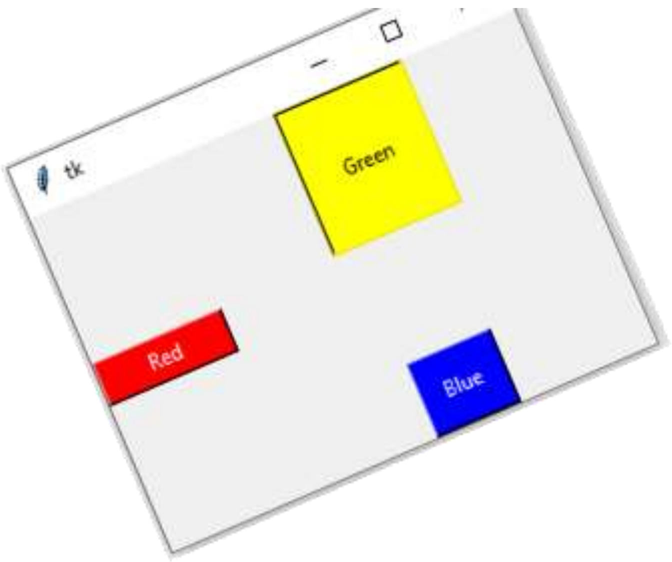
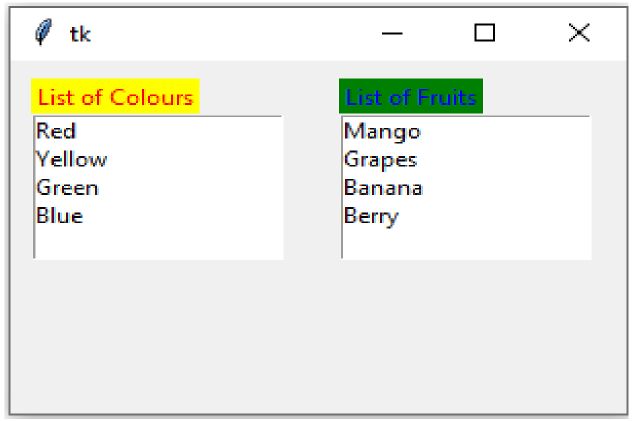
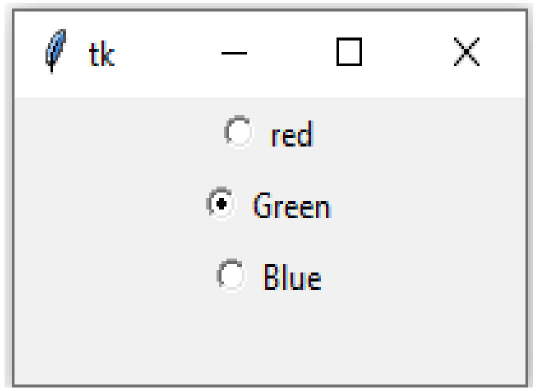




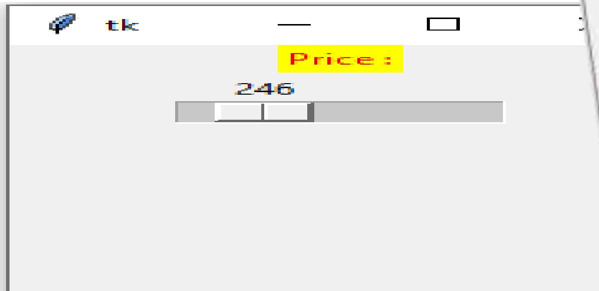
List of Colours
Red
Yellow
Green
Blue

List of Fruits
Mango
Grapes
Banana
Berry

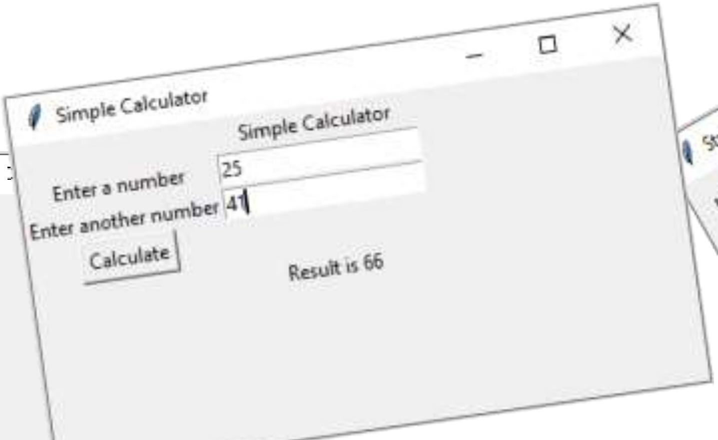
CMPE 103
Module 8
GUI Programming using Tkinter



red
[✓ Green]
Blue



Price :
246



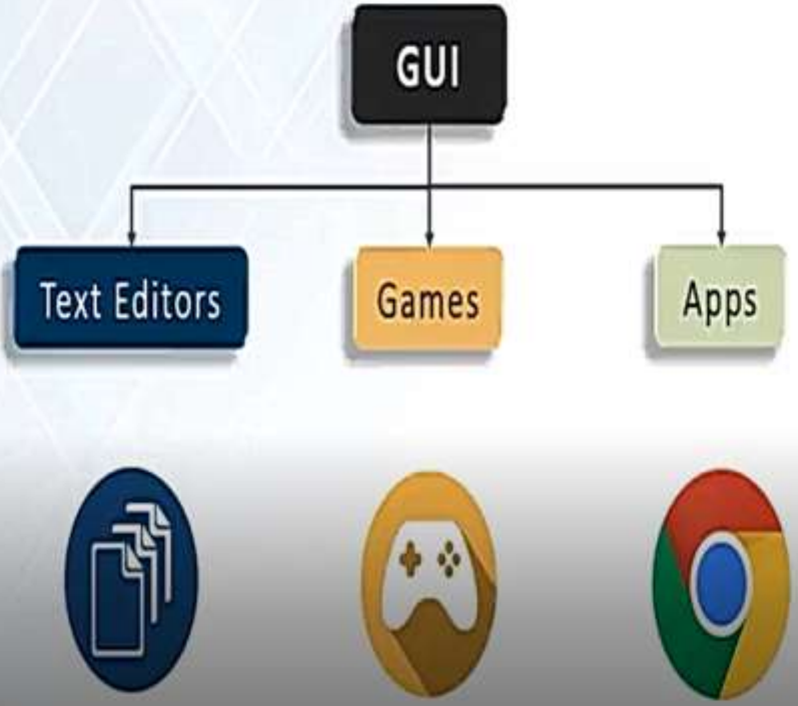
Simple Calculator
Enter a number 25
Enter another number 41
Result is 66

Name : abc
Regd No : 123

What Is A GUI?

What is GUI?

GUI is a desktop app which helps you to interact with computers



Event Driven Programming Paradigm

- Event-driven programming is a programming paradigm in which the flow of program execution is determined by events - for example a user action such as a mouse click, key press, or a message from the operating system or another program.
- An event-driven application is designed to detect events as they occur, and then deal with them using an appropriate event-handling procedure.
- In a typical modern event-driven program, there is no discernible flow of control. The main routine is an event-loop that waits for an event to occur, and then invokes the appropriate event-handling routine.
- Event callback is a function that is invoked when something significant happens like when click event is performed by user or the result of database query is available.

Event Handlers: Event handlers is a type of function or method that run a specific action when a specific event is triggered. For example, it could be a button that when user click it, it will display a message, and it will close the message when user click the button again, this is an event handler.

