Ethan Roberts

CS 417

Design Patterns – Square

Roberts.E.assn06_squares

Problem 1. (Source Code):

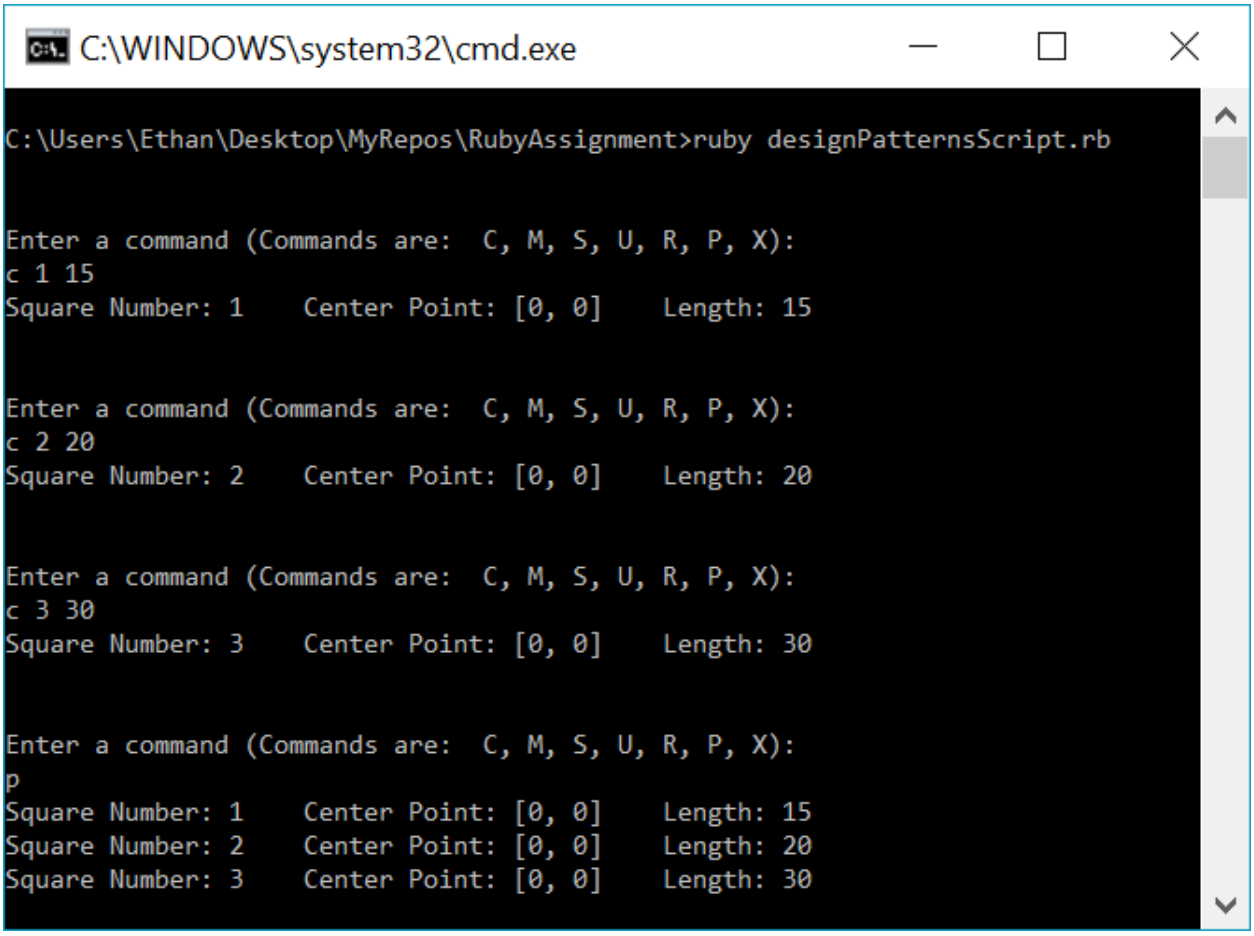
```
#  Ethan Roberts
#  CS 417 Topics in OOP

#  This program will read a command and -
#  display what action will be completed.

#  Roberts.E.assn06
#  Design Patterns

# This class contains associative stacks

class Square

  attr_reader :squareNumber
  attr_reader :length
  attr_reader :centerPoint


  def initialize
    @squareNumber = 0
    @length = 0
    @squareNumber = []


    #for pushing contents
    #these three stacks are associative
    @centerPointStack = Array.new()
    @lengthStack = Array.new()
    @cmdStack = Array.new()

    #used as a temporary stack in case of undo/redo
    # These stacks are associative
    @otherStackCP = Array.new()
    @otherStackLength = Array.new()
    @otherStackCmd = Array.new()
  end


  def createSquare(i,j)
    @centerPoint = [0,0]
    @squareNumber = i
    @length = j
```

