Introduction to OAuth2 in JavaScript

Basics

Authorizing Access To API

OpenID Connect

OpenID Connect On Clients

Impersonating The User

Credentials

Basics

Basics

Authorizing Access To API

OpenID Connect

OpenID Connect On Clients

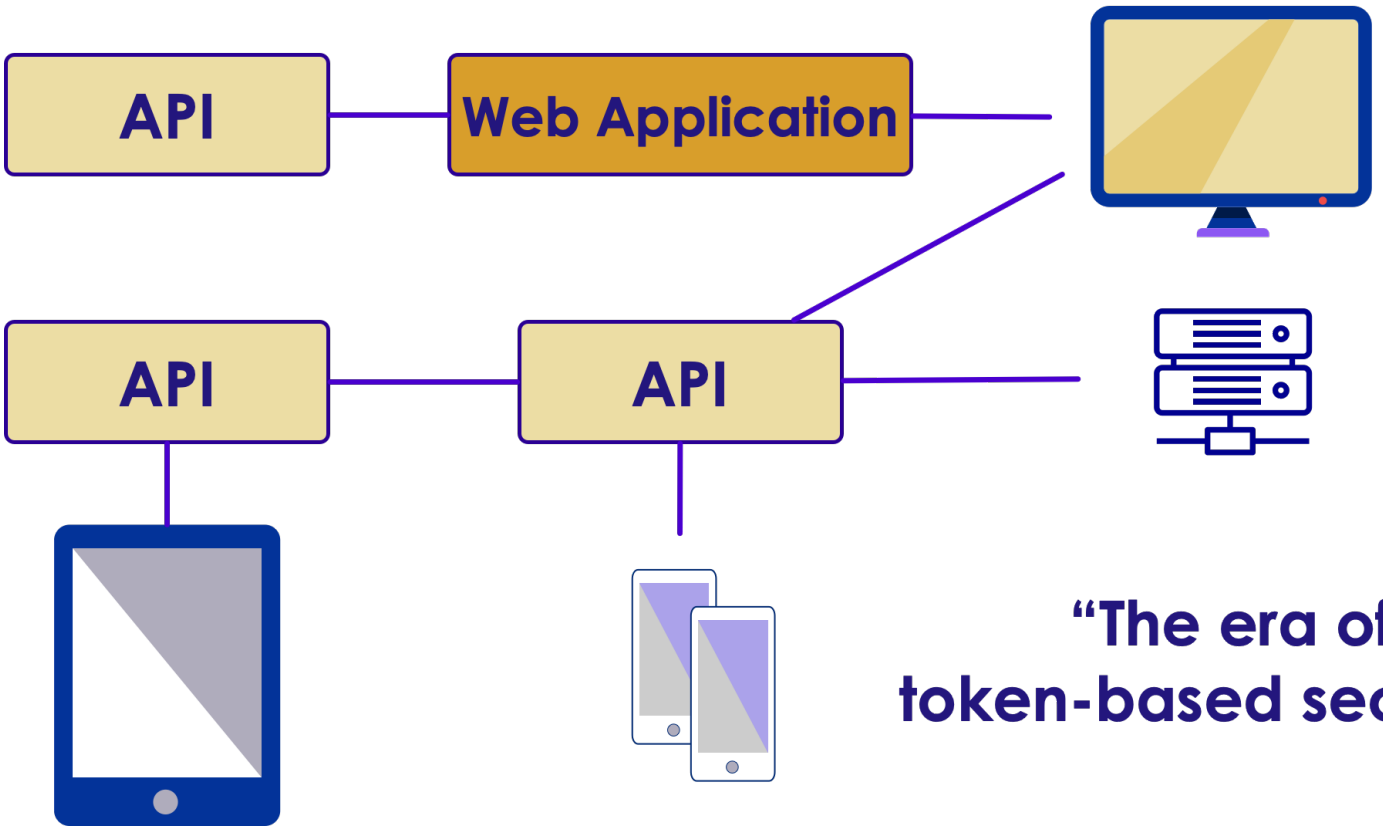
Impersonating The User Credentials

What Is It

OAuth 2.0 is an open protocol to allow secure authorization in a simple and standard method from web, mobile and desktop application

