

# Jahresbericht 2017

Fachgebiet Software-Architekturen

Prof. Dr. Robert Hirschfeld





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

# **Jahresbericht 2017**

**Fachgebiet Software-Architekturen**

Prof. Dr. Robert Hirschfeld

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

1. März 2018



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# 1 Personelle Zusammensetzung

## **Leiter des Fachgebiets**

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Dipl.-Inf. Marcel Weiher (extern, Microsoft Corp.)  
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### **Gastwissenschaftler und Gastwissenschaftlerinnen**

Prof. Alan Borning, Ph.D.  
University of Washington, Seattle, Washington, USA  
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Dr. Carl Friedrich Bolz-Tereick  
Heinrich-Heine-Universität Düsseldorf  
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Dr. Bert Freudenberg  
Y Combinator Research, Mountain View, California, USA  
Viewpoints Research Institute, Los Angeles, California, USA  
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## 1 Personelle Zusammensetzung

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Kyushu University, 九州大学, Fukuoka, Japan  
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### **Tutoren und Studentische Hilfskräfte**

Tom Beckmann  
Jonas Chromik  
Justus Eilers  
Eva Krebs  
Pius Ladenburger  
Fabio Niephaus  
Jakob Reschke  
Daniel Stolpe

### **Schülerpraktikanten**

Till Funk  
Leibniz Gymnasium Potsdam, Klasse 9  
*Entwicklung von Dokumentation und Beispielanwendungen in der Programmiersprache Squeak/Etoys.*



## 2 Lehrveranstaltungen

### Wintersemester 2017/2018 (24 SWS)

*Code Repository Mining* (4 SWS, Seminar, Master)

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

*Context-oriented Programming* (4 SWS, Seminar, Master)

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

*Programming Languages: Design and Implementation* (4 SWS, Seminar, Bachelor)

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

*Software Architecture* (4 SWS, Vorlesung, Bachelor)

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

*Web-based Development Environments* (4 SWS, Seminar, Master)

Hirschfeld, Ingalls, Ramson, Lincke

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

Polze, Hirschfeld

*GS/Squeak: Smalltalk as a Language Implementation Platform* (2 SWS, Seminar, Bachelorprojekt)

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

### Sommersemester 2017 (12 SWS), Forschungsfreisemester

*Programming Language Concepts, Tools, and Environments* (4 SWS, Seminar, Master)

Hirschfeld, Ramson, Rein, Lincke, Taeumel, Mattis

*Software Engineering 1* (4 SWS, Vorlesung, Bachelor)

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

## 2 Lehrveranstaltungen

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

*The Font Engineering Toolkit* (2 SWS, Seminar, Bachelorprojekt)  
Hirschfeld, Pape, Taeumel, Rein, Felgentreff, Lincke

### **Wintersemester 2016/2017 (24 SWS)**

*Live Programming Systems* (4 SWS, Seminar, Master)  
Hirschfeld, Felgentreff, Lehmann, Rein

*Software Architecture* (4 SWS, Vorlesung, Bachelor)  
Hirschfeld, Pape, Taeumel, Lincke, Rein, Henning

*Software Design* (4 SWS, Seminar, Master)  
Hirschfeld, Lincke, Lehmann, Felgentreff

*Software Modularity* (4 SWS, Seminar, Bachelor)  
Hirschfeld, Taeumel, Henning, Mattis

*Virtual Machines and Execution Environments* (4 SWS, Vorlesung, Master)  
Hirschfeld, Felgentreff, Pape, Mattis

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

*The Font Engineering Toolkit* (2 SWS, Seminar Bachelorprojekt)  
Hirschfeld, Pape, Taeumel, Rein, Felgentreff, Lincke

## 3 Promotionsvorhaben

### Abgeschlossene Promotionsvorhaben

Dr. Tim Felgentreff

*The Design and Implementation of Object-Constraint Programming.*

Externe Gutachter: Dr. Alan C. Kay (Viewpoints Research Institute, Los Angeles, California, USA), Prof. Dr. Wolfgang De Meuter (Vrije Universiteit Brussel, Brussels, Belgium)

### 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 Taeumel

*Data-driven Tool Construction for Exploratory Programming.*

Marcel Weiher (extern, Microsoft Corp.)

