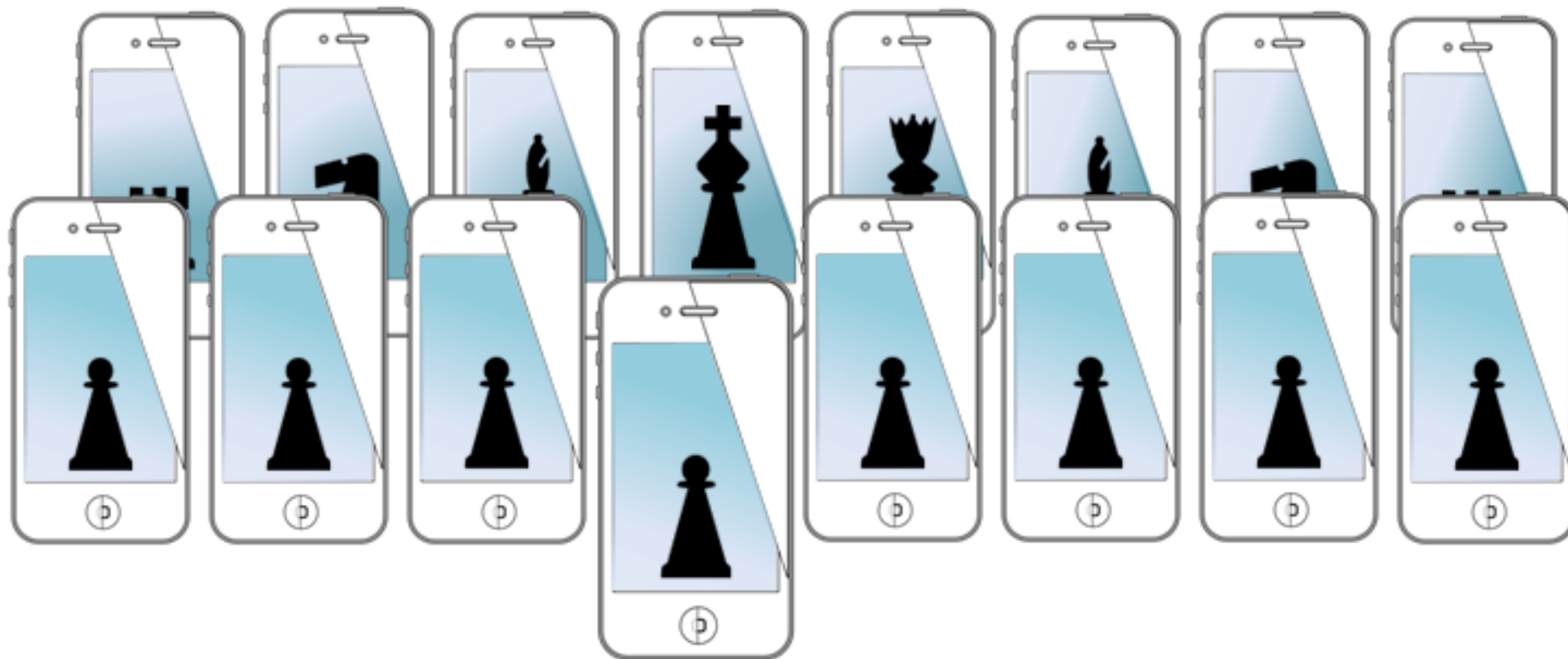


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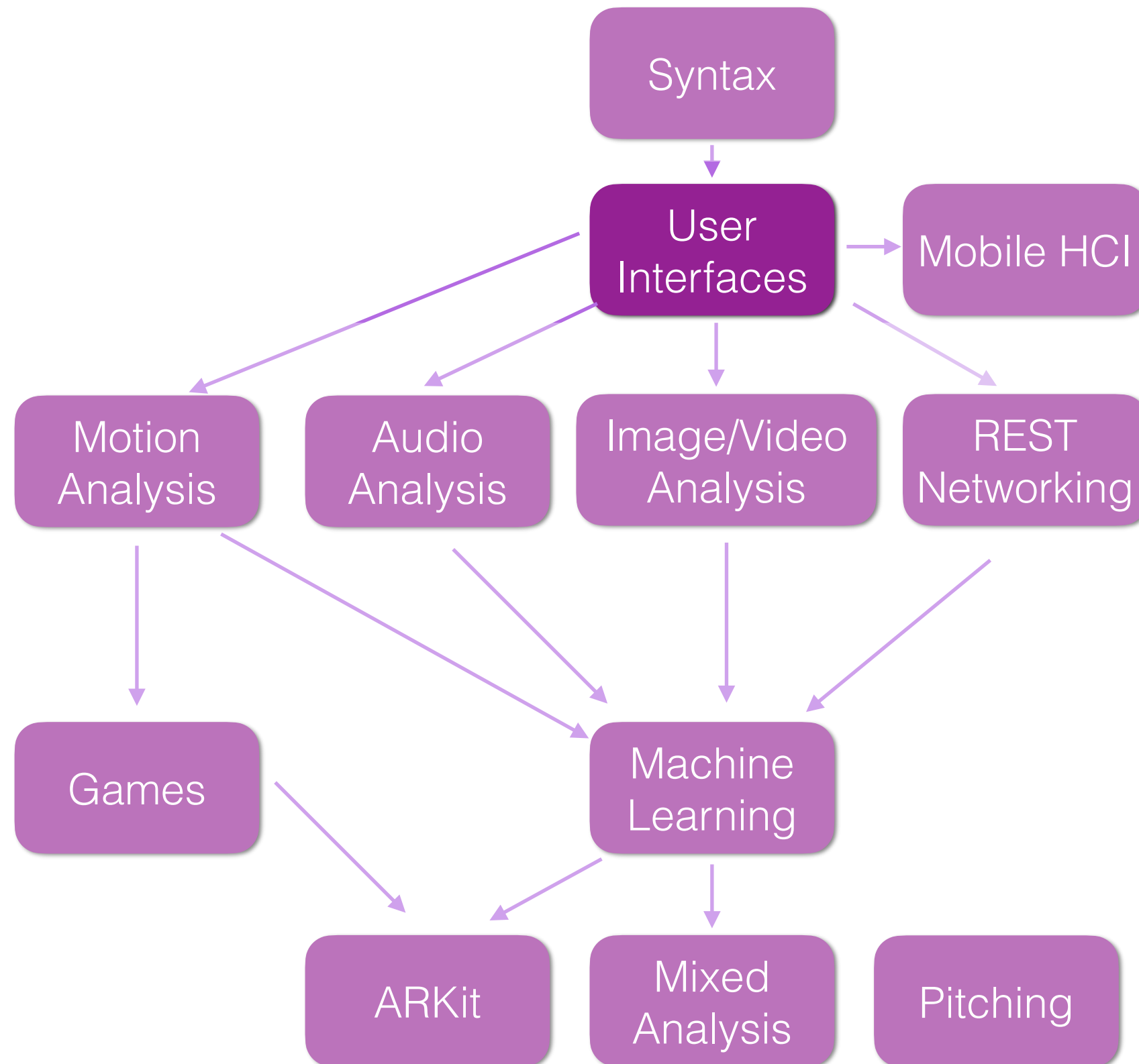
UI elements

Eric C. Larson, Lyle School of Engineering,
Department of Computer Science, Southern Methodist University

course logistics and agenda

- logistics:
 - new office hours zoom room
 - flipped module preparation
- agenda:
 - implicit / optional
 - gesture recognizers
 - timers / segmented control
 - **remainder of time:** extended demo!

class progression



optional versus implicit

- optional values can be nil or a specific datatype
 - many properties of a swift class will therefore be optional
- lazily instantiated properties must be optional (no init needed), but `if let` syntax is cumbersome if used for all properties every time
- enter the world of implicitly unwrapped optionals!
 - do not check if nil, go to the data ... runtime error if nil...

```
@IBOutlet weak var implicitUnwrapLabel: UILabel!
```

```
@IBOutlet weak var optionalLabel: UILabel?
```

```
@IBOutlet weak var label: UILabel
```

why can we not do this?

```
implicitUnwrapLabel.text = "No need to unwrap with ?"  
optionalLabel?.text = "must unwrap"
```

```
if let label = optionalLabel {  
    label.text = "safely unwrapped in if let"  
}
```

review: UI text field and model



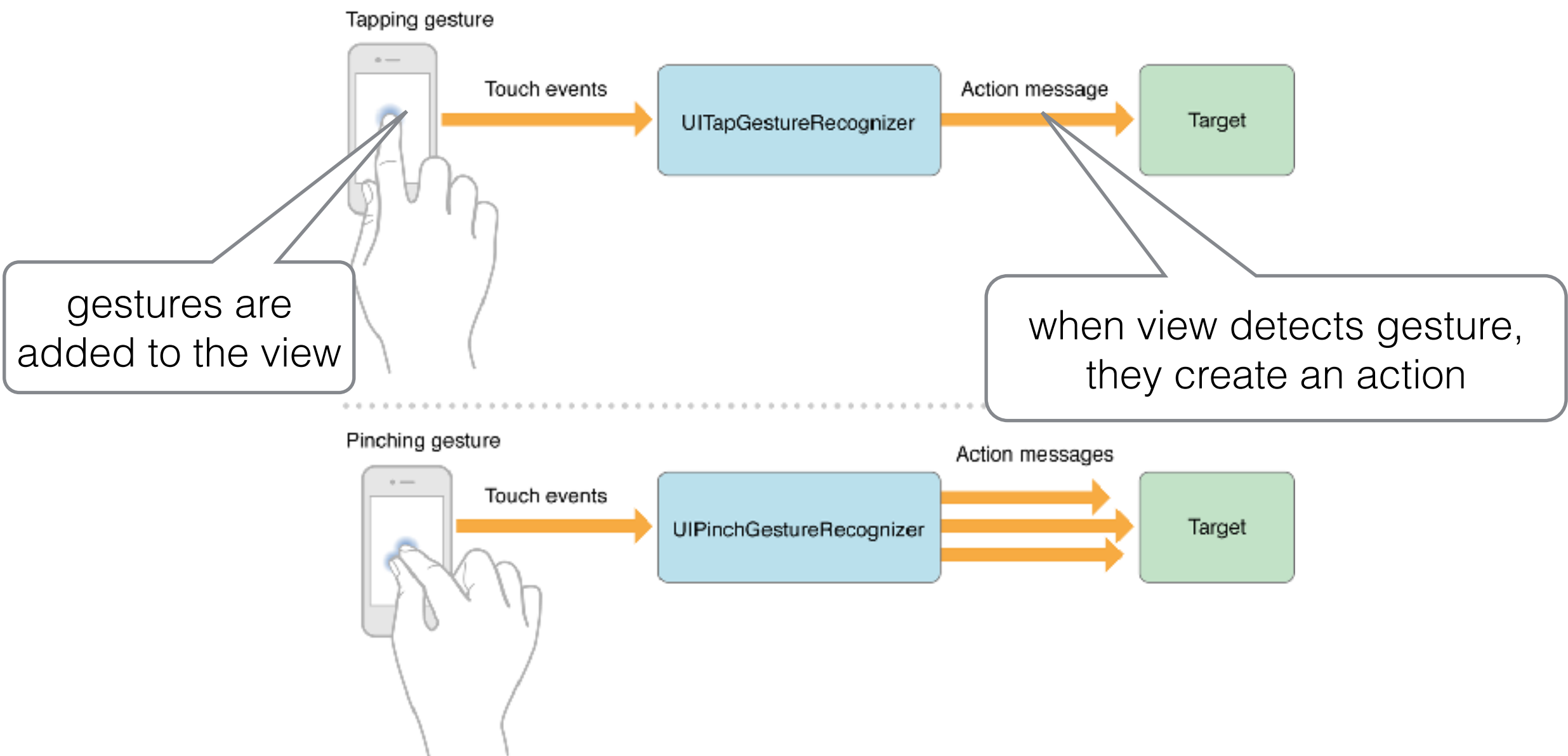
gesture recognition

- the fun part about doing things on the iPhone!
- **the point**: recognize different gestures and then make something happen
- lots of ways to do this
 - **programmatically**: quick and versatile
 - **target-action**: easy
 - **delegation**: more feature rich
- here is the complete documentation:

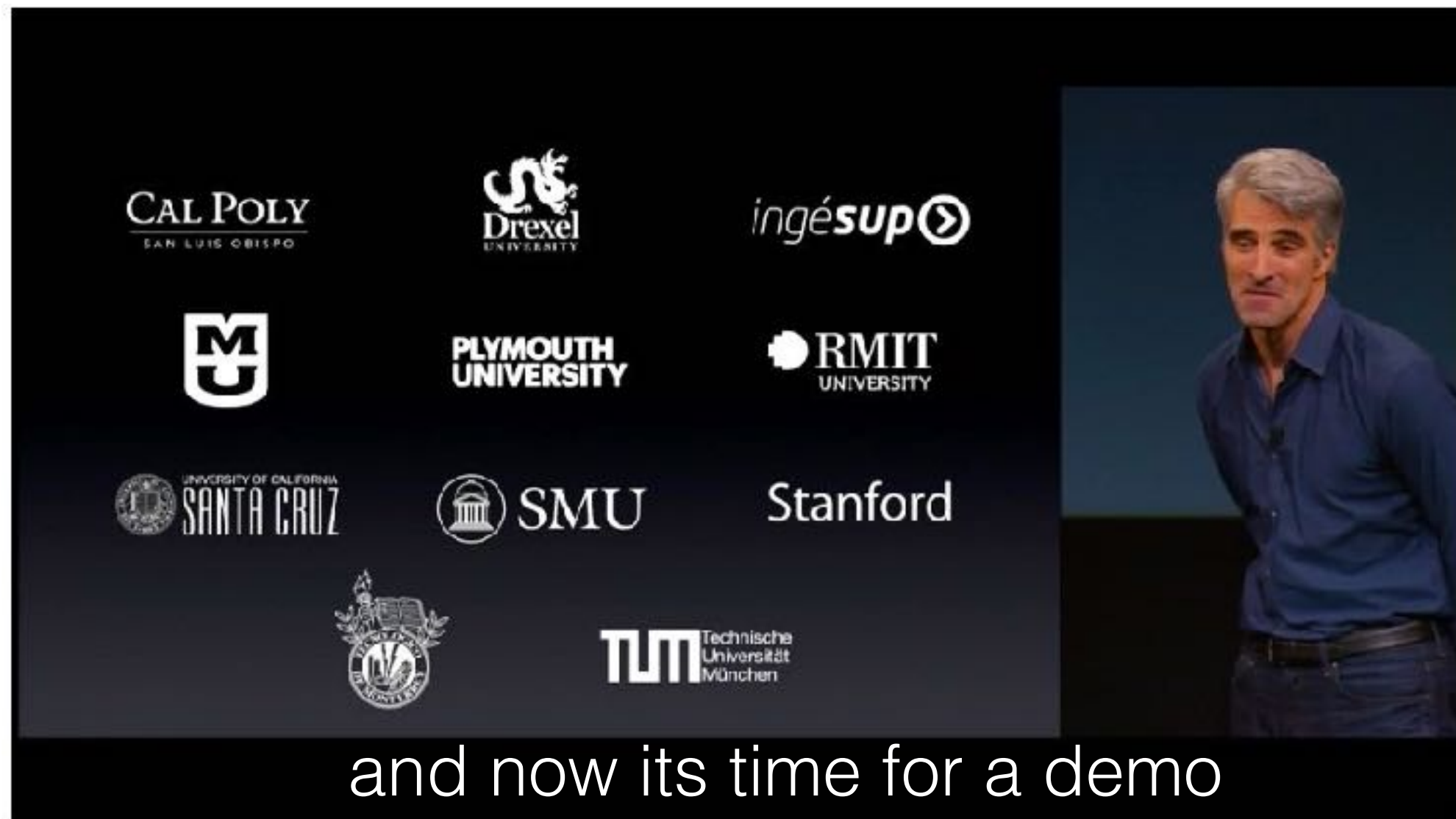
https://developer.apple.com/library/ios/documentation/EventHandling/Conceptual/EventHandlingiPhoneOS/GestureRecognizer_basics/GestureRecognizer_basics.html

gesture recognition

- need a UIGestureRecognizer
- UITapGestureRecognizer, UIPinchGestureRecognizer, ...



UI gesture demo

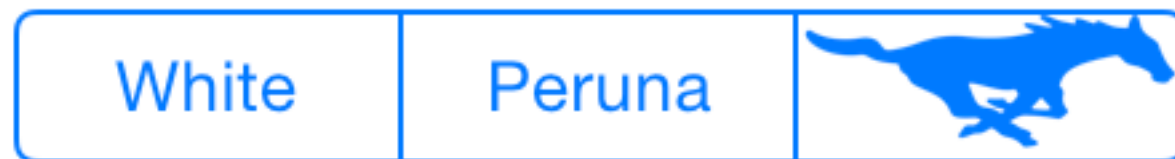


timers, segmented control

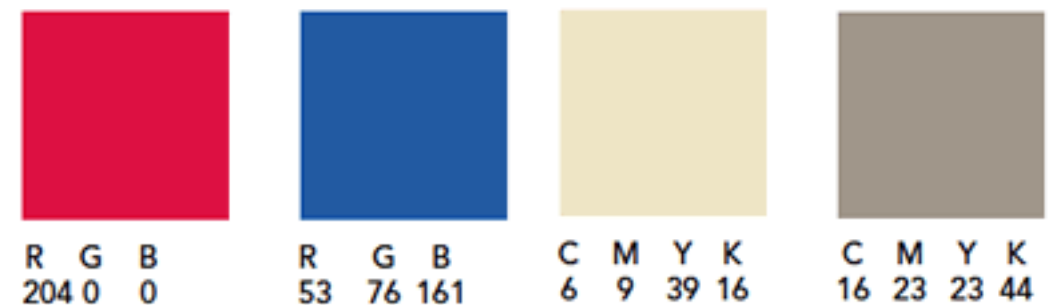
```
- (IBAction)updateFromSegmentedControl:(UISegmentedControl *)sender {  
    NSString *selectedText = [sender titleForSegmentAtIndex: [sender selectedSegmentIndex]];  
    YOUR_CODE  
}
```

get title from control

get value of control



standard SMU colors

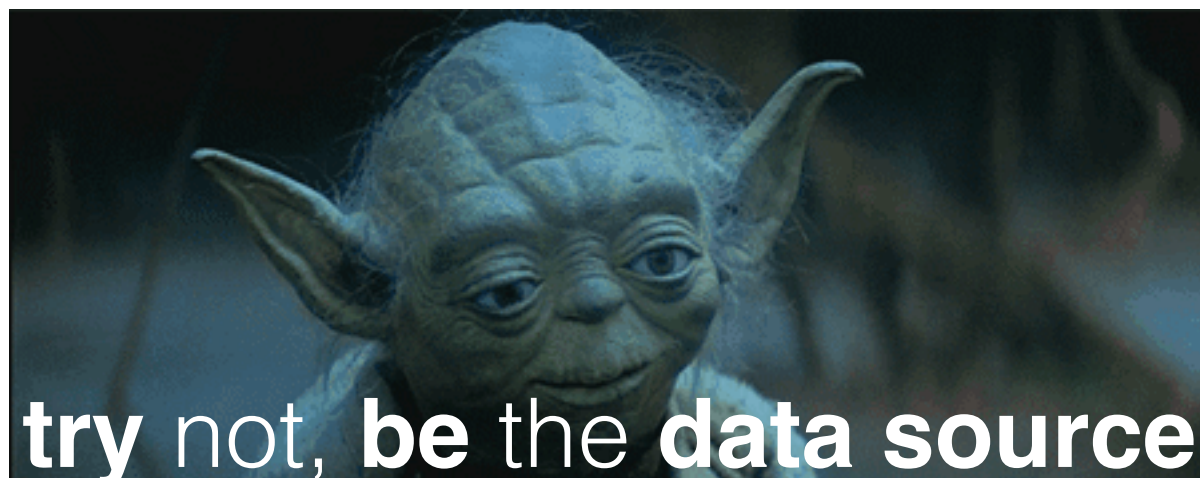
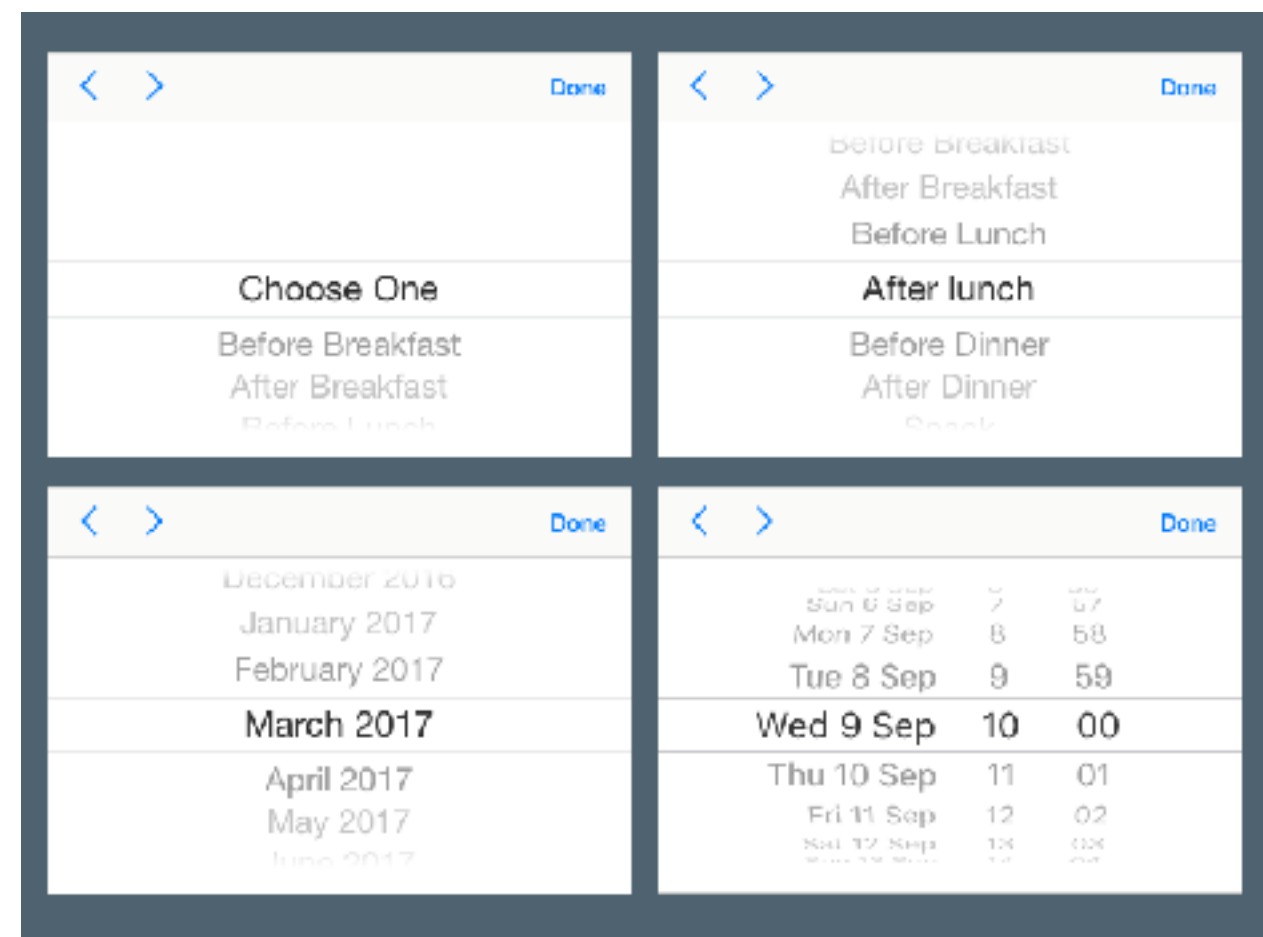


```
NSTimer *timer = [NSTimer scheduledTimerWithTimeInterval:someIntervalInSeconds  
                                                         target:self  
                                                         selector:@selector(someFunction:)  
                                                         userInfo:nil  
                                                         repeats:YES];  
  
// don't get blocked by the main thread  
[[NSRunLoop mainRunLoop] addTimer:timer forMode:NSRunLoopCommonModes];
```

when should the timer be running? what modes?

pickers

- **look at documentation:** find out how to use a picker view
- you will have all the tools to do it from working with collections and the table view controllers in flipped lecture video!
- you are the data source!



assignment one, discuss

- Posted on Canvas!



