tutorial

Windows App SDK

Flags Game

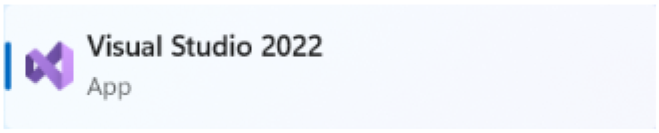
Flags Game

Flags Game shows how you can create a simple game where the aim is to guess the correct country's **Flag** from a set of **Flags** using flag assets and a toolkit from **NuGet** using the **Windows App SDK**.

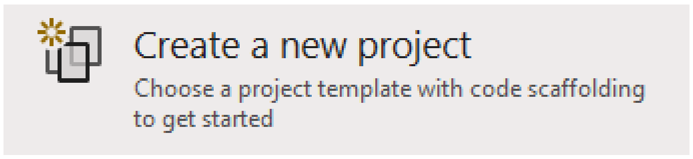
Step 1

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.

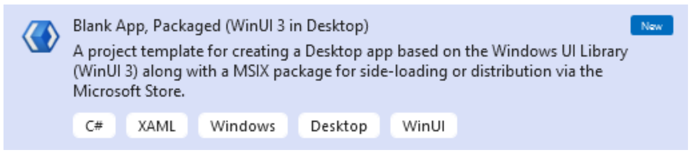


Once **Visual Studio 2022** has started select **Create a new project**.


Create a new project

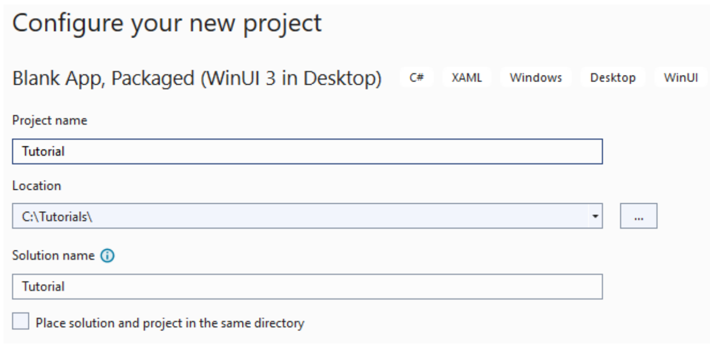
Choose a project template with code scaffolding to get started

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 *FlagsGame*, 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

