

# Jahresbericht 2018

Fachgebiet Software-Architekturen

Prof. Dr. Robert Hirschfeld





Hasso-Plattner-Institut  
Digital-Engineering-Fakultät  
Universität Potsdam

# **Jahresbericht 2018**

**Fachgebiet Software-Architekturen**

Prof. Dr. Robert Hirschfeld

<https://www.hpi.uni-potsdam.de/swa>

28. Februar 2019



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# 1 Personelle Zusammensetzung

## **Leiter des Fachgebiets**

Prof. Dr. Robert Hirschfeld  
robert.hirschfeld@hpi.uni-potsdam.de  
+49 331 5509 541

## **Assistentin der Arbeitsgruppe**

Sabine Wagner  
sabine.wagner@hpi.uni-potsdam.de  
+49 331 5509 220

## **Mitarbeiter und Doktoranden**

Dr. Jens Lincke  
jens.lincke@hpi.uni-potsdam.de  
+49 331 5509 544

Johannes Henning, M.Sc.  
johannes.henning@hpi.uni-potsdam.de  
+49 331 5509 275

Toni Mattis, M.Sc.  
toni.mattis@hpi.uni-potsdam.de  
+49 331 5509 204

Fabio Niephaus, M.Sc.  
fabio.niephaus@hpi.uni-potsdam.de  
+49 331 5509 3928

Tobias Pape, M.Sc.  
tobias.pape@hpi.uni-potsdam.de  
+49 331 5509 276

Stefan Ramson (geb. Lehmann), M.Sc.  
stefan.ramson@hpi.uni-potsdam.de  
+49 331 5509 217

Patrick Rein, M.Sc.  
patrick.rein@hpi.uni-potsdam.de  
+49 331 5509 279

Marcel Taeumel, M.Sc.  
marcel.taeumel@hpi.uni-potsdam.de  
+49 331 5509 151

Dipl.-Inf. Marcel Weiher (extern)  
marcel.weiher@hpi.uni-potsdam.de  
+49 331 5509 217

### **Gastwissenschaftler**

Prof. Alan Borning, Ph.D.  
University of Washington, Seattle, Washington, USA  
borning@cs.washington.edu

Richard P. Gabriel, Ph.D.  
Dreamsongs, Redwood City, California, USA  
rpg@dreamsongs.com

Dr. Malte Appeltauer  
Zalando SE, Berlin  
malte.appeltauer@zalando.de

Dr. Carl Friedrich Bolz-Tereick  
Heinrich-Heine-Universität Düsseldorf  
cfbolz@gmx.de

Dr. Tim Felgentreff  
Oracle Labs, Potsdam  
tim.felgentreff@oracle.com

Dr. Bert Freudenberg  
Viewpoints Research Institute, Los Angeles, California, USA  
bert@freudenbergs.de

## *1 Personelle Zusammensetzung*

Dr. Michael Perscheid  
SAP Innovation Center, Potsdam  
michael.perscheid@sap.com

Dipl.-Inf. Nikolas Martens  
Berlin  
nikolas.m@rtens.org

### **Studentische Hilfskräfte**

Tom Beckmann  
Leon Bein  
Tom Braun  
Jonas Chromik  
Justus Eilers  
Eva Krebs  
Pius Ladenburger  
Stephan Lutz  
Leon Matthes  
Alexander Meißner  
Martin Stamm  
Tobias Zagorni



## 2 Lehrveranstaltungen

### Wintersemester 2018/2019 (16 SWS)

#### *Introduction to Programming I*

(4 SWS, Vorlesung, IT-Systems Engineering, Bachelor)

Hirschfeld, Pape, Mattis, Henning, Niephaus, Taeumel, Ramson, Felgentreff

#### *Reverse Engineering*

(4 SWS, Seminar, IT-Systems Engineering, Master)

Hirschfeld, Ramson, Lincke, Rein, Felgentreff

#### *Software Architecture*

(4 SWS, Vorlesung, IT-Systems Engineering, Bachelor)

Hirschfeld, Rein, Taeumel, Pape, Niephaus, Lincke, Mattis, Henning, Ramson

#### *Graduate School Research Seminar*

(2 SWS, Forschungskolleg)

Polze, Hirschfeld

#### *Blocks to the Rescue: Live Exploration of an Interactive Environment to Support Education, Construction, and Reflection in Program Design*

(2 SWS, Seminar, IT-Systems Engineering, Bachelorprojekt)

Hirschfeld, Taeumel, Mattis, Ramson, Rein, Lincke

### Sommersemester 2018 (24 SWS)

#### *Machine Learning on Code Repositories*

(4 SWS, Seminar, IT-Systems Engineering, Master)

Hirschfeld, Mattis, Ramson

#### *Programming Experience*

(4 SWS, Seminar, IT-Systems Engineering, Master)

Hirschfeld, Rein, Lincke, Ramson

## 2 Lehrveranstaltungen

### *Reactive Programming*

(4 SWS, Seminar, IT-Systems Engineering, Master)

Hirschfeld, Ramson, Lincke

### *Software Engineering I*

(4 SWS, Vorlesung, IT-Systems Engineering, Bachelor)

Hirschfeld, Pape, Rein, Taeumel, Lincke, Ramson, Niephaus, Mattis, Henning

### *Virtual Execution Environments*

(4 SWS, Vorlesung, IT-Systems Engineering, Master)

Hirschfeld, Pape, Niephaus, Felgentreff

### *Graduate School Research Seminar*

(2 SWS, Forschungskolleg)

Polze, Hirschfeld

### *GS/Squeak: Smalltalk as a Language Implementation Platform*

(2 SWS, Seminar, IT-Systems Engineering, Bachelorprojekt)

Hirschfeld, Pape, Niephaus, Taeumel, Lincke, Rein, Ramson, Mattis, Henning

## **Wintersemester 2017/2018 (24 SWS)**

### *Code Repository Mining*

(4 SWS, Seminar, IT-Systems Engineering, Master)

Hirschfeld, Mattis, Taeumel, Lincke, Rein, Ramson, Henning, Niephaus, Felgentreff

### *Context-oriented Programming*

(4 SWS, Seminar, IT-Systems Engineering, Master)

Hirschfeld, Lincke, Rein, Ramson, Mattis, Niephaus, Felgentreff

### *Programming Languages: Design and Implementation*

(4 SWS, Seminar, IT-Systems Engineering, Bachelor)

Hirschfeld, Taeumel, Lincke, Rein, Ramson, Mattis, Henning, Niephaus, Felgentreff

