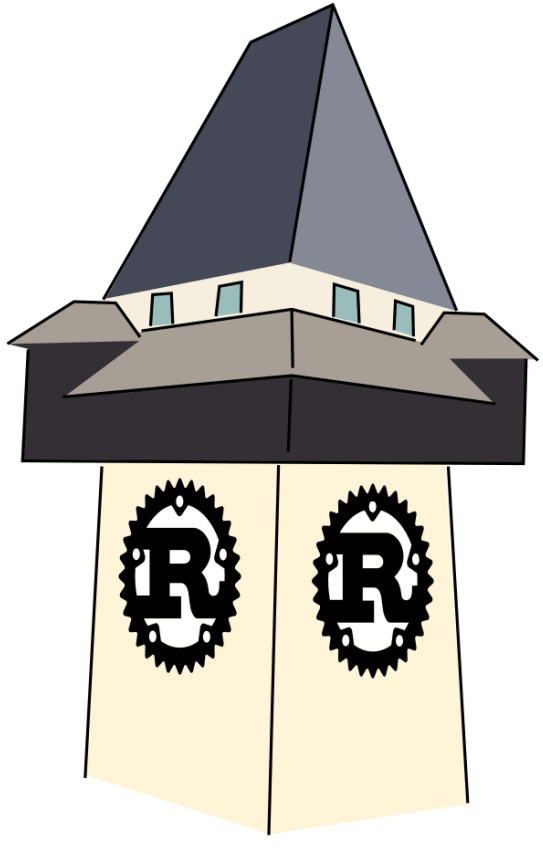
RUST GRAZ – 00 INTRO

Lukas Prokop

July 25, 2019



Data types and Trait std::iter::Iterator

25th of July 2019

Rust Graz, lab10

WELCOME BACK!

After one year w/o a talk, we are going to reboot RustGraz.

1. Regular talks each month.
2. Starting with introductory topics in summer 2019.
3. English as preferred language to include internationals.

ABOUT THE MEETUP

ORGANIZATION VIA MEETUP

25
JUL

Thursday, July 25, 2019

Data types and Trait std::iter::Iterator

Hosted by Lukas Prokop
From Rust Graz Meetup
Public group

You're going 5 people going

Share:

Organizer tools

Thursday, July 25, 2019
7:00 PM to 10:00 PM
Add to calendar

lab10 - Incubator & Coworking Space
Strauchergasse 13, 8020 · Graz

Details

We are back! On 25th of July 2019, we are going to start our monthly series on introductory rust topics. In particular, Lukas is going to talk about "Data types and Trait std::iter::Iterator":

* integers, 128-bit integers
* usize
* floating point numbers (IEEE 754)
* bool, char, string
* unit, never

WHICH DATE?

