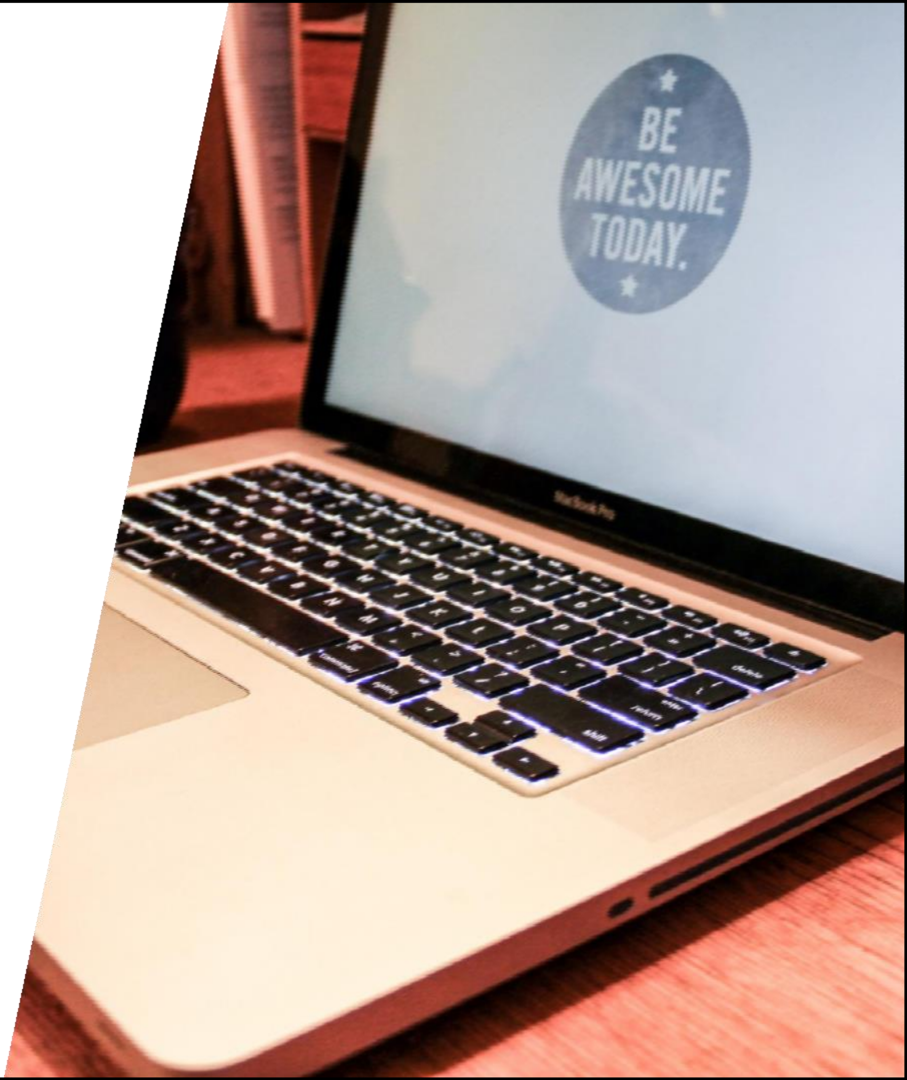
Getting started with the iOS Designer

▶

Objectives

1. Create a single screen application and add controls
2. Describe and use Auto Layout
3. Interact with controls and views programmatically
4. Apply segues and navigation



Create a single screen application and add controls

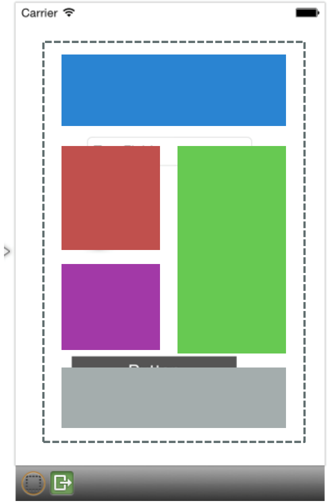
Tasks

1. Describe the iOS Designer
2. Identify controls and properties
3. Demonstrate the designer workflow
4. Work with subviews

Reminder: UIView

- A **`UIView`** defines a rectangular area on the screen and provides:

Visualization

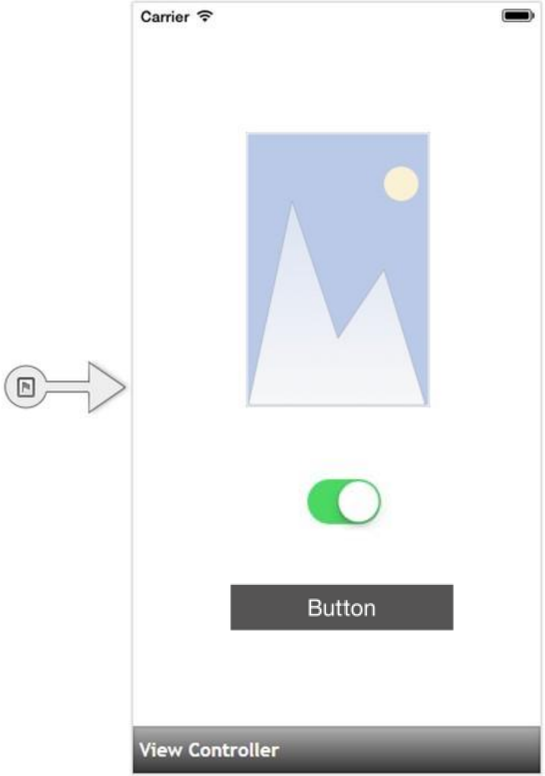


Layout for subviews

Event publishing

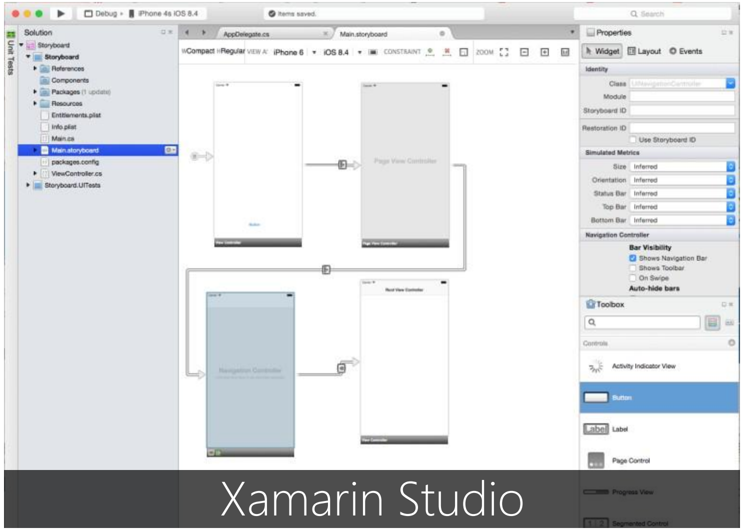
Reminder: View Controllers

- A **`UIViewController`** provides view management for a single screen
- Owns a **`UIView`** (root view) and receives lifetime notifications from it
- Acts as the mediator between the view(s) and the data/logic/model(s)

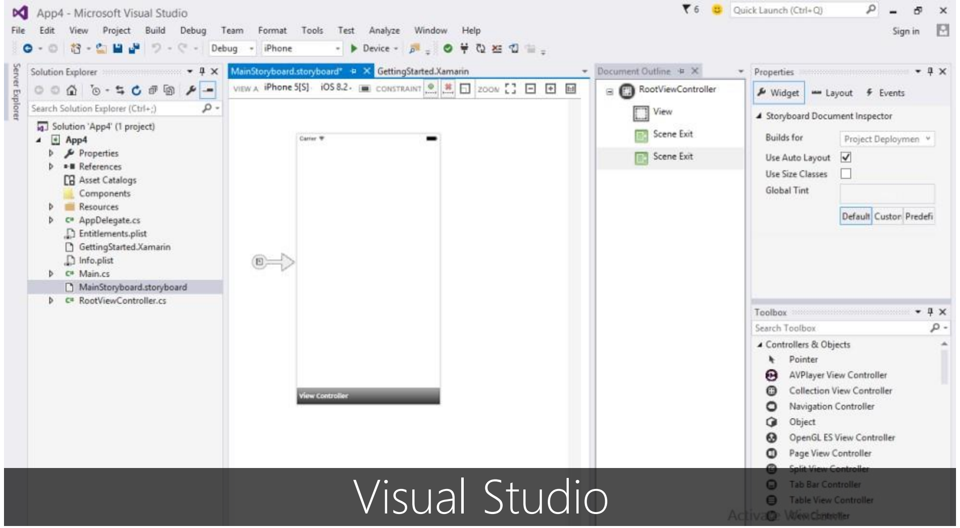


The iOS Designer

- ❖ The Xamarin.iOS designer is a visual drag + drop editor for creating and editing screens (View Controllers + Views) in your iOS applications



Xamarin Studio



Visual Studio

Parts of the Designer

- The iOS Designer has several windows which you use to examine, visualize, design the UI of your application

Document Outline

Properties Explorer

Designer Surface

Toolbox

Designer Toolbar

Demonstration

Tour the Xamarin.iOS designer

Storyboards vs. XIBs

- iOS supports two designer file formats

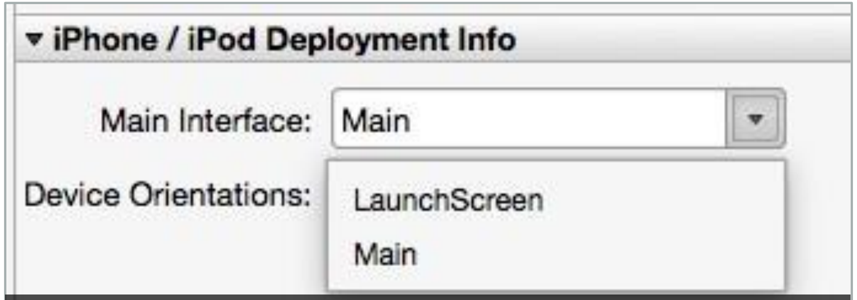
Storyboards let you design multiple screens together with the relationships between them; this is the default file created for your app

XIB is the original format which defines a single screen or part of a screen; this is used today for the Launch Screen

Using Storyboards

- Most of the time you will only have one Storyboard in your app, but you can add as many as you need to segregate or share your UI definitions

- Info.plist identifies the one to start the app with and is editable under iOS Application settings



▾ iPhone / iPod Deployment Info

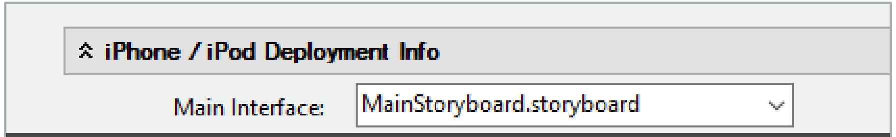
Main Interface: Main

Device Orientations:

LaunchScreen

Main

Xamarin Studio



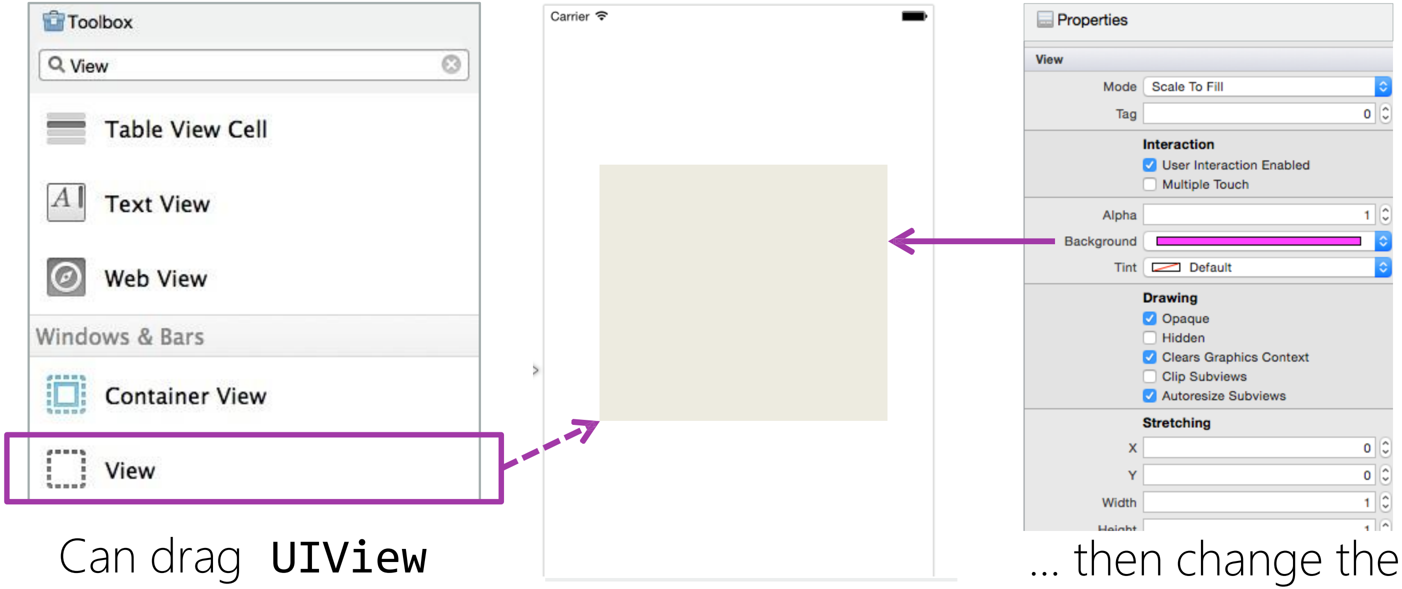
iPhone / iPod Deployment Info

Main Interface: MainStoryboard.storyboard

Visual Studio

Workflow [Xamarin Studio]

- Drag widgets onto the designer surface and then set properties



View

Mode: Scale To Fill
Tag: 0

Interaction
☑ User Interaction Enabled
□ Multiple Touch

Alpha: 1
Background: 🟪
Tint: Default

Drawing
☑ Opaque
□ Hidden
☑ Clears Graphics Context
□ Clip Subviews
☑ Autoresize Subviews

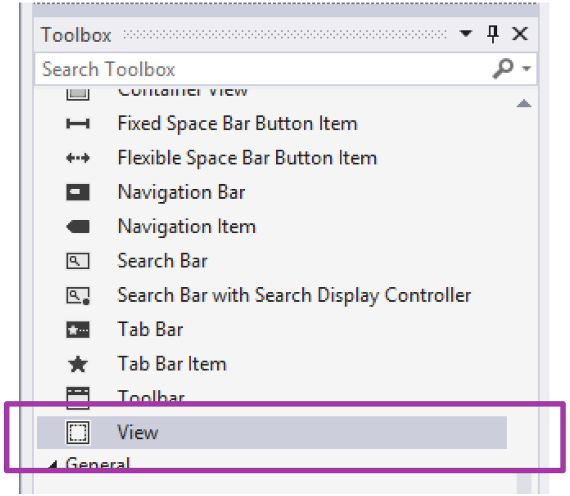
Stretching
X: 0
Y: 0
Width: 1
Height: 1

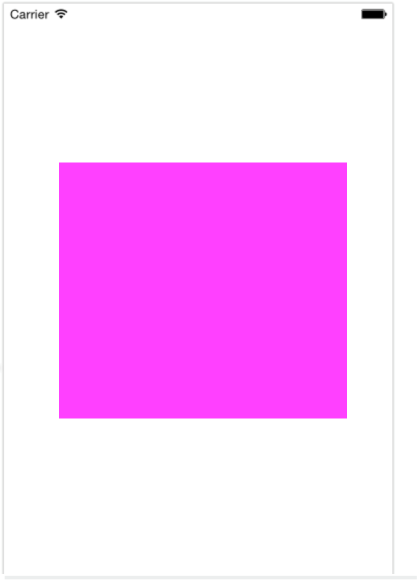
Can drag **`UIView`** from the toolbox

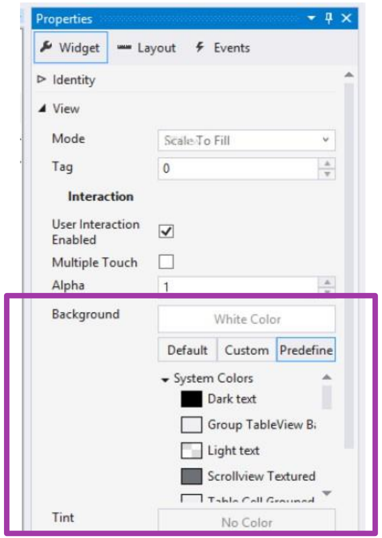
... then change the background color

Workflow [Visual Studio]

- Drag widgets onto the designer surface and then set properties







Mode: Scale To Fill

Tag: 0

User Interaction Enabled: ☑

Multiple Touch: □

Alpha: 1

Background: White Color

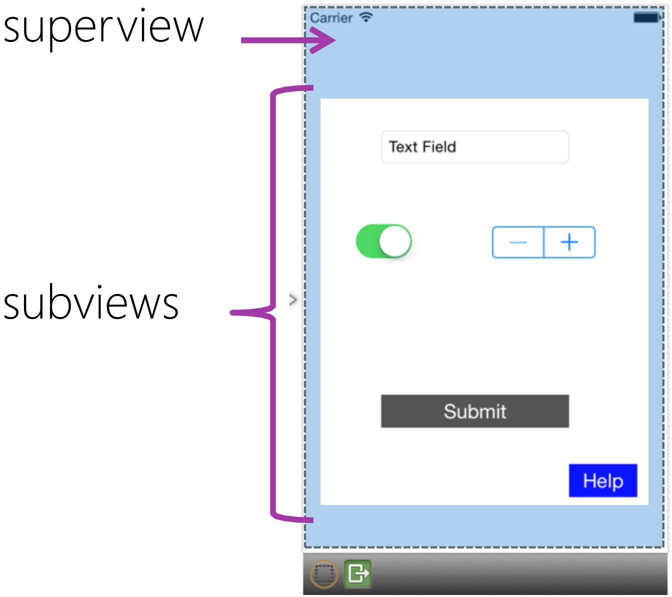
Tint: No Color

Can drag **`UIView`** from the toolbox

… then change the background color

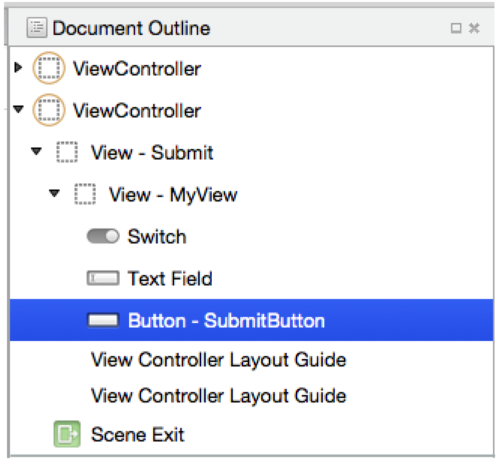
Layout and subviews

❖ Controls (subviews) can be positioned onto the root **`UIView`** (superview)



superview

subviews



Document Outline

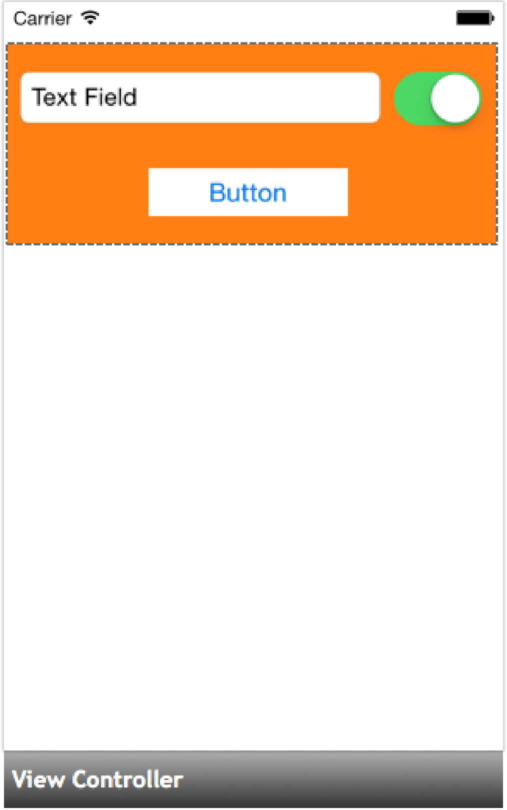
- ViewController
- ViewController
  - View - Submit
    - View - MyView
      - Switch
      - Text Field
      - Button - SubmitButton
    - View Controller Layout Guide
    - View Controller Layout Guide
  - Scene Exit

Use the document outline view to see relationships

Composite controls

- Can take advantage of the view architecture to create *composite controls* by nesting controls within a **`UIView`**

- Composite controls can be made reusable and are easily moved or animated as a group by adjusting the parent view



Individual Exercise

Create the UI for a single view application

Summary

1. Describe the iOS Designer
2. Identify controls and properties
3. Demonstrate the designer workflow
4. Work with subviews

Describe and use Auto Layout

Tasks

1. Describe the Auto Layout system
2. Identify constraints
3. Add constraints using the Designer

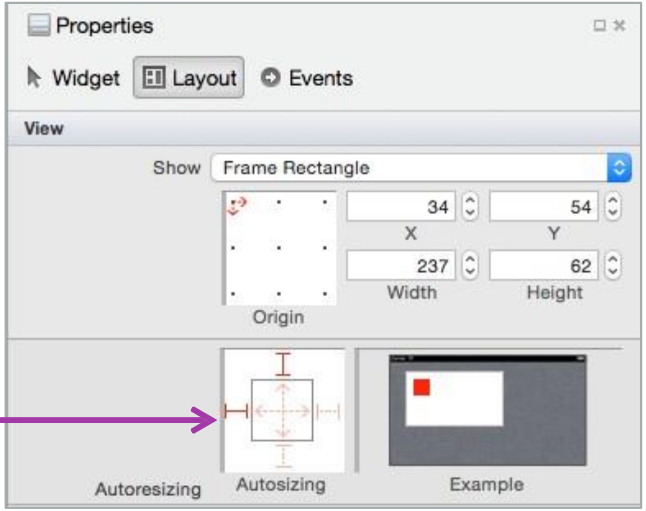
Responsive interface design

- There are several things which can affect the layout of your UI at runtime
  - Orientation changes
  - Running on a device with a different resolution or form factor
  - Positioning dynamic content
  - Working with user-selectable fonts
  - Localization

Layout solutions

- ❖ Apple has two APIs to manage layout rules in the UI design

You define each side of the frame with either a "flexible" or "fixed" margin to decide if it stretches with, or is pinned to the parent



Show: Frame Rectangle

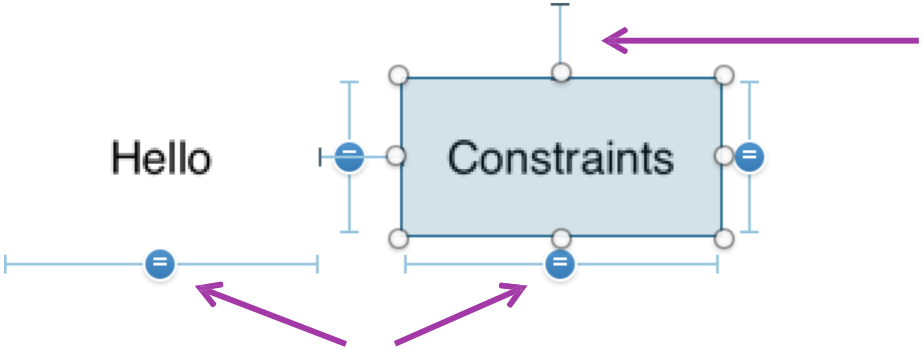
X	Y
34	54

Width	Height
237	62

Autoresizing Masks

What is Auto Layout?

