TECHNOGURUS
TUTORIALS
ENGINEERING
DEGREE | DIPLOMA

PYTHON

GUI

`BY

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Python GUI Programming

Tkinteris Python's default GUI library. It is based on the Tktoolkit, originally designed for the Tool Command Language (Tcl). Due to Tk's popularity, it has been ported to a variety of other scripting languages, including Perl (Perl/Tk), Ruby (Ruby/Tk), and Python (Tkinter). •The combination of Tk'sGUI development portability and flexibility along with the simplicity of a scripting language integrated with the power of systems language gives you the tools to rapidly design and implement a wide variety of commercial-quality GUI applications.
tkinter's chief virtues are that it is fast, and that it usually comes bundled with Python. Although its standard documentation is weak, good material is available, which includes: references, tutorials, a book and others. tkinter is also famous for having an outdated look and feel, which has been vastly improved in Tk 8.5. Nevertheless, there are many other GUI libraries that you could be interested in.
other options
Python GUI Development Options
Tkinter

An open source GUI library and the continuing de facto standard for portable GUI development in Python. Python scripts that use Tkinter to build GUIs run portably on Windows, X Windows (Unix and Linux), and Macintosh (both classic and OS X), and they display a native look-and-feel on each of these. Tkinter makes it easy to build simple and portable GUIs quickly. Moreover, it can be easily augmented with Python code, as well as with larger extension packages such as Pmw (a third-party widget library), Tix (another widget library, and now a standard part of Python), and PIL (an image-processing extension).
The underlying Tk library used by Tkinter is a standard in the open source world at large and is also used by the Perl, Ruby, PHP, and Tcl scripting languages, giving it a user base that numbers in the millions. The Python binding to Tk is enhanced by Python's simple object model; Tk widgets become customizable and embeddable objects, not string commands.
Tkinter is mature, robust, widely used, and well documented. It includes roughly 25 basic widget types, plus various dialogs and other tools. Moreover, there is a dedicated book on the subject, plus a large library of published Tkinter and Tk documentation. Perhaps most importantly, because it is based on a library developed for scripting languages, Tkinter is also a relatively lightweight toolkit, and as such it meshes well with a scripting language like Python.
Because of such attributes, Python's Tkinter module ships with Python as a standard library module and is the basis of Python's standard IDLE integrated development environment GUI. In fact, Tkinter is the only GUI toolkit that is part of Python; all others on this list are third-party extensions. The underlying Tk library is also shipped with Python on some platforms (including Windows and most Linux systems).

Although Tkinter is easy to use, its text and canvas widgets are powerful enough to implement web pages, three-dimensional visualization, and animation. PythonWorks, Komodo, and others provide GUI builders for Tkinter, and some Tk tools work for Python too; as we will see, though, Tkinter is usually so easy to code that GUI builders are not widely used.

wxPython

A Python interface for the open source wxWidgets (formerly called wxWindows[*]) library, a portable GUI class framework originally written to be used from the C++ programming language. The wxPython system is an extension module that wraps wxWindows classes. This library is generally considered to excel at building sophisticated interfaces and is probably the second most popular Python GUI toolkit today, behind Tkinter. Today, wxPython code is portable to Windows, Unix-like platforms, and Mac OS X.

[*] Per an article that appeared on slashdot.org in 2004, the name of the underlying wxWidgets library was changed from wxWindows in response to a "polite request" by Microsoft.

Because wxPython is based on a C++ class library, it is generally more complex than Tkinter: it provides more than 200 classes at last count, requires an object-oriented coding style, and has a design reminiscent of MFC. wxPython often expects programmers to write more code, partly because it is a more complex system and partly because it inherits this mindset from its underlying C++ library.

Moreover, wxPython is not as well documented as Tkinter: some of its documentation is oriented toward C++, and there are no books dedicated to wxPython as I write these words. By contrast, Tkinter is covered by one book dedicated to it, large sections of other Python books, and an even larger library of existing literature on the underlying Tk toolkit. (After I wrote this paragraph, a wxPython book was preannounced, but it is still under development and will likely be the only Python-specific wxPython resource available for some time to come.)

On the other hand, in exchange for its added complexity, wxPython provides a powerful toolkit. wxPython comes with a richer set of widgets out of the box than Tkinter, including trees and HTML viewersthings that require extensions such as Pmw or Tix in Tkinter. In addition, some prefer the appearance of the interfaces it renders. BoaConstructor and wxDesigner, among other options, provide a GUI builder that generates wxPython code. Some wxWidgets tools also support Python work. For a quick look at wxPython widgets and code, run the demo that comes with the system.

PyQt

A Python interface to Qt, perhaps the third most widely used GUI toolkit for Python today. PyQt is a full-featured GUI library and runs portably today on Windows, Mac OS X, and Unix and Linux (including the Zaurus Linux-based PDA). Qt is generally more complex, yet more feature rich, than Tkinter as well; it currently contains 300 classes and more than 5,750 functions and methods. Perhaps its most widely cited drawback is that it is not completely open source for commercial use. (Qt 4, announced after this chapter was written, now provides both GPL and commercial license versions on all platforms, including Windows. The GPL version is open source, but also imposes requirements beyond those of the Python BSD-style license; you must, for example, make your source code freely available to end users under the GPL unless you purchase a commercial license instead.) Qt grew up on Linux; the PyQt and PyKDE extension packages provide access to KDE development libraries (PyKDE requires PyQt). The BlackAdder and Qt Designer systems provide a GUI builder for PyQt.

PyGTK

A Python interface to GTK, a portable GUI library originally used as the core of the Gnome window system on Linux. The gnome-python and PyGTK extension packages export Gnome and GTK toolkit calls. At this writing, PyGTK runs portably on Windows and POSIX systems such as Linux and Mac OS X (provided that an X server for Mac OS X has been installed, though a native version is in the works).

Jython

As we will see in Chapter 18, Jython (the system formerly known as JPython) is a Python port for Java, which gives Python scripts seamless access to Java class libraries on the local machine. Because of that, Java GUI libraries such as swing and awt become another way to construct GUIs in Python code run by the JPython system. Such solutions are obviously Java specific and limited in portability to the portability of Java and its libraries. Furthermore, swing is likely the largest and most complex GUI option for Python work. A new package named jTkinter also provides a Tkinter port to Jython using Java's JNI; if installed, Python scripts may also use Tkinter to build GUIs under JPython.

MFC

The Windows PyWin32 extensions package for Python, available at Python's web site, includes wrappers for the Microsoft Foundation Classes (MFC) frameworka development library that includes user interface components. With the Windows extensions, Python programs can construct Windows GUIs using the same MFC calls applied in languages such as Visual C++. Pythonwin, an MFC sample program that implements a Python development GUI, is included with the extensions package. This is a Windows-only solution, but it may be an appealing option for developers with a prior intellectual investment in using the MFC framework from Visual C++.

PythonCard

An open source GUI builder and library built on top of the wxPython toolkit and considered by some to currently be Python's closest equivalent to GUI builders such as those familiar to Visual Basic developers. PythonCard describes itself as a GUI construction kit for building cross-platform desktop applications on Windows, Mac OS X, and Linux, using the Python language.

Dabo

An emerging open source GUI builder also built on wxPython, and a bit more. Dabo is a portable, three-tier, cross-platform application development framework, inspired by Visual FoxPro and written in Python. Its tiers support database access, business logic, and user interface. Its open design is intended to eventually support a variety of databases and multiple user interfaces (wxPython, Tkinter, and even HTML over HTTP).

AnyGui

A toolkit that aims to provide an API that is portable across a variety of underlying toolkits, including Tkinter, wxPython, and Qt. This API takes a lowest-common-denominator approach to achieve its portability. (As of this writing, AnyGui is no longer being actively developed and serves mostly as a proof-of-concept project.)

WPY

An MFC-like GUI library for Python, ported to run on both X Windows for Unix (where it uses Tk) and Windows for PCs (where it uses MFC). WPY scripts run unchanged on each platform, but they use MFC coding styles.

Others

On Macintosh OS X platforms, Python scripts can use the Cocoa library. For Unix-like systems, interfaces to the raw X Windows and Motif libraries also exist for Python; they provide maximum control over the X11 development environment but are an X-only solution.

Climbing the GUI Learning Curve

GUI PROGRAMMING

There are basically five main steps that are required to get your GUI up and running:

1. Import the Tkinter module (or from tkinter import *).
2. Create a top-level windowing object that contains your entire GUI application.
3. Build all your GUI components (and functionality) on top (or within) of your top-level windowing object.
4. Connect these GUI components to the underlying application code.
5. Enter the main event loop.

Code:

Event-Driven Processing

• Events can include the actual button press (and release), mouse movement, hitting the Return or Enter key, etc. The entire system of events that occurs from the beginning until the end of a GUI application is what drives it. This is known as event-driven processing.
Tk has three geometry managers that help with positioning your widgetset:
• Placer: You provide the size of the widgets and locations to place them; the manager then places them for you. The problem is that you have to do this with all the widgets, burdening the developer with coding that should otherwise take place automatically.
• Packer: it packs widgets into the correct places (namely the containing parent widgets, based on your instruction), and for every succeeding widget, it looks for any remaining “real estate” into which to pack the next one. The process is similar to how you would pack elements into a suitcase when traveling.
• Grid: It is used to specify GUI widget placement, based on grid coordinates. The Grid will render each object in the GUI in their grid position.

