Authentication with OpenID Connect in Angular

Dr. Philippe De Ryck

https://Pragmatic Web Security.com

Dr. Philippe De Ryck

- Deep understanding of the web security landscape
- Google Developer Expert (not employed by Google)
- Course curator of the SecAppDev course
  (https://secappdev.org)

Pragmatic Web Security

High-quality security training for developers and managers

Custom courses covering web security, API security, Angular security, …

Consulting services on security, OAuth 2.0, OpenID Connect, …

@PhilippeDeRyck

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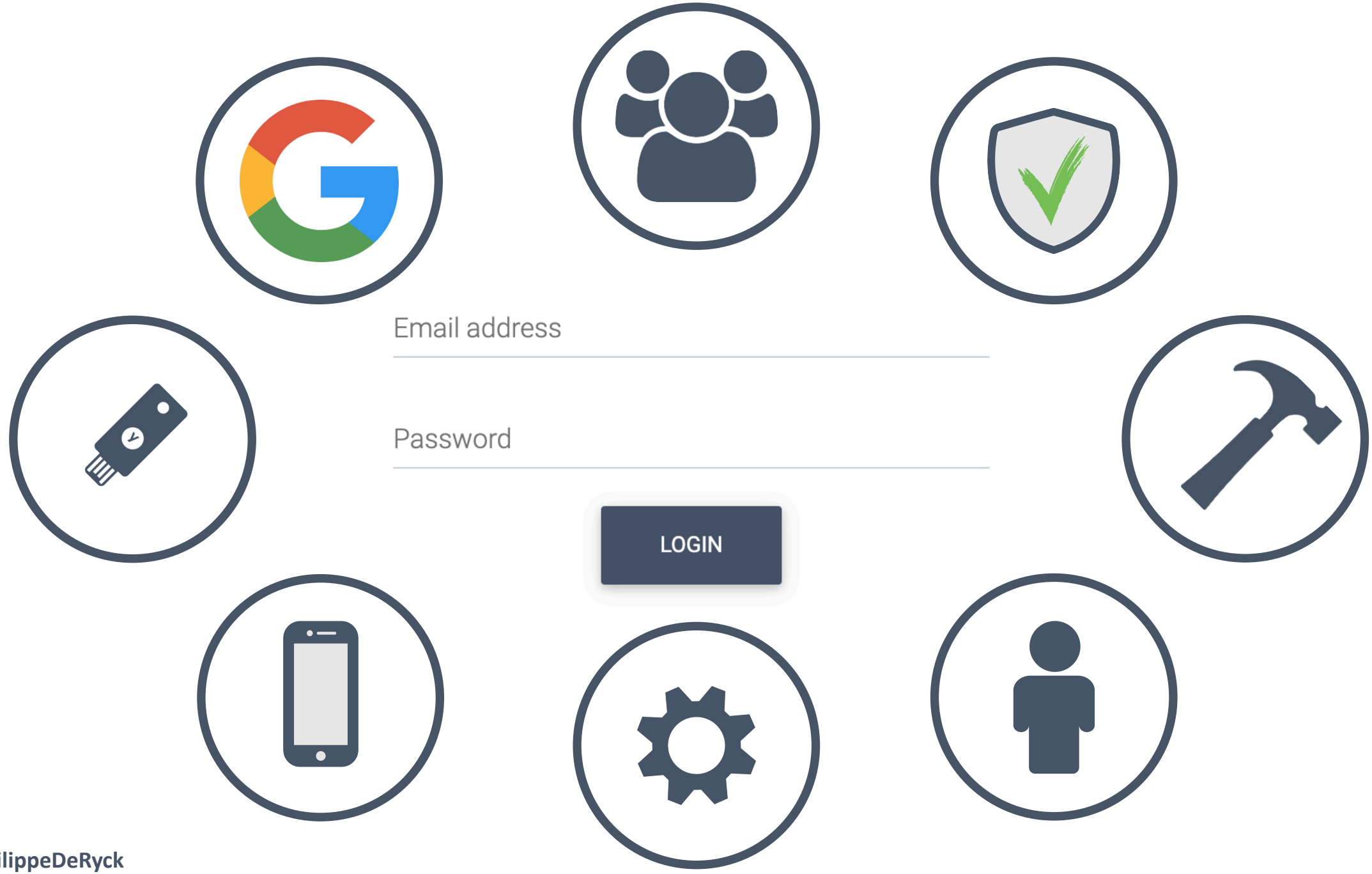
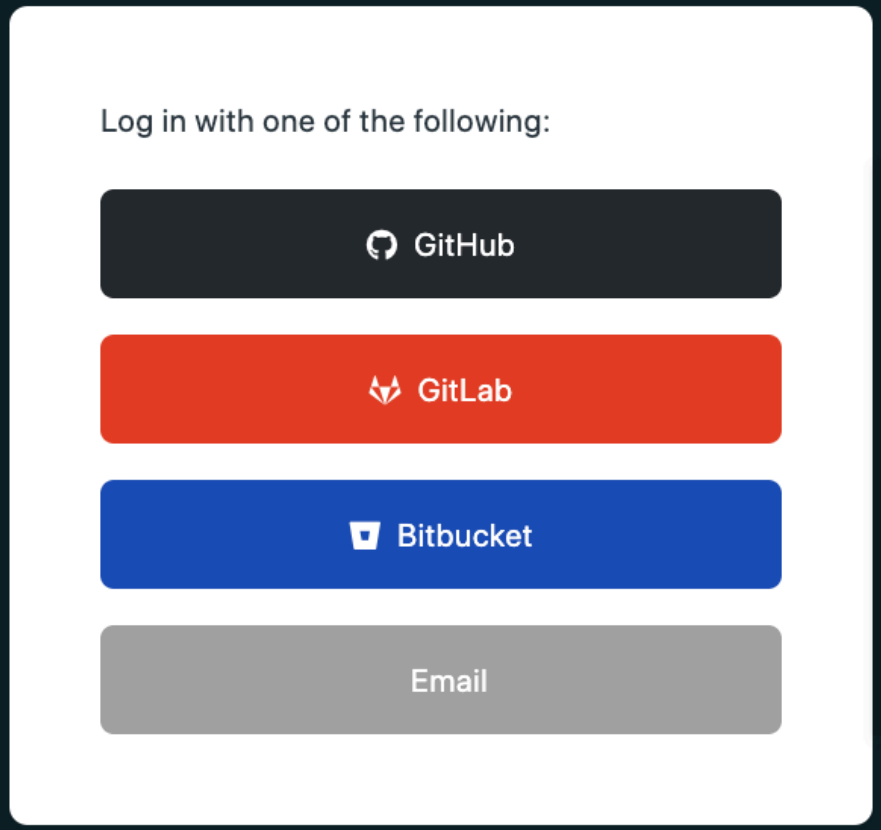

Email address
Password
LOGIN


IDENTITY
PROVIDER

Welcome to Netlify

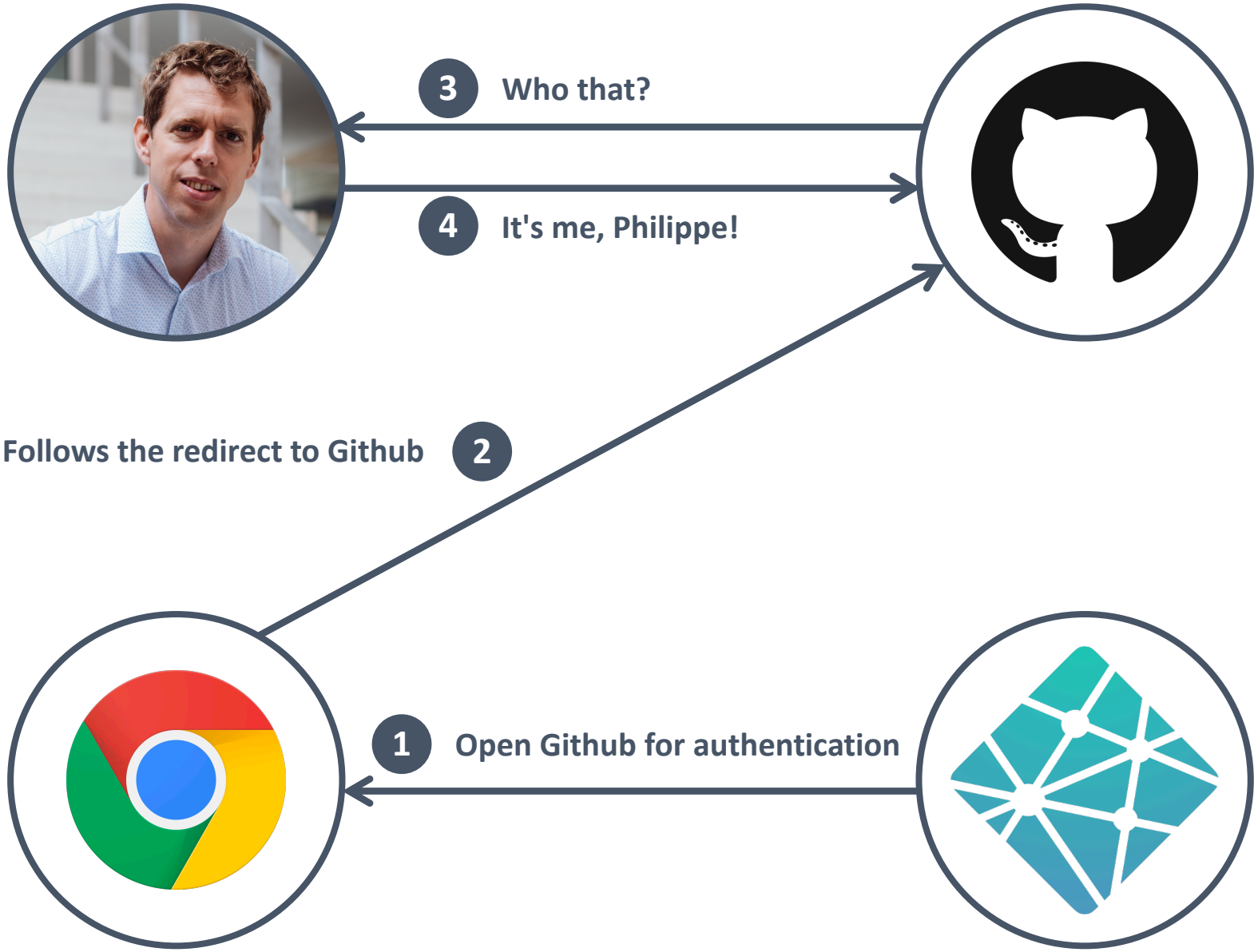


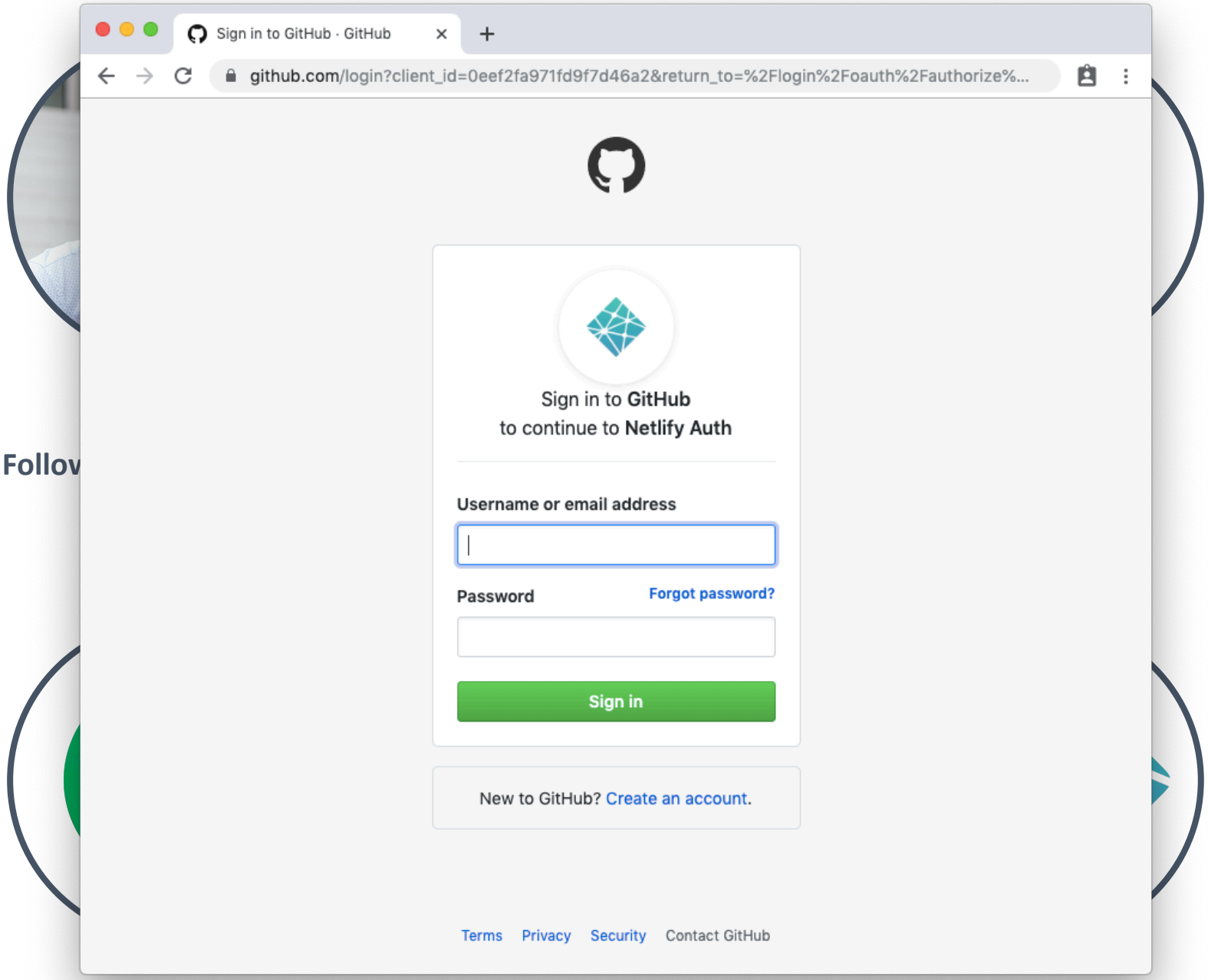
Log in via SSO

HELPFUL TIP #5

Fan of the Command Line?

