Events and Binds

Introduction

A Tkinter application runs most of its time inside an event loop, which is entered via the mainloop method. It waiting for events to happen. Events can be key presses or mouse operations by the user.

Tkinter provides a mechanism to let the programmer deal with events. For each widget, it's possible to bind Python functions and methods to an event.

widget.bind(event, handler)

If the defined event occurs in the widget, the "handler" function is called with an event object. describing the event.

```
#!/usr/bin/python3
# write tkinter as Tkinter to be Python 2.x compatible
from tkinter import *
def hello(event):
    print("Single Click, Button-1")
def quit(event):
    print("Double Click, so let's stop")
    import sys; sys.exit()

widget = Button(None, text='Mouse Clicks')
widget.pack()
widget.bind('<Button-1>', hello)
widget.bind('<Double-1>', quit)
widget.mainloop()
```

Let's have another simple example, which shows how to use the motion event, i.e. if the mouse is moved inside of a widget:

```
from tkinter import *

def motion(event):
    print("Mouse position: (%s %s)" % (event.x, event.y))
    return

master = Tk()
whatever_you_do = "Whatever you do will be insignificant, but it is very important that you do
it.\n(Mahatma Gandhi)"
msg = Message(master, text = whatever_you_do)
msg.config(bg='lightgreen', font=('times', 24, 'italic'))
msg.bind('<Motion>',motion)
msg.pack()
mainloop()
```

Every time we move the mouse in the Message widget, the position of the mouse pointer will be printed. When we leave this widget, the function motion() is not called anymore.

Events

Tkinter uses so-called event sequences for allowing the user to define which events, both specific and general, he or she wants to bind to handlers. It is the first argument "event" of the bind method. The event sequence is given as a string, using the following syntax:

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

The type field is the essential part of an event specifier, whereas the "modifier" and "detail" fields are not obligatory and are left out in many cases. They are used to provide additional information for the chosen "type". The event "type" describes the kind of event to be bound, e.g. actions like mouse clicks, key presses or the widget got the input focus.

Event	Description
<Button>	A mouse button is pressed with the mouse pointer over the widget. The detail part specifies which button, e.g. The left mouse button is defined by the event <Button-1>, the middle button by <Button-2>, and the rightmost mouse button by <Button-3>. <Button-4> defines the scroll up event on mice with wheel support and and <Button-5> the scroll down. If you press down a mouse button over a widget and keep it pressed, Tkinter will automatically "grab" the mouse pointer. Further mouse events like Motion and Release events will be sent to the current widget, even if the mouse is moved outside the current widget. The current position, relative to the widget, of the mouse pointer 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: , , and <1> are all synonyms.
<Motion>	The mouse is moved with a mouse button being held down. To specify the left, middle or right mouse button use <B1-Motion>, <B2-Motion> and <B3-Motion> respectively. The current position of the mouse pointer is provided in the x and y members of the event object passed to the callback, i.e. event.x, event.y
<ButtonRelease>	Event, if a button is released. To specify the left, middle or right mouse button use <ButtonRelease-1>, <ButtonRelease-2>, and <ButtonRelease-3> respectively. The current position of the mouse pointer is provided in the x and y members of the event object passed to the callback, i.e. event.x and event.y
<Double-Button>	Similar to the Button event, see above, but the button is double clicked instead of a single click. To specify the left, middle or right mouse button use <Double-Button-1>, <Double-Button-2>, and <Double-Button-3> respectively. You can use Double or Triple as prefixes. Note that if you bind to both a single click (<Button-1>) and a double click (<Double-Button-1>), both bindings will be called.
<Enter>	The mouse pointer entered the widget. Attention: This doesn't mean that the user pressed the Enter key!. <Return> is used for this purpose.
<Leave>	The mouse pointer left the widget.
<FocusIn>	Keyboard focus was moved to this widget, or to a child of this widget.
<FocusOut>	Keyboard focus was moved from this widget to another widget.
<Return>	The user pressed the Enter key. You can bind to virtually all keys on the 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).
a	The user typed an "a" key. 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 size of the widget changed. The new size is provided in the width and height attributes of the event object passed to the callback. On some platforms, it can mean that the location changed.

Event Computing

In computing an event is an action that is usually initiated outside the scope of a program and that is handled by a piece of code inside the program. Events include, for example, mouse clicks, mouse movements or a keystroke of a user, i.e. he or she presses a key on the keyboard. Another source can be a hardware device such as a timer.

A program or a script whose behaviour depends on events is said to be event-driven.

This website is created by Bernd Klein from:

Bodenseo
Python Training Courses

Events Philosophically

An Event is an occurrence regarded as a bare instant of space-time as contrasted with an object which fills space and has endurance. It can also be an occurrence regarded in isolation from, or contrasted with, human agency Compare act.

We also like to thank Denise Mitchinson for providing the style sheet of this website.

Classroom Trainings

This website contains a free and extensive online tutorial by Bernd Klein, using material from his live Python classes.

If you are interested in an instructor-led classroom training course, you may have a look at the Python and Tkinter courses

by Bernd Klein at Bodensee. You can attend one of his Python courses in Paris, London, Toronto, Berlin, Munich, Hamburg, Amsterdam, Den Haag (The Hague) or Lake Constance / Zurich.

It is also possible to book an on-site training course at your company or institute.

Quote of the Day:

"I think it is inevitable that people program poorly. Training will not substantially help matters. We have to learn to live with it." (Alan Perlis)

Graphical User Interface

A graphical user interface (GUI) is a type of user interface that allows users to interact with electronic devices in a graphical way, i.e. with images, rather than text commands. Originally interactive user interfaces to computers were not graphical, they were text oriented and usually consisted of commands, which had to be remembered. The DOS operating system from Microsoft and the Bourne shell under Linux are examples of such user-computer interfaces.

Team

Most of this tutorial was created by Bernd Klein. Some chapters of the chapter on machine learning were created by Tobias Schlagenhauf. Melisa Atay has created a chapter on Tkinter. Further chapters are currently being created by Bernd and Melisa. Melisa also takes care of maintaining and updating the website together with Bernd.

We are happy to accept guest contributions if they meet the quality standards of this website. Please note, however, that we cannot pay you any fees, as this website does not generate any income apart from very few donations. Donations that can only cover a minimal part of the costs of this website.

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