Corrode: Automatically translating C to Rust

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init

- what does Corrode do?
- what doesn't Corrode do?

intermission

- testing
- community

what does Corrode do?

- preserve C semantics and ABI
- make implicit C rules explicit in Rust

“semantics”: what does this C expression mean?

```
a + b
```

make implicit C rules explicit in Rust

C:

```
unsigned char a;
...
(long) 3 + (short) 0xFFFFFFFF + a
```

make implicit C rules explicit in Rust

C:

```
unsigned char a;
...
(long) 3 + (short) 0xFFFFFFFF + a
```

Rust:

```
3i32 as (isize) +
0xffffffffu32 as (i16) as (isize) +
a as (isize)
```

what doesn't Corrode do?

- generate idiomatic Rust
- handle all of C

non-idiomatic output

C:

```
for(unsigned i = 0; i < 10; ++i)
    ...
```

non-idiomatic output

C:

```
for(unsigned i = 0; i < 10; ++i)
    ...
```

Idiomatic Rust:

```
for i in 0..10 { ... }
```

non-idiomatic output

C:

```
for(unsigned i = 0; i < 10; ++i)
    ...
```

Idiomatic Rust:

```
for i in 0..10 { ... }
```

Corrode-generated Rust:

```
let mut i : u32 = 0i32 as (u32);
while i < 10i32 as (u32) {
    ...
    i = i.wrapping_add(1 as (u32));
}
```

intermission

questions so far?

testing

- Csmith/C-Reduce
- porting musl

randomized testing and delta debugging

- Csmith: generate random legal C99 source files (!)
- C-Reduce: delete parts of a buggy source file that don't make the bug disappear

porting musl libc

- musl: an implementation of the standard C library
  - `printf`, `memcpy`, `bsearch`, `atexit`, `...`
- ~1,300 C source files for x86-64
- Corrode produces Rust source for 267 (~20%)
- `rustc` compiles 194 without errors (~15%)
  - mostly "possibly uninitialized variable" errors
  - some problems with global initializers
  - C unions can't be accessed or initialized, only passed by reference
  - some known issues with Corrode's array handling
- I haven't figured out how to link the result yet ;-)

contributing

- literate programming
- bugs tagged “easy”

literate programming

- literate programming: interleaved code and documentation
- Corrode is currently 41 pages of executable internals documentation

“easy” bugs

- give new contributors an easy way to get started
- (thanks to Alec Theriault for making big contributions after tackling a Corrode issue I tagged “easy”!)

fini

Questions?

- `https://github.com/jameysharp/corrode`
- Twitter: @jamey_sharp
- `http://www.lunchsage.com/`