

Introduction to Servo

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@COSCUP 2016

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About Me

- Shing Lyu 呂行
- Mozilla Employee
- Servo team
- Have contributed to Servo since Nov, 2014
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What is Servo

- Parallel **browser engine** developed by **Mozilla Research**
- Written in **Rust**
- <https://servo.org/>



mozilla/browser.html · GitHub

GitHub

This repository Search

Explore Features Enterprise

mozilla / browser.html

<> Code Issues 106 Pull requests 3 Wiki Pulse Graphs

Experimental browser built in HTML

1,357 commits 16 branches 6 releases

Branch: master New pull request New file Find file HTTPS https://

gordonbrander Add Slack badge to CONTRIBUTING.md

.bin	Packaging.
.profile	Enable eval for live reloading purposes.
css	Mini sidebar WIP
docs	Describe interaction in terms of state and actions.
interface	stash!
src	Change select color to blue
test	Fix test.
type	Implement tab crossfade animations.
flowconfig	stash!

Getting Started — A-Frame

★ Daring Fireball

mozilla/browser.html · GitHub

MYMUSIC RX presents BEDSTOCK

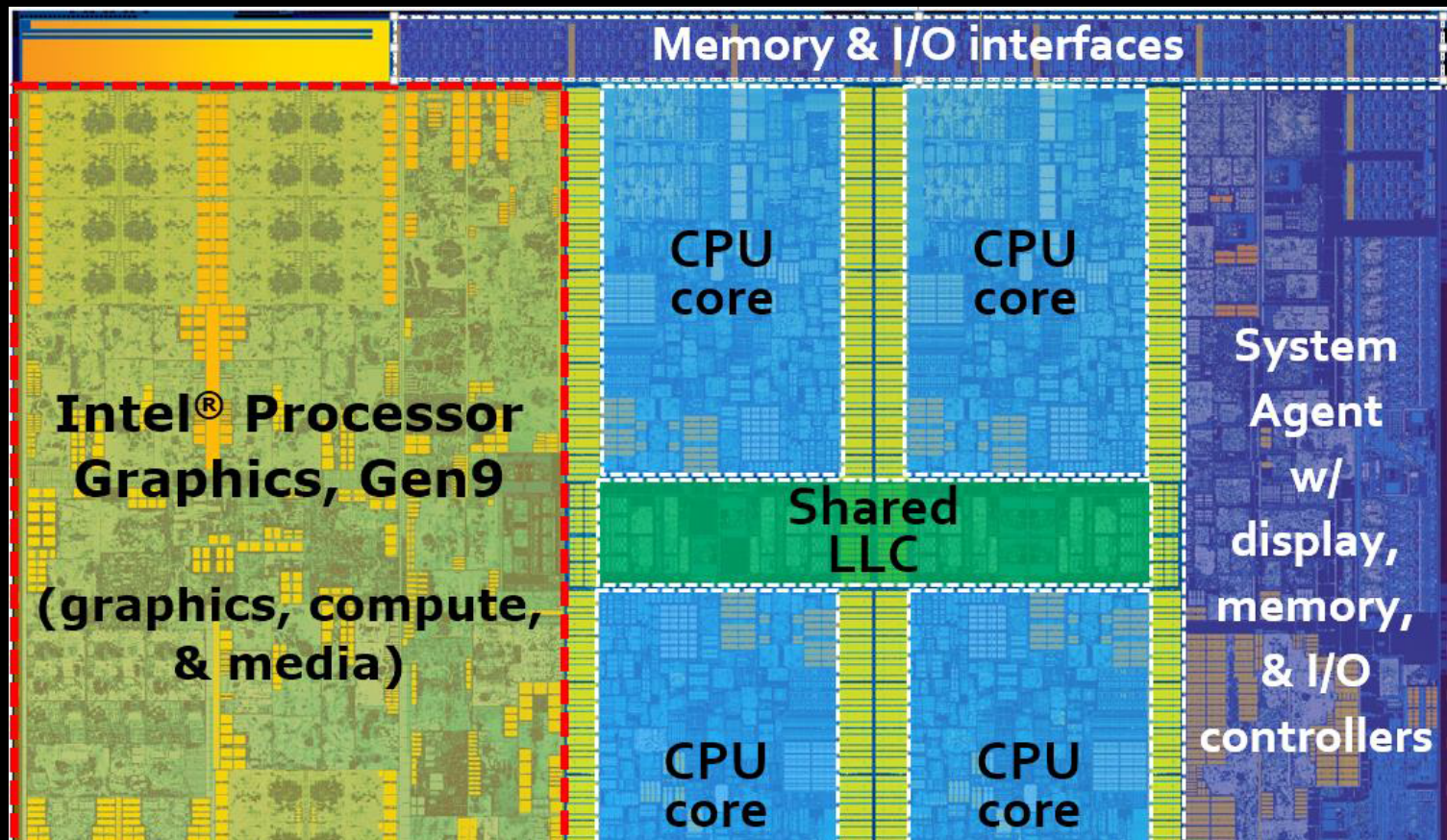
Why a new browser engine?

