Introduction to OAuth 2.0

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APIs are meant to be used

- Much of my data and the functionality of my life is available through APIs today
- I want to have applications access my APIs
- I don't want the applications to have to impersonate me
- I don't want to share my keys with everyone

A valet key for APIs

- A valet key gives someone else limited access to a car
- What if we could do that for web APIs?

OAuth 2.0

From the spec (RFC6749)

The OAuth 2.0 authorization framework enables a third-party application to obtain limited access to an HTTP service, either on behalf of a resource owner by orchestrating an approval interaction between the resource owner and the HTTP service, or by allowing the third-party application to obtain access on its own behalf.

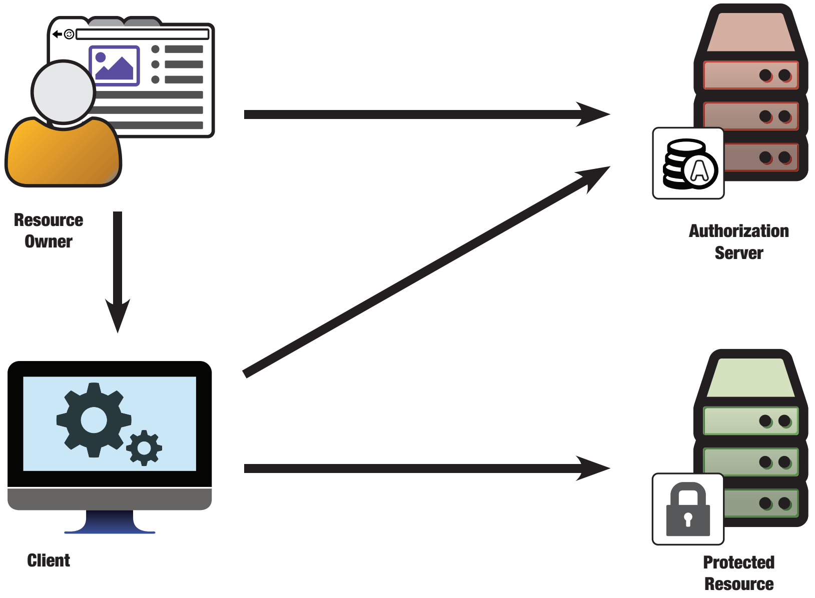
The good bits

The OAuth 2.0 authorization framework enables a third-party application to obtain limited access to an HTTP service, either on behalf of a resource owner by orchestrating an approval interaction between the resource owner and the HTTP service, or by allowing the third-party application to obtain access on its own behalf.

In other words

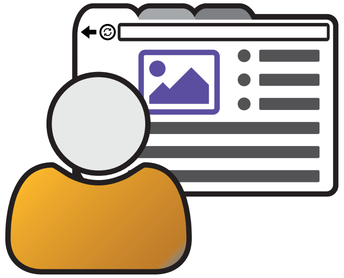
OAuth 2.0 is a delegation protocol that lets people allow applications to access things (like APIs) on their behalf.

Who is involved?



The resource owner

- Has access to some resource or API
- Can delegate access to that resource or API
- Usually has access to a web browser
- Usually is a person



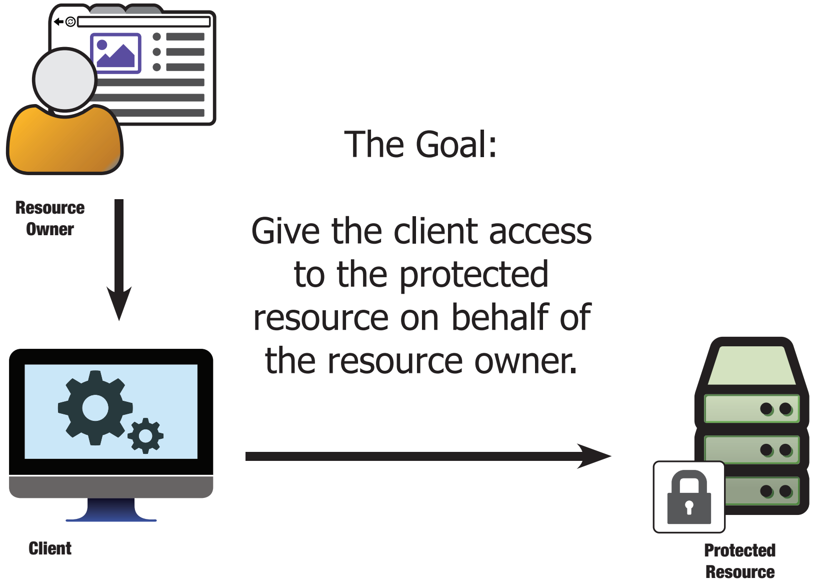
The protected resource

- Web service (API) with security controls
- Protects things for the resource owner
- Shares things on the resource owner's request

The client application

- Wants to access the protected resource
- Does things on the resource owner's behalf
- Could be a web server
  - But it's still a "client" in OAuth parlance
  - Could also be a native app or JS app

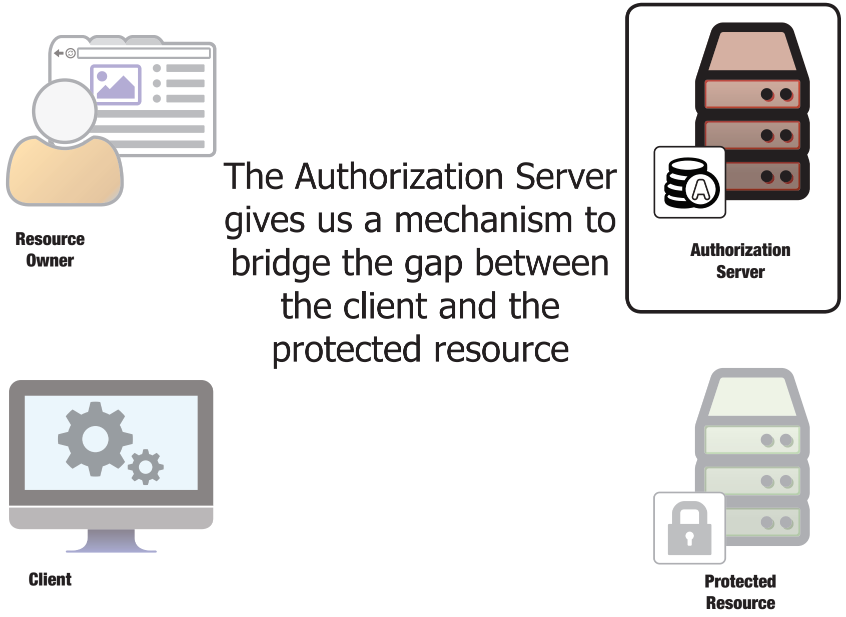
What are we trying to solve?



