Homework 1 - PhraseThrow

In this assignment, you will be reimplementing the PhraseThrow demo from class. Remember that PhraseThrow is a very simple version of the popular party game Catch Phrase. This is the only homework assignment that will provide a step-by-side tutorial on how to complete it. This assignemnt should take you no longer than an hour to complete, and will be **due on Monday, January 19 at 11:59pm**.

Hand-In

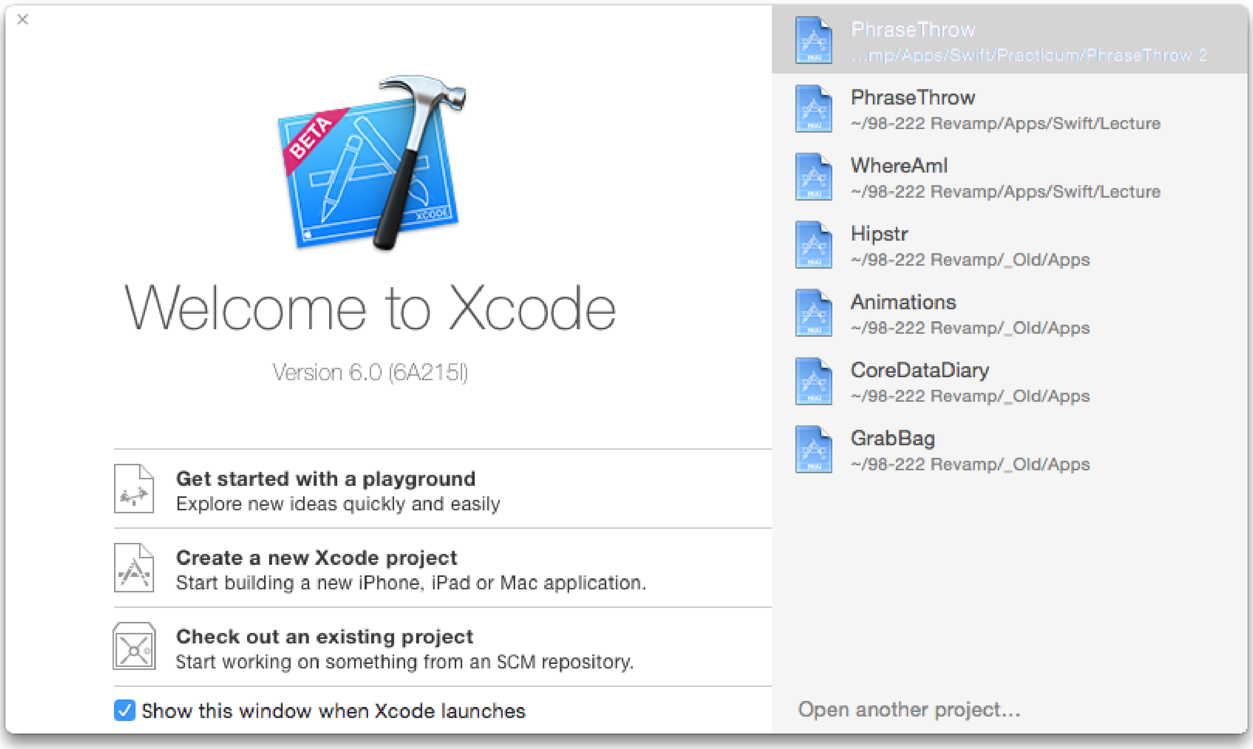
Coming soon.

Requirements

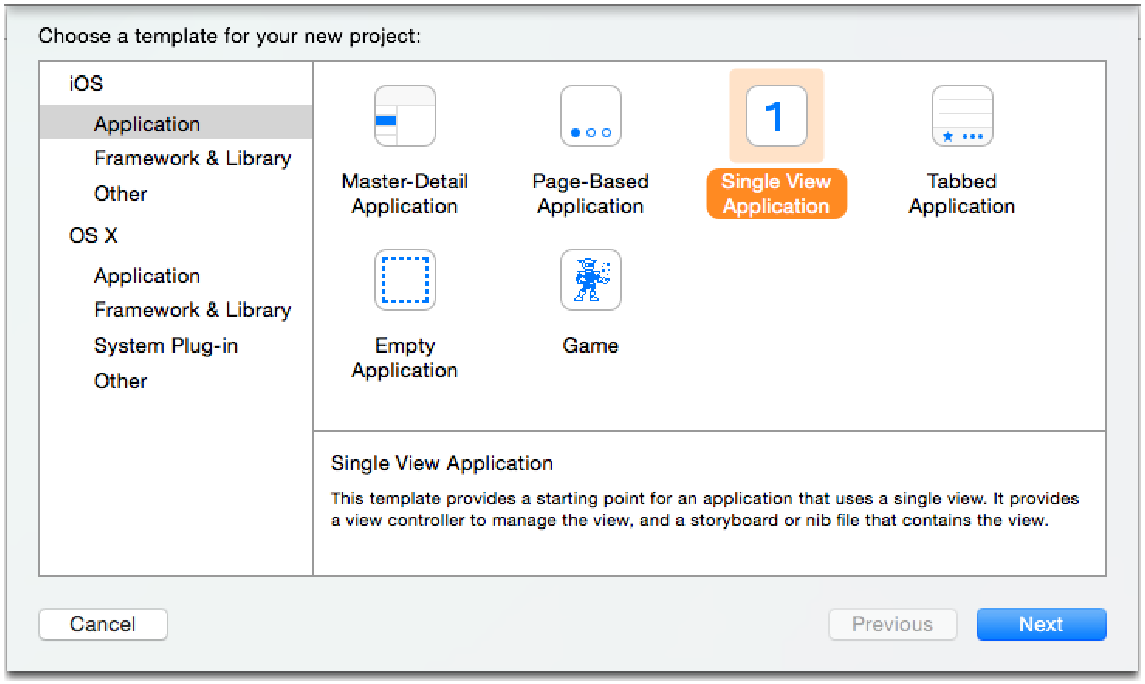
You will need a list of nouns! You can download that list here: nounlist.txt. You'll probably want to right click and select **Save Link As../...** and then drag it into your Xcode project.

The PhraseThrow demo

Open up Xcode. You'll be greeted with this window:


Welcome to Xcode
Version 6.0 (6A215l)
Get started with a playground
Explore new ideas quickly and easily
Create a new Xcode project
Start building a new iPhone, iPad or Mac application.
Check out an existing project
Start working on something from an SCM repository.
Show this window when Xcode launches
PhraseThrow
...mp/Apps/Swift/Practicum/PhraseThrow 2
PhraseThrow
~/98-222 Revamp/Apps/Swift/Lecture
WhereAmI
~/98-222 Revamp/Apps/Swift/Lecture
Hipstr
~/98-222 Revamp/_Old/Apps
Animations
~/98-222 Revamp/_Old/Apps
CoreDataDiary
~/98-222 Revamp/_Old/Apps
GrabBag
~/98-222 Revamp/_Old/Apps
Open another project...

