SSY236

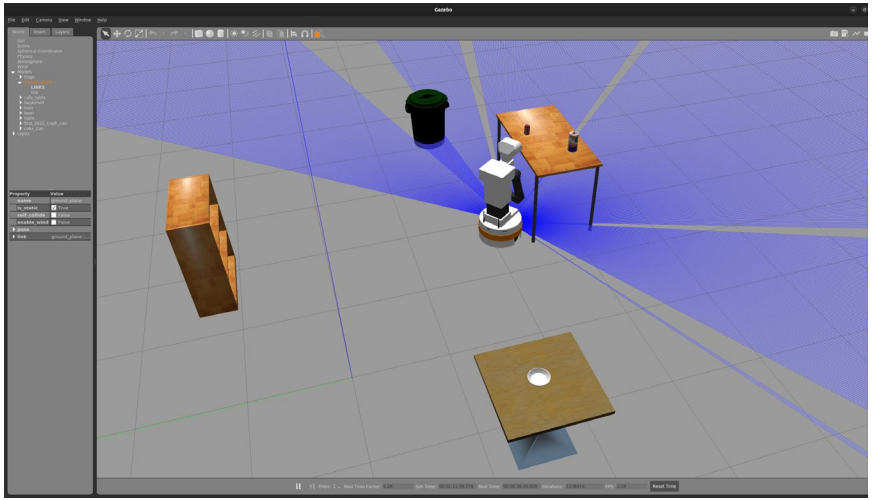
Assignment 03: Perception & Reasoning

Karinne Ramirez-Amaro

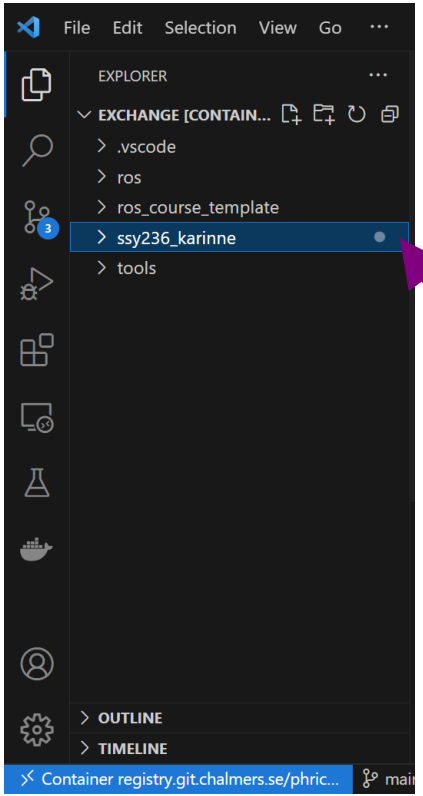
Assignment 03

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

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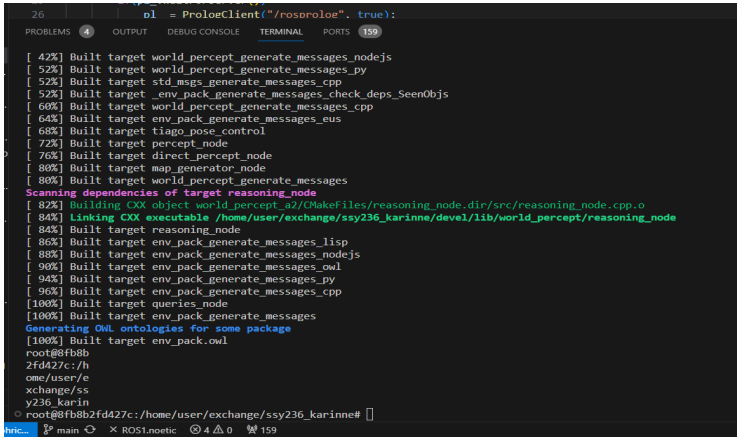


1) Make sure that you source the right workspace:

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”

