flexmls

created by FBS

Presented by Cal Heldenbrand

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- *cal@FBSData.com*

What does it do?

- Protocol that defines a secure OAuth2 implementation
- Provides an identity layer on top of OAuth2
  - In the form of an ID Token
- Adds Claims (profile info) to an identity
  - Via a UserInfo API endpoint
- SSO / SLO
- Creates and uses OAuth2 code/access/refresh tokens
- “Mobile friendly”

Who uses it?

- Google
- Amazon
- Microsoft
- IBM
- PayPal
- eBay
- Salesforce
- Ping Identity

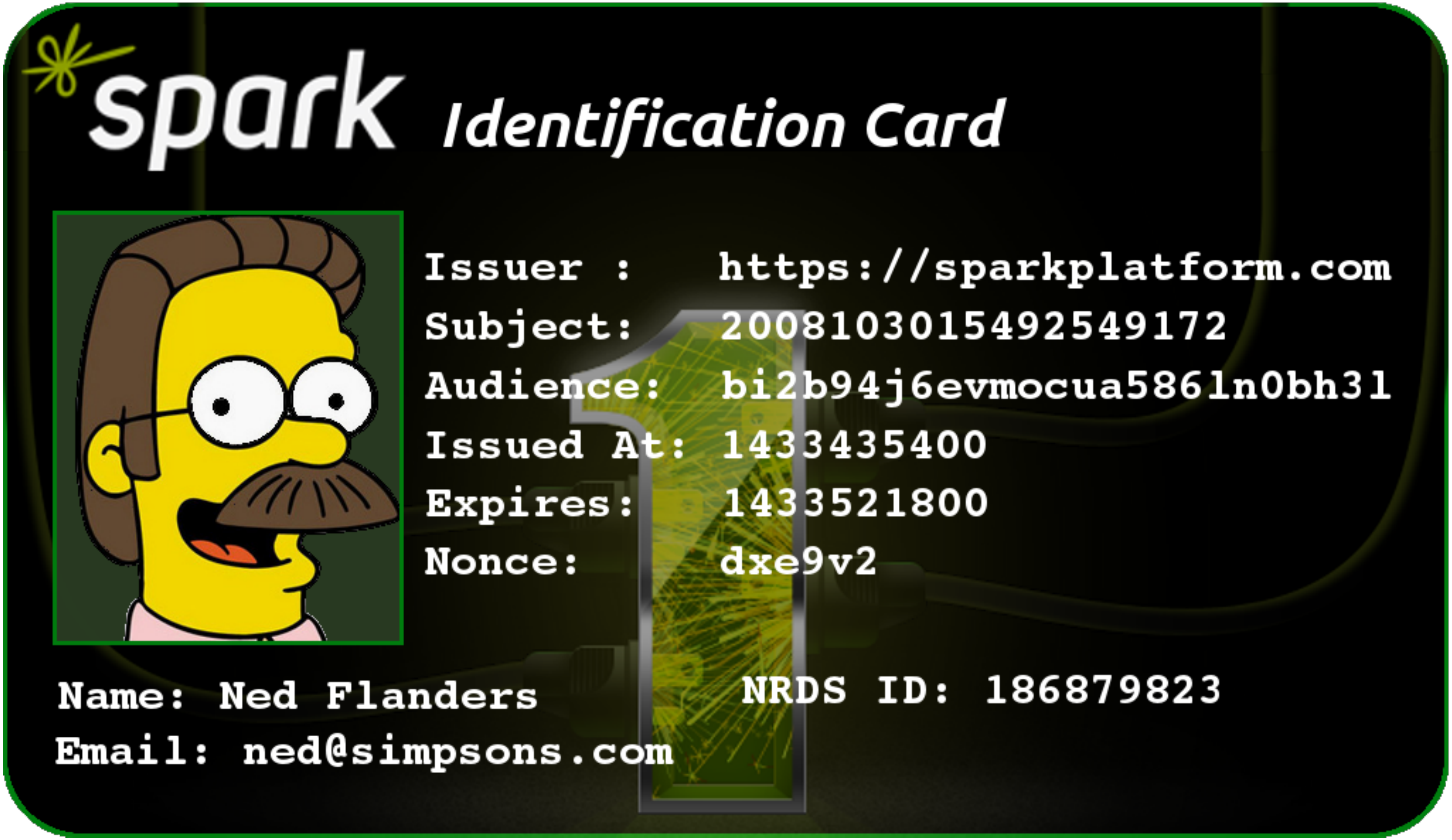
(Future)

- Yahoo
- AOL
- Facebook

OIDC Philosophy

- Keep Simple Things Simple
  - Everything is in JSON
  - Build only the features you ***need***
  - Features are detected using a discovery service
  - Adding a new Provider is only a few lines of code
- Let Complex Things Be Possible
  - Encrypted ID Tokens
  - ID Token issued to multiple apps

An ID Token is like...



spark *Identification Card*

Issuer :	https://sparkplatform.com
Subject:	2008103015492549172
Audience:	bi2b94j6evmocua5861n0bh31
Issued At:	1433435400
Expires:	1433521800
Nonce:	dxe9v2

Name: Ned Flanders

Email: ned@simpsons.com

NRDS ID: 186879823

And an Access Token should be...

- Access delegation ONLY (consent)
- Not tied to an identity

- Not for federation
- Not for authorization

  … wait, what!?

Source: API Security: Deep Dive into Oauth and OpenID Connect

An ID Token

```
eyJ0eXAiOiJKV1QiLCJhbGciOiJSUzI1NiJ9.eyJpc3MiOiJodHRwc
zovL3NwYXJrcGxhdGZvcm0uY29tIiwic3ViIjoiMjAwODEwMzAxNTQ
5MjU0OTE3MiIsImF1ZCI6ImJpMmI5NGo2ZXZtb2N1YTU4NmxuMGJoM
2wiLCJleHAiOjE0MzM1MjE4MDAsImlhdCI6MTQzMzQzNTQwMCwibm9
uY2UiOiJkeGU5djIiLCJuYW1lIjoiTmVkIEZsYW5kZXJzIiwiZW1ha
WwiOiJuZWRAc2ltcHNvbnMuY29tIiwiTWVtYmVyTnJkc0lkIjoiMTg
2ODc5ODIzIn0.Zpe4jBmqMy7zyiSPdeRFLr8loX2bDzqQmKEEb2zC2
u0du4UCjzKDF54mE5FDsiyCytUptt_xAPMXWkUjCqmptxif7202EAM
6qiCszMfcRH-DjeKq8MBKbsWncm68xasQfsHfyh5vuJArvXGU6AP4k
as0xX9Rk2xF_JQXkc-QVrybPpwM83Cx9XVkQ2rLQoZyh7L3r3uC5Rj
cyc-DH5dfsgquALnGHO_mjyh1P9p0_AthLW__3usfmYGMIojcfJc2V
xPE840BzIG0YNmCGPbdvs_bu88wMpWzncDZti8BKUdqS7YYtPc1Lc3
PCX0-49o3mCktZd9YxIl61WSlXjbsRw
```

An ID Token Decoded

Header

```
{
  "typ":"JWT",
  "alg":"RS256"
}
```

Claims

```
{
  "iss":"https://sparkplatform.com",
  "sub":"20081030154925491 72",
  "aud":"bi2b94j6evmocua586ln0bh3l",
  "exp":1433521800,
  "iat":1433435400,
  "nonce":"dxe9v2",
  "name":"Ned Flanders",
  "email":"ned@simpsons.com",
  "MemberNrdsId":"186879823",
  “at_hash”:”tq7zVbs_DdGzS9o-i0a_VA“
}
```

Checksum

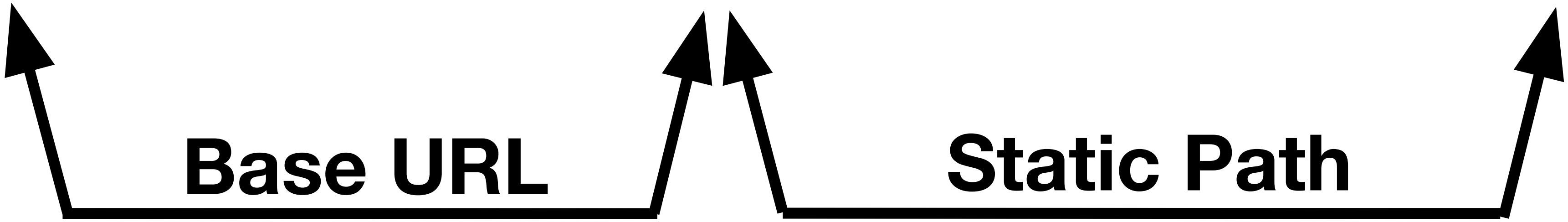
```
{  Zpe4jBmqMy7zyiSPdeRFLr … 49o3mCktZd9YxIl61WSlXjbsRw  }
```

OpenID Authentication Flows

- Authorization Code Flow
  - Just like the current Web API OAuth2
- Implicit Flow
  - ID Token, Access Token given to the client
- Hybrid Flow
  - Combo of Implicit and Authorization Code
  - Designed with native mobile apps in mind
  - Reduces your carbon footprint?

Discovery Service

```
curl https://openidp.fbsdata.com/.well-known/openid-configuration
curl https://accounts.google.com/.well-known/openid-configuration
```



Base URL

Static Path

- Client Developers specify a Base URL
- Client library appends static path
- Providers could use a static JSON file
  - Rarely changes

Discovery Response

```
{
"issuer" : "https://openidp.fbsdata.com",

"response_types_supported": [ "code", "token", "id_token",
  "code token", "code id_token", "id_token token",
  "code id_token token"],

"authorization_endpoint" : "https://openidp.fbsdata.
com/authorize",

"token_endpoint" : "https://openidp.fbsdata.com/token",

"userinfo_endpoint" : "https://openidp.fbsdata.com/userinfo",

"jwks_uri" : "https://openidp.fbsdata.com/jwks.json",

"claims_supported" : [ "sub", "iss", "name", "given_name",
  "family_name", "middle_name", "preferred_username", "website",
  "address", "phone_number", "MemberMlsId",
  "OfficeKey","MemberNrdsId"]
}
```

UserInfo Endpoint

- Protected by Access Token
- Returns JSON of Claims
- Extended info that can't fit in an ID Token

