**Task 7.1 & 7.2 – ShapeDrawer – Save / Load**

**ExtensionMethods.cs**

using System;

using System.IO;

using SplashKitSDK;

namespace ShapeDrawer

{

public static class ExtensionMethods

{

public static int ReadInteger(this StreamReader reader)

{

return Convert.ToInt32(reader.ReadLine());

}

public static float ReadSingle(this StreamReader reader)

{

return Convert.ToSingle(reader.ReadLine());

}

public static Color ReadColor(this StreamReader reader)

{

return Color.RGBColor(reader.ReadSingle(), reader.ReadSingle(), reader.ReadSingle());

}

public static void WriteColor(this StreamWriter writer, Color clr)

{

writer.WriteLine("{0}\n{1}\n{2}", clr.R, clr.G, clr.B);

}

}

}

**Program.cs**

using System;

using System.Collections.Generic;

using SplashKitSDK;

namespace ShapeDrawer;

public class Program

{

// Private enumeration for shape kinds

private enum ShapeKind

{

Rectangle,

Circle,

Line

}

public static void Main()

{

Window window = new Window("Shape Drawer - Multiple Shape Kinds", 800, 600);

// Create a new Drawing object

Drawing myDrawing = new Drawing();

// Variable to track which kind of shape to add

ShapeKind kindToAdd = ShapeKind.Circle;

// Number of parallel lines (last digit of student ID is 1, so X=1)

int parallelLines = 1;

// Step 9: File path for saving/loading -

string filePath = "/Users/minthukyawkhaung/Desktop/TestDrawing.txt"; // Mac

//string filePath =

do

{

SplashKit.ProcessEvents();

SplashKit.ClearScreen();

// Check for R key to select Rectangle

if (SplashKit.KeyTyped(KeyCode.RKey))

{

kindToAdd = ShapeKind.Rectangle;

}

// Check for C key to select Circle

if (SplashKit.KeyTyped(KeyCode.CKey))

{

kindToAdd = ShapeKind.Circle;

}

// Check for L key to select Line

if (SplashKit.KeyTyped(KeyCode.LKey))

{

kindToAdd = ShapeKind.Line;

}

// Step 9: Check for S key to save

if (SplashKit.KeyTyped(KeyCode.SKey))

{

try

{

myDrawing.Save(filePath);

Console.WriteLine("Drawing saved successfully to: " + filePath);

}

catch (Exception e)

{

Console.Error.WriteLine("Error saving file: {0}", e.Message);

}

}

// Step 16: Check for O key to open/load

if (SplashKit.KeyTyped(KeyCode.OKey))

{

try

{

myDrawing.Load(filePath);

Console.WriteLine("Drawing loaded successfully from: " + filePath);

}

catch (Exception e)

{

Console.Error.WriteLine("Error loading file: {0}", e.Message);

}

}

// Check if left mouse button is clicked

if (SplashKit.MouseClicked(MouseButton.LeftButton))

{

// Get mouse position

float mouseX = SplashKit.MouseX();

float mouseY = SplashKit.MouseY();

// Declare myShape variable

Shape? myShape = null;

if (kindToAdd == ShapeKind.Rectangle)

{

myShape = new MyRectangle();

}

else if (kindToAdd == ShapeKind.Circle)

{

myShape = new MyCircle();

}

else // Line

{

// Draw parallelLines number of lines at the same time

for (int i = 0; i < parallelLines; i++)

{

Shape lineShape = new MyLine(Color.Red, mouseX, mouseY + (i \* 10), mouseX + 100, mouseY + (i \* 10));

myDrawing.AddShape(lineShape);

}

}

// Add the shape to the drawing

if (myShape != null)

{

myShape.X = mouseX;

myShape.Y = mouseY;

myDrawing.AddShape(myShape);

}

}

// Check if spacebar is pressed

if (SplashKit.KeyTyped(KeyCode.SpaceKey))

{

// Change the background color to a new random color

myDrawing.Background = SplashKit.RandomColor();

}

// Check if right mouse button is clicked

if (SplashKit.MouseClicked(MouseButton.RightButton))

{

// Get current mouse position

Point2D mousePos = SplashKit.MousePosition();

// Tell myDrawing to SelectShapesAt the current mouse pointer position

myDrawing.SelectShapesAt(mousePos);

}

// Check if Delete key or Backspace key is pressed

if (SplashKit.KeyTyped(KeyCode.DeleteKey) || SplashKit.KeyTyped(KeyCode.BackspaceKey))

{

// Get all selected shapes and remove them from the drawing

List<Shape> selectedShapes = myDrawing.SelectedShapes;

foreach (Shape shape in selectedShapes)

{

myDrawing.RemoveShape(shape);

}

}

// Tell myDrawing to Draw

myDrawing.Draw();

