

# Assignment 3

## ROS

### Divyansh Agarwal

#### 1. Create new ROS Workspace and inside the workspace create the ROS Package

Commands:

```
mkdir -p ~/assignment3/src
```

```
cd assignment3/
```

```
catkin_make
```

```
(base) divyansh@divyansh-HP:~$ cd assignment3/
(base) divyansh@divyansh-HP:~/assignment3$ catkin_make
Base path: /home/divyansh/assignment3
Source space: /home/divyansh/assignment3/src
Build space: /home/divyansh/assignment3/build
Devel space: /home/divyansh/assignment3/devel
Install space: /home/divyansh/assignment3/install
Creating symlink "/home/divyansh/assignment3/src/CMakeLists.txt" pointing to "/opt/ros/noetic/share/catkin/cmake/toplevel.cmake"
####
### Running command: "cmake /home/divyansh/assignment3/src -DCATKIN_DEVEL_PREFIX=/home/divyansh/assignment3/devel -DCMAKE_INSTALL_PREFIX=/home/divyansh/assignment3/install -G Unix Makefiles" in "/home/divyansh/assignment3/build"
###
-- The C compiler identification is GNU 9.3.0
-- The CXX compiler identification is GNU 9.3.0
-- Check for working C compiler: /usr/bin/cc
-- Check for working C compiler: /usr/bin/cc -- works
-- Detecting C compiler ABI info
-- Detecting C compiler ABI info - done
-- Detecting C compile features
-- Detecting C compile features - done
-- Check for working CXX compiler: /usr/bin/c++
-- Check for working CXX compiler: /usr/bin/c++ -- works
-- Detecting CXX compiler ABI info
-- Detecting CXX compiler ABI info - done
-- Detecting CXX compile features
-- Detecting CXX compile features - done
-- Using CATKIN_DEVEL_PREFIX: /home/divyansh/assignment3/devel
-- Using CMAKE_PREFIX_PATH: /opt/ros/noetic
-- This workspace overlays: /opt/ros/noetic
-- Found PythonInterp: /home/divyansh/anaconda3/bin/python3 (found suitable version "3.7.6", minimum required is "3")
-- Using PYTHON_EXECUTABLE: /home/divyansh/anaconda3/bin/python3
-- Using Debian Python package layout
-- Found PY_em: /home/divyansh/anaconda3/lib/python3.7/site-packages/em.py
-- Using empy: /home/divyansh/anaconda3/lib/python3.7/site-packages/em.py
-- Using CATKIN_ENABLE_TESTING: ON
-- Call enable_testing()
```

```
(base) divyansh@divyansh-HP:~/assignment3$ vim ~/.bashrc
(base) divyansh@divyansh-HP:~/assignment3$ source ~/.bashrc
(base) divyansh@divyansh-HP:~/assignment3$ cd src
(base) divyansh@divyansh-HP:~/assignment3/src$ catkin_create_pkg threenode rospy std_msgs roscpp
Created file threenode/package.xml
Created file threenode/CMakeLists.txt
Created folder threenode/include/threenode
Created folder threenode/src
Successfully created files in /home/divyansh/assignment3/src/threenode. Please adjust the values in package.xml
```

```
. /etc/bash_completion
fi
fi
#source /opt/ros/noetic/setup.bash
#source /home/divyansh/prac_rosexrt/devel/setup.bash
source /home/divyansh/assignment3/devel/setup.bash

# >>> conda initialize >>>
```

```
(base) divyansh@divyansh-HP:~/assignment3/src$ catkin_create_pkg for_rostopics rospy roscpp std_msgs
Created file for_rostopics/package.xml
Created file for_rostopics/CMakeLists.txt
Created folder for_rostopics/include/for_rostopics
Created folder for_rostopics/src
Successfully created files in /home/divyansh/assignment3/src/for_rostopics. Please adjust the values in package.xml.
(base) divyansh@divyansh-HP:~/assignment3/src$ catkin_create_pkg threenode rospy roscpp std_msgs
Created file threenode/package.xml
Created file threenode/CMakeLists.txt
Created folder threenode/include/threenode
Created folder threenode/src
Successfully created files in /home/divyansh/assignment3/src/threenode. Please adjust the values in package.xml.
```

```
Base path: /home/divyansh/assignment3
Source space: /home/divyansh/assignment3/src
Build space: /home/divyansh/assignment3/build
Devel space: /home/divyansh/assignment3/devel
Install space: /home/divyansh/assignment3/install
--
-- catkin: command: "cmake /home/divyansh/assignment3/src -DCATKIN_DEVEL_PREFIX=/home/divyansh/assignment3/devel -DCMAKE_INSTALL_PREFIX=/home/divyansh/assignment3/i
install -G Unix Makefiles" in "/home/divyansh/assignment3/build"
--
-- Using CATKIN_DEVEL_PREFIX: /home/divyansh/assignment3/devel
-- Using CMAKE_PREFIX_PATH: /home/divyansh/assignment3/devel;/opt/ros/noetic
-- This workspace overlays: /home/divyansh/assignment3/devel;/opt/ros/noetic
-- Found PythonInterp: /home/divyansh/anaconda3/bin/python3 (found suitable version "3.7.6", minimum required is "3")
-- Using PYTHON_EXECUTABLE: /home/divyansh/anaconda3/bin/python3
-- Using Debian Python package layout
-- Using empy: /home/divyansh/anaconda3/lib/python3.7/site-packages/em.py
-- Using CATKIN_ENABLE_TESTING: ON
-- catkin enable testing()
-- Using CATKIN_TEST_RESULTS_DIR: /home/divyansh/assignment3/build/test_results
-- Forcing gtest/gmock from source, though one was otherwise available.
-- Found gtest sources under '/usr/src/gtest': gtests will be built
-- Found gmock sources under '/usr/src/gmocktest': gmock will be built
-- Found PythonInterp: /home/divyansh/anaconda3/bin/python3 (found version "3.7.6")
-- Using Python nosetests: /usr/bin/nosetests3
-- catkin 0.8.10
-- BUILD_SHARED_LIBS is on
-- BUILD_SHARED_LIBS is on
--
-- traversing 2 packages in topological order:
-- - for_rostopics
-- - threenode
--
-- ++ processing catkin package: 'for_rostopics'
-- ==> add_subdirectory(for_rostopics)
-- ++ processing catkin package: 'threenode'
-- ==> add_subdirectory(threenode)
-- Configuring done
-- Generating done
-- Build files have been written to: /home/divyansh/assignment3/build
--
-- catkin: command: "make -j8 -l8" in "/home/divyansh/assignment3/build"
```

