
 <b>Marwadi University</b> Marwadi Chandarana Group	<b>Marwadi University</b> <b>Faculty of Engineering &amp; Technology</b> <b>Department of Information and Communication Technology</b>	
<b>Subject: Programming With Python (01CT1309)</b>	<b>Aim:</b> Building a Basic User-Interactive GUI Application using Kivy in Python	
<b>Experiment No: 16</b>	<b>Date:</b>	<b>Enrollment No: 92400133037</b>

**Aim:** Building a Basic User-Interactive GUI Application using Kivy in Python

**IDE:**

A comparative analysis of Tkinter and Kivy, two popular Python GUI frameworks:

Criteria	Tkinter	Kivy
Origin/Integration	Built-in standard GUI toolkit for Python	Third-party library, must be installed separately
Platform Support	Cross-platform (Windows, macOS, Linux)	Cross-platform (Windows, macOS, Linux, Android, iOS)
Mobile App Support	Not natively supported	Yes, designed for mobile apps (Android/iOS)
Look and Feel	Native look (uses OS elements; sometimes outdated)	Custom UI (same look on all platforms)
Ease of Use (Beginner Friendly)	Easier for beginners, simple widgets and layout	Slightly steeper learning curve due to different approach
Custom Widgets	Limited custom widgets	Highly customizable, supports multi-touch, gestures
Performance	Lightweight, fast for basic applications	Better for graphics-rich or touch-based applications
Layout Management	Pack, Grid, Place layout managers	Uses relative positioning and advanced layout controls
Graphics and Animation	Basic support	Rich support for OpenGL, animations, and gestures
Community and Support	Long-standing, extensive community	Newer but active open-source community
Event Handling	Traditional event binding using command and bind	Event-driven, uses Clock, on_touch_*, properties

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<b>Development Use Case</b>	Desktop apps, simple tools, admin panels	Mobile apps, multimedia apps, dashboards, games
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### Use Tkinter:

You are developing a simple desktop application, teaching basic GUI programming, or need something lightweight and native-looking on desktops.

### Use Kivy:

You are targeting mobile platforms, want touch support, need consistent UI across devices, or are building multimedia-rich or gesture-based apps.

Library	Purpose / UI Type	Installation	Import Syntax	Best Use Case
<b>Tkinter</b>	Native Desktop GUI	Built-in (python3-tk on Linux)	import tkinter as tk	Basic desktop apps, learning GUI concepts
<b>Kivy</b>	Multi-touch apps for desktop & mobile	pip install kivy	from kivy.app import App	Mobile-like UIs, gesture support, kiosk apps
<b>Textual</b>	Terminal UI with app-like look	pip install textual	from textual.app import App	Terminal dashboards, TUI-based dev tools
<b>Remi</b>	Web UI from pure Python (no HTML)	pip install remi	import remi.gui as gui	Turn Python scripts into web apps easily
<b>NiceGUI</b>	Fast web UI with Vue3 + Python	pip install nicegui	from nicegui import ui	Reactive dashboards, IoT UI, admin panels
<b>Flet</b>	Flutter-style UI in pure Python	pip install flet	import flet as ft	Mobile/web-style apps, no need for Dart
<b>Eel</b>	HTML/JS frontend + Python backend	pip install eel	import eel	Convert HTML+JS UI into desktop apps with Python
<b>Dear PyGui</b>	GPU-accelerated desktop GUI	pip install dearpygui	import dearpygui.dearpygui as dpg	High-perf apps, dashboards, tools with fast UI

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<b>pywebview</b>	Native desktop app with embedded web UI	pip install pywebview	import webview	Build web UI as desktop apps with native look
<b>Toga</b>	Native UI for desktop/mobile (BeeWare)	pip install toga	import toga	Native look across macOS, Windows, Linux
<b>JustPy</b>	Server-side reactive web UI (no JS needed)	pip install justpy	import justpy as jp	Dashboards, education tools, reactive forms
<b>Gooley</b>	Turn CLI apps into GUI instantly	pip install gooley	from gooley import Gooley	Beautify CLI tools, Python scripts for non-coders

Example Syntax Comparison:

### Tkinter Button Example:

import tkinter as tk

```
def say_hello():
    print("Hello, Tkinter!")
```


```
root = tk.Tk()
btn = tk.Button(root, text="Click Me", command=say_hello)
btn.pack()
root.mainloop()
```



The screenshot shows a code editor with the following code:

```
lab16 > Tkinter.py > ...
1 import tkinter as tk
2 def say_hello():
3     print("Hello, Tkinter!")
4 root = tk.Tk()
5 btn = tk.Button(root, text="Click Me", command=say_hello)
6 btn.pack()
7 root.mainloop()
8
9
10 from kivy.app import App
11 from kivy.uix.button import Button
12 class MyApp(App):
13     def build(self):
14         return Button(text='Click Me', on_press=lambda x: print("Hello, Kivy!"))
15
16 MyApp().run()
```

Next to the code is a small window titled "tk" with a button labeled "Click Me".