- Performance
 - Parallelism
 - GPU (WebRender)
- Memory safety
- Embedding
- Modularity

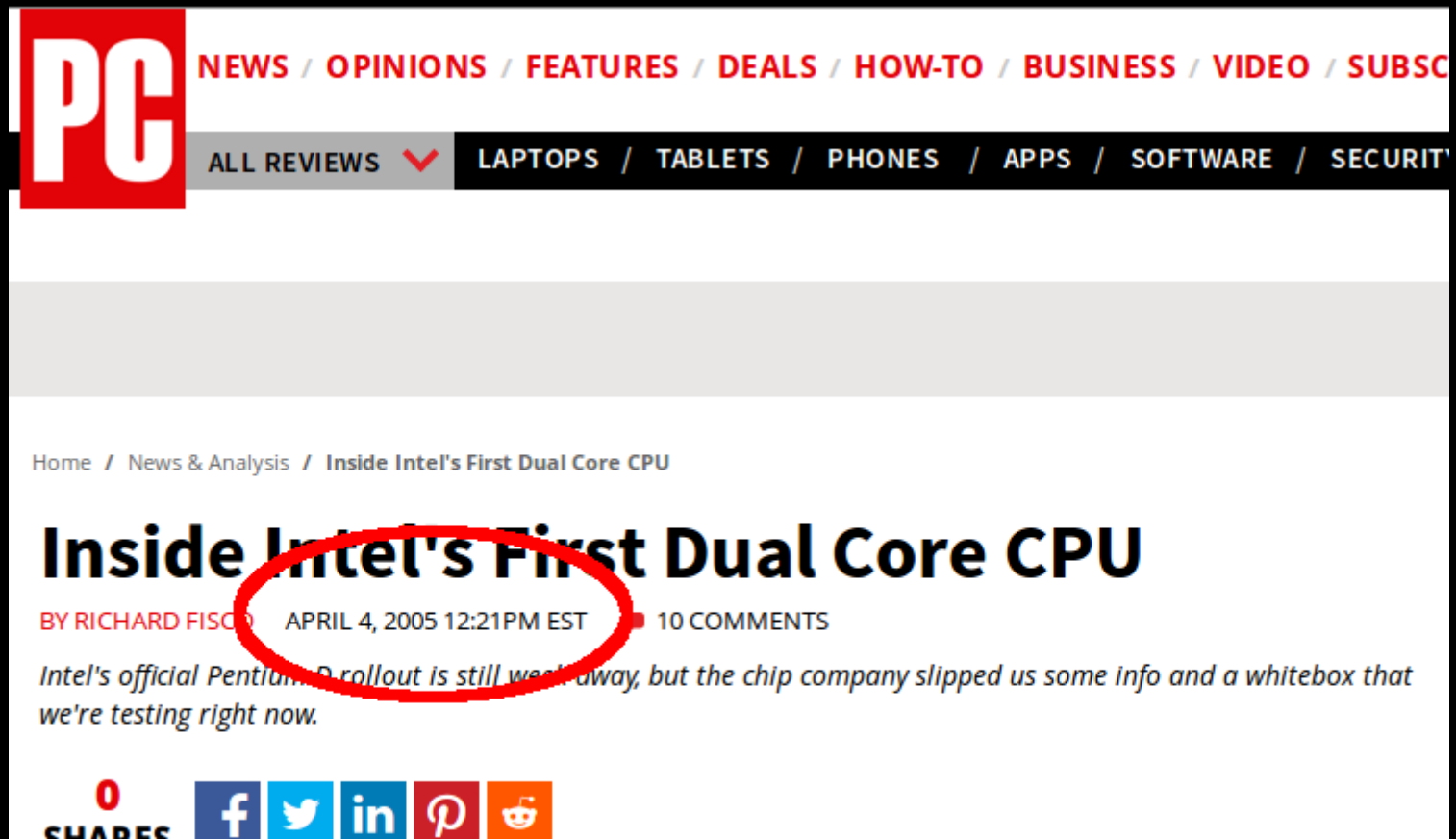
Performance

Parallelism

Modern CPU & GPU



All mainstream browser engines are from the 2000s



The image is a screenshot of a PC World website article. At the top, there is a red navigation bar with the 'PC' logo and links for NEWS, OPINIONS, FEATURES, DEALS, HOW-TO, BUSINESS, VIDEO, and SUBSCRIBE. Below this is a black navigation bar with links for ALL REVIEWS (with a dropdown arrow), LAPTOPS, TABLETS, PHONES, APPS, SOFTWARE, and SECURITY. The article title is 'Inside Intel's First Dual Core CPU', with 'Intel's' circled in red. The byline is 'BY RICHARD FISCH' and the date is 'APRIL 4, 2005 12:21PM EST'. There are '10 COMMENTS'. The lead paragraph starts with 'Intel's official Pentium D rollout is still weeks away, but the chip company slipped us some info and a whitebox that we're testing right now.' At the bottom left, there is a '0 SHARES' counter and social media icons for Facebook, Twitter, LinkedIn, Pinterest, and Reddit.

