Extending Xamarin.Forms lets you put into your apps new and additional device-specific functionality or controls which make apps that look and feel better.

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History

Xamarin.Forms was designed as an abstraction framework to build cross platform data-centric apps quickly

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Agenda

1. Xamarin.Forms concepts
2. Places for Extension
3. Mark up Extensions
4. Elements and Renderers

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Concepts

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Reasons for Extension

- Change display aspects
- Take advantage of device features
- Newly created control

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Agenda

1. ~~Xamarin.Forms concepts~~
2. Places for Extension
3. Mark up Extensions
4. Elements and Renderers

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Places for Extension

- Services with DependencyService
- Markup Extensions
- Composite Controls
- Renderers

Interfaces with DependencyService (non-visual)

Markup Extensions (XAML files)

Composite Controls (Xamarin.Forms control)

Platform Specific Renderers (Native controls)

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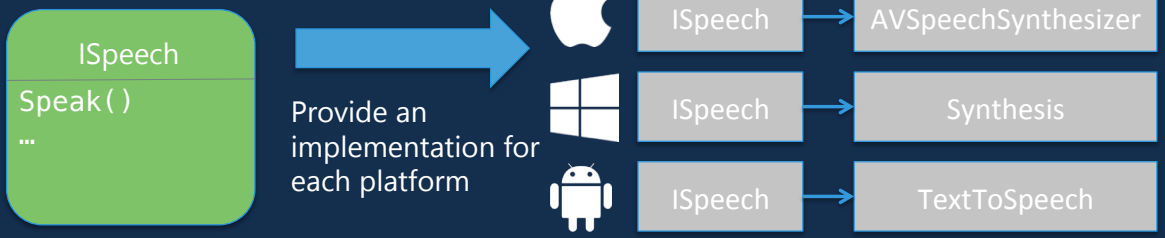
Custom Services

- You can use the Dependency Service to provide platform services

Define an interface for the service and then provide platform implementations



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Example of Markup Extensions

- Markup Extensions can create run-time calculated values from XAML

```
<Label Text="Name" Font="Bold" />
<Entry Text="{Binding Name}" />

<Label Text="Email" Font="Bold" />
<Entry Text="{Binding Email}" />
```

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Creating Composite Controls

- We could also create custom controls by using existing controls

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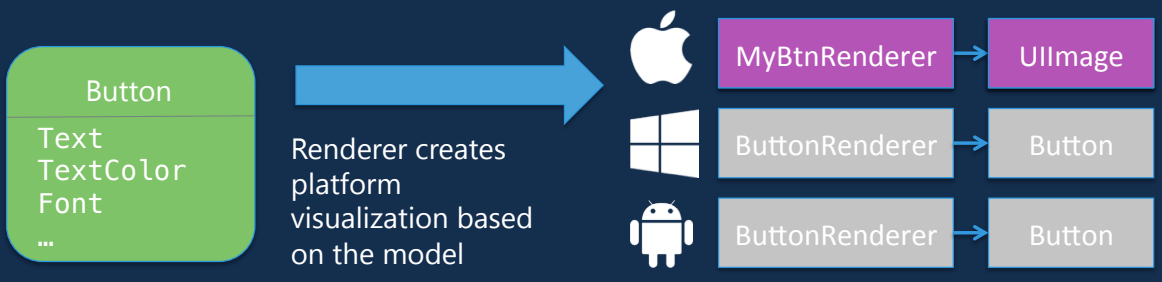
Extending a control on a platform

- If we don't like the way a control is rendered on the platform, we can change it

Element describes the visual element



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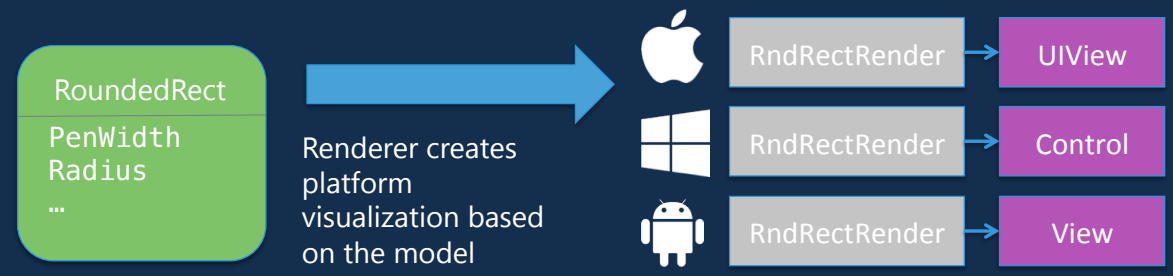
Writing new extensions

