How to get started with Qt for Python

Dr Frazer Noble

Introduction

In this presentation, I will describe:

- How to get started with Qt for Python.

Getting started

Create a new directory named "pysided6" in `C:/Users/%USER%/`.

Note: Replace `%USER%` with your username.

Open Visual Studio Code in `C:/Users/%USER%/pyside6`: either:

1. Open Visual Studio Code and select "File > Open Folder..." and navigate to `C:/Users/%USER%/pyside6`;

   or,
2. Right click in `C:/Users/%USER%/pyside6` and select "Open with Code".

Open a new terminal: either:

1. press `Ctrl`+`~`;

   or
2. select "View > Terminal".

Create a new virtual environment named "venv".

Type the following command into the terminal and then press `Enter`:

```
python -m venv venv
```

This will create the `venv` virtual environment in `pyside6`.

Note: A prompt indicating Visual Studio Code "noticed a new virtual environment" and will ask "if you want to select it for the workspace folder". Press the "Yes" button.

Activate the virtual environment.

Type the following command into the terminal and then press `Enter`:

```
.\venv\Scripts\Activate.ps1
```

This will activate the `venv` virtual environment.

Note: To deactivate the `venv` virtual environment, type `deactivate` into the terminal and then press `Enter`.

Install `pyside6`.

Type the following command into the terminal and then press `Enter`:

```
python -m pip install pyside6
```

This will install the latest version of `pyside6` into the `venv` virtual environment.

Update `pip`.

Type the following command into the terminal and then press `Enter`:

```
python -m pip install --upgrade pip
```

This will update `pip` to the latest version.

`hello_world.py`

Create a new file named "hello_world.py" in `C:/Users/%USER%/pyside6`.

Open `hello_world.py` and type the following Python code into the file:

```python
import sys

from PySide6 import QtCore, QtGui, QtWidgets
```

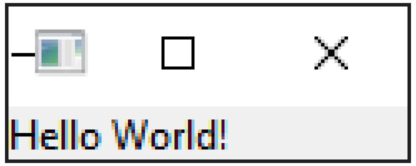
```
if __name__ == "__main__":

    app = QtWidgets.QApplication([])

    label = QtWidgets.QLabel('Hello World!')
    label.show()

    sys.exit(app.exec_())
```

Type the following command into the terminal and then press `Enter`:

```
python hello_world.py
```

This will run `hello_world.py`.

Something similar to the following will be displayed:



Hello World!

Figure: `hello_world.py` 's GUI.

`simple_button.py`

Create a new file named "simple_button.py" in `C:/Users/%USER%/pyside6`.

Open `simple_button.py` and type the following Python code into the file:

```python
import sys

from PySide6 import QtCore, QtGui, QtWidgets


@QtCore.Slot()
def greet():
    print("Hello World!")
```

```python
if __name__ == "__main__":

    app = QtWidgets.QApplication([])

    button = QtWidgets.QPushButton("Click Me!")
    button.clicked.connect(greet)

    button.show()

    sys.exit(app.exec_())
```

Type the following command into the terminal and then press `Enter`:

```
python simple_button.py
```

This will run `simple_button.py`.

Something similar to the following will be displayed:

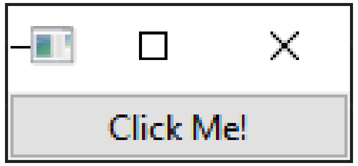


Figure: `simple_button.py`'s GUI.

Left click on the "Click Me!" button.

"Hello World!" will be displayed in the terminal.

`simple_dialog.py`

Create a new file named "simple_dialog.py" in `C:/Users/%USER%/pyside6`.

Open `simple_dialog.py` and type the following Python code into the file:

```python
import sys

from PySide6 import QtCore, QtGui, QtWidgets
```

```python
class Form(QtWidgets.QDialog):

    def __init__(self, parent=None):

        super(Form, self).__init__(parent)
        self.setWindowTitle("My Form")

        self.label = QtWidgets.QLabel('Username:')
        self.username = QtWidgets.QLineEdit("")
        self.button = QtWidgets.QPushButton("Click Me!")

        self.layout = QtWidgets.QVBoxLayout(self)
        self.layout.addWidget(self.label)
        self.layout.addWidget(self.username)
        self.layout.addWidget(self.button)

        self.button.clicked.connect(self.greet)

    @QtCore.Slot()
    def greet(self):
        print("Hello {}!".format(self.username.text()))
```

```python
if __name__ == "__main__":

    app = QtWidgets.QApplication([])

    form = Form()
    form.show()

    sys.exit(app.exec_())
```

Type the following command into the terminal and then press `Enter`:

```
python simple_dialog.py
```

This will run `simple_dialog.py`.

