Tkinter Canvas

Summary: in this tutorial, you'll learn about the Tkinter Canvas widget and how to draw various objects on it.

Introduction to the Tkinter canvas widget

The canvas widget is the most flexible widget in Tkinter. The Canvas widget allows you to build anything from custom widgets to complete user interfaces.

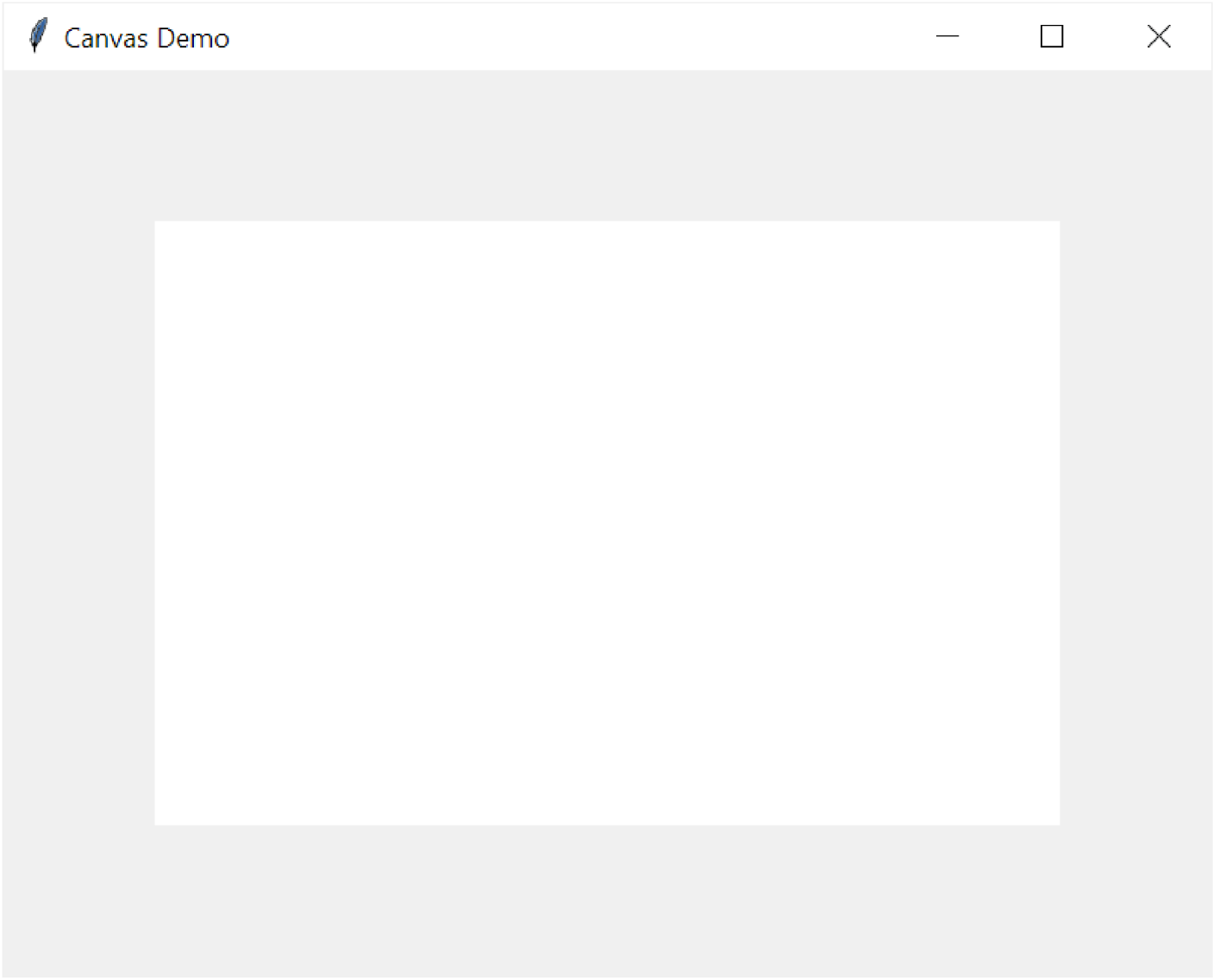
The canvas widget is a blank area on which you can draw figures, create text, and place images.

To create a canvas widget, you create a new instance of the `Canvas` class from the `tkinter` module. For example, the following creates a canvas on a window:

```
import tkinter as tk

root = tk.Tk()
root.geometry('800x600')
root.title('Canvas Demo')

canvas = tk.Canvas(root, width=600, height=400, bg='white')
```

```
canvas.pack(anchor=tk.CENTER, expand=True)

root.mainloop()
```

Output:



How it works.

First, create a new `Canvas` object with the width `600px`, height `400px` and background `white`:

```
canvas = tk.Canvas(root, width=600, height=400, bg='white')
```

Second, place the `canvas` object on the `root` window using the `pack()` (https://www.pythontutorial.net/tkinter/tkinter-pack/) geometry.

```
canvas.pack(anchor=tk.CENTER, expand=True)
```

A canvas has a coordinate system like a window. The origin `(0,0)` is at the top-left corner. The direction of the x-axis is from left to right and the direction of the y-axis is from top to bottom.

