Introduction to

Servo

Shing Lyu, Mozilla

@COSCUP 2016

Table of Contents

About Me

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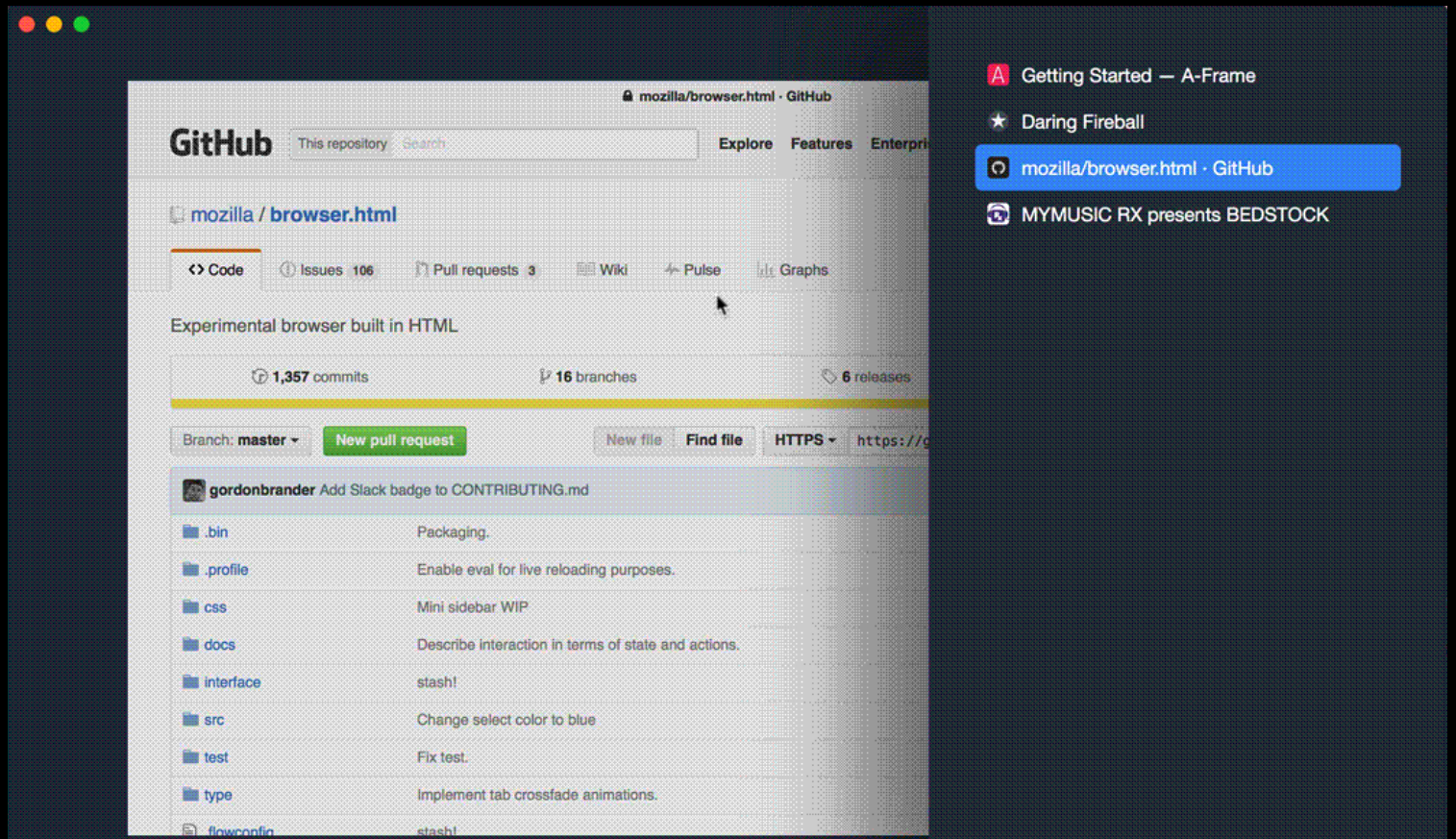
What is Servo

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


mozilla/browser.html · GitHub
GitHub
This repository
Search
Explore
Features
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
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

