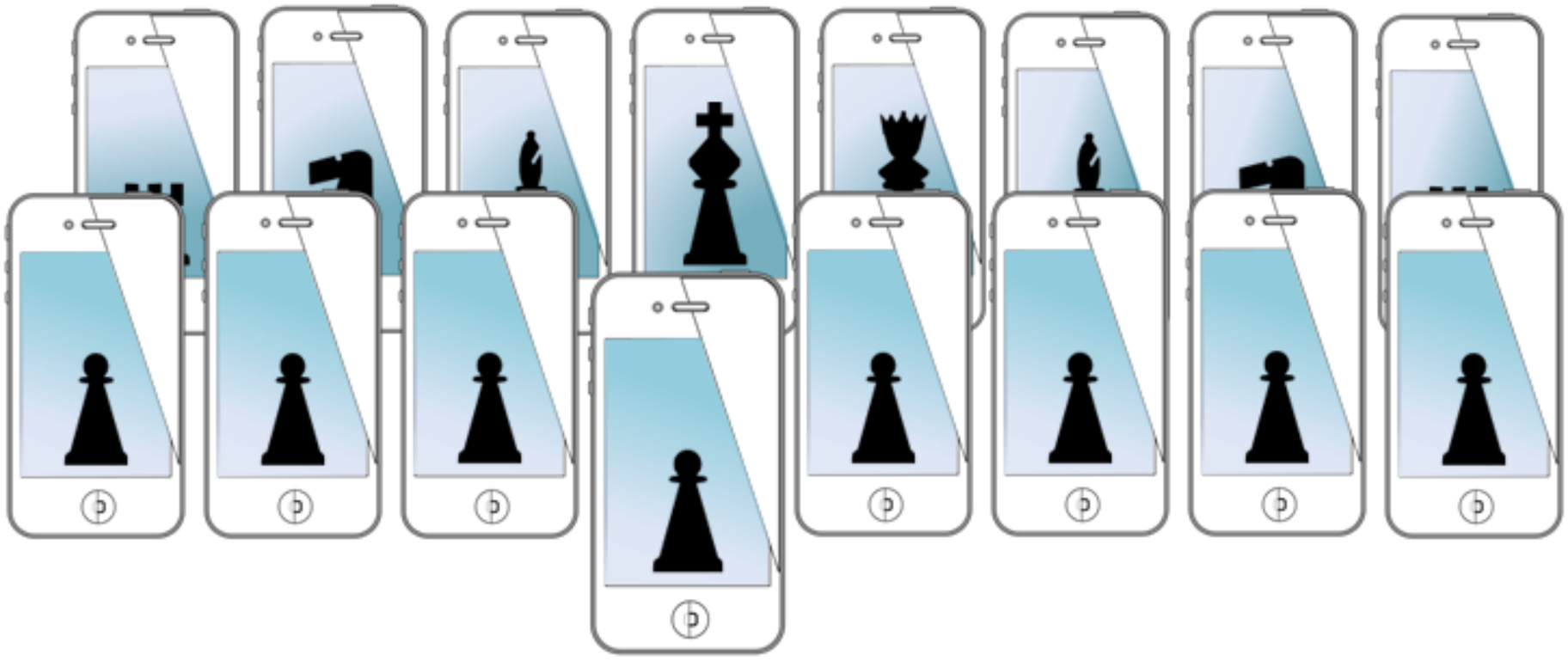
MOBILE SENSING & LEARNING



CSE5323 & 7323

Mobile Sensing and Learning

week one, lecture one: course introduction

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

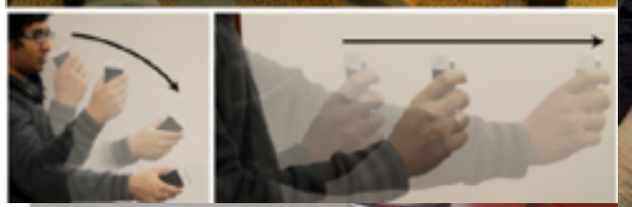
agenda

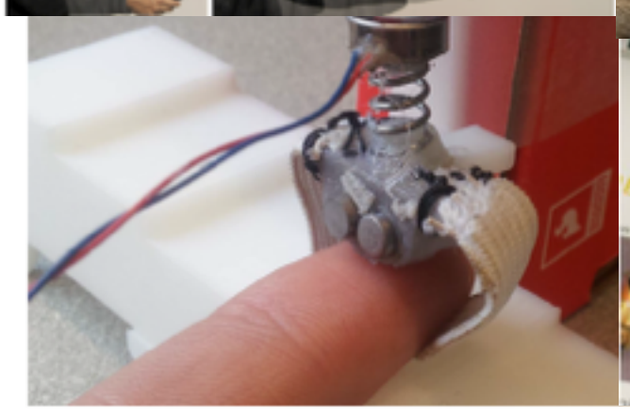
- introductions
- class logistics
- what is this mobile sensing course?
  - and what this course is not…
- course goals
- how to do well
- syllabus
  - hardware, lab access, grading, MOD
- Xcode and git

introductions

- education
  - undergrad and masters from Oklahoma State
  - PhD from the university of Washington, Seattle
- research
  - signal, image, and video processing (mobile)
    - how can combining DSP, machine learning, and sensing make seamless computing?
  - natural gestures
    - novel interaction techniques and user interface technology
  - mobile health
    - moving outside the clinic: how mobile sensing can help patients and doctors
  - sustainability
    - how technology can increase awareness

http://eclarson.com





introductions

- about you:
  - name (what you go by)
  - grad/undergrad, department, and major
  - something true or false
- that's all we have time for…

course logistics

- lab: Wednesday 5-7PM, but up for discussion
- we will use canvas for managing the course
- and GitHub for managing code:
  - https://github.com/SMU-MSLC-2016

what is this course (not)