Adding items to a canvas using create_* methods

A canvas object has a number of `add_*` methods. These methods allow you to place items on it. The items are:

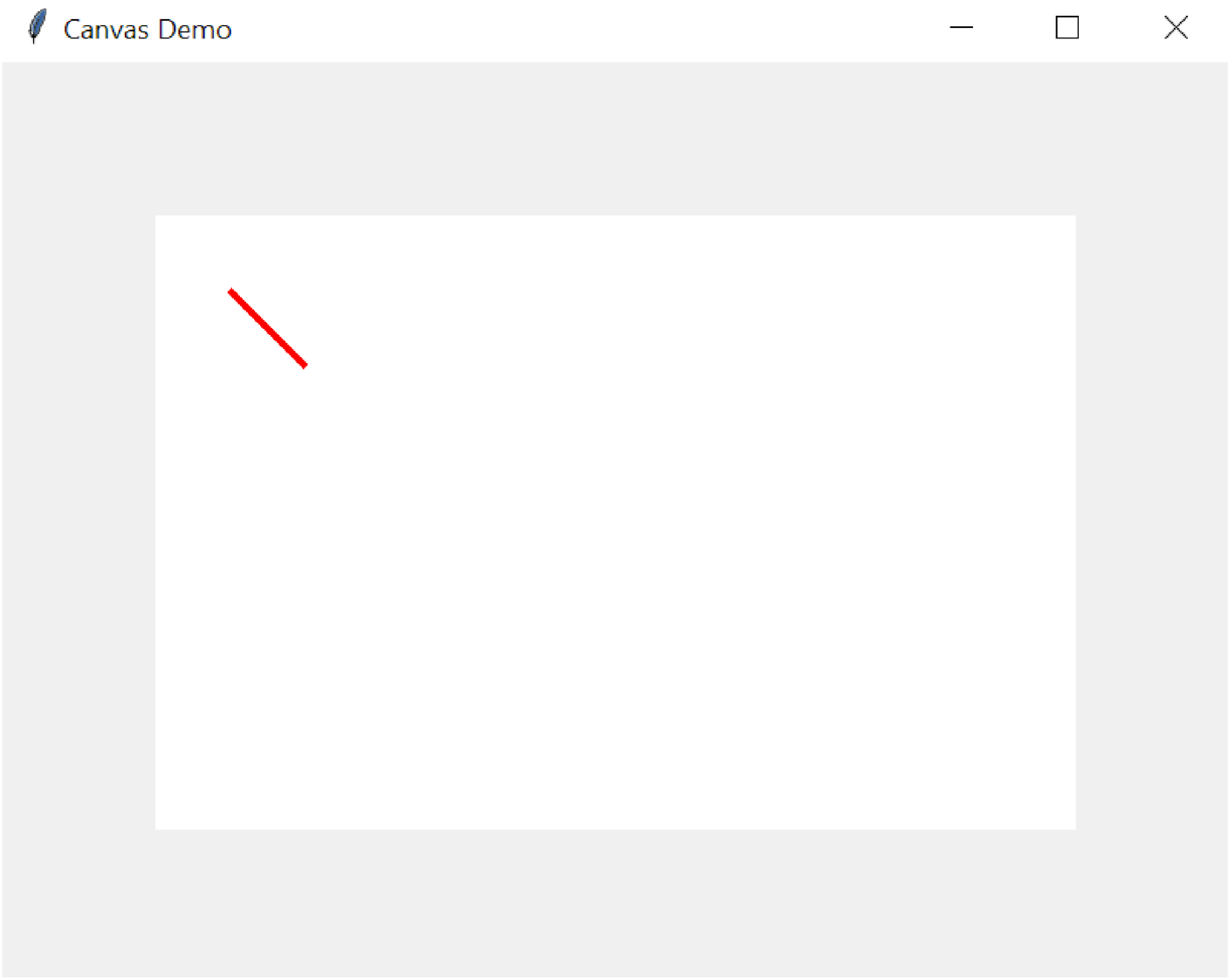
Item	Method
Line	create_line()
Rectangle	create_rectangle()
Oval	create_oval()
Arc	create_arc()
Polygon	create_polygon()
Text	create_text(()
Image	create_image()

Creating a line

To create a line, you use the `create_line()` method. For example, the following creates a red line:

```
canvas.create_line((50, 50), (100, 100), width=4, fill='red')
```

Output:



In this example, a line consists of two points `(50,50)` and `(100,100)`. The `create_line()` method connects the dots between these points.

The `width` argument specifies the width of the line. And the `fill` argument specifies the color of the line.

