Zhan Shi

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Education

Kyoto University Apr, 2022 - Mar, 2024
Master of Informatics in Commucation and Computer Engineering Kyoto, Japan
Advisor: Atsushi Igarashi

Kumamoto University Oct, 2019 - March, 2022
B.Eng. in Computer Science Kumamoto, Japan

Shandong University Sep, 2019 - June, 2021
B.Eng. in IoT Engineering Qingdao, China

Work Experience

Luogu, Shanghai, China luogu.com
Backend Team Leader, Remote, Part-Time Jul, 2017 - Apr, 2023

- Led and participated in the backend development of the biggest online-judge platform in China.
- Designed and developed a back-end framework in PHP with dependency injection and container compilation.
- Designed and led the development of several curial middlewares, including a distributed asynchronous task worker in Rust, a WebSocket server in Python.
- While continuously introducing new features, progressively optimized and refactored the existing codebase, enabling scalability from tens of thousands to over a million users, and supported an annual judgment volume of fifty million.

Research Experience

A Cast Calculus for Implementing Gradual Dependent Types, Master's Thesis Jan, 2023 - Feb, 2024
Kyoto University, advised by Prof. Atsushi Igarashi and Prof. Taro Sekiyama Kyoto, Japan

- Proposed a novel approach to implementing gradual dependent types soundly and efficiently for introducing dependent types into general-purpose programming languages.
- Prsented a cast calculus as the core language base on dependent pattern matching and pattern unification.
- Implemented a prototype of the cast calculus in Haskell.

OpenSource Contributions

Aya Prover, Practical implementation of a dependent type system aya-dev

- Overhauled records to support dependent types.
- Helped with some bugs and refactorings in primitive definitions.

Personal Projects

yukino, A type-driven and high-performance ORM framework in Rust yukino-dev

- Derives SQL operations from simple Rust code based on a monadic structure.
- Provides a functional query builder that delegates its type-checking to the type system of Rust (makes heavy use of type-level computation).
- The abstraction is type-safe but zero-cost, ensures both efficiency and type safety.

iroha, A tokenization library for procedural macros in Rust iroha

annotation-rs, Compile-time annotation parser for Rust annotation-rs

ty-ops, Type-level simply typed lambda calculus in Rust ty-ops

Skills

- **Programming Languages :**
  - Proficient in both Object-Oriented Programming and Functional Programming, experienced in meta-programming. Able to work effectively with any programming language.
  - Highly proficient in Agda, Haskell, PHP, Python, Rust.
  - Comfortable with C/C++, Coq, Java, JavaScript, OCaml, TypeScript.

- **Type Theory:** familiar with variants dependent type theories, their semantics, and relevant proofs, interested in normalization-by-evaluation, gradual typing, and effect systems, and also have experience with formal verification.
- **Compiler:** understand variants compiler architectures, familiar with compiler frontend, especially in type checking. Also have experience in parser generator and DSL design.
- **Web Development: 7 years** of experience in full-stack web development:
  - Backend: Proficient in various backend frameworks in PHP, Python, and Rust, including Symfony, Laravel, Django, and Actix. Familiar with message queues and asynchronous programming. Also experienced in backend framework design.
  - Frontend: experienced with Vue.
  - Database: knowledgeable in MySQL, PostgreSQL, Redis, and Elasticsearch with a strong background in database design and optimization.
  - DevOps: Skilled in Docker, proficient in CI/CD practices, and experienced with cloud services.
- **Development Tools:** can adapt to any editors/OSs, usually use JetBrains IDEs and VSCode under Ubuntu, familiar with git and docker, and have experience with team collaboration tools like GitHub and Slack.
- **Languages:** Chinese: native speaker, English: fluent, Japanese: business

Publications & Talks

[1] Z. Shi, "Partial Gradual Dependent Type Theory", in *Companion Proceedings of the 2023 ACM SIGPLAN International Conference on Systems, Programming, Languages, and Applications: Software for Humanity*, in SPLASH 2023. Cascais, Portugal: Association for Computing Machinery, 2023, p. 22. doi: 10.1145/3618305.3623594.