Praktikum Entwicklung von Mediensystemen mit iOS

Sommersemester 2014

Fabius Steinberger, Dr. Alexander De Luca

Media Informatics munich

Today

- Organization
- Introduction to iOS programming
- Hello World
- Assignment 1

Organization

- 6 ECTS
- Bachelor: Vertiefendes Thema
- Master: Gruppenpraktikum
- Thursdays 14 - 16, Amalienstr. 17 A107
- Check your emails (cip / campus)
- http://www.medien.ifi.lmu.de/lehre/ss14/pem/

Roadmap

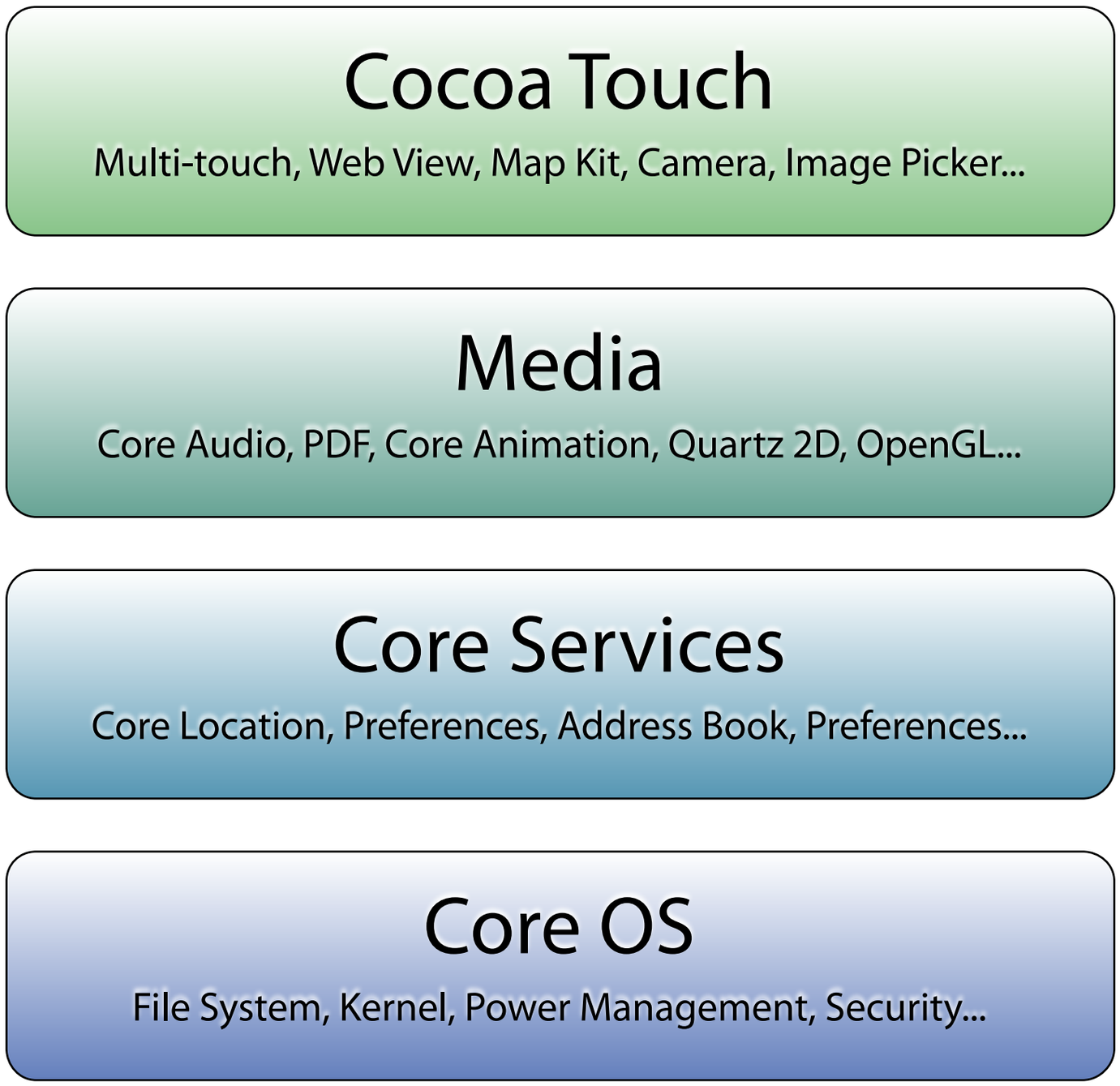
- 10.4., 24.4., 8.5.: bi-weekly lectures and assignments
- May, June: app development in teams, milestone presentations
- July: final presentation (likely 3.7. or 17.7.)

iOS

- Mobile operating system by Apple for iPhone, iPad and iPod Touch
- Based on Unix, derived from OS X
- Latest release: iOS 7.1 (March 2014)
- High market share, high user engagement, high willingness to pay for apps.
- Overall smartphone / tablet market is huge and still growing, and many PEM skills also apply to Android development.

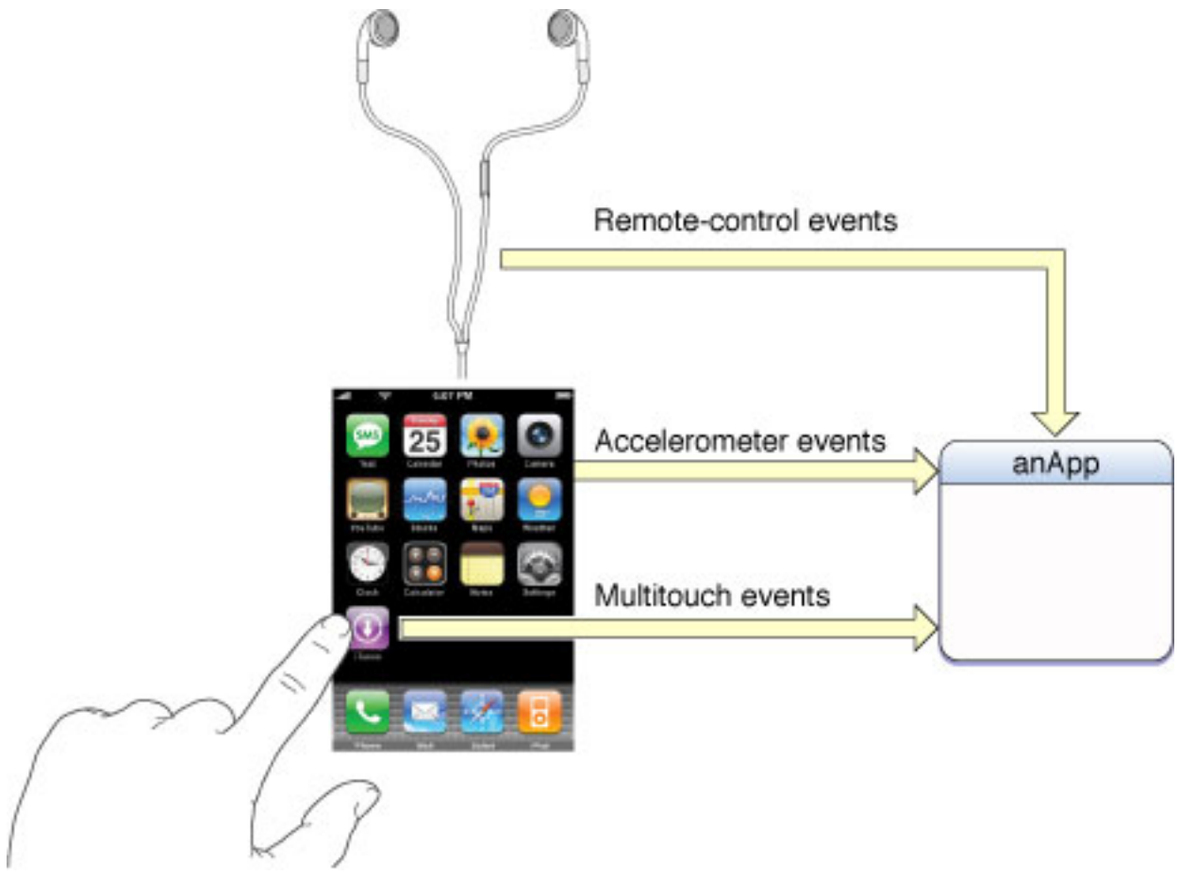
iOS 7

Layers of iOS



User Input

- GUI controls: buttons, sliders, switches etc.
- Multi-touch gestures: tap, pinch, rotate, swipe, pan, long press
- Accelerometer: shaking, rotating



Tap Gesture Recognizer – Provides a recognizer for tap gestures which land on the view.

Pinch Gesture Recognizer – Provides a recognizer for pinch gestures which are invoked on the...

Rotation Gesture Recognizer – Provides a recognizer for rotation gestures which are invoked on the...

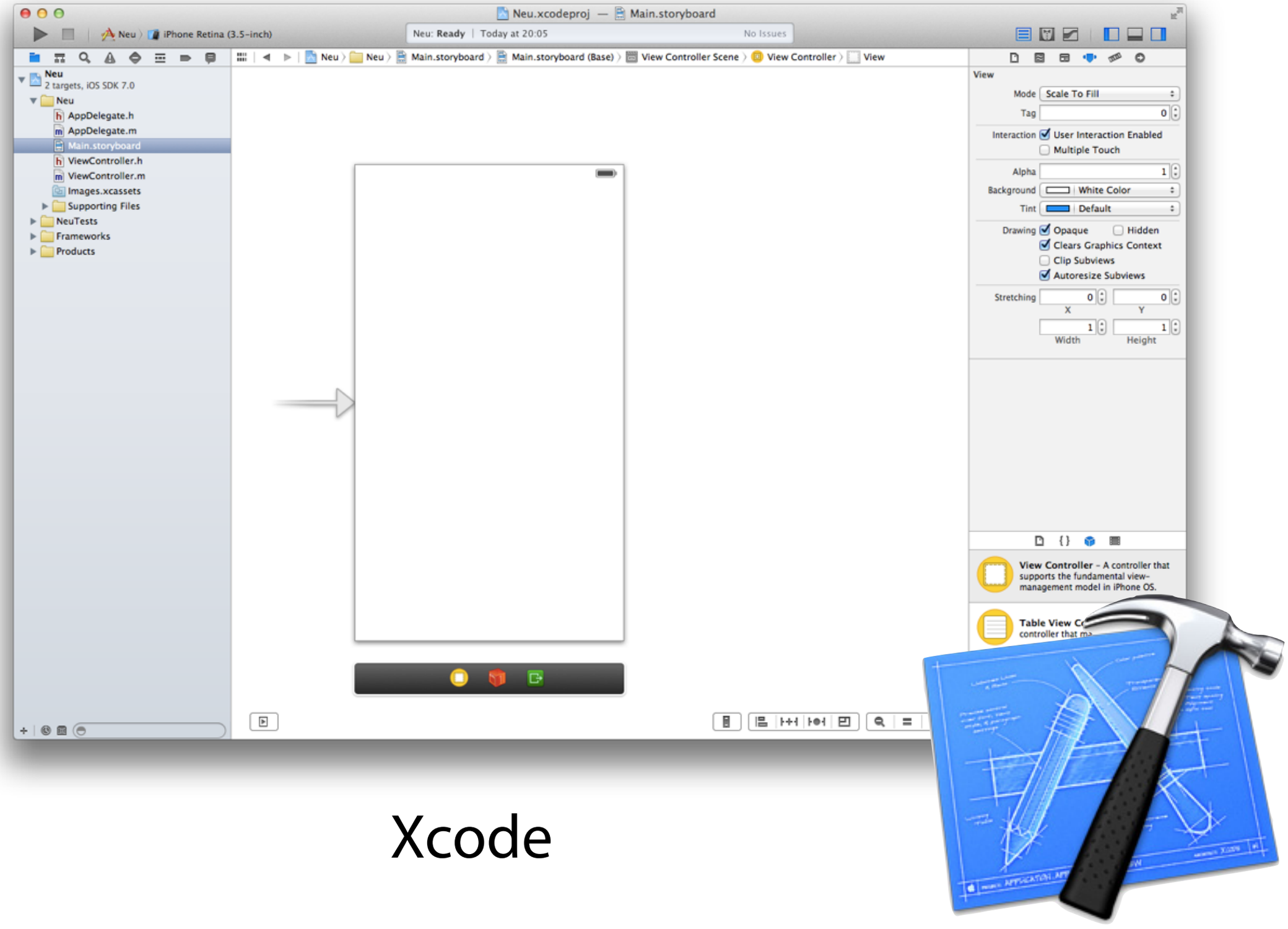
Swipe Gesture Recognizer – Provides a recognizer for swipe gestures which are invoked on the...

Pan Gesture Recognizer – Provides a recognizer for panning (dragging) gestures which are...

Long Press Gesture Recognizer – Provides a recognizer for long press gestures which are invoked...

iOS Development

Development Environment



Xcode

Xcode

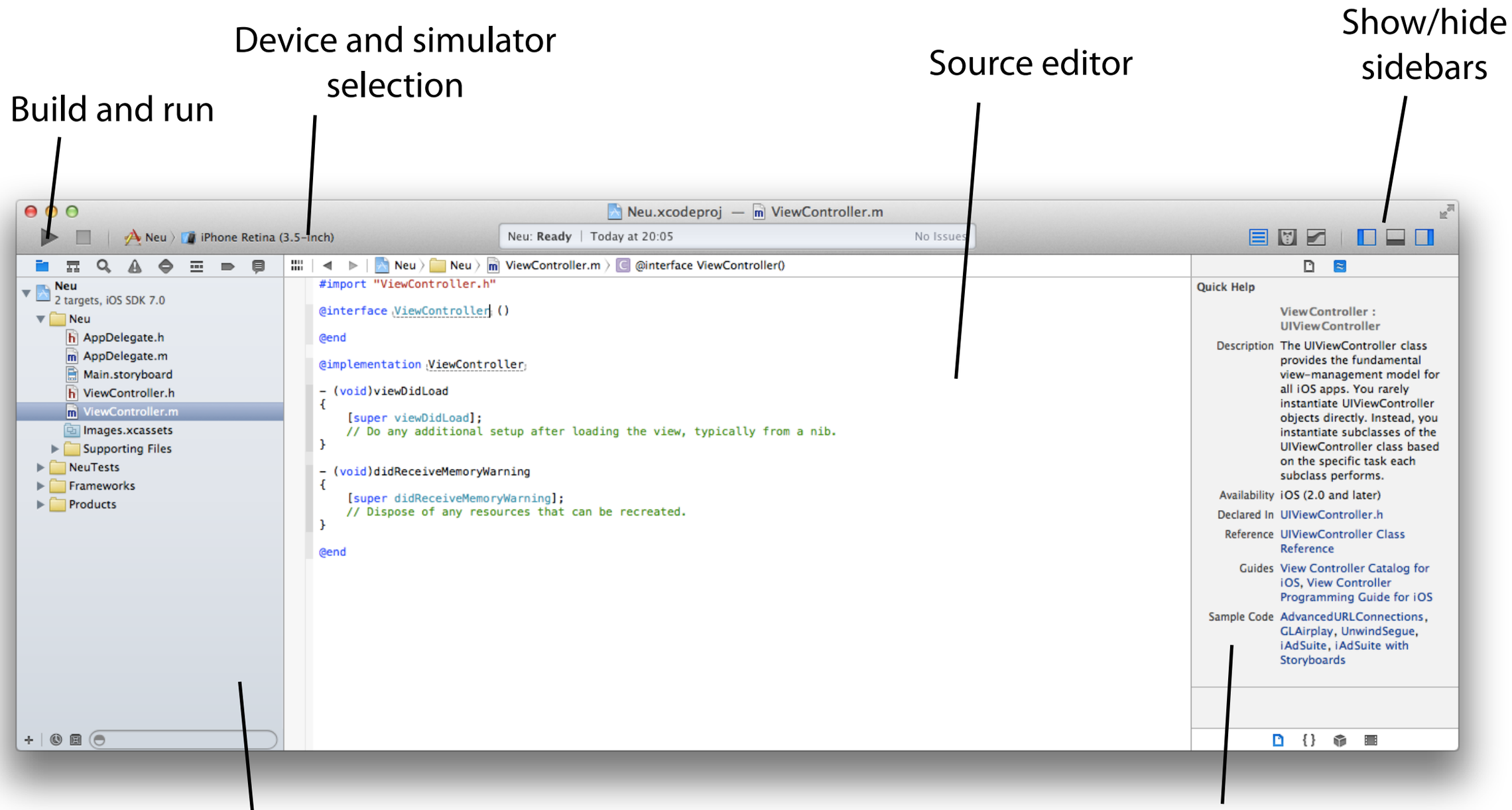
- Source editor: code completion, syntax highlighting, context-sensitive information

- Interface builder: UI elements library and inspector, split editor to connect UI with code, Storyboards

- Compiler: C, C++, Objective-C
- iOS Simulator: run and test apps on a Mac

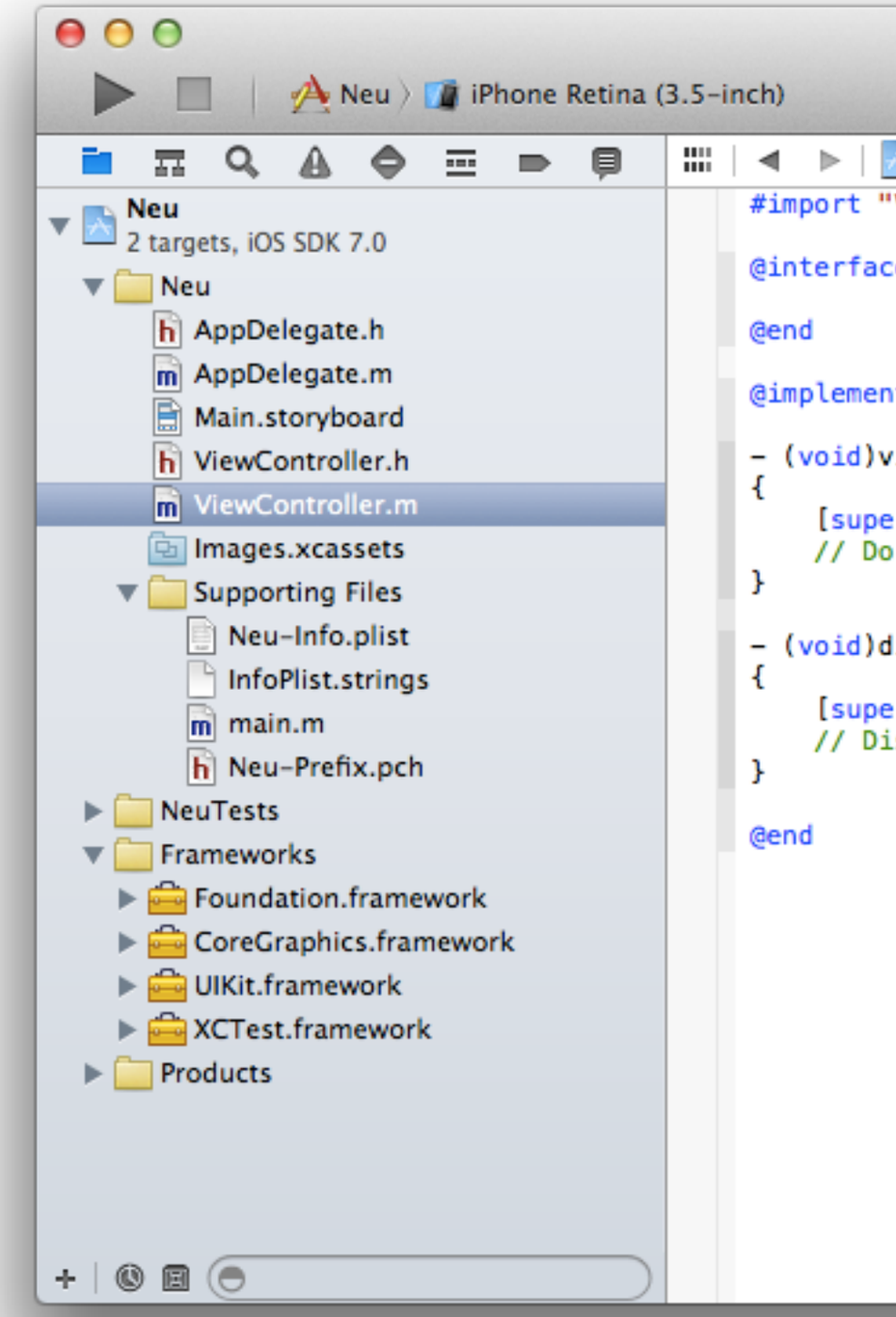
- More: refactoring, version control, debugging, analysis (https://developer.apple.com/xcode/)

Xcode


Build and run
Device and simulator selection
Source editor
Show/hide sidebars
Neu.xcodeproj — ViewController.m
Neu 〉 iPhone Retina (3.5-inch)
Neu: Ready | Today at 20:05
No Issues
Neu 〉 Neu 〉 ViewController.m 〉 @interface ViewController()
Neu
2 targets, iOS SDK 7.0
Neu
AppDelegate.h
AppDelegate.m
Main.storyboard
ViewController.h
ViewController.m
Images.xcassets
Supporting Files
NeuTests
Frameworks
Products
#import "ViewController.h"
@interface ViewController ()
@end
@implementation ViewController
- (void)viewDidLoad
{
[super viewDidLoad];
// Do any additional setup after loading the view, typically from a nib.
}
- (void)didReceiveMemoryWarning
{
[super didReceiveMemoryWarning];
// Dispose of any resources that can be recreated.
}
@end
Quick Help
ViewController : UIViewController
Description The UIViewController class provides the fundamental view-management model for all iOS apps. You rarely instantiate UIViewController objects directly. Instead, you instantiate subclasses of the UIViewController class based on the specific task each subclass performs.
Availability iOS (2.0 and later)
Declared In UIViewController.h
Reference UIViewController Class Reference
Guides View Controller Catalog for iOS, View Controller Programming Guide for iOS
Sample Code AdvancedURLConnections, GLAirplay, UnwindSegue, iAdSuite, iAdSuite with Storyboards
File navigator
Utilities sidebar (API

Contents of an Xcode project

- Source code files (.h and .m)
- User interface files (.storyboard and .xib)
- Libraries (.framework)
- Resources, e.g. images (.png)
- App configuration file (Info.plist)



Objective-C

- Language for programming iOS and Mac apps, also used by Apple to create much of OS X, iOS, APIs
- Strict superset of C, adds syntax for classes, methods, etc.
- Object-orientated

Introduction: https://developer.apple.com/library/Mac/documentation/Cocoa/Conceptual/ProgrammingWithObjectiveC/Introduction/Introduction.html

Elements of Objective-C

Java	Objective-C	
MyClass.java	Header.h Implementation.m	
Methods and method calls	Methods and messages	*
Attributes, setters, getters	Properties, instance variables	
Constructor	Initializer	*
Interface	Protocol	*
Garbage Collection	Automatic Reference Counting (ARC)	*

* Different terminology, but very similar to writing Java code

Methods

- Definition (in .h):

```
- (void) doSomething;
```

```
- (void) doSomethingWithA: (NSString *) a
andB: (NSString *) b;
```

- Implementation (in .m):

```
- (void) doSomething {
  // do something
}
```

```
- (void) doSomethingWithA: (NSString *) a
andB: (NSString *) b {
    // do something with a and b
}
```

- Method call (“message”) (in .m):


```
[self doSomething];
```

```
NSString* a = @"a";
NSString* b = @"b";
[self doSomethingWithA:a andB:b];
```

Properties

- Auto-creation instance variable, getter and setter
- The getter has the name of the property (”myProperty“)
- The name of the setter is ”get“ + property name (”getMyProperty“)
- Definition (in .h):

```
@property(strong, nonatomic) NSString *name;
```

`strong/weak:` refers to ownership. Always use strong except for properties that point to a parent.

`nonatomic/atomic:` use nonatomic to avoid multi-threading issues.

- Using getters (in .m):

```
NSString *labelText = self.name;
labelText = [self name];
```

- Using setters (in .m):

```
[self setName:@"Max"];
self.name = @"Max";
```

`self.name:` this syntax does NOT access the variable itself. It’s a getter/setter, just like the other syntax.

- Using the instance variable (in .m):

```
_name = @"Max";
labelText = _name;
```

`_name:` Use this instance variable in custom setters/getters and in init-methods only. In any other case, use the getter/setter.

Instance Variables (“ivars”)

- Like private/protected attributes in Java
- Definition (in .h): `NSString* _name;`
- Use (in .m):

```
_name = @"Max";
labelText = _name;
```

- You don’t have to use the underscore (_), but it’s good practice. Otherwise you accidentally mix up ivars and properties (see next slide).

- Most of the time it is better to use properties instead

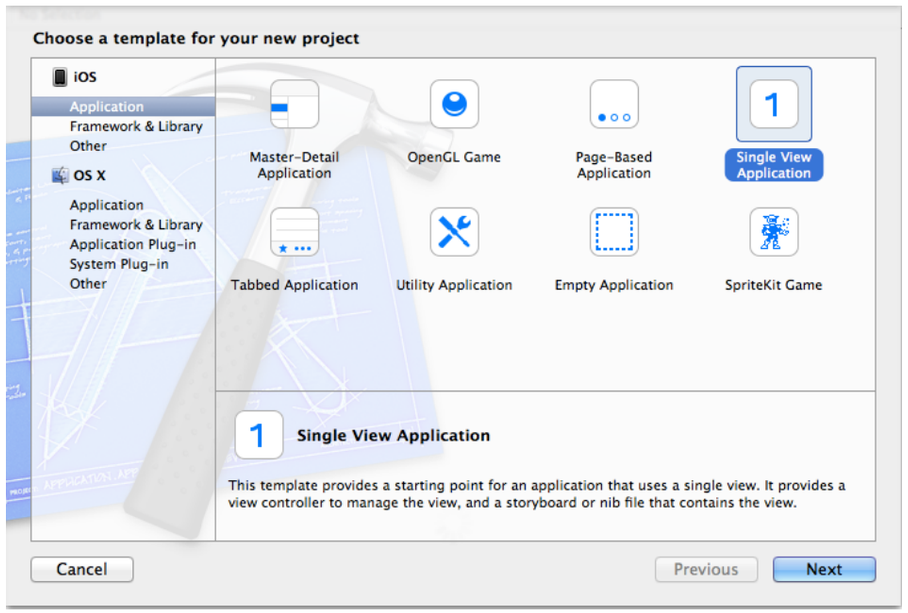
Object Initialization

- Object: `MyClass *myObject = [[MyClass alloc] init];`
- Object with parameter: `MyClass *myObject = [[MyClass alloc] initWithParameter: parameter];`
- String:
```
NSString *hello = @"Hello";
NSString *helloWorld = [NSString stringWithFormat:@"%@ World", hello];
```
- Array:
```
NSArray *colors = @[@"Green", @"Red", @"Yellow"];
NSMutableArray *mutableColors = [@[@"Green", @"Red", @"Yellow"] mutableCopy];
```

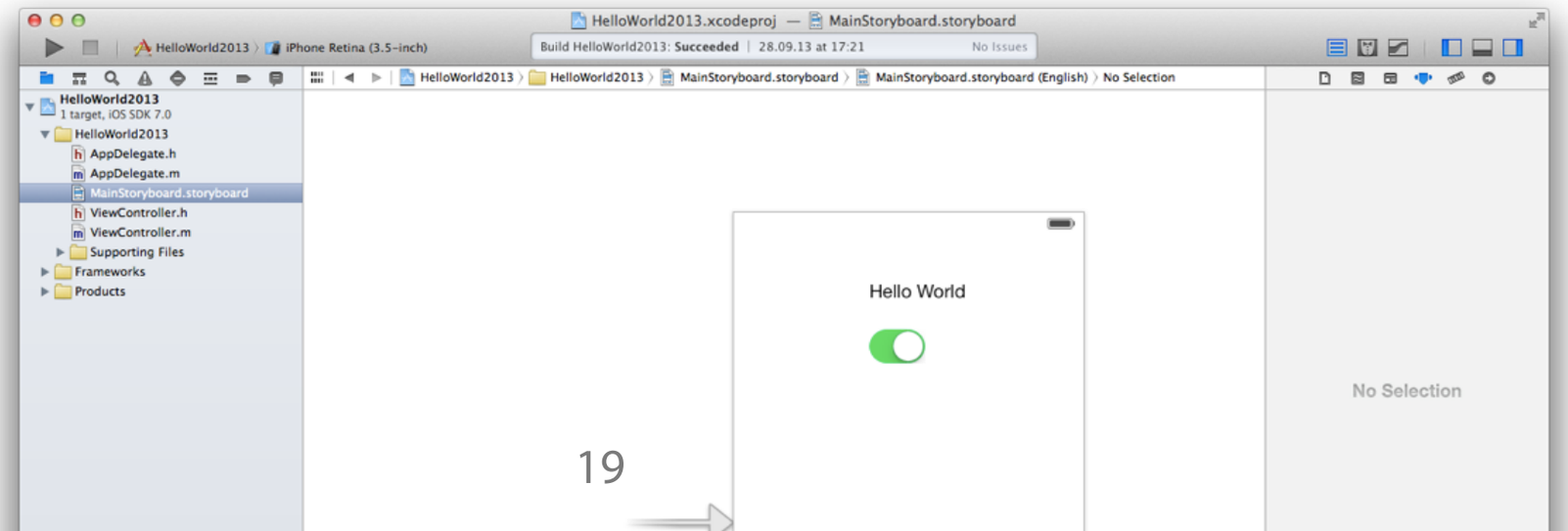
If your app doesn't work properly, make sure your objects aren't `nil`. There are no Null Pointer Exceptions. Less crashes, more confusion.

Hello World

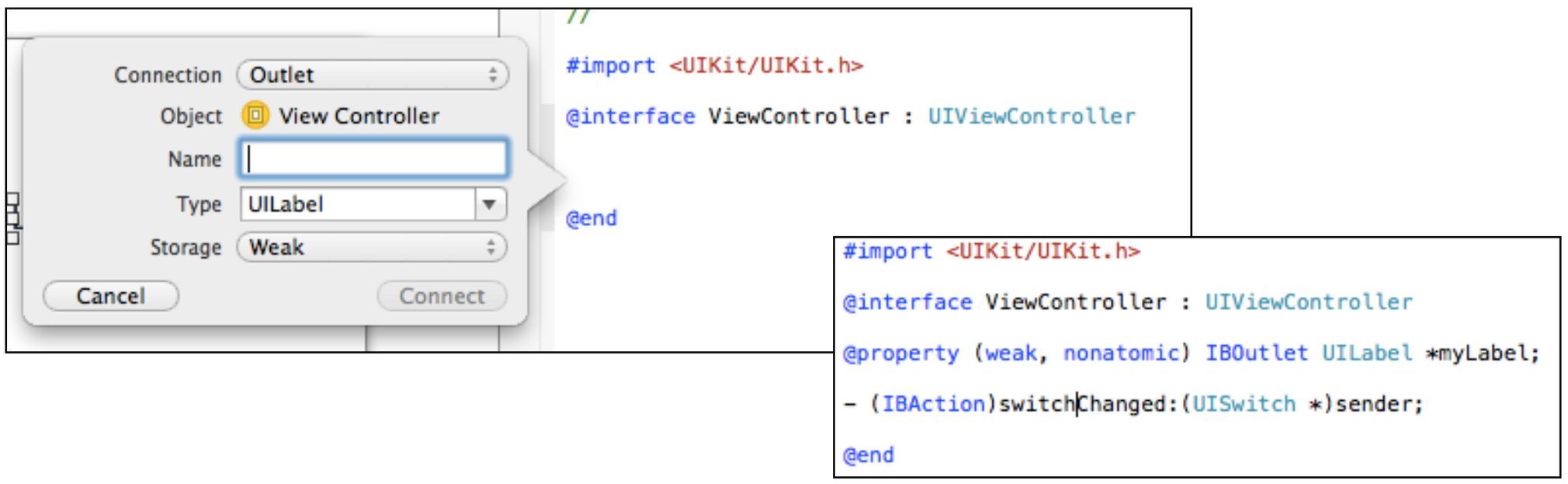
- New Xcode Project: Single View Application



- In the storyboard, drag a text label and a switch onto the screen



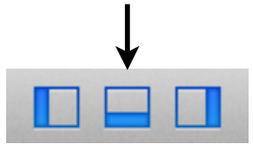
Hello World

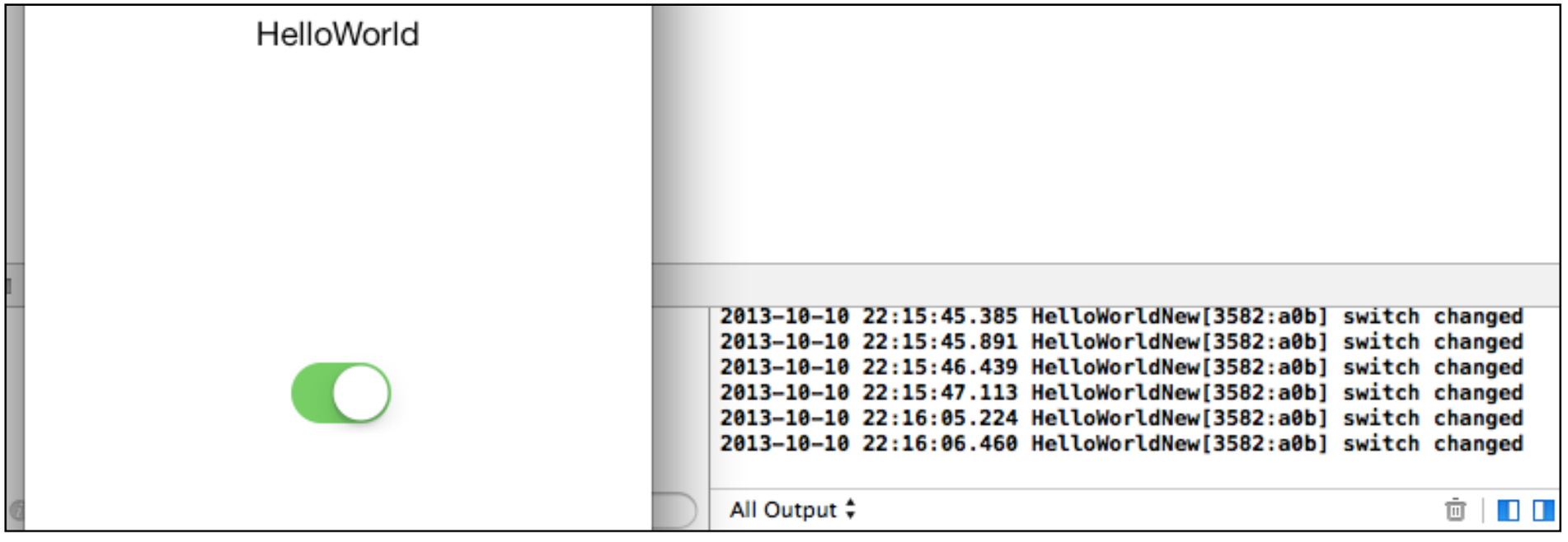
- Open the assistant editor  and ctrl-drag the text label into ViewController.h. Enter a name and click Connect. You now have access to the UI element in your code.
- Again, ctrl-drag the switch into the code. This time, select Action instead of Outlet. Change the type from id to UISwitch. Enter a name and click Connect. You now have a listener method that is called by the OS when the user changes the value of our switch.
- 

Hello World

- Close the assistant editor and go to ViewController.m. Complete the IBAction method:

```
- (IBAction)switchChanged:(UISwitch *)sender {
    NSLog(@"switch changed");
    if (sender.on) {
        self.myLabel.text = @"HelloWorld";
    } else {
        self.myLabel.text = @"";
    }
}
```

- Open the debug area and run the code. 



UIViewController

- One of the most important classes in iOS programming
- You have to subclass UIViewController when creating a new screen
- Provides methods for managing the view hierarchy throughout its life cycle and for reacting to events (also great for debugging), e.g.

```
– viewDidLoad:
– viewWillAppear:
– viewDidAppear:
– viewWillDisappear:
– viewDidDisappear:
- (void)willRotateToInterfaceOrientation:(UIInterfaceOrientation)toInterfaceOrientation
duration:(NSTimeInterval)duration;
```

- For more see http://developer.apple.com/library/ios/#documentation/uikit/reference/UIViewController_Class/Reference/Reference.html

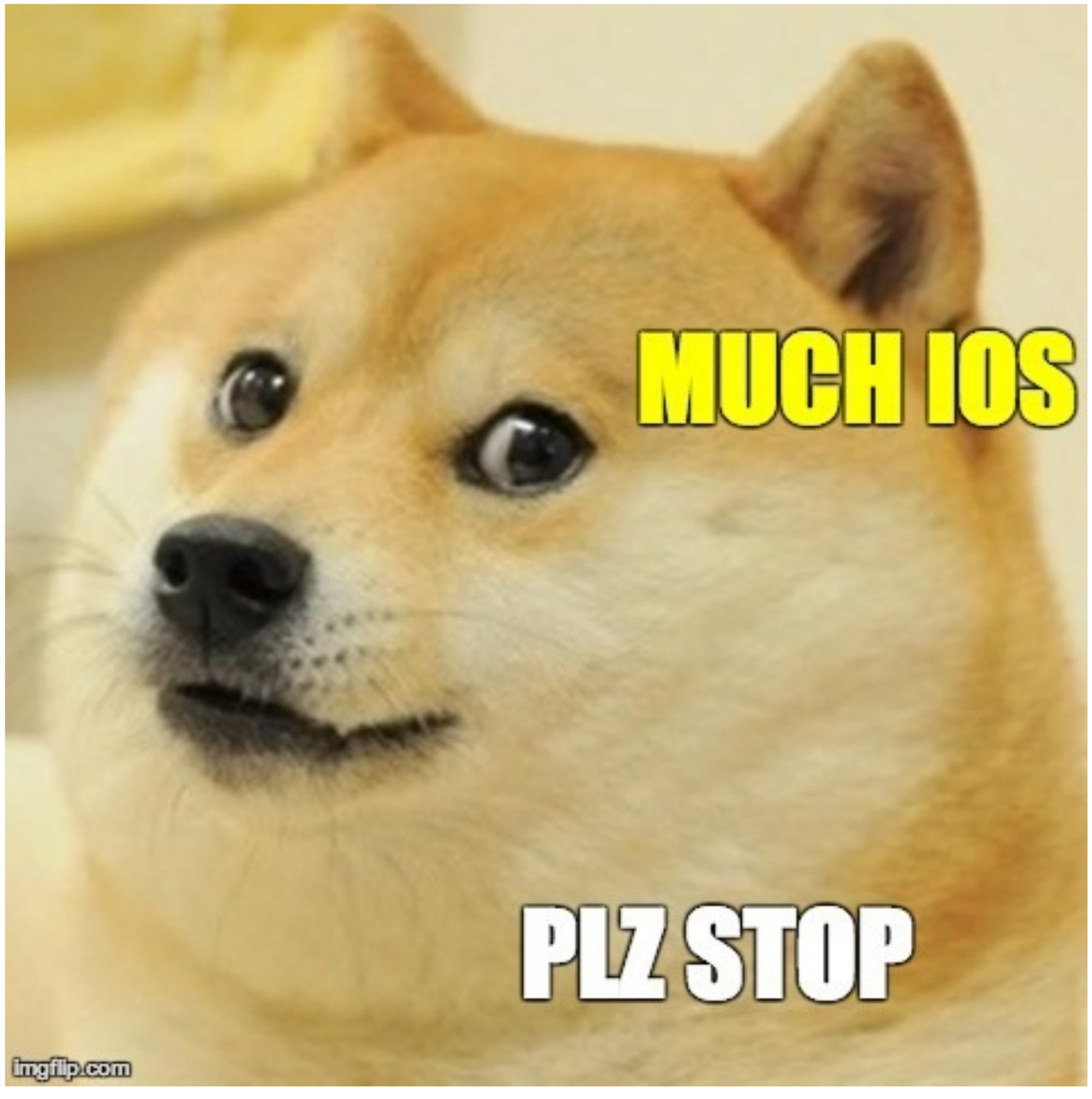
App Delegate

- Every app must have an App Delegate.
- Provides methods for managing the app throughout its life cycle (also great for debugging), e.g.

```
- application:didFinishLaunchingWithOptions:
– applicationDidBecomeActive:
– applicationDidEnterBackground:
– applicationWillEnterForeground:
– applicationWillTerminate:
```

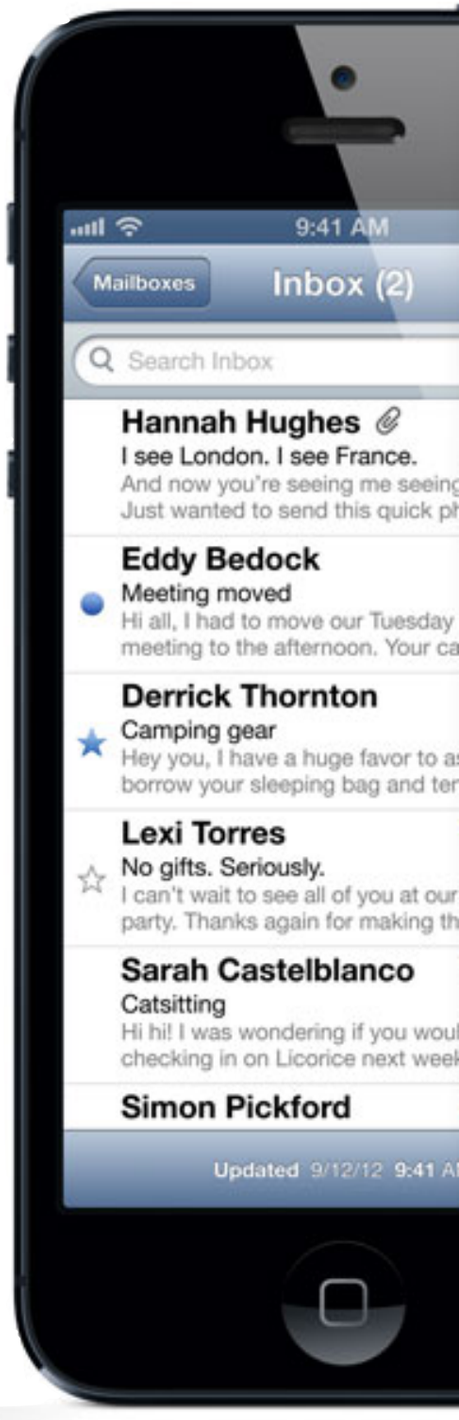
- For more see: http://developer.apple.com/library/ios/#documentation/uikit/reference/UIApplicationDelegate_Protocol/Reference/Reference.html
- There are lots of protocols (often named Delegate), e.g. for managing the keyboard, table views, date pickers.

Phewww



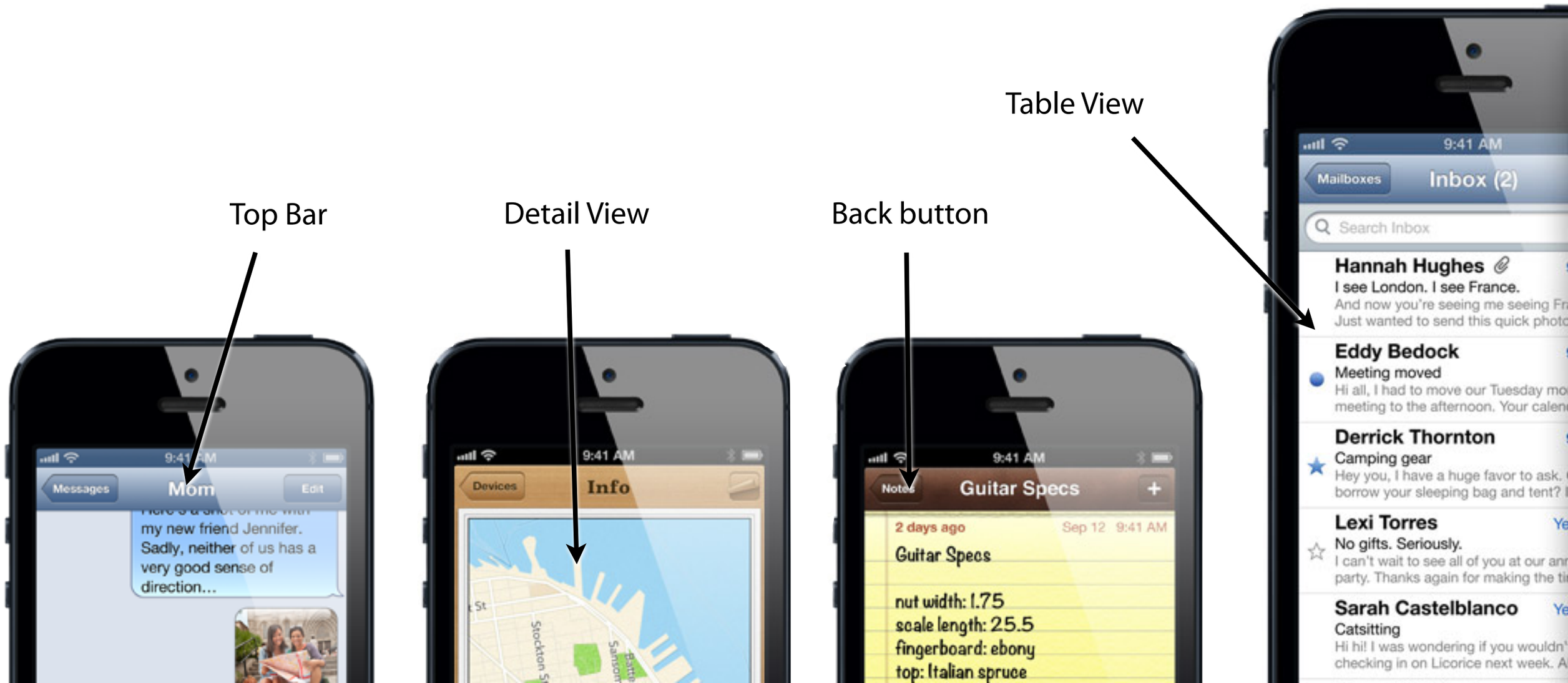
Part 2

- Table View
- Navigation Controller
- Passing Data Between Scenes



Navigation-based Apps (iPhone)

- Master View Controller: A Table View displays a list of table rows. Navigate to the Detail View by selecting a table row.
- Detail View Controller: Custom content. Navigate to Master by tapping the Back Button

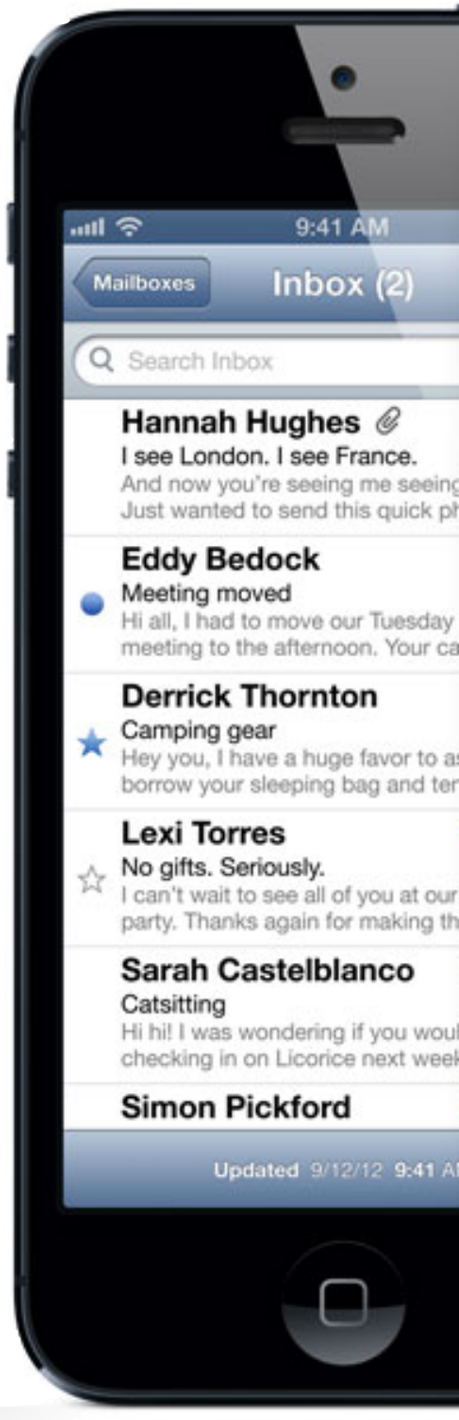


Navigation-based Apps (iPad)

- Split View: Master View and Detail View fit on one screen

Code

- First: Hello Table View
- Then: Hello Navigation Controller

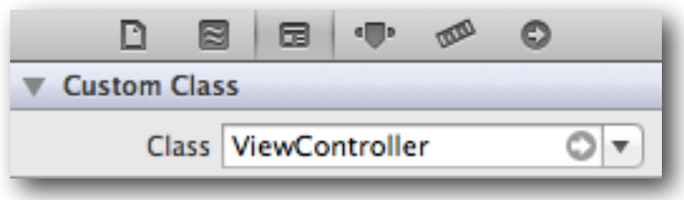


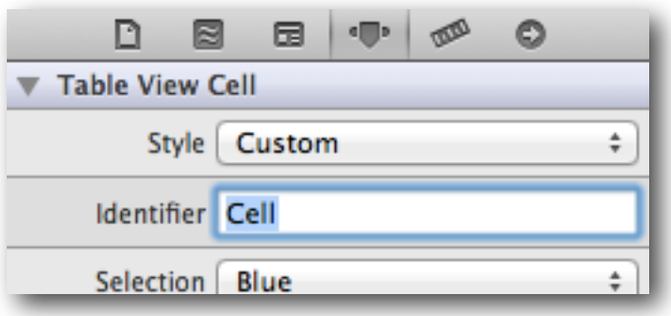
Hello Table View

- Create a new XCode Project (“Single View Application”) for iPhone.
- Change the base class of ViewController to UITableViewController and make it UITableViewDelegate and UITableViewDataSource. Add an array in .h and fill it with data in viewDidLoad in .m:

```
@interface ViewController : UITableViewController<UITableViewDelegate, UITableViewDataSource>
@property(strong, nonatomic) NSArray* tableEntries;

self.tableEntries = @[@"Blur", @"Beatles", @"Stone Roses", @"Oasis", @"Velvet Underground"];
```

- In the Storyboard, delete the scene and create a new Table View Controller. Change its class to ViewController.
- Select the Table View Cell and change its Identifier to “Cell”.





Hello Table View

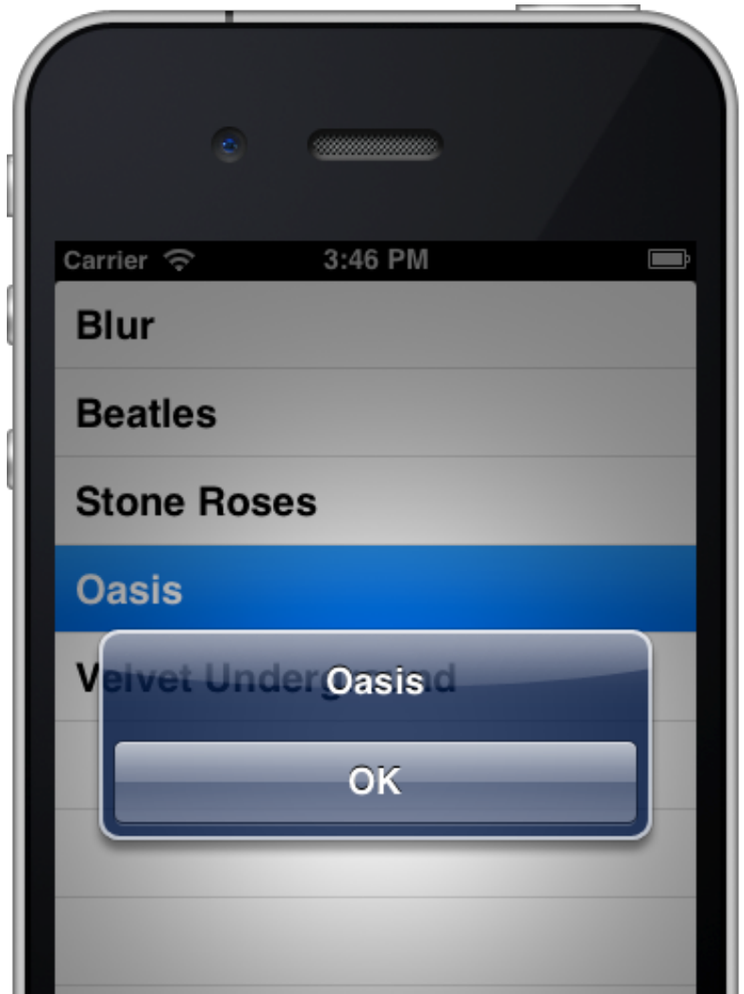
- Our table rows need to be filled with the data stored in our array. For this, implement the following methods of the Table View Data Source and Table View Delegate protocols:

```
// number of section in table
- (NSInteger)numberOfSectionsInTableView:(UITableView *)tableView {
    return 1;
}

// number of rows in our section
-(NSInteger)tableView:(UITableView *)tableView numberOfRowsInSection:(NSInteger)section {
    return [self.tableEntries count];
}

// fill table rows with content
- (UITableViewCell *)tableView:(UITableView *)tableView cellForRowAtIndexPath:(NSIndexPath *)indexPath {

    UITableViewCell *cell = [tableView dequeueReusableCellWithIdentifier:@"Cell" forIndexPath:indexPath];

    cell.textLabel.text = [self.tableEntries objectAtIndex:indexPath.row];
    return cell;
}
```

