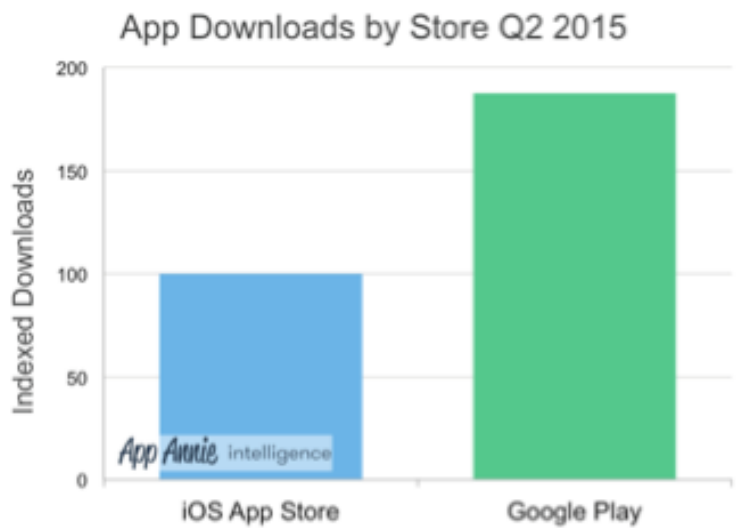
Foreignerds

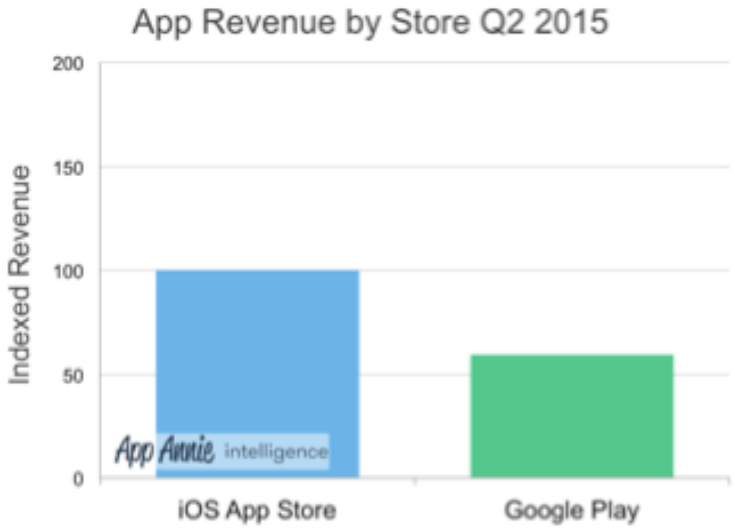
iOS Application Development & **Swift** Programming Language

Outlines

- Basic understanding about iOS App Development
- Development environment: Xcode IDE
- Foundations and Tools
- Introduction of Swift programming language

What is iOS App Development? Why you should care?





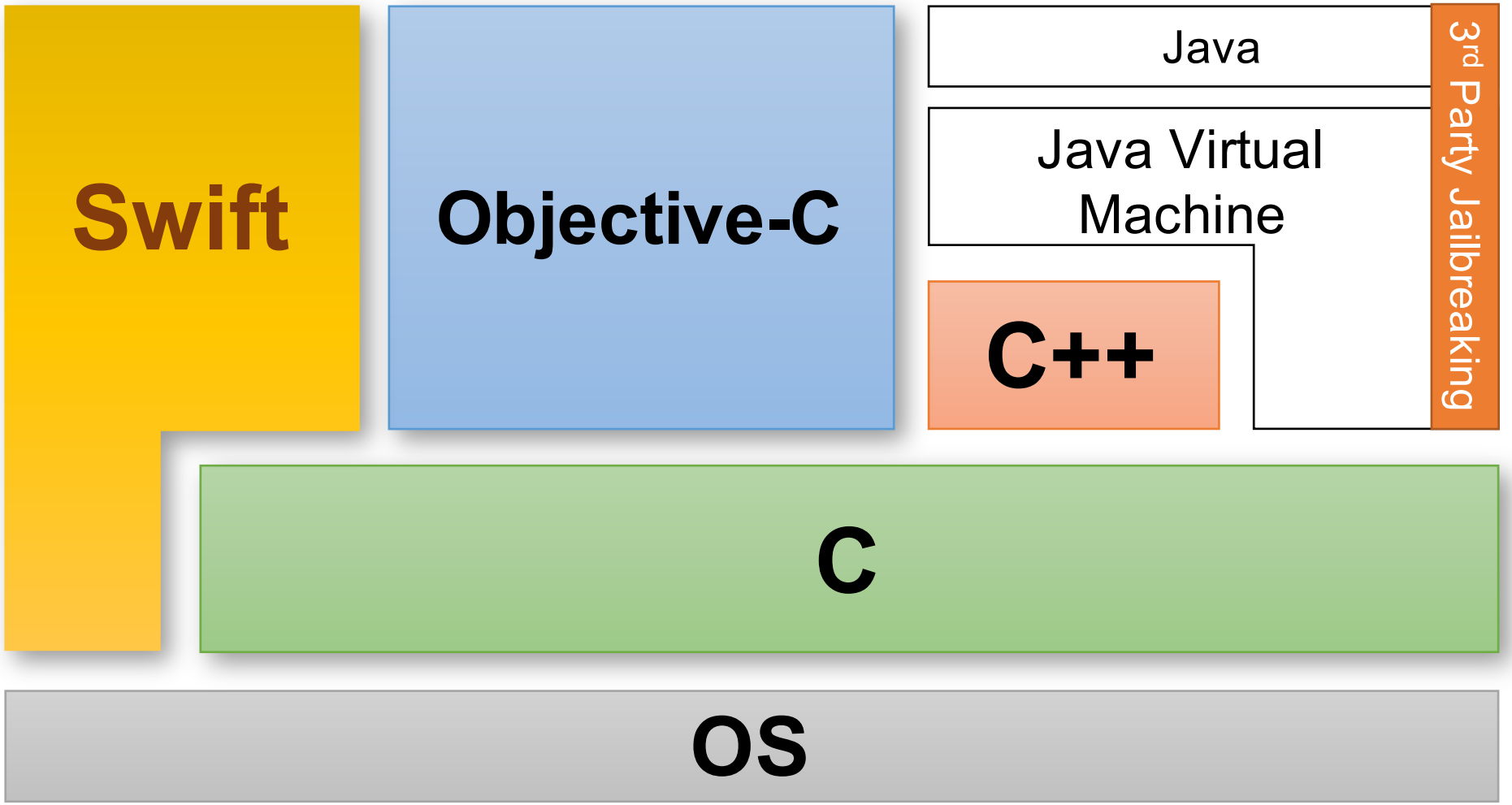
Why iOS apps have higher revenue?

1. iOS-device users are willing to pay for apps
2. Billing issue in developing countries for Google Play store
3. Less pirate apps in iOS (close platform)

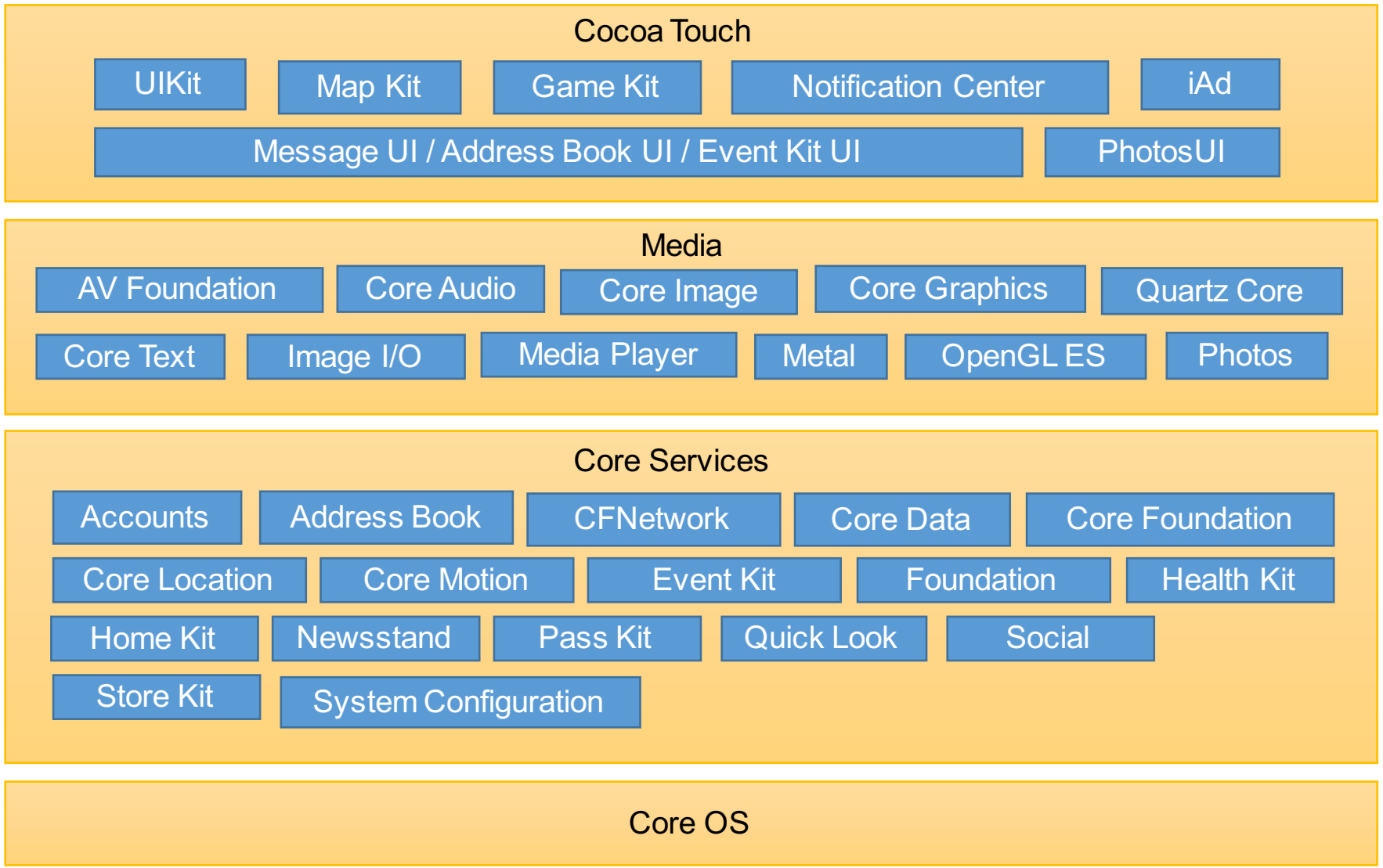
What is iOS?

- Previously—iPhone OS
- Unix-based operating system.
  Subset of **Mac OS X** (based on NeXTSTEP Unix OS, 1989~1997).
- First smartphone OS with **multi-touch** graphical user interface
- Latest version: iOS 9
- iOS Devices: iPod, iPod Touch, iPhone, iPad etc.
- Highly integrated (hardware + software)
- Security reason; Applications run individually, cannot interact with each other easily (iOS 7-)

iOS Application Compiler Architecture



iOS Software Stack



iOS Versions and Compatibility

iOS ver.	Devices							
	Media Player			Smart Phone			Tablet	
	iPod Touch 3	iPod Touch 4	iPod Touch 5~	iPhone 3GS	iPhone 4	iPhone 4S~	iPad	iPad 2~
~ 5.1.1	✔	✔		✔	✔	✔	✔	✔
~ 6.1.6		✔	✔	✔	✔	✔		✔
~ 7.1.2			✔		✔	✔		✔
~ 8.4.1			✔			✔		✔
9.0 ~			✔			✔		✔

Tools Required for iOS App Development

Mac OS compiler

+

Xcode IDE

Developer Program

Apple Developer Program

Overview What´s Included How it Works Enroll

How the Program Works

Getting Started

If you’ re new to development on Apple Platforms, you can get started with our tools and resources for free. If you’ re ready to build more advanced capabilities and distribute your apps on the App Store, enroll in the Apple Developer Program. The cost is 99 USD per membership year.

