iOS Dev Accelerator Week1 Day2

- Closures
- Accounts & Social Framework
- Callbacks
- Concurrency
- HTTP Status Codes
- Swift Switch Statements

Homework Review

Closures

Closures

- Closures in Swift are similar to blocks in C and Objective-C and lamdas (or closures) in other languages.
- Closures are an extremely important topic, so pay attention!!
- Apple uses closures/blocks in a significant portion of their API’s, so if you don’t understand what they are and what they do, you're going to be in trouble — in a big way

So what is a closure?

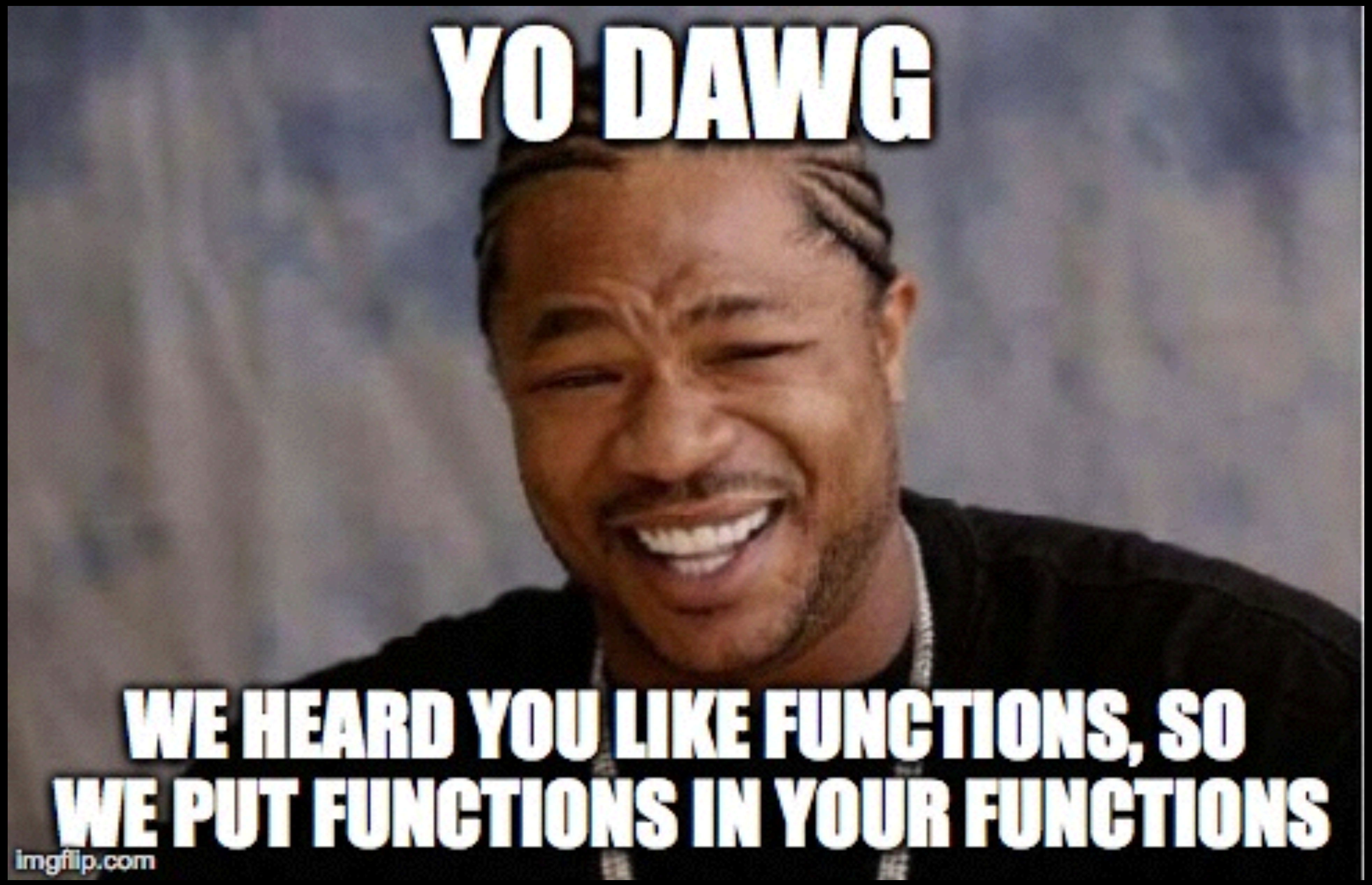
- “Closures are self-contained blocks of **function**ality that can be passed around and used in your code”
- Before we can really get into closures, we need to talk about what functions are.