- mobile sensing
  - activity recognition **some, yes!**
  - audio analysis **yes!**
  - vision analysis **yes!**
- machine learning **some, for inference**
- microcontroller communication **yes!**
- general iOS development **some basic skills**
- animation and graphics **no, except to display data**
- user interface design **some, all apps rely on user**

for what we do not cover…

- take the free Stanford iOS course!

  https://itunes.apple.com/us/course/developing-ios-7-apps-for/id733644550

  Also go to: https://developer.apple.com

- prerequisite: model based coding (or ability to pick it up quick)
- CSE's will find some of this review, EE's will find some of this review — just not at the same time
- creative computation? creativity and design are well rewarded in this class

course goals

- exposure to iOS development, MVCs
- understand how to use embedded sensors, on/off phone
- exposure to machine learning as a service
- real time analysis of data streams
    - applications in mobile health
- **present** and **pitch** applications

how to do well

- complete the lab assignments on time
    - there is no such thing as a late assignment
- start the **lab assignments early**
- iterate and test your apps
- use good coding practices, lazy instantiation, recycle classes, get on Apple's developer website for more info
- have fun—seriously
- collaborate, collaborate, collaborate
- and come to class

syllabus

- attendance
  - video of classes will not be available, sorry
- hardware is available for checkout
  - mac minis (password protected, do not change)
  - iPhones (password protected, do not change)
  - you can use your own stuff, but will need provisioned iPhone 5S or better

syllabus: lab assign.

- 50% of grade (5 labs @ 9% each, 1 lab @ 5%)
- turn in source code via canvas, show me the app
- usually every two weeks, one assignment per team (teams of 2-3)
- deliverables are worth 90% of the lab grade
- each lab deliverable will be graded on
  - how efficient your implementation is
  - how well you use proper coding styles and interface guidelines
  - how well each elements meets specified criteria
- Make it memory and computationally efficient, use hardware acceleration
- Comment code so that it is readable and immediately understandable
- remaining 10% of the points are reserved for truly exceptional work and work that is above and beyond in one or more elements of the application, incorporating elements not discussed in class and having superior performance

syllabus

- in class assignments (flipped assignments)
  - 25% of grade (5 @ 5% each)
  - watch videos before class
  - come ready to work on assignment as a team
  - turn in assignment at end of class
  - absence == no credit

final project

- worth 25% of grade
  - 15% from iOS application
  - 5% from final presentation
  - 5% from video (like kick-starter, with more detail)

The Mother of all demos (MOD)

Students will have the option to “opt out” of the final project website in exchange for a more risky “mother of all demos” demonstration. Groups that opt into this must meet **all** of the proposed specifications of their mobile applications (additionally, these demos should be more difficult). These specifications must work **flawlessly** during the final project presentation. If any specification is not met, the MOD **does not apply and a video summary will be due**. Note that it does not matter how close the specification was to working: if a portion of the application was specified to run in 5 seconds, but takes 5.1 seconds, the MOD is not met (it is **all** or **nothing**). You will be told immediately after demonstration whether the design specifications were met.