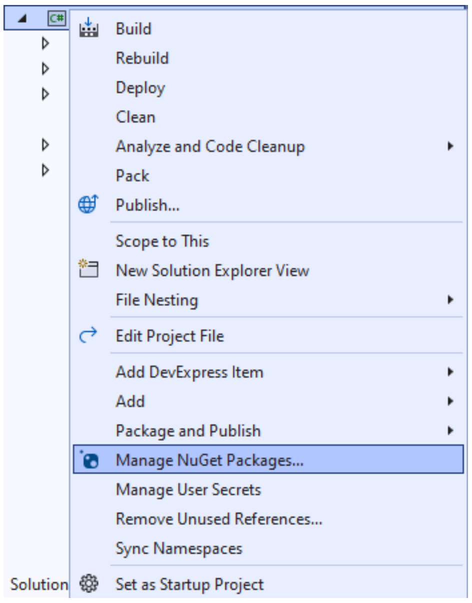
Location: C:\Tutorials\

Solution name: Tutorial

☐ Place solution and project in the same directory

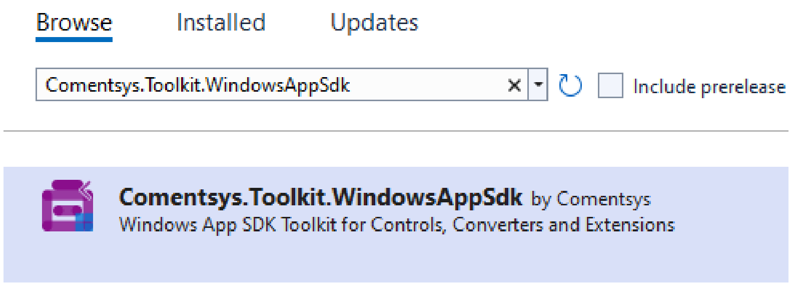
Step 2

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



Step 3

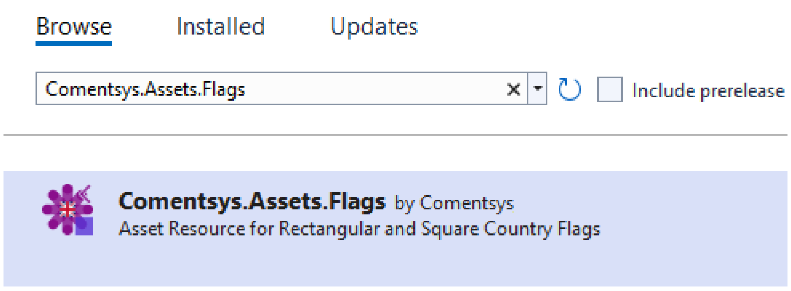
Then in the **NuGet Package Manager** from the **Browse** tab search for **Comentsys.Toolkit.WindowsAppSdk** and then select **Comentsys.Toolkit.WindowsAppSdk by Comentsys** as indicated and select **Install**


Browse
Installed
Updates
Comentsys.Toolkit.WindowsAppSdk
Include prerelease
Comentsys.Toolkit.WindowsAppSdk by Comentsys
Windows App SDK Toolkit for Controls, Converters and Extensions

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.

Step 4

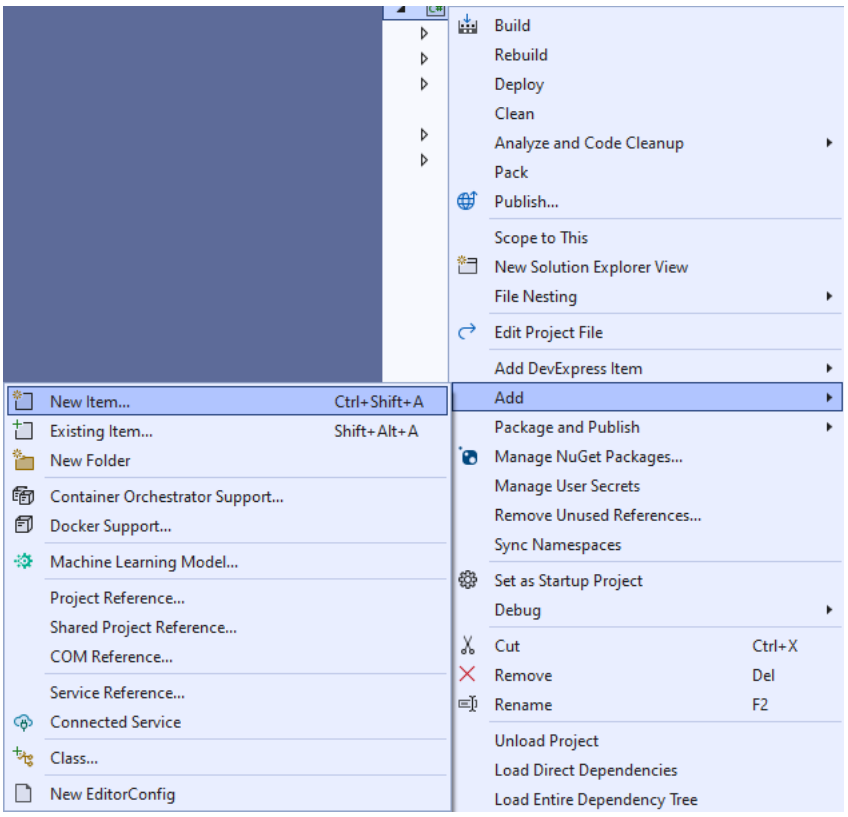
Then while still in the **NuGet Package Manager** from the **Browse** tab search for **Comentsys.Assets.Flags** and then select **Comentsys.Assets.Flags by Comentsys** as indicated and select **Install**


Browse
Installed
Updates
Comentsys.Assets.Flags
Include prerelease
Comentsys.Assets.Flags by Comentsys
Asset Resource for Rectangular and Square Country Flags

This will add the package for **Comentsys.Assets.Flags** 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: FlagsGame** by selecting the **x** next to it.