Functions

- “Functions are self-contained chunks of code that perform a specific task”
- Sounds pretty similar to closures, eh?
- Functions have names that tells the developer what the function does, and the developer uses that name to call the function.
- Methods are just functions associated with a type (class,struct, etc)
- **Functions have types, just like variables and constants.**

Function Types

- A function’s type consists of the function’s parameters types and return type.
- Since a function has a type, that means we can store it as a variable if we want.
- **This allows us to easily pass functions in as parameters to other functions**, and also return functions as well.


YO DAWG
WE HEARD YOU LIKE FUNCTIONS, SO
WE PUT FUNCTIONS IN YOUR FUNCTIONS
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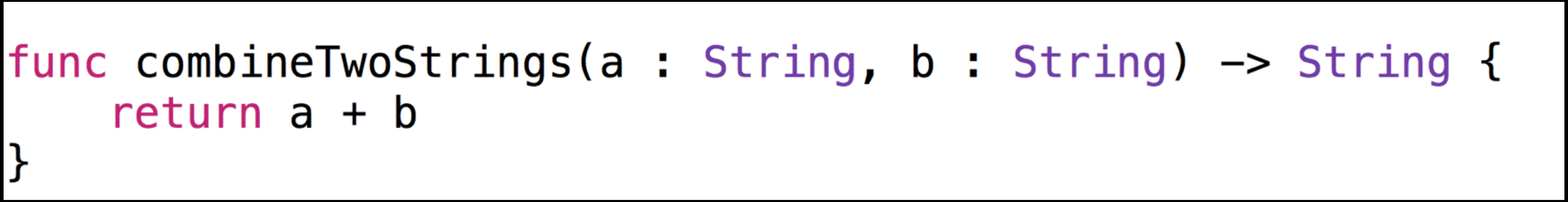
Function Types

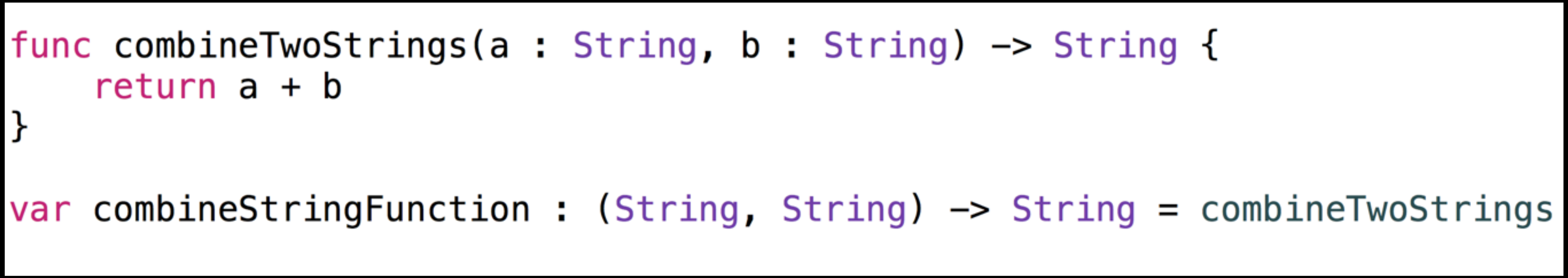
- For example, the function:



```swift
func combineTwoStrings(a : String, b : String) -> String {
    return a + b
}
```

- **Has a type of (String, String) -> String, just like “Brad” would have a type of String**

- So we could actually store this function as a variable:



```swift
func combineTwoStrings(a : String, b : String) -> String {
    return a + b
}

var combineStringFunction : (String, String) -> String = combineTwoStrings
```

- We can even pass the function in as a parameter to another function.

