tutorial

Windows App SDK

Gauge Control

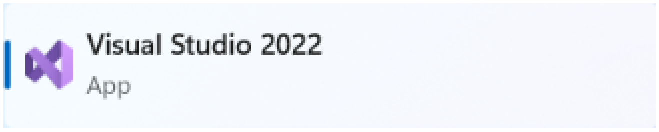
Gauge Control

Gauge Control shows how to create a **Control** that can be used as a **Gauge** using **Windows App SDK**

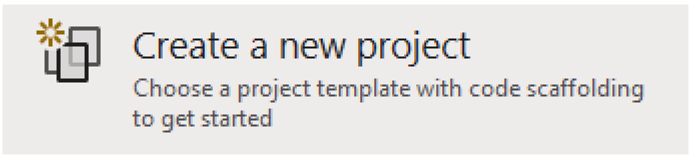
Step 1

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

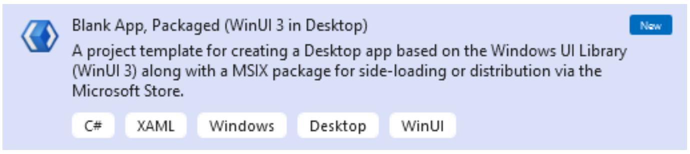
In **Windows 11** choose **Start** and then find or search for **Visual Studio 2022** and then select it.



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

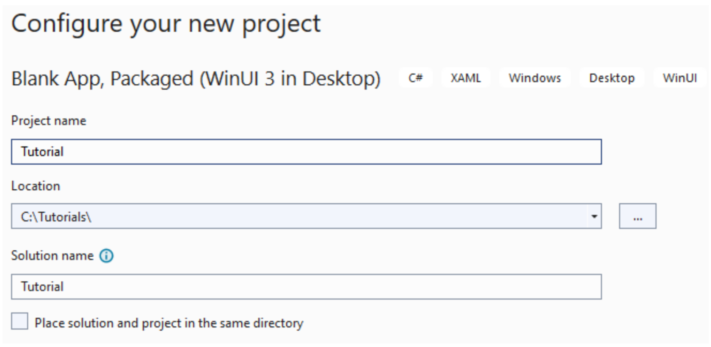

Create a new project
Choose a project template with code scaffolding to get started

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


Blank App, Packaged (WinUI 3 in Desktop)

A project template for creating a Desktop app based on the Windows UI Library (WinUI 3) along with a MSIX package for side-loading or distribution via the Microsoft Store.

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


Configure your new project

Blank App, Packaged (WinUI 3 in Desktop)

