Міністерство освіти і науки України

НТУУ «Київський політехнічний інститут ім. І. Сікорського»

Фізико-технічний інститут

# Програмування 4

# Лабораторна робота №9

«Побудова об’єктної ієрархії геометричних фігур»

**Виконала:**

Студентка II курсу

групи ФЕ-81

Яворська Яна

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1. Мета роботи:

Засвоїти базові поняття ООП на прикладі побудови ієрархії геометричних фігур засобами мови програмування Python.

1. Завдання:

Виконати свій варіант побудови об’єктної ієрархії геометричних фігур.

1. Код реалізації

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| lab\_9.py |
| class TShape(object):  ins = []  def \_\_new\_\_(cls, \*args, \*\*kwargs):  ins = object.\_\_new\_\_(cls)  cls.ins.append(ins)  return ins  def \_\_init\_\_(self, color="green", width=1, heigh=1):  self.color = color  self.width = width  self.heigh = heigh  def \_\_del\_\_(self):  try:  self.ins.remove(self)  except ValueError:  pass  class Pixel(TShape):  ins = []  def \_\_new\_\_(cls, \*args, \*\*kwargs):  if len(cls.ins)==20:  print("There is no more space for new objects")  else:  ins = object.\_\_new\_\_(cls)  cls.ins.append(ins)  return ins  def \_\_init\_\_(self, color, width=1, heigh=1):  TShape.\_\_init\_\_(self, color, width, heigh)  def change\_color(self, color):  self.color = color  class Circle(Pixel):  ins = []  def \_\_init\_\_(self, color, radius,transparency=1, is\_rotating=0, width=1, heigh=1):  Pixel.\_\_init\_\_(self, color, 2\*radius, 2\*radius)  self.radius = radius  self.transparency = transparency  self.is\_rotating = is\_rotating  def change\_color(self, color, transparency):  self.color = color  self.transparency = transparency  def moving(self):  if self.is\_rotating == 0:  print("Object is not rotating. Start rotating... Object is rotating now.")  self.is\_rotating=1  else:  print("Object is rotating. Stop rotating... Object is not rotating now.")  self.is\_rotating=0  def change\_radius(self, radius):  self.radius=radius  class Square(Pixel):  ins = []  def \_\_init\_\_(self, color, width=1, contrast=1, is\_rolling=0):  Pixel.\_\_init\_\_(self, color, width, width )  self.contrast = contrast  self.is\_rolling = is\_rolling  def change\_color(self, color, contrast):  self.color = color  self.contrast = contrast  def moving(self):  if self.is\_rolling == 0:  print("Object is not rolling. Start rolling... Object is rolling now.")  self.is\_rolling=1  else:  print("Object is rolling. Stop rolling... Object is not rolling now.")  self.is\_rolling=0  def change\_size(self, width):  self.width = width  self.heigh = width  class Rectangle(Square):  ins = []  def \_\_init\_\_(self, color, width=1,heigh=1, contrast=1, brightness=1, is\_rolling=0, is\_jumping=0):  Pixel.\_\_init\_\_(self, color, width, heigh )  self.contrast = contrast  self.brightness = brightness  self.is\_rolling = is\_rolling  self.is\_jumping = is\_jumping  def change\_color(self, color, contrast, brightness):  self.color = color  self.contrast = contrast  self.brightness = brightness  def moving(self):  if (self.is\_rolling == 0)and(self.is\_jumping == 0):  print("Object is not rolling and not jumping. Start rolling and jumping... Object is rolling and jumping now.")  self.is\_rolling=1  self.is\_jumping=1  else:  print("Object is rolling and jumping. Stop rolling and jumping... Object is not rolling and not jumping now.")  self.is\_rolling=0  self.is\_jumping=0  def change\_size(self, width, heigh):  self.width = width  self.heigh = heigh  def TShapef():  while(True):  print("Choose acting:", "1 - create new one", "2 - delete last one", "3 - get amount of objects", "4 - go out")  try:  a=int(input())  if (a<1)or(a>4):  raise Exception  except Exception:  print("Choose from list, please")  a = -1  if a==1:  ins = TShape()  elif a==2:  if len(TShape.ins)==0:  print("There is nothing to delete")  else:  TShape.ins[-1].\_\_del\_\_()  elif a==3:  print("Amount of objects:", len(TShape.ins))  else:  break  def Pixelf():  while(True):  print("Choose acting:", "1 - create new one", "2 - delete last one", "3 - get amount of objects", "4 - change color of last one", "5 - get color of last one","6 - go out")  try:  a=int(input())  if (a<1)or(a>6):  raise Exception  except Exception:  print("Choose from list, please")  a = -1  if a==1:  color=str(input("Enter color ="))  ins = Pixel(color)  elif a==2:  if len(Pixel.ins)==0:  print("There is nothing to delete")  else:  Pixel.ins[len(Pixel.ins)-1].