




downloads 72k (<http://pepy.tech/project/pysimplegui>)

downloads 37k (<https://pepy.tech/project/pysimplegui27>)

downloads 50k (<https://pepy.tech/project/pysimpleguiqt>)

downloads 8k (<https://pepy.tech/project/pysimpleguiWx>)

downloads 31k (<https://pepy.tech/project/pysimpleguiWeb>)

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A badge with a dark grey background and a green border. It contains the text "docs" in white and "passing" in white on a green background.A badge with a dark grey background and a yellow border. It contains the text "Awesome meter" in white and "100" in white on a yellow background.A badge with a dark grey background and a yellow border. It contains the text "Python" in white and "2.7 3.x" in white on a yellow background.

PySimpleGUI

Supports both Python 2.7 & 3 when using tkinter

Supports both PySide2 and PyQt5 (limited support)

PySimpleGUI source code can run either on Qt, tkinter, WxPython, Web (Remi) by changing only the import statement

A badge with a dark grey background and a red border. It contains the text "PYSIMPLEGUI FOR PYTHON 3.X VERSION" in white and "3.241.0" in white on a red background.A badge with a dark grey background and a blue border. It contains the text "PYSIMPLEGUI FOR PYTHON 2.7 VERSION" in white and "1.241.0" in white on a blue background.A badge with a dark grey background and an orange border. It contains the text "PYSIMPLEGUIQT FOR PYTHON 3.X VERSION" in white and "0.22.0" in white on an orange background.A badge with a dark grey background and an orange border. It contains the text "PYSIMPLEGUIWX VERSION" in white and "0.3.0" in white on an orange background.

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PYSIMPLEGUIWEBFOR PYTHON 3.X VERSION

0.2.23.0

Announcements of Latest Developments (<https://github.com/MikeTheWatchGuy/PySimpleGUI/issues/142>)

ReadTheDocs (<http://pysimplegui.readthedocs.io/>)

COOKBOOK! (<https://pysimplegui.readthedocs.io/cookbook/>)

Brief Tutorial (<https://pysimplegui.readthedocs.io/tutorial/>)

Latest Demos and Master Branch on GitHub (<https://github.com/MikeTheWatchGuy/PySimpleGUI>)

Docs in PDF Format (<https://github.com/MikeTheWatchGuy/PySimpleGUI/tree/master/docs>)

Run live in a web browser using repl.it! (<https://repl.it/@PySimpleGUI/PySimpleGUIWeb-Demos>)

Super-simple GUI to use... Powerfully customizable

Home of the 1-line custom GUI & 1-line progress meter

The native GUI framework for perfectionists with deadlines

Actively developed and supported (It's 2019 and still going strong)

Note regarding Python versions

As of 9/25/2018 **both Python 3 and Python 2.7 are supported!** The Python 3 version is named

`PySimpleGUI`. The Python 2.7 version is `PySimpleGUI27`. They are installed separately and the imports are different. See instructions in Installation section for more info.

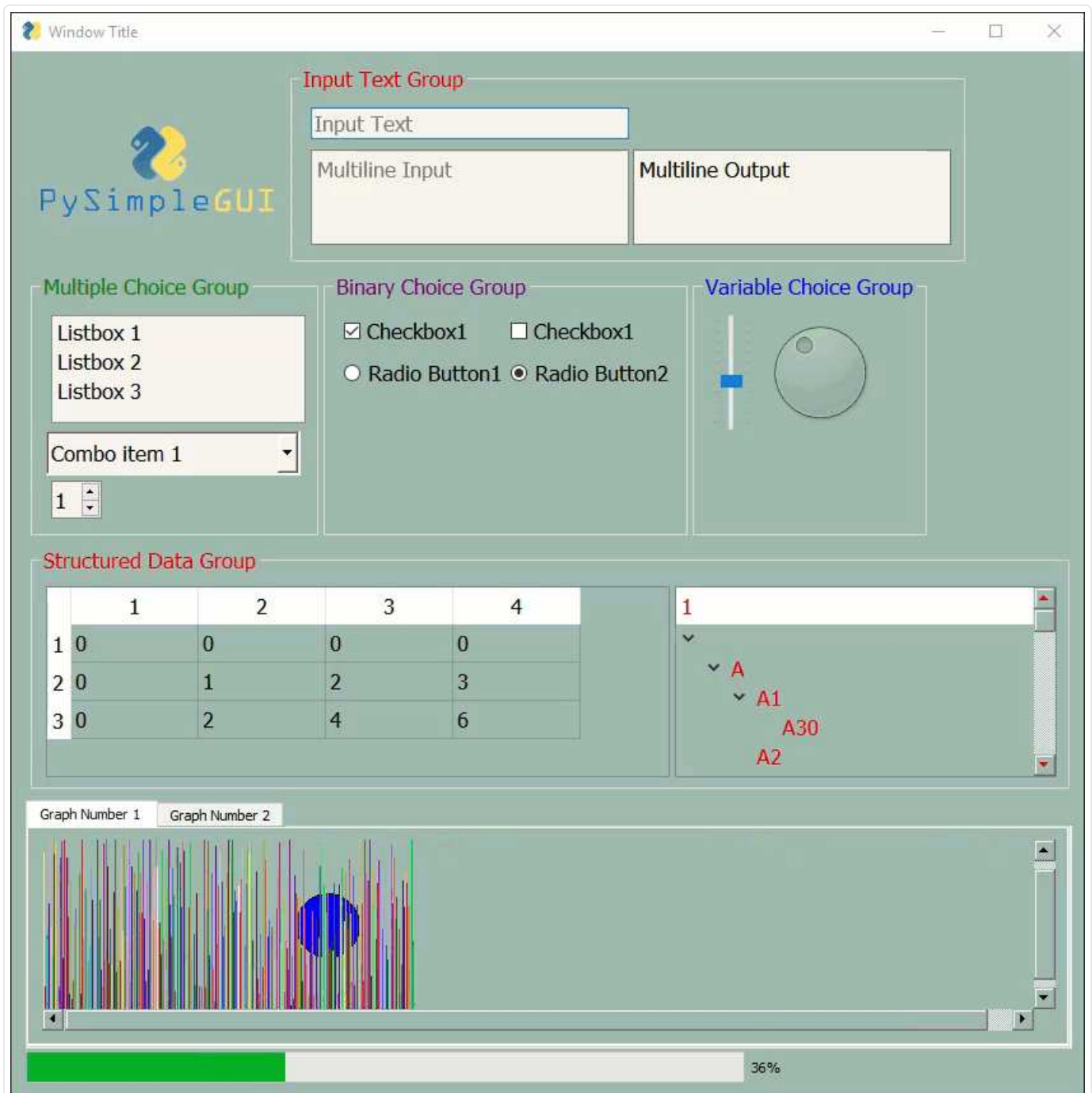
Qt Version

Github

Check out the new PySimpleGUI port to the Qt GUI Framework. You can learn more on the PySimpleGUIQt GitHub site (<https://github.com/MikeTheWatchGuy/PySimpleGUI/tree/master/PySimpleGUIQt>). **There is a separate Readme file for the Qt version** that you'll find there.

Give it a shot if you're looking for something a bit more "modern". PySimpleGUIQt is currently in Alpha. All of the widgets are operational but some may not yet be full-featured. If one is missing and your project needs it, log an Issue and you'll likely get priority support.

Here is a summary of the Qt Elements



Are there enough things on there to cover your GUI solution?

Source code compatibility

Your source code is completely portable from one platform to another by simply changing the import statement.

WxPython Version

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PySimpleGUIWx GitHub site (<https://github.com/PySimpleGUI/PySimpleGUI/tree/master/PySimpleGUIWx>).

There is a separate Readme file for the WxPython version.

Started in late December 2018 PySimpleGUIWx started with the SystemTray Icon feature. This enabled the package to have one fully functioning feature that can be used along with tkinter to provide a complete program. The System Tray feature is complete and working very well.

The Windowing code is coming together with Reads now operational which means Popups work. The elements are getting completed on a regular basis. 3 more were just checked in. At least 1 new element is getting completed a week.

Web Version (Remi)

PySimpleGUIWeb GitHub site (<https://github.com/PySimpleGUI/PySimpleGUI/tree/master/PySimpleGUIWeb>).
There is a separate Readme file for the Web version.

New for 2019, PySimpleGUIWeb. This is an exciting development! PySimpleGUI in your Web Browser!

The underlying framework supplying the web capability is the Python package Remi. <https://github.com/dddmodossola/remi> Remi provides the widgets as well as a web server for you to connect to. It's an exiting new platform to be running on and has temporarily bumped the WxPython port from the highest priority. PySimpleGUIWeb is the current high priority project.

Read on and you'll understand even more why this is an important project...

repl.it Version

Want to really get your mind blown? Check out this PySimpleGUI program (<https://repl.it/@PySimpleGUI/PySimpleGUIWeb-Demos>) running in your web browser.

Thanks to the magic of repl.it and Remi it's possible to run PySimpleGUI code in a browser window without having Python running on your computer.


The programs you write using repl.it will automatically download and install the latest PySimpleGUIWeb from PyPI onto a virtual Python environment. All that is required is to type `import PySimpleGUIWeb` you'll have a Python environment up and running with the latest PyPI release of PySimpleGUIWeb.

This is an exciting new development that's opening up all kinds of possibilities for new ways to program and learn PySimpleGUI. Stayed tuned, much more to be posted about this in the near future.

Educators in particular should be interested. Students can not only post their homework easily for their teacher to access, but teachers can also run the students programs online. No downloading needed. Run it and check the results.

Depending on how you're viewing this document, you may or may not see an embedded browser window below that is running PySimpleGUI code.

loading ...

open in 

main.py

history

```

size=(30,1)),
33 [sg.Multiline('Multiline Input', do_not_clear=True, size=(40,4)
enable_events=True)],
34 [sg.MultilineOutput('Multiline Output', size=(80,8), key='_MUL
font='Courier 12')],
35 [sg.Checkbox('Checkbox 1', enable_events=True, key='_CB1_'), sg
('Checkbox 2', default=True, enable_events=True, key='_CB2_')],

```

https://PySimpleGUIWeb-Demos--pysir

Python 3.6.1 (default, Dec 2015, 13:0

[GCC 4.8.2] on linux

172.18.0.1 - - [19/Mar/2019 08:12:50

[0m

LIST {0: '', 1: '', 1:

LIST {0: '', 1: '', 1:

LIST {0: '', 1: '', 1:

SLIDER {0: '', 1: '', 1:

SLIDER {0: '', 1: '', 1:

A new version of repl.it is available, [click here to reload.](#)

Support

PySimpleGUI is an active project. Bugs are fixed, features are added, often. Should you run into trouble, open an issue on the GitHub site and you'll receive help by someone in the community. It's very early in the port however with MANY more Elements left to implement. 3 down, 20-something to go.


Platforms

It's surprising that Python GUI code is completely cross platform from Windows to Mac to Linux. No source code changes. This is true for both PySimpleGUI and PySimpleGUIQt.

However, **Macs** suck. They suck on tkinter in particular. The "Look and feel" calls are disabled for Macs. Colored buttons in particular are broken. Not in the PySimpleGUI code, of course. It's mostly because Macs suck. Consider using Qt instead of tkinter on the Mac. Or, if using tkinter, bring your own button images.

Looking for a GUI package? Are you

- looking to take your Python code from the world of command lines and into the convenience of a GUI? *
- sitting on a Raspberry **Pi** with a touchscreen that's going to waste because you don't have the time to learn a GUI SDK?
- into Machine Learning and are sick of the command line?
- wanting to distribute your Python code to Windows users as a single .EXE file that launches straight into a GUI, much like a WinForms app?
- would like to run a program in the system tray?
- a teacher wanting to teach your students how to program using a GUI?

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19/03/2019 à 14:50

- a student that wants to put a GUI onto their project?
- looking for an active project?

Look no further, **you've found your GUI package.**

```
import PySimpleGUI as sg

sg.Popup('Hello From PySimpleGUI!', 'This is the shortest GUI program ever!')
```



Or how about a **custom GUI** in 1 line of code?

```
import PySimpleGUI as sg

event, (filename,) = sg.Window('Get filename example').Layout([[sg.Text('Filename')], [sg.In
```



Build beautiful customized windows that fit your specific problem. Let PySimpleGUI solve your GUI problem while you solve your real problems. Look through the Cookbook, find a matching recipe, copy, paste, run within minutes. This is the process PySimpleGUI was designed to facilitate.

Your windows don't have to look like "boring" old windows. Add a few custom graphics to your windows to polish things up.



Batter Up!



Pitcher: Robert Frost

ODDS

Hit20-1

Out2-1✓

Walk1-2

Batter: Truman Capote

ODDS

Hit20-1✓

Out2-1

Walk1-2

Credits Available
0

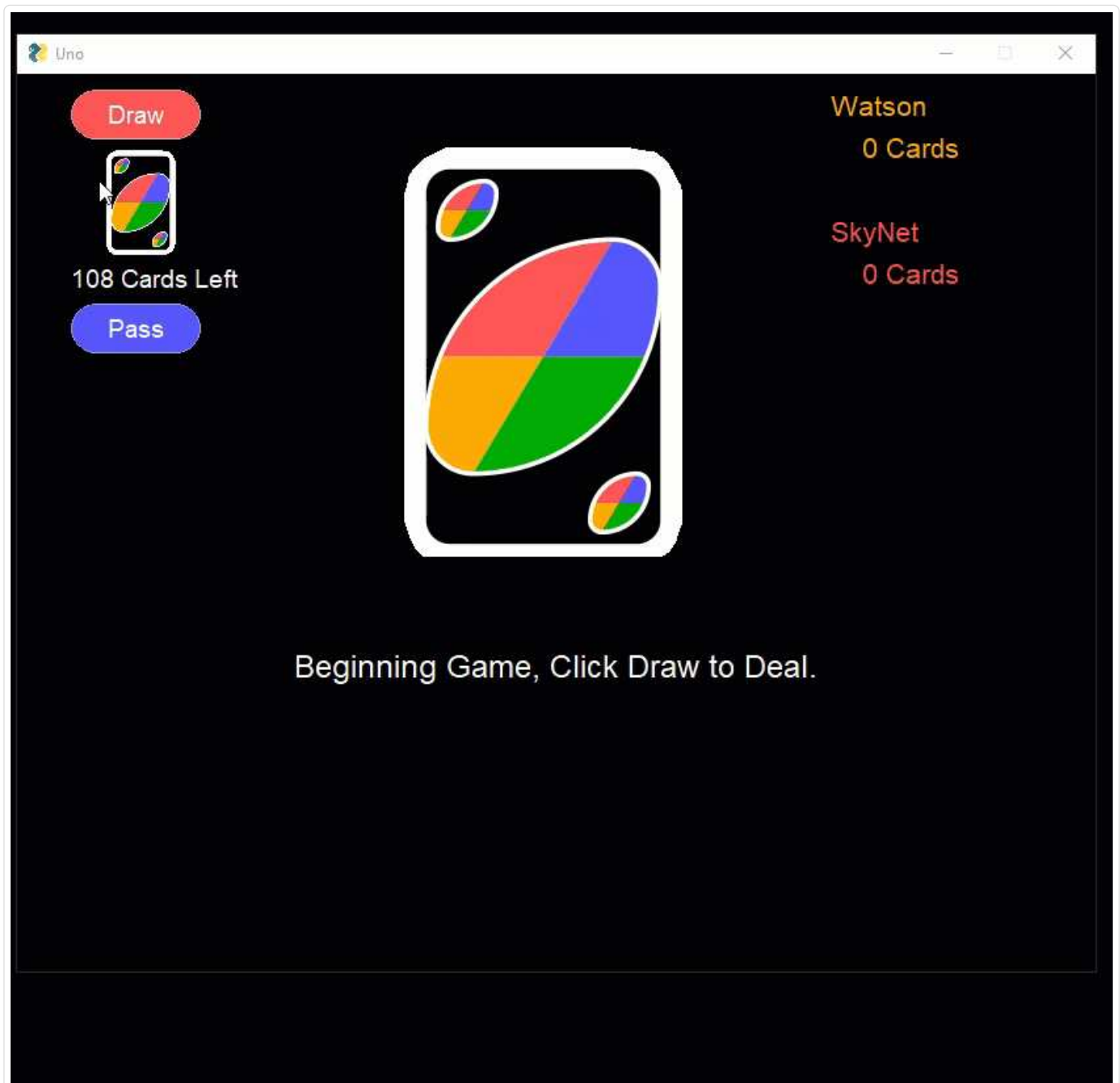
PLACE YOUR BET 

0
WIN!

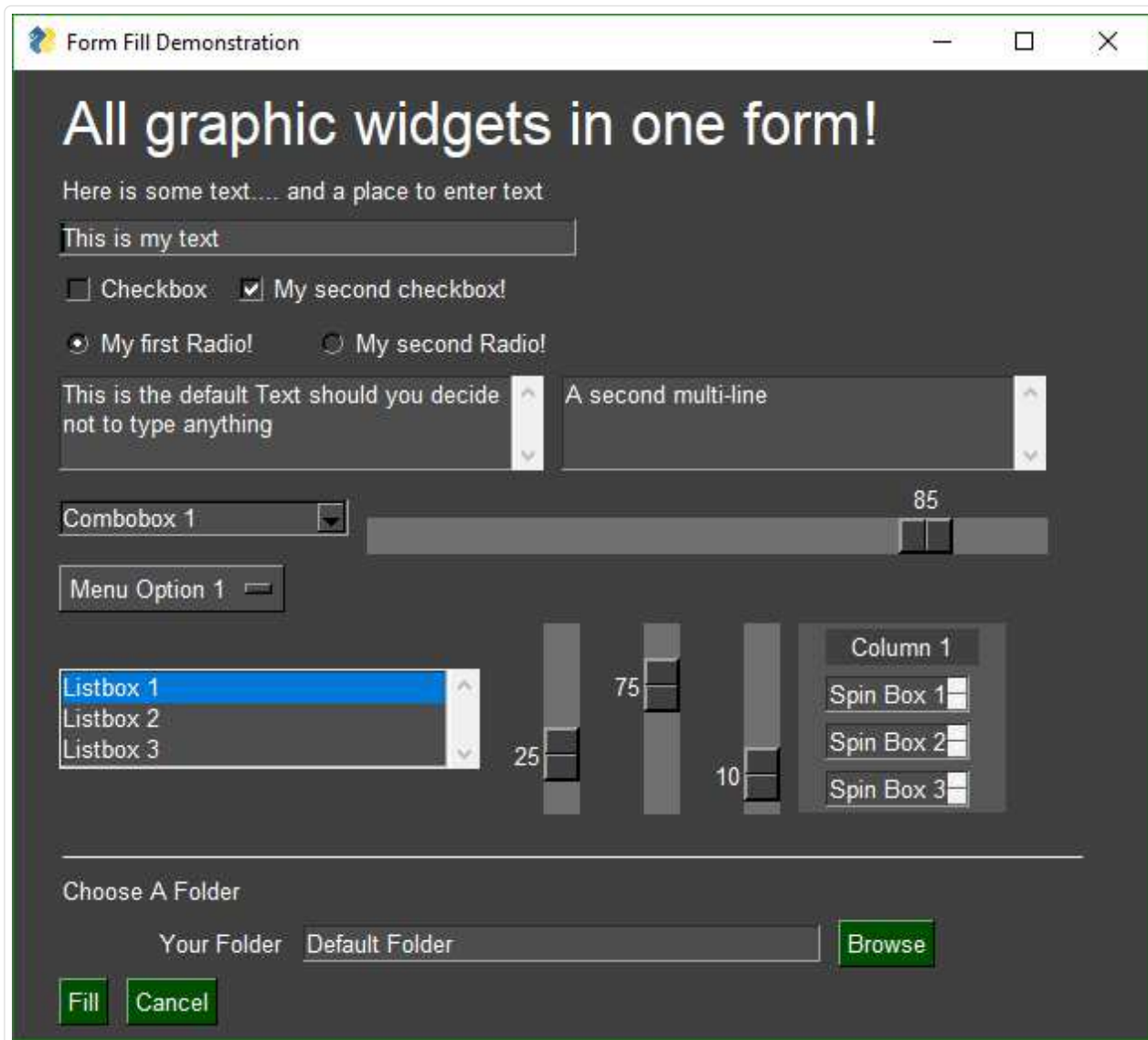
0
BET

0
LOSE!

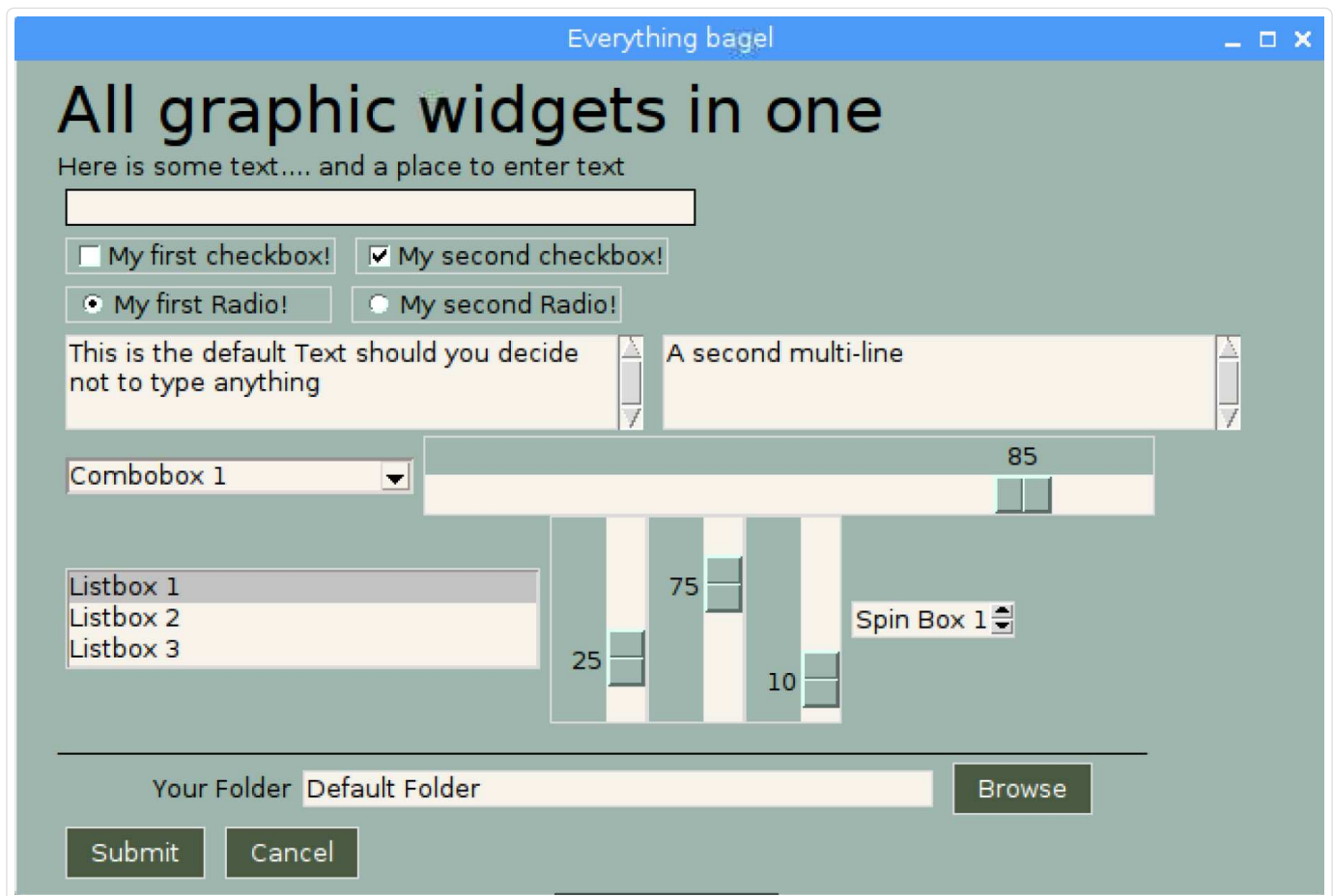




PySimpleGUI wraps tkinter or Qt so that you get all the same widgets as you would tkinter/Qt, but you interact with them in a more friendly way. It does the layout and boilerplate code for you and presents you with a simple, efficient interface.

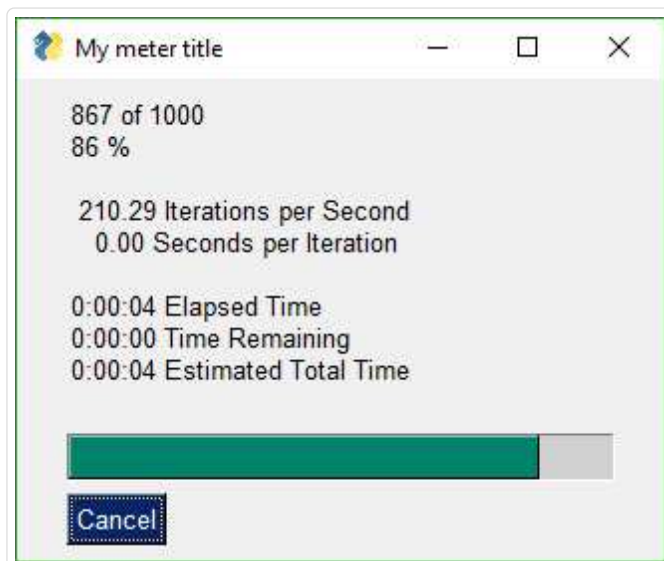


Perhaps you're looking for a way to interact with your **Raspberry Pi** in a more friendly way. The same for shown as on Pi (roughly the same)



In addition to a primary GUI, you can add a Progress Meter to your code with ONE LINE of code. Slide this line into any of your `for` loops and get a nice meter:

```
OneLineProgressMeter('My meter title', current_value, max_value, 'key')
```



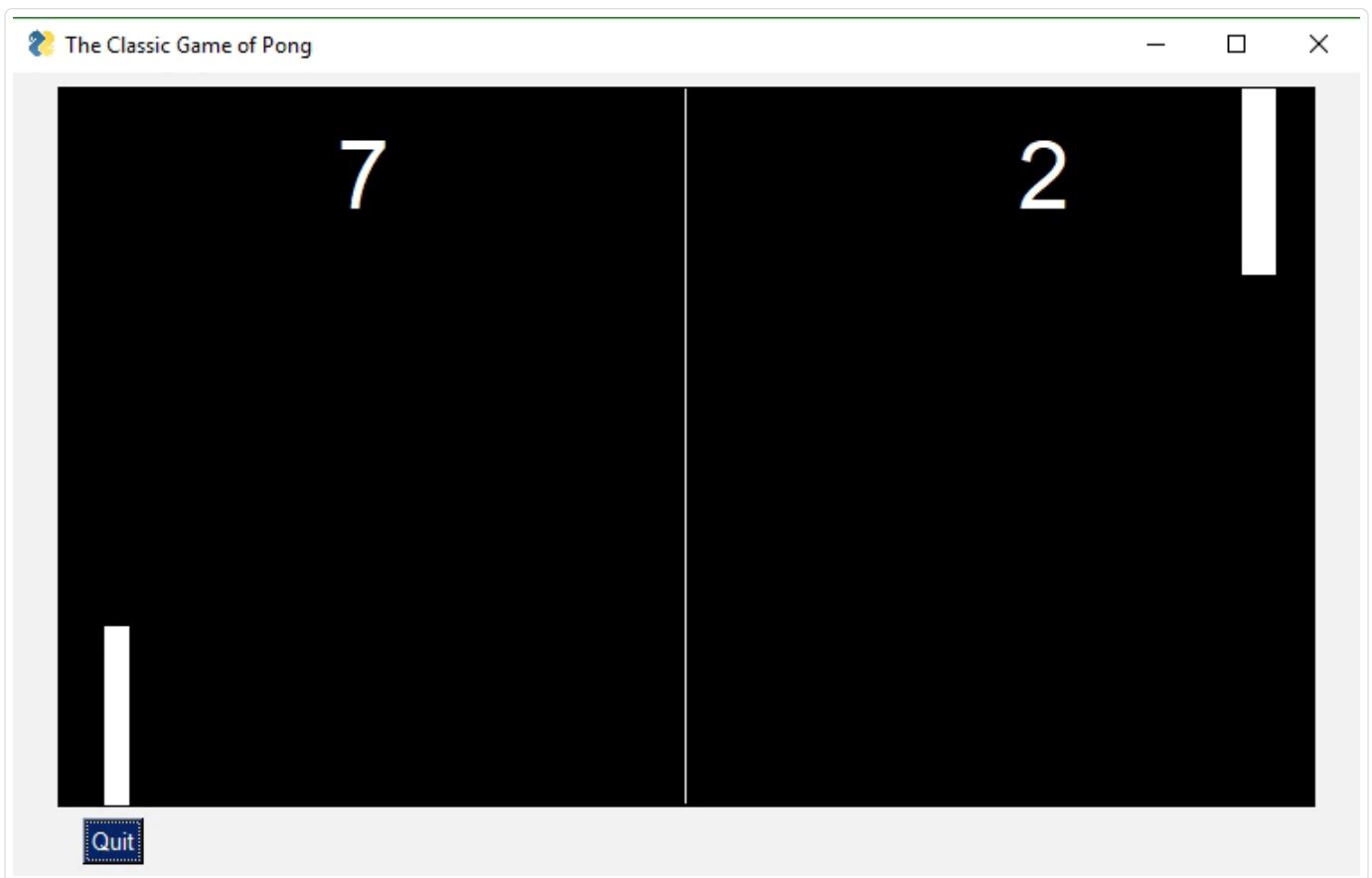
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It's simple to show animated GIFs.

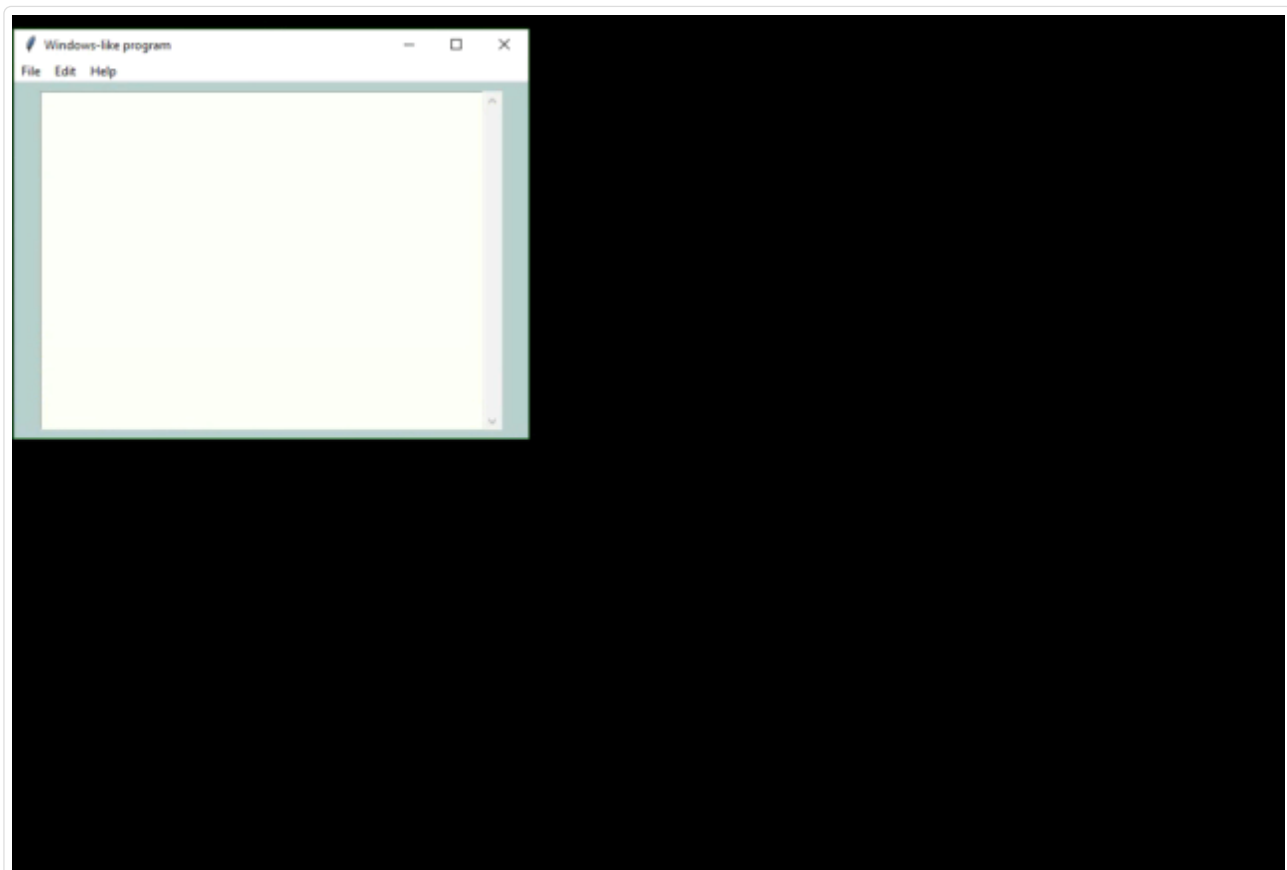
!loading animationYou can build an async media player GUI with custom buttons in 30 lines of code.

○

How about embedding a game inside of a GUI? This game of Pong is written in tkinter and then dropped into the PySimpleGUI window creating a game that has an accompanying GUI.



Combining PySimpleGUI with PyInstaller creates something truly remarkable and special, a Python program that looks like a Windows WinForms application. This application with working menu was created in 20 lines of Python code. It is a single .EXE file that launches straight into the screen you see. And more good news, the only icon you see on the taskbar is the window itself... there is no pesky shell window.



Background

I was frustrated by having to deal with the dos prompt when I had a powerful Windows machine right in front of me. Why is it SO difficult to do even the simplest of input/output to a window in Python??

There are a number of 'easy to use' Python GUIs, but they were too limited for my requirements. PySimpleGUI aims for the same simplicity found in packages like `EasyGUI` and `WxSimpleGUI`, both really handy but limited, and adds the ability to define your own layouts. This ability to make your own windows using a large palette of widgets is but one difference between the existing "simple" packages and `PySimpleGUI`.

With a simple GUI, it becomes practical to "associate" .py files with the python interpreter on Windows. Double click a py file and up pops a GUI window, a more pleasant experience than opening a dos Window and typing a command line.

The `PySimpleGUI` package is focused on the *developer*.

Create a custom GUI with as little and as simple code as possible.

This was the primary focus used to create PySimpleGUI.

"Do it in a Python-like way"

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was the second.

Features

While simple to use, PySimpleGUI has significant depth to be explored by more advanced programmers. The feature set goes way beyond the requirements of a beginner programmer, and into the required features needed for complex GUIs.

Features of PySimpleGUI **include:**

Support **for** Python versions 2.7 and 3

Text

Single **Line Input**

Buttons including these types:

- File Browse**
- Files **Browse**
- Folder **Browse**
- SaveAs
- Non-closing **return**
- Close window**
- Realtime
- Calendar chooser
- Color chooser
- Button Menu

Checkboxes

Radio Buttons

Listbox

Option Menu

Menubar

Button Menu

Slider

Dial

Graph

Frame with title

Icons

Multi-**line** Text **Input**

Scroll-able Output

Images

Tables

Trees

Progress Bar Async/Non-Blocking Windows

Tabbed windows

Paned windows

Persistent Windows

Redirect Python Output/Errors to scrolling **window**

'Higher level' APIs (**e.g.** MessageBox, YesNobox, ...)

Single-**Line**-Of-Code Proress Bar & Debug **Print**

Complete control of colors, look and feel

Selection of pre-defined palettes

Button images

Horizontal and Verticle Separators

Return values **as** dictionary

Set focus

Bind **return** key to buttons

Group widgets into a column and place into **window** anywhere

Scrollable columns

Keyboard low-level key **capture**

Mouse scroll-wheel support

Get Listbox values **as** they are selected

Get slider, spinner, combo **as** they are changed

Update elements **in** a live **window**

Bulk **window**-fill operation

Save / Load **window** to/from disk

Borderless (**no** titlebar) windows

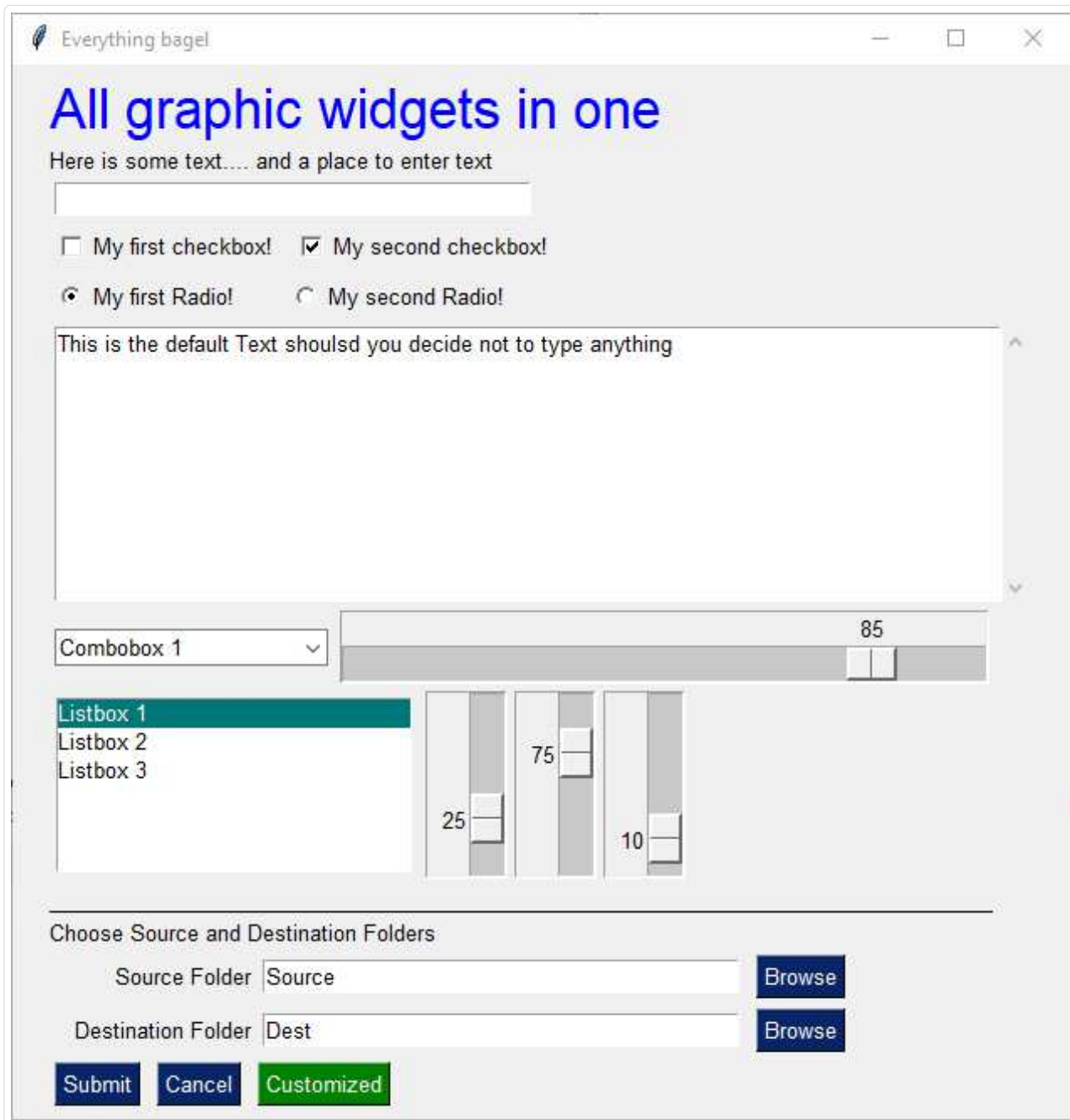
Always **on** top windows

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```
Menus with ALT-hotkey
Right click pop-up menu
Tooltips
Clickable links
Transparent windows
Movable windows
Animated GIFs
No async programming required (no callbacks to worry about)
```

An example of many widgets used on a single window. A little further down you'll find the 21 lines of code required to create this complex window. Try it if you don't believe it. Install PySimpleGUI then :

Start Python, copy and paste the code below into the >>> prompt and hit enter.
This will pop up...



