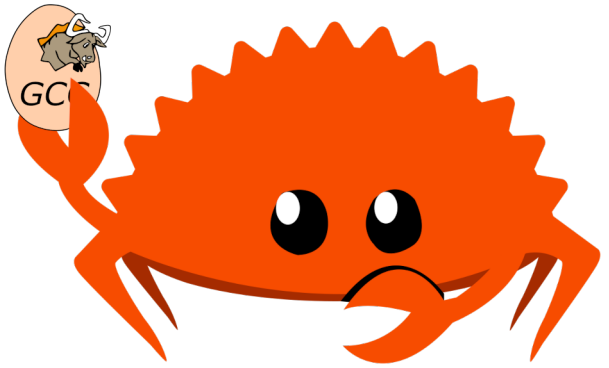
OPEN SOURCE SECURITY

EMBECOSM®



GCC Front-End for Rust

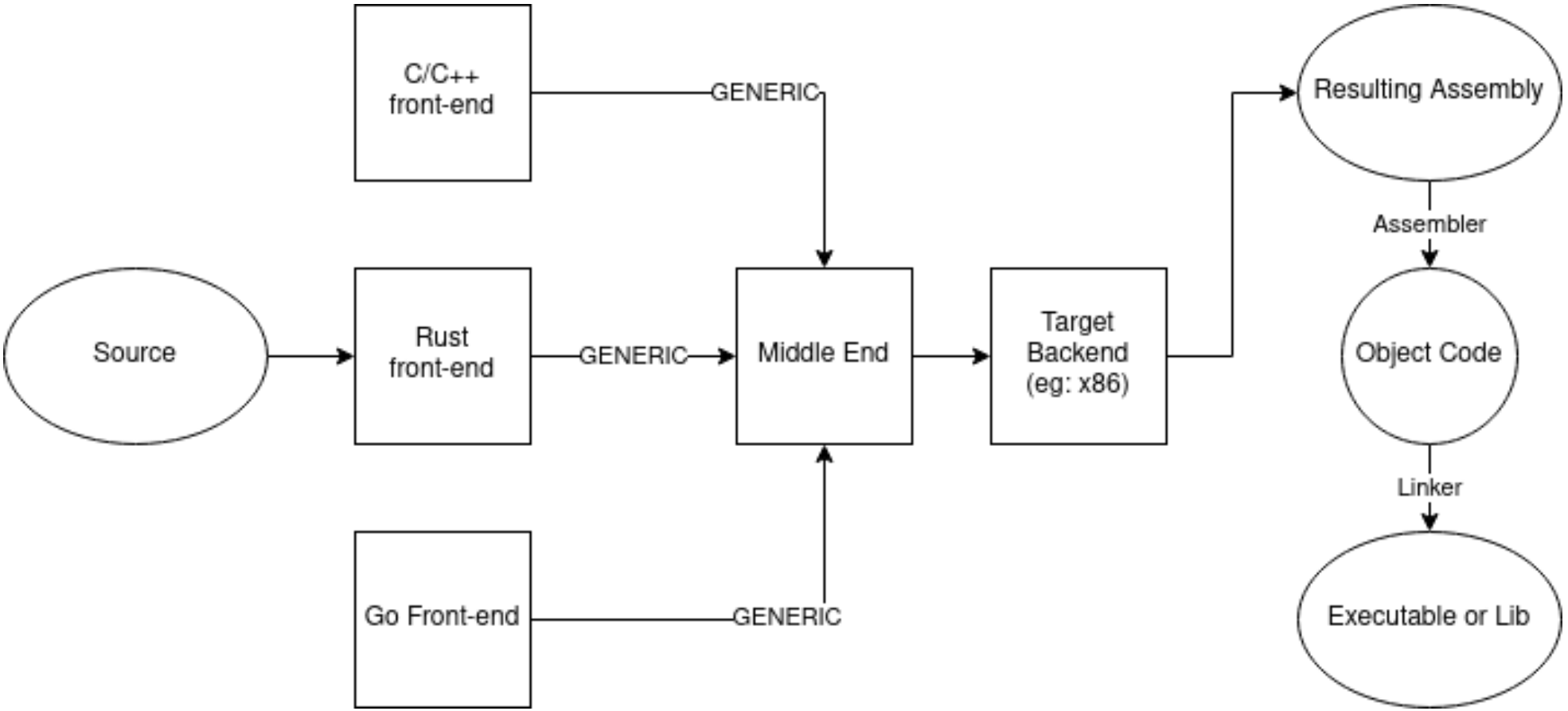
@the_philbert

Overview

- Motivation
  - What, Why, How
- Progress
  - Status
  - Community
  - Future Work
- Questions

OPEN SOURCE SECURITY

What is a Front-End



What is this?

- Full Implementation of Rust on top of GNU Toolchain
  - Goal to be up streamed with mainline GCC
  - Reuses Binutils (ld, as, gdb)
  - Written in C++
  - Reusing official Rust libcore, libstd, libproc

Personal Motivations

- I enjoy big projects, especially compilers
- GCC will provides a contrast to LLVM
  - Code Size
  - Register Allocation
  - Energy efficiency
  - Security Features
  - Performance characteristics

Benefits

- Independent implementation of Rust
  - Tight integration with GCC
  - Rustc bootstrapping
  - GCC Plugins support
  - LTO and CFI
  - Drive adoption of Rust though GCC via backporting
  - Retargeting
  - Backend support for more systems

How

- Community effort began back in 2014
  - Progress stalled with the frequency of language changes
  - Community effort restarted in early 2019
- Recent interest in driving Rust into Linux
  - Open Source Security, inc and Embecosm
  - MVP compiler is fully planned with weekly reporting and milestones tracked

