All lecture rooms come with data projectors, screens, microphones, whiteboards, Windows and Linux machines as well as connections for laptops via VGA or HDMI. We have an AV relay between our three largest lecture theatres, giving us a capacity of nearly 700 for a single event.

Additionally, the open floor area between the lecture rooms is large enough to accommodate 600 people in total.

**Wifi:** Connect to *eduroam*, or sign up (for free) to *The Cloud*.
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In memoriam Takayuki Muranushi (1983–2017) ............................................. page 31
Welcome to Oxford, and to ICFP 2017, the 22nd ACM SIGPLAN International Conference on Functional Programming!

ICFP provides a forum for sharing and discussing the latest work on the art and science of functional programming. We hope that you will enjoy the conference, including not only the technical presentations on a wide spectrum of topics, but also the opportunities for learning from and interacting with many researchers, developers, and students from around the world.

This year’s call for papers resulted in a near-record of 127 submissions, including 20 functional pearls and 4 experience reports. From these, the program committee selected 44 papers for presentation at the conference, including 6 pearls and 2 experience reports. In addition, the technical program includes invited keynotes by Chris Martens and Rich Hickey.

Following recent practice, ICFP 2017 employed a lightweight double-blind reviewing process, with each paper receiving three or more reviews from members of the program committee and a pool of external reviewers. Initial reviews were made available to authors, many of whom provided useful feedback and clarification during a 72-hour author response period. This was followed by online discussion and an in-person meeting of the program committee in Portland, Oregon, where the final selection of papers was made. Papers whose author list included a member of the program committee were not discussed until all other decisions had been made, and were held to a higher standard; ultimately, 4 of the 12 papers in this category were accepted.

All of the papers accepted for ICFP 2017 are being published in the inaugural edition of a new journal, Proceedings of the ACM on Programming Languages (PACMPL), which is a Gold Open Access journal publishing research on all aspects of programming languages, from design to implementation and from mathematical formalisms to empirical studies.

One of the more visible changes resulting from our participation in PACMPL is the new, single-column document format. The transition from the previous two-column format was not always easy, either for authors or reviewers. We thank everyone for their patience and goodwill throughout multiple iterations of this process, and we hope that the community will benefit from resulting improvements in readability and accessibility.

A less obvious impact of the move to PACMPL was the introduction of a new, two-phase selection and reviewing process, further enhancing the already rigorous approach that had been used in prior years. Concretely, this allowed for papers to be “conditionally accepted” at the end of the program committee meeting, and for the associated reviews to be annotated with a list of “mandatory revisions.” Authors of conditionally accepted papers then had approximately five weeks to revise and submit their papers for a second and final reviewing phase, including a cover letter to explain how the mandatory revisions had been addressed. In total, 30 papers were conditionally accepted, with mandatory revisions ranging from minor to more substantial but all judged to be feasible given the limited five week period for revision. While it is difficult to quantify the overall impact of this process, there were many cases where the extended opportunities for interaction between authors and reviewers helped to improve quality in both technical details and presentation. Ultimately, all conditionally accepted papers were accepted for inclusion in the conference.

Another new feature for ICFP this year that will be apparent from the papers in the proceedings is the introduction of an artifact evaluation process, with selected papers receiving a corresponding “badge” or “seal of approval” on their first page. Artifact evaluation, which supports future researchers in reproducing and building on current work, has proved to be a valuable component of other conferences, and we are confident that the ICFP community will benefit in a similar way. Although the process is optional, all authors of accepted papers were invited to prepare and submit artifacts to accompany and support their paper. These items were reviewed by an artifact evaluation committee that also provided feedback to authors to help improve the quality of submitted artifacts. The committee received 31 artifact submissions, all of which were accepted, and 27 of the associated papers are further badged as having a publicly available artifact.
As usual, the main conference is complemented by a range of affiliated events, including twelve co-hosted conferences, workshops or symposia, as well as the ICFP Programming Contest and the Student Research Competition, with results for both announced during the conference. In addition to technically focussed workshops on a broad range of topics, we are proud to include the SIGPLAN Programming Languages Mentoring Workshop (PLMW) at ICFP. The purpose of this mentoring workshop is to encourage senior undergraduate and beginning graduate students to pursue careers in programming language research, and to engage them in a process of imagining how they might contribute to the world. A novelty this year is that ICFP will run in parallel with FSCD 2017, the Second International Conference on Formal Structures for Computation and Deduction, with joint lunch and coffee breaks and the same overall schedule structure so that registrants at either conference can attend talks at the other.