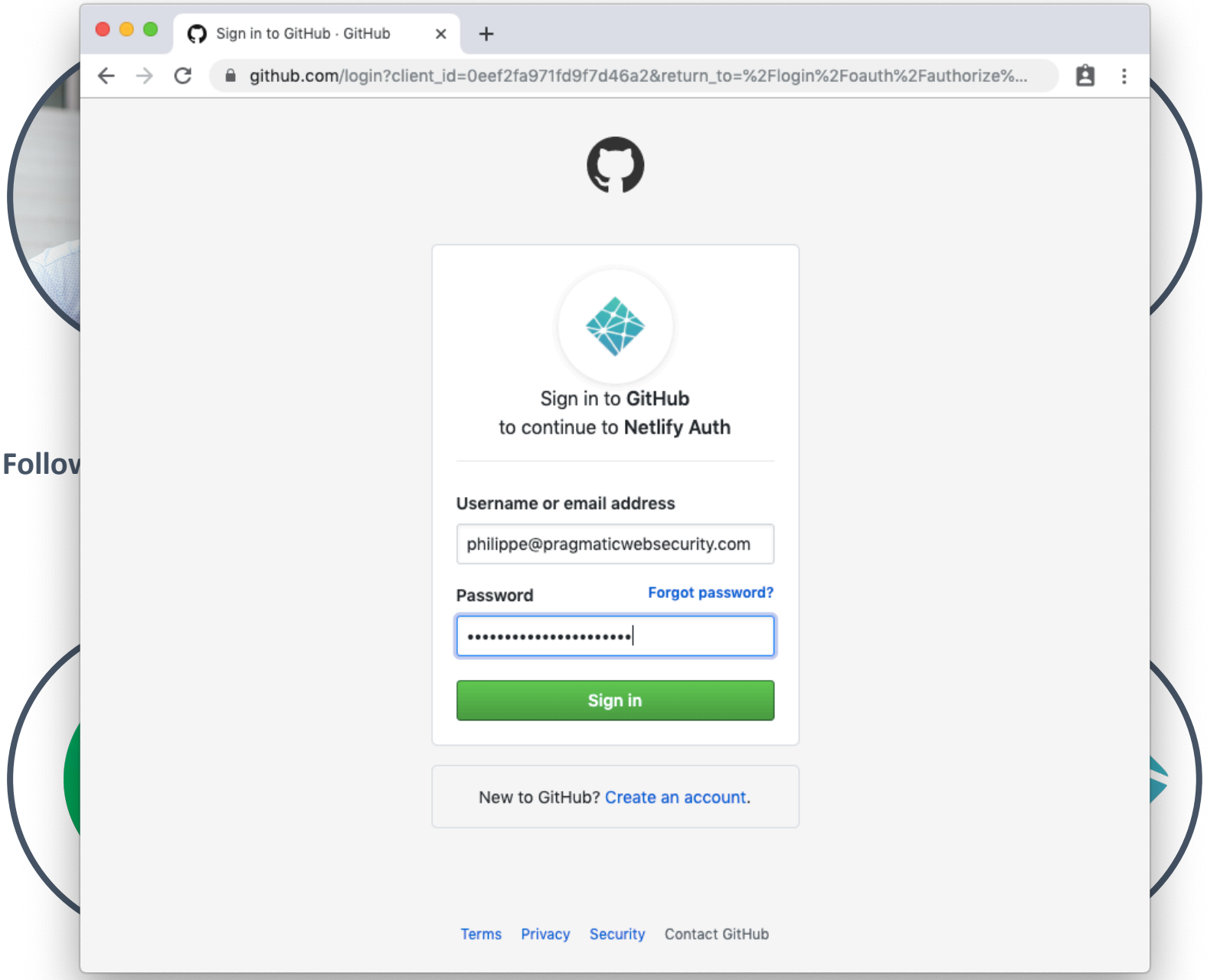
Did you know that Netlify has a Command line interface? Try out the Netlify CLI by running `npm install netlify-cli -g` in your terminal.


3 Who that?
4 It's me, Philippe!
Follows the redirect to Github 2
1 Open Github for authentication

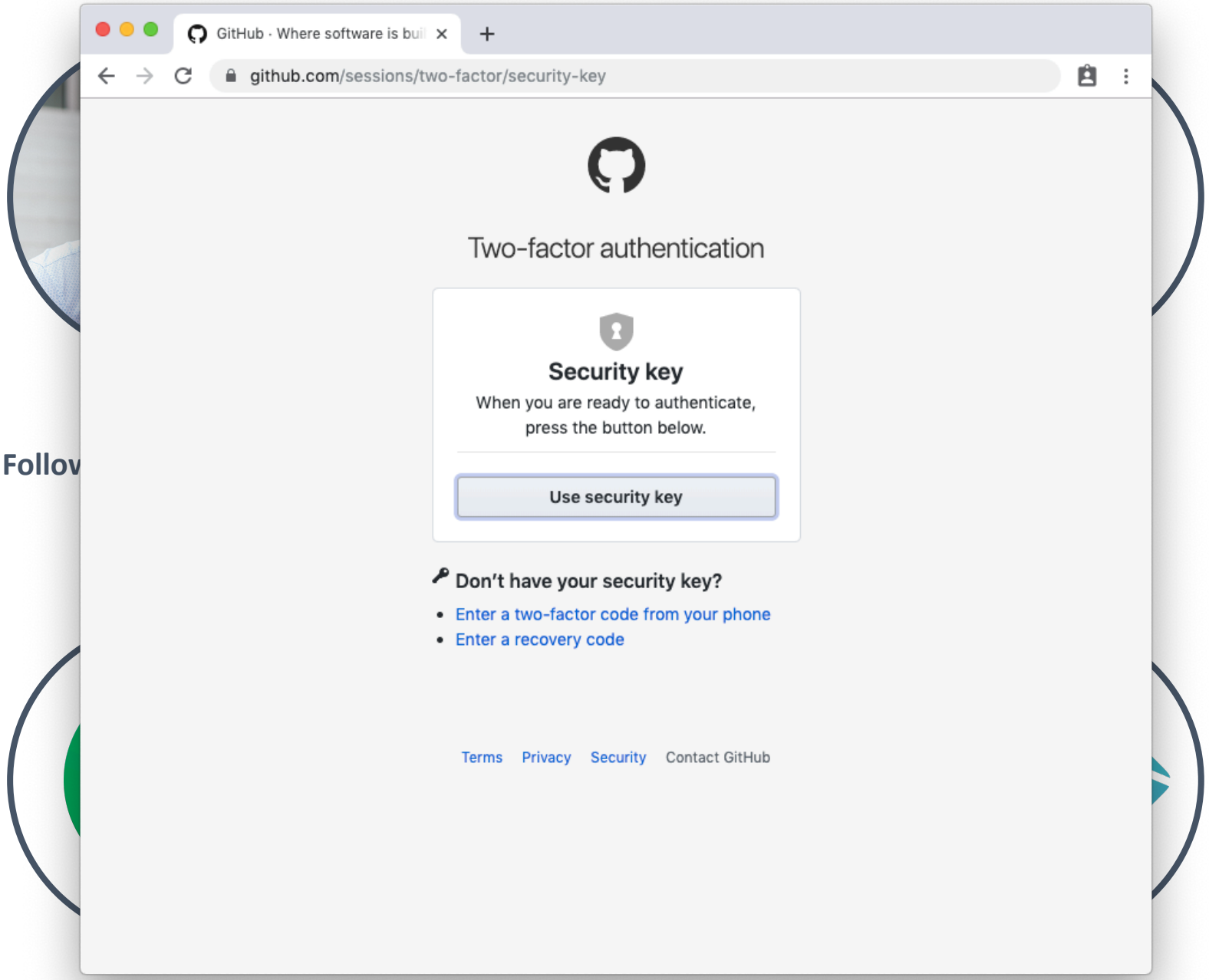

Sign in to GitHub · GitHub
github.com/login?client_id=0eef2fa971fd9f7d46a2&return_to=%2Flogin%2Foauth%2Fauthorize%...
Sign in to GitHub
to continue to Netlify Auth
Username or email address
Password
Forgot password?
Sign in
New to GitHub? Create an account.
Terms
Privacy
Security
Contact GitHub

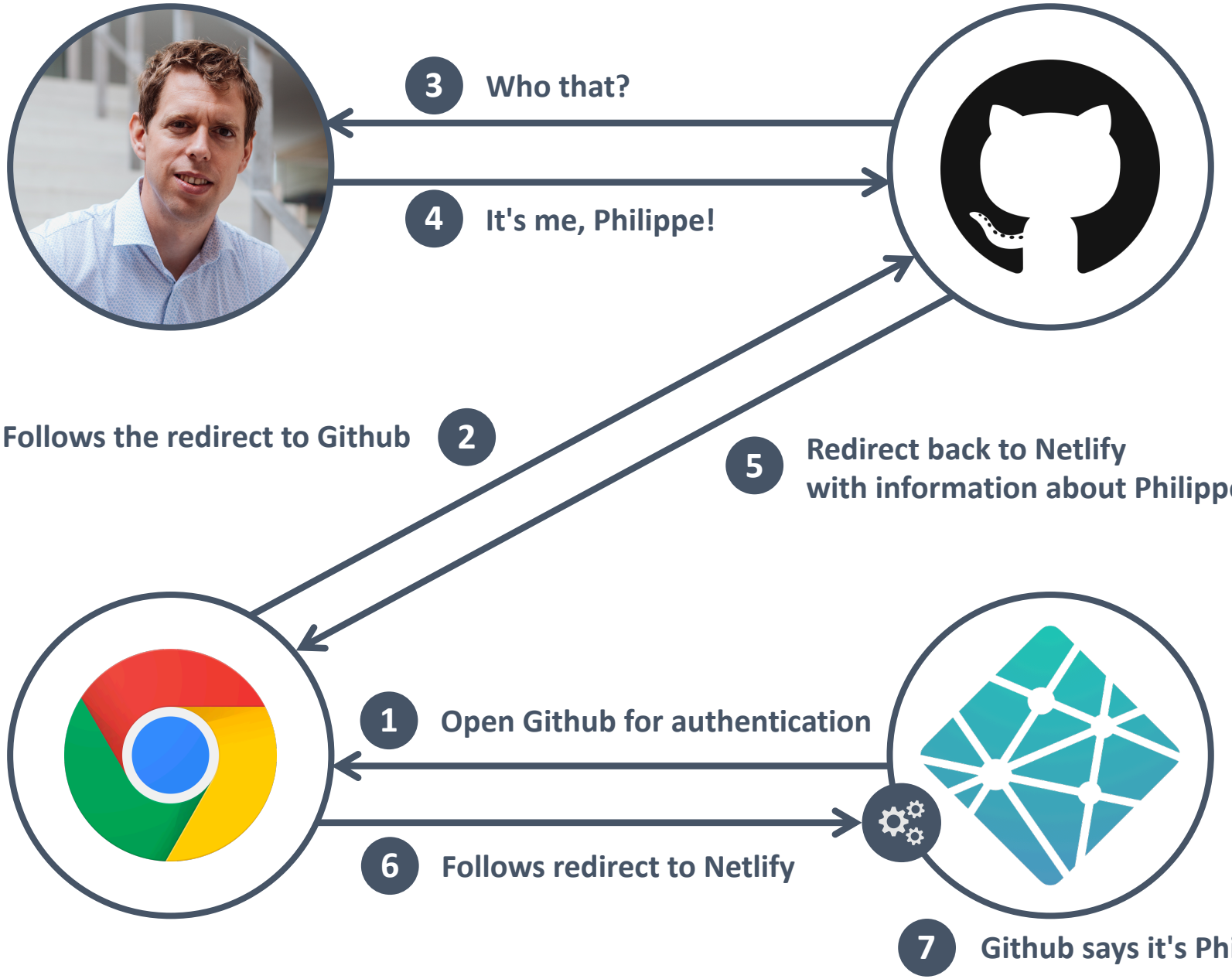
Follov

Follov


Sign in to GitHub · GitHub
github.com/login?client_id=0eef2fa971fd9f7d46a2&return_to=%2Flogin%2Foauth%2Fauthorize%...
Sign in to GitHub
to continue to Netlify Auth
Username or email address
philippe@pragmaticwebsecurity.com
Password
Forgot password?
Sign in
New to GitHub? Create an account.
Terms
Privacy
Security
Contact GitHub

