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Vishal Canumalla

github.com/vcanumalla
vcanumalla.github.io

Education

University of Washington Sept. 2020–June 2024
B.S. in Computer Science (GPA: 3.84) *Seattle, WA*

- Selected Coursework: Graduate Programming Languages, Graduate ML Systems, Distributed Systems, Data Structures & Parallelism, Algorithms, Systems Programming, Probability, Computational Biology

Experience

UW Programming Languages and Software Engineering Lab (PLSE) May 2023–Present.
Compiler Research Intern *Seattle, WA*

- Researcher on Lakeroad, a tool for automatically generating hardware compilers given high-level design models.
- Developed automated mapping for CFGLUT5, a previously unsupported configurable primitive on Xilinx FPGAs.
- Lakeroad's primitive mapping time is comparable to state-of-the-art proprietary toolchains on 90% of benchmarks.
- Lakeroad uses 85% less primitive resources for arithmetic and bitwise workloads on Xilinx and Lattice FPGAs.

UW Systems, Machine Learning, and Architecture Lab (SAMPL) Mar. 2021–May 2023
Undergraduate Research Assistant *Seattle, WA*

- Researcher on 3LA, a compiler flow for finding more efficient workflows for compiling to deep learning accelerators.
- Improved TVM deep learning accelerator code generation by adding Rust tensor optimization compiler passes.
- Devised rewrite rules for transforming convolutions to matrix multiplications, improving accelerator offloading.
- 3LA boosts deep learning operator offloading by 30% on MLPerf benchmarks on three deep learning accelerators.

Toyota Connected North America June–Sept. 2022
Software Engineer Intern *Plano, TX*

- Intern on Drivelink, a product improving telematic services for emergency notifications on Toyota/Lexus vehicles.
- Upgraded Java Spring dependencies in microservice applications, deploying them to Azure Kubernetes service.
- Upgraded developer CLI tools in Go for simulation of crash notifications to be MQTT protocol compatible.

Certora Mar.–June 2022
Software Engineer Intern *Seattle, WA*

- Researcher on Gambit, a prototype robustness and mutation testing library for the Certora Prover using Kotlin.
- Implemented a mutation testing framework for Solidity smart contracts, catching 30% more development bugs.
- Gambit is an ongoing research project, and is open-source on Github. (link).

Projects

LLVM-lang

- Implemented a simple front-end language in C++ to learn about about LLVM libraries and infrastructure.
- Wrote a lexer, parser, and compiler to LLVM IR, as well as support for optimizers and JIT compilation.

Publications

- *Generate Compilers from Hardware Models!* (PLARCH 2023)
  Gus Henry Smith, Ben Kushigian, **Vishal Canumalla**, Andrew Cheung, René Just, Zachary Tatlock.
- *Specialized Accelerators and Compilers: Replacing Accelerator APIs with a Formal Software/Hardware Interface.*
  Bo-Yuan Huang, Steven Lyubomirsky, Yi Li, Mike He, Thierry Tambe, Gus Henry Smith, Akash Gaonkar, **Vishal Canumalla**, Gu-Yeon Wei, Aarti Gupta, Zachary Tatlock, Sharad Malik.

Skills

Languages: C++, Racket, Java, Rust, OCaml, Coq
Technologies: TVM, Rosette, Spring, Git, CircleCI