iOS Frequently Asked Questions

In preparation for interviews, we'd like you to complete this questionnaire which includes some of the most frequently asked questions that come up during interviews.

If you are in training: All questions should be **completed by graduation** (end of your training). If there are any questions you can't complete, please address this with your CDM and tech trainer – however, it is up to you to ensure you're actively doing the necessary to find the answers with use case.

If you are in marketing: All questions should be completed by specified time this assignment is given to you. This is being given to you as a resource to help you win interviews. The level of efforts you place in this are paramount.

Do not copy and paste from online.

Great resources:
1. Stackoverflow.com
2. Developer.apple.com
3. To practice coding:
   a. Hackerrank.com
   b. Codility.com

Optionals, if...lets, guard, throw...catch, assert

Technical Concepts:

1. What security measures/tools/solutions have you worked with, in what project, and how?
   a. Authorization & authentication - verify user and grant user access
   b. Secure data - stored passwords, favorites, bookmarks, etc…
   c. Code signing - validates the code being executed is for a particular purpose
   d. Cryptogrophy - creating unreadable message/data that becomes readable with a secret key
   e. Keychain: is a specialized database for storing metadata or sensitive information.
2. How do you differentiate the account between a user using TouchID for one user and another one without? Also, what challenges can you face in this?
   a. Cannot differentiate between users, only between what information is stored on the phone
3. Can you differentiate if the TouchID is of one user or the other?
   a. Yes, only as far as the bits and bytes that are stored on the phone. A value of true or false does not differentiate between uses
4. Talk about your experience with key chain.
   a. I have used keychain to store and retrieve sensitive or secret user information, such as user names and passwords
5. What are the best practices to encrypting a key?
   a. For best practices, when taking memory size into account, AES 128bit encryption would be best
   b. For more secure encryption, without regard to space, AES 256 bit encryption would be better
6. What is encryption?
   a. Encryption is creating unreadable data/message that can only be deciphered by a secret key/passphrase/method
7. What is obfuscation?
   a. The practice of making something difficult to read (vs encryption which is unreadable)

8. What is SSL?
   a. Secure Socket Layer is a protocol that establishes a secure connection between a server and a browser
9. What are tokens in relation to security?
   a. A security token is a piece of information provided by a server to identify a user. When making a request, a user provides a token to the server, the server validates the token, and proceeds to process the user's request
10. What is certificate pinning in relation to security.
    a. Certificate pinning is associating a certificate with a service, so that when an entity makes contact with the service, comparing certificates can be used to verify the service is legitimate.
11. How do you install bluetooth in an app and talk about experience with this in a project.
    a. Core Bluetooth frameworks allows the app to discover, explore, and interact with other bluetooth devices
    b. Core Bluetooth is an API for "Bluetooth Low Energy" AKA "Bluetooth 4.0"
        i. Saves battery by transmitting small amounts of information at a time
12. How do you install location, Core Location capabilities in an app and talk about experience with this in a project.
    a. To install location, use the "import" keyword to include the "CoreLocation" framework in the project
    b. Ask for user's permission, store response, setup a radius for when to update user's location to prevent battery drain, set accuracy,
13. How do you install in-app pay capability in an app, and talk about experience with this in a project.
    a. Apple Pay or In-App Purchase -> https://developer.apple.com/apple-pay/get-started/
    b. In-App purchase tutorial -> https://www.raywenderlich.com/5456-in-app-purchase-tutorial-getting-started

14. How do you install mapping and MapKit capability in a project, and talk about experience with this in a project.
    a. Import MapKit , get information about the map view's behavior by providing a delegate object, The map view calls the methods of your custom delegate to let it know about changes in the map status and to coordinate the display of custom annotations
15. What is TDD?
    a. Test Driven Development (TDD) is a popular way to write software. The methodology dictates that you write tests before writing supporting code
16. What's the value of TDD?
    a. One such benefit is that the tests provide documentation about how a developer expects the app to behave.
    b. Methods and functions could change , but the output should remain the same
17. How does TDD work and what's the process?
    a. ExitTest framework to test this kind of design
18. What is your experience with TDD on a project?
    a. When we know what a particular function of an app should be, we design tests that align with the functions expected output, and implement the function to pass all tests
19. What is your experience with pull requests for code reviews?
    a. Each individual in a project is assigned a particular task/function to complete
    b. Before merging their work with the main project, a peer reviews the code of another partner to ensure project integrity
20. How do pull requests work?
    a. Pull requests work by downloading an updating a person's project files to be up-to-date with the most recent changes made to a project

21. What do you look for in sound code?
    a. Naming conventions/styling
    b. Optimizations
    c. Architecture
    d. Design patterns
    e. No memory leaks
    f. Efficient code that makes the best use of memory and code execution speed
22. What is your experience with code coverage percent and what is it and why is it valuable?
    a. Code coverage percent is used to determine the amount of testing that has been done on the project
    b. For example, 90% code coverage means that 90% of the code has been tested
23. What is your experience with paired programming what is it and why is it valuable?
    a. Paired programming: Agile development technique where two programmers work at one workstation (https://en.wikipedia.org/wiki/Pair_programming)
    b. Driver: person coding, Observer/Navigator: Reviews the code written by the driver
    c. Driver focuses on the tactical aspects
    d. Navigator focuses on the strategic aspects
24. What is your experience with unit testing and what tools have you use other than XCTest?
    a. A unit is the smallest testable part of software, Usually has few inputs and one output
    b. XCTest -> https://developer.apple.com/documentation/xctest
        i. Brief tutorial -> https://www.youtube.com/watch?v=mAOcUMNqwe0
25. What is your experience with UI-Automated testing and what tools have you used?
    a.
26. Talk about Appium, its use, and why it's a useful tool.
    a. Cross-platform automation testing suite allows for testing on iOS and Andriod using languages such as Java, Objective-C, JavaScript with node.js, PHP, Ruby, Python, C#, etc.
        i. http://appium.io/docs/en/about-appium/intro/
    b. Appium is an 'HTTP Server' written using a Node.js platform that receives connection and command request from the client and executes that command on mobile devices (Android / iOS)
    c. Useful:
        i. Allows for testing across multiple platforms using the same API
        ii. Many languages can use the framework to write automation tests
        iii. Tests both UI and programtically
27. Talk about Calabash, its use, and why it's a useful tool.
    a. Calabash helps automate and test any iOS or Android app, native or hybrid, from the UI level down -> https://calaba.sh/
    b. Useful:
        i. Can automate gestures, assertions, and take screenshots
        ii. Can select devices based on form factor, manufacturer, operating system, or even popularity in your target market.
        iii. Supports Cucumber - creates tests using high level language that non-technical professions can understand
28. What are retain cycles and how to avoid retain cycles?
    a. Brief description ->
        i. https://medium.com/@vinodhswamy/strong-cycle-retain-cycle-in-swift-f452f07518b2
29. How do you manage memory in iOS – and what tools are available to do such?
    a. **ARC** *(Automatic Reference Counting)* is a compile time feature XCode provides us for automated memory management that frees an object only when the reference count of the object = 0
    b. assigning the object types: strong, weak, unowned
    c. using structs instead of classes

