CitrineOS

Open Source Charger Network Software for Rapid OCPP 2.0.1 and NEVI Compliant EV Charge Management

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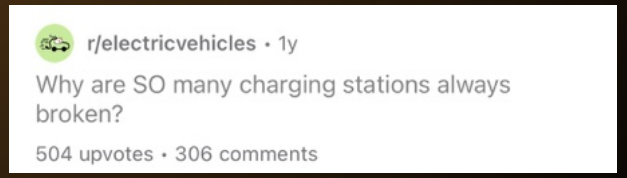
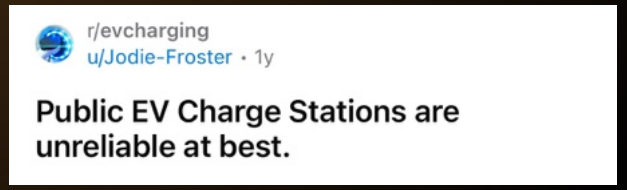
Broken Chargers

- US study found less than 75% Chargers were working [1]
- Mandates on reliability are coming e.g. in UK [2] and US NEVI funding[3]
- US EV owner survey showed broken chargers as a major concern for charging on public infrastructure[4]
- Reddit users are unhappy [r/electricvehicles, r/evcharging]

https://www.metrowestdailynews.com/story/news/2022/06/09/senators-upset-over-broken-ev-charger-stations-mass-pike/7549513001/





[1]: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4077554

[2]: https://www.gov.uk/government/consultations/the-consumer-experience-at-public-electric-vehicle-chargepoints/the-consumer-experience-at-public-chargepoints

[3] https://www.whitehouse.gov/briefing-room/statements-releases/2023/02/15/fact-sheet-biden-harris-administration-announces-new-standards-and-major-progress-for-a-made-in-america-national-network-of-electric-vehicle-chargers/

[4] https://pluginamerica.org/wp-content/uploads/2023/05/2023-EV-Survey-Final.pdf

Proprietary Implementations

Dall-E’s interpretation of messy integrations for OCPP 1.6

What we have seen in the field is

- Messy integrations between software stacks
- Misunderstood OCPP 1.6 message exchange on both Central system and charger
- Obscure custom messages for monitoring
- Broken parts of the charger go unnoticed

How to improve the current state

Use OCPP 2.0.1

- Clear cut use cases and test cases
- Advanced monitoring

Make Open Source

- Making OCPP 2.0.1 accessible for testing and knowledge building
- Community involvement improves cross compatibility

