# Zero to Knowing

**BUILDING APPS**

**IN PY**THON

WITH PY**QT**

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## WHAT IS PYQT?

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A **module that connects the Qt C++ framework and  Python**

Allows us to **create graphical user interfaces** (GUIs).  It has a **wide range of functionalities** such as thread management, support for SQL databases, an embedded web browser, and an extensive collection of GUI widgets.   There is so **much more**!

These features make **Qt** a comprehensive framework for building a wide range of applications beyond just GUIs.

## PyQt5 vs PyQt6

**No Major Difference** Bettween the Two!

We focus on PyQt5 as these two versions of the Framework are so **smiliar** and there are easy work arounds

By learning and understanding PyQt5, you'll be able to **work with older PyQt Apps as well as new PyQt Apps**

## Why do we use PyQt?

- Cross-platform: PyQt allows your programs to run on different operating systems
- Ready-made GUI widgets: Provides pre-built **graphical user interface** (GUI) elements. (buttons, menus, etc)
- Extensive functionality: A wide range of features beyond GUI components, including networking, databases, multimedia, and graphics.
- Visual design: Integrates with, enabling you to visually design your user interface by dragging and dropping elements.
- Language simplicity: PyQt is based on Python, which has a straightforward syntax and is known for being beginner-friendly.

## Windowed Applications

### The Foundations of your first App

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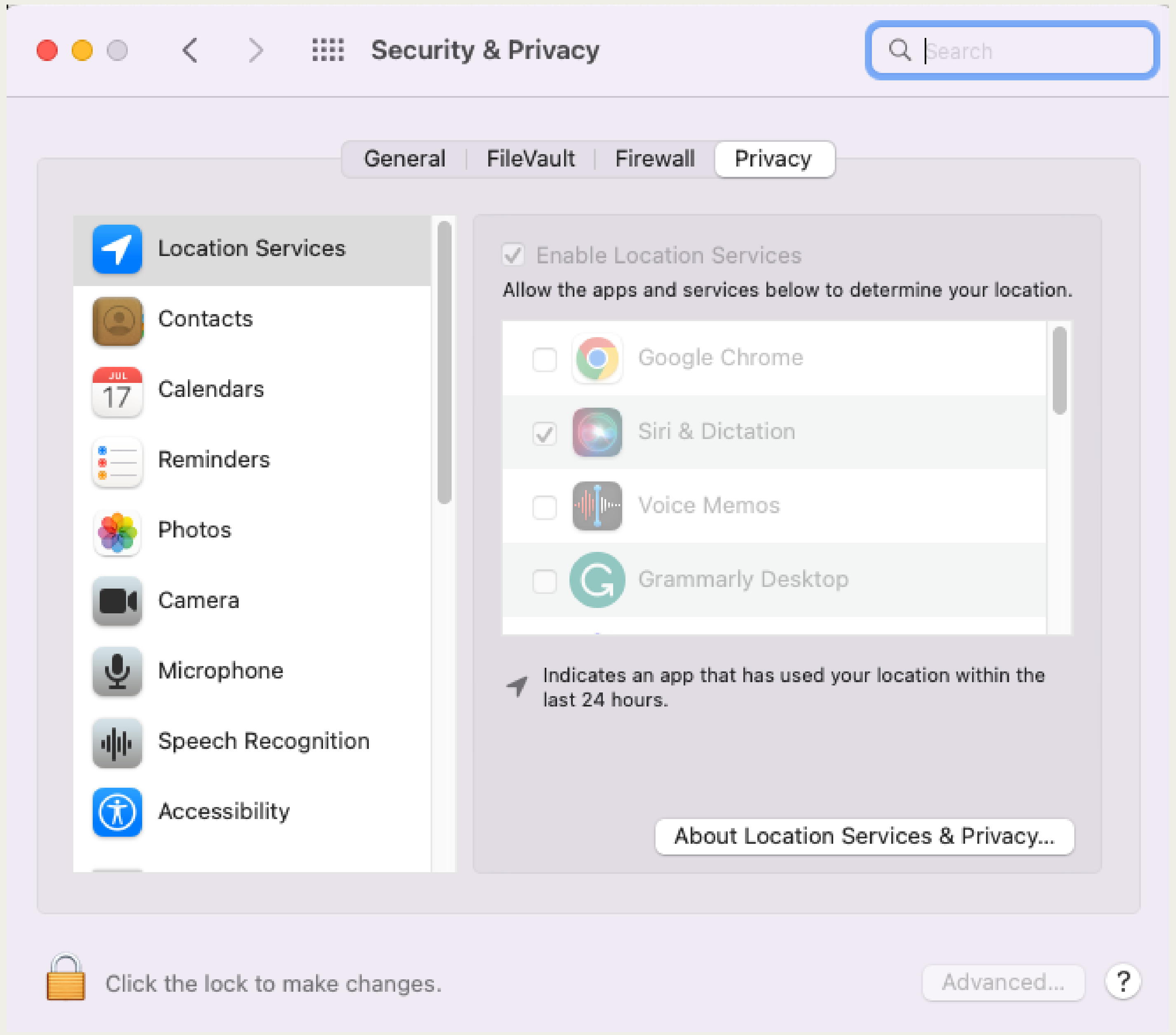
# Windowed Applications

Two current and Popular examples of Windowed Applications



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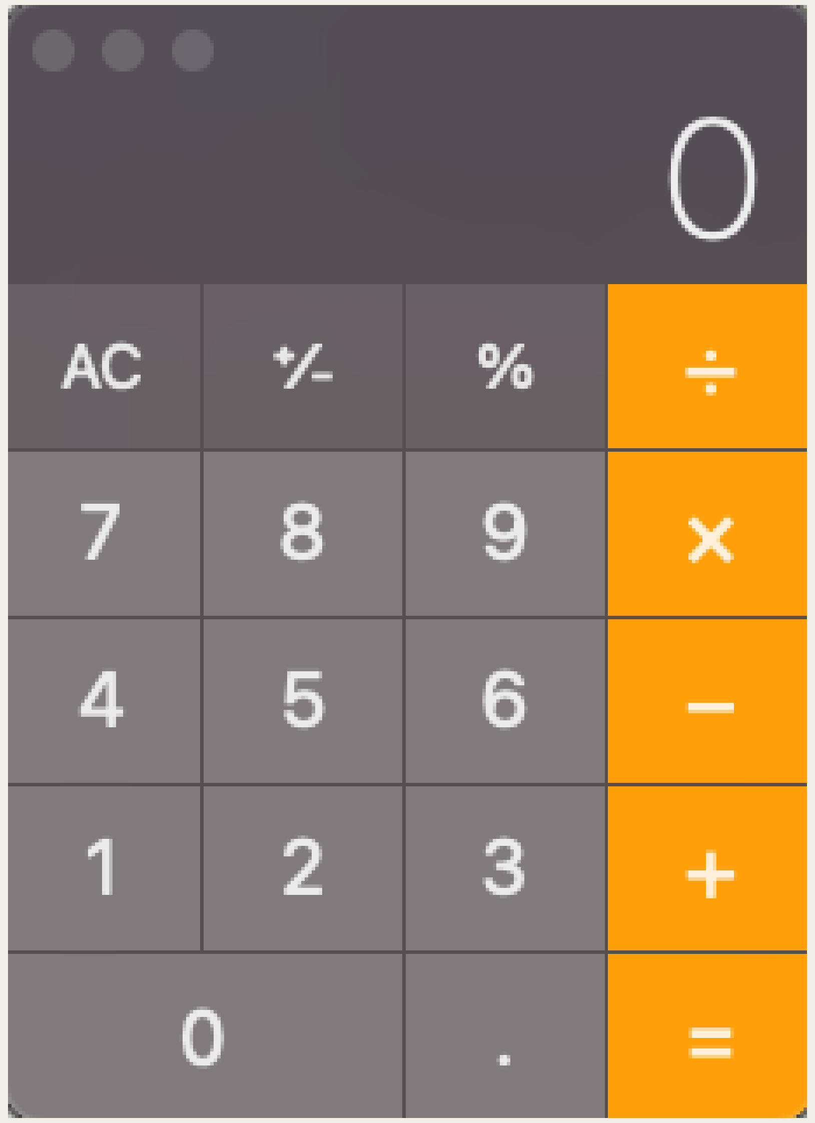
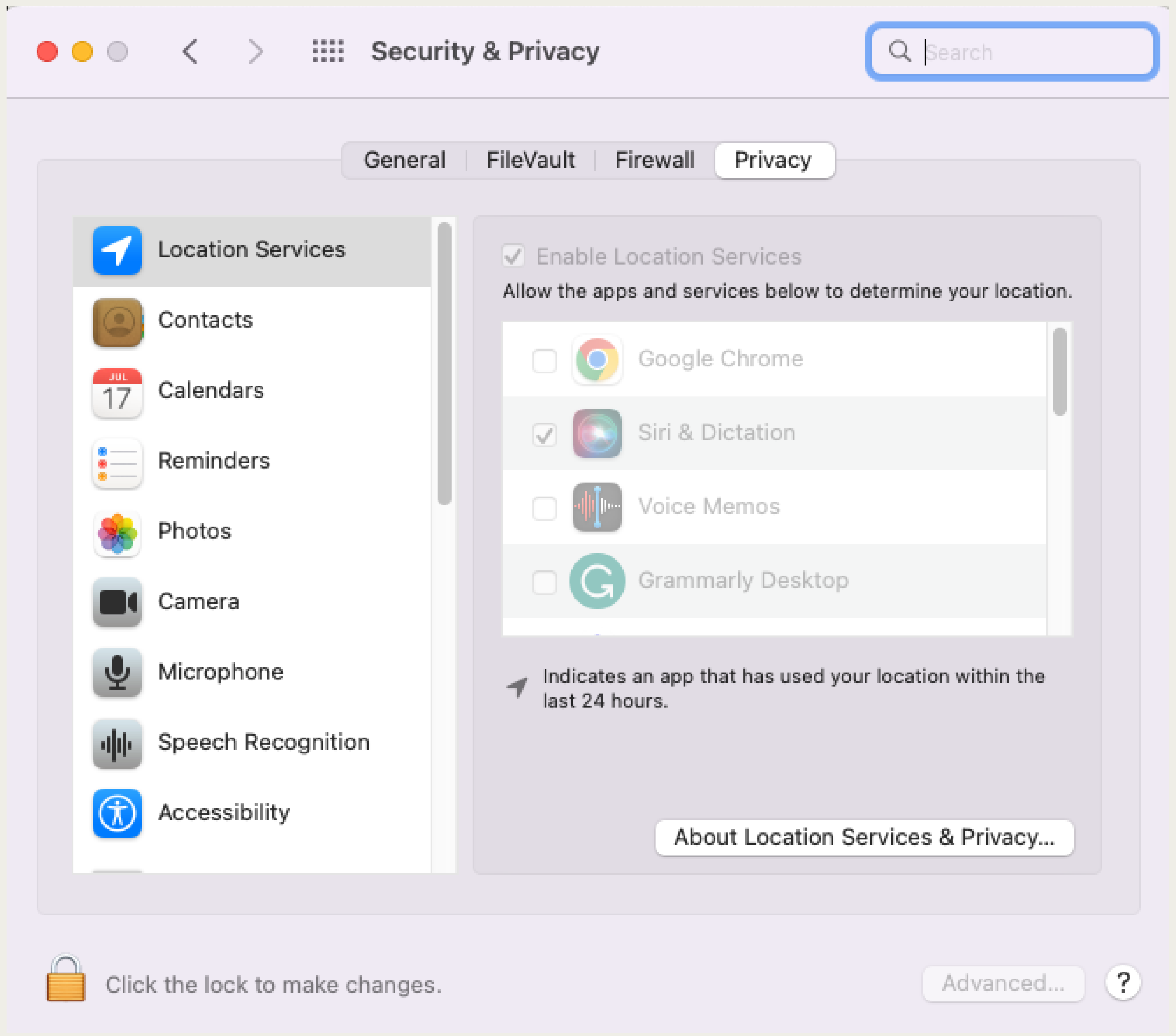
Advanced...
?



