Understanding JWT/CWT, OpenID and Related Ecosystem

Michael Jones, John Bradley
Aaron Parecki

JWT, OpenID Connect, CWT, and Verifiable Claims

Michael B. Jones – Microsoft and John Bradley – Yubico

W3C Workshop on Strong Authentication and Identity

December 10, 2018

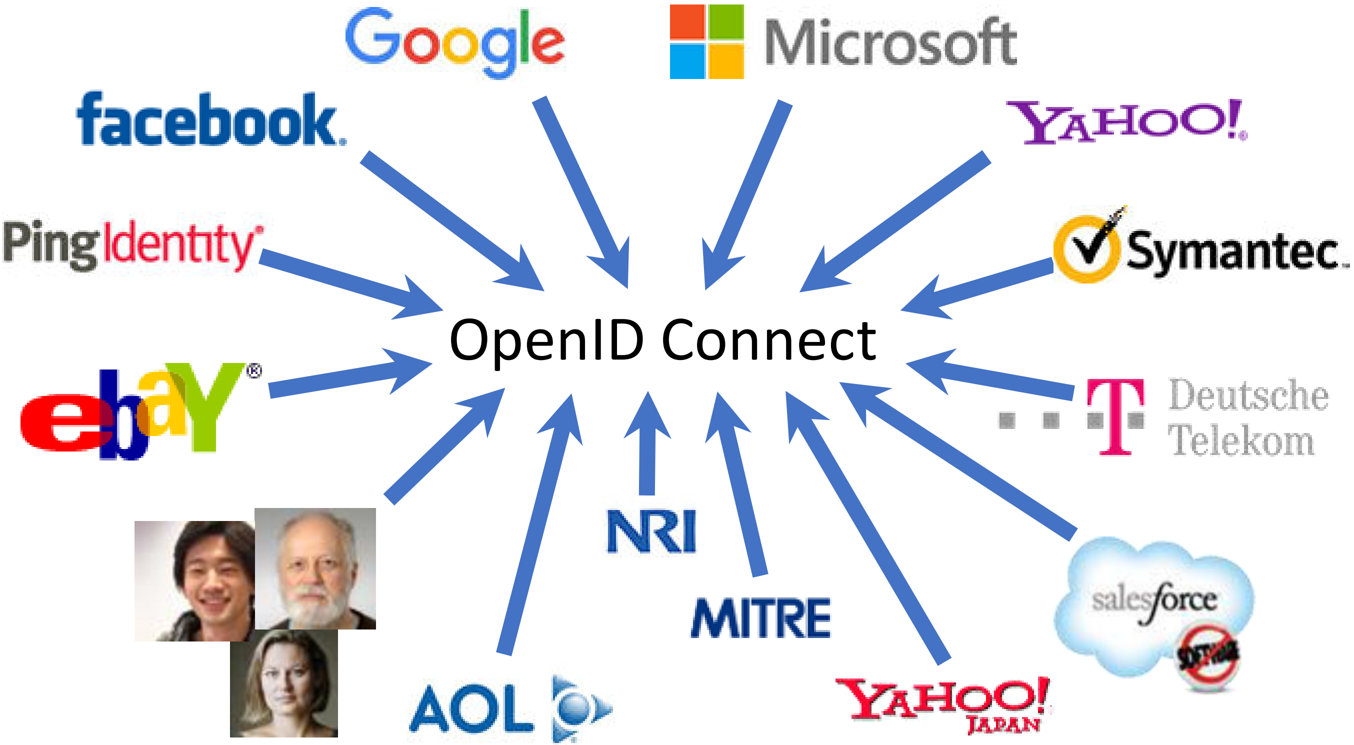
JSON Web Token (JWT) – RFC 7519

- Representation of claims in JSON
- Can be signed with JSON Web Signature (JWS) – RFC 7515
- Can be encrypted with JSON Web Encryption (JWE) – RFC 7516
- Algorithms used extensible using IANA JOSE Algorithms Registry
  - For instance, ed25519 added and secp256k1 being added
- By design, does not use any form of JSON canonicalization
  - Base64url encodes values to maintain content integrity instead
- JWTs used by OpenID Connect, many other applications

ID Token Claims Example

```
{
 "iss": "https://server.example.com",
 "sub": "248289761001",
 "aud": "0acf77d4-b486-4c99-bd76-074ed6a64ddf",
 "iat": 1311280970,
 "exp": 1311281970,
 "nonce": "n-0S6_WzA2Mj"
}
```

Working Together



OpenID Connect

What is OpenID Connect?

- Simple identity layer on top of OAuth 2.0
- Enables RPs to verify identity of end-user
- Enables RPs to obtain basic profile info
- REST/JSON interfaces → low barrier to entry
- Described at http://openid.net/connect/

You’re Probably Already Using OpenID Connect!