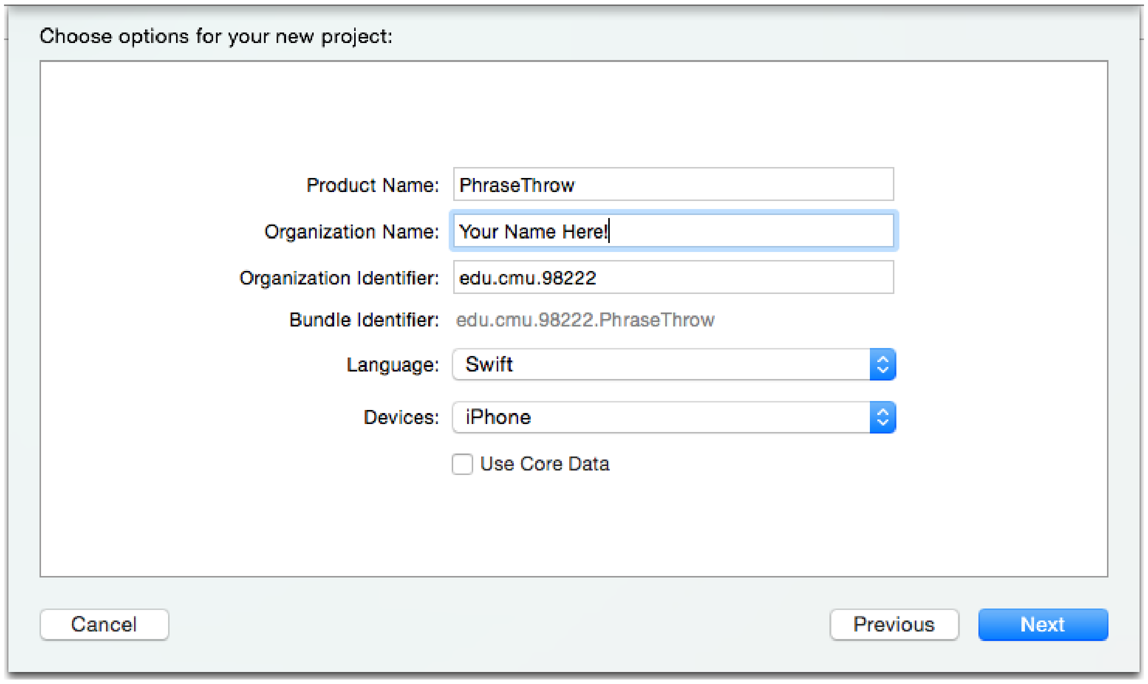
We'll be starting from scratch today, so select **Create a new Xcode project**. You'll be greeted with the Xcode editor window, and a little pop up asking you to choose a template for your new project. On the left hand side bar, you should select **iOS > Application** (since that's what we're making) and then choose **Single View Application**, like so:



Single View Application

This template provides a starting point for an application that uses a single view. It provides a view controller to manage the view, and a storyboard or nib file that contains the view.

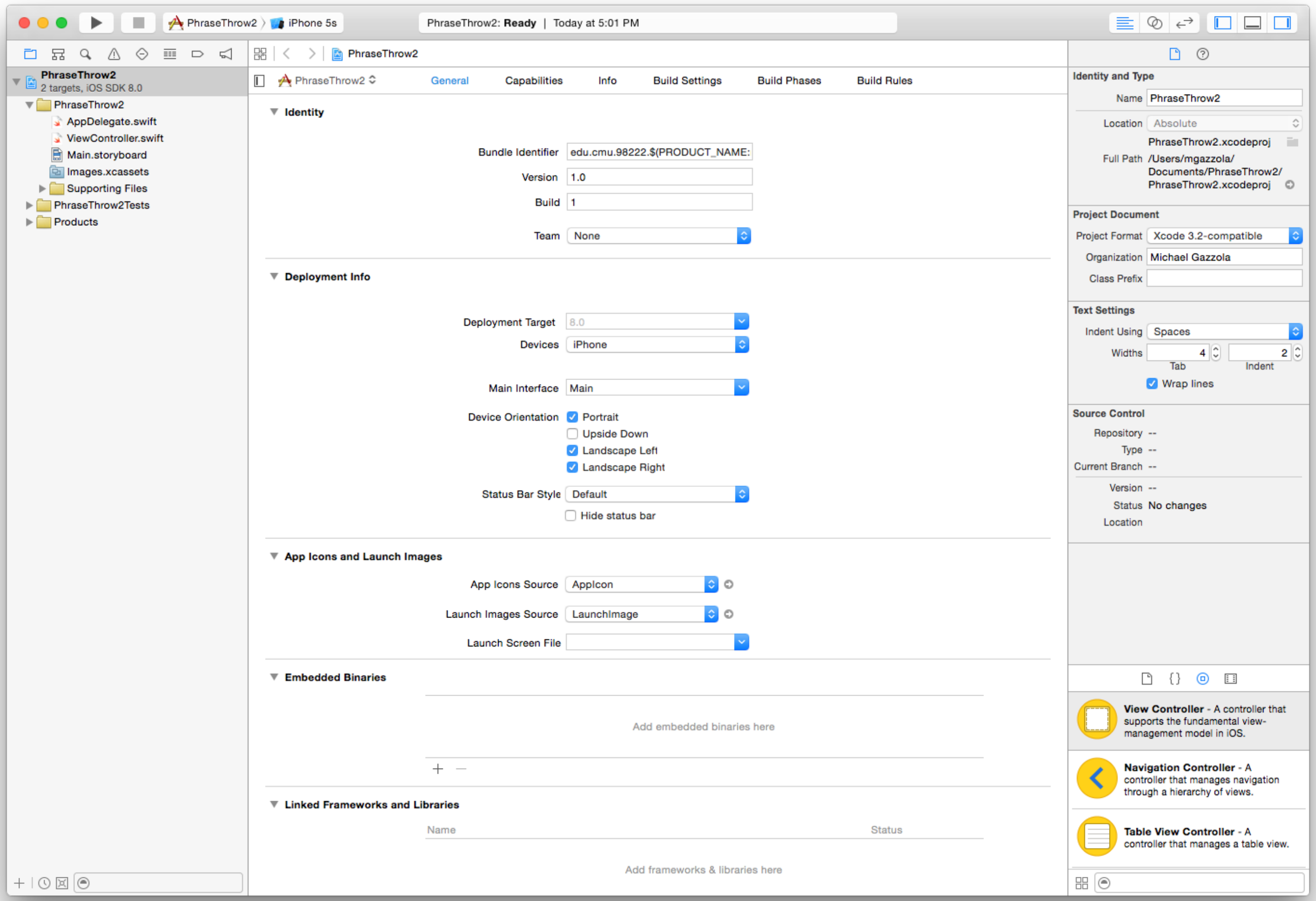
Then, you get to specify some options for your project. Under **Product Name:** you should put **PhraseThrow**, and under **Organization Name:**, just put your full name. The rest you should fill out as follows:



Product Name:	PhraseThrow
Organization Name:	Your Name Here!
Organization Identifier:	edu.cmu.98222
Bundle Identifier:	edu.cmu.98222.PhraseThrow
Language:	Swift
Devices:	iPhone
	☐ Use Core Data

It's not important what those fields mean, but you can probably figure out what they all mean from the context. Product Name is the name of your project, and Organization Name is the name of../...well, your organization (say if you were Google or something, but the name of the developer is also traditional here). Organization Identifier is a unique identifier for your developer organization, which is something we'll talk about later in the semester, and Bundle Identifier is a unique identifier for your project (also something we'll cover later in the semester).

Then, you pick a directory to save your project in (don't worry about the 'Create Git repository' stuff, unless you like Git), and hit **Create**! Voila!


PhraseThrow2 › iPhone 5s
PhraseThrow2: **Ready** | Today at 5:01 PM

PhraseThrow2
2 targets, iOS SDK 8.0
PhraseThrow2
AppDelegate.swift
ViewController.swift
Main.storyboard
Images.xcassets
Supporting Files
PhraseThrow2Tests
Products

PhraseThrow2
General | Capabilities | Info | Build Settings | Build Phases | Build Rules

Identity

Bundle Identifier	edu.cmu.98222.$(PRODUCT_NAME:
Version	1.0
Build	1
Team	None

Deployment Info

Deployment Target	8.0
Devices	iPhone
Main Interface	Main
Device Orientation	✓ Portrait ☐ Upside Down ✓ Landscape Left ✓ Landscape Right
Status Bar Style	Default ☐ Hide status bar

App Icons and Launch Images

App Icons Source	AppIcon
Launch Images Source	LaunchImage
Launch Screen File	

Embedded Binaries

Add embedded binaries here

Linked Frameworks and Libraries

Name	Status

Add frameworks & libraries here

Identity and Type

Name	PhraseThrow2
Location	Absolute PhraseThrow2.xcodeproj
Full Path	/Users/mgazzola/Documents/PhraseThrow2/PhraseThrow2.xcodeproj

Project Document

Project Format	Xcode 3.2-compatible
Organization	Michael Gazzola
Class Prefix	

Text Settings

Indent Using	Spaces
Widths	Tab 4, Indent 2
	✓ Wrap lines

Source Control

Repository	--
Type	--
Current Branch	--
Version	--
Status	No changes
Location	

View Controller - A controller that supports the fundamental view-management model in iOS.

