Why you should take a look at 

Antonin Carette - FOSDEM 2018 - Rust devroom

Slides and resources available @ *github.com/k0pernicus/fosdem_rust_talk*

Chalut 'tiot Biloute!

- I tried to understand what the computer I trained to understand understood
- Free & Open Source <3
- French guy, you know... The accent... Yep...

k0pernicus

At the beginning…
a need

Since 2000, for consumers,

big changes:

- from 32bit to 64bit architectures,
- from mono-core to multi-core architectures,
- from mono-thread to multi-threaded applications,
- more powerful hardware,
- a lot of new softwares,
- etc...

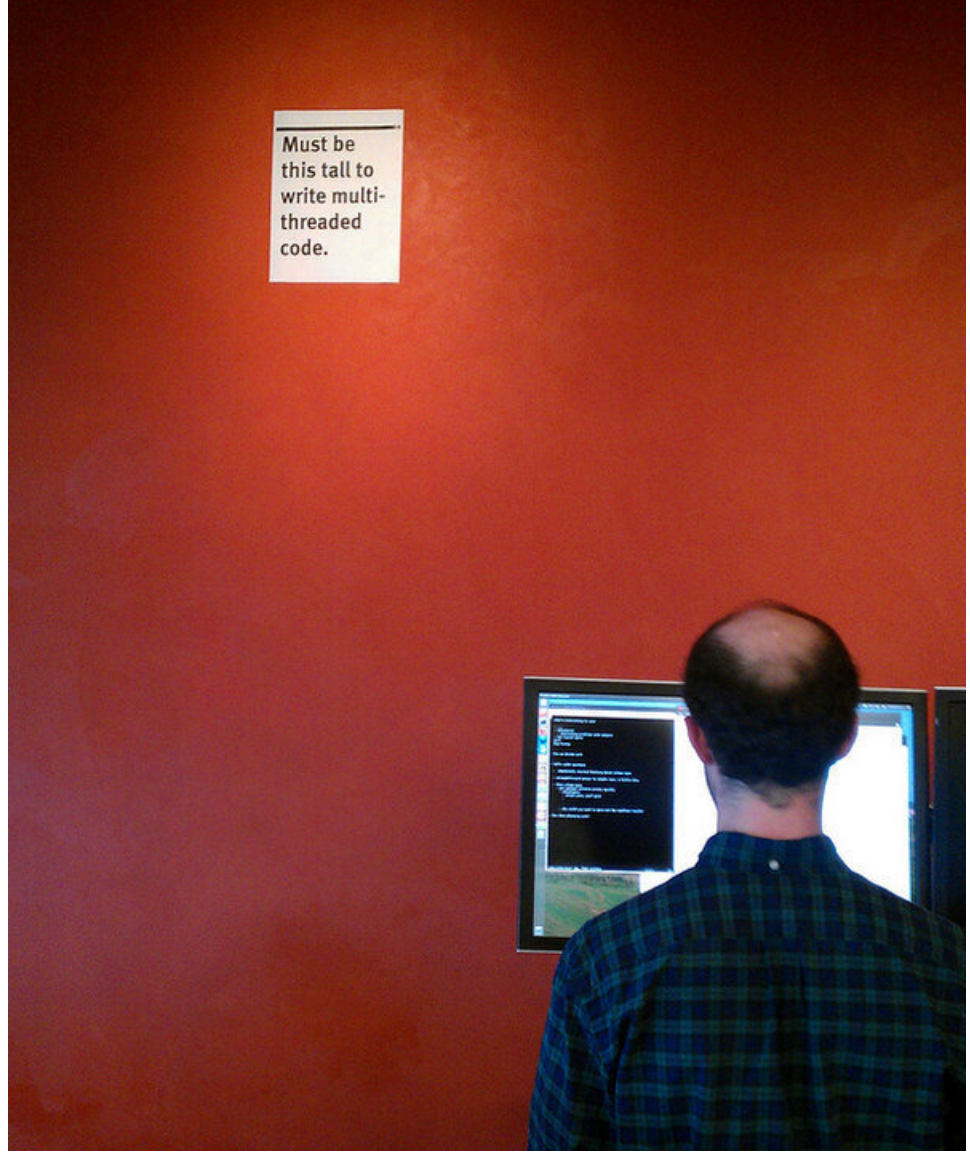
Since 2000, for developers,

big troubles:

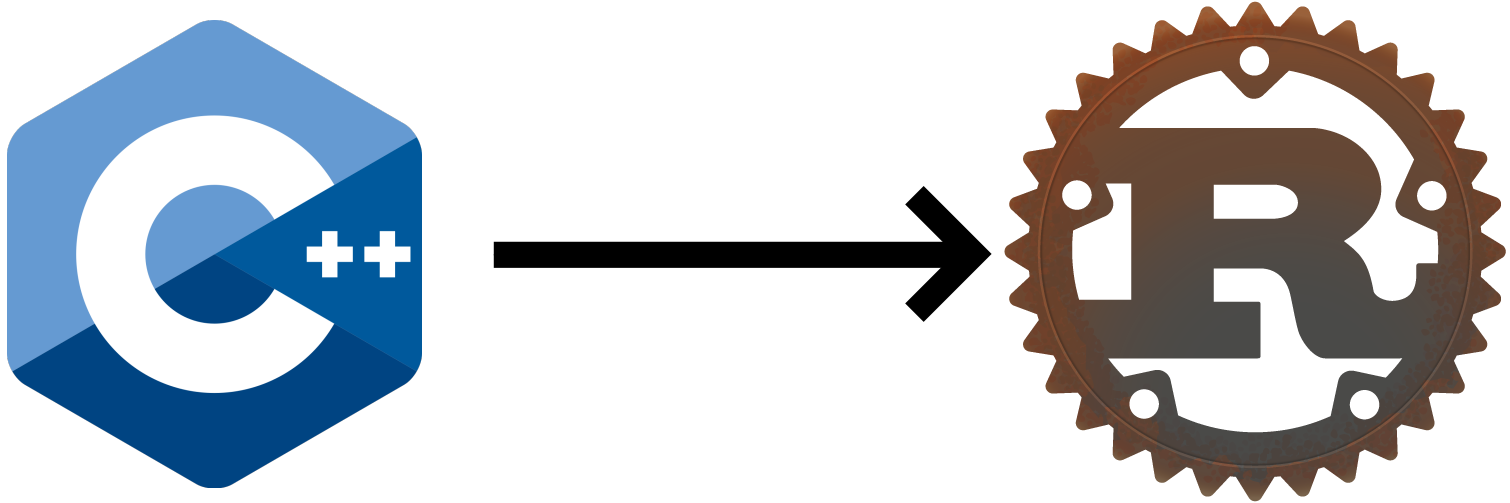
- from sequential code to multi-threaded/multi-core support applications,
- data race issues,
- big memory leaks problems,
- big RAM consumption,
- the software race,
- etc...

"Must be This Tall to Write Multi-Threaded Code"