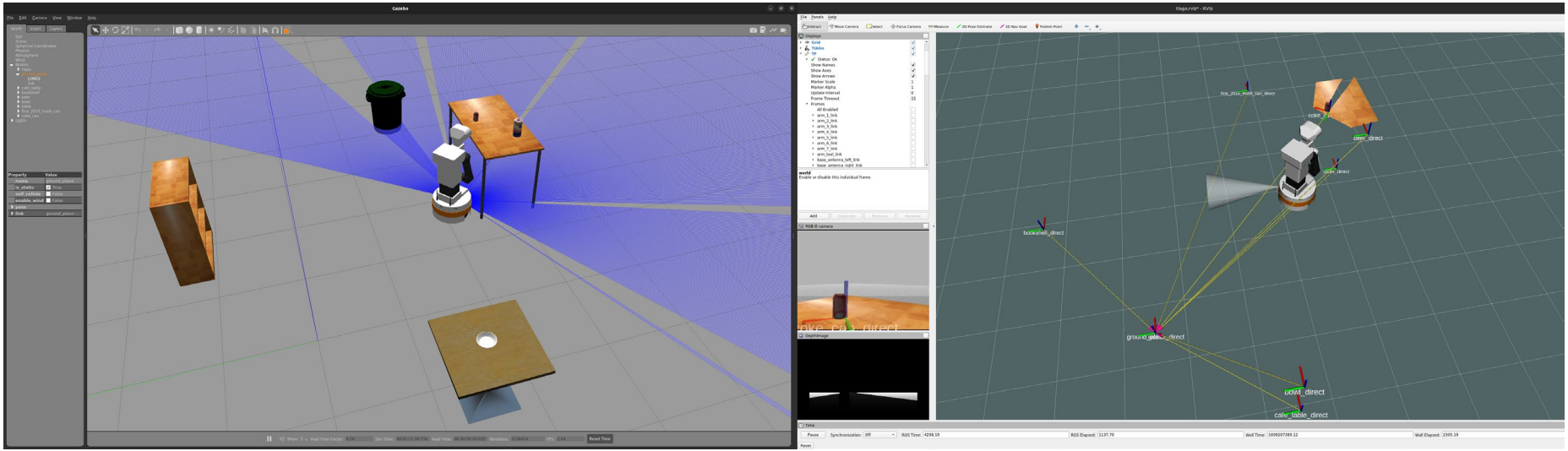
3) Then, simply compile:

catkin_make

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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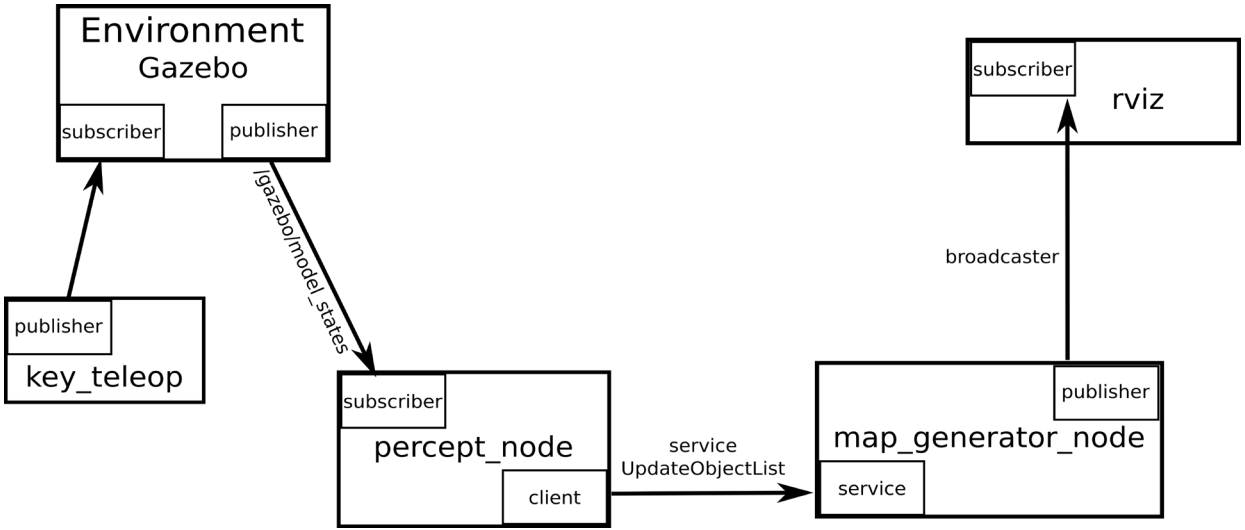

