SOFTWARE: APPS

(PROGRAMS THAT DO THINGS)

OT 699 – WEEK 3

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OBJECTIVES THIS WEEK

1) Basic concepts for App design
2) Build a fully functional graphical user interface in Python!

BASIC CONCEPTS

What is an App?

A game, a word processor, even a website with more than simple text

Due to the popularity of the App store, “App” has started to mean “on my phone”, although this is not a distinction made in the app development community

What an App usually isn’t?

Command line code that you write yourself to do some math on data you collect

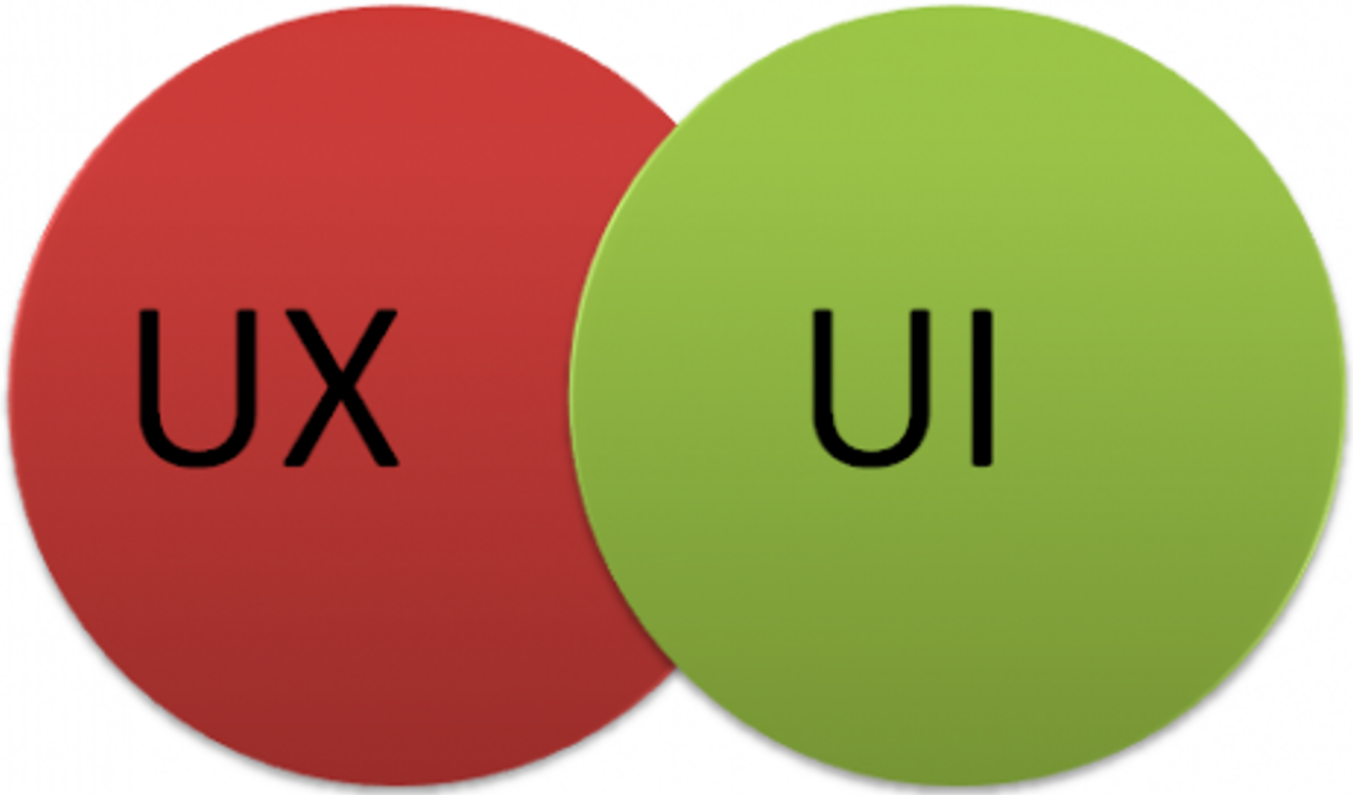
	Desktop	Web	Mobile	Mobile Web
Facebook	None	Open through browser on computer (Chrome, Safari, FireFox, IE, etc)	Open through icon downloaded in Google Play, iTunes, etc.	Open through browser on device at http://m.facebook.com
Photo Editing	iPhoto, Paint, Microsoft Office Picture Manager	Sites like Flickr and PicMonkey—launched by computer	Instant Retro Photo, PicSay (Android); PicStitch, Be Funky Photo Editor (Apple)	Flickr, etc, launched through mobile browser
Solitaire	Comes stock on Microsoft in “Accessories” —doesn’t need Internet	worldofsolitaire.com; games.com; solitaire-cardgame.com	The Solitaire Games (Apple); Solitaire Free Pack (Android)	worldofsolitaire.com; games.com; solitaire-cardgame.com opened in mobile browser

CONSIDERATIONS BEFORE YOU TRY MAKING AN APP:

- Who is it for
- What does it do
- Why is this needed
- How and where should a user interact with it
- Limitations of device hardware or software
- Who will build it? How fast? And for how much?

Know the Difference

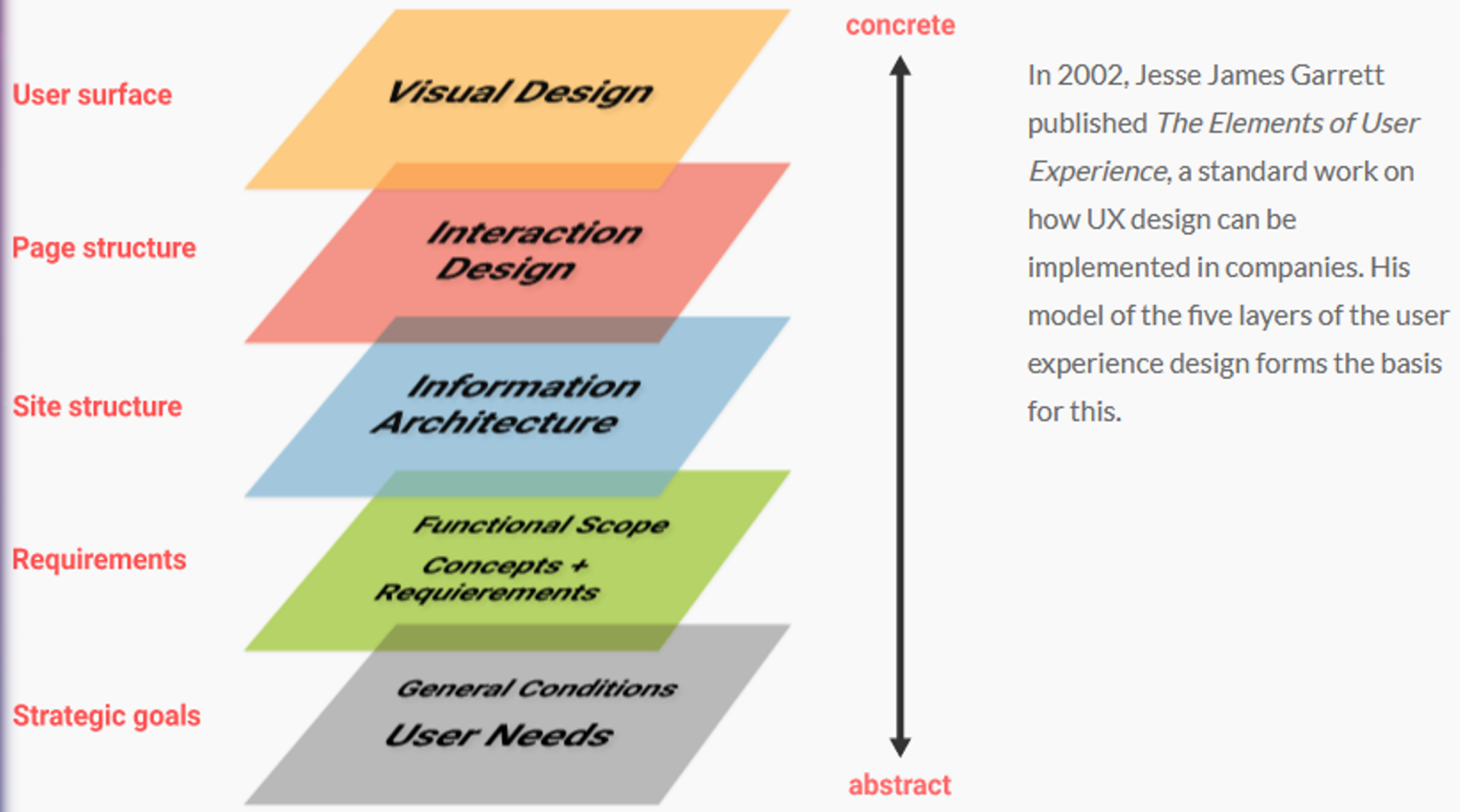
- User Stories
- Usability Testing
- User Research
- Personas



