A practical Introduction to OpenID Connect & OAuth 2.0

Slides: https://tinyurl.com/y92rw2wf

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identity SERVER PolicyServer

Me

- **Independent Consultant**
  - Specializing on Application Security Architectures
  - Working with Software Development Teams (ISVs and in-house)

- **Creator and Maintainer of IdentityServer OSS Project**
  - Certified OpenID Connect & OAuth 2.0 Implementation for .NET
  - https://identityserver.io

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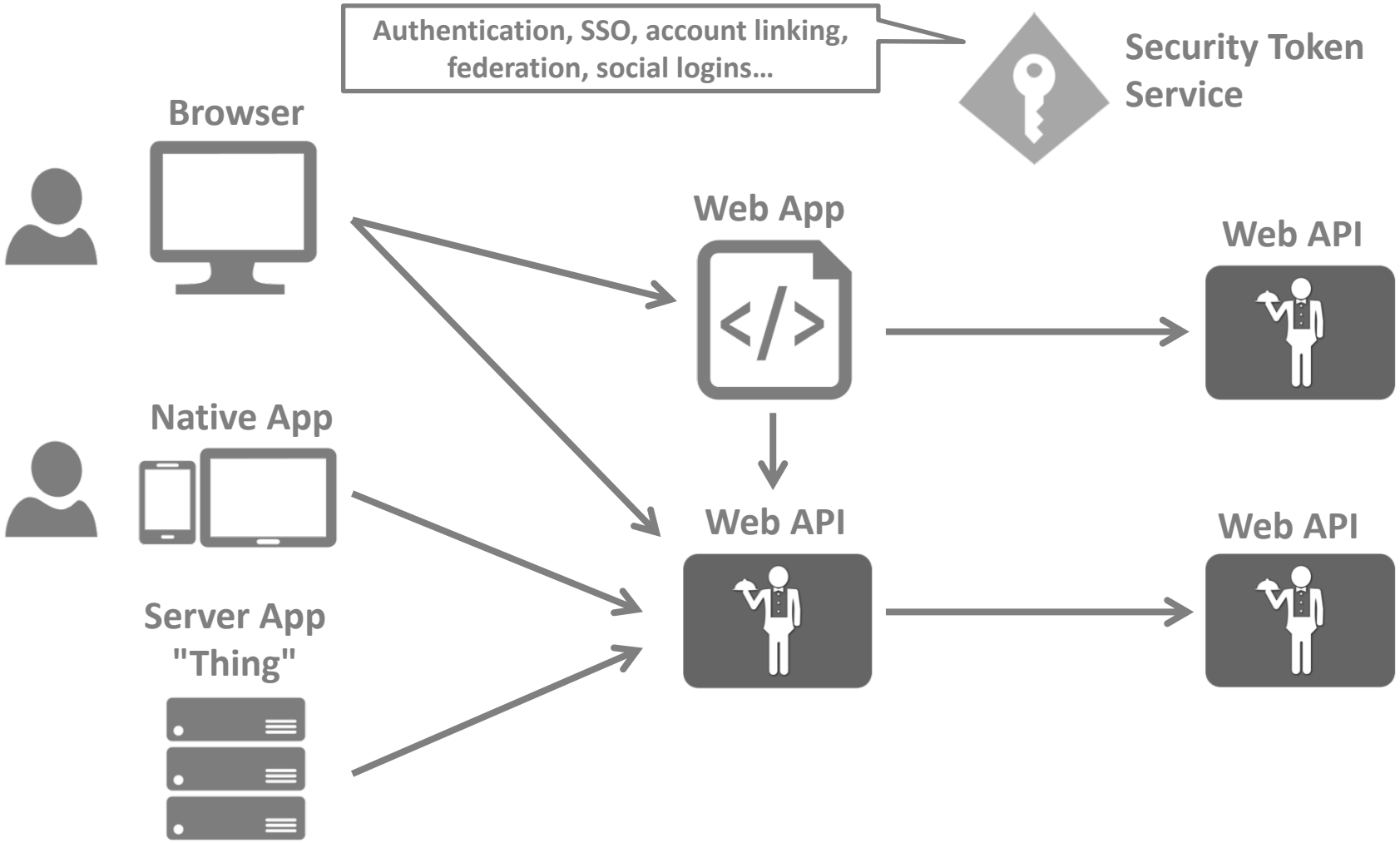
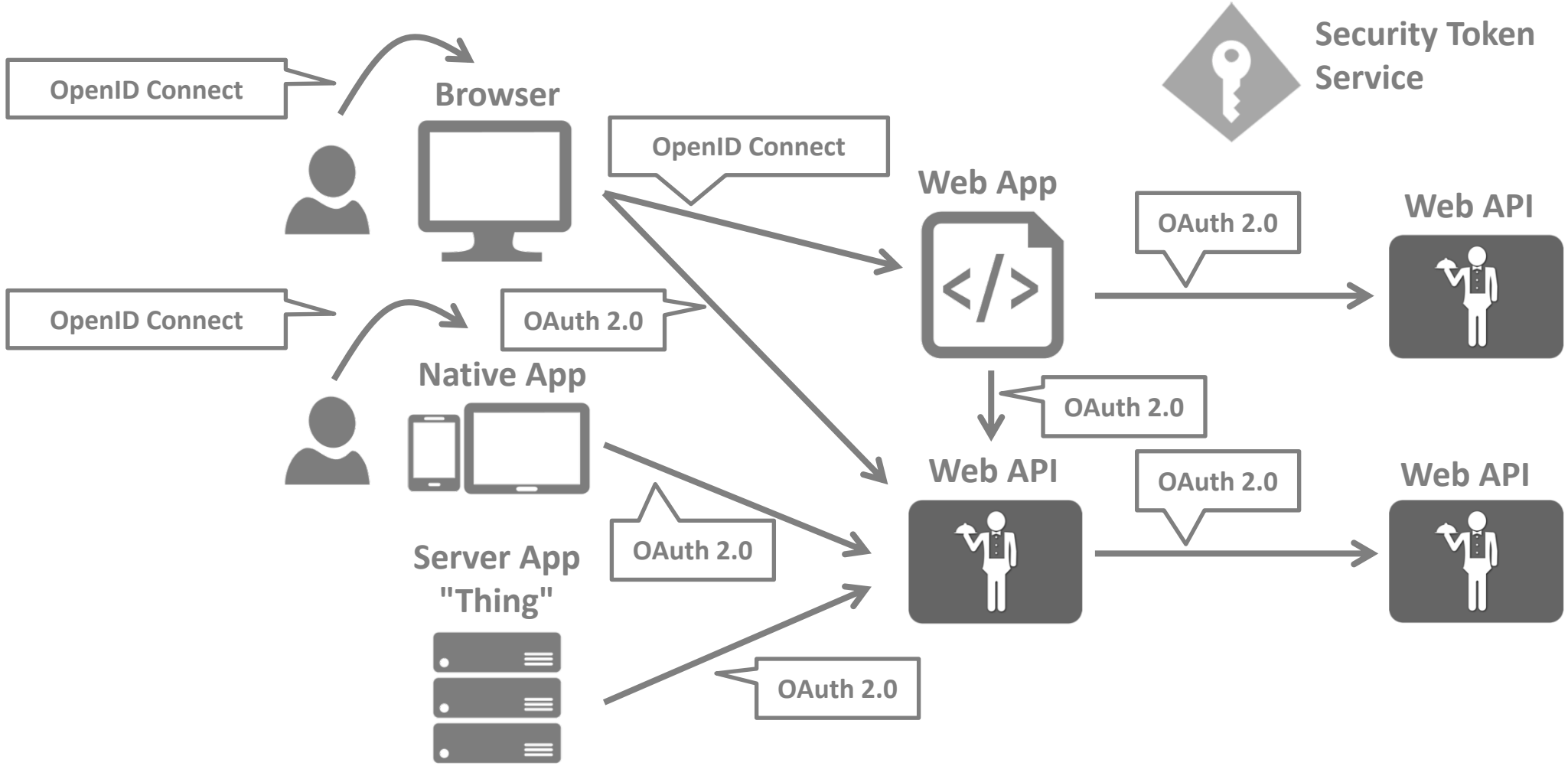
slides **https://speakerdeck.com/leastprivilege**