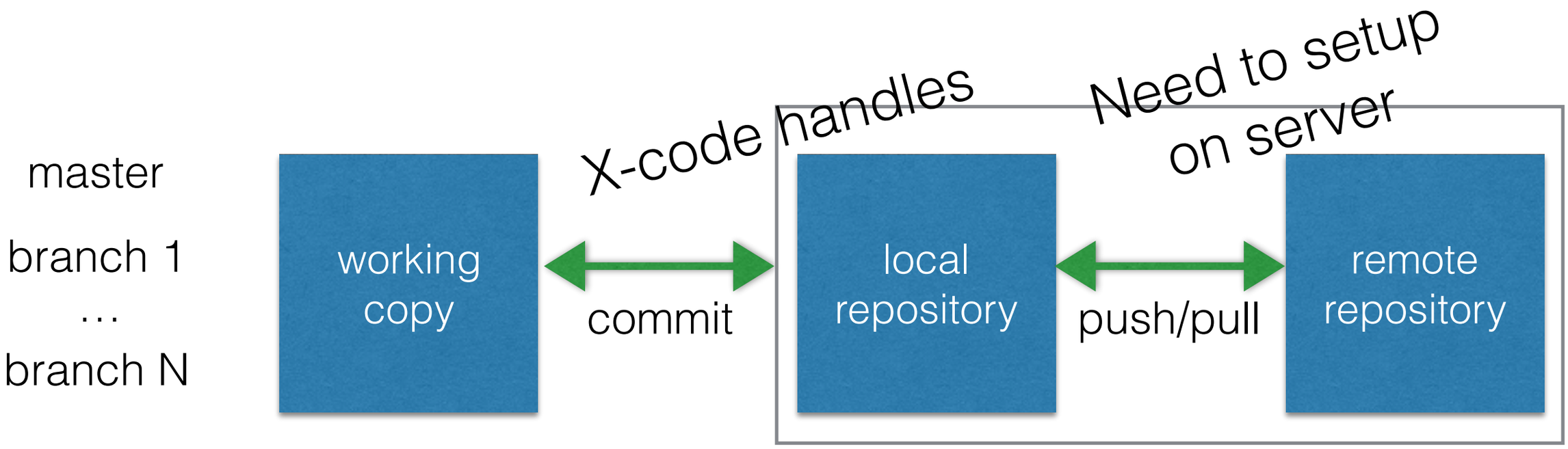
before next class

- look at the class website
- get a team together (groups of 2 or 3, no exceptions)
  - contribute equally, everyone codes, everyone designs
  - pick good members with different skills than you
  - take turns watching each other code (I know…)
- assignment 1 is already up!
  - let's check it out…

git

- built into unix (and therefore OSX) and Xcode
- use it when developing with teams or just by yourself
- branching, merging, and all the jazz

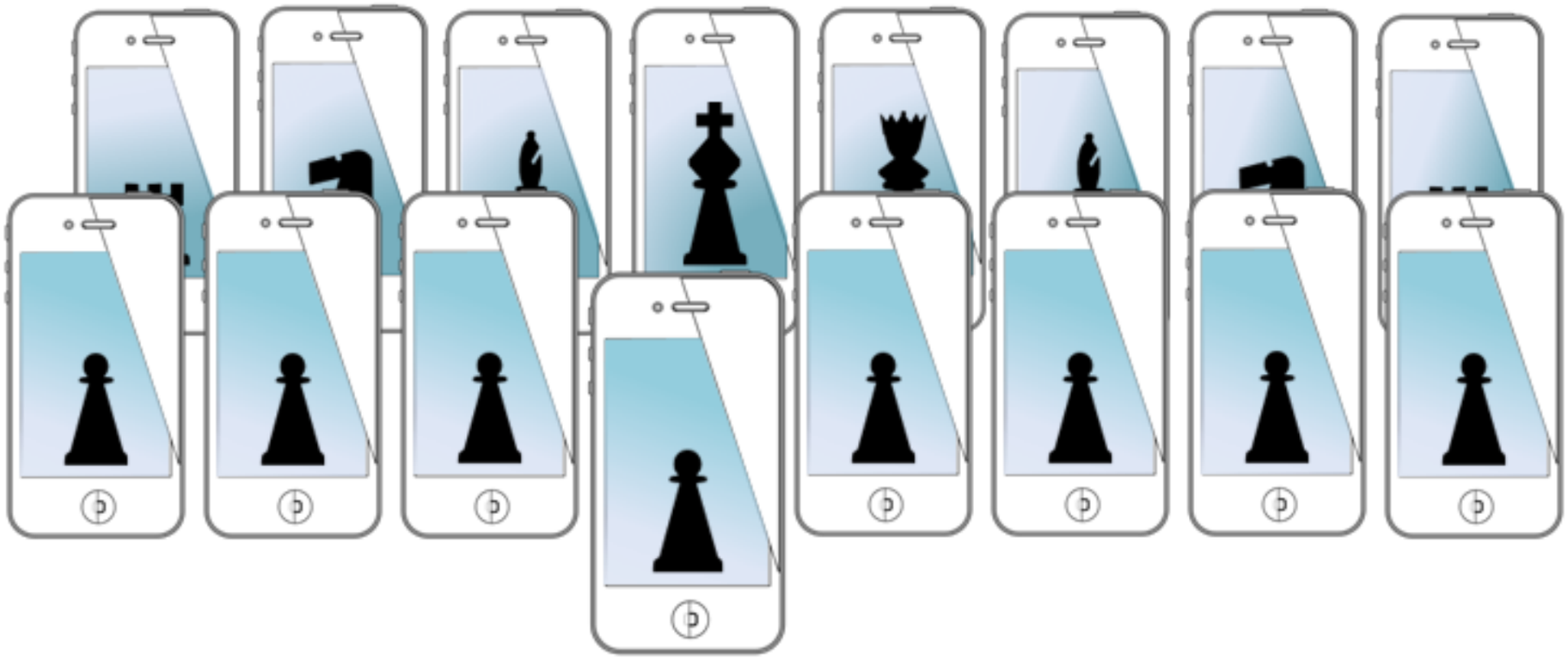
```
git init
git add .
git commit -m"starting commit"
```



git with Xcode

- provides GUI for most git commands
  - commit, branch, push, pull, etc.
- rarely is command line needed
- git is great for code!!
- but not great for storyboards …

MOBILE SENSING & LEARNING



CSE5323 & 7323

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week one, lecture one: course introduction