```
import PySimpleGUI as sg

layout = [[sg.Text('All graphic widgets in one window!', size=(30, 1), font=("Helvetica", 25)),
           [sg.Text('Here is some text.... and a place to enter text')],
           [sg.InputText()],
           [sg.Checkbox('My first checkbox!'), sg.Checkbox('My second checkbox!', default=True)],
           [sg.Radio('My first Radio!', "RADIO1", default=True), sg.Radio('My second Radio!', "RADIO2", default=True)],
           [sg.Multiline(default_text='This is the default Text should you decide not to type anything',
                           size=(10, 10))],
           [sg.InputCombo(['Combobox 1', 'Combobox 2'], size=(20, 3)),
            sg.Slider(range=(1, 100), orientation='h', size=(35, 20), default_value=85)],
           [sg.ListBox(values=['Listbox 1', 'Listbox 2', 'Listbox 3'], size=(30, 6)),
            sg.Slider(range=(1, 100), orientation='v', size=(10, 20), default_value=25),
            sg.Slider(range=(1, 100), orientation='v', size=(10, 20), default_value=75),
            sg.Slider(range=(1, 100), orientation='v', size=(10, 20), default_value=10)],
           [sg.Text('_' * 100, size=(70, 1))],
           [sg.Text('Choose Source and Destination Folders', size=(35, 1))],
           [sg.Text('Source Folder', size=(15, 1), auto_size_text=False, justification='right'), sg.InputText(),
            sg.FolderBrowse()],
           [sg.Text('Destination Folder', size=(15, 1), auto_size_text=False, justification='right'), sg.InputText(),
            sg.FolderBrowse()],
           [sg.Submit(), sg.Cancel(), sg.Button('Customized', button_color=('white', 'green'))]]

event, values = sg.Window('Everything bagel', auto_size_text=True, default_element_size=(40, 20)).get_event_value(), sg.Window('Everything bagel').get_values()
```

Design Goals

Copy, Paste, Run.

PySimpleGUI's goal with the API is to be easy on the programmer, and to function in a Python-like way. Since GUIs are visual, it was desirable for the code to visually match what's on the screen. By providing a significant amount of documentation and an easy to use Cookbook, it's possible to see your first GUI within 5 minutes of beginning the installation.

Be Pythonic

Be Pythonic... Attempted to use language constructs in a natural way and to exploit some of Python's interesting features. Python's lists and optional parameters make PySimpleGUI work smoothly.

- windows are represented as Python lists.
 - A window is a list of rows
- A row is a list of elements
- Return values are a list of button presses and input values.
- Return values can also be represented as a dictionary
- The SDK calls collapse down into a single line of Python code that presents a custom GUI and returns values
- Linear programming instead of callbacks

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Lofty Goals

Change Python

The hope is not that **this** package will become part of the Python Standard Library.

The hope is that Python will become **the** go-to language for creating GUI programs that run on Windows, Mac, and Linux *for all levels of developer*.

The hope is that beginners that are interested in graphic design will have an easy way to express themselves, right from the start of their Python experience.

There is a noticeable gap in the Python GUI solution. Fill that gap and who knows what will happen.

Maybe there's no "there there". **Or** maybe a simple GUI API will enable Python to dominate yet another computing discipline like it has so many others. This is my attempt to find out.

Getting Started with PySimpleGUI

Installing PySimpleGUI

Installing Python 3

```
pip install --upgrade PySimpleGUI
```

On some systems you need to run pip3.

```
pip3 install --upgrade PySimpleGUI
```

On a Raspberry Pi, this should work:

```
sudo pip3 install --upgrade pysimplegui
```

Some users have found that upgrading required using an extra flag on the pip `--no-cache-dir`.

```
pip install --upgrade --no-cache-dir
```

On some versions of Linux you will need to first install pip. Need the Chicken before you can get the Egg (get it... Egg?)

```
sudo apt install python3-pip
```

If for some reason you are unable to install using `pip`, don't worry, you can still import PySimpleGUI by downloading the file PySimpleGUI.py and placing it in your folder along with the application that is importing it.

`tkinter` is a requirement for PySimpleGUI (the only requirement). Some OS variants, such as Ubuntu, do not come with `tkinter` already installed. If you get an error similar to:

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```
ImportError: No module named tkinter
```

then you need to install `tkinter` . For python 2.7

```
sudo apt-get install python-tk
```

For python 3 `sudo apt-get install python3-tk`

More information about installing tkinter can be found here: <https://www.techinfected.net/2015/09/how-to-install-and-use-tkinter-in-ubuntu-debian-linux-mint.html>

Installing for Python 2.7

```
pip install --upgrade PySimpleGUI27
```

or

```
pip2 install --upgrade PySimpleGUI27
```

You may need to also install "future" for version 2.7

```
pip install future
```

or

```
pip2 install future
```

Python 2.7 support is relatively new and the bugs are still being worked out. I'm unsure what may need to be done to install tkinter for Python 2.7. Will update this readme when more info is available

Like above, you may have to install either pip or tkinter. To do this on Python 2.7:

```
sudo apt install python-pip
```

```
sudo apt install python-tkinter
```

Testing your installation

Once you have installed, or copied the .py file to your app folder, you can test the installation using python. At the command prompt start up Python.

Instructions for Python 2.7:

```
python
>>> import PySimpleGUI27
>>> PySimpleGUI27.main()
```

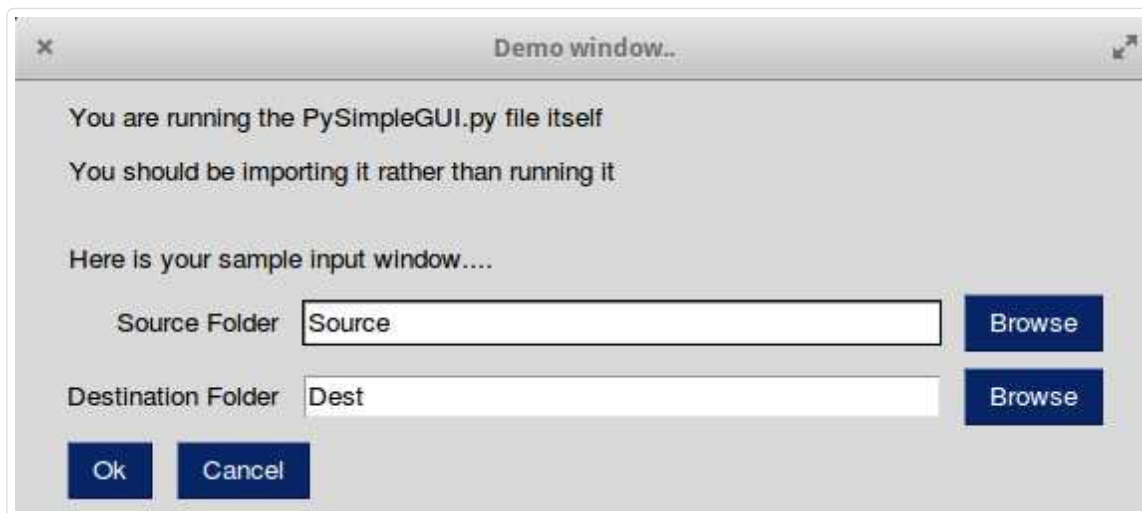
Instructions for Python 3:

```
python3
>>> import PySimpleGUI
>>> PySimpleGUI.main()
```

You will see a sample window in the center of your screen. If it's not installed correctly you are likely to get an error message during one of those commands

Here is the window you should see:

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Prerequisites

Python 2.7 or Python 3

tkinter

PySimpleGUI Runs on all Python3 platforms that have tkinter running on them. It has been tested on Windows, Mac, Linux, Raspberry Pi. Even runs on `pypy3`.

EXE file creation

If you wish to create an EXE from your PySimpleGUI application, you will need to install `PyInstaller`. There are instructions on how to create an EXE at the bottom of this ReadMe

Qt Version

Please see the Qt specific documentation. The readme that contains all you need to know about Qt specific matters is here: <https://pysimplegui.readthedocs.io/readmeqt/>

Using - Python 3

To use in your code, simply import....

```
import PySimpleGUI as sg
```

Then use either "high level" API calls or build your own windows.

```
sg.Popup('This is my first Popup')
```



Yes, it's just that easy to have a window appear on the screen using Python. With PySimpleGUI, making a custom window appear isn't much more difficult. The goal is to get you running on your GUI within **minutes**, not hours nor days.

Using - Python 2.7

Those using Python 2.7 will import a different module name

```
import PySimpleGUI27 as sg
```

Code Samples Assume Python 3

While all of the code examples you will see in this Readme and the Cookbook assume Python 3 and thus have an `import PySimpleGUI` at the top, you can run **all** of this code on Python 2.7 by changing the import statement to `import PySimpleGUI27`

APIs

PySimpleGUI can be broken down into 2 types of API's:

- * High Level single call functions (The `Popup` calls)
- * Custom window functions

Python Language Features

There are a number of Python language features that PySimpleGUI utilizes heavily for API access that should be understood...

- * Variable number of arguments to a function call
- * Optional parameters to a function call
- * Dictionaries

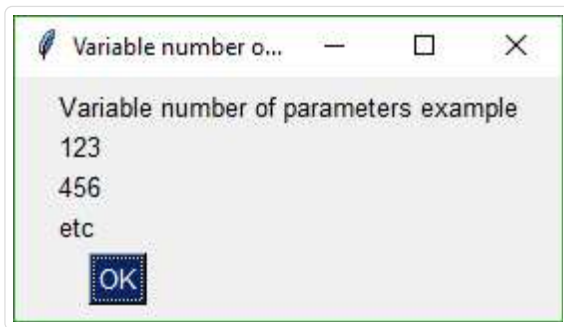
Variable Number of Arguments

The "High Level" API calls that *output* values take a variable number of arguments so that they match a "print" statement as much as possible. The idea is to make it simple for the programmer to output as many items as desired and in any format. The user need not convert the variables to be output into the strings. The PySimpleGUI functions do that for the user.

```
sg.Popup('Variable number of parameters example', var1, var2, "etc")
```

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Each new item begins on a new line in the Popup



Optional Parameters to a Function Call

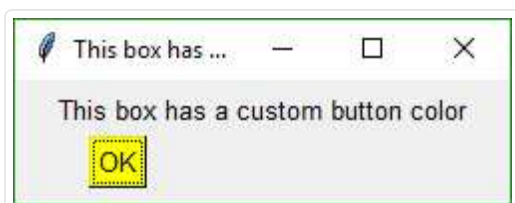
This feature of the Python language is utilized **heavily** as a method of customizing windows and window Elements. Rather than requiring the programmer to specify every possible option for a widget, instead only the options the caller wants to override are specified.

Here is the function definition for the `Popup` function. The details aren't important. What is important is seeing that there is a long list of potential tweaks that a caller can make. However, they don't *have* to be specified on each and every call.

```
def Popup(*args,
          button_color=None,
          button_type=MSG_BOX_OK,
          auto_close=False,
          auto_close_duration=None,
          icon=DEFAULT_WINDOW_ICON,
          line_width=MESSAGE_BOX_LINE_WIDTH,
          font=None):
```

If the caller wanted to change the button color to be black on yellow, the call would look something like this:

```
sg.Popup('This box has a custom button color', button_color=('black', 'yellow'))
```



Dictionaries

Dictionaries are used by more advanced PySimpleGUI users. You'll know that dictionaries are being used if you see a `key` parameter on any Element. Dictionaries are used in 2 ways:

1. To identify values when a window is read
2. To identify Elements so that they can be "updated"

High Level API Calls - Popup's

"High level calls" are those that start with "Popup". They are the most basic form of communications with the user. They are named after the type of window they create, a pop-up window. These windows are meant to be short lived while, either delivering information or collecting it, and then quickly disappearing.

Popup Output

Think of the `Popup` call as the GUI equivalent of a `print` statement. It's your way of displaying results to a user in the windowed world. Each call to `Popup` will create a new `Popup` window.

`Popup` calls are normally blocking. your program will stop executing until the user has closed the `Popup` window. A non-blocking window of `Popup` discussed in the `async` section.

Just like a `print` statement, you can pass any number of arguments you wish. They will all be turned into strings and displayed in the `popup` window.

There are a number of `Popup` output calls, each with a slightly different look (e.g. different button labels).

The list of `Popup` output functions are

```
Popup  
PopupOk  
PopupYesNo  
PopupCancel  
PopupOkCancel  
PopupError  
PopupTimed, PopupAutoClose  
PopupNoWait, PopupNonBlocking
```

The trailing portion of the function name after `Popup` indicates what buttons are shown. `PopupYesNo` shows a pair of button with Yes and No on them. `PopupCancel` has a Cancel button, etc.

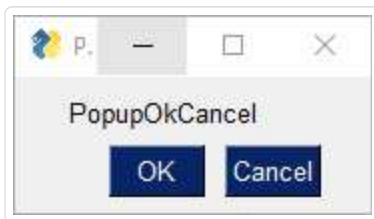
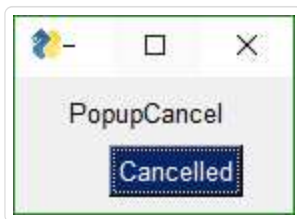
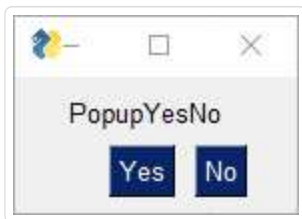
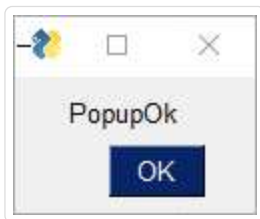
While these are "output" windows, they do collect input in the form of buttons. The `Popup` functions return the button that was clicked. If the Ok button was clicked, then `Popup` returns the string 'Ok'. If the user clicked the X button to close the window, then the button value returned is `None`.

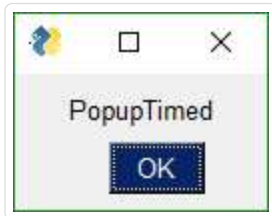
The function `PopupTimed` or `PopupAutoClose` are `popup` windows that will automatically close after come period of time.

Here is a quick-reference showing how the `Popup` calls look.

```
sg.Popup('Popup') - Shows OK button  
sg.PopupOk('PopupOk') - Shows OK button  
sg.PopupYesNo('PopupYesNo') - Shows Yes and No buttons  
sg.PopupCancel('PopupCancel') - Shows Cancelled button  
sg.PopupOkCancel('PopupOkCancel') - Shows OK and Cancel buttons  
sg.PopupError('PopupError') - Shows red error button  
sg.PopupTimed('PopupTimed') - Automatically closes  
sg.PopupAutoClose('PopupAutoClose') - Same as PopupTimed
```

 v: latest ▼





```

Popup(*args, Variable number of arguments you want to display
    button_color=None, Color of buttons (text_color, background_color)
    background_color=None, Color of background
    text_color=None, Color of text
    button_type=POPUP_BUTTONS_OK, Type of button layout
    auto_close=False, If True window will automatically close
    auto_close_duration=None, Number of seconds for autoclose
    non_blocking=False, If True returns immediately
    icon=DEFAULT_WINDOW_ICON, Icon to use on the taskbar
    line_width=None, Width of lines in characters
    font=None, Font to use for characters
    no_titlebar=False, If True no titlebar will be shown
    grab_anywhere=False, If True can move window by grabbing anywhere
    keep_on_top=False, If True window will be on top of other windows
    location=(None,None)): (x,y) coordinates to show the window

```

The other output Popups are variations on parameters. Usually the `button_type` parameter is the primary one changed.

The choices for `button_type` are:

```

POPUP_BUTTONS_YES_NO
POPUP_BUTTONS_CANCELLED
POPUP_BUTTONS_ERROR
POPUP_BUTTONS_OK_CANCEL
POPUP_BUTTONS_OK
POPUP_BUTTONS_NO_BUTTONS

```

Note that you should not call `Popup` yourself with different `button_types`. Rely on the `Popup` function named that sets that value for you. For example `PopupYesNo` will set the button type to `POPUP_BUTTONS_YES_NO` for you.

Scrolled Output

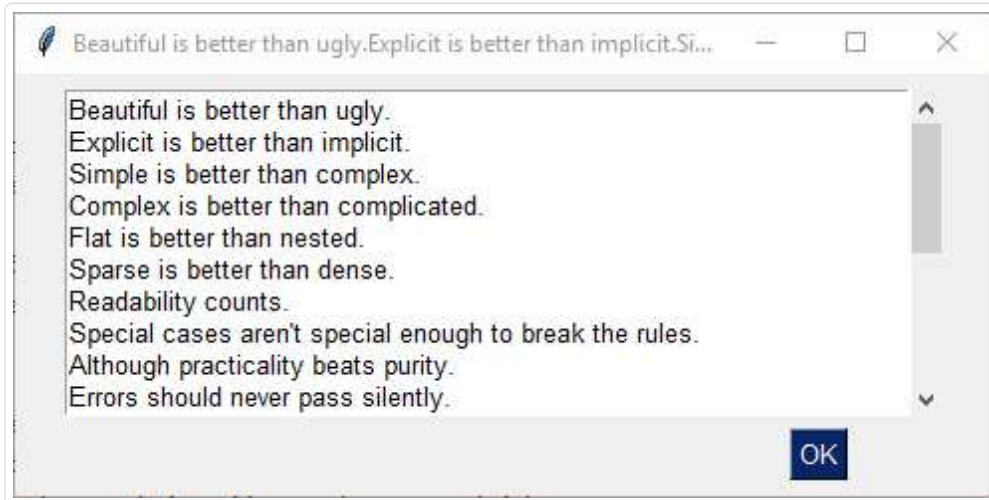
 v: latest ▼

There is a scrolled version of `Popups` should you have a lot of information to display.

```
PopupScrolled(*args, button_color=None, yes_no=False, auto_close=False, auto_close_duration=N
```

Typical usage:

```
sg.PopupScrolled(my_text)
```



The `PopupScrolled` will auto-fit the window size to the size of the text. Specify `None` in the height field of a `size` parameter to get auto-sized height.

This call will create a scrolled box 80 characters wide and a height dependent upon the number of lines of text.

```
sg.PopupScrolled(my_text, size=(80, None))
```

Note that the default max number of lines before scrolling happens is set to 50. At 50 lines the scrolling will begin.


If `non_blocking` parameter is set, then the call will not blocking waiting for the user to close the window. Execution will immediately return to the user. Handy when you want to dump out debug info without disrupting the program flow.

PopupNoWait

The `Popup` call `PopupNoWait` or `PopupNonBlocking` will create a popup window and then immediately return control back to you. All other popup functions will block, waiting for the user to close the popup window.

This function is very handy for when you're **debugging** and want to display something as output but don't want to change the programs's overall timing by blocking. Think of it like a `print` statement. There are no return values on one of these `Popups`.

Popup Input

There are `Popup` calls for single-item inputs. These follow the pattern of `Popup` followed by `Get` and then the type of item to get. There are 3 of these input `Popups` to choose from, each with settings enabling customization.  v: latest ▼

- `PopupGetText` - get a single line of text
- `PopupGetFile` - get a filename
- `PopupGetFolder` - get a folder name

Use these Popups instead of making a custom window to get one data value, call the Popup input function to get the item from the user. If you find the parameters are unable to create the kind of window you are looking for, then it's time for you to create your own window.

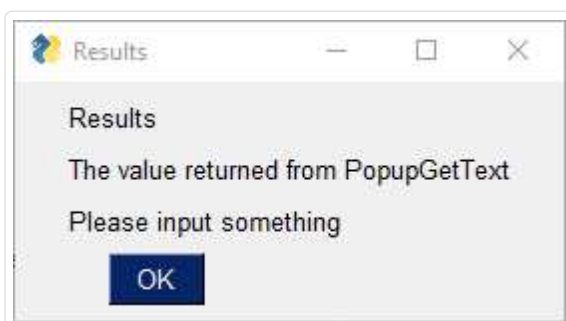
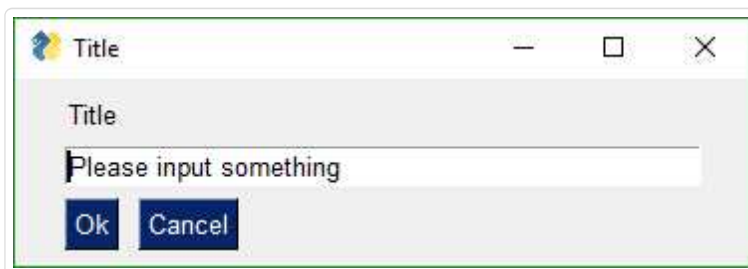
PopupGetText

Use this Popup to get a line of text from the user.

```
PopupGetText(message, The message you wish to display with the input field
               default_text='', Text to initially fill into the input field
               password_char='', Password character if this is a password field
               size=(None, None), Size of the window
               button_color=None, Color to use for buttons (foreground, background)
               background_color=None, Background color for window
               text_color=None, Text color for window
               icon=DEFAULT_WINDOW_ICON, Icon to display on taskbar
               font=None, Font to use for text
               no_titlebar=False, If True no titlebar will be shown
               grab_anywhere=False, If True can grab anywhere to move the window
               keep_on_top=False, If True window will stay on top of other windows
               location=(None, None)) Location on screen to display window
```

```
import PySimpleGUI as sg

text = sg.PopupGetText('Title', 'Please input something')
sg.Popup('Results', 'The value returned from PopupGetText', text)
```



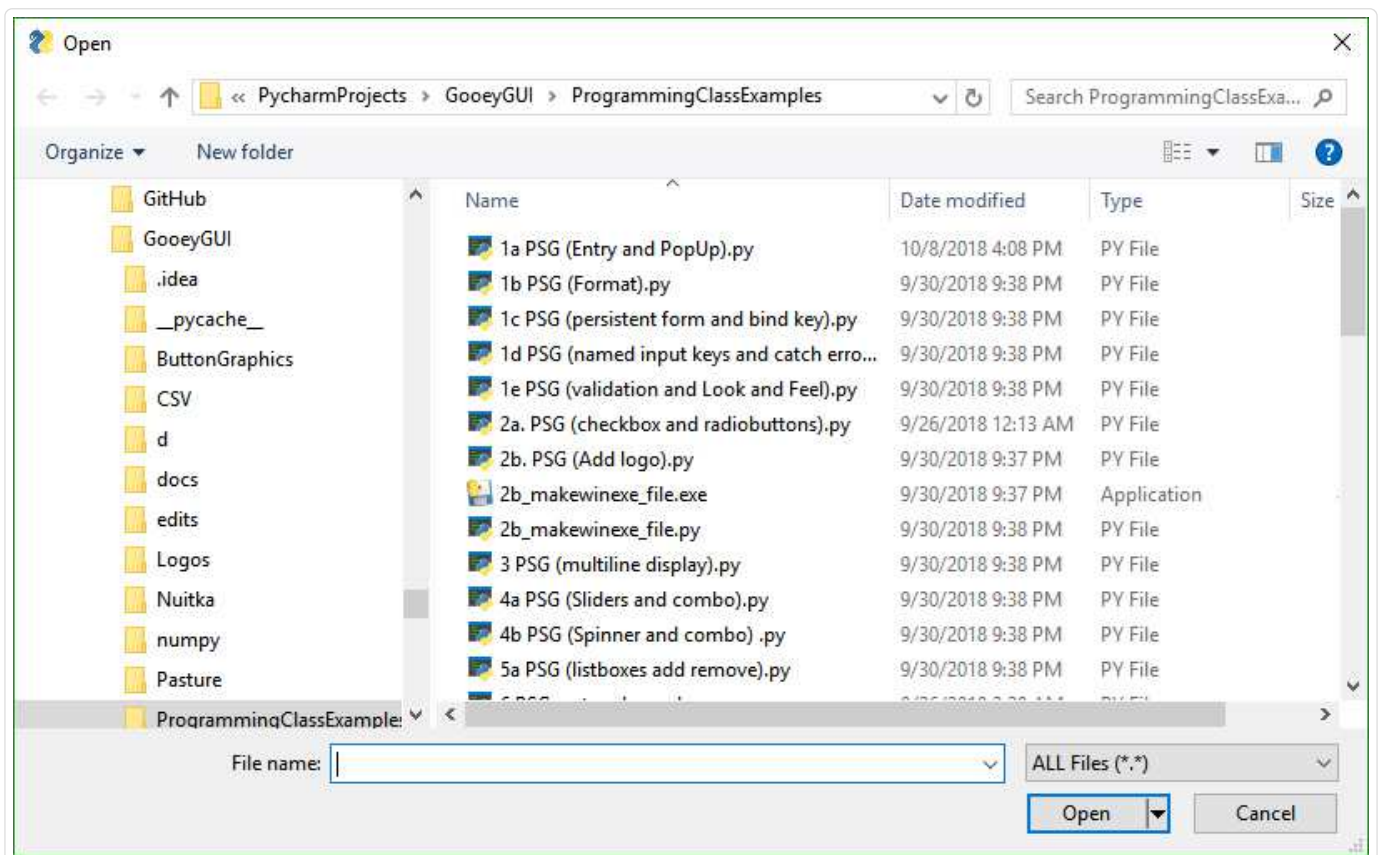
 v: latest ▼

PopupGetFile

Gets a filename from the user. There are options to configure the type of dialog box to show. Normally an "Open File" dialog box is shown

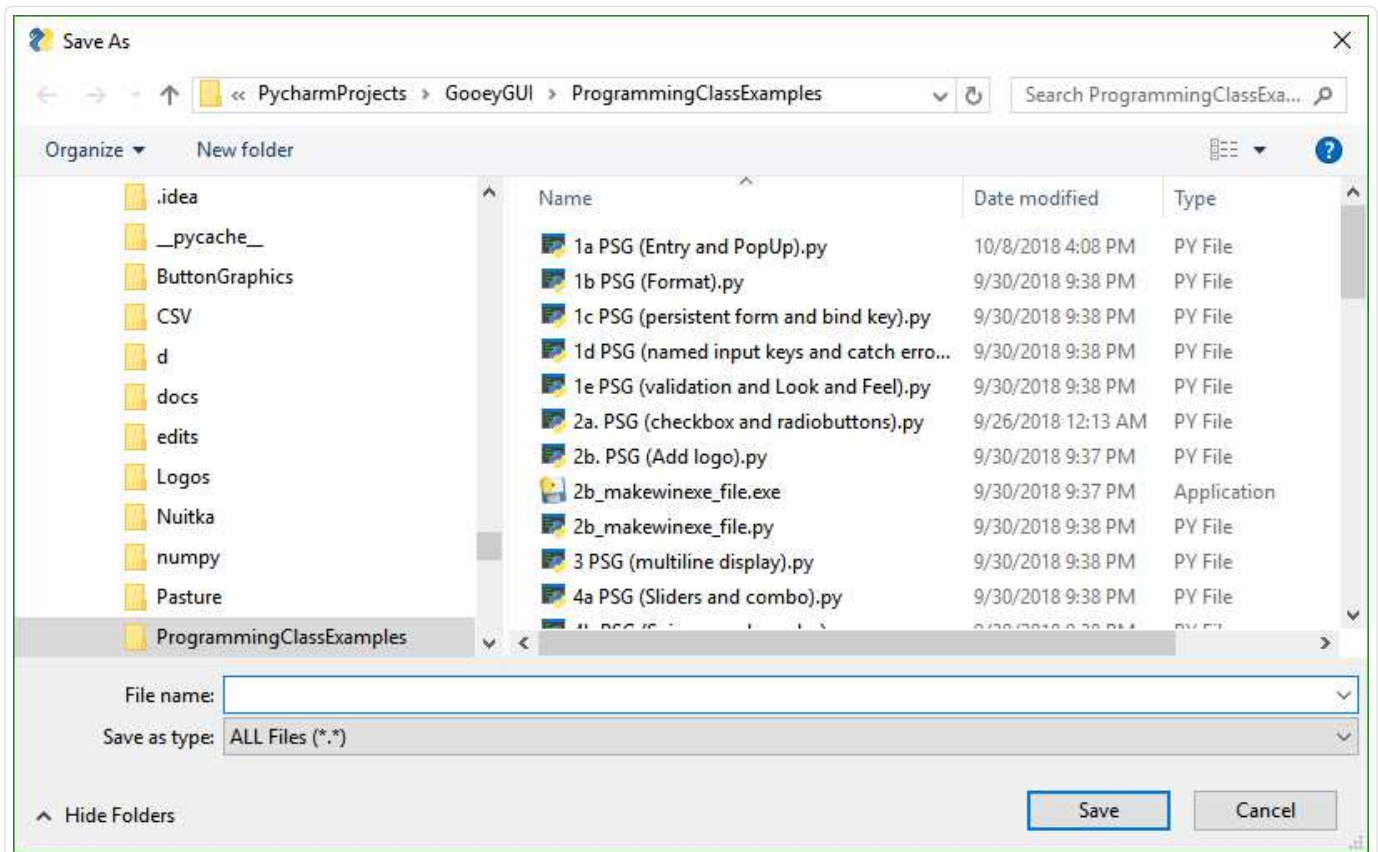
```
PopupGetFile(message, Message to show in the window
              default_path='', Path browsing should start from
              default_extension='', Which filetype is the default
              save_as=False, Determines which dialog box stype to show
              file_types=(("ALL Files", "*..*"),), Which filetypes are displayed
              no_window=False, if True no window is displayed except the dialog box
              size=(None, None), Size of window
              button_color=None, Color of buttons
              background_color=None, Color of window background
              text_color=None, Color of text in window
              icon=DEFAULT_WINDOW_ICON, Icon to show on taskbar
              font=None, Font to use
              no_titlebar=False, If True does not display a titlebar
              grab_anywhere=False, if True can grab window anywhere to move it
              keep_on_top=False, if True window will be on top of others
              location=(None, None)) Location on screen to show window
```

If configured as an Open File Popup then (save_as is not True) the dialog box will look like this



If you set the parameter save_As to True, then the dialog box looks like this:

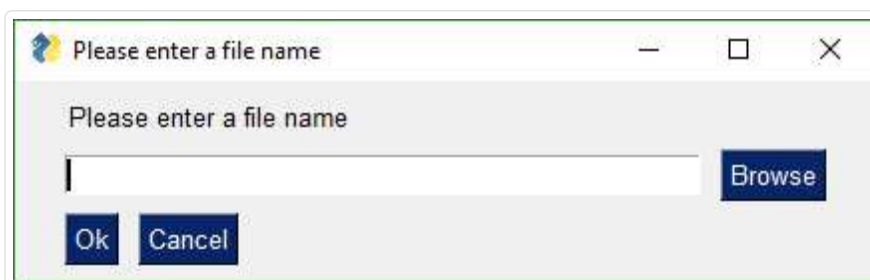
 v: latest ▼



If you choose a filename that already exists, you'll get a warning popup box asking if it's OK. You can also specify a file that doesn't exist. With an "Open" dialog box you cannot choose a non-existing file.

A typical call produces this window.

```
text = sg.PopupGetFile('Please enter a file name')
sg.Popup('Results', 'The value returned from PopupGetFile', text)
```



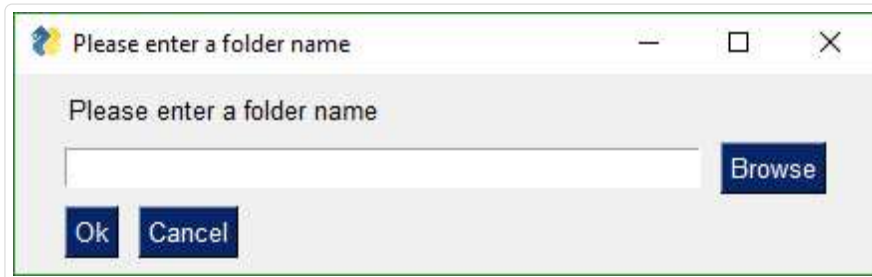
PopupGetFolder

The window created to get a folder name looks the same as the get a file name. The difference is in what the browse button does. `PopupGetFile` shows an Open File dialog box while `PopupGetFolder` shows an Open Folder dialog box.

```
PopupGetFolder(message, Message to display in window
                default_path='', Path to start browsing
                no_window=False, If True no window will be shown
                size=(None,None), Size of window
                button_color=None, Color of buttons
                background_color=None, Background color of window
                text_color=None, Color of window text
                icon=DEFAULT_WINDOW_ICON, Icon to show on taskbar
                font=None, Font to use for window
                no_titlebar=False, If True no titlebar will be shown
                grab_anywhere=False, If True can grab anywhere on window to move
                keep_on_top=False, If True window will be on top
                location=(None, None)) Location on screen to create window
```

This is a typical call

```
text = sg.PopupGetFolder('Please enter a folder name')
sg.Popup('Results', 'The value returned from PopupGetFolder', text)
```



PopupAnimated



The animated Popup enables you to easily display a "loading" style animation specified through a GIF file that is either stored in a file or a base64 variable.

```
def PopupAnimated(image_source,
                  message=None,
                  background_color=None,
                  text_color=None,
                  font=None,
                  no_titlebar=True,
                  grab_anywhere=True,
                  keep_on_top=True,
                  location=(None, None),
                  alpha_channel=.8,
                  time_between_frames=0)
```

`image_source` - The GIF file specified as a string filename or a base64 variable
`message` - optional text message to be displayed under the animation
`background_color` - the background color to use for the window and all of the other parts of the window
`text_color` - color to use for optional text
`font` - font to use for the optional text
`no_titlebar` - no titlebar window setting
`location` - location to show the window
`alpha_channel` - alpha channel to use for the window
`time_between_frames` - amount of time in milliseconds to use between frames

To close animated popups, call `PopupAnimated` with `image_source=None`. This will close all of the currently open `PopupAnimated` windows.

Progress Meters!

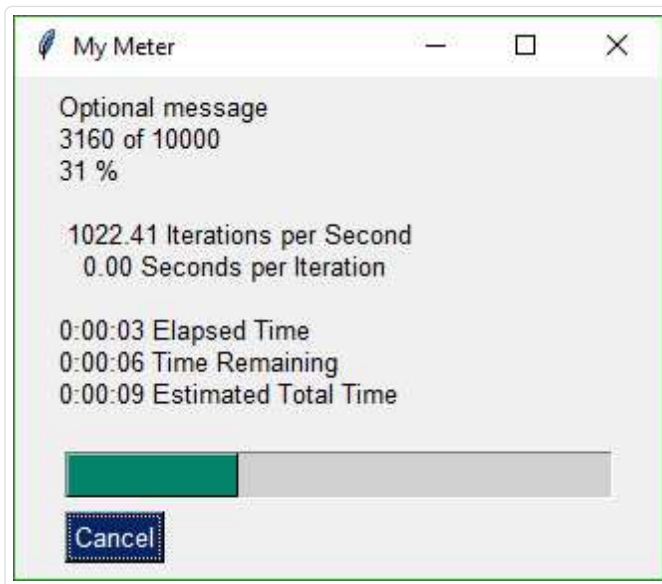
We all have loops in our code. Isn't it joyful waiting, watching a counter scrolling past in a text window? How about one line of code to get a progress meter, that contains statistics about your code?

```
OneLineProgressMeter(title,
                     current_value,
                     max_value,
                     key,
                     *args,
                     orientation=None,
                     bar_color=DEFAULT_PROGRESS_BAR_COLOR,
                     button_color=None,
                     size=DEFAULT_PROGRESS_BAR_SIZE,
                     border_width=DEFAULT_PROGRESS_BAR_BORDER_WIDTH):
```

Here's the one-line Progress Meter in action!

```
for i in range(1,10000):
    sg.OneLineProgressMeter('My Meter', i+1, 10000, 'key','Optional message')
```

That line of code resulted in this window popping up and updating.



A meter AND fun statistics to watch while your machine grinds away, all for the price of 1 line of code. With a little trickery you can provide a way to break out of your loop using the Progress Meter window. The cancel button results in a `False` return value from `OneLineProgressMeter`. It normally returns `True`.

Be sure and add one to your loop counter so that your counter goes from 1 to the max value. If you do not add one, your counter will never hit the max value. Instead it will go from 0 to max-1.