Application

A Modern Application



"The era of token-based security"

Typical Payload of OAuth2 Access Token

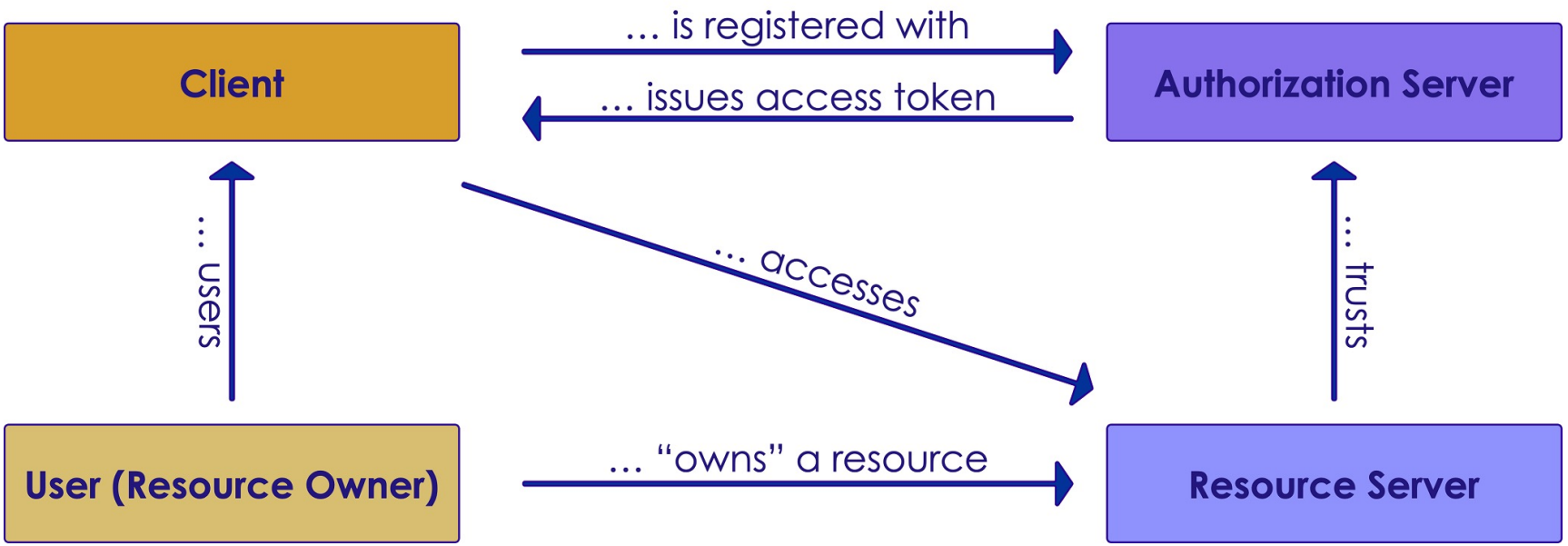
```
{
  "client_id": "tripgalleryimplicit",
  "scope":"gallerymanagement",
  "sub":"b05d3546-6ca8-4d32-b95c-77e94d705ddf",
  "amr":"password",
  "auth_time":"1437400047",
  "idp":"idsrv",
  "iss":"https://elephantscale/identity",
  "aud":"https://elephantscale/identity/resources",
  "exp":1437403647,
  "nbf":1437403647

}
```

Defining OAuth 2.0

- Is not an authentication method
- Is an authorization method
- Standard is silent about the user
- RFC6749

Actors

The Main Actors



Simple Questions

- Different types of applications require different means to achieve authorization
- Where can the token be delivered to?
- Can the client application safely store secrets?

Making Decision

- How can you safely achieve authorization?
- By answering to this question choose your type of application you are building:
  - Client Credentials
  - Implicit
  - Authorization Code
  - Resource Owner Password Credentials
  - Device Code

Clients

- Confidential clients:
  - Clients that can maintain the confidentiality of their credentials
  - Example: web applications
- Public clients:
  - Clients that cannot maintain the confidentiality of their credentials

Client Examples

- JavaScript clients
  - Native apps
    - iOS
    - Android
    - Windows Phone apps built in a native or compile to native language
  - User-Agent based apps
  - JavaScript apps

Endpoints: On Authorization Server

- Authorization endpoint
  - Used by the client to get authorization the owner of resource through user-agent redirection
- Token endpoint
  - Client uses this token to exchange an authorization grant for an access tokent usualy with client authentication

Endpoints: On Client

- On client
  - Redirection endpoint
    - Authorization server uses it to return responses containing authorization credentials to the client through resource owner user=agent

What About Authorization server?