### *Software Architecture*

(4 SWS, Vorlesung, IT-Systems Engineering, Bachelor)

Hirschfeld, Pape, Taeumel, Lincke, Rein, Ramson, Mattis, Henning, Niephaus

### *Web-based Development Environments*

(4 SWS, Seminar, IT-Systems Engineering, Master)

Hirschfeld, Ingalls, Ramson, Lincke, Rein

*Graduate School Research Seminar*  
(2 SWS, Forschungskolleg)  
Polze, Hirschfeld

*GS/Squeak: Smalltalk as a Language Implementation Platform*  
(2 SWS, Seminar, IT-Systems Engineering, Bachelorprojekt)  
Hirschfeld, Pape, Niephaus, Taeumel, Lincke, Rein, Ramson, Mattis

## 3 Promotionsvorhaben

### In Begutachtung

Marcel Taeumel

*Data-driven Tool Construction in Exploratory Programming Environments.*

Externe Gutachter:

Prof. Dr. Kim Mens (Université catholique de Louvain, Belgium), Prof. Dr. Michele Lanza (Università della Svizzera italiana, Switzerland)

### Laufende Promotionsvorhaben

Johannes Henning

*Programming Language and Runtime Support for Database Analytics.*

Toni Mattis

*Supporting Program Comprehension Through Semantic Code Models.*

Fabio Niephaus

*Live Multi-language Development and Run-time Environments.*

Tobias Pape

*Programming Concepts and Extensions for Improving Language-level Implementations.*

Stefan Ramson

*Active Expressions as a Basic Building Block for Reactive Programming Concepts.*

Patrick Rein

*Language Exploration and Development Environments.*

Marcel Weiher (extern)

*Linguistic Architectural Support for Interactive Software.*

## 4 Abschlussarbeiten

### Masterarbeiten

Daniel Stolpe

*Graal-LSP: A Language Server Implementation With Polyglot Support for the GraalVM.*

Betreuer: Hirschfeld, Felgentreff, Niephaus

David Rauch

*Babylonian-style Programming: Designing and Implementing an Integration of Live Examples Into General-purpose Source Code.*

Betreuer: Hirschfeld, Rein

Astrid Thomschke

*Hyperlively: Bootstrapping a Visual General-purpose Programming System in the Web.*

Betreuer: Hirschfeld, Lincke

### Bachelorarbeiten

Jakob Braun

*Applying Database Concepts to the Squeak Environment.*

Betreuer: Hirschfeld, Pape, Niephaus

Marc André Freiheit

*Squeak/Smalltalk as an IDE for the Gemstone Object DBMS.*

Betreuer: Hirschfeld, Pape, Niephaus

Wilhelm Friedemann

*Bootstrapping the Squeak/Smalltalk Programming Environment in GemStone/S.*

Betreuer: Hirschfeld, Pape, Niephaus

Stephan Lutz

*In-database Programming Environment for the GemStone OODBMS: Simplifying the Development of Specialized Database Tools.*

Betreuer: Hirschfeld, Pape, Niephaus

#### 4 Abschlussarbeiten

Martin Stamm

*Solving Language Differences of Squeak and GemStone Smalltalk on a Method Level.*

Betreuer: Hirschfeld, Pape, Niephaus

Pit Wegner

*GemStone as a Multi-language Programming Platform.*

Betreuer: Hirschfeld, Pape, Niephaus

Tobias Zagorni

*Extending the GemStone OODBMS with a Graphical Interface.*

Betreuer: Hirschfeld, Pape, Niephaus

## 5 Master- und Bachelorprojekte

### Masterprojekt 2018 (Ausschreibung)

*Directly Accessing Columnar Objects in SQLite From the PyPy Virtual Machine.*

In this project, we will design and implement a columnar backend for the SQLite database and measure the performance of both this new backend and the existing B-Tree implementation in various scenarios. Using the columnar object layout, we will then map Python objects directly onto these columnar data structures and compare the performance of this JIT-compiled direct access to the traditional database access with ORMs and SQL.

Betreuer: Hirschfeld, Henning, Niephaus, Mattis

### Masterprojekt 2017/2018 (Ausschreibung)

*Merging in Object-centric Version Control Systems.*

In this project, we will design and implement means and tools to merge version-controlled objects in interactive, object-based programming systems. In particular, we will look into tools to visualize and interactively resolve differences between object graphs. The main challenge will be to account for complex and domain-specific merge conflicts. Further, to allow programmers to work with services such as Travis CI, we will investigate ways to integrate service configurations into object-oriented abstractions within the programming system. All tools will be developed based on the object tracking framework Squot and its bridge to Git called Squit.

Betreuer: Hirschfeld, Rein, Pape, Niephaus, Reschke

### Bachelorprojekt 2017/2018

*GS/Squeak: Smalltalk as a Language Implementation Platform.*

Databases and runtime environments of programming languages have traditionally been kept strictly apart. However, with GemStone/S there is a Smalltalk-based, object-oriented database management system that defies this separation. Its language environment and database system are tightly integrated. Moreover, it recently gained support for so-called environments that allow classes to maintain different sets of behavior. As part of this bachelor's project, the students explore how this functionality can be used to integrate the Squeak/Smalltalk programming system into GemStone.

This integration could allow not only the reuse of various Squeak/Smalltalk tools for software development in GemStone. Since the programming system supports live and exploratory programming, it could also enable novel interactions with the database system, such as live object inspection of database objects or interactive debugging from within the system itself.

Partner: Dale Henrichs (GemTalk Systems, Beaverton, Oregon, USA)

Teilnehmer: Jakob Braun, Marc André Freiheit, Wilhelm Friedemann, Stephan Lutz, Martin Stamm, Pit Wegner, Tobias Zagorni

Betreuer: Hirschfeld, Pape, Niephaus

### **Bachelorprojekt 2018/2019**

*Blocks to the Rescue: Live Exploration of an Interactive Environment to Support Education, Construction, and Reflection in Program Design.*

In this project, students will explore implementation strategies and application domains of block-based languages. Drawing from the design of the existing approaches such as Scratch and Snap!, they will extend the Squeak/Smalltalk live programming system to support the block-based paradigm as a flexible mechanism complementary to the Morphic graphics framework. The following goals form the starting point in this project and are likely to be refined and extended: design and implement a new block-based scripting system in Squeak/Smalltalk; explore means to construct sophisticated object state such as pre-scripted sprites; explore means to construct sophisticated object behavior such as custom blocks; refine the script execution model considering concurrency and reflection; explore trade-offs in visual programming to teach messaging and objects.

