THE UNIVERSITY OF CHICAGO


MPCS 51033 • SPRING 2017 • SESSION 4

# BACKENDS FOR MOBILE APPLICATIONS

# CLASS NEWS

# CLASS NEWS

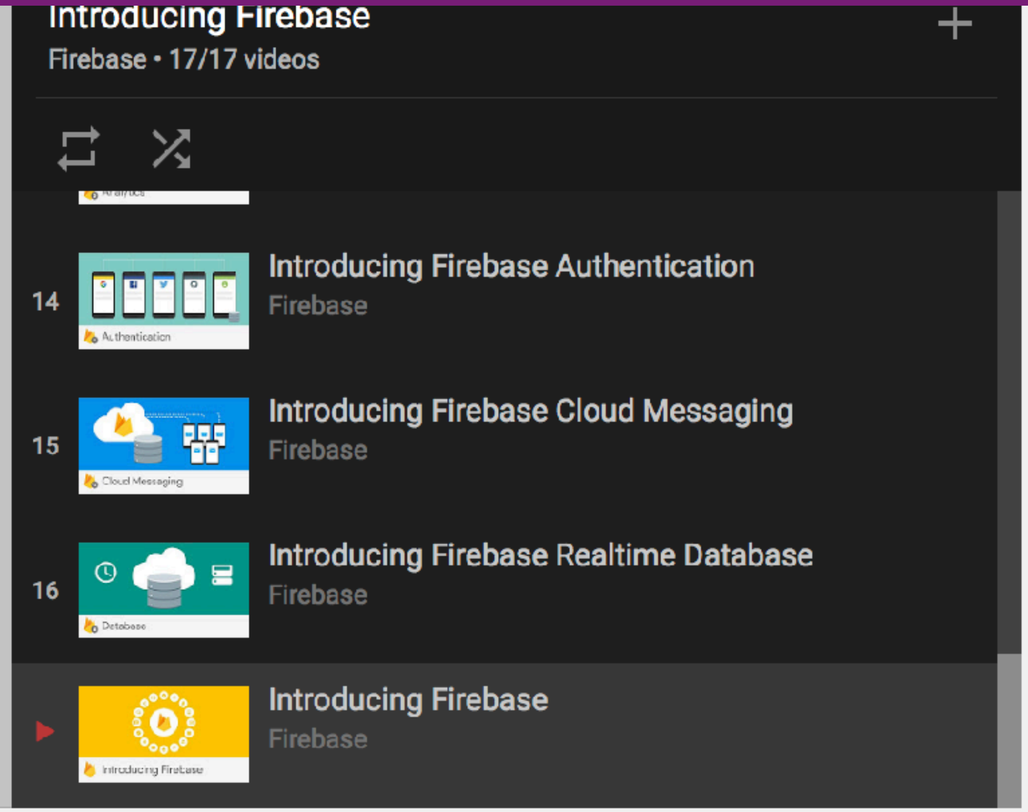
- Office hours tomorrow from 10-11:30 in Young 308

# FIREBASE🔥

# FIREBASE

- https://youtu.be/O17OWyx08Cg?list=PLl-K7zZEsYLmOF_07layrTntevxtbUxDL

# FIREBASE

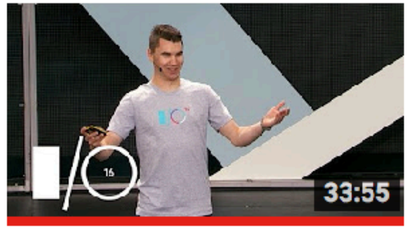




## Introducing Firebase

**Firebase**

Subscribed | 56,536

287,389 views




**Zero to App: Develop with Firebase - Google I/O 2016**

Firebase

119,707 views

# FIREBASE IN ACTION

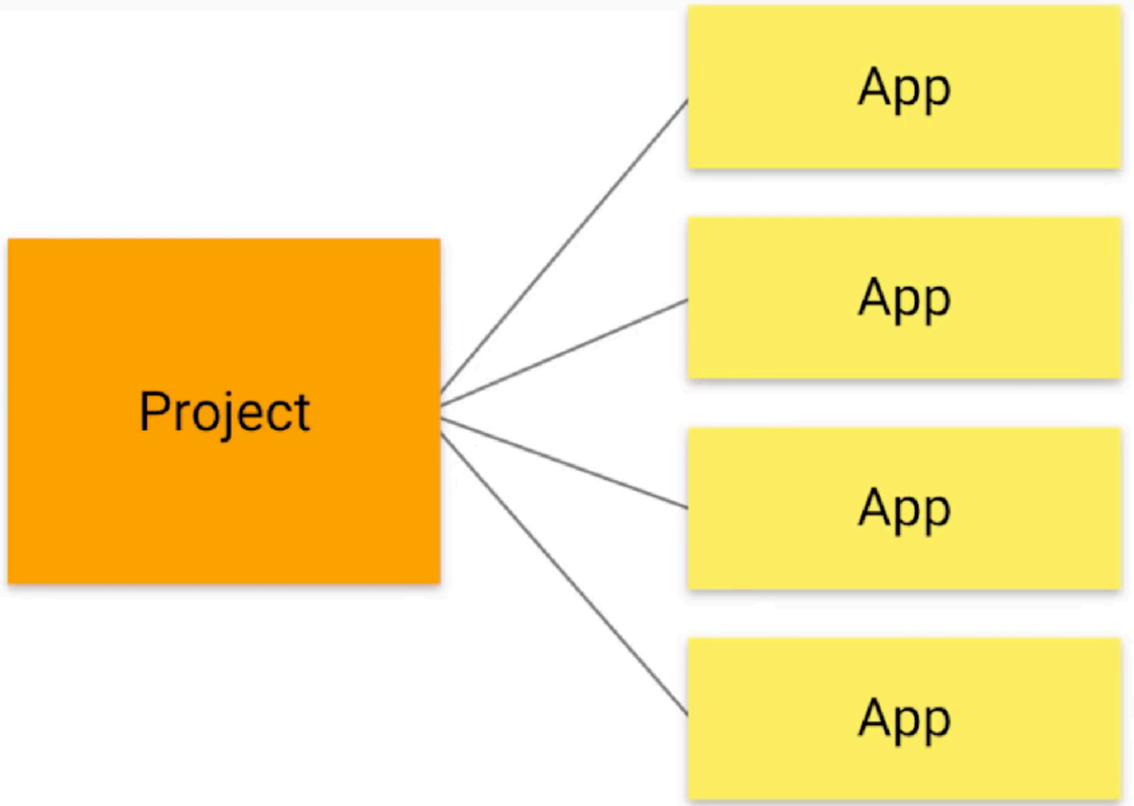
## PREREQUISTES

- Before you begin, you need a few things set up in your environment:
  - Xcode 7.0 or later
  - An Xcode project targeting iOS 7 or above
  - The bundle identifier of your app
  - CocoaPods 1.0.0 or later
  - For Cloud Messaging:
    - A physical iOS device
    - APNs certificate with Push Notifications enabled
    - In Xcode, enable Push Notifications in App > Capabilities

# FIREBASE IN ACTION

## PROJECTS VS. APPS

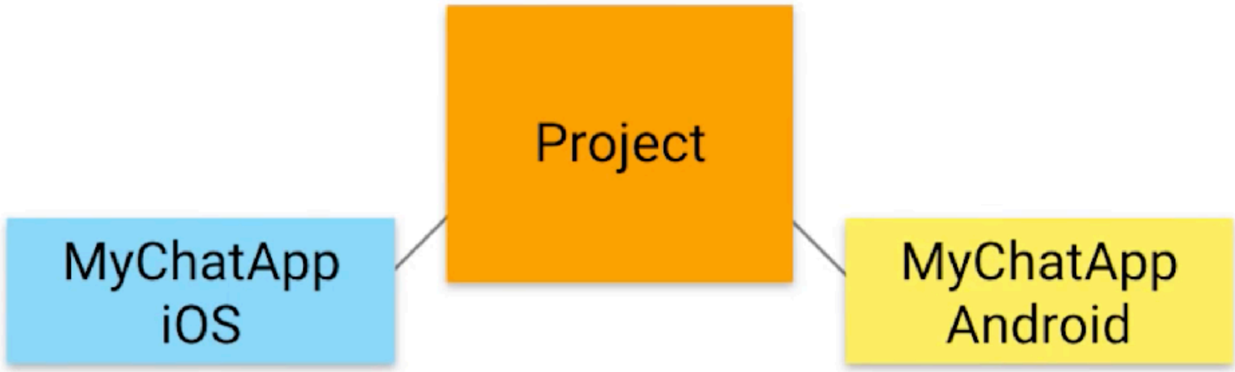
- Project consists of 1+ apps
  - Apps all share the same backend
  - Use Cloud Messaging to communicate with each other



# FIREBASE IN ACTION

## PROJECTS VS. APPS

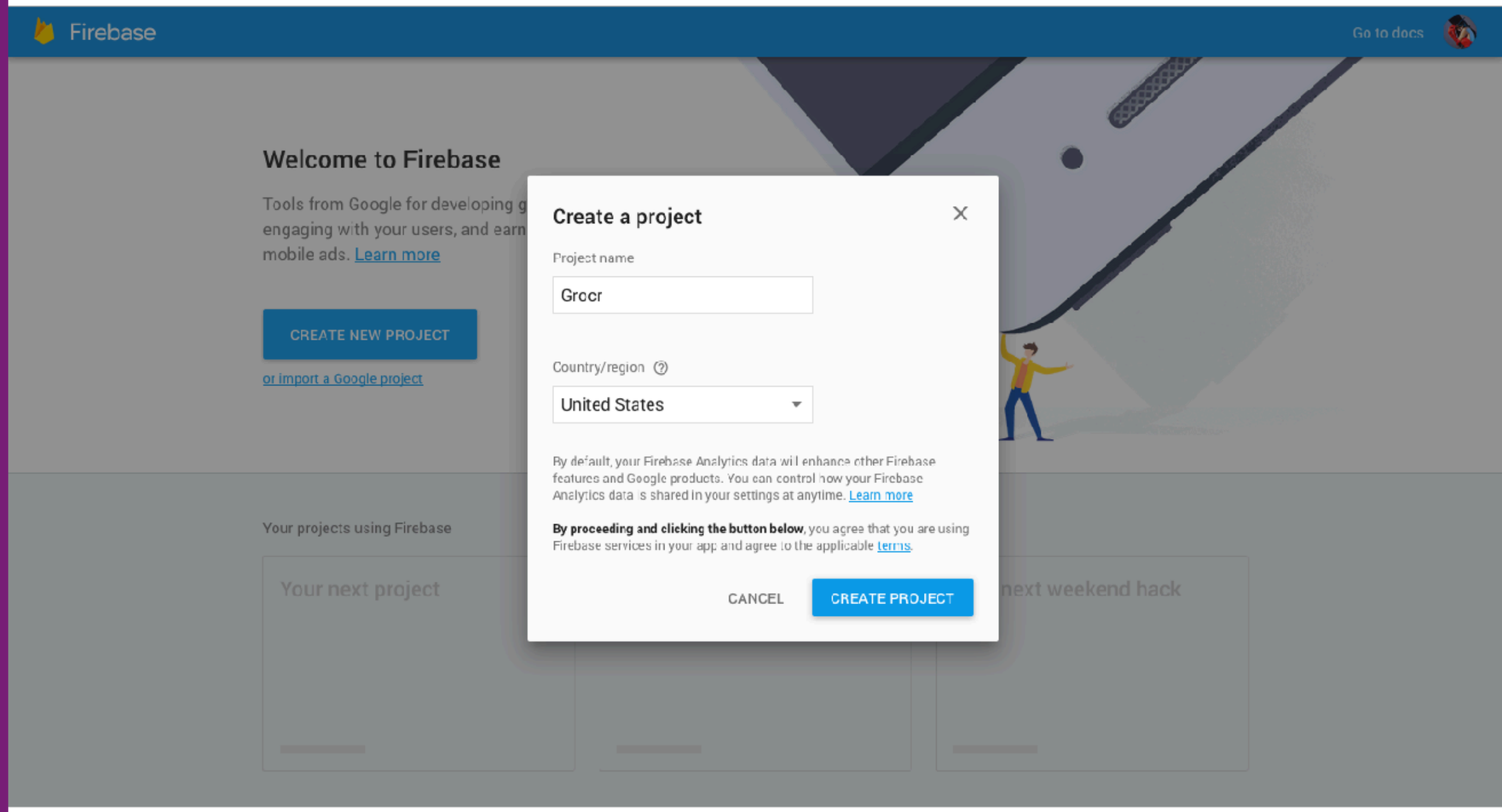
- Cross platform app
  - iOS and Android would be different apps in the same project
  - Access same data from different platforms
  - Send messages to all apps



# FIREBASE IN ACTION

## PROJECTS VS. APPS

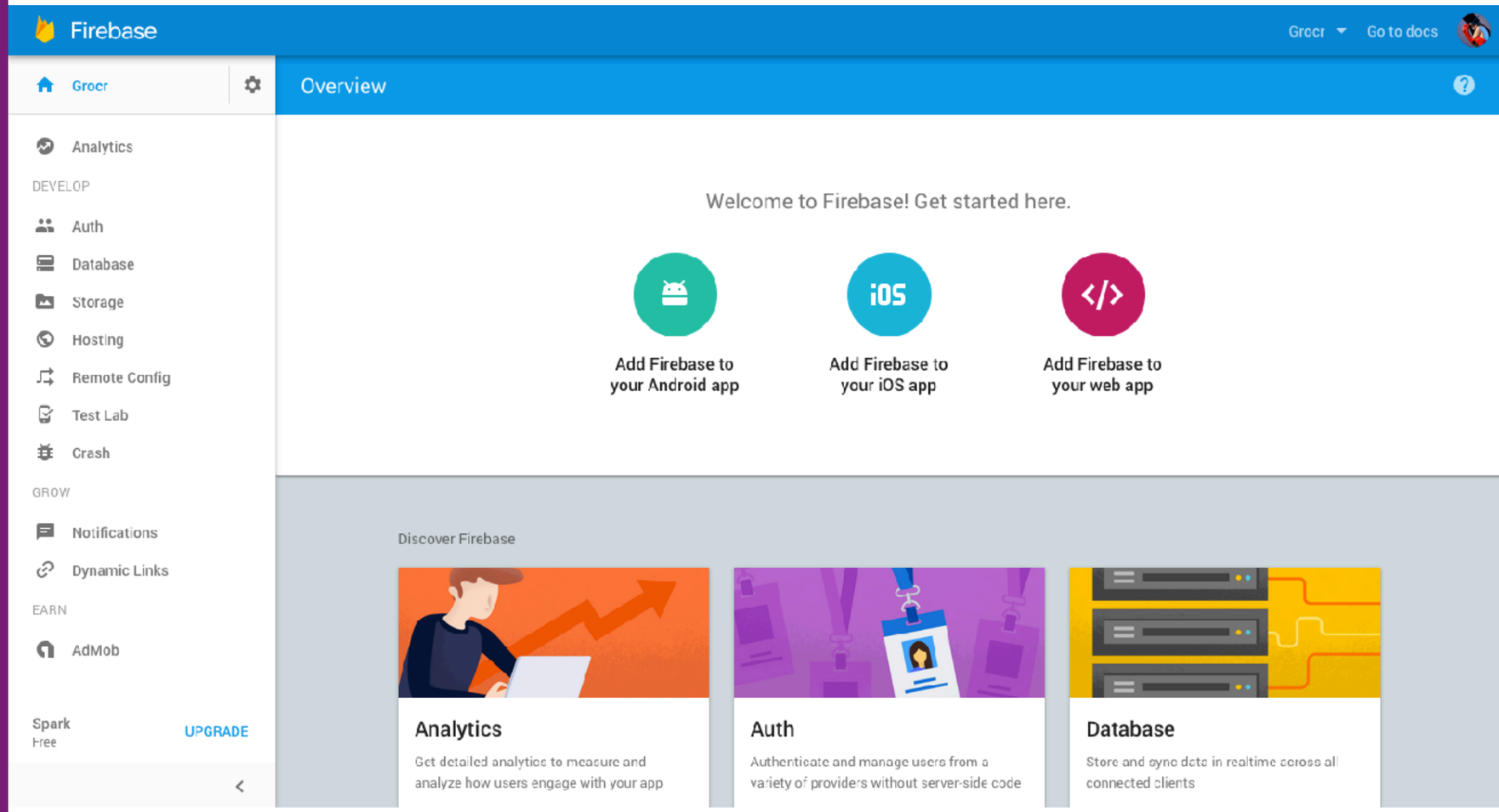
- Create a Firebase project



# FIREBASE IN ACTION

## REGISTER APP

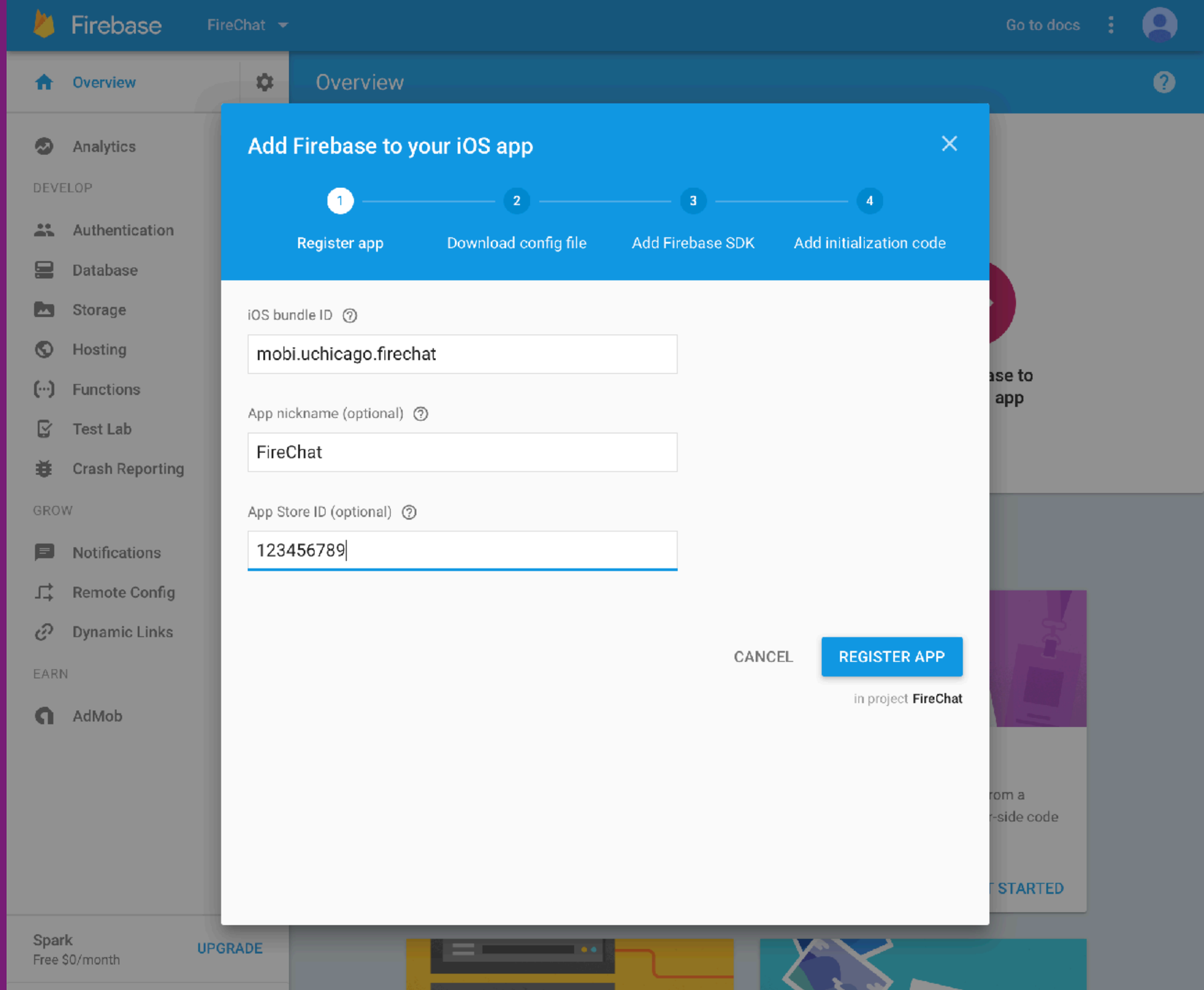
- Add Firebase to your app



# FIREBASE IN ACTION

## REGISTER APP

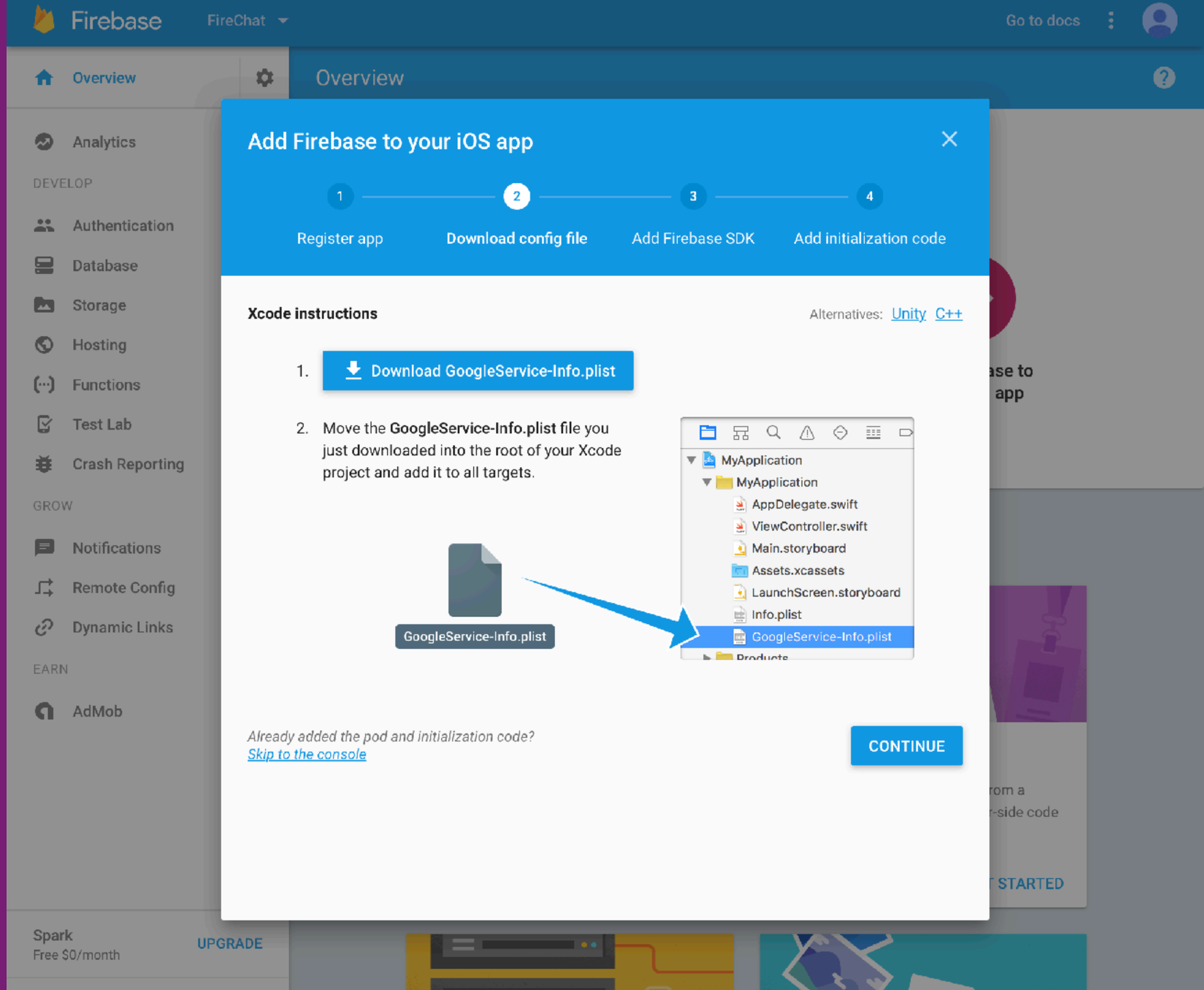
- Add Firebase to your app
- Bundle id needs to match you app bundle id
- App Store ID will be generated when you submit
  - Invites, Dynamic Links