*Linguistic Architectural Support for Interactive Software.*

## 4 Abschlussarbeiten

### Masterarbeiten

Bastian Kruck

*Crossing Abstraction Barriers When Debugging Code Transformations: Live Debugging With Compilers.*

Betreuer: Robert Hirschfeld, Tim Felgentreff

Philipp Otto

*Komposition von modularen Spracherweiterungen für JavaScript.*

Betreuer: Robert Hirschfeld, Stefan Ramson

Jakob Reschke

*Ein Vorschlag zur Versionsverwaltung in objektbasierten Systemen.*

Betreuer: Robert Hirschfeld, Tobias Pape, Marcel Taeumel

Fabio Niephaus

*Squimera: A Live, Smalltalk-based IDE for Dynamic Programming Languages.*

Betreuer: Robert Hirschfeld, Tim Felgentreff

### Bachelorarbeiten

Justus Hildebrand

*Improving Font Reviews Through Design and Implementation of a Review Tool for Font Designers.*

Betreuer: Robert Hirschfeld, Tobias Pape, Marcel Taeumel

Corinna Jaschek

*Iterative Software Prototyping.*

Betreuer: Robert Hirschfeld, Tobias Pape, Marcel Taeumel

Eva Krebs

*Viability of Complex Font Rendering in Live Environments.*

Betreuer: Robert Hirschfeld, Tobias Pape, Marcel Taeumel

Alexander Löser

*Live Glyph Editing in a Live Environment.*

Betreuer: Robert Hirschfeld, Tobias Pape, Marcel Taeumel

Tom Beckmann

*Considerate Code Generation in Live User Interface Design.*

Betreuer: Robert Hirschfeld, Tobias Pape, Marcel Taeumel

## 5 Master- und Bachelorprojekte

### Masterprojekt 2017

*Source Code at Scale: Analyzing Idiom and Pattern Usage Across GitHub.*

Textbooks suggest a variety of means to improve code maintainability, including recommendations on code metrics (such as the length of methods), language-specific idioms, and larger structural and architectural blueprints—design patterns—for implementing recurring concepts. This project was concerned with a statistical analysis of code metrics, idioms, and patterns to track their real-world usage and identify factors which positively and negatively impact them. In the context of such code analysis at scale, the project created infrastructure for reproducible experiments on large numbers of code repositories and determined the feasibility of common parsing techniques.

Teilnehmer: Jonas Chromik, Arne Mayer, Daniel Stolpe

Betreuer: Toni Mattis, Patrick Rein, Robert Hirschfeld

### Bachelorprojekt 2016/2017

*The Font Engineering Toolkit: Live Font Creation in a Self-supporting Programming Environment.*

The demand for multi-script typefaces has grown over the last years due to widespread internationalization efforts in software development. However, many type designers lack the knowledge to design typefaces for non-Latin writing systems such as Devanagari and Cyrillic. Thus, an efficient review process and knowledge transfer between designers and language experts is more important than ever. Unfortunately, the contemporary means for reviewing typefaces is unstructured, complex, and not well supported by dedicated tools. We propose a new approach for structuring feedback and lowering complexity barriers in the process. We designed and implemented GlyphHub, a platform for font reviews. The result illustrates GlyphHub's feasibility as a central platform for font reviews. It opens a new space for future features to further improve the process of type reviewing in general.

Partner: Lasse Fister, graphicore (<http://graphicore.de>), Nürnberg

Teilnehmer: Justus Hildebrand, Corinna Jaschek, Eva Krebs, Alexander Löser, Tom Beckmann

Betreuer: Tobias Pape, Marcel Taeumel, Robert Hirschfeld

## **Bachelorprojekt 2017/2018**

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

Databases and runtime environment 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 different 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: Fabio Niephaus, Tobias Pape, Robert Hirschfeld

# 6 Bearbeitete Forschungsthemen

## **Forschungsthemen**

Software Modularity  
Meta-level Architectures  
Programming Environments and Tool Support  
Exploratory Programming  
Reactive Programming  
Virtual Machines and Execution Environments  
Context-oriented Programming (COP)  
Programming Languages  
Code Repository Mining  
Statistical Code Repository Analysis and Machine Learning

## **Anwendungsbereiche**

Education  
Live Programming  
End-user Development  
Design Thinking for Programming Activities  
Cloud Programming Environments

## **Technologien**

Squeak/Smalltalk  
LivelyKernel/JavaScript  
RSqueak/PyPy  
TruffleSqueak/Truffle+Graal  
Vivide  
Gramada/Ohm  
Babelsberg



## 7 Veröffentlichungen

### Zeitschriften und Konferenzen (begutachtet)

Patrick Rein, Stefan Ramson, Jens Lincke, Tim Felgentreff, and Robert Hirschfeld. *Group-based Behavior Adaptation Mechanisms in Object-oriented Systems*. In IEEE Software Special Issue on Context-aware and Smart Health Care, vol. 34, no. 6, pages 78-82, 2017, IEEE.

