A Web Rendering Engine For The Future 🔮

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X ION | Europe

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About Me

- **Igalia** Web Platform Team
- **Web engines hacker** with experience in Chromium/Blink and Safari/WebKit
- **CSS Working Group** member since 2017
- **Servo** Technical Steering Committee (TSC) chair since 2023

About Igalia

- **Open Source Consultancy** founded in 2001
- 140 people, fully remote (25 countires)
- **Flat structure** (cooperative like model)
- Top contributors to **Chromium, WebKit, Gecko and Servo**

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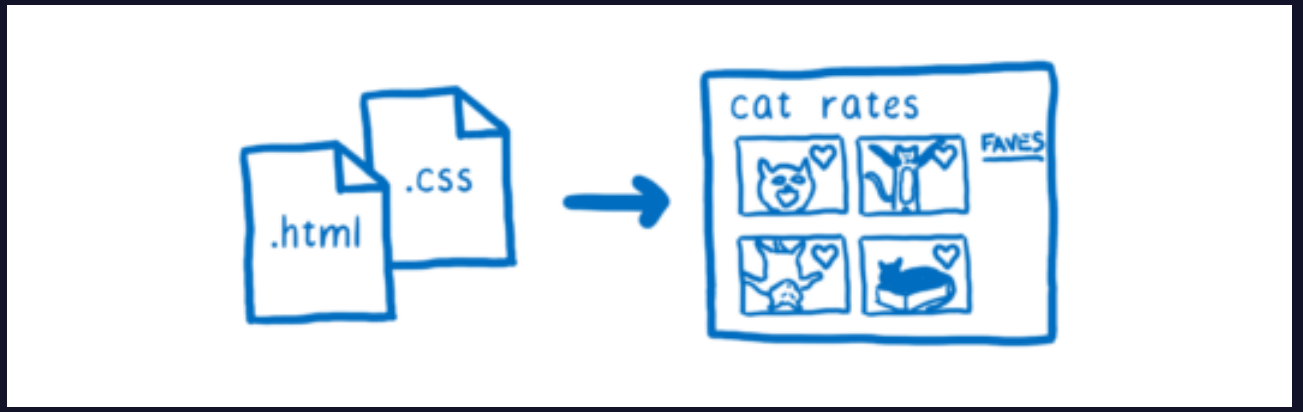
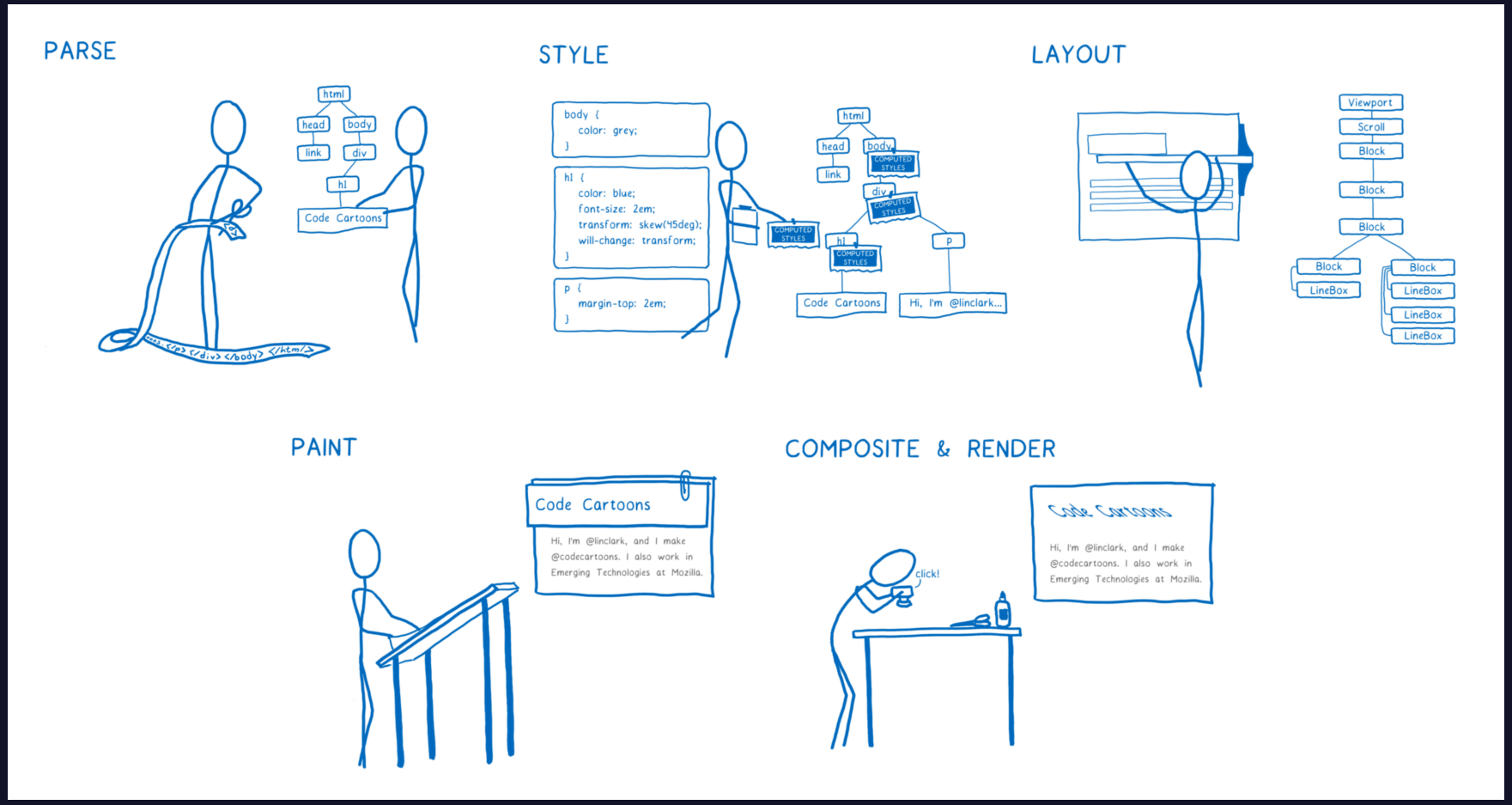
and **embedded** applications.