❖ Auto Layout is a system that helps organize the application UI by describing relationships between visual elements



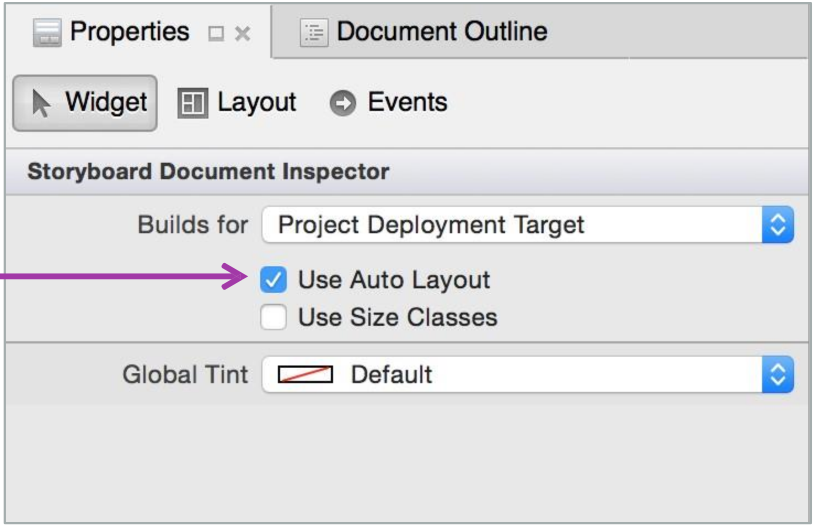
Can set positions relative to other views (or the parent view)

Can set heights and widths

Auto Layout in the Designer

- Storyboard designer allows us to visually manage Auto Layout constraints without writing any code

Enabled by default but can be turned on and off in the Storyboard properties in Xamarin Studio or Visual Studio – this will cause the Storyboard to revert back to the "Springs and Struts" approach



Builds for: Project Deployment Target

☑ Use Auto Layout

□ Use Size Classes

Global Tint: Default

What are Constraints?

- Constraints determine *one aspect* of a **`UIView`** position or size and essentially form the rules that describe the layout

```
view.left = superview.left
```

```
view.top = superview.top + 20
```

```
view.top = otherView.bottom + 8
```

```
view.height = 0.5 * superview.height
```

```
view.height = 0.5 * view.width
```

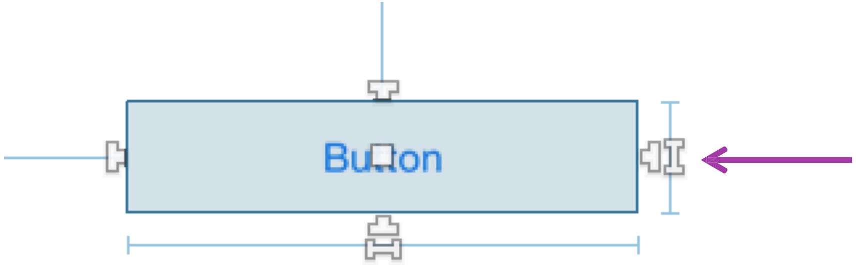
Constraint behavior

- Constraints are:
  - Applied to views
  - Cumulative
  - Prioritized
  - Able to cross views

- They decide the position and size of the `UIView` they are applied to

Xamarin.iOS Designer

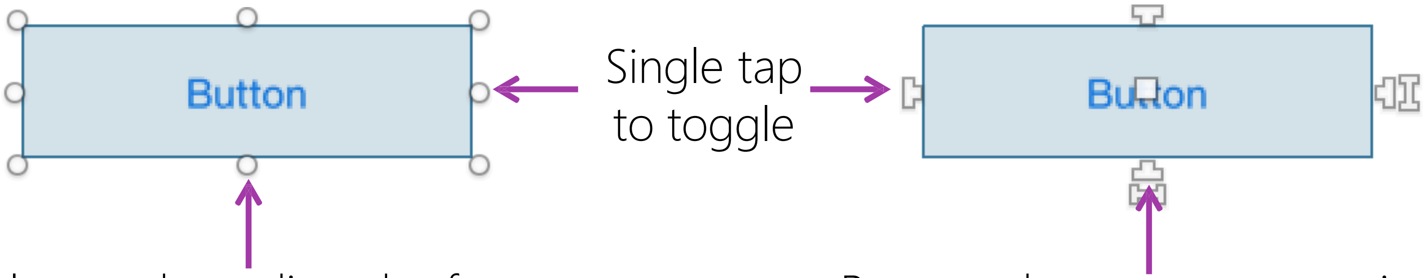
- The designer adds the constraints directly into the Storyboard and iOS will then apply them when the UI is inflated at runtime



constraints are shown graphically and can be changed either on the designer surface or in the property pad

Constraint "Mode"

- In the iOS Designer, single-tap views to toggle between editing the frame and editing constraints



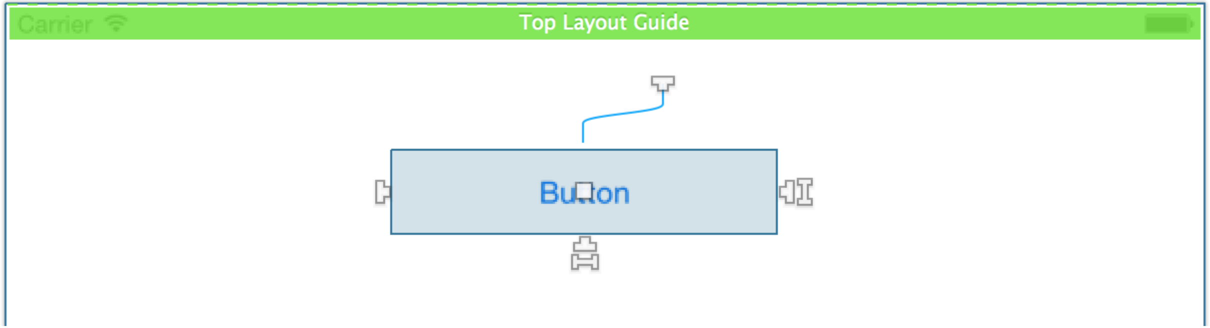
Single tap to toggle

Circles used to adjust the frame

Bars used to create constraints

Adding Constraints

- Use the *dragging control decorators* on a view to create a constraint with itself, the parent, or a sibling view



Can select and drag the handles and drop onto the target view

Types of Constraints

- Designer supports manipulation of three types of constraints

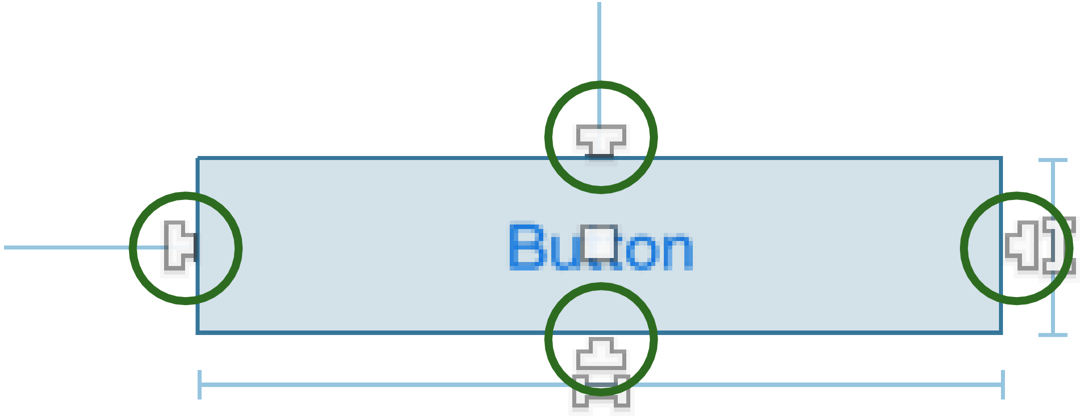
Spacing Constraints

Sizing Constraints

Alignment Constraints

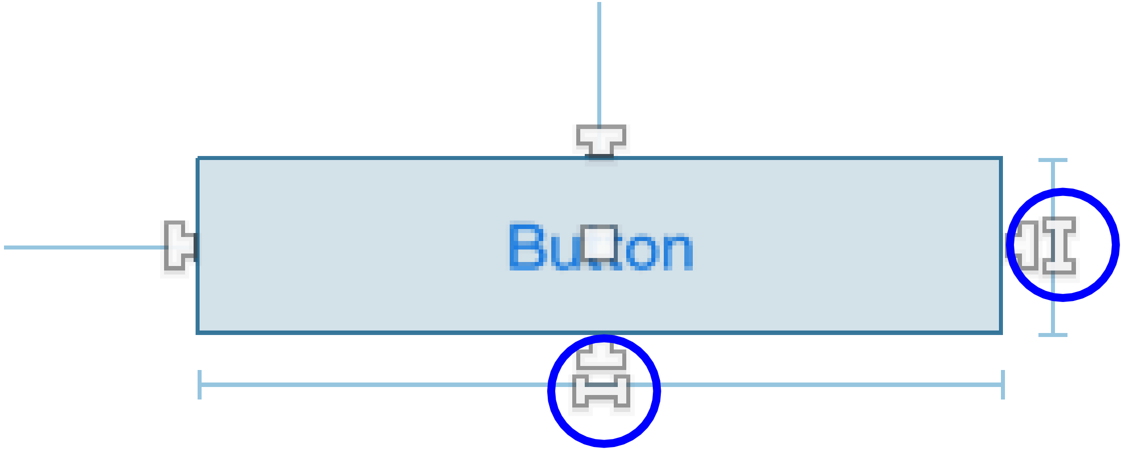
Spacing constraints

- Spacing constraints allow you to position a view relative to another view (or parent) by dragging the T-handle shapes on each edge



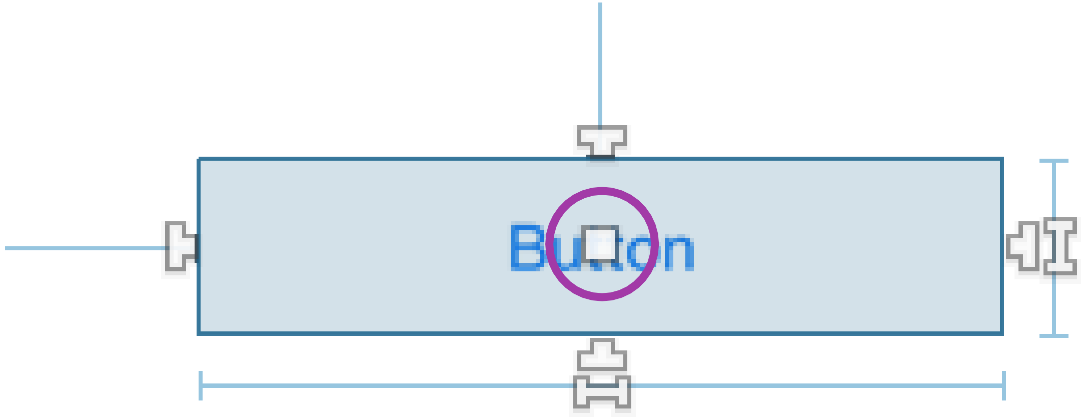
Sizing constraints

- Sizing constraints allow you to control a views width and height (can be a constant, fixed to another constraint, or an inequality) by dragging the center "I" bar shape on the right and bottom edge of the view