- We don't have to implement Authorization server
  - Identity server
    - For example: @leastprivilege and @brockallen Implement OAuth 2.0 and OpenID Connect

Authorizing Access To API

Basics

Authorizing Access To API

OpenID Connect

OpenID Connect On Clients

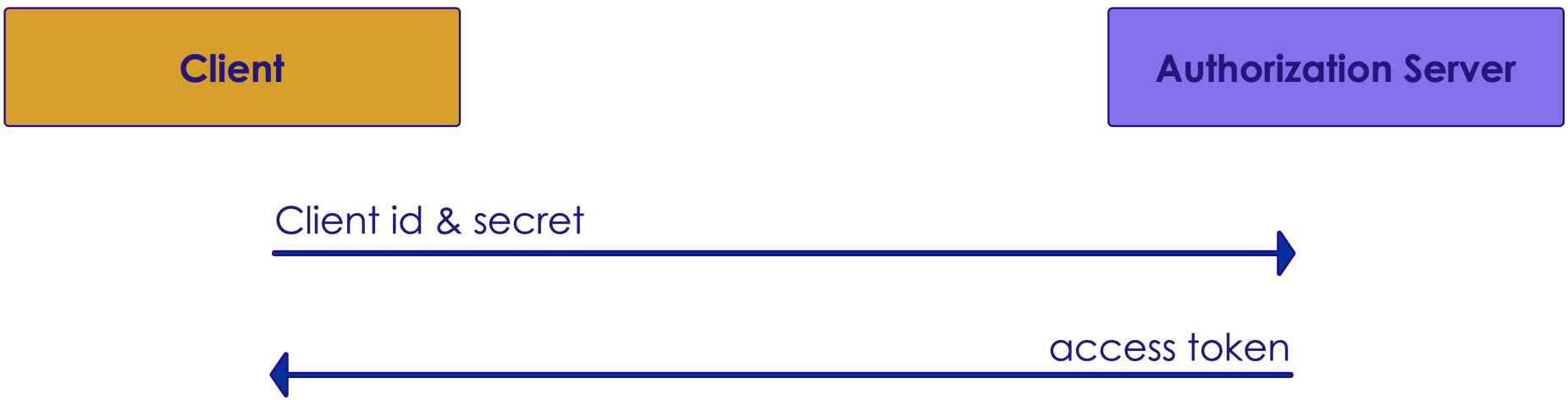
Impersonating The User Credentials

Client Credentials Flow

- Machine to machine communication
  - No human or username and password involved
  - Can be used to get access token using client credentials
- Is used only by confidential clients
  - A public client doesn't safely store the client secret

