GUIs in Python

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Objectives

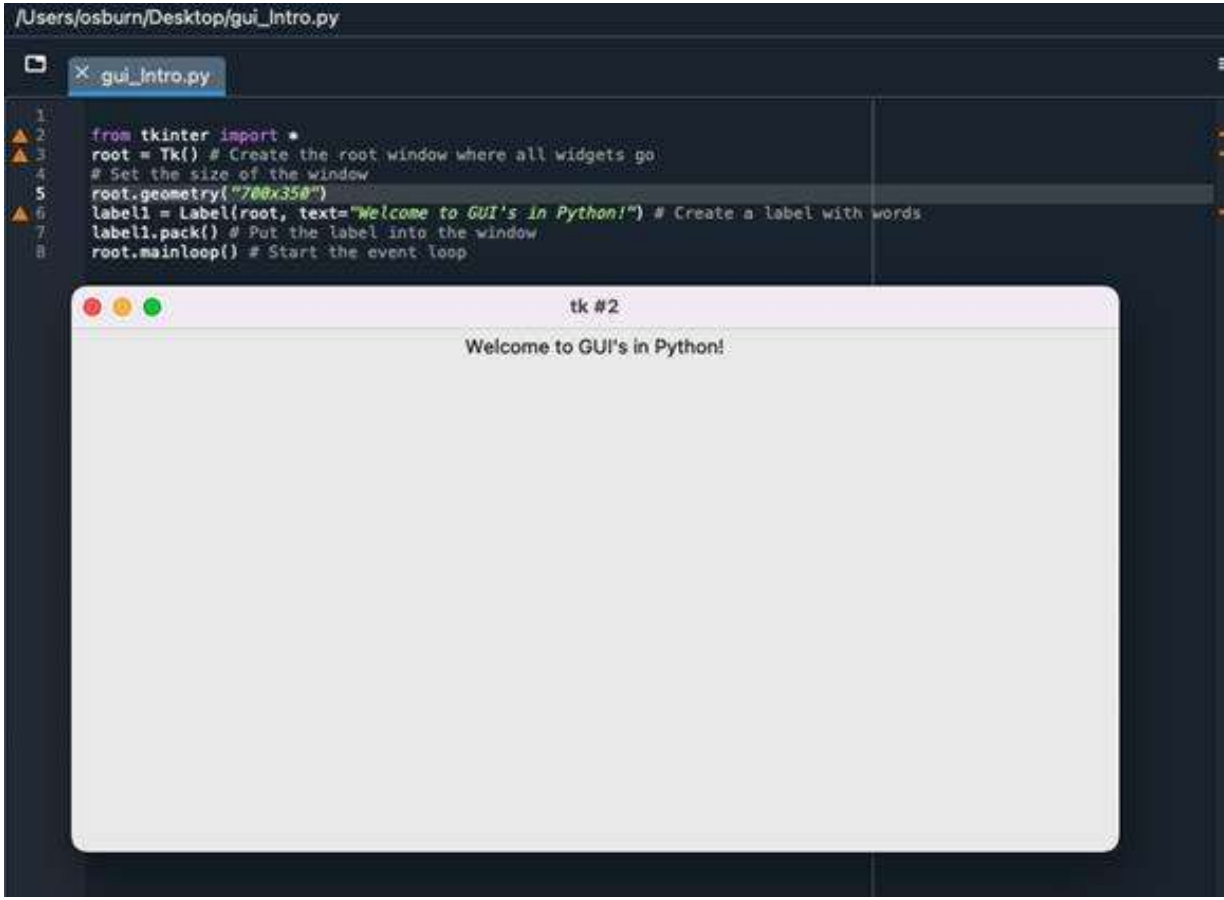
GUI

- What is a GUI?
- How does it relate to Python?

GUI

What is a GUI?