The Goal:

Give the client access to the protected resource on behalf of the resource owner.

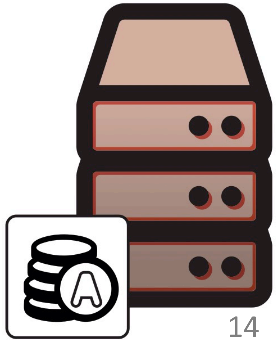
Introducing the Authorization Server (AS)



The Authorization Server gives us a mechanism to bridge the gap between the client and the protected resource

The Authorization Server

- Generates tokens for the client
- Authenticates resource owners (users)
- Authenticates clients
- Manages authorizations



OAuth Tokens

- Represent granted delegated authorities
  - From the resource owner to the client for the protected resource
- Issued by authorization server
- Used by client
  - Format is opaque to clients
- Consumed by protected resource

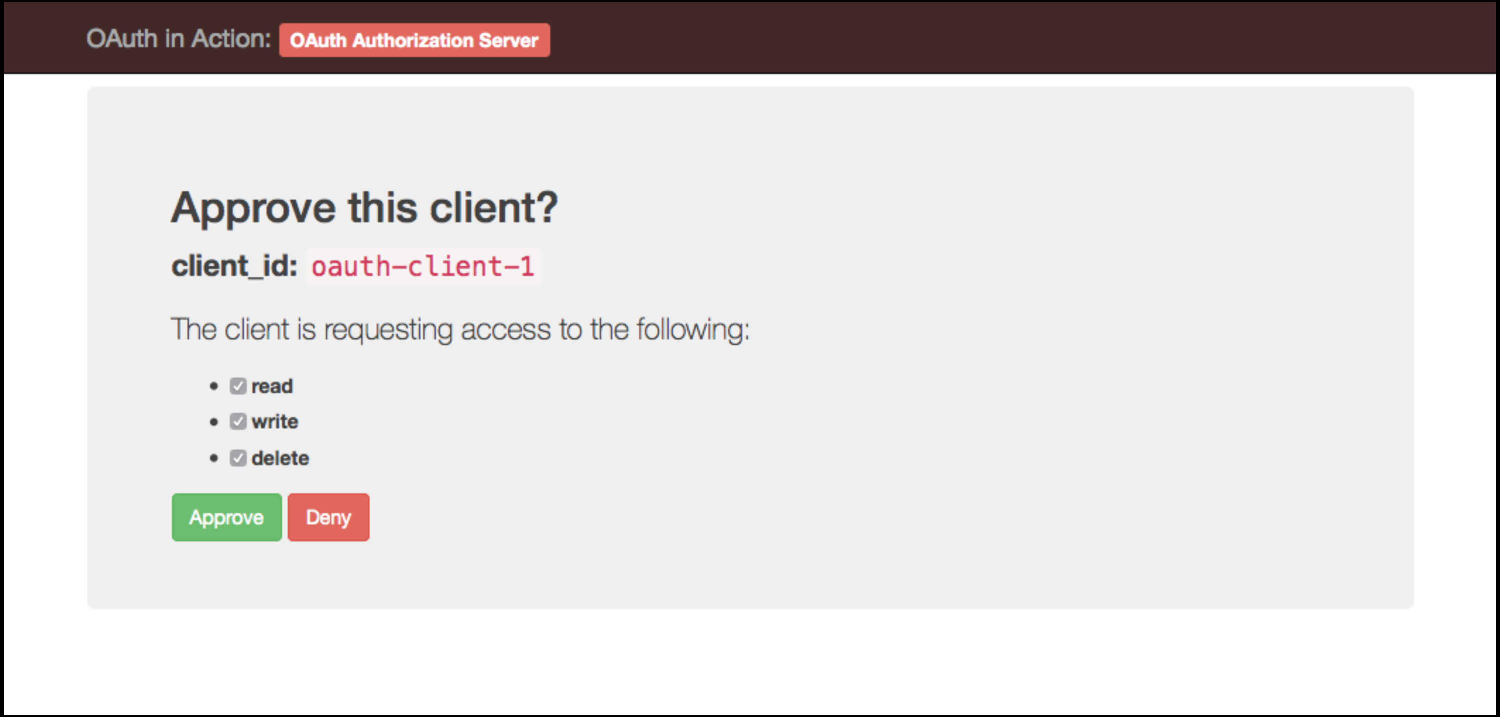
Example OAuth Tokens

- 92d42038006dba95d0c501951ac5b5eb
- 2df029c6-b38d-4083-b8d9-db67c774d13f
- eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJzdWIiOiIxMjM0NTY3ODkwIiwibmFtZSI6IkpvaG4gRG9lIiwiYWRtaW4iOnRydWV9.TJVA95OrM7E2cBab30RMHrHDcEfxjoYZgeFONFh7HgQ
- waterbuffalo-elephant-helicopter-argument

The OAuth approach at the AS

- Client authenticates for itself
- User authorizes client to act on user's behalf
- Server generates a token to represent that authorization
- Client presents that token to gain access

You've used OAuth



OAuth in Action: OAuth Authorization Server

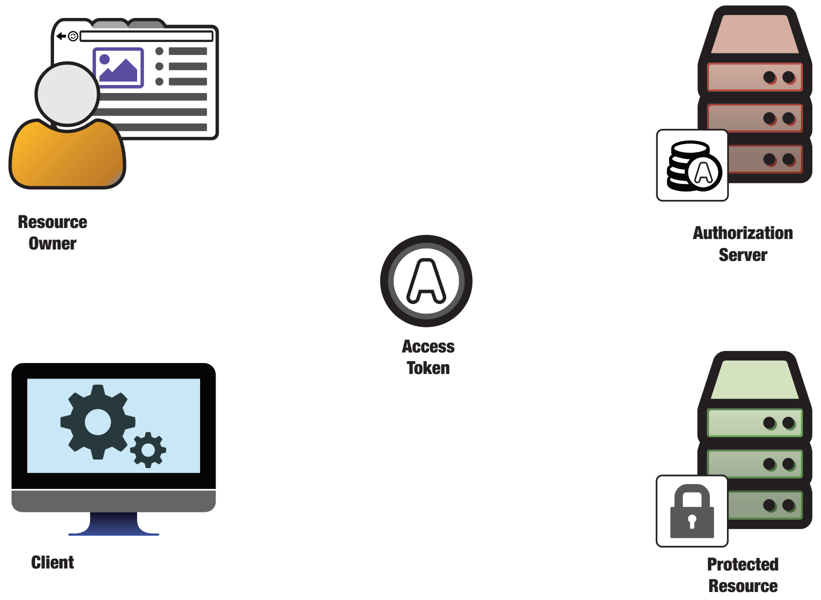
Approve this client?

