

Matthias Springer

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Profile

I am a second-year doctoral student in mathematical and computing sciences, interested in programming language design, GPU computing, modularity, virtual machines, execution environments, program transformation and optimization, compilers, web development, algorithm design and database query processing.

Education

- Since Oct. 2015 **Tokyo Institute of Technology** 【東京工業大学】, Meguro-ku, Tokyo, Japan,
Programming Research Group, Department of Mathematical and Computing Sciences
PhD Candidate, Academic advisor: Prof. Hidehiko Masuhara.
- *Research areas:* Compilers, Program Optimization, GPGPU, Modularity, Context-oriented Programming
 - *Relevant coursework:* Programming Language Design, Practical Parallel Programming
- Sept. 2014 **Hasso Plattner Institute, University of Potsdam**, Potsdam, Brandenburg, Germany,
- Sept. 2015 Master of Science, IT Systems Engineering, overall grade: 1.0 (A+).
- *Master's project:* Spur to go faster: Low-level Functionality in a High-level Language
 - *Master's thesis:* Nested Class Modularity in Squeak/Smalltalk
Thesis supervised by Prof. Dr. Robert Hirschfeld
 - *Relevant coursework:* VMs and Execution Environments, Context-oriented Programming
- Sept. 2013 **University of California, San Diego**, La Jolla, CA, United States,
- June 2014 Visiting student, Department of Computer Science and Engineering, GPA: 4.0, Provost's Honors.
- Full tuition and living expenses covered by UC Education Abroad Program and DAAD Scholarship
 - *Relevant coursework:* Advanced Compilers (CSE 131/231), Programming Languages (CSE 130/230), Adv. Algorithms (CSE 190/202/203A), Parallel Computation (CSE 260), Database Analytics (CSE 190)
- Aug. 2010 **Hasso Plattner Institute, University of Potsdam**, Potsdam, Brandenburg, Germany,
- July 2013 Bachelor of Science, IT Systems Engineering, overall grade: 1.0 (A+), rank 1-3/74.
- *Bachelor's project:* Evolving Applications: Object-migration with Ruby and GemStone
 - *Bachelor's thesis:* Inter-language Collaboration in an Object-oriented Virtual Machine Project and thesis supervised by Prof. Dr. Robert Hirschfeld, Tim Felgentreff, Tobias Pape
 - *Relevant coursework:* Software Architecture, Software Engineering I, Advanced Modularity, Database Systems I/II, Internet and WWW Technologies, Designing Interactive Systems (HCI)

Research Experience

- Since Oct. 2014 **Programming Languages**, Tokyo Institute of Technology / Hasso Plattner Institute,
Research with Prof. Hidehiko Masuhara and Prof. Robert Hirschfeld.
- *GPGPU:* Working on Ikra, a GPGPU library for Ruby focusing on Array-based operations. Working on low-level performance optimizations and high-level language abstractions for parallel operations.
 - *Virtual Machines:* Worked on the rpython-based RSqueak VM; implemented low-level primitives in a high-level language, including a transparent language-to-VM-to-language dispatch mechanism. Implemented call-target-specific method arguments for the Truffle-based JRuby implementation.
 - *Context-oriented Programming:* Worked on ContextAmber, a COP implementation for Amber Smalltalk. Implemented and evaluated concepts for partial method inlining and inlined layered method invalidation.
 - *Modularity in OOP:* Designed and implemented the Matriona module system for Squeak/Smalltalk, based on a hierarchical name lookup mechanism and supporting class nesting/parameterization. Evaluated concepts for dependency/version management, mixin modularity and class family inheritance.

- March 2014 **Relationship Queries**, *University of California, San Diego*,
- Nov. 2014 Database research with Prof. Yannis Papakonstantinou and Chunbin Lin.
Evaluated algorithms and data structures for relationship queries in relational/graph database systems, and compared them with latest column store techniques. Implemented the *FastR* database prototype.
- May 2011 **Student Research Assistant**, *Hasso Plattner Institute, Internet Technologies and Systems Group*.
- Apr. 2013
 - o *SOA Security Lab*: A browser-based simulation system for modelling and executing SOA security scenarios. Worked on the Oryx Modelling Editor, developed a database backend with Grails and PostgreSQL, and integrated the system into an existing OpenNebula VM network.
 - o *tele-lab*: A hands-on system for teaching and simulating network security scenarios. Worked on the user interface using Grails, HTML and JavaScript.

Work Experience

- 2017, 2016, 2014 **Google Inc.**, *United States*, Software Engineering Intern.
(3 × 14 weeks)
 - o [Summer 2017, Mountain View, CA; Host: DeLesley Hutchins] (Preliminary) Working with the TensorFlow team on efficient execution of machine learning workloads on GPUs.
 - o [Summer 2016, Seattle, WA; Host: Vijay Menon] Part of the Dart programming language team. Working on a Dart-to-Java compiler, focusing on performance optimizations and language interoperability.
 - o [Summer 2014, Boulder, CO; Host: Craig Wright] Working on a business event process engine for an internal Google payments system, using Megastore, F1/Spanner, Java and Guice.
- Nov. 2015 **Tokyo Institute of Technology**, *Meguro-ku, Tokyo-to, Japan*, Research/Teaching Assistant.
- June 2017 TA Lectures: Information Literacy (Prof. Morozov, Ph.D.). Also TA for some exchange students in our lab.
- April 2012 **Hasso Plattner Institute**, *Potsdam, Germany*, Teaching Assistant.
- March 2015 Lectures: Mathematics II (Dr. habil. Börner), Software Architecture (Prof. Dr. Hirschfeld), Software Engineering I (Prof. Dr. Hirschfeld)
- Aug. 2012 **Senacor Technologies AG**, *Munich, Germany*, Software Development Intern.
- Oct. 2012 Developed software components and tests for a service-oriented environment in the financial sector, using Java EE, the Spring Framework and Oracle database servers.
- Aug. 2011 **TNG Technology Consulting GmbH**, *Munich, Germany*, Software Development Intern.
- Oct. 2011 Developed plugins for Atlassian JIRA/Confluence (Subversion commit monitor) and Hudson/Jenkins (job status monitor). Set up an LDAP server for user authentication for SSH and Atlassian JIRA/Confluence.
- July 2005 **Max Planck Computing & Data Facility (Rechenzentrum Garching)**, *Garching, Germany*, Intern.

