

# AI & Robotics

Python GUIs with a focus on Qt for ROS



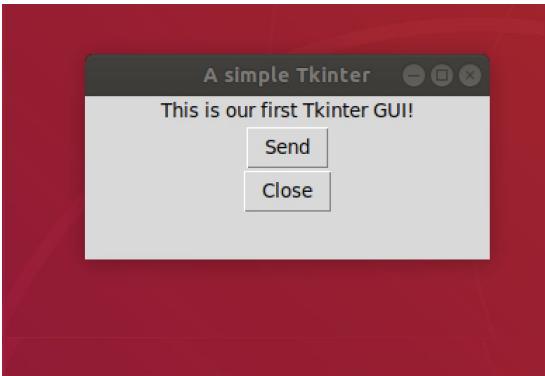
# Goals



## The junior-colleague

- can create a Qt graphical user interfaces for ROS nodes

# Tkinter



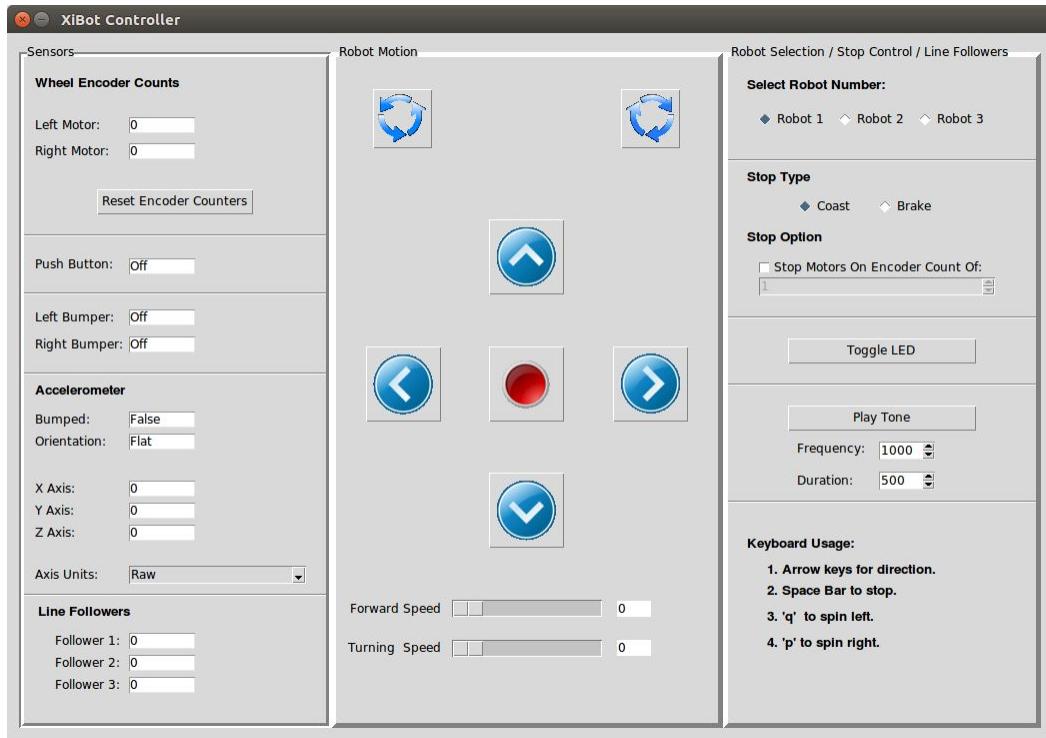
Tkinter is Python's **de-facto standard GUI** (Graphical User Interface) package.

It is a thin object-oriented layer on top of Tcl/Tk (pronounced "tickle/Tk"). Tcl is the Tool Command Language, a programming language that was first released in 1988.

## [INFO]

<https://en.wikipedia.org/wiki/Tcl>, <https://docs.python.org/2/library/tkinter.html>, <https://wiki.python.org/moin/TkInter>

# Tkinter



when someone says you're cute  
but you know you're ugly



[INFO]

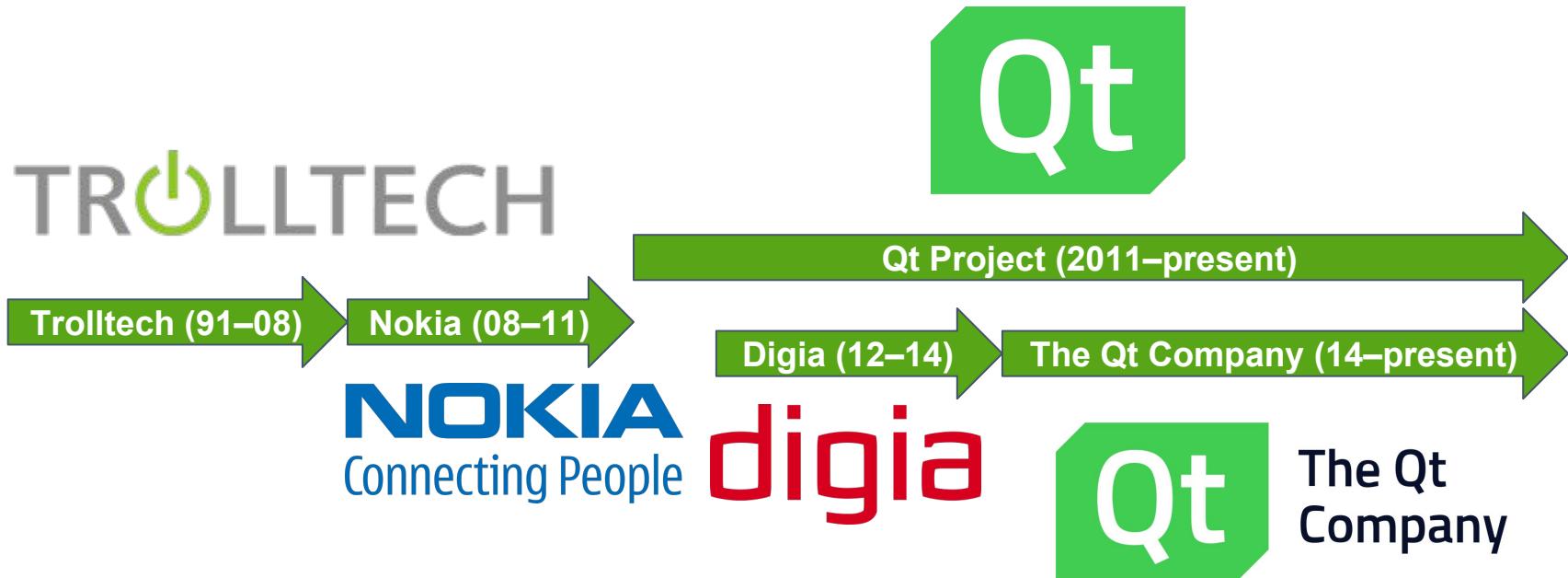
<https://github.com/MrYsLab/xibot>

# Qt



(pronounced "cute") is a **free and open-source widget toolkit** for creating graphical user interfaces as well as cross-platform applications that **run on various software and hardware platforms** such as Linux, Windows, macOS, Android or embedded systems with **little or no change in the underlying codebase** while still being a **native application with native capabilities and speed**.

# History of the developers



# Site

The screenshot shows the official Qt website. At the top, there's a navigation bar with links for Developers, Blog, English (dropdown), Contact Us (in a green button), Download. Try. Buy. (in a green button), Products, Professional Services, Resources, Customers, Company, a search icon, and a user icon. On the left, there are two monitors displaying the Qt Designer interface, one showing a dashboard design and the other showing a file browser. In the background, a developer with a beard is visible from the side, looking at a computer screen. The main headline reads "Software development made smarter" and the subtext says "Create fluid, high-performance and intuitive UIs, applications, and embedded devices – with the same code base for all platforms." A green button at the bottom left says "Start free Qt trial". At the bottom, there's a footer with the Qt logo, the text "Refined Performance. Better Developer Experience. Qt 5.12 LTS Available Now", a link to "All Events >", and a small circular icon with a speech bubble.