client_id: `oauth-client-1`

The client is requesting access to the following:

- ✓ read
- ✓ write
- ✓ delete

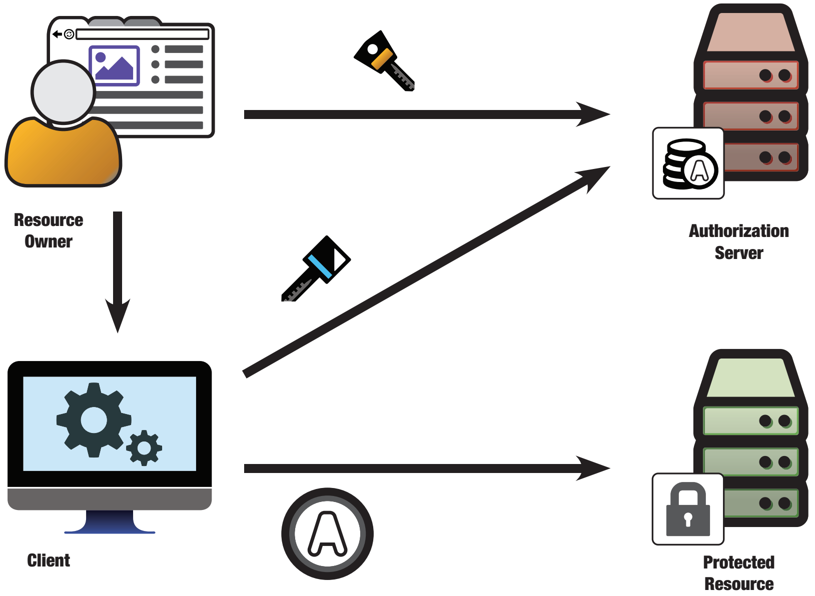
The pieces of OAuth



The Authorization Code Flow

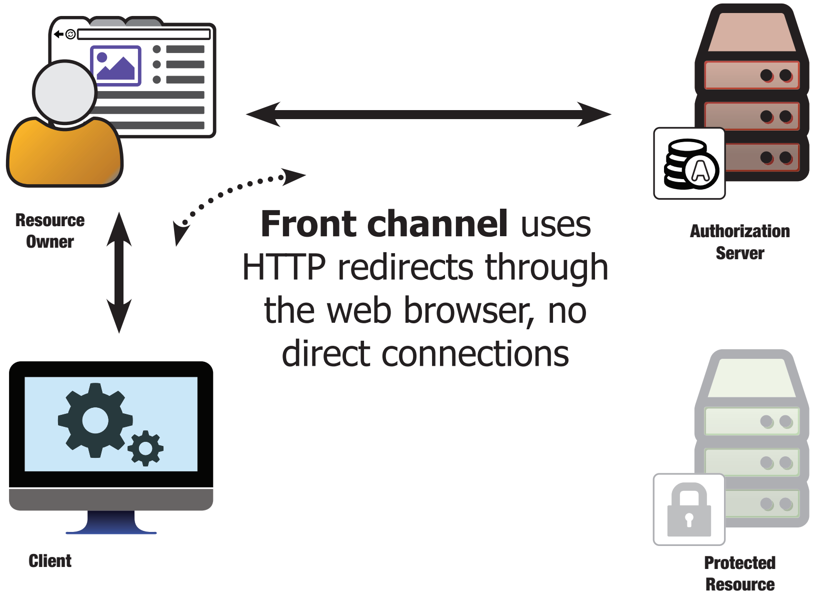
A deep dive into the canonical OAuth 2.0 transaction

