Course by Consortium GARR and Reti Business & IT Consulting

OIDC Overview

OIDC primer - a course on OpenID Connect

Credits: Roland Hedberg, Ioannis Kakavas

Introduction to OpenID Connect

OIDC is an open standard published by the **OpenID Foundation** in 02/2014.

As an open standard it can be implemented without license or intellectual property concerns.

(*) Sustaining Corporate Members.

Introduction to OpenID Connect

OIDC defines an interoperable way to perform **user authentication**.

1. Clients can **verify the identity** of the end-user based on the authentication performed by an Authorization Server;

2. It allows clients to **obtain basic profile information** about the end-user in an interoperable and REST-like manner.

The actors involved

1. The **User** is someone trying to access a protected resource.

2. The **Relying Party** (or Client) is the entity that requests, receives and uses tokens. The RP can be any of a web application, a native application or mobile application.

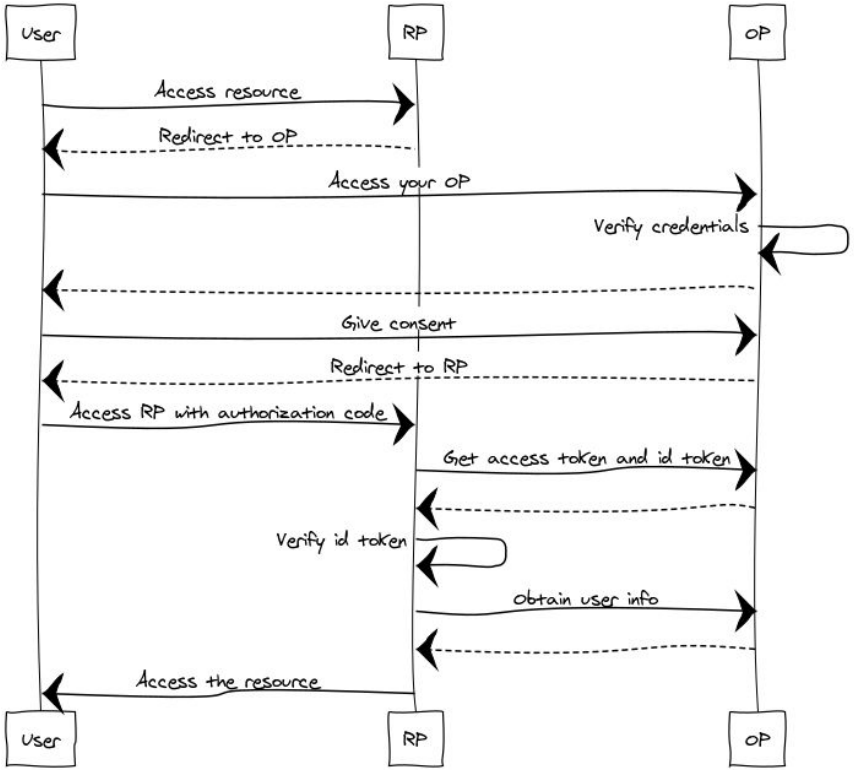
3. The **OpenID Provider** is the entity that releases tokens. The OP is usually a web based server that is able to receive and process requests for tokens from RPs.

Authentication flows

OpenID supports three flows to authenticate a user and retrieve ID token:

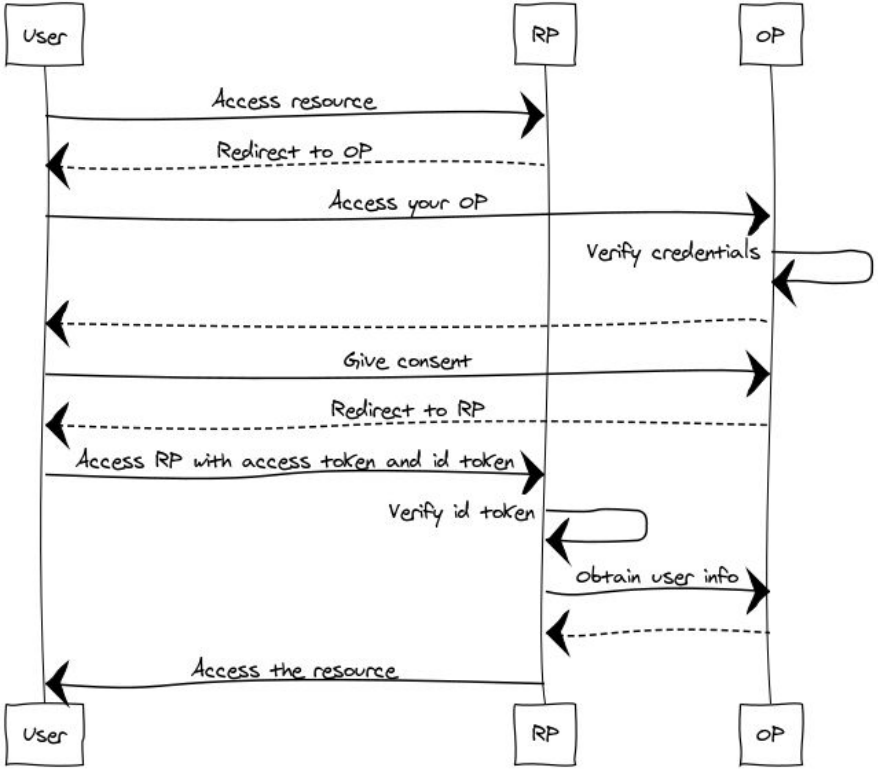
1. **Authorisation code flow** — the most commonly used flow, intended for traditional web apps as well as native/mobile apps. This flow offers optimal security, as tokens are not revealed to the browser and the client app can also be authenticated.
2. **Implicit flow** — for browser (JavaScript) based apps that don't have a backend. The ID token is received directly with the redirection response from the OP. No back-channel request is required here.
3. **Hybrid flow** — rarely used, allows the app front-end and back-end to receive tokens separately from one another. Essentially a combination of the code and implicit flows *(not shown in the following)*.