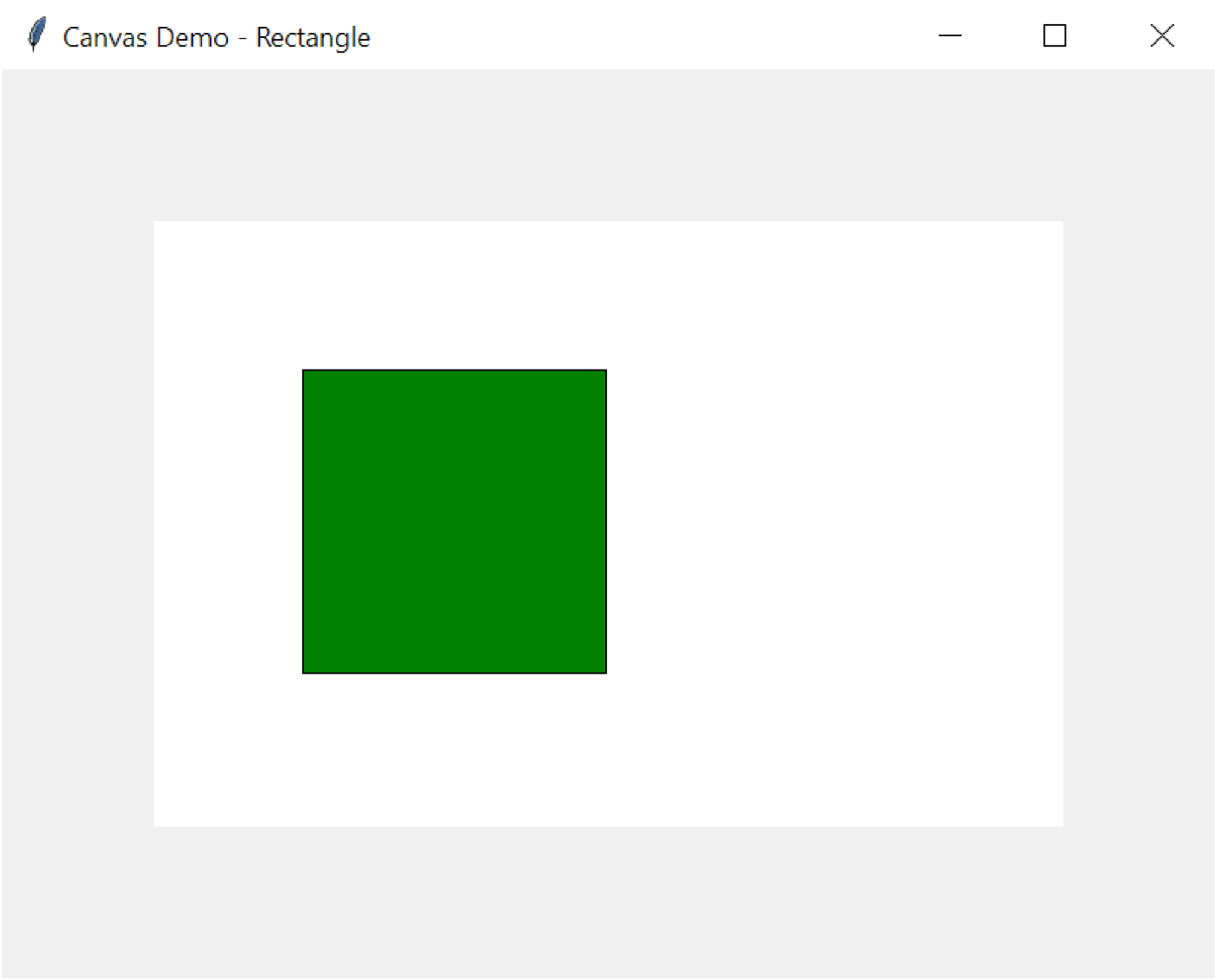
Creating a rectangle

To draw a rectangle, you use the `create_rectangle()` method. For example:

```
import tkinter as tk

root = tk.Tk()
root.geometry('800x600')
root.title('Canvas Demo - Rectangle')
```

```
canvas = tk.Canvas(root, width=600, height=400, bg='white')
canvas.pack(anchor=tk.CENTER, expand=True)

canvas.create_rectangle((100, 100), (300, 300), fill='green')

root.mainloop()
```

Output:



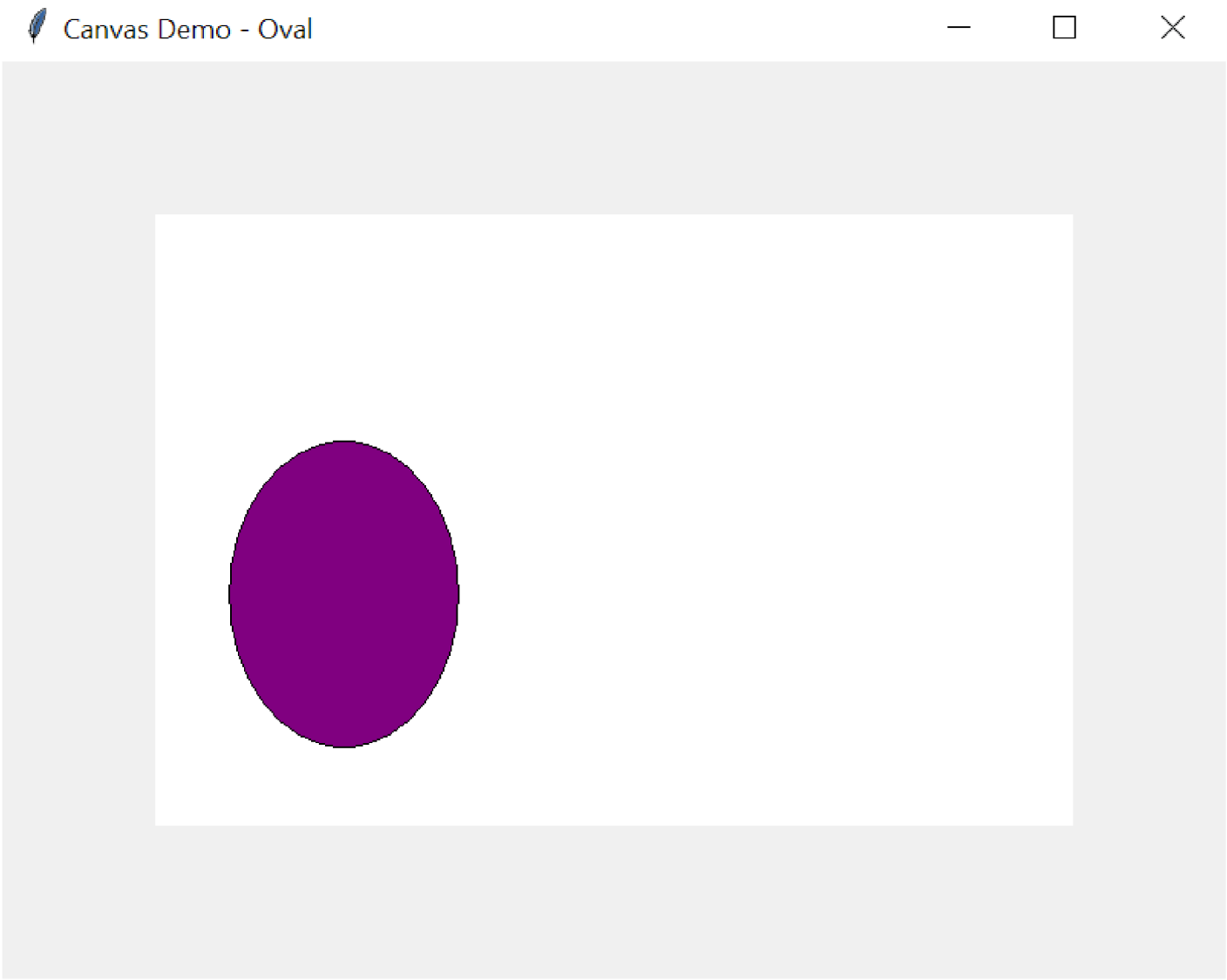
Creating an oval

To draw an oval, you use the `create_oval()` method. For example:

```
import tkinter as tk
```

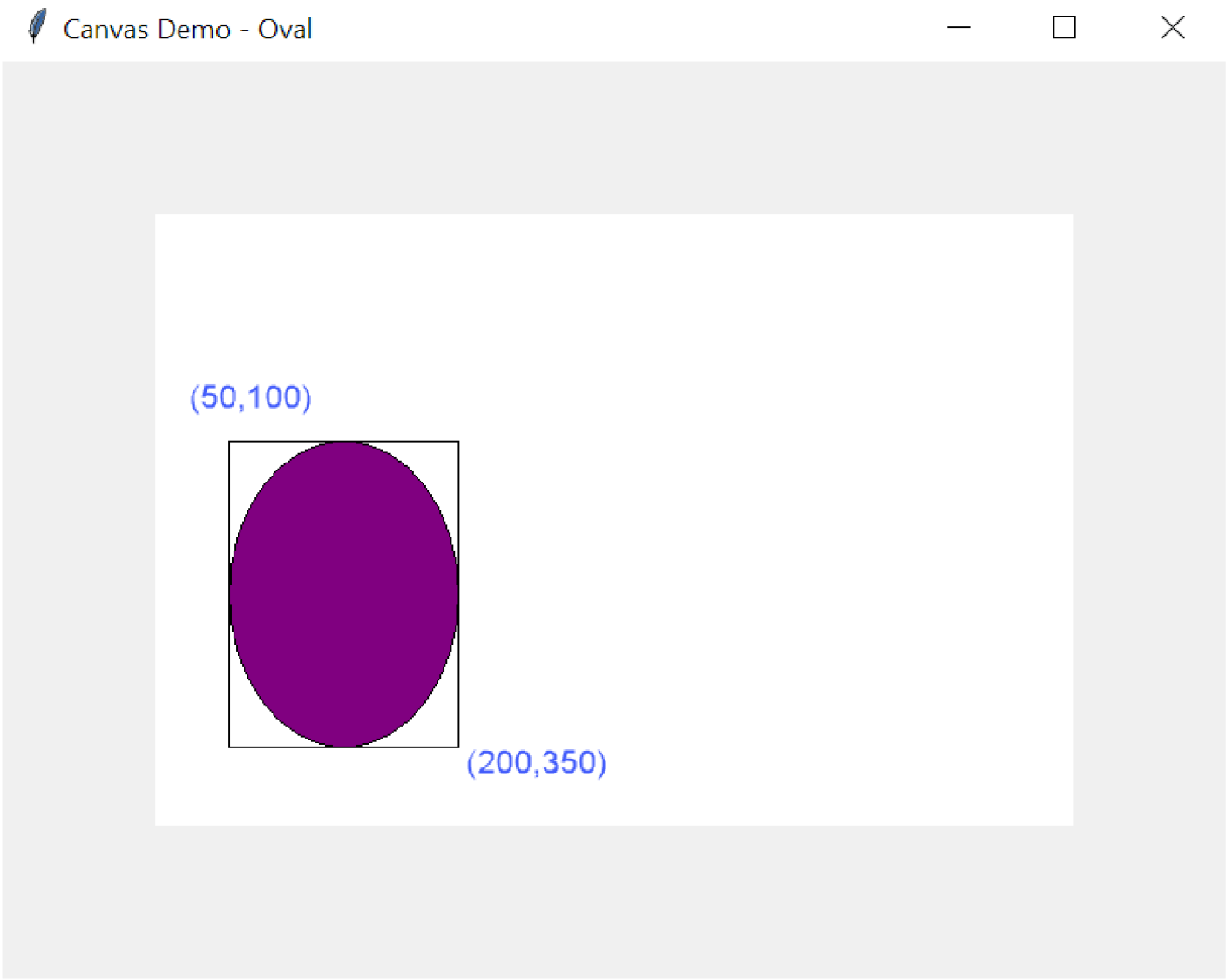
```
root = tk.Tk()
root.geometry('800x600')
root.title('Canvas Demo - Oval')

canvas = tk.Canvas(root, width=600, height=400, bg='white')
canvas.pack(anchor=tk.CENTER, expand=True)


points = (
    (50, 150),
    (200, 350),
)
canvas.create_oval(*points, fill='purple')

root.mainloop()
```