Follov


GitHub · Where software is bui
github.com/sessions/two-factor/security-key
Two-factor authentication
Security key
When you are ready to authenticate, press the button below.
Use security key
Don't have your security key?
Enter a two-factor code from your phone
Enter a recovery code
Terms
Privacy
Security
Contact GitHub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5 Redirect back to Netlify
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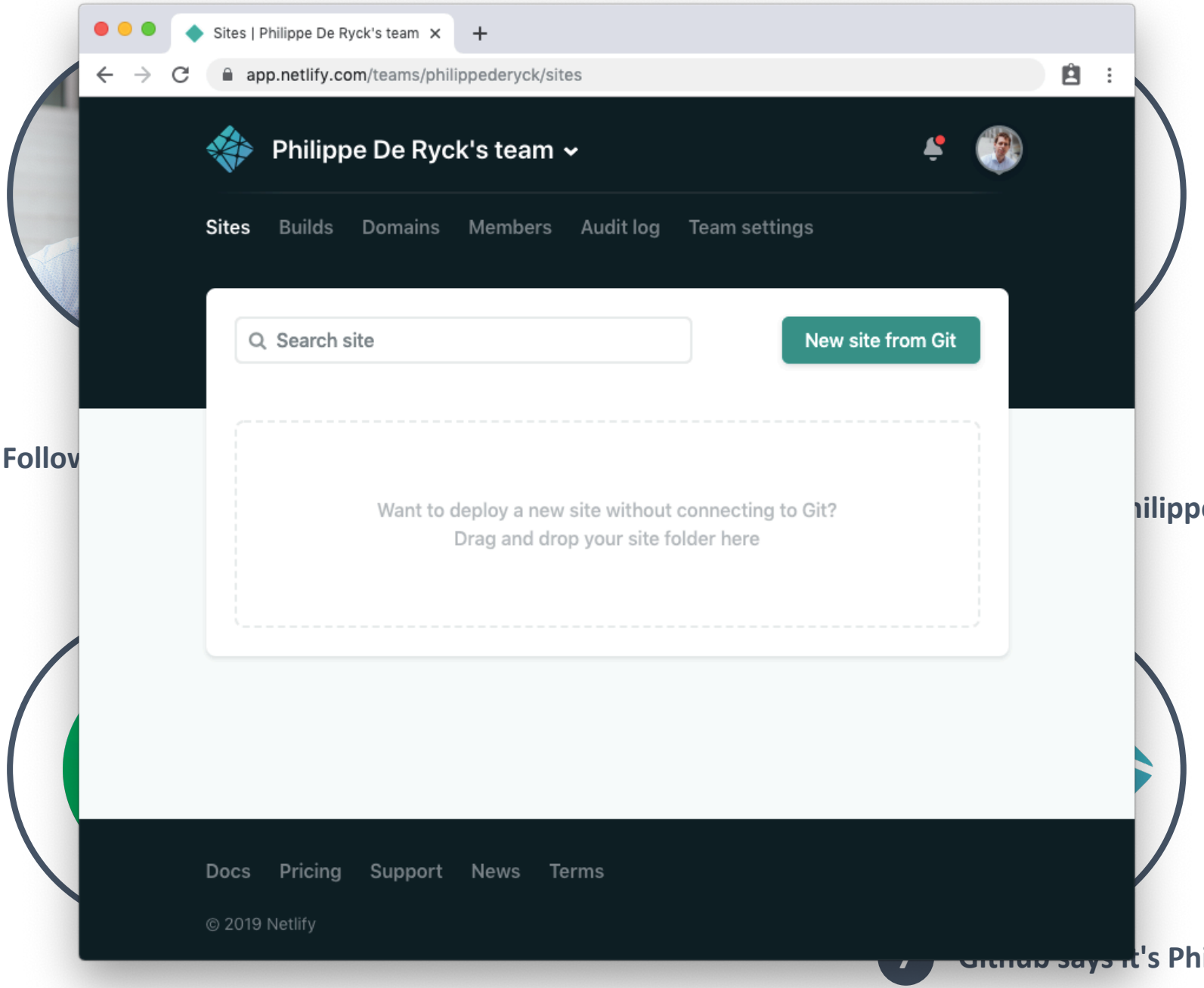
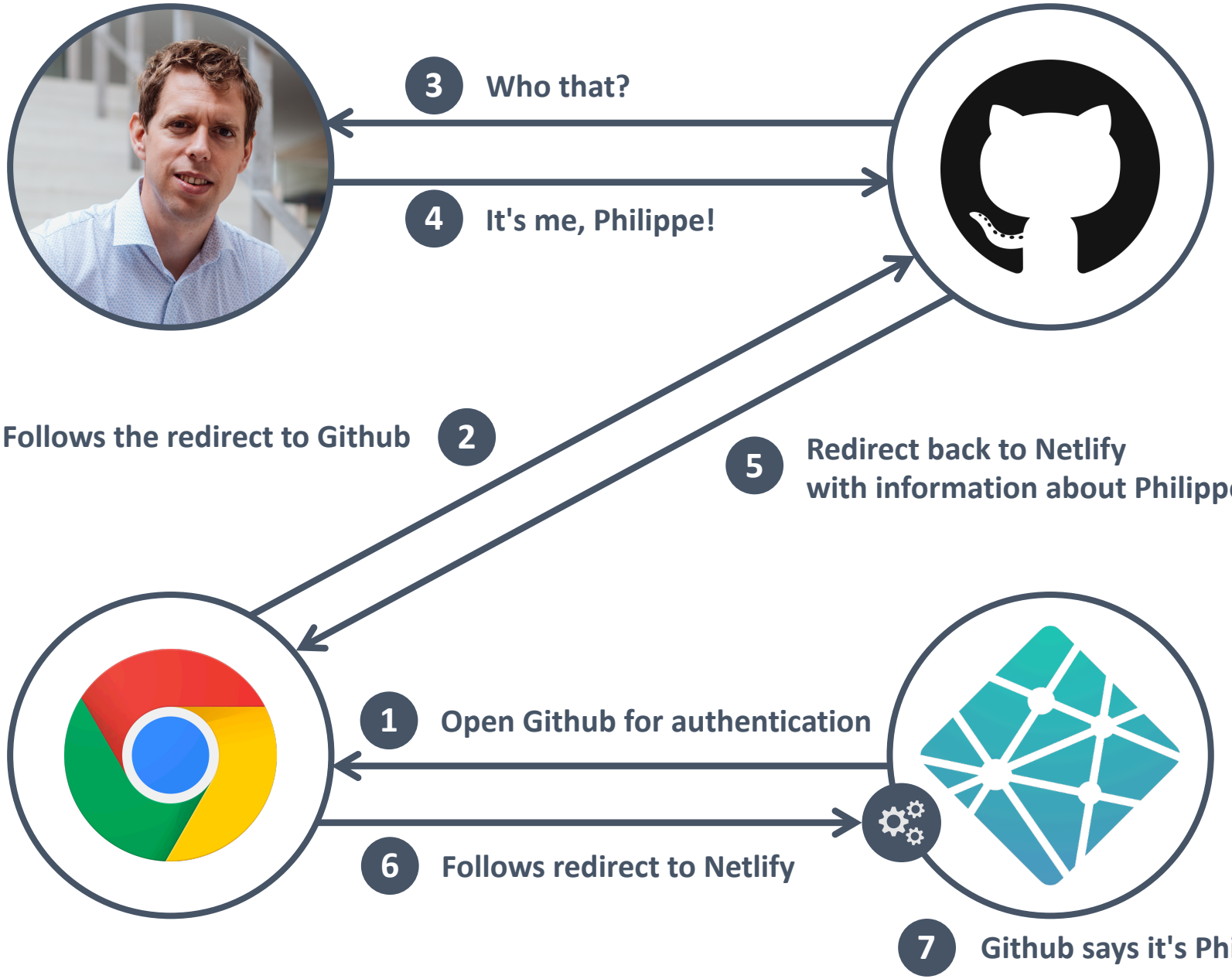
1 Open Github for authentication
6 Follows redirect to Netlify
7 Github says it's Philippe. Hi Philippe!



Follov

ilippe

's Philippe. Hi Philippe!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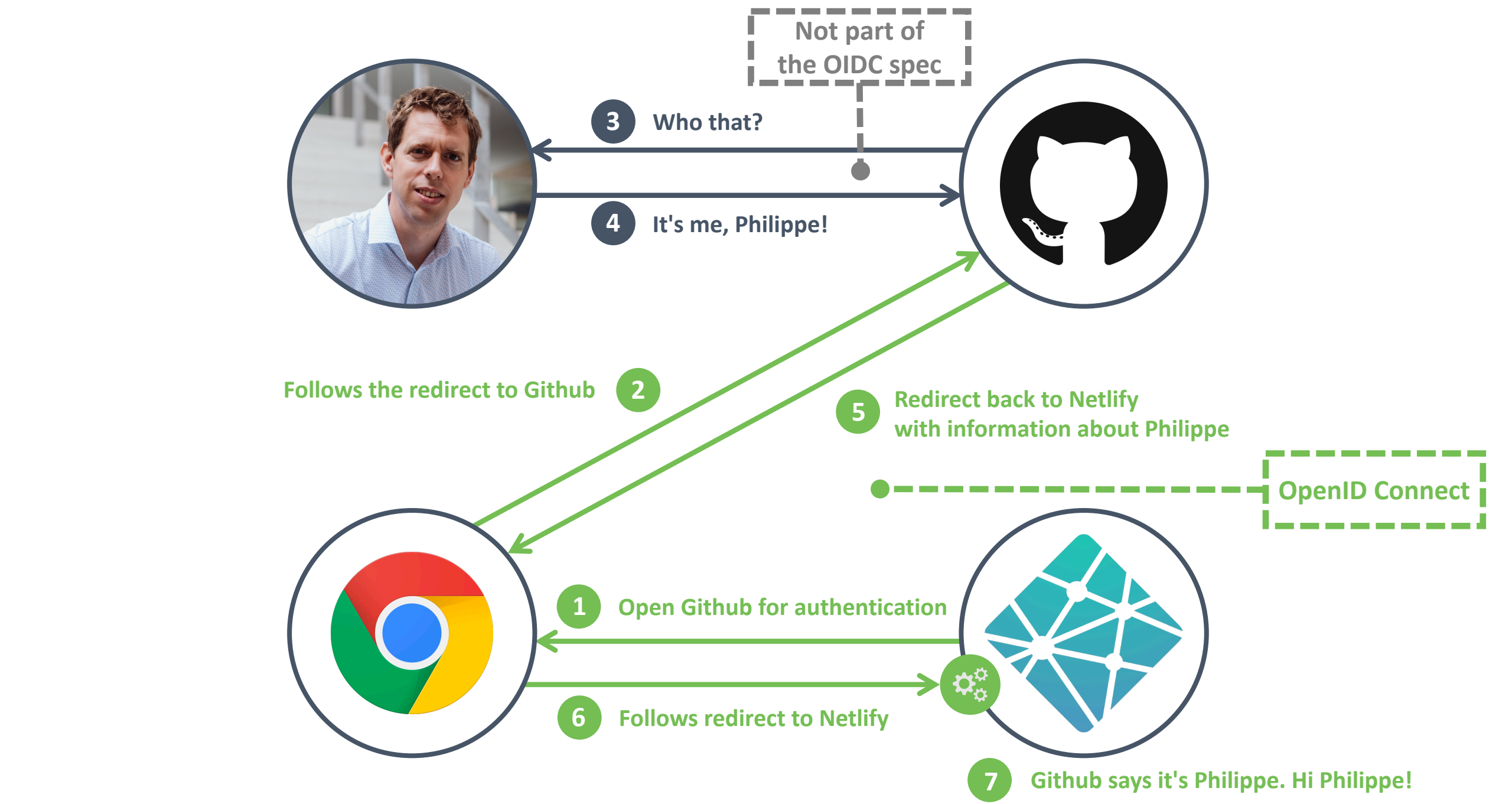
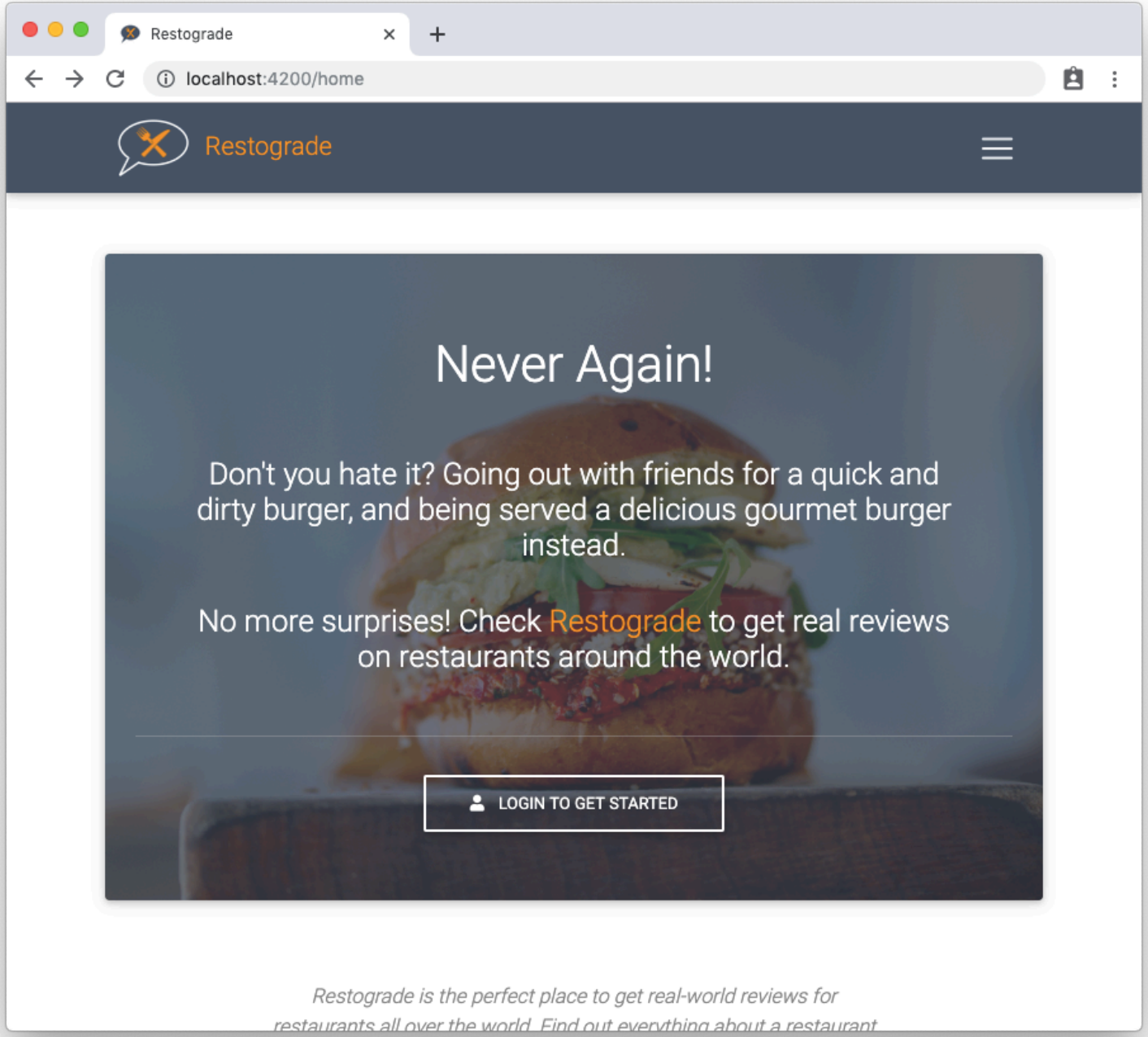
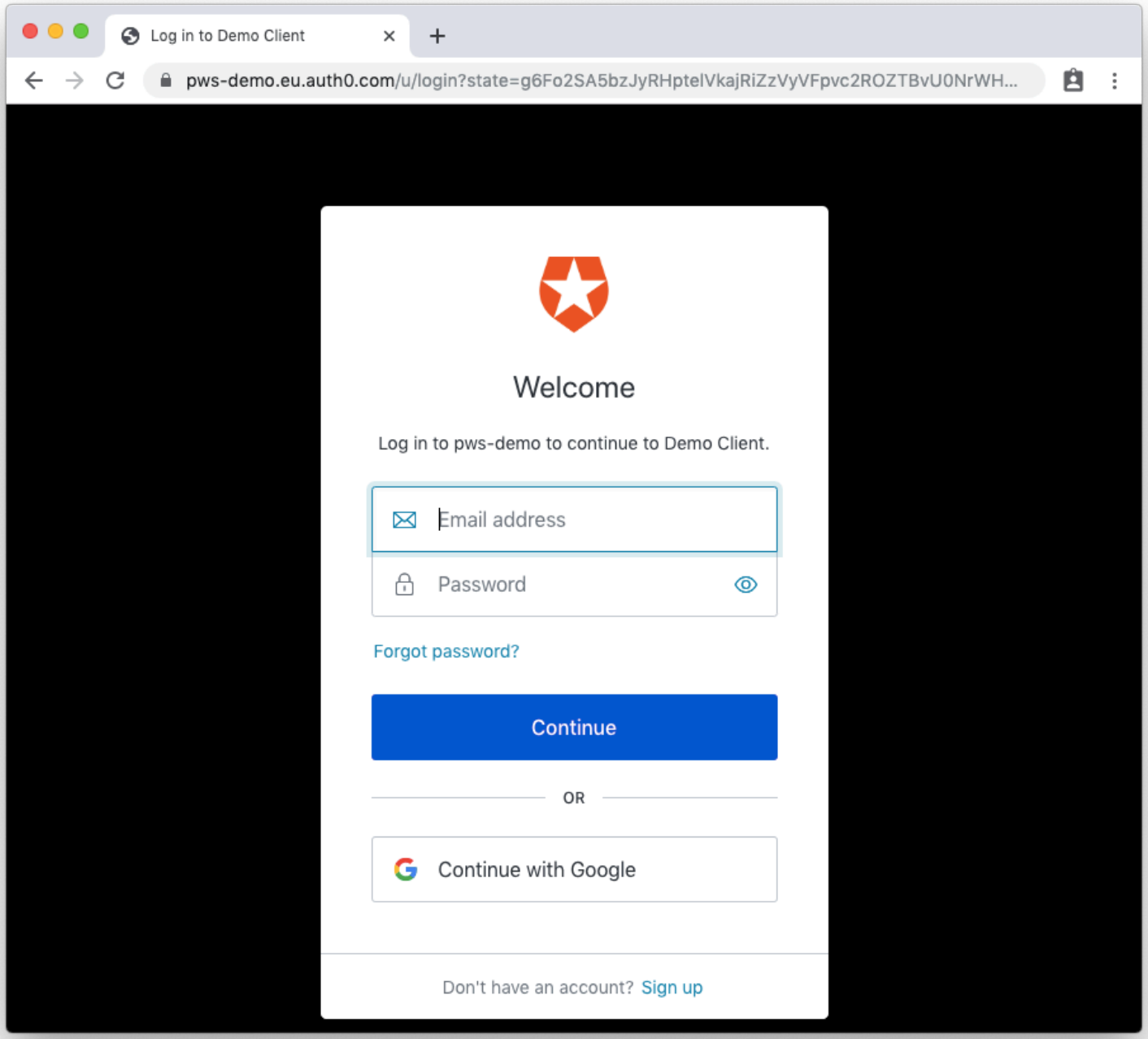
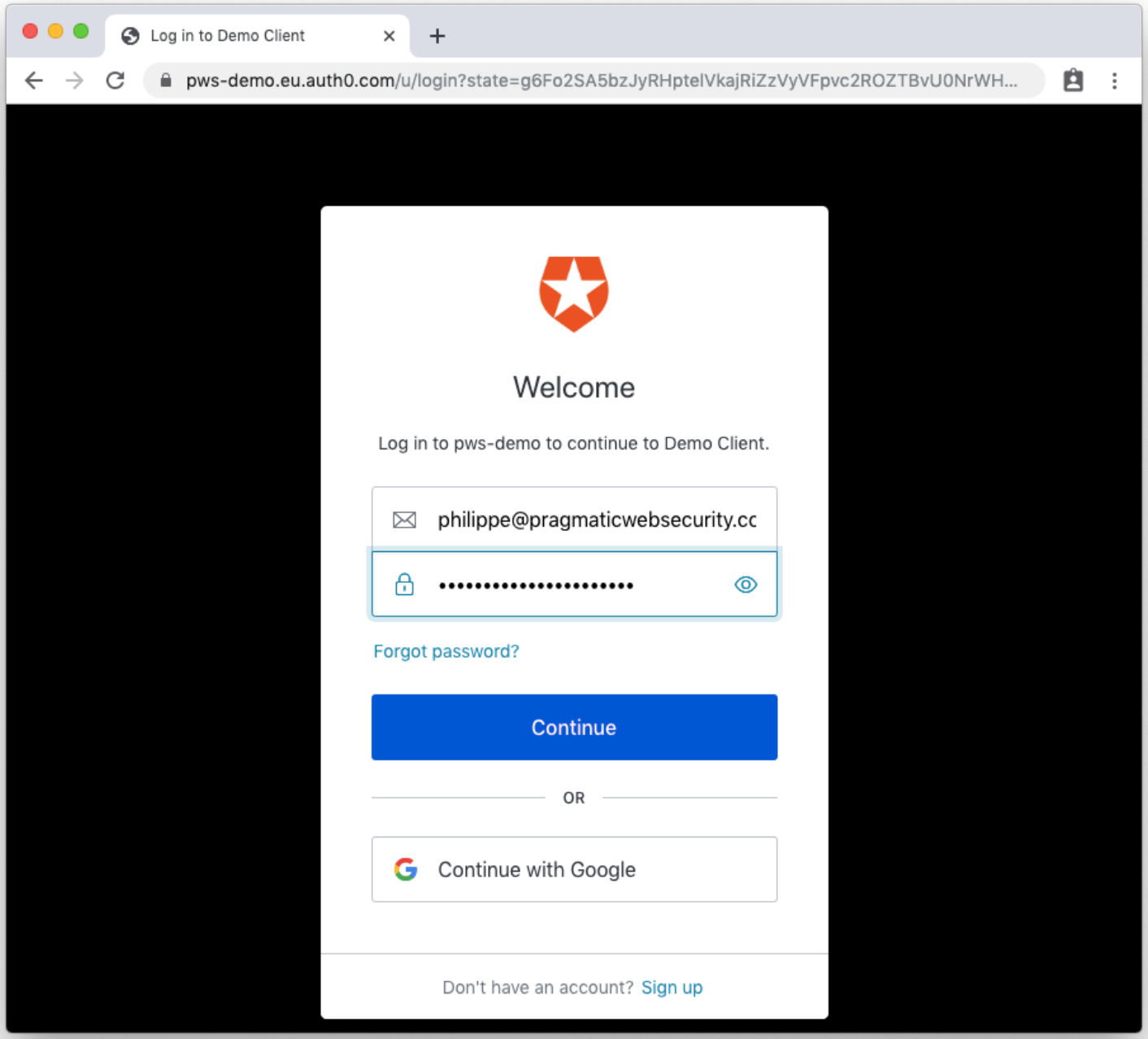
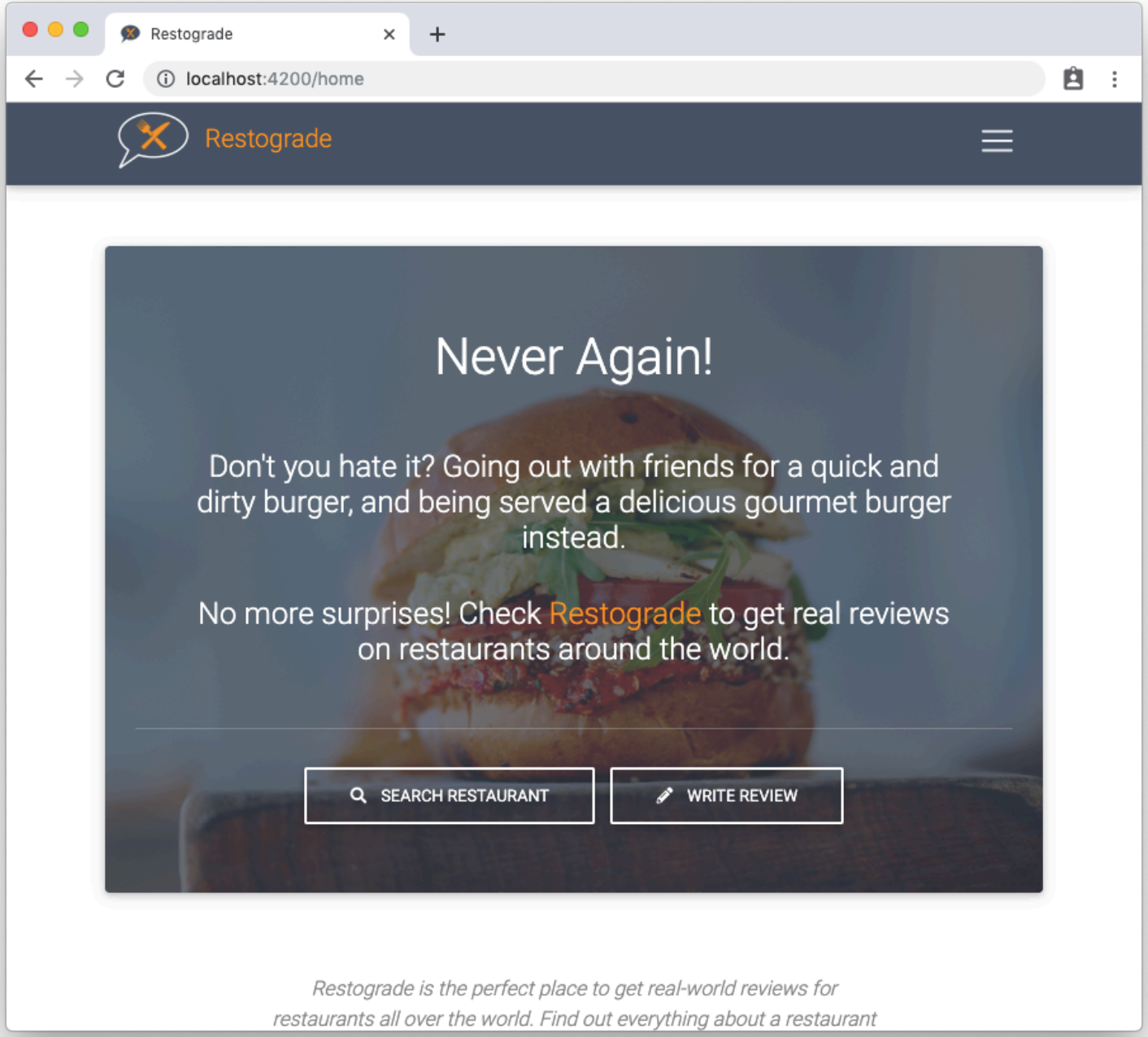