Alignment constraints

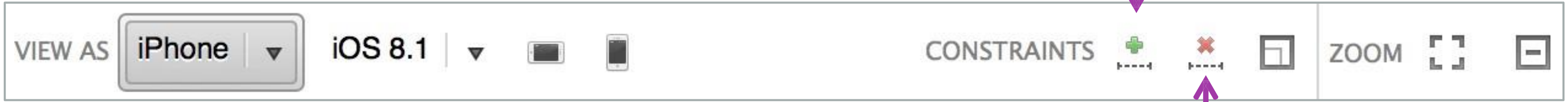
- Alignment constraints allow you to align a view to the X or Y axis of it's superview or a sibling



Add Recommended Constraints

- Xamarin Designer can add recommended constraints to a View

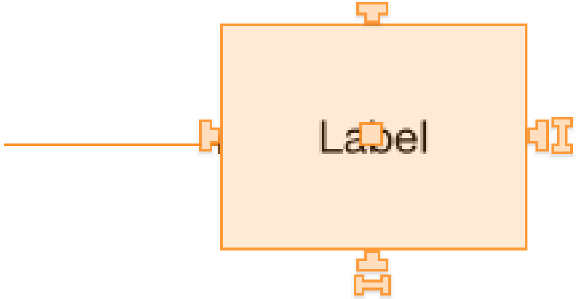
Adds 4 constraints to set position and size



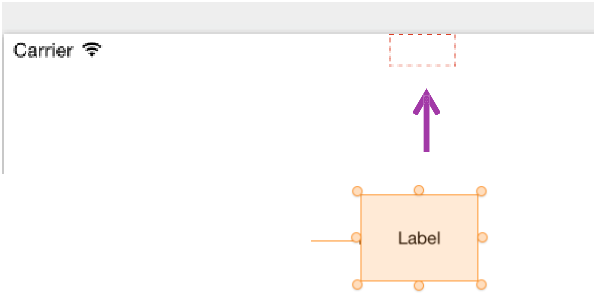
Removes all constraints
for a selected view

What is a fully-constrained view?

- A *fully-constrained view* has enough constraints to uniquely describe the view's position and size, typically this requires 4 constraints



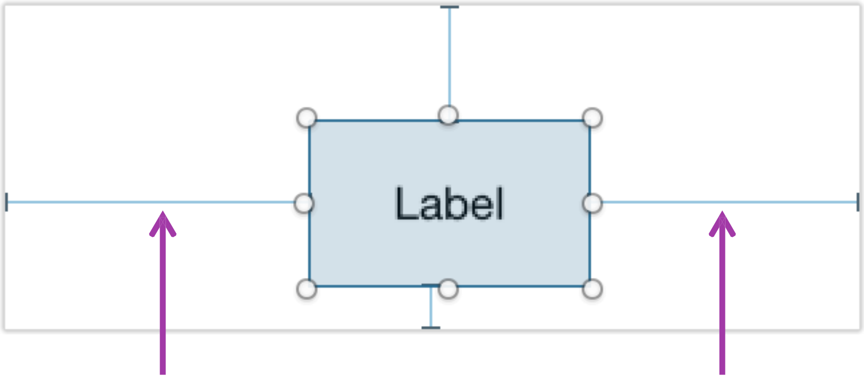
Designer shows view in orange when it does not have enough constraints to determine size and/or position



... will often show a dotted rectangle for where the view will be positioned/sized at runtime

What is a fully-constrained view?

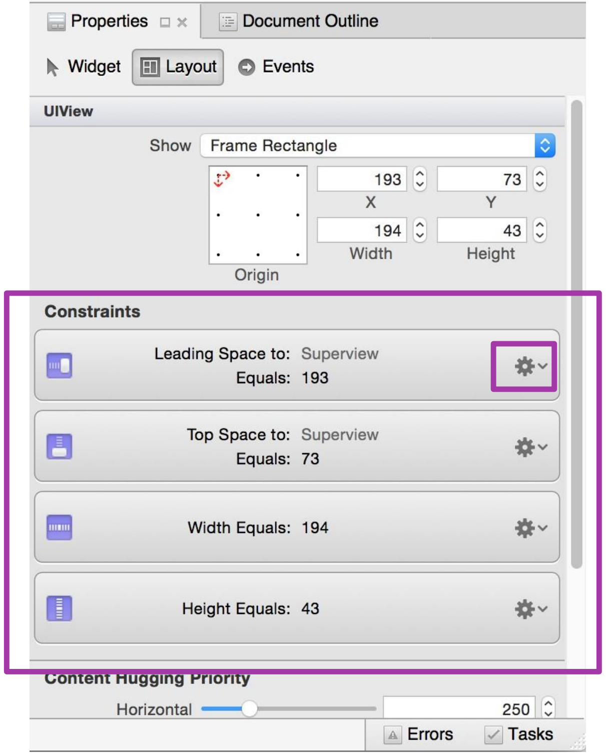
- A *fully-constrained view* has enough constraints to uniquely describe the view's position and size, typically this requires 4 constraints



Properties can be constrained indirectly. We can constrain the left edge and right edge which will effectively constrain the width.

Editing Constraints

- Layout Area in the Properties Pane provides a more powerful way to edit and manage constraints
  - Provides an overview of all constraints
  - Can “fine-tune” constraints through an inline editor



Show: Frame Rectangle

X	193
Y	73
Width	194
Height	43

Leading Space to: Superview
Equals: 193

Top Space to: Superview
Equals: 73

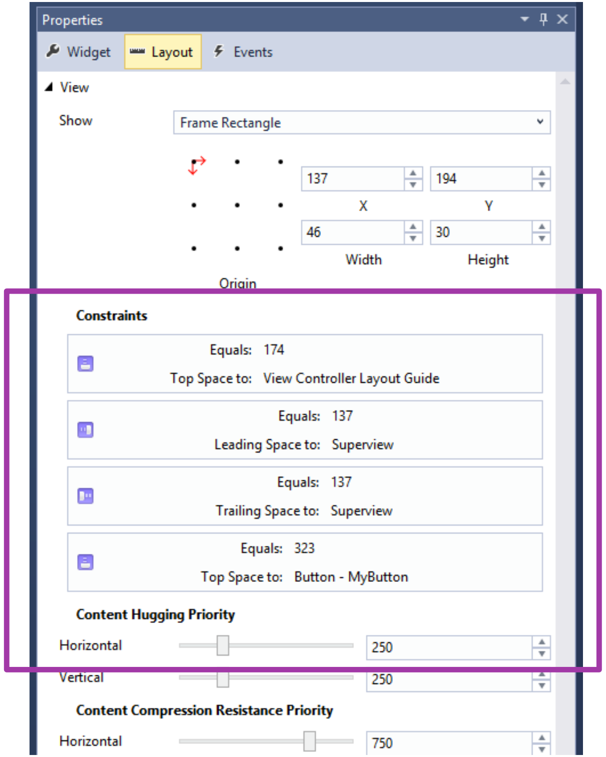
Width Equals: 194

Height Equals: 43

Content Hugging Priority
Horizontal 250

Editing Constraints [Visual Studio]

- Layout Area in the Properties Pane provides a more powerful way to edit and manage constraints
  - Provides an overview of all constraints
  - Can "fine-tune" constraints through an inline editor



Show: Frame Rectangle

X: 137
Y: 194
Width: 46
Height: 30

Constraints

Equals: 174
Top Space to: View Controller Layout Guide

Equals: 137
Leading Space to: Superview

Equals: 137
Trailing Space to: Superview

Equals: 323
Top Space to: Button - MyButton

Content Hugging Priority

Horizontal: 250

Vertical: 250

Content Compression Resistance Priority

Horizontal: 750

Group Exercise

Add constraints to the fireworks app

Summary

1. Describe the Auto Layout system
2. Identify constraints
3. Add constraints using the Designer

Interact with controls and views programmatically

Tasks

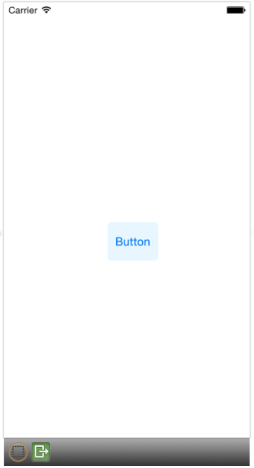
1. Associate a class for the `UIViewController`
2. Adding actions to a control
3. Naming views
4. Inspect outlets and actions

User interaction

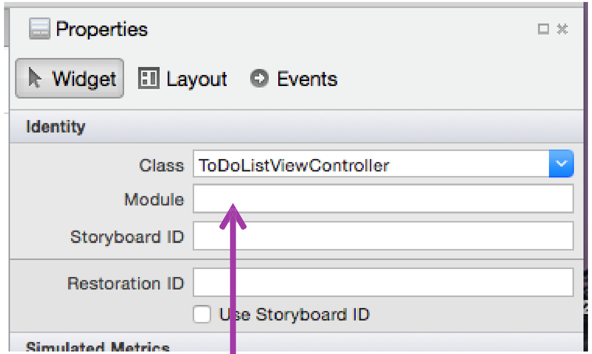
- Applying behavior to the views of an app is essential if you want your code to respond to user interactions
- Keep in mind that not every view needs to be accessible in code – only things that drive the business logic or display results

Assign a class

- In order to apply behaviors to your controls the **`UIViewController`** must have a class associated to it



Select the grey bar on the view controller

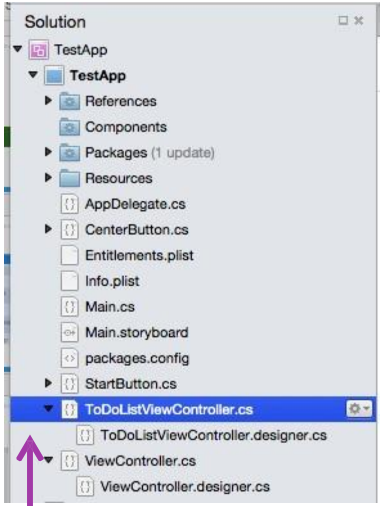


Identity

Class: ToDoListViewController
Module:
Storyboard ID:
Restoration ID:
□ Use Storyboard ID

Simulated Metrics

Assign it a class name



Solution

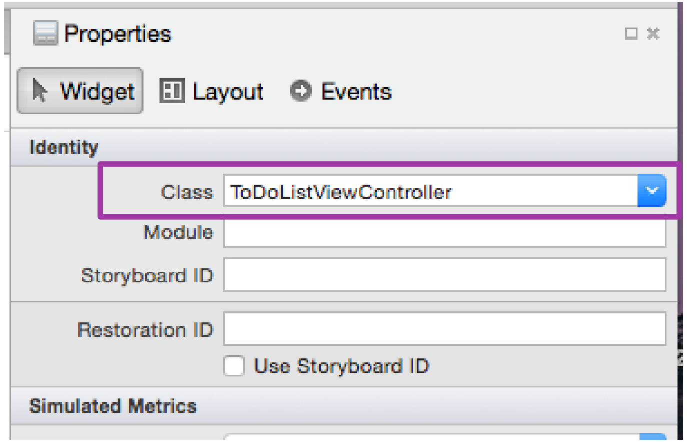
- TestApp
  - **TestApp**
    - References
    - Components
    - Packages (1 update)
    - Resources
    - AppDelegate.cs
    - CenterButton.cs
    - Entitlements.plist
    - Info.plist
    - Main.cs
    - Main.storyboard
    - packages.config
    - StartButton.cs
    - ToDoListViewController.cs
      - ToDoListViewController.designer.cs
    - ViewController.cs
      - ViewController.designer.cs

Xamarin will populate a C# file in the solution

Naming guidelines

- There are two recommended practices to follow when naming your backing class:

    1) Name should reflect what the screen *does* or *manages* this makes it easier to identify when you have multiple screens
    2) Name should end with the "**`ViewController`**" suffix to make it obvious what it is