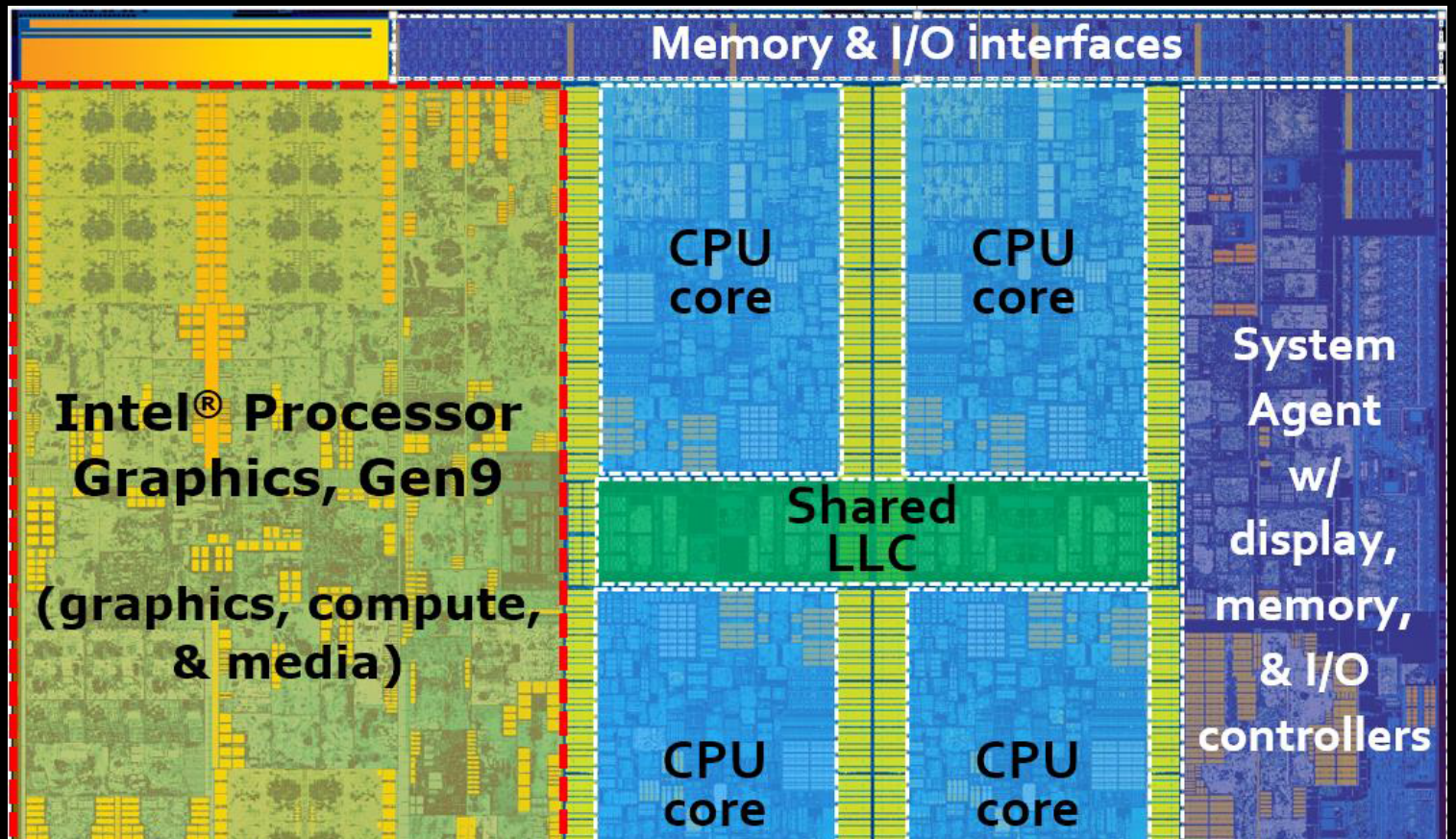
Why a new browser engine?