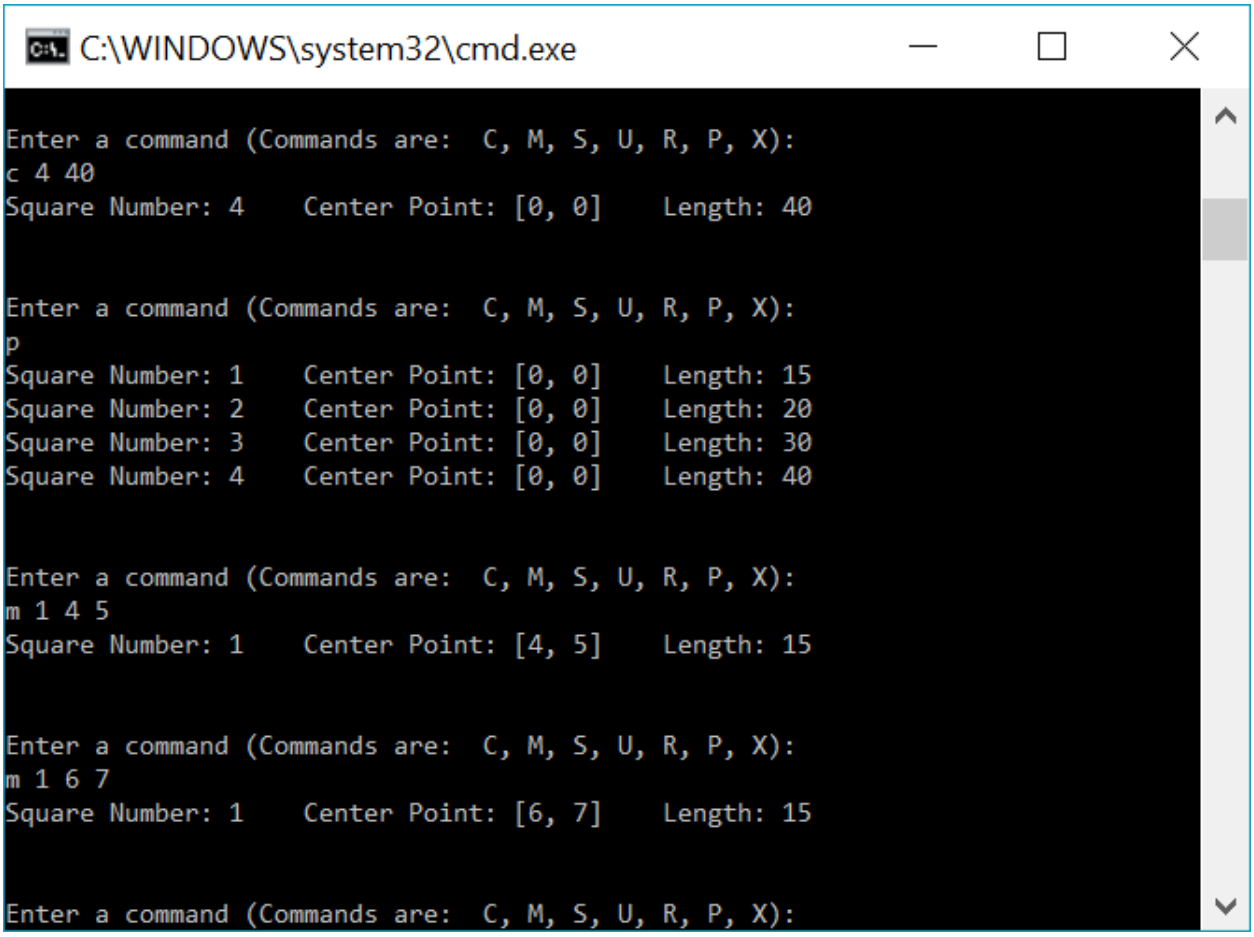
```
  @centerPointStack.push(@centerPoint)
  @lengthStack.push(@length)
  @cmdStack.push("C")

  return self
end


def moveSquare(j,k)
  @centerPoint = [j,k]

  @centerPointStack.push(@centerPoint)
  @lengthStack.push(@length)
  @cmdStack.push("M")
end


# scaling square and increasing/decreasing length by "j"
def scaleSquare(i,j)
  j = j.to_i
  @length = @length + j


  @centerPointStack.push(@centerPoint)
  @lengthStack.push(@length)
  @cmdStack.push("S")
end


# Saving main stack contents into "otherStack" (temporary stack)
def undo

  #if nothing is on the "main" stack
  if (@lengthStack.empty?)
    print "Nothing left to undo...\n\n"
  else
    @otherStackCP.push(@centerPointStack.pop())
    @otherStackLength.push(@lengthStack.pop())
    @otherStackCmd.push(@cmdStack.pop())
  end


  if (!@lengthStack.empty?)  #if the stack is not empty, get element
    @centerPoint = @centerPointStack.last()
    @length = @lengthStack.last()
  end
end


# Pulling "otherStack" (temporary stack) contents and pushing
# onto main stack
def redo

   #if nothing is on the "redo" stack
  if (@otherStackCP.empty?)
    print "Nothing left to redo...\n\n"
```