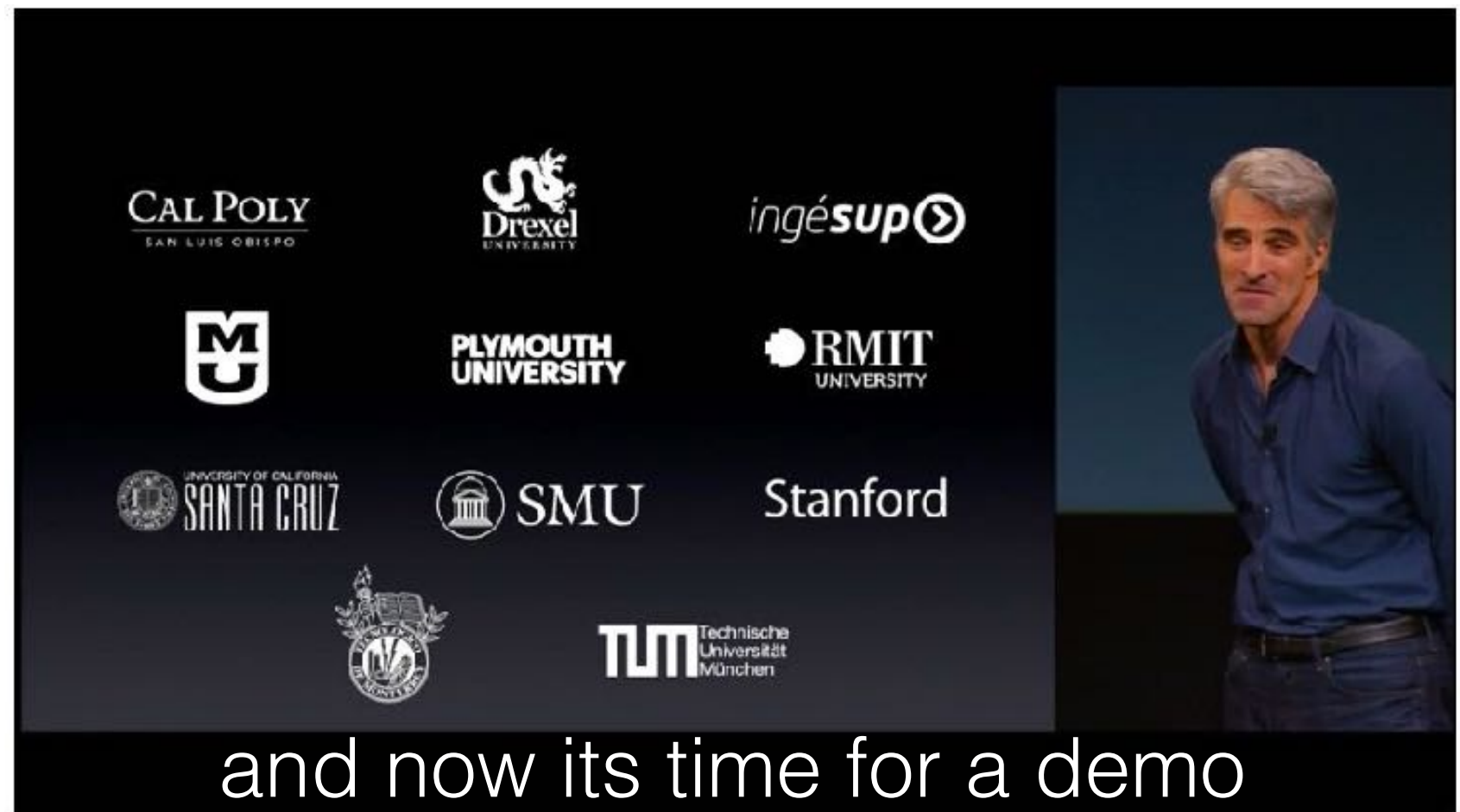
before demo... don't forget

- next lectures:
 - mobile HCI
 - audio access

adding functionality



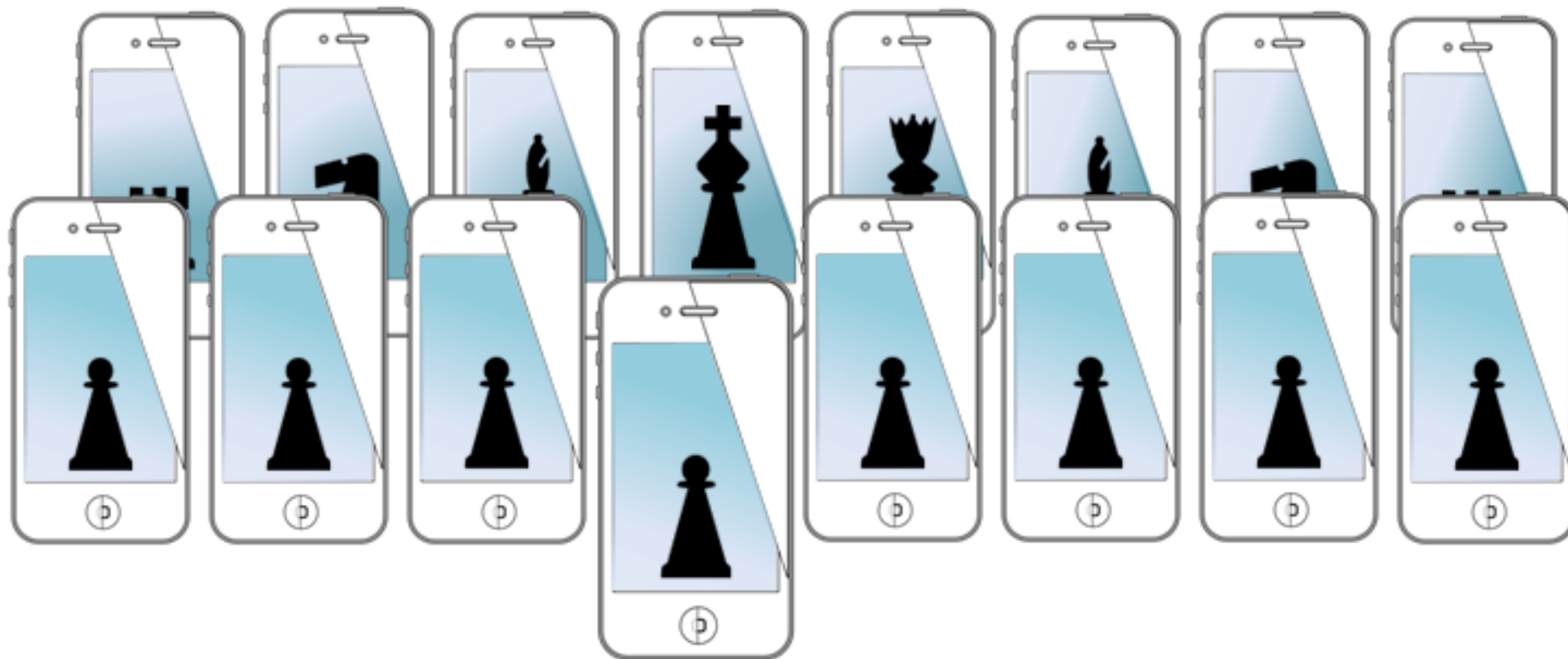
- additional functionality, feedback, etc.
- using the `switch` statement in swift (very powerful)
- `if let`
- mixing objective-c
- and more!



<https://developer.apple.com/swift/>

<https://docs.swift.org/swift-book/GuidedTour/GuidedTour.html>

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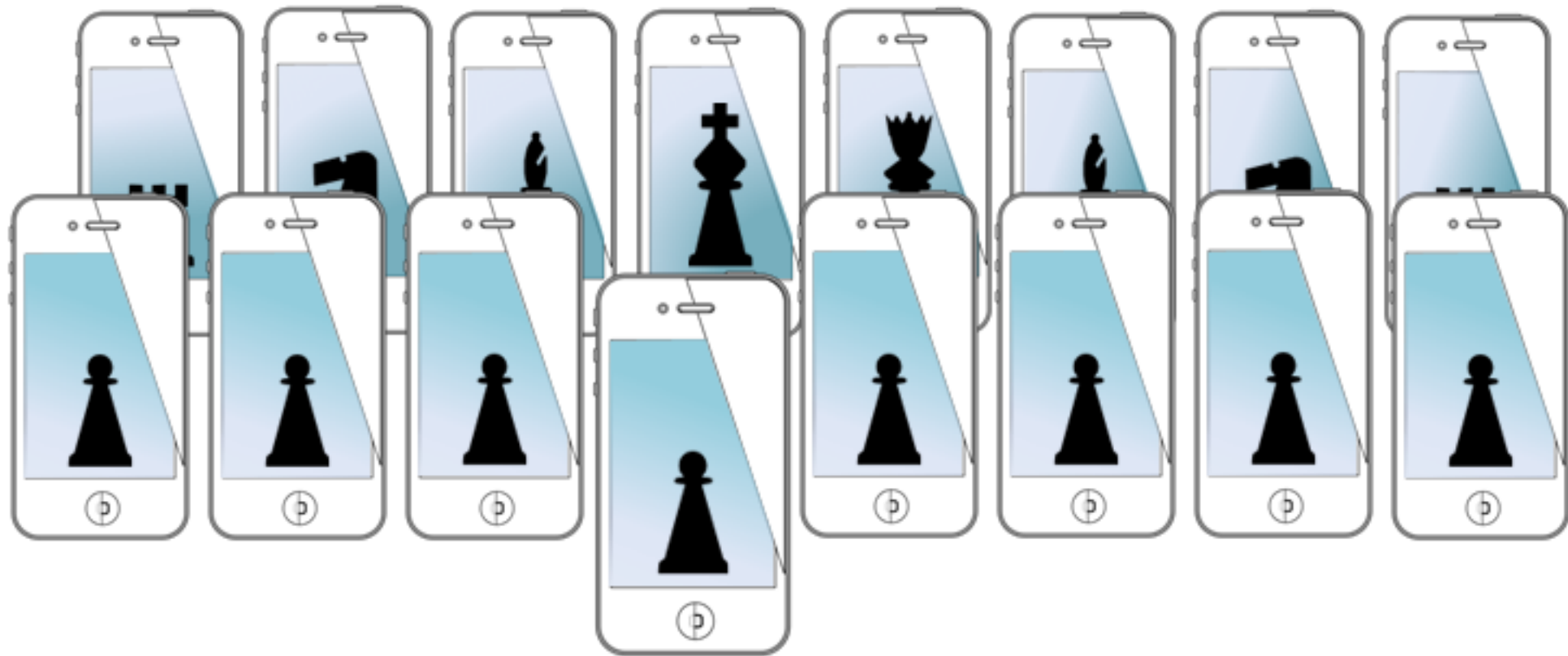
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UI elements

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Video Module One, model view controllers

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agenda (video)

- MVC (potential review)
 - outlets, actions, delegates, protocols, data source
- ViewControllers in iOS
 - TableViewController, NavigationViewController, CollectionViewController, UIViewController
- storyboard (with UIViewController)
 - outlets, auto layout, programatic creation
 - timers, UIScrollView, image assets,

MVC's

review

controller has direct connection to view class

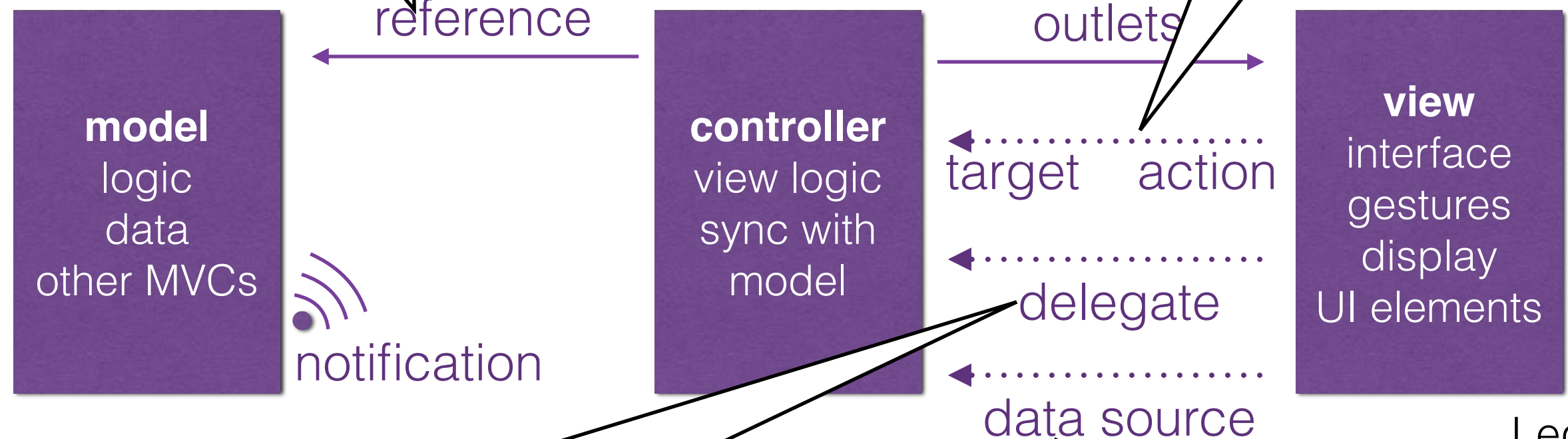
```
@property (weak, nonatomic) IBOutlet UITextField *firstName;
@property (weak, nonatomic) IBOutlet UITextField *lastName;
@property (weak, nonatomic) IBOutlet UITextField *phoneNumber;
```

controller has direct connection to model class

```
ModelClass *myModel = [get global handle to model]
PhoneNumberStruct * phNumber = [myModel getNumber];
self.phoneNumberLabel.text = phNumber.number;
```

view sends a targeted message

```
- (IBAction)buttonPressed:(id)sender;
- (IBAction)showPhBookPressed:(id)sender;
```

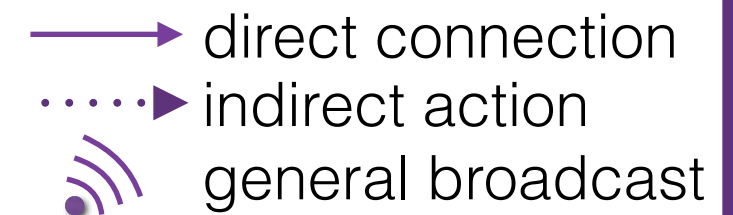


```
MainViewController ()<UITextFieldDelegate>
#pragma mark - UITextField Delegate
- (BOOL)textFieldShouldReturn:(UITextField *)textField { ... }
```

controller implements method for view class

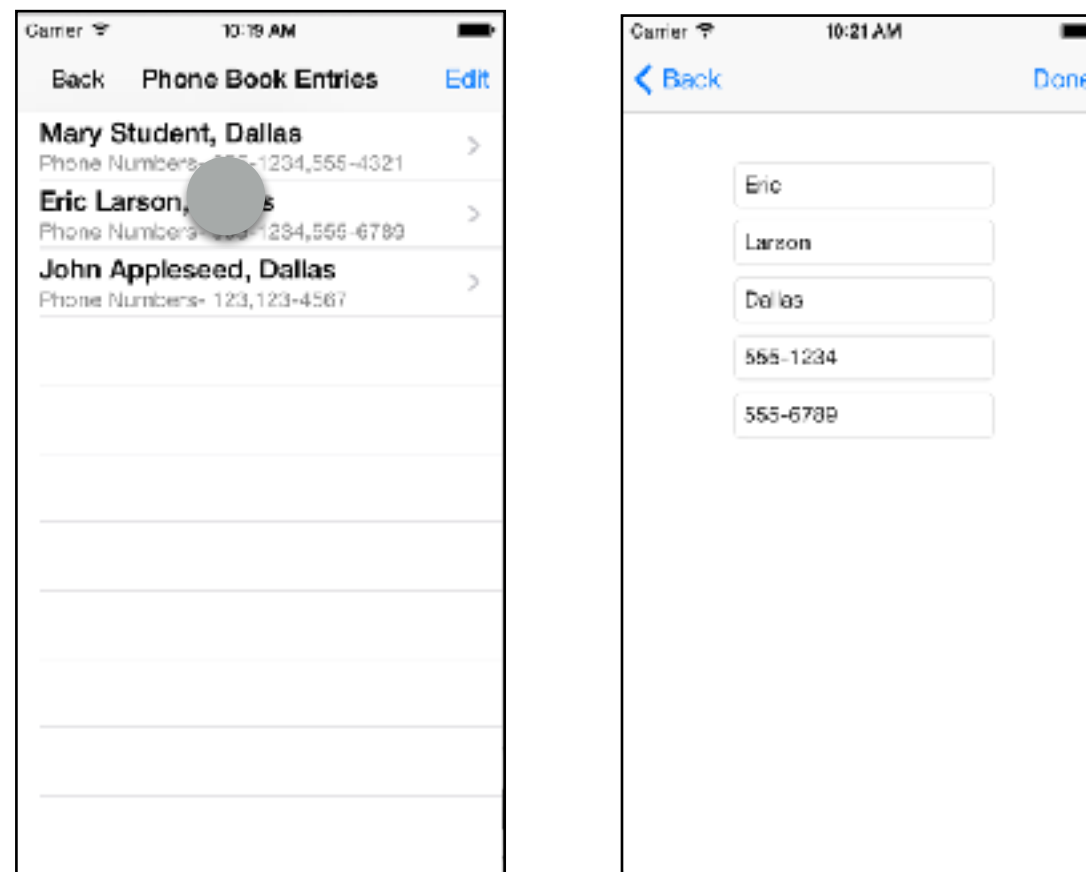
```
- (NSInteger)numberOfSectionsInTableView:(UITableView *)tableView
- (NSInteger)tableView:(UITableView *)tableView numberOfRowsInSectionSection:(NSInteger)section
```

