

# The Social Web

## Decentralization and Building a Better Internet



#RubyWorld2024

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Hello everyone.

# Andy Piper

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I am Andy Piper. You may know me as a developer advocate on the internet. I've worked in a few places during my career, usually talking about messaging APIs and interoperability. Right now, I am a freelance technologist, and I continue to care about the Web and Open Source technologies, as I always have done.

One of the ways that I contribute to the web and open source in practical terms, is that I work with the Mastodon team on developer relations and community.

It is wonderful to be here!

This is not my first time in Japan, but it has been a few years since I was last able to visit this wonderful country. Thank you for having me here again. It is extra exciting for me, because it is Ruby Week! I'm honoured to be here in Shimane, speaking to such a talented group of Ruby developers.

I've used a number of different programming languages in my career, some a lot more than others. Let me tell you about my relationship with Ruby.

My first experiences with Ruby were back in 2012, when I worked on the early version of Cloud Foundry at VMware and Pivotal. Cloud Foundry eventually switched to Go, but I spent a lot of time with Ruby back then. I have also had the pleasure to meet Matz [gesture to him if he is there] a couple of times before on my previous visits to Japan. I do not use Ruby myself very often today, but I still appreciate its value and importance, and I will talk about that today.

# Message from Eugen Rochko



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Why am *I* here? Well, I am very happy and honoured to be here on behalf of Eugen Rochko, the founder of Mastodon, who was not able to travel here to speak to you all in person.

I have a short message from Eugen that I brought with me, and I'd like to play that for you now.



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# Today's topics

- Why decentralization matters
- Growth of the open Social Web
- Challenges to building a better internet
- The Ruby perspective



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So let me begin by telling you what we're going to cover today.

[1] First, I'll talk about the decentralized social web, and why that's important; right now, more than ever!

[2] We will look into how the Social Web has grown.

[3] We will talk a little bit about why it is difficult to make something better, but why it is worth doing.

[4] Of course, I want to talk about Ruby as well!

And I hope to convince you all that the Social Web needs your passion, code, and support.

Let's get started.

# Building a Better Internet Together



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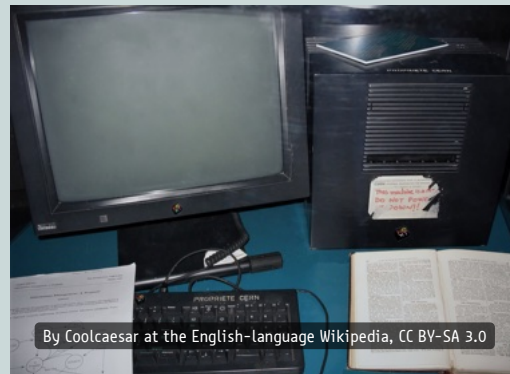
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## [section 1]

Today I'm excited to talk about how WE - all of us - can build a better internet, one that centres on users and communities, not corporations with hidden motives.

I'm here to represent Mastodon, this decentralized social media platform that's part of the larger, growing open Social Web, and that is written in Ruby. I also care about making a better online experience for everyone, beyond Mastodon!

# Evolution of the Internet



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In order to understand why decentralization matters today, let's look back at how the internet has developed.

My university degree subject was History, and I believe that we need to understand the history of our technology. I think that my interest in history has also given me a deep interest in people, society, and culture.

The internet started as a space for collaboration.

The World Wide Web offered *incredible* opportunities for people to share, connect, and create freely. It was meant to be a space of open exchange. Sir Tim Berners-Lee, the inventor of the web who is from the UK like me, famously said: "This is for everyone".

The *PROBLEM* was that as the web grew, so did the power of a small number of technology giants. Today, a few dominant companies set the rules for most online social spaces.

Society and technology are extremely interconnected. We see this all the time.

# The Problem with Closed Platforms



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We thought we were building a digital public square, but that evolved into a collection of private, profit-driven platforms that prioritize data collection for advertising, and algorithms to drive engagement over user well-being.

You might notice something else, as well - those private platform don't want you to easily access and share content between them, they want you to post your content into, and stay on, their platforms! Very often, they do not want you to make that choice to use a different tool, so they add more and more features into their own apps like chat, and video, and selling you things, so that you never have to leave.