- The same element/renderer model is used for new components

Element describes the visual element



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Agenda

1. ~~Xamarin.Forms concepts~~
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Existing Markup Extensions

```
<Label Text="Name" Font="Bold" />
<Entry Text="{Binding Name, Mode=TwoWay}" />

<Label Text="Email" Font="Bold" />
<Entry Text="{Binding Email, Mode=TwoWay}" />
```

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Localization Markup Example

```
<Label Text="{i18n:Translate Name}" />
<Entry Text="" x:Name="nameEntry" Placeholder="task name" />
<Label Text="{i18n:Translate Notes}" />
<Entry Text="{Binding Path=Notes}" x:Name="notesEntry" />
<Button Text="{i18n:Translate Save}" Clicked="OnSave" />
```

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Markup Extensions

Add a content property attribute to capture the Markup Extension Value

```
[ContentProperty("Name")] // {DateDisplay Name}
public class DateDisplayExtension : IMarkupExtension
{
    public string Name {
        get;
        set;
    }
}
```

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Markup Extensions

Implement the ProvideValue method to calculate the value

```
public class DateDisplayExtension : IMarkupExtension
{
    public object ProvideValue
      (IServiceProvider serviceProvider)
    {
        if (serviceProvider == null)
            throw new ArgumentNullException ("No Provider");

        if (Name == "Date")
            return DateTime.Now.ToString ("D");
        else
            return "The value could not be determined";
    }
}
```

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Markup Extensions

After the namespace is registered, use the Markup extension

```
<?xml version="1.0" encoding="UTF-8"?>
<ContentPage xmlns="http://xamarin.com/schemas/2014/forms"
    xmlns:x="http://schemas.microsoft.com/winfx/2009/xaml"
    xmlns:dd="clr-namespace:ExtendingXamarinForms;assembly=ExtendingXamarinForms"
    x:Class="ExtendingXamarinForms.MarkupExtensionExamplePage">
       <Label Text="{dd:DateDisplay Date}"></Label>
</ContentPage>
```

This is your class name without the Extension suffix

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Demonstration

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Agenda

1. ~~Xamarin.Forms concepts~~
2. ~~Places for Extension~~
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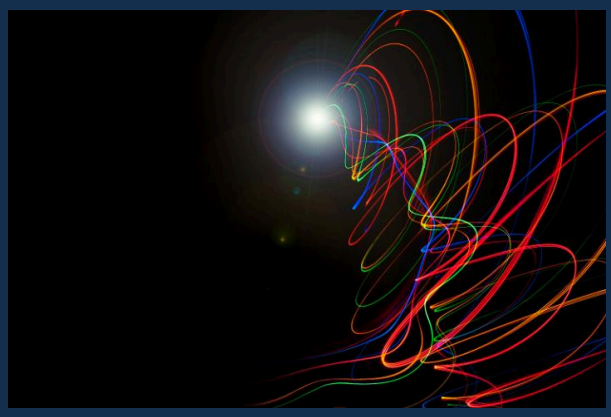
Creating abstractions

Xamarin.Forms uses abstractions to define what it wants done and then provides platform implementations for those mechanisms



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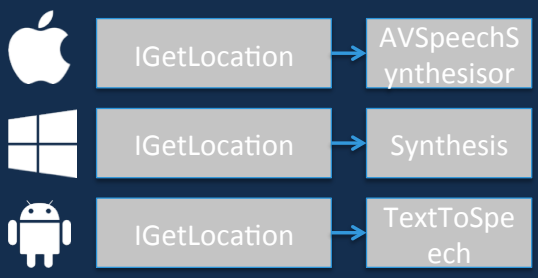
Creating Services

- You may be familiar with DependencyService that creates abstractions

Define an interface for the service and then provide platform implementations

ISpeech
Speak
...

Provide an implementation for each platform



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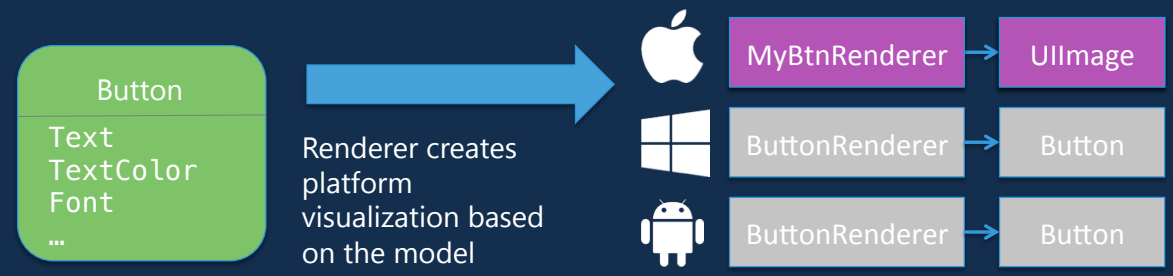
Extending a control on a platform

