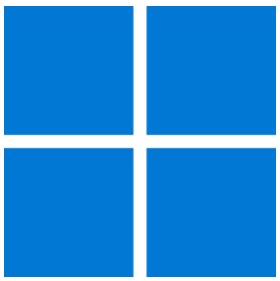
tutorial

# Windows App SDK



# Lucky Darts

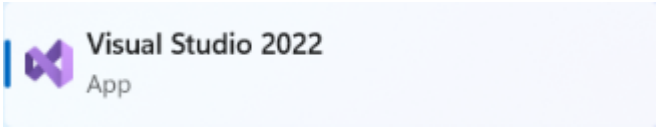
# Lucky Darts

**Lucky Darts** shows how you can create a darts game with a random chance of hitting the right spot on the dartboard using a control in a toolkit from **NuGet** using the **Windows App SDK**.

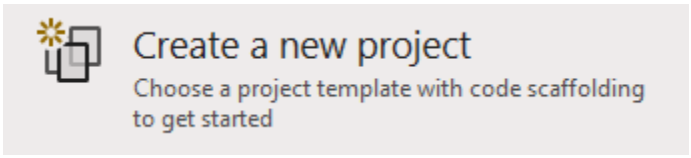
## Step 1

Follow **Setup and Start** on how to get **Setup** and **Install** what you need for **Visual Studio 2022** and **Windows App SDK**.

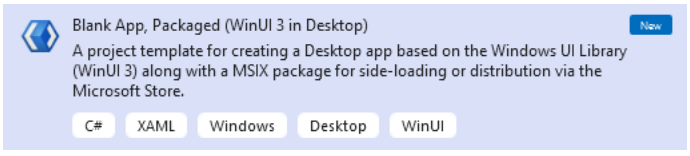
In **Windows 11** choose **Start** and then find or search for **Visual Studio 2022** and then select it.



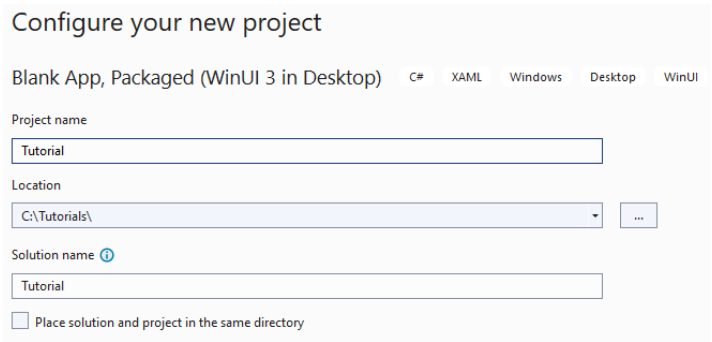

Once **Visual Studio 2022** has started select **Create a new project**.




Then choose the **Blank App, Packages (WinUI in Desktop)** and then select **Next**.

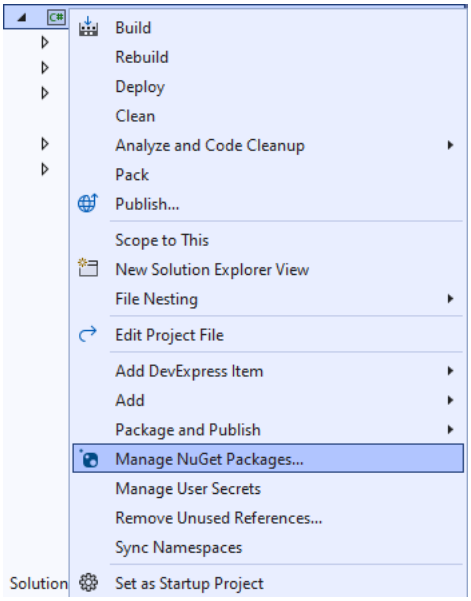



After that in **Configure your new project** type in the **Project name** as *LuckyDarts*, then select a Location and then select **Create** to start a new **Solution**.



