Calculator Program in Python Python Calculator Project

Work on Python Calculator Project and get ready for a boost in your career

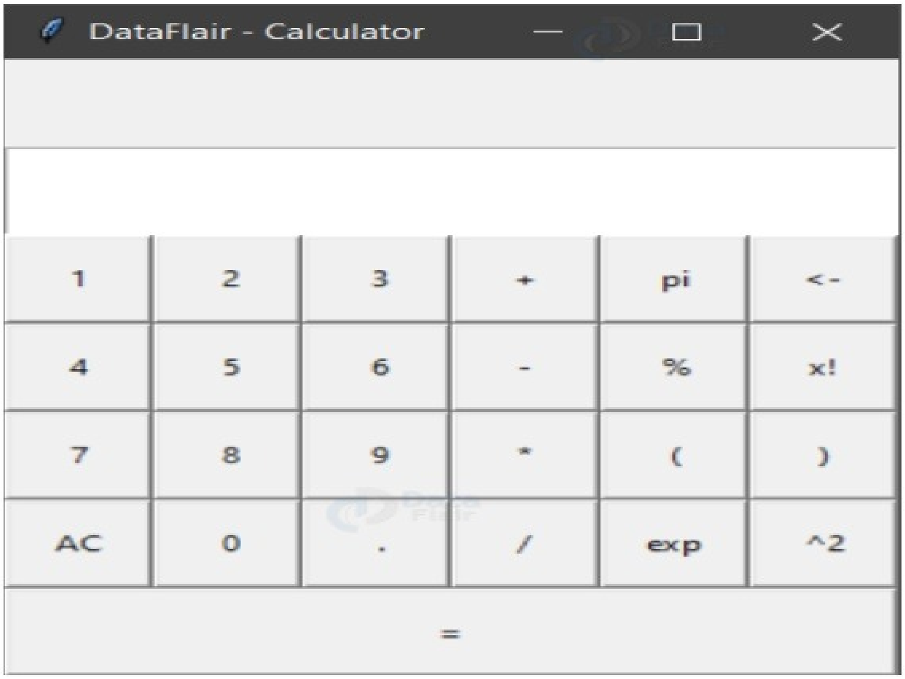
The calculator is one application that we all use in our day to day lives. If you are trying to get your hands dirty with programming in python, Calculator is a project which is easy and useful at the same time. Today, we are going to build a Python Calculator using Tkinter with easy to understand steps.

What is Tkinter?

Python offers various utilities to design the GUI wiz Graphical User Interface, and one such utility is Tkinter which is most commonly used. It is indeed one of the fastest and easiest ways to build GUI application. Moreover, Tkinter is cross-platform, hence the same code works on macOS, Windows, and Linux.

Python Calculator Project

The python calculator which we are going to build will look something like this:



Download Python Calculator Project:

Before proceeding ahead, please download the source code of calculator program in Python: [Python Calculator Project]

Step 1: Importing the necessary modules

To use the Tkinter we need to import the Tkinter module. We are also going to import the function factorial from math module.

Code:

```
from tkinter import *

import parser

from math import factorial
```

Step 2: Making a window for our calculator

Now we are going to draft the window for our calculator which will accommodate the buttons.

