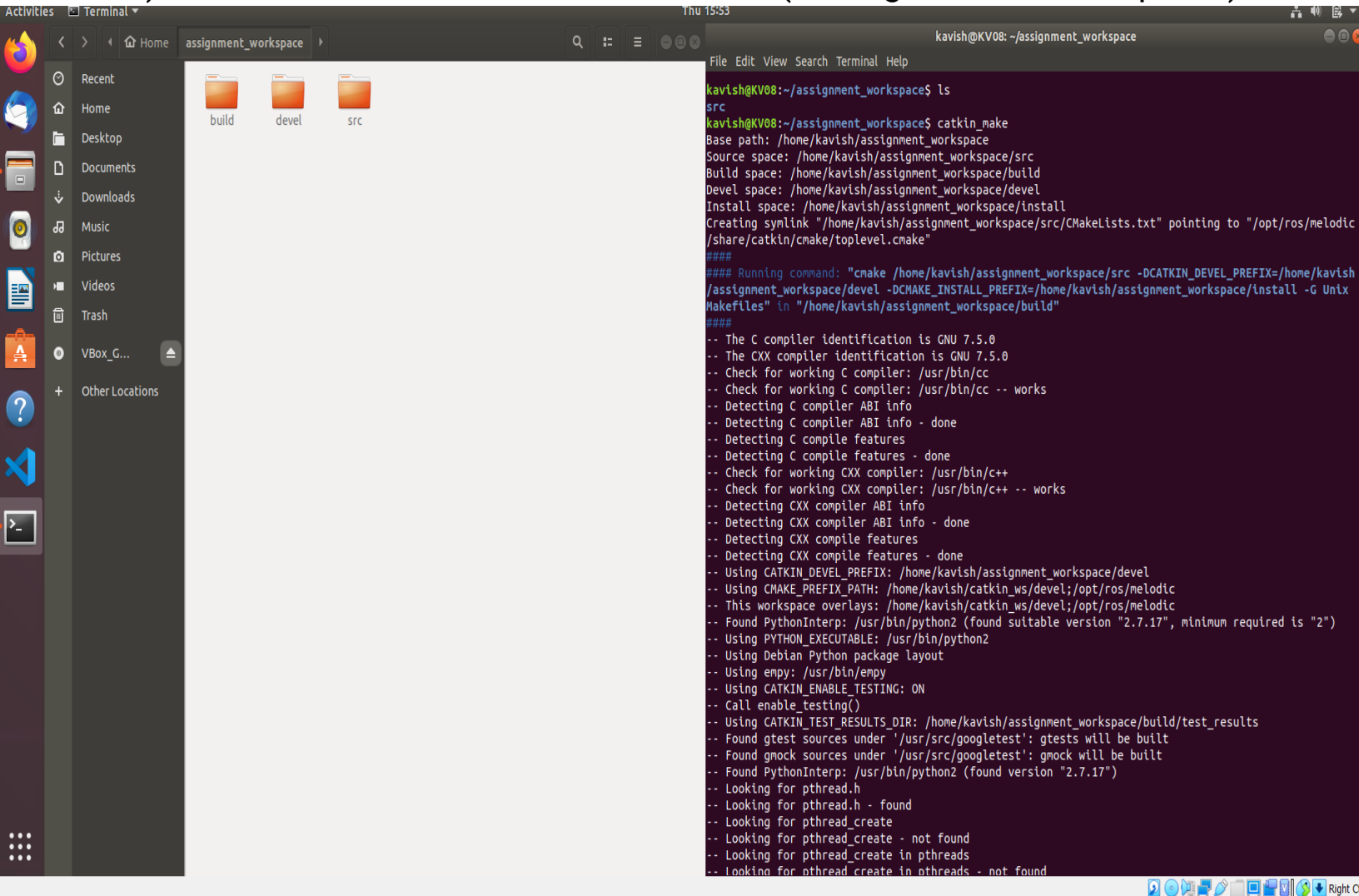


# ASSIGNMENT-3

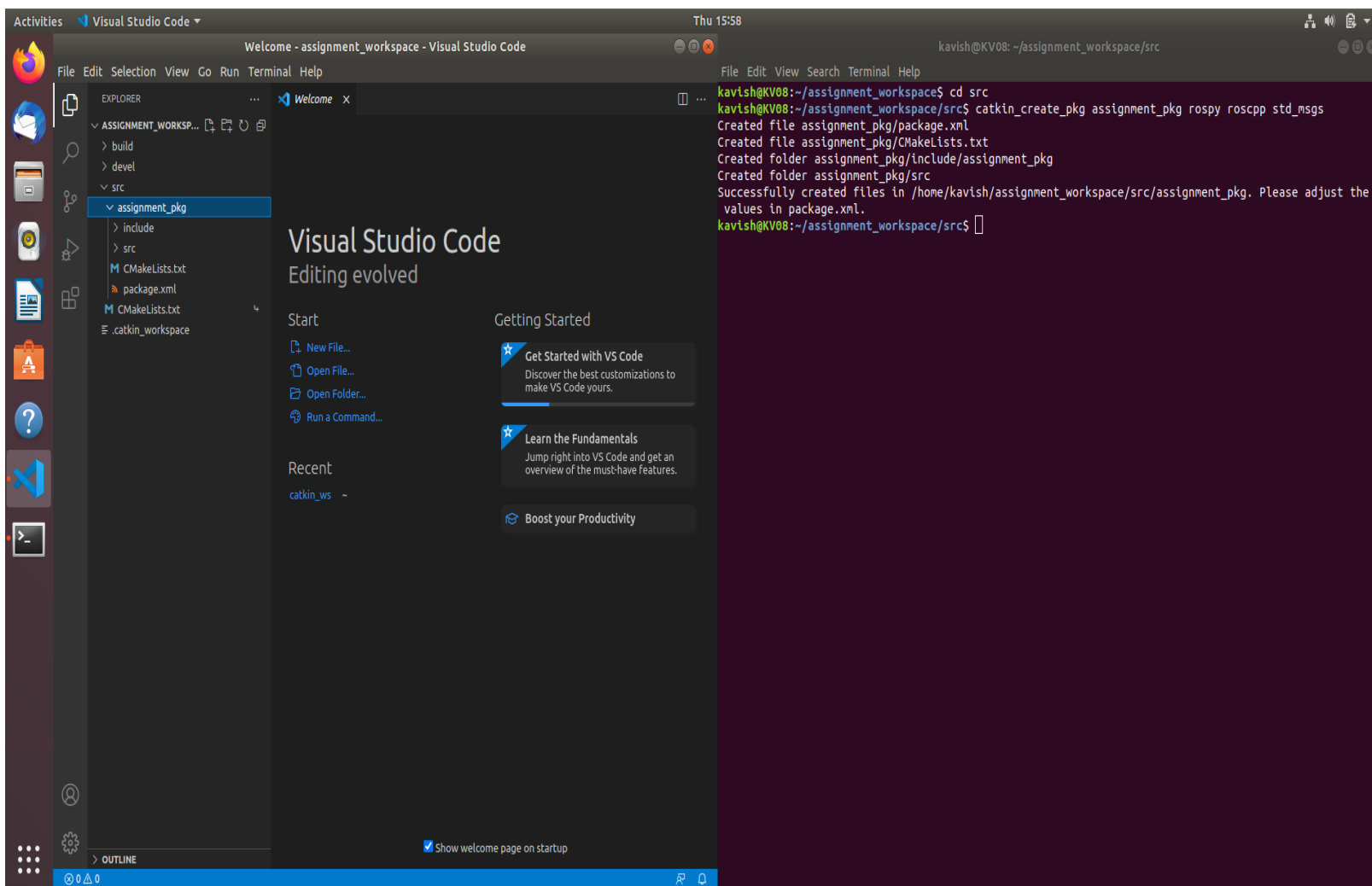
**NAME:** KAVISH MEHTA

**COLLEGE ID:** 18BIS0130

## 1) CREATE NEW CATKIN WORKSPACE(assignment\_workspace):



## 2) Create a new package(assignment\_package) :



### 3) Creating three nodes that are active until and unless not manually closed

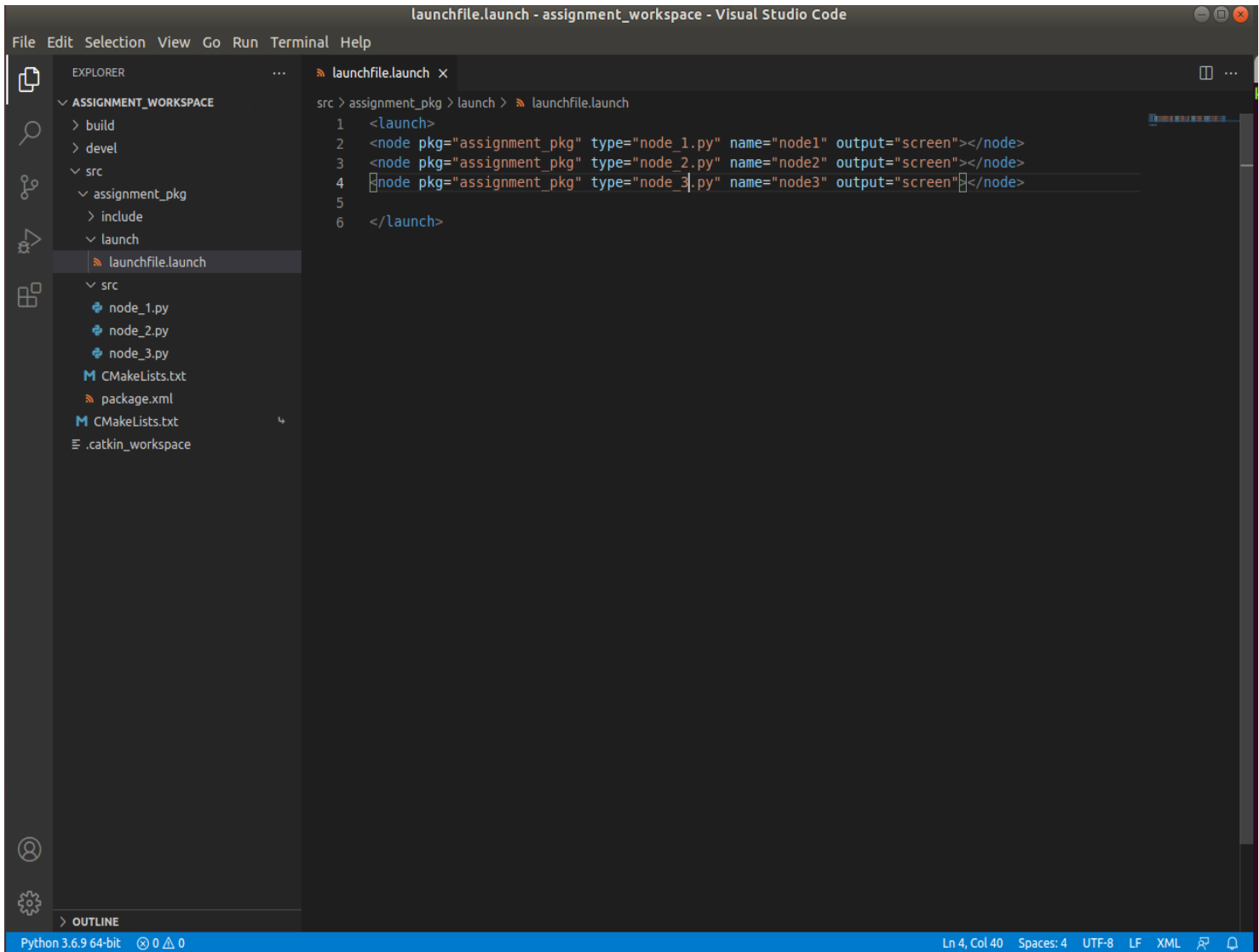
The screenshot shows the Visual Studio Code interface with a workspace named 'node\_1.py - assignment\_workspace'. The Explorer panel on the left shows the file structure, including 'src' and 'src/assignment\_pkg'. The main editor displays the code for 'node\_1.py', which is a ROS node that logs its status and sleeps. The terminal on the right shows the execution of the following commands:

```
kavish@KV08: ~/assignment_workspace/src/assignment_pkg/src$ cd src
kavish@KV08: ~/assignment_workspace/src/assignment_pkg/src$ ls
node_1.py node_2.py node_3.py
kavish@KV08: ~/assignment_workspace/src/assignment_pkg/src$ chmod +x node_1.py node_2.py node_3.py
kavish@KV08: ~/assignment_workspace/src/assignment_pkg/src$ ls
node_1.py node_2.py node_3.py
kavish@KV08: ~/assignment_workspace/src/assignment_pkg/src$
```