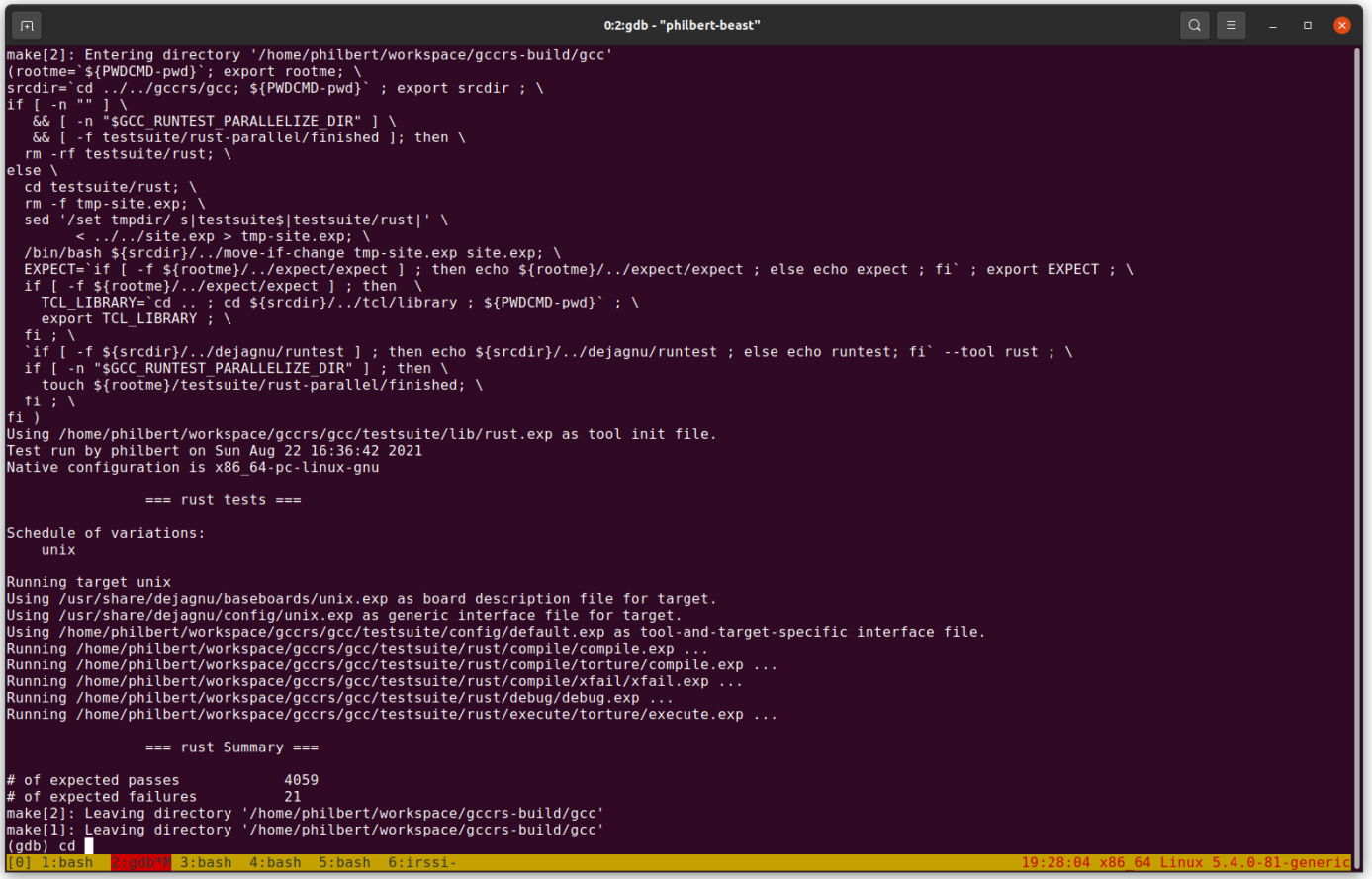
OPEN SOURCE SECURITY

EMBECOSM®

Milestones

- Core Data Structures - Done
- Core Control Flow 1 - Done
- Generics - Done
- Core Trait Resolution – Done
- Control Flow 2 – In Progress
- Macros and cfg-expansion
- Imports and Visibility
- Unstable Features
- Intrinsics/builtins