Navigation Controller - A controller that manages navigation through a hierarchy of views.

Table View Controller - A controller that manages a table view.

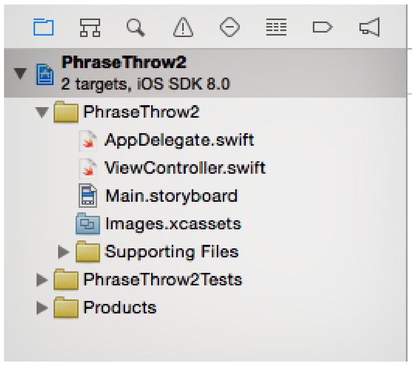
Now what?

So this may seem like an information overload to you guys. So many tabs and features and buttons all over the place. Xcode is a mess. This guide will help you pick the things you need to know, though. The first thing we need to do is figure out what app we're making!

Though, I'm not going to explain the game rules here. You can look up the game that PhraseThrow is based off of, Catch Phrase. The only difference is that our app will provide the random nouns!

So, as a TL;DR, we're making an app which has a button that, when pressed, picks a random noun from a (large) list of nouns and displays it on the screen. This is more-or-less the minimum our app will accomplish.

Now, let's start building our app. Look at the left sidebar of Xcode:



Those are all the files in your project. They were all autogenerated when you picked the template for your project (remember, Single View Application). The main stuff that you need to know right now is already out in the open: **AppDelegate**, **ViewController**, and

Main.storyboard.

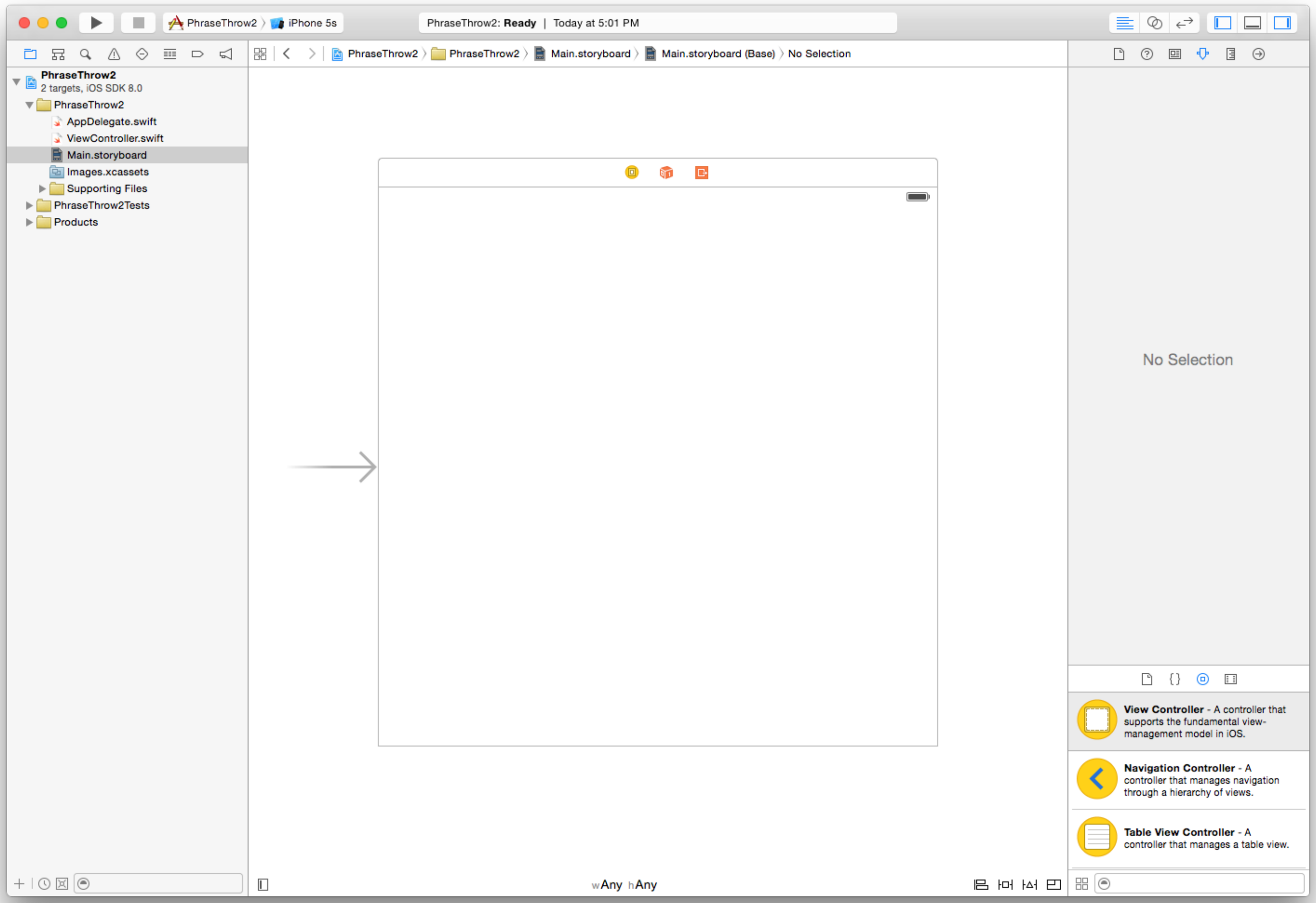
The **AppDelegate** isn't very important for this app. It contains code that deals with app startup, backgrounding, and shutdown operations. We don't want to modify any of it here for this project, so we'll leave it alone (though we will mess around with it in the future).

The **ViewController** is the class that../...well, controls the main view. It's the **C** in MVC for this app. It's in charge with processing everything for your app, basically. We'll be working with it very closely in this demo.

And finally, **Main.storyboard**. It's not a Swift file, like the other two classes.s This is a **Storyboard**, which is an abstraction for a view on an iPhone--it basically represents what you **see** on your iPhone when people use your app.

Creating the View

So, let's start with the Storyboard. Click on Main.storyboard, and you'll be greeted with the **Interface Builder**:



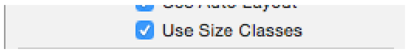
View Controller - A controller that supports the fundamental view-management model in iOS.

Navigation Controller - A controller that manages navigation through a hierarchy of views.

Table View Controller - A controller that manages a table view.

Whoops, that doesn't look like am iPhone screen. Apple is making a push for arbitrarily sized iPhone development, so what you're seeing is a generic size class--we'll get into all of that in the next lecture though, so don't worry about it.

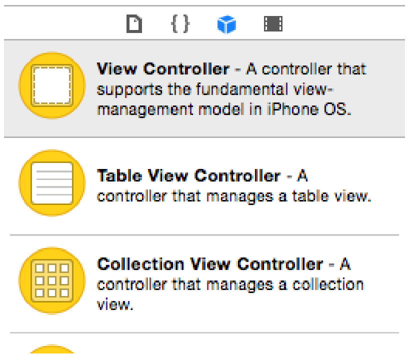
We're not interested in designing for arbitrarily sized iPhones in this lecture. Therefore, on the right hand side, you should see click the button you'll see the option:


☑ Use Size Classes

Turn that off. A little popup should appear. Make sure that "Keep size class data for" is set to **iPhone**, and click **Disable Size Classes**.

Now it should look a little bit more like an iPhone screen! Specifically, this screen is for an iPhone 5/5S. Great, so now we can start building our app's main screen.