Web Rendering Engine



- **Blink** (Chrome), **Gecko** (Firefox), **WebKit** (Safari)
- Huge projects: **millions lines of code**
- Big teams: >100 engineers

Rendering Engine Main Phases



Pictures by Lin Clark

https://hacks.mozilla.org/2017/08/inside-a-super-fast-css-engine-quantum-css-aka-stylo/

Servo Phases & Modules

- Parsing: html5ever, **rust-cssparser**
- Style: **Stylo**
- Layout
- Painting
- Compositing: **WebRender**

JavaScript engine: **SpiderMonkey** (C++)

What's Not Servo Right Now?

- A web browser.
  Servo is a **web rendering engine**
- A production ready rendering engine.
  Servo is **experimental**
- An engine to browse the general web.
  Servo can render a **controlled environment**

Features

Independent

- 2012-2020: Mozilla Research
- 2020-2023: Linux Foundation
- 2023-: **Linux Foundation Europe**

Independent

	2022	2023	2024 H1
PRs (total)	215	1094	1152
PRs (no bots)	65	673	711
Contributors	20	54	73

Independent

- Main web engines are managed by **big corporations** (Apple, Google, Mozilla)
- Funding comes from **Google Search & Ads**
- Servo:
  - **Open governance** at LF Europe
  - Managed by the **TSC** (Technical Steering Committee)