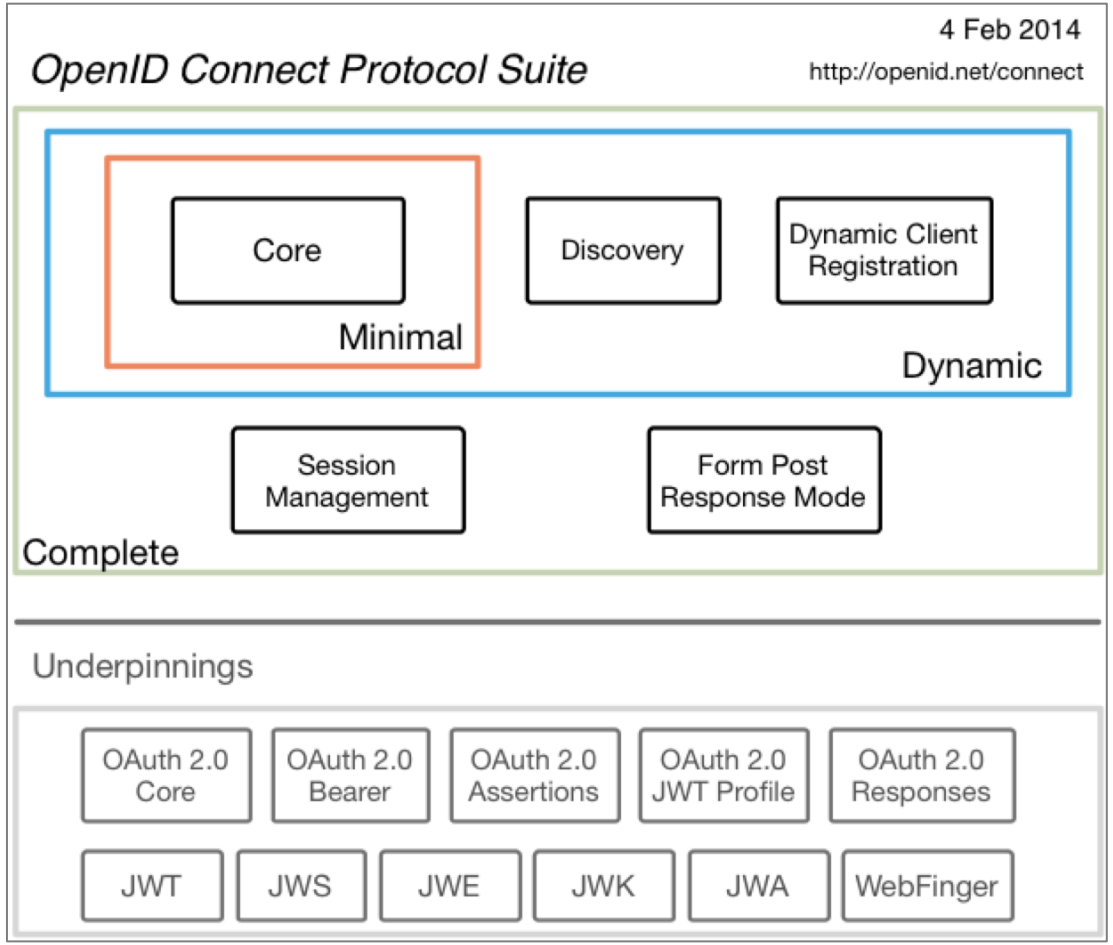
"Modern Applications"



Security Protocols



http://openid.net/connect/



OpenID Connect Certification

for providers and
client libraries

OpenID Certification | OpenID

https://openid.net/certification/

OpenID Foundation · Current Working Groups · Specs & Dev Info · OpenID® Certification · OpenID Connect FAQ and Q&As

Certified OpenID Providers

These implementations have been granted certifications for these OpenID Provider conformance profiles:

Organization	Implementation	Basic OP	Implicit OP	Hybrid OP	Config OP	Dynamic OP
Auth0	Auth0	24-May-2016	15-Feb-2017	15-Feb-2017	24-May-2016	
Authlete	Authlete 1.1	12-Jul-2017	12-Jul-2017	12-Jul-2017	12-Jul-2017	
Dominick Baier & Brock Allen	IdentityServer3 v1.6	8-May-2015	8-May-2015	8-May-2015	8-May-2015	
Dominick Baier & Brock Allen	IdentityServer4	12-Dec-2016	12-Dec-2016	12-Dec-2016	12-Dec-2016	
CA	CA API Gateway/CA Mobile API Gateway	22-Jun-2017			22-Jun-2017	
CA	CA Single Sign-On 12.7	1-Mar-2017				
Clareity Security	Identity Provider v6.3.4	4-May-2016	23-Jun-2016	23-Jun-2016	23-Jun-2016	
ClassLink	ClassLink OneClick 2015	3-Nov-2015			3-Nov-2015	
Cloudentity	Cloudentity OIDC services 1.3	18-Aug-2017			18-Aug-2017	18-Aug-2017
Connect2id	Connect2id Server 6.1.2a	3-Jan-2017	3-Jan-2017	3-Jan-2017	3-Jan-2017	3-Jan-2017
CZ.NIC	mojeID	7-Jul-2016		31-Jul-2016	7-Jul-2016	7-Jul-2016
Deutsche Telekom	Telekom Login	29-Sep-2015			22-Sep-2015	
ForgeRock	OpenAM 13	13-Apr-2015	13-Apr-2015	13-Apr-2015	13-Apr-2015	
Google	Google Federated Identity	20-Apr-2015	21-Apr-2015	23-Apr-2015	15-Apr-2015	
Thierry Habart	SimpleIdentityServer V1.0.0	9-Dec-2015			11-Dec-2015	
Thierry Habart	SimpleIdentityServer V2.0.0	19-Jan-2016	19-Jan-2016	19-Jan-2016	19-Jan-2016	19-Jan-2016

IdentityServer

Dominick (Main)

GitHub, Inc. [US] https://github.com/IdentityServer

This organization | Search | Pull requests | Issues | Gist

IdentityServer

https://identityserver.io identity@leastprivilege.com

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Pinned repositories

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IdentityServer4
OpenID Connect and OAuth 2.0 Framework for ASP.NET Core
C# 995 303

IdentityServer4.AccessTokenValidation
IdentityServer Access Token Validation for ASP.NET Core
C# 50 38

IdentityServer4.Samples
Samples for IdentityServer4
JavaScript 213 200

IdentityServer3
OpenID Connect Provider and OAuth 2.0 Authorization Server Framework for ASP.NET 4.x/Katana
C# 1.8k 738

IdentityServer3.AccessTokenValidation
OWIN Middleware to validate access tokens from IdentityServer3
C# 57 70

IdentityServer3.Samples
Samples for IdentityServer v3
JavaScript 432 946

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IdentityServer4
OpenID Connect and OAuth 2.0 Framework for ASP.NET Core
security identity oauth2 dotnet aspnet-core openid-connect identityserver4
C# 995 303 Updated 14 hours ago

IdentityServer4.Quickstart.UI
Starter UI for in-memory IdentityServer4

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aspnet-core dotnet identityserver4 oauth2 openid-connect