Tobias Pape, Carl Friedrich Bolz, and Robert Hirschfeld. *Adaptive Just-in-time Value Class Optimization for Lowering Memory Consumption and Improving Execution Time Performance*. In Elsevier Science of Computer Programming (SCICO), Special Issue on Experimental Software and Toolkits (EST), vol. 140, no. 1, pages 17-29, 2017.

Toni Mattis, Patrick Rein, and Robert Hirschfeld. *Edit Transactions: Dynamically Scoped Change Sets for Controlled Updates in Live Programming*. In Journal on The Art, Science, and Engineering of Programming, vol. 1, no. 2, art. 13, 32 pages, 2017.

Stefan Ramson and Robert Hirschfeld. *Active Expressions: Basic Building Blocks for Reactive Programming*. In Journal on The Art, Science, and Engineering of Programming, vol. 1, no. 2, art. 12, 49 pages, 2017.

Matthias Springer, Hidehiko Masuhara, and Robert Hirschfeld. *A Layer-based Approach to Hierarchical Dynamically-scoped Open Classes*. In Journal of Information Processing, Information Processing Society (IPJS), vol.25, no. 1, pages 296-307, 2017, Japan.

Marcel Taeumel, Stephanie Platz, Bastian Steinert, Robert Hirschfeld, and Hidehiko Masuhara. *Unravel Programming Sessions with Thresher: Identifying Coherent and Complete Sets of Fine-granular Source Code Changes*. In Journal of the Japan Society for Software Science and Technology (JSSST) on Computer Software, vol. 34, no. 1, pages 103-108, 2017, Japan.

Bastian Kruck, Tobias Pape, Tim Felgentreff, and Robert Hirschfeld. *Crossing Abstraction Barriers When Debugging in Dynamic Languages*. In Proceedings of the Object-oriented Programming Languages and Systems (OOPS) Track of the ACM Symposium on Applied Computing (SAC) 2017, Marrakech, Morocco, April 4-6, 2017, ACM Press.

### Workshops (begutachtet)

Toni Mattis, Patrick Rein, Stefan Ramson, Jens Lincke, and Robert Hirschfeld. *Towards Concept-aware Programming Environments for Guiding Software Modularity*. In Proceedings of the Programming Experience 2017.2 (PX/17.2) Workshop, co-located with the Conference on Object-oriented Programming, Systems, Languages, and Applications (OOPSLA), pages 36-45, Vancouver, British Columbia, Canada, October 22, 2017, ACM DL.

Jens Lincke, Stefan Ramson, Patrick Rein, Robert Hirschfeld, Marcel Taeumel, and Tim Felgentreff. *Designing a Live Development Experience for Web Components*. In Proceedings of the Programming Experience 2017.2 (PX/17.2) Workshop, co-located with the Conference on Object-oriented Programming, Systems, Languages, and Applications (OOPSLA), pages 28-35, Vancouver, British Columbia, Canada, October 22, 2017, ACM DL.

Patrick Rein, Jens Lincke, Stefan Ramson, Toni Mattis, and Robert Hirschfeld. *Living in Your Programming Environment: Enabling Exploratory Programming for Productivity Tools*. In Proceedings of the Programming Experience 2017.2 (PX/17.2) Workshop, co-located with the Conference on Object-oriented Programming, Systems, Languages, and Applications (OOPSLA), pages 17-27, Vancouver, British Columbia, Canada, October 22, 2017, ACM DL.

Stefan Ramson, Jens Lincke, and Robert Hirschfeld. *The Declarative Nature of Implicit Layer Activation*. In Proceedings of the Workshop on Context-oriented Programming (COP) 2017, co-located with the European Conference on Object-oriented Programming (ECOOP), pages 7-16, Barcelona, Spain, June 20, 2017, ACM DL.

Johannes Henning, Tim Felgentreff, and Robert Hirschfeld. *VM Wrapping - Fake It Till You Make It*. In Proceedings of the Workshop on Implementation, Compilation, Optimization of Object-Oriented Languages, Programs and Systems (ICOOOLPS) 2017, co-located with the European Conference on Object-oriented Programming (ECOOP), Barcelona, Spain, June 19, 2017, ACM DL.

Patrick Rein, Marcel Taeumel, Robert Hirschfeld, and Michael Perscheid. *Exploratory Development of Data-intensive Applications*. In Proceedings of the Programming Experience 2017 (PX/17) Workshop, co-located with the International Conference on the Art, Science, and Engineering of Programming (⟨Programming⟩), Brussels, Belgium, April 3, 2017, ACM DL.