Trigger Functions: Trigger functions in event-driven programming are a functions that decide what code to run when there are a specific event occurs, which are used to select which event handler to use for the event when there is specific event occurred.

Events: Events include mouse, keyboard and user interface, which events need to be triggered in the program in order to happen, that mean user have to interacts with an object in the program, for example, click a button by a mouse, use keyboard to select a button and etc.

Introduction:

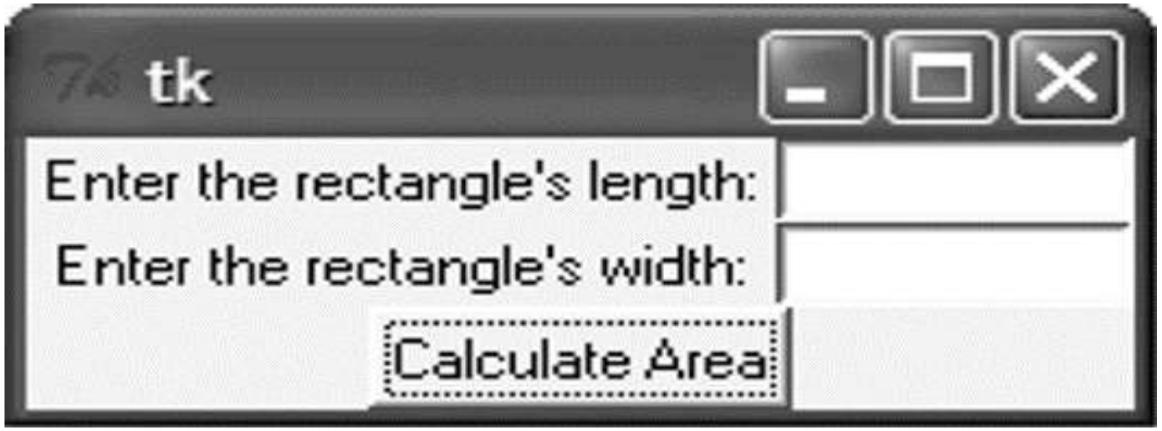
- A graphical user interface is an application that has buttons, windows, and lots of other widgets that the user can use to interact with your application.

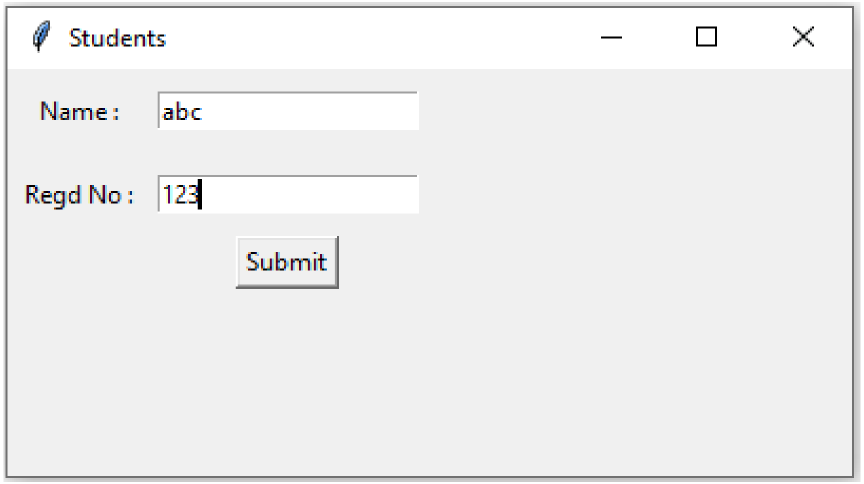
- A good example would be a web browser. It has buttons, tabs, and a main window where all the content loads.

- In GUI programming, a **top-level root** windowing object contains all of the **little windowing objects** that will be part of your complete GUI application.

- These windowing objects can be text labels, buttons, list boxes, etc. These individual little GUI components are known as **widgets**.

- A graphical user interface allows the user to interact with the operating system and other programs using graphical elements such as icons, buttons, and dialog boxes.
- GUIs popularized the use of the mouse.
- GUIs allow the user to point at graphical elements and click the mouse button to activate them.
- GUI Programs Are Event-Driven
- User determines the order in which things happen
- GUI programs respond to the actions of the user, thus they are event driven.
- The Tkinter module is a wrapper around tk, which is a wrapper around tcl, which is what is used to create windows and graphical user interfaces.





- Python offers multiple options for developing GUI (Graphical User Interface). The most commonly used **GUI method** is **tkinter.**

- **Tkinter** is the easiest among all to get started with. It is Python's standard GUI (Graphical User Interface) package. It is the most commonly used toolkit for **GUI Programming** in Python

- since Tkinter is the Python interface to Tk (Tea Kay), it can be pronounced as **Tea-Kay-inter**. i.e tkinter = **t k inter**.

tkinter - GUI for Python:

- Python provides the standard library **tkinter** for creating the graphical user interface for **desktop-based applications.**

- Developing desktop-based applications with **tkinter** is not a complex task.

- A Tkinter window application can be created by using the following steps.

1. *Import the **tkinter** module.*
2. *Create the **main application window**.*
3. *Add the **widgets** like labels, buttons, frames, etc. to the window.*
4. *Call the **main event loop** so that the actions can take place on*

1. Importing tkinter is same as importing any other module in the python code. Note that the name of the module in **Python 2.x** is '**Tkinter**' and in **Python 3.x** is '**tkinter**'.

   import tkinter **(or)** **from tkinter import ***

2. After importing **tkinter** module we need to create a main window, tkinter offers a method '**Tk()**' to create **main window**. The basic code used to create the main window of the application is:

   top = tkinter.Tk() **(or)** **top=Tk()**

3. After creating main window, we need to **add components** or **widgets** like labels, buttons, frames, etc.

4. After adding widgets to **main window**, we need to run the application, tkinter offers a method '**mainloop()**' to run application. The basic code used to run the application is:

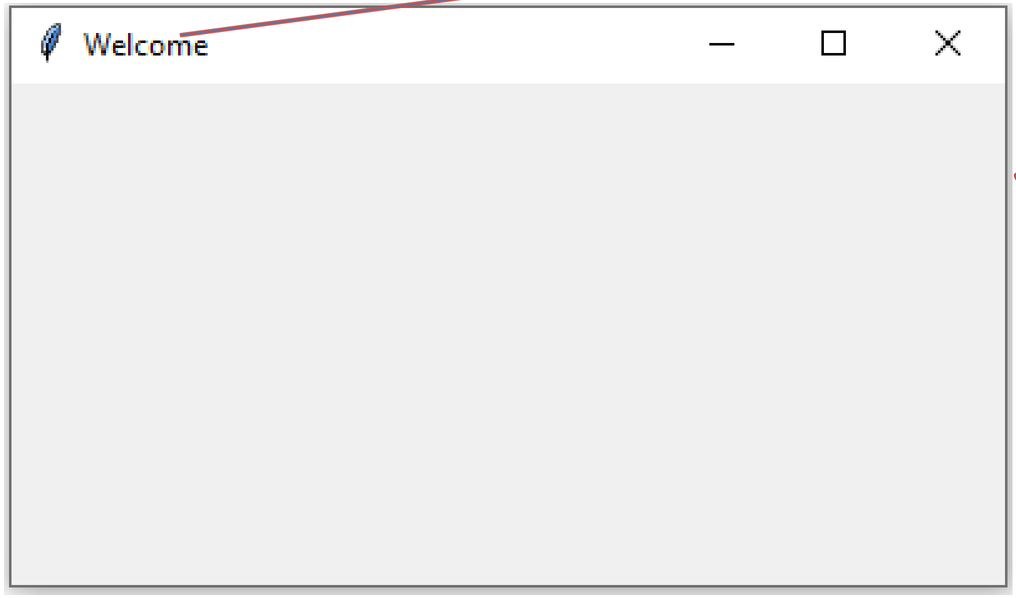
   top.mainloop ()

Example: **tkndemo.py**

```
import tkinter
top = tkinter.Tk()           #creating the application main window.
top.title("Welcome"          #title of main window
)top.geometry("400x300"      #size of main window
) top.mainloop()             #calling the event main
                             loop
```

Output:

```
>>> python tkndemo.py
```



- tkinter also offers access to the geometric configuration of the widgets which can organize the widgets in the parent windows.