http://bholley.net/blog/2015/must-be-this-tall-to-write-multi-threaded-code.html

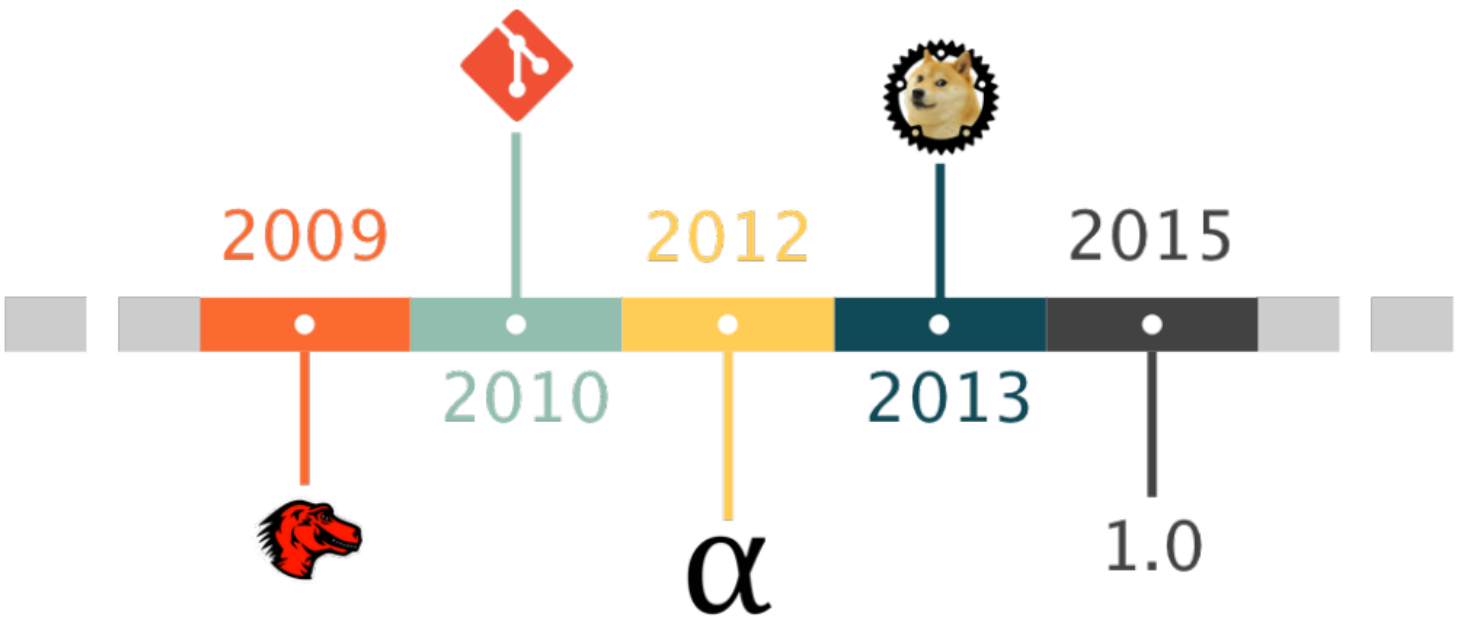


We need a memory and threads safe programming language, with the same performance than C++.



= **Rust**, a *modern*, *safe*, *fast*,
and *concurrent* Open Source
systems programming language.

Quick history



Content / Layers

1. Core concepts
2. What developers want!? Productivity!
3. Open Source is not only code!
4. Awesome companies && awesome projects
5. #Rust2018
6. Conclusion

Beyond the best features

- Immutability (default)
- **Memory leaks and data race safety, raised at compilation time**
- **Zero-cost abstraction**
- Define type behaviours with *traits*
- Rich build tool (*cargo*)
- Generics
- Multiple metaprogramming levels
- FFI (C, Ruby, Python, Haskell, etc.)
- WASM
- Rich error handling
- etc...

Once upon a time...

the DVD seller,
and the customer.

Vector author: macrovector (Freepik)

Feature::MemSafety

I would like to
buy this DVD!

Feature::MemSafety

Sorry sir, but the box is empty...

Feature::MemSafety

```
struct DVD{
    title: String,
}

fn take (dvd: DVD) {
    println!("Owner >> Thanks for the DVD!")
}

fn main () {
    // Null pointer
    let dvd : DVD;
    // COMPILE TIME ERROR <- use of possibly uninitialized variable: `dvd`
    take(dvd);
}
```

No null pointer derefence situation

Feature::MemSafety

Sir, we have the
DVD you requested!

Feature::MemSafety

Thanks!

Feature::MemSafety

This DVD is not mine anymore!