Tkinter Dimensions

Various lengths, widths, and other dimensions of widgets can be described in many different units.

- If you set a dimension to an integer, it is assumed to be in pixels.
- You can specify units by setting a dimension to a string containing a number followed by.

S.No.	Character & Description
1	**c** Centimeters
2	**i** Inches
3	**m** Millimeters
4	**n** Printer's points (about 1/72")

Length options

Tkinter expresses a length as an integer number of pixels. Here is the list of common length options −

- **borderwidth** − Width of the border which gives a three-dimensional look to the widget.
- **highlightthickness** − Width of the highlight rectangle when the widget has focus .
- **padX padY** − Extra space the widget requests from its layout manager beyond the minimum the widget needs to display its contents in the x and y directions.
- **selectborderwidth** − Width of the three-dimentional border around selected items of the widget.

- **wraplength** − Maximum line length for widgets that perform word wrapping.
- **height** − Desired height of the widget; must be greater than or equal to 1.
- **underline** − Index of the character to underline in the widget's text (0 is the first character, 1 the second one, and so on).
- **width** − Desired width of the widget.

Tkinter Colors

Tkinter represents colors with strings. There are two general ways to specify colors in Tkinter −

- You can use a string specifying the proportion of red, green and blue in hexadecimal digits. For example, "#fff" is white, "#000000" is black, "#000fff000" is pure green, and "#00ffff" is pure cyan (green plus blue).
- You can also use any locally defined standard color name. The colors "white", "black", "red", "green", "blue", "cyan", "yellow", and "magenta" will always be available.

Color options

The common color options are −

- **activebackground** − Background color for the widget when the widget is active.
- **activeforeground** − Foreground color for the widget when the widget is active.
- **background** − Background color for the widget. This can also be represented as *bg*.
- **disabledforeground** − Foreground color for the widget when the widget is disabled.
- **foreground** − Foreground color for the widget. This can also be represented as *fg*.
- **highlightbackground** − Background color of the highlight region when the widget has focus.
- **highlightcolor** − Foreground color of the highlight region when the widget has focus.
- **selectbackground** − Background color for the selected items of the widget.
- **selectforeground** − Foreground color for the selected items of the widget.

Tkinter Anchors

Anchors are used to define where text is positioned relative to a reference point.
Here is list of possible constants, which can be used for Anchor attribute.

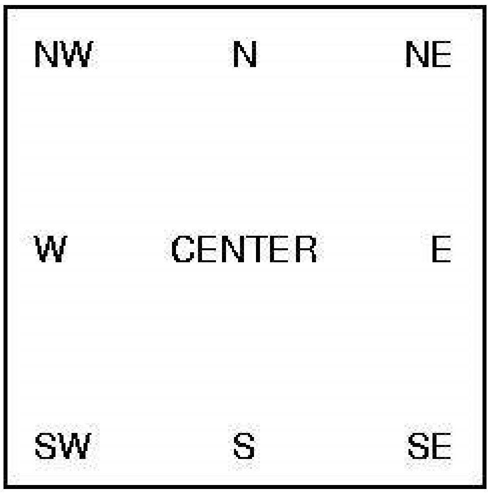
- NW
- N
- NE
- W
- CENTER
- E
- SW
- S
- SE

For example, if you use CENTER as a text anchor, the text will be centered horizontally and vertically around the reference point.
Anchor NW will position the text so that the reference point coincides with the northwest (top left) corner of the box containing the text.
Anchor W will center the text vertically around the reference point, with the left edge of the text box passing through that point, and so on.

If you create a small widget inside a large frame and use the anchor = SE option, the widget will be placed in the bottom right corner of the frame. If you used anchor = N instead, the widget would be centered along the top edge.

Example

The anchor constants are shown in this diagram −



Tkinter Relief styles

The relief style of a widget refers to certain simulated 3-D effects around the outside of the widget. Here is a screenshot of a row of buttons exhibiting all the possible relief styles −
Here is list of possible constants which can be used for relief attribute −

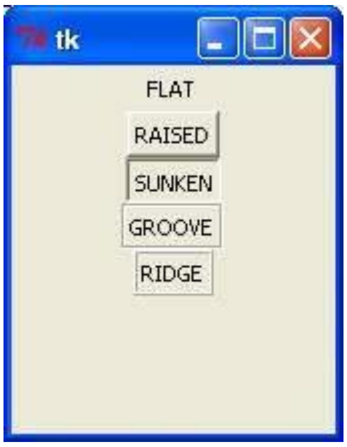
- FLAT
- RAISED
- SUNKEN
- GROOVE
- RIDGE

```
from tkinter import *
import tkinter

top = Tk()

B1 = Button(top, text = "FLAT", relief = FLAT )
B2 = Button(top, text = "RAISED", relief = RAISED )
B3 = Button(top, text = "SUNKEN", relief = SUNKEN )
B4 = Button(top, text = "GROOVE", relief = GROOVE )
B5 = Button(top, text = "RIDGE", relief = RIDGE )
```

```
B1.pack()
B2.pack()
B3.pack()
B4.pack()
B5.pack()
top.mainloop()
```



tkinter pack() method

This geometry manager organizes widgets in blocks before placing them in the parent widget.

Syntax

```
widget.pack( pack_options )
```

Here is the list of possible options −

- **expand** − When set to true, widget expands to fill any space not otherwise used in widget's parent.
- **fill** − Determines whether widget fills any extra space allocated to it by the packer, or keeps its own minimal dimensions: NONE (default), X (fill only horizontally), Y (fill only vertically), or BOTH (fill both horizontally and vertically).
- **side** − Determines which side of the parent widget packs against: TOP (default), BOTTOM, LEFT, or RIGHT.

Example

Try the following example by moving cursor on different buttons −

```
from tkinter import *

root = Tk()
frame = Frame(root)
frame.pack()

bottomframe = Frame(root)
bottomframe.pack( side = BOTTOM )
```

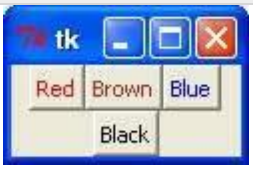
```
redbutton = Button(frame, text = "Red", fg = "red")
redbutton.pack( side = LEFT)

greenbutton = Button(frame, text = "Brown", fg = "brown")
greenbutton.pack( side = LEFT )

bluebutton = Button(frame, text = "Blue", fg = "blue")
bluebutton.pack( side = LEFT )

blackbutton = Button(bottomframe, text = "Black", fg = "black")
blackbutton.pack( side = BOTTOM)

root.mainloop()
```



tkinter.grid()

This geometry manager organizes widgets in a table-like structure in the parent widget.

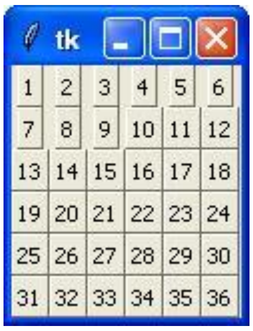
Syntax

```
widget.grid( grid_options )
```

Here is the list of possible options −

- **column** − The column to put widget in; default 0 (leftmost column).
- **columnspan** − How many columns widgetoccupies; default 1.
- **ipadx, ipady** −How many pixels to pad widget, horizontally and vertically, inside widget's borders.
- **padx, pady** − How many pixels to pad widget, horizontally and vertically, outside v's borders.
- **row** − The row to put widget in; default the first row that is still empty.
- **rowspan** − How many rowswidget occupies; default 1.
- **sticky** − What to do if the cell is larger than widget. By default, with sticky='', widget is centered in its cell. sticky may be the string concatenation of zero or more of N, E, S, W, NE, NW, SE, and SW, compass directions indicating the sides and corners of the cell to which widget sticks.

```
from  tkinter import *
root = Tk(  )
b = 0
for r in range(6):
   for c in range(6):
      b = b + 1
      Button(root, text = str(b),
         borderwidth = 1 ).grid(row = r,column = c)
```



tkinter place()

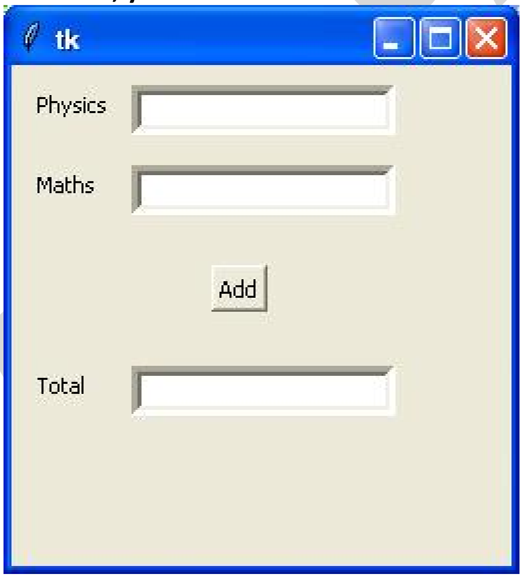
This geometry manager organizes widgets by placing them in a specific position in the parent widget.

