An Introduction to Tkinter

Fredrik Lundh

An Introduction to Tkinter
by Fredrik Lundh

Table of Contents

Preface

This is yet another snapshot of my continously growing Tkinter documentation.

If you like this book, you might be interested in hearing that O'Reilly & Associates (http:// www.ora.com) will be publishing a Tkinter book (tentatively called *Programming Tkinter in Python*) in a not too distant future. This book features lots of brand new material written by yours truly, giving you a more thorough description of Tkinter (and many other things) than you can find anywhere else.

</F>

(last update: Oct 05, 1999)

I. Introducing Tkinter

The first few chapters in this book provide a brief introduction to Tkinter. After reading this, you should have a fair grasp of the Tkinter fundamentals.

Chapter 1. What's Tkinter?

The *Tkinter* module ("Tk interface") is the standard Python interface to the Tk GUI toolkit from Scriptics (http:// www.scriptics.com) (formerly developed by Sun Labs).

Both Tk and Tkinter are available on most Unix platforms, as well as on Windows and Macintosh systems. Starting with the 8.0 release, Tk offers native look and feel on all platforms.

Tkinter consists of a number of modules. The Tk interface is located in a binary module named _tkinter (this was tkinter in earlier versions). This module contains the low-level interface to Tk, and should never be used directly by application programmers. It is usually a shared library (or DLL), but might in some cases be statically linked with the Python interpreter.

In addition to the Tk interface module, Tkinter includes a number of Python modules. The two most important modules are the Tkinter module itself, and a module called Tkconstants. The former automatically imports the latter, so to use Tkinter, all you need to do is to import one module:

```
import Tkinter
```

Or, more often:

```
from Tkinter import *
```


Chapter 2. Hello, Tkinter

But enough talk. Time to look at some code instead.

As you know, every serious tutorial should start with a "hello world"-type example. In this overview, we'll show you not only one such example, but two.

First, let's look at a pretty minimal version:

Example 2-1. Our First Tkinter Program

```
# File: hello1.py

from Tkinter import *

root = Tk()

w = Label(root, text="Hello, world!")
w.pack()

root.mainloop()
```

Running the Example

To run the program, run the script as usual:

```
$ python hello1.py
```

The following window appears.

Figure 2-1. Running the program

To stop the program, just close the window.

Details

We start by importing the Tkinter module. It contains all classes, functions and other things needed to work with the Tk toolkit. In most cases, you can simply import everything from Tkinter into your module's namespace:

```
from Tkinter import *
```

To initialize Tkinter, we have to create a Tk *root* widget. This is an ordinary window, with a title bar and other decoration provided by your window manager. You should only create one root widget for each program, and it must be created before any other widgets.

```
root = Tk()
```

Next, we create a Label widget as a child to the root window:

```
w = Label(root, text="Hello, world!")
w.pack()
```

A Label widget can display either text or an icon or other image. In this case, we use the text option to specify which text to display. Next, we call the pack method on this widget, which tells it to size itself to fit the given text, and make itself visible. But before this happens, we have to enter the Tkinter event loop:

```
root.mainloop()
```

The program will stay in the event loop until we close the window. The event loop doesn't only handle events from the user (such as mouse clicks and key presses) or the windowing system (such as redraw events and window configuration messages), it also handle operations queued by Tkinter itself. Among these operations are geometry management (queued by the pack method) and display updates. This also means that the application window will not appear before you enter the main loop.

Chapter 3. Hello, Again

When you write larger programs, it is usually a good idea to wrap your code up in one or more classes. The following example is adapted from the "hello world" program in Matt Conway's *A Tkinter Life Preserver* (http://www.python.org/docs/tkinter).

Example 3-1. Our Second Tkinter Program

```
# File: hello2.py

from Tkinter import *

class App:

    def __init__(self, master):

        frame = Frame(master)
        frame.pack()

        self.button = Button(frame, text="QUIT", fg="red", command=frame.quit)
        self.button.pack(side=LEFT)

        self.hi_there = Button(frame, text="Hello", command=self.say_hi)
        self.hi_there.pack(side=LEFT)

    def say_hi(self):
        print "hi there, everyone!"

root = Tk()

app = App(root)

root.mainloop()
```

Running the Example

When you run this example, the following window appears.

Figure 3-1. Running the sample program (using Tk 8.0 on a Windows 95 box)

If you click the right button, the text "hi there, everyone!" is printed to the console. If you click the left button, the program stops.

Details

This sample application is written as a class. The constructor (the __init__ method) is called with a parent widget (the master), to which it adds a number of child widgets. The constructor starts by creating a Frame widget. A frame is a simple container, and is in this case only used to hold the other two widgets.

```
class App:
    def __init__(self, master):

        frame = Frame(master)
        frame.pack()
```

The frame instance is stored in a local variable called frame. After creating the widget, we immediately call the pack method to make the frame visible.

We then create two Button widgets, as children to the frame.

```
self.button = Button(frame, text="QUIT", fg="red", command=frame.quit)
self.button.pack(side=LEFT)

self.hi_there = Button(frame, text="Hello", command=self.say_hi)
self.hi_there.pack(side=LEFT)
```

This time, we pass a number of *options* to the constructor, as keyword arguments. The first button is labelled "QUIT", and is made red (fg is short for foreground). The second is labelled "Hello". Both buttons also take a command option. This option specifies a function, or (as in this case) a bound method, which will be called when the button is clicked.

The button instances are stored in instance attributes. They are both packed, but this time with the side=LEFT argument. This means that they will be placed as far left as possible in the frame; the first button is placed at the frame's left edge, and the second is placed just to the right of the first one (at the left edge of the *remaining space* in the frame, that is). By default, widgets are packed relative to their parent (which is master for the frame widget, and the frame itself for the buttons). If the side is not given, it defaults to TOP.

The "hello" button callback is given next. It simply prints a message to the console everytime the button is pressed:

```
def say_hi(self):
    print "hi there, everyone!"
```

Finally, we provide some script level code that creates a Tk root widget, and one instance of the App class using the root widget as its parent:

```
root = Tk()

app = App(root)

root.mainloop()
```


The last call is to the mainloop method on the root widget. It enters the Tk event loop, in which the application will stay until the quit method is called (just click the QUIT button), or the window is closed.

More on widget references

In the second example, the frame widget is stored in a local variable named frame, while the button widgets are stored in two instance attributes. Isn't there a serious problem hidden in here: what happens when the __init__ function returns and the frame variable goes out of scope?

Just relax; there's actually no need to keep a reference to the widget instance. Tkinter automatically maintains a widget tree (via the master and children attributes of each widget instance), so a widget won't disappear when the application's last reference goes away; it must be explicitly destroyed before this happens (using the destroy method). But if you wish to do something with the widget after it has been created, you better keep a reference to the widget instance yourself.

Note that if you don't need to keep a reference to a widget, it might be tempting to create and pack it on a single line:

```
Button(frame, text="Hello", command=self.hello).pack(side=LEFT)
```

Don't store the result from this operation; you'll only get disappointed when you try to use that value (the pack method returns None). To be on the safe side, it might be better to always separate construction from packing:

```
w = Button(frame, text="Hello", command=self.hello)
w.pack(side=LEFT)
```

More on widget names

Another source of confusion, especially for those who have some experience of programming Tk using Tcl, is Tkinter's notion of the *widget name*. In Tcl, you must explicitly name each widget. For example, the following Tcl command creates a Button named "ok", as a child to a widget named "dialog" (which in turn is a child of the root window, ".").

```
button .dialog.ok
```

The corresponding Tkinter call would look like:

```
ok = Button(dialog)
```

However, in the Tkinter case, ok and dialog are references to widget instances, not the actual names of the widgets. Since Tk itself needs the names, Tkinter automatically assigns a unique name to each new widget. In the above case, the dialog name is probably something like ".1428748," and the button could be named ".1428748.1432920". If you wish to get the full name of a Tkinter widget, simply use the str function on the widget instance:

```
>>> print str(ok)
.1428748.1432920
```

(if you print something, Python automatically uses the str function to find out what to print. But obviously, an operation like "name = ok" won't do the that, so make sure always to explicitly use str if you need the name).

If you really need to specify the name of a widget, you can use the name option when you create the widget. One (and most likely the only) reason for this is if you need to interface with code written in Tcl.

In the following example, the resulting widget is named ".dialog.ok" (or, if you forgot to name the dialog, something like ".1428748.ok"):

```
ok = Button(dialog, name="ok")
```

To avoid conflicts with Tkinter's naming scheme, don't use names which only contain digits. Also note that name is a "creation only" option; you cannot change the name once you've created the widget.

Chapter 4. Tkinter Classes

Widget classes

Tkinter supports 15 core widgets:

Table 4-1. Tkinter Widget Classes

Widget	Description
Button	A simple button, used to execute a command or other operation.
Canvas	Structured graphics. This widget can be used to draw graphs and plots, create graphics editors, and to implement custom widgets.
Checkbutton	Represents a variable that can have two distinct values. Clicking the button toggles between the values.
Entry	A text entry field.
Frame	A container widget. The frame can have a border and a background, and is used to group other widgets when creating an application or dialog layout.
Label	Displays a text or an image.
Listbox	Displays a list of alternatives. The listbox can be configured to get radiobutton or checklist behavior.
Menu	A menu pane. Used to implement pulldown and popup menus.
Menubutton	A menubutton. Used to implement pulldown menus.
Message	Display a text. Similar to the label widget, but can automatically wrap text to a given width or aspect ratio.
Radiobutton	Represents one value of a variable that can have one of many values. Clicking the button sets the variable to that value, and clears all other radiobuttons associated with the same variable.
Scale	Allows you to set a numerical value by dragging a "slider".
Scrollbar	Standard scrollbars for use with canvas, entry, listbox, and text widgets.
Text	Formatted text display. Allows you to display and edit text with various styles and attributes. Also supports embedded images and windows.
Toplevel	A container widget displayed as a separate, top-level window.

Also note that there's no widget class hierarchy in Tkinter; all widget classes are siblings in the inheritance tree.

All these widgets provide the Misc and geometry management methods, the configuration management methods, and additional methods defined by the widget itself. In addition, the Toplevel class also provides the window manager interface. This means that a typical widget class provides some 150 methods.

Mixins

The Tkinter module provides classes corresponding to the various widget types in Tk, and a number of mixin and other helper classes (a *mixin* is a class designed to be combined with other classes using multiple inheritance). When you use Tkinter, you should never access the mixin classes directly.

Implementation mixins

The Misc class is used as a mixin by the root window and widget classes. It provides a large number of Tk and window related services, which are thus available for all Tkinter core widgets. This is done by *delegation*; the widget simply forwards the request to the appropriate internal object.

The Wm class is used as a mixin by the root window and Toplevel widget classes. It provides window manager services, also by delegation.

Using delegation like this simplifies your application code: once you have a widget, you can access all parts of Tkinter using methods on the widget instance.

Geometry mixins

The Grid, Pack, and Place classes are used as mixins by the widget classes. They provide access to the various geometry managers, also via delegation.

Table 4-2. Geometry Mixins

Manager	Description
Grid	The grid geometry manager allows you to create table-like layouts, by organizing the widgets in a 2-dimensional grid. To use this geometry manager, use the grid method.
Pack	The pack geometry manager lets you create a layout by "packing" the widgets into a parent widget, by treating them as rectangular blocks placed in a frame. To use this geometry manager for a widget, use the pack method on that widget to set things up.
Place	The place geometry manager lets you explicitly place a widget in a given position. To use this geometry manager, use the place method.

Widget configuration management

The Widget class mixes the Misc class with the geometry mixins, and adds configuration management through the cget and configure methods, as well as through a partial dictionary

interface. The latter can be used to set and query individual options, and is explained in further detail in the next chapter.

Chapter 5. Widget Configuration

To control the appearance of a widget, you usually use *options* rather than method calls. Typical options include text and color, size, command callbacks, etc. To deal with options, all core widgets implement the same configuration interface:

Configuration Interface

widgetclass(master, option=value, ...) ⇒ widget

Create an instance of this widget class, as a child to the given master, and using the given options. All options have default values, so in the simplest case, you only have to specify the master. You can even leave that out if you really want; Tkinter then uses the most recently created root window as master. Note that the name option can only be set when the widget is created.

cget(option) ⇒ string

Return the current value of an option. Both the option name, and the returned value, are strings. To get the name option, use str(widget) instead.

configure(option=value, ...)
config(option=value, ...)

Set one or more options (given as keyword arguments).

Note that some options have names that are reserved words in Python (class, from, ...). To use these as keyword arguments, simply append an underscore to the option name (class_, from_, ...). Note that you cannot set the name option using this method; it can only be set when the widget is created.

For convenience, the widgets also implement a partial dictionary interface. The __setitem__ method maps to configure, while __getitem__ maps to cget. As a result, you can use the following syntax to set and query options:

```
value = widget[option]
widget[option] = value
```

Note that each assignment results in one call to Tk. If you wish to change multiple options, it is usually a better idea to change them with a single call to config or configure (personally, I prefer to always change options in that fashion).

The following dictionary method also works for widgets:

keys() ⇒ list

Return a list of all options that can be set for this widget. The name option is not included in this list (it cannot be queried or modified through the dictionary interface anyway, so this doesn't really matter).

Backwards Compatibility

Keyword arguments were introduced in Python 1.3. Before that, options were passed to the widget constructors and configure methods using ordinary Python dictionaries. The source code could then look something like this:

```
self.button = Button(frame, {"text": "QUIT", "fg": "red", "command": frame.quit})
self.button.pack({"side": LEFT})
```

The keyword argument syntax is of course much more elegant, and less error prone. However, for compatibility with existing code, Tkinter still supports the older syntax. You shouldn't use this syntax in new programs, even if it might be tempting in some cases. For example, if you create a custom widget which needs to pass configuration options along to its parent class, you may come up with something like:

```
def __init__(self, master, **kw):
    Canvas.__init__(self, master, kw) # kw is a dictionary
```

This works just fine with the current version of Tkinter, but it may not work with future versions. A more general approach is to use the apply function:

```
def __init__(self, master, **kw):
    apply(Canvas.__init__, (self, master), kw)
```

The apply function takes a function (an unbound method, in this case), a tuple with arguments (which must include self since we're calling an unbound method), and optionally, a dictionary which provides the keyword arguments.

Chapter 6. Widget Styling

All Tkinter standard widgets provide a basic set of "styling" options, which allow you to modify things like colors, fonts, and other visual aspects of each widget.

Colors

Most widgets allow you to specify the widget and text colors, using the background and foreground options. To specify a color, you can either use a color name, or explicitly specify the red, green, and blue (RGB) color components.

Color Names

Tkinter includes a color database which maps color names to the corresponding RGB values. This database includes common names like Red, Green, Blue, Yellow, and LightBlue, but also more exotic things like Moccasin, PeachPuff, etc.

On an X window system, the color names are defined by the X server. You might be able to locate a file named xrgb.txt which contains a list of color names and the corresponding RGB values. On Windows and Macintosh systems, the color name table is built into Tk.

Under Windows, you can also use the Windows system colors (these can be changed by the user via the control panel):

SystemActiveBorder, SystemActiveCaption, SystemAppWorkspace, SystemBackground, SystemButtonFace, SystemButtonHighlight, SystemButtonShadow, SystemButtonText, SystemCaptionText, SystemDisabledText, SystemHighlight, SystemHighlightText, SystemInactiveBorder, SystemInactiveCaption, SystemInactiveCaptionText, SystemMenu, SystemMenuText, SystemScrollbar, SystemWindow, SystemWindowFrame, SystemWindowText.

On the Macintosh, the following system colors are available:

SystemButtonFace, SystemButtonFrame, SystemButtonText, SystemHighlight, SystemHighlightText, SystemMenu, SystemMenuActive, SystemMenuActiveText, SystemMenuDisabled, SystemMenuText, SystemWindowBody.

Color names are case insensitive. Many (but not all) color names are also available with or without spaces between the words. For example, "lightblue", "light blue", and "Light Blue" all specify the same color.

RGB Specifications

If you need to explicitly specify a color, you can use a string with the following format:

```
#RRGGBB
```

RR, GG, BB are hexadecimal representations of the red, green and blue values, respectively. The following sample shows how you can convert a color 3-tuple to a Tk color specification:

```
tk_rgb = "#%02x%02x%02x" % (128, 192, 200)
```


Tk also supports the forms "#RGB" and "#RRRRGGGGBBBB" to specify each value with 16 and 65536 levels, respectively.

You can use the winfo_rgb widget method to translate a color string (either a name or an RGB specification) to a 3-tuple:

```
rgb = widget.winfo_rgb("red")
red, green, blue = rgb[0]/256, rgb[1]/256, rgb[2]/256
```

Note that winfo_rgb returns 16-bit RGB values, ranging from 0 to 65535. To map them into the more common 0-255 range, you must divide each value by 256 (or shift them 8 bits to the right).

Fonts

Widgets that allow you to display text in one way or another also allows you to specify which font to use. All widgets provide reasonable default values, and you seldom have to specify the font for simpler elements like labels and buttons.

Fonts are usually specifed using the font widget option. Tkinter supports a number of different font descriptor types:

- Font descriptors
- User-defined font names
- System fonts
- X font descriptors

With Tk versions before 8.0, only *X font descriptors* are supported (see below).

Font descriptors

Starting with Tk 8.0, Tkinter supports platform independent font descriptors. You can specify a font as tuple containing a family name, a height in points, and optionally a string with one or more styles. Examples:

```
("Times", 10, "bold")
("Helvetica", 10, "bold italic")
("Symbol", 8)
```

To get the default size and style, you can give the font name as a single string. If the family name doesn't include spaces, you can also add size and styles to the string itself:

```
"Times 10 bold"
"Helvetica 10 bold italic"
"Symbol 8"
```

Here are some families available on most Windows platforms:

Arial (corresponds to Helvetica), Courier New (Courier), Comic Sans MS, Fixedsys, MS Sans Serif, MS Serif, Symbol, System, Times New Roman (Times), and Verdana:

arial 14 points: I'd like to have an argu
courier new 12 points: What? Pri
comic sans ms 8 points: Pack my box with fiven dozen jugs of
fixedsys 9 points: Here you see some En
ms sans Serif 11 points: Pack my box with fiven dozen
ms serif 16 points: The quick brown fox ju
σψμβολ 12 ποιντσ: Φιγυρε τηισ ουτ, ωονδερ βοψ
system 10 points: Hello, Harry. Now there's the
times new roman 16 points: That turni
verdana 10 points: The quick brown fox jumps

Note that if the family name contains spaces, you must use the tuple syntax described above.

The available styles are normal, bold, roman, italic, underline, and overstrike.

Tk 8.0 automatically maps Courier, Helvetica, and Times to their corresponding native family names on all platforms. In addition, a font specification can never fail under Tk 8.0; if Tk cannot come up with an exact match, it tries to find a similar font. If that fails, Tk falls back to a platform-specific default font. Tk's idea of what is "similar enough" probably doesn't correspond to your own view, so you shouldn't rely too much on this feature.

Tk 4.2 under Windows supports this kind of font descriptors as well. There are several restrictions, including that the family name must exist on the platform, and not all the above style names exist (or rather, some of them have different names).

Font names

In addition, Tk 8.0 allows you to create named fonts and use their names when specifying fonts to the widgets.

The tkFont module provides a Font class which allows you to create font instances. You can use such an instance everywhere Tkinter accepts a font specifier. You can also use a font instance to get font metrics, including the size occupied by a given string written in that font.

```
tkFont.Font(family="Times", size=10, weight=tkFont.BOLD)
tkFont.Font(family="Helvetica", size=10, weight=tkFont.BOLD,
        slant=tkFont.ITALIC)
tkFont.Font(family="Symbol", size=8)
```

If you modify a named font (using the config method), the changes are automatically propagated to all widgets using the font.

The Font constructor supports the following style options (note that the constants are defined in the tkFont module):

Table 6-1. Font Style Options

Option	Type	Description
family	string	Font family.
size	integer	Font size in points. To give the size in pixels, use a negative value.
weight	constant	Font thickness. Use one of NORMAL or BOLD. Default is NORMAL.
slant	constant	Font slant. Use one of NORMAL or ITALIC. Default is NORMAL.
underline	flag	Font underlining. If 1 (true), the font is underlined. Default is 0 (false).
overstrike	flag	Font strikeout. If 1 (true), a line is drawn over text written with this font. Default is 0 (false).

System fonts

Tk also supports system specific font names. Under X, these are usually font aliases like fixed, 6x10, etc.

Under Windows, these include ansi, ansifixed, device, oemfixed, system, and systemfixed:

ansi: I didn't know ants had six legs, Marcus
ansifixed: Another merciless sweep
device: We like dressing up, ye
oemfixed: One day Ricky the magic p
system: Pretty strong meat there from Sam
systemfixed: Simon Zinc Trumpet Har

On the Macintosh, the system font names are application and system.

Note that the system fonts are full font names, not family names, and they cannot be combined with size or style attributes. For portability reasons, avoid using these names wherever possible.

X Font Descriptors

X Font Descriptors are strings having the following format (the asterisks represent fields that are usually not relevant. For details, see the Tk documentation, or an X manual):

```
-*-family-weight-slant-*--*-size-*-*-*-*-charset
```

The font *family* is typically something like Times, Helvetica, Courier or Symbol.

The *weight* is either Bold or Normal. Slant is either R for "roman" (normal), I for italic, or O for oblique (in practice, this is just another word for italic).

Size is the height of the font in decipoints (that is, points multiplied by 10). There are usually 72 points per inch, but some low-resolution displays may use larger "logical" points to make sure that small fonts are still legible. The *character set*, finally, is usually ISO8859-1 (ISO Latin 1), but may have other values for some fonts.

The following descriptor requests a 12-point boldface Times font, using the ISO Latin 1 character set:

```
-*-Times-Bold-R-*--*-120-*-*-*-*-ISO8859-1
```

If you don't care about the character set, or use a font like Symbol which has a special character set, you can use a single asterisk as the last component:

```
-*-Symbol-*-*-*--*-80-*
```

A typical X server supports at least Times, Helvetica, Courier, and a few more fonts, in sizes like 8, 10, 12, 14, 18, and 24 points, and in normal, bold, and italic (Times) or oblique (Helvetica, Courier) variants. Most servers also support freely scaleable fonts. You can use programs like xlsfonts and xfontsel to check which fonts you have access to on a given server.

This kind of font descriptors can also be used on Windows and Macintosh. Note that if you use Tk 4.2, you should keep in mind that the font family must be one supported by Windows (see above).

Text Formatting

While text labels and buttons usually contain a single line of text, Tkinter also supports multiple lines. To split the text across lines, simply insert newline characters (\n) where necessary.

By default, the lines are centered. You can change this by setting the justify option to LEFT or RIGHT. The default value is CENTER.

You can also use the wraplength option to set a maximum width, and let the widget wrap the text over multiple lines all by itself. Tkinter attempts to wrap on whitespace, but if the widget is too narrow, it may break individual words across lines.

Borders

All Tkinter widgets have a border (though it's not visible by default for some widgets). The border consists of an optional 3D relief, and a focus highlight region.

Relief

The relief settings control how to draw the widget border:

borderwidth (or bd) is the width of the border, in pixels. Most widgets have a default borderwidth of one or two pixels. There's hardly any reason to make the border wider than that.

relief controls how to draw the 3D border. It can be set to one of SUNKEN, RAISED, GROOVE, RIDGE, and FLAT.

Focus Highlights

The highlight settings control how to indicate that the widget (or one of its children) has keyboard focus. In most cases, the highlight region is a border outside the relief. The following options control how this extra border is drawn:

The highlightcolor is used to draw the highlight region when the widget has keyboard focus. It's usually black, or some other distinct contrast color.

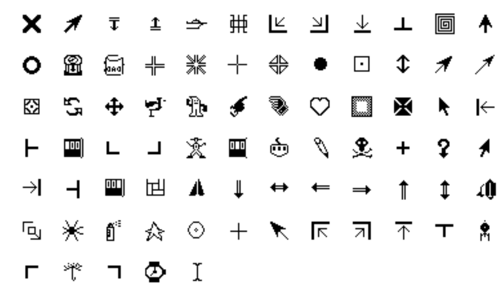
The highlightbackground is used to draw the highlight region when the widget doesn't have focus. It's usually same as the widget background.

The highlightthickness option is the width of the highlight region, in pixels. It is usually one or two pixels for widgets that can take keyboard focus.

Cursors

The cursor option control which mouse cursor to use when the mouse is moved over the widget. If this option isn't set, the widget uses the same mouse pointer as its parent.

Note that some widgets, including the Text and Entry widgets, set this option by default.



Chapter 7. Events and Bindings

As was mentioned earlier, a Tkinter application spends most of its time inside an event loop (entered via the mainloop method). Events can come from various sources, including key presses and mouse operations by the user, and redraw events from the window manager (indirectly caused by the user, in many cases).

Tkinter provides a powerful mechanism to let you deal with events yourself. For each widget, you can bind Python functions and methods to events.

```
widget.bind(event, handler)
```

If an event matching the *event* description occurs in the widget, the given *handler* is called with an object describing the event.

Here's a simple example:

Example 7-1. Capturing clicks in a window

```
# File: bind1.py

from Tkinter import *

root = Tk()

def callback(event):
    print "clicked at", event.x, event.y

frame = Frame(root, width=100, height=100)
frame.bind("<Button-1>", callback)
frame.pack()

root.mainloop()
```

In this example, we use the bind method of the frame widget to bind a callback function to an event called <Button-1>. Run this program and click in the window that appears. Each time you click, a message like "clicked at 44 63" is printed to the console window.

