Johannes Doerfert

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Objective

While the polyhedral model allows for elegant and powerful ways to parallelize scientific applications, it lacks applicability. I want to enable these transformations for general purpose programs and combine them with other parallelization approaches.

Education

International Max Planck Research School for Computer Science   since 2013

- ▶ PhD student at the Compiler Design Lab of Prof. Sebastian Hack
- ▶ Stipendiary at the International Max Planck Research School for Computer Science
- ▶ Topics: Compiler Construction, Polyhedral Optimization and Timing Analysis

Saarland University – Graduate School of Computer Science   since 2012

- ▶ Received a scholarship for the PhD preparation phase
- ▶ Current Master grade 1.6 according to Master regulations (Overall average: 1.8; 1.0 is best possible, 5.0 worst)

Saarland University, Saarbrücken, Germany   2009 – 2012

- ▶ Bachelor's Degree in CS with minor in Mathematics; overall grade 1.8 (1.0 is best possible, 5.0 worst)
- ▶ Thesis title: Speculative Loop Parallelization (grade 1.3)
- ▶ Got best possible grade in Programming, Concurrent Programming and Algebra

Albert-Schweitzer Gymnasium (Sec. School), Dillingen, Germany   2000 – 2009

- ▶ Grade 2.0; Majors: Mathematics, Physics and Politics

Academic Activities

Publications

- ▶ Conference paper: *Optimistic Loop Optimisation*. In the Proceedings of the International Symposium on Code Generation and Optimization (CGO) 2017. J. Doerfert, T. Grosser, and S. Hack
- ▶ Conference paper: *Input Space Splitting for OpenCL*. In the Proceedings of the 25th International Conference on Compiler Construction (CC) 2016. S. Moll, J. Doerfert, and S. Hack
- ▶ Conference paper: *Runtime Pointer Disambiguation*. In Proceedings of the International Conference on Object Oriented Programming Systems, Languages and Applications (OOPSLA) 2015. R. Alves, F. Gruber, J. Doerfert, A. Labrineas, T. Grosser, F. Rastello, and F. M. Q. Pereira
- ▶ Workshop paper: *Polly's Polyhedral Scheduling in the Presence of Reductions*. In Proceedings of the 2015 IMPACT Workshop part of HIPEAC. J. Doerfert, K. Streit, S. Hack, and Z. Benaissa
- ▶ Journal paper: *Generalized Task Parallelism*. In ACM Transactions on Architecture and Code Optimization (TACO) 2015. K. Streit, J. Doerfert, C. Hammacher, S. Hack, and A. Zeller
- ▶ Conference Paper: *Architecture-Parametric Timing Analysis*. In the Proceedings of the Real-Time and Embedded Technology and Application Symposium 2014. J. Reinecke and J. Doerfert
- ▶ Workshop paper: *SPolly: Speculative Optimization in the Polyhedral Model*. In Proceedings of the 2013 IMPACT Workshop part of HIPEAC. J. Doerfert, C. Hammacher, K. Streit, and S. Hack
- ▶ Conference paper: *Impact of Resource Sharing on Performance and Performance Prediction*. In Proceedings of the 24th International Conference on Concurrency Theory (CONCUR) 2013. A. Abel, F. Benz, J. Doerfert, B. Dörr, S. Hahn, F Haupenthal, M. Jacobs, Amir H. Moin, J. Reineke, B. Schommer, and R. Wilhelm

Advanced Training

- ▸ 2015: HiPEAC Summer School on Advanced Computer Architecture and Compilation for High-Performance and Embedded Systems
- ▸ 2013: Spring School on Polyhedral Code Optimization and Analysis

Honours

- ▸ 2016: HiPEAC collaboration grant
- ▸ 2013–2016: Stipendiary at the International Max Planck Research School for Computer Science (IMPRS-CS)
- ▸ 2012–2013: Scholarship for the PhD preparation phase from the Graduate School of Computer Science
- ▸ 2010–2012: Member of Honours Programme for Bachelor Students

Skills

Technical

- ▸ LLVM, LLVM/Polly, isl: extensive experience
- ▸ C/C++: extensive experience, used in coursework (programming lecture, operating systems, distributed systems, compiler construction), for my bachelor thesis and ongoing research projects
- ▸ Latex, Java, Python, SML: experienced, used in some coursework (programming lecture, software design lab) and private projects

Social

- ▸ Spoken & written languages: German (native), English (proficient)