Syntax

```
widget.place( place_options )
```

Here is the list of possible options −

- **anchor** − The exact spot of widget other options refer to: may be N, E, S, W, NE, NW, SE, or SW, compass directions indicating the corners and sides of widget; default is NW (the upper left corner of widget)
- **bordermode** − INSIDE (the default) to indicate that other options refer to the parent's inside (ignoring the parent's border); OUTSIDE otherwise.
- **height, width** − Height and width in pixels.
- **relheight, relwidth** − Height and width as a float between 0.0 and 1.0, as a fraction of the height and width of the parent widget.
- **relx, rely** − Horizontal and vertical offset as a float between 0.0 and 1.0, as a fraction of the height and width of the parent widget.
- **x, y** − Horizontal and vertical offset in pixels.



tkinter Widgets:

S.No.	Operator & Description
1	**Button** The Button widget is used to display the buttons in your application.
2	**Canvas** The Canvas widget is used to draw shapes, such as lines, ovals, polygons and rectangles, in your application.
3	**Checkbutton** The Checkbutton widget is used to display a number of options as checkboxes. The user can select multiple options at a time.
4	**Entry** The Entry widget is used to display a single-line text field for accepting values from a user.
5	**Frame** The Frame widget is used as a container widget to organize other widgets.
6	**Label** The Label widget is used to provide a single-line caption for other widgets. It can also contain images.
7	**Listbox** The Listbox widget is used to provide a list of options to a user.
8	**Menubutton** The Menubutton widget is used to display menus in your application.
9	**Menu** The Menu widget is used to provide various commands to a user. These commands are contained inside Menubutton.
10	**Message** The Message widget is used to display multiline text fields for accepting values from a user.
11	**Radiobutton** The Radiobutton widget is used to display a number of options as radio buttons. The user can select only one option at a time.
12	**Scale** The Scale widget is used to provide a slider widget.
13	**Scrollbar**

	The Scrollbar widget is used to add scrolling capability to various widgets, such as list boxes.
14	**Text** The Text widget is used to display text in multiple lines.
15	**Toplevel** The Toplevel widget is used to provide a separate window container.
16	**Spinbox** The Spinbox widget is a variant of the standard Tkinter Entry widget, which can be used to select from a fixed number of values.
17	**PanedWindow** A PanedWindow is a container widget that may contain any number of panes, arranged horizontally or vertically.
18	**LabelFrame** A labelframe is a simple container widget. Its primary purpose is to act as a spacer or container for complex window layouts.
19	**tkMessageBox** This module is used to display message boxes in your applications.

Button

Syntax

Here is the simple syntax to create this widget −

```
w = Button ( master, option = value, ... )
```

Parameters

- **master** − This represents the parent window.
- **options** − Here is the list of most commonly used options for this widget. These options can be used as key-value pairs separated by commas.

Additional padding above and below the text.

S.No.	Option & Description
1	**activebackground** Background color when the button is under the cursor.
2	**activeforeground** Foreground color when the button is under the cursor.
3	**bd** Border width in pixels. Default is 2.
4	**bg** Normal background color.
5	**command** Function or method to be called when the button is clicked.
6	**fg** Normal foreground (text) color.
7	**font** Text font to be used for the button's label.
8	**height** Height of the button in text lines (for textual buttons) or pixels (for images).
9	**highlightcolor** The color of the focus highlight when the widget has focus.
10	**image** Image to be displayed on the button (instead of text).
11	**justify** How to show multiple text lines: LEFT to left-justify each line; CENTER to center them; or RIGHT to right-justify.
12	**padx** Additional padding left and right of the text.
13	**pady**
14	**relief** Relief specifies the type of the border. Some of the values are SUNKEN, RAISED, GROOVE, and RIDGE.
15	**state** Set this option to DISABLED to gray out the button and make it unresponsive. Has the value ACTIVE when the mouse is over it. Default is NORMAL.
16	**underline**

	Default is -1, meaning that no character of the text on the button will be underlined. If nonnegative, the corresponding text character will be underlined.
17	**width** Width of the button in letters (if displaying text) or pixels (if displaying an image).
18	**wraplength** If this value is set to a positive number, the text lines will be wrapped to fit within this length.

Methods

Following are commonly used methods for this widget −

S.No.	Medthod & Description
1	**flash()** Causes the button to flash several times between active and normal colors. Leaves the button in the state it was in originally. Ignored if the button is disabled.
2	**invoke()** Calls the button's callback, and returns what that function returns. Has no effect if the button is disabled or there is no callback.

CODE:

tkinter Canvas

The Canvas is a rectangular area intended for drawing pictures or other complex layouts. You can place graphics, text, widgets or frames on a Canvas.

Syntax

Here is the simple syntax to create this widget −

```
w = Canvas ( master, option=value, ... )
```

Parameters

- **master** − This represents the parent window.
- **options** − Here is the list of most commonly used options for this widget. These options can be used as key-value pairs separated by commas.

S.No.	Option & Description
1	**bd** Border width in pixels. Default is 2.
2	**bg** Normal background color.
3	**confine** If true (the default), the canvas cannot be scrolled outside of the scrollregion.
4	**cursor** Cursor used in the canvas like arrow, circle, dot etc.
5	**height** Size of the canvas in the Y dimension.
6	**highlightcolor** Color shown in the focus highlight.
7	**relief** Relief specifies the type of the border. Some of the values are SUNKEN, RAISED, GROOVE, and RIDGE.
8	**scrollregion** A tuple (w, n, e, s) that defines over how large an area the canvas can be scrolled, where w is the left side, n the top, e the right side, and s the bottom.
9	**width** Size of the canvas in the X dimension.

10	**xscrollincrement** If you set this option to some positive dimension, the canvas can be positioned only on multiples of that distance, and the value will be used for scrolling by scrolling units, such as when the user clicks on the arrows at the ends of a scrollbar.
11	**xscrollcommand** If the canvas is scrollable, this attribute should be the .set() method of the horizontal scrollbar.
12	**yscrollincrement** Works like xscrollincrement, but governs vertical movement.
13	**yscrollcommand** If the canvas is scrollable, this attribute should be the .set() method of the vertical scrollbar.

The Canvas widget can support the following standard items −

arc . Creates an arc item, which can be a chord, a pieslice or a simple arc.

```
coord = 10, 50, 240, 210
arc = canvas.create_arc(coord, start = 0, extent = 150, fill = "blue")
```

image . Creates an image item, which can be an instance of either the BitmapImage or the PhotoImage classes.

```
filename = PhotoImage(file = "sunshine.gif")
image = canvas.create_image(50, 50, anchor = NE, image = filename)
```

line . Creates a line item.

```
line = canvas.create_line(x0, y0, x1, y1, ..., xn, yn, options)
```

oval . Creates a circle or an ellipse at the given coordinates. It takes two pairs of coordinates; the top left and bottom right corners of the bounding rectangle for the oval.

```
oval = canvas.create_oval(x0, y0, x1, y1, options)
```

polygon . Creates a polygon item that must have at least three vertices.

```
oval = canvas.create_polygon(x0, y0, x1, y1,...xn, yn, options)
```

code:

Tkinter Checkbutton

The Checkbutton widget is used to display a number of options to a user as toggle buttons. The user can then select one or more options by clicking the button corresponding to each option.

You can also display images in place of text.

Syntax

Here is the simple syntax to create this widget −

```
w = Checkbutton ( master, option, ... )
```

Parameters

- **master** − This represents the parent window.
- **options** − Here is the list of most commonly used options for this widget. These options can be used as key-value pairs separated by commas.

S.No.	Option & Description
1	**activebackground** Background color when the checkbutton is under the cursor.
2	**activeforeground** Foreground color when the checkbutton is under the cursor.
3	**bg** The normal background color displayed behind the label and indicator.
4	**bitmap** To display a monochrome image on a button.
5	**bd** The size of the border around the indicator. Default is 2 pixels.
6	**command** A procedure to be called every time the user changes the state of this checkbutton.
7	**cursor** If you set this option to a cursor name (*arrow, dot etc.), the mouse cursor will change to that pattern when it is over the checkbutton.*
8	**disabledforeground**

	The foreground color used to render the text of a disabled checkbutton. The default is a stippled version of the default foreground color.
9	**font** The font used for the text.
10	**fg** The color used to render the text.
11	**height** The number of lines of text on the checkbutton. Default is 1.
12	**highlightcolor** The color of the focus highlight when the checkbutton has the focus.
13	**image** To display a graphic image on the button.
14	**justify** If the text contains multiple lines, this option controls how the text is justified: CENTER, LEFT, or RIGHT.
15	**offvalue** Normally, a checkbutton's associated control variable will be set to 0 when it is cleared (off). You can supply an alternate value for the off state by setting offvalue to that value.
16	**onvalue** Normally, a checkbutton's associated control variable will be set to 1 when it is set (on). You can supply an alternate value for the on state by setting onvalue to that value.
17	**padx** How much space to leave to the left and right of the checkbutton and text. Default is 1 pixel.
18	**pady** How much space to leave above and below the checkbutton and text. Default is 1 pixel.
19	**relief** With the default value, relief = FLAT, the checkbutton does not stand out from its background. You may set this option to any of the other styles
20	**selectcolor**

	The color of the checkbutton when it is set. Default is selectcolor = "red".
21	**selectimage** If you set this option to an image, that image will appear in the checkbutton when it is set.
22	**state** The default is state = NORMAL, but you can use state = DISABLED to gray out the control and make it unresponsive. If the cursor is currently over the checkbutton, the state is ACTIVE.
23	**text** The label displayed next to the checkbutton. Use newlines ("\n") to display multiple lines of text.
24	**underline** With the default value of -1, none of the characters of the text label are underlined. Set this option to the index of a character in the text (counting from zero) to underline that character.
25	**variable** The control variable that tracks the current state of the checkbutton. Normally this variable is an *IntVar*, and 0 means cleared and 1 means set, but see the offvalue and onvalue options above.
26	**width** The default width of a checkbutton is determined by the size of the displayed image or text. You can set this option to a number of characters and the checkbutton will always have room for that many characters.
27	**wraplength** Normally, lines are not wrapped. You can set this option to a number of characters and all lines will be broken into pieces no longer than that number.