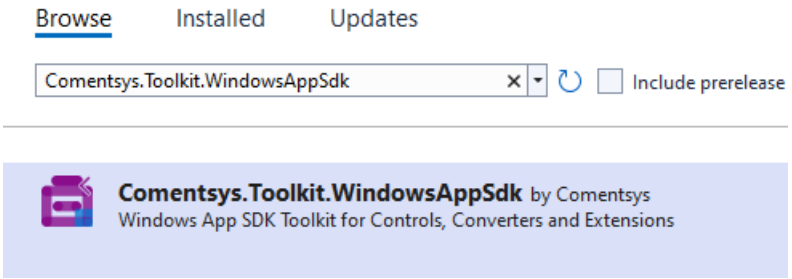
## Step 2

Then in **Visual Studio** within **Solution Explorer** for the **Solution**, right click on the **Project** shown below the **Solution** and then select **Manage NuGet Packages...**




## Step 3

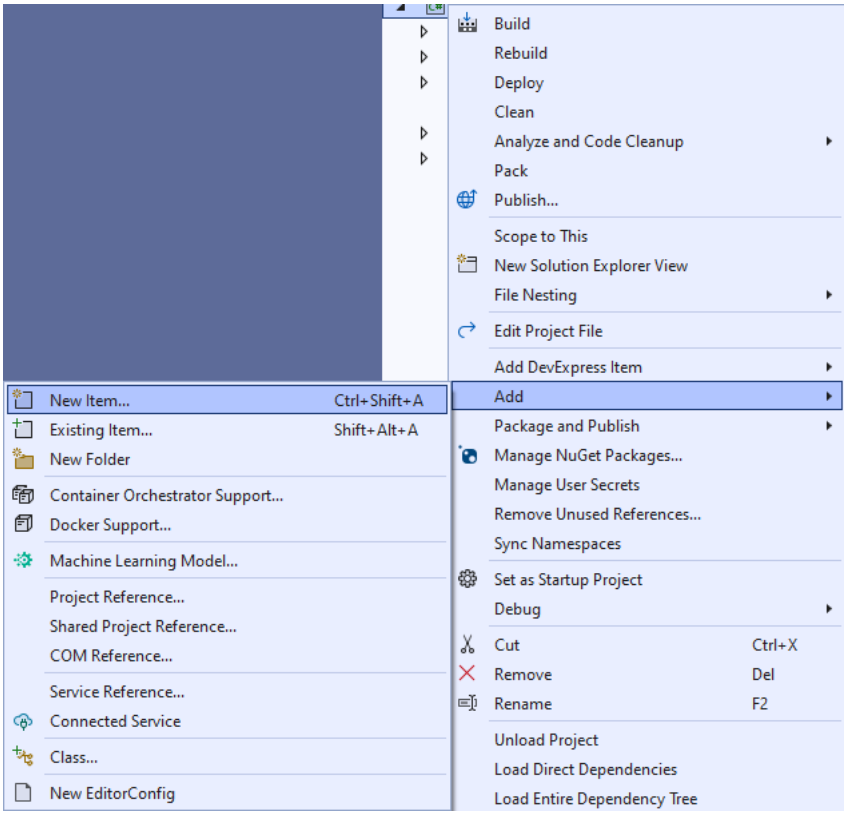
Then in the **NuGet Package Manager** from the **Browse** tab search for **Comentsys.Toolkit.WindowsAppSdk** and then select **Comentsys.Toolkit.WindowsAppSdk by Comentsys** as indicated and select **Install**




This will add the package for **Comentsys.Toolkit.WindowsAppSdk** to your **Project**. If you get the **Preview Changes** screen saying **Visual Studio is about to make changes to this solution. Click OK to proceed with the changes listed below.** You can read the message and then select **OK** to **Install** the package,, then you can close the **tab** for **Nuget: LuckyDarts** by selecting the **x** next to it.