# FIREBASE IN ACTION

## CONFIG FILE

- Generates a .plist to include in your project



# FIREBASE IN ACTION

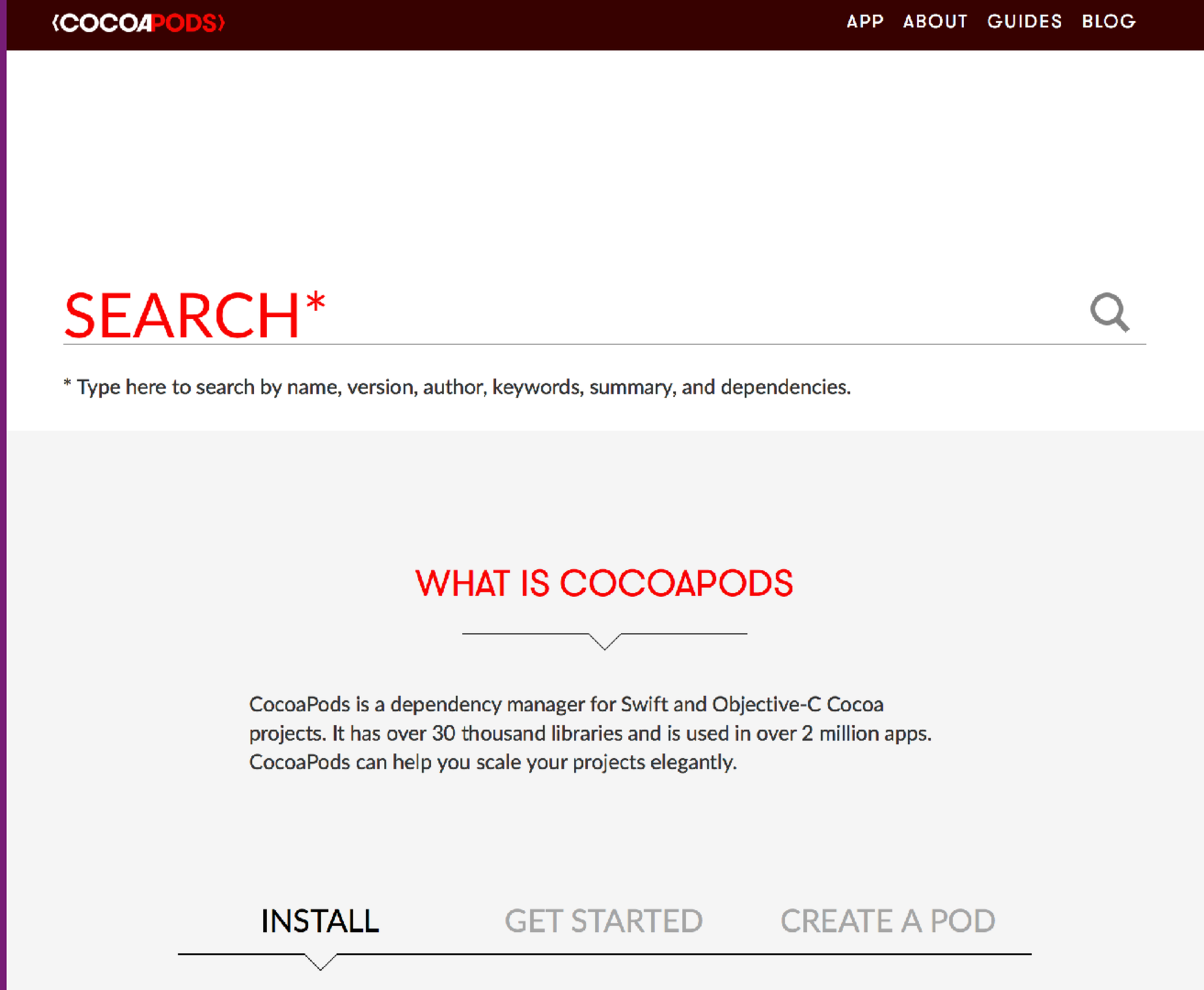
## CONFIG FILE

| Key | Type | Value |
|---|---|---|
| ▼ Information Property List | Dictionary | (17 items) |
| AD_UNIT_ID_FOR_BANNER_TEST | String | ca-app-pub-3940256099942544/2934735716 |
| AD_UNIT_ID_FOR_INTERSTITIAL_T... | String | ca-app-pub-3940256099942544/4411468910 |
| CLIENT_ID | String | 487781121319-ms6r6t0ninob0i8ri4mord3kd5roto9v.apps.googleusercontent.com |
| REVERSED_CLIENT_ID | String | com.googleusercontent.apps.487781121319-ms6r6t0ninob0i8ri4mord3kd5roto9v |
| API_KEY | String | AIzaSyDjXHxBu32Fwmh9urpLpB-B33av8hUPoNA |
| GCM_SENDER_ID | String | 487781121319 |
| PLIST_VERSION | String | 1 |
| BUNDLE_ID | String | mobi.uchicago.firechat |
| PROJECT_ID | String | firechat-66f87 |
| STORAGE_BUCKET | String | firechat-66f87.appspot.com |
| IS_ADS_ENABLED | Boolean | YES |
| IS_ANALYTICS_ENABLED | Boolean | NO |
| IS_APPINVITE_ENABLED | Boolean | YES |
| IS_GCM_ENABLED | Boolean | YES |
| IS_SIGNIN_ENABLED | Boolean | YES |
| GOOGLE_APP_ID | String | 1:487781121319:ios:78425b1380795a79 |
| DATABASE_URL | String | https://firechat-66f87.firebaseio.com |

# FIREBASE IN ACTION

## ADD SDK

- Firebase uses cocoapods for SDK distribution
- Changes xcodeproject to xcworkspace



# FIREBASE IN ACTION

## ADD SDK

HTTPS://WWW.YOUTUBE.COM/WATCH?V=IEAJVNRDZA0

# FIREBASE IN ACTION

## ADD SDK

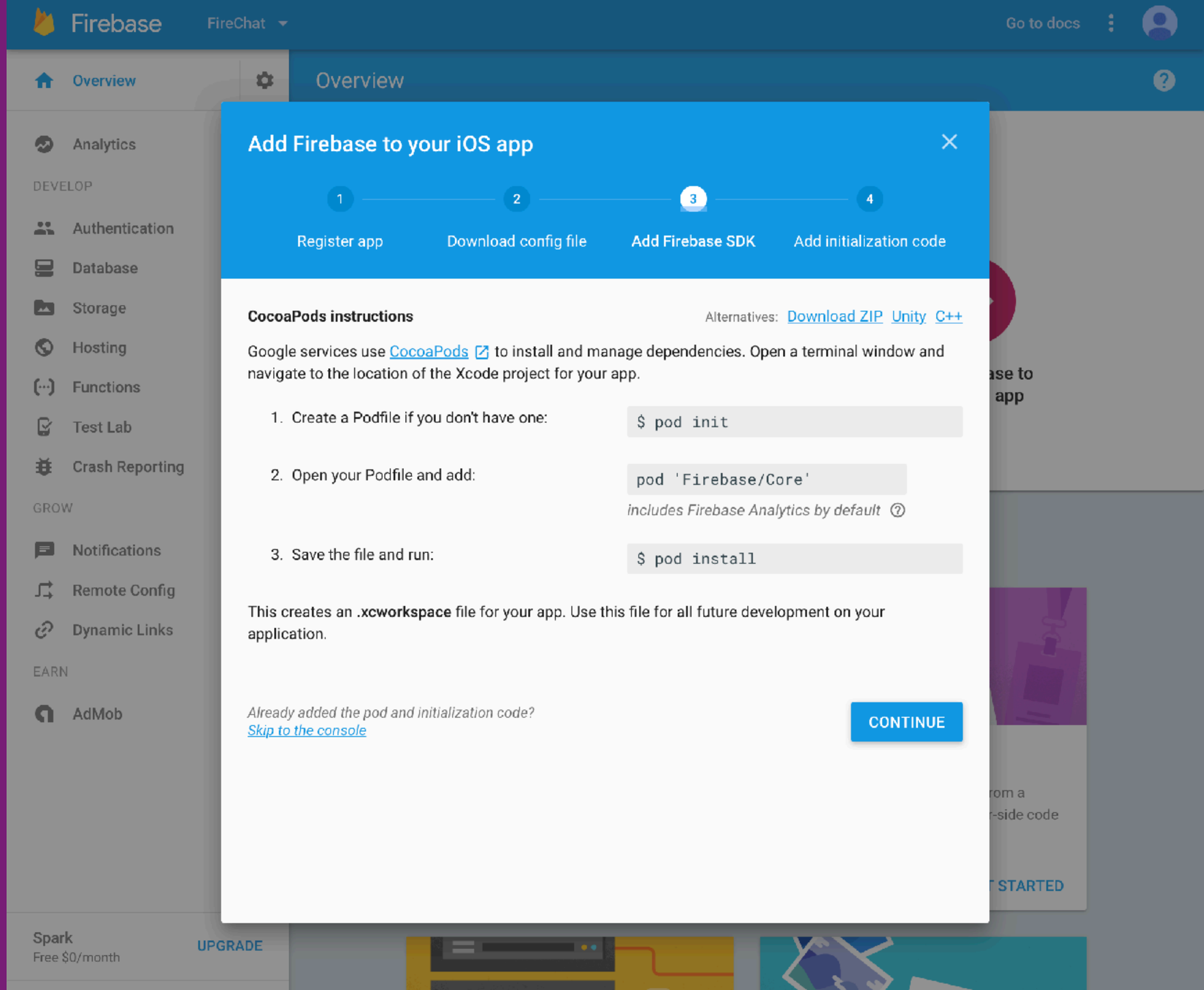
- Firebase pods

| Pod | Service |
| --- | --- |
| pod 'Firebase/Core' | Prerequisite libraries and Analytics |
| pod 'Firebase/AdMob' | AdMob |
| pod 'Firebase/Messaging' | Cloud Messaging / Notifications |
| pod 'Firebase/Database' | Realtime Database |
| pod 'Firebase/Invites' | Invites |
| pod 'Firebase/DynamicLinks' | Dynamic Links |
| pod 'Firebase/Crash' | Crash Reporting |
| pod 'Firebase/RemoteConfig' | Remote Config |
| pod 'Firebase/Auth' | Authentication |
| pod 'Firebase/Storage' | Storage |

# FIREBASE IN ACTION

## ADD SDK

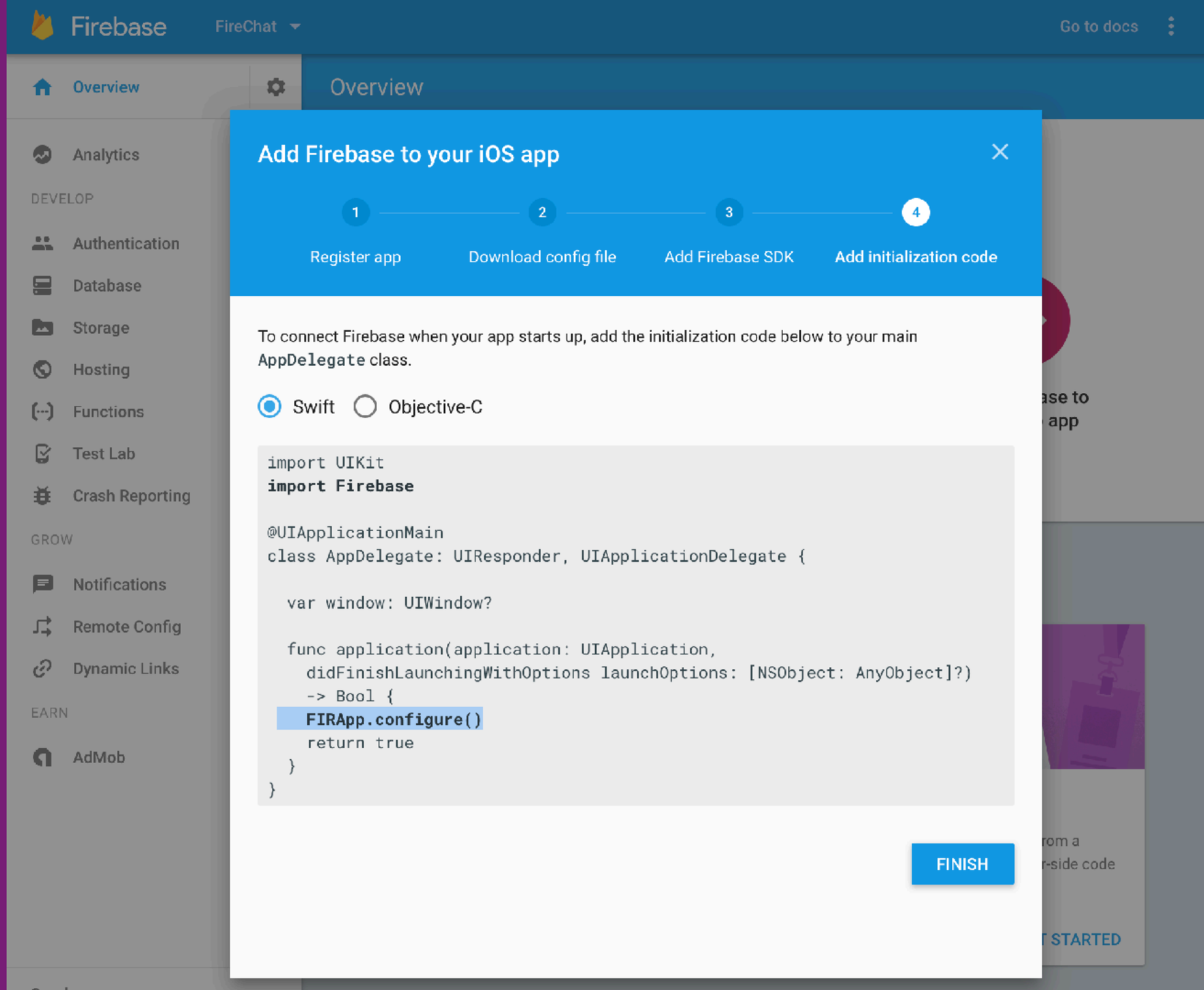
- Install the Firebase pods in your project
- There are multiple Firebase pods, use the one you need for the project



# FIREBASE IN ACTION

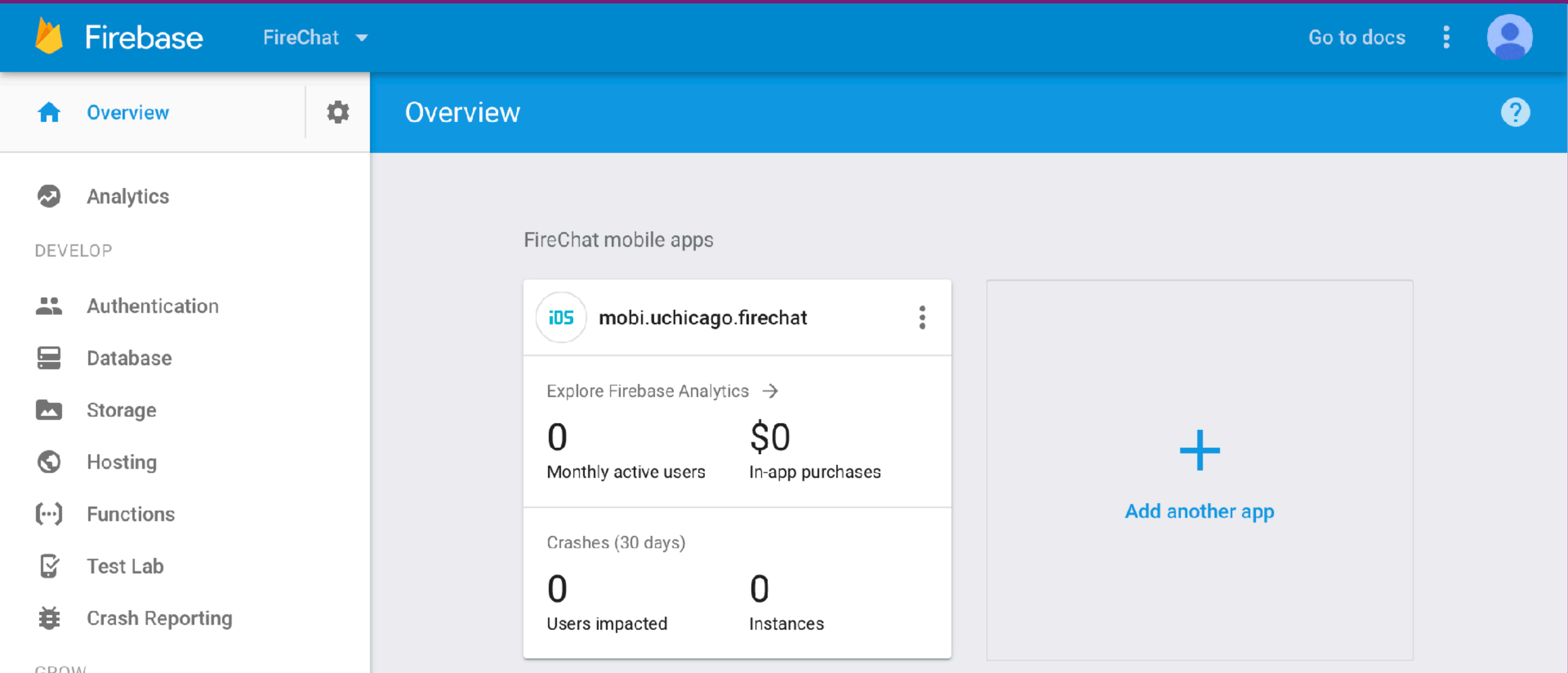
## ADD SDK

- Add initialization code to AppDelegate
  - Initializes services
  - Reads the plist and sets global variables



# FIREBASE IN ACTION

## CONSOLE



# FIREBASE IN ACTION

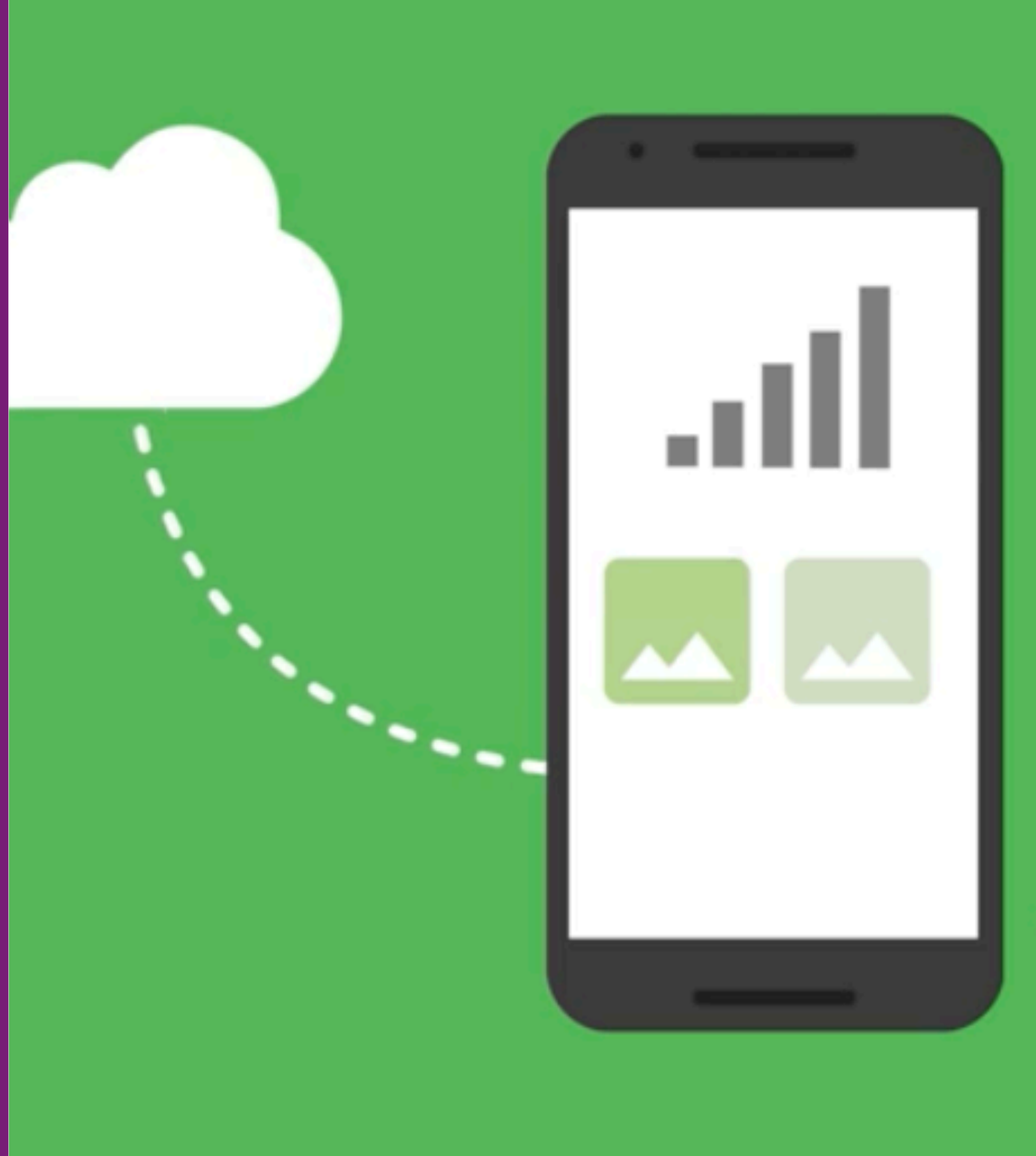
## BUILD THE APP

```
2017-04-19 01:16:22.866 FireChat[63153] <Notice> [Firebase/Messaging][I-IID001001] FIRInstanceID AppDelegate proxy enabled,
will swizzle app delegate remote notification handlers. To disable add "FirebaseAppDelegateProxyEnabled" to your Info.plist and
set it to NO
2017-04-19 01:16:22.883 FireChat[63153] <Notice> [Firebase/Analytics][I-ACS023007] Firebase Analytics v.3800000 started
2017-04-19 01:16:22.884 FireChat[63153] <Notice> [Firebase/Analytics][I-ACS023008] To enable debug logging set the following
application argument: -FIRAnalyticsDebugEnabled (see http://goo.gl/RfcP7r)
2017-04-19 01:16:22.905 FireChat[63153] <Notice> [Firebase/Analytics][I-ACS003007] Successfully created Firebase Analytics App
Delegate Proxy automatically. To disable the proxy, set the flag FirebaseAppDelegateProxyEnabled to NO in the Info.plist
2017-04-19 01:16:23.209 FireChat[63153] <Warning> [Firebase/Analytics][I-ACS005000] The AdSupport Framework is not currently
linked. Some features will not function properly. Learn more at http://goo.gl/9vSsPb
2017-04-19 01:16:23.520 FireChat[63153] <Notice> [Firebase/Analytics][I-ACS023012] Firebase Analytics enabled
```