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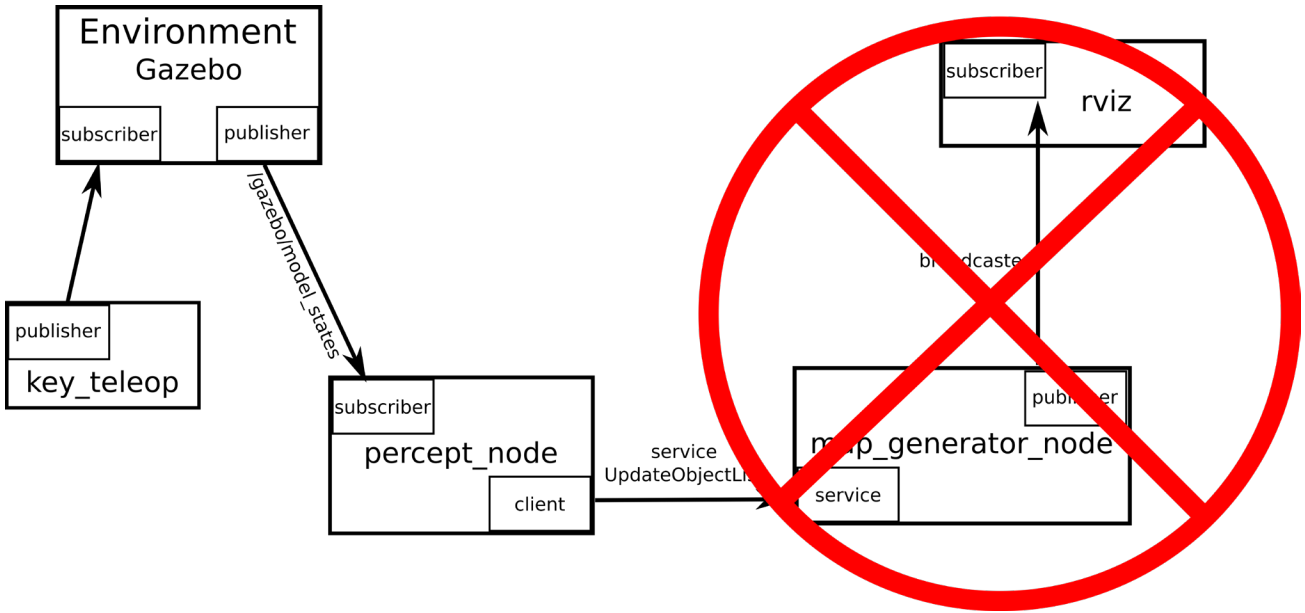

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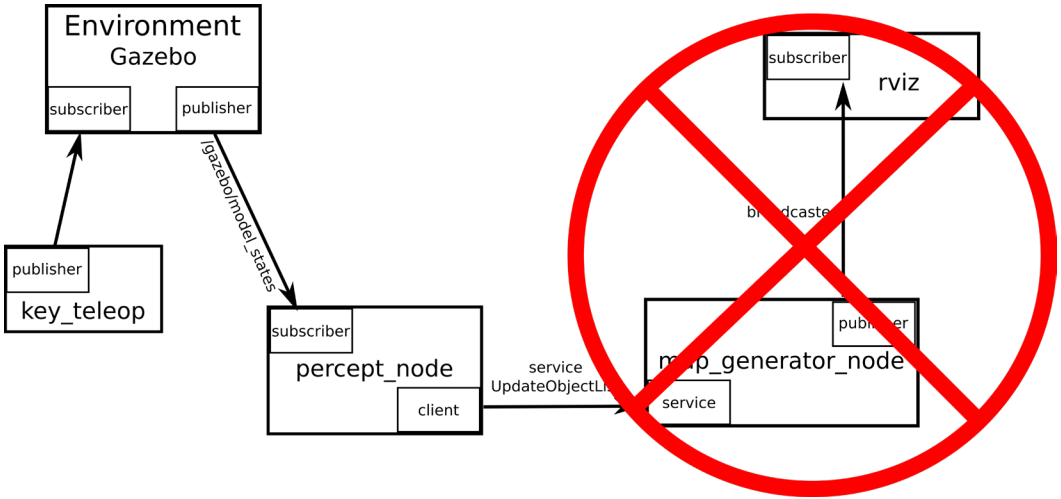
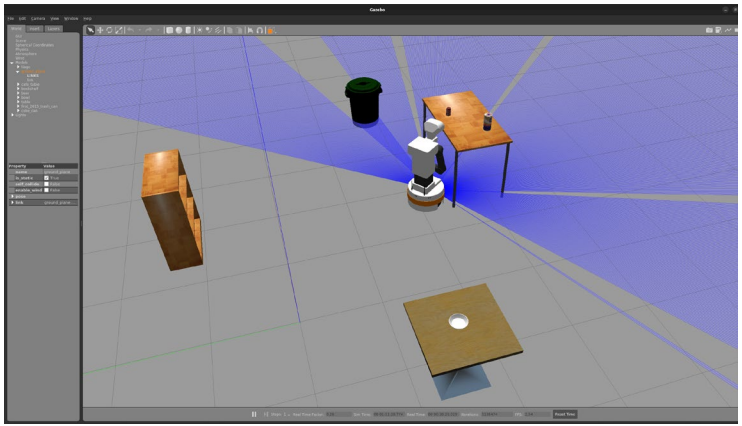
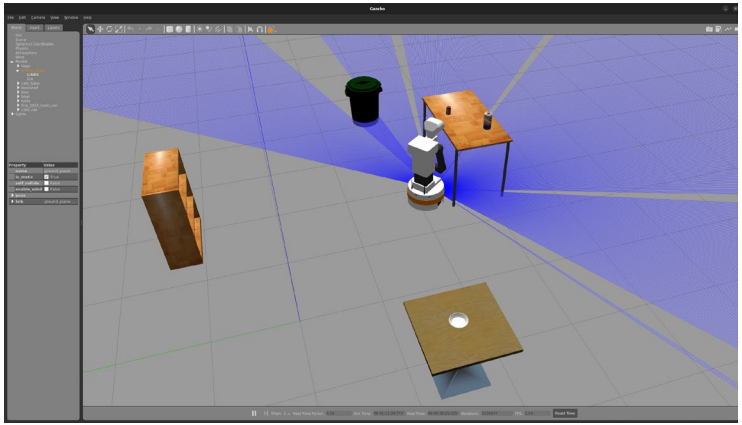


