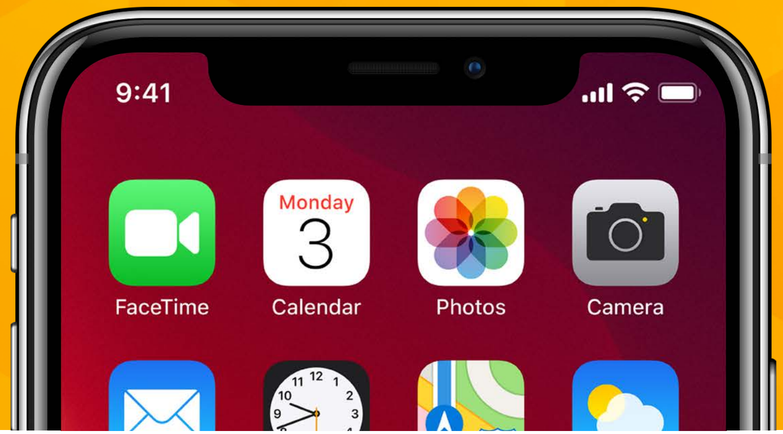

iOS Application Development

Lecture 3: Unit 2

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Seminar Groups

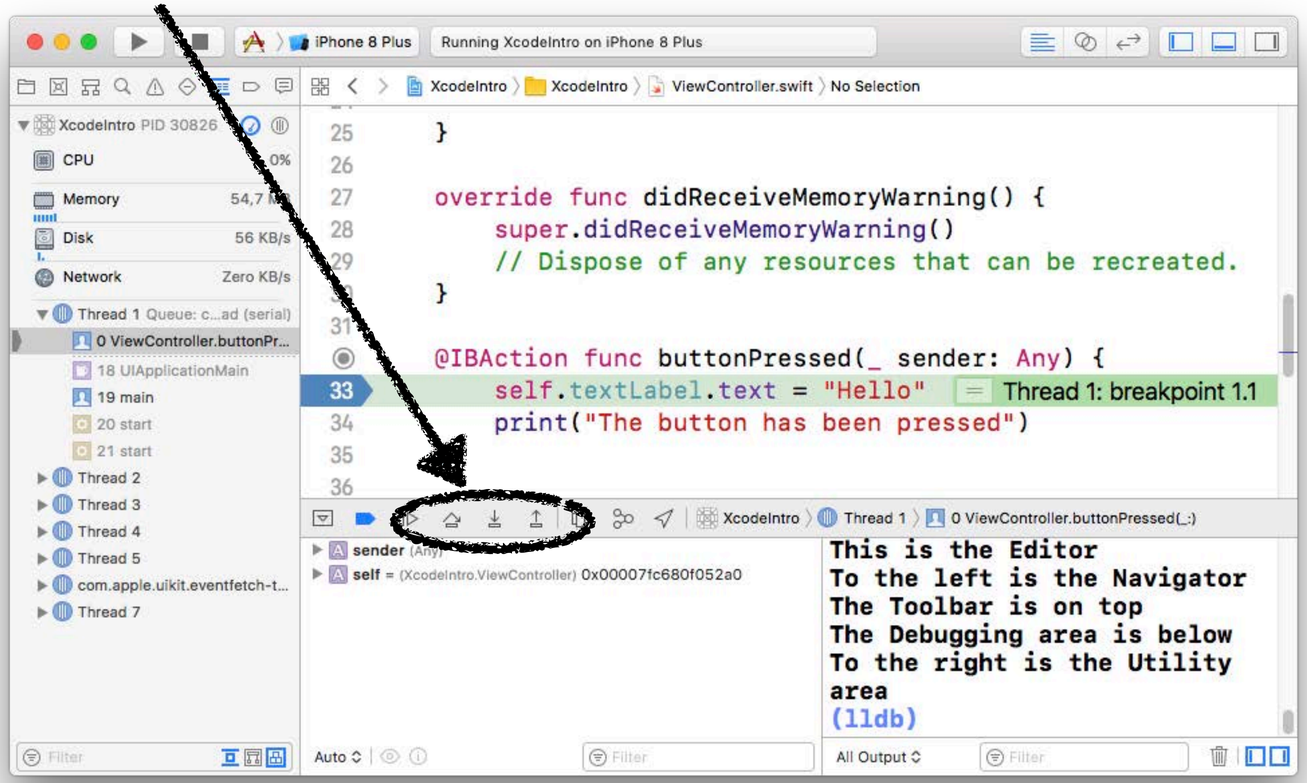
Topic	Group	Presentation	Discussions
Core Data	Group 10	3.12.19, first group	26.11.19
Scene Kit	Group 7	26.11.19, first group	19.11.19
Core ML + Create ML	Group 12	3.12.19, second group	26.11.19
SiriKit	Group 2	19.11.19, second group	12.11.19
WatchOS	Group 14	25.11.19, second group	18.11.19
MapKit, CoreLocation	Group 8	18.11.19, first group	11.11.19
Networking on iOS	Group 6	2.12.19, first group	25.11.19
Extensions & Inter-App communication	Group 5	19.11.19, first group	12.11.19
Debugging in Xcode and Instruments	Group 4	18.11.19, second group	11.11.19
ClassKit	Group 3	2.12.19, second group	25.11.19
RealityKit & Reality Composer	Group 1	09.12.19, first group	2.12.19
Bringing People into AR	Group 13	09.12.19, second group	25.11.19
GameplayKit	Group 9	26.11.19, second group	19.11.19
Swift UI	Group 11	25.11.19, first group	18.11.19

