https://vimeo.com/639236696

ROS Introduction 3:12 (captioned)

Open Robotics
Mountain View, CA, USA
We help make Robot Operating System (ROS) and the Ignition/Gazebo simulator.
info@openrobotics.org
Homepage
http://www.openrobotics.org
http://www.ros.org

An operating system is a software that provides interface between the applications and the hardware.

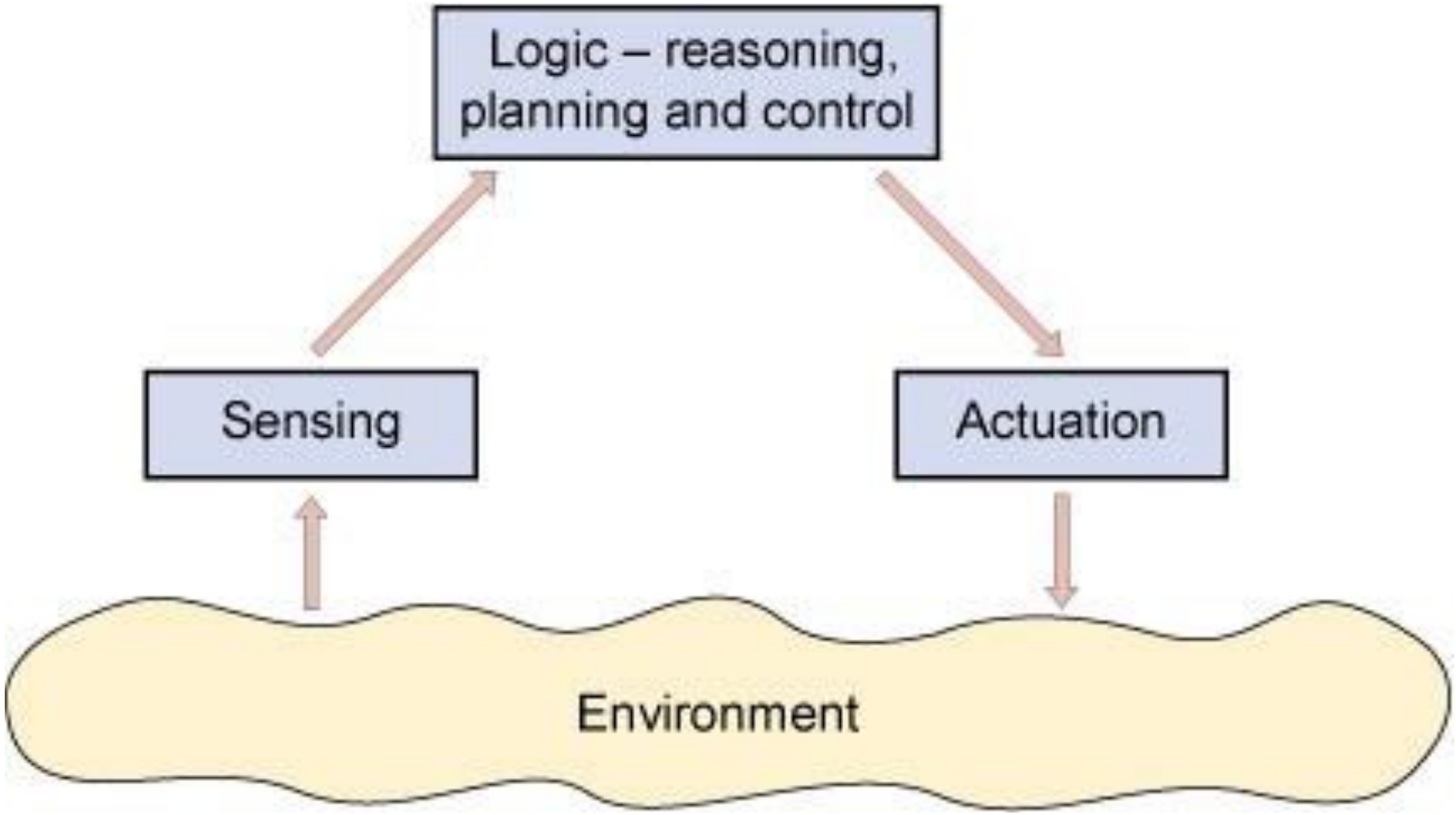
It deals with the allocation of resources such as memory, processor time etc. by using scheduling algorithms and keeps record of the authority of different users, thus providing a security layer.

The operating systems may include basic applications such as web browsers, editors, system monitoring applications etc.