Get started with enrollment 〉

If you want to distribute your app to App Store

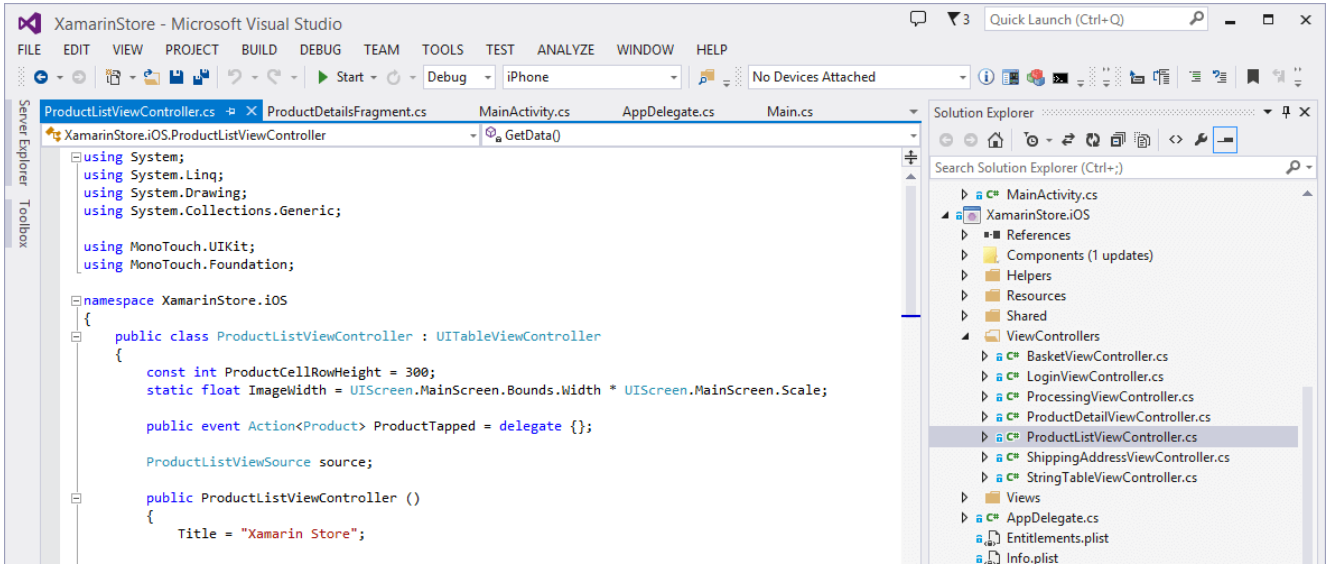
https://developer.apple.com/programs/how-it-works/

Development Types

	Apple ID	Individual	Organisation	Enterprise Program
Xcode Developer Tools	◎	◎	◎	◎
Xcdoe Beta	◎	◎	◎	◎
Test on Device	◎	◎	◎	◎
App Store Distribution		◎	◎	
In-house App Distribution				◎
Team Management			◎	◎
Cost	**Free**	99 USD	99 USD	299 USD
Requirement	13+	18+	DUNS Number	DUNS Number

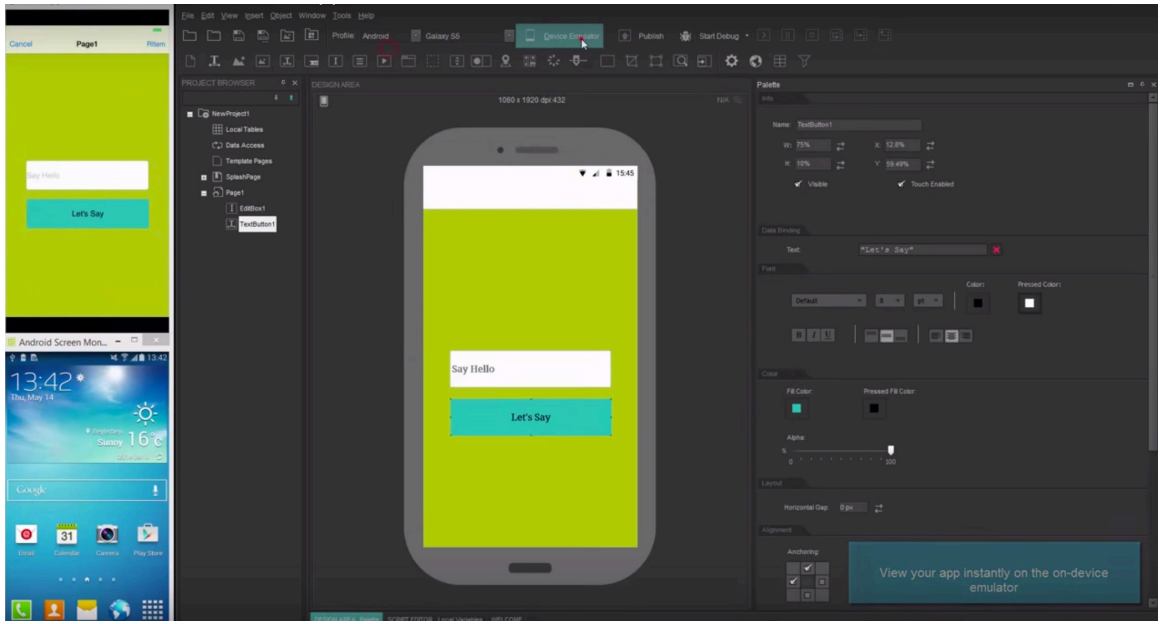
Alternative Development Environment (1)

- http://xamarin.com/platform
- Previous **Mono Touch**
- C#
- Write once, deploy on Android, iOS, Windows Phone
- **Still requires a Mac OS computer/compiler**



Alternative Development Environment (2)

- http://www.smartface.io/
- JavaScript
- Write once, deploy on Android, iOS,
- **Still requires a Mac OS computer for App Distribution**



Source: http://www.smartface.io/developer/guides/get-started/hello-world/

Alternative Development Environment (3)

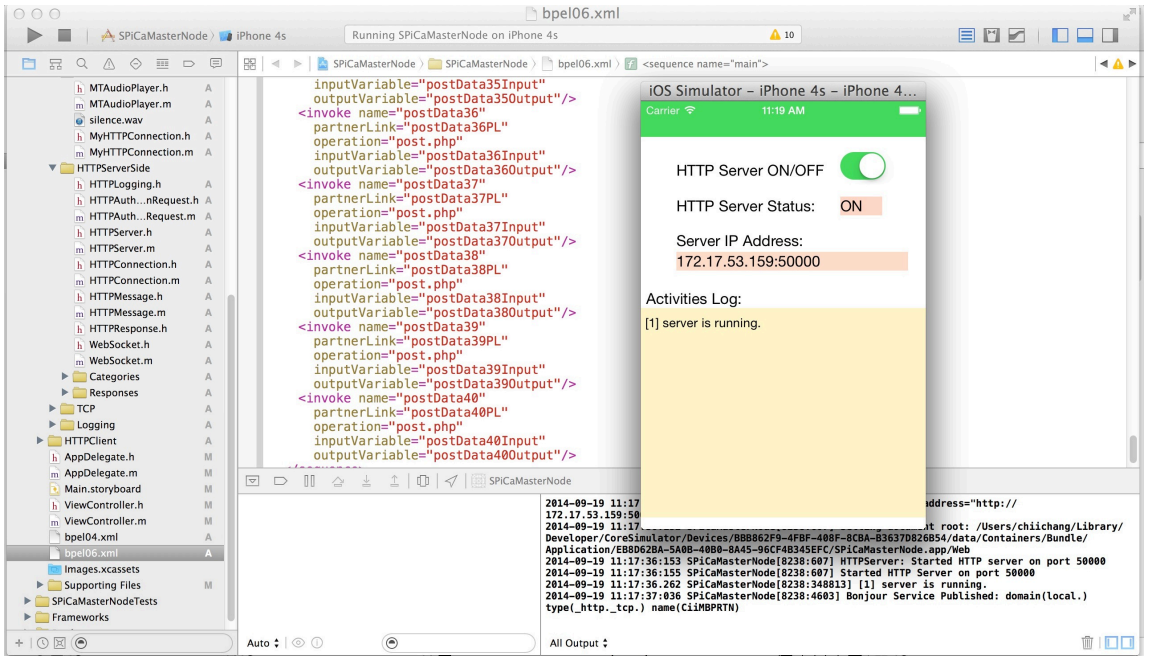
- Cloud Service
  - Example: https://virtualmacosx.com/

iOS Device Simulator

- Simulator ≠ Emulator
- Simulator:
  - Share hardware resources
  - Subset of current OS
  - Fast
- Emulator:
  - Virtual machine
  - Different OS
  - Slow