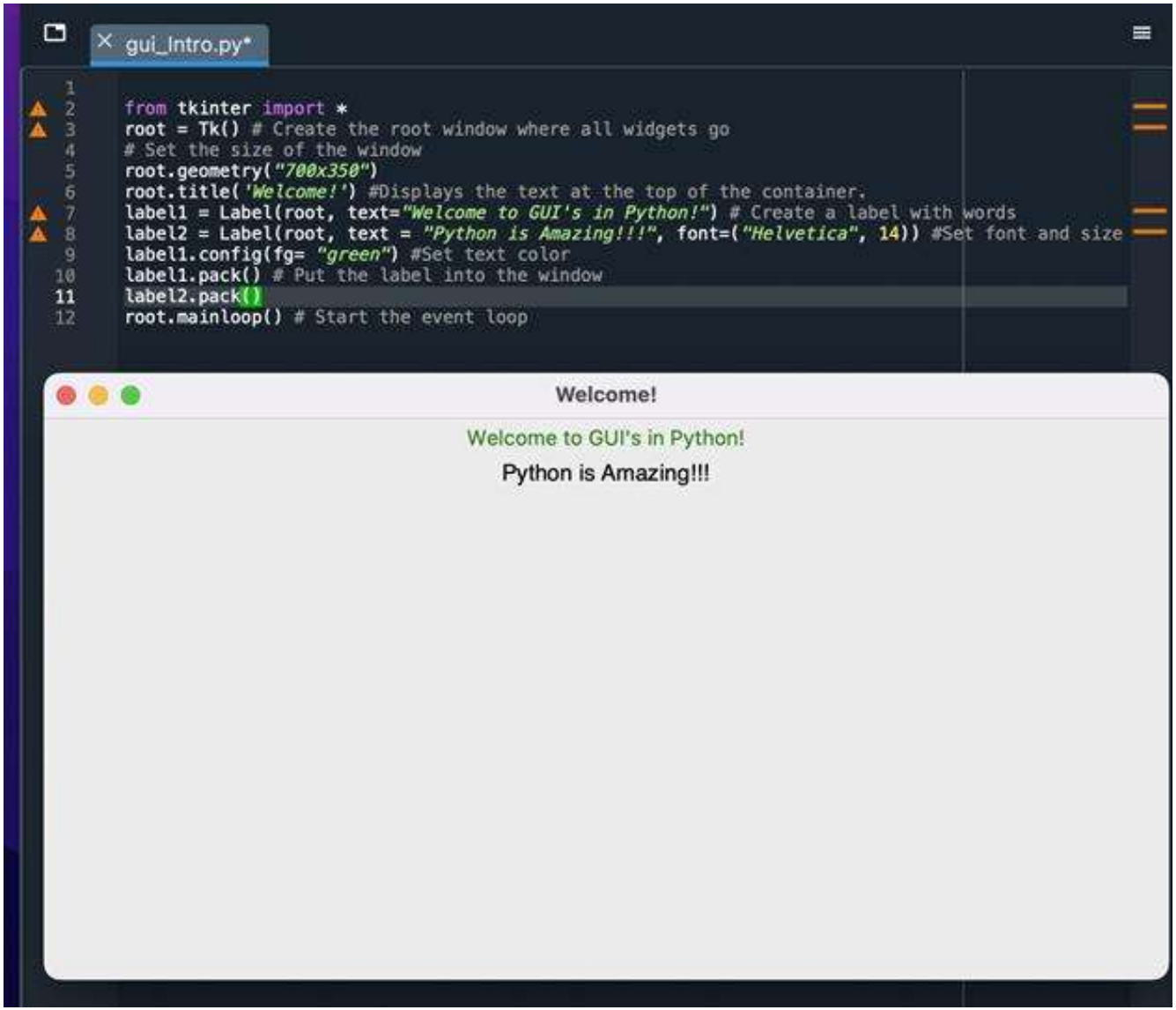
- Graphical user interface.
  - Using Spyder.
- Import tkinter.
- Widget that allows you to create windows.
  - Text label.
  - Button.
  - Drop-down menu.
  - Scroll bar.
  - Etc.



GUI

Labels

- Font.
  - Name
  - Size
  - Color.