Something similar to the following will be displayed:

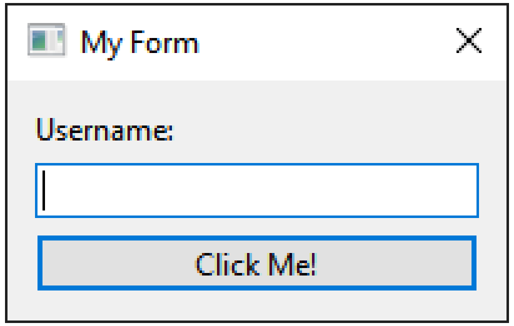


Figure: `simple_dialog.py`'s GUI.

Type "Bob" into the LineEdit's input.

Left click on the "Click Me!" button.

"Hello Bob!" will be displayed in the terminal.

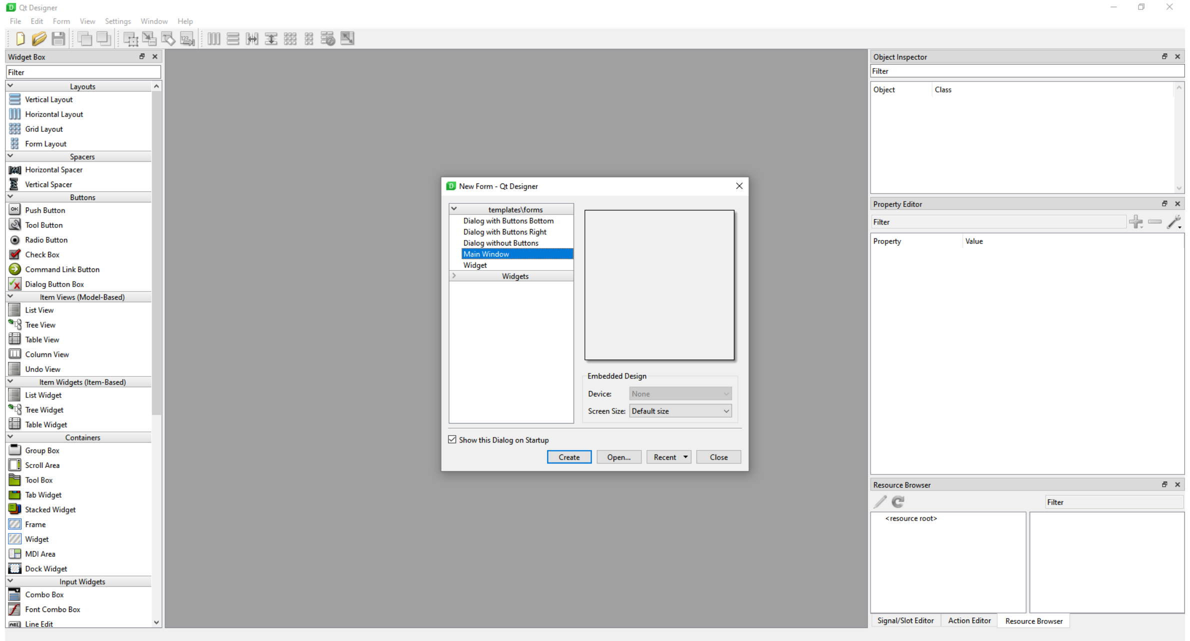
Qt Designer

Type the following command into the terminal and then press `Enter`:

```
pyside6-designer
```

This will start Qt Designer.

Something similar to the following will be displayed:



Device: None

Screen Size: Default size

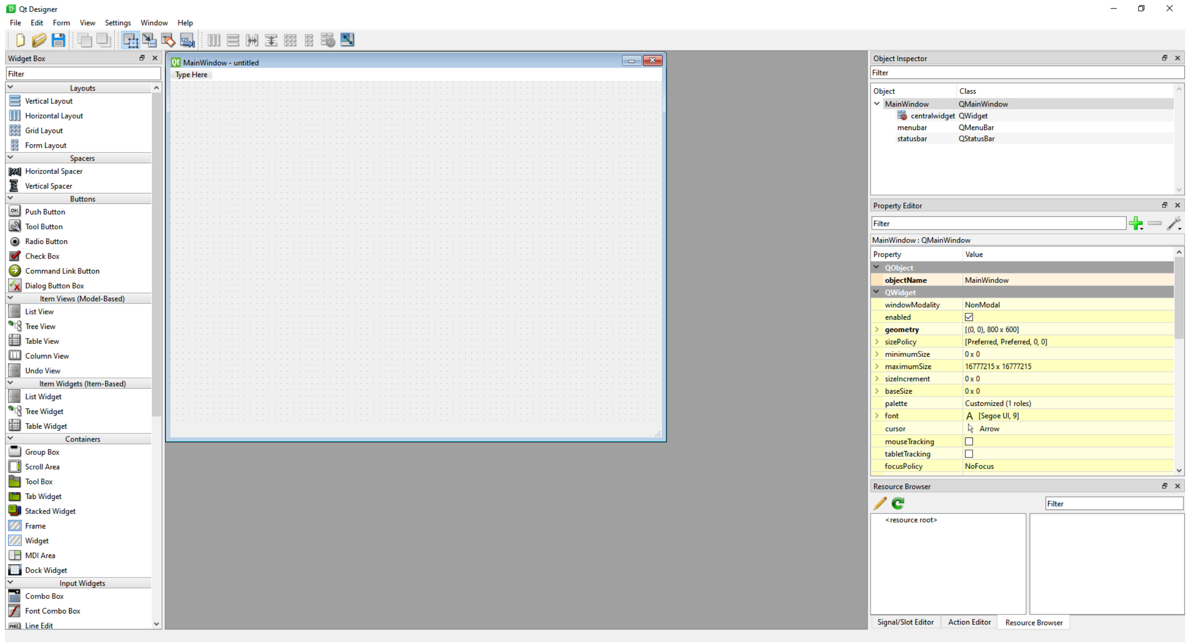
☑ Show this Dialog on Startup

Figure: Qt Designer.

Left click on "Main Window" in the "templates\forms" menu.

Left click on the "Create" button.

Something similar to the following will be displayed:



Object	Class
MainWindow	QMainWindow
centralwidget	QWidget
menubar	QMenuBar
statusbar	QStatusBar

MainWindow : QMainWindow

Property	Value
QObject	
objectName	MainWindow
QWidget	
windowModality	NonModal
enabled	☑
geometry	[(0, 0), 800 x 600]
sizePolicy	[Preferred, Preferred, 0, 0]
minimumSize	0 x 0
maximumSize	16777215 x 16777215
sizeIncrement	0 x 0
baseSize	0 x 0
palette	Customized (1 roles)
font	A [Segoe UI, 9]
cursor	Arrow
mouseTracking	□
tabletTracking	□
focusPolicy	NoFocus

Figure: Qt Designer.

`mainwindow.ui`

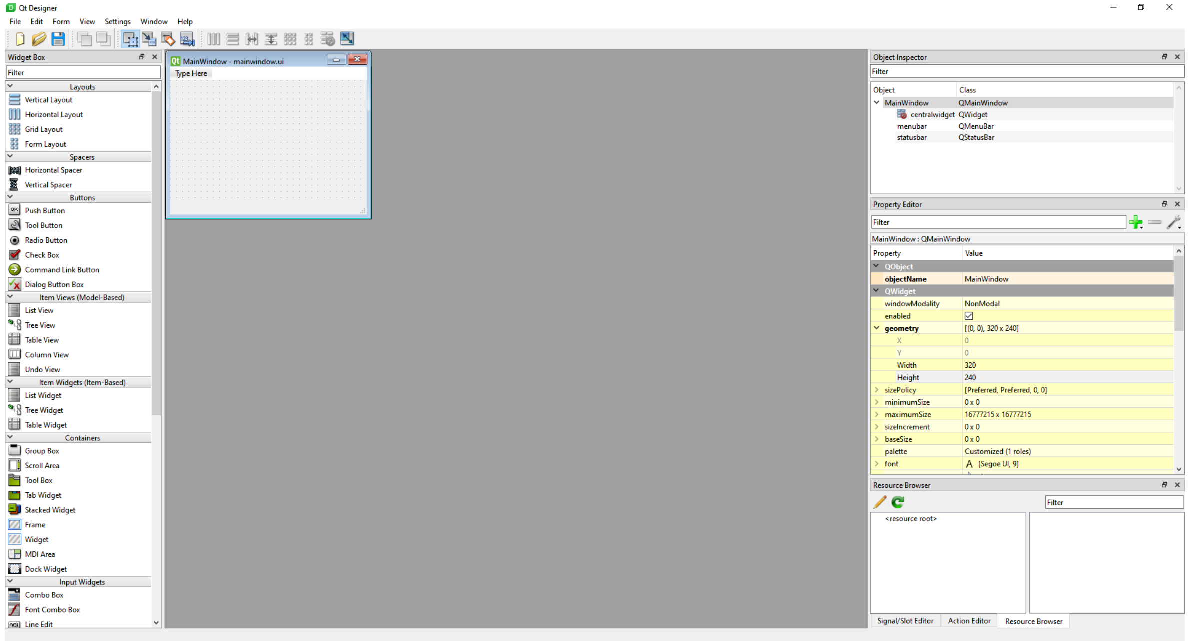
Save the project as "mainwindow.ui" in `C:/Users/%USER%/pyside6`. Either:

1. Press the "Save" button;

   or,

2. Select "File > Save".

Resize `mainwindow.ui` 's form to 320 x 240 pixels.



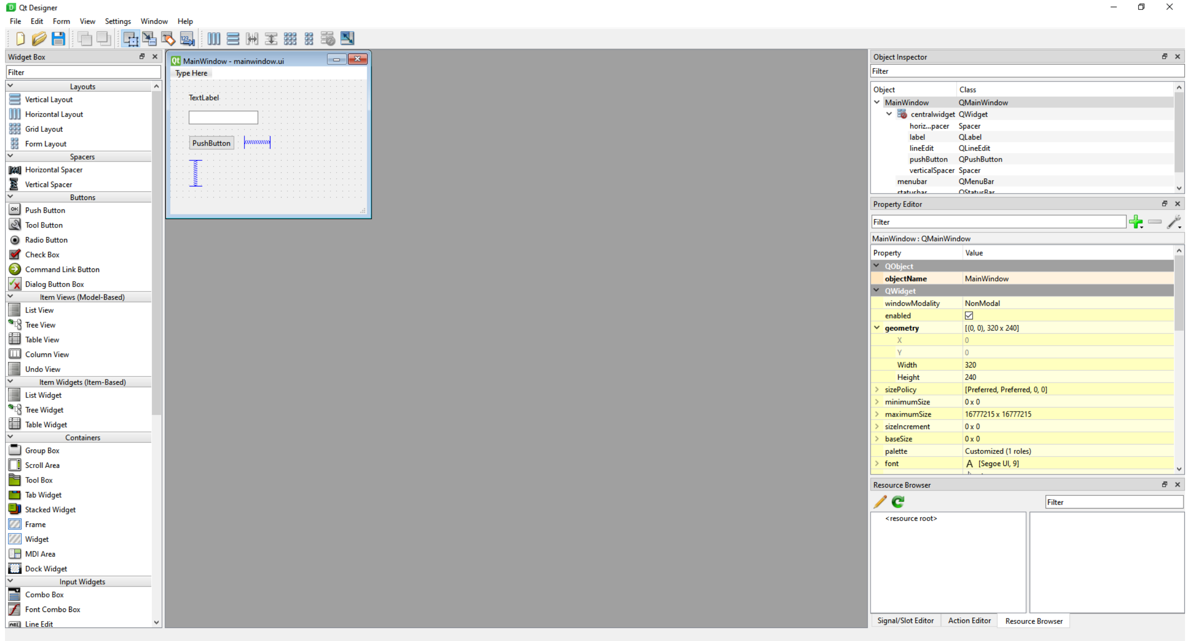
Object	Class
MainWindow	QMainWindow
centralwidget	QWidget
menubar	QMenuBar
statusbar	QStatusBar

MainWindow : QMainWindow

Property	Value
QObject	
objectName	MainWindow
QWidget	
windowModality	NonModal
enabled	☑
geometry	[(0, 0), 320 x 240]
X	0
Y	0
Width	320
Height	240
sizePolicy	[Preferred, Preferred, 0, 0]
minimumSize	0 x 0
maximumSize	16777215 x 16777215
sizeIncrement	0 x 0
baseSize	0 x 0
palette	Customized (1 roles)
font	A [Segoe UI, 9]

Figure: `mainwindow.ui` .

Drag 1 Label, 1 LineEdit, 1 PushButton, 1 Horizontal Spacer, and 1 VerticalSpacer widget onto `mainwindow.ui` as illustrated:



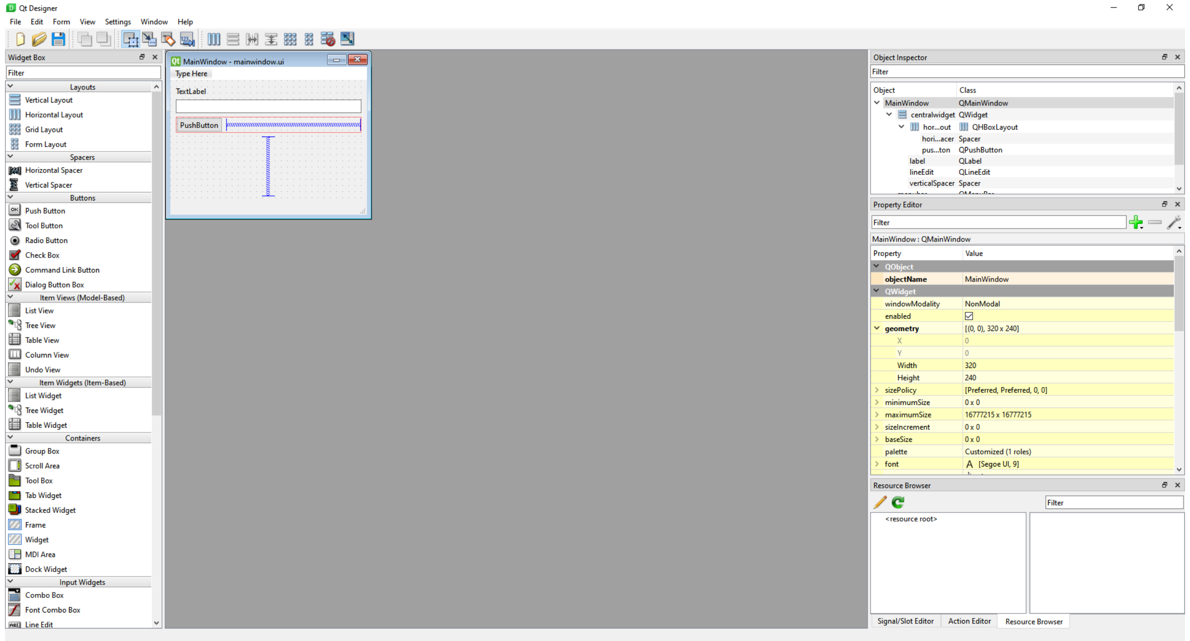
Object	Class
MainWindow	QMainWindow
centralwidget	QWidget
horiz...pacer	Spacer
label	QLabel
lineEdit	QLineEdit
pushButton	QPushButton
verticalSpacer	Spacer
menubar	QMenuBar
statusbar	QStatusBar

MainWindow : QMainWindow

Property	Value
QObject	
objectName	MainWindow
QWidget	
windowModality	NonModal
enabled	☑
geometry	[(0, 0), 320 x 240]
X	0
Y	0
Width	320
Height	240
sizePolicy	[Preferred, Preferred, 0, 0]
minimumSize	0 x 0
maximumSize	16777215 x 16777215
sizeIncrement	0 x 0
baseSize	0 x 0
palette	Customized (1 roles)
font	A [Segoe UI, 9]

Figure: `mainwindow.ui`.

Layout the widgets as illustrated:



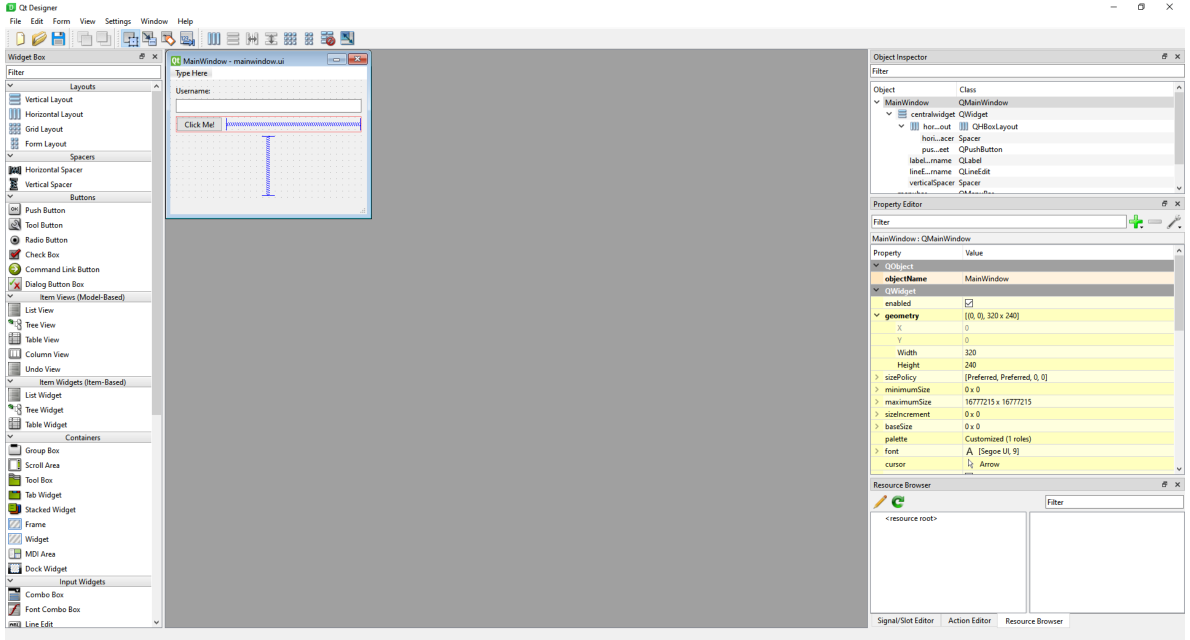
Object	Class
MainWindow	QMainWindow
centralwidget	QWidget
hor...out	QHBoxLayout
hori...acer	Spacer
pus...ton	QPushButton
label	QLabel
lineEdit	QLineEdit
verticalSpacer	Spacer

