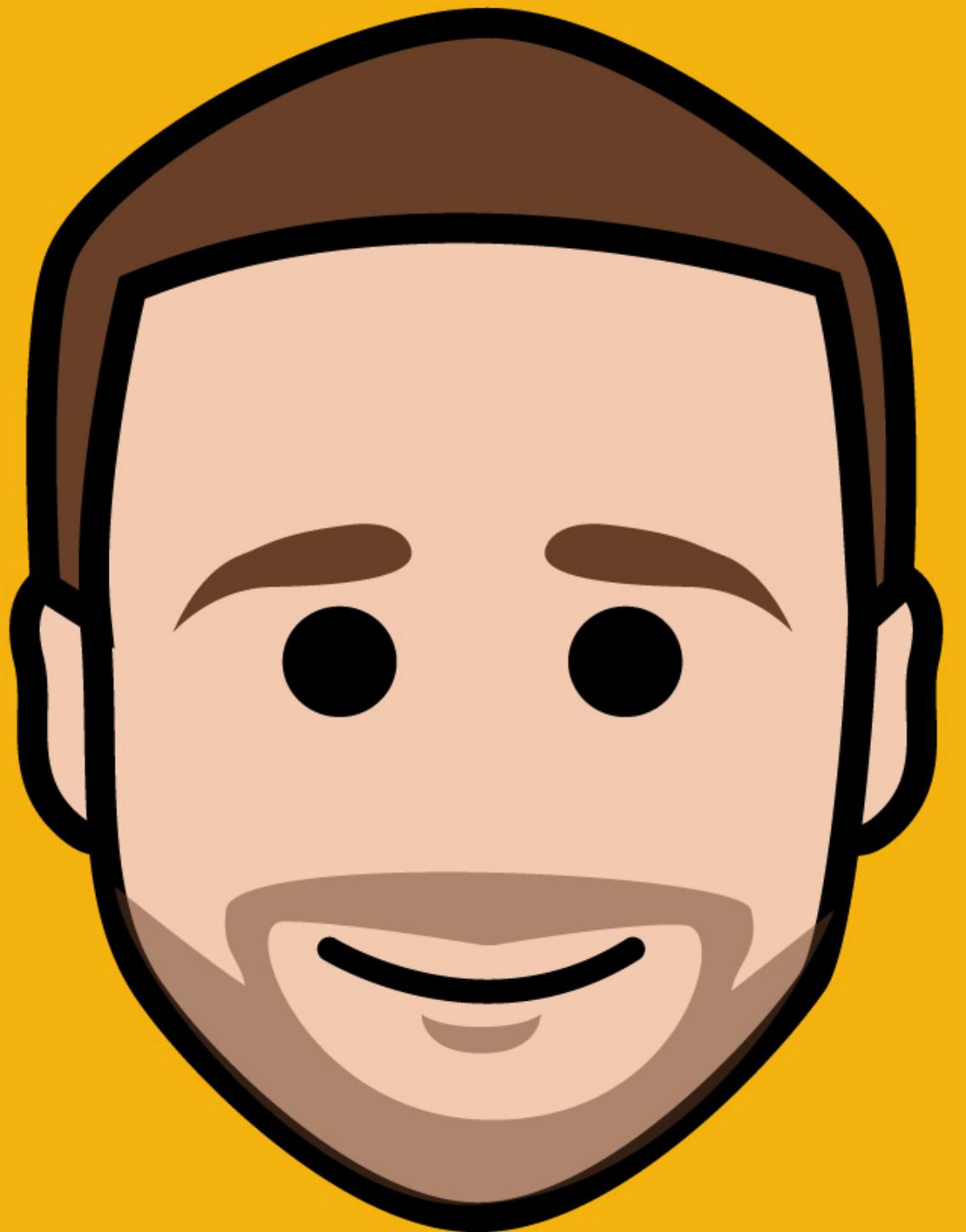


# iOS 101 for Android Developers

Stephen Barnes - [@smbarne](https://twitter.com/smbarne)

AnDevCon San Francisco 2014



# Who is this guy?

- Previously Senior Mobile Dev @Raizlabs, Now Senior iOS Dev @Fitbit
- Previous work includes Care.com, B&H Photography, and others for both Android and iOS
- Twitter: [@smbarne](https://twitter.com/smbarne)
- Github: [github.com/smbarne](https://github.com/smbarne)
- Misc: [engineeringart.io](https://engineeringart.io)

Why?

- Learn something new and useful from a new source
- Interact with people in on the same team more effectively
- Make something awesome for more than one platform, reach more people

# Overview

- A Word on UI Design
- Application Structure and Language
- Building Blocks: ViewControllers, TableViews, Cells, Tabbars, and more
- iOS Lifecycle
- iOS Layouts
- Data Management

# Requirements

- Apple Developer Account
- Mac

# Recommendations

Read through the [Start Developing iOS Apps Today](#) tutorial by Apple when possible.

# Resources

**Code:** [github.com/smbarne/AndroidForiOS](https://github.com/smbarne/AndroidForiOS)



# A Word on UI Design



1:11



AndroidForiOS



Red

Orange

Blue

Hello world!



4:43 PM



82%

Subway Lines

About

Red

Orange

Blue

Hello World

# Death to the Basement Menu (Navigation Drawer)

Long live the Tab Bar

Recent trends have advocating getting rid of the Basement Menu pattern, at least on iOS.

## fitbit

Edit

◀ Today ▶

5,151 steps

2.29 miles

970 calories burned

Track exercise

150 lbs

0 calories eaten

Dashboard

Challenges

Friends

Account

## Fitbit

Dashboard

Friends

Devices

Settings

Alarms

Help

Log Out

# Push/Pop vs Present/Dismiss

Android has a built in Activity Stack, iOS does not

- Use a `UINavigationController` to Push and Pop `UIViewController`s
  - Use this by default and for nested content
- Any `UIViewController` can modally Present another `UIViewController`
  - Use this for presenting modular or ediable content



Carrier

2:34 PM

**Subway Lines**[About](#)[Red](#)[Orange](#)[Blue](#)

Hello World



Carrier

2:28 PM

**Subway Lines**[About](#)[Red](#)[Orange](#)[Blue](#)

Hello World

••••• Wi-Fi 9:41 AM ↗ 100%

Today

Notifications

Monday,  
June 2nd

☀ Mostly sunny currently. The high  
will be 81°. Partly cloudy tonight  
with a low of 55°.