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

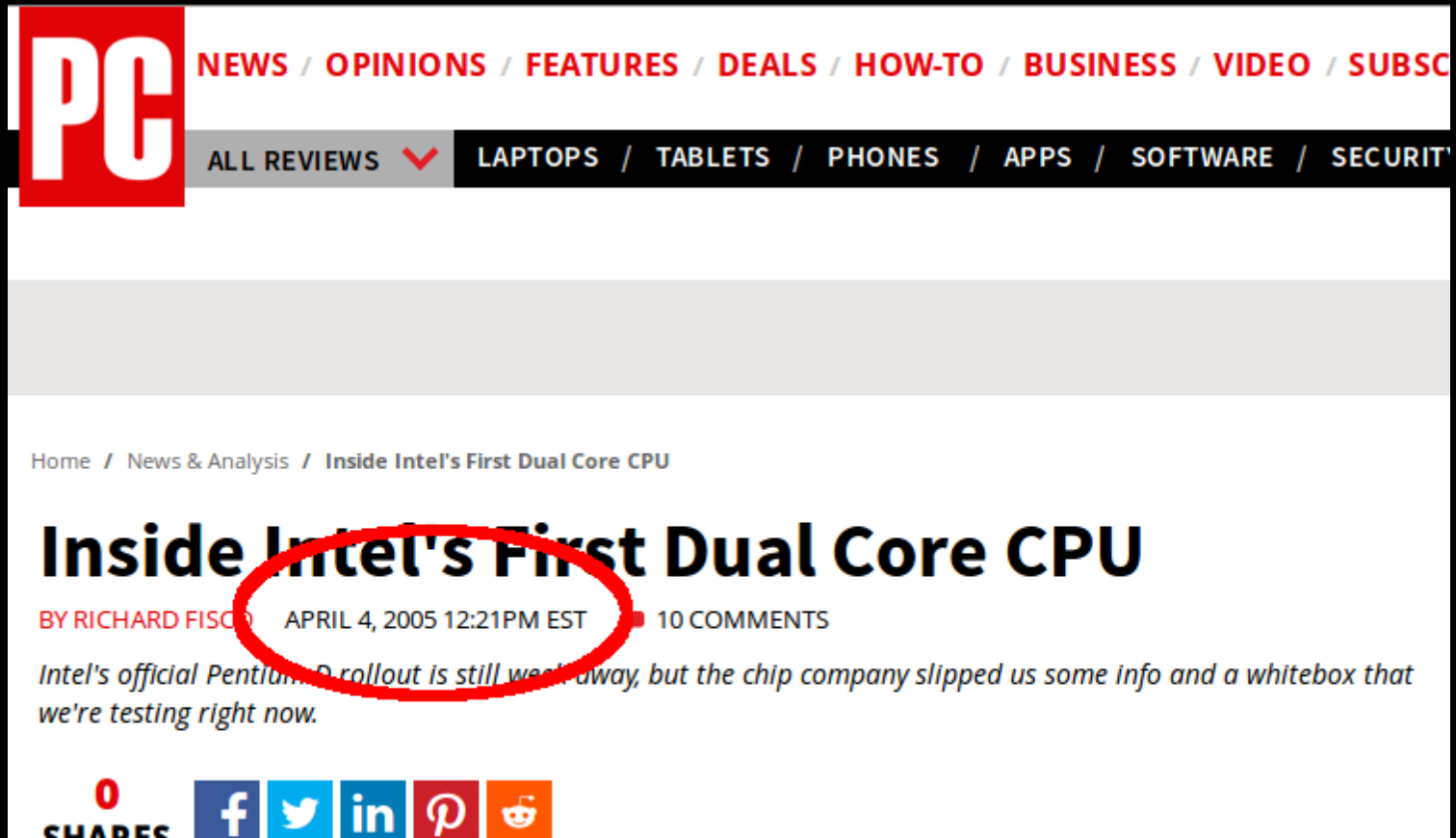
Performance

Parallelism

Modern CPU & GPU



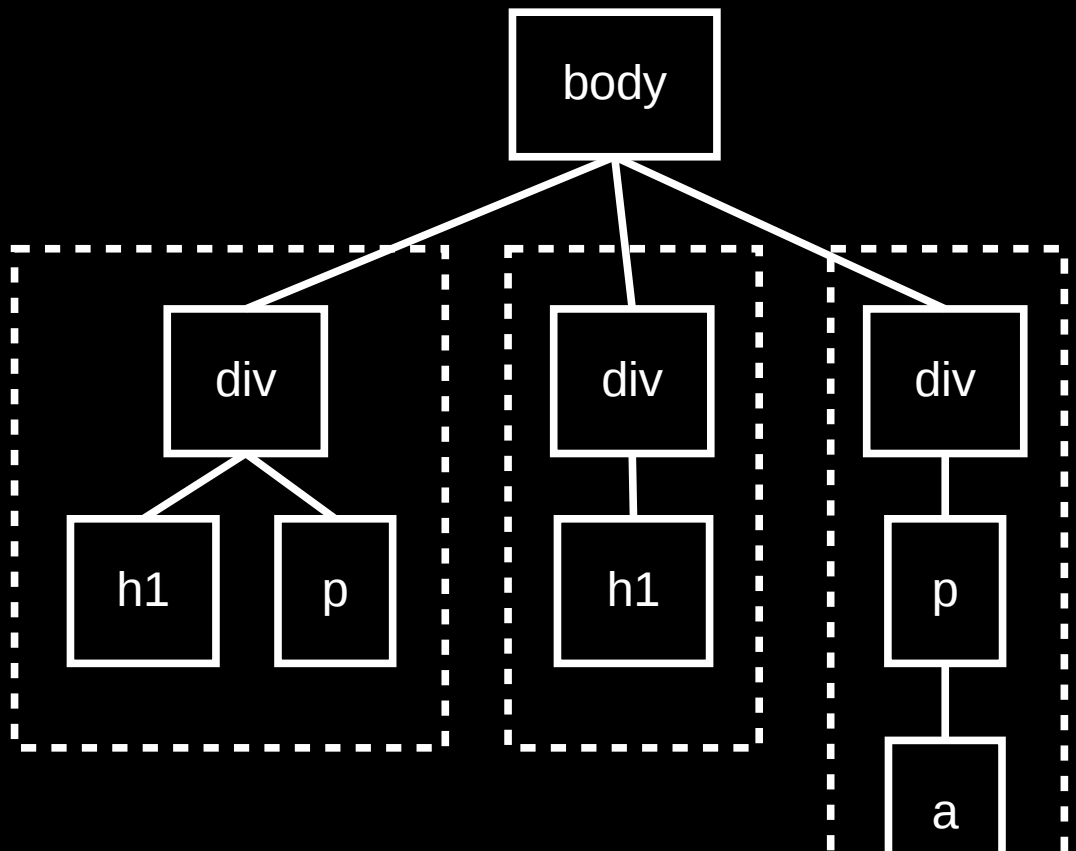
All mainstream browser engines are from the 2000s