Legend



controller life cycle review

- problem: we need to handoff control of the screen to a new view
- the app itself is handling most of this transition
 - app will “unfreeze” the new view and its class properties
- **you** need to send information from **source** ViewController to **destination** ViewController



controller life cycle review

Source Controller

Destination Controller

view is unfrozen, property memory allocated

`prepareForSegue`
prepare to leave the screen

set properties of destination, if needed

view outlets are ready for interaction

`viewDidLoad`

`viewWillAppear`

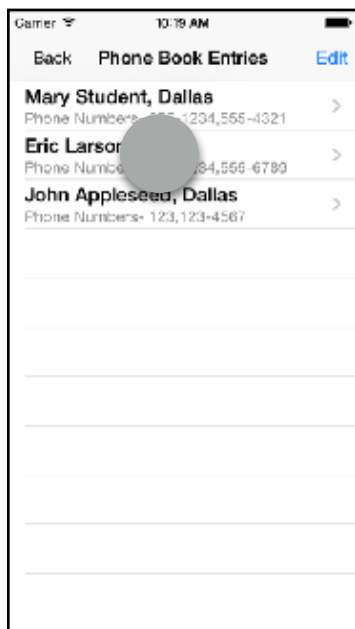
`viewDidAppear`

`viewWillDisappear`

`viewDidDisappear`

memory deallocated when app is ready

source



destination



user



the storyboard

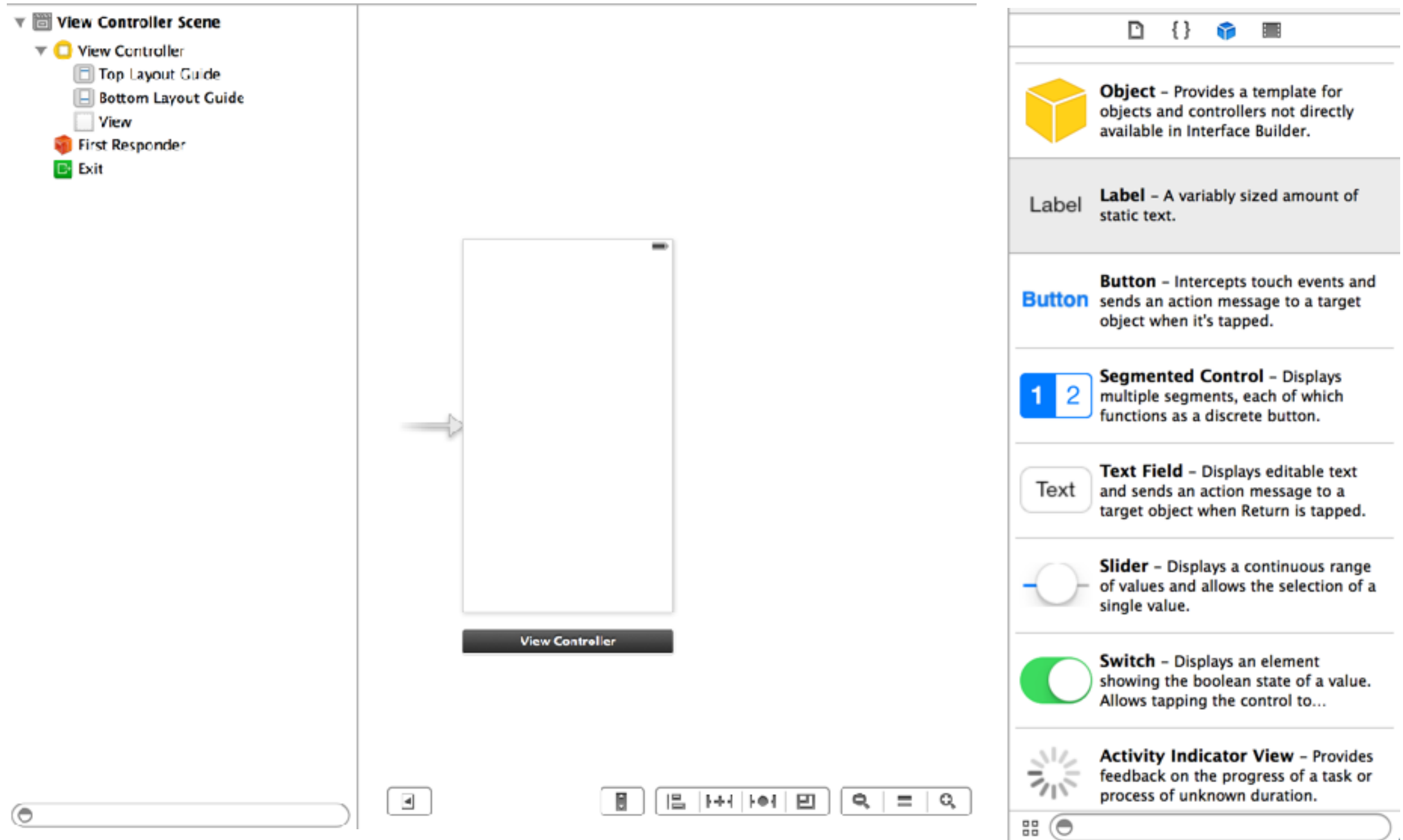


table view controller

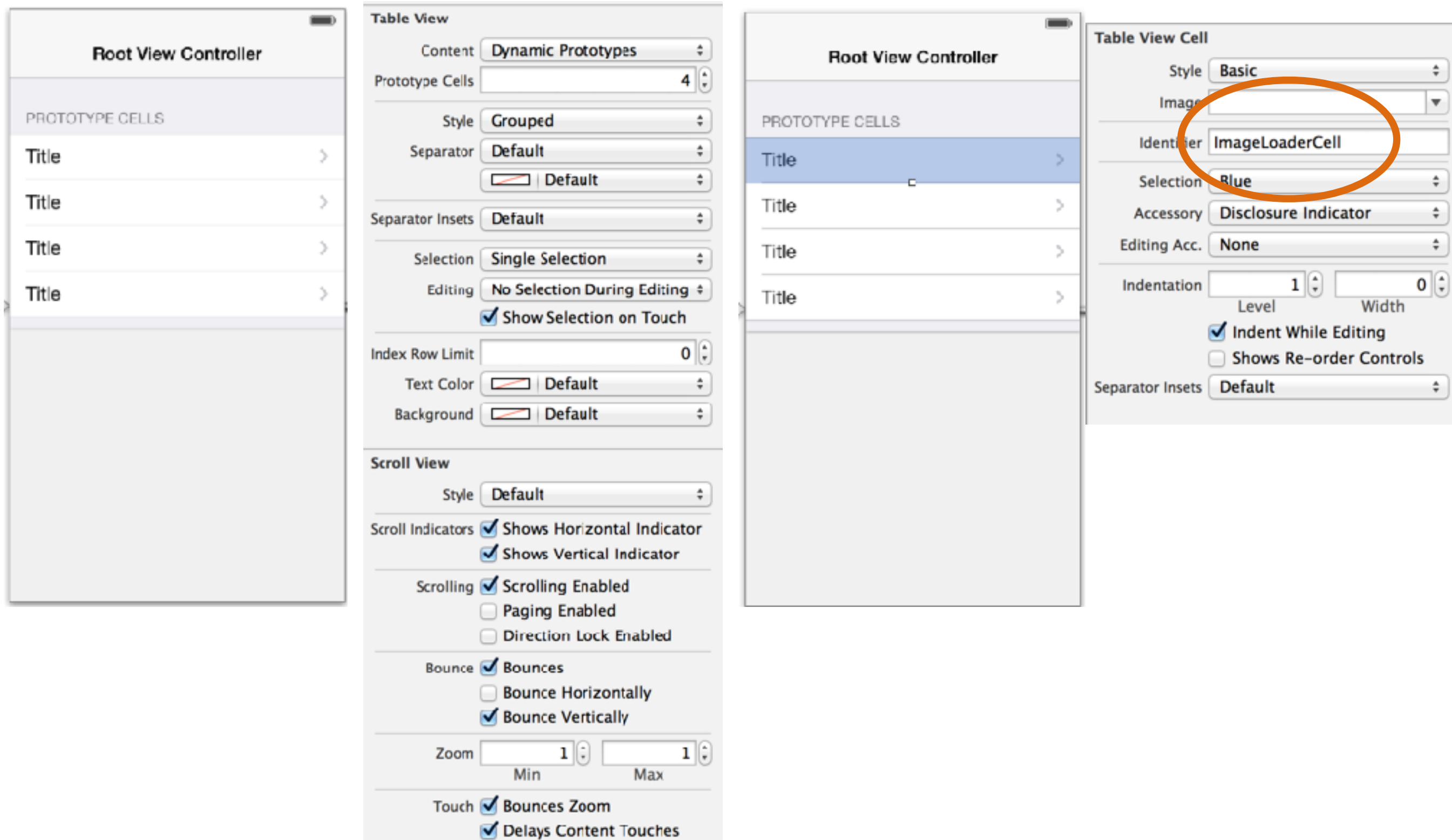


table view controller

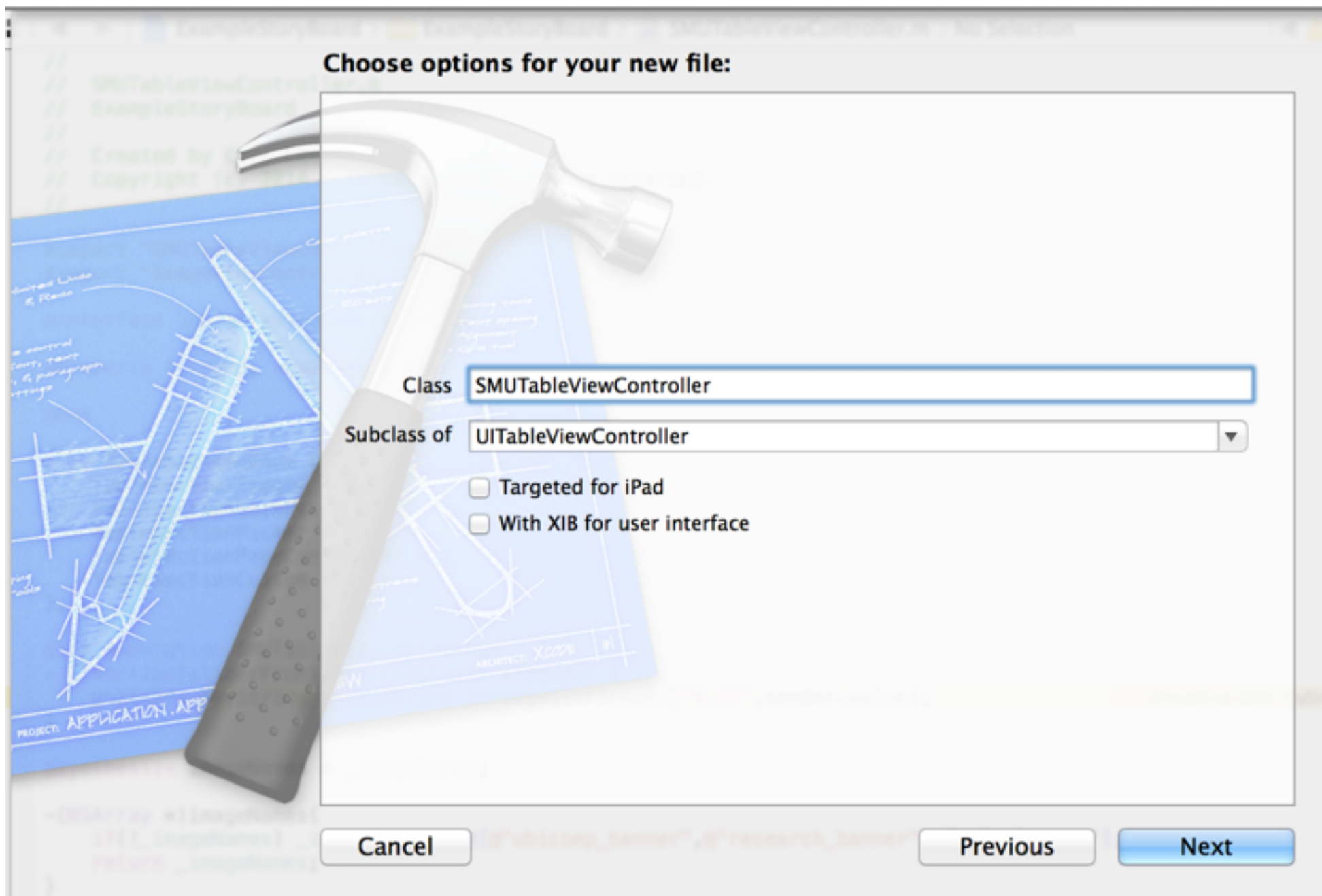


table view controller

- must implement “data source” methods

```
- (NSInteger)numberOfSectionsInTableView:(UITableView *)tableView
{
    return numSections;
}

- (NSInteger)tableView:(UITableView *)tableView numberOfRowsInSectionSection:(NSInteger)section
{
    return rowsInSectionNumber[section];
}

- (UITableViewCell *)tableView:(UITableView *)tableView cellForRowAtIndexPath:(NSIndexPath *)indexPath
{
    static NSString *CellIdentifier = nil;