- If you have an Android phone or log in at AOL, Deutsche Telekom, Google, Microsoft, NEC, NTT, Salesforce, Softbank, Symantec, Verizon, or Yahoo! Japan, you’re already using OpenID Connect
  - Many other sites and apps large and small also use OpenID Connect

OpenID Connect and Verifiable Claims

- Aggregated and Distributed Claims
- Self-Issued Identities
- Representation of Claim Verification Information

OpenID Connect: Aggregated and Distributed Claims

- OpenID Connect Core §5.6.2
- Defines how JWTs can contain claims signed by others
    - Issuers of aggregated and distributed claims can be different than JWT issuer
- For example, credit score signed by credit agency and payment information signed by bank
- Aggregated claims pass 3rd party claims by value
- Distributed claims pass 3rd party claims by reference

OpenID Connect: Self-Issued Identities

- OpenID Connect Core §7
- Digital identity controlled directly by you
    - Backed by public/private key pair
    - Sometimes called “user-centric identity” or “self-sovereign identity”
- Claims in self-issued identities
    - Self-issued claims signed by you
    - Aggregated and distributed claims signed by 3rd parties
- Implementations in Japan and at Microsoft

OpenID Connect: Representation of Claim Verification Information

- Syntax for providing metadata about claims along with claims
    - For instance, saying that name, address, and payment info validated by a particular bank
        - At a particular time
        - In a particular jurisdiction
        - Under a particular legal framework
- Also ways of requesting claims with particular validation information
- New work proposed by Torsten Lodderstedt at most recent IIW
    - Ideas contributed to OpenID Connect working group

CBOR Web Token (CWT) – RFC 8392

- Binary equivalent of JWT
  - Uses CBOR – RFC 7049 – instead of JSON
- Secured with CBOR Object Signing and Encryption (COSE) – RFC 8152
- Can be more compact than JWTs because no base64url encoding
- Good fit for IoT applications and bandwidth-constrained channels

IndieAuth

OAuth for the Open Web

Aaron Parecki
aaronpk.com

W3C Social Web Working Group

- Chartered to create open APIs for social networking,
  to enable social communication on the web
- Active from July 2014 to February 2018
- Identity and authentication was out of scope for REC-track documents

https://www.w3.org/wiki/Socialwg

W3C Social Web Working Group

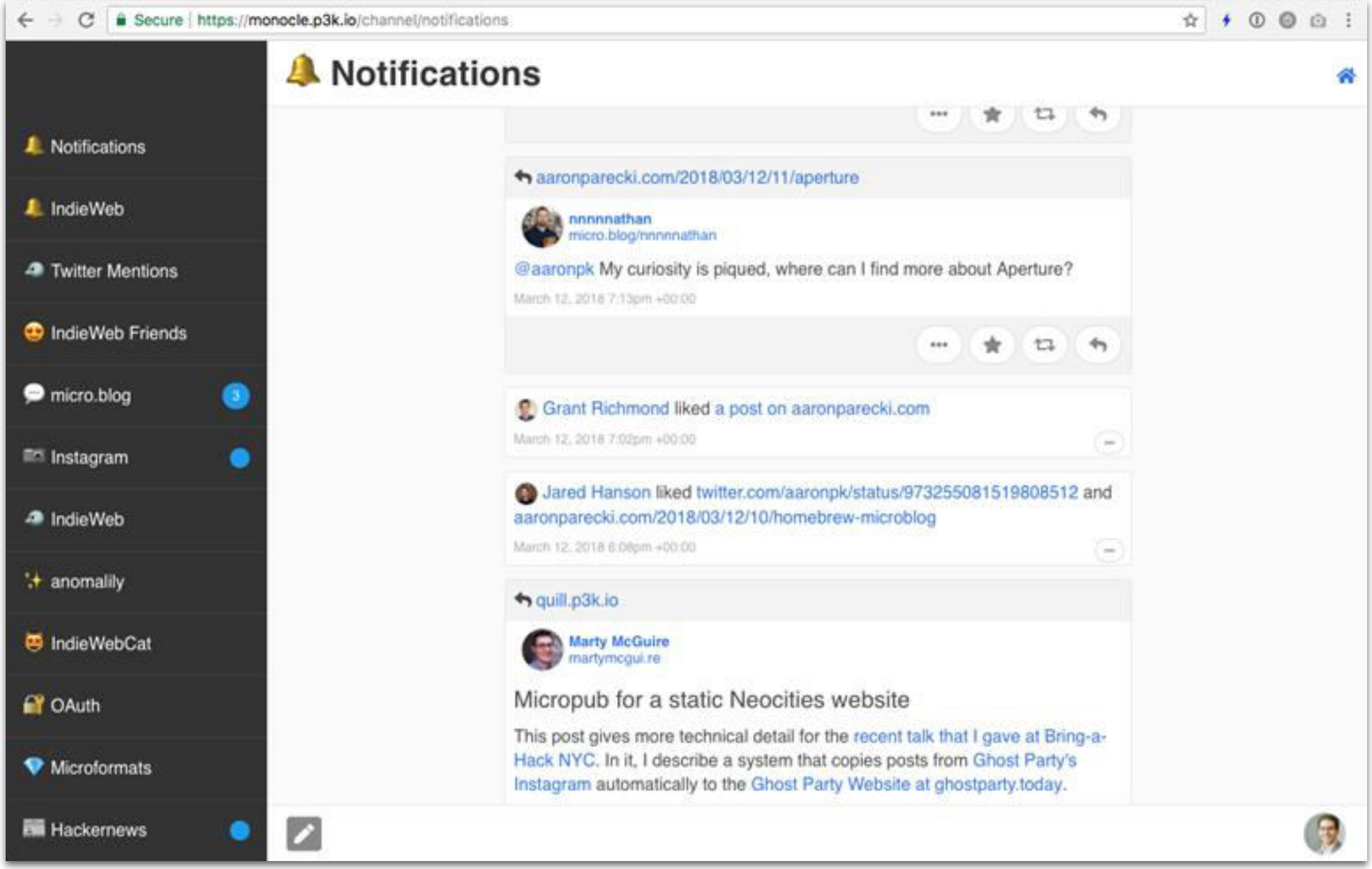
W3C Recommendations Published:

