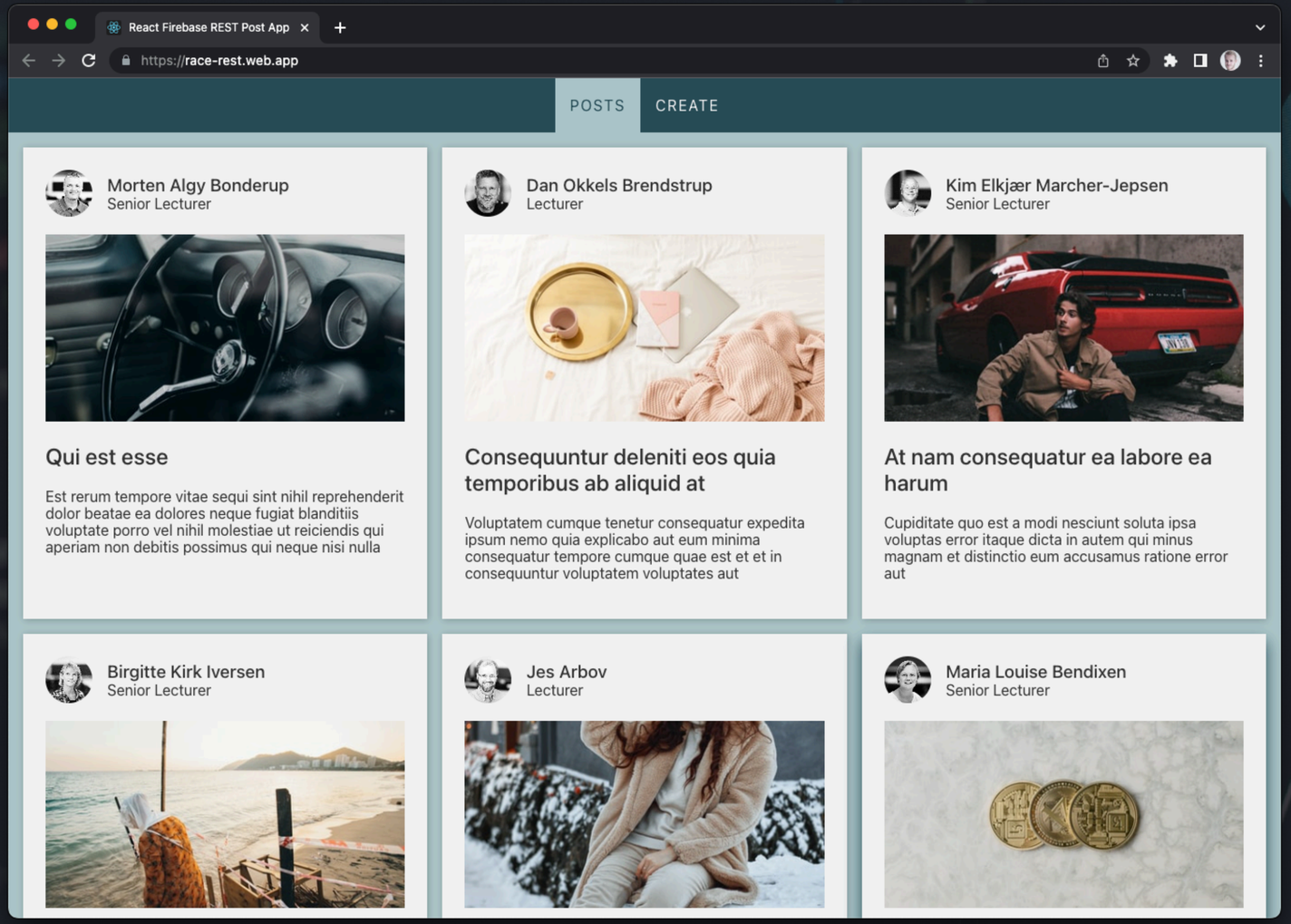
Firebase

Web Development

ERHVERVSAKADEMI AARHUS
BUSINESS ACADEMY AARHUS

React CRUD



https://race-rest.web.app/

Content

Client-Server Model

... how to communicate with backend/ data source (server)

CLIENT

SERVER

Web Development

WEB APP

API

DATA SOURCE

FETCH(...)

REQUEST

JSON DATA

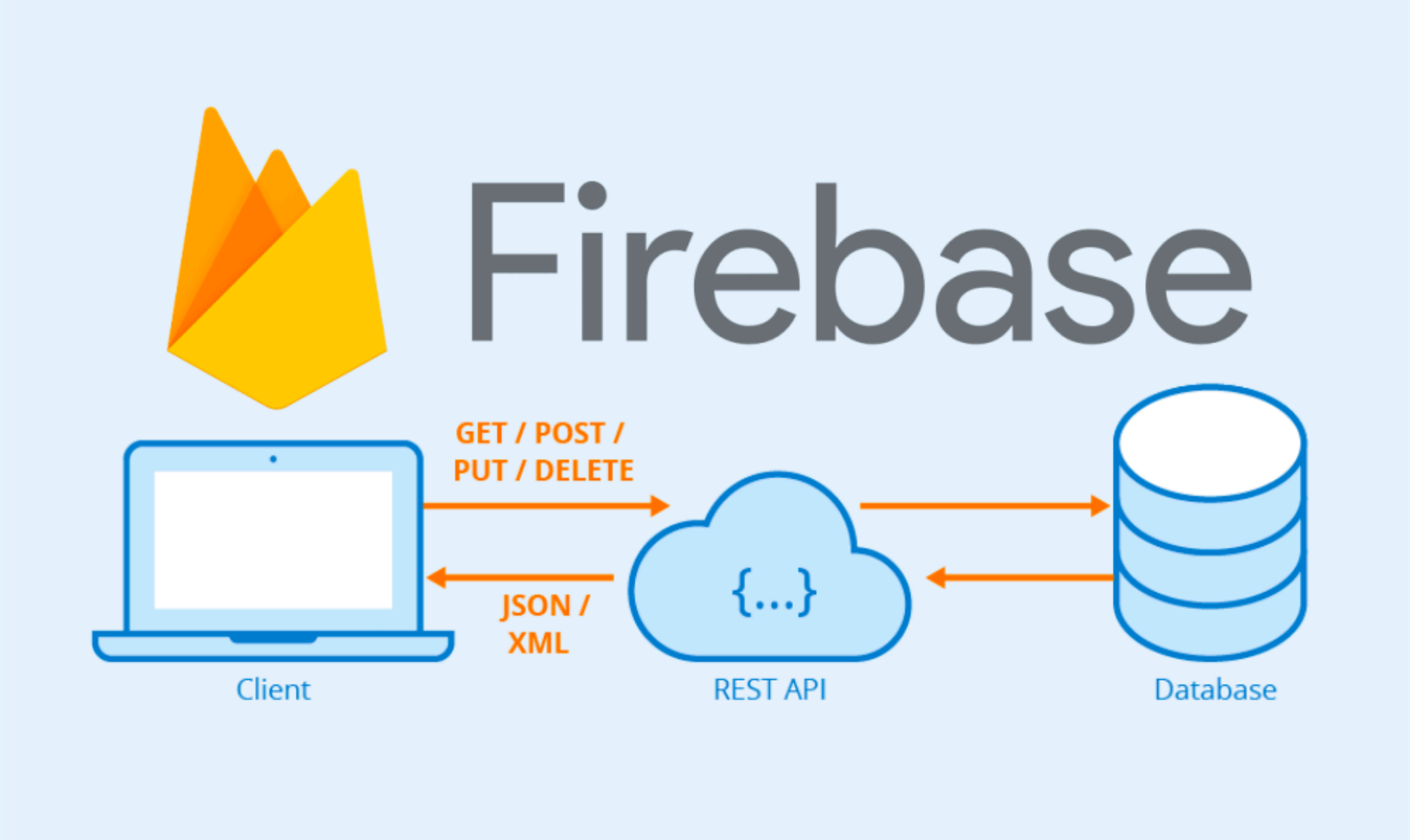
RESPONSE

JSON

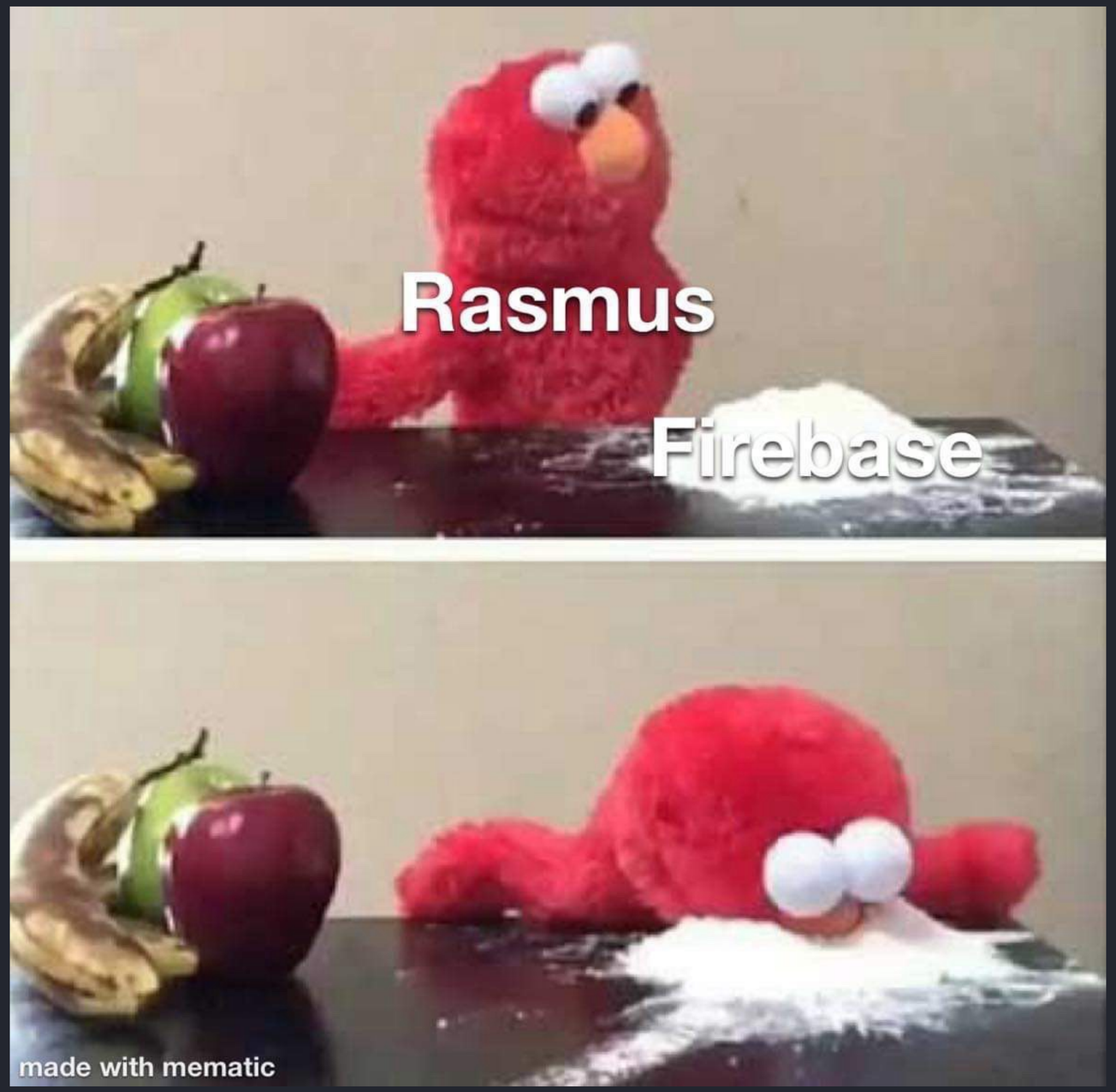
CLIENT

SERVER

When someone asks you how to get data from a database in a js code



javascript.plainenglish.io/firebase-cloud-functions-tutorial-creating-a-rest-api-8cbc51479f80

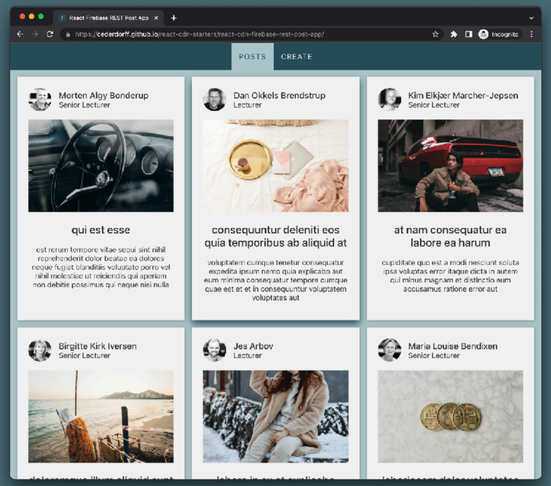

Rasmus
Firebase
made with mematic

Fetch, HTTP Request & Response

WEB APP

FIREBASE REST API

DATA SOURCE



FETCH(GET, POST, PUT, DELETE)

REQUEST

JSON DATA

RESPONSE

JSON

Firebase
Realtime Database

posts

users

What is Firebase?

Platform, a suite of tools & Backend-as-a-Service
for Web & App Development

100 SECONDS OF

https://www.youtube.com/watch?v=vAoB4VbhRzM

Introducing Firebase

https://www.youtube.com/watch?v=iosNuIdQoy8

Build better apps

Cloud Firestore
Store and sync app data at global scale

ML Kit BETA
Machine learning for mobile developers

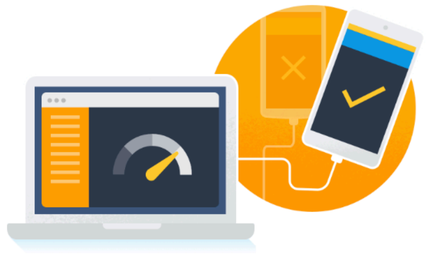
Cloud Functions
Run mobile backend code without managing servers

Authentication
Authenticate users simply and securely

Hosting
Deliver web app assets with speed and security

Cloud Storage
Store and serve files at Google scale

Realtime Database
Store and sync app data in milliseconds



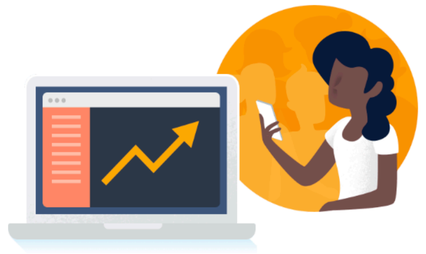
Improve app quality

Crashlytics
Prioritize and fix issues with powerful, realtime crash reporting

Performance Monitoring
Gain insight into your app's performance

Test Lab
Test your app on devices hosted by Google

App Distribution BETA
Distribute pre-release versions of your app to your trusted testers



Grow your business

In-App Messaging BETA
Engage active app users with contextual messages

Google Analytics
Get free and unlimited app analytics

Predictions
Smart user segmentation based on predicted behavior

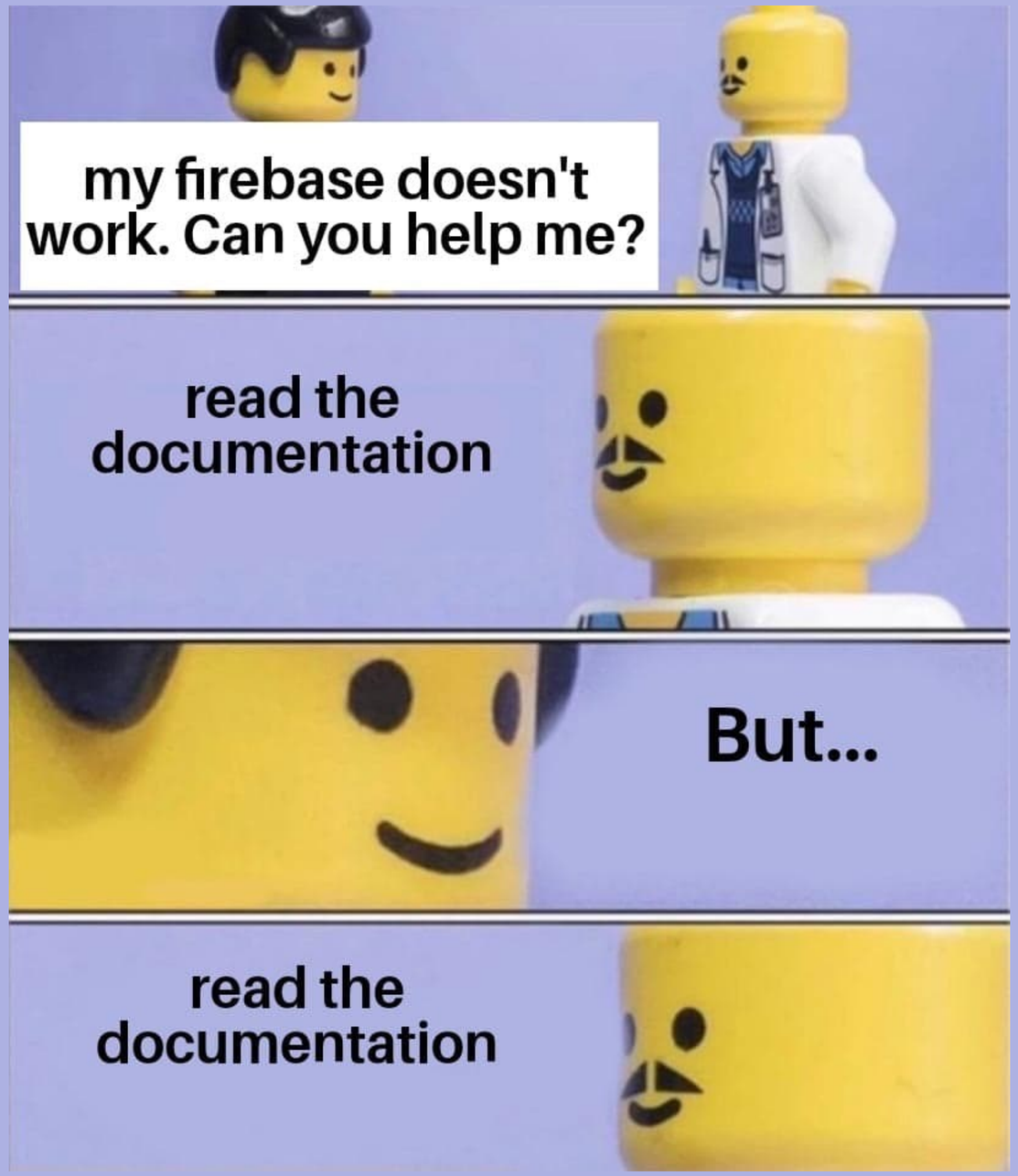
A/B Testing BETA
Optimize your app experience through experimentation