Project name: Tutorial

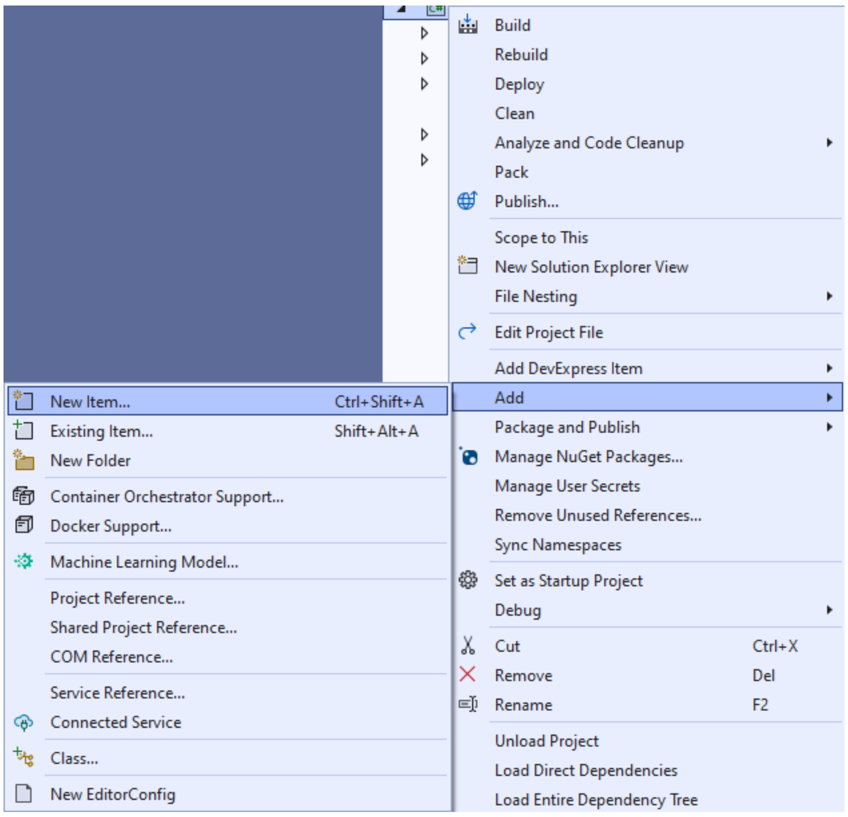
Location: C:\Tutorials\

Solution name: Tutorial

Place solution and project in the same directory

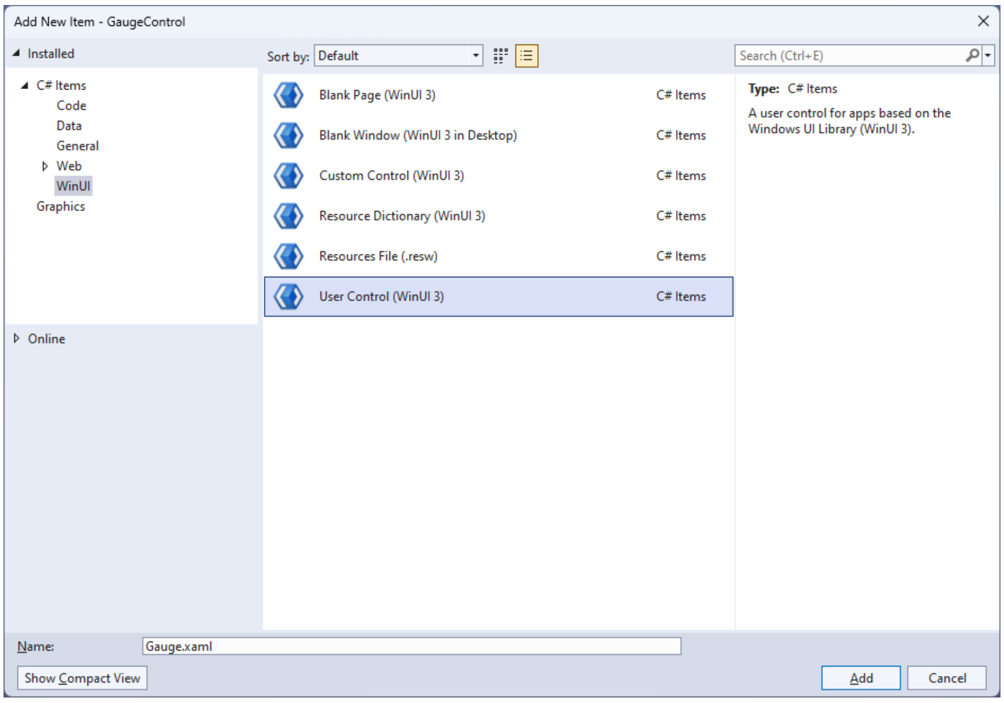
Step 2

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 3

Then in **Add New Item** from the **C# Items** list, select **WinUI** and then select **User Control (WinUI 3)** from the list next to this, then type in the name of *Gauge.xaml* and then **Click** on **Add**.


