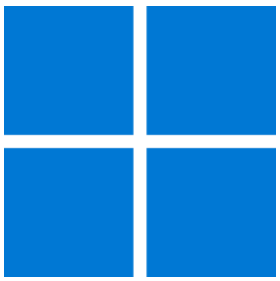
tutorial

Windows App SDK



Emoji Game

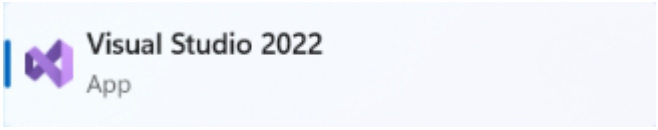
Emoji Game

Emoji Game shows how you can create a game where you can pick from a set of **Emoji** to identify which one is the correct one using emoji and a toolkit from **NuGet** using the **Windows App SDK**.

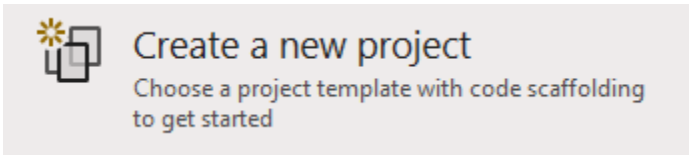
Step 1

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

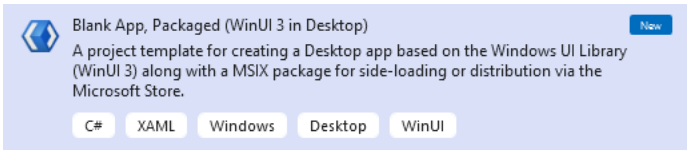
In **Windows 11** choose **Start** and then find or search for **Visual Studio 2022** and then select it.



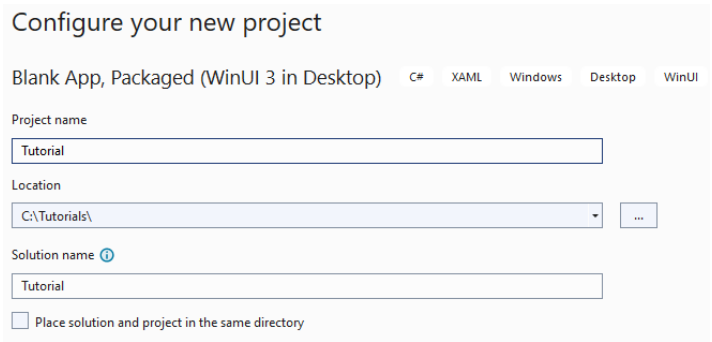
Once **Visual Studio 2022** has started select **Create a new project**.



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

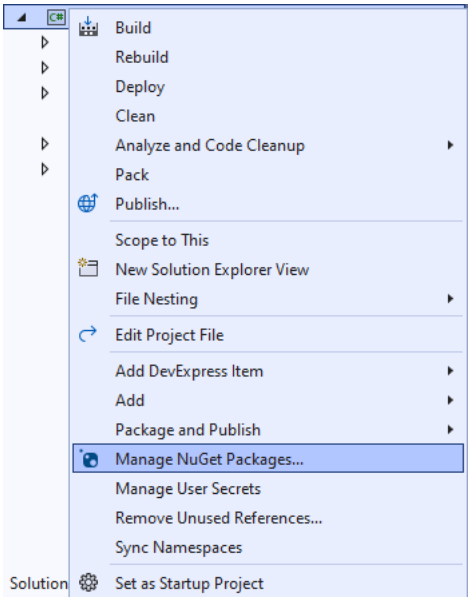


After that in **Configure your new project** type in the **Project name** as *EmojiGame*, then select a Location and then select **Create** to start a new **Solution**.