Events

Events are given as strings, using a special event syntax:

```
<modifier-type-detail>
```

The *type* field is the most important part of an event specifier. It specifies the kind of event that we wish to bind, and can be user actions like Button, and Key, or window manager events like Enter, Configure, and others. The modifier and detail fields are used to give additional information, and can in many cases be left out. There are also various ways to simplify the

event string; for example, to match a keyboard key, you can leave out the angle brackets and just use the key as is. Unless it is a space or an angle bracket, of course.

Instead of spending a few pages on discussing all the syntactic shortcuts, let's take a look on the most common event formats:

Table 7-1. Event Formats

Event	Description
<Button-1>	A mouse button is pressed over the widget. Button 1 is the leftmost button, button 2 is the middle button (where available), and button 3 the rightmost button. When you press down a mouse button over a widget, Tkinter will automatically "grab" the mouse pointer, and mouse events will then be sent to the current widget as long as the mouse button is held down. The current position of the mouse pointer (relative to the widget) is provided in the x and y members of the event object passed to the callback. You can use ButtonPress instead of Button, or even leave it out completely: <Button-1>, <ButtonPress-1>, and <1> are all synonyms. For clarity, I prefer the <Button-1> syntax.
<B1-Motion>	The mouse is moved, with mouse button 1 being held down (use B2 for the middle button, B3 for the right button). The current position of the mouse pointer is provided in the x and y members of the event object passed to the callback.
<Button-Release-1>	Button 1 was released. The current position of the mouse pointer is provided in the x and y members of the event object passed to the callback.
<Double-Button-1>	Button 1 was double clicked. You can use Double or Triple as prefixes. Note that if you bind to both a single click (<Button-1>) and a double click, both bindings will be called.
<Enter>	The mouse pointer entered the widget (this event doesn't mean that the user pressed the Enter key!).
<Leave>	The mouse pointer left the widget.
<Return>	The user pressed the Enter key. You can bind to virtually all keys on the keyboard. For an ordinary 102-key PC-style keyboard, the special keys are Cancel (the Break key), BackSpace, Tab, Return(the Enter key), Shift_L (any Shift key), Control_L (any Control key), Alt_L (any Alt key), Pause, Caps_Lock, Escape, Prior (Page Up), Next (Page Down), End, Home, Left, Up, Right, Down, Print, Insert, Delete, F1, F2, F3, F4, F5, F6, F7, F8, F9, F10, F11, F12, Num_Lock, and Scroll_Lock.
<Key>	The user pressed any key. The key is provided in the char member of the event object passed to the callback (this is an empty string for special keys).

Event	Description
a	The user typed an "a". Most printable characters can be used as is. The exceptions are space (<space>) and less than (<less>). Note that 1 is a keyboard binding, while <1> is a button binding.
<Shift-Up>	The user pressed the Up arrow, while holding the Shift key pressed. You can use prefixes like Alt, Shift, and Control.
<Configure>	The widget changed size (or location, on some platforms). The new size is provided in the width and height attributes of the event object passed to the callback.

The Event Object

The event object is a standard Python object instance, with a number of attributes describing the event.

Table 7-2. Event Attributes

Attribute	Description
widget	The widget which generated this event. This is a valid Tkinter widget instance, not a name. This attribute is set for all events.
x, y	The current mouse position, in pixels.
x_root, y_root	The current mouse position relative to the upper left corner of the screen, in pixels.
char	The character code (keyboard events only), as a string.
keysym	The key symbol (keyboard events only).
keycode	The key code (keyboard events only)
num	The button number (mouse button events only)
width, height	The new size of the widget, in pixels (Configure events only).
type	The event type.

For portability reasons, you should stick to char, height, width, x, y, x_root, y_root, and widget unless you know exactly what you're doing...

Instance and Class Bindings

The bind method we used in the above example creates an instance binding. This means that the binding applies to a single widget only; if you create new frames, they will not inherit the bindings.

But Tkinter also allows you to create bindings on the class and application level; in fact, you can create bindings on four different levels:

- the widget instance, using bind.
- the widget's toplevel window (Toplevel or root), also using bind.
- the widget class, using bind_class (this is used by Tkinter to provide standard bindings).
- the whole application, using bind_all.

For example, you can use bind_all to create a binding for the F1 key, so you can provide help everywhere in the application. But what happens if you create multiple bindings for the same key, or provide overlapping bindings?

First, on each of these four levels, Tkinter chooses the "closest match" of the available bindings. For example, if you create instance bindings for the <Key> and <Return> events, only the second binding will be called if you press the Enter key.

However, if you add a <Return> binding to the toplevel widget, *both* bindings will be called. Tkinter first calls the best binding on the instance level, then the best binding on the toplevel window level, then the best binding on the class level (which is often a standard binding), and finally the best available binding on the application level. So in an extreme case, a single event may call four event handlers.

A common cause of confusion is when you try to use bindings to override the default behavior of a standard widget. For example, assume you wish to disable the Enter key in the text widget, so that the users cannot insert newlines into the text. Maybe the following will do the trick?

```
def ignore(event):
    pass
text.bind("<Return>", ignore)
```

or, if you prefer one-liners:

```
text.bind("<Return>", lambda e: None)
```

(the lambda function used here takes one argument, and returns None)

Unfortunately, the newline is still inserted, since the above binding applies to the instance level only, and the standard behavior is provided by a class level bindings.

You could use the bind_class method to modify the bindings on the class level, but that would change the behavior of *all* text widgets in the application. An easier solution is to prevent Tkinter from propagating the event to other handlers; just return the string "break" from your event handler:

```
def ignore(event):
    return "break"
text.bind("<Return>", ignore)
```

or

```
text.bind("<Return>", lambda e: "break")
```

By the way, if you really want to change the behavior of all text widgets in your application, here's how to use the bind_class method:

```
top.bind_class("Text", "<Return>", lambda e: None)
```

But there are a lot of reasons why you shouldn't do this. For example, it messes things up completely the day you wish to extend your application with some cool little UI component you downloaded from the net. Better use your own Text widget specialization, and keep Tkinter's default bindings intact:

```
class MyText(Text):
    def __init__(self, master, **kw):
        apply(Text.__init__, (self, master), kw)
        self.bind("<Return>", lambda e: "break")
```

Protocols

In addition to event bindings, Tkinter also supports a mechanism called *protocol handlers*. Here, the term protocol refers to the interaction between the application and the window manager. The most commonly used protocol is called WM_DELETE_WINDOW, and is used to define what happens when the user explicitly closes a window using the window manager.

You can use the protocol method to install a handler for this protocol (the widget must be a root or Toplevel widget):

```
widget.protocol("WM_DELETE_WINDOW", handler)
```

Once you have installed your own handler, Tkinter will no longer automatically close the window. Instead, you could for example display a message box asking the user if the current data should be saved, or in some cases, simply ignore the request. To close the window from this handler, simply call the destroy method of the window:

Example 7-2. Capturing destroy events

```
# File: protocol1.py

from Tkinter import *
import tkMessageBox

def callback():
    if tkMessageBox.askokcancel("Quit", "Do you really wish to quit?"):
        root.destroy()

root = Tk()
root.protocol("WM_DELETE_WINDOW", callback)

root.mainloop()
```

Note that even you don't register an handler for WM_DELETE_WINDOW on a toplevel window, the window itself will be destroyed as usual (in a controlled fashion, unlike X). However, as of Python 1.5.2, Tkinter will not destroy the corresponding widget instance hierarchy, so it is a good idea to always register a handler yourself:

```
top = Toplevel(...)

# make sure widget instances are deleted
```



```
top.protocol("WM_DELETE_WINDOW", top.destroy)
```

Future versions of Tkinter will most likely do this by default.

Other Protocols

Window manager protocols were originally part of the X window system (they are defined in a document titled *Inter-Client Communication Conventions Manual*, or ICCCM). On that platform, you can install handlers for other protocols as well, like WM_TAKE_FOCUS and WM_SAVE_YOURSELF. See the ICCCM documentation for details.

Chapter 8. Application Windows

Base Windows

In the simple examples we've used this far, there's only one window on the screen; the root window. This is automatically created when you call the Tk constructor, and is of course very convenient for simple applications:

```
from Tkinter import *

root = Tk()

# create window contents as children to root...

root.mainloop()
```

If you need to create additional windows, you can use the Toplevel widget. It simply creates a new window on the screen, a window that looks and behaves pretty much like the original root window:

```
from Tkinter import *

root = Tk()

# create root window contents...

top = Toplevel()

# create top window contents...

root.mainloop()
```

There's no need to use pack to display the Toplevel, since it is automatically displayed by the window manager (in fact, you'll get an error message if you try to use pack or any other geometry manager with a Toplevel widget).

Menus

Tkinter provides a special widget type for menus. To create a menu, you create an instance of the Menu class, and use add methods to add entries to it:

- add_command(label=string, command=callback) adds an ordinary menu entry.
- add_separator() adds an separator line. This is used to group menu entries.
- add_cascade(label=string, menu=menu instance) adds a submenu (another Menu instance). This is either a pull-down menu or a fold-out menu, depending on the parent.

Here's an example:

Example 8-1. Creating a small menu

```
# File: menu1.py

from Tkinter import *

def callback():
    print "called the callback!"

root = Tk()

# create a menu
menu = Menu(root)
root.config(menu=menu)

filemenu = Menu(menu)
menu.add_cascade(label="File", menu=filemenu)
filemenu.add_command(label="New", command=callback)
filemenu.add_command(label="Open...", command=callback)
filemenu.add_separator()
filemenu.add_command(label="Exit", command=callback)

helpmenu = Menu(menu)
menu.add_cascade(label="Help", menu=helpmenu)
helpmenu.add_command(label="About...", command=callback)

mainloop()
```

In this example, we start out by creating a Menu instance, and we then use the config method to attach it to the root window. The contents of that menu will be used to create a menubar at the top of the root window. You don't have to pack the menu, since it is automatically displayed by Tkinter.

Next, we create a new Menu instance, using the menubar as the widget parent, and the add_cascade method to make it a pulldown menu. We then call add_command to add commands to the menu (note that all commands in this example use the same callback), and add_separator to add a line between the file commands and the exit command.

Finally, we create a small help menu in the same fashion.

Toolbars

Many applications place a toolbar just under the menubar, which typically contains a number of buttons for common functions like open file, print, undo, etc.

In the following example, we use a Frame widget as the toolbar, and pack a number of ordinary buttons into it.

Example 8-2. Creating a simple toolbar

```
# File: toolbar1.py
```

```
from Tkinter import *

root = Tk()

def callback():
    print "called the callback!"

# create a toolbar
toolbar = Frame(root)

b = Button(toolbar, text="new", width=6, command=callback)
b.pack(side=LEFT, padx=2, pady=2)

b = Button(toolbar, text="open", width=6, command=callback)
b.pack(side=LEFT, padx=2, pady=2)

toolbar.pack(side=TOP, fill=X)

mainloop()
```

The buttons are packed against the left side, and the toolbar itself is packed against the topmost side, with the fill option set to X. As a result, the widget is resized if necssary, to cover the full with of the parent widget.

Also note that I've used text labels rather than icons, to keep things simple. To display an icon, you can use the PhotoImage constructor to load a small image from disk, and use the image option to display it.

Status Bars

Finally, most applications sport a status bar at the bottom of each application window. Implementing a status bar with Tkinter is trivial: you can simply use a suitably configured Label widget, and reconfigure the text option now and then. Here's one way to do it:

```
status = Label(master, text="", bd=1, relief=SUNKEN, anchor=W)
status.pack(side=BOTTOM, fill=X)
```

If you wish to be fancy, you can use the following class instead. It wraps a label widget in a convenience class, and provides set and clear methods to modify the contents.

Example 8-3. A Status Bar Class

```
# File: tkSimpleStatusBar.py

class StatusBar(Frame):

    def __init__(self, master):
        Frame.__init__(self, master)
        self.label = Label(self, bd=1, relief=SUNKEN, anchor=W)
        self.label.pack(fill=X)

    def set(self, format, *args):
```



```
        self.label.config(text=format % args)
        self.label.update_idletasks()

    def clear(self):
        self.label.config(text="")
        self.label.update_idletasks()
```

The set method works like C's printf function; it takes a format string, possibly followed by a set of arguments (a drawback is that if you wish to print an arbitrary string, you must do that as set("%s", string)). Also note that this method calls the update_idletasks method, to make sure pending draw operations (like the status bar update) are carried out immediately.

But the real trick here is that we've inherited from the Frame widget. At the cost of a somewhat awkward call to the frame widget's constructor, we've created a new kind of custom widget that can be treated as any other widget. You can create and display the status bar using the usual widget syntax:

```
status = StatusBar(root)
status.pack(side=BOTTOM, fill=X)
```

We could have inherited from the Label widget itself, and just extended it with set and clear methods. This approach have a few drawbacks, though:

- It makes it harder to maintain the status bar's integrity. Some team members may cheat, and use config instead of set. That's not a big deal, until the day you decide to do some extra processing in the set method. Or the day you decide to use a Canvas widget to implement a fancier status bar.
- It increases the risk that your additional methods conflict with attributes or methods used by Tkinter. While the Frame and Toplevel widgets have relatively few methods, other widgets can have several dozens of widget specific attributes and methods.
- Future versions of Tkinter may use factory functions rather than class constructors for most widgets. However, it's more or less guaranteed that such versions will still provide Frame and Toplevel classes. Better safe than sorry, in other words.

Chapter 9. Dialog Windows

While the standard dialogs described in the previous section may be sufficient for many simpler applications, most larger applications require more complicated dialogs. For example, to set configuration parameters for an application, you will probably want to let the user enter more than one value or string in each dialog.

Basically, creating a dialog window is no different from creating an application window. Just use the Toplevel widget, stuff the necessary entry fields, buttons, and other widgets into it, and let the user take care of the rest. (By the way, don't use the ApplicationWindow class for this purpose; it will only confuse your users).

But if you implement dialogs in this way, you may end up getting both your users and yourself into trouble. The standard dialogs all returned only when the user had finished her task and closed the dialog; but if you just display another toplevel window, everything will run in parallel. If you're not careful, the user may be able to display several copies of the same dialog, and both she and your application will be hopelessly confused.

In many situations, it is more practical to handle dialogs in a synchronous fashion; create the dialog, display it, wait for the user to close the dialog, and then resume execution of your application. The wait_window method is exactly what we need; it enters a local event loop, and doesn't return until the given window is destroyed (either via the destroy method, or explicitly via the window manager):

```
widget.wait_window(window)
```

(Note that the method waits until the window given as an argument is destroyed; the only reason this is a method is to avoid namespace pollution).

In the following example, the MyDialog class creates a Toplevel widget, and adds some widgets to it. The caller then uses wait_window to wait until the dialog is closed. If the user clicks OK, the entry field's value is printed, and the dialog is then explicitly destroyed.

Example 9-1. Creating a simple dialog

```
# File: dialog1.py

from Tkinter import *

class MyDialog:

    def __init__(self, parent):

        top = self.top = Toplevel(parent)

        Label(top, text="Value").pack()

        self.e = Entry(top)
        self.e.pack(padx=5)

        b = Button(top, text="OK", command=self.ok)
```



```
        b.pack(pady=5)

    def ok(self):

        print "value is", self.e.get()

        self.top.destroy()


root = Tk()
Button(root, text="Hello!").pack()
root.update()

d = MyDialog(root)

root.wait_window(d.top)
```

If you run this program, you can type something into the entry field, and then click OK, after which the program terminates (note that we didn't call the mainloop method here; the local event loop handled by wait_window was sufficient). But there are a few problems with this example:

- The root window is still active. You can click on the button in the root window also when the dialog is displayed. If the dialog depends on the current application state, letting the users mess around with the application itself may be disastrous. And just being able to display multiple dialogs (or even multiple copies of one dialog) is a sure way to confuse your users.
- You have to explicitly click in the entry field to move the cursor into it, and also click on the OK button. Pressning Enter in the entry field is not sufficient.
- There should be some controlled way to cancel the dialog (and as we learned earlier, we really should handle the WM_DELETE_WINDOW protocol too).

To address the first problem, Tkinter provides a method called grab_set, which makes sure that no mouse or keyboard events are sent to the wrong window.

The second problem consists of several parts; first, we need to explicitly move the keyboard focus to the dialog. This can be done with the focus_set method. Second, we need to bind the Enter key so it calls the ok method. This is easy, just use the bind method on the Toplevel widget (and make sure to modify the ok method to take an optional argument so it doesn't choke on the event object).

The third problem, finally, can be handled by adding an additional Cancel button which calls the destroy method, and also use bind and protocol to do the same when the user presses Escape or explicitly closes the window.

The following Dialog class provides all this, and a few additional tricks. To implement your own dialogs, simply inherit from this class and override the body and apply methods. The former should create the dialog body, the latter is called when the user clicks OK.

Example 9-2. A dialog support class

```
# File: tkSimpleDialog.py
```

```
from Tkinter import *
import os

class Dialog(Toplevel):

    def __init__(self, parent, title = None):

        Toplevel.__init__(self, parent)
        self.transient(parent)

        if title:
            self.title(title)

        self.parent = parent

        self.result = None

        body = Frame(self)
        self.initial_focus = self.body(body)
        body.pack(padx=5, pady=5)

        self.buttonbox()

        self.grab_set()

        if not self.initial_focus:
            self.initial_focus = self

        self.protocol("WM_DELETE_WINDOW", self.cancel)

        self.geometry("+%d+%d" % (parent.winfo_rootx()+50,
                                  parent.winfo_rooty()+50))

        self.initial_focus.focus_set()

        self.wait_window(self)

    #
    # construction hooks

    def body(self, master):
        # create dialog body.  return widget that should have
        # initial focus.  this method should be overridden

        pass

    def buttonbox(self):
        # add standard button box. override if you don't want the
        # standard buttons

        box = Frame(self)
```



```
        w = Button(box, text="OK", width=10, command=self.ok, default=ACTIVE)
        w.pack(side=LEFT, padx=5, pady=5)
        w = Button(box, text="Cancel", width=10, command=self.cancel)
        w.pack(side=LEFT, padx=5, pady=5)

        self.bind("&lt;Return>", self.ok)
        self.bind("&lt;Escape>", self.cancel)

        box.pack()

    #
    # standard button semantics

    def ok(self, event=None):

        if not self.validate():
            self.initial_focus.focus_set() # put focus back
            return

        self.withdraw()
        self.update_idletasks()

        self.apply()

        self.cancel()

    def cancel(self, event=None):

        # put focus back to the parent window
        self.parent.focus_set()
        self.destroy()

    #
    # command hooks

    def validate(self):

        return 1 # override

    def apply(self):

        pass # override
```

The main trickery is done in the constructor; first, transient is used to associate this window with a parent window (usually the application window from which the dialog was launched). The dialog won't show up as an icon in the window manager (it won't appear in the task bar under Windows, for example), and if you iconify the parent window, the dialog will be hidden as well. Next, the constructor creates the dialog body, and then calls grab_set to make the dialog modal, geometry to position the dialog relative to the parent window, focus_set to move the keyboard focus to the appropriate widget (usually the widget returned by the body method), and finally wait_window.

Note that we use the protocol method to make sure an explicit close is treated as a cancel, and in the buttonbox method, we bind the Enter key to OK, and Escape to Cancel. The default=ACTIVE call marks the OK button as a default button in a platform specific way.

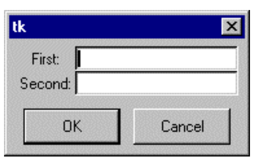
Using this class is much easier than figuring out how it's implemented; just create the necessary widgets in the body method, and extract the result and carry out whatever you wish to do in the apply method. Here's a simple example (we'll take a closer look at the grid method in a moment).

Example 9-3. Creating a simple dialog, revisited

```
# File: dialog2.py

import tkSimpleDialog

class MyDialog(tkSimpleDialog.Dialog):

    def body(self, master):

        Label(master, text="First:").grid(row=0)
        Label(master, text="Second:").grid(row=1)

        self.e1 = Entry(master)
        self.e2 = Entry(master)

        self.e1.grid(row=0, column=1)
        self.e2.grid(row=1, column=1)
        return self.e1 # initial focus

    def apply(self):
        first = string.atoi(self.e1.get())
        second = string.atoi(self.e2.get())
        print first, second # or something
```

And here's the resulting dialog:

Figure 9-1. running the dialog2.py script



Note that the body method may optionally return a widget that should receive focus when the dialog is displayed. If this is not relevant for your dialog, simply return None (or omit the return statement).

The above example did the actual processing in the apply method (okay, a more realistic example should probably to something with the result, rather than just printing it). But instead of doing the processing in the apply method, you can store the entered data in an instance attribute:

```
    def apply(self):
        first = int(self.e1.get())
        second = int(self.e2.get())
        self.result = first, second

d = MyDialog(root)
print d.result
```

Note that if the dialog is cancelled, the apply method is never called, and the result attribute is never set. The Dialog constructor sets this attribute to None, so you can simply test the result before doing any processing of it. If you wish to return data in other attributes, make sure to initialize them in the body method (or simply set result to 1 in the apply method, and test it before accessing the other attributes).

Grid Layouts

While the pack manager was convenient to use when we designed application windows, it may not be that easy to use for dialogs. A typical dialog may include a number of entry fields and check boxes, with corresponding labels that should be properly aligned. Consider the following simple example:

Figure 9-2. Simple Dialog Layout

First:	<entry field>
Second:	<entry field>
<checkbutton>	

To implement this using the pack manager, we could create a frame to hold the label "first:", and the corresponding entry field, and use side=LEFT when packing them. Add a corresponding frame for the next line, and pack the frames and the checkbutton into an outer frame using side=TOP. Unfortunately, packing the labels in this fashion makes it impossible to get the entry fields lined up, and if we use side=RIGHT to pack the entry field instead, things break down if the entry fields have different width. By carefully using width options, padding, side and anchor packer options, etc., we can get reasonable results with some effort. But there's a much easier way: use the grid manager instead.

This manager splits the master widget (typically a frame) into a 2-dimensional grid, or table. For each widget, you only have to specify where in this grid it should appear, and the grid managers takes care of the rest. The following body method shows how to get the above layout:

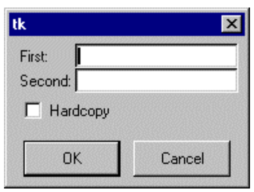
Example 9-4. Using the grid geometry maanager

```
# File: dialog3.py
```

```
def body(self, master):

    Label(master, text="First:").grid(row=0, sticky=W)
    Label(master, text="Second:").grid(row=1, sticky=W)

    self.e1 = Entry(master)
    self.e2 = Entry(master)

    self.e1.grid(row=0, column=1)
    self.e2.grid(row=1, column=1)

    self.cb = Checkbutton(master, text="Hardcopy")
    self.cb.grid(row=2, columnspan=2, sticky=W)
```

For each widget that should be handled by the grid manager, you call the grid method with the row and column options, telling the manager where to put the widget. The topmost row, and the leftmost column, is numbered 0 (this is also the default). Here, the checkbutton is placed beneath the label and entry widgets, and the columnspan option is used to make it occupy more than one cell. Here's the result:

Figure 9-3. Using the grid manager



If you look carefully, you'll notice a small difference between this dialog, and the dialog shown by the dialog2.py script. Here, the labels are aligned to the left margin. If you compare the code, you'll find that the only difference is an option called sticky.

When its time to display the frame widget, the grid geometry manager loops over all widgets, calculating a suitable width for each row, and a suitable height for each column. For any widget where the resulting cell turns out to be larger than the widget, the widget is centered by default. The sticky option is used to modify this behavior. By setting it to one of E, W, S, N, NW, NE, SE, or SW, you can align the widget to any side or corner of the cell. But you can also use this option to stretch the widget if necessary; if you set the option to E+W, the widget will be stretched to occupy the full width of the cell. And if you set it to E+W+N+S (or NW+SE, etc), the widget will be stretched in both directions. In practice, the sticky option replaces the fill, expand, and anchor options used by the pack manager.

The grid manager provides many other options allowing you to tune the look and behavior of the resulting layout. These include padx and pady which are used to add extra padding to widget cells, and many others. See the *Grid Geometry Manager* chapter for details.

Validating Data

What if the user types bogus data into the dialog? In our current example, the apply method will raise an exception if the contents of an entry field is not an integer. We could of course handle this with a try/except and a standard message box:

```
def apply(self):
    try:
        first = int(self.e1.get())
        second = int(self.e2.get())
        dosomething((first, second))
    except ValueError:
        tkMessageBox.showwarning(
            "Bad input",
            "Illegal values, please try again"
        )
```

There's a problem with this solution: the ok method has already removed the dialog from the screen when the apply method is called, and it will destroy it as soon as we return. This design is intentional; if we carry out some potentially lengthy processing in the apply method, it would be very confusing if the dialog wasn't removed before we finished. The Dialog class already contain hooks for another solution: a separate validate method which is called before the dialog is removed.

In the following example, we simply moved the code from apply to validate, and changed it to store the result in an instance attribute. This is then used in the apply method to carry out the work.

```
def validate(self):
    try:
        first= int(self.e1.get())
        second = int(self.e2.get())
        self.result = first, second
        return 1
    except ValueError:
        tkMessageBox.showwarning(
            "Bad input",
            "Illegal values, please try again"
        )
        return 0

def apply(self):
    dosomething(self.result)
```

Note that if we left the processing to the calling program (as shown above), we don't even have to implement the apply method.