# Online World in 2024

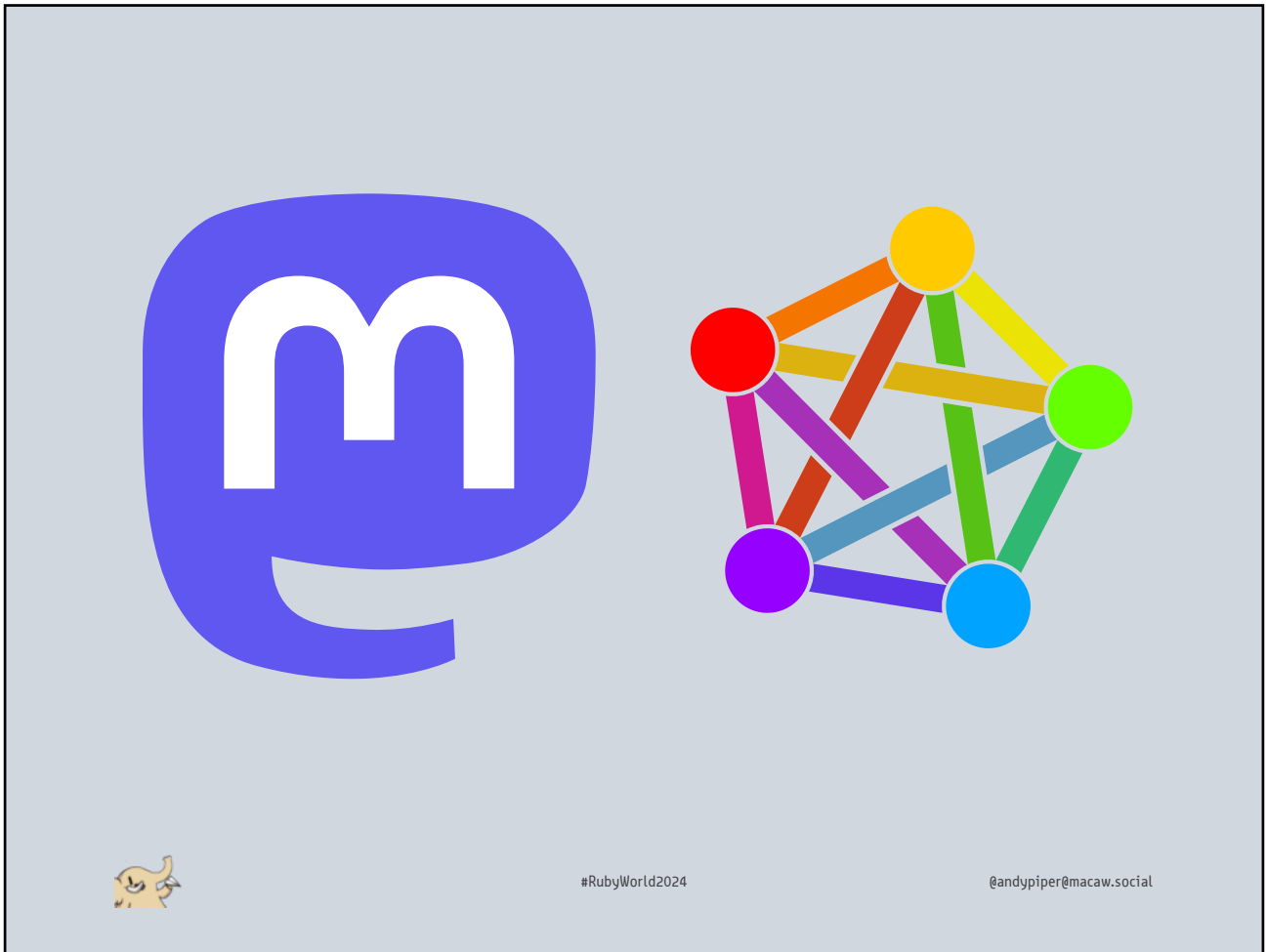


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Around the world, Right Now - we see changes that might challenge the freedoms that the internet has shown us all.

With so much power centralized by technology giants that are either in the USA or China, we've seen them influence decisions affecting our privacy, data security, and even democracy itself.



[section 2]

Mastodon offers an alternative to the closed social platforms.

It is based on the web's open, collaborative roots. It's part of the Fediverse (or Social Web) , a collection of interconnected services that operate independently, but can communicate seamlessly - this is called "federation".

Mastodon and the Social Web are powered by the ActivityPub protocol, and over the past couple of years there has been rapid growth in the number of services embracing federation.

# Launch of Social Web Foundation

Leaders of the open social networking movement have formed the Social Web Foundation, a non-profit organization dedicated to making connections between social platforms with the open standard protocol ActivityPub.

The “social web”, also called the “Fediverse”, is a network of independent social platforms connected with the open standard protocol ActivityPub. Users on any platform can follow their friends, family, influencers, or brands on any other participating network.

ActivityPub was standardized by the World Wide Web Consortium (W3C) in 2018. It has attracted over 100 software implementations, tens of thousands of supporting web sites, and tens of millions of users.



ActivityPub is a standard that is overseen by the W3C, the same organisation that supports many of the core web standards.