Tkinter provides the following geometry methods

1. pack () method:

The **pack()** method is used to organize components or widgets in main window.

Syntax:

```
widget.pack (options)
```

The possible options are

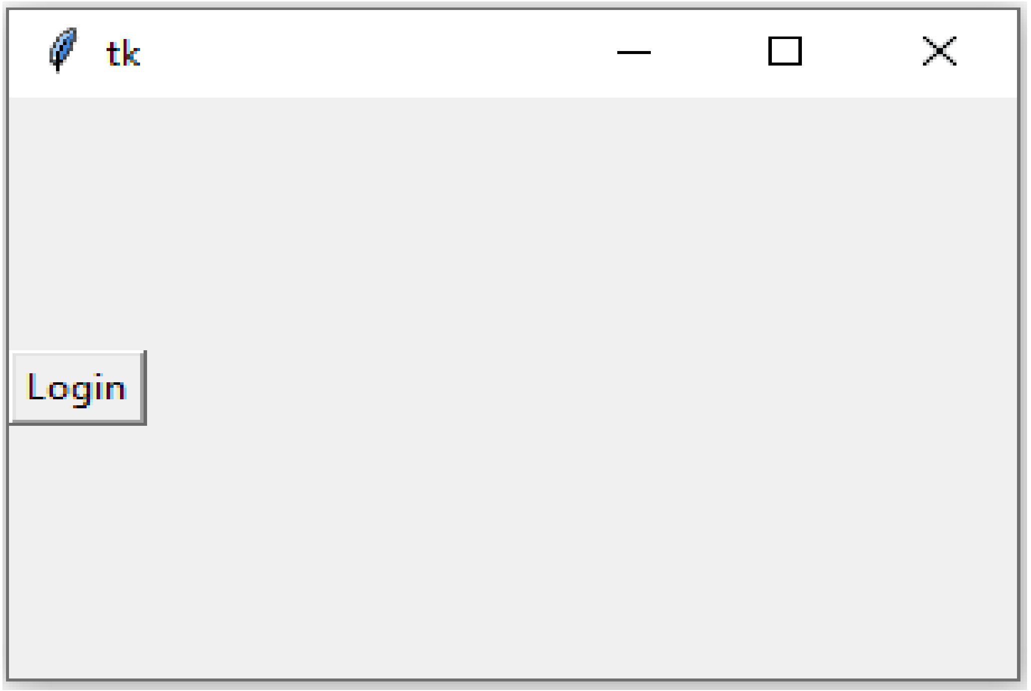
side: it represents the side to which the widget is to be placed on the window. Side may be **LEFT** or **RIGHT** or **TOP(default)** or **BOTTOM**.

Example: **tknpack.py**

```
from tkinter import *
top = Tk() top.geometry("300x200")
btn1 = Button(top, text = "Login") btn1.pack( side = LEFT)
top.mainloop()
```

Output:

```
>>> python tknpack.py
```



2. grid() method:

The **grid()** method organizes the widgets in the tabular form. We can specify the rows and columns as the options in the method call.

This is a more organized way to place the widgets to the python application.

Syntax:

```
widget.grid (options)
```

The possible options are

- **Column**

  The column number in which the widget is to be placed. The leftmost column is represented by **0**.
- **padx, pady**

  It represents the number of pixels to pad the widget outside the widget's border.
- **row**

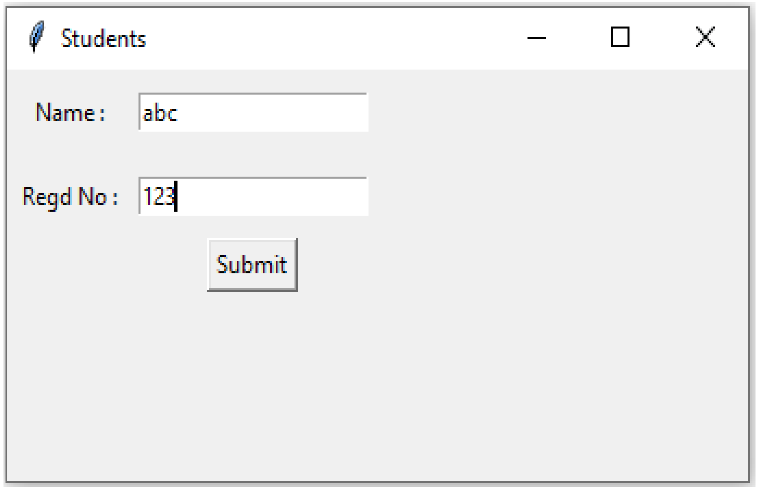
  The row number in which the widget is to be placed. The topmost row is represented by **0**.

Example: **tkngrid.py**

```
from tkinter import *
parent = Tk()
parent.title("Students")
parent.geometry("300x200")
name = Label(parent,text = "Name : ")
name.grid(row = 0, column = 0,pady=10,padx=5)
e1 = Entry(parent)
e1.grid(row = 0, column = 1)
regno = Label(parent,text = "Regd No : ")
regno.grid(row = 1, column = 0,pady=10,padx=5)
e2 = Entry(parent)
e2.grid(row = 1, column = 1)
btn = Button(parent, text = "Submit")
btn.grid(row = 3, column = 1)
parent.mainloop()
```

Output:

>>>python tkngrid.py



3. place() method:

The place() method organizes the widgets to the specific **x** and **y** coordinates.

Syntax:

```
widget.place(x,y)
```

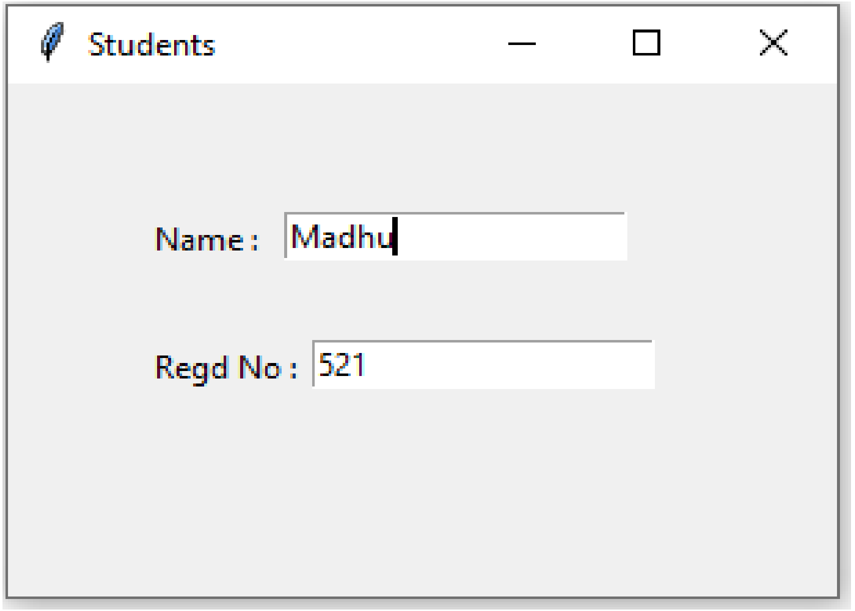
- **x, y:** It refers to the horizontal and vertical offset in the pixels.