- Webmention
- Linked Data Notifications
- Micropub
- Activity Streams
- WebSub
- ActivityPub

W3C Notes Published:

- Social Web Protocols
- JF2
- Post Type Discovery
- IndieAuth

https://www.w3.org/wiki/Socialwg#Specifications



Notifications

aaronparecki.com/2018/03/12/11/aperture

nnnnnathan
micro.blog/nnnnnathan

@aaronpk My curiosity is piqued, where can I find more about Aperture?

March 12, 2018 7:13pm +00:00

Grant Richmond liked a post on aaronparecki.com

March 12, 2018 7:02pm +00:00

Jared Hanson liked twitter.com/aaronpk/status/973255081519808512 and aaronparecki.com/2018/03/12/10/homebrew-microblog

March 12, 2018 6:08pm +00:00

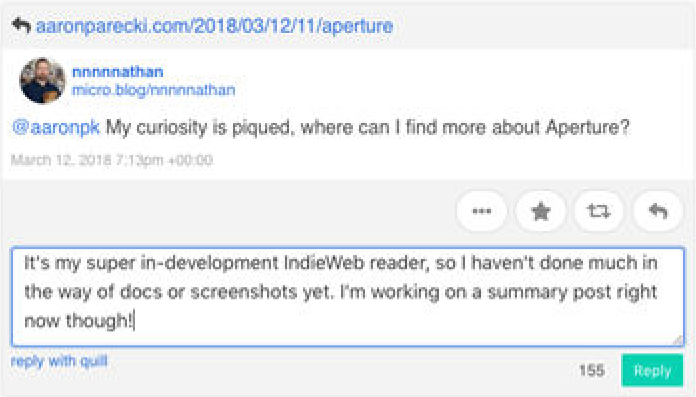
quill.p3k.io

Marty McGuire
martymcgui.re

Micropub for a static Neocities website

This post gives more technical detail for the recent talk that I gave at Bring-a-Hack NYC. In it, I describe a system that copies posts from Ghost Party's Instagram automatically to the Ghost Party Website at ghostparty.today.

aaron.pk/reader



aaronparecki.com/2018/03/12/11/aperture

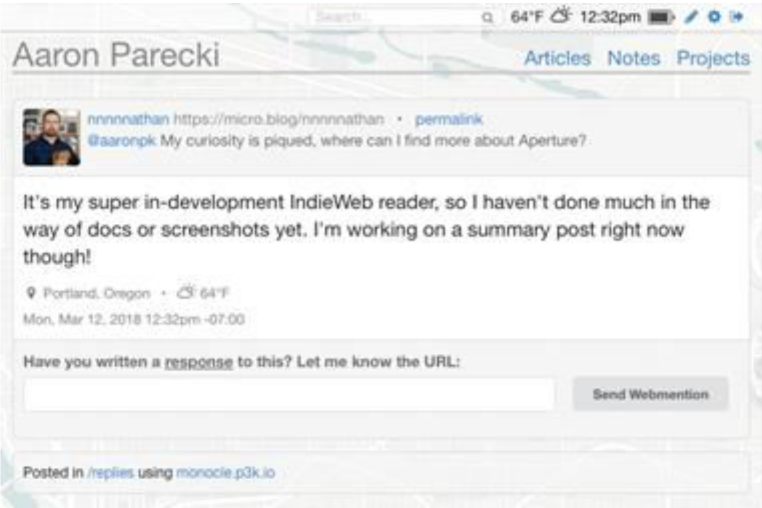
nnnnnathan
micro.blog/nnnnnathan

@aaronpk My curiosity is piqued, where can I find more about Aperture?