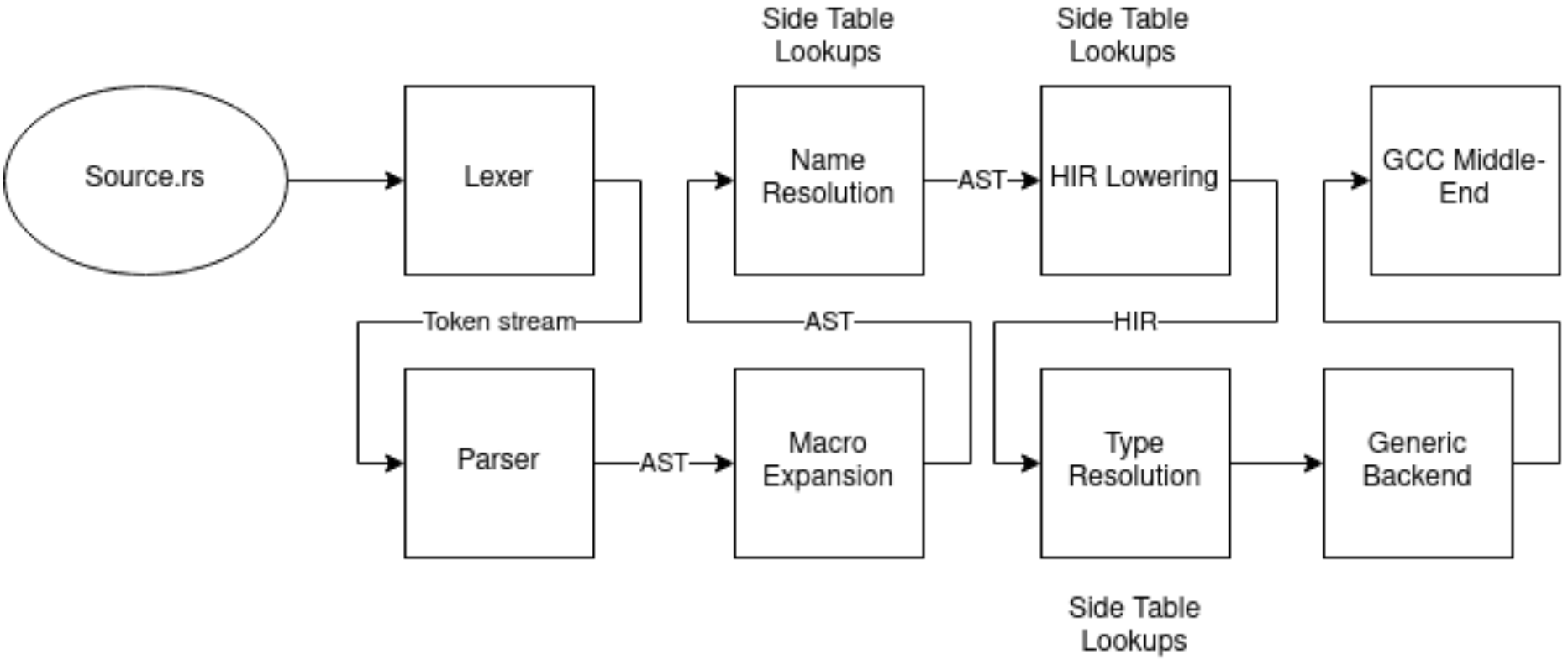
Demo



OPEN SOURCE SECURITY

EMBECOSM®

Compiler Pipeline



Community

Photo courtesy: Marc Poulhiès

Community

- Goal is to make working on compilers fun
- Status reporting
  - Weekly and Monthly
  - Shout out to contributors
  - Open and transparent
- Monthly Community Call
  - 1st Friday of the Month 09h00 UTC
  - Open to everyone who is interested
  - Hosted on Jitsi

OPEN SOURCE SECURITY

EMBECOSM®

GSoC 2021

- Part of the GCC Organisation
- Accepted two projects
  - Cargo GCCRS
    - Arthur Cohen
  - Dead Code Analysis
    - Wenzhang Yang

Get Involved 1

- Lots of scope to make your mark on the compiler
  - Joel wrote the Parser and AST
  - Mark Wielaard wrote support for unions
  - Marc Poulhiès added module support
  - Arthur Cohen extended this to support for module expansions
  - Thomas Schwinge merges from upstream GCC and built our testsuite with Marc

Get Involved 2

- We keep a list of good first PR's
  - Task guides and mentorship is offered
- Thanks for the support from:
  - flip1995
  - bjorn3
- Not all contributions must be code
  - Testcases
  - Bug Reports
    - We are on compiler explorer!

OPEN SOURCE SECURITY

EMBECOSM®

Future Work

- Borrow checker
  - https://github.com/rust-lang/polonius
- Incremental Compilation
- Retarget the code onto other infrastructure
- Drive Rust compiler compatibility testing
- Backport the front-end

Special Thanks

- Brad Spengler
  - https://opensrcsec.com/
- Jeremy Bennett
  - https://www.embecosm.com/
- David Edelsohn
  - https://gcc.gnu.org/steering.html

Questions

- Github: https://rust-gcc.github.io/
- Email: philip.herron@embecosm.com
- Zulip: https://gcc-rust.zulipchat.com/
- IRC: irc.oftc.net #gccrust
- https://gcc.gnu.org/mailman/listinfo/gcc-rust
- Thanks!

OPEN SOURCE SECURITY

EMBECOSM®