

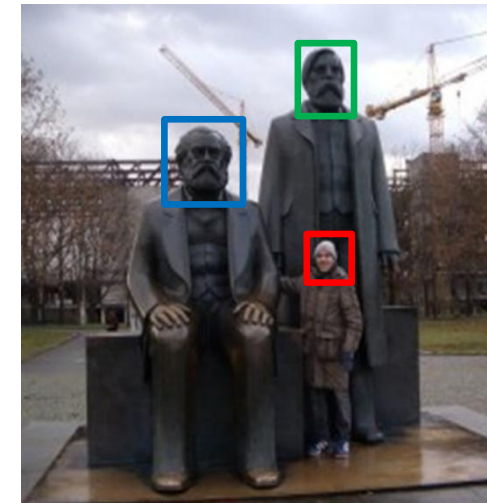
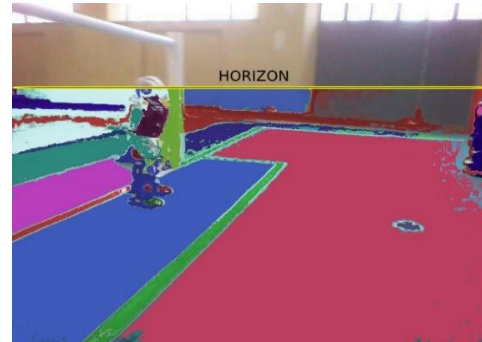
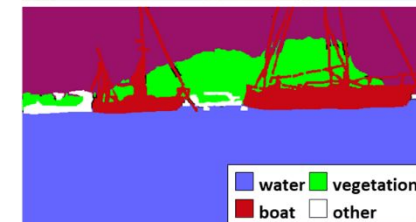


**UNIVERSITÀ DEGLI STUDI
DELLA BASILICATA**

Corso di Sistemi Informativi
A.A. 2018/19

Docente
Domenico Daniele Bloisi

rosvbag



Maggio 2019

References and credits

Queste slide si basano sul materiale contenuto nel libro

YoonSeok Pyo, HanCheol Cho, RyuWoon Jung, TaeHoon Lim,
“ROS Robot Programming - A Handbook Written by TurtleBot3 Developers”
<http://www.robotis.com/service/download.php?no=719>

rosbag

- I dati contenuti nei messaggi ROS possono essere registrati in appositi file
- Il file che contiene i messaggi prende il nome di **bag** e ha l'estensione “.bag”
- Il vantaggio offerto dai file di bag è quello di avere una registrazione che può essere utilizzata **più volte**, riproducendo ogni volta l'esatto scenario operativo in cui la bag è stata registrata

rosvag per i dati dei sensori

- Un esempio dell'utilità dei file di bag è dato dalla registrazione dei messaggi contenenti i dati prodotti dai sensori del robot
- Durante gli esperimenti con il robot reale, i dati dei sensori possono essere registrati in una bag
- I messaggi registrati possono essere poi caricati senza la necessità di ripetere l'esperimento, permettendo così di sviluppare con maggiore facilità algoritmi che richiedano modifiche frequenti dei parametri

Usare rosbag

`rosbag` è un package ROS per creare, riprodurre e comprimere bag di messaggi. Una bag è un file contenente i dati relativi a messaggi serializzati

- `rosbag record` □ record all the topics
- `rosbag info bag-name` □ info on the recorded bag
- `rosbag play --pause bag-name` □ play the recorded bag, starting paused
- `rosbag play -r #number bag-name` □ play the recorded bag at rate #number

Comandi rosbag

Command	Description
<code>rosbag record [OPTION] [TOPIC_NAME]</code>	Record the message of a specific topic on the bsg file
<code>rosbag info [FILE_NAME]</code>	Check information of a bag file
<code>rosbag play [FILE_NAME]</code>	Play a specific bag file
<code>rosbag compress [FILE_NAME]</code>	Compress a specific bag file
<code>rosbag decompress [FILE_NAME]</code>	Decompresses a specific bag file
<code>rosbag filter [INPUT_FILE] [OUTPUT_FILE] [OPTION]</code>	Create a new bag file with the specific content removed
<code>rosbag reindex bag [FILE_NAME]</code>	Reindex
<code>rosbag check bag [FILE_NAME]</code>	Check if the specific bag file can be played in the current system
<code>rosbag fix [INPUT_FILE] [OUTPUT_FILE] [OPTION]</code>	Fix the bag file version that was saved as an incompatible version

Esempio rosbag

Apriamo un
terminal e
digitiamo
\$ roscore

```
roscore http://localhost:11311/
bloisi@bloisi-U36SG:~$ roscore
... logging to /home/bloisi/.ros/log/4d85da46-576b-11e8-9e4c-2709ac87ed01/roslau
nch-bloisi-U36SG-2511.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://localhost:38804/
ros_comm version 1.12.13

SUMMARY
=====

PARAMETERS
* /rostdistro: kinetic
* /rosversion: 1.12.13

NODES

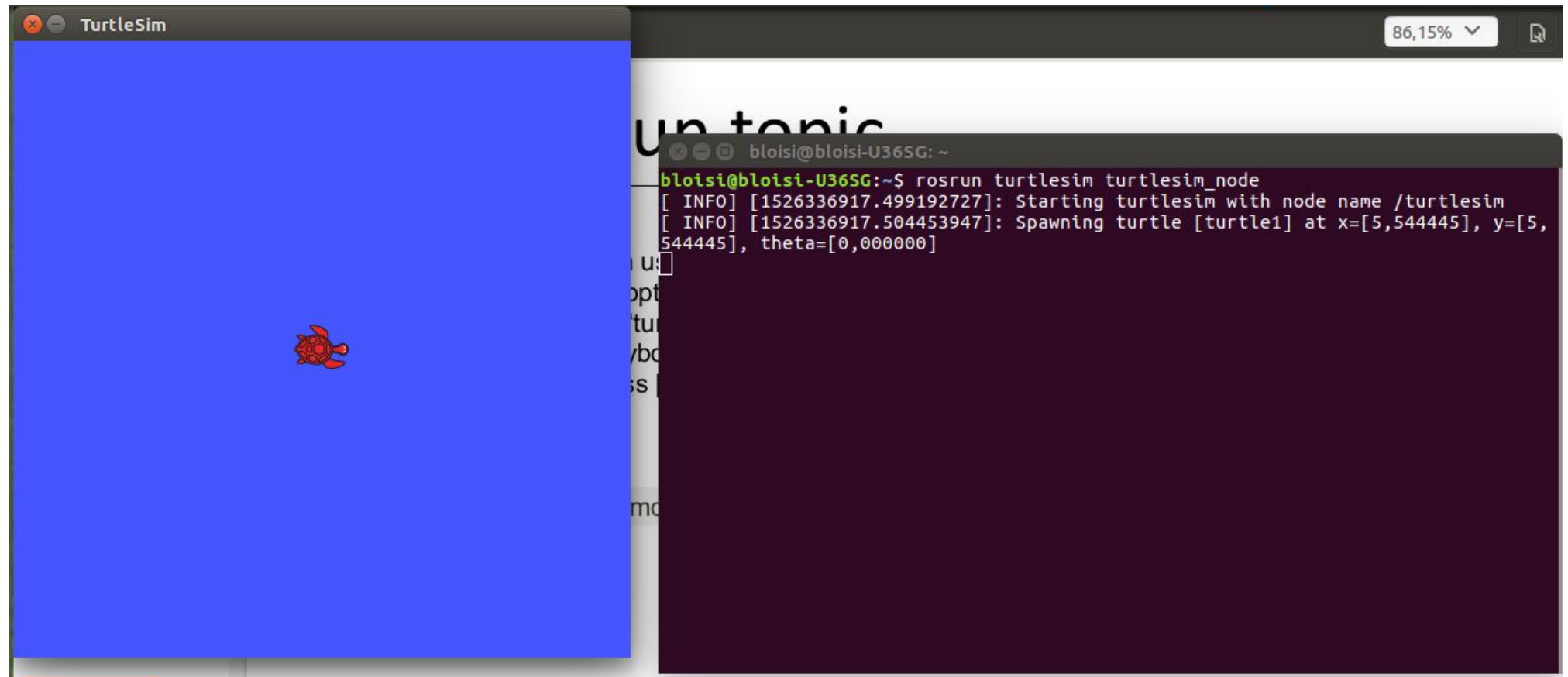
auto-starting new master
process[master]: started with pid [2523]
ROS_MASTER_URI=http://localhost:11311/

setting /run_id to 4d85da46-576b-11e8-9e4c-2709ac87ed01
process[roscout-1]: started with pid [2536]
started core service [/roscout]
```

Esempio rosbag – turtlesim

Apriamo un secondo terminal e digitiamo

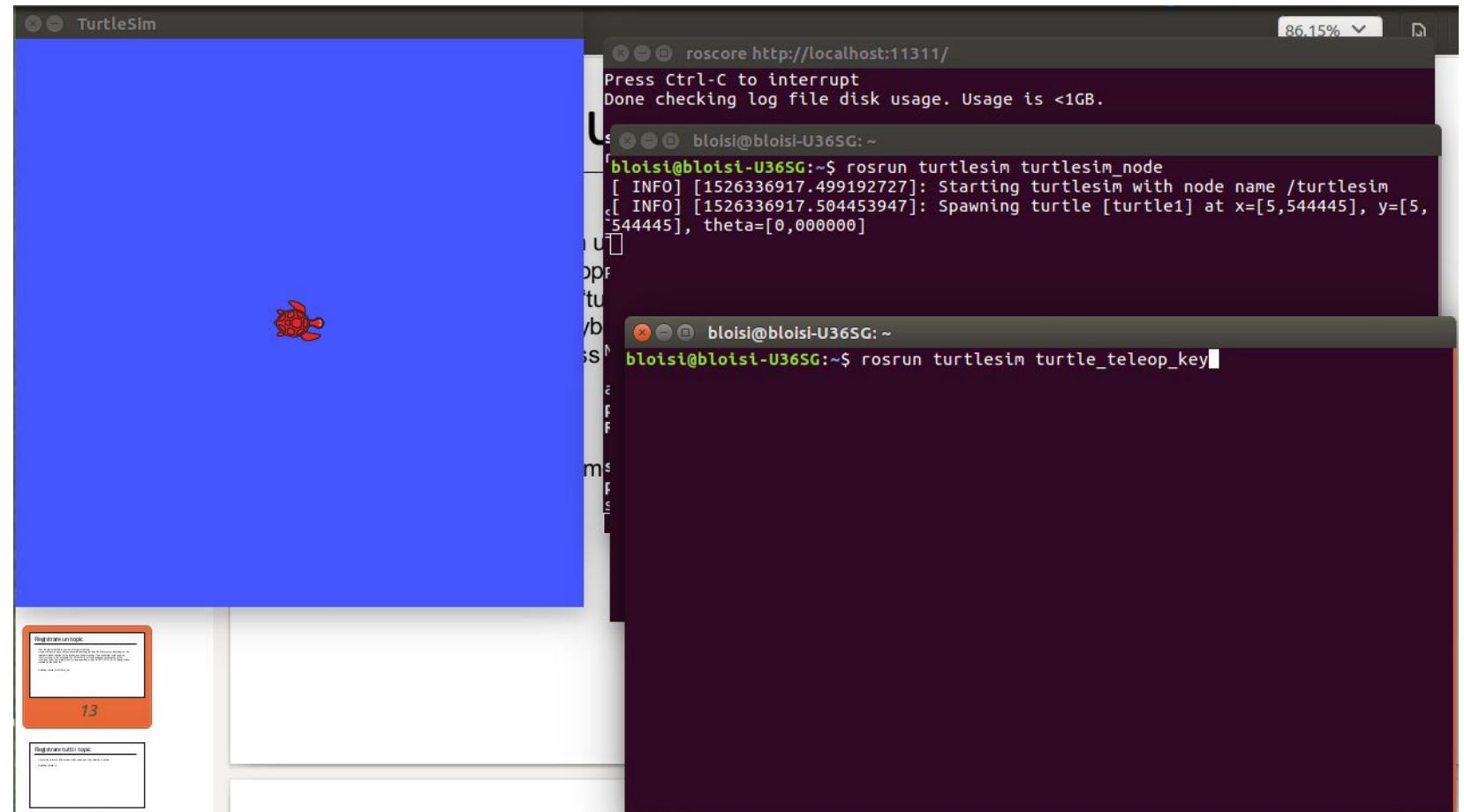
```
$ rosrun turtlesim turtlesim_node
```



