**GUI SCIENTIFIC CALCULATOR**

Project submitted to the

SRM University – AP, Andhra Pradesh

for the partial fulfillment of the requirements to award the degree of

**Bachelor of Technology/Master of Technology**

In

**Computer Science and Engineering**

**School of Engineering and Sciences**

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**30-11-2022**

# Certificate

Date: 6-Dec-22

This is to certify that the work present in this Project entitled “**GUI SCIENTIFIC CALCULATOR**” has been carried out by **[GROUP 16]** under my/our supervision. The work is genuine, original, and suitable for submission to the SRM University – AP for the award of Bachelor of Technology/Master of Technology in **School of Engineering and Sciences**.

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# Acknowledgements

We are grateful because we managed to complete our python project within the time given by our lecturer Mohammad Miskeen Ali. This project cannot be completed without the effort and co-operation from our group members, Group members Jyothi, Kiranmai, Siri Chandana, Usman. We also sincerely thank our lecturer for the guidance and encouragement in finishing this project and for teaching us in this course. Finally, we would like to express our gratitude to our friends and respondents for the support and willingness to spend some time to clarify the doubts.

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# Abstract

From time to time of the abacus until today, people have wanted a way to count numbers and perform mathematical calculations. Given the complexity of many of today’s math, it is helpful to have a calculator powerful enough to perform many different mathematical functions. It is also helpful to be able to analyze graphs of these functions. The goal of this project would provide all of the users with all of those options. Using a Graphical User Interface (GUI) that utilizes buttons to provide input to the backend, our calculator is capable of performing many different functions.

# Abbreviations

GUI Graphical User Interface

# Introduction

GUI stands for Graphical User Interface, and refers to computer programs that provide a visual means for users to interact with an underlying application or system. For example, the GUIs on our mobile phones allow us to interact with different functions through the display, which we can touch, tap, and swipe on.

Calculator is a device that performs arithemetic opertations on numbers. Scientific calculator as its name suggests, the scientific calculator is designed for performing scientific calculations. This type of calculator usually has more buttons than a standard calculator, as it needs to be able to perform trigonometric functions,logarithms, exponential operations.

This Mini project of “GUI Scientific Calculator” is purely made in python, with a good user-friendly interface which lets the user to enter the various values required to be input in order to calculate simple and complex problems in science,engineering and mathematics.

It’s a GUI-based project used with tkinter module to organize all the elements that work under Scientific Calculator in python.

The main window consisits of all the entry fields that the user is required to fill in order to generate a output. This main window also has a button to give output when operation is performed which has the required values.

We use the button method to display a button on our appilication 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** – span or combines the number of column.

## What is GUI?

Very simply, a Python GUI is a GUI that is written in the Python programming language. Python is a very popular programming language thanks to its great degree of readability, widespread adoption and most importantly, its beginner friendliness. While being incredibly useful for the fields of data science and machine learning, Python is also great for developing graphical user interfaces! In fact, it has many frameworks that even beginners can use to easily get started with developing a GUI.

### Applications of GUI:

## ****Games (Flappy Bird, Mount & Blade**)**

Apart from mobile applications, Python has been used to create some of the games that we know and love! With flashy graphics and rewarding interactivity, games are one use case that heavily leverage GUIs to create value and enjoyment for users. For example, games like [Flappy Bird](https://flappybird.io/) and [Mount & Blade](https://en.wikipedia.org/wiki/Mount_%26_Blade) were programmed in Python!

## Objective:

For those who do not know, a **Calculator** is basically a program on a **computer** that simulates the behavior of any **hand-held calculator** useful for **performing Mathematical Calculations**. It is a very basic device used in our everyday lives. Now all the smartphones also have a calculator application in them.

While creating any GUI Applications there are mainly two steps:

* The first step is to **create a User Interface**
* The second step is the most important one and in this, to **add functionalities to the GUI**

Now let’s begin with creating a **Scientific Calculator** using Tkinter in python which is used for **calculations.**

# Methodology

# 



## What is tkinter?

The [tkinter](https://docs.python.org/3/library/tkinter.html#module-tkinter) package (“Tk interface”) is the standard Python interface to the Tcl/Tk GUI toolkit. Both Tk and [tkinter](https://docs.python.org/3/library/tkinter.html#module-tkinter) are available on most Unix platforms, including macOS, as well as on Windows systems.

**Tkinter Modules**

Support for Tkinter is spread across several modules. Most applications will need the main [tkinter](https://docs.python.org/3/library/tkinter.html#module-tkinter) module, as well as the [tkinter.ttk](https://docs.python.org/3/library/tkinter.ttk.html#module-tkinter.ttk) module, which provides the modern themed widget set and API:

**from** **tkinter** **import** \*

**from** **tkinter** **import** ttk

## classes and objects:

A class is a user-defined blueprint or prototype from which objects are created. Classes provide a means of bundling data and functionality together. Creating a new class creates a new type of object, allowing new instances of that type to be made. Each class instance can have attributes attached to it for maintaining its state. Class instances can also have methods (defined by their class) for modifying their state.

