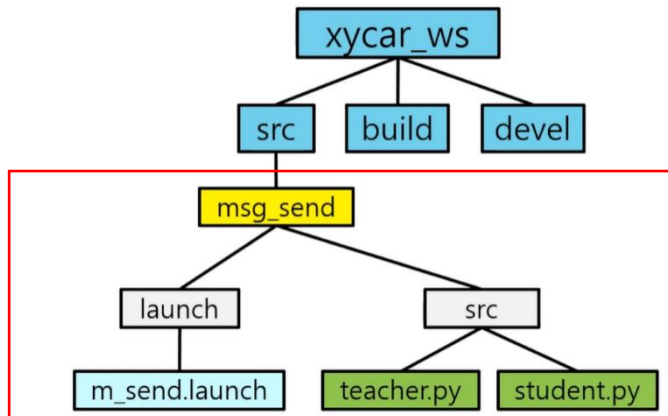


ROS 노드 통신 프로그래밍

1.1 : 1 노드 통신을 위한 패키지 만들기



Teacher.py와 student.py를 만들고 실행시키기

(1) Msg_send 패키지 만들기

soorim@soorim-virtual-machine:~/xycar_ws/src\$ catkin_create_pkg msg_send std_msgs rospy

```
soorim@soorim-virtual-machine: ~/xycar_ws/src
soorim@soorim-virtual-machine:~$ cs
soorim@soorim-virtual-machine:~/xycar_ws/src$ catkin_create_pkg msg_send std_msgs rospy
Created file msg_send/CMakeLists.txt
Created file msg_send/package.xml
Created folder msg_send/src
Successfully created files in /home/soorim/xycar_ws/src/msg_send. Please adjust
the values in package.xml.
soorim@soorim-virtual-machine:~/xycar_ws/src$
```

(2) Launch 디렉토리 만들기

```
soorim@soorim-virtual-machine:~/xycar_ws/src/msg_send$ mkdir launch
soorim@soorim-virtual-machine:~/xycar_ws/src/msg_send$ ls
CMakeLists.txt launch package.xml src
```

(3) 빌드하기

```
soorim@soorim-virtual-machine:~/xycar_ws/src/msg_send$ cm
Base path: /home/soorim/xycar_ws
Source space: /home/soorim/xycar_ws/src
Build space: /home/soorim/xycar_ws/build
Devel space: /home/soorim/xycar_ws/devel
Install space: /home/soorim/xycar_ws/install
####
#### Running command: "cmake /home/soorim/xycar_ws/src -DCATKIN_DEVEL_PREFIX=/home/soorim/xycar_ws/devel -DCMAKE_INSTALL_PREFIX=/home/soorim/xycar_ws/install -G Unix Makefiles" in "/home/soorim/xycar_ws/build"
```

cm: alias로 등록해놓음

(4) Src 폴더에 Teacher.py 와 student.py 작성

```
soorim@soorim-virtual-machine:~/xycar_ws/src/msg_send/src$ gedit teacher.py
soorim@soorim-virtual-machine:~/xycar_ws/src/msg_send/src$ gedit student.py
soorim@soorim-virtual-machine:~/xycar_ws/src/msg_send/src$ ls
student.py  teacher.py
```

-teacher.py

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

import rospy
from std_msgs.msg import String

rospy.init_node('teacher')

pub = rospy.Publisher('my_topic', String)

rate = rospy.Rate(2)

while not rospy.is_shutdown():
    pub.publish('call me please')
    rate.sleep()
```

-student.py

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

import rospy
from std_msgs.msg import String

def callback(msg):
    print msg.data

rospy.init_node('student')

sub = rospy.Subscriber('my_topic', String, callback)

rospy.spin()
```

-실행 권한 주기

```
soorim@soorim-virtual-machine:~/xycar_ws/src/msg_send/src$ chmod +x *.py
soorim@soorim-virtual-machine:~/xycar_ws/src/msg_send/src$ ls
student.py  teacher.py
```

(5) Launch 파일 만들기

```
soorim@soorim-virtual-machine:~/xycar_ws/src/msg_send/launch$ gedit m_send.launch
```

```
m_send.launch (~/xycar_ws/src/msg_send/launch) - gedit
열기(O)  저장(S)

<launch>
  <node pkg="msg_send" type="teacher.py" name="teacher"/>
  <node pkg="msg_send" type="student.py" name="student" output="screen"/>
</launch>
```