Example: tknplace.py

```
from tkinter
import * parent = Tk()
parent.title("Students")
parent.geometry("300x200")
name = Label(parent,text = "Name : ")
name.place(x=50,y=50)
e1 = Entry(parent)
e1.place(x=100,y=50)
regno = Label(parent,text = "Regd No : ")
regno.place(x=50,y=100)
e2 = Entry(parent)
e2.place(x=110,y=100)
parent.mainloop()
```

Output:

>>>python tknplace.py



```
Name : Madhu
Regd No : 521
```

- **Tkinter widgets or components:**

  Tkinter supports various widgets or components to build GUI application in python.

Widget	Description
Button	Creates various buttons in Python Application.
Checkbutton	Select one or more options from multiple options.(Checkbox)
Entry	Allows the user to enter single line of text(Textbox)
Frame	Acts like a container which can be used to hold the other widgets
Label	Used to display non editable text on window
Listbox	Display the list items, The user can choose one or more items.
Radiobutton	Select one option from multiple options.
Text	Allows the user to enter single or multiple line of text(Textarea)
Scale	Creates the graphical slider, the user can slide through the range of values
Toplevel	Used to create and display the top-level windows(Open a new window)

❖ Button Widget in Tkinter:

- The Button is used to add various kinds of buttons to the python application. We can also associate a method or function with a button which is called when the button is pressed.

  Syntax: **name = Button(parent, options)**

The options are

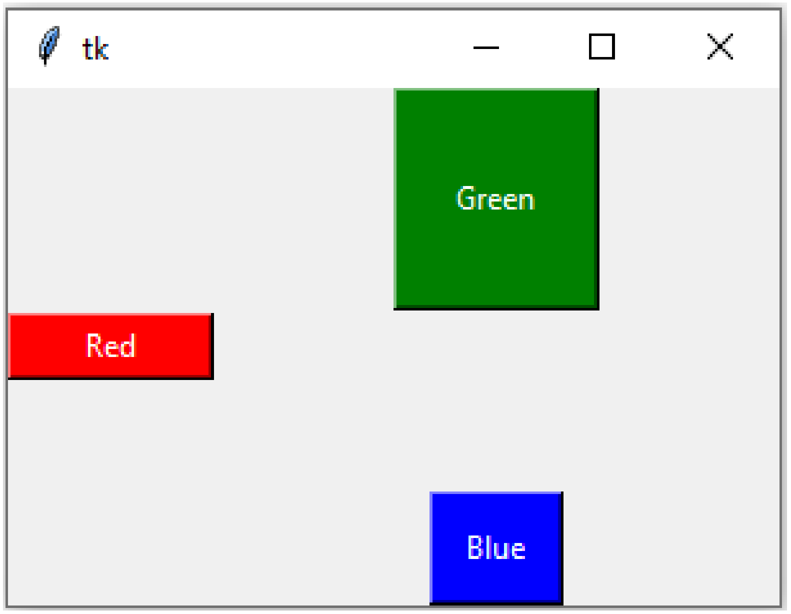
- **activebackground:** It represents the background of the button when it is active.
- **activeforeground:** It represents the font color of the button when it is active..
- **bd:** It represents the border width in pixels.
- **bg:** It represents the background color of the button.
- **command:** It is set to the function call which is scheduled when the function is called.
- **text:** It is set to the text displayed on the button.
- **fg:** Foreground color of the button.
- **height:** The height of the button.
- **padx:** Additional padding to the button in the horizontal direction.
- **pady:** Additional padding to the button in the vertical direction.
- **width:** The width of the button.

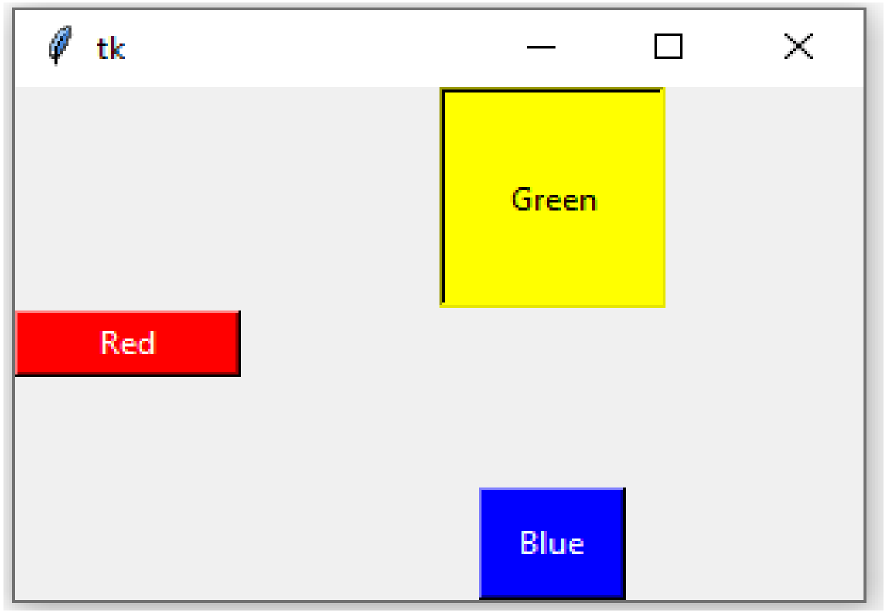
Example: **btndemo1.py**

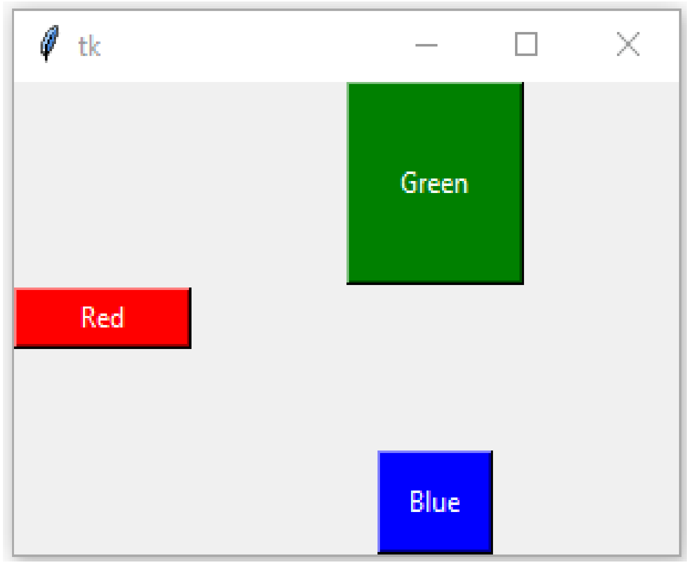
```
from tkinter import *
from tkinter import messagebox
top = Tk()
top.geometry("300x200")

def fun():
  messagebox.showinfo("Hello", "Blue Button clicked")
  btn1 = Button(top, text = "Red",bg="red",fg="white",width=10)
  btn1.pack( side = LEFT)
  btn2 = Button(top, text =
   "Green",bg="green",fg="white",width=10,height=5,
   activebackground="yellow")
  btn2.pack( side = TOP)
  btn3 = Button(top, text
   ="Blue",bg="blue",fg="white",padx=10,pady=10, command=fun)
  btn3.pack( side = BOTTOM)
top.mainloop()
```