[SOURCE]  
<https://www.qt.io>

# Usage



**Panasonic Avionics –  
Inflight Infotainment**

[Read More](#)



**Veriskin – Skin Cancer  
Diagnostics Device**

[Read More](#)



**Rimac Automobili – Car  
Infotainment System**

[Read More](#)

[SOURCE]

<https://www.qt.io>

# Usage



**AutoIO – Digital  
Instrument Clusters**

[Read More](#)



**BEP Marine – Marine  
Automation Systems**

[Read More](#)



**AMD – Graphics software**

[Read More](#)

**[SOURCE]**

<https://www.qt.io>

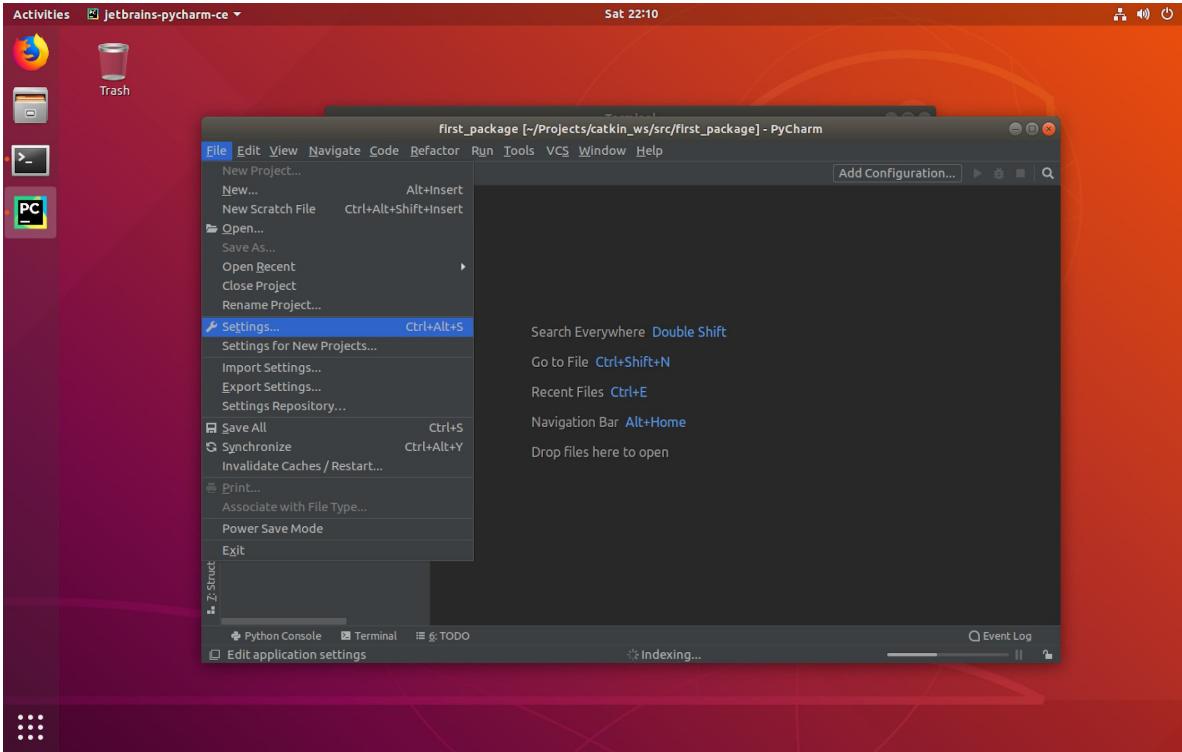
# Usage

```
1 // Copyright 1996-2018 Cyberbotics Ltd.
2 //
3 // Licensed under the Apache License, Version 2.0 (the "License");
4 // you may not use this file except in compliance with the License.
5 // You may obtain a copy of the License at
6 //
7 //     http://www.apache.org/licenses/LICENSE-2.0
8 //
9 // Unless required by applicable law or agreed to in writing, software
10 // distributed under the License is distributed on an "AS IS" BASIS,
11 // WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
12 // See the License for the specific language governing permissions and
13 // limitations under the License.
14
15 #include "WbConsole.hpp"
16
17 #include "WbActionManager.hpp"
18 #include "WbBuildEditor.hpp"
19 #include "WbClipboard.hpp"
20 #include "WbDockTitleBar.hpp"
21 #include "WbFindReplaceDialog.hpp"
22 #include "WbLog.hpp"
23 #include "WbMessageBox.hpp"
24 #include "WbPreferences.hpp"
25 #include "WbSyntaxHighlighter.hpp"
26 #include "WbTextFind.hpp"
27
28 #include <QtGui/QTextBlock>
29 #include <QtGui/QTextDocumentFragment>
30
31 #include <QtWidgets/QAction>
32 #include <QtWidgets/QMenu>
33 #include <QtWidgets/QPlainTextEdit>
34 #include <QtWidgets/QStyle>
35
36 #include <cassert>
37 #include <iostream>
38
39 #include <ode/ode.h> // for message handlers
40
41 // plain text edit with single line highlighting
42 class ConsoleEdit : public QPlainTextEdit {
43 public:
44     explicit ConsoleEdit(QWidget *parent) : QPlainTextEdit(parent) {
45         setObjectName("ConsoleEdit");
46         setContextMenuPolicy(Qt::CustomContextMenu);
47     }
48 }
```

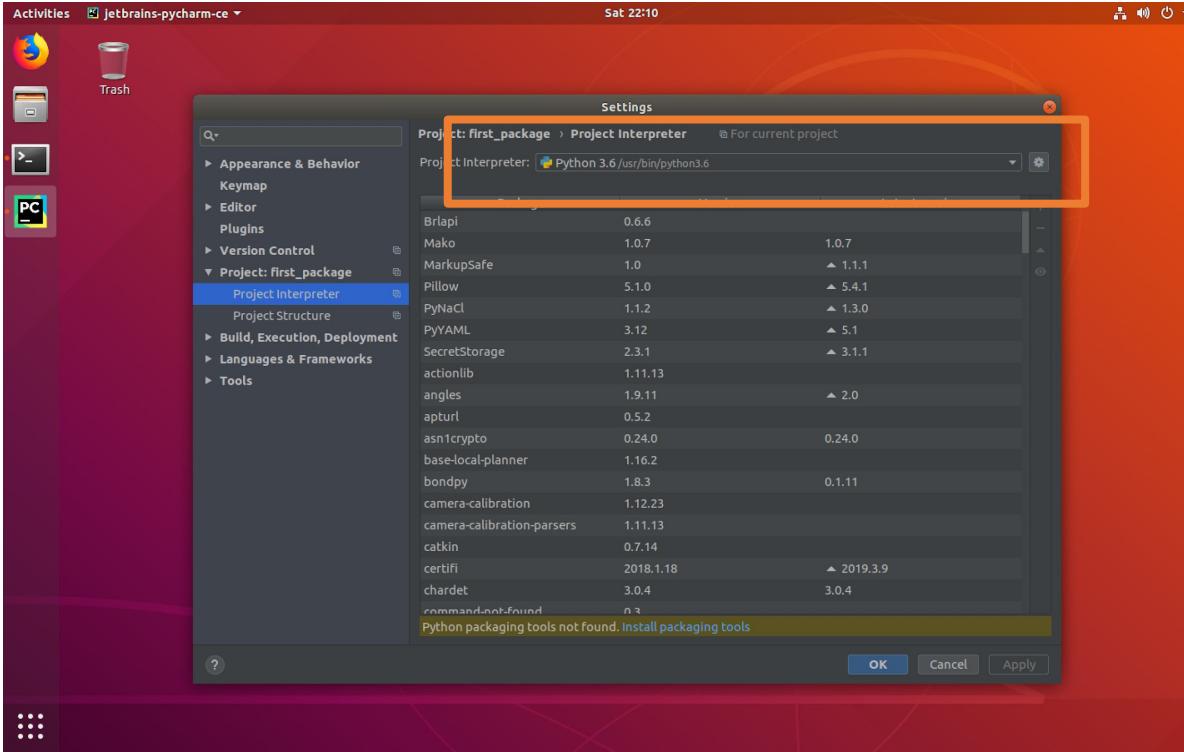
[SOURCE]