- Layout
- Visual Design
- Branding

* GUI = graphical user interface. Not all interfaces are graphical.

https://addontraining.com/what-is-ux-design-all-about/



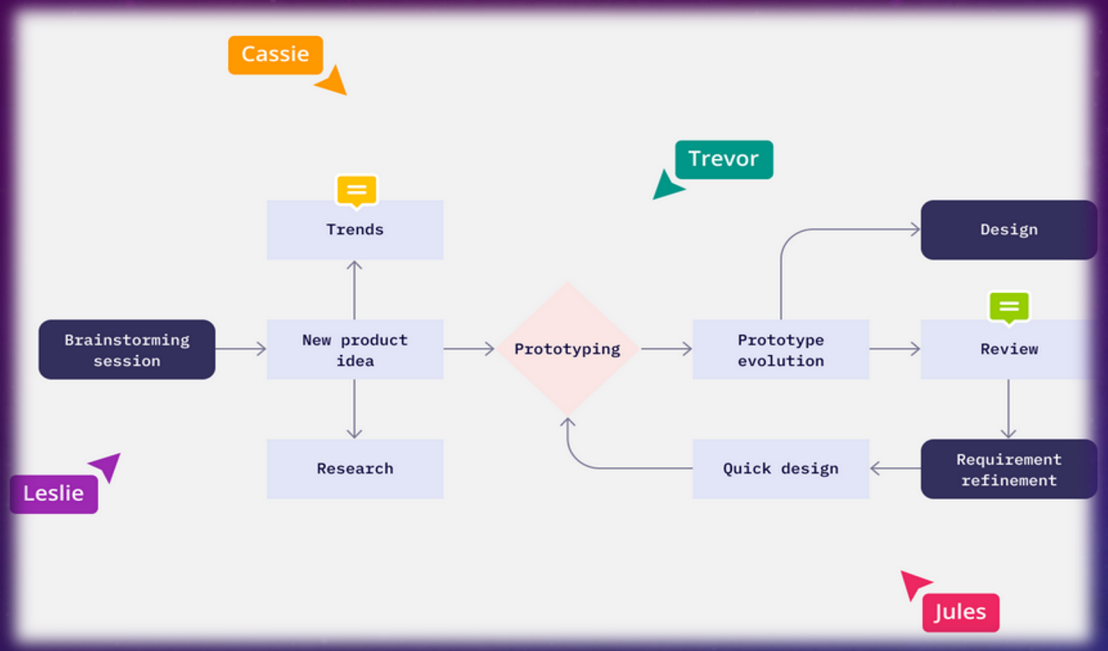
In 2002, Jesse James Garrett published *The Elements of User Experience*, a standard work on how UX design can be implemented in companies. His model of the five layers of the user experience design forms the basis for this.

Nearly all App development in industry is an iterative process that starts with abstract, high level thinking about the user.

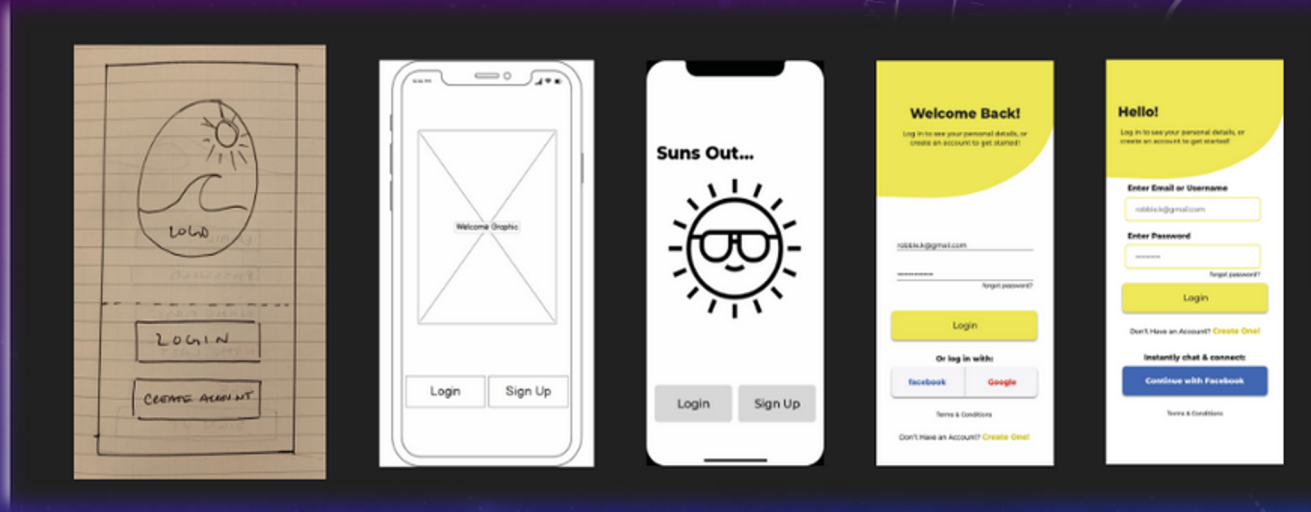
This process is full of sketches, sticky notes, polls, and interviews. The end is essentially a layout design of your app… something that can be handed off to a software developer.

https://thomas-sokolowski.com/the-ideal-ux-design-workflow/

FROM UX TO UI



Brainstorming software, various online whiteboard sites, trello or **miro** (e.g. https://miro.com/) are valuable for team efforts PPT is still used.



Wireframe stage: usually starts as a sketch and then you can use dedicated wireframing software or graphics design software of your choosing… This is where UI begins to depart from UX.

Software: Balsamiq, Framer, Webflow, Sketch

UX designer vs UI designer vs Front-end Developer roles comparison

	UX designer	UI designer	Front-end dev
Skills and knowledge	Needs marketing, technological and psychological knowledge	Needs graphic design skills, should know some specifics of front-end	Needs web development skills
Responsibilities	Navigates the design process	Designs the visual of the user interface	Develops part of the web application
What they need to start working?	Works on the basis of the research of users needs	Works on the basis of requirements	Works on the basis of requirements and design
Stage of development	Designs the user journey	Prepares the graphic layout according to the user journey	Writes code that connects the layout and the user journey
The role in UX design	Conducts user research, gathers feedback, works closely with the (internal or external) customer and end-user	Should be part of the UX design team	May play a role in the development team and/or in the UX design team
Do they work on development?	Is present before, throughout and after the development process	Usually, ends job with hand-over to developers	Should not start development before getting requirements (and the design)

For web app design, UI is often still conceptual.