How Parallelism helps Performance

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

Parallel Layout



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

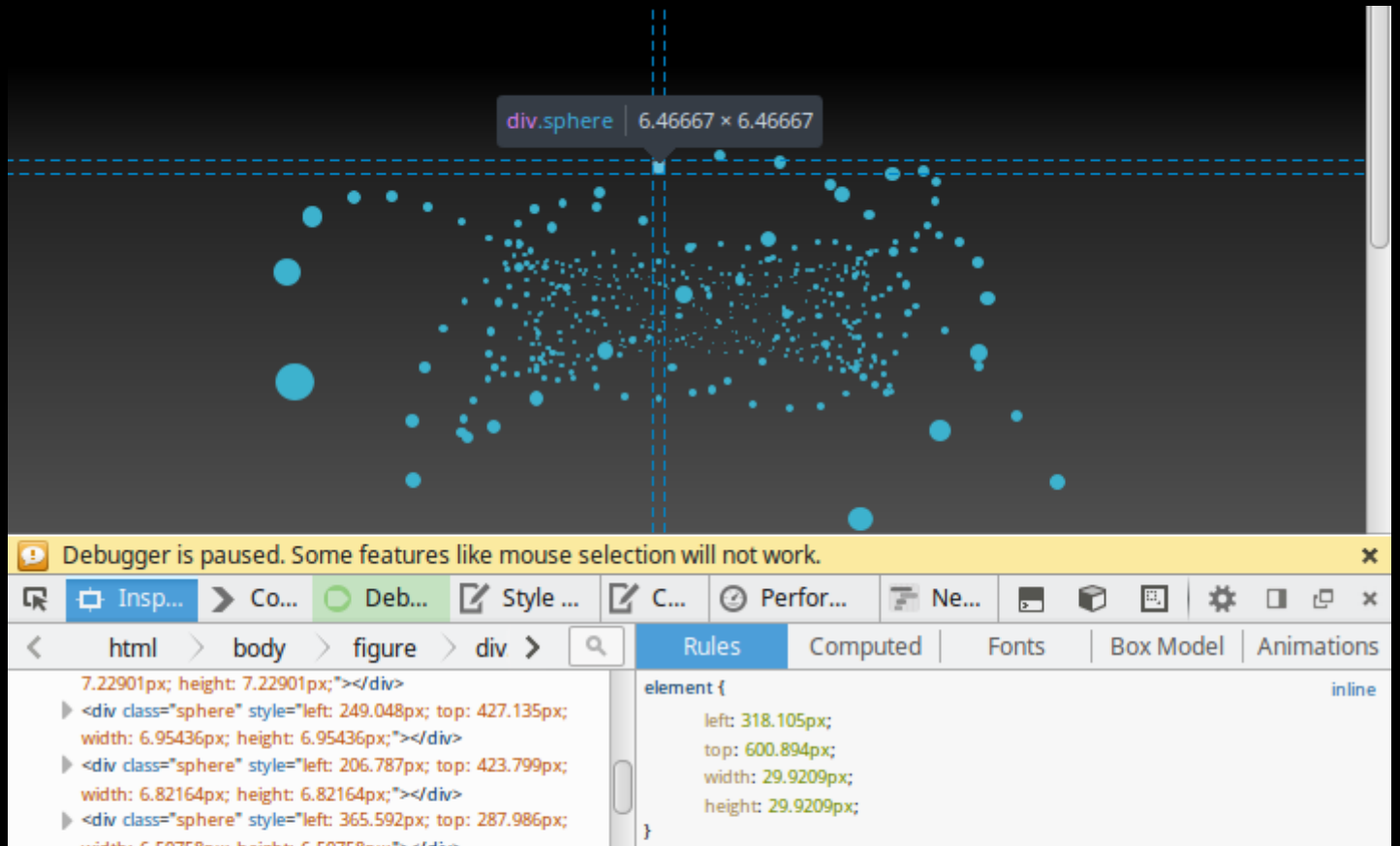
- Draw web content like a modern **game engine**
- On **GPU** instead of CPU
- immediate mode v.s. retained mode
- Batching