Dall-E: symbolic battle between OCPP 1.6 and OCPP 2.0.1, with OCPP 2.0.1 winning

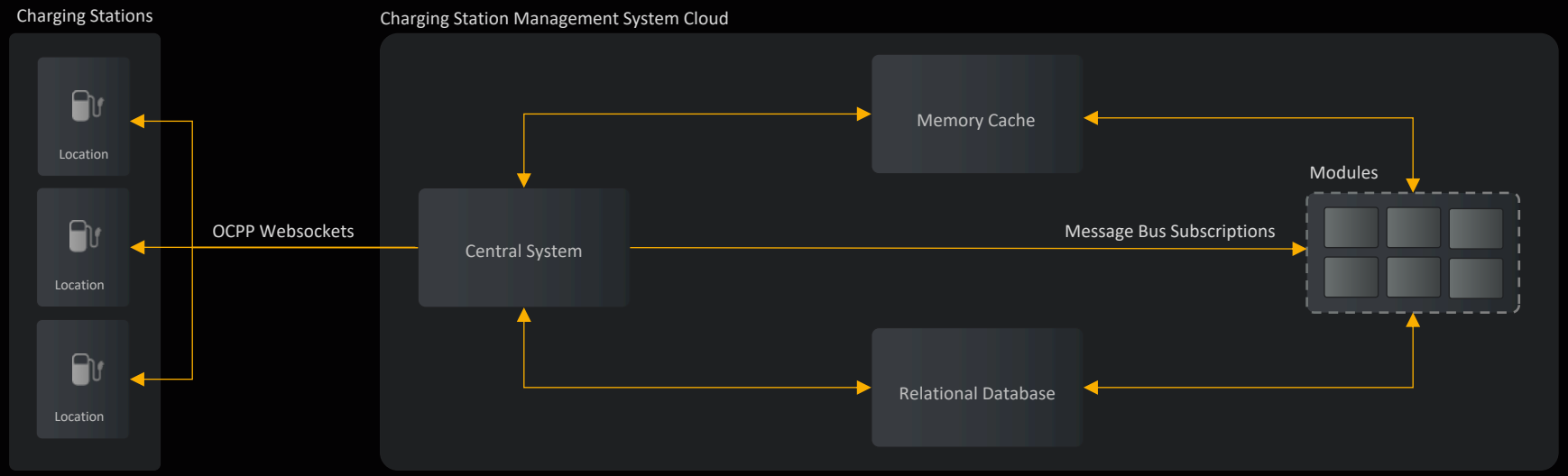
CitrineOS

- Written in Typescript for NodeJS
- API Based with a modular architecture
- Currently passes the OCTT Core and Advanced Security test cases
- Under Apache 2.0 License
- Recently adopted as a Linux Foundation Energy project

LFENERGY

System Architecture

Citrine is an OCPP 2.0.1 Charging Station Management System (CSMS) designed to be adaptable to various infrastructures and easily extensible via modular design. It uses the fastify web framework.



Looking under the hood

JSON schema generation out of the spec

- Part 3 of the OCPP spec includes raw JSON of the messages. CitrineOS uses JavaScript to generate schemas to use with AJV for validation and Typscript interfaces for the code

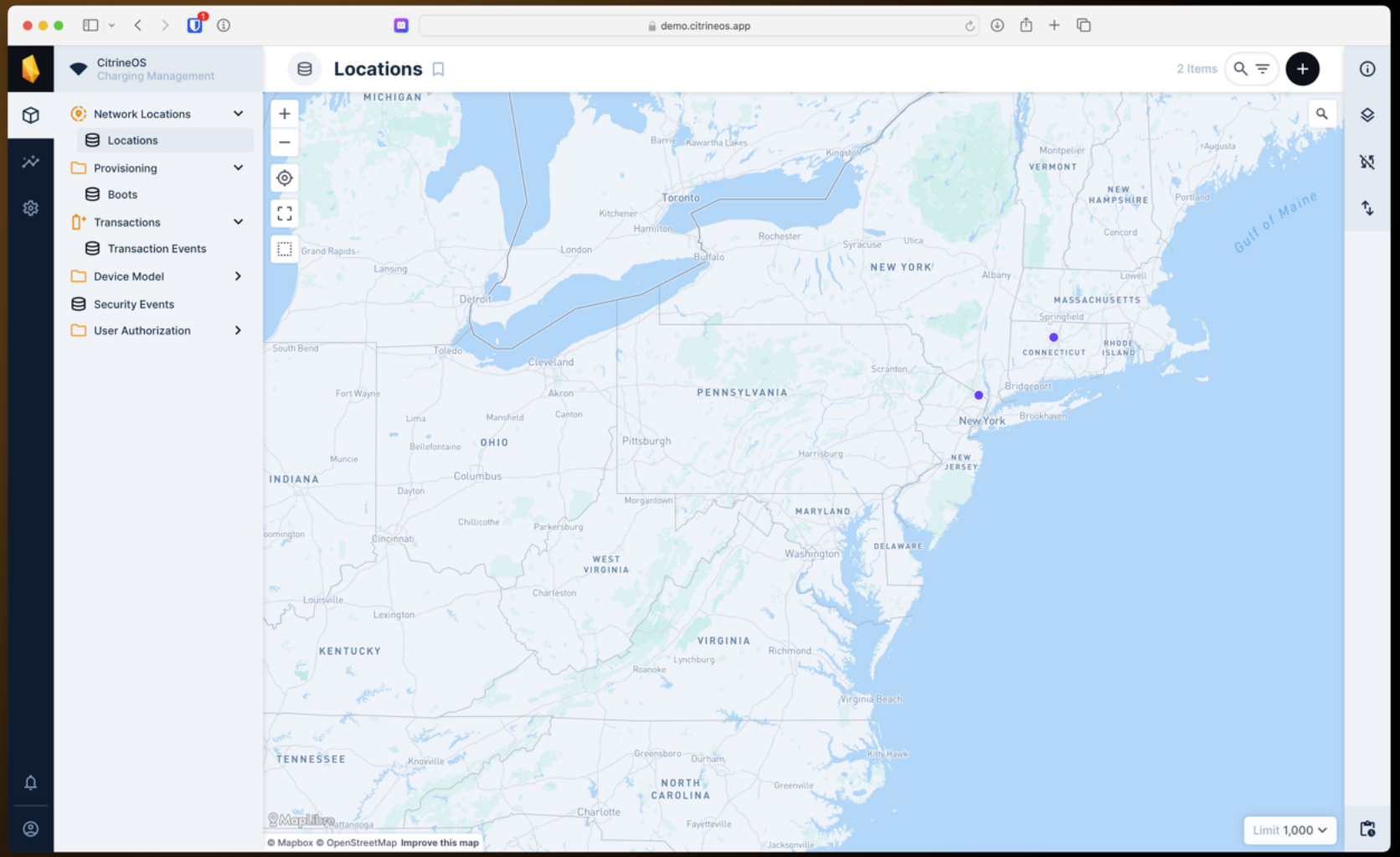
Configurable logical modules with decorators