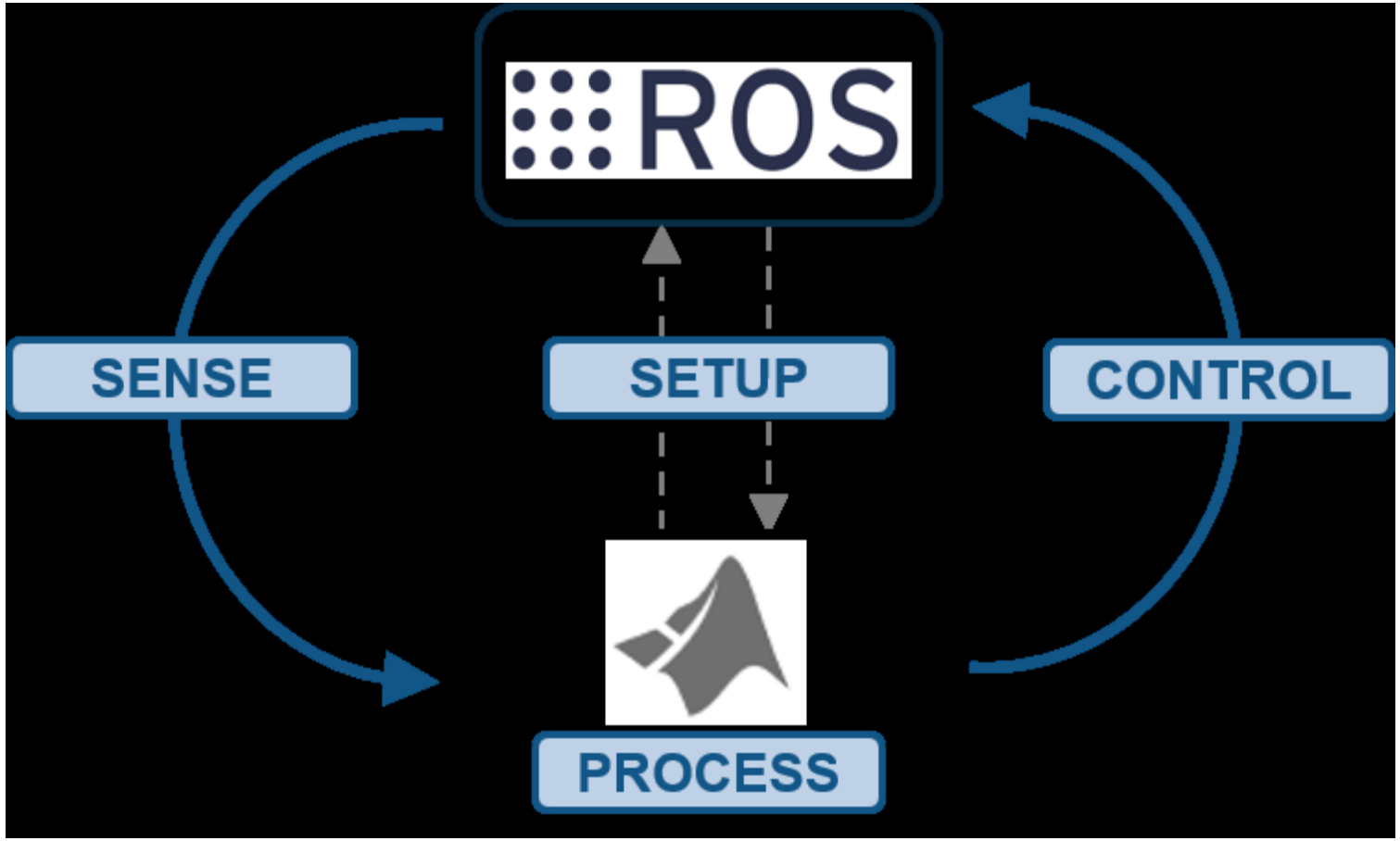
Khan Saad Bin Hasan
What is ROS?
Oct 20, 2019
https://towardsdatascience.com/what-why-and-how-of-ros-b2f5ea8be0f3

ROS, an open-source robot operating system. ROS is not an operating system in the traditional sense of process management and scheduling; rather, it provides a structured communications layer above the host operating systems of a heterogeneous compute cluster.[2]

Quigley, Morgan, et al. "ROS: an open-source Robot Operating System." ICRA workshop on open source software. Vol. 3. №3.2. 2009.



Robotic System



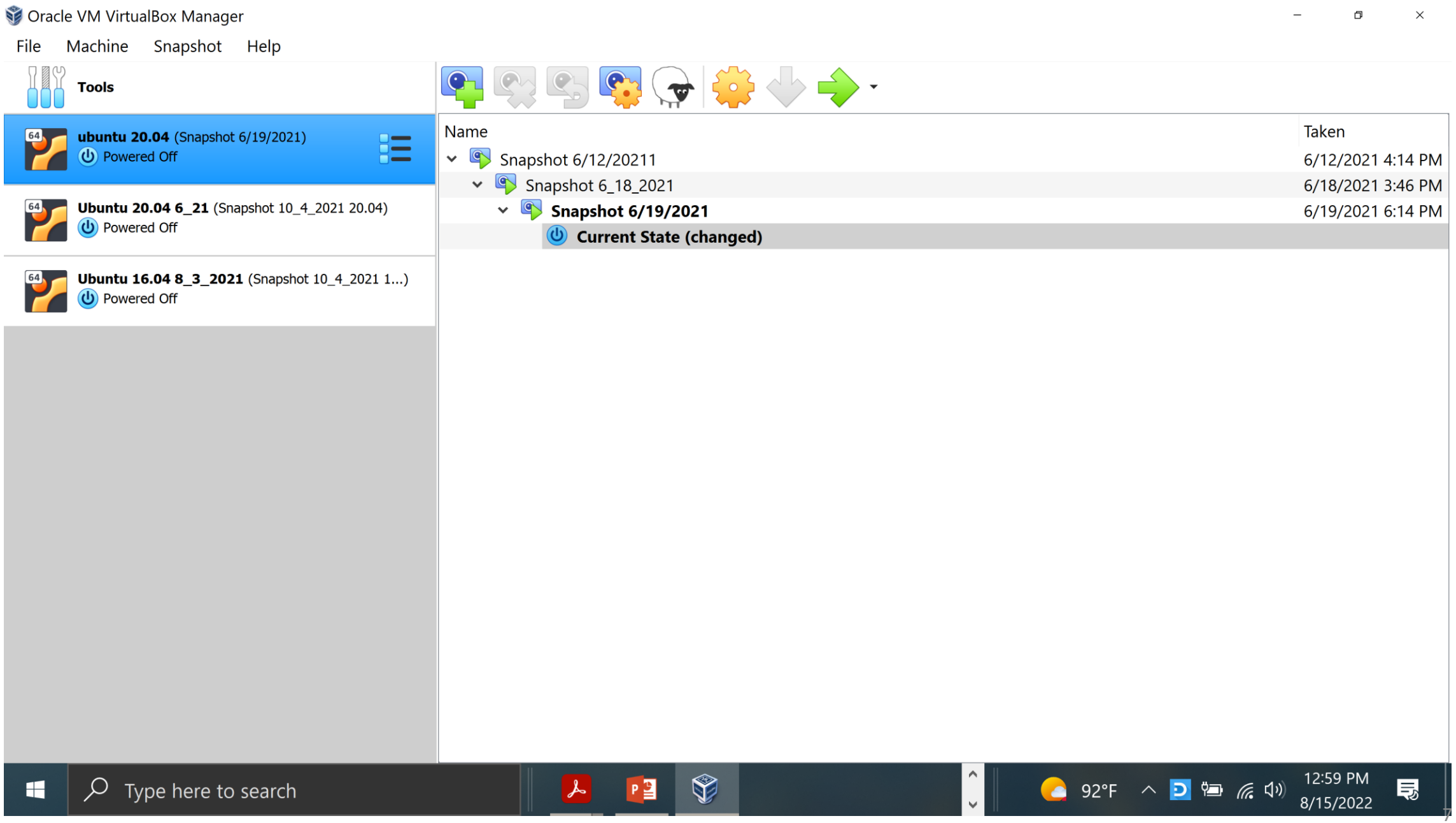
ROS is not an operating system but a meta operating system meaning, that it assumes there is an underlying operating system that will assist it in carrying out its tasks.

