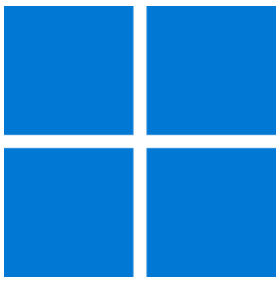
tutorial

Windows App SDK



Ruler Control

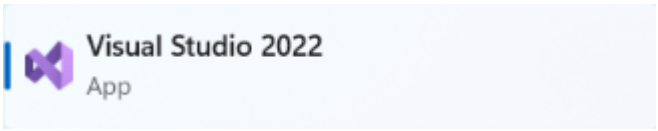
Ruler Control

Ruler Control shows how to create an on-screen **Ruler** for **Metric** or **Imperial** using **Windows App SDK**

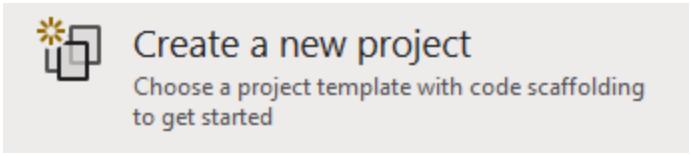
Step 1

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

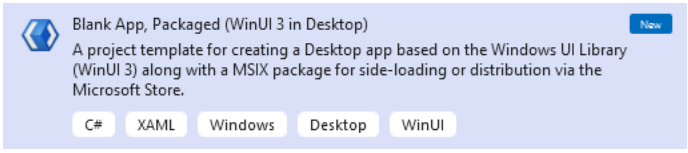
In **Windows 11** choose **Start** and then find or search for **Visual Studio 2022** and then select it.



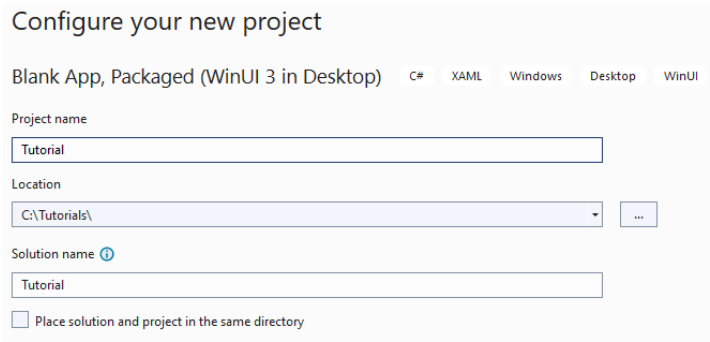
Once **Visual Studio 2022** has started select **Create a new project**.



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

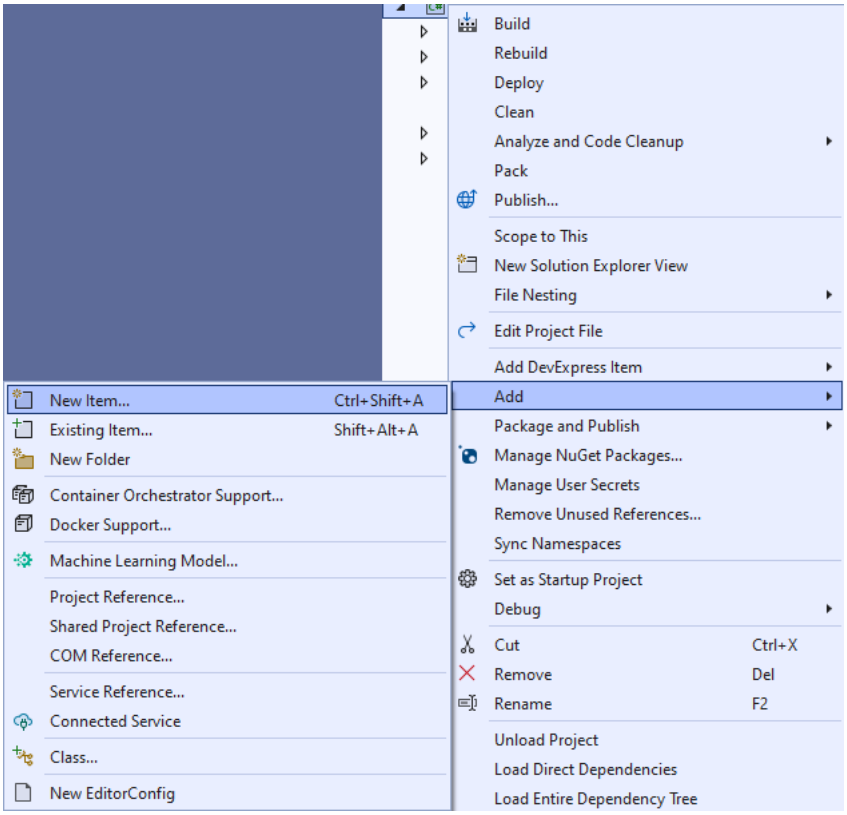


After that in **Configure your new project** type in the **Project name** as *RulerControl*, then select a Location and then select **Create** to start a new **Solution**.



