



# Mastodon Project Structure

The decentralized social network server. A massive Ruby on Rails application that uses Node.js for streaming and React for the frontend.

Updated 2025-12-30

#mastodon #ruby #rails #react #nodejs #activitypub #federation

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## Project Directory

mastodon/

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app/

Main Rails Appl...
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📁

models/

ActiveRecord mo...

📄

account.rb

📄

status.rb
- ▼

📁

services/

Business logic ...

📁

activitypub/

📄

post\_status\_service.rb

📄

process\_mentions\_service.rb
- ▼

📁

controllers/

API & Web Contr...

📁

api/
- ▼

📁

javascript/

React Frontend

📁

mastodon/

Main SPA source

📁

packs/

Webpack entry p...
- ▼

📁

lib/

📁

activitypub/

Protocol implem...
- ▼

📁

streaming/

Node.js WebSock...

📄

index.js

📄

package.json
- ▼

📁

config/

Configuration

📄

routes.rb

URL routing

📄

sidekiq.yml

Job queue config
- 📁

spec/
- RSpec Tests
- 📄

Gemfile
- Ruby dependenci...
- 📄

package.json
- JS dependencies
- 📄

docker-compose.yml
- Dev infrastru...



## Repository Info

**Repository** - mastodon/mastodon

**Stars** - 45k+

**License** - AGPL-3.0

**Last Analyzed** - December 2025



## Tech Stack

**Backend** - Ruby on Rails

**Frontend** - React + Redux

**Streaming** - Node.js (WebSockets)

**Database** - PostgreSQL

**Queue** - Sidekiq (Redis)

**Search** - ElasticSearch



## Architecture Notes

Mastodon is a monolithic Rails application for the most part. However, it offloads real-time updates (streaming timeline) to a separate Node.js service located in the `streaming/` directory. This hybrid approach allows it to leverage the rich Rails ecosystem for business logic while using Node's event loop for high-concurrency connections.



## Key Directories

**app/services/** - This is where the magic happens. Mastodon relies heavily on Service Objects to handle complex actions like `PostStatusService` (posting a toot) or `ProcessMentionsService`.

**app/lib/activitypub/** - The implementation of the ActivityPub protocol. This code handles the serialization and deserialization of JSON-LD messages that allow Mastodon to talk to other servers.

**app/javascript/mastodon/** - The React frontend. It's a Single Page Application (SPA) that communicates with the Rails backend via the REST API.



## Why This Structure?

Mastodon is the reference implementation for the ActivityPub protocol. Its codebase is a great resource for understanding how to build federated social networks and how to structure a large-scale Rails application with a modern frontend.