It is hard to overstate the fundamental importance of community to the good health and success of ICFP. Of course, this includes the authors and developers that share their work, and the attendees who provide a stimulating environment for discussion and debate. But special recognition is due for the many volunteers who—even when they are already very busy with other commitments—still step up to take on new responsibilities and roles in support of the conference. We are deepy humbled, impressed, and grateful for their commitment, hard work, and expertise. In particular, we would like to acknowledge the program committee, the external reviewers, and the artifact evaluation committee for their thorough and thoughtful reviews; Annabel Satin and Marta Zampollo, for their excellent arrangements; the members of the ICFP steering committee, for their long term stewardship and dedication to the success of the conference; Ryan Trinkle, for liaising with our industrial partners and sponsors; David Christiansen and Andres Löh for their leadership in organizing the associated workshops; Neelakantan Krishnaswami, Dan Licata, and Brigitte Pientka for chairing PLMW; Ilya Sergey for running the Student Research Competition; Sam Lindley for coordinating the ICFP Programming Contest; Lindsey Kuper for making sure that the ICFP community is informed and engaged; José Calderón for managing the process of recording and posting videos for many of the talks at ICFP and associated events; Dirk Beyer and Conference Publishing Consulting for compiling the proceedings; the PACMPL Editorial Board and the staff at ACM headquarters—especially Philip Wadler, Michael Hicks, Matthew Fluet, Scott Delman, Craig Rodkin, and Laura Lander—for guiding and supporting the transition to PACMPL; Ted Cooper and Larry Diehl for their assistance during the program committee meeting; and last, but not least, Yosuke Fukuda, Yuki Nishida, and Jakub Zalewski for organizing and leading the team of student volunteers that will be working to keep everything running smoothly during the conference.

We are indebted to our partners who made it possible to keep the cost of registration reasonable, and who provided support for students who would not have been able to attend without financial aid. We are also very grateful for the generous support of ACM and ACM SIGPLAN, including their commitment to PACMPL's Gold Open Access policy, making high-quality, peer-reviewed scientific research available without restrictions on access or (re-)use. The generosity of our supporters is key in helping our community to grow and thrive.

Welcome again to ICFP. We hope you enjoy the conference, the affiliated events, the location, and the opportunities that it all provides to meet new people and, for those who have attended previously, to reconnect with colleagues and friends!

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ICFP Keynotes

Compositional Creativity: Some Principles for Talking to Computers
Chris Martens (North Carolina State University)

Abstract: Generativity is an increasingly popular and useful concept, referring to a machine’s ability to respond to user input with new constructions not foreseen by the programmer. Yet increasingly, people treat computational systems as unknowable black-box systems, writing off the possibility of forming mental models that allow a collaborative relationship between human insight and fast computation.

I argue for the efficacy of transparent, compositional semantics for collaborating with virtual agents and deriving insights from system models. Having built systems based on automated reasoning for linear logic and epistemic modal logic, we can formalize notions of belief, intention, and action, in order to create virtual agents that behave in ways that humans can reason about based on intuitions about goal-driven behavior. For example, some of Grice’s maxims of conversation can be seen as derivable consequences of these principles. Ongoing work includes applying these formalisms to the tasks of navigating unknown rule systems in virtual environments, social skills training, and generative storytelling.

Bio: Chris Martens is an Assistant Professor at North Carolina State University, where she directs the Principles of Expressive Machines (POEM) lab. She was a postdoctoral researcher with UC Santa Cruz’s Expressive Intelligence Studio after completing her Ph.D. with the Principles of Programming group at Carnegie Mellon in 2015. At CMU she worked on logical frameworks, dependent type theory, and representing narrative structure with linear logic. Her current research activities include applying automated reasoning and compositional semantics to the authorship of generative systems, games, and narrative, as well as designing accessible tools for system modeling and logical specification.

