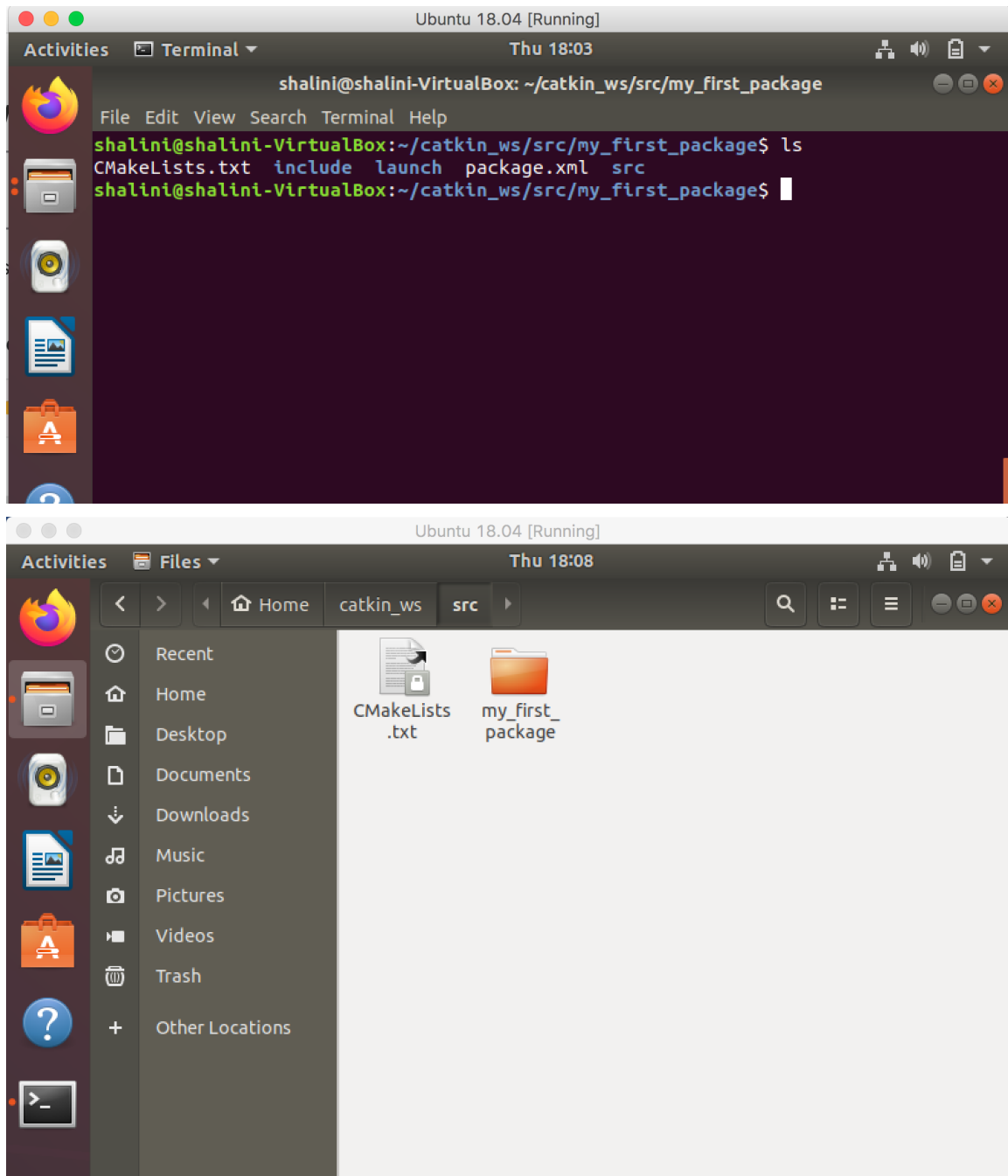


ASSIGNMENT 3

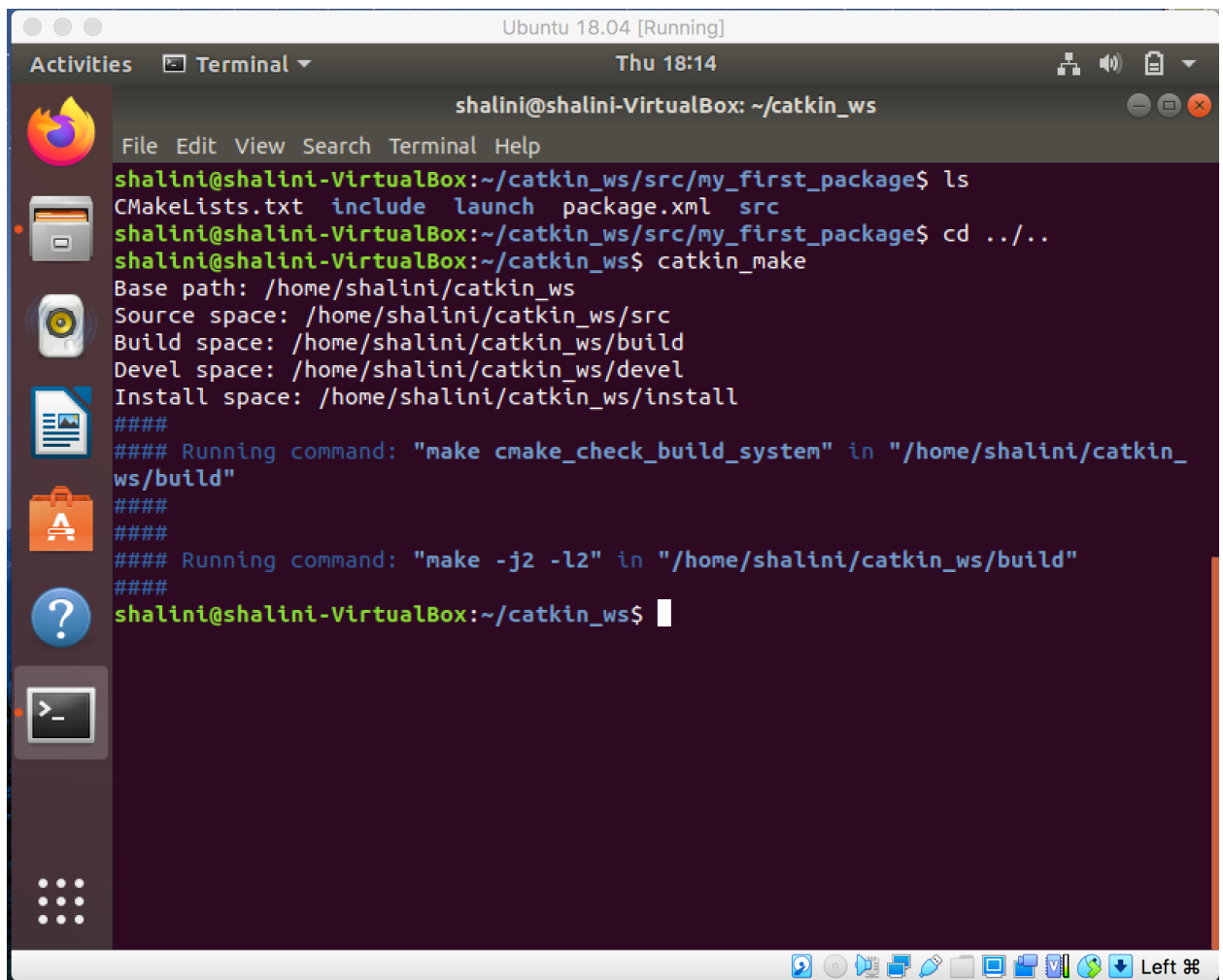
Name: Shalini Das

University: VIT Bhopal University

1.



We use catkin_make to compile the package.