Properties

Class ToDoListViewController

Module

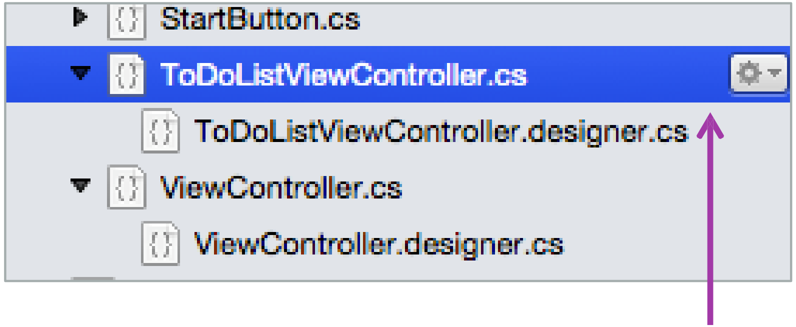
Storyboard ID

Restoration ID

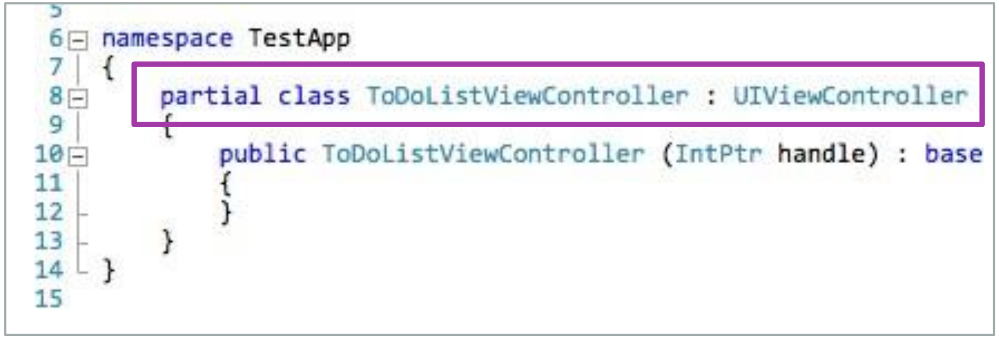
□ Use Storyboard ID

Partial classes [main file]

- When you assign a class in the designer, the class will be marked as a partial class and split into two files



StartButton.cs
ToDoListViewController.cs
ToDoListViewController.designer.cs
ViewController.cs
ViewController.designer.cs

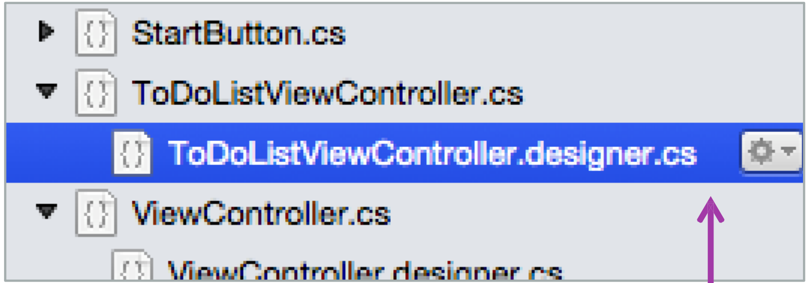


```
namespace TestApp
{
    partial class ToDoListViewController : UIViewController
    {
        public ToDoListViewController (IntPtr handle) : base
        {
        }
    }
}
```

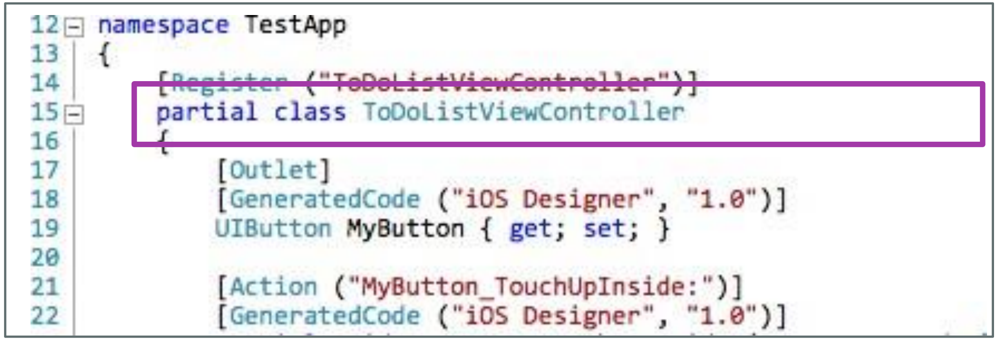
The .cs file is where you will code the behaviors for your view controller

Partial classes [designer file]

- When you assign a class in the designer, the class will be marked as a partial class and split into two files



StartButton.cs
ToDoListViewController.cs
ToDoListViewController.designer.cs
ViewController.cs
ViewController.designer.cs

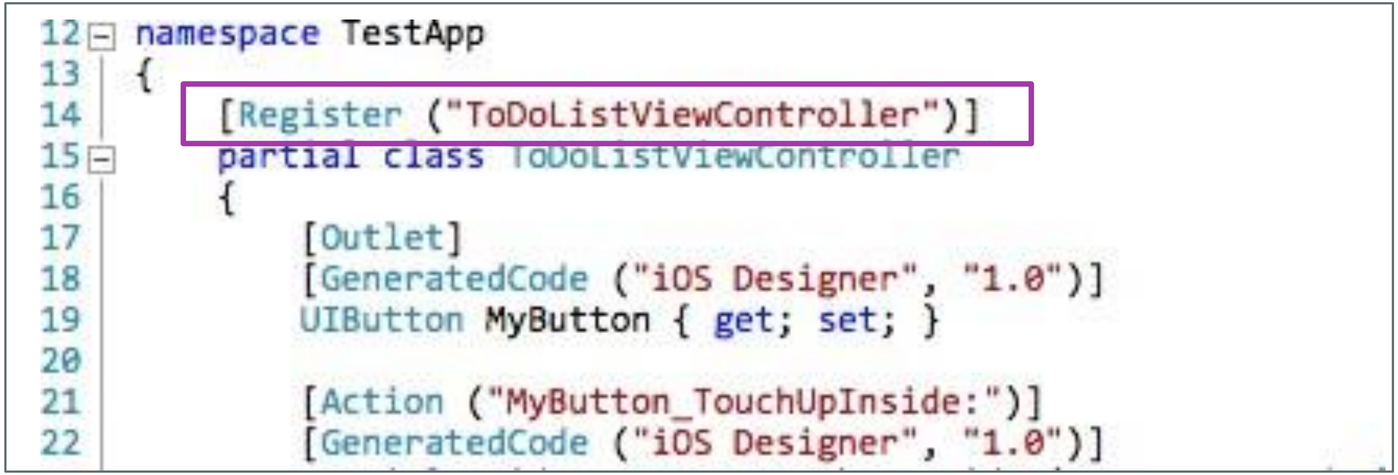


```
namespace TestApp
{
    [Register ("ToDoListViewController")]
    partial class ToDoListViewController
    {
        [Outlet]
        [GeneratedCode ("iOS Designer", "1.0")]
        UIButton MyButton { get; set; }

        [Action ("MyButton_TouchUpInside:")]
        [GeneratedCode ("iOS Designer", "1.0")]
```

The designer.cs file is a representation of the storyboard for the compiler, you should never change this file directly since it is auto-generated

Registering a class with iOS

- Classes that will be instantiated by iOS need to be *registered* with the Objective-C runtime – this is done through a `[Register]` attribute



```
namespace TestApp
{
    [Register ("ToDoListViewController")]
    partial class ToDoListViewController
    {
        [Outlet]
        [GeneratedCode ("iOS Designer", "1.0")]
        UIButton MyButton { get; set; }

        [Action ("MyButton_TouchUpInside:")]
        [GeneratedCode ("iOS Designer", "1.0")]
```

View Controller constructor

- iOS uses a custom constructor to create the View Controller

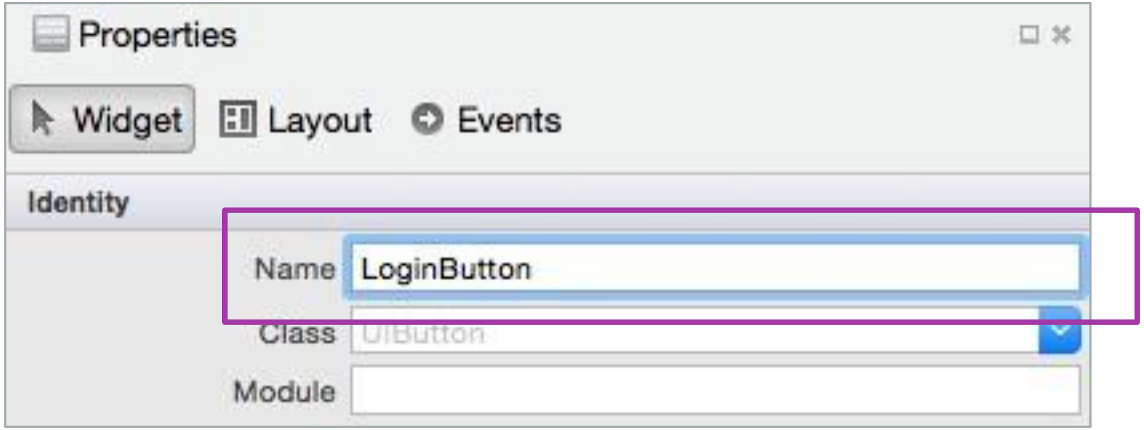
```
public partial class ViewController : UIViewController
{
    public ViewController(IntPtr handle) : base(handle)
    {
    }

    ...
}
```

Must have this constructor and chain to the base if iOS is going to instantiate this View Controller (e.g. load from a Storyboard)

Name your view

- Can name your views to make them accessible to View Controller code

Select the control in the design surface and then set the Name



Name LoginButton

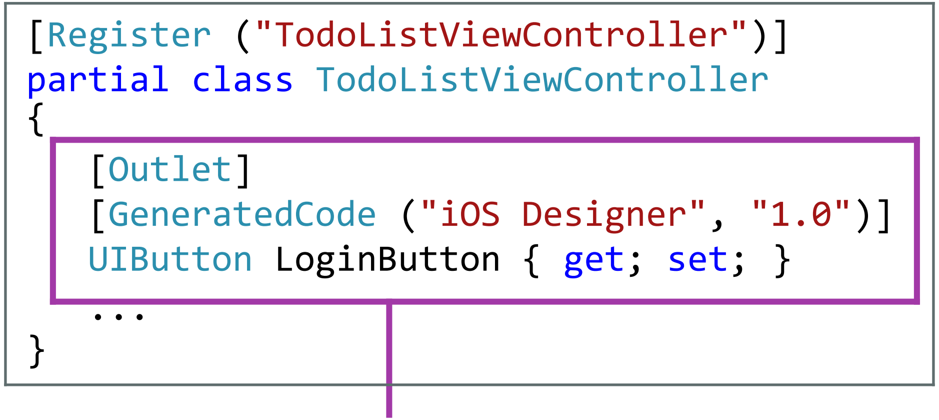
Class UIButton

Module

Hint: as with naming View Controllers, it is advisable to use a name which shows the purpose and then the type – to make it easier to identify in code

What is an Outlet?