<https://github.com/omichel/webots/blob/master/src/webots/gui/WbConsole.cpp>

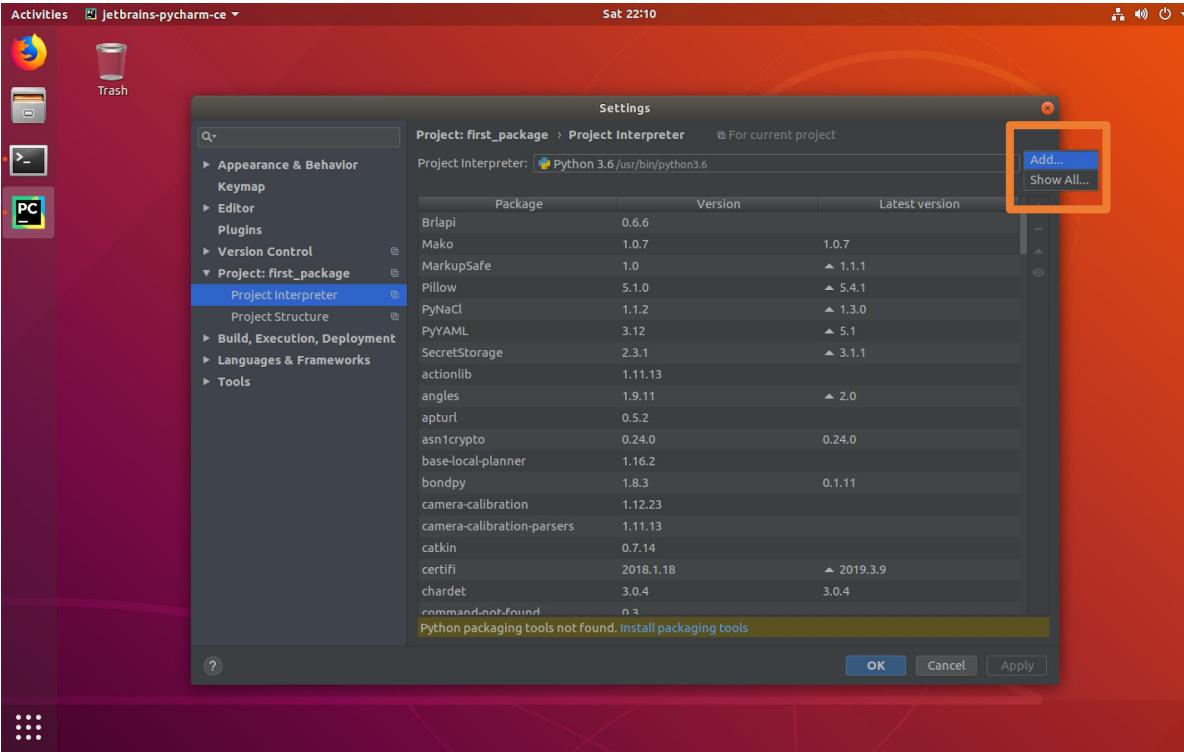
# Qt5 installed with ROS



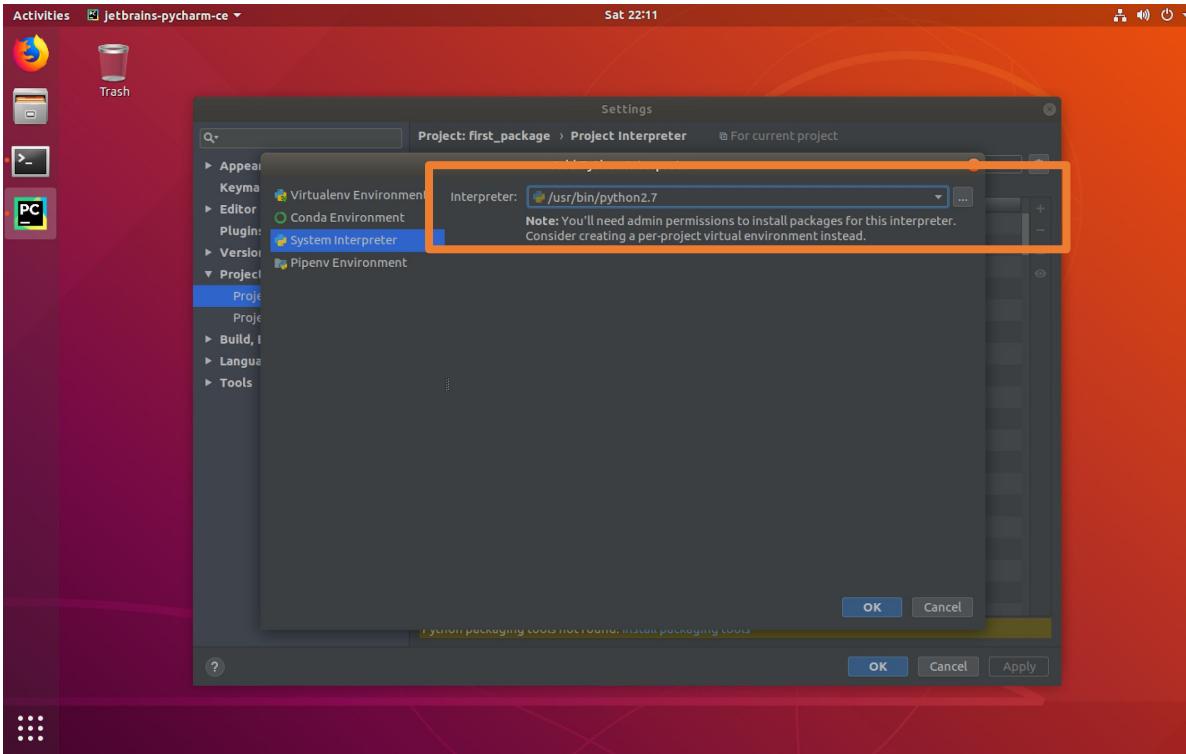
# Qt5 installed with ROS



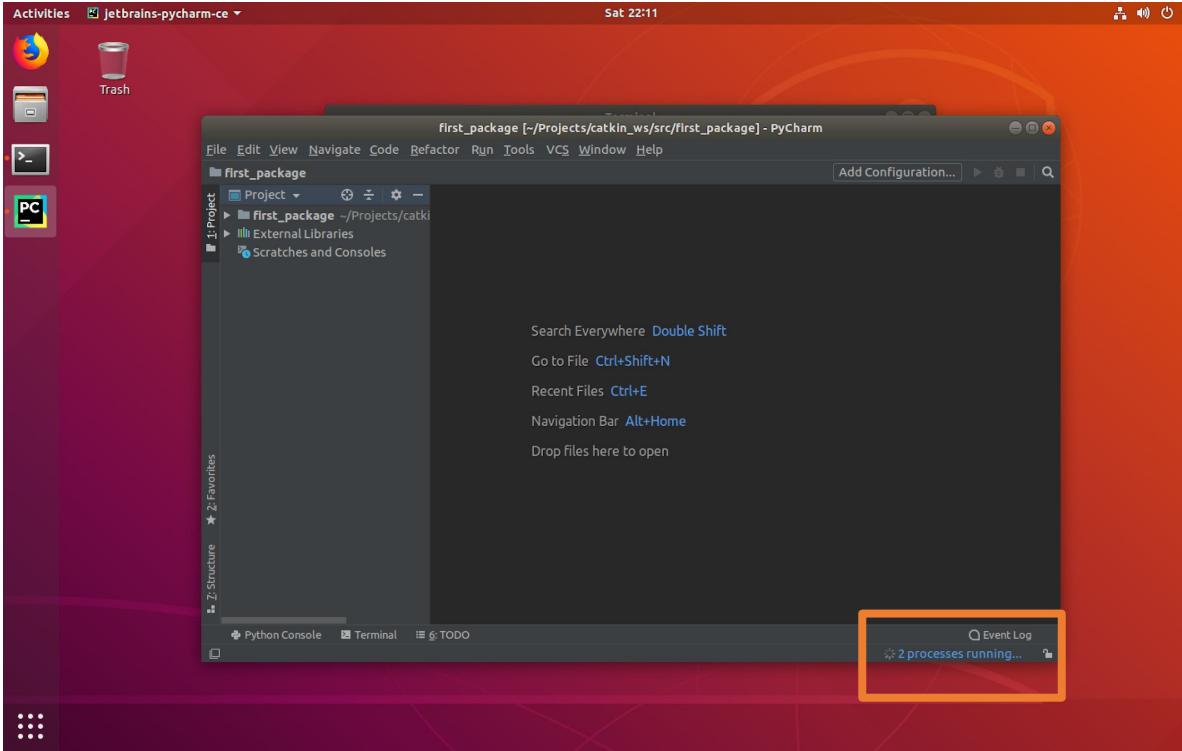
# Qt5 installed with ROS



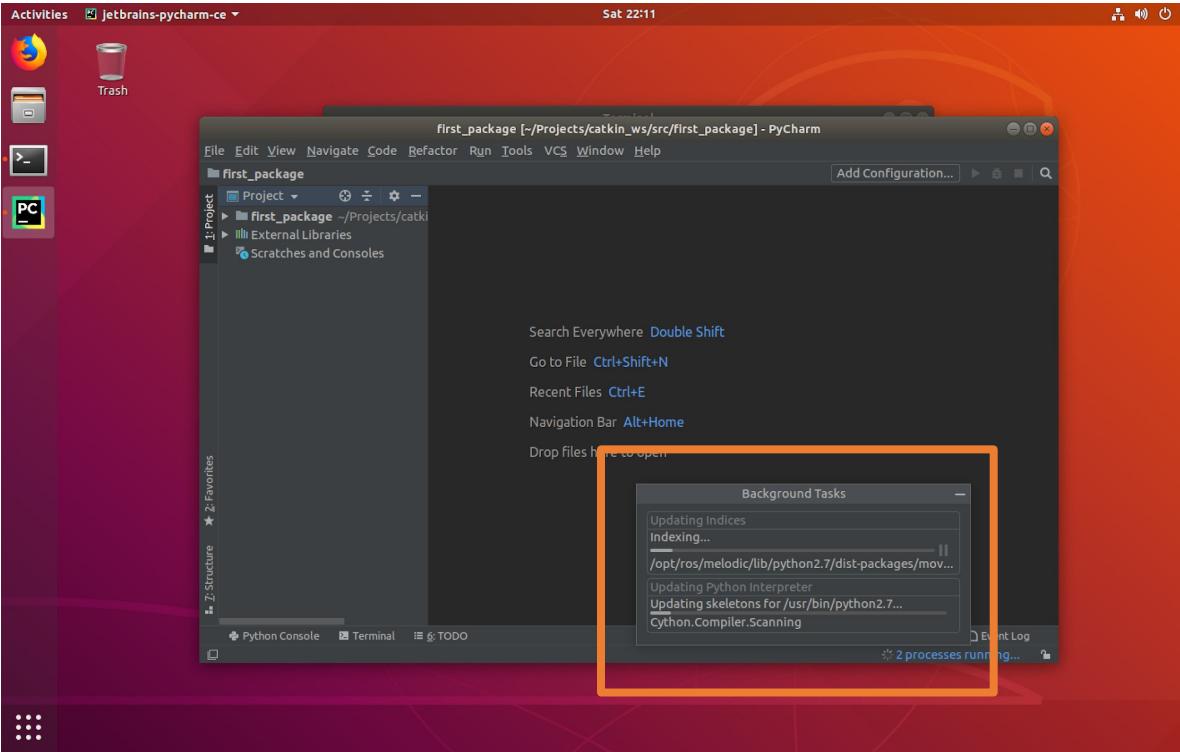
# Qt5 installed with ROS



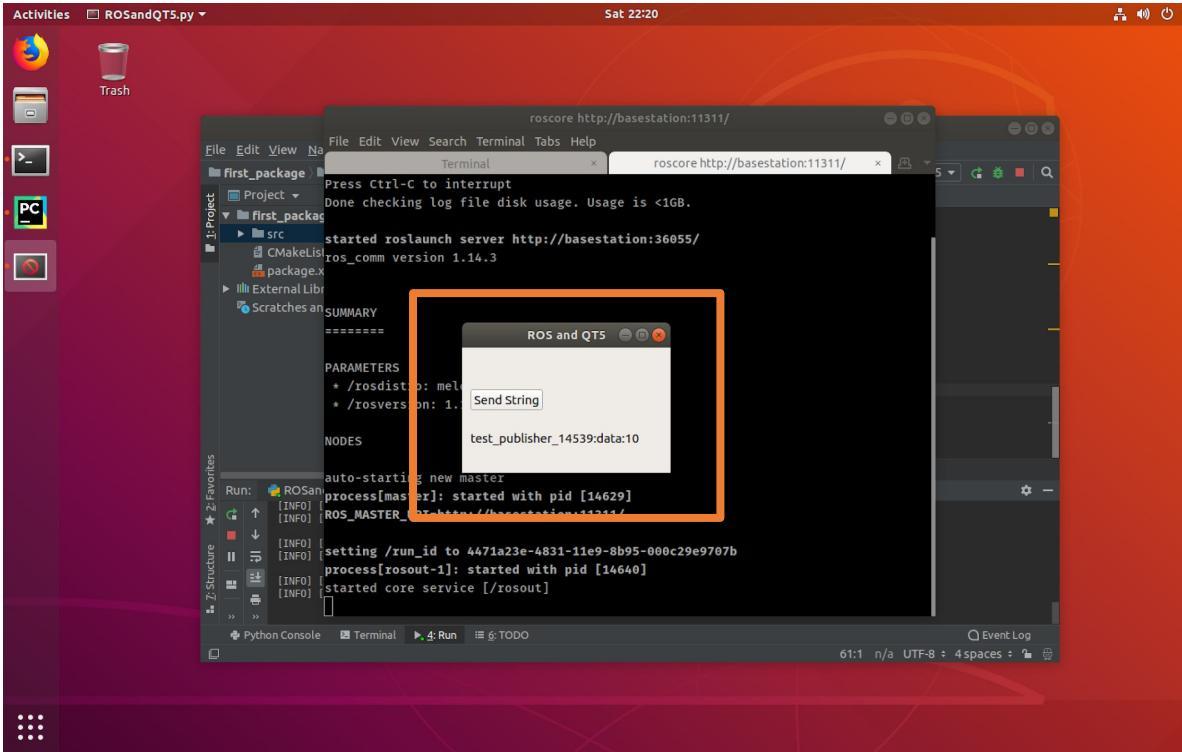