# REALTIME DATABASE

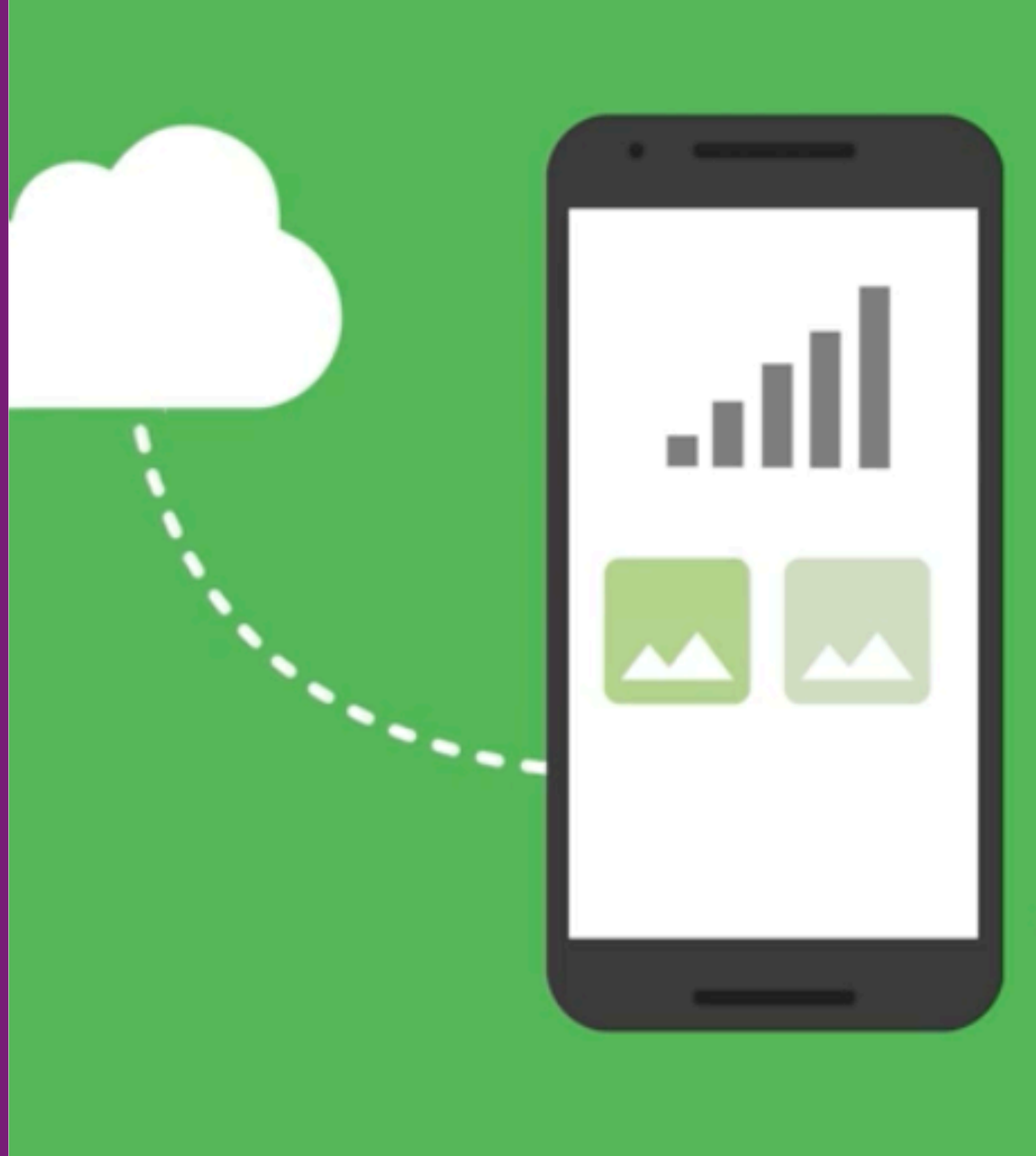
# REALTIME DATABASE

- Store and sync data with NoSQL cloud database
- Data is synced across all clients in realtime, and remains available when your app goes offline
  - https://youtu.be/O17OWyx08Cg?list=PLl-K7zZEsYLmOF_07IayrTntevxtbUxDL

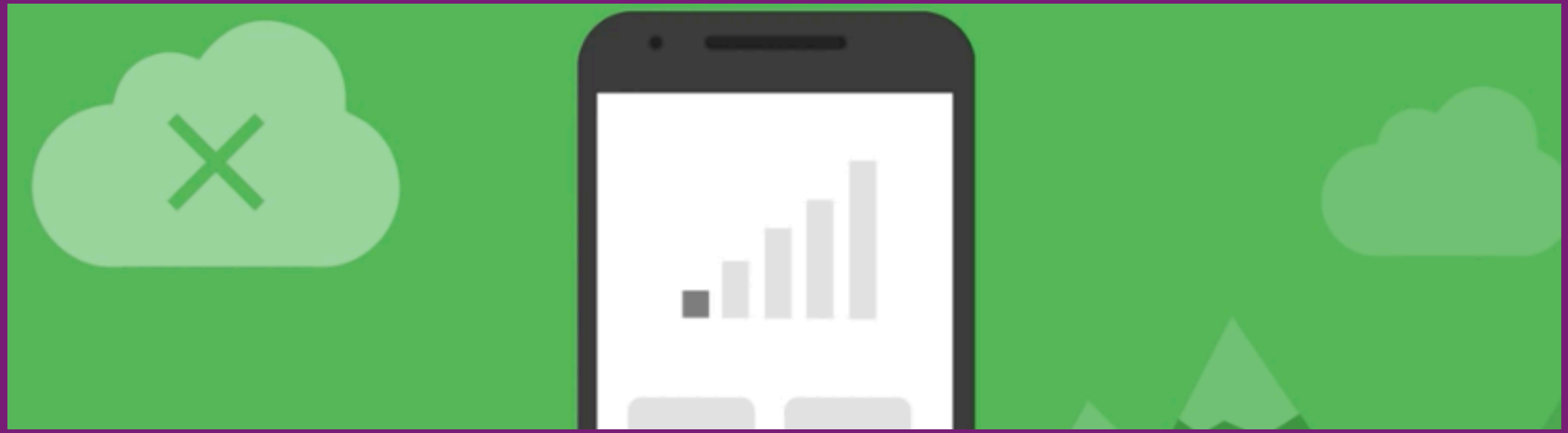


# REALTIME DATABASE

- Data is stored as JSON
- Syncronized in realtime to all clients
  - Milliseconds
- All networking code is included as part of the SDK



# REALTIME DATABASE



- Data is stored in a local cache while the user in offline
- Changes are automatically synced whe the device comes back on

# REALTIME DATABASE

- Implementation steps

| | | |
|---|---|---|
| 1 | Integrate the Firebase Realtime Database SDKs | Quickly include clients via Gradle, CocoaPods, or a script include. |
| 2 | Create Realtime Database References | Reference your JSON data, such as "users/user:1234/phone_number" to set data or subscribe to data changes. |
| 3 | Set Data and Listen for Changes | Use these references to write data or subscribe to changes. |
| 4 | Enable Offline Persistence | Allow data to be written to the device's local disk so it can be available while offline. |
| 5 | Secure your data | Use Firebase Realtime Database Security Rules to secure your data. |

# REALTIME DATABASE

```
platform :ios, '9.0'

target 'FireChat' do
  # Comment the next line if you're not using Swift and don't want to use dynamic
      frameworks
  use_frameworks!

  # Pods for FireChat
  pod 'Firebase/Core'
  pod 'Firebase/Database'


end
```

NEED TO POD INSTALL AGAIN

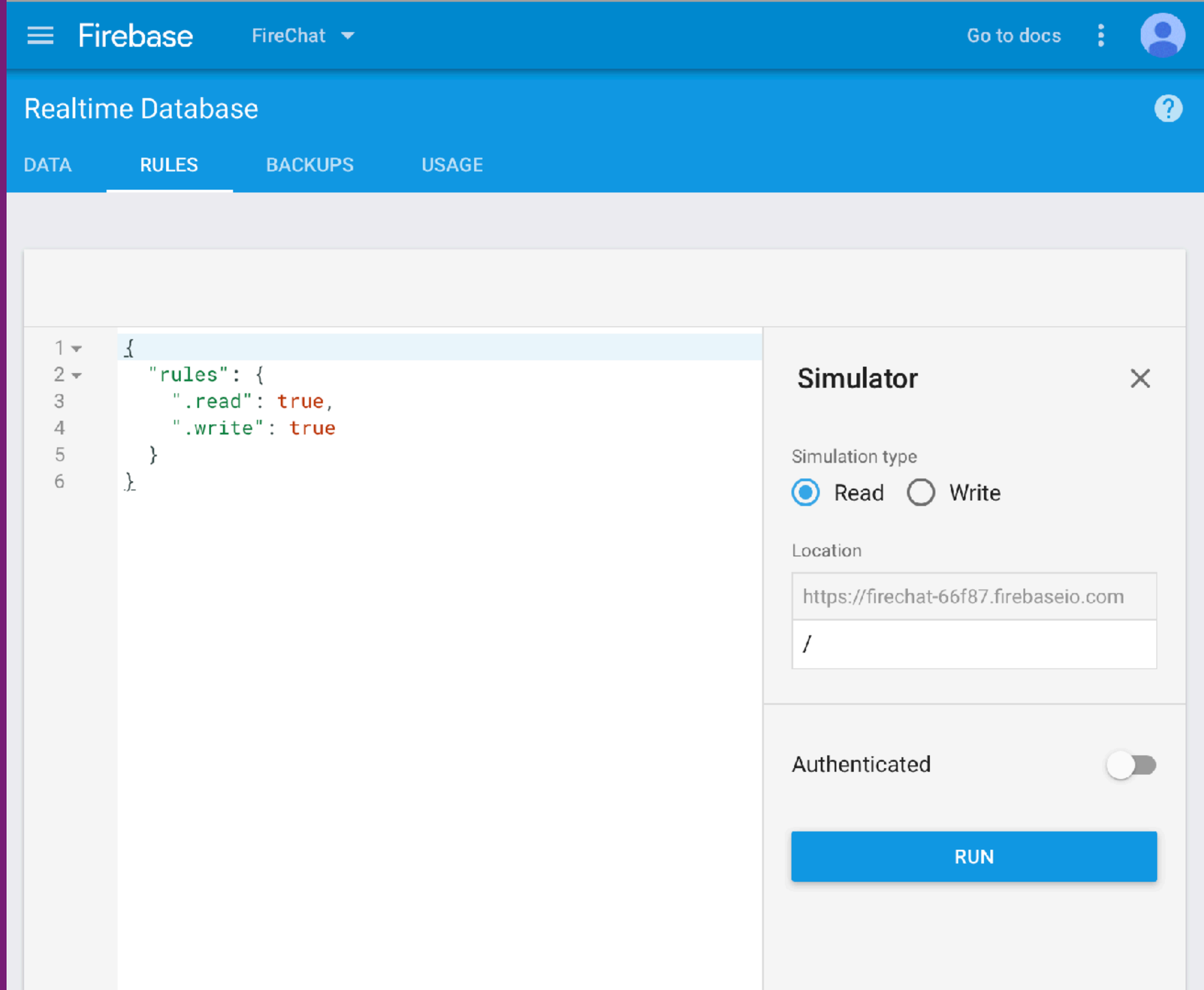
# DATABASE SECURITY

# REALTIME DATABASE

- Security is handled through "Firebase Realtime Database Security" rules
  - You set permissions on the database
  - Authentication is handled by "Firebase Authentication"

# REALTIME DATABASE

- Rules are set through the console
- Command line



# REALTIME DATABASE

```
// These rules require authentication
{
  "rules": {
    ".read": "auth != null",
    ".write": "auth != null"
  }
}
```

- Default
  - Requires authentication

# REALTIME DATABASE

```
// These rules give anyone, even people who are not users of your app,
// read and write access to your database
{
  "rules": {
    ".read": true,
    ".write": true
  }
}
```

- Public
  - Anyone

# REALTIME DATABASE

```
// These rules grant access to a node matching the authenticated
// user's ID from the Firebase auth token
{
  "rules": {
    "users": {
      "$uid": {
        ".read": "$uid === auth.uid",
        ".write": "$uid === auth.uid"
      }
    }
  }
}
```

- User
  - Each user has their own database

# REALTIME DATABASE

```
// These rules grant access to a node matching the authenticated
// user's ID from the Firebase auth token
{
  "rules": {
    "users": {
      "$uid": {
        ".read": "$uid === auth.uid",
        ".write": "$uid === auth.uid"
      }
    }
  }
}
```

- User
  - Each user has their own database

# REALTIME DATABASE

```
// These rules don't allow anyone read or write access to your database
{
  "rules": {
    ".read": false,
    ".write": false
  }
}
```

- Private
  - No one can access outside of console

# DATA STRUCTURE

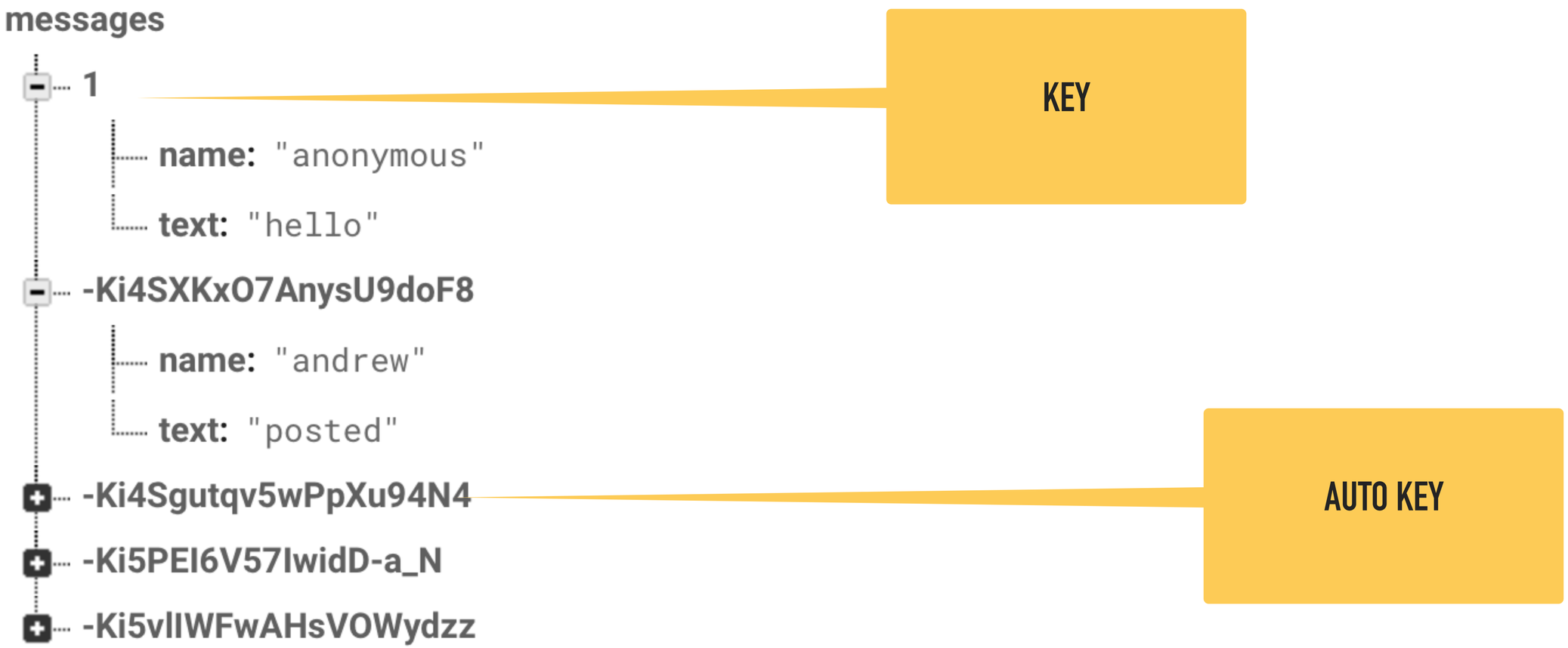
# DATA STRUCTURE

- JSON trees stored online
- Use multiple trees (not linked)
- Data is represented as a node accessible by a key
  - Use your own key (string)
  - `childByAutoId`

```
{
  "users": {
    "alovelace": {
      "name": "Ada Lovelace",
      "contacts": { "ghopper": true },
    },
    "ghopper": { ... },
    "eclarke": { ... }
  }
}
```

# DATA STRUCTURE

firechat-66f87 > messages



# DATA STRUCTURE

## BEST PRACTICES FOR DATAA

- Avoid nesting data
  - Fetch returns all data
  - Access control
  - Parsing in Swift isn't fun

```
{
  // This is a poorly nested data architecture,
  // of the "chats" node to get a list of conve
  // potentially downloading hundreds of megaby
  "chats": {
    "one": {
      "title": "Historical Tech Pioneers",
      "messages": {
        "m1": { "sender": "ghopper", "message":
        "m2": { ... },
        // a very long list of messages
      }
    },
    "two": { ... }
  }
}
```

# DATA STRUCTURE

## BEST PRACTICES FOR DATAA

- Flatten data
  - Isolate into different calls
  - Use metadata for faster fetching
  - Maintain unique references

```
{
  // Chats contains only meta info about each conversation
  // stored under the chats's unique ID
  "chats": {
    "one": {
      "title": "Historical Tech Pioneers",
      "lastMessage": "ghopper: Relay malfunction found. Cause: moth.",
      "timestamp": 1459361875666
    },
    "two": { ... },
    "three": { ... }
  },

  // Conversation members are easily accessible
  // and stored by chat conversation ID
  "members": {
    // we'll talk about indices like this below
    "one": {
      "ghopper": true,
      "alovelace": true,
      "eclarke": true
    },
    "two": { ... },
    "three": { ... }
  },

  // Messages are separate from data we may want to iterate quickly
  // but still easily paginated and queried, and organized by chat
  // conversation ID
  "messages": {
    "one": {
      "m1": {
        "name": "eclarke",
        "message": "The relay seems to be malfunctioning.",
```

# DATA STRUCTURE

## BEST PRACTICES FOR DATA

- Don't be afraid of redundant information
- Think "ease of retrieval" instead of efficient storage

```
// An index to track Ada's memberships
{
  "users": {
    "alovelace": {
      "name": "Ada Lovelace",
      // Index Ada's groups in her profile
      "groups": {
         // the value here doesn't matter, just that the key exists
         "techpioneers": true,
         "womentechmakers": true
      }
    },
    ...
  },
  "groups": {
    "techpioneers": {
      "name": "Historical Tech Pioneers",
      "members": {
        "alovelace": true,
        "ghopper": true,
        "eclarke": true
      }
    },
    ...
  }
}
```

/USERS/$UID/GROUPS/$GROUP_ID

# DATA STRUCTURE

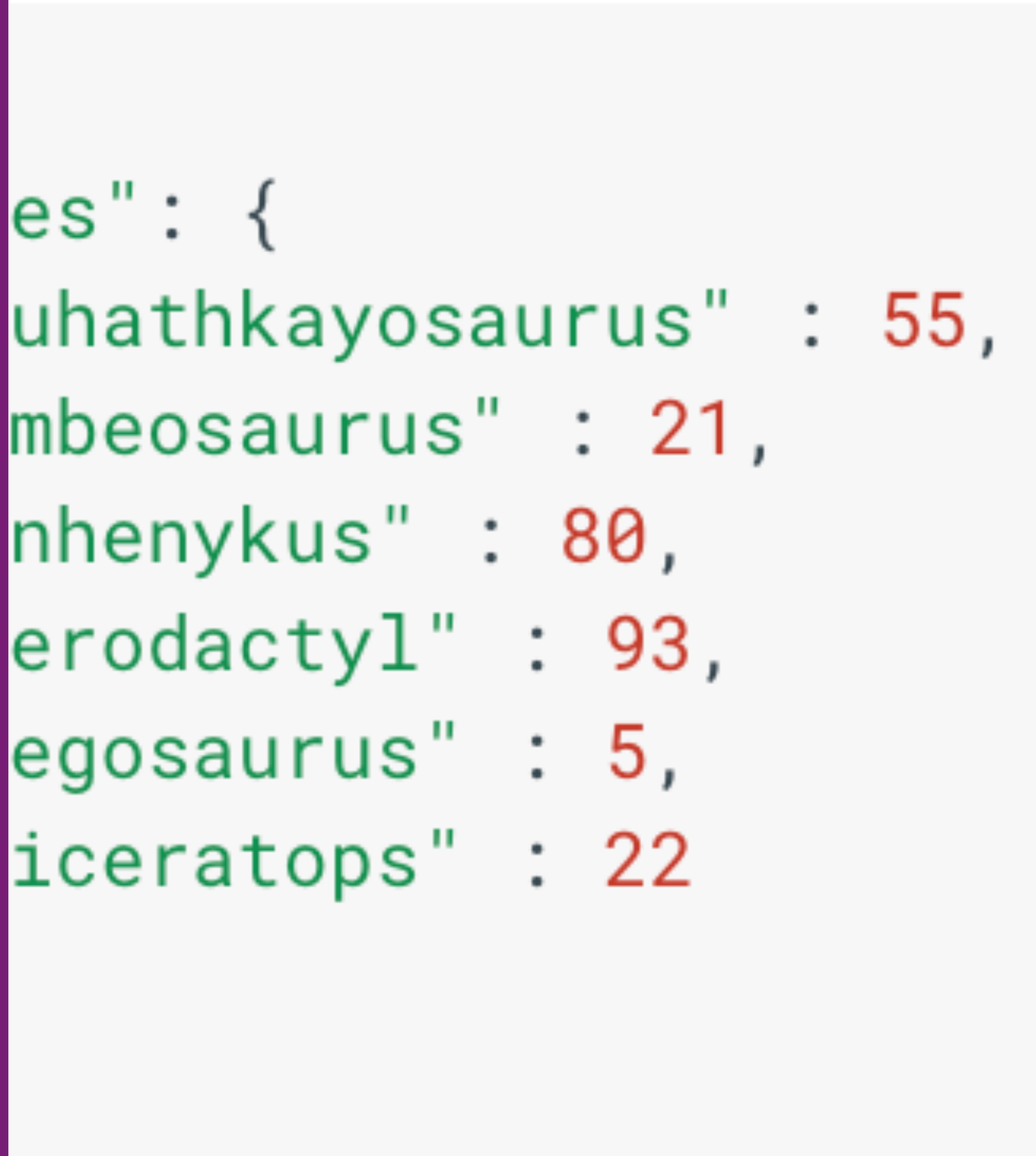
- There is a CLI tool that can profile your database
  - Speed
  - Bandwidth
  - Query Indices
- You can specify which keys to index on to improve performance

```
{
  "scores": {
    "bruhathkayosaurus" : 55,
    "lambeosaurus" : 21,
    "linhenykus" : 80,
    "pterodactyl" : 93,
    "stegosaurus" : 5,
    "triceratops" : 22
  }
}
```

```
{
  "rules": {
    "scores": {
      ".indexOn": ".value"
    }
  }
}
```