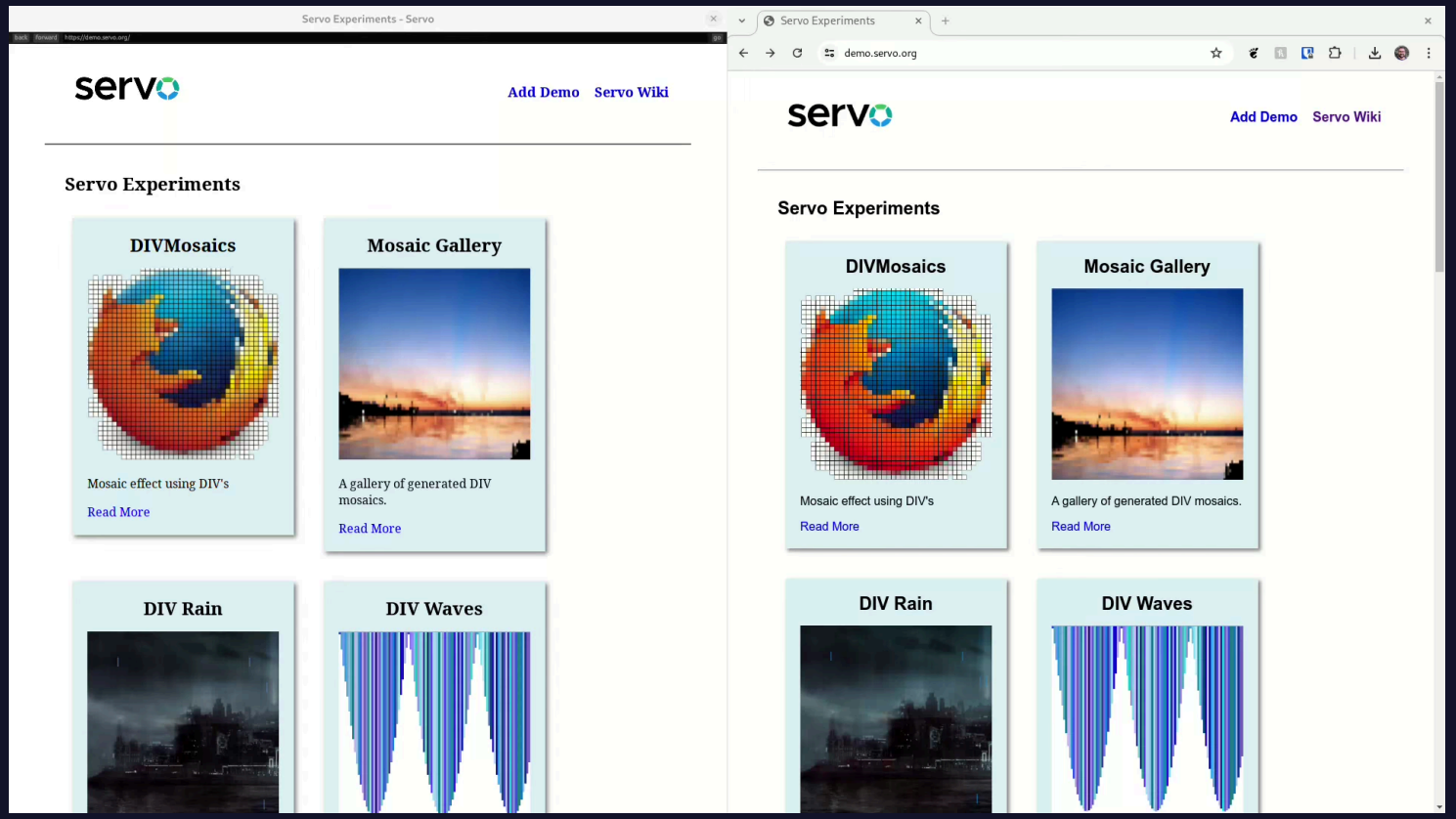
Parallel

- Since project's inception **parallelism** has been a foundation (Rust)
- Servo has a **parallel layout engine** (despite its complexity)
- Potentially **faster and more energy-efficient** taking advantage of **multiple cores**

Parallel

- No recent **performance work**
- Pending to do **proper benchmarking**
- Initial results are **quite promising**