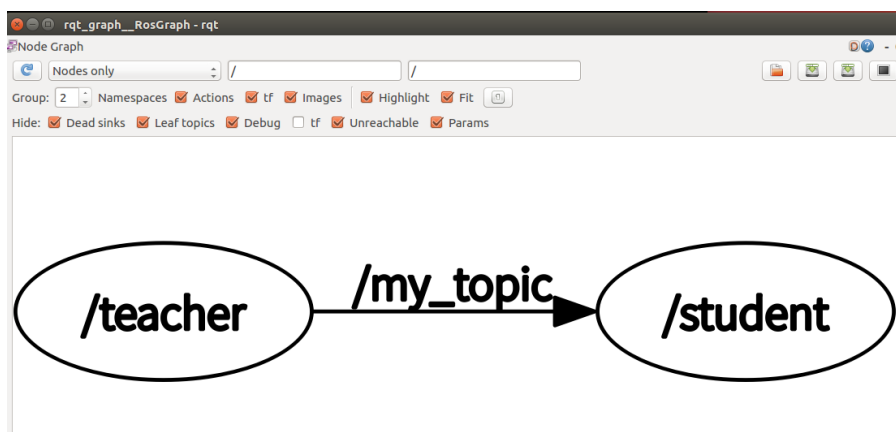
(6) 빌드

```
soorim@soorim-virtual-machine:~/xycar_ws/src/msg_send/launch$ cm
Base path: /home/soorim/xycar_ws
Source space: /home/soorim/xycar_ws/src
Build space: /home/soorim/xycar_ws/build
Devel space: /home/soorim/xycar_ws/devel
Install space: /home/soorim/xycar_ws/install
####
#### Running command: "make cmake_check_build_system" in "/home/soorim/xycar_ws/build"
####
####
#### Running command: "make -j2 -l2" in "/home/soorim/xycar_ws/build"
####
soorim@soorim-virtual-machine:~/xycar_ws$
```

(7) 실행

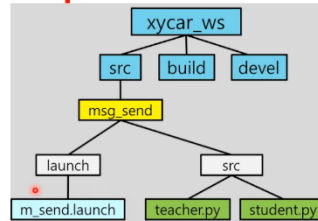
```
soorim@soorim-virtual-machine:~/xycar_ws$ roslaunch msg_send m_send.launch
```

```
setting /run_id to 2304f9ca-4438-11eb-a255-000c29068f06
process[rosout-1]: started with pid [40823]
started core service [/rosout]
process[teacher-2]: started with pid [40826]
process[student-3]: started with pid [40831]
/home/soorim/xycar_ws/src/msg_send/src/teacher.py:8: 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.
  pub = rospy.Publisher('my_topic', String)
call me please
call me please
call me please
call me please
call me please
call me please
call me please
```

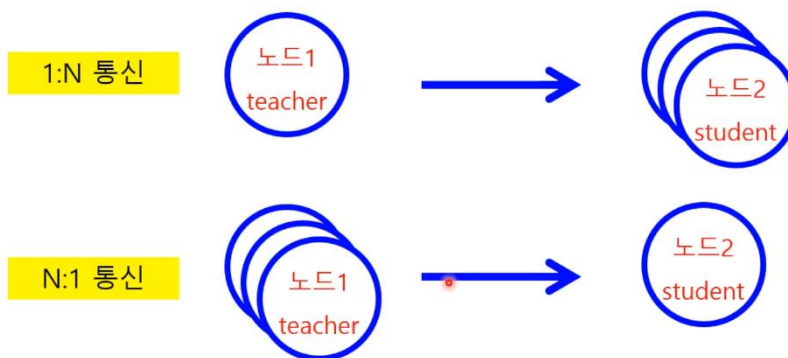


- 정리

- `$ cd ~/xycar_ws/src`
- `$ catkin_create_pkg msg_send std_msgs rospy`
- `$ mkdir launch`
- `$ cd ~/xycar_ws/src/msg_send/src`
- `$ gedit student.py`
- `$ gedit teacher.py`
- `$ chmod +x student.py teacher.py`
- `$ cd ~/xycar_ws/src/msg_send/launch`
- `$ gedit m_send.launch`
- `$ cm`
- `$ roslaunch msg_send m_send.launch`



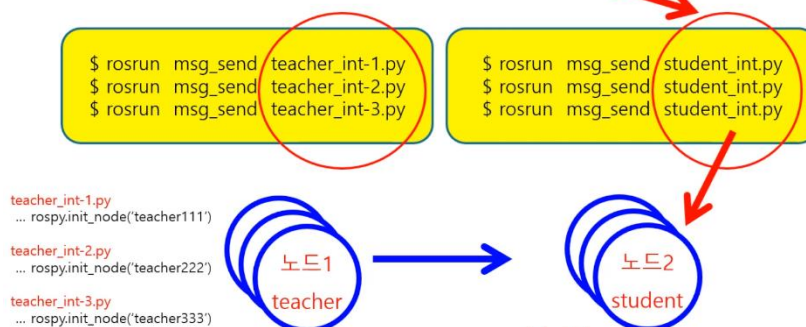
2. N: 1/ N:N 통신



하나의 코드로 여러 개의 노드를 연결하려면 각 노드의 이름을 달리해야 한다.