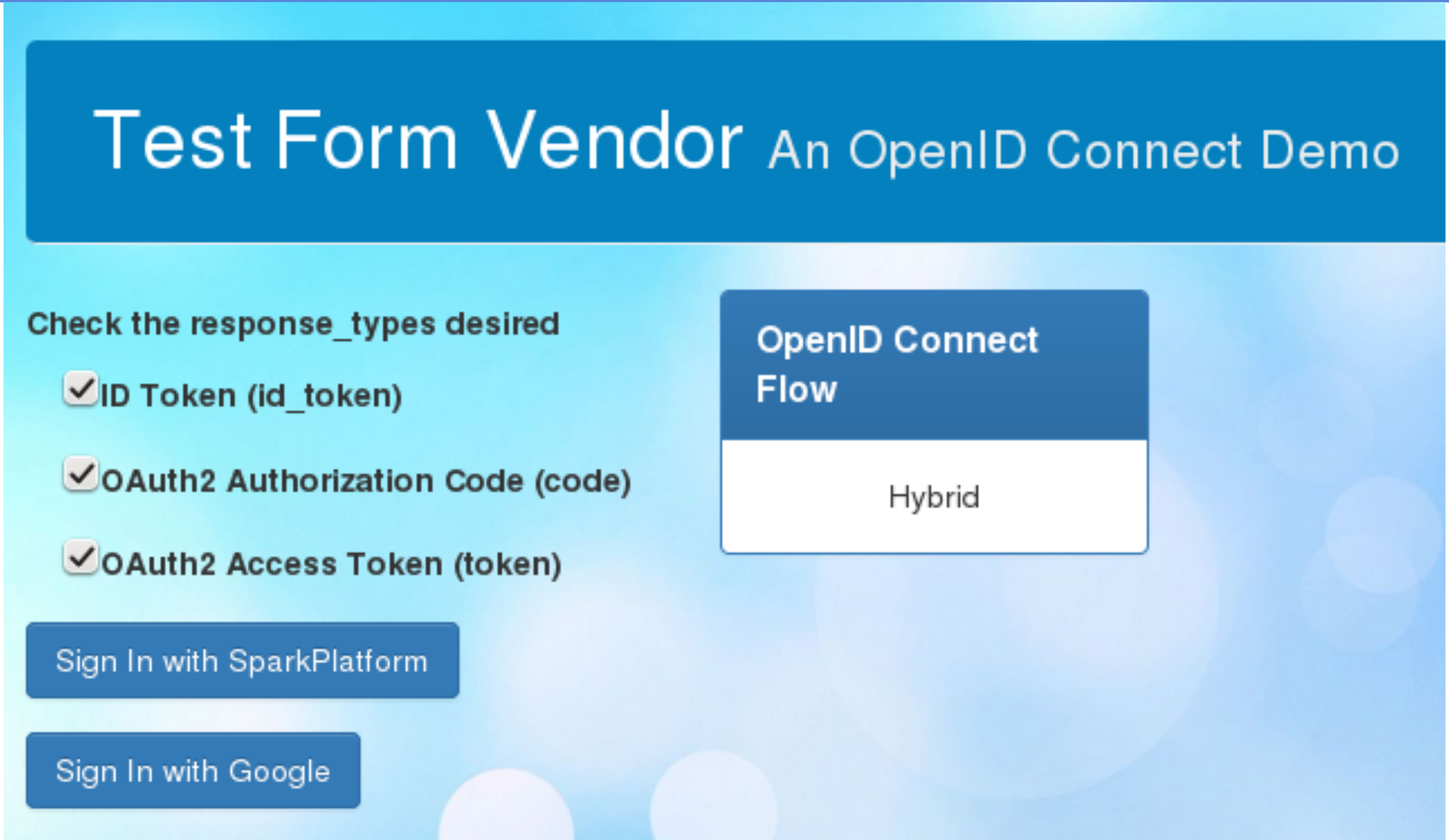
The Core Specification

- That's it for the core specification!
  - ID Tokens (required)
  - Discovery Service (required)
  - UserInfo Endpoint (optional)
- Implement just two pieces for a certified Provider
  - Or Relying Party (client)

Compliance Testing

- 3rd party tools
  - oictest
  - pyoidc
- OpenID Foundation Certification Program
  - General availability in Jan 2016
  - Open Source Web UI
  - http://openid.net/certification

Demo: TestFormVendor.com



Test Form Vendor An OpenID Connect Demo

Check the response_types desired

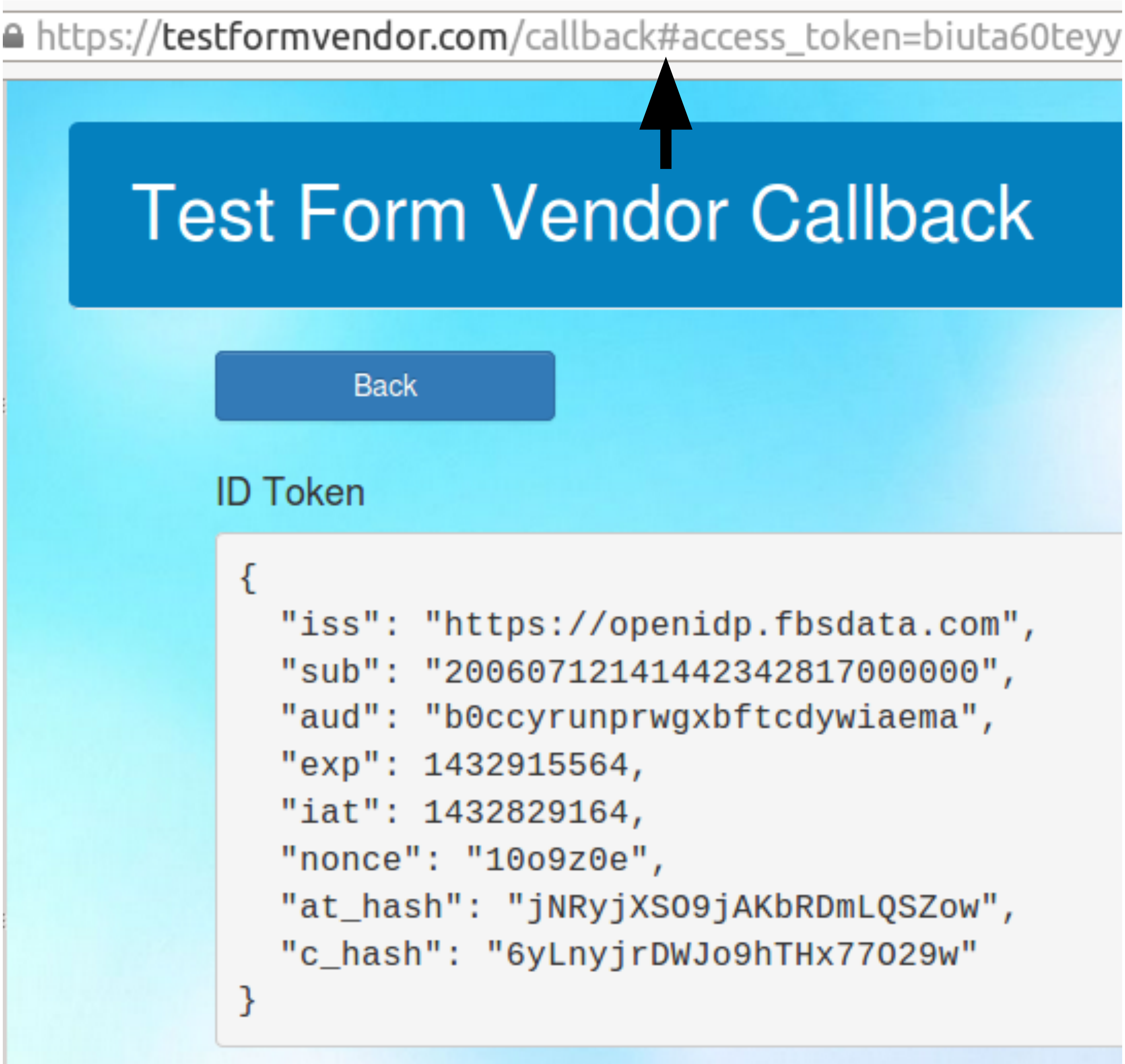
☑ ID Token (id_token)

☑ OAuth2 Authorization Code (code)

☑ OAuth2 Access Token (token)

OpenID Connect Flow

Hybrid

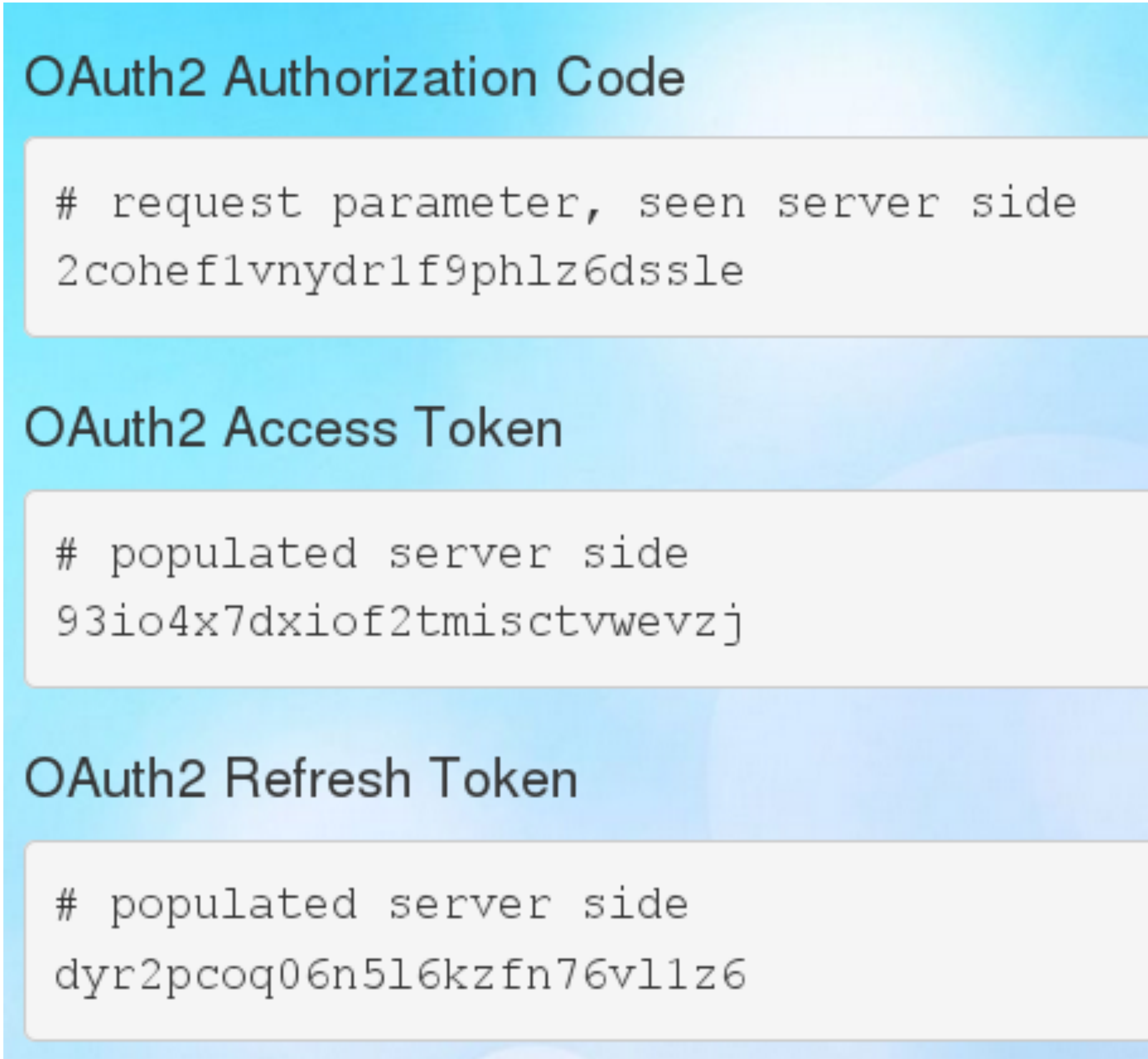


https://testformvendor.com/callback#access_token=biuta60teyy

Test Form Vendor Callback

ID Token

```
{
  "iss": "https://openidp.fbsdata.com",
  "sub": "20060712141442342817000000",
  "aud": "b0ccyrunprwgxbftcdywiaema",
  "exp": 1432915564,
  "iat": 1432829164,
  "nonce": "10o9z0e",
  "at_hash": "jNRyjXSO9jAKbRDmLQSZow",
  "c_hash": "6yLnyjrDWJo9hTHx77O29w"
}
```