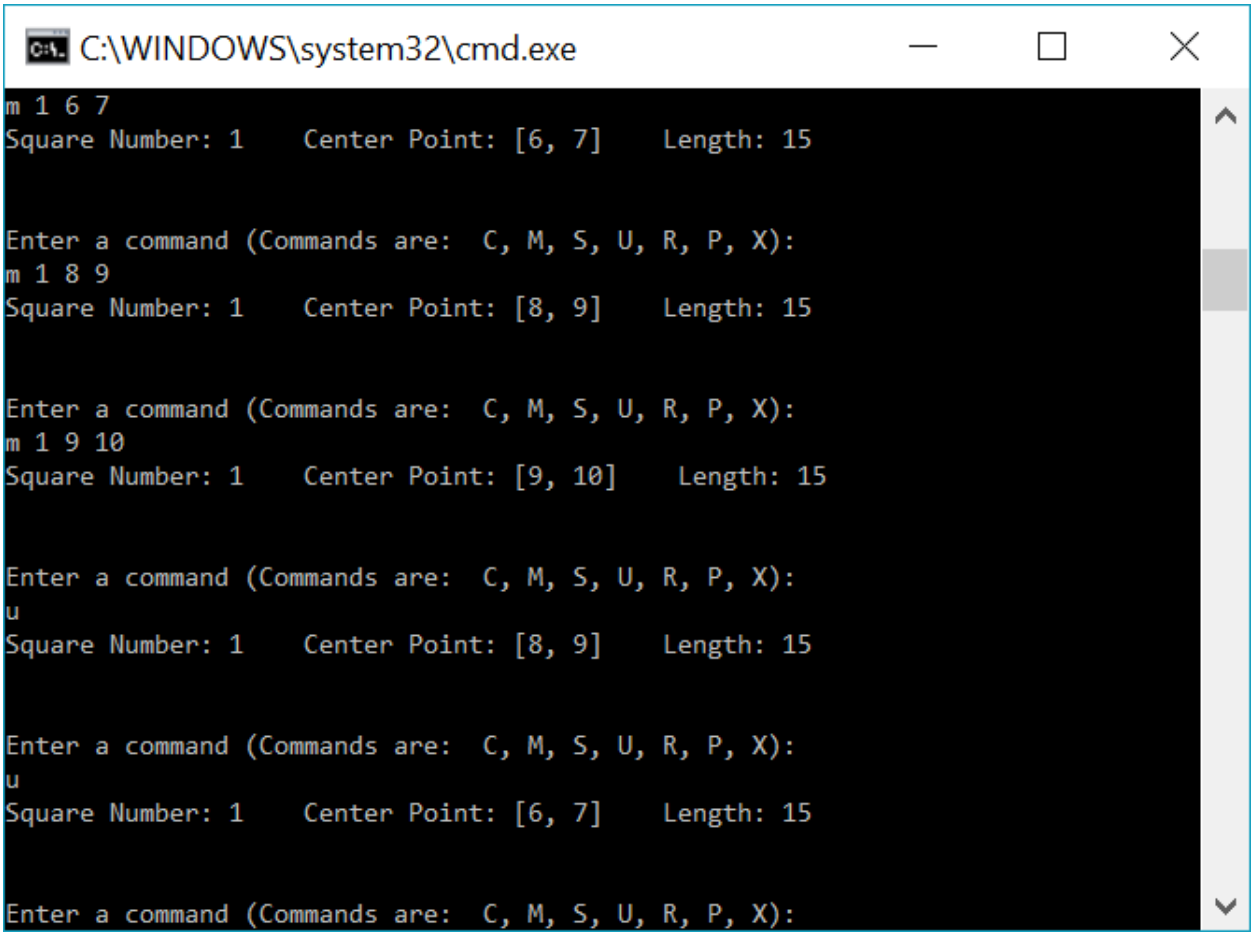
```
    else
      @centerPointStack.push(@otherStackCP.pop())
      @lengthStack.push(@otherStackLength.pop())
      @cmdStack.push(@otherStackCmd.pop())

      @centerPoint = @centerPointStack.last()
      @length = @lengthStack.last()
    end
  end


  def printSquareContents
    print "Square Number: "
    print self.squareNumber
    print "    "
    print "Center Point: "
    print self.centerPoint
    print "    "
    print "Length: "
    print self.length
    print "\n"
  end

end



myAry = []  #this array will contain Square objects
line = ""
userCmd = ""
i = 0
j = 0
k = 0
squareCounter = 0



while (userCmd != "X" && userCmd != "x")
  print "Enter a command (Commands are:  C, M, S, U, R, P, X):\n"
  line = gets.upcase
  line = line.split(' ')
  userCmd = line[0]

  if (userCmd == 'C')
   i = line[1].to_i
   j = line[2].to_i
   square = Square.new()
   myAry[i] = square.createSquare(i,j)
   squareCounter = squareCounter + 1
   myAry[i].printSquareContents
  end


  if (userCmd == 'M')
   i = line[1].to_i
   j = line[2].to_i
   k = line[3].to_i
```

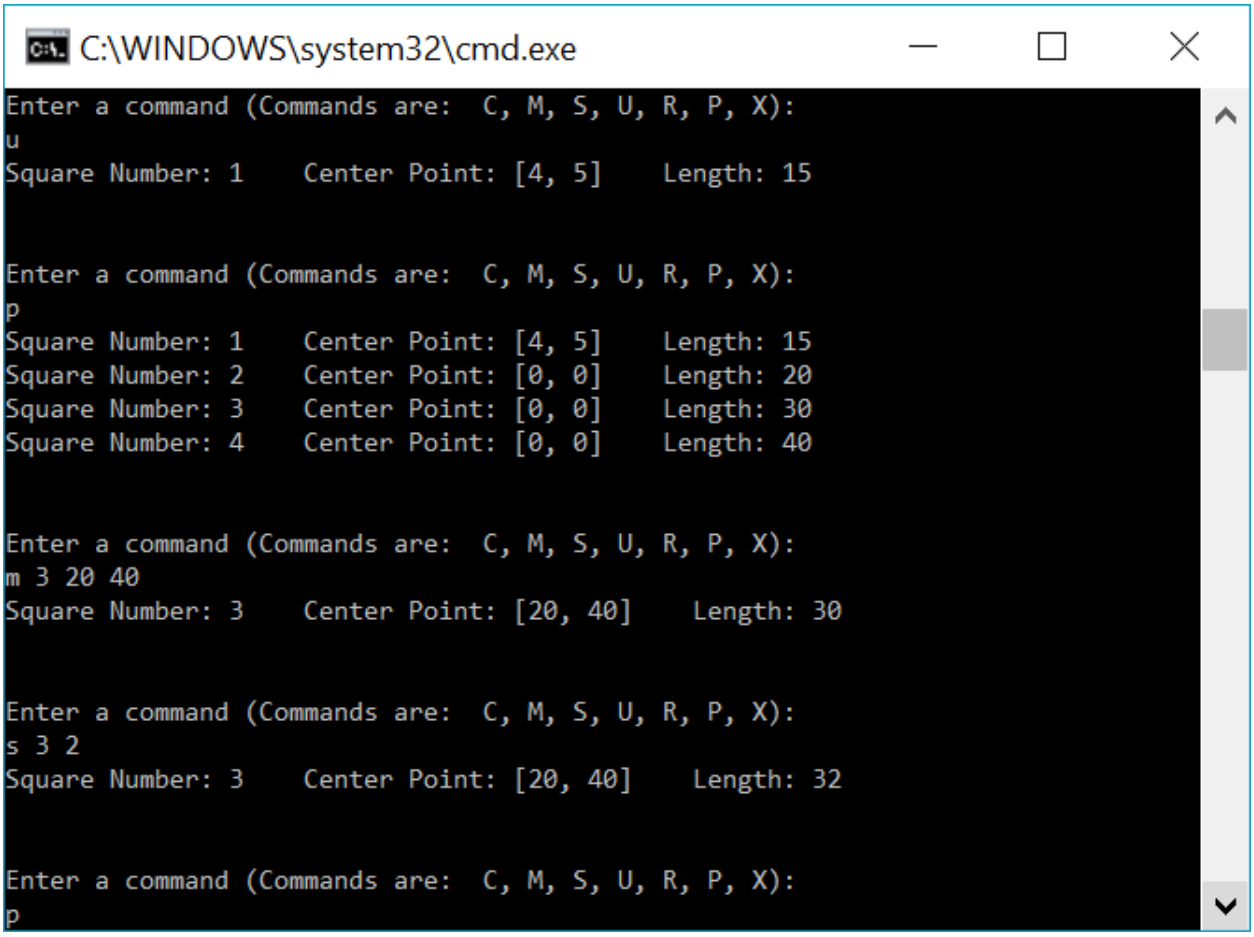
```
    myAry[i].moveSquare(j,k)
    myAry[i].printSquareContents
  end


  if (userCmd == 'S')
   i = line[1].to_i
   j = line[2].to_i

   myAry[i].scaleSquare(i,j)  #increases length of square
   myAry[i].printSquareContents
  end


  if (userCmd == 'U')
   myAry[i].undo
   myAry[i].printSquareContents
  end


  if (userCmd == 'R')
   myAry[i].redo
   myAry[i].printSquareContents
  end


  if (userCmd == 'P')
    z = 1
    while (z <= squareCounter)
      print myAry[z].printSquareContents
      z = z + 1
    end
  end

end

print "\n\nProgram Terminated\n"
```

