

## Robotics

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Homework2

Arya Ebrahimi

9822762175

### Question 1

a) What is the difference between packages in base.yaml and distribution.yaml?

To add dependencies in a package, one must add them in the package.xml file, then rosdep will handle the installation.

But how to find keys to put in package.xml?

According to the [ROS documentation](#), distribution.yaml contains ROS packages like turtlesim (line 6970 of the humble/distribution.yaml). and base.yaml contains non-ROS system dependencies such as beep.

b) According to the above question, in which category are the packages slam\_toolbox and ffmpeg, and how does rosdep install them?

Since slam\_toolbox is a ROS package, it can be found in distribution.yaml, where link of the package's Github repository is specified and rosdep can install dependency using that.

In contrast, ffmpeg is a non-ROS dependency, thus it is in base.yaml. As can be seen in [base.yaml](#) line 989, ffmpeg system packages for different Linux distributions are defined, and rosdep can install them using the names.

c) What is IDL, and how does ROS use that?

IDL is a term for a language that lets a program or object written in one language communicate with another program written in another language. IDLs describe an interface in a [language-independent](#) way, enabling communication between software components that do not share one language. Since ROS packages could be defined in C++ or Python, IDL is needed to make communication between nodes possible. Once the .msg files are defined, ROS provides tools for generating code in C++ and Python, and then nodes can use this generated code to send and receive messages over the ROS network.

## Question 2

```
arya@rosbox:~/ros2_ws$ ros2 launch yinsim yinsim_launch.py
[base] ariya@rosbox:~/ros2_ws$ ros2 launch yinsim yinsim_launch.py
[INFO] [launch]: All log files can be found below /home/arya/.ros/log/2023-03-10-20-34-33-358212-rosbox.pop-os-26009
[INFO] [launch]: Default logging verbosity is set to INFO
/opt/ros/humble/lib/python3.10/site-packages/launch_ros/events/lifecycle/lifecycle_node_matchers.py:30: UserWarning: 'matches_node_name' has been moved into the 'launch.events' module and will be removed from the 'lifecycle' module in the future
  warnings.warn(
[INFO] [yinnode-1]: process started with pid [26011]
[yinnode-1] [INFO] [1678467874.901877788] [custom_yinnode]: waiting...
[yinnode-1] [INFO] [1678467875.918960024] [custom_yinnode]: waiting...
[yinnode-1] [INFO] [1678467876.916938768] [custom_yinnode]: waiting...
[yinnode-1] [INFO] [1678467877.923354015] [custom_yinnode]: waiting...
[yinnode-1] [INFO] [1678467878.931838389] [custom_yinnode]: waiting...
[yinnode-1] [INFO] [1678467879.938830199] [custom_yinnode]: waiting...
[yinnode-1] [INFO] [1678467880.945355373] [custom_yinnode]: waiting...
[yinnode-1] [INFO] [1678467881.953083688] [custom_yinnode]: waiting...
[yinnode-1] [INFO] [1678467882.959932647] [custom_yinnode]: waiting...
[yinnode-1] [INFO] [1678467883.966873818] [custom_yinnode]: waiting...
[yinnode-1] [INFO] [1678467884.973173031] [custom_yinnode]: waiting...
[yinnode-1] [INFO] [1678467885.979688761] [custom_yinnode]: request sent
[yinnode-1] [INFO] [1678467886.226675300] [custom_yinnode]: **Hi Yin, I am Yang the opposite of you.**
[yinnode-1] [INFO] [1678467886.845365155] [custom_yinnode]: request sent
[yinnode-1] [INFO] [1678467887.226968959] [custom_yinnode]: **Yes, Yin; we ourselves, do not mean anything since we are only employed to express a relation**
[yinnode-1] [INFO] [1678467887.844931154] [custom_yinnode]: request sent
[yinnode-1] [INFO] [1678467888.226459544] [custom_yinnode]: **Precisely, Yin; we are used to describe how things function in relation to each other and to the universe.**
[yinnode-1] [INFO] [1678467889.845417748] [custom_yinnode]: request sent
[yinnode-1] [INFO] [1678467889.227096741] [custom_yinnode]: **For what is and what is not beget each other.**
[yinnode-1] [INFO] [1678467889.845408411] [custom_yinnode]: request sent
[yinnode-1] [INFO] [1678467890.227106740] [custom_yinnode]: **High and low place each other.**
[yinnode-1] [INFO] [1678467890.845501937] [custom_yinnode]: request sent
[yinnode-1] [INFO] [1678467891.227088239] [custom_yinnode]: **Before and behind follow each other.**
[yinnode-1] [INFO] [1678467891.845417748] [custom_yinnode]: request sent
[yinnode-1] [INFO] [1678467892.227314531] [custom_yinnode]: **And you fade into the darkness.**
[yinnode-1] [INFO] [1678467892.231391649] [custom_yinnode]: accepted
[yinnode-1] [INFO] [1678467892.231853721] [custom_yinnode]: Good bye
[yinnode-1] [INFO] [1678467895.844537324] [quitting]: Done
[INFO] [yinnode-1]: process has finished cleanly [pid 26011]
[INFO] [launch.user]: [LifecycleLaunch] yinsim node is exiting.
(base) ariya@rosbox:~/ros2_ws$
```