Debug Output

Another call in the 'Easy' families of APIs is `EasyPrint`. It will output to a debug window. If the debug window isn't open, then the first call will open it. No need to do anything but stick a 'print' call in your code. You can even replace your 'print' calls with calls to `EasyPrint` by simply sticking the statement

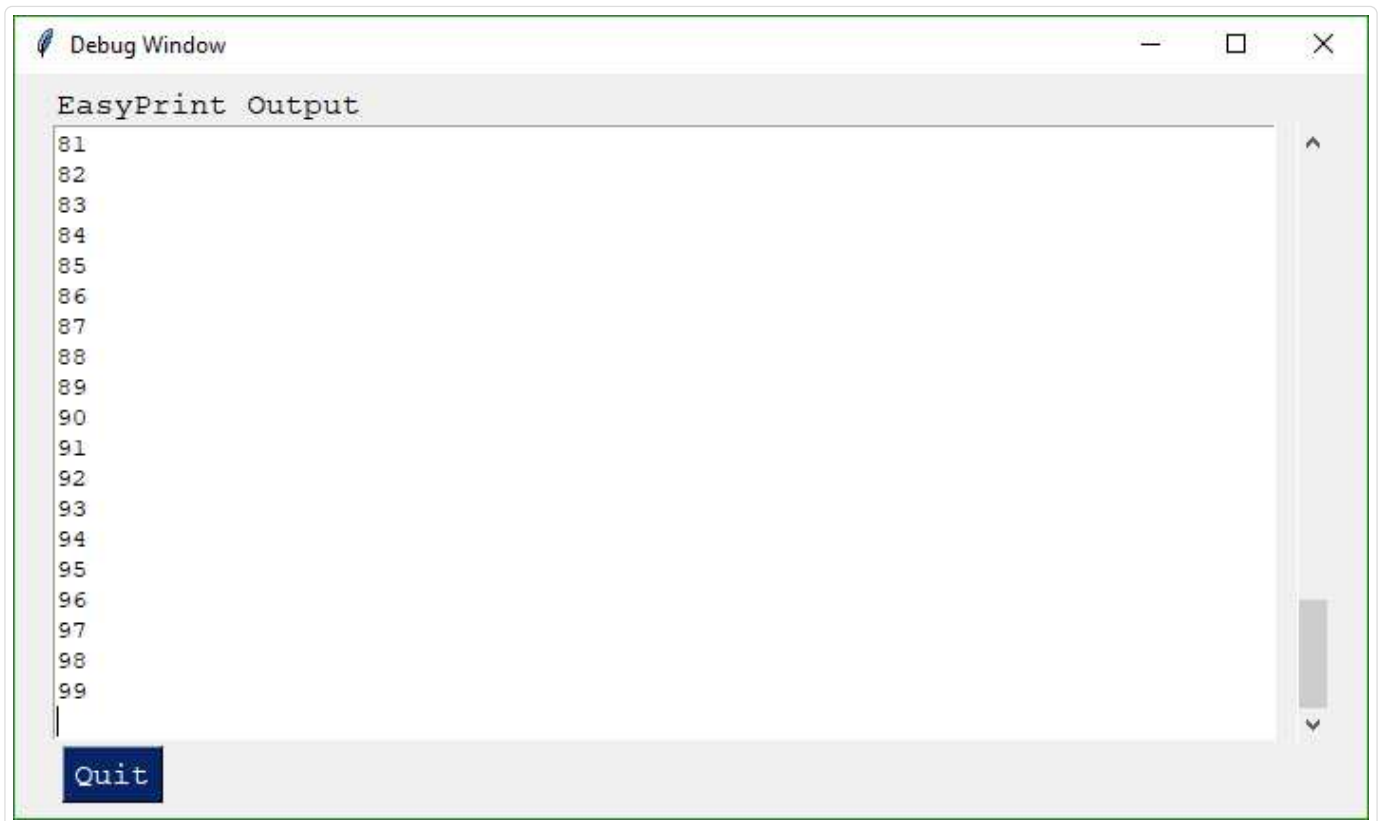
```
print = sg.EasyPrint
```

at the top of your code.

There are a number of names for the same `EasyPrint` function. `Print` is one of the better ones to use as it's easy to remember. It is simply `print` with a capital P.

```
import PySimpleGUI as sg

for i in range(100):
    sg.Print(i)
```



Or if you didn't want to change your code:

```
import PySimpleGUI as sg

print=sg.Print
for i in range(100):
    print(i)
```

Just like the standard print call, `EasyPrint` supports the `sep` and `end` keyword arguments. Other names that can be used to call `EasyPrint` include `Print`, `eprint`. If you want to close the window, call the function `EasyPrintClose`.

You can change the size of the debug window using the `SetOptions` call with the `debug_win_size` parameter.

There is an option to tell PySimpleGUI to reroute all of your stdout and stderr output to this window. To do so call `EasyPrint` with the parameter `do_not_reroute_stdout` set to `True`. After calling it once with this parameter set to `True`, all future calls to a normal `print` will go to the debug window.

If you close the debug window it will re-open the next time you `Print` to it.

Custom window API Calls (Your First window)

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This is the FUN part of the programming of this GUI. In order to really get the most out of the API, you should

be using an IDE that supports auto complete or will show you the definition of the function. This will make customizing go smoother.

This first section on custom windows is for your typical, blocking, non-persistent window. By this I mean, when you "show" the window, the function will not return until the user has clicked a button or closed the window. When this happens, the window will be automatically closed.

Two other types of windows exist.

1. Persistent window - rather than closing on button clicks, the show window function returns and the window continues to be visible. This is good for applications like a chat window.
2. Asynchronous window - the trickiest of the lot. Great care must be exercised. Examples are an MP3 player or status dashboard. Async windows are updated (refreshed) on a periodic basis.

It's both not enjoyable nor helpful to immediately jump into tweaking each and every little thing available to you.

The window Designer

The good news to newcomers to GUI programming is that PySimpleGUI has a window designer. Better yet, the window designer requires no training, no downloads, and everyone knows how to use it.



It's a manual process, but if you follow the instructions, it will take only a minute to do and the result will be a nice looking GUI. The steps you'll take are:

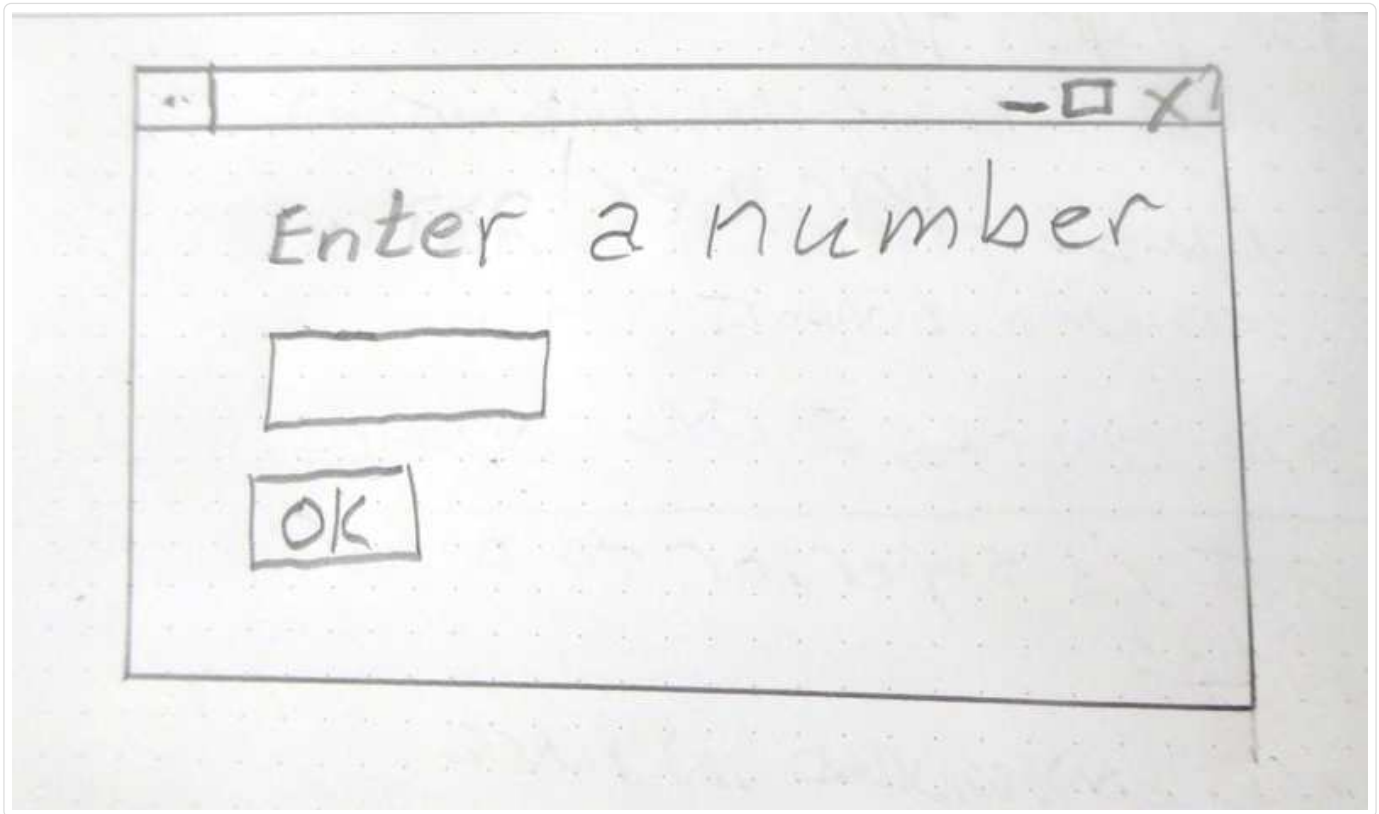
1. Sketch your GUI on paper
2. Divide your GUI up into rows
3. Label each Element with the Element name
4. Write your Python code using the labels as pseudo-code

Let's take a couple of examples.

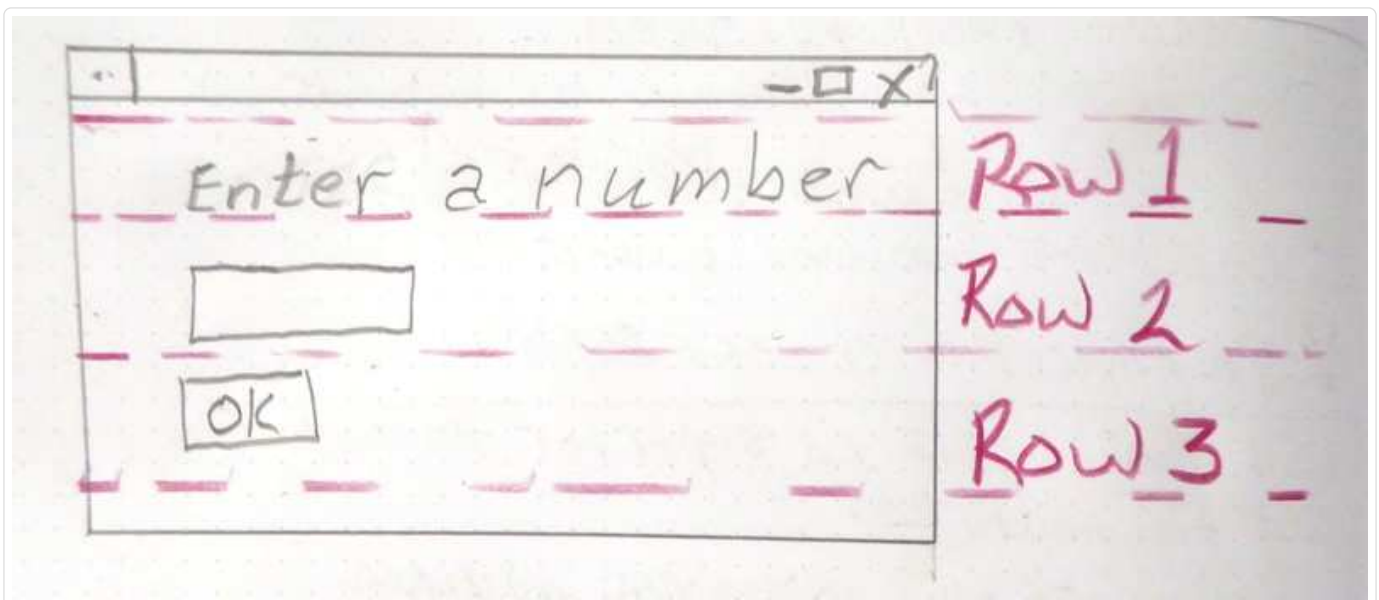
Enter a number.... Popular beginner programs are often based on a game or logic puzzle that requires the user to enter something, like a number. The "high-low" answer game comes to mind where you try to guess the number based on high or low tips.

Step 1- Sketch the GUI

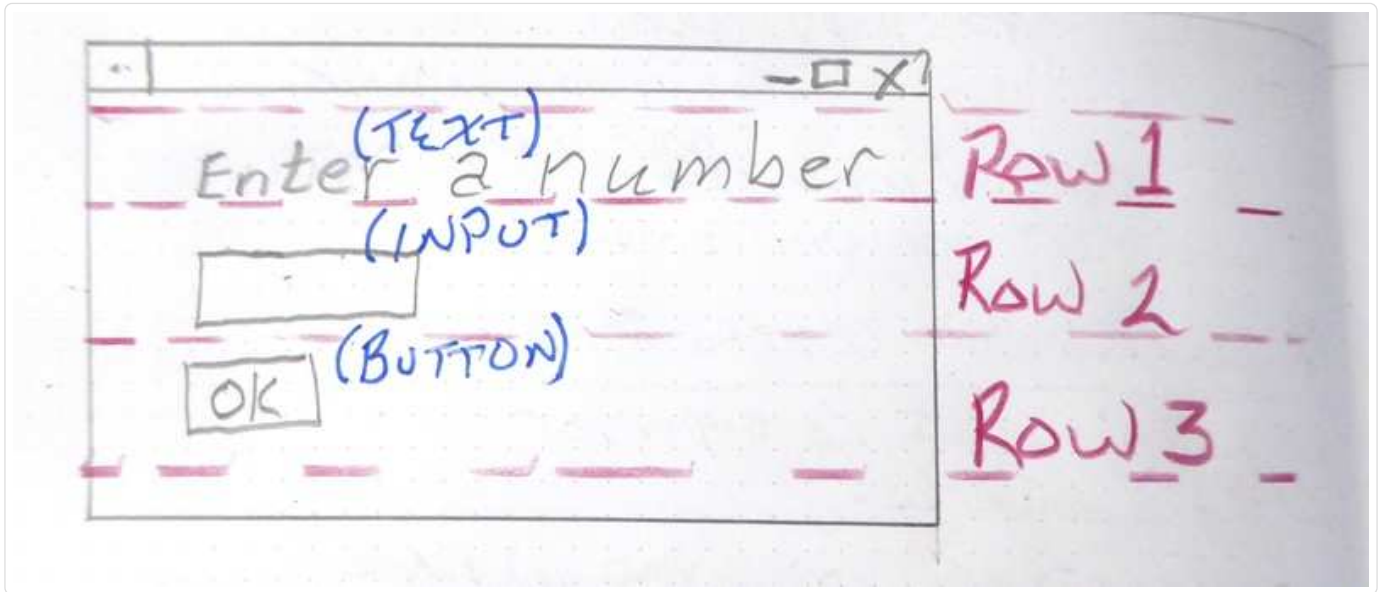
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Step 2 - Divide into rows



Step 3 - Label elements



Step 4 - Write the code

The code we're writing is the layout of the GUI itself. This tutorial only focuses on getting the window code written, not the stuff to display it, get results.

We have only 1 element on the first row, some text. Rows are written as a "list of elements", so we'll need `[]` to make a list. Here's the code for row 1

```
[ sg.Text('Enter a number') ]
```

Row 2 has 1 elements, an input field.

```
[ sg.Input() ]
```

Row 3 has an OK button

```
[ sg.OK() ]
```

Now that we've got the 3 rows defined, they are put into a list that represents the entire window.

```
layout = [ [sg.Text('Enter a Number')],  
            [sg.Input()],  
            [sg.OK()] ]
```

Finally we can put it all together into a program that will display our window.

```
import PySimpleGUI as sg

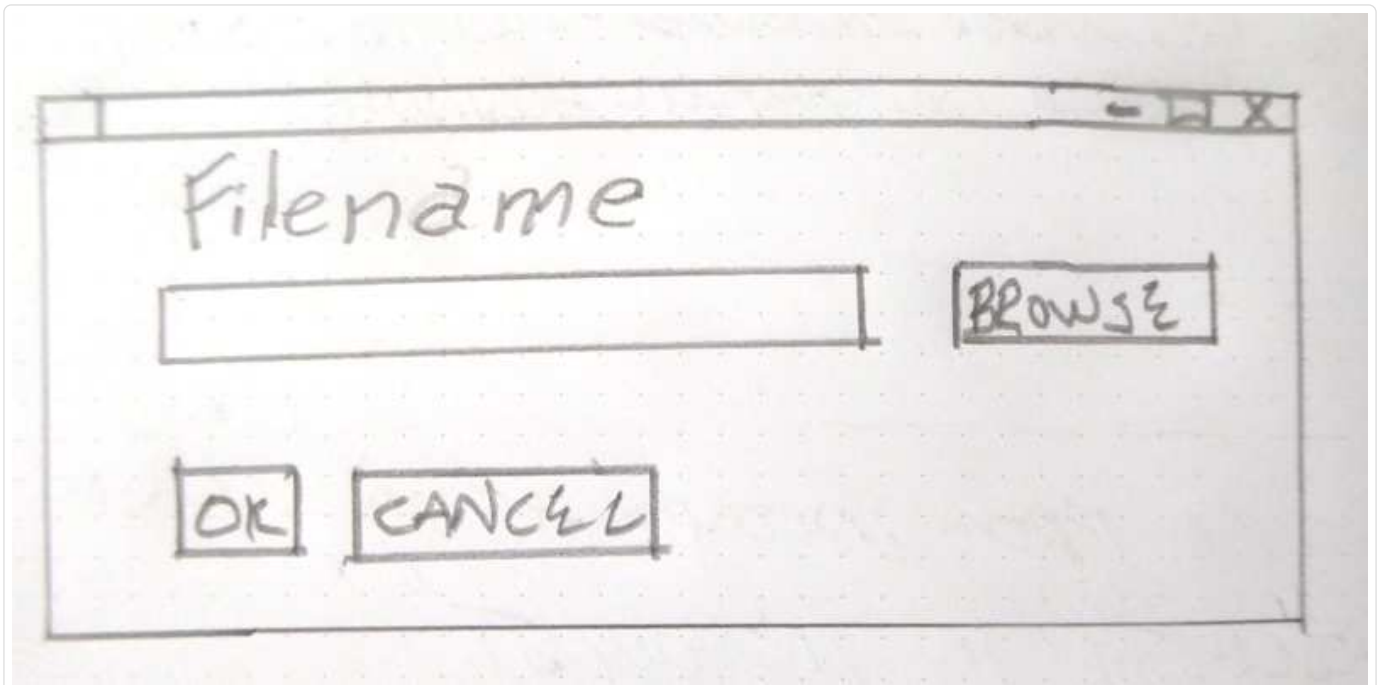
layout = [[sg.Text('Enter a Number')],
          [sg.Input()],
          [sg.OK()] ]

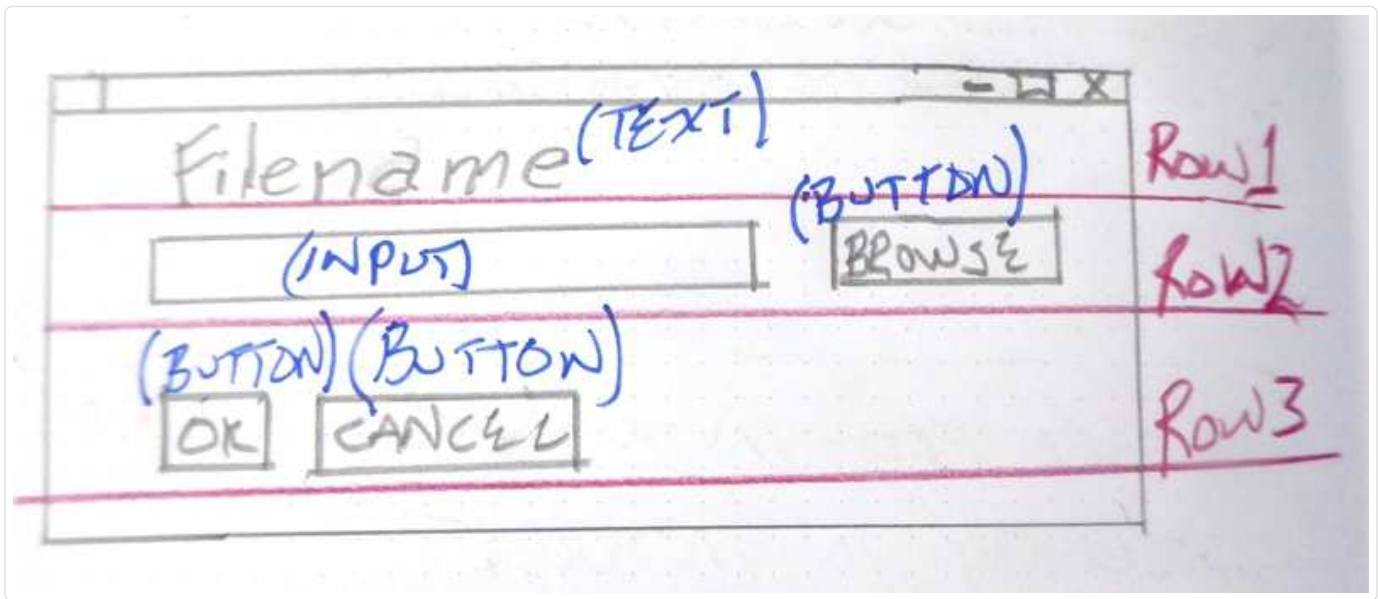
event, (number,) = sg.Window('Enter a number example').Layout(layout).Read()

sg.Popup(event, number)
```

Example 2 - Get a filename

Let's say you've got a utility you've written that operates on some input file and you're ready to use a GUI to enter than filename rather than the command line. Follow the same steps as the previous example - draw your window on paper, break it up into rows, label the elements.





Writing the code for this one is just as straightforward. There is one tricky thing, that browse for a file button. Thankfully PySimpleGUI takes care of associating it with the input field next to it. As a result, the code looks almost exactly like the window on the paper.

```
import PySimpleGUI as sg

layout = [[sg.Text('Filename')],
          [sg.Input(), sg.FileBrowse()],
          [sg.OK(), sg.Cancel()]]

event, (number,) = sg.Window('Get filename example').Layout(layout).Read()

sg.Popup(event, number)
```


Read on for detailed instructions on the calls that show the window and return your results.

Copy these design patterns!

All of your PySimpleGUI programs will utilize one of these 2 design patterns depending on the type of window you're implementing.

Pattern 1 - "One-shot Window" - Read into list or dictionary (**The Most Common Pattern**)

This will be the most common pattern you'll follow if you are not using an "event loop" (not reading the window multiple times). The window is read and closes.

It's unusual to assign the values returned from the read call directly into user variables. Usually the variables are grouped together into a list or dictionary of multiple return values. 


```
import PySimpleGUI as sg

window_rows = [[sg.Text('SHA-1 and SHA-256 Hashes for the file')],
                [sg.InputText(), sg.FileBrowse()],
                [sg.Submit(), sg.Cancel()]]

window = sg.Window('SHA-1 & 256 Hash').Layout(window_rows)

event, values = window.Read()
window.Close()

source_filename = values[0]
```

Pattern 2 A - Persistent window (multiple reads using an event loop)

Some of the more advanced programs operate with the window remaining visible on the screen. Input values are collected, but rather than closing the window, it is kept visible acting as a way to both output information to the user and gather input data.

This code will present a window and will print values until the user clicks the exit button or closes window using an X.

```
import PySimpleGUI as sg

layout = [[sg.Text('Persistent window')],
          [sg.Input(do_not_clear=True)],
          [sg.Button('Read'), sg.Exit()]]


window = sg.Window('Window that stays open').Layout(layout)

while True:
    event, values = window.Read()
    if event is None or event == 'Exit':
        break
    print(event, values)

window.Close()
```

Pattern 2 B - Persistent window (multiple reads using an event loop + updates data in window)

This is a slightly more complex, but maybe more realistic version that reads input from the user and displays that input as text in the window. Your program is likely to be doing both of those activities so this will give you a big jump-start.

Do not worry yet what all of these statements mean. Just copy it so you can begin to play with it, make some changes. Experiment to see how thing work.  v: latest ▼

A final note... the parameter `do_not_clear` in the input call determines the action of the input field after a button event. If this value is True, the input value remains visible following button clicks. If False, then the input

field is CLEARED of whatever was input. If you are building a "Form" type of window with data entry, you likely want False, the default setting (you can remove the parameter completely).

```
import sys
if sys.version_info[0] >= 3:
    import PySimpleGUI as sg
else:
    import PySimpleGUI27 as sg

layout = [[sg.Text('Your typed chars appear here:'), sg.Text('', key='_OUTPUT_') ],
          [sg.Input(do_not_clear=True, key='_IN_')],
          [sg.Button('Show'), sg.Button('Exit')]]

window = sg.Window('Window Title').Layout(layout)

while True:
    # Event Loop
    event, values = window.Read()
    print(event, values)
    if event is None or event == 'Exit':
        break
    if event == 'Show':
        # change the "output" element to be the value of "input" element
        window.FindElement('_OUTPUT_').Update(values['_IN_'])

window.Close()
```

How GUI Programming in Python Should Look? At least for beginners ?

While one goal was making it simple to create a GUI another just as important goal was to do it in a Pythonic manner. Whether it achieved these goals is debatable, but it was an attempt just the same.

The key to custom windows in PySimpleGUI is to view windows as ROWS of GUI Elements. Each row is specified as a list of these Elements. Put the rows together and you've got a window. This means the GUI is defined as a series of Lists, a Pythonic way of looking at things.

Let's dissect this little program

```
```python
```

```
import PySimpleGUI as sg
```

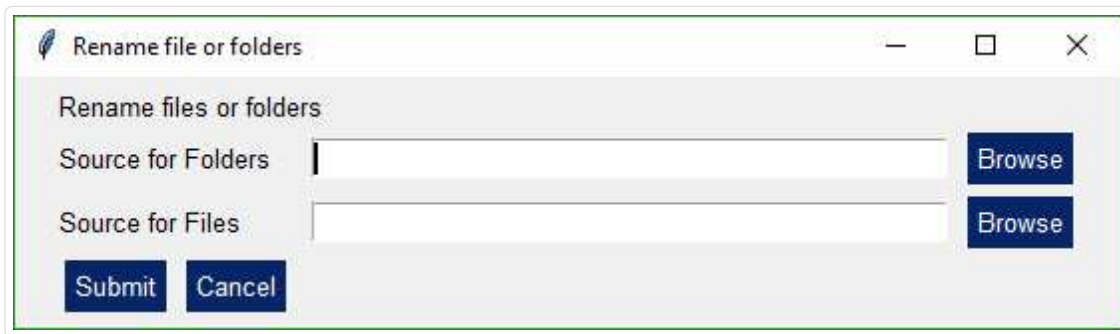
```
layout = [[sg.Text('Rename files or folders')],
 [sg.Text('Source for Folders', size=(15, 1)), sg.InputText(), sg.FolderBrowse()],
 [sg.Text('Source for Files ', size=(15, 1)), sg.InputText(), sg.FolderBrowse()],
 [sg.Submit(), sg.Cancel()]]

window = sg.Window('Rename Files or Folders')

event, values = window.Layout(layout).Read()
```

```
```
```

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Let's agree the window has 4 rows.

The first row only has **text** that reads `Rename files or folders`

The second row has 3 elements in it. First the **text** `Source for Folders`, then an **input** field, then a **browse** button.

Now let's look at how those 2 rows and the other two row from Python code:

```
layout = [[sg.Text('Rename files or folders')],
          [sg.Text('Source for Folders', size=(15, 1)), sg.InputText(), sg.FolderBrowse()],
          [sg.Text('Source for Files ', size=(15, 1)), sg.InputText(), sg.FolderBrowse()],
          [sg.Submit(), sg.Cancel()]]
```

See how the source code mirrors the layout? You simply make lists for each row, then submit that table to PySimpleGUI to show and get values from.

And what about those return values? Most people simply want to show a window, get the input values and do something with them. So why break up the code into button callbacks, etc, when I simply want my window's input values to be given to me.

For return values the window is scanned from top to bottom, left to right. Each field that's an input field will occupy a spot in the return values.

In our example window, there are 2 fields, so the return values from this window will be a list with 2 values in it.

python

```
event, values = window.Read()
folder_path, file_path = values
```

In one statement we both show the window and read the user's inputs. In the next the *list* of return values is split into individual variables `folder_path` and `file_path`.

Isn't this what a Python programmer looking for a GUI wants? Something easy to work with to get the values and move on to the rest of the program, where the real action is taking place. Why write pages of GUI code when the same layout can be achieved with PySimpleGUI in 3 or 4 lines of code. 4 lines or 40? Most would choose 4.

Return values

v: latest ▼

As of version 2.8 there are 2 forms of return values, list and dictionary.

Two Return Values

All Window Read calls return 2 values. By convention a read statement is written:

```
event, values = window.Read()
```

You don't HAVE to write your reads in this way. You can name your variables however you want. But if you want to code them in a way that other programmers using PySimpleGUI are used to, then use these statements.

Events

The first parameter `event` describes **why** the read completed. Events are one of these:

For all Windows:

- Button click
- Window closed using X

For Windows that have specifically enabled these. Please see the appropriate section in this document to learn about how to enable these and what the event return values are.

- Keyboard key press
- Mouse wheel up/down
- Menu item selected
- An Element Changed (slider, spinner, etc)
- A list item was clicked
- Return key was pressed in input element
- Timeout waiting for event
- Text was clicked
- Combobox item chosen
- Table row selected
- etc

Most of the time the event will be a button click or the window was closed.

Window closed event

Another convention to follow is the check for windows being closed with an X. This is an important event to catch. If you don't check for this and you attempt to use the window, your program will crash. Please check for closed window and exit your program gracefully.

To check for a closed window use this line of code:

```
if event is None:
```

Putting it all together we end up with an "event loop" that looks something like this:

```
while True:
    event, values = window.Read()
    if event is None:
        break
```

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Button Click Events

By default buttons will always return a click event, or in the case of realtime buttons, a button down event. You don't have to do anything to enable button clicks. To disable the events, disable the button using its Update method.

You can enable an additional "Button Modified" event by setting `enable_events=True` in the Button call. These events are triggered when something 'writes' to a button, *usually* it's because the button is listed as a "target" in another button.

The button value from a Read call will be one of 2 values:

1. The Button's text - Default
2. The Button's key - If a key is specified

If a button has a key set when it was created, then that key will be returned. If no key is set, then the button text is returned. If no button was clicked, but the window returned anyway, the event value is None.

None is returned when the user clicks the X to close a window.

If your window has an event loop where it is read over and over, remember to give your user an "out". You should ***always check for a None value*** and it's a good practice to provide an Exit button of some kind. Thus design patterns often resemble this Event Loop:

```
while True:
    event, values = window.Read()
    if event is None or event == 'Quit':
        break
```


Element Events

Some elements are capable of generating events when something happens to them. For example, when a slider is moved, or list item clicked on or table row clicked on. These events are not enabled by default. To enable events for an Element, set the parameter `enable_events=True`. This is the same as the older `click_submits` parameter. You will find the `click_submits` parameter still in the function definition. You can continue to use it. They are the same setting. An 'or' of the two values is used. In the future, `click_submits` will be removed so please migrate your code to using `enable_events`.

InputText - any change Combo - item chosen Option menu - item chosen Listbox - selection changed Radio - selection changed Checkbox - selection changed Spinner - new item selected Multiline - any change Text - clicked Status Bar - clicked Graph - clicked TabGroup - tab clicked Slider - slider moved Table - row selected Tree - node selected ButtonMenu - menu item chosen Right click menu - menu item chosen

Other Events

Menubar menu item chosen for MenuBar menus and ButtonMenu menus

You will receive the key for the MenuBar and ButtonMenu. Use that key to read the value in the return values dictionary. The value shown will be the full text plus key for the menu item chosen. Remember that you can put keys onto menu items. You will get the text and the key together as you defined it in the menu definition.  v: latest ▼

Right Click menu item chosen

Unlike menu bar and button menus, you will directly receive the menu item text and its key value. You will not do a dictionary lookup to get the value. It is the event code returned from `WindowRead()`.

Windows - keyboard, mouse scroll wheel

Windows are capable of returning keyboard events. These are returned as either a single character or a string if it's a special key. Experiment is all I can say. The mouse scroll wheel events are also strings. Put a print in your code to see what's returned.

Timeouts

If you set a timeout parameter in your read, then the system `TIMEOUT_KEY` will be returned. If you specified your own timeout key in the Read call then that value will be what's returned instead.

The `values` Variable - Return values as a list

The second parameter from a Read call is either a list or a dictionary of the input fields on the Window.

By default return values are a list of values, one entry for each input field.

Each of the Elements that are Input Elements will have a value in the list of return values. You can unpack your GUI directly into the variables you want to use.

```
event, (filename, folder1, folder2, should_overwrite) = sg.Window('My title').Layout(window_r
```

Or, more commonly, you can unpack the return results separately.

```
event, values = sg.Window('My title').Layout(window_rows).Read()
event, value_list = window.Layout(window_rows).Read()
value1 = value_list[0]
value2 = value_list[1]
...
```

However, this method isn't good when you have a lot of input fields. If you insert a new element into your window then you will have to shuffle your unpacks down, modifying each of the statements to reference `value_list[x]`.

The more common / advanced method is to request your values be returned as a dictionary.

`values` Variable - Return values as a dictionary

For those of you that have not encountered a Python dictionary, don't freak out! Just copy and paste the sample code and modify it. Follow this design pattern and you'll be fine. And you might learn something along the way.

For windows longer than 3 or 4 fields you will want to use a dictionary to help you organize your return values. In almost all (if not all) of the demo programs you'll find the return values being passed as a dictionary. It is not a difficult concept to grasp, the syntax is easy to understand, and it makes for very readable code.

The most common window read statement you'll encounter looks something like this:

```
window = sg.Window("My title").Layout(layout).Read()
```

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To use a dictionary, you will need to:

* Mark each input element you wish to be in the dictionary with the keyword `key`.

If **any** element in the window has a `key`, then **all** of the return values are returned via a dictionary. If some elements do not have a key, then they are numbered starting at zero.

Let's take a look at your first dictionary-based window.

```
import PySimpleGUI as sg
window = sg.Window('Simple data entry window')
layout = [
    [sg.Text('Please enter your Name, Address, Phone')],
    [sg.Text('Name', size=(15, 1)), sg.InputText('1', key='_name_')],
    [sg.Text('Address', size=(15, 1)), sg.InputText('2', key='_address_')],
    [sg.Text('Phone', size=(15, 1)), sg.InputText('3', key='_phone_')],
    [sg.Submit(), sg.Cancel()]
]

event, values = window.Layout(layout).Read()

sg.Popup(event, values, values['_name_'], values['_address_'], values['_phone_'])
```

To get the value of an input field, you use whatever value used as the `key` value as the index value. Thus to get the value of the name field, it is written as

```
values['name']
```

Think of the variable values in the same way as you would a list, however, instead of using 0,1,2, to reference each item in the list, use the values of the key. The Name field in the window above is referenced by

```
values['_name_']
```

You will find the key field used quite heavily in most PySimpleGUI windows unless the window is very simple.

Another convention you'll see in some of the demo programs is keys being named with an underscore at the beginning and the end. You don't HAVE to do this... your key value may look like this:

```
key = 'name'
```

The reason for this naming convention is that when you are scanning the code, these key values jump out at you. You instantly know it's a key. Try scanning the code above and see if those keys pop out.

```
key = '_name_'
```

The Event Loop / Callback Functions

All GUIs have one thing in common, an "event loop". Usually the GUI framework runs the event loop for you, but sometimes you want greater control and will run your own event loop. You often hear the term event loop when discussing embedded systems or on a Raspberry Pi.

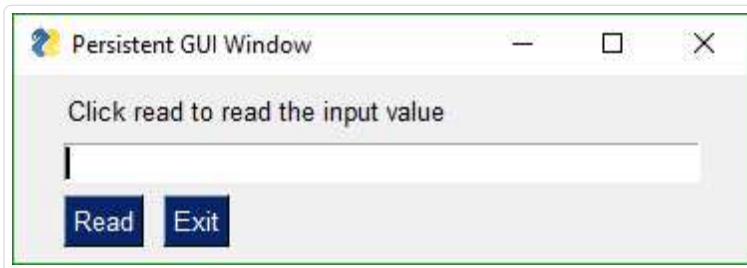
With PySimpleGUI if your window will remain open following button clicks, then your code will have an event loop. If your program shows a single "one-shot" window, collects the data and then has no other GUI interaction, then you don't need an event loop.

There's nothing mysterious about event loops... they are loops where you take care of.... wait for it..... *events*. Events are things like button clicks, key strokes, mouse scroll-wheel up/down.

Let's take a Pi demo program as an example. This program shows a GUI window, gets button presses, and uses them to control some LEDs. It loops, reading user input and doing something with it.

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This little program has a typical Event Loop



```
import PySimpleGUI as sg

layout = [[sg.Text('Click read to read the input value')],
          [sg.Input()],
          [sg.RButton('Read'), sg.Exit()]]

window = sg.Window('Persistent GUI Window').Layout(layout)

while True:
    event, values = window.Read()
    if event is None or event == 'Exit':
        break
    print(event, values)
window.Close()
```

In the Event Loop we are reading the window and then doing a series of button compares to determine what to do based on the button that was clicks (value of `button` variable)

The way buttons are presented to the caller in PySimpleGUI is **not** how *most* GUI frameworks handle button clicks. Most GUI frameworks, including tkinter, use **callback** functions, a function you define would be called when a button is clicked. This requires you to write asynchronous code, a concept beginners often stumble on and one that presents a barrier.

There is a more communications that have to happen between parts of your program when using callbacks. Callbacks break apart your program's logic apart and scatter it. One of the larger hurdles for beginners to GUI programming are these callback functions.

PySimpleGUI was specifically designed in a way so that callbacks would not be required. There is no coordination between one function and another required. You simply read your button click and take appropriate action at the same location in the code as when you read the button value.

Whether or not this is a "proper" design for GUI programs can be debated. It's not a terrible trade-off to run your own event loop and having a functioning GUI application versus one that maybe never gets written because callback functions were too much to grasp.