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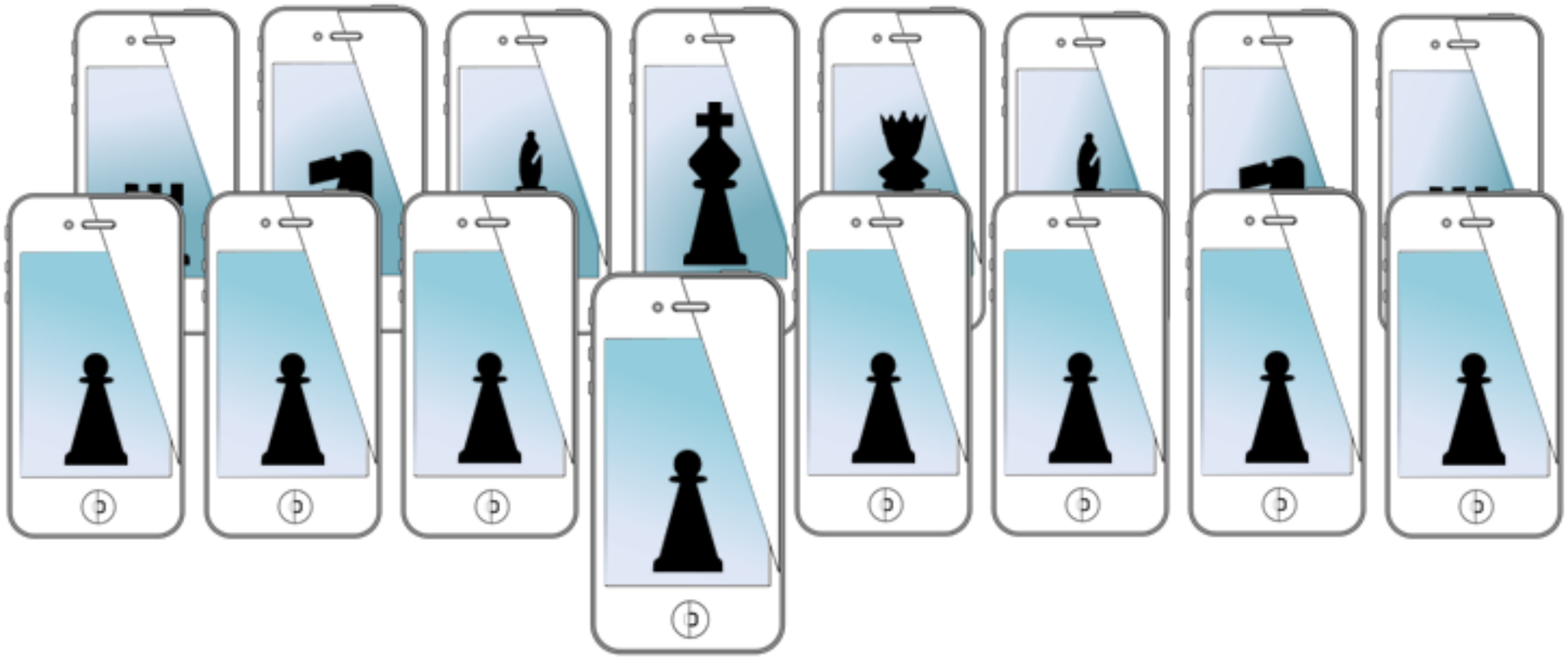
MOBILE SENSING & LEARNING



CSE5323 & 7323

Mobile Sensing & Learning

week one, lecture two: objective-C and !swift?

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

course logistics

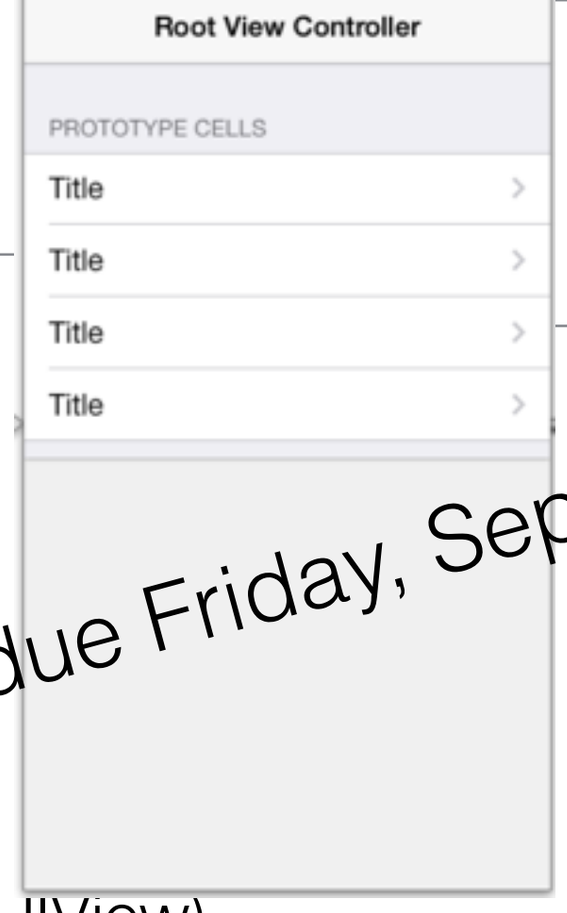
- lab time: W 5-7PM
- teams: must be on a team by next lecture
- next class period will be flipped, so view video on canvas!
- get access to:
  - room? mac mini's? iPhones?
- university developer program…
  - or just use my current setup
  - do **NOT** let Xcode manage any certificates, etc.
  - setup an account at developer.apple.com (sample code, video)

assignment one

- You have free reign to create an application that manages some type of mutable information: you might display images from online somewhere, stock exchange information, information from twitter--or movies, or books, or amazon
- The data you load and display can come from anywhere and you can do whatever you want with it.
- must use the interface elements as described (**next slide**). You will need to get creative in order to incorporate ALL the design elements below.