# Qt5 installed with ROS



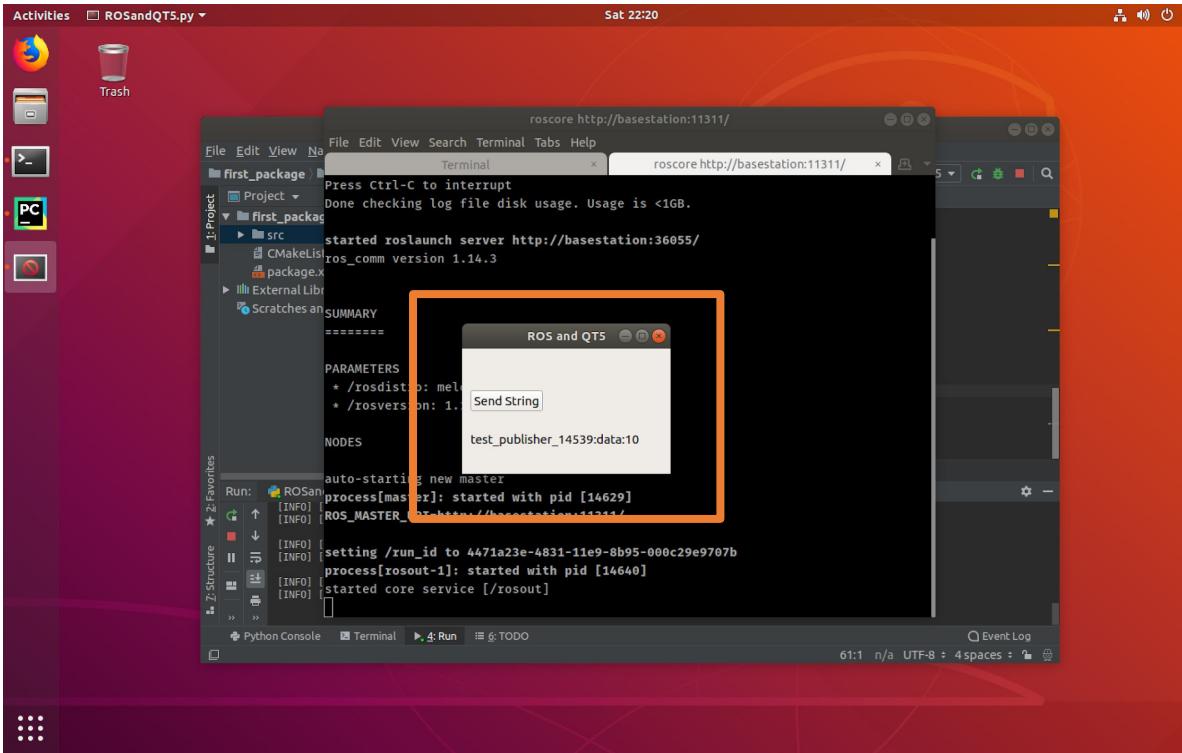
# Qt5 installed with ROS



# Qt5 installed with ROS



# Qt5 installed with ROS



# Learn Qt4 in on PluralSight

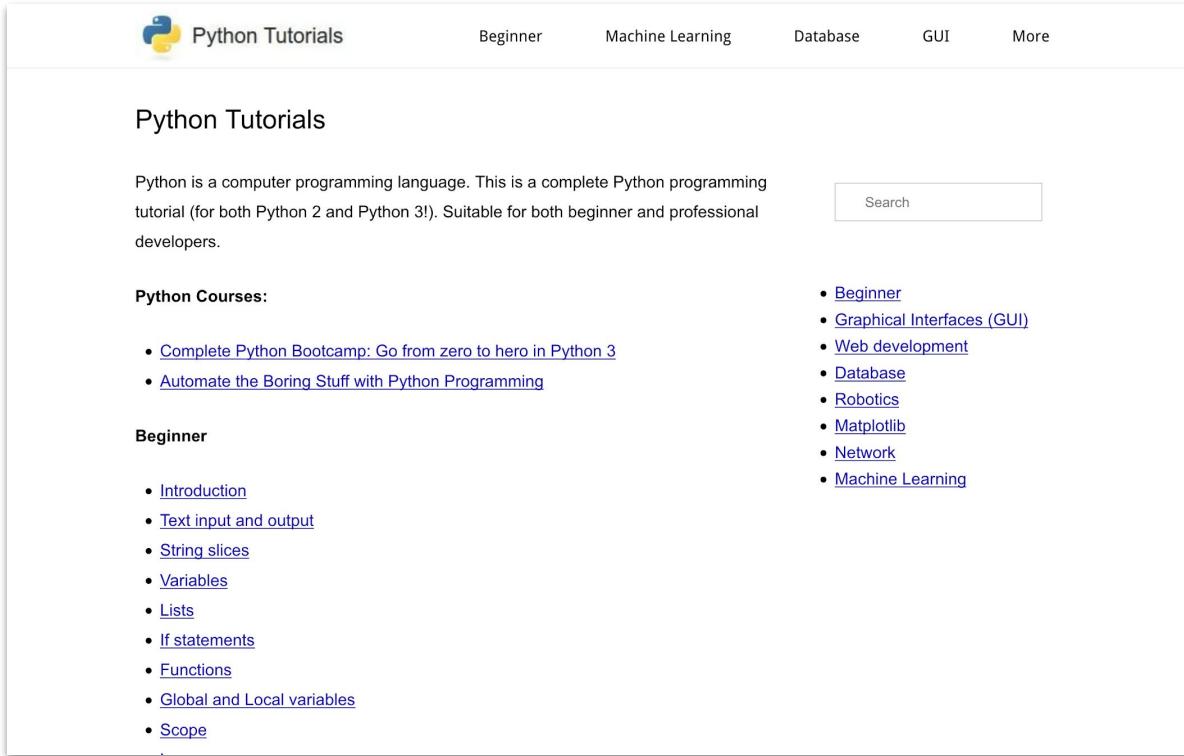
The screenshot shows a PluralSight course page. The main title is "Python Desktop Application Development" by Bo Milanovich. It includes a bio section with a photo of Bo Milanovich, his name, and his website (<http://bomilanovich.com>). The page features a large orange decorative graphic on the left. The PluralSight logo is at the bottom right. A black bar at the very bottom contains the text "using Python and its friend called Qt, and". To the right of the main content is a "Table of Contents" sidebar.