Output:



Like a rectangle, an oval takes the coordinate of the upper-left and lower-right corners of its *bounding box*. A bounding box of an oval is the smallest rectangle that contains the oval.

In this example, the upper-left and lower-right corners of the bounding box are `(50,150)` and `(200,350)` .



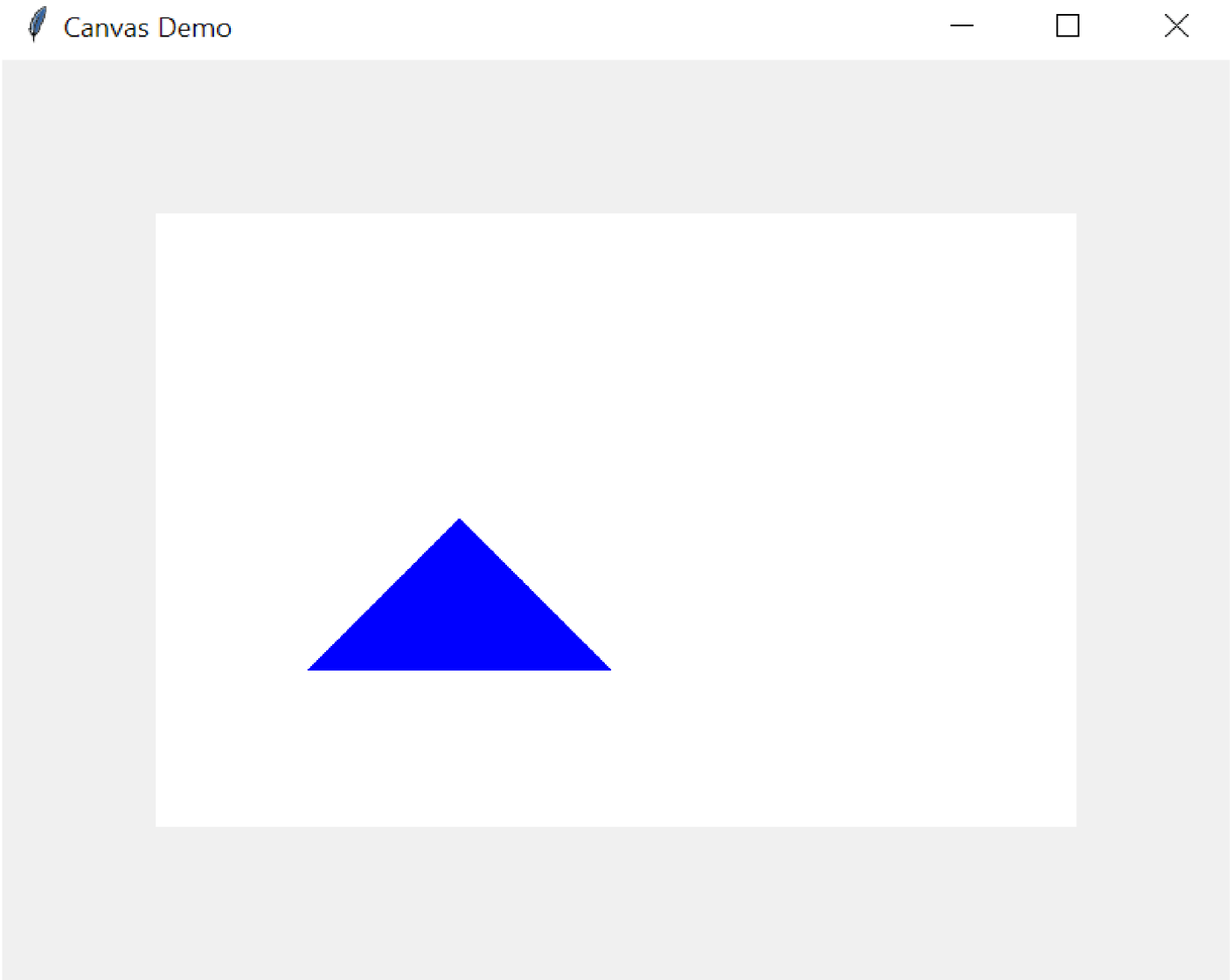
Creating a polygon

To draw a polygon, you use the `create_polygon()` method. For example:

```
import tkinter as tk

root = tk.Tk()
root.geometry('800x600')
root.title('Canvas Demo - Polygon')

canvas = tk.Canvas(root, width=600, height=400, bg='white')
canvas.pack(anchor=tk.CENTER, expand=True)