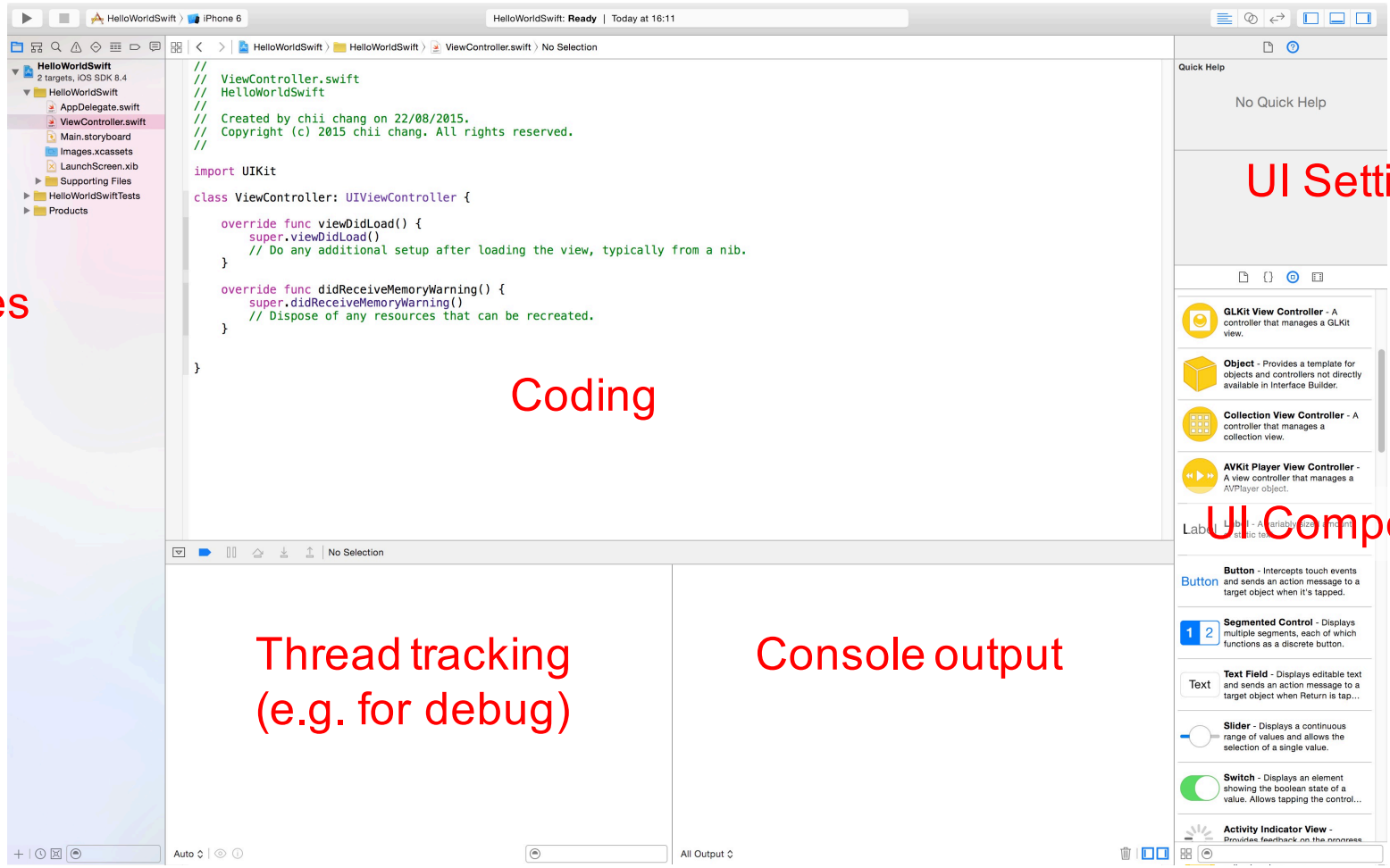
Demo

Hello World

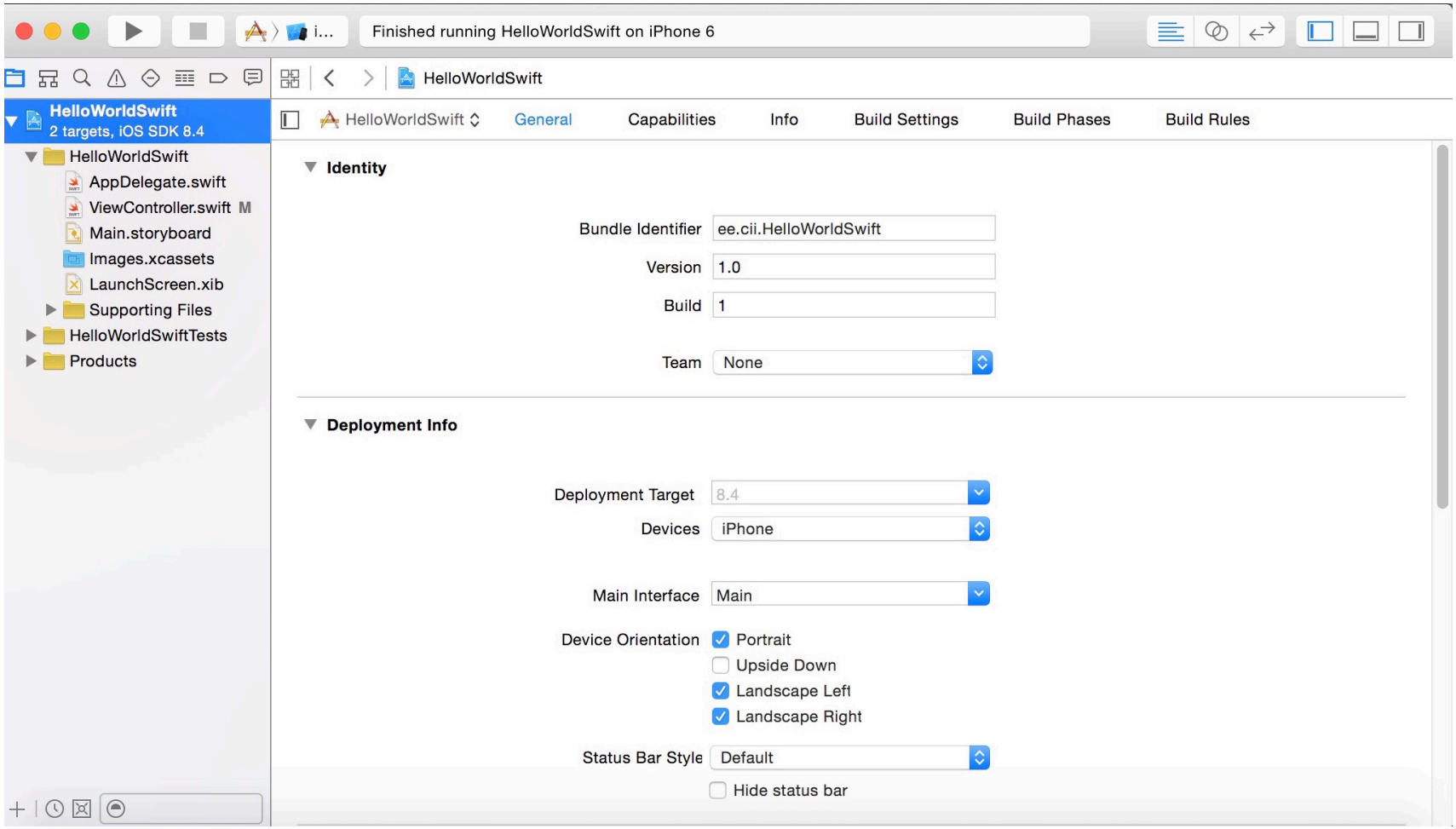


iPhone 4S Simulator

Development Environment: Xcode



Application Project

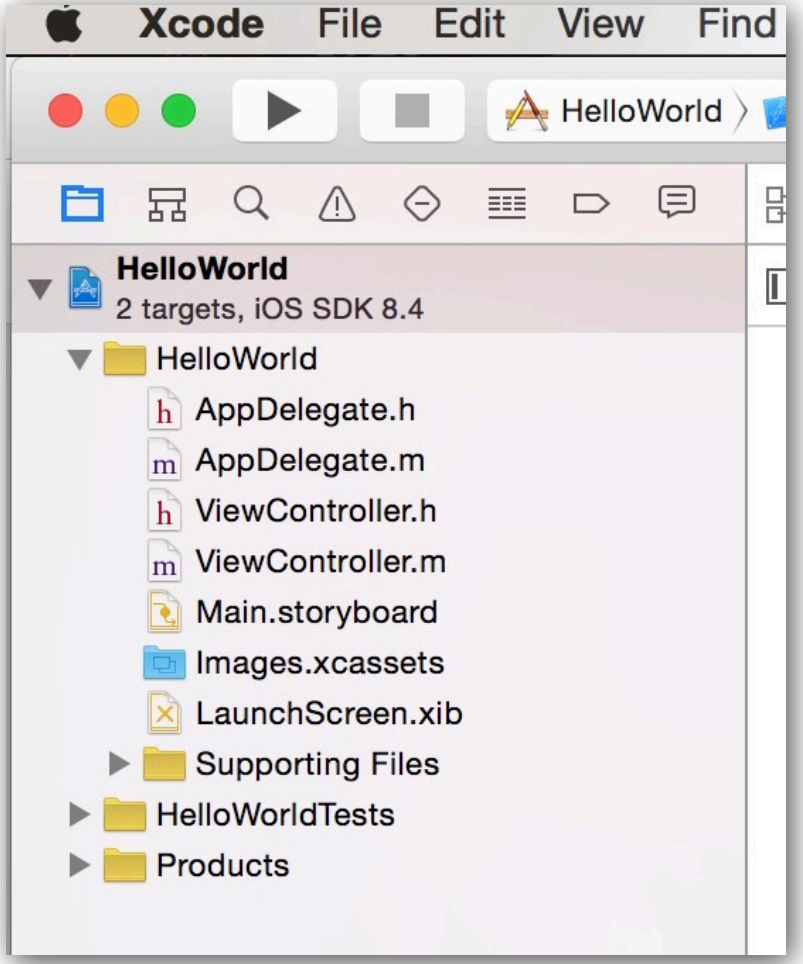


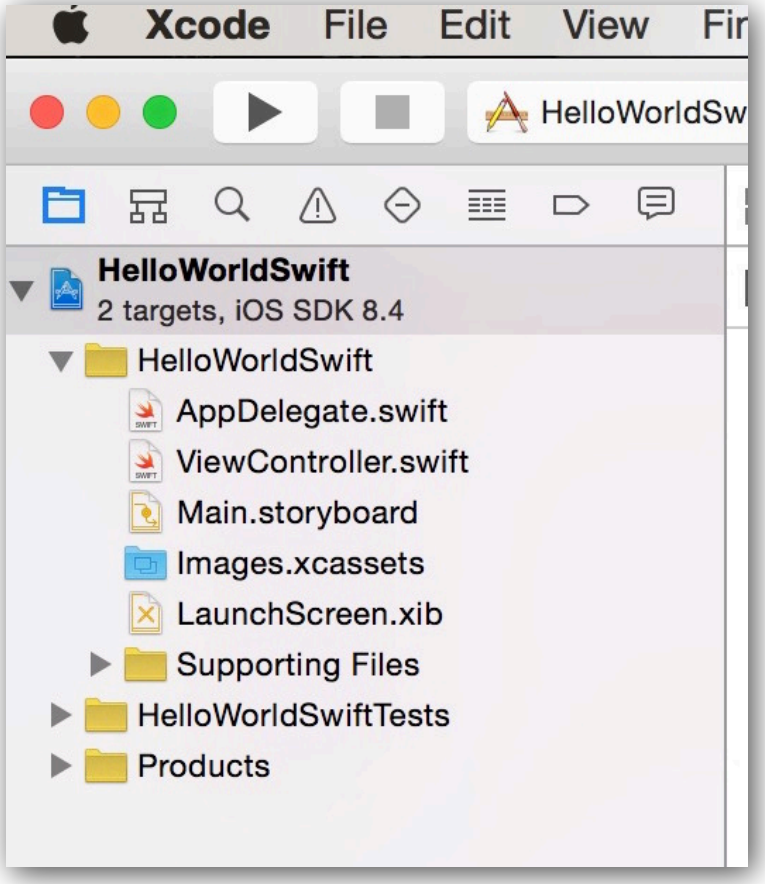
Programming Language

- Objective-C
- Swift
- C (limited usage)
- C++ (uncommon)

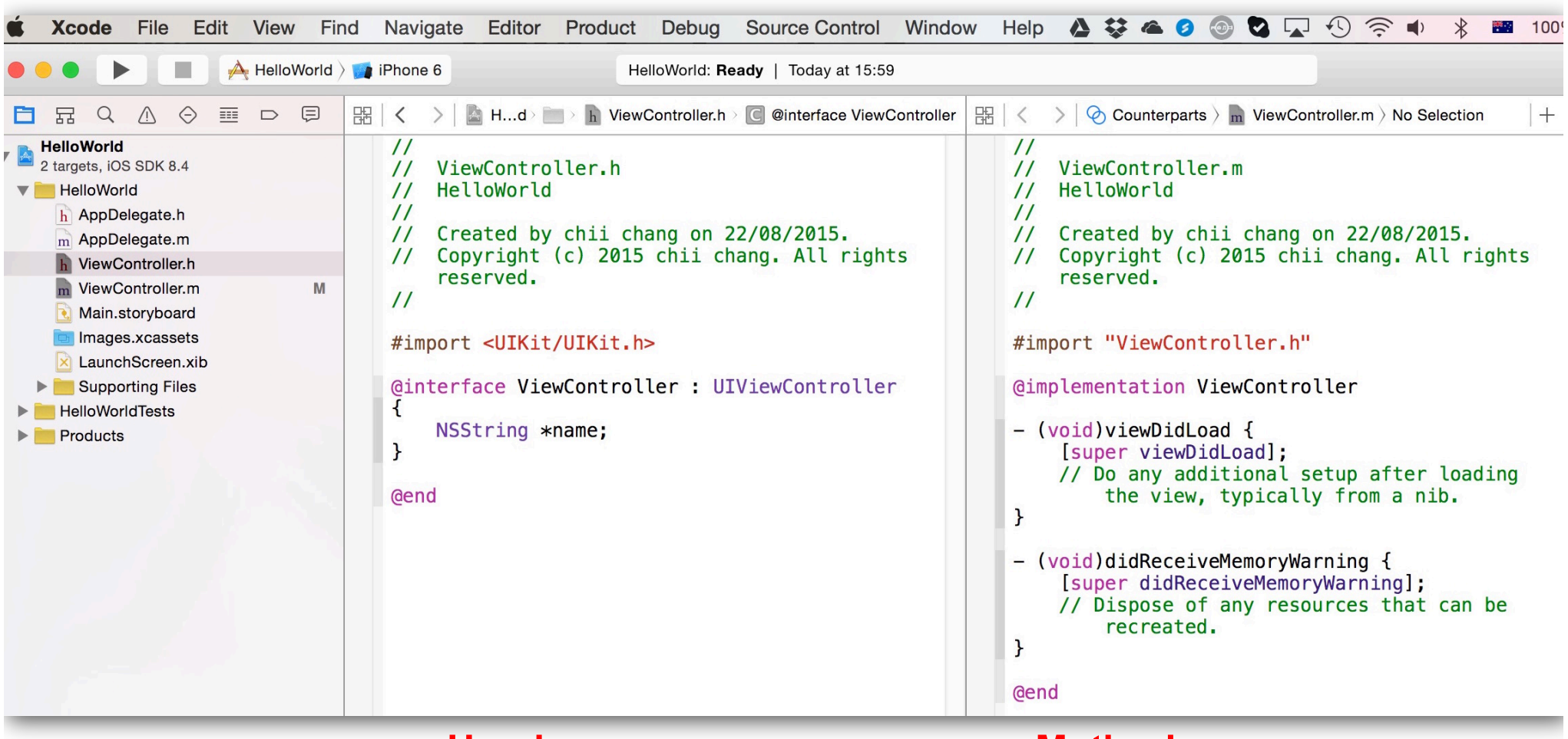
File Structure of iOS App (1/2)

