TIL-Script Typechecker

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Project goals

- Create a working typechecker for TIL constructions
- Plot typechecking graph to an image
- Write extensible code to allow further development

Accomplished goals

- Working typechecker
- Graph plotting
- TIL-Script parser
- Context recognition

Implementation

- Kotlin
- Gradle
- Antlr

Parser Implementation

- Existing TIL-Script grammar has been utilized
  - Slight tweaks were necessary to make it work with Antlr
- Parser is generated using Antlr
- Resulting AST is converted to a custom structure

Typechecker Implementation

- For typechecking to succeed, all names must be defined
- This is ensured in a separate step
- If at least one undefined name is found, processing ends
- Errors are printed to stdout

Typechecker Implementation

- Recursive implementation
- Aliases are expanded, expansions are compared
- Double execution is ignored
- Trivializations force construction of independent scopes
- Type deduction is unsupported
- Errors are, yet again, printed to stdout

Context Recognition

- Context recognition is also supported
- Recursive implementation
- No errors can be detected at this point

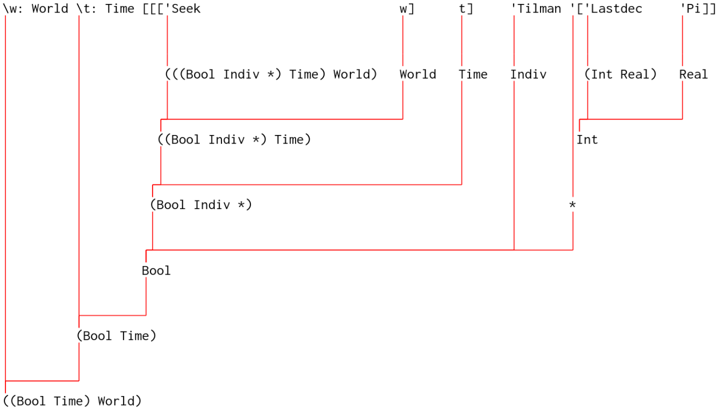
Program Output

- Errors are printed to stdout
- Script information is written to a JSON file
  - Constructions
  - All subconstructions of said constructions
  - Definitions
  - Constructed type
  - Type of TIL-Script statement
  - Context
- Typechecking graph is created as an SVG image

Graph Plotting

- No third party libraries
- Indentation is necessary due to lengths of type ids
- Monospace font

Graph Plotting



\w: World \t: Time [[['Seek w] t] 'Tilman '['Lastdec 'Pi]]

(((Bool Indiv *) Time) World) World Time Indiv (Int Real) Real

((Bool Indiv *) Time) Int

(Bool Indiv *) *

Bool

(Bool Time)

((Bool Time) World)

Possible Improvements

- LSP
  - Text editor integration
  - Code completion
  - Error reporting
  - Refactoring
  - Supported by all major editors (Vim, Emacs)

Possible Improvements

- Interactive browser application
  - Web application available online
  - Allows online text editing
  - Provides on-the-fly syntax and type coherence checking
  - Opportunity to utilize graphs

The End