Add New Item - GaugeControl
Installed
C# Items
Code
Data
General
Web
WinUI
Graphics
Online
Search (Ctrl+E)
Blank Page (WinUI 3) C# Items
Blank Window (WinUI 3 in Desktop) C# Items
Custom Control (WinUI 3) C# Items
Resource Dictionary (WinUI 3) C# Items
Resources File (.resw) C# Items
User Control (WinUI 3) C# Items
Show Compact View
Add
Cancel

Sort by: Default

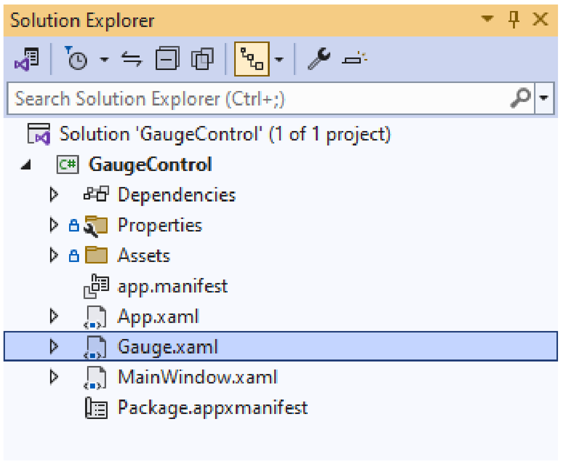
Type: C# Items

A user control for apps based on the Windows UI Library (WinUI 3).

Name: Gauge.xaml

Step 4

Then from **Solution Explorer** for the **Solution** double-click on **Gauge.xaml** to see the **XAML** for the **User Control**.



Solution 'GaugeControl' (1 of 1 project)
GaugeControl
Dependencies
Properties
Assets
app.manifest
App.xaml
Gauge.xaml
MainWindow.xaml
Package.appxmanifest

Step 5

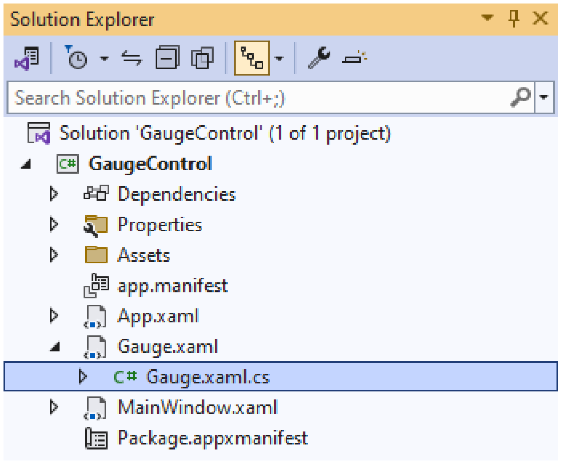
In the **XAML** for *Gauge.xaml* there be some **XAML** for a **`Grid`**, above **`</Grid>`**, type in the following **XAML**:

```
<Viewbox>
    <Canvas Name="Display" Height="300" Width="300" Loaded="Load"/>
</Viewbox>
```

This **XAML** contains a **`Viewbox`** which will **Scale** a **`Canvas`** with a **Loaded** event handler of **Load**.

Step 6

Then, within **Solution Explorer** for the **Solution** select the arrow next to **Gauge.xaml** then double-click on **Gauge.xaml.cs** to see the **Code** for the **User Control**.



Solution 'GaugeControl' (1 of 1 project)
GaugeControl
Dependencies
Properties
Assets
app.manifest
App.xaml
Gauge.xaml
Gauge.xaml.cs
MainWindow.xaml
Package.appxmanifest

Step 7

You will now be in the **View** for the **Code** of *Gauge.xaml.cs*, near the top of the **Code**, below the final **`using`** statement you will need to type the following **`using`** statement:

```
using Microsoft.UI.Xaml.Shapes;
```

Step 8

Then, while still in the **View** for the **Code** of *Gauge.xaml.cs* type in the following **Code** below the end of the **Constructor** of **`public Gauge() { ... }`**:

```
private Rectangle _needle;
private double _diameter = 0;

// Transform Method

// Markers Method

// Layout, Indicator & Load Methods

// Dependency Properties

// Properties
```

The **`class`** for **Gauge** represents the **User Control** for the **Gauge** and includes a **`Rectangle`** that will be used to represent the needle of the **Gauge** along with a **`double`** for the diameter of the **Gauge**.