# Windowed Applications



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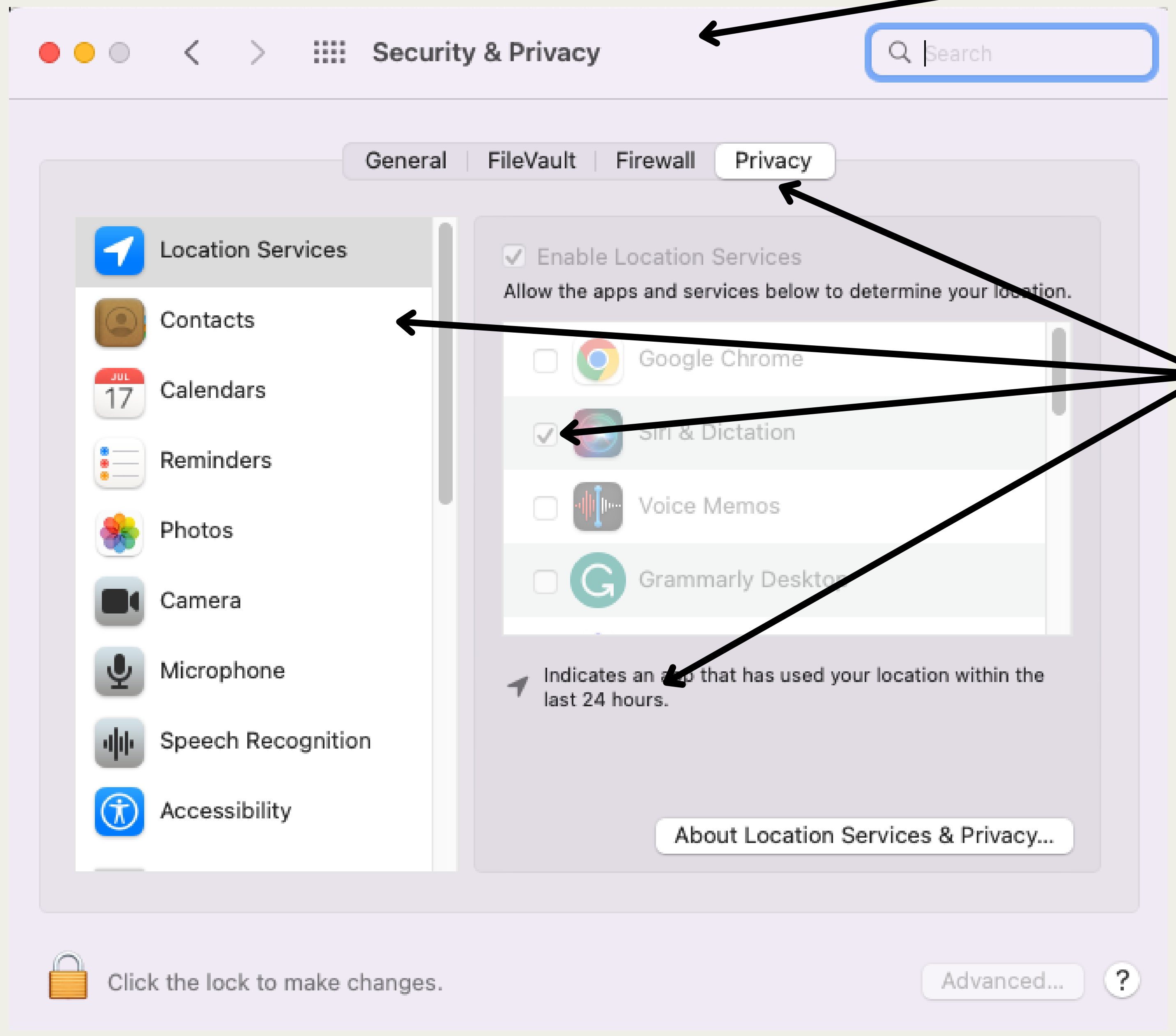
Main **Window**

App **Widgets** (Objects)

# Windowed Applications



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Main **Window**

App **Widgets** (Objects)

These work together to **create the Main App Interface** (GUI)

# Windowed Applications

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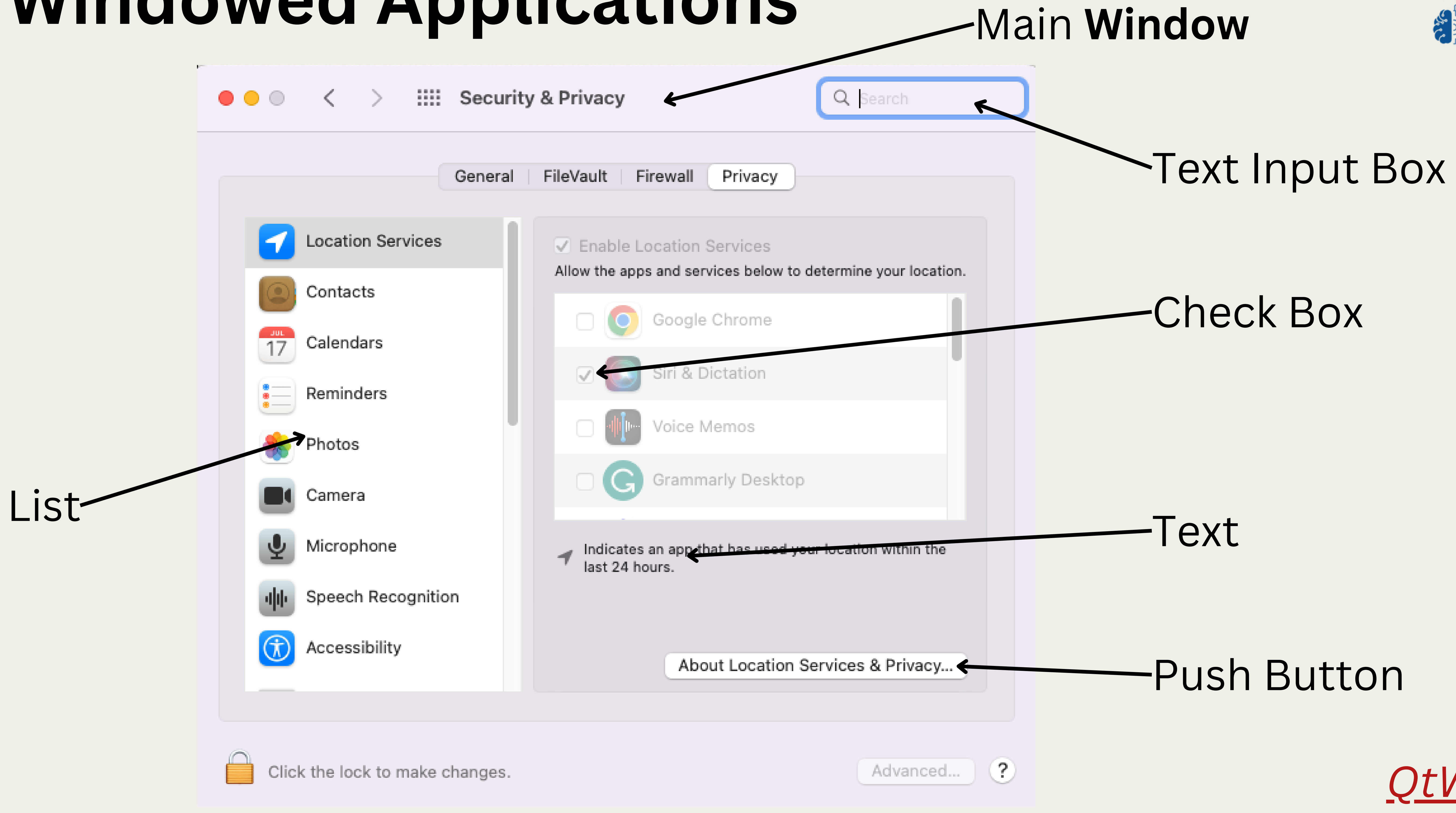