The authorization code flow



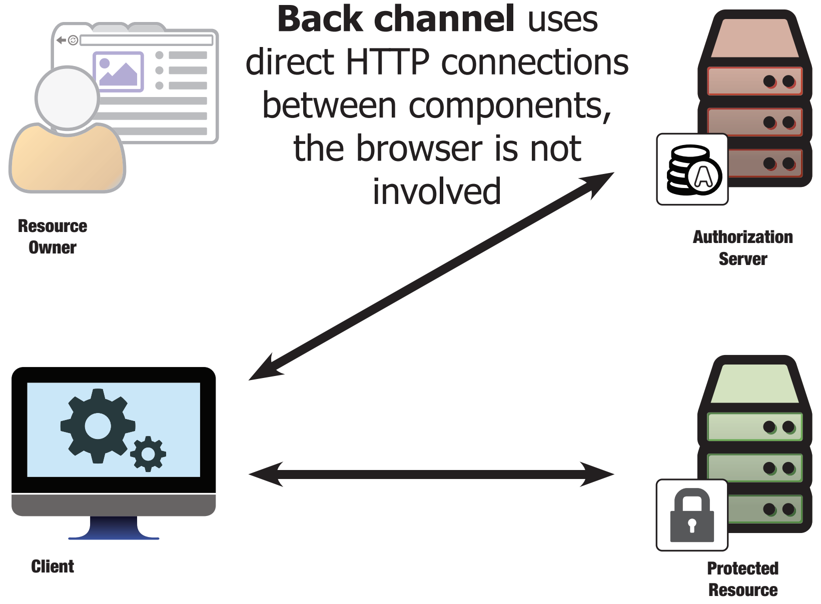
Two forms of communication

The front channel



Front channel uses HTTP redirects through the web browser, no direct connections

The back channel

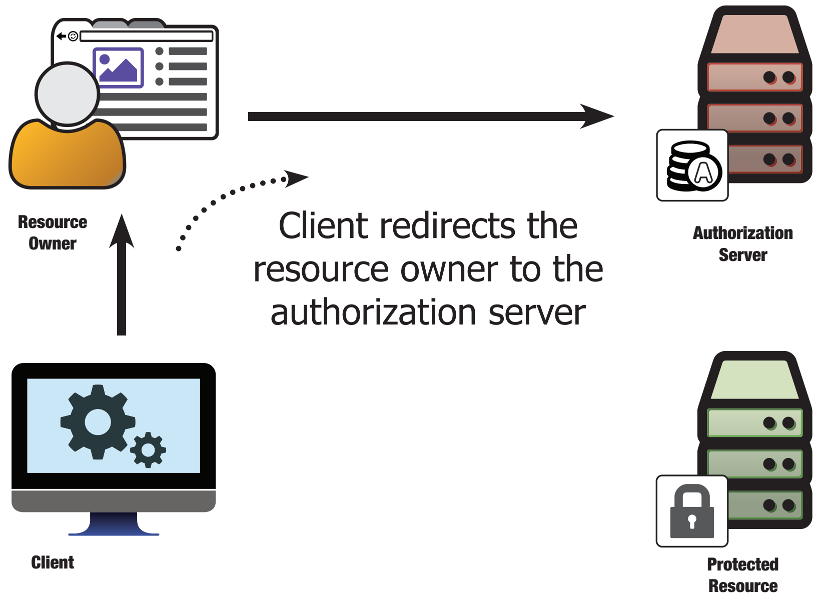


Back channel uses direct HTTP connections between components, the browser is not involved

The authorization code flow

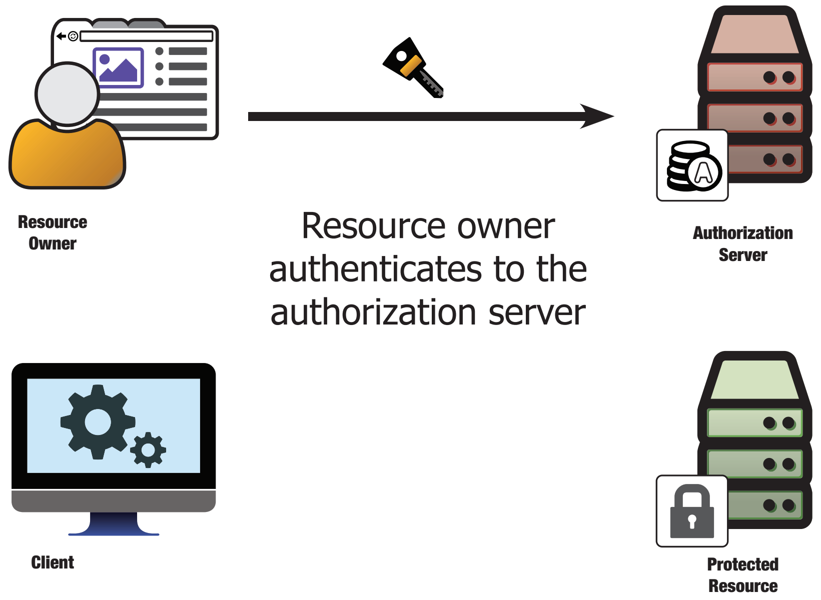
Step by step

Authorization Code: Step 1



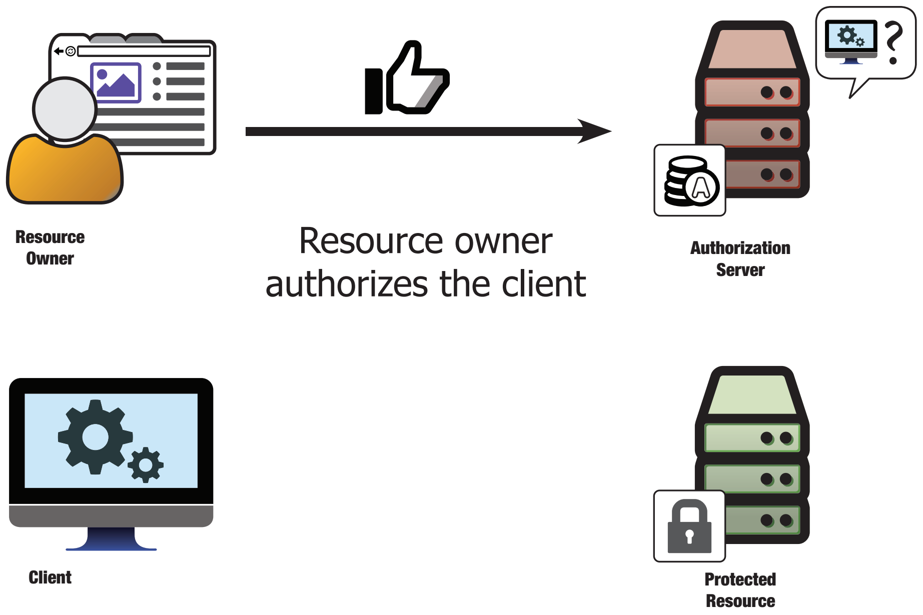
Client redirects the resource owner to the authorization server