Feature::MemSafety

```
struct DVD{
    title: String,
}

fn take (dvd: DVD) {
    println!("Owner >> I bought {} - it seems awesome!", dvd.title);
}

fn main () {
    let dvd = DVD{title: String::from("Blade Runner")};
    // `dvd` will belongs to `take`
    take(dvd);
    // `dvd` does not exists anymore, as `take` does not exists too, so I can't use it...
    // COMPILE TIME ERROR <- use of moved value: `dvd`
    println!("Me >> I still have {}!", dvd.title);
}
```

Ownership situation

Feature::MemSafety

I would like to rent this DVD!

Feature::MemSafety

Sure! Please **return to us this DVD before the end of** the FOSDEM!

Feature::MemSafety

```
struct DVD{
    title: String,
}

fn borrow (dvd: &DVD) {
    // Access without modifications
    println!("Borrower >> {} is awesome!", dvd.title);
}

fn main () {
    let dvd = DVD{title: String::from("Blade Runner")};
    // `main` is still the owner of `dvd`
    borrow(&dvd);
    println!("Me >> I still have {}!", dvd.title);
}
```

Borrowing situation

Feature::MemSafety

I couldn't read the DVD, due to the protection copy...

Feature::MemSafety

Sorry for that. This is a DVD copy of the movie.

Feature::MemSafety

Cool, a RW disk - let's try to modify it...

Feature::MemSafety

```
struct DVD{
    title: String,
}

fn mut_borrow (dvd: &mut DVD) {
    dvd.title = String::from("Bienvenue chez les Ch'tis");
    println!("Borrower >> Nyark nyark!");
}

fn main () {
    let mut dvd = DVD{title: String::from("Blade Runner")};
    // `main` is still the owner of `dvd`
    mut_borrow(&mut dvd);
    println!("Me >> I still have... WHAT!? WHAT IS {}!?", dvd.title);
}
```

Mutable Borrowing Situation

Feature::MemSafety

Using Rust, you can't:

- attempt to dereference a null pointer,
- attempt to use already-freed memory (ex. *dangling* pointer),
- forget to free memory,
- and attempt to free already-freed memory.

Feature::MemSafety

But there is rules to respect:

1. the borrower’s scope **must not outlast** the owner,
2. you can have **at least** one reference to a resource,
3. you can have **one** mutable reference to a resource,
4. you can't have the last two rules **at the same time**.

Feature::ThreadSafety

When does a data race happens?

- at least two pointers to the same ressource,
- at least one writing pointer,
- un-synchronized operations.

Feature::ThreadSafety

How can Rust answers to this problem ?

Ownership (again) because...

- if you have multiple references, you don't have any writing pointer,
- if you have one writing pointer, you don't have any other references,
- synchronized operations by default.

Feature::ThreadSafety

Using Rust, you can't:

- read and write the same variable from multiple threads at the same time (without wrapping it in a lock or other concurrency primitive),
- forget to acquire a lock before accessing the variable it protects.

Feature::ZeroCostAbst

Objective: to combine low-level control with high-level programming concepts.

Feature::ZeroCostAbst

Developers: "Features are good, abstraction is great, and we need safety - but we care about overhead..."

Rustaceans: "With Rust, you only pay for the features you actually use! Rust does not contains a GC, and performs safety checks at compile time!"

Be productive

cλementd 🐇
@clementd

Abonné

rustup + cargo is by far my fav toolchain when it comes to build + dep management

À l'origine en anglais

13:53 - 24 janv. 2018

Clément Delafargue, *Clever Cloud* CTO

Cargo

Awesome features, ...

- ***compile*** *the program*,
- ***check*** *the program*,
- ***build*** *the doc*,
- ***init*** *the project*,
- ***run*** *the program*,
- *run* ***unit tests***,
- *run* ***benchmarks***,
- ***publish*** *your crate*,
- ***install***/***uninstall*** *crate(s)*,
- etc...

