

# SSY236

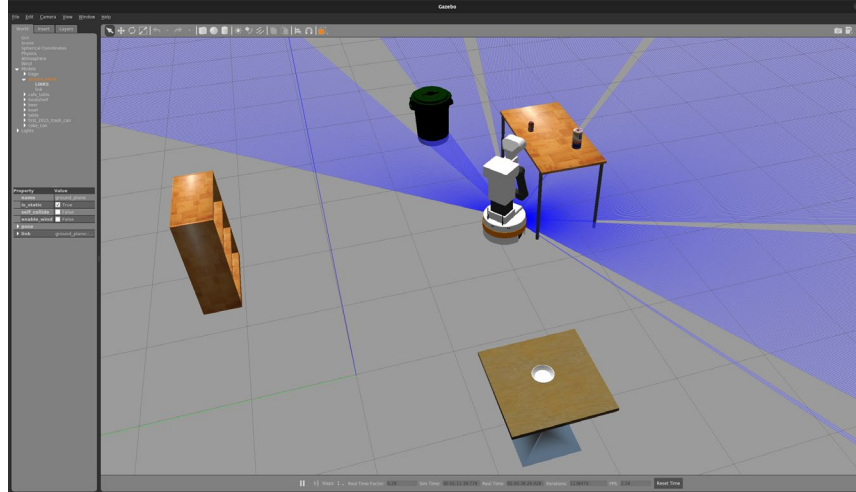
## Assignment 03: Perception & Reasoning

Karinne Ramirez-Amaro

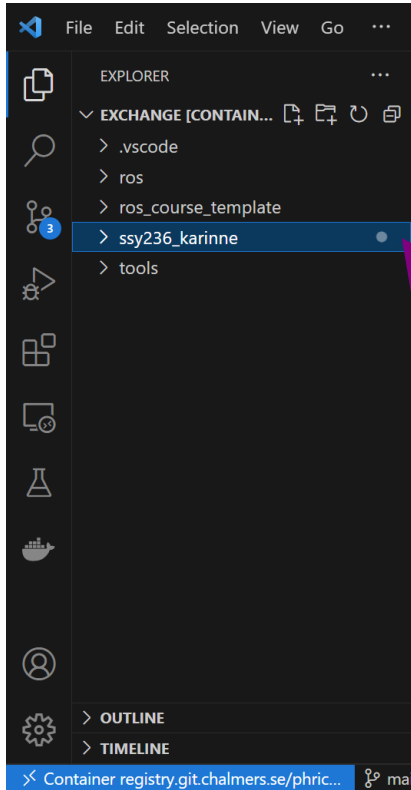
# Assignment 03

In this assignment you can accumulate a maximum of 12 points

**Goal: The robot should include into its knowledge base all the seen objects from the Gazebo environment**



# Assignment 03



- 1) Download the folder “world\_percept\_assig3.zip” from Canvas → Assignments
- 2) Unzip the file and you will get the folder “world\_percept\_assig3”
- 3) In your vscode, move to your exchange folder in the “EXPLORER” menu. Then, copy the folder “world\_percept\_assig3” inside your src folder, for example:
  - ssy236\_karinne
    - src
      - world\_percept\_assig3

# Assignment 03



1) Make sure that you source the right workspace:

```
cd /home/student/ros/workspaces/ssy236_karinne  
source /knowrob_ws/devel/setup.bash
```

2) Make sure you have included the new package  
“world\_percept\_assig3”

3) Then, simply compile:

***catkin\_make***

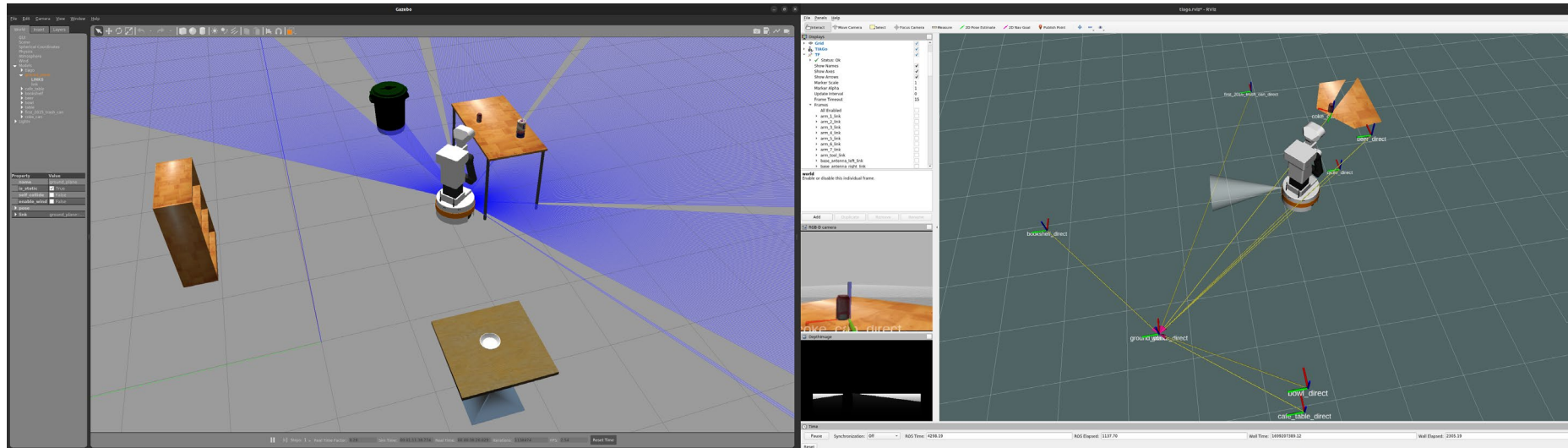
A screenshot of a terminal window with a dark background. The terminal shows the output of a ROS build process. It lists various targets being built, such as 'world\_percept\_generate\_messages\_nodejs', 'world\_percept\_generate\_messages\_py', 'std\_msgs\_generate\_messages\_cpp', etc. The output is color-coded, with green for successful builds and red for errors. At the bottom, it shows the user's prompt and the current directory: 'root@8fb8b2fd427c:/home/user/exchange/ssy236\_karinne#'.

```
28  dl = PrologClient("/rosprolog", true);  
PROBLEMS 4 OUTPUT DEBUG CONSOLE TERMINAL PORTS 159  
[ 42%] Built target world_percept_generate_messages_nodejs  
[ 52%] Built target world_percept_generate_messages_py  
[ 52%] Built target std_msgs_generate_messages_cpp  
[ 92%] Built target env_pack_generate_messages_check_deps_SeenObjs  
[ 60%] Built target world_percept_generate_messages_cpp  
[ 64%] Built target env_pack_generate_messages_eus  
[ 68%] Built target tiago_pose_control  
[ 72%] Built target percept_node  
[ 70%] Built target direct_percept_node  
[ 80%] Built target map_generator_node  
[ 80%] Built target world_percept_generate_messages  
Scanning dependencies of target reasoning_node  
[ 82%] Building CXX object world_percept_owl/Makefiles/reasoning_node.dir/src/reasoning_node.cpp.o  
[ 84%] Linking CXX executable /home/user/exchange/ssy236_karinne/devel/lib/world_percept/reasoning_node  
[ 84%] Built target reasoning_node  
[ 86%] Built target env_pack_generate_messages_lisp  
[ 88%] Built target env_pack_generate_messages_nodejs  
[ 90%] Built target env_pack_generate_messages_owl  
[ 94%] Built target env_pack_generate_messages_py  
[ 96%] Built target env_pack_generate_messages_cpp  
[100%] Built target queries_node  
[100%] Built target env_pack_generate_messages  
Generating Owl ontologies for some package  
[100%] Built target env_pack_owl  
root@8fb8b2fd427c:/home/user/exchange/ssy236_karinne#
```

Note: You may get a compilation error due to duplicated packages, to avoid this error go to the other packages inside your workspace and create a new empty file (without an extension) called “CATKIN\_IGNORE”, remove the folders build/ and devel/ and compile again