PC NEWS / OPINIONS / FEATURES / DEALS / HOW-TO / BUSINESS / VIDEO / SUBSCRIBE

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Home / News & Analysis / Inside Intel's First Dual Core CPU

Inside Intel's First Dual Core CPU

BY RICHARD FISCH APRIL 4, 2005 12:21PM EST 10 COMMENTS

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0 SHARES

f t in p r

How Parallelism helps Performance

- Super fast (CSS) style calculation
- Super fast parallel layout
- Battery saver

Demo

Parallel Layout

Performance

GPU

Animating properties that change the geometry of the page (layout) or cause painting are particularly expensive.

-- developers.google.com

WebRender

- 60 fps full screen animation
- No need to understand the implementation
- No WebGL, Canvas etc.

How does WebRender Work

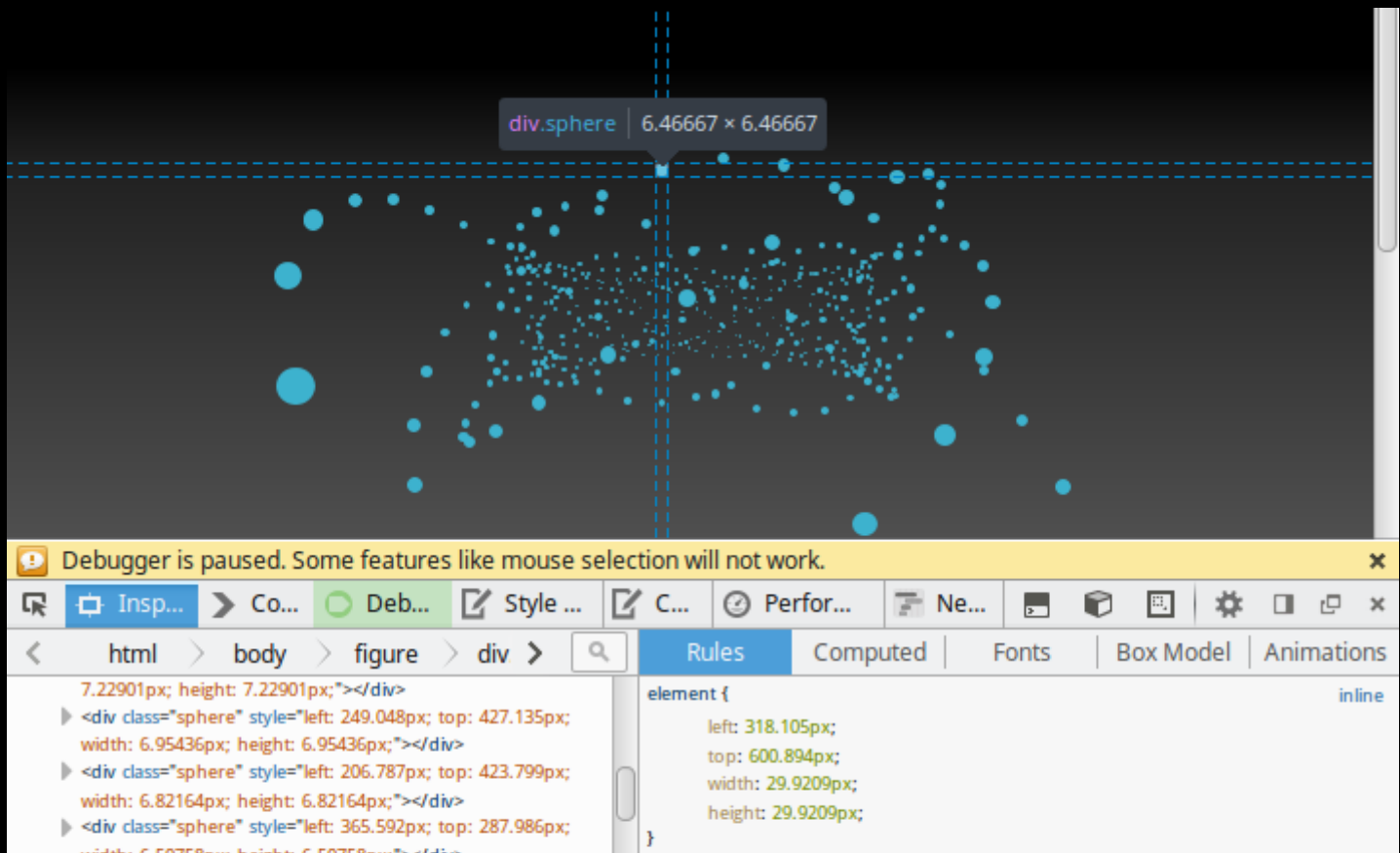
- Draw web content like a modern **game engine**
- On **GPU** instead of CPU
- immediate mode v.s. retained mode
- Batching