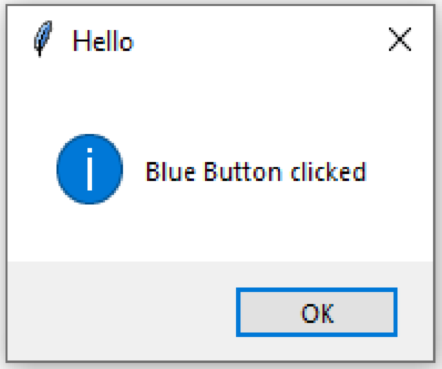
Output:

```
>>>python btndemo1.py
```









Blue Button clicked

❖ Checkbutton Widget in Tkinter:

- The Checkbutton is used to display the CheckButton on the window. The Checkbutton is mostly used to provide many choices to the user among which, the user needs to choose the one. It generally implements many of many selections.

  Syntax: **name = Checkbutton(parent, options)**

The options are

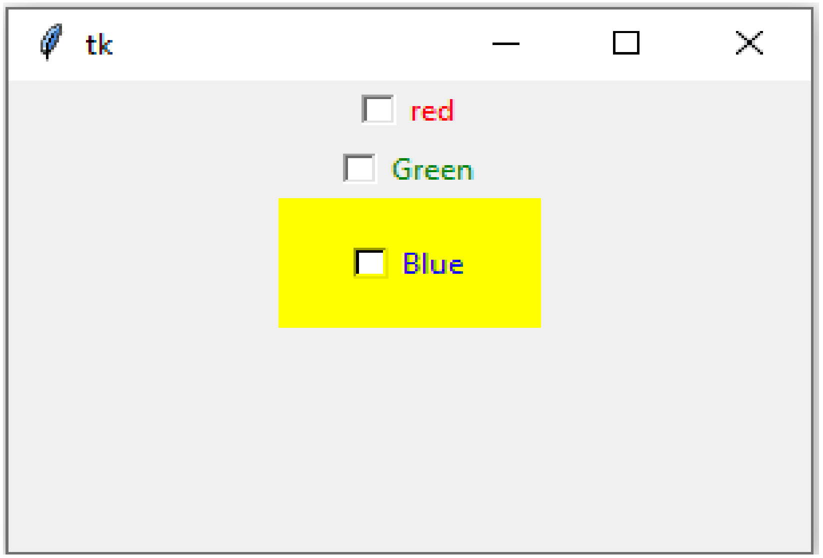
- **activebackground:**It represents the background of the Checkbutton when it is active.
- **activeforeground:**It represents the font color of the Checkbutton when when it is active.
- **bd:** It represents the border width in pixels.
- **bg:** It represents the background color of the Checkbutton.
- **command:** It is set to the function call which is scheduled when the function is called.
- **text:** It is set to the text displayed on the Checkbutton.
- **fg:** Foreground color of the Checkbutton.
- **height:** The height of the Checkbutton.
- **padx:** Additional padding to the Checkbutton in the horizontal direction.
- **pady:** Additional padding to the Checkbutton in the vertical direction.
- **width:** The width of the Checkbutton.

Example: **chbtndemo.py**

```
from tkinter
import * top =
Tk()
top.geometry("300x200")
cbtn1 = Checkbutton(top,
text="red",fg="red") cbtn1.pack()
cbtn2 = Checkbutton(top,
text="Green",fg="green",activebackground="orange")
cbtn2.pack()
cbtn3 = Checkbutton(top,
text="Blue",fg="blue",bg="yellow",width=10,height=3)
cbtn3.pack()
top.mainloop()
```

Output:

>>>python chbtndemo.py



❖ Entry Widget in Tkinter:

- The Entry widget is used to provide the single line text-box to the user to accept a value from the user. We can use the Entry widget to accept the text strings from the user.

Syntax: **name = Entry(parent, options)**

The options are

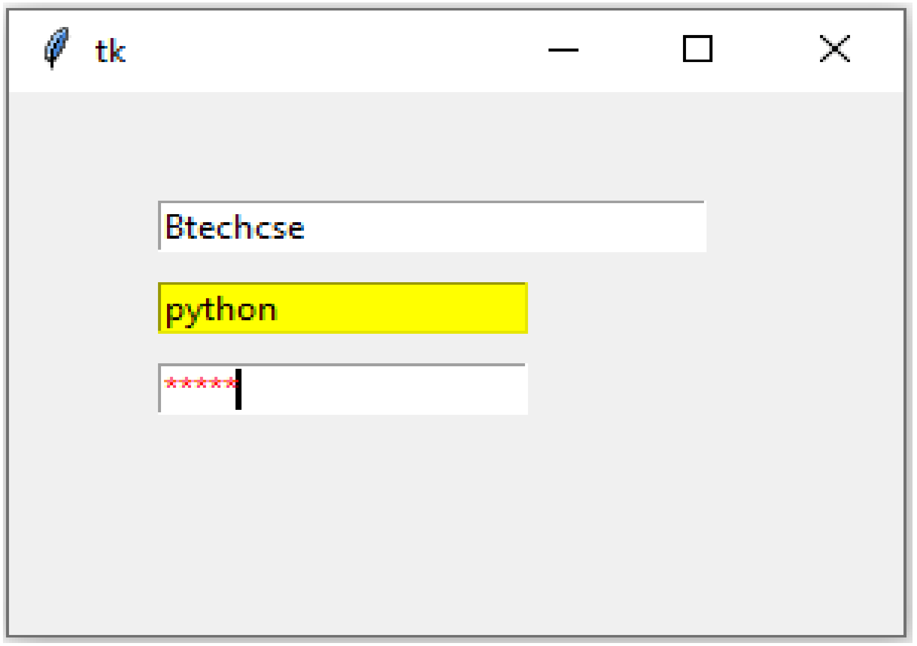
- **bd:** It represents the border width in pixels.
- **bg:** It represents the background color of the Entry.
- **show:** It is used to show the entry text of some other type instead of the string. For example, the password is typed using stars (*).
- **fg:** Foreground color of the Entry.
- **width:** The width of the Entry.

Example: **entrydemo.py**

```
from tkinter
import * top = Tk()
top.geometry("300x200") enty0 =
Entry(top,width="30") enty0.place(x=50,y=40)
enty1 = Entry(top,bg="yellow")
enty1.place(x=50,y=70)
enty2 = Entry(top,fg="red",show="*")
enty2.place(x=50,y=100)
top.mainloop()
```

Output:

>>>python entrydemo.py



```
Btechcse
python
*****
```

❖ Frame Widget in Tkinter:

- Frame widget is used to organize the group of widgets. It acts like a container which can be used to hold the other widgets. The rectangular areas of the screen are used to organize the widgets to the python application.

