

Reading Assignment I: Intro to Swift

Objective

The goal of our first reading assignment is to start to get a handle on this new language you must learn called Swift. This one covers mostly basic stuff like variables and control flow, methods and properties, Arrays and Strings, but note that Swift does some of this basic stuff in powerful ways (e.g. labelled arguments to functions, pattern-matched switch statements, functions as first-class types, mixing object-oriented and functional programming technique in the same programming language, etc.).

Below you will find a list of the sections in the [Swift Programming Language](#) document that you must read. It is color-coded to help you be efficient in consuming all this information. For example, Gray topics are ones which you do not have to read this time (i.e. you'll read about them next time or the time after). The other color-coding (described below) may mean different things to different people depending on your experience with various programming languages.

Learning a new language should be something that becomes “old hat” for you over time. Most veteran computer scientists probably know at least a dozen programming languages (some know dozens). If you are such a veteran (i.e. you know a dozen or more programming languages), the color-coding will mean very little. You'll recognize the various elements of the language easily and will just have to scan to figure out Swift's specific syntax.

Strangely, if Swift is only the second programming language you've ever had to learn, then the color-coding may well not mean much to you either since you'll probably have to carefully read **all** of the sections to understand this new language.

But if you lie somewhere in the middle, then the color-coding might be a help. Unhighlighted topics are normal features found in almost all programming languages with nothing particularly tricky about Swift's implementation thereof. You might find yellow topics to be a bit unusual (depending on your experience) and so you want to pay some attention when reading about them. Red topics are very important and/or are likely to be completely new to you unless you're an above-mentioned veteran. These sections require close and careful reading.

There are reading assignments in the first few weeks of this course, but not after that. This reading is a bit larger than the other two assignments both because the programming assignments at the start of the quarter are relatively easy (and so won't be as time-consuming as usual) and because, while there's a lot to read this week, a whole lot of it is pretty basic stuff (although there is some more complex stuff mixed in too, so beware).

Due

Ideally you should read all of the material referenced below before you watch Lecture 3. If you do so, then the demos you see in lecture in week 2 will be good confirmations of some of what you've learned. But you should definitely have finished this reading before you start watching the video of Lecture 5 or you may find yourself getting a bit lost.

In any case, set aside sufficient time because there's quite a bit of reading here. This is the highest volume reading assignment week, but also has the most stuff that you're likely to be familiar with from other languages, so hopefully some of this week's content will be stuff you'll be able to move through relatively quickly. Again though, slow down a bit when a topic is highlighted in yellow or red.

Materials

We recommend scrolling around through this document to give yourself an idea of how much time you want to budget for this before you dive in. For quick reference, in addition to [A Swift Tour](#) and the [Swift API Guidelines](#) you'll be reading most of the content in 11 ½ of the first 14 chapters listed along the left-hand side of [Swift Programming Language](#) (The Basics through the first half of Initialization, excluding Subscripts or Inheritance).

Swift Programming Language

Don't gloss over reading any NOTE text (inside gray boxes) since many of those things are quite important. However, if a NOTE refers to Objective-C or bridging, you can ignore it.

If you read something and don't understand it, that's what Piazza is for! Don't be shy.

If there is a link to another section in the text, you don't have to follow that link unless what it links to is also part of this week's reading assignment.


Always read the overview at the top of each major section (e.g., in [The Basics](#), be sure to read the part that starts "Swift is a new programming language for iOS, macOS, watchOS, and tvOS app development...").

Start with [A Swift Tour](#). It is a good place to "find your bearings" with the Swift language. We'll see at least a little bit of all the topics in the sections listed here in the first couple of weeks of lecture and this is a great place to read more about them.

- Simple Values
- Control Flow
- Functions and Closures
- Objects and Classes
- Enumerations and Structures
- Protocols and Extensions
- Error Handling
- Generics

The **Protocols and Extensions** section (note that it is in gray) is *super* important, so much so that we'll be covering it in slides in lecture in week 3 (which is why we're not requiring you to read that section this time). Having said that, you're always welcome to read ahead on anything in this document (we're just trying to keep your overall amount of reading to a manageable level). If you want to try to read that section and link it in your mind to the demo so far, know that **View** and **Identifiable** are both protocols. And when we talk about "constrains and gains" or "behaves like" in lecture, we're talking about protocols.

In the [Language Guide](#) area, read the following sections in the following chapters. It is important to understand the information in these sections for you to be able to continue to follow along in lecture as the quarter progresses, so don't blow off this reading.

By the way, Unicode variable and constant names (e.g., ) can be fun, but you will be held accountable for the quality of your naming (of all kinds) and readability in your code, so name things wisely. Also, we do not put semicolons at the ends of lines in Swift (we only use them to (very rarely, if ever) separate two statements on a single line).

The Basics

Optionals are a 10 out of 10 on the importance scale in Swift, but also very foreign to most programmers (which is why it is highlighted in red below). I'll be going over them in Lecture 4 (where I'll show that Optionals are actually just an Enumeration (`enum`)).