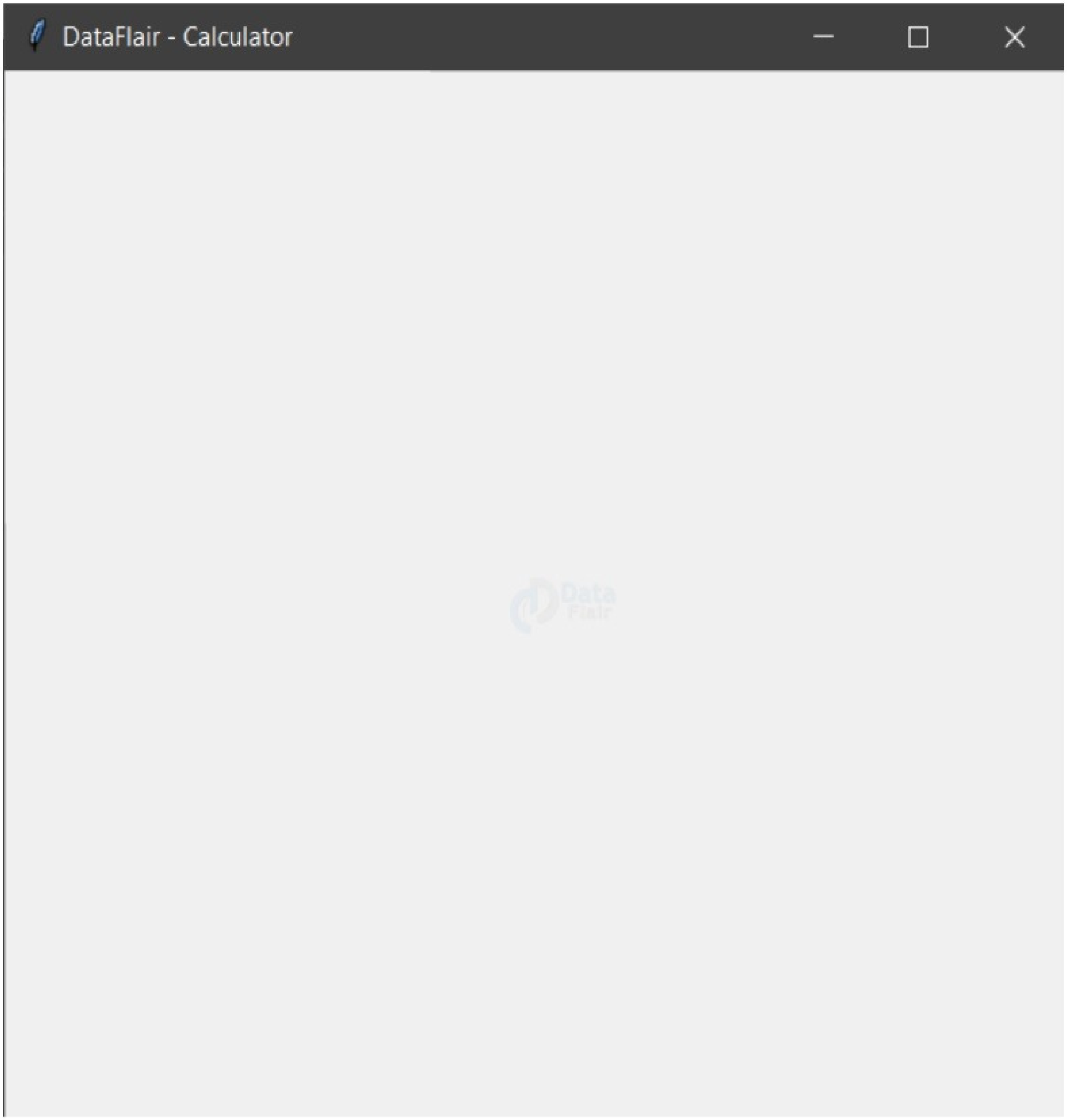
Code:

```
root = Tk()

root.title('DataFlair - Calculator')

root.mainloop()
```

Explanation:

The above code sets the title of python calculator window as ‘DataFlair – Calculator’. When you run the above code, you will get a window like this.

Output:



Step 3: Designing the buttons

Now let’s quickly design the buttons for our calculator and put them on our application window.