Note: You don't need to launch Rviz for this assignment!



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.

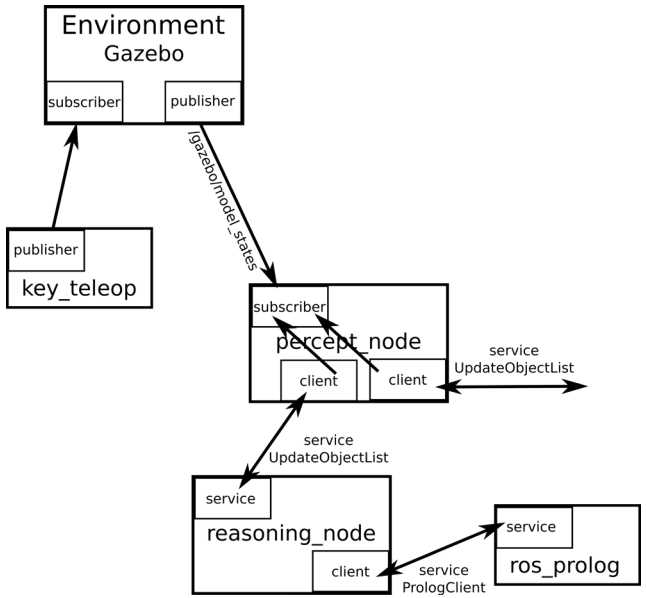
NOTE: Please make sure that the following classes are not included in the ontology; if they are included, please delete them: Bookshelf, Bowl, Coke_can

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) rosrun 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# rosrun rosprolog rosprolog world_percept
?- get_class('Test').
New class created: http://www.chalmers.se/ontologies/ssy236Ontology.owl#Test
true.

?- get_class('Test').
false.

?- get_class('Bottle').
New class created: http://www.chalmers.se/ontologies/ssy236Ontology.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

```
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false.

?- get_class('Bottle').
New class created: http://www.chalmers.se/ontologies/ssy236Ontology.owl#Bottle
true.

?- get_class('Bottle').
false.

?- create_instance_from_class('Test', '1', I).
I = ssy236Ontology:'Test_1'.

?- create_instance_from_class('Bowl', '2', I).
I = ssy236Ontology:'Bowl_2'.
```

```
?- owl_individual_of(I, ssy236Ontology:'Bowl').
I = ssy236Ontology:'Bowl_2' ;
false.

?- owl_individual_of(I, ssy236Ontology:'Test').
I = ssy236Ontology:'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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