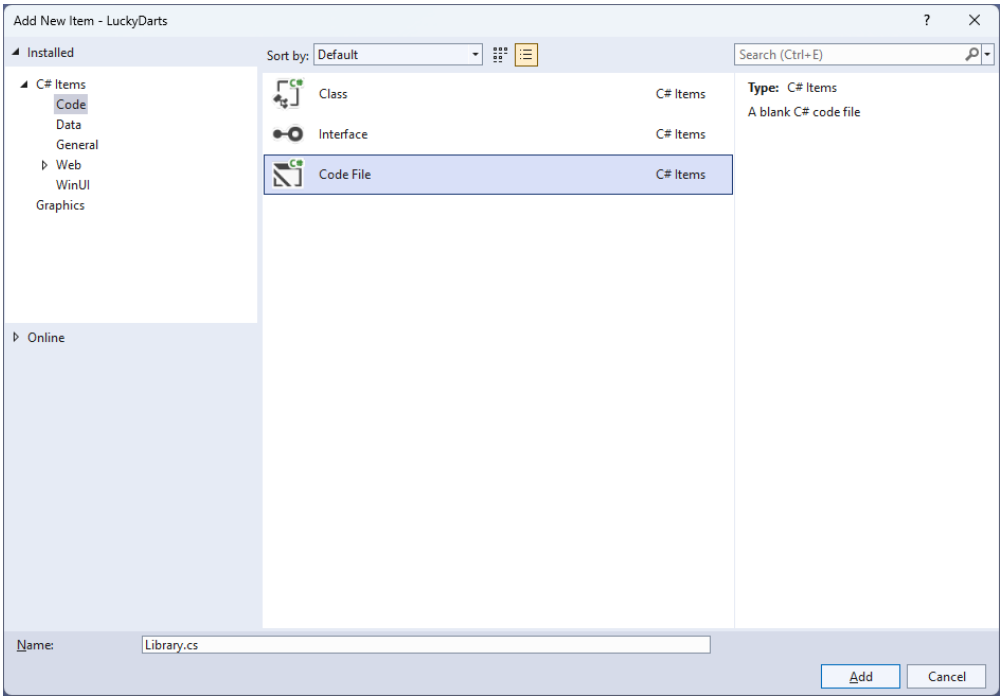
## Step 4

Then in **Visual Studio** within **Solution Explorer** for the **Solution**, right click on the **Project** shown below the **Solution** and then select **Add** then **New Item...**




## Step 5

Then in **Add New Item** from the **C# Items** list, select **Code** and then select **Code File** from the list next to this, then type in the name of *Library.cs* and then **Click** on **Add**.



## Step 6

You will now be in the **View** for the **Code** of *Library.cs*, within this first type the following **Code**:

```
using Comentsys.Toolkit.WindowsAppSdk;
using Microsoft.UI;
using Microsoft.UI.Xaml;
using Microsoft.UI.Xaml.Controls;
using Microsoft.UI.Xaml.Input;
using Microsoft.UI.Xaml.Media;
using Microsoft.UI.Xaml.Shapes;
using System;
using Windows.Foundation;
using Windows.UI;

public class Library
{
    private const string title = "Lucky Darts";
    private const int radius = 200;
    private const int circle = 360;
    private const int triple = 250;
    private const int offset = 40;
    private const int chance = 5;
    private const int size = 500;
    private const int dart = 10;
    private const int bull = 20;
    private const int ring = 10;
    private const int font = 25;
    private const int line = 2;
    private static readonly int[] numbers =
    {
        20, 1, 18, 4, 13, 6, 10, 15, 2, 17,
        3, 19, 7, 16, 8, 11, 14, 9, 12, 5
    };
    private static readonly double section =
        circle / numbers.Length;
    private readonly Random _random = new((int)DateTime.UtcNow.Ticks);

    private int _score = 0;
    private Dialog _dialog;
    private Canvas _canvas;
    private Piece _dart;

    // Is Odd, Get Ellipse, Add Circle & Get Sector

    // Add Section, Get Text & Add Text

    // Add Dart & Get Number

    // Get Score, Play & Add Board

    // Layout & New

}
```