.NET foundation

OpenID CERTIFIED

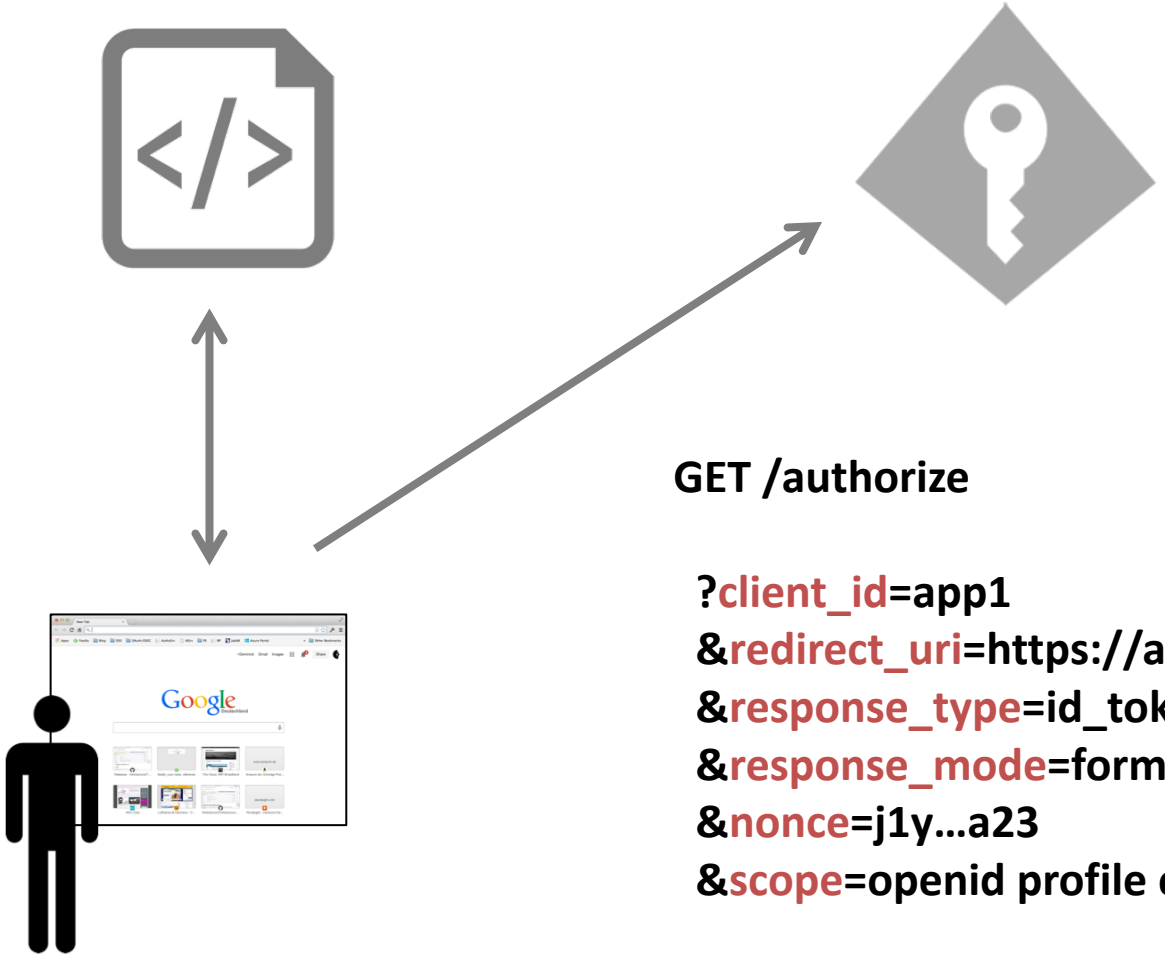
Endpoints

Discovery Endpoint

Authorize Endpoint

Token Endpoint

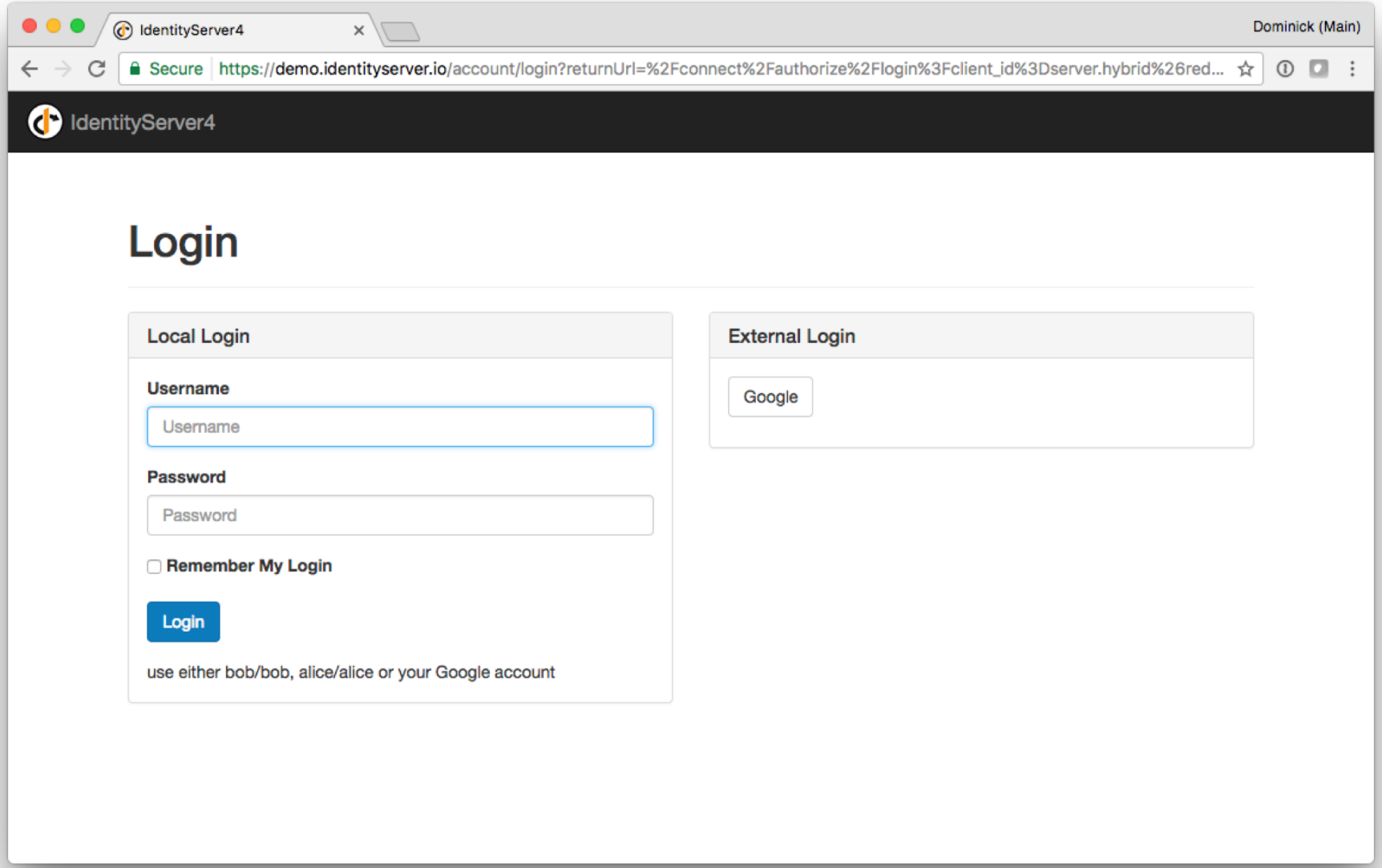
Authentication for Web Applications



GET /authorize

?client_id=app1
&redirect_uri=https://app.com/cb
&response_type=id_token
&response_mode=form_post
&nonce=j1y…a23
&scope=openid profile email

Authentication



Consent

IdentityServer4 Dominick (Main)

Secure https://demo.identityserver.io/consent?returnUrl=%2Fconnect%2Fauthorize%2Fconsent%3Fclient_id%3Dserver.hybrid%26redire...

IdentityServer4 Dominick Baier

Server-based Client (Hybrid) is requesting your permission

Uncheck the permissions you do not wish to grant.