Catkin\_create\_pkg threenode rospy roscpp std\_msgs

Catkin\_create\_pkg for\_rostopics rospy roscpp std\_msgs

2. Inside the created package create Three ROS Nodes using Python and that nodes should be active until and unless if we manually stop the process.

```
#!/usr/bin/env python
```

```
import rospy
```

```
rospy.init_node('my_first_node')
```

```
rate=rospy.Rate(5)
```

```
while not rospy.is_shutdown():
```

```
print("Hi, everyone this is my first node.")
```

```
rate.sleep()
```

```
#!/usr/bin/env python
```

```
import rospy
```

```
rospy.init_node('my_second_node')
```

```
rate=rospy.Rate(0.01)
```

```
while not rospy.is_shutdown():
```

```
print("Hi, everyone this is my second node.")
```

```
print("The rate is 0.01")
```

```
rate.sleep()
```

```
#!/usr/bin/env python
```

```
import rospy
```

```
rospy.init_node('my_third_node')
```

```
rate=rospy.Rate(0.5)
```

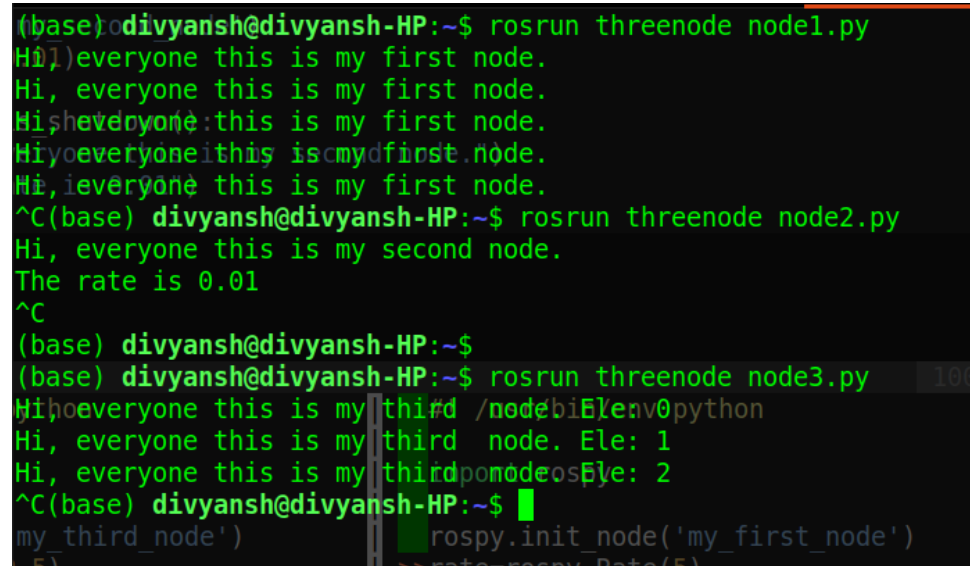
```
i=0
```

```
while not rospy.is_shutdown():
```

```
print("Hi, everyone this is my third node. Ele:",i)
```

```
i+=1
```

```
rate.sleep()
```



```
(base) divyansh@divyansh-HP:~$ rosrunc threecode node1.py
Hi, everyone this is my first node.
Hi, everyone this is my first node.
Hi, everyone this is my first node.
Hi, everyone this is my first node.
Hi, everyone this is my first node.
Hi, everyone this is my first node.
^C(base) divyansh@divyansh-HP:~$ rosrunc threecode node2.py
Hi, everyone this is my second node.
The rate is 0.01
^C
(base) divyansh@divyansh-HP:~$
(base) divyansh@divyansh-HP:~$ rosrunc threecode node3.py
Hi, everyone this is my third node. Ele: 1
Hi, everyone this is my third node. Ele: 2
^C(base) divyansh@divyansh-HP:~$
my_third_node')
rospy.init_node('my_first_node')
rate=rospy.Rate(5)
```

### 3. Create ROS launch file for launching three nodes at a time.

```
(base) divyansh@divyansh-HP:~$ roslaunch threenode threenode.launch
[INFO] [1561166] logging to /home/divyansh/.ros/log/ef9caed6-e3ea-11eb-bbfe-4d083881bb81/roslaunch-divyansh-HP-931561166
Checking log directory for disk usage. This may take a while.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.