Section	Topic	Duration
1	Introduction	1m 51s
	Why Python?	5m 49s
	Tools	2m 55s
2	Basic Code Structure	46m 56s
	Basic Code Structure	7m 26s
	QWidgets - UI Elements	3m 14s
	DEMO: QtWidgets	9m 27s
	Hello World Application	5m 53s
	Events	4m 30s
	DEMO: Events	6m 52s
	Layouts Are Your Friends	2m 31s
	DEMO: Layouts	5m 29s
3	Summary	1m 30s
	Our Real App	28m 24s
	Our First Real Application	0m 46s
	PyDownloader - What Is It?	3m 9s

[SOURCE]

<https://app.pluralsight.com/library/courses/python-desktop-application-development/table-of-contents>

# Python Tutorials



The screenshot shows the homepage of the Python Tutorials website. At the top, there is a navigation bar with the Python logo and the text "Python Tutorials". Below the navigation bar, there are several categories: "Beginner", "Machine Learning", "Database", "GUI", and "More". The main content area has a title "Python Tutorials" and a brief description: "Python is a computer programming language. This is a complete Python programming tutorial (for both Python 2 and Python 3). Suitable for both beginner and professional developers." To the right of the description is a search bar with the placeholder "Search". Below the description, there is a section titled "Python Courses:" with two items: "[Complete Python Bootcamp: Go from zero to hero in Python 3](#)" and "[Automate the Boring Stuff with Python Programming](#)". There is also a section titled "Beginner" with ten items: "[Introduction](#)", "[Text input and output](#)", "[String slices](#)", "[Variables](#)", "[Lists](#)", "[If statements](#)", "[Functions](#)", "[Global and Local variables](#)", "[Scope](#)", and "[.](#)". On the far right, there is a vertical sidebar with a list of categories: "Beginner", "Graphical Interfaces (GUI)", "Web development", "Database", "Robotics", "Matplotlib", "Network", and "Machine Learning".

Python Tutorials

Beginner Machine Learning Database GUI More

## Python Tutorials

Python is a computer programming language. This is a complete Python programming tutorial (for both Python 2 and Python 3). Suitable for both beginner and professional developers.

Search

**Python Courses:**

- [Complete Python Bootcamp: Go from zero to hero in Python 3](#)
- [Automate the Boring Stuff with Python Programming](#)

**Beginner**

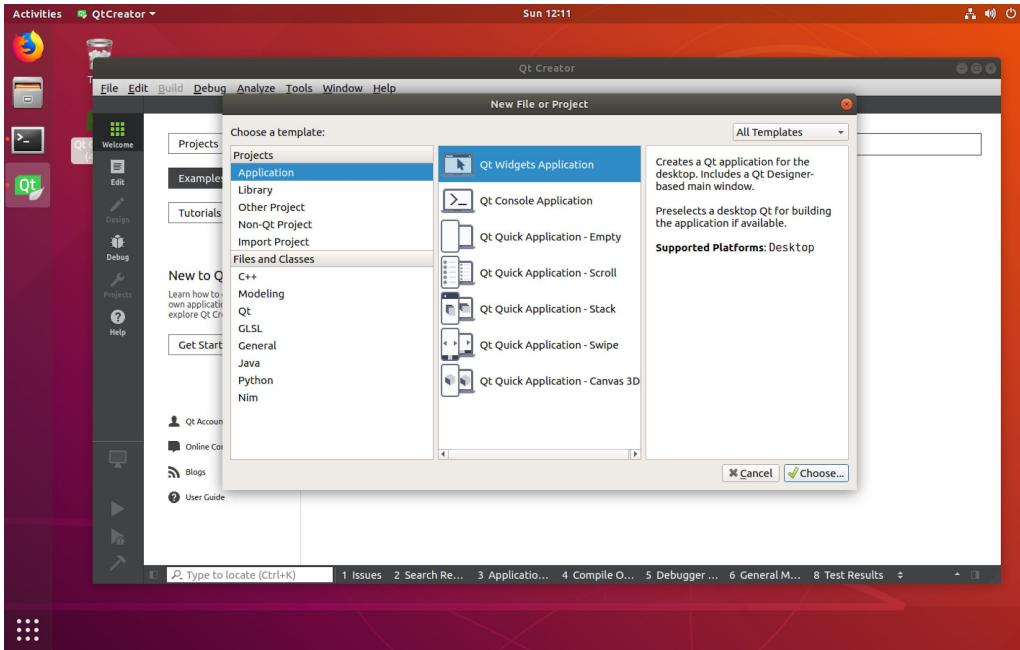
- [Introduction](#)
- [Text input and output](#)
- [String slices](#)
- [Variables](#)
- [Lists](#)
- [If statements](#)
- [Functions](#)
- [Global and Local variables](#)
- [Scope](#)
- [.](#)

- Beginner
- Graphical Interfaces (GUI)
- Web development
- Database
- Robotics
- Matplotlib
- Network
- Machine Learning

[SOURCE]

<https://pythontutorial.net>

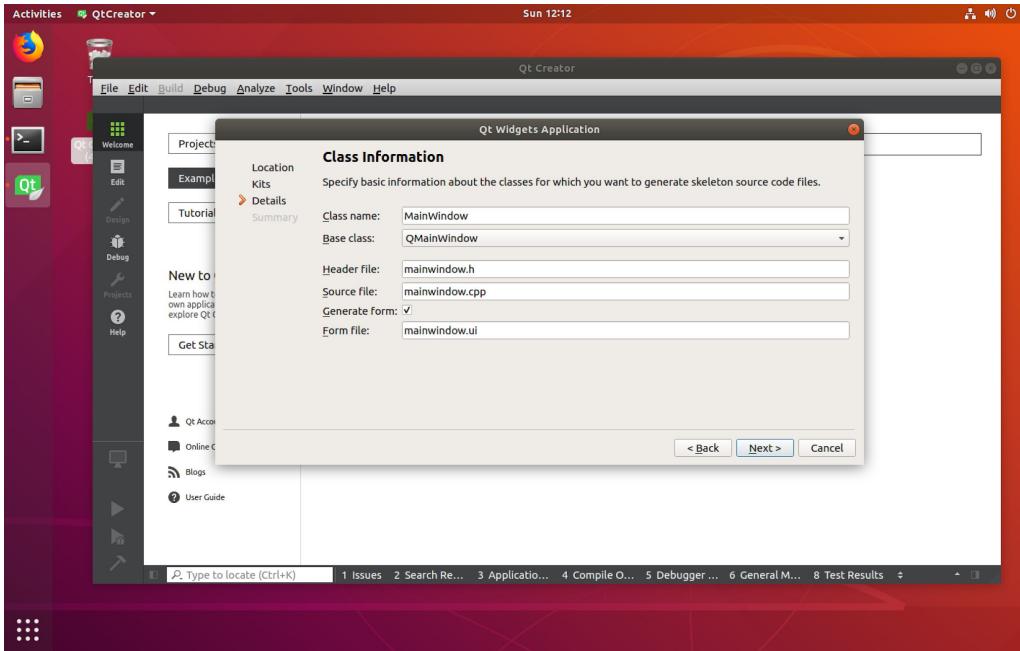
# UI build tool in qtcreator



[INFO]

\$ sudo apt install qtcreator

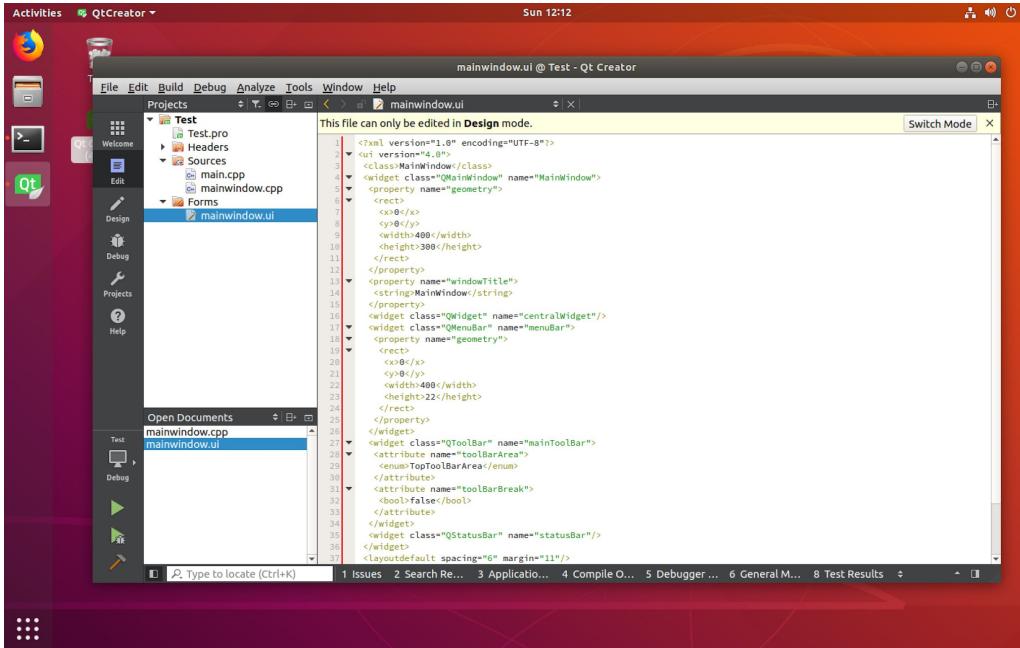
# UI build tool in qtcreator



[INFO]