- Create an iOS application in XCode that:
  - uses a **TableViewController** to load different views
  - must implement **three different types of cells and load them dynamically** (i.e., you cannot use a static table).
  - View navigation can be hierarchical in any way you want
  - When loading a new view controller your main view controller should hand off information to the controller that is getting created

assignment one



due Friday, Sep. 9

- Automatic Layout
- Buttons, Sliders, and Labels
- Stepper and Switch
- Picker (you must implement picker delegate)
- Segmented Control
- Timer (which should repeat and somehow update the UIView)
- ScrollView (with scrollable, zoomable content)
- Image View
- Navigation Controller
- Collection View Controller
- Table View Controller with dynamic prototype cells
- (An idea for exceptional Credit) Implement a modal view and handle properly using delegation or subclass view elements to make custom dynamics

agenda

a big syntax demo…

- **objective-c** and swift basics
  - class declaration
  - complex objects
  - common functions
  - encapsulation and primitives
  - memory management

and model view controllers for a breather in between!!!

objective c

- strict superset of c
- a lot like c
- but with “messages”
- so “functions” look funny (i.e., the braces in the logo)

objective c

classes

interface for class

class name

inherits from

```
@interface SomeClass  : NSObject

@property (strong, nonatomic) NSString *aString;

@end
```

if in the **.h** file,
it is public

property

```
@interface SomeClass ()

@property (strong, nonatomic) NSString *aString;

@end

@implementation SomeClass

   … implementation stuff…
@end
```

if in the **.m** file,
it is private

objective c

class properties

```
@interface SomeClass ()
{
    float aFloat;
}
@property (strong, nonatomic) NSString *aString;
@end

@implementation SomeClass
@synthesize aString = _aString;
```

(**rare**) protected class variable:
can't access easily and no custom getter/setter

property declared

backing variable

setter, **auto** created

```
-(void)setAString:(NSString *)aString{
    _aString = aString;
}
```

getter, **auto** created

```
-(NSString *)aString{
  return _aString;
}
```

lazy instantiation

getter, **custom**

```
-(NSString *)aString{
    if(!_aString)
        _aString = @"This string was not set";
    return _aString;
}
```

```
@end
```

objective c

ARC

```
@interface SomeClass ()

@property (strong, nonatomic) NSString *aString;
@end

@implementation SomeClass
@synthesize aString = _aString;
```

atomic ~ thread safe
nonatomic ~ faster access

strong ~ keep a reference
weak ~ no reference

automatic reference counting

not garbage collection
when reference count for variable == 0, immediately free memory

strong is usually what you want, else variable is never allocated

weak is used in scenarios where something else holds a reference

```
@end
```

objective c

encapsulation

```
NSNumber *aNum = [[NSNumber alloc]init];
aNum = @3;

NSString *aString = [NSString stringWithFormat:@"The time is always %d past %d",42,9];
aString = @"A string";
```

these are PropertyLists: **serializable**, containers for primitive values

Valid Property Lists: NSData, NSDate, NSNumber (int, float, bool)

```
NSArray *myArray = @[@32,@"a string",@[@1,@2,@3],@[@9,@42,@32]];
for(id obj in myArray)
    NSLog(@“Obj=%@",obj);
```

can store any object

loop over an NSArray

An **Array** of **PropertyLists** is also a **PropertyList**

```
@interface SomeClass ()
@property (strong, nonatomic) NSDictionary *aDictionary;
@end
```

Dictionary as a class property

An **Dictionary** of **PropertyLists** is also a **PropertyList**

Access self

```
self.aDictionary = @{@"key1":@3,@"key2":@"a string"};
for(id key in self.aDictionary)
    NSLog(@"key=%@, value=%@",key,self.aDictionary[key]);
```

objective c mutable and immutable

```
NSArray *myArray = @[@32,@"a string”,[[UILabel alloc]init] ];
```

possible to add objects now

all arrays are **nil** terminated
more on that later…

```
NSMutableArray *anArrayYouCanAddTo = [NSMutableArray arrayWithObjects:aNum,@32, nil];

[anArrayYouCanAddTo addObject:someComplexObject];

NSMutableArray *anotherArray = [@[@32,@"string me"] mutableCopy];
```

objective c

functions examples

return type | method name | parameter name | parameter type

```
-(NSNumber*) addOneToNumber:(NSNumber *)myNumber{

    return @([myNumber floatValue]+1);
}
```

```
NSNumber *obj = [self addOneToNumber:@4];
```

receiver class | message | parameter value

throwback to **c**

```
float addOneToNumber(float myNum){
    return myNum++;
}

float val = addOneToNumber(3.0);
```