The screenshot shows a terminal window titled "Ubuntu 18.04 [Running]" with a menu bar containing "Activities", "Terminal", and a dropdown arrow. The window title bar also displays "Thu 18:14" and window control buttons. The terminal content shows the user "shalini@shalini-VirtualBox" in the directory "~/catkin_ws". The user runs the following commands:

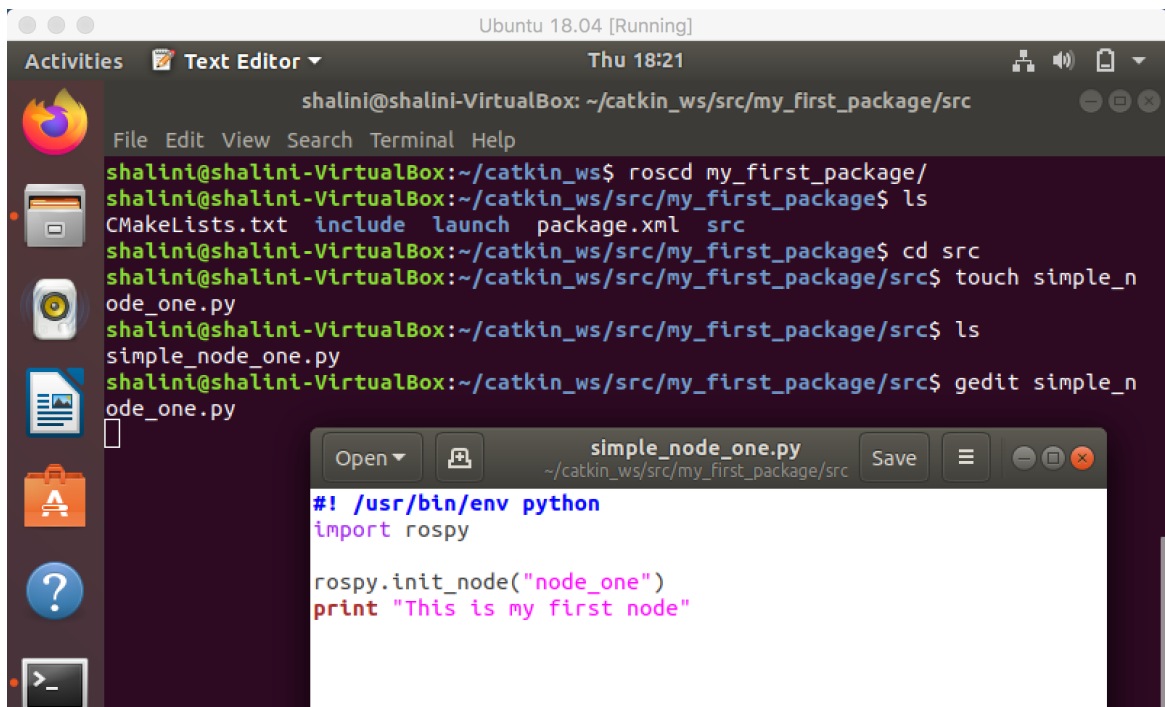
```
shalini@shalini-VirtualBox:~/catkin_ws/src/my_first_package$ ls
CMakeLists.txt  include  launch  package.xml  src
shalini@shalini-VirtualBox:~/catkin_ws/src/my_first_package$ cd ../../
shalini@shalini-VirtualBox:~/catkin_ws$ catkin_make
```

The output of `catkin_make` is as follows:

```
Base path: /home/shalini/catkin_ws
Source space: /home/shalini/catkin_ws/src
Build space: /home/shalini/catkin_ws/build
Devel space: /home/shalini/catkin_ws/devel
Install space: /home/shalini/catkin_ws/install
####
#### Running command: "make cmake_check_build_system" in "/home/shalini/catkin_ws/build"
####
####
#### Running command: "make -j2 -l2" in "/home/shalini/catkin_ws/build"
####
shalini@shalini-VirtualBox:~/catkin_ws$
```

The terminal window has a sidebar on the left with icons for Firefox, a file manager, a disk, a document, a shopping bag, a question mark, and a terminal icon. The bottom status bar shows various system icons and the text "Left ⌘".

2. We create three nodes: simple_node_one.py, loop_node.py and simple_loop_three.py



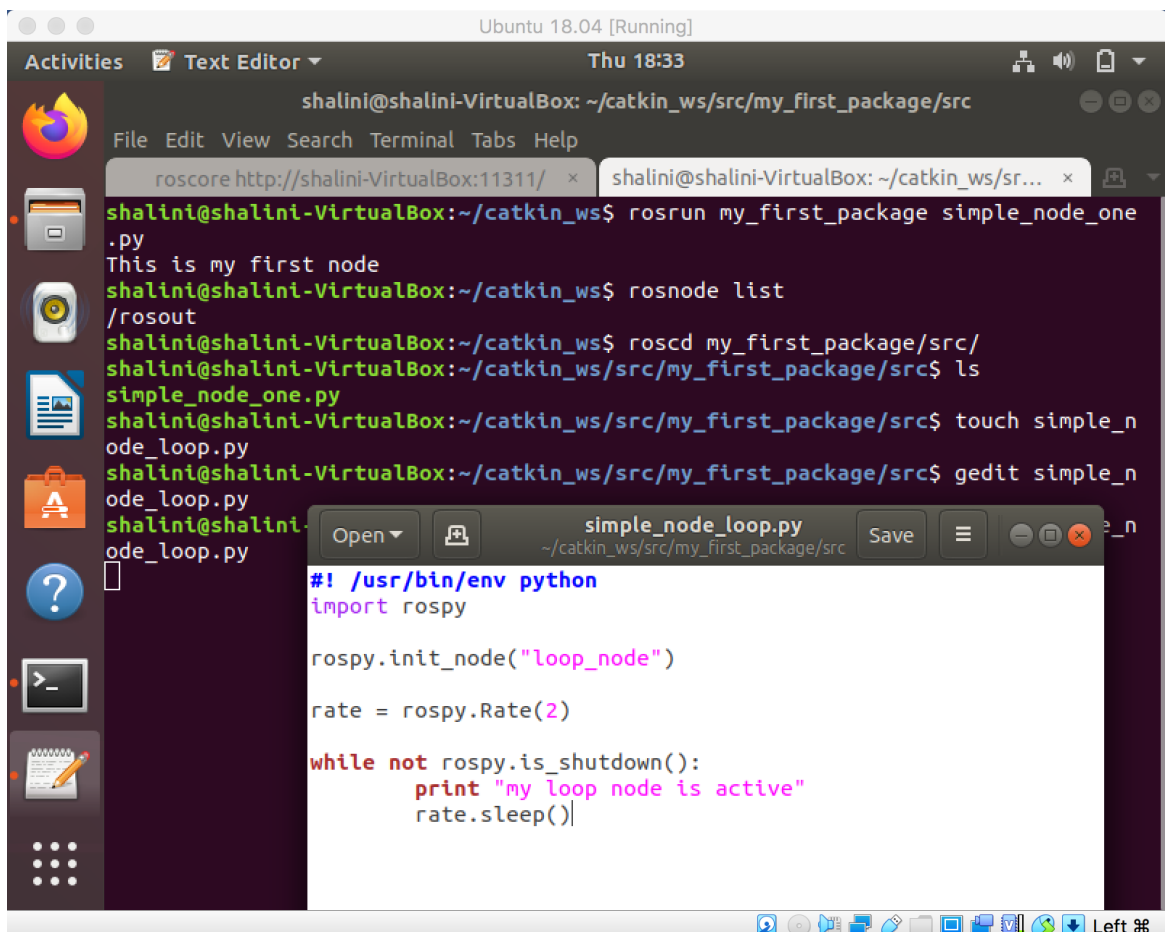
The screenshot shows a terminal window titled "Ubuntu 18.04 [Running]" with the time "Thu 18:21". The user is in the directory `~/catkin_ws/src/my_first_package/src`. The terminal output shows the following commands and results:

```
shalini@shalini-VirtualBox: ~/catkin_ws$ roscd my_first_package/
shalini@shalini-VirtualBox: ~/catkin_ws/src/my_first_package$ ls
CMakeLists.txt  include  launch  package.xml  src
shalini@shalini-VirtualBox: ~/catkin_ws/src/my_first_package$ cd src
shalini@shalini-VirtualBox: ~/catkin_ws/src/my_first_package/src$ touch simple_node_one.py
shalini@shalini-VirtualBox: ~/catkin_ws/src/my_first_package/src$ ls
simple_node_one.py
shalini@shalini-VirtualBox: ~/catkin_ws/src/my_first_package/src$ gedit simple_node_one.py
```

The editor window shows the content of `simple_node_one.py`:

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

rospy.init_node("node_one")
print "This is my first node"
```



The screenshot shows a terminal window titled "Ubuntu 18.04 [Running]" with the time "Thu 18:33". The user is in the directory `~/catkin_ws/src/my_first_package/src`. The terminal output shows the following commands and results:

```
shalini@shalini-VirtualBox: ~/catkin_ws$ roscore http://shalini-VirtualBox:11311/
shalini@shalini-VirtualBox: ~/catkin_ws$ rosrn my_first_package simple_node_one.py
This is my first node
shalini@shalini-VirtualBox: ~/catkin_ws$ rosnode list
/roscout
shalini@shalini-VirtualBox: ~/catkin_ws$ roscd my_first_package/src/
shalini@shalini-VirtualBox: ~/catkin_ws/src/my_first_package/src$ ls
simple_node_one.py
shalini@shalini-VirtualBox: ~/catkin_ws/src/my_first_package/src$ touch simple_node_loop.py
shalini@shalini-VirtualBox: ~/catkin_ws/src/my_first_package/src$ gedit simple_node_loop.py
shalini@shalini-VirtualBox: ~/catkin_ws/src/my_first_package/src$
```

The editor window shows the content of `simple_node_loop.py`:

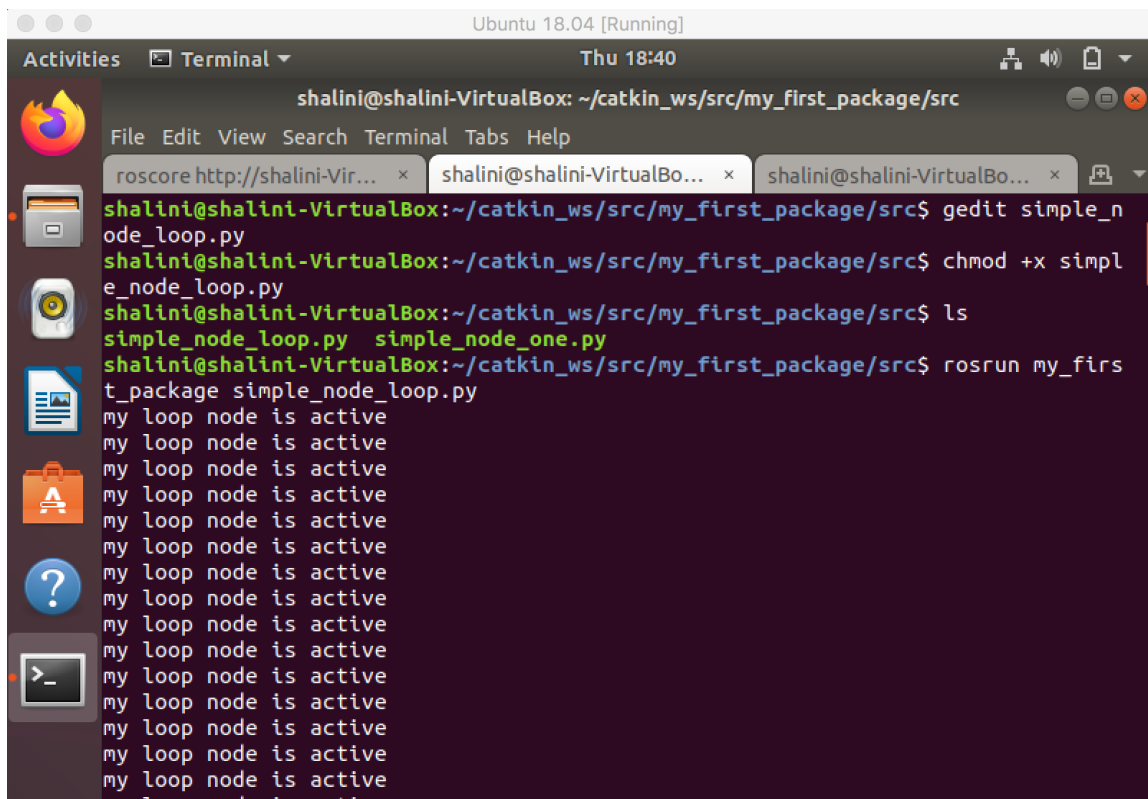
```
#!/usr/bin/env python
import rospy

rospy.init_node("loop_node")

rate = rospy.Rate(2)