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### Kivy Button Example:

```
from kivy.app import App
from kivy.uix.button import Button
```

```
class MyApp(App):
    def build(self):
        return Button(text='Click Me', on_press=lambda x: print("Hello, Kivy!"))
```

```
MyApp().run()
```

Kivy was first released in early 2011. This cross-platform Python framework can be deployed to Windows, Mac, Linux, and Raspberry Pi. It supports multitouch events in addition to regular keyboard and mouse inputs. Kivy even supports GPU acceleration of its graphics, since they're built using OpenGL ES2.

Before using Kivy, you need to install it. You can install it using pip:

```
pip install kivy
```

### Create a Simple Kivy Application


Let's start by building a basic app with a label and a button.

```
# Importing necessary modules from kivy
from kivy.app import App
from kivy.uix.button import Button
from kivy.uix.label import Label
from kivy.uix.boxlayout import BoxLayout
```

### # Defining the main application class

```
class SimpleApp(App):
    def build(self):
        # Creating a layout
        layout = BoxLayout(orientation='vertical')

        # Creating a label and adding it to the layout
        self.label = Label(text="Hello, ICT Department")
```

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```
layout.add_widget(self.label)
```

```
# Creating a button, binding it to the on_button_press function, and adding it to the layout
```

```
button = Button(text="Click Me!")
```

```
button.bind(on_press=self.on_button_press)
```

```
layout.add_widget(button)
```

```
# Returning the layout to be displayed
```

```
return layout
```

```
# Function to handle button click event
```

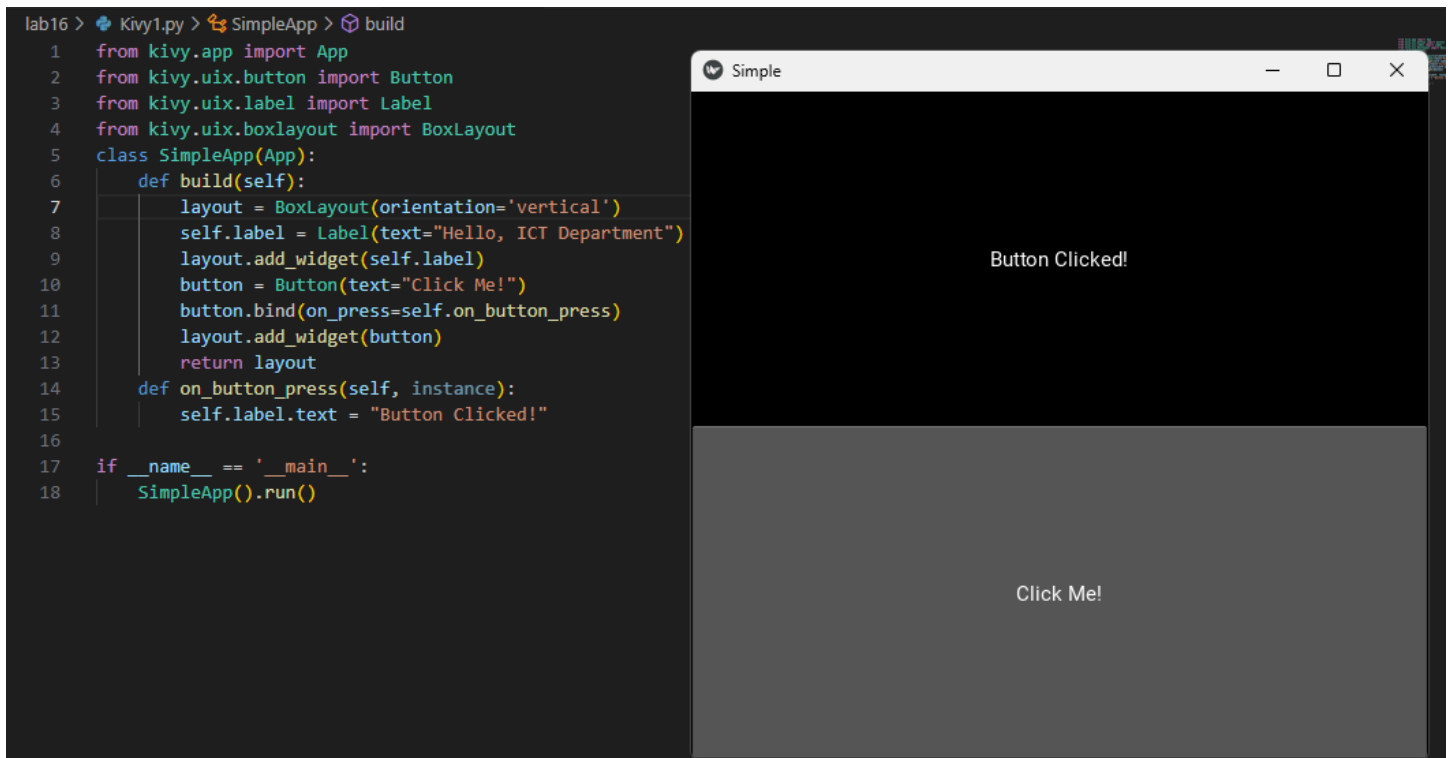
```
def on_button_press(self, instance):
```