Recap

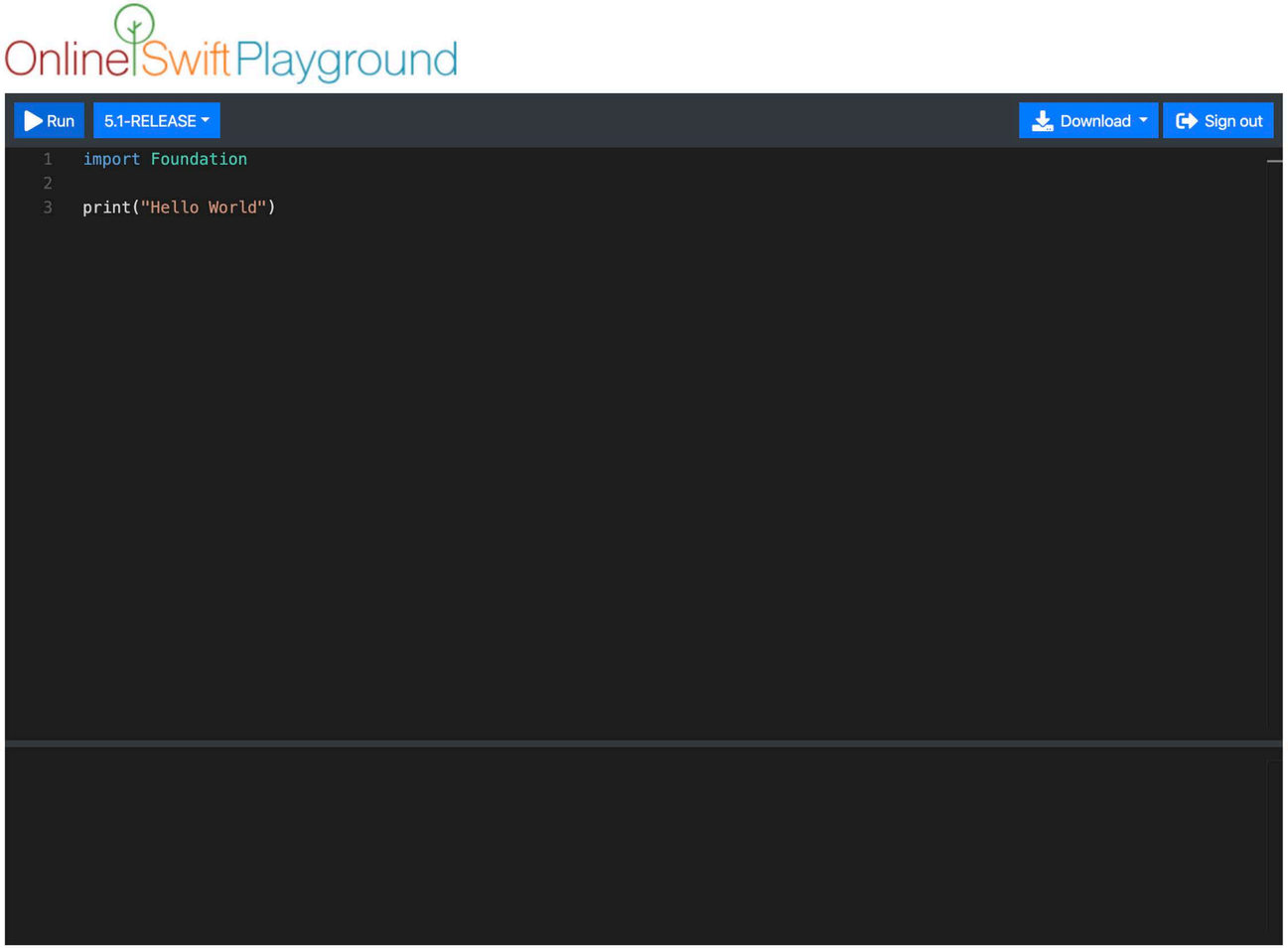
- Basics of Swift
- 2 Types of Variables
  - let: constant
  - var: variable
- Basics of XCode
  - IBOutlets
  - IBActions