# DATA STRUCTURE

- There is a CLI tool that can profile your database
  - Speed
  - Bandwidth
  - Query Indices



# READ AND WRITE DATA

# READ AND WRITE DATA

- Get a reference to the database

```
var ref: FIRDatabaseReference!

ref = FIRDatabase.database().reference()
```

- Access nodes by key
- Set values by key

```
self.ref.child("users").child(user.uid).setValue(["username": username])

self.ref.child("users/(user.uid)/username").setValue(username)
```

# READ AND WRITE DATA

- The values are native Swift types
  - Dictionary, Array, String, Int....
- You do not have to put in to JSON object

# READ AND WRITE DATA

- Overwrite the entire node and children

```
self.ref.child("users").child(user.uid).setValue(["username": username])
```

- Update

```
self.ref.child("users/(user.uid)/username").setValue(username)
```

# READ AND WRITE DATA

- Observed changes to the database

OBSERVE CHANGERS TO DATA

```
reference.observe(.value, with: { snapshot in
  print(snapshot.value!)

  var freshData = [MessageItem]()
  for item in snapshot.children {

    let messageItem = MessageItem(snapshot: item as! FIRDataSnapshot)
    freshData.append(messageItem)
  }
  self.messages = freshData
  print(self.messages)
  self.tableView.reloadData()

})
```

DATA RETURNED AS SNAPSHOT

# READ AND WRITE DATA

```
let userID = FIRAuth.auth()?.currentUser?.uid
ref.child("users").child(userID!).observeSingleEvent(of: .value, with: { (snapshot) in
  // Get user value
  let value = snapshot.value as? NSDictionary
  let username = value?["username"] as? String ?? ""
  let user = User.init(username: username)

  // ...
  }) { (error) in
    print(error.localizedDescription)
}
```

- Single callback for data not expected to change

# READ AND WRITE DATA

```
let key = ref.child("posts").childByAutoId().key
let post = ["uid": userID,
            "author": username,
            "title": title,
            "body": body]
let childUpdates = ["/posts/\(key)": post,
                    "/user-posts/\(userID)/\(key)/": post]
ref.updateChildValues(childUpdates)
```

- Use `updateChildValues` to make changes to multiple locations

# READ AND WRITE DATA

```
let reference = FIRDatabase.database().reference().child("messages")
var messages = [MessageItem]()
var user: FIRUser?


@IBAction func tapNewMessage(_ sender: UIBarButtonItem) {
  let alert = UIAlertController(title: "New Message",
                                message: "Message",
                                preferredStyle: .alert)

  let saveAction = UIAlertAction(title: "Post",
                                 style: .default) { _ in

                                  guard let textField = alert.textFields?.first,
                                    let text = textField.text else {
                                      return
                                  }

                                  let data = ["name":self.user?.displayName,"text": text]
                                  self.reference.childByAutoId().setValue(data)

  }
```

# READ AND WRITE DATA

```
let key = ref.child("posts").childByAutoId().key
let post = ["uid": userID,
            "author": username,
            "title": title,
            "body": body]
let childUpdates = ["/posts/\(key)": post,
                    "/user-posts/\(userID)/\(key)/": post]
ref.updateChildValues(childUpdates)
```

- Delete data by call `deleteValue` on a node, set to `nil`
- Multiple children delete using `updateChildValues` to nil

# WORKING WITH LISTS OF DATA

# WORKING WITH LISTS OF DATA

- Using `childByAutoId` keeps data sorted by timestamp and unique
- Call `getKey` to find the unique key of a node
- Use the keys for flattening your data structure

# WORKING WITH LISTS OF DATA

| Event type | Typical usage |
| --- | --- |
| **`FIRDataEventTypeChildAdded`** | Retrieve lists of items or listen for additions to a list of items. This event is triggered once for each existing child and then again every time a new child is added to the specified path. The listener is passed a snapshot containing the new child's data. |
| **`FIRDataEventTypeChildChanged`** | Listen for changes to the items in a list. This event is triggered any time a child node is modified. This includes any modifications to descendants of the child node. The snapshot passed to the event listener contains the updated data for the child. |
| **`FIRDataEventTypeChildRemoved`** | Listen for items being removed from a list. This event is triggered when an immediate child is removed.The snapshot passed to the callback block contains the data for the removed child. |
| **`FIRDataEventTypeChildMoved`** | Listen for changes to the order of items in an ordered list. This event is triggered whenever an update causes reordering of the child. It is used with data that is ordered by **`queryOrderedByChild`** or **`queryOrderedByValue`**. |

- Monitor for child events

# WORKING WITH LISTS OF DATA

```
// Listen for new comments in the Firebase database
commentsRef.observe(.childAdded, with: { (snapshot) -> Void in
  self.comments.append(snapshot)
  self.tableView.insertRows(at: [IndexPath(row: self.comments.count-1, section: self.kSectionComment
})
// Listen for deleted comments in the Firebase database
commentsRef.observe(.childRemoved, with: { (snapshot) -> Void in
  let index = self.indexOfMessage(snapshot)
  self.comments.remove(at: index)
  self.tableView.deleteRows(at: [IndexPath(row: index, section: self.kSectionComments)], with: UITab
})
```

RETURNS THE CHANGED NODE ONLY

# WORKING WITH LISTS OF DATA

```
// Listen for new comments in the Firebase database
commentsRef.observe(.childAdded, with: { (snapshot) -> Void in
  self.comments.append(snapshot)
  self.tableView.insertRows(at: [IndexPath(row: self.comments.count-1, section: self.kSectionComment
})
// Listen for deleted comments in the Firebase database
commentsRef.observe(.childRemoved, with: { (snapshot) -> Void in
  let index = self.indexOfMessage(snapshot)
  self.comments.remove(at: index)
  self.tableView.deleteRows(at: [IndexPath(row: index, section: self.kSectionComments)], with: UITab
})
```

RETURNS THE CHANGED NODE ONLY

# WORKING WITH LISTS OF DATA

```
_commentsRef.observeEventType(.Value, withBlock: { snapshot in
  for child in snapshot.children {
    ...
  }
})
```

- Returns everything
- Returns an array

# WORKING WITH LISTS OF DATA

| Method | Usage |
| --- | --- |
| **queryOrderedByKey** | Order results by child keys. |
| **queryOrderedByValue** | Order results by child values. |
| **queryOrderedByChild** | Order results by the value of a specified child key. |

- Query for sorted data

```
let myTopPostsQuery = (ref.child("user-
posts").child(getUid())).queryOrdered(byChild: "starCount")
```

# WORKING WITH LISTS OF DATA

- Filtering returned data

| Method | Usage |
| --- | --- |
| **queryLimitedToFirst** | Sets the maximum number of items to return from the beginning of the ordered list of results. |
| **queryLimitedToLast** | Sets the maximum number of items to return from the end of the ordered list of results. |
| **queryStartingAtValue** | Return items greater than or equal to the specified key or value, depending on the order-by method chosen. |
| **queryEndingAtValue** | Return items less than or equal to the specified key or value, depending on the order-by method chosen. |
| **queryEqualToValue** | Return items equal to the specified key or value, depending on the order-by method chosen. |

```
// Last 100 posts, these are automatically the 100 most recent
// due to sorting by push() keys
let recentPostsQuery = (ref?.child("posts").queryLimited(toFirst: 100))!
```

# STORE DATA OFFLINE

# STORE DATA OFFLINE

- Firebase keeps a local cache that it uses when there is no network connectivity
- The app functions the same
  - Callbacks are made
  - Data can be added, deleted, edited
- Changes are stored in queue
- Once back online, all changes are applied to the datastore
- Stored for active listeners by default

# STORE DATA OFFLINE

```
let scoresRef = FIRDatabase.database().referenceWithPath("scores")
scoresRef.keepSynced(true)
```

- Stored for active listeners by default
- Request other paths be stored

# STORE DATA OFFLINE

```
let scoresRef = FIRDatabase.database().referenceWithPath("scores")
scoresRef.queryOrderedByValue().queryLimitedToLast(4).observeEventType(.ChildAdded, withBlock: { snapshot in
  print("The \(snapshot.key) dinosaur's score is \(snapshot.value)")
})
```

- Data queries use the cached version (if available)

# STORE DATA OFFLINE

```
[FIRDatabase database].persistenceEnabled = YES;
```

- That's it 😀

# STORE DATA OFFLINE

```
let presenceRef = FIRDatabase.database().referenceWithPath("message");
// Write a string when this client loses connection
presenceRef.onDisconnectSetValue("I disconnected!")
```

```
let userLastOnlineRef = FIRDatabase.database().referenceWithPath("users/joe/lastOnline")
userLastOnlineRef.onDisconnectSetValue(FIRServerValue.timestamp())
```

- Manage presence (ie who is connected)

# STORE DATA OFFLINE

```
// since I can connect from multiple devices, we store each connection instance separately
// any time that connectionsRef's value is null (i.e. has no children) I am offline
let myConnectionsRef = FIRDatabase.database().referenceWithPath("users/joe/connections")

// stores the timestamp of my last disconnect (the last time I was seen online)
let lastOnlineRef = FIRDatabase.database().referenceWithPath("users/joe/lastOnline")

let connectedRef = FIRDatabase.database().referenceWithPath(".info/connected")

connectedRef.observeEventType(.Value, withBlock: { snapshot in
  // only handle connection established (or I've reconnected after a loss of connection)
  guard let connected = snapshot.value as? Bool where connected else {
    return
  }
  // add this device to my connections list
  // this value could contain info about the device or a timestamp instead of just true
  let con = myConnectionsRef.childByAutoId()
  con.setValue("YES")

  // when this device disconnects, remove it
  con.onDisconnectRemoveValue()

  // when I disconnect, update the last time I was seen online
  lastOnlineRef.onDisconnectSetValue(FIRServerValue.timestamp())
})
```

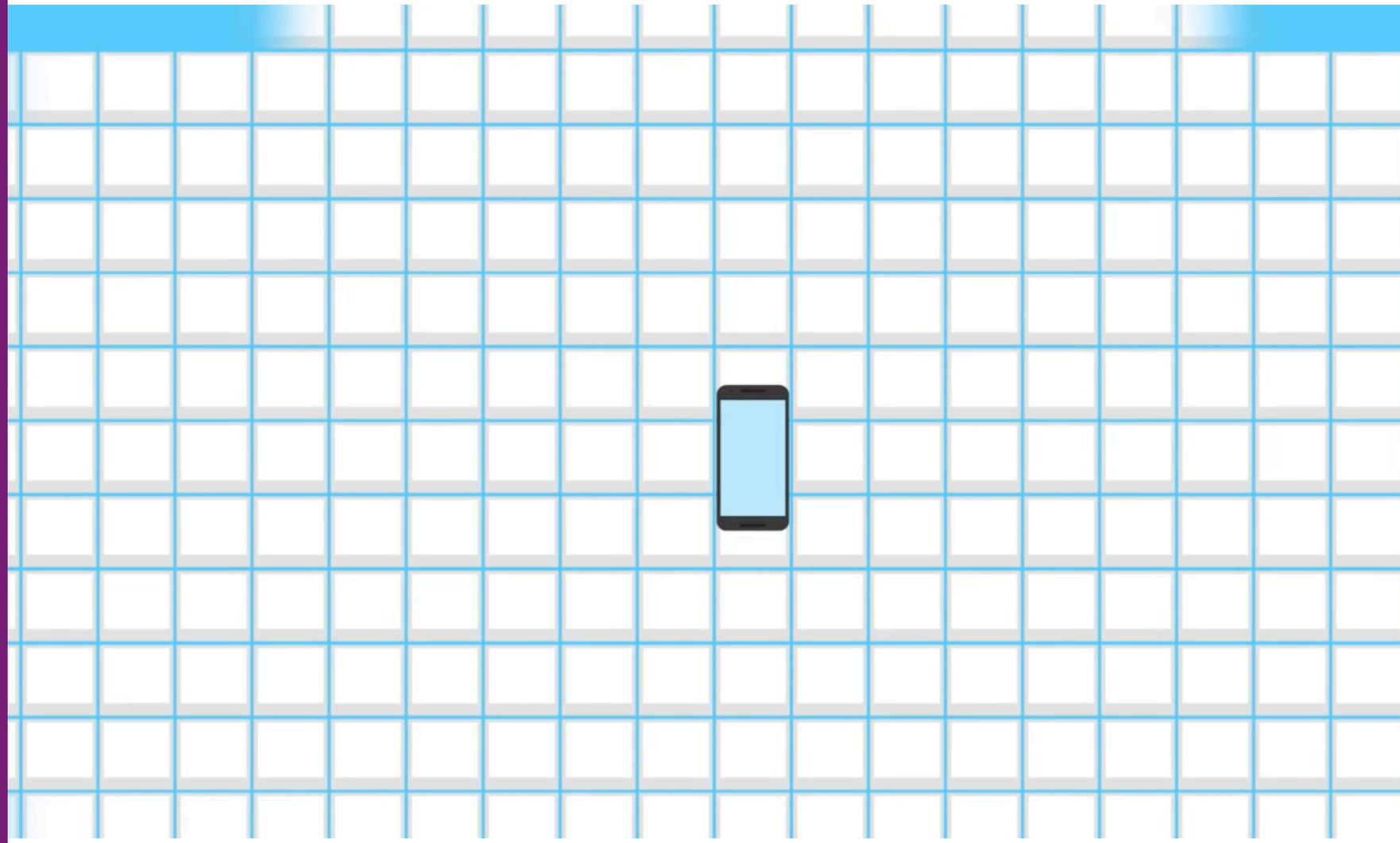
MANG USES ON/ OFFLINE

# BREAK TIME 😴

# FIREBASE STORAGE

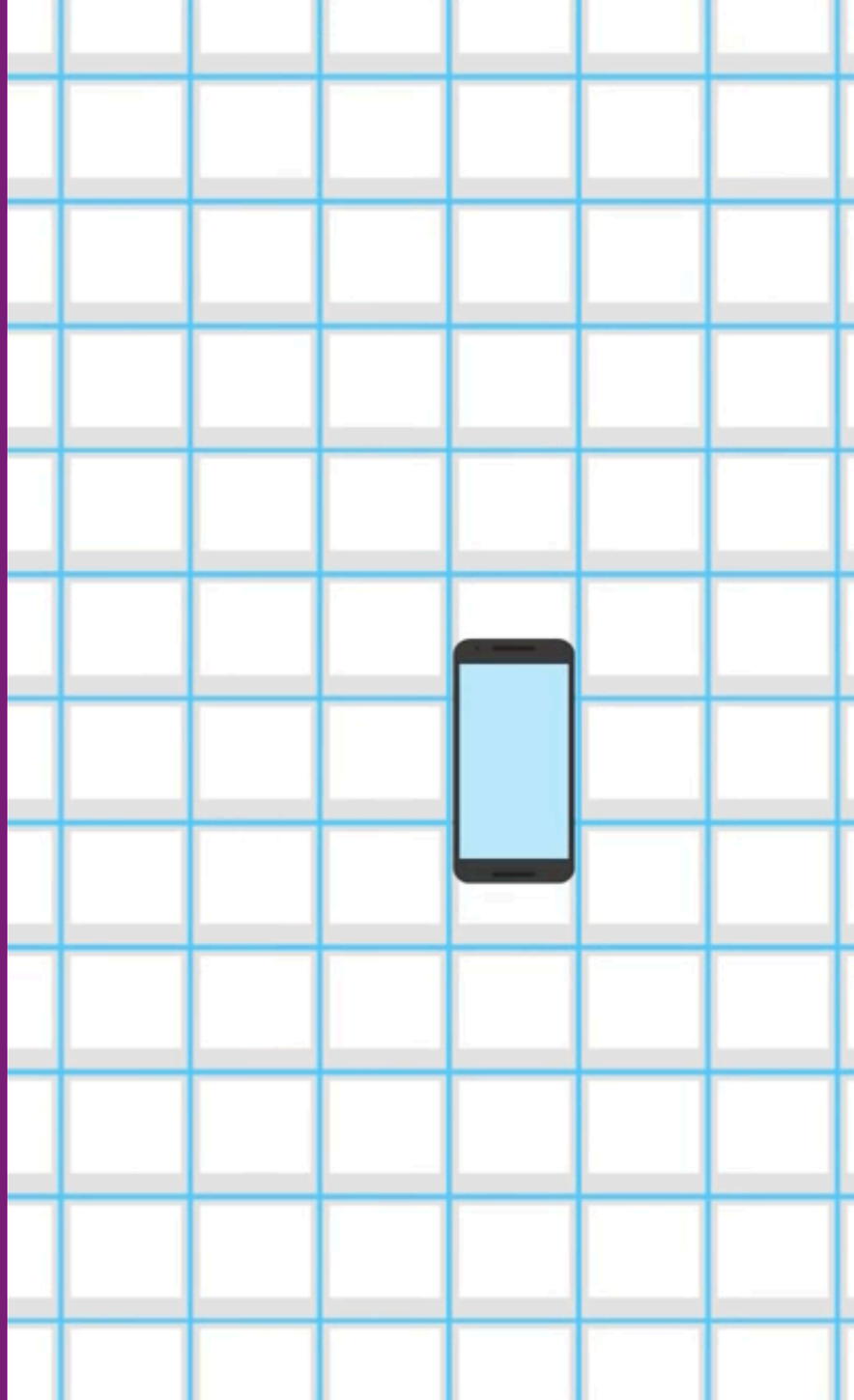
# FIREBASE STORAGE

- https://www.youtube.com/watch?list=PLl-K7zZEsYLmOF_07layrTntevxtbUxDL&v=_tyjqozrEPY



# FIREBASE STORAGE

- Cloud Storage for Firebase stores files (blobs)
  - Images
  - Video
  - ...
- Storage is also accessible through Google Cloud Storage



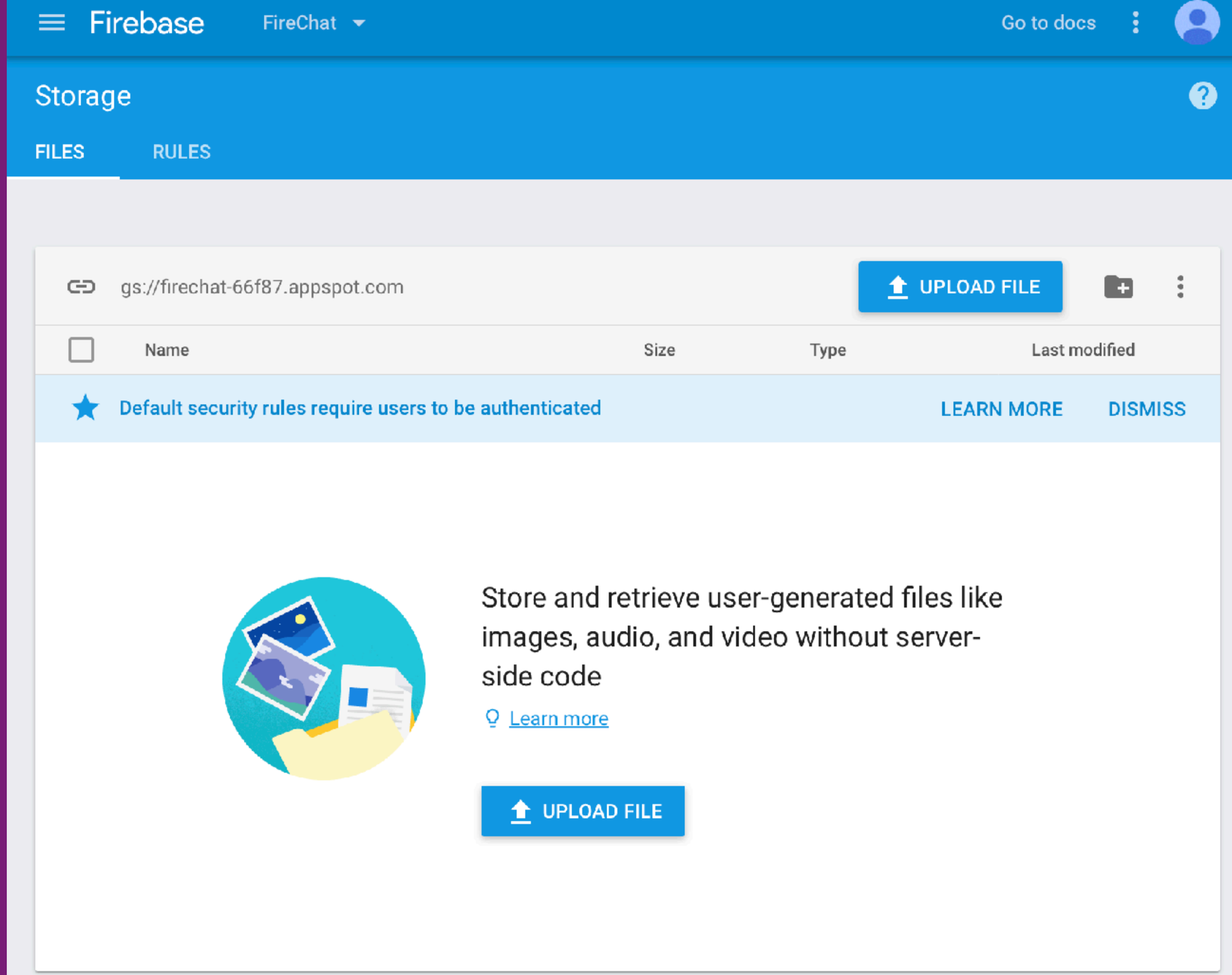
# FIREBASE STORAGE

- Cloud Storage for Firebase stores files (blobs)
  - Images
  - Video
  - ...
- Storage is also accessible through Google Cloud Storage

| | | |
|---|---|---|
| 1 | Integrate the Firebase SDKs for Cloud Storage. | Quickly include clients via Gradle, CocoaPods, or a script include. |
| 2 | Create a Reference | Reference the path to a file, such as "images/mountains.png", to upload, download, or delete it. |
| 3 | Upload or Download | Upload or download to native types in memory or on disk. |
| 4 | Secure your Files | Use Firebase Security Rules for Cloud Storage to secure your files. |