**Class** defined so far *Library.cs* has **using** for package of **Comentsys.Toolkit.WindowsAppSdk** and others.

## Step 7

Still in the **Class** for *Library.cs* after the **Comment** of **// Is Odd, Get Ellipse, Add Circle & Get Sector** type the following **Methods**:

```
private bool IsOdd(int value) =>
    value % 2 != 0;

private Ellipse GetEllipse(double diameter, Color fill) => new()
{
    Width = diameter,
    Height = diameter,
    StrokeThickness = line,
    Fill = new SolidColorBrush(fill),
    Stroke = new SolidColorBrush(Colors.WhiteSmoke)
};

private void AddCircle(Canvas canvas, double diameter, Color fill)
{
    var circle = GetEllipse(diameter, fill);
    Canvas.SetLeft(circle, (size - diameter) / 2);
    Canvas.SetTop(circle, (size - diameter) / 2);
    canvas.Children.Add(circle);
}

private Sector GetSector(double start, double finish,
    double radius, double hole, Color fill)
{
    Sector sector = new()
    {
        Hole = hole,
        Start = start,
        Finish = finish,
        Radius = radius,
        StrokeThickness = line,
        Fill = new SolidColorBrush(fill),
        Stroke = new SolidColorBrush(Colors.WhiteSmoke)
    };
    Canvas.SetLeft(sector, (size - radius * 2) / 2);
    Canvas.SetTop(sector, (size - radius * 2) / 2);
    return sector;
}
```

**IsOdd** is used to determine if the number is odd or even, **GetEllipse** will get an **Ellipse** to be used with **AddCircle** and **GetSector** will use the **Sector** control from the toolkit and set it up as needed.

## Step 8

While still in the **`Class`** for *Library.cs* after the **Comment** of **`// Add Section, Get Text & Add Text`** type in the following **Methods**:

```
private void AddSection(Canvas canvas, int index, double start)
{
    var finish = section;
    var sector = GetSector(start, finish, radius, bull,
        IsOdd(index) ? Colors.Black : Colors.MintCream);
    var doubleRing = GetSector(start, finish, radius, radius - ring,
        IsOdd(index) ? Colors.MediumSeaGreen : Colors.OrangeRed);
    var tripleRing = GetSector(start, finish, triple / 2, triple / 2 - ring,
        IsOdd(index) ? Colors.MediumSeaGreen : Colors.OrangeRed);
    canvas.Children.Add(sector);
    canvas.Children.Add(doubleRing);
    canvas.Children.Add(tripleRing);
}

private TextBlock GetText(string value)
{
    var text = new TextBlock()
    {
        Foreground = new SolidColorBrush(Colors.WhiteSmoke),
        TextAlignment = TextAlignment.Center,
        FontSize = font,
        Text = value
    };
    text.Measure(new Size(
        double.PositiveInfinity,
        double.PositiveInfinity));
    return text;
}

private void AddText(Canvas canvas, int index, double start)
{
    var text = GetText($"{numbers[index]}");
    double angle = start * Math.PI / (circle / 2);
    double width = canvas.ActualWidth / 2;
    double height = canvas.ActualHeight / 2;
    double left = width + (width - font) * Math.Cos(angle)
        - text.DesiredSize.Width / 2;
    double top = height + (height - font) * Math.Sin(angle)
        - text.DesiredSize.Height / 2;
    Canvas.SetLeft(text, left);
    Canvas.SetTop(text, top);
    canvas.Children.Add(text);
}
```

**`AddSection`** will create a section of the dartboard using **`GetSector`** and **`GetText`** will create a **`TextBlock`** for the numbers to be used by **`AddText`** which positions the numbers on the dartboard.