The status bar at the bottom indicates the Python 3.6.9 64-bit environment is active.

```
kavish@KV08: ~/assignment_workspace/devel
File Edit View Search Terminal Tabs Help
roscore http://KV08:11311/
kavish@KV08: ~/assignment_workspace/devel
kavish@KV08:~/assignment_workspace/devel$ rosrn assignment_pkg node_1.py
[INFO] [1626351132.187412]: node1 running
[INFO] [1626351132.687660]: node1 running
[INFO] [1626351133.188499]: node1 running
[INFO] [1626351133.688431]: node1 running
[INFO] [1626351134.188021]: node1 running
[INFO] [1626351134.687923]: node1 running
[INFO] [1626351135.188224]: node1 running
[INFO] [1626351135.688592]: node1 running
[INFO] [1626351136.188937]: node1 running
[INFO] [1626351136.688224]: node1 running
[INFO] [1626351137.189014]: node1 running
[INFO] [1626351137.688334]: node1 running
[INFO] [1626351138.188709]: node1 running
[INFO] [1626351138.688892]: node1 running
[INFO] [1626351139.188619]: node1 running
[INFO] [1626351139.688599]: node1 running
[INFO] [1626351140.188637]: node1 running
^Ckavish@KV08:~/assignment_workspace/devel$
```

#### 4) CREATING A LAUNCH FILE AND LAUNCHING ALL NODES AT ONCE :



The screenshot shows the Visual Studio Code interface with the file explorer on the left and the editor on the right. The file explorer shows the project structure for 'assignment\_workspace', including directories like 'build', 'devel', 'src', and 'launch'. The 'launch' directory contains the 'launchfile.launch' file. The editor displays the content of 'launchfile.launch', which is an XML file defining a launch configuration. The code is as follows:

```
src > assignment_pkg > launch > launchfile.launch
1 <launch>
2 <node pkg="assignment_pkg" type="node_1.py" name="node1" output="screen"></node>
3 <node pkg="assignment_pkg" type="node_2.py" name="node2" output="screen"></node>
4 <node pkg="assignment_pkg" type="node_3.py" name="node3" output="screen"></node>
5
6 </launch>
```

