Announcements

• Lab 1 due on Wednesday by 11:59 PM
  – Email it to cse438ta@gmail.com

• Lab 2 is due on Wednesday June 26th
  – Posted on course website

• We will hold Studio 2 on Wednesday
  – Meet in Whitaker Mac Lab on Wednesday

• TA Hours Posted on course website

• Everyone should have access to the Whitaker Mac lab

Today’s Topics

• Additional Swift Concepts

• Views Introduction

• MVC

• Lab 2

• MVC and Auto Layout Demos
Lazy Initialization of Properties (CS193p)

- Lazy properties do not get initialized until someone accesses them
- You can allocate objects, execute a closure, or call a method

```swift
lazy var theResult = LotsOfWorkObject()

lazy var someProperty: Type = {
    // construct the value of someProperty here
    return (the constructed value)
}()

lazy var myProperty = self.initializeMyProperty()
```

Initialization in Swift

- Classes and structures must set all of their stored properties when created
- Various way to set properties (without an init)
  - Define default values
  - Properties may be Optional (so they start out as nil)
  - Initialize a property by setting a closure
  - Use lazy instantiation
- Use an init when values can not be set using the previous examples
  - You can have as many init methods in your class or struct
  - Each init will have different arguments
Initialization (CS193p)

• Some init methods are for free
  – Free init() given to all base classes
    • A base class has no superclass
  – If a struct has no initializers, it will get a default one
    will all properties as arguments

• What can I do with an init?
  – Set property values, even those that already had defaults
  – Constant properties (those declared with let) can be set
  – You can call other init methods in your own class or struct
    using self.init(args)
  – In a class, you can also call super.init(args)
    • There are some rules for calling inits from other inits in a class
Class Initialization Requirements (CS193p)

- After init completes all properties must have values (Optionals can be nil)
- A class has two types of inits
  - Convenience and designated
- Designated init
  - Must (and can only) call a designated init in its immediate superclass
  - You must initialize all properties introduced by your class before calling a superclass’s init
  - You must call a superclass’s init before you assign a value to an inherited property
- Convenience init
  - Must (and can only) call an init in its own class
  - Must call that init before it can set any property values
  - The call of other inits must be completed before you can access properties or invoke methods

Initialization (CS193p)

- Inheriting init
  - If you do not implement any designated inits, you will inherit all of you superclass’s designated inits
  - If you override all of your superclass’s designated inits, you’ll inherit all its convenience inits
  - If you implement no inits, you will inherit all of your superclass’s inits
  - Any init inherited by these rules qualifies to satisfy any of the rules on the previous slide
- Required init
  - A class can mark one or more of its init methods as required
  - Any subclass must implement those init methods
    - They can be inherited per rules above
Failable init (CS193p)

• If an init is declared with a ? after the word init, it returns an Optional

    init? (arg1: Type1,..) {
        // might return nil here (means init failed)
    }

• **Example**

    Let image = UIImage(named:”foo”) //image is Optional UIImage

• **Typically use if-let for these cases**

    If let image = UIImage(named: "foo") {
        // image was successfully created
    } else {
        // failed to create image
    }
Views

View Fundamentals

- Rectangular area on screen
- Draws content
- Handles events
- Subclass of UIResponder (event handling class)
- Views arranged hierarchically
  - every view has one superview
  - every view has zero or more subviews
View Hierarchy - UIWindow

• Views live inside of a window

• UIWindow is actually just a view
  – adds some additional functionality specific to top level view

• One UIWindow for an iOS app
  – Contains the entire view hierarchy
  – Set up by default in Xcode template project

UIView Coordinate System

• Origin in upper left corner
• y axis grows downwards
• Units are points, not pixels
  – Points are units of coordinate system
  – Pixels are min size unit of drawing
  – Typically 2 pixels per point
  • var ContentScaleFactor

0,0 +x

+ y

UIView
**View Controllers**

**UIViewController**

- Basic building block
- Manages a screenful of content
- Subclass to add your application logic
Model, View, Controller
**Model**

- Manages the app data and state
- Not concerned with UI or presentation
- Often persists somewhere
- Same model should be reusable, unchanged in different interfaces

**View**

- Present the Model to the user in an appropriate interface
- Allows user to manipulate data
- Does not store any data  
  – (except to cache state)
- Easily reusable & configurable to display different data
### Controller

- Intermediary between Model & View
- Updates the view when the model changes
- Updates the model when the user manipulates the view
- Typically where the app logic lives

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### Model, View, Controller

```
Controller
   /|
 /  |
Model   View
```

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Why Model-View-Controller?

- Separating responsibilities also leads to reusability
- By minimizing dependencies, you can take a model or view class you’ve already written and use it elsewhere
- Think of ways to write fewer lines of code

Model, View, Controller

Model Object

Controller
- outlets
- actions

View
Lab 2

MVC Demo
Auto Layout Demo