Authorization Code: Step 2



Resource owner authenticates to the authorization server

Authorization Code: Step 3

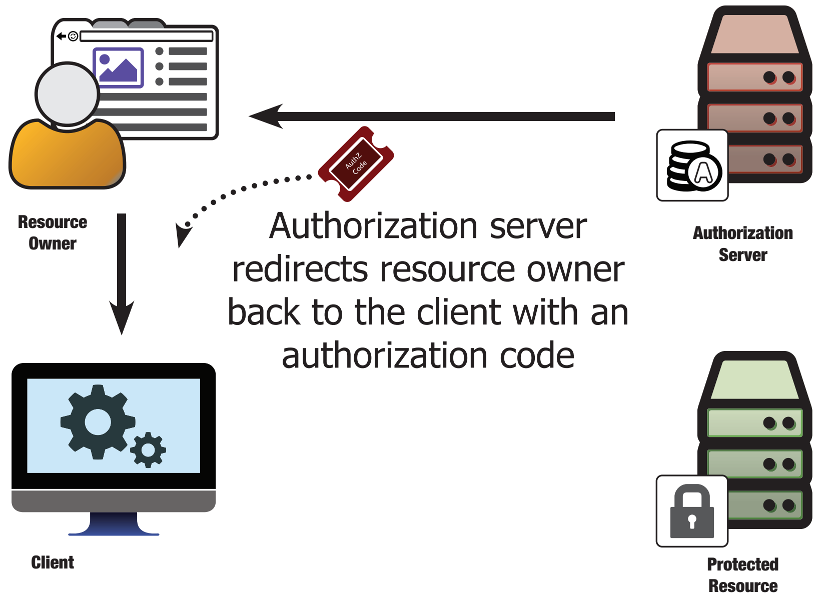


Resource owner authorizes the client

A layered trust model

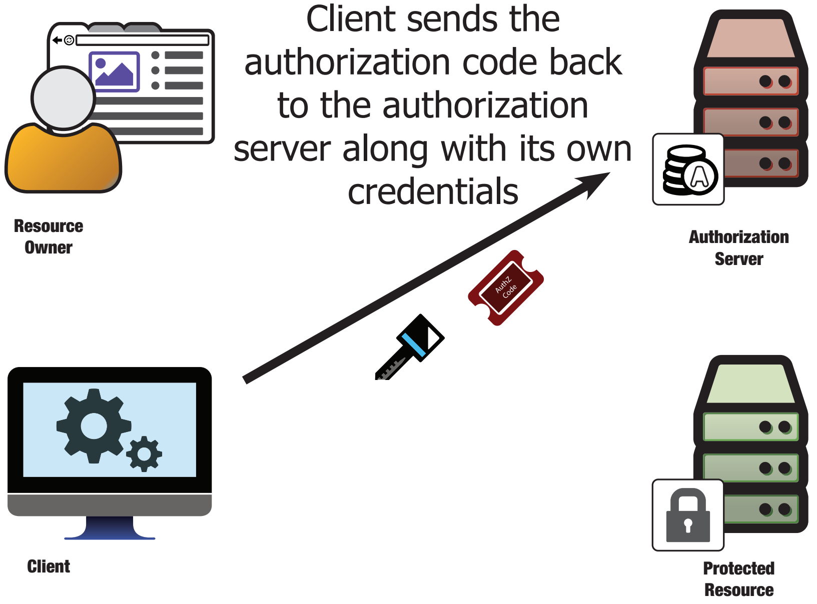
Whitelist	Internal parties Known business partners Customer organizations Trust frameworks	• Centralized control • Traditional policy management
Greylist	Unknown entities Trust On First Uuse	• End user decisions • Extensive auditing and logging • Rules on when to move to the white or black lists
Blacklist	Known bad parties Attack sites	• Centralized control • Traditional policy management

Authorization Code: Step 4

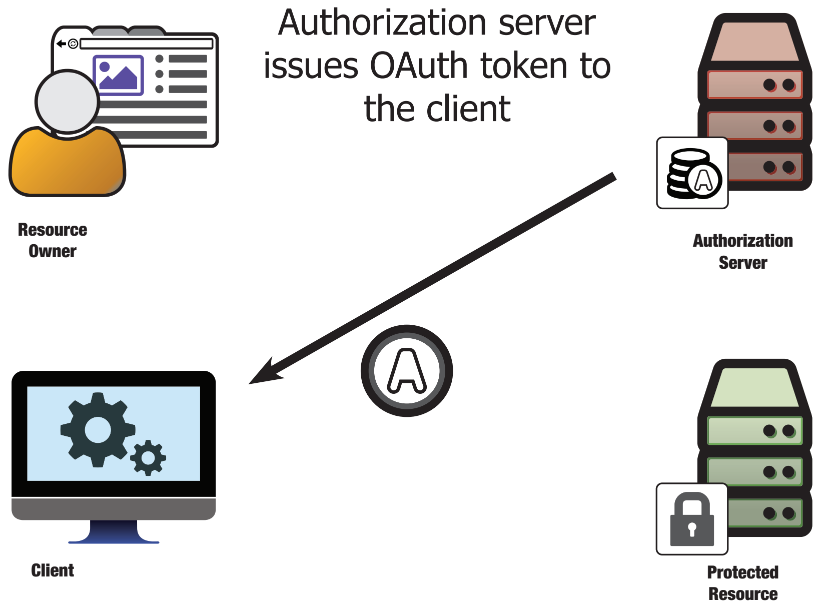


Authorization server redirects resource owner back to the client with an authorization code

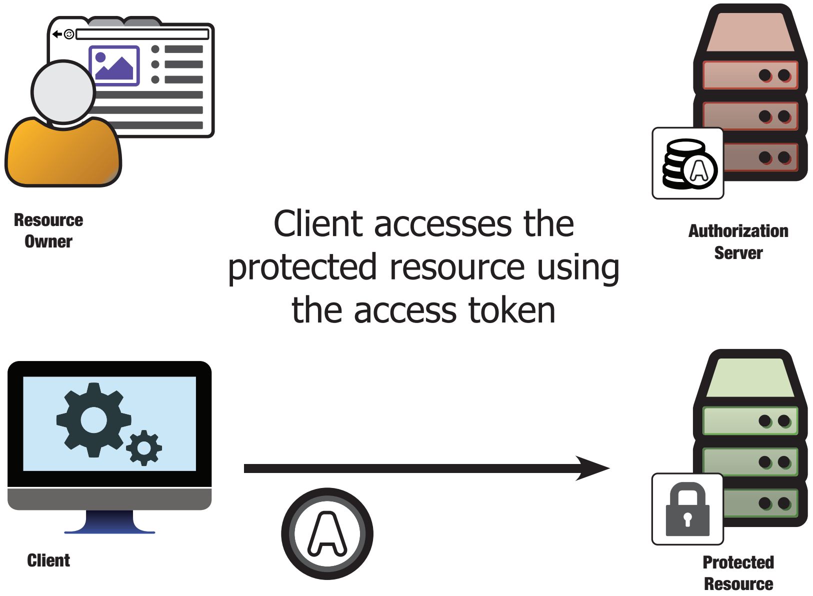
Authorization Code: Step 5


Client sends the authorization code back to the authorization server along with its own credentials
Resource Owner
Authorization Server
AuthZ Code
Client
Protected Resource

Authorization Code: Step 6



Authorization Code: Step 7



Client accesses the protected resource using the access token

Interpreting the token

- The client never knows or cares what's in the token itself
- The resource server needs to understand what's in the token
  - Who it's issued for
  - What it's good for