- Objective-C vs. Swift





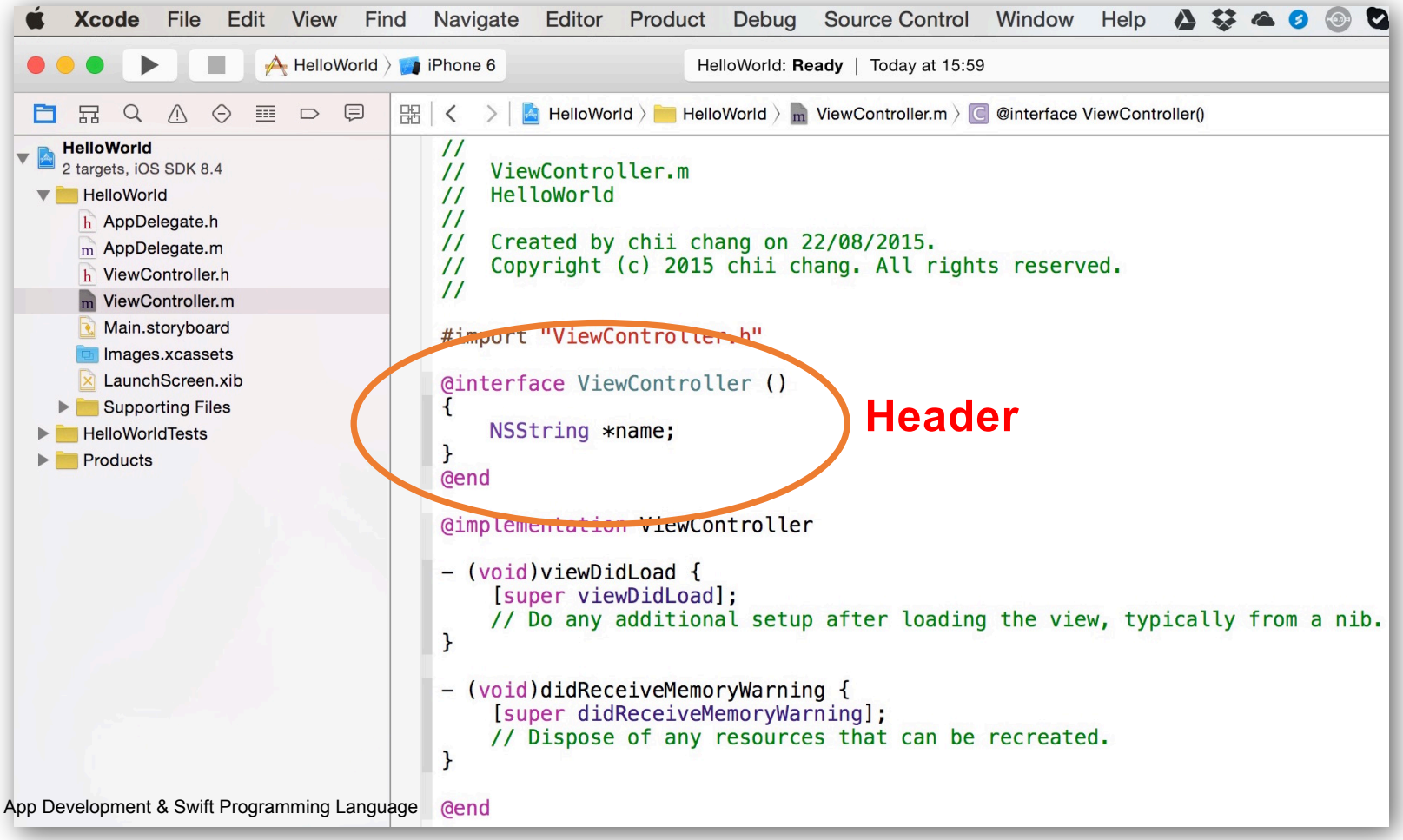
Objective-C Class



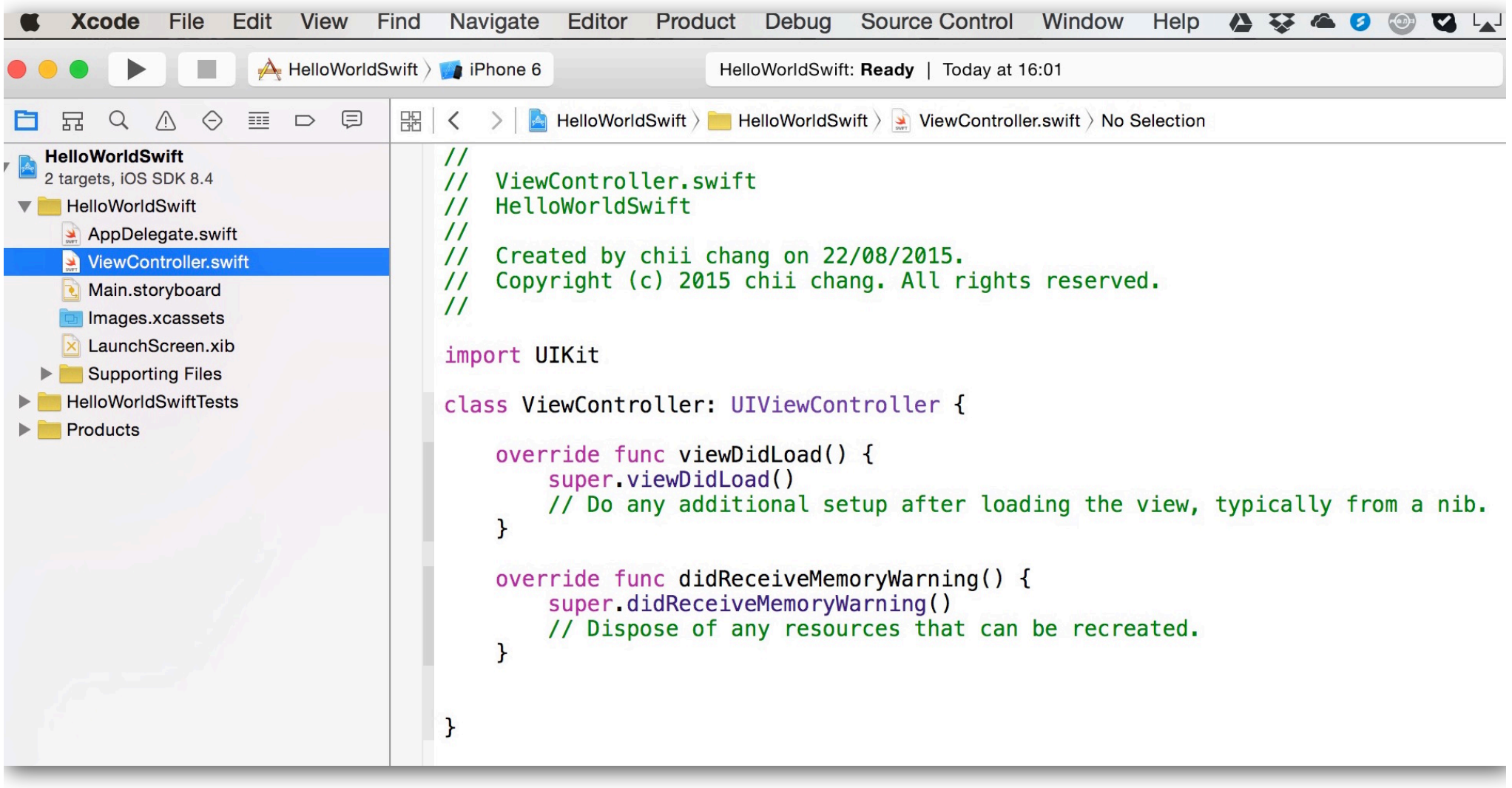
Header **Method**

File Structure of iOS App (2/2)

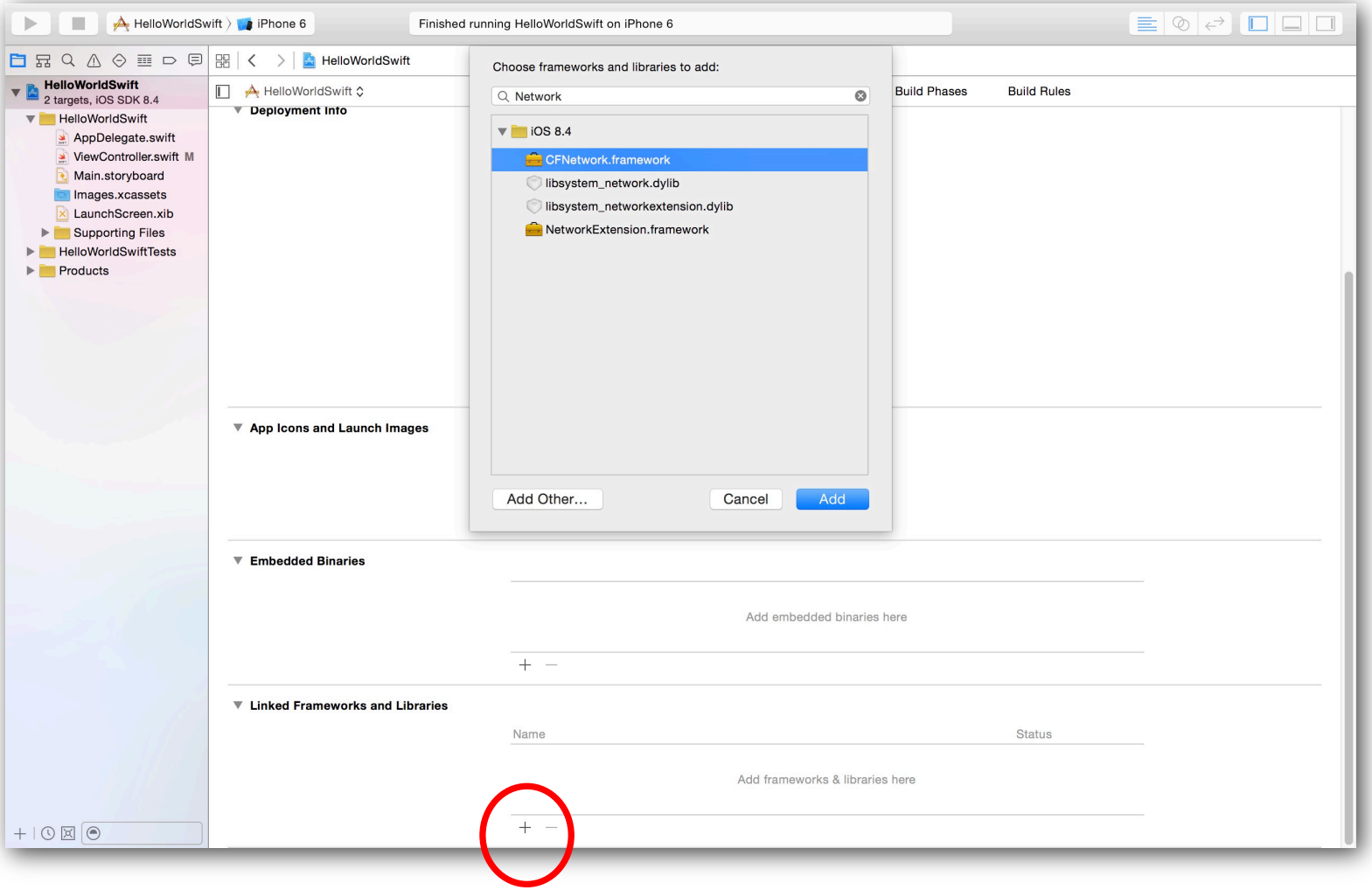
- Header description can be included in the method file (in Objective-C)



Swift Class


Xcode File Edit View Find Navigate Editor Product Debug Source Control Window Help
HelloWorldSwift 〉 iPhone 6
HelloWorldSwift: Ready | Today at 16:01
HelloWorldSwift 〉 HelloWorldSwift 〉 ViewController.swift 〉 No Selection
HelloWorldSwift
2 targets, iOS SDK 8.4
HelloWorldSwift
AppDelegate.swift
ViewController.swift
Main.storyboard
Images.xcassets
LaunchScreen.xib
Supporting Files
HelloWorldSwiftTests
Products
//
// ViewController.swift
// HelloWorldSwift
//
// Created by chii chang on 22/08/2015.
// Copyright (c) 2015 chii chang. 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.
}
}

Application Settings
- Linked Framework and Libraries

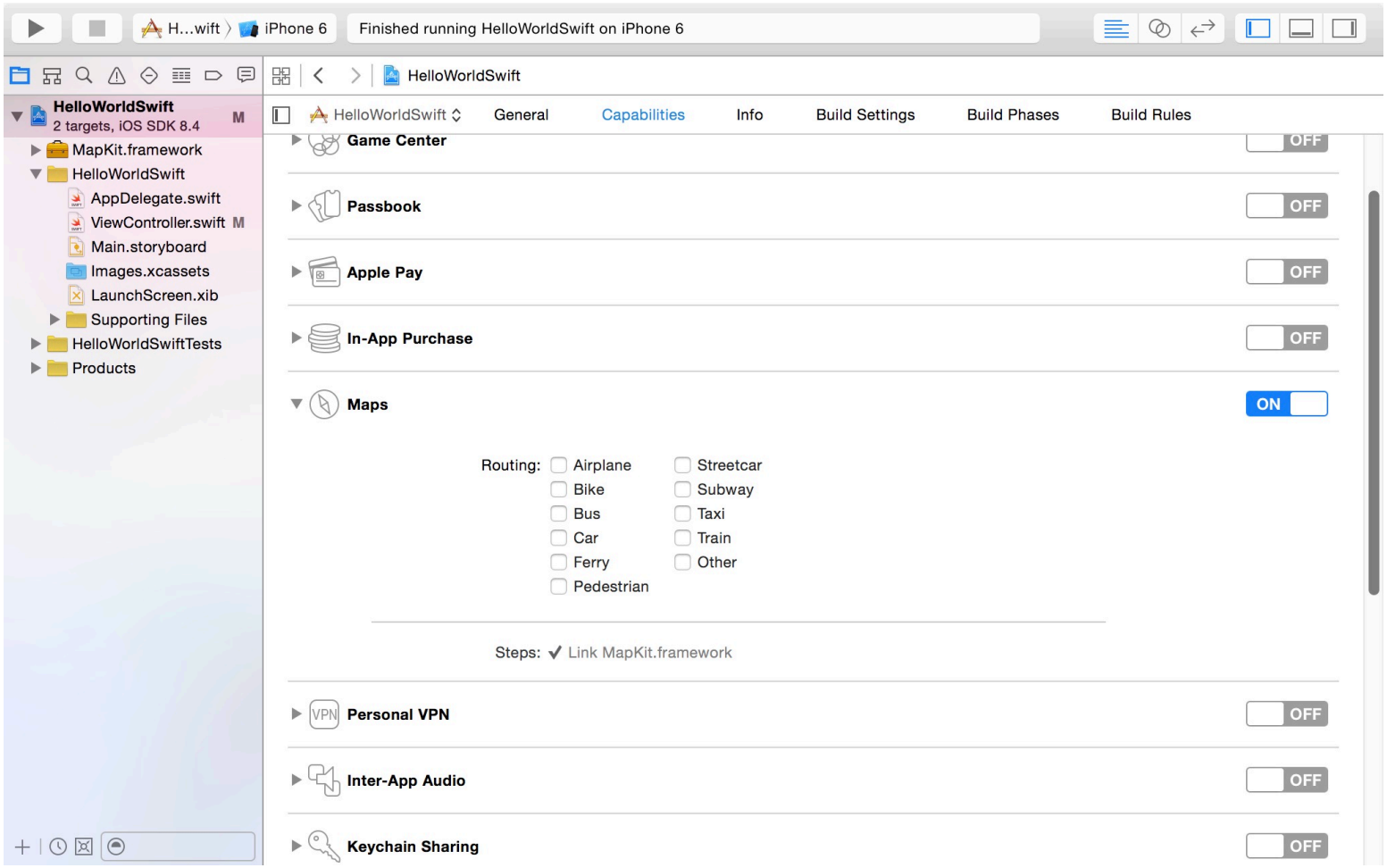


Importing 3rd Party Resources?