...one configuration file !

```
# The release profile, used for `cargo build --release`.
[profile.release]
opt-level = 3
debug = false
rpath = false
lto = false
debug-assertions = false
codegen-units = 1
panic = 'unwind'

# The testing profile, used for `cargo test`.
[profile.test]
opt-level = 0
debug = true
rpath = false
lto = false
debug-assertions = true
codegen-units = 1
panic = 'unwind'

# The benchmarking profile, used for `cargo bench`.
[profile.bench]
opt-level = 3
debug = false
rpath = false
lto = false
debug-assertions = false
codegen-units = 1
panic = 'unwind'
```

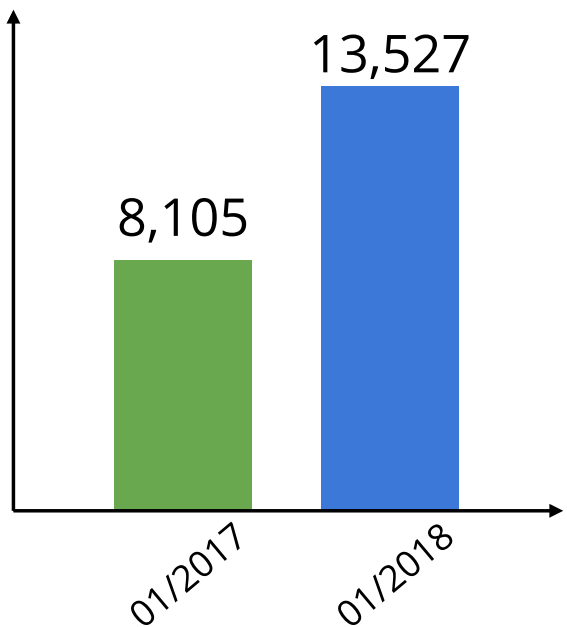
Rustup

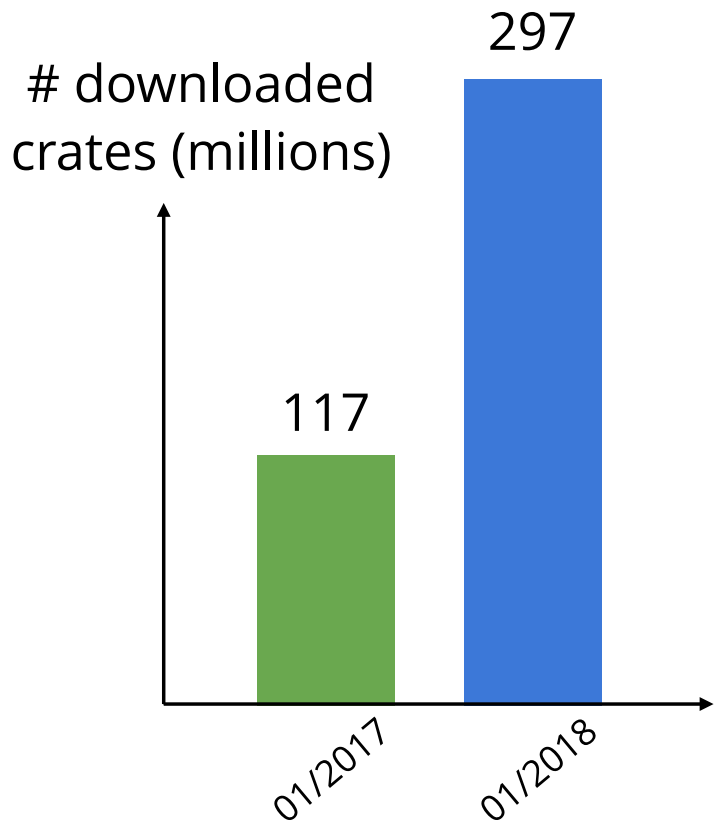
Objectives:

- installs Rust from the official release channels,
- enabling you to easily switch between stable, beta, and nightly compilers,
- keep the compilers updated,
- making cross-compiling simpler.

https://rustup.rs/

Be productive





Be productive

IDE's friendly: RLS, a standard interface for IDEs, editors and tools to interact with *Rust*

https://github.com/rust-lang-nursery/rls


Community 😍

Community 😍

The Rust compiler, for 50 releases...