Methods

Following are commonly used methods for this widget −

S.No.	Medthod & Description
1	**deselect()** Clears (turns off) the checkbutton.
2	**flash()**

	Flashes the checkbutton a few times between its active and normal colors, but leaves it the way it started.
3	**invoke()** You can call this method to get the same actions that would occur if the user clicked on the checkbutton to change its state.
4	**select()** Sets (turns on) the checkbutton.
5	**toggle()** Clears the checkbutton if set, sets it if cleared.

Code:

```
from tkinter import *
top = tkinter.Tk()
CheckVar1 = IntVar()
C1 = Checkbutton(top, text = "Music", variable = CheckVar1,onvalue = 1, offvalue = 0, height=5,width
= 20,)
C1.pack()
top.mainloop()
```

Tkinter Entry

The Entry widget is used to accept single-line text strings from a user.

- If you want to display multiple lines of text that can be edited, then you should use the *Text* widget.
- If you want to display one or more lines of text that cannot be modified by the user, then you should use the *Label* widget.

Syntax

Here is the simple syntax to create this widget −

```
w = Entry( master, option, ... )
```

Parameters

- **master** − This represents the parent window.
- **options** − Here is the list of most commonly used options for this widget. These options can be used as key-value pairs separated by commas.

S.No.	Option & Description
1	**bg** The normal background color displayed behind the label and indicator.
2	**bd** The size of the border around the indicator. Default is 2 pixels.
3	**command** A procedure to be called every time the user changes the state of this checkbutton.
4	**cursor** If you set this option to a cursor name (*arrow, dot etc.*), the mouse cursor will change to that pattern when it is over the checkbutton.
5	**font** The font used for the text.
6	**exportselection** By default, if you select text within an Entry widget, it is automatically exported to the clipboard. To avoid this exportation, use exportselection = 0.
7	**fg** The color used to render the text.
8	**highlightcolor** The color of the focus highlight when the checkbutton has the focus.

9	**justify** If the text contains multiple lines, this option controls how the text is justified: CENTER, LEFT, or RIGHT.
10	**relief** With the default value, relief = FLAT, the checkbutton does not stand out from its background. You may set this option to any of the other styles
11	**selectbackground** The background color to use displaying selected text.
12	**selectborderwidth**
13	**selectforeground** The foreground (text) color of selected text.
14	**show** Normally, the characters that the user types appear in the entry. To make a .password. entry that echoes each character as an asterisk, set show = "*".
15	**state** The default is state = NORMAL, but you can use state = DISABLED to gray out the control and make it unresponsive. If the cursor is currently over the checkbutton, the state is ACTIVE.
16	**textvariable** In order to be able to retrieve the current text from your entry widget, you must set this option to an instance of the StringVar class.
17	**width** The default width of a checkbutton is determined by the size of the displayed image or text. You can set this option to a number of characters and the checkbutton will always have room for that many characters.
18	**xscrollcommand** If you expect that users will often enter more text than the onscreen size of the widget, you can link your entry widget to a scrollbar.

Methods

Following are commonly used methods for this widget −

S.No.	Medthod & Description
1	**delete (first, last = None)**

	Deletes characters from the widget, starting with the one at index first, up to but not including the character at position last. If the second argument is omitted, only the single character at position first is deleted.
2	**get()** Returns the entry's current text as a string.
3	**icursor (index)** Set the insertion cursor just before the character at the given index.
4	**index (index)** Shift the contents of the entry so that the character at the given index is the leftmost visible character. Has no effect if the text fits entirely within the entry.
5	**insert (index, s)** Inserts string s before the character at the given index.
6	**select_adjust (index)** This method is used to make sure that the selection includes the character at the specified index.
7	**select_clear()** Clears the selection. If there isn't currently a selection, has no effect.
8	**select_from (index)** Sets the ANCHOR index position to the character selected by index, and selects that character.
9	**select_present()** If there is a selection, returns true, else returns false.
10	**select_range (start, end)** Sets the selection under program control. Selects the text starting at the start index, up to but not including the character at the end index. The start position must be before the end position.
11	**select_to (index)** Selects all the text from the ANCHOR position up to but not including the character at the given index.
12	**xview (index)** This method is useful in linking the Entry widget to a horizontal scrollbar.
13	**xview_scroll (number, what)**

	Used to scroll the entry horizontally. The what argument must be either UNITS, to scroll by character widths, or PAGES, to scroll by chunks the size of the entry widget. The number is positive to scroll left to right, negative to scroll right to left.

Code

```
from tkinter import *

top = Tk()
L1 = Label(top, text = "User Name")
L1.pack( side = LEFT)
E1 = Entry(top, bd = 5)
E1.pack(side = RIGHT)

top.mainloop()
```

Tkinter Frame

The Frame widget is very important for the process of grouping and organizing other widgets in a somehow friendly way. It works like a container, which is responsible for arranging the position of other widgets. It uses rectangular areas in the screen to organize the layout and to provide padding of these widgets. A frame can also be used as a foundation class to implement complex widgets.

Syntax

Here is the simple syntax to create this widget –

```
w = Frame ( master, option, ... )
```

Parameters

- **master** – This represents the parent window.
- **options** – Here is the list of most commonly used options for this widget. These options can be used as key-value pairs separated by commas.

S.No.	Option & Description
1	**bg** The normal background color displayed behind the label and indicator.
2	**bd** The size of the border around the indicator. Default is 2 pixels.
3	**cursor** If you set this option to a cursor name (*arrow, dot etc.*), the mouse cursor will change to that pattern when it is over the checkbutton.
4	**height** The vertical dimension of the new frame.
5	**highlightbackground** Color of the focus highlight when the frame does not have focus.
6	**highlightcolor** Color shown in the focus highlight when the frame has the focus.
7	**highlightthickness** Thickness of the focus highlight.
8	**relief** With the default value, relief = FLAT, the checkbutton does not stand out from its background. You may set this option to any of the other styles

9	**width** The default width of a checkbutton is determined by the size of the displayed image or text. You can set this option to a number of characters and the checkbutton will always have room for that many characters.

```
from tkinter import *

root = Tk()
frame = Frame(root)
frame.pack()

bottomframe = Frame(root)
bottomframe.pack( side = BOTTOM )

redbutton = Button(frame, text = "Red", fg = "red")
redbutton.pack( side = LEFT)

greenbutton = Button(frame, text = "Brown", fg="brown")
greenbutton.pack( side = LEFT )

bluebutton = Button(frame, text = "Blue", fg = "blue")
bluebutton.pack( side = LEFT )

blackbutton = Button(bottomframe, text = "Black", fg = "black")
blackbutton.pack( side = BOTTOM)

root.mainloop()
```

Tkinter Label

This widget implements a display box where you can place text or images. The text displayed by this widget can be updated at any time you want. It is also possible to underline part of the text (like to identify a keyboard shortcut) and span the text across multiple lines.

Syntax

Here is the simple syntax to create this widget −

```
w = Label ( master, option, ... )
```

Parameters

- **master** − This represents the parent window.
- **options** − Here is the list of most commonly used options for this widget. These options can be used as key-value pairs separated by commas.

S.No.	Option & Description
1	**anchor** This options controls where the text is positioned if the widget has more space than the text needs. The default is anchor = CENTER, which centers the text in the available space.
2	**bg** The normal background color displayed behind the label and indicator.
3	**bitmap** Set this option equal to a bitmap or image object and the label will display that graphic.
4	**bd** The size of the border around the indicator. Default is 2 pixels.
5	**cursor** If you set this option to a cursor name (*arrow, dot etc.*), the mouse cursor will change to that pattern when it is over the checkbutton.
6	**font** If you are displaying text in this label (with the text or textvariable option, the font option specifies in what font that text will be displayed.
7	**fg** If you are displaying text or a bitmap in this label, this option specifies the color of the text. If you are displaying a bitmap, this is the color that will appear at the position of the 1-bits in the bitmap.

