Tesla Zhang

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Education

B.S. in Computer Science at **The Pennsylvania State University**, PA, US 08/2018 – Present
Minor in Mathematics, Anticipated Date of Graduation: 01/2023 GPA 3.32/4.00

Job Experience

RisingWave Labs, Remote 7/2022 – Present
Streaming Database Developer Intern

- Proposed an overhaul of the query plan AST design, which better facilitates the enum feature implemented in the Rust programming language.

PLCT Lab, Remote 12/2020 – Present
Implementation of Dependent Types Opensource Maintainer

- Leading a team to explore modern techniques in type theory implementation, such as pattern unification, elimination of dependent pattern matching, cubical type theory, termination check of recursive functions, etc.

JetBrains Research, Remote 01/2020 – 12/2020
HoTT and Dependent Types Arend Team Intern

- Used features like gradle composite build and buildSrc to reduce build time and improve automation.
- Improved the language/IDE, such as sections, hygiene macros, optimized `Fin` type, semantic highlighting, etc.
- Created an extensible REPL framework, provided implementations in CLI (with contextual completion) and in IntelliJ IDEA (interacts with the opened project, supports completion, highlighting and goto definition).
- Designed and implemented an expression type-checking debugger that supports step-into and displays local context and expressions as stack frames.

PingCAP Inc., Remote 08/2018 – 08/2019
Distributed Storage Systems TiKV Intern - Ecosystem Team

- Improved many TiKV-relevant libraries, like optimizing the performance of grpcio, adding new features to procinfo.
- Helped to migrate the Protocol-Buffer library used by TiKV and its Raft implementation.
- Learned a lot about Rust programming, distributed system, working remotely, and databases.

Sourcebrella Inc., Shenzhen, China 02/2018 – 07/2018
Static Analysis Developer Intern

- Created IntelliJ/CLion/Eclipse plugin for the Pinpoint analyzer. Co-worked on the SonarQube plugin.
- Created a multi-threading cross Java/Kotlin source code indexer which can index Hadoop within 4 minutes.
- Learned a lot about Linux programming and the Clang/LLVM codebase.

Academic Experience

Multi-Campus REU, State College 5/2019 – 8/2019

- Extensively studied the literature on row polymorphism and record calculus.
- Implemented and formalized a row polymorphic dependent type theory.

Learning Assistant for Cmpsc 461, State College 8/2022 – Present

Related Projects

Aya Prover Practical implementation of a dependent type system (role: project leader)

- Supports dependent types, dependent pattern matching with confluence check for overlapping cases, higher inductive types, GADTs, hierarchial universes, cubical type theory features, and implicit arguments.
- Supports visualization of the type checking traces and exporting elaboration result to HTML or LaTeX. Supports LSP in VSCode. Binaries releases are based on jlink and GraalVM native-image.

IntelliJ Pest A Pest grammar language plugin for IDEs based on the IntelliJ Platform

- Semantic-based highlighting, completion, navigation, definition extraction/inlining, and Rust plugin integration.
- Provides live preview – test grammar files by dynamically highlighting user code according to the grammar on the fly. These highlighted code could be exported to HTML.

Guest0x0 Higher-dimensional language based on cubical type theory with cutting-edge research ideas

- Supports extension types in `redtt` and basic components in "CHM" cubical type theory.
- Reused most infrastructures extracted from the Aya compiler to simplify the implementation complexity.

DevKt Cross-platform lightweight code editor / Kotlin IDE

- Built-in Java/Kotlin highlights and completion, that can support other languages via plugins (transplantable from JetBrains IDE's). Has extra build & run support for Kotlin.
- Provides fine-grained highlight color and key bindings with hot reload.

JImgui Elegant and efficient Java port of *dear imgui* using JNI

Optimized JNI performance using the *Critical Native* feature of the HotSpot VM, supports auto-load built-in native libraries for mainstream platforms, with additional support for image loading and window scaling.

VSCode extension for Arend Arend language server, based on lsp4j and Arend compiler's internals.

Skills

- **Program Language**: **multilingual** (not limited to any specific language), especially experienced in Java Kotlin Rust C# Agda Haskell Arend, comfortable with Dart C C++ F# F⋆ Idris Perl MATLAB (in random order).
- **Compiler**: understand various program representations such as CFG, ANF, (P)HOAS, etc. Familiar with most parser generators, understand layout syntax parsing.
- **Kotlin/Java**: **6 years** of experience, familiar with JNI, Gradle, Kotlin coroutines, and Swing.
- **Type Theory**: understand Martin-Löf type theory, coinduction, HoTT, and Cubical, familiar with Idris, Agda (**3 years** of experience, contributor), Arend and some F⋆/Coq.
- **JetBrains MPS**: understand concepts and applications of **Language-Oriented Programming**.
- **IDE Tooling**: **3 years** of experience, familiar with the IntelliJ Platform infrastructure (created Julia, DTLC, Pest, etc.), also have experience with Eclipse/SonarQube/VSCode plugin development.
- **Mobile Development**: **2 years** of experience, Android (Java, Kotlin (Anko)), Flutter
- **Development Tool**: can adapt to any editors/OSs, usually use JetBrains IDEs and Emacs in Ubuntu, have experience with team collaboration tools like YouTrack, Jira, GitHub, BitBucket, Slack, JetBrains Space.

Miscellaneous

- Crates.io: https://crates.io/users/ice1000, publishing interesting Rust libraries
- IntelliJ Marketplace: https://plugins.jetbrains.com/author/10a216dd-c558-4aaf-aa8a-723f431452fb
- Research profile: https://personal.psu.edu/yqz5714
- Languages: English - fluent (TOEFL 100), Chinese - native speaker
- Opensource Contributions: https://ice1000.org/opensource-contributions
  member of JuliaEditorSupport, agda, pest-parser, EmmyLua, arend-lang and more, contributed to agda, Arend, KaTeX, shields.io, grpc-rs, intellij-solidity, intellij-haskell, intellij-rust, TeXiFy-IDEA, rust-analyzer and other projects (apart from organization ones)
- StackOverflow: 6000+ reputations, also active on other StackExchange sites
- Latest one-page version of this resume: https://tinyurl.com/y8xdlfug
- Latest complete version of this resume: https://tinyurl.com/y2v59t36
- Get the Chinese version of this resume: https://tinyurl.com/ya4urea8
- **1 dan** on CodeWars, ranked #78 on the whole site (Top 0.019%), solving and *making* new problems primarily in Haskell, Agda, and Idris

Publications

1. Tesla Zhang. "A Simpler Encoding of Indexed Types". In: *Proceedings of the 6th ACM SIGPLAN International Workshop on Type-Driven Development*. TyDe '21. Republic of Korea: ACM, 2021. ISBN: 978-1-4503-8616-6. DOI: 10.1145/3471875.3472991. arXiv: 2103.15408