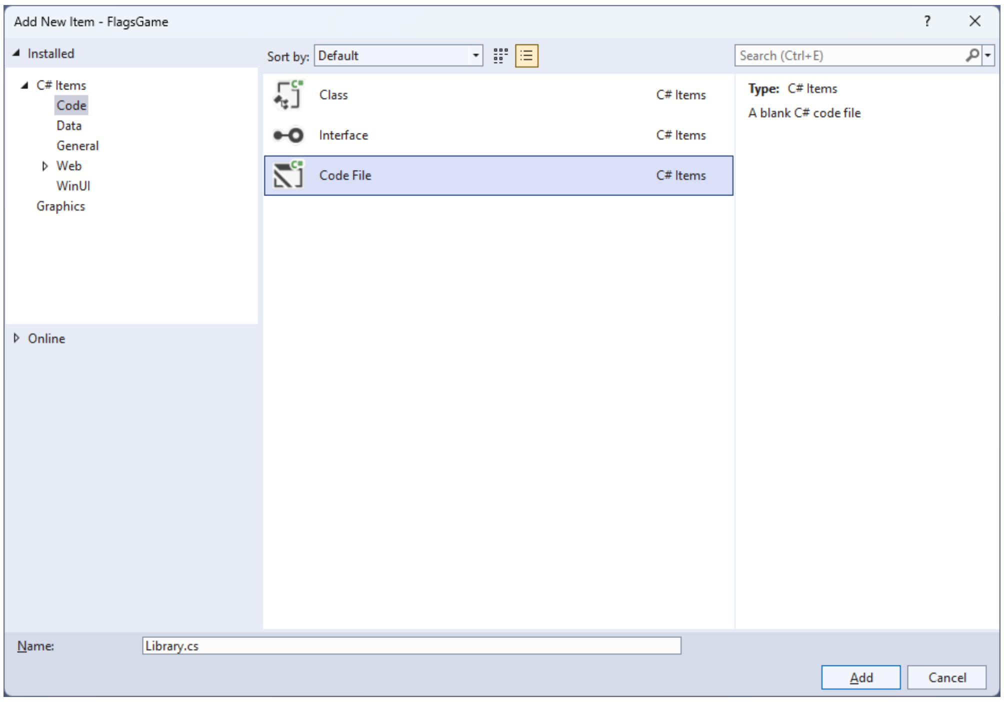
Step 5

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 6

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 7

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

```
using Comentsys.Assets.Flags;
using Comentsys.Toolkit.WindowsAppSdk;
using Microsoft.UI;
using Microsoft.UI.Xaml;
using Microsoft.UI.Xaml.Controls;
using Microsoft.UI.Xaml.Media;
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text.RegularExpressions;
using System.Threading.Tasks;

public class Library
{
    private const string space = " ";
    private const int flag_size = 72;
    private const int font = 20;
    private const int size = 3;

    private readonly Random _random = new((int)DateTime.UtcNow.Ticks);

    private Grid _grid;
    private TextBlock _text;

    private Dictionary<FlagType, ImageSource> _sources;
    private List<int> _indexes = new();
    private List<int> _choices = new();
    private int _turns;
    private bool _over;
    private string _name;

    // GetSourceAsync & SetSourcesAsync

    // Chose, Name, Country, Select & Set

    // Play & Add

    // Layout & New
}
```

`Class` defined so far *Library.cs* has **`using`** for package of **`Comentsys.Toolkit.WindowsAppSdk`** and others including **`Comentsys.Assets.Flags`**. It also has **Constants** to represent things needed in the game and there are **Variables** to keep track of values used in the game.