The actual code making is split between:

Front End: the normal code for your website. Software: **JavaScript, CSS, HTML**

Back End: if your website needs to communicate with a cloud server or database, do new fancy functions, etc.
Software: **Java, PHP, Node.js, Python**

https://www.ideamotive.co/blog/difference-between-ux-and-ui-designer-and-front-end-developer

WEB APPS- WHERE TO START

- Might be best to start with **WordPress** or **Wix** to get a foot in the door.
  - Then you can add little gadgets to your website (e.g. Java Applets or IFTTT (if this then that) to start turning a text+ picture website into a kind of user interface.

- Along the way you'll learn some internet jargon too…. Like how a web client (e.g. a browser) communicates via an FTP or HTTP protocol with a web server, how your HTML and other website resources are hosted, if you have a static or dynamic website, etc.

- Overview of what modern web development entails: https://www.youtube.com/watch?v=VfGW0Qiy2I0

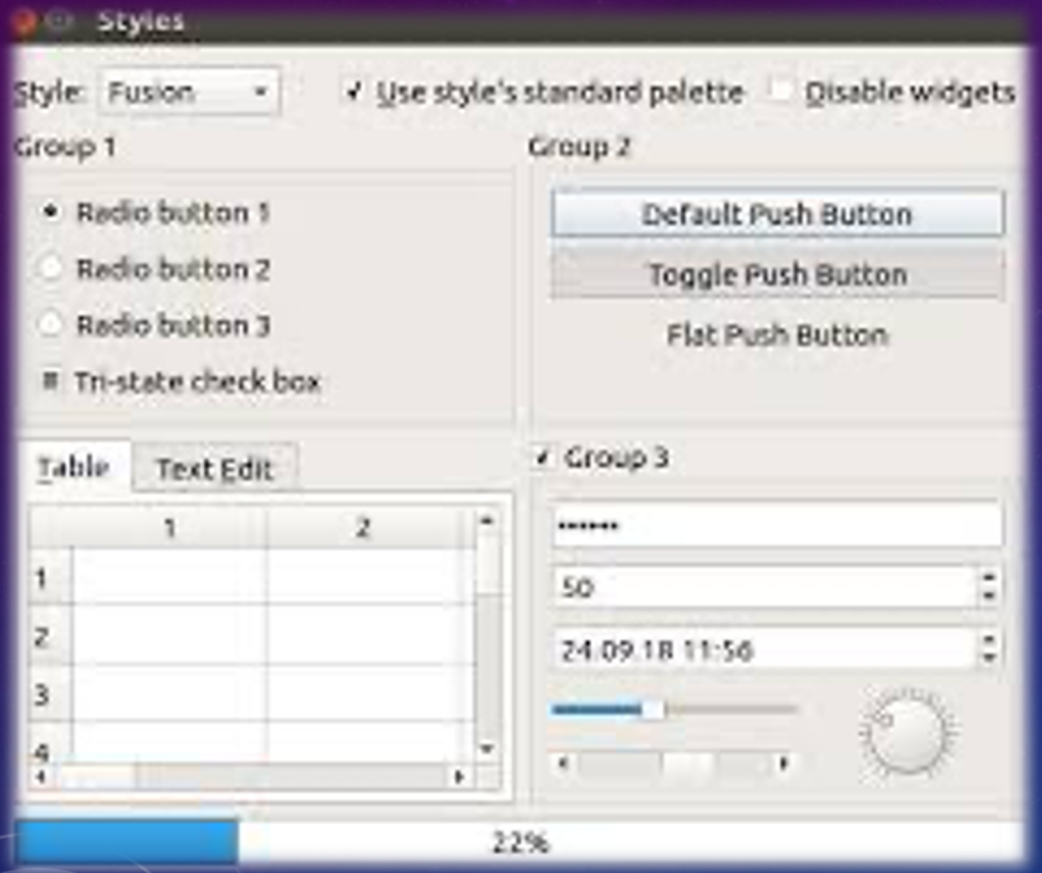
So, if web apps are a bit complicated..... are you stuck with mockups in PPT that don't do anything? NO!

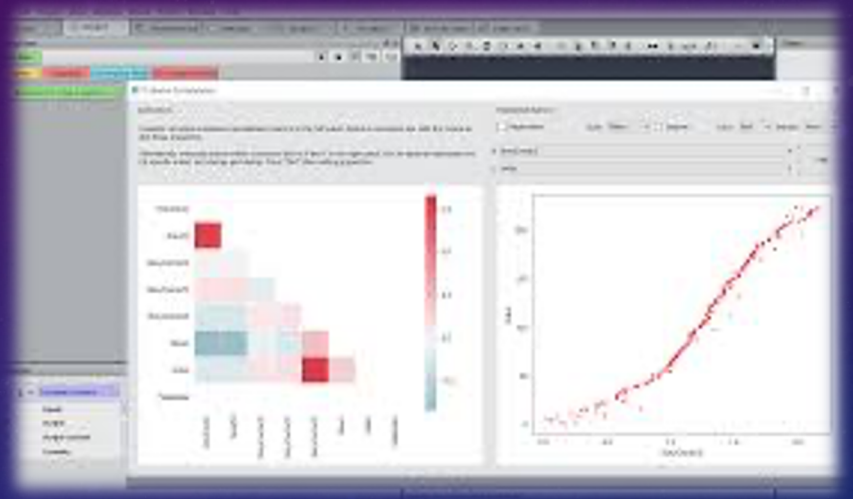
Development of desktop apps (which can also work on mobile devices that use windows or android) use general purpose programming languages

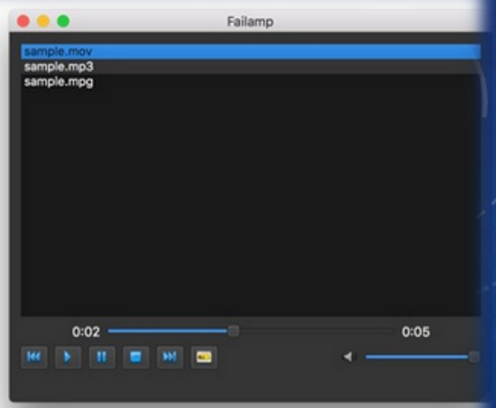
For hacking/innovation, it may be better to start by building something, then if it seems really good, hire a developer who can put it in the App store

Also, …. computers haven't been replaced by phones yet… people still use computer-based programs even if the word "App" seems to imply iPhone lately.

Python can be used to make apps.
Many are able to work on all operating systems







PyQt5

Kivy

Tkinter

PySide

PySimpleGUI

BeeWare

Flask

Flexx

Django

Python can create stand alone applications with graphical interfaces
Combined with standard python programming, this allows you to be creative and develop your own applications. On the left are some possible tools for developing GUIs and apps.

PyQt5 is the largest, most well documented, with the easiest learning curve
It is mainly for Windows/Linux/Mac, but is increasingly Android friendly

It also has a “designer” interface within Anaconda so that you only need to code the functions that run when you push buttons, rather than coding the visuals.

*Some occasional bugs appear when using Mac. These are typically solvable with some wrestling and trial & error, but if you have a choice, use a PC!