Fabio Niephaus, Tim Felgentreff, Tobias Pape, and Robert Hirschfeld. *Squeak Makes a Good Python Debugger*. In Proceedings of the Programming Experience 2017 (PX/17) Workshop, co-located with the International Conference on the Art, Science, and Engineering of Programming (⟨Programming⟩), Brussels, Belgium, April 3, 2017, ACM DL.

Tim Felgentreff, Fabio Niephaus, Tobias Pape, and Robert Hirschfeld. *When a Mouse Eats a Python: Smalltalk-style Development for Python and Ruby*. Workshop on Modern Language Runtimes, Ecosystems, and VMs (MoreVMs) 2017, co-located with the International Conference on the Art, Science, and Engineering of Programming (⟨Programming⟩), Brussels, Belgium, April 3, 2017.

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

Fabio Niephaus. *Towards A Squeak/Smalltalk-based Python IDE: An Interpreter-level Integration of Python With Smalltalk*. ACM Student Research Competition (First Place, Graduate Category), co-located with the International Conference on the Art, Science, and Engineering of Programming (⟨Programming⟩), Brussels, Belgium, April 3, 2017, ACM DL.

Toni Mattis. *Concept-aware Live Programming: Integrating Topic Models for Program Comprehension Into Live Programming Environments*. ACM Student Research Competition (Second Place, Graduate Category), co-located with the International Conference on the Art, Science, and Engineering of Programming (⟨Programming⟩), Brussels, Belgium, April 3, 2017, ACM DL.

Patrick Rein. *Automatic Reuse Through Implied Methods: The Design and Implementation of an Abstraction Mechanism for Implied Interfaces*. ACM Student Research Competition (Third Place, Graduate Category), co-located with the International Conference on the Art, Science, and Engineering of Programming (⟨Programming⟩), Brussels, Belgium, April 3, 2017, ACM DL.

Tobias Dürschmid. *Continuous Code Reviews: A Social Coding tool for Code Reviews inside the IDE*. ACM Student Research Competition (First Place, Undergraduate Category), co-located with the International Conference on the Art, Science, and Engineering of Programming (⟨Programming⟩), Brussels, Belgium, April 3, 2017, ACM DL.

### **Monografien (begutachtet)**

Tim Felgentreff. *The Design and Implementation of Object-Constraint Programming*. Doctoral Dissertation, 2017, Hasso Plattner Institute.

## Buchkapitel

Patrick Rein, Marcel Taeumel, and Robert Hirschfeld. *Making the Domain Tangible: Implicit Object Lookup for Source Code Readability*. In Hasso Plattner, Christoph Meinel, and Larry Leifer (eds.). *Design Thinking Research: Making Distinctions: Collaboration versus Cooperation*. pages 171-194, Springer 2017.

## Technische Berichte

Christoph Meinel, Hasso Plattner, Jürgen Döllner, Mathias Weske, Andreas Polze, Robert Hirschfeld, Felix Naumann, Holger Giese, Patrick Baudisch, Tobias Friedrich, und Emmanuel Müller (Hrsg.). *Proceedings of the 10th Ph.D. Retreat of the HPI Research School on Service-oriented Systems Engineering*. HPI Technical Reports, vol. 111, 2017, Hasso Plattner Institute.

Robin Schreiber, Robert Krahn, Daniel H.H. Ingalls, and Robert Hirschfeld. *Transmorphic: Mapping direct Manipulation to Source Code Transformations*. HPI Technical Reports, vol. 110, 2017, Hasso Plattner Institute.

Christopher Weyand, Jonas Chromik, Lennard Wolf, Steffen Kötte, Konstantin Haase, Tim Felgentreff, Jens Lincke, and Robert Hirschfeld. *Improving Hosted Continuous Integration Services*. HPI Technical Reports, vol. 108, 2017, Hasso Plattner Institute.

## Sonstiges

Luke Church, Richard P. Gabriel, Robert Hirschfeld, and Hidehiko Masuhara. *PX/17.2 (Chair's Welcome)*. In *Proceedings of the Programming Experience 2017.2 (PX/17.2) Workshop*, co-located with the *Conference on Object-oriented Programming, Systems, Languages, and Applications (OOPSLA)*, Vancouver, British Columbia, Canada, October 22, 2017, ACM DL.

Alice Allen, Cecilia Aragon, Christoph Becker, Jeffrey Carver, Andrei Chis, Benoit Combemale, Mike Croucher, Kevin Crowston, Daniel Garijo, Ashish Gehani, Carole Goble, Robert Haines, Robert Hirschfeld, James Howison, Kathryn Huff, Caroline Jay, Daniel S. Katz, Claude Kirchner, Kateryna Kuksenok, Ralf Lämmel, Oscar Nierstrasz, Matt Turk, Rob van Nieuwpoort, Matthew Vaughn, and Jurgen Vinju. *Engineering Academic Software*. In *Dagstuhl Manifestos*, vol. 6, no. 1, pages 1-20, 2017.