- An outlet is a property that is tied to a control in the UI design
  - Control must be defined in the screen owned by the View Controller
  - Property is private to the View Controller class
  - Decorated with an **`[Outlet]`** attribute to register it with iOS



```
[Register ("TodoListViewController")]
partial class TodoListViewController
{
   [Outlet]
   [GeneratedCode ("iOS Designer", "1.0")]
   UIButton LoginButton { get; set; }
   ...
}
```

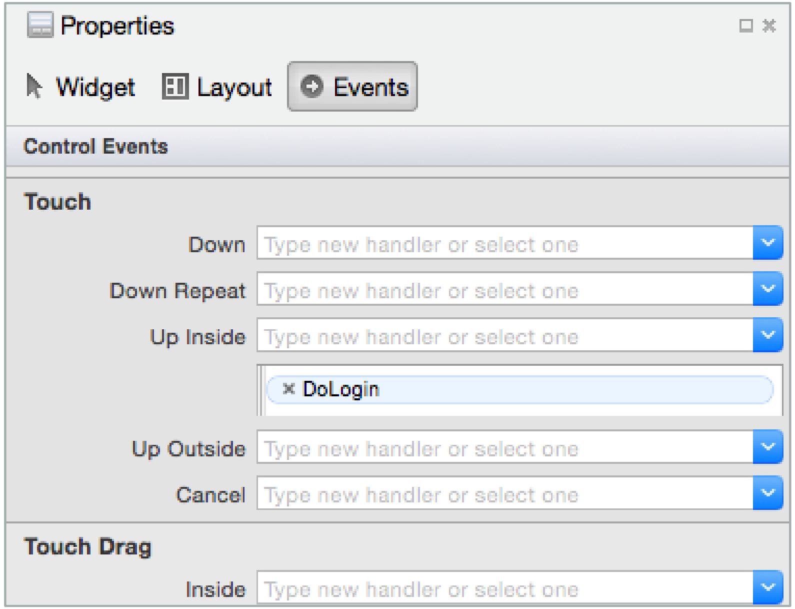
Designer adds this code to your designer.cs file when you name a control in the storyboard

What is an Action?

- ❖ Actions are methods that are called by a view in response to a runtime interaction or event

- ❖ In the Designer you can choose Events on the properties pane and associate methods to the actions the selected view raises at runtime

- ❖ Can double-click on most controls to add a handler for the "default" action



Down: Type new handler or select one

Down Repeat: Type new handler or select one

Up Inside: Type new handler or select one

× DoLogin

Up Outside: Type new handler or select one

Cancel: Type new handler or select one

Inside: Type new handler or select one

Implementing Actions

- Actions wired up in the designer are mapped to partial methods defined in the designer portion of your View Controller class and implemented in your main source file

ViewController.designer.cs

```
[Action ("DoLogin:")]
[GeneratedCode ("iOS Designer", "1.0")]
partial void DoLogin (UIButton sender);
```

```
partial void DoLogin(UIButton sender) {
   // TODO: add logic here
}
```

ViewController.cs

Individual Exercise

Code behaviors for your app

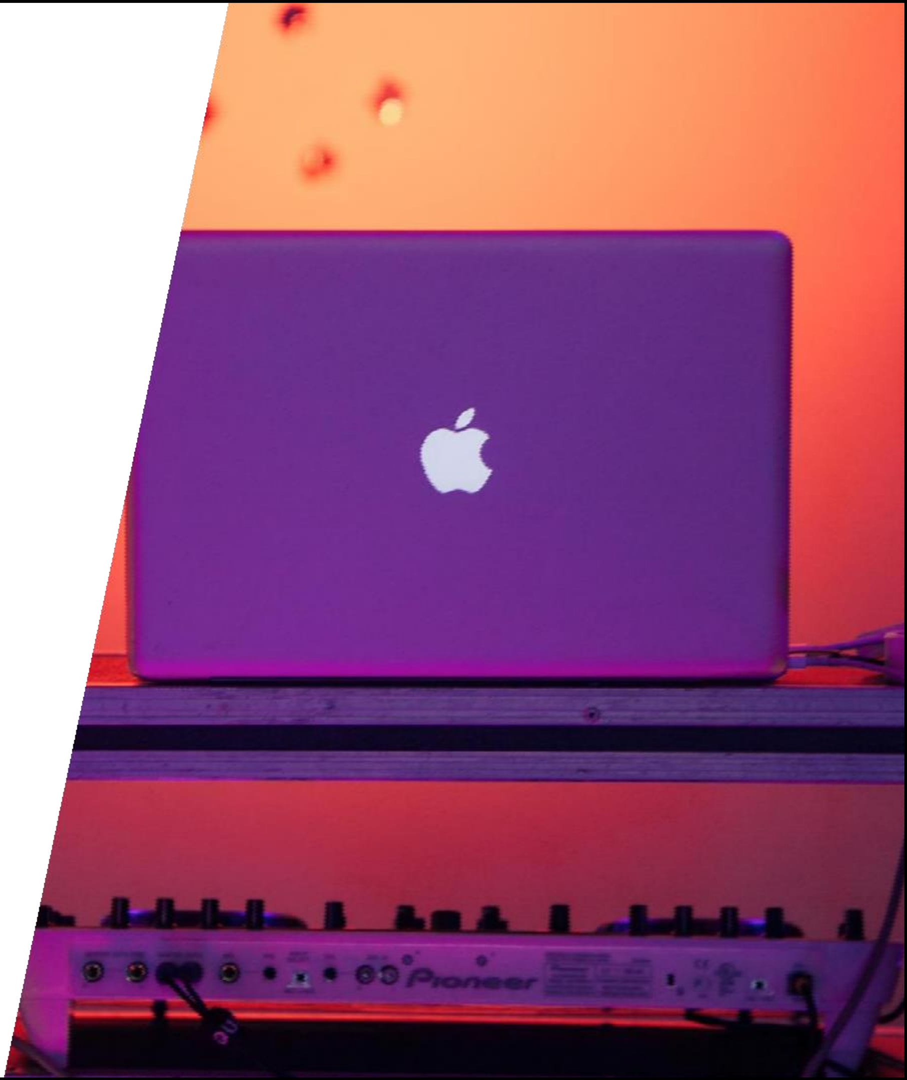
Summary

1. Associate a class for the `UIViewController`
2. Identify partial methods
3. Name views
4. Inspect outlets and actions

Apply navigation using segues

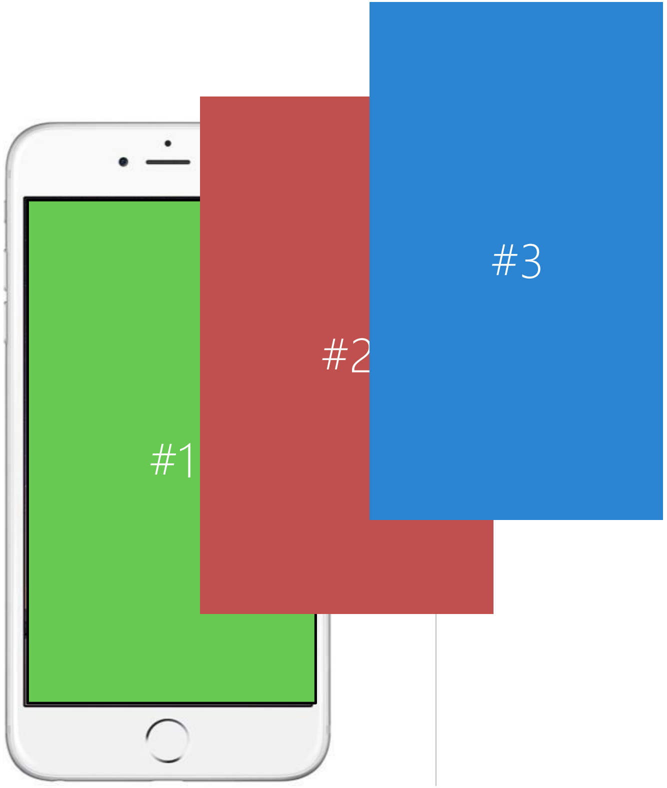
Tasks

1. Add a second `UIViewController`
2. Code a button to present a view controller
3. Code a button to dismiss a view controller
4. Utilize segues to create navigation



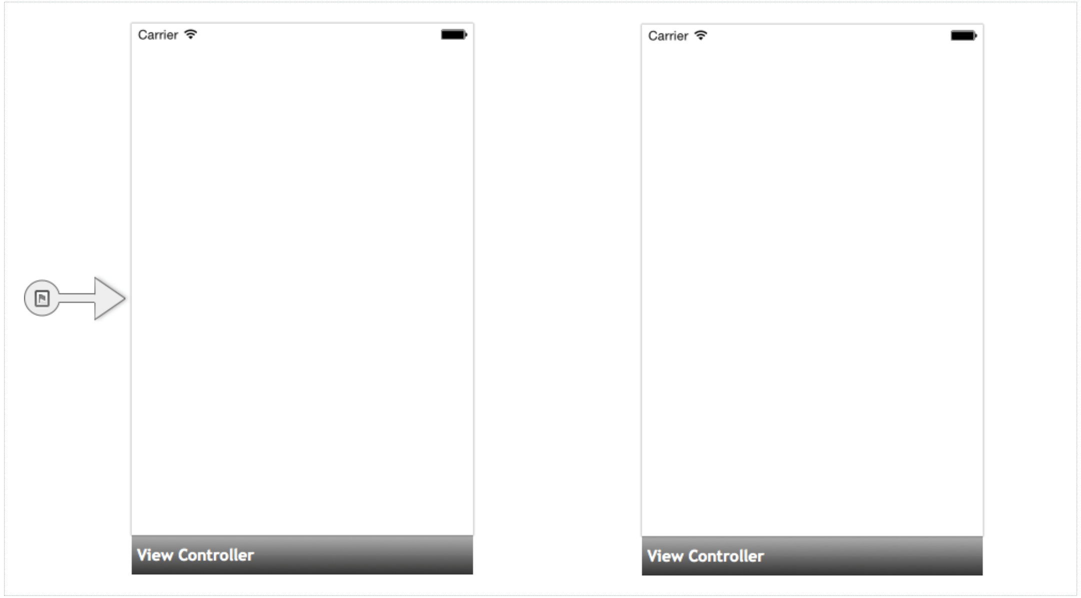
Multi-screen apps

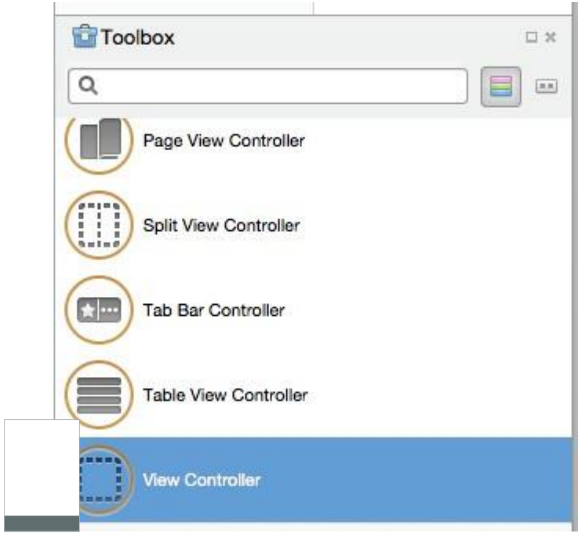
- Most applications consist of more than one screen
- Can define multiple screens in the Storyboard
- Can then display secondary screens through code, or by defining the relationships in the designer