30. How do you proactively avoid issues in the first place with the app (bugs, memory, battery)?
    a. Take care of retain cycles.
    b. Unnecessary caching or implementing caching library,
    c. Knowing what ARC handles in C. ARC essentially does not apply for C libraries.
    d. For debugging isolate pieces of code you are suspicious of
    e. Debugging with Xcode instruments tool. it has everything you might need to debug.
    f.
31. Describe a time you faced a challenge in memory management, what you found, and how you handled it.
    a.
32. How do you make sure your app is optimized, overall?
    a. Remove redundancies
    b. Following the most efficient design patterns
    c. Use threads effectively
    d. Use recursion appropriately
33. What steps do you take to debug a crash?
    a. Debugging with print()
    b. Setting breakpoints
    c. Exception handling
    d. Assertions
    e. https://learnappmaking.com/debugging-fix-bugs-xcode-debugger-breakpoints/
34. What is actually shown to you in crash logs – what information?
    a. Stack trace of every thread running when the crash occurred -> Symbolication
    b. Error code (if any)
    c. Exception type (if any)
    d. https://learnappmaking.com/debugging-fix-bugs-xcode-debugger-breakpoints/
35. What is the different between Crashlytics crash logs and iTunes Connect crash logs?
    a. Crashlytics -> https://docs.fabric.io/apple/crashlytics/crashes-and-issues.html
    b. Crashlytics collects information about crashes for an app and compiles the data for the developer
        i. Full stack framework (includes both server & client side)
        ii. Collects, organizes, and analyzes crash information
            1. Ex. 3000 crashes could be attributed to 20 main types of issues
    c. iTunes Connect crash logs ->
36. How do you install Crashlytics?
    a. If you don't already have a Fabric account, request an invitation from a member of your company's Fabric organization or sign up and create a new organization. A Fabric account is needed before you can install any of our kits.
    b. The Crashlytics Kit can be installed using CocoaPods by following the instructions on https://fabric.io/kits/ios/crashlytics/install or through the Fabric Mac App that can be downloaded from https://www.fabric.io/downloads/apple.
37. Talk about your experience in making network calls? What tools did you use?
    a. Network calls have been used to POST or GET from an API
    b. Calls made using NSURLSession or Alamofire CocoaPod
38. What do you have to consider with security in making network calls?
    a. Have to make sure the network connection is secure: HTTP -> HTTPS
39. What are the Apple Human Interface Guidelines and what's your experience with them? What are they important? How have they informed what native iOS users have grown to expect in their UI/UX experience?

a. Are software development documents which offer application developers a set of recommendations. Their aim is to improve the experience for the users by making application interfaces more intuitive, learnable, and consistent.

b. https://developer.apple.com/design/human-interface-guidelines/ios/overview/themes/#//apple_ref/doc/uid/TP40006556-CH22-SW1

40. Talk about AR (augmented reality) in relation to your experience. If no experience in it, how would it at least be implemented and what are some uses you can think of for it in an app and for the end user?
    a. ARKit 2 - uses so-called Visual Inertial Odometry (VIO) for tracking the environment and placing virtual objects with great accuracy and without any calibration.
    b. https://rubygarage.org/blog/create-augmented-reality-app-for-ios-11

41. Talk about WatchKit in relation to your experience. If no experience in it, how would it at least be implemented and what are some uses you can think of for it in an app and for the end user?
    a.

42. Talk about media streaming solutions experience.
    a.

43. How you populate a pickerview with an API call?
    a. generate the request method, save the data response into an array, inherit from UIPickerViewDelegate, UIPickerViewDataSource to populate the UIpickerview with the array data.

44. How you send a message to an API?
    a. Using NSURLSession or Alamofire

45. Describe the process to publishing one app into the app store.
    a. https://developer.apple.com/app-store/review/guidelines/
    b. Must meet the following guidelines (not comprehensive):
        i. Safety
            1. App should not contain any objectable content
        ii. Performance
            1. Accurate metadata: descriptions, screenshots, previews
        iii. Business
            1. Business model should be clear, items sold should be at a reasonable price, app reviews should be legitimate
        iv. Design
            1. Not a copycat app, minimum functionality a user would expect: swiping, pressing buttons, inputting information
        v. Legal
            1. App should abide by local laws (the laws in the area the app will be deployed/used)
            2. Abide by data collection and storage laws/guidelines
    c. After submission
        i. Apple reviews app - more complex apps or apps that have violated guidelines before will take longer to review
        ii. App store Connect provides status updates
        iii. Expedited requests can be made
        iv. Release dates - once approved, an app with a release date will not appear in the store until the release date
        v. Rejected apps - appeals can be made to contest rejected apps

46. What is Test Flight and other tools that do the same function (to create beta builds) and how can you relate it to you resume/project?

a. https://www.raywenderlich.com/5352-testflight-tutorial-ios-beta-testing
b. Test Flight is an Apple Product that allows a developer to invite users to test an app before it get published on the app store