Not part of
the OIDC spec
3
Who that?
4
It's me, Philippe!
Follows the redirect to Github
2
5
Redirect back to Netlify
with information about Philippe
OpenID Connect
1
Open Github for authentication
6
Follows redirect to Netlify
7
Github says it's Philippe. Hi Philippe!


Restograde
localhost:4200/home
Restograde
Never Again!
Don't you hate it? Going out with friends for a quick and dirty burger, and being served a delicious gourmet burger instead.
No more surprises! Check Restograde to get real reviews on restaurants around the world.
LOGIN TO GET STARTED
Restograde is the perfect place to get real-world reviews for restaurants all over the world. Find out everything about a restaurant


Log in to Demo Client
pws-demo.eu.auth0.com/u/login?state=g6Fo2SA5bzJyRHptelVkajRiZzVyVFpvc2ROZTBvU0NrWH...
Welcome
Log in to pws-demo to continue to Demo Client.
Email address
Password
Forgot password?
Continue
OR
Continue with Google
Don't have an account? Sign up


Log in to Demo Client
pws-demo.eu.auth0.com/u/login?state=g6Fo2SA5bzJyRHptelVkajRiZzVyVFpvc2ROZTBvU0NrWH...
Welcome
Log in to pws-demo to continue to Demo Client.
philippe@pragmaticwebsecurity.cc
Forgot password?
Continue
OR
Continue with Google
Don't have an account? Sign up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SEARCH RESTAURANT
WRITE REVIEW
Restograde is the perfect place to get real-world reviews for restaurants all over the world. Find out everything about a restaurant

3 Who that?

4 It's me, Philippe!

On-premise or cloud-based

Follows the redirect to the identity provider 2

5 Redirect back with information about Philippe

1 Authenticate with my provider

6 Follows redirect

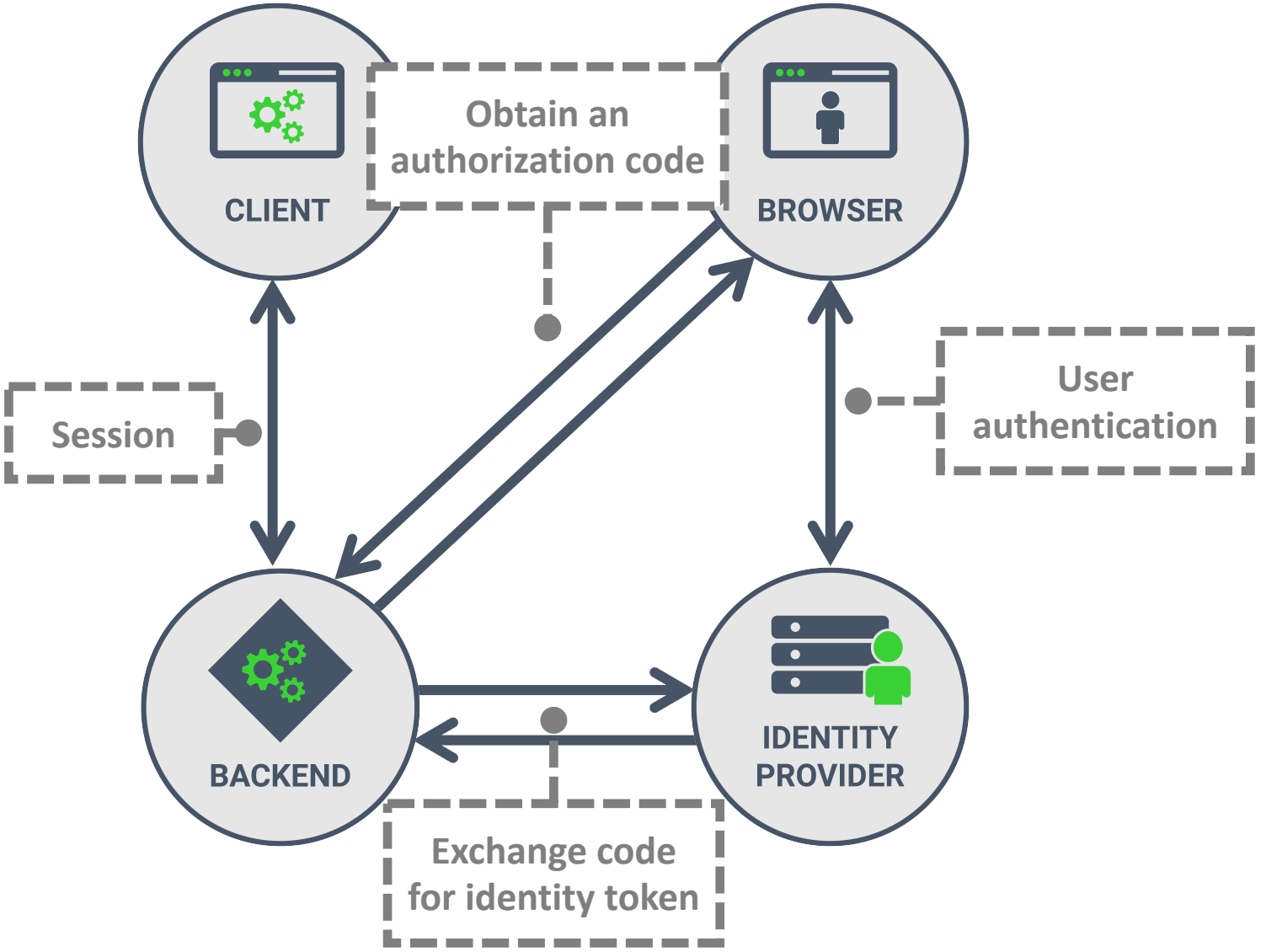
7 My provider says it's Philippe. Hi Philippe!