- `@AsHandler` to handle incoming OCPP 2.0.1 messages
- `@AsMessageEndpoint ` to expose functions allowing to send messages to charging stations
- `@AsDataEndpoint` to expose CRUD access to entities

OpenAPI documentation for a REST interface

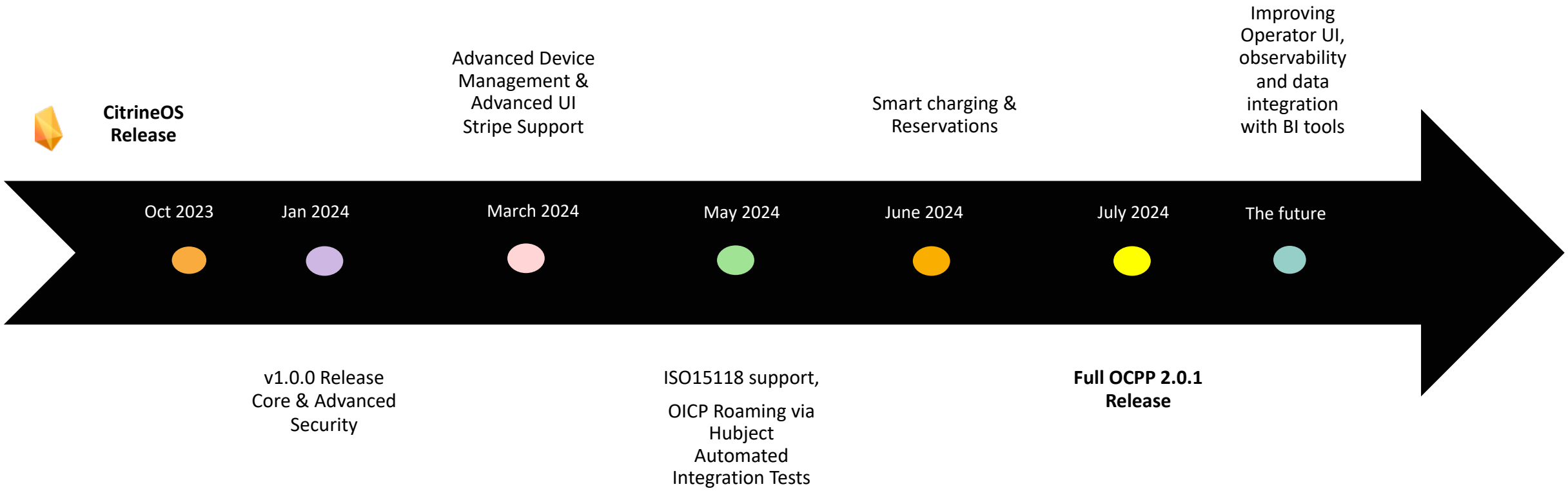
- Push OCPP messages to chargers and CRUD operations on data objects

Looking at a UI



Utilizing Directus as a simple UI that we can configure and customize to build nice flows

CitrineOS Roadmap



Call for Contributors

- Check out the project on Github (citrineos/citrineos-core)
- First technical steering committee happening March 14
- Get involved and bring ideas
- Join the Discord server