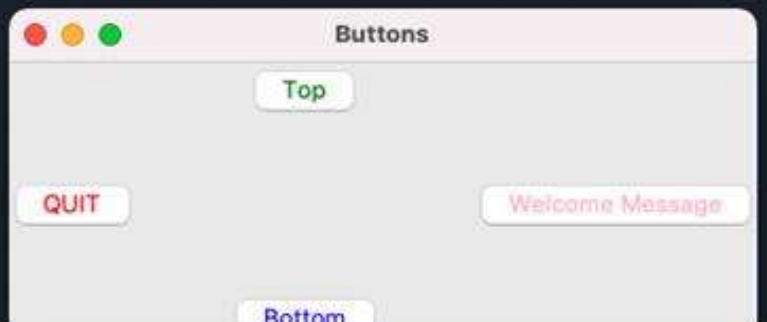


GUI

Buttons

- Font.
  - Name, size.
- Position.
- Color.
- Actions

```
1
2  from tkinter import *
3
4
5  root = Tk()#Create the root window where all widgets go
6  root.geometry("400x150")# Set the size of the window
7  root.title('Buttons')
8
9  def write_message(): #Message for second Button
10     print("Welcome to Python!")
11 def quit(): #Exit the window
12         root.destroy()
13
14
15 #Creates the button object with red text
16 button = Button(root,
17                 text="QUIT",
18                 fg="red",
19                 command=root.quit)
20 button.pack(side=LEFT)
21 #Creates a second button object that displays a message in console
22 message = Button(root,
23                  text="Welcome Message",
24                  fg="pink",
25                  command=write_message)
26 message.pack(side=RIGHT)
27
28 button3 = Button(root,
29                  text="Top",
30                  fg= "green")
31 button3.pack(side=TOP)
32
33 button4 = Button(root,
34                  text="Bottom",
35                  fg= "blue")
36 button4.pack(side=BOTTOM)
37 root.mainloop()
```



GUI

TextBox

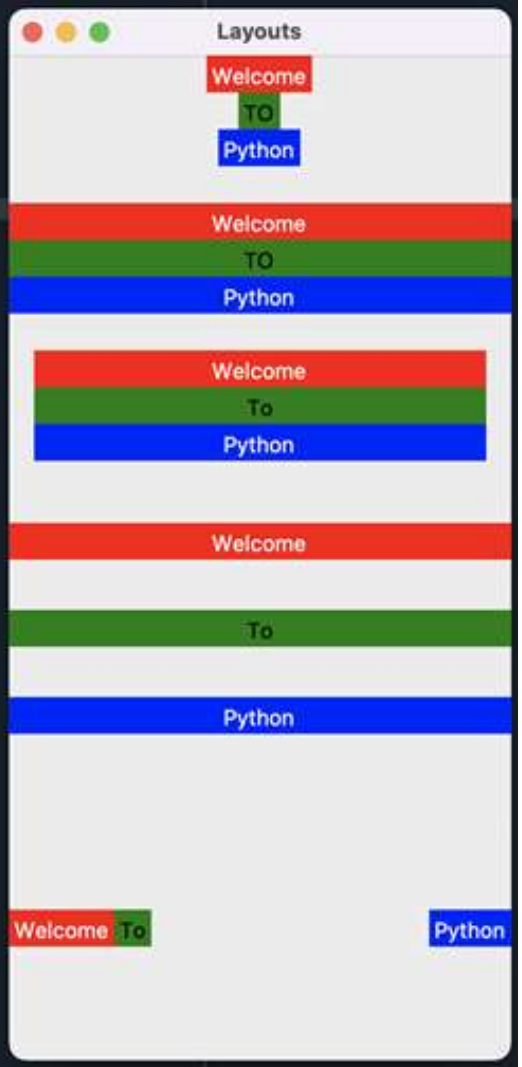
```python
#https://www.tutorialspoint.com/python/tk_text.htm
from tkinter import *

root = Tk()
root.geometry("300x300")
root.title('TextBoxes')

def insertText():
    user_input=textField1.get("1.0",END)  # read from one text box t1
    textField2.insert(END, user_input) # Add to another text box t2


user_input = StringVar() #Declares a string variable.

label1 = Label(root,  text='Enter Your Name', width=15 )  # Creates a label
label1.grid(row=1,column=1) #location on the window

textField1 = Text(root,  height=1, width=16,bg='yellow') # Create a  textbox
textField1.grid(row=1,column=2) #location on the window


b1 = Button(root, text='Update', width=10,bg='red',command=lambda: insertText()) # Creates a button
b1.grid(row=2,column=2) #location on the window

textField2 = Text(root, height=1, width=15, bg='pink' ) # added one textbox to read
textField2.grid(row=3,column=2) #location on the window


root.mainloop()
```