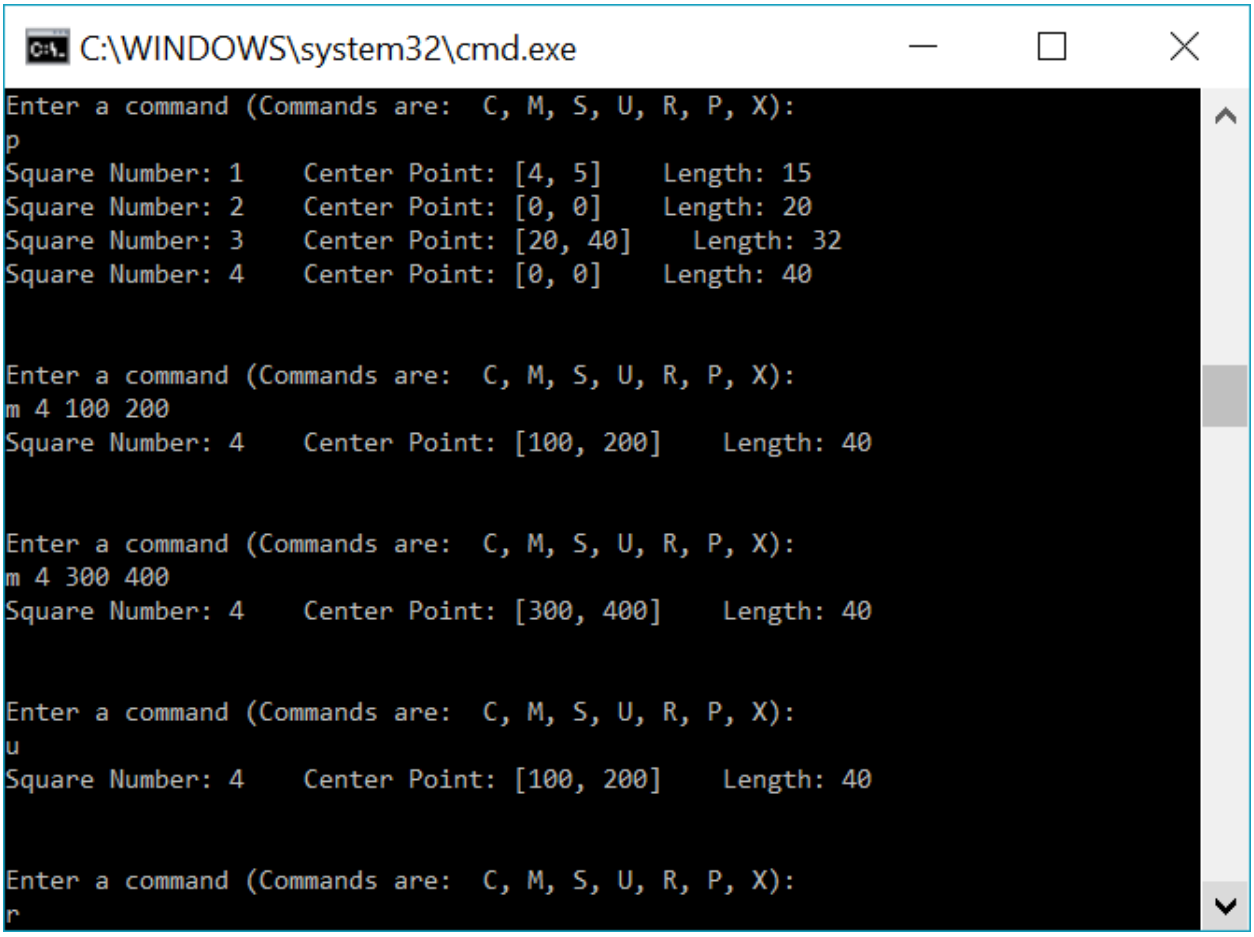
Problem 1.(Output):

