HIT3329 / HIT8329
Creating Data Driven Mobile Applications

Lecture 1
Welcome to iOS

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Swinburne University of Technology

SWINBURNE UNIVERSITY OF TECHNOLOGY

Before We Begin

Lectures & Labs
12 x Tuesday Nights

Assignments
8 x homework (2 x optional)

Portfolio Assessment
Only for the brave

Rules
No Copy Paste Coding

Requirements
Access to Intel Mac
OO Programming Experience

Texts
http://developer.apple.com
http://www.cocoadev.com

Q&A
http://stackoverflow.com
paul at longweekendmobile dot com

You Really Should Know These

Object Oriented Fundamentals:

- Classes
- Instances
- Difference between class & instance methods
- Instance variables (ivars)
- Class inheritance
- Superclass
- Subclassing
- Interfaces/Protocols

Some of Our Work

Japanese Flash

Animal Phone

www.longweekendmobile.com/apps

What's On For Today?

1. What This Course Is About
2. The Learning Curve
3. Objective-C
4. iOS Developer Tools

1.0 What This Course Is About

- Writing apps that are:
  - Data driven
  - Networked enabled
  - Sensor integrated
  - Touchable
  - Mobile

and most of all ...

... apps that are cool!

1.1 Learning Objectives

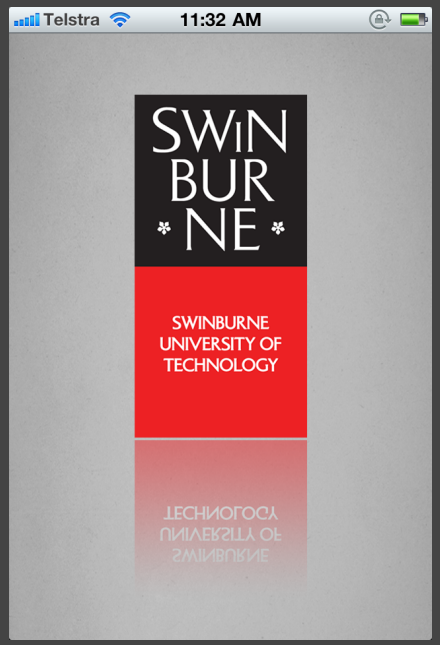
1. Build, test, and debug mobile applications that consume and process external data, as well as collect and publish data

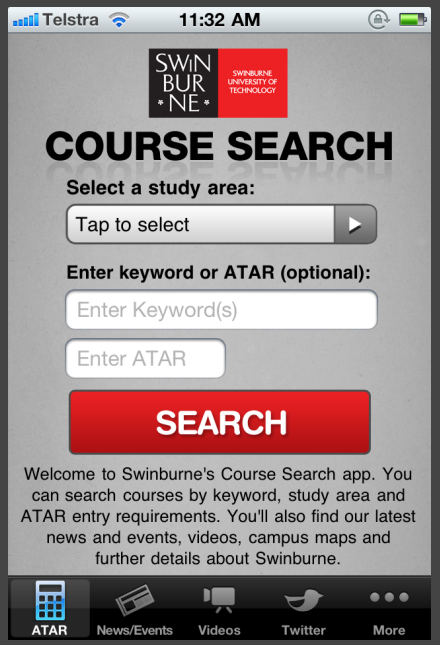
2. Explain the importance of and design testable, reusable code components

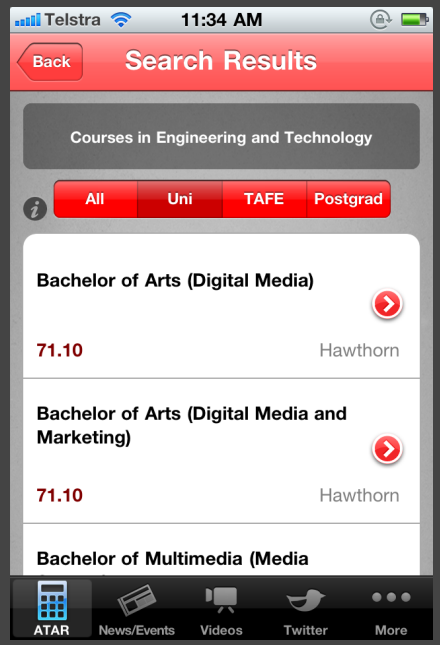
3. Design mobile applications that work within device and environmental limitations

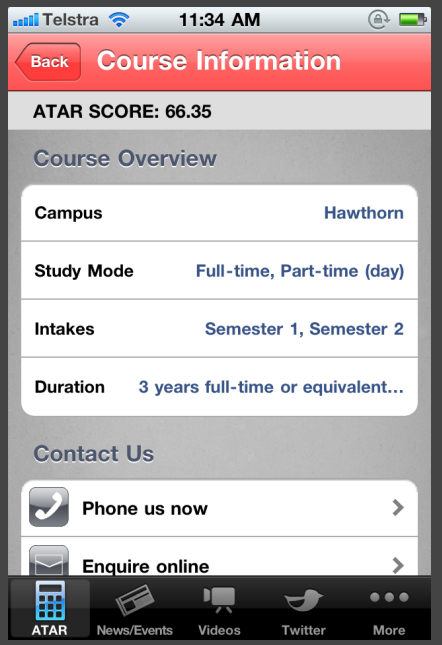
4. Use caching and concurrency to create fast applications with a better user experience

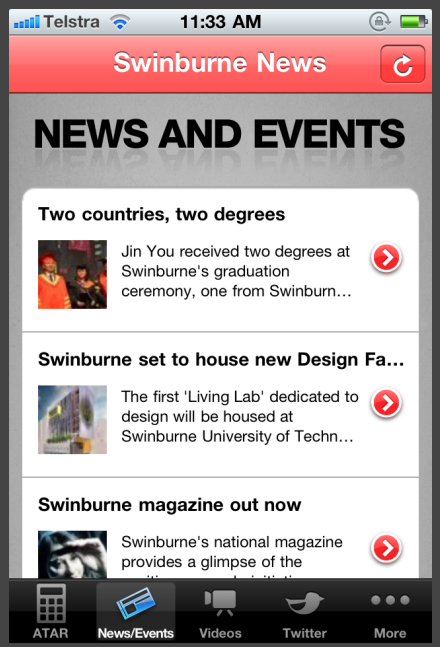
1.2 Example Data Driven App

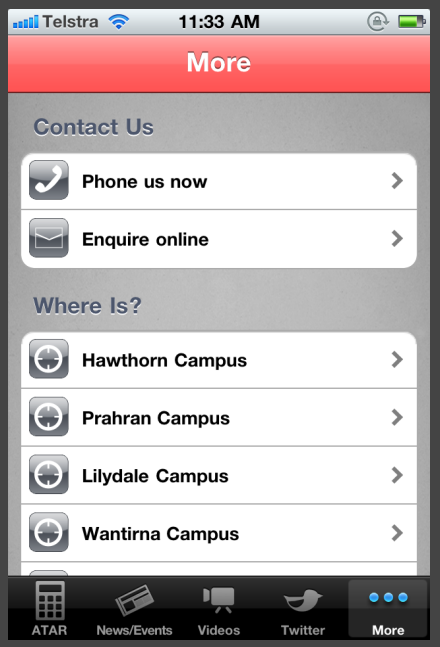


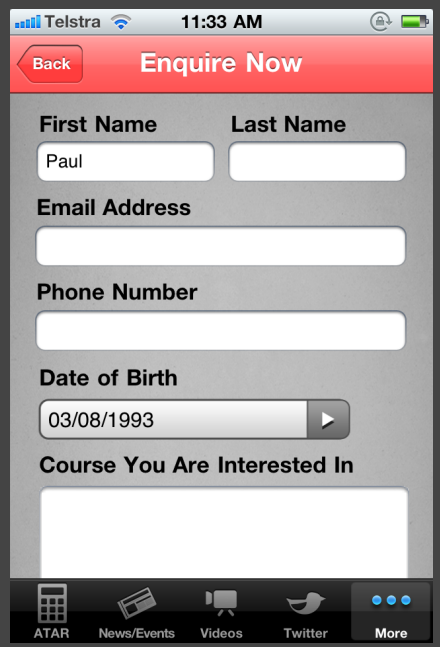












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2.0 The Learning Curve

- iPhone 2G released 2007
- iPhone 3G released 2008
- Long Weekend started 2009
- New, New, New
  - Language
  - Hardware
  - Tools
  - Distribution
  - Design Rules

2.1 Unfamiliar Platform

- Objective C - A Unique Language
  - object.someMethod(); // Java
  - [object someMethod]; // Objective C
- Manual Memory Management
- Centralised Distribution (App Store)
- Digital Signing of Apps
- Building to Simulator & Devices

2.2 Different Hardware

It's not a PC!

- *Reduced resources (RAM, CPU)*
- *Small screen*
- *Touch input*
- *No WIMP interfaces*

2.2 Different Hardware II

- Slow unreliable networks
- Battery can run out
- Phone can ring

2.3 The Apple App Store

Playing by the rules

- *Human Interface Guidelines*
- *Review rules unpublished (until 2010)*
- *Puzzling review process*

2.3 The Apple App Store II

- Submission lead time (up to 2 weeks)
- Bug fixes delayed (up to 2 weeks)
- Developer backend is lacking
- Even great apps get 1 star reviews

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3. **Objective-C**
4. iOS Developer Tools

3.0 Objective-C

- Dates back to 1981 *NB: C++ dates back to 1979*
- Similar to Smalltalk
- Popularised by NextStep
- Objective C Runtime
  - Provides dynamism in C
  - Open Source
  - Messaging Oriented

3.1 What is the Objective-C Runtime?

"The Objective-C Runtime is a Runtime Library ... written mainly in C & Assembler ... adds the Object Oriented capabilities to C to create Objective-C."

"... it loads in class information, does all method dispatching, method forwarding, etc ... [it] creates all the support structures that make Object Oriented Programming with Objective-C possible."

Source: http://cocoasamurai.blogspot.com/2010/01/understanding-objective-c-runtime.html

3.2 C Inside

- Strict superset of C
- Compatible with existing C libraries
- Optimise performance using C code
- Compatible with existing C++ libraries
- Mix C, C++ and Objective C code

3.3 Objective-C is Dynamic

- Object Oriented
- Dynamic Typing
- Introspection / Reflection

```
// get object's class name
[myObject class];

// does object responder to this 'selector'
[myObject respondsToSelector:@selector(foo)];

// get method signature for 'bar'
[myObject methodSignatureForSelector:@selector(bar)];
```

- Classes Are Objects

```
// is MyClass1 is subclassing MyClass1?
[MyClass2 isSubclassOfClass:MyClass1]
```

3.4 Objective-C is Dynamic II

- Expressive Message Syntax

```
[myArray insertObject:myObject atIndex:10];
```

- Late Binding
  - Respond to unhandled messages
  - Add methods to existing classes
  - Extend any class at runtime with categories
  - Dynamically create classes
- Language Favours Simplicity
  - No templates
  - No overloading
  - No multiple inheritance

3.5 Message Passing

- Pass 'messages' (we don't call methods)

```
[object method:someObject];
```

- Messages matched by *method signature*

This C method declaration:

```
(void)doItNow(char myString[], int[] myArray);
```

In ObjC:

```
-(void)doItNow:(NSString*)stringArg withArray:(NSArray*):arrayArg;
```

Matches this signature:

```
'doItNow:withArray:'
```

- Unlike method calls, sending an object a message doesn't mean it will perform it!

3.6 Message Passing + Dot Notation

Setter syntax

```
object.childObject.value = 1;      // Java
[[object childObject] setValue:1]; // ObjC
```

Setter in dot notation:

```
object.childObject.value = 1;
```

Getter syntax

```
[object childObject];         // get property
[[object childObject] value]; // nested syntax
```

Getter in dot notation:

```
object.childObject
object.childObject.value
```

3.7 Compiler Directives

- Compiler directives supplement standard C
- Non-standard syntax can look like this:

```
@interface ... @end
@implementation ... @end
@property
@synthesize
```

- Existing C syntax has also been "augmented"

```
for(id obj in myCollection)  // ObjC for loop
for(int i=0; i<=5; i++)      // C for loop
```

3.8 Header File (.h)

```
//
//  example.h - a class header file
//
@interface Classname : SuperClassName
{
  BOOL somethingHappened; // Instance variables (iVars)
  NSInteger anInt;        // ObjC data type
  int someOtherInt;       // C data type
}

+ (ret_type)aClassMethod;
- (ret_type)anInstanceMethod:(param_type)param1;
- (ret_type)myMethod:(param_type)p1 with:(param_type)p2;
@end
```

3.9 Implementation File (.m)

```
//
//  example.m - a class implementation file
//
@implementation Classname

+ (return_type)aClassMethod {
    // ...
}

- (return_type)anInstanceMethod:(param_type)param1 {
    // ...
}

- (ret_type)myMethod:(param_type)p1 with:(param_type)p2 {
    //...
}
@end
```

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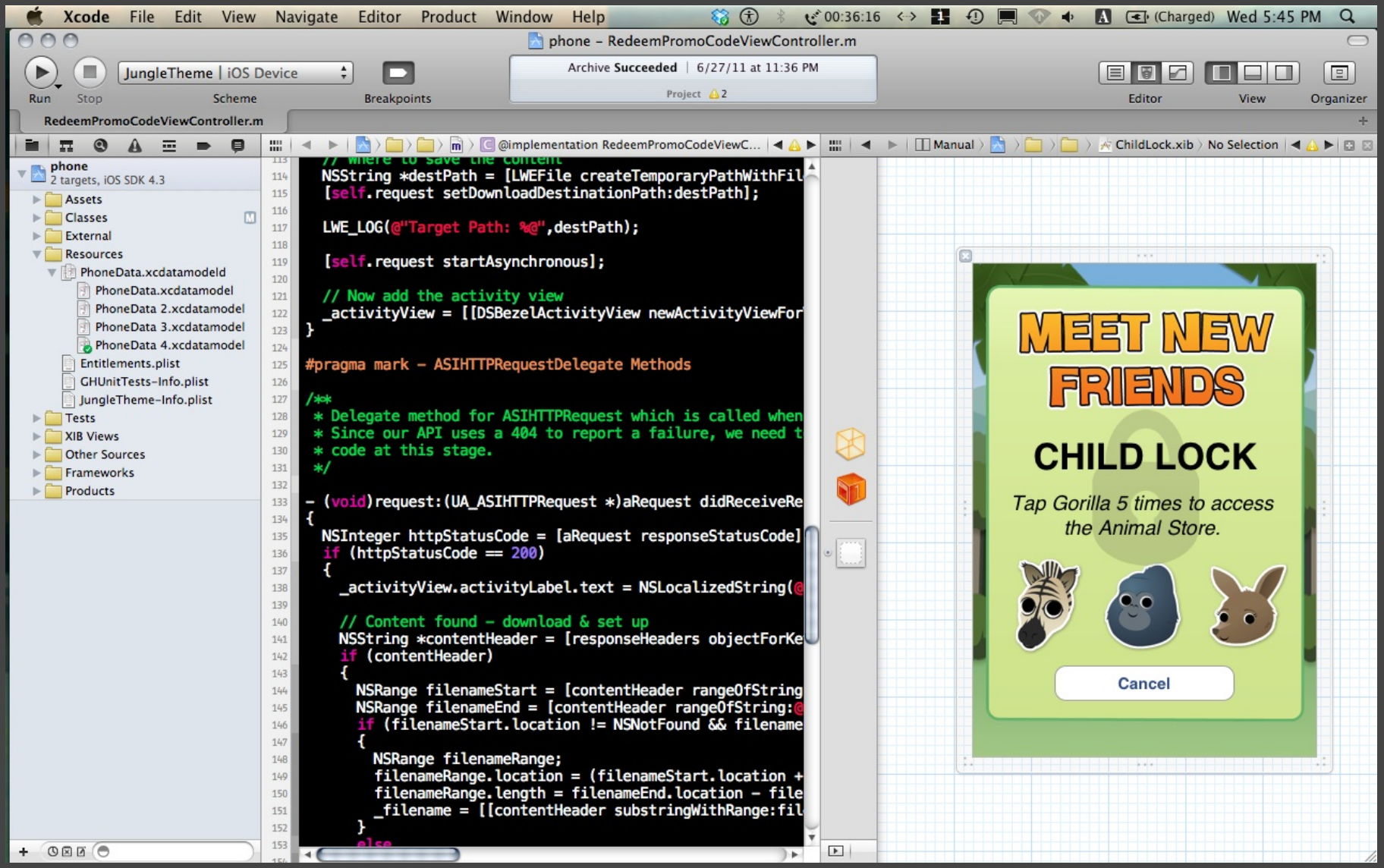
4.0 Xcode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Classes
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Resources
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PhoneData 3.xcdatamodel
PhoneData 4.xcdatamodel
Entitlements.plist
GHUnitTests-Info.plist
JungleTheme-Info.plist
Tests
XIB Views
Other Sources
Frameworks
Products
NSString *destPath = [LWEFile createTemporaryPathWithFil
[self.request setDownloadDestinationPath:destPath];
LWE_LOG(@"Target Path: %@",destPath);
[self.request startAsynchronous];
// Now add the activity view
_activityView = [[DSBezelActivityView newActivityViewFor
}
#pragma mark - ASIHTTPRequestDelegate Methods
/**
* Delegate method for ASIHTTPRequest which is called when
* Since our API uses a 404 to report a failure, we need t
* code at this stage.
*/
- (void)request:(UA_ASIHTTPRequest *)aRequest didReceiveRe
{
NSInteger httpStatusCode = [aRequest responseStatusCode]
if (httpStatusCode == 200)
{
_activityView.activityLabel.text = NSLocalizedString(@
// Content found - download & set up
NSString *contentHeader = [responseHeaders objectForKe
if (contentHeader)
{
NSRange filenameStart = [contentHeader rangeOfString
NSRange filenameEnd = [contentHeader rangeOfString:@
if (filenameStart.location != NSNotFound && filename
{
NSRange filenameRange;
filenameRange.location = (filenameStart.location +
filenameRange.length = filenameEnd.location - file
_filename = [[contentHeader substringWithRange:fil
}
else
ChildLock.xib No Selection
MEET NEW FRIENDS
CHILD LOCK
Tap Gorilla 5 times to access the Animal Store.
Cancel