Partner: Jens Mönig (SAP Knowledge and Education, Walldorf)

Teilnehmer: Leon Bein, Tom Braun, Björn Daase, Elina Emsbach, Leon Matthes, Maximilian Stiede

Betreuer: Hirschfeld, Taeumel, Mattis, Ramson, Rein



# 6 Bearbeitete Forschungsthemen

## **Forschungsthemen**

Software Modularity  
Context-oriented Programming  
Meta-level Architectures  
Exploratory Programming  
Live Programming  
Programming Languages  
Polyglot Programming  
Reactive Programming  
Virtual Machines and Execution Environments  
Code Repository Mining  
Statistical Code Repository Analysis and Machine Learning

## **Anwendungsbereiche**

Education  
End-user Development  
Programming Environments and Tool Support  
Design Thinking for Programming Activities  
Cloud Programming Environments  
Personal Productivity Programming

## **Technologien**

Squeak/Smalltalk  
LivelyKernel, JavaScript  
Vivide, VivideJS  
GraalSqueak, GraalVM+Truffle  
RSqueak, PyPy  
Gramada, Ohm  
Babelsberg Home

## 7 Veröffentlichungen

### Zeitschriften und Konferenzen (begutachtet)

Robert Hirschfeld, Tobias Dürschmid, Patrick Rein, Marcel Taeumel, and Hidehiko Masuhara. *Narratives for Multi-party Mechanisms and Concerns*. (Excerpt from COP-18) Conference of the Japan Society for Software Science and Technology (JSSST), Osaka University, Osaka, August 26–31, 2018.

Patrick Rein, Stefan Ramson, Jens Lincke, Robert Hirschfeld, and Tobias Pape. *Exploratory and Live, Programming and Coding: A Literature Study*. In *Journal on The Art, Science, and Engineering of Programming*, vol. 3, no. 1, art. 1, 33 pages, 2018.

Fabio Niephaus, Tim Felgentreff, Tobias Pape, Robert Hirschfeld, and Marcel Taeumel. *Live Multi-language Development and Runtime Environments*. In *Journal on The Art, Science, and Engineering of Programming*, vol. 2, no. 3, art. 8, 30 pages, 2018.

### Workshops (begutachtet)

Robert Hirschfeld, Tobias Dürschmid, Patrick Rein, and Marcel Taeumel. *Cross-cutting Commentary: Narratives for Multi-party Mechanisms and Concerns*. In *Proceedings of the Workshop on Context-oriented Programming (COP) 2018*, co-located with the European Conference on Object-oriented Programming (ECOOP), pages 39–47, Amsterdam, Netherlands, July 16, 2018, ACM DL.

Toni Mattis and Robert Hirschfeld. *Activity Contexts: Improving Modularity in Blockchain-based Smart Contracts using Context-oriented Programming*. In *Proceedings of the Workshop on Context-oriented Programming (COP) 2018*, co-located with the European Conference on Object-oriented Programming (ECOOP), pages 31–38, Amsterdam, Netherlands, July 16, 2018, ACM DL.

Fabio Niephaus, Tim Felgentreff, and Robert Hirschfeld. *GraalSqueak: A Fast Small-talk Bytecode Interpreter Written in an AST Interpreter Framework*. In *Proceedings of the Workshop on Implementation, Compilation, Optimization of Object-Oriented Languages, Programs and Systems (ICOOOLPS) 2018*, co-located with the European Conference on Object-oriented Programming (ECOOP), Amsterdam, Netherlands, July 17, 2018, ACM DL.

Siegfried Horschig, Toni Mattis, and Robert Hirschfeld. *Do Java Programmers Write Better Python? Studying Off-language Code Quality on GitHub*. In Proceedings of the Programming Experience 2018 (PX/18) Workshop, companion volume to International Conference on the Art, Science, and Engineering of Programming (‘Programming’), co-located with the International Conference on the Art, Science, and Engineering of Programming (‘Programming’), pages 127–134, Nice, France, April 10, 2018, ACM DL.

Patrick Rein and Robert Hirschfeld. *The Exploration Workspace: Interleaving the Implementation and Use of Plain Objects in Smalltalk*. In Proceedings of the Programming Experience 2018 (PX/18) Workshop, companion volume to International Conference on the Art, Science, and Engineering of Programming (‘Programming’), co-located with the International Conference on the Art, Science, and Engineering of Programming (‘Programming’), pages 113–116, Nice, France, April 10, 2018, ACM DL.

### **Student Research Competitions (begutachtet)**

Toni Mattis. *Mining Concepts from Code using Community Detection in Co-occurrence Graphs*. ACM Student Research Competition (Second Place, Graduate Category), In companion volume to International Conference on the Art, Science, and Engineering of Programming (‘Programming’), pages 232–233, Nice, France, April 12, 2018, ACM DL.

Patrick Rein. *A Soup of Objects: Convenience Interfaces for Accessing Domain Objects in a Global Object Graph*. ACM Student Research Competition (Graduate Category), In companion volume to International Conference on the Art, Science, and Engineering of Programming (‘Programming’), pages 236–238, Nice, France, April 12, 2018, ACM DL.

### **Buchkapitel**

Patrick Rein, Marcel Taeumel, and Robert Hirschfeld. *Towards Exploratory Software Design Environments for the Multi-Disciplinary Team*. In Christoph Meinel and Larry Leifer (eds.). *Design Thinking Research: Looking Further: Design Thinking Beyond Solution-Fixation*. pages 229–247, Springer 2018.

### Technische Berichte

Christoph Meinel, Hasso Plattner, Jürgen Döllner, Mathias Weske, Andreas Polze, Robert Hirschfeld, Felix Naumann, Holger Giese, and Patrick Baudisch, Tobias Friedrich, Erwin Böttinger, and Christoph Lippert (eds.). *Proceedings of the 11th Ph.D. Retreat of the HPI Research School on Service-oriented Systems Engineering*. HPI Technical Reports, vol. 129, 2018, Hasso Plattner Institute.

Jakob Reschke, Marcel Taeumel, Tobias Pape, Fabio Niephaus, and Robert Hirschfeld. *Towards Version Control in Object-based Systems*. HPI Technical Reports, vol. 121, 2018, Hasso Plattner Institute.

### Sonstiges

Robert Hirschfeld, Atsushi Igarashi, Tetsuo Kamina, Jens Lincke, and Hidehiko Masuhara. *COP-18 (Chairs' Welcome)*. In *Proceedings of the Workshop on Context-oriented Programming (COP) 2018*, co-located with the European Conference on Object-oriented Programming (ECOOP), Amsterdam, July 16, 2018, ACM DL.