II. Tkinter Reference

The rest of the chapters describe all classes provided by Tkinter, in alphabetical order.

Chapter 10. The BitmapImage Class

When to use the BitmapImage Class

This class is used to display images (either grayscale or true color images) in labels, buttons, canvases, and text widgets.

Patterns

FIXME: *To be added.*

Methods

configure(options)
config(options)

Change one or more configuration options.

cget(option) ⇒ value

Return the value of the given configuration option.

width() ⇒ integer
height() ⇒ integer

Returns the width (height) of the image, in pixels.

type() ⇒ string

Returns the string "bitmap".

Options

The BitmapImage class supports the following options.

Table 10-1. BitmapImage Options

Option	Type	Description
file	string	Read image data from the given file.
data	string	Read image data from a string. If the file option is given, this option is ignored.
width, height	integer	The width (height) of the image memory. Note that this is the requested size, not the actual size. To get the actual size, use the corresponding methods.
format	string	If several file handlers can handle the given file, this

Option	Type	Description
		option can be used to specify which handler to use. If you haven't installed extra file handlers, there's no need to use this option.

Chapter 11. The Button Widget

The Button widget is a standard Tkinter widget used to implement various kinds of buttons. Buttons can contain text or images, and you can associate a Python function or method with each button. When the button is pressed, Tkinter automatically calls that function or method.

The button can only display text in a single font, but the text may span more than one line. In addition, one of the characters can be underlined, for example to mark a keyboard shortcut. By default, the Tab key can be used to move to a button widget.

When to use the Button Widget

Simply put, button widgets are used to let the user say "do this now!," where *this* is either given by the text on the button, or implied by the icon displayed in the button. Buttons are typically used in toolbars, in application windows, and to accept or dismiss data entered into a dialog box.

For buttons suitable for data entry, see the Checkbutton and Radiobutton widgets.

Patterns

Plain buttons are pretty straightforward to use. Simply specify the button contents (text, bitmap, or image) and a callback to call when the button is pressed:

```
b = Button(master, text="OK", command=self.ok)
```

A button without a callback is pretty useless; it simply doesn't do anything when you press the button. You might wish to use such buttons anyway when developing an application. In that case, it is probably a good idea to disable the button to avoid confusing your beta testers:

```
b = Button(master, text="Help", state=DISABLED)
```

If you don't specify a size, the button is made just large enough to hold its contents. You can use the padx and pady option to add some extra space between the contents and the button border. You can also use the height and width options to explicitly set the size. If you display text in the button, these options define the size of the button in text units. If you display bitmaps or images instead, they define the size in pixels (or other screen units). You can actually specify the size in pixels even for text buttons, but it takes some magic. Here's one way to do it (there are others):

```
f = Frame(master, height=32, width=32)
f.pack_propagate(0) # don't shrink
b = Button(f, text="Sure!")
b.pack(fill=BOTH, expand=1)
```

Buttons can display multiple lines of text (but only in one font). You can use newlines or the wraplength option to make the button wrap text by itself. When wrapping text, use the anchor, justify, and possibly padx options to make things look exactly as you wish. An example:

```
b = Button(master, text=longtext, anchor=W, justify=LEFT, padx=2)
```

To make an ordinary button look like it's held down, for example if you wish to implement a toolbox of some kind, you can simply change the relief from RAISED to SUNKEN:

```
b.config(relief=SUNKEN)
```

You might wish to change the background as well. Note that a possibly better solution is to use a Checkbutton or Radiobutton with the indicatoron option set to false:

```
b = Checkbutton(master, image=bold, variable=var, indicatoron=0)
```

Methods

The Button widget supports the standard Tkinter Widget interface, plus the following methods:

flash()

Redraw the button several times, alternating between active and normal appearance.

invoke()

Call the command associated with the button.

Helpers

The following methods are only relevant if you're implementing your own keyboard bindings.

tkButtonDown()
tkButtonEnter()
tkButtonInvoke()
tkButtonLeave()
tkButtonUp()

These can be used in customized event bindings. All these methods accept zero or more dummy arguments.

Options

The Button widget supports the following options:

Table 11-1. Button Widget Options

Option	Type	Description
activebackground, activeforeground	color	The color to use when the button is activated.
anchor	constant	Controls where in the button the text (or image) should be located. Use one of N, NE, E, SE, S, SW, W,

Option	Type	Description
		NW, or CENTER. Default is CENTER. If you change this, it is probably a good idea to add some padding as well, using the padx and/or pady options.
background (bg), foreground (fg)	color	The button color. The default is platform specific.
bitmap	bitmap	The bitmap to display in the widget. If the image option is given, this option is ignored. The following bitmaps are available on all platforms: error, gray75, gray50, gray25, gray12, hourglass, info, questhead, question, and warning.  The following additional bitmaps are available on the Macintosh only: document, stationery, edition, application, accessory, folder, pfolder, trash, floppy, ramdisk, cdrom, preferences, querydoc, stop, note, and caution. You can also load the bitmap from an XBM file. Just prefix the filename with an at-sign, for example "@sample.xbm".
borderwidth (bd)	int	The width of the button border. The default is platform specific, but is usually 1 or 2 pixels.
command	callback	A function or method that is called when the button is pressed. The callback can be a function, bound method, or any other callable Python object.
cursor	cursor	The cursor to show when the mouse is moved over the button.
default	constant	If set, the button is a default button. Tk will indicate this by drawing a platform specific indicator (usually an extra border). NOTE: The syntax has changed in 8.0b2!!!
disabledforeground	color	The color to use when the button is disabled. The background is shown in the background color.
font	font	The font to use in the button. The button can only contain text in a single font.
highlightbackground, highlightcolor	color	Controls how to draw the focus highlight border. When the widget has focus, the border is drawn in the highlightcolor color. Otherwise, it is drawn in the highlightbackground color. The defaults are system

Option	Type	Description
		specific.
highlightthick-ness	distance	Controls the width of the focus highlight border. Default is typically one or two pixels.
image	image	The image to display in the widget. If specified, this takes precedence over the text and bitmap options.
justify	constant	Defines how to align multiple lines of text. Use LEFT, RIGHT, or CENTER.
padx, pady	distance	Button padding. These options specify the horizontal and vertical padding between the text or image, and the button border.
relief	constant	Border decoration. Usually, the button is SUNKEN when pressed, and RAISED otherwise. Other possible values are GROOVE, RIDGE, and FLAT.
state	constant	The button state: NORMAL, ACTIVE or DISABLED. Default is NORMAL.
takefocus	flag	Indicates that the user can use the Tab key to move to this button. Default is an empty string, which means that the button accepts focus only if it has any keyboard bindings (default is on, in other words).
text	string	The text to display in the button. The text can contain newlines. If the bitmap or image options are used, this option is ignored.
textvariable	variable	Associates a Tkinter variable (usually a StringVar) to the button. If the variable is changed, the button text is updated.
underline	int	Which character to underline, in a text label. Default is -1, which means that no character is underlined.
width, height	distance	The size of the button. If the button displays text, the size is given in text units. If the button displays an image, the size is given in pixels (or screen units). If the size is omitted, it is calculated based on the button contents.
wraplength	distance	Determines when a button's text should be wrapped into multiple lines. This is given in screen units. Default is no wrapping.

Chapter 12. The Canvas Widget

The Canvas widget provides structured graphics facilities for Tkinter. This is a highly versatile widget which are used to draw graphs and plots, create graphics editors, and implement various kinds of custom widgets.

To display things on the canvas, you create one or more canvas *items*, which are placed in a stack. By default, new items are drawn on top of items already on the canvas. Tkinter provides lots of methods allowing you to manipulate the items in various ways. Among other things, you can attach (*bind*) event callbacks to individual items.

When to use the Canvas Widget

The canvas is a general purpose widget, which is typically used to display and edit graphs and other drawings.

Another common use for this widget is to implement various kinds of custom widgets. For example, you can use a canvas as a completion bar, by drawing and updating a rectangle object.

Concepts

To be added.

Items

The Canvas widget supports the following standard items:

- arc (arc, chord, or pieslice)
- bitmap (built-in or read from XBM file)
- image (a BitmapImage or PhotoImage instance)
- line
- oval (a circle or an ellipse)
- polygon
- rectangle
- text
- window

Chords, pieslices, ovals, polygons, and rectangles are drawn as both an outline and an interior, either of which can be made transparent (if you insist, you can make both transparent).

Window items are used to place other Tkinter widgets on top of the canvas; for these items, the Canvas widget simply acts like a geometry manager.

You can also write your own item types in C or C++ and plug them into Tkinter via Python extension modules.

Coordinate Systems

The Canvas widget uses two coordinate systems; the window coordinate system (with (0, 0) in the upper left corner), and a canvas coordinate system in which the items are drawn. By scrolling the canvas, you can specify which part of the canvas coordinate system to show in the window.

The scrollregion option is used to limit scrolling operations for the canvas. To set this, you can usually use something like:

```
canvas.config(scrollregion=canvas.bbox(ALL))
```

To convert from window coordinates to canvas coordinates, use the canvasx and canvasy methods:

```
def callback(event):
    canvas = event.widget
    x = canvas.canvasx(event.x)
    y = canvas.canvasx(event.y)
    print canvas.find_closest(x, y)
```

Item Specifiers

The Canvas widget allows you to identify items in several ways. Everywhere a method expects an item specifier, you can use one of the following:

- item handles
- tags
- ALL
- CURRENT

Item handles are integer values that are used to identify a specific item on the canvas. Tkinter automatically assigns a new handle to each new item created on the canvas. Item handles can be passed to the various canvas methods either as integers or as strings.

Tags are symbolic names attached to items. Tags are ordinary strings, and they can contain anything except whitespace.

An item can have zero or more tags associated with it, and the same tag can be used for more than one item. However, unlike the Text widget, the Canvas widget doesn't allow you to create bindings or otherwise configure tags for which there are no existing items. All such operations are ignored.

You can either specify the tags via an option to the item create method, set them via the itemconfig method, or add them using the addtag_withtag method. The tags option take either a single string, or a tuple of strings.

```
item = canvas.create_line(0, 0, 100, 100, tags="uno")
canvas.itemconfig(item, tags=("one", "two"))
canvas.addtag_withtag("three", "one")
```


To get all tags associated with a specific item, use gettags. To get all items having a given tag, use find_withtag.

```
>>> print canvas.gettags(item)
('one', 'two', 'three')
>>> print canvas.find_withtag("one")
(1,)
```

The Canvas widget also provides two predefined tags:

ALL (or “all”) matches all items on the canvas.

CURRENT (or “current”) matches the item under the mouse pointer, if any. This can be used inside mouse event bindings to refer to the item that trigged the callback.

Printing

To be added.

Patterns

To be added.

Methods

The first group of methods are used to create and configure items on a canvas.

create_arc(bbox, options) ⇒ id

Create an *arc* canvas item. Returns the item handle.

create_bitmap(position, options) ⇒ id

Create a *bitmap* canvas item. Returns the item handle.

create_image(position, options) ⇒ id

Create an *image* canvas item. Returns the item handle.

create_line(coords, options) ⇒ id

Create a *line* canvas item. Returns the item handle.

create_oval(bbox, options) ⇒ id

Create an *oval* canvas item. Returns the item handle.

create_polygon(coords, options) ⇒ id

Create a *polygon* canvas item. Returns the item handle.

create_rectangle(bbox, options) ⇒ id

Create a *rectangle* canvas item. Returns the item handle.

create_text(position, options) ⇒ id

Create a *text* canvas item. Returns the item handle.

create_window(position, options) ⇒ id

Place a Tkinter widget on the canvas. Returns the item handle.

Note that widgets are drawn on top of the canvas (that is, the canvas acts like a geometry manager). You cannot draw other canvas items on top of a widget.

delete(items)

Delete all matching items. It is not an error to give an item specifier that doesn't match any items.

itemcget(item, option) ⇒ string

Get the current value for an option. If *item* refers to more than one items, this method returns the option value for the first item found.

itemconfig(item, options)
itemconfigure(item, options)

Change one or more options for all matching items.

coords(item) ⇒ list

Return the coordinates for the given item. If item refers to more than one items, this method returns the coordinates for the first item found.

coords(item, x0, y0, x1, y1, ..., xn, yn)

Change the coordinates for the given item. This method updates all matching items.

bbox(items) ⇒ tuple
bbox() ⇒ tuple

Returns the bounding box for the given items. If the specifier is omitted, the bounding box for all items are returned. Note that the bounding box is approximate and may differ a few pixels from the real value.

canvasx(screenx) ⇒ float
canvasy(screeny) ⇒ float

Convert a window coordinate (for example, the *x* and *y* coordinates from the structure passed to an event handler) to a canvas coordinate.

tag_bind(item, sequence, callback)
tag_bind(item, sequence, callback, "+")

Add an event binding to all matching items. Usually, the new binding replaces any existing binding for the same event sequence. The second form can be used to add the new callback to the existing binding.

Note that the new bindings are associated with the items, not the tag. For example, if you attach bindings to all items having the movable tag, they will only be attached to any

existing items with that tag. If you create new items tagged as movable, they will not get those bindings.

tag_unbind(item, sequence)

Remove the binding, if any, for the given event sequence. This applies to all matching items.

type(item) ⇒ string

Return the type of the given item: "arc", "bitmap", "image", "line", "oval", "polygon", "rectangle", "text", or "window". If item refers to more than one items, this method returns the type of the first item found.

lift(item)
tkraise(item)

Move the given item to the top of the canvas stack. If multiple items match, they are all moved, with their relative order preserved.

This method doesn't work with window items. To change their order, use lift on the widget instance instead.

lower(item)

Move the given item to the bottom of the canvas stack. If multiple items match, they are all moved, with their relative order preserved.

This method doesn't work with window items. To change their order, use lower on the widget instance instead.

move(item, dx, dy)

Move all items *dx* canvas units to the right, and *dy* canvas units downwards. Both coordinates can be negative.

scale(item, xscale, yscale, xoffset, yoffset)

Scale matching items according to the given scale factors. The coordinates for each item are first moved by -offset, then multiplied with the scale factory, and then moved back again. Note that this method modifies the item coordinates; you may loose precision if you use this method several times on the same items.

Printing

postscript(options)

Generate a Postscript rendering of the canvas contents. Images and embedded widgets are not included.

Table 12-1. Postscript Options

Option	Type	Description
colormap		

Option	Type	Description
colormode		
file		
fontmap		
height		
pageanchor		
pageheight		
pagewidth		
pagex		
pagey		
rotate		
width		
x		
y		

Searching for Items

The following methods are used to find certain groups of items, for later processing. Note that for each find method, there is a corresponding addtag method. Instead of processing the individual items returned by a find method, you can often get better performance by adding a temporary tag to a group of items, process all items with that tag in one go, and then remove the tag.

find_above(item) ⇒ item

Returns the item just above the given item.

find_all() ⇒ tuple

Return a tuple containing the identity of all items on the canvas, with the topmost item last (that is, if you haven't change the order using lift or lower, the items are returned in the order you created them). This is shortcut for find_withtag(ALL).

find_below(item) ⇒ item

Returns the item just below the given item.

find_closest(x, y) ⇒ item

Returns the item closest to the given position. Note that the position is given in canvas coordinates, and that this method always succeeds if there's at least one item in the canvas. To find items within a certain distance from a position, use find_overlapping with a small rectangle centered on the position.

find_enclosed(x1, y1, x2, y2) ⇒ tuple

Returns a tuple of all items completely enclosed by the rectangle (x1, y1, x2, y2).

find_overlapping(x1, y1, x2, y2) ⇒ tuple

Returns a tuple of all items that overlap the given rectangle, or that are completely enclosed by it.

find_withtag(item) ⇒ tuple

Returns a tuple of all items having the given specifier.

Manipulating Tags

The following methods are used to manipulate the tags, rather than the items themselves.

addtag_above(newtag, item)

Add *newtag* to the item just above the given item.

addtag_all(newtag)

Add *newtag* to all items on the canvas. This is shortcut for addtag_withtag(newtag, ALL).

addtag_below(newtag, item)

Add *newtag* to the item just below the given item.

addtag_closest(newtag, x, y)

Add *newtag* to the item closest to the given coordinate. See find_closest for more information.

addtag_enclosed(newtag, x1, y1, x2, y2)

Add *newtag* to all items enclosed by the given rectangle. See find_enclosed for more information.

addtag_overlapping(newtag, x1, y1, x2, y2)

Add *newtag* to all items overlapping the given rectangle. See find_overlapping for more information.

addtag_withtag(newtag, tag)

Add *newtag* to all items having the given tag.

dtag(item, tag)

Remove the given tag from all matching items. If the tag is omitted, all tags are removed from the matching items. It is not an error to give a specifier that doesn't match any items.

gettags(item) ⇒ tuple

Return all tags associated with the item.

Special Methods for Text Items

The following methods can be used with text items, as well as with any extension item type that supports a keyboard focus and an insertion cursor.

dchars()

FIXME

focus()

FIXME

icursor()

FIXME

index() ⇒ integer

FIXME

insert()

FIXME

select_adjust(item, index)

FIXME

select_clear()

FIXME

select_from(item, index)

FIXME

select_item()

FIXME

select_to(item, index)

FIXME

Scrolling

The following methods are used to scroll the canvas in various ways. The scan methods can be used to implement fast mouse pan/roam operations, while the xview and yview methods are used with standard scrollbars.

scan_mark(x, y)

Set the scanning anchor for fast horizontal scrolling to the given mouse coordinate.

scan_dragto(x, y)

Scrolls the widget contents according to the given mouse coordinate. The contents are moved 10 times the distance between the scanning anchor and the new position.

xview(MOVETO, offset)
yview(MOVETO, offset)

Adjust the canvas so that the given offset is at the left (top) edge of the canvas. Offset 0.0 is the beginning of the scrollregion, 1.0 the end. These methods are used by the Scrollbar bindings.

The MOVETO constant is not defined in Python 1.5.2 and earlier. For compatibility, use the string "moveto" instead.

xview(SCROLL, step, what)
yview(SCROLL, step, what)

Scroll the canvas horizontally (vertically) by the given amount. The what argument can be either UNITS (lines) or PAGES. These methods are used by the Scrollbar bindings.

These constants are not defined in Python 1.5.2 and earlier. For compatibility, use the strings "scroll", "units", and "pages" instead.

Options

Table 12-2. Canvas Options

Option	Type	Description
background (bg)	color	
borderwidth (bd)	distance	
closeenough		
confine		
cursor	cursor	
height	distance	
highlightbackground, highlightcolor	color	Controls how to draw the focus highlight border. When the widget has focus, the border is drawn in the highlightcolor color. Otherwise, it is drawn in the highlightbackground color. The defaults are system specific.
highlightthickness	distance	Controls the width of the focus highlight border. Default is one or two pixels. Note that the focus highlight border is drawn on top of the canvas coordinate systems; if you don't use

Option	Type	Description
		scrollbars, a one pixel border covers items drawn at canvas coordinate (0, 0).
insertbackground	color	Color used for the insertion cursor.
insertborderwidth	distance	Borderwidth for the insertion cursor.
insertofftime, insertontime	time	Controls cursor blinking.
insertwidth	distance	Width of the insertion cursor.
relief	constant	Border decoration. The default is FLAT. Other possible values are SUNKEN, RAISED, GROOVE, and RIDGE. Note that to show the border, you need to change the borderwidth from it's default value of 0. Also note that the border is drawn on top of the canvas coordinate system.
scrollregion	4-tuple	The bounding box of the scrollable area. If this option is not set, the scrolling is not bounded.
selectbackground	color	
selectborderwidth	distance	
selectforeground	color	
takefocus	flag	Indicates that the user can use the Tab key to move to this widget. Default is an empty string, which means that the canvas accepts focus only if it has any keyboard bindings (default is off, in other words).
width	distance	
xscrollcommand	callback	
xscrollincrement	distance	
yscrollcommand	callback	
yscrollincrement	distance	

Chapter 13. The Canvas Arc Item

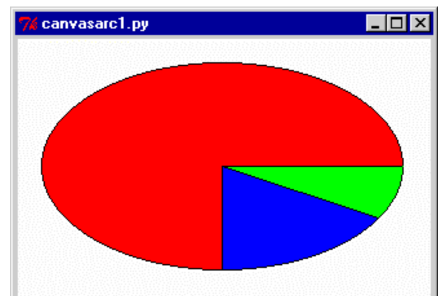
An arc item is a section of oval, delimited by two angles (start and extent). An arc item can be drawn in one of three ways:

- pieslice (lines are drawn from the perimeter to the oval's center)
- chord (the ends are connected with a straight line)
- arc (only the perimeter section is drawn)

```
xy = 20, 20, 300, 180
canvas.create_arc(xy, start=0, extent=270, fill="red")
canvas.create_arc(xy, start=270, extent=60, fill="blue")
canvas.create_arc(xy, start=330, extent=30, fill="green")
```

Pieslices and chords can be filled.

Figure 13-1. Pieslice Example



Methods

The following methods are used to create and configure arc items:

create_arc(x0, y0, x1, y1, options...) ⇒ id
create_arc(box, options...) ⇒ id

Create a arc item enclosed by the given rectangle. The start and extent options control which section to draw. If they are set to 0.0 and 360.0, a full oval is drawn which touches the rectangle's four edges.

delete(item)

Delete an arc item.

coords(item, x0, y0, x1, y1)

Change the enclosing rectangle for one or more arc items.

itemconfigure(item, options...)

Change the options for one or more arc items.

Options

The *arc* item supports the following options, via the create_arc method, and the itemconfig and itemcget configuration methods.

Table 13-1. Canvas Arc Options

Option	Type	Description
style	constant	Specifies how to draw the arc item (see above). Use one of PIESLICE, CHORD, or ARC. The default is PIESLICE. These constants are not defined in Python 1.5.2 and earlier. For compatibility, use the strings "pieslice", "chord", and "arc" instead.
start, extent	angle	The arc is drawn from the start angle (measured counter-clockwise from three o'clock) to the start angle plus the extent. Both angles are given in degrees, and can be negative. By default, the arc starts at 0.0 degrees (three o'clock), and extends 90.0 degrees counter-clockwise (twelve o'clock).
fill	color	The color to use for the arc's interior. If an empty string is given, the interior is not drawn. Note that arc's having the arc style cannot be filled. Default is empty (transparent).
stipple	bitmap	The name of a bitmap which is used as a stipple brush when filling the arc's interior. Typical values are "gray12", "gray25", "gray50", or "gray75". Default is a solid brush (no bitmap). As of Tk 8.0p2, the stipple option is ignored on the Windows platform. To draw stippled pieslices or chords, you have to create corresponding polygons.
outline	color	The color to use for the arc's outline. If an empty string is given, the outline is not drawn. Default is "black".
outlinestipple	bitmap	The name of a bitmap which is used as a stipple brush when drawing the arc's outline. Typical values are "gray12", "gray25", "gray50", or "gray75". Default is a

Option	Type	Description
		solid brush (no bitmap).
width	distance	The width of the arc's outline. Default is 1 pixel.
tags	tuple	One or more tags to associate with this item. If only a single tag is to be used, you can use a single string instead of a tuple of strings.

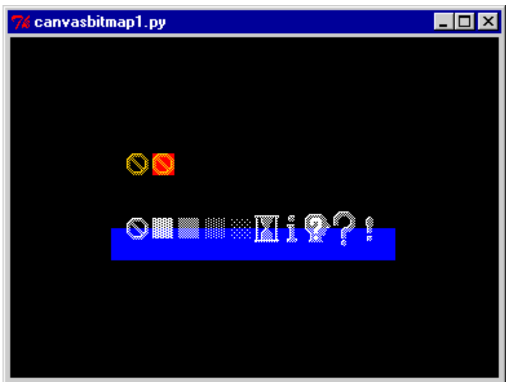
Chapter 14. The Canvas Bitmap Item

The *bitmap* item draws a bitmap on the canvas.

```
item = canvas.create_bitmap(100, 100, bitmap="info", foreground="gold")
```

You can use either a builtin bitmap, such as "hourglass", "info", "question", or "warning", or load a bitmap from an XBM file.

Figure 14-1. Bitmap Example



For more flexible image support, use create_image instead (with a Tkinter BitmapImage instance, or an instance of the corresponding *Python Imaging Library* class).

Bitmaps

The following bitmaps are available on all platforms: "error", "gray75", "gray50", "gray25", "gray12", "hourglass", "info", "questhead", "question", and "warning".

The following additional bitmaps are available on the Macintosh only: "document", "stationery", "edition", "application", "accessory", "folder", "pfolder", "trash", "floppy", "ramdisk", "cdrom", "preferences", "querydoc", "stop", "note", and "caution".

You can also load the bitmap from an XBM file. Just prefix the filename with an at-sign, for example "@sample.xbm".

Methods

The following methods are used to create and configure *bitmap* items:

create_bitmap(x0, y0, options...) ⇒ id

Create a bitmap item placed relative to the given position.

delete(item)

Delete a bitmap item.

coords(item, x0, y0)

Move one or more bitmap items.

itemconfigure(item, options...)

Change the options for one or more bitmap items.

Options

The *bitmap* item supports the following options, via the create_bitmap method, and the itemconfig and itemcget configuration methods.