8	**height** The vertical dimension of the new frame.
9	**image** To display a static image in the label widget, set this option to an image object.
10	**justify** Specifies how multiple lines of text will be aligned with respect to each other: LEFT for flush left, CENTER for centered (the default), or RIGHT for right-justified.
11	**padx** Extra space added to the left and right of the text within the widget. Default is 1.
12	**pady** Extra space added above and below the text within the widget. Default is 1.
13	**relief** Specifies the appearance of a decorative border around the label. The default is FLAT; for other values.
14	**text** To display one or more lines of text in a label widget, set this option to a string containing the text. Internal newlines ("\n") will force a line break.
15	**textvariable** To slave the text displayed in a label widget to a control variable of class *StringVar*, set this option to that variable.
16	**underline** You can display an underline (_) below the nth letter of the text, counting from 0, by setting this option to n. The default is underline = -1, which means no underlining.
17	**width** Width of the label in characters (not pixels!). If this option is not set, the label will be sized to fit its contents.
18	**wraplength** You can limit the number of characters in each line by setting this option to the desired number. The default value, 0, means that lines will be broken only at newlines.

Code

```
from tkinter import *

root = Tk()
root.title('Python Title')
Label(root, text='python label')
Lable.pack(pady=20,padx=50)

root.mainloop()
```

Tkinter Listbox

The Listbox widget is used to display a list of items from which a user can select a number of items

Syntax

Here is the simple syntax to create this widget −

```
w = Listbox ( master, option, ... )
```

Parameters

- **master** − This represents the parent window.
- **options** − Here is the list of most commonly used options for this widget. These options can be used as key-value pairs separated by commas.

S.No.	Option & Description
1	**bg** The normal background color displayed behind the label and indicator.
2	**bd** The size of the border around the indicator. Default is 2 pixels.
3	**cursor** The cursor that appears when the mouse is over the listbox.
4	**font** The font used for the text in the listbox.
5	**fg** The color used for the text in the listbox.
6	**height** Number of lines (not pixels!) shown in the listbox. Default is 10.
7	**highlightcolor** Color shown in the focus highlight when the widget has the focus.
8	**highlightthickness** Thickness of the focus highlight.
9	**relief** Selects three-dimensional border shading effects. The default is SUNKEN.
10	**selectbackground** The background color to use displaying selected text.

11	**selectmode** Determines how many items can be selected, and how mouse drags affect the selection − • **BROWSE** − Normally, you can only select one line out of a listbox. If you click on an item and then drag to a different line, the selection will follow the mouse. This is the default. • **SINGLE** − You can only select one line, and you can't drag the mouse.wherever you click button 1, that line is selected. • **MULTIPLE** − You can select any number of lines at once. Clicking on any line toggles whether or not it is selected. • **EXTENDED** − You can select any adjacent group of lines at once by clicking on the first line and dragging to the last line.
12	**width** The width of the widget in characters. The default is 20.
13	**xscrollcommand** If you want to allow the user to scroll the listbox horizontally, you can link your listbox widget to a horizontal scrollbar.
14	**yscrollcommand** If you want to allow the user to scroll the listbox vertically, you can link your listbox widget to a vertical scrollbar.

Methods

Methods on listbox objects include −

S.No.	Option & Description
1	**activate (index)** Selects the line specifies by the given index.
2	**curselection()** Returns a tuple containing the line numbers of the selected element or elements, counting from 0. If nothing is selected, returns an empty tuple.
3	**delete (first, last = None)** Deletes the lines whose indices are in the range [first, last]. If the second argument is omitted, the single line with index first is deleted.
4	**get (first, last = None)** Returns a tuple containing the text of the lines with indices from first to last, inclusive. If the second argument is omitted, returns the text of the line closest to first.

5	**index (i)** If possible, positions the visible part of the listbox so that the line containing index i is at the top of the widget.
6	**insert (index, *elements)** Insert one or more new lines into the listbox before the line specified by index. Use END as the first argument if you want to add new lines to the end of the listbox.
7	**nearest (y)** Return the index of the visible line closest to the y-coordinate y relative to the listbox widget.
8	**see (index)** Adjust the position of the listbox so that the line referred to by index is visible.
9	**size()** Returns the number of lines in the listbox.
10	**xview()** To make the listbox horizontally scrollable, set the command option of the associated horizontal scrollbar to this method.
11	**xview_moveto (fraction)** Scroll the listbox so that the leftmost fraction of the width of its longest line is outside the left side of the listbox. Fraction is in the range [0,1].
12	**xview_scroll (number, what)** Scrolls the listbox horizontally. For the what argument, use either UNITS to scroll by characters, or PAGES to scroll by pages, that is, by the width of the listbox. The number argument tells how many to scroll.
13	**yview()** To make the listbox vertically scrollable, set the command option of the associated vertical scrollbar to this method.
14	**yview_moveto (fraction)** Scroll the listbox so that the top fraction of the width of its longest line is outside the left side of the listbox. Fraction is in the range [0,1].
15	**yview_scroll (number, what)** Scrolls the listbox vertically. For the what argument, use either UNITS to scroll by lines, or PAGES to scroll by pages, that is, by the height of the listbox. The number argument tells how many to scroll.

```
from tkinter import *

top = Tk()

Lb1 = Listbox(top)
Lb1.insert(1, "Python")
Lb1.insert(2, "C")
Lb1.insert(3, "C++")
Lb1.insert(4, "PHP")
Lb1.insert(5, "JAVA")


Lb1.pack()
top.mainloop()
```

Tkinter Menubutton

A menubutton is the part of a drop-down menu that stays on the screen all the time. Every menubutton is associated with a Menu widget that can display the choices for that menubutton when the user clicks on it.

Syntax

Here is the simple syntax to create this widget −

```
w = Menubutton ( master, option, ... )
```

Parameters

- **master** − This represents the parent window.
- **options** − Here is the list of most commonly used options for this widget. These options can be used as key-value pairs separated by commas.

S.No.	Option & Description
1	**activebackground** The background color when the mouse is over the menubutton.
2	**activeforeground** The foreground color when the mouse is over the menubutton.
3	**anchor**

	This options controls where the text is positioned if the widget has more space than the text needs. The default is anchor = CENTER, which centers the text.
4	**bg** The normal background color displayed behind the label and indicator.
5	**bitmap** To display a bitmap on the menubutton, set this option to a bitmap name.
6	**bd** The size of the border around the indicator. Default is 2 pixels.
7	**cursor** The cursor that appears when the mouse is over this menubutton.
8	**direction** Set direction = LEFT to display the menu to the left of the button; use direction = RIGHT to display the menu to the right of the button; or use direction = 'above' to place the menu above the button.
9	**disabledforeground** The foreground color shown on this menubutton when it is disabled.
10	**fg** The foreground color when the mouse is not over the menubutton.
11	**height** The height of the menubutton in lines of text (not pixels!). The default is to fit the menubutton's size to its contents.
12	**highlightcolor** Color shown in the focus highlight when the widget has the focus.
13	**image** To display an image on this menubutton,
14	**justify** This option controls where the text is located when the text doesn't fill the menubutton: use justify = LEFT to left-justify the text (this is the default); use justify = CENTER to center it, or justify = RIGHT to right-justify.
15	**menu** To associate the menubutton with a set of choices, set this option to the Menu object containing those choices. That menu object must have been

	created by passing the associated menubutton to the constructor as its first argument.
16	**padx** How much space to leave to the left and right of the text of the menubutton. Default is 1.
17	**pady** How much space to leave above and below the text of the menubutton. Default is 1.
18	**relief** Selects three-dimensional border shading effects. The default is RAISED.
19	**state** Normally, menubuttons respond to the mouse. Set state = DISABLED to gray out the menubutton and make it unresponsive.
20	**text** To display text on the menubutton, set this option to the string containing the desired text. Newlines ("\n") within the string will cause line breaks.
21	**textvariable** You can associate a control variable of class StringVar with this menubutton. Setting that control variable will change the displayed text.
22	**underline** Normally, no underline appears under the text on the menubutton. To underline one of the characters, set this option to the index of that character.
23	**width** The width of the widget in characters. The default is 20.
24	**wraplength** Normally, lines are not wrapped. You can set this option to a number of characters and all lines will be broken into pieces no longer than that number.

Code

```
from tkinter import *

top = Tk()

mb =  Menubutton ( top, text = "Menu Top", relief = RAISED )
mb.grid()
mb.menu  =  Menu ( mb, tearoff = 0 )
mb["menu"]  =  mb.menu

option1  = IntVar()
option2   = IntVar()

mb.menu.add_checkbutton ( label = "option1",
                    variable = option1 )
mb.menu.add_checkbutton ( label = "option2",
                    variable = option2 )
mb.getvar(option1.get())

mb.pack()
top.mainloop()
```

Tkinter Menu

The goal of this widget is to allow us to create all kinds of menus that can be used by our applications. The core functionality provides ways to create three menu types: pop-up, toplevel and pull-down.
It is also possible to use other extended widgets to implement new types of menus, such as the *OptionMenu* widget, which implements a special type that generates a pop-up list of items within a selection.

Syntax

Here is the simple syntax to create this widget −

```
w = Menu ( master, option, ... )
```

Parameters

- **master** − This represents the parent window.
- **options** − Here is the list of most commonly used options for this widget. These options can be used as key-value pairs separated by commas.