while not rospy.is_shutdown():
    print "my loop node is active"
    rate.sleep()
```

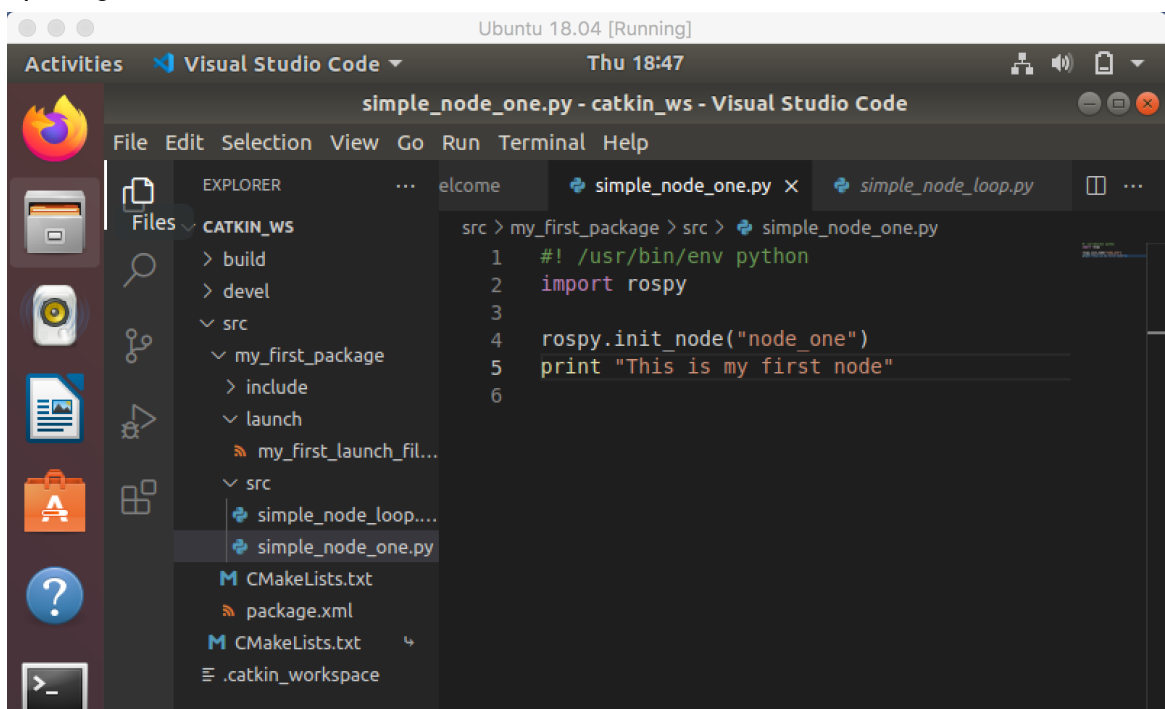
First we run the first node i.e. simple_node_loop.py



A terminal window titled 'Ubuntu 18.04 [Running]' with the date 'Thu 18:40'. The user is in the directory ~/catkin_ws/src/my_first_package/src. The terminal shows the following commands and output:

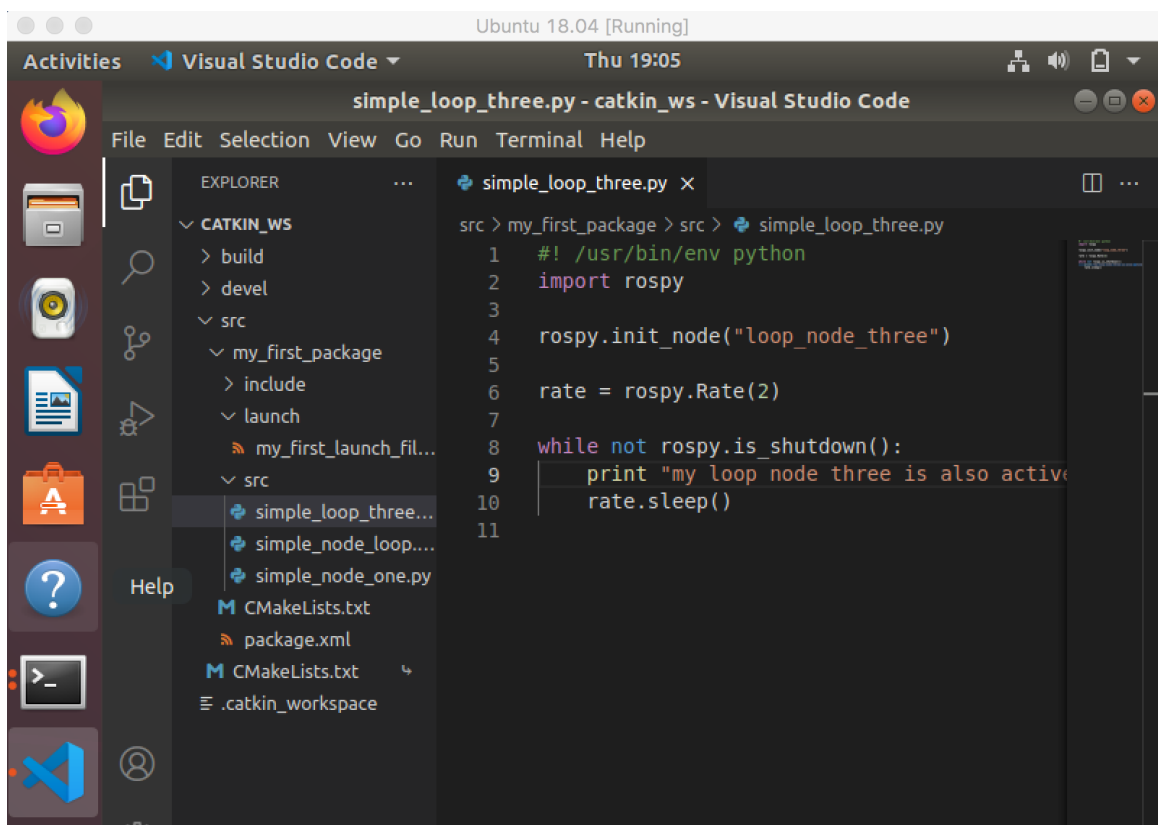
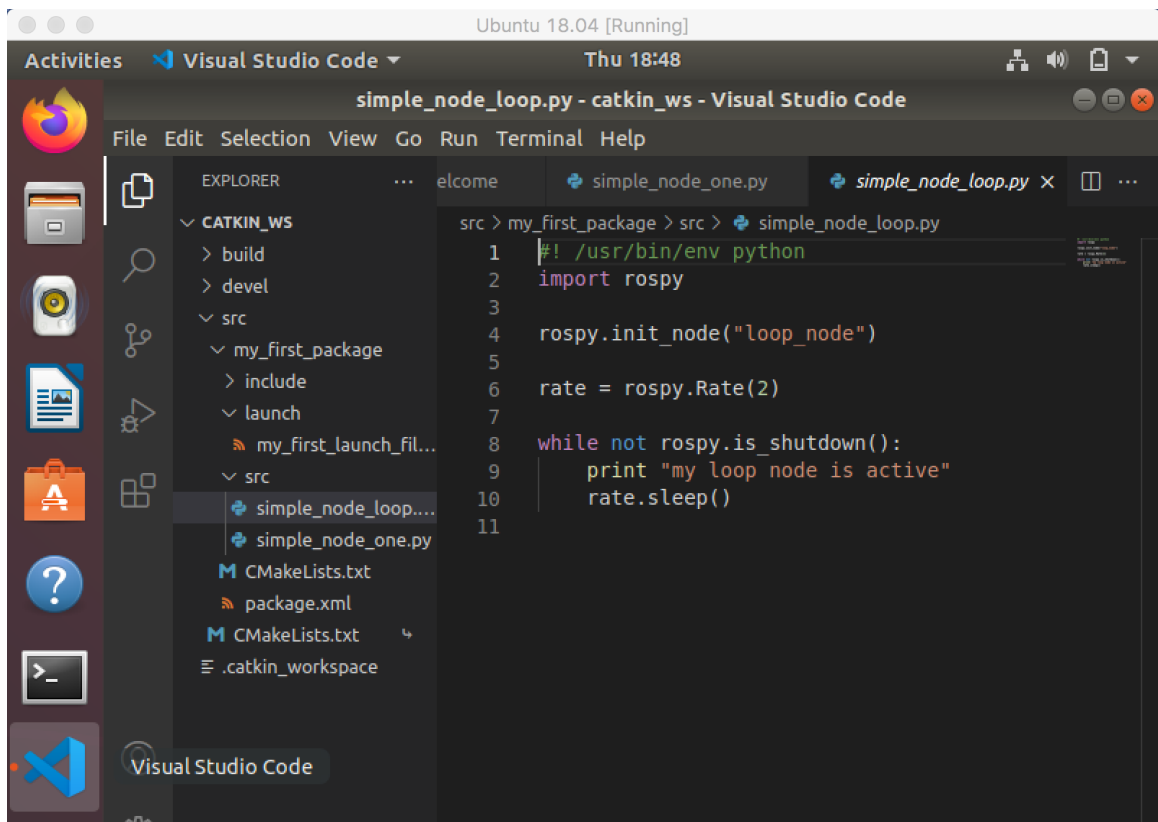
```
shalini@shalini-VirtualBox: ~/catkin_ws/src/my_first_package/src
$ gedit simple_node_loop.py
$ chmod +x simple_node_loop.py
$ ls
simple_node_loop.py  simple_node_one.py
$ rosrn my_first_package simple_node_loop.py
my loop node is active
my loop node is active
my loop node is active
my loop node is active
my loop node is active
my loop node is active
my loop node is active
my loop node is active
my loop node is active
my loop node is active
my loop node is active
my loop node is active
my loop node is active
my loop node is active
my loop node is active
my loop node is active
```

Opening the nodes in visual studio code

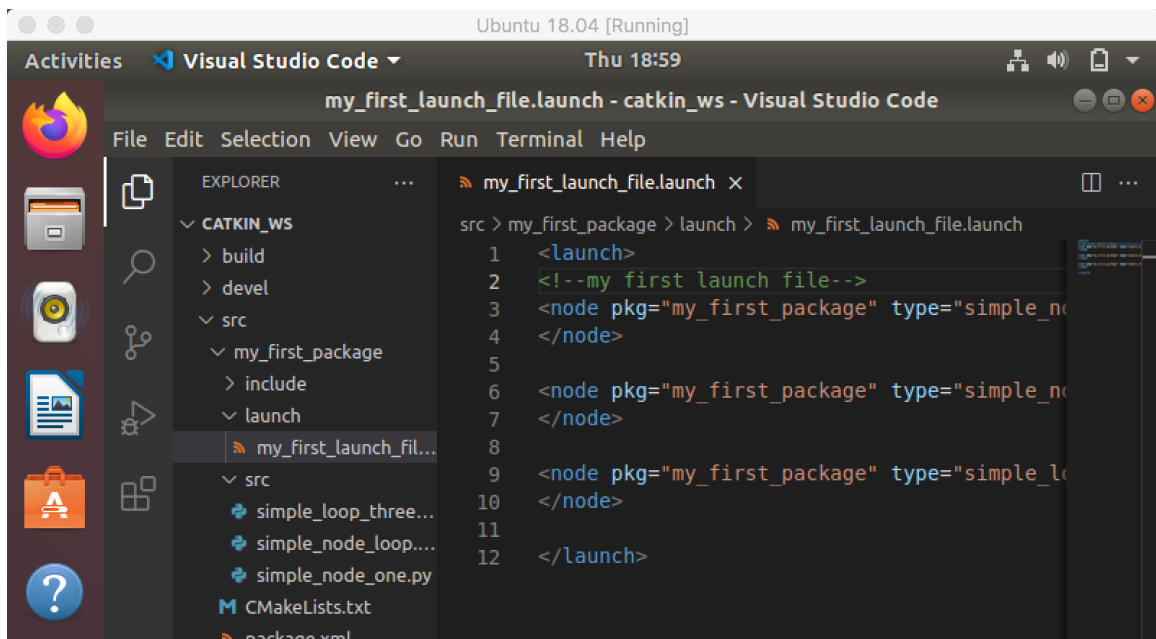


A Visual Studio Code window titled 'simple_node_one.py - catkin_ws - Visual Studio Code' with the date 'Thu 18:47'. The interface shows the Explorer sidebar on the left with the file tree expanded to the 'src' directory of 'my_first_package'. The main editor area displays the content of 'simple_node_one.py'.

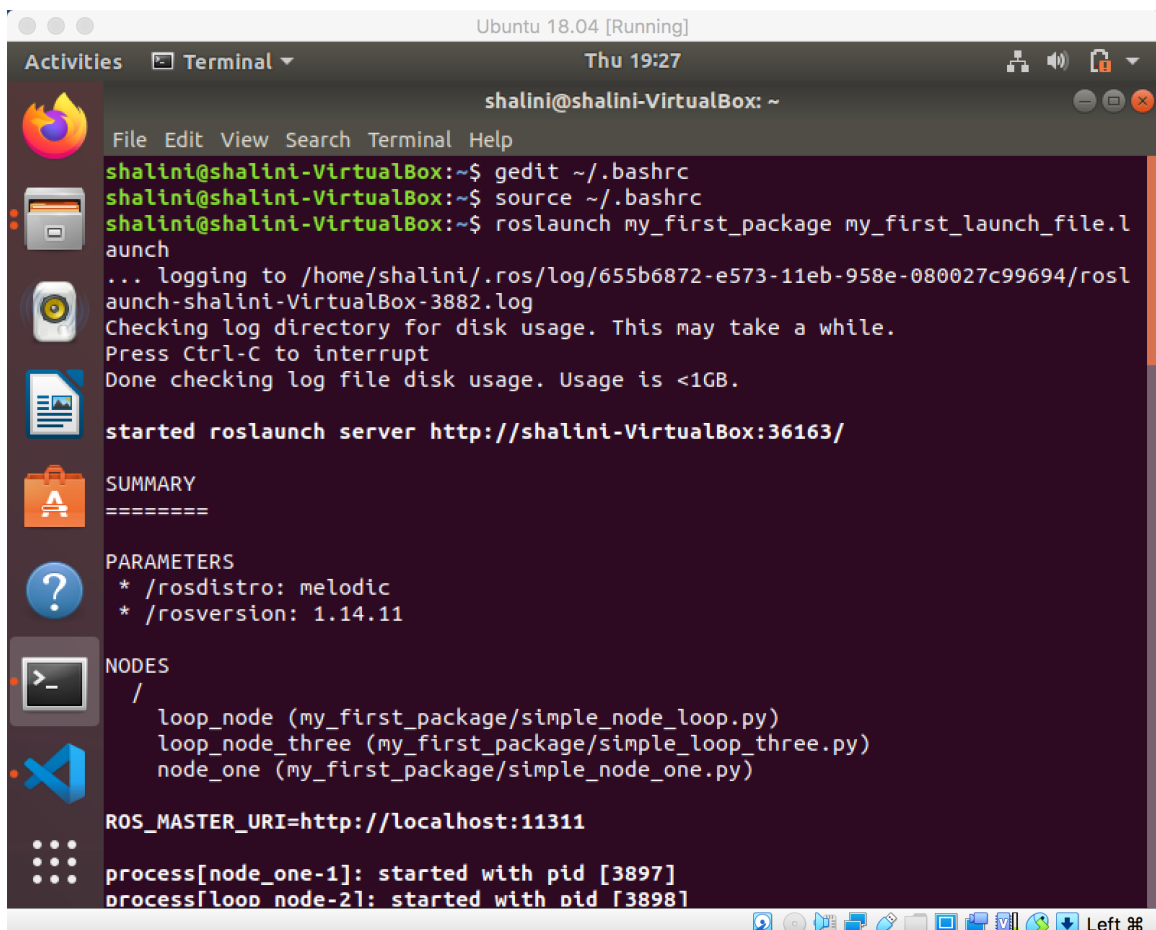
```
src > my_first_package > src > simple_node_one.py
1  #!/usr/bin/env python
2  import rospy
3
4  rospy.init_node("node_one")
5  print "This is my first node"
6
```



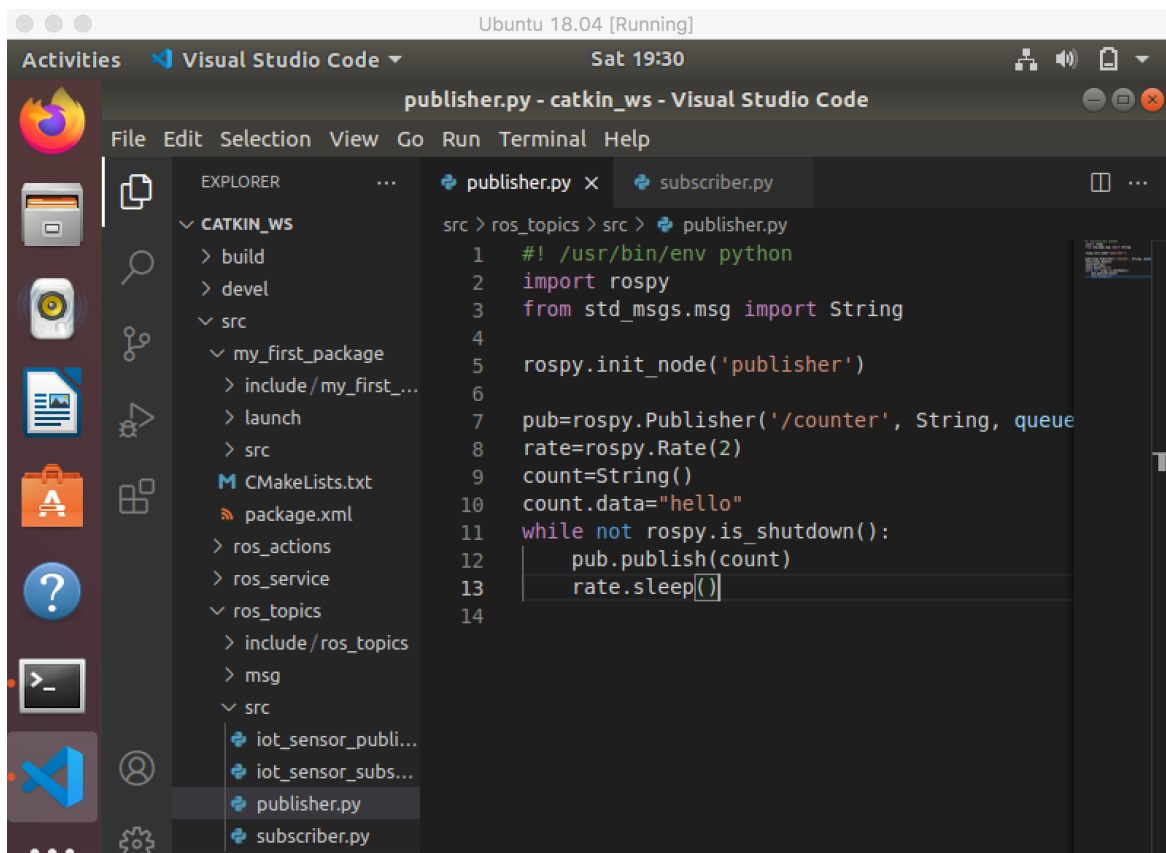
3. Creating a launch file named my_first_launch_file.launch.



Launching the nodes in the terminal.



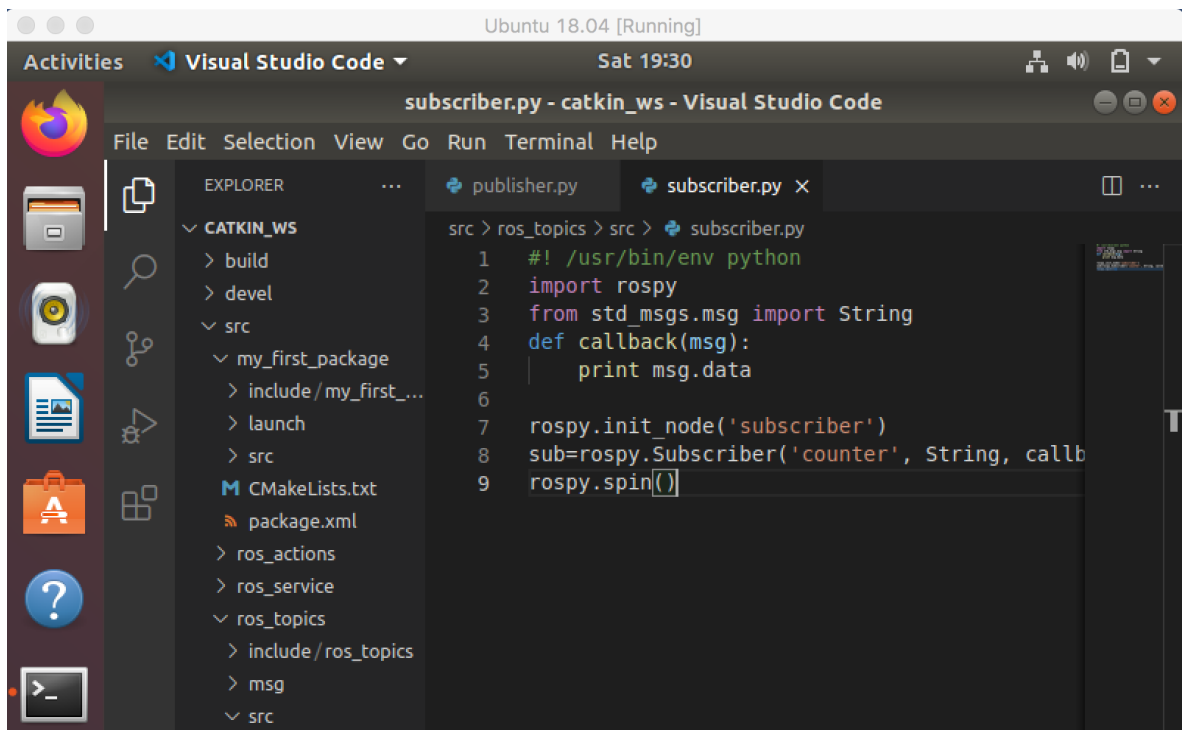
4. First creating a publisher node in the ros_topics package.



The screenshot shows the Visual Studio Code interface with the 'publisher.py' file open in the editor. The Explorer sidebar on the left shows the project structure of 'catkin_ws', with 'src' expanded to show 'ros_topics' and its subdirectory 'src'. The editor displays the following Python code for the publisher node:

```
src > ros_topics > src > publisher.py
1  #!/usr/bin/env python
2  import rospy
3  from std_msgs.msg import String
4
5  rospy.init_node('publisher')
6
7  pub=rospy.Publisher('/counter', String, queue_size=10)
8  rate=rospy.Rate(2)
9  count=String()
10 count.data="hello"
11 while not rospy.is_shutdown():
12     pub.publish(count)
13     rate.sleep()
14
```

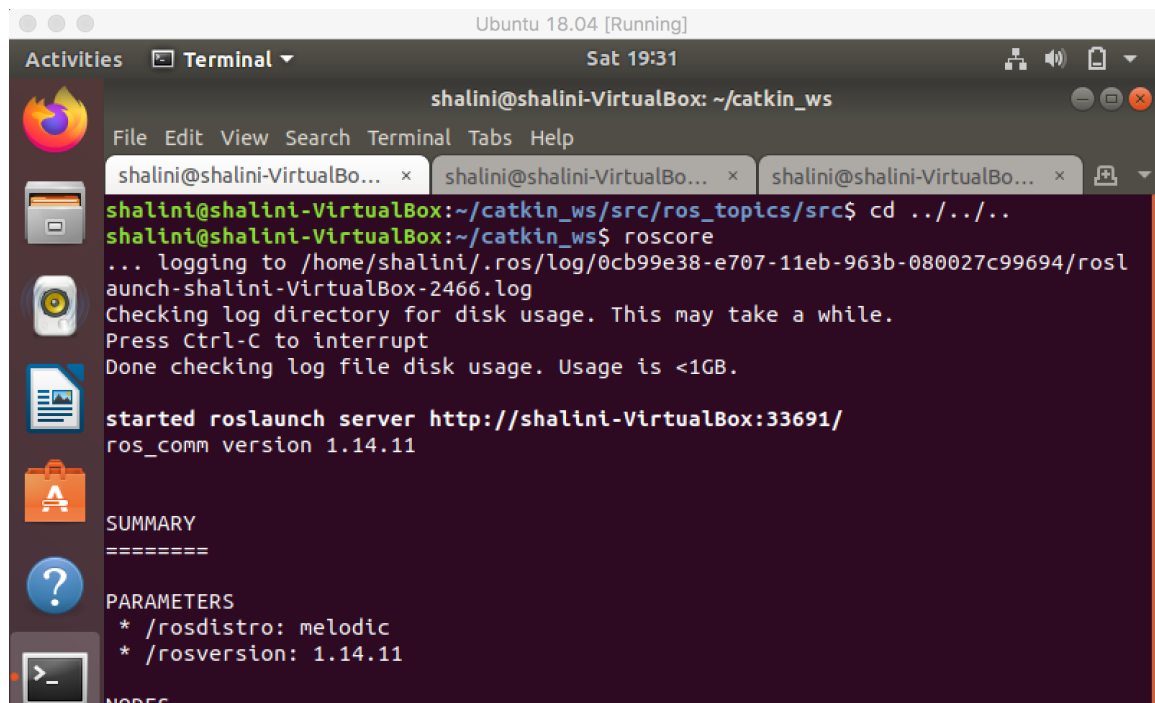
Then creating a subscriber node.



The screenshot shows the Visual Studio Code interface with the 'subscriber.py' file open in the editor. The Explorer sidebar on the left shows the project structure of 'catkin_ws', with 'src' expanded to show 'ros_topics' and its subdirectory 'src'. The editor displays the following Python code for the subscriber node:

```
src > ros_topics > src > subscriber.py
1  #!/usr/bin/env python
2  import rospy
3  from std_msgs.msg import String
4  def callback(msg):
5      print msg.data
6
7  rospy.init_node('subscriber')
8  sub=rospy.Subscriber('counter', String, callback)
9  rospy.spin()
```


Running the master node in the terminal.

A terminal window titled 'Ubuntu 18.04 [Running]' with a menu bar (File, Edit, View, Search, Terminal, Tabs, Help) and a status bar (Sat 19:31). The window shows the user 'shalini@shalini-VirtualBox' in the directory '~/catkin_ws'. The user runs 'cd ../../..' and then 'roscore'. The output shows logging to a file, a check for disk usage, and the start of a roslaunch server at http://shalini-VirtualBox:33691/. The roscore version is 1.14.11. A summary and parameters section follows, showing 'melodic' for rosdistro and '1.14.11' for rosversion. The nodes section is partially visible.

```
shalini@shalini-VirtualBox: ~/catkin_ws
File Edit View Search Terminal Tabs Help

shalini@shalini-VirtualBo... x shalini@shalini-VirtualBo... x shalini@shalini-VirtualBo... x

shalini@shalini-VirtualBox:~/catkin_ws/src/ros_topics/src$ cd ../../..
shalini@shalini-VirtualBox:~/catkin_ws$ roscore
... logging to /home/shalini/.ros/log/0cb99e38-e707-11eb-963b-080027c99694/rosl
aunch-shalini-VirtualBox-2466.log
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.