- All of this applies to methods to, which are just functions that are associated with a type.

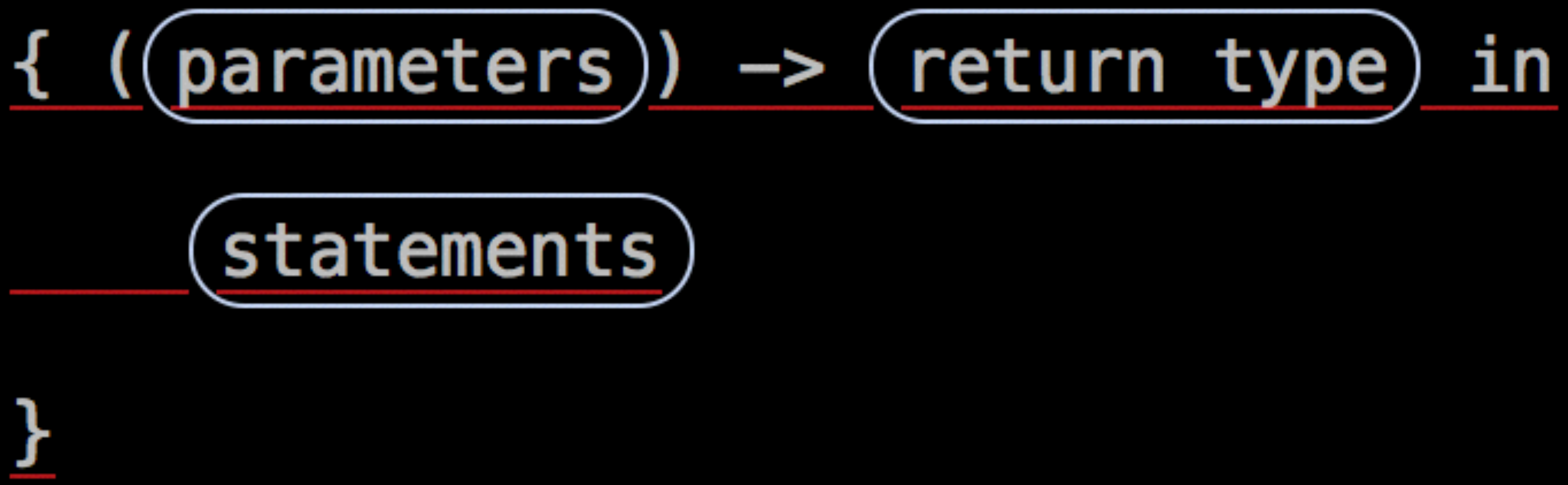
Demo

Back to closures

- Closures take three different forms:
- Global Functions
- Nested Functions
- Closure Expressions, which we will focus on today, and which is the main type of closure Apple sets their API up for. Whenever someone says closure while working with Swift, this is what they mean 99% of the time.

Syntax

- The general syntax of a closure expression is:

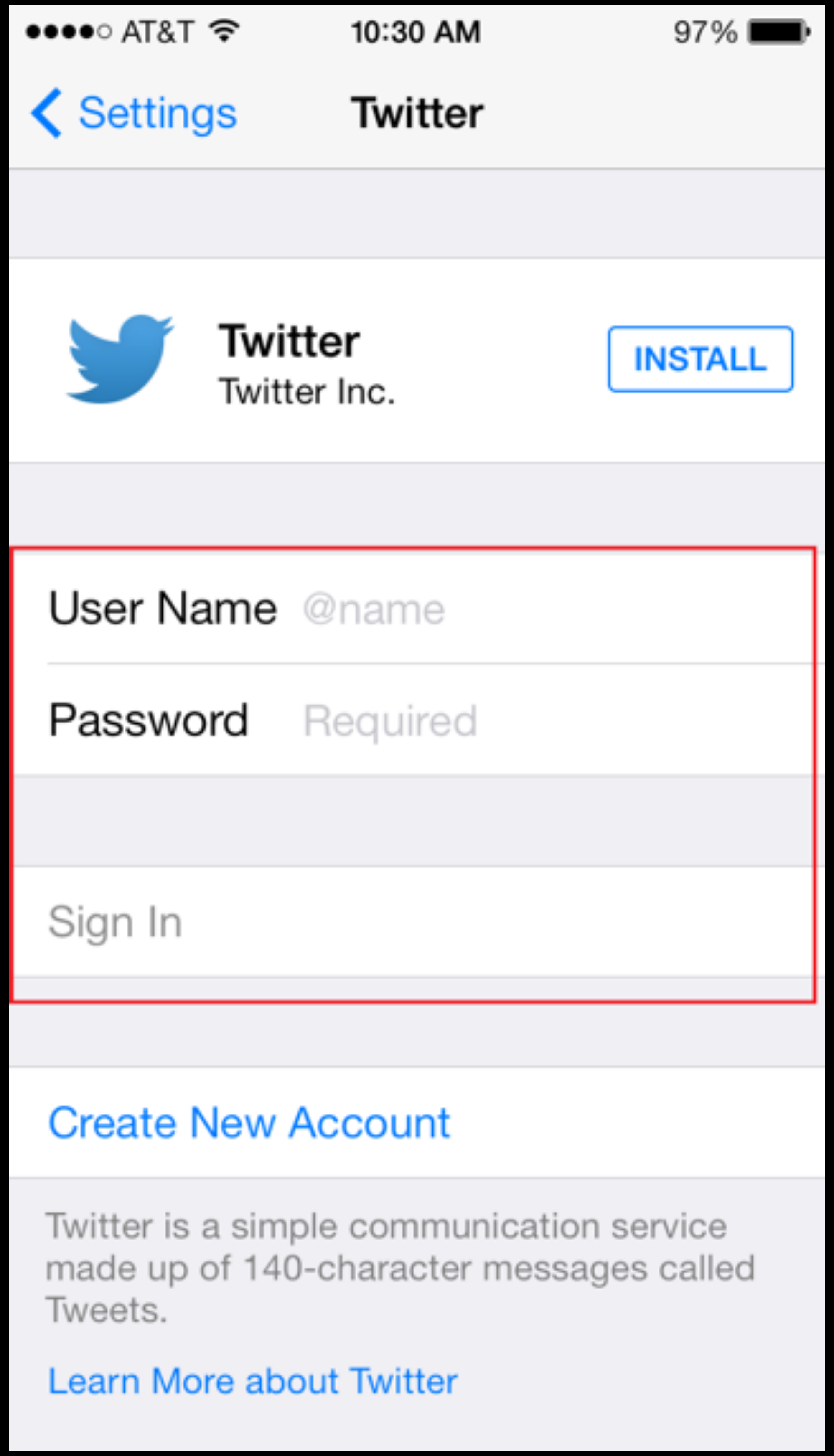


```
{ (parameters) -> return type in
    statements
}
```

Capturing Variables

- So why are closures called closures?
- Closures can capture and store references to variables (and constants) from the context in which the closure was defined. This is known as *closing* over those variables.
- Each type of closure has specific rules about capturing:
    - Global functions: no capturing
    - Nested functions: captures values from the enclosing function
    - Closure expression: captures values from its surrounding context

Demo


●●●●○ AT&T 10:30 AM 97%

< Settings Twitter

Twitter
Twitter Inc.
INSTALL

User Name @name
Password Required

Sign In

Create New Account

Twitter is a simple communication service made up of 140-character messages called Tweets.