47. Do you have any experience deploying applications with an Enterprise account
    a.

48. Describe Apple Push Notifications work flow and how do you relate this to your profile?
    a. The app must be configured properly and registered with the Apple Push Notification Service (APNS) to receive push notifications upon every start-up.
    b. A server must send a push notification to APNS directed to one or more specific devices identified by a unique device token
    c. The app must receive the push notification; it can then perform tasks or handle user actions using callbacks in the application delegate.
        i. Only one notification can be sent at a time. In the case that multiple notifications are sent to the same device, only the newest notification will be sent
        ii. APN will store notifications for a limited time, if the intended device is offline
    d. https://developer.apple.com/library/archive/documentation/NetworkingInternet/Conceptual/RemoteNotificationsPG/APNSOverview.html#//apple_ref/doc/uid/TP40008194-CH8-SW1

49. In Apple Push Notifications - what is the payload size?
    a. The payload is a dictionary that contains at least one item, aps
    b. {
    c.   "aps": {
    d.   "alert": "Breaking News!",
    e.   "sound": "default",
    f.   "link_url": "https://raywenderlich.com"
    g.   }
    h. }

    i. maximum size of 4096 bytes (4KB)
    j. https://developer.apple.com/library/archive/documentation/NetworkingInternet/Conceptual/RemoteNotificationsPG/CreatingtheNotificationPayload.html#//apple_ref/doc/uid/TP40008194-CH10-SW1

50. What is a silent push notification and when would it be good for an app to employ this.
    a. A silent push notification is a notification that is may not be visible to the user
    b. Good for an app to deploy to update the app's data for the next time the user wants to use the app
        i. For example, if the app has been offline for an extended amount of time, then it would be good to update the app in the background so there will be less lag when the user decides to use the app
    c. To enable: set "content-available" key equal to 1 inside the "aps" dictionary

51. Talk about what iBeacons are, how they work, how to implement, and the value of using them.
    a. https://developer.apple.com/ibeacon/Getting-Started-with-iBeacon.pdf
    b. is based on Bluetooth low energy proximity sensing by transmitting a universally unique identifier.
        can be used to determine the device's physical location,] track customers, or trigger a location-based action on the device such as a check-in on social media or a push notification.
    c. can also be used with an application as an indoor positioning system, which helps smartphones determine their approximate location or context

52. Talk about geofencing, how it works, how to implement, and a use case of why a dev would want to implement it in an app.
    a. https://blog.usejournal.com/geofencing-in-ios-swift-for-noobs-29a1c6d15dcc
    b. Geofencing is about selecting a location, setting up a radius around the location, and offering context-aware feedback based on the location and radius
        i. For example, selecting downtown atlanta as a location, setting a radius of 5 miles around downtown atlanta, and providing a user information based on being inside the circle (downtown atlanta) or outside the circle (surrounding areas)
    c. Implementation
        i. Select a primary location i.e Downtown Atlanta (33.7557° N, 84.3884° W)
        ii. Define region (radius around primary location)
        iii. Begin monitoring user's location
        iv. Schedule local notification (sound, appearence,...)
53. Talk about your experience with story boards.
    a. Creating reference storyboards
    b. Views are located here
    c. Navigation is added here
    d. Segues
54. Talk about your experience with different size classes and autolayout.
    a. https://www.raywenderlich.com/443-auto-layout-tutorial-in-ios-11-getting-started
55. If you change the frame of the view at runtime and you're using AutoLayout what happens at runtime if you modify it programmatically?
    a.
56. How do you go about building out the UI, generally?
    a.
57. How do you manage view hierarchy on the UI?
    a.
58. What is a custom view?
    a. https://medium.com/@nimjea/ibdesignable-and-ibinspectable-in-swift-c12ea557b82b
    b. Effects like:
        i. border width
        ii. border color
        iii. corner radius
        iv. shadow color
        v. shadow width
        vi. shadow opacity
59. What is an IBDesignable?
    a. https://medium.com/anantha-krishnan-k-g/ibdesignable-and-ibinspectable-in-swift-3-702d7dd00ca
    b. Identifies UIView or elements inherited by a view
60. What is an IBOutlet?
    a. https://www.hackingwithswift.com/example-code/xcode/what-is-an-iboutlet
    b. Connection between Interface Builder interface component to a property in a view controller/swift file
61. What is an IBInspectable?
    a. https://medium.com/@nimjea/ibdesignable-and-ibinspectable-in-swift-c12ea557b82b
    b. Custom properites will become viewable from the UI builder

62. Difference between Storyboard and XIB
    a. https://www.quora.com/What-is-the-difference-between-xib-and-storyboard-Which-one-is-better-and-why
    b. Storyboard
        i. shows multiple/different views
        ii. shows project flow, transitions
        iii. better for dynamic view where layout changes with context
        iv.
    c. XIB
        i. Single arbitrary/custom view
        ii. creating reusable cells/views/templates
63. When you should use Storyboards?
    a. https://www.quora.com/What-is-the-difference-between-xib-and-storyboard-Which-one-is-better-and-why
    b. When making complex transitions between views
    c. better for dynamic views where layout changes with context
64. When you should use XIBs?
    a. making templates/reusable cells or views
65. How you can achieve multiple inheritance in Swift?
    a. syntax: class MainClass: <class1>,<class2>
    b. Declare class followed by colon, then separate the inherited classes with a comma
66. Talk about the use of bridging headers in Swift.
    a.
67. Talk about the use of existing swift code on a Obj-C project.
    a.
68. Which would you choose to code in – Swift or Obj-C and why?
    a.
69. What does Swift offer over Obj-C?
    a. https://www.upwork.com/hiring/mobile/swift-vs-objective-c-a-look-at-ios-programming-languages/
    b. https://medium.com/@fluperofficial/a-comparative-study-objective-c-versus-swift-9f6cebffed2
    c. Swift executes faster
    d. Easier file management - no header and main files
    e. No pointers
    f. ARC memory management - ARC is supported across API's
    g. closures
    h. generics
    i. optionals
    j. type saftey i.e int x: Int
70. What does Obj-C offer over Swift?
    a. Automatic garbage collection
    b. mature language with huge community
    c. compatability with c and c++
71. How do you perform a migration from Obj-C to Swift
    a. Manually
    b. Use a program
        i. https://medium.com/swiftify/migrating-your-objective-c-project-to-swift-ccb0afac8191
72. Talk about the difference between overloading vs overriding?

a. Overloading is when there are two functions with the same name and different parameters
b. Overriding is when a subclass implements a function with the same function signature as a function in the parent class

73. What is abstraction?
    a. https://www.c-sharpcorner.com/UploadFile/e6a07d/pillars-of-oop/
    b. Defining an object/class by its most essential features
    c. Ex shape
        i. Essential: Height, width, # sides
        ii. Not essential: rounded corners, color, etc...