Demo

WebRender

Try it yourself: <http://bit.do/servodemo>

60fps Full-screen Animation



Security

Top Security Issues

- In Chrome's top 50 security bug
 - Use-after-free: 12
 - Double-free: 1
 - Overflow: 4
 - Race condition: 4 (Data retrieved: July 2016)



**Solved (for free!) by
Rust**

Rust's Lifetime Check

```
let y: &i32;           // -----+
{                       //      | y
    let x = 5;         //  -+   |
    y = &x;             //    | x |
}                       //  -+   |
                        //      |
println!("{}", y);     // -----+
```

↓↓ Won't compile! ↓↓

error: `x` does not live long enough

```
    y = &x;
        ^
```

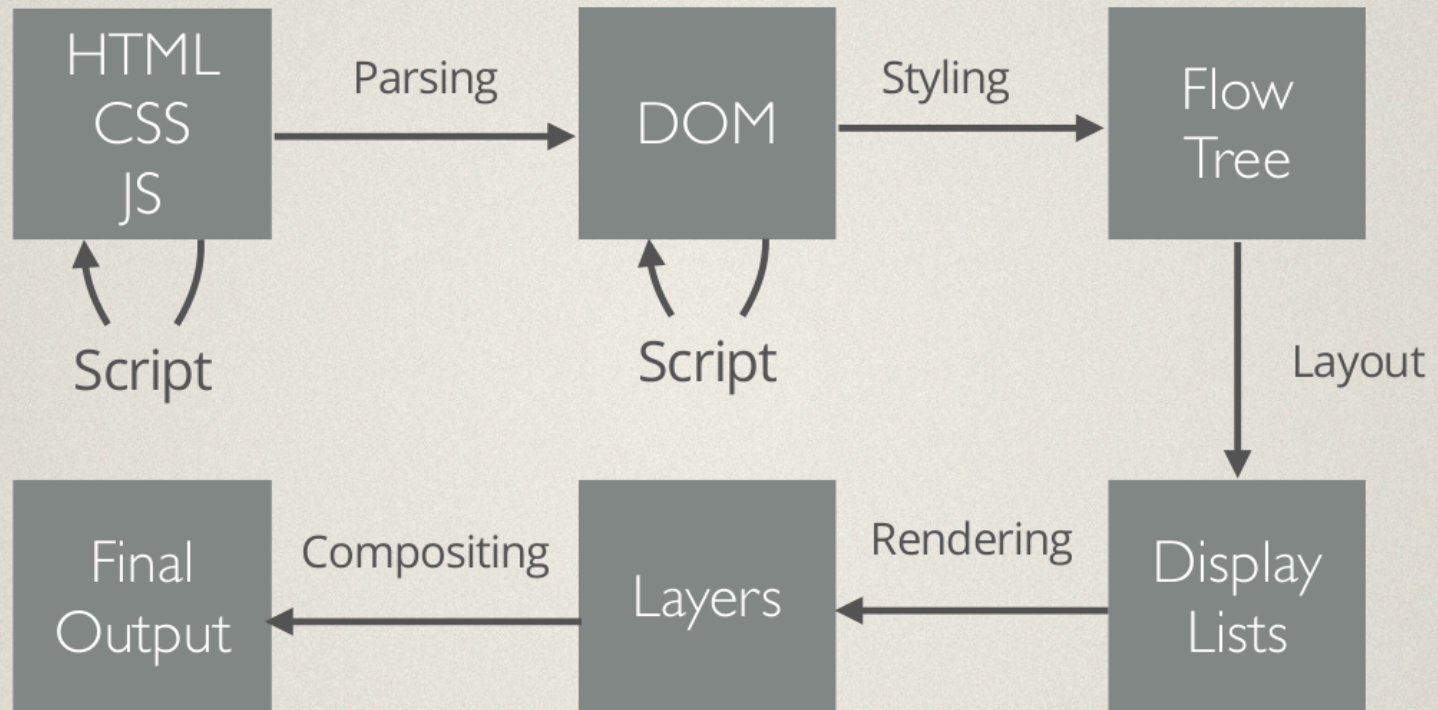
...(some helpful explanation of error message)