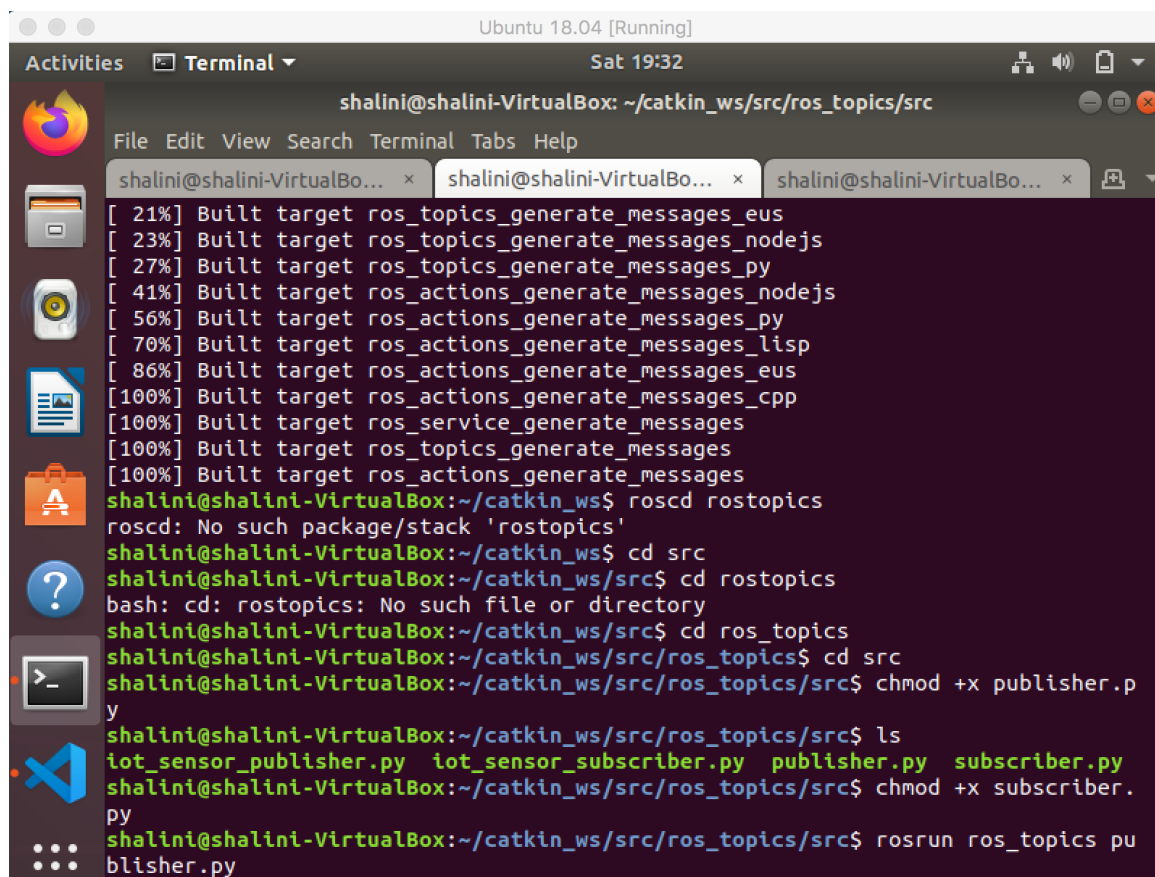
started roslaunch server http://shalini-VirtualBox:33691/
ros_comm version 1.14.11

SUMMARY
=====

PARAMETERS
* /rosdistro: melodic
* /rosversion: 1.14.11

NODES
```

Running the publisher node in the terminal.

A terminal window titled 'Ubuntu 18.04 [Running]' with a menu bar (File, Edit, View, Search, Terminal, Tabs, Help) and a status bar (Sat 19:32). The window shows the user 'shalini@shalini-VirtualBox' in the directory '~/catkin_ws/src/ros_topics/src'. The user runs 'roscd rostotics' (which fails with 'No such package/stack'), then 'cd src' and 'cd rostotics' (which fails with 'No such file or directory'). The user then runs 'cd ros_topics' and 'cd src'. The user then runs 'chmod +x publisher.py' and 'ls', showing files 'iot_sensor_publisher.py', 'iot_sensor_subscriber.py', 'publisher.py', and 'subscriber.py'. The user then runs 'chmod +x subscriber.py' and finally 'roslaunch ros_topics publisher.py'.

```
shalini@shalini-VirtualBox: ~/catkin_ws/src/ros_topics/src
File Edit View Search Terminal Tabs Help

shalini@shalini-VirtualBo... x shalini@shalini-VirtualBo... x shalini@shalini-VirtualBo... x

[ 21%] Built target ros_topics_generate_messages_eus
[ 23%] Built target ros_topics_generate_messages_nodejs
[ 27%] Built target ros_topics_generate_messages_py
[ 41%] Built target ros_actions_generate_messages_nodejs
[ 56%] Built target ros_actions_generate_messages_py
[ 70%] Built target ros_actions_generate_messages_lisp
[ 86%] Built target ros_actions_generate_messages_eus
[100%] Built target ros_actions_generate_messages_cpp
[100%] Built target ros_service_generate_messages
[100%] Built target ros_topics_generate_messages
[100%] Built target ros_actions_generate_messages

shalini@shalini-VirtualBox:~/catkin_ws$ roscd rostotics
roscd: No such package/stack 'rostotics'
shalini@shalini-VirtualBox:~/catkin_ws$ cd src
shalini@shalini-VirtualBox:~/catkin_ws/src$ cd rostotics
bash: cd: rostotics: No such file or directory
shalini@shalini-VirtualBox:~/catkin_ws/src$ cd ros_topics
shalini@shalini-VirtualBox:~/catkin_ws/src/ros_topics$ cd src
shalini@shalini-VirtualBox:~/catkin_ws/src/ros_topics/src$ chmod +x publisher.p
y
shalini@shalini-VirtualBox:~/catkin_ws/src/ros_topics/src$ ls
iot_sensor_publisher.py iot_sensor_subscriber.py publisher.py subscriber.py
shalini@shalini-VirtualBox:~/catkin_ws/src/ros_topics/src$ chmod +x subscriber.
py
shalini@shalini-VirtualBox:~/catkin_ws/src/ros_topics/src$ roslaunch ros_topics pu
blisher.py
```

The string "hello" is printed.

The screenshot shows a terminal window titled "shalini@shalini-VirtualBox: ~/catkin_ws/src/ros_topics/src". The terminal displays the following sequence of commands and output:

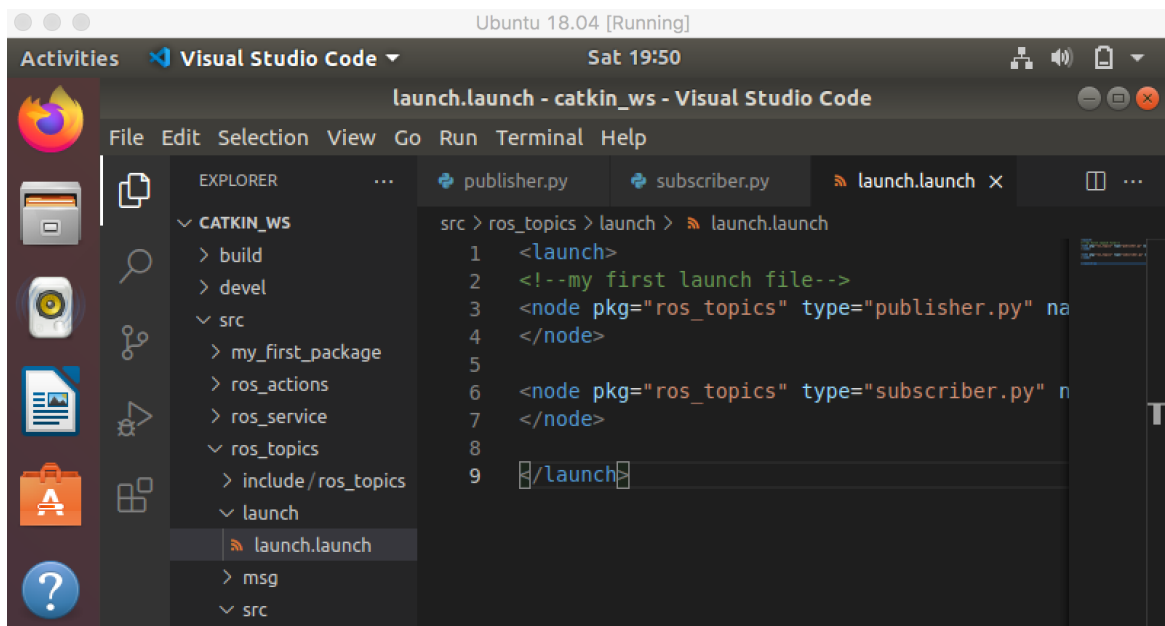
```

shalini@shalini-VirtualBox: ~/catkin_ws/src/ros_topics/src$ rosrun rostopics subscriber.py
[rospack] Error: package 'rostopics' not found
shalini@shalini-VirtualBox: ~/catkin_ws/src/ros_topics/src$ rosrn ros_topics subscriber.py
hello
hello
hello
hello
hello
hello
hello
hello
hello
hello
hello
hello
hello
hello
hello
hello
hello
hello
hello
hello