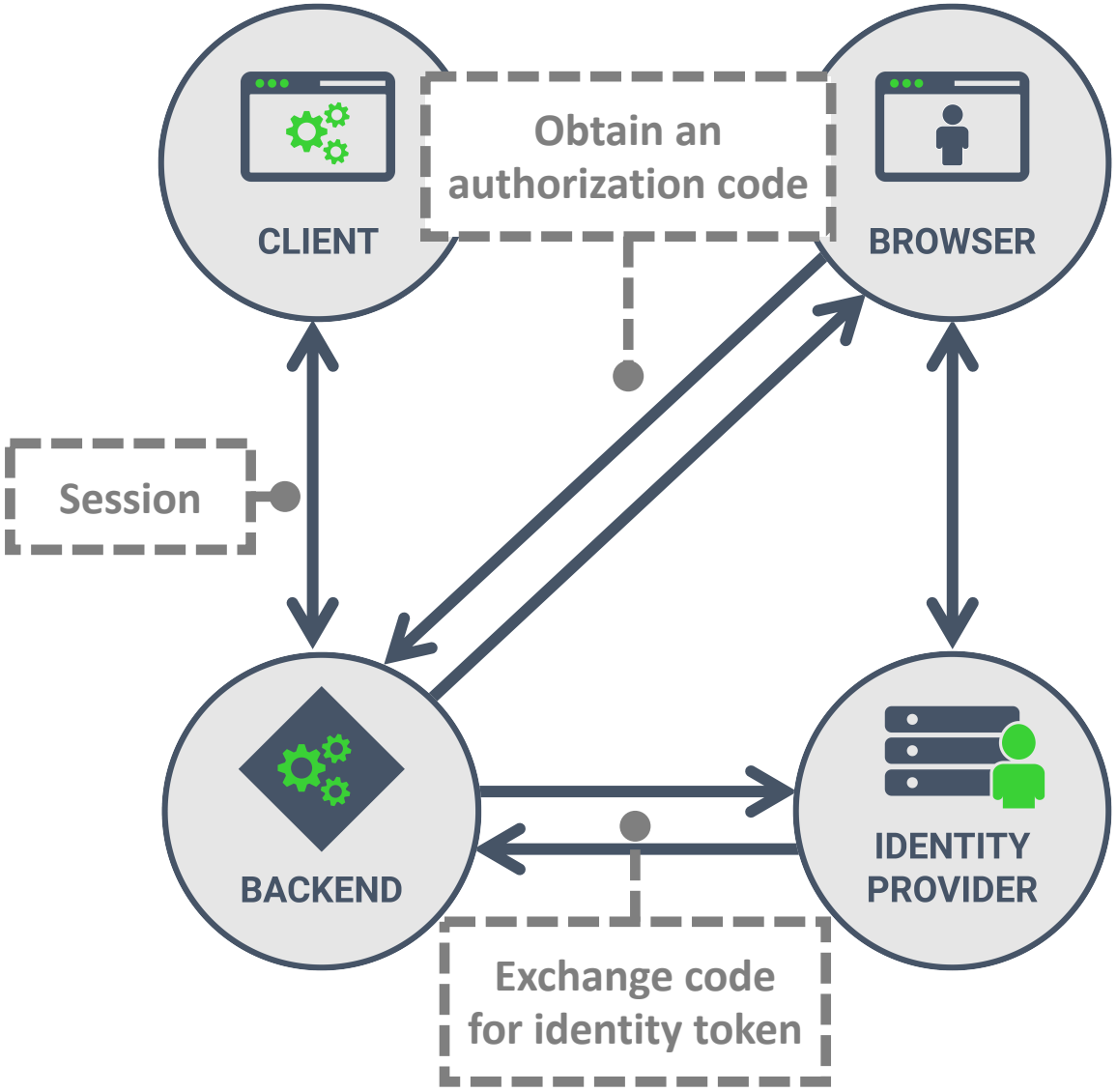
Delegate authentication with OpenID Connect

Building a secure custom authentication mechanism is hard

Identity providers are specialized in managing & authenticating users

Offloading authentication makes sense, even in a non-SSO scenario


CLIENT
Obtain an authorization code
BROWSER
Session
User authentication
BACKEND
IDENTITY PROVIDER
Exchange code for identity token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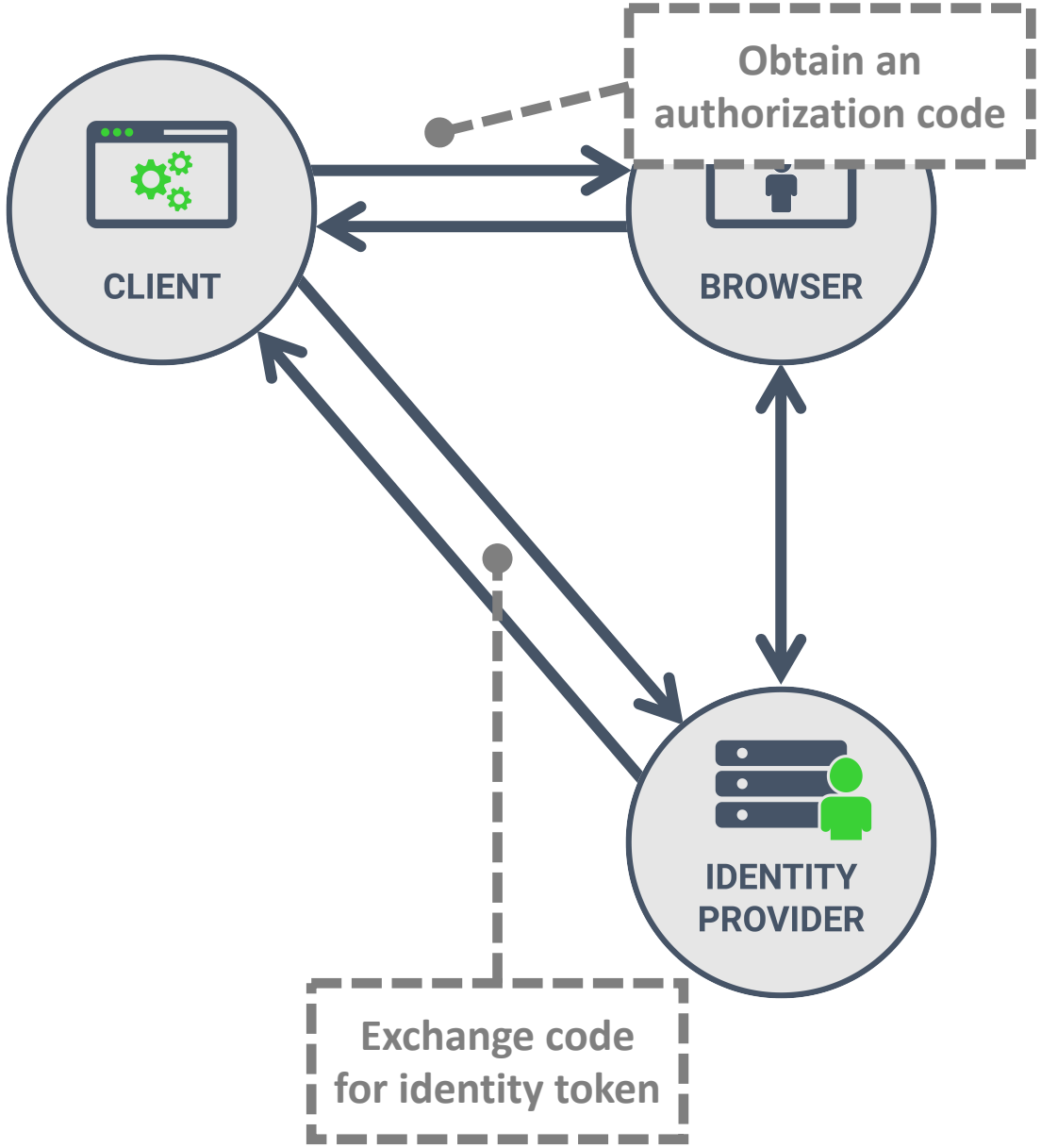
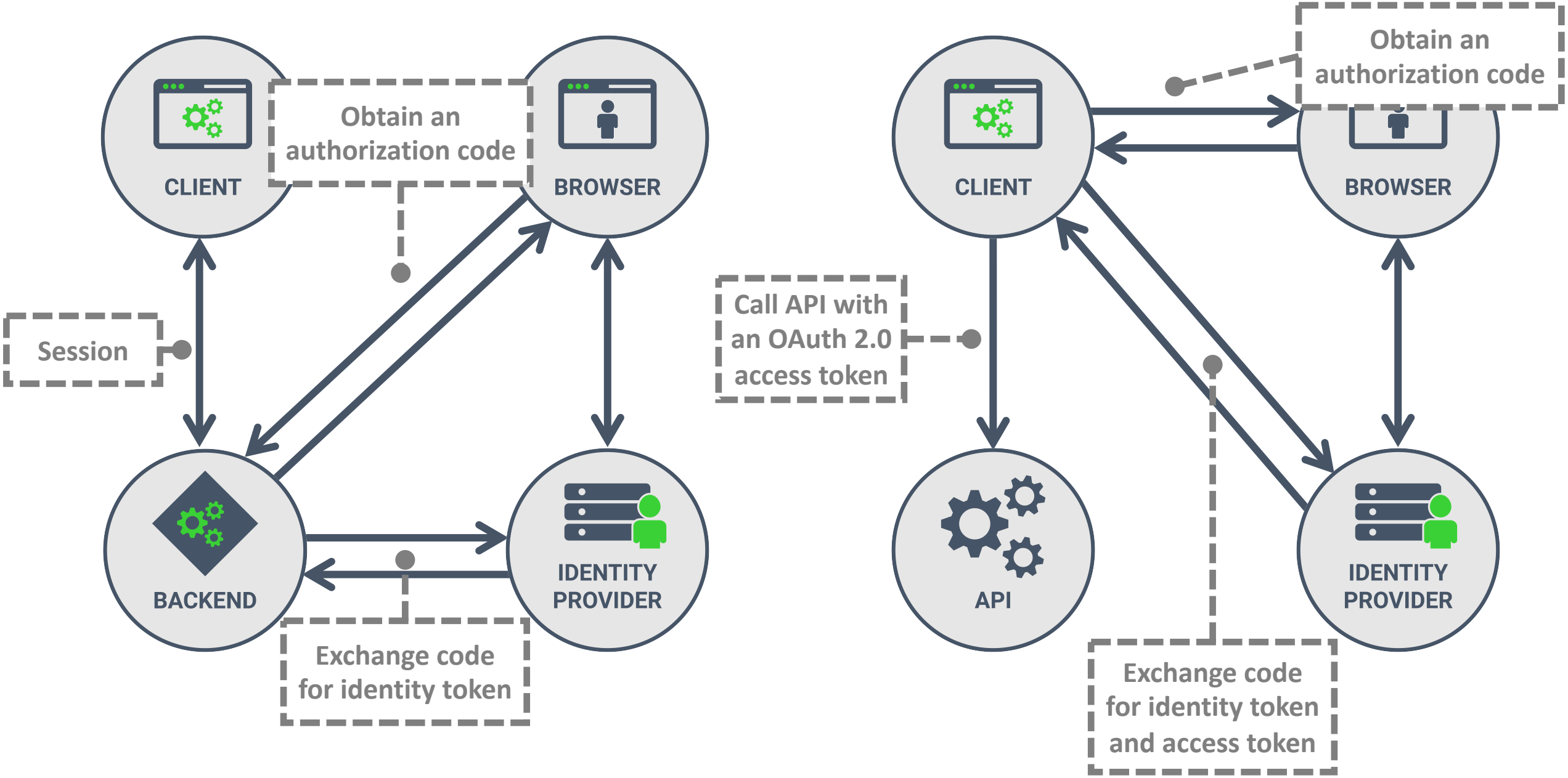
Obtain an
authorization code
BROWSER
Session
BACKEND
IDENTITY
PROVIDER
Exchange code
for identity token


Obtain an
authorization code
CLIENT
BROWSER
IDENTITY
PROVIDER
Exchange code
for identity token


CLIENT
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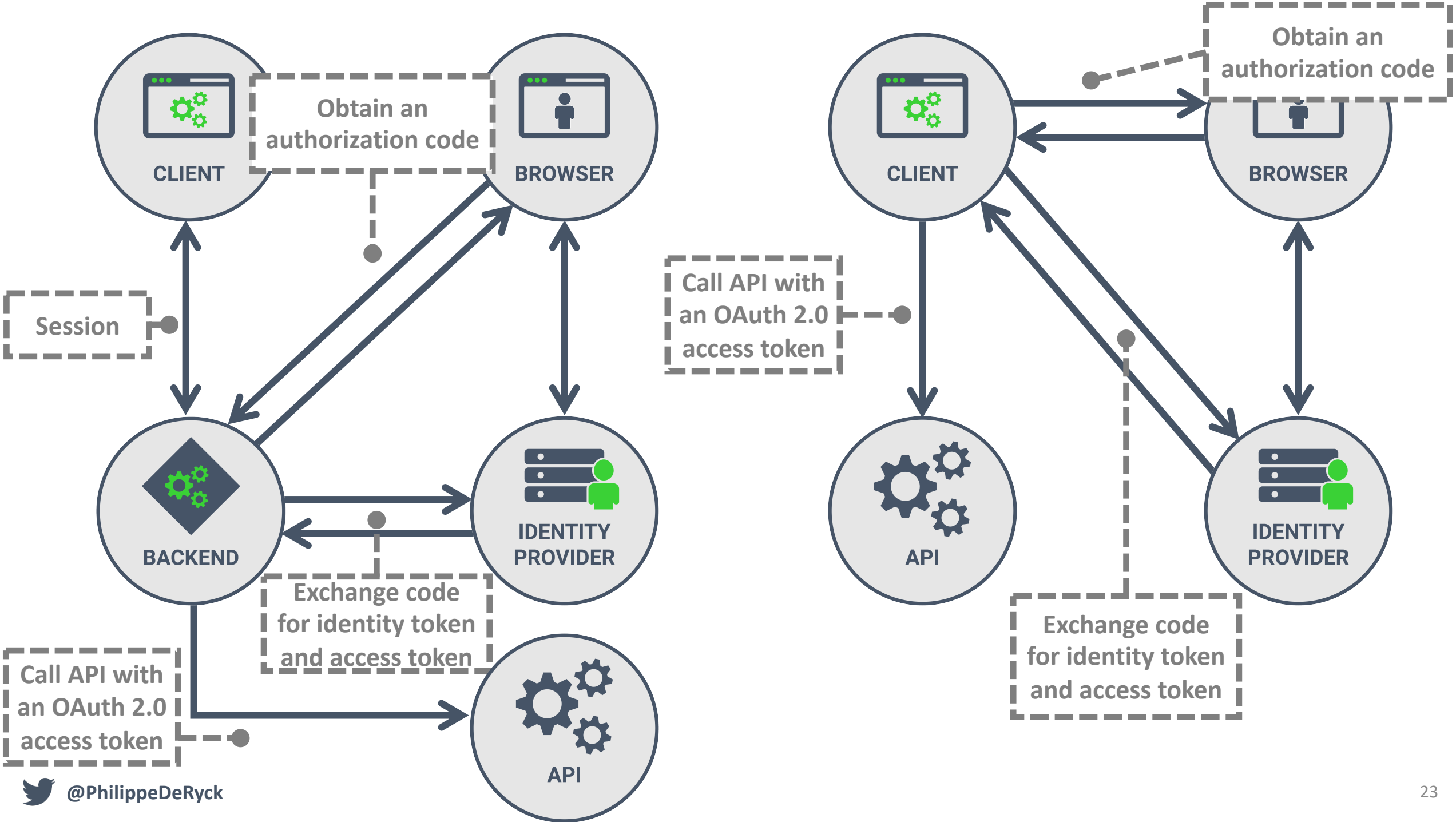
BACKEND
IDENTITY PROVIDER
Exchange code for identity token
CLIENT
Obtain an authorization code
BROWSER
Call API with an OAuth 2.0 access token
API
IDENTITY PROVIDER
Exchange code for identity token and access token


CLIENT
Obtain an authorization code
BROWSER
Session
BACKEND
IDENTITY PROVIDER
Exchange code for identity token and access token
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API
@PhilippeDeRyck
Obtain an authorization code
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BROWSER
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Create application

Name

Restograde backend

You can change the application name later in the application settings.