Esempio rosbag - teleop

Apriamo un terzo terminal e digitiamo

```
$ rosrun turtlesim turtle_teleop_key
```

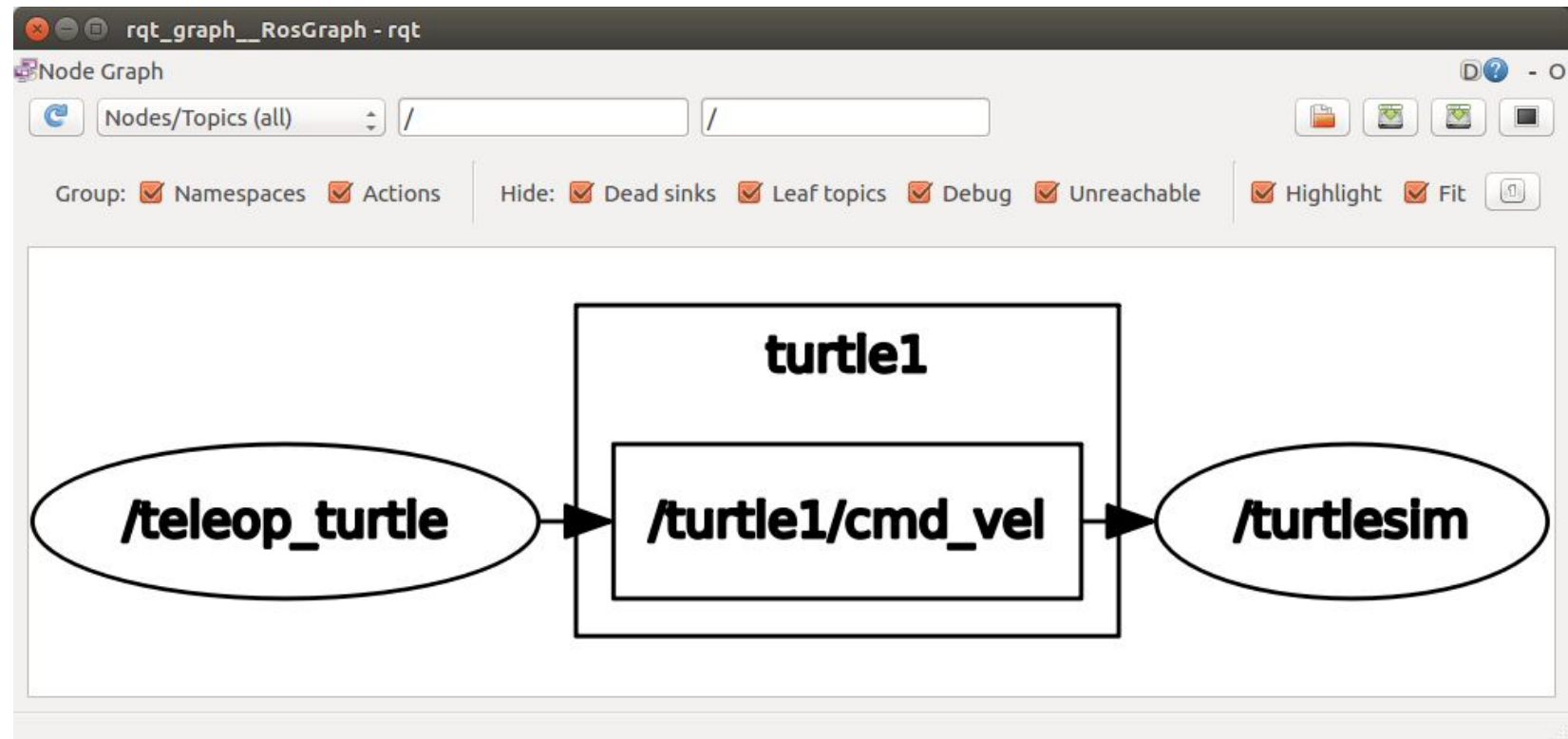


rqt_graph

Apriamo un quarto terminal e digitiamo

```
$ rqt_graph
```

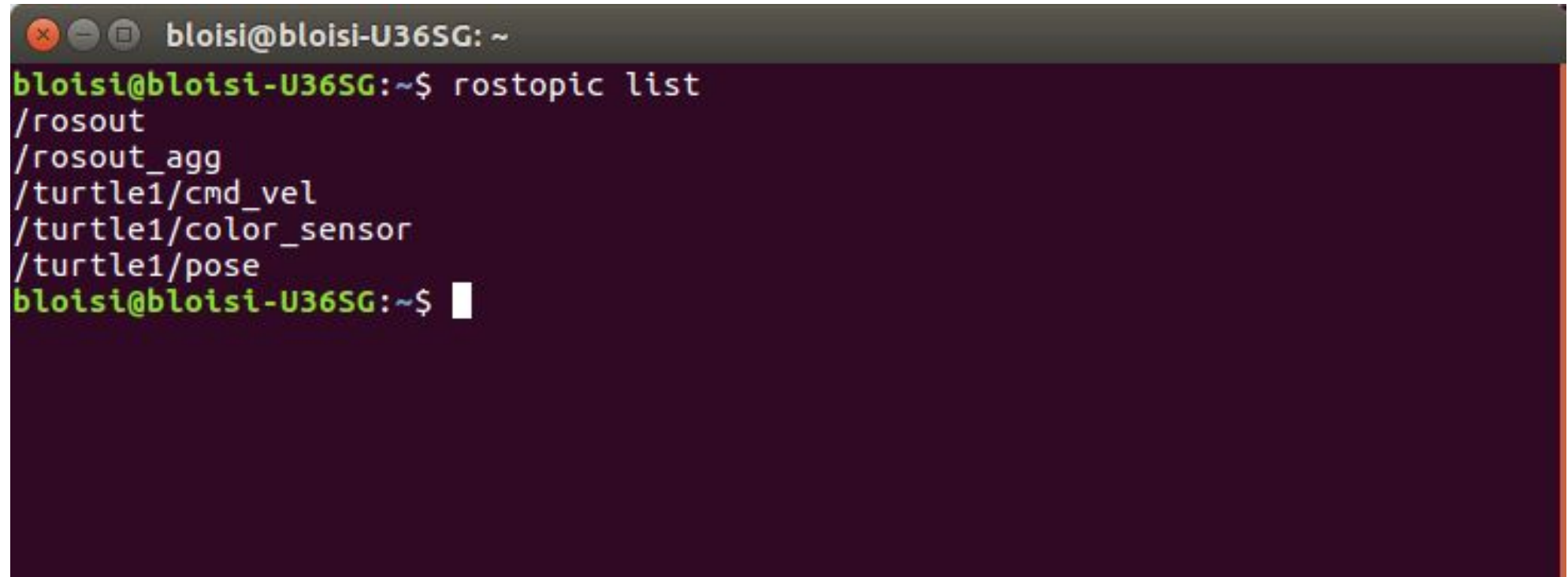
per verificare che i due nodi siano in collegamento tra loro



rostopic

Controlliamo anche a lista dei topic attivi

```
$ rostopic list
```

A terminal window with a dark purple background and a grey title bar. The title bar contains window control icons and the text 'bloisi@bloisi-U36SG: ~'. The terminal shows the command 'rostopic list' being executed, followed by a list of active ROS topics: '/rosout', '/rosout_agg', '/turtle1/cmd_vel', '/turtle1/color_sensor', and '/turtle1/pose'. The prompt returns to '\$' after the output.

```
bloisi@bloisi-U36SG: ~$ rostopic list
/rosout
/rosout_agg
/turtle1/cmd_vel
/turtle1/color_sensor
/turtle1/pose
bloisi@bloisi-U36SG: ~$
```

Registrare un topic

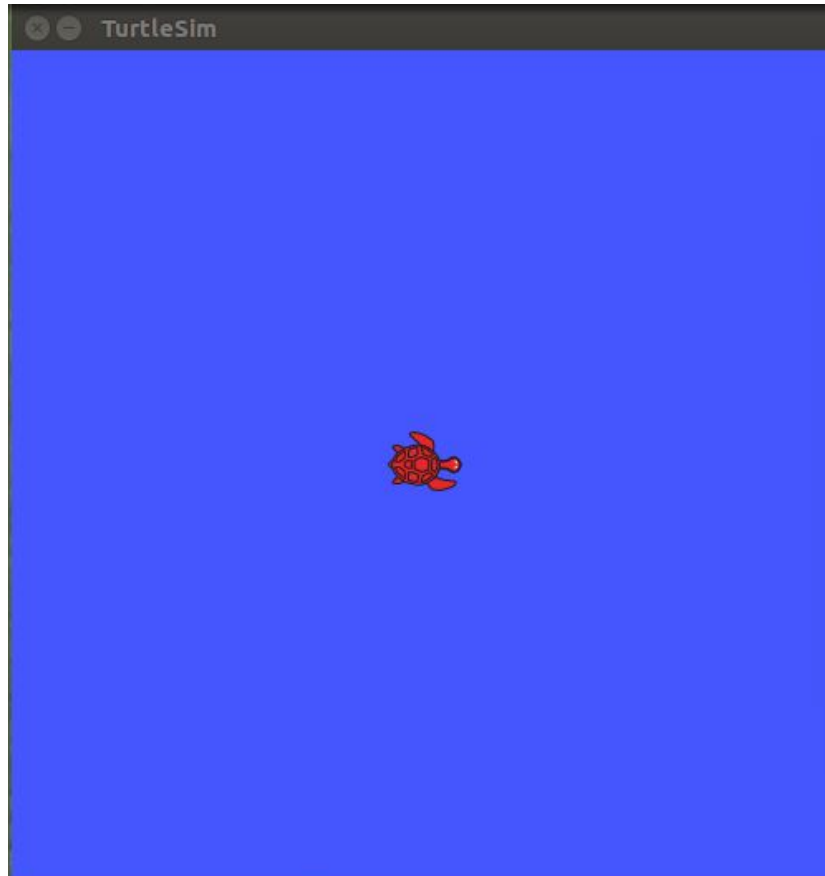
Tra tutti i topic attivi, possiamo scegliere quali registrare usando i comandi e le opzioni di rosbag

```
rosbag record <topic name>
```

Per esempio, per registrare i comandi inviati tramite `cmd_vel` digitiamo

```
$ rosbag record /turtle1/cmd_vel
```