ROS depends on the underlying Operating System. ROS demands a lot of functionality from the operating system.

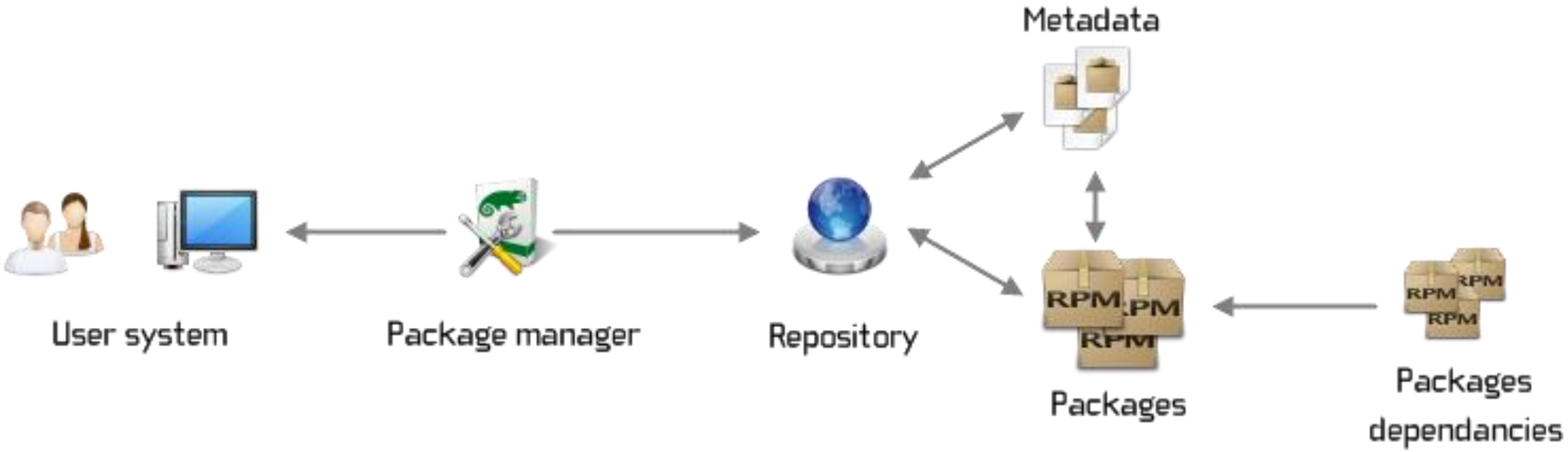
Hence, most people prefer to run ROS on Linux particularly Debian and Ubuntu since ROS has a very good support with Debian based operating systems especially Ubuntu.

That doesn’t mean that ROS can’t be run with Mac OS X or Windows 10 for that matter. **But the support is limited** and people may find themselves in tough situation with little help from the community.