Table 14-1. Canvas Bitmap Options

Option	Type	Description
bitmap	bitmap	The name of the bitmap.
anchor	constant	Specifies which part of the bitmap that should be placed at the given position. Use one of N, NE, E, SE, S, SW, W, NW, or CENTER. Default is CENTER.
foreground	color	The color to use for the bitmap's foreground pixels (that is, non-zero pixels). If an empty string is given, the foreground pixels are not drawn. Default is "black".
background	color	The color to use for the bitmap's background pixels (that is, zero pixels). If an empty string is given, the background pixels are not drawn. Default is empty (transparent).
tags	tuple	One or more tags to associate with this item. If only a single tag is to be used, you can use a single string instead of a tuple of strings.

Chapter 15. The Canvas Image Item

The *image* item draws an image on the canvas.

```
photo = PhotoImage(file="sample.gif")
item = canvas.create_image(10, 10, anchor=NW, image=photo)
```

Methods

The following methods are used to create and configure *image* items:

create_image(x0, y0, options...) ⇒ id

Create a image item placed relative to the given position. Note that the image itself is given by the *image* option.

[FIXME: add note on image ownership]

delete(item)

Delete an image item.

coords

coords(item, x0, y0). Move one or more image items.

itemconfigure

itemconfigure(item, options...). Change the options for one or more image (or other) items.

Options

The *image* item supports the following options, via the *create_image* method, and the *itemconfig* and *itemcget* configuration methods.

Table 15-1. Canvas Image Options

Option	Type	Description
image	image	The image object (a Tkinter *PhotoImage* or *BitmapImage* instance, or instances of the corresponding Python Imaging Library classes).
anchor	constant	Specifies which part of the image that should be placed at the given position. Use one of *N*, *NE*, *E*, *SE*, *S*, *SW*, *W*, *NW*, or *CENTER*. Default is *CENTER*.
tags	tuple	One or more tags to associate with this item. If only a single tag is to be used, you can use a single string

Option	Type	Description
		instead of a tuple of strings.

Chapter 16. The Canvas Line Item

Methods

create_line(x0, y0, x1, y1, ..., xn, yn, options...) ⇒ id

Create a line item.

delete(item)

Delete a line item.

coords(item, x0, y0, x1, y1, ..., xn, yn)

Change the coordinates for one or more line items.

itemconfigure(item, options...)

Change the options for one or more line items.

Options

The *line* item supports the following options, via the create_line method, and the itemconfig and itemcget configuration methods.

Table 16-1. Canvas Line Options

Option	Type	Description
width	distance	The width of the line. Default is 1 pixel.
fill	color	The color to use for the line. Default is "black".
stipple	bitmap	The name of a bitmap which is used as a stipple brush when drawing the line. Typical values are "gray12", "gray25", "gray50", or "gray75". Default is a solid brush (no bitmap).
arrow	constant	If set to a value other than NONE, the line is drawn as an arrow. The option value defines where to draw the arrow head: FIRST, LAST, or BOTH. Default is NONE. The FIRST and LAST constants are not defined in Python 1.5.2 and earlier. For compatibility, use the strings "first" and "last" instead.
arrowshape	3-tuple	Controls the shape of the arrow. Default is (8, 10, 3).
capstyle	constant	For wide lines, this option controls how to draw the line ends. Use one of BUTT, PROJECTING, ROUND. Default is BUTT. These constants are not defined in Python 1.5.2 and

Option	Type	Description
		earlier. For compatibility, use the strings "butt", "projecting", and "round" instead.
joinstyle	const	For wide lines, this option controls how to draw the joins between edges. Use one of BEVEL, MITER, or ROUND. Default is ROUND. These constants are not defined in Python 1.5.2 and earlier. For compatibility, use the strings "bevel", "miter", and "round" instead.
smooth	flag	If non-zero, the given coordinates are interpreted as b-spline vertices.
splinesteps	int	The number of steps to use when smoothing this line. Default is 12.
tags	tags	One or more tags to associate with this item. If only a single tag is to be used, you can use a single string instead of a tuple of strings.

Chapter 17. The Canvas Oval Item

Methods

create_oval(x0, y0, options...) ⇒ id

Create a oval item at the given position, using the given options. Note that the oval string itself is given by the *oval* option.

delete(item)

Delete an oval item.

coords(item, x0, y0)

Move one or more oval items.

itemconfigure(item, options...)

Change the options for one or more oval (or other) items.

Options

The *oval* item supports the following options, via the create_oval method, and the itemconfig and itemcget configuration methods.

Table 17-1. Canvas Oval Options

Option	Type	Description
fill	color	The color to use for the interior. If an empty string is given, the interior is not drawn. Default is empty (transparent).
stipple	bitmap	The name of a bitmap which is used as a stipple brush when filling the oval's interior. Typical values are “gray12”, “gray25”, “gray50”, or “gray75”. Default is a solid brush (no bitmap). As of Tk 8.0, the stipple option is ignored on the Windows platform. To draw stippled ovals, you have to create corresponding polygons.
outline	color	The color to use for the outline. If an empty string is given, the outline is not drawn. Default is “black”.
width	distance	The width of the outline. Default is 1 pixel.
tags	tuple	One or more tags to associate with this item. If only a single tag is to be used, you can use a single string instead of a tuple of strings.

Chapter 18. The Canvas Polygon Item

Methods

The following methods are used to create and configure *polygon* items:

create_polygon(xy, options...) ⇒ id
create_polygon(x0, y0, x1, y1, x2, y2, ..., xn, yn, options...) ⇒ id

Create a polygon item. You must specify at least 3 vertices when you create a new polygon.

delete(item)

Delete a polygonitem.

coords(item, x0, y0, x1, y1, x2, y2, ..., xn, yn)

Change the coordinates for one or more polygon items. Note that the coordinates must be given as separate arguments; you cannot use a sequence as with create_polygon.

itemconfigure(item, options...)

Change the options for one or more polygon items.

Options

The *polygon* item supports the following options, via the create_polygon method, and the itemconfig and itemcget configuration methods.

Table 18-1. Canvas Polygon Options

Option	Type	Description
fill	None	The color to use for the polygon interior. If an empty string is given, the interior is not drawn. Default is empty (transparent).
stipple	bitmap	The name of a bitmap which is used as a stipple brush when filling the polygon's interior. Typical values are “gray12”, “gray25”, “gray50”, or “gray75”. Default is a solid brush (no bitmap).
outline	None	The color to use for the polygon outline. If an empty string is given, the outline is not drawn. Default is “black”.
width	distance	The width of the polygon's outline. Default is 1 pixel.
smooth	None	If non-zero, the given coordinates are interpreted as b-spline vertices.

Option	Type	Description
splinesteps	None	The number of steps to use when smoothing the polygon outline. Default is 12.
tags	tuple	One or more tags to associate with the polygon. If only a single tag is to be used, you can use a single string instead of a tuple of strings.

Chapter 19. The Canvas Rectangle Item

Methods

The following methods are used to create and configure *rectangle* items:

create_rectangle(x0, y0, x1, y1, options...) ⇒ id

Create a rectangle item between the given coordinates. The rectangle item is created with the given options.

delete(item)

Delete a rectangle item.

coords(item, x0, y0, x1, y1)

Change the coordinates for one or more rectangle items. The *item* argument can match one or more rectangle items, rectangles, or any other item taking exactly four coordinates.

itemconfigure(item, options...)

Change the options for one or more rectangle items.

Options

The *rectangle* item supports the following options, via the create_rectangle method, and the itemconfig and itemcget configuration methods.

Table 19-1. Canvas Rectangle Options

Option	Type	Description
fill	None	The color to use for the rectangle interior. If an empty string is given, the interior is not drawn. Default is empty (transparent).
outline	None	The color to use for the outline. If an empty string is given, the outline is not drawn. Default is “black”.
stipple	None	The name of a bitmap which is used as a stipple brush when filling the rectangle's interior. Typical values are “gray12”, “gray25”, “gray50”, or “gray75”. Default is a solid brush (no bitmap).
tags	None	One or more tags to associate with the rectangle. If only a single tag is to be used, you can use a single string instead of a tuple of strings.
width	distance	The width of the rectangle's outline. Default is 1 pixel.

Chapter 20. The Canvas Text Item

Methods

The following methods are used to create and configure *text* items:

create_text(x0, y0, options...) ⇒ id

Create a text item at the given position, using the given options. Note that the text string itself is given by the text option.

delete(item)

Delete a text item.

coords(item, x0, y0)

Move one or more text items.

itemconfigure(item, options...)

Change the options for one or more text (or other) items.

Options

The *text* item supports the following options, via the create_text method, and the itemconfig and itemcget configuration methods.

Table 20-1. Canvas Text Options

Option	Type	Description
anchor	constant	Specifies which part of the text (the text's bounding box, more exactly) that should be placed at the given position. Use one of N, NE, E, SE, S, SW, W, NW, or CENTER. Default is CENTER.
fill	color	The color to use for the text. If an empty string is given, the text is not drawn. Default is empty (transparent).
font	font	
justify	constant	
stipple	bitmap	
tags	tuple	One or more tags to associate with the text. If only a single tag is to be used, you can use a single string instead of a tuple of strings.

Option	Type	Description
text	string	The text string.
width	distance	

Chapter 21. The Canvas Window Item

Methods

The following methods are used to create and configure *window* items:

create_window(x0, y0, options...) ⇒ id

Embed a window at the given position, using the given options. Note that the widget to use is given by the window option.

delete(item)

Delete a window item.

coords(item, x0, y0)

Move one or more window items.

itemconfigure(item, options...)

Change the options for one or more window (or other) items.

Options

The *window* item supports the following options, via the create_window method, and the itemconfig and itemcget configuration methods.

Table 21-1. Canvas Window Options

Option	Type	Description
window	window	The widget to embed in the canvas.
anchor	constant	Specifies which part of the window that should be placed at the given position. Use one of N, NE, E, SE, S, SW, W, NW, or CENTER. Default is CENTER.
height, width	distance	The height and width of the window. If omitted, the height and width defaults to the actual window size.
tags	tuple	One or more tags to associate with the window. If only a single tag is to be used, you can use a single string instead of a tuple of strings.

Chapter 22. The Checkbutton Widget

The Checkbutton widget is a standard Tkinter widgets used to implement on-off selections. Checkbuttons can contain text or images, and you can associate a Python function or method with each button. When the button is pressed, Tkinter automatically calls that function or method.

The button can only display text in a single font, but the text may span more than one line. In addition, one of the characters can be underlined, for example to mark a keyboard shortcut. By default, the Tab key can be used to move to a button widget.

Each *Checkbutton* widget should be associated with a variable.

When to use the Checkbutton Widget

The checkbutton widget is choose between two distinct values (usually switching something on or off). Groups of checkbuttons can be used to implement "many-of-many" selections.

To handle "one-of-many" choices, use Radiobutton and Listbox widgets.

Patterns

(Also see the Button patterns).

To use a Checkbutton, you must create a Tkinter variable:

```
var = IntVar()
c = Checkbutton(master, text="Expand", variable=var)
```

By default, the variable is set to 1 if the button is selected, and 0 otherwise. You can change these values using the onvalue and offvalue options. The variable doesn't have to be an integer variable:

```
var = StringVar()
c = Checkbutton(
    master, text="Color image", variable=var,
    onvalue="RGB", offvalue="L"
    )
```

If you need to keep track of both the variable and the widget, you can simplify your code somewhat by attaching the variable to the widget reference object.

```
v = IntVar()
c = Checkbutton(master, text="Don't show this again", variable=v)
c.var = v
```

If your Tkinter code is already placed in a class (as it should be), it is probably cleaner to store the variable in an attribute, and use a bound method as callback:

```
def __init__(self, master):
```

```
    self.var = IntVar()
    c = Checkbutton(master, text="Enable Tab",
                variable=self.var, command=self.cb)
    c.pack()

def cb(self, event):
    print "variable is", self.var.get()
```

Methods

The *Checkbutton* widgets support the standard Tkinter Widget interface, plus the following methods:

deselect()

Deselect the button.

flash()

Redraw the button several times, alternating between active and normal appearance.

invoke()

Call the command associated with the button.

select()

Select the button.

toggle()

Toggle the selection state.

Options

The Checkbutton widgets support the following options:

Table 22-1. Checkbutton Options

Option	Type	Description
activebackground, activeforeground	color	The color to use when the button is activated.
anchor	constant	Controls where in the button the text (or image) should be located. Use one of N, NE, E, SE, S, SW, W, NW, or CENTER. Default is CENTER. If you change this, it is probably a good idea to add some padding as well, using the padx and/or pady options.
background, foreground	color	The button color. The default is platform specific.

Option	Type	Description
bitmap	bitmap	The bitmap to display in the widget. If the image option is given, this option is ignored. The following bitmaps are available on all platforms: "error", "gray75", "gray50", "gray25", "gray12", "hourglass", "info", "questhead", "question", and "warning".  The following additional bitmaps are available on the Macintosh only: "document", "stationery", "edition", "application", "accessory", "folder", "pfolder", "trash", "floppy", "ramdisk", "cdrom", "preferences", "querydoc", "stop", "note", and "caution". You can also load the bitmap from an XBM file. Just prefix the filename with an at-sign, for example "@sample.xbm".
borderwidth (bd)	int	The width of the button border. The default is platform specific.
command	callback	A function or method that is called when the button is pressed. The callback can be a function, bound method, or any other callable Python object.
cursor	cursor	The cursor to show when the mouse is moved over the button.
default	int	If set, the button is a default button. Tk will indicate this by drawing a platform specific indicator (usually an extra border). NOTE: The syntax has changed in 8.0b2!!!
disabledforeground	color	The color to use when the button is disabled. The background is shown in the background color.
font	font	The font to use in the button. The button can only contain text in a single font.
highlightbackground, highlightcolor	color	Controls how to draw the focus highlight border. When the widget has focus, the border is drawn in the highlightcolor color. Otherwise, it is drawn in the highlightbackground color. The defaults are system specific.
highlight-thickness	distance	Controls the width of the focus highlight border. Default is typically one or two pixels.
image	image	The image to display in the widget. If specified, this

Option	Type	Description
		takes precedence over the text and bitmap options.
indicatoron	bool	Controls if the indicator should be drawn or not. This is on by default. Setting this option to false means that the relief will be used as the indicator. If the button is selected, it is drawn as SUNKEN instead of RAISED.
justify	constant	Defines how to align multiple lines of text. Use LEFT, RIGHT, or CENTER.
offvalue, onvalue	value	The values corresponding to a non-checked or checked button, respectively. Defaults are 0 and 1.
padx, paxy	distance	Button padding. These options specify the horizontal and vertical padding between the text or image, and the button border.
relief	constant	Border decoration. This is usually FLAT for checkbuttons, unless they use the border as indicator (via the indicatoron option).
selectcolor	color	Color to use for the selector.
selectimage	image	Graphic image to use for the selector.
state	constant	The button state: NORMAL, ACTIVE or DISABLED. Default is NORMAL.
takefocus	flag	Indicates that the user can use the Tab key to move to this button. Default is an empty string, which means that the button accepts focus only if it has any keyboard bindings (default is on, in other words).
text	string	The text to display in the button. The text can contain newlines. If the bitmap or image options are used, this option is ignored.
textvariable	variable	Associates a Tkinter variable (usually a StringVar) to the button. If the variable is changed, the button text is updated. Also see the variable option.
underline	int	Default is -1 (don't underline).
variable	variable	Associates a Tkinter variable to the button. When the button is pressed, the variable is toggled between offvalue and onvalue. Explicit changes to the variable are automatically reflected by the buttons.
width, height	distance	The size of the button. If the button displays text, the size is given in text units. If the button displays an

Option	Type	Description
		image, the size is given in pixels (or screen units). If the size is omitted, it is calculated based on the button contents.
wraplength	distance	Determines when a button's text should be wrapped into multiple lines. This is given in screen units. Default is no wrapping.

Chapter 23. The DoubleVar Class

When to use the DoubleVar Class

FIXME

Patterns

FIXME

Methods

`get()` ⇒ float
`set(float)`

FIXME

`trace(mode, callback)`
`trace_variable(mode, callback)`

FIXME

`trace_vdelete(mode, callback name)`

FIXME

`trace_vinfo()` ⇒ list

FIXME

Chapter 24. The Entry Widget

The *Entry* widget is a standard Tkinter widget used to enter or display a single line of text.

When to use the Entry Widget

The entry widget is used to enter text strings. This widget allows the user to enter one line of text, in a single font.

To enter multiple lines of text, use the text widget.

Concepts

Indexes

The *Entry* widget allows you to specify character positions in a number of ways:

- Numerical indexes
- ANCHOR
- END
- INSERT
- Mouse coordinates

Numerical indexes work just like Python list indexes. The characters in the string are numbered from 0 and upwards. You specify ranges just like you slice lists in Python; for example, (0, 5) corresponds to the first five characters in the entry widget.

ANCHOR (or "anchor") corresponds to the start of the selection, if any. You can use the *select_from* method to change this from the program.

END (or "end") corresponds to the position just after the last character in the entry widget. The range (0, END) corresponds to all characters in the widget.

INSERT (or "insert") corresponds to the current position of the text cursor. You can use the *icursor* method to change this from the program.

Finally, you can use the mouse position for the index, using the following syntax:

```
"@%d" % x
```

where *x* is given in pixels relative to the left edge of the entry widget.

Patterns

FIXME: *To be added.*

Methods

The Entry widget support the standard Tkinter Widget interface, plus the following methods:

insert(index, text)

Insert text at the given index. Use insert(INSERT, text) to insert text at the cursor, insert(END, text) to append text to the widget.

delete(index)
delete(from, to)

Delete the character at index, or within the given range. Use delete(0, END) to delete all text in the widget.

icursor(index)

Move the insertion cursor to the given index. This also sets the INSERT index.

get() ⇒ string

Get the current contents of the entry field.

index(index) ⇒ index

Return the numerical position corresponding to the given index.

Selection Methods

selection_adjust(index)
select_adjust(index)

Adjust the selection to include also the given character. If index is already selected, do nothing.

selection_clear()
select_clear()

Clear the selection.

selection_from(index)
select_from(index)

Starts a new selection. This also sets the ANCHOR index.

selection_present() ⇒ flag
select_present() ⇒ flag

Returns true (non-zero) if some part of the text is selected.

selection_range(start, end)
select_range(start, end)

Explicitly set the selection. Start must be smaller than end. Use selection_range(0, END) to select all text in the widget.

selection_to(index)
select_to(index)

Select all text between ANCHOR and the given index.

Scrolling Methods

These methods are used to scroll the entry widget in various ways. The scan methods can be used to implement fast mouse panning operations (they are bound to the middle mouse button, if available), while the xview method is used with a standard scrollbar widget.

scan_mark(x)

Set the scanning anchor for fast horizontal scrolling to the given mouse coordinate.

scan_dragto(x)

Scroll the widget contents sideways according to the given mouse coordinate. The text is moved 10 times the distance between the scanning anchor and the new position.

xview(index)

Make sure the given index is visible. The widget is scrolled if necessary.

xview_moveto(fraction)
xview_scroll(number, what)

Options

The Entry widget support the following options:

Table 24-1. Entry Options

Option	Type	Description
background (bg)	color	Widget background.
borderwidth (bd)	distance	Border width.
cursor	cursor	Widget cursor. The default is a text insertion cursor (typically an “I beam” cursor, e.g. xterm).
exportselection	flag	If true, selected text is automatically exported to the clipboard. Default is true.
font	font	Widget font. The default is system specific.
foreground (fg)	color	Text color.
highlightback-ground,	color	Controls how to draw the focus highlight border. When the widget has focus, the border is drawn in the

Option	Type	Description
highlightcolor		highlightcolor color. Otherwise, it is drawn in the highlightbackground color. The defaults are system specific.
highlight-thickness	distance	Controls the width of the focus highlight border. Default is typically one or two pixels.
insertback-ground	color	Color used for the insertion cursor.
insertborder-width	color	
insertofftime, insertontime	int	Controls cursor blinking.
insertwidth	int	Width of the insertion cursor.
justify	const	
relief	const	Border decoration. The default is FLAT. Other possible values are SUNKEN, RAISED, GROOVE, and RIDGE.
select-background	color	Selection background color. The default is system and display specific.
selectborder-width	int	Selection border width. The default is system specific.
select-foreground	color	Selection text color. The default is system and display specific.
show	character	Controls how to display the contents of the widget. If non-empty, the widget displays a string of characters instead of the actual contents. To get a password entry widget, use "*".
state	const	One of NORMAL or DISABLED. Default is NORMAL. Note that if you set this to DISABLED, calls to insert or delete are ignored.
takefocus	flag	Indicates that the user can use the Tab key to move to this widget. Default is an empty string, which means that the canvas accepts focus only if it has any keyboard bindings (default is on, in other words).
textvariable	variable	
width	int	
xscroll-command	callback	

Chapter 25. The Font Class

Patterns

Methods

copy() ⇒ font object

Return a distinct copy of the current font.

actual() ⇒ dictionary
actual(option) ⇒ value

Return actual font attributes. If no option is given, returns all actual font attribtues as a dictionary.

cget(option) ⇒ string

Get configured font attribute.

config() ⇒ dictionary
configure() ⇒ dictionary

Get full set of configured font attributes as a dictionary.

config(options)
configure(options…)

Modify one or more font attributes.

measure(text) ⇒ integer

Return text width.

metrics() ⇒ dictionary
metrics(options…) ⇒ value

Return one or more font metrics. If no arguments are given, all metrics are returned as a dictionary.

For best performance, make sure that this font is in use before calling this method. If necessary, you can create a dummy widget using the font.

Functions

families() ⇒ list

Get a list of available font families.

names() ⇒ list

Get a list of the names of names of all user-defined fonts.

Options

The constructor and the config method supports the following options.

Table 25-1. Font Options

Option	Type	Description
font	font	Font specifier (name, system font, or (family, size, style)-tuple). If you use this option, FIXME
family	string	Font family.
size	integer	Font size in points. To give the size in pixels, use a negative value.
weight	constant	Font thickness. Use one of NORMAL or BOLD. Default is NORMAL. Note that these constants are defined in the tkFont module.
slant	constant	Font slant. Use one of NORMAL or ITALIC. Default is NORMAL. Note that these constants are defined in the tkFont module.
underline	flag	Font underlining. If 1 (true), the font is underlined. Default is 0 (false).
overstrike	flag	Font strikeout. If 1 (true), a line is drawn over text written with this font. Default is 0 (false).

Chapter 26. The Frame Widget

A frame is rectangular region on the screen. The frame widget is mainly used as a geometry master for other widgets, or to provide padding between other widgets.

When to use the Frame Widget

Frame widgets are used to group other widgets into complex layouts. They are also used for padding, and as a base class when implementing compound widgets.

Patterns

The frame widget can be used as a place holder for video overlays and other external processes.

To use a frame widget in this fashion, set the background color to an empty string (this prevents updates, and leaves the color map alone), pack it as usual, and use the window_id method to get the window handle corresponding to the frame.

```
frame = Frame(width=768, height=576, bg="", colormap="new")
frame.pack()
video.attach_window(frame.window_id())
```

Methods

Except for the standard widget interface (config, etc), the Frame widget has no methods.

Options

The Frame widget supports the following options:

Table 26-1. Frame Options

Option	Type	Description
height, width	distance	Frame size.
background (bg)	color	The background color to use in this frame. This defaults to the application background color. To prevent updates, set the color to an empty string.
colormap	window	Some displays support only 256 colors (some use even less). Such displays usually provide a color map to specify which 256 colors to use. This option allows you to specify which color map to use for this frame, and its child widgets. By default, a new frame uses the same color map as its parent. Using this option, you can reuse the color map

Option	Type	Description
		of another window instead (this window must be on the same screen and have the same visual characteristics). You can also use the value "new" to allocate a new color map for this frame. You cannot change this option once you've created the frame.
cursor	cursor	The cursor to show when the mouse pointer is placed over the button widget. Default is a system specific arrow cursor.
relief	constant	Border decoration. The default is FLAT. Other possible values are SUNKEN, RAISED, GROOVE, and RIDGE. Note that to show the border, you need to change the borderwidth from it's default value of 0.
borderwidth (bd)	distance	Border width. Defaults to 0 (no border).
takefocus	flag	Indicates that the user can use the Tab key to move to this widget. Default is an empty string, which means that the frame accepts focus only if it has any keyboard bindings (default is off, in other words).
highlightbackground, highlightcolor	color	Controls how to draw the focus highlight border. When any child to the frame has focus, the border is drawn in the highlightcolor color. Otherwise, it is drawn in the highlightbackground color. The defaults are system specific.
highlightthickness	distance	Controls the width of the focus highlight border. Default is 0 (no border).

Chapter 27. The Grid Geometry Manager

The Grid geometry manager puts the widgets in a 2-dimensional table. The master widget is split into a number of rows and columns, and each "cell" in the resulting table can hold a widget.

When to use the Grid Manager

The grid manager is the most flexible of the geometry managers in Tkinter. If you don't want to learn how and when to use all three managers, you should at least make sure to learn this one.

The grid manager is especially convenient to use when designing dialog boxes. If you're using the packer for that purpose today, you'll be surprised how much easier it is to use the grid manager instead. Instead of using lots of extra frames to get the packing to work, you can in most cases simply pour all the widgets into a single container widget (I tend to use two; one for the dialog body, and one for the button box at the bottom), and use the grid manager to get them all where you want them.