Parallel



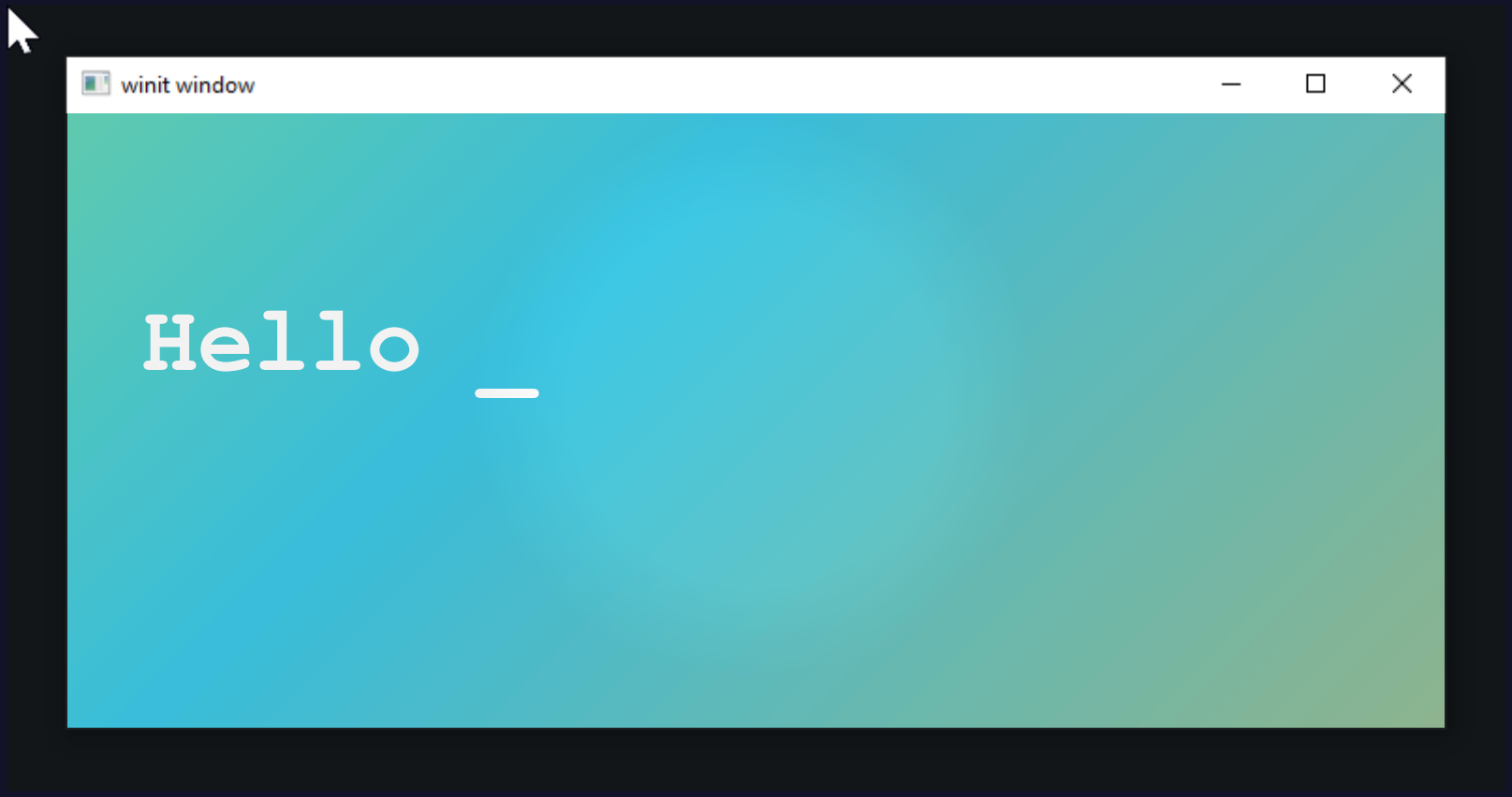
Servo

Chromium

Embeddable

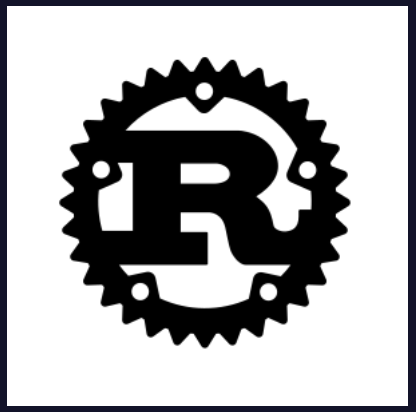
- Provide a **webview** for other applications
  - **API for embedders** is still evolving
  - **Use cases**: UI frameworks, other apps
- Valid alternative for **embedded devices**