survey via framadate.org/TeSBAMxfWoUijdEI

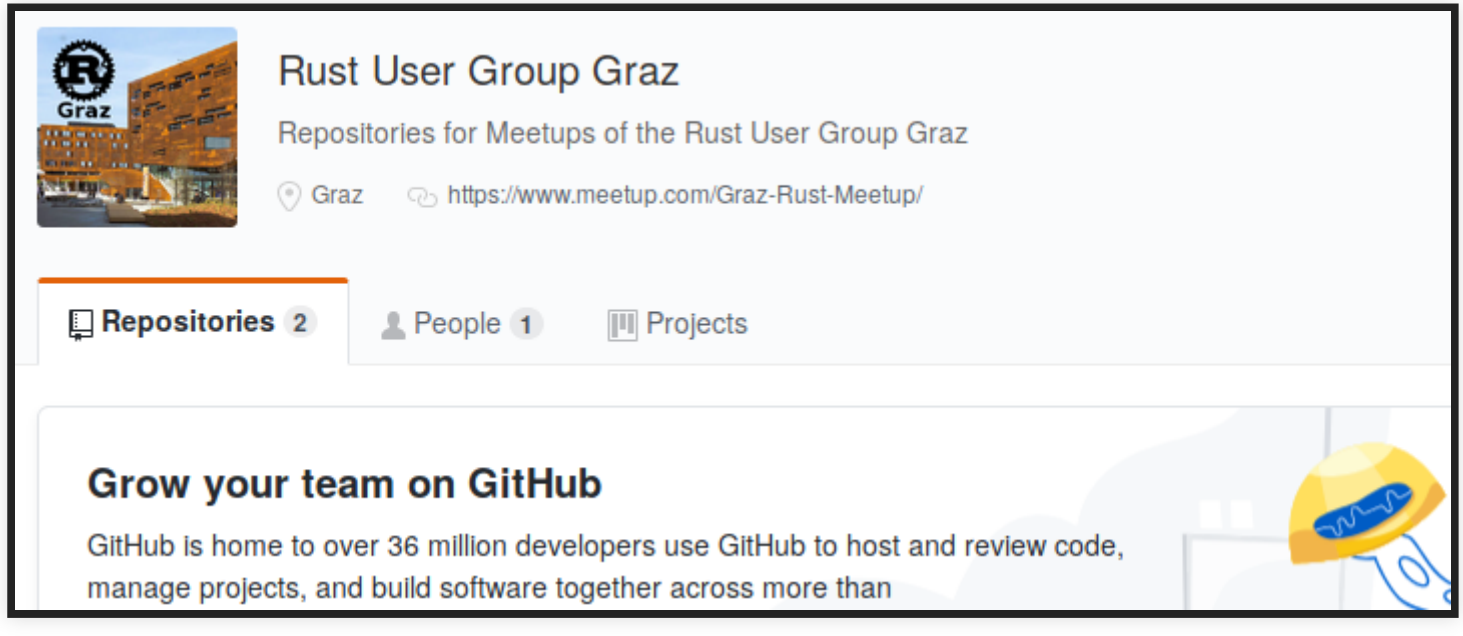
ANNOUCEMENTS ALSO VIA TWITTER

RESOURCES ON GITHUB

github.com/rust-user-group-graz

Today:

…-graz/00-intro, …-graz/01-getting-started,
…-graz/02-datatypes-and-iterator

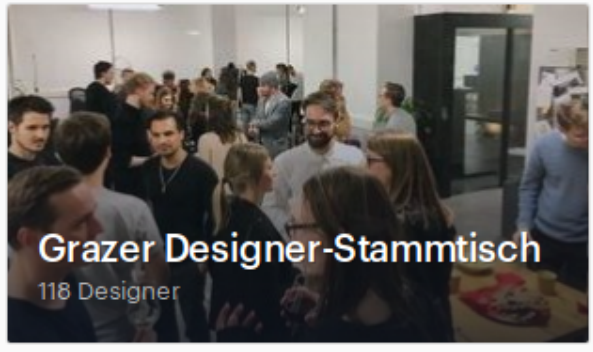


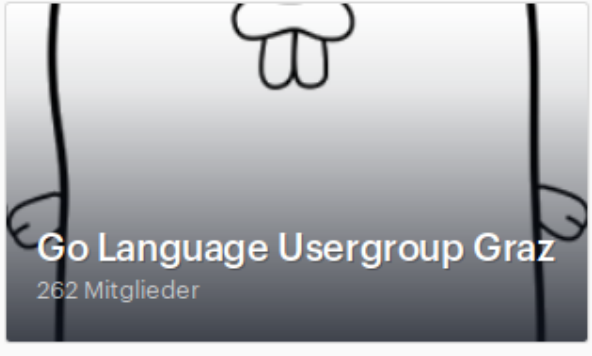
ABOUT RUST

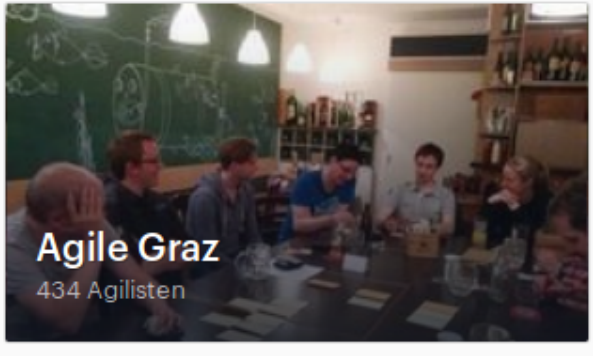
Why a meetup about rust? We have a bunch of other meetups going in Graz.