Learn More about Twitter

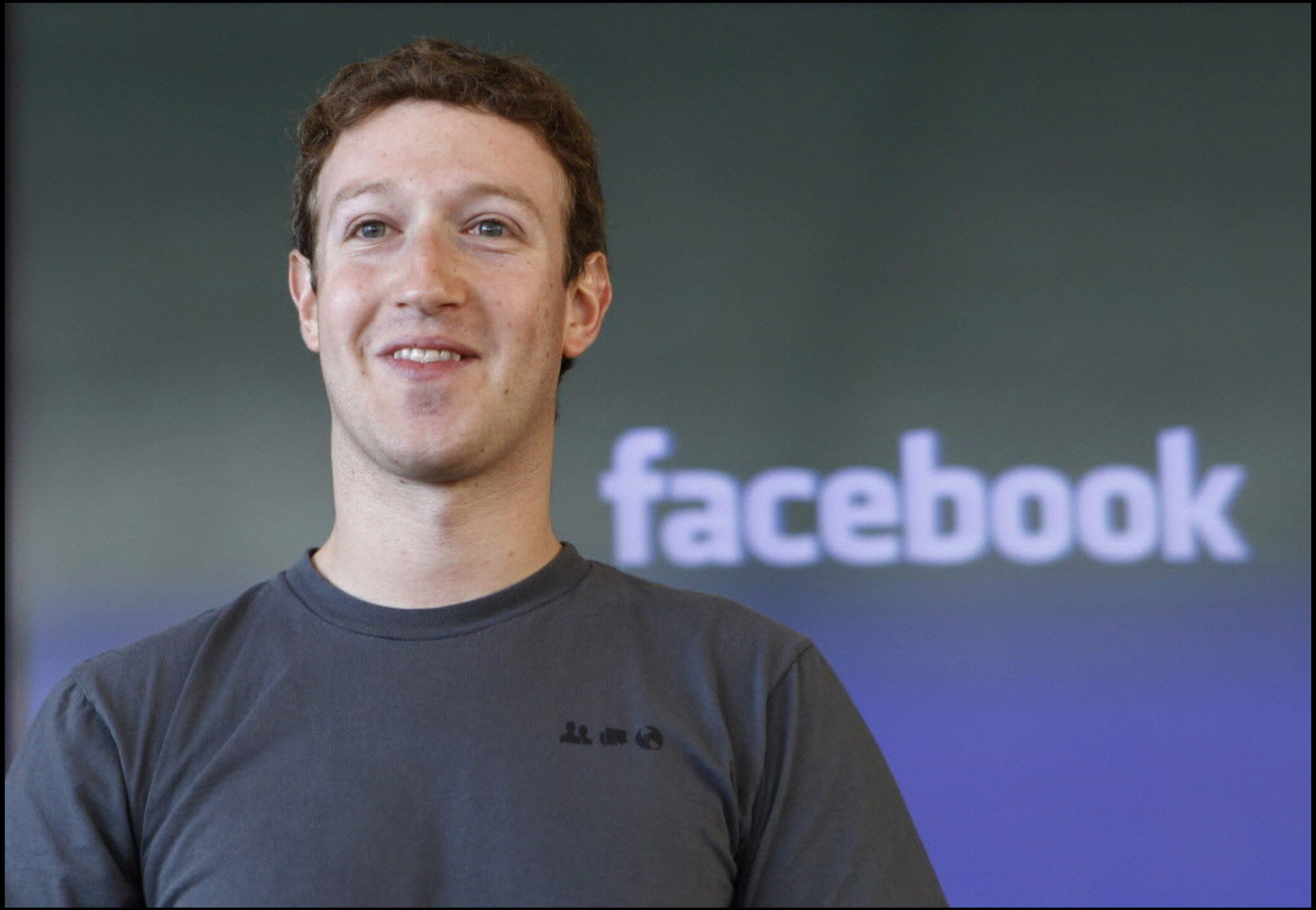
Accounts Framework

Accounts Framework

- The Accounts framework gives your app access to a user’s accounts stored in the ‘Accounts database’.
- Each account stores credentials for a particular Service, like Facebook or Twitter.
- Currently there are 4 service types available: Facebook, Twitter, SinaWeibo, and TencentWeibo.