MainWindow : QMainWindow

Property	Value
QObject	
objectName	MainWindow
QWidget	
windowModality	NonModal
enabled	☑
geometry	[(0, 0), 320 x 240]
X	0
Y	0
Width	320
Height	240
sizePolicy	[Preferred, Preferred, 0, 0]
minimumSize	0 x 0
maximumSize	16777215 x 16777215
sizeIncrement	0 x 0
baseSize	0 x 0
palette	Customized (1 roles)
font	A [Segoe UI, 9]

Figure: `mainwindow.ui`.

Change the Label and PushButton widgets' text as illustrated:



Object	Class
MainWindow	QMainWindow
centralwidget	QWidget
hor...out	QHBoxLayout
hori...acer	Spacer
pus...eet	QPushButton
label...rname	QLabel
lineE...rname	QLineEdit
verticalSpacer	Spacer

MainWindow : QMainWindow

Property	Value
QObject	
objectName	MainWindow
QWidget	
enabled	☑
geometry	[(0, 0), 320 x 240]
X	0
Y	0
Width	320
Height	240
sizePolicy	[Preferred, Preferred, 0, 0]
minimumSize	0 x 0
maximumSize	16777215 x 16777215
sizeIncrement	0 x 0
baseSize	0 x 0
palette	Customized (1 roles)
font	A [Segoe UI, 9]
cursor	Arrow

Figure: `mainwindow.ui`.

Change the Label widget's name to "labelUsername".

Change the LineEdit widget's name to "lineEditUsername".

Set the PushButton widget's minimum width to 75. Change the object's name to "pushButtonGreet".

`display_ui.py`

Type the following command into the terminal and then press `Enter`:

```
pyside6-uic mainwindow.ui -o ui_mainwindow.py
```

This will use `mainwindow.ui` to generate a class named `Ui_MainWindow` and save it into a file named `ui_mainwindow.py`.

Create a new file named "display_ui.py" in `C:/Users/%USER%/pyside6`.

Open `display_ui.py` and type the following Python code into the file:

```python
import sys

from PySide6 import QtCore, QtGui, QtWidgets

from ui_mainwindow import Ui_MainWindow


class MainWindow(QtWidgets.QMainWindow):
    def __init__(self):
        super(MainWindow, self).__init__()
        self.ui = Ui_MainWindow()
        self.ui.setupUi(self)
```

```
if __name__ == "__main__":

    app = QtWidgets.QApplication([])

    window = MainWindow()
    window.show()

    sys.exit(app.exec_())
```

Type the following command into the terminal and then press `Enter`:

```
python display_ui.py
```

This will run `display_ui.py`.

Something similar to the following will be displayed:

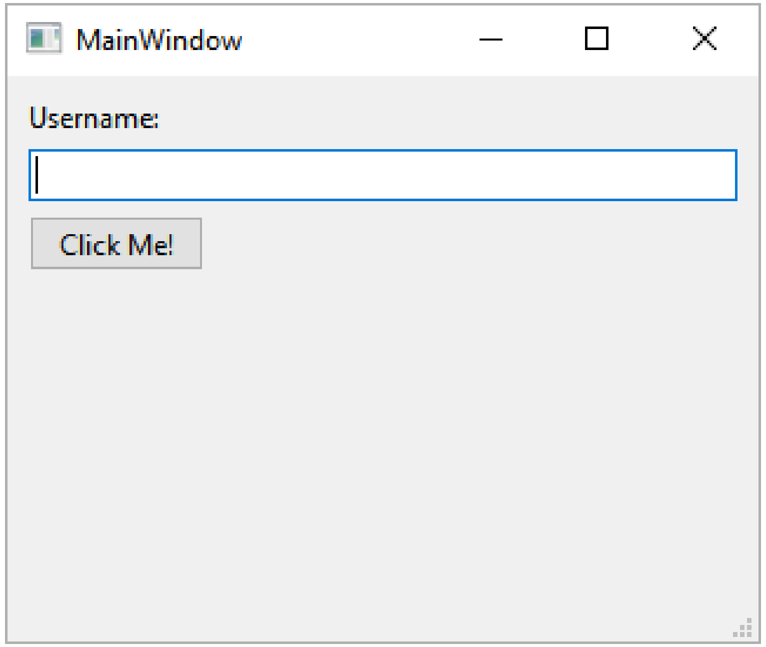


Figure: `display_ui.py`'s GUI.

Add the following Python code to `display_ui.py` 's `MainWindow` class:

```
@QtCore.Slot()
def greet(self):
    print("Hello {}!".format(self.ui.lineEditUsername.text()))
    return
```

This will define the slot `greet()` , which will display a message in the terminal when a signal connected to it is emitted.

Add the following Pythyon code to `MainWindow`'s `__init__()` member function:

```
self.ui.pushButtonGreet.clicked.connect(self.greet)
```

This will connect the `pushButtonGreet` widget's clicked `signal` to the `greet()` slot.

Type the following command into the terminal and then press `Enter`:

```
python display_ui.py
```

This will run `display_ui.py`.

Something similar to the following will be displayed:

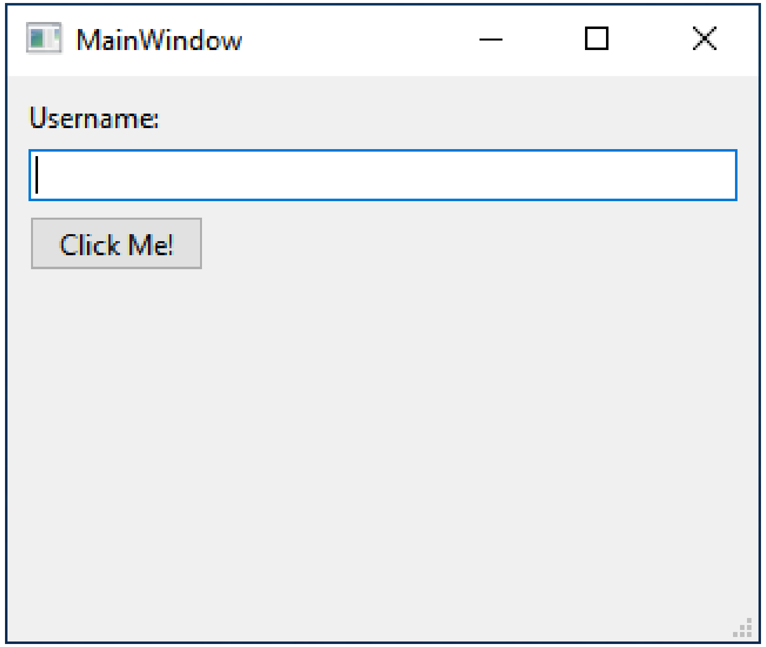


Figure: `display_ui.py`'s GUI.

Type "Bob" into the LineEdit's input.

Left click on the "Click Me!" button.

"Hello Bob!" will be displayed in the terminal.

dynamic_display_ui.py

Create a new file named "dynamic_display_ui.py" in `C:/Users/%USER%/pyside6`.

Open `dynamic_display_ui.py` and type the following Python code into the file:

```
import sys
import os

from PySide6 import QtCore, QtGui, QtWidgets
from PySide6.QtUiTools import QUiLoader
```

```python
class MainWindow(QtWidgets.QMainWindow):
    def __init__(self):
        super(MainWindow, self).__init__()
        self.ui = self.load_ui()
        self.ui.show()

    def load_ui(self):
        loader = QUiLoader()
        path = os.path.join(os.path.dirname(__file__), "mainwindow.ui")
        ui_file = QtCore.QFile(path)
        ui_file.open(QtCore.QFile.ReadOnly)
        ui = loader.load(ui_file, self)
        ui_file.close()
        return ui
```

```python
if __name__ == "__main__":

    app = QtWidgets.QApplication([])

    window = MainWindow()

    sys.exit(app.exec_())
```

Type the following command into the terminal and then press `Enter`:

```
python dynamic_display_ui.py
```

This will run `dynamic_display_ui.py`.