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*QtWidgets*

# Designing the Layout

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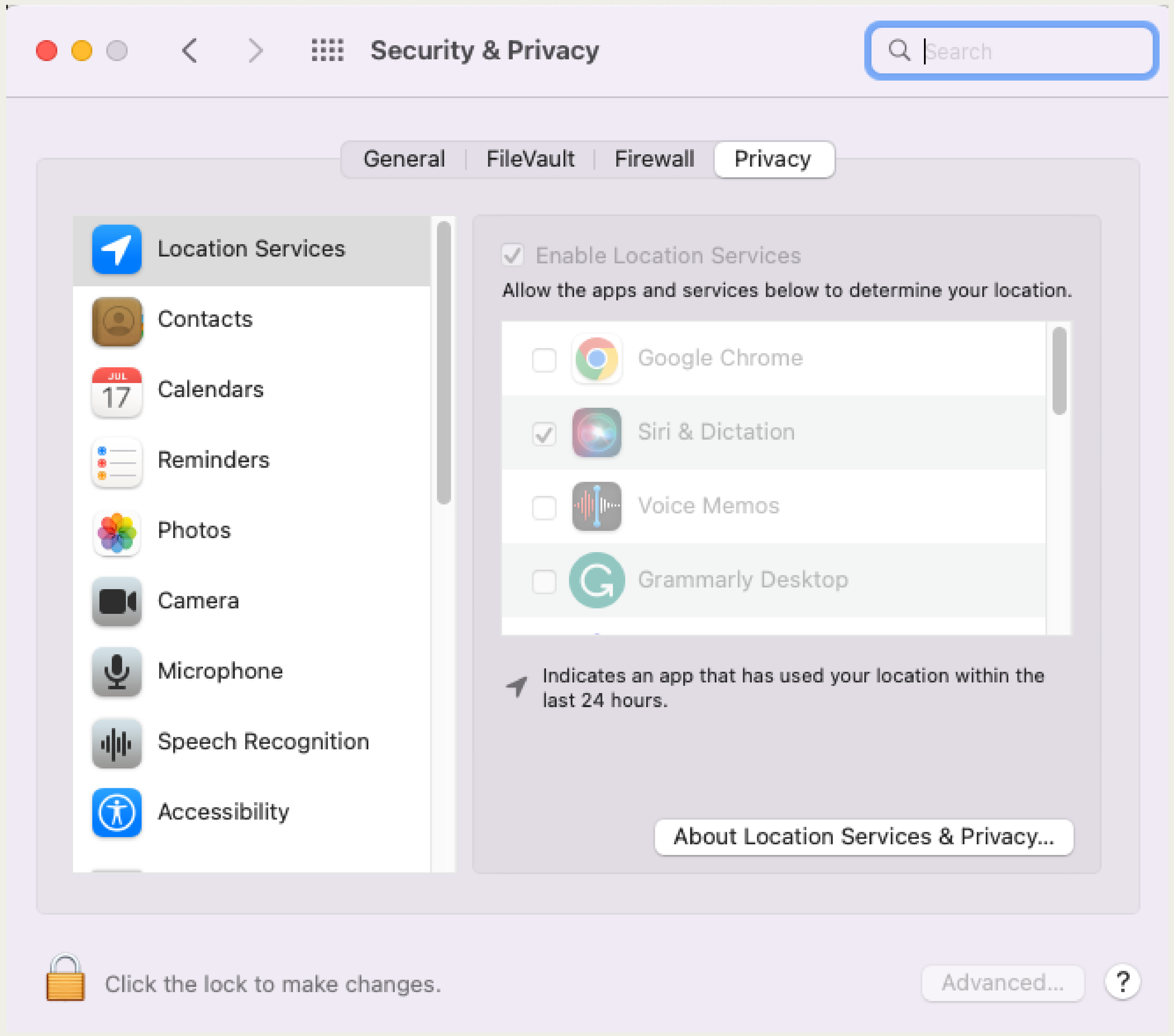

Security & Privacy

General | FileVault | Firewall | Privacy

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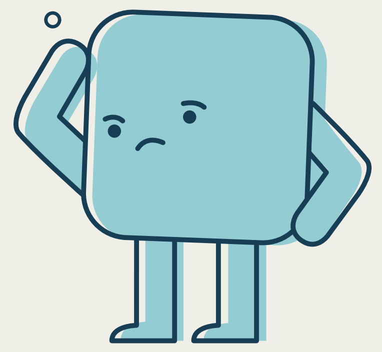
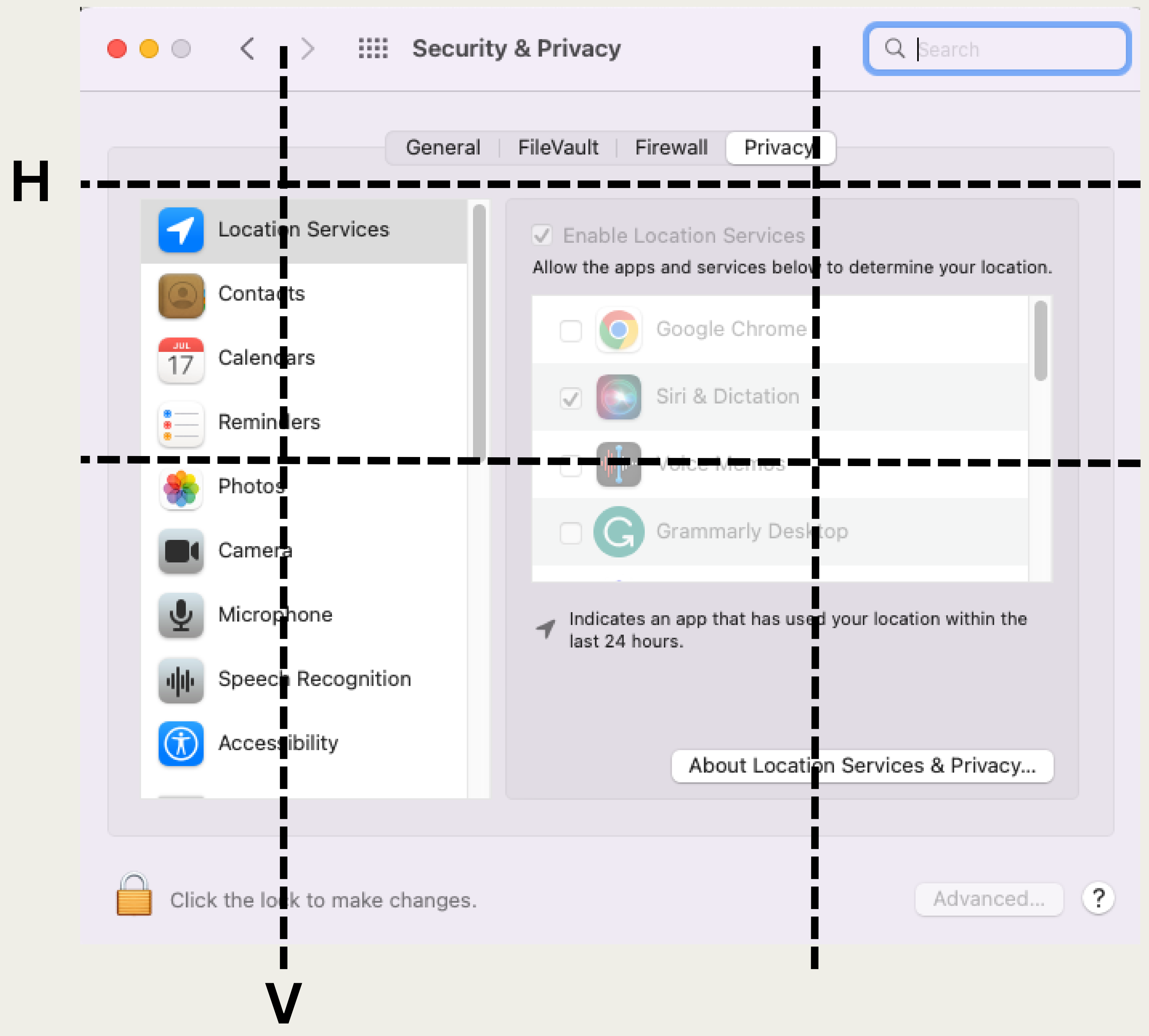
Advanced... ?

## Rows & Columns



How could be design this App so that everything is held in either a Row or a Column?

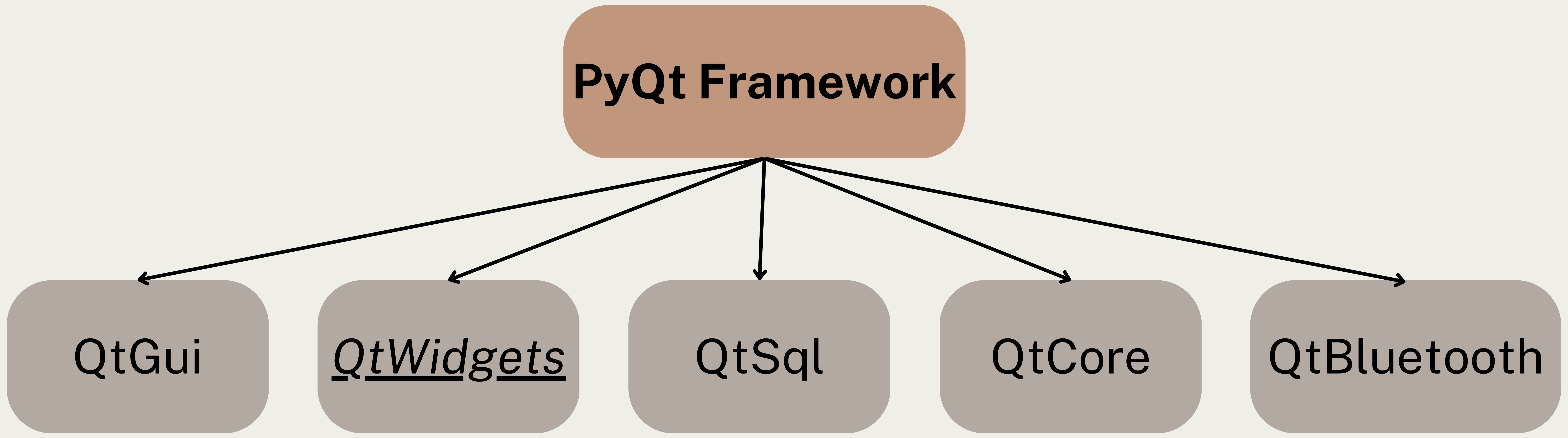
# Designing the Layout



We use Layouts in PyQt to build out our design.

Widgets (objects) are automatically aligned **vertically** and/or **horizontally**

## How to use PyQt



PyQt Framework has extensive modules that are all apart of it. Allowing you to import and use the specific modules you need for your project

# How to use PyQt

**PyQt Framework**

- **QtGui**: Classes for system integration, event handling, 2D graphics, basic imaging, fonts
- **QtWidgets**: provides a set of UI elements to create classic desktop-style user interfaces
- **QtSql**: Provides a driver layer, SQL API layer, and a user interface layer for SQL databases
- **QtCore**: A part of Qt's essential modules. The module adds features to C++:
- **QtBluetooth**: enables connectivity between Bluetooth enabled devices

## The Code Burger

1. All **Imports**
2. Main App Objects and **Settings**
3. **Create all Widgets** needed in App
4. **Design** your Layout, add your widgets to the screen
5. **Set the final layout** to the Main window
6. **Show** and **Execute** your app

## Class Flashback

```
class App():
    def __init__(self, users, storage, username):
        self.users = users
        self.storage = storage
        self.username = username

    def login(self):
        if self.username == "owner" and self.users >= 1:
            print("Welcome: ", self.username)
        else:
            print("You are not a user!")

    def increase_capacity(self, number):
        self.storage += number
        print("Updated:", self.storage)

admin = App( 100, 256, "owner" )

admin.login()
admin.increase_capacity( 64 )
```

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**OOP**

**Pause the Video!**

Try to understand what is happening

This should look familiar

Do you remember how to work with Objects and Classes in Python?

What is a **Method/Property**?