Ten Years of Clojure—FP Out of the Box
Rich Hickey (Cognitect Inc.)

Abstract: Since its first release in 2007, Clojure has seen considerable adoption in industries as diverse as Fortune 5 retail, international banking and finance, climate science and the latest startups. Clojure has tens of thousands of users and is a top 20 language in the RedMonk 2017 index. This is somewhat unexpected (especially by its author!) given that Clojure is a Lisp dialect emphasizing functional programming. What happened?

This talk examines the objectives of Clojure and its initial and ongoing design decisions. Moreover, we can now examine how that’s worked out—which features are valued by its users and how it is employed to build systems. We will briefly touch on Datomic, a functional database system written in Clojure by the same authors that completes the model of programming Clojure espouses. Finally we’ll look at what challenges remain for programmers and how Clojure might grow to address them.

Bio: Rich Hickey is the author of Clojure, and the designer of Datomic. Rich has 30 years of professional experience in all facets of software development. Rich has worked on scheduling systems, broadcast automation, audio analysis and fingerprinting, database systems, yield management, exit poll systems, and machine listening, in a variety of languages.
Social Events

- Monday 4th: Welcome Reception
  18:30–20:30, in the Foyer in the Maths Institute

- Wednesday 6th: Lambda Ladies Lunch
  12:00–13:00, in the Foyer in the Maths Institute

- Wednesday 6th: Banquet
  18:30–22:30, in the Blackwell Hall of the Weston Library, on Broad Street

- Thursday 7th: Industry Reception
  18:15–20:30, in the Ashmolean Museum, on Beaumont Street

- Saturday 9th: FARM Evening of Algorithmic Arts
  19:30–22:00, in the Old Fire Station, on George Street

(For a location map, see the inside back cover.)
Workshop on Higher-Order Programming with Effects

09:00 – 09:10  Welcome

09:00  Welcome
François Pottier and Aleksandar Nanevski

09:10 – 10:10  Invited talk

09:10  Invited Talk: Semantics of Effect Systems by Graded Monads
Shin-ya Katsumata

10:30 – 11:30  Modular Semantics

10:30  Higher-order Programming is an Effect
Oleg Kiselyov
11:00  A monadic solution to the Cartwright-Felleisen-Wadler conjecture
Ohad Kammar and Dylan McDermott

12:00 – 12:30  Rust

12:00  RustBelt: Securing the Foundations of the Rust Programming Language
Ralf Jung, Jacques-Henri Jourdan, Robbert Krebbers and Derek Dreyer

14:00 – 15:00  Effects and Dependent Types

14:00  Handling fibred algebraic effects
Danel Ahman
14:30  Only Control Effects and Dependent Types
Youyou Cong and William J. Bowman

15:30 – 16:30  Effects

15:30  Programming a Web Server with Algebraic Effects
Daan Leijen
16:00  Logical Relations for Algebraic Effects
Dariusz Biernacki, Maciej Piróg, Piotr Polesiuk and Filip Sieczkowski

16:50 – 17:20  Monotonicity

16:50  Recalling a Witness
Danel Ahman, Cătălin Hrițcu, Kenji Maillard, Aseem Rastogi, Nikhil Swamy and Cédric Fournet
Programming Languages Mentoring Workshop

09:00 – 09:10  **Welcome**

09:00  Welcome  
*Brigitte Pientka, Neelakantan R. Krishnaswami and Dan Licata*

09:10 – 10:00  **Keynote**

09:10  Keynote  
*Chris Martens*

10:30 – 11:30  **Session 1**

10:30  A Few Frank Remarks  
*Conor McBride*

11:00  Compositional Compiler Correctness  
*Amal Ahmed*

12:00 – 12:30  **Session 2**

12:00  TBD

14:00 – 15:00  **Session 3**

14:00  Gradual Typing  
*Ronald Garcia*

14:30  Scala: Types in Theory & Practice  
*Nada Amin*

15:30 – 16:30  **Session 4**

15:30  How to Write Papers and Give Talks That People Can Follow  
*Derek Dreyer*

16:50 – 17:40  **Session 5**

16:50  Panel Discussion: Careers in Programming Languages  
*Sam Staton and Richard A. Eisenberg*
### Scheme and Functional Programming Workshop