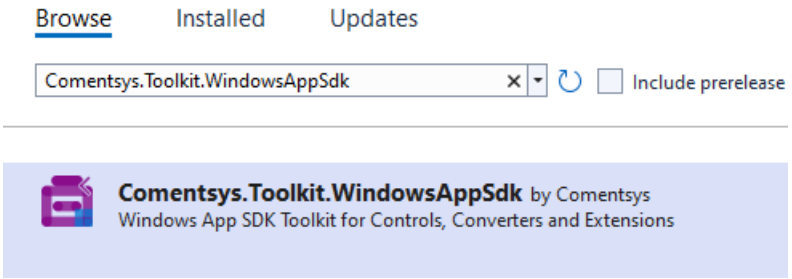
Step 2

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

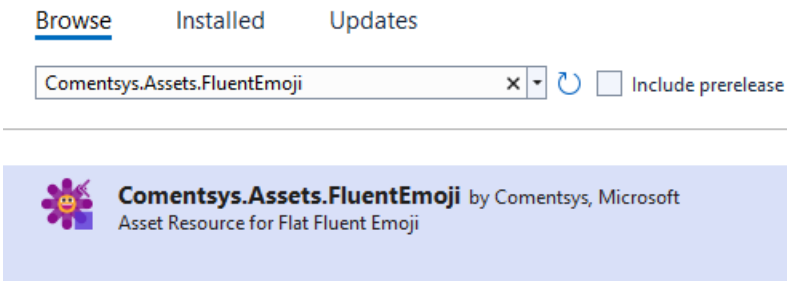
Then in the **NuGet Package Manager** from the **Browse** tab search for **Comentsys.Toolkit.WindowsAppSdk** and then select **Comentsys.Toolkit.WindowsAppSdk by Comentsys** as indicated and select **Install**



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.

Step 4

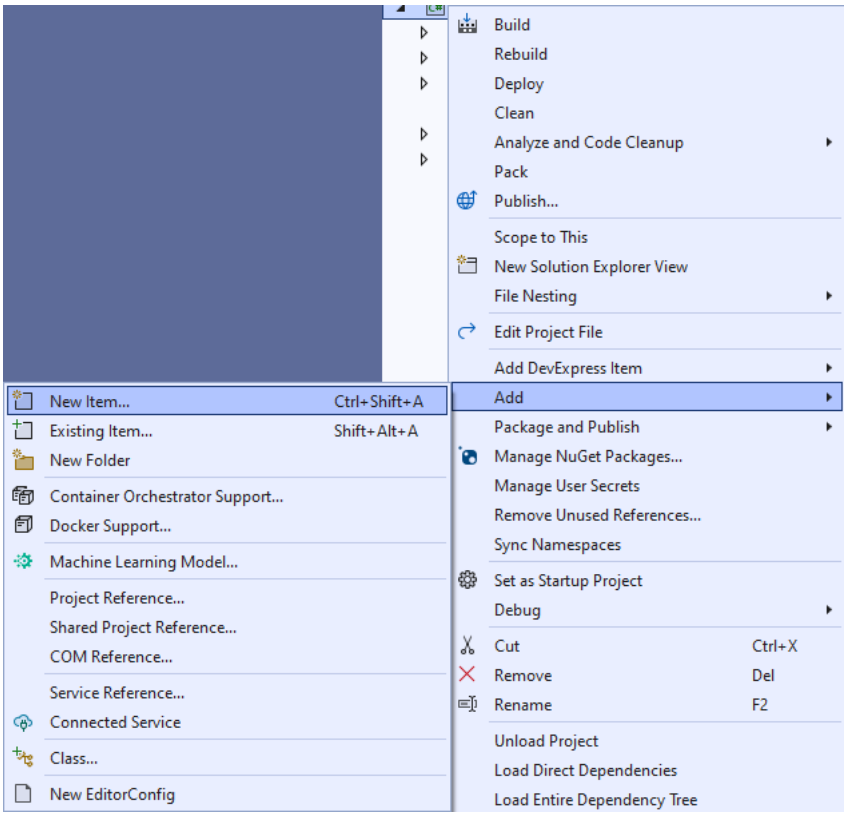
Then while still in the **NuGet Package Manager** from the **Browse** tab search for **Comentsys.Assets.FluentEmoji** and then select **Comentsys.Assets.FluentEmoji by Comentsys** as indicated and select **Install**