Cristina V. Lopes, Shigeru Chiba, Theo D'Hondt, Wolfgang De Meuter, Richard Gabriel, Robert Hirschfeld, Tobias Pape, Guido Salvaneschi, and Mario Südholt. *Introducing The Art, Science, and Engineering of Programming: An Open Access Journal for All-Things Programming (Editorial)*. In *Journal of The Art, Science, and Engineering of Programming (⟨Programming⟩)*, vol. 1, no. 1, 4 pages, 2017.

## 8 Vorträge auf Tagungen

**Toni Mattis**, Patrick Rein, Stefan Ramson, Jens Lincke, and Robert Hirschfeld. *Towards Concept-aware Programming Environments for Guiding Software Modularity*. Programming Experience 2017.2 (PX/17.2) Workshop, co-located with the Conference on Object-oriented Programming, Systems, Languages, and Applications (OOPSLA), Vancouver, British Columbia, Canada, October 22, 2017.

**Jens Lincke**, Stefan Ramson, Patrick Rein, Robert Hirschfeld, Marcel Taeumel, and Tim Felgentreff. *Designing a Live Development Experience for Web Components*. Programming Experience 2017.2 (PX/17.2) Workshop, co-located with the Conference on Object-oriented Programming, Systems, Languages, and Applications (OOPSLA), Vancouver, British Columbia, Canada, October 22, 2017.

**Patrick Rein**, Jens Lincke, Stefan Ramson, Toni Mattis, and Robert Hirschfeld. *Living in Your Programming Environment: Enabling Exploratory Programming for Productivity Tools*. Programming Experience 2017.2 (PX/17.2) Workshop, co-located with the Conference on Object-oriented Programming, Systems, Languages, and Applications (OOPSLA), Vancouver, British Columbia, Canada, October 22, 2017.

**Stefan Ramson**, Jens Lincke, and Robert Hirschfeld. *The Declarative Nature of Implicit Layer Activation*. Workshop on Context-oriented Programming (COP) 2017, co-located with the European Conference on Object-oriented Programming (ECOOP), Barcelona, Spain, June 20, 2017.

**Johannes Henning**, Tim Felgentreff, and Robert Hirschfeld. *VM Wrapping - Fake It Till You Make It*. Workshop on Implementation, Compilation, Optimization of Object-Oriented Languages, Programs and Systems (ICOOOLPS) 2017, co-located with the European Conference on Object-oriented Programming (ECOOP), Barcelona, Spain, June 19, 2017.

**Toni Mattis**, Patrick Rein, and Robert Hirschfeld. *Edit Transactions: Dynamically Scoped Change Sets for Controlled Updates in Live Programming*. International Conference on the Art, Science, and Engineering of Programming (⟨Programming⟩), Brussels, Belgium, April 3-6, 2017.

**Stefan Ramson** and Robert Hirschfeld. *Active Expressions: Basic Building Blocks for Reactive Programming*. International Conference on the Art, Science, and Engineering of Programming (⟨Programming⟩), Brussels, Belgium, April 3-6, 2017.

**Patrick Rein**, Marcel Taeumel, Robert Hirschfeld, and Michael Perscheid. *Exploratory Development of Data-intensive Applications*. Programming Experience 2017 (PX/17) Workshop, co-located with the International Conference on the Art, Science, and Engineering of Programming (⟨Programming⟩), Brussels, Belgium, April 3, 2017, ACM DL.

**Fabio Niephaus**, Tim Felgentreff, Tobias Pape, and Robert Hirschfeld. *Squeak Makes a Good Python Debugger*. Programming Experience 2017 (PX/17) Workshop, co-located with the International Conference on the Art, Science, and Engineering of Programming (⟨Programming⟩), Brussels, Belgium, April 3, 2017, ACM DL.

**Tim Felgentreff**, Fabio Niephaus, Tobias Pape, and Robert Hirschfeld. *When a Mouse Eats a Python: Smalltalk-style Development for Python and Ruby*. Workshop on Modern Language Runtimes, Ecosystems, and VMs (MoreVMs) 2017, co-located with the International Conference on the Art, Science, and Engineering of Programming (⟨Programming⟩), Brussels, Belgium, April 3, 2017.

**Bastian Kruck**, Tobias Pape, Tim Felgentreff, and Robert Hirschfeld. *Crossing Abstraction Barriers When Debugging in Dynamic Languages*. Object-oriented Programming Languages and Systems (OOPS) Track of the ACM Symposium on Applied Computing (SAC) 2017, Marrakech, Morocco, April 4-6, 2017.

