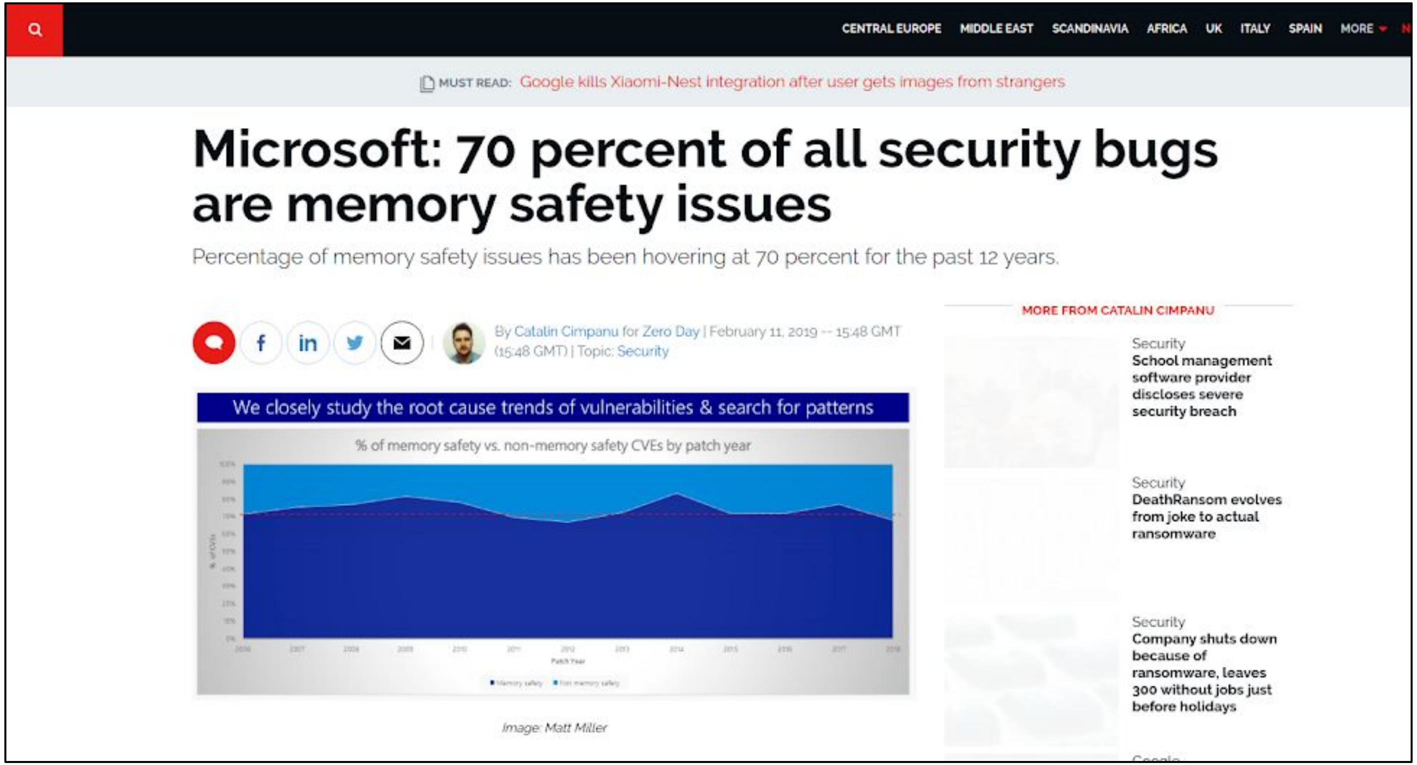
Intro to Rust

Rust Lisbon - 9 Jan 2020

Background and context



MUST READ: Google kills Xiaomi-Nest integration after user gets images from strangers

Microsoft: 70 percent of all security bugs are memory safety issues

Percentage of memory safety issues has been hovering at 70 percent for the past 12 years.

By Catalin Cimpanu for Zero Day | February 11, 2019 -- 15:48 GMT (15:48 GMT) | Topic: Security

We closely study the root cause trends of vulnerabilities & search for patterns

% of memory safety vs. non-memory safety CVEs by patch year

Image: Matt Miller

MORE FROM CATALIN CIMPANU

Security

School management software provider discloses severe security breach

Security

DeathRansom evolves from joke to actual ransomware

Security

Company shuts down because of ransomware, leaves 300 without jobs just before holidays

Google

History and values of Rust

- Founded in 2010 by

  moz://a

- Version 1.0 in 2015
- Current version 1.40

Values:

- Performance
- Reliability
- Tooling
- Community driven

Characteristics as language

- Low level language (but with high-level like features)
- Multi-paradigm (draws from imperative, OOP?, procedural, functional…)
- Compiled down to binary/wasm
- Memory safety without garbage collector or runtime (!!!)
- Can be used to build CLI tools, embedded, WASM, network components…

Main takeaways when programming Rust

“Do as much checking as possible at compile-time”

“Always write safe code” (steep learning curve)

“Immutable by default”

“Only change what is yours to change”

“Explicitly manage memory when copying variables, but implicitly derive variables’ types”

Code time!