March 12, 2018 7:13pm +00:00

It's my super in-development IndieWeb reader, so I haven't done much in the way of docs or screenshots yet. I'm working on a summary post right now though!

monocle.p3k.io



Aaron Parecki

nnnnnathan https://micro.blog/nnnnnathan • permalink
@aaronpk My curiosity is piqued, where can I find more about Aperture?

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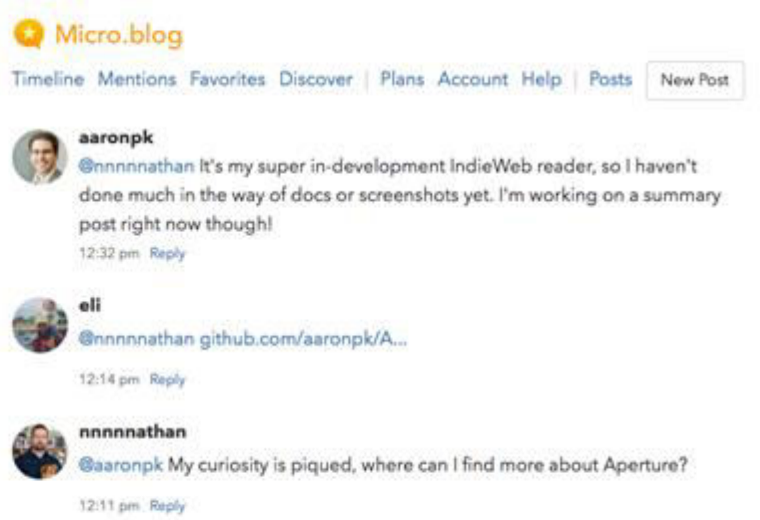
Portland, Oregon • 64°F
Mon, Mar 12, 2018 12:32pm -07:00

Have you written a response to this? Let me know the URL:

Posted in /replies using monocle.p3k.io

aaronparecki.com

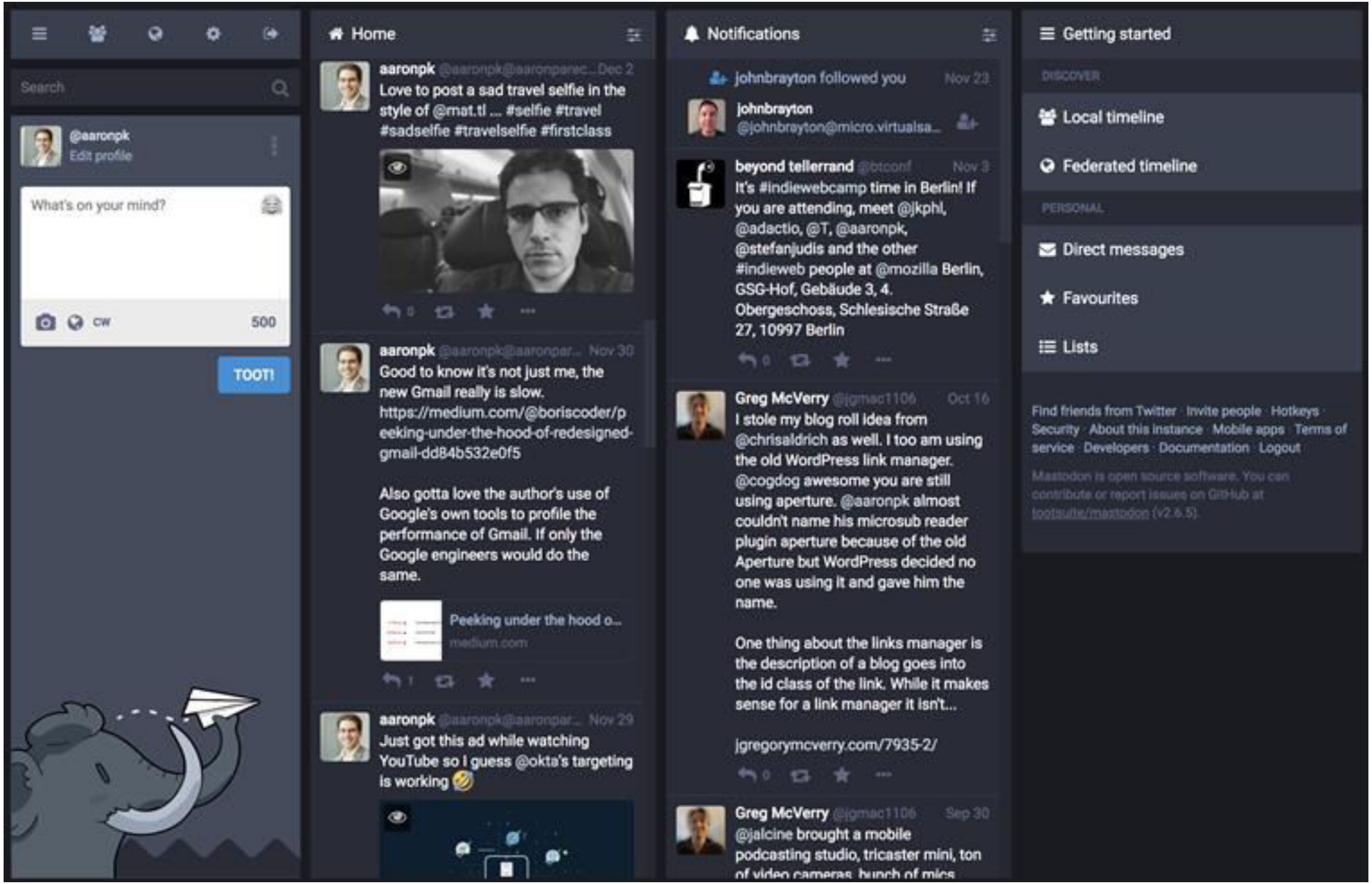


aaronpk
@nnnnnathan It's my super in-development IndieWeb reader, so I haven't done much in the way of docs or screenshots yet. I'm working on a summary post right now though!
12:32 pm Reply

eli
@nnnnnathan github.com/aaronpk/A...
12:14 pm Reply

nnnnnathan
@aaronpk My curiosity is piqued, where can I find more about Aperture?
12:11 pm Reply

micro.blog



Search

@aaronpk
Edit profile

What's on your mind?

CW 500

TOOT!

Home

aaronpk @aaronpk@aaronparec... Dec 2
Love to post a sad travel selfie in the style of @mat.tl ... #selfie #travel #sadselfie #travelselfie #firstclass

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aaronpk @aaronpk@aaronpar... Nov 30
Good to know it's not just me, the new Gmail really is slow. https://medium.com/@boriscoder/peeking-under-the-hood-of-redesigned-gmail-dd84b532e0f5

Also gotta love the author's use of Google's own tools to profile the performance of Gmail. If only the Google engineers would do the same.

Peeking under the hood o...
medium.com

1

aaronpk @aaronpk@aaronpar... Nov 29
Just got this ad while watching YouTube so I guess @okta's targeting is working 🤣

Notifications

johnbrayton followed you Nov 23

johnbrayton
@johnbrayton@micro.virtualsa...

beyond tellerrand @btconf Nov 3
It's #indiewebcamp time in Berlin! If you are attending, meet @jkphl, @adactio, @T, @aaronpk, @stefanjudis and the other #indieweb people at @mozilla Berlin, GSG-Hof, Gebäude 3, 4. Obergeschoss, Schlesische Straße 27, 10997 Berlin

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Greg McVerry @jgmac1106 Oct 16
I stole my blog roll idea from @chrisaldrich as well. I too am using the old WordPress link manager. @cogdog awesome you are still using aperture. @aaronpk almost couldn't name his microsub reader plugin aperture because of the old Aperture but WordPress decided no one was using it and gave him the name.

One thing about the links manager is the description of a blog goes into the id class of the link. While it makes sense for a link manager it isn't...

jgregorymcverry.com/7935-2/

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Greg McVerry @jgmac1106 Sep 30
@jalcine brought a mobile podcasting studio, tricaster mini, ton of video cameras, bunch of mics

Getting started

DISCOVER

Local timeline

Federated timeline

PERSONAL

Direct messages

Favourites

Lists

Find friends from Twitter · Invite people · Hotkeys · Security · About this instance · Mobile apps · Terms of service · Developers · Documentation · Logout

Mastodon is open source software. You can contribute or report issues on GitHub at tootsuite/mastodon (v2.6.5).

Follow me from Mastodon: aaronpk@aaronparecki.com

How can I comment on this

[blog post, photo, issue, etc]

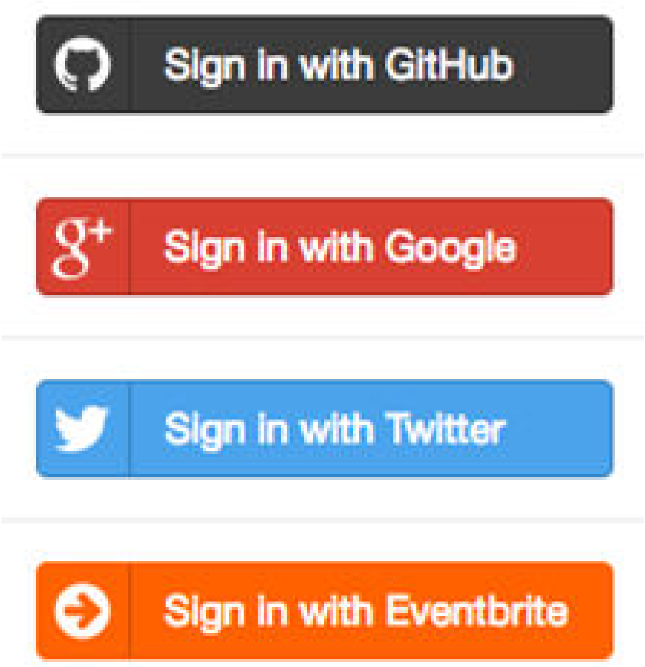
without having an account there?