Other Projects

- Sept. 2014 **ME310 Global Team-based Product Innovation & Engineering**,
- July 2015 *course offered by Hasso Plattner Institute and Stanford University*.
Working on a design challenge by Audi USA with Stanford mechanical engineering students. Developing and prototyping concepts for car-to-passenger and car-to-pedestrian communication in autonomous cars, using design thinking methods.
- June 2013 **Athens for Amber Smalltalk**, *Google Summer of Code 2013 Project*,
- Sept. 2013 *European Smalltalk User Group (ESUG), Mentors: Nicolas Petton, Igor Stasenko*.
Implemented the Athens vector graphics library in Amber Smalltalk, a Smalltalk execution environment running entirely in the web browser, using HTML5 Canvas. Developed a Morphic-like framework for building user interfaces on top of Athens.
- Dec. 2012 **MagLev Database Explorer**, *Part of Bachelor's project at HPI*.
- June 2013 An IDE running entirely in a web browser for exploring Ruby/Smalltalk objects persisted in a GemStone/S 64 image, writing Ruby/Smalltalk code and debugging Rails/Sinatra applications interactively. Built with Amber Smalltalk, Ruby on Rails and Twitter Bootstrap.

Achievements

- Oct. 2015 **Monbukagakusho (MEXT) Scholarship** 【文部科学省奨学金】 .
- Sept. 2018 Japanese government scholarship for research students, covering tuition and living expenses.

- Oct. 2014 **Hasso Plattner Scholarship.**
 - Sept. 2015 One-year scholarship awarded to the best Bachelor graduates.
 - March 2015 **Media Hack Day Berlin**, *Second Prize, Allryder API Prize, Fab Lab Berlin Prize.*
Developed GREENtire, an iOS app which consolidates useful information from different sensors of the car and from partner APIs to evaluate the driving behavior.
 - Sept. 2013 **German Academic Exchange Service Scholarship (DAAD Jahresstipendium).**
 - May 2014 German government scholarship from the German Academic Exchange Service (Deutscher Akademischer Austausch Dienst, DAAD) to study at a North American university for one academic year, covering tuition and living expenses.
 - 2010/2011 **informatiCup 2011**, *organized by the Gesellschaft für Informatik, Bonn, Germany.*
Participated in first round and in final round (6/38 teams invited). Wrote optimization algorithms for placing ATMs on a map, using Simulated Annealing, Tabu Search and greedy algorithms.
 - 2007 **German Federal Competition in Computer Science.**
 - 2010 Participated three years in a row. 30/around 1100 participants are invited to the final round.
 - o [2009/2010] 1st prize in first two rounds, invited to final round (*University of Freiburg*)
 - o [2008/2009] 2nd prize in first two rounds
 - o [2007/2008] 1st prize in first two rounds, invited to final round (*Max Planck Institute for CS*)
 - 2008/2009 **German Federal Competition in Mathematics**, 3rd prize in first round.
- Papers, evaluation and certificates: <http://m-sp.org/>

Academic Service

Reviewer, APLAS 2016 (ext.), ARRAY 2017 (ext.), COP 2017, CROW 2016, LASSY 2017 (ext.).
Student Volunteer, Conferences: ECOOP 2015, ECOOP 2016, PLDI 2016, ECOOP+PLDI 2017.

Skills

- Programming Android (A), C (C), C++ (B), C# .NET (A), Dart (B), Groovy (A), Haskell (A), Java EE (A), Java SE (C), LLVM (A), NumPy (A), Prolog (A), Python (B), Ruby (MRI, MagLev) (B), OCaml (A), Smalltalk (Amber, GemStone, Pharo, Seaside, Squeak) (C), SQL (B), Visual Basic (VB 6, VBA) (A).
- Software Design Patterns (B), Extreme Programming (A), BDD (A), Git (B), Jenkins (A), Scrum (A), Subversion (A), TDD (A), UML (B).
- Server OS Debian/Linux Server (A), Windows Server (A).
- Web CSS (A), Grails (B), HTML (A), JavaScript (A), jQuery (A), Ruby on Rails (A).
- Certifications* Database Administration Fundamentals (MTA 98-364)
Windows Server Administration Fundamentals (MTA 98-365)
Windows Applications Development with Microsoft .NET Framework 4 (MCTS 72-511) .

A: level 1/basic, B: level 2/experienced, C: level 3/expert

* Digital verification: <http://goo.gl/tUV71>, Transcript ID: 963416 and 963421, Access Code: 62478569

Personal Information

- Born July 28, 1990, Freising, Germany.
- Nationality German.
- Languages German (native speaker), English (CEFR C1/C2, TOEFL iBT score 117/120).
- Memberships ACM, ACM-SIGPLAN, Gesellschaft für Informatik e.V. (GI), Bundeswettbewerb Informatik Alumni und Freunde e.V. and Tokyo Tech International Student Association (TISA).
- Hobbies Running, weightlifting, Dance Dance Revolution, playing trumpet and flugelhorn.

Date: May 6, 2017