Accounts Workflow

- Get a reference to the account store by instantiating an instance of ACAccountStore.
- Get a reference to the correct account type you are looking by calling accountTypeWithTypeIdentifier() on your account store.
- Call requestAccessToAccountsWithType(completion:) on your account store.
- In the completion handler, check if access was granted, if its granted get an array of accounts back by calling accountsWithAccountType() on the accounts store.
- Prompt the user, asking which account they would like to use (or just pull object at index 0 from the array, assuming the user only has one account of that type)
- Success!



Social Framework

Social Framework

- “The Social framework provides a simple interface for accessing the user’s social media accounts”
- Prior to iOS6 there was only a Twitter framework. iOS6 introduced the Social framework which has support for Facebook, SinaWeibo, and TencentWeibo, in addition to Twitter.
- The social framework APIs focuses on two aspects of social integration: Requests and Composing (aka uploading).

SLRequest

- To make a request with the Social framework, you use the class SLRequest.
- SLRequest is a easy way to configure and perform an HTTP request for one of the supported social services.
- SLRequest has an initializer that does most of the setup for you.
- Once the request is setup, you can fire it off with performRequestWithHandler(), which we will use with a closure expression! It is considered a callback here, which is the next topic we will learn about.

Demo

Callbacks

Callback

- Straight from Google: “In computer programming, a callback is a piece of executable code that is passed as an argument to other code, which is expected to call back (execute) the argument at come convenient time”
- A callback that happens at a later time is considered an asynchronous callback, which is what social framework uses!
- In addition to social, all of Apple’s networking API’s use asynchronous callbacks.

Callback

- So why do we need callbacks?
- Well, probably something like 80% of iOS apps out there make network calls. API calls, image downloads, social uploading, etc
- Network operations are considered ‘blocking’ operations.
- Blocking operations are operations that must wait for some event (a server to respond, the completion of a saving to disk operation)
- We should never run blocking operations on the main thread (we will look at concurrency in our next topic) because our app’s interface will become unresponsive.
- The solution is to run that blocking code on a background queue (aka thread) so it doesn't slow our app’s responsiveness down, and give it a callback to perform once it is done with that operation.

Demo

Everyone the first time they try to comprehend concurrency programming

Concurrency

Concurrency Intro

- Concurrency is just a fancy word for multiple things happening at the same time.
- There are a number of different APIs an iOS developer can use to introduce concurrency to an app.

History of Concurrency

- Before multi-core CPU’s, the amount of work you could do on a computer was directly determined by the clock speed of the CPU.
- So instead of just increasing the clock speed, people realized you could just add more CPU cores to the chip.
- This way, the computer can execute more instructions per second without necessarily increasing the clock speed.

Using Concurrency

- Even if you have multiple cores, if the software you are using isn't designed to do multiple things at once, the cores go to waste.
- The traditional, ‘old fashioned’ way an app can use multiple cores is to create and manage multiple threads.
- So what are threads?

Threads

- “Threads are a lightweight way to implement multiple paths of execution inside of an application”
- “At the system level, programs run side by side, with the system dolling out execution time to each program based on its needs and the needs of other programs”
- Each program can have multiple threads of execution.

Threads

- These threads are used to perform tasks simultaneously, or almost simultaneously. In a single core CPU, multithreading can give the appearance of multitasking by splitting up the tasks into slices and running the slices from different tasks one after the other.
- Using multiple threads in your app has 2 main benefits:
    - It can improve the perceived responsiveness of your app
    - It can improve the real-time performance of your app

Nobody is perfect, including threads

- Multi threading introduces a 2 big issues to your app that you'll need to account for:
  - Each thread needs to coordinate its actions with other threads to prevent memory corruption. If two threads are trying to modify the same data in your app at the same time, bad things happen.
  - All interface operations have to take place on the main thread.