Choose an application type

Native

Mobile, desktop, CLI and smart device apps running natively.

e.g.: iOS, Electron, Apple TV apps

Single Page Web Applications

A JavaScript front-end app that uses an API.

e.g.: Angular.JS + NodeJS

Regular Web Applications

Traditional web app using redirects.

e.g.: Java, ASP.NET

Machine to Machine Applications

CLIs, daemons or services running on your backend.

e.g.: Shell script

CREATE CANCEL

Redirect from Netlify to Github

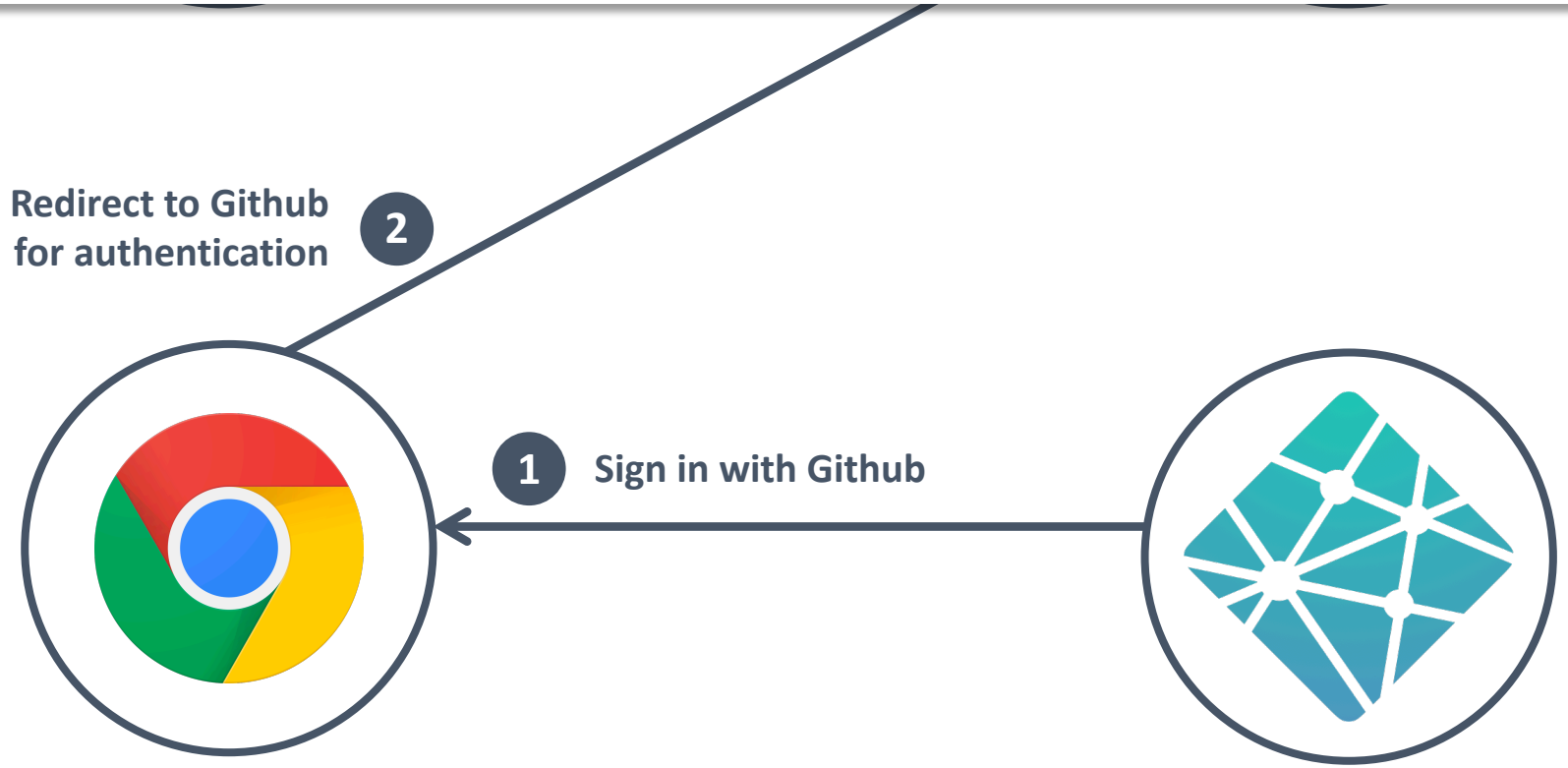
1 2

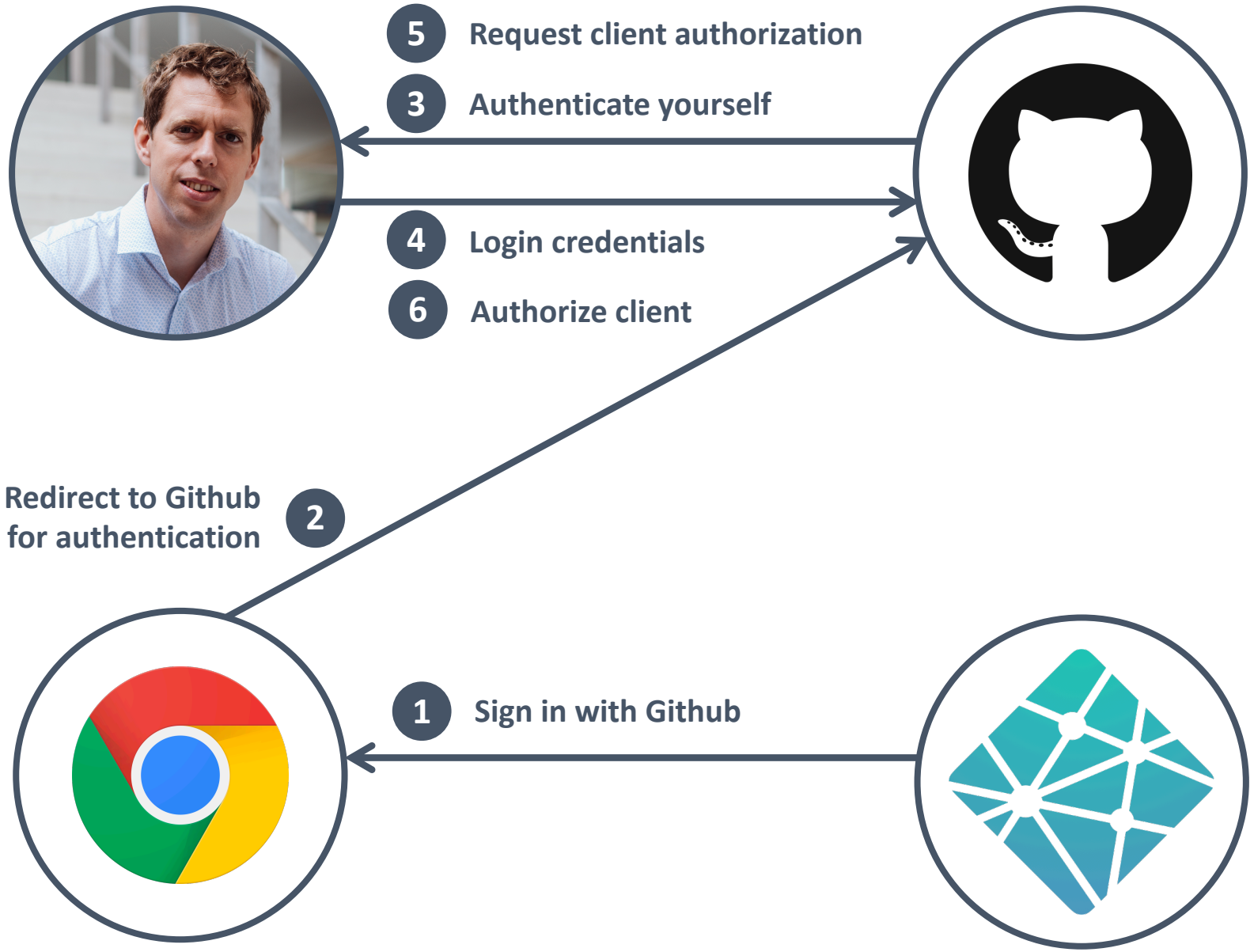
```
https://github.com/openid-connect/auth
  ?response_type=id_token code
  &client_id=NetlifyClient
  &scope=openid email profile
  &redirect_uri=https://netlify.com/codeCallback
  &state=s0wzojm2w8c23xzprkk6
  &nonce=Bh91lG2QLb1jAiaha372
```