How can I sign in to an app

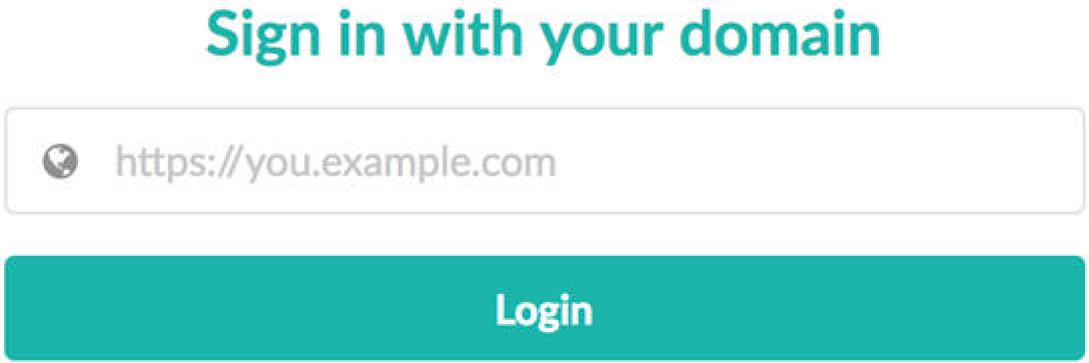
that lets me post to my account?

OAUTH
A
OAUTH

Traditional OAuth



IndieAuth: Bring your own identity



Sign in with your domain

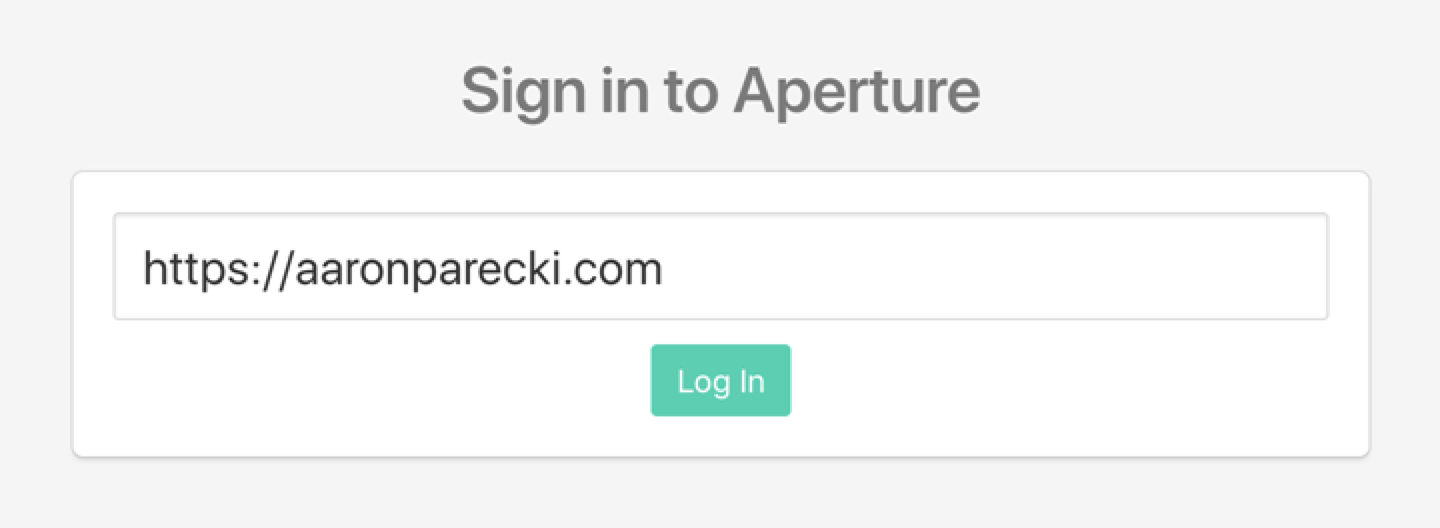
https://you.example.com

URLs for Identity

- aaronparecki.com
- mastodon.social/@aaronpk
- gitlab.com/aaronpk
- twitter.com/aaronpk