Esempio - Registrare un topic



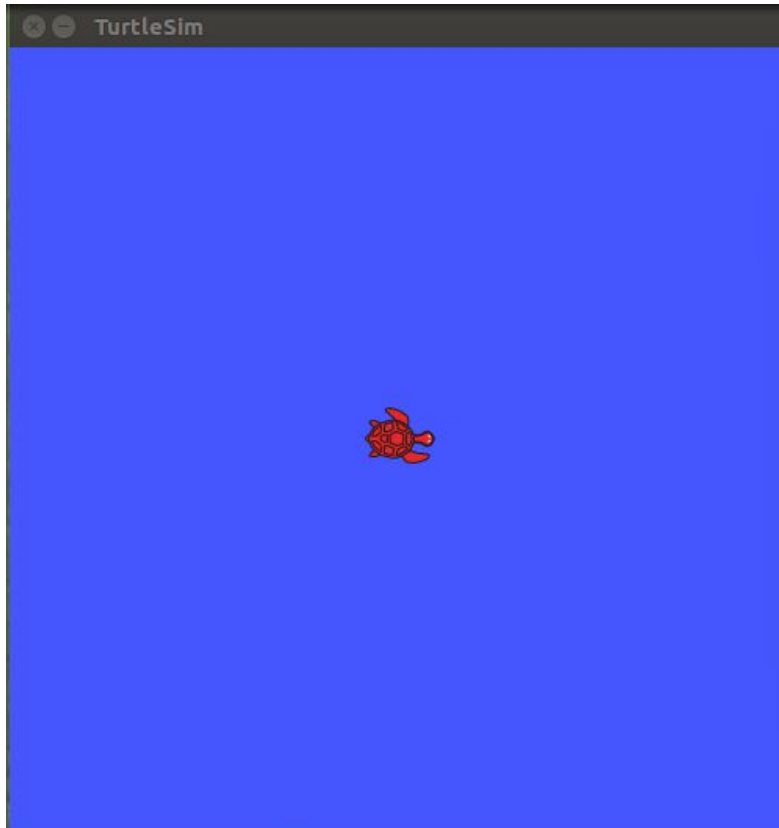
```
roscore http://localhost:11311/
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.

bloisi@bloisi-U36SG: ~
bloisi@bloisi-U36SG:~$ roslaunch turtlesim turtlesim_node
[ INFO] [1526336917.499192727]: Starting turtlesim with node name /turtlesim
[ INFO] [1526336917.504453947]: Spawning turtle [turtle1] at x=[5,544445], y=[5,544445], theta=[0,000000]

bloisi@bloisi-U36SG: ~
bloisi@bloisi-U36SG:~$ roslaunch turtlesim turtle_teleop_key
Reading from keyboard
-----
Use arrow keys to move the turtle.

bloisi@bloisi-U36SG: ~
bloisi@bloisi-U36SG:~$ rostopic list
/rosout
/rosout_agg
/turtle1/cmd_vel
/turtle1/color_sensor
/turtle1/pose
bloisi@bloisi-U36SG:~$ rosbag record /turtle1/cmd_vel
```

Esempio – Registrazione in corso...



```
roscore http://localhost:11311/
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.

bloisi@bloisi-U36SG: ~
bloisi@bloisi-U36SG:~$ rosrunc turtlesim turtlesim_node
[ INFO] [1526336917.499192727]: Starting turtlesim with node name /turtlesim
[ INFO] [1526336917.504453947]: Spawning turtle [turtle1] at x=[5,544445], y=[5,544445], theta=[0,000000]

bloisi@bloisi-U36SG: ~
bloisi@bloisi-U36SG:~$ rosrunc turtlesim turtle_teleop_key
Reading from keyboard
-----
Use arrow keys to move the turtle.

bloisi@bloisi-U36SG: ~
bloisi@bloisi-U36SG:~$ rostopic list
/rosout
/rosout_agg
/turtle1/cmd_vel
/turtle1/color_sensor
/turtle1/pose
bloisi@bloisi-U36SG:~$ rosbag record /turtle1/cmd_vel
[ INFO] [1526337037.406675213]: Subscribing to /turtle1/cmd_vel
[ INFO] [1526337037.414123426]: Recording to 2018-05-15-00-30-37.bag.
```

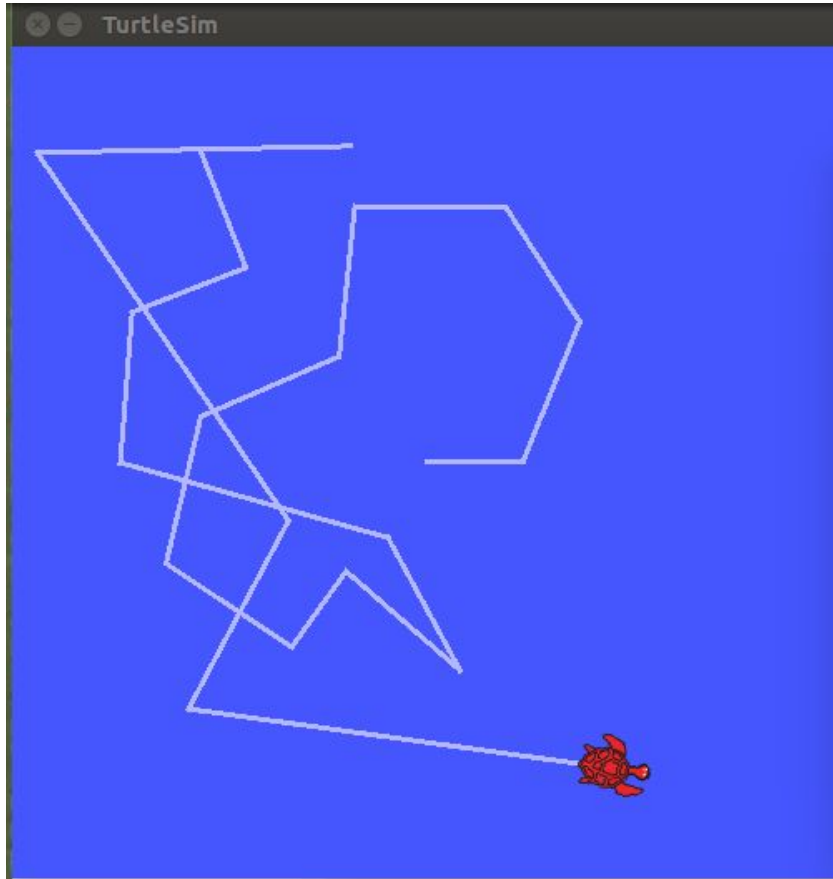

Registrazione tutti i topic

Se si vogliono registrare tutti i topic attivi, si può usare
l'opzione `-a`

```
$ rosbag record -a
```

Terminare la registrazione

[Ctrl-C] ci permette di terminare la registrazione della bag

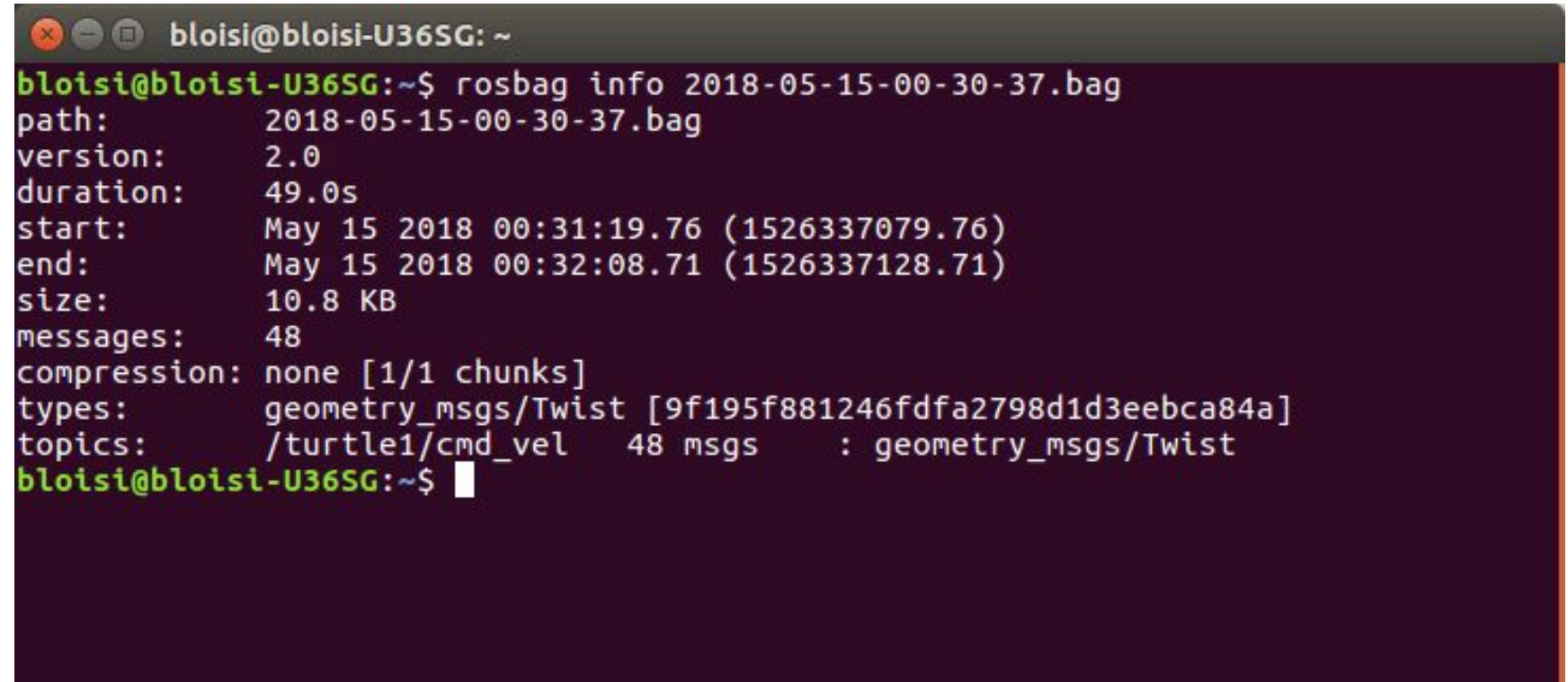


```
bloisi@bloisi-U36SG: ~  
bloisi@bloisi-U36SG:~$ rostopic list  
/rosout  
/rosout_agg  
/turtle1/cmd_vel  
/turtle1/color_sensor  
/turtle1/pose  
bloisi@bloisi-U36SG:~$ rosbag record /turtle1/cmd_vel  
[ INFO] [1526337037.406675213]: Subscribing to /turtle1/cmd_vel  
[ INFO] [1526337037.414123426]: Recording to 2018-05-15-00-30-37.bag.  
^Cbloisi@bloisi-U36SG:~$
```

rosvag info

Il comando info stampa a video informazioni sulla bag fornita come parametro. Nel nostro esempio, avremo informazioni sul file 2018-05-15-00-30-37.bag digitando

```
$ rosvag info 2018-05-15-00-30-37.bag
```

A terminal window with a dark background and light-colored text. The window title is 'bloisi@bloisi-U36SG: ~'. The prompt is 'bloisi@bloisi-U36SG:~\$'. The command 'rosvag info 2018-05-15-00-30-37.bag' has been entered. The output shows various metadata for the bag file, including path, version, duration, start/end times, size, number of messages, compression status, types, and topics.

```
bloisi@bloisi-U36SG:~$ rosvag info 2018-05-15-00-30-37.bag
path:      2018-05-15-00-30-37.bag
version:   2.0
duration:  49.0s
start:     May 15 2018 00:31:19.76 (1526337079.76)
end:       May 15 2018 00:32:08.71 (1526337128.71)
size:      10.8 KB
messages:  48
compression: none [1/1 chunks]
types:     geometry_msgs/Twist [9f195f881246fdfa2798d1d3eebca84a]
topics:    /turtle1/cmd_vel  48 msgs      : geometry_msgs/Twist
bloisi@bloisi-U36SG:~$
```

