iOS Foundations II
Session 5

- AutoLayout
- Optionals
- UITextField
- UIImageView
- UIImage

Autolayout

- A constraint-based layout system for making user interfaces:
  - `dynamic` (constraint rules are calculated and applied at runtime)
  - `adaptive` (general rules for all sizes plus optional per-size rules)
  - `responsive` (changes in orientation or constraints)

Autolayout

- AutoLayout needs to know 2 things about every view in your interface:
    1. Size - How big the view is going to be
    2. Location - Where the object is going to be located in its super view
- You accomplish this using constraints.

Constraints

- Constraints are the fundamental building block of autolayout.
- Constraints contain rules for the layout of your interface's elements.
- You could give a 50 point height constraint to an imageView, which constrains that view to always have a 50 point height. Or you give it a constraint to always be 20 points from the bottom of its superview.
- Constraints can work together, but sometimes they conflict with other constraints.
- At runtime Autolayout considers all constraints, and then calculates the positions and sizes that bests satisfies all the constraints.

Attributes

- When you attach constraints to a view, you attach them using attributes.
- The attributes are: **left/leading, right/trailing, top, bottom, width, height, centerX, centerY.**
- So if you attach a constraint of 50 points from a button's left attribute to its container's left attribute, thats saying "I want this button to be 50 points over from its super view's left side"

Constraints + Attributes = Math time

- “You can think of a constraint as a mathematical representation of a human-expressable statement”
- So if you say “the left edge should be 20 points from the left edge of its containing view”
- This translates to button.left = container.left x 1.0 + 20
- which is in the form of y = mx+b
- first attribute = second attribute * multiplier + constant
- In the case of an absolute value, like pinning height, width, centerX, or centerY, the second attribute is nil.
- You can change the constants in code as an easy way to programmatically adjust your interface.

Storyboard and Autolayout

- Storyboard makes setting up autolayout pretty intuitive and painless, and even though you can setup autolayout completely in code, Apple strongly recommends doing it in storyboard.
- Xcode will let you build your app even if you have constraints that are conflicting and incorrect, but Apple says you should never ship an app like that.
- When you drag a object onto your interface, it starts out with no constraints.

Intrinsic Content Size

- Intrinsic content size is the minimum size a view needs to display its content.
- Its available for certain UIView subclasses:
  - UIButton & UILabel: these views are as large as they need to display their full text
  - UIImageView: image views have a size big enough to display their entire image. This can change with its content mode.
- You will know a view has an intrinsic content size if autolayout doesn't require its size to be described with constraints.

Demo

Optionals

- You use optionals in situations where a value may be absent.
- An optional says:
  - There is a value and it equals x

    OR

  - There isn’t a value at all.
- The concept of optionals does not exist in Objective-C or even C!

Swift is strict!

- Swift does not allow you to leave properties in an undetermined state.
- They must be:
  - given a default value

    OR
  - a value set in the initializer

    OR
  - or marked as optional

Marking an Optional

- A question mark at the end of a type indicates that the value it contains is optional, meaning it might contain a value or it might be empty:

```
class Person {

    var firstName : String?
```

Accessing a value inside an optional

To access the value inside of an optional variable, you must force unwrap it with the exclamation mark:

```
// return the first and last names in a string
func returnFullName() -> String {
    return "\(self.firstName!) \(self.lastName)"
}
```

You can also use a question mark to use whats called optional chaining. Optional chaining is a process for querying and calling properties,methods, and subscripts on an optional that might currently be nil.

Implicitly Unwrapped

Instead of marking an optional with a ?, using an exclamation point ! will mark it as implicit unwrapped:

```
class Person {

    var firstName : String!
```

This makes it so you don't have to unwrap this optional to access its value.
So basically you are saying “I’m making this an optional, but this thing will always have a value when I need to access it”

Demo

UITextField

- “A `UITextField` object is a control that displays editable text and sends an action message to a target object when the user presses the return button.”
- A text field can have a delegate to handle editing related notifications.
- When a user taps into a text field, the text field becomes the first responder and it brings the keyboard on screen.
- You are responsible for making sure the text field you are editing is not covered by the keyboard.
- **A UITextField is a subclass of UIView, so it is put on screen the same as a UIView**

UITextField Keyboard Dismissal

- By default the textfield does not dismiss the keyboard once the user hits return.
- The delegate of the textfield can be notified when the user hits return by implementing this method:
  - textFieldShouldReturn(textField : UITextField)
- In the implementation of this method, call resignFirstResponder() on the textfield passed in
- Demo.

UIImage

- High-level way to display an image.
- UIImage's are immutable, you cannot change them after creation. Which means they are thread safe.
- So the only way to edit a UIImage is to make a copy of it.
- Since they are immutable, you are not allowed to access their underlying binary image data.
- Use the UIImagePNGRepresentation or UIImageJPEGRepresenation functions to get an NSData from a UIImage.