Step 9

While still in the **`class`** of **Gauge** after the **Comment** of **`// Transform Method`** type the following **Method**:

```
private TransformGroup Transform(double angle, double x, double y)
{
    var transformGroup = new TransformGroup();
    var firstTranslate = new TranslateTransform()
    {
        X = x,
        Y = y
    };
    transformGroup.Children.Add(firstTranslate);
    var rotateTransform = new RotateTransform()
    {
        Angle = angle
    };
    transformGroup.Children.Add(rotateTransform);
    var secondTranslate = new TranslateTransform()
    {
        X = _diameter / 2,
        Y = _diameter / 2
    };
    transformGroup.Children.Add(secondTranslate);
    return transformGroup;
}
```

This **Method** will create a **`TransformGroup`** to rotate elements to be used for the **Gauge**.

Step 10

While still in the **`class`** of **Gauge** after the **Comment** of **`// Markers Method`** type the following **Method**:

```
private void Markers(Canvas canvas, double thickness)
{
    var inner = _diameter;
    var markers = new Canvas()
    {
        Width = inner,
        Height = inner
    };
    for (int i = 0; i < 51; i++)
    {
        var marker = new Rectangle()
        {
            Fill = Foreground
        };
        if ((i % 5) == 0)
        {
            marker.Width = 4;
            marker.Height = 16;
            marker.RenderTransform = Transform(i * 6, -(marker.Width / 2),
            -(marker.Height * 2 + 4.5 - thickness / 2 - inner / 2 - 16));
        }
        else
        {
            marker.Width = 2;
            marker.Height = 8;
            marker.RenderTransform = Transform(i * 6, -(marker.Width / 2),
            -(marker.Height * 2 + 12.75 - thickness / 2 - inner / 2 - 16));
        }
        markers.Children.Add(marker);
    }
    markers.RenderTransform = new RotateTransform()
    {
        Angle = 30,
        CenterX = _diameter / 2,
        CenterY = _diameter / 2
    };
    canvas.Children.Add(markers);
}
```

This **Method** will create the set of small and large markers to be displayed on the **Gauge**.

Step 11

While still in the **class** of **Gauge** after the **Comment** of **// Layout, Indicator & Load Methods** type the following **Methods**:

```
private void Layout(Canvas canvas)
{
    canvas.Children.Clear();
    _diameter = canvas.Width;
    var face = new Ellipse()
    {
        Height = _diameter,
        Width = _diameter,
        Fill = Fill
    };
    canvas.Children.Add(face);
    Markers(canvas, face.StrokeThickness);
    _needle = new Rectangle()
    {
        Width = Needle,
        Height = (int)_diameter / 2 - 30,
        Fill = Foreground
    };
    canvas.Children.Add(_needle);
    var middle = new Ellipse()
    {
        Height = _diameter / 10,
        Width = _diameter / 10,
        Fill = Foreground
    };
    Canvas.SetLeft(middle, (_diameter - middle.ActualWidth) / 2);
    Canvas.SetTop(middle, (_diameter - middle.ActualHeight) / 2);
    canvas.Children.Add(middle);
}

private void Indicator(int value)
{
    Layout(Display);
    var percentage = value / (double)Maximum * 100;
    var position = (percentage / 2) + 5;
    _needle.RenderTransform = Transform(position * 6,
    -Needle / 2, 4.25);
}

private void Load(object sender, RoutedEventArgs e) =>
    Indicator(Value);
```

There will also be some **Errors** as these refer to **Properties** that will be added in the next few steps.

Layout will create the look-and-feel of the **Gauge** and uses the **Method** for **Markers** along with creating the centre point and needle for the **Gauge**. The **Method** of **Indicator** will use **Layout** along with calculating the position of the needle for the **Gauge** and **Load** will be used when the **Canvas** of the **User Control** is loaded and will call the **Method** of **Indicator**.