4.1 More About Xcode

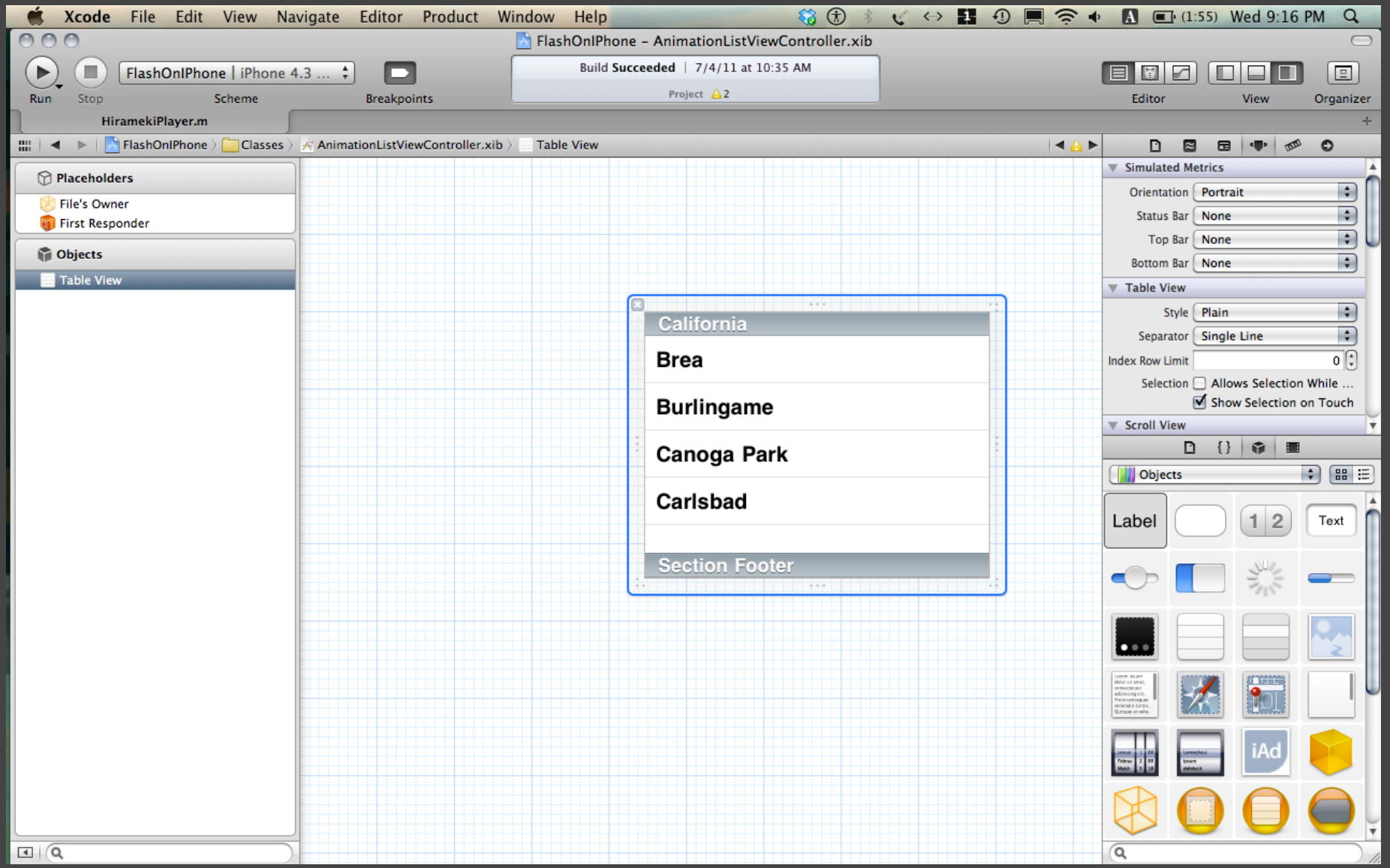
- Everyone uses it (almost)
- Free to download for ADC registrants
- Includes *Interface Builder*
- More evolved than Eclipse+Android
- Less evolved than Visual Studio

