```
Drawing.cs  using
System.Collections.Generic; using
SplashKitSDK; using System.IO;
using System.IO.Enumeration;

namespace ShapeDrawer
{
   public class Drawing
   {
       private readonly List<Shape> _shapes;
private Color _background;        private
StreamWriter writer;        private Shape s;

       private StreamReader reader;
private int count;        private
string kind;



       // Public property to access the background color
public Color Background
       {
           get { return _background; }
set { _background = value; }
       }

       public void Save(string filename)
       {
           // Step 1: Assign writer, a new StreamWriter passing in filename using
(StreamWriter writer = new StreamWriter(filename))
           {
            // Step 2: Tell writer to WriteColor, passing in Background
writer.WriteLine(Background.ToString());

            // Step 3: Tell writer to WriteLine, passing in ShapeCount
writer.WriteLine(_shapes.Count);

            // Step 4: For each Shape s in _shapes
foreach (Shape s in _shapes)
            {
              // Step 5: Tell s to SaveTo writer
              s.SaveTo(writer);
            }

            // Step 6: Tell writer to Close
            // This is automatically handled by the 'using' statement which disposes of the
StreamWriter
          }
      }

      public Drawing(Color background)
      {
          _shapes = new List<Shape>();
          _background = background;
      }

      public void Load(string filePath)
      {
          reader       =       new       StreamReader(filePath);
Background      =         reader.ReadColor();     count      =
reader.ReadInteger();

          _shapes.Clear();
```

```
            for (int i = 0;  i < count; i++)
            {
                reader.ReadLine();
if (kind == "Rectangle")
                {
                    s = new MyRectangle();
                }
                if (kind == "Circle")
                {
                    s = new MyCircle();
                }
else
                {
continue;
                }

                s.LoadFrom(reader);
                _shapes.Add(s);

                reader.Close();
            }
        }



        public Drawing() : this(Color.White) { } // Default constructor


        public void AddShape(Shape shape)
        {
            _shapes.Add(shape);
        }
        public void RemoveShape(Shape shape)
        {
            _shapes.Remove(shape);
        }

        public void Draw()
        {
            SplashKit.ClearScreen(_background);
foreach (Shape shape in _shapes)
            {
                shape.Draw();
            }
        }

        public void SelectShapesAt(Point2D pt)
        {
            foreach (Shape s in _shapes)
            {                if
(s.IsAt(pt))
                {
                    s.Selected = true;
                }
else
                {
                    s.Selected = false;
                }
            }
        }

        public List<Shape> SelectedShapes
        {
get
          {
              List<Shape> result = new List<Shape>();
foreach (Shape s in _shapes)
              {
                 if (s.Selected)
                 {
                    result.Add(s);
                 }
              }
              return result;
          }
        }
    }
}
```

ExtensionMethod.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);
        }


    }
}
```

MyCircle.cs using

```
SplashKitSDK;

namespace ShapeDrawer
{
    public class MyCircle : Shape
    {
        private int _radius;

        // Property for Radius
public int Radius
```

```
        {
            get { return _radius; }
set { _radius = value; }
        }

        public override void LoadFrom(StreamReader reader)
        {
            base.LoadFrom(reader);
            Radius = reader.ReadInteger();
        }



        // Default constructor initializes with Color.Blue and Radius 50
public MyCircle() : base(Color.Blue)
        {
            _radius = 50;  // Default radius
        }



        // Constructor that accepts color and radius         public
MyCircle(SplashKitSDK.Color color, int radius,float x, float y) : base(color)
        {
            _radius = radius;
            X = x;
Y = y;
        }

        // Override Draw method public
        override void Draw() {
            SplashKit.FillCircle(Color, X, Y, _radius);
            if (Selected)
            {
                DrawOutline(); // Draw outline if selected
            }
        }

        // Override DrawOutline method
public override void DrawOutline()
        {
            SplashKit.DrawCircle(Color.Black, X, Y, _radius + 2);
        }

        public override void SaveTo(StreamWriter writer)
        {
            base.SaveTo(writer);            writer.WriteLine("Circle");
writer.WriteLine(Radius);            writer.WriteLine($"{(int)(Color.R * 255)},{(int)(Color.G *
255)},{(int)(Color.B * 255)}");


        }

        // Override IsAt method to check if a point is within the circle
public override bool IsAt(Point2D pt)
        {
            return SplashKit.PointInCircle(pt, SplashKit.CircleAt(X, Y, _radius));
        }
    }

}
```

```
MyLine.cs using
SplashKitSDK; using
System;

namespace ShapeDrawer
{
   public class MyLine : Shape
   {
      private float _endX;
private float _endY;