## 9 Organisation von und Teilnahme an HPI-Workshops

*HPI-SAP Graduate School Workshop*

2017-12-11

Walldorf, Germany

*HPI-Nanjing University Graduate School Workshop*

2017-11-20..21

Nanjing, China

*HPI Research School Retreat*

2017-10-19..20

Neuruppin

*HPI-Stanford Design Thinking Research Workshop*

2017-09-12..13

Hasso Plattner Institute, Potsdam, Germany

*HPI-Stanford Design Thinking Research Workshop*

2017-06-19

Hudson Yards, New York City, New York, USA

*HPI-Stanford Design Thinking Research Workshop*

2017-02-05..07

Stanford, California, USA

*Symposium on Future Trends in Service-Oriented Computing*

2017-04-26..28

Hasso Plattner Institute, Potsdam



## 10 Vorträge von Gästen des Fachgebiets

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

2017-12-18..20

*Safe and Efficient Data Representations for Dynamic Languages with Shared-Memory Parallelism.*

Prof. Alan Borning, Ph.D. (University of Washington, Washington, USA)

2017-10-05..20

*Recent Developments in Object Constraints Programming.*

Dale Henrichs (GemTalk Systems, Inc., Oregon, USA)

2017-09-09

*Developing, Deploying, and Managing Scalable, High-performance, Multi-tier Applications Based on Business Objects.*

Joe Joder, Ph.D. (The Refactory, Inc., Illinois, USA)

2017-03-27..28

*Agile Development.*

Richard P. Gabriel, Ph.D. (IBM Almaden Research Center, California, USA)

2017-03-27..28

*AI Research.*

Prof. Dr. Hidehiko Masuhara (Tokyo Institute of Technology, 東京工業大学, Japan)

2017-03-21..28

*Advanced Modularity for High-performance Computing.*

Robert Krahn (Y Combinator Research, California, USA)

2017-03-15

*Lively Next.*

Prof. Dr. Harumi Watanabe (Tokai University, 東海大学, Tokyo, Japan)

2017-02-24

*COP and IoT.*

Ikuta Tanigawa (Kyushu University, 九州大学, Fukuoka, Japan)

2017-01-10..03-06

*RumbaSim and RumbaTalk: COP and IoT.*



## 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, Zurich, Switzerland

<https://labs.oracle.com>

SAP Innovation Center, Potsdam, Germany

<https://icn.sap.com>

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>

Tokyo Institute of Technology, 東京工業大学, Tokyo, Japan

<https://www.titech.ac.jp>, <https://prg.is.titech.ac.jp>

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

#### *RSqueak/VM*

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

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

#### *Vivide*

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>

#### *Squot and Squit*

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

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

#### *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>

#### *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>

#### *Matriona*

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

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

*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>

*Ohm/S*

A Squeak/Smalltalk implementation of the metaprogramming framework Ohm.

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

*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>

*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>

*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>

*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>

*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>

*TruffleSqueak*

An experimental virtual machine for Squeak/Smalltalk written in Truffle, a language implementation framework with support for polyglot language implementation on the GraalVM.

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

*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>

*GlyphHub*

A font engineering toolkit allowing for live font creation in a self-supporting programming environment.

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

*SqueakJS*

An HTML5 runtime engine for Squeak/Smalltalk written in pure JavaScript.

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

**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>

*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>

*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>

## 13 Drittmittelprojekte

### **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. Therefore, we want to research 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 think that the relevant portion of software will remain understandable and changeable largely by domain experts.

### **HPI-Stanford Design Thinking Research Program, 9th Call (2016-2017)**

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

Programmers collaborate continuously with domain experts to explore the problem space and shape a solution that fits the users' needs. In doing so, all parties grow a shared vocabulary, which is above all a list of named concepts and their relationships to each other. Nowadays, many programmers favor the object-oriented programming paradigm because it allows them to directly model real-world concepts and interactions in source code. However, classifications in such programs are defined in reverse order compared to what intuition suggests: creating a named structure vs. observing a structure and naming it. This mismatch poses constant challenges when programmers talk with domain experts about the system at hand and the next steps to be taken to evolve it. In this project we will investigate new means to extend the object-oriented paradigm to better support shared vocabularies with their intuitive classifications.