# create a polygon
```

```
points = (
    (100, 300),
    (200, 200),
    (300, 300),
)
canvas.create_polygon(*points, fill='blue')

root.mainloop()
```

Output:

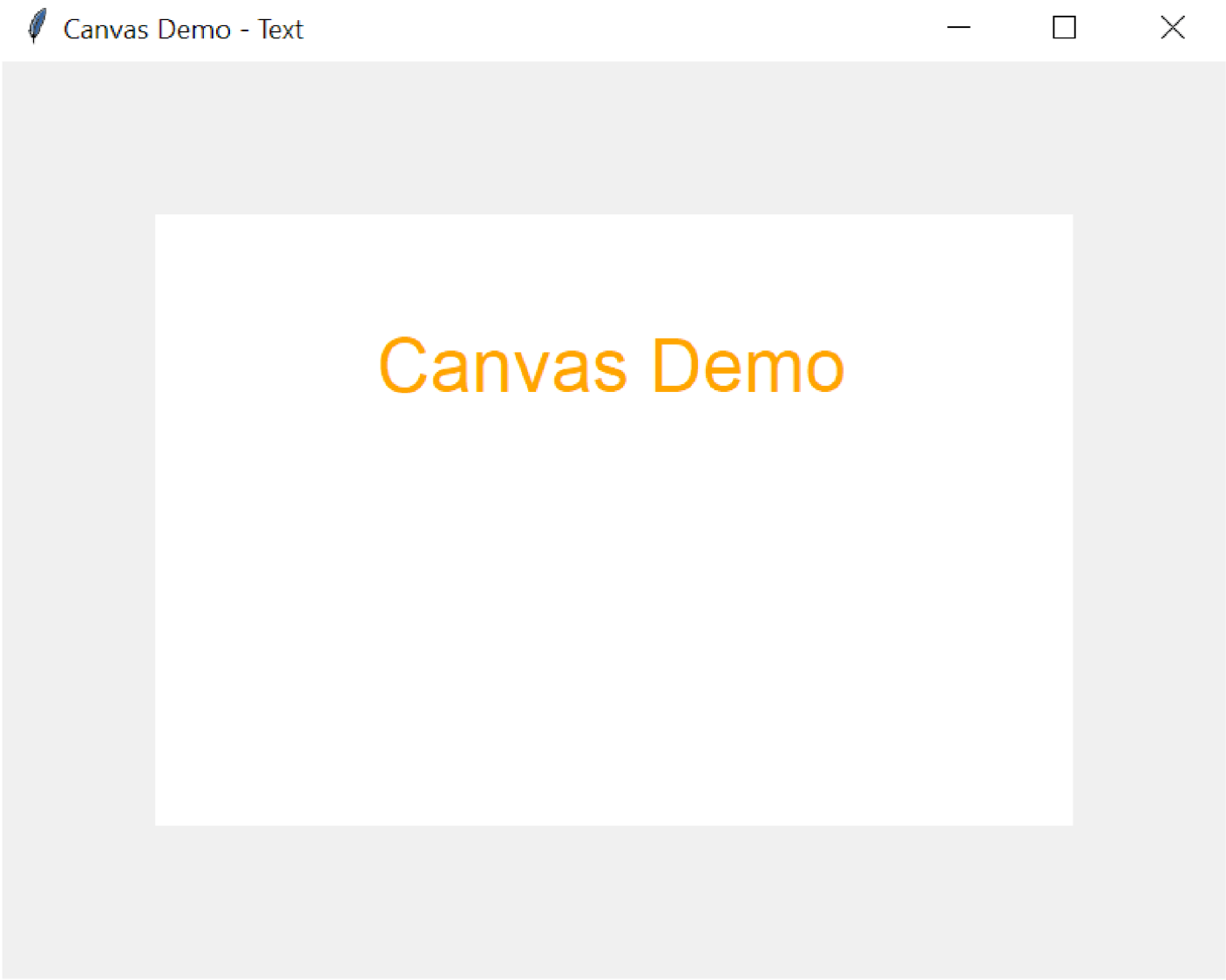


Creating a text

To place a text on a canvas, you use the `create_text()` method. For example:

```
import tkinter as tk

root = tk.Tk()
root.geometry('800x600')
root.title('Canvas Demo - Text')

canvas = tk.Canvas(root, width=600, height=400, bg='white')
canvas.pack(anchor=tk.CENTER, expand=True)


canvas.create_text(
    (300, 100),
    text="Canvas Demo",
    fill="orange",
    font='tkDefaeultFont 24'
)

root.mainloop()
```

Output:



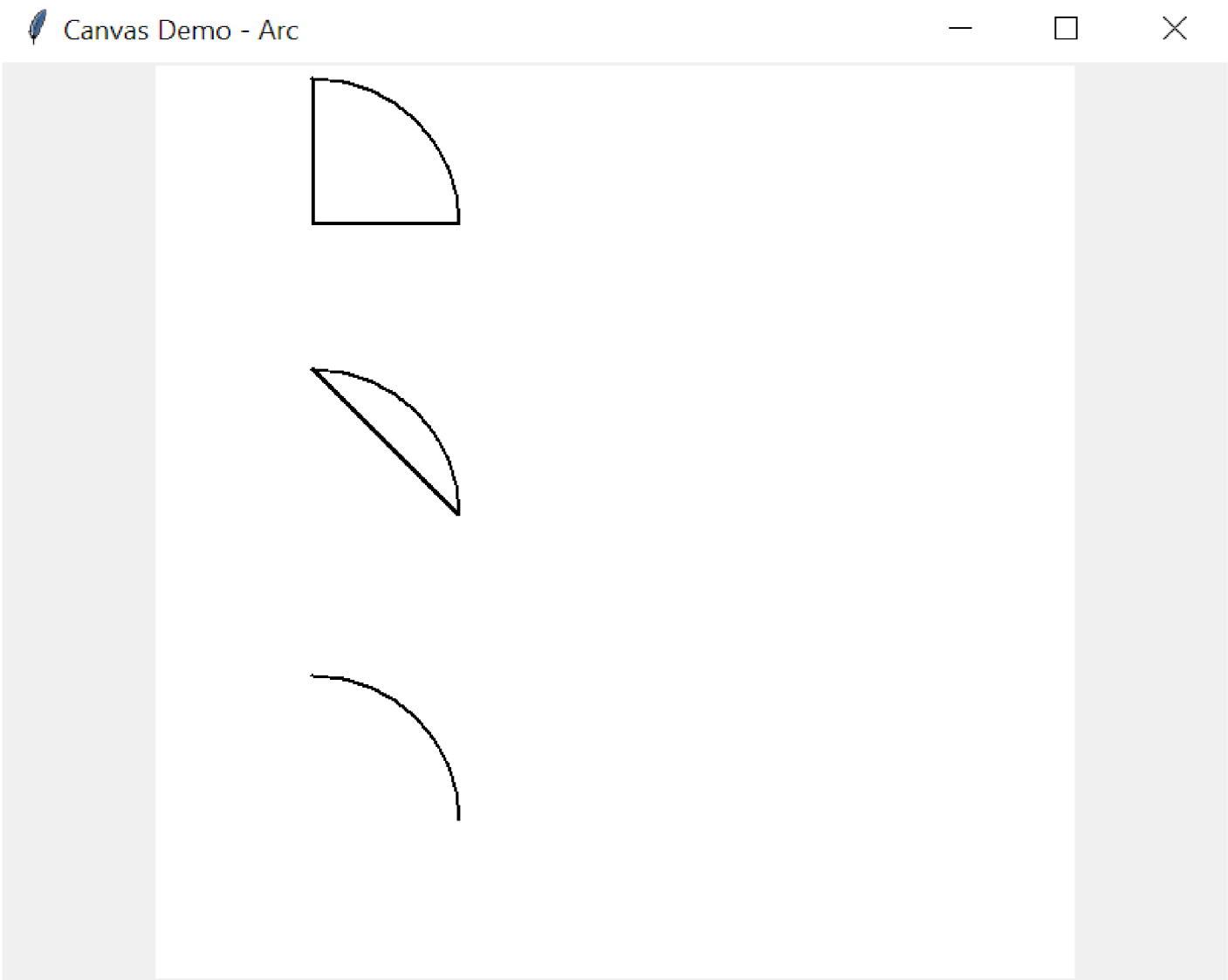
Create an arc

To draw an arc on a canvas, you use the `create_arc()` method. For example:

```
import tkinter as tk
from turtle import width

root = tk.Tk()
root.geometry('800x600')
root.title('Canvas Demo - Arc')

canvas = tk.Canvas(root, width=600, height=600, bg='white')
canvas.pack(anchor=tk.CENTER, expand=True)

canvas.create_arc((10, 10), (200, 200), style=tk.PIESLICE, width=2)
```

```
canvas.create_arc((10, 200), (200, 390), style=tk.CHORD, width=2)
canvas.create_arc((10, 400), (200, 590), style=tk.ARC, width=2)


root.mainloop()
```

Output:



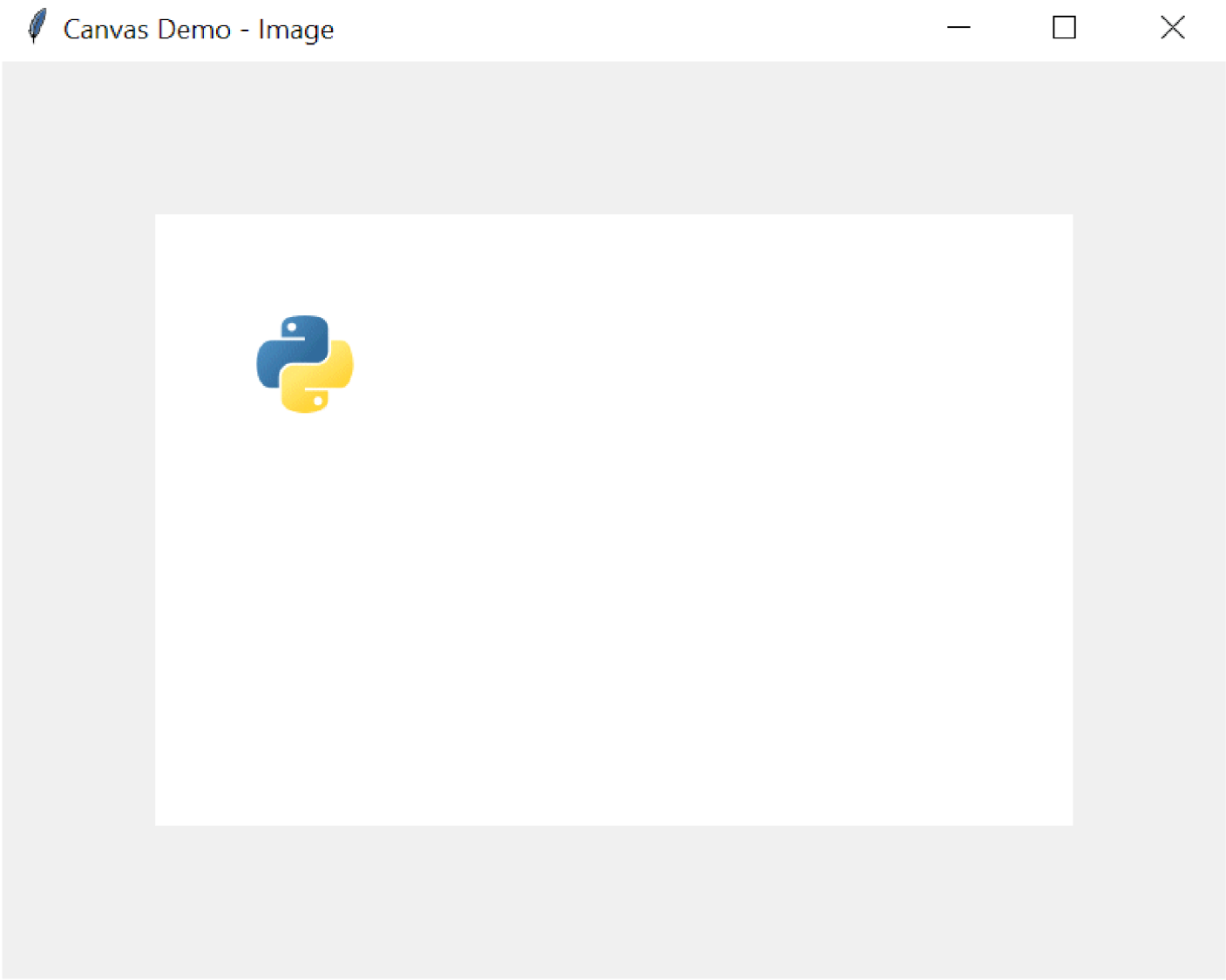
Create an image

To place an image on a canvas, you use the `create_image()` method. For example:

```
import tkinter as tk

root = tk.Tk()
```

```
root.geometry('800x600')
root.title('Canvas Demo - Image')

canvas = tk.Canvas(root, width=600, height=400, bg='white')
canvas.pack(anchor=tk.CENTER, expand=True)

python_image = tk.PhotoImage(file='python.gif')
canvas.create_image(
    (100, 100),
    image=python_image
)


root.mainloop()
```

Output:



Note that if you pass directly the `PhotoImage` (https://www.pythontutorial.net/tkinter/tkinter-photoimage/) to the `create_image()` method, the image won't display because it is automatically garbage collected (https://www.pythontutorial.net/advanced-python/python-garbage-collection/) .

The following code won't work:

```
canvas.create_image(
    (100, 100),
    image=tk.PhotoImage(file='python.gif')
)
```

Binding an event to the item

All the `create_*` method returns a string value that identifies the item in the context of the `Canvas` object. And you can use this value to bind an event to the item.

To bind an event to an item, you use the `tag_bind()` method of the `Canvas` object. For example:

```
import tkinter as tk

root = tk.Tk()
root.geometry('800x600')
root.title('Canvas Demo - Binding Event')

canvas = tk.Canvas(root, width=600, height=400, bg='white')
canvas.pack(anchor=tk.CENTER, expand=True)

python_image = tk.PhotoImage(file='python.gif')
image_item = canvas.create_image(
    (100, 100),
    image=python_image
)
canvas.tag_bind(
    image_item,
    '<Button-1>',
    lambda e: canvas.delete(image_item)
)

root.mainloop()
```

In this example, we bind the left-mouse click to the image item. If you click the image, the lambda (https://www.pythontutorial.net/python-basics/python-lambda-expressions/) will execute that removes the image from the canvas.

Summary

- A canvas is a blank area where you can draw items such as lines, rectangles, ovals, arcs, texts, and images.
- Use `Canvas()` to create a new canvas object.
- Use `tag_bind()` method to bind an event to an item on a canvas.