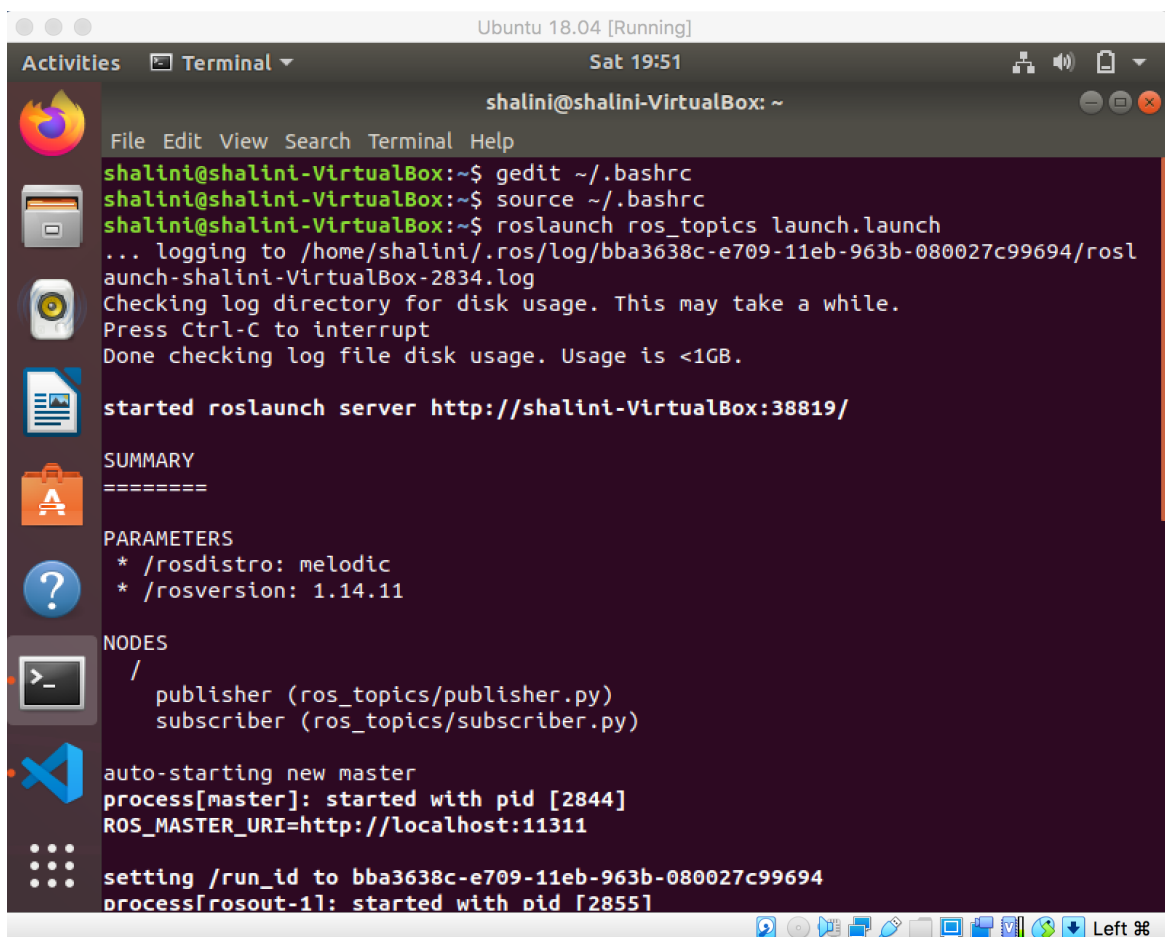
```

The error message "[rospack] Error: package 'rostopics' not found" indicates that the package name in the launch file was incorrect. The subsequent successful output "hello" is repeated 20 times, demonstrating that the corrected launch file works as intended.

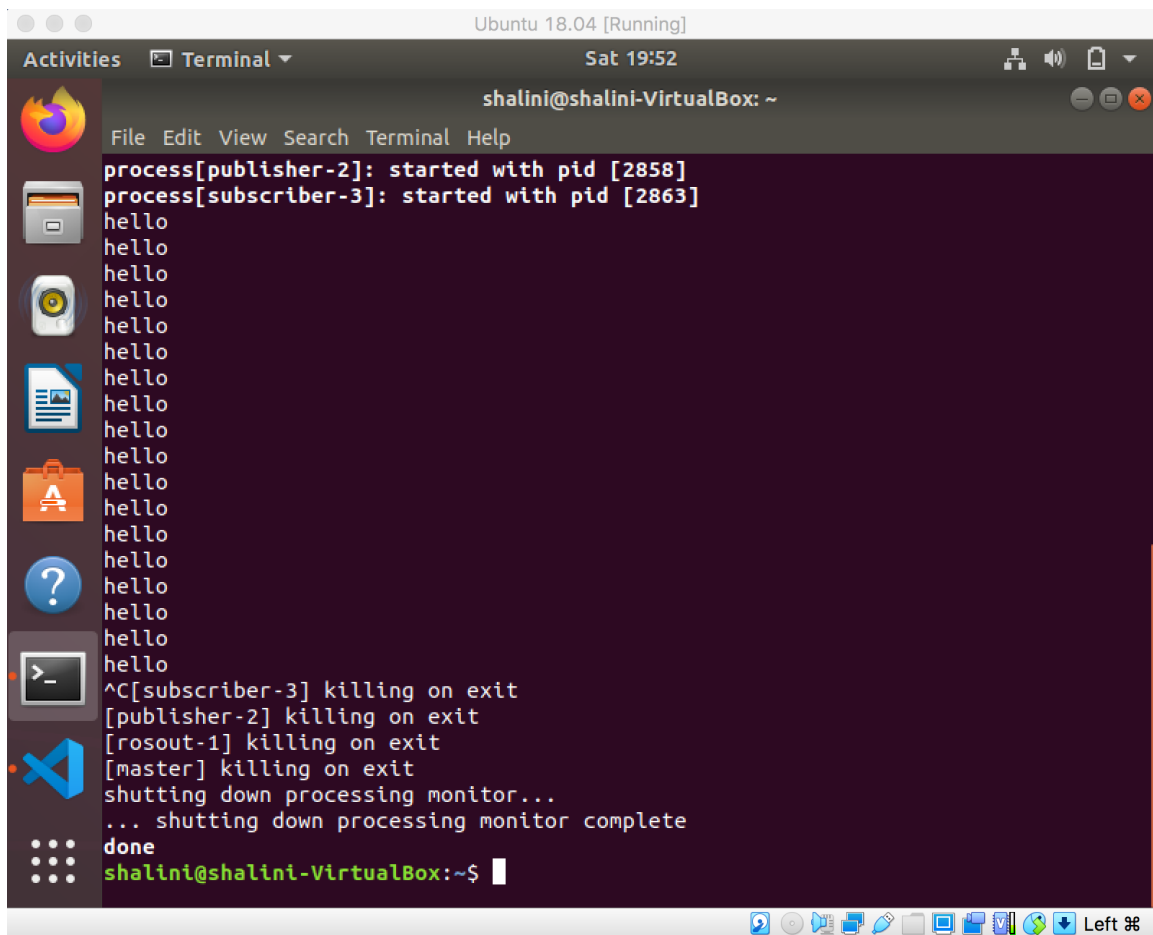
5. Creating a launch file `launch.launch` to launch subscriber and publisher together.



Launching both the nodes in the terminal.



We can see that the string hello is printed.



The screenshot shows a terminal window titled "shalini@shalini-VirtualBox: ~" running on Ubuntu 18.04. The terminal displays the output of a ROS program. It starts with two lines indicating the start of processes: "process[publisher-2]: started with pid [2858]" and "process[subscriber-3]: started with pid [2863]". This is followed by 12 lines of "hello" output. The program then terminates, showing several "killing on exit" messages for the subscriber, publisher, rosout, and master processes, followed by "shutting down processing monitor..." and "... shutting down processing monitor complete". The terminal ends with the prompt "shalini@shalini-VirtualBox:~\$".

```
process[publisher-2]: started with pid [2858]
process[subscriber-3]: started with pid [2863]
hello
hello
hello
hello
hello
hello
hello
hello
hello
hello
hello
hello
hello
hello
hello
hello
^C[subscriber-3] killing on exit
[publisher-2] killing on exit
[rosout-1] killing on exit
[master] killing on exit
shutting down processing monitor...
... shutting down processing monitor complete
done
shalini@shalini-VirtualBox:~$
```