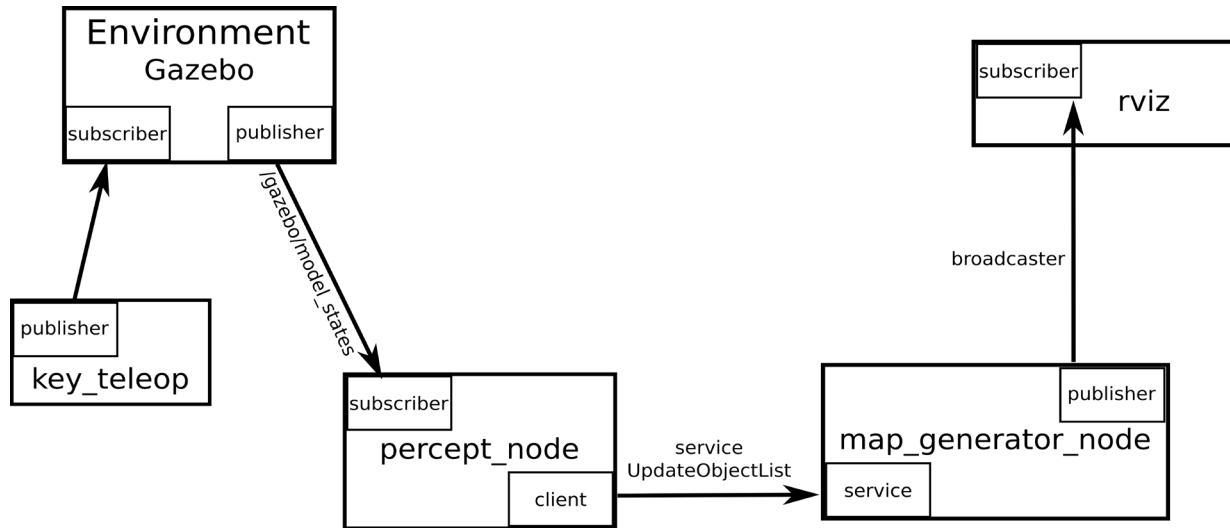
# Assignment 03 – Task 1

Recap from Assignment 02. The robot explores the environment and discovers the names and positions of new objects in the scene!



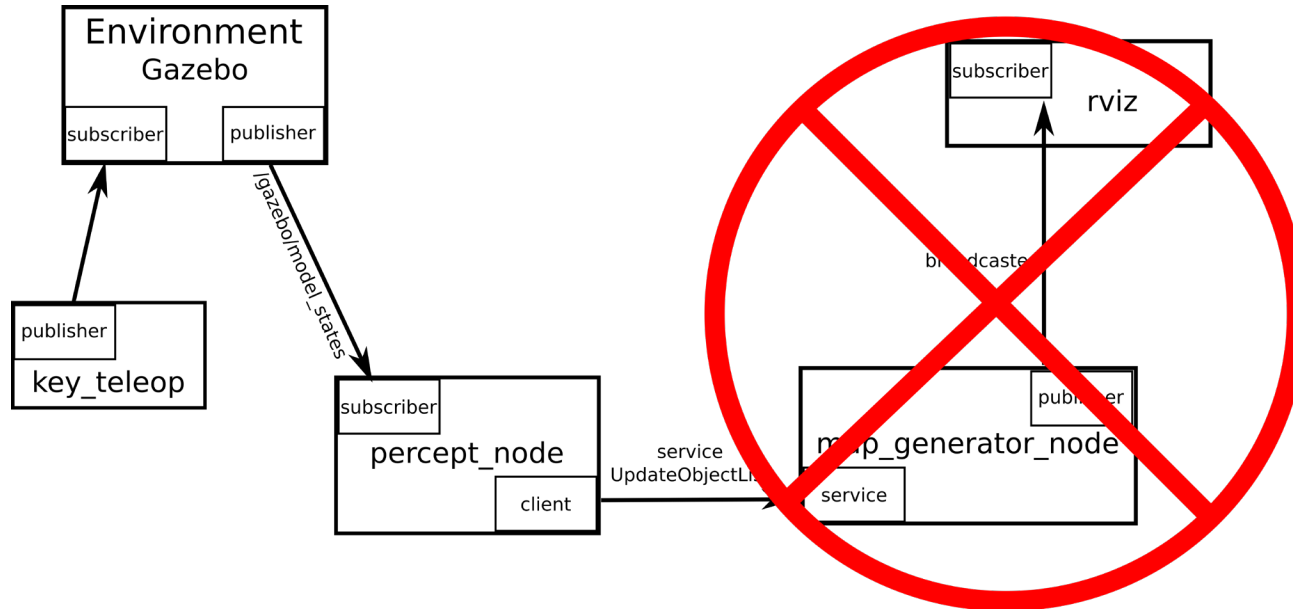
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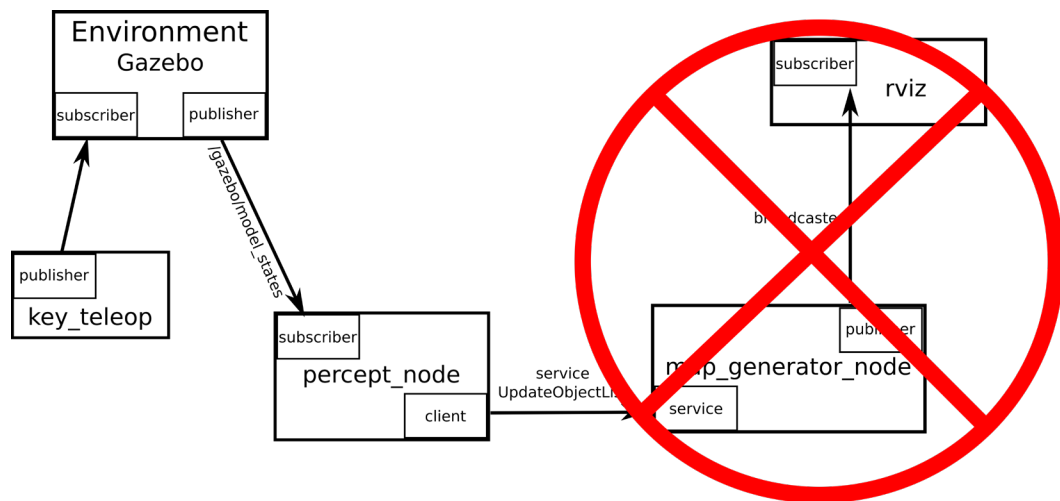
# Assignment 03 – Task 1