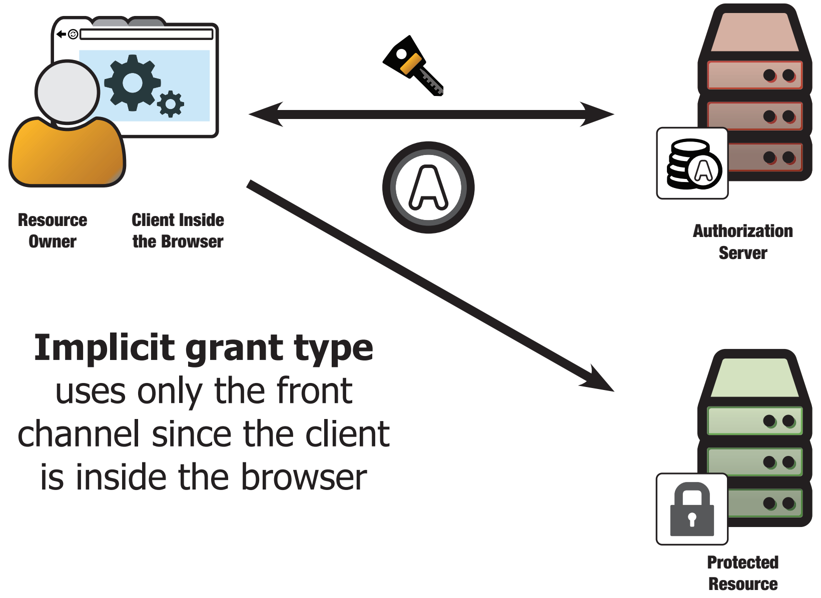
Thank You

Backup Slides

Here there be dragons

OTHER WAYS TO DO OAUTH 2.0

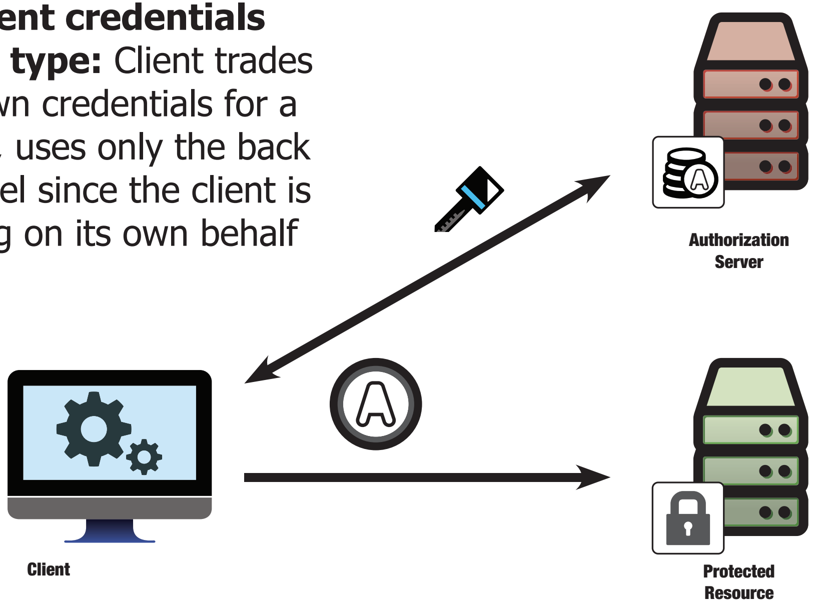
The implicit flow



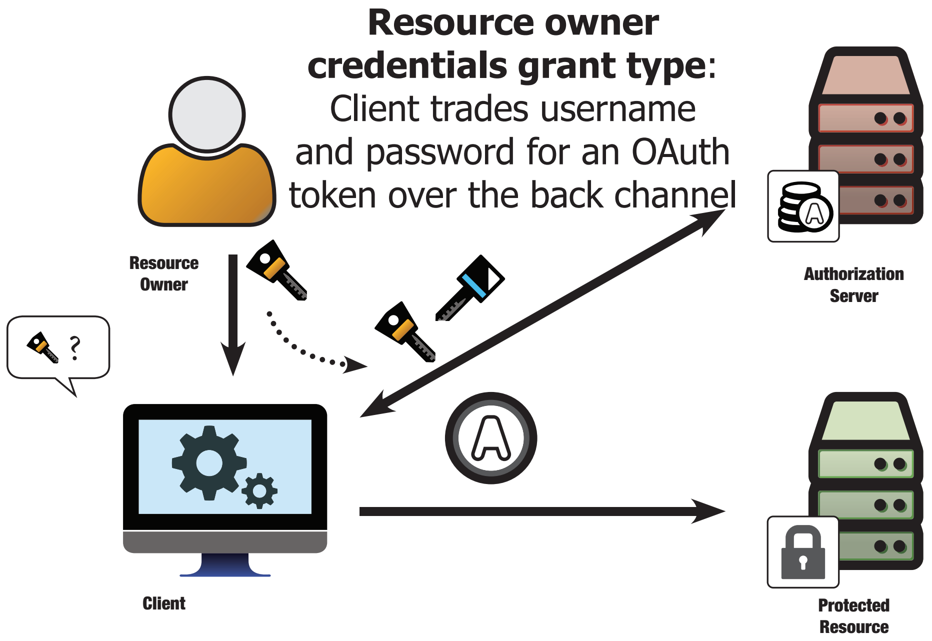
Implicit grant type uses only the front channel since the client is inside the browser

The client credentials flow

Client credentials grant type: Client trades its own credentials for a token, uses only the back channel since the client is acting on its own behalf

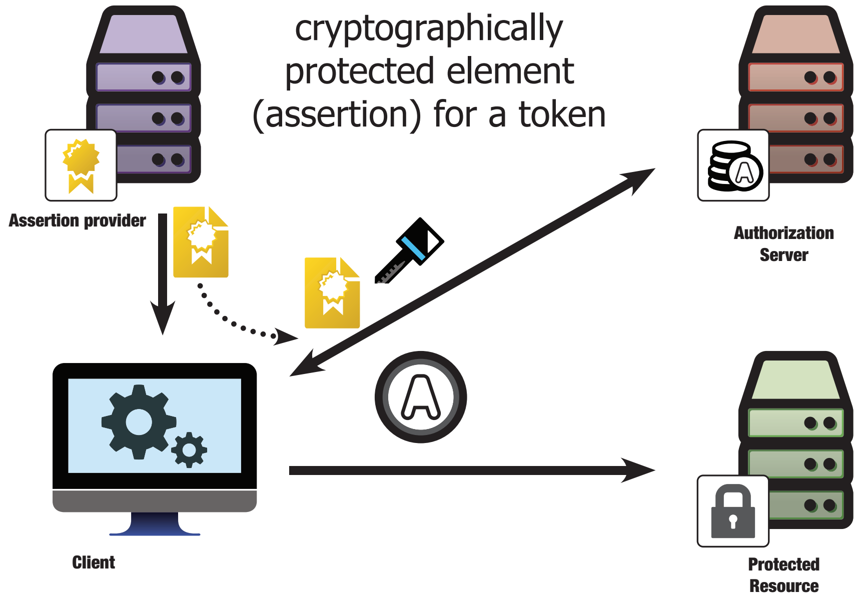


The resource owner password flow


Resource owner credentials grant type: Client trades username and password for an OAuth token over the back channel
Resource Owner
?
Authorization Server
Client
Protected Resource