Step 12

While still in the **class** of **Gauge** after the **Comment** of **// Dependency Properties** type the following **Dependency Properties**:

```
public static readonly DependencyProperty FillProperty =
DependencyProperty.Register(nameof(Fill), typeof(Brush),
typeof(Gauge), null);

public static readonly DependencyProperty NeedleProperty =
DependencyProperty.Register(nameof(Needle), typeof(int), typeof(Gauge),
new PropertyMetadata(2));

public static readonly DependencyProperty ValueProperty =
DependencyProperty.Register(nameof(Value), typeof(double), typeof(Gauge),
new PropertyMetadata(25));

public static readonly DependencyProperty MinimumProperty =
DependencyProperty.Register(nameof(Minimum), typeof(int), typeof(Gauge),
new PropertyMetadata(0));

public static readonly DependencyProperty MaximumProperty =
DependencyProperty.Register(nameof(Maximum), typeof(int), typeof(Gauge),
new PropertyMetadata(100));
```

There will still also be some **Errors** as these refer to **Properties** that will be added in the next step.

These **Dependency Properties** refer to various **Properties** of the **Gauge** that can be customised for the **User Control**.

Step 13

While still in the **`class`** of **Gauge** after the **Comment** of **`// Properties`** type the following **Properties**:

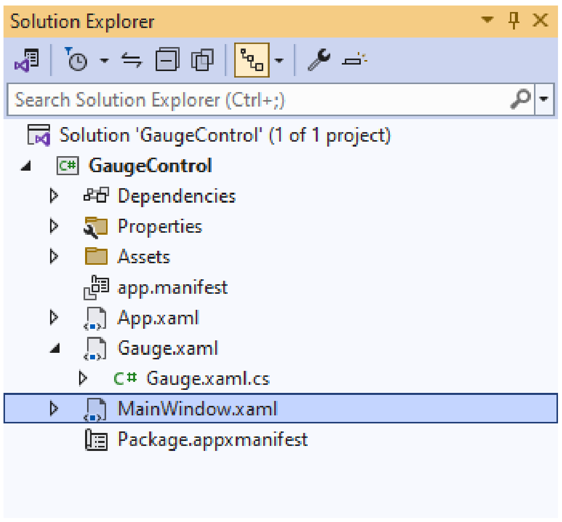
```
public Brush Fill
{
    get { return (Brush)GetValue(FillProperty); }
    set { SetValue(FillProperty, value); }
}

public int Needle
{
    get { return (int)GetValue(NeedleProperty); }
    set
    {
        SetValue(NeedleProperty, value);
        Indicator(Value);
    }
}

public int Value
{
    get { return (int)GetValue(ValueProperty); }
    set
    {
        if (value >= Minimum && value <= Maximum)
        {
            SetValue(ValueProperty, value);
            Indicator(value);
        }
    }
}

public int Minimum
{
    get { return (int)GetValue(MinimumProperty); }
    set { SetValue(MinimumProperty, value); }
}

public int Maximum
{
    get { return (int)GetValue(MaximumProperty); }
    set { SetValue(MaximumProperty, value); }
}
```

Any **Errors** should now be resolved, if you continue to get them check all previous steps to see if you have missed anything.

These **Properties** are for values for the **User Control** such as the **`Minimum`** or **`Maximum`** values for the **Gauge**.

Step 14

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



Step 15

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 16

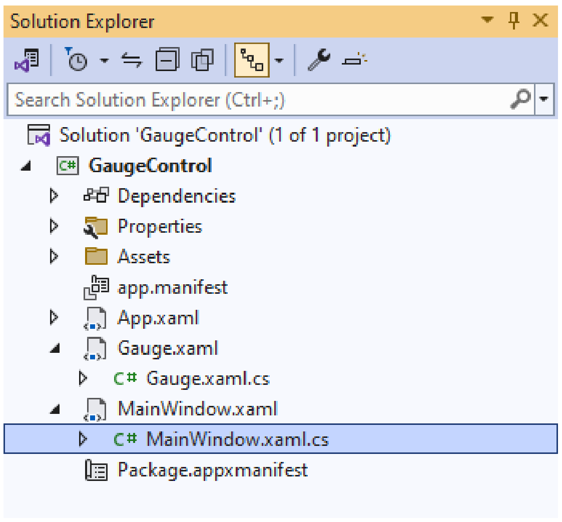
While still in the **XAML** for **MainWindow.xaml** above **`</Window>`**, type in the following **XAML**:

```
<local:Gauge Margin="50" Value="25" Foreground="WhiteSmoke" Needle="4"
    Fill="{ThemeResource SystemControlHighlightAccentBrush}"/>
```

This **XAML** contains the **User Control** of **`Gauge`** with various **Properties** including **`Value`** and **`Needle`**.