The first thing we want is a title label; we want the word **PhraseThrow** in big letters across the top of our screen, so that everyone knows what our app is called. On the right hand side of your screen, you should see the **Object Library**, which looks like this:

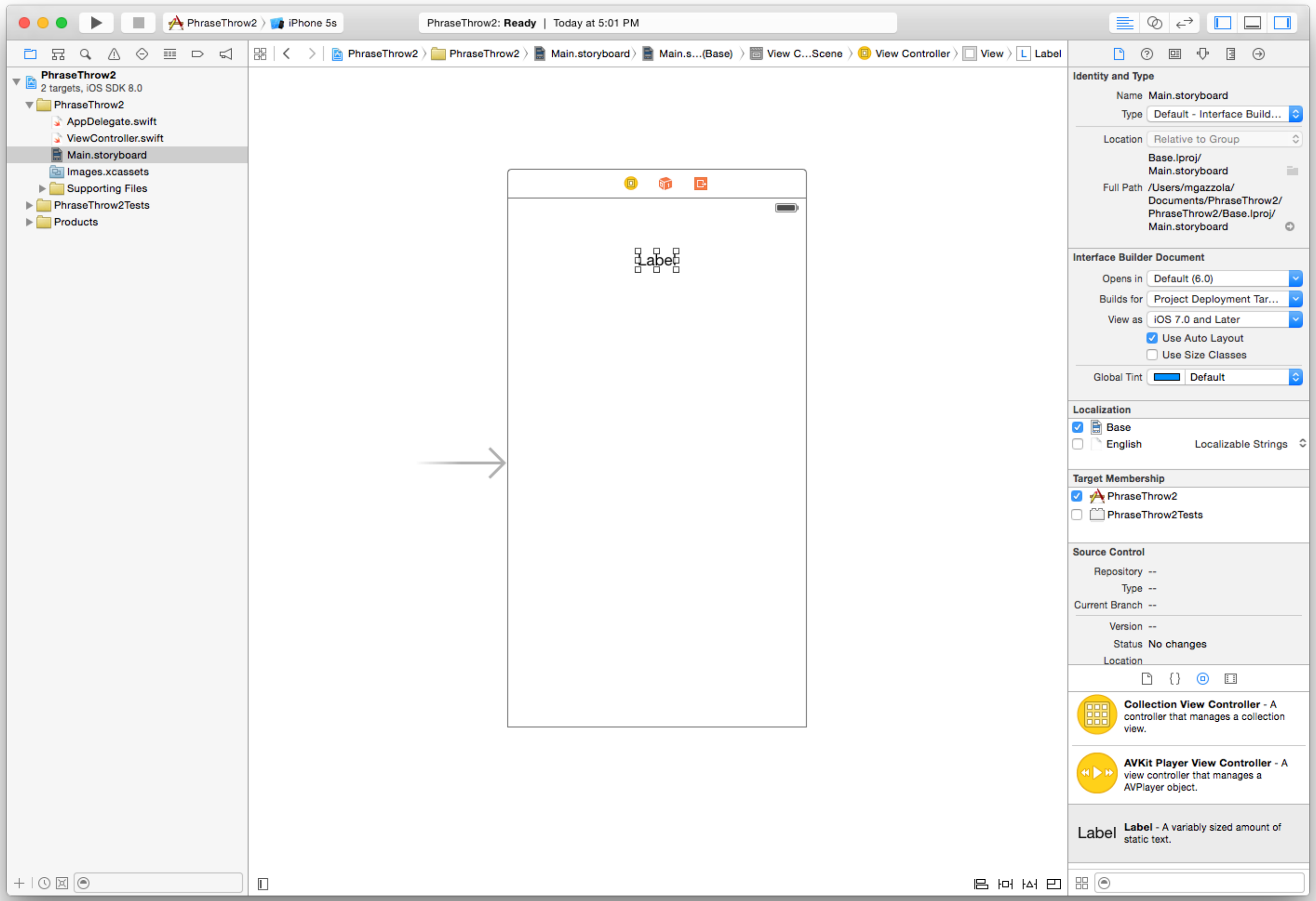


View Controller - A controller that supports the fundamental view-management model in iPhone OS.

Table View Controller - A controller that manages a table view.

Collection View Controller - A controller that manages a collection view.

Scroll down until you see an option for **Label**. Then, drag and drop it onto your view! It's as simple as that. You should see, if you move the label around the iPhone view, that Interface Builder will give you guidelines on how to center your label on the screen and whatnot. Make sure your label is centered horizontally, like so:



Identity and Type

Name Main.storyboard

Type Default - Interface Build...

Location Relative to Group

Base.lproj/
Main.storyboard

Full Path /Users/mgazzola/Documents/PhraseThrow2/PhraseThrow2/Base.lproj/Main.storyboard

Interface Builder Document

Opens in Default (6.0)

Builds for Project Deployment Tar...

View as iOS 7.0 and Later

✓ Use Auto Layout

☐ Use Size Classes

Global Tint Default

Localization

✓ Base

☐ English Localizable Strings

Target Membership

✓ PhraseThrow2

☐ PhraseThrow2Tests

Source Control

Repository --

Type --

Current Branch --

Version --

Status No changes

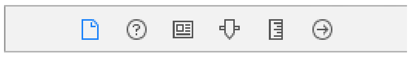
Location

Collection View Controller - A controller that manages a collection view.

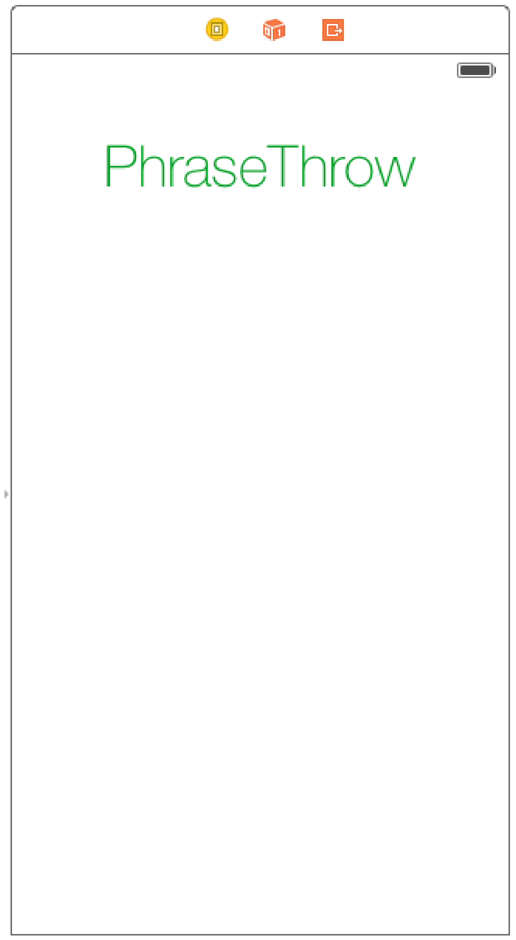
AVKit Player View Controller - A view controller that manages a AVPlayer object.

Label **Label** - A variably sized amount of static text.

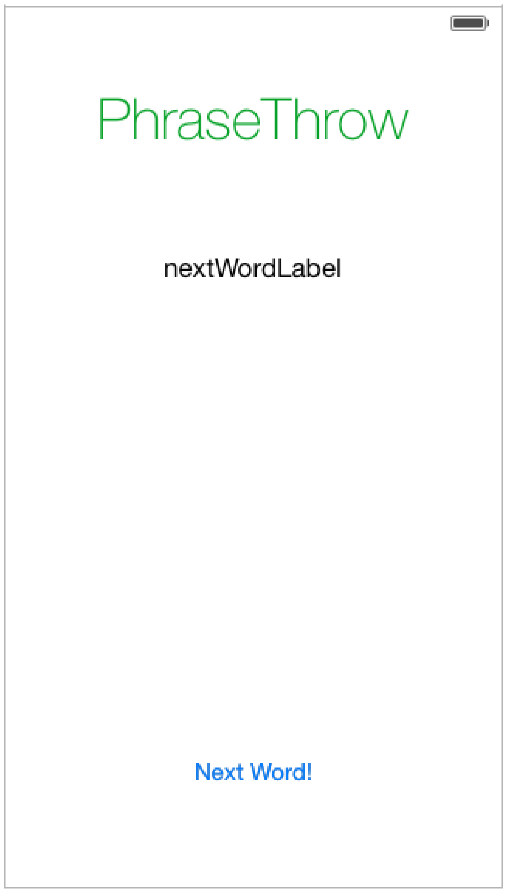
A label is just an object that displays text. That's all--nothing more! But the text inside can be modified--so, let's do that to get our title label. Double click on the label to edit its text, and edit it to "**PhraseThrow**" (without the quotes). Then, on the top right hand side of your screen, you should see a little toolbar like this:



That is the Inspector Toolbar--you'll want to select the fourth one from the left. That is the **Attributes Inspector**. It's full of information about your label (if not, click on your label to get it into focus, and then you should see tons of info). Use the Attributes Inspector to make your PhraseThrow title label nice and big and pretty (note that this will probably involve resizing your label). Mine looks like this now:



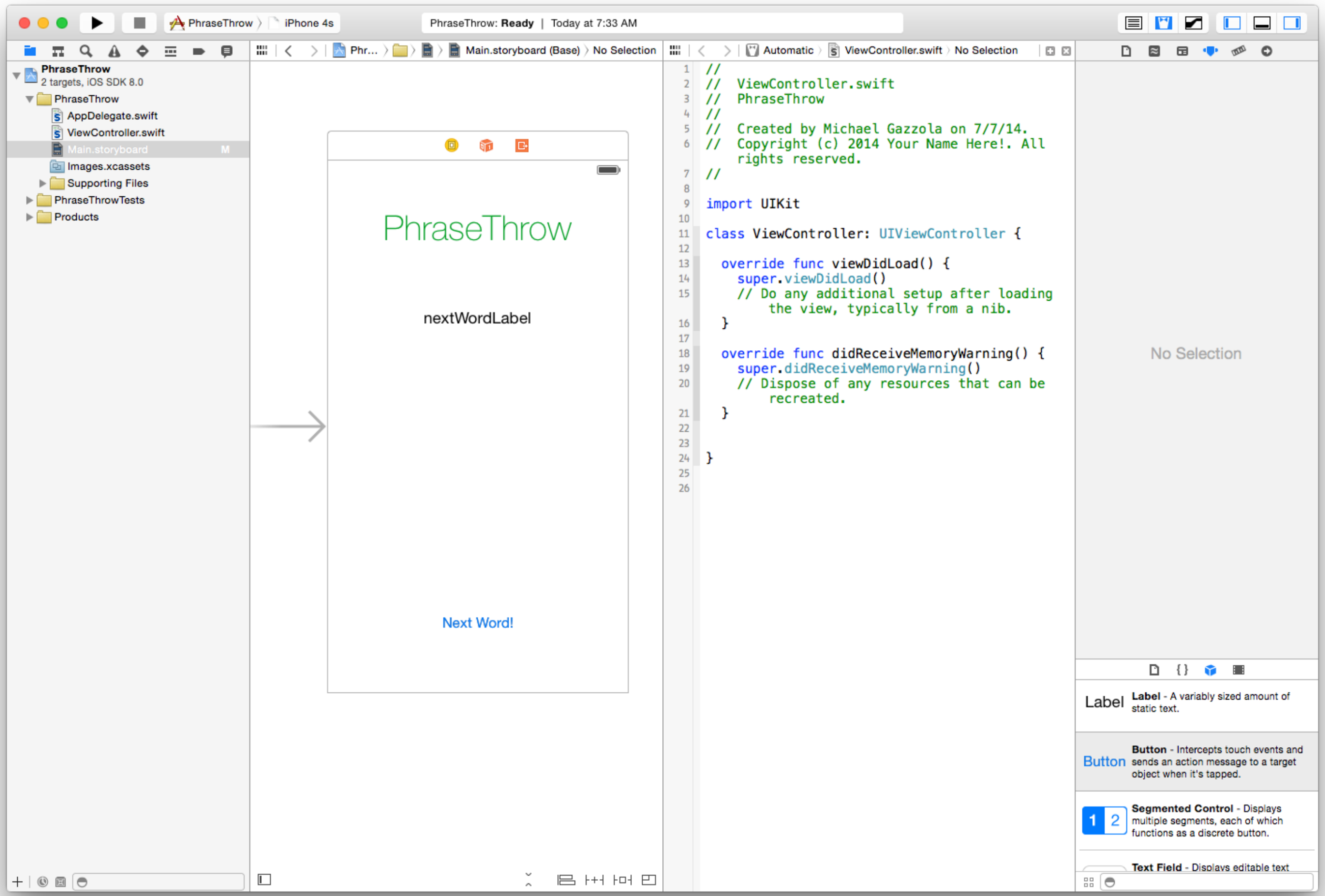
Great! Hopefully your label looks like awesome--if not, it's totally cool if you didn't modify the label at all. Now, we'll need two more things for our view: a label to display the random word on the screen, and a button to say "Hey, get a random word." You can find a button in the Object Library, just like your label. So, you should set up your screen like this:



It's good to have good design. Keep your button close to the bottom, and keep your labels grouped together near the top.

Making the Connections

Okay, so we have this view with two labels and a button, but right now if your app were to run, it would do nothing. Why? The labels and button are not connected to any code or logic. They do nothing. So, now we're going to start working with code. In the top right hand corner, you'll want to click on this icon (on non-Yosemite machines, you'll see a bow-and-tie guy). This is the **Assistant editor** and will help you make connections in your code. You should now have a screen looking like this:



```
//
//  ViewController.swift
//  PhraseThrow
//
//  Created by Michael Gazzola on 7/7/14.
//  Copyright (c) 2014 Your Name Here!. All
    rights reserved.
//

import UIKit

class ViewController: UIViewController {

  override func viewDidLoad() {
    super.viewDidLoad()
    // Do any additional setup after loading
        the view, typically from a nib.
  }

  override func didReceiveMemoryWarning() {
    super.didReceiveMemoryWarning()
    // Dispose of any resources that can be
        recreated.
  }


}
```

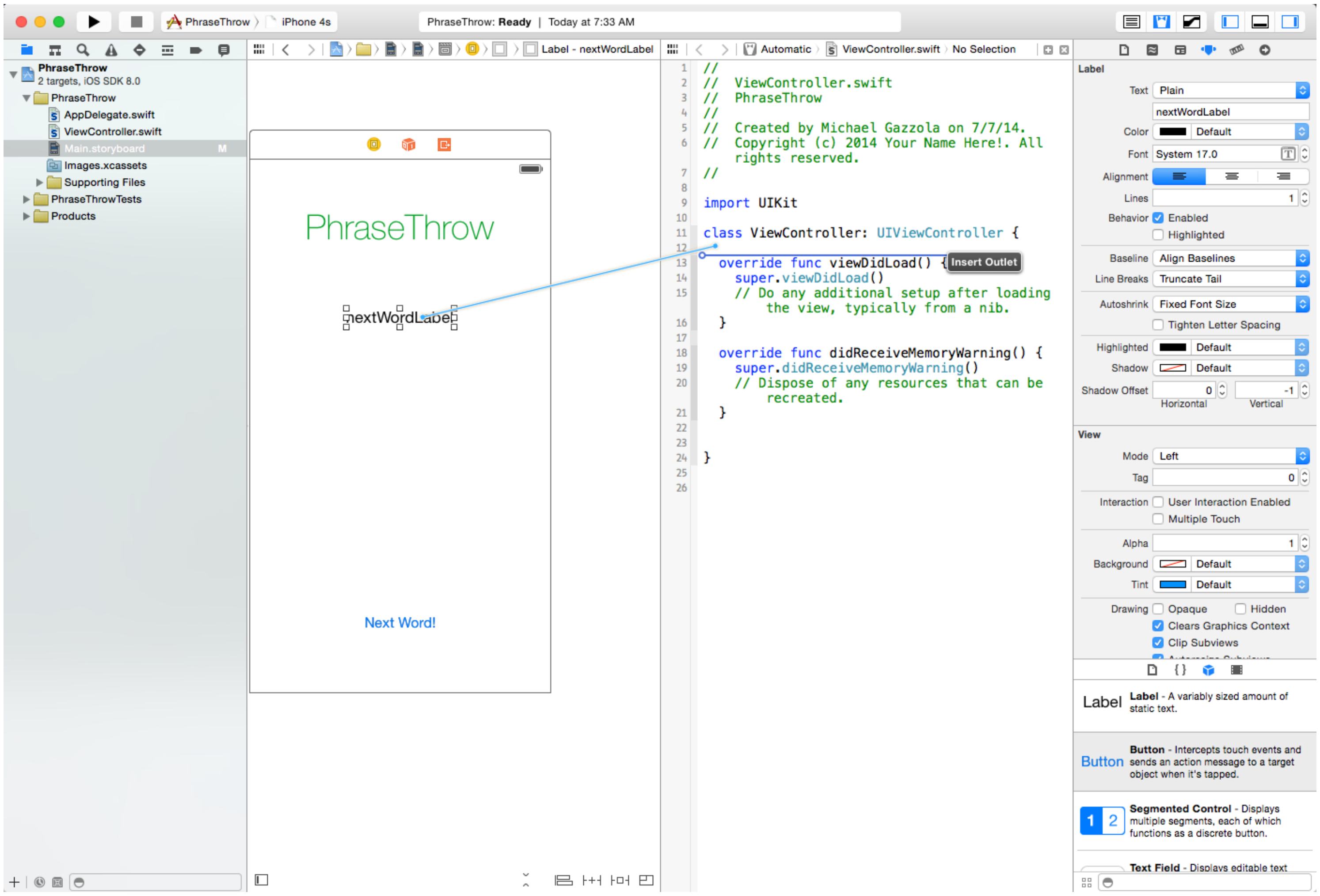
Label - A variably sized amount of static text.