\_\_del\_\_()  elif a==3:  print("Amount of objects:", len(Pixel.ins))  elif a==4:  if len(Pixel.ins)==0:  print("There is no object")  else:  while(1):  try:  color=str(input("Enter new color ="))  break  except Exception:  print("Wrong data type of variable")  Pixel.ins[len(Pixel.ins)-1].change\_color(color)  elif a==5:  if len(Pixel.ins)==0:  print("There is no object")  else:  print("Color of last one:",Pixel.ins[len(Pixel.ins)-1].color)  else:  break  def Circlef():  while(True):  print("Choose acting:", "1 - create new one", "2 - delete last one", "3 - get amount of objects", "4 - change color of last one", "5 - get color of last one","6 - change transparency of last one", "7 - get transparency of last one","8 - start/stop rotating","9 - change radius","10 - get radius","11 - go out")  try:  a=int(input())  if (a<1)or(a>11):  raise Exception  except Exception:  print("Choose from list, please")  a = -1  if a==1:  while(True):  try:  color=str(input("Enter color ="))  radius=float(input("Enter radius ="))  transparency=float(input("Enter transparency ="))  if (radius<=0)or(transparency<=0):  raise Exception  break  except Exception:  print("Wrong data of variable(s)")  ins = Circle(color,radius,transparency)  elif a==2:  if len(Circle.ins)==0:  print("There is nothing to delete")  else:  Circle.ins[len(Circle.ins)-1].\_\_del\_\_()  elif a==3:  print("Amount of objects:", len(Circle.ins))  elif a==4:  if len(Circle.ins)==0:  print("There is no object")  else:  while(1):  try:  color=str(input("Enter new color ="))  break  except Exception:  print("Wrong data type of variable")  Circle.ins[len(Circle.ins)-1].change\_color(color, Circle.ins[len(Circle.ins)-1].transparency)  elif a==5:  if len(Circle.ins)==0:  print("There is no object")  else:  print("Color of last one:",Circle.ins[len(Circle.ins)-1].color)  elif a==6:  if len(Circle.ins)==0:  print("There is no object")  else:  while(1):  try:  transparency=float(input("Enter new transparency ="))  if (transparency<=0):  raise Exception  break  except Exception:  print("Wrong data type of variable")  Circle.ins[len(Circle.ins)-1].change\_color(Circle.ins[len(Circle.ins)-1].color, transparency)  elif a==7:  if len(Circle.ins)==0:  print("There is no object")  else:  print("Transparency of last one:",Circle.ins[len(Circle.ins)-1].transparency)  elif a==8:  if len(Circle.ins)==0:  print("There is no object")  else:  Circle.ins[len(Circle.ins)-1].moving()  elif a==9:  if len(Circle.ins)==0:  print("There is no object")  else:  while(1):  try:  radius=float(input("Enter new radius ="))  if (radius<=0):  raise Exception  break  except Exception:  print("Wrong data type of variable")  Circle.ins[-1].change\_radius(radius)  elif a==10:  if len(Circle.ins)==0:  print("There is no object")  else:  print("Radius of last one:",Circle.ins[-1].radius)  else:  break  def Squaref():  while(True):  print("Choose acting:", "1 - create new one", "2 - delete last one", "3 - get amount of objects", "4 - change color of last one", "5 - get color of last one","6 - change contrast of last one", "7 - get contrast of last one","8 - change size of last one","9 - get size of last one","10 - start/stop rolling","11 - go out")  try:  a=int(input())  if (a<1)or(a>11):  raise Exception  except Exception:  print("Choose from list, please")  a = -1  if a==1:  while(True):  try:  color=str(input("Enter color ="))  size=float(input("Enter size(width) ="))  contrast=float(input("Enter contrast ="))  if (size<=0)or(contrast<=0):  raise Exception  break  except Exception:  print("Wrong data of variable(s)")  ins = Square(color, size, contrast)  elif a==2:  if len(Square.ins)==0:  print("There is nothing to delete")  else:  Square.ins[len(Square.ins)-1].\_\_del\_\_()  elif a==3:  print("Amount of objects:", len(Square.ins))  elif a==4:  if len(Square.ins)==0:  print("There is no object")  else:  while(1):  try:  color=str(input("Enter new color ="))  break  except Exception:  print("Wrong data of variable")  Square.ins[len(Square.ins)-1].change\_color(color,Square.ins[len(Square.ins)-1].contrast)  elif a==5:  if len(Square.ins)==0:  print("There is no object")  else:  print("Color of last one:",Square.ins[len(Square.ins)-1].color)  elif a==6:  if len(Square.ins)==0:  print("There is no object")  else:  while(1):  try:  contrast=float(input("Enter new contrast ="))  if (contrast<=0):  raise Exception  break  except Exception:  print("Wrong data of variable")  Square.ins[len(Square.ins)-1].change\_color(Square.ins[len(Square.ins)-1].color, contrast)  