- 4,700 forks,
- 74,000 commits,
- 2,000 contributors.

The community is open to RFCs here: *http://rust-lang.github.io/rfcs*

More than 90 Rust User Groups worldwide, in over 35 countries.

Big events in US/Canada (*Rust Belt Rust*), Europe (*Rust Fest*), etc...

Community 😍

Search a meetup/conference or help here: *https://community.rs/*

What's everyone working on this week:
https://users.rust-lang.org/c/community

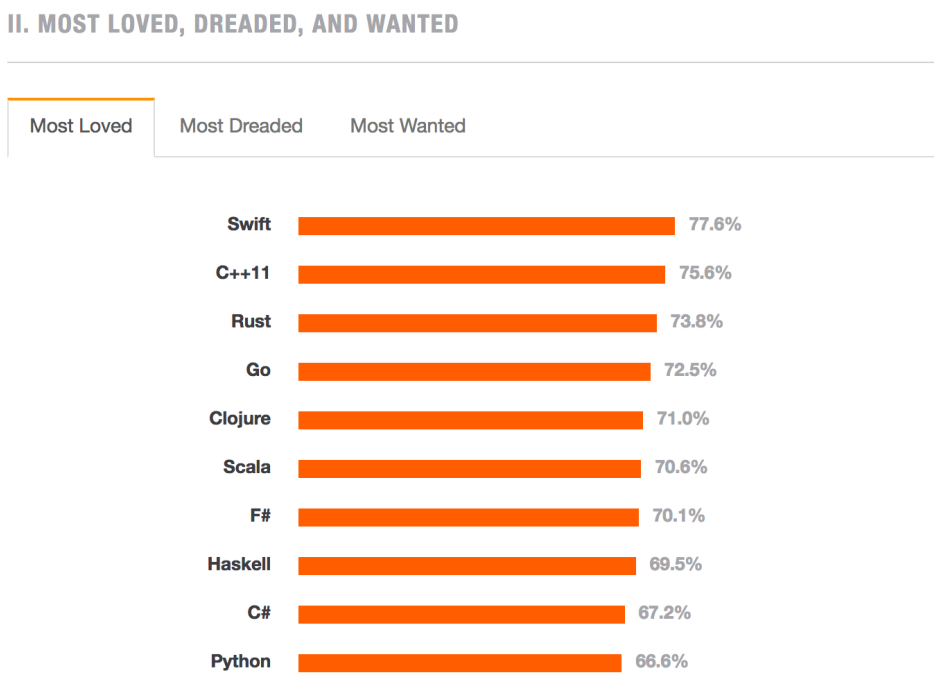
Search/find whatever you want about community here:
https://www.rust-lang.org/en-US/community.html