Code:

```
#adding the input field

display = Entry(root)

display.grid(row=1,columnspan=6,sticky=N+E+W+S)

#Code to add buttons to the Calculator

Button(root,text="1",command = lambda :get_variables(1)).grid(row=2,column=0,
sticky=N+S+E+W)

Button(root,text=" 2",command = lambda :get_variables(2)).grid(row=2,column=1,
sticky=N+S+E+W)

Button(root,text=" 3",command = lambda :get_variables(3)).grid(row=2,column=2,
sticky=N+S+E+W)

Button(root,text="4",command = lambda :get_variables(4)).grid(row=3,column=0,
sticky=N+S+E+W)

Button(root,text=" 5",command = lambda :get_variables(5)).grid(row=3,column=1,
sticky=N+S+E+W)

Button(root,text=" 6",command = lambda :get_variables(6)).grid(row=3,column=2,
sticky=N+S+E+W)

Button(root,text="7",command = lambda :get_variables(7)).grid(row=4,column=0,
sticky=N+S+E+W)

Button(root,text=" 8",command = lambda :get_variables(8)).grid(row=4,column=1,
sticky=N+S+E+W)

Button(root,text=" 9",command = lambda :get_variables(9)).grid(row=4,column=2,
sticky=N+S+E+W)

#adding other buttons to the calculator

Button(root,text="AC",command=lambda :clear_all()).grid(row=5,column=0,
sticky=N+S+E+W)
```

```
Button(root,text=" 0",command = lambda :get_variables(0)).grid(row=5,column=1,
sticky=N+S+E+W)

Button(root,text=" .",command=lambda :get_variables(".")).grid(row=5, column=2,
sticky=N+S+E+W)

Button(root,text="+",command= lambda :get_operation("+")).grid(row=2,column=3,
sticky=N+S+E+W)

Button(root,text="-",command= lambda :get_operation("-")).grid(row=3,column=3,
sticky=N+S+E+W)

Button(root,text="*",command= lambda :get_operation("*")).grid(row=4,column=3,
sticky=N+S+E+W)

Button(root,text="/",command= lambda :get_operation("/")).grid(row=5,column=3,
sticky=N+S+E+W)

# adding new operations

Button(root,text="pi",command= lambda
:get_operation("*3.14")).grid(row=2,column=4, sticky=N+S+E+W)

Button(root,text="%",command= lambda :get_operation("%")).grid(row=3,column=4,
sticky=N+S+E+W)

Button(root,text="(",command= lambda :get_operation("(")).grid(row=4,column=4,
sticky=N+S+E+W)

Button(root,text="exp",command= lambda
:get_operation("**")).grid(row=5,column=4, sticky=N+S+E+W)

Button(root,text="<-",command= lambda :undo()).grid(row=2,column=5,
sticky=N+S+E+W)

Button(root,text="x!", command= lambda: fact()).grid(row=3,column=5,
sticky=N+S+E+W)

Button(root,text=")",command= lambda :get_operation(")")).grid(row=4,column=5,
sticky=N+S+E+W)
```