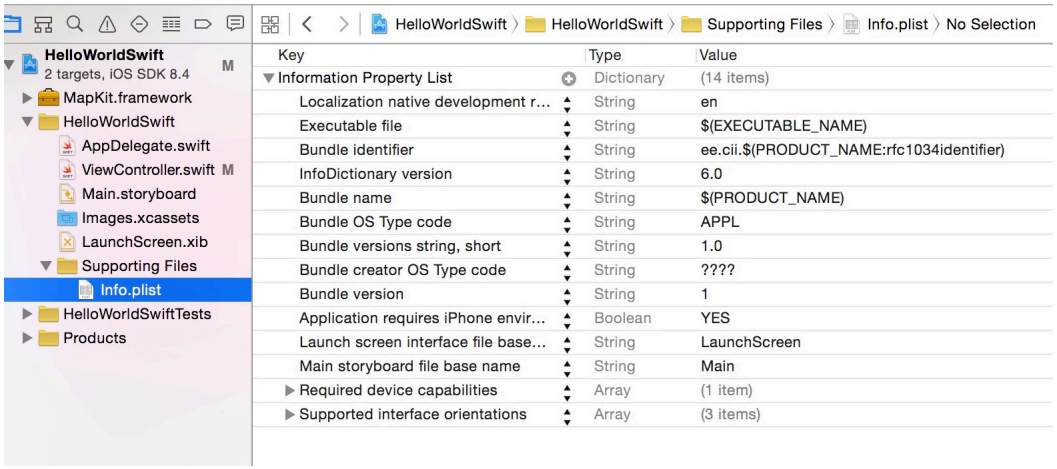
Demo

Bridging Objective-C class with Swift class

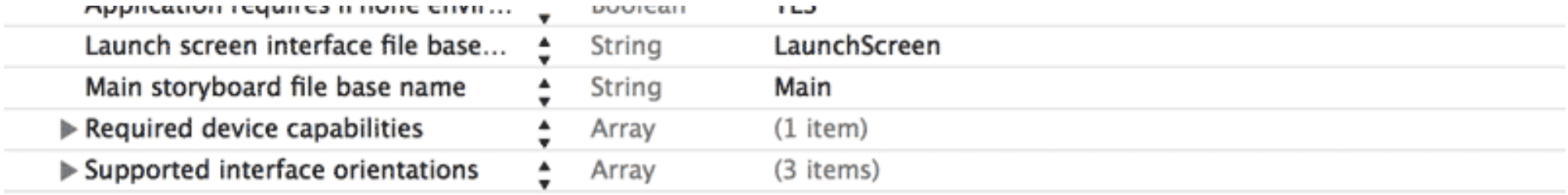
Application Settings
- Media Kit



Application Settings
- Property List (plist) and Permission



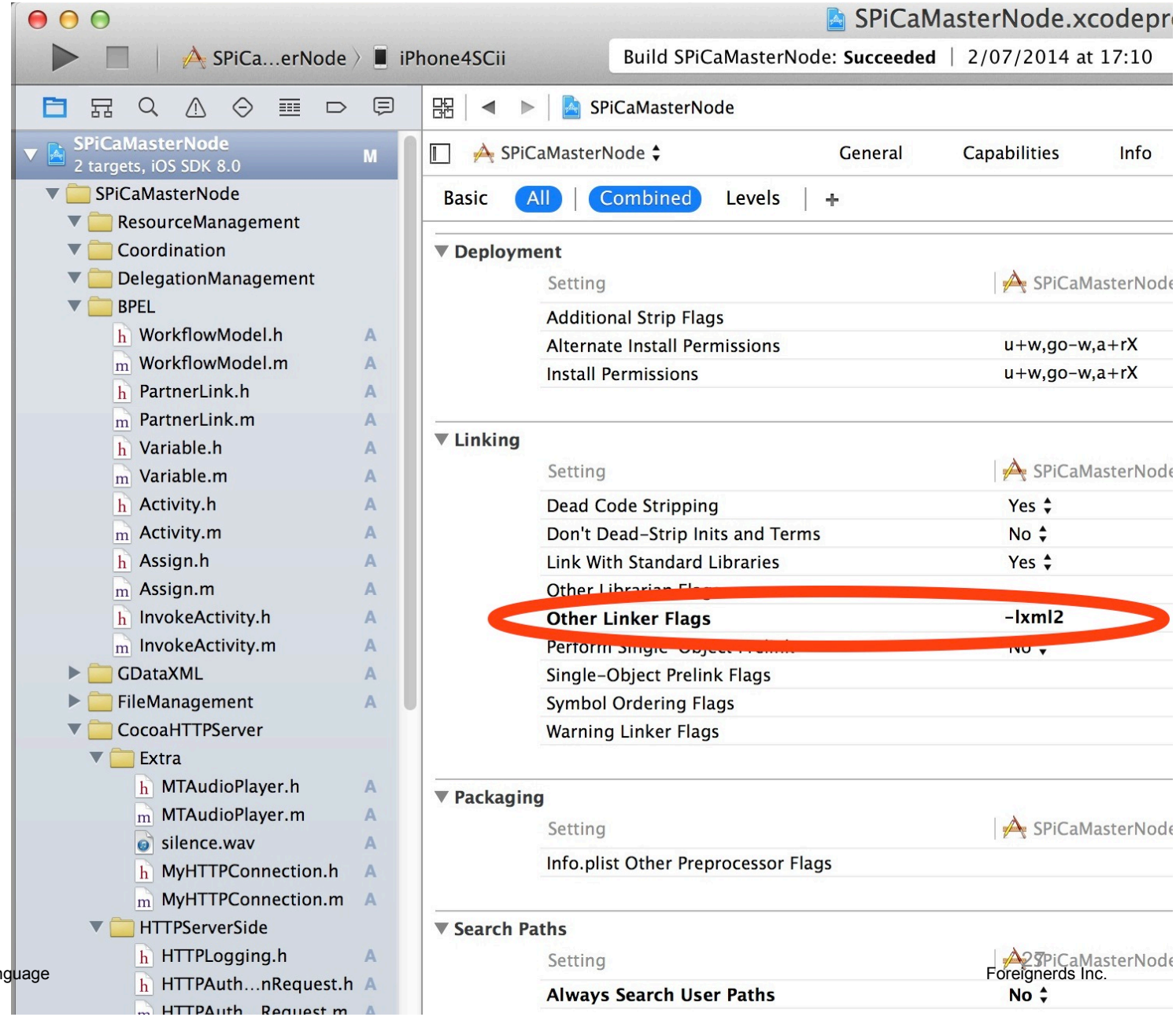
Example: Location Tracking Permission



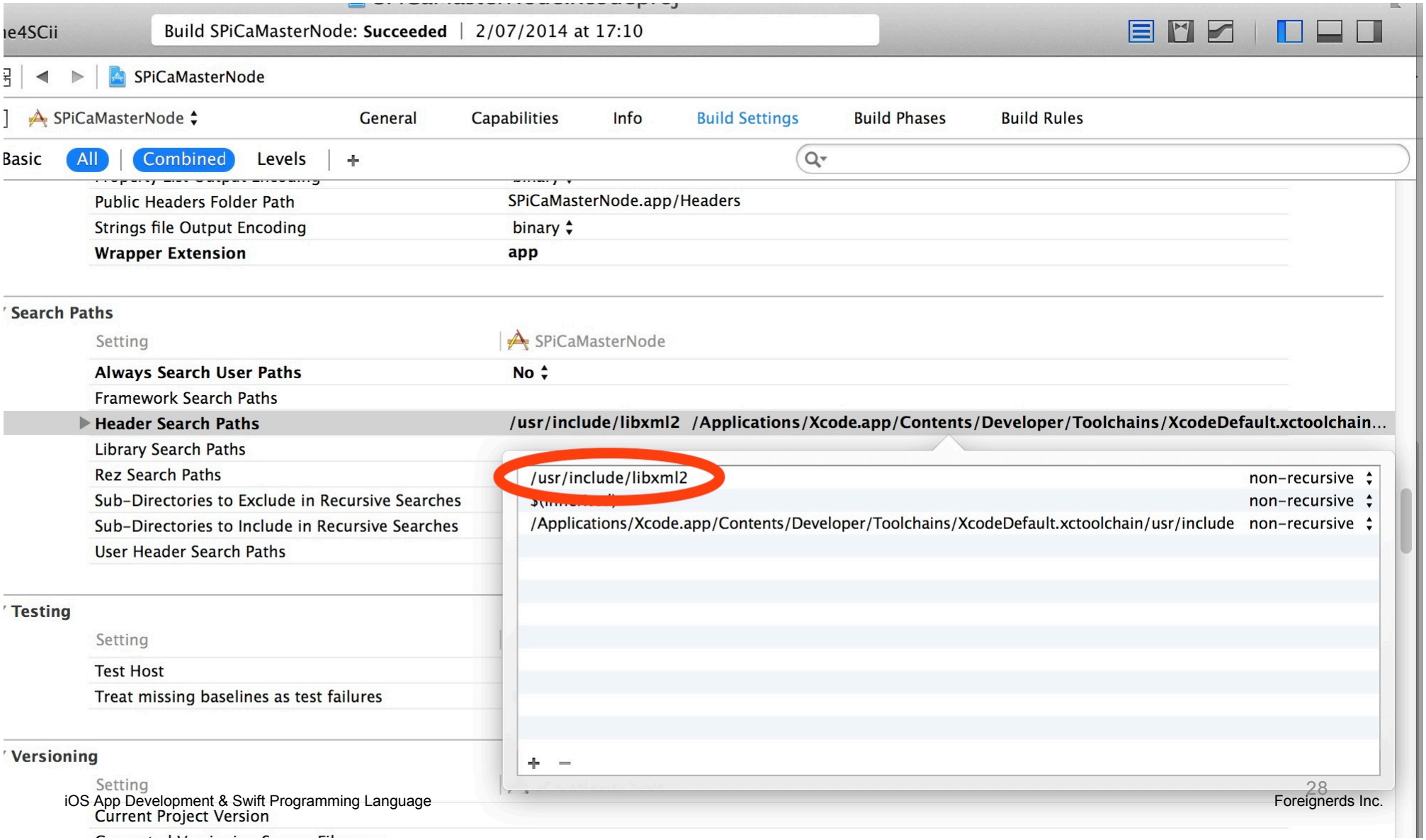
Source: http://willd.me/posts/getting-started-with-ibeacon-a-swift-tutorial

Application Settings - Flag

- Example, using GDataXML (of Gdata API)