PYQT5 DESIGNER + DEVELOPMENT IN PYTHON (SPYDER)

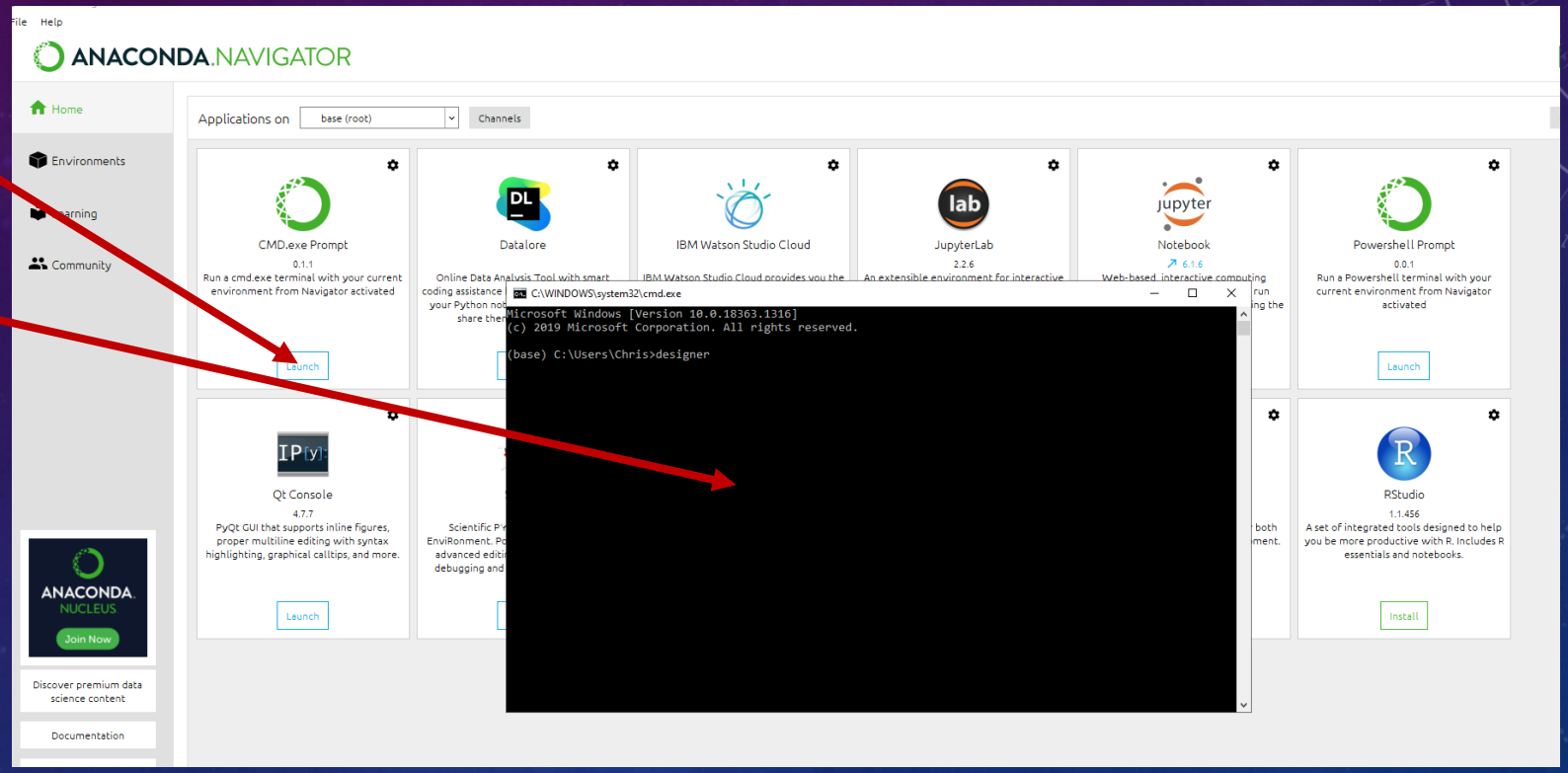
PyQt5 is a library (just a set of functions) that you can import into your favorite IDE (e.g. Spyder) at the start of a program.

Using these functions, you can get pop-up windows, buttons, text boxes, etc. and interacting with these “widgets” can trigger other python functions to run (e.g. printing something, doing a computation, etc.)

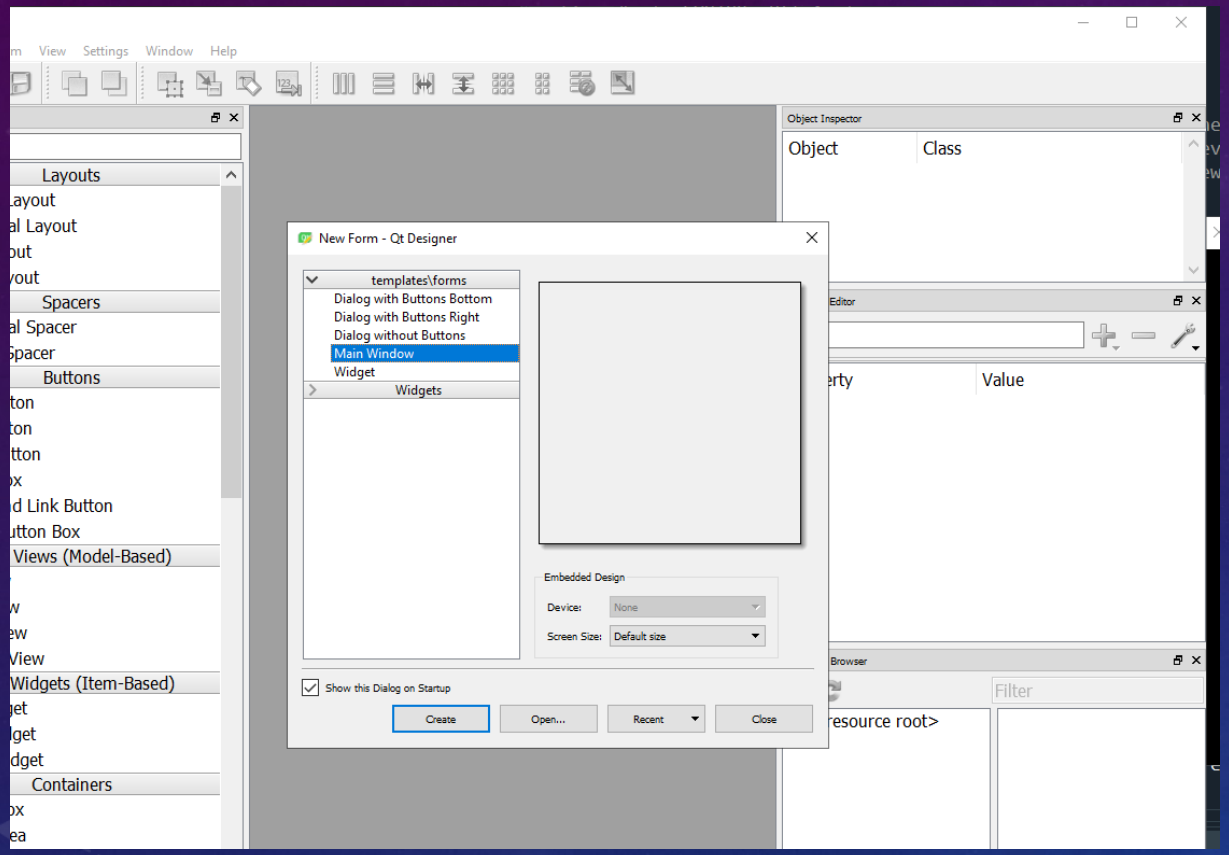
Many tutorials exist, for example a calculator made from absolute scratch is here: https://realpython.com/python-pyqt-gui-calculator/

THE DESIGNER: MAKES THE UI MOSTLY CODE-LESS

- Go to Anaconda Navigator
- Launch the prompt
- Type “ designer “ in the command line (no quotes)
- Hit enter