rosvag play

Ora che la bag è stata registrata, possiamo provare a riprodurla tramite

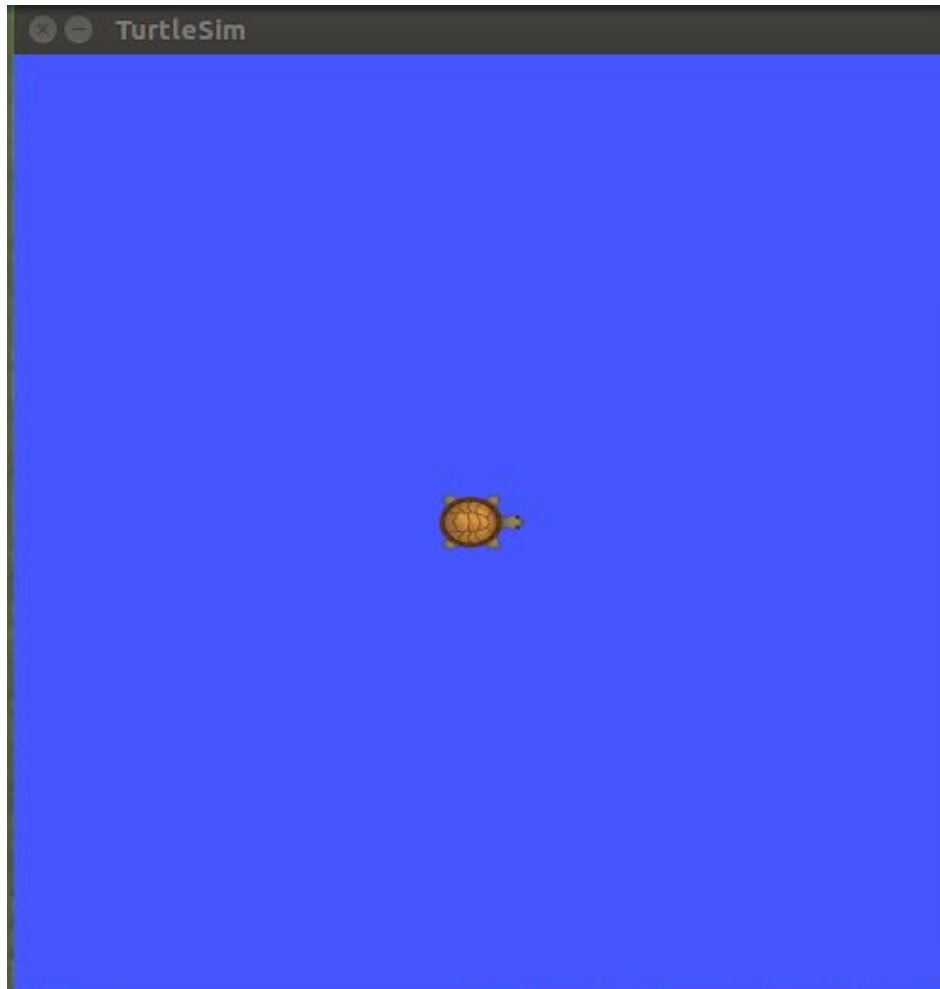
```
rosvag play <bagfile name>
```

Per esempio, per riprodurre la nostra bag

1. Terminiamo tutti i nodi attivi
2. Lanciamo il nodo turtlesim_node
3. Digitiamo

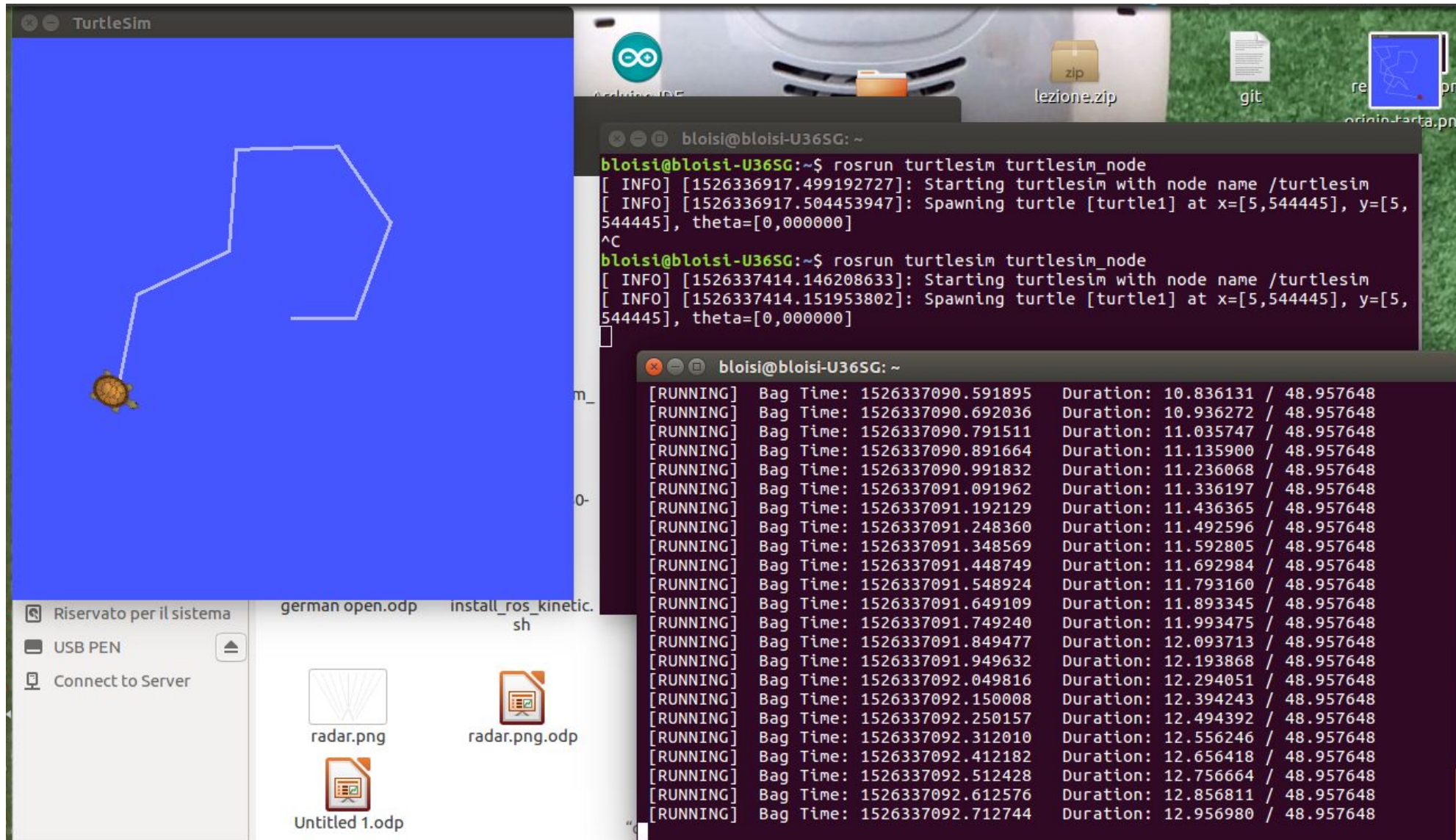
```
$ rosvag play 2018-05-15-00-30-37.bag
```

roslaunch play – esecuzione



```
bloisi@bloisi-U36SG: ~  
bloisi@bloisi-U36SG:~$ roslaunch turtlesim turtlesim_node  
[ INFO] [1526336917.499192727]: Starting turtlesim with node name /turtlesim  
[ INFO] [1526336917.504453947]: Spawning turtle [turtle1] at x=[5,544445], y=[5,544445], theta=[0,000000]  
^C  
bloisi@bloisi-U36SG:~$ roslaunch turtlesim turtlesim_node  
[ INFO] [1526337414.146208633]: Starting turtlesim with node name /turtlesim  
[ INFO] [1526337414.151953802]: Spawning turtle [turtle1] at x=[5,544445], y=[5,544445], theta=[0,000000]  
□  
bloisi@bloisi-U36SG: ~  
bloisi@bloisi-U36SG:~$ rosbag play 2018-05-15-00-30-37.bag
```


roslaunch play – esecuzione in corso



rosbag play – risultato finale



```
bloisi@bloisi-U36SG: ~  
bloisi@bloisi-U36SG:~$ rosrund turtlesim turtlesim_node  
[ INFO] [1526336917.499192727]: Starting turtlesim with node name /turtlesim  
[ INFO] [1526336917.504453947]: Spawning turtle [turtle1] at x=[5,544445], y=[5,544445], theta=[0,000000]  
^C  
bloisi@bloisi-U36SG:~$ rosrund turtlesim turtlesim_node  
[ INFO] [1526337414.146208633]: Starting turtlesim with node name /turtlesim  
[ INFO] [1526337414.151953802]: Spawning turtle [turtle1] at x=[5,544445], y=[5,544445], theta=[0,000000]  
□
```

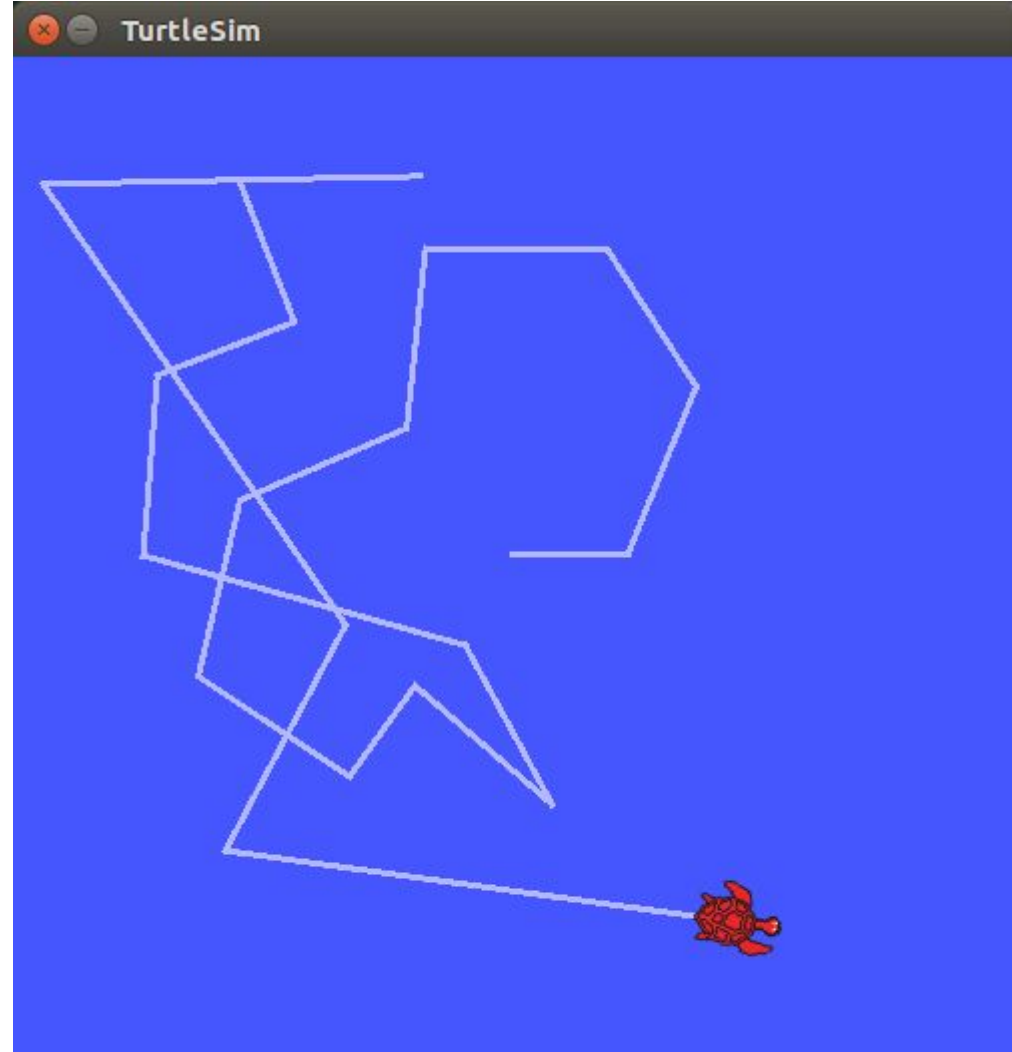
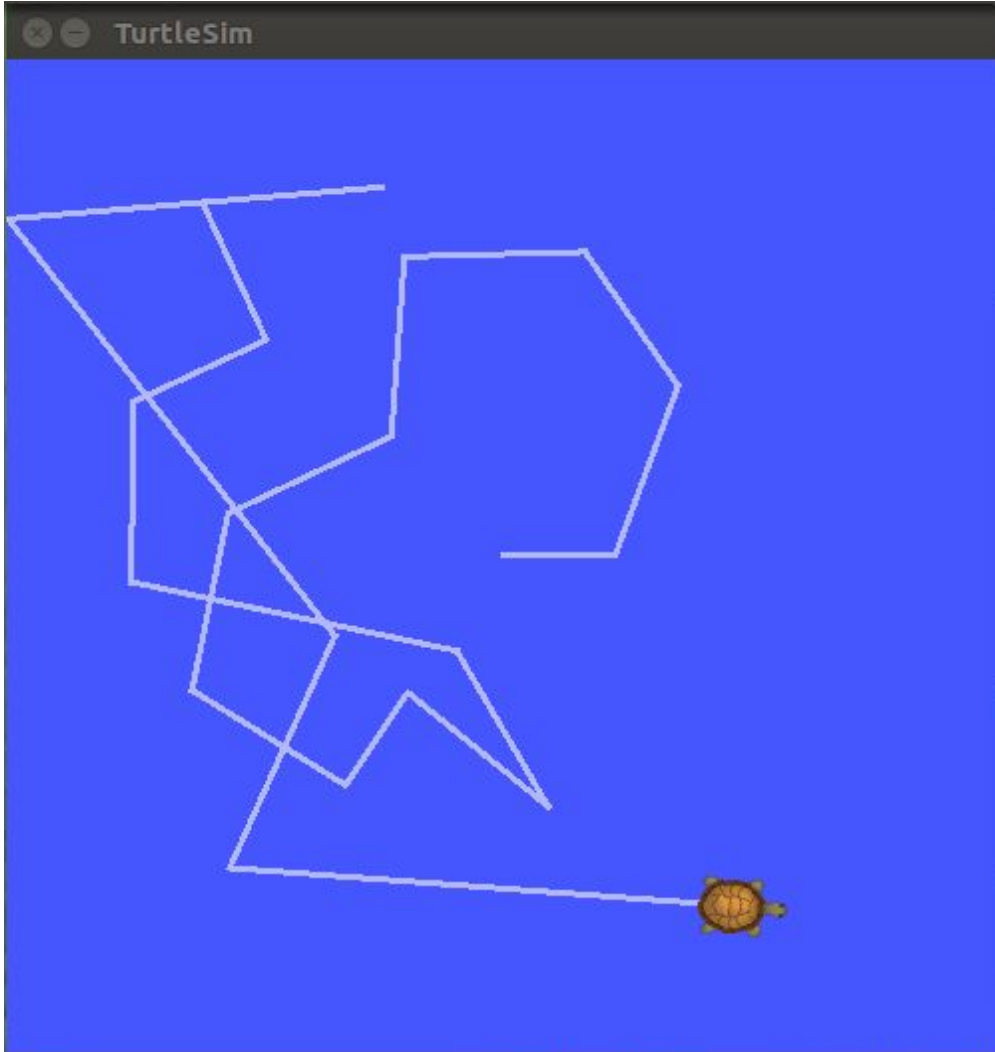
```
bloisi@bloisi-U36SG: ~  
[RUNNING] Bag Time: 1526337126.557608 Duration: 46.801843 / 48.957648  
[RUNNING] Bag Time: 1526337126.657763 Duration: 46.901998 / 48.957648  
[RUNNING] Bag Time: 1526337126.757943 Duration: 47.002178 / 48.957648  
[RUNNING] Bag Time: 1526337126.858106 Duration: 47.102342 / 48.957648  
[RUNNING] Bag Time: 1526337126.958296 Duration: 47.202532 / 48.957648  
[RUNNING] Bag Time: 1526337127.058506 Duration: 47.302742 / 48.957648  
[RUNNING] Bag Time: 1526337127.158664 Duration: 47.402900 / 48.957648  
[RUNNING] Bag Time: 1526337127.258812 Duration: 47.503048 / 48.957648  
[RUNNING] Bag Time: 1526337127.358996 Duration: 47.603232 / 48.957648  
[RUNNING] Bag Time: 1526337127.459208 Duration: 47.703444 / 48.957648  
[RUNNING] Bag Time: 1526337127.559368 Duration: 47.803604 / 48.957648  
[RUNNING] Bag Time: 1526337127.659556 Duration: 47.903791 / 48.957648  
[RUNNING] Bag Time: 1526337127.759781 Duration: 48.004016 / 48.957648  
[RUNNING] Bag Time: 1526337127.857417 Duration: 48.101653 / 48.957648  
[RUNNING] Bag Time: 1526337127.957637 Duration: 48.201872 / 48.957648  
[RUNNING] Bag Time: 1526337128.057879 Duration: 48.302115 / 48.957648  
[RUNNING] Bag Time: 1526337128.158112 Duration: 48.402348 / 48.957648  
[RUNNING] Bag Time: 1526337128.258319 Duration: 48.502555 / 48.957648  
[RUNNING] Bag Time: 1526337128.358572 Duration: 48.602807 / 48.957648  
[RUNNING] Bag Time: 1526337128.458740 Duration: 48.702976 / 48.957648  
[RUNNING] Bag Time: 1526337128.558883 Duration: 48.803119 / 48.957648
```

Done.

```
bloisi@bloisi-U36SG:~$
```



roslaunch play – confronto



I bag file possono essere molto grandi

Un bag file registrato per un breve periodo di tempo comporta la creazione di file aventi dimensioni contenute

Se, invece, si ha bisogno di registrare messaggi per un lungo periodo di tempo, allora la dimensione del bag file può crescere fino ad occupare molta memoria

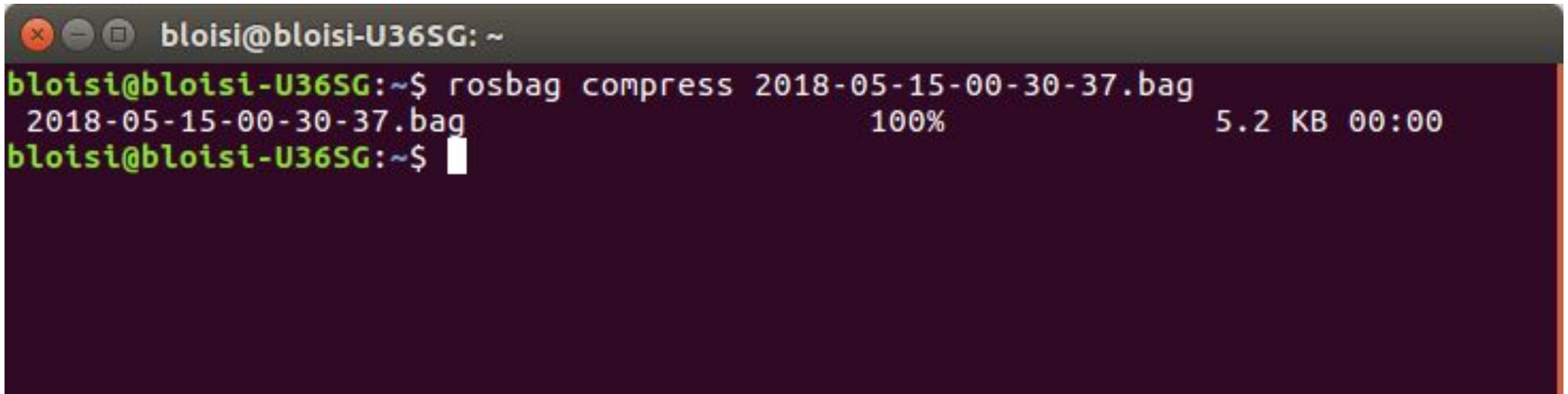
Si provi per esempio a scaricare la ROS bag a questo indirizzo

https://drive.google.com/file/d/1F8pd_Cc5n67cMkWdvTZphpi7zecRJDEJ/view?usp=sharing

rosvag compress

ROS fornisce la possibilità di comprimere i bag file grazie all'opzione `compress`

```
$ rosvag compress 2018-05-15-00-30-37.bag
```

A terminal window with a dark purple background and a grey title bar. The title bar contains three window control icons (close, minimize, maximize) and the text 'bloisi@bloisi-U36SG: ~'. The terminal shows the command 'bloisi@bloisi-U36SG:~\$ rosvag compress 2018-05-15-00-30-37.bag' being executed. Below the command, the progress of the compression is shown as '2018-05-15-00-30-37.bag' followed by '100%' and '5.2 KB 00:00'. The prompt 'bloisi@bloisi-U36SG:~\$' is visible again on the next line with a white cursor.

```
bloisi@bloisi-U36SG: ~  
bloisi@bloisi-U36SG:~$ rosvag compress 2018-05-15-00-30-37.bag  
2018-05-15-00-30-37.bag          100%          5.2 KB 00:00  
bloisi@bloisi-U36SG:~$
```

rosvag compress – esecuzione

```
bloisi@bloisi-U36SG: ~  
bloisi@bloisi-U36SG:~$ rosvag compress 2018-05-15-00-30-37.bag  
2018-05-15-00-30-37.bag          100%          5.2 KB 00:00  
bloisi@bloisi-U36SG:~$ ls  
2018-05-15-00-30-37.bag  
2018-05-15-00-30-37.orig.bag
```

rosvag decompress

Per riportare il bag file al suo formato originale, è possibile utilizzare `decompress`

```
$ rosvag decompress 2018-05-15-00-30-37.bag
```


rosvag con immagini

Una bag può contenere qualunque tipo di dato sia possibile inviare tramite i messaggi ROS

Le bag possono essere molto utili per la registrazioni di dati provenienti da telecamere montate su robot

In particolare, essendo presente un timestamp per ogni immagine, è possibile riprodurre fedelmente lo stream dati del sensore usato per effettuare le riprese

Image message

sensor_msgs/Image Message

File: `sensor_msgs/Image.msg`

Raw Message Definition

```
# This message contains an uncompressed image
# (0, 0) is at top-left corner of image
#

Header header          # Header timestamp should be acquisition time of image
                        # Header frame_id should be optical frame of camera
                        # origin of frame should be optical center of camera
                        # +x should point to the right in the image
                        # +y should point down in the image
                        # +z should point into to plane of the image
                        # If the frame_id here and the frame_id of the CameraInfo
                        # message associated with the image conflict
                        # the behavior is undefined

uint32 height          # image height, that is, number of rows
uint32 width           # image width, that is, number of columns

# The legal values for encoding are in file src/image_encodings.cpp
# If you want to standardize a new string format, join
# ros-users@lists.sourceforge.net and send an email proposing a new encoding.

string encoding         # Encoding of pixels -- channel meaning, ordering, size
                        # taken from the list of strings in include/sensor_msgs/image_encodings.h
```

http://docs.ros.org/kinetic/api/sensor_msgs/html/msg/Image.html

cv_bridge



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[vision_opencv](#): [cv_bridge](#) | [image_geometry](#)

Package Summary

✓ Released ✓ Continuous Integration ✓ Documented

This contains CvBridge, which converts between ROS Image messages and OpenCV images.

- Maintainer status: maintained
- Maintainer: Vincent Rabaud <vincent.rabaud AT gmail DOT com>
- Author: Patrick Mihelich, James Bowman
- License: BSD
- Bug / feature tracker: https://github.com/ros-perception/vision_opencv/issues
- Source: git https://github.com/ros-perception/vision_opencv.git (branch: kinetic)

Package Links

[Code API](#)

[Tutorials](#)

[FAQ](#)

[Changelog](#)

[Change List](#)

[Reviews](#)

[Dependencies](#) (4)

[Used by](#) (128)

[Jenkins jobs](#) (10)

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[ROS/Tutorials](#)

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[cv_bridge](#)