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

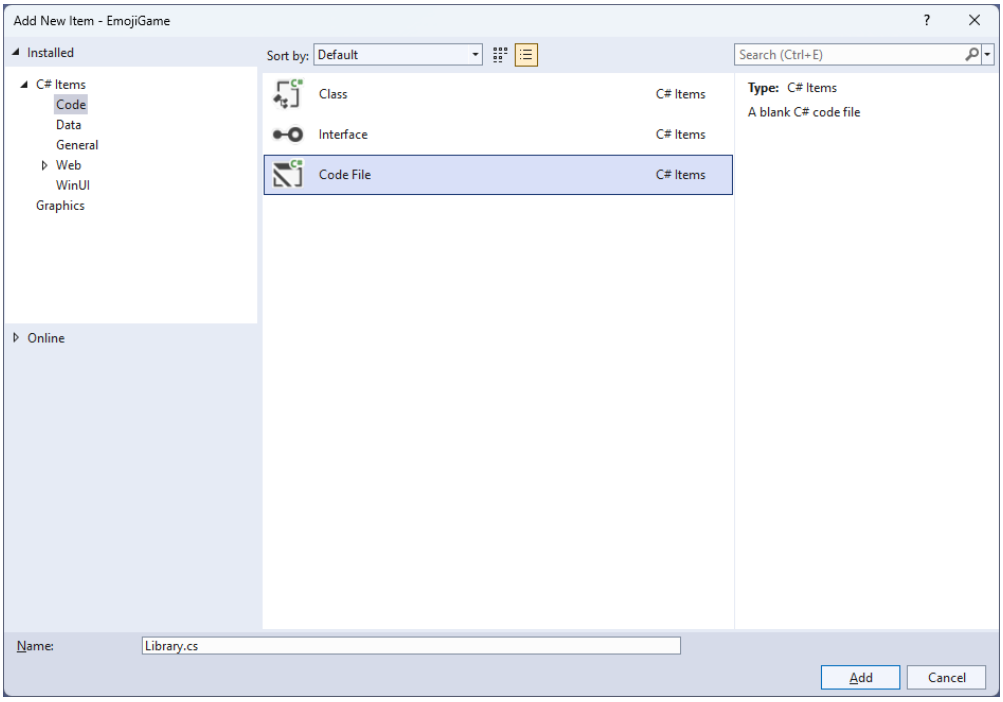
Step 5

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* to define a **`namespace`** allowing classes to be defined together, usually each is separate but will be defined in *Library.cs* by typing the following **Code** for **`using`** for **`Comentsys.Toolkit.WindowsAppSdk`** and others plus an **`enum`** for **`State`** and more.

```
using Comentsys.Assets.FluentEmoji;
using Comentsys.Toolkit.Binding;
using Comentsys.Toolkit.WindowsAppSdk;
using Microsoft.UI;
using Microsoft.UI.Xaml;
using Microsoft.UI.Xaml.Controls;
using Microsoft.UI.Xaml.Data;
using Microsoft.UI.Xaml.Media;
using System;
using System.Collections.Generic;
using System.Collections.ObjectModel;
using System.Linq;
using System.Text.RegularExpressions;
using System.Threading.Tasks;
using System.Windows.Input;

namespace EmojiGame;

public enum State
{
    None,
    Correct,
    Incorrect
}

// Item Class

public class Board : ObservableBase
{
    // Board Constants, Variables, Properties and GetSourceAsync Method

    // Board SetSourcesAsync Method

    // Board ChooseValues, ChooseUnique, Name, GetQuestion & Indexes Method

    // Board Next Method

    // Board SetupAsync, Correct & Play Method

}

// StateToBrushConverter Class

public class Library
{
    // Library Constants and GetBoundText Method

    // Library Layout & New Methods

}
```

Step 8

Still in *Library.cs* for the **`namespace`** of **`EmojiGame`** in *Library.cs* you will define a **`class`** for **`Item`** after the **Comment** of **`// Item Class`** by typing the following:

```
public class Item : ActionCommandObservableBase
{
    private State _state = State.None;

    public int Index {  get; }
    public FluentEmojiType Type { get; }
    public bool Correct { get; }
    public ImageSource Source { get; }
    public State State
    {
        get => _state;
        set => SetProperty(ref _state, value);
    }

    public Item(int index, FluentEmojiType type,
        bool correct, ImageSource source, Action<int> action) :
        base(new ActionCommandHandler((param) => action(index))) =>
        (Index, Type, Correct, Source) =
            (index, type, correct, source);
}
```