Step 8

While still in the **class** for *Library.cs* after the **Comment** of **// GetSourceAsync & SetSourcesAsync** type the following **Methods**:

```
private async Task<ImageSource> GetSourceAsync(FlagType flagType) =>
    await Flag.Get(FlagSet.Square, flagType)
    .AsImageSourceAsync();

private async Task SetSourcesAsync() =>
    _sources ??= new Dictionary<FlagType, ImageSource>()
    {
        { FlagType.Armenia, await GetSourceAsync(FlagType.Armenia) },
        { FlagType.Austria, await GetSourceAsync(FlagType.Austria) },
        { FlagType.Belgium, await GetSourceAsync(FlagType.Belgium) },
        { FlagType.Bulgaria, await GetSourceAsync(FlagType.Bulgaria) },
        { FlagType.Estonia, await GetSourceAsync(FlagType.Estonia) },
        { FlagType.France, await GetSourceAsync(FlagType.France) },
        { FlagType.Gabon, await GetSourceAsync(FlagType.Gabon) },
        { FlagType.Germany, await GetSourceAsync(FlagType.Germany) },
        { FlagType.Guinea, await GetSourceAsync(FlagType.Guinea) },
        { FlagType.Ireland, await GetSourceAsync(FlagType.Ireland) },
        { FlagType.Italy, await GetSourceAsync(FlagType.Italy) },
        { FlagType.Lithuania, await GetSourceAsync(FlagType.Lithuania) },
        { FlagType.Luxembourg, await GetSourceAsync(FlagType.Luxembourg) },
        { FlagType.Mali, await GetSourceAsync(FlagType.Mali) },
        { FlagType.Netherlands, await GetSourceAsync(FlagType.Netherlands) },
        { FlagType.Nigeria, await GetSourceAsync(FlagType.Nigeria) },
        { FlagType.Romania, await GetSourceAsync(FlagType.Romania) },
        { FlagType.Hungary, await GetSourceAsync(FlagType.Hungary) },
        { FlagType.SierraLeone, await GetSourceAsync(FlagType.SierraLeone) },
        { FlagType.Yemen, await GetSourceAsync(FlagType.Yemen) }
    };
```

GetSourceAsync will be used to get an **ImageSource** for a given **FlagType** and is used by the **Method** of **SetSourcesAsync** which will create a **Dictionary** of **Flags** which these have either horizontal or vertical stripes.

Step 9

While still in the **class** for *Library.cs* after the **Comment** of **// Chose, Name, Country, Select & Set** type the following **Methods**:

```
private List<int> Choose(int minimum, int maximum, int total) =>
    Enumerable.Range(minimum, maximum)
        .OrderBy(r => _random.Next(minimum, maximum))
            .Take(total).ToList();

private string Name(FlagType flag) =>
    Enum.GetName(typeof(FlagType), flag);

private string Country(FlagType flag) =>
    string.Join(space, new Regex(@"\p{Lu}\p{Ll}*")
        .Matches(Name(flag))
            .Select(s => s.Value));

private void Select()
{
    var choice = _choices[_turns];
    var index = _indexes[choice];
    var flag = _sources.ElementAt(index);
    _name = Name(flag.Key);
    _text.Text = Country(flag.Key);
    _turns++;
}

private void Set(string name, bool display) =>
    (_grid.FindName(name) as Button).Opacity = display ? 1 : 0;
```

Choose is used to get a set of randomised unique numbers, **Name** will return the **Flag** as a **string** and **Country** will return the **Name** as a formatted **string**. **Select** will be used when performing an action in the game and **Set** will be used to hide a **Flag** once selected.