Recently, the Social Web Foundation was formed, to help support and sustain momentum around ActivityPub. In their launch post, they wrote:

“The “social web”, also called the “Fediverse”, is a network of independent social platforms connected with the open standard protocol ActivityPub. Users on any platform can follow their friends, family, influencers, or brands on any other participating network.

ActivityPub was standardized by the World Wide Web Consortium (W3C) in 2018. It has attracted OVER ONE HUNDRED software implementations, tens of thousands of supporting web sites, and tens of millions of users.”

This is not just about adopting a technical protocol, although ActivityPub is very important.

# Philosophy & Principles

- user-centric
- privacy
- locality
- choice
- resilience



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This is a philosophy that puts users first, emphasizing local and community control and user empowerment. It is about an internet culture that values privacy, locality, choice, and resilience.

These are the principles that define Mastodon and the Fediverse.



BLOG

## Fediverse for Freedom

Posted on August 15, 2024

Tags: #Blueprint2024, 100DaysToOffload, 425, activitypub, bluesky, DMA, eu, european union, federation, fediverse, freedom, government, journalism, media, meta, NSI, parliament, press, social media, social web, threads, united kingdom, web



Over the past week, there's been a noticeable shift away from X in the UK, and it feels long overdue. According to Bluesky's PR, the platform has seen a surge in new users and activity from the UK. I've personally noticed more people finding my profiles on



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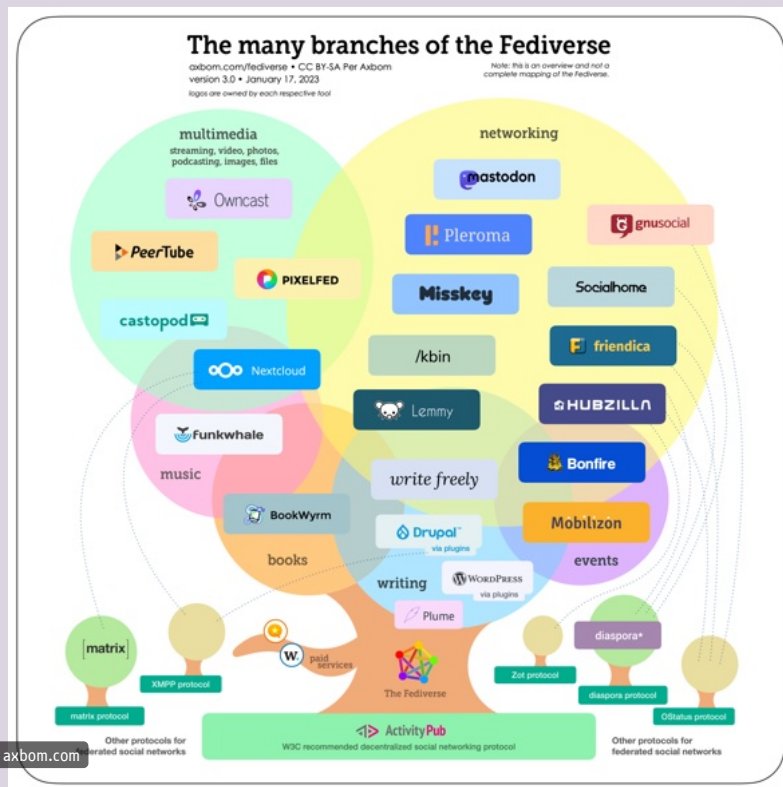
When we think of social media, we often talk about that small group of big companies, and those dominant and centralised platforms who don't really want you to go or to connect anywhere else.

The Fediverse changes this. Anyone can run their own platform, build their own community, and still communicate with others around the world.

This is also really important for public institutions such as governments and other organisations.

They have the opportunity to run their own services. This means that they no longer have to rely on private companies owned by billionaires, who can limit their access or ability to post at any time. I wrote about this on my blog several times this year. We see a number of organisations actively operating their own social web presences today, particularly in Europe.

In the light of recent global developments, I think we will see more countries and organisations realising that having all of your data hosted by a few US-based companies is not necessarily a great idea.