<table>
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<tr>
<th>Time</th>
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<th>Details</th>
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<td>09:00 – 09:10</td>
<td><strong>Session 0</strong></td>
<td>Welcome</td>
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<tr>
<td>09:10 – 10:10</td>
<td><strong>Session 1</strong></td>
<td>Keynote: Sam Tobin-Hochstadt</td>
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<td>10:30 – 11:30</td>
<td><strong>Session 2</strong></td>
<td>Paper: Scalar and Tensor Parameters for Importing Tensor Index Notation including Einstein Summation Notation Satoshi Egi</td>
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<tr>
<td>11:15</td>
<td>Lightning Talk: Extending the LISP model from cons cells to triples, from trees to hypergraphs Joe Corneli and Raymond Puzio</td>
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<tr>
<td>12:00 – 12:30</td>
<td><strong>Session 3</strong></td>
<td>Panel: Future of Scheme: François-René Rideau, Marc Feeley, Arthur Gleckler, Kathy Gray, Alaric Snell-Pym and Andy Wingo</td>
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<tr>
<td>14:00 – 15:00</td>
<td><strong>Session 4</strong></td>
<td>Paper: Toward Parallelizing Control-flow Analysis with Datalog Thomas Gilray and Sidharth Kumar</td>
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<td>14:45</td>
<td>Lightning: Gerbil on Gambit, as they say Racket on Chez Dimitris Vyzovitis</td>
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<tr>
<td>15:30 – 16:30</td>
<td><strong>Session 5</strong></td>
<td>Report: Status of the ongoing R7RS standardization process Alaric Snell-Pym</td>
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<td>16:15</td>
<td>Lightning: lambda talk Alain Marty</td>
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<td>16:50 – 17:50</td>
<td><strong>Session 6</strong></td>
<td>Invited Talk: Matthew Might</td>
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<td>17:20</td>
<td>Goodbye</td>
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# Workshop on Type-Driven Development

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<tr>
<td>09:00 – 09:05</td>
<td>Welcome</td>
<td>Welcome</td>
<td>Sam Lindley and Brent Yorgey</td>
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<tr>
<td>09:10 – 10:00</td>
<td>Invited talk</td>
<td>Driving types into PHP</td>
<td>Andrew Kennedy</td>
</tr>
<tr>
<td>10:30 – 11:30</td>
<td>Full papers 1</td>
<td>Type-directed diffing of structured data</td>
<td>Victor Cacciari Miraldo, Pierre-Evariste Dagand and Wouter Swierstra</td>
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<tr>
<td>11:00</td>
<td>Structured asynchrony with algebraic effects</td>
<td>Daan Leijen</td>
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<tr>
<td>12:00 – 12:25</td>
<td>Extended abstracts 1</td>
<td>Cogent↑: giving systems engineers a stepping stone</td>
<td>Zilin Chen</td>
</tr>
<tr>
<td>14:00 – 15:00</td>
<td>Full papers 2</td>
<td>Type safe Redis queries – a case study of type-level programming in Haskell</td>
<td>Ting-Yan Lai, Tyng-Ruey Chuang and Shin-Cheng Mu</td>
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<tr>
<td>14:30</td>
<td>Generic packet descriptions: verified parsing and pretty printing of low-level data</td>
<td>Marcell van Geest and Wouter Swierstra</td>
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<td>15:30 – 16:20</td>
<td>Extended abstracts 2</td>
<td>Affine killing</td>
<td>Kiko Fernandez-Reyes and Dave Clarke</td>
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<tr>
<td>15:55</td>
<td>On ringads and foldables</td>
<td>James McKinna</td>
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<tr>
<td>16:50 – 17:40</td>
<td>Extended abstracts 3</td>
<td>Type oriented programming for task based parallelism</td>
<td>Nick Brown, Ludovic Capelli and James Mark Bull</td>
</tr>
<tr>
<td>17:15</td>
<td>Type-directed reasoning for probabilistic, non-compositional resources</td>
<td>Edwin Brady, Kevin Hammond and Christopher Schwaab</td>
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ICFP Tutorials