An alternative is to use Virtual Box

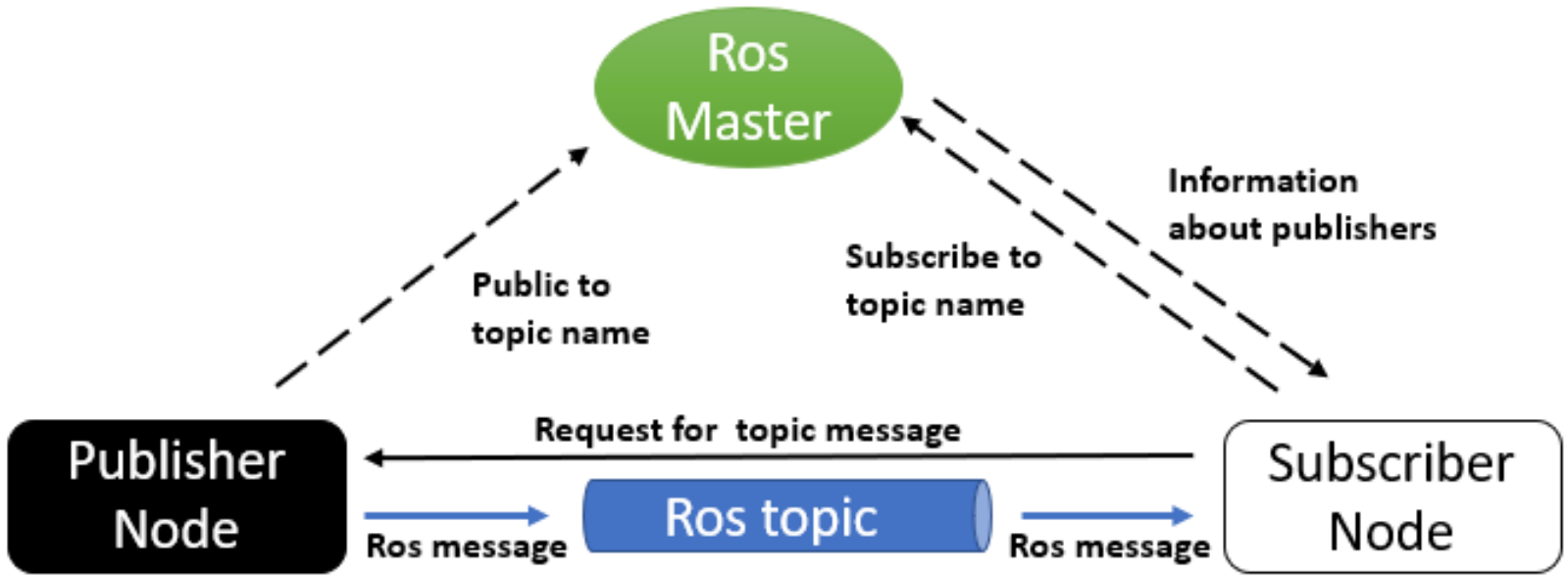

Oracle VM VirtualBox Manager
File
Machine
Snapshot
Help
Tools
ubuntu 20.04 (Snapshot 6/19/2021)
Powered Off
Ubuntu 20.04 6_21 (Snapshot 10_4_2021 20.04)
Powered Off
Ubuntu 16.04 8_3_2021 (Snapshot 10_4_2021 1...)
Powered Off
Name
Taken
Snapshot 6/12/20211
6/12/2021 4:14 PM
Snapshot 6_18_2021
6/18/2021 3:46 PM
Snapshot 6/19/2021
6/19/2021 6:14 PM
Current State (changed)
Type here to search
92°F
12:59 PM
8/15/2022

ROS 1 **Structure for Packages**



Software in ROS is organized in packages. *A package might contain ROS nodes, a ROS-independent library, a dataset, configuration files, a third-party piece of software, or anything else that logically constitutes a useful module.*

ROS 1 Structure



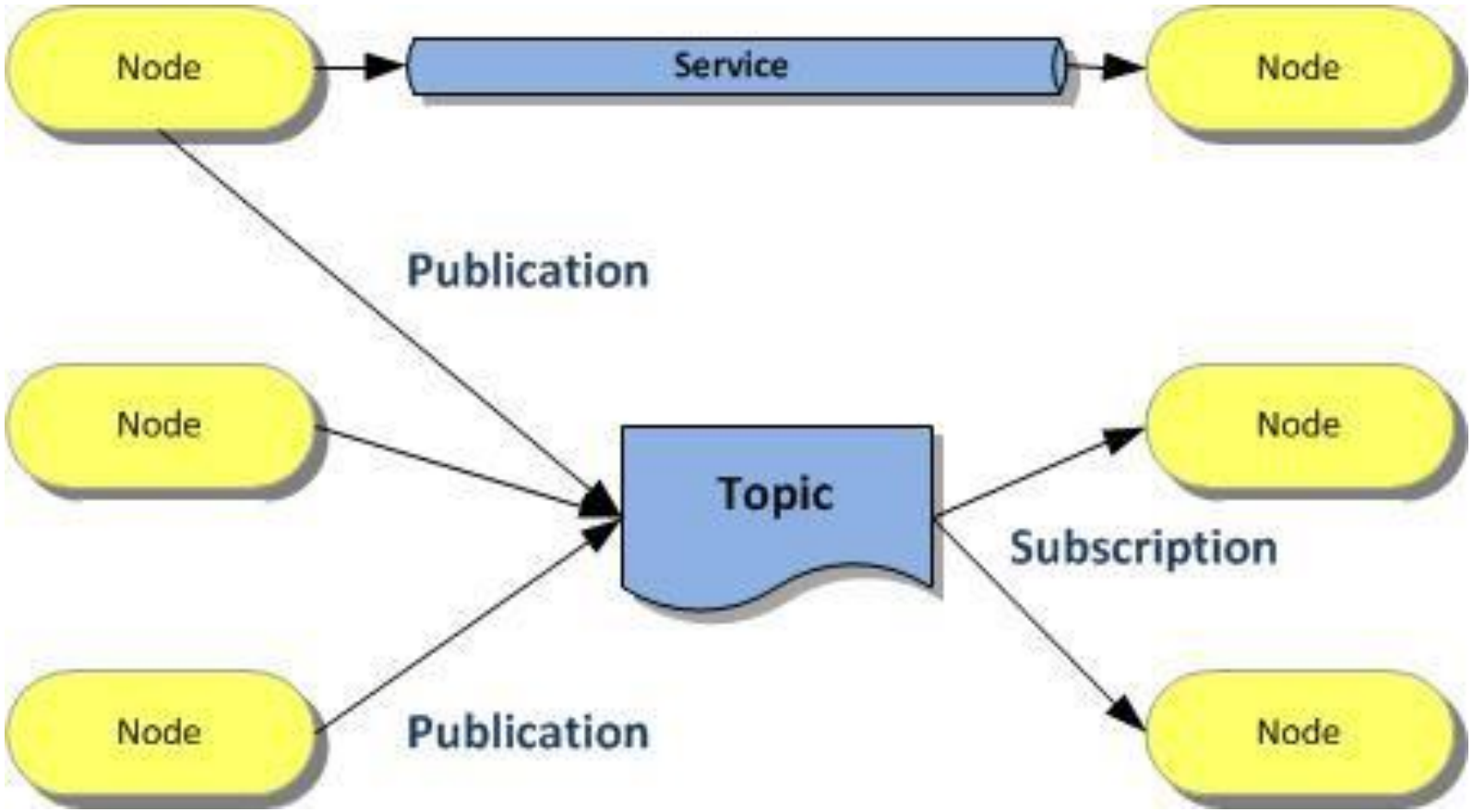
https://trojrobert.github.io/hands-on-introdution-to-robot-operating-system(ros)/