IndieAuth Summary

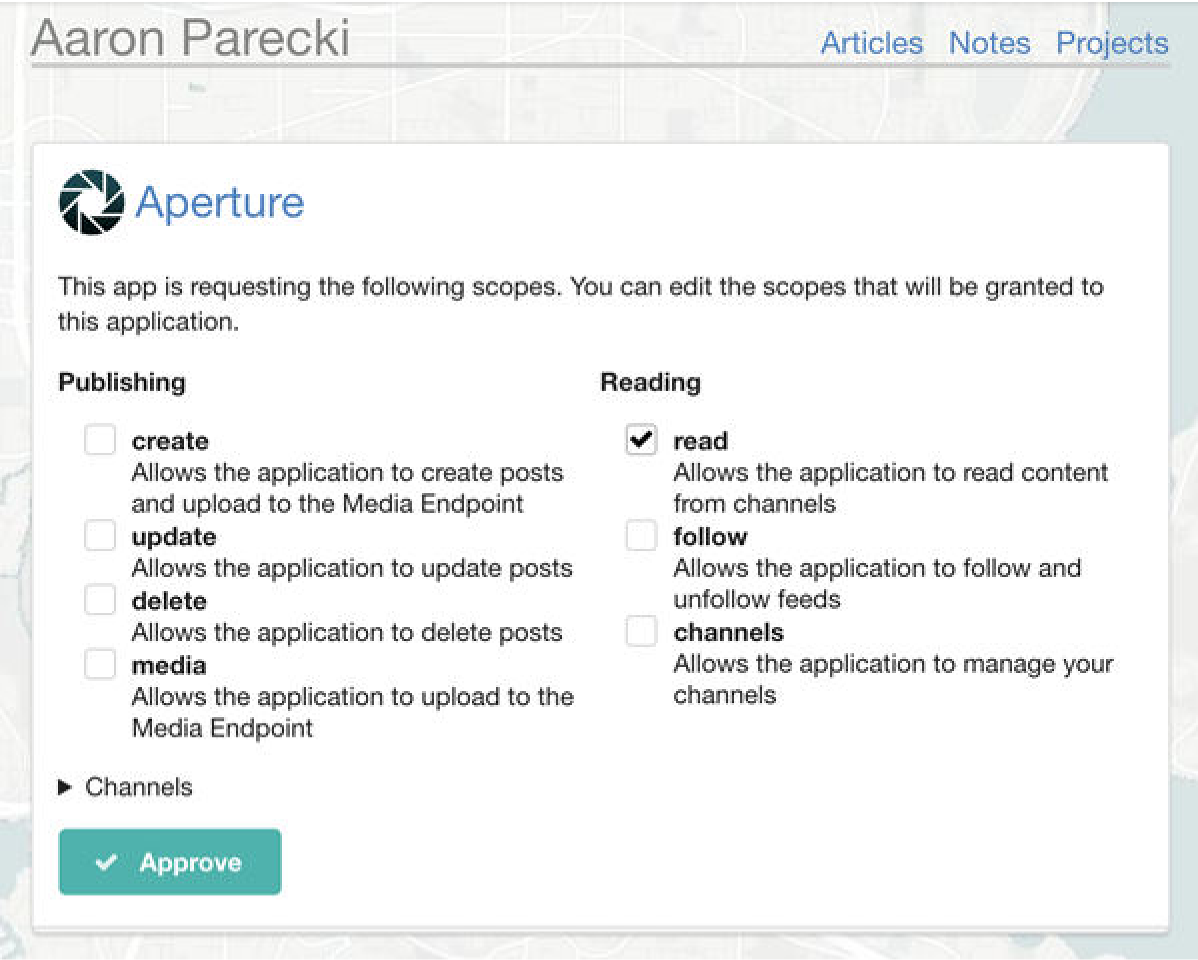
- User IDs are URLs – bring your own identity
- Applications are identified by URLs – no pre-registration necessary
- Authorization server is discovered from the user’s URL
- User ID is returned at the end of the OAuth exchange



Sign in to Aperture

https://aaronparecki.com

aperture.p3k.io



Aaron Parecki

Aperture

This app is requesting the following scopes. You can edit the scopes that will be granted to this application.