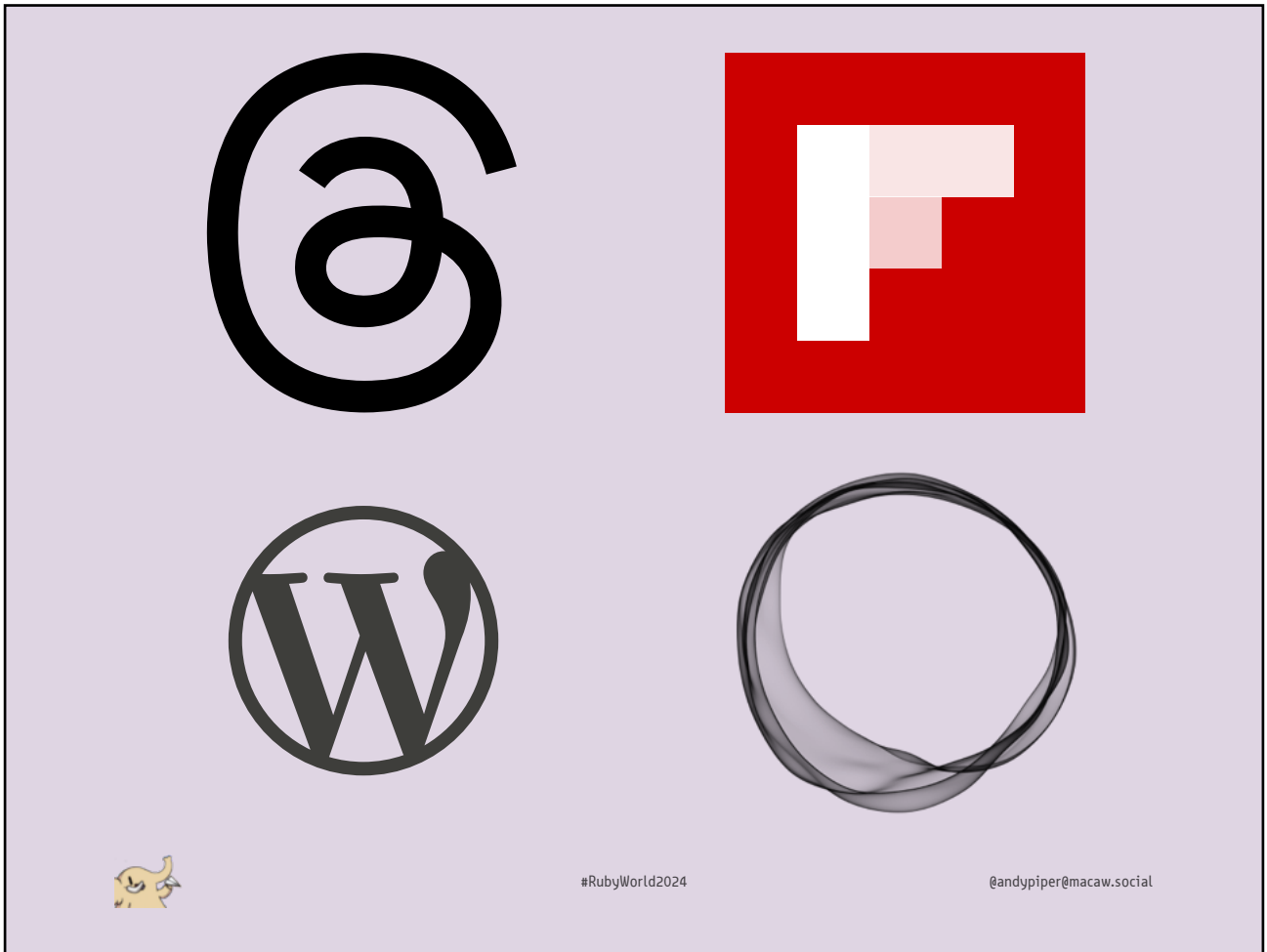


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Mastodon is one of the most well-known fediverse platforms, but there are services like PeerTube for video sharing, Pixelfed for photos, BookWorm for reading.

There is a lot of opportunity to build new things. There is a new short video app called Loops (a bit like TikTok) which is part of the movement to federate as well.