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! ⇓⇓

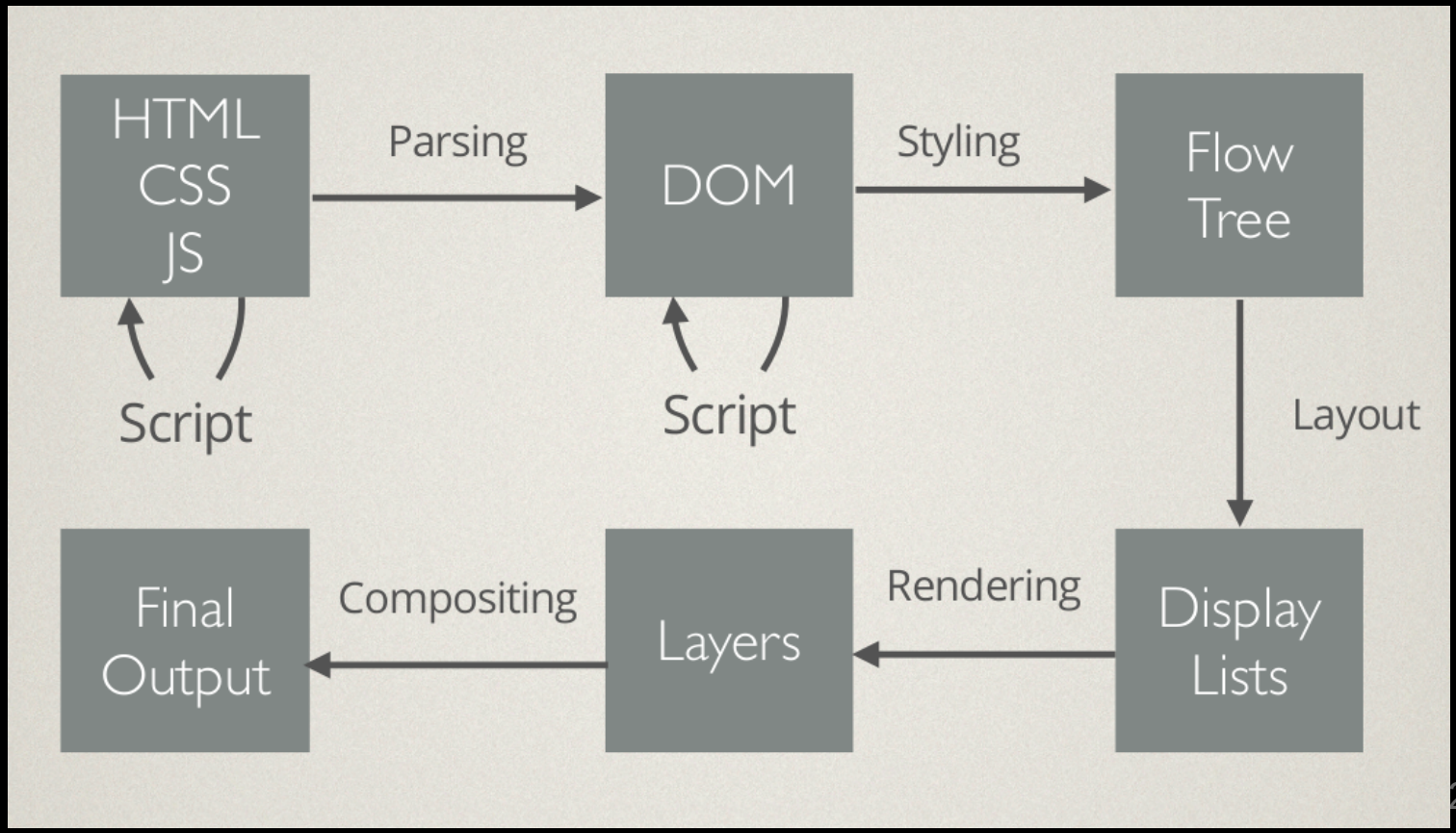
```
error: `x` does not live long enough
    y = &x;
         ^
...(some helpful explanation of error message)
```

