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.
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.
UIResponder Objects

UIResponder objects constitute the event-handling backbone of a UIKit app. As events occur, UIKit dispatches them to your app's responder objects for handling.

Key objects which are also responders include:
- UIApplication
- UIViewController
- All UIView objects (including UIWindow)
To handle a specific type of event, a `UIResponder` object must override the corresponding methods. For example, to handle touch events, a responder might have to implement a method such as:

```
touchesBegan(_:with:) - tells the responder that one or more new touches occurred in a view or window
```

or

```
touchesEnded(_:with:) – tells the responder when one or more fingers are raised from a view or window
```

The responder would then use the event information provided by UIKit to track changes to those touches and to update the app's interface appropriately.
A `UIView`, **by virtue of being a `UIResponder`, is the central focus of touches.**

It would make sense, then, if every touch were reported directly to the view in which it occurred; but this isn’t the case since the OS doesn’t see views, but only the entire app.

As such, a touch is represented as a `UITouch` object, which is bundled inside a `UIEvent` object - i.e. the **touch event**. The `UIEvent` object is then delivered to your application.

From a programmer’s perspective, this means you respond to `UIEvent` objects, **not `UITouch` objects.**
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 `UILongPressGestureRecognizer` 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.
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.
Predefined gesture recognizer classes:

- `UITapGestureRecognizer` (discrete)
- `UISwipeGestureRecognizer` (discrete)
- `UIPanGestureRecognizer` (continuous)
- `UIPinchGestureRecognizer` (continuous)
- `UIRotationGestureRecognizer` (continuous)
- `UILongPressGestureRecognizer` (continuous)
- `UIScreenEdgePanGestureRecognizer` (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.
  
  ```swift
  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.
  ```swift
  targetObject.addTapRecognizer(tapRecognizer)
  ```

- In the Swift file, write a function to handle the gesture.
  ```swift
  @IBAction func handleTap(recognizer: UITapGestureRecognizer) {
  ...
  }
  ```