SportsCenter

A's Athletics

30-17

5/23

4:07 PM

Blue Jays

26-22

OAK -124



Twins

23-21

5/23



Giants

29-18

SF -154

# Widgets

Now on iOS 8!

# Other Extensions

- Custom Keyboards
- Photo/Media Editing
- Storage Provider
- Document Picker
- More: <https://developer.apple.com/app-extensions/>

# Missing Patterns

- Global Back Button
  - Back is *within* app, not OS wide
- Overflow Menu
  - Try ActionSheets instead
- Actionbar
  - Somewhat similar with UINavigationBar

# Others

- Phone vs tablet<sup>1</sup>
- Rotation handling
- Aspect ratios<sup>1</sup>
- Overscroll

---

<sup>1</sup> iOS 8 now brings iOS to a similar architecture

swift

For iOS8 and Xcode 6, Apple announced **Swift**

Swift is an innovative new programming language for Cocoa and Cocoa Touch. Writing code is interactive and fun, the syntax is concise yet expressive, and apps run lightning-fast. Swift is ready for your next iOS and OS X project — or for addition into your current app — because Swift code works side-by-side with Objective-C.

# What does this mean?

- Swift is new, cool, and a very new paradigm
- Objective-C and Swift can be used in the same project
- There is a lot of Objective-C code still out there and will be for years

For this talk, we're going to focus on Objective-C for practical purposes

# Code Styling and Patterns

- Hello class prefixes - there is no name spacing in Objective-C.
- Install [VVDocumenter](#) to take advantage of AppleDoc
- Null is nil, and Objective-C handles gracefully handles message sending to nil objects gracefully<sup>2</sup>.
- Protocols <-> Interfaces and are preferred to direct inheritance

---

<sup>2</sup> Gotchas may still include runtime crashes when sending nil into a method that cannot handle nil.

- Instance variables are prefixed with `_`, not `m`.
- `@Properties!` A handy tool for synthesizing getters and setters.
  - Setters and Getters can be customer overriden and are called event when referencing `.property`

# Misc

- Provisioning
- App Store Review period
- Simulator, not emulator

# Project Structure

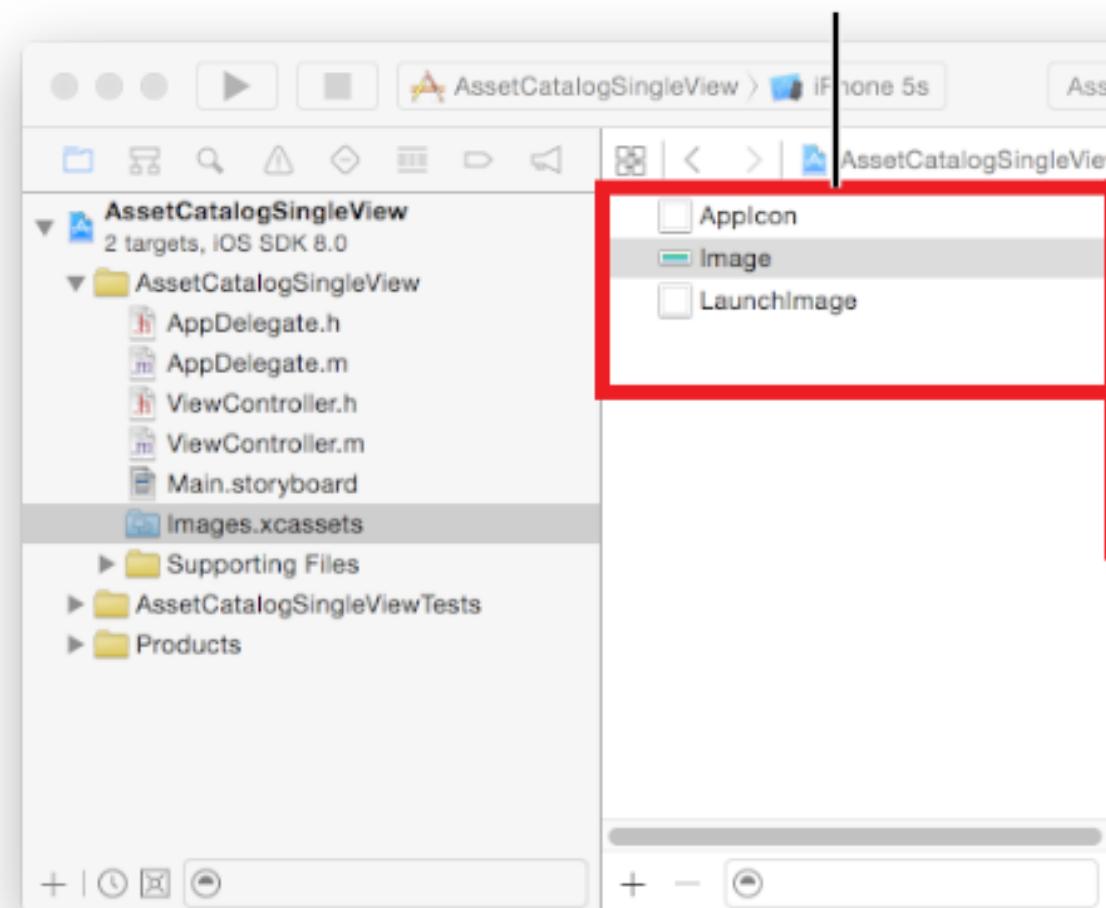
- No more packaging. For Objective-C, there is no name spacing
  - Note: Swift uses modules
- **info.plist** is required and similar to the **AndroidManifest.xml** on Android
- No **build.gradle** - All build info in **\*.xcodeproj**
  - You can build workspaces of multiple projects as well