Consider the following example:

<table>
<tr><td><label 1></td><td><entry 2></td><td colspan="2" rowspan="2"><image></td></tr>
<tr><td><label 1></td><td><entry 2></td></tr>
<tr><td colspan="2"><checkbutton></td><td><button 1></td><td><button 2></td></tr>
</table>

Creating this layout using the pack manager is possible, but it takes a number of extra frame widgets, and a lot of work to make things look good. If you use the grid manager instead, you only need one call per widget to get everything laid out properly (see next section for the code needed to create this layout).

> **Warning**
>
> Never mix grid and pack in the same master window. Tkinter will happily spend the rest of your lifetime trying to negotiate a solution that both managers are happy with. Instead of waiting, kill the application, and take another look at your code. A common mistake is to use the wrong parent for some of the widgets.

Patterns

Using the grid manager is easy. Just create the widgets, and use the grid method to tell the manager in which row and column to place them. You don't have to specify the size of the grid beforehand; the manager automatically determines that from the widgets in it.

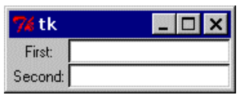
```
Label(master, text="First").grid(row=0)
Label(master, text="Second").grid(row=1)
```

```
e1 = Entry(master)
e2 = Entry(master)

e1.grid(row=0, column=1)
e2.grid(row=1, column=1)
```

Note that the column number defaults to 0 if not given.

Running the above example produces the following window:

Figure 27-1. Figure: simple grid example



Empty rows and columns are ignored. The result would have been the same if you had placed the widgets in row 10 and 20 instead.

Note that the widgets are centered in their cells. You can use the sticky option to change this; this option takes one or more values from the set N, S, E, W. To align the labels to the left border, you could use W (west):

```
Label(master, text="First").grid(row=0, sticky=W)
Label(master, text="Second").grid(row=1, sticky=W)

e1 = Entry(master)
e2 = Entry(master)

e1.grid(row=0, column=1)
e2.grid(row=1, column=1)
```

Figure 27-2. Figure: using the sticky option

You can also have the widgets span more than one cell. The columnspan option is used to let a widget span more than one column, and the rowspan option lets it span more than one row. The following code creates the layout shown in the previous section:

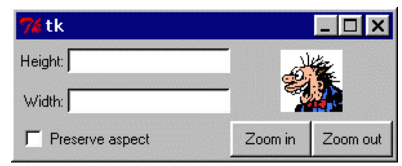
```
label1.grid(sticky=E)
label2.grid(sticky=E)

entry1.grid(row=0, column=1)
entry2.grid(row=1, column=1)

checkbutton.grid(columnspan=2, sticky=W)
```



```
image.grid(row=0, column=2, columnspan=2, rowspan=2,
        sticky=W+E+N+S, padx=5, pady=5)

button1.grid(row=2, column=2)
button2.grid(row=2, column=3)
```

There are plenty of things to note in this example. First, no position is specified for the label widgets. In this case, the column defaults to 0, and the row to the *first unused row in the grid*. Next, the entry widgets are positioned as usual, but the checkbutton widget is placed on the next empty row (row 2, in this case), and is configured to span two columns. The resulting cell will be as wide as the label and entry columns combined. The image widget is configured to span both columns and rows at the same time. The buttons, finally, is packed each in a single cell:

Figure 27-3. Figure: using column and row spans



Methods

Widget Methods

The following methods are available on widgets managed by the grid manager:

grid(option=value, ...)
grid_configure(option=value, ...)

Place the widget in a grid as described by the options (see below).

grid_forget()

Remove the widget. The widget is not destroyed, and can be displayed again by grid or any other manager.

grid_info() ⇒ dictionary

Return a dictionary containing the current options.

grid_remove()

Remove the widget. The widget is not destroyed, and can be displayed again by grid or any other manager.

Manager Methods

The following methods are available on widgets that are used as grid managers (that is, the geometry *masters* for widgets managed by the grid manager).

columnconfigure(column, option=value, ...)
rowconfigure(row, option=value, ...)

Set options for the given column (or row).

To change this for a given widget, you have to call this method on the widget's parent.

Table 27-1. Grid Manager Options

Option	Type	Description
minsize	integer	Defines the minimum size for the column (row). Note that if a column or row is completely empty, it will not be displayed, even if this option is set.
pad	integer	Padding to add to the size of the largest widget in the column (row) when setting the size of the whole column.
weight	integer	A relative weight used to distribute additional space between columns (rows). A column with the weight 2 will grow twice as fast as a column with weight 1. The default is 0, which means that the column will not grow at all.

grid_location(x, y) ⇒ tuple

Returns the grid cell under (or closest to) the given pixel coordinate. The result is a 2-tuple: (column, row).

grid_propagate(flag)

Enables or disables geometry propagation. When enabled, the grid manager attempts to change the size of the geometry master when a child widget changes size. Propagation is always enabled by default.

grid_size() ⇒ tuple

Returns the current grid size. This is defined as indexes of the first empty column and row in the grid, in that order. The result is a 2-tuple: (column, row).

grid_slaves() ⇒ list

Returns a list of the "slave" widgets managed by this widget. The widgets are returned as Tkinter widget references.

Options

The following options can be used with the grid and grid_configure methods:

Table 27-2. Grid Manager Options

Option	Type	Description
column	integer	Insert the widget at this column. Column numbers start with 0. If omitted, defaults to 0.
columnspan	integer	If given, indicates that the widget cell should span more than one column.
in (in_)	widget	Place widget inside to the given widget. You can only place a widget inside its parent, or in any decendant of its parent. If this option is not given, it defaults to the parent. Note that in is a reserved word in Python. To use it as a keyword option, append an underscore (in_).
ipadx, ipady	distance	Optional internal padding. Works like padx and pady, but the padding is added *inside* the widget borders. Default is 0.
padx, pady	distance	Optional padding to place around the widget in a cell. Default is 0.
row	integer	Insert the widget at this row. Row numbers start with 0. If omitted, defaults to the first empty row in the grid.
rowspan	integer	If given, indicates that the widget cell should span more than one row.
sticky	constant	Defines how to expand the widget if the resulting cell is larger than the widget itself. This can be any combination of the constants S, N, E, and W, or NW, NE, SW, and SE. For example, W (west) means that the widget should be aligned to the left cell border. W+E means that the widget should be stretched horizontally to fill the whole cell. W+E+N+S means that the widget should be expanded in both directions. Default is to center the widget in the cell.

Chapter 28. The IntVar Class

When to use the IntVar Class

FIXME

Patterns

FIXME

Methods

get() ⇒ integer
set(integer)

FIXME

trace(mode, callback)
trace_variable(mode, callback)

FIXME

trace_vdelete(mode, callback name)

FIXME

trace_vinfo() ⇒ list

FIXME

Chapter 29. The Label Widget

The Label widget is a standard Tkinter widget used to display a text or image on the screen. The button can only display text in a single font, but the text may span more than one line. In addition, one of the characters can be underlined, for example to mark a keyboard shortcut.

When to use the Label Widget

Labels are used to display texts and images. The label widget uses double buffering, so you can update the contents at any time, without annoying flicker.

To display data that the user can manipulate in place, it's probably easier to use the Canvas widget.

Patterns

To use a label, you just have to specify what to display in it (this can be text, a bitmap, or an image):

```
w = Label(master, text="Hello, world!")
```

If you don't specify a size, the label is made just large enough to hold its contents. You can also use the height and width options to explicitly set the size. If you display text in the label, these options define the size of the label in text units. If you display bitmaps or images instead, they define the size in pixels (or other screen units). See the Button description for an example how to specify the size in pixels also for text labels.

You can specify which color to use for the label with the foreground (or fg) and background (or bg) options. You can also choose which font to use in the label (the following example uses Tk 8.0 font descriptors). Use colors and fonts sparingly; unless you have a good reason to do otherwise, you should stick to the default values.

```
w = Label(master, text="Rouge", fg="red")
w = Label(master, text="Helvetica", font=("Helvetica", 16))
```

Labels can display multiple lines of text. You can use newlines or use the wraplength option to make the label wrap text by itself. When wrapping text, you might wish to use the anchor and justify options to make things look exactly as you wish. An example:

```
w = Label(master, text=longtext, anchor=W, justify=LEFT)
```

You can associate a variable with the label. When the contents of the variable changes, the label is automatically updated:

```
v = StringVar()
Label(master, textvariable=v).pack()
v.set("New Text!")
```

Methods

The Label widget supports the standard Tkinter Widget interface. There are no additional methods.

Options

The following options can be used for the *Label* widget.

Table 29-1. Label Options

Option	Type	Description
text	string	The text to display in the label. The text can contain newlines. If the bitmap or image options are used, this option is ignored.
bitmap	bitmap	The bitmap to display in the widget. If the image option is given, this option is ignored. The following bitmaps are available on all platforms: "error", "gray75", "gray50", "gray25", "gray12", "hourglass", "info", "questhead", "question", and "warning".  The following additional bitmaps are available on the Macintosh only: "document", "stationery", "edition", "application", "accessory", "folder", "pfolder", "trash", "floppy", "ramdisk", "cdrom", "preferences", "querydoc", "stop", "note", and "caution". You can also load the bitmap from an XBM file. Just prefix the filename with an at-sign, for example "@sample.xbm".
image	image	The image to display in the widget. If specified, this takes precedence over the text and bitmap options.
width, height	int	The size of the label. If the label displays text, the size is given in text units. If the label displays an image, the size is given in pixels (or screen units). If the size is omitted, it is calculated based on the label contents.
relief	constant	Border decoration. The default is FLAT. Other possible values are SUNKEN, RAISED, GROOVE, and RIDGE. Note that to show the border, you need to change the borderwidth from it's default value of 0.
borderwidth	dimension	The width of the label border. The default is 0 (no

Option	Type	Description
(bd)		border).
background (bg), foreground (fg)	color	The label color (the foreground value is used for text and bitmap labels only). The default is platform specific.
font	font	The font to use in the label. The label can only contain text in a single font.
justify	constant	Defines how to align multiple lines of text. Use LEFT, RIGHT, or CENTER.
anchor	constant	Controls where in the label the text (or image) should be located. Use one of N, NE, E, SE, S, SW, W, NW, or CENTER. Default is CENTER.
wraplength	distance	Determines when a label's text should be wrapped into multiple lines. This is given in screen units. Default is no wrapping.
textvariable	variable	Associates a Tkinter variable (usually a StringVar) to the label. If the variable is changed, the label text is updated.
underline	int	Default is -1.
cursor	cursor	The cursor to show when the mouse is moved over the label.

Chapter 30. The Listbox Widget

The Listbox widget is a standard Tkinter widget used to display a list of alternatives. The listbox can only contain text items, and all items must have the same font and color. Depending on the widget configuration, the user can choose one or more alternatives from the list.

When to use the Listbox Widget

Listboxes are used to select from a group of textual items. Depending on how the listbox is configured, the user can select one or many items from that list.

Patterns

When you first create the listbox, it is empty. The first thing to do is usually to insert one or more lines of text. The insert method takes an index and a string to insert. The index is usually an item number (0 for the first item in the list), but you can also use some special indexes, including ACTIVE, which refers to the "active" item (set when you click on an item, or by the arrow keys), and END, which is used to append items to the list.

```
listbox = Listbox(master)

listbox.insert(END, "a list entry")

for item in ["one", "two", "three", "four"]:
    listbox.insert(END, item)
```

To remove items from the list, use the delete method. The most common operation is to delete all items in the list (something you often need to do when updating the list).

```
listbox.delete(0, END)
listbox.insert(END, newitem)
```

You can also delete individual items. In the following example, a separate button is used to delete the ACTIVE item from a list.

```
lb = Listbox(master)
b = Button(master, text="Delete",
        command=lambda lb=lb: lb.delete(ANCHOR))
```

The listbox offers four different selection modes through the selectmode option. These are SINGLE (just a single choice), BROWSE (same, but the selection can be moved using the mouse), MULTIPLE (multiple item can be choosen, by clicking at them one at a time), or EXTENDED (multiple ranges of items can be chosen, using the Shift and Control keyboard modifiers). The default is BROWSE. Use MULTIPLE to get "checklist" behavior, and EXTENDED when the user would usually pick only one item, but sometimes would like to select one or more ranges of items.


```
lb = Listbox(selectmode=EXTENDED)
```

To query the selection, use curselection method. It returns a list of item indexes, but a bug in Tkinter 1.101 (Python 1.5.1) and earlier versions causes this list to be returned as a list of strings, instead of integers. This will most likely be fixed in later versions of Tkinter, so you should make sure that your code is written to handle either case. Here's one way to do that:

```
items = list.curselection()
try:
    items = map(int, items)
except ValueError: pass
```

In versions before Python 1.5, use string.atoi of int.

Use the get method to get the list item corresponding to a given index.

You can also use a listbox to represent arbitrary Python objects. In the next example, we assume that the input data is represented as a list of tuples, where the first item in each tuple is the string to display in the list. For example, you could display a dictionary by using the items method to get such a list.

```
self.lb.delete(0, END) # clear
for key, value in data:
    self.lb.insert(END, key)
self.data = data
```

When querying the list, simply fetch the items indexed by the selection list:

```
items = self.lb.curselection()
try:
    items = map(string.atoi, items)
except ValueError: pass
items = map(lambda i,d=self.data: d[i], items)
```

Unfortunately, the listbox doesn't provide a command option allowing you to track changes to the selection. The standard solution is to bind a *double-click* event to the same callback as the OK (or Select, or whatever) button. This allows the user to either select an alternative as usual, and click OK to carry out the operation, or to select and carry out the operation in one go by double-clicking on an alternative. This solution works best in BROWSE and EXTENDED modes.

```
lb.bind("<Double-Button-1>", self.ok)
```

If you wish to track arbitrary changes to the selection, you can either rebind the whole bunch of selection related events (see the Tk manual pages for a complete list of Listbox event bindings), or, much easier, poll the list using a timer:

```
def __init__(self, master):
    self.list = Listbox(selectmode=EXTENDED)
    self.list.pack()
    self.current = None
    self.poll() # start polling the list

def poll(self):
```

```
        now = self.list.curselection()
        if now != self.current:
            self.list_has_changed(now)
            self.current = now
        self.after(250, self.poll)
```

By default, the selection is exported via the X selection mechanism (or the clipboard, on Windows). If you have more than one listbox on the screen, this really messes things up for the poor user. If she selects something in one listbox, and then selects something in another, the original selection disappears. It is usually a good idea to disable this mechanism in such cases. In the following example, three listboxes are used in the same dialog:

```
b1 = Listbox(exportselection=0)
for item in families:
    b1.insert(END, item)

b2 = Listbox(exportselection=0)
for item in fonts:
    b2.insert(END, item)

b3 = Listbox(exportselection=0)
for item in styles:
    b3.insert(END, item)
```

The listbox itself doesn't include a scrollbar. Attaching a scrollbar is pretty straightforward. Simply set the xscrollcommand and yscrollcommand options of the listbox to the set method of the corresponding scrollbar, and the command options of the scrollbars to the corresponding xview and yview methods in the listbox. Also remember to pack the scrollbars before the listbox. In the following example, only a vertical scrollbar is used. For more examples, see pattern section in the Scrollbar description.

```
frame = Frame(master)
scrollbar = Scrollbar(frame, orient=VERTICAL)
listbox = Listbox(frame, yscrollcommand=scrollbar.set)
scrollbar.config(command=listbox.yview)
scrollbar.pack(side=RIGHT, fill=Y)
listbox.pack(side=LEFT, fill=BOTH, expand=1)
```

With some more trickery, you can use a single vertical scrollbar to scroll several lists in parallel. This assumes that all lists have the same number of items. Also note how the widgets are packed in the following example.

```
def __init__(self, master):
    scrollbar = Scrollbar(master, orient=VERTICAL)
    self.b1 = Listbox(master, yscrollcommand=scrollbar.set)
    self.b2 = Listbox(master, yscrollcommand=scrollbar.set)
    scrollbar.config(command=self.yview)
    scrollbar.pack(side=RIGHT, fill=Y)
    self.b1.pack(side=LEFT, fill=BOTH, expand=1)
    self.b2.pack(side=LEFT, fill=BOTH, expand=1)

def yview(self, *args):
```



```
    apply(self.b1.yview, args)
    apply(self.b2.yview, args)
```

Methods

The Listbox widget supports the standard Tkinter Widget interface, plus the following methods:

activate(index)

Activate the given index (it will be marked with an underline). The active item can be refered to using the ACTIVE index.

bbox(index) ⇒ tuple or None

Get the bounding box of the given item text. The bounding box is returned as a 4-tuple giving (*xoffset*, *yoffset*, *width*, *height*). If the item is not visible, this method returns None.

curselection() ⇒ list

Get a list of the currently selected alternatives. The list contains the indexes of the selected alternatives (beginning with 0 for the first alternative in the list). In Python 1.5.2 and earlier, the list contains strings instead of integers. Since this may change in future versions, you should make sure your code can handle either case. See the patterns section for a suggested solution.

delete(index)
delete(first, last)

Delete one or more items. Use delete(0, END) to delete all items in the list.

get(index) ⇒ string
get(first, last) ⇒ list

Get one or more items from the list. This function returns the string corresponding to the given index (or the strings in the given index range). Use get(0, END) to get a list of all items in the list. Use ACTIVE to get the active (underlined) item.

index(index) ⇒ integer

Return the numerical index (0 to size()-1) corresponding to the given index. This is typically ACTIVE, but can also be ANCHOR, or a string having the form "@x,y" where x and y are widget-relative pixel coordinates.

insert(index, items)

Insert one or more items at given index (this works as for Python lists; index 0 is before the first item). Use END to append items to the list. Use ACTIVE to insert items before the the active (underlined) item.

nearest(y) ⇒ string

Return the index nearest to the given coordinate (a widget-relative pixel coordinate).

see(index)

Make sure the given list index is visible. You can use an integer index, or END.

size() ⇒ integer

Return the number of items in the list. The valid index range goes from 0 to size()-1.

Selection Methods

The following methods are used to manipulate the listbox selection.

select_adjust(index)

Extend the selection to include the given index.

select_anchor(index)

Set the selection anchor to the given index. The anchor can be refered to using the ANCHOR index.

select_clear()

Clear the selection.

select_includes(index) ⇒ flag

Returns true (non-zero) if the given item is selected.

select_set(index)
select_set(first, last)

Add one or more items to the selection.

Scrolling Methods

These methods are used to scroll the listbox widget in various ways. The scan methods can be used to implement fast mouse scrolling operations (they are bound to the middle mouse button, if available), while the yview method is used with a standard scrollbar widget.

scan_mark(x, y)

Set the scanning anchor for fast horizontal scrolling to the given mouse coordinate.

scan_dragto(x, y)

Scroll the widget contents according to the given mouse coordinate. The text is moved 10 times the distance between the scanning anchor and the new position.

xview() ⇒ tuple
yview() ⇒ tuple

Determine which part of the full list that is visible in the horizontal (vertical) direction. This is given as the offset and size of the visible part, given in relation to the full size of the list (1.0 is the full list). These methods are used by the Scrollbar bindings.

xview(column)
yview(index)

Adjust the list so that the given character column (list item) is at the left (top) edge of the listbox. To make sure that a given item is visible, use the see method instead.

xview(MOVETO, offset)
yview(MOVETO, offset)

Adjust the list so that the given offset is at the left (top) edge of the listbox. Offset 0.0 is the beginning of the list, 1.0 the end. These methods are used by the Scrollbar bindings when the user drags the scrollbar slider.

The MOVETO constant is not defined in Python 1.5.2 and earlier. For compatibility, use the string "moveto" instead.

xview(SCROLL, step, what)
yview(SCROLL, step, what)

Scroll the list horizontally (vertically) by the given amount. The what argument can be either UNITS (lines) or PAGES. These methods are used by the Scrollbar bindings when the user clicks on a scrollbar arrow or in the trough.

These constants are not defined in Python 1.5.2 and earlier. For compatibility, use the strings "scroll", "units", and "pages" instead.

Options

The Listbox widget supports the following options:

Table 30-1. Listbox Options

Option	Type	Description
background (bg), fore-ground (fg)	color	The listbox color. The default is platform specific.
cursor	cursor	The cursor to show when the mouse is placed over the listbox.
exportselection	bool	If set, the list selection is automatically exported via the X selection mechanism. The default is on. If you have more than one list in the same dialog, it is probably best to disable this mechanism.
font	font	The font to use in the listbox. The listbox can only contain text in a single font.
relief	constant	Border decoration. The default is SUNKEN. Other possible values are FLAT, RAISED, GROOVE, and RIDGE.
borderwidth	distance	The width of the listbox border. The default is

Option	Type	Description
(bd)		platform specific, but is usually 1 or 2 pixels.
selectbackground, selectforeground	color	Selection color settings.
selectborderwidth	dimension	Selection border width. The selection is always raised.
selectmode	constant	Selection mode. One of SINGLE, BROWSE, MULTIPLE, or EXTENDED. Default is BROWSE. Use MULTIPLE to get checklist behavior, EXTENDED if the user usually selects one item, but sometimes would like to select one or more ranges of items. See the patterns section for more information.
setgrid	bool	
takefocus	bool	Indicates that the user can use the Tab key to move to this widget. Default is an empty string, which means that the listbox accepts focus only if it has any keyboard bindings (default is on, in other words).
width, height	distance	The size of the listbox, in text units.
xscrollcommand, yscrollcommand	command	Used to connect a listbox to a scrollbar. These options should be set to the set methods of the corresponding scrollbars.

Chapter 31. The Menu Widget

The Menu widget is used to implement toplevel, pulldown, and popup menus.

When to use the Menu Widget

This widget is used to display all kinds of menus used by an application. Since this widget uses native code where possible, you shouldn't try to fake menus using buttons and other Tkinter widgets.

Patterns

Toplevel menus are displayed just under the title bar of the root or any other toplevel windows (or on Macintosh, along the upper edge of the screen). To create a toplevel menu, create a new Menu instance, and use add methods to add commands and other menu entries to it.

Example 31-1. Creating a toplevel menu

```
# File: menu-example-2.py

from Tkinter import *

root = Tk()

def hello():
    print "hello!"

# create a toplevel menu
menubar = Menu(root)
menubar.add_command(label="Hello!", command=hello)
menubar.add_command(label="Quit!", command=root.quit)

# display the menu
root.config(menu=menubar)

mainloop()
```

Pulldown menus (and other submenus) are created in a similar fashion. The main difference is that they are attached to a parent menu (using add_cascade), instead of a toplevel window.

Example 31-2. Creating toplevel and pulldown menus

```
# File: menu-example-3.py

from Tkinter import *

root = Tk()
```

```
def hello():
    print "hello!"

menubar = Menu(root)

# create a pulldown menu, and add it to the menu bar
filemenu = Menu(menubar, tearoff=0)
filemenu.add_command(label="Open", command=hello)
filemenu.add_command(label="Save", command=hello)
filemenu.add_separator()
filemenu.add_command(label="Exit", command=root.quit)
menubar.add_cascade(label="File", menu=filemenu)

# create more pulldown menus
editmenu = Menu(menubar, tearoff=0)
editmenu.add_command(label="Cut", command=hello)
editmenu.add_command(label="Copy", command=hello)
editmenu.add_command(label="Paste", command=hello)
menubar.add_cascade(label="Edit", menu=editmenu)

helpmenu = Menu(menubar, tearoff=0)
helpmenu.add_command(label="About", command=hello)
menubar.add_cascade(label="Help", menu=helpmenu)

# display the menu
root.config(menu=menubar)

mainloop()
```

Finally, a popup menu is created in the same way, but is explicitly displayed, using the post method:

Example 31-3. Creating and displaying a popup menu

```
# File: menu-example-4.py

from Tkinter import *

root = Tk()

def hello():
    print "hello!"

# create a popup menu
menu = Menu(root, tearoff=0)
menu.add_command(label="Undo", command=hello)
menu.add_command(label="Redo", command=hello)

# create a canvas
frame = Frame(root, width=512, height=512)
frame.pack()
```



```
def popup(event):
    menu.post(event.x_root, event.y_root)

# attach popup to canvas
frame.bind("<Button-3>", popup)

mainloop()
```

You can use the postcommand callback to update (or even create) the menu everytime it is displayed.

Example 31-4. Updating a menu on the fly

```
# File: menu-example-5.py

from Tkinter import *

counter = 0

def update():
    global counter
    counter = counter + 1
    menu.entryconfig(0, label=str(counter))

root = Tk()

menubar = Menu(root)

menu = Menu(menubar, tearoff=0, postcommand=update)
menu.add_command(label=str(counter))
menu.add_command(label="Exit", command=root.quit)

menubar.add_cascade(label="Test", menu=menu)

root.config(menu=menubar)

mainloop()
```

Methods

The Menu widget supports the standard Tkinter Widget interface (with the exception of the geometry manager methods), plus the following methods:

add(type, options...)

Add (append) an entry of the given type to the menu. The type argument can be one of "command", "cascade" (submenu), "checkbutton", "radiobutton", or "separator". The options are as defined in the following table:

Table 31-1. Menu Item Options

Option	Type	Description
active-background	color	
active-foreground	color	
accelerator	string	
background	color	
bitmap	bitmap	
columnbreak	flag	
command	callback	
font	font	
foreground	color	
hidemargin	flag	
image	image	
indicatoron	flag	
label	string	
menu	widget	
offvalue	value	
onvalue	value	
selectcolor	color	
selectimage	image	
state	constant	
underline	integer	
value	value	
variable	variable	

add_cascade(options...)
add_checkbutton(options...)
add_command(options...)
add_radiobutton(options...)
add_separator(options...)