Publishing

□ **create**
Allows the application to create posts and upload to the Media Endpoint

□ **update**
Allows the application to update posts

□ **delete**
Allows the application to delete posts

□ **media**
Allows the application to upload to the Media Endpoint

Reading

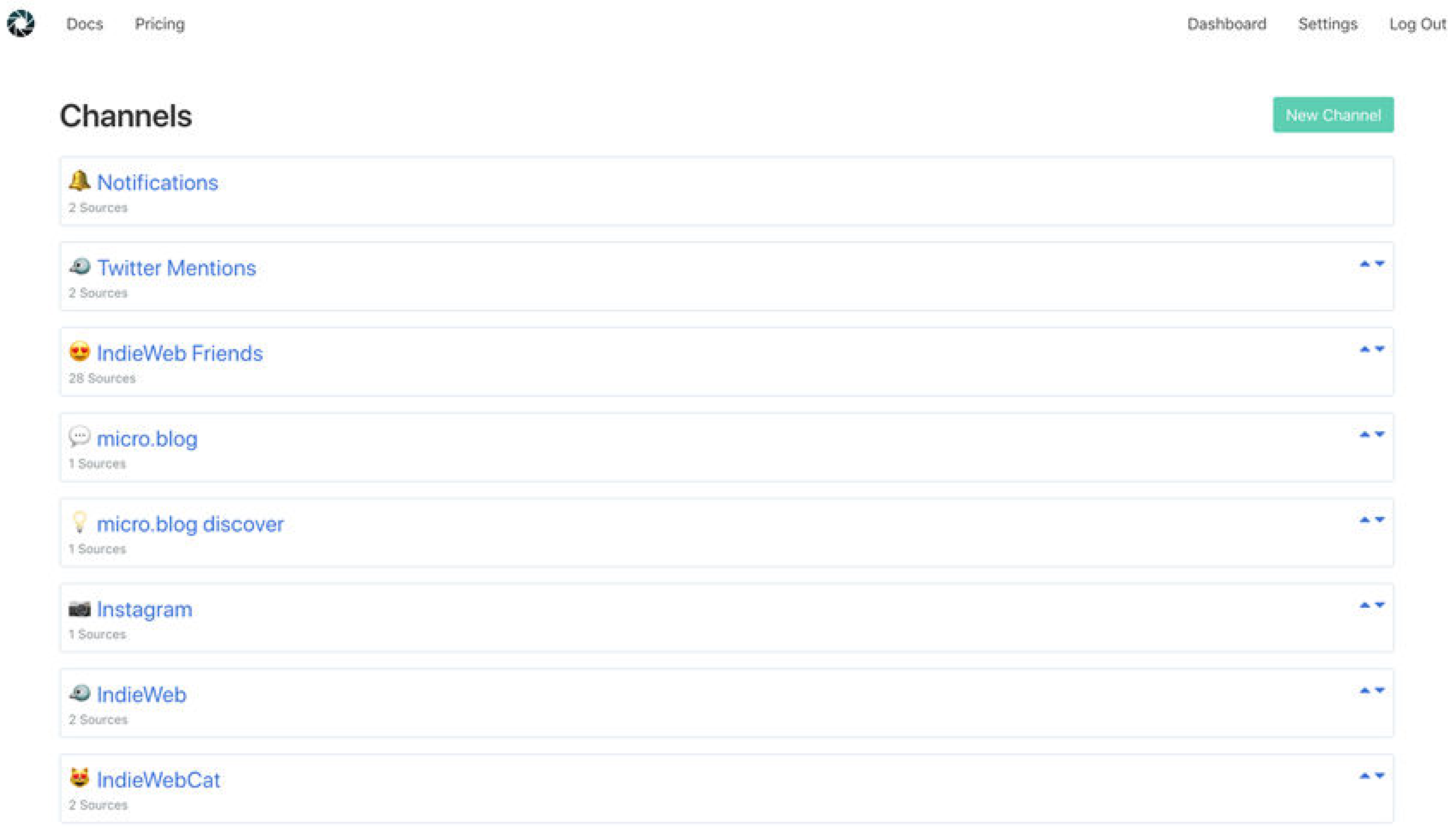
☑ **read**
Allows the application to read content from channels

□ **follow**
Allows the application to follow and unfollow feeds

□ **channels**
Allows the application to manage your channels

▶ Channels

aaronparecki.com



Channels

Notifications
2 Sources

Twitter Mentions
2 Sources

IndieWeb Friends
28 Sources

micro.blog
1 Sources

micro.blog discover
1 Sources

Instagram
1 Sources

IndieWeb
2 Sources

IndieWebCat
2 Sources

aperture.p3k.io

IndieAuth Providers

micro.blog

WordPress Plugin

Drupal Plugin

withknown.com

- Selfauth – PHP
- Dobrado – PHP
- Acquiescence – Ruby
- Cellar Door – Node.js
- Microblog.pub – Python

and more!

indieweb.org/IndieAuth

IndieAuth Summary

An extension to the OAuth authorization code flow

- Prompt user for their identity (URL input, browser extension auto-fill, etc)
- Discover user’s authorization endpoint
- Send the user there to ask their permission
- On the redirect back, exchange the authorization code for an access token and the user’s canonical URL

Learn More

https://indieauth.net

https://aaronparecki.com/2018/07/07/7/oauth-for-the-open-web

indieweb.org aaronpk.com