Adding screens to the storyboard

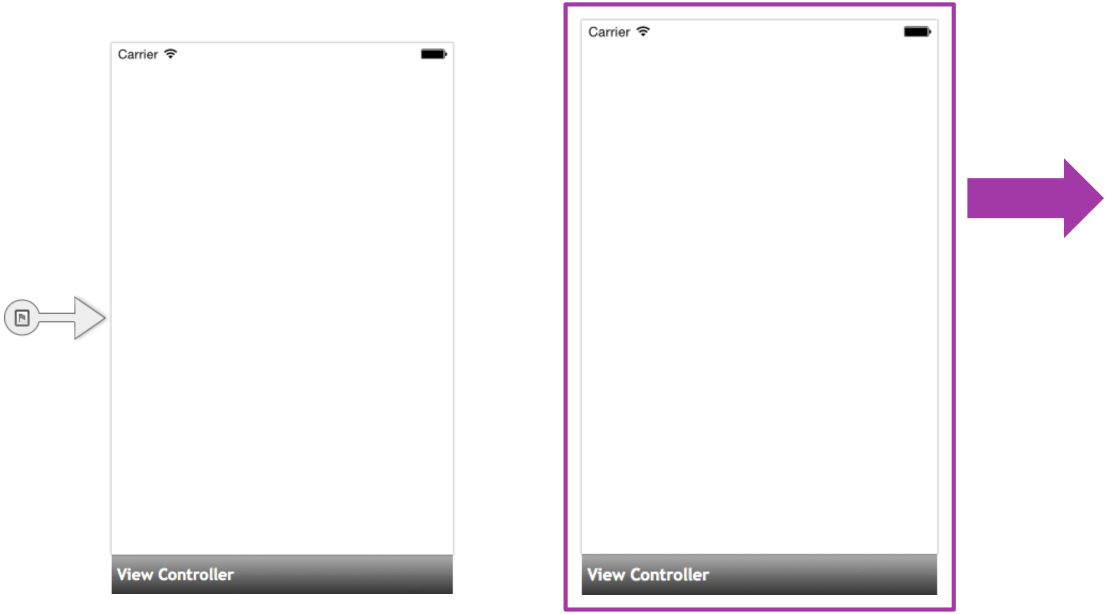
❖ You can add screens to your app by dragging a view controller onto the storyboard and then add your **`UIViews`** onto it

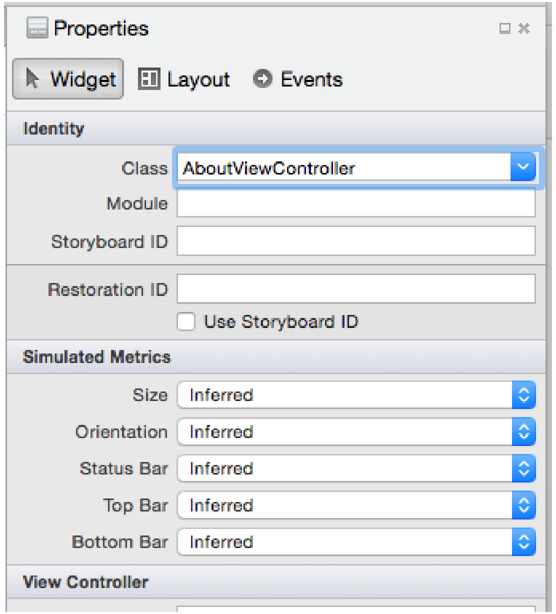




Create a class

- All new view controllers added to the storyboard should be assigned a backing class





Identity

Class: AboutViewController

Module:

Storyboard ID:

Restoration ID:

□ Use Storyboard ID

Simulated Metrics

Size: Inferred

Orientation: Inferred

Status Bar: Inferred

Top Bar: Inferred

Bottom Bar: Inferred

View Controller

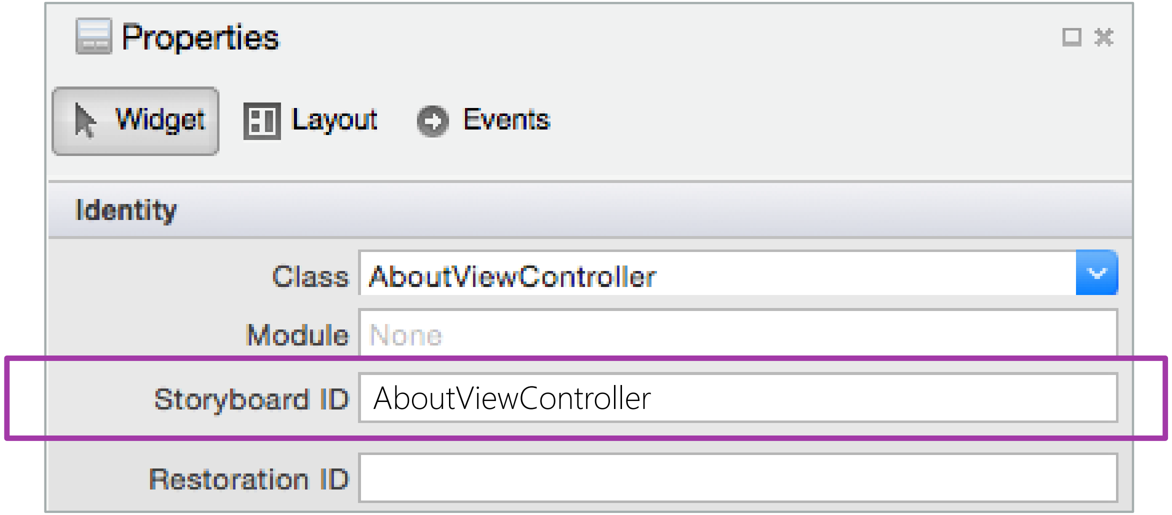
Instantiating a View Controller

- View Controllers defined in Storyboards must be created through the Storyboard APIs to get the proper views created

```
partial void ShowAboutPage(UIButton sender) {

   UIStoryboard storyboard = this.Storyboard;
   AboutViewController viewController = (AboutViewController)
     storyboard.InstantiateViewController("AboutViewController");
   ...
}
```

Naming a View Controller

❖ Must set the Storyboard Id on the View Controller to identify it to the Storyboard from code – a good practice is to give it the same name as the class that defines it in code



Identity

Class: AboutViewController

Module: None

Storyboard ID: AboutViewController

Restoration ID:

Present the view controller

- Can use the **`PresentViewController`** method to display a new View Controller in a modal fashion on top of your existing screen

```
partial void ShowAboutPage(UIButton sender)
{
   UIStoryboard storyboard = this.Storyboard;
   AboutViewController viewController = (AboutViewController)
     storyboard.InstantiateViewController("AboutViewController");

   this.PresentViewController(viewController, true, null);
}
```

Dismiss a modal view controller

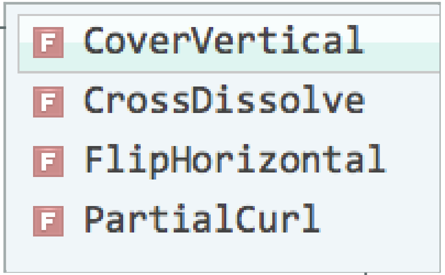
- To return to the previous View Controller, use the `DismissViewController` method in your active view controller

```
partial class AboutViewController : UIViewController
{
    ...
    partial void OnGoBack(UIButton sender)
    {
        this.DismissViewController(true, null);
    }
}
```

Changing the transition style

- Can customize the animation used to transition to the new controller through the `ModalTransitionStyle` property

```
partial void ShowAboutPage(UIButton sender)
{
   AboutViewController viewController = ...;
   viewController.ModalTransitionStyle =
          UIModalTransitionStyle.PartialCurl;

   this.PresentViewController(viewController, true, null);
}
```

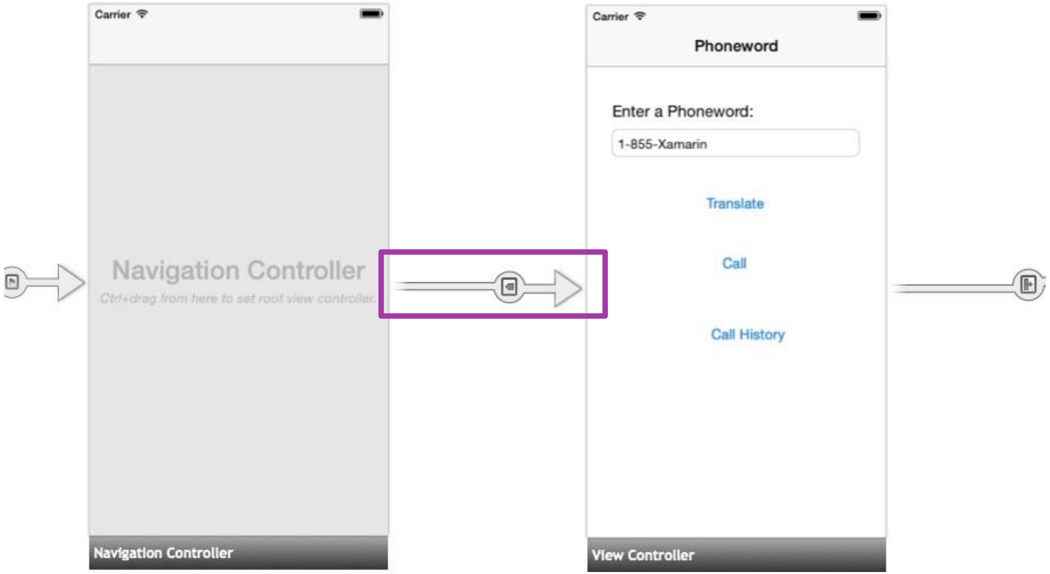


Individual Exercise

Add a second screen to your app
and code a button to navigate to it

What is a Segue?

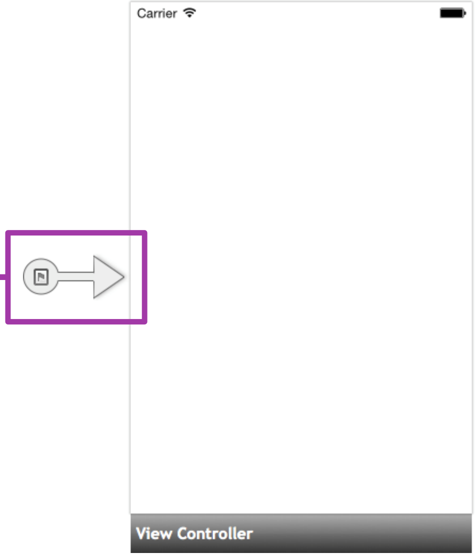
- *Segues* ("segways") define the transitions between the screens of our app in the designer

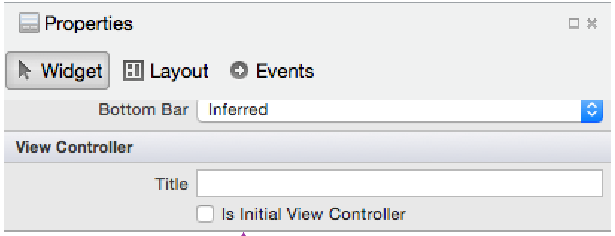


Sourceless segue

- The sourceless segue indicates the root (initial) view controller

Click+Drag to move the sourceless segue to a different screen





Bottom Bar Inferred

View Controller

Title

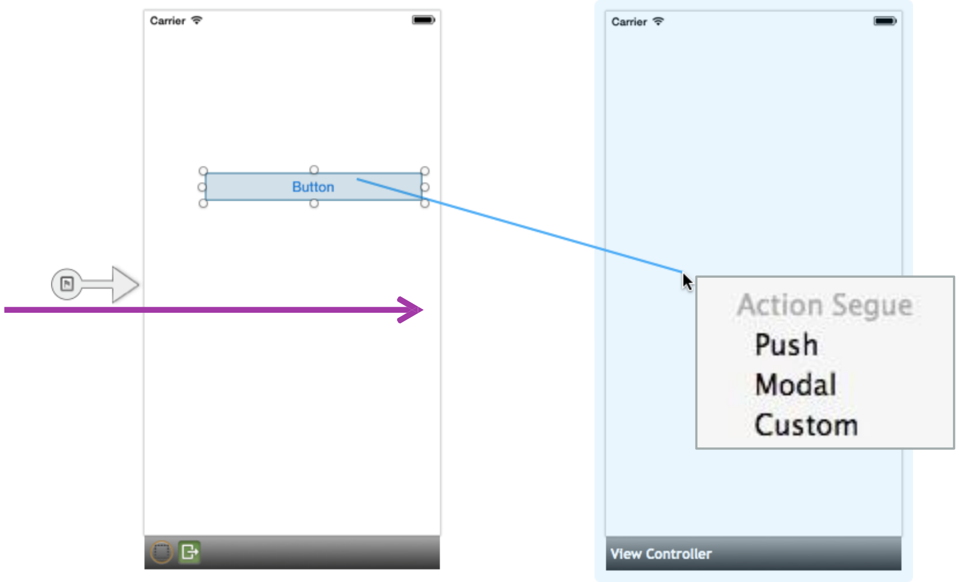
□ Is Initial View Controller

... or select the view controller and check the initial view controller checkbox

Create a segue relationship

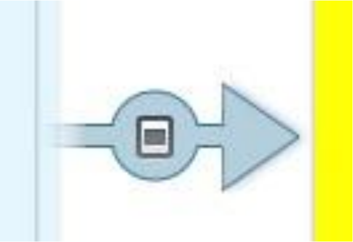
- Use **`Ctrl+Drag`** to create segues between two screens