What Rust can offer

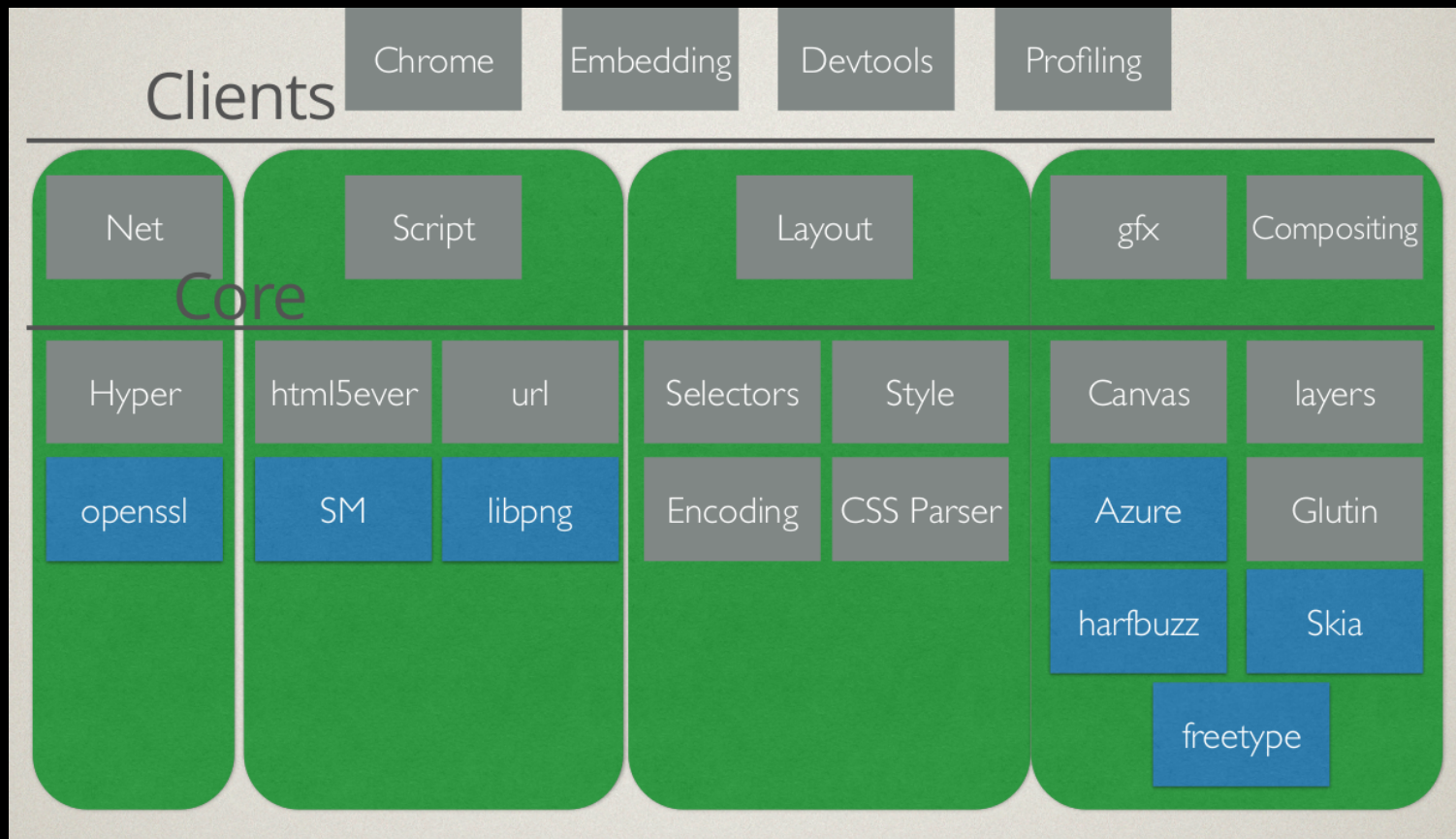
- <https://www.rust-lang.org>
- Features
 - Ownership & move
 - Guaranteed memory safety
 - Threads without data races
 - Pattern matching
 - Type inference
 - C/C++ bindings
 - and more!