The status bar at the bottom indicates the Python 3.6.9 64-bit environment, 0 errors/warnings, and the current file is 'Ln 4, Col 40' with 'Spaces: 4', 'UTF-8', 'LF', and 'XML' encoding.

```
kavish@KV08: ~/assignment_workspace
File Edit View Search Terminal Tabs Help
roscore http://KV08:11311/
kavish@KV08: ~/assignment_workspace
kavish@KV08:~/assignment_workspace$ roslaunch assignment_pkg launchfile.launch
... logging to /home/kavish/.ros/log/de53b080-e565-11eb-8491-0800272993fe/roslaunch-KV08-4191.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://KV08:42439/

SUMMARY
=====

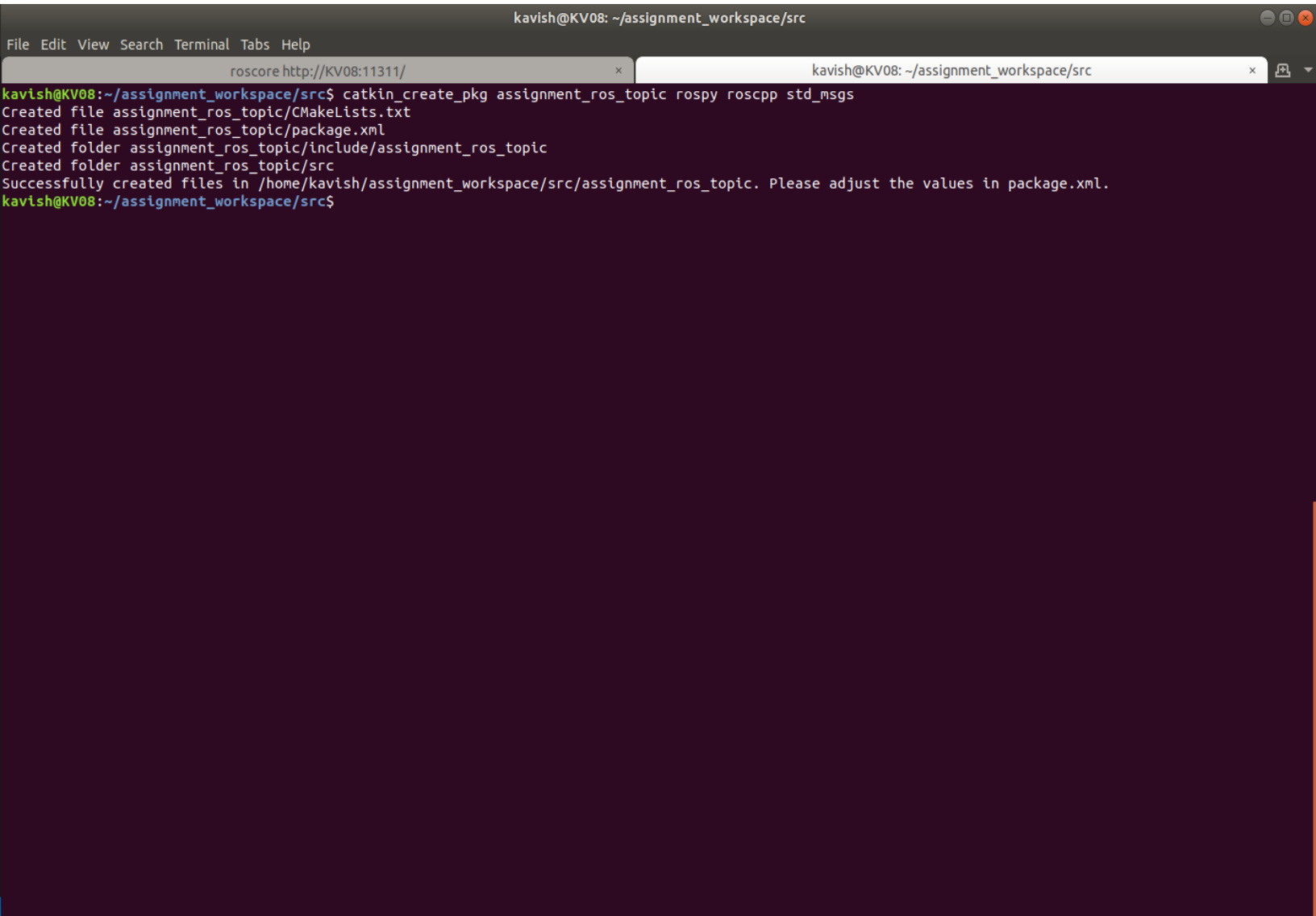
PARAMETERS
* /rostdistro: melodic
* /rosversion: 1.14.11

NODES
/
  node1 (assignment_pkg/node_1.py)
  node2 (assignment_pkg/node_2.py)
  node3 (assignment_pkg/node_3.py)

ROS_MASTER_URI=http://localhost:11311

process[node1-1]: started with pid [4206]
process[node2-2]: started with pid [4207]
process[node3-3]: started with pid [4208]
[INFO] [1626351744.365462]: node1 running
[INFO] [1626351744.391139]: node3 running
[INFO] [1626351744.400935]: node2 running
[INFO] [1626351744.866913]: node1 running
[INFO] [1626351744.891591]: node3 running
[INFO] [1626351744.901327]: node2 running
[INFO] [1626351745.366466]: node1 running
[INFO] [1626351745.391829]: node3 running
[INFO] [1626351745.401464]: node2 running
[INFO] [1626351745.866633]: node1 running
[INFO] [1626351745.891893]: node3 running
[INFO] [1626351745.901500]: node2 running
[INFO] [1626351746.365912]: node1 running
[INFO] [1626351746.391840]: node3 running
[INFO] [1626351746.401184]: node2 running
[INFO] [1626351746.866434]: node1 running
[INFO] [1626351746.891564]: node3 running
[INFO] [1626351746.901206]: node2 running
^C[node3-3] killing on exit
[node2-2] killing on exit
[node1-1] killing on exit
```

