS
* /rostdistro: kinetic
* /rosversion: 1.12.14

NODES

auto-starting new master
process[master]: started with pid [5138]
ROS_MASTER_URI=http://hind-virtual-machine:11311/

setting /run_id to 84c41e32-c244-11ea-9edc-000c298af7fe
process[roscout-1]: started with pid [5151]
started core service [/roscout]
```

2. Then, open another new terminal and type the following command then click enter.

```
cd ~/catkin_ws
```

```
hind@hind-virtual-machine: ~/catkin_ws
hind@hind-virtual-machine:~$ cd ~/catkin_ws
```

3. Next, type the following command then click enter.

```
source ./devel/setup.bash
```

```
hind@hind-virtual-machine:~/catkin_ws$ source ./devel/setup.bash
```

4. After that, type the following command then click enter.

```
roslaunch beginner_tutorials talker.py
```

```
hind@hind-virtual-machine:~/catkin_ws$ roslaunch beginner_tutorials talker.py
[INFO] [1594342114.417487]: hello world 1594342114.42
[INFO] [1594342114.518432]: hello world 1594342114.52
[INFO] [1594342114.618139]: hello world 1594342114.62
[INFO] [1594342114.718195]: hello world 1594342114.72
[INFO] [1594342114.818366]: hello world 1594342114.82
[INFO] [1594342114.918484]: hello world 1594342114.92
[INFO] [1594342115.018179]: hello world 1594342115.02
[INFO] [1594342115.118499]: hello world 1594342115.12
[INFO] [1594342115.218754]: hello world 1594342115.22
[INFO] [1594342115.318657]: hello world 1594342115.32
[INFO] [1594342115.418083]: hello world 1594342115.42
[INFO] [1594342115.517871]: hello world 1594342115.52
```


Running the Subscriber

1. Open a new terminal and repeat the second and third steps from the previous steps.
2. Then, type the following command then click enter.

```
roslaunch beginner_tutorials listener.py
```

```
hind@hind-virtual-machine: ~/catkin_ws
hind@hind-virtual-machine:~$ cd ~/catkin_ws
hind@hind-virtual-machine:~/catkin_ws$ source ./devel/setup.bash
hind@hind-virtual-machine:~/catkin_ws$ roslaunch beginner_tutorials listener.py
[INFO] [1594342236.719573]: /listener_5754_1594342236443I heard hello world 1594
342236.72
[INFO] [1594342236.818714]: /listener_5754_1594342236443I heard hello world 1594
342236.82
[INFO] [1594342236.919146]: /listener_5754_1594342236443I heard hello world 1594
342236.92
[INFO] [1594342237.020005]: /listener_5754_1594342236443I heard hello world 1594
342237.02
[INFO] [1594342237.119868]: /listener_5754_1594342236443I heard hello world 1594
342237.12
[INFO] [1594342237.218896]: /listener_5754_1594342236443I heard hello world 1594
342237.22
[INFO] [1594342237.319281]: /listener_5754_1594342236443I heard hello world 1594
342237.32
[INFO] [1594342237.418902]: /listener_5754_1594342236443I heard hello world 1594
342237.42
[INFO] [1594342237.519131]: /listener_5754_1594342236443I heard hello world 1594
342237.52
[INFO] [1594342237.619144]: /listener_5754_1594342236443I heard hello world 1594
342237.62
[INFO] [1594342237.718841]: /listener_5754_1594342236443I heard hello world 1594
```

3. Next, open another new terminal and type the following command then click enter.

```
cd ~/catkin_ws
```

```
hind@hind-virtual-machine: ~/catkin_ws
hind@hind-virtual-machine:~$ cd ~/catkin_ws
```

4. After that, type the following command then click enter.

```
roslaunch listener_listener.py
```

```
hind@hind-virtual-machine:~/catkin_ws$ roslaunch listener_listener.py
/ listener_5754_1594342236443
/ rosout
/ talker_5649_1594342114213
hind@hind-virtual-machine:~/catkin_ws$
```

5. Now, type the following command then click enter.

```
rostopic list
```

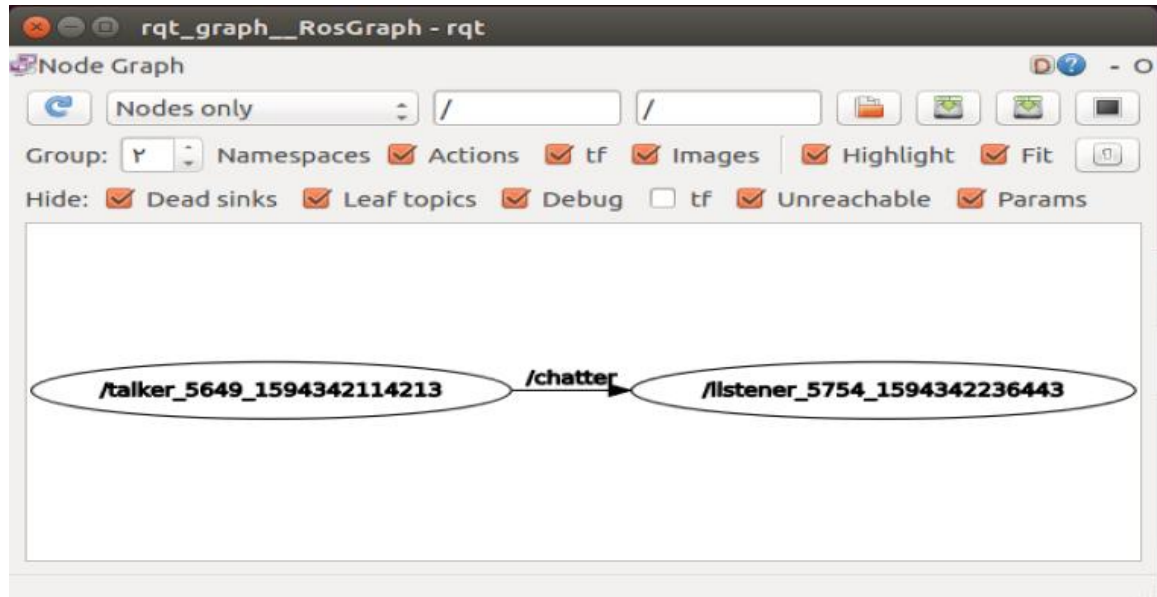
```
hind@hind-virtual-machine:~/catkin_ws$ rostopic list
/chatter
/rosout
/rosout_agg
hind@hind-virtual-machine:~/catkin_ws$
```

6. Finally, type the following command then click enter.

```
rqt_graph
```

```
hind@hind-virtual-machine:~/catkin_ws$ rqt_graph
```

After click enter, this window will appear.



References

<http://wiki.ros.org/ROS/Tutorials/WritingPublisherSubscriber%28python%29>

<http://wiki.ros.org/ROS/Tutorials/ExaminingPublisherSubscriber>

https://www.youtube.com/watch?v=GBtKo_pXrJQ&feature=youtu.be