GUI

Layouts

- Fill.
- Padding.
  - padx = horizontally.
  - pady = vertically.
- Side by side.
- Grid.

```
from tkinter import *

root = Tk()
root.geometry("300x600")
root.title('Layouts')



label1 = Label(root, text="Welcome", bg="red", fg="white")
label1.pack()
label2 = Label(root, text="TO", bg="green", fg="black")
label2.pack()
label3 = Label(root, text="Python", bg="blue", fg="white")
label3.pack()
label4 = Label(root, text="")
label4.pack()
label1 = Label(root, text="Welcome", bg="red", fg="white")
label1.pack(fill=X)
label2 = Label(root, text="TO", bg="green", fg="black")
label2.pack(fill=X)
label3 = Label(root, text="Python", bg="blue", fg="white")
label3.pack(fill=X)
label4 = Label(root, text="")
label4.pack()

label1 = Label(root, text="Welcome", bg="red", fg="white")
label1.pack(fill=X,  padx=15)
label2 = Label(root, text="To", bg="green", fg="black")
label2.pack(fill=X, padx=15)
label3 = Label(root, text="Python", bg="blue", fg="white")
label3.pack(fill=X, padx=15)
label4 = Label(root, text="")
label4.pack()

label1 = Label(root, text="Welcome", bg="red", fg="white")
label1.pack(fill=X,  pady=15)
label2 = Label(root, text="To", bg="green", fg="black")
label2.pack(fill=X, pady=15)
label3 = Label(root, text="Python", bg="blue", fg="white")
label3.pack(fill=X, pady=15)
label4 = Label(root, text="")
label4.pack()


label1 = Label(root, text="Welcome", bg="red", fg="white")
label1.pack(fill=X,  pady=15, side=LEFT)
label2 = Label(root, text="To", bg="green", fg="black")
label2.pack(fill=X, pady=15, side=LEFT)
label3 = Label(root, text="Python", bg="blue", fg="white")
label3.pack(fill=X, pady=15, side=RIGHT)
label4 = Label(root, text="")
label4.pack()

#label1 = Label(root, text="Welcome", bg="red", fg="white").grid(row=1, column=0)
#label2 = Label(root, text="To", bg="green", fg="black").grid(row=1, column=1)
#label3 = Label(root, text="Python", bg="blue", fg="white").grid(row=1, column=2)


mainloop()
```