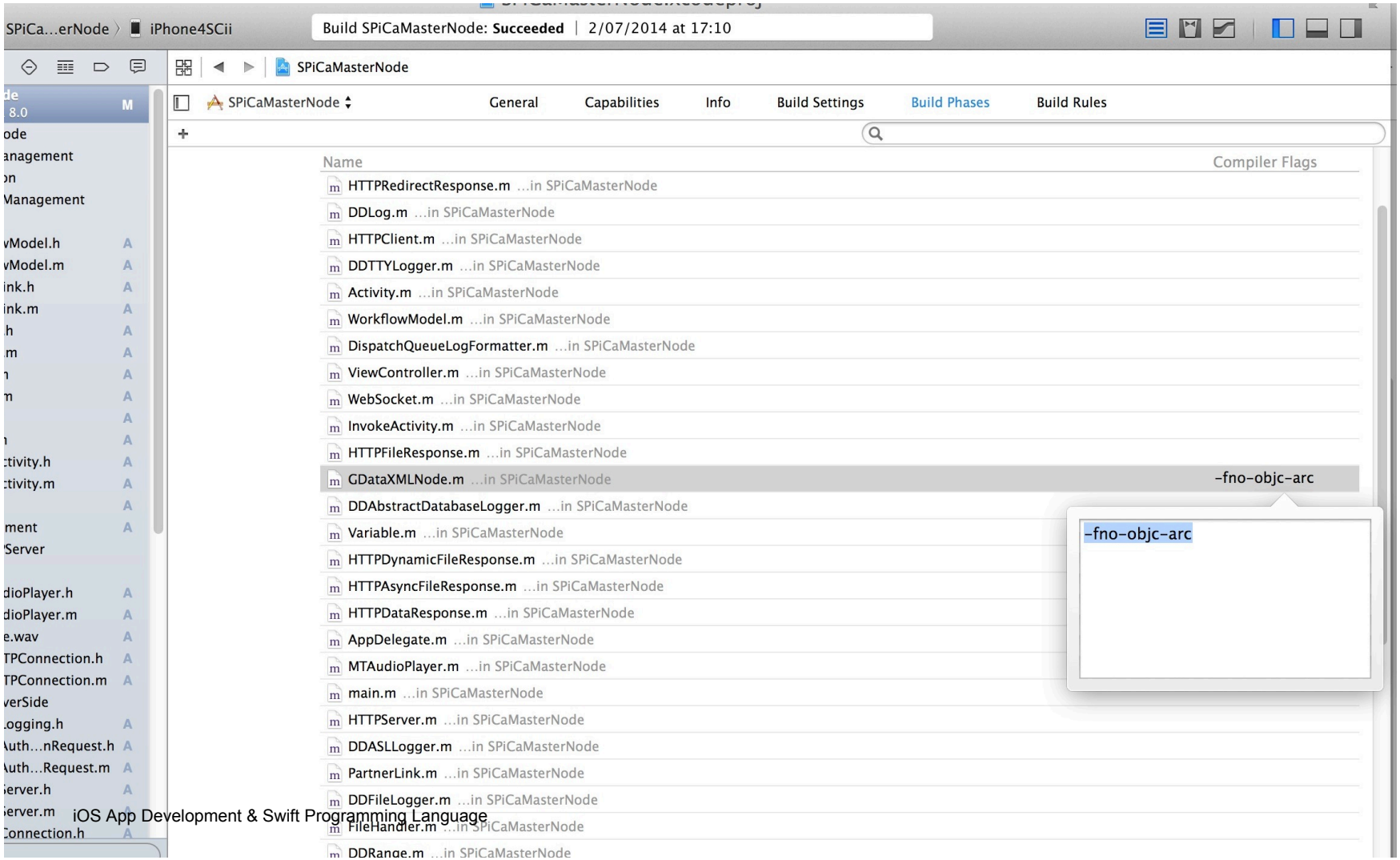


Application Settings – Search Path



Application Settings
– Individual Class Setting (disable ARC)

Disable "Automatic Reference Counting (ARC)"



Automatic Reference Counting (ARC)

Manual Reference Counting

Allocate


```
MyClass *obj1 = [[MyClass alloc] init];
```

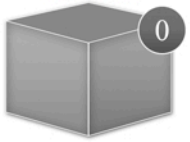
Retain


```
MyClass *obj2 = [obj1 retain];
```

Release


```
[obj2 release];
```

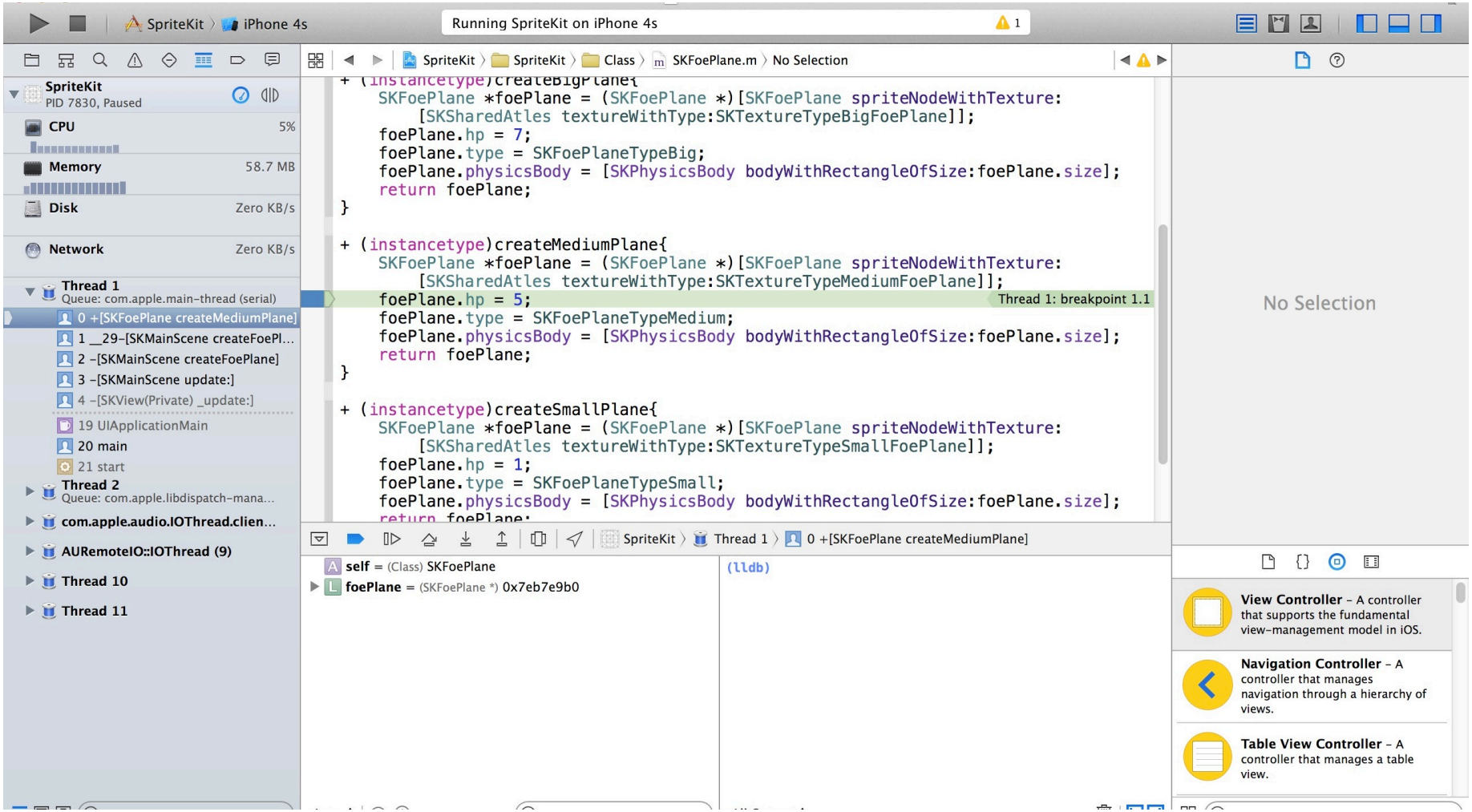
Release



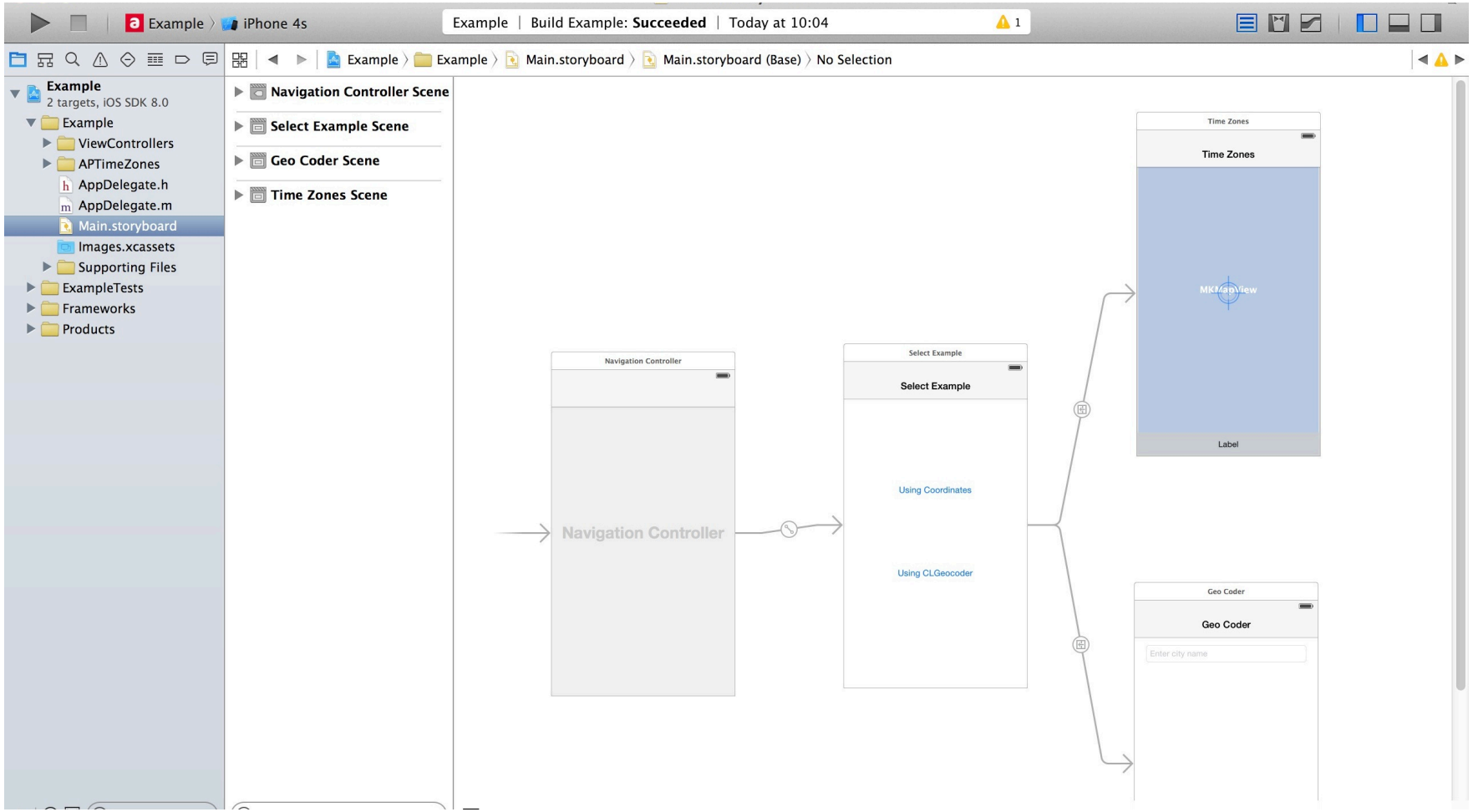

```
[obj1 release];
```

http://blog.teamtreehouse.com/ios-5-automatic-reference-counting-arc

Debug


SpriteKit 〉 iPhone 4s
Running SpriteKit on iPhone 4s
SpriteKit 〉 SpriteKit 〉 Class 〉 SKFoePlane.m 〉 No Selection
SpriteKit
PID 7830, Paused
CPU 5%
Memory 58.7 MB
Disk Zero KB/s
Network Zero KB/s
Thread 1
Queue: com.apple.main-thread (serial)
0 +[SKFoePlane createMediumPlane]
1 __29-[SKMainScene createFoePl...
2 -[SKMainScene createFoePlane]
3 -[SKMainScene update:]
4 -[SKView(Private) _update:]
19 UIApplicationMain
20 main
21 start
Thread 2
Queue: com.apple.libdispatch-mana...
com.apple.audio.IOThread.clien...
AURemoteIO::IOThread (9)
Thread 10
Thread 11
+ (instancetype)createBigPlane{
SKFoePlane *foePlane = (SKFoePlane *)[SKFoePlane spriteNodeWithTexture:
[SKSharedAtles textureWithType:SKTextureTypeBigFoePlane]];
foePlane.hp = 7;
foePlane.type = SKFoePlaneTypeBig;
foePlane.physicsBody = [SKPhysicsBody bodyWithRectangleOfSize:foePlane.size];
return foePlane;
}
+ (instancetype)createMediumPlane{
SKFoePlane *foePlane = (SKFoePlane *)[SKFoePlane spriteNodeWithTexture:
[SKSharedAtles textureWithType:SKTextureTypeMediumFoePlane]];
foePlane.hp = 5;
Thread 1: breakpoint 1.1
foePlane.type = SKFoePlaneTypeMedium;
foePlane.physicsBody = [SKPhysicsBody bodyWithRectangleOfSize:foePlane.size];
return foePlane;
}
+ (instancetype)createSmallPlane{
SKFoePlane *foePlane = (SKFoePlane *)[SKFoePlane spriteNodeWithTexture:
[SKSharedAtles textureWithType:SKTextureTypeSmallFoePlane]];
foePlane.hp = 1;
foePlane.type = SKFoePlaneTypeSmall;
foePlane.physicsBody = [SKPhysicsBody bodyWithRectangleOfSize:foePlane.size];
SpriteKit 〉 Thread 1 〉 0 +[SKFoePlane createMediumPlane]
self = (Class) SKFoePlane
foePlane = (SKFoePlane *) 0x7eb7e9b0
(lldb)
No Selection
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.