Embeddable



Tauri using Servo underneath

Memory-Safe



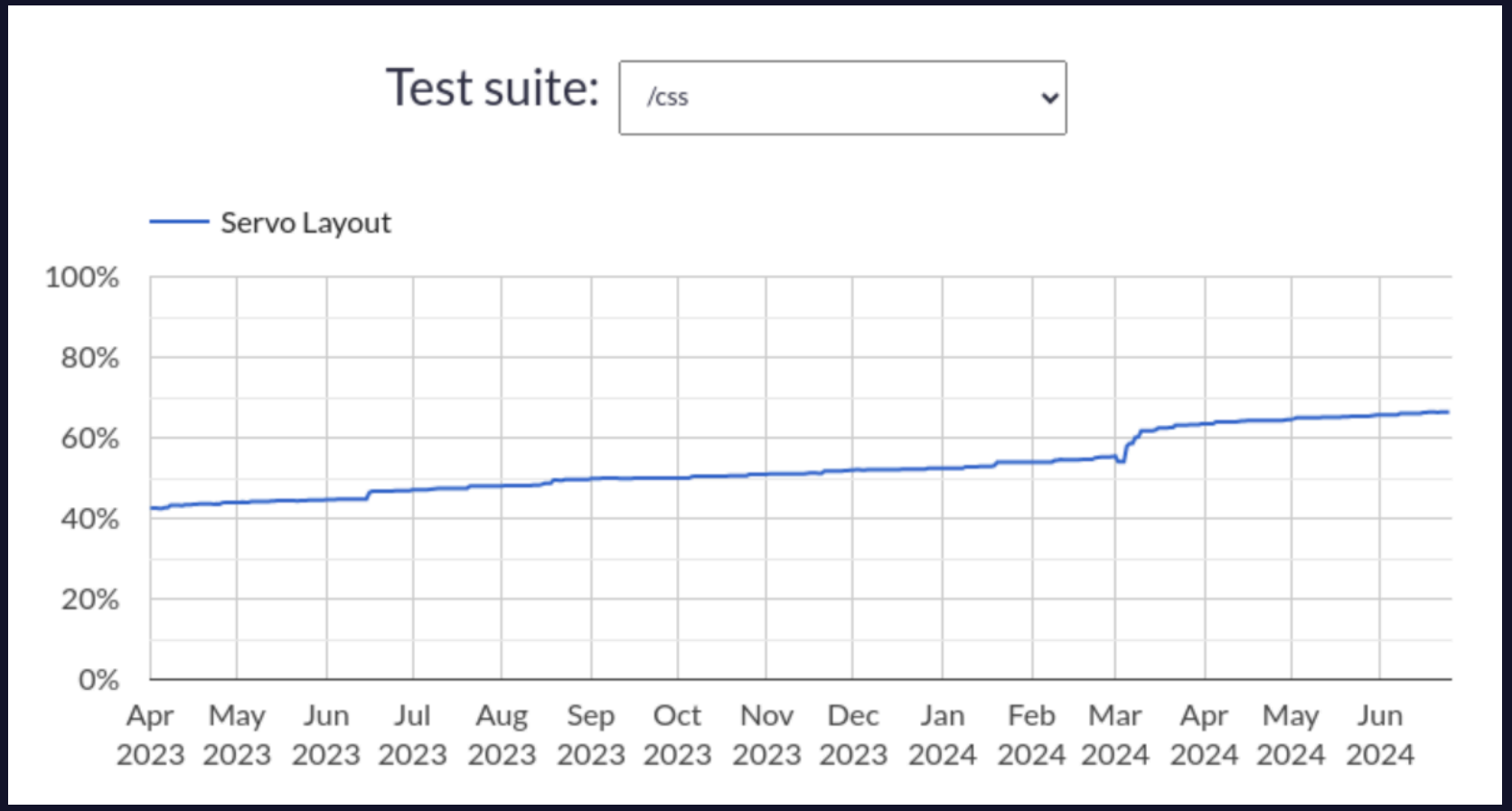
- **Rust** programming language
- **Fewer vulnerabilities** related to **memory** and **concurrency**
- Other web rendering engines use **C++**