- If we don't like the way a control is rendered on the platform, we can change it

Element describes the visual element



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Registering a Custom Renderer

Find the right renderer to Subclass

```
namespace ExtendingXamarinForms.iOS
{
    public class iOS8NavigationPageRenderer : NavigationRenderer
    {
        public iOS8NavigationPageRenderer () : base()
        {
            if (UIDevice.CurrentDevice.CheckSystemVersion (8, 0))
                this.HidesBarsOnSwipe = true;
        }
    }
}
```

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Registering a Custom Renderer

The renderers are subclasses of the actual device control

```
namespace ExtendingXamarinForms.iOS
{
    public class iOS8NavigationPageRenderer : NavigationRenderer
    {
        public iOS8NavigationPageRenderer () : base()
        {
            if (UIDevice.CurrentDevice.CheckSystemVersion (8, 0))
                this.HidesBarsOnSwipe = true;
        }
    }
}
```

This is a property of UINavigationController

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Registering a Custom Renderer

Each custom renderer needs to be registered

This is the Xamarin.Forms component you want to render

```
[assembly: ExportRenderer(typeof(NavigationPage),
    typeof(iOS8NavigationPageRenderer))]
```

This is your custom renderer

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Demonstration

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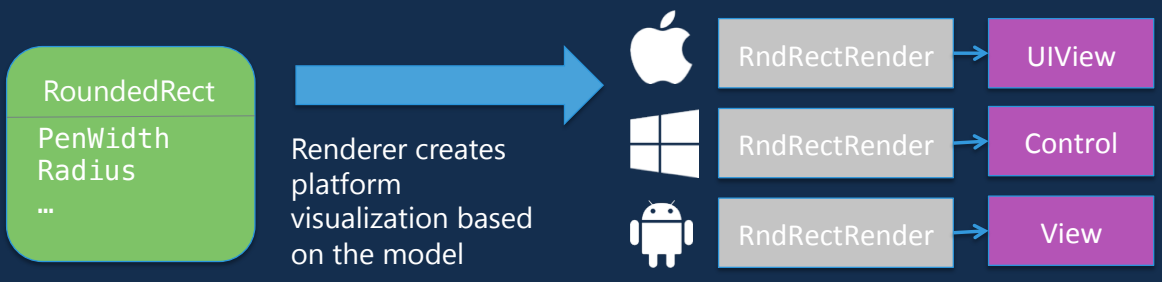
Xamarin.Forms rendering model

- Two pieces to each control: The element and the renderer

Element describes the visual element



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Creating a new control & renderers

- Step 1 - Create the element definition in your PCL/Shared Project

```
public class RoundedBoxView : BoxView
{

}
```

This is an existing view if you are extending the view, or View if you are creating a new one

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Creating a new control & renderers

- Step 2 – Add properties to your View definition

```
public static readonly BindableProperty CornerRadiusProperty =
     BindableProperty.Create<RoundedBoxView, double>(
           p => p.CornerRadius, defaultValue: 0 );

public double CornerRadius
{
    get { return (double)base.GetValue(CornerRadiusProperty); }
    set { base.SetValue(CornerRadiusProperty, value); }
}
```

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Creating a new control & renderers

- Step 3 – Implement a renderer for each platform

```
public class RoundedBoxViewRenderer :
    ViewRenderer<RoundedBoxView, UIView>
{
}
```

Define the control that you are rendering against

Define the native control that your renderer will be based on

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Implementing a composite renderer

```
protected override void OnElementChanged(
    ElementChangedEventArgs<RoundedBoxView> e)
{
    base.OnElementChanged(e);
    var rbv = e.NewElement;
    if (rbv != null) {
        childView = new UIView() {
            BackgroundColor = rbv.Color.ToUIColor(),
            AutoresizingMask = UIViewAutoresizing.FlexibleWidth |
            UIViewAutoresizing.FlexibleHeight
        };
        SetNativeControl(childView);
    }
}
```

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Implementing a drawn renderer

```
public override void Draw(System.Drawing.RectangleF rect)
{
    RoundedBoxView rbv = (RoundedBoxView)this.Element;

    using (var context = UIGraphics.GetCurrentContext()) {

        context.SetFillColor(rbv.Color.ToCGColor());
        ...
        var path = CGPath.FromRoundedRect(rc, radius, radius);
        context.AddPath(path);
        context.DrawPath(CGPathDrawingMode.FillStroke);
    }
}
```

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Register the renderers

- Step 4 – provide assembly registration per platform

This is the Xamarin.Forms element

```
[assembly: ExportRendererAttribute(typeof(RoundedBoxView),
    typeof(RoundedBoxViewRenderer))]
```

This is your custom renderer

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Summary

- Concepts
- Places for Extensions
- Creating Markup Extensions
- Working with Elements and Renderers

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