The assertions flows

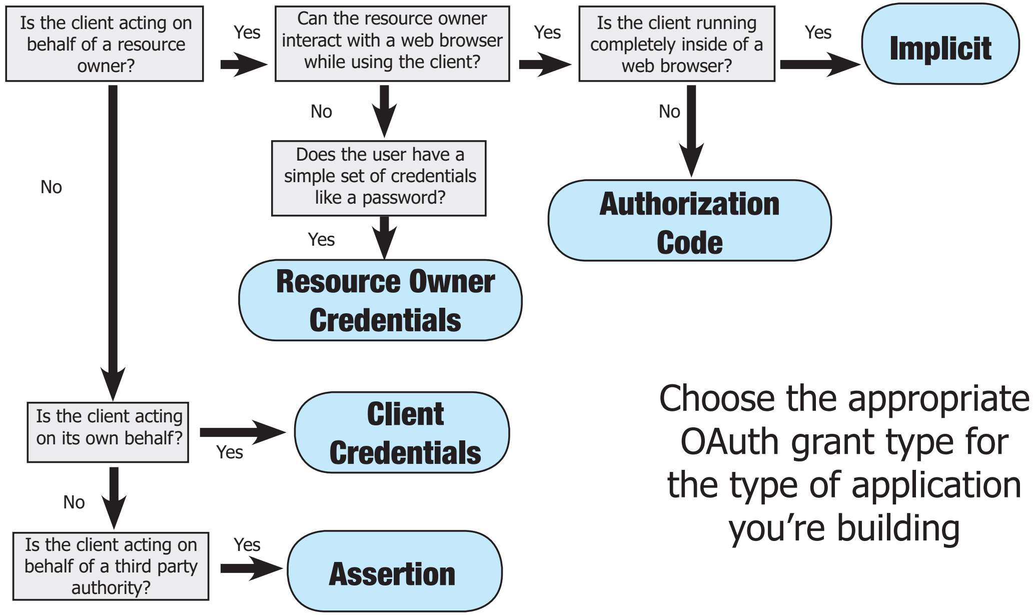
Client trades a cryptographically protected element (assertion) for a token



Different use cases

- Authorization code flow: web applications, some native applications
- Implicit flow: in-browser applications
- Client credentials flow: non-interactive
- Password flow: trusted legacy clients
- Assertion flows: trust frameworks

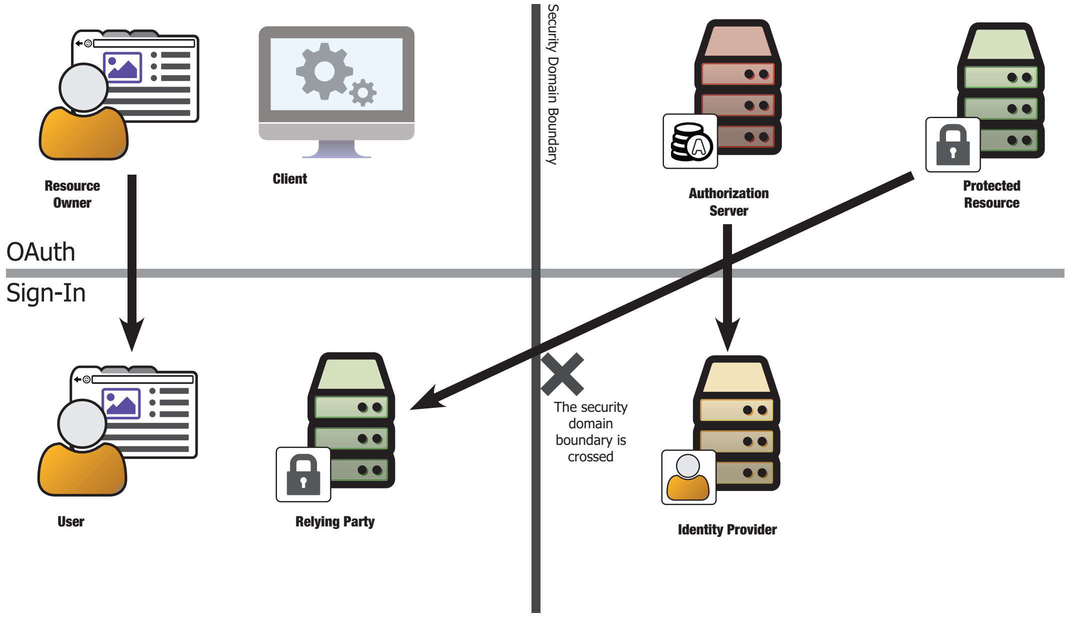
How to choose a flow


Is the client acting on behalf of a resource owner?
Yes
Can the resource owner interact with a web browser while using the client?
Yes
Is the client running completely inside of a web browser?
Yes
Implicit
No
No
Authorization Code
Does the user have a simple set of credentials like a password?
Yes
Resource Owner Credentials
No
Is the client acting on its own behalf?
Yes
Client Credentials
No
Is the client acting on behalf of a third party authority?
Yes
Assertion

