Tesla Zhang

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Education

The Pennsylvania State University, PA, US 08/2018 – Present

Major: Computer Science (Undergraduate), Anticipated Date of Graduation: 01/2023 GPA 3.23/4.00

Work Experience

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.

PLCT Lab, Remote 12/2020 – Present

(Implementation of Dependent Types) Types team lead

- Leading the types team to explore modern techniques in dependent type implementation, such as pattern unification of implicit variables, type checking of pattern matching, termination check of recursive definitions, etc.

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. (now Ant Financial Code Insight), 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.

Personal Projects

DevKt https://github.com/ice1000/dev-kt

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 keymap settings, supports hot reload.

Voile https://github.com/owo-lang/voile-rs

Experimental dependently-typed language with kind-based row-polymorphism

- Supports meta variable unification and non-dependent row-polymorphic sum and product type.
- Supports cumulative universe and typical ambiguity to get rid of Setω.

Aya https://github.com/aya-prover/aya-dev

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, and implicit arguments.
- Supports visualization of the type checking traces and exporting elaboration result to HTML or LaTeX.

IntelliJ Pest https://github.com/pest-parser/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.

External tactics for Agda https://github.com/ice1000/agda-mode

A REPL interacts with Agda CLI interface, simulating Ltac in Coq. Supports most actions available in the Emacs mode, like case-split, show expression and goal type, etc., implements IO via tokio and serde along with the required json interface in Agda compiler.

JImgui https://github.com/ice1000/jimgui

Java port of *dear imgui* implemented in JNI, with FFI code generated by custom tool. Optimized JNI performance using the *Critical Native* feature of the HotSpot VM, Supports auto-load built-in native libraries for mainstream platforms, implements image loading and window scaling apart from the vanilla imgui library.

Arend IO https://github.com/ice1000/arend-io

Experimental IO library for Arend, implements unsafePerformIO and simple IO actions.

VSCode extension for Arend https://github.com/ice1000/vscode-arend

VSCode language client for the Arend language, build on top of the experimental implementation of the Arend language server. Available from the VSCode extension marketplace.

Arend language server https://github.com/ice1000/arend-language-server

An experimental implementation of the Arend language server, based on the lsp4j framework and Arend compiler's internal interfaces.

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 (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**: **4 years** of experience, **4** projects collected in Awesome Kotlin, familiar with JNI, Gradle, and Swing, understand Contract DSL and Kotlin coroutines, did some code analysis with Kotlin's compiler.
- **Type Theory**: understand Martin-Löf type theory, coinduction, Homotopy type theory and Cubical type theory, familiar with Idris, Agda (**3 years** of experience, contributor), Arend (past member) 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 under Ubuntu, have experience with team collaboration tools like YouTrack, Jira, GitHub, BitBucket, Coding.net, Tower, Slack, JetBrains Space.

Miscellaneous

- Bintray profile: https://bintray.com/ice1000, for publishing useful JVM libraries
- Crates.io profile: https://crates.io/users/ice1000, for publishing interesting Rust libraries
- IntelliJ Plugin developer profile: 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: https://tinyurl.com/y5cmw3dz 5000+ 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 #59 on the whole site (Top 0.021%), solving and making new problems primarily in Haskell, Agda and Idris