Syntax: **name = Frame(parent, options)**

The options are

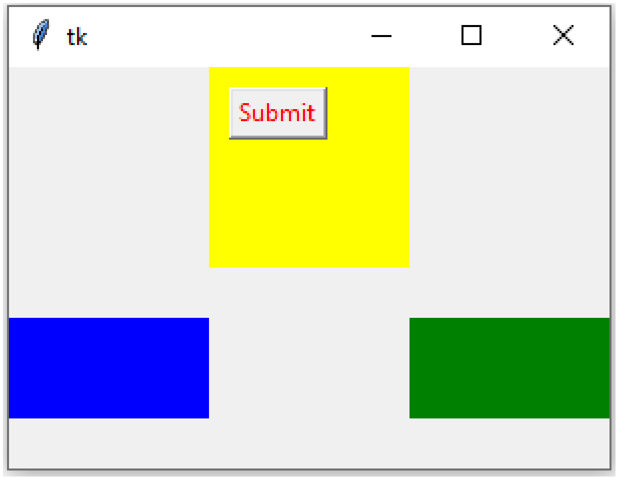
- **bd:** It represents the border width in pixels.
- **bg:** It represents the background color of the frame.
- **width:** The width of the frame.
- **height:** The height of the frame.

Example: **framedemo.py**

```
from tkinter import
* top = Tk()
top.geometry("300x200")
tframe =
Frame(top,width="100",height="100",bg="yellow")
tframe.pack()
lframe = Frame(top,width="100",height="50",bg="blue")
lframe.pack(side = LEFT)
rframe =
Frame(top,width="100",height="50",bg="green")
rframe.pack(side = RIGHT)
btn1 = Button(tframe, text="Submit", fg="red")
btn1.place(x=10,y=10)
top.mainloop()
```

Output:

>>>python framedemo.py



❖ Label Widget in Tkinter:

- The Label is used to specify the container box where we can place the text or images.

<u>Syntax:</u> **name = Label(parent, options)**

The options are

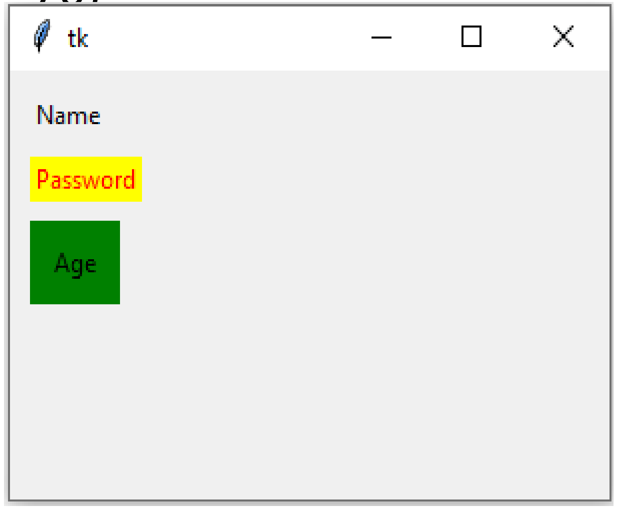
- **bd:** It represents the border width in pixels.
- **bg:** It represents the background color of the label.
- **text:** It is set to the text displayed on the label.
- **fg:** Foreground color of the label.
- **height:** The height of the label.
- **image:** It is set to the image displayed on the label.
- **padx:** Additional padding to the label in the horizontal direction.
- **pady:** Additional padding to the label in the vertical direction.
- **width:** The width of the label.

<u>Example:</u> **labeldemo.py**

```
from tkinter import
* top = Tk()
top.geometry("300x200")
lbl1 = Label(top,
text="Name")
lbl1.place(x=10,y=10)
lbl2 = Label(top, text="Password",
fg="red",bg="yellow") lbl2.place(x=10,y=40)
lbl3 = Label(top, text="Age",
padx=10,pady=10,bg="green") lbl3.place(x=10,y=70)
top.mainloop()
```

<u>Output:</u>

>>>python labeldemo.py



❖ Listbox Widget in Tkinter:

- The Listbox widget is used to display the list items to the user. We can place only text items in the Listbox. The user can choose one or more items from the list.

  Syntax: **name = Listbox(parent, options)**

The options are

- **bd:** It represents the border width in pixels.
- **bg:** It represents the background color of the listbox.
- **fg:** Foreground color of the listbox.
- **width:** The width of the listbox.
- **height:** The height of the listbox.

The following method is associated with the Listbox to insert list item to listbox at specified index.i.e, **insert ().**

Syntax:

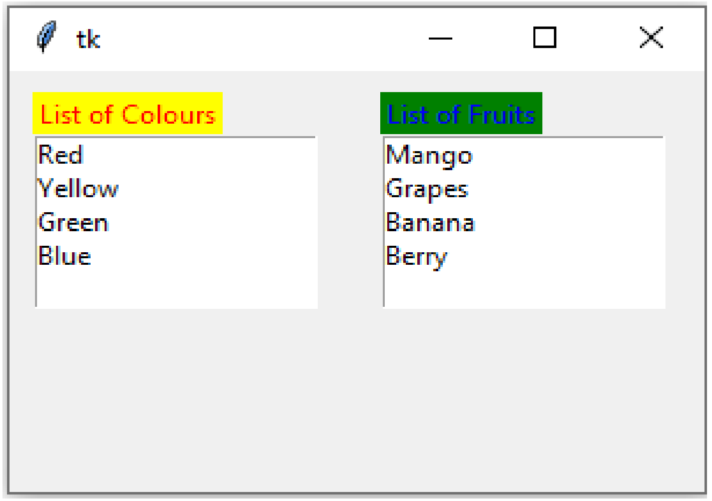
```
Listbox.insert (index, item)
```

<u>Example:</u> listboxdemo.py

```
from tkinter import *
top = Tk()
top.geometry("300x200")
lbl1 = Label(top, text="List of Colours",fg="red",bg="yellow")
lbl1.place(x=10,y=10)
lb = Listbox(top,height=5)
lb.insert(1,"Red")
lb.insert(2, "Yellow")
lb.insert(3, "Green")
lb.insert(4, "Blue")
lb.place(x=10,y=30)
lbl2 = Label(top, text="List of Fruits",fg="blue",bg="green")
lbl2.place(x=160,y=10)
lb1 = Listbox(top,height=5)
lb1.insert(1,"Mango")
lb1.insert(2, "Grapes")
lb1.insert(3, "Banana")
lb1.insert(4, "Berry")
lb1.place(x=160,y=30)
top.mainloop()
```

<u>Output:</u>

```
>>>python listboxdemo.py
```



❖ Radiobutton Widget in Tkinter:

- The Radiobutton widget is used to select one option among multiple options. The Radiobutton is different from a checkbutton. Here, the user is provided with various options and the user can select only one option among them.