OAuth2 Authorization Code

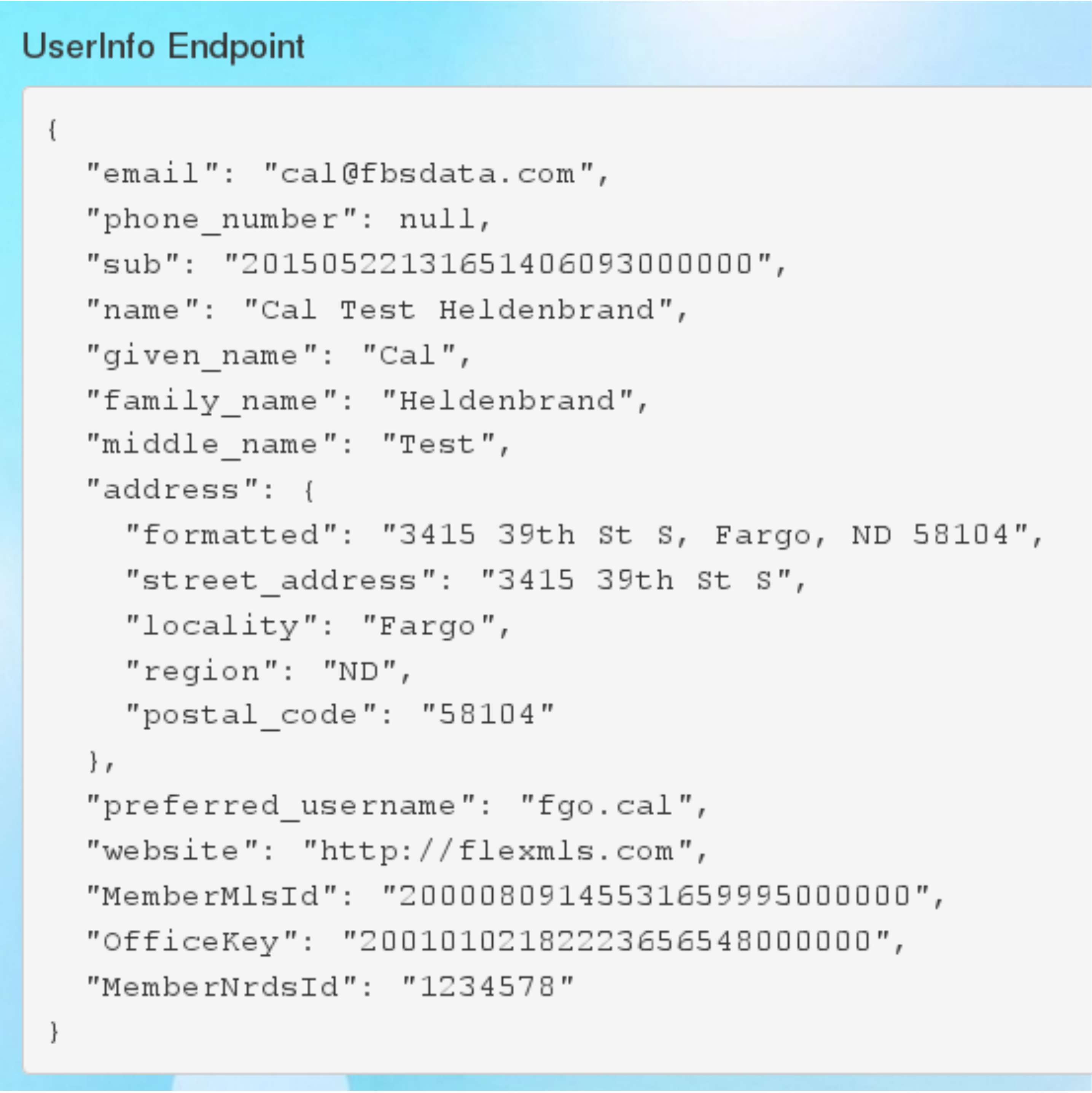
```
# request parameter, seen server side
2cohef1vnydr1f9phlz6dssle
```

OAuth2 Access Token

```
# populated server side
93io4x7dxiof2tmisctvwevzj
```

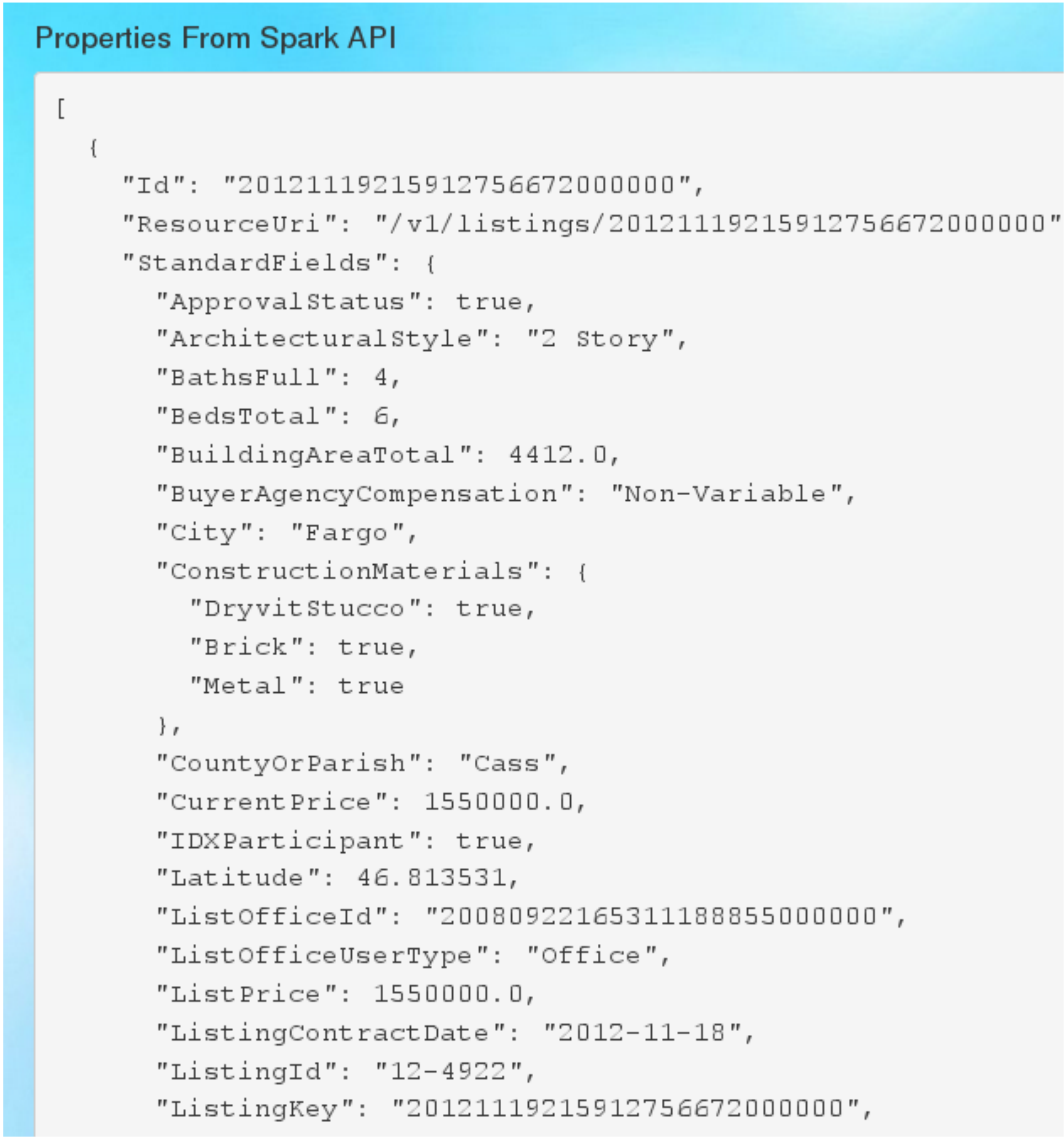
OAuth2 Refresh Token

```
# populated server side
dyr2pcoq06n5l6kzfn76vl1z6
```