Laundry

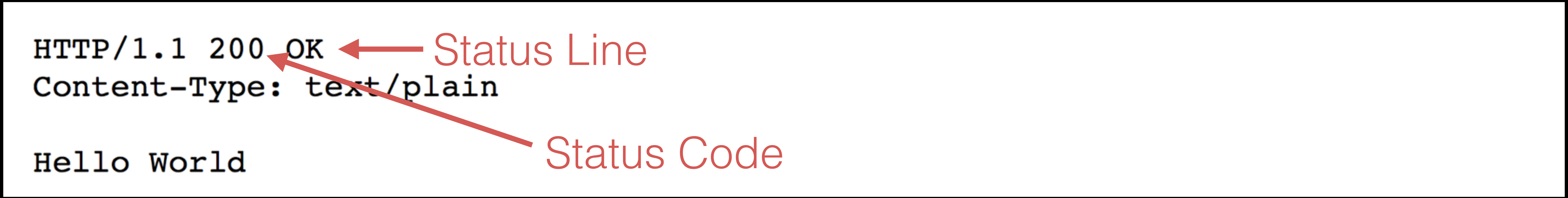
Operation Queues to the rescue

- “Cocoa operations are an object-oriented way to encapsulate work that you want to perform asynchronously.”
- Operations are added to an Operation Queue so they can be executed.
- Creating an operation queue is as simple as calling the init on NSOperationQueue
- You can add operations to a queue individually, in an array, or my favorite, by simply passing in a closure with the code you want to execute.
- NSOperationQueue has a type method for sending operations back to the main queue.

HTTP Status Codes

HTTP Status Codes

- When a web server responds to a request, one of the things that makes up its response is a status code:



```
HTTP/1.1 200 OK
Content-Type: text/plain

Hello World
```

- We will learn more in depth about HTTP and HTTP methods later on.

HTTP Status Codes

- So based on the status code in the response we get back, we can react accordingly in our code.
- Heres a general guide to the most common status codes an iOS app needs to watch for:
- 200 OK - standard response for a successful HTTP request
- 2XX - Most API services only use 200, but anything in the 200’s means whatever you were trying to request worked.
- 400 Bad - bad request, most likely syntax error
- 401 Unauthorized - authentication was required but not provided or incorrect in request
- 403 Forbidden - Request was valid, but the server refuses to respond.
- 404 Not found - The requested resource was not found
- 429 Too Many Requests - rate limited
- 5xx Server Error - not your app’s fault!
- **Keep in mind, its up to the server architects to decide which codes mean what, but they all generally all follow these best practices.**

Demo

Swift Switch Statements

Switch statement

- “A switch statement considers a value and compares it against several possible matching patterns”
- Once it finds a pattern that matches, it runs a block of code for that case.
- Its like an if statement, but provides multiple potential states.

Switch format:

```
switch some value to consider {
case value 1:
    respond to value 1
case value 2,
value 3:
    respond to value 2 or 3
default:
    otherwise, do something else
}
```

Switch statement

- Each possible case begins with the keyword case, and then the value for this case
- Each case must have at least one line of code that will execute if this specific case branch is chosen.
- Every swift statement in Swift must be exhaustive. Every possible value of the type being considered must be accounted for.
- If you have something like a number, where it would not be possible to have a case for every value, you can use the default keyword to specify a code of block to run if all the other cases dont hit.

Switch on single character

```
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 fall through

- Once the first matching switch case is completed, the switch statement is finished.
- This is different from C and Objective-C, where you have to specify that when you intend to exit the switch statement by using the keyword break
- You can use the fall through keyword if you want to opt int to fall through behavior

Range Matching

- “Values in a switch case can be checked for their inclusion in a range”
- We can use this for HTTP Status Code checking!

```
switch count {
case 0:
    naturalCount = "no"
case 1...3:
    naturalCount = "a few"
case 4...9:
    naturalCount = "several"
case 10...99:
    naturalCount = "tens of"
case 100...999:
    naturalCount = "hundreds of"
case 1000...999_999:
    naturalCount = "thousands of"
default:
    naturalCount = "millions and millions of"
}
```

Demo