All Widgets / Elements

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This code utilizes many of the common Elements. It does not include Tabs/Tab Groups.


```

import PySimpleGUI as sg

sg.ChangeLookAndFeel('GreenTan')

# ----- Menu Definition ----- #
menu_def = [['File', ['Open', 'Save', 'Exit', 'Properties']],
            ['Edit', ['Paste', ['Special', 'Normal', ], 'Undo'], ],
            ['Help', 'About...'], ]

# ----- Column Definition ----- #
column1 = [[sg.Text('Column 1', background_color='#F7F3EC', justification='center', size=
                [sg.Spin(values=('Spin Box 1', '2', '3'), initial_value='Spin Box 1')),
                [sg.Spin(values=('Spin Box 1', '2', '3'), initial_value='Spin Box 2')),
                [sg.Spin(values=('Spin Box 1', '2', '3'), initial_value='Spin Box 3'))]]

layout = [
    [sg.Menu(menu_def, tearoff=True)],
    [sg.Text('All graphic widgets in one window!', size=(30, 1), justification='center',
    [sg.Text('Here is some text.... and a place to enter text')),
    [sg.InputText('This is my text')],
    [sg.Frame(layout=[
        [sg.Checkbox('Checkbox', size=(10,1)), sg.Checkbox('My second checkbox!', default=True),
        [sg.Radio('My first Radio!', "RADIO1", default=True, size=(10,1)), sg.Radio('My
        [sg.Multiline(default_text='This is the default Text should you decide not to type an
        sg.Multiline(default_text='A second multi-line', size=(35, 3))],
        [sg.InputCombo(('Combobox 1', 'Combobox 2'), size=(20, 1)),
        sg.Slider(range=(1, 100), orientation='h', size=(34, 20), default_value=85)],
        [sg.InputOptionMenu(('Menu Option 1', 'Menu Option 2', 'Menu Option 3'))],
        [sg.Listbox(values=('Listbox 1', 'Listbox 2', 'Listbox 3'), size=(30, 3)),
        sg.Frame('Labelled Group',[[
            sg.Slider(range=(1, 100), orientation='v', size=(5, 20), default_value=25),
            sg.Slider(range=(1, 100), orientation='v', size=(5, 20), default_value=75),
            sg.Slider(range=(1, 100), orientation='v', size=(5, 20), default_value=10),
            sg.Column(column1, background_color='#F7F3EC')]]]),
        [sg.Text('_' * 80)],
        [sg.Text('Choose A Folder', size=(35, 1))],
        [sg.Text('Your Folder', size=(15, 1), auto_size_text=False, justification='right'),
        sg.InputText('Default Folder'), sg.FolderBrowse()],
        [sg.Submit(tooltip='Click to submit this window'), sg.Cancel()]
    ]

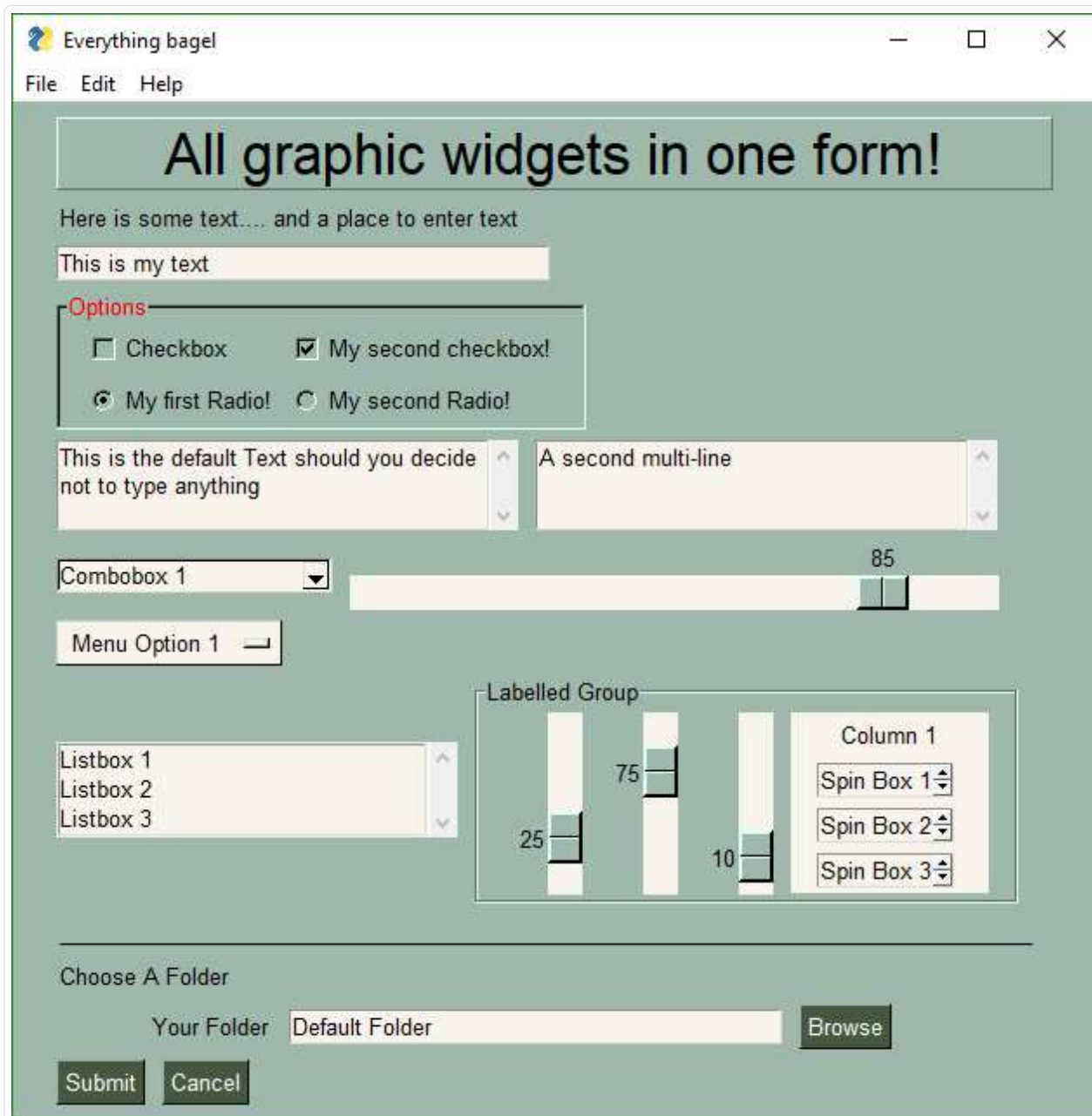
window = sg.Window('Everything bagel', default_element_size=(40, 1), grab_anywhere=False)

event, values = window.Read()

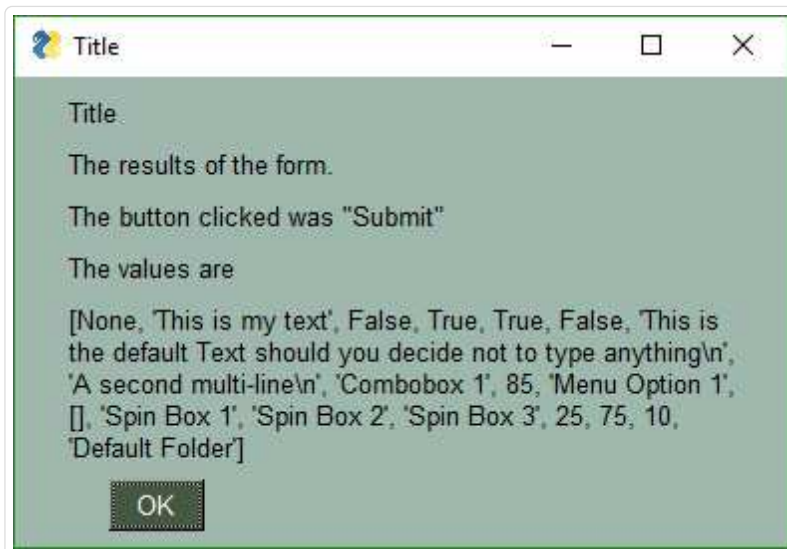
sg.Popup('Title',
        'The results of the window.',
        'The button clicked was "{}".format(event),
        'The values are', values)

```

This is a somewhat complex window with quite a bit of custom sizing to make things line up well. This is code you only have to write once. When looking at the code, remember that what you're seeing is a list of lists. Each row contains a list of Graphical Elements that are used to create the window.



Clicking the Submit button caused the window call to return. The call to Popup resulted in this window.



Note, button value can be None . The value for `button` will be the text that is displayed on the button element when it was created. If the user closed the window using something other than a button, then `button` will be `None` . It is ***vitaly important*** that your code contain the proper checks for None. Always give your users a way out of the window. Otherwise you'll end up with windows that never properly close.

You can see in the results Popup window that the values returned are a list. Each input field in the window generates one item in the return values list. All input fields return a `string` except for Check Boxes and Radio Buttons. These return `bool` .

Building Custom Windows

You will find it ***much easier*** to write code using PySimpleGUI if you use an IDE such as PyCharm. The features that show you documentation about the API call you are making will help you determine which settings you want to change, if any. In PyCharm, two commands are particularly helpful.

Control-Q (when cursor is on function name) brings up a box with the function definition
Control-P (when cursor inside function call "()") shows a list of parameters and their default

Synchronous windows

The most common use of PySimpleGUI is to display and collect information from the user. The most straightforward way to do this is using a "blocking" GUI call. Execution is "blocked" while waiting for the user to close the GUI window/dialog box.

You've already seen a number of examples above that use blocking windows. A truly non-blocking Read call looks like this:

```
event, values = window.Read(timeout=0)
```

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You can learn more about these async / non-blocking windows toward the end of this document.

Window Object - Beginning a window

The first step is to create the window object using the desired window customization.

This is the definition of the Window object:

```
Window( title,
        default_element_size=DEFAULT_ELEMENT_SIZE,
        default_button_element_size=(None, None),
        auto_size_text=None,
        auto_size_buttons=None,
        location=(None, None),
        size=(None, None),
        element_padding=None,
        button_color=None,
        font=None,
        progress_bar_color=(None, None),
        background_color=None,
        border_depth=None,
        auto_close=False,
        auto_close_duration=DEFAULT_AUTOCLOSE_TIME,
        icon=DEFAULT_WINDOW_ICON,
        force_toplevel=False,
        alpha_channel=1,
        return_keyboard_events=False,
        use_default_focus=True,
        text_justification=None,
        no_titlebar=False,
        grab_anywhere=False,
        keep_on_top=False,
        resizable=False,
        disable_close=False,
        disable_minimize=False,
        right_click_menu=None):
```

Parameter Descriptions. You will find these same parameters specified for each `Element` and some of them in `Row` specifications. The `Element` specified value will take precedence over the `Row` and `window` values.

```

default_element_size - Size of elements in window in characters (width, height)
default_button_element_size - Size of buttons on this window
auto_size_text - Bool. True if elements should size themselves according to contents. Default
auto_size_buttons - Bool. True if button elements should size themselves according to their
location - (x,y) Location to place window in pixels
size - (w,h) forces a window to be a particular size
element_padding - (w,h) default padding amount for elements
font - Font name and size for elements of the window
button_color - Default color for buttons (foreground, background). Can be text or hex
progress_bar_color - Foreground and background colors for progress bars
background_color - Color of the window background
border_depth - Amount of 'bezel' to put on input boxes, buttons, etc.
auto_close - Bool. If True window will autoclose
auto_close_duration - Duration in seconds before window closes
icon - .ICO file that will appear on the Task Bar and end of Title Bar
force_top_level - Bool. If set causes a tk.Tk window to be used as primary window rather than
alpha_channel - Float 0 to 1. 0 is invisible, 1 is fully visible, Anything between will be
return_keyboard_events - if True key presses are returned as buttons
use_default_focus - if True and no focus set, then automatically set a focus
text_justification - Justification to use for Text Elements in this window
no_titlebar - Create window without a titlebar
grab_anywhere - Grab any location on the window to move the window
keep_on_top - if True then window will always stop on top of other windows on the screen.
resizable - if True - user can manually change the size of the window. Defaults to False
disable_close - if True user will not be able to close using the X.
disable_minimize - if True user will not be able to minimize the window
right_click_menu - menu definition that will be used on all elements that support right click

```

Window Location

PySimpleGUI computes the exact center of your window and centers the window on the screen. If you want to locate your window elsewhere, such as the system default of (0,0), if you have 2 ways of doing this. The first is when the window is created. Use the `location` parameter to set where the window. The second way of doing this is to use the `SetOptions` call which will set the default window location for all windows in the future.

Window Size

You can get your window's size by accessing the `Size` property. The window has to be Read once or Finalized in order for the value to be correct. Note that it's a property, not a call.

```
my_windows_size = window.Size
```

To finalize your window:

```
window = Window('My Title').Layout(layout).Finalize()
```

Element Sizes

Note several variables that deal with "size". Element sizes are measured in characters. A Text Element with a size of 20,1 has a size of 20 characters wide by 1 character tall.

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The default Element size for PySimpleGUI is `(45,1)`.

Sizes can be set at the element level, or in this case, the size variables apply to all elements in the window. Setting `size=(20,1)` in the window creation call will set all elements in the window to that size.

There are a couple of widgets where one of the size values is in pixels rather than characters. This is true for Progress Meters and Sliders. The second parameter is the 'height' in pixels.

No Titlebar

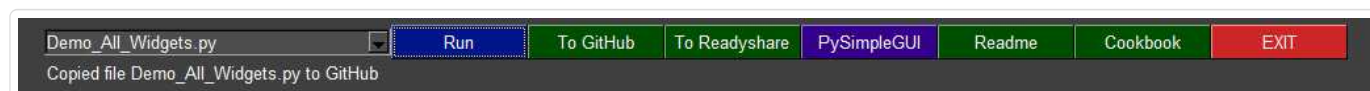
Should you wish to create cool looking windows that are clean with no windows titlebar, use the `no_titlebar` option when creating the window.

Be sure to provide your user an "exit" button or they will not be able to close the window! When no titlebar is enabled, there will be no icon on your taskbar for the window. Without an exit button you will need to kill via taskmanager... not fun.

Windows with no titlebar rely on the `grab_anywhere` option to be enabled or else you will be unable to move the window.

Windows without a titlebar can be used to easily create a floating launcher.

Linux users! Note that this setting has side effects for some of the other Elements. Multi-line input doesn't work at all, for example. So, use with caution.



Grab Anywhere

This is a feature unique to PySimpleGUI.

Note - there is a warning message printed out if the user closes a non-blocking window using a button with `grab_anywhere` enabled. There is no harm in these messages, but it may be distressing to the user. Should you wish to enable for a non-blocking window, simply get `grab_anywhere = True` when you create the window.


Always on top

To keep a window on top of all other windows on the screen, set `keep_on_top = True` when the window is created. This feature makes for floating toolbars that are very helpful and always visible on your desktop.

Focus

PySimpleGUI will set a default focus location for you. This generally means the first input field. You can set the focus to a particular element. If you are going to set the focus yourself, then you should turn off the automatic focus by setting `use_default_focus=False` in your Window call.

Window Methods (things you can do with a Window object)

There are a few methods (functions) that you will see in this document that act on Windows. The ones you will primarily be calling are:  [v: latest](#) ▼

```

window.Layout(layout) - Turns your definition of the Window into Window
window.Finalize() - creates the tkinter objects for the Window. Normally you do not call this
window.Read() - Read the Windows values and get the button / key that caused the Read to retu
window.ReadNonBlocking() - NO LONGER USED!
window.Refresh() - Use if updating elements and want to show the updates prior to the nex Rea
window.Fill(values_dict) - Fill each Element with entry from the dictionary passed in
window.SaveToDisk(filename) - Save the Window's values to disk
window.LoadFromDisk(filename) - Load the Window's values from disk
window.Close() - To close your window, if a button hasn't already closed it
window.Disable() - Use to disable the window input when opening another window on top of the p
window.Enable() - Re-enable a Disabled window
window.FindElement(key, silent_on_error=False) - Returns the element that has a matching key
window.Move(x,y) - Moves window to location x,y on screen'
window.SetAlpha(alpha) - Changes window transparency
window.BringToFront() - Brings the window to the top of other windows on the screen
window.Disappear(), Reappear() - Uses alpha channel to make window disappear
window.Hide(), UnHide() - Hides a window
window.CurrentLocation() - Returns current window location
window.Size = w,h - Forces a window to be a particular size. Note this is a property not a me
window.Size - Tuple (w,h) The size of the current window. Note this is a property
window.Minimize() - Minimizes window to taskbar

```

Window Methods

There are a number of operations you can do on a window after you've created the window. You call these after creating your Windows object.

Layout(rows)

Call to set the window layout. Must be called prior to Read. Most likely "chained" in line with the Window creation.

```

window = sg.Window('My window title').Layout(layout)

```

Finalize()

Call to force a window to go through the final stages of initialization. This will cause the tkinter resources to be allocated so that they can then be modified. This also causes your window to appear. If you do not want your window to appear when Finalize is called, then set the Alpha to 0 in your window's creation parameters.

If you want to call an element's Update method or call a Graph element's drawing primitives, you **must** either call `Read` or `Finalize` prior to making those calls.

Read(timeout=None, timeout_key='__TIMEOUT__')

Read the Window's input values and button clicks in a blocking-fashion

Returns event, values. Adding a timeout can be achieved by setting timeout=number of milliseconds before the Read times out after which a "timeout event" is returned. The value of timeout_key will be returned as the event. If you do not specify a timeout key, then the value `TIMEOUT_KEY` will be returned.

If you set the timeout = 0, then the Read will immediately return rather than waiting for input or for a timeout event. This is the same as the old ReadNonBlocking call.

ReadNonBlocking() (NO LONGER USED)

While this call will technically still work, it is being removed. If you want to get the same result, call Read with timeout = 0.

Read the Window's input values and button clicks but without blocking. It will immediately return. **Consider using Read with non-zero timeout instead!**

Will consume 100% of your CPU if you do not have other blocking calls in your event loop.

Refresh()

Cause changes to the window to be displayed on the screen. Normally not needed unless the changes are immediately required or if it's going to be a while before another call to Read.

SetIcon(icon, pngbase64)

Sets the window's icon that will be shown on the titlebar. Can either be a filename or a base64 string.

Fill(values_dict)

Populates the windows fields with the values shown in the dictionary.

Element(key, silent_on_error=False) (shorthand version)

FindElement(key, silent_on_error=False)

Returns the Element that has a matching key. If the key is not found, an Error Element is returned so that the program will not crash should the user try to perform an "update". A Popup message will be shown

FindElementWithFocus()

Returns the Element that currently has the focus. Returns None if no Elements were found.

SaveToDisk(filename)

Saves the window's values to disk

LoadFromDisk(filename)

Fills in a window's fields based on previously saved file

GetScreenDimensions()

Returns the size (w,h) of the screen in pixels

CurrentLocation()

Returns current screen position (x,y)

Move(x, y)

Move window to (x,y) position on the screen

Minimize()

Sends the window to the taskbar

Close()

Closes a window, blocking or non-blocking

CloseNonBlocking() (NO LONGER USED.. use Close instead)

Closes a non-blocking window

Disable()

Stops a window from responding until Enable is called

Enable()

Re-enables a previously disabled window

Hide()

Completely hides a window, including removing from the taskbar

UnHide()

Restores a window hidden using Hide

Disappear()

Makes a window disappear while leaving the icon on the taskbar

Reappear()

Makes a window reappear that was previously made to disappear using Disappear()

SetAlpha(alpha)

Sets the window's transparency. 0 is completely transparent. 1 is fully visible, normal . Can also use the property `Window.AlphaChannel` instead of method function call

Elements

"Elements" are the building blocks used to create windows. Some GUI APIs use the term "Widget" to describe these graphic elements.


Text
 Single **Line Input**
 Buttons including these types:
 File Browse
 Folder Browse
 Calendar picker
 Date Chooser
 Read window
 Close window ("Button" & all shortcut buttons)
 Realtime
 Checkboxes
 Radio Buttons
 Listbox
Slider
 Multi-line **Text Input**/Output
 Multi-line **Text** Output (Qt only)
 Scroll-able Output
Vertical Separator
 Progress Bar
 Option **Menu**
Menu
 ButtonMenu
Frame
Column
Graph
Image
Table
 Tree
Tab, TabGroup
 StatusBar
Pane
 Stretch (Qt only)

Common Element Parameters

Some parameters that you will see on almost all Elements are:

- key - Used with window.FindElement and with return values
- tooltip - Hover your mouse over the element and you'll get a popup with this text
- size - (width, height) - usually measured in characters-wide, rows-high. Sometimes they mean pixels
- font - specifies the font family, size, etc
- colors - Color name or #RRGGBB string
- pad - Amount of padding to put around element
- enable_events - Turns on the element specific events

Tooltip

Tooltips are text boxes that popup next to an element if you hold your mouse over the top of it. If you want to be extra kind to your window's user, then you can create tooltips for them by setting the parameter `tooltip` to some text string. You will need to supply your own line breaks / text wrapping. If you don't want to manually add them, then take a look at the standard library package `textwrap`.  v: latest ▼

Tooltips are one of those "polish" items that really dress-up a GUI and show's a level of sophistication. Go ahead, impress people, throw some tooltips into your GUI.

Size

Specifies the amount of room reserved for the Element. For elements that are character based, such a Text, it is (# characters, # rows). Sometimes it is a pixel measurement such as the Image element. And sometimes a mix like on the Slider element (characters long by pixels wide).

Colors

A string representing color. Anytime colors are involved, you can specify the tkinter color name such as 'lightblue' or an RGB hex value '#RRGGBB'. For buttons, the color parameter is a tuple (text color, background color)

Pad

The amount of room around the element in pixels. The default value is (5,3) which means leave 5 pixels on each side of the x-axis and 3 pixels on each side of the y-axis. You can change this on a global basis using a call to SetOptions, or on an element basis.

If you want more pixels on one side than the other, then you can split the number into 2 number. If you want 200 pixels on the left side, and 3 pixels on the right, the pad would be ((200,3), 3). In this example, only the x-axis is split.

Font

Specifies the font family, size, and style. Font families on Windows include:

Arial

Courier

Comic,

Fixedsys

Times

Verdana

* Helvetica (the default I think)

The fonts will vary from system to system, however, Tk 8.0 automatically maps Courier, Helvetica and Times to their corresponding native family names on all platforms. Also, font families cannot cause a font specification to fail on Tk 8.0 and greater.

If you wish to leave the font family set to the default, you can put anything not a font name as the family. The PySimpleGUI Demo programs and documentation use the family 'Any' to demonstrate this fact.. You could use "default" if that's more clear to you.

There are 2 formats that can be used to specify a font... a string, and a tuple

Tuple - (family, size, styles)

String - "Family Size Styles"

To specify an underlined, Helvetica font with a size of 15 the values:

('Helvetica', 15, 'underline italics')

'Helvetica 15 underline italics'

Key

If you are going to do anything beyond the basic stuff with your GUI, then you need to understand keys.

Keys are a way for you to "tag" an Element with a value that will be used to identify that element. After you put a key in an element's definition, the values returned from Read will use that key to tell you the value. For example, if you have an input field:

```
Input(key='mykey')
```

And your read looks like this:

```
event, values = Read()
```

Then to get the input value from the read it would be:

```
values['mykey']
```

You also use the same key if you want to call Update on an element. Please see the section below on Updates to understand that usage.

Visible

Beginning in version 3.17 you can create Elements that are initially invisible that you can later make visible.

To create an invisible Element, place the element in the layout like you normally would and add the parameter `visible=False`.

Later when you want to make that Element visible you simply call the Element's `Update` method and pass in the parameter `visible=True`.

This feature works best on Qt, but does work on the tkinter version as well. The visible parameter can also be used with the Column and Frame "container" Elements.

Output Elements

Building a window is simply making lists of Elements. Each list is a row in the overall GUI dialog box. The definition looks something like this:

```
layout = [ [row 1 element, row 1 element],
            [row 2 element, row 2 element, row 2 element] ]
```

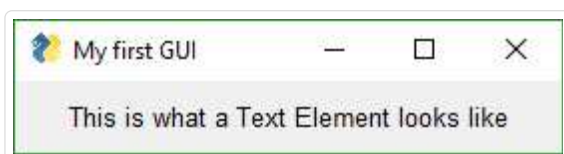
The code is a crude representation of the GUI, laid out in text.

Shortcut Functions / Multiple Function Names

Many of the main method calls and Element names have shortcuts. This enables you to code much quicker once you are used to using the SDK. The Text Element, for example, has 3 different names `Text`, `Txt` or `T`. `InputText` can also be written `Input` or `In`. `FindElement` was recently renamed to `Element` because it's a commonly used function.

Text Element

```
layout = [[sg.Text('This is what a Text Element looks like')]]
```



 v: latest ▼

The most basic element is the Text element. It simply displays text. Many of the 'options' that can be set for a Text element are shared by other elements.

```
Text(text,
      size=(None, None),
      auto_size_text=None,
      click_submits=False,
      enable_events=False,
      relief=None,
      font=None,
      text_color=None,
      background_color=None,
      justification=None,
      pad=None,
      key=None,
      right_click_menu=None,
      tooltip=None,
      visible=True)
```

Text - The text that's displayed
 size - Element's size
 click_submits - if clicked will cause a read **call to return the key value of** the button
 enable_events - same **as** click_submits
 relief - relief **to use** around the text
 auto_size_text - Bool. **Change width to match size of** text
 font - Font name **and size to use**
 text_color - text color
 background_color - background color
 justification - Justification **for** the text. **String** - 'left', 'right', 'center'
 pad - (x,y) amount **of padding in pixels to use** around element **when** packing
 key - used **to** identify element. This **value will return as** button **if** click_submits True
 right_click_menu - menu definition **to display if right** clicked
 tooltip - **string** representing tooltip

Some commonly used elements have 'shorthand' versions of the functions to make the code more compact. The functions `T` and `Txt` are the same as calling `Text`.

Fonts

Already discussed **in** the common parameters section. Either string or a tuple.

Color in PySimpleGUI are in one of two formats - color name or RGB value.

Individual colors are specified using either the color names as defined in tkinter or an RGB string of this format:

"#RRGGBB" **or** "darkblue"

auto_size_text

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A `True` value for `auto_size_text`, when placed on Text Elements, indicates that the width of the Element should be shrunk do the width of the text. The default setting is True.

Chortcut functions

The shorthand functions for `Text` are `Txt` and `T`

Events `enable_events`

If you set the parameter `enable_events` or `click_submits` then you will get an event if the user clicks on the `Text`.

Text Methods

Update

If you want to change the text, font, or colors after the element has been created, then use the `Update` method.

```
Update(value = None, background_color=None, text_color=None, font=None, visible=None)
```

value - new value to set text element to

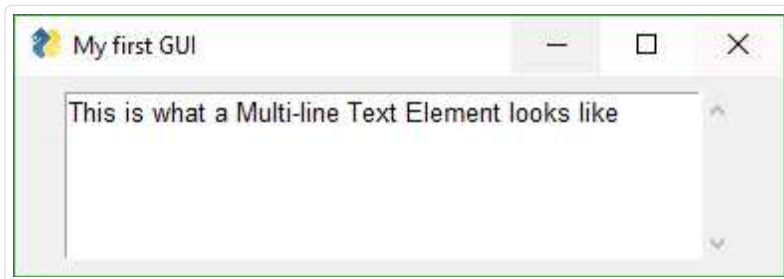
background_color - new background color

text_color - text color to display

font - font to use to display visible - visibility

Multiline Text Element

```
layout = [[sg.Multiline('This is what a Multi-line Text Element looks like', size=(45,5))]]
```



This Element doubles as both an input and output Element.

```

Multiline( default_text='',
            enter_submits=False,
            disabled=False,
            autoscroll=False,
            size=(None, None),
            auto_size_text=None,
            background_color=None,
            text_color=None,
            change_submits=False,
            enable_events=False,
            do_not_clear=False,
            key=None,
            focus=False,
            font=None,
            pad=None,
            tooltip=None,
            right_click_menu=None,
            visible=True)
'''

```

default_text - Text to display in the text box
change_submits - Bool. If True, pressing Enter key submits window
enable_events - Bool. same as change_submits
autoscroll - Bool. Causes "cursor" to always be at the end of the text
size - Element's size
right_click_menu - menu definition to display if right clicked
auto_size_text - Bool. Change width to match size of text

Multiline Methods

```

Update( value=None,
        disabled=None,
        append=False,
        font=None,
        text_color=None,
        background_color=None)

```

```
Update(self, value=None, disabled=None, append=False, font=None, text_color=None, background_
```

value - string to set the text field to

disabled - set to True to disable the element

append - rather than replacing the current text with new text, add the new text onto the end

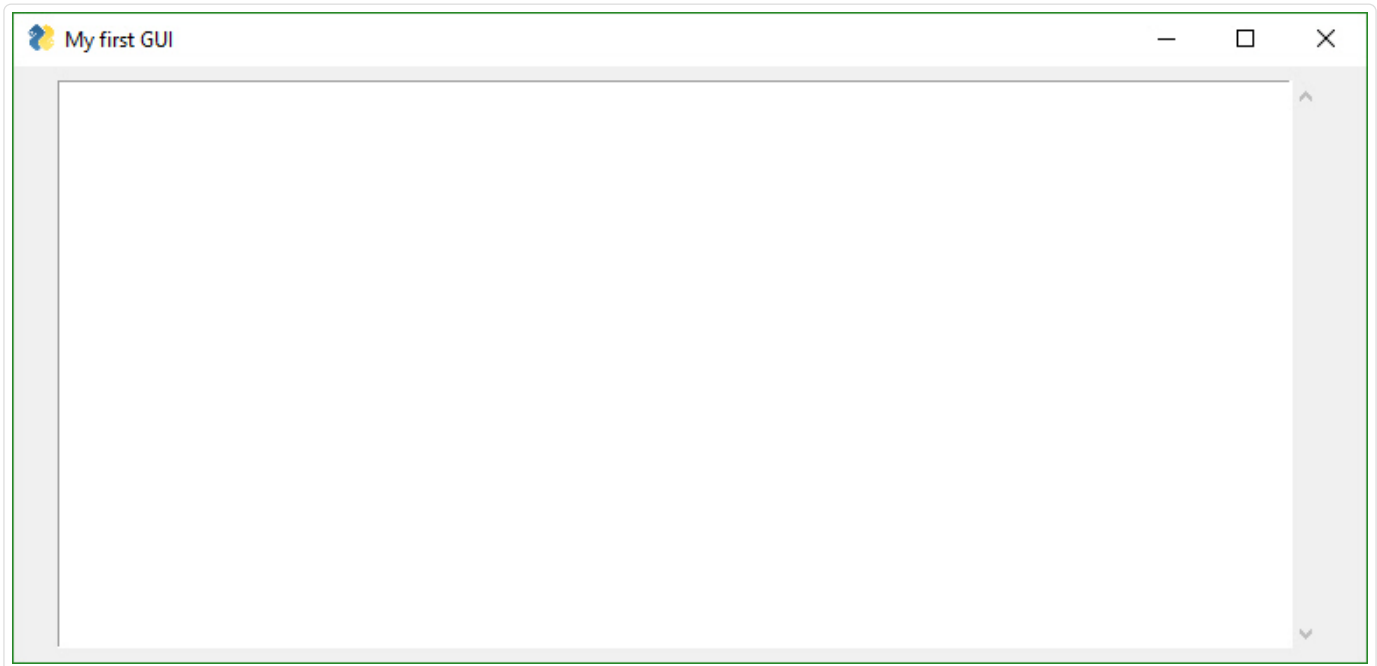
Output Element

Output re-routes `Stdout` to a scrolled text box.

Whatever you print will show up in this window.

Note that you will NOT see what you print until you call either `window.Read` or `window.Refresh`. If you want to immediately see what was printed, call `window.Refresh()` immediately after your print statement.

```
layout = [[sg.Output(size=(80,10))]]
```



```
Output( size=(None, None),
        background_color=None,
        text_color=None,
        pad=None,
        font=None,
        tooltip=None,
        right_click_menu=None,
        key=None,
        visible=True)
```

size - Size of Output Element (width, height) in characters You should be quite familiar with these parameters by now. If not, read [able another element](#) or [read about common parameters](#).

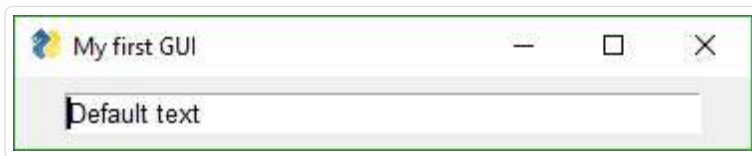
Input Elements

These make up the majority of the window definition. Optional variables at the Element level override the window level values (e.g. `size` is specified in the Element). All input Elements create an entry in the list of return values. A Text Input Element creates a string in the list of items returned.

Text Input Element Shortcuts (Input, In)

```
layout = [[sg.InputText('Default text')]]
```

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```
def InputText(default_text = '',
              size=(None, None),
              disabled=False,
              auto_size_text=None,
              password_char='',
              justification=None,
              background_color=None,
              text_color=None,
              font=None,
              tooltip=None,
              change_submits=False,
              do_not_clear=False,
              key=None,
              focus=False,
              right_click_menu=None,
              pad=None,
              vitable=True):
```

default_text - **Text** initially shown **in** the input box
 size - (width, height) **of** element **in** characters
 auto_size_text- Bool. True **is** element should be sized **to** fit **text**
 disabled - Bool **If** True the input **is** disabled
 password_char - Character that will be used **to** replace **each** entered character. Setting **to** a
 background_color - color **to** use **for** the input field background
 text_color - color **to** use **for** the typed **text**
 font - font used **for** the element
 tooltip - what **is** shown **when** hovered over element (doesn't appear to work)
 change_submits - **if** True, will cause a Window.Read **to** return **if** a button fills **in** the value
 do_not_clear - Bool. Normally windows clear **when** read, turn **off** clearing **with** this flag.
 key = Dictionary **key** **to** use **for** return values
 focus = Bool. True **if** this field should capture the focus (moves cursor **to** this field)
 pad - amount **of** room **in** pixels **to** leave around the element

There are two methods that can be called:

```
Input.Update(new_value) - sets the input to new_value
Input.Get() - returns the current value of the field.
```

Shorthand functions that are equivalent to `InputText` are `Input` and `In`

`do_not_clear` Parameter

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Important - This trips a lot of people up. If you do not set the `do_not_clear` parameter then the input field will clear when an event takes place. The behavior is a "forms" style window development. The assumption is that you want the field to clear. If you are writing a chat program then you're thankful. The rest of you, I'm sorry.

TextInput Methods

```
Update(value=None, disabled=None):  
Get()
```

Update - Change the Element

value - new value to display in field

disabled - if True will disable the element

Get - Returns the current value for the element (you can get also from a call to Read)

Combo Element

Also known as a drop-down list. Only required parameter is the list of choices. The return value is a string matching what's visible on the GUI.

```
layout = [[sg.InputCombo(['choice 1', 'choice 2'])]]
```



```
InputCombo(values,            ,  
            default_value=None  
            size=(None, None)  
            auto_size_text=None  
            background_color=None  
            text_color=None  
            change_submits=False  
            enable_events=False  
            readonly=True  
            disabled=False  
            key=None  
            pad=None  
            tooltip=None  
            visible=True)
```

```

values - Choices to be displayed. List of strings
default_value - which value should be initially chosen
size - (width, height) of element in characters
auto_size_text - Bool. True if size should fit the text length
background_color - color to use for the input field background
text_color - color to use for the typed text
change_submits - Bool. If set causes Read to immediately return if the selected value change
disabled - Bool. If set will disable changes
readonly - Bool. If set user cannot change the values to choose from
key - Dictionary key to use for return values
pad - (x,y) Amount of padding to put around element in pixels
tooltip - Text string. If set, hovering over field will popup the text

```

Shortcut functions - Combo, DropDown, Drop

Combo Methods

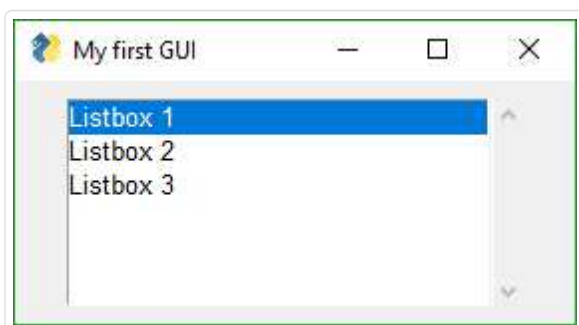
```
Update(value=None, values=None, set_to_index=None, disabled=None, readonly=None)
```

value - change which value is current selected
 values - change list of choices
 set_to_index - change selection to a particular choice
 disable - if True will disable element
 readonly - if True will make element readonly

Listbox Element

The standard listbox like you'll find in most GUIs. Note that the return values from this element will be a ***list of results, not a single result***. This is because the user can select more than 1 item from the list (if you set the right mode).

```
layout = [[sg.Listbox(values=['Listbox 1', 'Listbox 2', 'Listbox 3'], size=(30, 6))]]
```



```
Listbox(values
        default_values=None
        select_mode=None
        change_submits=False
        bind_return_key=False
        size=(None, None)
        disabled = False,
        auto_size_text=None
        font=None
        background_color=None
        text_color=None
        key=None
        pad=None
        right_click_menu=None
        tooltip=None,
        visible=True):
```

values - Choices to be displayed. List of strings
select_mode - Defines how to list is to operate.
 Choices include constants or strings:
 Constants version:
LISTBOX_SELECT_MODE_BROWSE
LISTBOX_SELECT_MODE_EXTENDED
LISTBOX_SELECT_MODE_MULTIPLE
LISTBOX_SELECT_MODE_SINGLE - the default
Strings version:
'browse'
'extended'
'multiple'
'single'

change_submits - if True, the window read will return with a button value of ''
bind_return_key - if the focus is on the listbox and the user presses return key, or if the u
size - (width, height) of element in characters
disapled - Bool. If True element is disabled
auto_size_text - Bool. True if size should fit the text length
background_color - color to use for the input field background
font - font to use for items in list
text_color - color to use for the typed text
key - Dictionary key to use for return values and to find element
pad - amount of padding to use when packing
tooltip - tooltip text

The `select_mode` option can be a string or a constant value defined as a variable. Generally speaking strings are used for these kinds of options.

ListBoxes can cause a window to return from a Read call. If the flag `change_submits` is set, then when a user makes a selection, the Read immediately returns.

Another way ListBoxes can cause Reads to return is if the flag `bind_return_key` is set. If True, then if the user presses the return key while an entry is selected, then the Read returns. Also, if this flag is set, if the user double-clicks an entry it will return from the Read.

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Listbox Methods

```
Update(values=None, disabled=None)
SetValue(values)
GetListValues()
```

Update - Change element

values - new list of choices

disabled - if True disables the element

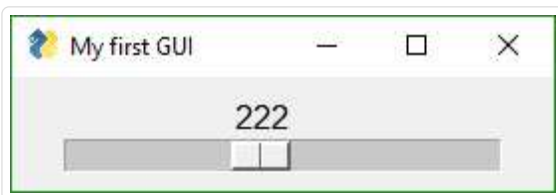
SetValue - Sets selection to one or more values

GetListValues - Return the list of values to choose from

Slider Element

Sliders have a couple of slider-specific settings as well as appearance settings. Examples include the `orientation` and `range` settings.