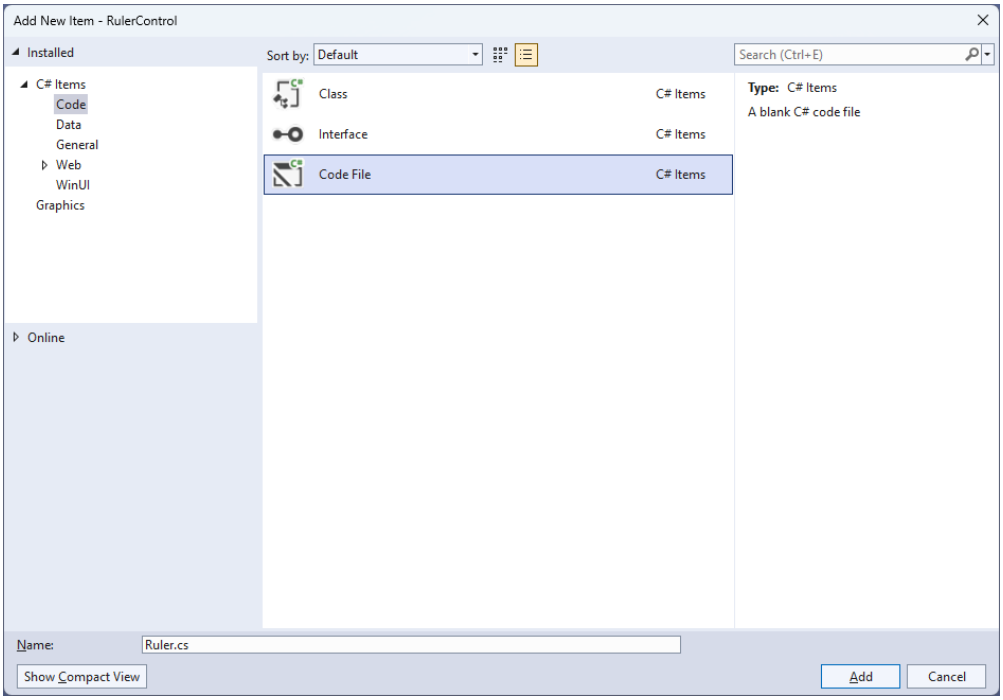
Step 2

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



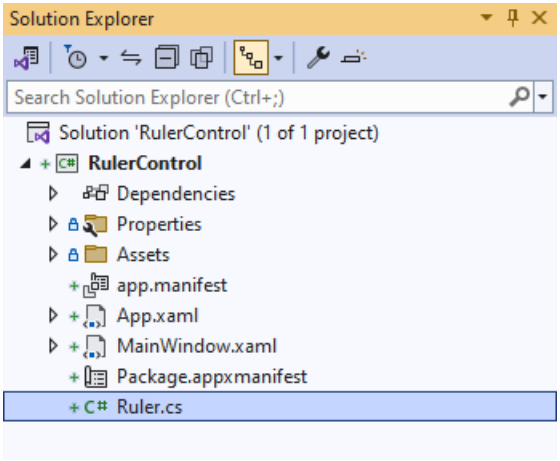
Step 3

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 *Ruler.cs* and then **Click** on **Add**.



Step 4

Then from **Solution Explorer** for the **Solution** double-click on **Ruler.cs** to see the **Code** for the **User Control**.



Step 5

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

```
using Microsoft.UI;
using Microsoft.UI.Xaml;
using Microsoft.UI.Xaml.Controls;
using Microsoft.UI.Xaml.Media;
using Microsoft.UI.Xaml.Shapes;
using Windows.Foundation;

namespace RulerControl;

public enum Units
{
    Cm,
    Inch
};

public class Ruler : Canvas
{
    private const double default_height = 40.0;

    private double _originalHeight;

    // Static Methods

    // Dependency Properties & Properties

    // Layout Method

    // Constructor & Measure Override Event Handler

}
```

There are **`using`** statements for the **User Control**, a **`namespace`** for **`RulerControl`** with an **`enum`** for the **`Units`** of the **Ruler** along with a **`class`** of **`Ruler`** that will represent the **User Control**.