Button - Intercepts touch events and sends an action message to a target object when it's tapped.

Segmented Control - Displays multiple segments, each of which functions as a discrete button.

Text Field - Displays editable text

So, we'll want to make two connections in our code: one for the nextWordLabel so that we can update it with a word, and one for the Next Word! button so we know **when** to update the nextWordLabel. To make a connection, simple hold the **Control** button on your keyboard and click and drag from the Label to your code, like so:


PhraseThrow
iPhone 4s
PhraseThrow: Ready | Today at 7:33 AM
PhraseThrow
2 targets, iOS SDK 8.0
PhraseThrow
AppDelegate.swift
ViewController.swift
Main.storyboard
Images.xcassets
Supporting Files
PhraseThrowTests
Products
Label - nextWordLabel
Automatic
ViewController.swift
No Selection
PhraseThrow
nextWordLabel
Next Word!
Insert Outlet
Label - A variably sized amount of static text.
Button - Intercepts touch events and sends an action message to a target object when it's tapped.
Segmented Control - Displays multiple segments, each of which functions as a discrete button.
Text Field - Displays editable text

```
//
//  ViewController.swift
//  PhraseThrow
//
//  Created by Michael Gazzola on 7/7/14.
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rights reserved.
//

import UIKit

class ViewController: UIViewController {

  override func viewDidLoad() {
    super.viewDidLoad()
    // Do any additional setup after loading
       the view, typically from a nib.
  }

  override func didReceiveMemoryWarning() {
    super.didReceiveMemoryWarning()
    // Dispose of any resources that can be
       recreated.
  }

}
```
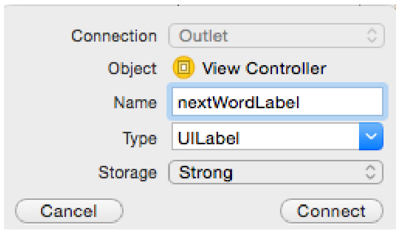

Label
Text: Plain
nextWordLabel
Color: Default
Font: System 17.0
Lines: 1
Behavior: [✓ Enabled] Highlighted
Baseline: Align Baselines
Line Breaks: Truncate Tail
Autoshrink: Fixed Font Size
Tighten Letter Spacing
Highlighted: Default
Shadow: Default
Shadow Offset: 0 (Horizontal) -1 (Vertical)

View
Mode: Left
Tag: 0
Interaction: User Interaction Enabled, Multiple Touch
Alpha: 1
Background: Default
Tint: Default
Drawing: Opaque, Hidden, [✓ Clears Graphics Context], [✓ Clip Subviews]

Release, and you'll get a little pop up asking you to fill in some information about the label. You should fill it out with something reasonable like this:

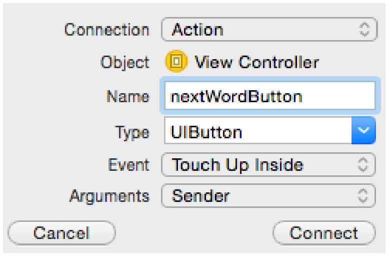


Connection	Outlet
Object	View Controller
Name	nextWordLabel
Type	UILabel
Storage	Strong

Then, click Connect. We won't worry about what most of this stuff means, because you're probably at an information overload. But all you need to know is that the label's name in your code is nextWordLabel, and its type is a UILabel. You should see that a line of coded was added to your ViewController:

```
@IBOutlet var nextWordLabel : UILabel!
```

We'll explain what that trailing exclamation mark means down below; for now, don't worry about it. Now, we'll do the same thing with the button, except we'll fill out its connection features a little differently. Make sure under Connection you select **Action** and not Outlet (otherwise your button won't do anything). Then, name it, and make sure its type is **UIButton** (it's something else, by default). Then, under Event, make sure you select **Touch Up Inside**. It shoud look like this:



Connection: Action
Object: View Controller
Name: nextWordButton
Type: UIButton
Event: Touch Up Inside
Arguments: Sender

Now, you should see that an entire Swift function was added to your code:

```
@IBAction func nextWordButton(sender : UIButton) {
}
```

The code in this function is called each time the button is pressed.

Now, we have connected the View to your ViewController class; we're officially done working with Interface Builder, for now.

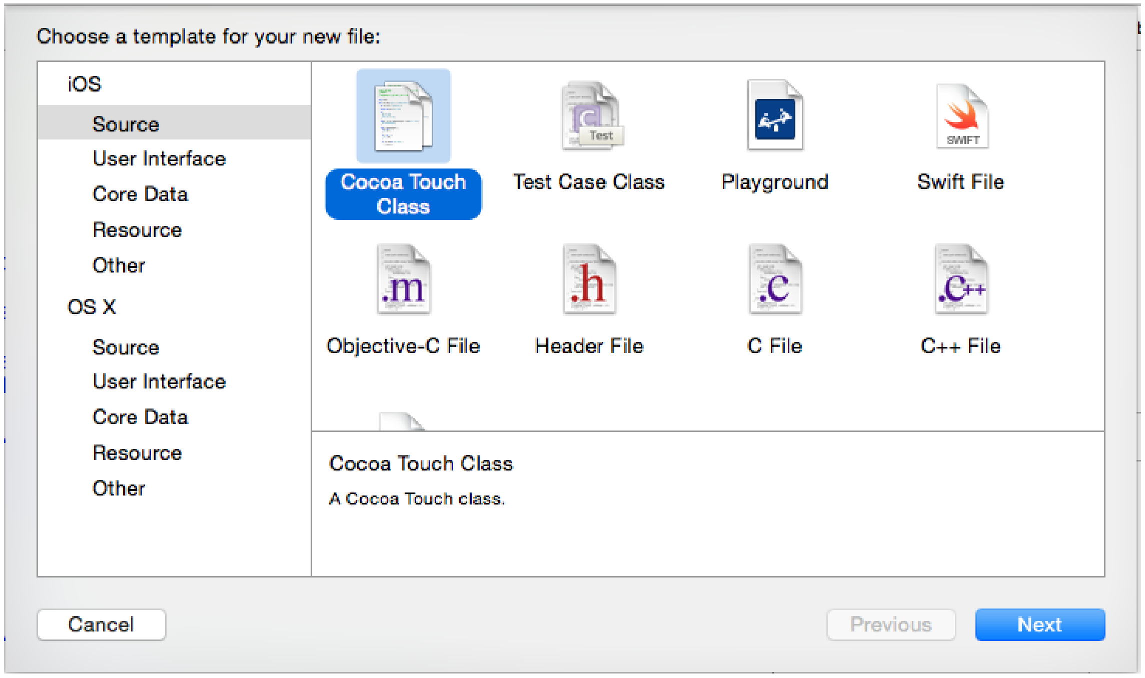
Writing the Code

Don't continue into this section unless you're familiar with Model-View-Controller (MVC). If you're unfamiliar with MVC, go back to the lecture on read about it. Also if you haven't read the Swift intro in Lecture 1, do that now!