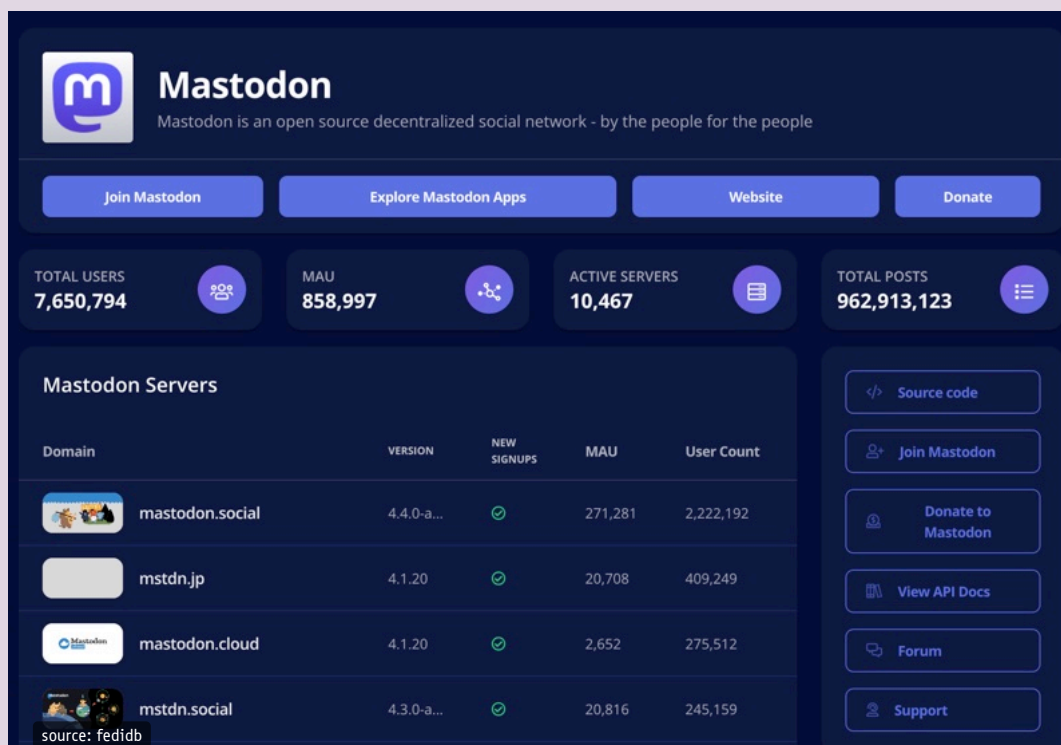


There are existing networks opening up, as well.

In the last year, we have seen Meta's Threads platform launch with a promise that it will be part of the fediverse. It has slowly started to federate, and users on other non-Meta platforms can follow Threads users if they opt-in to sharing. Just a few hours ago today, Threads enabled the ability for users on Threads to follow users on other platforms, so for the first time you can follow my Mastodon account (which is my main social account) on Threads! This is very very cool!

We have also seen established platforms like Flipboard and WordPress join the fediverse. The blog and newsletter platform Ghost is posting regular updates as they start to add features for federation as well.

All of this progress is really cool - it means I can write my blog on WordPress, post my photos on Pixelfed, keep my videos on PeerTube, and I can share those same things directly on my Mastodon account or any platform that supports ActivityPub.



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One of the largest Mastodon communities is right here, in Japan.

This dates back to 2017, right after Mastodon was started. mstdn.jp was created in April 2017 - it went viral and saw a growth of tens of thousands accounts within a few days, a catalyst for Mastodon's popularity in Japan.

If you look at this, you can see that mstdn.jp is still the second largest Mastodon instance worldwide, by numbers - both overall registered users, and the monthly active user count.

We really want to say thank you to our friends at Sujitech for running the instance, and for their support of Mastodon.

Mastodon is not only about individual large instances, though - it is important that there is a diverse community of different servers, with their own rules and owners, to accommodate many different interests. Diversity makes the internet stronger, and it makes the web more interesting.

Of course, Mastodon itself is only part of the fediverse story - for example, I know that the Misskey community is very active in Japan as well. I think the interest in Mastodon and the fediverse in Japan might be because they have values that are understood here: local community, respect for users, and data sovereignty.



# Challenges



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[section 3]

Building a decentralized social network like Mastodon has a unique set of challenges, both technical and social. I want to spend a bit of time talking about those, because we need to make an effort together to overcome them, if we want to build a better system together.

# Centralised platforms



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A centralized platform has one set of rules, one server architecture, and one approach to moderation. Oh, and usually there's only one owner with one business model, as well.

That makes it mostly easy to manage, but means that it can be difficult to fit well with a local culture, or to support a range of different opinions and views.

A centralized platform can also remove access or choose to limit the ability to post.

# Decentralised platforms



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In a federated system, there is no central control. Every server and platform may have its own rules, and be run in a different way, under different legal requirements.

Mastodon (and other ActivityPub services) operates as a federation of independently hosted servers, or “instances.” Each instance needs to handle its own user data, security, and interactions with other servers. There are technical challenges to hosting and scaling the data, and the network connections. We need to discuss and agree on the technical standards, as well. The Social Web Incubator Community Group at the W3C, and the less formal Fediverse Enhancement Proposals at SocialHub, are both parts of this discussion.

# Community Standards and Moderation



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There are also *social* challenges. The responsibility for content moderation and community standards belongs to the individual instances and their administrators. This can be great! It means that communities set their own standards, with a more localized experience. The challenge is that it also means that we need to provide good moderation tools, and to build strong ways to collaborate between instances.

People can be as complicated as technology!

If you are interested in these topics - moderation and user safety - there is a non-profit organization, called IFTAS - Independent Federated Trust and Safety - that is working on creating new tools and education in this area. It is an important thing to understand.