```
layout = [[sg.Slider(range=(1,500), default_value=222, size=(20,15), orientation='horizontal']
```



```
Slider(range=(None,None),
        default_value=None,
        resolution=None,
        orientation=None,
        border_width=None,
        relief=None,
        change_submits=False,
        disabled=False,
        size=(None, None),
        font=None,
        background_color=None,
        text_color=None,
        key=None,
        pad=None,
        tooltip=None,
        visible=True)
```

```

range - (min, max) slider's range
default_value - default setting (within range)
resolution - how much each 'tick' should represent. Default = 1
orientation - 'horizontal' or 'vertical' ('h' or 'v' work)
border_width - how deep the widget looks
relief - relief style. Values are same as progress meter relief values. Can be a constant
    RELIEF_RAISED= 'raised'
    RELIEF_SUNKEN= 'sunken'
    RELIEF_FLAT= 'flat'
    RELIEF_RIDGE= 'ridge'
    RELIEF_GROOVE= 'groove'
    RELIEF_SOLID = 'solid'
size - (width, height) of element in characters
disabled - Bool If True slider is disabled
auto_size_text - Bool. True if size should fit the text
background_color - color to use for the input field background
text_color - color to use for the typed text
change_submits - causes window read to immediately return if the checkbox value changes
key- Dictionary key to use for return values
tooltip - Tooltip to display when hovered over wlement

```

Qt Sliders

There is an important difference between Qt and tkinter sliders. On Qt, the slider values must be integer, not float. If you want your slider to go from 0.1 to 1.0, then make your slider go from 1 to 10 and divide by 10. It's an easy math thing to do and not a big deal. Just deal with it.... you're writing software after all. Presumably you know how to do these things. ;-)

Slider Methods

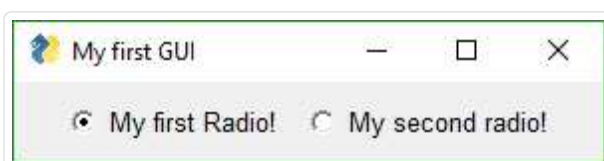
```
Update(self, value=None, range=(None, None), disabled=None, visible=None):
```

value - set current selection to value
 range - change range of valid values
 disabled - if True disables element

Radio Button Element

Creates one radio button that is assigned to a group of radio buttons. Only 1 of the buttons in the group can be selected at any one time.

```
layout = [[sg.Radio('My first Radio!', "RADIO1", default=True), sg.Radio('My second radio!',
```



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```
Radio(text,
      group_id,
      default=False,
      size=(None, None),
      disabled = False,
      auto_size_text=None,
      font=None,
      background_color = None,
      text_color = None,
      key = None,
      pad = None,
      tooltip = None,
      visible=True)
```

text - Text to display next to button
group_id - Groups together multiple Radio Buttons. Can be **any** value
default - Bool. Initial state
size - (width, height) size of **element** in **characters**
auto_size_text - Bool. True **if** should size width to fit **text**
font - Font type and size **for text** display
background_color - color to use **for** the background
text_color - color to use **for** the **text**
key - Dictionary key to use **for** return values
pad - padding around **element**
tooltip - tooltip to show when mouse hovered over **element**

Radio Button Methods

```
Update(value=None, disabled=None, visible=None)
```

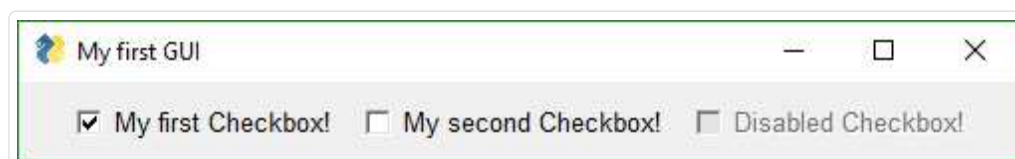
value - bool - if True change to selected

disabled - if True disables the element

Checkbox Element

Checkbox elements are like Radio Button elements. They return a bool indicating whether or not they are checked.

```
layout = [sg.Checkbox('My first Checkbox!', default=True), sg.Checkbox('My second Checkbox!')]
```



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```
Checkbox(text,
         default=False,
         size=(None, None),
         auto_size_text=None,
         font=None,
         background_color = None,
         text_color = None,
         change_submits = False
         disabled = False,
         key = None,
         pad = None,
         tooltip = None,
         visible=True):
```

text - Text to display next to checkbox
default- Bool + None. Initial state. True = Checked, False = unchecked, None = **Not** available
size - (width, height) size of element in characters
auto_size_text- Bool. True if should size width to fit text
disabled - Bool. If True element is disabled
font- Font type and size for text display
background_color - color to use for the background
text_color - color to use for the typed text
change_submits - causes window read to immediately return if the checkbox value changes
key = Dictionary key to use for return values
pad - Padding around element in window
tooltip - text to show when mouse is hovered over element

Shortcut functions - CBox, CB, Check

Checkbox Methods

```
Update(value=None, disabled=None, visible=None)
Get()
```

Update - changes the element

value - Bool if True checks the checkbox

disabled - if True disables the element

Get - returns current state

Spin Element

An up/down spinner control. The valid values are passed in as a list.

```
layout = [[sg.Spin([i for i in range(1,11)], initial_value=1), sg.Text('Volume level')]]
```




```
Spin(values,
      initial_value=None,
      disabled = False,
      size=(None, None),
      change_submits = False,
      auto_size_text=None,
      font=None,
      background_color = None,
      text_color = None,
      key = None,
      pad = None,
      tooltip = None,
      visible=True):
```

Parameter definitions

```
values - List of valid values
initial_value - String with initial value
size - (width, height) size of element in characters
auto_size_text - Bool. True if should size width to fit text
font - Font type and size for text display
disabled - Bool. If True element is disabled
background_color - color to use for the background
text_color - color to use for the typed text
change_submits - causes window read to immediately return if the spinner value changes
key = Dictionary key to use for return values
pad - padding around element in the window
tooltip - text to show when mouse hovered over element
```

Qt Differences - `values` is a range!

Note that Qt does not allow arbitrary spinner values. With PySimpleGUI-tkinter you can have any values in your list. In Qt they must be integers. Yea, it kinda sucks. I'm working on it.

On Qt values is a tuple representing a range. On plain PySimpleGUI this value is a list of items. Make sure on the plain version you specify items as a list using `[]` and not a generator using `()`.

Spin Methods

```
Update(value=None, values=None, disabled=None, visible=None)
```

value - set the current value

values - set available choices

disabled - if True disables the element

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Image Element

Images can be placed in your window provide they are in PNG, GIF, PPM/PGM format. JPGs cannot be shown because tkinter does not naively support JPGs. You can use the Python Imaging Library (PIL) package to convert your image to PNG prior to calling PySimpleGUI if your images are in JPG format.

```
Image(filename=None,
      data=None,
      data_base64=None,
      background_color=None,
      size=(None, None),
      pad=None,
      key=None,
      tooltip=None,
      click_submits=False,
      enable_events=False,
      visible=True,
      right_click_menu=None,
      size_px=(None, None),
      visible=True)
```

Parameter definitions

```
filename - file name if the image is in a file
data - if image is in RAM (PIL format?)
data_base64 - image in base64 format
background_color - Color of background
size - Size (Width, Height) of image in pixels
pad - Padding around Element in the window
key - Key used to find the element
tooltip - text to show when mouse if hovered over image
click_submits, enable_events - if True returns event when image is clicked
visible - if False will create image as hidden
size_px - size of image in pixels
```

Update Image Methods

Like other Elements, the Image Element has an `Update` method. Call Update if you want to change the image.

```
def Update(self, filename=None, data=None, visible=None):
```

Choose **either** a filename or in-ram data image to use to replace current image

UpdateAnimation Method for Animated GIFs



Starting in version 3.23 you can specify an animated GIF as an image and can animate the GIF by calling `UpdateAnimation`. Exciting stuff!

```
UpdateAnimation(source,
                time_between_frames=0)
```

`source` can be a filename **or** a base64 bytes variable (unlike other calls that split out the filename parameter and base64 parameter into 2 parameters).

`time_between_frames` is an optional parameter. It will keep track of the amount of time between frame changes for you to give you a smooth animation. With this parameter you can call the function as often as you want and it will advance to the next frame only after the correct amount of time has lapsed.

You can call the method without setting the `time_between_frames` value and it will show a frame and immediately move on to the next frame. This enables you to do the inter-frame timing.

Button Element

MAC USERS - Macs suck when it comes to tkinter and button colors. It sucks so badly with colors that the `LookAndFeel1` call is disabled. You cannot change button colors for Macs. You're stuck with the system default color if you are using the tkinter version of PySimpleGUI. The Qt version does not have this issue.

Buttons are the most important element of all! They cause the majority of the action to happen. After all, it's a button press that will get you out of a window, whether it be Submit or Cancel, one way or another a button is involved in all windows. The only exception is to this is when the user closes the window using the "X" in the upper corner which means no button was involved.

The Types of buttons include:

Folder Browse

File Browse

Files Browse

File SaveAs

File Save

Close window (normal button)

Read window

Realtime

Calendar Chooser

Color Chooser

 v: latest ▼

Close window - Normal buttons like Submit, Cancel, Yes, No, do NOT close the window... they used to. Now to

close a window you need to use a `CloseButton` / `CButton`.

Folder Browse - When clicked a folder browse dialog box is opened. The results of the Folder Browse dialog box are written into one of the input fields of the window.

File Browse - Same as the Folder Browse except rather than choosing a folder, a single file is chosen.

Calendar Chooser - Opens a graphical calendar to select a date.

Color Chooser - Opens a color chooser dialog

Read window - This is a window button that will read a snapshot of all of the input fields, but does not close the window after it's clicked.

Realtime - This is another async window button. Normal button clicks occur after a button's click is released. Realtime buttons report a click the entire time the button is held down.

Most programs will use a combination of shortcut button calls (`Submit`, `Cancel`, etc), normal `Buttons` which leave the windows open and `CloseButtons` that close the window when clicked.

Sometimes there are multiple names for the same function. This is simply to make the job of the programmer quicker and easier. Or they are old names that are no longer used but kept around so that existing programs don't break.

The 4 primary windows of PySimpleGUI buttons and their names are:

1. `Button` = `ReadButton` = `RButton` = `ReadFormButton` (old style... use `Button` instead)
2. `CloseButton` = `CButton`
3. `RealtimeButton`
4. `DummyButton`

You will find the long-form names in the older programs. `ReadButton` for example.

In Oct 2018, the definition of `Button` changed. Previously `Button` would CLOSE the window when clicked. It has been changed so the `Button` calls will leave the window open in exactly the same way as a `ReadButton`. They are the same calls now. To enable windows to be closed using buttons, a new button was added...

`CloseButton` or `CButton` .

The most basic `Button` element call to use is `Button`

```

Button(button_text='',
        button_type=BUTTON_TYPE_CLOSES_WIN
        target=(None, None)
        tooltip=None
        file_types=(("ALL Files", "*..*"),)
        initial_folder=None
        disabled = False
        image_filename=None
        image_data=None
        image_size=(None, None)
        image_subsample=None
        border_width=None
        size=(None, None)
        auto_size_button=None
        button_color=None
        default_value = None
        font=None
        bind_return_key=False
        focus=False
        pad=None
        key=None,
        visible=True):

```

Parameters

button_text - Text to be displayed on the button
 button_type - You should NOT be setting this directly
 target - key or (row,col) target **for** the button
 tooltip - tooltip text **for** the button
 file_types - the filetypes that will be used to match files
 initial_folder - starting path **for** folders and files
 disabled = Bool If True button is disabled
 image_filename - image filename **if** there is a button image
 image_data - **in**-RAM image to be displayed on button
 image_size - size of button image **in** pixels
 image_subsample - amount to reduce the size of the image
 border_width - width of border around button **in** pixels
 size - size **in** characters
 auto_size_button - True **if** button size is determined by button text
 button_color - (text color, backound color)
 default_value - initial value **for** buttons that hold information
 font - font to use **for** button text
 bind_return_key - If True the return key will cause this button to fire
 focus - **if** focus should be set to this button
 pad - (x,y) padding **in** pixels **for** packing the button
 key - key used **for** finding the element

Shortcut, Pre-defined Buttons

These Pre-made buttons are some of the most important elements of all because they are used so much. They all basically do the same thing, set the button text to match the function name and set the parameters to commonly used values. If you find yourself needing to create a custom button often because it's not on this list, please post a request on GitHub. . They include:

```

OK
Ok
Submit
Cancel
Yes
No
Exit
Quit
Help
Save
SaveAs
FileBrowse
FilesBrowse
FileSaveAs
FolderBrowse

```

IMPORTANT NOTE ABOUT SHORTCUT BUTTONS Prior to release 3.11.0, these buttons closed the window. Starting with 3.11 they will not close the window. They act like RButtons (return the button text and do not close the window)

If you are having trouble with these buttons closing your window, please check your installed version of PySimpleGUI by typing `pip list` at a command prompt. Prior to 3.11 these buttons close your window.

Using older versions, if you want a Submit() button that does not close the window, then you would instead use `RButton('Submit')`. Using the new version, if you want a Submit button that closes the window like the old Submit() call did, you would write that as `CloseButton('Submit')` or `CButton('Submit')`

```
layout = [[sg.OK(), sg.Cancel()]]
```



Button targets

The `FileBrowse`, `FolderBrowse`, `FileSaveAs`, `FilesSaveAs`, `CalendarButton`, `ColorChooserButton` buttons all fill-in values into another element located on the window. The target can be a Text Element or an InputText Element. The location of the element is specified by the `target` variable in the function call.

The Target comes in two forms.

1. Key
2. (row, column)

Targets that are specified using a key will find its target element by using the target's key value. This is the "preferred" method.

If the Target is specified using (row, column) then it utilizes a grid system. The rows in your GUI are numbered starting with 0. The target can be specified as a hard coded grid item or it can be relative to the button.

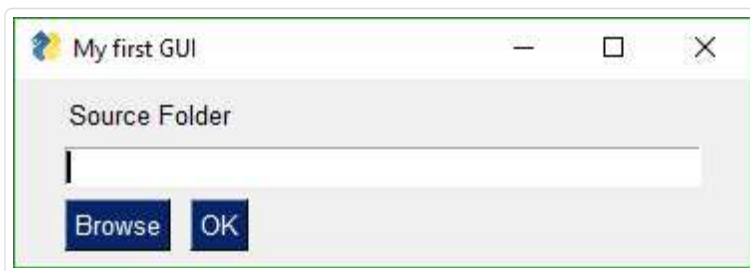
The (row, col) targeting can only target elements that are in the same "container". Containers are the Window,

Column and Frame Elements. A File Browse button located inside of a Column is unable to target elements outside of that Column.

The default value for `target` is `(ThisRow, -1)`. `ThisRow` is a special value that tells the GUI to use the same row as the button. The Y-value of -1 means the field one value to the left of the button. For a File or Folder Browse button, the field that it fills are generally to the left of the button in most cases. `(ThisRow, -1)` means the Element to the left of the button, on the same row.

If a value of `(None, None)` is chosen for the target, then the button itself will hold the information. Later the button can be queried for the value by using the button's key.

Let's examine this window as an example:



The `InputText` element is located at (1,0)... row 1, column 0. The `Browse` button is located at position (2,0). The Target for the button could be any of these values:

```
Target = (1,0)
Target = (-1,0)
```

The code for the entire window could be:

```
layout = [[sg.T('Source Folder')],
          [sg.In()],
          [sg.FolderBrowse(target=(-1, 0)), sg.OK()]]
```

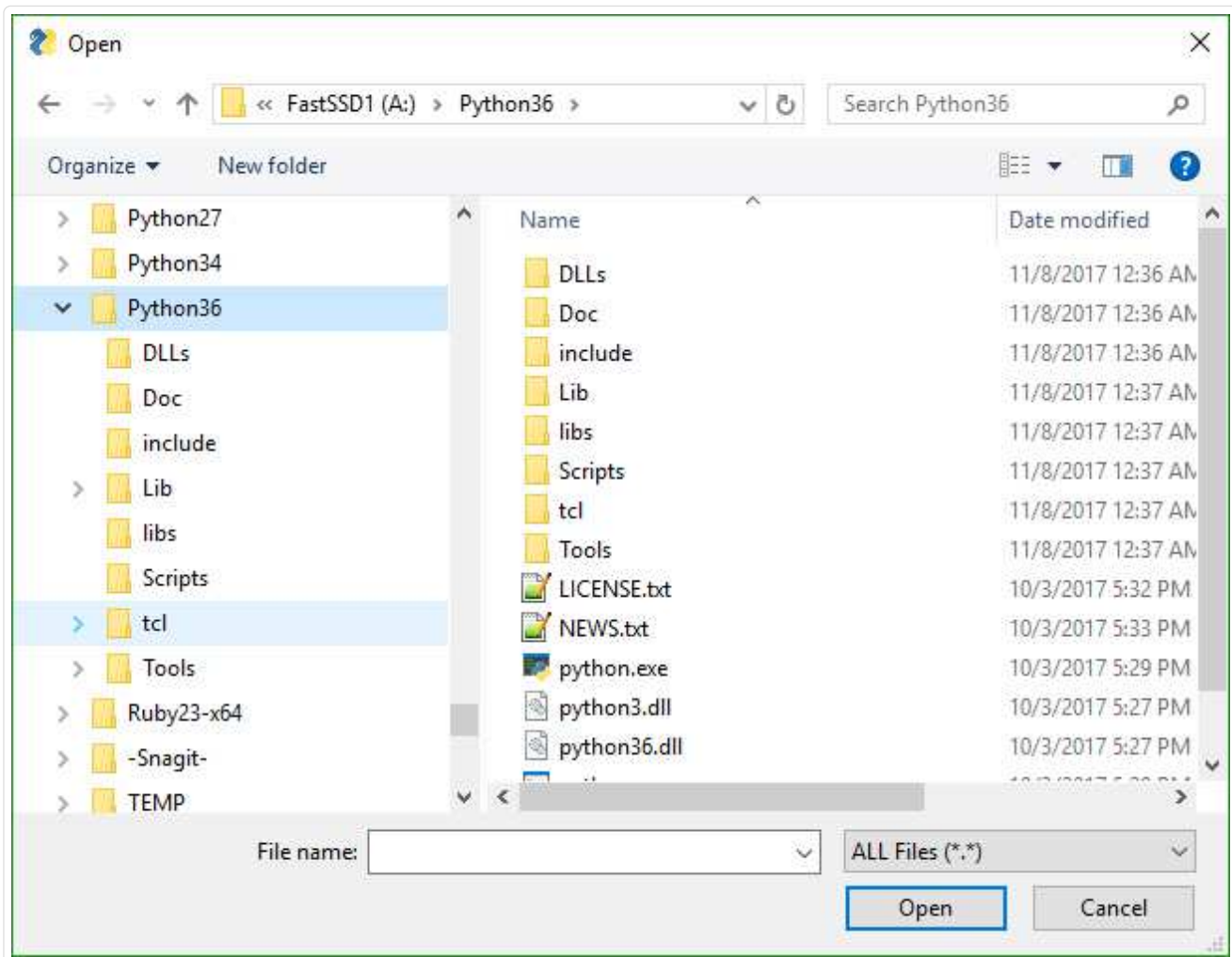
or if using keys, then the code would be:

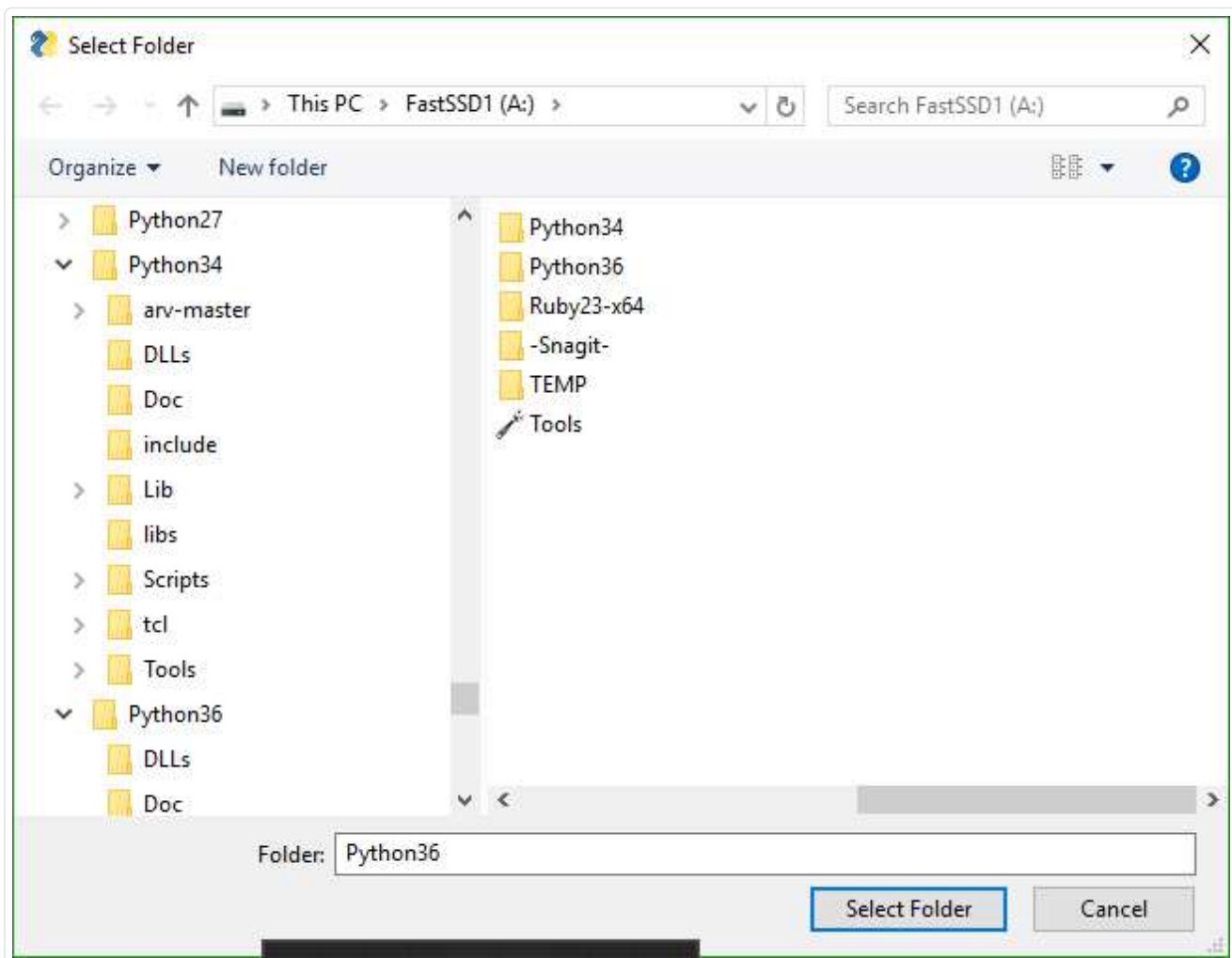
```
layout = [[sg.T('Source Folder')],
          [sg.In(key='input')],
          [sg.FolderBrowse(target='input'), sg.OK()]]
```

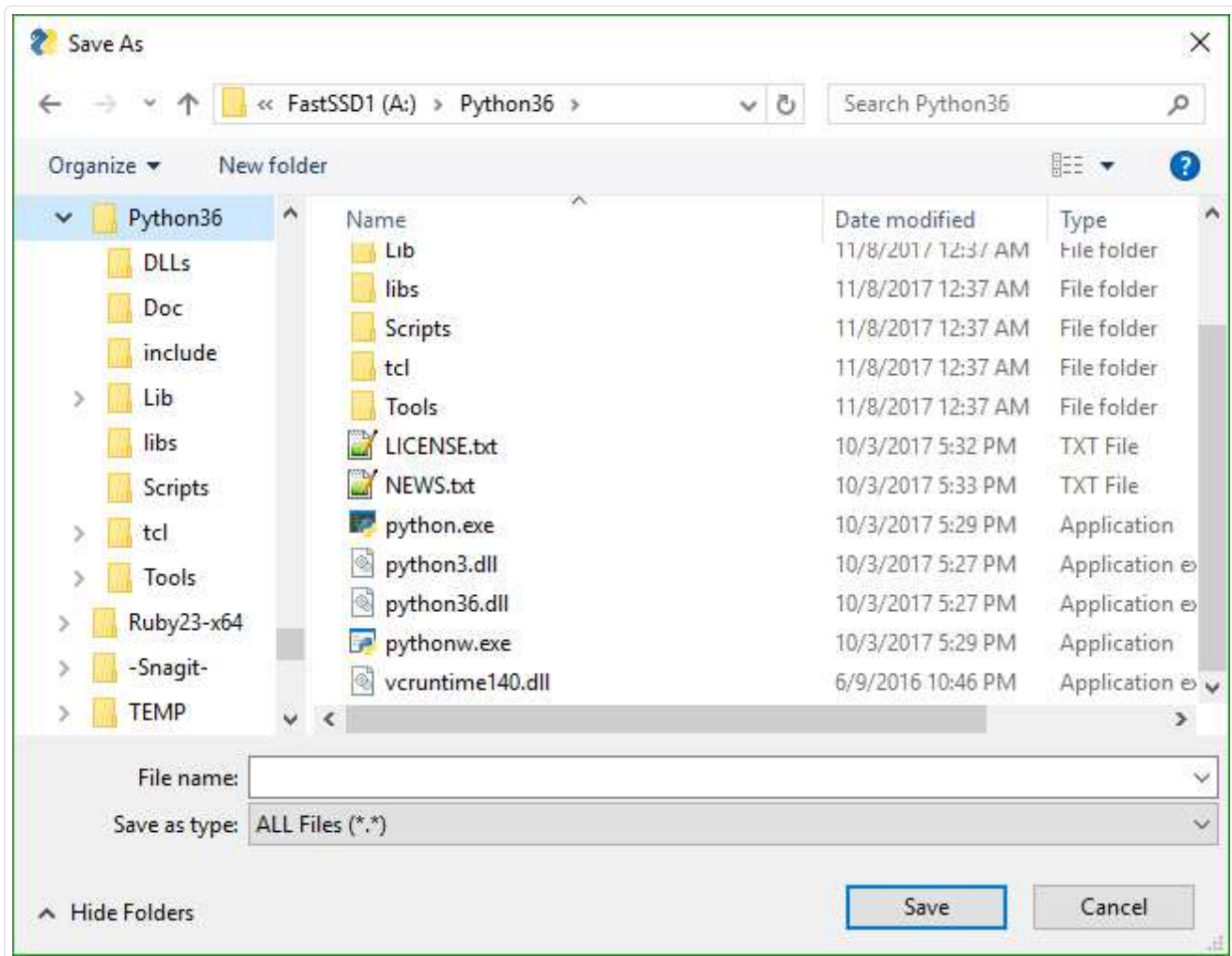
See how much easier the key method is?

Save & Open Buttons

There are 4 different types of File/Folder open dialog box available. If you are looking for a file to open, the `FileBrowse` is what you want. If you want to save a file, `SaveAs` is the button. If you want to get a folder name, then `FolderBrowse` is the button to use. To open several files at once, use the `FilesBrowse` button. It will create a list of files that are separated by ';

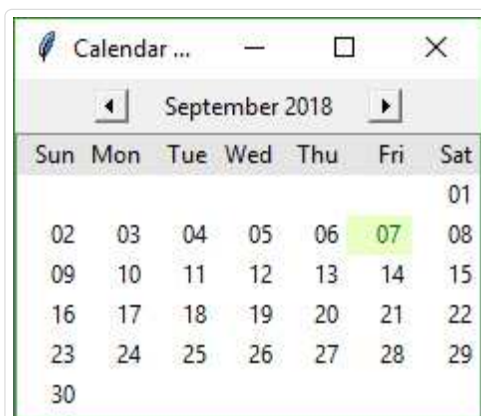






Calendar Buttons

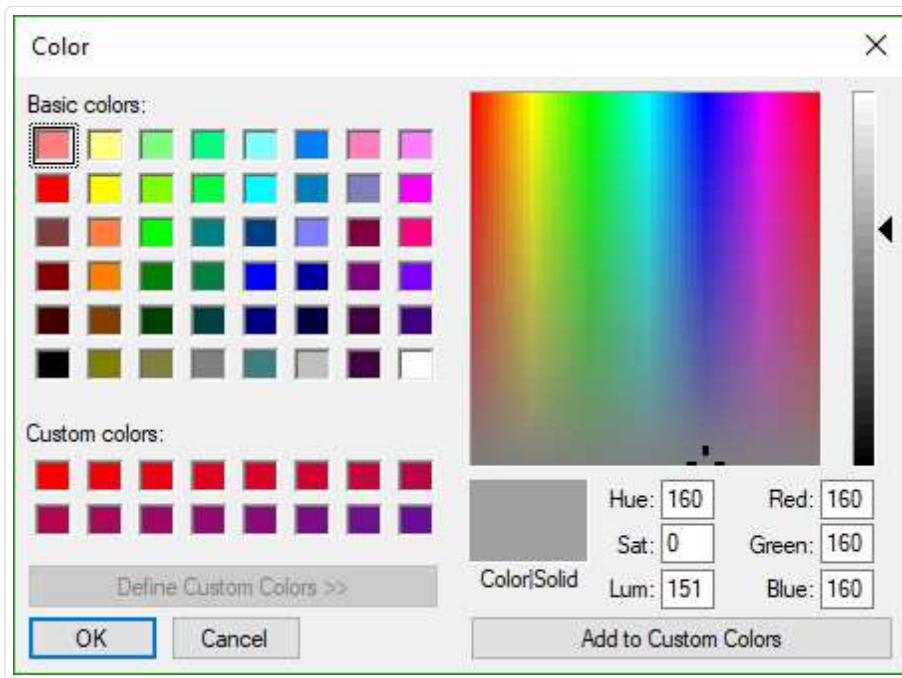
These buttons pop up a calendar chooser window. The chosen date is returned as a string.



Color Chooser Buttons

v: latest ▼

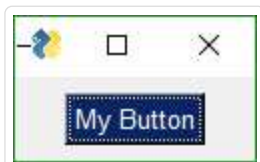
These buttons pop up a standard color chooser window. The result is returned as a tuple. One of the returned values is an RGB hex representation.



Custom Buttons

Not all buttons are created equal. A button that closes a window is different that a button that returns from the window without closing it. If you want to define your own button, you will generally do this with the Button Element `Button`, which closes the window when clicked.

```
layout = [[sg.Button('My Button')]]
```



All buttons can have their text changed by changing the `button_text` variable in the button call. It is this text that is returned when a window is read. This text will be what tells you which button is called so make it unique. Most of the convenience buttons (Submit, Cancel, Yes, etc) are all Buttons. Some that are not are `FileBrowse`, `FolderBrowse`, `FileSaveAs`. They clearly do not close the window. Instead they bring up a file or folder browser dialog box.

Button Images

Now this is an exciting feature not found in many simplified packages.... images on buttons! You can make a pretty spiffy user interface with the help of a few button images.

Your button images need to be in PNG or GIF format. When you make a button with an image, set the button background to the same color as the background. There's a button color `TRANSPARENT_BUTTON` that you can set your button color to in order for it to blend into the background. Note that this value is currently the same as the color as the default system background on Windows. If you want to set the button background color to the current system default, use the value `COLOR_SYSTEM_DEFAULT` as the background color.

This example comes from the `Demo Media Player.py` example program. Because it's a non-blocking button,

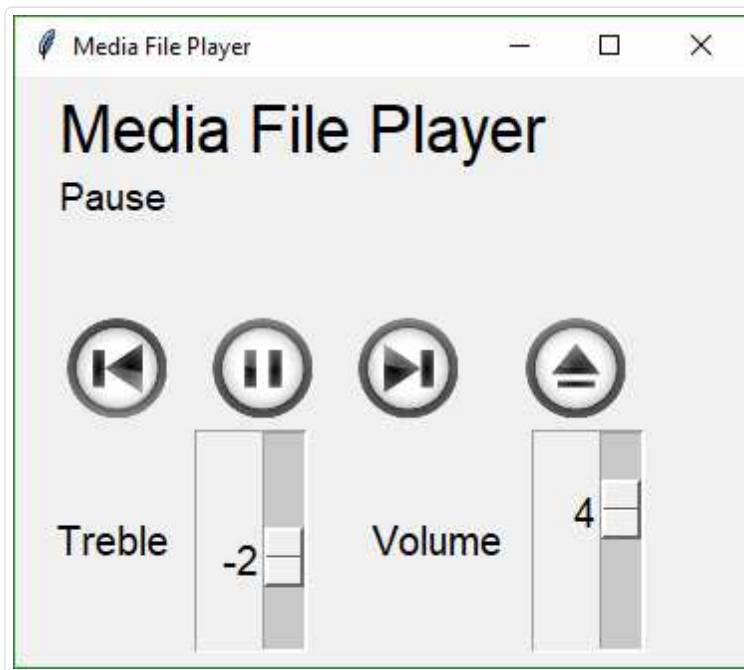
it's defined as `RButton`. You also put images on blocking buttons by using `Button`.

```
sg.RButton('Restart Song', button_color=sg.TRANSPARENT_BUTTON,
          image_filename=image_restart, image_size=(50, 50), image_subsample=2, bord
```

Three parameters are used for button images.

```
image_filename - Filename. Can be a relative path
image_size - Size of image file in pixels
image_subsample - Amount to divide the size by. 2 means your image will be 1/2 the size. 3
```

Here's an example window made with button images.



You'll find the source code in the file Demo Media Player. Here is what the button calls look like to create media player window

python

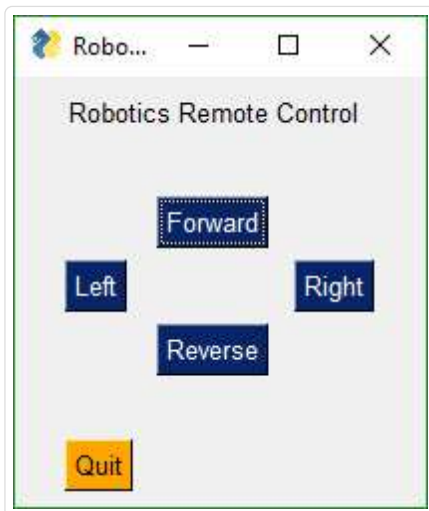
```
sg.RButton('Pause', button_color=sg.TRANSPARENT_BUTTON,
          image_filename=image_pause,
          image_size=(50, 50),
          image_subsample=2,
          border_width=0)
```

This is one you'll have to experiment with at this point. Not up for an exhaustive explanation.

Realtime Buttons

Normally buttons are considered "clicked" when the mouse button is let UP after a downward click on the button. What about times when you need to read the raw up/down button values. A classic example for this is a robotic remote control. Building a remote control using a GUI is easy enough. One button for each of the directions is a start. Perhaps something like this:

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This window has 2 button types. There's the normal "Read Button" (Quit) and 4 "Realtime Buttons".

Here is the code to make, show and get results from this window:


```
import PySimpleGUI as sg

gui_rows = [[sg.Text('Robotics Remote Control')],
             [sg.T(' ' * 10), sg.RealtimeButton('Forward')],
             [sg.RealtimeButton('Left'), sg.T(' ' * 15), sg.RealtimeButton('Right')],
             [sg.T(' ' * 10), sg.RealtimeButton('Reverse')],
             [sg.T('')],
             [sg.Quit(button_color=('black', 'orange'))]
            ]

window = sg.Window('Robotics Remote Control', auto_size_text=True).Layout(gui_rows)

#
# Some place later in your code...
# You need to perform a Read or Refresh call on your window every now and then or
# else it will appear as if the program has locked up.
#
# your program's main loop
while (True):
    # This is the code that reads and updates your window
    event, values = window.Read(timeout=0)
    if event is not None:
        print(event)
    if event == 'Quit' or values is None:
        break

window.Close() # Don't forget to close your window!
```

This loop will read button values and print them. When one of the Realtime buttons is clicked, the call to `window.Read` will return a button name matching the name on the button that was depressed or the key if there was a key assigned to the button. It will continue to return values as long as the button remains depressed. Once released, the Read will return timeout events until a button is again clicked.  v: latest ▼

File Types

The `FileBrowse` & `SaveAs` buttons have an additional setting named `file_types`. This variable is used to filter the files shown in the file dialog box. The default value for this setting is

```
FileTypes=(("ALL Files", "*..*"),)
```

This code produces a window where the Browse button only shows files of type .TXT

```
layout = [[sg.In(), sg.FileBrowse(file_types=(("Text Files", "*.txt"),))]]
```

NOTE - Mac users will not be able to use the `file_types` parameter. tkinter has a bug on Macs that will crash the program is a `file_type` is attempted so that feature had to be removed. Sorry about that!

The ENTER key

The ENTER key is an important part of data entry for windows. There's a long tradition of the enter key being used to quickly submit windows. PySimpleGUI implements this by tying the ENTER key to the first button that closes or reads a window.

The Enter Key can be "bound" to a particular button so that when the key is pressed, it causes the window to return as if the button was clicked. This is done using the `bind_return_key` parameter in the button calls. If there are more than 1 button on a window, the FIRST button that is of type Close window or Read window is used. First is determined by scanning the window, top to bottom and left to right.

Button Methods

```
Update(text=None, button_color=(None, None), disabled=None, image_data=None, image_filename=None)

GetText()
```

Update - Change the button element

```
text - sets button text
button color - (text, background)
disabled - if True disables the button
image_data - sets button image to in-ram image
image_filename - sets button image using a file
```

GetText - Returns the current text shown on a button

ButtonMenu Element

The ButtonMenu element produces a unique kind of effect. It's a button, that when clicked, shows you a menu. It's like clicking one of the top-level menu items on a MenuBar. As a result, the menu definition take the format of a single menu entry from a normal menu definition. A normal menu definition is a list of lists. This definition is one of those lists.

Here is a sample definition:

```
['Menu', ['&Pause Graph', 'Menu item::optional_key']]
```

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The very first string normally specifies what is shown on the menu bar. In this case, the value is **not used**. You

set the text for the button using a different parameter, the `button_text` parm.