Command	Action	Example usage and subcommandexamples
roscore	Starts the Master	$ roscore
rosrun	Runs an executable programand creates nodes	$ rosrun [package name][executable name]

rosnode	Shows information about nodes and lists the activenodes	$ rosnode info [node name]
		$ rosnode<subcommand>
		Subcommand: list

rostopic	Shows information aboutROS topics	$ rostopic<subcommand><topicname> Subcommands: echo, info, and type
rosmsg	Shows information about themessage types	$ rosmsg<subcommand> [packagename]/ [message type] Subcommands: show, type, and list
rosservice	Displays the runtime information about variousservices and allows the display of messages beingsent to a topic	$ rosservice<subcommand>[service name] Subcommands: args, call, find,info, list, and type
rosparam	Used to get and set parameters (data) used bynodes	$ rosparam<subcommand>[parameter] Subcommands: get, set, list, and delete

The website (http://wiki.ros.org/ROS/CommandLineTools) describes many ROS commands.


Node
Service
Node
Publication
Node
Topic
Node
Subscription
Node
Publication
Node

Some of the important files/directories inside Packages are:

1. Nodes: A node *is a process that performs computation.*

2. CMakeLists.txt: It is the input to the CMake build system for building software packages.

3. Package.xml : It defines properties about the package such as the package name, version numbers, authors, maintainers, and dependencies on other catkin packages.

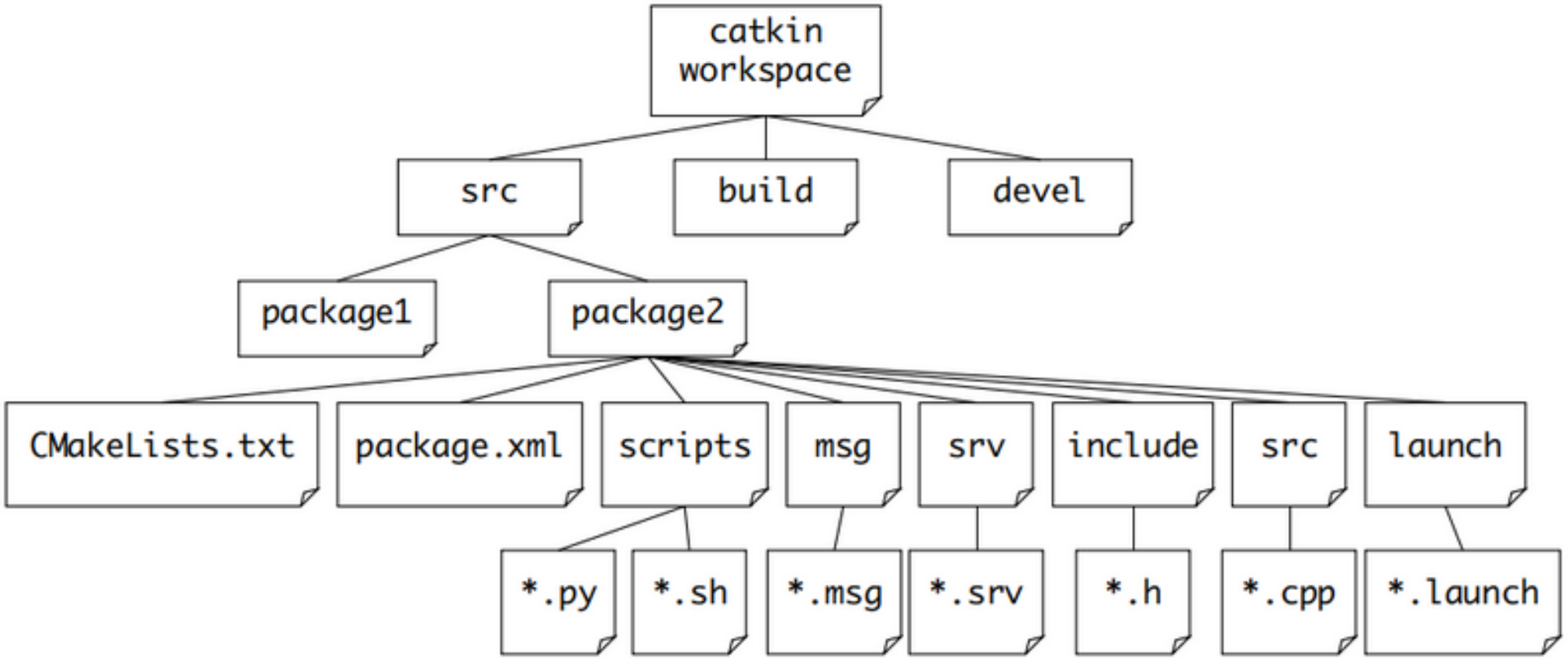
4. .yaml files: To run a rosnode you may require a lot of parameters e.g, Kp,Ki,Kd parameters in PID control. We can configure these using YAML files.