Modularity

Architecture

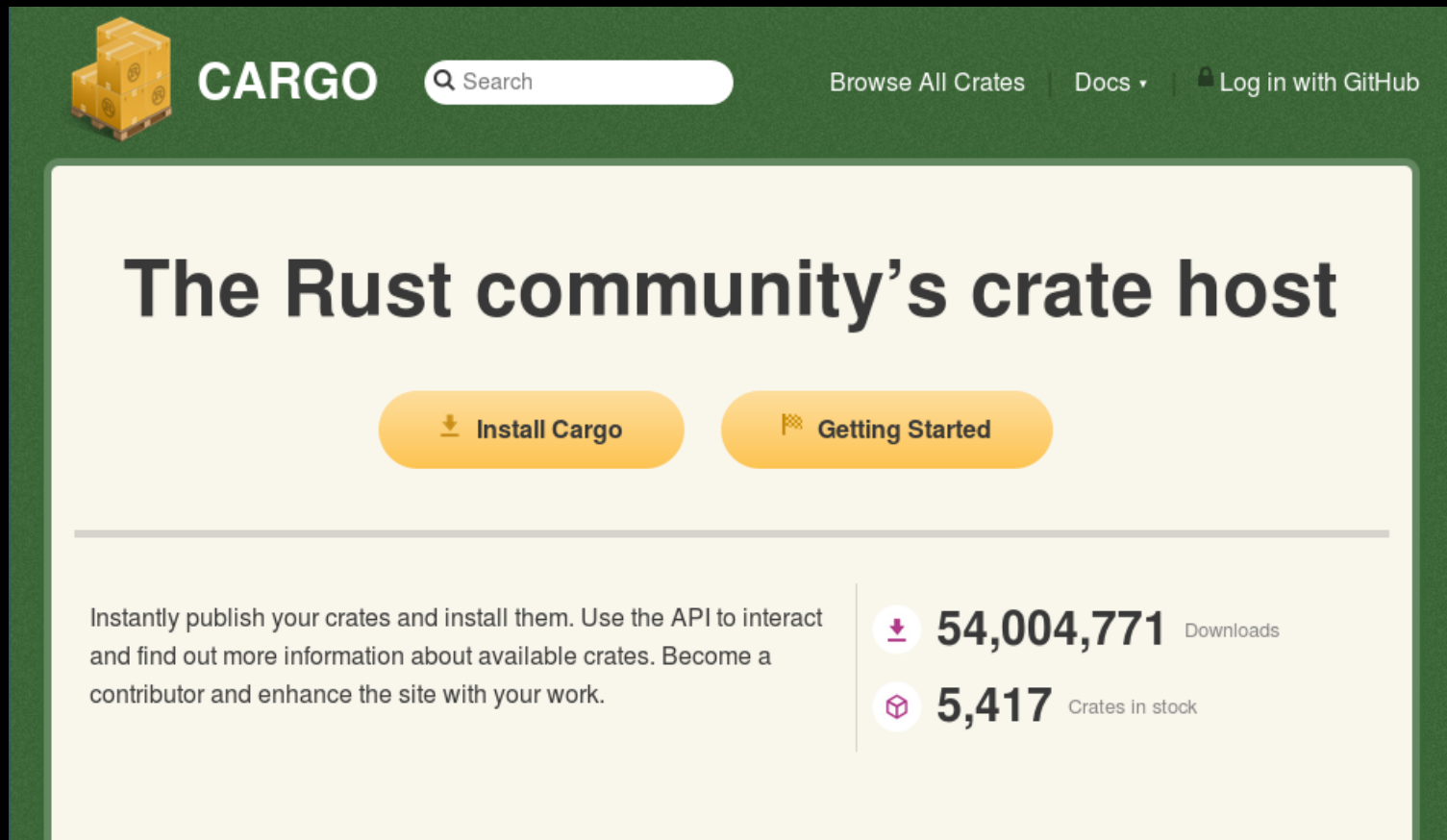


Components



Modularity

- Servo is composed of over 200+ crates
- Cargo and crates.io



The screenshot shows the crates.io website, which is the Rust community's crate host. The header is green and features the Cargo logo (three yellow crates), the word "CARGO" in white, a search bar, and links for "Browse All Crates", "Docs", and "Log in with GitHub". The main content area has a white background with the heading "The Rust community's crate host". Below this are two orange buttons: "Install Cargo" and "Getting Started". A horizontal line separates this from the footer, which contains a paragraph about publishing crates and two statistics: "54,004,771 Downloads" and "5,417 Crates in stock".