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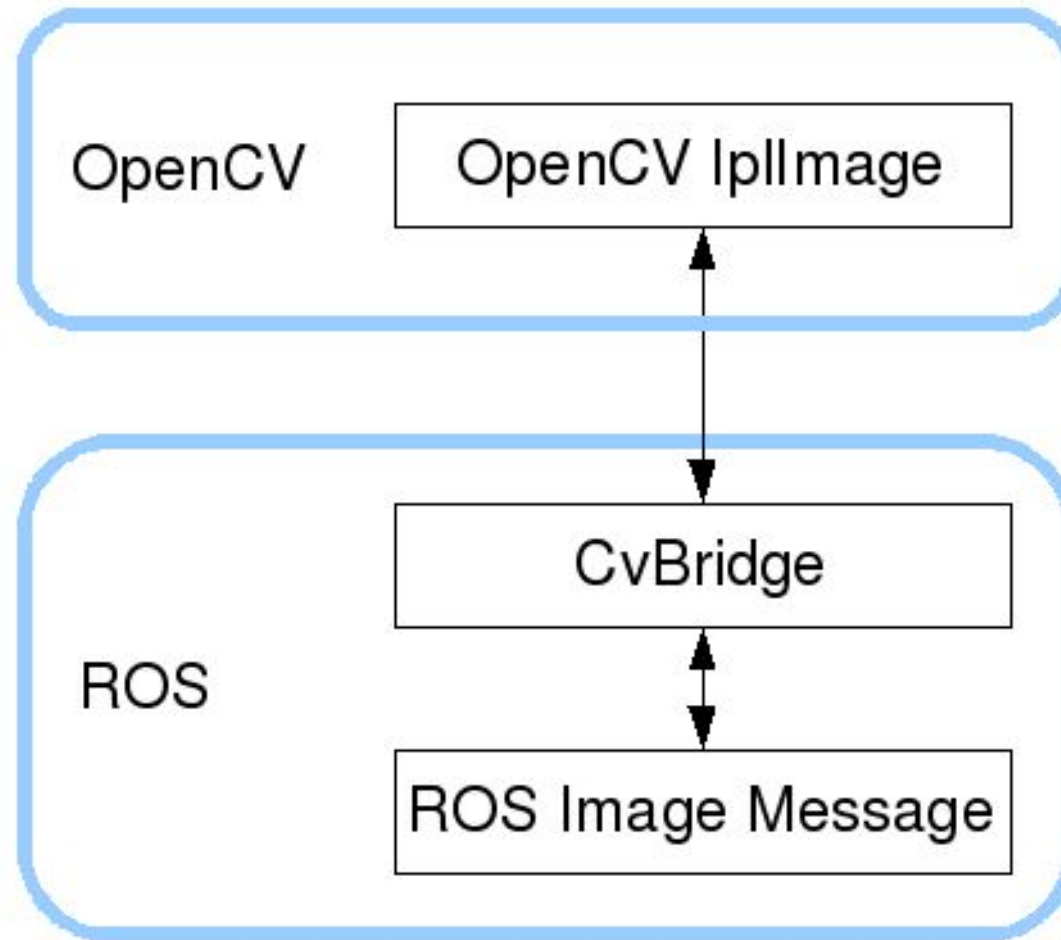
Altre azioni:

Utente

[Accedi](#)

http://wiki.ros.org/cv_bridge

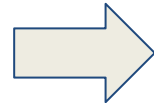
cv_bridge



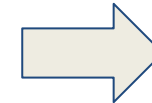
Esempio: unibas_viewer



rosvag acquisita con
un sensore RGBD



unibas_viewer

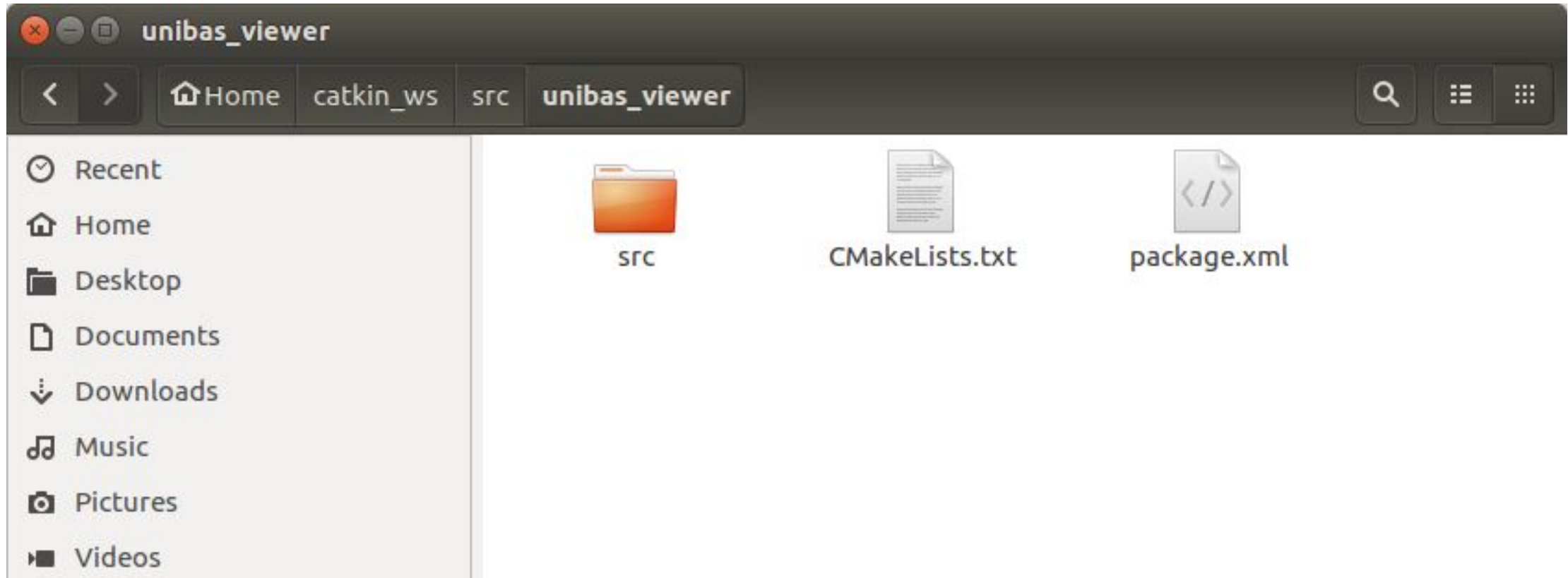


visualizzazione
immagine OpenCV

creazione del nodo unibas_viewer

```
bloisi@bloisi-U36SG: ~/catkin_ws/src
bloisi@bloisi-U36SG:~$ cd ~/catkin_ws/src
bloisi@bloisi-U36SG:~/catkin_ws/src$ catkin_create_pkg unibas_viewer sensor_msgs
cv_bridge rospy std_msgs
Created file unibas_viewer/CMakeLists.txt
Created file unibas_viewer/package.xml
Created folder unibas_viewer/src
Successfully created files in /home/bloisi/catkin_ws/src/unibas_viewer. Please adjust the values in package.xml.
bloisi@bloisi-U36SG:~/catkin_ws/src$
```


cartella unibas_viewer



http://wiki.ros.org/cv_bridge/Tutorials/ConvertingBetweenROSImagesAndOpenCVImagesPython

catkin_make

```
bloisi@bloisi-U36SG: ~/catkin_ws
bloisi@bloisi-U36SG:~$ cd ~/catkin_ws/src
bloisi@bloisi-U36SG:~/catkin_ws/src$ catkin_create_pkg unibas_viewer sensor_msgs
cv_bridge rospy std_msgs
Created file unibas_viewer/CMakeLists.txt
Created file unibas_viewer/package.xml
Created folder unibas_viewer/src
Successfully created files in /home/bloisi/catkin_ws/src/unibas_viewer. Please adjust the values in package.xml.
bloisi@bloisi-U36SG:~/catkin_ws/src$ cd ..
bloisi@bloisi-U36SG:~/catkin_ws$ catkin_make
```

settiamo l'ambiente ROS

`. ~/catkin_ws/devel/setup.bash`

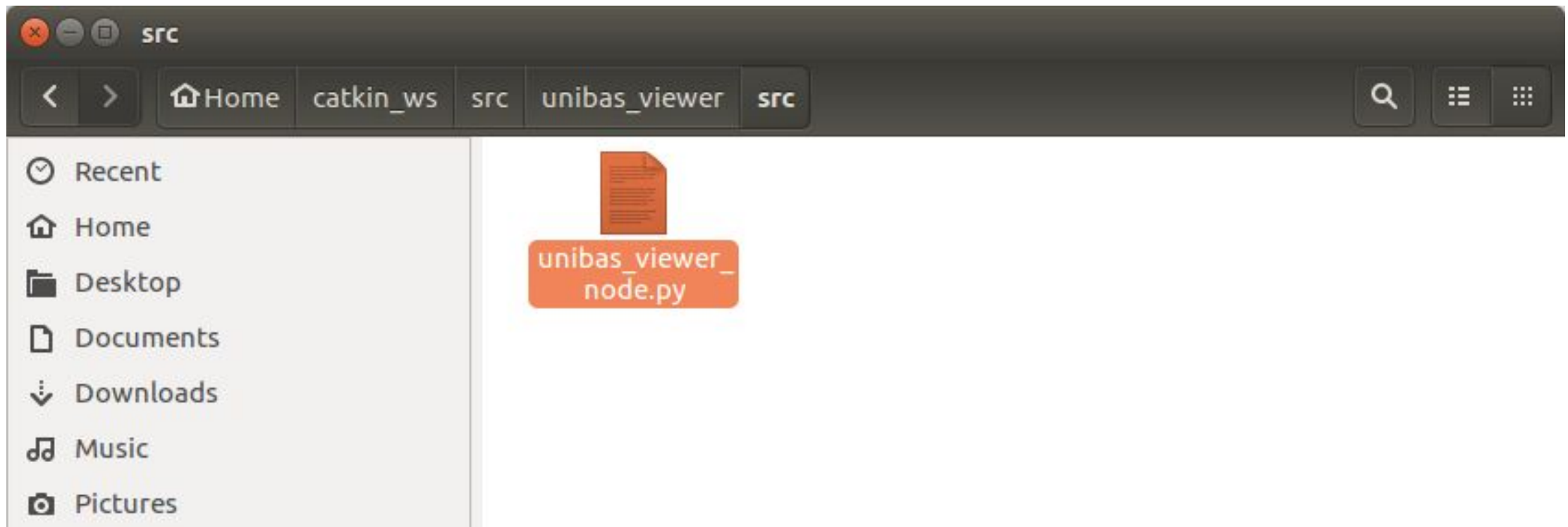
```
bloisi@bloisi-U36SG: ~/catkin_ws
[ 52%] Built target hw1_generate_messages_py
[ 53%] Built target hw1_generate_messages_lisp
[ 53%] Built target turtlebot3_msgs_generate_messages_eus
[ 61%] Built target turtlebot3_applications_msgs_generate_messages_py
[ 63%] Built target turtlebot3_applications_msgs_generate_messages_cpp
[ 65%] Built target turtlebot3_applications_msgs_generate_messages_lisp
[ 70%] Built target turtlebot3_example_generate_messages_py
[ 75%] Built target turtlebot3_example_generate_messages_nodejs
[ 79%] Built target turtlebot3_example_generate_messages_cpp
[ 81%] Built target turtlebot3_applications_msgs_generate_messages_nodejs
[ 87%] Built target turtlebot3_example_generate_messages_eus
[ 89%] Built target turtlebot3_diagnostics
[ 94%] Built target turtlebot3_example_generate_messages_lisp
[ 94%] Built target turtlebot3_msgs_generate_messages
[ 96%] Built target turtlebot3_fake_node
[ 97%] Built target homework_1_generate_messages
[ 97%] Built target turtlebot3_drive
[100%] Built target turtlebot3_panorama
[100%] Built target hw1_generate_messages
[100%] Built target turtlebot3_example_generate_messages
[100%] Built target turtlebot3_applications_msgs_generate_messages
bloisi@bloisi-U36SG:~/catkin_ws$ . ~/catkin_ws/devel/setup.bash
bloisi@bloisi-U36SG:~/catkin_ws$
```


rospack find

rospack find unibas_viewer

```
bloisi@bloisi-U36SG: ~/catkin_ws
[ 58%] Built target turtlebot3_applications_msgs_generate_messages_eus
[ 61%] Built target turtlebot3_applications_msgs_generate_messages_py
[ 63%] Built target turtlebot3_applications_msgs_generate_messages_cpp
[ 65%] Built target turtlebot3_applications_msgs_generate_messages_lisp
[ 70%] Built target turtlebot3_example_generate_messages_py
[ 75%] Built target turtlebot3_example_generate_messages_nodejs
[ 79%] Built target turtlebot3_example_generate_messages_cpp
[ 81%] Built target turtlebot3_applications_msgs_generate_messages_nodejs
[ 87%] Built target turtlebot3_example_generate_messages_eus
[ 94%] Built target turtlebot3_example_generate_messages_lisp
[ 94%] Built target turtlebot3_msgs_generate_messages
[ 96%] Built target turtlebot3_fake_node
[ 97%] Built target homework_1_generate_messages
[ 97%] Built target turtlebot3_drive
[100%] Built target turtlebot3_panorama
[100%] Built target hw1_generate_messages
[100%] Built target turtlebot3_example_generate_messages
[100%] Built target turtlebot3_applications_msgs_generate_messages
bloisi@bloisi-U36SG:~/catkin_ws$ . ~/catkin_ws/devel/setup.bash
bloisi@bloisi-U36SG:~/catkin_ws$ rospack find unibas_viewer
/home/bloisi/catkin_ws/src/unibas_viewer
```