## 14 Mitarbeit in Programmkomitees

*Dynamic Languages Symposium (DLS) 2017*

2017-10-24, co-located with SPLASH 2017, Vancouver, British Columbia, Canada  
<https://conf.researchr.org/track/dls-2017/dls-2017>

*Programming Experience Workshop (PX/17.2) 2017*

2017-10-22, co-located with SPLASH 2017, Vancouver, British Columbia, Canada  
<http://2017.splashcon.org/track/px-17-2>

*Workshop on Meta-Programming Techniques and Reflection (Meta) 2017*

2017-10-22, co-located with SPLASH 2017, Vancouver, British Columbia, Canada  
<http://2017.splashcon.org/track/meta-2017>

*International Conference on Managed Languages and Runtimes (ManLang) 2017*

2017-09-25..29, Prague, Czech Republic  
<http://d3s.mff.cuni.cz/conferences/manlang17>

*Flexible MDE (FlexMDE) Workshop 2017*

2017-09-18, co-located with Models 2017, Austin, Texas, USA  
<http://www.di.univaq.it/flexmde>

*Workshop on Digital Enterprise Engineering and Architecture (IDEA) 2017*

2017-06-28..30, co-located with the International Conference on Business Information Systems (BIS) 2017, Poznań, Poland  
<http://digitalenterprise.eu>

*International Conference on Enabling Technologies: Infrastructure for Collaborative Enterprises (WETICE) 2017*

2017-06-21..23, Track on Validation of Safety critical Collaboration systems, Poznań, Poland  
<http://www.dmi.unict.it/~tramonta/VSC/index.html>

*Smart Digital Futures (SDF) 2017*

2017-06-21..23, Special Track on Digital Architecture and Decision Management, The Algarve, Portugal  
<http://idt-17.kesinternational.org/cms/userfiles/is04.pdf>

*Workshop on Context-oriented Programming (COP) 2017*  
2017-06-20, co-located with ECOOP 2017, Barcelona, Spain  
<http://2017.ecoop.org/track/COP-2017-papers>

*International Workshop on Liquid Multi-Device Software 2017*  
2017-06-05, co-located with the International Conference on Web Engineering (ICWE) 2017, Rome, Italy  
<http://liquidsoftware.org>  
<http://icwe2017.webengineering.org>

*Evaluation of Novel Approaches to Software Engineering (ENASE) 2017*  
2017-04-28..29, Porto, Portugal, <http://www.enase.org/?y=2017>

*Object-Oriented Programming Languages and Systems (OOPS) 2017*  
2017-04-03..07, Special Track at the ACM Symposium on Applied Computing (SAC) 2017, Marrakech, Morocco  
<http://oops.disi.unige.it/OOPS17>

*Programming Experience Workshop (PX/17) 2017*  
2017-04-04, co-located with <Programming> 2017, Brussels, Belgium  
<http://2017.programming-conference.org/track/px-2017>

*Workshop on Live Adaptation of Software Systems (LASSY) 2017*  
2017-04-03, co-located with <Programming> 2017, Brussel, Brussels, Belgium  
<https://2017.programming-conference.org/track/LASSY-2017-papers>

*Conference on the Art, Science, and Technology of Programming (<Programming>) 2017*  
2017-04-03..06, Brussels, Belgium  
<https://2017.programming-conference.org/committee/programming-2016-papers-program-committee>

# 15 Begutachtungen und Gremientätigkeit

## Begutachtungen

Robert Hirschfeld

*Deutsche Forschungsgesellschaft (DFG)*

*STIC AmSud Program, Chile*

*VLIR-UOS, TEAM and South Initiatives, Belgium*

*Carnegie Mellon University (CMU), Pennsylvania, USA*

*Vrije Universiteit Brussel, Belgium*

*Kyushu University, Japan*

*The Journal of Object Technology (JOT)*

*IEEE Software Journal*

*Elsevier Journal on the Science of Computer Programming*

Gutachten zu Bachelorarbeiten, Masterarbeiten und Dissertationen

Gutachten für Berufungsverfahren

Tobias Pape

*ACM Student Research Competition Grand Finals*

## Gremientätigkeit

Robert Hirschfeld

*Steering Committee Chair, ACM SIGPLAN Onward!*

*Steering Committee Chair, AOSA*

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

*Advisory 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)*

*Mitglied, Fakultätsrat der Digital-Engineering-Fakultät*

*Mitglied, Promotionsausschuss der Mathematisch-Naturwissenschaftlichen Fakultät*

*Mitglied, Promotionsausschuss der Digital-Engineering-Fakultät*

*Koordinator, HPI-Forschungskolleg*

*Mitglied, Berufungskommission Digital Health — Big Data*

*Mitglied, Berufungskommission Digital Health — Connected Health*

15 *Begutachtungen und Gremientätigkeit*

Tobias Pape

*Managing Editor, AOSA Programming Journal*

Patrick Rein

*Secretary, AOSA*

*Treasurer, AOSA*

Marcel Taeumel

*Member, Squeak Oversight Board*

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

## 16 Tagungsorganisation

*ACM SIGPLAN Symposium on New Ideas in Programming and Reflections on Software (Onward!) 2017*