[INFO] [1561166] started roslaunch server http://divyansh-HP:44557/

SUMMARY
=====

PARAMETERS
* /rostopic: noetic
* /rosversion: 1.15.11

NODES
  my_first_node (threenode/node1.py)
  my_second_node (threenode/node2.py)
  my_third_node (threenode/node3.py)

[INFO] [1561166] ROS_MASTER_URI=http://localhost:11311
[INFO] [1561166] process[my_first_node-1]: started with pid [33172]
[INFO] [1561166] process[my_second_node-2]: started with pid [33173]
[INFO] [1561166] process[my_third_node-3]: started with pid [33174]
```

Launch file in launch folder

<launch>

<!-- format is node with pkg name type (the node file name) then the name() of node-->

<node pkg='threenode' type='node1.py' name='my\_first\_node' output='screen' >

</node>

<node pkg='threenode' type='node2.py' name='my\_second\_node' output='screen'>

```
</node>
```

```
<node pkg='threenode' type='node3.py' name='my_third_node' output='screen' >
```

```
</node>
```

```
</launch>
```

4. Create a ROS Topic to publisher node and subscriber node to communicate the String data via ros topic (Create new ros topic as well).

Publisher:

```
#!/usr/bin/env python
```

```
import rospy
```

```
from std_msgs.msg import String
```

```
rospy.init_node('publisher')
```

```
pub=rospy.Publisher('/alpha',String,queue_size=1)
```

```
count=String()
```

```
count.data="*"
```

```
cnt=1
```

```
rate=rospy.Rate(1)
```

```
while not rospy.is_shutdown():
```

```
pub.publish(count)
```

```
count.data+=count.data
```

```
cnt+=1  
rate.sleep()
```

```
Subscriber  
#!/usr/bin/env python
```

```
import rospy
```

```
from std_msgs.msg import String
```

```
def callback(msg):  
    print(msg.data)
```

```
rospy.init_node('subscriber')  
sub=rospy.Subscriber('alpha',String,callback)
```

```
rospy.spin()
```







```
(base) divyansh@divyansh-HP:~$ rostopic info /alpha
Type: std_msgs/String

Publishers:
* /publisher.py (http://divyansh-HP:38163/)

Subscribers:
* /subscriber.py (http://divyansh-HP:43593/)
```

<launch>

<node pkg='for\_rostopics' type='pub.py' name='publisher.py' output='screen'>

</node>

<node pkg='for\_rostopics' type='sub.py' name='subscriber.py' output='screen'>

</node>

</launch>