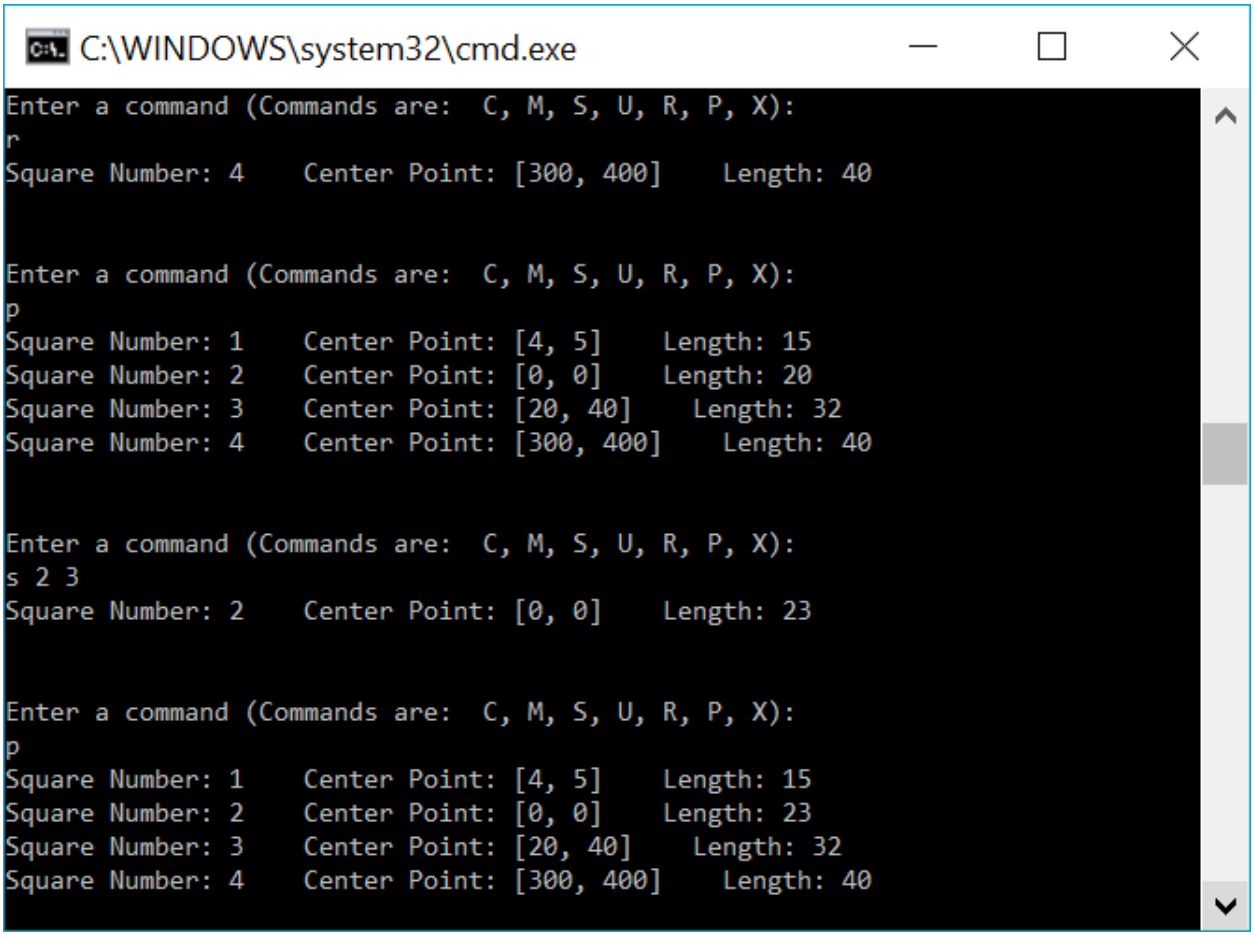


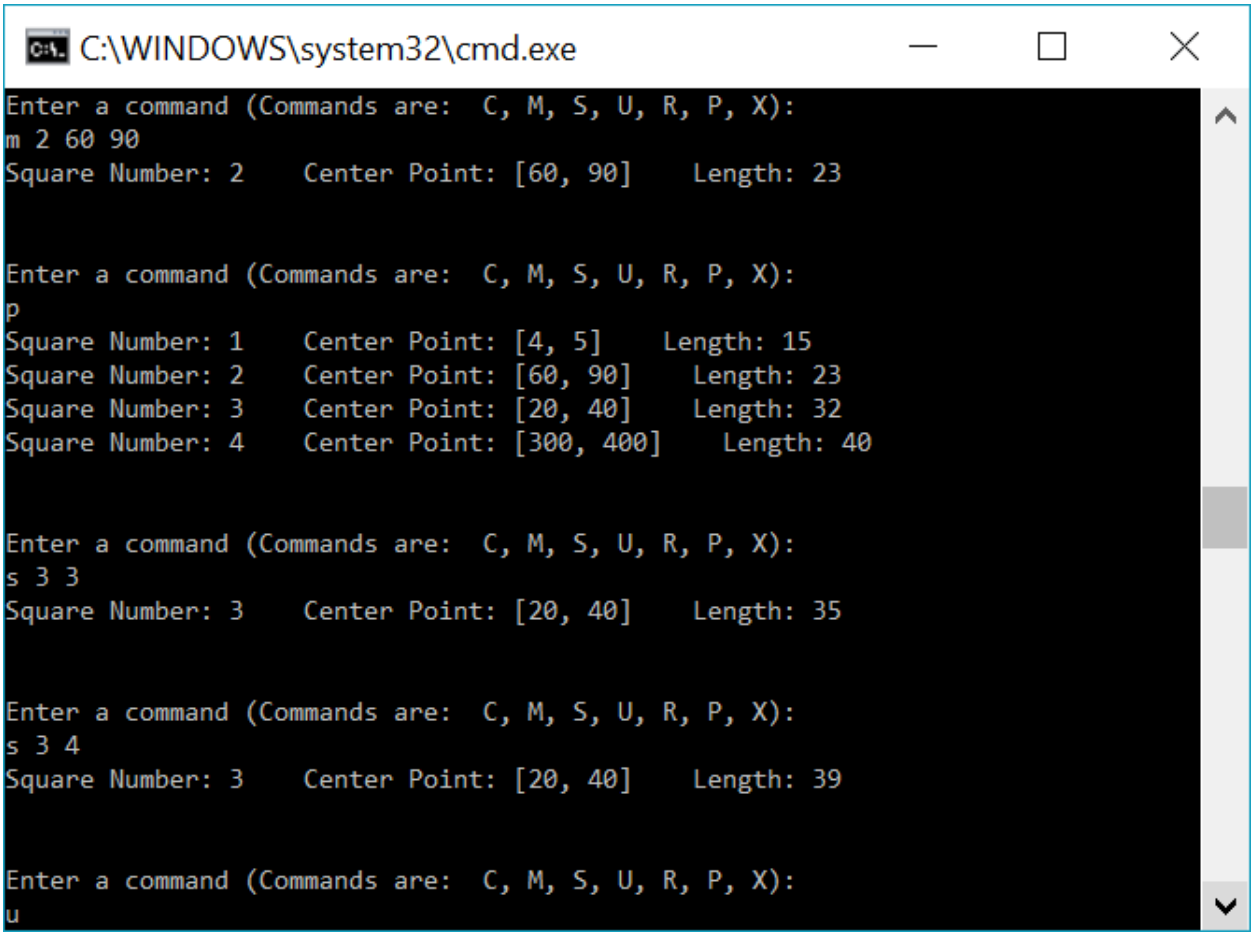

C:\WINDOWS\system32\cmd.exe
Enter a command (Commands are: C, M, S, U, R, P, X):
c 4 40
Square Number: 4   Center Point: [0, 0]   Length: 40
Enter a command (Commands are: C, M, S, U, R, P, X):
p
Square Number: 1   Center Point: [0, 0]   Length: 15
Square Number: 2   Center Point: [0, 0]   Length: 20
Square Number: 3   Center Point: [0, 0]   Length: 30
Square Number: 4   Center Point: [0, 0]   Length: 40
Enter a command (Commands are: C, M, S, U, R, P, X):
m 1 4 5
Square Number: 1   Center Point: [4, 5]   Length: 15
Enter a command (Commands are: C, M, S, U, R, P, X):
m 1 6 7
Square Number: 1   Center Point: [6, 7]   Length: 15
Enter a command (Commands are: C, M, S, U, R, P, X):