    UITableViewCell *cell = nil;

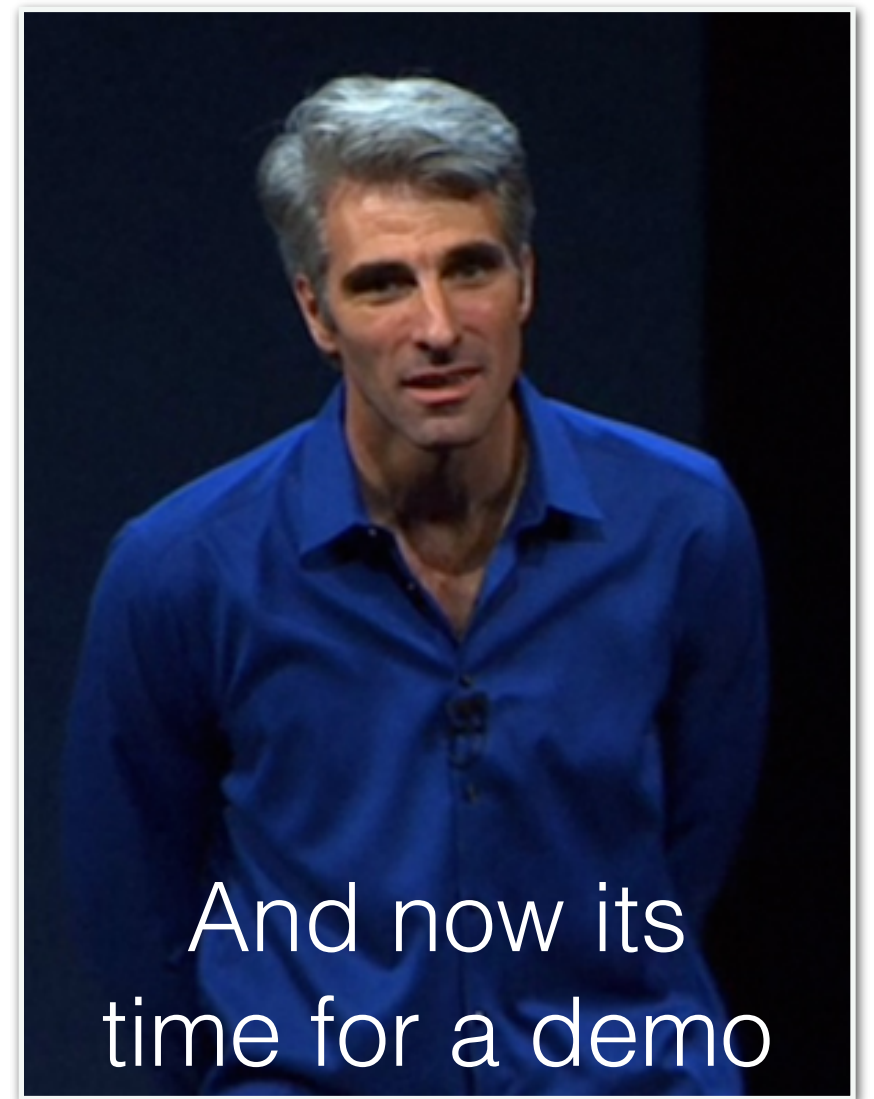
    CellIdentifier = @"ImageLoaderCell";
    cell = [tableView dequeueReusableCellWithIdentifier:CellIdentifier forIndexPath:indexPath];

    // Configure the cell
    cell.textLabel.text = @"An Image";
    return cell;
}
```

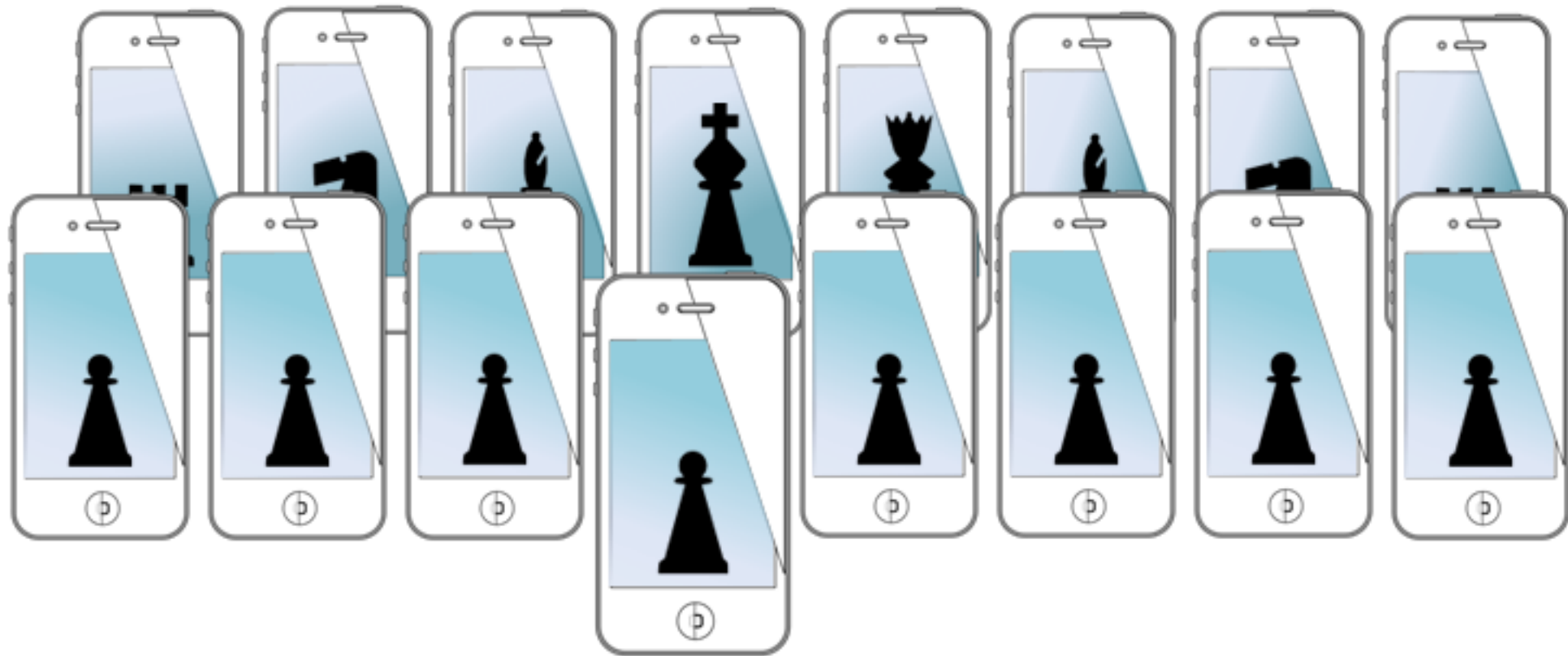
cell prototype from storyboard

set cell attributes

table view controller demo



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scroll view delegate

```
@interface SomeViewController () <UIScrollViewDelegate>
```

add view to the scroll view

```
[self.someScrollView addSubview:self.imageView];  
self.someScrollView.contentSize = self.image.size;  
self.someScrollView.minimumZoomScale = 0.1;  
self.someScrollView.delegate = self;
```

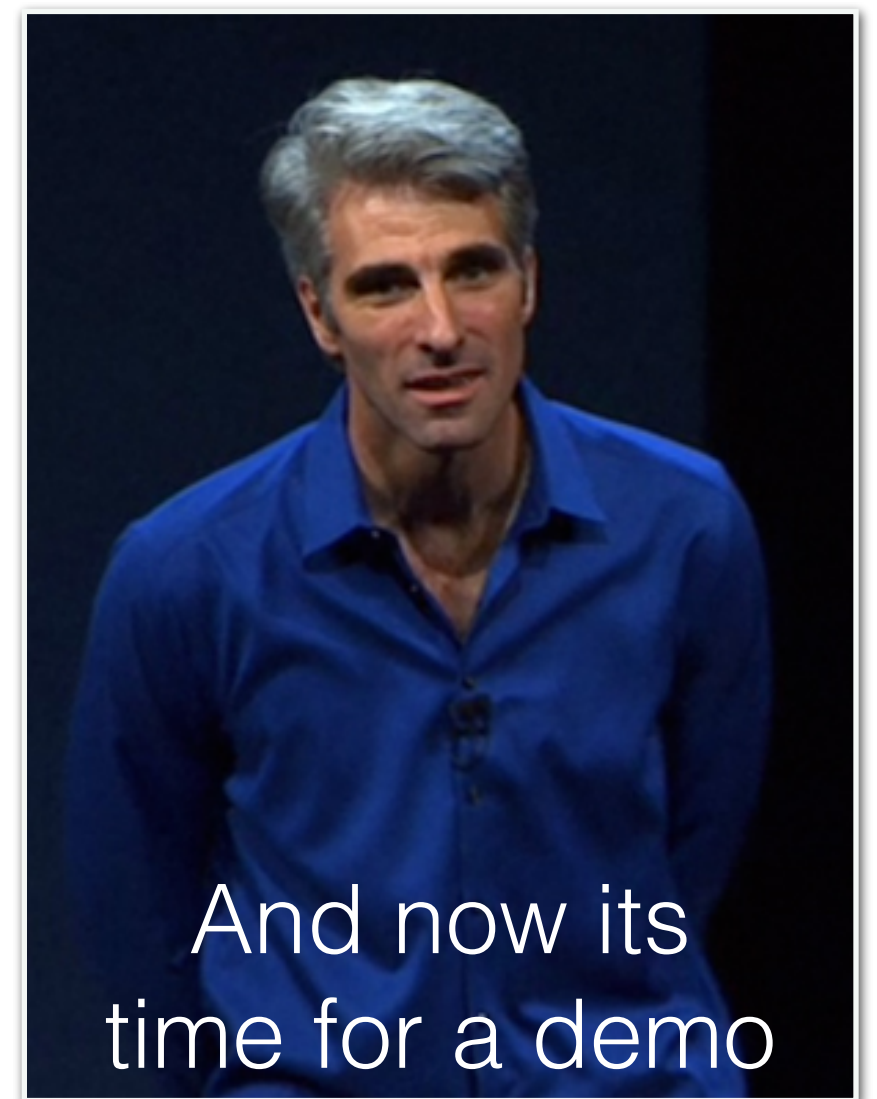
I am a delegate for the Scroll View: I implement methods in the Scroll View Protocol!

set VC as delegate

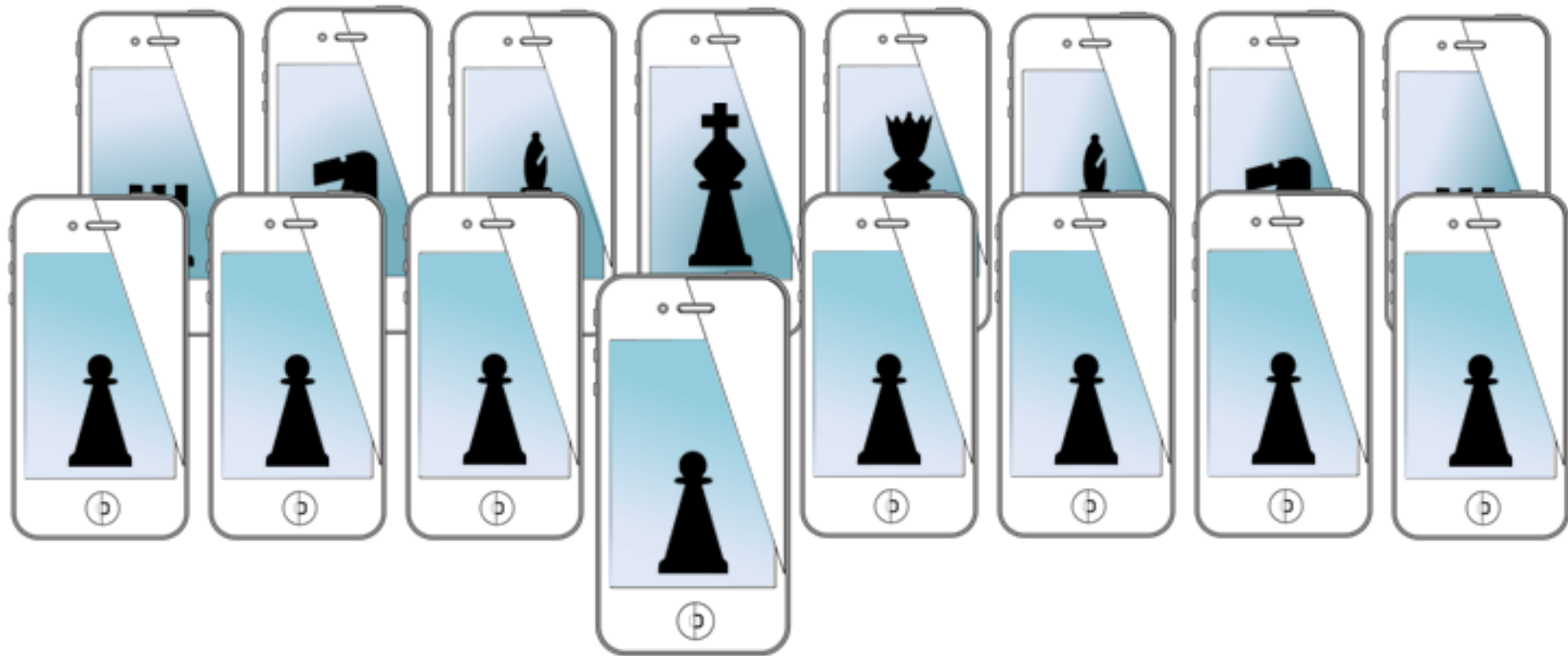
```
#pragma Delegate Methods  
-(UIView*) viewForZoomingInScrollView:(UIScrollView *)scrollView  
{  
    return self.imageView;  
}
```

one of many methods in the protocol

demo



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Supplemental Slides

- we do not explicitly cover these topics in class anymore
- some of the info in these slides may be deprecated!
- otherwise, have fun browsing the material