Machine Learning Graz
Machine Learning Graz
436 Machine Learners

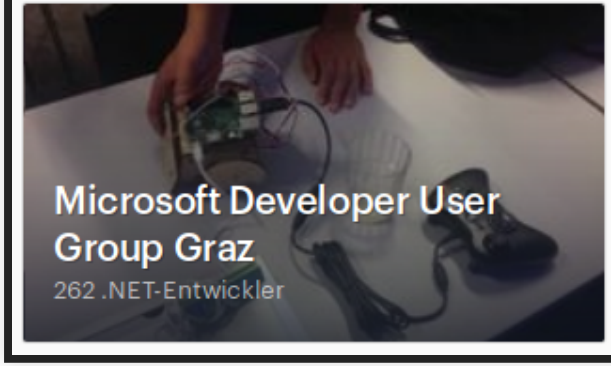

Python User Group Graz
376 Pythonistas

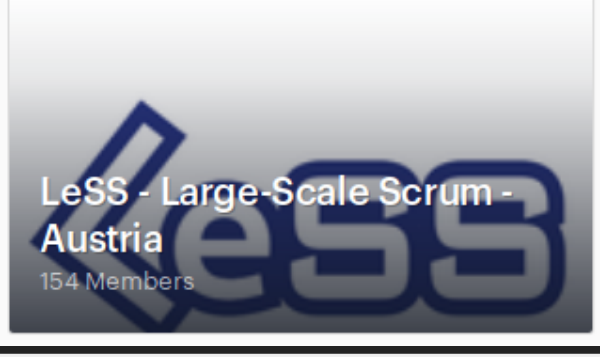

Grazer Designer-Stammtisch
118 Designer

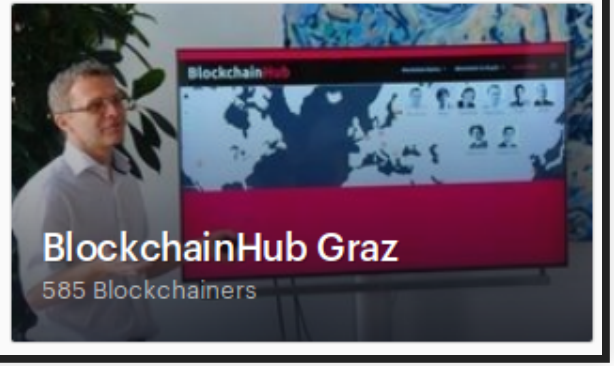

Go Language Usergroup Graz
262 Mitglieder


Agile Graz
434 Agilisten


Infracoders / DevOps / CloudNative Graz
162 Infracoders


Microsoft Developer User Group Graz
262 .NET-Entwickler


LeSS - Large-Scale Scrum - Austria
154 Members


BlockchainHub Graz
585 Blockchainers

ABOUT THE STATE OF RUST

rust is a *multi-paradigm system* programming language focused on *safety*, especially *safe concurrency* (via Wikipedia) and a *rich type system* and *ownership model* guaranteeing memory-safety and thread-safety (via rust-lang.org).

Ok. But does it work?

CURRENT STATE OF RUST: SOME PROJECTS

- Mozilla Research published rust to improve Firefox (Firefox Quantum, v57, 2×speed, 30% less RAM than Chrome, 75% of Firefox's code rewritten, 5 mio. LOCs, servo project)

CURRENT STATE OF RUST: SOME PROJECTS

- pairity.io develops the “fastest and most advanced Etherum client“ (Pairity Etherum), “a framework for building blockchains and spawning decentralised innovation“ (Parity Substrate), “the next-generation platform for connecting independent blockchains together“ (Polkadot) and others.