Something similar to the following will be displayed:

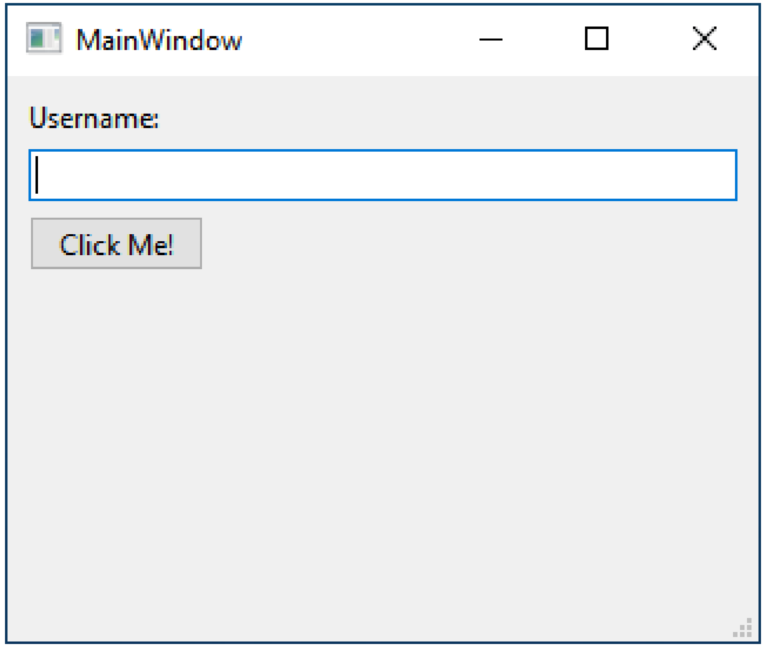


Figure: `dynamic_display_ui.py` 's GUI.

Add the following Python code to `dynamic_display_ui.py`'s `MainWindow` class:

```
@QtCore.Slot()
def greet(self):
    print("Hello {}!".format(self.ui.lineEditUsername.text()))
    return
```

This will define the slot `greet()`, which will display a message in the terminal when a signal connected to it is emitted.

Add the following Pythyon code to `MainWindow`'s `__init__()` member function:

```
self.ui.pushButtonGreet.clicked.connect(self.greet)
```

This will connect the `pushButtonGreet` widget's `clicked` signal to the `greet()` slot.

Type the following command into the terminal and then press `Enter`:

```
python dynamic_display_ui.py
```

This will run `dynamic_display_ui.py`.

Something similar to the following will be displayed:

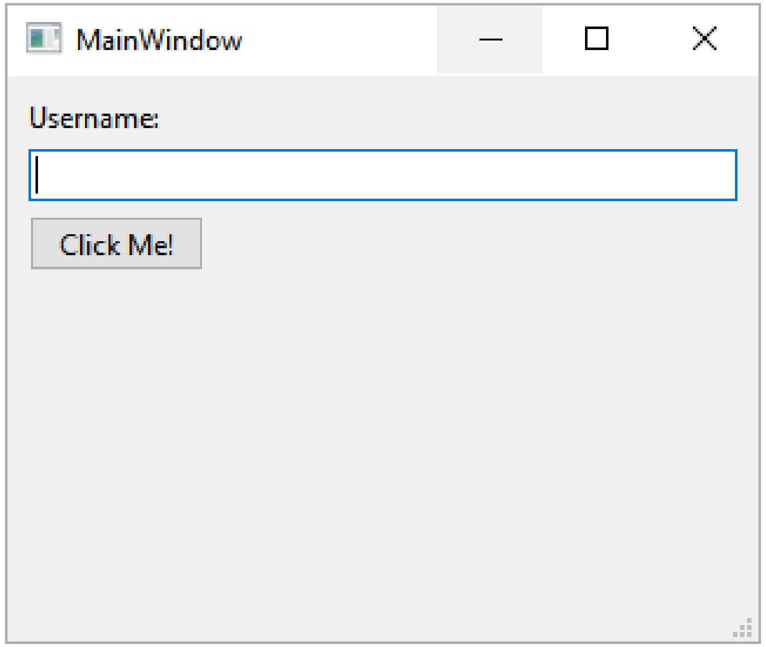


Figure: `dynamic_display_ui.py`'s GUI.

Type "Bob" into the LineEdit's input.

Left click on the "Click Me!" button.

"Hello Bob!" will be displayed in the terminal.

Conclusion

In this presentation, I have described:

- How to get started with Qt for Python.

References

1. https://doc.qt.io/qtforpython/index.html