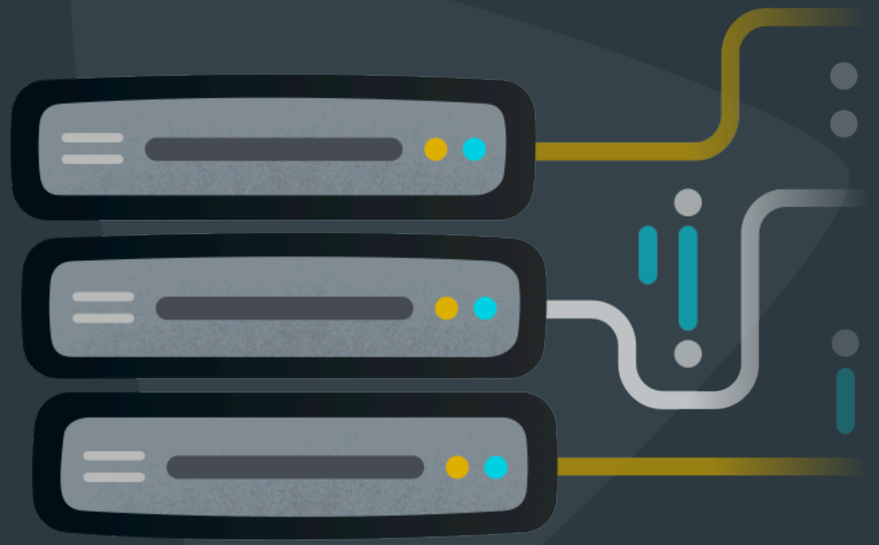
Cloud Messaging
Send targeted messages and notifications

Remote Config
Modify your app without deploying a new version

Dynamic Links
Drive growth by using deep links with attribution

MANY DEVICES
ONE PLATFORM


my firebase doesn't work. Can you help me?
read the documentation
But...
read the documentation



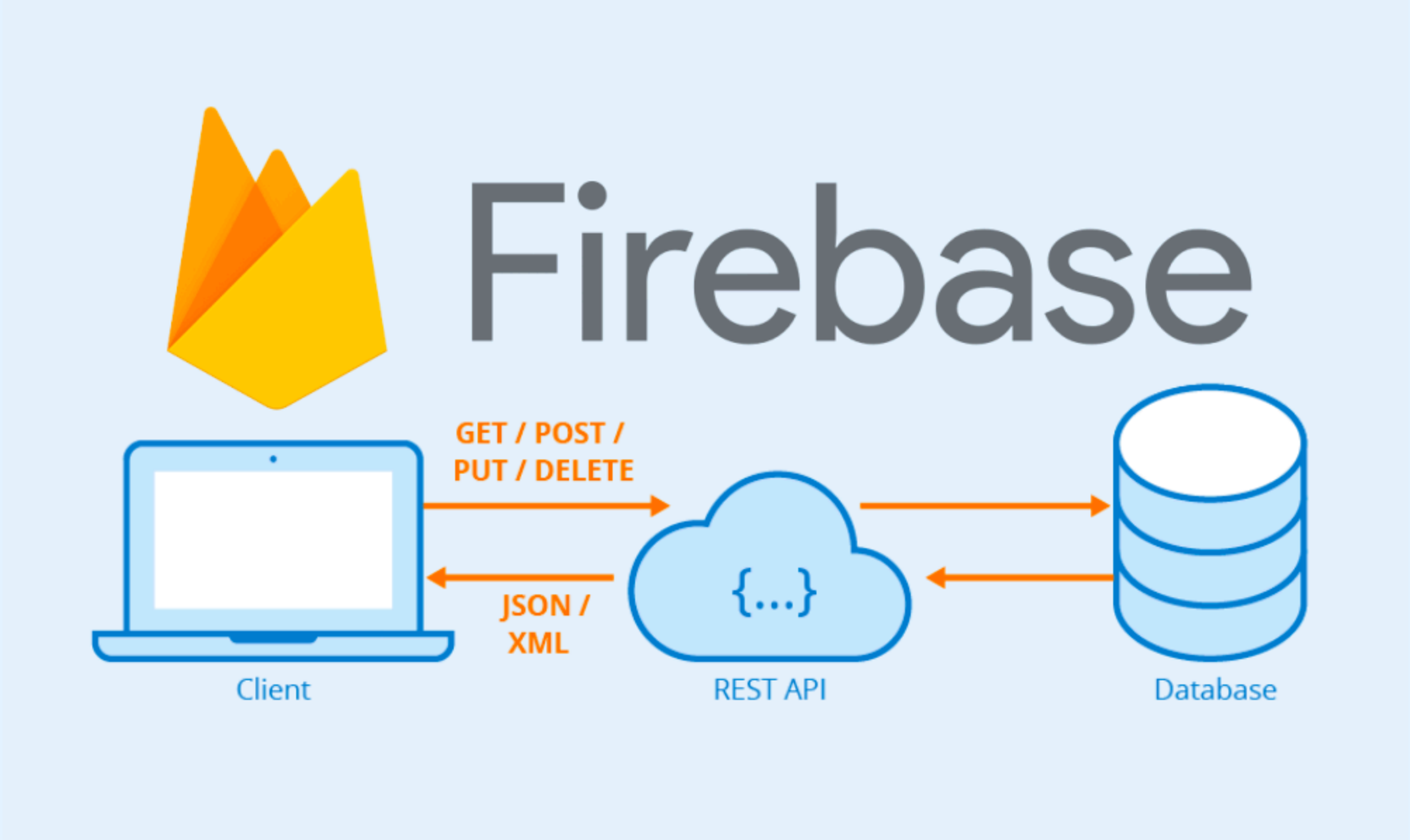
Realtime Database & REST API

Store and sync data in real time

REST API or SDK

https://firebase.google.com/products/realtime-database

Database



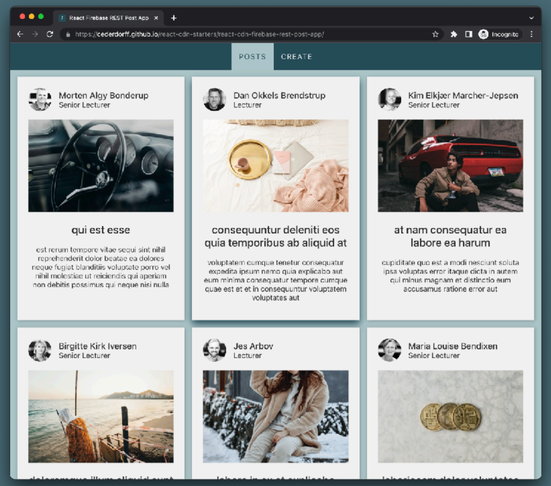
javascript.plainenglish.io/firebase-cloud-functions-tutorial-creating-a-rest-api-8cbc51479f80

Fetch, HTTP Request & Response

WEB APP

FIREBASE REST API

DATA SOURCE



FETCH(GET, POST, PUT, DELETE)

REQUEST

JSON DATA

RESPONSE

JSON

Firebase
Realtime Database

posts

users

Realtime Database REST API

https://firebase.google.com/docs/database/rest/start

```
export default function PostsPage() {
    const [posts, setPosts] = useState([]);
    const [showLoader, dismissLoader] = useIonLoading();

    async function getPosts() {
        const response = await fetch("https://race-rest-default-rtdb.firebaseio.com/posts.json");
        const data = await response.json();
        // map object into an array with objects
        const postsArray = Object.keys(data).map(key => ({ id: key, ...data[key] }));
        return postsArray;
    }

    async function getUsers() {
        const response = await fetch("https://race-rest-default-rtdb.firebaseio.com/users.json");
        const data = await response.json();
        // mapp object into an array with objects
        const users = Object.keys(data).map(key => ({ id: key, ...data[key] }));
        return users;
    }
```

Cloud Firestore

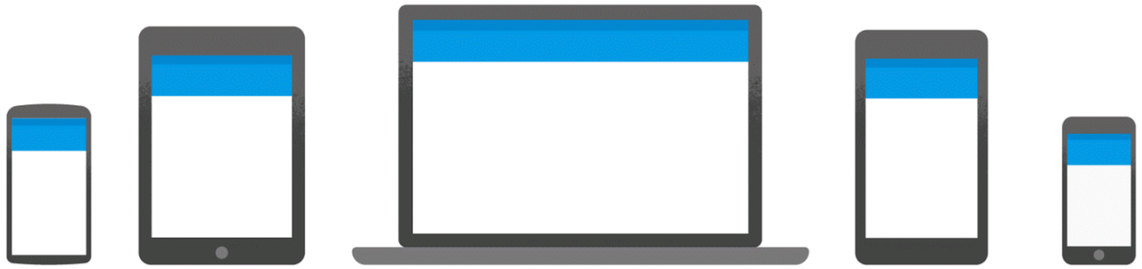
https://www.youtube.com/watch?v=QcsAb2RR52c

CLOUD FIRESTORE

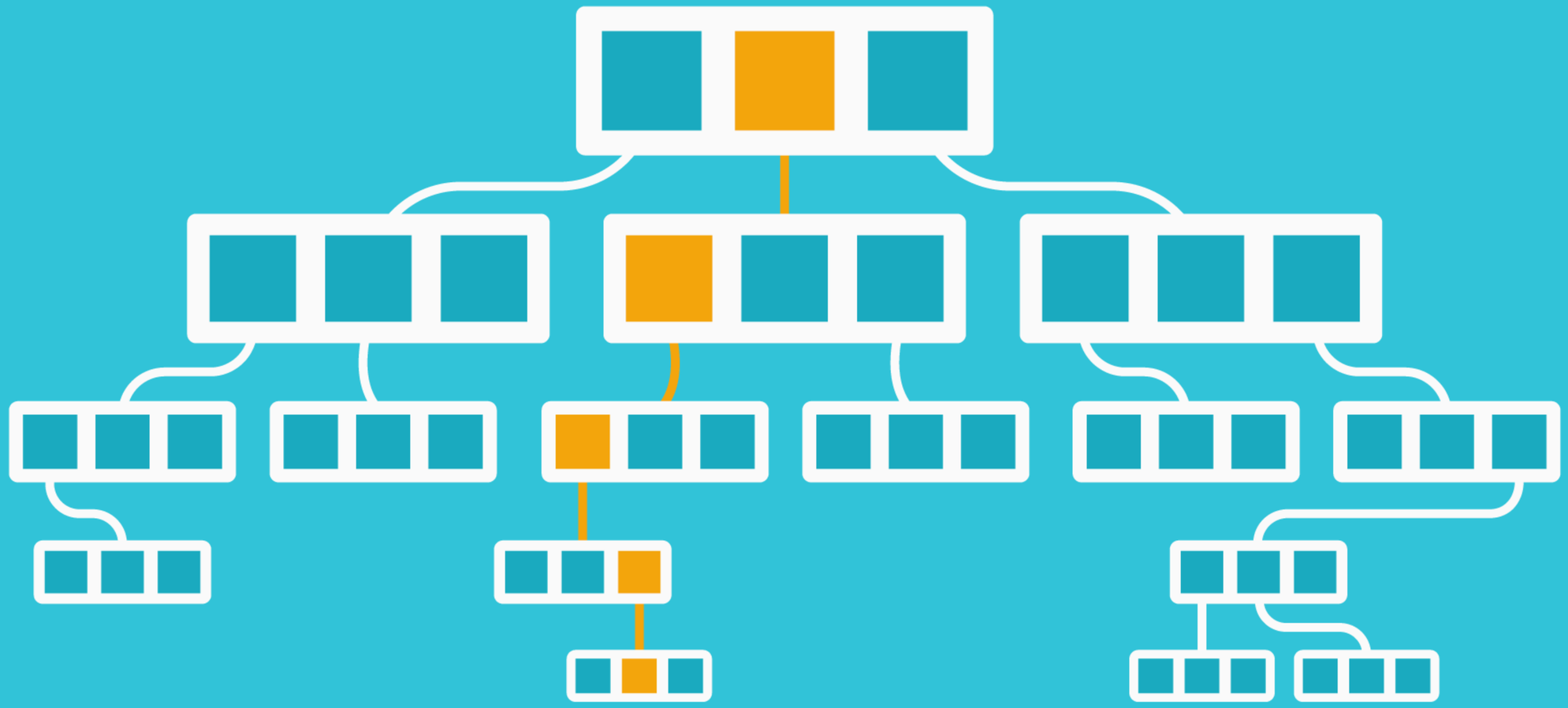
STORE AND SYNC DATA ACROSS PLATFORMS

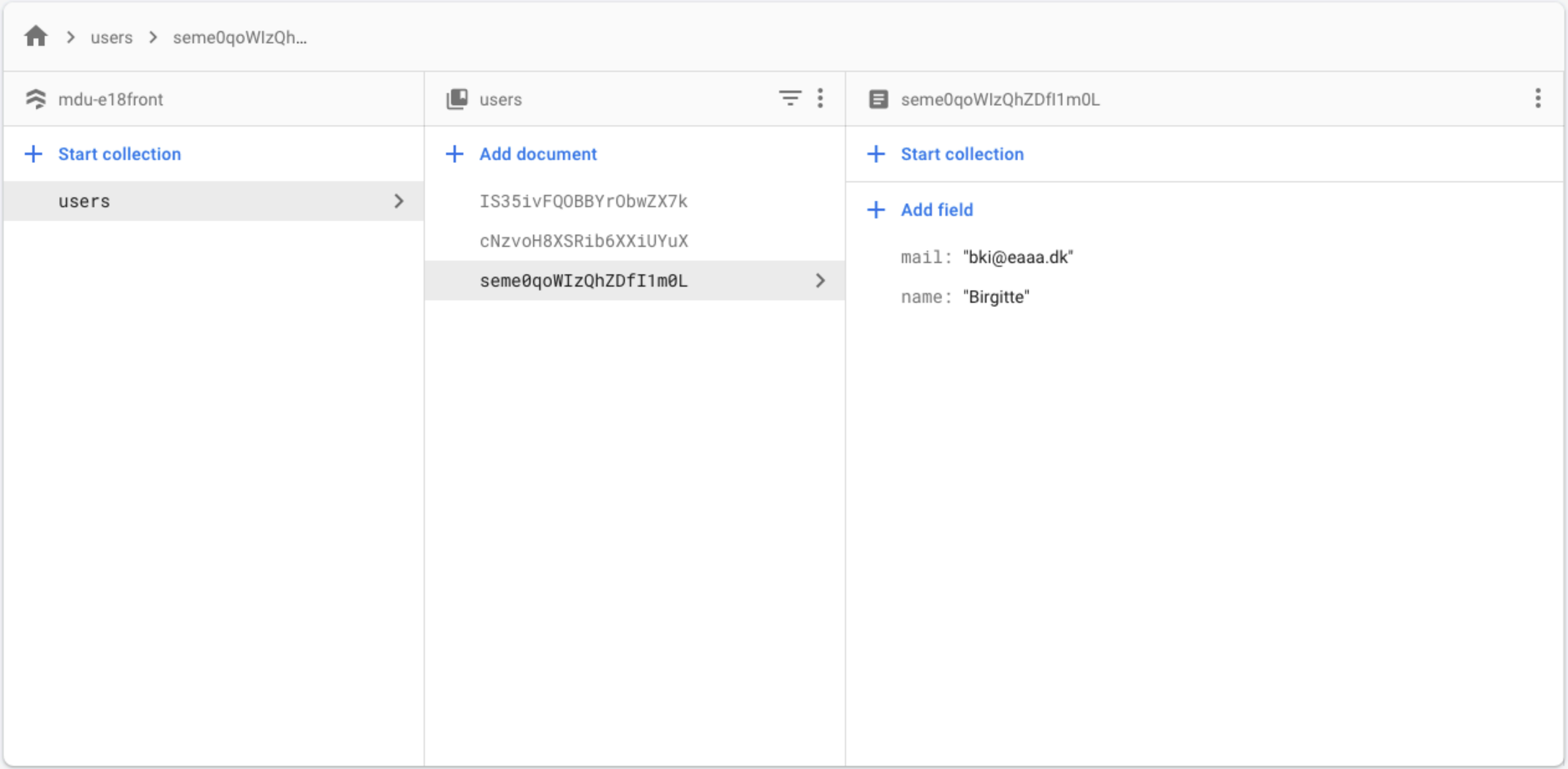
https://firebase.google.com/products/firestore/

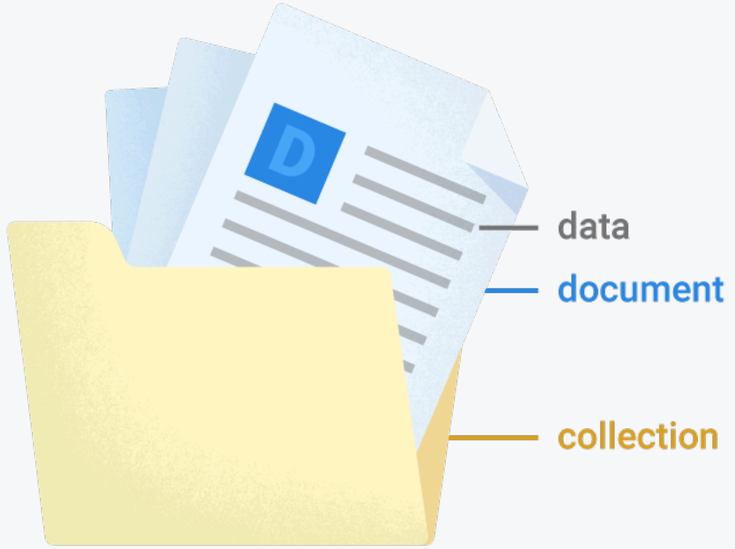
REALTIME UPDATES



COLLECTIONS & DOCUMENTS




users
seme0qoWIzQh...
mdu-e18front
Start collection
users
users
Add document
IS35ivFQOBBYrObwZX7k
cNzvoH8XSRib6XXiUYuX
seme0qoWIzQhZDfI1m0L
seme0qoWIzQhZDfI1m0L
Start collection
Add field
mail: "bki@eaaa.dk"
name: "Birgitte"



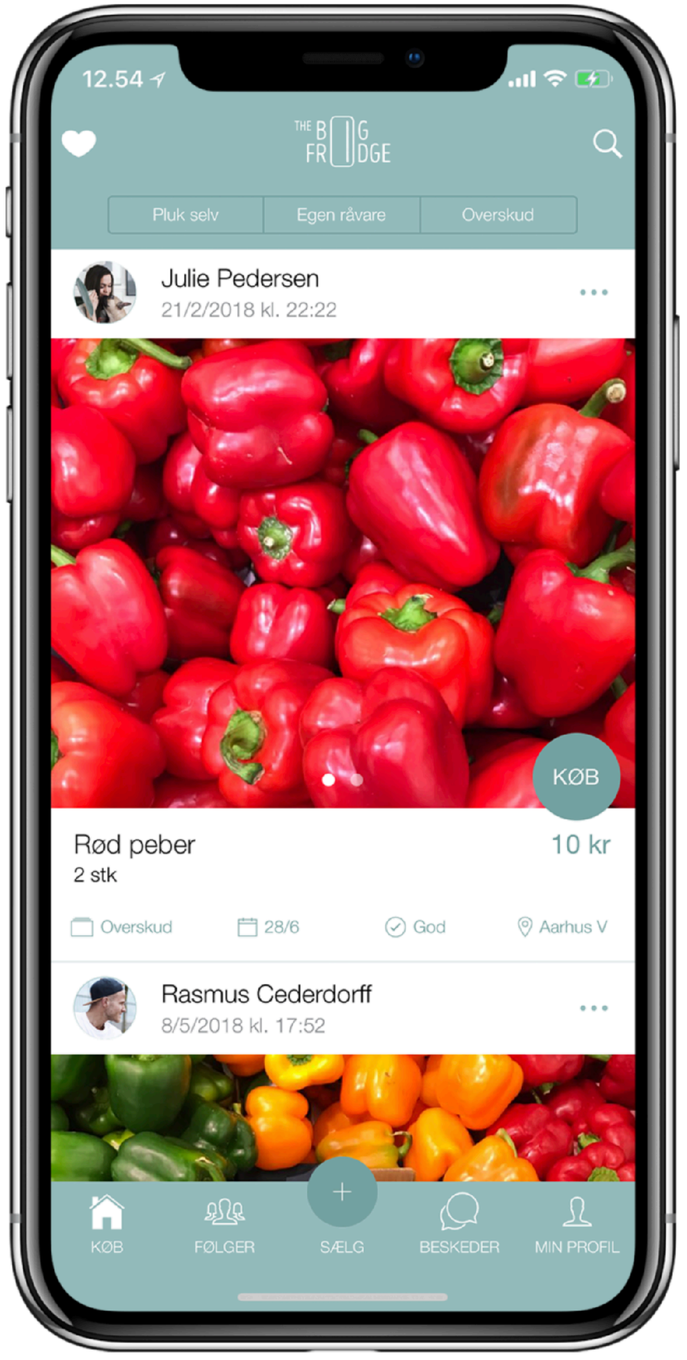
users > seme0qoWIzQh...

mdu-e18front	users	seme0qoWIzQhZDfI1m0L
+ Start collection	+ Add document	+ Start collection
users >	IS35ivFQOBBYrObwZX7k	+ Add field
	cNzvoH8XSRib6XXiUYuX	mail: "bki@eaaa.dk"
	seme0qoWIzQhZDfI1m0L >	name: "Birgitte"

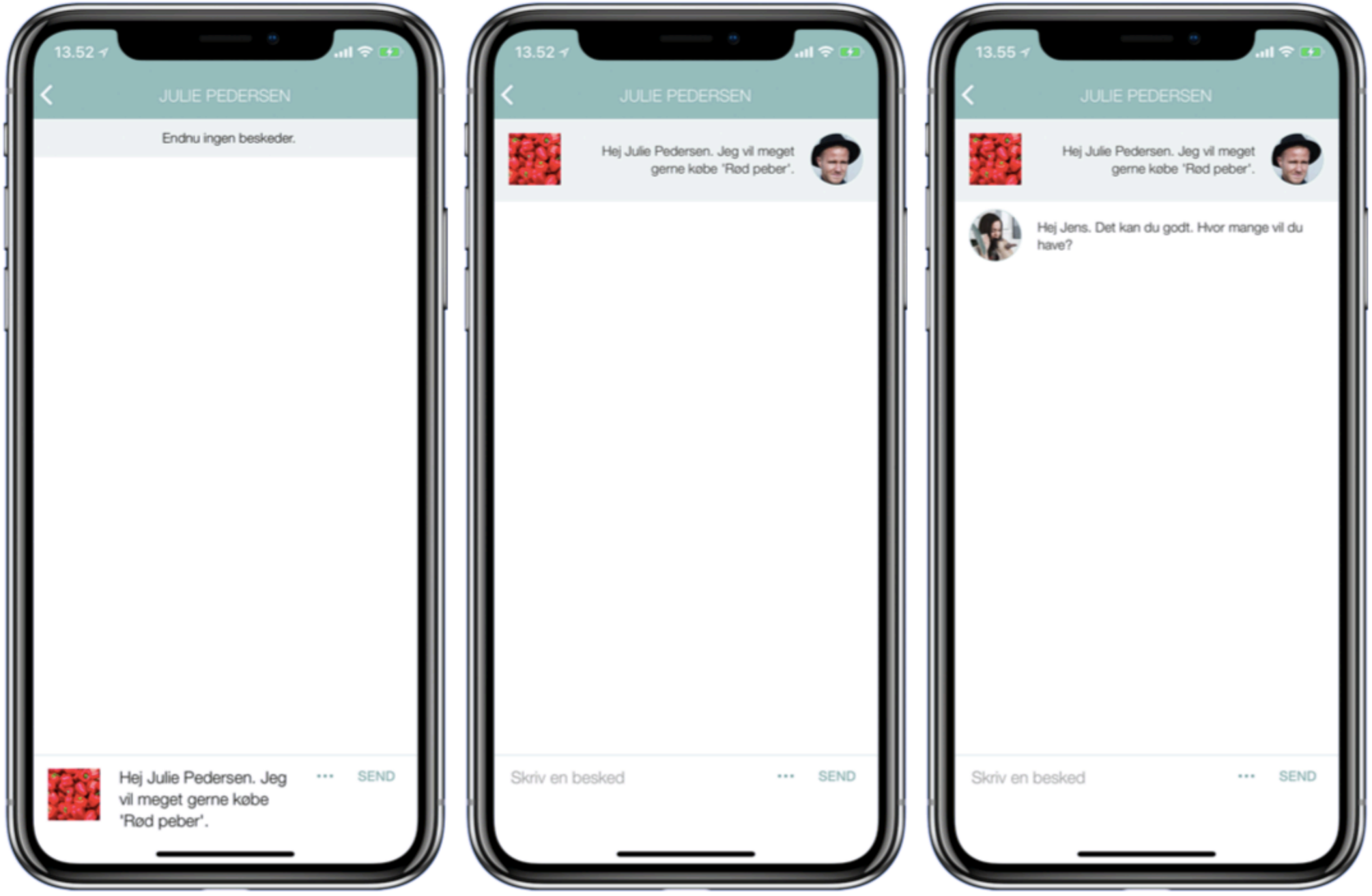
COLLECTION, DOCUMENT & DATA

```
let teachers = [{
    name: "Birgitte Kirk Iversen",
    initials: "bki",
    mail: "bki@baaa.dk",
    phone: "72286316",
    address: "Sønderhøj 30, 8260 Viby J",
    position: "Senior Lecturer",
    department: "Multimedia Design",
    img: "https://www.baaa.dk/CropUp/headshot/media/1524902/birgitte-kirk-iversen.jpg"
  }, {
    name: "Gertie Margrethe Kolding Jensen",
    initials: "gkj",
    mail: "gkj@baaa.dk",
    phone: "72286349",
    address: "Sønderhøj 30, 8260 Viby J",
    position: "Senior Lecturer",
    department: "Multimedia Design",
    img: "https://www.eaaa.dk/CropUp/headshot/media/2046228/Gertie-Kolding.jpg"
  }, {
    name: "Kim Elkjær Marcher-Jepsen",
    initials: "kije",
    mail: "kije@baaa.dk",
    phone: "7228 6325",
    address: "Sønderhøj 30, 8260 Viby J",
    position: "Lecturer",
    department: "Multimedia Design",
    img: "https://www.baaa.dk/CropUp/headshot/media/3124373/Kim-Elkjaer-Marcher-Jepsen.jpg"
  },
  {
    name: "Rasmus Cederdorff",
```


15.28
THE BIG FRIDGE


12.54
THE BIG FRIDGE
Pluk selv
Egen råvare
Overskud
Julie Pedersen
21/2/2018 kl. 22:22
KØB
Rød peber
10 kr
2 stk
Overskud
28/6
God
Aarhus V
Rasmus Cederdorff
8/5/2018 kl. 17:52
KØB
FØLGER
SÆLG
BESKEDER
MIN PROFIL


15.05
SØG
Søg
Nyeste brugere
Han...
Birthe Ande...
Jesper Chri...
Lars Jensen
Nyeste salgsindlæg
Rasmus Cederdorff
8/5/2018 kl. 17:52
KØB
Peber
15 kr
KØB
FØLGER
SÆLG
BESKEDER
MIN PROFIL


13.52
JULIE PEDERSEN
Endnu ingen beskeder.
Hej Julie Pedersen. Jeg vil meget gerne købe 'Rød peber'.
SEND
13.52
JULIE PEDERSEN
Hej Julie Pedersen. Jeg vil meget gerne købe 'Rød peber'.
Skriv en besked
SEND
13.55
JULIE PEDERSEN
Hej Julie Pedersen. Jeg vil meget gerne købe 'Rød peber'.
Hej Jens. Det kan du godt. Hvor mange vil du have?
Skriv en besked
SEND

BEGIVENHEDER

Juni 2018

Man	Tir	Ons	Tor	Fre	Lør	Søn
18	19	20	21	22	23	24

22/06/2018

Hele dagen	Alle dage er en fredag 🙌🏻
09.06 10.06	Det er jo fredag! 😅
09.45 10.00	Fredagsmøde med management

FRAVÆRENDE

I dag


Rasmus Cederdorff (RC)
Arbejder hjemme hele dagen. Fang mig på mobil.
AH


Rikke Gravesen Horsevad (RGH)
21 + 22 fri
FRI


Gitte Egholm Hansen (GH)
Fri fredag d. 22/6
FRI


Bettina Beermann (BBE)
Går ved 12-tiden fredag 22/6
GT

Kommende


Rasmus Cederdorff (RC)
Ferie fra 30/06 til 07/07.
FERIE


Rasmus Cederdorff (RC)
ANDET

Michael Andersen (MA)
Er i Belgien. Fang mig på mobilen.
FR

Anett Andersen (AAN)
Ferie fra 22. juli til 14. august.
FERIE


Anne Skyum (AS)

CLOUD FIRESTORE

CREATE, READ, UPDATE & DELETE DATA

https://firebase.google.com/products/firestore/

FIREBASE TEMPLATES

firebase-*

spa-firebase-*

react-cdn-firebase-*

React-cdn-firestore-*

FIREBASE DOCS

Getting started video: https://youtu.be/iosNuIdQoy8?list=PLI-K7zZEsYLmOF_07IayrTntevxtbUxDL

Cloud Firestore Introduction: https://firebase.google.com/docs/firestore

Get started with Cloud Firestore: https://firebase.google.com/docs/firestore/quickstart

Add and manage data: https://firebase.google.com/docs/firestore/manage-data/add-data

Delete data: https://firebase.google.com/docs/firestore/manage-data/delete-data

Read data: https://firebase.google.com/docs/firestore/query-data/get-data

Read data - realtime updates: https://firebase.google.com/docs/firestore/query-data/listen

Order and limit data: https://firebase.google.com/docs/firestore/query-data/order-limit-data

Cloud Firestore

iOS NODE JAVA GO

Use our flexible, scalable NoSQL cloud database to store and sync data for client- and server-side development.

Cloud Firestore is a flexible, scalable database for mobile, web, and server development from Firebase and Google Cloud Platform. Like Firebase Realtime Database, it keeps your data in sync across client apps through realtime listeners and offers offline support for mobile and web so you can build responsive apps that work regardless of network latency or Internet connectivity. Cloud Firestore also offers seamless integration with other Firebase and Google Cloud Platform products, including Cloud Functions.

Get started

Key capabilities

Flexibility	The Cloud Firestore data model supports flexible, hierarchical data structures. Store your data in documents, organized into collections. Documents can contain complex nested objects in addition to subcollections.

CREATE

```
addDoc(_usersRef, newUser);
```

READ

```
onSnapshot(_usersRef, snapshot => {…
});
```

UPDATE

```
const userRef = doc(_usersRef, _selectedUserId);
updateDoc(userRef, userToUpdate);
```

DELETE

```
const userRef = doc(_usersRef, id);
deleteDoc(userRef);
```

GETTING STARTED

Getting Started with Firebase Cloud Firestore & React

R E A D

READ DOCS

```
import { useState, useEffect } from "react";
import { onSnapshot } from "firebase/firestore";
import { postsRef } from "../firebase-config";

export default function HomePage() {
    const [posts, setPosts] = useState([]);

    useEffect(() => {
        onSnapshot(postsRef, data => {
            const postsData = data.docs.map(doc => {
                return { ...doc.data(), id: doc.id };
            });
            setPosts(postsData);
        });
    }, []);

    return (
        <section className="page">
            <section className="grid-container">
                {posts.map(post => (
                    <article key={post.id}>
                        <img src={post.image} alt={post.title} />
```

Imports

State

useEffect

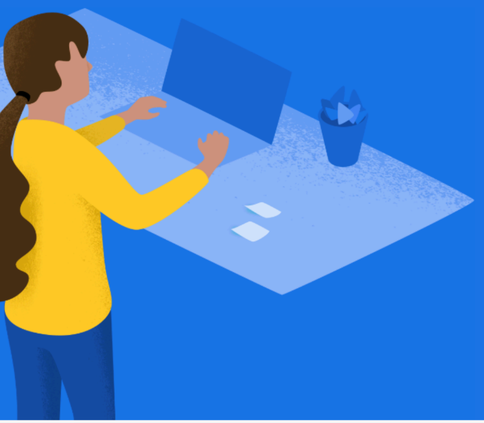
Transform data & save in state

Use map to return HTML & display every post

SET UP YOUR OWN FIREBASE PROJECT

Firebase

Go to docs



Your Firebase projects

+

Add project

mdu-e18front

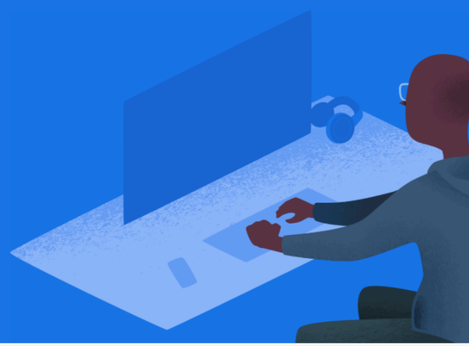
mdu-e18front

</>

mdu-f18front

mdu-f18front

</>



LoginApp

loginapp-a7a17

eaaa-front-fall-18

eaaa-front-fall-18

CONSOLE.FIREBASE.GOOGLE.COM

Firebase User CRUD – Overvie

console.firebase.google.com/u/1/project/user-crud-race/overview

Firebase

Project Overview

Build

- Authentication
- Firestore Database
- Realtime Database
- Storage
- Hosting
- Functions
- Machine Learning

Release and monitor
Crashlytics, Performance, Test Lab ...

Analytics
Dashboard, Realtime, Events, Conve...

Engage
Predictions, A/B Testing, Cloud Mes...

Extensions

Spark
Free $0/month

Upgrade

Firebase User CRUD

Go to docs

Firebase User CRUD

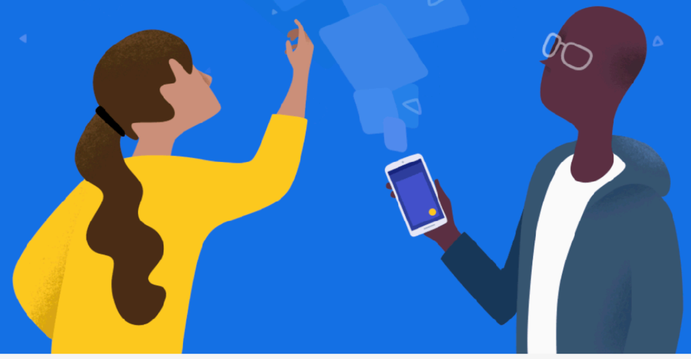
Spark plan

Get started by adding Firebase to your app

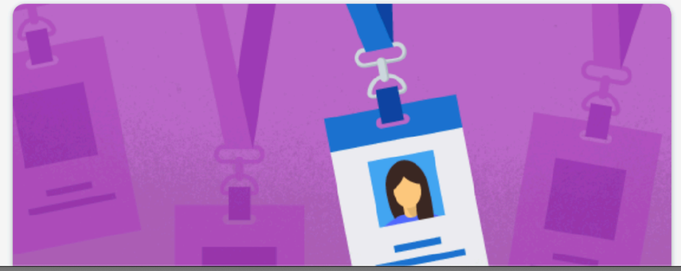
Web

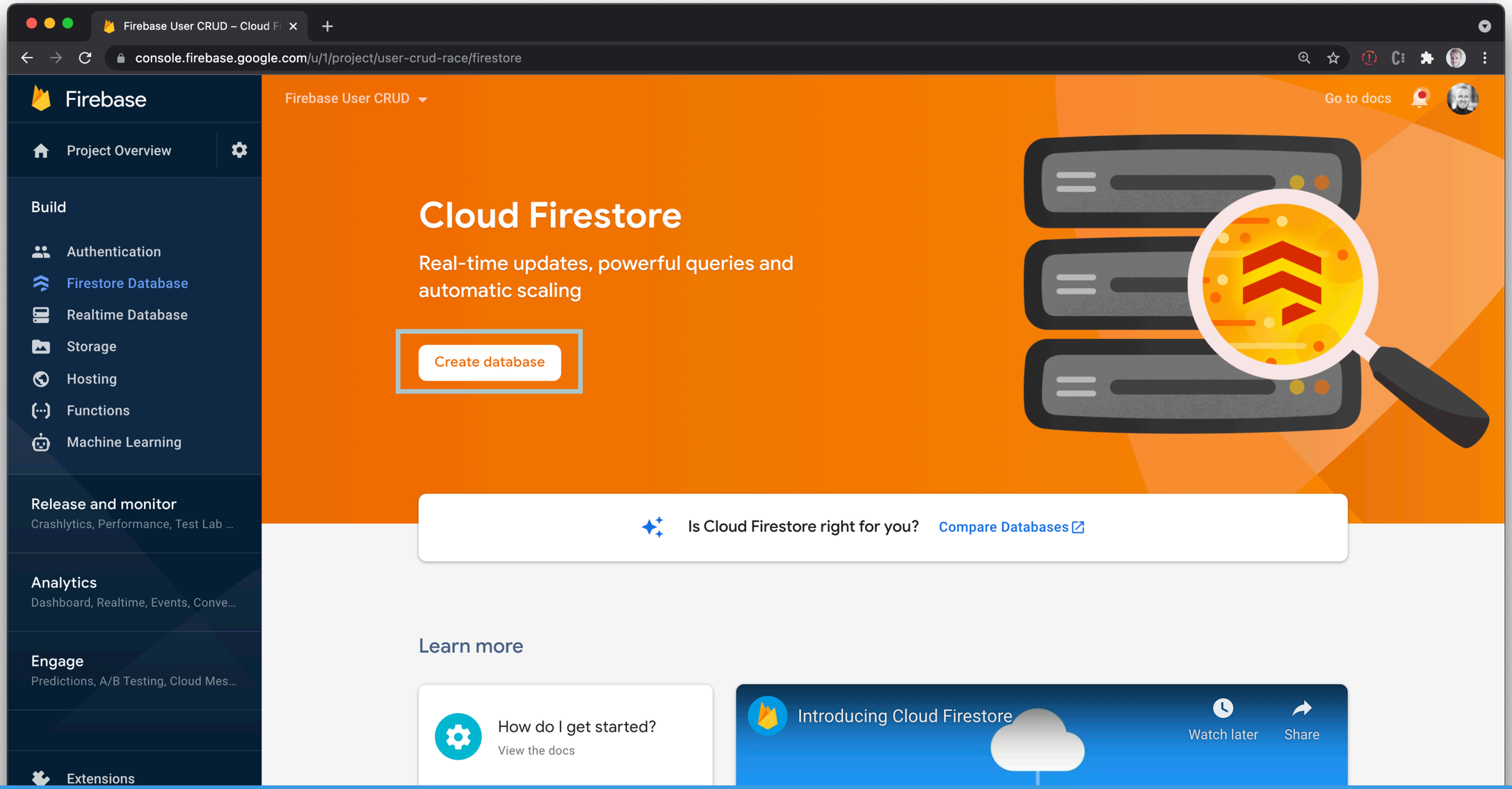
iOS+

Add an app to get started

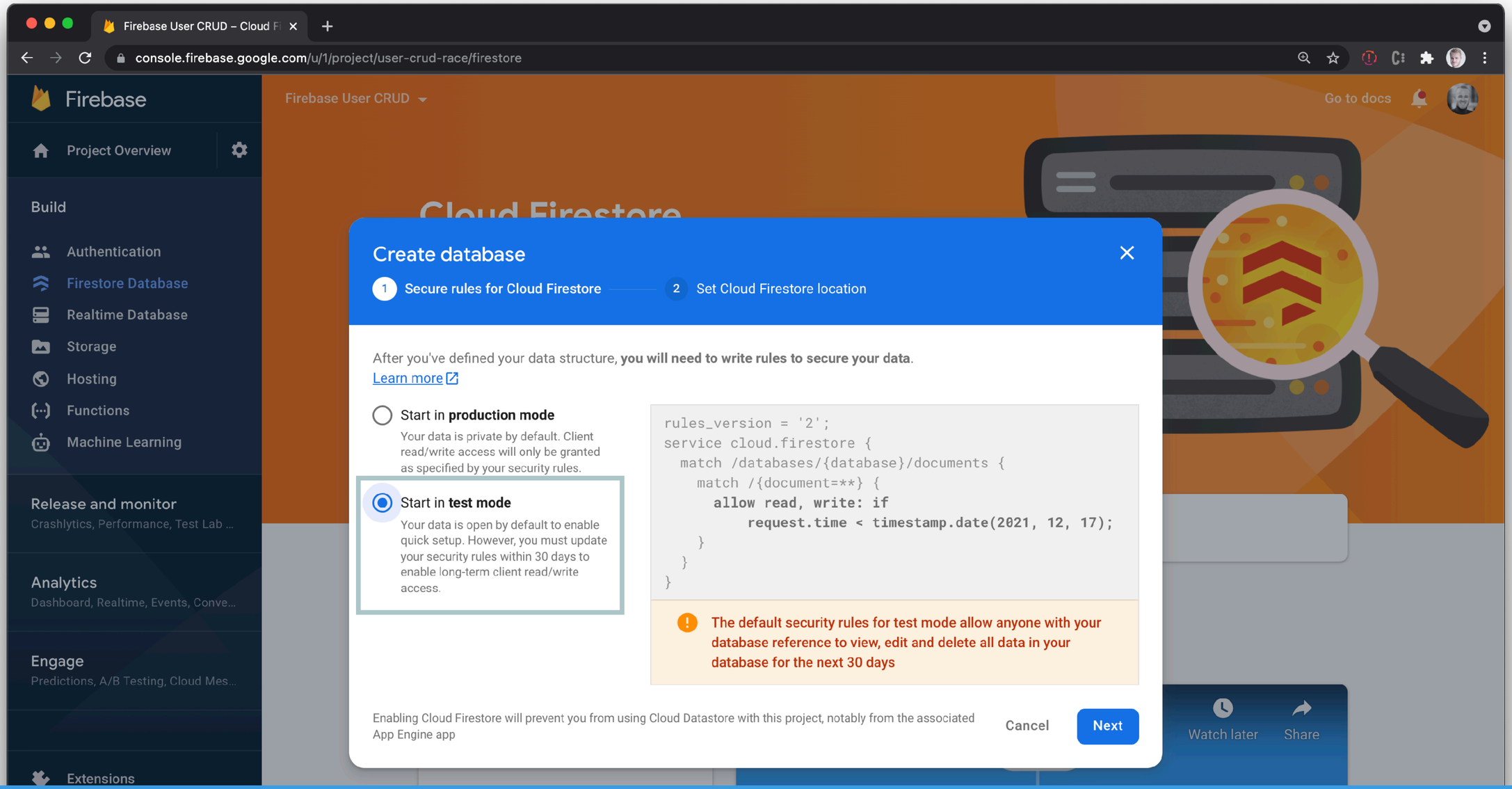


Store and sync app data in milliseconds

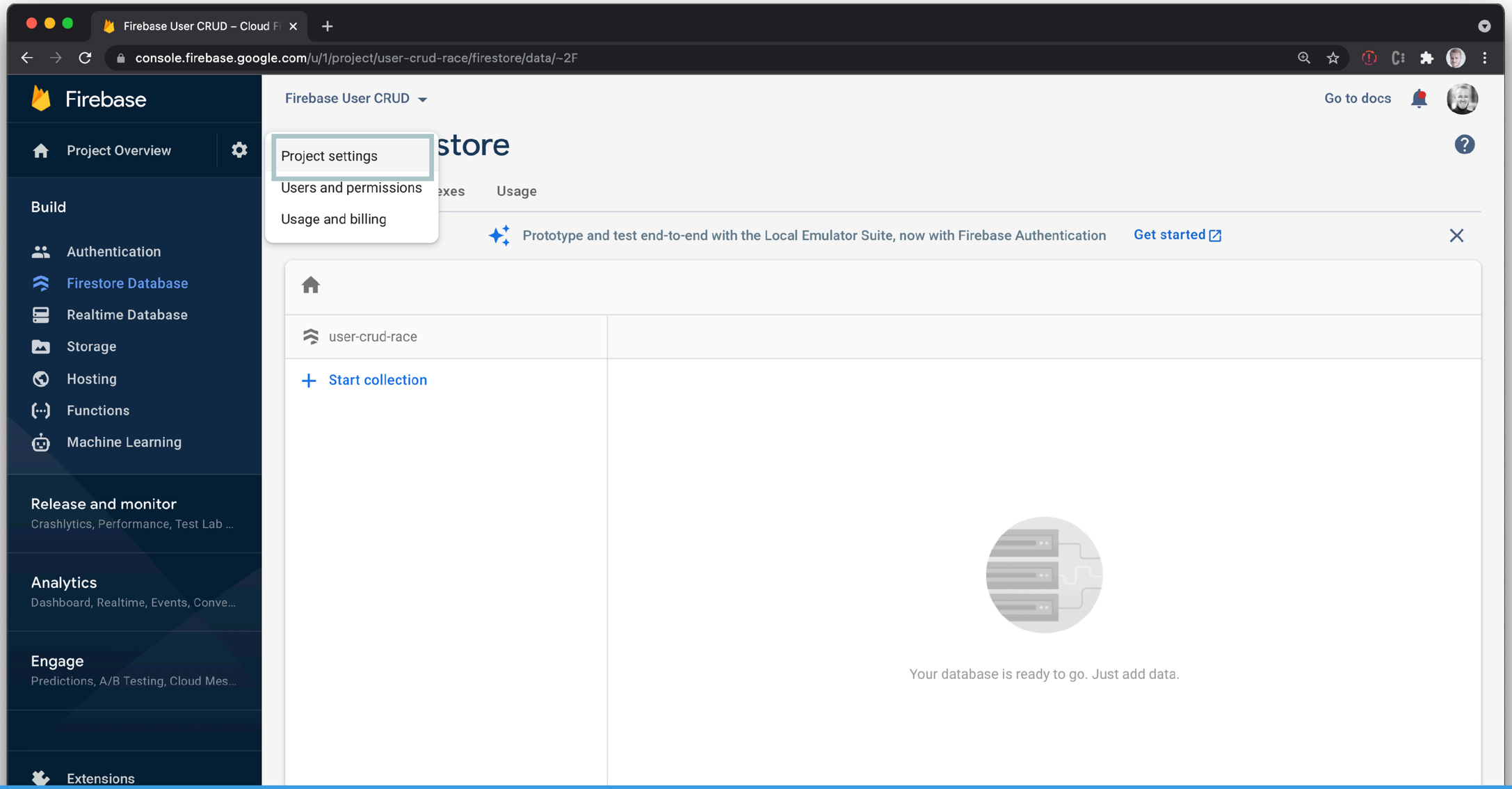




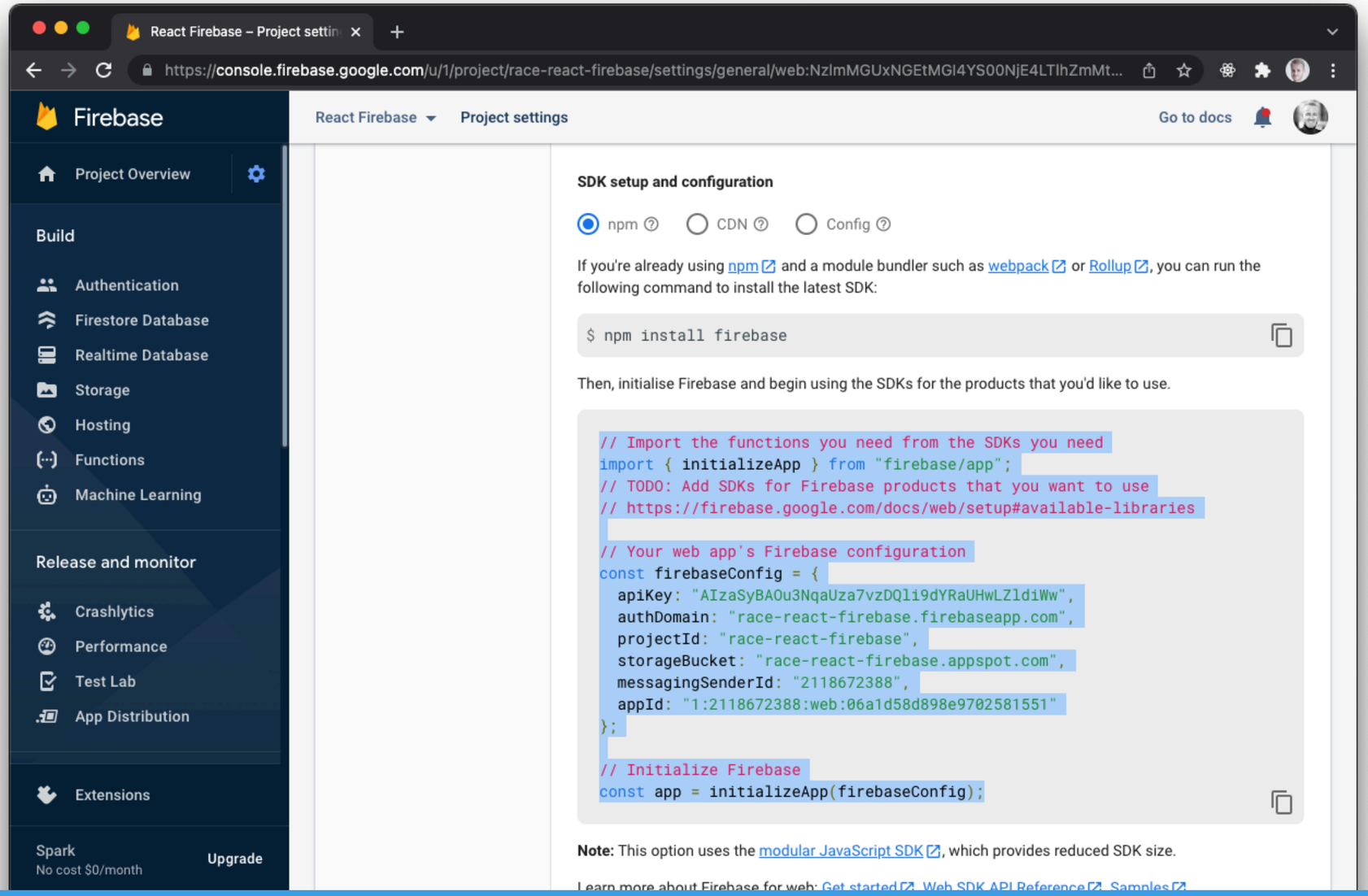
CREATE DATABASE



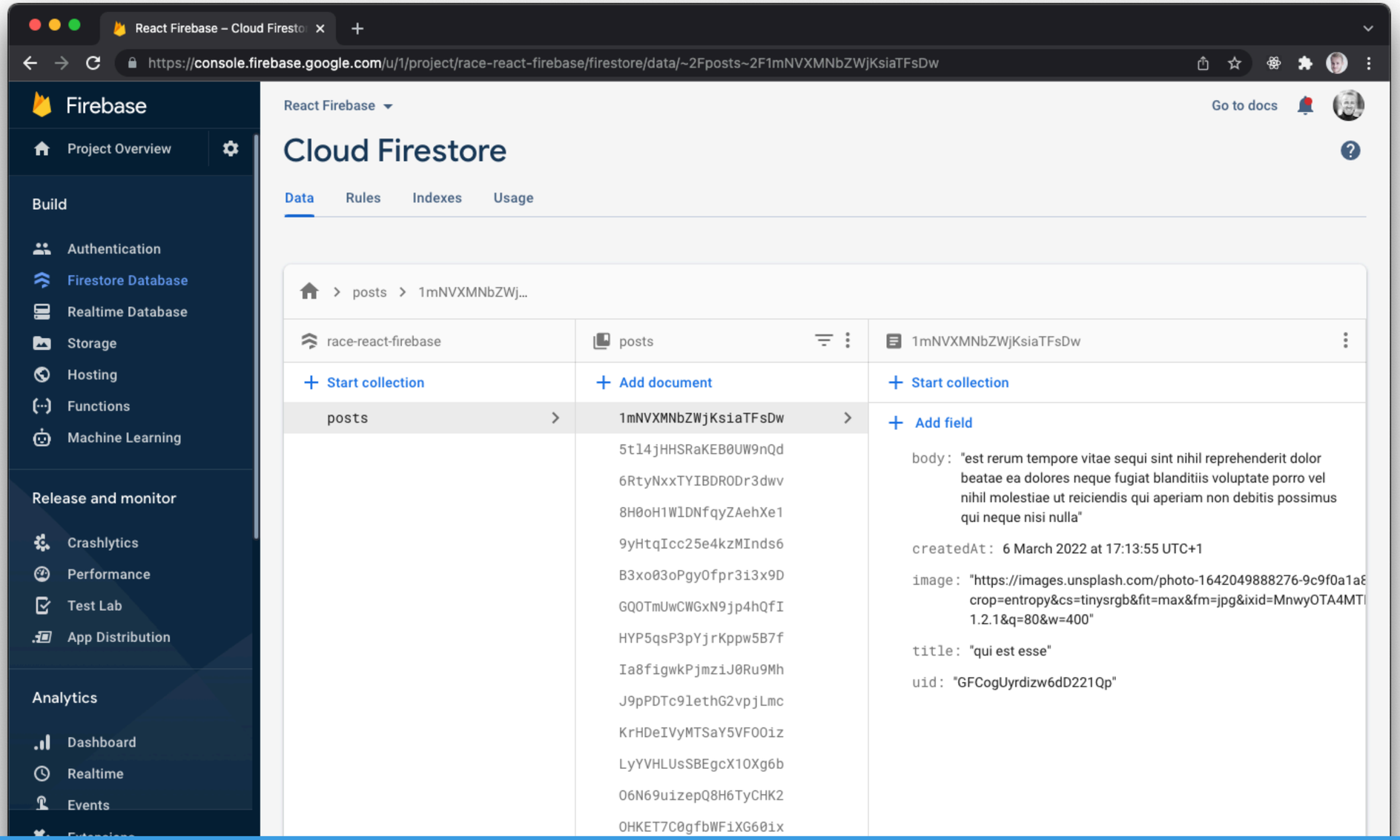
SECURITY RULES: test mode



GO TO: Project settings



COPY `firebaseConfig` and paste in `firebase-config.js`



Add posts collection and a few docs

ADD DOC

```
await addDoc(postsRef, newPost);
```

https://firebase.google.com/docs/firestore/manage-data/add-data#add_a_document

Help? react-cdn-firestore-post-app

UPDATE DOC

```
await updateDoc(docRef, postToUpdate);
```

https://firebase.google.com/docs/firestore/manage-data/add-data#update-data

Help? react-cdn-firestore-post-app

DELETE DOC

```
// ========== DELETE ==========
function deleteUser(id) {
    const docRef = doc(_usersRef, id);
    deleteDoc(docRef);
}
```

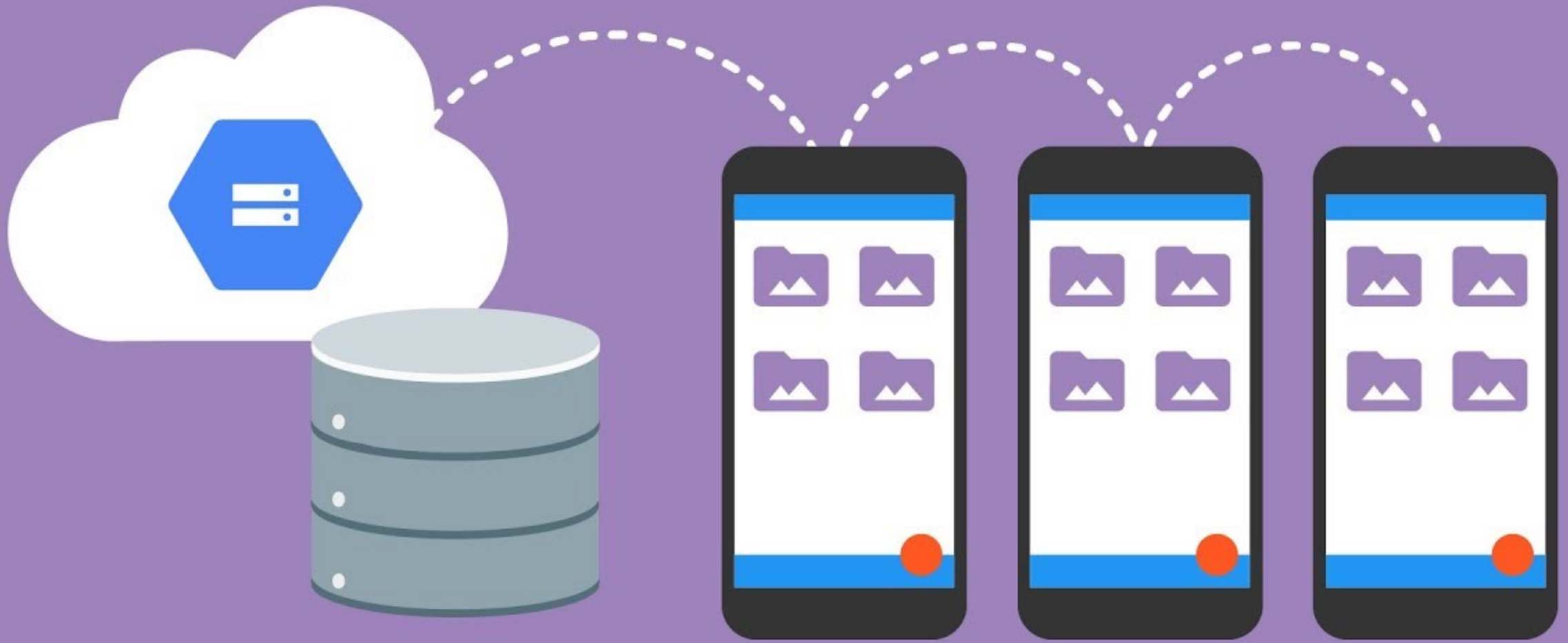
https://firebase.google.com/docs/firestore/manage-data/delete-data

Help? react-cdn-firestore-post-app

Cloud Storage

Store and serve content, images, files, etc.

https://firebase.google.com/products/storage

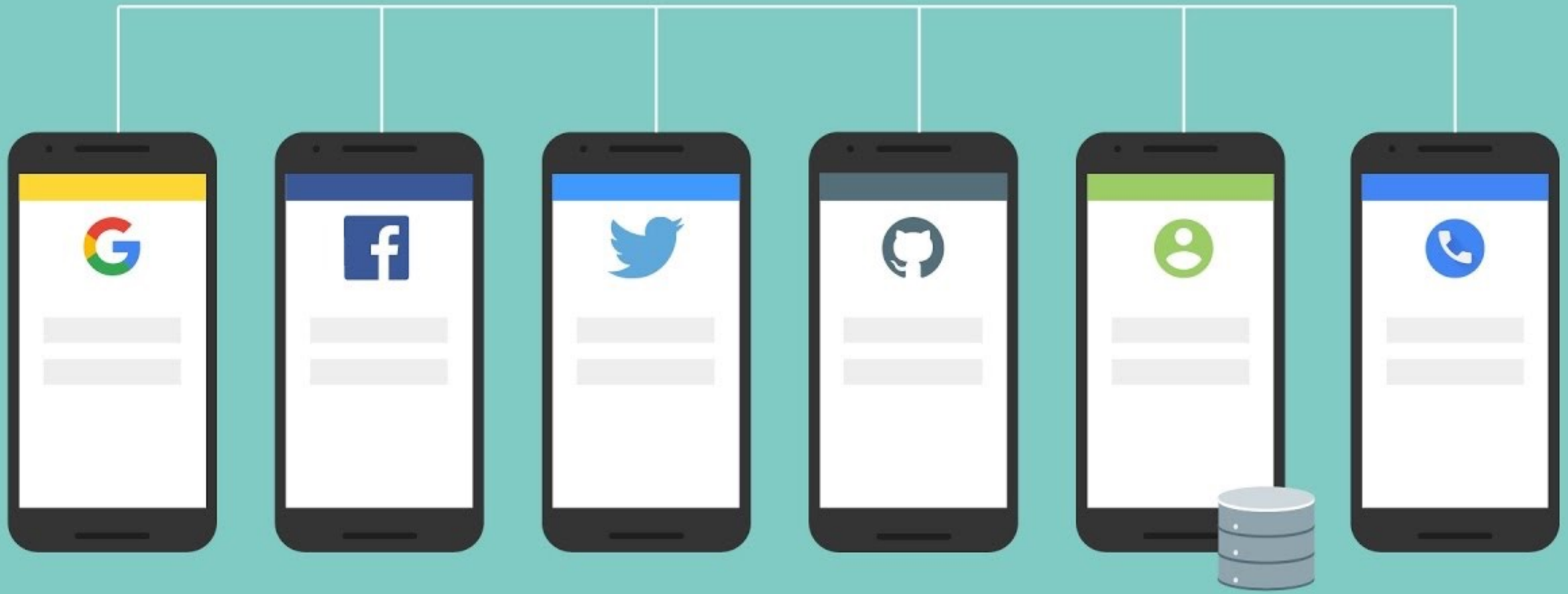


Storage

Firebase Authentication

Sign Up, Sign In and authenticate users

https://firebase.google.com/products/auth



Authentication

Authentication

Sign-in providers

Provider	Status
Email/Password	
Phone	Disabled
Google	Disabled
Play Games	Disabled
Game Center Beta	Disabled
Facebook	Disabled
Twitter	Disabled
GitHub	Disabled

Email/Password

Enable

Allow users to sign up using their email address and password. Our SDKs also provide email address verification, password recovery and email address change primitives. Learn more

Email link (passwordless sign-in) Enable

Cancel Save

Project Overview

Develop

Authentication
Database
Storage
Hosting
Functions
ML Kit

Quality
Crashlytics, Performance, Test Lab

Analytics
Dashboard, Events, Conversions, Au...

Grow
Predictions, A/B Testing, Cloud Mes...

Authentication

Users | Sign-in method | Templates | Usage

Search by email address, phone number or user UID

Add user

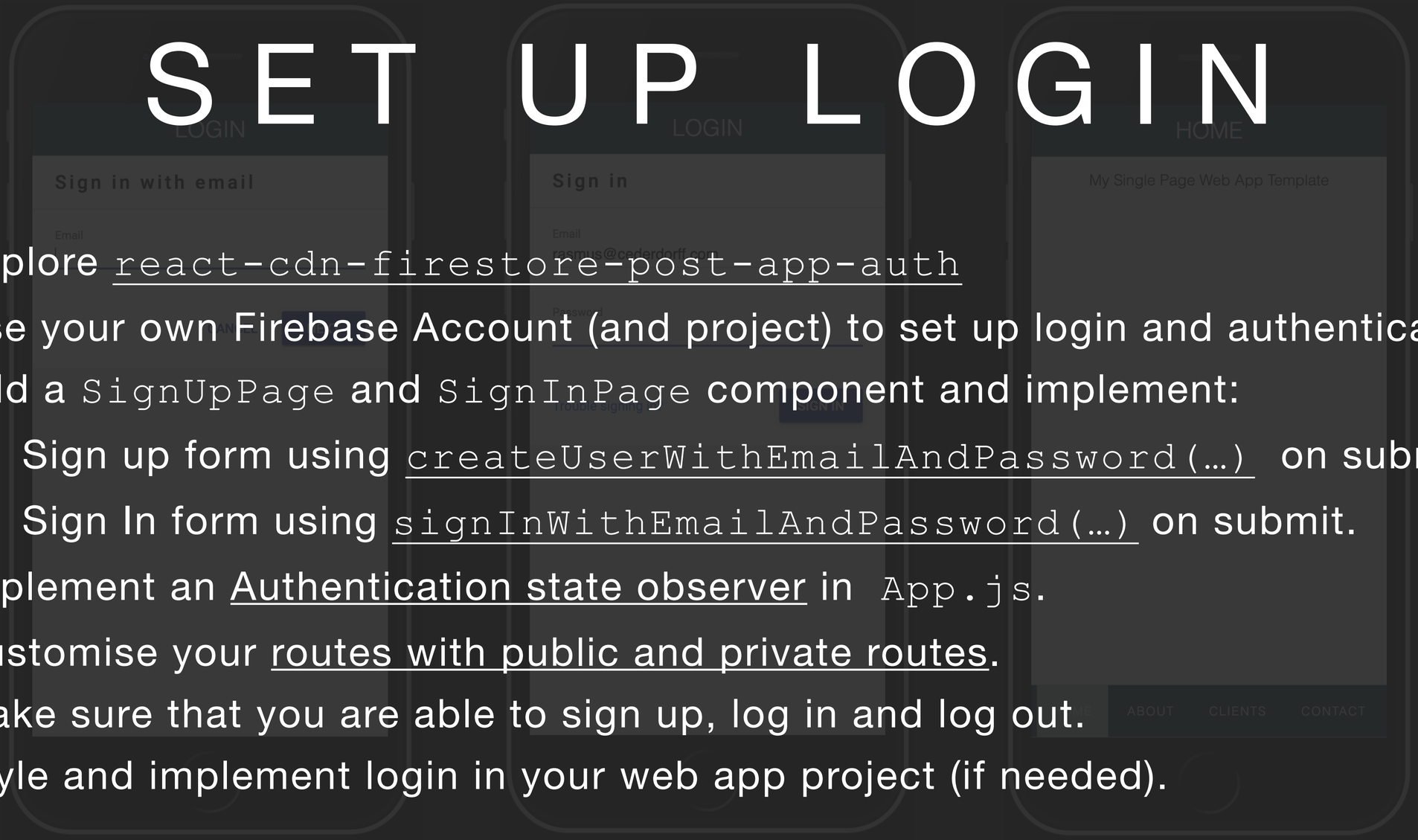
Identifier	Providers	Created	Signed In	User UID
rasmus@cederdorff.com	✉	9 Sep 2019	9 Sep 2019	mdAhTk3kLwhl3enYjMspg0e6g492

Rows per page: 50 1-1 of 1

Spark
Free $0/month
Upgrade

when you ask Rasmus
for help and he says
"Read documentation"

SET UP LOGIN



1. Explore `react-cdn-firestore-post-app-auth`
2. Use your own Firebase Account (and project) to set up login and authentication.
3. Add a `SignUpPage` and `SignInPage` component and implement:
    1. Sign up form using `createUserWithEmailAndPassword(…)` on submit.
    2. Sign In form using `signInWithEmailAndPassword(…)` on submit.
4. Implement an Authentication state observer in `App.js`.
5. Customise your routes with public and private routes.
6. Make sure that you are able to sign up, log in and log out.
7. Style and implement login in your web app project (if needed).

```
function App() {
    const auth = getAuth();
    const [isAuth, setIsAuth] = React.useState(localStorage.getItem("isAuth"));

    onAuthStateChanged(auth, user => {
        if (user) {
            // User is signed in
            setIsAuth(true);
            localStorage.setItem("isAuth", true);
        } else {
            // User is signed out
            setIsAuth(false);
            localStorage.removeItem("isAuth");
        }
    });
```