Flow In A Picture

Client Credentials Flow



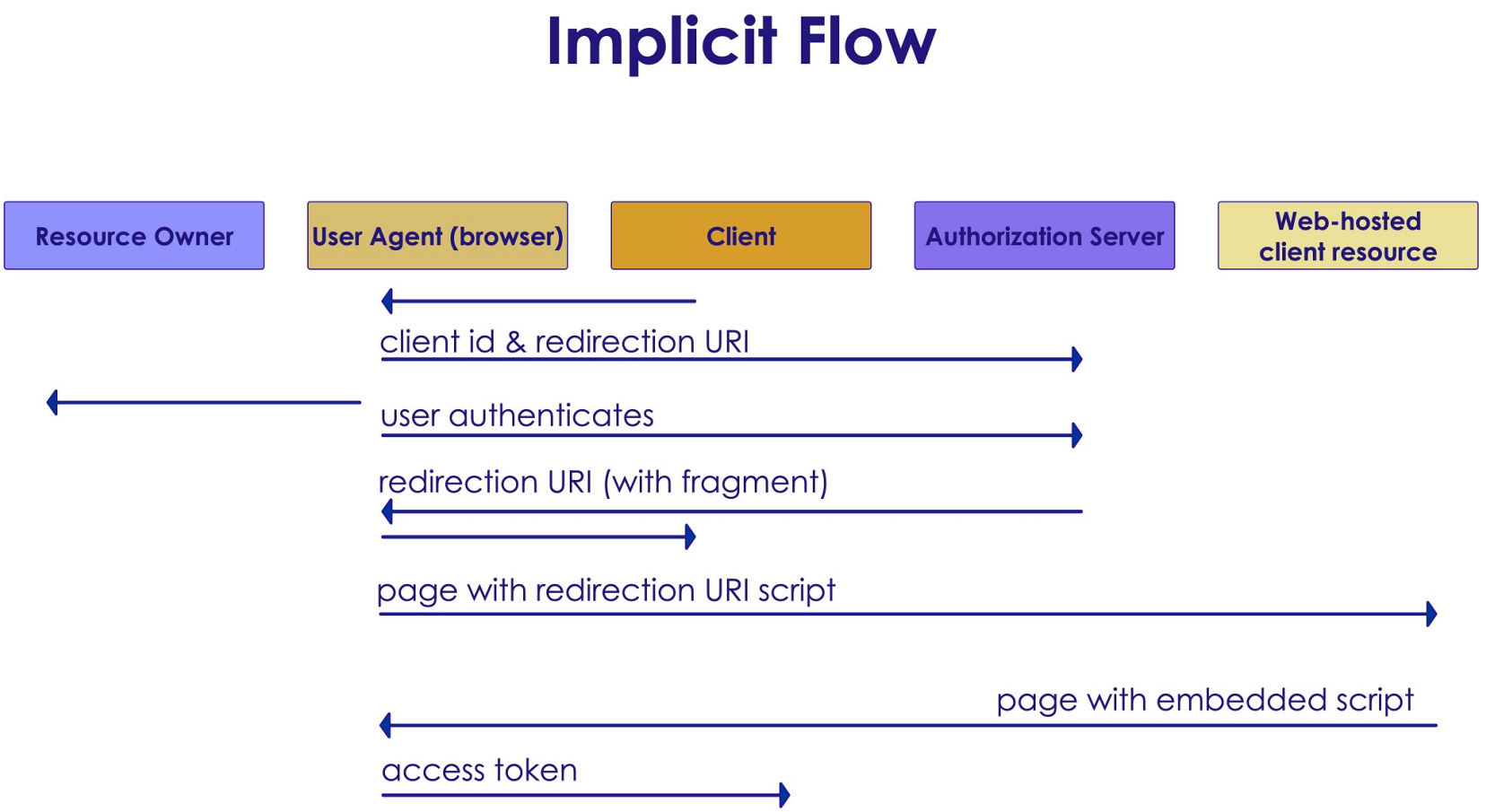
How About Angular?

- Question: Can we use client credential for our Angular applications?
- Answer: Yes but **It is not safe**
- It's like to lock the door but leave the key on it

Implicit Flow

- For public clients at predefined redirection URI and also might used by confidential clients (JavaScript or Angular apps)
- To obtain access tokens not refresh tokens
- No client authentication because a public user cannot store the secret safely