2017-10-25..27, co-located with SPLASH 2017, Vancouver, British Columbia, Canada

<https://2017.onward-conference.org/track/onward-2017-Onward-Papers>

<https://2017.onward-conference.org/track/onward-2017-essays-2017>

*ACM SIGPLAN Dynamic Languages Symposium 2017 (DLS)*

2017-10-24, co-located with SPLASH 2017, Vancouver, British Columbia, Canada

<https://conf.researchr.org/track/dls-2017/dls-2017>

*Programming Experience 2017.2 (PX/17.2) Workshop*

2017-10-22, co-located with SPLASH 2017, Vancouver, British Columbia, Canada,

<https://2017.splashcon.org/track/px-17-2>

(<https://dl.acm.org/citation.cfm?id=3176645>)

*Jahresversammlung des Squeak Deutschland e.V.*

2017-10-14, Hasso-Plattner-Institut, Potsdam

[https://squeak.de/news/2017/08/04/squeak\\_treffen](https://squeak.de/news/2017/08/04/squeak_treffen)

*Workshop on Context-Oriented Programming (COP) 2017*

2017-06-20, co-located with ECOOP 2017, Barcelona, Spain

<https://2017.ecoop.org/track/COP-2017-papers>

*Programming Experience 2017 (PX/17) Workshop*

2017-04-04, co-located with <Programming> 2017, Brussels, Belgium

<https://2017.programming-conference.org/track/px-2017>

(<https://dl.acm.org/citation.cfm?id=3079368>)

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

(<Programming>) 2017

2017-04-03..06, Brussels, Belgium

<https://2017.programming-conference.org>

# 17 Herausgeberschaft

## Zeitschriften

*Journal on The Art, Science, and Engineering of Programming*

Robert Hirschfeld und Tobias Pape

<http://programming-journal.org/2017>

## Tagungsbände

Proceedings of the *Programming Experience 2017.2 (PX/17.2) Workshop*, co-located with the Conference on Object-oriented Programming, Systems, Languages, and Applications (OOPSLA), Vancouver, British Columbia, Canada, October 22, 2017, ACM DL.

Proceedings of the *Workshop on Context-oriented Programming (COP) 2017*, co-located with the European Conference on Object-oriented Programming (ECOOP), Barcelona, Spain, June 20, 2017, ACM DL.

Proceedings of the *Programming Experience 2017 (PX/17) Workshop*, co-located with the International Conference on the Art, Science, and Engineering of Programming (<Programming>), Brussels, Belgium, April 3, 2017, 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

<http://programming-journal.org>

**Konferenzen**

<http://programming-conference.org>

<http://modularity.info>

<http://programming-experience.org>

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

<http://onward-conference.org>

**Forschungsverbände**

<http://aosa-inc.org>

**Software-Repositorys**

<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.*

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

Patrick Rein  
*ACM, AOSA*

Marcel Taeumel  
*Squeak Deutschland e.V.*



## 19 Auszeichnungen

Tobias Dürschmid

*First Place, 2017* *«Programming» ACM Student Research Competition*, Undergraduate Category (Title of Submission: Continuous Code Reviews).

Richard P. Gabriel

*AOSA Outstanding Service Award 2017* for Excellent Service to the *«Programming» Community*.

Toni Mattis

*Second Place, 2017* *«Programming» ACM Student Research Competition*, Graduate Category (Title of Submission: Concept-aware Live Programming).

Fabio Niephaus

*Masterabschluss mit Auszeichnung, Hasso-Plattner-Studienpreis, First Place, 2017* *«Programming» ACM Student Research Competition*, Graduate Category (Title of Submission: Towards A Squeak/Smalltalk-based Python IDE).

Tobias Pape

*AOSA Outstanding Service Award 2017* for Excellent Service to the *«Programming» Community*.

Patrick Rein

*Third Place, 2017* *«Programming» ACM Student Research Competition*, Graduate Category (Title of Submission: Automatic Reuse through Implied Methods).

## 20 Sonstiges

Robert Hirschfeld

*Forschungsfreisemester im Sommersemester 2017*

Visiting Professor

Programming Research Group, School of Computing

Tokyo Institute of Technology, 東京工業大学, Tokyo, Japan

Host: Prof. Dr. Hidehiko Masuhara

<https://www.titech.ac.jp>, <https://prg.is.titech.ac.jp>