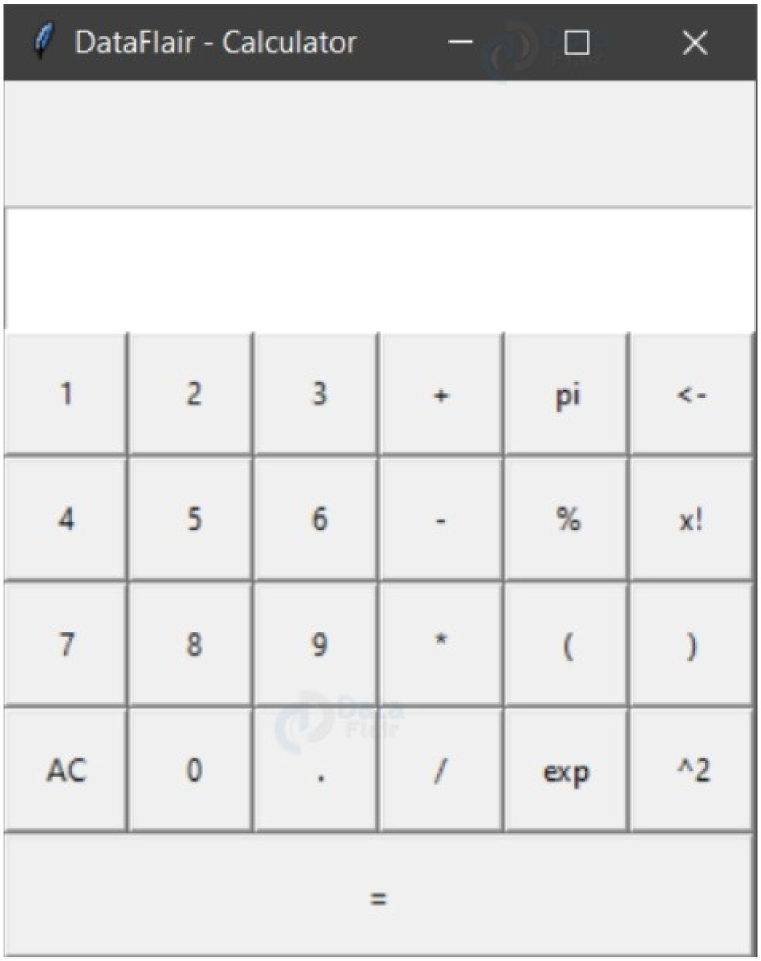
```
Button(root,text="^2",command= lambda
:get_operation("**2")).grid(row=5,column=5, sticky=N+S+E+W)

Button(root,text="^2",command= lambda
:get_operation("**2")).grid(row=5,column=5, sticky=N+S+E+W)

Button(root,text="=",command= lambda :calculate()).grid(columnspan=6,
sticky=N+S+E+W)
```

Explanation:

In this calculator program in python, the “Entry” function helps in making a text input field and we use .grid() method to define the positioning associated with the button or input field. We use the button method to display a button on our application window.

- root – the name with which we refer to our window
- text – text to be displayed on the button
- row – row index of the grid
- column – column index of the grid
- columnspan – spans or combines the number of columns
- sticky – If the resulting cell is larger than the widget then sticky defines how to expand the widget. The combination of constants used S, N, E, and W, or NW, NE, SW, and SE are analogous to the directions in compass. N+E+W+S means that the widget should be expanded in all directions

When you run the above code, you will get calculator output like this.



NOTE:

If you have noticed an error such as no function get_variable() found, then do not worry. We are just defining an action function associated with each button. Since we have just called and not declared them yet hence the error. Now, lets defined those functions.

To connect the digit button to the get_variable() function, we use the “command” parameter. Here we pass ‘1’ as an argument to the get_variable() function when button ‘1’ is pressed.

Step 4: Mapping the buttons to their functionalities

Mapping the digits

Code:

```
# i keeps the track of current position on the input text field

i = 0

# Receives the digit as parameter and display it on the input field

def get_variables(num):

    global i

    display.insert(i,num)

    i+=1
```

Explanation:

The get_variable() function receives the digit as parameter. The digit is inserted to the input field with .insert() method with parameters ‘i’ and ‘num’. The global variable i is incremented each time to get updated with the position to insert the next digit or next operator.

- i – the position to insert the digit
- num – the digit

Mapping the operator buttons

Code:

```
def get_operation(operator):

    global i
    length = len(operator)

    display.insert(i,operator)

    i+=length
```

Explanation:

The get_operation() function receives the operator as a parameter which is then inserted to the text field at the ith position of python calculator.

Mapping the AC button

Code:

```
def clear_all():

    display.delete(0,END)
```

Explanation:

We use the .delete() method to remove characters in the text field. It accepts the start and end position as the parameter.

- 0 – start position
- END – end position

Mapping the undo button

Code:

```
def undo():

    entire_string = display.get()

    if len(entire_string):
        new_string = entire_string[:-1]
        clear_all()
        display.insert(0,new_string)
    else:
        clear_all()
        display.insert(0,"Error")
```

Explanation:

We use the .get() method to fetch the string present on the input field. If there is really a string present, we slice out the last character, clear the input field and push the new string back to the input field which does not contain the last character.