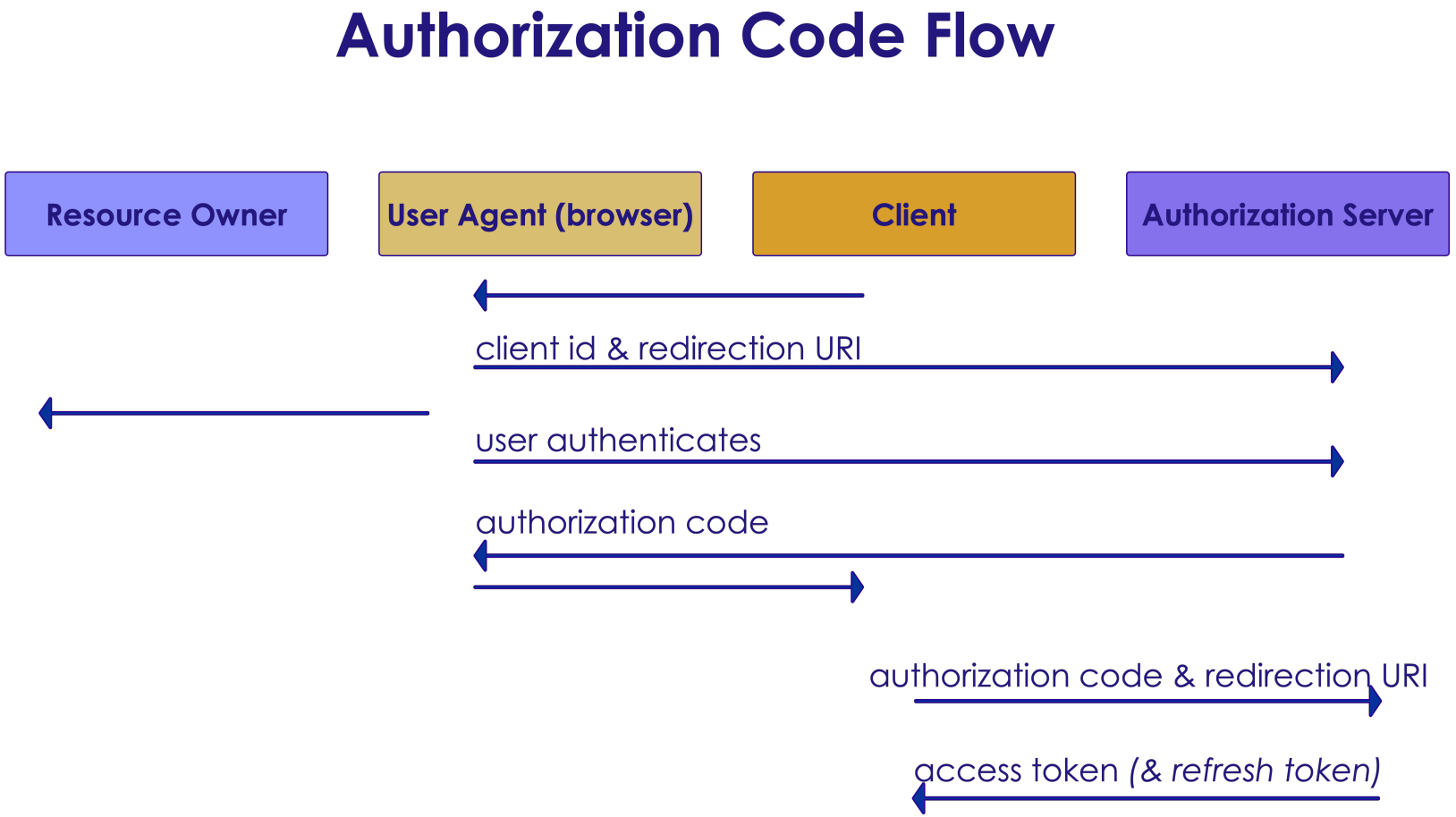
Implicit Flow In A Picture



Authorization Code Flow

- Optimized for confidential and public clients
- To get access and refresh tokens
- Includes a client authentication step