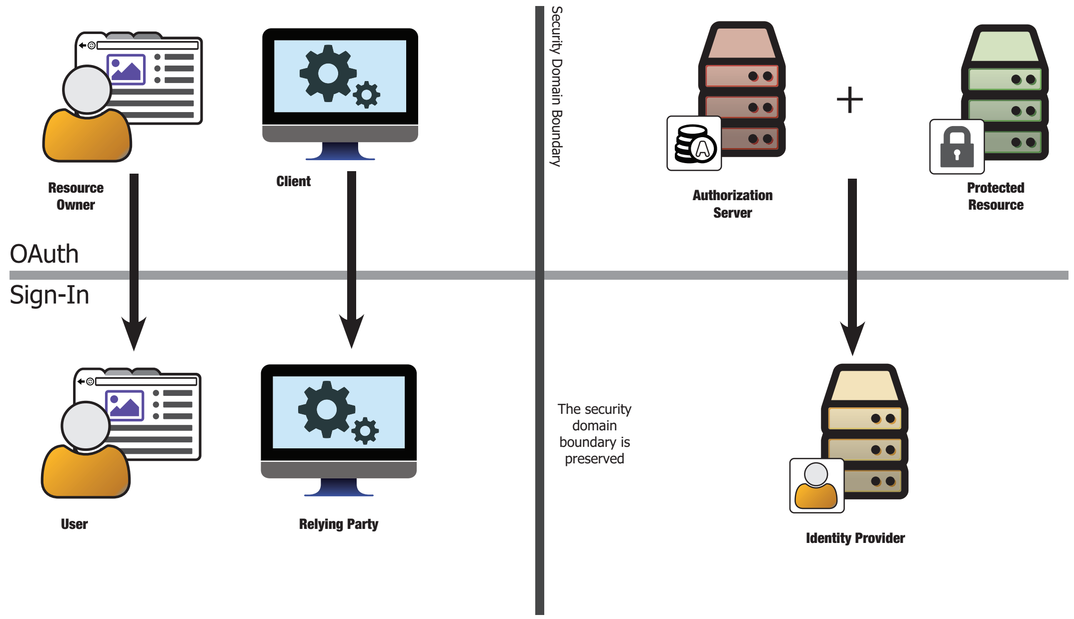
Choose the appropriate OAuth grant type for the type of application you're building

Can we build authentication on OAuth?

How can we split the network?



A better way to split the network



That works!

- We’re using OAuth to protect the identity
- The client consumes the identity

Authorization is Chocolate

- Good on its own
- Great as part of a larger recipe
- Many different recipes can use it

Authentication is Fudge

- Confection with several ingredients
- Tends to have one flavor as the most obvious
- Could be made using chocolate
  - – But not required

Agreeing on a recipe

- Let’s make a recipe for chocolate fudge:
  - Standard authentication protocol
  - Built on top of standard authorization protocol
  - Interoperable cross domain

OpenID Connect

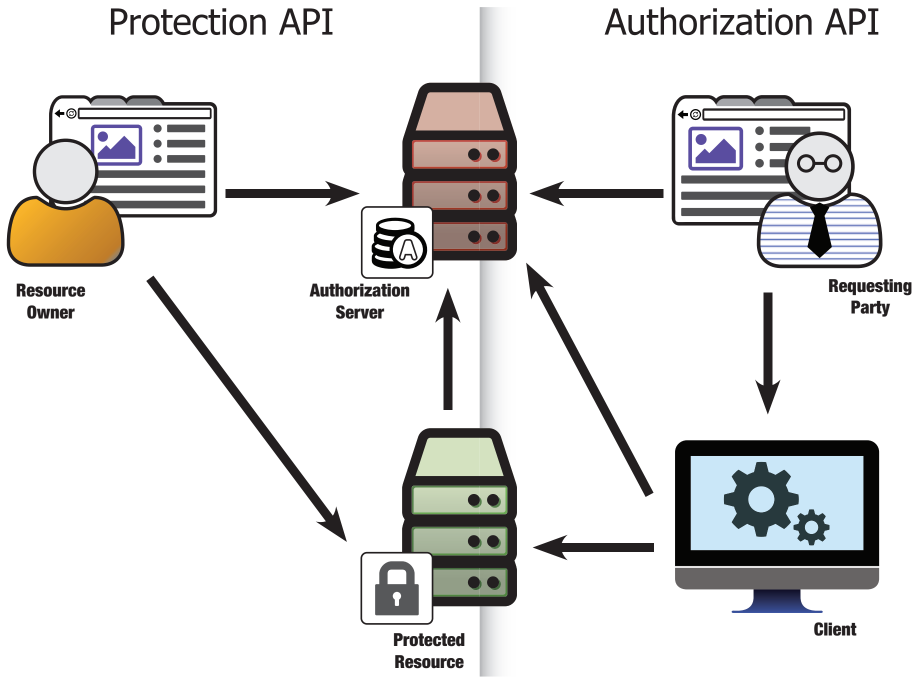
- IdP offers interactive OAuth flows
- ID Token carries authentication information
  - Formatted as a JWT
  - Audience is the client, not the resource
- UserInfo Endpoint
  - Standard set of claims and scopes

User Managed Access

Person to person delegation

- OAuth lets Alice share with herself
- UMA lets Alice share with Bob
  - Bob is the "Requesting Party (RqP)" to Alice's "Resource Owner (RO)"
  - Alice can set policies ahead of time

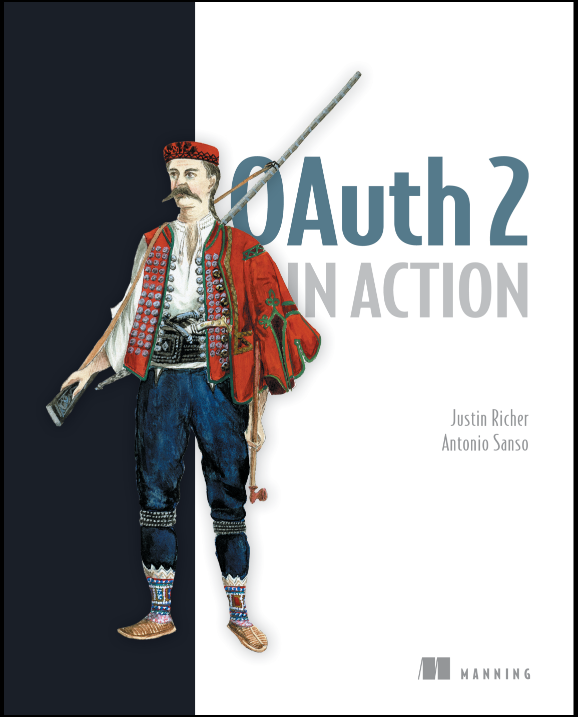
User Managed Access



Wide ecosystem benefits

- Alice can introduce a new resource to her AS
- The resource server can manage its access using this AS and its tokens

Reference book for OAuth 2



- *OAuth 2 In Action*
- First 9 chapters available today, more coming soon
- Out this spring/summer

https://manning.com/books/oauth-2-in-action