Convenience functions, used to add items of the given type.

insert(index, type, options...)
insert_cascade(index, options...)
insert_checkbutton(index, options...)
insert_command(index, options...)
insert_radiobutton(index, options...)
insert_separator(index, options...)

Same as add and friends, but inserts the new item at the given index.

entryconfig(index, options...)
entryconfigure(index, options...)

Reconfigure the given menu entry. Only the given options are changed; the rest are left as is.

index(index) ⇒ integer

Convert an index (of any kind) to an integer index.

delete(index)
delete(start, stop)

Delete one or more menu entries.

Displaying Menus

invoke(index)

Invoke the given entry (just like if the user had clicked on it).

post(x, y)

Display the menu at the given position. The position should be given in pixels, relative to the root window.

unpost()

Remove a posted menu.

yposition(index) ⇒ integer

Return the vertical offset for the given entry. This can be used to position a popup menu so that a given entry is under the the mouse when the menu appears.

Options

Table 31-2. Menu Options

Option	Type	Description
active-background	color	
activeborder-	distance	

Option	Type	Description
width		
active-foreground	color	
background (bg)	color	
borderwidth (bd)	distance	
cursor	cursor	The cursor to show when the mouse pointer is placed over the button widget. Default is a system specific arrow cursor.
disabled-foreground	color	
font	font	
foreground (fg)	color	
postcommand	callback	If given, this callback is called whenever Tkinter is about to display this menu. If you have dynamic menus, use this callback to update their contents.
relief	constant	Border decoration. The default is RAISED. Other possible values are FLAT, SUNKEN, GROOVE, and RIDGE.
selectcolor	color	
takefocus	flag	Indicates that the user can use the Tab key to move to this widget. Default is an empty string, which means that the menu accepts focus only if it has any keyboard bindings (default is on, in other words).
tearoff	flag	If set, menu entry 0 will be a "tearoff entry", which is usually a dashed separator line. If the user selects this entry, Tkinter creates a small Toplevel with a copy of this menu. This is on by default, so if you're writing code for Windows and Macintosh, you may want to explicitly set this option to false to make sure the menus looks as people expect them to.
tearoff-command	callback	If given, this callback is called when this menu is teared off (that is, if the tearoff option is set, and the user clicks on the "tearoff entry".)
title	string	
type	constant	

Chapter 32. The Menubutton Widget

The Menubutton widget displays popup or pulldown menu when activated.

This widget is not documented in this version of this document. You will probably not miss it...

When to use the Menubutton Widget

This widget is used to implement various kinds of menus. In earlier versions of Tkinter, it was used to implement toplevel menus, but this is now done with the Menu widget.

Patterns

Methods

Options

Chapter 33. The Message Widget

When to use the Message Widget

The message widget is used to display multiple lines of text. It's very similar to a plain Label, but can adjust its width to maintain a given aspect ratio.

Patterns

FIXME: To be added

Methods

The Message widget supports the standard Tkinter Widget interface. There are no additional methods.

Options

The Message widget support the following options:

Table 33-1. Message Options

Option	Type	Description
anchor	constant	
aspect	value	
background (bg)	color	
cursor	cursor	The cursor to show when the mouse pointer is placed over the message widget. Default is a system specific arrow cursor.
font	font	
foreground (fg)	color	
highlight-background, highlightcolor	color	Controls how to draw the focus highlight border. When the widget has focus, the border is drawn in the highlightcolor color. Otherwise, it is drawn in the highlightbackground color. The defaults are system specific.
highlight-thickness	distance	Controls the width of the focus highlight border. Default is 0 (no border).

Option	Type	Description
justify	constant	
padx, pady	distance	
relief	constant	Border decoration. The default is FLAT. Other possible values are SUNKEN, RAISED, GROOVE, and RIDGE. Note that to show the border, you need to change the borderwidth from it's default value of 0.
borderwidth (bd)	distance	Border width. The default is 0 (no border).
takefocus	flag	Indicates that the user can use the Tab key to move to this widget. Default is an empty string, which means that the message accepts focus only if it has any keyboard bindings (default is off, in other words).
text	string	
textvariable	variable	
width	distance	

Chapter 34. The Pack Geometry Manager

The Pack geometry manager packs widgets in rows or columns. You can use options like fill, expand, and side to control this geometry manager.

When to use the Pack Manager

To be added.

> **Warning**
>
> Don't mix grid and pack in the same master window. Tkinter will happily spend the rest of your lifetime trying to negotiate a solution that both managers are happy with. Instead of waiting, kill the application, and take another look at your code. A common mistake is to use the wrong parent for some of the widgets.

Patterns

To be added.

Methods

Widget Methods

The following methods are available on widgets managed by the pack manager:

pack(option=value, ...)
pack_configure(option=value, ...)

Pack the widget as described by the options (see below).

pack_forget()

Remove the widget. The widget is not destroyed, and can be displayed again by pack or any other manager.

pack_info() ⇒ dictionary

Return a dictionary containing the current options.

Manager Methods

The following methods are available on widgets that are used as pack managers (that is, the geometry *masters* for widgets managed by the pack manager).

pack_propagate(value)

Enable or disable geometry propagation.

pack_slaves() ⇒ list

Returns a list of the "slave" widgets managed by this widget. The widgets are returned as Tkinter widget references.

Options

The following options can be used with the pack and pack_configure methods:

Table 34-1. Pack Manager Options

Option	Type	Description
side	constant	Specifies which side to pack the widget against. To pack widgets vertically, use TOP (default). To pack widgets horizontally, use LEFT. You can also pack widgets along the BOTTOM and RIGHT edges. You can mix sides in a single geometry manager, but the results may not be what you expect. While you can create pretty complicated layouts by nesting Frame widgets, you may prefer using the grid geometry manager for all non-trivial layouts.
fill	constant	Specifies whether the widget should occupy all the space given to it by the master. If NONE (default), keep the widget's original size. If X (horizontally), Y (vertically), or BOTH, fill the given space along that direction. To make a widget fill the entire master widget, set fill to BOTH and expand to a non-zero value.
expand	flag	Specifies whether the widgets should be expanded to fill any extra space in the geometry master. If zero (default), the widget is not expanded.
in (in_)	widget	Pack widget inside the given widget. You can only pack a widget inside its parent, or in any decendant of its parent. This option should usually be left out, in which case the widget is packed inside its parent. Note that in is a reserved word in Python. To use it as a keyword option, append an underscore (in_).

Chapter 35. The PhotoImage Class

When to use the PhotoImage Class

This class is used to display images (either grayscale or true color images) in labels, buttons, canvases, and text widgets.

Patterns

FIXME: *To be added.*

Methods

configure(options)
config(options)

Change one or more configuration options.

cget(option) ⇒ string

Return the value of the given configuration option.

width() ⇒ integer
height() ⇒ integer

Returns the width (height) of the image, in pixels.

type() ⇒ string

Returns the string "photo".

get(x, y) ⇒ string

Fetch the pixel at the given position (where (0, 0) is in the upper left corner).

As of Python 1.5.2, this method returns a string containing one or three pixel components. Here's how to convert this string to either an integer or a 3-tuple of integers:

```
optionvalue = im.get(x, y)
if type(value) == type(""):
    try:
        value = int(value)
    except ValueError:
        value = tuple(map(int, string.split(value)))
```

put(data)
put(data, bbox)

Write pixel data to the image.

read()

Not supported in 1.5.2 or earlier.

write(filename, options)

Save the contents of the PhotoImage to a file using the given format. The following options can be used:

Table 35-1. PhotoImage Write Options

Option	Type	Description
format	string	Specifies the format handler to use when writing this image. This is typically "gif" or "ppm".
from_coords	tuple	Save only a part of the image. If a 2-tuple is given, write saves the rectangle between that position, and the lower right corner of the image. If a 4-tuple is given, it specifies which rectangle to save.

blank()

Clears the image. The size is left as it is, but the contents are made completely transparent.

copy() ⇒ photoimage object

Duplicate the current PhotoImage instance.

zoom(xscale, yscale)
zoom(scale)

Resize the image to (xscale*width, yscale*height) pixels, using nearest neighbor resampling. In other words, each pixel in the source image will be expanded to xscale*yscale pixels. If only one scale is given, it is used for both directions.

subsample(xscale, yscale)
subsample(scale)

Resize the image to (xscale/width, yscale/height) pixels, using nearest neighbor resampling. If only one scale is given, it is used for both directions.

Options

The PhotoImage class supports the following options.

Table 35-2. PhotoImage Options

Option	Type	Description
file	string	Read image data from the given file. The file can contain GIF, PGM (grayscale), or PPM (truecolor) data. Transparent regions in the GIF file are made transparent.

Option	Type	Description
		To handle other file formats, use the corresponding class in the Python Imaging Library.
data	string	Read image data from a string. In the current version of Tk, this only works for base64-encoded GIF files. If the file option is given, this option is ignored.
width, height	integer	The width (height) of the image memory. Note that this is the requested size, not the actual size. To get the actual size, use the corresponding methods.
format	string	If several file handlers can handle the given file, this option can be used to specify which handler to use. If you haven't installed extra file handlers, there's no need to use this option.
gamma	float	The image gamma. To get fully accurate colors, this should be set to a combination of the gamma values for the image and display. Default is 1.0 (no gamma correction).
palette	integer or string	Specifies the number of palette entries to use when displaying this image. You can either use a single integer to display the image as a grayscale image with that number of grayscale levels, or a string with three numbers separated by slashes, to display the image as a color image with that number of red, green, and blue values. The default is system specific.

Chapter 36. The Place Geometry Manager

The Place geometry manager is the simplest of the three general geometry managers provided in Tkinter. It allows you explicitly set the position and size of a window, either in absolute terms, or relative to another window.

You can access the place manager through the place method which is available for all standard widgets.

When to use the Place Manager

It is usually not a good idea to use place for ordinary window and dialog layouts; its simply to much work to get things working as they should. Use the pack or grid managers for such purposes.

However, place has its uses in more specialized cases. Most importantly, it can be used by compound widget containers to implement various custom geometry managers. Another use is to position control buttons in dialogs.

Patterns

Let's look at some usage patterns. The following command centers a widget in its parent:

```
w.place(relx=0.5, rely=0.5, anchor=CENTER)
```

Here's another variant. It packs a Label widget in a frame widget, and then places a Button in the upper right corner of the frame. The button will overlap the label.

```
pane = Frame(master)
Label(pane, text="Pane Title").pack()
b = Button(pane, width=12, height=12,
        image=launch_icon, command=self.launch)
b.place(relx=1, x=-2, y=2, anchor=NE)
```

The following excerpt from a Notepad widget implementation displays a notepad page (implemented as a Frame) in the notepad body frame. It first loops over the available pages, calling place_forget for each one of them. Note that it's not an error to "unplace" a widget that it's not placed in the first case:

```
for w in self.__pages:
    w.place_forget()
self.__pages[index].place(in_=self.__body, x=bd, y=bd)
```

You can combine the absolute and relative options. In such cases, the relative option is applied first, and the absolute value is then added to that position. In the following example, the widget *w* is almost completely covers its parent, except for a 5 pixel border around the widget.


```
w.place(x=5, y=5, relwidth=1, relheight=1, width=-10, height=-10)
```

You can also place a widget outside another widget. For example, why not place two widgets on top of each other:

```
w2.place(in_=w1, relx=0.5, y=-2, anchor=S, bordermode="outside")
```

Note the use of relx and anchor options to center the widgets vertically. You could also use (relx=0, anchor=SW) to get left alignment, or (relx=1, anchor=SE) to get right alignment.

By the way, why not combine this way to use the packer with the launch button example shown earlier. The following example places two buttons in the upper right corner of the *pane*:

```
b1 = DrawnButton(pane, (12, 12), launch_icon, command=self.launch)
b1.place(relx=1, x=-2, y=2, anchor=NE)
b2 = DrawnButton(pane, (12, 12), info_icon, command=self.info)
b2.place(in_=b1, x=-2, anchor=NE, bordermode="outside")
```

Finally, let's look at a piece of code from an imaginary SplitWindow container widget. The following piece of code splits *frame* into two subframes called *f1* and *f2*.

```
f1 = Frame(frame, bd=1, relief=SUNKEN)
f2 = Frame(frame, bd=1, relief=SUNKEN)
split = 0.5
f1.place(rely=0, relheight=split, relwidth=1)
f2.place(rely=split, relheight=1.0-split, relwidth=1)
```

To change the split point, set *split* to something suitable, and call the place method again. If you haven't changed an option, you don't have to specify it again.

```
f1.place(relheight=split)
f2.place(rely=split, relheight=1.0-split)
```

You could add a small frame to use as a dragging handle, and add suitable bindings to it, e.g:

```
f3 = Frame(frame, bd=2, relief=RAISED, width=8, height=8)
f3.place(relx=0.9, rely=split, anchor=E)
f3.bind("<B1-Motion>", self.adjust)
```

Methods

place(option=value, ...)
place_configure(option=value, ...)

Place the widget as described by the options (see below).

place_forget()

Remove the widget. The widget is not destroyed, and can be displayed again by place or any other manager.

place_info() ⇒ dictionary

Return a dictionary containing the current options.

place_slaves() ⇒ list

Returns a list of the "slave" widgets managed by this widget. The widgets are returned as Tkinter widget references.

Options

The following options can be used with the place and place_configure methods:

Table 36-1. Place Manager Options

Option	Type	Description
anchor	constant	Specifies which part of the widget that should be placed at the given position. Valid values are N, NE, E, SE, SW, W, NW, or CENTER. Default is NW (the upper left corner, that is).
bordermode	constant	If INSIDE, the size and position are relative to the reference widget's inner size, excluding any border. If OUTSIDE, it's relative to the outer size, including the border. Default is INSIDE. These constants are not defined in Python 1.5.2 and earlier. For compatibility, use the strings "inside" and "outside" instead.
in (in_)	widget	Place widget relative to the given widget. You can only place a widget relative to its parent, or to any decendant of its parent. If this option is not given, it defaults to the parent. Note that in is a reserved word in Python. To use it as a keyword option, append an underscore (in_).
relwidth, rel-height	float	Size, relative to the reference widget.
relx, rely	float	Position, relative to the reference widget (usually the parent, unless otherwise specified by the in option). 0.0 is the left (upper) edge, 1.0 is the right (lower) edge.
width, height	integer	Size, in pixels. If omitted, it defaults to the widget's "natural" size.
x, y	integer	Absolute position, in pixels. If omitted, defaults to 0.

Chapter 37. The Radiobutton Widget

The Radiobutton is a standard Tkinter widget used to implement one-of-many selections. Radiobuttons can contain text or images, and you can associate a Python function or method with each button. When the button is pressed, Tkinter automatically calls that function or method.

The button can only display text in a single font, but the text may span more than one line. In addition, one of the characters can be underlined, for example to mark a keyboard shortcut. By default, the Tab key can be used to move to a button widget.

Each group of Radiobutton widgets should be associated with single variable. Each button then represents a single value for that variable.

When to use the Radiobutton Widget

The radiobutton widget is used to implement one-of-many selections. It's almost always used in groups, where all group members use the same variable.

Patterns

The Radiobutton widget is very similar to the check button. To get a proper radio behavior, make sure to have all buttons in a group point to the same variable, and use the value option to specify what value each button represents:

```
v = IntVar()
Radiobutton(master, text="One", variable=v, value=1).pack(anchor=W)
Radiobutton(master, text="Two", variable=v, value=2).pack(anchor=W)
```

If you need to get notified when the value changes, attach a command callback to each button.

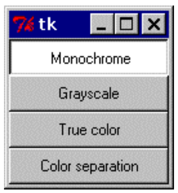
To create a large number of buttons, use a loop:

```
MODES = [
    ("Monochrome", "1"),
    ("Grayscale", "L"),
    ("True color", "RGB"),
    ("Color separation", "CMYK"),
]

v = StringVar()
v.set("L") # initialize

for text, mode in MODES:
    b = Radiobutton(master, text=text,
                    variable=v, value=mode)
    b.pack(anchor=W)
```

Figure 37-1. Standard radiobuttons

To turn the above example into a “button box” rather than a set of radio buttons, set the indicatoron option to 0. In this case, there's no separate radio button indicator, and the selected button is drawn as SUNKEN instead of RAISED:

Figure 37-2. Using indicatoron=0



Methods

The Radiobutton widget supports the standard Tkinter Widget interface, plus the following methods:

deselect()

Deselect the button.

flash()

Redraw the button several times, alternating between active and normal appearance.

invoke()

Call the command associated with the button.

select()

Select the button.

Options

The Radiobutton widget supports the following options:

Table 37-1. Radiobutton Options

Option	Type	Description
activebackground, activeforeground	color	The color to use when the button is activated.
anchor	constant	Controls where in the button the text (or image) should be located. Use one of N, NE, E, SE, S, SW, W, NW, or CENTER. Default is CENTER. If you change this, it is probably a good idea to add some padding as well, using the padx and/or pady options.
background (bg), foreground (fg)	color	The button color. The default is platform specific.
bitmap	bitmap	The bitmap to display in the widget. If the image option is given, this option is ignored. The following bitmaps are available on all platforms: "error", "gray75", "gray50", "gray25", "gray12", "hourglass", "info", "questhead", "question", and "warning".  The following additional bitmaps are available on the Macintosh only: "document", "stationery", "edition", "application", "accessory", "folder", "pfolder", "trash", "floppy", "ramdisk", "cdrom", "preferences", "querydoc", "stop", "note", and "caution". You can also load the bitmap from an XBM file. Just prefix the filename with an at-sign, for example "@sample.xbm".
borderwidth (bd)	int	The width of the button border. The default is platform specific, but is usually 1 or 2 pixels.
command	callback	A function or method that is called when the button is pressed. The callback can be a function, bound method, or any other callable Python object.
cursor	cursor	The cursor to show when the mouse is moved over the button.
default	int	If set, the button is a default button. Tk will indicate

Option	Type	Description
		this by drawing a platform specific indicator (usually an extra border). NOTE: The syntax has changed in 8.0b2!!!
disabledforeground	color	The color to use when the button is disabled. The background is shown in the background color.
font	font	The font to use in the button. The button can only contain text in a single font.
highlight-background, highlightcolor	color	Controls how to draw the focus highlight border. When the widget has focus, the border is drawn in the highlightcolor color. Otherwise, it is drawn in the highlightbackground color. The defaults are system specific.
highlight-thickness	distance	Controls the width of the focus highlight border. Default is typically one or two pixels.
image	image	The image to display in the widget. If specified, this takes precedence over the text and bitmap options.
indicatoron	bool	Controls if the indicator should be drawn or not. For check and radio buttons, this is on by default. Setting this option to false means that the relief will be used as the indicator. If the button is selected, it is drawn as SUNKEN instead of RAISED. For a menu button, this is off by default. Setting it to true draws a small indicator to the right. This is used by the OptionMenu widget.
justify	constant	Defines how to align multiple lines of text. Use LEFT, RIGHT, or CENTER.
padx, paxy	distance	Button padding. These options specify the horizontal and vertical padding between the text or image, and the button border.
relief	constant	Border decoration. Usually, the button is SUNKEN when pressed, and RAISED otherwise. Other possible values are GROOVE, RIDGE, and FLAT.
selectcolor	color	Color to use for the selector.
selectimage	image	Graphic image to use for the selector.
state	constant	The button state: NORMAL, ACTIVE or DISABLED. Default is NORMAL.
takefocus	flag	Indicates that the user can use the Tab key to move to this button. Default is an empty string, which means that the button accepts focus only if it has any keyboard bindings (default is on, in other words).

Option	Type	Description
text	string	The text to display in the button. The text can contain newlines. If the bitmap or image options are used, this option is ignored.
textvariable	variable	Associates a Tkinter variable (usually a StringVar) to the button. If the variable is changed, the button text is updated.
underline	int	Default is -1.
value	None	The value to assign to the associated variable when the button is pressed.
variable	variable	Associates a Tkinter variable to the button. When the button is pressed, the variable is set to value. Explicit changes to the variable are automatically reflected by the buttons.
width, height	distance	The size of the button. If the button displays text, the size is given in text units. If the button displays an image, the size is given in pixels (or screen units). If the size is omitted, it is calculated based on the button contents.
wraplength	distance	Determines when a button's text should be wrapped into multiple lines. This is given in screen units. Default is no wrapping.

Chapter 38. The Scale Widget

When to use the Scale Widget

To be added.

Patterns

Methods

get() ⇒ integer or float

Get the current scale value. Tkinter returns an integer if possible, otherwise a floating point value.

set(value)

Set the scale value.

Options

Table 38-1. Scale Options

Option	Type	Description
activebackground	color	
background (bg)	color	
bigincrement	value	
command	callback	
cursor	cursor	The cursor to show when the mouse pointer is placed over the scale widget. Default is a system specific arrow cursor.
digits	value	
font	font	
foreground (fg)	color	
from (from_)	value	
highlightbackground, highlightcolor	color	Controls how to draw the focus highlight border. When the widget has focus, the border is drawn in the highlightcolor color. Otherwise, it is drawn in the highlightbackground color. The defaults are system specific.
highlightthickness	distance	Controls the width of the focus highlight border. Default is 0 (no border).
label	string	
length	distance	
orient	constant	
relief	constant	Border decoration. The default is FLAT. Other possible values are SUNKEN, RAISED, GROOVE, and RIDGE.
borderwidth (bd)	distance	The width of the button border. The default is platform specific, but is usually 1 or 2 pixels.
repeatdelay	time	
repeatinterval	time	
resolution	value	
showvalue	flag	
sliderlength	distance	
sliderrelief	constant	
state	constant	
takefocus	flag	Indicates that the user can use the Tab key to move to this widget. Default is an empty string, which means that the scale accepts focus only if it has any keyboard bindings (default is off, in other words).
tickinterval	time	
to	value	
troughcolor	color	
variable	variable	
width	distance	

Chapter 39. The Scrollbar Widget

When to use the Scrollbar Widget

This widget is used to implement scrolled listboxes, canvases, and text fields.

Patterns

The Scrollbar widget is almost always used in conjunction with a Listbox, Canvas, or Text widget. Horizontal scrollbars can also be used with the Entry widget.

To connect a vertical scrollbar to such a widget, you have to do two things:

1. Set the widget's yscrollcommand callbacks to the set method of the scrollbar.
2. Set the scrollbar's command to the yview method of the widget.

Example 39-1. Connecting a scrollbar to a listbox

```
# File: scrollbar-example-1.py

from Tkinter import *

root = Tk()

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

listbox = Listbox(root, yscrollcommand=scrollbar.set)
for i in range(1000):
    listbox.insert(END, str(i))
listbox.pack(side=LEFT, fill=BOTH)

scrollbar.config(command=listbox.yview)

mainloop()
```

When the widget view is modified, the widget notifies the scrollbar by calling the set method. And when the user manipulates the scrollbar, the widget's yview method is called with the appropriate arguments.

Adding a horizontal scrollbar is as simple. Just use the xscrollcommand option, and the xview method.

Methods

get() ⇒ lo, hi

Returns the relative offset for the upper (leftmost) and lower (rightmost) end of the scrollbar slider. Offset 0.0 means that the slider is in its topmost (or leftmost) position, and offset 1.0 means that it is in its bottommost (or rightmost) position.

set(lo, hi)

Moves the slider to a new position.

delta(deltax, deltay) ⇒ float

Returns a floating point number that should be added to the current slider offsets in order to move the slider the given number of pixels. This is typically used by the mouse bindings to figure out how to move the slider when the user is dragging it around.

fraction(x, y)

Returns a floating point value which gives the offset corresponding to the given mouse position.

identify(x, y) ⇒ string

Returns a string describing what's under the mouse pointer. This is typically one of "arrow1" (top/left arrow), "trough1", "slider", "trough2" or "arrow2" (bottom/right).

Options

The Scrollbar widget supports the following options.

Note that most options are ignored on Windows and Macintosh, where the scrollbar is drawn via the native UI toolkit. For best results, use only the command and orient options in your programs.

Table 39-1. Scrollbar Options

Option	Type	Description
orient	constant	Defines how to draw the scrollbar. Use one of HORIZONTAL or VERTICAL. Default is VERTICAL.
command	callback	Used to update the associated widget. This is typically the xview or yview method of the scrolled widget. If the user drags the scrollbar slider, the command is called as callback(MOVETO, offset), where offset 0.0 means that the slider is in its topmost (or leftmost) position, and offset 1.0 means that it is in its bottommost (or rightmost) position. If the user clicks the arrow buttons, or clicks in the trough, the command is called as callback(SCROLL, step, what). The second argument is either "-1" or "1"

Option	Type	Description
		depending on the direction, and the third argument is UNITS to scroll lines (or other units relevant for the scrolled widget), or PAGES to scroll full pages. These constants are not defined in Python 1.5.2 and earlier. For compatibility, use the strings "moveto", "scroll", "units", and "pages" instead.
active-background	color	
activerelief	constant	
background (bg)	color	
cursor	cursor	The cursor to show when the mouse pointer is placed over the scrollbar widget. Default is a system specific arrow cursor.
elementborder-width	distance	
highlightback-ground, highlightcolor	color	Controls how to draw the focus highlight border. When the widget has focus, the border is drawn in the highlightcolor color. Otherwise, it is drawn in the highlightbackground color. The defaults are system specific.
highlight-thickness	distance	Controls the width of the focus highlight border. Default is 0 (no border). Note that this option is ignored under Windows.
jump	constant	
relief	constant	Border decoration. The default is SUNKEN. Other possible values are FLAT, RAISED, GROOVE, and RIDGE. Note that this option is ignored under Windows.
borderwidth (bd)	distance	Border width. The default is 0 (no border). Note that this option is ignored under Windows.
repeatdelay	time	
repeatinterval	time	
takefocus	flag	Indicates that the user can use the Tab key to move to this widget. Default is an empty string, which means that the scrollbar accepts focus only if it has any keyboard bindings (default is off, in other words).
troughcolor	color	

Option	Type	Description
width	distance	

Chapter 40. The StringVar Class

When to use the StringVar Class

FIXME

Patterns

FIXME

Methods

get() ⇒ string
set(string)

FIXME

trace(mode, callback)
trace_variable(mode, callback)

FIXME

trace_vdelete(mode, callback name)

FIXME

trace_vinfo() ⇒ list

FIXME

Chapter 41. The Text Widget

The Text widget provides formatted text display. It allows you to display and edit text with various styles and attributes. The widget also supports embedded images and windows.

