Tesla Zhang

ice1000kotlin@gmail.com · https://ice1000.org · https://github.com/ice1000

Education

B.S. in Computer Science at **The Pennsylvania State University**, PA, US — Aug, 2018 – Dec, 2022
Minor in Mathematics, GPA 3.28/4.00

Ph.D. in Computer Science at **Carnegie Mellon University**, PA, US — Aug, 2023 – Present

Work Experience

JetBrains Research, Remote — Jan, 2020 – Dec, 2020
HoTT and Dependent Types, Interactive Theorem Prover Development

- Used features like gradle composite build and buildSrc to reduce build time and improve automation.
- Improved the language/IDE, such as sections, hygiene macros, `Fin` type with elaborative subtyping, 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 — Dec, 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, Cartesian cubical type theory, termination check of recursive functions, etc.

RisingWave Labs, Remote — Jul, 2022 – Jul, 2023
Streaming Database, Developer Intern

- Proposed an overhaul of the query plan AST design, which better facilitates the enum feature implemented in the Rust language.
- Implemented a pretty printing framework for trees with line fitting and Unicode art. Integrated into SQL explain.

Sourcebrella Inc., Shenzhen, China — Feb, 2018 – Jul, 2018
Static Analysis, Compiler Frontend, IDE Plugin Development

- 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.

PingCAP Inc., Remote — Aug, 2018 – Aug, 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.

Related Projects

Aya Prover, Practical Implementation of Dependent Types (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, Pest language plugin for 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.

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

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

Skills

- Programming Languages: 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. and normalization by evaluation. Familiar with most parser generators, understand layout syntax parsing.
- Kotlin/Java: **8 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 Lean/F★/Coq.
- **JetBrains MPS**: understand concepts and applications of Language-Oriented Programming.

- IDE Tooling: **4 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**, familiar with Flutter, Android, and iOS.
- Tools: editor-agnostic, have experience with team tools like YouTrack, Jira, GitHub, BitBucket, Slack, JetBrains Space and more.

Misc

- Crates.io: https://crates.io/users/ice1000, publishing interesting Rust libraries
- IntelliJ Marketplace: https://plugins.jetbrains.com/author/10a216dd-c558-4aaf-aa8a-723f431452fb
- Languages: English - fluent (TOEFL 100), Chinese - native speaker
- Open-source 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+ reputation, also active on other StackExchange sites
- Latest revision of this resume: one-page version https://tinyurl.com/y8xdlfug, complete version: https://tinyurl.com/y2v59t36
- Get the Chinese version of this resume: https://tinyurl.com/ya4urea8
- **1 dan** on CodeWars, ranked #111 on the whole site (Top 0.020%), solving and making new coding challenges primarily in Haskell, Agda, and Idris and some other JVM languages

Publications

[1] T. Zhang, "A simpler encoding of indexed types," in *Proc. 6th ACM SIGPLAN Int. Workshop Type-Driven Develop.* in Tyde '21, Republic of Korea, 2021, doi: 10.1145/3471875.3472991.