```
ButtonMenu( button_text,
            menu_def,
            tooltip=None,
            disabled=False,
            image_filename=None,
            image_data=None,
            image_size=(None, None),
            image_subsample=None,
            border_width=None,
            size=(None, None),
            auto_size_button=None,
            button_color=None,
            font=None,
            pad=None,
            key=None,
            visible=True,
            size_px=(None, None) ):
```

One use of this element is to make a "fake menu bar" that has a colored background. Normal menu bars cannot have their background color changed. Not so with ButtonMenus.

This is the effect:

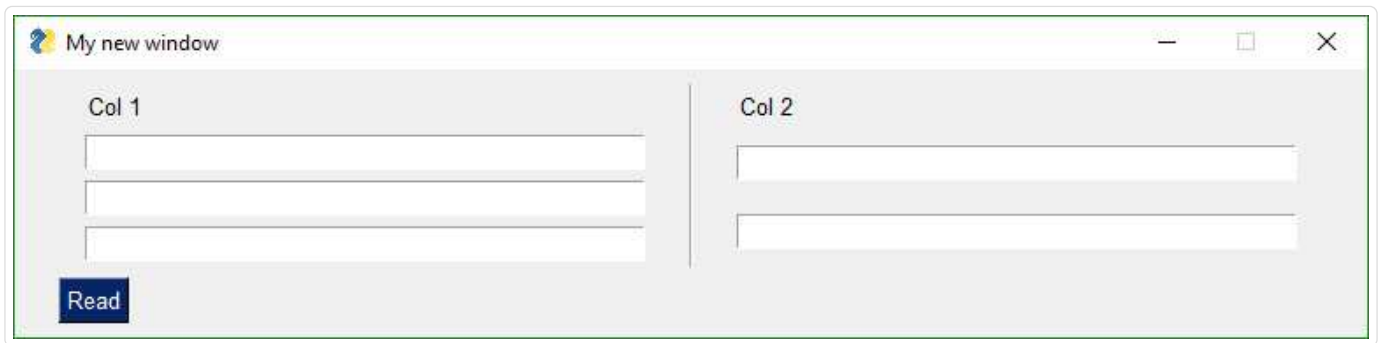


Return values for ButtonMenus are sent via the return values dictionary. If a selection is made, then an event is generated that will equal the ButtonMenu's key value. Use that key value to look up the value selected by the user. This is the same mechanism as the Menu Bar Element, but differs from the pop-up (right click) menu.

Vertical Separator Element

This element has limited usefulness and is being included more for completeness than anything else. It will draw a line between elements.

```
VerticalSeparator(pad=None)
```



It works best when placed between columns or elements that span multiple rows. If on a "normal" row with elements that are only 1 row high, then it will only span that one row.

ProgressBar Element

The `ProgressBar` element is used to build custom Progress Bar windows. It is HIGHLY recommended that you use `OneLineProgressMeter` that provides a complete progress meter solution for you. Progress Meters are not easy to work with because the windows have to be non-blocking and they are tricky to debug.

The **easiest** way to get progress meters into your code is to use the `OneLineProgressMeter` API. This consists of a pair of functions, `OneLineProgressMeter` and `OneLineProgressMeterCancel`. You can easily cancel any progress meter by calling it with the current value = max value. This will mark the meter as expired and close the window.

You've already seen `OneLineProgressMeter` calls presented earlier in this readme.

```
sg.OneLineProgressMeter('My Meter', i+1, 1000, 'key', 'Optional message')
```

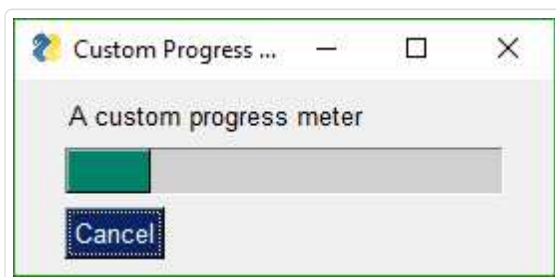
The return value for `OneLineProgressMeter` is:

`True` if meter updated correctly

`False` if user clicked the Cancel button, closed the window, or value reached the max value.

Progress Meter in Your window

Another way of using a Progress Meter with PySimpleGUI is to build a custom window with a `ProgressBar` Element in the window. You will need to run your window as a non-blocking window. When you are ready to update your progress bar, you call the `UpdateBar` method for the `ProgressBar` element itself.




```
import PySimpleGUI as sg

# layout the window
layout = [[sg.Text('A custom progress meter')],
          [sg.ProgressBar(10000, orientation='h', size=(20, 20), key='progressbar')],
          [sg.Cancel()]]

# create the window`
window = sg.Window('Custom Progress Meter').Layout(layout)
progress_bar = window.FindElement('progressbar')
# loop that would normally do something useful
for i in range(10000):
    # check to see if the cancel button was clicked and exit loop if clicked
    event, values = window.Read(timeout=0)
    if event == 'Cancel' or event is None:
        break
    # update bar with loop value +1 so that bar eventually reaches the maximum
    progress_bar.UpdateBar(i + 1)
# done with loop... need to destroy the window as it's still open
window.Close()
```

Output

The Output Element is a re-direction of Stdout. Anything "printed" will be displayed in this element.

```
Output(size=(None, None))
```

Here's a complete solution for a chat-window using an Async window with an Output Element

```
import PySimpleGUI as sg

# Blocking window that doesn't close
def ChatBot():
    layout = [[(sg.Text('This is where standard out is being routed', size=[40, 1])),
               [sg.Output(size=(80, 20))],
               [sg.Multiline(size=(70, 5), enter_submits=True),
                sg.RButton('SEND', button_color=(sg.YELLOWWS[0], sg.BLUES[0])),
                sg.Button('EXIT', button_color=(sg.YELLOWWS[0], sg.GREENS[0]))]]

    window = sg.Window('Chat Window', default_element_size=(30, 2)).Layout(layout)

    # ----- Loop taking in user input and using it to query HowDoI web oracle --- #
    while True:
        event, value = window.Read()
        if event == 'SEND':
            print(value)
        else:
            break

ChatBot()
```

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ProgressBar Methods

```
UpdateBar(current_count, max=None)
```

current_count - sets the current value

max - changes the max value

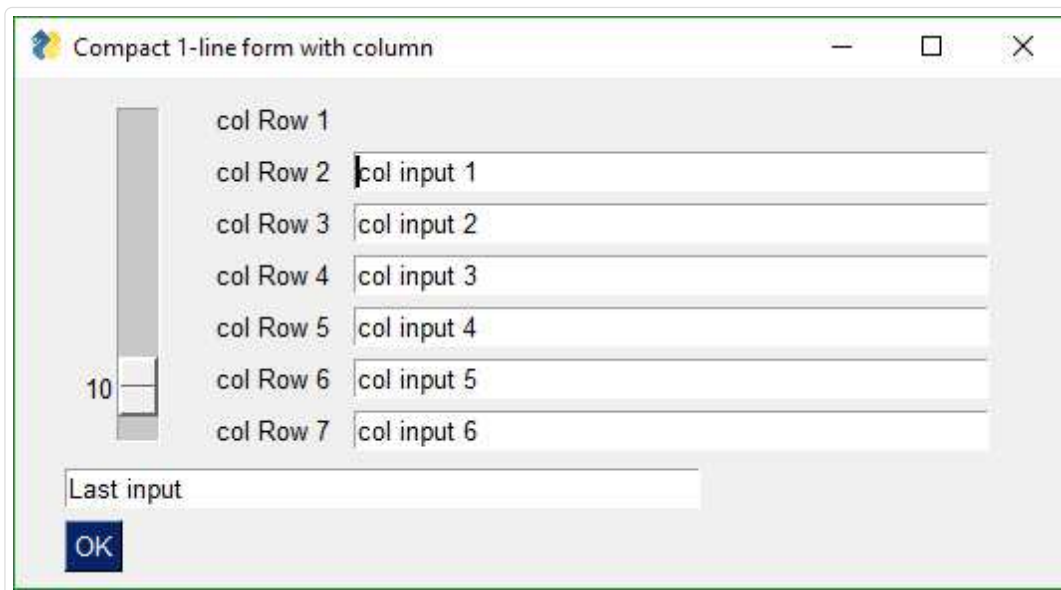
Column Element

Starting in version 2.9 you'll be able to do more complex layouts by using the Column Element. Think of a Column as a window within a window. And, yes, you can have a Column within a Column if you want.

Columns are specified in exactly the same way as a window is, as a list of lists.

```
Column( layout,
        background_color=None,
        size=(None, None),
        pad=None,
        scrollable=False,
        vertical_scroll_only=False,
        right_click_menu=None,
        key=None,
        visible=True)
```

Columns are needed when you have an element that has a height > 1 line on the left, with single-line elements on the right. Here's an example of this kind of layout:



This code produced the above window.

```
import PySimpleGUI as sg

# Demo of how columns work
# window has on row 1 a vertical slider followed by a COLUMN with 7 rows
# Prior to the Column element, this layout was not possible
# Columns layouts look identical to window layouts, they are a list of lists of elements.

window = sg.Window('Columns') # blank window

# Column layout
col = [[sg.Text('col Row 1')],
       [sg.Text('col Row 2'), sg.Input('col input 1')],
       [sg.Text('col Row 3'), sg.Input('col input 2')],
       [sg.Text('col Row 4'), sg.Input('col input 3')],
       [sg.Text('col Row 5'), sg.Input('col input 4')],
       [sg.Text('col Row 6'), sg.Input('col input 5')],
       [sg.Text('col Row 7'), sg.Input('col input 6')]]

layout = [[sg.Slider(range=(1,100), default_value=10, orientation='v', size=(8,20)), sg.Column
           [sg.In('Last input')],
           [sg.OK()]]

# Display the window and get values
# If you're willing to not use the "context manager" design pattern, then it's possible
# to collapse the window display and read down to a single line of code.
event, values = sg.Window('Compact 1-line window with column').Layout(layout).Read()

sg.Popup(event, values, line_width=200)
```

The Column Element has 1 required parameter and 1 optional (the layout and the background color). Setting the background color has the same effect as setting the window's background color, except it only affects the column rectangle.

```
Column(layout, background_color=None)
```

The default background color for Columns is the same as the default window background color. If you change the look and feel of the window, the column background will match the window background automatically.

Frame Element (Labelled Frames, Frames with a title)

Frames work exactly the same way as Columns. You create layout that is then used to initialize the Frame.

```

Frame(  title,
        layout,
        title_color=None,
        background_color=None,
        title_location=None,
        relief=DEFAULT_FRAME_RELIEF,
        size=(None, None),
        font=None,
        pad=None,
        border_width=None,
        key=None,
        tooltip=None,
        right_click_menu=None,
        visible=True)

```

```

def Frame(title - the label / title to put on frame
          layout - list of rows of elements the frame contains
          title_color - color of the title text
          background_color - color of background
          title_location - locations to put the title
          relief - type of relief to use
          size - size of Frame in characters. Do not use if you want frame to autosize
          font - font to use for title
          pad - element padding to use when packing
          border_width - how thick the line going around frame should be
          key - key used to location the element
          tooltip - tooltip text

```

This code creates a window with a Frame and 2 buttons.

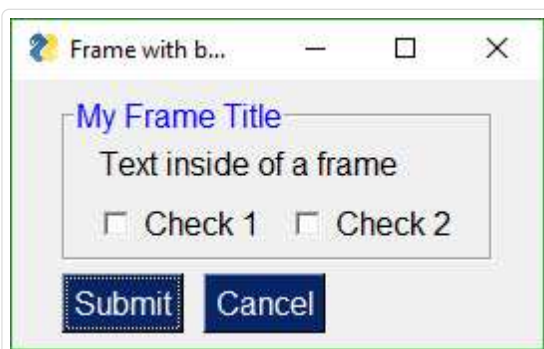
```

frame_layout = [
    [sg.T('Text inside of a frame')],
    [sg.CB('Check 1'), sg.CB('Check 2')],
]

layout = [
    [sg.Frame('My Frame Title', frame_layout, font='Any 12', title_color='blue')],
    [sg.Submit(), sg.Cancel()]
]

window = sg.Window('Frame with buttons', font=("Helvetica", 12)).Layout(layout)

```



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Notice how the Frame layout looks identical to a window layout. A window works exactly the same way as a Column and a Frame. They all are "container elements". Elements that contain other elements.

These container Elements can be nested as deep as you want. That's a pretty spiffy feature, right? Took a lot of work so be appreciative. Recursive code isn't trivial.

Canvas Element

```
Canvas(canvas=None,
        background_color=None,
        size=(None, None),
        pad=None,
        key=None,
        tooltip=None,
        right_click_menu=None,
        visible=True)
```

In my opinion, the tkinter Canvas Widget is the most powerful of the tkinter widget. While I try my best to completely isolate the user from anything that is tkinter related, the Canvas Element is the one exception. It enables integration with a number of other packages, often with spectacular results.

Matplotlib, Pyplot Integration

One such integration is with Matploplib and Pyplot. There is a Demo program written that you can use as a design pattern to get an understanding of how to use the Canvas Widget once you get it.

```
def Canvas(canvas - a tkinter canvas if you created one. Normally not set
            background_color - canvas color
            size - size in pixels
            pad - element padding for packing
            key - key used to lookup element
            tooltip - tooltip text
```

The order of operations to obtain a tkinter Canvas Widget is:

```
figure_x, figure_y, figure_w, figure_h = fig.bbox.bounds
# define the window layout
layout = [[sg.Text('Plot test')],
          [sg.Canvas(size=(figure_w, figure_h), key='canvas')],
          [sg.OK(pad=((figure_w / 2, 0), 3), size=(4, 2))]]

# create the window and show it without the plot
window = sg.Window('Demo Application - Embedding Matplotlib In PySimpleGUI').Layout(layout).F

# add the plot to the window
fig_photo = draw_figure(window.FindElement('canvas').TKCanvas, fig)

# show it all again and get buttons
event, values = window.Read()
```

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To get a tkinter Canvas Widget from PySimpleGUI, follow these steps:

Add Canvas Element to your window

Layout your window

Call `window.Finalize()` - *this is a critical step you must not forget*

Find the Canvas Element by looking up using key

Your Canvas Widget Object will be the `found_element.TKCanvas`

Draw on your canvas to your heart's content

* Call `window.Read()` - Nothing will appear on your canvas until you call Read

See `Demo_Matplotlib.py` for a Recipe you can copy.

Canvas Methods

TKCanvas - not a method but a property. Returns the tkinter Canvas Widget

Graph Element

All you math fans will enjoy this Element... and all you non-math fans will enjoy it too.

I've found nothing to be less fun than dealing with a graphic's coordinate system from a GUI Framework. It's always upside down from what I want. (0,0) is in the upper left hand corner. In short, it's a **pain in the ass**.

Graph Element to the rescue. A Graph Element creates a pixel addressable canvas using YOUR coordinate system. You get to define the units on the X and Y axis.

There are 3 values you'll need to supply the Graph Element. They are:

Size of the canvas in pixels

The lower left (x,y) coordinate of your coordinate system

* The upper right (x,y) coordinate of your coordinate system

After you supply those values you can scribble all of over your graph by creating Graph Figures. Graph Figures are created, and a Figure ID is obtained by calling:

DrawCircle

DrawLine

DrawPoint

DrawRectangle

* *DrawOval*

You can move your figures around on the canvas by supplying the Figure ID the x,y amount to move.

```
graph.MoveFigure(my_circle, 10, 10)
```

This Element is relatively new and may have some parameter additions or deletions. It shouldn't break your code however.

```

Graph(canvas_size,
      graph_bottom_left,
      graph_top_right,
      background_color=None,
      pad=None,
      change_submits=False,
      drag_submits=False,
      enable_events=False,
      key=None,
      tooltip=None,
      right_click_menu=None,
      visible=True)

```

Graph Methods

```

DrawLine(self, point_from, point_to, color='black', width=1)
DrawPoint(self, point, size=2, color='black')
DrawCircle(self, center_location, radius, fill_color=None, line_color='black')
DrawOval(self, top_left, bottom_right, fill_color=None, line_color=None)
DrawArc(self, top_left, bottom_right, extent, start_angle, style=None, arc_color='black')
DrawRectangle(self, top_left, bottom_right, fill_color=None, line_color=None)
DrawText(self, text, location, color='black', font=None, angle=0)
Erase(background_color)
DeleteFigure(figure_id)
Update()
Move(self, x_direction, y_direction)
MoveFigure(self, figure, x_direction, y_direction)
TKCanvas

```

All of the Drawing methods return a "**figure**" that can be used move and delete the figure

DrawLine - draws a line

DrawPoint - draws a single point

DrawCircle - draws a circle

DrawOval - draws an oval

DrawArc - draws an arc

DrawRectangle - draws a rectangle

DrawText - draws text

Erase - erases entire graph

Update - changes background color

Move - moves everything an x,y direction

MoveFigure - moves an individual figure

DeleteFigure - delete an individual figure

Table Element

Out of all of the Elements, it's the Table and the Tree that are the most "problematic" in the tkinter inter and Qt implementations. They're hard is my only defense.

 v: latest ▼

Known visualization problem....

If you click on the header, it can go into spasms for some tables. I don't understand what's causing it and it's been there evidently since the first release of Tables.

```
Table( values,
        headings=None,
        visible_column_map=None,
        col_widths=None,
        def_col_width=10,
        auto_size_columns=True,
        max_col_width=20,
        select_mode=None,
        display_row_numbers=False,
        num_rows=None,
        row_height=None,
        font=None,
        justification='right',
        text_color=None,
        background_color=None,
        alternating_row_color=None,
        row_colors=None,
        vertical_scroll_only=True,
        size=(None, None),
        change_submits=False,
        enable_events=False,
        bind_return_key=False,
        pad=None,
        key=None,
        tooltip=None,
        right_click_menu=None,
        visible=True):
```

values - Your table's array

headings - list of strings representing your headings, if you have any

visible_column_map - list of bools. If True, column in that position is shown. Defaults to all columns

col_widths - list of column widths

def_col_width - default column width. defaults to 10

auto_size_columns - bool. If True column widths are determined by table contents

max_col_width - maximum width of a column. defaults to 25

select_mode - table rows can be selected, but doesn't currently do anything

display_row_numbers - bool. If True shows numbers next to rows num_rows = the number of rows to display at a time (same as size[0])

row_height = number of pixels high a row should be. Normally left as default value

font - font for table entries

justification - left, right, center

text_color - color of text

alternating row color - if set will change background color for alternating rows row_colors - list of tuples representing (row_number, color) e.g. row_colors = ((5, 'white', 'blue'), (0, 'red'), (15, 'yellow'))

vertical_scroll_only - if True will not show a horizontal scrollbar. NOTE - will have to disable to get horizontal

scrollbars background_color - cell background color

 v: latest ▼

size - (None, number of rows) - don't use, use num_rows instead enable_events - will return a 'row selected' event when row is selected change_submits - the old way of indicating enable_events bind_return_key -

returns event if a double click or a return key is pressed while row is highlighted
pad - element padding for packing
key - key used to lookup element
tooltip - tooltip text

Read return values from Table Element

The values returned from a `Window.Read` call for the Tree Element are a list of row numbers that are currently highlighted.

Update Call

The Update method can be used to make changes to a table that's already been displayed. The call takes a single parameter, values, which is the new table to display. The entire table is replaced.

```
def Update(self, values=None):
```

`values` is a table containing your rows just like you passed in when creating the Table Element.

Tree Element

The Tree Element and Table Element are close cousins. Many of the parameters found in the Table Element apply to Tree Elements. In particular the heading information, column widths, etc.

```
Tree(    data=None,
        headings=None,
        visible_column_map=None,
        col_widths=None,
        col0_width=10,
        def_col_width=10,
        auto_size_columns=True,
        max_col_width=20,
        select_mode=None,
        show_expanded=False,
        change_submits=False,
        enable_events=False,
        font=None,
        justification='right',
        text_color=None,
        background_color=None,
        num_rows=None,
        row_height=None,
        pad=None,
        key=None,
        tooltip=None,
        right_click_menu=None,
        visible=True)
```

```

class Tree(data=None - data in TreeData format
    headings=None - list of strings representing your headings
    visible_column_map=None - list of bools indicating which columns to display
    col_widths=None - list of column widths
    col0_width=10 - width of the first column which has the text data
    def_col_width=10 - default column width
    auto_size_columns=True - if true will autosize columns (currently only sizes to col h
    max_col_width=20 - max width for columns in characters
    select_mode=None - not yet used
    show_expanded - Bool - if True the tree will be fully expanded when shown
    font=None - the display font
    justification='right' - justification for data display
    text_color=None - color of text to display
    background_color=None - background color
    num_rows=None - number of rows to display
    row_height=None - height of rows in pixels
    pad=None - element padding
    key=None - key for element
    tooltip=None - tooltip

```

Unlike Tables there is no standard format for trees. Thus the data structure passed to the Tree Element must be constructed. This is done using the TreeData class. The process is as follows:

Get a TreeData Object

"Insert" data into the tree

* Pass the filled in TreeData object to Tree Element

TreeData format

```

def TreeData()
def Insert(self, parent, key, text, values, icon=None)

```

To "insert" data into the tree the TreeData method Insert is called.

```
Insert(parent_key, key, display_text, values)
```

To indicate insertion at the head of the tree, use a parent key of "". So, every top-level node in the tree will have a parent node = ""

This code creates a TreeData object and populates with 3 values

```

treedata = sg.TreeData()

treedata.Insert("", '_A_', 'A', [1,2,3])
treedata.Insert("", '_B_', 'B', [4,5,6])
treedata.Insert("_A_", '_A1_', 'A1', ['can','be','anything'])

```

Note that you **can** use the same values for display_text and keys. The only thing you have to watch for is that you cannot repeat keys.

When Reading a window the Table Element will return a list of rows that are selected by the user. The list will be empty if no rows are selected.

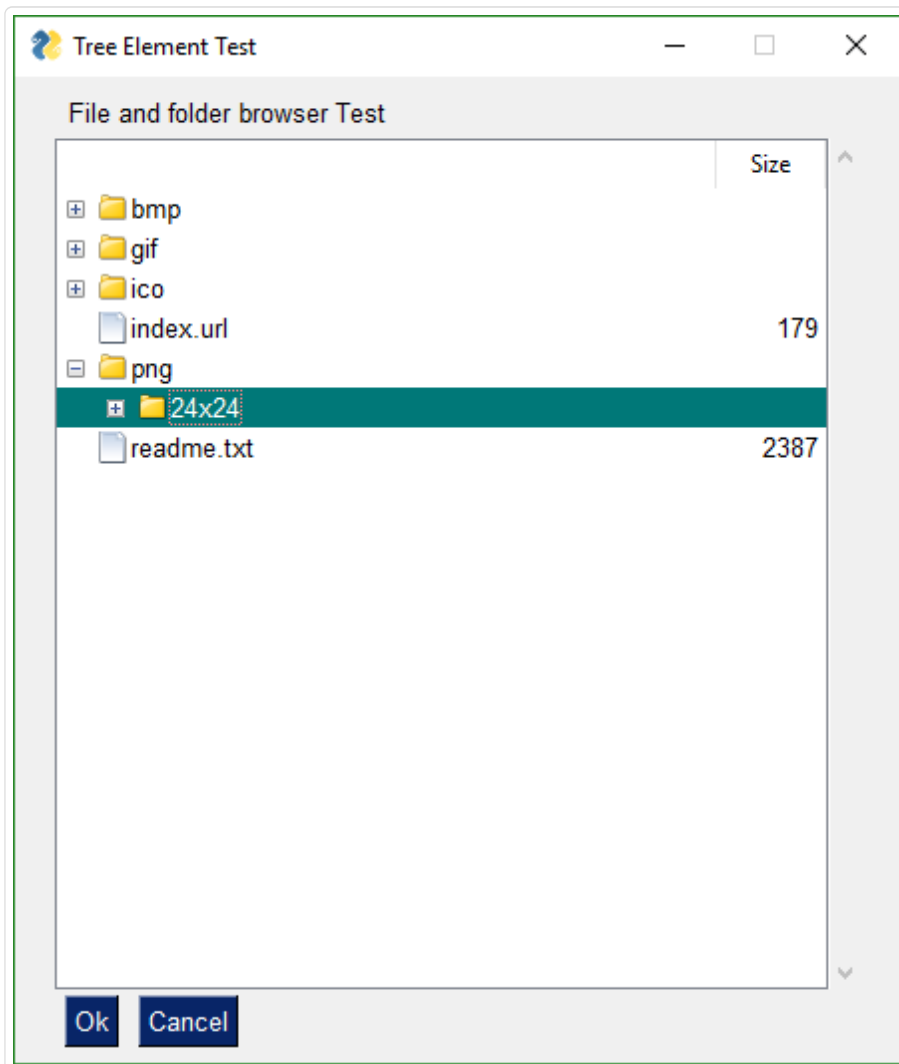
 v: latest ▼

Icons on Tree Entries

If you wish to show an icon next to a tree item, then you specify the icon in the call to `Insert`. You pass in a

filename or a Base64 bytes string using the optional `icon` parameter.

Here is the result of showing an icon with a tree entry.



Tab and Tab Group Elements

Tabs have been a part of PySimpleGUI since the initial release. However, the initial implementation applied tabs at the top level only. The entire window had to be tabbed. There with other limitations that came along with that implementation. That all changed in version 3.8.0 with the new elements - Tab and TabGroup. The old implementation of Tabs was removed in version 3.8.0 as well.

Tabs are another "Container Element". The other Container Elements include:

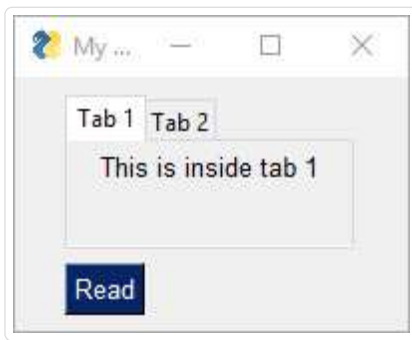
Frame

Column

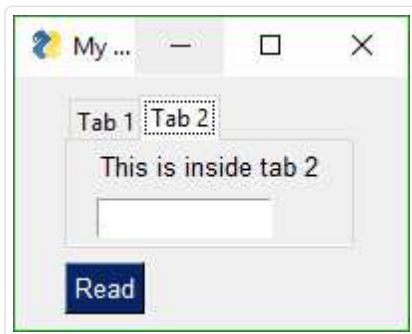
You layout a Frame in exactly the same way as a Frame or Column elements, by passing in a list of elements.

How you place a Tab into a Window is different than Graph or Frame elements. You cannot place a tab directly into a Window's layout. It must first be placed into a TabGroup. The TabGroup can then be placed into the Window.

Let's look at this Window as an example:



View of second tab:



First we have the Tab layout definitions. They mirror what you see in the screen shots. Tab 1 has 1 Text Element in it. Tab 2 has a Text and an Input Element.

```
tab1_layout = [[sg.T('This is inside tab 1')]]

tab2_layout = [[sg.T('This is inside tab 2')],
               [sg.In(key='in')]]
```


The layout for the entire window looks like this:

```
layout = [[sg.TabGroup([[sg.Tab('Tab 1', tab1_layout), sg.Tab('Tab 2', tab2_layout)]])],
          [sg.RButton('Read')]]
```

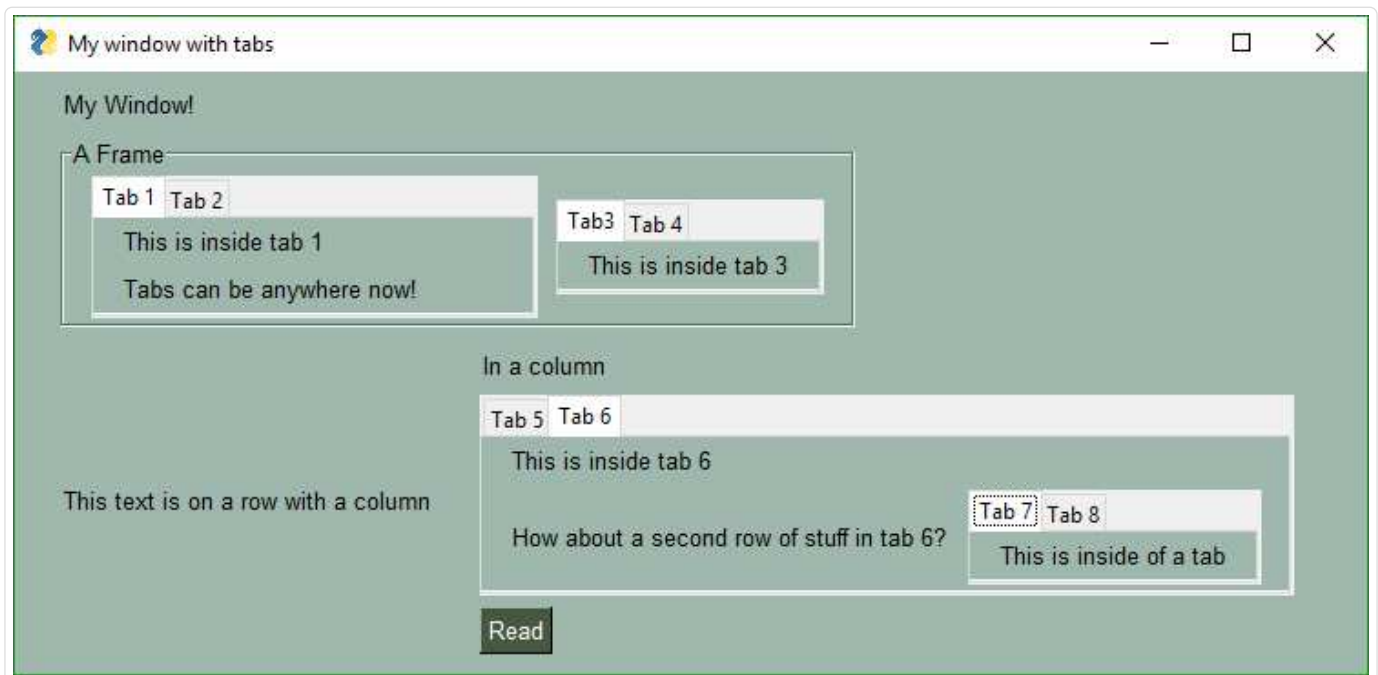
The Window layout has the TabGroup and within the tab Group are the two Tab elements.

One important thing to notice about all of these container Elements... they all take a "list of lists" at the layout. They all have a layout that starts with `[[`

You will want to keep this `[[]]` construct in your head as you're debugging your tabbed windows. It's easy to overlook one or two necessary '['s

As mentioned earlier, the old-style Tabs were limited to being at the Window-level only. In other words, the tabs were equal in size to the entire window. This is not the case with the "new-style" tabs. This is why you're not going to be upset when you discover your old code no longer works with the new PySimpleGUI release. It'll be worth the few moments it'll take to convert your code.  [v: latest](#) ▼

Check out what's possible with the NEW Tabs!



Check out Tabs 7 and 8. We've got a Window with a Column containing Tabs 5 and 6. On Tab 6 are... Tabs 7 and 8.

As of Release 3.8.0, not all of *options* shown in the API definitions of the Tab and TabGroup Elements are working. They are there as placeholders.

The definition of a TabGroup is

```
TabGroup(layout,
         title_color=None
         background_color=None
         font=None
         pad=None
         border_width=None
         change_submits = False
         key=None
         tooltip=None)
```

The definition of a Tab Element is

```
Tab(title,
     layout,
     title_color=None,
     background_color=None,
     font=None,
     pad=None
     disabled=False
     border_width=None
     key=None
     tooltip=None)
```

 v: latest ▼

Reading Tab Groups

Tab Groups now return a value when a Read returns. They return which tab is currently selected. There is also a `change_submits` parameter that can be set that causes a Read to return if a Tab in that group is selected / changed. The key or title belonging to the Tab that was switched to will be returned as the value

Tab Element Methods

```
Update(disabled = None, visible=None)
```

WARNING - This Update method may not be working correctly

Pane Element

New in version 3.20 is the Pane Element, a super-cool tkinter feature. You won't find this one in PySimpleGUIQt, only PySimpleGUI. It's difficult to describe one of these things. Think of them as "Tabs without labels" that you can slide.



```
Pane(pane_list, background_color=None, size=(None, None), pad=None, orientation='vertical', s
```

Each "Pane" of a Pane Element must be a Column Element. The parameter `pane_list` is a list of Column Elements.

Calls can get a little hairy looking if you try to declare everything in-line as you can see in this example.

```
sg.Pane([col5, sg.Column([[sg.Pane([col1, col2, col4], handle_size=15, orientation='v', back
```

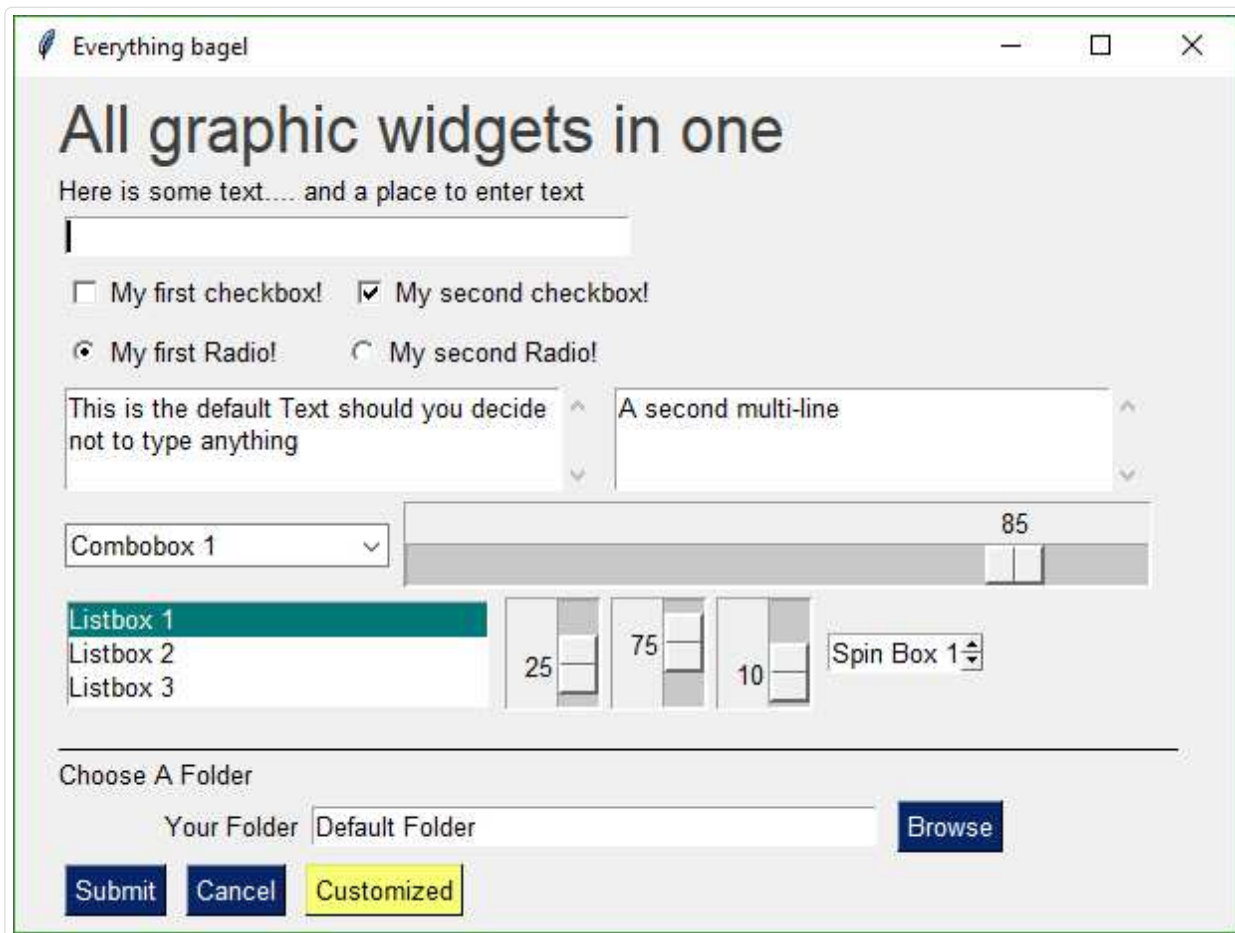
Combing these with *visibility* make for an interesting interface with entire panes being hidden from view until needed by the user. It's one way of producing "dynamic" windows.

Colors

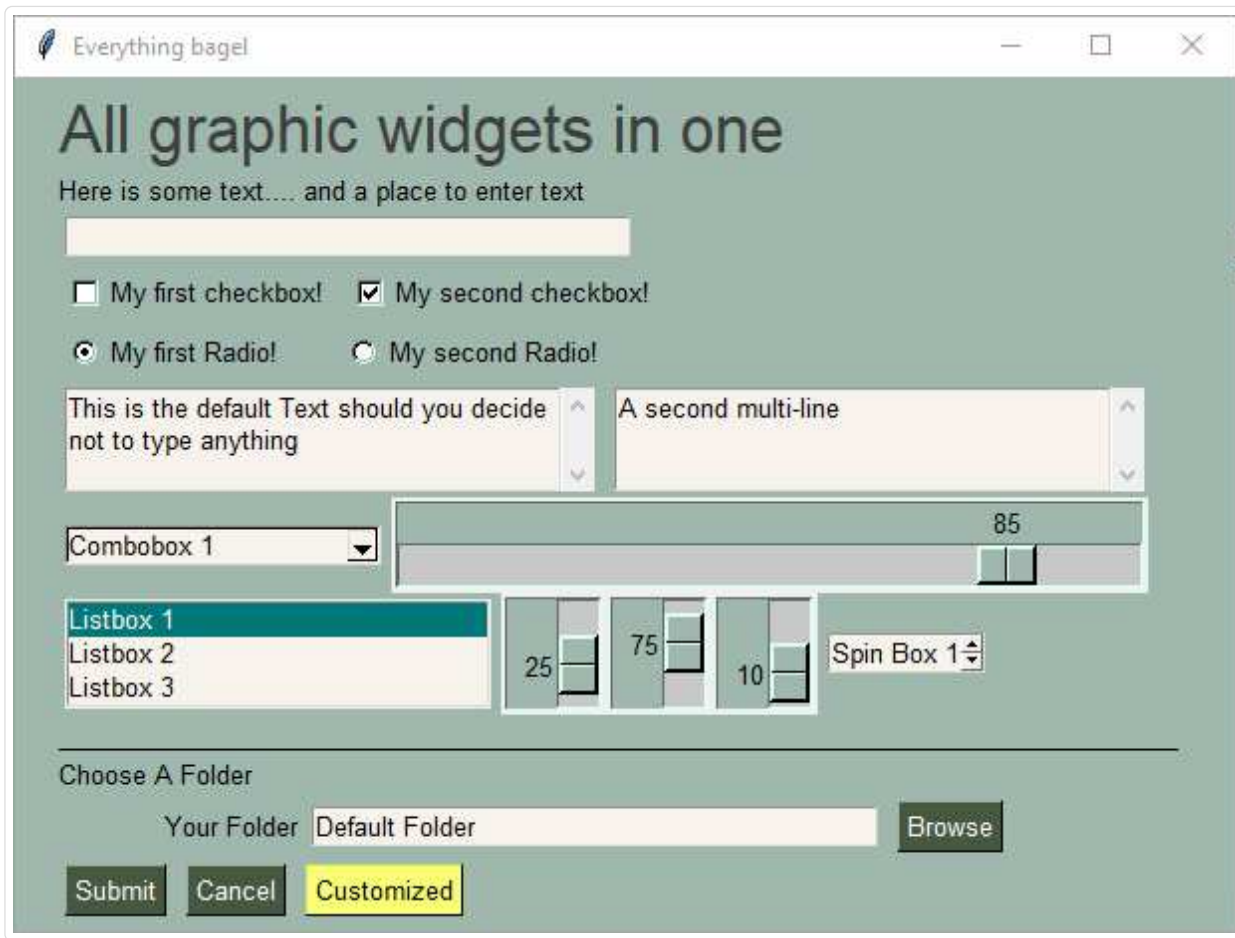
v: latest ▼

Starting in version 2.5 you can change the background colors for the window and the Elements.

Your windows can go from this:



to this... with one function call...



While you can do it on an element by element or window level basis, the easiest way, by far, is a call to `SetOptions`.

Be aware that once you change these options they are changed for the rest of your program's execution. All of your windows will have that look and feel, until you change it to something else (which could be the system default colors).

This call sets all of the different color options.