creiamo unibas_viewer_node.py



http://wiki.ros.org/cv_bridge/Tutorials/ConvertingBetweenROSImagesAndOpenCVImagesPython

creiamo unibas_viewer_node.py



```
1#!/usr/bin/env python
2from __future__ import print_function
3
4import roslib
5roslib.load_manifest('unibas_viewer')
6import sys
7import rospy
8import cv2
9from std_msgs.msg import String
10from sensor_msgs.msg import Image
11from cv_bridge import CvBridge, CvBridgeError
12
13class unibas_viewer:
14
15    def __init__(self):
16        self.bridge = CvBridge()
17        self.image_sub = rospy.Subscriber("/camera/rgb/image_raw", Image, self.callback)
18
```

http://wiki.ros.org/cv_bridge/Tutorials/ConvertingBetweenROSImagesAndOpenCVImagesPython

creiamo unibas_viewer_node.py

creiamo unibas_viewer_node.py

permessi per unibas_viewer_node.py

```
bloisi@bloisi-U36SG: ~/catkin_ws/src/unibas_viewer/src
bloisi@bloisi-U36SG:~$ cd ~/catkin_ws/
bloisi@bloisi-U36SG:~/catkin_ws$ cd src/
bloisi@bloisi-U36SG:~/catkin_ws/src$ cd unibas_viewer/
bloisi@bloisi-U36SG:~/catkin_ws/src/unibas_viewer$ cd src/
bloisi@bloisi-U36SG:~/catkin_ws/src/unibas_viewer/src$ ls
bloisi@bloisi-U36SG:~/catkin_ws/src/unibas_viewer/src$ chmod +x unibas_viewer_node.py
bloisi@bloisi-U36SG:~/catkin_ws/src/unibas_viewer/src$
```

roscore

```
roscore http://localhost:11311/
bloisi@bloisi-U36SG:~$ roscore
... logging to /home/bloisi/.ros/log/78cf387c-7bbf-11e9-b0ad-50465dde6884/roslau
nch-bloisi-U36SG-8561.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://localhost:35105/
ros_comm version 1.12.14

SUMMARY
=====

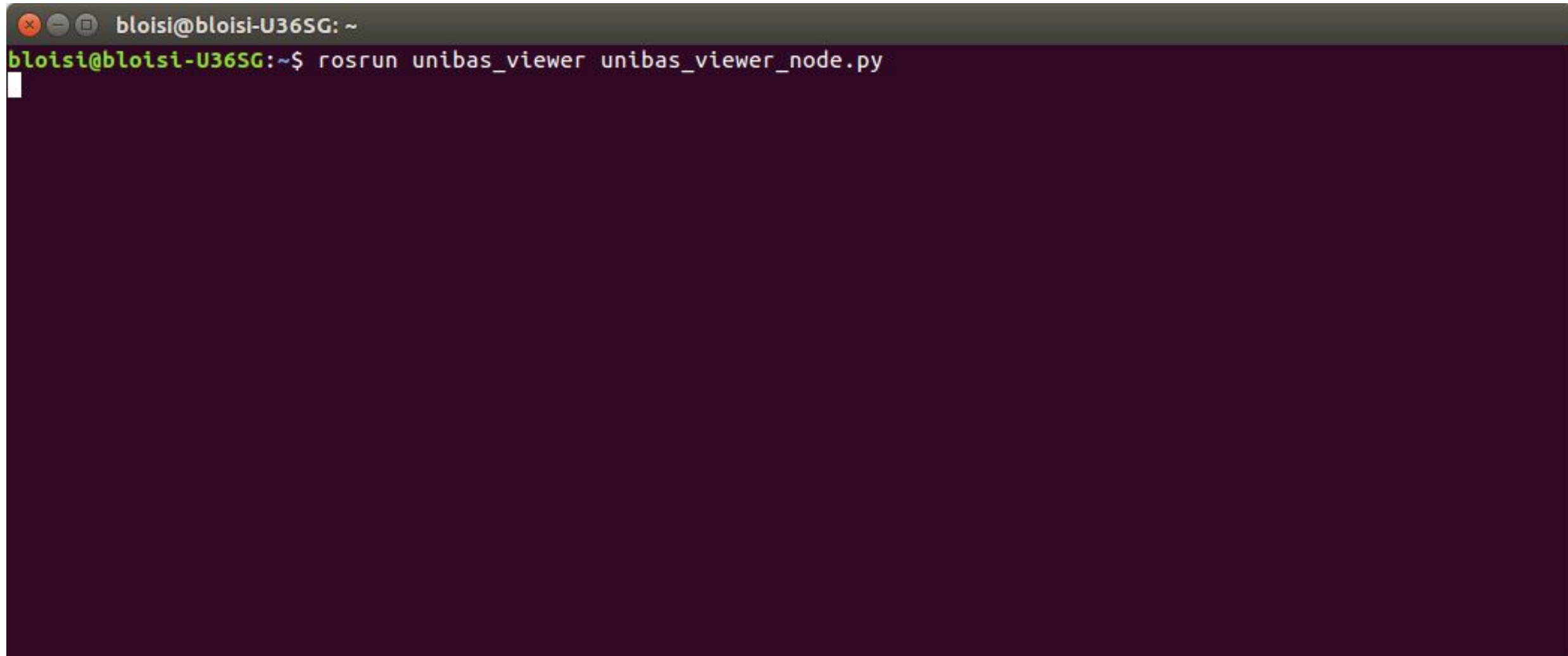
PARAMETERS
* /rosdistro: kinetic
* /rosversion: 1.12.14

NODES

auto-starting new master
process[master]: started with pid [8584]
ROS_MASTER_URI=http://localhost:11311/

setting /run_id to 78cf387c-7bbf-11e9-b0ad-50465dde6884
process[rosout-1]: started with pid [8733]
started core service [/rosout]
```

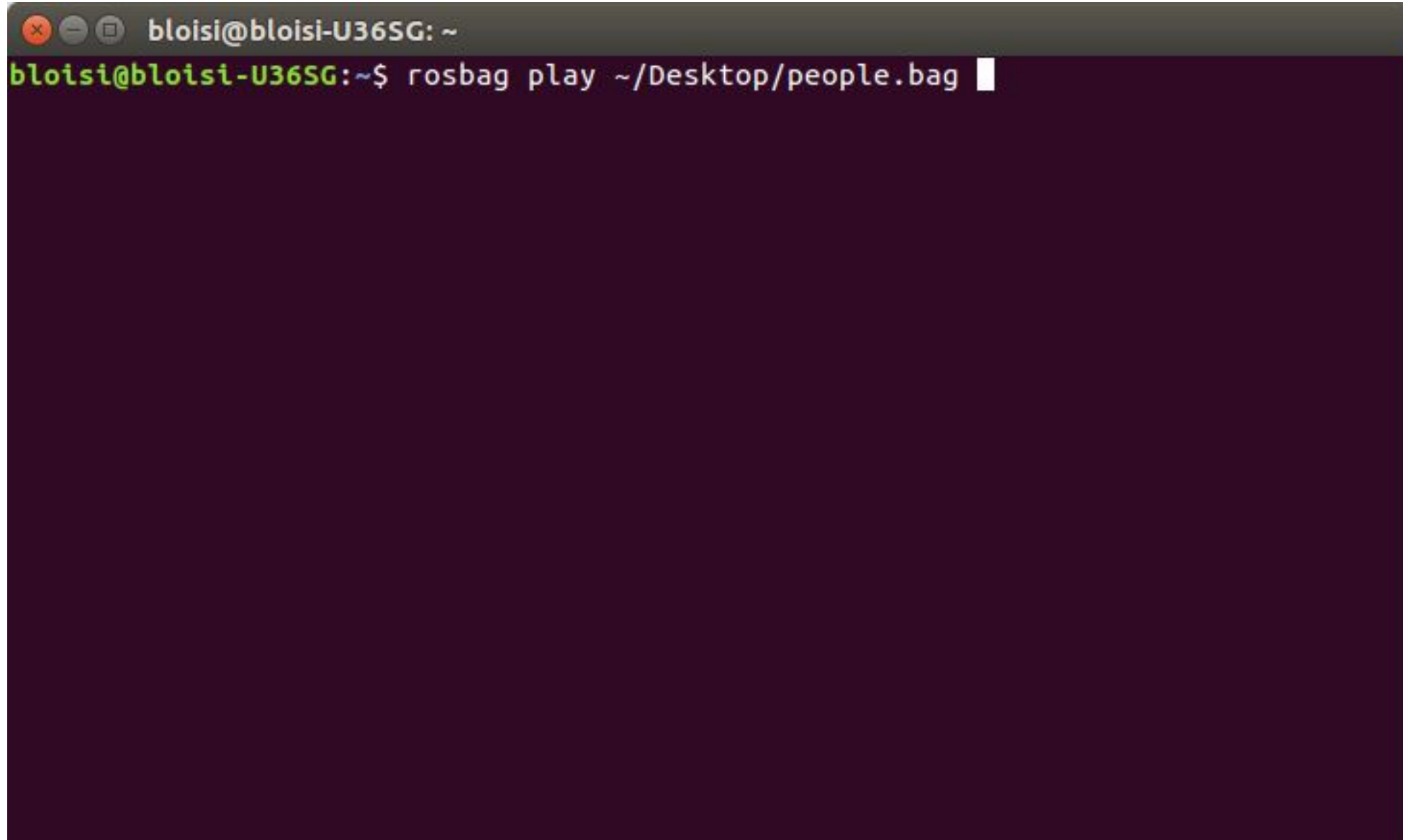
roslaunch



```
bloisi@bloisi-U36SG: ~  
bloisi@bloisi-U36SG:~$ roslaunch unibas_viewer unibas_viewer_node.py
```

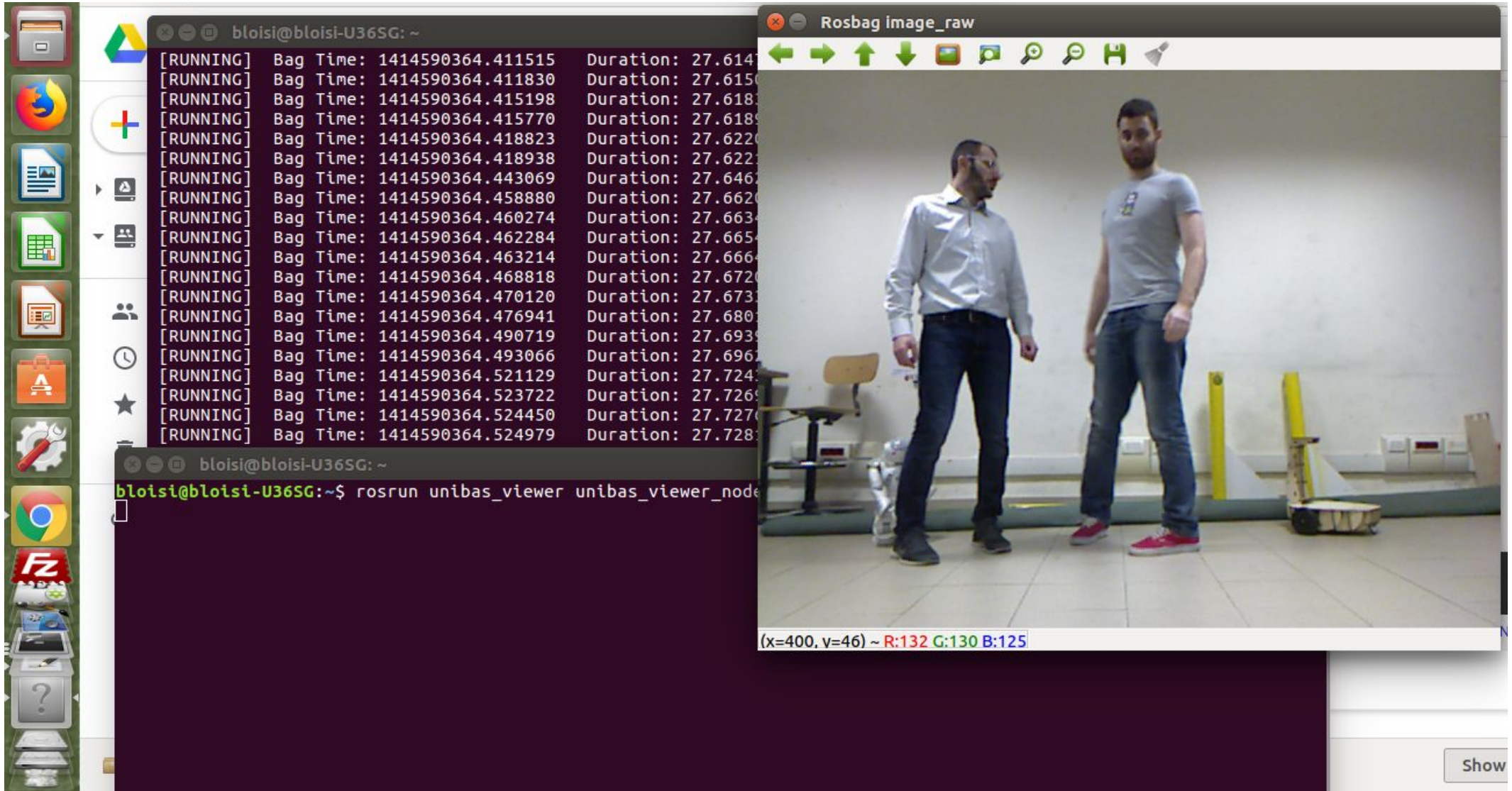
A terminal window with a dark purple background. The title bar shows the window name 'bloisi@bloisi-U36SG: ~' and standard window control buttons. The terminal content shows the command 'roslaunch unibas_viewer unibas_viewer_node.py' being entered at the prompt 'bloisi@bloisi-U36SG:~\$'. A white cursor is visible at the end of the command line.

