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Лабораторна робота з програмування No 9

Виконав:

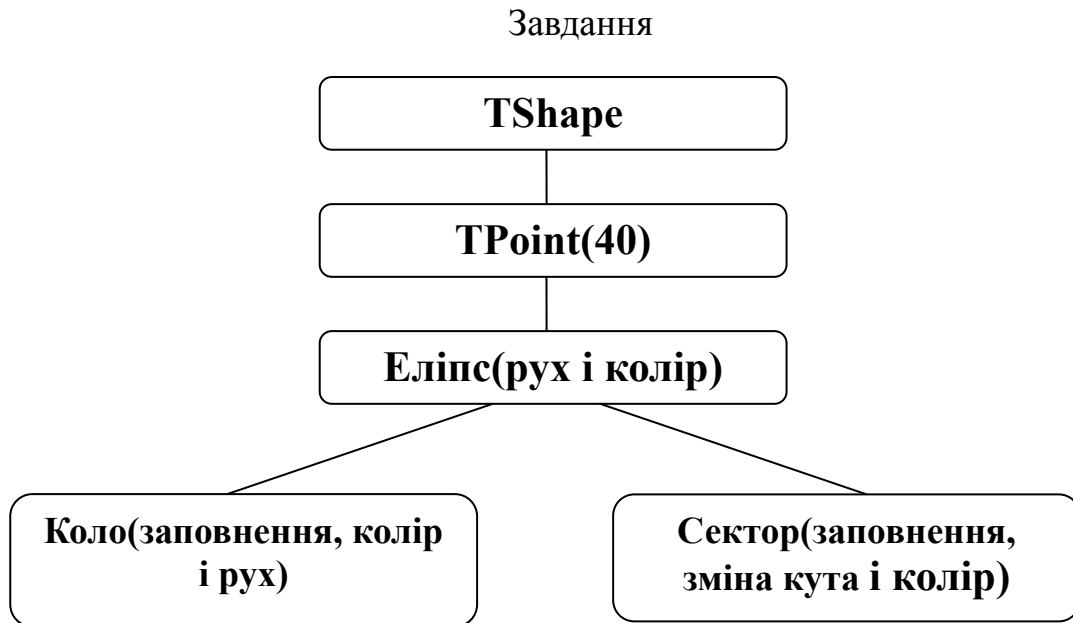
Студент 2 курсу групи ФЕ-81

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Київ 2020

Мета роботи:засвоїти базові поняття ООП на прикладі побудови ієрархії геометричних фігур засобами мови програмування Python.



Код

```
from tkinter import *  
import time
```

```
class TShape:  
    def __init__(self, x = 0.0, y = 0.0):  
        self.x = x  
        self.y = y
```

```
class TPoint(TShape):  
    def __init__(self, x = 0.0, y = 0.0, width = 4.0):  
        TShape.__init__(self, x, y)  
        self.width = width
```

```
class Elips:  
    def __init__(self, color = 'none', left_top = TPoint(10.0, 10.0), right_bottom =  
TPoint(90.0, 50.0)):  
        self.left_top = left_top  
        self.color = color  
        self.right_bottom = right_bottom  
        self.width = left_top.width  
        self.pos_on_canvas = None
```

```
    def draw(self, canvas):  
        if self.color == 'none':  
            self.pos_on_canvas = canvas.create_oval(self.left_top.x, self.left_top.y,  
self.right_bottom.x, self.right_bottom.y, width = self.width)  
        else:  
            self.pos_on_canvas = canvas.create_oval(self.left_top.x, self.left_top.y,  
self.right_bottom.x, self.right_bottom.y, width = self.width, fill = self.color)
```

```
def move(self, canvas, dest):
    x_mov = dest.x - canvas.coords(self.pos_on_canvas)[2]
    y_mov = dest.y - canvas.coords(self.pos_on_canvas)[3]
    canvas.move(self.pos_on_canvas, x_mov, y_mov)
```

```
def delete(self, canvas):
    canvas.delete(self.pos_on_canvas)
```

```
class Round (Elips):
    def __init__(self, radius, color = 'none', center = TPoint(100.0, 100.0)):
        left_top = TPoint(center.x + radius, center.y + radius)
        right_bottom = TPoint(center.x - radius, center.y - radius)
        Elips.__init__(self, color, left_top, right_bottom)
```

```
class Sector (Elips):
    def __init__(self, startangle, angle, color = 'none', left_top = TPoint(10.0, 10.0),
right_bottom = TPoint(100.0, 100.0)):
        self.angle = angle
        self.start_angle = startangle
        Elips.__init__(self, color, left_top, right_bottom)
```

```
def draw(self, canvas):
    if self.color == 'none':
        self.pos_on_canvas = canvas.create_arc(self.left_top.x, self.left_top.y,
self.right_bottom.x, self.right_bottom.y, start = self.start_angle, extent = self.angle, width =
self.width)
    else:
        self.pos_on_canvas = canvas.create_arc(self.left_top.x, self.left_top.y,
self.right_bottom.x, self.right_bottom.y, start = self.start_angle, extent = self.angle, fill =
self.color, width = self.width)
```

```
#ROOT
```

```
root = Tk()
```

```
#ELEMS
```

```
sect = Sector(0, 90)
```

```
circle = Round(10, 'red')
```

```
elips = Elips('red')
```

```
#BOOLS
```

```
sect_spawned = False
```

```
elips_spawned = False
```

```
round_spawned = False
```

```
#Canvas
```

```
c = Canvas(root, width=950, height=500, bg='white')
```

```
def spawn_elips():
```

```
    global elips
```

```
    global elips_spawned
```

```
    if elips_spawned:
```

```
        elips.delete(c)
```

```
        elips_spawned = False
```

```
        print(elips_spawned)
```

```
        return
```

```
    elips = Elips('red', TPoint(200.0, 200.0))
```

```
    elips.draw(c)
```

```
    elips_spawned = True
```

```
def spawn_round():
```

```
global circle
global round_spawned
```

```
if round_spawned:
    circle.delete(c)
    round_spawned = False
    return
circle = Round(10, 'red')
circle.draw(c)
round_spawned = True
```

```
def spawn_sector():
    global sect
    global sect_spawned
```

```
if sect_spawned:
    sect.delete(c)
    sect_spawned = False
    return
sect = Sector(0, 90)
sect.draw(c)
sect_spawned = True
```

```
def elips_move():
    elips.move(c, TPoint(600.0, 300.0))
```

```
def round_move():
    circle.move(c, TPoint(600.0, 300.0))
```

```
def sector_move():  
    sect.move(c, TPoint(600.0, 300.0))
```

```
#BUTTON SETTINGS
```

```
b1 = Button(root, text="Spawn Elips", width=15, height=3, command=spawn_elips)  
b2 = Button(root, text="Spawn Round", width=15, height=3, command=spawn_round)  
b3 = Button(root, text="Spawn Sector", width=15, height=3, command=spawn_sector)  
b4 = Button(root, text="Move Elips", width=15, height=3, command=elips_move)  
b5 = Button(root, text="Move Round", width=15, height=3, command=round_move)  
b6 = Button(root, text="Move Sector", width=15, height=3, command=sector_move)
```

```
#PACK SEGMENT
```

```
c.pack()  
b1.pack(side = LEFT, padx=10)  
b2.pack(side = LEFT, padx=10)  
b3.pack(side = LEFT, padx=10)  
b4.pack(side = LEFT, padx=10)  
b5.pack(side = LEFT, padx=10)  
b6.pack(side = LEFT, padx=10)
```

```
root.mainloop()
```