When to use the Text Widget

The text widget is used to display text documents, containing either plain text or formatted text (using different fonts, embedded images, and other embellishments). The text widget can also be used as a text editor.

Concepts

The text widget stores and displays lines of text.

The text body can consist of characters, marks, and embedded windows or images. Different regions can be displayed in different styles, and you can also attach event bindings to regions.

By default, you can edit the text widget's contents using the standard keyboard and mouse bindings. To disable editing, set the state option to DISABLED (but if you do that, you'll also disable the insert and delete methods).

Indexes

Indexes are used to point to positions within the text handled by the text widget. Like Python sequence indexes, text widget indexes correspond to positions between the actual characters.

Tkinter provides a number of different index types:

- line/column ("line.column")
- line end ("line.end")
- INSERT
- CURRENT
- END
- user-defined marks
- user-defined tags ("tag.first", "tag.last")
- selection (SEL_FIRST, SEL_LAST)
- window coordinate ("@x,y")
- embedded object name (window, images)
- expressions

Lines and columns

line/column indexes are the basic index type. They are given as strings consisting of a line number and column number, separated by a period. Line numbers start at 1, while column numbers start at 0, like Python sequence indexes. You can construct indexes using the following syntax:

```
"%d.%d" % (line, column)
```

It is not an error to specify line numbers beyond the last line, or column numbers beyond the last column on a line. Such numbers correspond to the line beyond the last, or the newline character ending a line.

Note that line/column indexes may look like floating point values, but it's seldom possible to treat them as such (consider position 1.25 vs. 1.3, for example). I sometimes use 1.0 instead of "1.0" to save a few keystrokes when referring to the first character in the buffer, but that's about it.

You can use the index method to convert all other kinds of indexes to the corresponding line/column index string.

Line endings

A *line end* index is given as a string consisting of a line number directly followed by the text ".end". A line end index correspond to the newline character ending a line.

Named indexes

INSERT (or "insert") corresponds to the insertion cursor.

CURRENT (or "current") corresponds to the character closest to the mouse pointer. However, it is only updated if you move the mouse without holding down any buttons (if you do, it will not be updated until you release the button).

END (or "end") corresponds to the position just after the last character in the buffer.

User-defined marks are named positions in the text. INSERT and CURRENT are predefined marks, but you can also create your own marks. See below for more information.

User-defined tags represent special event bindings and styles that can be assigned to ranges of text. For more information on tags, see below.

You can refer to the beginning of a tag range using the syntax "*tag*.first" (just before the first character in the text using that tag), and "*tag*.last" (just after the last character using that tag).

```
"%s.first" % tagname
"%s.last" % tagname
```

If the tag isn't in use, Tkinter raises a TclError exception.

The *selection* is a special tag named SEL (or "sel") that corresponds to the current selection. You can use the constants SEL_FIRST and SEL_LAST to refer to the selection. If there's no selection, Tkinter raises a TclError exception.

Coordinates

You can also use *window coordinates* as indexes. For example, in an event binding, you can find the character closest to the mouse pointer using the following syntax:

```
"@%d,%d" % (event.x, event.y)
```

Embedded objects

Embedded object name can be used to refer to windows and images embedded in the text widget. To refer to a window, simply use the corresponding Tkinter widget instance as an index. To refer to an embedded image, use the corresponding Tkinter PhotoImage or BitmapImage object.

Expressions

Expressions can be used to modify any kind of index. Expressions are formed by taking the string representation of an index (use str if the index isn't already a string), and appending one or more *modifiers* from the following list:

- "+ *count* chars" moves the index forward. The index will move over newlines, but not beyond the END index.
- "- *count* chars" moves the index backwards. The index will move over newlines, but not beyond index "1.0".
- "+ *count* lines" and "- *count* lines" moves the index full lines forward (or backwards). If possible, the index is kept in the same column, but if the new line is too short, the index is moved to the end of that line.
- "linestart" moves the index to the first position on the line.
- "lineend" the index to the last position on the line (the newline, that is).
- "wordstart" and "wordend" moves the index to the beginning (end) of the current word. Words are sequences of letters, digits, and underline, or single non-space characters.

The keywords can be abbreviated and spaces can be omitted as long as the result is not ambigous. For example, "+ 5 chars" can be shortened to "+5c".

For compatibility with implementations where the constants are not ordinary strings, you may wish to use str or formatting operations to create the expression string. For example, here's how to remove the character just before the insertion cursor:

```
def backspace(event):
    event.widget.delete("%s-1c" % INSERT, INSERT)
```

Marks

Marks are (usually) invisible objects embedded in the text managed by the widget. Marks are positioned between character cells, and moves along with the text.

- user-defined marks
- INSERT
- CURRENT

You can use any number of *user-defined marks* in a text widget. Mark names are ordinary strings, and they can contain anything except whitespace (for convenience, you should avoid names that can be confused with indexes, especially names containing periods). To create or move a mark, use the mark_set method.

Two marks are predefined by Tkinter, and have special meaning:

INSERT (or "insert") is a special mark that is used to represent the insertion cursor. Tkinter draws the cursor at this mark's position, so it isn't entirely invisible.

CURRENT (or "current") is a special mark that represents the character closest to the mouse pointer. However, it is only updated if you move the mouse without holding down any buttons (if you do, it will not be updated until you release the button).

Special marks can be manipulated as other user-defined marks, but they cannot be deleted.

If you insert or delete text before a mark, the mark is moved along with the other text. To remove a mark, you must use the mark_unset method. Deleting text around a mark doesn't remove the mark itself.

If you insert text *at* a mark, it may be moved to the end of that text or left where it was, depending on the mark's *gravity* setting (LEFT or RIGHT; default is RIGHT). You can use the mark_gravity method to change the gravity setting for a given mark.

In the following example, the "sentinel" mark is used to keep track of the original position for the insertion cursor.

```
text.mark_set("sentinel", INSERT)
text.mark_gravity("sentinel", LEFT)
```

You can now let the user enter text at the insertion cursor, and use text.get("sentinel", INSERT) to pick up the result.

Tags

Tags are used to associated a display style and/or event callbacks with ranges of text.

- user-defined tags
- SEL

You can define any number of *user-defined tags*. Any text range can have multiple tags, and the same tag can be used for many different ranges. Unlike the Canvas widget, tags defined for the text widget are not tightly bound to text ranges; the information associated with a tag is kept also if there is no text in the widget using it.

Tag names are ordinary strings, and they can contain anything except whitespace.

SEL (or "sel") is a special tag which corresponds to the current selection, if any. There should be at most one range using the selection tag.

The following options are used with tag_config to specify the visual style for text using a certain tag.

Table 41-1. Text Tag Options

Option	Type	Description
background	color	The background color to use for text having this tag. Note that the bg alias cannot be used with tags; it is interpreted as bgstipple rather than background.
bgstipple (or bg)	bitmap	The name of a bitmap which is used as a stipple brush when drawing the background. Typical values are "gray12", "gray25", "gray50", or "gray75". Default is a solid brush (no bitmap).
borderwidth	distance	The width of the text border. The default is 0 (no border). Note that the bd alias cannot be used with tags.
fgstipple (or fg)	bitmap	The name of a bitmap which is used as a stipple brush when drawing the text. Typical values are "gray12", "gray25", "gray50", or "gray75". Default is a solid brush (no bitmap).
font	font	The font to use for text having this tag.
foreground	color	The color to use for text having this tag. Note that the fg alias cannot be used with tags; it is interpreted as fgstipple rather than foreground.
justify	constant	Controls text justification (the first character on a line determines how to justify the whole line). Use one of LEFT, RIGHT, or CENTER. Default is LEFT.
lmargin1	distance	The left margin to use for the first line in a block of text having this tag. Default is 0 (no left margin).
lmargin2	distance	The left margin to use for every line but the first in a block of text having this tag. Default is 0 (no left margin).
offset	distance	Controls if the text should be offset from the baseline. Use a positive value for superscripts, a negative value for subscripts. Default is 0 (no offset).
overstrike	flag	If non-zero, the text widget draws a line over the text that has this tag. For best results, you should use overstrike fonts instead.
relief	constant	The border style to use for text having this tag. Use one of SUNKEN, RAISED, GROOVE, RIDGE, or FLAT. Default is FLAT (no border).
rmargin	distance	The right margin to use for blocks of text having this tag. Default is 0 (no right margin).
spacing1	distance	Spacing to use above the first line in a block of text

Option	Type	Description
		having this tag. Default is 0 (no extra spacing).
spacing2	distance	Spacing to use between the lines in a block of text having this tag. Default is 0 (no extra spacing).
spacing3	distance	Spacing to use after the last line of text in a block of text having this tag. Default is 0 (no extra spacing).
tabs	string	
underline	flag	If non-zero, the text widget underlines the text that has this tag. For example, you can get the standard hyperlink look with (foreground="blue", underline=1). For best results, you should use underlined fonts instead.
wrap	constant	The word wrap mode to use for text having this tag. Use one of NONE, CHAR, or WORD.

If you attach multiple tags to a range of text, style options from the most recently created tag override options from earlier tags. In the following example, the resulting text is blue on a yellow background.

```
text.tag_config("n", background="yellow", foreground="red")
text.tag_config("a", foreground="blue")
text.insert(contents, ("n", "a"))
```

Note that it doesn't matter in which order you attach tags to a range; it's the tag creation order that counts.

You can change the tag priority using the tag_raise and tag_lower. If you add a text.tag_lower("a") to the above example, the text becomes red.

The tag_bind method allows you to add event bindings to text having a particular tag. Tags can generate mouse and keyboard events, plus <Enter> and <Leave> events. For example, the following code snippet creates a tag to use for any hypertext links in the text:

```
text.tag_config("a", foreground="blue", underline=1)
text.tag_bind("<Enter>", show_hand_cursor)
text.tag_bind("<Leave>", show_arrow_cursor)
text.tag_bind("<Button-1>", click)
text.config(cursor="arrow")

text.insert(INSERT, "click here!", "a")
```

Patterns

When you create a new text widget, it has no contents. To insert text into the widget, use the insert method and insert text at the INSERT or END indexes:

```
text.insert(END, "hello, ")
```



```
text.insert(END, "world")
```

You can use an optional third argument to the insert method to attach one or more tags to the newly inserted text:

```
text.insert(END, "this is a ")
text.insert(END, "link", ("a", "href"+href))
```

To insert embedded objects, use the window_create or image_create methods:

```
button = Button(text, text="Click", command=click)
text.window_create(INSERT, window=button)
```

To delete text, use the delete method. Here's how to delete all text from the widget (this also deletes embedded windows and images, but not marks):

```
text.delete(1.0, END)
```

To delete a single character (or an embedded window or image), you can use delete with only one argument:

```
text.delete(INSERT)
text.delete(button)
```

To make the widget read-only, you can change the state option from NORMAL to DISABLED:

```
text.config(state=NORMAL)
text.delete(1.0, END)
text.insert(END, text)
text.config(state=DISABLED)
```

Note that you must change the state back to NORMAL before you can modify the widget contents from within the program. Otherwise, calls to insert and delete will be silently ignored.

To fetch the text contents of the widget, use the get method:

```
contents = text.get(1.0, END)
```

FIXME: *add material on the dump method, and how to use it on 1.5.2 and earlier*

Here's a simple way to keep track of changes to the text widget:

```
import md5
def getsignature(contents):
    return md5.md5(contents).digest()

text.insert(END, contents) # original contents
signature = getsignature(contents)

...

contents = text.get(1.0, END)
if signature != getsignature(contents):
    print "contents have changed!"
```

FIXME: *modify to handle ending linefeed added by text widget*

The index method converts an index given in any of the supported formats to a line/column index. Use this if you need to store an "absolute" index.

```
index = text.index(index)
```

However, if you need to keep track of positions in the text even after other text is inserted or deleted, you should use marks instead.

```
text.mark_set("here", index)
text.mark_unset("here")
```

The following function converts any kind of index to a (line, column)-tuple. Note that you can directly compare positions represented by such tuples.

```
def getindex(text, index):
    return tuple(map(int, string.split(text.index(index), ".")))

if getindex(text, INSERT) < getindex(text, "sentinel"):
    text.mark_set(INSERT, "sentinel")
```

The following example shows how to enumerate all regions in the text that has a given tag.

```
ranges = text.tag_ranges(tag)
for i in range(0, len(ranges), 2):
    start = ranges[i]
    stop = ranges[i+1]
    print tag, repr(text.get(start, stop))
```

The search method allows you to search for text. You can search for an exact match (default), or use a Tcl-style regular expression (call with the regexp option set to true).

```
text.insert(END, "hello, world")

start = 1.0
while 1:
    pos = text.search("o", start, stopindex=END)
    if not pos:
        break
    print pos
    start = pos + "+1c"
```

Given an empty text widget, the above example prints 1.4 and 1.8 before it stops. If you omit the stopindex option, the search wraps around if it reaches the end of the text.

To search backwards, set the backwards option to true (to find all occurences, start at END, set stopindex to 1.0 to avoid wrapping, and use "-1c" to move the start position).

Methods

The Text widget supports the standard Tkinter Widget interface, plus the following methods:

insert(index, text)
insert(index, text, tags)

> Insert text at the given position (typically INSERT or END). If you provide one or more tags, they are attached to the new text.
>
> If you insert text on a mark, the mark is moved according to its gravity setting.

delete(index)
delete(start, stop)

> Delete the character (or embedded object) at the given position, or all text in the given range. Any marks within the range are moved to the beginning of the range.

get(index)
get(start, stop)

> Return the character at the given position, or all text in the given range.

dump(index, options...)
dump(start, stop, options...)

> Return a list of widget contents at the given position, or for all text in the given range. This includes tags, marks, and embedded objects. Not implemented in Python 1.5.2 and earlier.

see(index)
yview(index)

> If necessary, scroll the text widget to make sure the text at the given position is visible. The see method scrolls the widget only if the given position isn't visible at all, while yview always scrolls the widget to move the given position to the top of the window.

index(index)

> Return the "line.column" index corresponding to the given index.

compare(index1, op, index2)

> Compare the two positions, and return true if the condition held. The op argument is one of "<", "<=", "==", ">=", ">", or "!=" (Python's "<>" syntax is not supported).

Methods for Marks

The following methods are used to manipulate builtin as well as user-defined marks.

mark_set(mark, index)

> Move the mark to the given position. If the mark doesn't exist, it is created (with gravity set to RIGHT). You also use this method to move the predefined INSERT and CURRENT marks.

mark_unset(mark)

> Remove the given mark from the widget. You cannot remove the builtin INSERT and CURRENT marks.

index(mark)

Return the line/column position corresponding to the given mark (or any other index specifier; see above).

mark_gravity(mark)

Return the current gravity setting for the given mark (LEFT or RIGHT).

mark_gravity(mark, gravity)

Sets the gravity for the given mark. The gravity setting controls how to move the mark if text is inserted exactly on the mark. If LEFT, the mark is not moved if text is inserted at the mark (that is, the text is inserted just after the mark). If RIGHT, the mark is moved to the right end of the text (that is, the text is inserted just before the mark). The default gravity setting is RIGHT.

mark_names()

Return a tuple containing the names of all marks used in the widget. This includes the INSERT and CURRENT marks (but not END, which is a special index, not a mark).

Methods for Embedded Windows

The Text widget allows you to embed windows into the widget. Embedded windows occupy a single character position, and moves with the text flow.

window_create(index, options...)

Insert a widget at the given position. You can either create the widget (which should be a child of the text widget itself) first, and insert it using the window option, or provide a callback which is called when the window is first displayed.

Table 41-2. Text Window Options

Option	Type	Description
align	constant	Defines how to align the window on the line. Use one of TOP, CENTER, BOTTOM, or BASELINE. The last alignment means that the bottom of the window is aligned with the text baseline - that is, the same alignment that is used for all text on the line).
create	callback	This callback is called when the window is first displayed by the text widget. It should create the window (as a child to the text widget), and return the resulting widget instance.
padx, pady	distance	Adds horizontal (vertical) padding between the window and the surrounding text. Default is 0 (no padding).
stretch	flag	If zero (or OFF), the window will be left as is also if the line is higher than the window. If non-zero (or ON), the window is stretched to cover the full line (in this case, the alignment is ignored).
window	widget	Gives the widget instance to insert into the text.

index(window)

Return the line/column position corresponding to the given window (or any other index specifier; see above).

delete(window)

Remove the given window from the text widget, and destroy it.

window_cget(index, option)

Return the current value of the given option. If there's no window on the given position, this method raises a TclError exception.

window_config(index, options...)
window_configure(index, options...)

Modifies one or more options. If there's no window on the given position, this method raises a TclError exception.

window_names()

Return a tuple containing all windows embedded in the text widget. In 1.5.2 and earlier, this method returns the *names* of the widgets, rather than the widget instances. This will most likely be fixed in future versions.

Here's how to convert the names to a list of widget instances in a portable fashion:

```
windows = text.window_names()
try:
    windows = map(text._nametowidget, windows)
except TclError: pass
```

Methods for Embedded Images

The Text widget allows you to embed images into the widget. Embedded images occupy a single character position, and moves with the text flow.

Note that the image interface is not available in early version of Tkinter (it's not implemented by Tk versions before 8.0). For such platforms, you can display images by embedding Label widgets instead.

image_create

image_create(index, options...). Insert an image at the given position. The image is given by the image option, and must be a Tkinter PhotoImage or BitmapImage instance (or an instance of the corresponding PIL classes).

This method doesn't work with Tk versions before 8.0.

Table 41-3. Text Image Options

Option	Type	Description
align	constant	Defines how to align the image on the line. Use one of TOP, CENTER, BOTTOM, or BASELINE. The last alignment means that the bottom of the image is aligned with the text baseline -- that is, the same alignment that is used for all text on the line).
image	image	Gives the image instance to insert into the text.
name	string	Gives the name to use when referring to this image in the text widget. The default is the name of the image object (which is usually generated by Tkinter).
padx, pady	distance	Adds horizontal (vertical) padding between the image and the surrounding text. Default is 0 (no padding).

index

index(image). Return the line/column position corresponding to the given image (or any other index specifier; see above).

delete

delete(image). Remove the given image from the text widget, and destroy it.

image_cget

image_cget(index, option). Return the current value of the given option. If there's no image on the given position, this method raises a TclError exception. Not implemented in Python 1.5.2 and earlier.

image_config

image_config(index, options...), image_configure(index, options...). Modifies one or more options. If there's no image on the given position, this method raises a TclError exception. Not implemented in Python 1.5.2 and earlier.

image_names

image_names(). Return a tuple containing the names of all images embedded in the text widget. Tkinter doesn't provide a way to get the corresponding PhotoImage or BitmapImage objects, but you can keep track of those yourself using a dictionary (using str(image) as the key).

This method is not implemented in Python 1.5.2 and earlier.

Methods for Tags

The following methods are used to manipulate tags and tag ranges.

tag_add

tag_add(tag, index), tag_add(tag, start, top). Add *tag* to the character at the given position, or to the given range.

tag_remove

tag_remove(tag, index), tag_remove(tag, start, stop). Remove the tag from the character at the given position, or from the given range. The information associated with the tag is not removed (not even if you use tag_remove(1.0, END)).

tag_delete

tag_delete(tag), tag_delete(tags...). Remove the given tags from the widget. All style and binding information associated with the tags are also removed.

tag_config

tag_config(tag, options...), tag_configure(tag, options...). Set style options for the given tag. If the tag doesn't exist, it is created.

Note that the style options are associated with tags, not text ranges. Any text having a given tag will be rendered according to its style options, even if it didn't exist when the binding was created. If a text range has several tags associated with it, the Text widget combines the style options for all tags. Tags towards the top of the tag stack (created later, or raised using tag_raise) have precedence.

tag_cget

tag_cget(tag, option). Get the current value for the given option.

tag_bind

tag_bind(tag, sequence, func), tag_bind(tag, sequence, func, "+"). Add an event binding to the given tag. Tag bindings can use mouse- and keyboard-related events, plus <Enter> and <Leave>. If the tag doesn't exist, it is created. Usually, the new binding replaces any existing binding for the same event sequence. The second form can be used to add the new callback to the existing binding.

Note that the new bindings are associated with tags, not text ranges. Any text having the tag will fire events, even if it didn't exist when the binding was created. To remove bindings, use tag_remove or tag_unbind.

tag_unbind

tag_unbind(tag, sequence). Remove the binding, if any, for the given tag and event sequence combination.

tag_names

tag_names(). Return a tuple containing all tags used in the widget. This includes the SEL selection tag.

tag_names(index). Return a tuple containing all tags used by the character at the given position.

tag_nextrange

tag_nextrange(tag, index), tag_nextrange(tag, start, stop). Find the next occurence of the given tag, starting at the given index. If two indexes are given, search only from start to stop. Note that this method looks for the start of a range, so if you happen to start on a character that has the given tag, this method will return that range *only* if that character is the first in the range. Otherwise, the current range is skipped.

tag_prevrange

tag_prevrange(tag, index), tag_prevrange(tag, start, stop). Find the next occurence of the given tag, starting at the given index and searching towards the beginning of the text. If two indexes are given, search from *start* to *stop*. As for nextrange, this method looks for the start of a range, beginning at the start index. So if you start on a character that has the given tag, this method will return that range *unless* the search started on the first character in that tag range.

tag_lower

tag_lower(tag), tag_lower(tag, below). Move the given tag to the bottom of the tag stack (or place it just under the *below* tag). If multiple tags are defined for a range of text, options defined by tags towards the top of the stack have precedence.

tag_raise

tag_raise(tag), tag_raise(tag, above). Move the given tag to the top of the tag stack (or place it just over the *above* tag).

tag_ranges

tag_ranges(tag). Return a tuple with start- and stop-indexes for each occurence of the given tag. If the tag doesn't exist, this method returns an empty tuple. Note that the tuple contains two items for each range.

Methods for Selections

To manipulate the selection, use tag methods like tag_add and tag_remove on the SEL tag. There are no selection-specific methods provided by the Text widget.

But if you insist, here's how how to emulate the Entry widget selection methods:

```
def selection_clear(text):
    text.tag_remove(SEL, 1.0, END)

def selection_from(text, index):
    text._anchor = index

def selection_present(text):
    return len(text.tag_ranges(SEL)) != 0
```



```
def selection_range(text, start, end):
    text.tag_remove(SEL, 1.0, start)
    text.tag_add(SEL, start, end)
    text.tag_remove(SEL, end, END)

def selection_to(text, index):
    if text.compare(index, "<", text._anchor):
        selection_range(text, index, text._anchor)
    else:
        selection_range(text, text._anchor, index)
```

Methods for Rendering

The following methods only work if the text widget is updated. To make sure this is the case, call the update_idletasks method before you use any of these.

bbox

bbox(index). Returns the bounding box for the given character, as a 4-tuple: (x, y, width, height). If the character is not visible, this method returns None.

dlineinfo

dlineinfo(index). Returns the bounding box for the line containing the given character, as a 5-tuple: (x, y, width, height, offset). The last tuple member is the offset from the top of the line to the baseline. If the line is not visible, this method returns None.

Methods for Printing

The Text widget doesn't contain any builtin support for printing. To print the contents, use get or dump and pass the resulting text to a suitable output device.

If you have a Postscript printer, you can use PIL's PSDraw module.

Methods for Searching

search

search(pattern, index, options...). Search for text in the widget. Returns the first matching position if successful, or an empty string if there was no match.

Table 41-4. Text Search Options

Option	Type	Description
forwards, backwards	flag	Search from the given position towards the end of the buffer (forwards), or the beginning (backwards). Default is forwards.
exact, regexp	flag	Interpret the pattern as a literal string (exact), or a Tcl-style regular expression (regexp). Default is exact.
nocase	flag	Enable case-insensitive search. Default is case

		sensitive.
stopindex	index	Don't search beyond this position. Default is to search the whole buffer, and wrap around if the search reaches the end of the buffer. To prevent wrapping, set stopindex to END when searching forwards, and 1.0 when searching backwards.
count	variable	Return the length of the match in the given variable. If given, this variable should be a Tkinter IntVar.

Methods for Scrolling

These methods are used to scroll the text widget in various ways. The scan methods can be used to implement fast mouse pan/roam operations (they are bound to the middle mouse button, if available), while the xview and yview methods are used with standard scrollbars.

scan_mark, scan_dragto

scan_mark(x, y), scan_dragto(x, y). scan_mark sets the scanning anchor for fast horizontal scrolling to the given mouse coordinate. scan_dragto scrolls the widget contents sideways according to the given mouse coordinate. The text is moved 10 times the distance between the scanning anchor and the new position.

xview, yview

xview(), yview(). Returns a tuple containing two values; the first value corresponds to the relative offset of the first visible line (column), and the second corresponds to the relative offset of the line (column) just after the last one visible on the screen. Offset 0.0 is the beginning of the text, 1.0 the end.

xview, yview

xview(MOVETO, offset), yview(MOVETO, offset). Adjust the text widget so that the given offset is at the left (top) edge of the text. Offset 0.0 is the beginning of the text, 1.0 the end. These methods are used by the Scrollbar bindings when the user drags the scrollbar slider.