# Class Flashback

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```
class App():
    def __init__(self, users, storage, username):
        self.users = users
        self.storage = storage
        self.username = username

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        if self.username == "owner" and self.users >= 1:
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    def increase_capacity(self, number):
        self.storage += number
        print("Updated:", self.storage)

admin = App(100, 256, "owner")

admin.login()
admin.increase_capacity( 64 )
```

**A Class has properties and methods which relate to that class or an object of that Class**

We create an Object of the App class

We pass 3 Arguments to our Class

These **Arguments are** then **given to** our **__init__** method as our parameters

We use the **parameters** to the **value of our properties**

We can use these **properties around our class** similar to a normal **variable in a function**

A **Method** is a Function in a Class
A **Property** is a Variable in a Class

A method/property **must be linked** to an Object to work

**QApplication, QPushButton, QLabel**

# Connecting to PyQt

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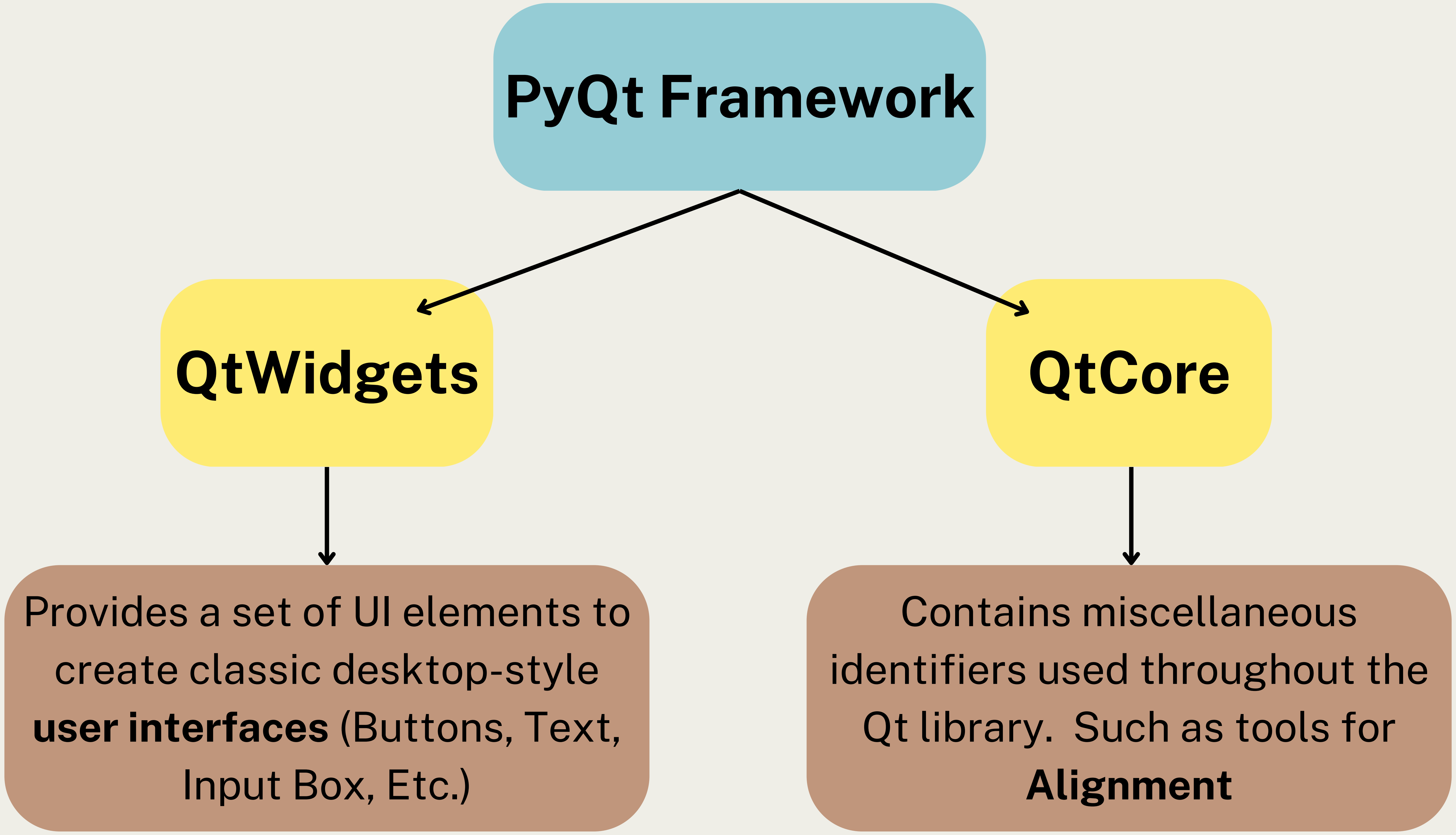
```
from PyQt5.QtCore import Qt
from PyQt5.QtWidgets import QApplication, QWidget, QLabel, QPushButton, QVBoxLayout
```

| **PyQt Classes** | **What it does** |
|---|---|
| QApplication | Important Object - Allows us to **create** and execute our **app** |
| QWidget | Important Object - Allows us to **create a Main Window** |
| QLabel | This is simply a **Text** (string) object |
| QPushButton | This is a click/submit style **button** object |
| QVBoxLayout | This allows us to use **Vertical Alignment** |

# PyQt Modules -> QtWidgets and Qt:



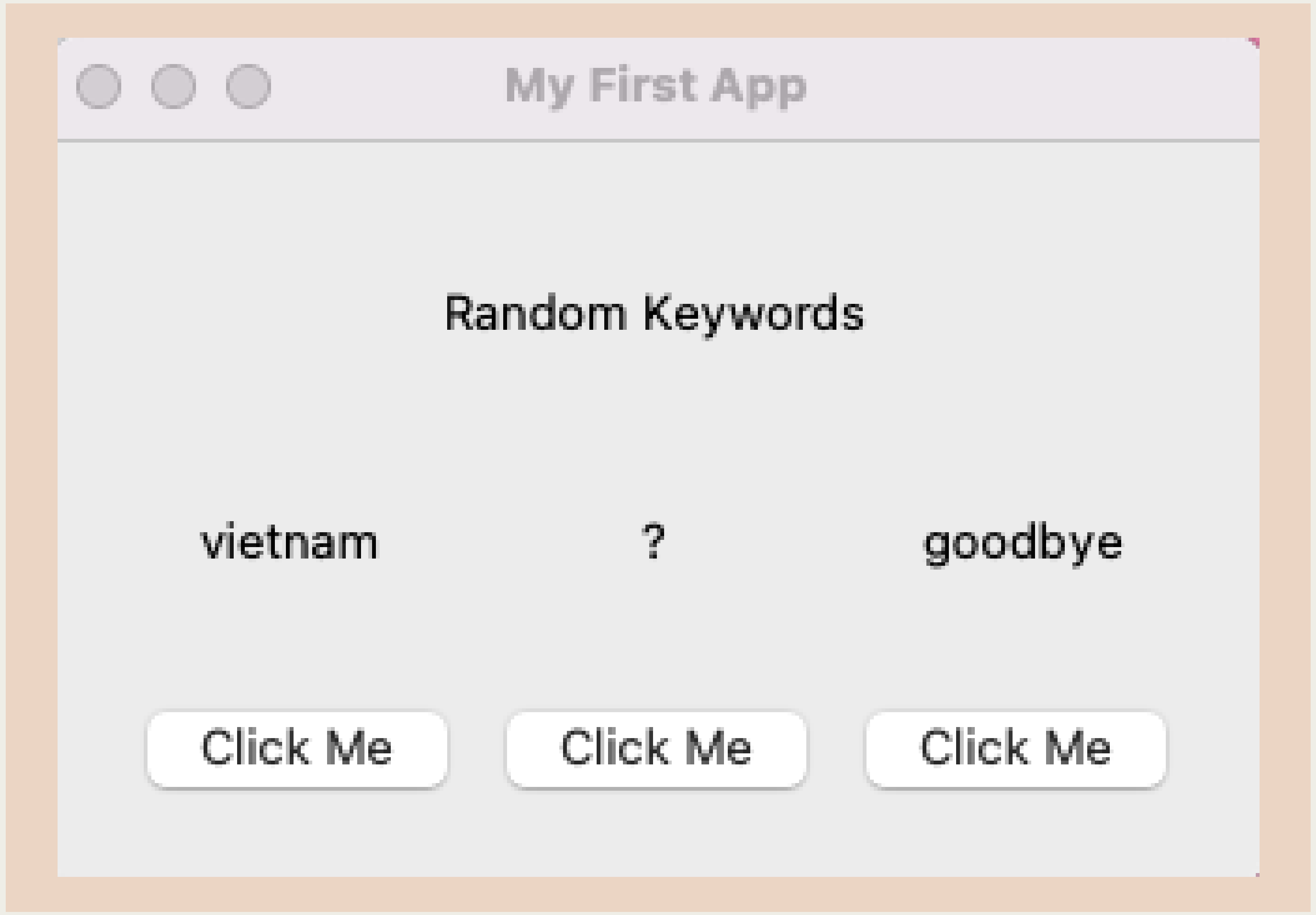
Provides a set of UI elements to create classic desktop-style **user interfaces** (Buttons, Text, Input Box, Etc.)

Contains miscellaneous identifiers used throughout the Qt library.  Such as tools for **Alignment**

# Main PyQt Methods

| **PyQt Method** | **What it does** |
|---|---|
| .addWidget() | Allows you to **add an object to the layout** |
| .setText() | **Change the text** of an existing object |
| .addLayout() | Used to **add Layouts** together |
| .setLayout() | Used to **set the final design** to the main window |