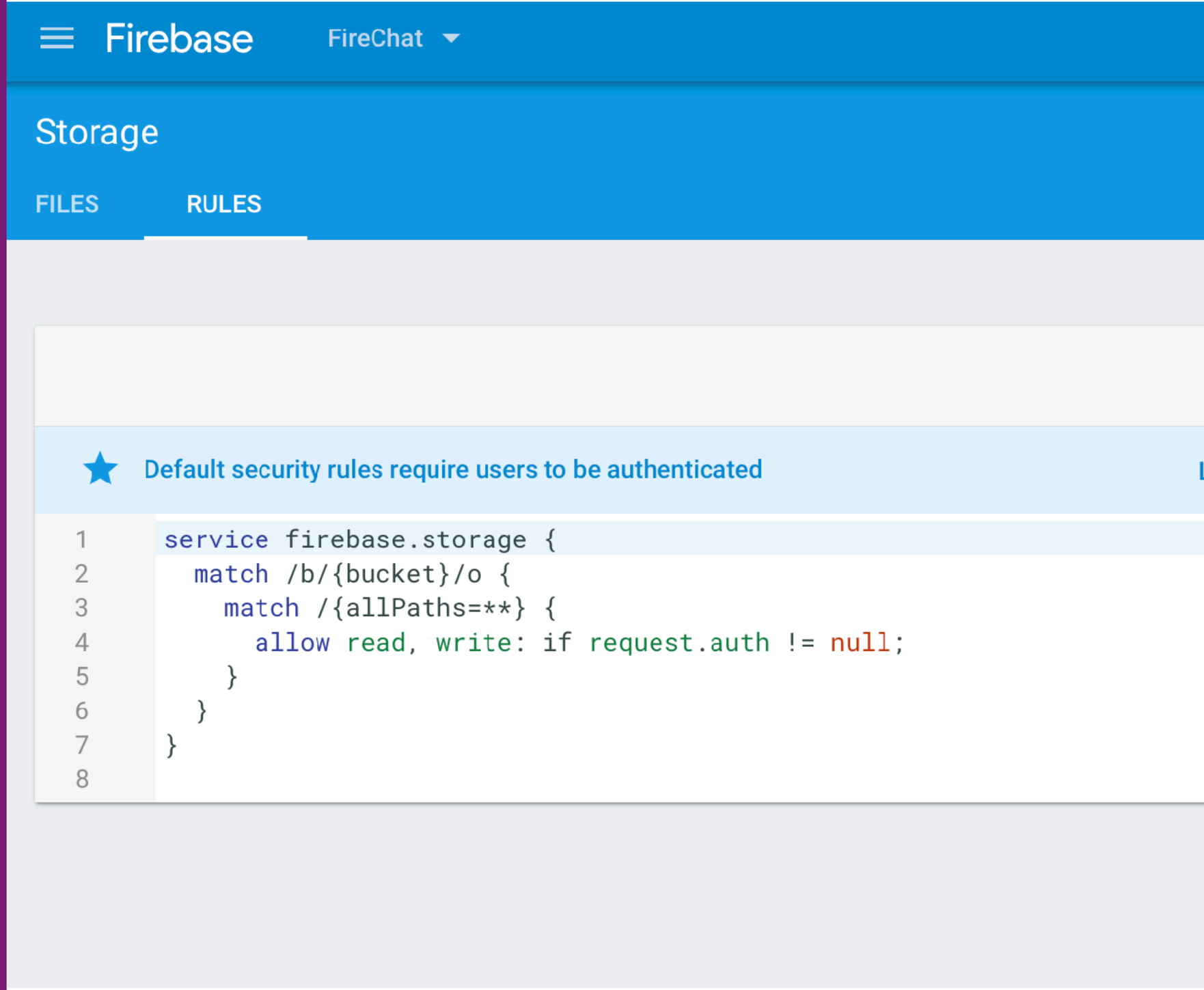
# FIREBASE STORAGE

- Online console for storage
- Set permission rules



# FIREBASE STORAGE

- Online console for storage
- Set permission rules



# FIREBASE STORAGE

```
# Uncomment the next line to define a global platform for your project
 platform :ios, '9.0'

target 'FireChat' do
  # Comment the next line if you're not using Swift and don't want to use dynamic framew
  use_frameworks!

  # Pods for FireChat
  pod 'Firebase/Core'
  pod 'Firebase/Database'

  pod 'Firebase/Auth'
  pod 'GoogleSignIn'

  pod 'Firebase/Crash'

  pod 'Firebase/Storage'

end
```

# FIREBASE STORAGE

```
// Only authenticated users can read or write to the bucket
service firebase.storage {
  match /b/{bucket}/o {
    match /{allPaths=**} {
      allow read, write: if request.auth != null;
    }
  }
}
```

- Default - users only

# FIREBASE STORAGE

```
// Anyone can read or write to the bucket, even non-users of your app.
// Because it is shared with Google App Engine, this will also make
// files uploaded via GAE public.
service firebase.storage {
  match /b/{bucket}/o {
    match /{allPaths=**} {
      allow read, write;
    }
  }
```

- Public

# FIREBASE STORAGE

```
// Grants a user access to a node matching their user ID
service firebase.storage {
  match /b/{bucket}/o {
    // Files look like: "user/<UID>/path/to/file.txt"
    match /user/{userId}/{allPaths=**} {
      allow read, write: if request.auth.uid == userId;
    }
  }
```

- User based storage

# FIREBASE STORAGE

```
// Access to files through Firebase Storage is completely disallowed.
// Files may still be accessible through Google App Engine or GCS APIs.
service firebase.storage {
  match /b/{bucket}/o {
    match /{allPaths=**} {
      allow read, write: if false;
    }
  }
}
```

- Private

# FIREBASE STORAGE

- References to our storage
- Data accesible by path

```
// Points to the root reference
let storageRef = FIRStorage.storage().reference()

// Points to "images"
let imagesRef = storageRef.child("images")

// Points to "images/space.jpg"
// Note that you can use variables to create child values
let fileName = "space.jpg"
let spaceRef = imagesRef.child(fileName)

// File path is "images/space.jpg"
let path = spaceRef.fullPath;

// File name is "space.jpg"
let name = spaceRef.name;

// Points to "images"
let images = spaceRef.parent()
```

# FIREBASE STORAGE

```
// Create a root reference
let storageRef = storage.reference()

// Create a reference to "mountains.jpg"
let mountainsRef = storageRef.child("mountains.jpg")

// Create a reference to 'images/mountains.jpg'
let mountainImagesRef = storageRef.child("images/mountains.jpg")

// While the file names are the same, the references point to different files
mountainsRef.name == mountainImagesRef.name;            // true
mountainsRef.fullPath == mountainImagesRef.fullPath;    // false
```

- Create a reference node

# UPLOAD

# FIREBASE STORAGE

```
// Data in memory
let data = Data()

// Create a reference to the file you want to upload
let riversRef = storageRef.child("images/rivers.jpg")

// Upload the file to the path "images/rivers.jpg"
let uploadTask = riversRef.put(data, metadata: nil) { (metadata, error) in
  guard let metadata = metadata else {
    // Uh-oh, an error occurred!
    return
  }
  // Metadata contains file metadata such as size, content-type, and download URL.
  let downloadURL = metadata.downloadURL
}
```

- Upload from image in memory

# FIREBASE STORAGE

```
// File located on disk
let localFile = URL(string: "path/to/image")!

// Create a reference to the file you want to upload
let riversRef = storageRef.child("images/rivers.jpg")

// Upload the file to the path "images/rivers.jpg"
let uploadTask = riversRef.putFile(localFile, metadata: nil) { metadata, error in
  if let error = error {
    // Uh-oh, an error occurred!
  } else {
    // Metadata contains file metadata such as size, content-type, and download URL.
    let downloadURL = metadata!.downloadURL()
  }
}
```

- Upload from image on disk

# FIREBASE STORAGE

```
// Upload a file in our asset catalog; this is just an example
func uploadFile() {
  // Local file you want to upload
  let data = UIImagePNGRepresentation(UIImage(named:"Kitten")!)
  let kittenRef = storageRef.child("images/kitten.jpg")


  // Create the file metadata
  let metadata = FIRStorageMetadata()
  metadata.contentType = "image/jpeg"


  // Upload the file to the path "images/kitten.jpg"
  let _ = kittenRef.put(data!, metadata: nil) { (metadata, error) in
    guard let metadata = metadata else {
      // Uh-oh, an error occurred!
      return
    }
    // Metadata contains file metadata such as size, content-type, and download URL.
    _ = metadata.downloadURL
  }
}
```

# FIREBASE STORAGE

- Default metadata is taken from the image
- You can override it

```
// Create storage reference
let mountainsRef = storageRef.child("images/mountains.jpg")

// Create file metadata including the content type
let metadata = FIRStorageMetadata()
metadata.contentType = "image/jpeg"

// Upload data and metadata
mountainsRef.put(data, metadata: metadata)

// Upload file and metadata
mountainsRef.putFile(localFile, metadata: metadata)
```

# FIREBASE STORAGE

```
// Add a progress observer to an upload task
let observer = uploadTask.observe(.progress) { snapshot in
  // A progress event occured
}
```

- Observe progress on a file upload

# FIREBASE STORAGE

```
// Local file you want to upload
let localFile = URL(string: "path/to/image")!

// Create the file metadata
let metadata = FIRStorageMetadata()
metadata.contentType = "image/jpeg"

// Upload file and metadata to the object 'images/mountains.jpg'
let uploadTask = storageRef.putFile(localFile, metadata: metadata)

// Listen for state changes, errors, and completion of the upload.
uploadTask.observe(.resume) { snapshot in
  // Upload resumed, also fires when the upload starts
}

uploadTask.observe(.pause) { snapshot in
  // Upload paused
}

uploadTask.observe(.progress) { snapshot in
  // Upload reported progress
  let percentComplete = 100.0 * Double(snapshot.progress!.completedUnitCount)
    / Double(snapshot.progress!.totalUnitCount)
}
```

UPLOAD AND OBSERVE

# DOWNLOAD

# FIREBASE STORAGE

- Once you have a reference, you can download files from Cloud Storage in three ways:
  - Download to NSData in memory
  - Download to an NSURL representing a file on device
  - Generate an NSURL representing the file online

# FIREBASE STORAGE

```
// Create a reference with an initial file path and name
let pathReference = storage.reference(withPath: "images/stars.jpg")

// Create a reference from a Google Cloud Storage URI
let gsReference = storage.reference(forURL: "gs://<your-firebase-storage-bucket>/images/stars.jpg")

// Create a reference from an HTTPS URL
// Note that in the URL, characters are URL escaped!
let httpsReference = storage.reference(forURL: "https://firebasestorage.googleapis.com/b/bucket/o/im
```

- Files are accessible through different APIs

# FIREBASE STORAGE

```
// Create a reference to the file you want to download
let starsRef = storageRef.child("images/stars.jpg")

// Fetch the download URL
starsRef.downloadURL { url, error in
  if let error = error {
    // Handle any errors
  } else {
    // Get the download URL for 'images/stars.jpg'
  }
}
```

- Files are accessible through different APIs

# FIREBASE STORAGE

```
// Create a reference to the file you want to download
let islandRef = storageRef.child("images/island.jpg")

// Create local filesystem URL
let localURL = URL(string: "path/to/image")!

// Download to the local filesystem
let downloadTask = islandRef.write(toFile: localURL) { url, error in
  if let error = error {
    // Uh-oh, an error occurred!
  } else {
    // Local file URL for "images/island.jpg" is returned
  }
}
```

- Download to file on disk

# FIREBASE STORAGE

- Why work so hard?
- FirebaseUI (part of Storage) will download and cache
  - Based on SDWedImage


build passing | pod v4.0.0 | platform osx | ios | tvos | watchos | license MIT | dependencies up to date | references | codecov 76%

This library provides an async image downloader with cache support. For convenience, we added c
elements like `UIImageView`, `UIButton`, `MKAnnotationView`.

## Features

- [x] Categories for `UIImageView`, `UIButton`, `MKAnnotationView` adding web image and cache m
- [x] An asynchronous image downloader
- [x] An asynchronous memory + disk image caching with automatic cache expiration handling
- [x] A background image decompression
- [x] A guarantee that the same URL won't be downloaded several times
- [x] A guarantee that bogus URLs won't be retried again and again
- [x] A guarantee that main thread will never be blocked
- [x] Performances!
- [x] Use GCD and ARC

## Supported Image Formats

- Image formats supported by UIImage (JPEG, PNG, ...), including GIF
- WebP format, including animated WebP (use the `WebP` subspec)

## Requirements

# FIREBASE STORAGE

```
// Reference to an image file in Firebase Storage
let reference = storageRef.child("images/stars.jpg")

// UIImageView in your ViewController
let imageView: UIImageView = self.imageView

// Placeholder image
let placeholderImage = UIImage(named: "placeholder.jpg")

// Load the image using SDWebImage
imageView.sd_setImage(with: reference, placeholderImage: placeholderImage)
```

HAVEN'T QUITE GOT IT TO WORK AS ADVERTISED

- Download directly to UIImage
- Swap from placeholder to real image once downloaded

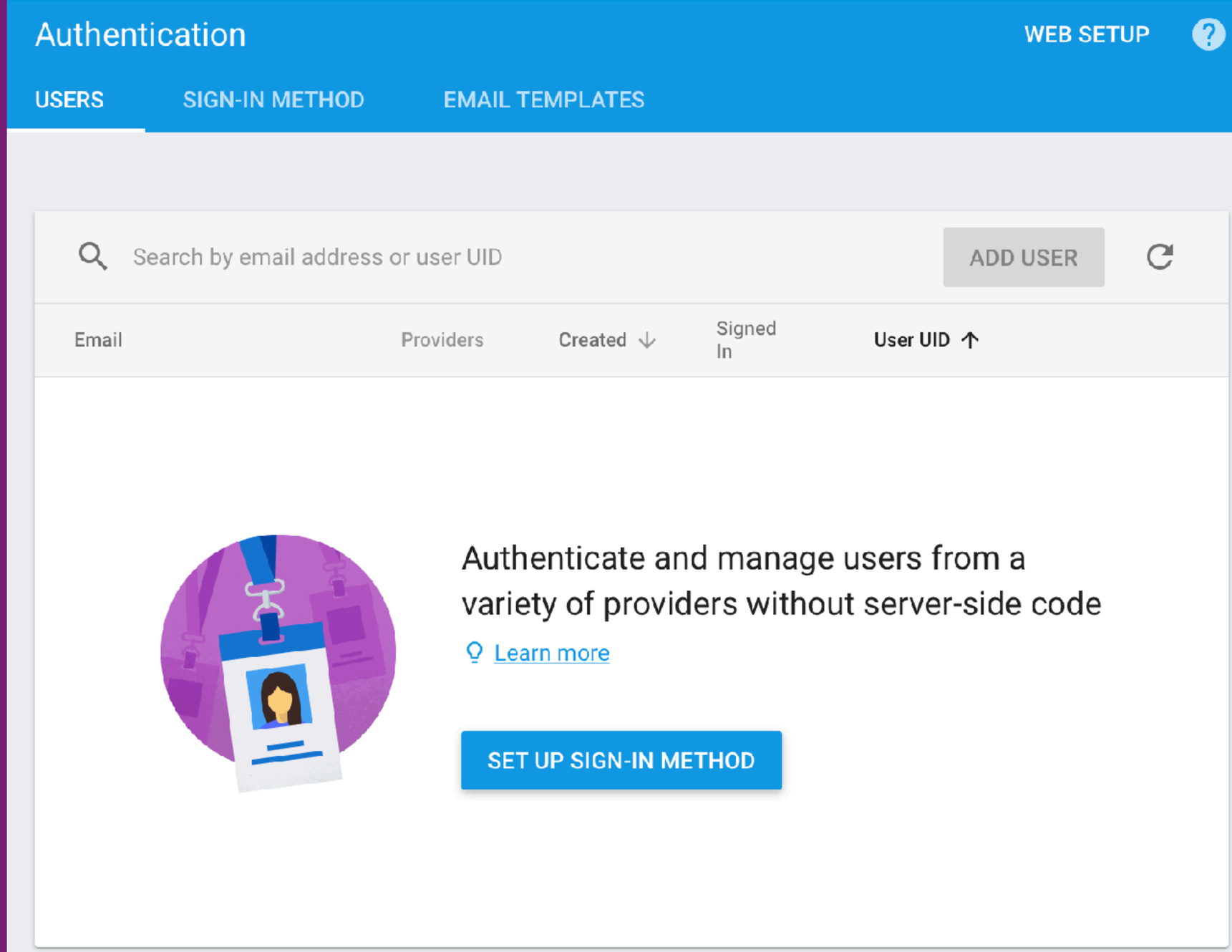
# FIREBASE AUTHENTICATION

# FIREBASE AUTHENTICATION

- https://www.youtube.com/watch?v=8sGY55yxicA&index=14&list=PLI-K7zZEsYLmOF_07IayrTntevxtbUxDL

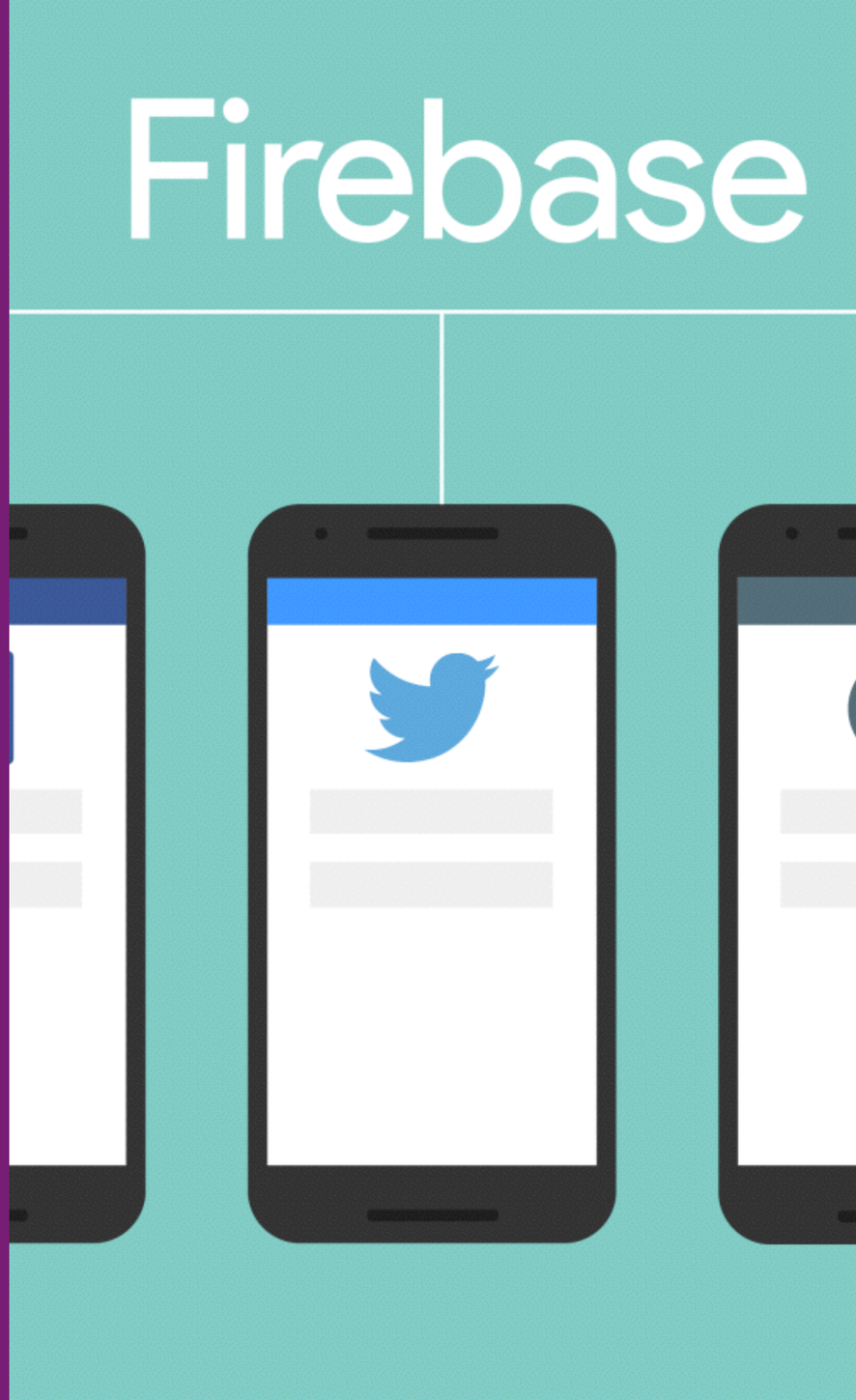
# FIREBASE AUTHENTICATION

- Provide a secure and customized experience for users
- Many options, including your own custom systems



# FIREBASE AUTHENTICATION

- Authentication flow
  - User logins to service through interface
  - Credentials passed to Firebase Authentication SDK
  - Backend does authorization and passes back response from the client



# FIREBASE AUTHENTICATION

- Using FirebaseUI Auth

## Using FirebaseUI Auth

| | | |
|---|---|---|
| 1 | Set up sign-in methods | For email address and password sign-in and any federated identity providers you want to support, enable them in the Firebase console and complete any configuration required by the identity provider, such as setting your OAuth redirect URL. |
| 2 | Customize the sign-in UI | You can customize the sign-in UI by setting FirebaseUI options, or fork the code on GitHub to customize the sign-in experience further. |
| 3 | Use FirebaseUI to perform the sign-in flow | Import the FirebaseUI library, specify the sign-in methods you want to support, and initiate the FirebaseUI sign-in flow. |

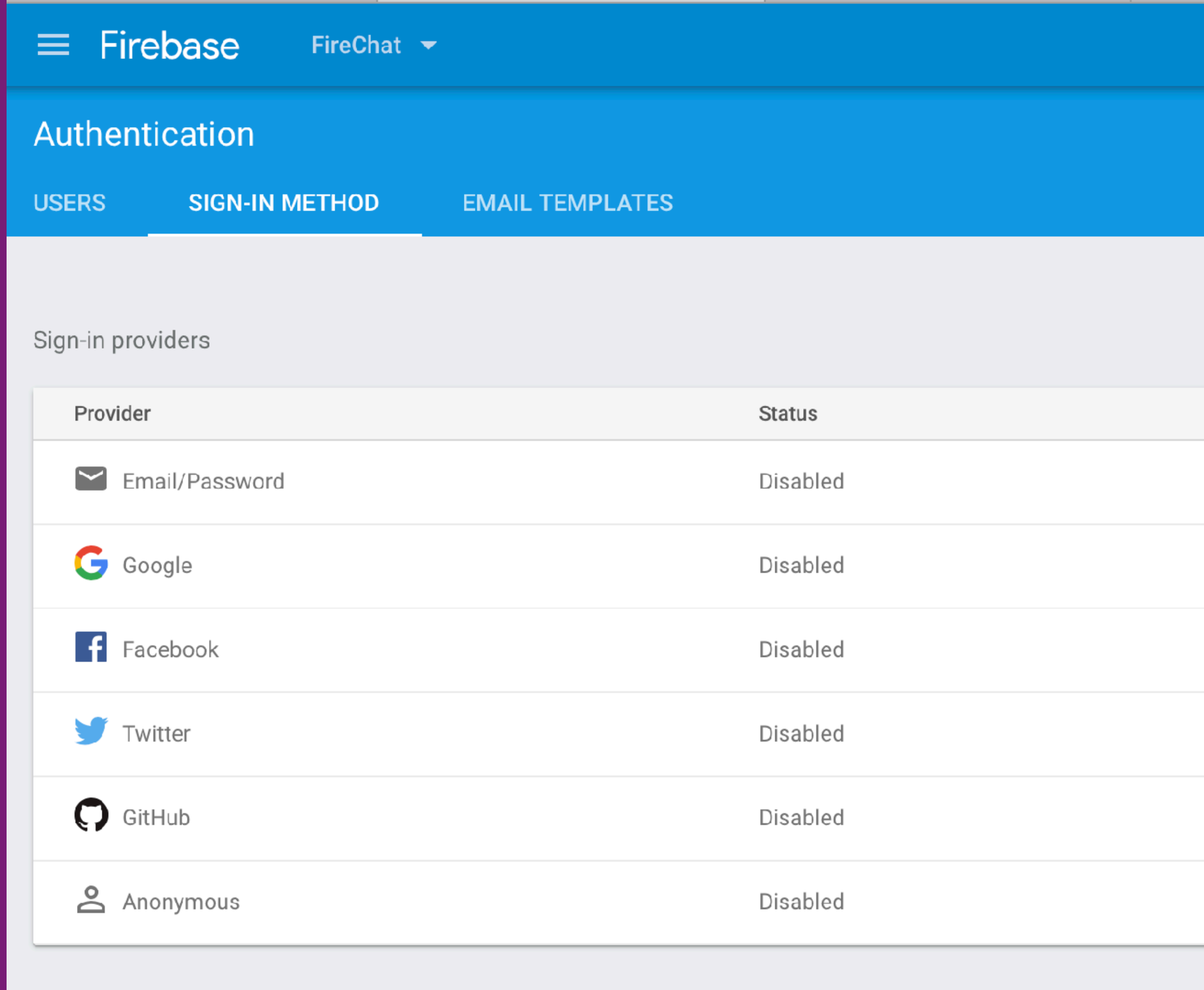
# FIREBASE AUTHENTICATION

- Firebase Authentication SDK

| Using the Firebase Authentication SDK | | |
|---|---|---|
| 1 | Set up sign-in methods | For email address and password sign-in and any federated identity providers you want to support, enable them in the Firebase console and complete any configuration required by the identity provider, such as setting your OAuth redirect URL. |
| 2 | Implement UI flows for your sign-in methods | For email address and password sign-in, implement a flow that prompts users to type their email addresses and passwords. For federated sign-in, implement the flow required by each provider. |
| 3 | Pass the user's credentials to the Firebase Authentication SDK | Pass the user's email address and password or the OAuth token that was acquired from the federated identity provider to the Firebase Authentication SDK. |

