SAMEERAN JOSHI

CONTACT

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RESEARCH INTEREST

Compilers, Computer Architecture, Programming Languages, Compiler Optimizations, LLVM, Hardware-Software Codesign, Modern C++, HPC systems

PUBLICATIONS

PEAK: **Generating High-Performance Schedules in MLIR**, Amir Mohammad Tavakkoli∗, **Sameeran Joshi∗**, Shreya Singh, Yufan Xu, P. Sadayappan, and Mary Hall. In Proceedings of the 36th International Workshop on Languages and Compilers for Parallel Computing**(LCPC23)**. Oct. 2023(Accepted)

An NSF REU Site Based on Trust and Reproducibility of Intelligent Computation: Experience Report, Mary Hall, Ganesh Gopalakrishnan, Eric Eide, Johanna Cohoon, Jeff M. Phillips, Mu Zhang, Shireen Y. Elhabian, Aditya Bhaskara, Harvey Dam, Artem Yadrov, Tushar Kataria, Amir Mohammad Tavakkoli, **Sameeran Joshi**, Mokshagna Sai Teja Karanam. In **EduHPC workshop** at The International Conference for High Performance Computing, Networking, Storage, and Analysis (**SC23**) (Accepted)

EDUCATION

School of Computing, University of Utah
PhD Student in Computer Science | Aug 2022 – Currently Enrolled

Pune University, India
Bachelor's In Computer Engineering | Aug 2015 – May 2019
GPA: 8.29/10

WORK EXPERIENCE

Advanced Micro Devices (AMD)

CPU Compiler Engineer | June 2019 – Present

Software System Designer 2, *April 2020 to Present*

Parallel compilation in clang-driver

- Parallelized the compilation phase for building applications with AOCC by adding compiler flag
- Achieved huge gains in build times of large HPC applications like WRF from 10min to 1min and CAM4 from 38sec to 10 sec with AOCC clang driver

Binary Level Static Performance Analyzer Tool

- Extended LLVM BOLT to compare statically 2 binaries to report performance difference
- Implemented python utilities for analyzing the data, plotting results and graphs to aid in reporting issues
- Added count of basic blocks, vector, loops, scalars, loads & stores, spills & reloads, etc. to report issues based on various metrics
- Reported performance issues and suggested missing optimizations in AOCC for SPEC CPU 2017, polybench and HPC workloads compared to ICC
- Presented paper in internal conference (13% acceptance rate) at AMD

LLVM Flang Group

- 50+ commits to Fortran language compiler frontend in LLVM including new features, bug fixes, infrastructure changes
- Added parsing and semantic support for OpenMP 4.5/5.0 and Fortran 2018 language features in LLVM Flang
- Reviewed voluntarily OpenMP, OpenACC, Flang driver patches from community members

Software System Designer 1, *July 2019 to March 2020*

Compiler Validation Group:

- Implemented from scratch regression, unit tests for 12+ Fortran 2008 language standard to fuzz AOCC compiler
- Reported Internal Compiler Errors, segmentation faults, mis compilations in AOCC Flang source
- Focused on compiler validation, automation, CI/CD frameworks, debug testing to verify AOCC

OTHER PROJECTS

GCC - GNU Compiler Collection
Google Summer Of Code
Extending Csmith for GCC C-Language Extensions, June 2018 – April 2019
Mentor: Andi Kleen

- Added ~15 GNU C language extensions to Csmith and found unexplored bugs (ICE's, seg faults, crashes) in GCC compiler
- Found 12 critical bugs, 11 were fixed by GCC community
- Increased the fuzzing code coverage of csmith on GCC by – line coverage: 5%, function coverage: 7%, branch coverage: 4%
- Presented work at Pune Kernel meetup on work done in Csmith

Git Statistics Excel Generator, *AMD, India*
Manager: Hariharan Parasuraman

- Designed small utility to collect, visualize, create reports of individual contributions in open-source projects for managerial audits

AWARDS

- TFWS Scholarship (awarded to 5% students of baccalaureate class) *2015-2019*
- AMD Spotlight award for performance recognition at AMD 2020

ACTIVITIES AND INTERESTS

- Volunteered at CppOnSea'21, CppCon'21
- 2021 LLVM developers meeting PC member
- Co-founded bitSimplify: RISC-V based LLVM toolchain startup
- Student Travel Grant for attending Workshop on Sparse Tensor Computations