roslaunch

A terminal window with a dark purple background and a grey title bar. The title bar contains three window control icons (close, minimize, maximize) and the text 'bloisi@bloisi-U36SG: ~'. The terminal shows a command prompt 'bloisi@bloisi-U36SG:~\$' followed by the command 'rosbag play ~/Desktop/people.bag' and a white cursor. The rest of the terminal is empty.

```
bloisi@bloisi-U36SG: ~  
bloisi@bloisi-U36SG:~$ rosbag play ~/Desktop/people.bag
```


visualizzazione



rostopic list

```
bloisi@bloisi-U36SG: ~  
bloisi@bloisi-U36SG:~$ rostopic list  
/camera/debayer/parameter_descriptions  
/camera/debayer/parameter_updates  
/camera/depth/image/compressed/parameter_descriptions  
/camera/depth/image/compressed/parameter_updates  
/camera/depth/image/compressedDepth/parameter_descriptions  
/camera/depth/image/compressedDepth/parameter_updates  
/camera/depth/image/theora/parameter_descriptions  
/camera/depth/image/theora/parameter_updates  
/camera/depth/image_raw/compressed/parameter_descriptions  
/camera/depth/image_raw/compressed/parameter_updates  
/camera/depth/image_raw/compressedDepth/parameter_descriptions  
/camera/depth/image_raw/compressedDepth/parameter_updates  
/camera/depth/image_raw/theora/parameter_descriptions  
/camera/depth/image_raw/theora/parameter_updates  
/camera/depth/image_rect/compressed/parameter_descriptions  
/camera/depth/image_rect/compressed/parameter_updates  
/camera/depth/image_rect/compressedDepth/parameter_descriptions  
/camera/depth/image_rect/compressedDepth/parameter_updates  
/camera/depth/image_rect/theora/parameter_descriptions  
/camera/depth/image_rect/theora/parameter_updates  
/camera/depth/image_rect_raw/compressed/parameter_descriptions  
/camera/depth/image_rect_raw/compressed/parameter_updates  
/camera/depth/image_rect_raw/compressedDepth/parameter_descriptions  
/camera/depth/image_rect_raw/compressedDepth/parameter_updates  
/camera/depth/image_rect_raw/theora/parameter_descriptions  
/camera/depth/image_rect_raw/theora/parameter_updates  
/camera/depth_rectify_depth/parameter_descriptions  
/camera/depth_rectify_depth/parameter_updates  
/camera/depth_registered/camera_info  
/camera/depth_registered/disparity  
/camera/depth_registered/hw_registered/image_rect_raw  
/camera/depth_registered/hw_registered/image_rect_raw/compressed  
/camera/depth_registered/hw_registered/image_rect_raw/compressed/parameter_descriptions  
/camera/depth_registered/hw_registered/image_rect_raw/compressed/parameter_updates  
/camera/depth_registered/hw_registered/image_rect_raw/compressedDepth  
/camera/depth_registered/hw_registered/image_rect_raw/compressedDepth/parameter_descriptions  
/camera/depth_registered/hw_registered/image_rect_raw/compressedDepth/parameter_updates  
/camera/depth_registered/hw_registered/image_rect_raw/theora
```


rostopic list

```
bloisi@bloisi-U36SG: ~  
/camera/depth_registered/hw_registered/image_rect_raw/theora/parameter_descriptions  
/camera/depth_registered/hw_registered/image_rect_raw/theora/parameter_updates  
/camera/depth_registered/image_raw  
/camera/depth_registered/image_raw/compressed  
/camera/depth_registered/image_raw/compressed/parameter_descriptions  
/camera/depth_registered/image_raw/compressed/parameter_updates  
/camera/depth_registered/image_raw/compressedDepth  
/camera/depth_registered/image_raw/compressedDepth/parameter_descriptions  
/camera/depth_registered/image_raw/compressedDepth/parameter_updates  
/camera/depth_registered/image_raw/theora  
/camera/depth_registered/image_raw/theora/parameter_descriptions  
/camera/depth_registered/image_raw/theora/parameter_updates  
/camera/depth_registered/points  
/camera/depth_registered/sw_registered/image_rect_raw/compressed/parameter_descriptions  
/camera/depth_registered/sw_registered/image_rect_raw/compressed/parameter_updates  
/camera/depth_registered/sw_registered/image_rect_raw/compressedDepth/parameter_descriptions  
/camera/depth_registered/sw_registered/image_rect_raw/compressedDepth/parameter_updates  
/camera/depth_registered/sw_registered/image_rect_raw/theora/parameter_descriptions  
/camera/depth_registered/sw_registered/image_rect_raw/theora/parameter_updates  
/camera/depth_registered/rectify_depth/parameter_descriptions  
/camera/depth_registered/rectify_depth/parameter_updates  
/camera/driver/parameter_descriptions  
/camera/driver/parameter_updates  
/camera/ir/image_raw/compressed/parameter_descriptions  
/camera/ir/image_raw/compressed/parameter_updates  
/camera/ir/image_raw/compressedDepth/parameter_descriptions  
/camera/ir/image_raw/compressedDepth/parameter_updates  
/camera/ir/image_raw/theora/parameter_descriptions  
/camera/ir/image_raw/theora/parameter_updates  
/camera/ir/image_rect_ir/compressed/parameter_descriptions  
/camera/ir/image_rect_ir/compressed/parameter_updates  
/camera/ir/image_rect_ir/compressedDepth/parameter_descriptions  
/camera/ir/image_rect_ir/compressedDepth/parameter_updates  
/camera/ir/image_rect_ir/theora/parameter_descriptions  
/camera/ir/image_rect_ir/theora/parameter_updates  
/camera/projector/camera_info  
/camera/rectify_color/parameter_descriptions  
/camera/rectify_color/parameter_updates  
/camera/rectify_ir/parameter_descriptions
```


rostopic list

```
bloisi@bloisi-U36SG: ~  
/camera/rgb/image_color/theora/parameter_updates  
/camera/rgb/image_mono  
/camera/rgb/image_mono/compressed  
/camera/rgb/image_mono/compressed/parameter_descriptions  
/camera/rgb/image_mono/compressed/parameter_updates  
/camera/rgb/image_mono/compressedDepth/parameter_descriptions  
/camera/rgb/image_mono/compressedDepth/parameter_updates  
/camera/rgb/image_mono/theora  
/camera/rgb/image_mono/theora/parameter_descriptions  
/camera/rgb/image_mono/theora/parameter_updates  
/camera/rgb/image_raw  
/camera/rgb/image_raw/compressed  
/camera/rgb/image_raw/compressed/parameter_descriptions  
/camera/rgb/image_raw/compressed/parameter_updates  
/camera/rgb/image_raw/compressedDepth/parameter_descriptions  
/camera/rgb/image_raw/compressedDepth/parameter_updates  
/camera/rgb/image_raw/theora  
/camera/rgb/image_raw/theora/parameter_descriptions  
/camera/rgb/image_raw/theora/parameter_updates  
/camera/rgb/image_rect_color  
/camera/rgb/image_rect_color/compressed  
/camera/rgb/image_rect_color/compressed/parameter_descriptions  
/camera/rgb/image_rect_color/compressed/parameter_updates  
/camera/rgb/image_rect_color/compressedDepth/parameter_descriptions  
/camera/rgb/image_rect_color/compressedDepth/parameter_updates  
/camera/rgb/image_rect_color/theora  
/camera/rgb/image_rect_color/theora/parameter_descriptions  
/camera/rgb/image_rect_color/theora/parameter_updates  
/camera/rgb/image_rect_mono  
/camera/rgb/image_rect_mono/compressed  
/camera/rgb/image_rect_mono/compressed/parameter_descriptions  
/camera/rgb/image_rect_mono/compressed/parameter_updates  
/camera/rgb/image_rect_mono/compressedDepth/parameter_descriptions  
/camera/rgb/image_rect_mono/compressedDepth/parameter_updates  
/camera/rgb/image_rect_mono/theora  
/camera/rgb/image_rect_mono/theora/parameter_descriptions  
/camera/rgb/image_rect_mono/theora/parameter_updates  
/clock
```

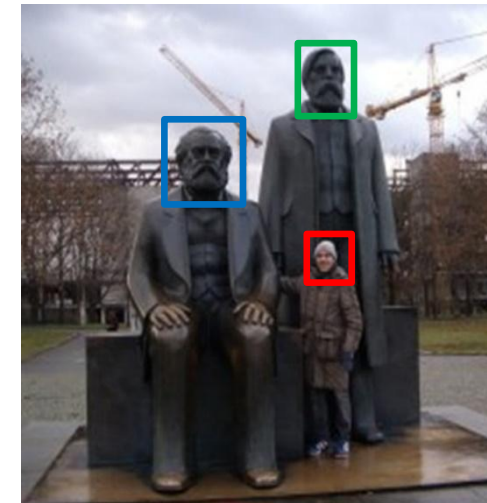
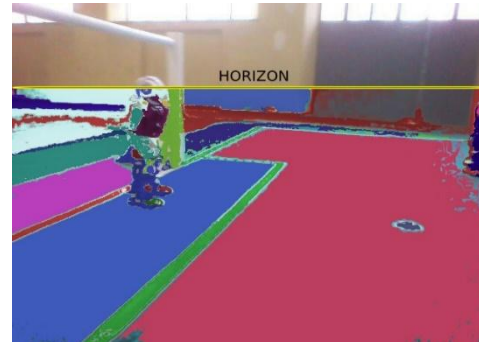
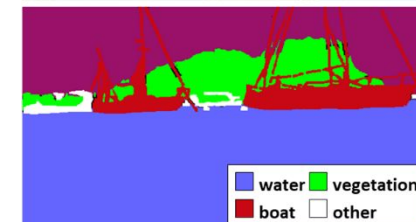
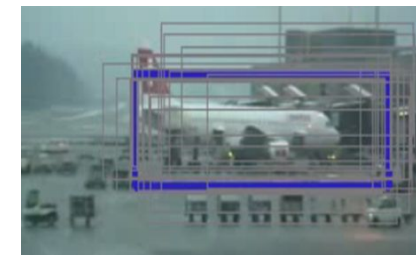


**UNIVERSITÀ DEGLI STUDI
DELLA BASILICATA**

Corso di Sistemi Informativi
A.A. 2018/19

Docente
Domenico Daniele Bloisi

rosvbag



Maggio 2019