XCode Debugging

- Set breakpoints for execution on simulator and device
- Continue, Step over, Step into, Step out



Online SwiftPlayground



http://online.swiftplayground.run/

Strings

- A unicode string value that is a collection of characters

```
var string = "hallo"

string.count // -> 5
```

- Individual characters are of type Character.
  But since Strings are more common => single characters are also of type String

```
let a = "a" //'a' is a String

let b: Character = "b" //'b' is a Character”
```

Strings

- Check if String is empty:

```
var myString = ""

if myString.isEmpty {
    print("The string is empty")
}
```

  - Concatenation and Interpolation

```
let string1 = "Hello"
let string2 = ", world!"
let myString = string1 + string2 // "Hello, world!"
var mySecondString = myString + ", world!" // "Hello, world!"
mySecondString += " Hello!" // "Hello, world! Hello!”

let a = 4
let b = 5
print("If a is \(a) and b is \(b), then a + b equals \(a+b)")
//“If a is 4 and b is 5, then a + b equals 9
```

Strings

- Equality and Comparison:

```
let month = "January"
let otherMonth = "January"
let lowercaseMonth = "january"

if month == otherMonth {
    print("They are the same") //Output: “They are the same.”
}

if month != lowercaseMonth {
    print("They are not the same.") //Output: “They are not the same.”
}
```

```
let name = "Johnny Appleseed"
if name.lowercased() == "joHnnY aPPleseeD".lowercased() {
    print("The two names are equal.") // Output: The two names are equal.
}
```

Functions

- Basic function definition

```
func functionName (parameters) -> ReturnType {
    //body of the function
}
```

  - Function without parameters and ReturnType

```
func displayPi() {
    print("3.1415926535")
}

displayPi() //Output: 3.1415926535
```

Functions

- Function with one parameter

```
func triple(value: Int) {
    let result = value * 3
    print("If you multiply \(value) by 3, you'll get \(result).")
}
triple(value: 10) //Output: “If you multiply 10 by 3, you'll get 30.
```

- Function with multiple parameters

```
func multiply(firstNumber: Int, secondNumber: Int) {
    let result = firstNumber * secondNumber
    print("The result is \(result).")
}
multiply(firstNumber: 10, secondNumber: 5) //Output: The result is 50.
```

Functions

- Argument labels

```
func sayHello(to person: String, and anotherPerson: String) {
    print("Hello \(person) and \(anotherPerson)")
}

sayHello(to: "Miles", and: "Riley")


func sayHello(_ person: String, _ anotherPerson: String) {
    print("Hello \(person) and \(anotherPerson)")
}

sayHello("Luke", "Dave")
```

Functions

- Default parameter values

```
func display(teamName: String, score: Int = 0) {
    print("\(teamName): \(score)")
}

display(teamName: "Wombats", score: 100) //"Wombats: 100”

display(teamName: "Wombats") //"Wombats: 0"
```

Functions

- Return Values:

```
func multiply(firstNumber: Int, secondNumber: Int) -> Int {
    let result = firstNumber * secondNumber
    return result
}


let myResult = multiply(firstNumber: 10, secondNumber: 5)
//myResult = 50
print("10 * 5 is \(myResult)")
```