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<th>Tutorial Content</th>
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<td>09:10 – 12:30</td>
<td><strong>Morning tutorial</strong></td>
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<td>09:10–10:00</td>
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<td>10:30–11:30</td>
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<tr>
<td>12:00–12:30</td>
<td>Tutorial T1: Writing Verified Programs in CakeML</td>
</tr>
<tr>
<td></td>
<td>Ramana Kumar, Michael Norrish, Scott Owens and Magnus O. Myreen</td>
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<tr>
<td>14:00 – 17:50</td>
<td><strong>Afternoon tutorial</strong></td>
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<td>14:00–15:00</td>
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<td>15:00–16:20</td>
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<tr>
<td>16:50–17:50</td>
<td>Tutorial T2: Certified Functional (Co)programming with Isabelle/HOL</td>
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<td>Jasmin Blanchette, Andreas Lochbihler, Andrei Popescu and Dmitriy Traytel</td>
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</tbody>
</table>
# ICFP – Day 1

## 09:00 – 10:00  Monday Keynote  
**Chair:** Jeremy Gibbons

09:00 Welcome
09:10 Compositional creativity: some principles for talking to computers  
*Chris Martens*

## 10:30 – 12:00  Art and Education  
**Chair:** Kathryn Gray

10:30 Super 8 Languages for Making Movies (Functional Pearl) [#30]  
*Leif Andersen, Stephen Chang and Matthias Felleisen*
10:52 Testing and Debugging Functional Reactive Programming [#2]  
*Ivan Perez and Henrik Nilsson*
11:15 Lock-Step Simulation Is Child’s Play (Experience Report) [#3]  
*Joachim Breitner and Chris Smith*
11:37 Scaling up Functional Programming Education [#4]  
*Benjamin Canou, Roberto Di Cosmo and Grégoire Henry*

## 13:00 – 14:30  Functional Programming Techniques  
**Chair:** Graham Hutton

13:00 Faster Coroutine Pipelines [#5]  
*Mike Spivey*
13:22 A Pretty But Not Greedy Printer (Functional Pearl) [#6]  
*Jean-Philippe Bernardy*
13:45 Generic Functional Parallel Algorithms: Scan and FFT [#7]  
*Conal Elliott*
14:07 A Unified Approach to Solving Seven Programming Problems (Functional Pearl) [#8]  
*William E. Byrd, Michael Ballantyne, Gregory Rosenblatt and Matthew Might*

## 15:00 – 16:10  Applications  
**Chair:** Alexandra Silva

15:00 Prototyping a Query Compiler using Coq (Experience Report) [#9]  
*Joshua Auerbach, Martin Hirzel, Louis Mandel, Avraham Shinnar and Jerome Simeon*
15:23 A Framework for Adaptive Differential Privacy [#10]  
*Daniel Winograd-Cort, Andreas Haeberlen, Aaron Roth and Benjamin C. Pierce*
15:46 Symbolic Conditioning of Arrays in Probabilistic Programs [#11]  
*Praveen Narayanan and Chung-chieh Shan*

## 16:40 – 18:10  Effects  
**Chair:** Ben Lippmeier

16:40 Abstracting Definitional Interpreters [#12]  
*David Darais, Nicholas Labich, Phúc C. Nguyen and David Van Horn*
17:02 On the Expressive Power of User-Defined Effects [#13]  
*Yannick Forster, Ohad Kammar, Sam Lindley and Matija Pretnar*
17:25 Imperative Functional Programs That Explain Their Work [#14]  
*Wilmer Ricciotti, Jan Stolarek, Roly Perera and James Cheney*
17:47 Effect-Driven QuickChecking of Compilers [#15]  
*Jan Midtgaard, Mathias Nygaard Justesen, Patrick Kasting, Flemming Nielson and Hanne Riis Nielson*

## 18:10 – 18:20  Monday Closing Events  
**Chair:** Peter Thiemann

18:10 Monday Announcements
FSCD – Day 1

10:30 – 10:45  Welcome

10:30  Welcome message
  *Sam Staton and Dale Miller*

10:45 – 11:45  Session 1

10:45  Brzozowski Goes Concurrent – A Kleene Theorem for Pomset Languages
  *Alexandra Silva*

13:00 – 14:30  Session 2

13:00  Polynomial running times for polynomial-time oracle machines
  *Akitoshi Kawamura and Florian Steinberg*