- 노드의 init 함수에서 `anonymous=True` 값을 넣어주면 노드 이름이 자동 설정됨

- 예시 `rospy.init_node('student', anonymous=True)`



-실습 (1 :N 통신)

String 대신에 int32값으로 count 값을 넣어서 보내기

(1) Src 파일에 teacher_int.py 와 student_int.py 만들기

```
soorim@soorim-virtual-machine:~/xycar_ws/src/msg_send/src$ cp teacher.py teacher_int.py
soorim@soorim-virtual-machine:~/xycar_ws/src/msg_send/src$ ls
student.py teacher.py teacher_int.py
soorim@soorim-virtual-machine:~/xycar_ws/src/msg_send/src$ gedit teacher_int.py
soorim@soorim-virtual-machine:~/xycar_ws/src/msg_send/src$ cp student.py student_int.py
soorim@soorim-virtual-machine:~/xycar_ws/src/msg_send/src$ gedit student_int.py
```

-teacher_int.py

```
#!/usr/bin/env python
import rospy
from std_msgs.msg import Int32

rospy.init_node('teacher')

pub = rospy.Publisher('my_topic', Int32)

rate = rospy.Rate(2)

count=1
while not rospy.is_shutdown():
    pub.publish(count)
    count+=1
    rate.sleep()
```

-student_int.py

```
#!/usr/bin/env python
import rospy
from std_msgs.msg import Int32

def callback(msg):
    print msg.data

rospy.init_node('student')

sub = rospy.Subscriber('my_topic', Int32, callback)

rospy.spin()
```

(2) Launch에 m_send_int.launch 만들기

```
soorim@soorim-virtual-machine:~/xycar_ws/src/msg_send/launch$ gedit m_send_int.launch

* m_send_int.launch (~/xycar_ws/src/msg_send/launch) - gedit

열기(O)  저장(S)

<launch>
  <node pkg="msg_send" type="teacher_int.py" name="teacher" />
  <node pkg="msg_send" type="student_int.py" name="student1" output="screen" />
  <node pkg="msg_send" type="student_int.py" name="student2" output="screen" />
  <node pkg="msg_send" type="student_int.py" name="student3" output="screen" />
</launch>
```

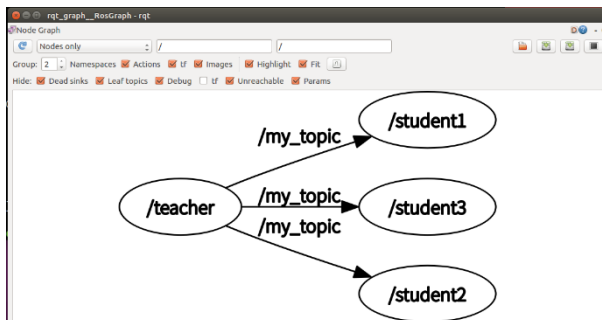
(3) 빌드

```
soorim@soorim-virtual-machine:~/xycar_ws/src/msg_send/launch$ cm
Base path: /home/soorim/xycar_ws
Source space: /home/soorim/xycar_ws/src
Build space: /home/soorim/xycar_ws/build
Devel space: /home/soorim/xycar_ws/devel
Install space: /home/soorim/xycar_ws/install
####
#### Running command: "make cmake_check_build_system" in "/home/soorim/xycar_ws/build"
####
####
#### Running command: "make -j2 -l2" in "/home/soorim/xycar_ws/build"
####
```

(4) 실행

\$ roslaunch msg_send m_send_int.launch

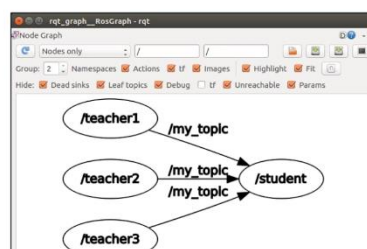
```
process[student2-4]: started with pid [41648]
process[student3-5]: started with pid [41651]
/home/soorim/xycar_ws/src/msg_send/src/teacher_int.py:8: SyntaxWarning:
ted with an explicit keyword argument 'queue_size'. Please see http://w
blishers%20and%20Subscribers for more information.
pub = rospy.Publisher('my_topic', Int32)
2
2
2
3
3
3
```



- 실습 (N : 1통신)

- Launch 파일만 바꿔서 (m_send_n1.launch)

```
<launch>
<node pkg="msg_send" type="teacher_int.py" name="teacher1"/>
<node pkg="msg_send" type="teacher_int.py" name="teacher2"/>
<node pkg="msg_send" type="teacher_int.py" name="teacher3"/>
<node pkg="msg_send" type="student_int.py" name="student" output="screen"/>
</launch>
```



- 실습 (N : N 통신)

- Launch 파일만 바꿔서 (m_send_nn.launch)

```
<launch>
  <node pkg="msg_send" type="teacher_int.py" name="teacher1"/>
  <node pkg="msg_send" type="teacher_int.py" name="teacher2"/>
  <node pkg="msg_send" type="teacher_int.py" name="teacher3"/>
  <node pkg="msg_send" type="student_int.py" name="student1" output="screen"/>
  <node pkg="msg_send" type="student_int.py" name="student2" output="screen"/>
  <node pkg="msg_send" type="student_int.py" name="student3" output="screen"/>
</launch>
```