Functions

- Returning Multiple Values using Tuples:

```
func tupleReturn() -> (Int,String,Double)
{
    return (1,"String",2.0)
}

let myTuple = tupleReturn()
print("This is my tuple: \(myTuple.0), \(myTuple.1), \(myTuple.2)")
```

Structs

- Most basic Swift types are Structs:
  - String, Int, Double, Bool
- Value types (structs) vs reference types (classes)
- Basic struct:

```
struct Person {
    var name: String
}

let firstPerson = Person(name: "Jasmine")
print(firstPerson.name) //Output: Jasmine
```

Structs

- Struct methods:

```
struct Person {
    var name: String
    func sayHello() {
        print("Hello, there! My name is \(name)!")
    }
}

let person = Person(name: "Jasmine")
person.sayHello() //Output: “Hello, there! My name is Jasmine!”
```

Structs

- Initializers:

```
var string = String.init() // ""
var integer = Int.init() // 0
var bool = Bool.init() // false

//Shorthand version of the default initializer:

var string = String() // ""
var integer = Int() // 0
var bool = Bool() // false
```

```
struct Odometer {
    var count: Int = 0
}

let odometer = Odometer() //default value for count = 0
let odometer = Odometer(count: 27000) //set count value
```

Structs

- Custom initializers:

```
struct Temperature {
    var celsius: Double

    init(celsius: Double) {
        self.celsius = celsius
    }

    init(fahrenheit: Double) {
        celsius = (fahrenheit - 32) / 1.8
    }
}

let currentTemperature = Temperature(celsius: 18.5) //celsius: 18.5
let boiling = Temperature(fahrenheit: 212.0) //celsius: 100.0
```

Structs

- Mutating methods:

```
struct Odometer {
    var count: Int = 0 // Assigns a default value to the `count` property.

    mutating func increment() {
        count += 1
    }

    mutating func increment(by amount: Int) {
        count += amount
    }

    mutating func reset() {
        count = 0
    }
}
var odometer = Odometer() // odometer.count defaults to 0
odometer.increment() // odometer.count is incremented to 1
odometer.increment(by: 15) // odometer.count is incremented to 16
odometer.reset() // odometer.count is reset to 0
```

Structs

- Computed properties:

```
struct Temperature {
    var celsius: Double

    var fahrenheit: Double {
        return celsius * 1.8 + 32
    }

    var kelvin: Double {
        return celsius + 273.15
    }
}

let currentTemperature = Temperature(celsius: 0.0)
print(currentTemperature.fahrenheit) //Output: 32.0
print(currentTemperature.kelvin) //Output: 273.15
```

Structs

- Property observers:

```
struct StepCounter {
    var totalSteps: Int = 0 {
        willSet {
            print("About to set totalSteps to \(newValue)")

        }
        didSet {
            if totalSteps > oldValue  {
                print("Added \(totalSteps - oldValue) steps")
            }
        }
    }
}
var stepCounter = StepCounter()
stepCounter.totalSteps = 40  //About to set totalSteps to 40        Added 40 steps
stepCounter.totalSteps = 100 //About to set totalSteps to 100       Added 60 steps
```

Classes

- Classes are reference types

- Basic class:

```
class Person {
    let name: String

    init(name: String) {
        self.name = name
    }

    func sayHello() {
        print("Hello, there!")
    }
}

let person = Person(name: "Jasmine")
print(person.name) //Jasmine
person.sayHello() //Hello, there!
```

- Subaclass and override functions:

```
class Student: Person {
    var favoriteSubject: String

    override func sayHello() {
        print("Hello, student!")
    }

    init(name: String, favoriteSubject: String) {
        self.favoriteSubject = favoriteSubject
        super.init(name: name)
    }
}
```

Collections

- Groups of objects
- Two Common collection types:
  - Array:

```
var names: [String] = ["Anne", "Gary", "Keith"]
```

  - Dictionary:

```
var scores = ["Richard": 500, "Luke": 400, "Cheryl": 800]
```

- Collections are **value types!!**

Arrays

- Array Types:

```
var myArray: [Int] = []

var myArray: Array<Int> = []

var myArray = [Int]()
```

```
var myArray = [Int](repeating: 0, count: 100)

let firstNumber = myArray[0] //Access values

myArray[1] = 2 //Set values

myArray.append(101) //Add Values
```