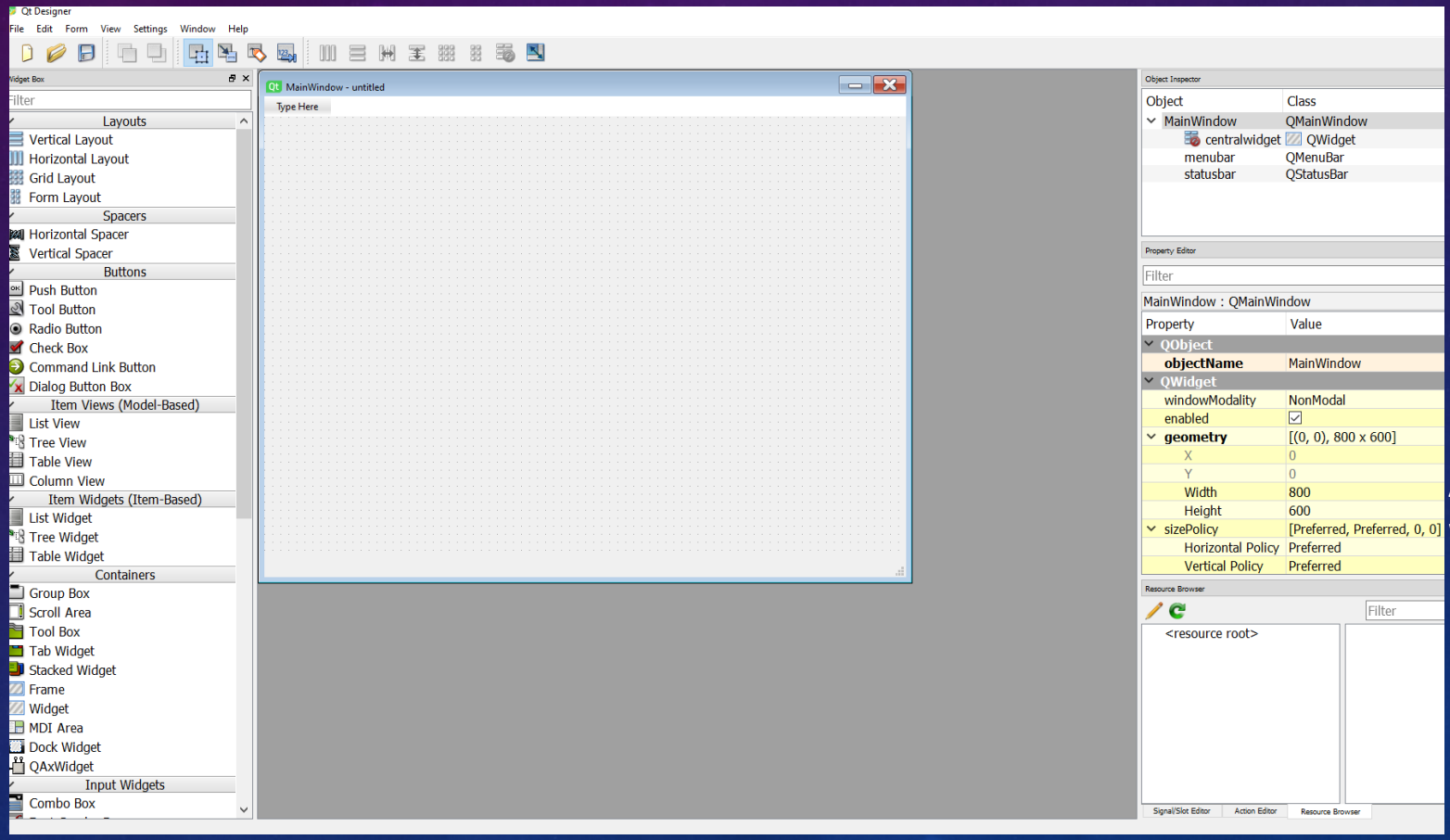


QUICK TOUR OF DESIGNER



The “main Window” should be highlighted
Click “Create”

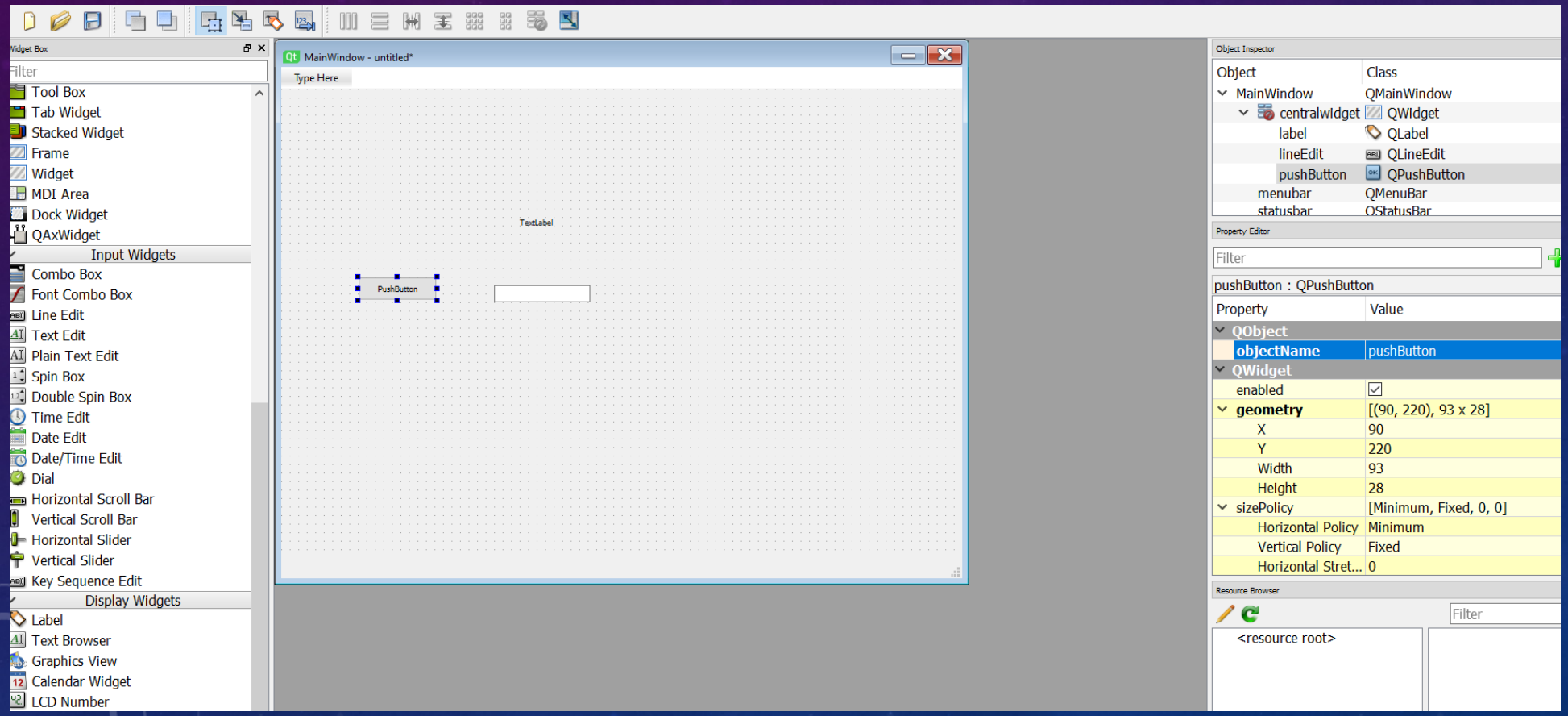
Left:
Widgets
To drag and drop
Onto the main window