UserInfo Endpoint

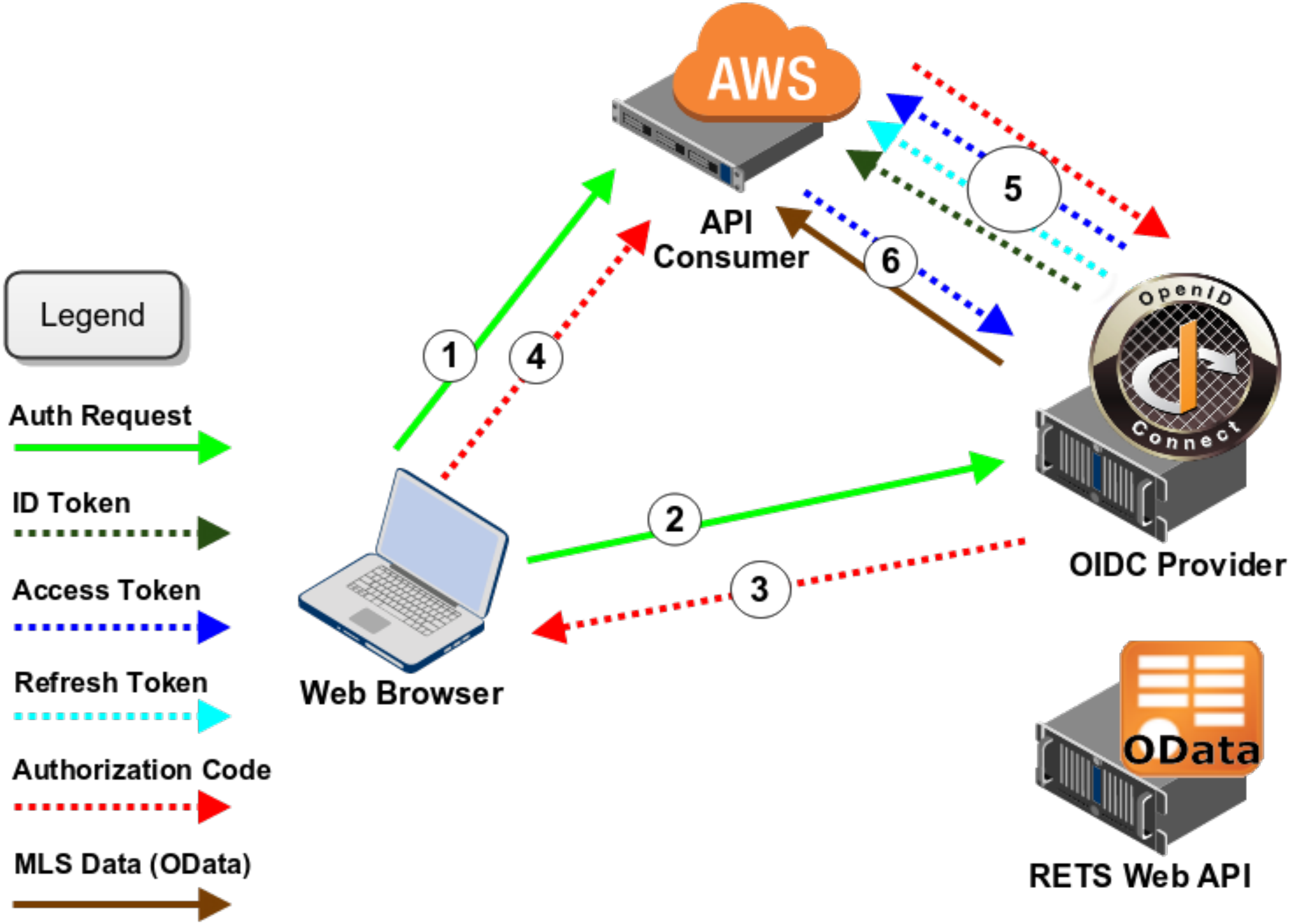
```
{
  "email": "cal@fbsdata.com",
  "phone_number": null,
  "sub": "20150522131651406093000000",
  "name": "Cal Test Heldenbrand",
  "given_name": "Cal",
  "family_name": "Heldenbrand",
  "middle_name": "Test",
  "address": {
    "formatted": "3415 39th St S, Fargo, ND 58104",
    "street_address": "3415 39th St S",
    "locality": "Fargo",
    "region": "ND",
    "postal_code": "58104"
  },
  "preferred_username": "fgo.cal",
  "website": "http://flexmls.com",
  "MemberMlsId": "20000809145531659995000000",
  "OfficeKey": "20010102182223656548000000",
  "MemberNrdsId": "1234578"
}
```



Properties From Spark API

```
[
  {
    "Id": "20121119215912756672000000",
    "ResourceUri": "/v1/listings/20121119215912756672000000"
    "StandardFields": {
      "ApprovalStatus": true,
      "ArchitecturalStyle": "2 Story",
      "BathsFull": 4,
      "BedsTotal": 6,
      "BuildingAreaTotal": 4412.0,
      "BuyerAgencyCompensation": "Non-Variable",
      "City": "Fargo",
      "ConstructionMaterials": {
        "DryvitStucco": true,
        "Brick": true,
        "Metal": true
      },
      "CountyOrParish": "Cass",
      "CurrentPrice": 1550000.0,
      "IDXParticipant": true,
      "Latitude": 46.813531,
      "ListOfficeId": "20080922165311188855000000",
      "ListOfficeUserType": "Office",
      "ListPrice": 1550000.0,
      "ListingContractDate": "2012-11-18",
      "ListingId": "12-4922",
      "ListingKey": "20121119215912756672000000",
```

Authorization Code Flow



Legend

Auth Request

ID Token

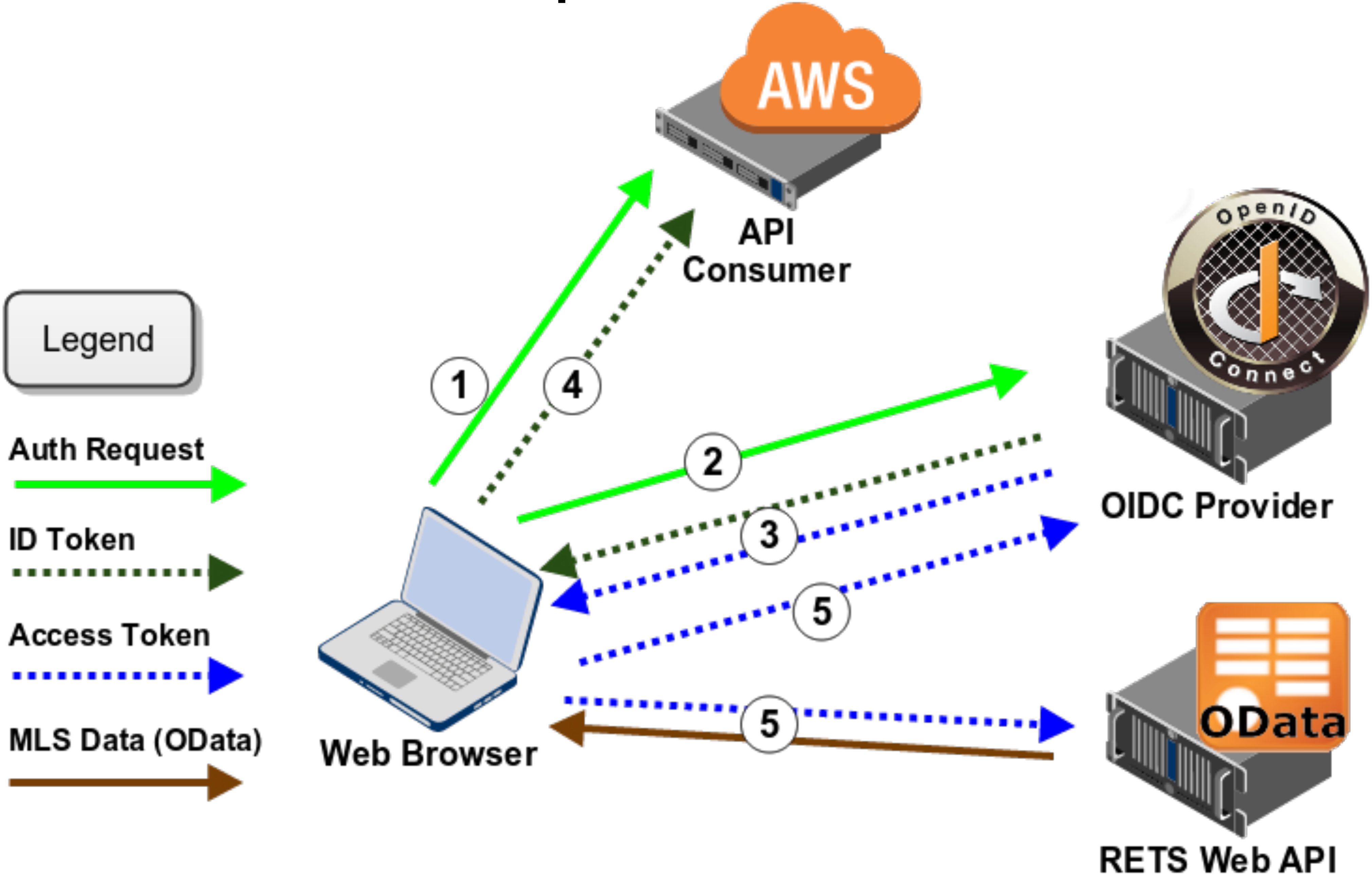
Access Token

Refresh Token

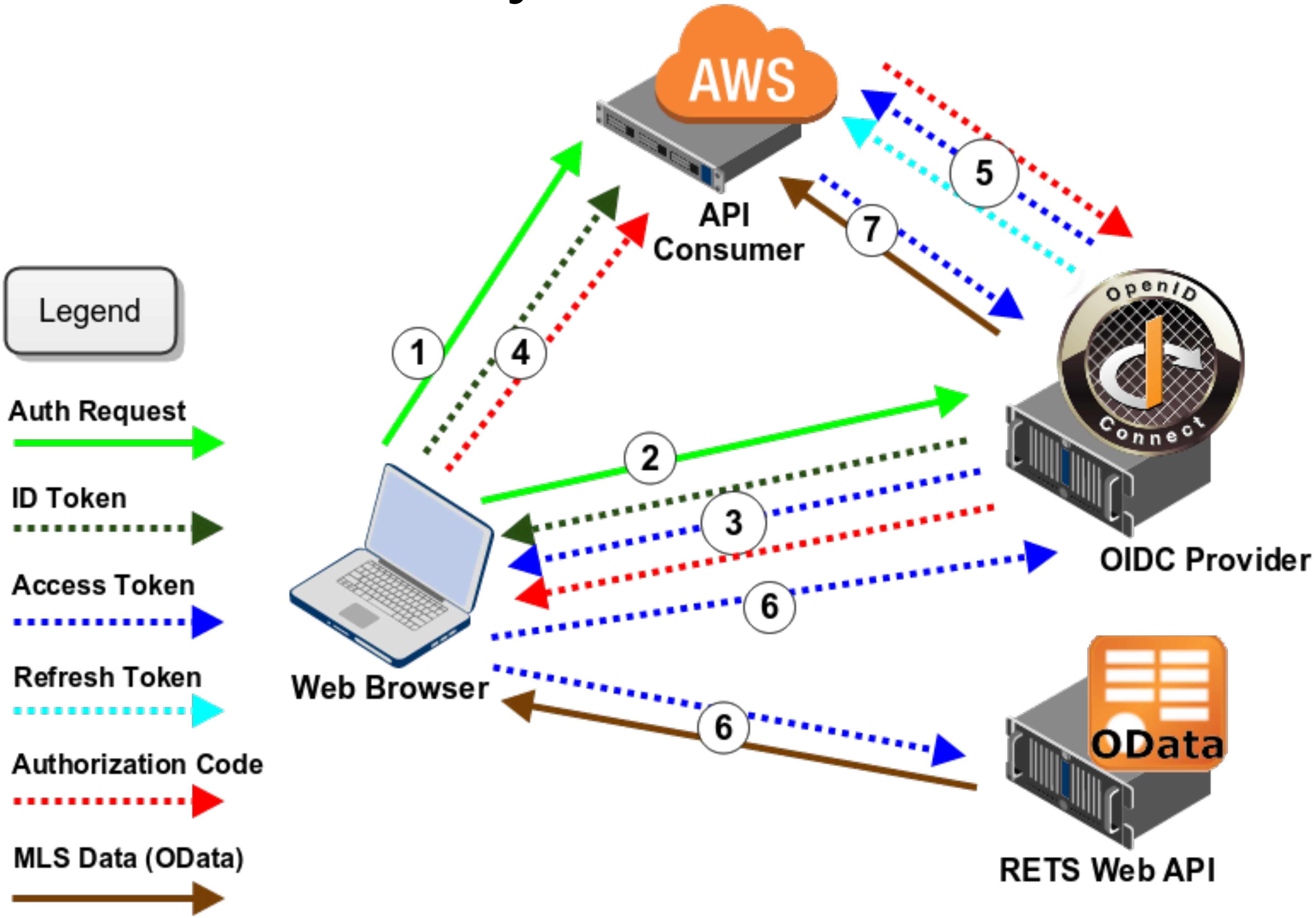
Authorization Code

MLS Data (OData)