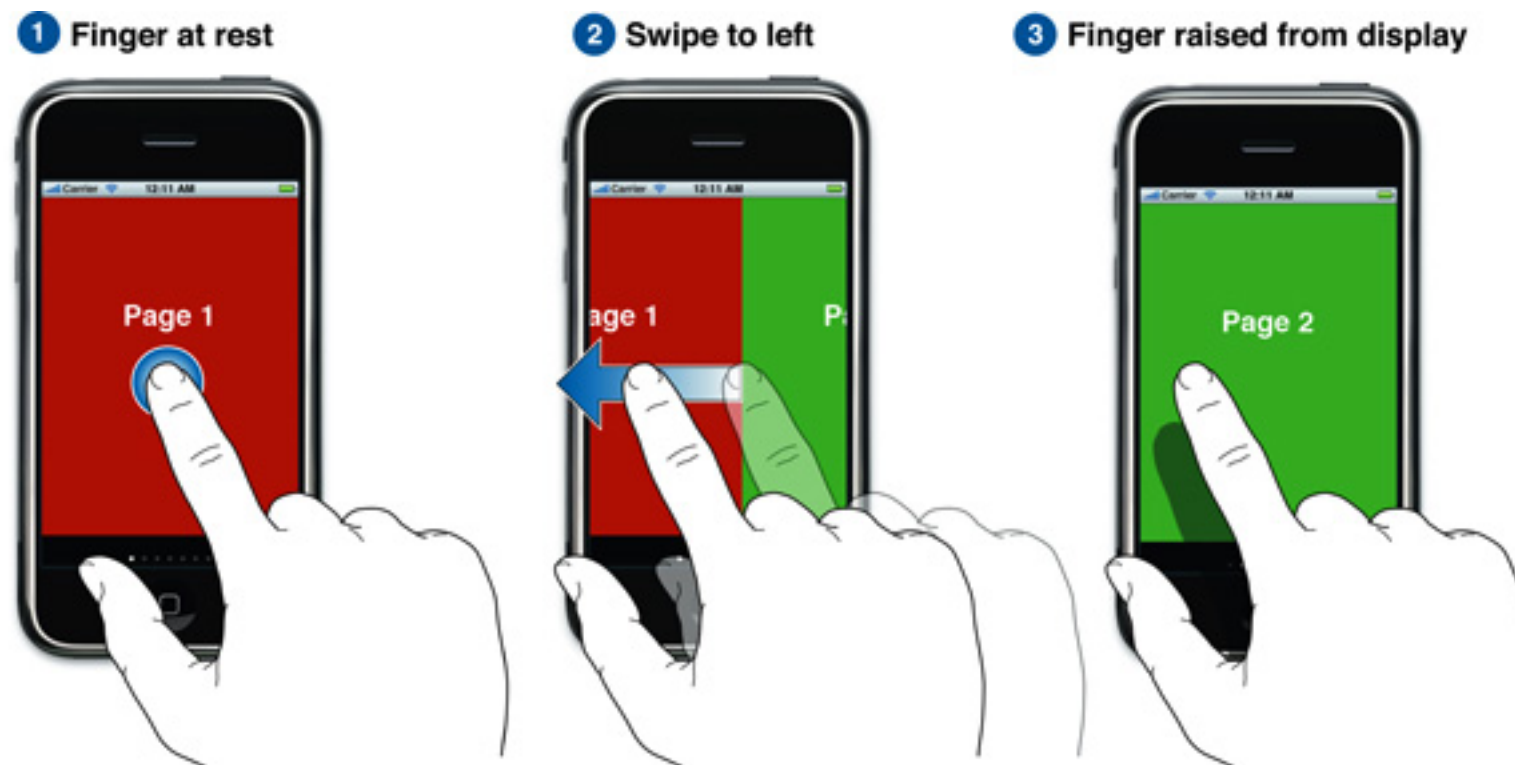
disclaimer!

page view controller

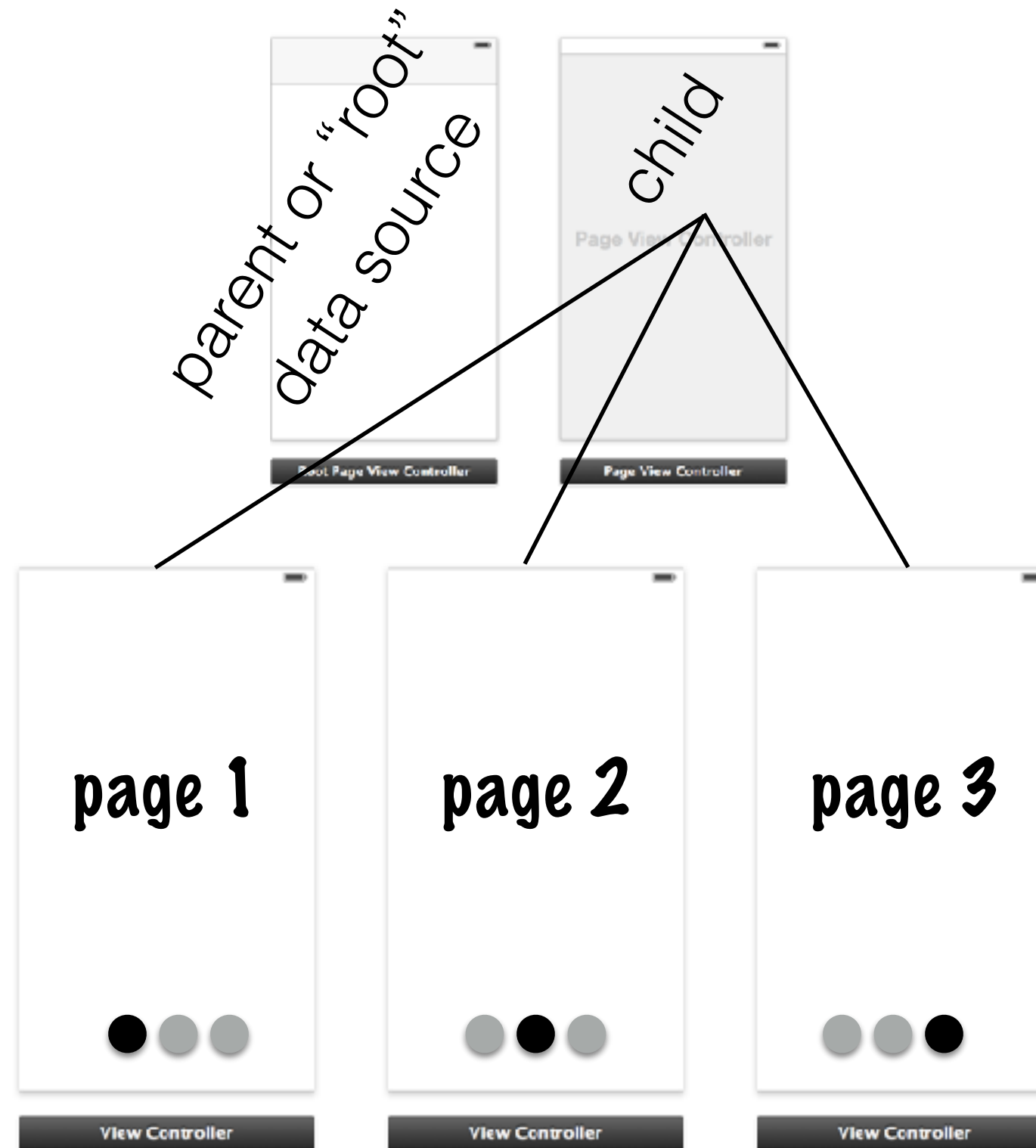
- place `UIPageViewController` in storyboard
- place a “root controller” for the page
 - adopt `<UIPageViewControllerDataSource>`
 - instantiate `pageViewController`
 - instantiate views to be paged

page view controller

- place `UIPageViewController` in storyboard
- place a “root controller” for the page
 - adopt `<UIPageViewControllerDataSource>`
 - instantiate `pageViewController` from “root”
 - instantiate views to be paged in “root”



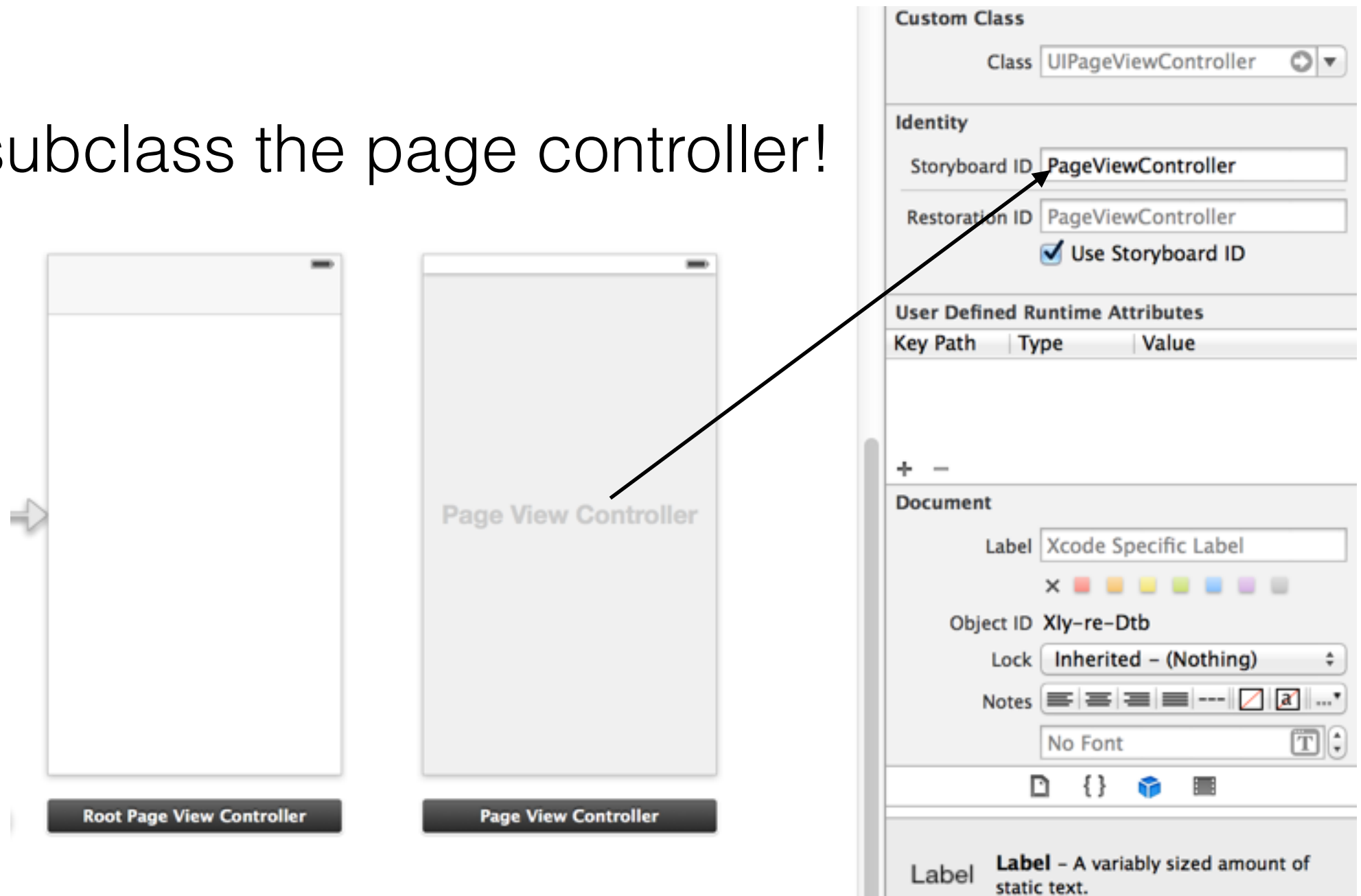
page view controller



different instantiations of view controller

page view controller

no need to subclass the page controller!



but root of the page controller must be the data source...

root page view controller

instantiation in root view controller

```
@property (strong, nonatomic) UIPageViewController * pageViewController;  
@property (strong, nonatomic) NSArray *pageContent;  
  
_pageViewController = [self.storyboard instantiateViewControllerWithIdentifier:@"PageViewController"];  
_pageViewController.dataSource = self;
```

set first page

instantiate!