      // Constructor with parameters for color and coordinates        public MyLine(Color
color, float startX, float startY, float endX, float endY) : base(color)
      {
X = startX;
Y = startY;
         _endX = endX;
         _endY = endY;
      }
      // Default constructor initializing color and coordinates
public MyLine() : this(Color.RandomRGB(255), 0.0f, 0.0f, 100, 100)
      {
      }

      // Property for EndX
      public float EndX
```

```
        {           get { return
_endX; }            set { _endX
= value; }
        }

        // Property for EndY
public float EndY
        {
            get { return _endY; }
set { _endY = value; }
        }

        // Override Draw to actually draw the line
public override void Draw()
        {
            SplashKit.DrawLine(Color, X, Y, _endX, _endY);
        }

        // Override DrawOutline for the selection
public override void DrawOutline()
        {
            if (Selected)
            {
                SplashKit.DrawLine(Color.Black, X - 5, Y - 5, _endX + 5, _endY + 5);
            }
        }

        public override bool IsAt(Point2D pt)
        {
            // Create a Line object from the start and end points
            Line line = SplashKit.LineFrom(X, Y, _endX, _endY);
            // Use the PointOnLine method, which expects a Line object
return SplashKit.PointOnLine(pt, line);
        }
        public override void SaveTo(StreamWriter writer)
        {
            base.SaveTo(writer);            writer.WriteLine("Line");            writer.WriteLine(EndX);
writer.WriteLine(EndY);            writer.WriteLine($"{(int)(Color.R * 255)},{(int)(Color.G *
255)},{(int)(Color.B * 255)}");

        }
        public override void LoadFrom(StreamReader reader)
        {
            Color = reader.ReadColor();
            EndX = reader.ReadInteger();
            EndY = reader.ReadInteger();
        }
    }
}

MyRectangle.cs using
SplashKitSDK;

namespace ShapeDrawer
{
    public class MyRectangle : Shape
    {
        private int _width, _height;

        // Property for Width
        public int Width
        {
            get { return _width; }
set { _width = value; }
        }

        // Property for Height
public int Height
        {
            get { return _height; }
set { _height = value; }
        }

        // Default constructor initializes with Color.Green, 0.0f for x and y, and 100 for width and height
public MyRectangle() : this(Color.RandomRGB(255), 0.0f, 0.0f, 100, 100)
        {
        }

        public override void SaveTo(StreamWriter writer)
        {
            base.SaveTo(writer);            writer.WriteLine("Rectangle");
writer.WriteLine(Width);            writer.WriteLine(Height);
writer.WriteLine($"{(int)(Color.R * 255)},{(int)(Color.G * 255)},{(int)(Color.B * 255)}");

        }

        public override void LoadFrom(StreamReader reader)
        {
            base.LoadFrom(reader);
            Width = reader.ReadInteger();
            Height = reader.ReadInteger();
        }
        // Constructor that accepts color, x, y, width, and height         public
MyRectangle(Color color, float x, float y, int width, int height) : base(color)
        {
X = x;
Y = y;
            _width = width;
            _height = height;
        }

        // Override Draw method
public override void Draw()
        {
            SplashKit.FillRectangle(Color, X, Y, _width, _height);

            if (Selected)
            {
                DrawOutline(); // Draw outline if selected
            }
        }

        // Override DrawOutline method
public override void DrawOutline()
        {
            SplashKit.DrawRectangle(Color.Black, X - 2, Y - 2, _width + 4, _height + 4);
        }

        // Override IsAt method to check if a point is within the rectangle
public override bool IsAt(Point2D pt)
        {
            return (pt.X >= X && pt.X <= X + _width && pt.Y >= Y && pt.Y <= Y + _height);
        }
    }
}
Program.cs using
System; using
SplashKitSDK;

namespace ShapeDrawer
{
    public class Program
    {
        private enum ShapeKind
        {
            Rectangle,
            Circle,
            Line
        }

        public static void Main()
        {
            // Default shape to add is Circle
            ShapeKind kindToAdd = ShapeKind.Circle;

            Drawing myDrawing = new Drawing(); // Create a Drawing object using the default constructor
Window window = new Window("Shape Drawer", 800, 600);

            // Set up the file path for saving/loading
            string desktopPath = "C:\\Users\\joshu\\OneDrive\\Desktop\\COS20007
OOP\\ShapeDrawer";
            string filePath = System.IO.Path.Combine(desktopPath, "TestDrawing.txt");
```

```
      do
      {
        SplashKit.ProcessEvents();              window.Clear(Color.White); //
Clear with a temporary white color

        myDrawing.Draw(); // Draw all shapes

        if (SplashKit.MouseClicked(MouseButton.LeftButton))
        {
          // Create a new shape based on kindToAdd
          Shape newShape = null;  // Initialize as null to handle lines differently

          if (kindToAdd == ShapeKind.Rectangle)
          {
            // Create a new rectangle
newShape = new MyRectangle();
          }
          else if (kindToAdd == ShapeKind.Circle)
          {
            // Create a new circle
newShape = new MyCircle();
          }
          else if (kindToAdd == ShapeKind.Line)
          {
            // Create a new line
float startX = SplashKit.MouseX();
float startY = SplashKit.MouseY();
// Placeholder end points for the line, can be
adjusted based on user input
newShape = new MyLine(Color.Red, startX,
startY, startX + 100, startY + 50);
```