Modular

- Several Servo modules (**crates**) are popular in the **Rust ecosystem**
- 🦊 **Firefox** uses some Servo modules:
  - rust-cssparser
  - Stylo
  - WebRender

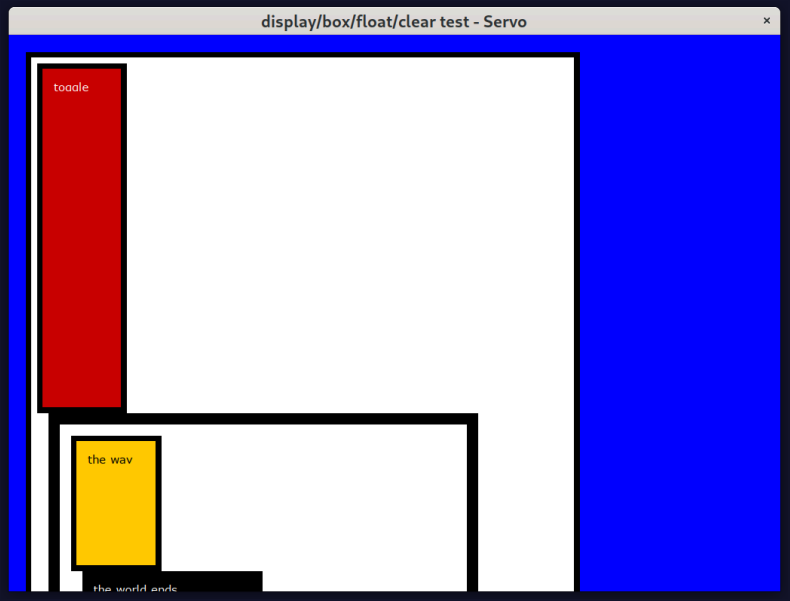
Status

CSS

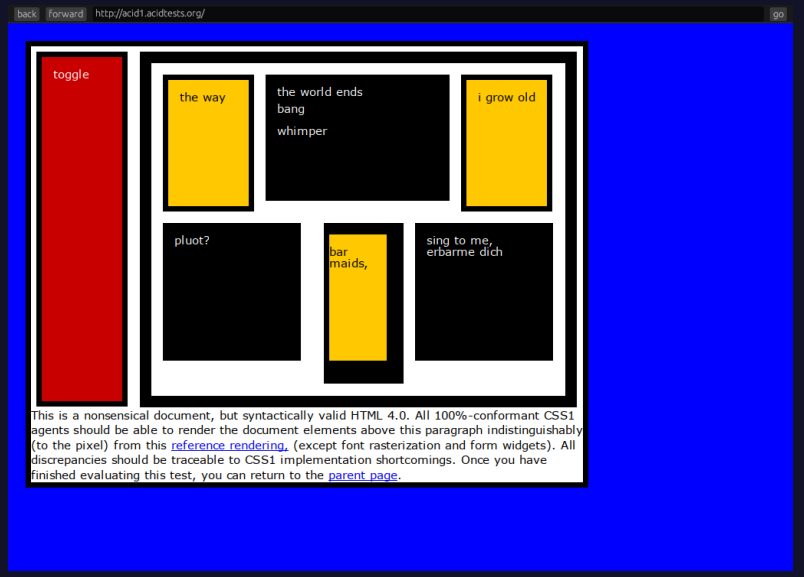


https://wpt.servo.org

Acid1 Test

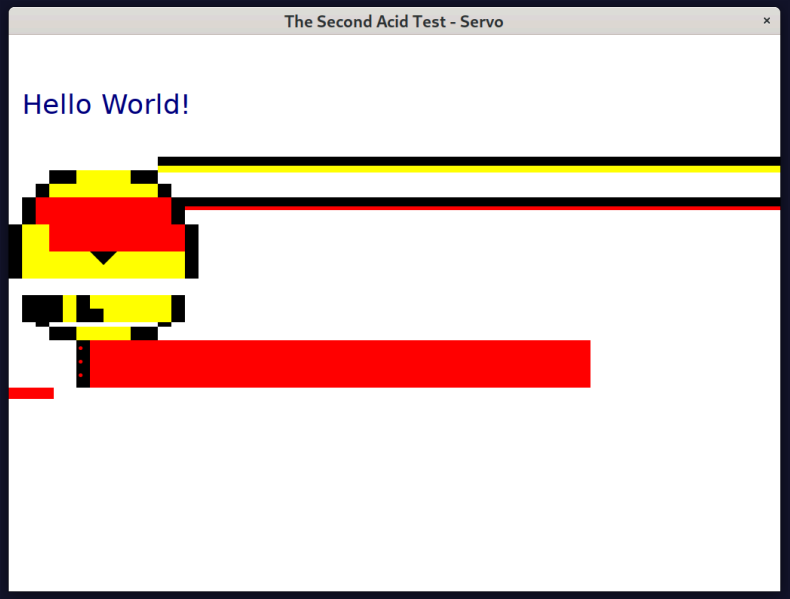


January 2023



June 2024

Acid2 Test



January 2023

June 2024

Long-Term Vision

The embeddable, independent, memory-safe, modular, parallel web rendering engine

HTML & CSS Support

- Servo layout engine **lacks several features**
- Requires a **lot of work** to make it web compatible
- This is a **years-long effort**

Performance

- Servo **has not been optimized yet in most cases**
- Most of the existing optimization work has been done in **modules that are shared with Firefox** (e.g. Stylo, WebRender)
- There's still **a lot of work to do** in other parts of Servo (e.g. incremental layout)

Binary Size & Memory Footprint

- Servo is expected to be a **lightweight and modular web rendering engine**
- Lots of work to do:
  - **Reduce binary size**
  - **Memory usage** fine tuning
  - Allow **customizations** (disabling some parts)
- **No recent work** regarding these topics

Accessibility (A11y)

- A11y in other rendering engines usually have a **negative performance impact**
- Servo aims to have **a11y support without impacting the end user**
- Servo currently **does not have any a11y support**

Popular Frameworks

- Servo **does not support popular development frameworks** (e.g. React, Vue)