| .show() / .hide() | Allows you to **show or hide an object** |

## You're first application:



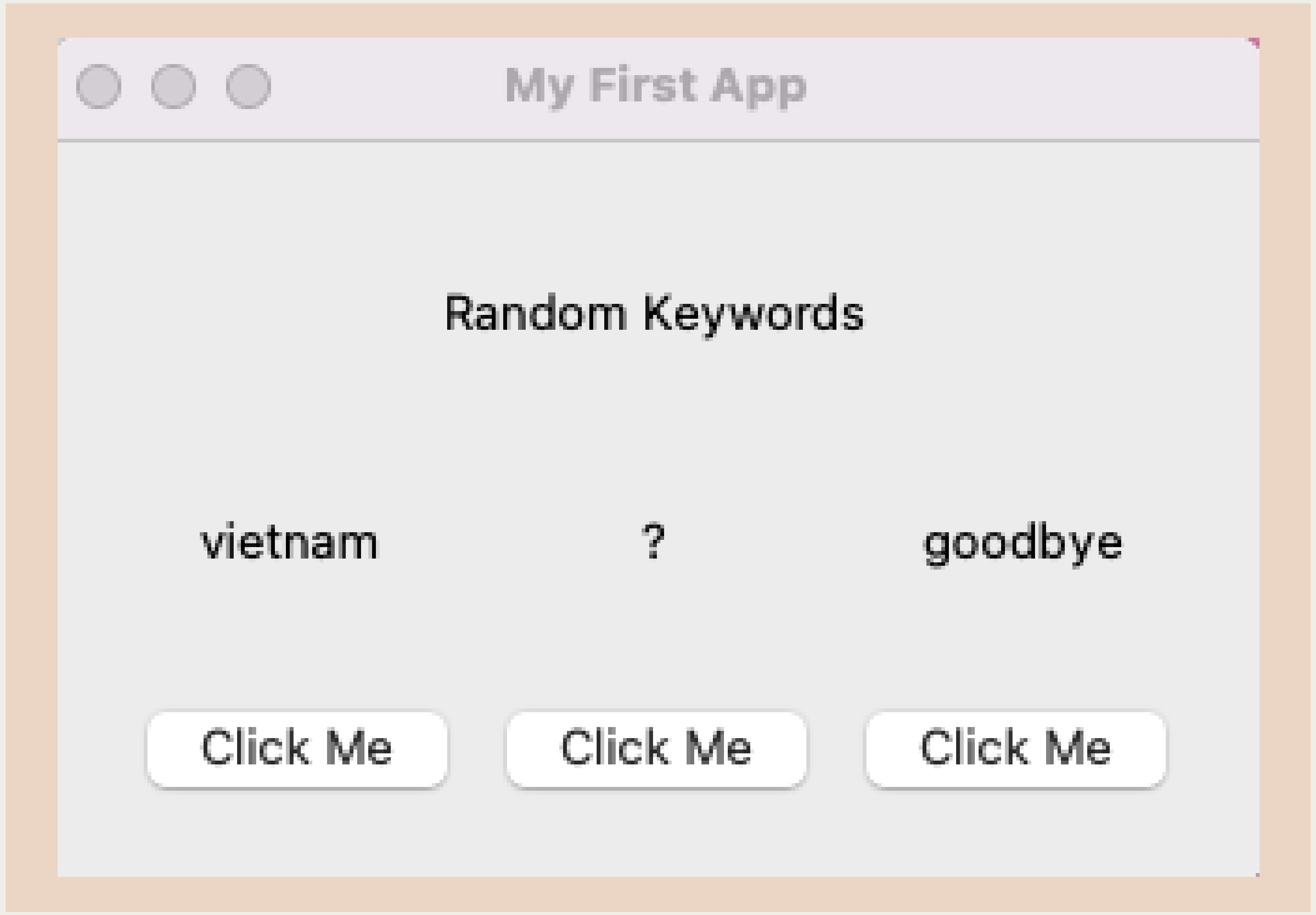
Random Keywords

vietnam ? goodbye

**Your first App!**

Let's get you comfortable with the **foundations** of PyQt and understanding the **basic concepts**!

## You're first application:



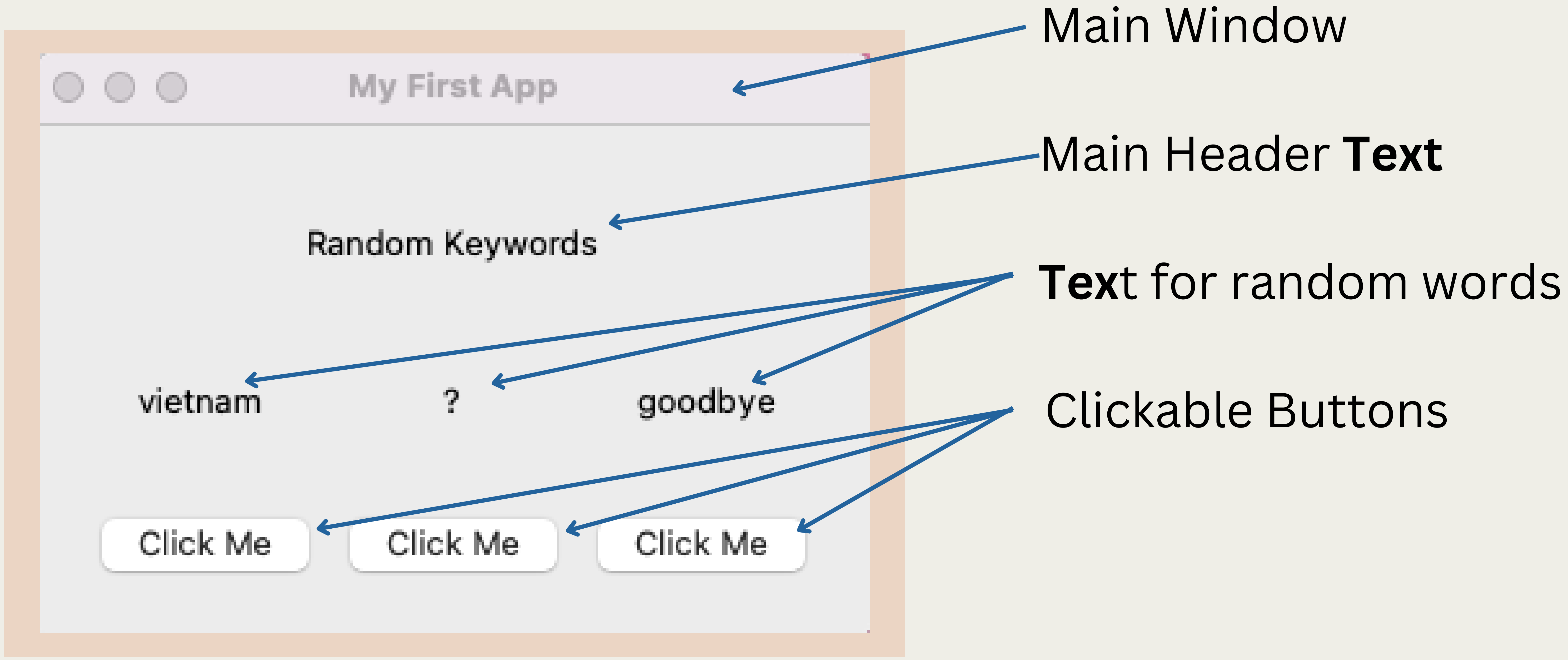
Main Window

Main Header Text

Text for random words

Clickable Buttons

## You're first application:



Can you name all the Classes we will need?

## You're first application:

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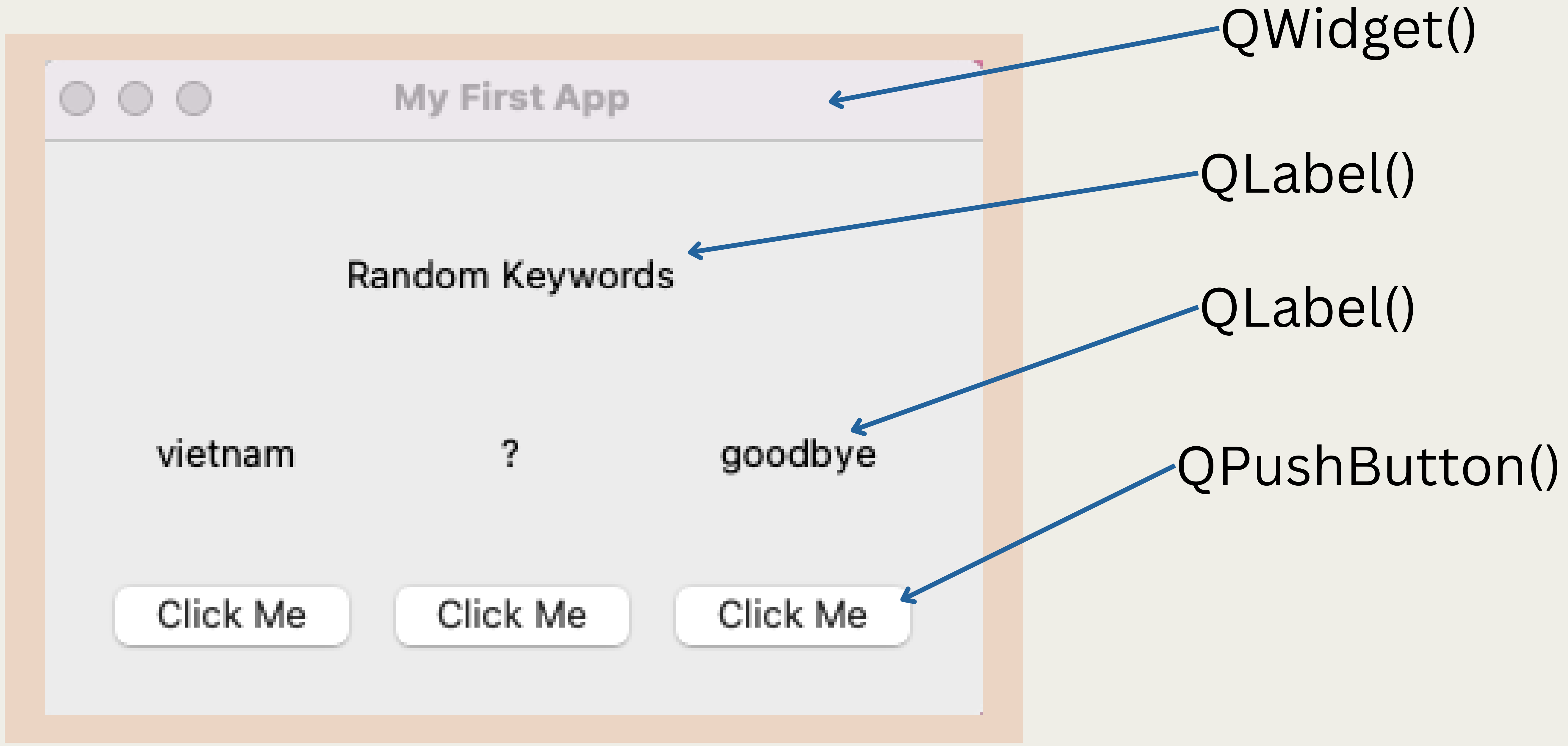
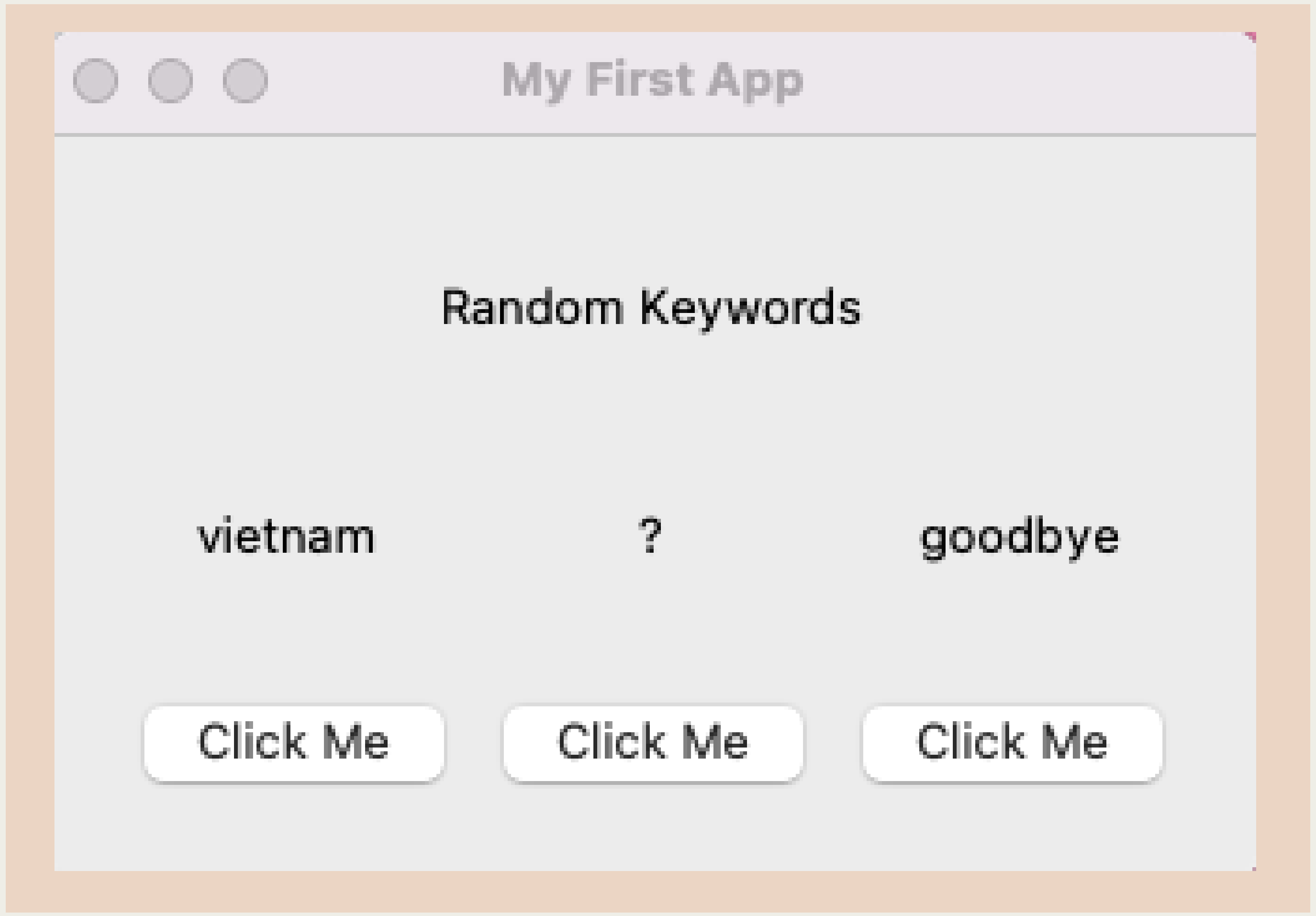


What about our Design?  How could we do this?

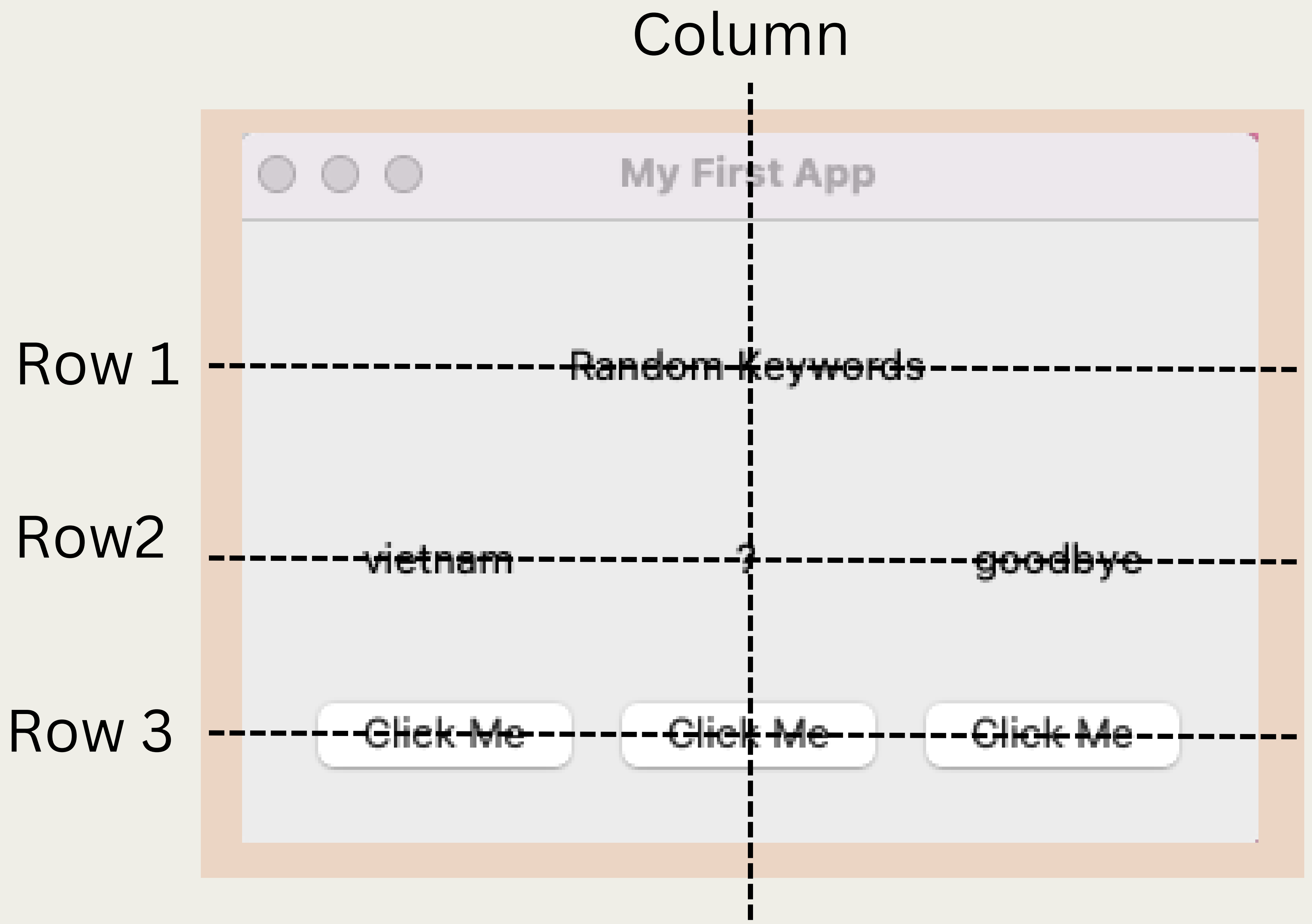
## Application Design



The app
(Base layers).
These 3 layers are
into
our which is
used as our

What about our Design? How could we do this?

## Application Design



The app **starts with 3 Rows** (Base layers). These 3 layers are **stacked like a cake** into our **column** which is used as our **final design**

What about our Design? How could we do this?

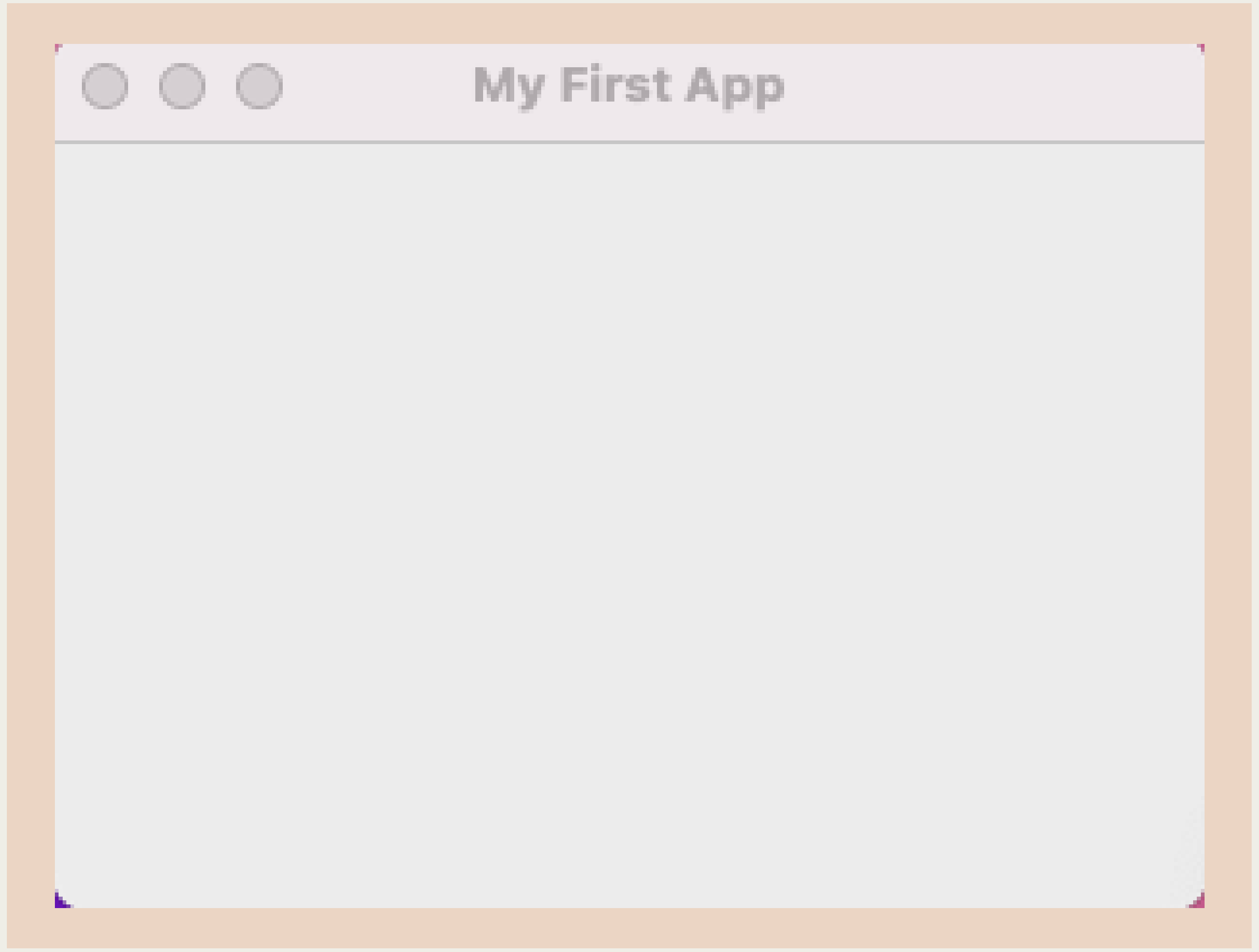
## Initial Code Setup:

```
from PyQt5.QtCore import Qt
from PyQt5.QtWidgets import QApplication, QWidget, QLabel, QPushButton,
QVBoxLayout, QHBoxLayout

#App Settings
app = QApplication([])
main_window = QWidget()
main_window.setWindowTitle("My First App")
main_window.resize(300,200)

#Create all Object/Widgets below here

main_window.show()
app.exec_()
```



## Designing our App

Learning how to set the layout and design the app

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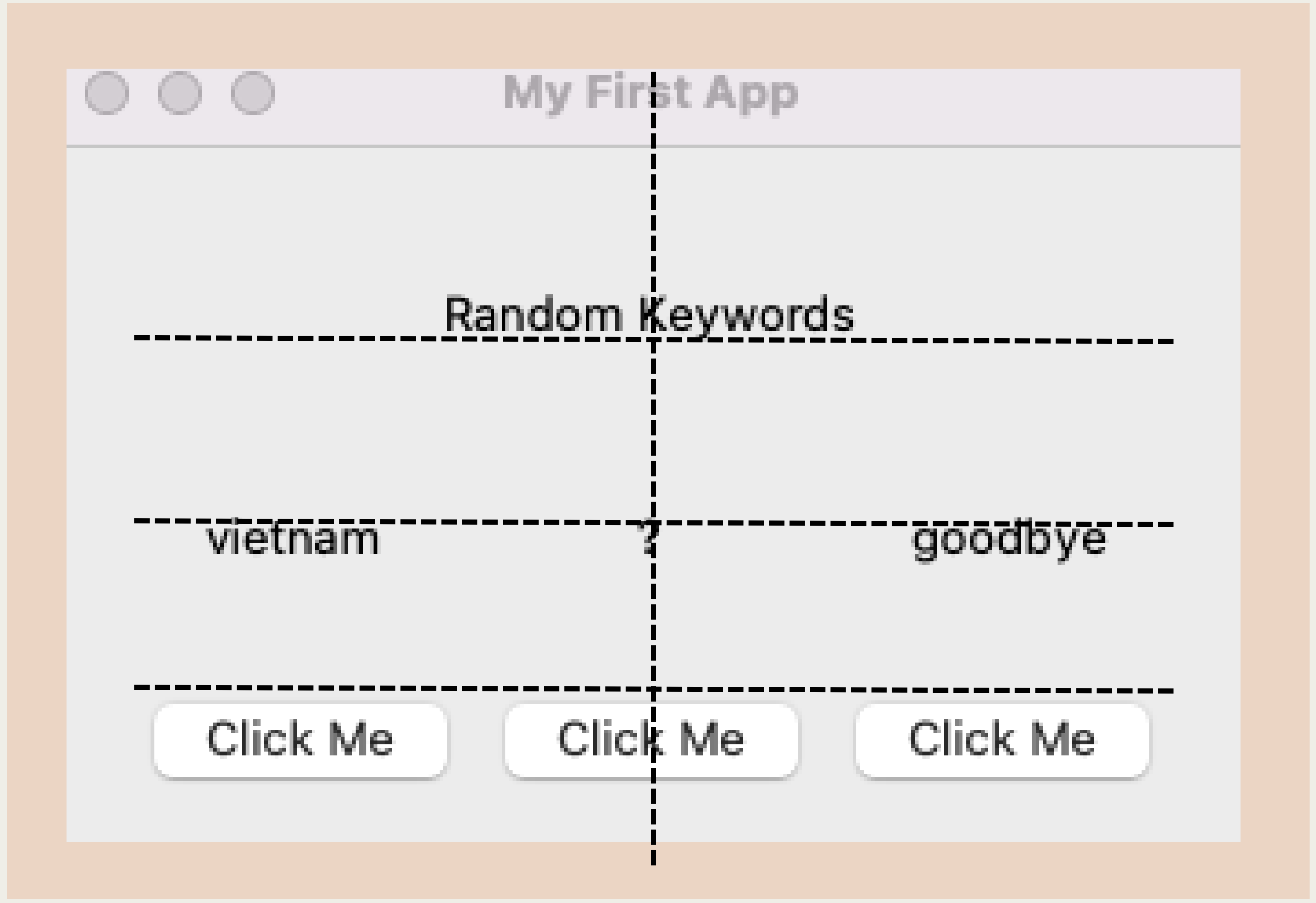
## DESIGNING OUR APP

How can we achieve this look?

PyQt Layout Tools:

- QVBoxLayout()
- QHBoxLayout()



## DESIGNING OUR APP

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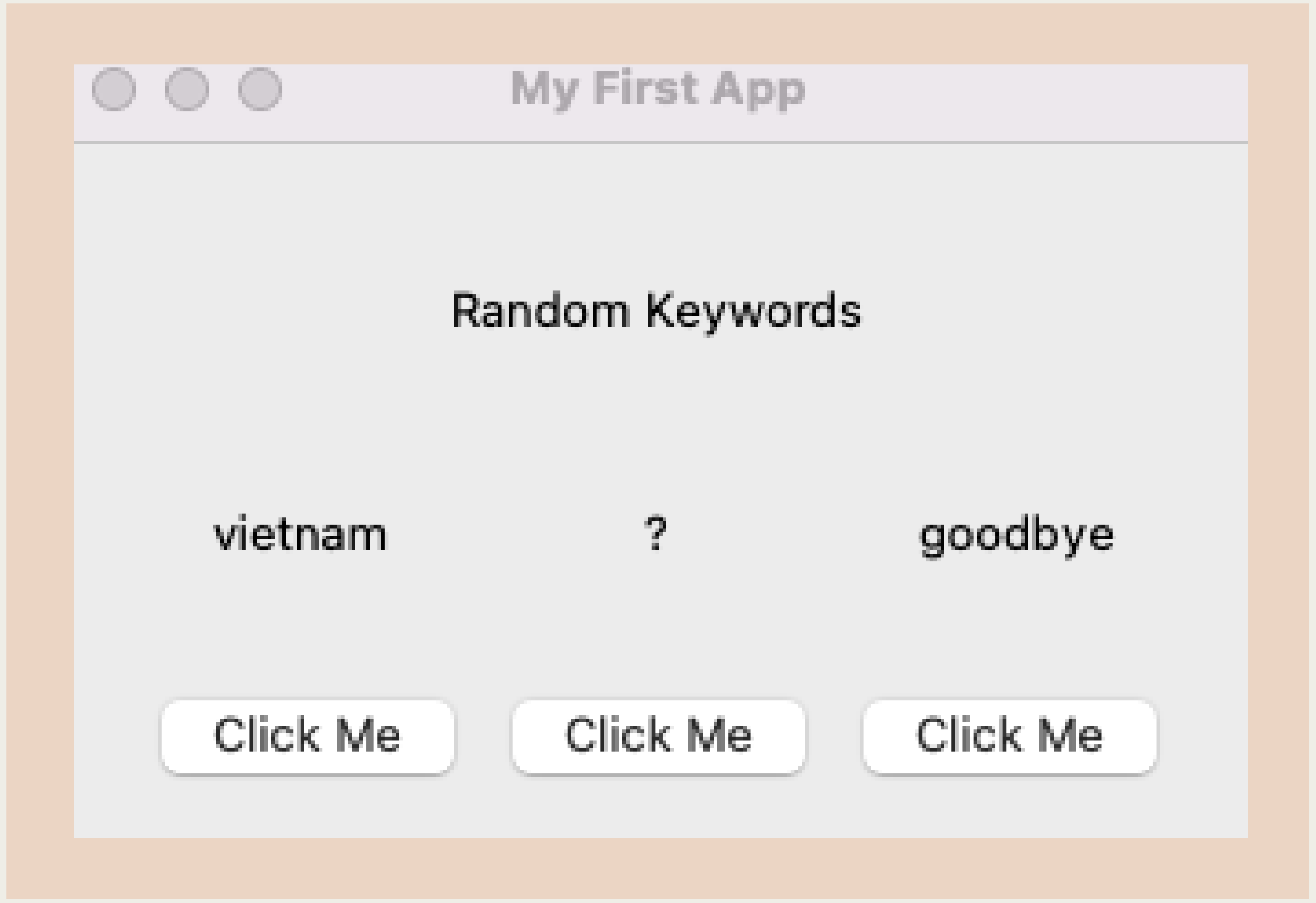
```
#Create all Object/Widgets below here
title_text = QLabel("Random Keywords")
text1 = QLabel("?")
text2 ...
text3 ...

button1 = QPushButton("Click Me")
button2 ...
button3...

#Design our app
master_layout = QVBoxLayout()
row1 = QHBoxLayout()
```



## DESIGNING OUR APP

ZERO TO KNOWING

```
#Create all Object/Widgets below here
title_text = QLabel("Random Keywords")
text1 = QLabel("?")
text2 ...
text3 ...

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button2 ...
button3...

#Design our app
master_layout = QVBoxLayout()
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```