```
                }

                if (newShape != null)
                {
                    // Set the position of the new shape for non-line shapes
if (kindToAdd != ShapeKind.Line)
                    {
                        newShape.X = SplashKit.MouseX();
newShape.Y = SplashKit.MouseY();
                    }

                    myDrawing.AddShape(newShape); // Add the new shape to the drawing
                }
            }

            // Change shape to Rectangle if 'R' key is pressed
if (SplashKit.KeyTyped(KeyCode.RKey))
            {
                kindToAdd = ShapeKind.Rectangle;
            }

            // Save the drawing if 'S' key is pressed
if (SplashKit.KeyTyped(KeyCode.SKey))
            {
                // Call the Save method of Drawing class
myDrawing.Save(filePath);
            }

            // Load the drawing if 'O' key is pressed
            if (SplashKit.KeyTyped(KeyCode.OKey))
            {
                myDrawing.Load(filePath);  // Load the drawing from the file
            }

            // Change shape to Circle if 'C' key is pressed
if (SplashKit.KeyTyped(KeyCode.CKey))
            {
                kindToAdd = ShapeKind.Circle;
            }

            if (SplashKit.KeyTyped(KeyCode.LKey))
            {
                kindToAdd = ShapeKind.Line;
            }

            // Change the background color to a random color when the space key is pressed
if (SplashKit.KeyTyped(KeyCode.SpaceKey))
            {
                myDrawing.Background = SplashKit.RandomColor();
            }

            // Select shapes at the current mouse pointer position when the right mouse button is
clicked             if (SplashKit.MouseClicked(MouseButton.RightButton))
            {
                myDrawing.SelectShapesAt(SplashKit.MousePosition());
            }

            // Remove selected shapes if the delete or backspace key is pressed             if
(SplashKit.KeyTyped(KeyCode.DeleteKey) || SplashKit.KeyTyped(KeyCode.BackspaceKey))             {
                foreach (var shape in myDrawing.SelectedShapes)
                {
                    myDrawing.RemoveShape(shape);
                }
            }

            window.Refresh(60);
        } while (!window.CloseRequested);

        window.Close();
    }
  }
}
Shape.cs using
SplashKitSDK; using
System.IO;
namespace ShapeDrawer
{
  public abstract class Shape
  {
    private Color _color;      private
float _x, _y,_width,_height;      private
bool _selected;

    public virtual void SaveTo(StreamWriter writer)
    {
        writer.WriteLine(_color);
writer.WriteLine(X);
        writer.WriteLine(Y);
    }

    public virtual void LoadFrom(StreamReader reader)
    {
        Color = reader.ReadColor();
X = reader.ReadInteger();
Y = reader.ReadInteger();
    }

    // Property for Color
public Color Color
    {
        get { return _color; }
set { _color = value; }
    }

    // Property for X coordinate
public float X
    {
        get { return _x; }
set { _x = value; }
    }

    // Property for Y coordinate
public float Y
    {
        get { return _y; }
set { _y = value; }
    }

    public float Width //call and intialize the variable
    {
        get { return _width; } //get and store the width
set { _width = value; }
    }
    public float Height //call and intialize the variable

    {

        get { return _height; } //get and store the height

set { _height = value; }

    }




    // Property for Selected

public bool Selected

    {

        get { return _selected; }

set { _selected = value; }

    }


    // Default constructor that initializes with Color.Yellow

public Shape() : this(Color.Yellow)

    {

    }


    // Constructor that accepts color as a parameter

public Shape(Color color)

    {

        _color = color;