  <u>**Syntax:**</u> **name = Radiobutton(parent, options)**

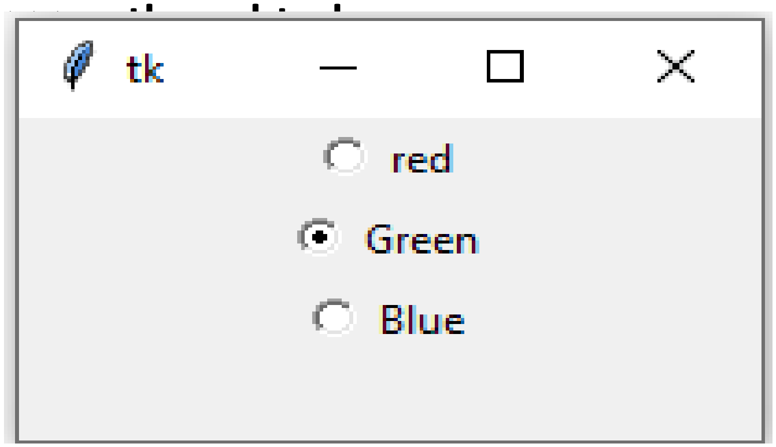
The options are

- **activebackground:**It represents the background of the Radiobutton when it is active.
- **activeforeground:**It represents the font color of the Radiobutton when when it is active.
- **bd:** It represents the border width in pixels.
- **bg:** It represents the background color of the Radiobutton.
- **command:**It is set to the function call which is scheduled when the function is called.
- **text:** It is set to the text displayed on the Radiobutton.
- **fg:** Foreground color of the Radiobutton.
- **height:**The height of the Radiobutton.
- **padx:** Additional padding to the Radiobutton in the horizontal direction.
- **pady:** Additional padding to the Radiobutton in the vertical direction.
- **width:**The width of the Radiobutton.
- **Variable:** It is used to keep track of the user's choices. It is shared among all the radiobuttons.

Example: **rbtndemo.py**

```
from tkinter import *
top = Tk()
top.geometry("200x100")
radio = IntVar()
rbtn1 = Radiobutton(top,
text="red",variable=radio,value="1") rbtn1.pack()
rbtn2 = Radiobutton(top,
text="Green",variable=radio,value="2")
rbtn2.pack()
rbtn3 = Radiobutton(top,
text="Blue",variable=radio,value="3") rbtn3.pack()
top.mainloop()
```

Output:



❖ Text Widget in Tkinter:

- The Text widget allows the user to enter multiple lines of text.It is different from Entry because it provides a multi-line text field to the user so that the user can write the text and edit the text inside it.

Syntax: **name = Text(parent, options)**

The options are

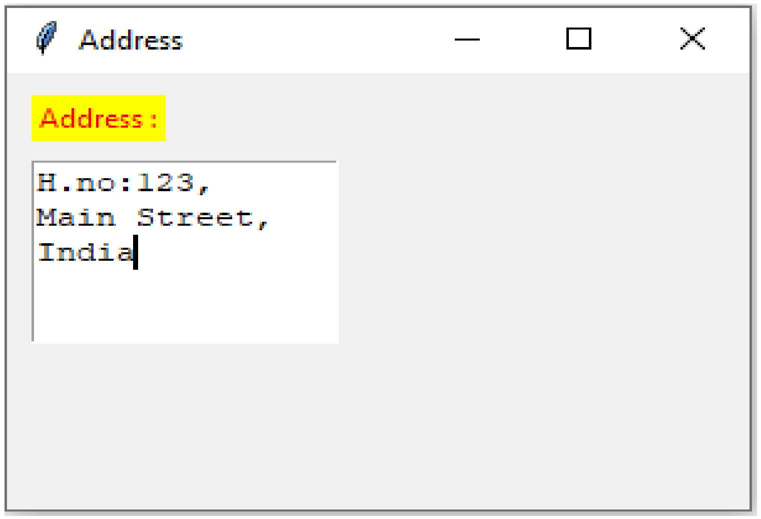
- **bd:** It represents the border width in pixels.
- **bg:** It represents the background color of the Text.
- **show:**It is used to show the entry text of some other type instead of the string. For example, the password is typed using stars (*).
- **fg:** Foreground color of the Text.
- **width:** The width of the Text.
- **height:** The vertical dimension of the widget in lines.

<u>Example:</u> textdemo.py

```
from tkinter import *
top = Tk()
top.title("Address")
top.geometry("300x200")
lbl=Label(top,text="Address
:",fg="red",bg="yellow") lbl.place(x=10,y=10)
txt=Text(top,width=15,height=5)
txt.place(x=10,y=40)
top.mainloop()
```

<u>Output:</u>

>>>python textdemo.py



```
H.no:123,
Main Street,
India
```

❖ Scale Widget in Tkinter:

- The Text widget allows the user to enter multiple lines of text.It is different from Entry because it provides a multi-line text field to the user so that the user can write the text and edit the text inside it.

Syntax: **name = Scale(parent, options)**

The options are

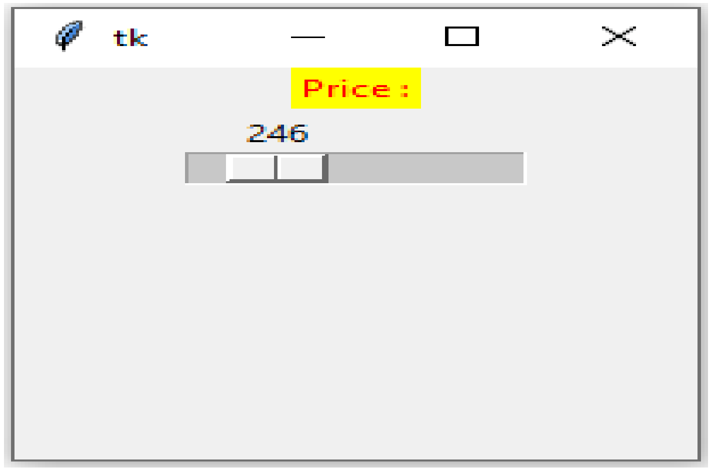
- **activebackground:**It represents the background of the Scale when it is active.
- **bd:** It represents the border width in pixels.
- **bg:** It represents the background color of the Scale.
- **command:** It is set to the function call which is scheduled when the function is called.
- **fg:** Foreground color of the Scale.
- **from_:** It is used to represent one end of the widget range.
- **to:** It represents a float or integer value that specifies the other end of the range represented by the scale.
- **orient**: It can be set to horizontal or vertical depending upon the type of the scale.

<u>Example:</u> scaledemo.py

```
from tkinter import *
top = Tk()
top.geometry("200x200")
lbl=Label(top,text="Price
:",bg="yellow",fg="red") lbl.pack()
scale = Scale( top, from_ = 100, to = 1000, orient =
HORIZONTAL)
scale.pack(anchor=CENTER)
top.mainloop()
```

<u>Output:</u>

>>>python scaledemo.py



❖ Toplevel Widget in Tkinter:

- The Toplevel widget is used to create and display the toplevel windows which are directly managed by the window manager.

Syntax: **name = Toplevel(options)**

The options are

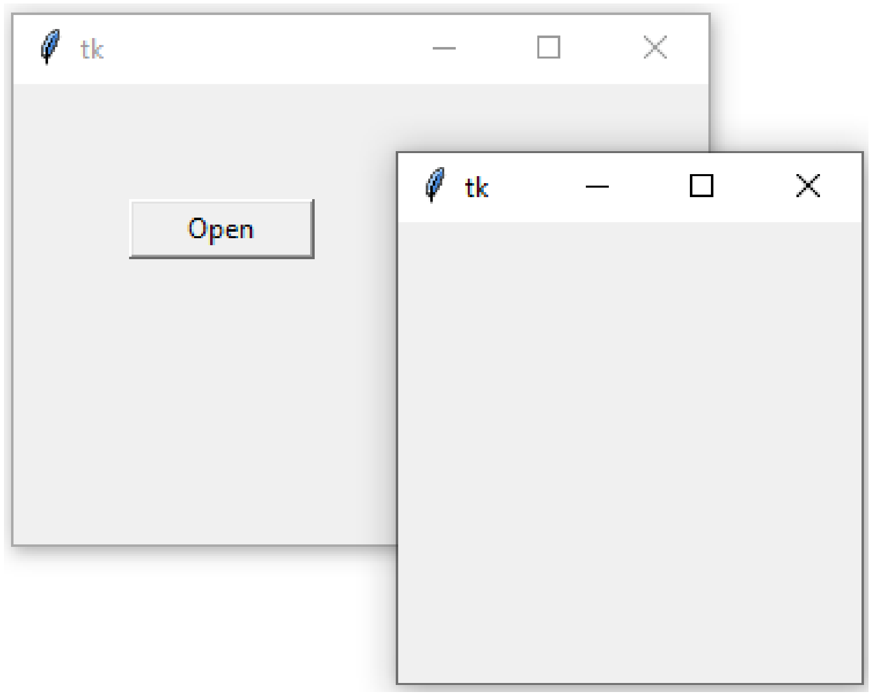
- **bd:** It represents the border width in pixels.
- **bg:** It represents the background color of the Toplevel.
- **fg:** Foreground color of the Toplevel.
- **width:** The width of the Toplevel.
- **height:** The vertical dimension of the widget in lines.