Luke Church, Richard P. Gabriel, Robert Hirschfeld, and Hidehiko Masuhara. *PX/18 (Chairs' Welcome)*. In *Proceedings of the Programming Experience 2018 (PX/18) Workshop*, companion volume to *International Conference on the Art, Science, and Engineering of Programming (⌞Programming⌟)*, co-located with the *International Conference on the Art, Science, and Engineering of Programming (⌞Programming⌟)*, pages xiv–xvi, Nice, France, April 10, 2018, ACM DL.

Richard P. Gabriel. *Future Software Design*. *Workshop on Designing the Software Systems of the Future*, Software Engineering Institute, Carnegie Mellon University, Pittsburgh, Pennsylvania, USA, January 12–14, 2018.

Fachgebiet Software-Architekturen. *Jahresbericht 2017*. Hasso-Plattner-Institut, Digital-Engineering-Fakultät, Universität Potsdam, 2018.

## 8 Vorträge auf Tagungen

**Robert Hirschfeld**, Tobias Dürschmid, Patrick Rein, Marcel Taeumel, and Hidehiko Masuhara. *Narratives for Multi-party Mechanisms and Concerns*. (Excerpt from COP-18) Conference of the Japan Society for Software Science and Technology (JSSST), Osaka University, Osaka, Japan, August 26–31, 2018.

**Robert Hirschfeld**, Tobias Dürschmid, Patrick Rein, and Marcel Taeumel. *Cross-cutting Commentary: Narratives for Multi-party Mechanisms and Concerns*. Workshop on Context-oriented Programming (COP) 2018, co-located with the European Conference on Object-oriented Programming (ECOOP), Amsterdam, Netherlands, July 16, 2018.

**Toni Mattis** and Robert Hirschfeld. *Activity Contexts: Improving Modularity in Blockchain-based Smart Contracts using Context-oriented Programming*. Workshop on Context-oriented Programming (COP) 2018, co-located with the European Conference on Object-oriented Programming (ECOOP), Amsterdam, Netherlands, July 16, 2018.

**Fabio Niephaus**, Tim Felgentreff, and Robert Hirschfeld. *GraalSqueak: A Fast Smalltalk Bytecode Interpreter Written in an AST Interpreter Framework*. Workshop on Implementation, Compilation, Optimization of Object-Oriented Languages, Programs and Systems (ICOOOLPS) 2018, co-located with the European Conference on Object-oriented Programming (ECOOP), Amsterdam, Netherlands, July 17, 2018.

Siegfried Horschig, **Toni Mattis**, and Robert Hirschfeld. *Do Java Programmers Write Better Python? Studying Off-language Code Quality on GitHub*. Programming Experience 2018 (PX/18) Workshop, co-located with the International Conference on the Art, Science, and Engineering of Programming (⟨Programming⟩), Nice, France, April 10, 2018.

**Patrick Rein** and Robert Hirschfeld. *The Exploration Workspace: Interleaving the Implementation and Use of Plain Objects in Smalltalk*. Programming Experience 2018 (PX/18) Workshop, co-located with the International Conference on the Art, Science, and Engineering of Programming (⟨Programming⟩), Nice, France, April 10, 2018.

**Toni Mattis**. *Mining Concepts from Code using Community Detection in Co-occurrence Graphs*. ACM Student Research Competition (Second Place, Graduate Category) at the International Conference on the Art, Science, and Engineering of Programming (⟨Programming⟩), Nice, France, April 9–12, 2018.

**Patrick Rein.** *A Soup of Objects: Convenience Interfaces for Accessing Domain Objects in a Global Object Graph.* ACM Student Research Competition (Graduate Category) at the International Conference on the Art, Science, and Engineering of Programming (⟨Programming⟩), Nice, France, April 9–12, 2018.

**Fabio Niephaus,** Tim Felgentreff, Tobias Pape, Robert Hirschfeld, and Marcel Taelmel. *Live Multi-language Development and Runtime Environments.* International Conference on the Art, Science, and Engineering of Programming (⟨Programming⟩), Nice, France, April 9–12, 2018.

**Richard P. Gabriel.** *Future Software Design.* Workshop on Designing the Software Systems of the Future, Software Engineering Institute, Carnegie Mellon University, Pittsburgh, Pennsylvania, USA, January 12–14, 2018.

## 9 Organisation von und Teilnahme an HPI-Workshops

*HPI-SAP Graduate School Workshop*

2018-12-10

Walldorf, Germany

*HPI-Nanjing University Graduate School Workshop*

2018-11-20–21

Nanjing University, Nanjing, China

*HPI Research School Retreat*

2018-10-18–19

Neuruppin, Germany

*HPI-Stanford Design Thinking Research Workshop*

2018-09-10–12

Hasso Plattner Institute, Potsdam, Germany

*Gemeinsamer Workshop der DFG Graduiertenkollegs*

2018-05-27–30

Schloss Dagstuhl, Germany

*Symposium on Future Trends in Service-oriented Computing*

2018-04-18–20

Hasso Plattner Institute, Potsdam, Germany

*HPI-Stanford Design Thinking Research Workshop*

2018-03-12–14

Stanford University, Stanford, California, USA

*HPI-University of Cape Town Graduate School Workshop*

2018-03-08–10

University of Cape Town, Cape Town, South Africa

## 10 Vorträge von Gästen des Fachgebiets

Dr. Stefan Marr (University of Kent, Canterbury, UK)

2018-12-17-21

*Efficient Deterministic Replay for Actors.*

*Safely Combining Concurrency Abstractions.*

Jens Mönig (SAP Knowledge and Education, Walldorf, Germany)

2018-12-04-06

*Designing Block-based Programming Languages for Learners and Leaders.*

Dr. Stephen Kell (University of Kent, Canterbury, UK)

2018-11-29

*Growing a Dynamic Object Model in Unix.*

Richard P. Gabriel, Ph.D. (Dreamsongs, Software Architecture Group, California)

2018-11-07

*How a Computer Can Write a Poem and Make it Sound like an Angry Type Theorist or*

*Proving Theorems and Seeing Cats.*

Luke Church (University of Cambridge and Google, UK)

2018-07-17-23

*Programming Interaction Design.*

Mariana Mărașoiu (University of Cambridge and Google, UK)

2018-07-17-23

*Programming Interaction Design.*

Richard P. Gabriel, Ph.D. (Dreamsongs, Software Architecture Group, California)

2018-06-17-22

*InkWell.*

Jens Mönig (SAP Knowledge and Education, Walldorf, Germany)

2018-04-19

*Reinventing on Purpose.*

Symposium on Future Trends in Service-oriented Computing.