Authorization Code Flow In A Picture

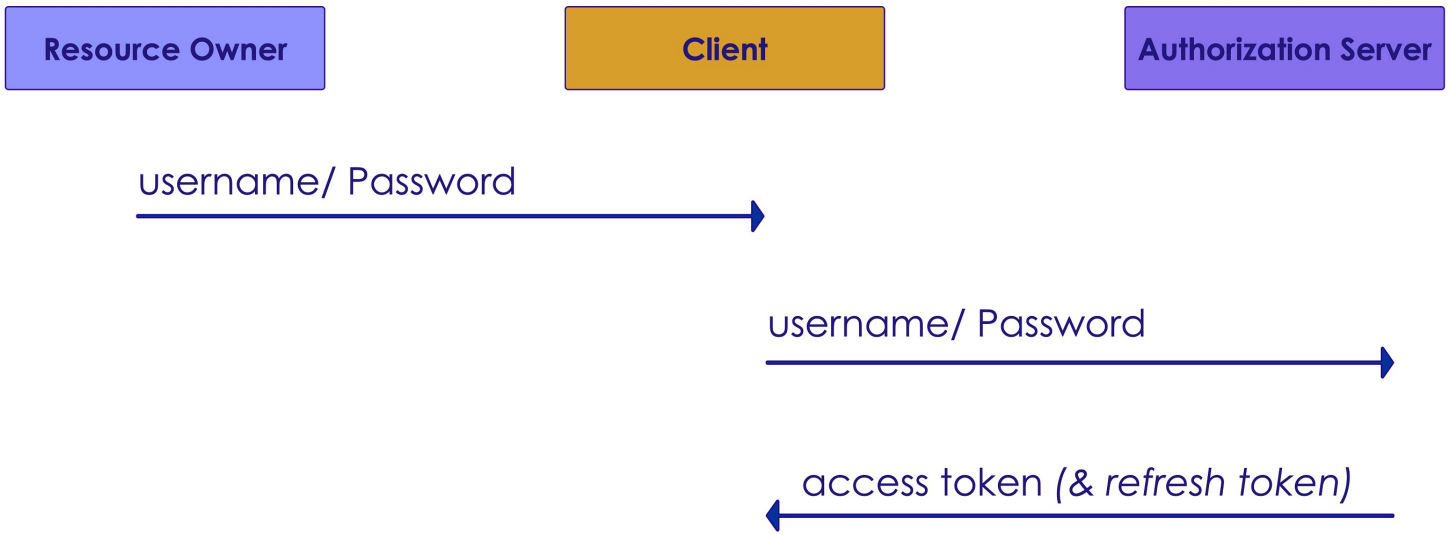


Resource Owner Password Credentials Flow

- Client has to be able to obtain the resource owner's credentials (for example via in-app login screen)
- Just for trusted applications
- Is used to obtain access and refresh tokens
- Inludes a client authentication step
- High risk in compared to other flows so it is the last choice

Flow In A Picture

Resource Owner Password Credentials Flow



Device Code Flow

- Between devices that have Internet connection but not browser
- Flow between smart TVs, media consols, etc.

Device Code Flow In A Picture

1

2

Angular And Cross-Origin Resource Sharing

- Browsers prevent the web page from making AJAX requests to another domain
- `Cross-Origin Resource Sharing (CORS)` is `W3C` standard
- Allows server to relax the same origin policy

Example:

- Origin: http://elephantscale.com
- Different domain: http://elephantscale.org
- Different port: http://elephantscale.com:2546
- Different scheme: https://elephantscale.com
- Different subdomain: http://www.elephantscale.com

OpenID Connect

Basics

Authorizing Access To API

OpenID Connect

OpenID Connect On Clients

Impersonating The User

Credentials

Problem?

- OAuth 2 has to do with authorization
- How can we can handle authentication?
- How can we get information regarding identity
- Solution: OpenID Connect

OpenID Connect

- A simple identity layer on the OAuth 2 protocol
- Core functionality:
  - Authentication
  - Claims about the user

How It Works?

- New type of token : ID token
- Example: A typical ID token:

```
{
  "sub": "b05d3546-6ca8-4d32-b95c-77e94d705ddf",
  "amr":"password",
  "auth_time":"1437400047",
  "idp":"idsrv",
  "given_name": "Jack",
  "family_name": "Brown",
  "iss":"https://elephantscale/identity",
  "aud":"https://elephantscale",
  "exp":1443101047,
  "nbf":1443101047

}
```

OpenID Connect token

- `id_token` contains claims about the authentication of an end user (and other requested claims)
- `id_token` can be used for signing in to an application
- Access tokens are for accessing resources
- `UserInfo` endpoint:
- Can be used by the client to get more user information of the authenticated user
- These claims are requested with the `access_token`

OpenID Connect Flow

- Extends authorization code of OAuth 2 and implicit flow

OpenID Connect Flows

OpenID Connect extends OAuth 2.0's Authoritahzation Code and Implicit flows

Authorization Code

Implicit

… and introduces a new one

Hybrid

Scopes And Claims

- OpenID Connect adds `identity` scopes to `OAuth 2.0` resource scopes
- Example:
  - profile scope:
    - name
    - family-name
    - middle-name
    - ...