Recap from Assignment 02. The robot explores the environment and discovers the names and positions of new objects in the scene!

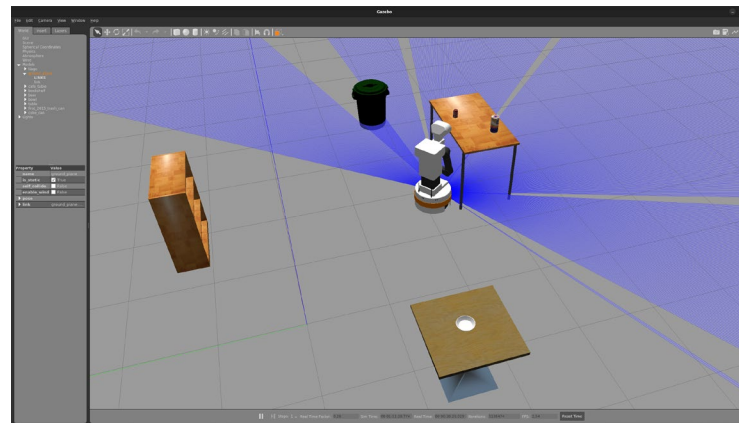


# Assignment 03 – Task 1

Recap from Assignment 02. The robot explores the environment and discovers the names and positions of new objects in the scene!



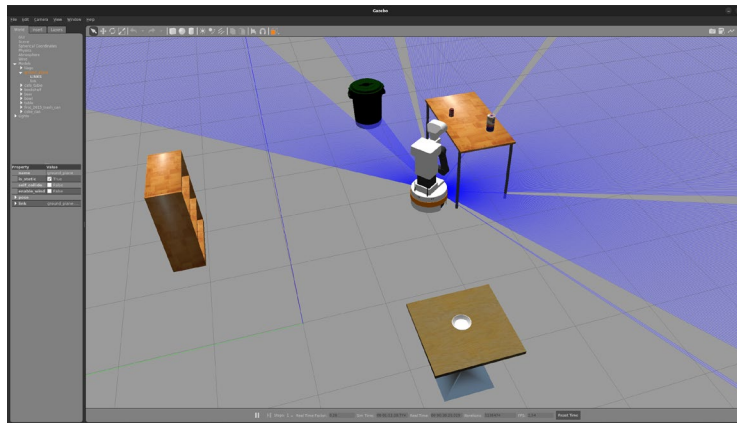
**Note: You don't need to launch Rviz for this assignment!**





# Assignment 03 – Task 1

A3.T01: First you need to modify the given ontology `ssy236Ontology.owl` to include information about the new environment (2 pts)



- The ontology should contain the following classes:
  - Table,
  - Beer
  - Trash\_bin
  - Floor
  - Cereal

NOTE: Before you include these new classes, first verify that they don't exist.

NOTE: Please make sure that the following classes are not included in the ontology; if they are included, please delete them: Bookshelf, Bowl, Coke\_can