UIImage Supported Formats

Format	Filename extensions
Tagged Image File Format (TIFF)	`.tiff`, `.tif`
Joint Photographic Experts Group (JPEG)	`.jpg`, `.jpeg`
Graphic Interchange Format (GIF)	`.gif`
Portable Network Graphic (PNG)	`.png`
Windows Bitmap Format (DIB)	`.bmp`, `.BMPf`
Windows Icon Format	`.ico`
Windows Cursor	`.cur`
X Window System bitmap	`.xbm`

UIImage Methods

- class func imageNamed(String) -> UIImage
- Returns an image object associated with a specified file name.
- Uses caching. If the image isn't in the cache, it then loads the image from the main bundle, caches it, and then returns the image.
- Since iOS 4, it is not no longer necessary to put .png into your string if its a png file. Still need .jpeg though!
- If you know this image is only going to be used once, and don't need the caching, use the method imageWithContentsOfFile which doesn't cache. Saves memory.

UIImage Methods

- class func imageWithData(NSData) ->UIImage
- The data passed in can be from a file or data you created.
- returns nil if it could not initialize the image from the specified data.
- no caching.

UIImageView

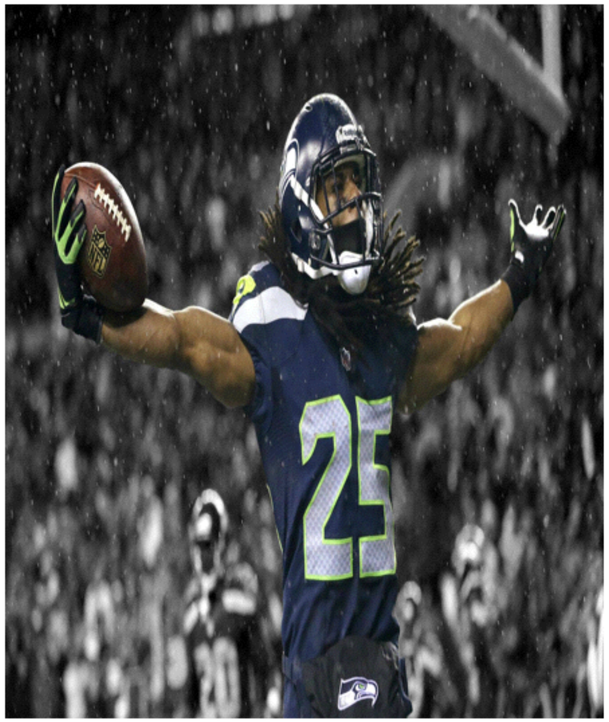
- View based container for displaying images(s)
- The image displayed is sized, scaled to fit, or positioned in the image view based on the imageView’s contentMode.
- Apple recommends images displayed using the same imageView be the same size.

UIImageView Content Mode

```
typedef enum {
   UIViewContentModeScaleToFill,
   UIViewContentModeScaleAspectFit,
   UIViewContentModeScaleAspectFill,
   UIViewContentModeRedraw,
   UIViewContentModeCenter,
   UIViewContentModeTop,
   UIViewContentModeBottom,
   UIViewContentModeLeft,
   UIViewContentModeRight,
   UIViewContentModeTopLeft,
   UIViewContentModeTopRight,
   UIViewContentModeBottomLeft,
   UIViewContentModeBottomRight,
} UIViewContentMode;
```

- ScaleToFill: scale content to fit the size of itself by changing the aspect ratio if necessary
- ScaleAspectFit: scale content to fit the size of the view by maintaining aspect ratios. Any remaining area of the view's bounds is transparent.
- ScaleAspectFill:scale content to fill the size of the view. Some content maybe be clipped to fill the view's bounds.

UIImageView Content Mode



ScaleToFill:

AspectFit:

AspectFill

UIImageView Optimization

- Pre-scale your images: if the imageView you using is very small, generate thumbnails of your images in a cache vs scaling large images to fit the small view.
- Disable alpha blending: Unless you are intentionally working transparency, you should mark your imageView's as Opaque.

UIImageView Animation

- Workflow for getting an image based animation:
    1. Create an array of the animation frame images
    2. set your imageView's .animationImages to the array
    3. set your imageView's animationDuration
    4. call startAnimating on your imageView

Camera Programming

- 2 ways for interfacing with the camera in your app:
    1. UIImagePickerController (basic)
    2. AVFoundation Framework (advanced)
- We are going to use UIImagePickerController for our roster app.
- UIImagePickerController is just a view controller that you configure, and then present.
- It has built in functionality for letting a user choose a photo by using the camera or letting them select a photo from their photo library.

UIImagePickerController

- The workflow of using UIImagePickerController is 3 steps:
    1. Instantiate and modally present the UIImagePickerController
    2. ImagePicker manages the user's interaction with the camera or photo library
    3. The system invokes your image picker controller delegate methods to handle the user being done with the picker.

UIImagePickerController Setup

- The first thing you have to account for is checking if the device has a camera.
- If your app absolutely relies on a camera, add a UIRequiredDeviceCapabilities key in your info.plist
- Use the isSourceTypeAvailable class method on UIImagePickerController to check if camera is available.

UIImagePickerController Setup

- Next make sure something is setup to be the delegate of the picker. This is usually the view controller that is spawning the picker.
- The final step is to actually create the UIImagePicker with a sourceType of UIImagePickerControllerSourceTypeCamera.
- Media Types: Used to specify if the camera should be locked to photos, videos, or both.
- AllowsEditing property to set if the user is able to modify the photo in the picker after taking the photo.

UIImagePickerControllerDelegate

- The Delegate methods control what happens after the user is done using the picker. 2 big methods:
  1. imagePickerControllerDidCancel:
  2. imagePickerController:didFinishPickingMediaWithInfo: