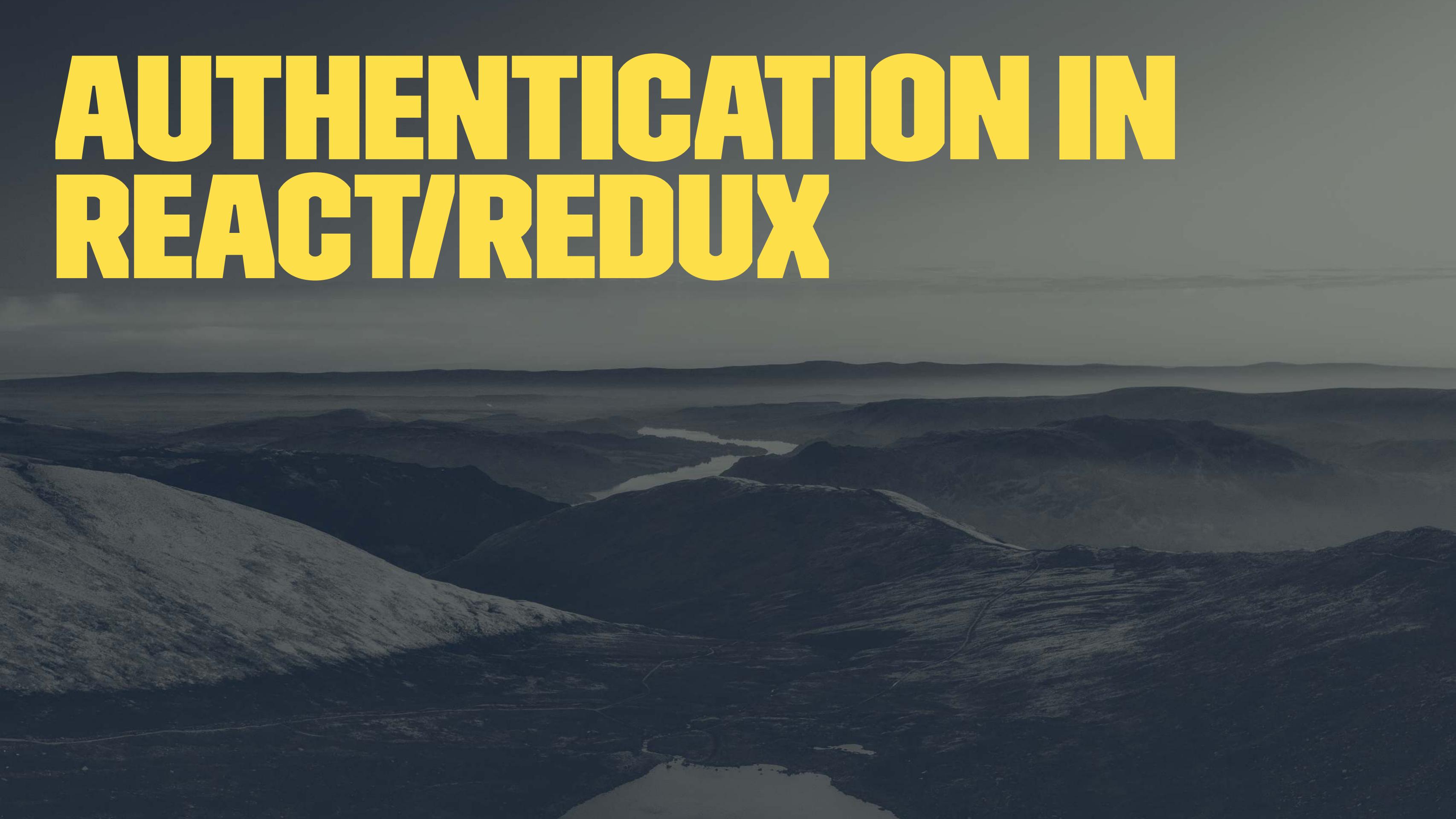


AUTHENTICATION IN REACT/REDUX



ROADMAP

- » Authentication
- » (Debugging)



AUTHENTICATION

- » Verify identity of something
 - » Who is somebody
- » Identity can be
 - » User
 - » Different Service
 - » Pets
 - » ...
- » Sometimes referred to as Authn



AUTHENTICATION

- » identity is verified by credentials
- » usually combination of username/password
- » other data might be used for identification
 - » IP Geolocation
 - » 2 Factor Authentication
 - » Security Keys

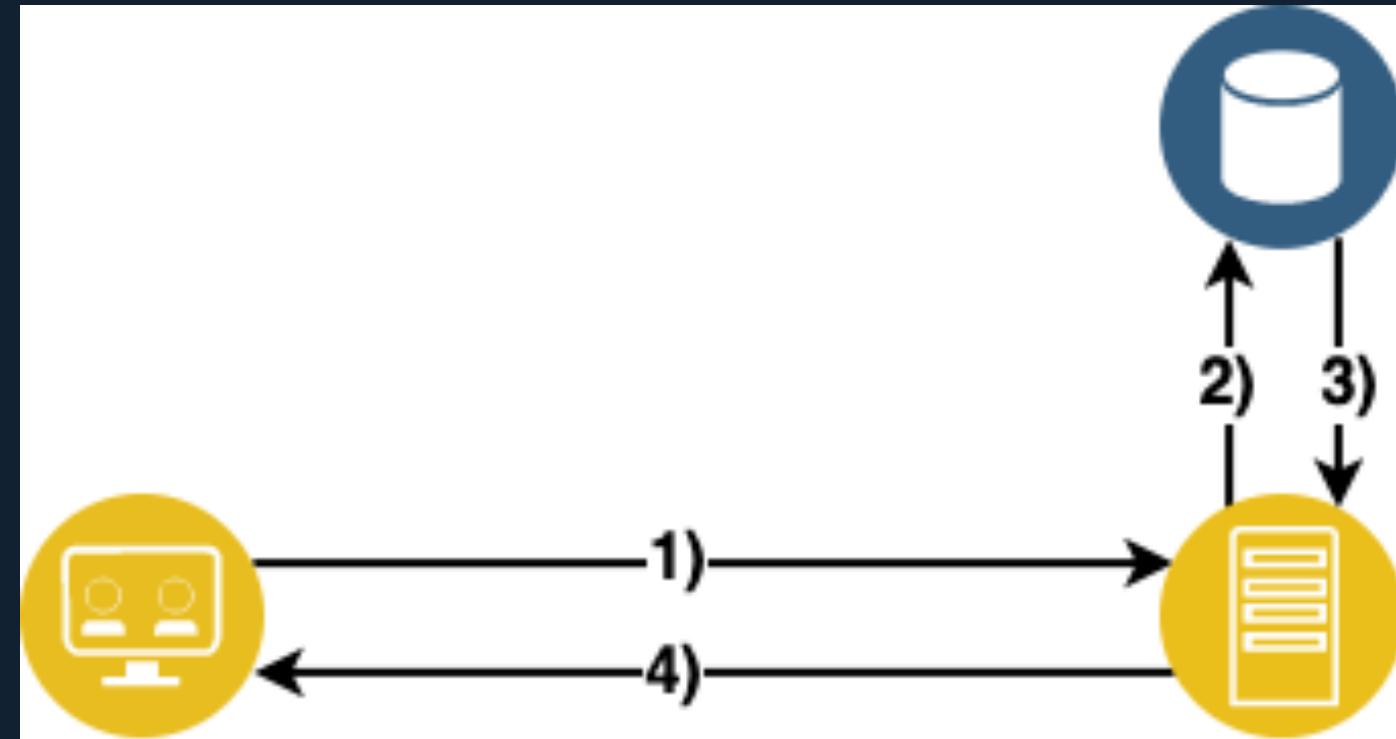
AUTHORIZATION

- » what resources should somebody have access to
 - » What am I allowed to do
 - » eg. A person can only change its own password
 - » usually happens after authentication
 - » Anonymous resources might be accessible without authz (eg. reading news articles)



STATEFUL AUTHENTICATION

» Session data is stored in the backend ^{1 2 3 4}



¹ /money_transactions/ is called

² the session for the user is fetched from a db

³ the session information is returned and verified

⁴ result of /money_transactions/ is returned to client

STATEFUL AUTHENTICATION

» Pros:

- » Revoke session anytime
- » Easy to implement
- » Session data can be changed anytime

» Cons:

- » Increasing server resources
- » Every session needs to hit db
- » hard to integrate 3rd party apps

STATELESS AUTHENTICATION

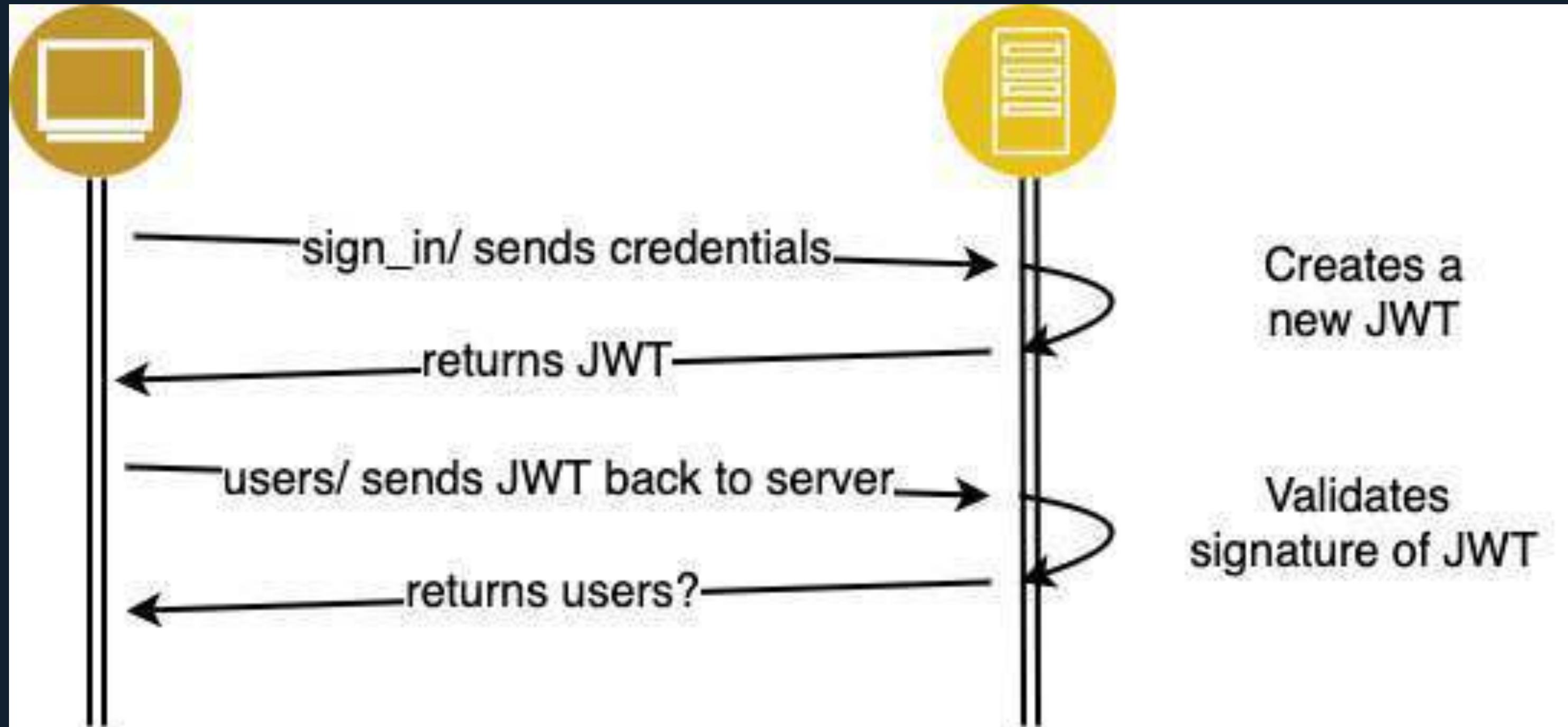
- » Session data is stored directly on the client
- » Session data is signed and integrity can be verified
- » server only needs to verify validity
- » does not need to refetch data



STATELESS AUTHENTICATION

- » Pros:
 - » Lower server overhead
 - » Easy to scale and integrate with 3rd party
 - » 3rd party can read session data
- » Cons:
 - » Session can't be revoked anytime
 - » More complex to implement
 - » Session data can't be changed until it expires

STATELESS AUTHENTICATION



JWT (JSON WEB TOKEN)

“JSON Web Token (JWT) is a compact, URL-safe means of representing claims to be transferred between two parties.”

- » A signed JSON whose validity can be verified by others

ANATOMY OF JWT

- » Header Algorithm & Token type (red)
- » Payload (purple)
- » whatever data needed for identification
- » signature (blue)

```
eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJ  
zdWIiOiIxMjM0NTY3ODkwIiwibmFtZSI6IkpvaG4  
gRG9lIiwiaWF0IjoxNTE2MjM5MDIyfQ.SflKxwRJ  
SMeKKF2QT4fwpMeJf36P0k6yJV_adQssw5c|
```

HEADER

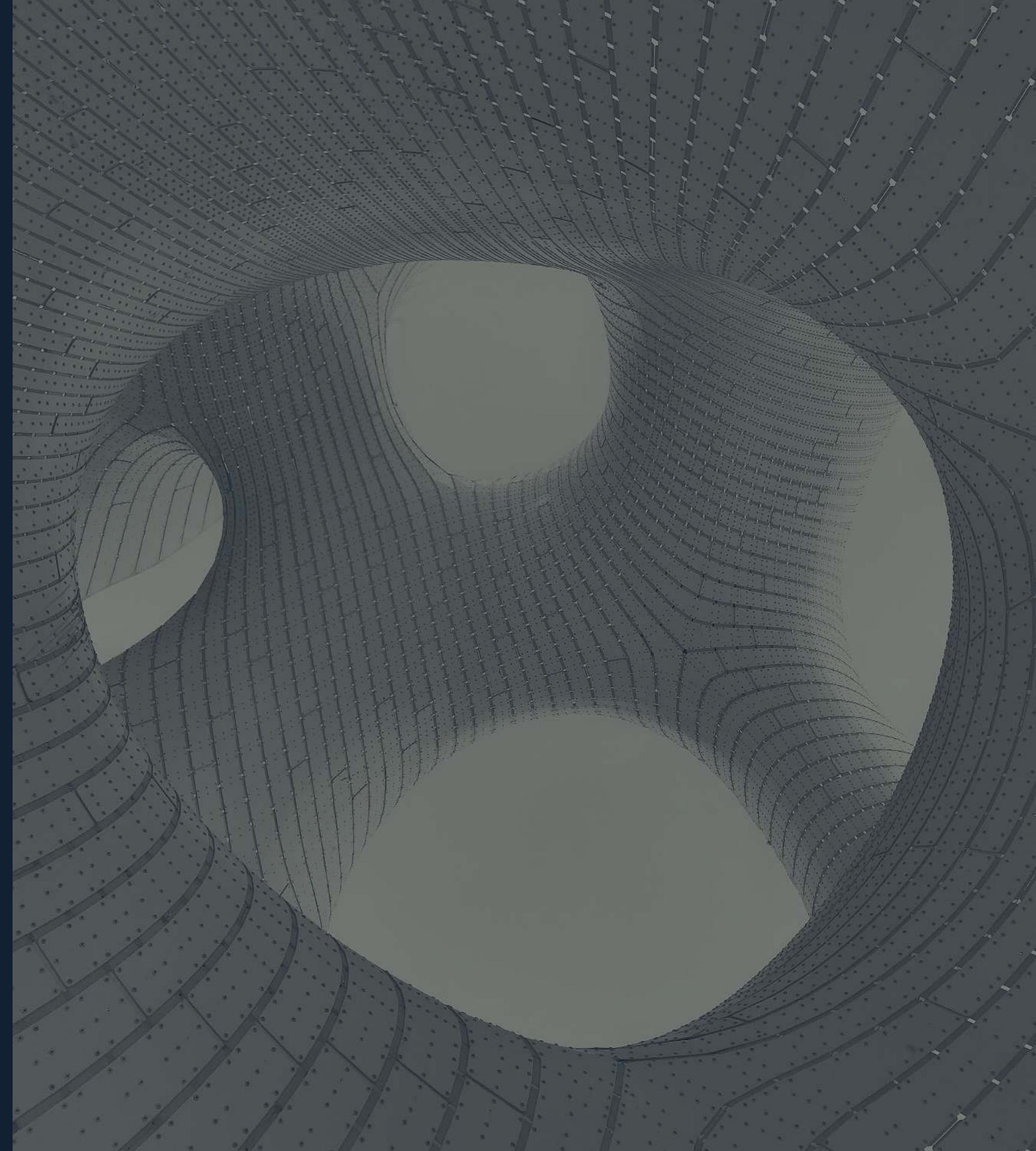
```
» declare type JWT  
» declare hashing algorithm  
to use  
» there are many others  
(see https://jwt.io/)  
  
{  
  "alg": "HS256",  
  "typ": "JWT"  
}
```



PAYLOAD

- » Carries the information which we want to transmit
- » Also called JWT claims
- » can be read without the secret
 - » don't store sensitive data in here!!!

```
{  
  "id": "1234567890",  
  "name": "John Doe",  
  "roles": ["Admin"]  
}
```



SIGNATURE

- » Hash of
 - » header
 - » payload
 - » secret
- » required for data verification

ANATOMY OF JWT

```
// Header
{ "alg": "HS256", "typ": "JWT" }

// Payload (any valid JSON can be added)
{ "id": "1234567890", "name": "John Doe" }

// verify signature
// ...
```

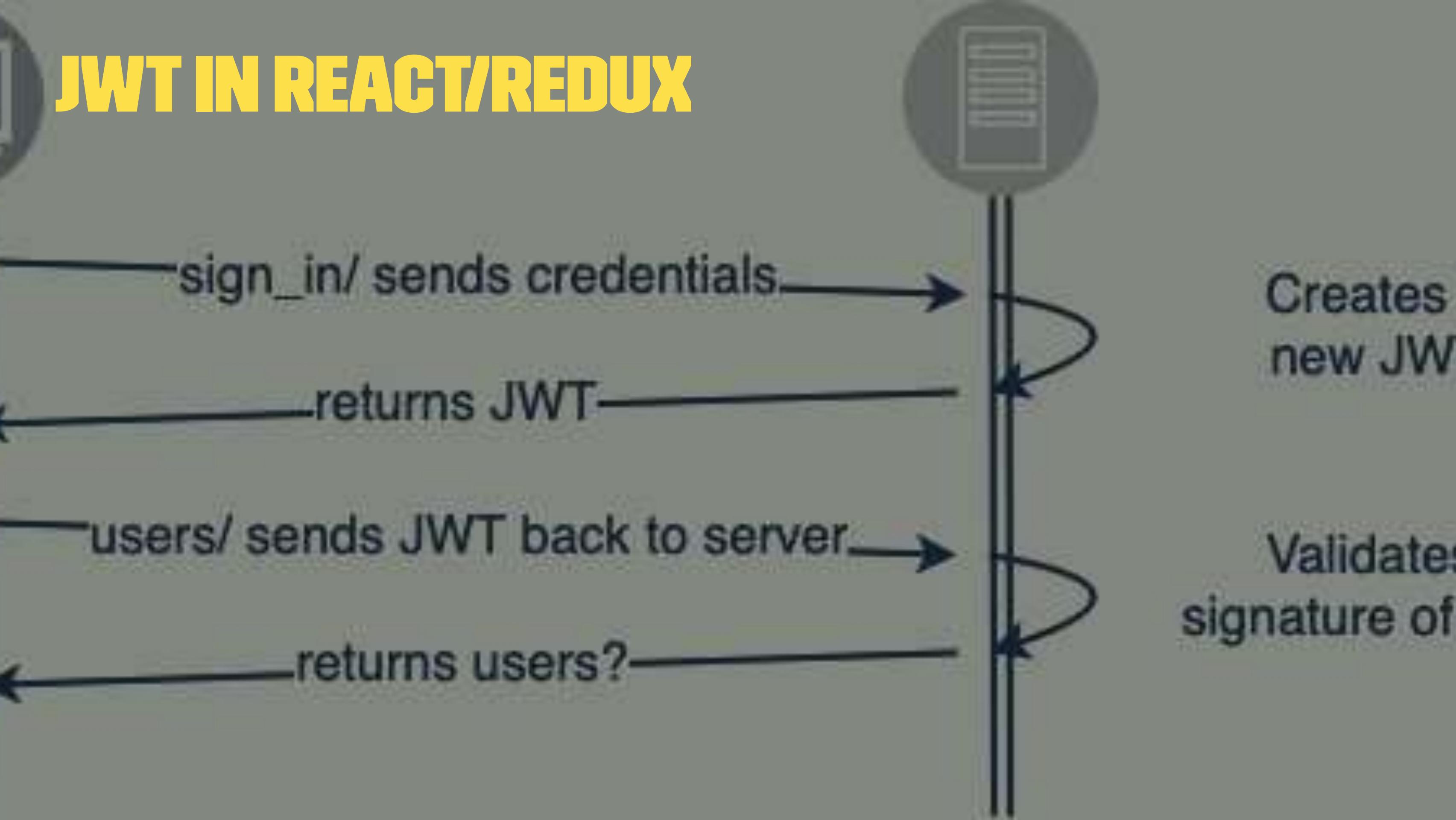
gets converted to:

```
eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJzdWIiOiIxMjM0NTY3ODkwIiwibmFtZSI6IkpvaG4gRG9lIiwiaWF0IjoxNTE2MjM5MDIyfQ.SflKxwRJSMeKKF2QT4fwpMeJf36P0k6yJV_adQssw5c|
```

PROS

- » Standard by IETF
- » Scalable
 - » no DB hit needed for subsequent requests
- » Stateless
- » Distributable
- » Secure against CSRF

JWT IN REACT/REDUX



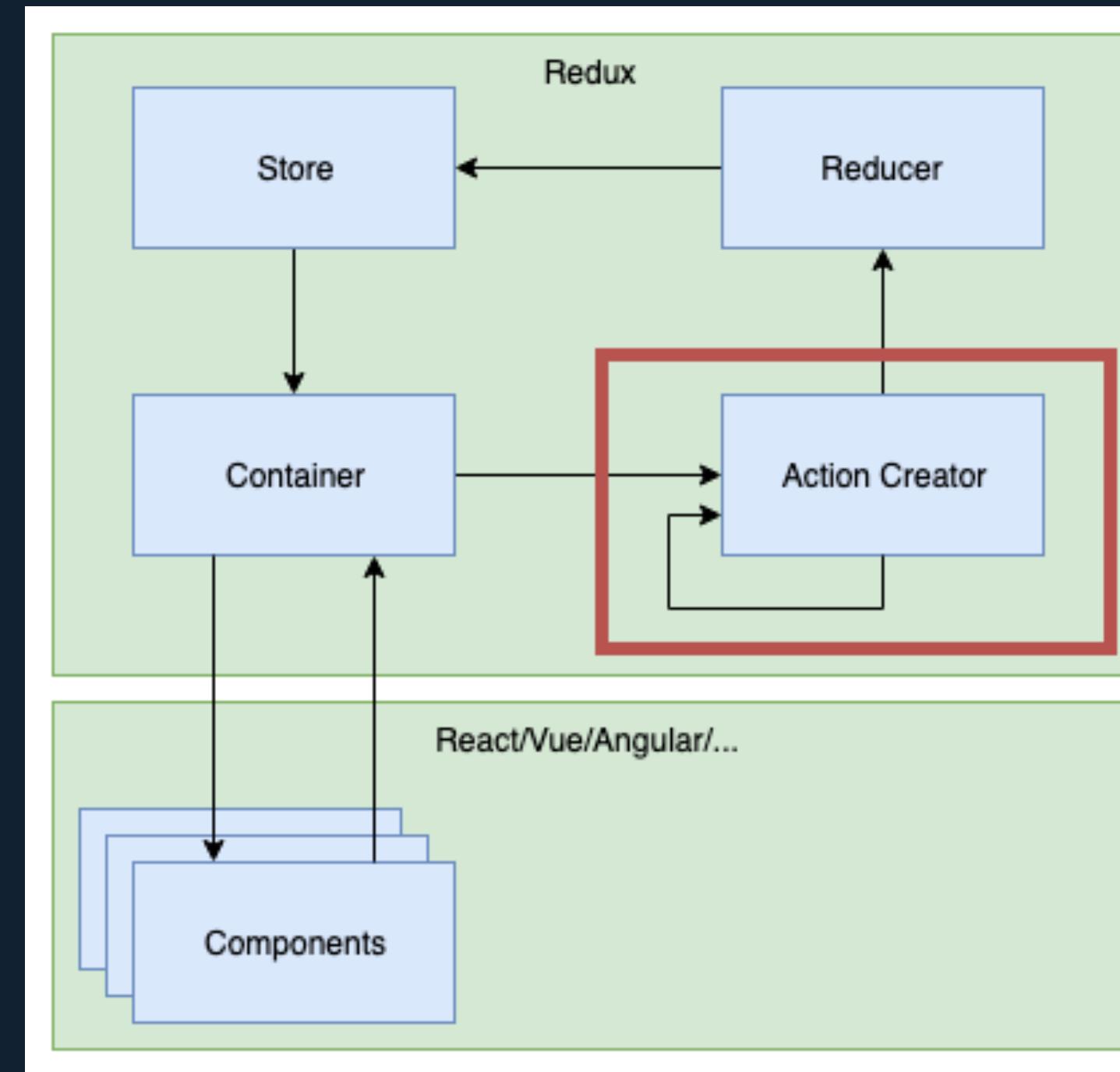
JWT IN REACT/REDUX

» Where would it fit best?



React/Vue/Angular/...

JWT IN REACT/REDUX



RECEIVING A JWT

```
const signIn = ({ email, password }) => async (dispatch) => {
  const response = await fetch("/sign_in", {
    "method": "POST",
    "headers": {
      "Accept": "application/json",
      "Content-Type": "application/json"
    },
    "body": JSON.stringify({ user: { email, password } })
  });
  const token = response.headers.get('Authorization')
  dispatch({ type: 'auth/signed_in', payload: { token } }) // still needs to be written
})
```

SENDING JWT TO BACKEND

```
const getUsers = ({ email, password }) => async (dispatch, getState) => {
  const jwtToken = getState().auth.token
  // ^^^^^^
  // get JWT token from state
  if (!jwtToken) { redirect('/sign_in') }

  const response = await fetch("/users", {
    headers: {
      'Authorization': jwtToken
      // ^^^^^^
      // add JWT token to fetch call
    },
  });
  // ...
})
```

SIGN OUT

```
const signOut = ({ email, password }) => async (dispatch) => {
  // no http call required (token needs to be removed from state in reducer)
  dispatch({ type: 'auth/signed_out' })
})
```

SIGN OUT CAVEATS

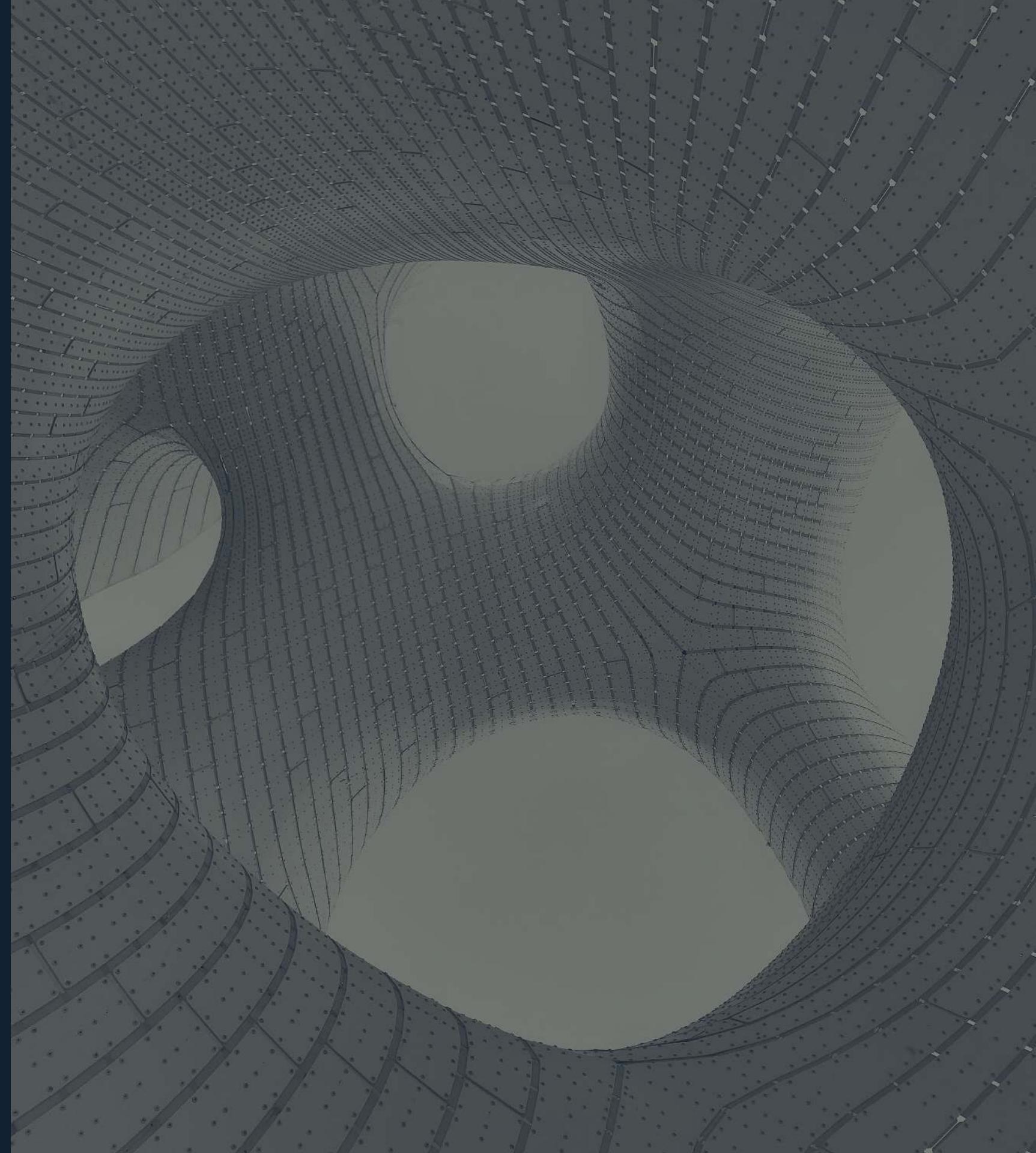
- » items in store need to be removed manually
- » eg. previous money transactions/users
- » otherwise there is a possible data leak

```
const initialState = {}
const userReducer = (previousState = initialState, action) => {
  switch(action.type) {
    // ...
    case 'auth/signed_out':
      return initialState
    // ...
  }
}
```

AUTHENTICATION WITH FIREBASE

FIREBASE INSTALL FIREBASE TOOLS

- » `npm install -g firebase-tools`
- » `firebase login`

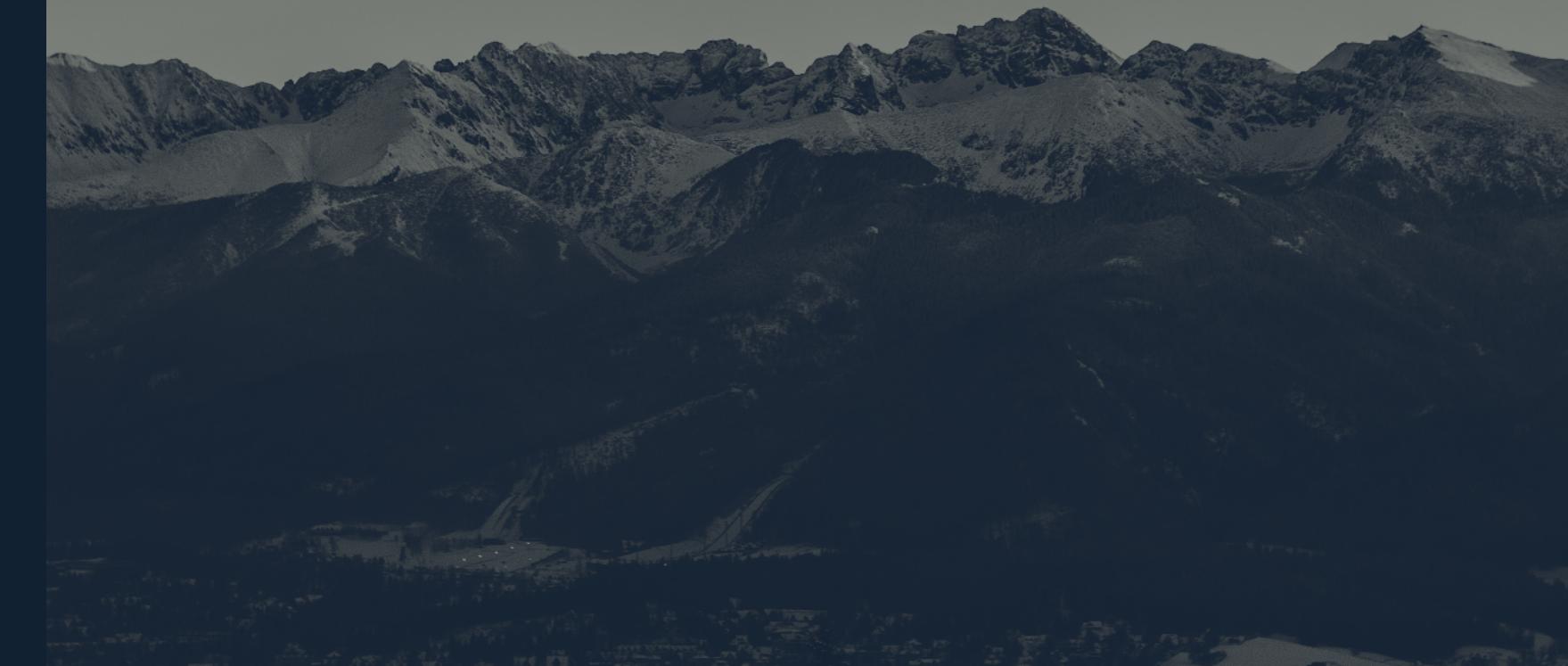


FIREBASE

INITIALIZE PROJECT IN

FIREBASE

- » `firebase init`
- » Select features
 - » Database
 - » Hosting
 - » Emulators
- » Create new project
 - » select name + 5 random characters at the end



FIREBASE INITIALIZE PROJECT IN FIREBASE

- » What do you want to use as your public directory?
 - » enter build
- » Configure as a single-page app
 - » enter y
- » Set up automatic builds
 - » enter n for now

FIREBASE EMULATOR SETUP

- » Select
 - » Authentication Emulator
 - » Database Emulator



FIREBASE EMULATOR SETUP

Which Firebase emulators do you want to set up? Press Space to select emulators, then Enter to confirm your choices. Authentication Emulator, Database Emulator?

- Which port do you want to use for the auth emulator? 9099
- Which port do you want to use for the database emulator? 9000
- Would you like to enable the Emulator UI? Yes
- Which port do you want to use for the Emulator UI (leave empty to use any available port)?
- Would you like to download the emulators now? (y/N) y

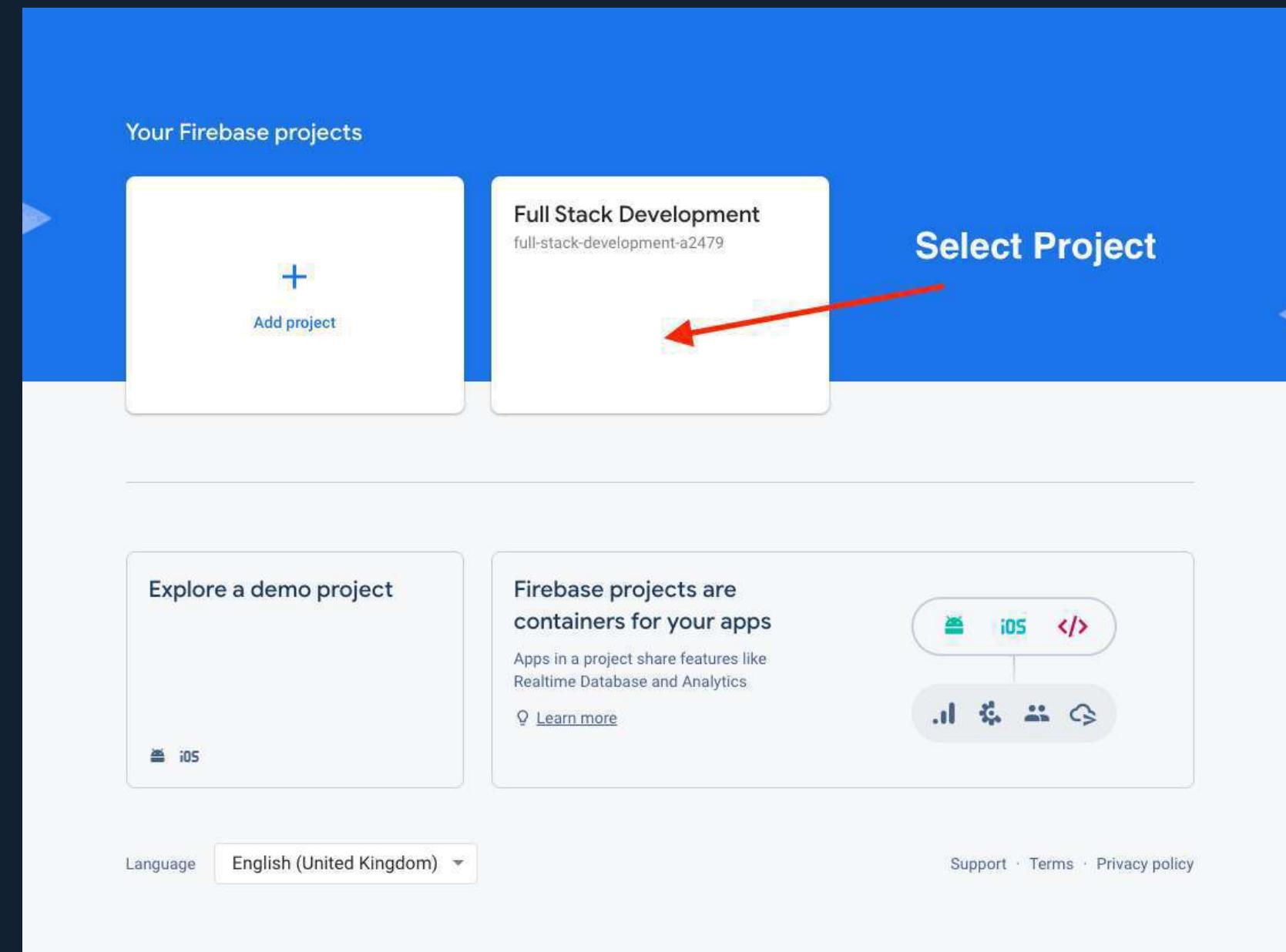
FIREBASE EMULATOR SETUP

» Adapt start scripts in package.json

```
"start:emulators": "firebase emulators:start",
"start": "concurrently -n firebase,app,storybook 'npm run start:emulators' 'npm run start:app' 'npm run start:storybook'",
```

FIREBASE

GET FIREBASE CONFIG 1/3



FIREBASE

GET FIREBASE CONFIG 2/3

The screenshot shows the Firebase Project Overview page with the 'Project settings' tab selected. A red arrow points to the 'Project settings' link in the left sidebar, labeled '1) go to Project Settings'. Another red arrow points to the 'Web Application' app entry in the 'Your apps' section, labeled '2) select config'. A third red arrow points to the 'Config' radio button under the 'Firebase SDK snippet' section, labeled '3) copy config'. The 'Config' snippet code is displayed below:

```
// For Firebase JS SDK v7.20.0 and later, measurementId is optional
const firebaseConfig = {
  apiKey: "AIzaSyBaUKK6ikaiYN98xIiQiCV-wPIaPCNS26Y",
  authDomain: "full-stack-development-a2479.firebaseio.com",
  projectId: "full-stack-development-a2479",
  storageBucket: "full-stack-development-a2479.appspot.com",
  messagingSenderId: "338202513827",
  appId: "1:338202513827:web:7ecd7edebc5641f9deca16",
  measurementId: "G-QZ6VWV6785"
};
```

FIREBASE

GET FIREBASE CONFIG 3/3

» paste config in src.firebaseio.json ⁶

```
// src.firebaseio.js

const firebaseConfig = {
  apiKey: "AIzaSyBaUKK6ikaiYN98xIiQiCV-wPIaPCNS26Y",
  authDomain: "full-stack-development-a2479.firebaseio.com",
  projectId: "full-stack-development-a2479",
  storageBucket: "full-stack-development-a2479.appspot.com",
  messagingSenderId: "338202513827",
  appId: "1:338202513827:web:7ecd7edebc5641f9deca16",
  measurementId: "G-QZ6VWV6785"
};
```

⁶ different for each user

FIREBASE

INSTALL FIREBASE SDK

```
» npm i firebase firebase-tools
```

```
// src/firebase.js
import firebase from 'firebase'
import 'firebase/auth'

const firebaseConfig = {
  apiKey: "AIzaSyBaUKK6ikaiYN98xIiQiCV-wPIaPCNS26Y",
  authDomain: "full-stack-development-a2479.firebaseio.com",
  projectId: "full-stack-development-a2479",
  storageBucket: "full-stack-development-a2479.appspot.com",
  messagingSenderId: "338202513827",
  appId: "1:338202513827:web:7ecd7edebc5641f9deca16",
  measurementId: "G-QZ6VWV6785"
};

firebase.initializeApp(firebaseConfig)
```

FIREBASE

INSTALL FIREBASE SDK

```
» npm i firebase firebase-tools
```

```
// src/firebase.js
import firebase from 'firebase'
import 'firebase/auth'

const firebaseConfig = {
  apiKey: "AIzaSyBaUKK6ikaiYN98xIiQiCV-wPIaPCNS26Y",
  authDomain: "full-stack-development-a2479.firebaseio.com",
  projectId: "full-stack-development-a2479",
  storageBucket: "full-stack-development-a2479.appspot.com",
  messagingSenderId: "338202513827",
  appId: "1:338202513827:web:7ecd7edebc5641f9deca16",
  measurementId: "G-QZ6VWV6785"
};

firebase.initializeApp(firebaseConfig)
```

FIREBASE INITIALIZE FIREBASE AUTH⁷

```
// src/firebase.js
// ...

firebase.initializeApp(firebaseConfig)

export const auth = firebase.auth()

if (process.env.NODE_ENV === 'development') {
// ^^^^^^
// when app is started in development mode
// use the local emulator
  auth.useEmulator('http://localhost:9099')
}
```

⁷ complete firebase.js <https://gist.github.com/webpapaya/d317f23e993a29055766b00074a5a5eb>

FIREBASE

INITIALIZE FIREBASE AUTH

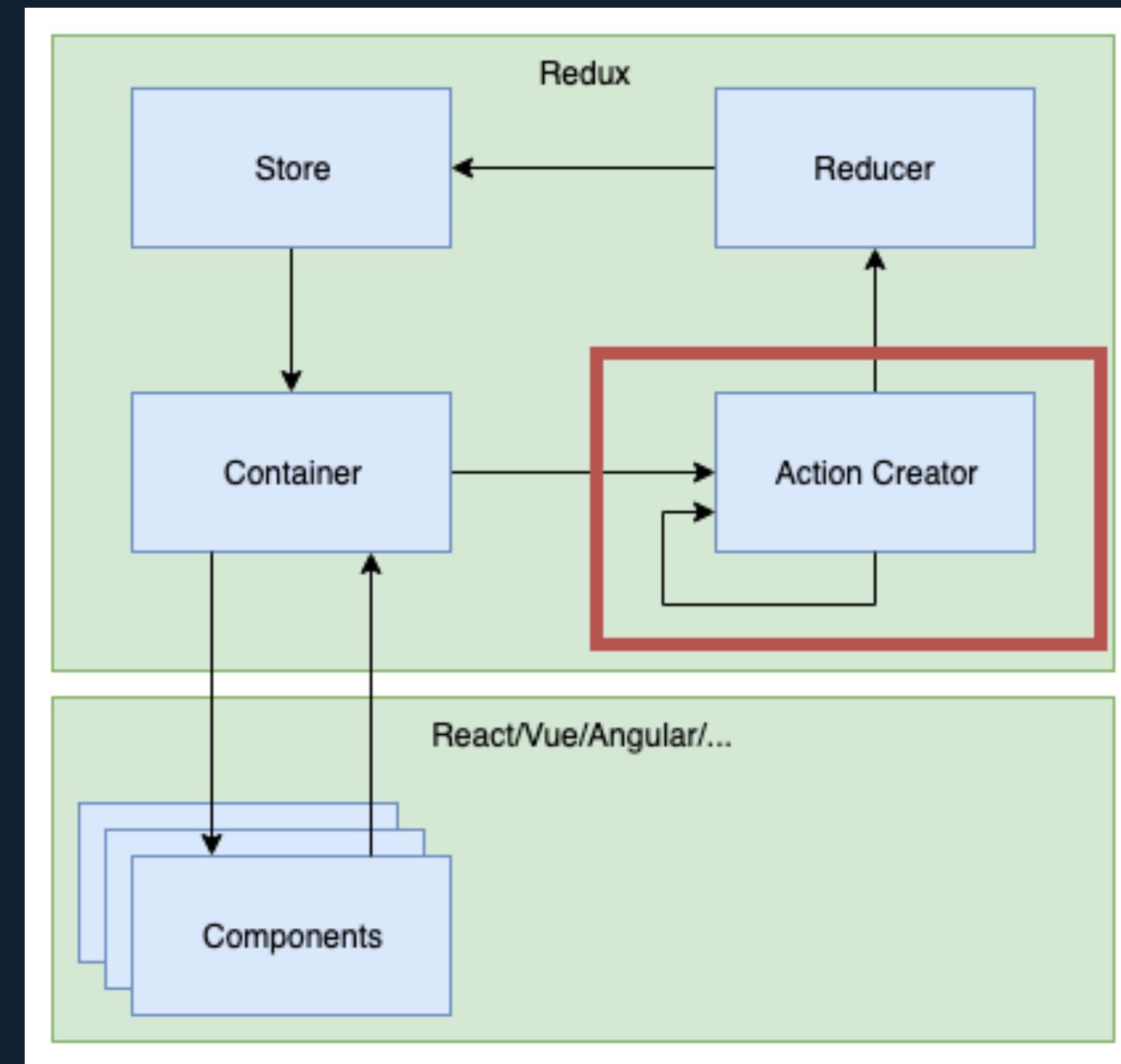
```
import { auth } from ' ../../firebase.js'

// with our auth instance we can
// signIn
auth.signInWithEmailAndPassword('email@mail.com', 'superSecret')

// signUp
auth.createUserWithEmailAndPassword('email@mail.com', 'superSecret')

// signOut
auth.signOut()
```

FIREBASE AND REDUX



FIREBASE AND REDUX

BUILD AN ACTION CREATOR FOR SIGN UP

```
// src/firebase.js
// ...

import { auth } from './firebase'
const signUp = ({ email, password }) => async (dispatch) => {
  const result = await auth.createUserWithEmailAndPassword(email, password)
  dispatch({
    type: 'user/signedUp'
  })
}
```

HOMEWORK

» see wiki

FEEDBACK

- » Questions: `tmayrhofer.lba@fh-salzburg.ac.at`
- » <https://de.surveymonkey.com/r/8TW92LL>