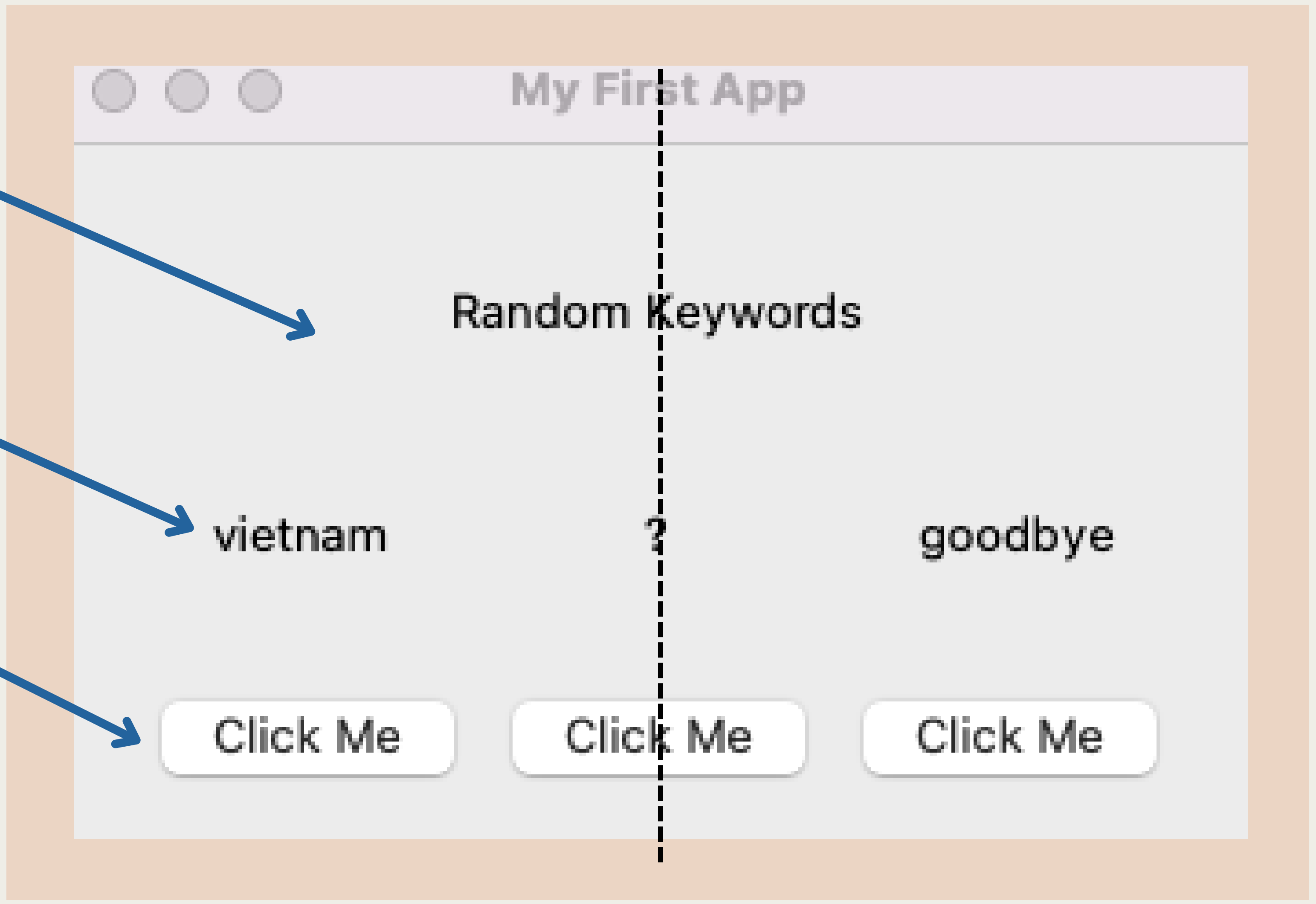

## DESIGNING OUR APP

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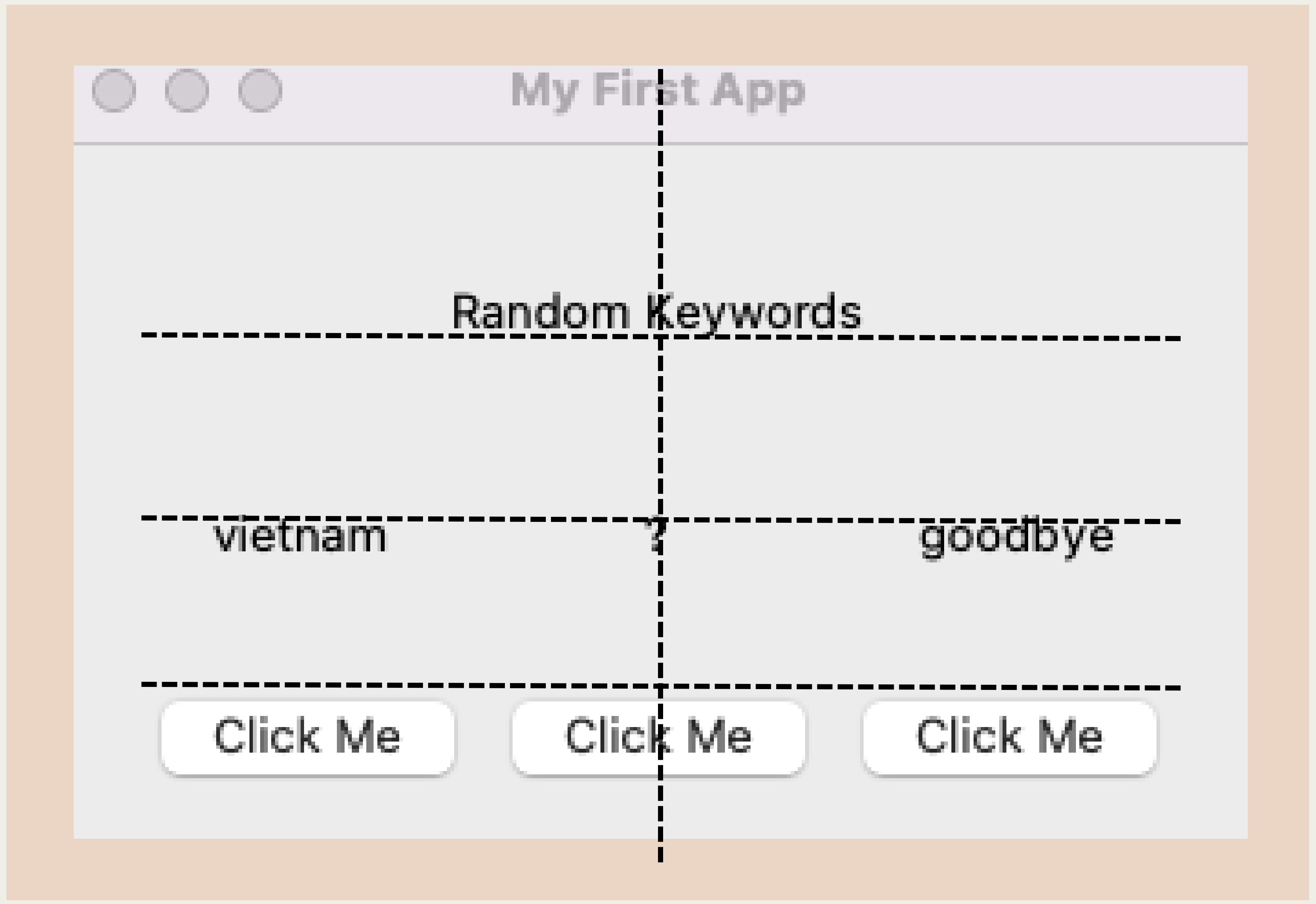
```
#Design our app
master_layout = QVBoxLayout()
row1 = QHBoxLayout()
row2...
row3 ...

row1.addWidget(title_text, alignment=Qt.AlignCenter)

row2.addWidget(text1, alignment=Qt.AlignCenter)
row2.addWidget...

row3.addWidget(button1)
row3.addWidget...
```



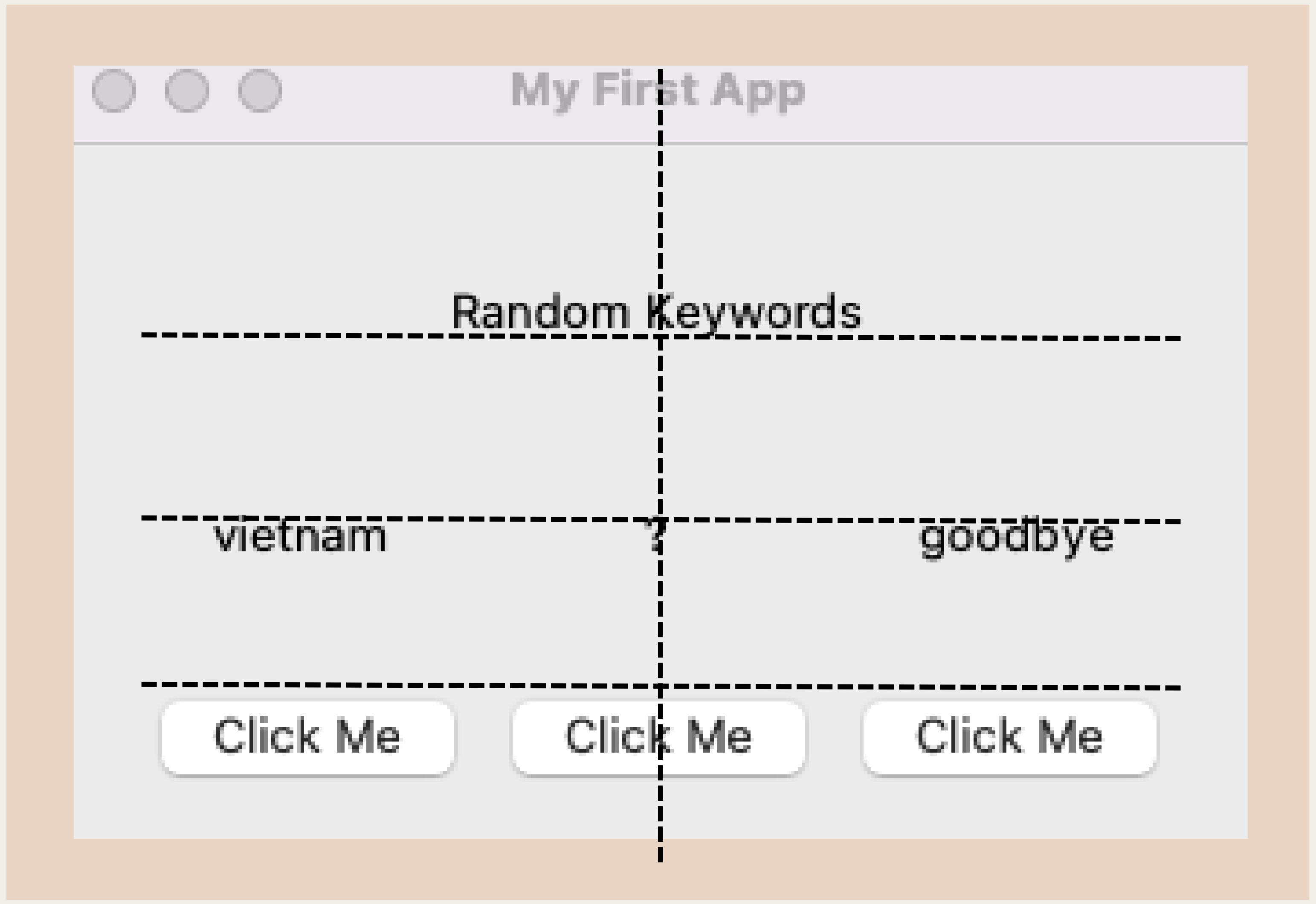
## DESIGNING OUR APP

```
#Design our app
master_layout = QVBoxLayout()
row1 = QHBoxLayout()
row2 = QHBoxLayout()
row3 = QHBoxLayout()

#Previous Code Here


master_layout.addLayout(row1)
master_layout.addLayout(row2)
master_layout.addLayout(row3)

main_window.setLayout(master_layout)
```



## DESIGNING OUR APP

ZERO TO KNOWING

```
#Design our app
master_layout = QVBoxLayout()
row1 = QHBoxLayout()
row2 = QHBoxLayout()
row3 = QHBoxLayout()

#Previous Code Here

master_layout.addLayout(row1)
master_layout.addLayout(row2)
master_layout.addLayout(row3)

main_window.setLayout(master_layout)
```

Creating a **master layout, everything is added to this**

Creating **3 rows**, we will add our objects/widgets to each row

Here we **add our rows to our master layout**, in the order we want them to appear

We **use.addLayout method** to **add "design layouts"** together, **don't use .addWidget**

We **take our master layout** and **set it as the final design to** our **main_window**

## The Code Burger

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## Displaying a Random word

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```
#Getting a Random Word from a List
from random import choice
my_words= ["Hello", "Goodbye", "Test", "Python", "PyQt", "Code"]

def display_word():
    word = choice( my_words )
    text1.setText( word )
```

The **value of** the variable **word** is a **random word** from the list

choice -> This **takes a list** as an argument and **randomly selects one of the elements**

# Event Handing in PyQt

```
#Linking a Button to a Function
button = QPushButton("Click Me")

def test_function():
    print("This button is working!")
```

Event Type -> Click Event

```
button.clicked.connect(test_function)
```

When this button   is Clicked   I want to connect   To this Function

# Event Handing in PyQt

```python
#Linking a Button to a Function
button = QPushButton("Click Me")

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```

Event Type -> Click Event

```python
button.clicked.connect(test_function)
```

When this **button** is **Clicked** I want to **connect** To this **Function**

(Literal Translation)