Yoshiki Ohshima, Ph.D. (CEO Vision, California, USA)

2018-04-19

*Shadama: A Massively-Parallel Particle Simulation Environment for Everyone.*

Symposium on Future Trends in Service-oriented Computing.

Stephan Eggermont (Roche, Berlin, Germany)

2018-04-19

*Software Migration.*

Myroslava Romaniuk (Ukrainian Catholic University, Ukraine)

2018-04-19

*Code Quality and Test Integration.*

Dr. Clément Béra (INRIA, Lille)

2018-03-05-06

*Sista: A Metacircular Architecture for Runtime Optimisations Persistence.*

Prof. Dr. Peter Thiemann (University of Freiburg, Germany)

2018-02-22

*Gradual Session Types.*

Martin Probst (Google Munich, Germany)

2018-02-14

*TypeScript.*

## 11 Partner

Bedarra Research Labs, Ottawa, Ontario, Canada  
<http://www.bedarra.org>

DOCOMO Euro-Labs, Munich, Germany  
<http://www.docomoeurolabs.de>

Dreamsongs, Redwood City, California, USA  
<https://www.dreamsongs.com>

eXXcelent solutions, Ulm, Germany  
<http://www.exxcelent.de>

GemTalk Systems, Beaverton, Oregon, USA  
<http://www.gemtalksystems.com>

graphicore, Fürth, Germany  
<http://www.graphicore.de>

HARC, Y Combinator Research, San Francisco, California, USA  
<https://harc.ycr.org/member>

impara, Magdeburg, Germany  
<http://www.impara.de>

Industrial Design Institute, Magdeburg, Germany  
<http://www.gestaltung.hs-magdeburg.de>

Instantiations, Raleigh, North Carolina, USA  
<https://www.instantiations.com>

Kyoto University, 京都大学, Kyoto, Japan  
<http://www.kyoto-u.ac.jp>, <http://www.sato.kuis.kyoto-u.ac.jp>

Kyushu University, 九州大学, Fukuoka, Japan  
<https://www.kyushu-u.ac.jp>

Oracle Labs Potsdam, Germany  
<https://labs.oracle.com>

Oracle Labs Redwood City, Switzerland  
<https://labs.oracle.com>

Oracle Labs Zurich, Switzerland  
<https://labs.oracle.com>

SAP Innovation Center, Potsdam, Germany  
<https://icn.sap.com>

SAP Knowledge and Education, Walldorf, Germany  
[urlhttps://www.sap.de](https://www.sap.de)

SAP Palo Alto Research Center, Palo Alto, California, USA  
<https://www.sap.com>

SEC-i SmartEnergy Control Initiative, Ilmenau, Germany  
<http://www.sec-i.org>

Stanford University, Center for Design Research, Palo Alto, California, USA  
<http://www-cdr.stanford.edu>

Steinmayr Net Intelligence, Bergisch Gladbach, Germany  
<http://www.steinmayr.de>

Sun Microsystems Laboratories, Menlo Park, California, USA  
<http://research.sun.com>

Technische Universität Darmstadt, Darmstadt, Germany  
<http://www.stg.tu-darmstadt.de>

Teleplace, Redwood City, California, USA  
<http://www.teleplace.com>

The University of Tokyo, 東京大学, Tokyo, Japan  
<http://www.u-tokyo.ac.jp>, <https://www.csg.ci.i.u-tokyo.ac.jp>

Tokai University, 東海大学, Tokyo, Japan  
<https://www.u-tokai.ac.jp>

Tokyo Institute of Technology, 東京工業大学, Tokyo, Japan  
<https://www.titech.ac.jp>, <https://prg.is.titech.ac.jp>

11 *Partner*

Travis CI, Berlin, Germany  
<https://travis-ci.com>

University of Antwerp, Antwerp, Belgium  
<http://www.win.ua.ac.be>

University of Bern, Bern, Switzerland  
<https://www.iam.unibe.ch/~scg>

University of Koblenz-Landau, Koblenz, Germany  
<http://softlang.wikidot.com>

Viewpoints Research Institute, Glendale, California, USA  
<http://www.vpri.org>

Vrije Universiteit Brussel, Brussels, Belgium  
<https://soft.vub.ac.be>

VMware R&D, GemStone Systems, Beaverton, Oregon, USA  
<http://www.gemstone.com>

Windward Solutions, Los Altos, California, USA  
<http://www.windwardsolutions.com>

## 12 Open-Source-Projekte

### Eigene Projekte

#### *Lively4*

The self-supporting web-based development environment Lively4 transfers Lively Kernel's live programming experience to newest web technology. By integrating Smalltalk-like tool support with Web Components and cloud storages, Lively4 encourages an exploratory style of programming and wiki-inspired collaboration between students.

<https://lively-kernel.org/lively4/lively4-core/start.html>

<https://github.com/LivelyKernel/lively4-core>

#### *Vivide/VivideJS*

A Squeak/Smalltalk-based programming environment and framework that supports low-effort construction of graphical tools by employing a data-driven perspective and a script-based programming model.

<https://github.com/hpi-swa/vivide>

<https://github.com/LivelyKernel/lively4-core/tree/gh-pages/src/client/vivide>

#### *Squot and Squit*

An object tracker for Squeak/Smalltalk allowing version control of arbitrary objects (Squot) with support for a Git backend (Squit) written Smalltalk.

<https://github.com/hpi-swa/Squot>

#### *Ohm/S*

A Squeak/Smalltalk implementation of the metaprogramming parser-generator framework Ohm.

<https://github.com/hpi-swa/Ohm-S>

#### *Gramada*

Gramada is an interactive development environment for programming languages defined in Ohm. It is based on Vivide and implemented in Squeak/Smalltalk.

<https://github.com/hpi-swa/Gramada>

#### *GraalSqueak*

An experimental virtual machine for Squeak/Smalltalk written in Truffle, the language implementation framework for GraalVM.

<https://github.com/hpi-swa/graalsqueak>

### *Home Desktop System*

The Home System is a live, object-centric desktop system build on top of Squeak/Smalltalk. It is based upon the idea of representing data as living objects and allowing its users to adapt it to their needs without any restrictions.

<https://github.com/hpi-swa-lab/home-desktop-system/>

### *Animations*

An extension for Squeak/Smalltalk that employs a simple programming model for adding animations to the Morphic framework.

<https://github.com/hpi-swa/animations>

### *Widgets*

A set of graphical controls such as tree views, lists views, and buttons implemented in Squeak/Smalltalk using the Signals observer pattern.