SplashKit.RefreshScreen();

} while (!window.CloseRequested);

}

}

**Drawing.cs**

using System;

using System.Collections.Generic;

using System.IO;

using SplashKitSDK;

namespace ShapeDrawer

{

public class Drawing

{

// Private fields

private readonly List<Shape> \_shapes;

private Color \_background;

// Constructor

public Drawing(Color background)

{

\_shapes = new List<Shape>();

\_background = background;

}

// Default constructor using Color.White

public Drawing() : this(Color.White)

{

// other steps could go here…

}

//Properties

public List<Shape> SelectedShapes

{

get

{

List<Shape> result = new List<Shape>();

foreach (Shape s in \_shapes)

{

if (s.Selected)

{

result.Add(s);

}

}

return result;

}

}

public int ShapeCount

{

get { return \_shapes.Count; }

}

public Color Background

{

get { return \_background; }

set { \_background = value; }

}

//Methods

public void Draw()

{

SplashKit.ClearScreen(\_background);

foreach (Shape s in \_shapes)

{

s.Draw();

}

}

// SelectShapesAt method that selects/deselects shapes at given point

public void SelectShapesAt(Point2D pt)

{

foreach (Shape s in \_shapes)

{

if (s.IsAt(pt))

{

s.Selected = true;

}

else

{

s.Selected = false;

}

}

}

public void AddShape(Shape s)

{

\_shapes.Add(s);

}

public void RemoveShape(Shape s)

{

\_shapes.Remove(s);

}

// Step 4,31: Save method to save drawing to file

public void Save(string filename)

{

StreamWriter writer = new StreamWriter(filename);

try

{

writer.WriteColor(Background);

writer.WriteLine(ShapeCount);

foreach (Shape s in \_shapes)

{

s.SaveTo(writer);

}

}

finally

{

writer.Close();

}

}

// Step 1,30: Load method to load drawing from file

public void Load(string filename)

{

StreamReader reader = new StreamReader(filename);

string? kind;

Shape? s;

try

{

Background = reader.ReadColor();

int count = reader.ReadInteger();

\_shapes.Clear();

for (int i = 0; i < count; i++)

{

kind = reader.ReadLine();

switch (kind)

{

case "Rectangle":

s = new MyRectangle();

break;

case "Circle":

s = new MyCircle();

break;

case "Line":

s = new MyLine();

break;

default:

throw new InvalidDataException("Unknown shape kind: " + kind); // Step 28: Handle unknown shape kind

}

s.LoadFrom(reader);

AddShape(s);

}

}

finally

{

reader.Close();

}

}

}

}

**Shape.cs**

using System;

using System.IO;

using SplashKitSDK;

namespace ShapeDrawer;

public abstract class Shape

{

// Fields

private Color \_color;

private float \_x;

private float \_y;

private bool \_selected;

// Default constructor

public Shape() : this(Color.Yellow)

{

}

// Overloaded constructor that takes color as argument

public Shape(Color color)

{

\_color = color;

\_x = 0.0f;

\_y = 0.0f;

\_selected = false;

}

// Properties

public Color Color

{

get { return \_color; }

set { \_color = value; }

}

public float X

{

get { return \_x; }

set { \_x = value; }

}

public float Y

{

get { return \_y; }

set { \_y = value; }

}

public bool Selected

{

get { return \_selected; }

set { \_selected = value; }

}

// Abstract methods - must be implemented by derived classes

public abstract void Draw();

public abstract void DrawOutline();

public abstract bool IsAt(Point2D pt);

// Step 5: Virtual SaveTo method - can be overridden by derived classes

public virtual void SaveTo(StreamWriter writer)

{

writer.WriteColor(Color);

writer.WriteLine(X);

writer.WriteLine(Y);

}

// Step 13: Virtual LoadFrom method - can be overridden by derived classes

public virtual void LoadFrom(StreamReader reader)

{

Color = reader.ReadColor();

X = reader.ReadSingle();

Y = reader.ReadSingle();

}

}

**MyRectangle.cs**

using System;

using System.IO;

using SplashKitSDK;

namespace ShapeDrawer;

public class MyRectangle : Shape

{

// Fields

private int \_width;

private int \_height;

// Default constructor

public MyRectangle() : this(Color.Green, 0.0f, 0.0f, 181, 181)

{

// Using 181 (100 + 81, where 81 is the last two digits based on the original Shape constructor)

}

// Overloaded constructor

public MyRectangle(Color color, float x, float y, int width, int height) : base(color)

{

X = x;

Y = y;

\_width = width;

\_height = height;

}

// Properties

public int Width

{

get { return \_width; }

set { \_width = value; }

}

public int Height

{

get { return \_height; }

set { \_height = value; }

}

// Override Draw method

public override void Draw()