4.2 Xcode Project Tree

- Classes*
- Resources*
  - XIB Files
- Property Lists
- Frameworks
  - Products

** Default group names, user changeable*

4.3 Interface Builder



4.4 More About Interface Builder

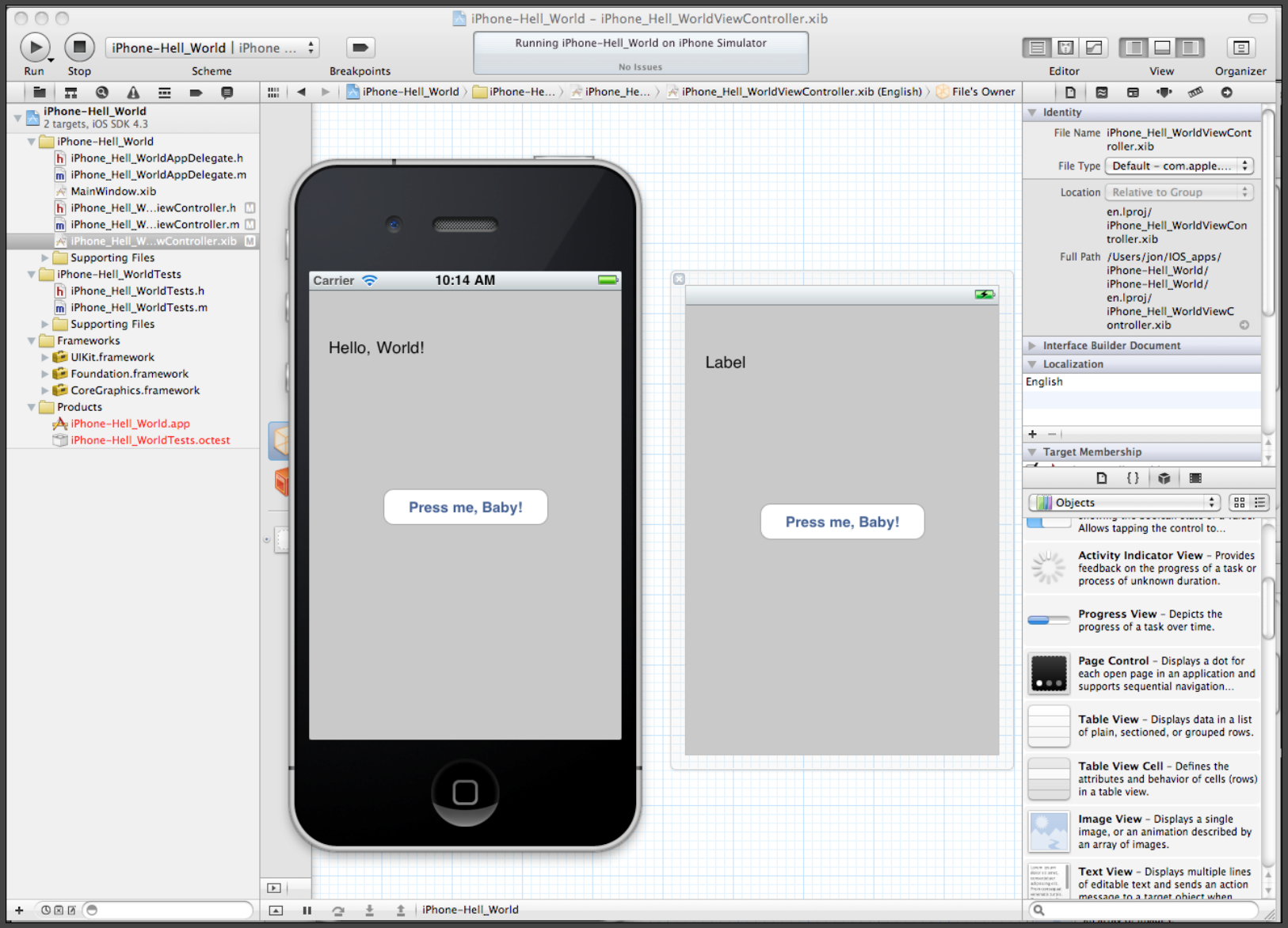
- IB creates user interface files
- These are called XIB/NIB files
  - *"Class Archives"*
  - *"Frozen Classes"*
  - *"Serialised Classes"*
- Interfaces can be written in code too
- We "connect" XIB objects to a controller class
- Provides a library of standard interface objects

Acronym Alert!