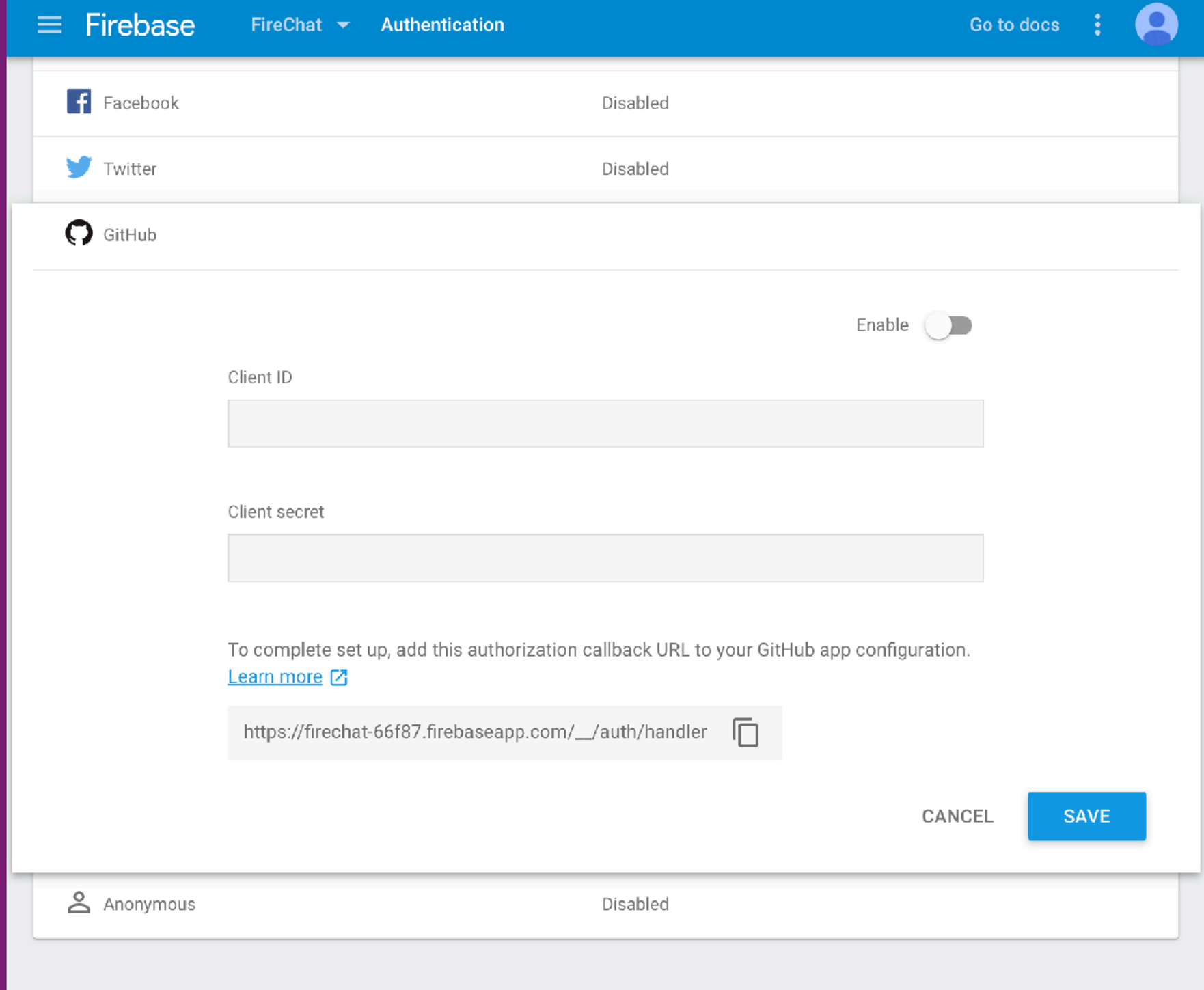
# FIREBASE AUTHENTICATION

- Select method



# FIREBASE AUTHENTICATION

- Third-party authentication requires granting access

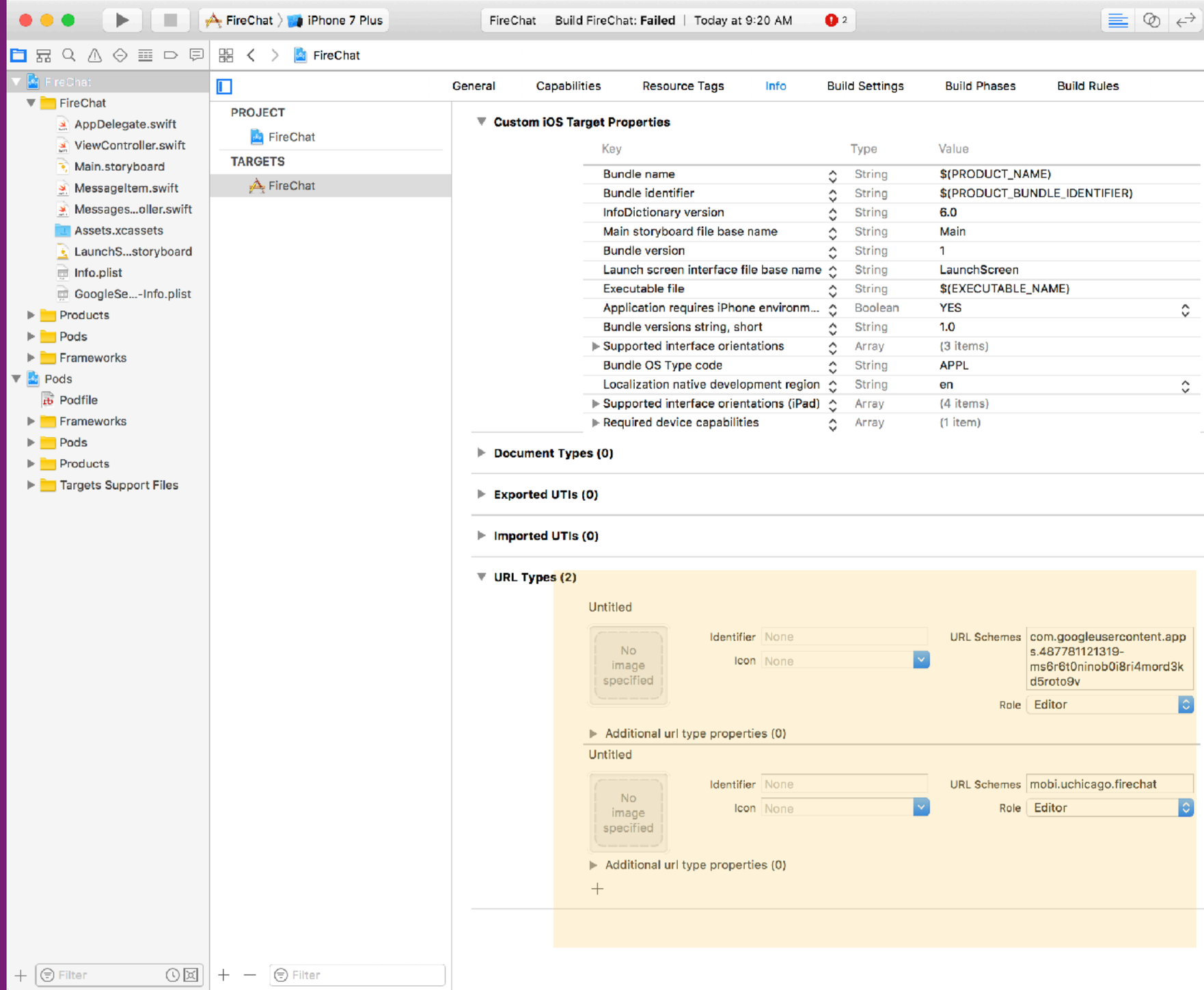


# FIREBASE AUTHENTICATION

```
 platform :ios, '9.0'

target 'FireChat' do
  # Comment the next line if you're not using Swift and don't want
      to use dynamic frameworks
  use_frameworks!

  # Pods for FireChat
  pod 'Firebase/Core'
  pod 'Firebase/Database'

  pod 'Firebase/Auth'
  pod 'GoogleSignIn'


end
```

# FIREBASE AUTHENTICATION

- Add URL types to the target info
- Provides way to launch app from login callback



# FIREBASE AUTHENTICATION

- Update the app delegate to handle authentication

```
//
//  AppDelegate.swift
//  FireChat
//
//  Created by T. Andrew Binkowski on 4/19/17.
//  Copyright © 2017 T. Andrew Binkowski. All rights reserved.
//

import UIKit
import Firebase
import GoogleSignIn

@UIApplicationMain
class AppDelegate: UIResponder, UIApplicationDelegate, GIDSignInDelegate {

    var window: UIWindow?

    override init() {...}

    func application(_ application: UIApplication, didFinishLaunchingWithOptions launchOptions: [UIApplicationLaunchOptionsKey: Any]?)

    func applicationWillResignActive(_ application: UIApplication) {...}

    func applicationDidEnterBackground(_ application: UIApplication) {...}

    func applicationWillEnterForeground(_ application: UIApplication) {...}

    func applicationDidBecomeActive(_ application: UIApplication) {...}

    func applicationWillTerminate(_ application: UIApplication) {...}

    // Open the app from URL callback during Google authentication
    @available(iOS 9.0, *)
    func application(_ application: UIApplication,
                     open url: URL,
                     options: [UIApplicationOpenURLOptionsKey : Any]) -> Bool {
      return GIDSignIn.sharedInstance().handle(url,
                                               sourceApplication:options[UIApplicationOpenURLOptionsKey.sourceApplication] as? String,
                                               annotation: [:])
    }



    //
    // MARK: - Google Sign In/Out Delegate Methods
    //
    func sign(_ signIn: GIDSignIn!, didSignInFor user: GIDGoogleUser!, withError error: Error?) {...}


    func sign(_ signIn: GIDSignIn!, didDisconnectWith user: GIDGoogleUser!, withError error: Error!) {...}
```

# FIREBASE AUTHENTICATION

```
// Open the app from URL callback during Google authentication
@available(iOS 9.0, *)
func application(_ application: UIApplication,
                 open url: URL,
                 options: [UIApplicationOpenURLOptionsKey : Any]) -> Bool {
  return GIDSignIn.sharedInstance().handle(url,
                                           sourceApplication:options[UIApplicationOpenURLOptionsKey.sourceApplication] as? String,
                                           annotation: [:])
}



//
// MARK: - Google Sign In/Out Delegate Methods
//
func sign(_ signIn: GIDSignIn!, didSignInFor user: GIDGoogleUser!, withError error: Error?) {•••}
```

- Allows the app to open from a callback

# FIREBASE AUTHENTICATION

```
//
// MARK: - Google Sign In/Out Delegate Methods
//
func sign(_ signIn: GIDSignIn!, didSignInFor user: GIDGoogleUser!, withError error: Error?) {
  if let error = error {
    print(error.localizedDescription)
    return
  }

  // Use Google authentication to get credentials
  guard let authentication = user.authentication else { return }
  let credential = FIRGoogleAuthProvider.credential(withIDToken: authentication.idToken,
                                                    accessToken: authentication.accessToken)
  FIRAuth.auth()?.signIn(with: credential) { (user, error) in
    if let error = error {
      print(error.localizedDescription)
      return
    }
  }
}


func sign(_ signIn: GIDSignIn!, didDisconnectWith user: GIDGoogleUser!, withError error: Error!) {•••}
```

SUCCESS FROM GOOGLE NOW PASS TO FIREBASE

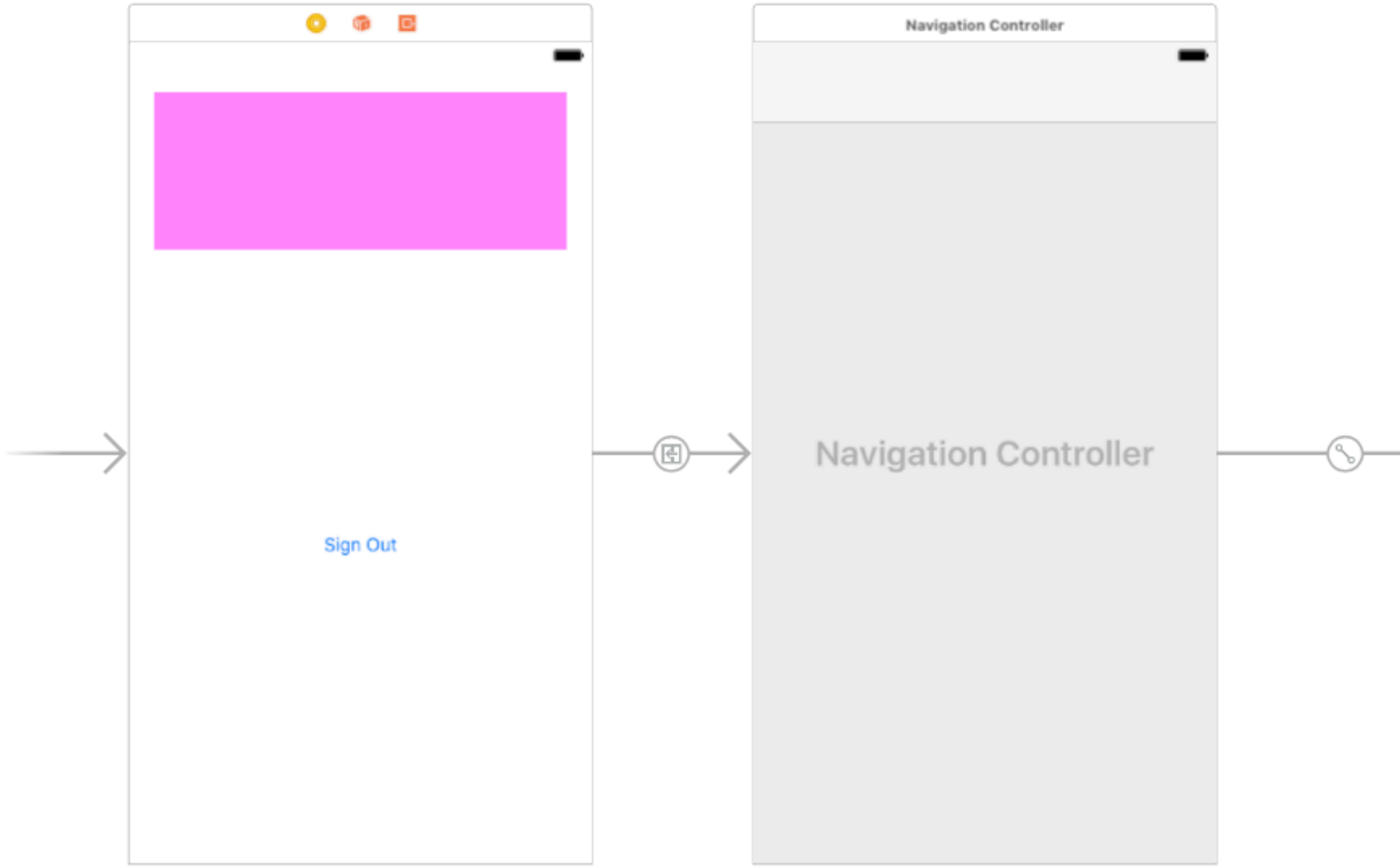
# FIREBASE AUTHENTICATION

```
//
// MARK: - Google Sign In/Out Delegate Methods
//
func sign(_ signIn: GIDSignIn!, didSignInFor user: GIDGoogleUser!, withError error: Error?) {•••}


func sign(_ signIn: GIDSignIn!, didDisconnectWith user: GIDGoogleUser!, withError error: Error!) {
  // Perform any operations when the user disconnects from app here.
  print("Signed out...")
}
```

DO SOMETHING WHEN WE LOG OUT

# FIREBASE AUTHENTICATION

- Login view controller
  - Google button
  - Logout button
  - Authenticate
  - Segue when successful



# FIREBASE AUTHENTICATION

- Login view controller
  - Google button
  - Logout button
  - Authenticate
  - Segue when successful

```
import UIKit
import Firebase
import GoogleSignIn

class ViewController: UIViewController, GIDSignInUIDelegate {

  ///
  @IBOutlet weak var signInButton: GIDSignInButton!

  ///
  @IBAction func tapSignOut(_ sender: UIButton) {
    print("Sign out")
    let firebaseAuth = FIRAuth.auth()
    do {
      try firebaseAuth?.signOut()
    } catch let signOutError as NSError {
      print ("Error signing out: %@", signOutError)
    }

  }

  //
  // MARK: -
  //

  override func viewDidLoad() {
    super.viewDidLoad()

    // Login automically or call dialogue
    GIDSignIn.sharedInstance().uiDelegate = self
    GIDSignIn.sharedInstance().signIn()

    // Setup listener
    FIRAuth.auth()!.addStateDidChangeListener() { auth, user in

      // Automatically segue after a successfull login; users seem to
      // hang around while developing, you may need to clean and remove
      // app from simulator
      if user != nil {
        self.performSegue(withIdentifier: "segueToMessages", sender: nil)
      }
    }
  }

  deinit {
  }
}
```

# FIREBASE AUTHENTICATION

```
import UIKit
import Firebase
import GoogleSignIn

class ViewController: UIViewController, GIDSignInUIDelegate {

  ///
  @IBOutlet weak var signInButton: GIDSignInButton!

  ///
  @IBAction func tapSignOut(_ sender: UIButton) {•••}

  //
  // MARK: -
  //

  override func viewDidLoad() {
    super.viewDidLoad()

    // Login automically or call dialogue
    GIDSignIn.sharedInstance().uiDelegate = self
    GIDSignIn.sharedInstance().signIn()

    // Setup listener
    FIRAuth.auth()!.addStateDidChangeListener() { auth, user in

      // Automatically segue after a successfull login; users seem to
      // hang around while developing, you may need to clean and remove
      // app from simulator
      if user != nil {
        self.performSegue(withIdentifier: "segueToMessages", sender: nil)
      }
    }
  }
```