```
    self.label.text = "Button Clicked!"
```

```
# Running the application
```

```
if __name__ == '__main__':
```

```
    SimpleApp().run()
```



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### Kivy Login Page Example

```

from kivy.app import App
from kivy.uix.boxlayout import BoxLayout
from kivy.uix.label import Label
from kivy.uix.textinput import TextInput
from kivy.uix.button import Button

# Defining the main application class
class LoginApp(App):
    def build(self):
        # Main layout
        layout = BoxLayout(orientation='vertical', padding=10, spacing=10)

        # Username label and input
        self.username_label = Label(text="Username:")
        layout.add_widget(self.username_label)



        self.username_input = TextInput(multiline=False)
        layout.add_widget(self.username_input)

        # Password label and input
        self.password_label = Label(text="Password:")
        layout.add_widget(self.password_label)

        self.password_input = TextInput(password=True, multiline=False)
        layout.add_widget(self.password_input)

        # Login button
        self.login_button = Button(text="Login")
        self.login_button.bind(on_press=self.check_credentials)
        layout.add_widget(self.login_button)

```

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```
# Label to display the login status
self.status_label = Label(text="")
layout.add_widget(self.status_label)
```

```
return layout
```

```
# Function to check the credentials
def check_credentials(self, instance):
    username = self.username_input.text
    password = self.password_input.text
```

```
# Simple validation (hardcoded username/password for demonstration)
if username == "admin" and password == "password":
    self.status_label.text = "Login Successful"
    self.status_label.color = (0, 1, 0, 1) # Green color for success
else:
    self.status_label.text = "Invalid Credentials"
    self.status_label.color = (1, 0, 0, 1) # Red color for error
```

```
# Running the application
if __name__ == '__main__':
    LoginApp().run()
```

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```

1  from kivy.app import App
2  from kivy.ui.bxlayout import BoxLayout
3  from kivy.ui.label import Label
4  from kivy.ui.textinput import TextInput
5  from kivy.ui.button import Button
6  class LoginApp(App):
7      def build(self):
8          layout = BoxLayout(orientation='vertical', padding=10, spacing=10)
9          self.username_label = Label(text="Username:")
10         layout.add_widget(self.username_label)
11         self.username_input = TextInput(multiline=False)
12         layout.add_widget(self.username_input)
13
14         self.password_label = Label(text="Password:")
15         layout.add_widget(self.password_label)
16         self.password_input = TextInput(password=True, multiline=False)
17         layout.add_widget(self.password_input)
18
19         self.login_button = Button(text="Login")
20         self.login_button.bind(on_press=self.check_credentials)
21         layout.add_widget(self.login_button)
22
23         self.status_label = Label(text="")
24         layout.add_widget(self.status_label)
25         return layout
26


```

```

27     def check_credentials(self, instance):
28         username = self.username_input.text
29         password = self.password_input.text
30         if username == "admin" and password == "password":
31             self.status_label.text = "Login Successful"
32             self.status_label.color = (0, 1, 0, 1) # Green color for success
33         else:
34             self.status_label.text = "Invalid Credentials"
35             self.status_label.color = (1, 0, 0, 1)
36
37 if __name__ == '__main__':
38     LoginApp().run()

```



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Login

Username:

ict

Password:

\*\*\*

Login

Invalid Credentials

Calculator App Using Kivy

```
from kivy.app import App
```


```
from kivy.uix.gridlayout import GridLayout
```

```
from kivy.uix.button import Button
```

```
from kivy.uix.textinput import TextInput
```

# Defining the calculator layout and logic