`Item` represents the elements for the **Emoji** in the game with various **Properties** and uses **`ActionCommandObservableBase`** from the package of **`Comentsys.Toolkit.WindowsAppSdk.`**

Step 9

While still in the **namespace** of **EmojiGame** in *Library.cs* in the **class** of **Board** after the **Comment** of **// Board Constants, Variables, Properties and GetSourceAsync Method** type the following **Constants**, **Variables**, **Properties** and **Method**:

```
private const string space = " ";
private const int rounds = 12;
private const int options = 2;

private readonly Random _random = new((int)DateTime.UtcNow.Ticks);
private Dictionary<FluentEmojiType, ImageSource> _sources;
private ObservableCollection<Item> _items = new();
private List<int> _selected = new();
private List<int> _options = new();
private List<int> _indexes = new();
private string _question;
private string _message;
private int _round;
private bool _over;

public ObservableCollection<Item> Items
{
    get => _items;
    set => SetProperty(ref _items, value);
}

public string Question
{
    get => _question;
    set => SetProperty(ref _question, value);
}

public string Message
{
    get => _message;
    set => SetProperty(ref _message, value);
}

private async Task<ImageSource> GetSourceAsync(FluentEmojiType type) =>
    await FlatFluentEmoji.Get(type)
    .AsImageSourceAsync();
```

Constants are values that are used for the **Board** that will not change and **Variables** are used to store various values that will be set or changed some of which are exposed using the **Properties** and then there is a **Method** of **GetSourceAsync** which will be used to get the assets for the **Emoji**.

Step 10

While still in the **namespace** of **EmojiGame** in *Library.cs* in the **class** of **Board** after the **Comment** of **// Board SetSourcesAsync Method** type the following first part of the **Method**:

```
private async Task SetSourcesAsync() =>
_sources ??= new Dictionary<FluentEmojiType, ImageSource>()
{
    { FluentEmojiType.GrinningFace,
        await GetSourceAsync(FluentEmojiType.GrinningFace) },
    { FluentEmojiType.BeamingFaceWithSmilingEyes,
        await GetSourceAsync(FluentEmojiType.BeamingFaceWithSmilingEyes) },
    { FluentEmojiType.FaceWithTearsOfJoy,
        await GetSourceAsync(FluentEmojiType.FaceWithTearsOfJoy) },
    { FluentEmojiType.GrinningSquintingFace,
        await GetSourceAsync(FluentEmojiType.GrinningSquintingFace) },
    { FluentEmojiType.WinkingFace,
        await GetSourceAsync(FluentEmojiType.WinkingFace) },
    { FluentEmojiType.FaceSavoringFood,
        await GetSourceAsync(FluentEmojiType.FaceSavoringFood) },
    { FluentEmojiType.SmilingFace,
        await GetSourceAsync(FluentEmojiType.SmilingFace) },
    { FluentEmojiType.HuggingFace,
        await GetSourceAsync(FluentEmojiType.HuggingFace) },
    { FluentEmojiType.ThinkingFace,
        await GetSourceAsync(FluentEmojiType.ThinkingFace) },
    { FluentEmojiType.FaceWithRaisedEyebrow,
        await GetSourceAsync(FluentEmojiType.FaceWithRaisedEyebrow) },
    { FluentEmojiType.NeutralFace,
        await GetSourceAsync(FluentEmojiType.NeutralFace) },
    { FluentEmojiType.ExpressionlessFace,
        await GetSourceAsync(FluentEmojiType.ExpressionlessFace) },
    { FluentEmojiType.FaceWithRollingEyes,
        await GetSourceAsync(FluentEmojiType.FaceWithRollingEyes) },
    { FluentEmojiType.PerseveringFace,
        await GetSourceAsync(FluentEmojiType.PerseveringFace) },
    { FluentEmojiType.FaceWithOpenMouth,
        await GetSourceAsync(FluentEmojiType.FaceWithOpenMouth) },
    { FluentEmojiType.HushedFace,
        await GetSourceAsync(FluentEmojiType.HushedFace) },
    { FluentEmojiType.SleepyFace,
        await GetSourceAsync(FluentEmojiType.SleepyFace) },
    { FluentEmojiType.TiredFace,
        await GetSourceAsync(FluentEmojiType.TiredFace) },
    { FluentEmojiType.SleepingFace,
        await GetSourceAsync(FluentEmojiType.SleepingFace) },
```

You will define the rest of the **Method** of **SetSourcesAsync** in the next **Step**.