Experience

Internships

- ▸ 2016: three months research internship with Prof. Torsten Hoefler and Dr. Tobias Grosser at ETH in Zurich, Switzerland
- ▸ 2015: one month research internship with Prof. Uday Bondhugula at the Indian Institute of Science (IISC) in Bangalore, India
- ▸ 2014: three months industry internship in the compiler team at Qualcomm Innovation Center in San Diego

Talks

- ▸ 2016: Tutorial about LLVM/Polly at the LLVM Developers' Meeting in Barcelona, Spain
- ▸ 2016: Talk about LLVM/Polly at the SEPARS Meeting in Munich, Germany
- ▸ 2015: Invited talk at the Second Workshop on the LLVM Compiler Infrastructure in HPC in Austin, TX, USA
- ▸ 2015: Tutorial about LLVM/Polly at the LLVM Developers' Meeting in San Jose, CA, USA
- ▸ 2015: Department talk at the Indian Institute of Science (IISc) in Bangalore, India

Supervision

- ▸ 2016: Supervised a Google Summer of Code (GSoC) project on LLVM/Polly and attended the GSoC mentor summit as LLVM representative
- ▸ 2015: Supervised three project groups for the Static Program Analysis lecture
- ▸ 2015: Co-supervised a Google Summer of Code (GSoC) project on LLVM/Polly
- ▸ since 2013: Created and (co)supervised four bachelor thesis topics, two master thesis topics and two research immersion labs

Organization

- ▸ 2016/17: Communication chair and part of the local organization team for the European LLVM Developers' Conference (EuroLLVM) 2017 in Saarbrücken, Germany

Volunteer work

- 2013–2015: Member of the board of directors of a non-profit organization supporting the Computer Science Department at Saarland University
- 2012–2014: Students' representative in the Faculty Board and several appointment committees for professorships
- 2010–2013: Member of Students' Representatives Council; student counseling, system administration, organization of social events

Teaching

- 2013: Teaching assistant in the core course Compiler Construction
- 2010–2013: Tutored introductory programming lectures in four semesters; gave tutorials and office hours, marked tests, projects and exams, supervised other teaching assistants

Projects

Research Project – Polyhedral assisted compiler optimization (since 2016)

- Using polyhedral analysis techniques to enable and improve non-polyhedral compiler optimizations

Research Project – PIR: Parallel LLVM IR (since 2015)

- Efforts to put fork-join parallelization constructs into the LLVM IR
- Cooperation with the authors of Tapir at MIT and local collogues

Research Project – Polyhedral optimization of OpenCL (since 2015)

- Performing specialization of the OpenCL input space to improve vectorization opportunities
- Use various overapproximation to overcome the applicability issues of polyhedral optimizers on general OpenCL kernels

Open Source Project – LLVM/Polly (since 2012)

- LLVM/Polly performs polyhedral analysis and optimization on low-level LLVM intermediate representation
- One of the main developers and author of features like: reductions, non-affine subregions, scalar/phi handling and optimistic assumptions

Bachelor Thesis – Speculative Loop Parallelization (2012)

- Speculate to overcome the applicability issues of polyhedral optimizers
- Performing speculation and specialization based on both static and dynamic information
- Implemented as an extension to a state-of-the-art polyhedral optimizer and integrated into an adaptive runtime system for LLVM

Personal Interests

Soccer

- Played for years during my childhood, nowadays mostly watching and occasionally playing with friends

Online

Profile

- Saarland University http://compilers.cs.uni-saarland.de/people/doerfert
- LinkedIn https://linkedin.com/in/johannes-doerfert-3a0770a2

Github

- Personal https://github.com/jdoerfert
- Parallel-IR https://github.com/Parallel-IR
- Compiler Design Lab https://github.com/cdl-saarland

References

Prof. Dr. Sebastian Hack, Head of Compiler Design Lab at Saarland University

- ► Supervisor of my bachelor thesis and PhD
- ► Contact:
  Compiler Design Lab, Saarland University
  Campus E1 3, 66123 Saarbrücken, Germany
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  `http://www.cdl.uni-saarland.de/people/hack/`

Prof. Dr. Andreas Zeller, Head of Software Engineering Chair at Saarland University

- ► Second supervisor of my bachelor thesis
- ► Contact:
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Assistant Prof. Dr. Jan Reineke, Head of the Real-Time and Embedded Systems Lab

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