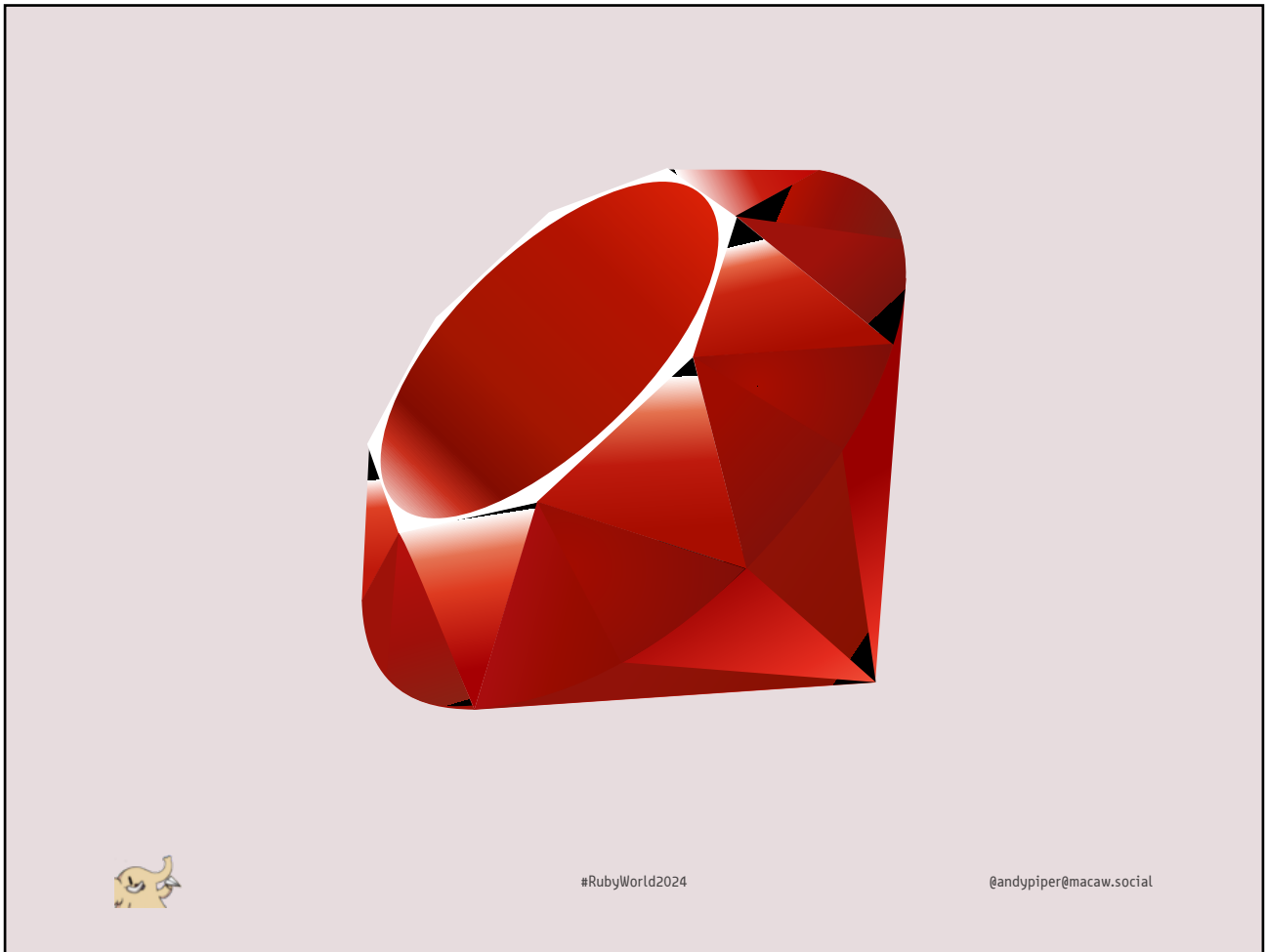


This is the internet, and the internet connects our world.

This means that we must THINK truly globally. We need to enable people in different countries to use the Social Web in ways that make cultural sense. We need people from places such as Japan and other countries in this region to take part in the conversations about technology standards, and user expectations.

This is difficult. There are language barriers between us, and timezones, and sometimes it can be a bit scary when we feel less confident about how we communicate.

There is a lot of work to do, and there are a lot of tools to build, to make the decentralized Social Web successful, and to make it accessible to as many people as we want it to reach.



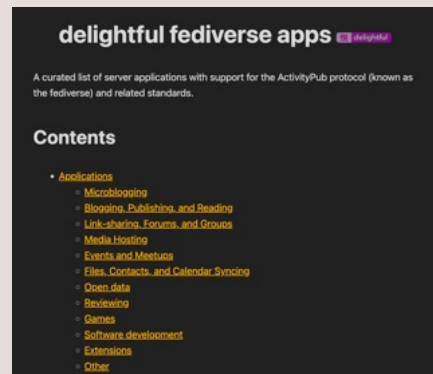
[section 4]

This brings me to my final section - the role of developers, particularly Ruby developers - in building the Social Web.