Scopes And Claims, cont'd

- Email and phone
  - email scope:
    - email
    - verified-email
  - phone scope:
    - phone-num
    - verified-num

OpenID Connect On Clients

Basics

Authorizing Access To API

OpenID Connect

OpenID Connect On Clients

Impersonating The User

Credentials

Choosing The Right Flow

- Depends on the `response_type` is requested
- Authorization code: Confidential clients
- Implicit: Public clients
- Hybrid: Confidential or public clients if you send auth code to the server not user agent

Helper Components

- Helper components for `JavaScript`:
  - `oidc` client
  - `oidc` token manager

```
https://github.com/IdentityModel/oidc-client
https://github.com/IdentityModel/oidc-token-manager
```

Impersonating The User

Basics

Authorizing Access To API

OpenID Connect

OpenID Connect On Clients

Impersonating The User

Credentials

A Bit API Level

Impersonating the User

" I can access the update method because I'm in the correct role"

" I can get my private trips, because the API know who I am"

" I can delete the pictures I added, because the API knows who I am"

CLIENT

API

Role-Based Authentication

- We are not authorizing access to actions depending on the user (Because of functional requirements)
- We can add additional claims in the acces token and use them for authorization
- A role claim is an example, and allows role-based authorization

Credentials

Basics

Authorizing Access To API

OpenID Connect

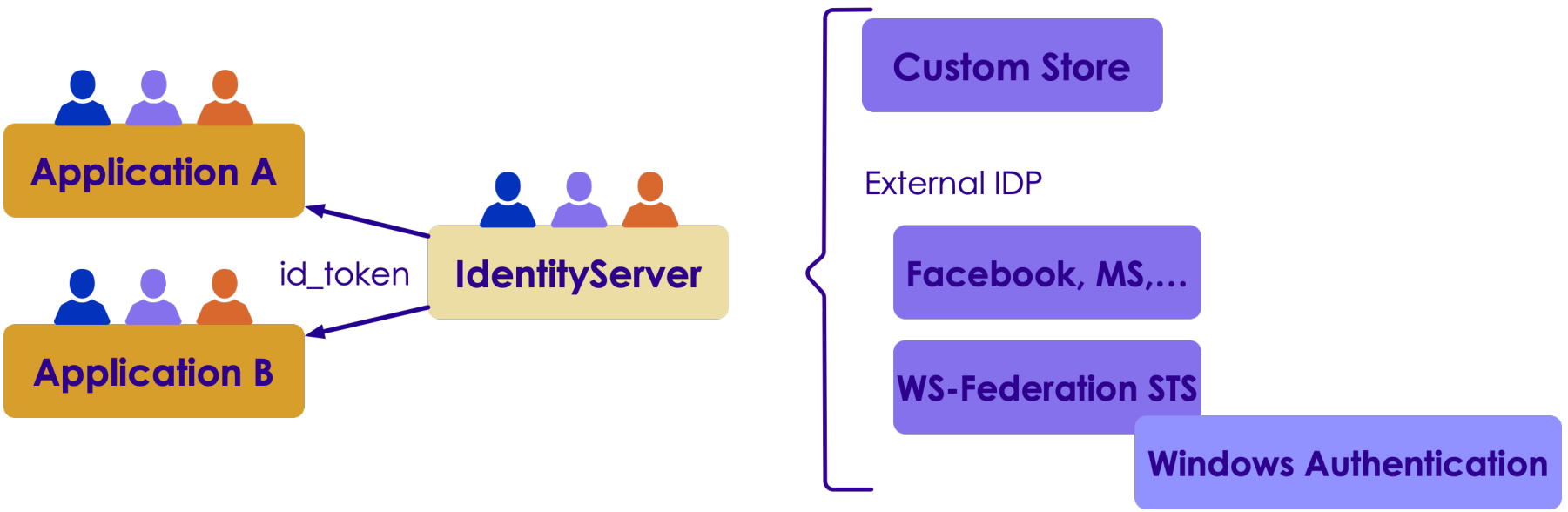
OpenID Connect On Clients

Impersonating The User

Credentials

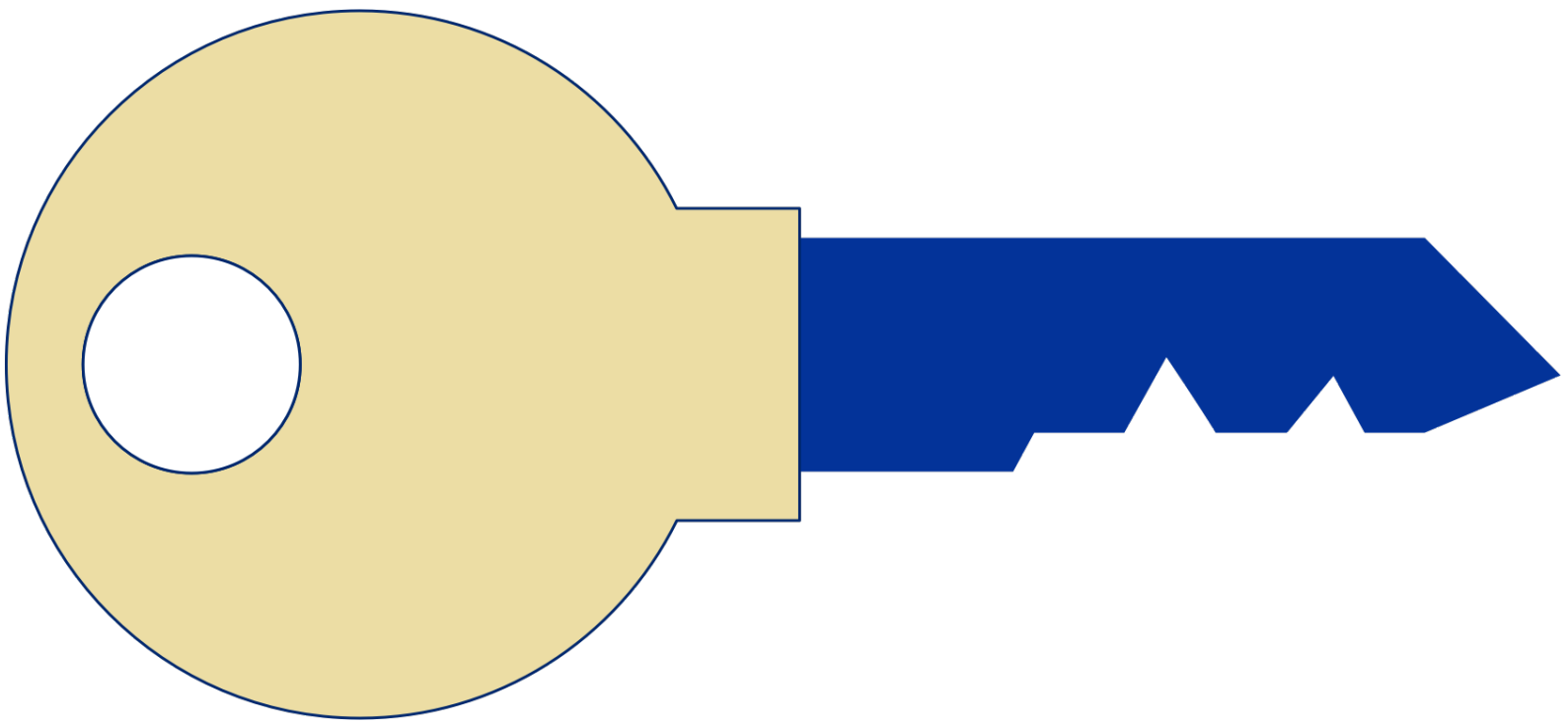
Diagram

Dealing with Credentials



Two-Factor Authentication

- 2FA provides identification of users by means of the combination of two different components
- Something you know, something you posses, something that's inseparable from you
- Not all applications might require 2FA
- Use `acr_values` parameter (to authorization endpoint)



Additional Resources

- Entity Framework Persistence Layer

```
1 https://github.com/IdentityServer/IdentityServer3.EntityFr
```

- Identity Manager

```
1 https://github.com/IdentityManager/IdentityManager
```