\$ sudo apt install qtcreator

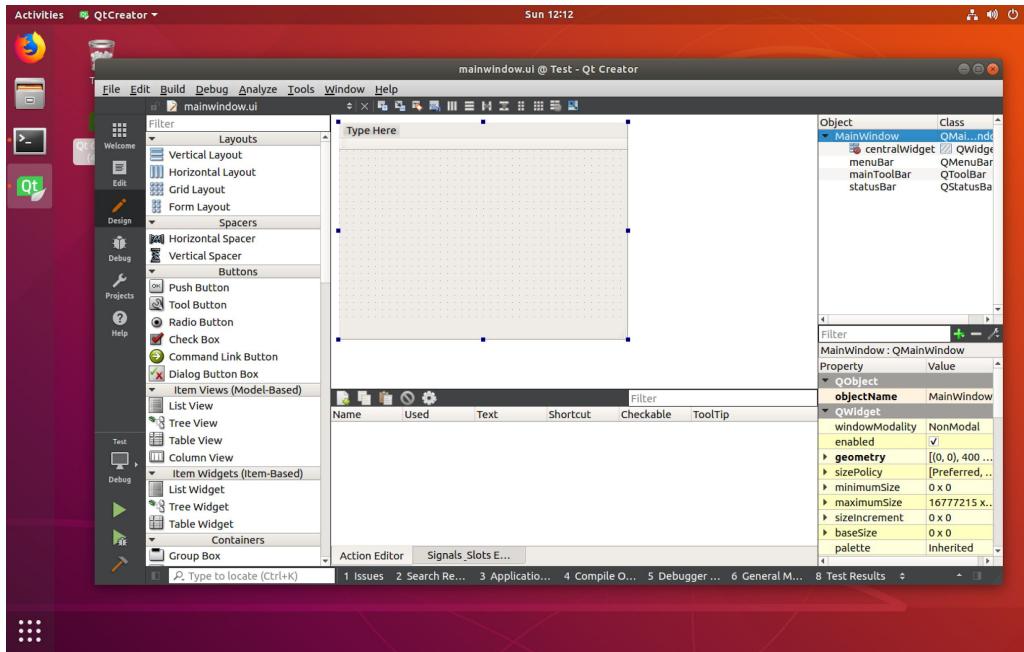
# UI build tool in qtcreator



[INFO]

\$ sudo apt install qtcreator

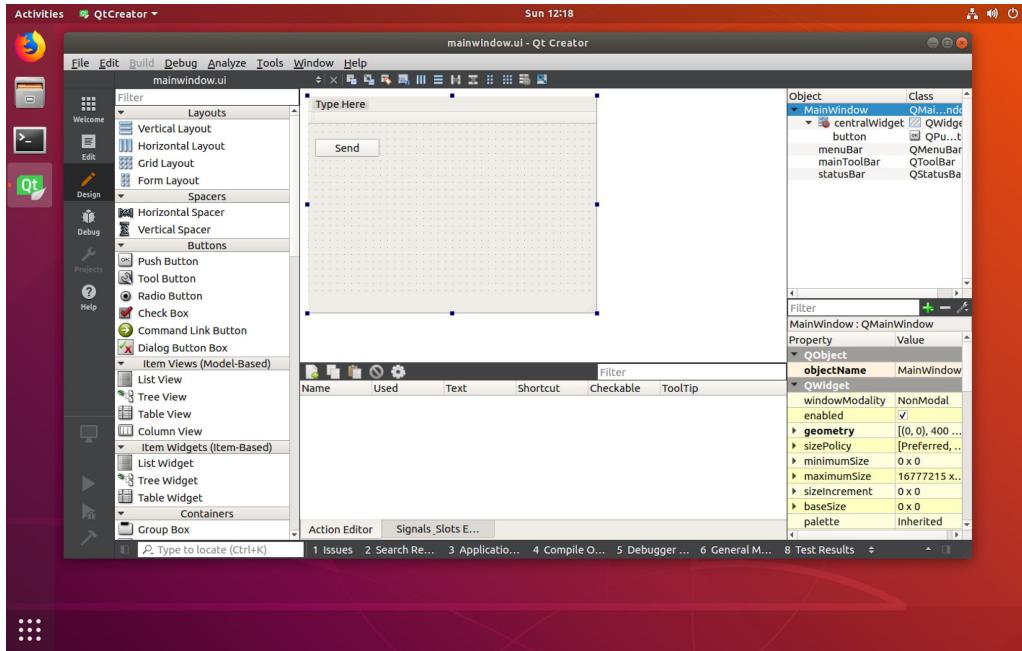
# UI build tool in qtcreator



[INFO]

\$ sudo apt install qtcreator

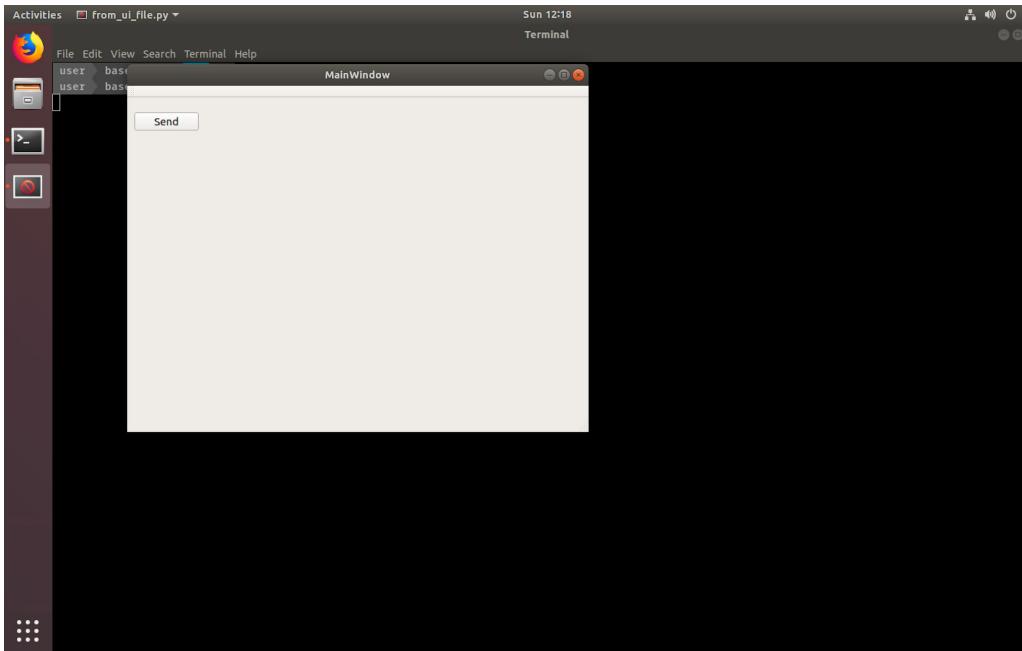
# Move the .ui file to a ros\_package and use it



[INFO]

\$ sudo apt install qtcreator

# Move the .ui file to a ros\_package and use it



[INFO]

```
$ sudo apt install qtcreator
```

# More Qt in ROS: rqt

The screenshot shows the ROS.org website interface for the package 'rqt'. At the top, there's a navigation bar with links for About, Support, Discussion Forum, Service Status, and Q&A answers. A search bar is also present. Below the navigation, there are four main tabs: Documentation, Browse Software, News, and Download. The 'Documentation' tab is selected, showing a 'Package Summary' page.