Right: properties of
Anything in the main
Window that is highlighted

ADDING WIDGETS

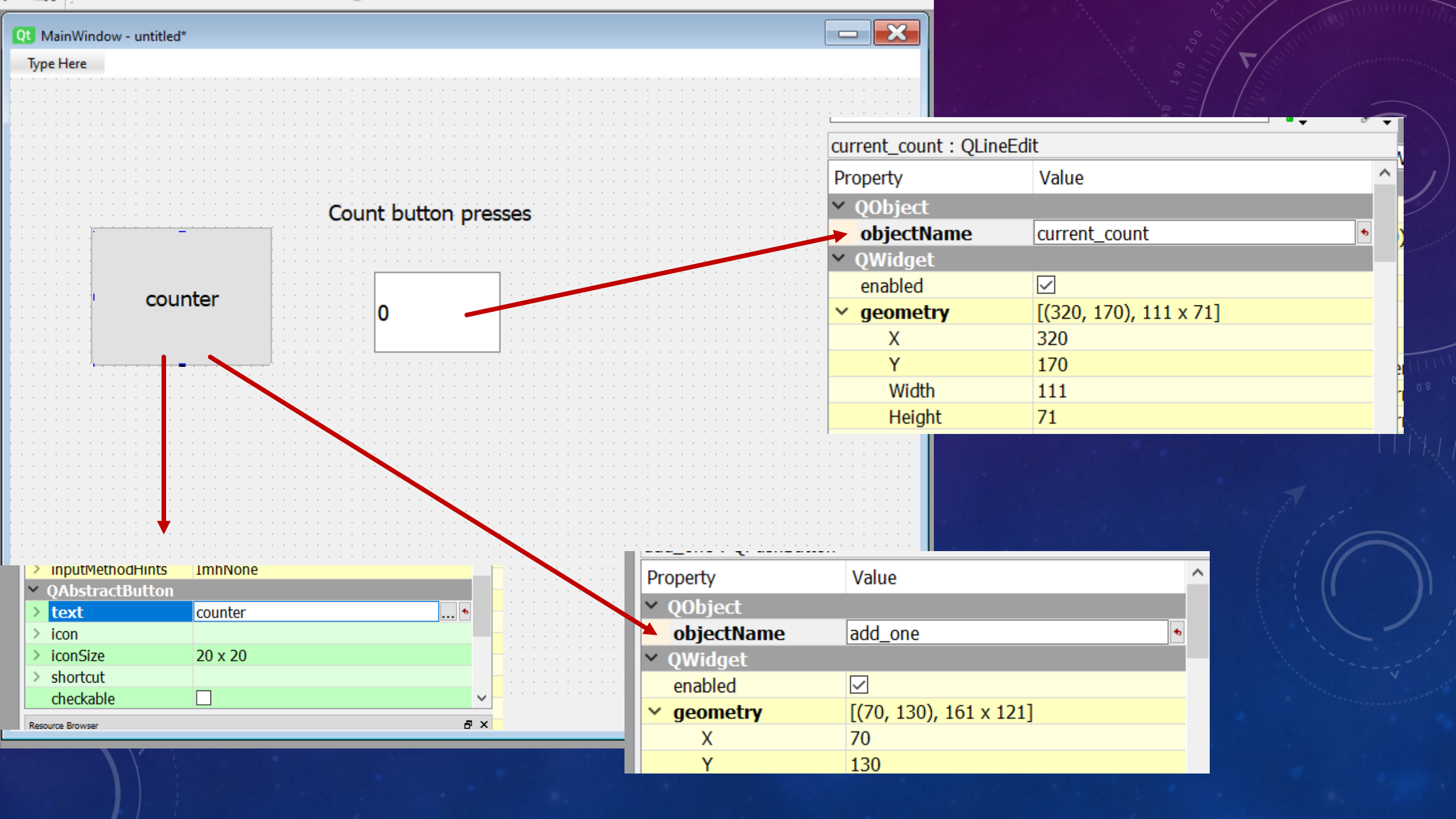
Drag a “PushButton”, a “Line Edit”, and a “Label” from the left into the main window



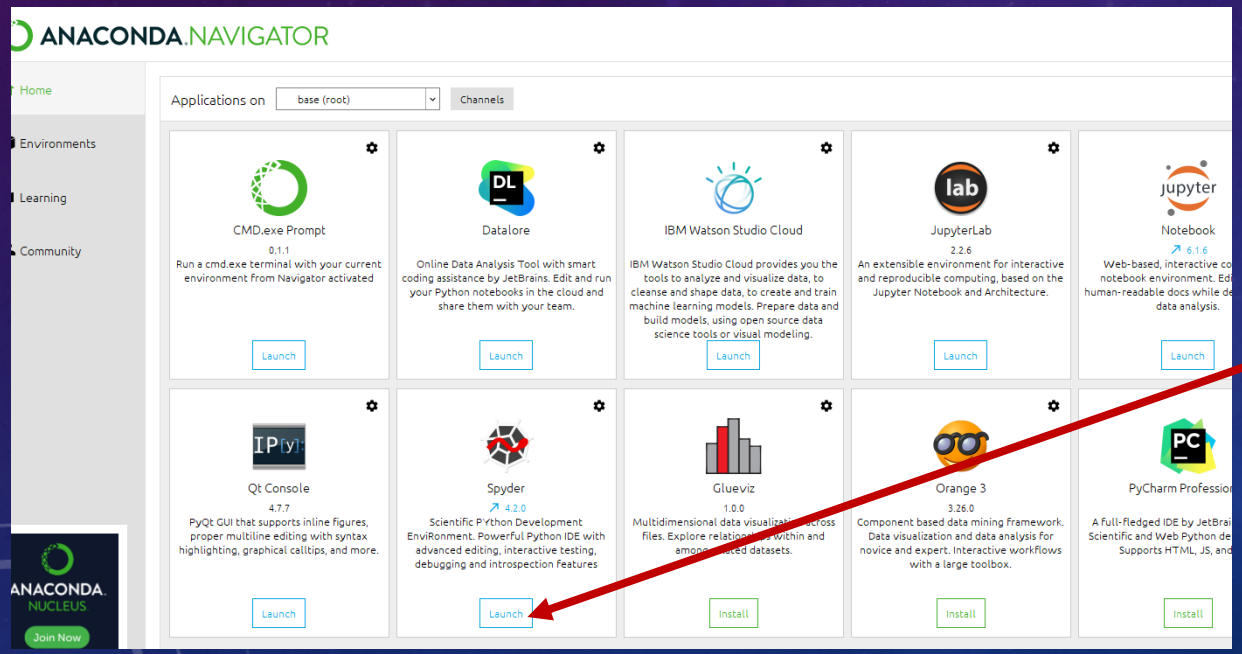
Note,
When you select the PushButton, you can look over on the right where the yellow is, and you will see “objectName” is “pushButton”.