Step 11

While still in the **`namespace`** of **`EmojiGame`** in *Library.cs* in the **`class`** of **`Board`** after the end of first part of the **Method** for **`SetSourcesAsync`** of **`await GetSourceAsync(FluentEmojiType.SleepingFace) },`** from the previous **Step** type the following last part of the **Method**:

```
    { FluentEmojiType.RelievedFace,
        await GetSourceAsync(FluentEmojiType.RelievedFace) },
    { FluentEmojiType.UnamusedFace,
        await GetSourceAsync(FluentEmojiType.UnamusedFace) },
    { FluentEmojiType.PensiveFace,
        await GetSourceAsync(FluentEmojiType.PensiveFace) },
    { FluentEmojiType.ConfusedFace,
        await GetSourceAsync(FluentEmojiType.ConfusedFace) },
    { FluentEmojiType.AstonishedFace,
        await GetSourceAsync(FluentEmojiType.AstonishedFace) },
    { FluentEmojiType.FrowningFace,
        await GetSourceAsync(FluentEmojiType.FrowningFace) },
    { FluentEmojiType.ConfoundedFace,
        await GetSourceAsync(FluentEmojiType.ConfoundedFace) },
    { FluentEmojiType.DisappointedFace,
        await GetSourceAsync(FluentEmojiType.DisappointedFace) },
    { FluentEmojiType.WorriedFace,
        await GetSourceAsync(FluentEmojiType.WorriedFace) },
    { FluentEmojiType.FaceWithSteamFromNose,
        await GetSourceAsync(FluentEmojiType.FaceWithSteamFromNose) },
    { FluentEmojiType.AnguishedFace,
        await GetSourceAsync(FluentEmojiType.AnguishedFace) },
    { FluentEmojiType.FearfulFace,
        await GetSourceAsync(FluentEmojiType.FearfulFace) },
    { FluentEmojiType.FlushedFace,
        await GetSourceAsync(FluentEmojiType.FlushedFace) },
    { FluentEmojiType.ZanyFace,
        await GetSourceAsync(FluentEmojiType.ZanyFace) },
    { FluentEmojiType.FaceExhaling,
        await GetSourceAsync(FluentEmojiType.FaceExhaling) },
    { FluentEmojiType.AngryFace,
        await GetSourceAsync(FluentEmojiType.AngryFace) },
    { FluentEmojiType.NerdFace,
        await GetSourceAsync(FluentEmojiType.NerdFace)  }
};
```

`SetSourcesAsync` is used to set the assets for the **Emoji** needed for the game.

Step 12

While still in the **namespace** of **EmojiGame** in *Library.cs* in the **class** of **Board** after the **Comment** of **// Board ChooseValues, ChooseUnique, Name, GetQuestion & Indexes Method** type the following **Methods**:

```
private List<int> ChooseValues(int minimum, int maximum, int total)
{
    var choose = new List<int>();
    var values = Enumerable.Range(minimum, maximum).ToList();
    for (int index = 0; index < total; index++)
    {
        var value = _random.Next(0, values.Count);
        choose.Add(values[value]);
    }
    return choose;
}

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

private string Name(FluentEmojiType item) =>
    Enum.GetName(typeof(FluentEmojiType), item);

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

private List<int> Indexes(IEnumerable<FluentEmojiType> items) =>
    items.Select(item => Array.IndexOf(items.ToArray(), item))
        .ToList();
```

ChooseValues is used to get a list of randomised non-unique numbers and **ChooseUnique** is used to get a list of randomised unique numbers. **Name** is used to get the name of an **Emoji** and **GetQuestion** will be used to get the displayed **Emoji** to be guessed with **Indexes** returning the positions of a given **FluentEmojiType**.

Step 13

While still in the **`namespace`** of **`EmojiGame`** in *Library.cs* in the **`class`** of **`Board`** after the **Comment** of **`// Board Next Method`** type the following **Method**:

```
public bool Next()
{
    if (_round < rounds)
    {
        Items.Clear();
        var emoji = _sources.Keys.ToArray();
        var correct = emoji[_selected[_round]];
        Question = GetQuestion(correct);
        var incorrect = ChooseUnique(0, _options.Count - 1, options);
        var indexOne = _options[incorrect.First()];
        var indexTwo = _options[incorrect.Last()];
        var one = emoji[indexOne];
        var two = emoji[indexTwo];
        _options.Remove(indexOne);
        _options.Remove(indexTwo);
        var indexes = ChooseUnique(0, options + 1, options + 1);
        var items = new List<Item>()
        {
            new Item(indexes[0], correct, true, _sources[correct], Play),
            new Item(indexes[1], one, false, _sources[one], Play),
            new Item(indexes[2], two, false, _sources[two], Play)
        }.OrderBy(o => o.Index);
        foreach (var item in items)
        {
            Items.Add(item);
        }
        _round++;
        return true;
    }
    return false;
}
```

`Next` is used to proceed through the game to get the next **Emoji** to guess and uses the **Methods** of **`GetQuestion`** and **`ChooseUnique`** and will use the **Method** of **`Play`** which will be defined in the next **Step**.

Step 14

While still in the **namespace** of **EmojiGame** in *Library.cs* in the **class** of **Board** after the **Comment** of **// Board SetupAsync, Correct & Play Method** type the following **Methods** of **SetupAsync** which will configure the game, **Correct** which will set the **State** accordingly and then the **Method** of **Play**.

```
public async Task SetupAsync()
{
    _round = 0;
    _over = false;
    Question = string.Empty;
    Message = string.Empty;
    await SetSourcesAsync();
    _indexes = Indexes(_sources.Keys);
    _selected = ChooseValues(0, _indexes.Count, rounds);
    _options = _indexes.Where(index => !_selected
        .Any(selected => selected == index)).ToList();
    Next();
}

public bool Correct(Item selected)
{
    foreach(var item in Items)
    {
        item.State = item.Correct ?
            State.Correct : State.Incorrect;
    }
    return selected.Correct;
}

public void Play(int index)
{
    if(!_over)
    {
        if (Correct(_items[index]))
        {
            if(!Next())
            {
                Message = "Game Over, You Won";
                _over = true;
            }
        }
        else
        {
            Message = "Incorrect, You Lost!";
            _over = true;
        }
    }
    else
        Message = "Game Over";
}
```

Step 15

Still in *Library.cs* for the **`namespace`** of **`EmojiGame`** in *Library.cs* you will define a **`class`** after the **Comment** of **`// StateToBrushConverter Class`** by typing the following:

```
public class StateToBrushConverter : IValueConverter
{
    public object Convert(object value, Type targetType,
        object parameter, string language)
    {
        if (value is State state)
        {
            return new SolidColorBrush(value switch
            {
                State.Correct => Colors.Green,
                State.Incorrect => Colors.Red,
                _ => Colors.Transparent
            });
        }
        return null;
    }

    public object ConvertBack(object value, Type targetType,
        object parameter, string language) =>
        throw new NotImplementedException();
}
```

`StateToBrushConverter` uses the **`interface`** of **`IValueConverter`** for **Data Binding** which will allow the colours of the **`Item`** in the game to be represented from either *Green*, *Red* or *Transparent* as a **`SolidColorBrush`**.

Step 16

While still in the **`namespace`** of **`EmojiGame`** in *Library.cs* and in the **`class`** of **`Library`** after the **Comment** of **`// Library Constants and GetBoundText Method`** type the following **Constants** and **Method**:

```
private const int font = 20;
private readonly Board _board = new();

private TextBlock GetBoundText(string property)
{
    var text = new TextBlock()
    {
        FontSize = font,
        VerticalAlignment = VerticalAlignment.Center,
        HorizontalAlignment = HorizontalAlignment.Center
    };
    var binding = new Binding()
    {
        Source = _board,
        Mode = BindingMode.OneWay,
        Path = new PropertyPath(property),
        UpdateSourceTrigger = UpdateSourceTrigger.PropertyChanged
    };
    BindingOperations.SetBinding(text, TextBlock.TextProperty, binding);
    return text;
}
```

Constants are values that are used in the game that will not change and there is also a **Method** of **`GetBoundText`** which is used to get a **`TextBlock`** to be used with **Data Binding**.