What Rust can offer

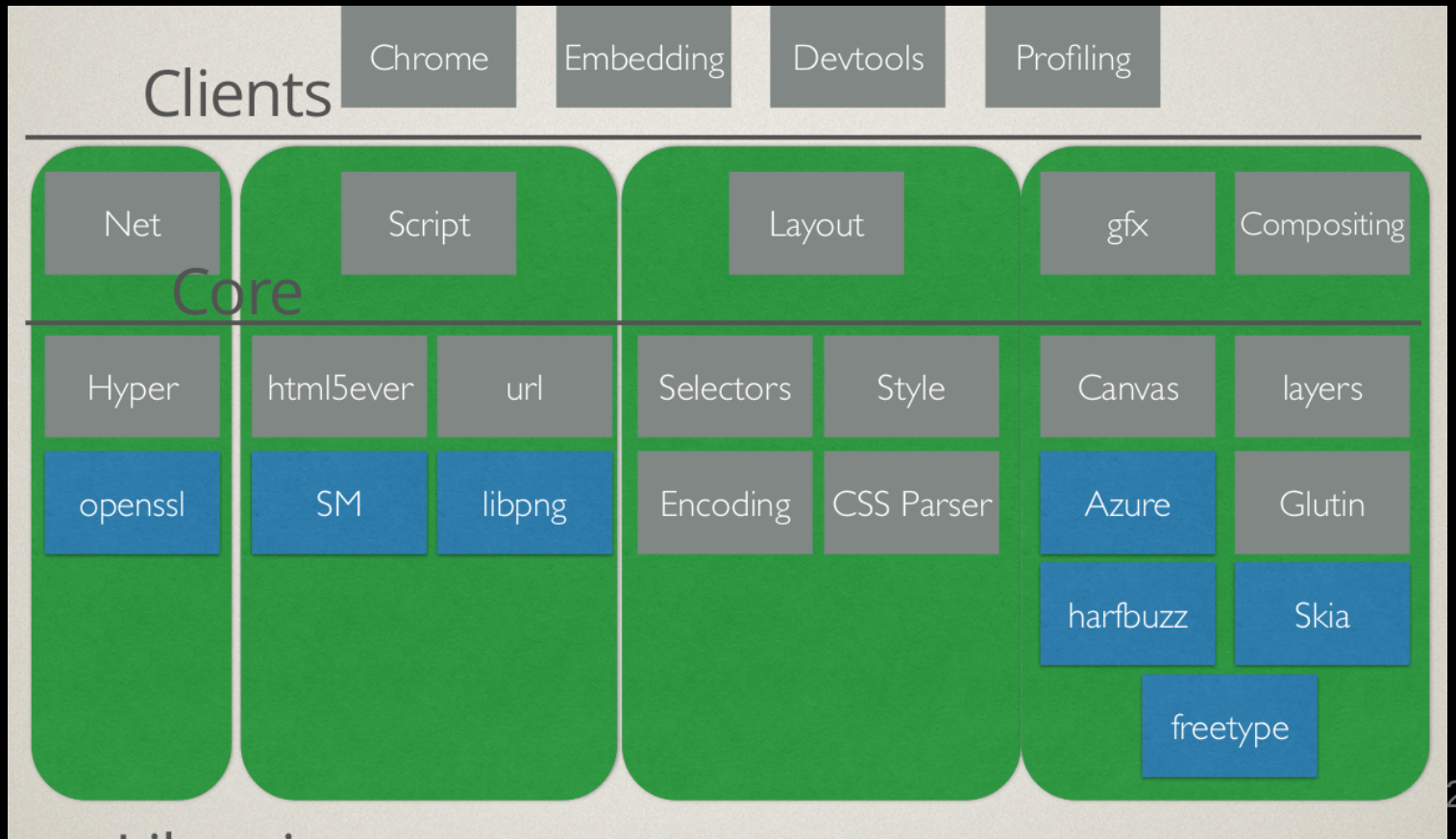
- https://www.rust-lang.org
- Features
  - Ownership & move
  - Guaranteed memory safety
  - Threads without data races
  - Pattern matching
  - Type inference
  - C/C++ bindings
  - and more!