```
SetOptions(background_color='#9FB8AD',
            text_element_background_color='#9FB8AD',
            element_background_color='#9FB8AD',
            scrollbar_color=None,
            input_elements_background_color='#F7F3EC',
            progress_meter_color = ('green', 'blue')
            button_color=('white', '#475841'))
```

SystemTray

This is a PySimpleGUIQt and PySimpleGUIWx only feature. Don't know of a way to do it using tkinter. [Your latest source code for SystemTray is identical for the Qt and Wx implementations.](#) You can switch frameworks by simply changing your import statement.

In addition to running normal windows, it's now also possible to have an icon down in the system tray that you can read to get menu events. There is a new `SystemTray` object that is used much like a `Window` object. You first get one, then you perform Reads in order to get events.

Here is the definition of the `SystemTray` object.

```
SystemTray(menu=None, filename=None, data=None, data_base64=None, tooltip=None):
    '''
    SystemTray - create an icon in the system tray
    :param menu: Menu definition
    :param filename: filename for icon
    :param data: in-ram image for icon
    :param data_base64: base64 data for icon
    :param tooltip: tooltip string '''
```

You'll notice that there are 3 different ways to specify the icon image. The base-64 parameter allows you to define a variable in your .py code that is the encoded image so that you do not need any additional files. Very handy feature.

System Tray Design Pattern

Here is a design pattern you can use to get a jump-start.

This program will create a system tray icon and perform a blocking Read. If the item "Open" is chosen from the system tray, then a popup is shown.

```
import PySimpleGUIQt as sg

menu_def = ['BLANK', ['&Open', '---', '&Save', ['1', '2', ['a', 'b']], '&Properties', 'E&xit']]

tray = sg.SystemTray(menu=menu_def, filename=r'default_icon.ico')

while True: # The event loop
    menu_item = tray.Read()
    print(menu_item)
    if menu_item == 'Exit':
        break
    elif menu_item == 'Open':
        sg.Popup('Menu item chosen', menu_item)
```

The design pattern creates an icon that will display this menu:



v: latest ▼

Icons

When specifying "icons", you can use 3 different formats.

`filename` - `filename` `data_base64` - base64 byte string * `data` - in-ram bitmap or other "raw" image

You will find 3 parameters used to specify these 3 options on both the initialize statement and on the Update method.

Menu Definition

```
menu_def = ['BLANK', ['&Open', '&Save', ['1', '2', ['a', 'b']], '!&Properties', 'E&xit']]
```

A menu is defined using a list. A "Menu entry" is a string that specifies: *text shown* keyboard shortcut * key

See section on Menu Keys for more information on using keys with menus.

An entry without a key and keyboard shortcut is a simple string `'Menu Item'`

If you want to make the "M" be a keyboard shortcut, place an `&` in front of the letter that is the shortcut.

```
'&Menu Item'
```

You can add "keys" to make menu items unique or as another way of identifying a menu item than the text shown. The key is added to the text portion by placing `::` after the text.

```
'Menu Item::key'
```

The first entry can be ignored. `'BLANK'` was chosen for this example. It's this way because normally you would specify these menus under some heading on a menu-bar. But here there is no heading so it's filled in with any value you want.

Separators If you want a separator between 2 items, add the entry `'---'` and it will add a separator item at that place in your menu.

Disabled menu entries

If you want to disable a menu entry, place a `!` before the menu entry

SystemTray Methods

Read - Read the context menu or check for events

```
def Read(timeout=None)
    """
    Reads the context menu
    :param timeout: Optional. Any value other than None indicates a non-blocking read
    :return: String representing meny item chosen. None if nothing read.
    """
```

The `timeout` parameter specifies how long to wait for an event to take place. If nothing happens within the timeout period, then a "timeout event" is returned. These types of reads make it possible to run asynchronously. To run non-blocked, specify `timeout=0` on the Read call.

Read returns the menu text, complete with key, for the menu item chosen. If you specified `Open::key` as the menu entry, and the user clicked on `Open`, then you will receive the string `Open::key` upon completion of the Read.

Read special return values

In addition to Menu Items, the Read call can return several special values. They include:

EVENT_SYSTEM_TRAY_ICON_DOUBLE_CLICKED - Tray icon was double clicked

EVENT_SYSTEM_TRAY_ICON_ACTIVATED - Tray icon was single clicked

EVENT_SYSTEM_TRAY_MESSAGE_CLICKED - a message balloon was clicked
TIMEOUT_KEY is returned if no events are available if the timeout value is set in the Read call

Hide

Hides the icon. Note that no message balloons are shown while an icon is hidden.

```
def Hide()
```

Close

Does the same thing as hide

```
def Close()
```

UnHide

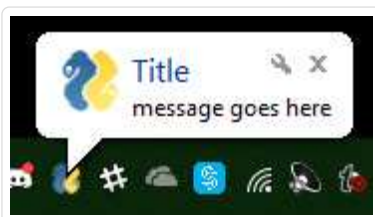
Shows a previously hidden icon

```
def UnHide()
```

ShowMessage

Shows a balloon above the icon in the system tray area. You can specify your own icon to be shown in the balloon, or you can set `messageicon` to one of the preset values.

This message has a custom icon.



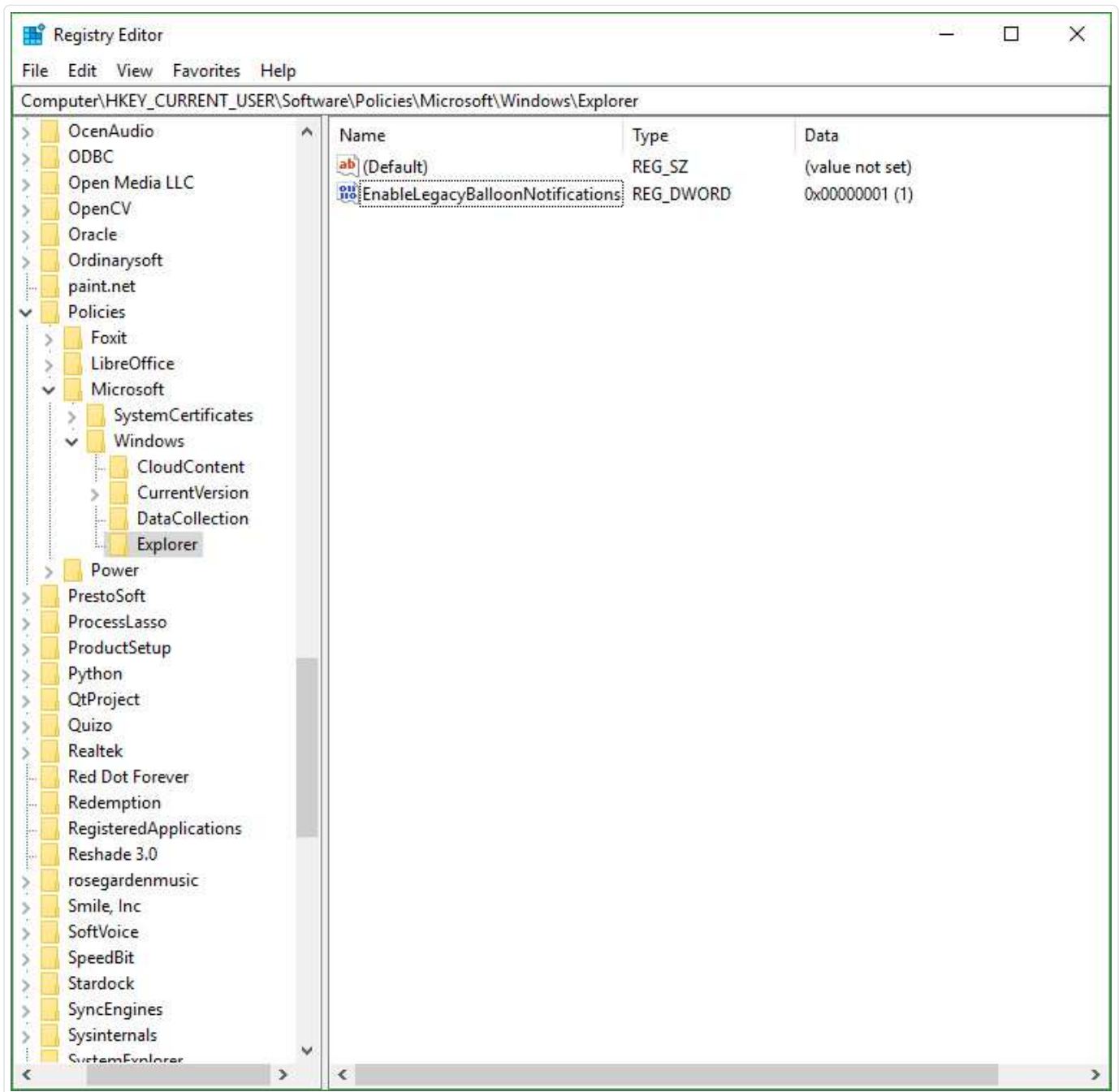
The preset `messageicon` values are:

```
SYSTEM_TRAY_MESSAGE_ICON_INFORMATION  
SYSTEM_TRAY_MESSAGE_ICON_WARNING  
SYSTEM_TRAY_MESSAGE_ICON_CRITICAL  
SYSTEM_TRAY_MESSAGE_ICON_NOICON
```

 v: latest ▼

```
ShowMessage(title, message, filename=None, data=None, data_base64=None, messageicon=None, tim
'''
Shows a balloon above icon in system tray
:param title: Title shown in balloon
:param message: Message to be displayed
:param filename: Optional icon filename
:param data: Optional in-ram icon
:param data_base64: Optional base64 icon
:param time: How long to display message in milliseconds :return:
'''
```

Note, on windows it may be necessary to make a registry change to enable message balloons to be seen. To fix this, you must create the DWORD you see in this screenshot.



Update

You can update any of these items within a SystemTray object *Menu definition* Icon * Tooltip

Change them all or just 1.

```

Update(menu=None, tooltip=None, filename=None, data=None, data_base64=None, )
'''
Updates the menu, tooltip or icon
:param menu: menu definition
:param tooltip: string representing tooltip
:param filename: icon filename
:param data: icon raw image
:param data_base64: icon base 64 image
:return:
'''

```

Global Settings

Global Settings

Let's have some fun customizing! Make PySimpleGUI look the way you want it to look. You can set the global settings using the function `PySimpleGUI.SetOptions`. Each option has an optional parameter that's used to set it.

```

SetOptions(icon=None
            button_color=(None, None)
            element_size=(None, None),
            margins=(None, None),
            element_padding=(None, None)
            auto_size_text=None
            auto_size_buttons=None
            font=None
            border_width=None
            slider_border_width=None
            slider_relief=None
            slider_orientation=None
            autoclose_time=None
            message_box_line_width=None
            progress_meter_border_depth=None
            progress_meter_style=None
            progress_meter_relief=None
            progress_meter_color=None
            progress_meter_size=None
            text_justification=None
            text_color=None
            background_color=None
            element_background_color=None
            text_element_background_color=None
            input_elements_background_color=None
            element_text_color=None
            input_text_color=None
            scrollbar_color=None, text_color=None
            debug_win_size=(None, None)
            window_location=(None, None)
            tooltip_time = None

```

 v: latest ▼

Explanation of parameters

```

icon - filename of icon used for taskbar and title bar
button_color - button color (foreground, background)
element_size - element size (width, height) in characters
margins - tkinter margins around outsize
element_padding - tkinter padding around each element
auto_size_text - autosize the elements to fit their text
auto_size_buttons - autosize the buttons to fit their text
font - font used for elements
border_width - amount of bezel or border around sunken or raised elements
slider_border_width - changes the way sliders look
slider_relief - changes the way sliders look
slider_orientation - changes orientation of slider
autoclose_time - time in seconds for autoclose boxes
message_box_line_width - number of characers in a line of text in message boxes
progress_meter_border_depth - amount of border around raised or lowered progress met
progress_meter_style - style of progress meter as defined by tkinter
progress_meter_relief - relief style
progress_meter_color - color of the bar and background of progress meters
progress_meter_size - size in (characters, pixels)
background_color - Color of the main window's background
element_background_color - Background color of the elements
text_element_background_color - Text element background color
input_elements_background_color - Input fields background color
element_text_color - Text color of elements that have text, like Radio Buttons
input_text_color - Color of the text that you type in
scrollbar_color - Color for scrollbars (may not always work)
text_color - Text element default text color
text_justification - justification to use on Text Elements. Values are strings - 'le
debug_win_size - size of the Print output window
window_location - location on the screen (x,y) of window's top left cornder
tooltip_time - time in milliseconds to wait before showing a tooltip. Default is 400


```

These settings apply to all windows `SetOptions`. The Row options and Element options will take precedence over these settings. Settings can be thought of as levels of settings with the window-level being the highest and the Element-level the lowest. Thus the levels are:

- window level
- Row level
- Element level

Each lower level overrides the settings of the higher level. Once settings have been changed, they remain changed for the duration of the program (unless changed again).

Persistent windows (Window stays open after button click)

Apologies that the next few pages are perhaps confusing. There have been a number of changes recently in PySimpleGUI's Read calls that added some really cool stuff, but at the expense of being not so simple. Part of the issue is an attempt to make sure existing code doesn't break. These changes are all in the area of non-blocking reads and reads with timeouts.  [View latest](#) ▼

There are 2 ways to keep a window open after the user has clicked a button. One way is to use non-blocking

windows (see the next section). The other way is to use buttons that 'read' the window instead of 'close' the window when clicked. The typical buttons you find in windows, including the shortcut buttons, close the window. These include OK, Cancel, Submit, etc. The Button Element also closes the window.

The `RButton` Element creates a button that when clicked will return control to the user, but will leave the window open and visible. This button is also used in Non-Blocking windows. The difference is in which call is made to read the window. The normal `Read` call with no parameters will block, a call with a `timeout` value of zero will not block.

Note that `InputText` and `MultiLine` Elements will be **cleared** when performing a `Read`. If you do not want your input field to be cleared after a `Read` then you can set the `do_not_clear` parameter to True when creating those elements. The clear is turned on and off on an element by element basis.

The reasoning behind this is that Persistent Windows are often "forms". When "submitting" a form you want to have all of the fields left blank so the next entry of data will start with a fresh window. Also, when implementing a "Chat Window" type of interface, after each read / send of the chat data, you want the input field cleared. Think of it as a Texting application. Would you want to have to clear your previous text if you want to send a second text?

The design pattern for Persistent Windows was already shown to you earlier in the document... here it is for your convenience.

```
import PySimpleGUI as sg

layout = [[sg.Text('Persistent window')],
          [sg.Input()],
          [sg.RButton('Read'), sg.Exit()]]

window = sg.Window('Window that stays open').Layout(layout)

while True:
    event, values = window.Read()
    if event is None or event == 'Exit':
        break
    print(event, values)

window.Close()
```

Read(timeout = t, timeout_key='timeout')

Read with a timeout is a very good thing for your GUIs to use in a read non-blocking situation, if you can use them. If your device can wait for a little while, then use this kind of read. The longer you're able to add to the timeout value, the less CPU time you'll be taking.

One way of thinking of reads with timeouts:

During the timeout time, you are "yielding" the processor to do other tasks.

But it gets better than just being a good citizen....**your GUI will be more responsive than if you used a non-blocking read**  v: latest ▼

Let's say you had a device that you want to "poll" every 100ms. The "easy way out" and the only way out until

recently was this:

```
# YOU SHOULD NOT DO THIS....  
while True:                # Event Loop  
    event, values = window.ReadNonBlocking()    # DO NOT USE THIS CALL ANYMORE  
    read_my_hardware() # process my device here  
    time.sleep(.1)      # sleep 1/10 second
```

This program will quickly test for user input, then deal with the hardware. Then it'll sleep for 100ms, while your gui is non-responsive, then it'll check in with your GUI again. I fully realize this is a crude way of doing things. We're talking dirt simple stuff without trying to use threads, etc to 'get it right'. It's for demonstration purposes.

The new and better way.... using the Read Timeout mechanism, the sleep goes away.

```
# This is the right way to poll for hardware  
while True:                # Event Loop  
    event, values = window.Read(timeout = 100)  
    read_my_hardware() # process my device here
```

This event loop will run every 100 ms. You're making a Read call, so anything that the user does will return back to you immediately, and you're waiting up to 100ms for the user to do something. If the user doesn't do anything, then the read will timeout and execution will return to the program.

Non-Blocking Windows (Asynchronous reads)

There are TWO ways to perform a non-blocking read.

The "old way" was:

```
event, values = sg.ReadNonBlocking()
```

The new way

```
event, values = sg.Read(timeout=0)
```

You should use the new way if you're reading this for the first time.

The difference in the 2 calls is in the value of event. For ReadNonBlocking, event will be `None` if there are no other events to report. There is a "problem" with this however. With normal Read calls, an event value of None signified the window was closed. For ReadNonBlocking, the way a closed window is returned is via the values variable being set to None.

sg.TIMEOUT_KEY

If you're using the new, timeout=0 method, then an event value of None signifies that the window was closed, just like a normal Read. That leaves the question of what it is set to when not other events are happening. This value will be the value of `timeout_key`. If you did not specify a timeout_key value in your call to read, then it will be set to a default value of: `TIMEOUT_KEY = 'timeout'`

 v: latest ▼

If you wanted to test for "no event" in your loop, it would be written like this:

```
while True:
    event, value = window.Read(timeout=0)
    if event is None:
        break # the use has closed the window
    if event == sg.TIMEOUT_KEY:
        print("Nothing happened")
```

Use async windows sparingly. It's possible to have a window that appears to be async, but it is not. **Please** try to find other methods before going to async windows. The reason for this plea is that async windows poll tkinter over and over. If you do not have a sleep in your loop, you will eat up 100% of the CPU time. It's important to be a good citizen. Don't chew up CPU cycles needlessly.

Non-blocking is generally reserved as a "last resort". Too many times people use non-blocking reads when a blocking read will do just fine.

There is a hybrid approach... a read with a timeout. You'll score much higher points on the impressive meter if you're able to use a lot less CPU time by using this type of read.

The most legit time to use a non-blocking window is when you're working directly with hardware. Maybe you're driving a serial bus. If you look at the Event Loop in the Demo_OpenCV_Webcam.py program, you'll see that the read is a non-blocking read. However, there is a place in the event loop where blocking occurs. The point in the loop where you will block is the call to read frames from the webcam. When a frame is available you want to quickly deliver it to the output device, so you don't want your GUI blocking. You want the read from the hardware to block.

Another example can be found in the demo for controlling a robot on a Raspberry Pi. In that application you want to read the direction buttons, forward, backward, etc, and immediately take action. If you are using RealtimeButtons, your only option at the moment is to use non-blocking windows. You have to set the timeout to zero if you want the buttons to be real-time responsive.

However, with these buttons, adding a sleep to your event loop will at least give other processes time to execute. It will, however, starve your GUI. The entire time you're sleeping, your GUI isn't executing.

Periodically Calling Read

Let's say you do end up using non-blocking reads... then you've got some housekeeping to do. It's up to you to periodically "refresh" the visible GUI. The longer you wait between updates to your GUI the more sluggish your windows will feel. It is up to you to make these calls or your GUI will freeze.

There are 2 methods of interacting with non-blocking windows.

1. Read the window just as you would a normal window
2. "Refresh" the window's values without reading the window. It's a quick operation meant to show the user the latest values

With asynchronous windows the window is shown, user input is read, but your code keeps right on chugging. YOUR responsibility is to call `PySimpleGUI.Read` on a periodic basis. Several times a second or more will produce a reasonably snappy GUI.

Exiting (Closing) a Persistent Window

If your window has a button that closes the window, then PySimpleGUI will automatically close the window for you. If all of your buttons are ReadButtons, then it'll be up to you to close the window when done.

To close a window, call the `Close` method.

```
window.Close()
```

Persistent Window Example - Running timer that updates

See the sample code on the GitHub named Demo Media Player for another example of Async windows. We're going to make a window and update one of the elements of that window every .01 seconds. Here's the entire code to do that.

```
import PySimpleGUI as sg
import time

# ----- Create Form -----
sg.ChangeLookAndFeel('Black')
sg.SetOptions(element_padding=(0, 0))


layout = [[sg.Text(''),
            [sg.Text('', size=(8, 2), font=('Helvetica', 20), justification='center', key='t'),
             [sg.ReadButton('Pause', key='button', button_color=('white', '#001480')),
              sg.ReadButton('Reset', button_color=('white', '#007339'), key='Reset'),
              sg.Exit(button_color=('white', 'firebrick4'), key='Exit')]]],

window = sg.Window('Running Timer', no_titlebar=True, auto_size_buttons=False, keep_on_top=True)

# ----- main loop -----
current_time = 0
paused = False
start_time = int(round(time.time() * 100))
while (True):
    # ----- Read and update window -----
    event, values = window.Read(timeout=10)
    current_time = int(round(time.time() * 100)) - start_time
    # ----- Display timer in window -----
    window.FindElement('text').Update('{:02d}:{:02d}.{:02d}'.format((current_time // 100),
                                                                    (current_time // 100) % 100,
                                                                    current_time % 100))
```

Previously this program was implemented using a sleep in the loop to control the clock tick. This version uses the new timeout parameter. The result is a window that reacts quicker than the one with the sleep and the accuracy is just as good.

Instead of a Non-blocking Read --- Use change_submits = True or return_keyboard_events = True

Any time you are thinking "I want an X Element to cause a Y Element to do something", then you want to use the `change_submits` option.  v: latest ▼

Instead of polling, try options that cause the window to return to you. By using non-blocking windows, you are *polling*. You can indeed create your application by polling. It will work. But you're going to be maxing out

your processor and may even take longer to react to an event than if you used another technique.

Examples

One example is you have an input field that changes as you press buttons on an on-screen keypad.



Updating Elements (changing elements in active window)

If you want to change Elements in your window after the window has been created, then you will call the Element's Update method.

NOTE a window **must be Read or Finalized** before any Update calls can be made.

Here is an example of updating a Text Element

```
import PySimpleGUI as sg

layout = [ [sg.Text('My layout', key='_TEXT_')],
           [sg.Button('Read')]]

window = sg.Window('My new window').Layout(layout)

while True:           # Event Loop
    event, values = window.Read()
    if event is None:
        break
    window.Element('_TEXT_').Update('My new text value')
```

 v: latest ▼

Notice the placement of the Update call. If you wanted to Update the Text Element *prior* to the Read call,

outside of the event loop, then you must call `Finalize` on the window first.

In this example, the `Update` is done prior the `Read`. Because of this, the `Finalize` call is added to the Window creation.

```
import PySimpleGUI as sg

layout = [ [sg.Text('My layout', key='_TEXT_')],
           [sg.Button('Read')]
         ]

window = sg.Window('My new window').Layout(layout).Finalize()

window.Element('_TEXT_').Update('My new text value')

while True:          # Event Loop
    event, values = window.Read()
    if event is None:
        break
```

Persistent windows remain open and thus continue to interact with the user after the `Read` has returned. Often the program wishes to communicate results (output information) or change an `Element`'s values (such as populating a `List Element`).

You can use `Update` to do things like:

Have one `Element` (appear to) make a change to another `Element`

Disable a button, slider, input field, etc

Change a button's text

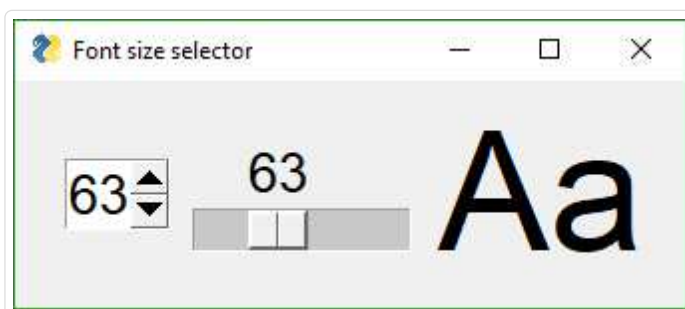
Change an `Element`'s text or background color

Add text to a scrolling output window

Change the choices in a list

* etc

The way this is done is via an `Update` method that is available for nearly all of the `Elements`. Here is an example of a program that uses a persistent window that is updated.



In some programs these updates happen in response to another `Element`. This program takes a `Spinner` and a `Slider`'s input values and uses them to resize a `Text Element`. The `Spinner` and `Slider` are on the left, the `Text` element being changed is on the right.

 v: latest ▼

```
# Testing async window, see if can have a slider
# that adjusts the size of text displayed

import PySimpleGUI as sg
fontSize = 12
layout = [[sg.Spin([sz for sz in range(6, 172)], font=('Helvetica 20'), initial_value=fontSize,
    sg.Slider(range=(6,172), orientation='h', size=(10,20),
    change_submits=True, key='slider', font=('Helvetica 20')),
    sg.Text("Aa", size=(2, 1), font="Helvetica " + str(fontSize), key='text')]]

sz = fontSize
window = sg.Window("Font size selector", grab_anywhere=False).Layout(layout)
# Event Loop
while True:
    event, values= window.Read()
    if event is None:
        break
    sz_spin = int(values['spin'])
    sz_slider = int(values['slider'])
    sz = sz_spin if sz_spin != fontSize else sz_slider
    if sz != fontSize:
        fontSize = sz
        font = "Helvetica " + str(fontSize)
        window.FindElement('text').Update(font=font)
        window.FindElement('slider').Update(sz)
        window.FindElement('spin').Update(sz)

print("Done.")
```

Inside the event loop we read the value of the Spinner and the Slider using those Elements' keys. For example, `values['slider']` is the value of the Slider Element.

This program changes all 3 elements if either the Slider or the Spinner changes. This is done with these statements:

```
window.FindElement('text').Update(font=font)
window.FindElement('slider').Update(sz)
window.FindElement('spin').Update(sz)
```

Remember this design pattern because you will use it **OFTEN** if you use persistent windows.

It works as follows. The call to `window.FindElement` returns the Element object represented by the provided `key`. This element is then updated by calling its `Update` method. This is another example of Python's "chaining" feature. We could write this code using the long-form:

```
text_element = window.FindElement('text')
text_element.Update(font=font)
```

The takeaway from this exercise is that keys are key in PySimpleGUI's design. They are used to both read the values of the window and also to identify elements. As already mentioned, they are used as targets in Button calls.

 v: latest ▼

Locating Elements

The Window method call that's used to find an element is: `FindElement` or the shortened version `Element`

When you see a call to `window.FindElement` or `window.Element`, then you know an element is being addressed. Normally this is done so you can call the element's `Update` method.

ProgressBar / Progress Meters

Note that to change a progress meter's progress, you call `UpdateBar`, not `Update`. It's an old naming convention that's left over from before the `Update` calls were implemented.

Keyboard & Mouse Capture

Beginning in version 2.10 you can capture keyboard key presses and mouse scroll-wheel events. Keyboard keys can be used, for example, to detect the page-up and page-down keys for a PDF viewer. To use this feature, there's a boolean setting in the Window call `return_keyboard_events` that is set to `True` in order to get keys returned along with buttons.

Keys and scroll-wheel events are returned in exactly the same way as buttons.

For scroll-wheel events, if the mouse is scrolled up, then the `button` text will be `MouseWheel:Up`. For downward scrolling, the text returned is `MouseWheel:Down`

Keyboard keys return 2 types of key events. For "normal" keys (a,b,c, etc), a single character is returned that represents that key. Modifier and special keys are returned as a string with 2 parts:

Key Sym:**Key** Code

Key Sym is a string such as 'Control_L'. The Key Code is a numeric representation of that key. The left control key, when pressed will return the value 'Control_L:17'

```
import PySimpleGUI as sg

# Recipe for getting keys, one at a time as they are released
# If want to use the space bar, then be sure and disable the "default focus"

with sg.Window("Keyboard Test", return_keyboard_events=True, use_default_focus=False) as wind
    text_elem = sg.Text("", size=(18, 1))
    layout = [[sg.Text("Press a key or scroll mouse")],
               [text_elem],
               [sg.Button("OK")]]

    window.Layout(layout)
    # ----- Loop taking in user input --- #
    while True:
        event, value = window.Read()

        if event == "OK" or event is None:
            print(event, "exiting")
            break
        text_elem.Update(event)
```

 v: latest ▼

You want to turn off the default focus so that there no buttons that will be selected should you press the spacebar.

Realtime Keyboard Capture

Use realtime keyboard capture by calling

```
import PySimpleGUI as sg

with sg.Window("Realtime Keyboard Test", return_keyboard_events=True, use_default_focus=False):
    layout = [[sg.Text("Hold down a key")],
              [sg.Button("OK")]]

    window.Layout(layout)

    while True:
        event, value = window.Read(timeout=0)
        if event == "OK" or event is None:
            print(event, value, "exiting")
            break
        if event != sg.TIMEOUT_KEY:
            print(event)
```

Menus

MenuBar

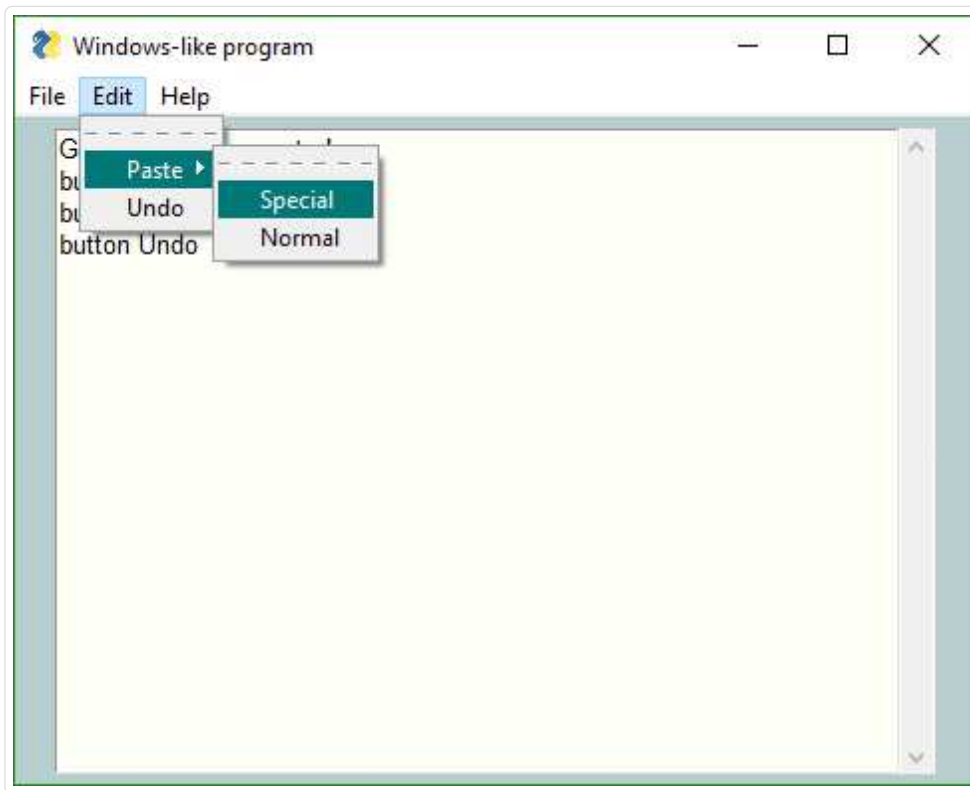
Beginning in version 3.01 you can add a MenuBar to your window. You specify the menus in much the same way as you do window layouts, with lists. Menu selections are returned as events and as of 3.17, also as in the values dictionary. The value returned will be the entire menu entry, including the key if you specified one.

This definition:

```
menu_def = [['File', ['Open', 'Save', 'Exit',]],
            ['Edit', ['Paste', ['Special', 'Normal',], 'Undo',]],
            ['Help', 'About...'],]
```

Note the placement of ',' and of []. It's tricky to get the nested menus correct that implement cascading menus. See how paste has Special and Normal as a list after it. This means that Paste has a cascading menu with items Special and Normal.

They menu_def layout produced this window:



To add a menu to a Window place the `Menu` or `MenuBar` element into your layout.

```
layout = [[sg.Menu(menu_def)]]
```

It doesn't really matter where you place the Menu Element in your layout as it will always be located at the top of the window.

ButtonMenus


Button menus were introduced in version 3.21, having been previously released in PySimpleGUIQt. They work exactly the same and are source code compatible between PySimpleGUI and PySimpleGUIQt. These types of menus take a single menu entry where a Menu Bar takes a list of menu entries.

Right Click Menus

Right Click Menus were introduced in version 3.21. Almost every element has a `right_click_menu` parameter and there is a window-level setting for rich click menu that will attach a right click menu to all elements in the window.

The menu definition is the same as the button menu definition, a single menu entry.

```
right_click_menu = ['&Right', ['Right', '!&Click', '&Menu', 'E&xit', 'Properties']]
```

The first string in a right click menu and a button menu is **ignored**. It is not used. Normally you would put the string that is shown on the menu bar in that location.  v: latest ▼

Return values for right click menus are different than menu bars and button menus. Instead of the value being returned through the values dictionary, it is instead sent back as an Event. You will not

Menu Shortcut keys

You have used ALT-key in other Windows programs to navigate menus. For example Alt-F+X exits the program. The Alt-F pulls down the File menu. The X selects the entry marked Exit.

The good news is that PySimpleGUI allows you to create the same kind of menus! Your program can play with the big-boys. And, it's trivial to do.

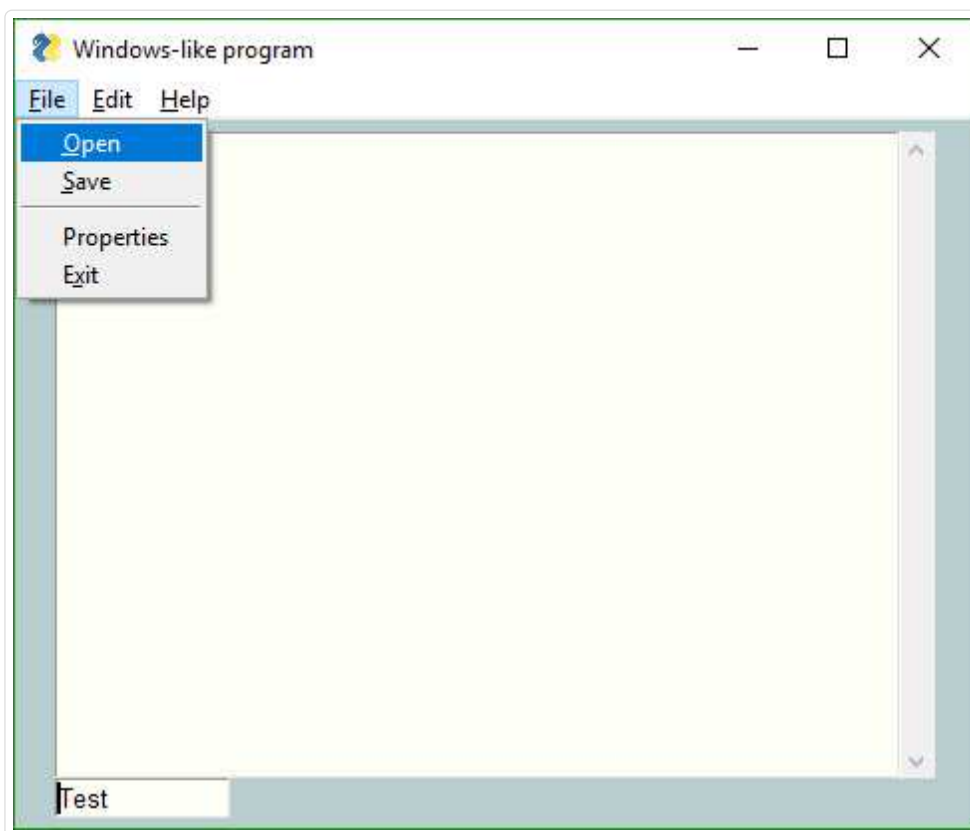
All that's required is for your to add an "&" in front of the letter you want to appear with an underscore. When you hold the Alt key down you will see the menu with underlines that you marked.

One other little bit of polish you can add are separators in your list. To add a line in your list of menu choices, create a menu entry that looks like this: '---'

This is an example Menu with underlines and a separator.