in viewDidLoad

```
[self.pageViewController setViewControllers:firstPageToDisplay // the page is a view controller!  
                        direction:UIPageViewControllerNavigationDirectionForward  
                        animated:NO  
                        completion:nil];
```

```
[self addChildViewController:_pageViewController];  
[self.view addSubview:_pageViewController.view];  
[self.pageViewController didMoveToParentViewController:self];
```

apple says do
this, in order

some datasource protocol methods

```
- (NSInteger)presentationCountForPageViewController:(UIPageViewController *)pageViewController  
{  
    return [self.pageContent count];  
}  
  
- (NSInteger)presentationIndexForPageViewController:(UIPageViewController *)pageViewController  
{  
    return 0;  
}
```

page view controller

some datasource protocol methods (cont.)

```
- (NSInteger)presentationCountForPageViewController:(UIPageViewController *)pageViewController
{
    return [self.pageContent count];
}

- (NSInteger)presentationIndexForPageViewController:(UIPageViewController *)pageViewController
{
    return 0;
}

-(UIViewController*)pageViewController:(UIPageViewController *)pageViewController
viewControllerBeforeViewController:(UIViewController *)viewController
{}

-(UIViewController*)pageViewController:(UIPageViewController *)pageViewController
viewControllerAfterViewController:(UIViewController *)viewController
{}
```

1. create pages (VCs)
2. set any information for loading
3. return the instantiated VC

page view demo

programmatic UI creation

```
@property (strong, nonatomic) IBOutlet UIButton *button;
```

...

```
// a button, created programmatically
self.button = [UIButton buttonWithType:UIButtonTypeSystem];

// set a target method for a control event, touch down
[self.button addTarget:self
                  action:@selector(updateLabelFromProgramButton:)
          forControlEvents:UIControlEventTouchUpInside];

// set the button attribute
[self.button setTitle:@"PButton" forState:UIControlStateNormal];
```

visual format language

```
// say that these exist and are initialized and added to the view as subviews
```

```
UIButton *button;
```

```
UILabel *label;
```

```
[button setTranslatesAutoresizingMaskIntoConstraints:NO];
```

```
// setup button and label constraints, also make same size
```

```
NSDictionary *varBindings = NSDictionaryOfVariableBindings(button, label);
```

```
NSArray *constraints =
```

```
    [NSLayoutConstraint constraintsWithVisualFormat:@"|-[button]-24-[label(==button)]-|"
```

```
        options:0
```

```
        metrics:nil
```

```
        views:varBindings];
```

```
[self.view addConstraints:constraints];
```

same size as button

8 points from left side

24 points between

```
// metrics for use in visual constraints
```

```
NSDictionary *metrics = @{@"spacing":@"10.0"};
```

```
[NSLayoutConstraint constraintsWithVisualFormat:@"|-[button]-spacing-[label(==button)]-|"
```

```
        options:0
```

```
        metrics:metrics
```

```
        views:varBindings];
```

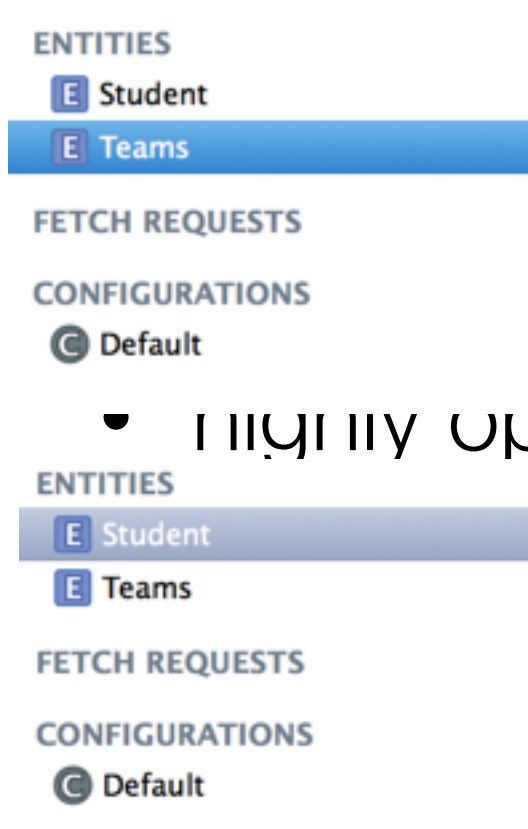
```
@“V:|-[button]”
```

```
options:NSLayoutFormatAlignAllTop | NSLayoutFormatAlignAllCenterX
```

core data databases

- allows access to SQLite database
- integrated deeply into Xcode and into iOS
- highly optimized
- excellent for storing persistent table data
 - but usable for most anything

core data schema



▼ Attributes

Attribute ▲	Type
S hardware	String
S name	String

+ -

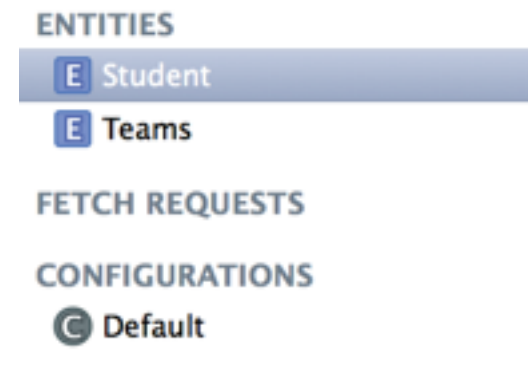
```

@interface Teams : NSObject

@property (nonatomic, retain) NSString * name;
@property (nonatomic, retain) NSString * hardware;
@property (nonatomic, retain) NSSet *members;

@end
    
```

• highly optimized



▼ Attributes

Attribute ▲	Type
S major	String
S name	String

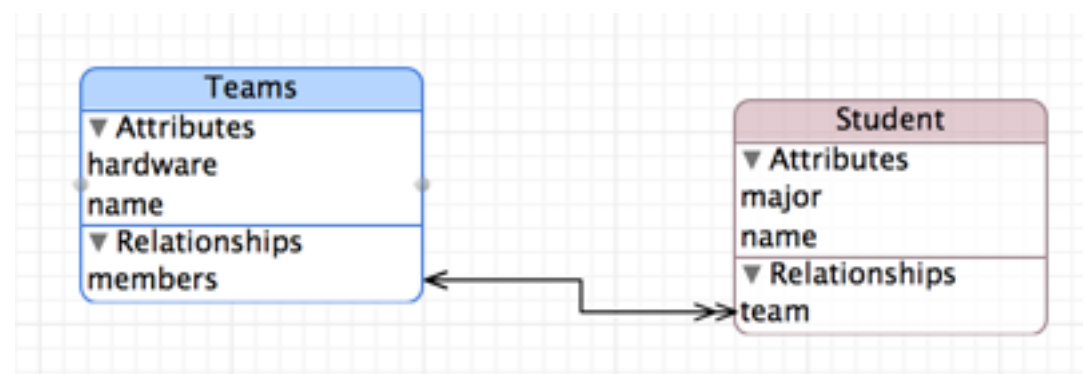
+ -

```

@interface Student : NSObject







@property (nonatomic, retain) NSString * name;
@property (nonatomic, retain) NSString * major;
@property (nonatomic, retain) Teams *team;

@end
    
```



able data
ata

core data

- schema creation  create SQLite Database on phone
- automatic subclassing  enable access through properties
- NSManagedObject  bundle “data models”
- NSManagedObjectContext  get “context” for using data model
- NSPersistentStore  coordinate access to the data model
- NSFetchRequest  create and execute queries

core data setup

```
// Getter for managed context
- (NSManagedObjectContext *) managedObjectContext {

    if(!_managedObjectContext){
        // create the storage coordinator
        NSPersistentStoreCoordinator *coordinator = [self persistentStoreCoordinator];
        if (coordinator != nil) {
            _managedObjectContext = [[NSManagedObjectContext alloc] init];
            [_managedObjectContext setPersistentStoreCoordinator: coordinator];
        }
    }

    return _managedObjectContext;
}

// getter for the storage coordinator
- (NSPersistentStoreCoordinator *)persistentStoreCoordinator {
    if (!_persistentStoreCoordinator) {

        // this points to our model
        NSURL *storeUrl = [NSURL fileURLWithPath: [[self applicationDocumentsDirectory]
                                                    stringByAppendingPathComponent: @"ModelName.sqlite"]];

        NSError *error = nil;
        _persistentStoreCoordinator = [[NSPersistentStoreCoordinator alloc]
                                        initWithManagedObjectModel:[self managedObjectModel]];

        if(![_persistentStoreCoordinator addPersistentStoreWithType:NSSQLiteStoreType
                    configuration:nil URL:storeUrl options:nil error:&error]) {
            // exit gracefully if you need the database to function in the UI
        }
    }
    return _persistentStoreCoordinator;
}
```


core data setup

```
// getter for the storage coordinator
- (NSPersistentStoreCoordinator *)persistentStoreCoordinator {
    if (!_persistentStoreCoordinator) {

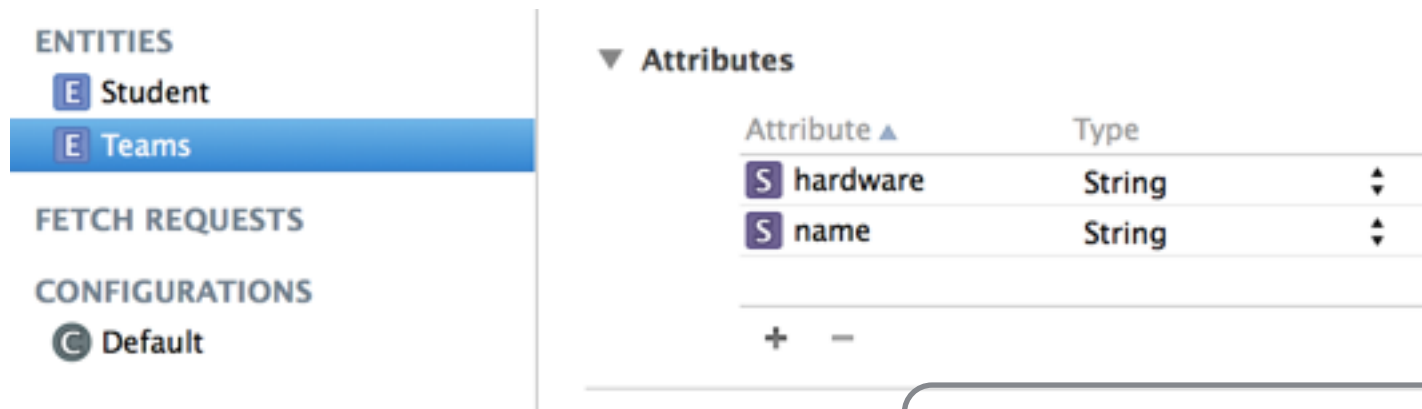
        // this points to our model
        NSURL *storeUrl = [NSURL fileURLWithPath: [[self applicationDocumentsDirectory]
                                                    stringByAppendingPathComponent: @"modelName.sqlite"]];

        NSError *error = nil;
        _persistentStoreCoordinator = [[NSPersistentStoreCoordinator alloc]
                                        initWithManagedObjectModel:[self managedObjectModel]];

        if(![_persistentStoreCoordinator addPersistentStoreWithType:NSSQLiteStoreType
                    configuration:nil URL:storeUrl options:nil error:&error]) {
            // exit gracefully if you need the database to function in the UI
        }
    }
    return _persistentStoreCoordinator;
}

// getter for the object model, create if needed
- (NSManagedObjectModel *)managedObjectModel {
    if (!_managedObjectModel) {
        _managedObjectModel = [NSManagedObjectModel mergedModelFromBundles:nil];
    }
    return _managedObjectModel;
}
```

entering data



create a new entity from model

```
// get a new entry
team = [NSEntityDescription insertNewObjectForEntityForName:@"Teams"
                                     inManagedObjectContext:self.managedObjectContext];

// save the attributes
team.name = self.teamNameTextField.text;
team.hardware = [self assignHardware];

// save into the database
NSError *error;
if (![self.managedObjectContext save:&error]) {
    NSLog(@"save database failed: %@", [error localizedDescription]);
}
```

set attributes

not saved in database until here

queries in core data

```
-(NSArray*)getAllTeamsFromDatabase
{
    // initializing NSFetchRequest
    NSFetchRequest *fetchRequest = [[NSFetchRequest alloc] init];

    //Setting Entity to be Queried
    NSEntityDescription *entity = [NSEntityDescription entityForName:@"Teams"
                                                                    inManagedObjectContext:self.managedObjectContext];

    [fetchRequest setEntity:entity];
    NSError* error;

    // Query on managedObjectContext With Generated fetchRequest
    NSArray *fetchedRecords = [self.managedObjectContext executeFetchRequest:fetchRequest error:&error];

    // Returning Fetched Records
    return fetchedRecords;
}
```

request

fetch

entity to request from

array of results, even if size=0

```
-(NSArray*)getTeamFromDatabase:(NSString*)teamName
{
    // initializing NSFetchRequest
    ...

    fetchRequest.predicate =
        [NSPredicate predicateWithFormat:@"name = %@", teamName];

    ...

    // Returning Fetched Records
    return [self.managedObjectContext executeFetchRequest:fetchRequest error:&error];
}
```

set predicate

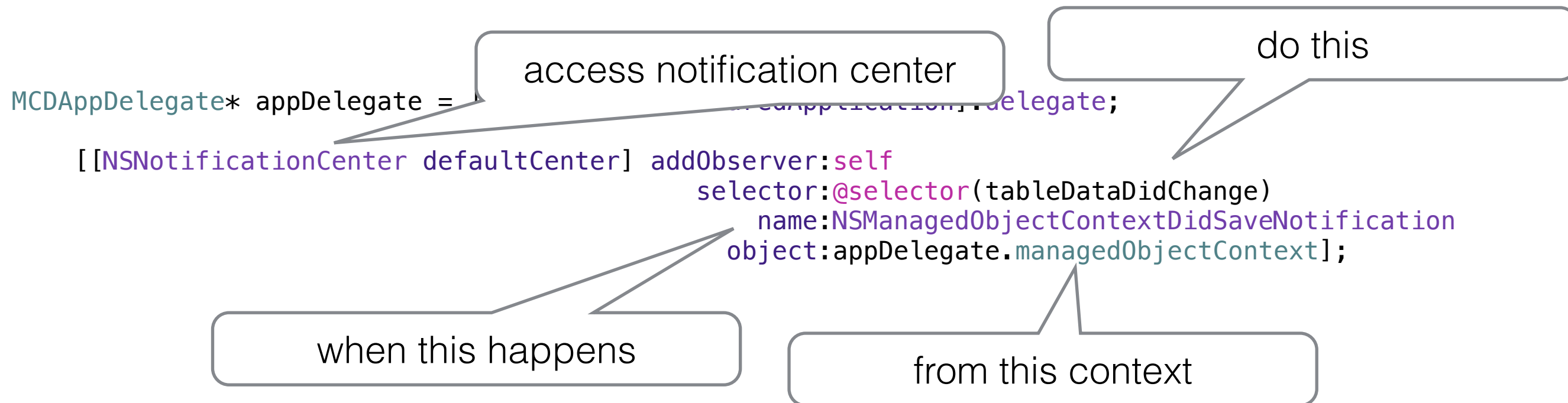
@name = %@"
@name contains[c] %@"
@value > 7"
@team.name = %@"
@"any student.name contains %@"

core data demo

- Who Was In That!
- Class Teams! will make available on website

notifications

- NotificationCenter - a radio station for which any method can tune in on



lets add notifications to WhoWasInThat!