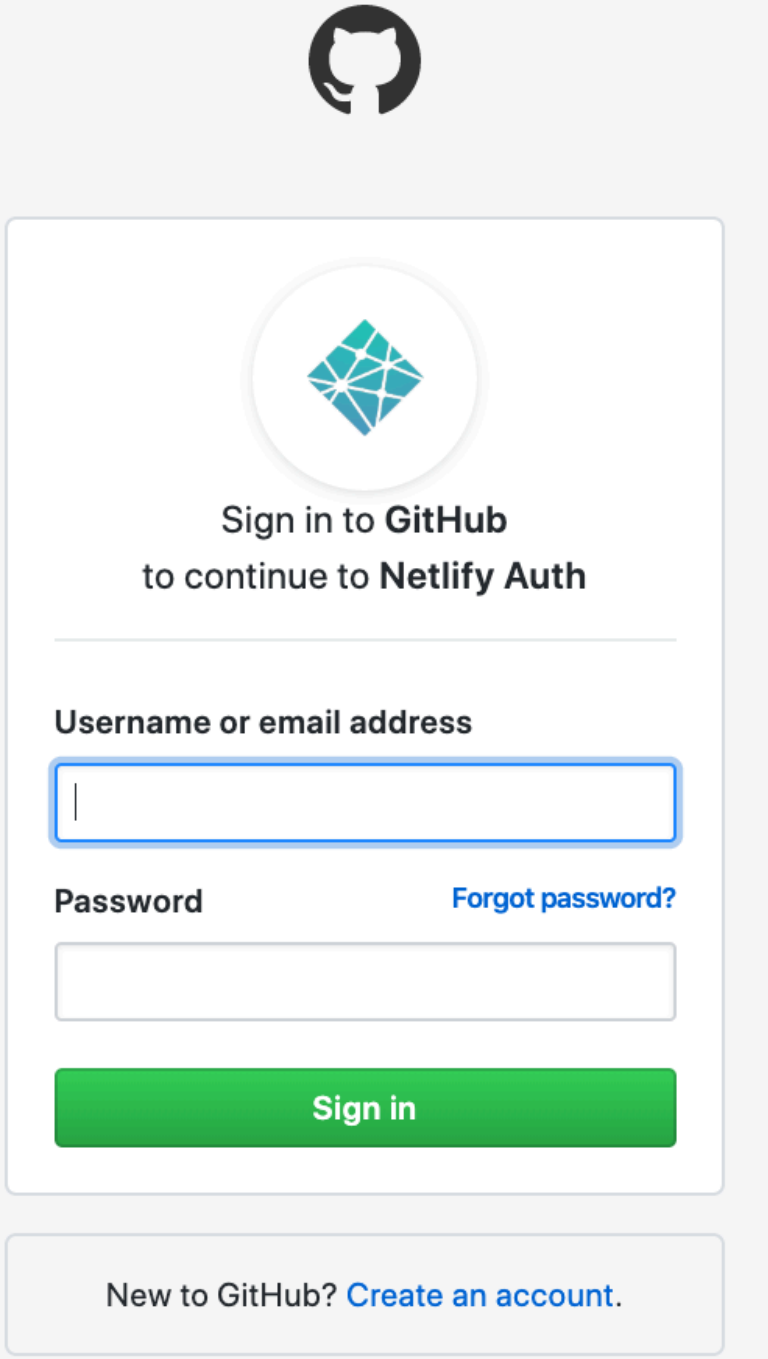
GitHub's OIDC endpoint

Indicates the OIDC hybrid flow

Requests access to user's identity information



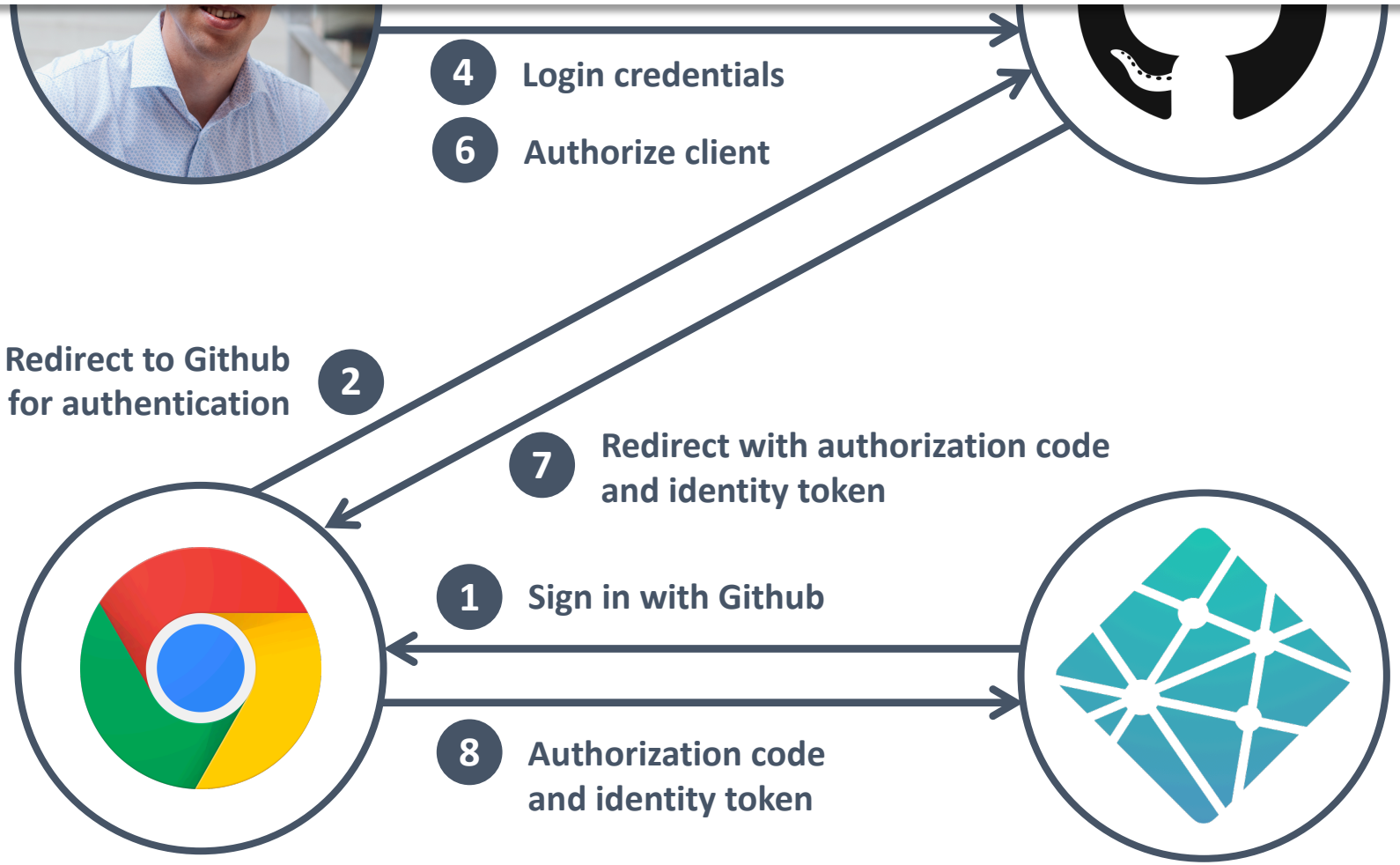

5 Request client authorization
3 Authenticate yourself
4 Login credentials
6 Authorize client
Redirect to Github
for authentication
2
1 Sign in with Github


Sign in to GitHub
to continue to Netlify Auth
Username or email address
Password
Forgot password?
Sign in
New to GitHub? Create an account.

Redirect from Github to Netlify


```
https://netlify.com/codeCallback
  ?code=q3AKQ...0X4UeQ
  &id_token=eyJhbGciO...du6TY9w
  &state=s0wzojm2w8c23xzprkk6
```

- Approved redirect URI
- Authorization code
- JWT containing authentication information



THE IDENTITY TOKEN CONTAINS INFORMATION ABOUT THE USER'S AUTHENTICATION

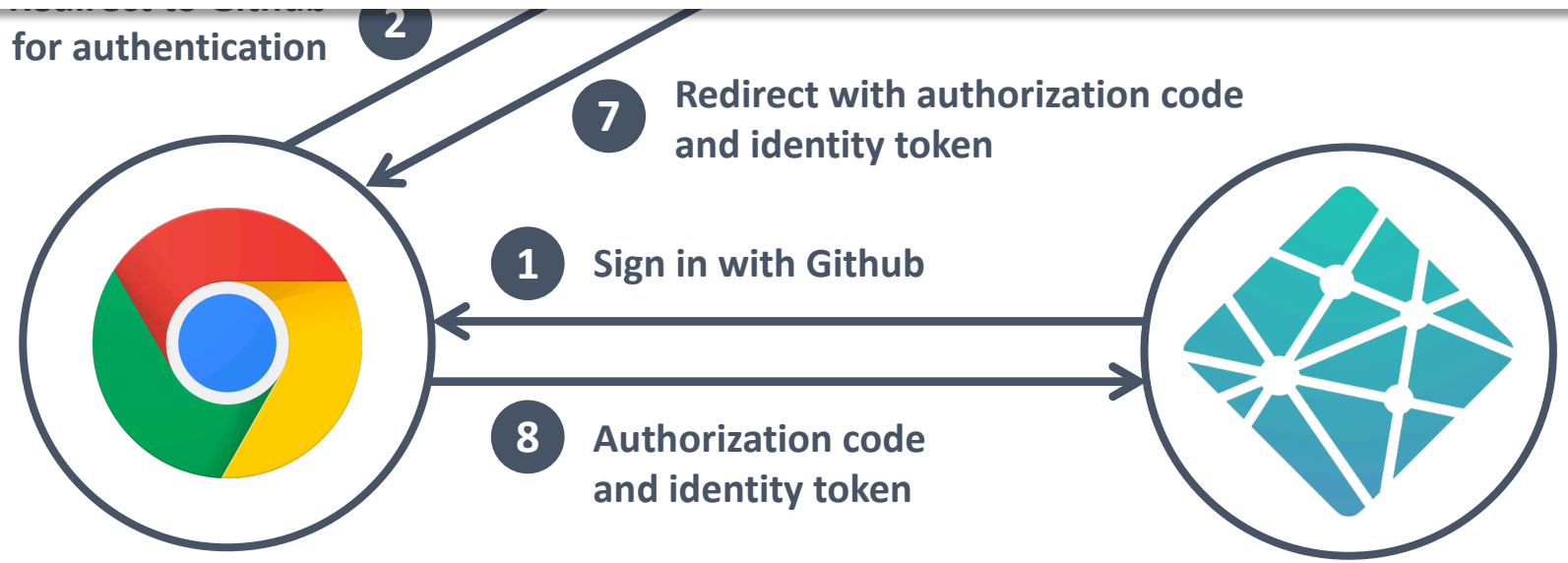

```
{
  "name": "Philippe De Ryck",
  "email": "philippe@pragmaticwebsecurity.com",
  "email_verified": true,
  "iss": "https://github.com",
  "aud": "NetlifyClient",
  "iat": "1550400912",
  "exp": "1550422512",
  "sub": "github|bBFd87uO9PDaVpOjZRB7",
}
```

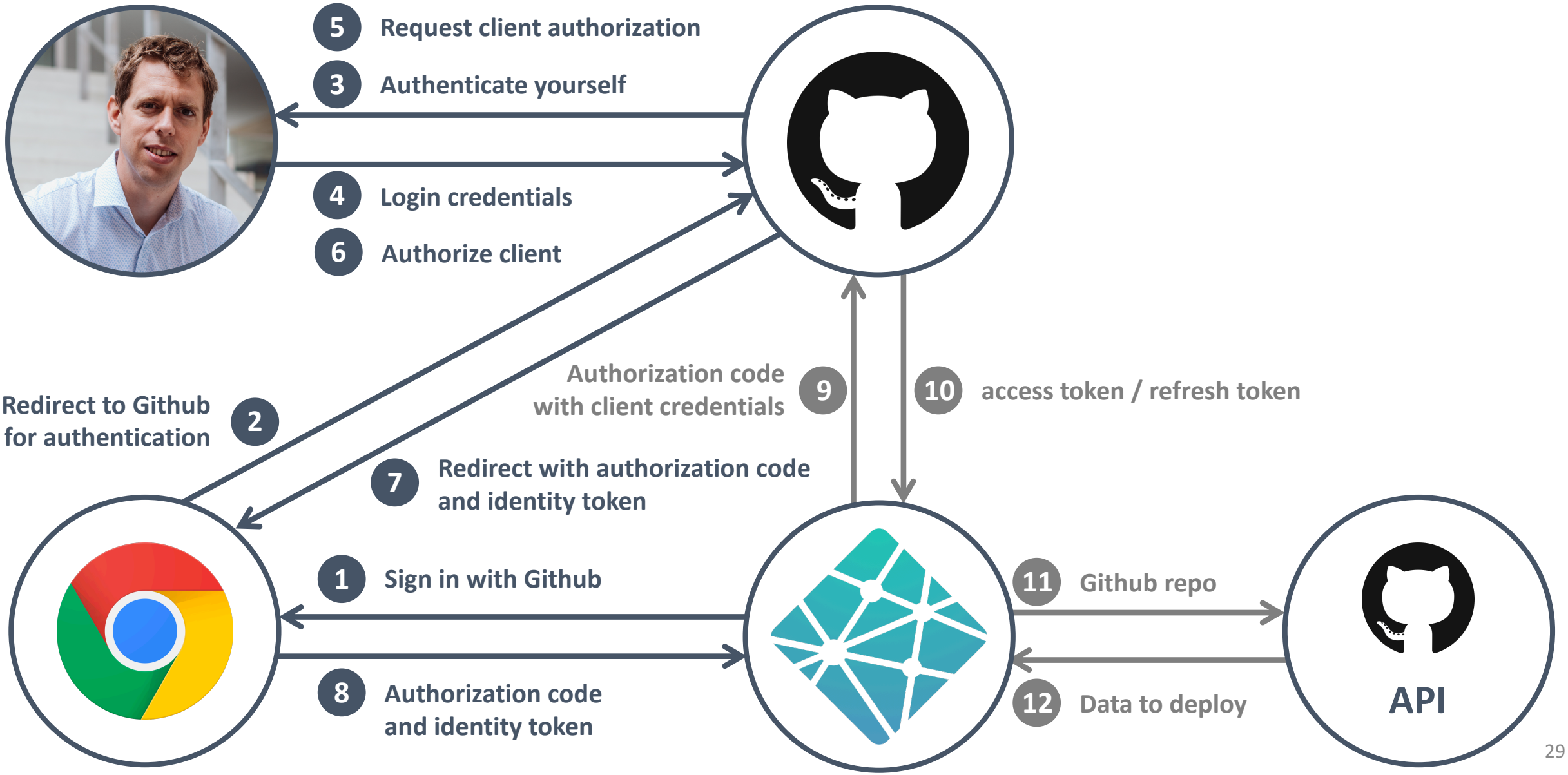
Profile information about the user

The identifier of the issuer of the token

The intended audience for this token

The unique ID of the user within the issuer




5 Request client authorization
3 Authenticate yourself
4 Login credentials
6 Authorize client
Redirect to Github for authentication
2
Authorization code with client credentials
9
10 access token / refresh token
7 Redirect with authorization code and identity token
1 Sign in with Github
8 Authorization code and identity token
11 Github repo
12 Data to deploy
API

Create application

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Restograde SPA

You can change the application name later in the application settings.

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Mobile, desktop, CLI and smart device apps running natively.

e.g.: iOS, Electron, Apple TV apps

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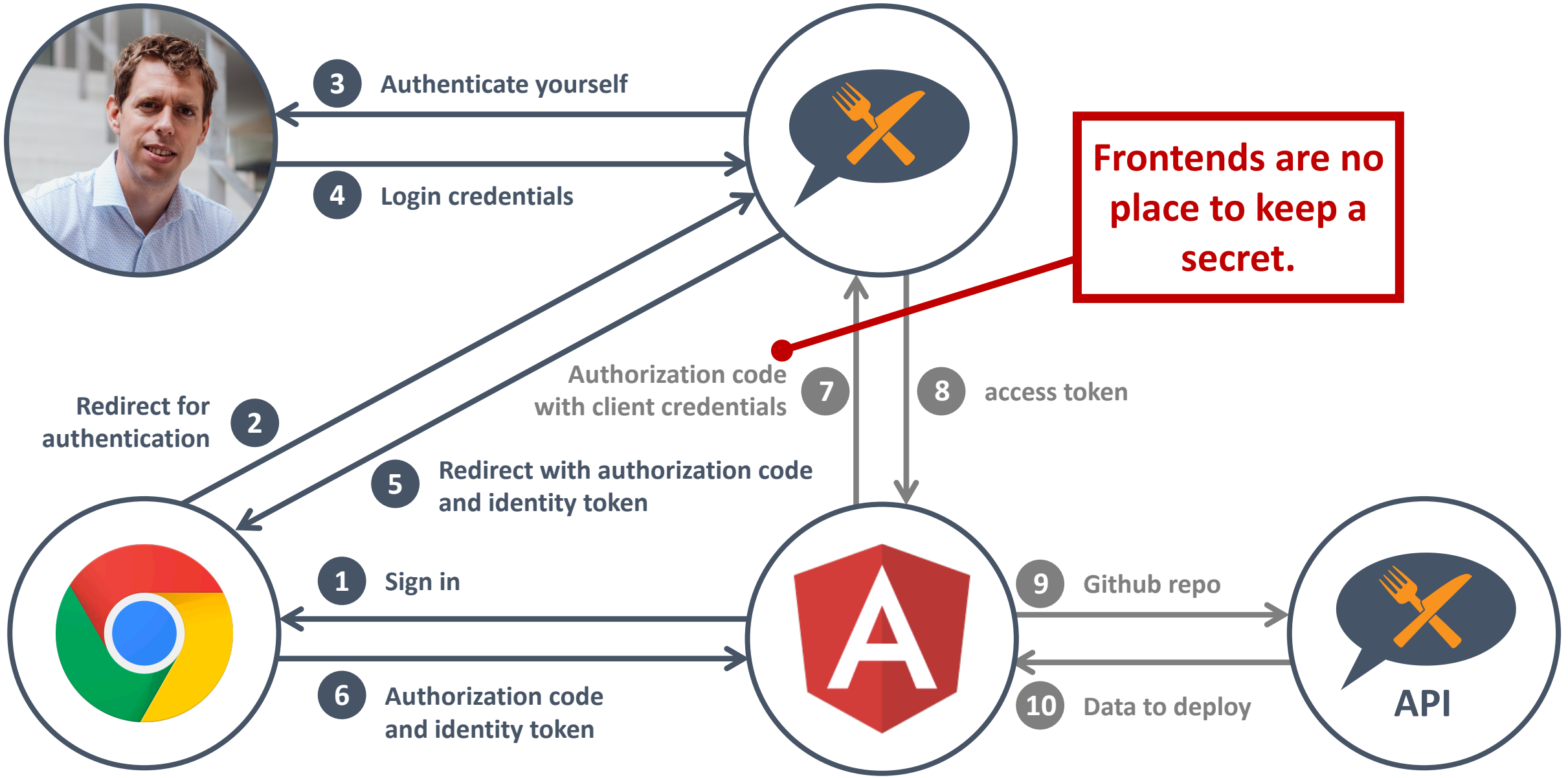
CREATE CANCEL