<https://github.com/hpi-swa/widgets>

### *GlyphHub*

Creating fonts is a complex task that requires expert knowledge in a variety of domains. GlyphHub is a platform that aims to enhance the means of communication by integrating complex font rendering and editing in a live environment, including an approach to generate code based on users' live edits.

<https://github.com/hpi-swa-lab/GlyphHub>

### *smalltalkCI*

A framework for testing Smalltalk projects written in Squeak/Smalltalk, GemStone, and Pharo on Linux, macOS, and Windows. It provides support for Smalltalk on Travis CI and can be used with AppVeyor and other CI infrastructures.

<https://github.com/hpi-swa/smalltalkCI>

<https://docs.travis-ci.com/user/languages/smalltalk>

### *RSqueak/VM*

A Squeak/Smalltalk virtual machine written in the language implementation framework RPython that allows for various research experiments such as performance optimizations and language compositions.

<https://github.com/hpi-swa/RSqueak>

### *Babelsberg*

A formal design of Object-Constraint Programming with multiple implementations for object-constraint programming to integrate constraint declaration and continuous satisfaction with mutable object-oriented structures and behavior.

<https://github.com/babelsberg>

*ContextJS*

Context-oriented programming provides dedicated support for defining and composing variations to a basic program behavior. ContextJS implements context-oriented programming for JavaScript and introduces language abstractions to define a variety of scopes to dynamically adapt behavior variations at runtime.

<https://github.com/LivelyKernel/ContextJS>

<https://www.npmjs.com/package/contextjs>

*SqueakJS*

SqueakJS executes Squeak in a web page without a plugin. It is a fully capable virtual machine implemented in pure JavaScript running unmodified Squeak images. Squeak is a modern implementation of Smalltalk, the original dynamic object-oriented programming environment. It runs bit-identically on virtually any platform, and now in the web browser, too.

<https://github.com/bertfreudenberg/SqueakJS>

<https://squeak.js.org>

*Lively Web*

A browser-based runtime and development environment with live capabilities allowing to inspect and change applications and the system while it is running. Developers share applications and tools they created in Lively Web through an instance-based publication mechanism.

<https://lively-web.org/welcome.html>

<https://github.com/LivelyKernel/LivelyKernel>

*Matriona*

An experimental module system for Squeak/Smalltalk based on nested classes and inspired by Newspeak.

<https://github.com/hpi-swa/smalltalk-nested-classes>

*SwaLint*

An extendable code critics tool for Squeak/Smalltalk projects. Using object-oriented code metrics, SwaLint can give developers insight on the structure of their code and the architecture of their software. Codifying best-practices for Smalltalk programs, SwaLint is a hands-on tool to improve code quality.

<https://github.com/hpi-swa-teaching/SwaLint>

*Community Code Project*

A code review tool supporting ongoing collaborative discussions on code quality of a variety of meta objects such as packages, classes, protocols, and methods in the Squeak/Smalltalk environment.

<https://github.com/hpi-swa-lab/CommunityCodeReview>

## **Beiträge zu Projekten**

### *Squeak/Smalltalk*

An object-oriented, class-based, reflective, and self-sustaining programming system and a dialect of Smalltalk with support for live and exploratory programming.  
<https://squeak.org>

### *OpenSmalltalk VM*

The cross-platform virtual machine for Squeak, Pharo, Cuis, and Newspeak.  
<https://github.com/OpenSmalltalk/opensmalltalk-vm>

### *SqueakSSL Plugin*

A plugin for the OpenSmalltalkVM that provides an interface to the native SSL/TLS facilities with support for Windows, Unix, and MacOS.  
<https://github.com/squeak-smalltalk/squeakssl>

### *SqueakCI*

The base environment for running Squeak/Smalltalk continuous integration tests.  
<https://github.com/squeak-smalltalk/squeak-ci>

### *Ohm*

A library and language for building parsers, interpreters, compilers, and more.  
<https://github.com/harc/ohm>

### *Graal*

A dynamic compiler written in Java that integrates with the HotSpot JVM.  
<https://github.com/oracle/graal>

### *Truffle*

A framework for implementing languages and instruments that use Graal as a dynamic compiler.  
<https://github.com/oracle/graal/tree/master/truffle>

### *Travis Build*

A library used on Travis CI workers to generate shell based build scripts. The library can be extended to provide community-supported languages such as Dart, R, and Smalltalk.  
<https://github.com/travis-ci/travis-build>



*PyPy*

An alternative implementation of the Python programming language. It includes RPython, a translation and support framework for producing implementations of dynamic languages, emphasizing a clean separation between language specification and implementation aspects.

<http://pypy.org>

*Topaz*

A high-performance implementation of the Ruby programming language written in RPython.

<https://github.com/topazproject/topaz>

## 13 Drittmittelprojekte

### Oracle Labs 2018

*Language-agnostic IDE Support for Truffle/Graal Languages.*

By providing the Language Server Protocol (LSP) with Truffle, Truffle-based languages could—with little effort—offer strong development tool support.

In this project, we investigate and implement parts of the LSP that can be supported directly by Truffle without impact on existing languages. We provide suggestions for additional extension points required to support other development scenarios of the LSP. Also, we investigate how dynamic languages with few static guarantees for module imports and analysis (such as Ruby or Python) can be supported in rich IDE scenarios as language agnostic as possible.

### HPI-Stanford Design Thinking Research Program, 11th Call (2018-2019)

*Can Design Thinking Improve Programming? III — Exploring Means to Grow a Shared Vocabulary Between Programmers and Domain Experts.*

Software design projects are carried out by teams of experts from multiple professions, which need to establish a shared vocabulary to foster collaboration and focused discussions. Tacit knowledge impedes direct knowledge exchange and thus involves social interactions supported by design tools such as interviews, drawings, and tangible prototypes. Similarly, in software engineering, there are agile practices to cope with changing insights due to only slowly revealing, domain-specific details. Eventually, the executable code artifacts carry that vocabulary and describe the software. Thus, collaboration close to such artifacts can support knowledge exchange.

In this project, we investigate the strategies non-programming experts apply when understanding source code. We derive techniques to represent readable, domain-specific expressions carried by general-purpose programming languages to reduce translation efforts and support collaboration. We enrich the text form with visual, yet executable, annotations to amplify the use of tangible artifacts. In addition to improving timeliness and quality, we expect domain experts to carry on adjusting domain-specific rules in the software product without the programmers' assistance.