Ownership system

- Central feature of Rust
- Prevents data-race at compile-time!
- Compiler is like your father: very strict but guides you to do the right thing

Ownership system

3 rules follow we must:

1. Each value in Rust has a variable that’s called its *owner*.
2. There can only be one owner at a time.
3. When the owner goes out of scope, the value will be dropped.

Code time!

Ownership system

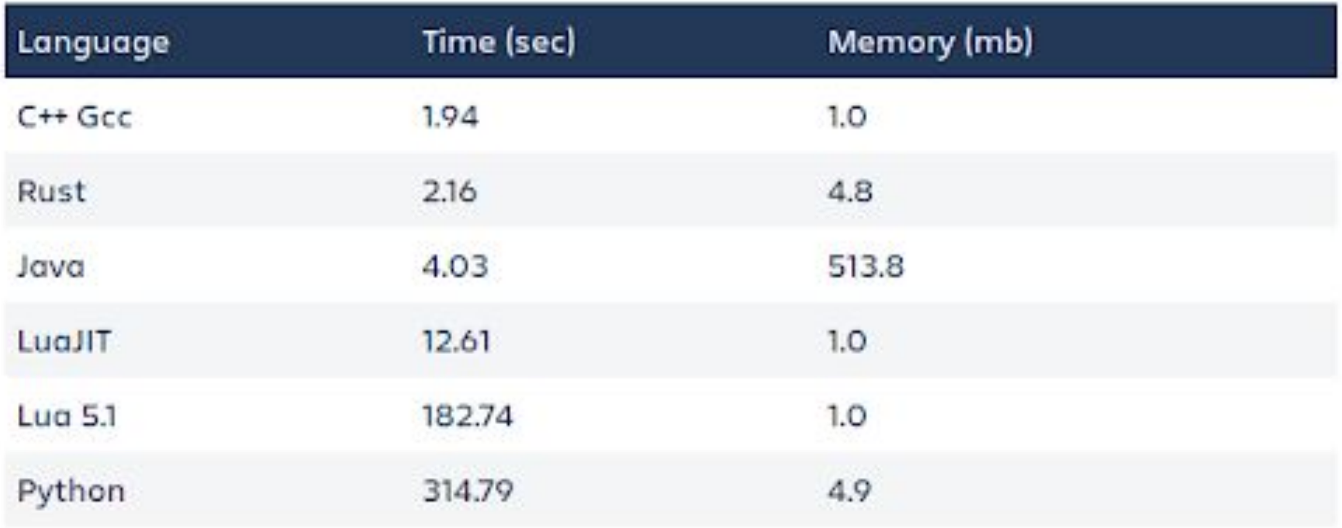
When dealing with mutable references, at any given time, we can only have **either**:

One mutable reference

or

Multiple immutable references

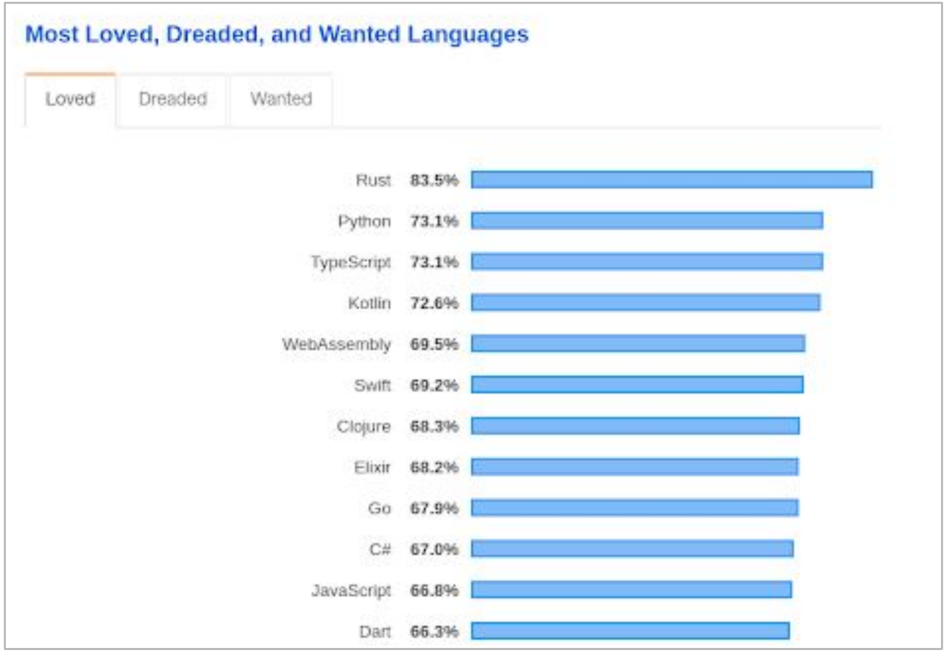
Rust vs other languages



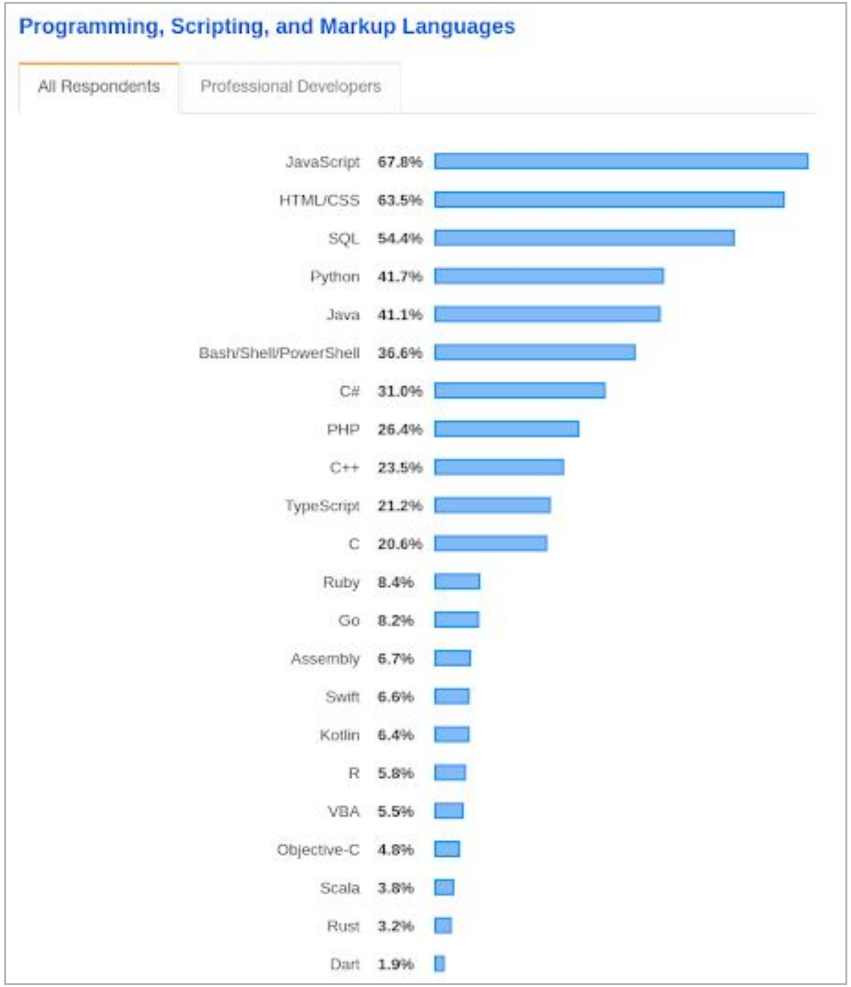
Language	Time (sec)	Memory (mb)
C++ Gcc	1.94	1.0
Rust	2.16	4.8
Java	4.03	513.8
LuaJIT	12.61	1.0
Lua 5.1	182.74	1.0
Python	314.79	4.9

Source

Rust vs other languages



4 years in a row!



https://insights.stackoverflow.com/survey/2019#technology

Rust’s ecosystem

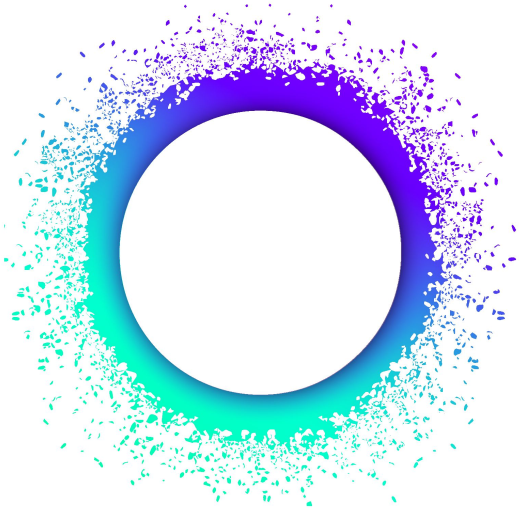
- Strong community
- Flourishing crates ecosystem
- Still a niche language, though adoption rising
- Strong build, toolchain and docs tooling
- IDE tooling lacking, catching up
- Language is incrementally updating (editions)
- Last addition: *async / await*

Rust Book

Cargo

WebAssembly

For decentralized tech



Holochain

Demo time!

Thank you!

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