Community 😍

Developer Survey 2015

stackoverflow.com

💪 3rd position

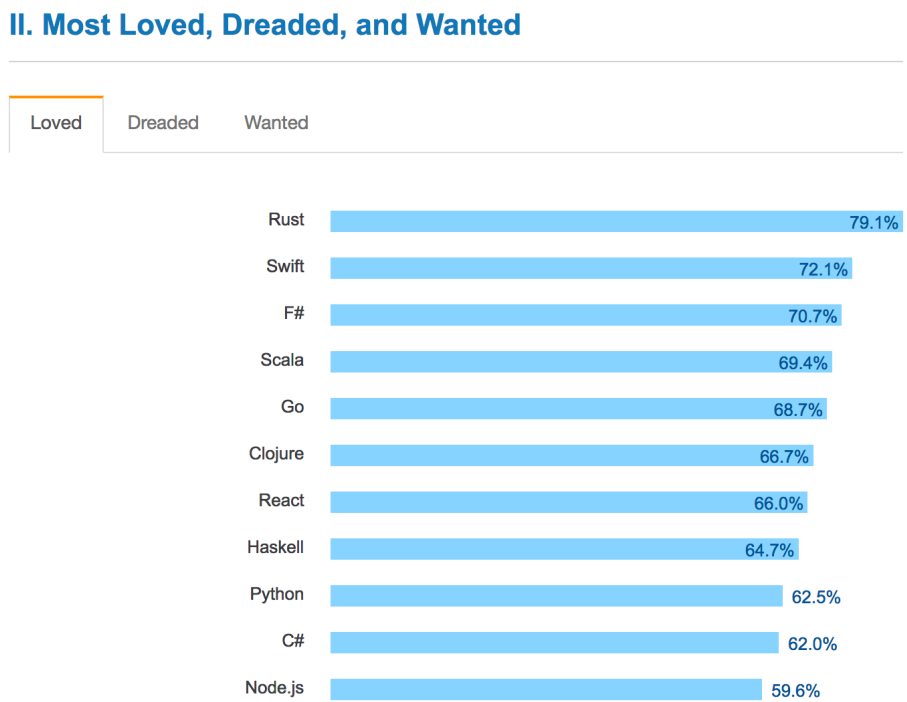


Community 😍

Developer Survey 2016

stackoverflow.com

🎉 1st position



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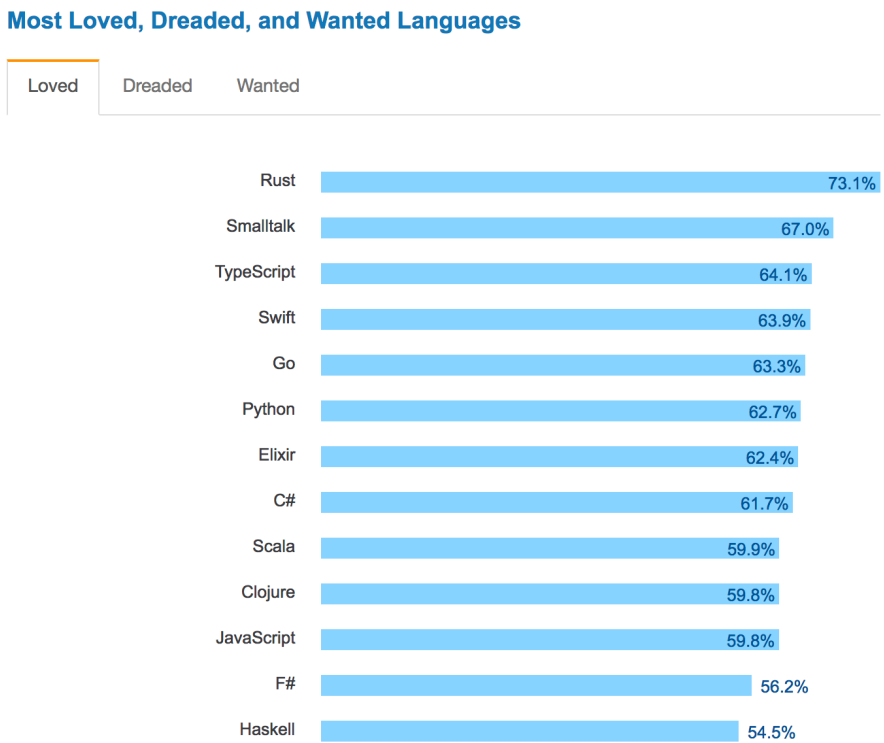
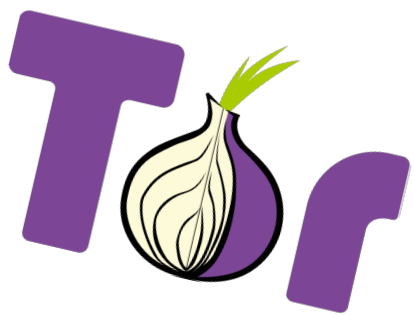