Example: topleveldemo.py

```
from tkinter import *
top = Tk()
top.geometry("300x200")
def fun():
    chld =
    Toplevel(top)
    chld.mainloop()
btn1 = Button(top, text =
"Open",width=10,command=fun)
btn1.place(x=50,y=50)
top.mainloop()
```

Output:

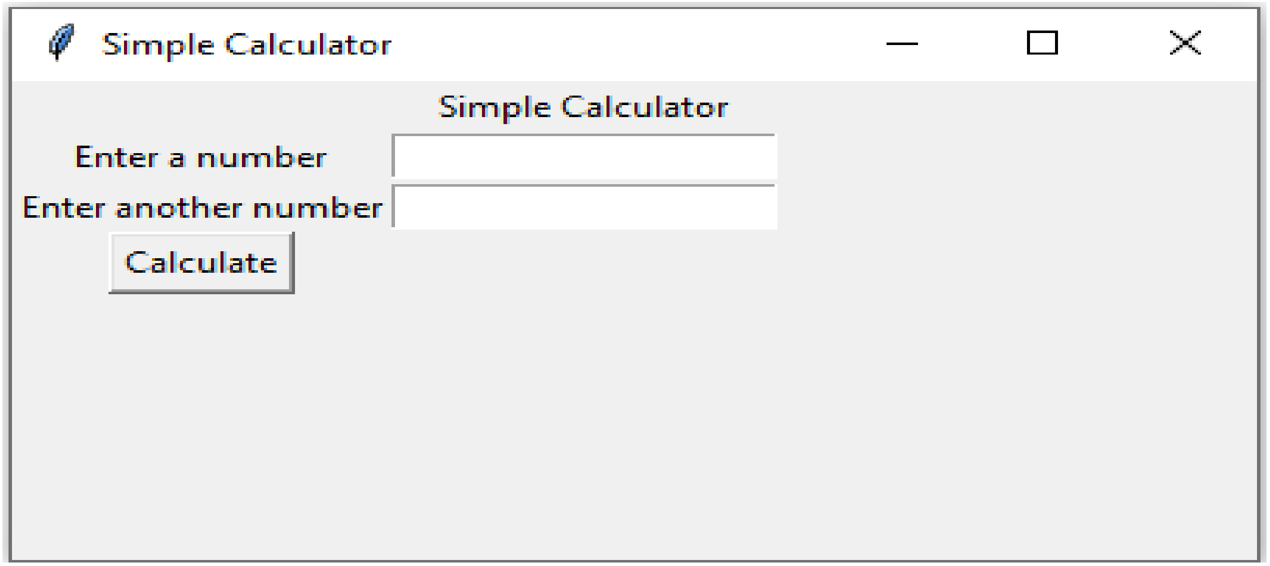
```
>>>python topleveldemo.py
```



<u>Example:</u> simplecalc.py

```
import tkinter as tk
from functools import partial
def call_result(label_result, n1, n2):
    num1 = (n1.get())
    num2 = (n2.get())
    result = int(num1)+int(num2)
    label_result.config(text="Result is %d" % result)
    return
root = tk.Tk()
root.geometry('400x200+100+200')
root.title('Simple Calculator')
number1 = tk.StringVar()
number2 = tk.StringVar()
```

```
labelTitle = tk.Label(root, text="Simple Calculator").grid(row=0,
column=2) labelNum1 = tk.Label(root, text="Enter a
number").grid(row=1, column=0) labelNum2 = tk.Label(root, text="Enter
another number").grid(row=2,
    column=0)
labelResult = tk.Label(root)
labelResult.grid(row=7,
column=2)
entryNum1 = tk.Entry(root, textvariable=number1).grid(row=1,
column=2) entryNum2 = tk.Entry(root,
textvariable=number2).grid(row=2, column=2) call_result =
partial(call_result, labelResult, number1, number2)
buttonCal = tk.Button(root, text="Calculate",
    command=call_result).grid(row=3,
    column=0)
root.mainloop()
```

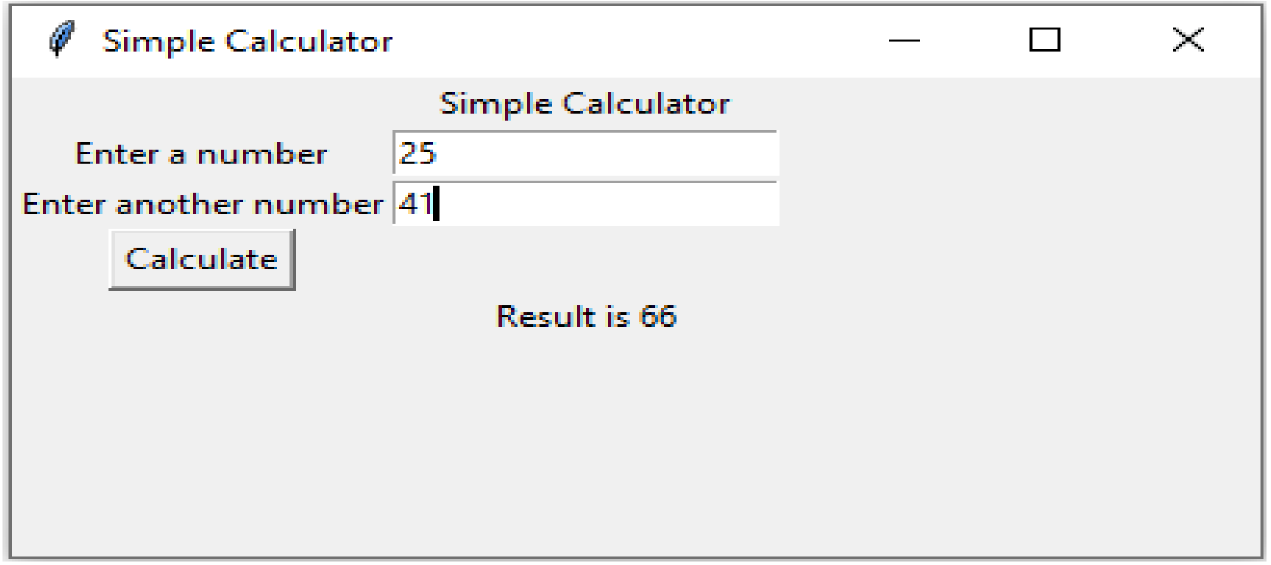


Simple Calculator

Enter a number

Enter another number

Calculate



Simple Calculator

Enter a number 25

Enter another number 41

Calculate

Result is 66