```
class CalculatorGrid(GridLayout):
```

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```

def __init__(self, **kwargs):
    super(CalculatorGrid, self).__init__(**kwargs)
    self.cols = 4 # Grid layout with 4 columns

    # TextInput field to display the calculation results
    self.result = TextInput(font_size=32, readonly=True, halign="right", multiline=False)
    self.add_widget(self.result)

    # Buttons for numbers and operations
    buttons = [
        '7', '8', '9', '/',
        '4', '5', '6', '*',
        '1', '2', '3', '-',
        '.', '0', '=', '+'
    ]


    # Adding buttons to the layout
    for button in buttons:
        self.add_widget(Button(text=button, font_size=24, on_press=self.on_button_press))

    # Clear button to reset the calculator
    self.add_widget(Button(text="C", font_size=24, on_press=self.clear_result))

    # Function to handle button press events
    def on_button_press(self, instance):
        current_text = self.result.text
        button_text = instance.text

        # If the equals sign is pressed, evaluate the expression
        if button_text == "=":
            try:
                self.result.text = str(eval(current_text))
            except Exception:

```

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```
self.result.text = "Error"
```

```
else:
```

```
# Otherwise, append the pressed button's text to the current expression
```

```
if current_text == "Error":
```

```
self.result.text = button_text # Reset the result if there's an error
```

```
else:
```

```
self.result.text += button_text
```

```
# Function to clear the result field
```

```
def clear_result(self, instance):
```

```
self.result.text = ""
```

```
# Main App class
```

```
class CalculatorApp(App):
```


```
def build(self):
```

```
return CalculatorGrid()
```

```
# Running the application
```

```
if __name__ == '__main__':
```

```
CalculatorApp().run()
```

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```


1  from kivy.app import App
2  from kivy.uix.gridlayout import GridLayout
3  from kivy.uix.button import Button
4  from kivy.uix.textinput import TextInput
5
6  class CalculatorGrid(GridLayout):
7      def __init__(self, **kwargs):
8          super(CalculatorGrid, self).__init__(**kwargs)
9          self.cols = 4
10         self.result = TextInput(font_size=32, readonly=True, halign="right", multiline=False)
11         self.add_widget(self.result)
12         buttons = [
13             '7', '8', '9', '/',
14             '4', '5', '6', '*',
15             '1', '2', '3', '-',
16             '.', '0', '=', '+'
17         ]
18         for button in buttons:
19             self.add_widget(Button(text=button, font_size=24, on_press=self.on_button_press))
20         self.add_widget(Button(text="C", font_size=24, on_press=self.clear_result))
21     def on_button_press(self, instance):
22         current_text = self.result.text
23         button_text = instance.text
24         if button_text == "=":
25             try:
26                 self.result.text = str(eval(current_text))
27             except Exception:

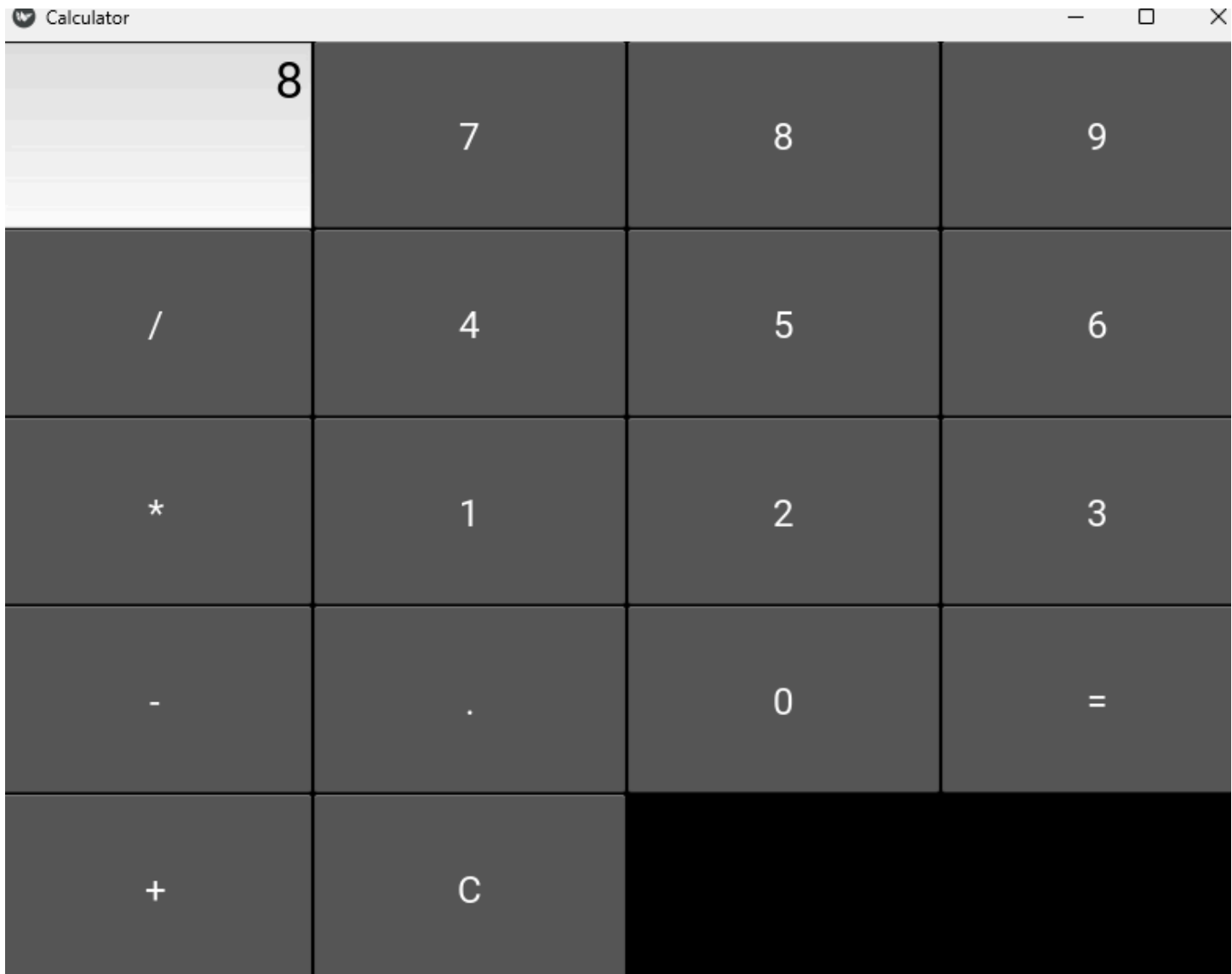
```

```

28         self.result.text = "Error"
29     else:
30         if current_text == "Error":
31             self.result.text = button_text
32         else:
33             self.result.text += button_text
34     def clear_result(self, instance):
35         self.result.text = ""
36 class CalculatorApp(App):
37     def build(self):
38         return CalculatorGrid()
39 if __name__ == '__main__':
40     CalculatorApp().run()