74. What is inheritance?
    a. https://www.c-sharpcorner.com/UploadFile/e6a07d/pillars-of-oop/
    b.

75. What is encapsulation?
    a. https://www.c-sharpcorner.com/UploadFile/e6a07d/pillars-of-oop/
    b. Hiding the underlying workings of a class while making private class properties available through setters and getters

76. Describe polymorphism.
    a. https://www.c-sharpcorner.com/UploadFile/e6a07d/pillars-of-oop/
    b. When one object can become another
    c. Ex. Shape object becomes a Square object through inheritance

77. Open and Closed principles in swift – describe this, and also give an example of how you can use these principles in your last project.
    a. https://medium.com/@vinodhswamy/solid-principles-in-swift-7dc2b793fd68
    b. Designing a class so that new requirements can be met by extending the class instead of rewriting the class

78. Have you worked with the Decorator pattern and also give an example of actually *when.*
    a. https://docs.google.com/document/d/1ETvqW8WngrN901AzYGnNxyIZQKKKRdneXYAU8Oy9YJk/edit
    b. Allows adding addition requirements to an object at runtime - follows the open/closed principle
    c. Decorator pattern consists of base components that can be extended at runtime with decorator classes

79. What is your most familiar design patterns across these categories: creational, structural, behavioral – gives examples of all three and when you used.
    a.

80. If you created an app from scratch, which architecture would you use (MVC, MVVM, MVP, Viper) and why?
    a. MVP (Model View Presenter)
        i. https://medium.com/cr8resume/make-you-hand-dirty-with-mvp-model-view-presenter-eab5b5c16e42
        ii. User interacts with view, View connected directly to presenter, presenter passes info to model, model responds to presenter, presenter updates view
    b. MVVM (Model View ViewModel)
        i. https://www.wintellect.com/model-view-viewmodel-mvvm-explained/
        ii. View -> data binding <- view model -> model
        iii. Ex. View contains date format, model contains date timestamp, view model places model into view

81. What is KVO?
    a. Key-Value Observing (KVO)
        i. https://www.hackingwithswift.com/example-code/language/what-is-key-value-observing
    b. Assign a piece of code to a variable, code execute when variable changes

82. What is delegation?
    a. https://shinesolutions.com/2011/06/14/delegation-notification-and-observation/
    b. Allowing an object to communicate back to its owner from another object/class
    c. A controller defines a protocol to describe what a delegate object must do in order to be allowed to respond to a controller's event
83. What is the difference between KVO and Delegation and NSNotification?
    a. https://shinesolutions.com/2011/06/14/delegation-notification-and-observation/
    b. Delegation
        i. Controller must implement an object's protocols in order to become its delegate and control the object
    c. Notification
        i. Single object that allows other objects to be informed of occurring events
    d. KVO
        i. One object can observe the properties of another object for changes
    e. Delegation vs Notification vs KVO
        i. Delegation & notification more suited for controllers communicating with objects where as KVO is for objects listening for changes in other objects
84. Explain Notifications in terms of a design pattern.
    a. https://learnappmaking.com/notification-center-how-to-swift/
    b. Broadcast data from one part of app to another through the Notification Center
    c. 3 Components:
        i. Listener called an Observer
        ii. Sender
        iii. Notification Center
    d. Listener(s) register with notification center, sender messages notification center, notification center notifies listener(s)
85. Give an example of when you'd use the design pattern Notifications in your project.
    a.
86. Talk about Foundation objects.
    a. https://developer.apple.com/documentation/foundation
    b. Provides utilities such as:
        i. storage and persistence
        ii. data and time
        iii. text processing
        iv. sorting and filtering
        v. networking
87. What's the difference in NSSet and NSString?
    a. NSString is a static, plain-text unicode string object
        i. provides an extensive set of APIs for working with strings,
    b. NSSet is an object representing a static, unordered, uniquing collection of objects.
88. How to determine equality between NSObjects, and is native to NSObject class?
    a. You can determine equality with the Instance Method "isEqual:" and yes, it is native to the NSObject class
89. Have you use MRR?
    a. Manual Retain Release (MRR)
    b. alloc: create object, allocate memory for object
    c. retain: claim ownership of an object already created
    d. release: free object from memory

90. What are the states of the app?
    a. Non-running: The app is not running
    b. Inactive: The app is running in the foreground, but not receiving events. An iOS app can be placed into an inactive state, for example, when a call or SMS message is received.
    c. Active: The app is running in the foreground and receiving events.
    d. Background: The app is running in the background and executing code
    e. Suspended: The app is in the background but no code is being executed.