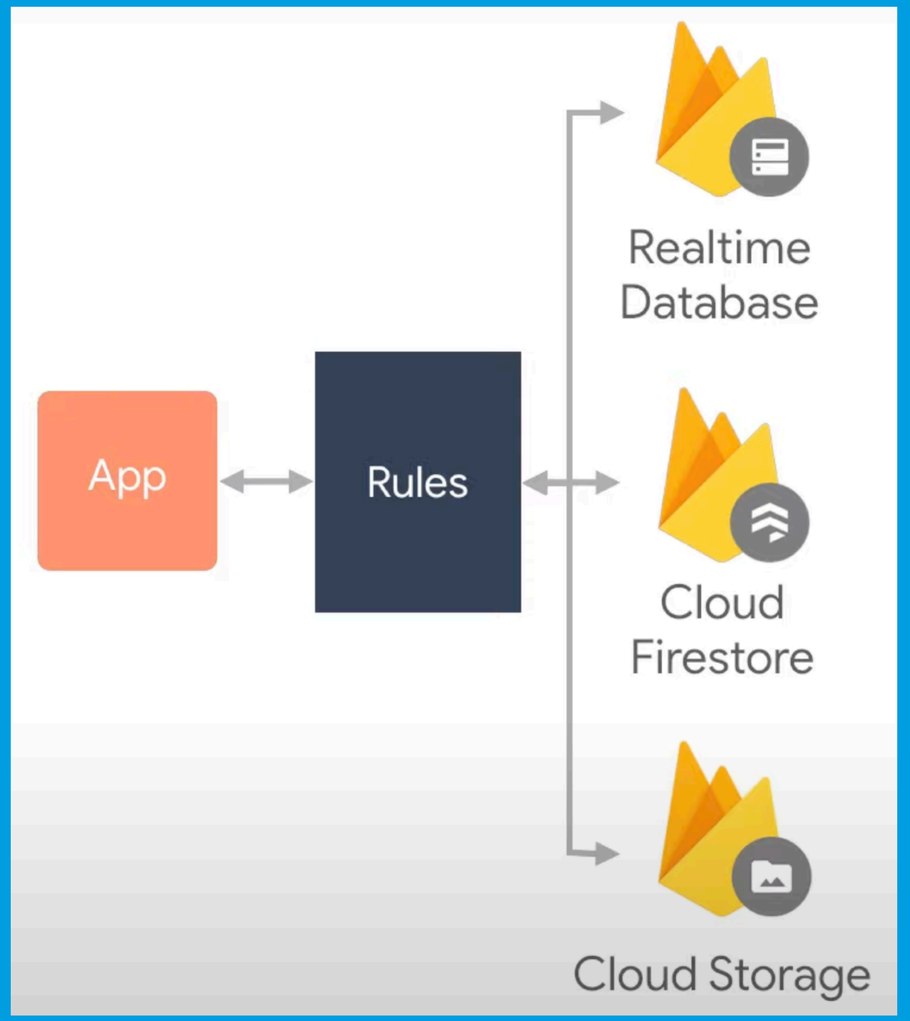
```
    return (
        <main>
            {isAuth ? (
                <>
                    <Nav />
                    <Routes>
                        <Route path="/" element={<PostsPage />} />
                        <Route path="/create" element={<CreatePage />} />
                        <Route path="/profile" element={<ProfilePage />} />
                        <Route path="/posts/:postId" element={<UpdatePage />} />
                        <Route path="*" element={<Navigate to="/" />} />
                    </Routes>
                </>
            ) : (
                <Routes>
                    <Route path="/signin" element={<SignInPage />} />
                    <Route path="/signup" element={<SignUpPage />} />
                    <Route path="*" element={<Navigate replace to="/signin" />} />
                </Routes>
            )}
        </main>
    );
}
```

VALIDATION & ERROR HANDLING

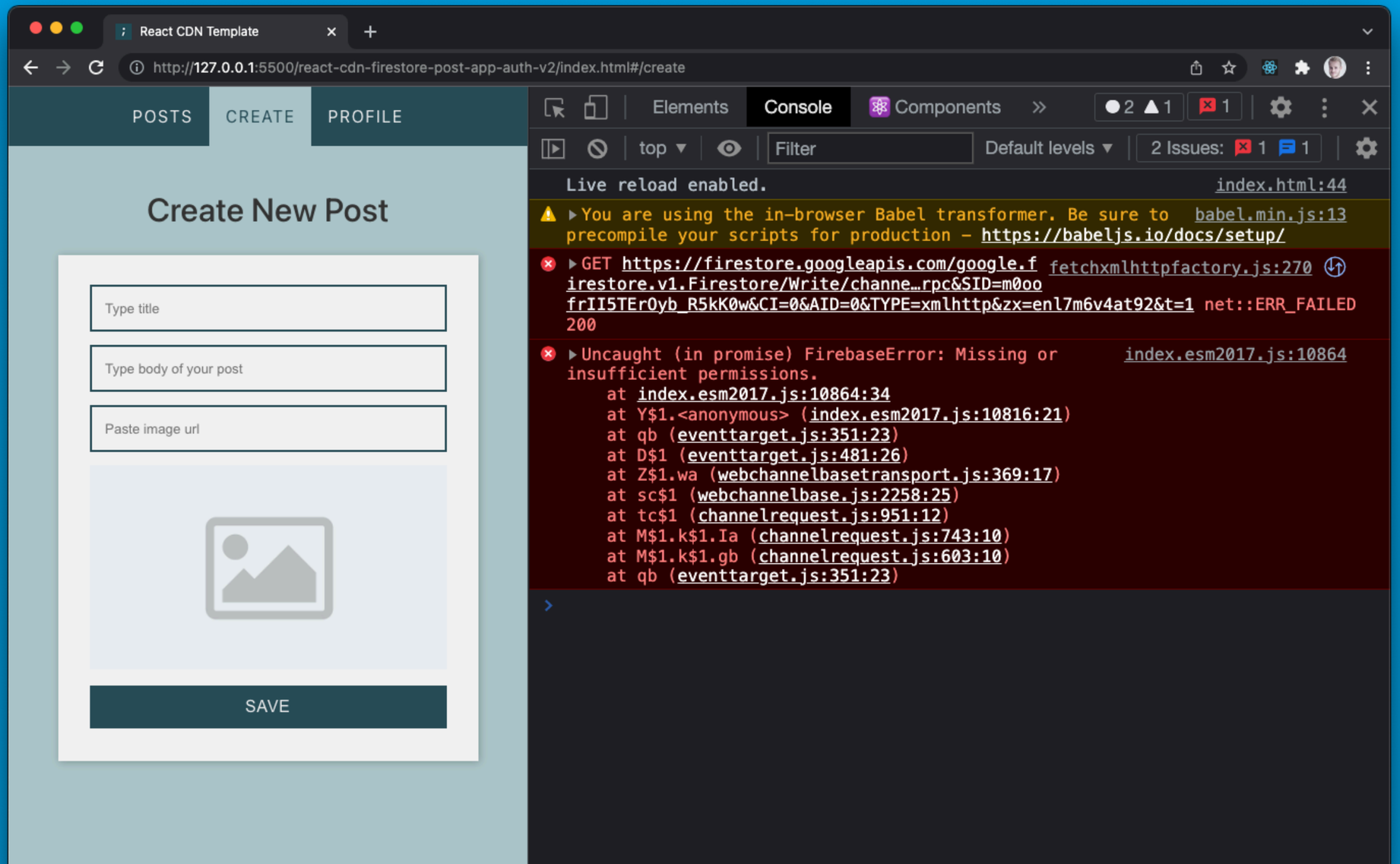
Firebase Security Rules

Firebase Security Rules

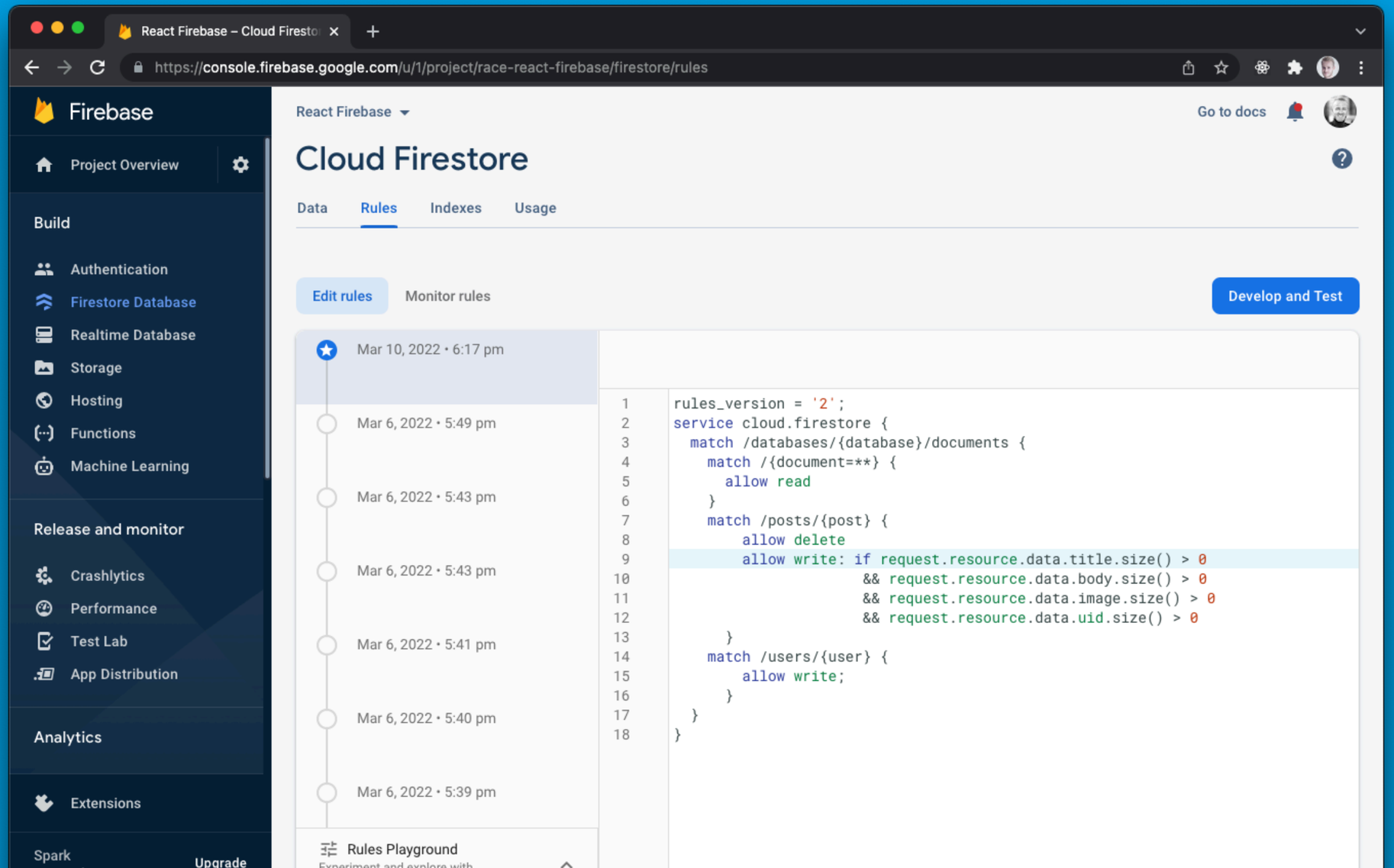
Firebase Security Rules



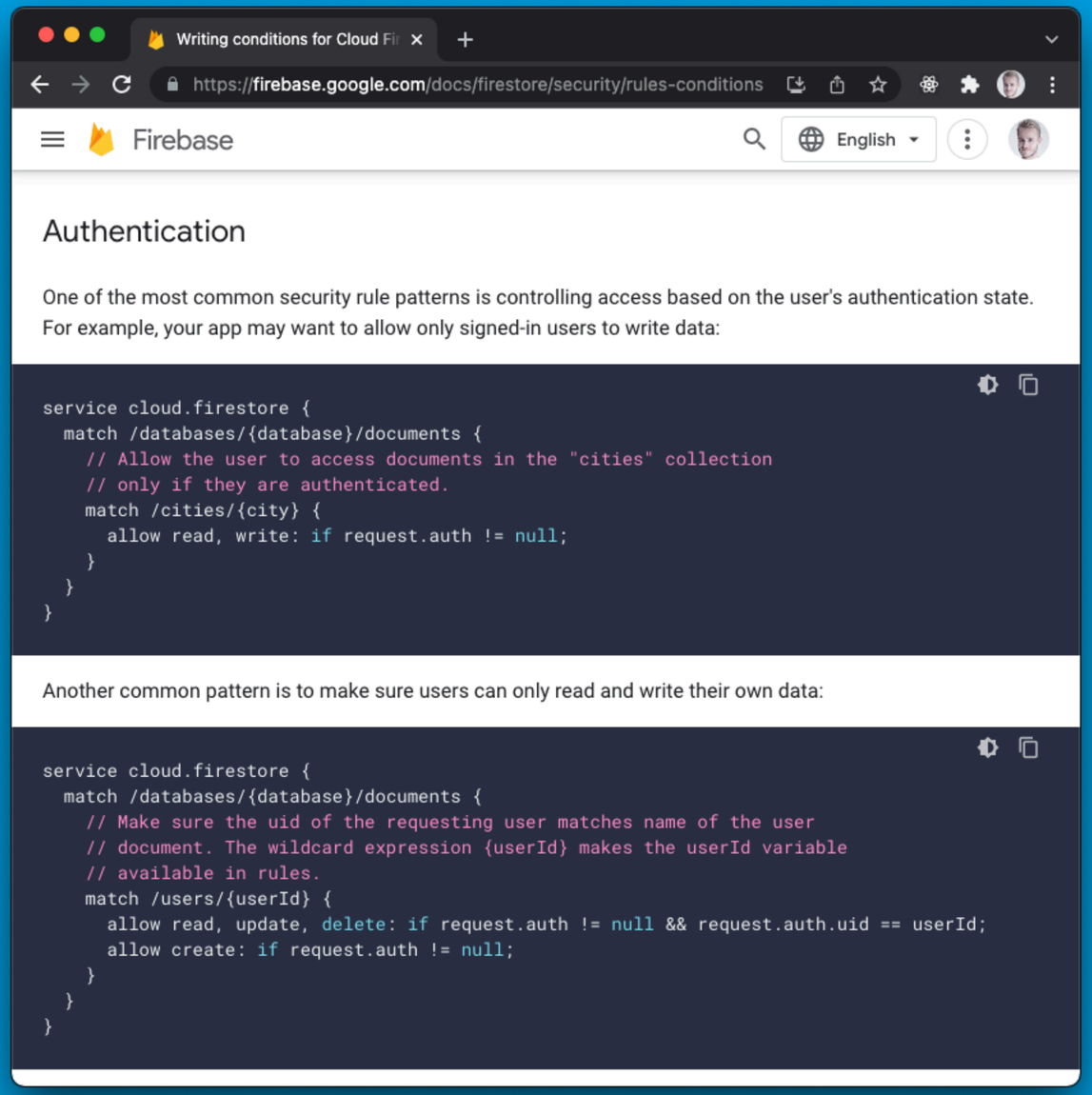
SECURITY RULES



SECURITY RULES



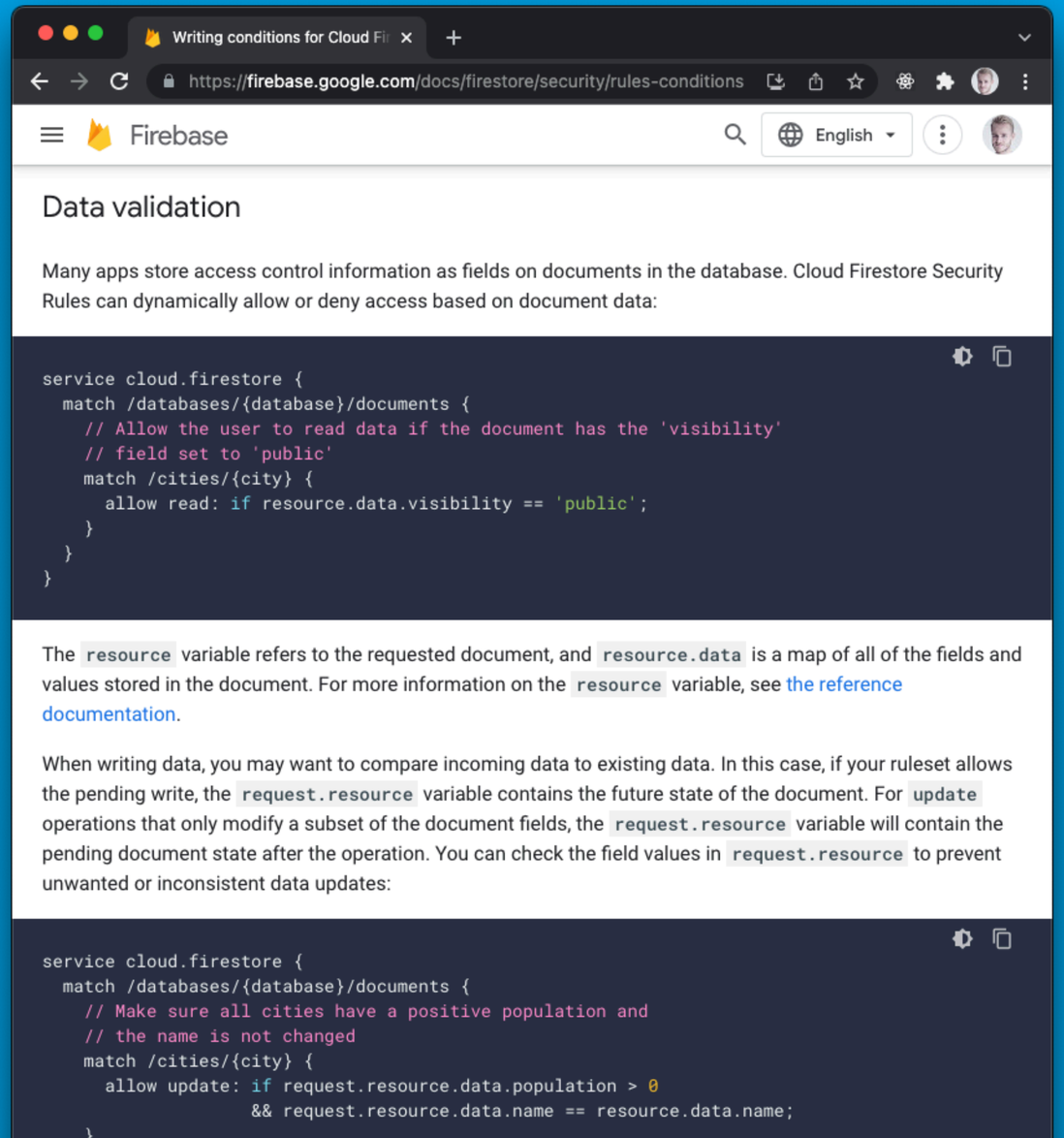
SECURITY RULES



Auth required | Deny all | Allow all

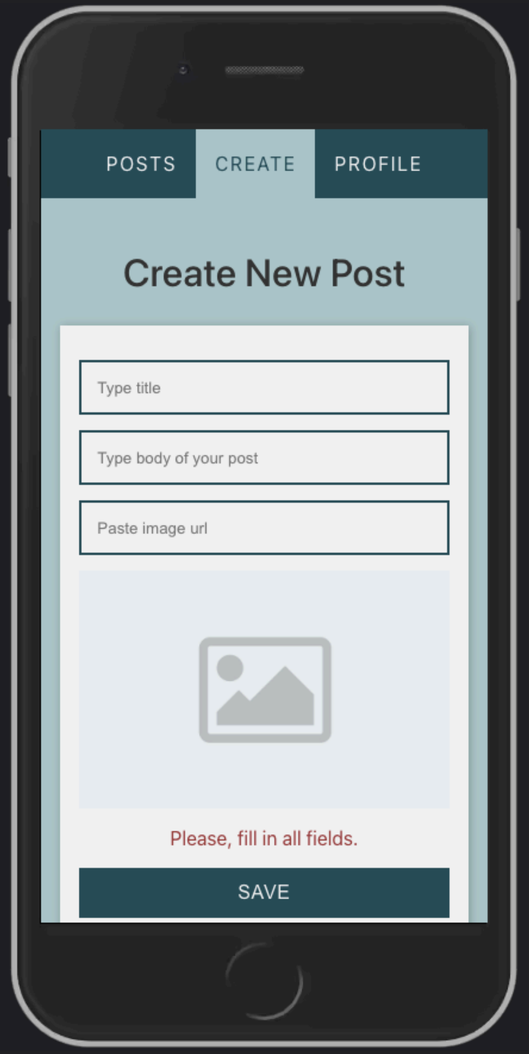
```
// Allow read/write access on all documents to any user signed in to the application
service cloud.firestore {
  match /databases/{database}/documents {
    match /{document=**} {
      allow read, write: if request.auth != null;
    }
  }
}
```