# Asset Bundles

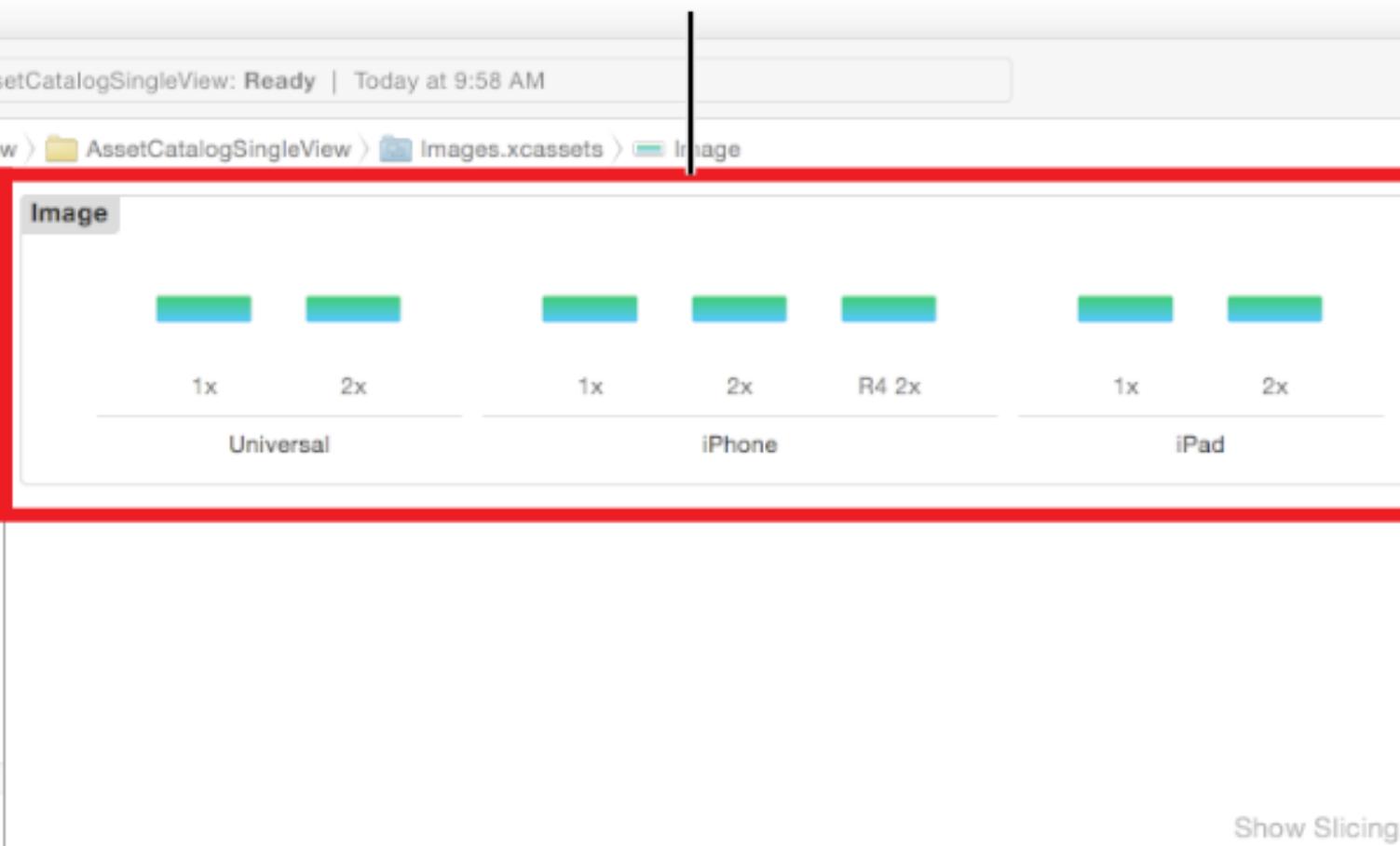
# For images, Xcode provides XCAssets Bundles

- There are **Three** buckets, instead of the many buckets for Android
  - **@1x, @2x, and @3x**
- The iPhone 6+ is the first device to have @3x and a non-1:1 or 2:1 pixel ratio