Authorization code flow



1. User access resource on RP.
2. The RP redirect the user to the OP for authentication.
3. Client sends an Authentication Request containing the desired request parameters to the OP.
4. OP Server Authenticates the End-User by checking credentials.
5. Authorization Server obtains End-User Consent/Authorization.
6. Authorization Server sends the End-User back to the Client with an Authorization Code.
7. Client requests a response using the Authorization Code at the Token Endpoint.
8. Client receives a response that contains an ID Token and Access Token in the response body.
9. Client validates the ID token and retrieves the End-User's Subject Identifier.

Implicit flow



1. Client prepares an Authentication Request containing the desired request parameters.
2. Client sends the request to the Authorization Server.
3. Authorization Server Authenticates the End-User.
4. Authorization Server obtains End-User Consent/Authorization.
5. Authorization Server sends the End-User back to the Client with an ID Token and, if requested, an Access Token.
6. Client validates the ID token and retrieves the End-User's Subject Identifier.

OpenID endpoints

The endpoints defined in the standard are:

- **Authorize endpoint**: this endpoint performs authentication and authorisation.
- **Token endpoint**: this endpoint allows the requester to get his tokens. If the authorize endpoint is human interaction, this endpoint is machine to machine interaction.
- **UserInfo endpoint**: this endpoint allows you to make a request using your access token to receive claims about the authenticated end-user

Optional endpoints are:

- **Discovery**: this endpoint provide metadata about the OpenID Connect provider, allowing applications to automatically configure for that provider.
- **Client Registration**: this endpoint allow a relaying party to register with the OpenID provider.

ID token

The OpenID Connect ID token is a **signed token** given to the client application.
The ID token is directed to the RP and is intended to be parsed by it.

The ID token **contains a set of claims** about the authentication session, including:

- an identifier for the user (sub),
- the identifier for the identity provider that issued the token (iss), and
- the identifier of the client for which this token was created (aud).

ID token

The OpenID Connect ID token is a **signed token** given to the client application.

The ID token is directed to the RP and is intended to be parsed by it.

The ID token **contains a set of claims** about the authentication session, including:

- an identifier for the user (sub),
- the identifier for the identity provider that issued the token (iss),
- the identifier of the client for which this token was created (aud),
- the expiration time (exp),
- the time of issuing (iat),
- the authentication time (auth_time), and
- a value used to associate a Client session, to mitigate replay attacks (nonce).

Claims and Scopes

OpenID Connect specifies a set of **standard claims**, or user attributes.

They are intended to supply the client app with consented user details such as email, name and picture, upon request.

Clients can request claims in two ways:

1. An **entire claims category** by its scope value (see the above table for the scope value to claim mappings)
2. **Individually**, with the optional claims request parameter.

Claims and Scopes

Scope value	Associated claims
email	email, email_verified
phone	phone_number, phone_number_verified
profile	name, family_name, given_name, middle_name, nickname, preferred_username, profile, picture, website, gender, birthdate, zoneinfo, locale, updated_at
address	address

Summary

In order to use the OpenID connect authentication:

- register a Client (this can happen dynamically or statically) and obtain a client_id & client_secret
- issue an authentication request to the OP endpoint by redirecting the user browser
- the OP will authenticate user (via username/password or any other mechanism)
- the OP will then redirect the user browser to the Client redirection endpoint and extract the access token
- [request an ID token to the Token Endpoint of the OP using the access token]
- parse the response and extract the id token
- (optionally) use the access token to retrieve user information

Q&A

Thanks for your attention!