Dictionaries

- Dictionary Types:

```
var myDictionary = [String: Int]()
var myDictionary = Dictionary<String, Int>()
var myDictionary: [String: Int] = [:]
```

```
var scores = ["Richard": 500, "Luke": 400, "Cheryl": 800]

scores["Oli"] = 399 // Set 399 for key "Oli"
let oldValue = scores.updateValue(100, forKey: "Richard") // Get old value before
updating

let players = Array(scores.keys) //["Richard", "Luke", “Cheryl”,”Oli"]
let points = Array(scores.values) //[500, 400, 800, 399]”

if let myScore = scores["Luke"] {
print(myScore) // 400
}
```

For Loops

```
for index in 1...5 {
    print("This is number \(index)")
}
```

```
for _ in 1...3 {
    print("Hello!")
}
```

```
let names = [“Tim", "Cathy", "Jan"]
for name in names {
    print("Hello \(name)")
}
```

```
for letter in "ABCD".characters {
   print("The letter is \(letter)")
}
```

```
for (index, letter) in "ABCD".characters.enumerated() {
    print("\(index): \(letter)")
}
```

```
let vehicles = ["unicycle" : 1, "bike" : 2, "car" : 4, "truck" : 6]
for (vehicleName, wheelCount) in vehicles {
    print("A \(vehicleName) has \(wheelCount) wheels")
}
```

While loop

- Basis while loop:

```
var numberOfLives = 3

while numberOfLives > 0 {
    print("I still have \(numberOfLives) lives.")
}
```

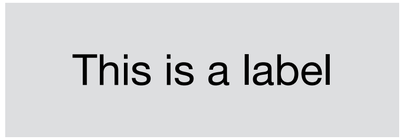
```
var numberOfLives = 3
var stillAlive = true
while stillAlive {
    numberOfLives -= 1
    if numberOfLives == 0 {
        stillAlive = false
    }
}
```

```
var numberOfLives = 3
var stillAlive = true
while stillAlive {
    numberOfLives -= 1
    if numberOfLives == 0 {
        break
    }
}
```

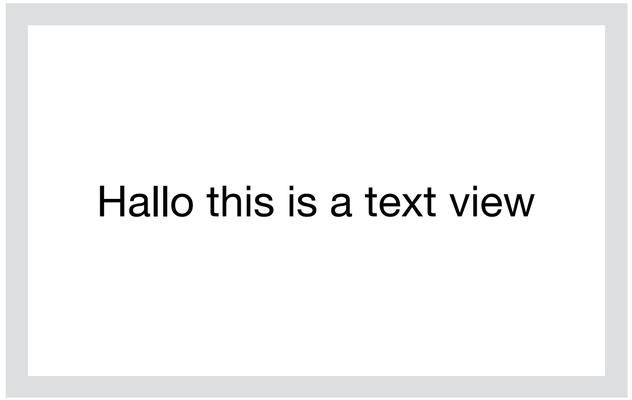
Introduction to UIKit

- The UIKit provides most important parts of an iOS app
- UIView is the foundation class for all visual elements in UIKit
- Subclasses of UIView:
  - UILabel
  - UIButton
  - UIImageView
  - UIScrollView

UIView subclasses



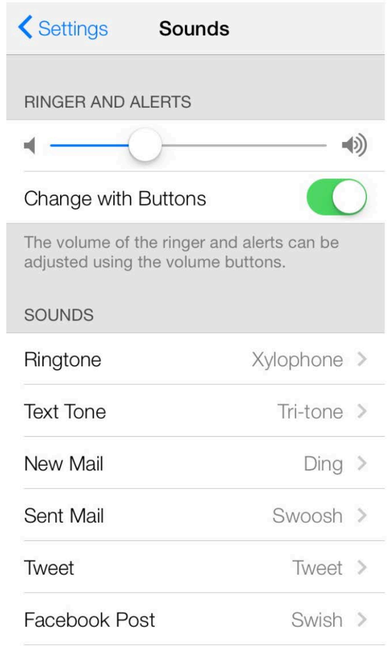
UILabel



UITextView

UIImageView

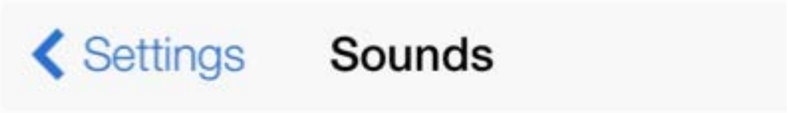
UIScrollView



UITableView

UIToolbar

UITabBar



UINavigationBar

UIView subclasses (Controls)