CURRENT STATE OF RUST: SOME PROJECTS

- npm registry uses rust for its CPU-bound bottlenecks
- Several components of the Dropbox core file-storage system were written in Rust to pursue greater datacenter efficiency

CURRENT STATE OF RUST: SOME PROJECTS

- Redox (redox-os.org) is a Unix-like Operating System written in Rust, aiming to bring the innovations of Rust to a modern microkernel and full set of applications
- “Writing an OS in Rust” (os.phil-opp.com)

Redox is a Unix-like Operating System written in **Rust**, aiming to bring the innovations of Rust to a modern microkernel and full set of applications.

View Releases

Pull from GitLab

- Implemented in Rust
- Microkernel Design
- Includes optional GUI - Orbital
- Supports Rust Standard Library
- MIT Licensed
- Drivers run in Userspace
- Includes common Unix commands
- Custom libc written in Rust (relibc)

CURRENT STATE OF RUST: SOME PROJECTS

- Jix (jix.one) implements a SAT solver "Varisat" in rust and blogs about its design
- TLS performance: rustls versus OpenSSL (15% quicker to send data, 5% quicker to receive data, 30-70% quicker to resume a client connection, …, uses less than half the memory of OpenSSL)

CURRENT STATE OF RUST

- For the fourth year in a row, Rust is the **most loved**[1] programming language among our respondents, followed close behind by Python, the fastest-growing major language today (stackoverflow Developer Survey Results 2019)

[1] most loved means “high percentage of developers who are currently using rust express high interest in continuing to do so“

CRITICISM OF RUST

CRITICISM OF RUST

So rust is great and saves the world?

- We saw some positive sides
- Let's talk about some negative sides

Literature:

- Criticizing the Rust Language, and Why C/C++ Will Never Die by afiskon (translated to English), abridged version by Quxxy
- Rust is not a good C replacement by Drew DeVault

CRITICIZING THE RUST LANGUAGE, AND WHY C/C++ WILL NEVER DIE

- Since `unsafe` exists, Rust is no better than C++ for safety.
- Safe Rust is not as fast as C++, so you need to write in unsafe, thus there's no point.
- C++ has fuzzers and static checkers, and you can write tests.

CRITICIZING THE RUST LANGUAGE, AND WHY C/C++ WILL NEVER DIE

- Rust has five incompatible kinds of pointers (example is that you can't go from having pointers to the heap to pointers to the stack without changing types).
- `Vec<Rc<RefCell<Box<Trait>>>>`
- Rust doesn't insert the necessary Rcs and Boxes for you.

CRITICIZING THE RUST LANGUAGE, AND WHY C/C++ WILL NEVER DIE

- Macros are a crutch and will prevent any good IDEs from existing.
- “cargo actively encourages downloading packages directly from git repositories”
- “C++ doesn't restrict programmers regarding what they can or cannot use.”
- Smart pointers aren't perfect.

CRITICIZING THE RUST LANGUAGE, AND WHY C/C++ WILL NEVER DIE

- No strict description of Rust's semantics.
- “the source of troubles is usually in humans”
- There are no Rust jobs.

RUST IS NOT A GOOD C REPLACEMENT

- *“kitchen sink” programming language:* language solves problems by adding more language features. New features per year:
  C → 0.73, Go → 2, C++ → 11.3, Rust → 15
- C is the most portable programming language
- C has a spec
- C has many implementations
- C has a consistent & stable ABI

RUST IS NOT A GOOD C REPLACEMENT

- Cargo is mandatory
- Concurrency is generally a bad thing
- Safety

“Go is the result of C programmers designing a new programming language, and Rust is the result of C++ programmers designing a new programming language”

ABOUT ME

Dec 2017–end 2019

self-employed software developer (python, Go)

Oct 2019+

IAIK PhD student in infosec (interest in RISC-V)

Others

- bachelor's degree math student
- co-organizer of PyGraz and Grazer Linuxtage
- I didn't have time to program rust for too long. Let's get serious in the next months [together]!

DISCLAIMER

I don't think rust should be your first programming language. Thus, I assume familiarity with fundamental programming concepts.