CARGO Search Browse All Crates Docs Log in with GitHub

The Rust community's crate host

Install Cargo Getting Started

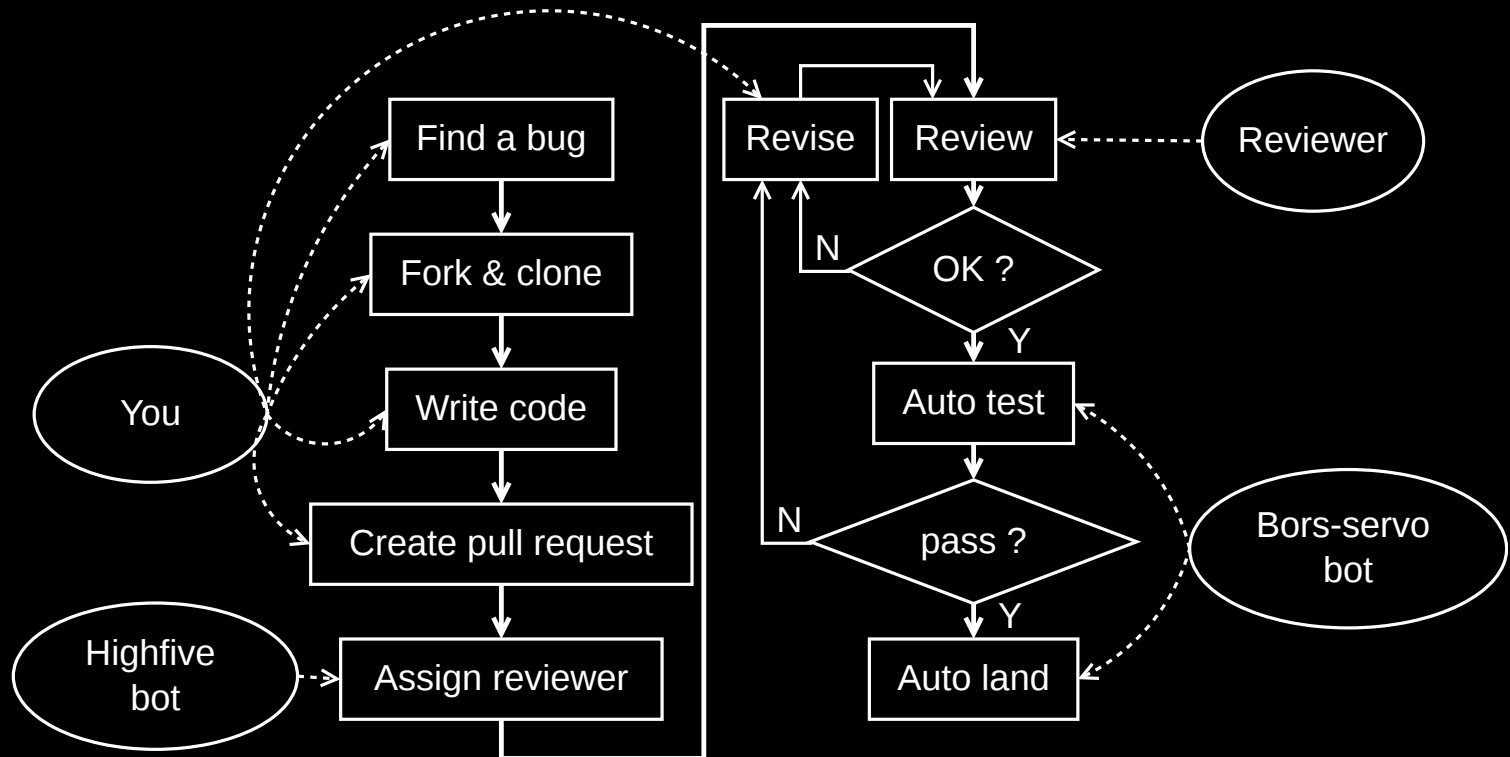
Instantly publish your crates and install them. Use the API to interact and find out more information about available crates. Become a contributor and enhance the site with your work.

54,004,771 Downloads

5,417 Crates in stock

Developer Happiness

GitHub Workflow



Test the Web Forward

- Cross-browser Web Platform Tests (WPT)
- Servo is actively running and uplifting to WPT tests
- testtheforward.org



photo credit: testtheforward.org

Community!



Working Remotly

- Sync => Async
 - GitHub issues & email
 - IRC
 - Video conference
 - This Week In Servo
- Timezone => async
- Workweeks!





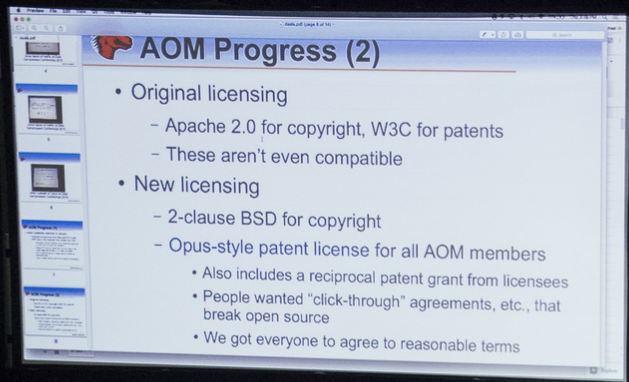


- Who are impacted by the outcome?
- 4. Who is the **decision maker**?
- 5. Where and how do we **document**?









AOM Progress (2)

- Original licensing
 - Apache 2.0 for copyright, W3C for patents
 - These aren't even compatible
- New licensing
 - 2-clause BSD for copyright
 - Opus-style patent license for all AOM members
 - Also includes a reciprocal patent grant from licensees
 - People wanted "click-through" agreements, etc., that break open source
 - We got everyone to agree to reasonable terms





Why contributing?