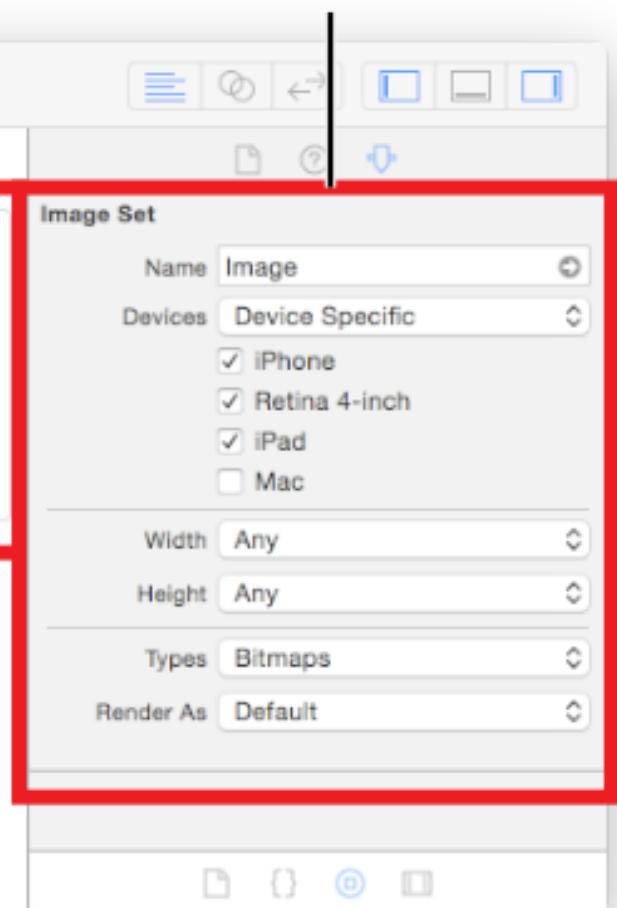
## Set list



## Set viewer



## Set attributes inspector

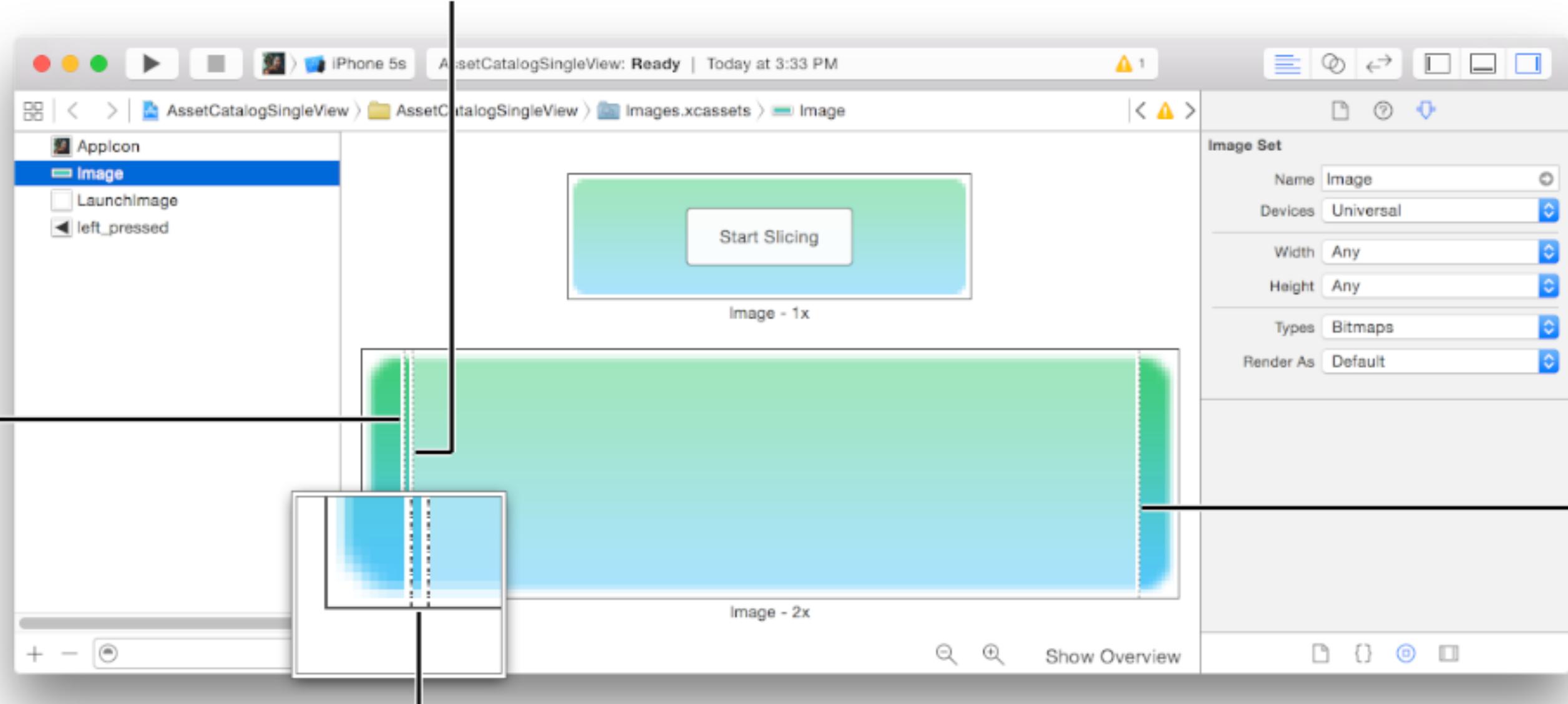


## Inner slicing handle

Left slicing handle

Right slicing handle

Resizable area



# Dimens and Strings

```
NSLocalizedString(@"This is your string value", @"A descriptive comment for localization");  
static const CGFloat kFBConstantValue = 0.1f;
```

iOS uses a strings file for each language which can be generated by running genstrings on the project.

Tools

## IDEs

- Xcode
- AppCode

## Distribution

- Testflight
- Cross-Platform: HockeyApp, Beta by Crashlytics, Appblade, etc

# Building Blocks

Building Blocks: ViewControllers, TableViews,  
Cells, Tabbars, and more

UIViewControllers <-> Activities

# UIViewController

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.

iOS is strongly architected around the **MVC** framework.  
UIViewControllers are the glue between model objects and  
the view displayed to the user.

- It is very easy to create large UIViewControllers so be careful
- iOS tends towards dumber views and more View Controller logic
- View Controllers do not return values and must have custom initializers created to send data. No Intents here.