5. launch files: To run multiple nodes at once in ROS we use launch files.

Any code that will be written should be in the form of packages. And the packages should be inside a workspace. Catkin is used in ROS1.

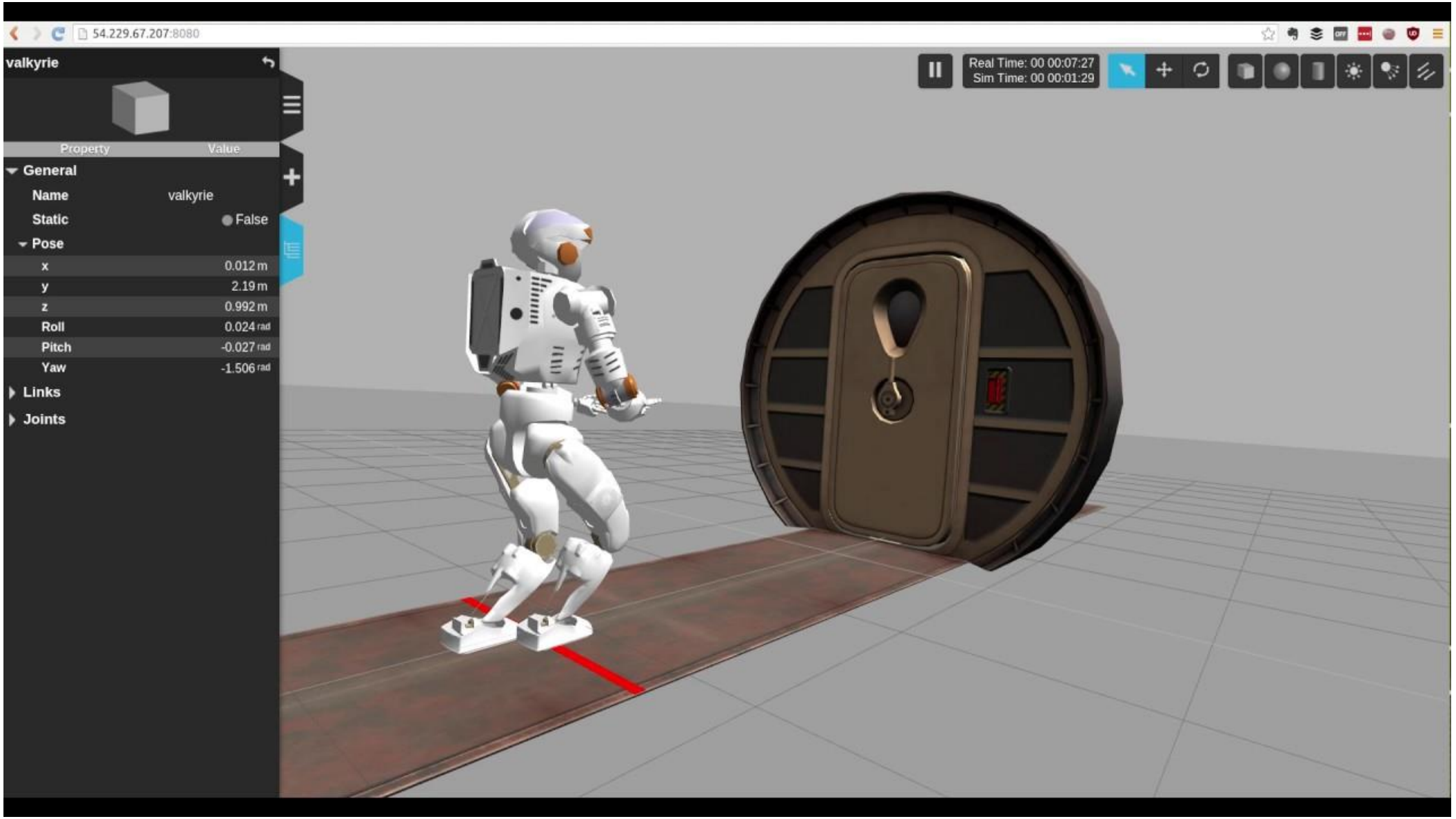
A catkin workspace is a folder where you modify, build, and install catkin packages. It can contain up to four different spaces *which each serve a different role in the software development process.*

1. The source space contains the source code of catkin packages. This is where you can extract/checkout/clone source code for the packages you want to build. Each folder within the source space contains one or more catkin packages.
2. The build space is where CMake is invoked to build the catkin packages in the source space. CMake and catkin keep their cache information and other intermediate files here.
3. The development space (or devel space) is where built targets are placed prior to being installed. The way targets are organized in the devel space is the same as their layout when they are installed. This provides a useful testing and development environment which does not require invoking the installation step.
4. Once targets are built, they can be installed into the install space by invoking the install target, usually with make install.