Modularity

Architecture

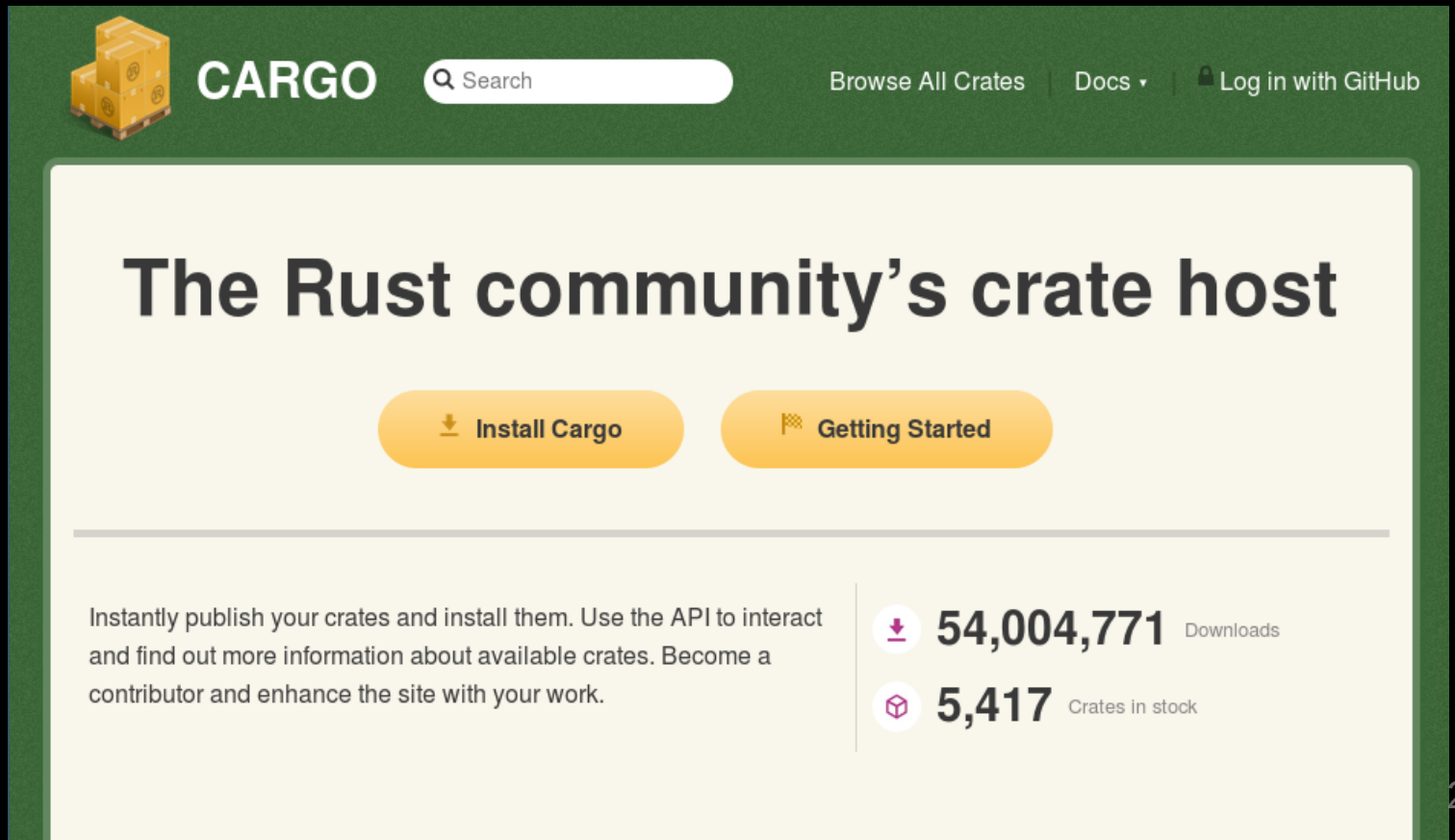


Components


Clients
Chrome
Embedding
Devtools
Profiling
Net
Script
Layout
gfx
Compositing
Core
Hyper
html5ever
url
Selectors
Style
Canvas
layers
openssl
SM
libpng
Encoding
CSS Parser
Azure
Glutin
harfbuzz
Skia
freetype

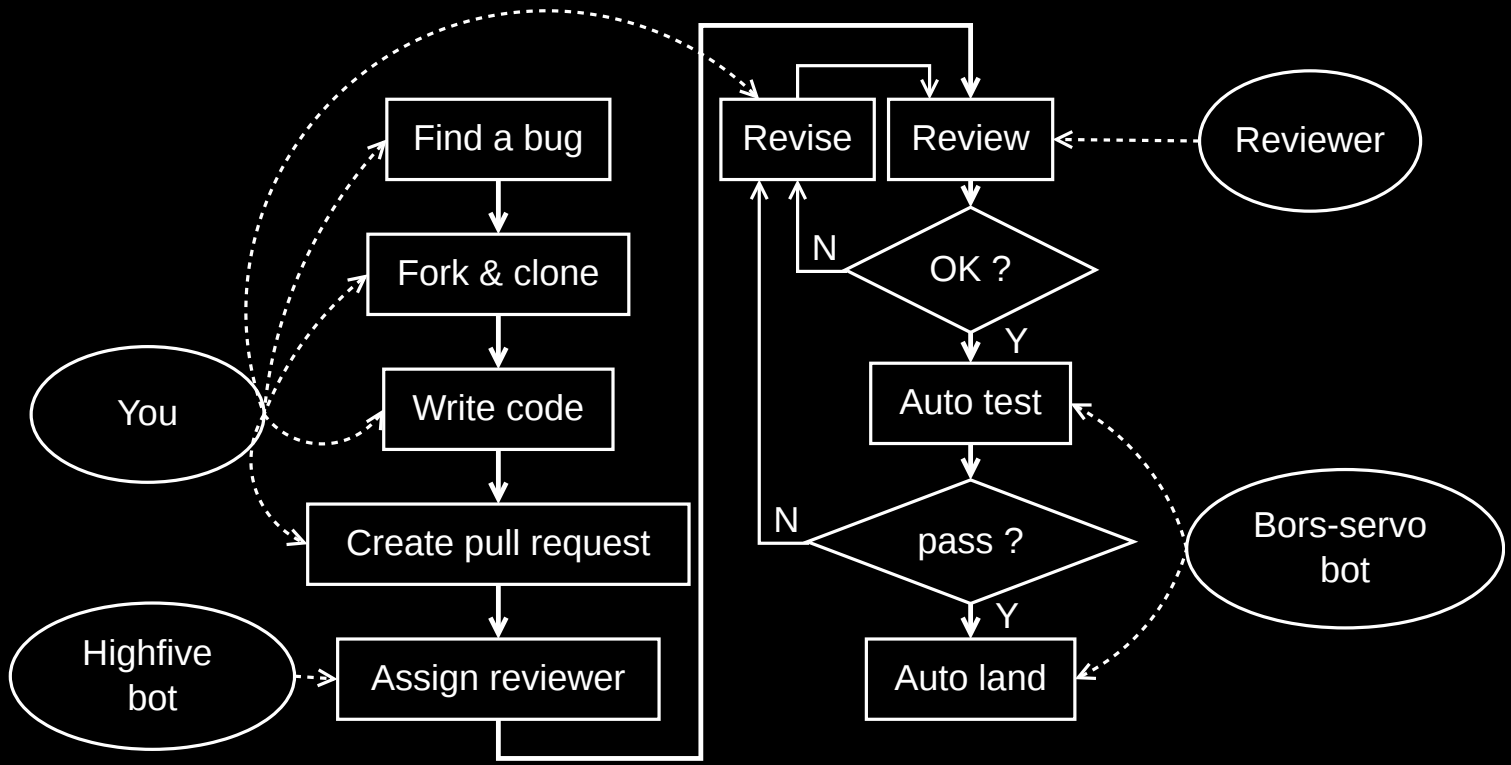
Modularity

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



Developer Happiness

GitHub Wrokflow



Test the Web Forward

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

photo credit: testthewebforward.org

Community!