**Package Summary**

**✓ Released** **✓ Continuous Integration: 1 / 1** **✓ Documented**

rqt is a Qt-based framework for GUI development for ROS. It consists of three parts/metapackages

- rqt (you're here)
- [rqt\\_common\\_plugins](#) - ROS backend tools suite that can be used on/off of robot runtime.
- [rqt\\_robot\\_plugins](#) - Tools for interacting with robots during their runtime.

rqt metapackage provides a widget [rqt\\_gui](#) that enables multiple 'rqt' widgets to be docked in a single window.

- Maintainer status: maintained
- Maintainer: Dirk Thomas <dthomas AT osrfoundation DOT org>
- Author: Dirk Thomas, Dorian Scholz, Aaron Blasdel
- License: BSD
- Bug / feature tracker: <https://github.com/ros-visualization/rqt/issues>
- Source: git <https://github.com/ros-visualization/rqt.git> (branch: kinetic-devel)

**Package Links**

- Tutorials
- FAQ
- Change List
- Reviews

**Dependencies (4)**

- Jenkins Jobs (9)

**Wiki**

- Distributions
- ROS/Installation
- ROS/Tutorials
- RecentChanges

**rqt**

**Page**

- Immutable Page
- Info
- Attachments

**More Actions:**

**User**

[Login](#)

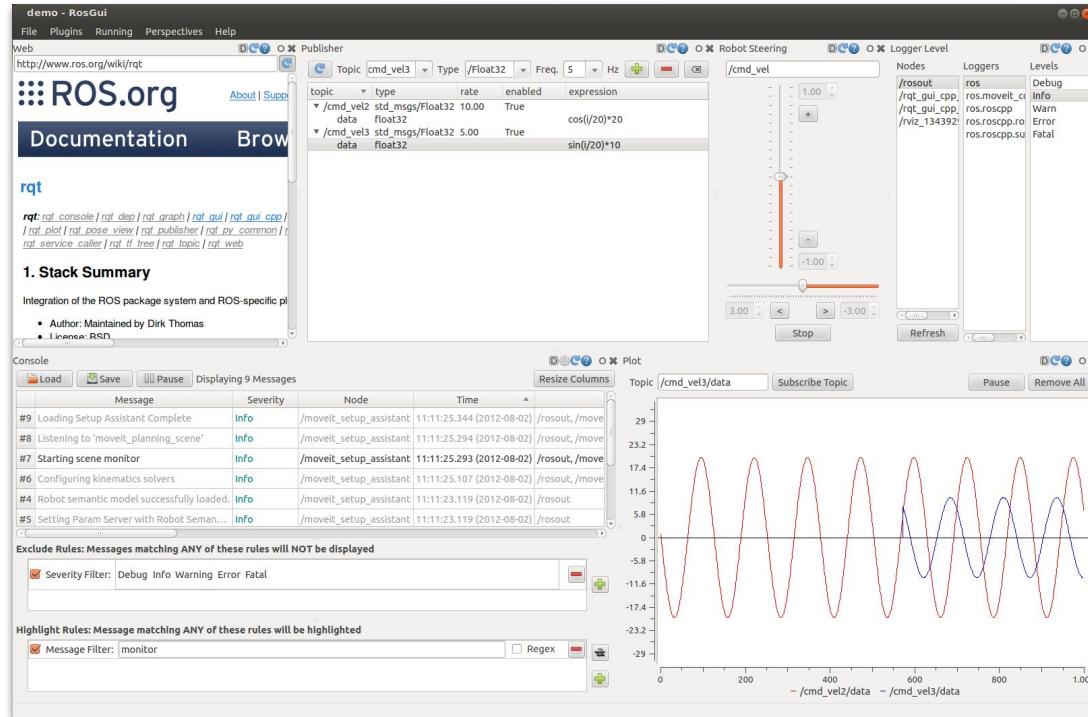
**Contents**

1. Introduction
  - 1. rqt components structure
  - 2. Required environment
  - 3. Advantage of rqt framework
2. Instructions
  - 1. Installation
  - 2. User Documentation

[SOURCE]

<http://wiki.ros.org/rqt>

# More Qt in ROS: rqt



[SOURCE]

<http://wiki.ros.org/rqt>

# PySide?

Qt

Page Discussion

Read View source View history Search

Main page Recent changes Random page Help

Tools What links here Related changes Special pages Printable version Permanent link Page information

## Qt for Python

(Redirected from PySide2)

En Ar Bg De El Es Fa Fi Fr Hi Hu It Ja Kn Ko Ms Ni Pt Ru Sq Th Tr Uk Zh

Qt for Python PySide

### Qt for Python

The **Qt for Python** project aims to provide a complete port of the **PySide** module to Qt 5. The development started on [GitHub](#) in May 2015. The project managed to port Pyside to Qt 5.3, 5.4 & 5.5. During April 2016 The Qt Company decided to properly support the port (see [details](#)).

The module was released mid June 2018 as a Technical Preview (supporting Qt 5.11), and it was officially released without the Technical Preview tag, in December 2018 for Qt 5.12.

This wiki page tracks the progress of the **Qt for Python** project development and provides further information concerning the effort.

**Qt for Python** is available under [GPLv3](#)/[GPLv2](#) and commercial license for the following platforms:

	Linux	macOS	Windows			
	32bit	64bit	32bit	64bit	32bit	64bit
Python 2.7	*		*		**	**
Python 3.5+	*		*		**	**

Contents [hide]

- 1 **Qt for Python**
  - 1.1 What does it look like?
- 2 Getting Started
- 3 Community
- 4 Development Status
- 5 Frequently Asked Questions
- 6 Contributing to the Qt for Python Wiki

[SOURCE]

[https://wiki.qt.io/Qt\\_for\\_Python](https://wiki.qt.io/Qt_for_Python)

# PyQt vs PySide

PyQt is significantly **older** than PySide and, partially due to that, has a **larger community** and is **usually ahead when it comes to adopting new developments**. It is mainly developed by Riverbank Computing Limited and distributed under GPL v3 and a commercial license. Releases follow a regular schedule and the software is generally considered very robust, mature, and well supported.

PySide is developed by Nokia and had its initial release in 2009, in a time when Nokia was the owner of QT. As can be read on the [PySide web page](#), PySide has been developed and published in **response to a lack of a QT wrapper for Python that has a suitable license for FOSS and proprietary software development**. Without going too much into the details of the different license models involved, **if you want to develop a commercial application, PyQt requires you to pay fees for a commercial license, while the LGPL license of PySide permits application in commercial projects**.

[[SOURCE](#)]

<https://www.e-education.psu.edu/geog489/node/2225>

# Kivy



Kivy - Open source Python library for rapid development of applications that make use of **innovative user interfaces**, such as multi-touch apps.

[[SOURCE](#)]

<https://kivy.org>

# PyGame



Pygame is a cross-platform set of Python modules designed for **writing video games**. It includes computer graphics and sound libraries designed to be used with the Python programming language.

[[SOURCE](#)]

<https://www.pygame.org>