Implicit Flow



Hybrid Flow



Legend

Auth Request

ID Token

Access Token

Refresh Token

Authorization Code

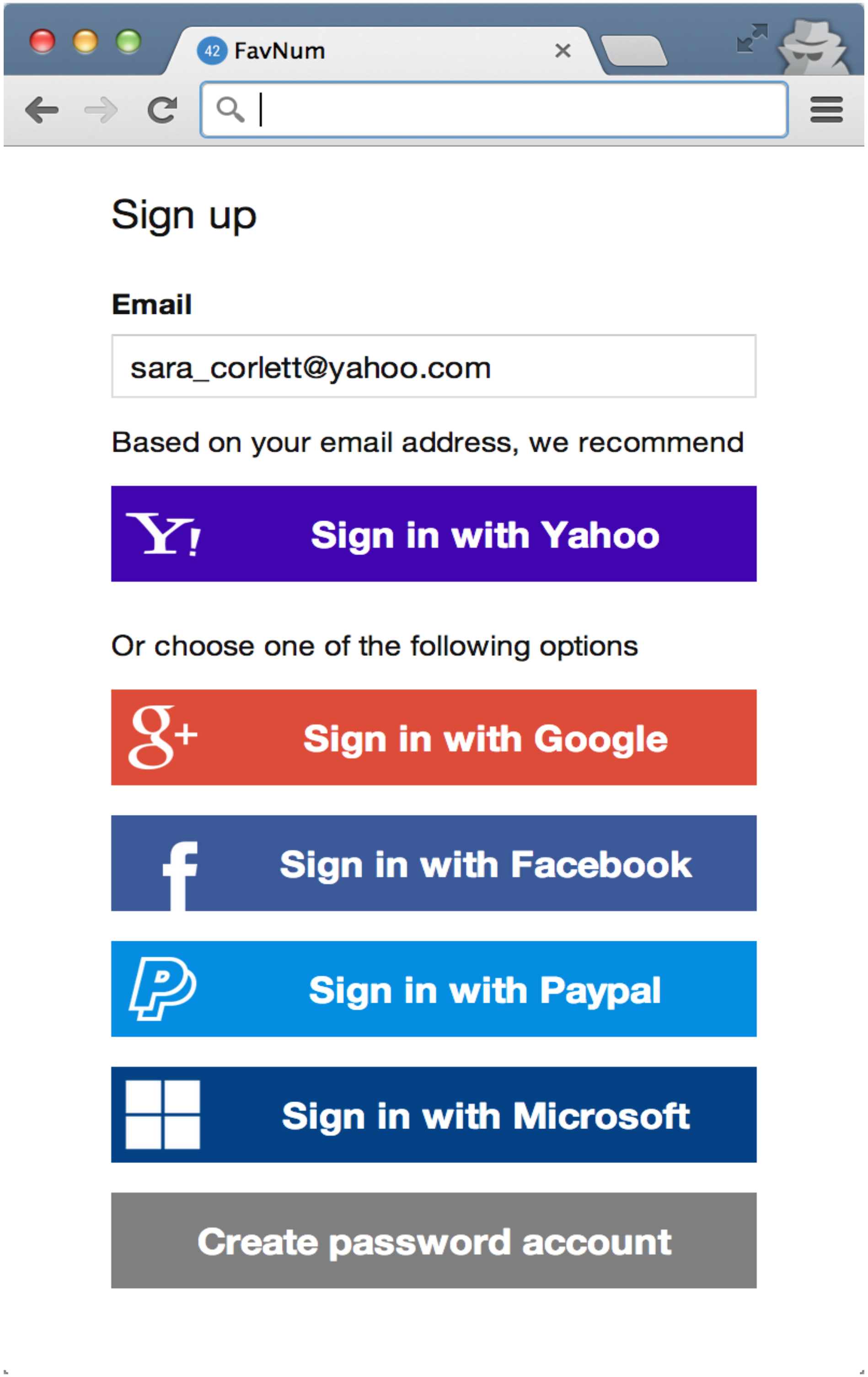
MLS Data (OData)

The Future of OpenID Connect

- Federated identities
  - Federation is more than just SSO
  - Account linking (ex: Google Identity Toolkit)
  - Trust relationships between Providers (ex: Amazon)
- Federation is currently **not** part of the OpenID Connect standard!

Account Chooser
+
Google Identity Toolkit

Demo: gitkitmobile.appspot.com



Sign up

Email

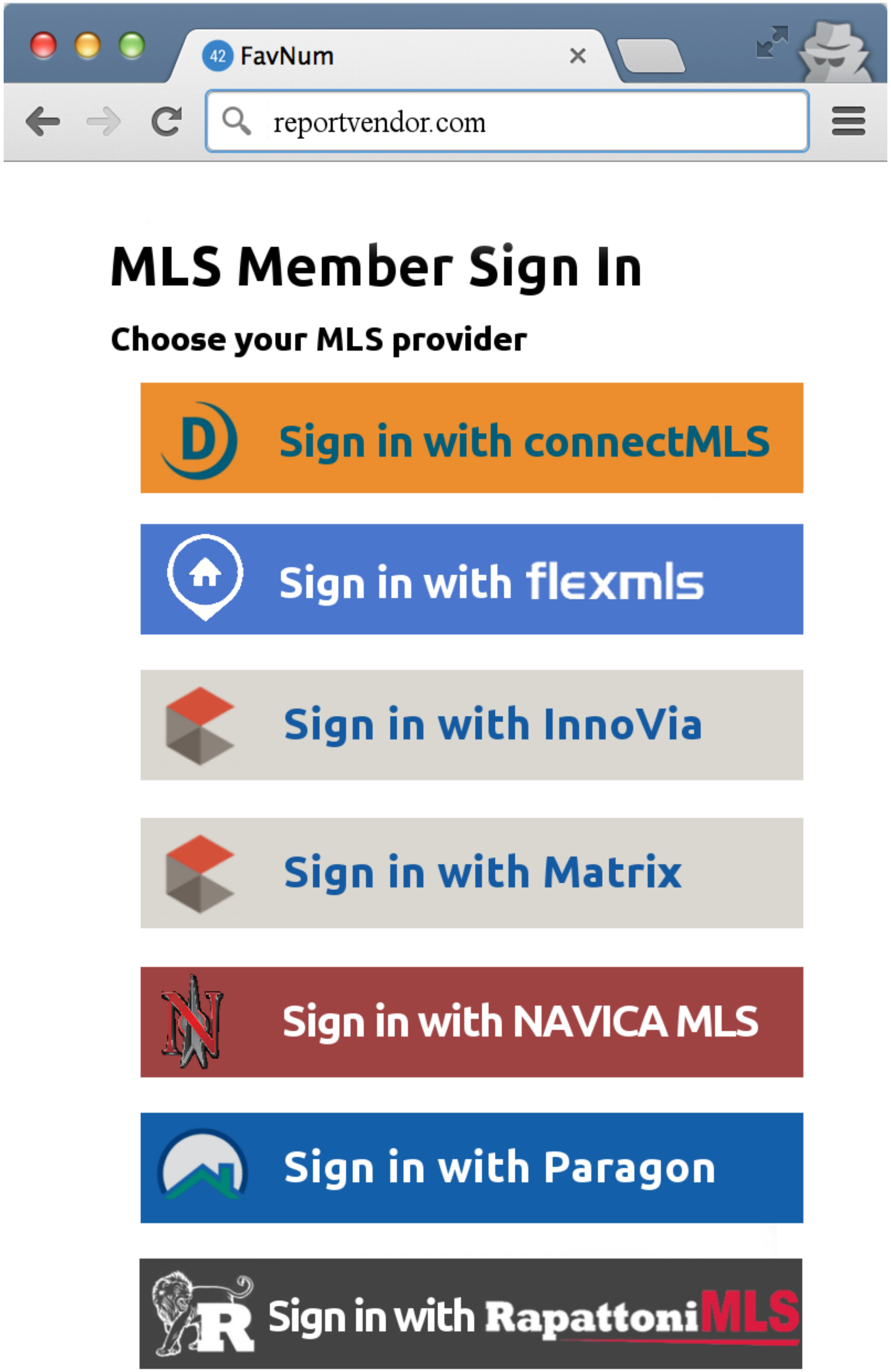
sara_corlett@yahoo.com

Based on your email address, we recommend

Or choose one of the following options

RETS
Identity Toolkit

- Simple front-end code to include widget
- Populates vendors with configured client_ids
- Saves account state with cookie
- Extend to VOW users?