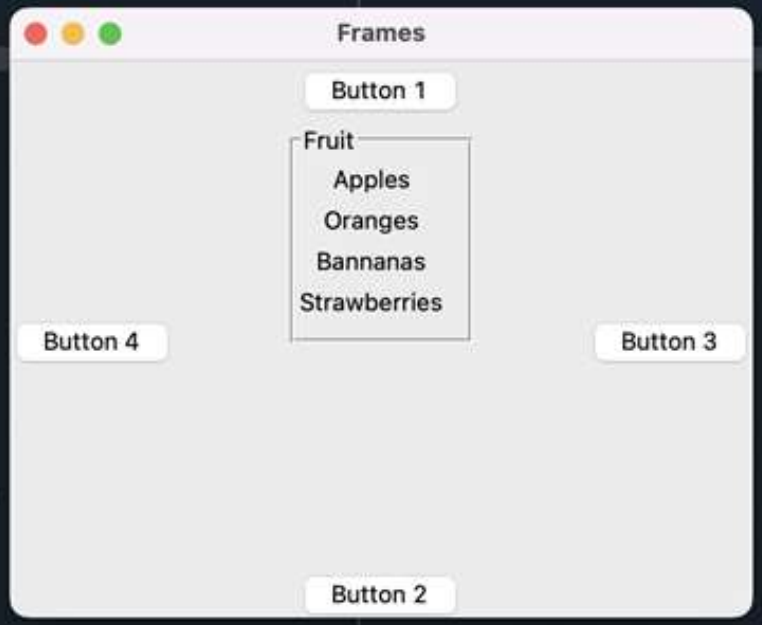


GUI

Frames

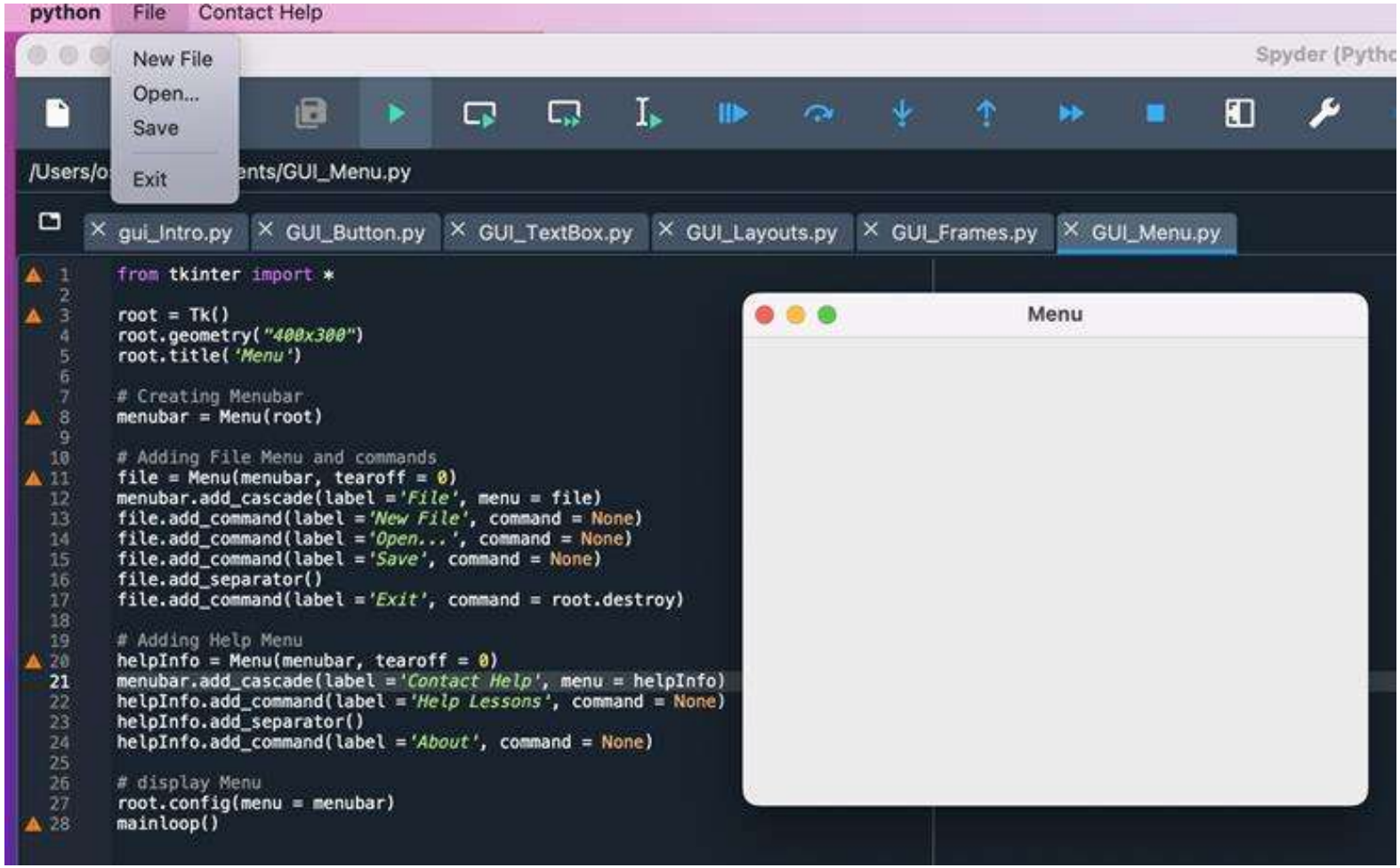
- Locations.
- Label frame.

```
from tkinter import *

root = Tk()
root.geometry("400x300")
root.title('Frames')

#Builds the frame
frame = Frame(root)
frame.pack()

#Setup the different Frame sides
leftframe = Frame(root)
leftframe.pack(side=LEFT)
rightframe = Frame(root)
rightframe.pack(side=RIGHT)
topframe = Frame(root)
topframe.pack(side = TOP)
bottomframe = Frame(root)
bottomframe.pack(side = BOTTOM)


#Assigning the buttons to the different locations
button1 = Button(topframe, text="Button 1")
button1.pack(side=LEFT)

button2 = Button(bottomframe, text="Button 2")
button2.pack(side=RIGHT)

button3 = Button(rightframe, text="Button 3")
button3.pack(side=LEFT)

button4 = Button(leftframe, text="Button 4",)
button4.pack(side=RIGHT)

#Creates a Labeld Frame
labelFrame = LabelFrame(root, text="Fruit")
label1 = Label(labelFrame, text="Apples")
label1.grid(row=0, column=0)
label2 = Label(labelFrame, text="Oranges")
label2.grid(row=1, column=0)
label2 = Label(labelFrame, text="Bannanas")
label2.grid(row=2, column=0)
label2 = Label(labelFrame, text="Strawberries")
label2.grid(row=3, column=0)
#To display the frame
labelFrame.pack(padx=5, pady=5, ipadx=5, ipady=5)

mainloop()
```