The Ruby community is global and thriving, and that is very exciting and empowering. In my role as a developer advocate, as someone who works with developer communities, I've seen how Ruby's reach and culture have enabled it to grow and succeed.

Here is the COOL part - Ruby has been a part of this story for at least as long as Mastodon itself, because Mastodon is built using Ruby and Ruby on Rails. And it is going strong!

# Ruby is core in the Fediverse



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Mastodon is not the only ActivityPub service built with Ruby. For example, there is a new app, called ManyFold - a 3D printing catalog app - that is also built with Rails. There is also a Ruby gem called Federails that provides ActivityPub support for apps, and I know that the author of ManyFold has been contributing to that. If you look at the “delightful Fediverse” list of apps, there are at least 20 references to Ruby, and that is really cool!

And of course you have your own "Matz-todon" instance, ruby.social!



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I'm here to talk about Mastodon! So let me tell you a bit about the importance of Ruby to the Mastodon project.

Six months ago, we started to share a monthly blog series which is “behind the scenes” from our development team, where you can follow what we are working on. We call this “Trunk and Tidbits”. If you read these blog posts, you will see a summary of the changes we are making over time, and also learn about new things that we are working on.

I help to write the blog posts, but I told you at the start of the talk that I do not write and run Ruby code myself every day, so I talked to the team to get a good understanding of what we have been building and learning!

In the most recent release, 4.3 that came out in October this year, we updated our dependencies. We support the maintained Ruby versions, and try to update our recommended version to the most recently-released Ruby. With 4.3, we moved our baseline to Ruby 3.3.

We saw significant improvements after updating to Ruby 3.3 and YJIT.



# Ruby 3.3

## 15-20% CPU usage and response time improvements



150k RPM peak on mastodon.social

120ms P90 response time

200m Sidekiq jobs/day on 160 CPU cores



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When we upgraded our flagship instance - mastodon.social - from Ruby 3.2 (with YJIT enabled) to Ruby 3.3 also with YJIT, we saw 15-20% response time and CPU usage improvements. We really love these kinds of improvements in Ruby, and we are already planning to move on to Ruby 3.4 in the future.

Our backend stack is a classic Rails app with Sidekiq and Postgres, in a big monolith. We serve more than 150k RPM at peak on mastodon.social, with a 120ms P90 response time. We process more than 200 million sidekiq jobs per day, on 160 CPU cores, which is quite impressive!

By the way, as well as mastodon.social, we also operate a second instance, mastodon.online. We run the latest code from GitHub on mastodon.social and mastodon.online as much as we