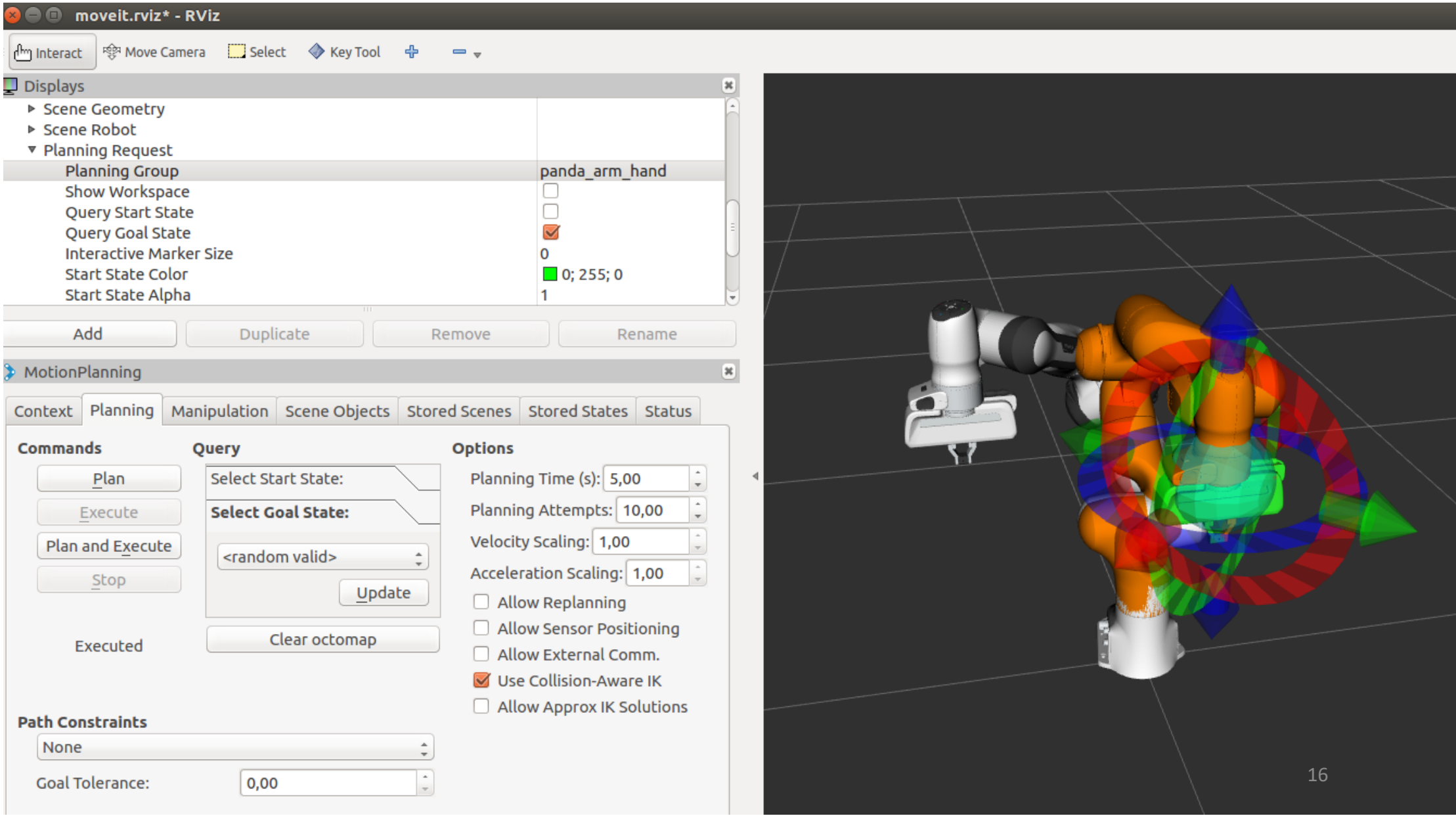


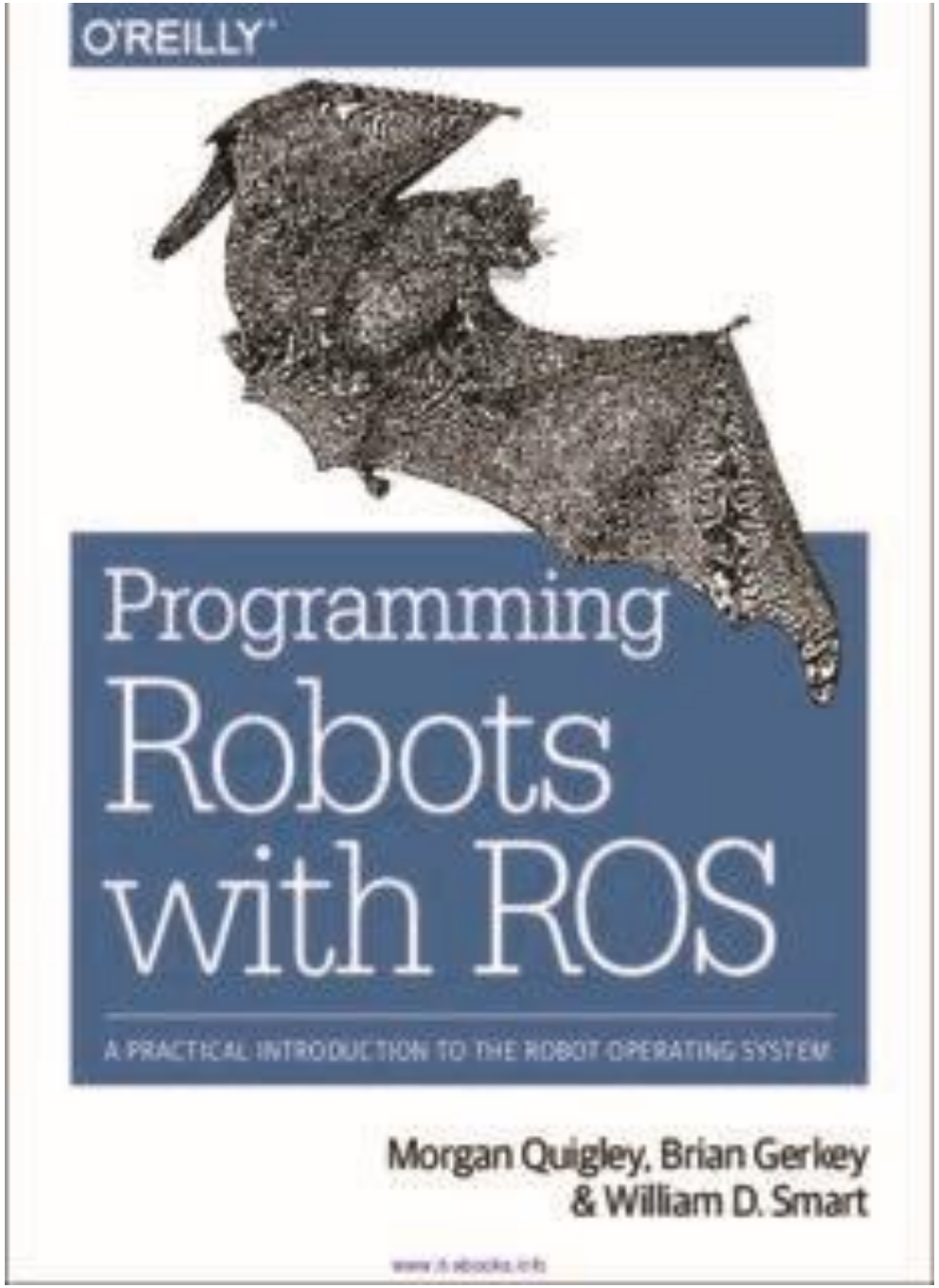
To compile our ROS1 workspace, use the *catkin_make* command to start the build process.