GUI

Menus


python
File
Contact Help
New File
Open...
Save
Exit
Spyder (Pytho
/Users/o
ents/GUI_Menu.py
gui_Intro.py
GUI_Button.py
GUI_TextBox.py
GUI_Layouts.py
GUI_Frames.py
GUI_Menu.py
1 from tkinter import *
3 root = Tk()
4 root.geometry("400x300")
5 root.title('Menu')
7 # Creating Menubar
8 menubar = Menu(root)
10 # Adding File Menu and commands
11 file = Menu(menubar, tearoff = 0)
12 menubar.add_cascade(label ='File', menu = file)
13 file.add_command(label ='New File', command = None)
14 file.add_command(label ='Open...', command = None)
15 file.add_command(label ='Save', command = None)
16 file.add_separator()
17 file.add_command(label ='Exit', command = root.destroy)
19 # Adding Help Menu
20 helpInfo = Menu(menubar, tearoff = 0)
21 menubar.add_cascade(label ='Contact Help', menu = helpInfo)
22 helpInfo.add_command(label ='Help Lessons', command = None)
23 helpInfo.add_separator()
24 helpInfo.add_command(label ='About', command = None)
26 # display Menu
27 root.config(menu = menubar)
28 mainloop()
Menu

GUI

Images

- Tkinter only supports GIF, PGM, and PBM.
- To read JPGs you need to use the Python Imaging Library.

```
1   from tkinter import *
2
3   root = Toplevel()
4   root.title('PythonGuides')
5
6
7   photo = PhotoImage(file='/Users/osburn/Desktop/smile.png')
8   photo = photo.subsample(2)
9   lbl = Label(root,image = photo)
10  lbl.image = photo
11  lbl.grid(column=0, row=3)
12
13  mainloop()
```