Storyboard

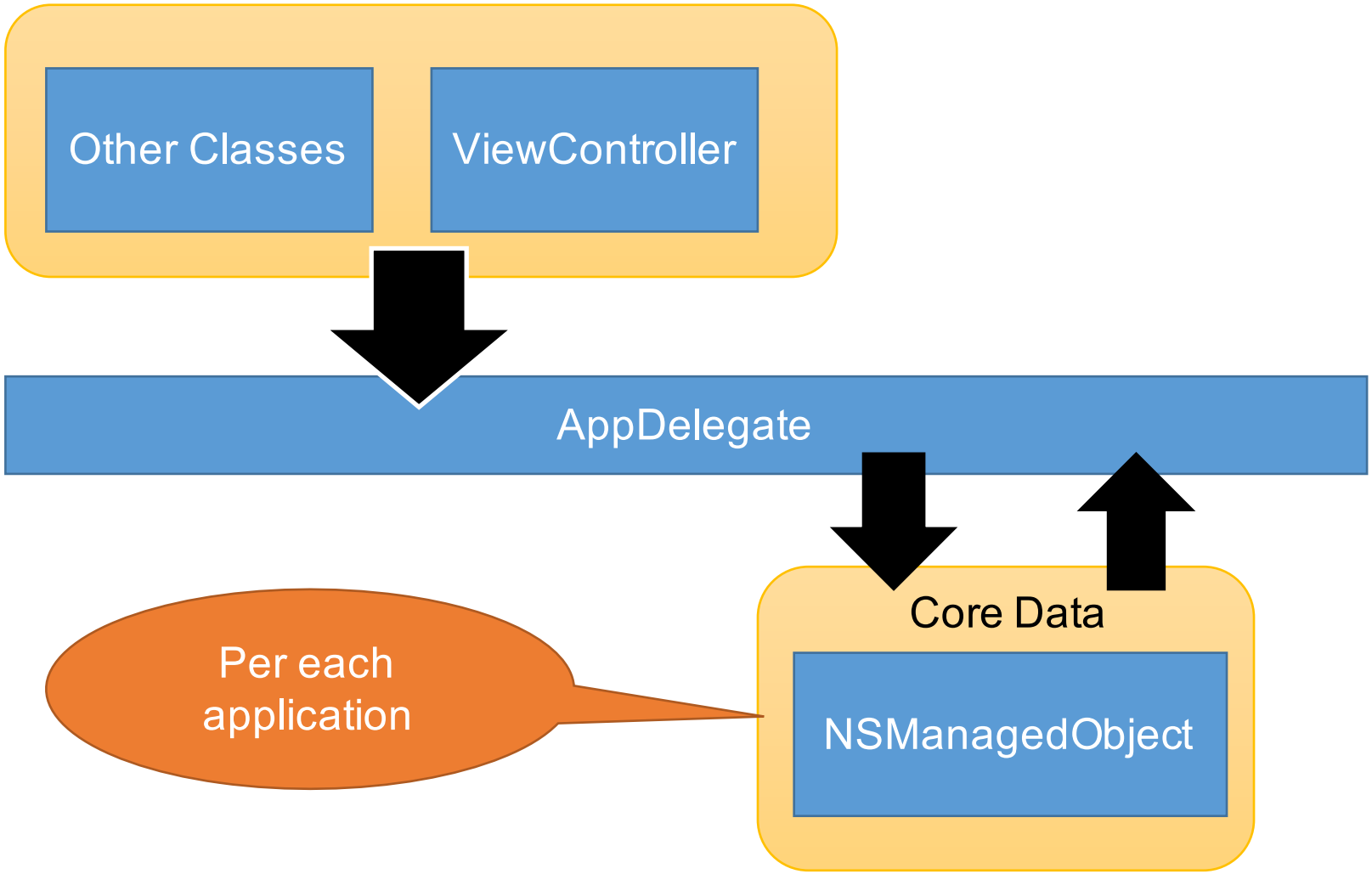

Example
iPhone 4s
Example | Build Example: Succeeded | Today at 10:04
Example
2 targets, iOS SDK 8.0
Example
ViewControllers
APTimeZones
AppDelegate.h
AppDelegate.m
Main.storyboard
Images.xcassets
Supporting Files
ExampleTests
Frameworks
Products
Example > Example > Main.storyboard > Main.storyboard (Base) > No Selection
Navigation Controller Scene
Select Example Scene
Geo Coder Scene
Time Zones Scene
Navigation Controller
Select Example
Using Coordinates
Using CLGeocoder
Time Zones
MKMapView
Label
Geo Coder
Enter city name

Basic Graphical User Interface

- Layout
- Linking GUI objects to classes (drag and drop) in Objective-C

DEMO

Inbuilt Database: Core Data



Detail in later slides

Accessing File System?

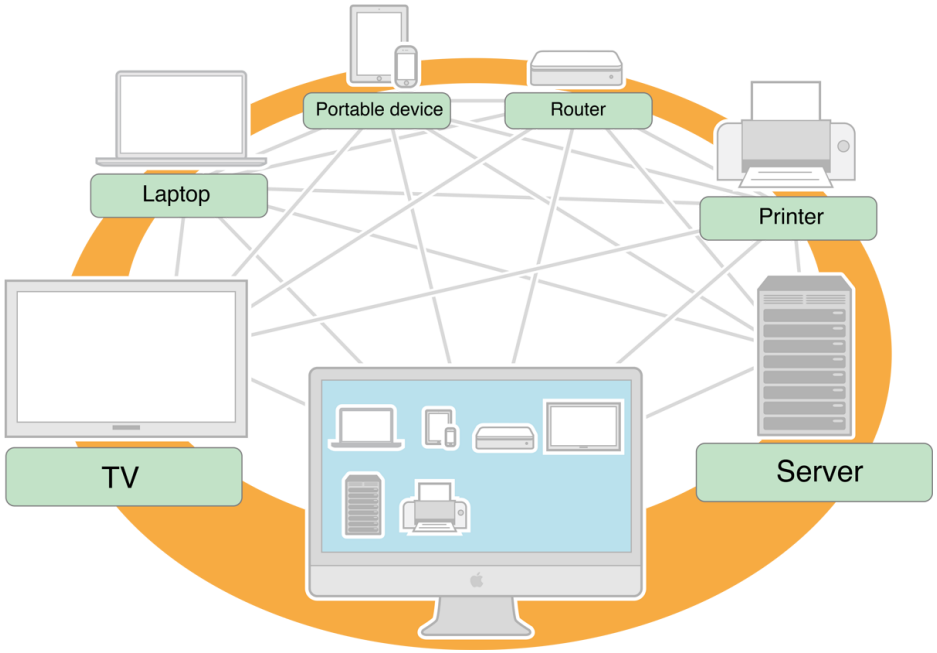
- By default, an application can only access its corresponding directories
- Example in Objective-C:

```
+(void)saveFile:(NSData *)aData withFileName:(NSString
*)fileName andFileType:(NSString *)fileType
{
    NSString *docDir =
[NSSearchPathForDirectoriesInDomains(NSDocumentDirectory,
NSUserDomainMask, YES) objectAtIndex:0];
    NSString *ffPath = [NSString
stringWithFormat:@"%@/%@.%@",docDir,fileName,fileType];
    [aData writeToFile:ffPath atomically:YES];
}
```

Zero-configuration: Bonjour

- Multicast DNS (mDNS)
- Included in foundation library: **NSNetService**; **CFNetServices**

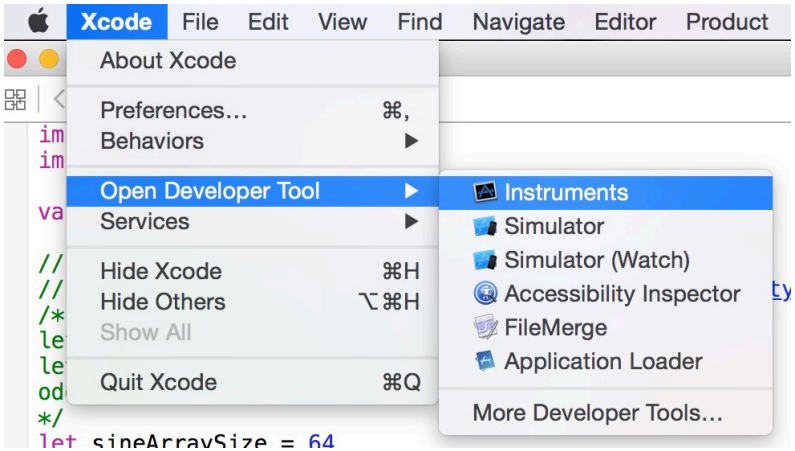
"Bonjour is a suite of protocols for zero-configuration networking over IP that Apple has submitted to the IETF as part of the ongoing standards-creation process."
—(Mac Developer Library)

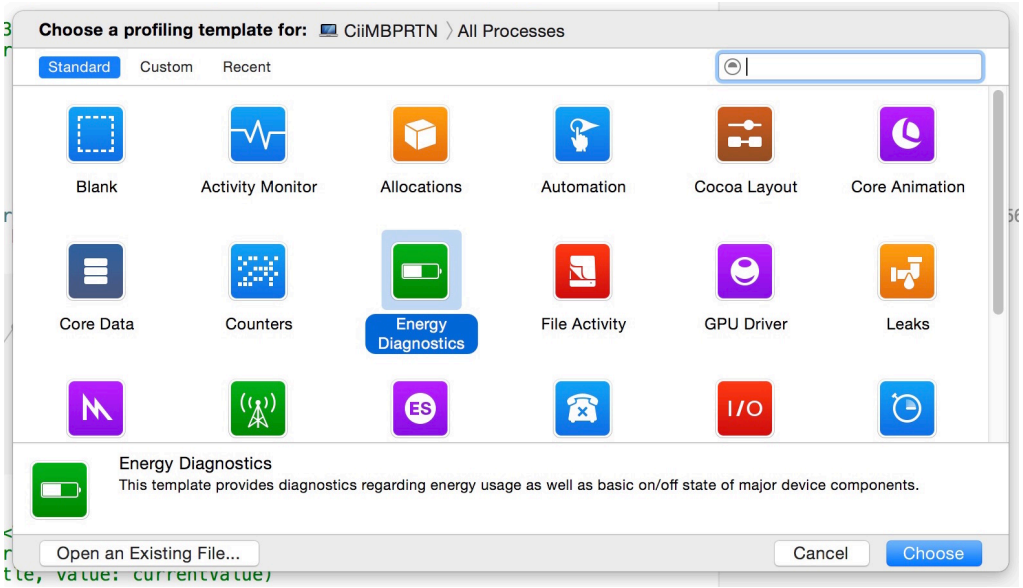


Source:
https://developer.apple.com/library/mac/documentation/Cocoa/Conceptual/NetServices/Introduction.html

Instruments

- Demo



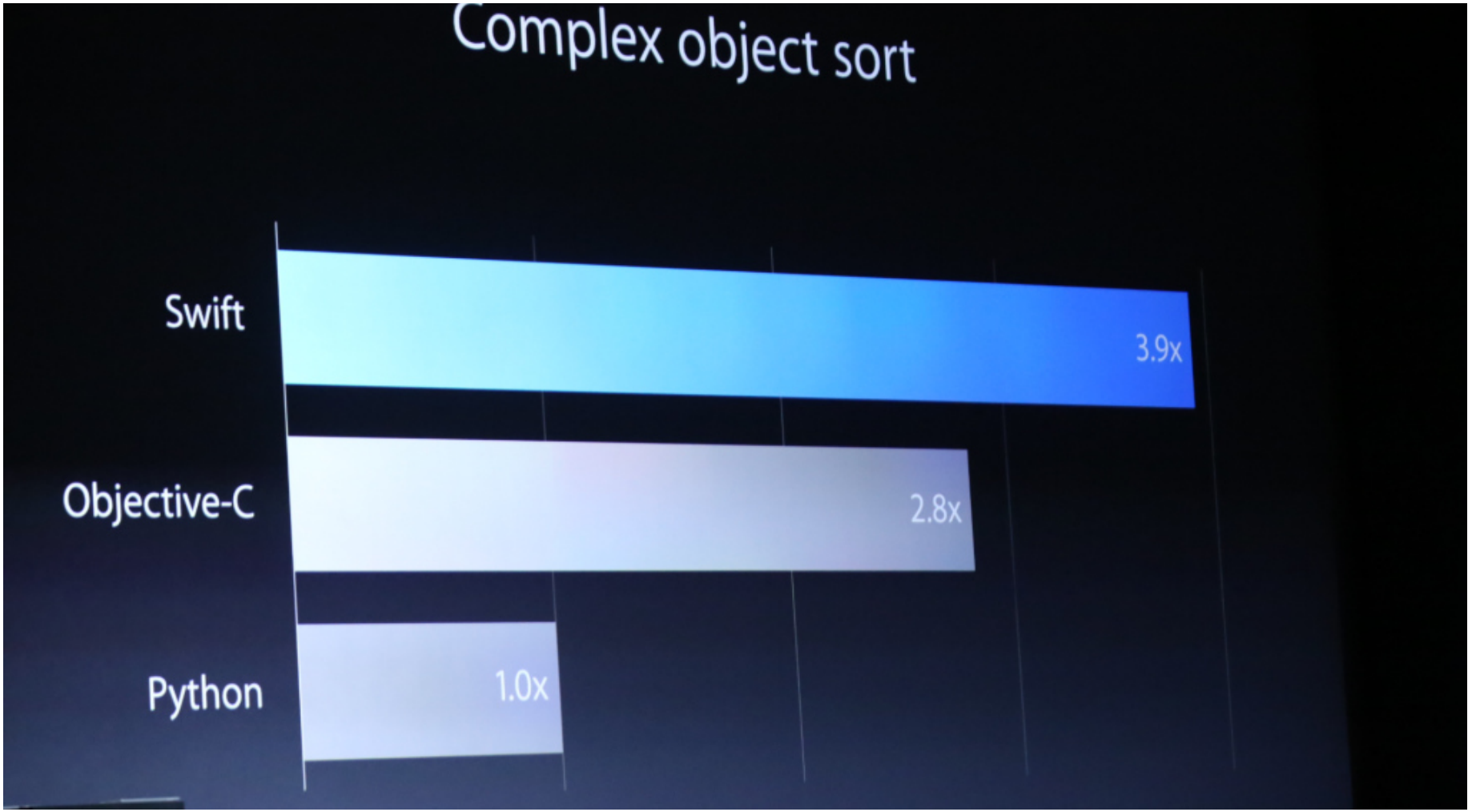


Programming Languages for iOS App Development

- Objective-C (ObjC)
  - Programming language for NeXTSTEP OS (1980s)
  - from NeXT inc. founded by Steve Jobs in 1985 – 1996 (Acquired by Apple Computer)
- **Swift**
  - Ver. 1 introduced in 2014;
  - Now: **Swift 2**, **Open Source** in fall 2015, introduced in WWDC 2015[1]
- C++
  - See http://www.raywenderlich.com/62989/introduction-c-ios-developers-part-1