## 5) CREATING NEW ROS TOPIC, PUBLISHER NODE, SUBSCRIBER NODE AND SENDING STRING DATA



The screenshot shows a terminal window titled "kavish@KV08: ~/assignment\_workspace/src". The terminal output shows the execution of the command `catkin_create_pkg assignment_ros_topic rospy roscpp std_msgs`. The output indicates that several files and folders were created, including `assignment_ros_topic/CMakeLists.txt`, `assignment_ros_topic/package.xml`, `assignment_ros_topic/include/assignment_ros_topic`, and `assignment_ros_topic/src`. A final message states: "Successfully created files in /home/kavish/assignment\_workspace/src/assignment\_ros\_topic. Please adjust the values in package.xml." The terminal prompt is `kavish@KV08:~/assignment_workspace/src$`.

```
kavish@KV08: ~/assignment_workspace/src
File Edit View Search Terminal Tabs Help
roscore http://KV08:11311/
kavish@KV08: ~/assignment_workspace/src
kavish@KV08:~/assignment_workspace/src$ catkin_create_pkg assignment_ros_topic rospy roscpp std_msgs
Created file assignment_ros_topic/CMakeLists.txt
Created file assignment_ros_topic/package.xml
Created folder assignment_ros_topic/include/assignment_ros_topic
Created folder assignment_ros_topic/src
Successfully created files in /home/kavish/assignment_workspace/src/assignment_ros_topic. Please adjust the values in package.xml.
kavish@KV08:~/assignment_workspace/src$
```

publisher.py - assignment\_workspace - Visual Studio Code

File Edit Selection View Go Run Terminal Help

EXPLORER

- ASSIGNMENT\_WORKSPACE
  - build
  - devel
  - src
    - assignment\_pkg
    - assignment\_ros\_topic
      - include
      - src
        - publisher.py
        - subscriber.py
  - CMakeLists.txt
  - package.xml
  - CMakeLists.txt
  - .catkin\_workspace