Tools: Gazebo Simulator

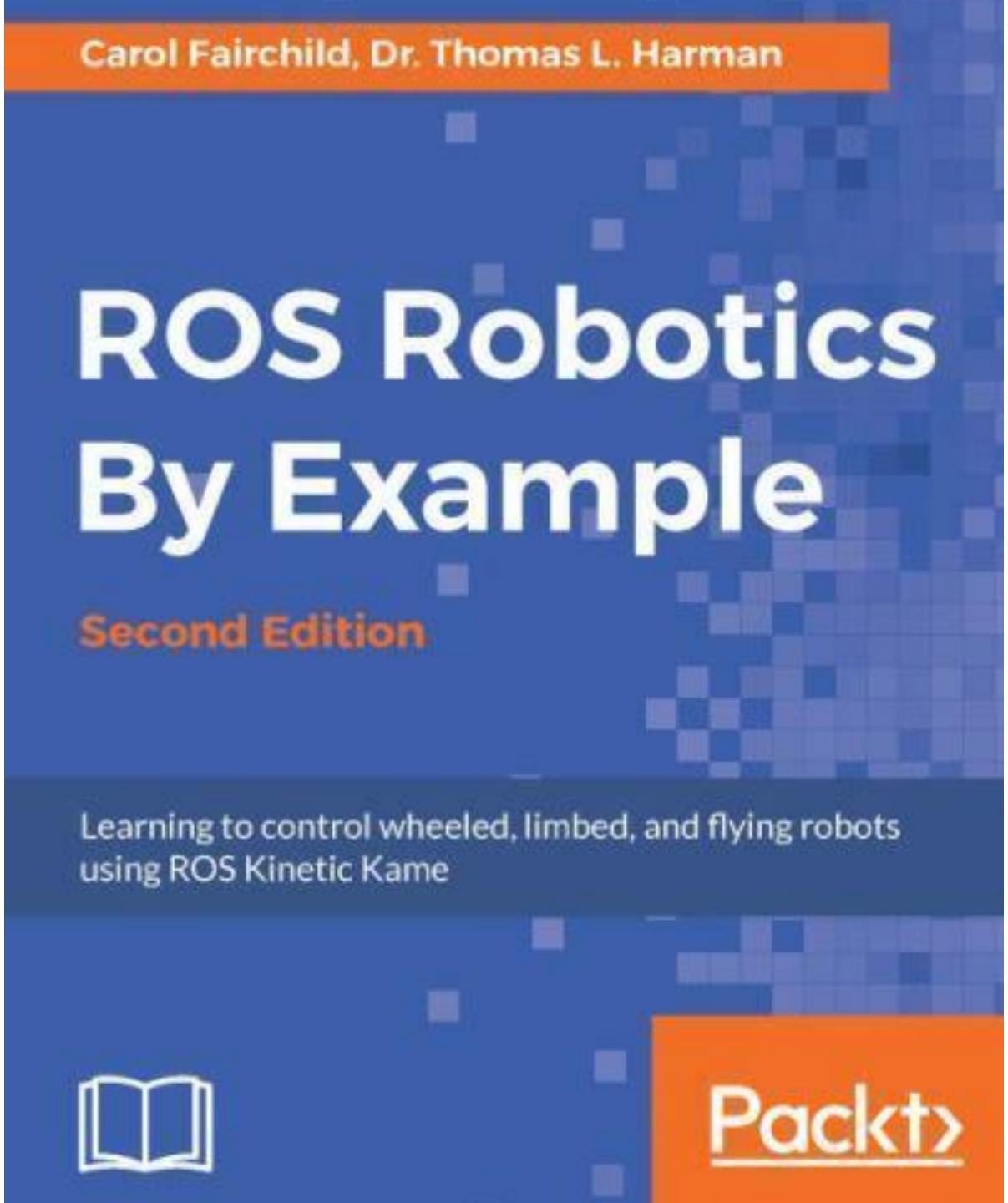


RVIZ Robot Visualizer





447 Pages · 2015 · 32.43 MB · 18,725 Downloads·
English


Carol Fairchild, Dr. Thomas L. Harman
ROS Robotics By Example
Second Edition
Learning to control wheeled, limbed, and flying robots using ROS Kinetic Kame
Packt