if time slides!

swift

- syntax is nothing like objective c
- a lot like python syntax (but not)
- weakly typed, no need for semicolons
- can be hard to read or interpret
- powerful use of *tuples, optionals, switch*
- you need to look online for more material than this lecture
 - https://developer.apple.com/library/ios/documentation/Swift/Conceptual/Swift_Programming_Language/TheBasics.html



swift

variables

```
let maximumNumberOfLoginAttempts = 10
var currentLoginAttempt = 0
```

not mutable

mutable

```
let pi = 3.14159
// pi is inferred to be of type Double
let three = 3
let pointOneFourOneFiveNine = 0.14159
let pi = Double(three) + pointOneFourOneFiveNine
// pi equals 3.14159, and is inferred to be of type Double
let meaningOfLife = 42
// meaningOfLife is inferred to be of type Int
```

and then there is this...

```
let orangesAreOrange = true
let turnipsAreDelicious = false
```

```
let π = 3.14159
let 你好 = "你好世界"
let 🐶🐮 = "dogcow"
```

```
var friendlyWelcome = "Hello World!"
var friendlyWelcome: String = "Hello World!"

println(friendlyWelcome)

println("The current value of friendlyWelcome is \(friendlyWelcome)")
```

no need to set

see this: https://developer.apple.com/library/ios/documentation/Swift/Conceptual/Swift_Programming_Language/TheBasics.html

Swift

tuples

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

```
let (statusCode, statusMessage) = http404Error  
println("The status code is \(statusCode)")  
// prints "The status code is 404"  
println("The status message is \(statusMessage)")  
// prints "The status message is Not Found"
```

```
println("The status code is \(http404Error.0)")  
// prints "The status code is 404"  
println("The status message is \(http404Error.1)")  
// prints "The status message is Not Found"
```

```
let http200Status = (statusCode: 200, description: "OK")
```

```
println("The status code is \(http200Status.statusCode)")  
// prints "The status code is 200"  
println("The status message is \(http200Status.description)")  
// prints "The status message is OK"
```

see this: https://developer.apple.com/library/ios/documentation/Swift/Conceptual/Swift_Programming_Language/TheBasics.html

swift

optionals

```
let possibleNumber = "123"  
let convertedNumber = possibleNumber.toInt()  
// convertedNumber is inferred to be of type "Int?", or "optional Int"
```

```
var serverResponseCode: Int? = 404  
// serverResponseCode contains an actual Int value of 404  
serverResponseCode = nil  
// serverResponseCode now contains no value
```

can now set to nil :)

```
var surveyAnswer: String?  
// surveyAnswer is automatically set to nil
```

```
if convertedNumber != nil {  
    println("convertedNumber has an integer value of \(convertedNumber!).")  
}  
// prints "convertedNumber has an integer value of 123."
```

```
if let actualNumber = possibleNumber.toInt() {  
    println("\(possibleNumber)' has an integer value of \(actualNumber)")  
} else {  
    println("\(possibleNumber)' could not be converted to an integer")  
}  
// prints "'123' has an integer value of 123"
```

see this: https://developer.apple.com/library/ios/documentation/Swift/Conceptual/Swift_Programming_Language/TheBasics.html

swift

accessing optionals

optional

```
let possibleString: String? = "An optional string."  
let forcedString: String = possibleString! // requires an exclamation mark
```

! **unwrap** output to be **string**. Else: **error**

implicit unwrap

```
let assumedString: String! = "An implicitly unwrapped optional string."  
let implicitString: String = assumedString // no need for an exclamation mark
```

output always unwrapped to be **string**. Else: **error**

```
if assumedString != nil {  
    println(assumedString)  
}  
// prints "An implicitly unwrapped optional string."
```

```
if let definiteString = assumedString {  
    println(definiteString)  
}  
// prints "An implicitly unwrapped optional string."
```

Optional unwrapping is not my favorite part of swift

see this: https://developer.apple.com/library/ios/documentation/Swift/Conceptual/Swift_Programming_Language/TheBasics.html

swift

arrays

```
var shoppingList = ["Eggs", "Milk"]
```

```
println("The shopping list contains \(shoppingList.count) items.")  
// prints "The shopping list contains 2 items."
```

```
if shoppingList.isEmpty {  
    println("The shopping list is empty.")  
} else {  
    println("The shopping list is not empty.")  
}  
// prints "The shopping list is not empty."
```

```
shoppingList += ["Baking Powder"]  
shoppingList += ["Chocolate Spread", "Cheese", "Butter"]
```

```
var firstItem = shoppingList[0]  
// firstItem is equal to "Eggs"
```

```
shoppingList[0] = "Six eggs"
```

like a dequeue

```
let butter = shoppingList.removeLast()  
let sixEggs = shoppingList.removeAtIndex(0)
```

like a pop

see this: https://developer.apple.com/library/ios/documentation/Swift/Conceptual/Swift_Programming_Language/TheBasics.html

Swift

dictionaries

```
var airports = ["YYZ": "Toronto Pearson", "DUB": "Dublin"]  
  
airports["LHR"] = "London"  
// the airports dictionary now contains 3 items
```

```
if let oldValue = airports.updateValue("Dublin Airport", forKey: "DUB") {  
    println("The old value for DUB was \(oldValue).")  
}  
// prints "The old value for DUB was Dublin."
```

```
airports["APL"] = "Apple International"  
// "Apple International" is not the real airport for APL, so delete it  
airports["APL"] = nil  
// APL has now been removed from the dictionary
```

```
let airportCodes = [String](airports.keys)  
// airportCodes is ["YYZ", "LHR"]  
  
let airportNames = [String](airports.values)  
// airportNames is ["Toronto Pearson", "London Heathrow"]
```

see this: https://developer.apple.com/library/ios/documentation/Swift/Conceptual/Swift_Programming_Language/TheBasics.html

Swift

loops

```
for index in 1...3 {  
    println("\(index) times 5 is \(index * 5)")  
}  
// 1 times 5 is 5  
// 2 times 5 is 10  
// 3 times 5 is 15
```

```
let names = ["Anna", "Alex", "Brian"]  
for name in names {  
    println("Hello, \(name)!")  
}  
// Hello, Anna!  
// Hello, Alex!  
// Hello, Brian!
```

```
for (index, value) in enumerate(names) {  
    println("Item \(index + 1): \(value)")  
}  
// Item 1: Anna  
// Item 2: Alex  
// Item 3: Brian
```

```
let numberOfLegs = ["spider": 8, "ant": 6, "cat": 4]  
for (animalName, legCount) in numberOfLegs {  
    println("\(animalName)s have \(legCount) legs")  
}  
// ants have 6 legs  
// cats have 4 legs  
// spiders have 8 legs
```

see this: https://developer.apple.com/library/ios/documentation/Swift/Conceptual/Swift_Programming_Language/TheBasics.html

swift

switch

```
let someCharacter: Character = "e"
switch someCharacter {
case "a", "e", "i", "o", "u":
    println("\(someCharacter) is a vowel")
case "b", "c", "d", "f", "g", "h", "j", "k", "l", "m",
     "n", "p", "q", "r", "s", "t", "v", "w", "x", "y", "z":
    println("\(someCharacter) is a consonant")
default:
    println("\(someCharacter) is not a vowel or a consonant")
}
// prints "e is a vowel"
```

no pass through

```
let somePoint = (1, 1)
switch somePoint {
case (0, 0):
    println("(0, 0) is at the origin")
case (_, 0):
    println("\(somePoint.0), 0) is on the x-axis")
case (0, _):
    println("0, \(somePoint.1) is on the y-axis")
case (-2...2, -2...2):
    println("\(somePoint.0), \(somePoint.1) is inside the box")
default:
    println("\(somePoint.0), \(somePoint.1) is outside of the box")
}
// prints "(1, 1) is inside the box"
```

"any" value

see this: https://developer.apple.com/library/ios/documentation/Swift/Conceptual/Swift_Programming_Language/TheBasics.html

swift

switch continued...

```
let anotherPoint = (2, 0)
switch anotherPoint {
case (let x, 0):
    println("on the x-axis with an x value of \(x)")
case (0, let y):
    println("on the y-axis with a y value of \(y)")
case let (x, y):
    println("somewhere else at (\(x), \(y))")
}
// prints "on the x-axis with an x value of 2"
```

"any" value and set

```
let yetAnotherPoint = (1, -1)
switch yetAnotherPoint {
case let (x, y) where x == y:
    println("\(x), \(y) is on the line x == y")
case let (x, y) where x == -y:
    println("\(x), \(y) is on the line x == -y")
case let (x, y):
    println("\(x), \(y) is just some arbitrary point")
}
// prints "(1, -1) is on the line x == -y"
```

very powerful, concise,
readable

see this: https://developer.apple.com/library/ios/documentation/Swift/Conceptual/Swift_Programming_Language/TheBasics.html

swift

functions

internal name

input type

```
func sayHello(personName: String ) -> String {  
    let greeting = "Hello, " + personName + "!"  
    return greeting  
}
```

return type

internal name

input type

external name

```
func join(string s1: String, toString s2: String, withJoiner joiner: String)  
    -> String {  
    return s1 + joiner + s2  
}
```

return type

external name

passed value

```
join(string: "hello", toString: "world", withJoiner: ", ")  
// returns "hello, world"
```

see this: https://developer.apple.com/library/ios/documentation/Swift/Conceptual/Swift_Programming_Language/TheBasics.html

There are too many ways of defining functions to cover it all. For instance you can also setup default values...

array of ints

```
func minMax(array: [ Int ]) -> (min: Int , max: Int ) {  
    var currentMin = array[0]  
    var currentMax = array[0]  
    for value in array[1..  
        array.count] {  
        if value < currentMin {  
            currentMin = value  
        } else if value > currentMax {  
            currentMax = value  
        }  
    }  
    return (currentMin, currentMax)  
}
```

return tuple

tuple keys are external names!!

```
let bounds = minMax([8, -6, 2, 109, 3, 71])  
println("min is \(bounds.min) and max is \(bounds.max)")  
// prints "min is -6 and max is 109"
```

see this: https://developer.apple.com/library/ios/documentation/Swift/Conceptual/Swift_Programming_Language/TheBasics.html

Swift

classes and properties

```
class DataImporter {  
    var fileName = "data.txt"  
    // the DataImporter class would provide data importing functionality here  
}
```

class variable

```
class DataManager {  
    lazy var importer = DataImporter()  
    var data = [String]()  
    // the DataManager class would provide data management functionality here  
}
```

lazy instantiation

```
let manager = DataManager()  
manager.data.append("Some data")  
manager.data.append("Some more data")  
// the DataImporter instance for the importer property has not yet been created
```

class initialized, but importer is not set

```
println(manager.importer.fileName)  
// the DataImporter instance for the importer property has now been created  
// prints "data.txt"
```

when accessed first, sets value

see this: https://developer.apple.com/library/ios/documentation/Swift/Conceptual/Swift_Programming_Language/TheBasics.html


```
class StepCounter {  
    var totalSteps: Int = 0 {  
        willSet(newTotalSteps) {  
            println("About to set totalSteps to \(newTotalSteps)")  
        }  
        didSet {  
            if totalSteps > oldValue {  
                println("Added \(totalSteps - oldValue) steps")  
            }  
        }  
    }  
}
```

```
let stepCounter = StepCounter()  
stepCounter.totalSteps = 200  
// About to set totalSteps to 200  
// Added 200 steps  
stepCounter.totalSteps = 360  
// About to set totalSteps to 360  
// Added 160 steps  
stepCounter.totalSteps = 896  
// About to set totalSteps to 896  
// Added 536 steps
```

see this: https://developer.apple.com/library/ios/documentation/Swift/Conceptual/Swift_Programming_Language/TheBasics.html

```
class Counter {  
    var count = 0  
    func increment() {  
        count++  
    }  
    func incrementBy(amount: Int) {  
        count += amount  
    }  
    func reset() {  
        count = 0  
    }  
}
```

```
class Counter {  
    var count: Int = 0  
    func incrementBy(amount: Int, numberOfTimes: Int) {  
        count += amount * numberOfTimes  
    }  
}
```

see this: https://developer.apple.com/library/ios/documentation/Swift/Conceptual/Swift_Programming_Language/TheBasics.html

see this: https://developer.apple.com/library/ios/documentation/Swift/Conceptual/Swift_Programming_Language/TheBasics.html

Lots more on the inter-webs!

Need more help on MVC's ? Check out Ray Wenderlich:

<http://www.raywenderlich.com/46988/ios-design-patterns>

for next time...

- View Controllers in iOS
 - Watch videos **before class**
- Come ready to work in teams on an in class project