ARCTIC OCEAN
NORTH ATLANTIC OCEAN
NORTH PACIFIC OCEAN
Asia
Africa
South America
Australia
SOUTH PACIFIC OCEAN
SOUTH ATLANTIC OCEAN
INDIAN OCEAN
SOUTHERN OCEAN

Working Remotly

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


SCHEDULING
SHARED
REMINDERS
SCHEDULING
SMART SCHEDULE
UI
LISTS
Smart lists
VOICE
mozilla


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


mozilla
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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

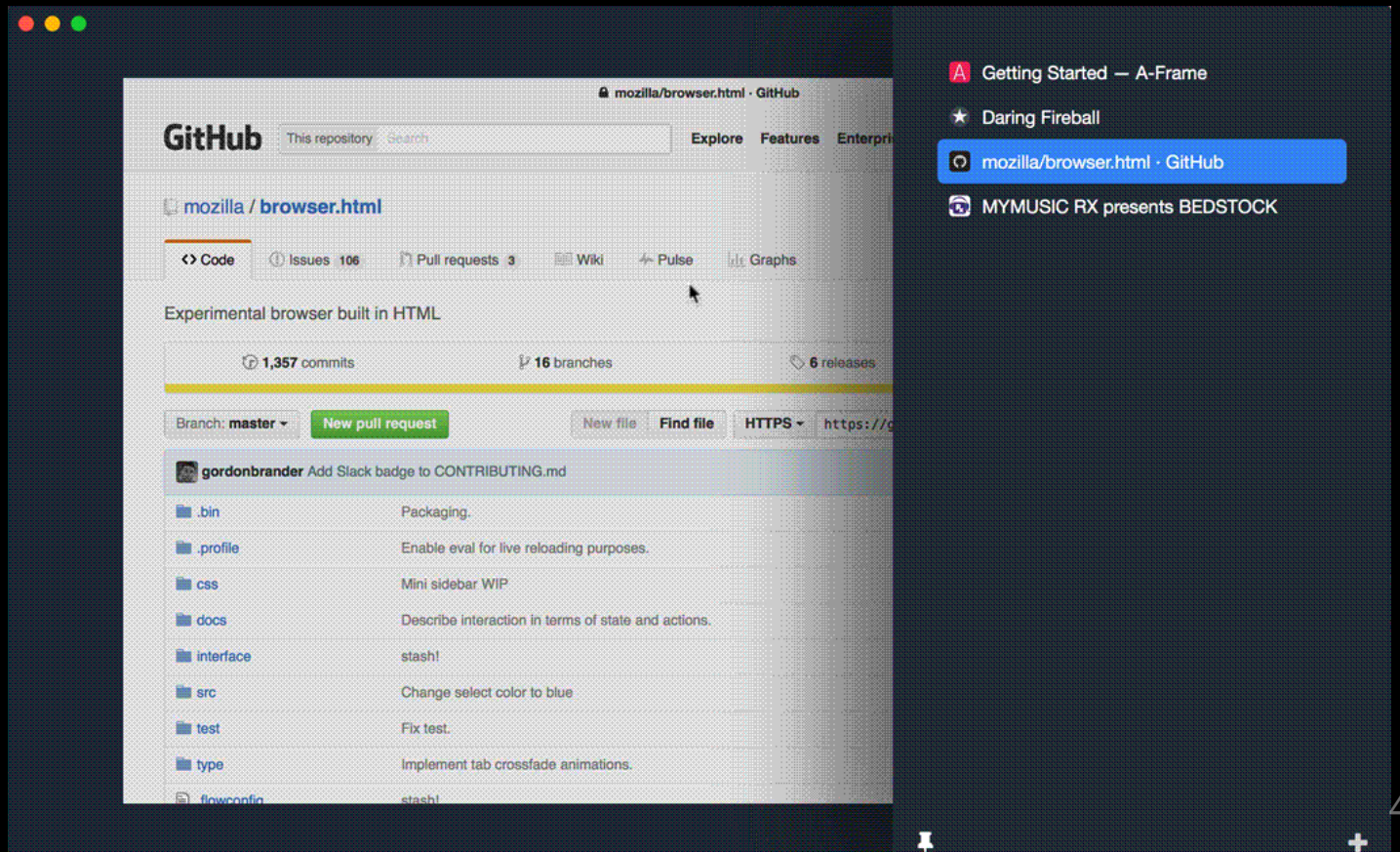
Backup

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