★ NIB = NeXT Interface Builder

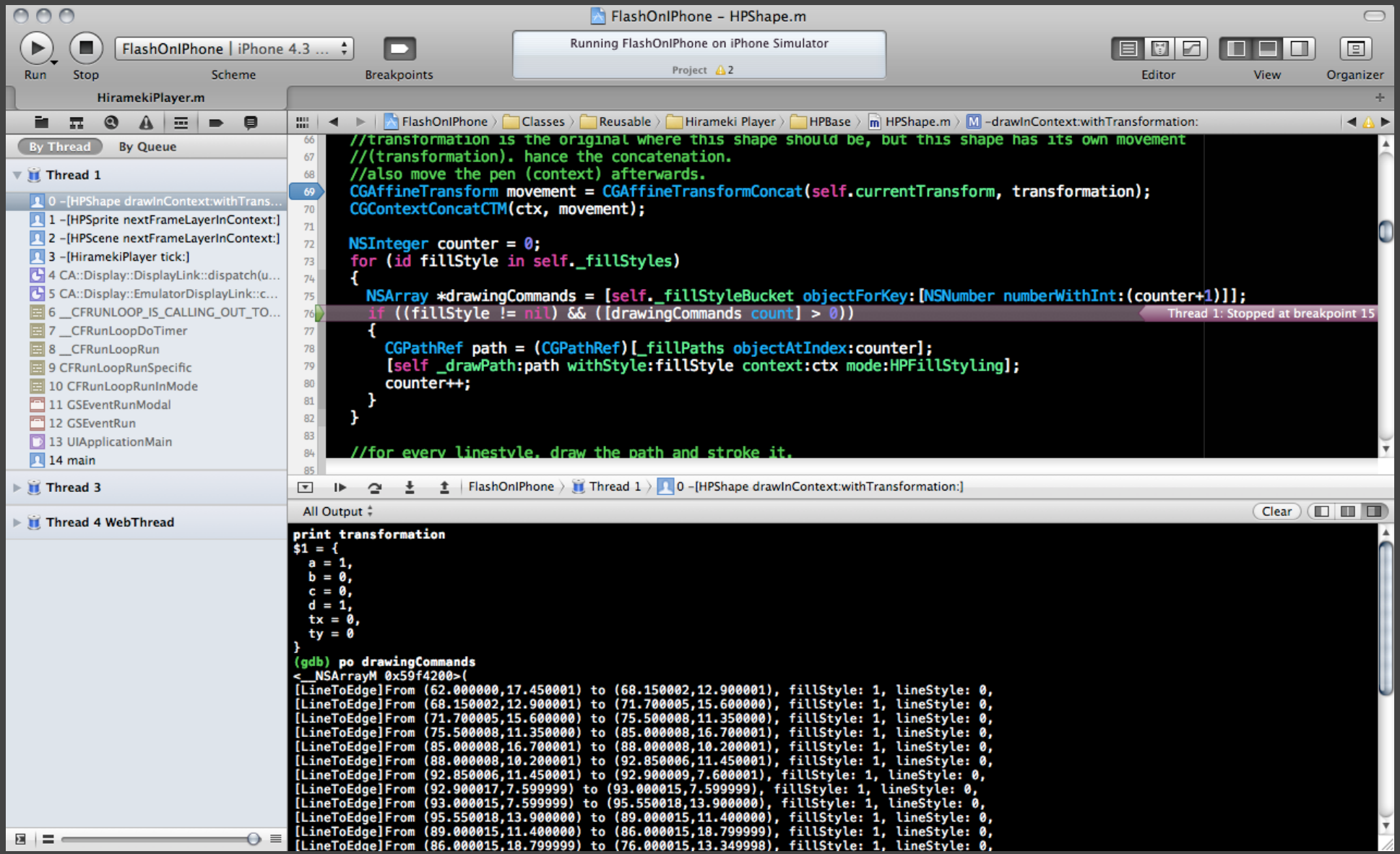
★ XIB = Mac OS X Interface Builder

4.5 iOS Simulator



Source: http://xcode4iphoneheavenorhell.wordpress.com/

4.6 Debugging Tools



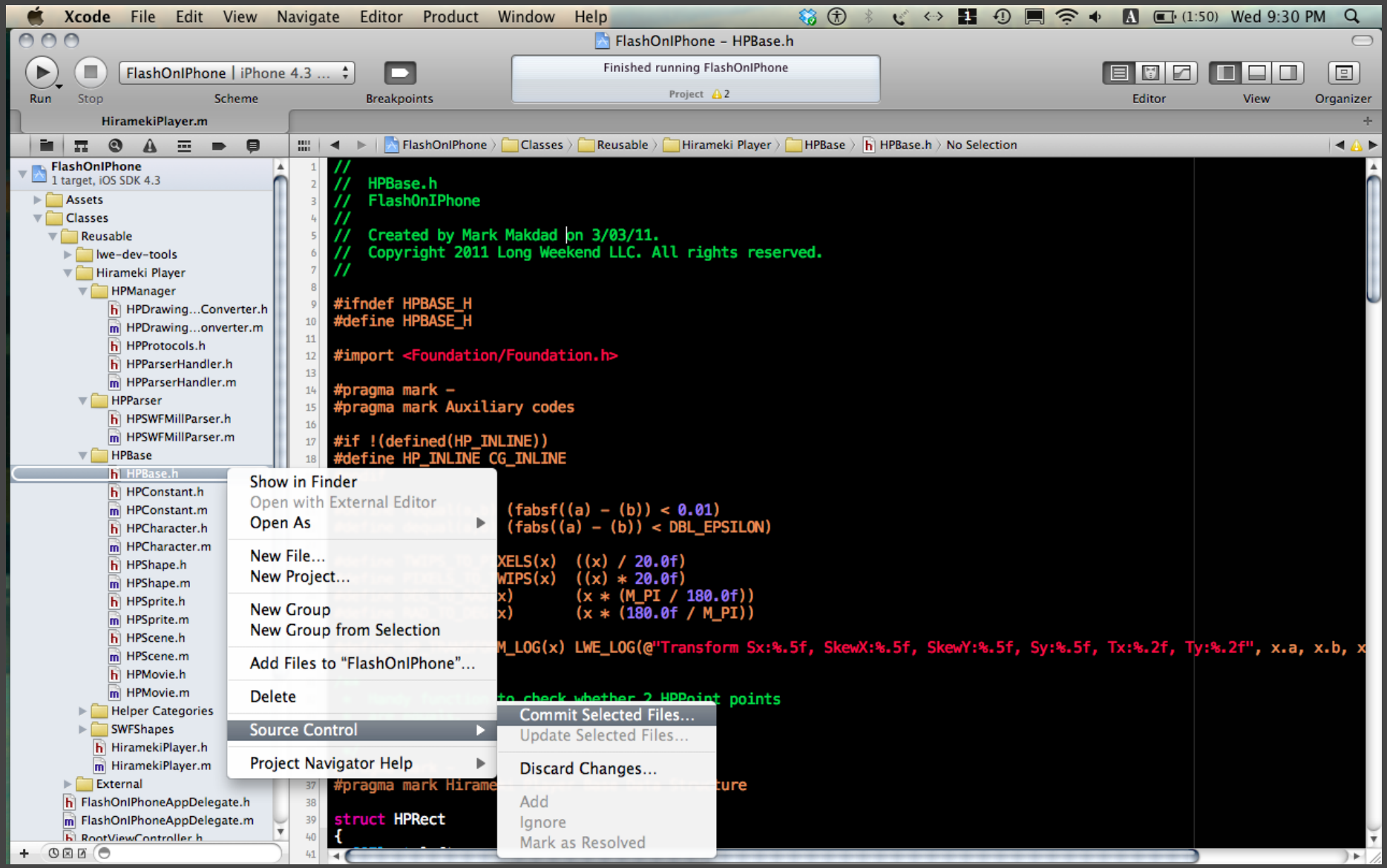
4.7 More About Debugging

- Adding & removing breakpoints
- Stepping through code
- Debugging console commands
  1. print - prints a value
  2. po - prints objects (NSObjects)
  3. po [object class] - prints class name
- Log to console
  1. NSLog(@"Something happened!");
  2. NSLog(@"%@", myString);
  3. Takes format specifiers: %d %@ %f %U

4.8 Tethered Debugging

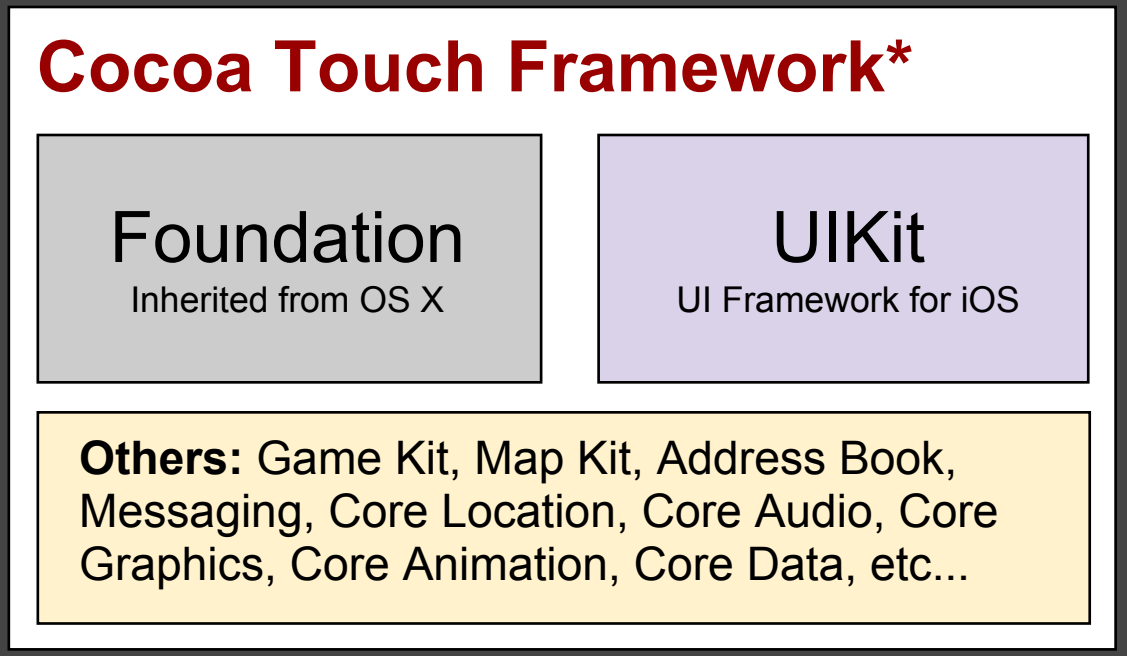
Source: Apple Inc

4.9 Integrated Version Control



Integrates with SVN + GiT client binaries

4.10 Cocoa Touch



** Not indicative of size or importance*

"Cocoa Touch provides an abstraction layer of iOS ... Cocoa Touch is based on the Mac OS X Cocoa API ... primarily written in the Objective-C language ... allows the use of hardware and features that are not found in Mac OS X computers"

Quote Source: http://en.wikipedia.org/wiki/Cocoa_Touch

4.11 Other Included Frameworks

Audio and Video ☆ Core Audio ☆ OpenAL Media Library AV Foundation	**Graphics & Animation** ☆ Core Animation ☆ OpenGL ES Quartz 2D	**User Applications** Address Book ☆ Core Location ☆ Map Kit Store Kit
Data Management ☆ Core Data ☆ SQLite	**Networking & Internet** Bonjour WebKit BSD Sockets	

End of Lecture 1

1. Lab Work: Starts next week
2. Familiarise yourself with ObjC syntax
3. Read the Assignments
4. *Dream of ObjC*