

COMP6991 24T1

Metaprogramming

Examples of metaprogramming

- > Compiler plugins
 - > e.g. Project Lombok
- > Macro systems
 - > e.g. C, Rust
- > Runtime reflection
 - > e.g. Java, C#
- > Embedded DSLs
 - > e.g. jOOQ, elisp
 - > Combinators, e.g. Nom

Why?

- > Purpose-fit syntax
- > Increased validation
- > Convenience
- > Syntax extension

Why not?

- > Difficult to write / maintain?
- > Difficult to understand?
- > Integration with base language?

Macros in C

Macros in Rust

Declarative macros

(Macros by example)

- > "Easy" to read
- > "Easy" to write
- > Simple semantics
- > Limited in capability

C macros -> Rust

Procedural macros

(Proc macros)

- > Fully-fledged Rust code!
- > `fn(TokenStream) -> TokenStream`
- > Very difficult to write?
- > Very difficult to read?
- > Extremely powerful
- > Intricate implications

vec![...]

Macro metavariables

> Reference:

<https://doc.rust-lang.org/reference/macros-by-example.html#metavariables>

Macrokata!

for (a; b; c) { ... }

Awesome macros!

> `sqlx`

> `yew`