Step 6

Then in the **`namespace`** of **`RulerControl`** in the **`class`** of **`Ruler`** after the **Comment** of **`// Static Methods`** type the following **Static Methods**:

```
private static double CmToDip(double cm) =>
    cm * 96.0 / 2.54;

private static double InchToDip(double inch) =>
    inch * 96.0;

private static Path GetLine(Brush stroke, double thickness,
    Point start, Point finish) => new()
{
    Stroke = stroke,
    StrokeThickness = thickness,
    Data = new LineGeometry()
    {
        StartPoint = start,
        EndPoint = finish
    }
};
```

These **Static Methods** include **`CmToDip`** and **`InchToDip`** which will perform the conversions for the measurements to be displayed on the **Ruler** to device independent pixels. There is also **`GetLine`** which will return the **`Path`** used to display the lines on the **Ruler**.

Step 7

While still in the **`namespace`** of **`RulerControl`** in the **`class`** of **`Ruler`** after the **Comment** of **`// Dependency Properties & Properties`** type the following **Dependency Properties** and **Properties**:

```
public static readonly DependencyProperty ForegroundProperty =
DependencyProperty.Register(nameof(Foreground), typeof(Brush),
typeof(Ruler), new PropertyMetadata(new SolidColorBrush(Colors.Black)));

public static readonly DependencyProperty LengthProperty =
DependencyProperty.Register(nameof(Length), typeof(double),
typeof(Ruler), new PropertyMetadata(10.0));

public static readonly DependencyProperty SegmentProperty =
DependencyProperty.Register(nameof(Segment), typeof(double),
typeof(Ruler), new PropertyMetadata(20.0));

public static readonly DependencyProperty UnitProperty =
DependencyProperty.Register(nameof(Unit), typeof(double),
typeof(Ruler), new PropertyMetadata(Units.Cm));

public Brush Foreground
{
    get { return (Brush)GetValue(ForegroundProperty); }
    set { SetValue(ForegroundProperty, value); }
}

public double Length
{
    get { return (double)GetValue(LengthProperty); }
    set { SetValue(LengthProperty, value); }
}

public double Segment
{
    get { return (double)GetValue(SegmentProperty); }
    set { SetValue(SegmentProperty, value); }
}

public Units Unit
{
    get { return (Units)GetValue(UnitProperty); }
    set { SetValue(UnitProperty, value); }
}
```

The **Dependency Properties** or **Properties** for the **User Control** can be customised for the **Ruler**.

Step 8

While still in the **`namespace`** of **`RulerControl`** in the **`class`** of **`Ruler`** after the **Comment** of **`// Layout Method`** type the following **Method**:

```
private void Layout()
{
    Children.Clear();
    for (double value = 0.0; value <= Length; value++)
    {
        double dip;
        if (Unit == Units.Cm)
        {
            dip = CmToDip(value);
            if (value < Length)
            {
                for (int i = 1; i <= 9; i++)
                {
                    if (i != 5)
                    {
                        var mm = CmToDip(value + 0.1 * i);
                        Children.Add(GetLine(Foreground, 0.5, new Point(mm, Height),
                        new Point(mm, Height - Segment / 3.0)));
                    }
                }
                var middle = CmToDip(value + 0.5);
                Children.Add(GetLine(Foreground, 1.0, new Point(middle, Height),
                new Point(middle, Height - Segment * 2.0 / 3.0)));
            }
        }
        else
        {
            dip = InchToDip(value);
            if (value < Length)
            {
                var quarter = InchToDip(value + 0.25);
                Children.Add(GetLine(Foreground, 0.5, new Point(quarter, Height),
                new Point(quarter, Height - Segment / 3.0)));
                var middle = InchToDip(value + 0.5);
                Children.Add(GetLine(Foreground, 1.0, new Point(middle, Height),
                new Point(middle, Height - 0.5 * Segment * 2.0 / 3.0)));
                var division = InchToDip(value + 0.75);
                Children.Add(GetLine(Foreground, 0.5, new Point(division, Height),
                new Point(division, Height - 0.25 * Segment / 3.0)));
            }
        }
        Children.Add(GetLine(Foreground, 1.0, new Point(dip, Height),
        new Point(dip, Height - Segment)));
    }
}
```

This **Method** creates the look-and-feel for the **User Control** for either *Metric* or *Imperial* units to be displayed accordingly for the **Ruler**.

Step 9

While still in the **`namespace`** of **`RulerControl`** in the **`class`** of **`Ruler`** after the **Comment** of **`// Constructor & Measure Override Event Handler`** type the following **Constructor** and **Event Handler**:

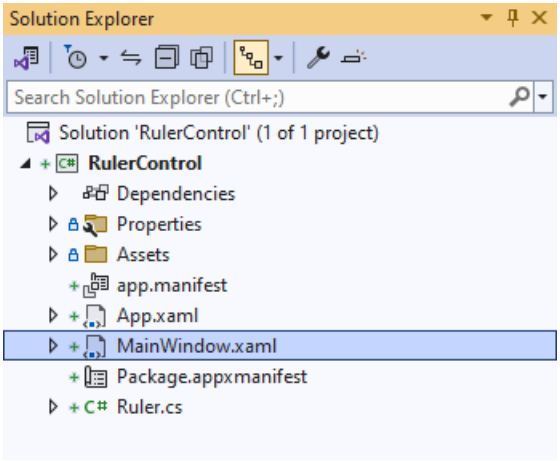
```
public Ruler() =>
    Loaded += (object sender, RoutedEventArgs e) => Layout();

protected override Size MeasureOverride(Size availableSize)
{
    Height = !double.IsNaN(Height) ? Height : default_height;
    var desiredSize = (Unit == Units.Cm) ?
        new Size(CmToDip(Length), Height) :
        new Size(InchToDip(Length), Height);
    if(Height != _originalHeight)
    {
        Layout();
        _originalHeight = Height;
    }
    return desiredSize;
}
```

The **Constructor** will call the **Method** of **`Layout`** when the **User Control** has been **`Loaded`** and the **Event Handler** of **`MeasureOverride`** will manage the resizing of the **Ruler**.

Step 10

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



Step 11

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 12

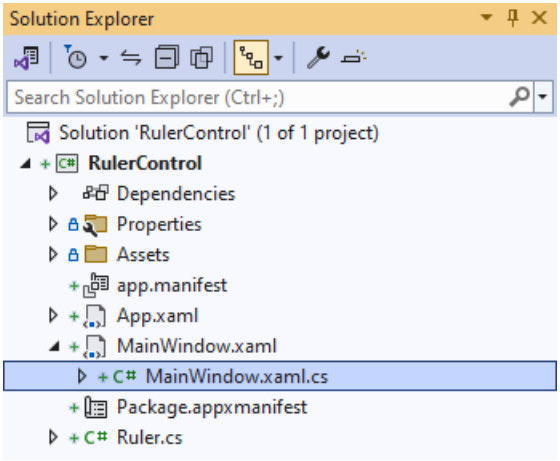
While still in the **XAML** for **MainWindow.xaml** above **`</Window>`**, type in the following **XAML**:

```
<Viewbox Margin="50">
    <local:Ruler Length="15.0" Unit="Cm"
    Background="{ThemeResource SystemControlHighlightAccentBrush}"
    Foreground="{ThemeResource SystemControlBackgroundAltHighBrush}"/>
</Viewbox>
```

This **XAML** contains a **`ViewBox`** including the **User Control** of **`Ruler`** with the **`Length`** and **`Unit`** set.

Step 13

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**.



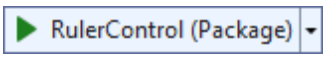
Step 14

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";
}
```

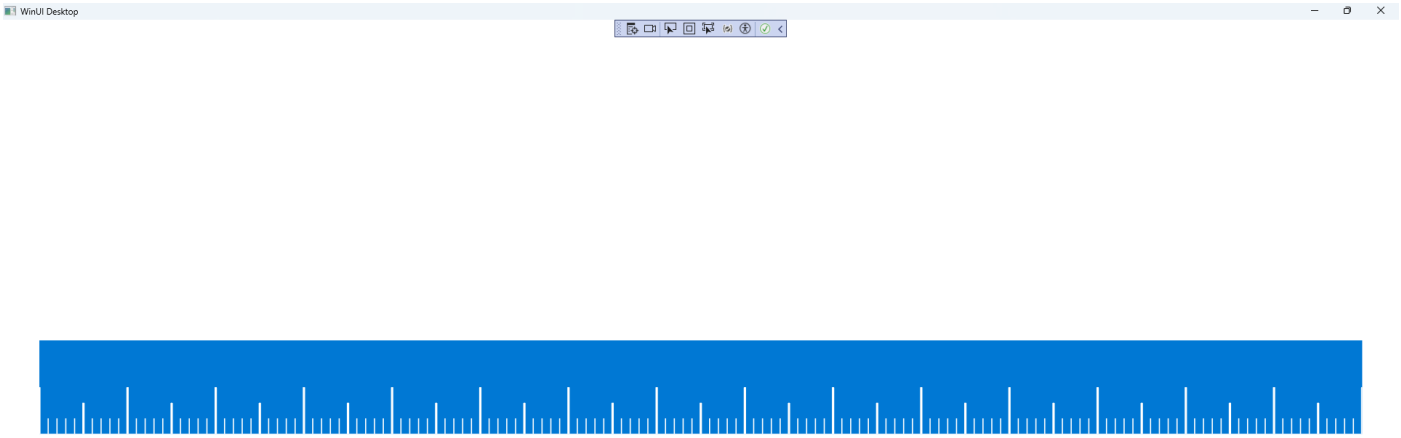
Step 15

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



Step 16

Once running you will see the **Ruler Control** displayed with the given *Length* and *Unit*.



Step 17

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!