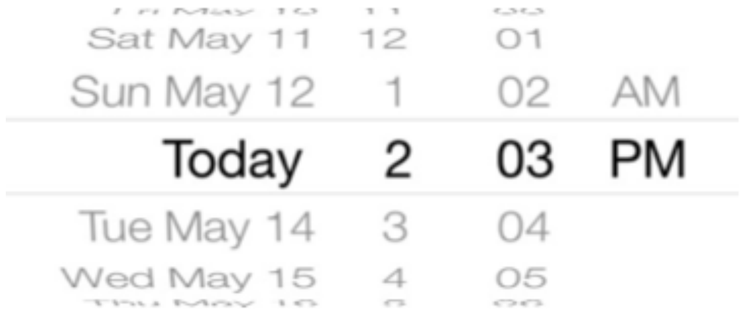
UIButton

UISlider

UISwitch

UITextField

UISegmentedControl



UIDatePicker

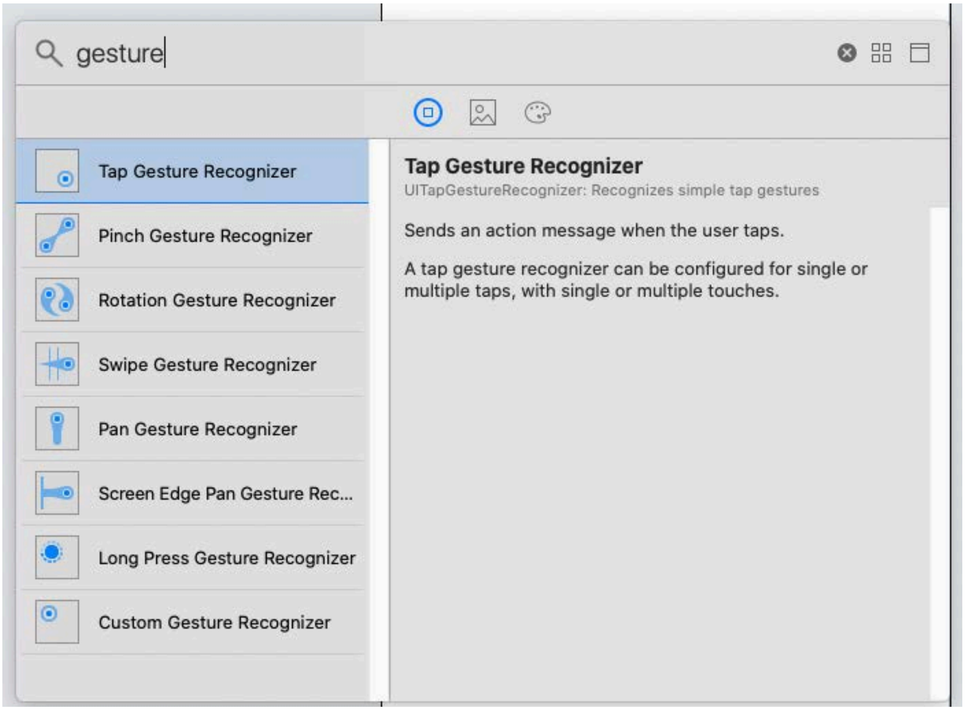
Gesture Recognizers

- Basic touch gestures
- Can be included using the Interface Builder
- Can also be added using code
  - Custom touch input:

```
 override func touchesBegan(_ touches:
Set<UITouch>, with event: UIEvent?) { }

 override func touchesMoved(_ touches:
Set<UITouch>, with event: UIEvent?) { }

 override func touchesEnded(_ touches:
Set<UITouch>, with event: UIEvent?) { }
```



Summary

- Strings
- Function
- Classes and Structs
- Collections
- Next week: Unit 3:
  - Auto layout
  - Swift Optionals, Guard, and Inspection
  - Segues and Navigation Controllers