The blue connector appears as you drag your mouse from a control to the target screen

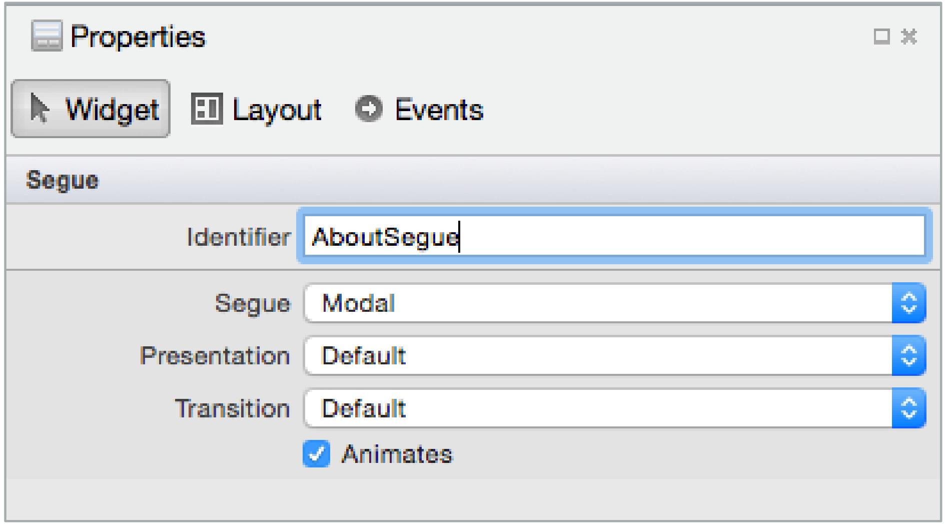


Segue properties

- Segues have properties such as an ID and transition type



Select the segue on the storyboard to view segue options



Segue

Identifier: AboutSegue

Segue: Modal

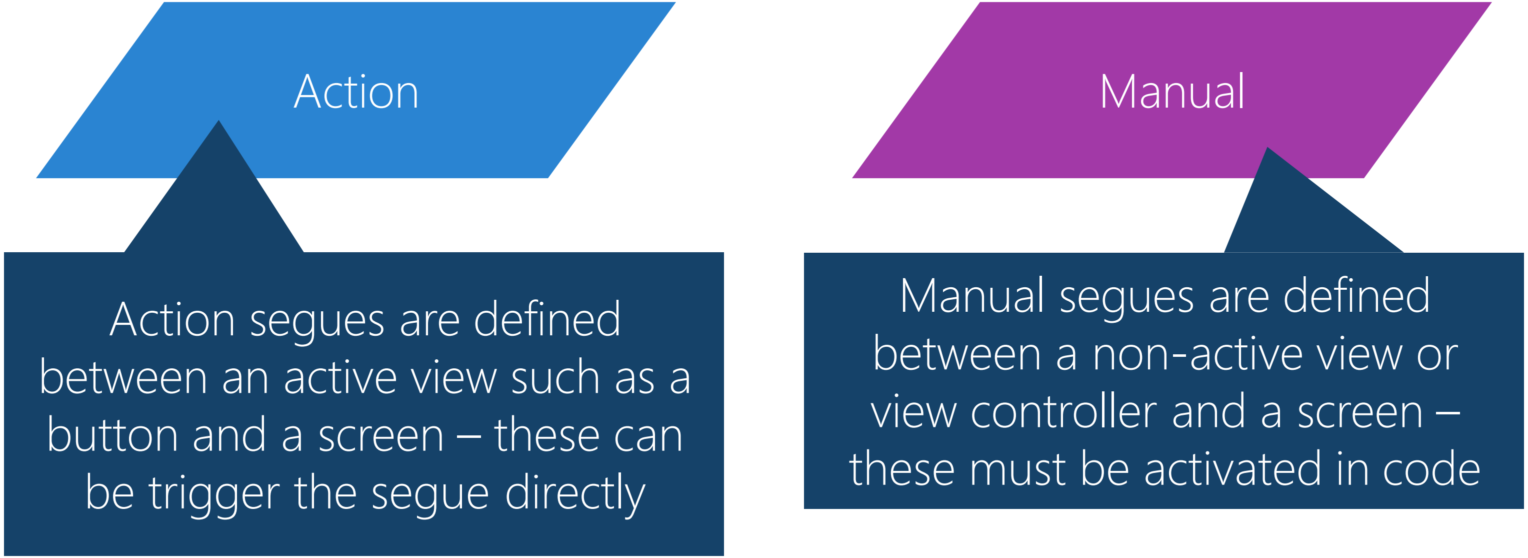
Presentation: Default

Transition: Default

☑ Animates

Relationship types

- There are two types of relationships that can be created:



Action

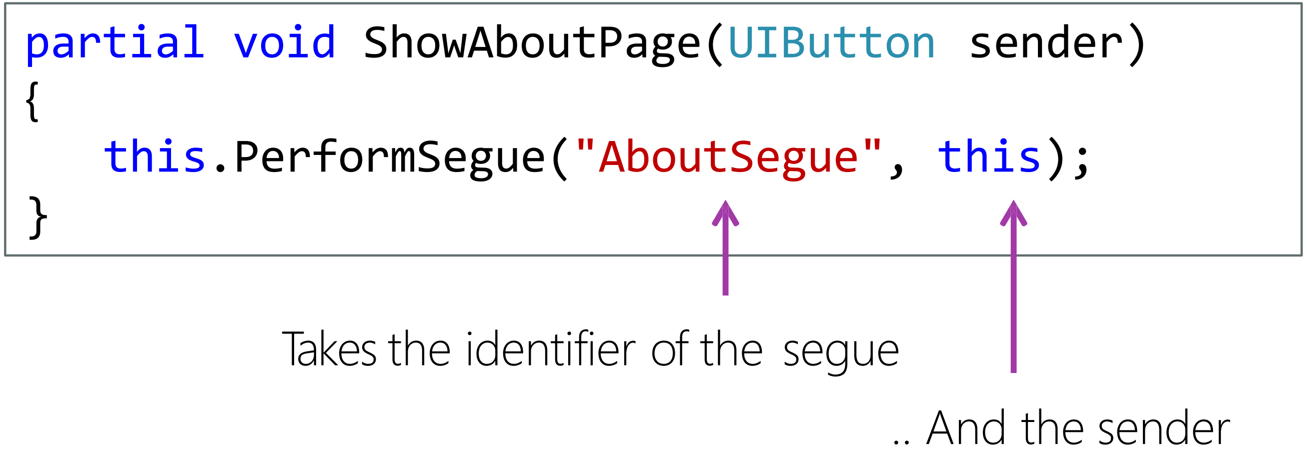
Action segues are defined between an active view such as a button and a screen – these can be trigger the segue directly

Manual

Manual segues are defined between a non-active view or view controller and a screen – these must be activated in code

Run a segue from code

- Can use **PerformSegue** in a View Controller to initiate a segue from code – this allows you to define the transition in the Storyboard, but decide when to run it based on your application logic



```
partial void ShowAboutPage(UIButton sender)
{
   this.PerformSegue("AboutSegue", this);
}
```

Takes the identifier of the segue

.. And the sender

Stopping a segue

- Sometimes you need to stop a segue from occurring due to some application state

```
public override bool ShouldPerformSegue(
          string segueIdentifier, NSObject sender)
{
    if (IsScreenDataValid()
           && segueIdentifier != "AboutSegue")
       return false; // do not run any segue except About

    return true; // allow segue
}
```

Influence a segue

- Sometimes you need to just setup the target screen with some data from the source – can use **`PrepareForSegue`** override

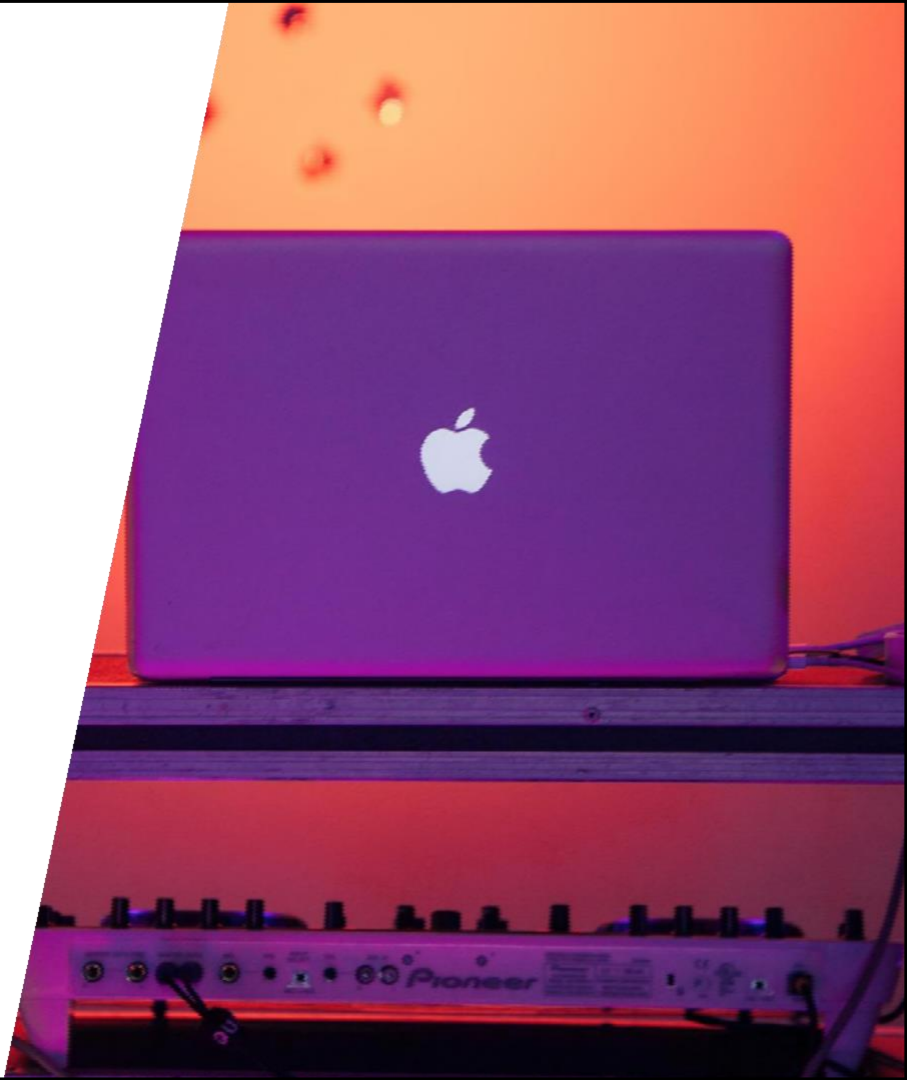
```
public override void PrepareForSegue(UIStoryboardSegue segue,
                                      NSObject sender)
{
   if (segue.Identifier == "AboutSegue") {
      var vc = segue.DestinationViewController as
                    AboutViewController;
      vc.RegisteredUserName = ...; // Some custom property
   }
}
```

Individual Exercise

Add segues to define the navigation

Summary

1. Add a second `UIViewController`
2. Code a button to present a view controller
3. Code a button to dismiss a view controller
4. Utilize segues to create navigation



Thank You!