## Step 9

While still in the **`Class`** for *Library.cs* after the **Comment** of **`// Add Dart & Get Number`** type in the following **Methods**:

```
private void AddDart(Point point)
{
    _canvas.Children.Remove(_dart);
    _dart = new Piece()
    {
        Width = dart,
        Height = dart,
        Name = nameof(_dart),
        Fill = new SolidColorBrush(Colors.SlateGray),
        Stroke = new SolidColorBrush(Colors.DarkGray)
    };
    Canvas.SetLeft(_dart, point.X - dart / 2);
    Canvas.SetTop(_dart, point.Y - dart / 2);
    _canvas.Children.Add(_dart);
}

private int GetNumber(double degrees) =>
degrees switch
{
    >= 351 => 6,
    >= 333 => 10,
    >= 315 => 15,
    >= 297 => 2,
    >= 279 => 17,
    >= 261 => 3,
    >= 243 => 19,
    >= 225 => 7,
    >= 207 => 16,
    >= 189 => 8,
    >= 171 => 11,
    >= 153 => 14,
    >= 135 => 9,
    >= 117 => 12,
    >= 99 => 5,
    >= 81 => 20,
    >= 63 => 1,
    >= 45 => 18,
    >= 27 => 4,
    >= 9 => 13,
    _ => 6
};
```

**`AddDart`** will position the dart on the dartboard with a given position and **`GetNumber`** will get the number of the dartboard based upon the angle passed in.

## Step 10

While still in the **`Class`** for *Library.cs* after the **Comment** of **`// Get Score, Play & Add Board`** type in the following **Methods**:

```
private int GetScore(Point point)
{
    double x = point.X - size / 2;
    double y = size / 2 - point.Y;
    double radians = Math.Atan2(y, x);
    int degrees = (int)(radians * (circle / 2) / Math.PI);
    degrees = degrees < 0 ? circle + degrees : degrees;
    int number = GetNumber(degrees);
    var length = (int)Math.Floor(Math.Sqrt(x * x + y * y));
    return length switch
    {
        >= radius => 0,
        >= radius - ring and <= radius => number * 2,
        >= triple / 2 - ring and <= triple / 2 => number * 3,
        >= bull - ring and <= bull => 25,
        <= bull / 2 => 50,
        _ => number
    };
}

private void Play(Point point)
{
    var x = _random.Next((int)point.X - offset, (int)point.X + offset);
    var y = _random.Next((int)point.Y - offset, (int)point.Y + offset);
    var hit = IsOdd(_random.Next(0, chance)) ? point : new Point(x, y);
    var score = GetScore(hit);
    _score += score;
    AddDart(hit);
    _dialog.Show($"Scored {score}, Total {_score}");
}

private void AddBoard(Canvas canvas, double diameter)
{
    var board = GetEllipse(diameter, Colors.Transparent);
    board.Tapped += (object sender, TappedRoutedEventArgs e) =>
        Play(e.GetPosition(canvas));
    Canvas.SetLeft(board, (size - diameter) / 2);
    Canvas.SetTop(board, (size - diameter) / 2);
    canvas.Children.Add(board);
}
```

**`GetScore`** will work out the score of the position on the dartboard, taking into account the double ring, triple ring, outer bullseye and the inner bullseye. **`Play`** will position the dart on the dart board in a randomised location near where was selected and then the score will be updated accordingly and is used in **`AddBoard`** which will add a transparent **`Ellipse`** which will capture **Events** when it is **`Tapped`**.

## Step 11

While still in the **`Class`** for *Library.cs* after the **Comment** of **`// Layout & New`** type in the following **Methods**:

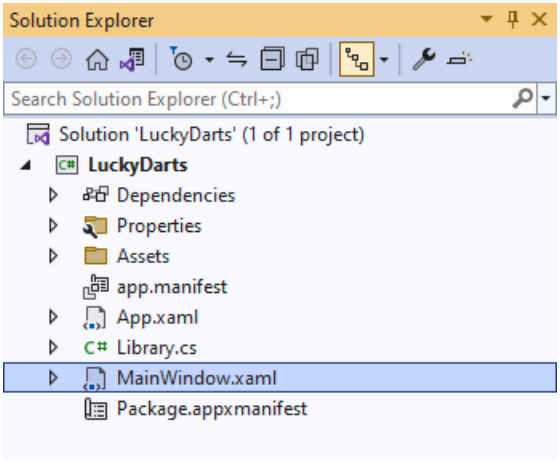
```
private void Layout(Grid grid)
{
    grid.Children.Clear();
    _canvas = new Canvas()
    {
        Width = size,
        Height = size
    };
    var start = -(section / 2);
    AddCircle(_canvas, size, Colors.Black);
    AddCircle(_canvas, (radius * 2) + (line * 2), Colors.WhiteSmoke);
    for (int index = 0; index < numbers.Length; index++)
    {
        AddSection(_canvas, index, start);
        AddText(_canvas, index, start + (section / 2) - (circle / 4));
        start += section;
    }
    AddCircle(_canvas, bull * 2, Colors.MediumSeaGreen);
    AddCircle(_canvas, bull, Colors.OrangeRed);
    AddBoard(_canvas, size);
    grid.Children.Add(_canvas);
}

public void New(Grid grid)
{
    _score = 0;
    _dialog = new Dialog(grid.XamlRoot, title);
    Layout(grid);
}
```