```

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### Post Lab Exercise:

- Design Counter App (This app has a button that increments a counter displayed on the screen every time the button is clicked)
- Text Input App (This app allows users to type in a text field and display the typed text on the screen when a button is pressed.)

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lab16 > PostLab1.py > CounterApp > build

```


1  from kivy.app import App
2  from kivy.uix.button import Button
3  from kivy.uix.label import Label
4  from kivy.uix.boxlayout import BoxLayout
5  class CounterApp(App):
6      def build(self):
7          self.count = 0
8          layout = BoxLayout(orientation='vertical')
9
10         self.label = Label(text="Count: 0", font_size=30)
11         layout.add_widget(self.label)
12
13         button = Button(text="Increment", font_size=24)
14         button.bind(on_press=self.increment_counter)
15         layout.add_widget(button)
16
17         return layout
18     def increment_counter(self, instance):
19         self.count += 1
20         self.label.text = f"Count: {self.count}"
21
22 if __name__ == "__main__":
23     CounterApp().run()

```

Counter

Count: 0

Increment

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```

lab16 > PostLab2.py > TextInputApp
1  from kivy.app import App
2  from kivy.uix.boxlayout import BoxLayout
3  from kivy.uix.textinput import TextInput
4  from kivy.uix.label import Label
5  from kivy.uix.button import Button
6
7  class TextInputApp(App):
8      def build(self):
9          layout = BoxLayout(orientation='vertical', padding=10, spacing=10)
10
11         self.input_field = TextInput(hint_text="Type something here...", multiline=False, font_size=20)
12         layout.add_widget(self.input_field)
13
14         button = Button(text="Show Text", font_size=24)
15         button.bind(on_press=self.show_text)
16         layout.add_widget(button)
17
18         self.label = Label(text="", font_size=24)
19         layout.add_widget(self.label)
20
21         return layout
22
23     def show_text(self, instance):
24         user_text = self.input_field.text
25         self.label.text = f"You typed: {user_text}"
26
27 if __name__ == "__main__":
28     TextInputApp().run()

```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

✓ TERMINAL

python

Show Text

You typed: python

Activate Window Settings to act

**GITHUB LINK:**

[https://github.com/Heer972005/Python\\_Lab](https://github.com/Heer972005/Python_Lab)