OUTLINE

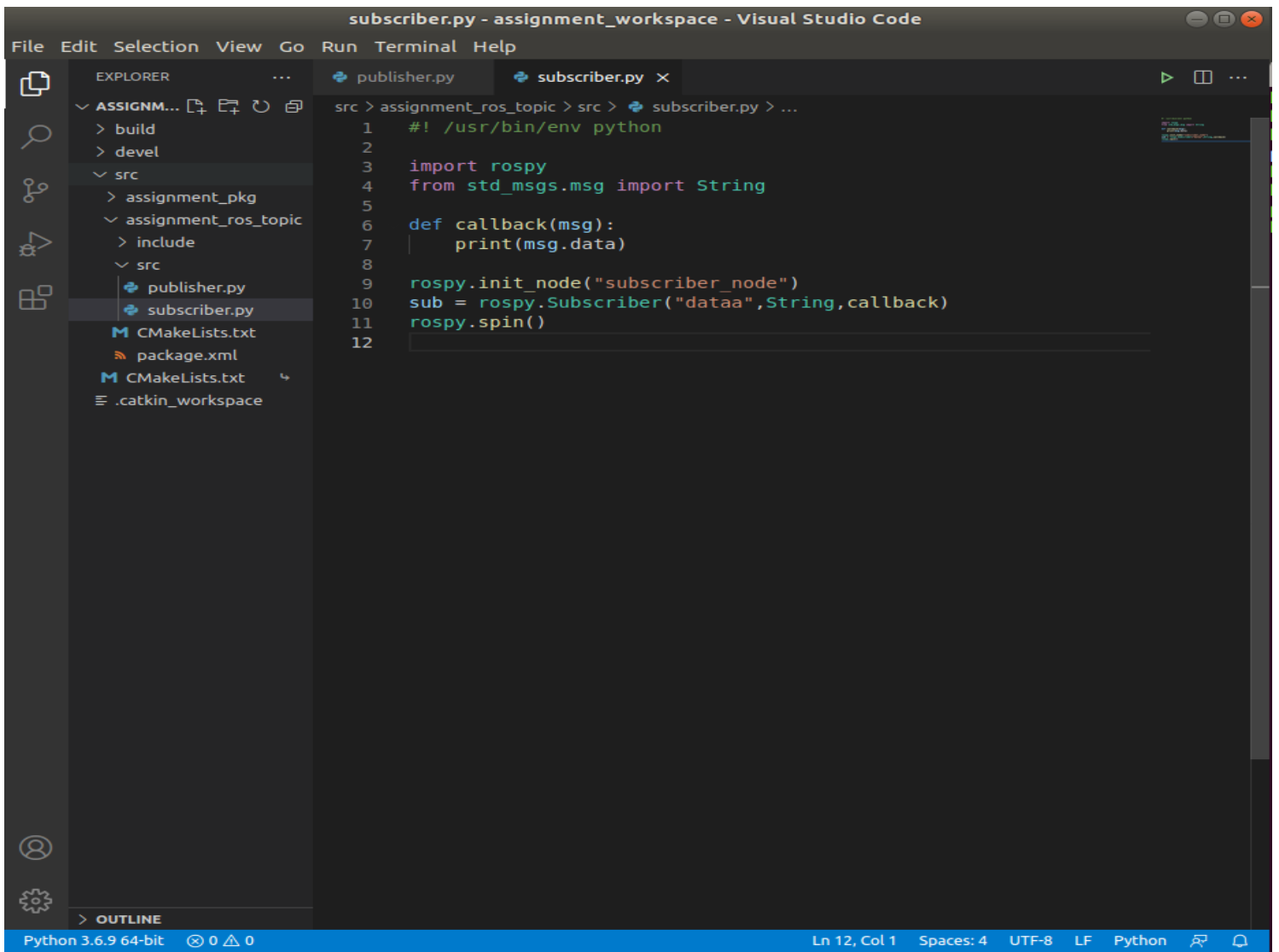
publisher.py x subscriber.py

src > assignment\_ros\_topic > src > publisher.py > ...

```
1
2  #!/usr/bin/env python
3
4  import rospy
5  from std_msgs.msg import String
6
7  rospy.init_node("publisher_node")
8  pub = rospy.Publisher("/dataa",String,queue_size=1)
9  rate = rospy.Rate(2)
10
11  dat = String()
12  dat.data = "This is my assignment"
13
14  while not rospy.is_shutdown():
15      pub.publish(dat)
16      rate.sleep()
```

Python 3.6.9 64-bit 0 0 Ln 16, Col 17 Spaces: 4 UTF-8 LF Python





## 6) Creating launch file and launching publisher and subscriber together

```
kavish@KV08: ~/assignment_workspace
File Edit View Search Terminal Tabs Help
roscore http://KV08:11311/
kavish@KV08: ~/assignment_workspace
kavish@KV08:~/assignment_workspace$ roslaunch assignment_ros_topic launchfile.launch
... logging to /home/kavish/.ros/log/de53b080-e565-11eb-8491-0800272993fe/roslaunch-KV08-4742.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://KV08:40331/

SUMMARY
=====

PARAMETERS
* /rostdistro: melodic
* /rosversion: 1.14.11

NODES
/
  publisher_node (assignment_ros_topic/publisher.py)
  subscriber_node (assignment_ros_topic/subscriber.py)

ROS_MASTER_URI=http://localhost:11311

process[publisher_node-1]: started with pid [4757]
process[subscriber_node-2]: started with pid [4758]
This is my assignment
This is my assignment
This is my assignment
This is my assignment
This is my assignment
This is my assignment
This is my assignment
This is my assignment
This is my assignment
This is my assignment
This is my assignment
^C[subscriber_node-2] killing on exit
[publisher_node-1] killing on exit
shutting down processing monitor...
... shutting down processing monitor complete
done
kavish@KV08:~/assignment_workspace$
```

Q7) Identify two ROS-based robots :

**1) Nao robot:-**

NAO is an autonomous, programmable humanoid robot.

It has the following feature:

- 25 degrees of freedom which enable him to move and adapt to his environment
- 7 touch sensors located on the head, hands and feet, sonars and an inertial unit to perceive his environment and locate himself in space.
- 4 directional microphones and speakers to interact with humans.
- Speech recognition and dialogue available in 20 languages
- Two 2D cameras to recognize shapes, objects and even people.
- Open and fully programmable platform.

**2) Elfin Robot:-**

The Elfin Robot is a 6 axis collaborative robot.

Features:

- The Elfin Robot is built from 3 different D-modules with connecting parts in between.
- The power of the Elfin is the big reach with the combination of the different payloads, this creates a lot of different options.

- The D-modules are in one line with each other which makes it possible for the robot to stand vertically and makes the robot capable of working close to its own base.
- The robot is safe because of the internal measuring system that makes sure that every impact is noticed and where needed, can stop the robot.
- The package comes with a control box which supply adequate power to the robot and the touchscreen tablet to control the robot.