- Required work **implementing different web platform specs** to support them
- **Complements the work related to HTML & CSS** including other standards

Popular Websites

- Similar to the previous point
- Servo **cannot render popular websites** due to missing features (e.g. WebRTC)
- **Adding support for features** to be able to use some websites or web apps in Servo

Wrap Up

Servo Rendering Engine

- Strong points:
  - **Independent**: Open governance at LF EU
  - **Performant**: Web content parallelization
  - **Secure**: Rust language
- Not so good:
  - Still **experimental**
  - **Missing features**

A Rendering Engine For The Future

- How to get there:
  - Growing a **healthy ecosystem around the project**
  - With **multiple organizations joining efforts**
  - Public and private sector **funding the project**

Opportunities

- **Simple applications** that need to render web content
  - Known and controlled environment
  - Specific features: WebGL, WebGPU, CSS
- Allowing **UI frameworks** to use Servo
- **Default web engine** in the Rust ecosystem
- Eventually growing to **support a web browser**

Challenges

- Huge **competitors**
- The web platform is **always evolving**
- Not big enough **team**
- Lack of **funding**

Join The Project

- GitHub: `github.com/servo`
- Chat: `servo.zulipchat.com`
- Email: `join@servo.org`
- Sponsor: GitHub & Open Collective

Looking into **growing the community around the project**

https://**servo.org**

https://floss.social/**@servo**

https://twitter.com/**ServoDev**

servo

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