91. If a user is actually using the app and receives a call, what state does the app go into?
    a. When a call is received, the app is placed into an inactive state.
92. What are the latest updates in the latest version of Xcode and when was it released and do you experience any issues with it?
    a. https://developer.apple.com/xcode/whats-new/
    b. XCode 9 -> XCode 10
        i. Dark Mode
        ii. Source Control
            1. Changes made in local repository or changes made on remote repository are highlighted directly within the editor
        iii. Editor
            1. Code ribbons - hide statement blocks
            2. Place multiple cursors on editor and make multiple changes at once
        iv. Playground
            1. Run new code automatically and instantly
            2. Support for Machine Learning - possible to train in playground
        v. Debugging
            1. Memory tool - compact layout update i.e easier to analyze and understand leaks
93. What are the latest updates in the latest version of Swift and when was it released and do you experience any issues with it?
    a. Some functions became properties of class
        i. Occurs when attempting to build an XCode 10 project with XCode 9
94. What are the latest updates in the latest version of iOS and when was it released and do you experience any issues with it?
    a.
95. What interests you from the last WWDC (World Wide Dev Conference)?
    a. https://developer.apple.com/videos/wwdc2018/
96. What resources do you use to stay up to date in iOS and Apple, generally, and how so?
    a. WWDC videos -> https://developer.apple.com/videos/wwdc2018/
    b. MacRumors -> https://www.macrumors.com/
    c. Medium -> https://medium.com/
    d. RayWenderlich -> https://www.raywenderlich.com/
97. What is lightweight migration in CoreData?
    a. Why migrate -> When changes need to be made to the data model
    b. Migration -> taking old model and supplying it to the new model
        i. Ex. phone book model changing from storing Name and Number to storing Name, Number, Email
    c. Lightweight Migration - requires the least amount of work from the user
        i. Happens automatically when using NSPersistentContainer

98. Give an example of lightweight migration you have actually done (in CoreData), and how does it actually work?
    a. Tutorial -> https://www.raywenderlich.com/7585-lightweight-migrations-in-core-data-tutorial
99. Describe the creation of an app that makes a request to an API which populates a TableView with models created with a JSON, using MVVM.
    a.
100. Which mechanism would you to safely save a password in the end user's device and why do you chose this mechanism.
    a. https://medium.com/ios-os-x-development/securing-user-data-with-keychain-for-ios-e720e0f9a8e2
    b. Keychain would be the prefered method
        i. Keychain - container that securely stores small blocks of data for apps and services
            1. When locked, a piece of data cannot be accessed or decrypted
            2. Only app that encrypted the data can decrypt the data unless configured to allow access from other apps
    c. Keychain cocoapod -> https://cocoapods.org/pods/Keychain
    Sub-Question: Give an example of doing this in a previous project.
        a.
101. Value Types vs Reference Types – describe the difference, and how are these related to Swift?
    a. https://developer.apple.com/swift/blog/?id=10
    b. Value types: struct, enum, tuple
    c. Reference types: classes
    d. Value vs Reference
        i. Value types are unique
            1. Ex. var a = b, means a's value will be different from b's vales including when modifications are made to either a or b
        ii. Reference type variables refer to the the same object
            1. Ex. var a = b, means any changes to a will effect b
102. When to use a struct over a class on Swift.
    a. https://developer.apple.com/swift/blog/?id=10
    b. want to compare ==
    c. want copies to have independent states
    d. data will be used in threads
103. When to use a class over a struct on Swift.
    a. https://developer.apple.com/swift/blog/?id=10
    b. when comparing type ===
    c. when you want to create shared, mutable state
104. What is a mutating function and when you should use it?
    a. https://www.natashatherobot.com/mutating-functions-swift-structs/
    b. Mutating function is created by applying the mutating keyword in front of the function declaration
    c. Mutating functions should be used when you want the properties within a struct to change
105. Any vs AnyObject – describe the difference.
    a. https://medium.com/@mimicatcodes/any-vs-anyobject-in-swift-3-b1a8d3a02e00
    b. Any can refer to any type at all including functions and optionals
    c. AnyObject can refer to an instance of any class
    d. Any can refer to anything while anyobject can only refer to classes
106. Can you use AnyObject with enums and arrays?
    a. Tested in playground ->No, AnyObject can only refer to classes

107. What is a Swift protocol?
   a. https://docs.swift.org/swift-book/LanguageGuide/Protocols.html
   b. A protocol defines a methods/properties that accomplish a certain task or piece of functionality

   a.
109. What is an optional?
   a. https://developer.apple.com/documentation/swift/optional
   b. Optional is an enumeration with two cases: .none, .some
        i. .none = nil
        ii. .some = <value>
   c. Optional must be unwrapped before the value can be accessed
110. What is optional chaining?
   a. https://docs.swift.org/swift-book/LanguageGuide/OptionalChaining.html
   b. The process of performing a task if the value of an optional is present, else the optional will return nil and the task will not be performed
        i. Ex. if let data = data { //perform some task }
111. What is optional binding?
   a. https://medium.com/whoknows-swift/swift-what-is-the-optional-binding-7624c7f9098e
   b. ? : defines a variable as option meaning the variable may contain a value or nil
   c. unwrapping is required
        i. conditional unwrapping
        ii. forced unwrapping
112. What is a tuple?
   a. https://docs.swift.org/swift-book/ReferenceManual/Types.html
   b. Comma separated list of values within parenthesis
        i. ex. (data,response, error)
113. Are tuples limited to only two or three?
   a. https://medium.com/@abhimuralidharan/tuple-in-swift-a9ddeb314c79
   b. No
114. Difference between Guard and Let?
   a. https://medium.com/@abhimuralidharan/if-let-if-var-guard-let-and-defer-statements-in-swift-4f87fe857eb6
   b. Guard checks if a variable has a value, if it does not, then an 'else' statement block executes (usually a return)
   c. Let assigns a value to a variable whether a value is present or not
115. What is Generics?
   a. https://docs.swift.org/swift-book/LanguageGuide/Generics.html
   b. Flexible reusable functions or types that can work with any values or with values that follow certain constraints
        i. Ex. Arrays do not specify the types of values it can contain
116. Explain GCD and NSOperations, and the differences.
   a. https://www.quora.com/What-is-the-difference-in-GCD-and-NSOperation
   b. GCD is a low-level-C based API
        i. Implementation of GCD is very light-weight
   c. NSOperation is an Objective C classes
        i. Implementation is complex and heavy-weight
        ii. NSOperation is a wrapper of GCD - implicitly using GCD
   d. How to choose between the two
        i. NSOperation offers more control at the cost of higher overhead
        ii. GCD is better for light background work & is easier to implement