**`Layout`** will create the look-and-feel of the dartboard and **`New`** will start a new game.

## Step 12

Then from **Solution Explorer** for the **Solution** double-click on **MainWindow.xaml** to see the **XAML** for the **Main Window**.




## Step 13

In the **XAML** for **MainWindow.xaml** there be some **XAML** for a **`StackPanel`**, this should be **Removed** by removing the following:

```
<StackPanel Orientation="Horizontal"
HorizontalAlignment="Center" VerticalAlignment="Center">
    <Button x:Name="myButton" Click="myButton_Click">Click Me</Button>
</StackPanel>
```

## Step 14

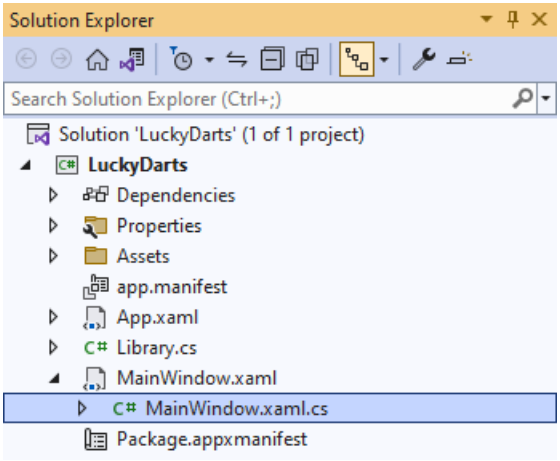
While still in the **XAML** for **MainWindow.xaml** above **`</Window>`**, type in the following **XAML**:

```
<Grid>
    <Viewbox>
        <Grid Margin="50" Name="Display"
        HorizontalAlignment="Center"
        VerticalAlignment="Center" Loaded="New"/>
    </Viewbox>
    <CommandBar VerticalAlignment="Bottom">
        <AppBarButton Icon="Page2" Label="New" Click="New"/>
    </CommandBar>
</Grid>
```

This **XAML** contains a **`Grid`** with a **`Viewbox`** which will scale a **`Grid`**. It has a **`Loaded`** event handler for **`New`** which is also shared by the **`AppBarButton`**.

## Step 15

Then, within **Solution Explorer** for the **Solution** select the arrow next to **MainWindow.xaml** then double-click on **MainWindow.xaml.cs** to see the **Code** for the **Main Window**.




## Step 16

In the **Code** for **MainWindow.xaml.cs** there be a **Method** of **`myButton_Click(...)`** this should be **Removed** by removing the following:

```
private void myButton_Click(object sender, RoutedEventArgs e)
{
    myButton.Content = "Clicked";
}
```

## Step 17

Once **`myButton_Click(...)`** has been removed, type in the following **Code** below the end of the **Constructor** of **`public MainWindow() { ... }`**:

```
private readonly Library _library = new();

private void New(object sender, RoutedEventArgs e) =>
    _library.New(Display);
```