S.No.	Option & Description
1	**activebackground** The background color that will appear on a choice when it is under the mouse.
2	**activeborderwidth** Specifies the width of a border drawn around a choice when it is under the mouse. Default is 1 pixel.
3	**activeforeground** The foreground color that will appear on a choice when it is under the mouse.
4	**bg** The background color for choices not under the mouse.
5	**bd** The width of the border around all the choices. Default is 1.
6	**cursor** The cursor that appears when the mouse is over the choices, but only when the menu has been torn off.
7	**disabledforeground**

	The color of the text for items whose state is DISABLED.
8	**font** The default font for textual choices.
9	**fg** The foreground color used for choices not under the mouse.
10	**postcommand** You can set this option to a procedure, and that procedure will be called every time someone brings up this menu.
11	**relief** The default 3-D effect for menus is relief = RAISED.
12	**image** To display an image on this menubutton.
13	**selectcolor** Specifies the color displayed in checkbuttons and radiobuttons when they are selected.
14	**tearoff** Normally, a menu can be torn off, the first position (position 0) in the list of choices is occupied by the tear-off element, and the additional choices are added starting at position 1. If you set tearoff = 0, the menu will not have a tear-off feature, and choices will be added starting at position 0.
15	**title** Normally, the title of a tear-off menu window will be the same as the text of the menubutton or cascade that lead to this menu. If you want to change the title of that window, set the title option to that string.

Methods

These methods are available on Menu objects −

S.No.	Option & Description
1	**add_command (options)** Adds a menu item to the menu.
2	**add_radiobutton(options)** Creates a radio button menu item.
3	**add_checkbutton(options)**

	Creates a check button menu item.
4	**add_cascade(options)** Creates a new hierarchical menu by associating a given menu to a parent menu
5	**add_separator()** Adds a separator line to the menu.
6	**add(type, options)** Adds a specific type of menu item to the menu.
7	**delete(startindex [, endindex])** Deletes the menu items ranging from startindex to endindex.
8	**entryconfig(index, options)** Allows you to modify a menu item, which is identified by the index, and change its options.
9	**index(item)** Returns the index number of the given menu item label.
10	**insert_separator (index)** Insert a new separator at the position specified by index.
11	**invoke (index)** Calls the command callback associated with the choice at position index. If a checkbutton, its state is toggled between set and cleared; if a radiobutton, that choice is set.
12	type (index) Returns the type of the choice specified by index: either "cascade", "checkbutton", "command", "radiobutton", "separator", or "tearoff".

Code
```
from tkinter import *
def donothing():
  filewin = Toplevel(root)
  button = Button(filewin, text="Do nothing button")
  button.pack()

root = Tk()
menubar = Menu(root)
filemenu = Menu(menubar, tearoff = 0)
filemenu.add_command(label="New", command = donothing)
filemenu.add_command(label = "Open", command = donothing)
filemenu.add_command(label = "Save", command = donothing)
filemenu.add_command(label = "Save as...", command = donothing)
filemenu.add_command(label = "Close", command = donothing)

filemenu.add_separator()

filemenu.add_command(label = "Exit", command = root.quit)
menubar.add_cascade(label = "File", menu = filemenu)
editmenu = Menu(menubar, tearoff=0)
editmenu.add_command(label = "Undo", command = donothing)

editmenu.add_separator()

editmenu.add_command(label = "Cut", command = donothing)
editmenu.add_command(label = "Copy", command = donothing)
editmenu.add_command(label = "Paste", command = donothing)
editmenu.add_command(label = "Delete", command = donothing)
editmenu.add_command(label = "Select All", command = donothing)

menubar.add_cascade(label = "Edit", menu = editmenu)
helpmenu = Menu(menubar, tearoff=0)
helpmenu.add_command(label = "Help Index", command = donothing)
helpmenu.add_command(label = "About...", command = donothing)
menubar.add_cascade(label = "Help", menu = helpmenu)

root.config(menu = menubar)
root.mainloop()
```

Tkinter Radiobutton

This widget implements a multiple-choice button, which is a way to offer many possible selections to the user and lets user choose only one of them. In order to implement this functionality, each group of radiobuttons must be associated to the same variable and each one of the buttons must symbolize a single value. You can use the Tab key to switch from one radionbutton to another.

Syntax

Here is the simple syntax to create this widget −

```
w = Radiobutton ( master, option, ...  )
```

Parameters

- **master** − This represents the parent window.
- **options** − Here is the list of most commonly used options for this widget. These options can be used as key-value pairs separated by commas.

S.No.	Option & Description
1	**activebackground** The background color when the mouse is over the radiobutton.
2	**activeforeground** The foreground color when the mouse is over the radiobutton.
3	**anchor** If the widget inhabits a space larger than it needs, this option specifies where the radiobutton will sit in that space. The default is anchor = CENTER.
4	**bg** The normal background color behind the indicator and label.
5	**bitmap** To display a monochrome image on a radiobutton, set this option to a bitmap.
6	**borderwidth** The size of the border around the indicator part itself. Default is 2 pixels.
7	**command** A procedure to be called every time the user changes the state of this radiobutton.

8	**cursor** If you set this option to a cursor name (*arrow, dot etc.*), the mouse cursor will change to that pattern when it is over the radiobutton.
9	**font** The font used for the text.
10	**fg** The color used to render the text.
11	**height** The number of lines (not pixels) of text on the radiobutton. Default is 1.
12	**highlightbackground** The color of the focus highlight when the radiobutton does not have focus.
13	**highlightcolor** The color of the focus highlight when the radiobutton has the focus.
14	**image** To display a graphic image instead of text for this radiobutton, set this option to an image object.
15	**justify** If the text contains multiple lines, this option controls how the text is justified: CENTER (the default), LEFT, or RIGHT.
16	**padx** How much space to leave to the left and right of the radiobutton and text. Default is 1.
17	**pady** How much space to leave above and below the radiobutton and text. Default is 1.
18	**relief** Specifies the appearance of a decorative border around the label. The default is FLAT; for other values.
19	**selectcolor** The color of the radiobutton when it is set. Default is red.
20	**selectimage**

	If you are using the image option to display a graphic instead of text when the radiobutton is cleared, you can set the selectimage option to a different image that will be displayed when the radiobutton is set.
21	**state** The default is state = NORMAL, but you can set state = DISABLED to gray out the control and make it unresponsive. If the cursor is currently over the radiobutton, the state is ACTIVE.
22	**text** The label displayed next to the radiobutton. Use newlines ("\n") to display multiple lines of text.
23	**textvariable** To slave the text displayed in a label widget to a control variable of class *StringVar*, set this option to that variable.
24	**underline** You can display an underline (_) below the nth letter of the text, counting from 0, by setting this option to n. The default is underline = -1, which means no underlining.
25	**value** When a radiobutton is turned on by the user, its control variable is set to its current value option. If the control variable is an *IntVar*, give each radiobutton in the group a different integer value option. If the control variable is a *StringVar*, give each radiobutton a different string value option.
26	**variable** The control variable that this radiobutton shares with the other radiobuttons in the group. This can be either an IntVar or a StringVar.
27	**width** Width of the label in characters (not pixels!). If this option is not set, the label will be sized to fit its contents.
28	**wraplength** You can limit the number of characters in each line by setting this option to the desired number. The default value, 0, means that lines will be broken only at newlines.

Methods

S.No.	Method & Description

1	**deselect()** Clears (turns off) the radiobutton.
2	**flash()** Flashes the radiobutton a few times between its active and normal colors, but leaves it the way it started.
3	**invoke()** You can call this method to get the same actions that would occur if the user clicked on the radiobutton to change its state.
4	**select()** Sets (turns on) the radiobutton

Code

```
from tkinter import *

def sel():
   selection = "You selected the option " + str(var.get())
   label.config(text = selection)

root = Tk()
var = IntVar()
R1 = Radiobutton(root, text = "Option 1", variable = var, value = 1,
              command = sel)
R1.pack( anchor = W )

R2 = Radiobutton(root, text = "Option 2", variable = var, value = 2,
              command = sel)
R2.pack( anchor = W )

R3 = Radiobutton(root, text = "Option 3", variable = var, value = 3,
              command = sel)
R3.pack( anchor = W)

label = Label(root)
label.pack()
root.mainloop()
```

Tkinter Scale

The Scale widget provides a graphical slider object that allows you to select values from a specific scale.

Syntax

Here is the simple syntax to create this widget −

```
w = Scale ( master, option, ... )
```

Parameters

- **master** − This represents the parent window.
- **options** − Here is the list of most commonly used options for this widget. These options can be used as key-value pairs separated by commas.

S.No.	Option & Description
1	**activebackground** The background color when the mouse is over the scale.
2	**bg** The background color of the parts of the widget that are outside the trough.
3	**bd** Width of the 3-d border around the trough and slider. Default is 2 pixels.
4	**command** A procedure to be called every time the slider is moved. This procedure will be passed one argument, the new scale value. If the slider is moved rapidly, you may not get a callback for every possible position, but you'll certainly get a callback when it settles.
5	**cursor** If you set this option to a cursor name (*arrow, dot etc.*), the mouse cursor will change to that pattern when it is over the scale.
6	**digits** The way your program reads the current value shown in a scale widget is through a control variable. The control variable for a scale can be an IntVar, a DoubleVar (float), or a StringVar. If it is a string variable, the digits option controls how many digits to use when the numeric scale value is converted to a string.
7	**font** The font used for the label and annotations.
8	**fg** The color of the text used for the label and annotations.