Step 17

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 18

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

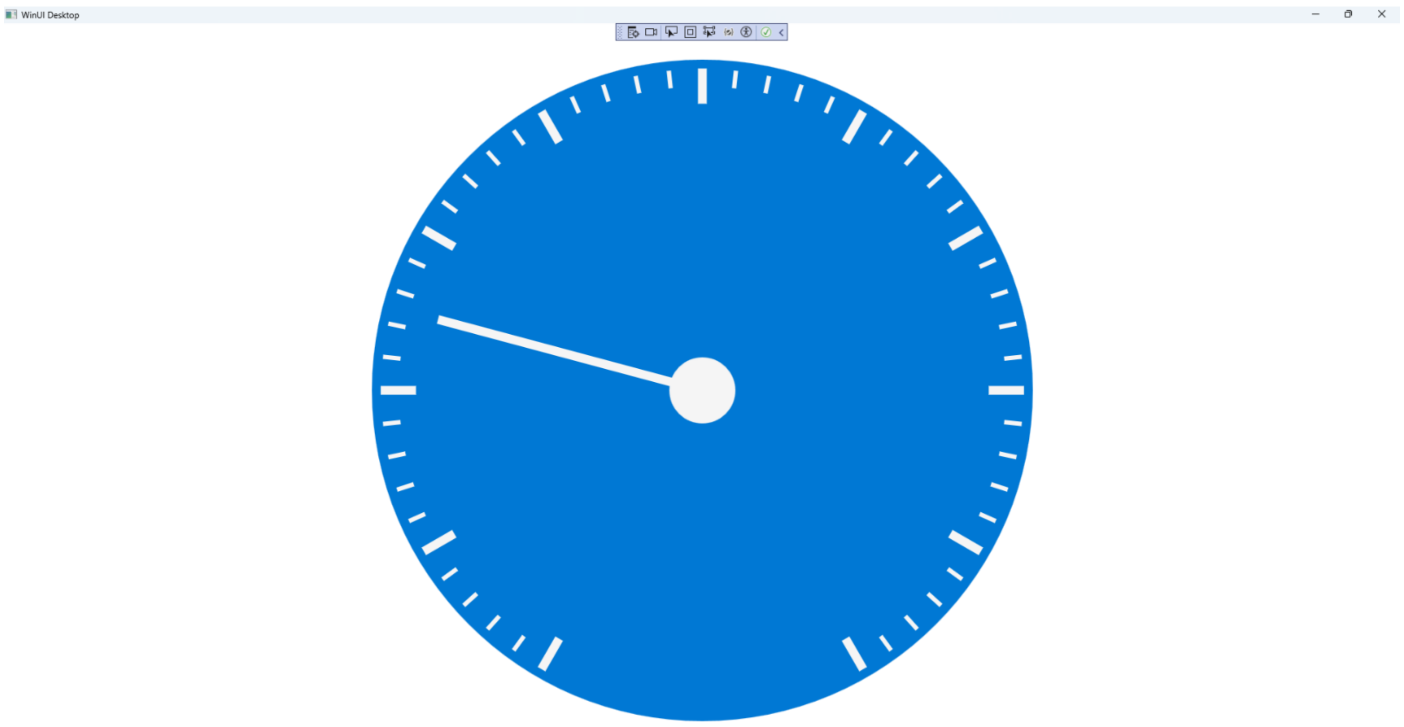
```
private void myButton_Click(object sender, RoutedEventArgs e)
{
    myButton.Content = "Clicked";
}
```

Step 19

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

Step 20

Once running you will see the **Gauge Control** displayed, with a *Value* which can be changed in the **XAML** to show the *Needle* in a different position.



Step 21

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!