Step 10

While still in the **class** for *Library.cs* after the **Comment** of **`// Play & Add`** type the following **Methods**:

```
private void Play(Button button)
{
    if(!_over)
    {
        string name = button.Name;
        if(_name == name)
        {
            Set(name, false);
            if(_turns < size * size)
                Select();
            else
                _text.Text = "You Won!";
        }
        else
            _over = true;
    }
    if(_over)
        _text.Text = "Game Over!";
}

private void Add(int row, int column, int index)
{
    var flag = _sources.ElementAt(_indexes[index]);
    var border = new Border()
    {
        BorderBrush = new SolidColorBrush(Colors.Black),
        BorderThickness = new Thickness(2)
    };
    var image = new Image()
    {
        Height = flag_size,
        Width = flag_size,
        Source = flag.Value
    };
    border.Child = image;
    var button = new Button()
    {
        Name = Name(flag.Key),
        Content = border
    };
    button.Click += (object sender, RoutedEventArgs e) =>
        Play(sender as Button);
    button.SetValue(Grid.RowProperty, row);
    button.SetValue(Grid.ColumnProperty, column);
    _grid.Children.Add(button);
}
```

`Play` is used when interacting with a **`Button`** and is used by **`Add`** for elements of the game.

Step 11

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

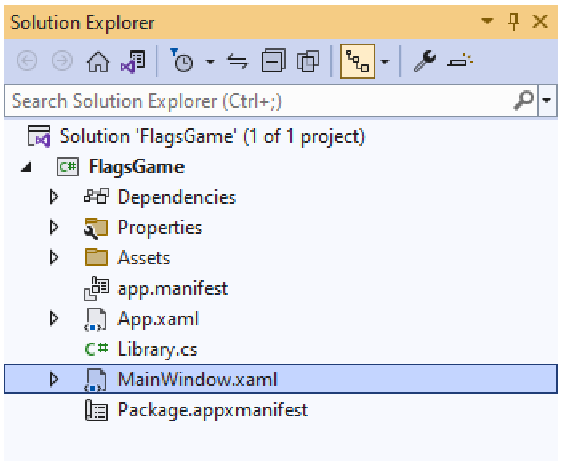
```
private void Layout(Grid grid)
{
    var index = 0;
    grid.Children.Clear();
    grid.RowDefinitions.Clear();
    grid.RowDefinitions.Add(new RowDefinition()
    {
        Height = GridLength.Auto
    });
    grid.RowDefinitions.Add(new RowDefinition()
    {
        Height = new GridLength(1, GridUnitType.Star)
    });
    _text = new TextBlock()
    {
        FontSize = font,
        HorizontalAlignment = HorizontalAlignment.Center
    };
    Grid.SetRow(_text, 0);
    grid.Children.Add(_text);
    _grid = new Grid();
    for (int row = 0; row < size; row++)
    {
        _grid.RowDefinitions.Add(new RowDefinition());
        for (int column = 0; column < size; column++)
        {
            if (row == 0)
                _grid.ColumnDefinitions.Add(new ColumnDefinition());
            Add(row, column, index);
            index++;
        }
    }
    Grid.SetRow(_grid, 1);
    grid.Children.Add(_grid);
}

public async void New(Grid grid)
{
    _turns = 0;
    _over = false;
    await SetSourcesAsync();
    _indexes = Choose(0, _sources.Count, _sources.Count);
    _choices = Choose(0, size * size, size * size);
    Layout(grid);
    Select();
}
```

Layout will create the look-and-feel of the game and is used by **New** which will setup and begin a 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

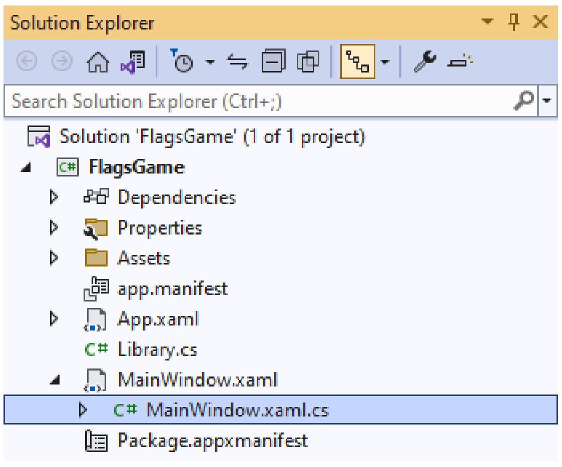
While still in the **XAML** for **MainWindow.xaml** above **`</Window>`**, type in the following **XAML**:

```
<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() { ... }`**:

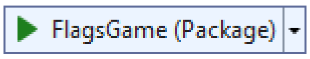
```
private readonly Library _library = new();

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.