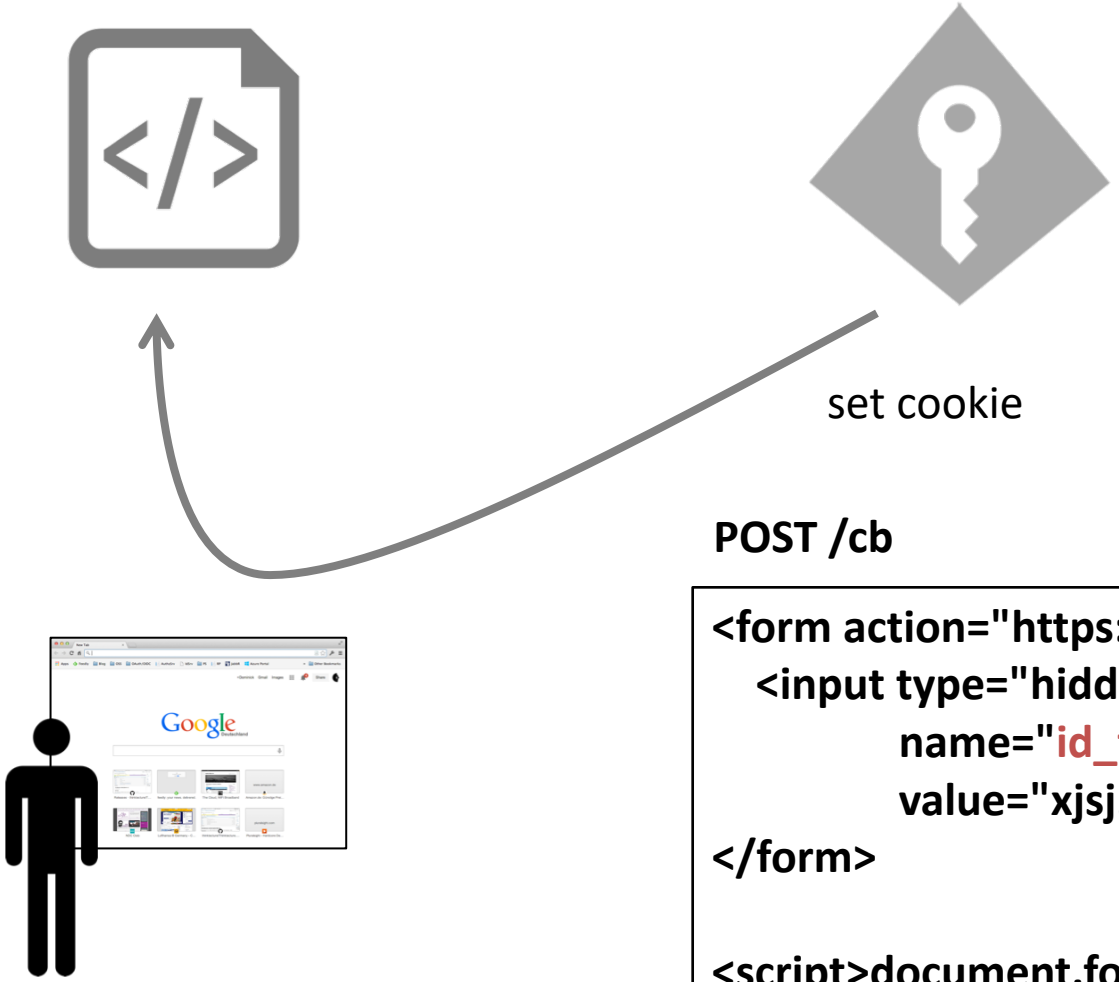
Personal Information

- Your user identifier *(required)*
- User profile
  Your user profile information (first name, last name, etc.)
- Your email address

Remember My Decision

Yes, Allow | No, Do Not Allow

Response



POST /cb

```
<form action="https://app.com/cb">
   <input type="hidden"
            name="id_token"
            value="xjsj…aas" />
</form>

<script>document.forms[0].submit()</script>
```

Identity Token

Header

```
{
  "typ": "JWT",
  "alg": "RS256",
  "kid": "mj399j…"
}
```

Payload

```
{
  "iss": "https://issuer",
  "exp": 1340819380,
  "iat": 1340818761,
  "aud": "app1",
  "nonce": "j1y…a23",
  "amr": [ "pwd" ],
  "auth_time": 12340819300

  "sub": "182jmm199",
  "name": "Alice",
}
```

eyJhbGciOiJub25lIn0.eyJpc3MiOiJqb2UiLA0KICJleHAiOjEzMD.4MTkzODAsDQogImh0dHA6Ly9leGFt