**HPI-Stanford Design Thinking Research Program, 10th Call (2017-2018)**

*Can Design Thinking Improve Programming? II — Exploring Means to Grow a Shared Vocabulary Between Programmers and Domain Experts.*

Software engineering is a multi-disciplinary profession that involves not only programmers but also domain experts, which benefits from a shared vocabulary for knowledge exchange. Especially in the domain of data exploration, the co-creation of software benefits from materialized artifacts that capture an agreement on terms while remaining comprehensive to all parties. Hence, both source-code artifacts and natural-language artifacts are constantly shaped in a process of learning, recalling, and accepting. We observed that there is always some notion of accepted ambiguity of words and that domain experts express concepts rather declaratively after observing real data in depth. However even in live, object-oriented programming systems, which are usually a good fit for co-creation, there is no inherent support for ambiguity in code or declarative classifications of existing objects.

In this project, we investigate two new concepts to improve communication between programmers and domain experts: 1) a notion of ambiguity for object message sending and 2) declarative classifications with automatic management of representatives. In result, the overall software quality will be higher because domain-specific rules can directly be expressed and verified in source code. We expect a relevant portion of software to remain understandable and changeable largely by domain experts.

## 14 Mitarbeit in Programmkomitees

*ACM SIGPLAN Symposium on New Ideas in Programming and Reflections on Software (Onward!) 2018*

2018-11-07–09

Co-located with SPLASH 2018

Boston, Massachusetts, USA

<https://2018.onward-conference.org/track/onward-2018-papers/>

<https://2018.onward-conference.org/track/onward-2018-Onward-Essays>

*ACM SIGPLAN Software Language Engineering (SLE) 2018*

2018-11-05–06

Co-located with SPLASH 2018

Boston, Massachusetts, USA

<https://conf.researchr.org/track/sle-2018/papers/>

<http://www.sleconf.org/2018/>

*ACM SIGPLAN Dynamic Languages Symposium (DLS) 2018*

2018-11-06

Co-located with SPLASH 2018

Boston, Massachusetts, USA

<https://conf.researchr.org/track/dls-2018/dls-2018/>

<http://www.dynamic-languages-symposium.org/dls-18/>

*LIVE Workshop 2018*

2018-11-06

Co-located with SPLASH 2018

Boston, Massachusetts, USA

<https://2018.splashcon.org/track/live-2018-papers>

<http://2018.splashcon.org/>

*Flexible MDE (FlexMDE) Workshop 2018*

2018-10-14–16

Co-located with Models 2018

Copenhagen, Denmark

<http://www.di.univaq.it/flexmde/>

*International Conference on Managed Languages and Runtimes (ManLang) 2018*

2018-09-10–14

Linz, Austria

<http://ssw.jku.at/manlang18/>

*International Workshop on Digital Enterprise Engineering and Architecture (IDEA) 2018*

2018-07-18–20

Co-located with BIS 2018

Berlin, Germany

<http://bis.ue.poznan.pl/bis2018/workshops/idea/>

*International Conference on Enabling Technologies: Infrastructure for Collaborative Enterprises (WETICE) 2018*

2018-06-27–29

Track on Validation of Safety critical Collaboration systems

Paris, France

<http://www.dmi.unict.it/~tramonta/VSC/index.html>

*European Conference on Object-Oriented Programming (ECOOP) 2018*

2018-07-16–23

Amsterdam, Netherlands

<http://conf.researchr.org/home/ecoop-2018/>

*Workshop on Implementation, Compilation, Optimization of Object-Oriented Languages, Programs, and Systems (ICOOOLPS) 2018*

2018-07-17

Co-located with ECOOP 2018

Amsterdam, Netherlands

<https://2018.ecoop.org/track/ICOOOLPS-2018-papers/>

*Workshop on Context-oriented Programming (COP) 2018*

2018-07-16

Co-located with ECOOP 2018

Amsterdam, Netherlands

<https://2018.ecoop.org/track/COP-2018-papers/>

*Conference on the Art, Science, and Engineering of Programming (⟨Programming⟩) 2018*

2018-04-09–12

Nice, France

<http://2018.programming-conference.org/>

#### 14 *Mitarbeit in Programmkomitees*

*Programming Experience Workshop (PX/18) 2018*

2018-04-10

Co-located with <Programming> 2018

Nice, France

<http://programming-experience.org/px18/>

<https://2018.programming-conference.org/track/px-2018-papers/>

*The Live Adaptation of Software SYstems Workshop (LASSY) 2018*

2018-04-10

Co-located with <Programming> 2018

Nice, France

<https://2018.programming-conference.org/track/LASSY-2018-papers/>

*Object-Oriented Programming Languages and Systems (OOPS) 2018*

*Special Track at the ACM Symposium on Applied Computing (SAC) 2018*

2018-04-09–13

Pau, France

<http://oops.disi.unige.it/OOPS18/>

*Digitization Technology and Management (DiTeM) 2018*

2018-03-23–24

Co-located with ENASE 2018

Funchal, Madeira/Portugal

<http://www.enase.org/>

# 15 Begutachtungen und Gremientätigkeit

## Begutachtungen

Robert Hirschfeld

*Studienstiftung des deutschen Volkes*

*Research Foundation Flanders (FWO), Belgium*

*University of California at Santa Cruz, USA*

*CODE University of Applied Sciences Berlin, Germany*

*University of Technology Sydney (UTS), Australia*

*Utrecht University, Netherlands*

*University College London (UCL), UK*

*Vrije Universiteit Brussel (VUB), Belgium*

Gutachten zu Bachelorarbeiten, Masterarbeiten und Dissertationen

Gutachten für Berufungsverfahren

Jens Lincke

*Fondo Nacional de Desarrollo Científico y Tecnológico (FONDECYT), Chile*

Tobias Pape

*ACM Student Research Competition Grand Finals*

## Gremientätigkeit

Robert Hirschfeld

*Steering Committee Chair, ACM SIGPLAN Onward!*

*Steering Committee Past Chair, AOSA*

*Steering Committee Emeritus Member, ACM SIGPLAN Dynamic Languages Symposium (DLS)*

*Advisory Board Member, AOSA Programming Journal*

*Editorial Board Member, AOSA Programming Journal*

*Managing Editor, AOSA Programming Journal*

*Organizing Committee Member, Workshop on Context-oriented Programming (COP)*

*Organizing Committee Member, Programming Experience Workshop (PX)*

*Stellvertretendes Mitglied, Kommission für Entwicklungsplanung und Finanzen (EPK) der Universität Potsdam*