117. Describe why it's valuable to employ GCD and NSOperations.
    a. https://cocoacasts.com/choosing-between-nsoperation-and-grand-central-dispatch/
    b. Allows for background processing, resuming/pausing tasks
118. Explain when you'd use one over the other – GCD versus NSOperations.
    a. Answered in questions 116/117
119. It is possible to add a dependency in GCD?
    a. https://cocoacasts.com/choosing-between-nsoperation-and-grand-central-dispatch/
        i. Section: When to Switch
    b. Not possible to add dependencies to GCD, NSOperation allows adding dependencies
120. What are the three URL Configurations?
    a. https://developer.apple.com/documentation/foundation/url_loading_system
121. What are the differences between URL Configurations you've listed above?
    a.
122. What's the rate limit of silent notifications?
    a. https://developer.apple.com/documentation/usernotifications/setting_up_a_remote_notification_server/pushing_updates_to_your_app_silently
    b. About 2 or 3 notifications an hour
123. What is difference between atomic and non-atomic?
    a. https://medium.com/@YogevSitton/atomic-vs-non-atomic-properties-crash-course-d11c23f4366c
    b. Atomic guarantees a value will be returned, although not necessarily the correct value
        i. Not thread safe
        ii. Performance issue because of thread locking/unlocking
    c. Nonatomic does NOT guarantee a value will be returned
        i. Enhanced speed performance
124. How does iOS achieve thread safety?
    a. http://basememara.com/creating-thread-safe-arrays-in-swift/
    b. Using GCD to synchronize threads?
125. What is difference between strong and weak?
    a. https://cocoacasts.com/what-is-the-difference-between-strong-weak-and-unowned-references
    b. A variable in objective c declared with the key 'weak' will not have a reference counted towards it
        i. Why is reference important?
            1. MRC - when a variable has a reference count of 0, it will be freed from memory
    c. Strong variable will add a reference count of 1
126. What are categories in Obj-C.
    a. https://medium.com/ios-os-x-development/an-introduction-to-categories-in-objective-c-d6d55d91569f
    b. Categories add new functionality to a class after a class object has been created
        i. Similar to open/closed principle
127. What are extensions in Obj-C?
    a. https://developer.apple.com/library/archive/documentation/Cocoa/Conceptual/ProgrammingWithObjectiveC/CustomizingExistingClasses/CustomizingExistingClasses.html
    b. Similar to a category, however the class being extended must have its source course present during compile time
    c. Unlike categories, extensions can add additional properties and instance variables
128. Why do you have to set IBOutlets set to weak?
    a. https://cocoacasts.com/should-outlets-be-weak-or-strong
    b. So that the outlets can be freed when the main view controller is deallocated

129. What are stacks? Which control in iOS uses Stacks?
    a.
130. What is MVVM and MVC? (not just the words or definition, but the advantages over other architectural designs – the aim here is to do a senior-level comparison and what one may address over the other)
    a.
131. What is a REST API?
    a. Representational State Transfer (REST) API
        i. https://en.wikipedia.org/wiki/Representational_state_transfer
    b. Request made to a an API through a URI, commonly a URL, will be responded with a payload in the form of a JSON, among other formats such as XML or HTML
        i. Requests include: POST, GET, UPDATE, DELETE
132. What is SOAP?
    a. Simple Object Access Protocol (SOAP) API
        i. https://en.wikipedia.org/wiki/SOAP
    b. Processes running on different operating systems such as Windows or Linux to communicate using XML by making requests through HTTP
133. What is the difference between SOAP and Restful web services?
    a. https://searchmicroservices.techtarget.com/tip/REST-vs-SOAP-Choosing-the-best-web-service
    b. SOAP is a set of rules on how to exchange XML data
    c. REST is a set of architectural principles on how to exchange data over HTTP
        i. Data exchanged can be in XML, JSON, HTML
    c . SOAP vs REST
        i. Access to REST data through HTTP, SOAP allows for different protocols (HTML, plus more…)
        ii.
134. What is the difference between stateless and stateful web services?
    a. https://nordicapis.com/defining-stateful-vs-stateless-web-services/
    b. State: the condition or quality of an entity at a moment in time
    c. Stateful web services keep involve a context such as when logging into a website or adding items to a shopping cart
    d. Stateless web services don't require an exact context per say, such as requesting the current time or date, weather
135. In Obj-C, what problems do you have in blocks?
    a. http://conradstoll.com/blog/2013/1/19/blocks-operations-and-retain-cycles.html
    b. Retain cycles are a problem within blocks
136. In Obj-C, how can you avoid retain cycle in blocks?
    a. https://medium.com/mackmobile/avoiding-retain-cycles-in-swift-7b08d50fe3ef
    b. Use a struct instead of classes when creating objects
        i. Structs get passed by value instead of reference like classes
    c. Use weak variables
    d. Create protocols that only classes can adopt so that properties can be made weak
    e. Using [weak self] within a closure
137. What is an Extension in Swift?
    a. https://docs.swift.org/swift-book/LanguageGuide/Extensions.html
    b. Allows for adding additional functionality to classes that a developer may not have access to
    c. Allows adding:
        i. Properties
        ii. Methods
        iii. Initializers