Step 17

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

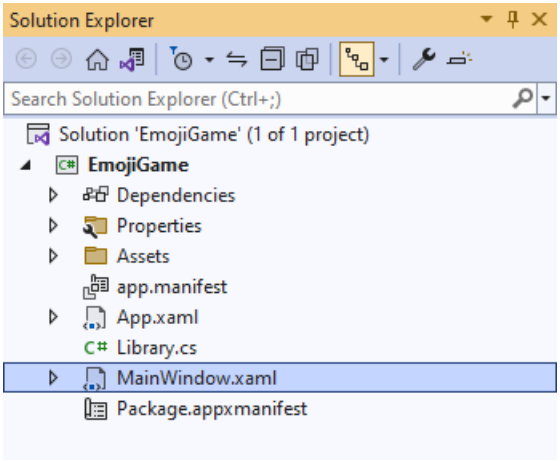
```
private void Layout(Grid grid, DataTemplate itemTemplate,
    ItemsPanelTemplate itemsPanel)
{
    grid.Children.Clear();
    var panel = new StackPanel()
    {
        Orientation = Orientation.Vertical
    };
    var question = GetBoundText(nameof(_board.Question));
    panel.Children.Add(question);
    var items = new ItemsControl()
    {
        ItemsSource = _board.Items,
        ItemTemplate = itemTemplate,
        ItemsPanel = itemsPanel
    };
    panel.Children.Add(items);
    var message = GetBoundText(nameof(_board.Message));
    panel.Children.Add(message);
    grid.Children.Add(panel);
}

public async void New(Grid grid, DataTemplate itemTemplate,
    ItemsPanelTemplate itemsPanel)
{
    await _board.SetupAsync();
    Layout(grid, itemTemplate, itemsPanel);
}
```

`Layout` will create the look-and-feel of the game by setting up all the elements including using a **`DataTemplate`** for the elements and **`New`** will use **`Layout`** and setup the **Emoji** used in the game.

Step 18

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



Step 19

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 20

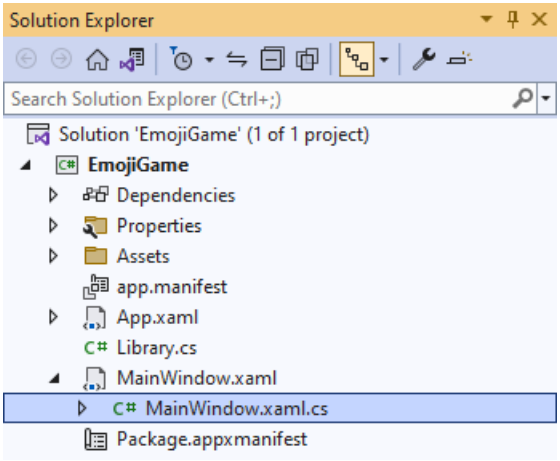
While still in the **XAML** for **MainWindow.xaml** above **`</Window>`**, type in the following **XAML**:

```
<Grid>
    <Grid.Resources>
        <local:StateToBrushConverter x:Key="StateToBrushConverter"/>
        <DataTemplate x:Name="DataTemplate">
            <Button Command="{Binding Command}">
                <Border Height="100" Width="100"
                    CornerRadius="5" BorderThickness="5"
                    BorderBrush="{Binding State,
                    Converter={StaticResource StateToBrushConverter}}">
                    <Image Source="{Binding Source}"/>
                </Border>
            </Button>
        </DataTemplate>
        <ItemsPanelTemplate x:Name="ItemsTemplate">
            <StackPanel Orientation="Horizontal"/>
        </ItemsPanelTemplate>
    </Grid.Resources>
    <Viewbox>
        <Grid Margin="50" Name="Display"
            HorizontalAlignment="Center"
            VerticalAlignment="Center" Loaded="New">
            <ProgressRing/>
        </Grid>
    </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`** and defines the **Templates** that will be used in the game.

Step 21

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 22

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 23

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, DataTemplate, ItemsTemplate);
```