9	**from_** A float or integer value that defines one end of the scale's range.
10	**highlightbackground** The color of the focus highlight when the scale does not have focus.
11	**highlightcolor** The color of the focus highlight when the scale has the focus.
12	**label** You can display a label within the scale widget by setting this option to the label's text. The label appears in the top left corner if the scale is horizontal, or the top right corner if vertical. The default is no label.
13	**length** The length of the scale widget. This is the x dimension if the scale is horizontal, or the y dimension if vertical. The default is 100 pixels.
14	**orient** Set orient = HORIZONTAL if you want the scale to run along the x dimension, or orient = VERTICAL to run parallel to the y-axis. Default is horizontal.
15	**relief** Specifies the appearance of a decorative border around the label. The default is FLAT; for other values.
16	**repeatdelay** This option controls how long button 1 has to be held down in the trough before the slider starts moving in that direction repeatedly. Default is repeatdelay = 300, and the units are milliseconds.
17	**resolution** Normally, the user will only be able to change the scale in whole units. Set this option to some other value to change the smallest increment of the scale's value. For example, if from_ = -1.0 and to = 1.0, and you set resolution = 0.5, the scale will have 5 possible values: -1.0, -0.5, 0.0, +0.5, and +1.0.
18	**showvalue** Normally, the current value of the scale is displayed in text form by the slider (above it for horizontal scales, to the left for vertical scales). Set this option to 0 to suppress that label.
19	**sliderlength**

	Normally the slider is 30 pixels along the length of the scale. You can change that length by setting the sliderlength option to your desired length.
20	**state** Normally, scale widgets respond to mouse events, and when they have the focus, also keyboard events. Set state = DISABLED to make the widget unresponsive.
21	**takefocus** Normally, the focus will cycle through scale widgets. Set this option to 0 if you don't want this behavior.
22	tickinterval To display periodic scale values, set this option to a number, and ticks will be displayed on multiples of that value. For example, if from_ = 0.0, to = 1.0, and tickinterval = 0.25, labels will be displayed along the scale at values 0.0, 0.25, 0.50, 0.75, and 1.00. These labels appear below the scale if horizontal, to its left if vertical. Default is 0, which suppresses display of ticks.
23	**to** A float or integer value that defines one end of the scale's range; the other end is defined by the from_ option, discussed above. The to value can be either greater than or less than the from_ value. For vertical scales, the to value defines the bottom of the scale; for horizontal scales, the right end.
24	**troughcolor** The color of the trough.
25	**variable** The control variable for this scale, if any. Control variables may be from class IntVar, DoubleVar (float), or StringVar. In the latter case, the numerical value will be converted to a string.
26	**width** The width of the trough part of the widget. This is the x dimension for vertical scales and the y dimension if the scale has orient = HORIZONTAL. Default is 15 pixels.

Methods

Scale objects have these methods −

S.No.	Method & Description
get()	This method returns the current value of the scale.

set (value)	Sets the scale's value.

Code:

```
from tkinter import *

def sel():
   selection = "Value = " + str(var.get())
   label.config(text = selection)

root = Tk()
var = DoubleVar()
scale = Scale( root, variable = var )
scale.pack(anchor = CENTER)

button = Button(root, text = "Get Scale Value", command = sel)
button.pack(anchor = CENTER)

label = Label(root)
label.pack()

root.mainloop()
```

Tkinter Scrollbar

This widget provides a slide controller that is used to implement vertical scrolled widgets, such as Listbox, Text and Canvas. Note that you can also create horizontal scrollbars on Entry widgets.

Syntax

Here is the simple syntax to create this widget −

```
w = Scrollbar ( master, option, ... )
```

Parameters

- **master** − This represents the parent window.
- **options** − Here is the list of most commonly used options for this widget. These options can be used as key-value pairs separated by commas.

S.No.	Option & Description
1	**activebackground** The color of the slider and arrowheads when the mouse is over them.
2	**bg** The color of the slider and arrowheads when the mouse is not over them.
3	**bd** The width of the 3-d borders around the entire perimeter of the trough, and also the width of the 3-d effects on the arrowheads and slider. Default is no border around the trough, and a 2-pixel border around the arrowheads and slider.
4	**command** A procedure to be called whenever the scrollbar is moved.
5	**cursor** The cursor that appears when the mouse is over the scrollbar.
6	**elementborderwidth** The width of the borders around the arrowheads and slider. The default is elementborderwidth = -1, which means to use the value of the borderwidth option.
7	**highlightbackground** The color of the focus highlight when the scrollbar does not have focus.
8	**highlightcolor** The color of the focus highlight when the scrollbar has the focus.
9	**highlightthickness**

	The thickness of the focus highlight. Default is 1. Set to 0 to suppress display of the focus highlight.
10	**jump** This option controls what happens when a user drags the slider. Normally (jump = 0), every small drag of the slider causes the command callback to be called. If you set this option to 1, the callback isn't called until the user releases the mouse button.
11	**orient** Set orient = HORIZONTAL for a horizontal scrollbar, orient = VERTICAL for a vertical one.
12	**repeatdelay** This option controls how long button 1 has to be held down in the trough before the slider starts moving in that direction repeatedly. Default is repeatdelay = 300, and the units are milliseconds.
13	**repeatinterval** repeatinterval
14	**takefocus** Normally, you can tab the focus through a scrollbar widget. Set takefocus = 0 if you don't want this behavior.
15	**troughcolor** The color of the trough.
16	**width** Width of the scrollbar (its y dimension if horizontal, and its x dimension if vertical). Default is 16.

Methods

Scrollbar objects have these methods −

S.No.	Method & Description
1	**get()** Returns two numbers (a, b) describing the current position of the slider. The a value gives the position of the left or top edge of the slider, for horizontal and vertical scrollbars respectively; the b value gives the position of the right or bottom edge.
2	**set (first, last)**

	To connect a scrollbar to another widget w, set w's xscrollcommand or yscrollcommand to the scrollbar's set() method. The arguments have the same meaning as the values returned by the get() method.

Code:

```
from tkinter import *

root = Tk()
scrollbar = Scrollbar(root)
scrollbar.pack( side = RIGHT, fill = Y )

mylist = Listbox(root, yscrollcommand = scrollbar.set )
for line in range(100):
   mylist.insert(END, "This is line number " + str(line))

mylist.pack( side = LEFT, fill = BOTH )
scrollbar.config( command = mylist.yview )

mainloop()
```

Tkinter Text

Text widgets provide advanced capabilities that allow you to edit a multiline text and format the way it has to be displayed, such as changing its color and font.

You can also use elegant structures like tabs and marks to locate specific sections of the text, and apply changes to those areas. Moreover, you can embed windows and images in the text because this widget was designed to handle both plain and formatted text.

Syntax

Here is the simple syntax to create this widget −

```
w = Text ( master, option, ... )
```

Parameters

- **master** − This represents the parent window.
- **options** − Here is the list of most commonly used options for this widget. These options can be used as key-value pairs separated by commas.

S.No.	Option & Description
1	**bg**

	The default background color of the text widget.
2	**bd** The width of the border around the text widget. Default is 2 pixels.
3	**cursor** The cursor that will appear when the mouse is over the text widget.
4	**exportselection** Normally, text selected within a text widget is exported to be the selection in the window manager. Set exportselection = 0 if you don't want that behavior.
5	**font** The default font for text inserted into the widget.
6	**fg** The color used for text (and bitmaps) within the widget. You can change the color for tagged regions; this option is just the default.
7	**height** The height of the widget in lines (not pixels!), measured according to the current font size.
8	**highlightbackground** The color of the focus highlight when the text widget does not have focus.
9	**highlightcolor** The color of the focus highlight when the text widget has the focus.
10	**highlightthickness** The thickness of the focus highlight. Default is 1. Set highlightthickness = 0 to suppress display of the focus highlight.
11	**insertbackground** The color of the insertion cursor. Default is black.
12	**insertborderwidth** Size of the 3-D border around the insertion cursor. Default is 0.
13	**insertofftime** The number of milliseconds the insertion cursor is off during its blink cycle. Set this option to zero to suppress blinking. Default is 300.
14	**insertontime**

	The number of milliseconds the insertion cursor is on during its blink cycle. Default is 600.
15	**insertwidth** Width of the insertion cursor (its height is determined by the tallest item in its line). Default is 2 pixels.
16	**padx** The size of the internal padding added to the left and right of the text area. Default is one pixel.
17	**pady** The size of the internal padding added above and below the text area. Default is one pixel.
18	**relief** The 3-D appearance of the text widget. Default is relief = SUNKEN.
19	**selectbackground** The background color to use displaying selected text.
20	**selectborderwidth** The width of the border to use around selected text.
21	**spacing1** This option specifies how much extra vertical space is put above each line of text. If a line wraps, this space is added only before the first line it occupies on the display. Default is 0.
22	**spacing2** This option specifies how much extra vertical space to add between displayed lines of text when a logical line wraps. Default is 0.
23	**spacing3** This option specifies how much extra vertical space is added below each line of text. If a line wraps, this space is added only after the last line it occupies on the display. Default is 0.
24	**state** Normally, text widgets respond to keyboard and mouse events; set state = NORMAL to get this behavior. If you set state = DISABLED, the text widget will not respond, and you won't be able to modify its contents programmatically either.
25	**tabs**

	This option controls how tab characters position text.
26	**width** The width of the widget in characters (not pixels!), measured according to the current font size.
27	**wrap** This option controls the display of lines that are too wide. Set wrap = WORD and it will break the line after the last word that will fit. With the default behavior, wrap = CHAR, any line that gets too long will be broken at any character.
28	**xscrollcommand** To make the text widget horizontally scrollable, set this option to the set() method of the horizontal scrollbar.
29	**yscrollcommand** To make the text widget vertically scrollable, set this option to the set() method of the vertical scrollbar.