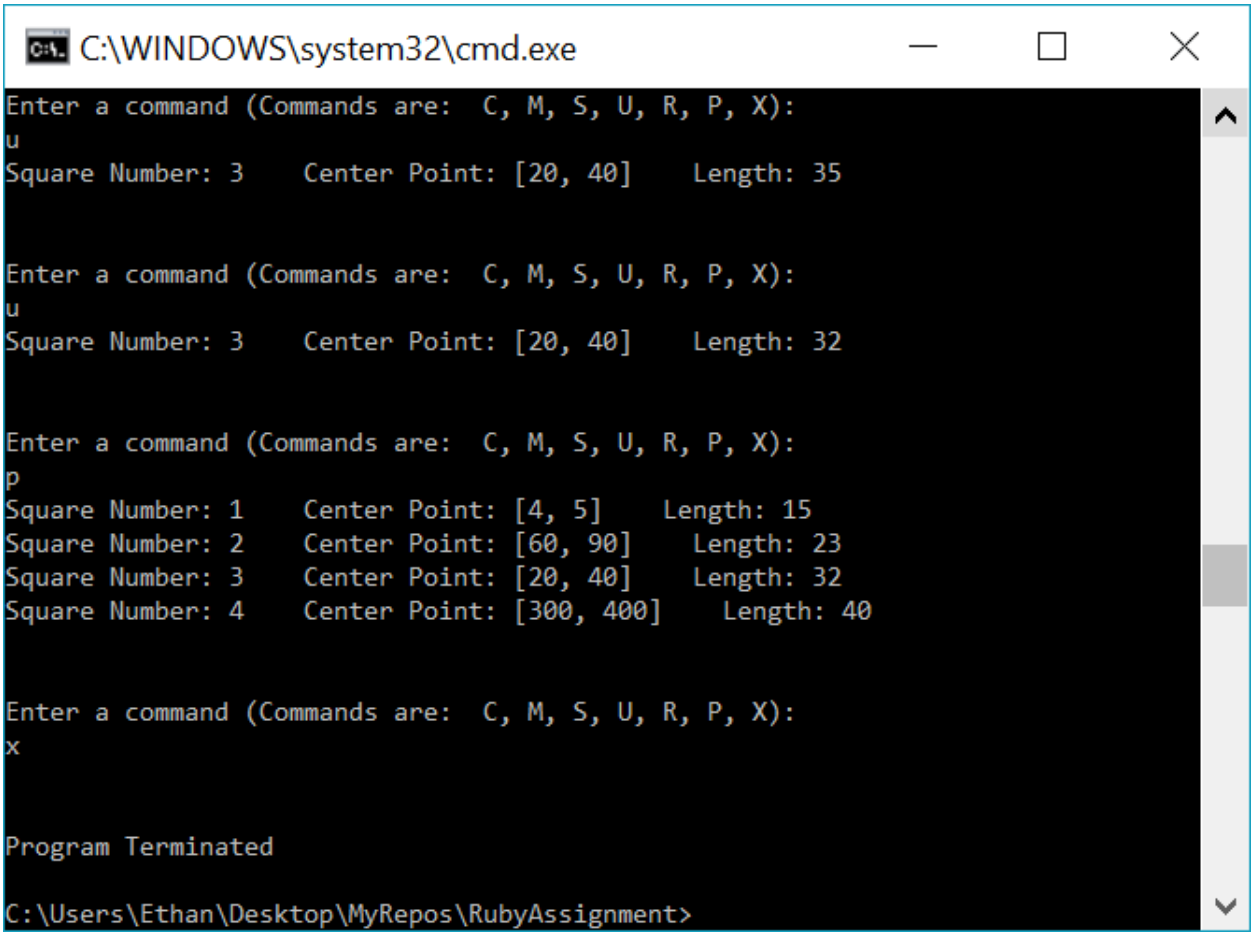

C:\WINDOWS\system32\cmd.exe
m 1 6 7
Square Number: 1 Center Point: [6, 7] Length: 15
Enter a command (Commands are: C, M, S, U, R, P, X):
m 1 8 9
Square Number: 1 Center Point: [8, 9] Length: 15
Enter a command (Commands are: C, M, S, U, R, P, X):
m 1 9 10
Square Number: 1 Center Point: [9, 10] Length: 15
Enter a command (Commands are: C, M, S, U, R, P, X):
u
Square Number: 1 Center Point: [8, 9] Length: 15
Enter a command (Commands are: C, M, S, U, R, P, X):
u
Square Number: 1 Center Point: [6, 7] Length: 15
Enter a command (Commands are: C, M, S, U, R, P, X):


C:\WINDOWS\system32\cmd.exe
Enter a command (Commands are: C, M, S, U, R, P, X):
u
Square Number: 1   Center Point: [4, 5]   Length: 15
Enter a command (Commands are: C, M, S, U, R, P, X):
p
Square Number: 1   Center Point: [4, 5]   Length: 15
Square Number: 2   Center Point: [0, 0]   Length: 20
Square Number: 3   Center Point: [0, 0]   Length: 30
Square Number: 4   Center Point: [0, 0]   Length: 40