{

if (Selected)

{

DrawOutline();

}

SplashKit.FillRectangle(Color, X, Y, \_width, \_height);

}

// Override DrawOutline method

public override void DrawOutline()

{

// The outline is 6 pixels wider on all sides

SplashKit.DrawRectangle(Color.Black, X - 6, Y - 6, \_width + 12, \_height + 12);

}

// Override IsAt method

public override bool IsAt(Point2D pt)

{

return pt.X >= X && pt.X <= (X + \_width) &&

pt.Y >= Y && pt.Y <= (Y + \_height);

}

// Step 6: Override SaveTo method

public override void SaveTo(StreamWriter writer)

{

writer.WriteLine("Rectangle");

base.SaveTo(writer);

writer.WriteLine(Width);

writer.WriteLine(Height);

}

// Step 14: Override LoadFrom method

public override void LoadFrom(StreamReader reader)

{

base.LoadFrom(reader);

Width = reader.ReadInteger();

Height = reader.ReadInteger();

}

}

**MyCircle.cs**

using System;

using System.IO;

using SplashKitSDK;

namespace ShapeDrawer;

public class MyCircle : Shape

{

// Fields

private int \_radius;

// Default constructor

public MyCircle() : this(Color.Blue, 0.0f, 0.0f, 131)

{

// Using 131 (50 + 81, where 81 is the last two digits)

}

// Overloaded constructor

public MyCircle(Color color, float x, float y, int radius) : base(color)

{

X = x;

Y = y;

\_radius = radius;

}

// Properties

public int Radius

{

get { return \_radius; }

set { \_radius = value; }

}

// Override Draw method

public override void Draw()

{

if (Selected)

{

DrawOutline();

}

SplashKit.FillCircle(Color, X, Y, \_radius);

}

// Override DrawOutline method

public override void DrawOutline()

{

// Draw a black circle with a radius 2 pixels larger

SplashKit.DrawCircle(Color.Black, X, Y, \_radius + 2);

}

// Override IsAt method

public override bool IsAt(Point2D pt)

{

// Check if the point is within the circle using SplashKit's helper method

return SplashKit.PointInCircle(pt, SplashKit.CircleAt(X, Y, \_radius));

}

// Step 7: Override SaveTo method

public override void SaveTo(StreamWriter writer)

{

writer.WriteLine("Circle");

base.SaveTo(writer);

writer.WriteLine(Radius);

}

// Step 15: Override LoadFrom method

public override void LoadFrom(StreamReader reader)

{

base.LoadFrom(reader);

Radius = reader.ReadInteger();

}

}

**MyLine.cs**

using System;

using System.IO;

using SplashKitSDK;

namespace ShapeDrawer;

public class MyLine : Shape

{

// Fields

private float \_endX;

private float \_endY;

// Default constructor

public MyLine() : this(Color.Red, 0.0f, 0.0f, 100.0f, 100.0f)

{

}

// Overloaded constructor

public MyLine(Color color, float startX, float startY, float endX, float endY) : base(color)

{

X = startX;

Y = startY;

\_endX = endX;

\_endY = endY;

}

// Properties

public float EndX

{

get { return \_endX; }

set { \_endX = value; }

}

public float EndY

{

get { return \_endY; }

set { \_endY = value; }

}

// Override Draw method

public override void Draw()

{

if (Selected)

{

DrawOutline();

}

SplashKit.DrawLine(Color, X, Y, \_endX, \_endY);

}

// Override DrawOutline method

public override void DrawOutline()

{

// Draw small circles around the start and end points

SplashKit.FillCircle(Color.Black, X, Y, 5);

SplashKit.FillCircle(Color.Black, \_endX, \_endY, 5);

}

// Override IsAt method

public override bool IsAt(Point2D pt)

{

// Check if the point is on the line using SplashKit's helper method

Line line = SplashKit.LineFrom(X, Y, \_endX, \_endY);

return SplashKit.PointOnLine(pt, line, 5.0f);

}

// Step 8: Override SaveTo method

public override void SaveTo(StreamWriter writer)

{

writer.WriteLine("Line");

base.SaveTo(writer);

writer.WriteLine(EndX);

writer.WriteLine(EndY);

}

// Step 15: Override LoadFrom method

public override void LoadFrom(StreamReader reader)

{

base.LoadFrom(reader);

EndX = reader.ReadSingle();

EndY = reader.ReadSingle();

}

}

**TextDrawing.txt**

1

1

1

6

Circle

0

0

1

425

230

131

Rectangle

0

0.49803922

0

81

412

181

181

Rectangle

0

0.49803922

0

563

38

181

181

Line

1

0

0

446

443

546

443

Line

1

0

0

634

487

734

487

Circle

0

0

1

133

134

131