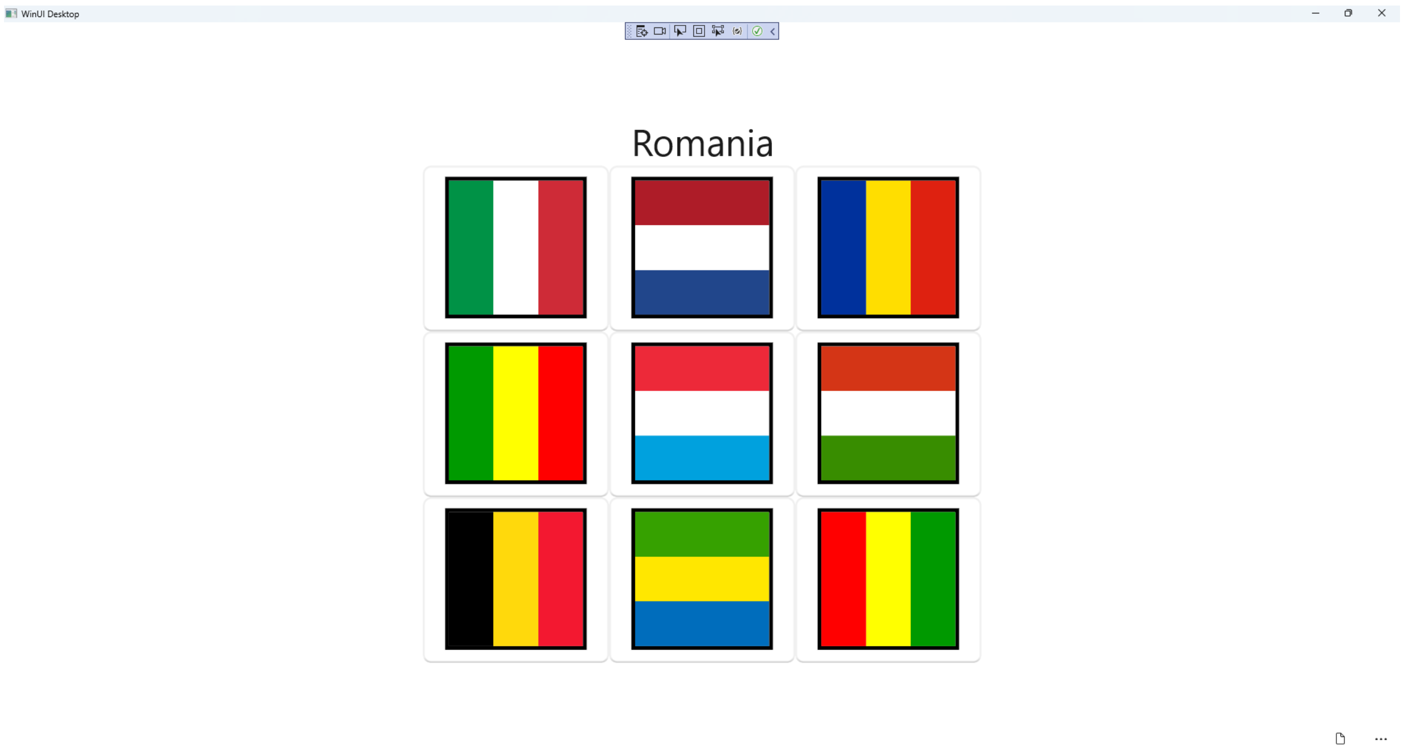
Step 18

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



Step 19

Once running there will be *9* options for **Flags** available to select from and the aim is to correctly guess which **Flag** belongs to which country and if you guess all of them correctly you win but get any wrong and you lose or you can select *New* to start a new 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!