Enter a command (Commands are: C, M, S, U, R, P, X):
m 3 20 40
Square Number: 3   Center Point: [20, 40]   Length: 30
Enter a command (Commands are: C, M, S, U, R, P, X):
s 3 2
Square Number: 3   Center Point: [20, 40]   Length: 32
Enter a command (Commands are: C, M, S, U, R, P, X):
p

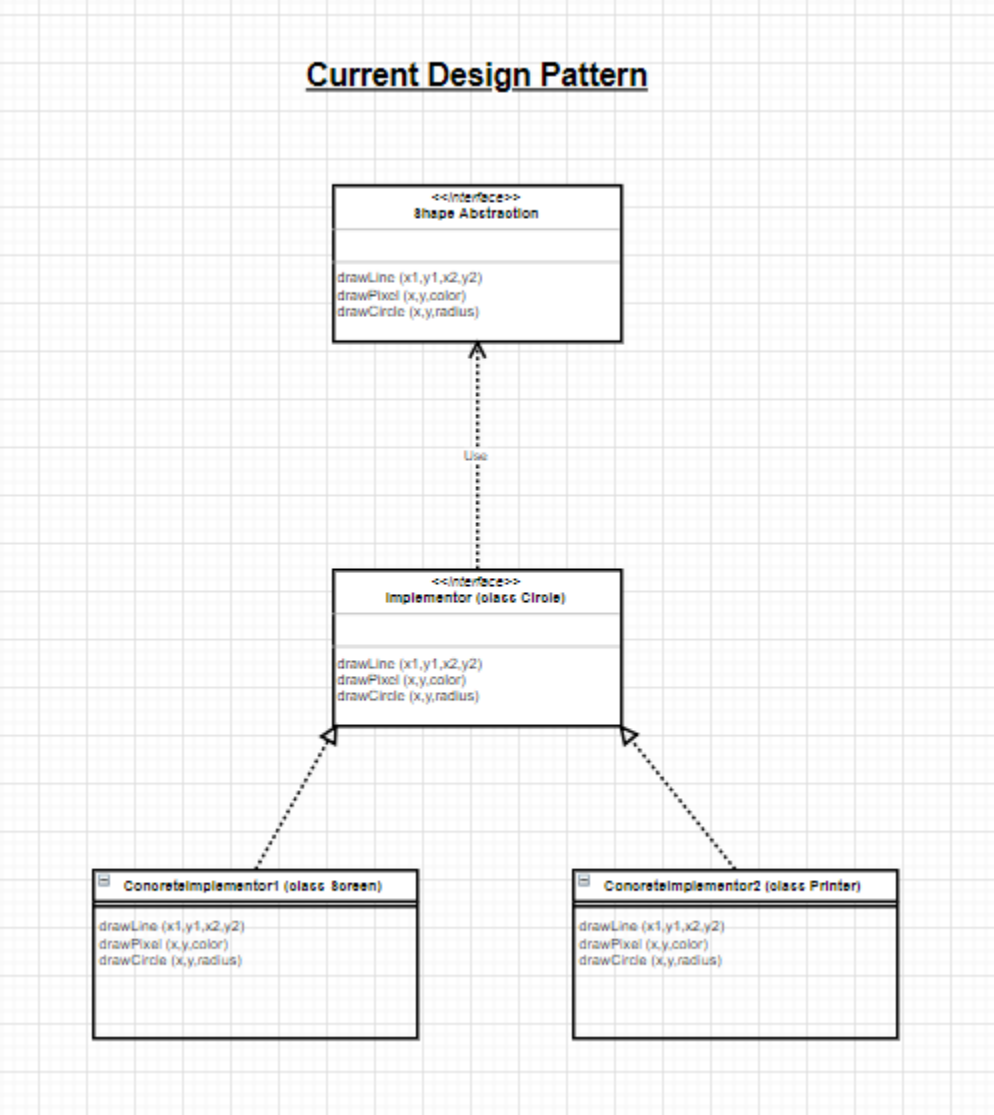

C:\WINDOWS\system32\cmd.exe
Enter a command (Commands are: C, M, S, U, R, P, X):
p
Square Number: 1   Center Point: [4, 5]   Length: 15
Square Number: 2   Center Point: [0, 0]   Length: 20
Square Number: 3   Center Point: [20, 40]   Length: 32
Square Number: 4   Center Point: [0, 0]   Length: 40
Enter a command (Commands are: C, M, S, U, R, P, X):
m 4 100 200
Square Number: 4   Center Point: [100, 200]   Length: 40
Enter a command (Commands are: C, M, S, U, R, P, X):
m 4 300 400
Square Number: 4   Center Point: [300, 400]   Length: 40
Enter a command (Commands are: C, M, S, U, R, P, X):
u
Square Number: 4   Center Point: [100, 200]   Length: 40
Enter a command (Commands are: C, M, S, U, R, P, X):
r