SECURITY RULES



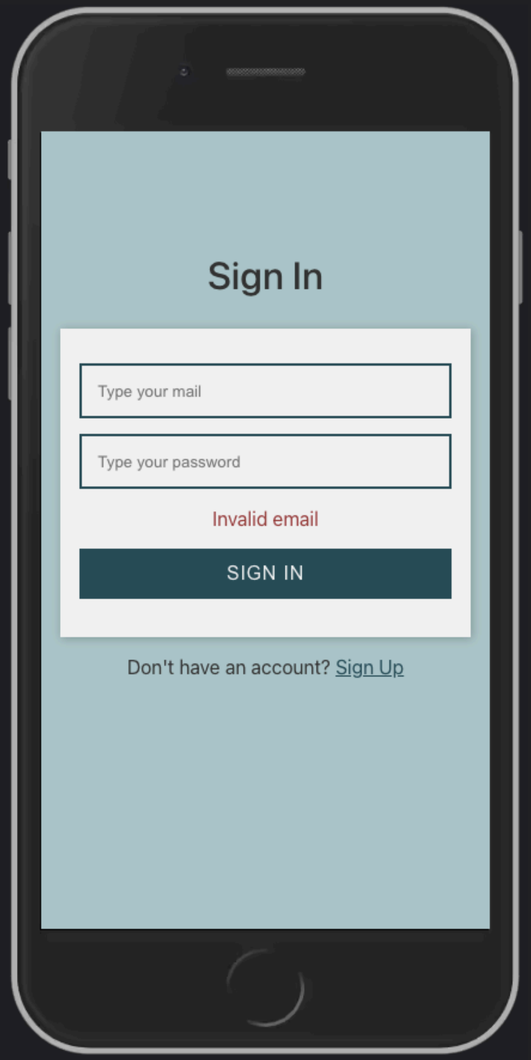

```
service cloud.firestore {
  match /databases/{database}/documents {
    match /{document=**} {
      allow read
    }
    match /posts/{post} {
        allow delete
        allow write: if request.resource.data.title.size() > 0
                     && request.resource.data.body.size() > 0
                     && request.resource.data.image.size() > 0
                     && request.resource.data.uid.size() > 0
    }
    match /users/{user} {
        allow write;
    }
  }
}
```

VALIDATE FORM



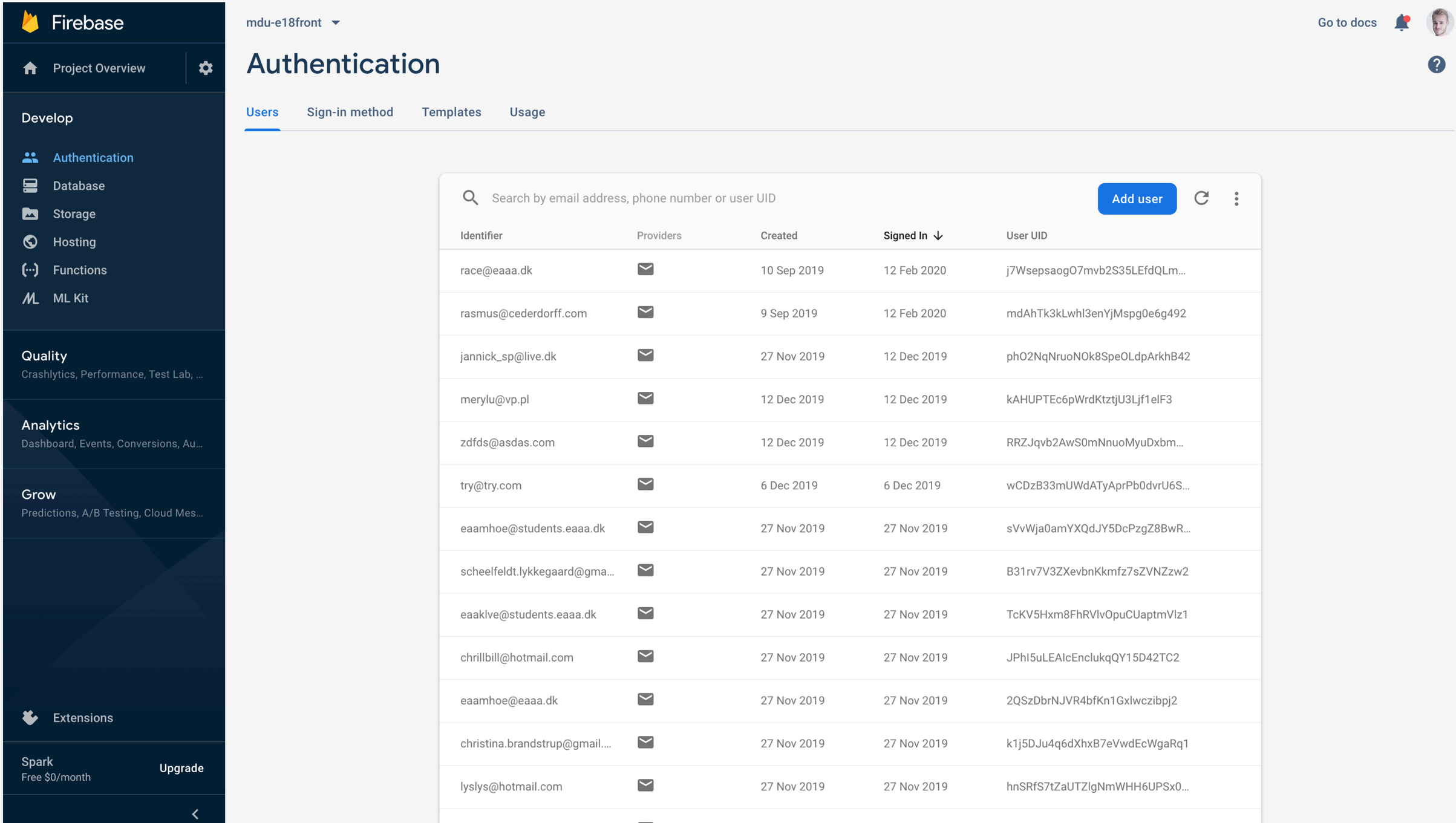

```
const [errorMessage, setErrorMessage] = React.useState("");

function submitEvent(event) {
    event.preventDefault();
    const validForm = formData.title && formData.body && formData.image;
    if (validForm) {
        handleSubmit(formData);
    } else {
        setErrorMessage("Please, fill in all fields.");
    }
}

return (
    <form onSubmit={submitEvent}>
        <input type="text" value={formData.title} onChange={handleChange
        <input value={formData.body} onChange={handleChange} name="body"
        <input type="url" value={formData.image} accept="image/*" onChar
        <img className="image-preview" src={formData.image} alt="Choose"
        <p className="text-error">{errorMessage}</p>

        <button>Save</button>
    </form>
);
```

VALIDATE FORM

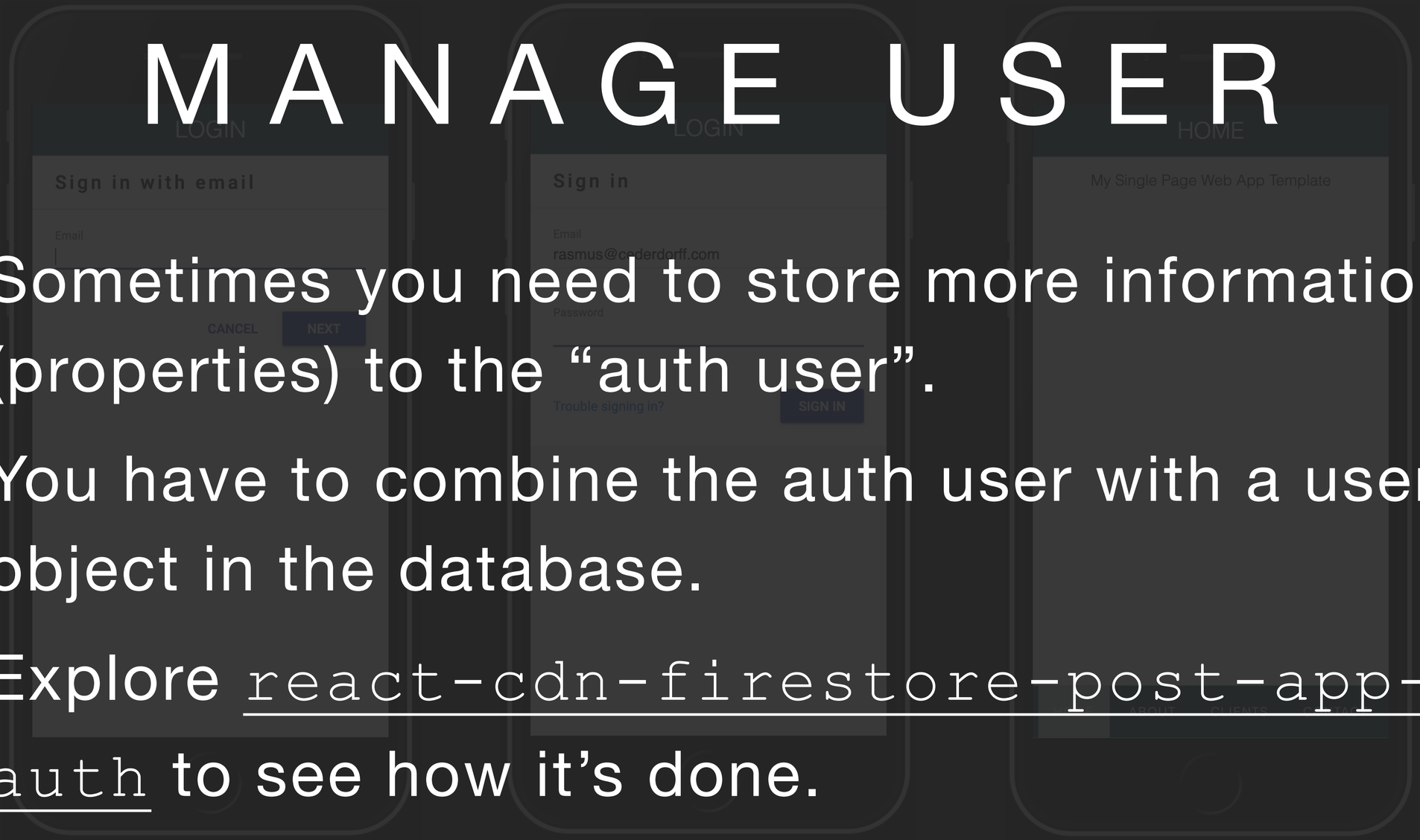



```
const [errorMessage, setErrorMessage] = React.useState("");

function signIn(event) {
    //...
    signInWithEmailAndPassword(auth, mail, password)
        .then(userCredential => {
            // Signed in
            const user = userCredential.user;
        })
        .catch(error => {
            let code = error.code;
            code = code.replaceAll("-", " ");
            code = code.replaceAll("auth/", "");
            setErrorMessage(code);
        });
}
return (
    <section className="page">
        <h1>Sign In</h1>
        <form onSubmit={signIn}>
            <input type="email" name="mail" placeholder="Type your mail" />
            <input type="password" name="password" placeholder="Type your password" />
            <p className="text-error">{errorMessage}</p>
            <button>Sign in</button>
        </form>
        <p className="text-center">
```

USER MANAGEMENT IN FIREBASE

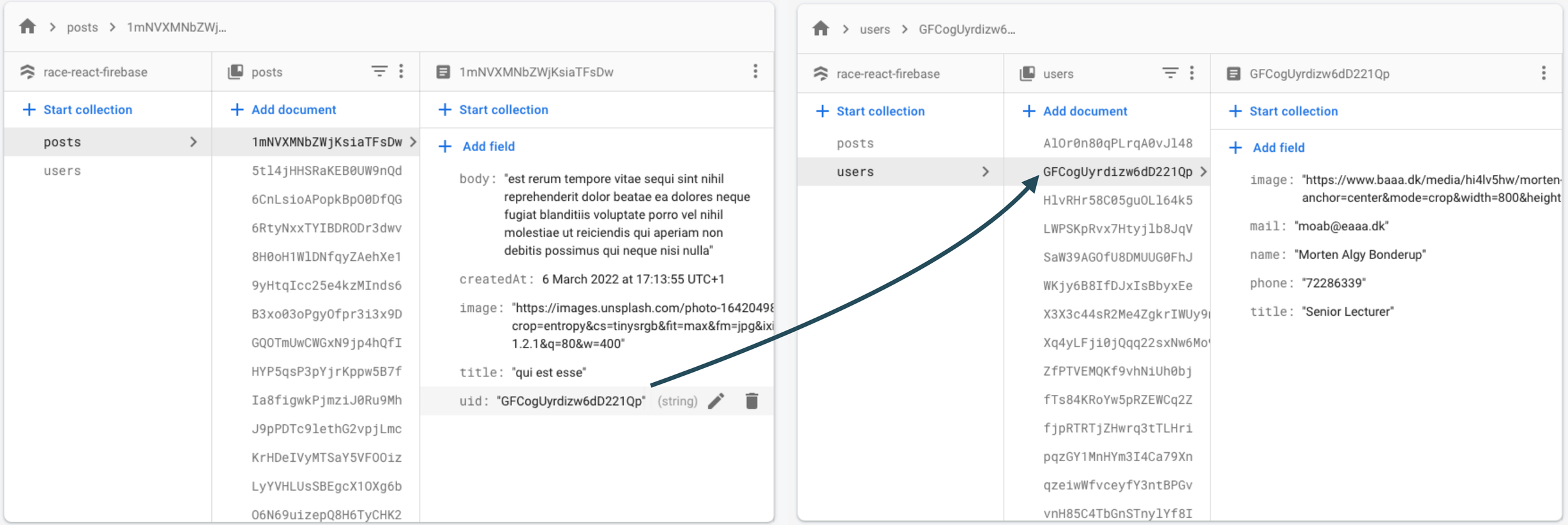

Firebase
Project Overview
Develop
Authentication
Database
Storage
Hosting
Functions
ML Kit
Quality
Crashlytics, Performance, Test Lab, ...
Analytics
Dashboard, Events, Conversions, Au...
Grow
Predictions, A/B Testing, Cloud Mes...
Extensions
Spark
Free $0/month
Upgrade
mdu-e18front
Go to docs
Authentication
Users
Sign-in method
Templates
Usage
Search by email address, phone number or user UID
Add user
Identifier
Providers
Created
Signed In
User UID
race@eaaa.dk 10 Sep 2019 12 Feb 2020 j7WsepsaogO7mvb2S35LEfdQLm...
rasmus@cederdorff.com 9 Sep 2019 12 Feb 2020 mdAhTk3kLwhl3enYjMspg0e6g492
jannick_sp@live.dk 27 Nov 2019 12 Dec 2019 phO2NqNruoNOk8SpeOLdpArkhB42
merylu@vp.pl 12 Dec 2019 12 Dec 2019 kAHUPTEc6pWrdKtztjU3Ljf1elF3
zdfds@asdas.com 12 Dec 2019 12 Dec 2019 RRZJqvb2AwS0mNnuoMyuDxbm...
try@try.com 6 Dec 2019 6 Dec 2019 wCDzB33mUWdATyAprPb0dvrU6S...
eaamhoe@students.eaaa.dk 27 Nov 2019 27 Nov 2019 sVvWja0amYXQdJY5DcPzgZ8BwR...
scheelfeldt.lykkegaard@gma... 27 Nov 2019 27 Nov 2019 B31rv7V3ZXevbnKkmfz7sZVNZzw2
eaaklve@students.eaaa.dk 27 Nov 2019 27 Nov 2019 TcKV5Hxm8FhRVlvOpuCUaptmVlz1
chrillbill@hotmail.com 27 Nov 2019 27 Nov 2019 JPhI5uLEAIcEnclukqQY15D42TC2
eaamhoe@eaaa.dk 27 Nov 2019 27 Nov 2019 2QSzDbrNJVR4bfKn1Gxlwczibpj2
christina.brandstrup@gmail.... 27 Nov 2019 27 Nov 2019 k1j5DJu4q6dXhxB7eVwdEcWgaRq1
lyslys@hotmail.com 27 Nov 2019 27 Nov 2019 hnSRfS7tZaUTZlgNmWHH6UPSx0...