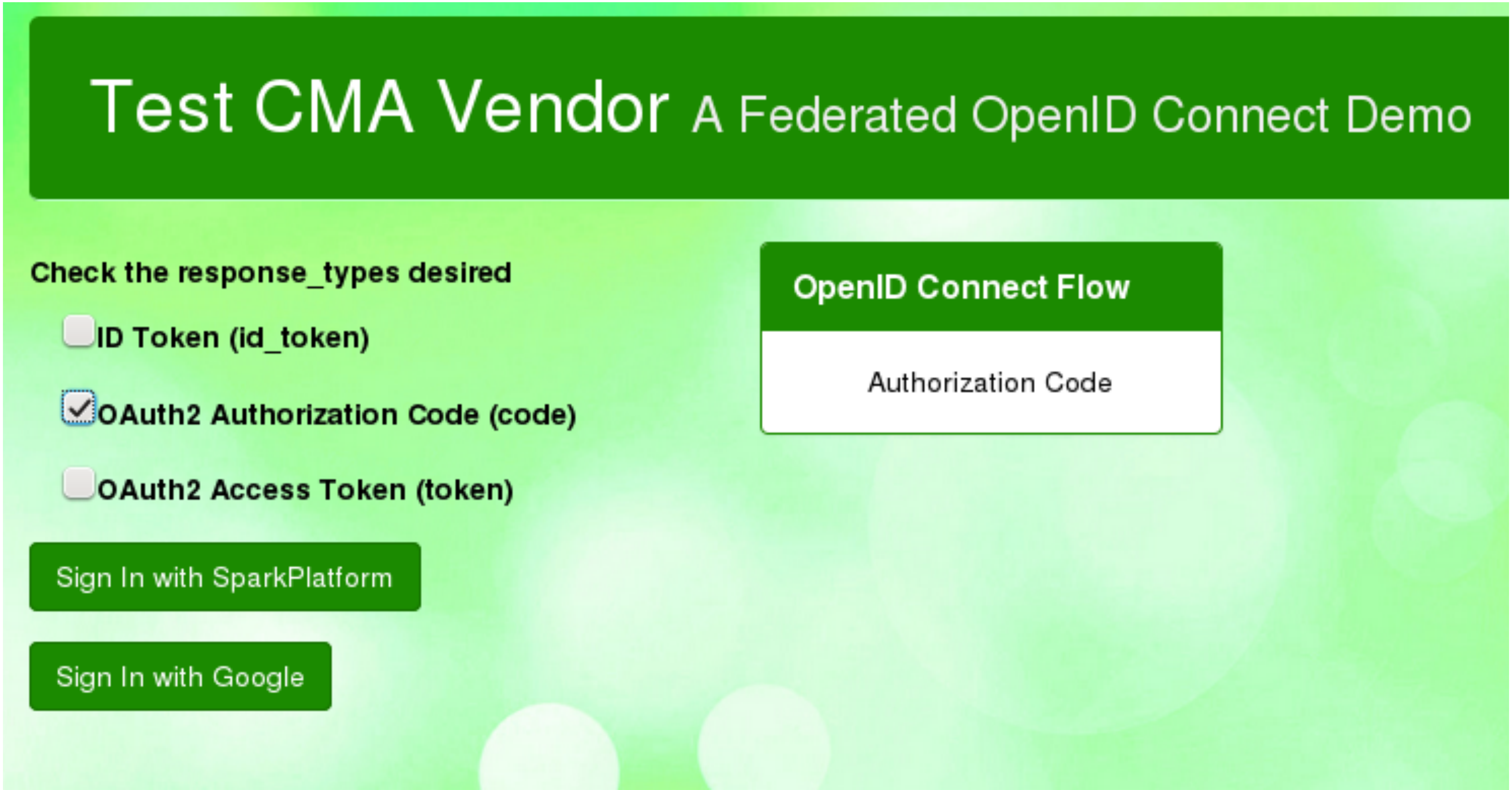
MLS Member Sign In

Choose your MLS provider

RETS Identity Toolkit with VOW Users?

1) Member `ned.flanders` declares `bob@gmail.com` as his client in the MLS
2) Ned logs into VOW website using the RETS Identity toolkit
3) VOW website queries the MLS's UserInfo Endpoint which returns a list of clients
4) `ned.flanders` is now “linked” with `bob@gmail.com`
5) Bob logs in at the VOW website using Google+ OpenID Connect login
6) VOW website uses Ned's VOW-scoped access token to retrieve API data for Bob

Demo: TestCMAVendor.com



Test CMA Vendor A Federated OpenID Connect Demo

Check the response_types desired

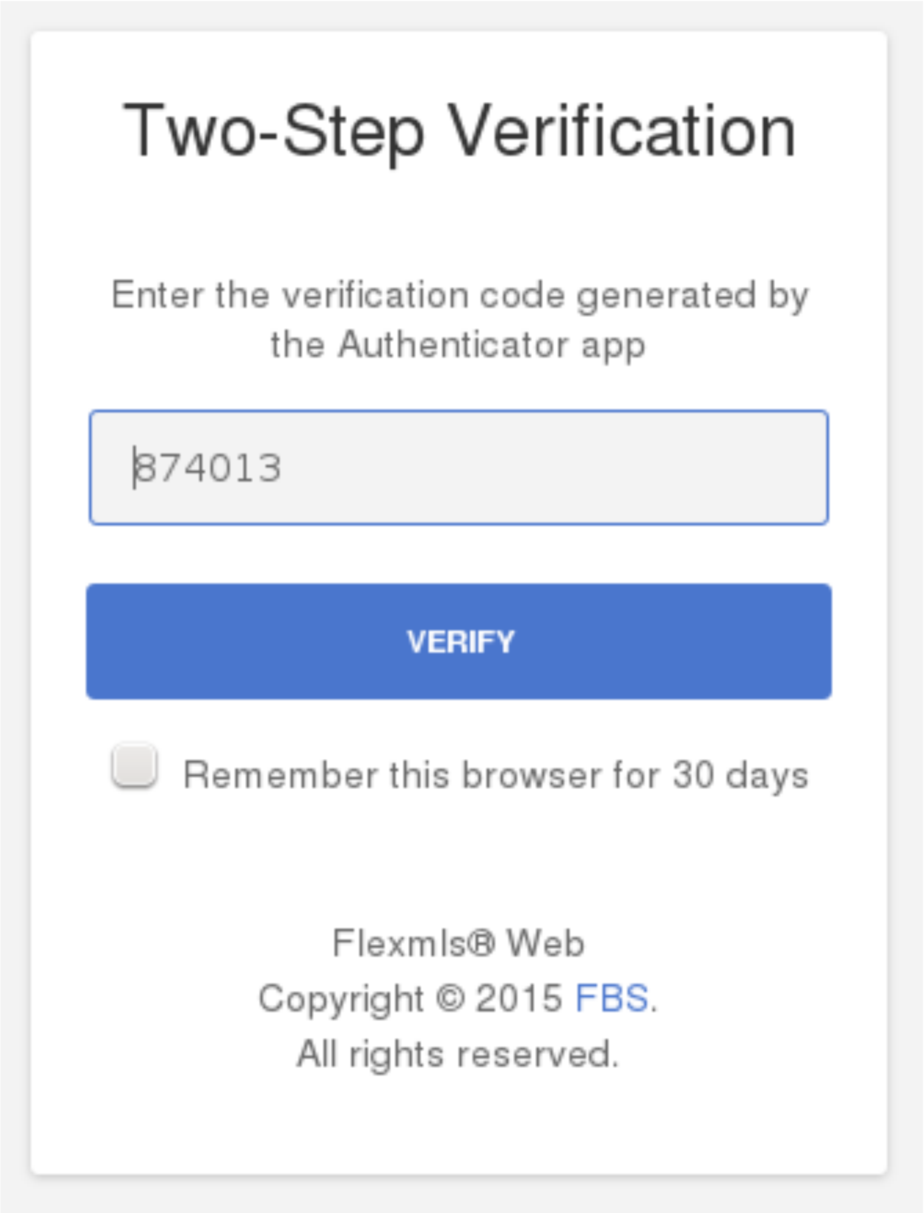
□ ID Token (id_token)

☑ OAuth2 Authorization Code (code)

□ OAuth2 Access Token (token)