```
# ----- Menu Definition ----- #
menu_def = [['&File', ['&Open', '&Save', '---', 'Properties', 'E&xit' ]],
            ['&Edit', ['Paste', ['Special', 'Normal',], 'Undo'],],
            ['&Help', '&About...'],]
```

And this is the spiffy menu it produced:



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Disabled Menu Entries

If you want one of your menu items to be disabled, then place a '!' in front of the menu entry. To disable the Paste menu entry in the previous examples, the entry would be: `['!&Edit', ['Paste', ['Special', 'Normal',],], 'Undo'],]`

If you want to change the disabled menu item flag / character from '!' to something else, change the variable `MENU_DISABLED_CHARACTER`

Keys for Menus

Beginning in version 3.17 you can add a `key` to your menu entries. The `key` value will be removed prior to be inserted into the menu. When you receive Menu events, the entire menu entry, including the `key` is returned. A key is indicated by adding `::` after a menu entry, followed by the key.

To add the `key` `_MY_KEY_` to the Special menu entry, the code would be:

```
['&Edit', ['Paste', ['Special::_MY_KEY_', 'Normal', ],], 'Undo'],]
```

If you want to change the characters that indicate a key follows from '::' to something else, change the variable `MENU_KEY_SEPARATOR`

Running Multiple Windows

If you wish to run multiple windows in your event loop, then there are 2 methods for doing this.

1. First window does not remain active while second window is visible
2. First window remains active while second window is visible

You will find the 2 design matters in 2 demo programs in the Demo Program area of the GitHub (<http://www.PySimpleGUI.com>)

Critically important When creating a new window you must use a "fresh" layout every time. You cannot reuse a layout from a previous window. As a result you will see the layout for window 2 being defined inside of the larger event loop.

A rule of thumb to follow:

If you are calling `Window` then you should define your window layout in the statement just prior to the `Window` call.

Multi-Window Design Pattern 1 - both windows active

```
import PySimpleGUI as sg

# Design pattern 2 - First window remains active

layout = [[ sg.Text('Window 1'),],
            [sg.Input(do_not_clear=True)],
            [sg.Text('', key='_OUTPUT_')],
            [sg.Button('Launch 2'), sg.Button('Exit')]]

win1 = sg.Window('Window 1').Layout(layout)

win2_active = False
while True:
    ev1, vals1 = win1.Read(timeout=100)
    win1.FindElement('_OUTPUT_').Update(vals1[0])
    if ev1 is None or ev1 == 'Exit':
        break

    if not win2_active and ev1 == 'Launch 2':
        win2_active = True
        layout2 = [[sg.Text('Window 2')],
                    [sg.Button('Exit')]]

        win2 = sg.Window('Window 2').Layout(layout2)

    if win2_active:
        ev2, vals2 = win2.Read(timeout=100)
        if ev2 is None or ev2 == 'Exit':
            win2_active = False
            win2.Close()
```

Multi-Window Design Pattern 2 - only 1 active window

```
import PySimpleGUIQt as sg

# Design pattern 1 - First window does not remain active

layout = [[ sg.Text('Window 1'),],
            [sg.Input(do_not_clear=True)],
            [sg.Text('', key='_OUTPUT_')],
            [sg.Button('Launch 2')]]

win1 = sg.Window('Window 1').Layout(layout)
win2_active=False
while True:
    ev1, vals1 = win1.Read(timeout=100)
    if ev1 is None:
        break
    win1.FindElement('_OUTPUT_').Update(vals1[0])

    if ev1 == 'Launch 2' and not win2_active:
        win2_active = True
        win1.Hide()
        layout2 = [[sg.Text('Window 2')],          # note must create a layout from scratch ever.
                    [sg.Button('Exit')]]

        win2 = sg.Window('Window 2').Layout(layout2)
        while True:
            ev2, vals2 = win2.Read()
            if ev2 is None or ev2 == 'Exit':
                win2.Close()
                win2_active = False
                win1.UnHide()
                break
```


Sample Applications

There are too many to list!!


There are over 130 sample programs to give you a jump start.

Use the example programs as a starting basis for your GUI. Copy, paste, modify and run! The demo files are:

| Source File | Description |
|----------------------------------|--|
| Demo_All_Widgets.py | Nearly all of the Elements shown in a single window |
| Demo_Borderless_Window.py | Create clean looking windows with no border |
| Demo_Button_States.py | One way of implementing disabling of buttons |
| Demo_Calendar.py | Demo of the Calendar Chooser button |
| Demo_Canvas.py | window with a Canvas Element that is updated outside of the window |

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| Source File | Description |
|--|---|
| Demo_Chat.py | A chat window with scrollable history |
| Demo_Chatterbot.py | Front-end to Chatterbot Machine Learning project |
| Demo_Color.py | How to interact with color using RGB hex values and named colors |
| Demo_Columns.py | Using the Column Element to create more complex windows |
| Demo_Compare_Files.py | Using a simple GUI front-end to create a compare 2-files utility |
| Demo_Cookbook_Browser.py | Source code browser for all Recipes in Cookbook |
| Demo_Dictionary.py | Specifying and using return values in dictionary format |
| Demo_DOC_Viewer_PIL.py | Display a PDF, HTML, ebook file, etc in your window |
| Demo_DisplayHash1and256.py | Using high level API and custom window to implement a simple display hash code utility |
| Demo_DuplicateFileFinder.py | High level API used to get a folder that is used by utility that finds duplicate files. Uses progress meter to show progress. 2 lines of code required to add GUI and meter |
| Demo_Fill_Form.py | How to perform a bulk-fill for a window. Saving and loading a window from disk |
| Demo Font Sizer.py | Demonstrates Elements updating other Elements |
| Demo_Func_Callback_Simulator.py | For the Raspberry Pi crowd. Event loop that simulates traditional GUI callback functions should you already have an architecture that uses them |
| Demo_GoodColors.py | Using some of the pre-defined PySimpleGUI individual colors |
| Demo_HowDoI.py | This is a utility to be experienced! It will change how you code |
| Demo_Img_Viewer.py | Display jpg, png,tiff, bmp files |
| Demo_Keyboard.py | Using blocking keyboard events |
| Demo_Keyboard_Realtime.py | Using non-blocking / realtime keyboard events |
| Demo_Machine_Learning.py | A sample Machine Learning front end |
| Demo_Matplotlib.py | Integrating with Matplotlib to create a single graph |
| Demo_Matplotlib_Animated.py | Animated Matplotlib line graph |

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| Source File | Description |
|--|--|
| Demo_Matplotlib_Animated_Scatter.py | Animated Matplotlib scatter graph |
| Demo_Matplotlib_Browser.py | Browse Matplotlib gallery |
| Demo_Media_Player.py | Non-blocking window with a media player layout. Demonstrates button graphics, Update method |
| Demo_MIDI_Player.py | GUI wrapper for Mido MIDI package. Functional MIDI player that controls attached MIDI devices |
| Demo_NonBlocking_Form.py | a basic async window |
| Demo_OpenCV.py | Integrated with OpenCV |
| Demo_Password_Login | Password protection using SHA1 |
| Demo_PDF_Viewer.py | Submitted by a user! Previews PDF documents. Uses keyboard input & mouse scrollwheel to navigate |
| Demo_Pi_LEDs.py | Control GPIO using buttons |
| Demo_Pi_Robotics.py | Simulated robot control using realtime buttons |
| Demo_PNG_Vierwer.py | Uses Image Element to display PNG files |
| Demo_Progress_Meters.py | Demonstrates using 2 progress meters simultaneously |
| Demo_Recipes.py | A collection of various Recipes. Note these are not the same as the Recipes in the Recipe Cookbook |
| Demo_Script_Launcher.py | Demonstrates one way of adding a front-end onto several command line scripts |
| Demo_Script_Parameters.py | Add a 1-line GUI to the front of your previously command-line only scripts |
| Demo_Tabbed_Form.py | Using the Tab feature |
| Demo_Table_Simulation.py | Use input fields to display and edit tables |
| Demo_Timer.py | Simple non-blocking window |

Packages Used In Demos

While the core PySimpleGUI code does not utilize any 3rd party packages, some of the demos do. They add a GUI to a few popular packages. These packages include:

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- * Chatterbot (<https://github.com/gunthercox/ChatterBot>)
- * Mido (<https://github.com/olemb/mido>)

- * Matplotlib (<https://matplotlib.org/>)
- * PyMuPDF (<https://github.com/rk700/PyMuPDF>)

Creating a Windows .EXE File

It's possible to create a single .EXE file that can be distributed to Windows users. There is no requirement to install the Python interpreter on the PC you wish to run it on. Everything it needs is in the one EXE file, assuming you're running a somewhat up to date version of Windows.

Installation of the packages, you'll need to install PySimpleGUI and PyInstaller (you need to install only once)

```
pip install PySimpleGUI
pip install PyInstaller
```

To create your EXE file from your program that uses PySimpleGUI, `my_program.py`, enter this command in your Windows command prompt:

```
pyinstaller -wF my_program.py
```

You will be left with a single file, `my_program.exe`, located in a folder named `dist` under the folder where you executed the `pyinstaller` command.

That's all... Run your `my_program.exe` file on the Windows machine of your choosing.

"It's just that easy."

(famous last words that screw up just about anything being referenced)

Your EXE file should run without creating a "shell window". Only the GUI window should show up on your taskbar.

If you get a crash with something like:

```
ValueError: script '.....\src\tkinter' not found
```


Then try adding `--hidden-import tkinter` to your command

Creating a Mac App File

There are reports that PyInstaller can be used to create App files. It's not been officially tested.

Run this command on your Mac

```
pyinstaller --onefile --add-binary='/System/Library/Frameworks/Tk.framework
/Tk':tk' --add-binary='/System/Library/Frameworks/Tcl.framework/Tcl':tcl'
your_program.py
```

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This info was located on Reddit with the source traced back to: <https://github.com/pyinstaller/pyinstaller/issues/1350>

Fun Stuff

Here are some things to try if you're bored or want to further customize

Debug Output

Be sure and check out the EasyPrint (Print) function described in the high-level API section. Leave your code the way it is, route your stdout and stderr to a scrolling window.

For a fun time, add these lines to the top of your script

```
import PySimpleGUI as sg
print = sg.Print
```

This will turn all of your print statements into prints that display in a window on your screen rather than to the terminal.

Look and Feel

Dial in the look and feel that you like with the `SetOptions` function. You can change all of the defaults in one function call. One line of code to customize the entire GUI.

Or beginning in version 2.9 you can choose from a look and feel using pre-defined color schemes. Call `ChangeLookAndFeel` with a description string.

```
sg.ChangeLookAndFeel('GreenTan')
```

Valid values for the description string are:

```
GreenTan
LightGreen
BluePurple
Purple
BlueMono
GreenMono
BrownBlue
BrightColors
NeutralBlue
Kayak
SandyBeach
TealMono
```

To see the latest list of color choices, take a look at the bottom of the `PySimpleGUI.py` file where you'll find the `ChangeLookAndFeel` function.

You can also combine the `ChangeLookAndFeel` function with the `SetOptions` function to quickly modify one of the canned color schemes. Maybe you like the colors but was more depth to your bezels. You can dial in exactly what you want.

ObjToString

Ever wanted to easily display an objects contents easily? Use `ObjToString` to get a nicely formatted recursive walk of your objects.

This statement:

```
print(sg.ObjToStr(x))
```

And this was the output

```
<class '__main__.X'>
  abc = abc
  attr12 = 12
  c = <class '__main__.C'>
    b = <class '__main__.B'>
      a = <class '__main__.A'>
        attr1 = 1
        attr2 = 2
        attr3 = three
      attr10 = 10
      attrx = x
```

You'll quickly wonder how you ever coded without it.

Known Issues

While not an "issue" this is a ***stern warning***


Do not attempt to call `PySimpleGUI` from multiple threads! It's `tkinter` based and `tkinter` has issues with multiple threads

Progress Meters - the visual graphic portion of the meter may be off. May return to the native tkinter progress meter solution in the future. Right now a "custom" progress meter is used. On the bright side, the statistics shown are extremely accurate and can tell you something about the performance of your code. If you are running 2 or more progress meters at the same time using `OneLineProgressMeter`, you need to close the meter by using the "Cancel" button rather than the X

Async windows - these include the 'easy' windows (`OneLineProgressMeter` and `EasyPrint/Print`). If you start overlapping having Async windows open with normal windows then things get a littler squirrely. Still tracking down the issues and am making it more solid every day possible. You'll know there's an issue when you see blank window.

EasyPrint - EasyPrint is a new feature that's pretty awesome. You print and the output goes to a window, with a scroll bar, that you can copy and paste from. Being a new feature, it's got some potential problems. There are known interaction problems with other GUI windows. For example, closing a Print window can also close other windows you have open. For now, don't close your debug print window until other windows are closed too.

Contributing

A MikeTheWatchGuy production... entirely responsible for this code.... unless it causes you trouble in which case I'm not at all responsible.  [View latest](#) ▼

Versions


| Version | Description |
|---------|---|
| 1.0.9 | July 10, 2018 - Initial Release |
| 1.0.21 | July 13, 2018 - Readme updates |
| 2.0.0 | July 16, 2018 - ALL optional parameters renamed from CamelCase to all_lower_case |
| 2.1.1 | July 18, 2018 - Global settings exposed, fixes |
| 2.2.0 | July 20, 2018 - Image Elements, Print output |
| 2.3.0 | July 23, 2018 - Changed form.Read return codes, Slider Elements, Listbox element. Renamed some methods but left legacy calls in place for now. |
| 2.4.0 | July 24, 2018 - Button images. Fixes so can run on Raspberry Pi |
| 2.5.0 | July 26, 2018 - Colors. Listbox scrollbar. tkinter Progress Bar instead of homegrown. |
| 2.6.0 | July 27, 2018 - auto_size_button setting. License changed to LGPL 3+ |
| 2.7.0 | July 30, 2018 - realtime buttons, window_location default setting |
| 2.8.0 | Aug 9, 2018 - New None default option for Checkbox element, text color option for all elements, return values as a dictionary, setting focus, binding return key |
| 2.9.0 | Aug 16, 2018 - Screen flash fix, <code>do_not_clear</code> input field option, <code>autosize_text</code> defaults to <code>True</code> now, return values as ordered dict, removed text target from progress bar, rework of return values and initial return values, removed legacy <code>Form.Refresh()</code> method (replaced by <code>Form.ReadNonBlockingForm()</code>), COLUMN elements!!, colored text defaults |
| 2.10.0 | Aug 25, 2018 - Keyboard & Mouse features (Return individual keys as if buttons, return mouse scroll-wheel as button, bind return-key to button, control over keyboard focus), SaveAs Button, Update & Get methods for InputText, Update for Listbox, Update & Get for Checkbox, Get for Multiline, Color options for Text Element Update, Progress bar Update can change max value, Update for Button to change text & colors, Update for Image Element, Update for Slider, Form level text justification, Turn off default focus, scroll bar for Listboxes, Images can be from filename or from in-RAM, Update for Image). Fixes - text wrapping in buttons, msg box, removed slider borders entirely and others |
| 2.11.0 | Aug 29, 2018 - Lots of little changes that are needed for the demo programs to work. Buttons have their own default element size, fix for Mac default button color, padding support for all elements, option to immediately return if list box gets selected, FilesBrowse button, Canvas Element, Frame Element, Slider resolution option, <code>Form.Refresh</code> method, better text wrapping, 'SystemDefault' look and feel settin |

 v: latest ▼

| Version | Description |
|----------|--|
| 2.20.0 | Sept 4, 2018 - Some sizable features this time around of interest to advanced users. Renaming of the MsgBox functions to Popup. Renaming GetFile, etc, to PopupGetFile. High-level windowing capabilities start with Popup, PopupNoWait/PopupNonblocking, PopupNoButtons, default icon, change_submits option for Listbox/Combobox/Slider/Spin/, New OptionMenu element, updating elements after shown, system default color option for progress bars, new button type (Dummy Button) that only closes a window, SCROLLABLE Columns!! (yea, playing in the Big League now), LayoutAndShow function removed, form.Fill - bulk updates to forms, FindElement - find element based on key value (ALL elements have keys now), no longer use grid packing for row elements (a potentially huge change), scrolled text box sizing changed, new look and feel themes (Dark, Dark2, Black, Tan, TanBlue, DarkTanBlue, DarkAmber, DarkBlue, Reds, Green) |
| 2.30.0 | Sept 6, 2018 - Calendar Chooser (button), borderless windows, load/save form to disk |
| 3.0.0 | Sept 7, 2018 - The "fix for poor choice of 2.x numbers" release. Color Chooser (button), "grab anywhere" windows are on by default, disable combo boxes, Input Element text justification (last part needed for 'tables'), Image Element changes to support OpenCV?, PopupGetFile and PopupGetFolder have better no_window option |
| 3.01.01 | Sept 10, 2018 - Menus! (sort of a big deal) |
| 3.01.02 | Step 11, 2018 - All Element.Update functions have a <code>disabled</code> parameter so they can be disabled. Renamed some parameters in Update function (sorry if I broke your code), fix for bug in Image.Update. Wasn't setting size correctly, changed grab_anywhere logic again, added grab anywhere option to PupupGetText (assumes disabled) |
| 3.02.00 | Sept 14, 2018 - New Table Element (Beta release), MsgBox removed entirely, font setting for InputText Element, packing change risky change that allows some Elements to be resized, removed command parameter from Menu Element, new function names for ReadNonBlocking (Finalize, PreRead), change to text element autosizing and wrapping (yet again), lots of parameter additions to Popup functions (colors, etc). |
| 3.03.00 | New feature - One Line Progress Meters, new display_row_numbers for Table Element, fixed bug in EasyProgresssMeters (function will soon go away), OneLine and Easy progress meters set to grab anywhere but can be turned off. |
| 03,04.00 | Sept 18, 2018 - New features - Graph Element, Frame Element, more settings exposed to Popup calls. See notes below for more. |
| 03.04.01 | Sept 18, 2018 - See release notes |
| 03.05.00 | Sept 20, 2018 - See release notes |
| 03.05.01 | Sept 22, 2018 - See release notes |
| 03.05.02 | Sept 23, 2018 - See release notes |
| 03.06.00 | Sept 23, 2018 - Goodbye FlexForm, hello Window |

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| Version | Description |
|---------------------|--|
| 03.08.00 | Sept 25, 2018 - Tab and TabGroup Elements\ |
| 01.00.00
for 2.7 | Sept 25, 2018 - First release for 2.7 |
| 03.08.04 | Sept 30, 2018 - See release notes |
| 03.09.00 | Oct 1, 2018 |
| 2.7
01.01.00 | Oct 1, 2018 |
| 2.7
01.01.02 | Oct 8, 2018 |
| 03.09.01 | Oct 8, 2018 |
| 3.9.3 &
1.1.3 | Oct 11, 2018 |
| 3.9.4 &
1.1.4 | Oct 16, 2018 |
| 3.10.1 &
1.2.1 | Oct 20, 2018 |
| 3.10.3 &
1.2.3 | Oct 23, 2018 |
| 3.11.0 &
1.11.0 | Oct 28, 2018 |
| 3.12.0 &
1.12.0 | Oct 28, 2018 |
| 3.13.0 &
1.13.0 | Oct 29, 2018 |
| 3.14.0 &
1.14.0 | Nov 2, 2018 |
| 3.15.0 &
1.15.0 | Nov 20, 2018 |
| 3.16.0 &
1.16.0 | Nov 26, 2018 |
| 3.17.0 &
1.17.0 | Dec 1, 2018 |

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Release Notes

2.3 - Sliders, Listbox's and Image elements (oh my!)

If using Progress Meters, avoid cancelling them when you have another window open. It could lead to future windows being blank. It's being worked on.

New debug printing capability. `sg.Print`

2.5 Discovered issue with scroll bar on `Output` elements. The bar will match size of ROW not the size of the element. Normally you never notice this due to where on a form the `Output` element goes.

Listboxes are still without scrollwheels. The mouse can drag to see more items. The mouse scrollwheel will also scroll the list and will `page up` and `page down` keys.

2.7 Is the "feature complete" release. Pretty much all features are done and in the code

2.8 More text color controls. The caller has more control over things like the focus and what buttons should be clicked when enter key is pressed. Return values as a dictionary! (NICE addition)

2.9 COLUMNS! This is the biggest feature and had the biggest impact on the code base. It was a difficult feature to add, but it was worth it. Can now make even more layouts. Almost any layout is possible with this addition.

..... insert releases 2.9 to 2.30

3.0 We've come a long way baby! Time for a major revision bump. One reason is that the numbers started to confuse people the latest release was 2.30, but some people read it as 2.3 and thought it went backwards. I kinda messed up the 2.x series of numbers, so why not start with a clean slate. A lot has happened anyway so it's well earned.

One change that will set PySimpleGUI apart is the parlor trick of being able to move the window by clicking on it anywhere. This is turned on by default. It's not a common way to interact with windows. Normally you have to move using the titlebar. Not so with PySimpleGUI. Now you can drag using any part of the window. You will want to turn this off for windows with sliders. This feature is enabled in the Window call.

Related to the Grab Anywhere feature is the `no_titlebar` option, again found in the call to Window. Your window will be a spiffy, borderless window. It's a really interesting effect. Slight problem is that you do not have an icon on the taskbar with these types of windows, so if you don't supply a button to close the window, there's no way to close it other than task manager.

3.0.2 Still making changes to Update methods with many more ahead in the future. Continue to mess with grab anywhere option. Needed to disable in more places such as the `PopupGetText` function. Any time there is text input on a form, you generally want to turn off the grab anywhere feature.

3.2.0

Biggest change was the addition of the Table Element. Trying to make changes so that form resizing is a possibility but unknown if will work in the long run. Removed all `MsgBox`, `Get*` functions and replaced with `Popup` functions. `Popups` had multiple new parameters added to change the look and feel of a popup.

3.3.0

`OneLineProgressMeter` function added which gives you not only a one-line solution to progress meters, but also gives you the ability to have more than 1 running at the same time, something not possible with the `EasyProgressMeterCall`

3.4.0

- Frame - New Element - a labelled frame for grouping elements. Similar to Column
- Graph (like a Canvas element except uses the caller's coordinate system rather than tkinter's).
- initial_folder - sets starting folder for browsing type buttons (browse for file/folder).
- Buttons return key value rather than button text **If** a `key` is specified,
- OneLineProgressMeter! Replaced EasyProgressMeter (sorry folks that's the way progress works sometimes)
- Popup - changed ALL of the Popup calls to provide many more customization settings
 - Popup
 - PopupGetFolder
 - PopupGetFile
 - PopupGetText
 - Popup
 - PopupNoButtons
 - PopupNonBlocking
 - PopupNoTitlebar
 - PopupAutoClose
 - PopupCancel
 - PopupOK
 - PopupOKCancel
 - PopupYesNo

3.4.1

- Button.GetText - Button class method. Returns the current text being shown on a button.
- Menu - Tearoff option. Determines if menus should allow them to be torn off
- Help - Shortcut button. Like Submit, cancel, etc
- ReadButton - shortcut for ReadFormButton

3.5.0

- Tool Tips for all elements
- Clickable text
- Text Element relief setting
- Keys as targets for buttons
- New names for buttons:
 - Button = SimpleButton
 - RButton = ReadButton = ReadFormButton
- Double clickable list entries
- Auto sizing table widths works now
- Feature DELETED - Scaling. Removed from all elements

3.5.1

- Bug fix for broken PySimpleGUI if Python version < 3.6 (sorry!)
- LOTS of Readme changes

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3.5.2

- Made `Finalize()` in a way that it can be chained

- Fixed bug in return values from Frame Element contents

3.6.0

- Renamed FlexForm to Window
- Removed LookAndFeel capability from Mac platform.

3.8.0

- Tab and TabGroup Elements - awesome new capabilities

1.0.0 Python 2.7

It's official. There is a 2.7 version of PySimpleGUI!

3.8.2

- Exposed `TKOut` in Output Element
- `DrawText` added to Graph Elements
- Removed `Window.UpdateElements`
- `Window.grab_anywhere` defaults to False

3.8.3

- Listbox, Slider, Combobox, Checkbox, Spin, Tab Group - if `change_submits` is set, will return the Element's key rather than "
- Added `change_submits` capability to Checkbox, Tab Group
- Combobox - Can set value to an Index into the Values table rather than the Value itself
- Warnings added to Drawing routines for Graph element (rather than crashing)
- Window - can "force top level" window to be used rather than a normal window. Means that instead of calling Tk to get a window, will call `TopLevel` to get the window
- Window Disable / Enable - Disables events (button clicks, etc) for a Window. Use this when you open a second window and want to disable the first window from doing anything. This will simulate a 'dialog box'
- Tab Group returns a value with Window is Read. Return value is the string of the selected tab
- Turned off `grab_anywhere` for Popups
- New parameter, `default_extension`, for `PopupGetFile`
- Keyboard shortcuts for menu items. Can hold ALT key to select items in men
- Removed old-style Tabs - Risky change because it hit fundamental window packing and creation. Will also break any old code using this style tab (sorry folks this is how progress happens)

3.8.6

- Fix for Menus.
- Fixed table colors. Now they work
- Fixed returning keys for tabs
- Window Hide / UnHide methods
- Changed all Popups to remove context manager
- Error checking for Graphing objects and for Element Updates

3.9.0 & 1.1.0

- The FIRST UNIFIED version of the code!
- Python 2.7 got a TON of features . Look back to 1.0 release for the list
- Tab locations - Can place Tabs on top, bottom, left, right now instead of only the top

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3.9.1 & 1.1.2

- Tab features
- Themes
- Enable / Disable
- Tab text colors
- Selected tab color
- New GetListValues method for Listbox
- Can now have multiple progress bars in 1 window
- Fix for closing debug-output window with other windows open
- Topanga Look and Feel setting
- User can create new look and feel settings / can access the look and feel table
- New PopupQuick call. Shows a non-blocking popup window with auto-close
- Tree Element partially done (don't use despite it showing up)

3.9.3 & 1.1.3

- Disabled setting when creating element for:
- Input
- Combo
- Option Menu
- Listbox
- Radio
- Checkbox
- Spinner
- Multiline
- Buttons
- Slider
- Doc strings on all Elements updated
- Buttons can take image data as well as image files
- Button Update can change images
- Images can have background color
- Table element new num_rows parameter
- Table Element new alternating_row_color parameter
- Tree Element
- Window Disappear / Reappear methods
- Popup buttons resized to same size
- Exposed look and feel table

3.9.4 & 1.1.4

- Parameter order change for Button.Update so that new button ext is at front
- New Graph.DrawArc method
- Slider tick interval parameter for labeling sliders
- Menu tearoff now disabled by default
- Tree Data printing simplified and made prettier
- Window resizable parameter. Defaults to not resizable
- Button images can have text over them now
- BUG fix in listbox double-click. First bug fix in months

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- New Look And Feel capability. List predefined settings using ListOfLookAndFeelValues

3.10.1 & 1.2.1

- Combobox new readonly parameter in init and Update
- Better default sizes for Slider
- Read of Tables now returns which rows are selected (big damned deal feature)
- PARTIAL support of Table.Update with new values (use at your own peril)
- Alpha channel setting for Windows
- Timeout setting for Window.Read (big damned deal feature)
- Icon can be base64 image now in SetIcon call
- Window.FindElementWithFocus call
- Window.Move allows moving window anywhere on screen
- Window.Minimize will minimize to taskbar
- Button background color can be set to system default (i.e. not changed)

3.10.2 & 1.2.2

Emergency patch release... going out same day as previous release *The timeout timer for the new Read with timer wasn't being properly shut down* The Image.Update method appears to not have been written correctly. It didn't handle base64 images like the other elements that deal with images (buttons)

3.10.3 & 1.2.3

- New element - Vertical Separator
- New parameter for InputText - change_submits. If True will cause Read to return when a button fills in the InputText element
- Read with timeout = 0 is same as read non blocking and is the new preferred method
- Will return event == None if window closed
- New Close method will close all window types
- Scrollbars for Tables automatically added (no need for a Column Element)
- Table Update method complete
- Turned off expand when packing row frame... was accidentally turned on (primary reason for this release)
- Try added to Image Update so won't crash if bad image passed in

3.11.0 & 1.11.0

- Syncing up the second digit of the releases so that they stay in sync better. the 2.7 release is built literally from the 3.x code so they really are the same
- Reworked Read call... significantly.
- Realtime buttons work with timeouts or blocking read
- Removed default value parm on Buttons and Button Updates
- New Tree Element parm show_expanded. Causes Tree to be shown as fully expanded
- Tree Element now returns which rows are selected when Read
- New Window method BringToFront
- Shortcut buttons no longer close windows!
- Added CloseButton, CButton that closes the windows

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3.12.0 & 1.12.0

- Changed Button to be the same as ReadButton which means it will no longer close the window
- All shortcut buttons no longer close the window
- Updating a table clears selected rows information in return values
- Progress meter uses new CloseButton
- Popups use new CloseButton

3.13.0 & 1.13.0

- Improved multiple window handling of Popups when the X is used to close
- Change submits added for:
 - Multiline
 - Input Text
 - Table
 - Tree
- Option to close calendar chooser when date selected
- Update for Tree Element
- Scroll bars for Trees

3.14.0 & 1.14.0

- More windowing changes...
 - using a hidden root windowing (Tk())
 - all children are Toplevel() windows
- Read only setting for:
 - Input Text
 - Multiline
- Font setting for InputCombo, Multiline
- change_submits setting for Radio Element
- SetFocus for multiline, input elements
- Default mon, day, year for calendar chooser button
- Tree element update, added ability to change a single key
- Message parm removed from ReadNonBlocking
- Fix for closing windows using X
- CurrentLocation method for Windows
- Debug Window options
 - location
 - font
 - no_button
 - no_titlebar
 - grab_anywhere
 - keep_on_top
- New Print / EasyPrint options
 - location
 - font
 - no_button
 - no_titlebar
 - grab_anywhere

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- keep_on_top
- New popup, PopupQuickMessage
- PopupGetFolder, PopupGetFile new initial_folder parm

3.15.0 & 1.15.0

- Error checking for InputText.Get method
- Text color, background color added to multiline element.Update
- Update method for Output Element - gives ability to clear the output
- Graph Element - Read returns values if new flages set
 - Change submits, drag submits
 - Returns x,y coordinates
- Column element new parm vertical_scroll_only
- Table element new parm - bind return key - returns if return or double click
- New Window parms - size, disable_close
- "Better" multiwindow capabilities
- Window.Size property
- Poupups - new title parm, custom_text
 - title sets the window title
 - custom_text - single string or tuple string sets text on button(s)

3.16.0 & 1.16.0

- Bug fix in PopupScrolled
- New `Element` shortcut function for `FindElement`
- Dummy Stretch Element made for backwards compatibility with Qt
- Timer function prints in milliseconds now, was seconds

3.17.0 & 1.17.0 2-Dec-2018

3.17.0 2-Dec-2017 *Tooltip offset now programmable. Set variable `DEFAULT_TOOLTIP_OFFSET`. Defaults to (20,-20)* Tooltips are always on top now *Disable menu items* Menu items can have keys *StatusBar Element* (preparing for a real status bar in Qt) *enable_events* parameter added to ALL Elements capable of generating events *InputText.Update select parameter will select the input text* Listbox.Update - *set_to_index* parameter will select a single items *Menus can be updated!* Menus have an entry in the return values *LayoutAndRead deprecated* Multi-window support continues (X detection) *PopupScrolled now has a location parameter* *row_height* parameter to Table Element *Stretch Element (DUMMY) so that can be source code compatible with Qt* ButtonMenu Element (DUMMY) so can be source code compat with Qt. Will implement eventually

3.18.0 11-Dec-2018

NOTE - **Menus are broken** on version 2.7. Don't know how long they've been this way. Please get off legacy Python if that's what you're running.

- Default progress bar length changed to shorter
- Master window and tracking of num open windows moved from global to Window class variable
- Element visibility setting (when created and when Updating element)
- Input text visibility
- Combo visibility

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- Combo replaces InputCombo as the primary class name
- Option menu visibility
- Listbox visibility
- Listbox new SetFocus method
- Radio visibility
- Checkbox visibility
- Spin visibility
- Spin new Get method returns current value
- Multiline visibility
- Text visibility
- StatusBar visibility
- Output visibility
- Button visibility
- Button SetFocus
- ProgressBar - New Update method (used only for visibility)
- Image - clickable images! enable_events parameter
- Image visibility
- Canvas visibility
- Graph visibility
- Graph - new DrawImage capability (finally)
- Frame visibility
- Tab visibility (may not be fully functional)
- TabGroup visibility
- Slider visibility
- Slider - new disable_number_display parameter
- Column visibility
- Menu visibility - Not functional
- Table visibility
- Table - new num_rows parm for Update - changes number of visible rows
- Tree visibility
- Window - New element_padding parameter will get padding for entire window
- OneLineProgressMeter - Completely REPLACED the implementation
- OneLineProgressMeter - can get reason for the cancellation (cancel button versus X)
- EasyProgressMeter - completely removed. Use OneLineProgressMeter instead
- Debug window, EasyPrint, Print - debug window will re-open if printed to after being closed
- SetOptions - can change the error button color
- Much bigger window created when running PySimpleGUI.py by itself. Meant to help with regression testing

3.19.2 13-Dec-2018

- Warning for Mac's when trying to change button color
- New parms for Button.Update - image_size and image_subsample
- Buttons - remove highlight when border depth == 0
- OneLineProgressMeter - better layout implementation

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3.20.0 & 1.20.0 18-Dec-2018

- New Pane Element
- Graphh.DeleteFigure method
- disable_minimize - New parameter for Window
- Fix for 2.7 menus
- Debug Window no longer re-routes stdout by default
- Can re-route by specifying in Print / EasyPrint call
- New non-blocking for PopupScrolled
- Can set title for PopupScrolled window

3.21.0 & 1.21.0 28-Dec-2018

- ButtonMenu Element
- Embedded base64 default icon
- Input Text Right click menu
- Disabled Input Text are now 'readonly' instead of disabled
- Listbox right click menu
- Multiline right click menu
- Text right click menu
- Output right click menu
- Image right click menu
- Canvas right click menu
- Graph right click menu
- Frame right click menu
- Tab, tabgroup right click menu (unsure if works correctly)
- Column right click menu
- Table right click menu
- Tree right click menu
- Window level right click menu
- Window icon can be filename or bytes (Base64 string)
- Window.Maximize method
- Attempted to use Styles better with Combobox
- Fixed bug blocking setting bar colors in OneLineProgressMeter

3.22.0 PySimpleGUI / 1.22.0 PySimpleGUI27

- Added type hints to some portions of the code
- Output element can be made invisible
- Image sizing and subsample for Button images
- Invisibility for ButtonMenusup
- Attempt at specifying size of Column elements (limited success)
- Table Element
- New row_colors parameter
- New vertical_scroll_only parameter - NOTE - will have to disable to get horizontal scrollbars  v: latest ▼
- Tree Element
- New row_height parameter

- New feature - Icons for tree entries using filename or Base64 images
- Fix for bug sending back continuous mouse events
- New parameter `silence_on_error` for `FindElement` / `Element` calls
- Slider returns float now
- Fix for Menus when using Python 2.7
- Combobox Styling (again)

3.23.0 PySimpleGUI / 1.23.0 PySimpleGUI27 16-Jan-2019

- Animated GIFs!
- Calendar Chooser stays on top of other windows
- Fixed bug of no column headings for Tables
- Tables now use the font parameter

3.24.0 1.24.0 16-Jan-2019

- `PopupAnimated` - A popup call for showing "loading" type of windows

Upcoming

Make suggestions people! Future release features

Port to other graphic engines. Hook up the front-end interface to a backend other than tkinter. Qt, WxPython, etc. At the moment, Wx and Kivy are being considered for the next GUI framework. Work has already begun on Wx. Kivy is likely to be next instead of Wx however.

Code Condition

```
Make it run
Make it right
Make it fast
```

It's a recipe for success if done right. PySimpleGUI has completed the "Make it run" phase. It's far from "right" in many ways. These are being worked on. The module is particularly poor for PEP 8 compliance. It was a learning exercise that turned into a somewhat complete GUI solution for lightweight problems.

While the internals to PySimpleGUI are a tad sketchy, the public interfaces into the SDK are more strictly defined and comply with PEP 8 for the most part.

Please log bugs and suggestions in the GitHub! It will only make the code stronger and better in the end, a good thing for us all, right?

Design

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A moment about the design-spirit of `PySimpleGUI`. From the beginning, this package was meant to take advantage of Python's capabilities with the goal of programming ease.

Single File

While not the best programming practice, the implementation resulted in a single file solution. Only one file is needed, `PySimpleGUI.py`. You can post this file, email it, and easily import it using one statement.

Functions as objects

In Python, functions behave just like object. When you're placing a Text Element into your form, you may be sometimes calling a function and other times declaring an object. If you use the word `Text`, then you're getting an object. If you're using `Text`, then you're calling a function that returns a `Text` object.

Lists

It seemed quite natural to use Python's powerful list constructs when possible. The form is specified as a series of lists. Each "row" of the GUI is represented as a list of Elements. When the form read returns the results to the user, all of the results are presented as a single list. This makes reading a form's values super-simple to do in a single line of Python code.

Dictionaries

Want to view your form's results as a dictionary instead of a list... no problem, just use the `key` keyword on your elements. For complex forms with a lot of values that need to be changed frequently, this is by far the best way of consuming the results.

You can also look up elements using their keys. This is an excellent way to update elements in reaction to another element. Call `form.FindElement(key)` to get the Element.

Named / Optional Parameters

This is a language feature that is featured **heavily** in all of the API calls, both functions and classes. Elements are configured, in-place, by setting one or more optional parameters. For example, a Text element's color is chosen by setting the optional `text_color` parameter.

tkinter tkinter is the "official" GUI that Python supports. It runs on Win <!--stackedit_data:

```
eyJoaXN0b3J5IjpbNjY5NTQ1Njk0LDcyMDgwODczMiwxNjc5ODUwOTkyLC0xNDYxNDI4MSwtNjA2MzcwMTgsLTUwOTM1OTEyMywtMjQ0OTc2MjksMTMwNzY5MjU5LC0yOTY3ODM1NSwtNzc0MDc0MjMwLDI2NjM2NDQxNyw0NDk0MzM5NDMsLTExNDg0OTA2MjNdfQ==
```

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