    }


    // Empty method bodies for Draw and DrawOutline public

    virtual void Draw() { }


    public virtual void DrawOutline() { }
    // Virtual IsAt method returns false
public virtual bool IsAt(Point2D pt)
    {
        return false;
    }
}
}
```

testDrawing.txt

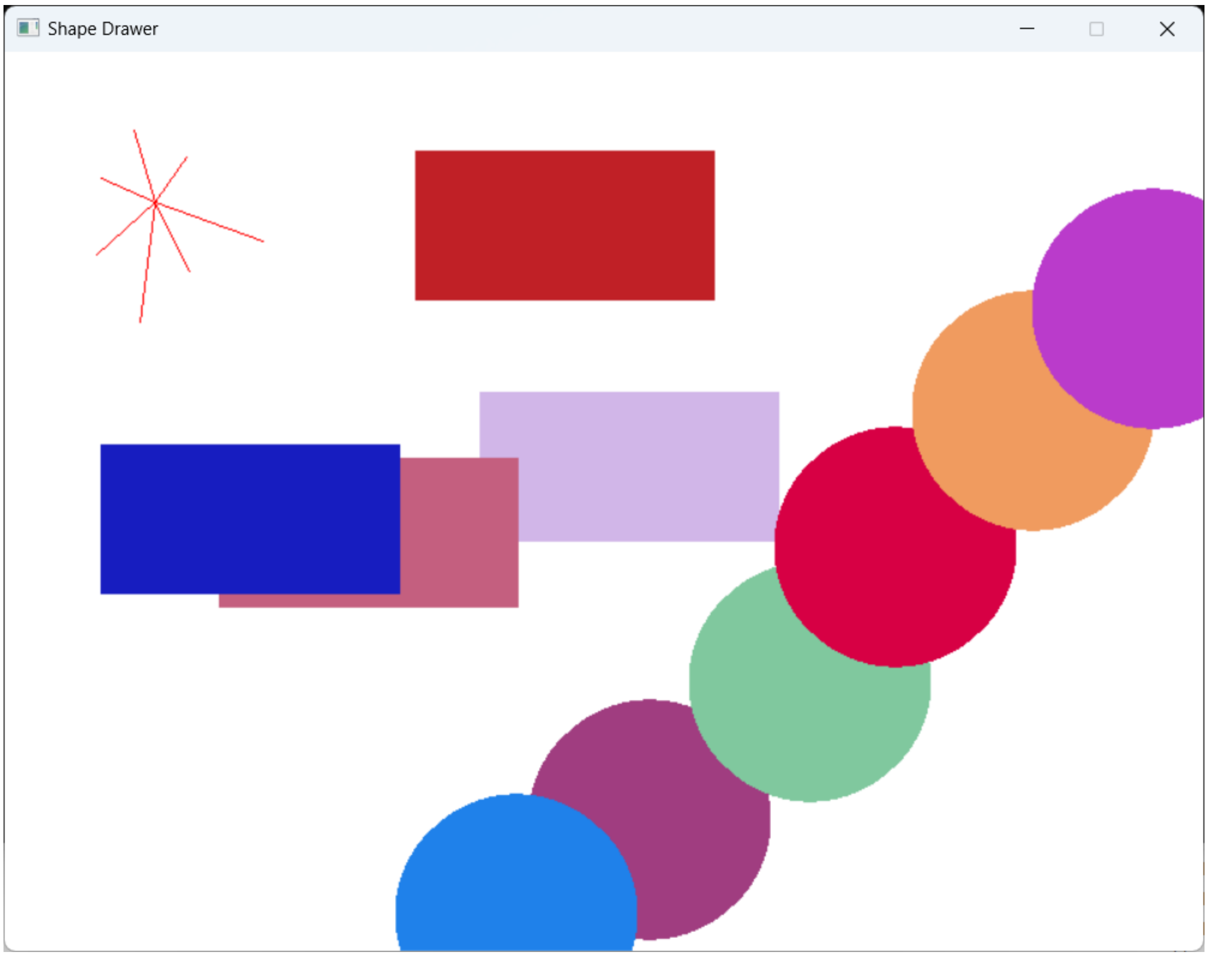
```
SplashKitSDK.Color
18
SplashKitSDK.Color
36
30
Circle
50
0,0,255
SplashKitSDK.Color
30
125
Circle
50
0,0,255
SplashKitSDK.Color
24
202
Circle
50
0,0,255
SplashKitSDK.Color
22
```

```
311

Circle

50

0,0,255

SplashKitSDK.Color

35

428

Circle

50

0,0,255

SplashKitSDK.Color

28

538

Circle

50

0,0,255

SplashKitSDK.Color

155

22

Rectangle

100

100

146,78,105

SplashKitSDK.Color

171

143

Rectangle

100

100

208,218,16

SplashKitSDK.Color
```

```
183
302
Rectangle
100
100
19,101,5
SplashKitSDK.Color
185
416
Rectangle
100
100
177,66,204
SplashKitSDK.Color
207
563
Rectangle
100
100
9,157,65
SplashKitSDK.Color
390
62
Line
490
112
255,0,0
SplashKitSDK.Color
396
181
Line
```

```
496

231

255,0,0

SplashKitSDK.Color

401

285

Line

501

335

255,0,0

SplashKitSDK.Color

406

397

Line

506

447

255,0,0

SplashKitSDK.Color

418

509

Line

518

559

255,0,0

SplashKitSDK.Color

429

461

Line

529

511

255,0,0
```

```
SplashKitSDK.Color

410

570

Line

510

620

255,0,0
```


Shape Drawer