138. In Obj-C, can you add properties in Categories?
    a. http://kaspermunck.github.io/2012/11/adding-properties-to-objective-c-categories/
    b. Not possible to add properties
139. What is toll-bridging and describe its purpose?
    a. https://developer.apple.com/library/archive/documentation/General/Conceptual/CocoaEncyclopedia/Toll-FreeBridgin/Toll-FreeBridgin.html
    b. The ability to interchange Core Foundation objects with Foundation objects
        i. Ex. NSLocale (see *NSLocale Class Reference*) is interchangeable with its Core Foundation counterpart, CFLocale (see *CFLocale Reference*)
140. Define class cluster and describe the purpose?
    a. Detailed
        i. https://developer.apple.com/library/archive/documentation/General/Conceptual/DevPedia-CocoaCore/ClassCluster.html
    b. Number example:
        i. https://en.swifter.tips/class-cluster/
    c. Class Cluster: grouping complete, private subclasses under one abstract, public superclass
        i. Ex. Abstract class: NSNumber, Private subclasses: Int, Float, Bool
141. What is difference between KVC and KVO?
    a. KVC & KVO explanation
        i. https://medium.com/@pleelaprasad/kvo-kvc-in-swift-12f77300c387
    b. Obj-C example of KVO
        i. https://www.hackingwithswift.com/example-code/language/what-is-key-value-observing
    c. Swift example of KVC & KVO
        i. https://www.uraimo.com/swiftbites/kvo-and-kvc-in-swift/
    d. KVC vs KVO
        i. KVC is a way to access a class's property indirectly through a string instead of using accessors/setters or accessing the property directly
        ii. KVO is a way to execute a statement block whenever a property being observed is modified
            1. An object being observed must KVC compliant
142. What is method swizzling and the purpose?
    a. https://medium.com/@abhimuralidharan/method-swizzling-in-ios-swift-1f38edaf984f
    b. Swizzling: ability to change a methods functionality at runtime
    c. Purpose:
        i. (Informal) Modifying the functionality of an existing method by creating a wrapper around the existing method
143. What is a linked list?
    a. https://www.raywenderlich.com/947-swift-algorithm-club-swift-linked-list-data-structure
    b. Linked list: a sequence of data items known as 'nodes'
    c. Singly linked list: each node only has a reference to the next node
    d. Doubly linked list: each node has a reference to the last node and next node
144. Difference between array and linked list?
    a. https://www.geeksforgeeks.org/linked-list-vs-array/
    b. Array vs Linked list
        i. Array has fixed size, linked list size is dynamic
        ii. Shifting elements to add a new element to an array is expensive
        iii. Random access not allowed in linked lists
        iv. Arrays can be cached, huge memory performance boost

145. How does an array work in terms of memory and in comparison to a linked list – which is faster?
    a. https://www.geeksforgeeks.org/linked-list-vs-array/
    b. Easier to cache array
    c. An array has a set size so it is allocated in memory contiguously
        i. Ex. base address of array 0x000 i.e. array[0]
            next address of array 0x004   i.e array[1]
146. What is a queue in relation to GCD?
    a. Part 1:
        i. https://www.raywenderlich.com/5370-grand-central-dispatch-tutorial-for-swift-4-part-1-2
    b. A queue is a code block for running background processes
    c. Queue decides when and where code block should execute
147. What are the different queues in GCD?
    a. https://medium.com/@nimjea/grand-central-dispatch-in-swift-fdfdd8b22d52
    b. Global queue: for performing non-UI tasks
    c. Main queue: for updating UI after a task completes
148. How do we assign priority to queues in GCD?
    a. https://www.raywenderlich.com/5370-grand-central-dispatch-tutorial-for-swift-4-part-1-2
    b. Priority is given to a queue by assigning a Quality of Service (QoS) class to a queue
    c. Quality of Service classes (Priorities):
        i. .userInteractive
        ii. .userInitiated
        iii. .default
        iv. .utility
        v. .background
        vi. .unspecified
149. What is the value of assigning priorities to queues in GCD and give an example of doing this?
    a. https://developer.apple.com/library/archive/documentation/Performance/Conceptual/EnergyGuide-iOS/PrioritizeWorkWithQoS.html#//apple_ref/doc/uid/TP40015243-CH39-SW1
    b. Assigning tasks a higher priority consumes more resources, so that the task can complete sooner than a lower priority task, therefore priority matters when considering resources
    c. Priority should also be considered when the UI needs to updated to improve UX
    d. Ex. Spotify app
        i. Use high priority to buffer song being played
        ii. Use lower priority to next songs in queue
150. What object in iOS uses a stack?
    a.
151. What is Singleton?
    a. https://cocoacasts.com/what-is-a-singleton-and-how-to-create-one-in-swift
    b. Ensures only one instance of a class is instantiated at a time
152. How do you create a singleton in Obj-C?
    a. http://www.galloway.me.uk/tutorials/singleton-classes/
    b. Too complicated to post
153. How do you create a singleton in Swift?
    a. https://cocoacasts.com/what-is-a-singleton-and-how-to-create-one-in-swift
    b. Creating a singleton:
        i. Create a static variable that initializes the class i.e static let shared = NetworkManager()
        ii. create a private init(...) within the class i.e private init() { }

154. Give an example of when actually using and choosing Singleton make sense to use?
    a. https://en.wikipedia.org/wiki/Singleton_pattern
    b. Swift Examples
        i. https://cocoacasts.com/what-is-a-singleton-and-how-to-create-one-in-swift
    c. Singleton pattern makes sense when we want data to be easily passed around in a project
    d. Examples:
        i. File manager
        ii. NetworkManager
        iii. UserDefaults
155. Give me the exact syntax of a singleton.
    a.
156. Give me an example of when you've used this on project.
    a. Creating network manager
    b. Using file manager to navigate through files in a project (KnowYourLeage app)
157. What is a closure in Swift?
    a. https://docs.swift.org/swift-book/LanguageGuide/Closures.html
    b. A self-contained blocks of functionality that can be passed around in code
    c. Can capture and store references to constants and variables that define a closure
    d. Types of closures:
        i. Global functions are closures with names and no values
        ii. Nested functions are closure with name and can capture values from enclosing function
        iii. Closure expressions are unnamed closures that can capture values from surrounding context
158. Difference between Retain and Copy?
    a. https://stackoverflow.com/questions/2399490/what-is-the-difference-between-copy-and-retain
    b. Retaining an object creates a reference to object, therefore increasing the objects reference count by 1
    c. Copying an object allocates another space in memory with the same value of the object being copied, but unlike retaining, the copy is not a reference to the object that was copied (new object is independent of the original object)
159. Difference between shallow versus deep copy?
    a. http://net-informations.com/faq/net/shallow-deep-copy.htm
    b. A shallow copy is when one object refers to another object i.e. no actual values were copied but a reference is made to the original object
    c. A deep copy is when all the values of one object are copied to another object, making the copy's values independent of the original copy
160. Give of an example of when using a copy property makes sense.
    a. A copy property would make sense when a developer wants to modify an object without modifying the object directly
    b. Ex. var baseURL = <someURL>, let query = baseURL + <query>
        i. In this example, we want to make a copy of the baseURL and modify its value without changing the baseURL's value permanently
161. What Databases have you used?
162. What are the different components making up Core Data?
163. In Core Data, can you have multiple managed contexts?
164. What is Core Data Faulting?
165. How do you ensure thread safety in Core Data?
166. What are the different contexts you can use in Core Data?
167. How do you fetch data from Core Data? Explain steps.
168. What is mapping model in data bases and how is this related to lightweight migration in Core Data?