# FIREBASE AUTHENTICATION

```
import UIKit
import Firebase
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class ViewController: UIViewController, GIDSignInUIDelegate {

  ///
  @IBOutlet weak var signInButton: GIDSignInButton!

  ///
  @IBAction func tapSignOut(_ sender: UIButton) {
    print("Sign out")
    let firebaseAuth = FIRAuth.auth()
    do {
      try firebaseAuth?.signOut()
    } catch let signOutError as NSError {
      print ("Error signing out: %@", signOutError)
    }

  }

  //
```
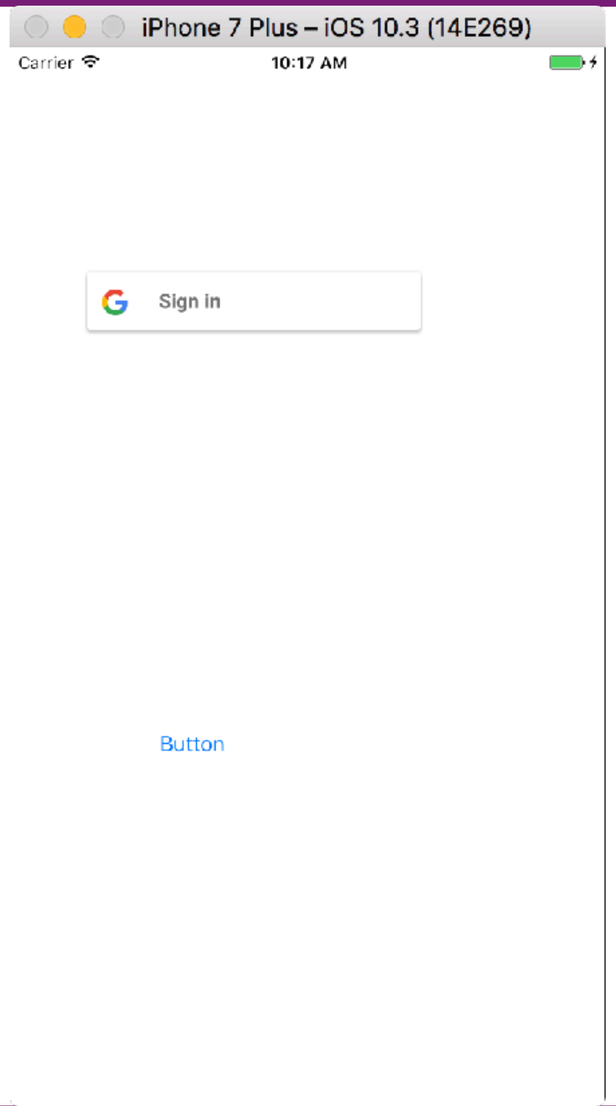
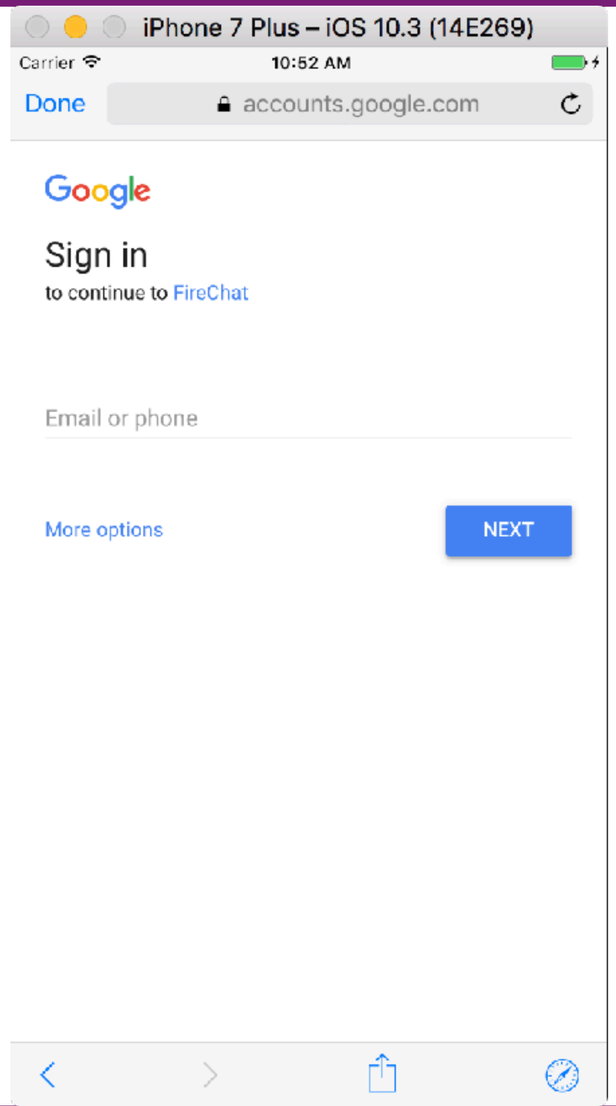
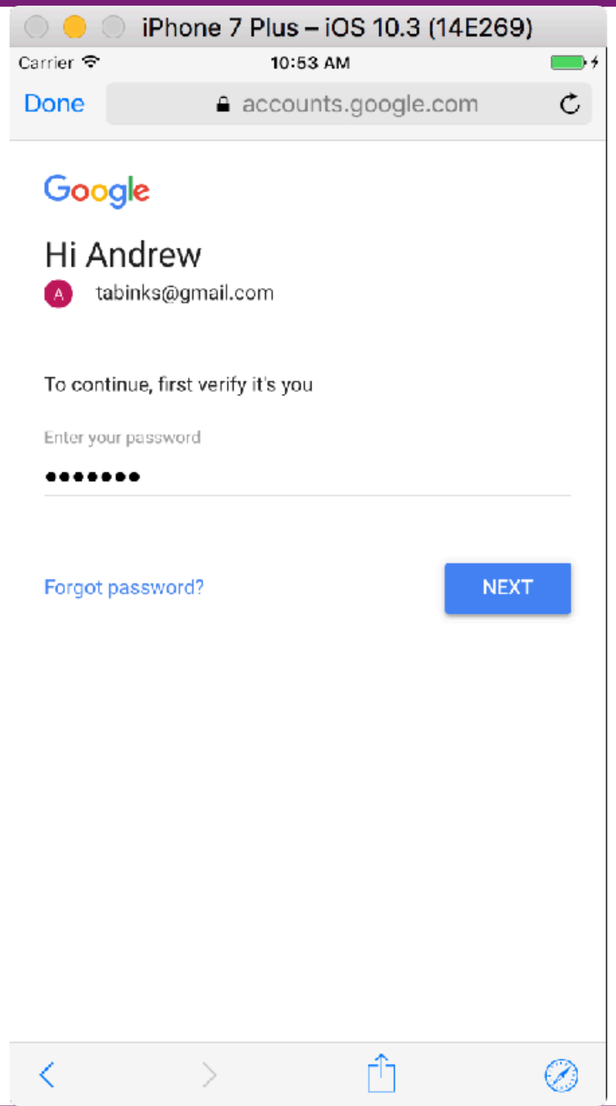
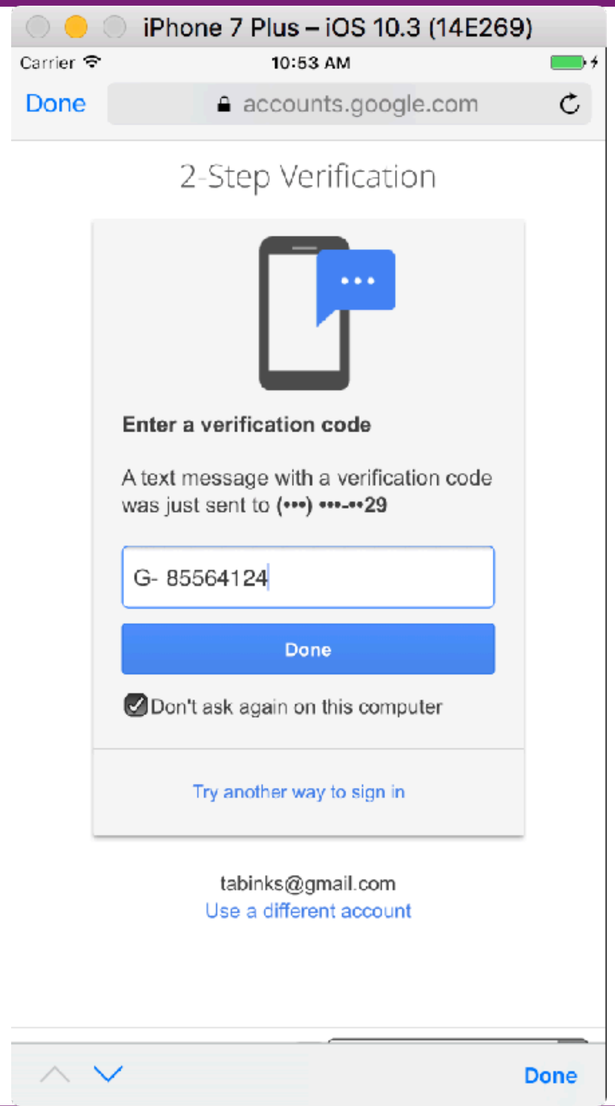

# FIREBASE AUTHENTICATION

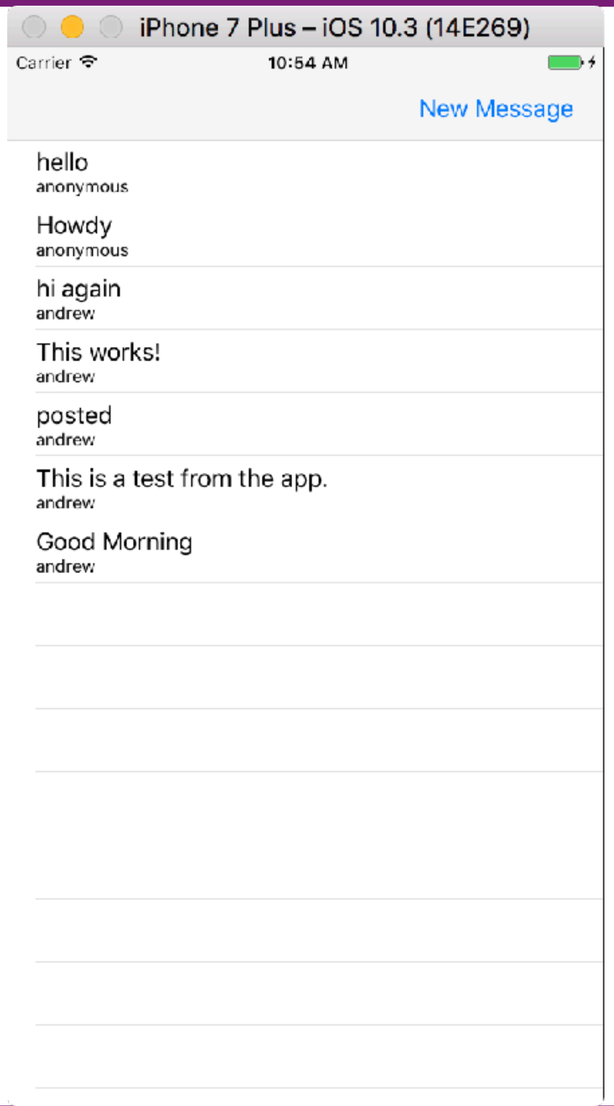


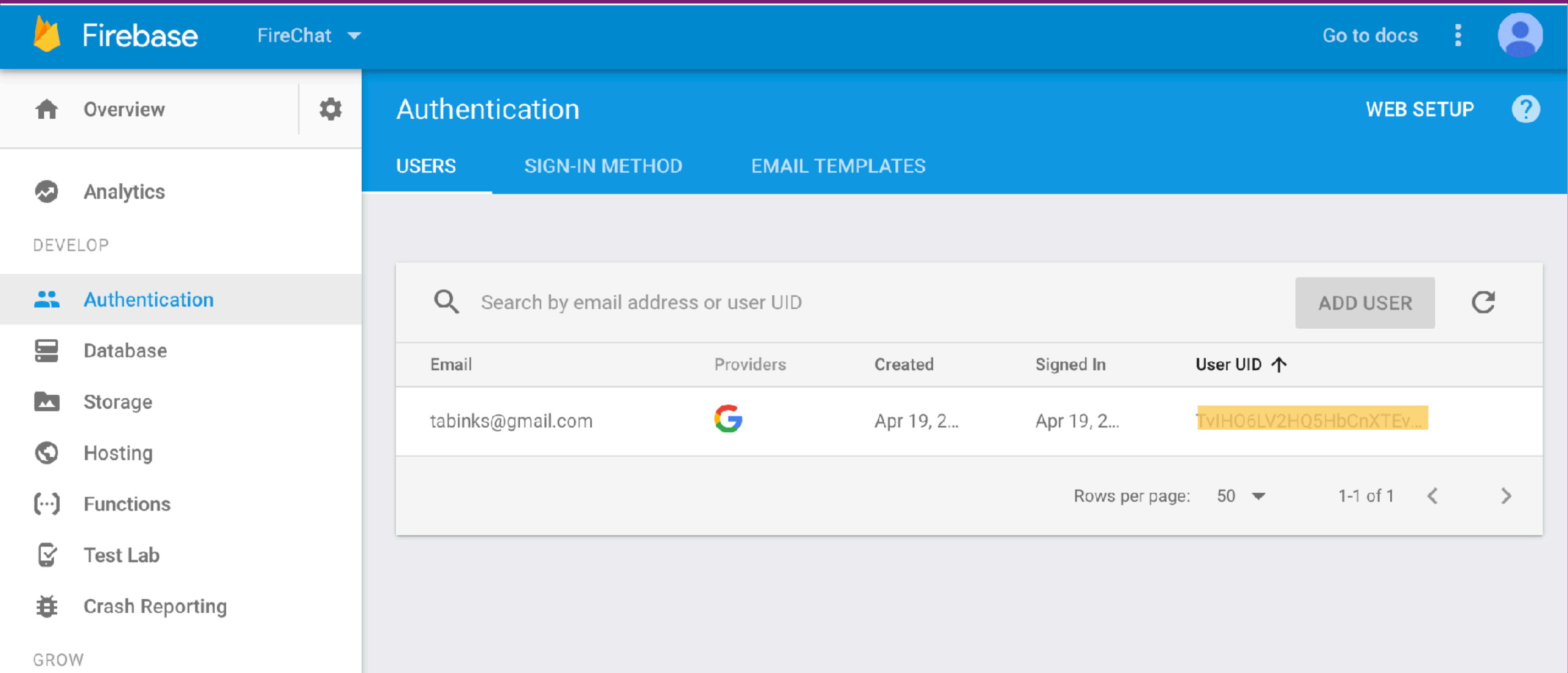
# FIREBASE AUTHENTICATION



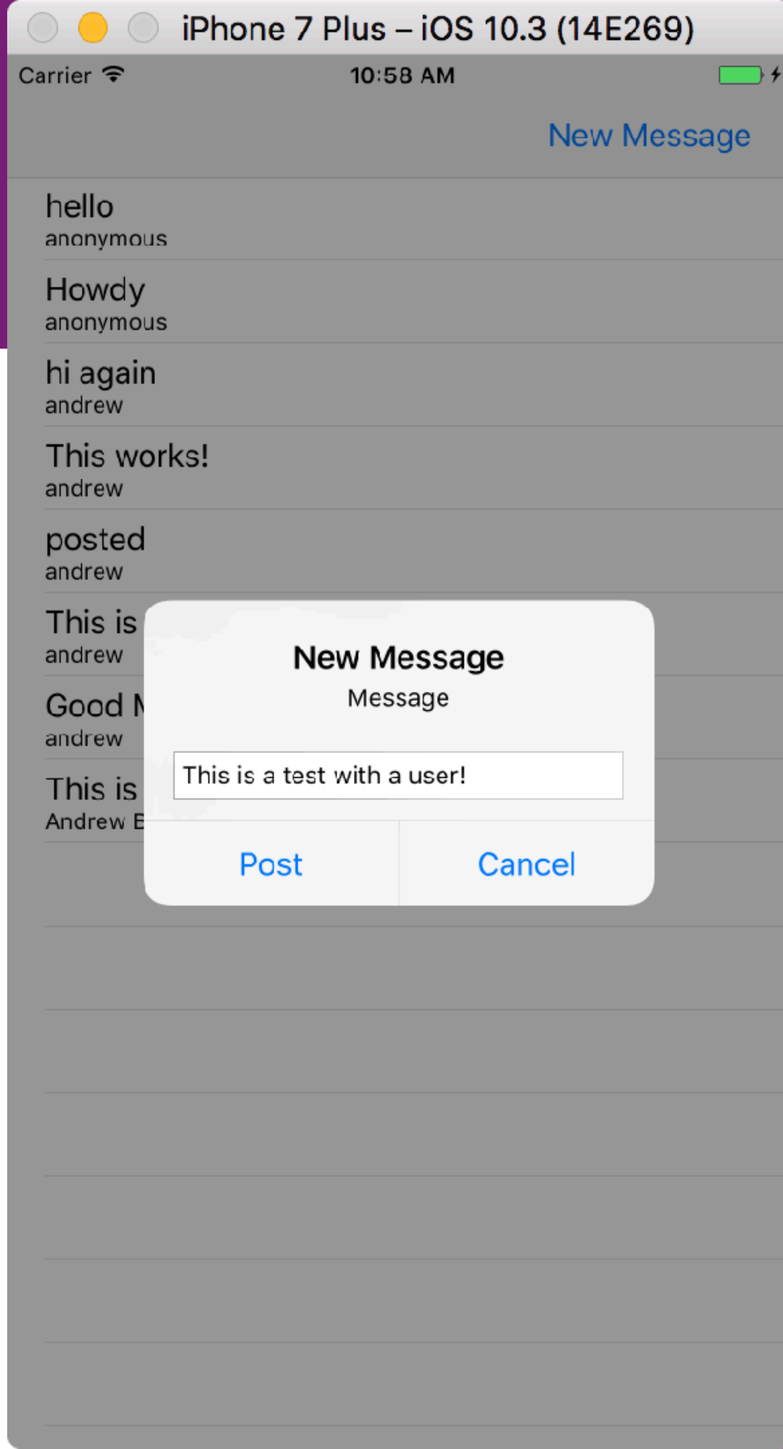



# FIREBASE AUTHENTICATION



# FIREBASE AUTHENTICATION

# FIREBASE ANALYTICS

# FIREBASE ANALYTICS

- https://youtu.be/iT6EaIwtonY?list=PLl-K7zZEsYLmOF_07IayrTntevxtbUxDL

# FIREBASE ANALYTICS

- Firebase Analytics is a free app measurement solution that provides insight on app usage and user engagement
- Installed in Core

# FIREBASE ANALYTICS

- Integrate with other services

| | |
|---|---|
| BigQuery | Link your Firebase Analytics app to BigQuery where you can perform custom analysis on your entire Analytics dataset and import other data sources. |
| Firebase Crash Reporting | Firebase Analytics logs events for each crash so you can get a sense of the rate of crashes for different versions or regions, allowing you to gain insight into which users are impacted. You can also create audiences for users who have experienced multiple crashes and respond with Firebase Notifications directed at that audience. |
| Firebase Notifications | Firebase Analytics automatically logs events that correspond to your Firebase Notifications and supports reporting on the impact of each campaign. |
| Firebase Remote Config | Use Firebase Analytics audience definitions to change the behavior and appearance of your app for different audiences without distributing multiple versions of your app. |
| Google Tag Manager | Integrating Google Tag Manager alongside Firebase Analytics enables you to manage your Firebase Analytics implementation remotely from a web interface after your app has been distributed. |

# FIREBASE ANALYTICS

- Key data is pulled from authentication
- Consider what you what to know

| | | |
|---|---|---|
| 1 | Connect your app to Firebase | Getting started with Analytics is easy. Just add the Firebase SDK to your new or existing app, and data collection begins automatically. You can view analytics data in the Firebase console within hours. |
| 2 | Log custom data | You can use Analytics to log custom events that make sense for your app, like E-Commerce purchases or achievements. |
| 3 | Create audiences | You can define the audiences that matter to you in the Firebase console. |
| 4 | Target audiences | Use your custom audiences to target messages, promotions, or new app features using other Firebase features, such as Notifications, and Remote Config. |

# FIREBASE ANALYTICS

- Automatically tracked events

| Event name | Triggered... |
| --- | --- |
| first_open | the first time a user launches an app after installing or re-installing it.<br><br>This event is not triggered when a user downloads the app onto a device, but instead when he or she first uses it. To see raw download numbers, look in Google Play Developer Console or in iTunesConnect. |
| in_app_purchase | when a user completes an in-app purchase that is processed by the App Store on iTunes or Google Play. The product ID, product name, currency, and quantity are passed as parameters.<br><br>This event is triggered only by versions of your app that include the Firebase SDK. Also, **subscription revenue, paid app-purchase revenue, and refunds are not automatically tracked**, and so your reported revenue may differ from the values you see in the Google Play Developer Console. Events which are flagged as being invalid or sandbox (test) are ignored. |
| user_engagement | periodically, while the app is in the foreground. |
| session_start | when a user engages the app for more than the minimum session duration after a period of inactivity that exceeds the session timeout duration. |

# FIREBASE ANALYTICS

- Predefined events

```
FIRAnalytics.logEvent(withName: kFIREventLogin, parameters: nil)
```

- Custom events

```
FIRAnalytics.logEvent(withName: "message-cancelled", parameters: nil)
```

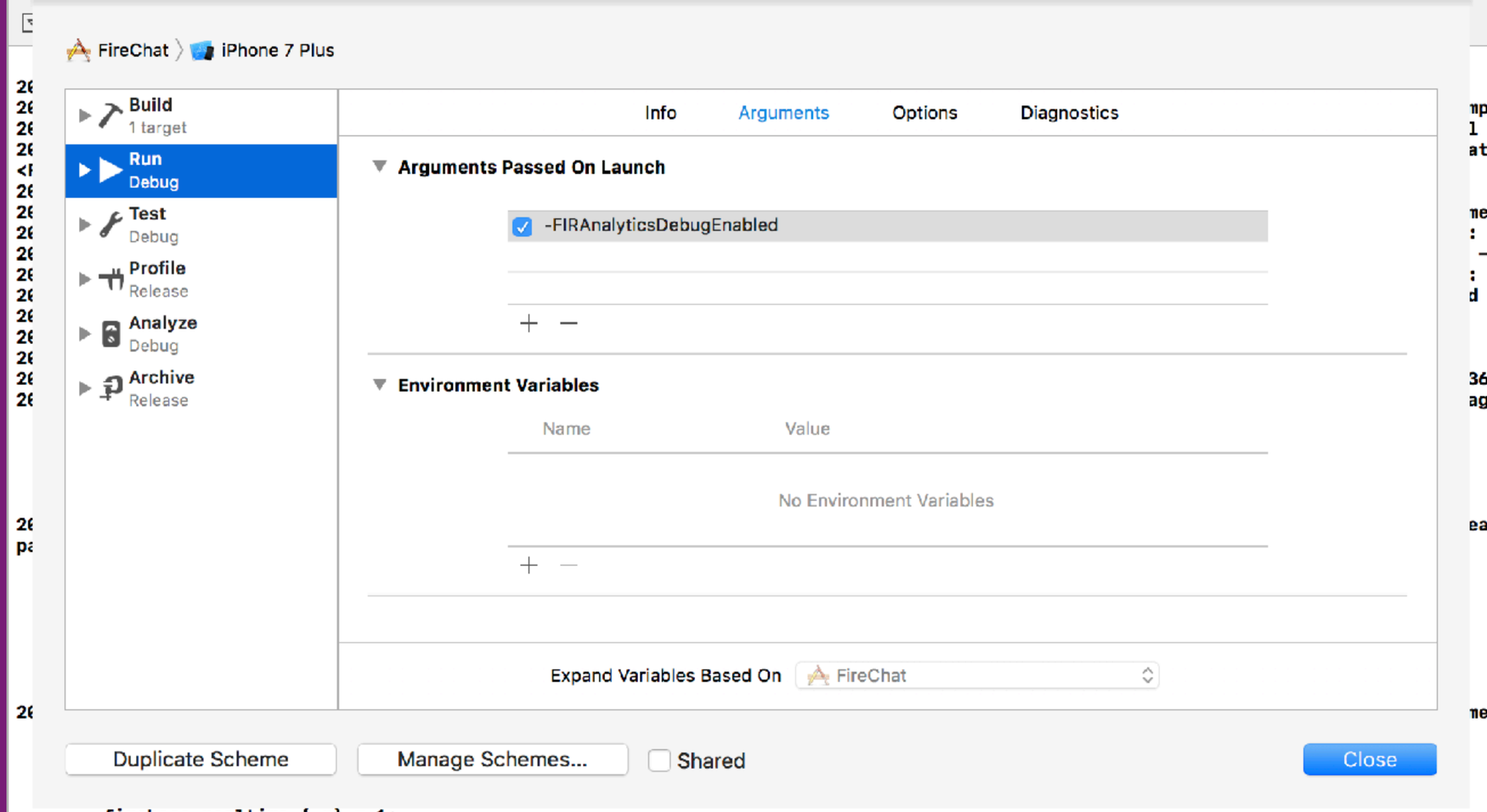
# FIREBASE ANALYTICS

```
@IBAction func tapNewMessage(_ sender: UIBarButtonItem) {
  let alert = UIAlertController(title: "New Message",
                                message: "Message",
                                preferredStyle: .alert)

  let saveAction = UIAlertAction(title: "Post",
                                 style: .default) { _ in

                                  guard let textField = alert.textFields?.first,
                                    let text = textField.text else {
                                      return
                                  }

                                  let data = ["name":self.user?.displayName
                                  self.reference.childByAutoId().setValue(d
  }


  let cancelAction = UIAlertAction(title: "Cancel",
                                   style: .default)
  _ = UIAlertAction(title: "Cancel", style: .default) { (_) in
      FIRAnalytics.logEvent(withName: "message-cancelled", parameters: nil)
  }
  alert.addTextField()
```

TRACK CANCELLED MESSAGES

# FIREBASE ANALYTICS

- View login in the console
  - Products > Scheme
  - Passed on launch




```
        firebase_realtime (_r) = 1;
        firebase_debug (_dbg) = 1;
    }
2017-04-19 11:22:34.865 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS002002] Measurement timer scheduled to fire in approx. (s): 0.
2017-04-19 11:22:34.866 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS023028] Upload task scheduled to be executed in approx. (s): 0
2017-04-19 11:22:35.895 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS002001] Measurement timer fired
2017-04-19 11:22:35.896 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS002003] Measurement timer canceled
2017-04-19 11:22:35.896 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS023033] Starting data upload
2017-04-19 11:22:35.897 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS023105] Event is not subject to real-time event count daily li
real-time. Event
        firebase
        engageme
        firebase
        firebase
        firebase
        firebase_event_origin (_o) = auto;
    }
2017-04-19 11:22:35.898 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS012018] Saving bundle. size (bytes): 397
2017-04-19 11:22:35.899 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS023116] Bundle added to the upload queue. BundleID, timestamp
2017-04-19 11:22:35.906 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS023038] Uploading events. Elapsed time since last successful
```