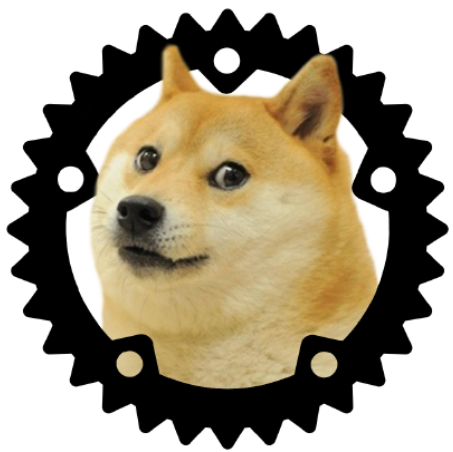
Rust in production

OVH.com



https://www.rust-lang.org/en-US/friends.html

Rust in production



piston

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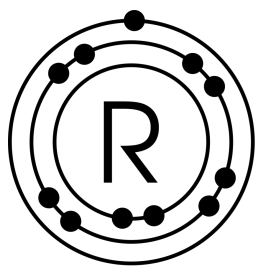


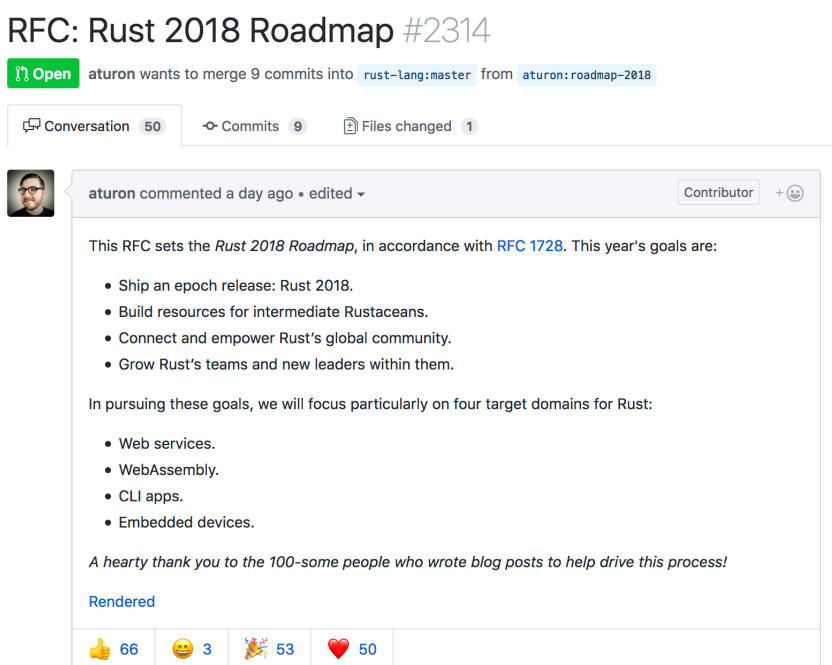
Redox

DIESEL

https://github.com/rust-unofficial/awesome-rust

#Rust2018

"*We care about your requests.*"



RFC: Rust 2018 Roadmap #2314

Open **aturon** wants to merge 9 commits into `rust-lang:master` from `aturon:roadmap-2018`

Conversation 50 · Commits 9 · Files changed 1

aturon commented a day ago • edited — Contributor

This RFC sets the *Rust 2018 Roadmap*, in accordance with RFC 1728. This year's goals are:

- Ship an epoch release: Rust 2018.
- Build resources for intermediate Rustaceans.
- Connect and empower Rust's global community.
- Grow Rust's teams and new leaders within them.

In pursuing these goals, we will focus particularly on four target domains for Rust:

- Web services.
- WebAssembly.
- CLI apps.
- Embedded devices.

A hearty thank you to the 100-some people who wrote blog posts to help drive this process!

Rendered

👍 66 · 😄 3 · 🎉 53 · ❤️ 50

https://github.com/rust-lang/rfcs/pull/2314

Thank you !

Rust Official	https://rust-lang.org
Rust Book	https://doc.rust-lang.org/book
#irc	irc.mozilla.org - #rust, #rust-beginners
Forum	https://users.rust-lang.org/
	https://rust-slack.herokuapp.com/