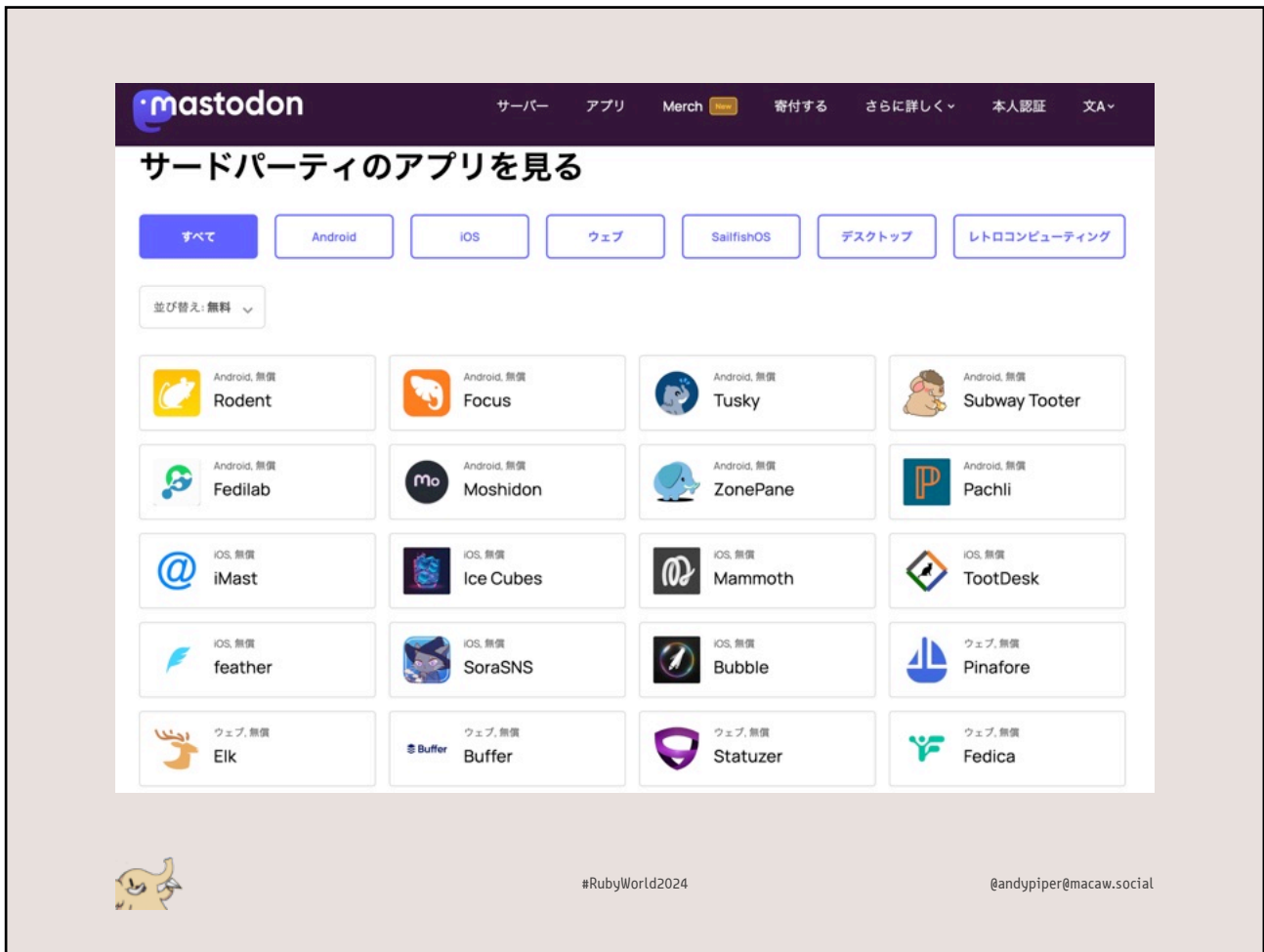
can, to get new features to a lot of users and to get a good idea of the performance and usability of our updates.

We try to use modern Ruby constructs where we can. The Mastodon codebase is very clean and well organised for such a large project, thanks to the expressiveness of Ruby, and Rails patterns. We find that this combination makes it easy to prototype new features as we improve Mastodon.

As well as the overall Ruby runtime, we're also closely following the recent performance improvements in the json gem. Right now, we use a third-party gem for JSON processing called oj - this has been valuable for many years, but the recent work on the json gem has brought it level with oj, and our preference to reduce dependencies as much as possible means that we hope to move to the json gem soon.

A lot of this great performance work originates from Shopify, so we are really grateful to their contributions to Ruby! As a community, please continue to improve Ruby, and making it better for everyone!

There are a number of ways for Ruby developers to get involved with Mastodon itself. The best place to start is our CONTRIBUTING guide, which has a lot of information about how our small team works, and how we accept contributions from the developer community.



My role on the team is to help developers to work with the Mastodon API, and to be successful building apps with Mastodon. Our team is in different places around the world, but we might not always know how users in countries such as Japan prefer to use a social network, so I strongly believe that it is important to have a variety of apps available. We know that there are some great apps from here in Japan, such as SoraSNS on the iPhone.



Photo by Shane Rounce on Unsplash



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I want to finish my talk today, with this message.

It's not just about Mastodon. It's about you, and it's about all of us.

You - Ruby developers - have an opportunity to help to expand the fediverse and open social web ecosystem, by building new libraries, apps, and tools, even whole new platforms. Go out and invent new things!

The website describes Ruby Week as: "a campaign that expresses the values of "freedom, fun, and contribution to the community" that are alive in Ruby." and I love that description! Freedom, fun, and contribution. This is great.

It is not just writing code.

We - all of us here in this room today - are able to shape the future of the internet with all of our contributions to the community.

We - ALL of us here in this room today - need to tell the story of the web to our friends and families, opt when we can to support open platforms over closed algorithms, and we need to make sure that the future of the internet is decentralized, safe from efforts to subvert our freedoms.

We have the power to build an internet that is open, free, and based on the values of community and trust that we care about.

I'm here today and asking you all to help us on the Mastodon team, and friends of the Social Web Foundation, to do that.



Finally - again, Mastodon is a non-profit organization. We rely on donations to keep us going.

Please support us if you can. It is more important than ever before that there are financially stable, sustainable, open alternatives to the legacy centralized platforms operated out of one or two specific countries.

We appreciate all of you, and I want to thank the developer community here in Japan and the Ruby developer community, for everything you bring to the free and open Social Web.

Thank you! Enjoy RubyWorld!