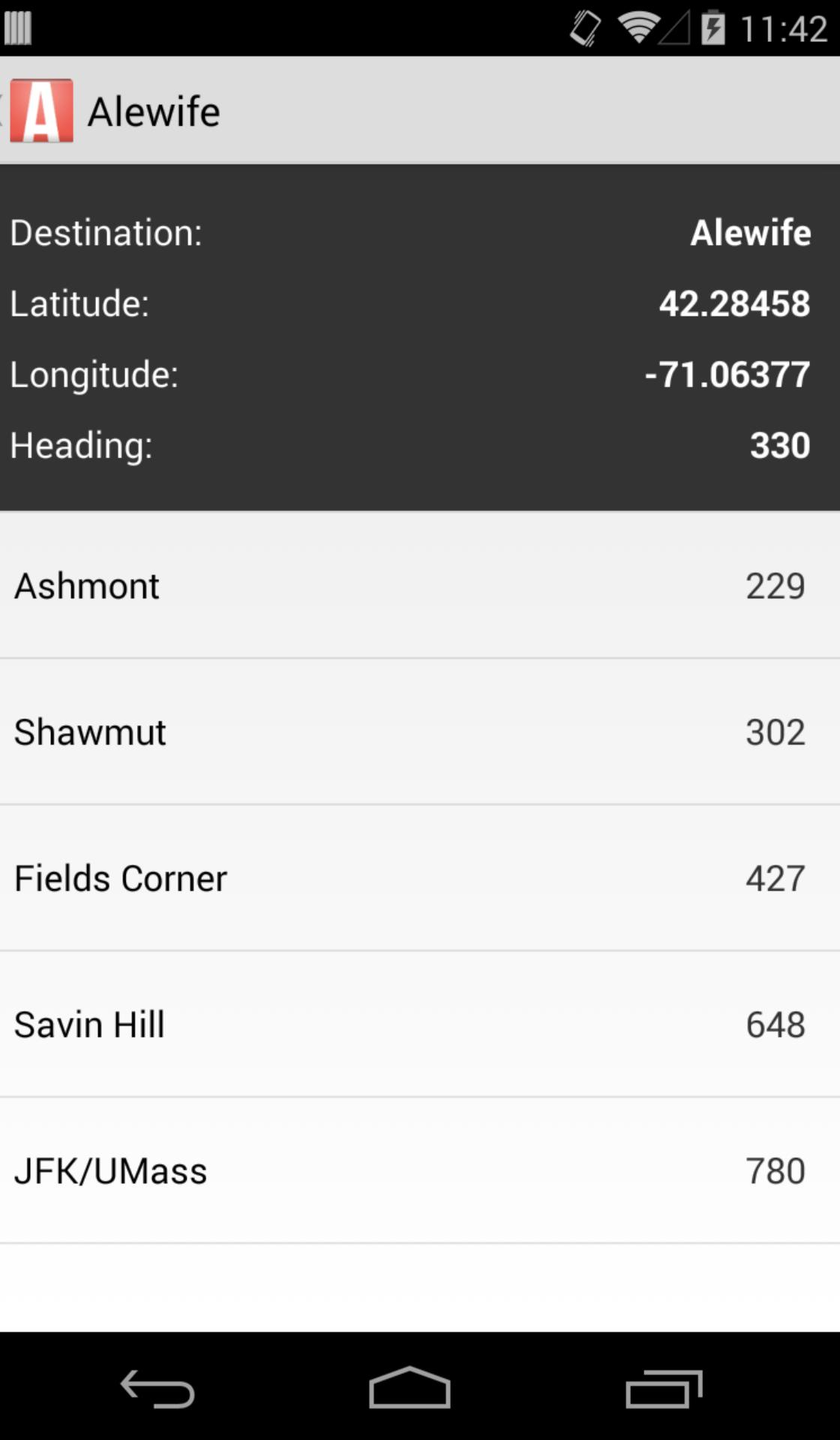
# Fragments do not exist on iOS

If designing a modular controller system, use Child View Controller Containment.

# Explain it to me with code

Let's look at a sample **UITableViewController** and a sample **ListFragment** that show a list of prediction times for a subway trip courtesy of the **MBTA** (Massachusetts Bay Transportation Authority).

# ListFragment Implementation



```
public class TripDetailFragment extends ListFragment {  
    /**  
     * The configuration flags for the Trip Detail Fragment.  
     */  
    public static final class TripDetailFragmentState {  
        public static final String KEY_FRAGMENT_TRIP_DETAIL = "KEY_FRAGMENT_TRIP_DETAIL";  
    }  
  
    protected Trip mTrip;  
  
    /**  
     * Use this factory method to create a new instance of  
     * this fragment using the provided parameters.  
     *  
     * @param trip the trip to show details  
     * @return A new instance of fragment TripDetailFragment.  
     */  
    public static TripDetailFragment newInstance(Trip trip) {  
        TripDetailFragment fragment = new TripDetailFragment();  
        Bundle args = new Bundle();  
        args.putParcelable(TripDetailFragmentState.KEY_FRAGMENT_TRIP_DETAIL, trip);  
        fragment.setArguments(args);  
        return fragment;  
    }  
  
    public TripDetailFragment() { }  
}
```

```
@Override
public View onCreateView(LayoutInflater inflater, ViewGroup container,
                        Bundle savedInstanceState) {
    Prediction[] predictions =
        mTrip.predictions.toArray(new Prediction[mTrip.predictions.size()]);
    PredictionArrayAdapter predictionArrayAdapter =
        new PredictionArrayAdapter(getActivity().getApplicationContext(), predictions);
    setListAdapter(predictionArrayAdapter);
    return super.onCreateView(inflater, container, savedInstanceState);
}

@Override
public void onViewCreated(View view, Bundle savedInstanceState) {
    super.onViewCreated(view, savedInstanceState);
    TripDetailsView headerView = new TripDetailsView(getActivity());
    headerView.updateFromTripObject(mTrip);
    getListView().addHeaderView(headerView);
}
}
```

&lt; Red

**Alewife**Destination: **Alewife**Latitude **42.28**Longitude **-71.06**Heading **330**

Ashmont 229

Shawmut 302

Fields Corner 427

Savin Hill 648

JFK/UMass 780

# iOS Tableview Implementation

```
@interface MBTASubwayTripTableViewController ()  
@property (assign, nonatomic) MBTATrip *trip;  
@end  
  
@implementation MBTASubwayTripTableViewController  
- (instancetype)initWithTrip:(MBTATrip *)trip {  
    self = [super initWithStyle:UITableViewStylePlain];  
    if (self) {  
        _trip = trip;  
        [self setTitle:trip.destination];  
    }  
    return self;  
}  
  
- (void)viewDidLoad {  
    [super viewDidLoad];  
  
    [self.tableView registerClass:[MBTAPredictionCell class]  
        forCellReuseIdentifier:[MBTAPredictionCell reuseIdentifier]];  
    [self.tableView  
        registerNib:[UINib nibWithNibName:NSStringFromClass([MBTATripHeaderView class]) bundle:nil]  
        forCellReuseIdentifier:[MBTATripHeaderView reuseIdentifier]];  
}
```

```
#pragma mark - UITableViewDelegate
- (CGFloat)tableView:(UITableView *)tableView
    heightForHeaderInSection:(NSInteger)section {
    return [MBTATripHeaderView heightForTrip:self.trip];
}

- (UIView *)tableView:(UITableView *)tableView
    viewForHeaderInSection:(NSInteger)section {
    MBTATripHeaderView *headerView = [self.tableView
        dequeueReusableCellWithIdentifier:[MBTATripHeaderView reuseIdentifier]];
    [headerView setFromTrip:self.trip];
    return headerView;
}

- (void)tableView:(UITableView *)tableView
    didSelectRowAtIndexPath:(NSIndexPath *)indexPath {
    [tableView deselectRowAtIndexPath:indexPath animated:YES];
}
```

```
#pragma mark - UITableViewDataSource
- (NSInteger)numberOfSectionsInTableView:(UITableView *)tableView {
    return 1;
}

- (NSInteger)tableView:(UITableView *)tableView
 numberOfRowsInSection:(NSInteger)section {
    return [self.trip.predictions count];
}

- (UITableViewCell *)tableView:(UITableView *)tableView
    cellForRowAtIndexPath:(NSIndexPath *)indexPath {
    UITableViewCell *cell = [tableView
        dequeueReusableCellWithIdentifier:[MBTAPredictionCell reuseIdentifier]
        forIndexPath:indexPath];

    MBTAPrediction *prediction = [self.trip.predictions objectAtIndex:indexPath.row];
    [(MBTAPredictionCell *)cell setFromPrediction:prediction];

    return cell;
}
```



Let's break down some of that piece by piece...

