Jacob Leach

jacob@z-tech.org • github/riz0id

Education

2018-2022 B.S. in Computer Science and Mathematics (expected)

2018 High School, 4.0 GPA

Projects

2020 Chemical Abstract Machine in Agda and Haskell
- Modified Chandy-Lamport implementation using CHAM semantics .

2019 Constructive reals using Cauchy sequences in Agda.
- Formalised real numbers in Agda constructively.

2018 Data parallel 2D heterogeneous explicit heat flow simulation and graph in haskell.
- Simulates the heat equation with an explicit method
- Employs AccelerateHs native LLVM backend for data parallelism

2018 Personal website written in Haskell.
- Built web server on Servant
- Webpage generation from custom Markup language parsed using Parsec

2018 Real time polygon rasterization in Java
- Rasters polygons in real time without graphics dependencies
- Implements Bresenham Algorithm for rasterization

2018 Embedded SQLite domain specific language in Lua (MoonScript)
- Implemented query building through hierarchy of metatable classes
- Interfaced efficient Lua to SQLite translation through C binding API.

2016 C99 compiler using Java
- Implemented recursive descent parser adherent to standard C99 syntax
- Fashioned a LLVM IR clone as a compilation target

Activities

2019 Contributions to Agda's standard library.
- Defined algebraic morphisms for rings and groups
- Proved homomorphisms between varying rational constructions
- Completed algebraic properties for rational numbers

References provided on request

Last revised: 2020-04-18

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Skills

Languages	Haskell (1 year), C++ (4 years), productive in Java, Lua, C, Python and Lisp
Math	Agda, Constructive Analysis
Software	Linux (4 years), Emacs, git

Internships

2020-02 to 2020-03	Homotopy Type Theory for Biological applications at Sylph Bioscience

References provided on request

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