3 Authenticate yourself
4 Login credentials
Frontends are no place to keep a secret.
Redirect for authentication
2
Authorization code with client credentials
7
8
access token
5
Redirect with authorization code and identity token
1 Sign in
6 Authorization code and identity token
9 Github repo
10 Data to deploy
API

4 Store code challenge

10 Match code challenge to verifier

5 Authenticate yourself

6 Login credentials

PKCE replaces client credentials with a "one-time password"

Authorization code with code verifier 9

11 access token

Redirect for authentication with code challenge 3

7 Redirect with authorization code and identity token

2 Sign in URL with code challenge

8 Authorization code and identity token

12 Github repo

13 Data to deploy

API

1 Generate code verifier


Talk is cheap.
Show me the code.
Linus Torvalds
quotefancy

```
npm install angular-oauth2-oidc
```

```
this.oauthService.initCodeFlow();
```

```
npm install @auth0/auth0-spa-js
```

```
this.auth0Client$.subscribe((client: Auth0Client) => {
  client.loginWithRedirect()
});
```

```
npm install keycloak-js
```

```
keycloak.init({
  flow: 'hybrid',
  promiseType: 'native',
})
```

USE THE RIGHT OIDC FLOW FOR YOUR APPLICATION

Both a backend and a frontend can use the OIDC hybrid flow

Backends require client authentication & frontends require PKCE

OIDC is typically used along with OAuth 2.0 to enable API access

Draft	B. de Medeiros
	N. Agarwal
	Google
	N. Sakimura
	NRI
	J. Bradley
	Ping Identity
	M. Jones
	Microsoft
	January 25, 2017

TOC

Ope

Abstract

OpenID Connect 1.0 is a s
identity of the End-User b
basic profile information a

This document describes h

Draft	M. Jones
	Microsoft
	January 25, 2017

TOC

OpenID Connect Front-Channel Logout 1.0 - draft 02

Abstract

OpenID Connect 1.0 is a
identity of the End-User
basic profile information

This specification defines
between the OP and RPs
pages. Other protocols h
does the same thing. It a
Connect Session Manage

Draft	M. Jones
	Microsoft
	J. Bradley
	Ping Identity
	January 25, 2017

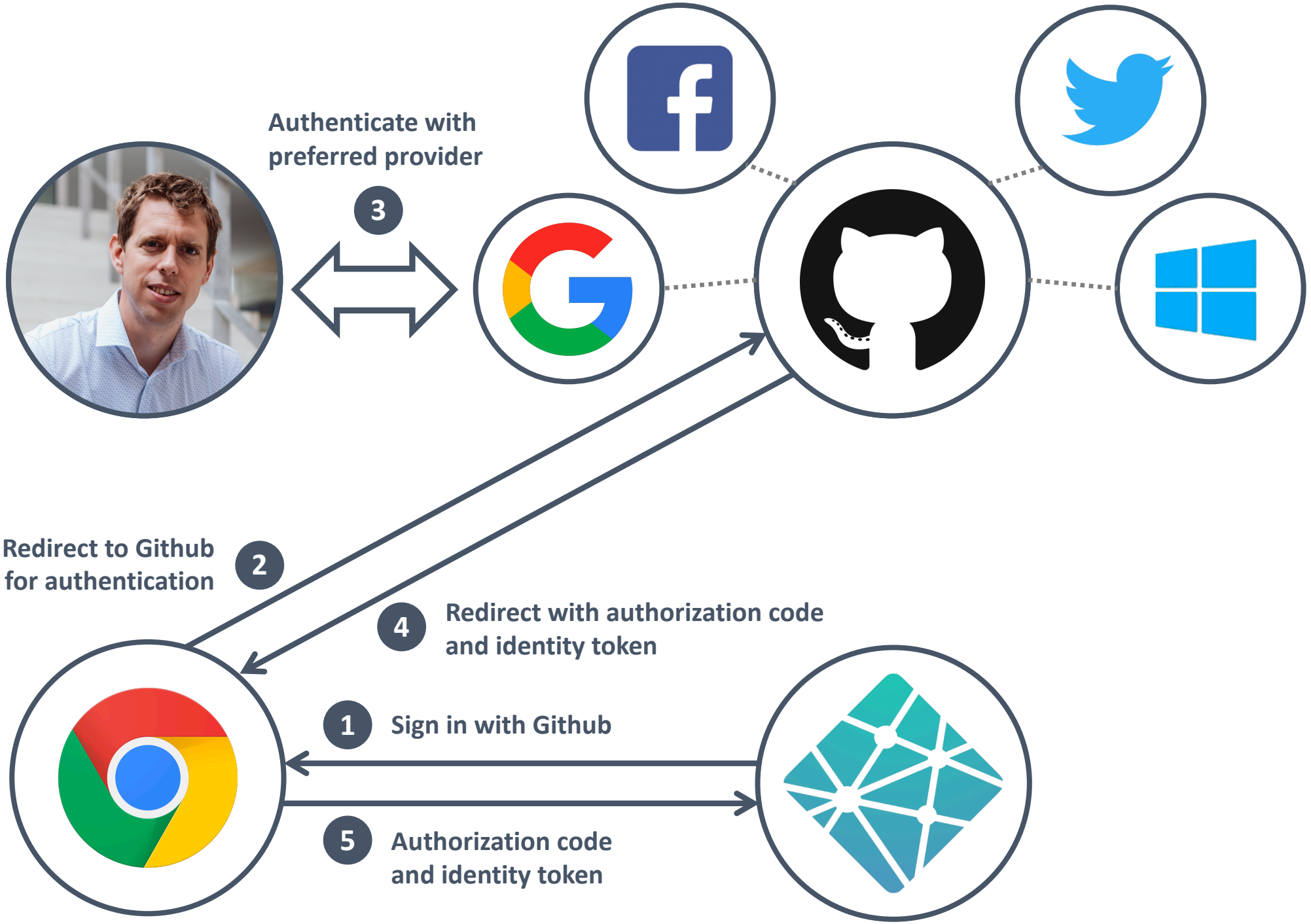
TOC

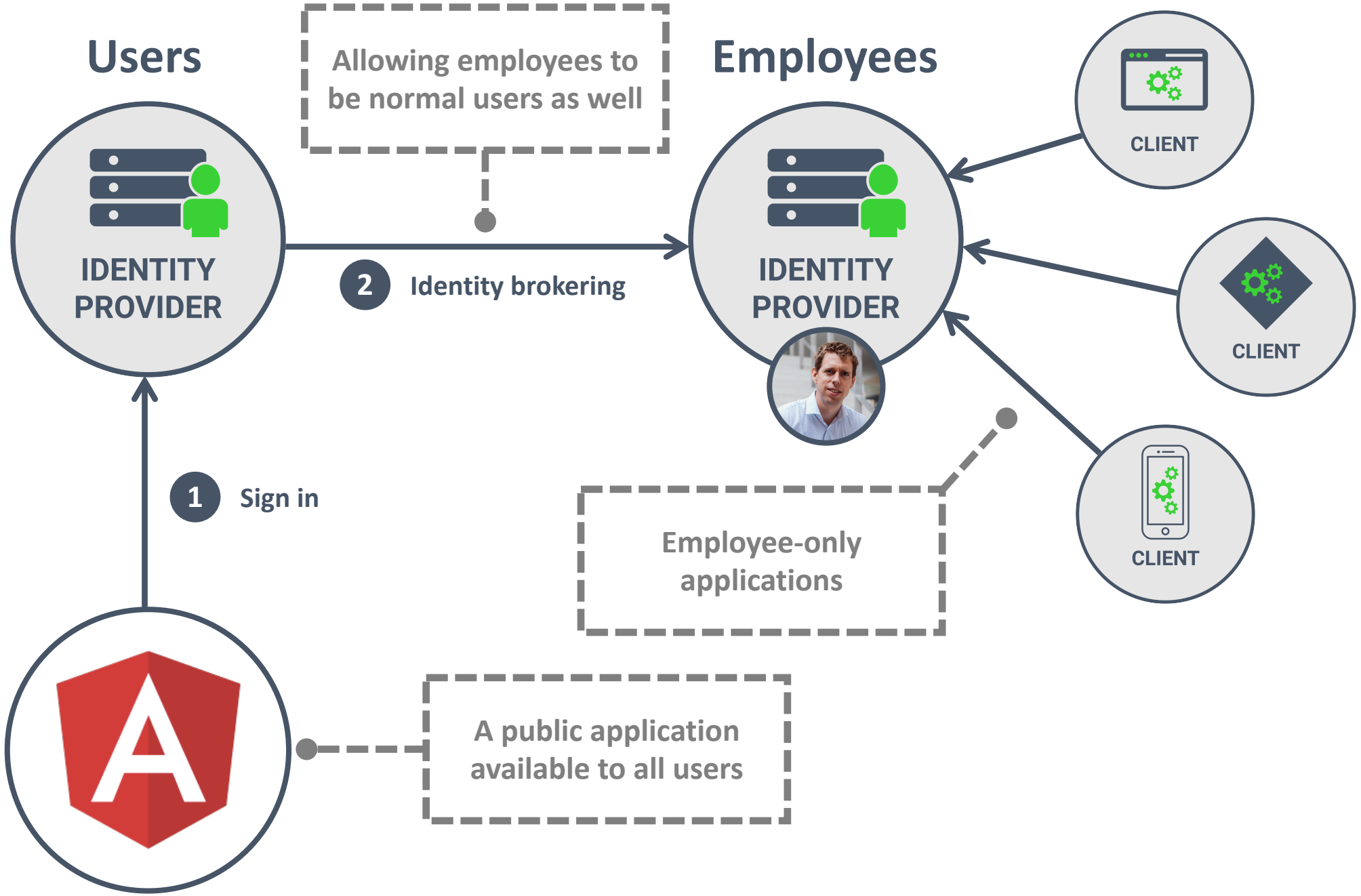
OpenID Connect Back-Channel Logout 1.0 - draft 04

Abstract

OpenID Connect 1.0 is a simple identity layer on top of the OAuth 2.0 protocol. It enables Clients to verify the identity of the End-User based on the authentication performed by an Authorization Server, as well as to obtain basic profile information about the End-User in an interoperable and REST-like manner.

This specification defines a logout mechanism that uses direct back-channel communication between the OP and RPs being logged out; this differs from front-channel logout mechanisms, which communicate logout requests from the OP to RPs via the User Agent.


Authenticate with
preferred provider
3
Redirect to Github
for authentication
2
4
Redirect with authorization code
and identity token
1
Sign in with Github
5
Authorization code
and identity token


Users
Allowing employees to be normal users as well
Employees
IDENTITY PROVIDER
2
Identity brokering
IDENTITY PROVIDER
CLIENT
CLIENT
CLIENT
1
Sign in
Employee-only applications
A public application available to all users

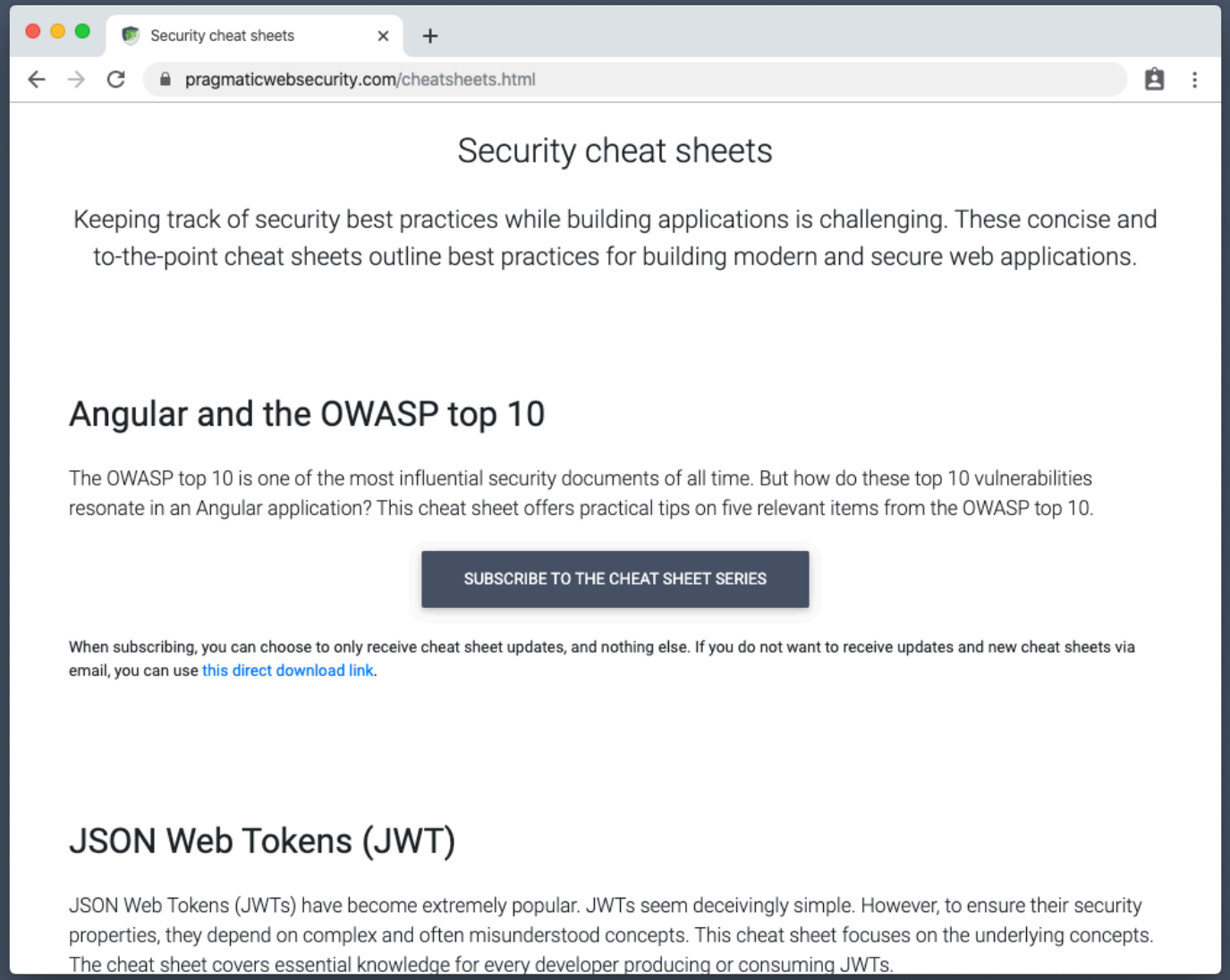
OIDC IS MORE THAN AUTHENTICATION ALONE

OIDC also includes support for session management and logout

Identity brokering enables the chaining of multiple identity providers

Identity brokering is a crucial concept in enterprise architectures

FREE SECURITY CHEAT SHEETS FOR MODERN APPLICATIONS



@PhilippeDeRyck

https://cheatsheets.pragmaticwebsecurity.com/

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March 9th – 13th, 2020
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@PhilippeDeRyck