# UITableViews and Datasources

# ListView, meet UITableView

Both are structured around showing a linear list of Views smoothly

- iOS has *cells* - any content you want to show in a UITableView should be a subclass of UITableViewCell
- Reuse your views in a UITableView! You do this by dequeuing a cell fromt he UITableView
- Default UITableViewCells are available that you can populate just like Android has default ListView Views

# iOS Uses the Delegation Pattern Often

- UITableViewDelegate is a protocol a UIViewController implements to control a UITableView's behavior.
  - This includes row height<sup>3</sup>, header views, row selection actions

---

<sup>3</sup> iOS8 added fully automatic table view cell sizing

**UITableViews are populated via Datasources**

# Goodbye adapters, hello datasources

Instead of having adapters, iOS has **datasource delegation**

- Datasources provide the data and are responsible for dequeuing and setting up the cells
- It is important that the number of sections and rows match any additions and removals to the UITableView

```
- (void)viewDidLoad {
    [super viewDidLoad];

    [self.tableView registerClass:[MBTAPredictionCell class]
        forCellReuseIdentifier:[MBTAPredictionCell reuseIdentifier]];
    [self.tableView registerNib:
        [UINib nibWithNibName:NSStringFromClass([MBTATripHeaderView class]) bundle:nil]
        forCellReuseIdentifier:[MBTATripHeaderView reuseIdentifier]];
}
```

```
#pragma mark - UITableViewDataSource
- (NSInteger)numberOfSectionsInTableView:(UITableView *)tableView {
    return 1;
}

- (NSInteger)tableView:(UITableView *)tableView
 numberOfRowsInSection:(NSInteger)section {
    return [self.trip.predictions count];
}

- (UITableViewCell *)tableView:(UITableView *)tableView
    cellForRowAtIndexPath:(NSIndexPath *)indexPath {
    UITableViewCell *cell = [tableView
        dequeueReusableCellWithIdentifier:[MBTAPredictionCell reuseIdentifier]
        forIndexPath:indexPath];

    MBTAPrediction *prediction = [self.trip.predictions objectAtIndex:indexPath.row];
    [(MBTAPredictionCell *)cell setFromPrediction:prediction];

    return cell;
}
```

# Now compare that to our Adapter

```
public class PredictionArrayAdapter extends ArrayAdapter<Prediction> {  
    int LAYOUT_RESOURCE_ID = R.layout.view_three_item_list_view;  
  
    public PredictionArrayAdapter(Context context) {  
        super(context, R.layout.view_three_item_list_view);  
    }  
  
    public PredictionArrayAdapter(Context context, Prediction[] objects) {  
        super(context, R.layout.view_three_item_list_view, objects);  
    }  
}
```

```
@Override
public View getView(int position, View convertView, ViewGroup parent) {
    Prediction prediction = this.getItem(position);
    View inflatedView = convertView;
    if(convertView==null)
    {
        LayoutInflator inflater = (LayoutInflator)getContext()
            .getSystemService(Context.LAYOUT_INFLATER_SERVICE);
        inflatedView = inflater.inflate(LAYOUT_RESOURCE_ID, parent, false);
    }

    TextView stopNameTextView = (TextView)inflatedView
        .findViewById(R.id.view_three_item_list_view_left_text_view);
    TextView middleTextView = (TextView)inflatedView
        .findViewById(R.id.view_three_item_list_view_middle_text_view);
    TextView stopSecondsTextView = (TextView)inflatedView
        .findViewById(R.id.view_three_item_list_view_right_text_view);

    stopNameTextView.setText(prediction.stopName);
    middleTextView.setText("");
    stopSecondsTextView.setText(prediction.stopSeconds.toString());

    return inflatedView;
}
```

# Note

Android's **GridView** is similar to **UICollectionView**

blocks

# Blocks

- Blocks are Apple's lambda addition to Objective-C
- They largely replace the delegation pattern
- Used similarly to anonymous functions and AsyncTasks
- Reference: [goshdarnblocksyntax.com](http://goshdarnblocksyntax.com)

# Using Blocks

```
__weak MBTATripListTableViewController *weakSelf = self;

[[MBTADataManager shared] importDataForKey:self.lineType
withCompletion:^(MBTATripList *tripList, BOOL succeeded, NSError *error) {
if (succeeded) {
    weakSelf.data = tripList.trips;
    [weakSelf.tableView reloadData];
}
else {
    [[[UIAlertView alloc] initWithTitle:@"Uh Oh"
                                message:@"Error loading data, sorry!"
                                delegate:nil
                               cancelButtonTitle:@"OK"
                               otherButtonTitles:nil] show];
}
}];
```