MANIPULATING WIDGET PROPERTIES

1) Resize the widgets so they are big enough to see, physically drag their corners like any other window
2) Change font and text size by scrolling down under where “objectName” was.. You’ll see a “font” option. Click in the cell to the right of “font” to make it readable
3) Do that for all 3 widgets.
4) Change the “TextLabel” widget’s text by selecting it, scrolling down beyond “font” to where it says “Text” in bold. Change the text to “count button presses”
5) Select the empty text box and give it a starting value of 0. Scroll down to where it says “text” and add a 0 to the “value” column next to it.
6) Change the “objectName” (first property) as follows
    1) PushButton -> add_one
    2) lineEdit -> current_count
7) Change the PushButton’s text to say “counter”


MainWindow - untitled*
Type Here
Count button presses
counter
0
current_count : QLineEdit
Property
Value
QObject
objectName
current_count
QWidget
enabled
geometry
[(320, 170), 111 x 71]
X
320
Y
170
Width
111
Height
71
inputMethodHints
ImhNone
QAbstractButton
text
counter
icon
iconSize
20 x 20
shortcut
checkable
Resource Browser
Property
Value
QObject
objectName
add_one
QWidget
enabled
geometry
[(70, 130), 161 x 121]
X
70
Y
130

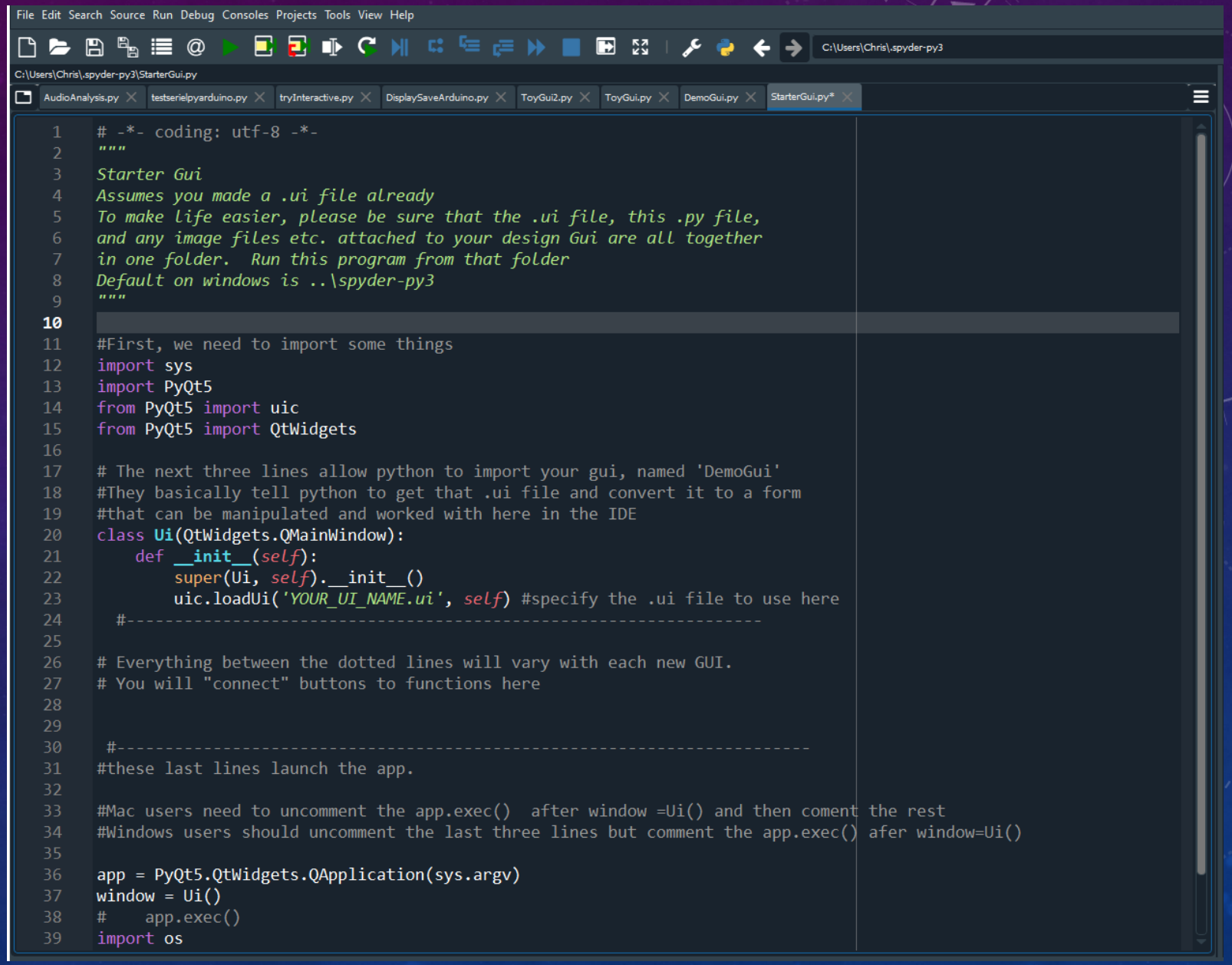
FILE→ SAVEAS→ DemoGui Into your .spyder-py3 folder



After saving, launch spyder from anaconda navigator

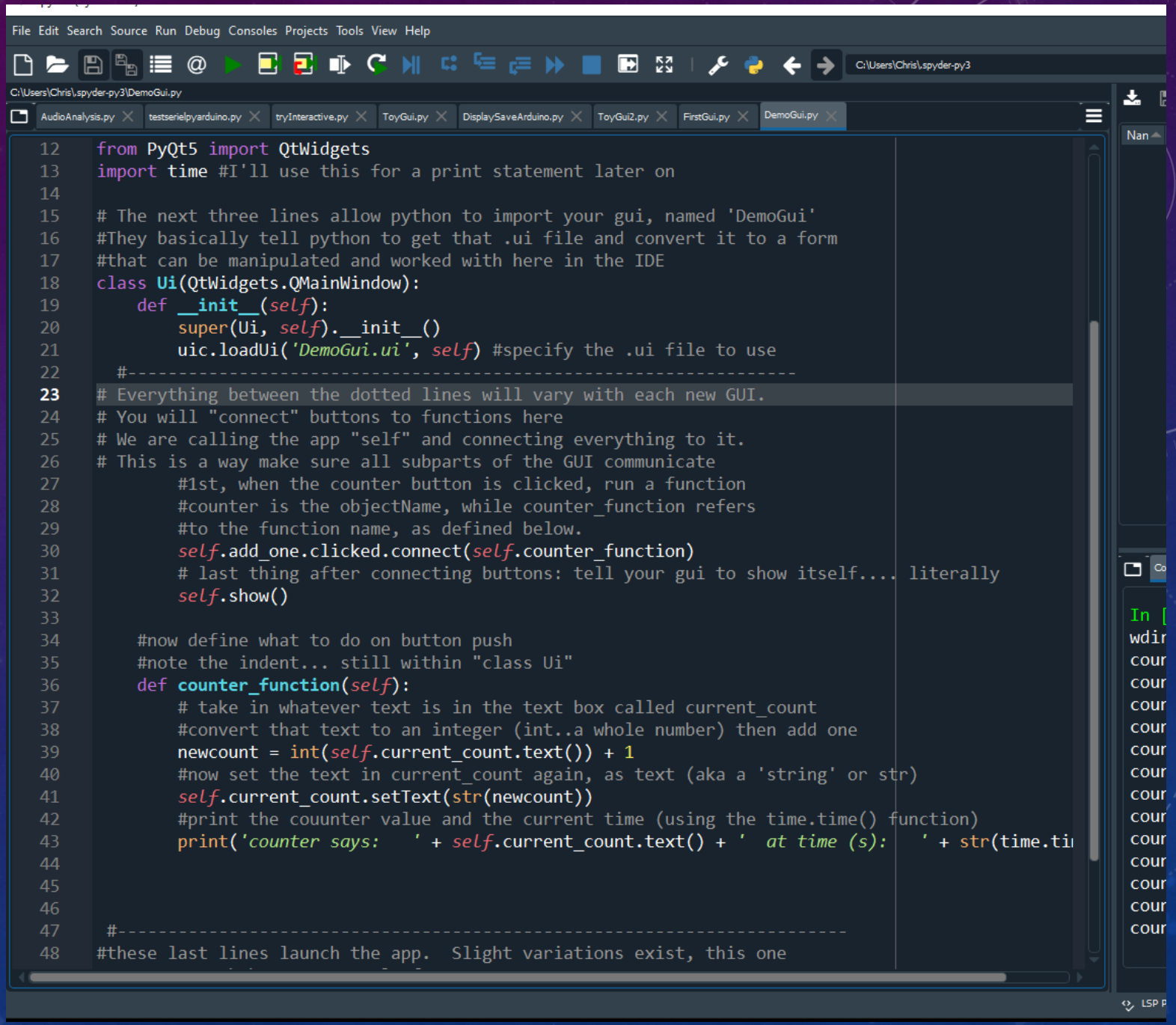
START THE CODE

This code to the right is the start of your GUI. Other than for the "import time" statement at the top, And the name of the UI file in line 21 ('DemoGui'), this won't need to change if You make a different UI file.