[1] https://developer.apple.com/swift/blog/?id=29

Swift has better performance



WWDC 2014

Demo: Playground

Swift:
Basic Syntax

- **`NS*`**; e.g. **`NSURL`**, **`NSURLRequest`**, **`NSURLSession`** or **`NSURLConnection`** etc.
- 'NS' stands for 'NeXTSTEP';
- No Semicolon required
- Type safe

Example of 'Type Safe':

```
let url = NSURL(string:
"http://www.stackoverflow.com" )
```

```
var v1 = 123
```

Java, Objective-C, Swift
(without importing extra libraries)

- Java

```
java.lang.String gender = new String("Male");
```

or

```
java.lang.String gender = "Male";
```

- Objective-C

```
NSString *gender = [[NSString alloc] initWithString:@"Male"];
```

or

```
NSString *gender = @"Male";
```

- Swift

```
let gender = "Male"   // Constant; Cannot be changed
```

or

```
var gender = "Male"   // Can be changed
```

or

```
var gender: String? = "Male"
```

Demo

Swift:
Basic Syntax

• ‘Let’ (constant value) and ‘Var’ (variable)

```
let person = "Peter"
var man = "Peter"
man = "Ken" // this is ok
person = "Ken" // this is an error
```

Let π = 3.14159265359

```
let 🐱 = "cat"

print(🐱) //display "cat"
```

Swift:
Basic Syntax

- Array

```
var a2 = ["cat", "mouse", "dog”]
print(a2[1]) //display “mouse”
```

- Dictionary (Hashmap)

```
var animalList = ["🐱":"cat", "🐶":"dog", "🐭":"mouse"]

print(animalList["🐶"]!) //display ”dog”
```

Swift:
Basic Syntax

- Dictionary (Hashmap)

```
var animalList: [Character: String] = [:]

animalList["🐱"] = "cat"
animalList["🐶"] = "dog"
animalList["🐭"] = "mouse"

print(animalList["🐶"]!) //display "dog"
```

Swift:
Basic Syntax

- Loop

```
for i in 0...3
{
    print(i)
}
```

```
//display
0
1
2
3
```

```
Same as
for var i = 0; i<=3; ++i {
    print(i)
}
```

```
for j in 0..<3
{
    print(j)
}
```

```
// display
0
1
2
```

Swift:
Basic Syntax

```
If let actualNumber = Int(possibleNumber) {
    print("\'\(possibleNumber) \' has an integer value of \(actualNumber)")
} else {
    print("\'\(possibleNumber) \' could not be converted to an integer")
}
```

Source: “The Swift Programming Language (Swift 2)”

Swift:
Tuples

```
let http404Error = (404, “Not Found” )

// http404Error is of type (Int, String), and
equals (404, "Not Found”)
```

From: Apple Inc. “The Swift Programming Language.” iBooks. https://itun.es/au/jEUH0.l

Swift:
Functions

```
func greet(name: String, day: String) -> String
{
    return "Hello \(name)! Today is \(day)."
}
greet( "Peter" , day: "Monday" )
//display "Hello Peter! Today is Monday."
```

Swift: Protocol

- ‘Protocol’ (in Swift) is similar to ‘Interface’ in Java

```
protocol ExampleProtocol {
      var simpleDescription: String { get }
      mutating func adjust()
}

class SimpleClass: ExampleProtocol {
      var simpleDescription: String =
                              "A very simple class."
      var anotherProperty: Int = 69105
      func adjust() {
            simpleDescription += "  Now 100% adjusted."
      }
}
```

From: Apple Inc. “The Swift Programming Language.”

More GUI

Demo

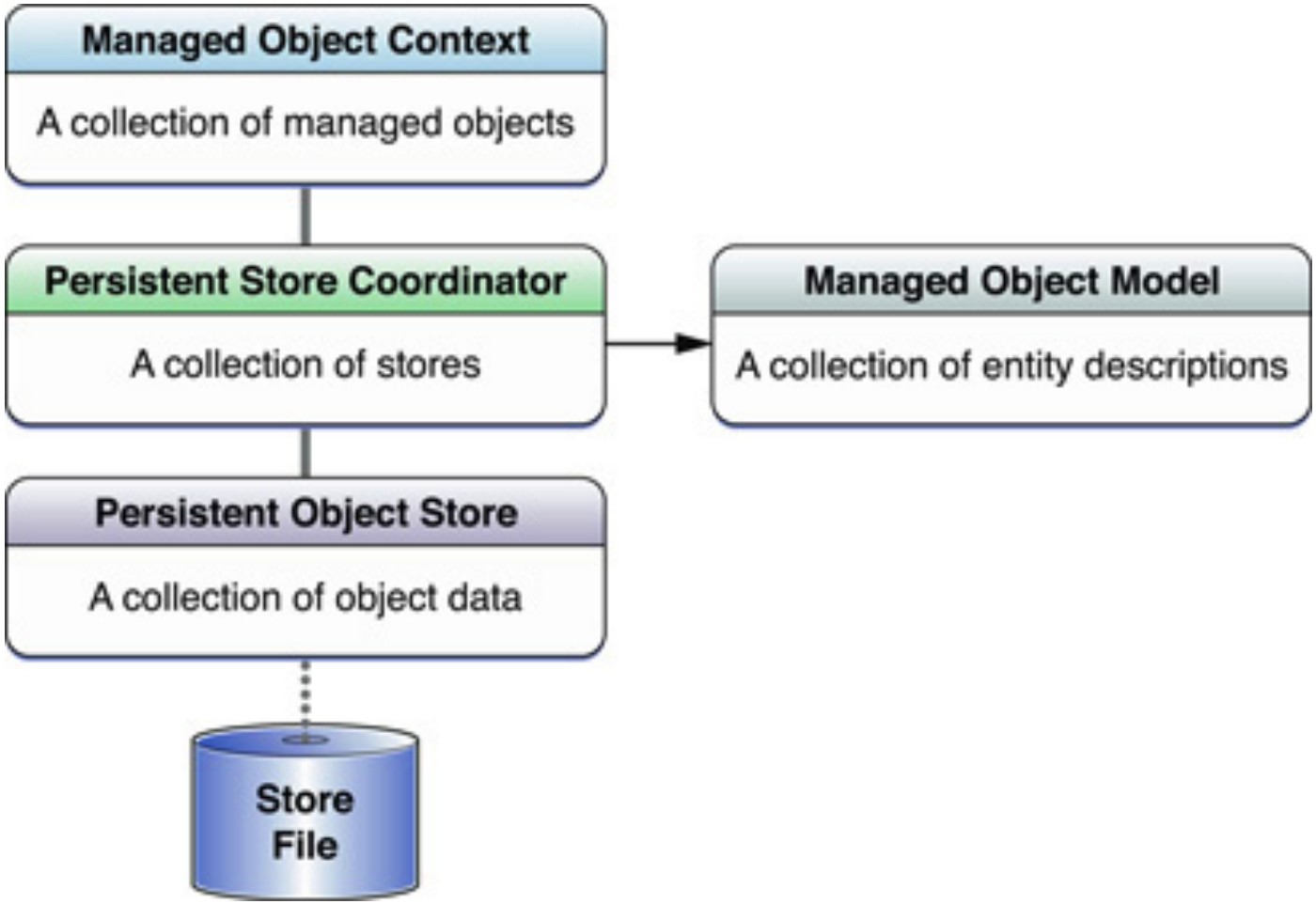
Navigation Control, Image View, Table View, Web View, MapView

in Swift

[Partial Source code]
Core Data Example: https://github.com/BNakum/Tutorials
from http://agstya.com/core-data-tutorial-in-swift-2-0/

TableView Example: http://kodu.ut.ee/~chang/table.zip

Swift:
Core Data



[source] https://developer.apple.com/library/ios/documentation/DataManagement/Devpedia-CoreData/coreDataStack.html

Swift:
Core Data

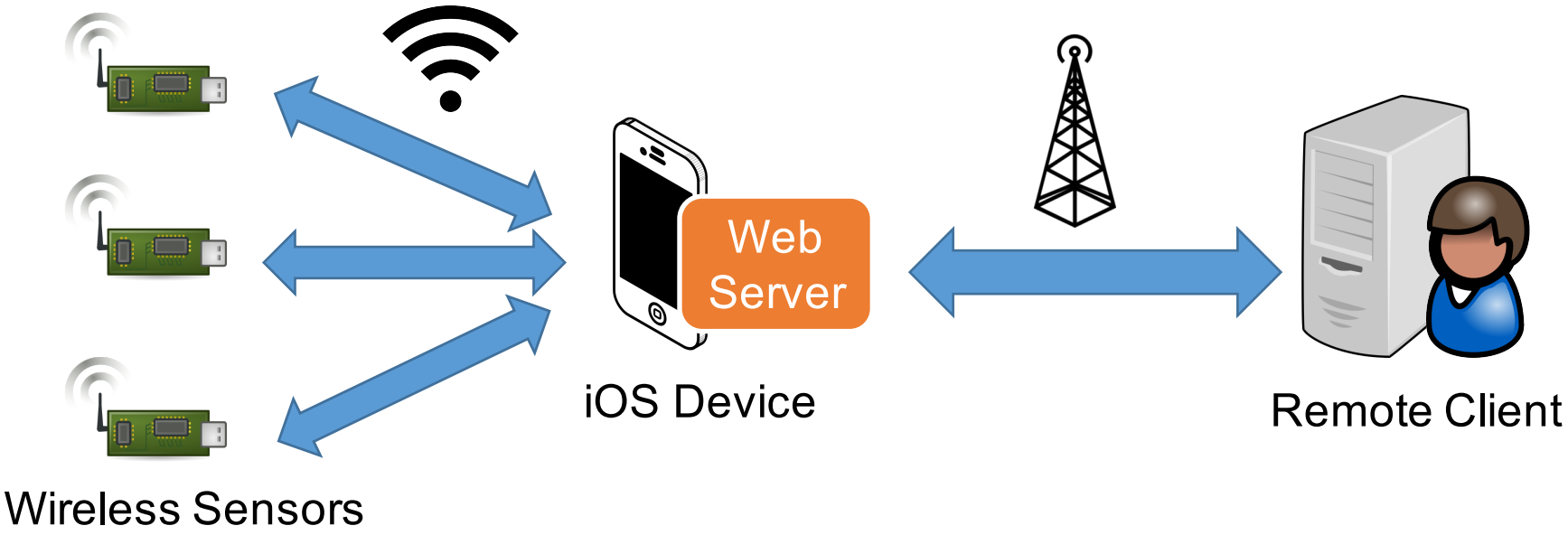
```
let appDelegate =
UIApplication.sharedApplication().delegate as!
AppDelegate


let managedContext =
appDelegate.managedObjectContext


//fetch all data
let fetchRequest = NSFetchRequest(entityName:
"TheEntityName" )
```

Demo

Mobile Web Service Provisioning



Demo

File Upload Service hosted on iPhone

Interesting Tools

- https://developer.apple.com/videos/wwdc/2015/
- Mobile Web Server: CocoaHTTPServer https://github.com/robbiehanson/CocoaHTTPServer
- GData Objective-C Client https://code.google.com/p/gdata-objectivec-client/
- RESTKit https://github.com/RestKit/RestKit
- AFNetworking https://github.com/AFNetworking/AFNetworking

- RESTful BPEL workflow execution engine by Mobile & Cloud Lab

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Thankyou