**-FIRANALYTICSDEBUGENABLED**

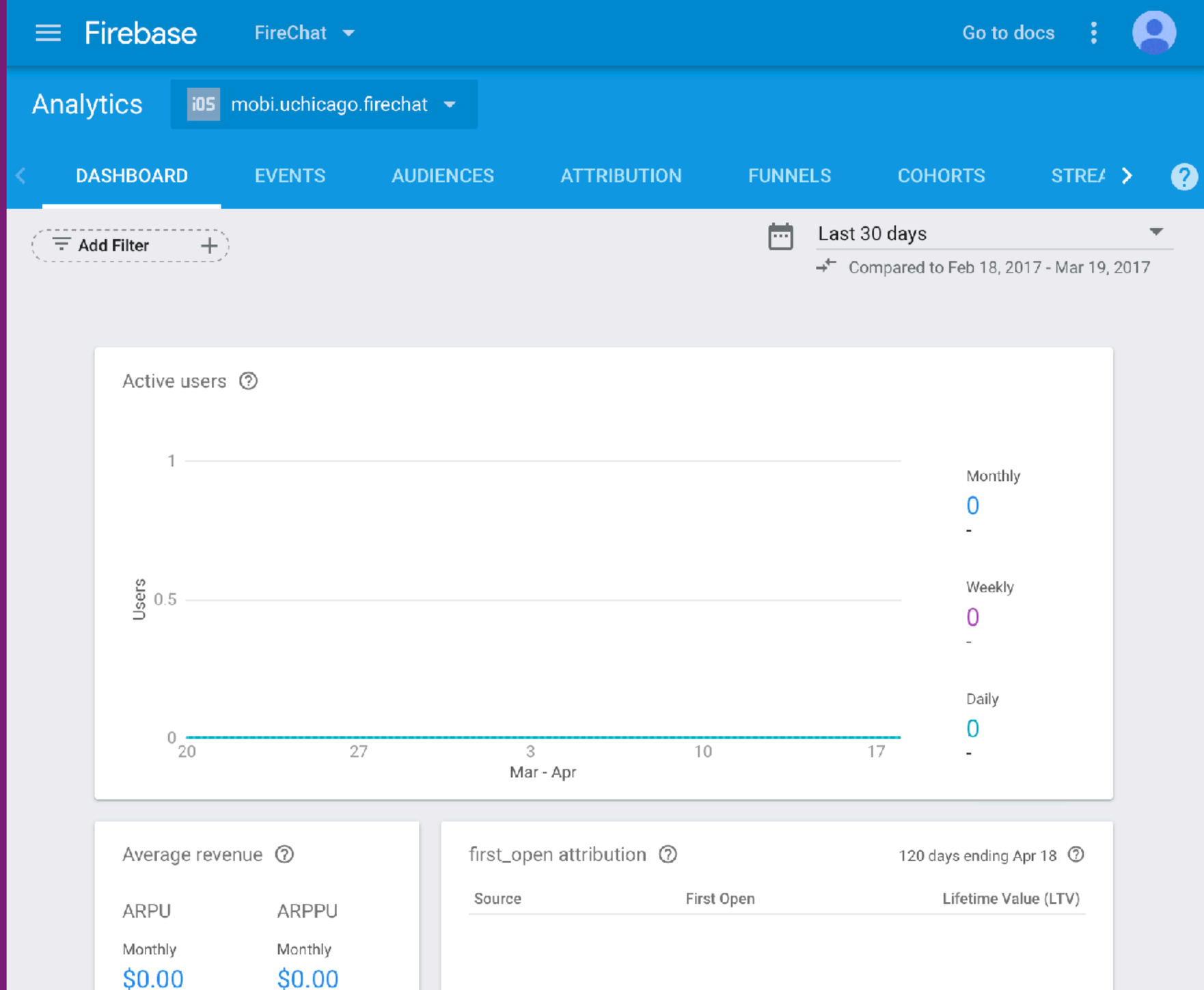
# FIREBASE ANALYTICS

```
2017-04-19 11:22:20.771 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS012018] Saving bundle. size (bytes): 392
2017-04-19 11:22:20.771 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS023116] Bundle added to the upload queue. BundleID, timestamp (ms): 4, 1492618939686
2017-04-19 11:22:20.779 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS023038] Uploading events. Elapsed time since last successful upload (s): 1.4290108680725
2017-04-19 11:22:20.780 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS023039] Measurement data sent to network. Timestamp (ms), data: 1492618940779,
<FIRAPBMeasurementBatch: 0x60000000a2e0>
2017-04-19 11:22:20.782 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS900000] Uploading data. Host: https://app-measurement.com/a
2017-04-19 11:22:20.908 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS901006] Received SSL challenge for host. Host: https://app-measurement.com/a
2017-04-19 11:22:21.039 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS023044] Successful upload. Got network response. Code, size: 204, -1
2017-04-19 11:22:21.041 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS002002] Measurement timer scheduled to fire in approx. (s): -0.3548879027366638
2017-04-19 11:22:21.041 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS023028] Upload task scheduled to be executed in approx. (s): -0.3548879027366638
2017-04-19 11:22:21.048 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS023024] No data to upload. Upload task will not be scheduled
2017-04-19 11:22:21.048 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS002003] Measurement timer canceled
2017-04-19 11:22:34.853 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS033003] Scheduling user engagement timer
2017-04-19 11:22:34.853 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS002003] Engagement timer canceled
2017-04-19 11:22:34.854 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS002002] Engagement timer scheduled to fire in approx. (s): 3600
2017-04-19 11:22:34.854 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS023051] Logging event: origin, name, params: auto, user_engagement (_e), {
        firebase_screen_id (_si) = 7128337720279460482;
        engagement_time_msec (_et) = 15878;
        firebase_screen_class (_sc) = FireChat.MessagesTableViewController;
        firebase_event_origin (_o) = auto;
    }
2017-04-19 11:22:34.854 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS023073] Debug mode is enabled. Marking event as debug and real-time. Event name,
parameters: user_engagement (_e), {
        firebase_screen_id (_si) = 7128337720279460482;
        engagement_time_msec (_et) = 15878;
        firebase_screen_class (_sc) = FireChat.MessagesTableViewController;
        firebase_event_origin (_o) = auto;
        firebase_realtime (_r) = 1;
        firebase_debug (_dbg) = 1;
    }
2017-04-19 11:22:34.864 FireChat[84861] <Debug> [Firebase/Analytics][I-ACS023072] Event logged. Event name, event params: user_er
        firebase_screen_id (_si) = 7128337720279460482;
        engagement_time_msec (_et) = 15878;
        firebase_screen_class (_sc) = FireChat.MessagesTableViewController;
        firebase_event_origin (_o) = auto;
        firebase_realtime (_r) = 1;
```

IT'S A LITTLE CREEPY

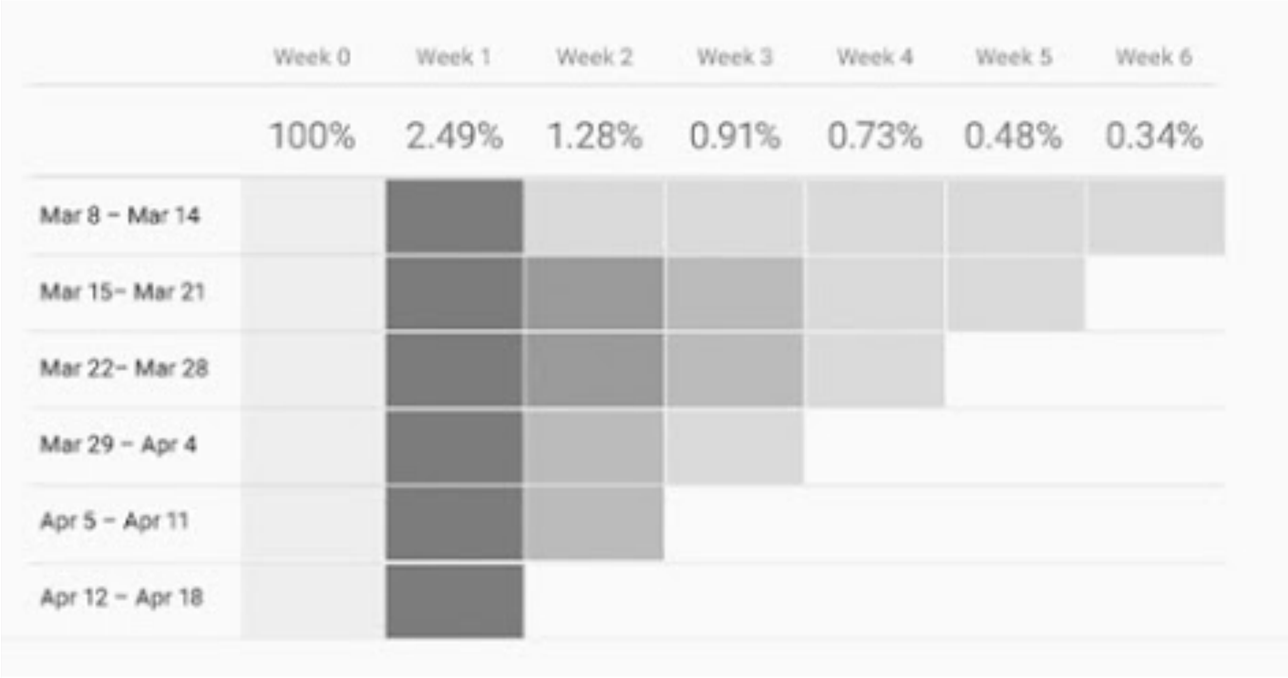
# FIREBASE ANALYTICS

- Data is accessed in the online console
- 24 hour delay



# FIREBASE ANALYTICS

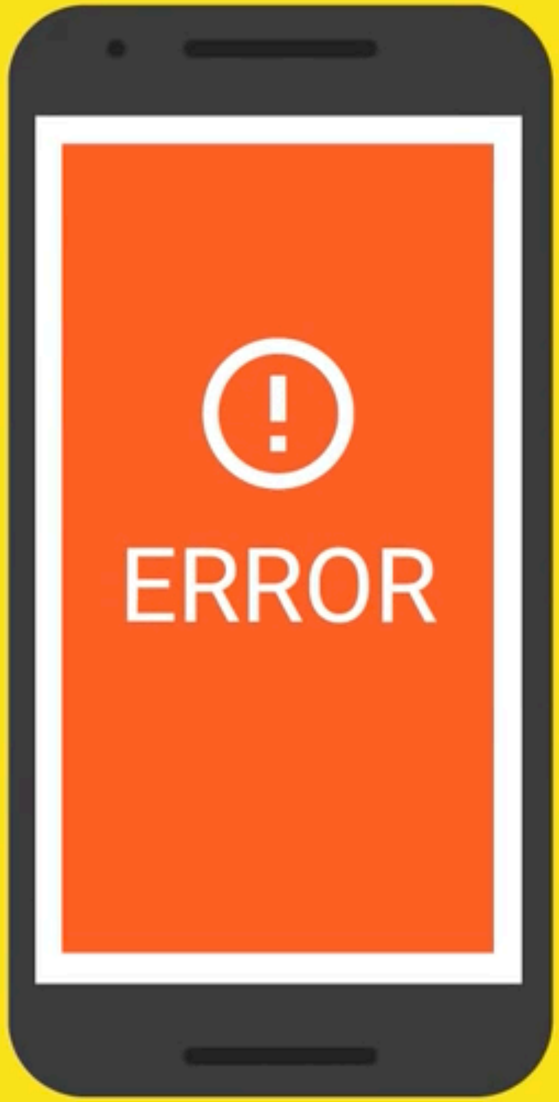
- Active users
- Average revenue, IAP
- first_open, first_open attribution
- Retention cohort
- User engagement (daily, per user, sessions, avg. session duration)
- Device and App info
- Location
- Demographics
- ...



# FIREBASE CRASH REPORTING

# FIREBASE CRASH REPORTING

- https://www.youtube.com/watch?list=PLl-K7zZEsYLmOF_07layrTntevxtbUxDL&v=B7mlLVAkcfU#



# FIREBASE CRASH REPORTING

- Part of Firebase Core
- Free

| | |
|---|---|
| Monitor fatal and non-fatal errors | Monitor fatal errors in iOS and fatal and non-fatal errors in Android. Reports are triaged by the severity of impact on users. |
| Collect the data you need to diagnose problems | Each report contains a full stack trace as well as device characteristics, performance data, and user circumstances when the error took place. Similar reports are automatically grouped into issues to make it easier to identify related bugs. |
| Email alerts | Enable email alerts to receive frequent updates when new crashes are uncovered or regressions are detected. |
| Integrate with Analytics | Errors captured are set as **`app_exception`** events in Analytics, allowing you to filter audiences based on who sees errors.<br><br>In addition to grouping errors into similar stack traces, Crash Reporting also integrates with Analytics to provide you with the list of events that preceded a crash. This information helps to simplify your debugging process. |

# FIREBASE CRASH REPORTING

```
 platform :ios, '9.0'

target 'FireChat' do
  # Comment the next line if you're not using Swift and don't want to use dynamic frameworks
  use_frameworks!

  # Pods for FireChat
  pod 'Firebase/Core'
  pod 'Firebase/Database'

  pod 'Firebase/Auth'
  pod 'GoogleSignIn'

  pod 'Firebase/Crash'

end
```

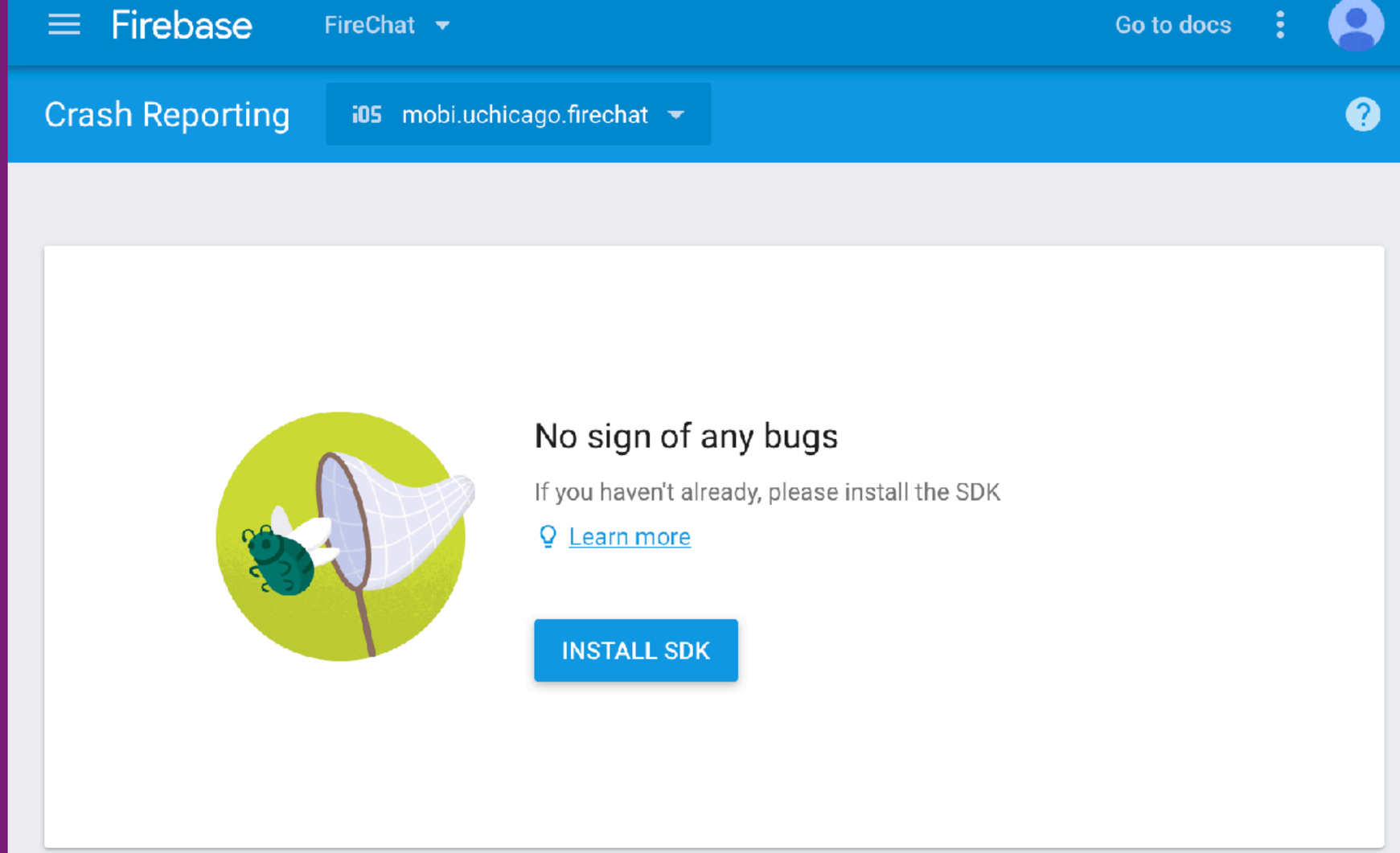
# FIREBASE CRASH REPORTING

```
@IBAction func didPressCrash(_ sender: AnyObject) {
  FIRCrashMessage("Forced Crash")
  fatalError()
}
```

- Add additional information to crash messages
- Should be anonymous

# FIREBASE CRASH REPORTING

- Logs crash data and crash-free data



# ASSIGNMENT 3

# ASSIGNMENT 3

- Part 1
  - Firebase tutorials

- Part 2
  - Develop a group messaging application using Firebase

# PART 1

# ASSIGNMENT 3 - PART 1

- Ray Weinerlich Tutorial to build a grocery app
- https://www.raywenderlich.com/139322/firebase-tutorial-getting-started-2



## Firebase Tutorial: Getting Started

*Attila Hegedüs on September 19, 2016*

Tweet Like

**Update note:** This tutorial has been updated for iOS 10 and Swift 3 by Attila Hegedüs. The original tutorial was written by David East.

Firebase is a mobile-backend-as-a-service that provides several features for building powerful mobile apps. Firebase has three core services: a realtime database, user authentication and hosting. With the Firebase iOS SDK, you can use these services to build powerful apps without writing a single line of server code.

The realtime database is one of the most unique features of Firebase.

*Learn the fundamentals in the Firebase tutorial.*

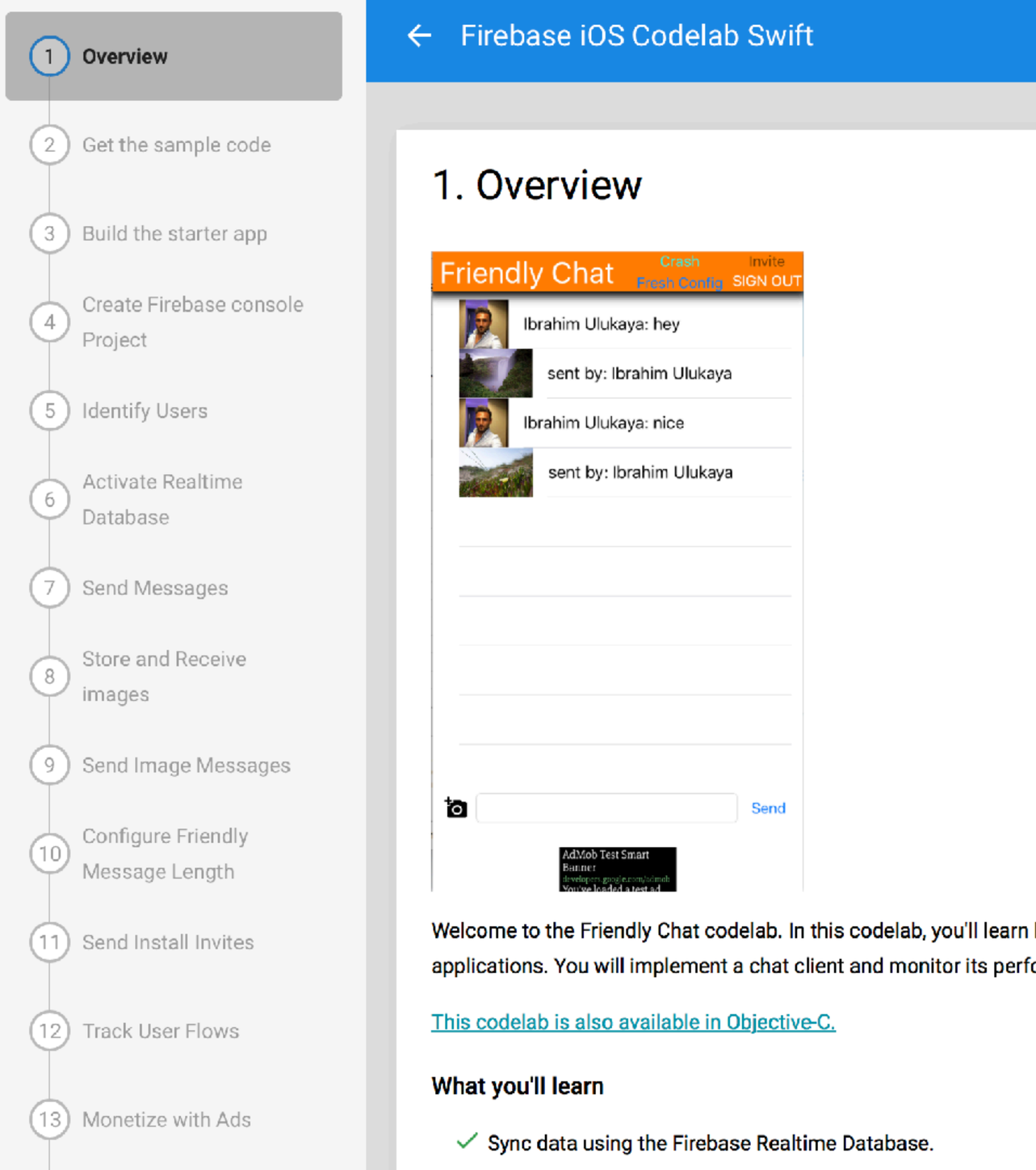
Ever used pull-to-refresh to fetch new data? You can forget about it with Firebase.

When a Firebase database updates, all connected users receive updates in realtime. This means your app can stay up to date without user interaction.

In this Firebase tutorial, you'll learn all the fundamentals of Firebase by making a collaborative groce list app called **Grocr**. When items get added to the list they'll appear instantly on any user's devices, you're not going to stop there. You'll tweak **Grocr** to work offline, so the list stays in sync even with a spotty grocery store data connection.

# ASSIGNMENT 3 - PART 1

- Firebase codelab tutorial to build a (very sparse) chat application (that doesn't quite work as advertised)
- https://codelabs.developers.google.com/codelabs/firebase-ios-swift/#0



# PART 2

# NEXT WEEK TOPICS

- cloud functions
- firebase messaging
- remote config
- app indexing
- Dynamic links
- Admob
- Invites
- Ad words
- Notification

IF YOU WANT TO GET A PAID DEVELOPER ACCOUNT, THIS IS THE WEEK

# ASSIGNMENT 3 - PART 2

- Build a group messaging application using Firebase (yes the world needs another one)

# ASSIGNMENT 3 - PART 2

- Authenticated users will be able to send messages to other authenticated users
- The messages can be text or images
- Users will invite other users to a chat using Firebase Invites (next week) and utilizing Dynamic links
- Notifications when someone joins a group

# ASSIGNMENT 3 - PART 2

- The application interface can be "sparse" as long as it supports the functionality

THE UNIVERSITY OF CHICAGO


MPCS 51033 • SPRING 2017 • SESSION 4

# BACKENDS FOR MOBILE APPLICATIONS