COMPLETE CODE

You have this code.
It's called DemoGui.py
Cleverly (or no) named to be the same as DemoGui.ui



THE MAIN PROGRAM LOGIC:

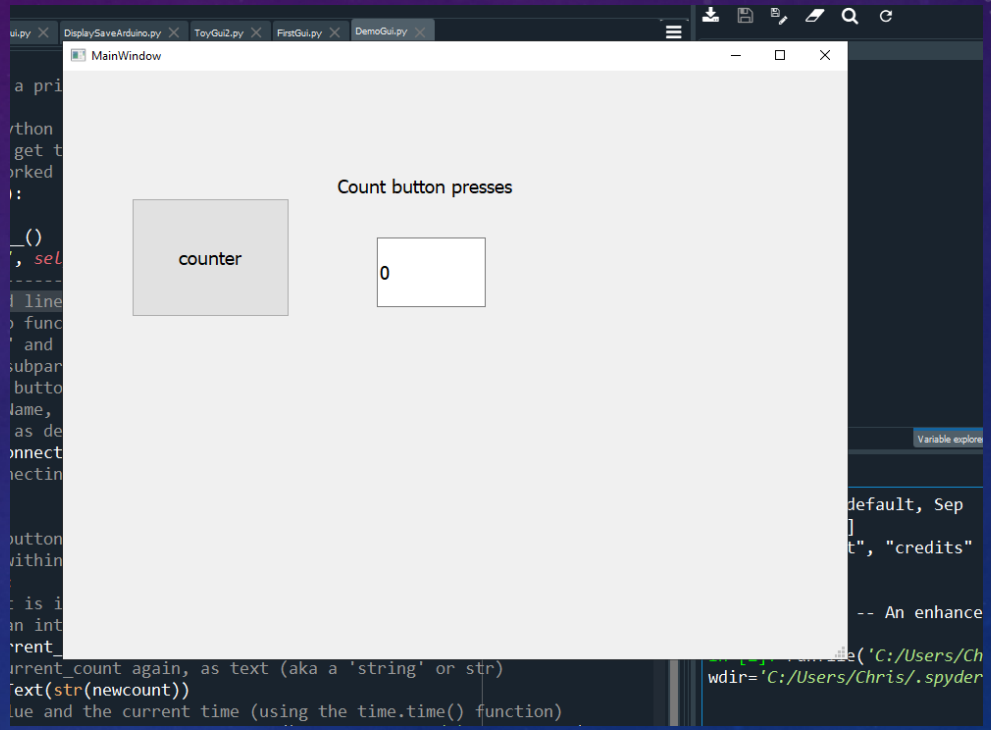
If the objectName of your lineEdit text box is called “current_count”, then to get the text out upon a button press, then in the function definition for that button press, write:
self.current_count.text()

That’s a string, so to make it a number say:
Int(self.current_count.text())

Now it is an integer. You can +1 and call it something else like Newcount:
Newcount= Int(self.current_count.text())+1

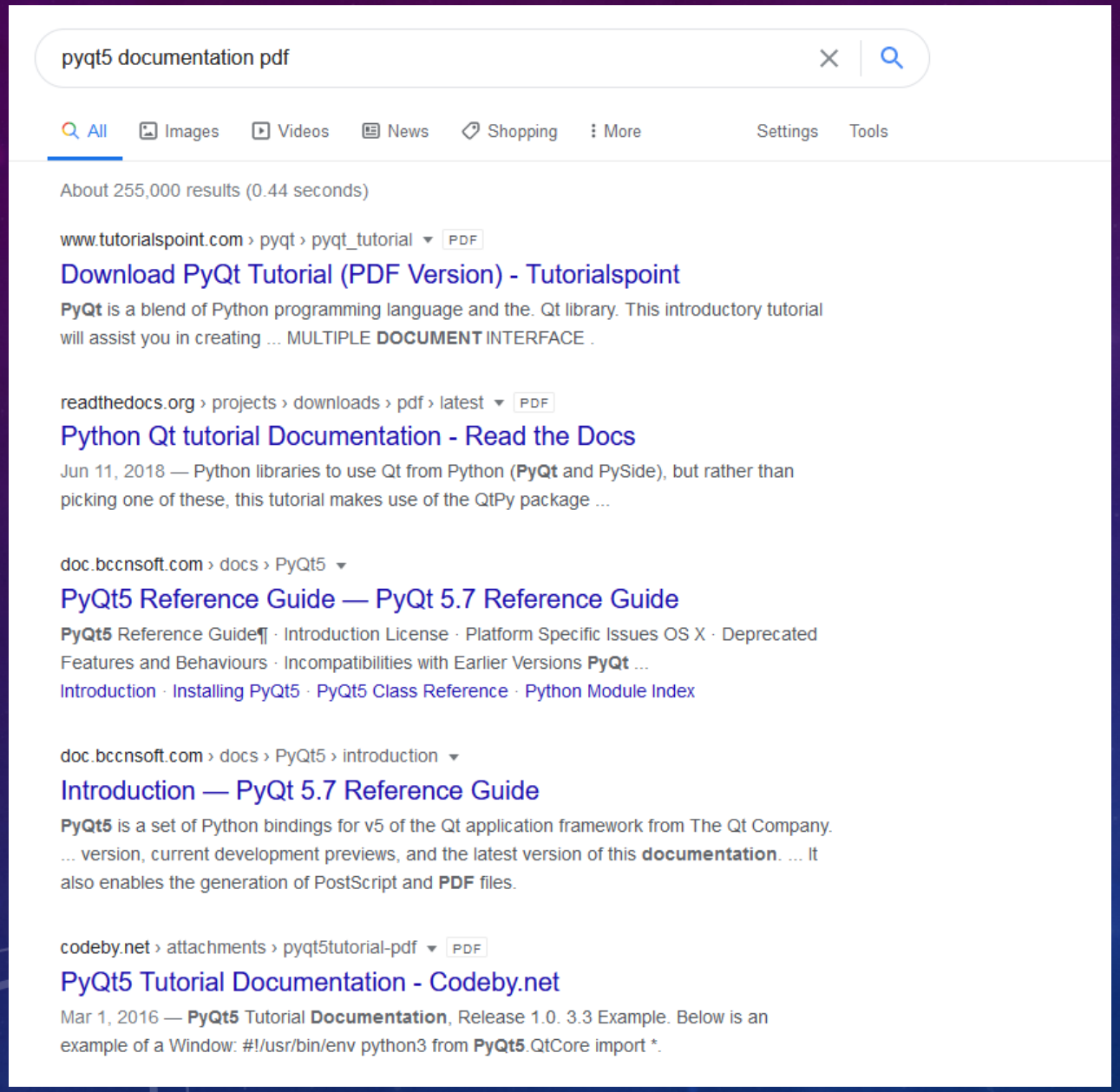
Now you can make Newcount be the new text in the GUI:
self.current_count.setText(str(Newcount))

Note that Newcount was converted back to a string first since it is a text box



THAT'S AN APP

From these beginnings, more can be done



Lots of resources for documentation

THIS CAN SCALE UP: THE POSSIBILITIES ARE ENDLESS