First, we should make a model. We'll make a class called **NounDictionary**, which will basically just hold a massive list of nouns. This class will also support one function: **randomWord**(), which may return a random noun from the list. Think carefully about how this fits into Model-View-Controller.

We'll first need a list of nouns to save in our NounDictionary class. Make sure you download nounlist.txt (right click, Save Link As../...) and drag and drop it into your Xcode project. You should drag it into the Supporting Files folder. A dialog should popup whe you do this. Just select **Copy items if needed** and click Finish.

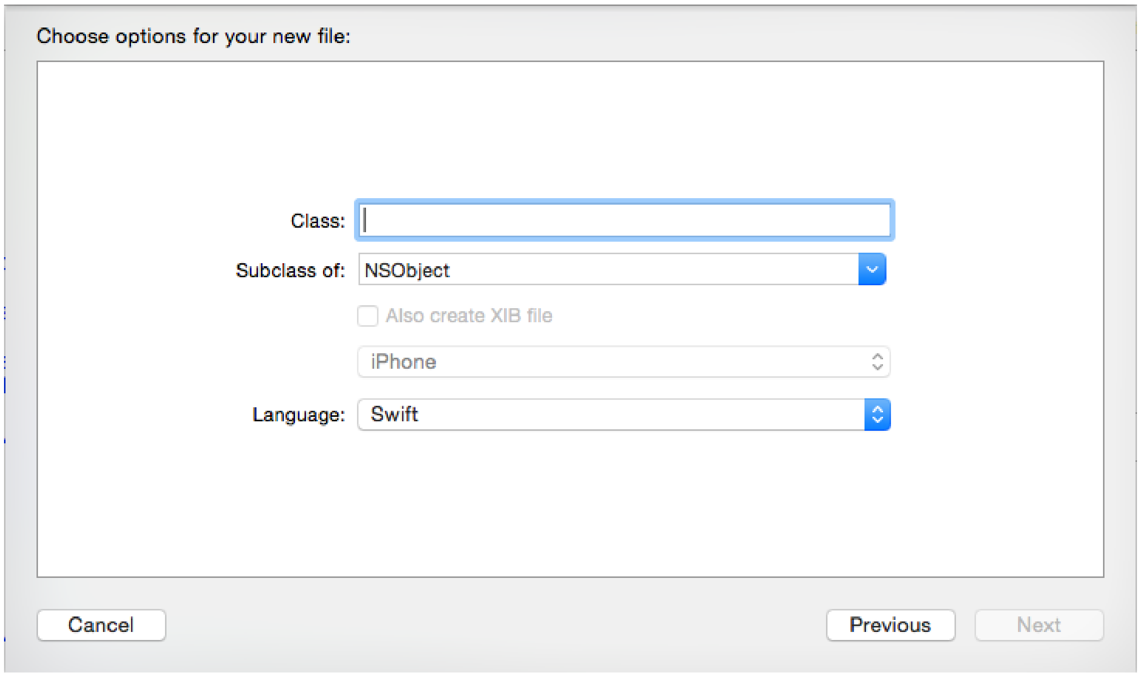
Next, we need to make a new class file. Hit Cmd+N, or go to File > New > File. You'll see a prompt like this:



Choose a template for your new file:

Cocoa Touch Class
A Cocoa Touch class.

Select **Cocoa Touch Class**, since this is basically a template for new iOS templates. You'll see another form like this:


Choose options for your new file:

Class:

Subclass of: NSObject

Also create XIB file

iPhone

Language: Swift

Under Class, put **NounDictionary**, and under Subclass of:, just leave it as **NSObject**. Leave everything else (make sure Language is set to **Swift**). Hit **Next**, and then hit **Create**. You'll be all set with a new empty class that looks like this:

```
import UIKit
class NounDictionary: NSObject {
}
```

Now, we can implement this class. In the interest of time, I'll just post the annotated code for the NounDictionary class:

```
class NounDictionary: NSObject {

  var wordList : [String]?  // Think: why would we want this as an optional?

  override init() {
    super.init()  // Always call your superclass's init.

    // Get the file containing the words.
    var mainBundle = NSBundle.mainBundle()
    var filePath : String? = mainBundle.pathForResource(
      "nounlist", ofType: ".txt")
    // Make sure the file exists!
    if (filePath != nil) {
      var words: String? = String(contentsOfFile: filePath!,
                                  encoding: NSUTF8StringEncoding,
                                  error: nil)
      // Now, create an array by separating on newline characters.
      self.wordList = words!.componentsSeparatedByString("\n")
    }
  }

  // Is called when the Next Word button is pressed.
  // Randomly picks a word from the word list and returns it.
  func randomWord() -> String? {
    // Check to make sure we have a valid word list. If initialization failed,
    // we might not have one!
    if (self.wordList != nil) {
      // Picks a random UInt32 because 0 and self.wordList.count.
      var index = arc4random_uniform(UInt32(self.wordList!.count))
      var word: String = self.wordList![Int(index)]
      return word
    }
    // If we're here, then we don't have any words!
    return nil
```

So, now, let's focus only on our ViewController code. Let's leave Assistant editor mode (click the button to the left of the suit and tie guy) and open up ViewController.swift. Right now, the only stuff you should have in there is this body of code:

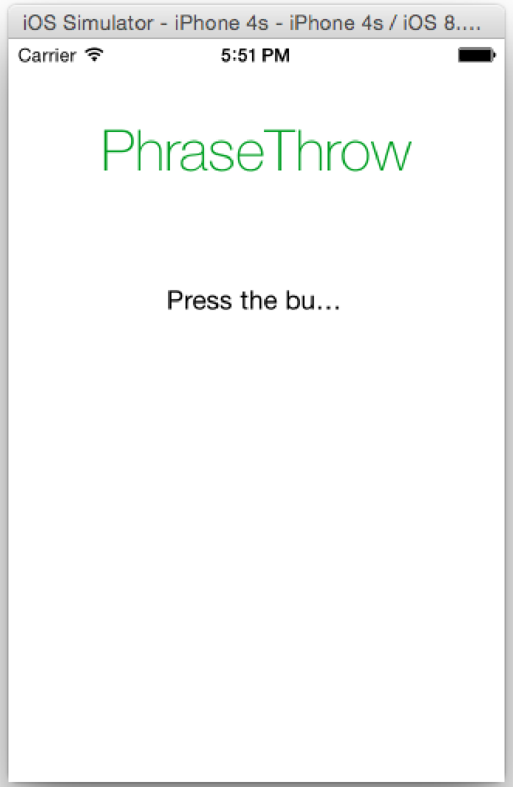
```
//
//  ViewController.swift
//  PhraseThrow
//
//  Created by Michael Gazzola on 7/7/14.
//  Copyright (c) 2014 Your Name Here!. All rights reserved.
//

import UIKit

class ViewController: UIViewController {

  @IBOutlet var nextWordLabel : UILabel!

  @IBAction func nextWordButton(sender : UIButton) {
  }

  override func viewDidLoad() {
    super.viewDidLoad()
    // Do any additional setup after loading the view, typically from a nib.
  }

  override func didReceiveMemoryWarning() {
    super.didReceiveMemoryWarning()
    // Dispose of any resources that can be recreated.
  }


}
```

There are two functions in there that you didn't write: viewDidLoad, which is a function that is called when your iPhone loads up your Main.storyboard, and didReceiveMemoryWarning, which we will never worry about in this class.

