View Frame and Bounds

Core Graphics Fundamental Structures

- `CGPoint`: a structure that contains a point in a two-dimensional coordinate system.

  Ex. `let pt = CGPoint(x:3, y:-5)`

- `CGSize`: a structure that contains width and height values.

  Ex.
  ```
  let mySize = CGSize(width:10,
                      height:5)
  ```

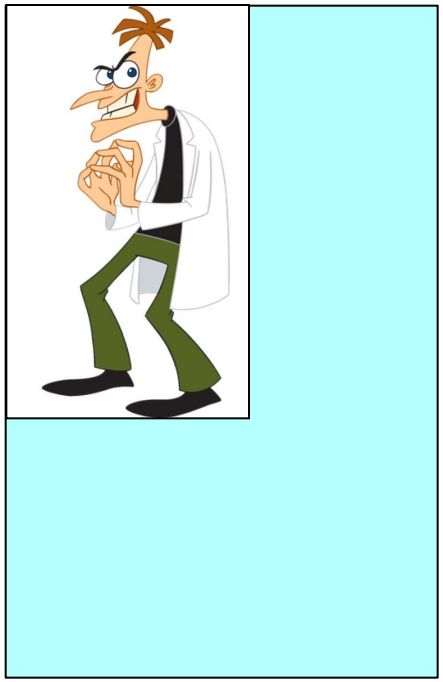
- `CGRect`: a structure that contains the location and dimensions of a rectangle.

  Ex.
  ```
  let rect = CGRect(x: 3, y: 5,
                    width: 10, height: 5)
  ```
  or
  ```
  let rect = CGRect(origin:pt,
                    size:mySize)
  ```

Frame and Bounds

- *Frame* and *Bounds* are fundamental concepts for all of the elements in the UI.
- Each view has both a frame and a bounds structure. The structure is a CGRect and consists of 4 floats.
  - The **frame** of an UIView is the rectangle, expressed as a location (x,y) and size (width,height) **relative to the superview it is contained within**.
  - The **bounds** of an UIView is the rectangle, expressed as a location (x,y) and size (width,height) **relative to its own coordinate system** (0,0).

Frame and Bounds



Frame
origin = (0,0)
width = 219
height = 300

Bounds
origin = (0,0)
width = 219
height = 300

Frame and Bounds

Frame
origin = (71,50)
width = 219
height = 300

Bounds
origin = (0,0)
width = 219
height = 300

Scroll Views

Scroll Views

- Scroll Views provide a way to present content larger than a single screen.
  - Critical for phones since they have limited screen real estate
  - Also helpful for iPads
- Scroll Views provide a way for moving within the content to view various parts of it.

To implement scrolling:

- Create a `UIScrollView` and define its properties
- Make the `UIScrollView` a subview of the VC's view
- Make the view you want scrollable a subview of the `UIScrollView`.

Gesture Recognizers

Events

There are 4 general types of UI events in iOS:

- **Touch** events: the most common
- **Motion** events
- **Remote-control** events: allow a responder object to receive commands from an external accessory or headset (usually to manage audio and video)
- **Press** events: represent interactions with a game controller, AppleTV remote, or other device that has physical buttons

Gestures

Gestures refer to touches and touch events.

- Central to the modern smart phone experience
- A core built-in capability in iOS

A *touch* is an instance of the user putting a finger on the screen.

The OS and the hardware work together to know when a finger touches the screen, where it is, when it moves, and when it is no longer touching the screen.

Its location at any point in time is reduced to a single appropriate point.

Gestures (cont.)

Why are they important?

- They allow us to interact more naturally and intuitively with the application
- It is a *significant* paradigm shift to how humans interact with computers: analogous to what happened when people were first provided GUIs to interact with computers

Gesture Recognizers

Gesture recognizers are high-level mechanisms provided by iOS that takes care of the nitty-gritty of touch events, and makes it very easy to respond to a set of common touch events/sequences.

- They handle touches and movements of one or more fingers that happen on a specific area of the screen
- They are objects derived from the abstract *UIGestureRecognizer* class that are related to a view, and monitor for a predefined gesture made on that view
- There are some predefined subclasses which deal with specific (common) kinds of gestures
- They all perform an action once a valid gesture is detected.

Without gesture recognizers, you would be writing pages of code to handle what takes only a few lines of code *with* gesture recognizers.