Hello Table View

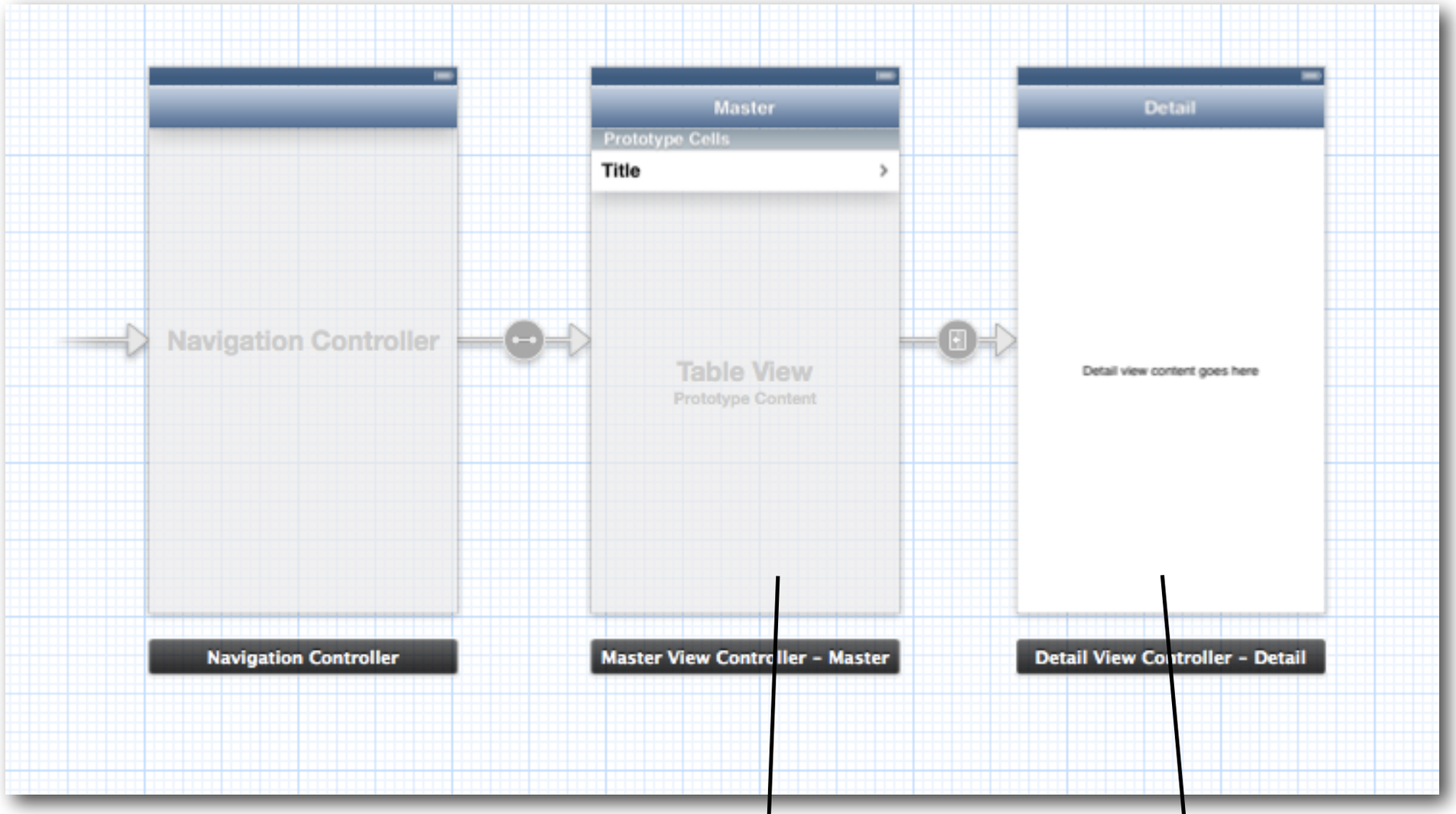
- Handle row selection:

```
// handle user interaction (i.e. row selection)
- (void)tableView:(UITableView *)tableView didSelectRowAtIndexPath:(NSIndexPath *)indexPath
{
    UIAlertView *alert = [[UIAlertView alloc] initWithTitle:[self.tableEntries objectAtIndex:indexPath.row]
                                                    message:nil
                                                   delegate:nil
                                          cancelButtonTitle:@"OK"
                                          otherButtonTitles:nil, nil];
    [alert show];
}
```



Hello Navigation Controller

- Create a new Xcode Project (“Master Detail Application”).




```
@interface
MasterViewController :
UITableViewController
```

```
@interface
DetailViewController :
UIViewController
```

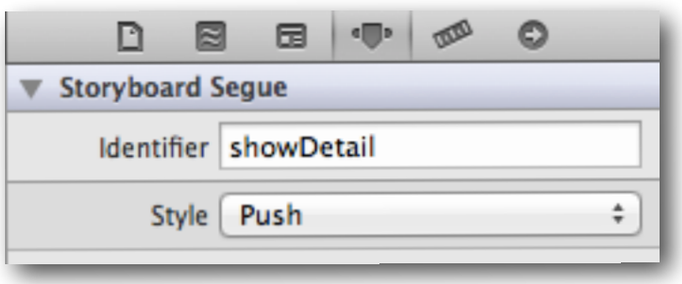
Hello Navigation Controller

- Master View Controller: "+" button in Top Bar created in viewDidLoad:

```
UIBarButtonItem *addButton = [[UIBarButtonItem alloc]
initWithBarButtonSystemItem:UIBarButtonSystemItemAdd target:self action:@selector(insertNewObject:)];

self.navigationItem.rightBarButtonItem = addButton;
```

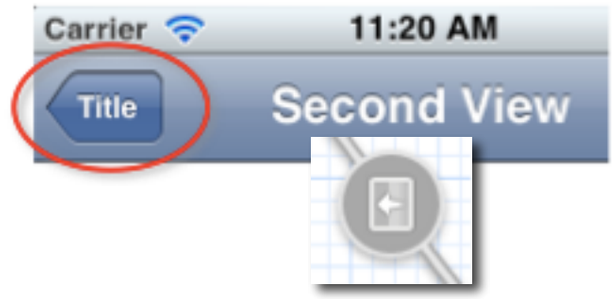
  - `target:self` which object receives the action?
  - `action:@selector(insertNewObject:)` what's the action? (this calls a method "insertNewObject:")

- Row selection by the user: The Detail View Controller is pushed as defined by the Storyboard Segue:

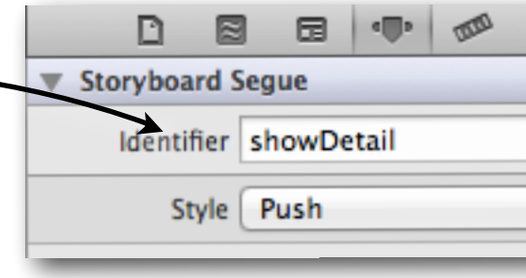


Passing Data Between Scenes (Push)

- Push Segues add View Controllers on the Navigation Stack. Based on user interaction, the View Controllers are pushed or popped.
- Update data in prepareForSegue
  - In Master View Controller:




```
- (void)prepareForSegue:(UIStoryboardSegue *)segue sender:(id)sender
{
    if ([[segue identifier] isEqualToString:@"showDetail"]) {
        NSIndexPath *indexPath = [self.tableView indexPathForSelectedRow];
        NSDate *object = _objects[indexPath.row];
        [[segue destinationViewController] setDetailItem:object];
    }
}
```



  - In Detail View Controller:

```
- (void)setDetailItem:(id)newDetailItem
{
    // Update the text label
}
```

Passing Data Between Scenes (Global)

- Use the Application Delegate for global data:

```
#import "AppDelegate.h"

AppDelegate *appDelegate = (AppDelegate*) [UIApplication sharedApplication].delegate;
NSArray *data = appDelegate.data;
```

- sharedApplication is a singleton (i.e. an instance that exists only once) that can be accessed from anywhere within the application.

Top Resources

- Stanford CS 193P iPhone Application Development: https://itunes.apple.com/us/course/coding-together-developing/id593208016
- Official documentation: https://developer.apple.com/library/ios
- Tutorials: http://www.raywenderlich.com/tutorials
- Solutions to specific problems: Google + Stackoverflow
- Developer videos: https://developer.apple.com/videos/

Assignment 1

- Individual assignment (feel free to help each other though)
- Get to know Xcode and Objective-C
- Navigation-based app
- Due Thursday 24.4., upload to Uniworx

- Questions?