169. Different types of URLSession's data task?
170. What are the different session types?
171. Difference between Sync vs Async?
172. What is Apple Notification Center Service?
173. How would you set constraints to center 3 buttons on the UI?
174. How would you synchronize contact in offline apps and locally?
175. In obj c and swift- what do they mean by type safe language?
176. What are the benefits of having a type safe language?
177. What is NS error object and how do you use it?
178. What are the three parts to NS error object?
179. Why better to throw an error vs default state?
180. Which one may be better, and validate why you think such (in relation to throwing an error versus default state)
181. Have you written code in your job where you threw errors? Can you at least describe that code?
182. For singleton design pattern, if you have a log in function is it a good idea to use singleton and explain why.
183. What is a binary tree and give an example of using one (and when) – both in Obj-C and Swift (two uses cases).
184. I want to be able to make multiple API requests at the same time, however, I also what to ensure they return in a certain (or sequential) order – what is the process I do to ensure this?
185. Give an example of when you've had to ensure something similar to the above in a previous project?
186. Have you used XCTest, on what project, and in what way?
187. Have you used JENKINS, on what project, in what way, and what does Jenkins enable and why is it valuable?
188. Have you actually set up the Jenkins sever and environment?
189. Have you written code using Fastlane and if not Fastlane, what tool similar have you used and how so?
190. What is ARC and how does it work?
191. Obj-C – properties that are dynamic vs synthesize – discuss this.
192. How are dispatch groups implemented?
193. Have you used dispatch groups in your projects?
194. How do child contexts work?
195. How do you ensure all the conditions are met for Unit Tests?
196. Can you capture the unit test results?
197. Singleton – do you still need to overload the init
198. Discuss a specific scenario working with locks.
199. What is the difference between dispatch sync and dispatch async?
200. NSFetchResultsController – describe how to use it and its purpose.
201. What's the advantage of using NSFetchResultsController vs other options?
202. Difference between nil and none?
203. How is the implementation of structure different in Obj-C and Swift?
204. Can you have service responses with SOAP?
205. Is there an iOS framework for XML?
206. What are the different parsers in XML?
207. Difference between mode-based parsing and event-based parsing?
208. Talk about your experience with RxSwift and how to implement it, too.
209. Talk about your experience with RxCocoa and how to implement it, too.
210. Have you used HTTP and how does it work?
211. Have you worked with RFP's?
212. Have you worked with hybrid apps?

213. Talk about your experience with localized applications.
214. How do you localize an App.
215. Talk about how to manage localized resources with Interface builder files.
216. Talk about how to manage localized resources using code.
217. Describe the ViewController lifecycle
218. What happens on each step of the ViewController lifecycle.

Coding:
1. Create a unit test function for an addition function for a calculator.
2. Given an array of words, create a function that returns an array with only those words that are palindromes (a word that is the same backwards and forwards)
   a. Example: mom, ana
   b. Non-example: plant
3. Give an example of using Generics in Swift – write an actual function.

Project Related and Production-Environment Related:
1. Give a description of your last two projects:
   a. Why were you brought there initially?
   b. What the current state of app and production environment upon your arrival?
   c. What was the app and what does it do?
   d. Who was the end user of the app?
   e. What did you specifically implement feature wise in the app and how?
   f. What percent of time did you lead and what percent of time did you code?
   g. What challenges did you face in the production environment and in development and how did you address them?
   h. What was the size of the team and break down of roles?
   i. How did you manage the day-to-day production environment, task management and tracking, documentation standards? What tools were used to manage this?
   j. What was the testing environment like? Was it rigorous? What tools and practices were used to manage sound code?
   k. What weekly standing meetings were present, who was present, and what was discussed?
   l. How did you cycle through the Software Development Cycle through the 2-week sprints and what major milestone meetings happen during the sprints?
2. What things will you keep in mind (as a lead) during SCRUM meetings?
3. How do you divide tasks in production environment appropriately, strategically, and track the stories and back log of tasks?
4. What types of questions do you ask when in the requirement gathering phase of a project?
5. What do you do in the first week of entering a new production environment as a contractor?
6. What are all aspects you consider when building an app from scratch and what are the steps to take in starting the process?
7. What is your proudest technical accomplishment to date in a production environment, why, and how did you actually do to contribute to the accomplishment you're discussing?
8. What was the greatest technical failure in a production environment, why, how did you rectify, and what is your key learning from this to take forward into your future development practice?
9. What is your experience in working across a variety of stakeholders – PM, Product Owner, QA, junior devs, offshore teams, etc.?
10. Do you track reviews of the product and how do you use the reviews to inform future production environment decisions?

11. Talk about your work in collaborating closely with the design team.
12. What app/project is closest to your heart and why?

HR/Logistical/Eligibilty:

1. Q1. Where are you currently located?

2. Q2: You are located in the same location as our office. Can you do a F2F?

3. Q3: Have you always been a 1099 consultant or a W-2 employee?

4. Q4: I wanted to clarify your requirement on the rate.

5. Q5: What is your W-2 required rate, after the contract portion of the C2H is over?

6. Q6: So, you have a company you work through? (If they ask this on the interview, and SA has not revealed this yet to vendor, then fine, you have to acknowledge it)

7. Q7: You are the owner of the company, correct?

8. Q8: Do you have any contracts with your company preventing you from going permanent after the contract period of C2H is done?

9. Q9: Why do you work for your company on C2C – what do they offer you?

10. Q10: If we were willing to help you with all that (logistics, marketing), would you consider cutting out that third party and coming to us?”

11. Q11: What is the name of your company?

12. Q12: Why are you looking to do C2C?

13. Q13: Are you looking to do C2H for 3 month or 6 months?

14. Q14: What was your salary at your other positions?