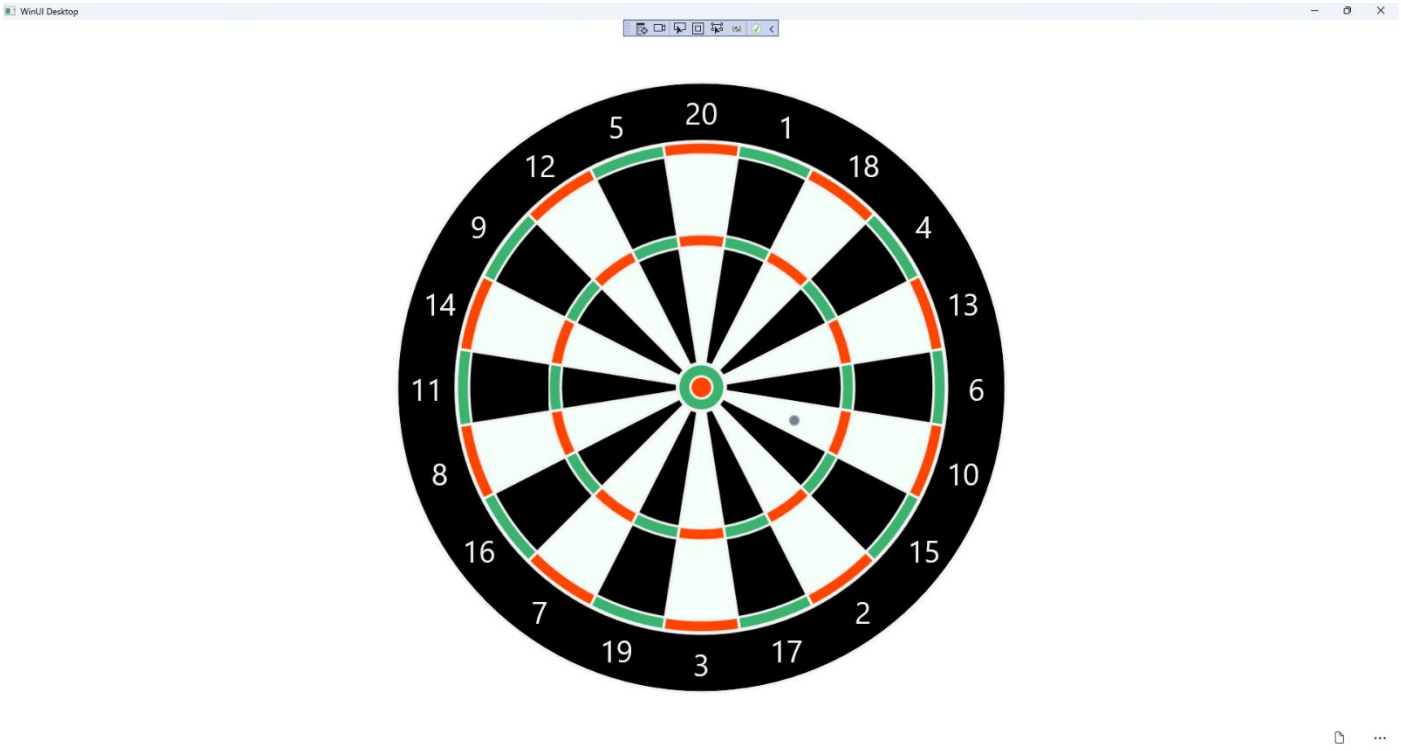
Here an **Instance** of the **Class** of **`Library`** is created then below this is the **Method** of **`New`** that will be used with **Event Handler** from the **XAML**, this **Method** uses Arrow Syntax with the **`=>`** for an Expression Body which is useful when a **Method** only has one line.

## Step 18

That completes the **Windows App SDK** application. In **Visual Studio 2022** from the **Toolbar** select **LuckyDarts (Package)** to **Start** the application.


## Step 19

Once running you can then select anywhere on the dartboard to try and see if you can get that score but there's a random chance you won't hit that spot and see what score you can get or select *New* to restart the game.




## Step 20

To **Exit** the **Windows App SDK** application, select the **Close** button from the top right of the application as that concludes this **Tutorial** for **Windows App SDK** from tutorialr.com!