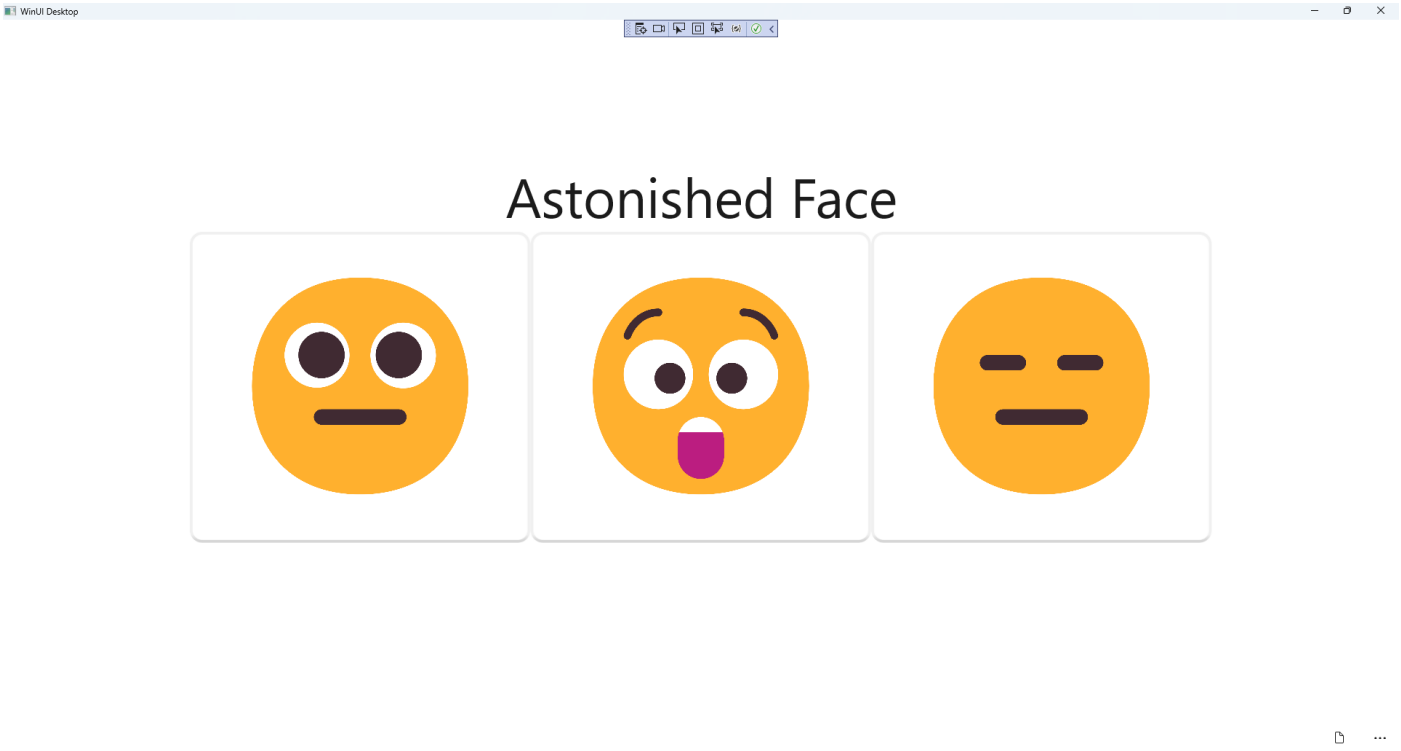
Here an **Instance** of the **Class** of **`Library`** is created then below this is the **Method** of **`New`** that will be used with **Event Handler** from the **XAML**, this **Method** uses Arrow Syntax with the **`=>`** for an Expression Body which is useful when a **Method** only has one line and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

Step 24

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

Step 25

Once running you can select an **Emoji** that you think is the one being asked for, if you get it right you progress to the next set of **Emoji** to pick from and if you get all *9* rounds and you win, but get any wrong and you lose or you can select *New* to start a new game.



Step 26

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!