elif a==7:  if len(Square.ins)==0:  print("There is no object")  else:  print("Contrast of last one:",Square.ins[len(Square.ins)-1].contrast)  elif a==8:  if len(Square.ins)==0:  print("There is no object")  else:  while(1):  try:  size=float(input("Enter new size(width) ="))  if (size<=0):  raise Exception  break  except Exception:  print("Wrong data of variable")  Square.ins[len(Square.ins)-1].change\_size(size)  elif a==9:  if len(Square.ins)==0:  print("There is no object")  else:  print("Size of last one:",Square.ins[len(Square.ins)-1].width)  elif a==10:  if len(Square.ins)==0:  print("There is no object")  else:  Square.ins[len(Square.ins)-1].moving()  else:  break  def Rectanglef():  while(True):  print("Choose acting:", "1 - create new one", "2 - delete last one", "3 - get amount of objects", "4 - change color of last one", "5 - get color of last one","6 - change contrast of last one", "7 - get contrast of last one","8 - change brightness of last one", "9 - get brightness of last one","10 - change size of last one","11 - get size of last one","12 - start/stop moving","13 - go out")  try:  a=int(input())  if (a<1)or(a>13):  raise Exception  except Exception:  print("Choose from list, please")  a = -1  if a==1:  while(True):  try:  color=str(input("Enter color ="))  width=float(input("Enter width ="))  heigh=float(input("Enter heigh ="))  contrast=float(input("Enter contrast ="))  brightness=float(input("Enter brightness ="))  if (brightness<=0)or(contrast<=0)or(width<=0)or(heigh<=0):  raise Exception  break  except Exception:  print("Wrong data of variable(s)")  ins = Rectangle(color,width,heigh,contrast,brightness)  elif a==2:  if len(Rectangle.ins)==0:  print("There is nothing to delete")  else:  Rectangle.ins[len(Rectangle.ins)-1].\_\_del\_\_()  elif a==3:  print("Amount of objects:", len(Rectangle.ins))  elif a==4:  if len(Rectangle.ins)==0:  print("There is no object")  else:  while(1):  try:  color=str(input("Enter new color ="))  break  except Exception:  print("Wrong data of variable")  Rectangle.ins[len(Rectangle.ins)-1].change\_color(color,Rectangle.ins[len(Rectangle.ins)-1].contrast,Rectangle.ins[len(Rectangle.ins)-1].brightness)  elif a==5:  if len(Rectangle.ins)==0:  print("There is no object")  else:  print("Color of last one:",Rectangle.ins[len(Rectangle.ins)-1].color)  elif a==6:  if len(Rectangle.ins)==0:  print("There is no object")  else:  while(1):  try:  contrast=float(input("Enter new contrast ="))  if (contrast<=0):  raise Exception  break  except Exception:  print("Wrong data of variable")  Rectangle.ins[len(Rectangle.ins)-1].change\_color(Rectangle.ins[len(Rectangle.ins)-1].color, contrast,Rectangle.ins[len(Rectangle.ins)-1].brightness)  elif a==7:  if len(Rectangle.ins)==0:  print("There is no object")  else:  print("Contrast of last one:",Rectangle.ins[len(Rectangle.ins)-1].contrast)  elif a==8:  if len(Rectangle.ins)==0:  print("There is no object")  else:  while(1):  try:  brightness=float(input("Enter new brightness ="))  if (brightness<=0):  raise Exception  break  except Exception:  print("Wrong data of variable")  Rectangle.ins[len(Rectangle.ins)-1].change\_color(Rectangle.ins[len(Rectangle.ins)-1].color, Rectangle.ins[len(Rectangle.ins)-1].contrast, brightness)  elif a==9:  if len(Rectangle.ins)==0:  print("There is no object")  else:  print("Brightness of last one:",Rectangle.ins[len(Rectangle.ins)-1].brightness)  elif a==10:  if len(Rectangle.ins)==0:  print("There is no object")  else:  while(1):  try:  width=float(input("Enter new width ="))  heigh=float(input("Enter new heigh ="))  if (width<=0)or(heigh<=0):  raise Exception  break  except Exception:  print("Wrong data of variable(s)")  Rectangle.ins[len(Rectangle.ins)-1].change\_size(width,heigh)  elif a==11:  if len(Rectangle.ins)==0:  print("There is no object")  else:  print("Width of last one:",Rectangle.ins[len(Rectangle.ins)-1].width)  print("Heigh of last one:",Rectangle.ins[len(Rectangle.ins)-1].heigh)  elif a==12:  if len(Rectangle.ins)==0:  print("There is no object")  else:  Rectangle.ins[len(Rectangle.ins)-1].moving()  else:  break  while(True):  print("Choose class:","1 - TShape", "2 - Pixel", "3 - Circle", "4 - Square", "5 - Rectangle")  try:  a=int(input())  if (a<1)or(a>5):  raise Exception  except Exception:  print("Choose from list, please")  a=-1  if a==1:  TShapef()  elif a==2:  Pixelf()  elif a==3:  Circlef()  elif a==4:  Squaref()  elif a==5:  Rectanglef() |

1. Виконання програми

  