**Some points on Python class:**

* Classes are created by keyword class.
* Attributes are the variables that belong to a class.
* Attributes are always public and can be accessed using the dot (.) operator. Eg.: Myclass.Myattribute

### The self

* Class methods must have an extra first parameter in the method definition. We do not give a value for this parameter when we call the method, Python provides it.
* If we have a method that takes no arguments, we still have one argument.
* This is similar to this pointer in C++ and this reference in Java.
* When we call a method of this object as myobject.method(arg1, arg2), this is automatically converted by Python into MyClass.method(myobject, arg1, arg2) – this is all the special self is about.

### \_\_init\_\_ method

* The \_\_init\_\_ method is similar to constructors in C++ and Java. Constructors are used to initialize the object’s state.
* Like methods, a constructor also contains a collection of statements(i.e. instructions) that are executed at the time of Object creation.
* It runs as soon as an object of a class is instantiated. The method is useful to do any initialization you want to do with your object.

## Basic Functions:

**Addition**

The addition (sum function) is used by clicking on the “+” button. The function results in a+b.

**Subtraction**

The subtraction (minus function) is used by clicking on the “-“button. The function results in a-b.

**Multiplication**

The multiplication (times function) is used by clicking on the “\*“button. The function results in a\*b.

**Division**

The division is used by clicking on the “/“button. The function results in a/b.

**Square**

The square function is used by clicking on the “x^2“button. The function results in x\*x.

**Square Root**

The square root function is used by clicking on the “√ “button. The function results in square root of a number.

**Raise to the power**

The raise to the power (x raised to the y function) is used by clicking on the “x^y” button.

**Natural Exponential**

The natural exponential (e raised to the x) is used by clicking in the “e” and followed by “x^y”. The result displays e (2.71828…..) raised to x.

**Logarithm**

The natural logarithm is used by clicking on the button “ln”

**Factorial**

The factorial function is used by clicking the “!” button, which results in factorial of a given number.

**Pi**

Pi is a mathematical constant of the ratio of a circle’s circumference to its diameter.

**Trigonometric functions**

The sine, cosine, tangent functions can be used by clicking on “sin, cos, tan” buttons respectively, which results the sin, cos, tan values in degrees.

**Hyperbolic functions**

The sinh, cosh, tanh functions can be used by clicking on “sinh, cosh, tanh” buttons respectively, which results the sinh, cosh, tanh values in degrees

**Inverse**

Multiplicative inverse (reciprocal function) is used by clicking in “1/x” button. This function is the same as x^-1 or dividing 1 by the number.

### Logic Used:

* Program used a bunch of if statements used to decide the output according to the input given by user.
* This is the basic logic on which the program works.
* The calculator of problems or statements and other values is done by using formulas and data collected is used to calculate the output of a particular value in terms of members.
* There are various functions and if statements which also control output when a certain value is entered.

### Algorithm:

* 1.Input the first number
* 2.Input the operator
* 3.Input the second number
* 4. Calculate the result
* 5.Display the result

### Hardware:

The project can be accessed or developed under this criterion only

**SOFTWARE REQUIRMENTS:-**

Any Windows, Macintosh, Linux-based operating system with an3.y

IDLE containing Python version 3.5.4 or above

**HARDWARE REQUIRMENTS: -**

**Hard disk drive:** 100 GB and cloud data if needed

**RAM:** Minimum 2 GB

**Processor:** intel core i3 or AMD ryzen 3

**Requirments For Software Development:**

Windows 7 or up are required. The system must be connected via LAN and connection to internet is mandatory, only if u have cloud system or actually not necessary.

As a part of hardware, the user should have a laptop or desktop computer which is capable of handling python idle. It should also have minimum of 2GB ram for the easy complication and smooth running of the program.

# Concluding Remarks

We built a Scientific Calculator in python using Tkinters and defines what happens when a user interacts with a GUI element.

Using Frame widgets to create containers/windows in which to arrange GUI components. Positioning Buttons widgets within a Frame widget using Tkinter’s Layout Manager. The grid layout manager was chosen for the Calculator application due to its precision compared to alternative layout techniques.

# Future Work

Our project will be able to implement in future after making some changes and modifications as we make our project at very low level. So, the modifications that can be done in our project are:

To make it screen touch so no need to touch key buttons and one more change which can be made is to give access to the key board.

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* Learning Python – Mark Lutz