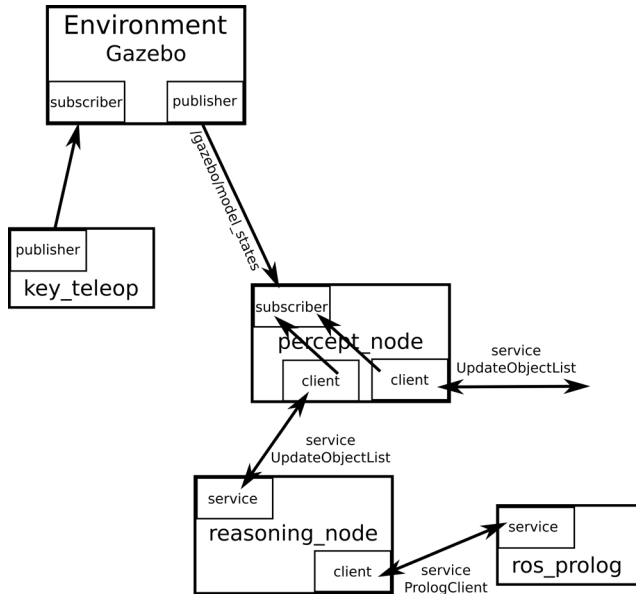
# Assignment 03 – Task 2



A3.T02: Create one Prolog predicate inside the file “instance\_utils.pl” (4 pts)

- The new predicate is called `get_class` with arity 1, i.e. `get_class/1`, which is already defined in the “module” of the file “instance\_utils.pl”
- The goal of this new predicate is to check if the input class already exists in the ontology. If the input class does not exist, then a new class should be asserted in the correct ontology. Otherwise, nothing should happen.
- Hint: The existing predicate of “`getClassPath/2`” can help you with your new predicate definition.

# Assignment 03 – Task 3



A3.T03 (6 pts): Modify the callback function of the new node defined in the file “reasoning\_node.cpp” For this you need to :

- Modify the callback function (2 pts) which is a service that receives the seen\_object from the client node “percept\_node” and it needs to:

1) Verify that the seen object already has a class and if not, it should create it. You need to modify the function getClass(), → 2 pts.

2) Assert the seen object as a new instance of the seen object class. You need to also modify the function assertKnowledge(), → 2 pts.

# Assignment 03 – Task 3

Hint you should debug your Prolog queries before calling them in C++

- (Terminal 1) `roslaunch world_percept_assig3 reasoning.launch`
- (Terminal 2) `roslaunch rosprolog rosprolog world_percept_assig3`

```
?- halt.  
% The following threads wouldn't die: [<thread>(3,0x55c086c1a830),<thread>(4,0x55c086c1a060)]  
root@8fb8b2fd427c:/home/user/exchange/ssy236_karinne# roslaunch rosprolog rosprolog world_percept  
?- get_class('Test').  
New class created: http://www.chalmers.se/ontologies/ssy2360ontology.owl#Test  
true.  
  
?- get_class('Test').  
false.  
  
?- get_class('Bottle').  
New class created: http://www.chalmers.se/ontologies/ssy2360ontology.owl#Bottle  
true.  
  
?- get_class('Bottle').  
false.  
  
?-
```

Ln 78, Col 10 Spaces: 4 UTF-8

# Assignment 03 – Task 3



Hint: If you want to debug your server node you can always call it from the console

- rosservice call /assert\_knowledge "object\_pose:  
 position:  
 x: 0.0  
 y: 0.0  
 z: 0.0  
 orientation:  
 x: 0.0  
 y: 0.0  
 z: 0.0  
 w: 0.0  
 object\_name: """

# Assignment 03 – Task 3



Verify that the new classes are created in the ontology and that the new instances are created

```
% The following threads wouldn't die: [<thread>(3,0x55c086c1a830),<thread>(4,0x55c086c1a060)]
root@8fb8b2fd427c:/home/user/exchange/ssy236_karinne# rosrund rosprolog rosprolog world_percept
?- get_class('Test').
New class created: http://www.chalmers.se/ontologies/ssy2360ontology.owl#Test
true.

?- get_class('Test').
false.

?- get_class('Bottle').
New class created: http://www.chalmers.se/ontologies/ssy2360ontology.owl#Bottle
true.

?- get_class('Bottle').
false.

?- create_instance_from_class('Test', '1', I).
I = ssy2360ontology:'Test_1'.

?- create_instance_from_class('Bowl', '2', I).
I = ssy2360ontology:'Bowl_2'.
```

```
?- owl_individual_of(I, ssy2360ontology:'Bowl').
I = ssy2360ontology:'Bowl_2' ;
false.

?- owl_individual_of(I, ssy2360ontology:'Test').
I = ssy2360ontology:'Test_1' ;
false.

?-
```

# Assignment 03



Deadline for Assignment 03: **Dec 02 at 11:59 pm**

- Please upload your original material before the deadline
- Upload your whole package in a zip file
  - Within this zip file you should include a README file that explains how to run your code
  - Also please include the name of your teammates
  - Please name the file “world\_percept\_assig3\_CID\_A03.zip”



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