*Mitglied, Fakultätsrat der Digital-Engineering-Fakultät*

*Mitglied, Promotionsausschuss der Digital-Engineering-Fakultät*

*Koordinator, HPI-Forschungskolleg*

*Vorsitz, Berufungskommission (W3) Design Thinking and Innovation Research*  
*Mitglied, Berufungskommission (W3) Artificial Intelligence—Intelligent Systems*  
*Mitglied, Berufungskommission (W3) Artificial Intelligence—Machine Learning*  
*Mitglied, Berufungskommission (W3) Digital Health—Big Data*  
*Mitglied, Berufungskommission (W3) Digital Health—Connected Health*  
*Stellvertretendes Mitglied, Berufungskommission (W3) Data Engineering—Computational Statistics*  
*Stellvertretendes Mitglied, Berufungskommission (W3) Data Engineering—Scalable Data Engineering*

Richard P. Gabriel

*Steering Committee Member, ACM SIGPLAN Onward!*

*Steering Committee Member, AOSA*

*Advisory Board Member, AOSA Programming Journal*

*Organizing Committee Member, Programming Experience Workshop (PX)*

Tim Felgentreff

*Steering Committee Chair, ACM SIGPLAN Dynamic Languages Symposium (DLS)*

*Program Committee Chair, ACM SIGPLAN Dynamic Languages Symposium 2018*

Jens Lincke

*Organizing Committee Member, Workshop on Context-oriented Programming (COP)*

*Mitglied, Berufungskommission (W3) Design Thinking and Innovation Research*

Marcel Taeumel

*Member, Squeak Oversight Board*

*1. Vorsitzender, Squeak Deutschland e.V.*

## **Community Service**

Fabio Niephaus

*Organizing Committee Member, ‹Programming› 2018*

*Organizing Committee Member, SPLASH 2018*

Tobias Pape

*Editorial Board Member, AOSA Programming Journal*

*Managing Editor, AOSA Programming Journal*

*Organizing Committee Member, ‹Programming› 2018*

Patrick Rein

*Secretary, AOSA*

*Treasurer, AOSA*



## 16 Tagungsorganisation

*ACM SIGPLAN Symposium on New Ideas in Programming and Reflections on Software (Onward!) 2018*

2018-11-07–09

Co-located with SPLASH 2018

Boston, Massachusetts, USA

<https://2018.onward-conference.org/track/onward-2018-papers/>

<https://2018.onward-conference.org/track/onward-2018-Onward-Essays>

*ACM SIGPLAN Dynamic Languages Symposium (DLS) 2018*

2018-11-06

co-located with SPLASH 2018

Boston, Massachusetts, USA

<https://conf.researchr.org/track/dls-2018/dls-2018>

*Jahresversammlung des Squeak Deutschland e.V.*

2018-10-13

Hasso-Plattner-Institut, Potsdam

[https://squeak.de/news/2018/09/26/squeak\\_treffen/](https://squeak.de/news/2018/09/26/squeak_treffen/)

*Workshop on Implementation, Compilation, Optimization of Object-Oriented Languages, Programs, and Systems (ICOOOLPS) 2018*

2018-07-17

Co-located with ECOOP 2018

Amsterdam, Netherlands

<https://2018.ecoop.org/track/ICOOOLPS-2018-papers/>

*Workshop on Context-Oriented Programming (COP) 2018*

2018-07-16

co-located with ECOOP 2018

Amsterdam, Netherlands

<https://2018.ecoop.org/track/COP-2018-papers>

16 *Tagungsorganisation*

*Programming Experience 2018 (PX/18) Workshop*

2017-04-10

co-located with *Programming 2018*

Nice, France

<https://2018.programming-conference.org/track/px-2018-papers>

(<https://dl.acm.org/citation.cfm?id=3191697>)

*International Conference on the Art, Science, and Engineering of Programming*

(*Programming*) 2018

2018-04-09-12

Nice, France

<https://2018.programming-conference.org/>

# 17 Herausgeberschaft

## Zeitschriften

*Journal on The Art, Science, and Engineering of Programming*  
Robert Hirschfeld und Tobias Pape (Managing Editors)  
<https://programming-journal.org/2018>

## Tagungsbände

Proceedings of the *ACM SIGPLAN Dynamic Languages Symposium (DLS) 2018*, co-located with *Systems, Programming, Languages, and Applications: Software for Humanity (SPLASH)*, Boston, Massachusetts, USA, November 6, 2018, ACM DL.

Proceedings of the *Workshop on Context-oriented Programming (COP) 2018*, co-located with the *European Conference on Object-oriented Programming (ECOOP)*, Amsterdam, Netherlands, July 16, 2018, ACM DL.

Proceedings of the *Programming Experience 2018 (PX/18) Workshop*, co-located with the *International Conference on the Art, Science, and Engineering of Programming (<Programming>)*, Nice, France, April 10, 2018, ACM DL.

## Web-Portale

### Fachgebiet Software-Architekturen

<https://www.hpi.de/swa>

### Programmiersprachen, -werkzeuge und -umgebungen

<https://squeak.org>

<https://squeak.de>

<https://squeak-ev.de>

<https://lively-kernel.org>

## Zeitschriften

<https://programming-journal.org>

**Konferenzen**

<https://programming-conference.org>

<https://modularity.info>

<http://programming-experience.org>

<https://dynamic-languages-symposium.org>

<https://onward-conference.org>

**Forschungsverbände**

<https://aosa-inc.org>

**Software-Repositories**

<https://github.com/orgs/hpi-swa>

<https://github.com/orgs/hpi-swa-lab>

<https://github.com/orgs/hpi-swa-teaching>

## 18 Mitgliedschaften

Robert Hirschfeld  
*ACM, AOSA, Squeak Deutschland e.V.*

Toni Mattis  
*ACM*

Fabio Niephaus  
*ACM, Squeak Deutschland e.V., CdE e.V.*

Tobias Pape  
*AOSA, Squeak Deutschland e.V.*

Patrick Rein  
*ACM, AOSA*

Marcel Taeumel  
*Squeak Deutschland e.V.*

## 19 Auszeichnungen

Richard P. Gabriel

*ACM Onward! Most Notable Paper Award 2018 for 2008*

(Paper Title: Designed as Designer).

Toni Mattis

*Third Place, 2018 <Programming> ACM Student Research Competition*

(Title of Submission: Mining Concepts from Code using Community Detection).

Richard P. Gabriel

*AOSA Outstanding Reviewer Award 2018*

Robert Hirschfeld

*AOSA Outstanding Service Award 2018*

for Excellent Service to the <Programming> Community.