second parameter name | second parameter

```
-(NSNumber*)     addToNumber:(NSNumber *)myNumber
          withOtherNumber: (NSNumber *)anotherNumber
```

```
NSNumber *obj = [self addToNumber:@4 withOtherNumber:@67];
```

objective c

common functions

function

NSString to format

object to print

```
NSLog(@"The value is: %@",someComplexObject);
```

%@ is print for serializable objects

```
NSLog(@"The value is: %d",someInt);
NSLog(@"The value is: %.2f”,someFloatOrDouble);
```

```
someComplexObject = nil;

if(!someComplexObject)
    printf("Wow, printf works!");
```

set to nothing,
subtract from reference count

this means: **if variable is not nil**

nil only works for objects!
no primitives, structures, or enums

objective c

review

```
@interface SomeViewController ()
{
    float aFloat;
}
@property (strong, nonatomic) NSString *aString;
@property (strong, nonatomic) NSDictionary *aDictionary;
@end

@implementation SomeViewController
@synthesize aString = _aString;

-(NSString *)aString{
    if(!_aString)
        _aString = [NSString stringWithFormat:@"This is a string %d",3];
    return _aString;
}

-(void)setAString:(NSString *)aString{
    _aString = aString;
}

- (void)viewDidLoad
{
    [super viewDidLoad];

    self.aDictionary = @{@"key1":@3,@"key2":@"a string"};
    for(id key in _aDictionary)
        NSLog(@"key=%@, value=%@",key,_aDictionary[key]);


    NSArray *myArray = @[@32,@"a string", self.aString ];
    for(id obj in myArray)
        NSLog(@“Obj=%@",obj);

   self->aFloat = 5.0;

}
```

protected class variable

private properties

backing variable

getter

setter

call from super class

dictionary

dictionary iteration

array

array iteration

protected class variable access

adding to our project

- let's add a slider to our project
- and user lazy instantiation
- and some git branching

MVC's

controller has direct connection to view class

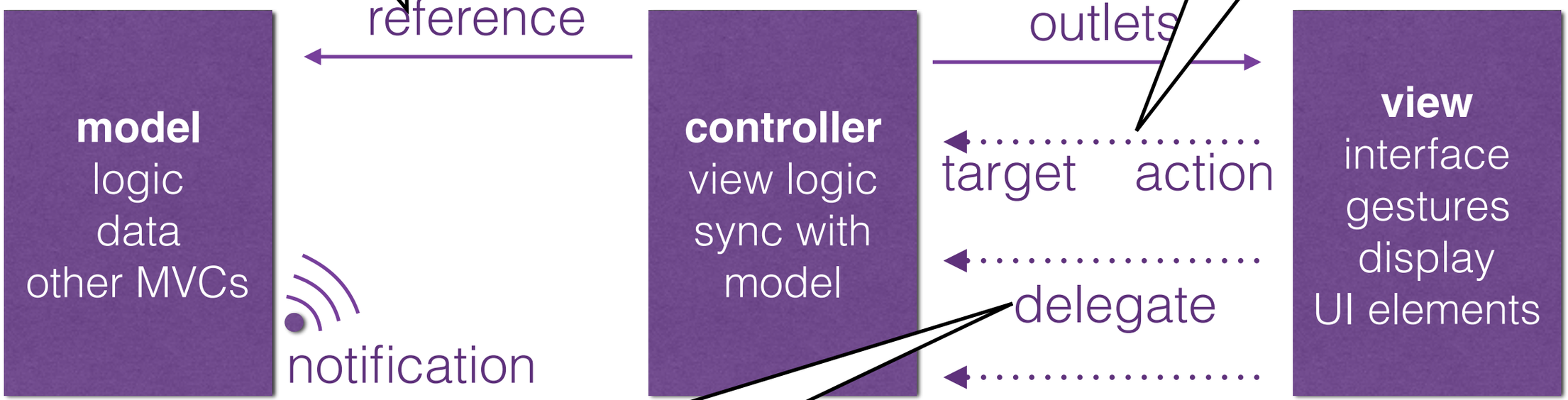
```
@property (weak, nonatomic) IBOutlet UITextField *firstName;
@property (weak, nonatomic) IBOutlet UITextField *lastName;
@property (weak, nonatomic) IBOutlet UITextField *phoneNumber;
```

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

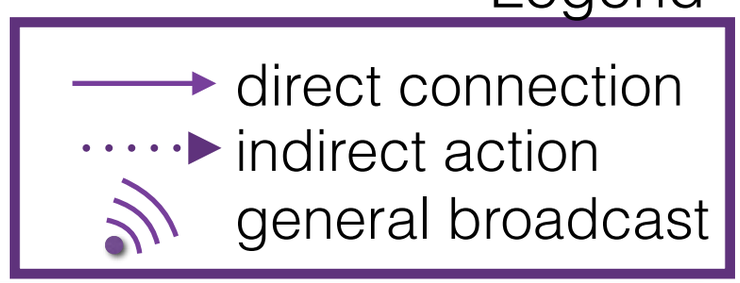
```
- (IBAction)buttonPressed:(id)sender;
- (IBAction)showPhBookPressed:(id)sender;
```