MANAGE USER

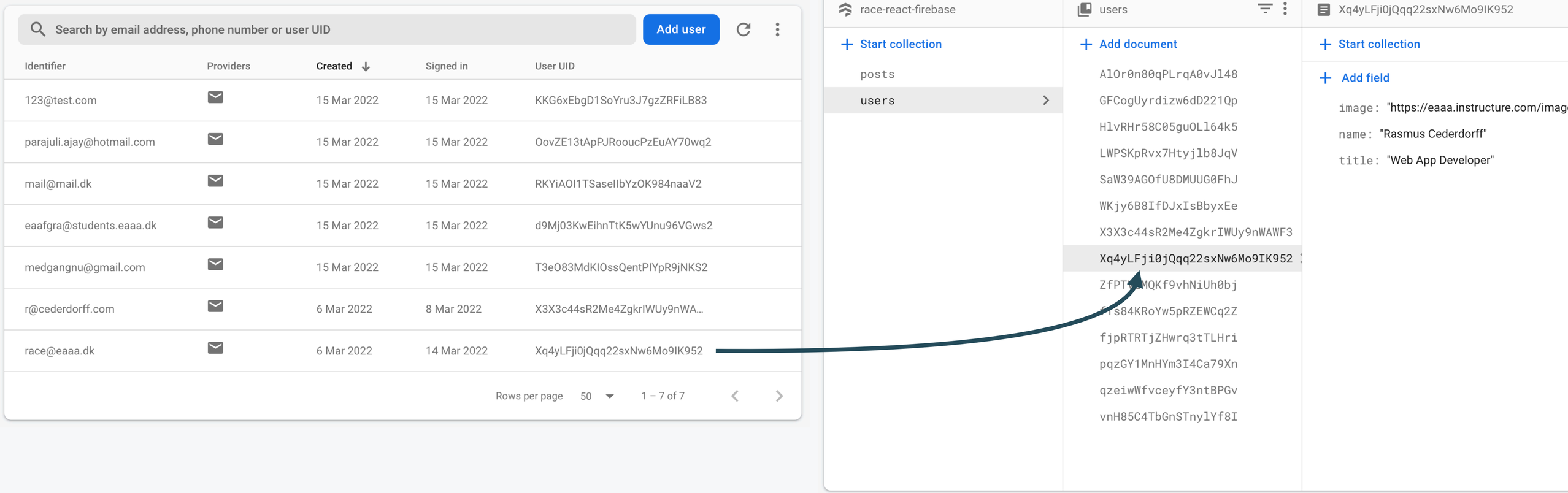


1. Sometimes you need to store more information (properties) to the “auth user”.
2. You have to combine the auth user with a user object in the database.
3. Explore `react-cdn-firestore-post-app-auth` to see how it’s done.

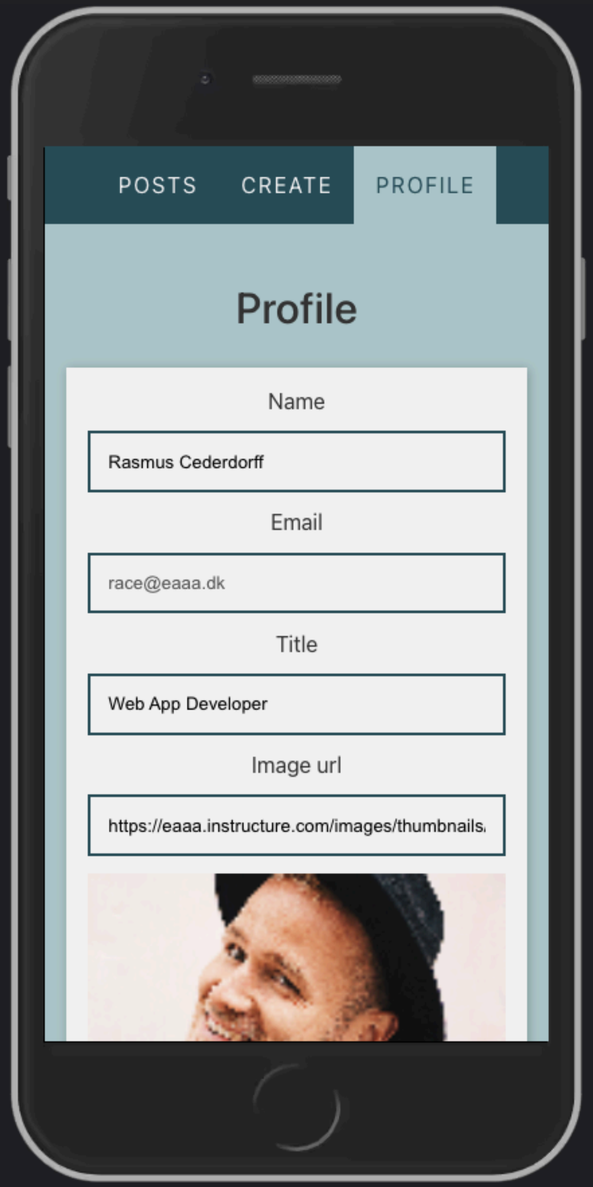
COMBINE POST & USER DATA



COMBINE AUTH USER & USER DATA



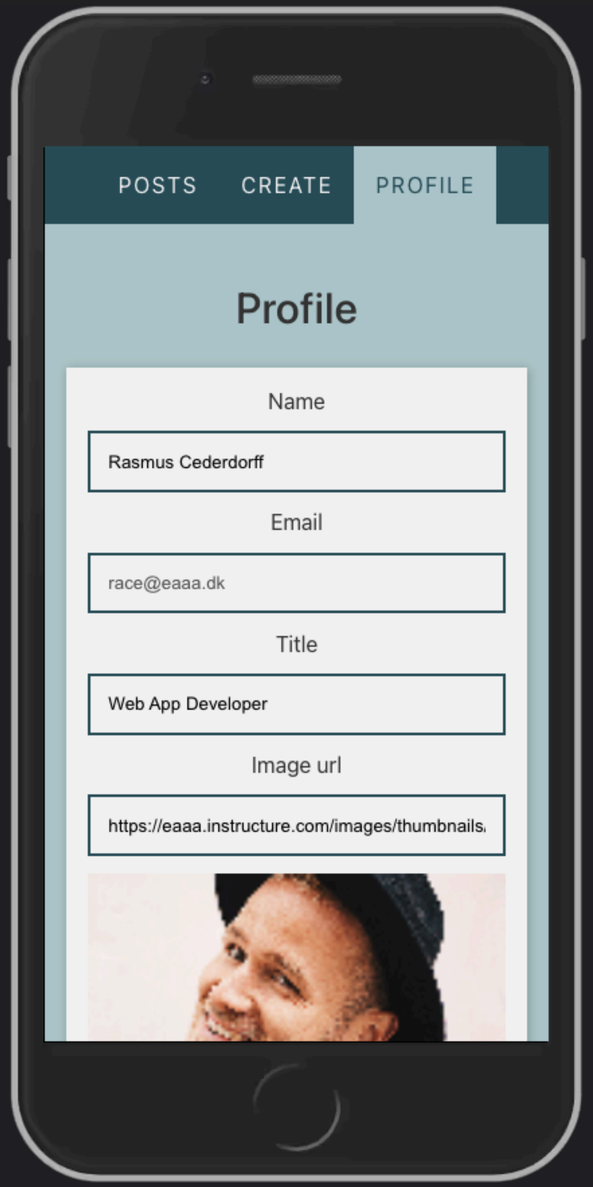
COMBINE AUTH USER & USER DATA




```
function ProfilePage({ showLoader }) {
    const [user, setUser] = React.useState({});
    const auth = getAuth();

    React.useEffect(async () => {
        showLoader(true);

        if (auth.currentUser) {
            setUser(auth.currentUser);

            const docRef = doc(usersRef, auth.currentUser.uid);
            const docSnap = await getDoc(docRef);
            if (docSnap.data()) {
                setUser(prevUser => ({ ...prevUser, ...docSnap.data() }));
            }
        }

        showLoader(false);
    }, [auth.currentUser]);
```

Concatenating auth user with user data from users collection

COMBINE AUTH USER & USER DATA




```
function ProfilePage({ showLoader }) {
    const [user, setUser] = React.useState({});
    const auth = getAuth();

    ...

    async function submitEvent(event) {
        event.preventDefault();
        showLoader(true);

        const userToUpdate = { name: user.name, title: user.title, image:
        console.log(userToUpdate);
        const docRef = doc(usersRef, user.uid);

        await setDoc(docRef, userToUpdate);
        showLoader(false);
    }
```

Setting user data in users collection using auth user id

ORDER & SORT

PERFORM SIMPLE AND COMPOUND QUERIES IN CLOUD FIRESTORE
https://firebase.google.com/docs/firestore/query-data/queries

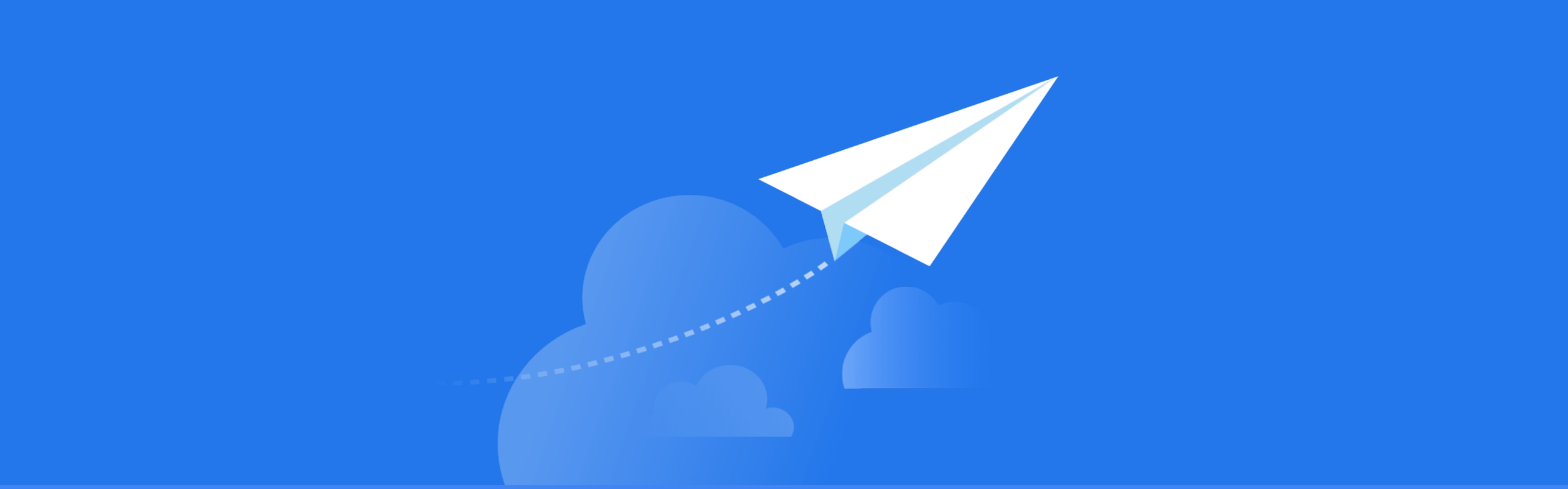
ORDER AND LIMIT DATA WITH CLOUD FIRESTORE
https://firebase.google.com/docs/firestore/query-data/order-limit-data

PAGINATE DATA WITH QUERY CURSORS
https://firebase.google.com/docs/firestore/query-data/query-cursors

```
const q = query(postsRef, orderBy("createdAt", "desc"));
onSnapshot(q, data => {…
});
```

```
const q = query(postsRef, where("uid", "==", "Xq4yLFji0jQqq22sxNw6Mo9IK952"));
onSnapshot(q, data => {…
});
```

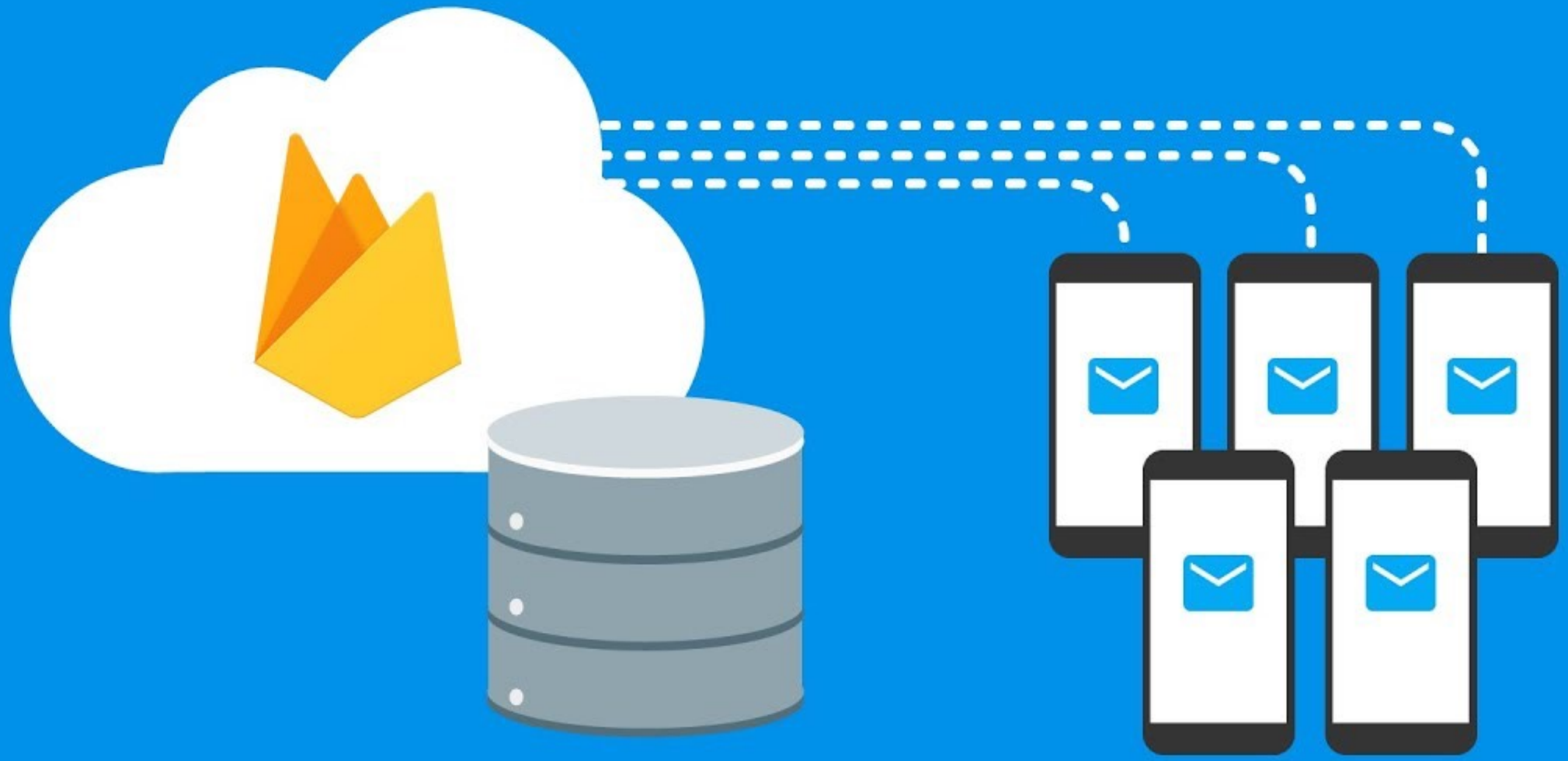
https://firebase.google.com/docs/firestore/query-data/queries#simple_queries



Cloud Messaging

Send notifications across platforms

https://firebase.google.com/products/cloud-messaging



Cloud Messaging

WHAT ELSE?

Build better apps

Cloud Firestore
Store and sync app data at global scale

ML Kit BETA
Machine learning for mobile developers

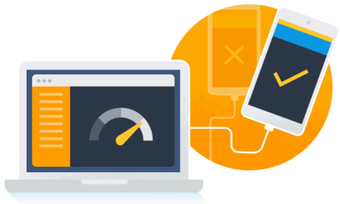
Cloud Functions
Run mobile backend code without managing servers

Authentication
Authenticate users simply and securely

Hosting
Deliver web app assets with speed and security

Cloud Storage
Store and serve files at Google scale

Realtime Database
Store and sync app data in milliseconds



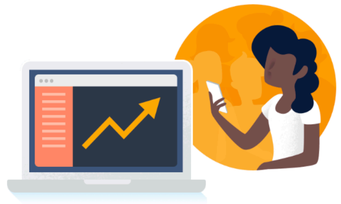
Improve app quality

Crashlytics
Prioritize and fix issues with powerful, realtime crash reporting

Performance Monitoring
Gain insight into your app's performance

Test Lab
Test your app on devices hosted by Google

App Distribution BETA
Distribute pre-release versions of your app to your trusted testers



Grow your business

In-App Messaging BETA
Engage active app users with contextual messages

Google Analytics
Get free and unlimited app analytics

Predictions
Smart user segmentation based on predicted behavior

A/B Testing BETA
Optimize your app experience through experimentation

Cloud Messaging
Send targeted messages and notifications

Remote Config
Modify your app without deploying a new version

Dynamic Links
Drive growth by using deep links with attribution


Code
Every
Day