Gesture Recognizers

You can set up gesture recognizers in IB or in code.

- A view can contain more than one gesture recognizer
- They are contained in a UIView property (an array) named gestureRecognizers

However, just one gesture can occur at any given point in time.

There are two types of gesture recognizers:

- Discrete: manage a single event; for example, touch to select an object
- Continuous: manage a series of events; for example, dragging an object on the screen

Gesture Recognizers

Predefined gesture recognizer classes:

- `UI`**`Tap`**`GestureRecognizer` (discrete)
- `UI`**`Swipe`**`GestureRecognizer` (discrete)
- `UI`**`Pan`**`GestureRecognizer` (continuous)
- `UI`**`Pinch`**`GestureRecognizer` (continuous)
- `UI`**`Rotation`**`GestureRecognizer` (continuous)
- `UI`**`LongPress`**`GestureRecognizer` (continuous)
- `UI`**`ScreenEdgePan`**`GestureRecognizer` (continuous)

Setting Up a Gesture Recognizer Using IB

- In IB, identify the object that you want to manipulate on the storyboard. Drag a Gesture Recognizer object **on top of the target object.**
- In the Swift file, write a function to handle the gesture.
- In IB, ctrl-drag the Gesture Recognizer object to the View Controller. Choose the name of the function you wrote.
- Click on the target object and go to the Attribute Inspector. Make sure "User Interface Enabled" is clicked on.

Setting Up a Gesture Recognizer Programmatically

- Create a Gesture Recognizer using one of the functions listed on the previous chart.

```
let tapRecognizer =
    UITapGestureRecognizer(target: self, action:
    #selector(handleTap(recognizer:)))
```

- Set up any properties for the Gesture Recognizer that you may want.
- Associate the Gesture Recognizer with the target object.

```
targetObject.addTapRecognizer(tapRecognizer)
```

- In the Swift file, write a function to handle the gesture.

```
@IBAction func handleTap(recognizer:
    UITapGestureRecognizer) {
        <code>
    }
```

Camera

Camera

Starting with the iOS 8 SDK, you can get access to the camera device, camera roll and photo library through the `UIImagePickerController` class.

This allows photos and videos to be taken from within an application and for existing photos and videos to be presented to the user for selection.

The `UIImagePickerController` is a view controller *that gets presented modally* (meaning as a popover). When we select or cancel the picker, it runs the delegate, where we handle the case and dismiss the modal.

`UIImagePickerController`

The ultimate purpose of the `UIImagePickerController` class is to provide applications with either a photo or video. It achieves this by providing the user with access to the camera, camera roll or photo library on the device.

In the case of the camera, the user is able to either take a photo or record a video depending on the capabilities of the device and the application's configuration of the `UIImagePickerController` object.

Attributes of an `UIImagePickerController`

- `sourceType : UIImagePickerControllerSourceType`
  One of
  - `.camera`
  - `.photoLibrary`
  - `.savedPhotosAlbum`
- `mediaTypes` : array of strings
  - `kUTTypeImage` (image)
  - `kUTTypeMovie` (video)
- `allowsEditing` : Boolean
  allow changes before the image is passed back to the application

Creating and configuring a `UIImagePickerController`

- Optionally, check to make sure you have access to the camera / camera roll / photo library using the `isSourceTypeAvailable(_:)` class method
- Optionally, check to make sure the media type you want to use is available by using the `availableMediaTypes(for:)` class method
- Create an instance of `UIImagePickerController` and set up its parameters.
- Identify a `UIImagePickerControllerDelegate`.
- Present the image picker using `present()`.

Example code for `UIImagePickerController`

```
// create instance
let imagePicker = UIImagePickerController()

// identify delegate
imagePicker.delegate = self

// set up properties
imagePicker.sourceType =
    UIImagePickerControllerSourceType.photoLibrary
imagePicker.allowsEditing = false

// present the instance
present(imagePicker, animated:true, completion: nil)
```

`UIImagePickerController` delegate methods

As part of the `UIImagePickerController` delegate, you need to implement these protocol methods:

```
// Indicate that the user selected a photo/video
func imagePickerController(
      (UIImagePickerController,
      didFinishPickingMediaWithInfo:
      [String:Any] )

// Indicate that the user cancelled the pick
func imagePickerControllerDidCancel
       (UIImagePickerController)
```