Header **Payload** **Signature**

Identity Token Validation

- **According to 3.1.3.7 of the OpenID Connect specification**
  - The issuer name in the discovery document MUST exactly match the value of the **iss** claim.
  - The client MUST validate that the **aud** (audience) claim contains its **client_id** value registered at the issuer.
  - The **alg** value SHOULD be the default of RS256 or some other expected value.
  - The current time MUST be before the time represented by the **exp** Claim.
  - The **iat** claim can be used to reject tokens that were issued too far away from the current time.
  - The **nonce** value must match the nonce that was sent in the authentication request. A nonce claim MUST be present.
  - (some more checks for specific scenarios)

Session Management

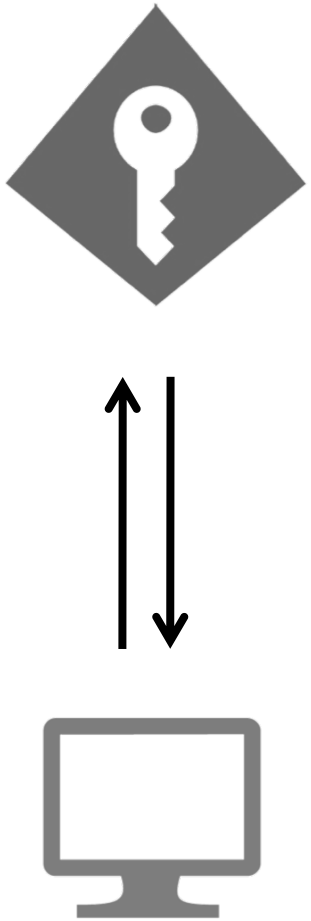
- ***/authorize* starts a logon session**
  - distribution of stable session ID to all clients
- ***/end_session* ends it**
  - end the session with provider
  - notifies clients that session has ended

Single Sign-Out

- **Complete sign-out process consists of**
  1. clean up session at local RP
  2. clean up session at the STS
  3. clean up resources at all other RPs in the same session
  4. (clean up session at potential upstream STS)

- **Cleanup is complicated - thus three specs**
  - JS-based notifications
  - front-channel notification
  - back-channel notifications

Front-Channel Notifications

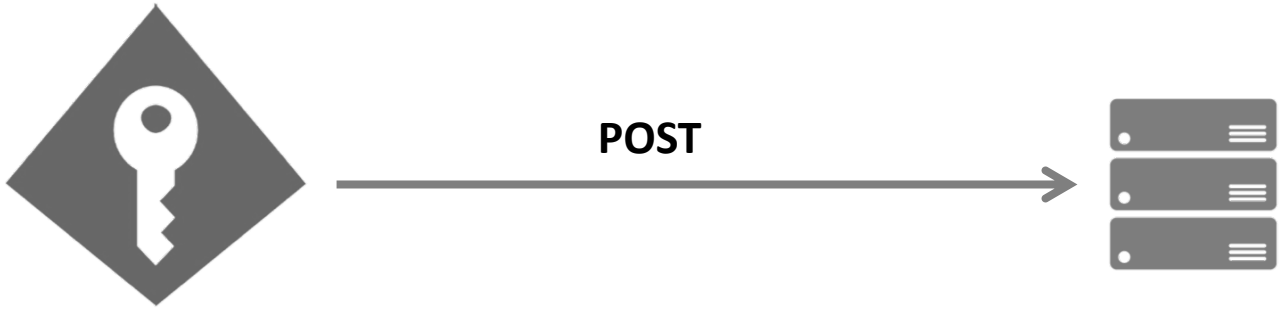


GET /end_session

```
<iframe style="visibility:hidden"
     src="https://client1/signout?sid=123">
</iframe>
<iframe class="visibility:hidden"
     src="https://client2/signout?sid=123">
</iframe>
<iframe class="visibility:hidden"
     src="https://client3/signout?sid=123">
</iframe>

<a href="https://client1">return</a>
```

Back-Channel Notifications



GET /end_session

Client


```
{
  "iss": "https://demo.identityserver.io",
  "sub": "248289761001",
  "aud": "client1",
  "iat": 1471566154,
  "jti": "bWJq",
  "sid": "8u09jejd099",
  "events": {
    "http://schemas.openid.net/event/backchannel-logout": {}
  }
}
```