Figure 1: Terminal output of yinnode.

```
arya@rosbox:~/ros2_ws$ ros2 launch yangsim yangsim_launch.py
[base] ariya@rosbox:~/ros2_ws$ ros2 launch yangsim yangsim_launch.py
[INFO] [yangnode-1]: process started with pid [26012]
[yangnode-1] [INFO] [1678467892.856965903] [custom_yangnode]: 41
[yangnode-1] [INFO] [1678467892.867386535] [custom_yangnode]: 40
[yangnode-1] [INFO] [1678467892.877985234] [custom_yangnode]: 39
[yangnode-1] [INFO] [1678467892.888279882] [custom_yangnode]: 38
[yangnode-1] [INFO] [1678467892.898737297] [custom_yangnode]: 37
[yangnode-1] [INFO] [1678467892.909228710] [custom_yangnode]: 36
[yangnode-1] [INFO] [1678467892.919696660] [custom_yangnode]: 35
[yangnode-1] [INFO] [1678467892.930168714] [custom_yangnode]: 34
[yangnode-1] [INFO] [1678467892.940571630] [custom_yangnode]: 33
[yangnode-1] [INFO] [1678467892.951035287] [custom_yangnode]: 32
[yangnode-1] [INFO] [1678467892.961501861] [custom_yangnode]: 31
[yangnode-1] [INFO] [1678467892.972007854] [custom_yangnode]: 30
[yangnode-1] [INFO] [1678467892.982424292] [custom_yangnode]: 29
[yangnode-1] [INFO] [1678467892.992914858] [custom_yangnode]: 28
[yangnode-1] [INFO] [1678467893.003293204] [custom_yangnode]: 27
[yangnode-1] [INFO] [1678467893.013749075] [custom_yangnode]: 26
[yangnode-1] [INFO] [1678467893.024128535] [custom_yangnode]: 25
[yangnode-1] [INFO] [1678467893.034616530] [custom_yangnode]: 24
[yangnode-1] [INFO] [1678467893.045142114] [custom_yangnode]: 23
[yangnode-1] [INFO] [1678467893.055622005] [custom_yangnode]: 22
[yangnode-1] [INFO] [1678467893.066096628] [custom_yangnode]: 21
[yangnode-1] [INFO] [1678467893.076520171] [custom_yangnode]: 20
[yangnode-1] [INFO] [1678467893.086968352] [custom_yangnode]: 19
[yangnode-1] [INFO] [1678467893.097398403] [custom_yangnode]: 18
[yangnode-1] [INFO] [1678467893.107790800] [custom_yangnode]: 17
[yangnode-1] [INFO] [1678467893.118222074] [custom_yangnode]: 16
[yangnode-1] [INFO] [1678467893.128634866] [custom_yangnode]: 15
[yangnode-1] [INFO] [1678467893.138993780] [custom_yangnode]: 14
[yangnode-1] [INFO] [1678467893.149453960] [custom_yangnode]: 13
[yangnode-1] [INFO] [1678467893.159835964] [custom_yangnode]: 12
[yangnode-1] [INFO] [1678467893.170377735] [custom_yangnode]: 11
[yangnode-1] [INFO] [1678467893.181270758] [custom_yangnode]: 10
[yangnode-1] [INFO] [1678467893.191700645] [custom_yangnode]: 9
[yangnode-1] [INFO] [1678467893.202191394] [custom_yangnode]: 8
[yangnode-1] [INFO] [1678467893.212622139] [custom_yangnode]: 7
[yangnode-1] [INFO] [1678467893.223036883] [custom_yangnode]: 6
[yangnode-1] [INFO] [1678467893.233416820] [custom_yangnode]: 5
[yangnode-1] [INFO] [1678467893.244313733] [custom_yangnode]: 4
[yangnode-1] [INFO] [1678467893.254752516] [custom_yangnode]: 3
[yangnode-1] [INFO] [1678467893.265251685] [custom_yangnode]: 2
[yangnode-1] [INFO] [1678467893.275938946] [custom_yangnode]: 1
[yangnode-1] [INFO] [1678467893.286307690] [custom_yangnode]: 0
[yangnode-1] [INFO] [1678467893.299260891] [custom_yangnode]: Result received: farewell
[yangnode-1] terminate called without an active exception
[ERROR] [yangnode-1]: process has died [pid 26084, exit code -6, cmd '/home/arya/ros2_ws/install/yangsim/lib/yangsim/yangnode --ros-args -r __node:=custom_yangnode --params-file /tmp/launch_params_ushkkit5'].
(base) ariya@rosbox:~/ros2_ws$
```

Figure 2: Terminal output of yangnode.

```
arya@rosbox:~/ros2_ws$ ros2 topic echo /conversation
data: 'Yin said: I am Yin, some mistake me for an actual material entity but I am more of a concept, 82, 7354'
---
data: 'Yang said: **Hi Yin, I am Yang the opposite of you.**, 42, 3439'
---
data: 'Yin said: Interesting Yang, so one could say, in a philosophical sense, we are two polar elements, 87, 8085'
---
data: 'Yang said: **Yes, Yin; we ourselves, do not mean anything since we are only employed to express a relation**, 97, 8826'
---
data: 'Yin said: We, Yang, are therefore the balancing powers in the universe., 61, 5622'
---
data: 'Yang said: **Precisely, Yin; we are used to describe how things function in relation to each other and to the universe.**, 110, ...'
---
data: 'Yin said: Difficult and easy complete each other., 39, 3673'
---
data: 'Yang said: **For what is and what is not beget each other.**, 49, 4219'
---
data: 'Yin said: Long and short show each other., 31, 2869'
---
data: 'Yang said: **High and low place each other.**, 34, 2867'
---
data: 'Yin said: Noise and sound harmonize each other., 37, 3496'
---
data: 'Yang said: **Before and behind follow each other.**, 40, 3500'
---
data: 'Yin said: You shine your light., 21, 1993'
---
data: 'Yang said: **And you fade into the darkness., 35, 3020'
---
```

Figure 3: Conversation topic result.