- It's fun & challenging
- It's relative new so there are low-hanging fruits
- You can learn whatever you want
 - HTML & CSS Spec
 - Parsers
 - Data Structures
 - Algorithm
 - Parallel programming
 - Computer Graphics
 - DevOps

Get Involved

- Download the **nightly!**
- Good 1st Bug: Servo Starters
- GitHub: <https://github.com/servo/servo>
 - Issues are tracked on GitHub
- IRC: `#servo`
 - I'm `[:shinglyu]`
- Mailing list: `dev-servo@lists.mozilla.org`

Thank you

Questions?

shing.lyu@gmail.com

slyu@mozilla.com

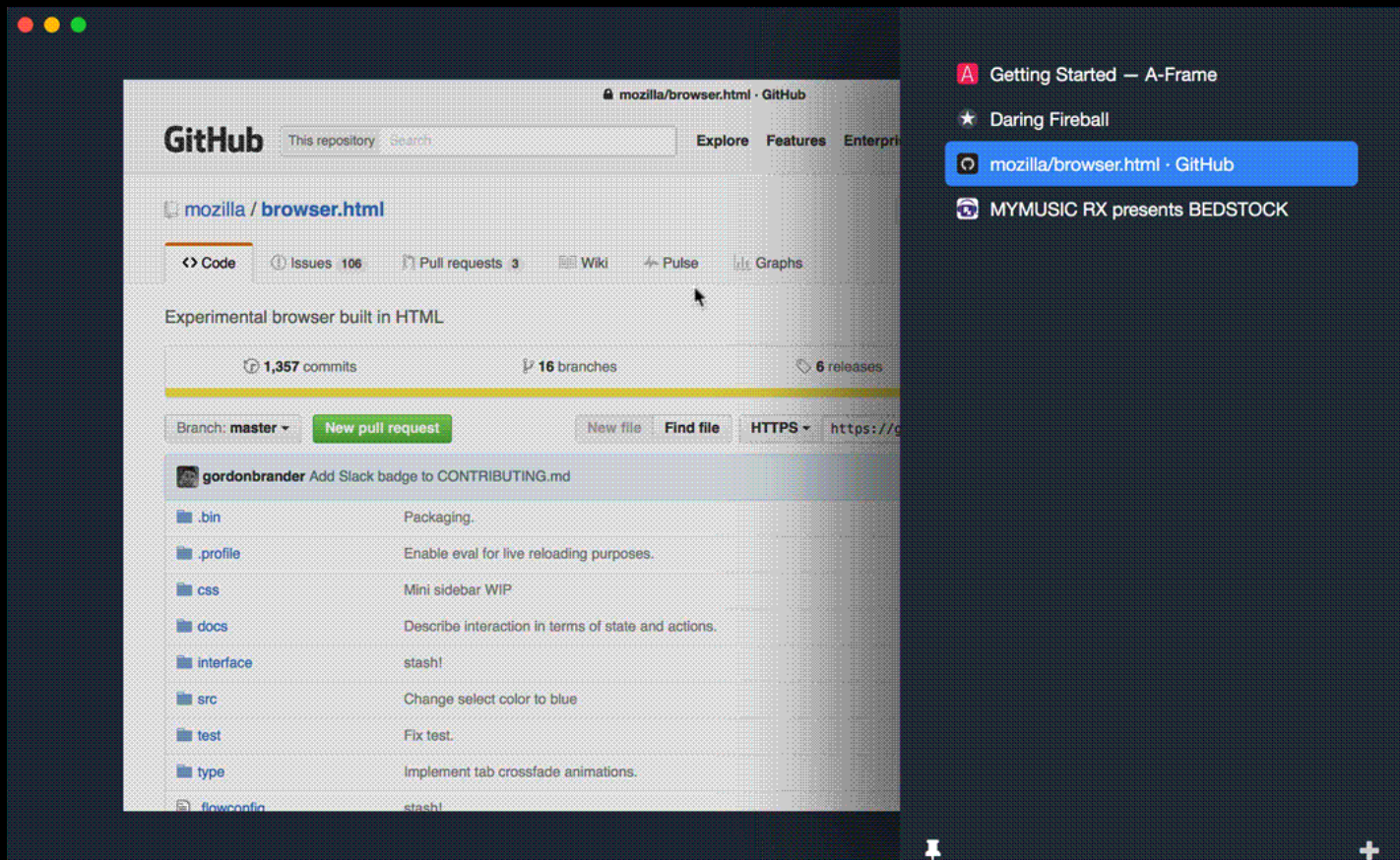
Backup

Implementation Strategy

- **Rewrite** layout, rendering, HTML/CSS parsing, networking, core engine glue
- **Reuse** JS engine, media codecs, graphics libs, fonts, WebRTC
- **Bootstrap** with OpenSSL, image libs, etc.

browser.html

- Servo is an engine, you need a chrome



Debugging

- Time / Memory profiling
- gdb / lldb
- `RUST_LOG`, `RUST_BACKTRACE=1`

Roadmap

- [June Tech Preview](#)
- Oxidation: move Rust/Servo component into Gecko
- [more](#)

Autolander == Developer happiness

- Auto-assigned reviewer
- No more manual push/backout
- "try" on builtbot
- Helpful bots

Getting Started

- `git clone`
`https://github.com/servo/servo.git`
- Create a branch, write code
- `./mach build --debug`
- `./mach test-*`
- Submit a Pull Request
- Code review (Reviewable.io)
- Rebase => Auto-test => Merge