# Grand Central Dispatch

Apple's centralized threading dispatching system for iOS and OSX.  
It makes threading safer and more convenient. Used largely via  
dispatch blocks such as:

```
dispatch_async(<#dispatch_queue_t queue#>, <#^(void)block#>)
```

```
dispatch_sync(<#dispatch_queue_t queue#>, <#^(void)block#>)
```

```
- (void)importDataForKey:(MBTALineType)key
    withCompletion:(MBTAImportCompletionBlock)completion {
    dispatch_async([self backgroundQueue], ^{
        BOOL succeeded = NO;
        MBTATripList *tripList = nil;

        NSDictionary *data = [MBTADataManager
            dictionaryWithContentsOfJSONString:[NSString fileNameForLineType:key]];
        if ([data isKindOfClass:[NSDictionary class]]) {
            tripList = [[MBTATripList alloc] initWithData:[data objectForKey:@"TripList"]];
            succeeded = YES;
        }

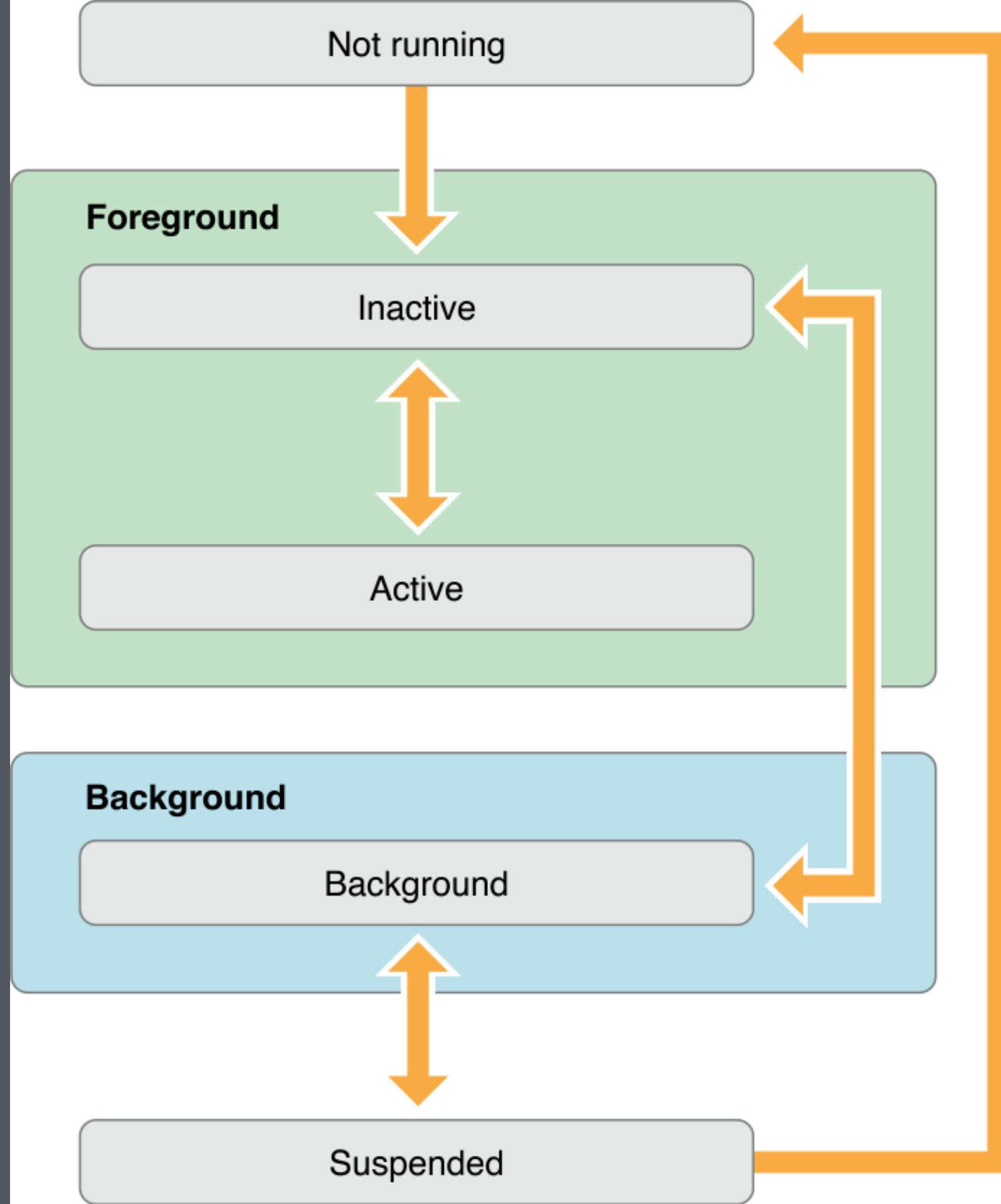
        if (completion) {
            dispatch_async(dispatch_get_main_queue(), ^{
                completion(tripList, succeeded, nil);
            });
        }
    });
}
```

# iOS Lifecycle



THAT'S \$37

#TheLEGOMovie



- iOS apps may **not** run fully in the background
  - They can, however, register to be awoken at periodic intervals and through push and silent push notifications
- There is one entrance point when the app is launching
  - `(BOOL)application:didFinishLaunchingWithOptions:`
- If removed from memory, the app will be relaunched from the beginning

# Benefits

- Rotation without destruction
- Properties - no need to save and restore state data
- A simpler lifecycle for VCs instead of the Activity->Fragment lifecycle

# Layouts

# Main View Components

- UITabBar <-> ViewSwitcher
- UITableView <-> ListView
- UICollectionView <-> GridView

# Layout Basics

iOS is Heading More and More Towards Android's Layout Structure

Autolayout is about applying **constraints** to views that determine how they will layout.

- Interface Builder is your friend
- Starting off, Xcode can recognize and automatically build constraints for you
- When building constraints, make sure you have enough to fully calculate the view
- Constraints can be modified and created in code as well