13:30  A Curry-Howard Approach to Church’s Synthesis
  *Colin Riba and Pierre Pradic*

14:00  Streett Automata Model Checking of Higher-Order Recursion Schemes
  *Ryota Suzuki, Koichi Fujima, Naoki Kobayashi and Takeshi Tsukada*

15:00 – 16:00  Session 3

15:00  Relating System F and $\lambda^2$: A Case Study in Coq, Abella and Beluga
  *Jonas Kaiser, Brigitte Pientka and Gert Smolka*

15:30  Nested Multisets, Hereditary Multisets, and Syntactic Ordinals in Isabelle/HOL
  *Jasmin Blanchette, Mathias Fleury and Dmitriy Traytel*

16:40 – 18:10  Session 4

16:40  A polynomial-time algorithm for the Lambek calculus with brackets of bounded order
  *Max Kanovich, Stepan Kuznetsov, Glyn Morrill and Andre Scedrov*

17:10  A sequent calculus for semi-associativity
  *Noam Zeilberger*

17:40  Combinatorial Flows and their Normalisation
  *Lutz Strassburger*
# ICFP – Day 2

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<tr>
<th>Time</th>
<th>Session</th>
<th>Chair</th>
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<td>09:00 – 10:00</td>
<td><strong>Tuesday Keynote</strong></td>
<td>Chair: Mark Jones</td>
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<tr>
<td>09:00</td>
<td>Ten Years of Clojure – FP Out of the Box</td>
<td>Rich Hickey</td>
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<tr>
<td>10:30 – 12:00</td>
<td><strong>Low-level and Systems Programming</strong></td>
<td>Chair: Sam Tobin-Hochstadt</td>
</tr>
<tr>
<td>11:15</td>
<td>Verifying Efficient Function Calls in CakeML [#18]</td>
<td>Scott Owens, Michael Norrish, Ramana Kumar, Magnus O. Myreen, Yong Kiam Tan</td>
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<tr>
<td>13:00 – 14:30</td>
<td><strong>Foundations of Higher-Order Programming</strong></td>
<td>Chair: Gabriel Scherer</td>
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<td>13:00</td>
<td>Foundations of Strong Call by Need [#20]</td>
<td>Thibaut Balabonski, Pablo Barenbaum, Eduardo Bonelli and Delia Kesner</td>
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<tr>
<td>14:07</td>
<td>No-Brainer CPS Conversion [#23]</td>
<td>Milo Davis, William Meehan and Olin Shivers</td>
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<td>15:00 – 16:10</td>
<td><strong>Tools for Verification</strong></td>
<td>Chair: Nikhil Swamy</td>
</tr>
<tr>
<td>15:00</td>
<td>Kami: A Platform for High-Level Parametric Hardware Specification and Its Modular Verification [#24]</td>
<td>Joonwon Choi, Muralidaran Vijayaraghavan, Benjamin Sherman, Adam Chlipala and Arvind undefined</td>
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<tr>
<td>15:46</td>
<td>Local Refinement Typing [#26]</td>
<td>Benjamin Cosman and Ranjit Jhala</td>
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<tr>
<td>16:40 – 17:50</td>
<td><strong>Program Construction</strong></td>
<td>Chair: John Hughes</td>
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<tr>
<td>16:40</td>
<td>Compiling to Categories [#27]</td>
<td>Conal Elliott</td>
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<tr>
<td>17:03</td>
<td>Visitors Unchained [#28]</td>
<td>François Pottier</td>
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<td>17:26</td>
<td>Staged Generic Programming [#29]</td>
<td>Jeremy Yallop</td>
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<td>17:50 – 18:20</td>
<td><strong>Tuesday Closing Events</strong></td>
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<tr>
<td>17:50</td>
<td>Programming Contest Report</td>
<td>Sam Lindley</td>
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FSCD – Day 2

10:30 – 11:30  **Session 5**

10:30  Uniform Resource Analysis by Rewriting: Strengths and Weaknesses  
*Georg Moser*

11:30 – 12:00  **Session 6**

11:30  Continuation Passing Style for Effect Handlers  
*Daniel H"ollerstr"om, Sam Lindley, Bob Atkey and KC Sivaramakrishnan*