Constants and Variables

Comments

Semicolons

Integers

Floating-Point Numbers

Type Safety and Type Inference

Numeric Literals

Numeric Type Conversion

Type Aliases

Booleans

Tuples

Optionals

Error Handling

Assertions and Preconditions

Basic Operators

Terminology

Assignment Operator

Arithmetic Operators

Compound Assignment Operators

Comparison Operators

Ternary Conditional Operator

Nil-Coalescing Operator

Range Operators

Logical Operators

Strings and Characters

Strings are very powerful in Swift since they can represent text in almost any language on earth (which adds some understandable complexity). Because of that, this is one of the sections that might be fairly time-consuming to read through. On the other hand, you're also probably not going to be caught flat-footed if you aren't an expert in Swift **Strings**, so if you need to postpone this to next week because you're time-constrained, you may.

- String Literals
- Initializing an Empty String
- String Mutability
- Strings Are Value Types
- Working with Characters
- Concatenating Strings and Characters
- String Interpolation
- Unicode
- Counting Characters
- Accessing and Modifying a String
- Substrings
- Comparing Strings
- Unicode Representations of Strings

Collection Types

Array (and to a lesser extent Dictionary) is one of the most powerful and often-used structs in all of Swift. This is a type that you will want to master early, not only by reading the sections below carefully, but also by fully acquainting yourself with the **documentation page** for Array. Array has a vast array (pun intended) of built-in capabilities that will save you lots of coding time down the road if you know they're there.

- Mutability of Collections
- Arrays
- Sets
- Performing Set Operations (and this)
- Dictionaries

Control Flow

There are a lot of words in this section (and in the next one about functions), but most of it will be very familiar (save for maybe the yellow sections), so likely this will not be as time-consuming to read as it may appear at first.

- For-In Loops
- While Loops
- Conditional Statements
 - If
 - Switch
 - No Implicit Fallthrough
 - Interval Matching
 - Tuples
 - Value Bindings
 - Where
 - Compound Cases
- Control Transfer Statements
 - Continue
 - Break
 - Fallthrough
 - Labeled Statements
- Early Exit
- Checking API Availability

Functions

- Defining and Calling Functions
- Function Parameters and Return Values
- Function Argument Labels and Parameter Names
 - Specifying Argument Labels
 - Omitting Argument Labels
 - Default Parameter Values
 - Variadic Parameters
 - In-Out Parameters
- Function Types
- Nested Functions

Closures

We referred to closures as “in line functions” in the demo and showed off most of what is covered in the two subsections here that you are required to read this week. But closures are more powerful than just “in line functions” and we’ll read about that in the grayed-out sections in the next reading assignment.

Closure Expressions

Trailing Closures

Capturing Values

Closures are Reference Types

Escaping Closures

Autoclosures

Enumerations

Enumerations are surprisingly important in Swift, so be sure to pay close attention to this chapter.

Enumeration Syntax

Matching Enumeration Values in a Switch Statement

Iterating over Enumeration Cases

Associated Values

Raw Values

Recursive Enumerations

Structures and Classes

Understanding that structs are value types and get copied around all over the place and are usually immutable is fundamental to adjusting to the functional programming methodology in Swift (which is why that section is highlighted in red here). The languages you are likely to be coming from will probably be based on (object-oriented) reference types.

Comparing Structures and Classes

Structures and Enumerations Are Value Types

Classes Are Reference Types

Properties

We saw computed properties a couple of different times in the demo (e.g. `var body`). Note that the section on **Computed Properties** here goes into how to create computed properties that you can also *set* (i.e. that aren't read-only) and we can wait until next week to see that (which is why it is in gray here).

Also, there is an example of a **Type Method** (i.e. function) in the demo (`static func createMemoryGame`), but it is obviously also possible to have **Type Properties** which you'll read about here. For some reason these **Type Properties** and **Type Methods** confuse many students (i.e. they get them confused with normal methods and properties), but you can just think of them as “global” properties and functions that are “name-spaced” to be associated with a Type.

Stored Properties

Computed Properties

Property Observers

Property Wrappers

Global and Local Variables

Type Properties

Methods

Instance Methods

The self Property

Modifying Value Types from Within Instance Methods

Assigning to self Within a Mutating Method

Type Methods

Subscripts

Inheritance

We're kind of going to gloss over object-oriented programming in Swift because (outside of your `ViewModel`), you're not going to use it much in `SwiftUI`.

Initialization

Setting Initial Values for Stored Properties

Customizing Initialization

Default Initializers

Initializer Delegation for Value Types

Class Inheritance and Initialization

Failable Initializers

Required Initializers

Setting a Default Property Value with a Closure or Function

Swift API Guidelines

Read this [Swift API Guidelines](#) document in its entirety.

Given that you are completely new to Swift, some of what is in this document will be a bit hard to fully absorb at first. But familiarizing yourself with what is in this document is crucial to writing good Swift code. So, for this week, the goal is to know what's there rather than completely and fully master the guidelines right off the bat. As the quarter progresses, you should eventually become an *expert namer of properties, methods and other Swift constructs*. This will require you to refer back to this document often.

Be sure to click everywhere that it says “MORE DETAIL”.

Pay special attention to the “Write a documentation comment” section.

Pay special attention to the “Follow case conventions” section.

Pay special attention to the entire “Argument Labels” section.

You can ignore (for now), points that reference Protocols. When we learn about Protocols next week, be sure to check back with this document after that.

You can also ignore the final subsection of the final section “Special Instructions -> Take extra care with unconstrained polymorphism”. We won't be doing anything with the Any and AnyObject types.