OpenID Connect Flow

Authorization Code



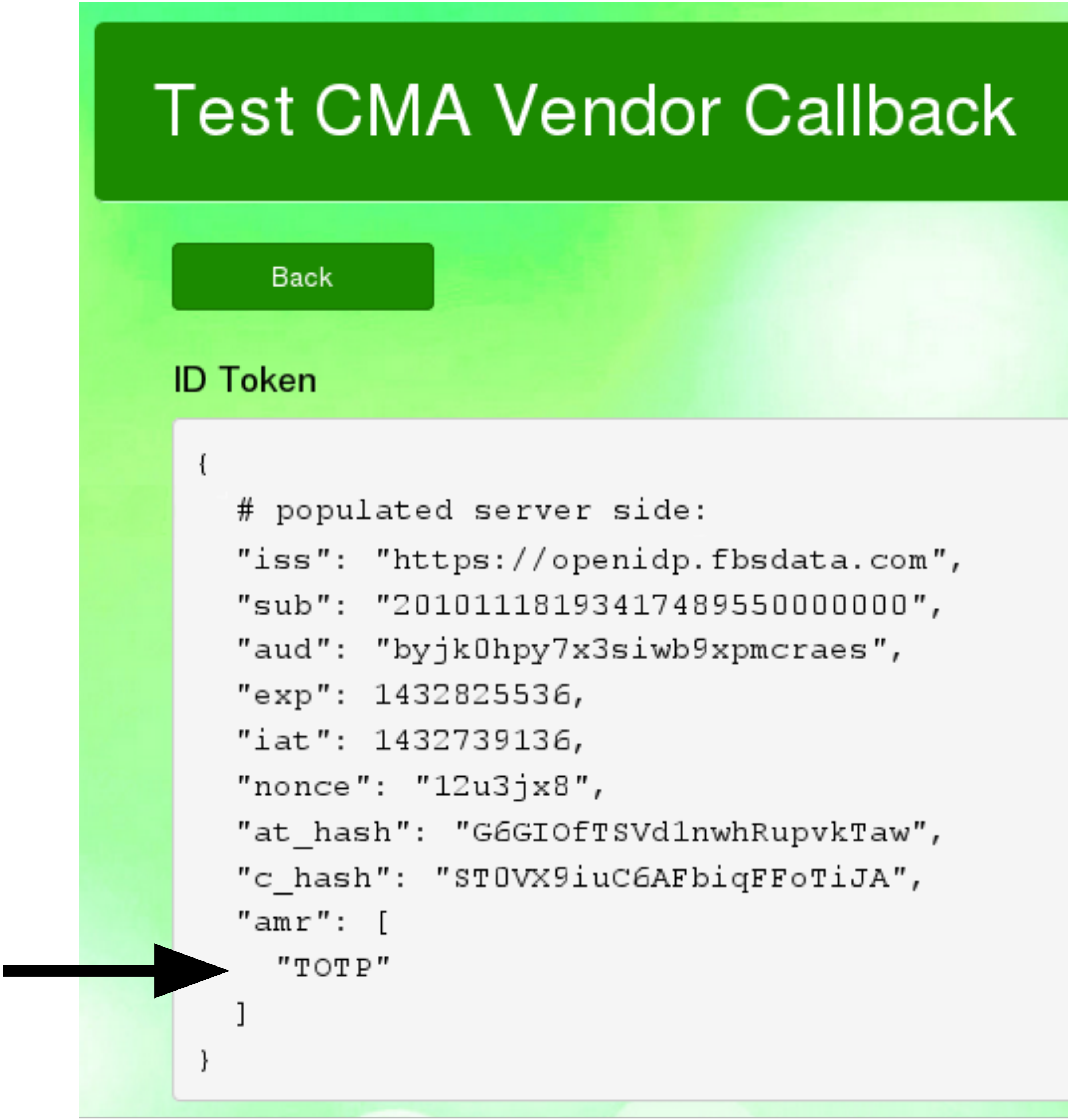
Two-Step Verification

Enter the verification code generated by the Authenticator app

874013

☐ Remember this browser for 30 days

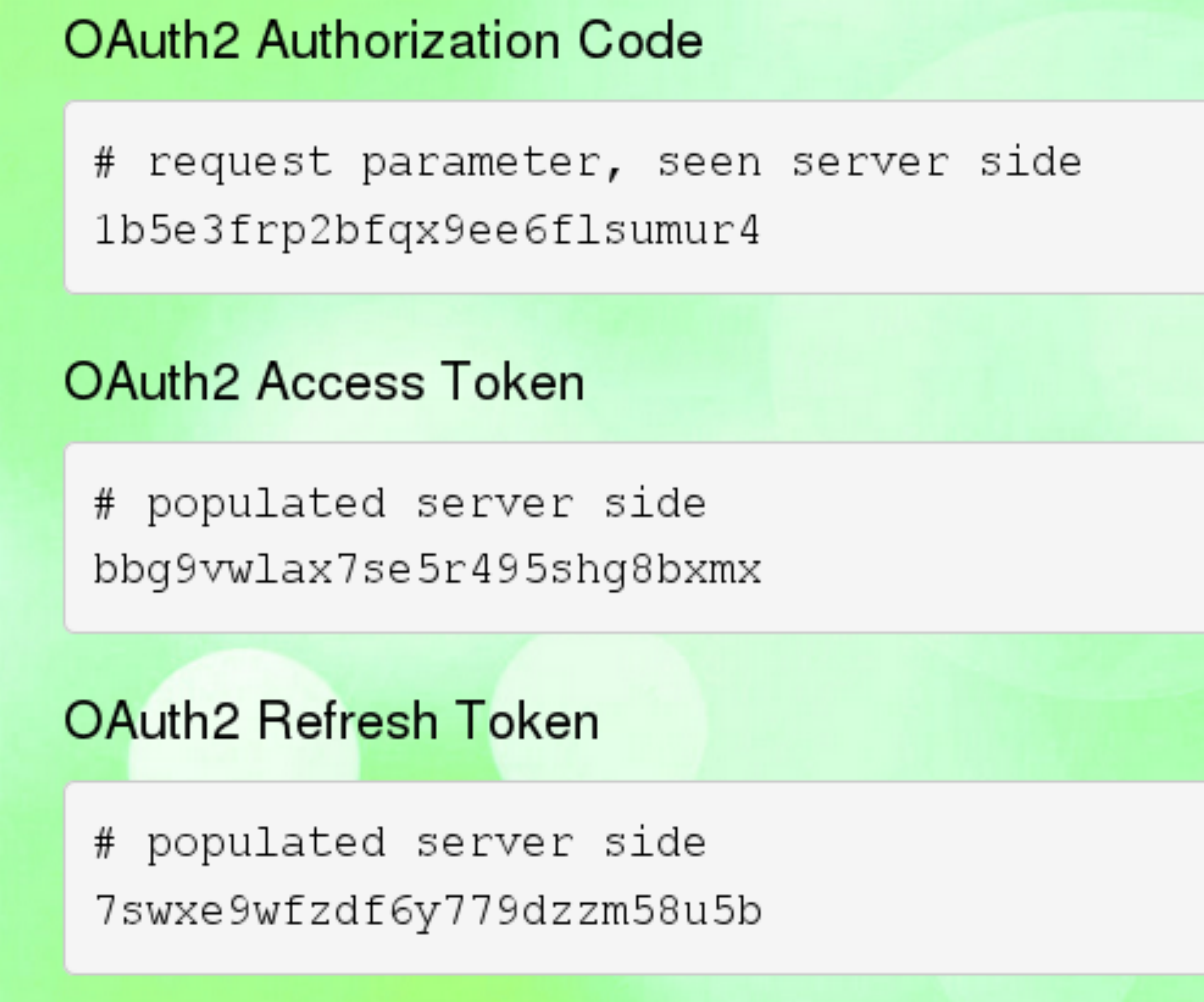
Flexmls® Web



Test CMA Vendor Callback

ID Token

```
{
  # populated server side:
  "iss": "https://openidp.fbsdata.com",
  "sub": "20101118193417489550000000",
  "aud": "byjk0hpy7x3siwb9xpmcraes",
  "exp": 1432825536,
  "iat": 1432739136,
  "nonce": "12u3jx8",
  "at_hash": "G6GIOfTSVd1nwhRupvkTaw",
  "c_hash": "ST0VX9iuC6AFbiqFFoTiJA",
  "amr": [
    "TOTP"
  ]
}
```



OAuth2 Authorization Code

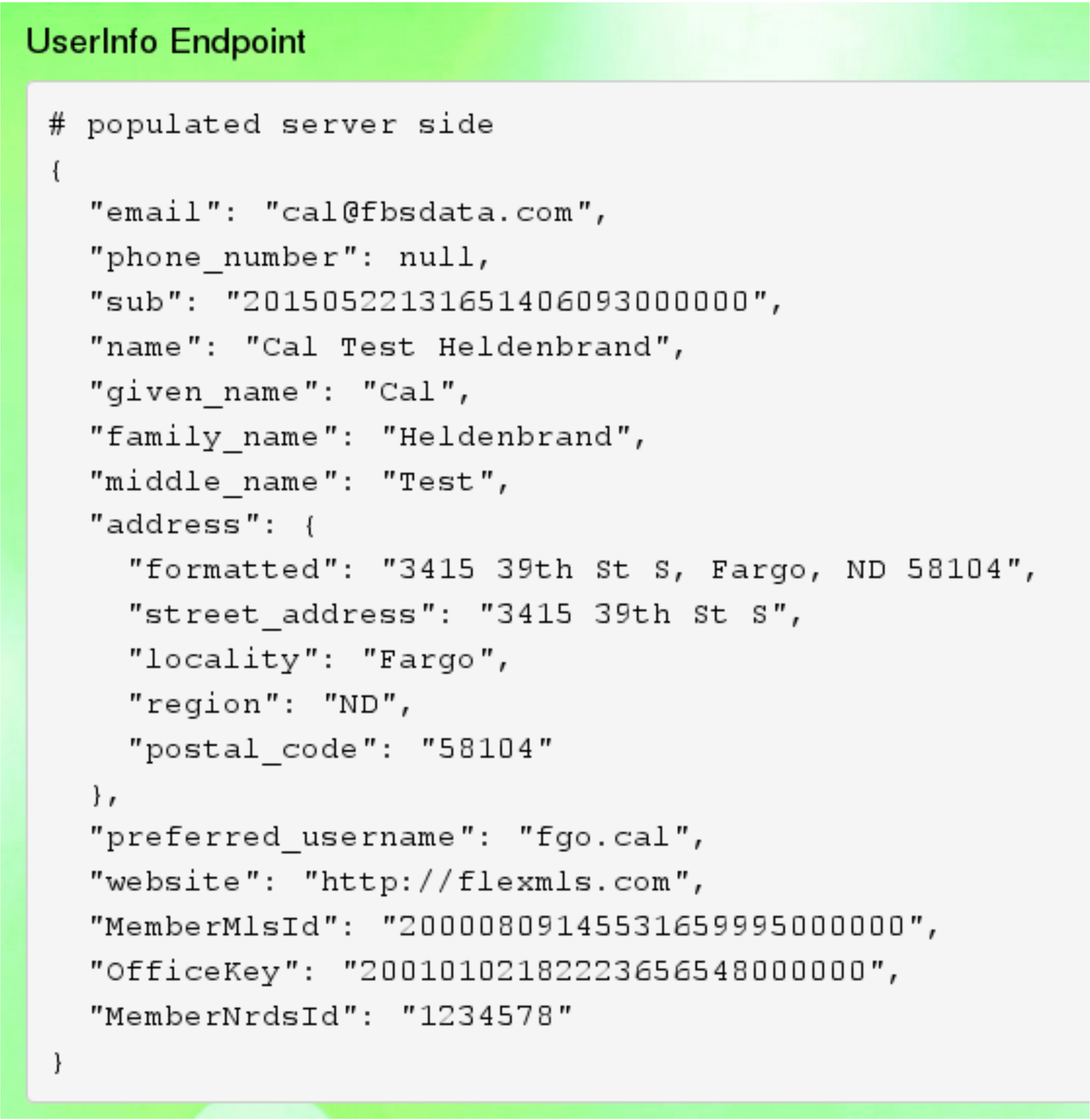
```
# request parameter, seen server side
lb5e3frp2bfqx9ee6flsumur4
```

OAuth2 Access Token

```
# populated server side
bbg9vwlax7se5r495shg8bxmx
```

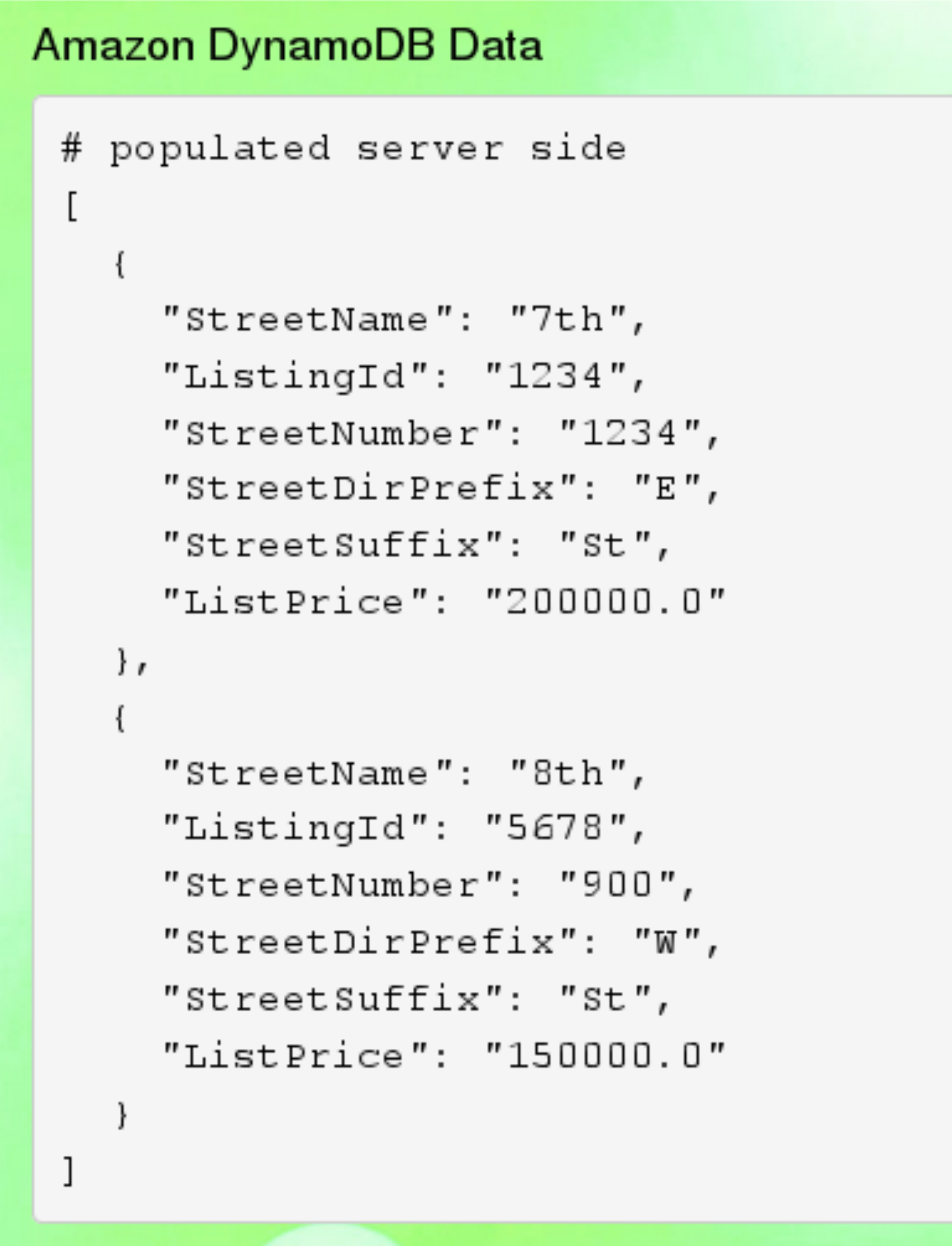
OAuth2 Refresh Token

```
# populated server side
7swxe9wfzdf6y779dzzm58u5b
```