GUI

Event driven

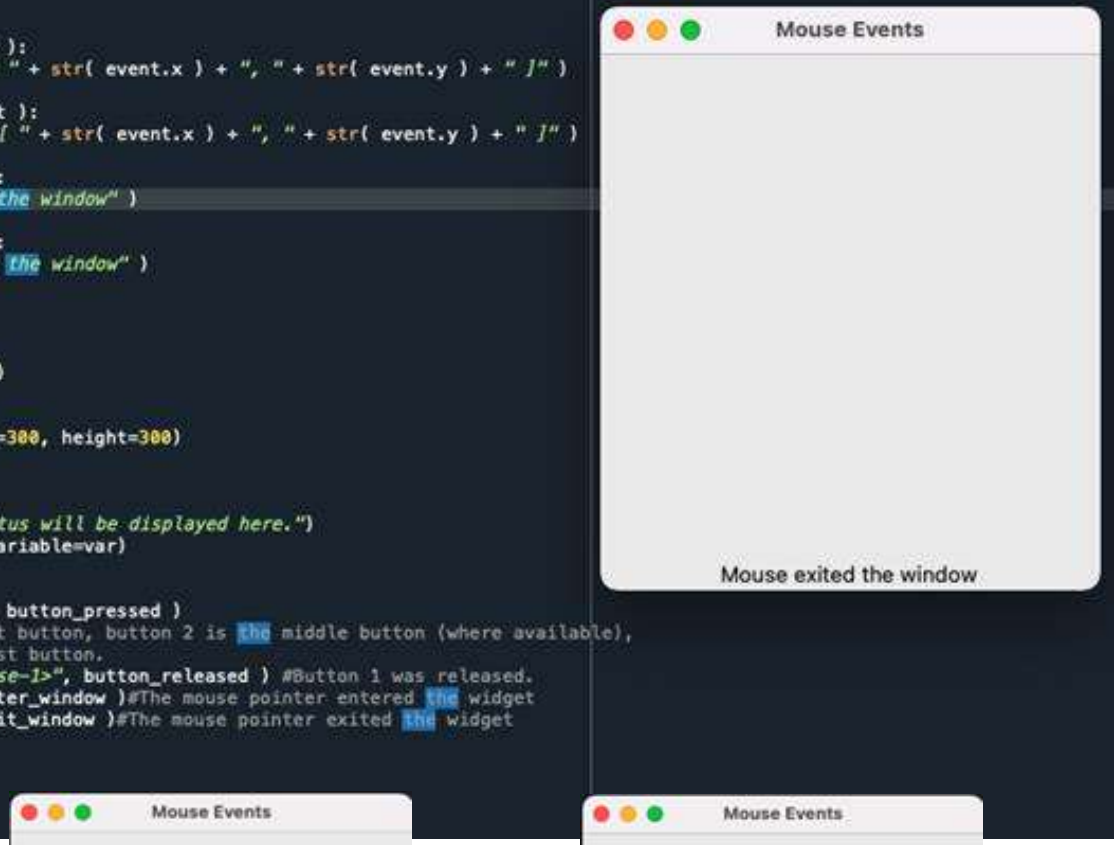
- A programming paradigm where the flow of the program is driven by sensor outputs or user actions (aka events) - Wikipedia
- Batch programming - programming paradigm where the flow of events is determined completely by the programmer - Wikipedia