The MOVETO constant is not defined in Python 1.5.2 and earlier. For compatibility, use the string "moveto" instead.

xview, yview

xview(SCROLL, step, what), yview(SCROLL, step, what). Scroll the text widget horizontally (vertically) by the given amount. The what argument can be either UNITS (lines, characters) or PAGES. These methods are used by the Scrollbar bindings when the user clicks at a scrollbar arrow or in the trough.

These constants are not defined in Python 1.5.2 and earlier. For compatibility, use the strings "scroll", "units", and "pages" instead.

yview_pickplace

yview_pickplace(index). Same as see, but only handles the vertical position correctly. New code should use see instead.

Options

The Text widget supports the following options.

FIXME: *sort in relevance order*

Table 41-5. Text Options

Option	Type	Description
background (bg)	color	The background color for this widget. Default is system specific (usually "white"). If you change the background color, you should make sure to change the foreground color as well.
borderwidth (bd)	distance	Border width. Default is platform dependent, but is usually one or two pixels.
cursor	cursor	The cursor to show when the mouse pointer is placed over the text widget. The default is a text insertion cursor (typically an "I beam" cursor, such as xterm).
exportselection	flag	If true, selected text is automatically exported to the clipboard. Default is true.
font	font	Widget font. The default is system specific (usually "black").
foreground (fg)	color	Text color.
height	distance	Widget height, in text units.
highlightback-ground, highlightcolor	color	Controls how to draw the focus highlight border. When the widget has focus, the border is drawn in the highlightcolor color. Otherwise, it is drawn in the highlightbackground color. The defaults are system specific.
highlight-thickness	distance	Controls the width of the focus highlight border. Default is 0 (no border).
insertbackground	color	
insertborderwidth	distance	
insertofftime, insertontime	time	

Option	Type	Description
insertwidth	distance	Controls cursor blinking and style. It's usually best to leave these as they are.
padx, pady	distance	Extra padding between the widget's inner border and the text body. Default is 0 (no padding).
relief	constant	Border decoration. The default is SUNKEN. Other possible values are FLAT, RAISED, GROOVE, and RIDGE.
select-background	color	Selection background color. The default is system and display specific.
selectborder-width	distance	Selection border width. The default is system specific.
select-foreground	color	Selection text color. The default is system and display specific.
setgrid	flag	If true, Tkinter attempts to resize the window containing the text widget in full character steps (based on the font option).
spacing1	distance	Spacing to use above the first line in a block of text. Default is 0 (no extra spacing).
spacing2	distance	Spacing to use between the lines in a block of text wrapped by the widget. Default is 0 (no extra spacing).
spacing3	distance	Spacing to use after the last line of text in a block of text having this tag. Default is 0 (no extra spacing).
state	constant	One of NORMAL or DISABLED. Default is NORMAL. Note that if you set this to DISABLED, calls to insert or delete are ignored.
tabs	string	
takefocus	flag	If true, you can use Tab to move focus to this widget (but not from it; the default bindings for the Text widget insert the tab character). Default is an empty string, which means that the text widget accepts focus only if it has any keyboard bindings (default is on, in other words).
width	distance	Widget width, in text units.
wrap	constant	Word wrap mode. Use one of NONE, CHAR, or WORD. Default is NONE.
xscroll-command, yscroll-	callback	Scrollbar callbacks. These options should be set to the set method for the corresponding scrollbar.

Option	Type	Description
command		

Chapter 42. The Toplevel Widget

The *Toplevel* widget work pretty much like *Frame*, but it is displayed in a separate, top-level window. Such windows usually have title bars, borders, and other "window decorations".

When to use the Toplevel Widget

To be added.

Methods

Except for the standard widget interface (*config*, etc), the *Toplevel* widget has no methods.

Options

Table 42-1.

Option	Type	Description
height, width	distance	Toplevel window size.
background (bg)	color	The background color to use in this toplevel. This defaults to the application background color. To prevent updates, set the color to an empty string.
colormap	widget	Some displays support only 256 colors (some use even less). Such displays usually provide a color map to specify which 256 colors to use. This option allows you to specify which color map to use for this toplevel window, and its child widgets. By default, a new toplevel window uses the same color map as the root window. Using this option, you can reuse the color map of another window instead (this window must be on the same screen and have the same visual characteristics). You can also use the value "new" to allocate a new color map for this window. You cannot change this option once you've created the window.
menu	widget	A menu to associate with this toplevel window. On Unix and Windows, the menu is placed at the top of the toplevel window itself. On Macs, the menu is displayed at the top of the screen when the toplevel window is selected.

Option	Type	Description
cursor	cursor	The cursor to show when the mouse pointer is placed over the toplevel widget. Default is a system specific arrow cursor.
relief	constant	Border decoration: either *FLAT*, *SUNKEN*, *RAISED*, *GROOVE*, or *RIDGE*. The default is *FLAT*.
borderwidth (bd)	distance	Width of the 3D border. Defaults to 0 (no border).
takefocus	flag	Indicates that the user can use the *Tab* key to move to this widget. Default is an empty string, which means that the toplevel accepts focus only if it has any keyboard bindings (default is off, in other words).
highlightback-ground, highlightcolor	color	Controls how to draw the focus highlight border. When any child to the toplevel window has focus, the border is drawn in the *highlightcolor* color. Otherwise, it is drawn in the *highlightbackground* color. The defaults are system specific.
highlight-thickness	distance	Controls the width of the focus highlight border. Default is 0 (no border).
class (class_)	class	
visual	visual	Controls the "visual" type to use for this window. This option should usually be omitted. In that case, the visual type is inherited from the root window. Some more advanced displays support "mixed visuals". This typically means that the root window is a 256-color display (the "pseudocolor" visual type), but that individual windows can be displayed as true 24-bit color (the "truecolor" visual type). On such displays, you may wish to explicitly set the visual option to "truecolor" for any windows used to display full-color images. Other possible values include "directcolor", "staticcolor", "grayscale", or "staticgray". See your X window documentation for details. You cannot change this option once you've created the window.
screen	screen	
container	container	
use	widget	

Chapter 43. Basic Widget Methods

The following methods are provided by all widgets (including the root window). In the method descriptions, *self* refer to the widget via which you reached the method.

The root window and other *Toplevel* windows provide additional methods. See the *Window Methods* section for more information.

Configuration

config

config(options...), configure(options...). Change one or more options for self.

config

config(), configure(). Return a dictionary containing the current settings for all widget options. For each option key in the dictionary, the value is either a five-tuple (option, option database key, option database class, default value, current value), or a two-tuple (option alias, option). The latter case is used for aliases like *bg* (*background*) and *bd* (*borderwidth*).

Note that the value fields aren't correctly formatted for some option types. See the description of the *keys* method for more information, and a workaround.

cget

cget(option). Return the current value for the given option.

Note that option values are always returned as strings (also if you gave a nonstring value when you configured the widget). Use *int* and *float* where appropriate.

keys

keys(). Return a tuple containing the options available for this widget. You can use *cget* to get the corresponding value for each option.

Note that the tuple currently include option aliases (like *bd*, *bg*, and *fg*). To avoid this, you can use *config* instead. On the other hand, *config* doesn't return valid option values for some option types (such as font names), so the best way is to use a combination of *config* and *cget*:

```
for item in w.config():
    if len(item) == 5:
        option = item[0]
        value = w.cget(option)
        print option, value
```


Event processing

mainloop

mainloop(). Enter Tkinter's main event loop. To leave the event loop, use the *quit* method. Event loops can be nested; it's ok to call *mainloop* from within an event handler.

quit

quit(). Leaves Tkinter's main event loop. Note that you can have nested event loops; each call to *quit* terminates the outermost event loop.

update

update(). Process all pending events, call event callbacks, complete any pending geometry management, redraw widgets as necessary, and call all pending idle tasks. This method should be used with care, since it may lead to really nasty race conditions if called from the wrong place (from within an event callback, for example, or from a function that can in any way be called from an event callback, etc.)

update_idletasks

update_idletasks(). Call all pending idle tasks, without processing any other events. This can be used to carry out geometry management and redraw widgets if necessary, without calling any callbacks.

focus_set

focus_set(), focus(). Move keyboard focus to self. This means that all keyboard events sent to the application will be routed to self.

focus_displayof

focus_displayof().

focus_force

focus_force(). Force keyboard focus to self.

FIXME: *what's the difference between "moving" and "forcing"*?

focus_get

focus_get().

focus_lastfor

focus_lastfor().

tk_focusNext

tk_focusNext(). Return the next widget (following self) that should have focus. This is used by the default bindings for the *Tab* key.

tk_focusPrev

tk_focusPrev(). Return the previous widget (preceding self) that should have focus. This is used by the default bindings for the *Shift-Tab* key.

grab_current

grab_current().

grab_release

grab_release(). Release the event grab.

grab_set

grab_set(). Route all events for this application to *self*.

grab_set_global

grab_set_global(). Route all events for the entire screen to *self*.

This should only be used in very special circumstances, since it blocks all other applications running on the same screen. And that probably includes your development environment, so you better make sure your application won't crash or lock up until it has properly released the grab.

grab_status

grab_status().

wait_variable

wait_variable(variable). Wait for the given Tkinter variable to change. This method enters a local event loop, so other parts of the application will still be responsive. The local event loop is terminated when the variable is updated (setting it to it's current value also counts).

wait_visibility

wait_visibility(widget). Wait for the given widget to become visible. This is typically used to wait until a new toplevel window appears on the screen. Like *wait_variable*, this method enters a local event loop, so other parts of the application will still work as usual.

wait_window

wait_window(widget). Wait for the given widget to be destroyed. This is typically used to wait until a destroyed window disappears from the screen. Like *wait_variable* and *wait_visibility*, this method enters a local event loop, so other parts of the application will still work as usual.

Event callbacks

All event callbacks take one argument; an event descriptor. See the introduction for more information on this descriptor.

bind

bind(sequence, callback), bind(sequence, callback, "+"). Add an event binding to self. Usually, the new binding replaces any existing binding for the same event sequence. The second form can be used to add the new callback to the existing binding.

unbind

unbind(sequence). Remove any bindings for the given event sequence, for self.

bind_all

bind_all(sequence, callback), bind_all(sequence, callback, "+"). Add an event binding to the application level. Usually, the new binding replaces any existing binding for the same event sequence. The second form can be used to add the new callback to the existing binding.

unbind_all

unbind_all(sequence). Remove any bindings for the given event sequence, on the application level.

bind_class

bind_class(class, sequence, func), bind_class(class, sequence, func, "+"). Add an event binding to the given widget class. Usually, the new binding replaces any existing binding for the same event sequence. The second form can be used to add the new callback to the existing binding.

unbind_class

unbind_class(class, sequence). Remove any bindings for the given event sequence, for the given binding class.

bindtags

bindtags(). Return a tuple containing the binding search order used for self. By default, this tuple contains the self's widget name (*str(self)*), the widget class (e.g. *Button*), the root window's name, and finally the special name *all* which refers to the application level.

bindtags

bindtags(bindings). Modify the binding search order for self.

Alarm handlers and other non-event callbacks

after

after(delay_ms, callback, args...). Register an alarm callback that is called after the given number of milliseconds (Tkinter only guarantees that the callback will not be called earlier than that; if the system is busy, the actual delay may be much longer). The callback is only called once for each call to *after*. To keep calling the callback, you need to reregister the callback inside itself:

```
class App:
    def __init__(self, master):
        self.master = master
        self.poll() # start polling

    def poll(self):
        ...
        self.master.after(100, self.poll)
```

You can provide one or more arguments which are passed to the callback. This method returns an alarm id which can be used with *after_cancel* to cancel the callback.

after_cancel

after_cancel(id). Cancels the given alarm callback.

after

after(delay_ms). Wait for the given number of milliseconds. Note that in the current version, this also blocks the event loop. In practice, this means that you might as well do:

```
time.sleep(delay_ms*0.001)
```

after_idle

after_idle(callback, args...). Register an idle callback which is called when the system is idle (that is, when there are no more events to process in the mainloop). The callback is only called once for each call to *after_idle*.

Window management

lift

lift(), tkraise(), lift(above), tkraise(above). Move self to the top of the window stack. If self is a child window, it is moved to the top of it's toplevel window. If self is a toplevel window (the root or a *Toplevel* window), it is moved in front of all other windows on the display. If an argument is given, the widget (or window) is moved so it's just above the given widget (window).

lower

lower(), lower(below). Same as *lift*, but moves the widget to the bottom of the stack (or places it just under the *below* widget).

Window Related Information

This group of methods provide information related to the widget (*self*) to which the method belongs.

winfo_cells

winfo_cells(). Return the number of "cells" in the color map for self. This is typically a value between 2 and 256 (also for true color displays, by some odd reason).

winfo_children

winfo_children(). Return a list containing widget instances for all children of self. The windows are returned in stacking order from bottom to top. If the order doesn't matter, you can get the same information from the *children* widget attribute (it's a dictionary mapping Tk widget names to widget instances, so *widget.children.values()* gives you a list of instances).

winfo_class

winfo_class(). Returns the Tkinter widget class name for self. If self is a Tkinter base widget, *widget.winfo_class()* is the same as *widget.__class__.__name__*.

winfo_colormapfull

winfo_colormapfull(). Return true if the color map for self is full.

winfo_containing

winfo_containing(x, y). Return the widget at the given position, or *None* if there is no such window, or it isn't owned by this application. The coordinates are given relative to the screen's upper left corner.

winfo_depth

winfo_depth(). Return the bit depth used to display self. This is typically 8 for a 256-color display device, 15 or 16 for a "hicolor" display, and 24 or 32 for a true color display.

winfo_exists

winfo_exists(). Return true if there is Tk window corresponding to self. Unless you've done something really strange, this method should always return true.

winfo_pixels

winfo_pixels(distance), winfo_fpixels(distance). Convert the given distance (in any form accepted by Tkinter) to the corresponding number of pixels. *winfo_pixels* returns an integer value, *winfo_fpixels* a floating point value.

winfo_geometry

winfo_geometry(). Returns a string describing self's "geometry". The string has the following format:

```
"%dx%d%+d%+d" % (width, height, xoffset, yoffset)
```

where all coordinates are given in pixels.

winfo_width, winfo_height

winfo_width(), winfo_height(). Return the width (height) of self, in pixels. Note that if the window isn't managed by a geometry manager, these methods returns 1. To you get the real value, you may have to call *update_idletasks* first. You can also use *winfo_reqheight* to get the widget's requested height (that is, the "natural" size as defined by the widget itself based on it's contents).

winfo_id

winfo_id(). Return a string containing a system-specific window identifier corresponding to self. For Unix, this is the X window identifier. For Windows, this is the HWND cast to a long integer.

winfo_ismapped

winfo_ismapped(). Return true if there is window corresponding to self in the underlying window system (an X window, a Windows HWND, etc).

winfo_manager

winfo_manager(). Return the name of the geometry manager used to keep manage self (typically one of *grid*, *pack*, *place*, *canvas*, or *text*).

FIXME: *this is not implemented by Tkinter (or is it, in 1.5.2?)*

winfo_name

winfo_name(). Return the Tk widget name. This is the same as the last part of the full widget name (which you can get via *str(widget)*).

winfo_parent

winfo_parent(). Return the full widget name of self's parent, or an empty string if self doesn't have a parent (if self is the root window, that is).

To get the widget instance instead, you can simply use the *master* attribute instead of calling this method (the *master* attribute is *None* for the root window). Or if you insist, use *_nametowidget* to map the full widget name to an instance.

winfo_pathname

winfo_pathname(id). Return the full window name for the window having the given identity (see *winfo_id* for details). If the window doesn't exist, or it isn't owned by this application, Tkinter raises a *TclError* exception.

To convert the full name to a widget instance, use *_nametowidget*.

winfo_reqheight, winfo_reqwidth

winfo_reqheight(), winfo_reqwidth(). Return the "natural" height (width) for self. The natural size is the minimal size needed to display the widget's contents, including padding, borders, etc. This size is calculated by the widget itself, based on the given options. The actual widget size is then determined by the widget's geometry manager, based on this value, the size of the widget's master, and the options given to the geometry manager.

winfo_rootx, winfo_rooty

winfo_rootx(), winfo_rooty(). Return the pixel coordinates for self's upper left corner, relative to the screen's upper left corner.

winfo_screen

winfo_screen(). Return the X window screen name for the current window. The string has the following format:

```
":%d.%d" % (display, screen)
```

On Windows and Macintosh, this is always ":0.0".

winfo_screencells

winfo_screencells(). Returns the number of "cells" in the default color map for self's screen.

winfo_screendepth

winfo_screendepth(). Return the default bit depth for self's screen.

winfo_screenwidth, winfo_screenheight

winfo_screenwidth(), winfo_screenheight(). Return the width (height) of self's screen, in pixels.

winfo_screenmmwidth, winfo_screenmmheight

winfo_screenmmwidth(), winfo_screenmmheight(). Return the width (height) of self's screen, in millimetres. This may not be accurate on all platforms.

FIXME: *does this take the logical resolution into account on Windows?*

winfo_screenvisual

winfo_screenvisual(). Return the "visual" type used for self. This is typically "pseudocolor" (for 256-color displays) or "truecolor" (for 16- or 24-bit displays).

Other possible values (on X window systems only) include "directcolor", "staticcolor", "grayscale", or "staticgray".

winfo_toplevel

winfo_toplevel(). Return the toplevel window (or root) window for self, as a widget instance.

winfo_visual

winfo_visual(). Return a string describing the display type (the X window "visual") for self's screen. This is one of *staticgray*, *grayscale*, *staticcolor*, *psuedocolor*, *directcolor*, or *truecolor*. For most display devices, this is either *psuedocolor* (an 8-bit colormapped display), or *truecolor* (a 15- or 24-bit truecolor display).

winfo_x, winfo_y

winfo_x(), winfo_y(). Return the pixel coordinates for self's upper left corner, relative to its parent's upper left corner.

Miscellaneous

bell

bell(). Generate a system-dependent sound (typically a short beep).

clipboard_append

clipboard_append(string). Add text to the clipboard.

clipboard_clear

clipboard_clear(). Clear the clipboard.

selection_clear

selection_clear().

selection_get

selection_get().

selection_handle

selection_handle(command).

selection_own

selection_own().

selection_own_get

selection_own_get().

tk_focusFollowsMouse

tk_focusFollowsMouse().

tk_strictMotif

tk_strictMotif(flag). Under Unix, this method can be called to enforce strict Motif look and feel. To use this, create a root window by calling the *Tk* constructor, and then call this method with flag set to 1 before you create any other widgets. This method has no effect on other platforms.

winfo_rgb

winfo_rgb(color). Convert a color string (in any form accepted by Tkinter) to a 3-tuple containing the corresponding red, green, and blue component. Note that the tuple contains 16-bit values (0..65535).

Tkinter Interface Methods

The following methods are used by Tkinter's inner workings. Don't use these unless you know exactly what you are doing, and why you should do that.

getboolean

getboolean(s). Convert a string to a boolean (flag) value, using Tcl's conventions.

getdouble

getdouble(s). Convert a string to a floating point value, using Tcl's conventions. In practice, this is equivalent to *float* and *string.atof*.

getint

getint(s). Convert a string to an integer point value, using Tcl's conventions. In practice, this is equivalent to *int* and *string.atoi*.

register

register(callback). Register a Tcl to Python callback. Returns the name of a Tcl wrapper procedure. When that procedure is called from a Tcl program, it will call the corresponding Python function with the arguments given to the Tcl procedure. Values returned from the Python callback are converted to strings, and returned to the Tcl program.

winfo_atom

winfo_atom(string). Map the given to a unique integer. Everytime you call this method with the same string, the same integer will be returned.

winfo_atomname

winfo_atomname(id). Return the string corresponding to the given integer (obtained by a call to *winfo_atom*). If the integer isn't in use, Tkinter raises a *TclError* exception. Note that Tkinter predefines a bunch of integers (typically 1-80 or so). If you're curious, you can use *winfo_atomname* to find out what they are used for.

Option Database

Not yet documented.

option_add

option_add(pattern, value).

option_clear

option_clear().

option_get

option_get(name, className).

option_readfile

option_readfile(fileName).

Chapter 44. Toplevel Window Methods

This group of methods are used to communicated with the window manager. They are available on the root window (*Tk*), as well as on all *Toplevel* instances.

Note that different window managers behave in different ways. For example, some window managers don't support icon windows, some don't support window groups, etc.

Visibility Methods

deiconify

deiconify(). Display the window. New windows are displayed by default, so you only have to use this method if you have used *iconify* or *withdraw* to remove the window from the screen.

iconify

iconify(). Turn the window into an icon (without destroying it). To redraw the window, use *deiconify*. Under Windows, the window will show up in the taskbar.

When the window has been iconified, the *state* method returns "iconic".

withdraw

withdraw(). Remove the window from the screen (without destroying it). To redraw the window, use *deiconify*.

When the window has been withdrawn, the *state* method returns "withdrawn".

state

state(). Returns the current state of self. This is one of the values "normal", "iconic" (see *iconify*), "withdrawn" (see *withdraw*) or "icon" (see *iconwindow*).

Style Methods

title

title(string), title(). Set (get) the window title.

group

group(window). Adds *self* to the window group controlled by the given window. A group member is usually hidden when the group owner is iconified or withdrawn (the exact behavior depends on the window manager in use).

transient

transient(master). Make self a transient window for the given master (if omitted, *master* defaults to self's parent). A transient window is always drawn on top of its master, and is automatically hidden when the master is iconified or withdrawn. Under Windows, *transient* windows don't show show up in the task bar.

overrideredirect

overrideredirect(flag), overrideredirect(). Set (get) the *override redirect* flag. If non-zero, this prevents the window manager from decorating the window. In other words, the window will not have a title or a border, and it cannot be moved or closed via ordinary means.

Window Geometry Methods

geometry

geometry(). Returns a string describing self's "geometry". The string has the following format:

```
"%dx%d%+d%+d" % (width, height, xoffset, yoffset)
```

where all coordinates are given in pixels.

geometry

geometry(geometry). Change the geometry for *self*. The string format is as described above.

aspect

aspect(minNumer, minDenom, maxNumer, maxDenom), aspect(). Control the aspect ratio (the relation between width and height) of this window. The aspect ratio is constrained to lie between *minNumer/minDenom* and *maxNumer/maxDenom*.

If no arguments are given, this method returns the current constraints as a 4-tuple, if any.

maxsize

maxsize(width, height), maxsize(). Set (get) the maximum size for this window.

minsize

minsize(width, height), minsize(). Set (get) the minimum size for this window.

resizable

resizable(width, height), resizable(). Set (get) the resize flags. The *width* flag controls whether the window can be resized horizontally by the user. The *height* flag controls whether the window can be resized vertically.

Icon Methods

iconbitmap

iconbitmap(bitmap), iconbitmap(). Set (get) the icon bitmap to use when this window is iconified. This method are ignored by some window managers (including Windows).

Note that this method can only be used to display monochrome icons. To display a color icon, put it in a *Label* widget and display it using the *iconwindow* method instead (see below).

iconmask

iconmask(bitmap), iconmask(). Set (get) the icon bitmap mask to use when this window is iconified. This method are ignored by some window managers (including Windows).

iconname

iconname(newName=None), iconname(). Set (get) the icon name to use when this window is iconified. This method are ignored by some window managers (including Windows).

iconposition

iconposition(x, y), iconposition(). Set (get) the icon position hint to use when this window is iconified. This method are ignored by some window managers (including Windows).

iconwindow

iconwindow(window), iconwindow(). Set (get) the icon window to use as an icon when this window is iconified. This method are ignored by some window managers (including Windows).

Property Access Methods

client

client(name), client(). Set (get) the WM_CLIENT_MACHINE property. This property is used by window managers under the X window system. It is ignored on other platforms.

To remove the property, set it to an empty string.

colormapwindows

colormapwindows(wlist...), colormapwindows(). Set (get) the WM_COLORMAP_WINDOWS property. This property is used by window managers under the X window system. It is ignored on other platforms.

command

command(value), command(). Set (get) the WM_COMMAND property. This property is used by window managers under the X window system. It is ignored on other platforms.

To remove the property, set it to an empty string.

focusmodel

focusmodel(model), focusmodel(). Set (get) the focus model.

frame

frame(). Return a string containing a system-specific window identifier corresponding to self's outermost parent. For Unix, this is the X window identifier. For Windows, this is the HWND cast to a long integer.

Note that if the window hasn't been reparented by the window manager, this method returns the window identifier corresponding to self.

positionfrom

positionfrom(who), positionfrom(). Set (get) the position controller.

protocol

protocol(name, function). Register *function* as a callback which will be called for the given protocol. The *name* argument is typically one of *BWM_DELETE_WINDOW* (the window is about to be deleted), *WM_SAVE_YOURSELF* (called by X window managers when the application should save a snapshot of its working set) or WM_TAKE_FOCUS (called by X window managers when the application receives focus).

sizefrom

sizefrom(who), sizefrom(). Set (get) the size controller.

Index