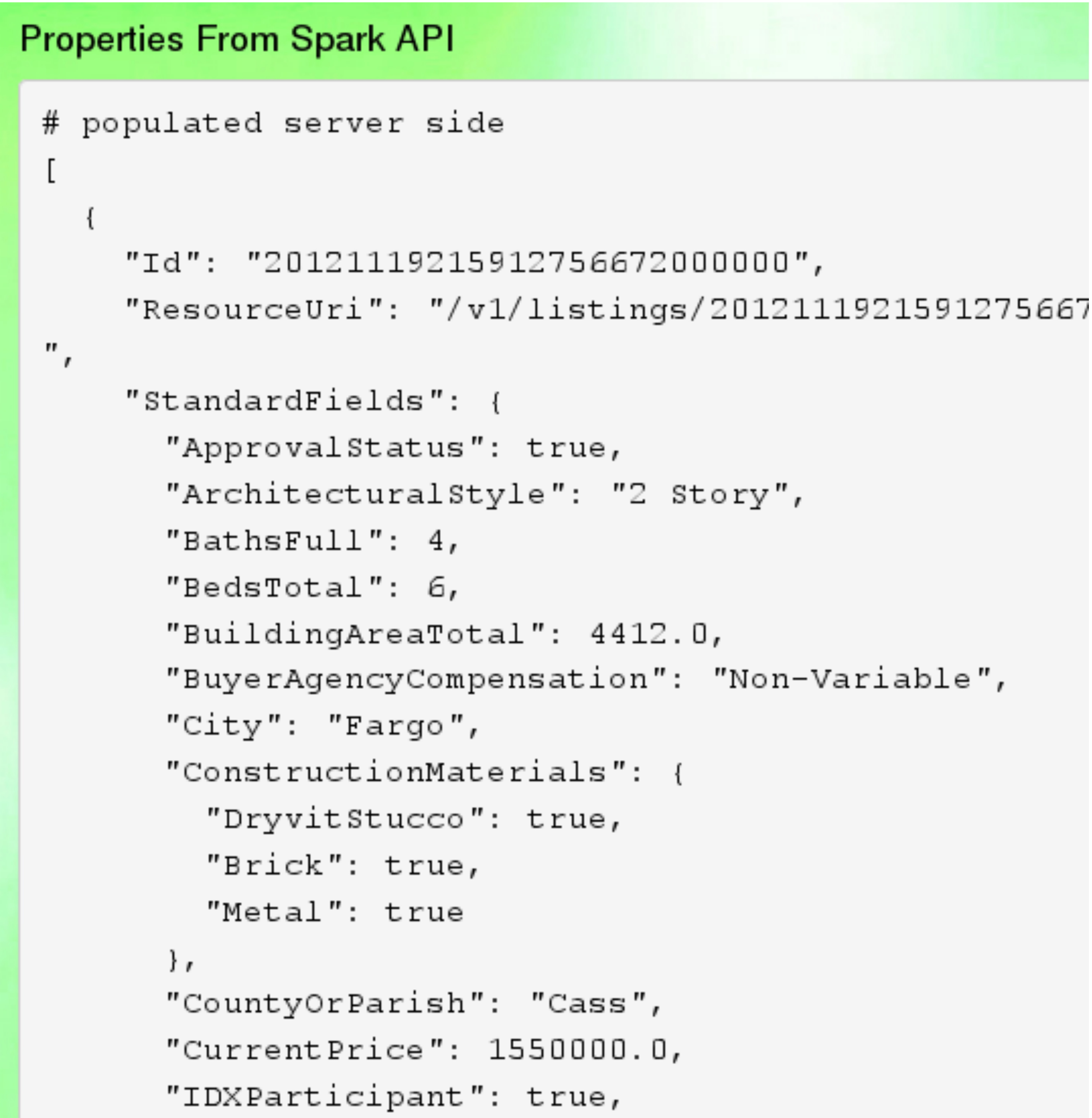
UserInfo Endpoint

```
# populated server side
{
  "email": "cal@fbsdata.com",
  "phone_number": null,
  "sub": "20150522131651406093000000",
  "name": "Cal Test Heldenbrand",
  "given_name": "Cal",
  "family_name": "Heldenbrand",
  "middle_name": "Test",
  "address": {
    "formatted": "3415 39th St S, Fargo, ND 58104",
    "street_address": "3415 39th St S",
    "locality": "Fargo",
    "region": "ND",
    "postal_code": "58104"
  },
  "preferred_username": "fgo.cal",
  "website": "http://flexmls.com",
  "MemberMlsId": "20000809145531659995000000",
  "OfficeKey": "20010102182223656548000000",
  "MemberNrdsId": "1234578"
}
```



Amazon DynamoDB Data

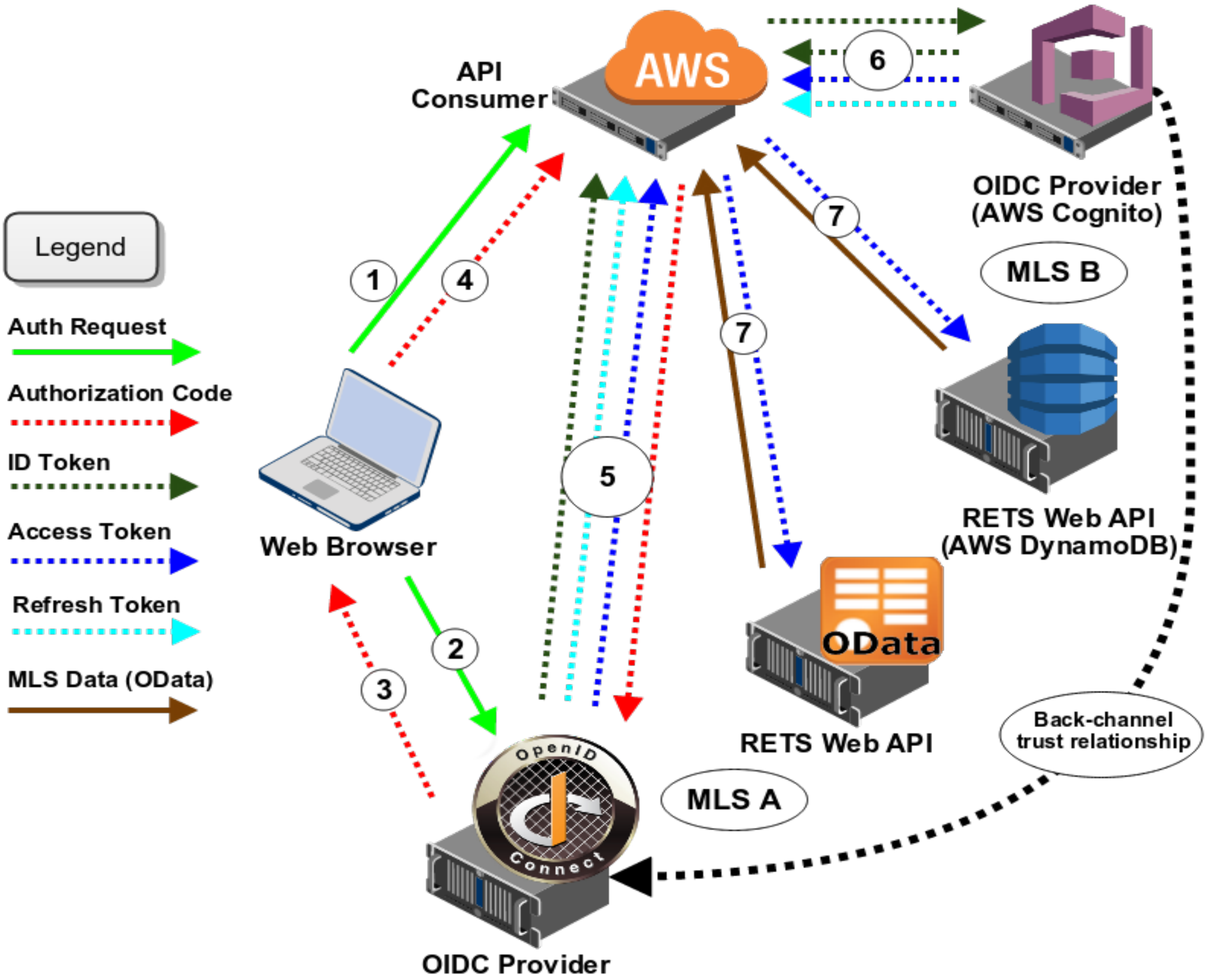
```
# populated server side
[
  {
    "StreetName": "7th",
    "ListingId": "1234",
    "StreetNumber": "1234",
    "StreetDirPrefix": "E",
    "StreetSuffix": "St",
    "ListPrice": "200000.0"
  },
  {
    "StreetName": "8th",
    "ListingId": "5678",
    "StreetNumber": "900",
    "StreetDirPrefix": "W",
    "StreetSuffix": "St",
    "ListPrice": "150000.0"
  }
]
```



Properties From Spark API

```
# populated server side
[
  {
    "Id": "20121119215912756672000000",
    "ResourceUri": "/v1/listings/20121119215912756667
",
    "StandardFields": {
      "ApprovalStatus": true,
      "ArchitecturalStyle": "2 Story",
      "BathsFull": 4,
      "BedsTotal": 6,
      "BuildingAreaTotal": 4412.0,
      "BuyerAgencyCompensation": "Non-Variable",
      "City": "Fargo",
      "ConstructionMaterials": {
        "DryvitStucco": true,
        "Brick": true,
        "Metal": true
      },
      "CountyOrParish": "Cass",
      "CurrentPrice": 1550000.0,
      "IDXParticipant": true,
```

Federated Authorization Code Flow



The Future of OpenID Connect

- Proof of Possession access tokens
  - (AKA Holder of Key token)
  - Uses public/private keys and JWT
  - Cannot be copied and replayed
- OAuth2 signed requests
  - Uses PoP tokens to sign each API request
  - TLS is optional!
- Token Binding
  - ID and access tokens are “bound” to a TLS session
  - Cannot be replayed
  - Federation – crypto-bind tokens to multiple TLS sessions between many relying parties & providers

Conclusion

- Worldwide standard
- OIDC is a [simple] addition on top of OAuth2
  - Easy migration from Web API Security 1.0.2
- Discovery service removes requirement for a RESO Web Security document
- Certification program will be avail soon
- Once the basics are implemented, many cool features are possible in the future

flexmls
created by FBS

Questions?