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

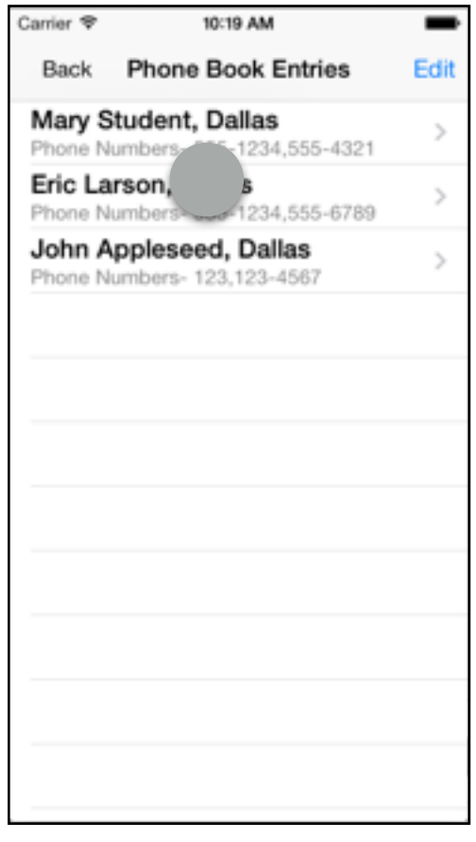
controller implements method for view class

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



MVC life cycle

- 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

Source Controller

`prepareForSegue`
prepare to leave the screen

set properties of destination, if needed

Destination Controller

view is unfrozen, property memory allocated

view outlets are ready for interaction

`viewDidLoad`

`viewWillAppear`

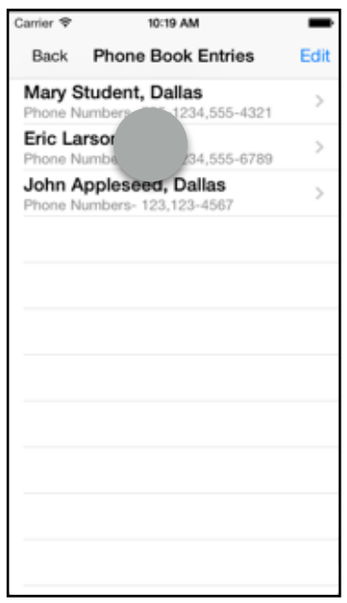
`viewDidAppear`

`viewWillDisappear`

`viewDidDisappear`

memory deallocated when app is ready

source



destination

user

MVC's

- sometimes the best way to create a model is through a Singleton

in .h file (so its public)

```
@interface MyCustomClass : NSObject

+ (MyCustomClass*)sharedInstance;

@end
```

+ means its a
class method
don't need instance to call it

in .m file

custom getter

called like a backing variable

```
+ (MyCustomClass*)sharedInstance
{
    static MyCustomClass * _sharedInstance = nil;

    static dispatch_once_t oncePredicate;

    dispatch_once(&oncePredicate, ^{
         _sharedInstance = [[MyCustomClass alloc] init];
     });
     return _sharedInstance;
}
```

don't worry about syntax
until next week…

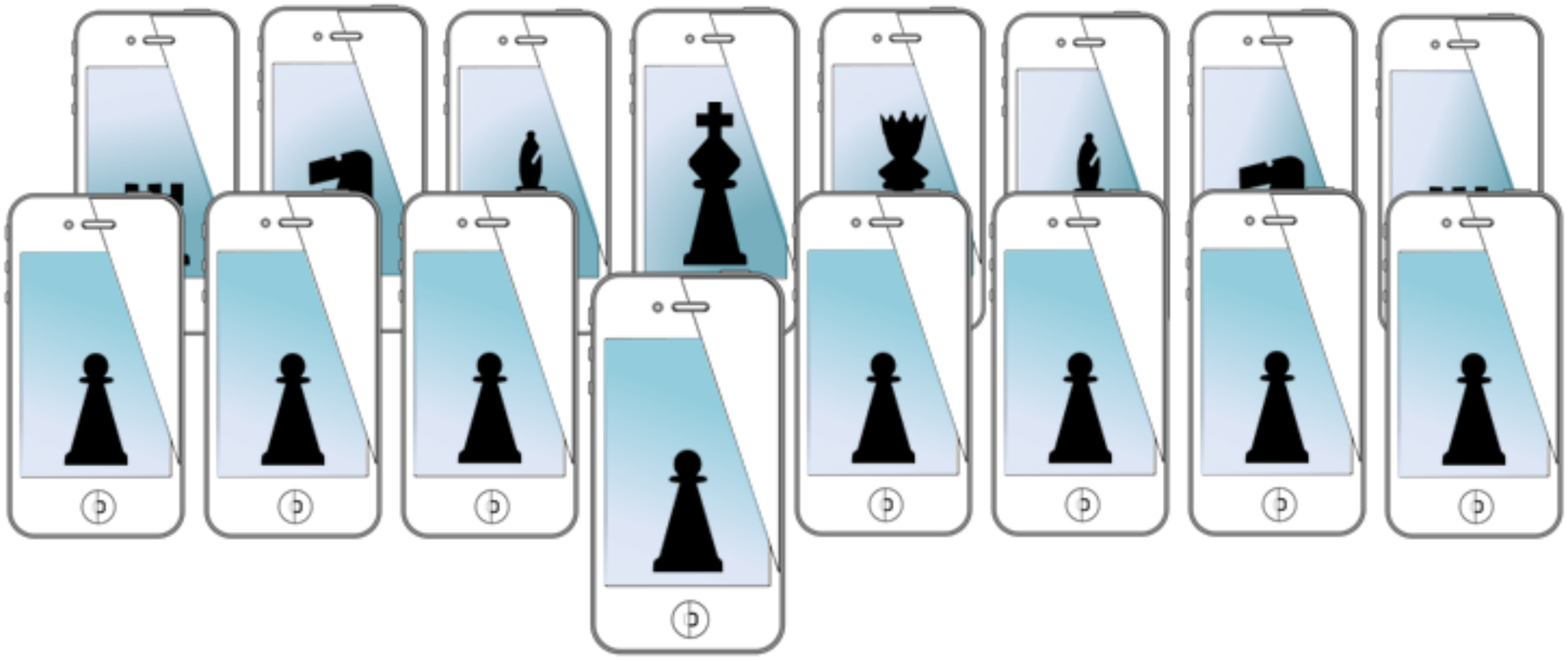
Need more help on MVC's ? Check out Ray Wenderlich:

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

MOBILE SENSING & LEARNING



CSE5323 & 7323

Mobile Sensing & Learning

week one, lecture two: objective-C and swift

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

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

```
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

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

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

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"
```

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

like a dequeue

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

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

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 orig
case (_, 0):
    println("(\(so      oint.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

functions

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

classes and properties

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

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

class variable

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

swift

classes and properties

no custom setter or getters

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

but we can still do custom actions around the property access

```
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 methods

```
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!

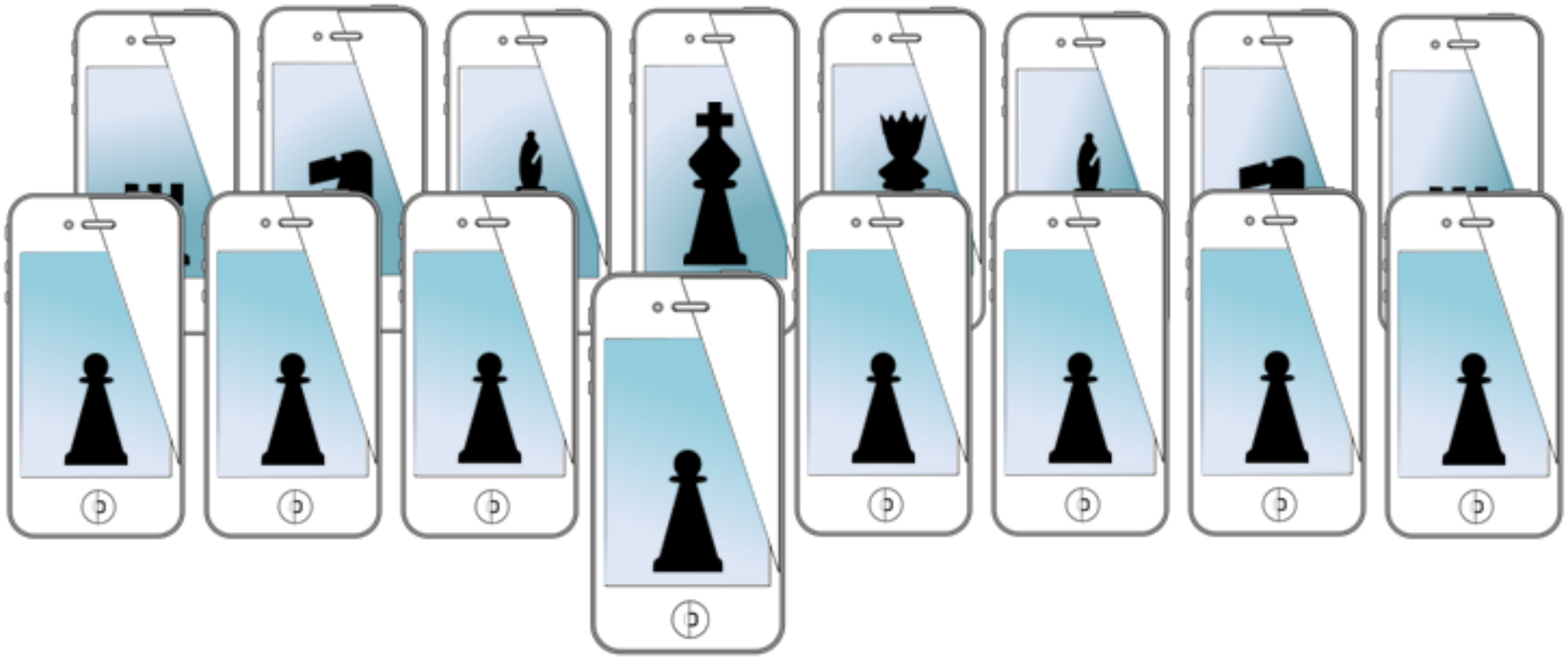
Need more help on MVC's ? Check out Ray Wenderlich:

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

MOBILE SENSING & LEARNING



CSE5323 & 7323

Mobile Sensing & Learning

week one, lecture two: objective-C and !swift?

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