Mapping the ‘= ’ button

Code:

```
def calculate():
    entire_string = display.get()
    try:
        a = parser.expr(entire_string).compile()
        result = eval(a)
        clear_all()
        display.insert(0,result)
    except Exception:
       clear_all()
       display.insert(0,"Error")
```

Explanation:

We fetch the string present on the input field using the .get() method. We now use the parse module to scan the string with the help of .expr() method which accepts the string as a parameter. We basically leave it to the parser to build an abstract syntax tree of the string which is evaluated using the eval() function.

Once we get the result, we push it to the input field after clearing it.

Mapping the factorial key

Code:

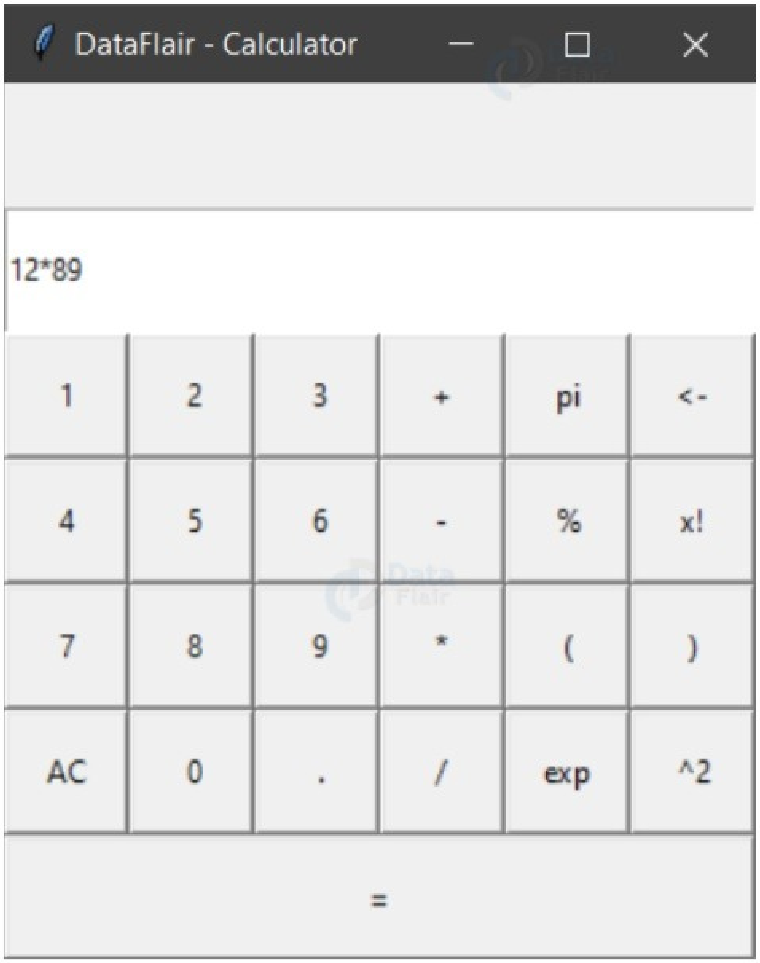
```
def fact():
   entire_string = display.get()
   try:
       result = factorial(int(entire_string))
       clear_all()
       display.insert(0,result)
   except Exception:
       clear_all()
       display.insert(0,"Error")
```

Explanation:

We fetch the string from the input field. We convert the string to type int and pass it to the factorial function which we imported in the beginning. After that we clear the input field and push the result to the input field. We deal with any exception by clearing the input field followed by pushing an error message on the input field.

Final Screens of Python Calculator

When you execute this calculator program in python you will get following screens:



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Summary

Hooray! We have successfully designed a python calculator with tkinter. This means that you have a better understanding of the way tkinter is used to build GUI applications. Apart from this, you can now take a step forward to extend the project by making a history tab which keeps track of the previous calculations or adding a background image to the calculator.