We want to focus on viewDidLoad. This is where we will initialize everything. You can start by writing to nextWordLabel, just to get our feet wet with our app. Change your viewDidLoad method so that it looks like this:

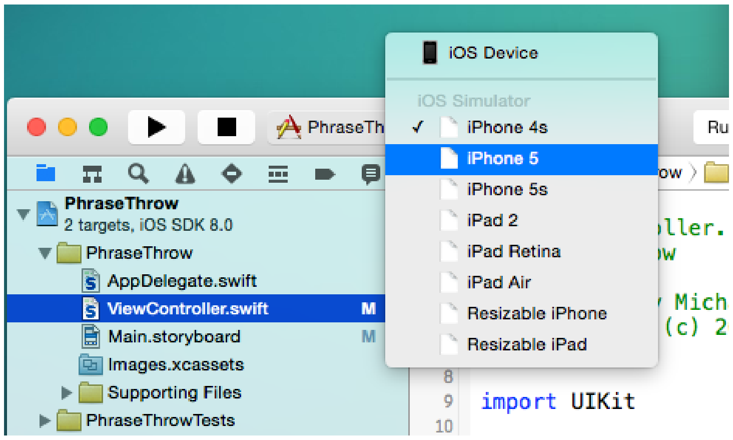
```
override func viewDidLoad() {
    super.viewDidLoad()
    // Initial text.
    self.nextWordLabel.text = "Press the button!"
}
```

Now you will run your app for the first time. In the top left hand corner of Xcode is a little ▶ icon. Click it and watch your app run on the Simulator.



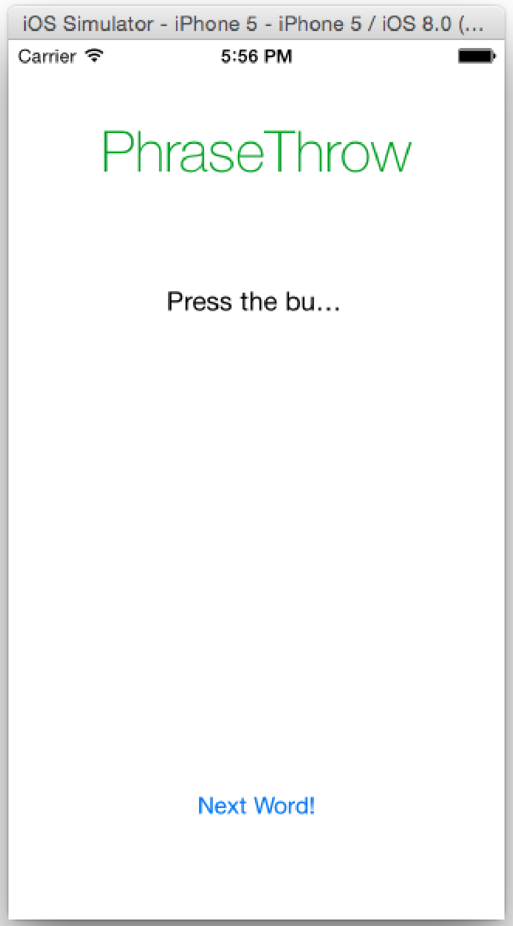
Uh-oh. You might want to dive into Interface Builder later to fix nextWordLabel to make sure the Label is big enough to hold the entirety of its contents. But more importantly, where did our button go?!

The interface you built was for an iPhone 5. The simulator by default runs an iPhone 4S. Therefore, your button is getting cut off! Stop the simulation (by hitting the Stop button next to the Play button) and access the drop down menu right next to it to select an iPhone 5:



```
import UIKit
```

Now, run the simulation again and everything should be good:



Alternatively, you could just move the button up the screen on Interface Builder so that it displays on both iPhone 4S and iPhone 5. Later on in the course, we'll talk about how to do this programmatically so you don't ever have to worry about this.

Now, we know how to edit nextWordLabel, and we have our app displaying as it should. We've also written a class called NounDictionary which will give us random nouns. So, now we need to mash these two amenities together. Our ViewController will have an instance of NounDictionary. Every time our button is pressed, we'll make a call to NounDictionary to grab a random word, and then we'll update our label. Sounds easy enough?

We won't implement an init for our ViewController--it only appears once, so we can do our initialization in the viewDidLoad method. Set up a member variable for our ViewController's NounDictionary like this:

```
class ViewController: UIViewController {

  var nounDict: NounDictionary!
  ... // rest of the class
```

What does that ! mean at the end of NounDictionary? Well, it has to do with optionals. Basically, nounDict is a NounDictionary? optional type, which means it can be a NounDictionary or nil. But, when we use the ! at the end of the type, it basically says **always unwrap this optional**. So, every time you use self.nounDict, it will implicitly unwrap the optional for you. This is convenient at times, but you need to be careful to not use self.nounDict when it might be nil.

So, to solve this problem, one of the first things we will do is make an instance of it. That way, we know it's not nil for the rest of the lifetime of the app. (It's also worth noting that the Swift language won't let us instantiate the NounDictionary at the same time that we declare it, which is why we have to instantiate it separately.) So, our viewDidLoad method should look like this:

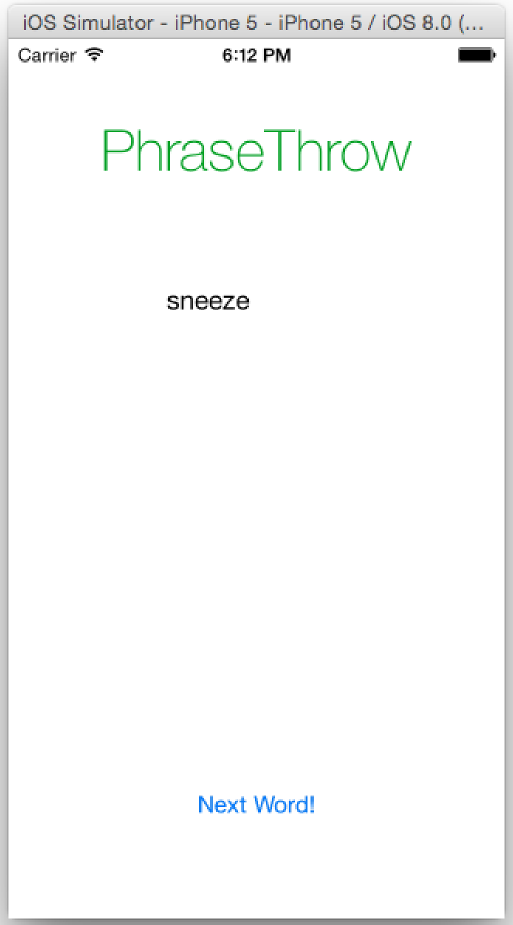
```
override func viewDidLoad() {
  super.viewDidLoad()
  self.nounDict = NounDictionary()  // No unwrapping needed!
  self.nextWordLabel.text = ""
  // Do any additional setup after loading the view, typically from a nib.
}
```

That code will run as soon as our view loads. Next, we only need to handle the logic for when the button is pressed. That code looks like this:

The code that runs when your button is pressed is in the nextWordButton method. The code for that function should therefore be this:

```
@IBAction func nextWordButton(sender: UIButton) {
  var word: String? = nounDict.randomWord()
  if word != nil {
    self.nextWordLabel.text = word!
  }
}
```

Really simple! Now, run your app and click the button a few times:



Congratulations! You just made your first Swift iPhone app!

Bonus (Highly Recommended!!)

For many students, this demo is unfulfilling. For extra credit, you can implement some of the following extra features:

Fix nextWordLabel so that the word is centered and it fits inside the label.

Capitalize the word when you display it.

Add a timer. Hint, use the NSTimer class. This is a great chance to start looking through the Apple Swift documentation and get cozy with Swift syntax.

Add support for two teams to play, complete with score.

Have a sound play whenever the button is pressed.

Good luck!