Akshay Bhosale

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Research interests

High Performance Computing, Parallel Programming, Compilers, Automatic Parallelization.

Education

University of Delaware — Newark, DE, USA
PhD in Computer Engineering — May, 2018 – Present
Mentors: Rudolf Eigenmann — *GPA: 3.7*

University of Mumbai — Mumbai, Maharashtra, India
Bachelor in Electronics Engineering — May, 2012 – May, 2016
GPA: 8.13

Industry experience

Pacific Northwest National Laboratory
Division of Computational Sciences — Richland, WA, USA
PhD Intern — Jan, 2022 - May, 2022
Implemented a Python/Numpy front end for the COMET domain-specific compiler infrastructure. The compiler is based on the MLIR framework developed by Google (Contributed Code).

Research experience

PAROT Group, University of Delaware — Newark, DE, USA
Research Assistant — May 2018 – Present
Developing and implementing advanced compiler analysis and optimization techniques in the Cetus compiler infrastructure.

Research Projects

Automatic Parallelization of Complex Program Patterns
Mentors: Rudolf Eigenmann — May, 2019 – Present
Developing advanced analysis techniques to automatically parallelize loops with subscripted subscript patterns in scientific application codes. Benchmarking the performance of the transformed applications on state-of-the art supercomputing clusters (Project Website).

The Cetus Project
Mentors: Rudolf Eigenmann — May, 2019 – Present
Fixing bugs and adding features to the Cetus source-to-source compiler infrastructure. Releasing new versions of the compiler on the official Cetus website hosted at the University of Delaware (Cetus Website, GitHub Repository).

Published work

Automatic and Interactive Program Parallelization Using the Cetus Source to Source Compiler Infrastructure v2.0.
Akshay Bhosale, Parinaz Barakhshan, Miguel Rosas, Rudolf Eigenmann
Electronics, 11(5), 809, 2022.

On the Automatic Parallelization of Subscripted Subscript Patterns using Array Property Analysis
Akshay Bhosale, Rudolf Eigenmann
Proceedings of the ACM International Conference on Supercomputing, 2021.

Compile-time Parallelization of Subscripted Subscript Patterns
Akshay Bhosale, Rudolf Eigenmann
Proceedings of the IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW), 2020.

Work under review

Recurrence Analysis for Automatic Parallelization of Subscripted Subscripts
(Submitted to the *ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming, PPoPP, 2024*)

Relevant Skills

Programming
Proficient in: Python, Java, C, OpenMP programming.

Compilers
Dependence Analysis, Optimization and Transformation techniques, Intermediate Representation, Control Flow Analysis.

Service and outreach

University Graduate Student Government August, 2020 – May, 2021
Vice President of Student Affairs - Oversaw the working of the Diversity, Student Life, Sustainability and Mental Health committees. Worked closely with the university administration in addressing myriad issues affecting graduate students.

International Student and Scholar Services (ISSS) May, 2018 – May, 2020
Volunteer - Steering committee member of the International Student Mentoring (iBuddy) program, Organizing committee member of signature ISSS events at the University of Delaware.

Professional memberships

IEEE Computer Society May, 2017 – Present
ACM SIGPLAN May, 2019 – Present