11:42

 Alewife

Destination: Alewife  
Latitude: 42.28458  
Longitude: -71.06377  
Heading: 330

Ashmont	229
Shawmut	302
Fields Corner	427
Savin Hill	648
JFK/UMass	780



••••○ AT&amp;T ⌂

4:43 PM

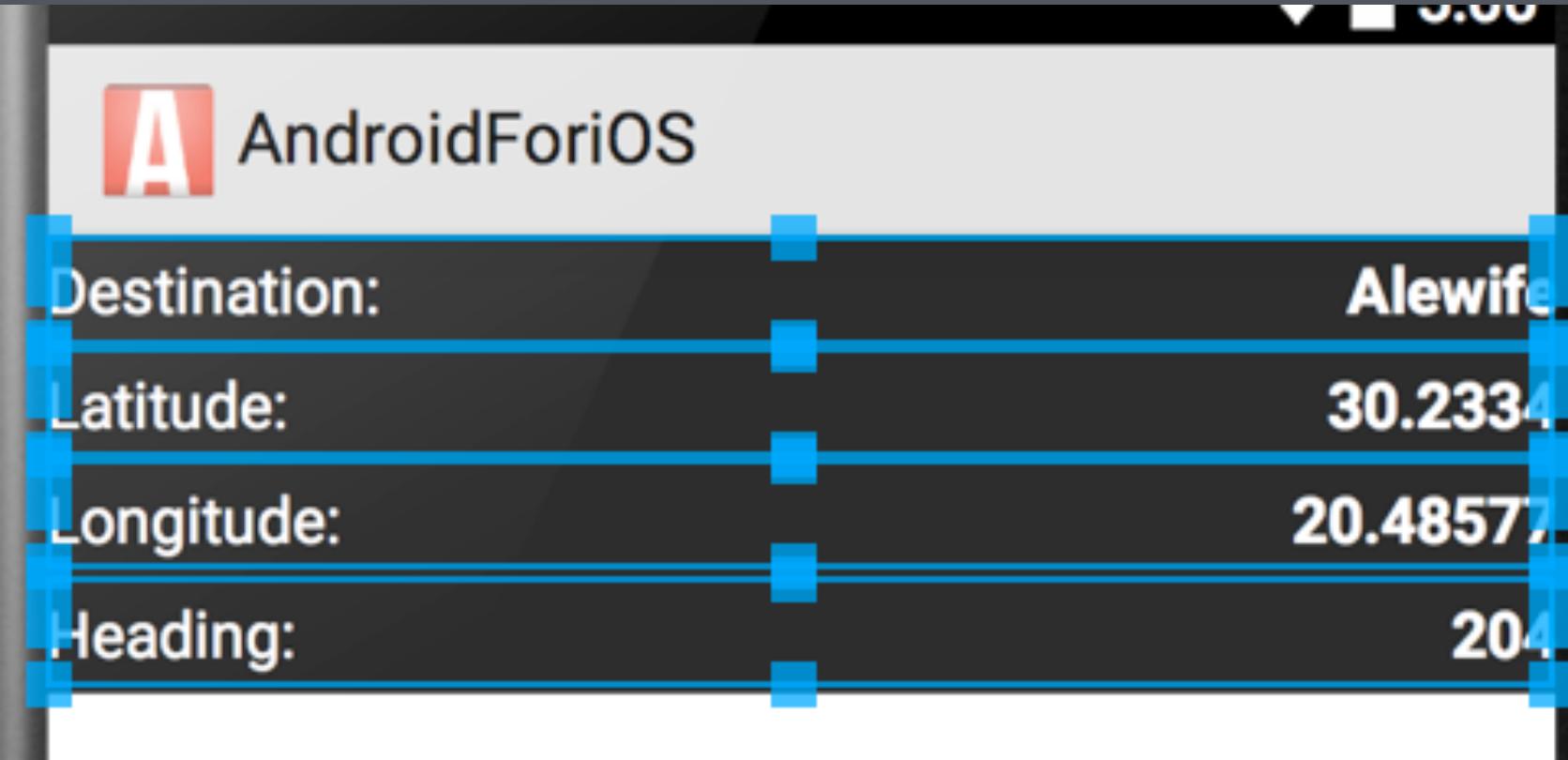
\* 82%

&lt; Red

Alewife

Destination: Alewife  
Latitude 42.28  
Longitude -71.06  
Heading 330

Ashmont	229
Shawmut	302
Fields Corner	427
Savin Hill	648
JFK/UMass	780



```
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:background="#222222"
    android:orientation="vertical">
    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:orientation="horizontal">
        <TextView />      <TextView />
    </LinearLayout>
    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:orientation="horizontal" >
        <TextView />      <TextView />
    </LinearLayout>
    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:orientation="horizontal">
        <TextView />      <TextView />
    </LinearLayout>
    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:orientation="horizontal" >
        <TextView />      <TextView />
    </LinearLayout>
</LinearLayout>
```

X

\*\*\*

I I

H Destination: H Alewife



H Latitude

I 42.39514



H Longitude

I 70.99405



H Heading

I 210



\*\*\*

\*\*\*

Data

# Options

- **NSUserDefaults <-> Shared Preferences**
- In memory objects
- Saving to the documents directory <-> Saving to and fetching from file structure via the **internal** or **external** file storage
- **Core Data <-> SQLite**

Core Data

Core Data is a Model Layer Framework designed to be easy to use and reliant. It is similar to Object-relational mapping, but it is not.

Core Data provides a native solution to storing and managing model data for iOS.

## Features:

- Direct ties to UI components such as UITableView through NSFetchedResultsController
- Grouping, filtering, and organizing data in memory and in the user interface.
- Relationship maintenance.
- Schema migration.
- And more...

# Example: Fetching a Root User Object

```
NSUserDefaults *defaults = [NSUserDefaults standardUserDefaults];
NSURL *uri = [defaults URLForKey:@"rootItem"];
NSManagedObjectID *moid = [managedObjectContext.persistentStoreCoordinator
    managedObjectIDForURIRepresentation:uri];
NSError *error = nil;
Item *rootItem = (id) [managedObjectContext existingObjectWithID:moid
    error:&error];
```

# Example: Searching and Filtering Data

```
NSManagedObjectContext *moc = [self managedObjectContext];
NSEntityDescription *entityDescription = [NSEntityDescription
    entityForName:@"Employee" inManagedObjectContext:moc];
NSFetchRequest *request = [[NSFetchRequest alloc] init];
[request setEntity:entityDescription];

// Set Search Predicate
NSNumber *minimumSalary = ...;
NSPredicate *predicate = [NSPredicate predicateWithFormat:
    @"(lastName LIKE[c] 'Worsley') AND (salary > %@)", minimumSalary];
[request setPredicate:predicate];
```

```
// Set Ordering Descriptor
NSSortDescriptor *sortDescriptor = [[NSSortDescriptor alloc]
    initWithKey:@"firstName" ascending:YES];
[request setSortDescriptors:@[sortDescriptor]];

NSError *error;
NSArray *array = [moc executeFetchRequest:request error:&error];
if (array == nil) {
    // Deal with error...
}
```

# Popular Libraries

- **AFNetworking <-> Volley**
- **MagicalRecord <-> ActiveAndroid**
- **SDWebImage <-> Picasso**

# Go Out and Build Something Cross Platform!

@smbarne - iOS 101 for Android Developers

**Code:** [github.com/smbarne/AndroidForiOS](https://github.com/smbarne/AndroidForiOS)