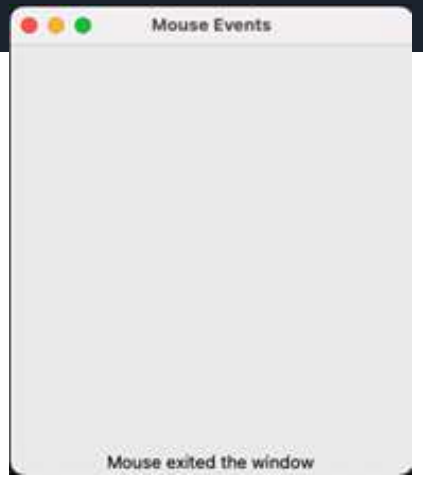
GUI

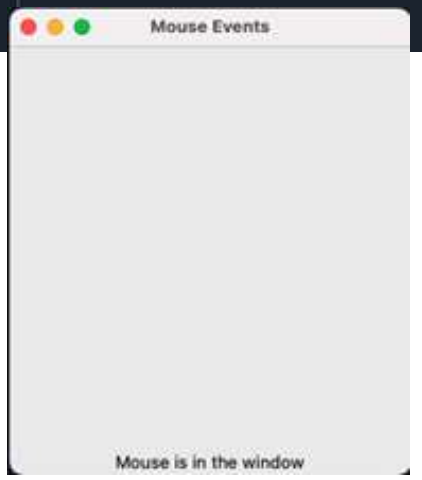
Mouse clicks

- Events.
- Bindings.

```
#https://web.archive.org/web/20201112115151id_/https://effbot.org/tkinterbook/tkinter-events-and-bindings.htm
from tkinter import *

def button_pressed( event ):
   var.set( "Pressed at [ " + str( event.x ) + ", " + str( event.y ) + " ]" )

def button_released( event ):
   var.set( "Released at [ " + str( event.x ) + ", " + str( event.y ) + " ]" )

def enter_window( event ):
   var.set( "Mouse is in the window" )

def exit_window(  event ):
   var.set( "Mouse exited the window" )


root = Tk()
root.title("Mouse Events")


frame = Frame(root, width=300, height=300)
frame.pack()

var = StringVar()
var.set("Mouse Events status will be displayed here.")
label = Label(root, textvariable=var)
label.pack(side=BOTTOM)

frame.bind( "<Button-1>", button_pressed )
# Button 1 is the leftmost button, button 2 is the middle button (where available),
#and button 3 the rightmost button.
frame.bind( "<ButtonRelease-1>", button_released ) #Button 1 was released.
frame.bind( "<Enter>", enter_window )#The mouse pointer entered the widget
frame.bind( "<Leave>", exit_window )#The mouse pointer exited the widget


root.mainloop()
```







GUI

ListBoxes

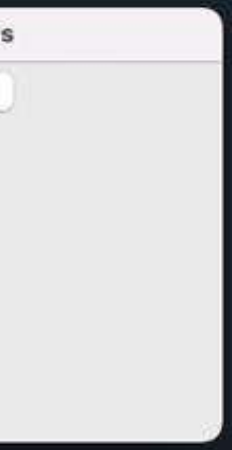
- selectmode = multiple
- listbox.get(<int>)
- listbox.curselection()

```
1   from tkinter import *
2
3   root = Tk()
4   root.geometry("200x220")
5   root.title("List Boxes")
6   frame = Frame(root)
7   frame.pack()
8
9   label = Label(root,text = "A list of Car Parts.")
10  label.pack()
11
12  listbox = Listbox(root)   #Creats the Listbox widget
13  listbox.insert(1,"Breaks")  #adds items to the widget
14  listbox.insert(2, "Muffler")
15  listbox.insert(3, "Tires")
16  listbox.insert(4, "Windshield Wipers")
17  listbox.insert(5, "Head Lights")
18  listbox.pack()
19
20  root.mainloop()
21
```

GUI

DialogBoxes


```python
from tkinter import *

root = Tk()
root.title('Dialog Boxes')
root.geometry('300x200')


def msg1():
    messagebox.showinfo('information', 'Please call Support.')
    messagebox.showerror('error', 'There was an error!')
    messagebox.showwarning('warning', 'This is a warning')
    messagebox.askquestion('Ask Question', 'Do you want to continue?')
    messagebox.askokcancel('Ok Cancel', 'Are You sure?')
    messagebox.askyesno('Yes|No', 'Do you want to proceed?')
    messagebox.askretrycancel('retry', 'Failed! want to try again?')

Button(root, text='Click Me', command=msg1).pack()

root.mainloop()
```



Demo


ASU
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