C:\WINDOWS\system32\cmd.exe
Enter a command (Commands are: C, M, S, U, R, P, X):
r
Square Number: 4   Center Point: [300, 400]   Length: 40
Enter a command (Commands are: C, M, S, U, R, P, X):
p
Square Number: 1   Center Point: [4, 5]   Length: 15
Square Number: 2   Center Point: [0, 0]   Length: 20
Square Number: 3   Center Point: [20, 40]   Length: 32
Square Number: 4   Center Point: [300, 400]   Length: 40
Enter a command (Commands are: C, M, S, U, R, P, X):
s 2 3
Square Number: 2   Center Point: [0, 0]   Length: 23
Enter a command (Commands are: C, M, S, U, R, P, X):
p
Square Number: 1   Center Point: [4, 5]   Length: 15
Square Number: 2   Center Point: [0, 0]   Length: 23
Square Number: 3   Center Point: [20, 40]   Length: 32
Square Number: 4   Center Point: [300, 400]   Length: 40

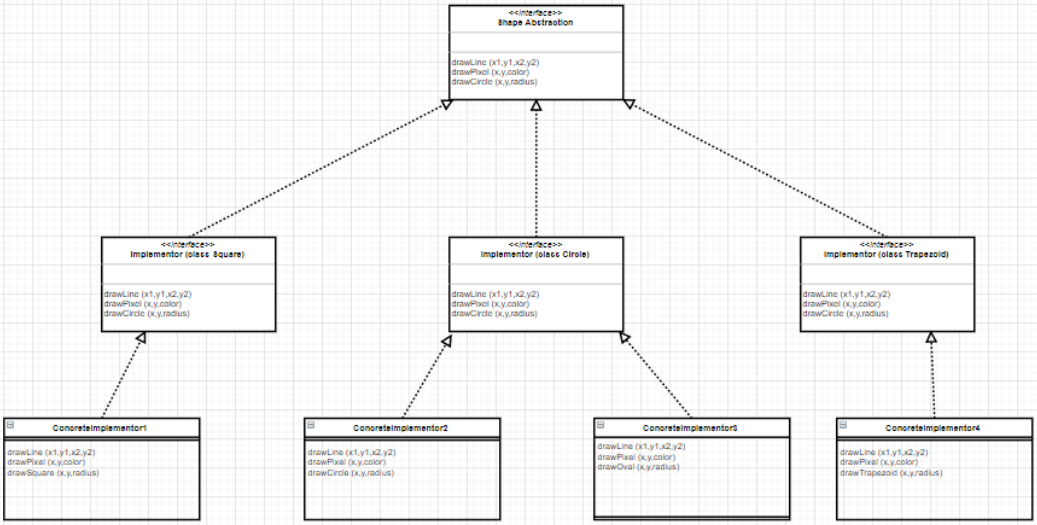

C:\WINDOWS\system32\cmd.exe
Enter a command (Commands are: C, M, S, U, R, P, X):
m 2 60 90
Square Number: 2   Center Point: [60, 90]   Length: 23
Enter a command (Commands are: C, M, S, U, R, P, X):
p
Square Number: 1   Center Point: [4, 5]   Length: 15
Square Number: 2   Center Point: [60, 90]   Length: 23
Square Number: 3   Center Point: [20, 40]   Length: 32
Square Number: 4   Center Point: [300, 400]   Length: 40
Enter a command (Commands are: C, M, S, U, R, P, X):
s 3 3
Square Number: 3   Center Point: [20, 40]   Length: 35
Enter a command (Commands are: C, M, S, U, R, P, X):
s 3 4
Square Number: 3   Center Point: [20, 40]   Length: 39
Enter a command (Commands are: C, M, S, U, R, P, X):
u


C:\WINDOWS\system32\cmd.exe
Enter a command (Commands are: C, M, S, U, R, P, X):
u
Square Number: 3   Center Point: [20, 40]   Length: 35
Enter a command (Commands are: C, M, S, U, R, P, X):
u
Square Number: 3   Center Point: [20, 40]   Length: 32
Enter a command (Commands are: C, M, S, U, R, P, X):
p
Square Number: 1   Center Point: [4, 5]   Length: 15
Square Number: 2   Center Point: [60, 90]   Length: 23
Square Number: 3   Center Point: [20, 40]   Length: 32
Square Number: 4   Center Point: [300, 400]   Length: 40
Enter a command (Commands are: C, M, S, U, R, P, X):
x
Program Terminated
C:\Users\Ethan\Desktop\MyRepos\RubyAssignment>

Problem 2. UML Diagram:



New Design Pattern



Problem 2. Class Prototype

```
#  Ethan Roberts
#  CS 417 Topics in OOP

#  Design Patterns

#  This is a prototype

class MainAbstract  #main abstract implementation
  # Main abstract interface that "Servant" class will implement for some
shape
  # regardless of if it has edges or no edges

end



class Servant < MainAbstract  # servant class
  #This class inherits the MainAbstract interface and it will
  #be used by all shapes

end



class Circle < Servant
   #using Servant class

end



class Polygon < Servant
 #using servant class and this class is being extended

end



class OutputType  # this class will be implemented for classes that are using
outputs

end



class XMLFormatter < OutputType


end



class OutputPolygon < OutputType
```

```
end


class OutputCircle < OutputType

end
```