Methods

Text objects have these methods −

S.No.	Method & Description
1	**delete(startindex [,endindex])** This method deletes a specific character or a range of text.
2	**get(startindex [,endindex])** This method returns a specific character or a range of text.
3	**index(index)** Returns the absolute value of an index based on the given index.
4	**insert(index [,string]...)** This method inserts strings at the specified index location.
5	**see(index)** This method returns true if the text located at the index position is visible.

Text widgets support three distinct helper structures: Marks, Tabs, and Indexes:

Marks are used to bookmark positions between two characters within a given text. We have the following methods available when handling marks −

S.No.	Method & Description
1	**index(mark)** Returns the line and column location of a specific mark.
2	**mark_gravity(mark [,gravity])** Returns the gravity of the given mark. If the second argument is provided, the gravity is set for the given mark.
3	**mark_names()** Returns all marks from the Text widget.
4	**mark_set(mark, index)** Informs a new position to the given mark.
5	**mark_unset(mark)** Removes the given mark from the Text widget.

Tags are used to associate names to regions of text which makes easy the task of modifying the display settings of specific text areas. Tags are also used to bind event callbacks to specific ranges of text.
Following are the available methods for handling tabs −

S.No.	Method & Description
1	**tag_add(tagname, startindex[,endindex] ...)** This method tags either the position defined by startindex, or a range delimited by the positions startindex and endindex.
2	**tag_config** You can use this method to configure the tag properties, which include, justify(center, left, or right), tabs(this property has the same functionality of the Text widget tabs's property), and underline(used to underline the tagged text).
3	**tag_delete(tagname)** This method is used to delete and remove a given tag.
4	**tag_remove(tagname [,startindex[.endindex]] ...)** After applying this method, the given tag is removed from the provided area without deleting the actual tag definition.

Code:

```
from tkinter import *

root = Tk()
```

```
text = Text(root)
text2= Text(root)
text.insert(INSERT, "First words.....")
text.insert(END, "Last words")
text2.insert(INSERT, "Second words.....")
text2.insert(END, "Last words")
text.pack()
text2.pack()
text.tag_add("start", "1.0", "1.5")
text.tag_add("end", "1.8", "1.13")
text.tag_config("start", background = "yellow", foreground = "blue")
text.tag_config("end", background = "black", foreground = "green")
root.mainloop()
```

Tkinter Toplevel

Toplevel widgets work as windows that are directly managed by the window manager. They do not necessarily have a parent widget on top of them.
Your application can use any number of top-level windows.

Syntax

Here is the simple syntax to create this widget −

```
w = Toplevel ( option, ... )
```

Parameters

options − Here is the list of most commonly used options for this widget. These options can be used as key-value pairs separated by commas.

S.No.	Option & Description
1	**bg** The background color of the window.
2	**bd** Border width in pixels; default is 0.
3	**cursor** The cursor that appears when the mouse is in this window.
4	**class_**

	Normally, text selected within a text widget is exported to be the selection in the window manager. Set exportselection = 0 if you don't want that behavior.
5	**font** The default font for text inserted into the widget.
6	**fg** The color used for text (and bitmaps) within the widget. You can change the color for tagged regions; this option is just the default.
7	**height** Window height.
8	**relief** Normally, a top-level window will have no 3-d borders around it. To get a shaded border, set the bd option larger that its default value of zero, and set the relief option to one of the constants.
9	**width** The desired width of the window.

Methods

Toplevel objects have these methods −

S.No.	Methods and Description
1	**deiconify()** Displays the window, after using either the iconify or the withdraw methods.
2	**frame()** Returns a system-specific window identifier.
3	**group(window)** Adds the window to the window group administered by the given window.
4	**iconify()** Turns the window into an icon, without destroying it.
5	**protocol(name, function)** Registers a function as a callback which will be called for the given protocol.
6	**iconify()** Turns the window into an icon, without destroying it.

7	**state()** Returns the current state of the window. Possible values are normal, iconic, withdrawn and icon.
8	**transient([master])** Turns the window into a temporary(transient) window for the given master or to the window's parent, when no argument is given.
9	**withdraw()** Removes the window from the screen, without destroying it.
10	**maxsize(width, height)** Defines the maximum size for this window.
11	**minsize(width, height)** Defines the minimum size for this window.
12	**positionfrom(who)** Defines the position controller.
13	**resizable(width, height)** Defines the resize flags, which control whether the window can be resized.
14	**sizefrom(who)** Defines the size controller.
15	**title(string)** Defines the window title.

Example

Try following example yourself −

Code:

```
from tkinter import *

root = Tk()
root.title("Hello")
top = Toplevel()
top.title("Challo")
top.mainloop()
```

Tkinter Spinbox

The Spinbox widget is a variant of the standard Tkinter Entry widget, which can be used to select from a fixed number of values.

Syntax

Here is the simple syntax to create this widget −

```
w = Spinbox( master, option, ... )
```

Parameters

- **master** − This represents the parent window.
- **options** − Here is the list of most commonly used options for this widget. These options can be used as key-value pairs separated by commas.

S.No.	Option & Description
1	**activebackground** The color of the slider and arrowheads when the mouse is over them.
2	**bg** The color of the slider and arrowheads when the mouse is not over them.
3	**bd** The width of the 3-d borders around the entire perimeter of the trough, and also the width of the 3-d effects on the arrowheads and slider. Default is no border around the trough, and a 2-pixel border around the arrowheads and slider.
4	**command** A procedure to be called whenever the scrollbar is moved.
5	**cursor** The cursor that appears when the mouse is over the scrollbar.
6	disabledbackground The background color to use when the widget is disabled.
7	**disabledforeground** The text color to use when the widget is disabled.
8	**fg** Text color.
9	**font**

	The font to use in this widget.
10	**format** Format string. No default value.
11	**from_** The minimum value. Used together with to to limit the spinbox range.
12	**justify** Default is LEFT
13	**relief** Default is SUNKEN.
14	**repeatdelay** Together with repeatinterval, this option controls button auto-repeat. Both values are given in milliseconds.
15	**repeatinterval** See repeatdelay.
16	**state** One of NORMAL, DISABLED, or "readonly". Default is NORMAL.
17	**textvariable** No default value.
18	**to** See from.
19	**validate** Validation mode. Default is NONE.
20	**validatecommand** Validation callback. No default value.
21	**values** A tuple containing valid values for this widget. Overrides from/to/increment.
22	**vcmd** Same as validatecommand.
23	**width** Widget width, in character units. Default is 20.

24	**wrap** If true, the up and down buttons will wrap around.
25	**xscrollcommand** Used to connect a spinbox field to a horizontal scrollbar. This option should be set to the set method of the corresponding scrollbar.

Methods

Spinbox objects have these methods −

S.No.	Methods and Description
1	**delete(startindex [,endindex])** This method deletes a specific character or a range of text.
2	**get(startindex [,endindex])** This method returns a specific character or a range of text.
3	**identify(x, y)** Identifies the widget element at the given location.
4	**index(index)** Returns the absolute value of an index based on the given index.
5	**insert(index [,string]...)** This method inserts strings at the specified index location.
6	**invoke(element)** Invokes a spinbox button.

Code:
```
from tkinter import *

top = Tk()

w = Spinbox(top, from_= 0,to = 10)
w.pack()
top.mainloop()
```

tkMessageBox

The tkMessageBox module is used to display message boxes in your applications. This module provides a number of functions that you can use to display an appropriate message.
Some of these functions are showinfo, showwarning, showerror, askquestion, askokcancel, askyesno, and askretryignore.

Syntax

Here is the simple syntax to create this widget −

```
tkMessageBox.FunctionName(title, message [, options])
```

Parameters

- **FunctionName** − This is the name of the appropriate message box function.
- **title** − This is the text to be displayed in the title bar of a message box.
- **message** − This is the text to be displayed as a message.
- **options** − options are alternative choices that you may use to tailor a standard message box. Some of the options that you can use are default and parent. The default option is used to specify the default button, such as ABORT, RETRY, or IGNORE in the message box. The parent option is used to specify the window on top of which the message box is to be displayed.

You could use one of the following functions with dialogue box −

- showinfo()
- showwarning()
- showerror ()
- askquestion()
- askokcancel()
- askyesno ()
- askretrycancel ()

code:

```
from tkinter import *

from tkinter import messagebox

top = Tk()
top.geometry("100x100")
def hello():
  messagebox.showinfo("Say Hello", "Hello World")
  return
B1 = Button(top, text = "Say Hello", command = hello)
B1.place(x = 35,y = 50)
top.mainloop()
```

Event Handling

Event sources (widgets) can specify their handlers

• command handlers

• callbacks

Command Handlers use the 'command=' keyword followed by the command you want executed
Code:

• A callback is the name of the function that is to be run in response of an event

• Callbacks can be defined as a free standing function in our program or as a class member.