13:00 – 14:30  **Session 7**

13:00  Confluence of an extension of Combinatory Logic by Boolean constants  
*Lukasz Czajka*

13:30  Improving Rewriting Induction Approach for Proving Ground Confluence  
*Takahito Aoto, Yoshihito Toyama and Yuta Kimura*

14:00  The confluent terminating context-free substitutive rewriting system for the $\lambda$-calculus  
with surjective pairing and terminal type  
*Yohji Akama*

15:00 – 16:00  **Session 8**

15:00  Is the optimal implementation inefficient? Elementary not  
*Stefano Guerrini and Marco Solieri*

15:30  Optimality and the Linear Substitution Calculus  
*Pablo Barenbaum and Eduardo Bonelli*

16:40 – 18:10  **Session 9**

16:40  Generalized Refocusing: from Hybrid Strategies to Abstract Machines  
*Małgorzata Biernacka, Witold Charatonik and Klara Zielińska*

17:10  Observably Deterministic Concurrent Strategies and Intensional Full Abstraction for Parallel-or  
*Simon Castellan, Pierre Clairambault and Glynn Winskel*

17:40  Refutation of Sallé’s Longstanding Conjecture  
*Benedetto Intrigila, Giulio Manzonetto and Andrew Polonsky*
## ICFP – Day 3

### 09:00 – 10:00  SRC Presentations and Domain-Specific Languages  
Chair: Martin Erwig

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<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
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<tbody>
<tr>
<td>09:00</td>
<td>Student Research Competition: Finalist Presentations</td>
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<tr>
<td>09:37</td>
<td>Herbarium Racketensis: A Stroll through the Woods (Functional Pearl) [#1]</td>
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### 10:30 – 12:00  Dependently Typed Programming  
Chair: Dan Licata

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<tr>
<th>Time</th>
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<tr>
<td>10:30</td>
<td>A Specification for Dependent Types in Haskell [#31]</td>
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<tr>
<td></td>
<td><em>Stephanie Weirich, Antoine Voizard, Pedro Avezedo and Richard Eisenberg</em></td>
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<tr>
<td>10:52</td>
<td>Parametric Quantifiers for Dependent Type Theory [#32]</td>
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<td></td>
<td><em>Andreas Nuyts, Andrea Vezzosi and Dominique Devriese</em></td>
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<tr>
<td>11:15</td>
<td>Normalization by Evaluation for Sized Dependent Types [#33]</td>
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<td></td>
<td><em>Andras Abel, Andrea Vezzosi and Theo Winterhalter</em></td>
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<tr>
<td>11:37</td>
<td>A Metaprogramming Framework for Formal Verification [#34]</td>
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<td><em>Gabriel Elbner, Sebastian Ulrich, Jared Roesch, Jeremy Avigad and Leonardo De Moura</em></td>
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### 13:00 – 14:30  Contracts and Sessions  
Chair: Matthew Flatt

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<th>Time</th>
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<tr>
<td>13:00</td>
<td>Chaperone Contracts for Higher-Order Sessions [#35]</td>
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<td></td>
<td><em>Hernan Melgratti and Luca Padovani</em></td>
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<tr>
<td>13:22</td>
<td>Whip: Higher-Order Contracts for Modern Services [#36]</td>
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<td><em>Lucas Waye, Christos Dimoulas and Stephen Chong</em></td>
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<tr>
<td>13:45</td>
<td>Manifest Sharing with Session Types [#37]</td>
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<td></td>
<td><em>Stephanie Balzer and Frank Pfenning</em></td>
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<td>14:07</td>
<td>Gradual Session Types [#38]</td>
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<td></td>
<td><em>Atsushi Igarashi, Peter Thiemann, Vasco Vasconcelos and Philip Wadler</em></td>
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### 15:00 – 16:10  Integrating Static and Dynamic Typing  
Chair: Ron Garcia

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<tr>
<td>15:00</td>
<td>Theorems for Free for Free: Parametricity, With and Without Types [#39]</td>
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<td><em>Amal Ahmed, Dustin Jamner, Jeremy G. Siek and Philip Wadler</em></td>
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<td>15:23</td>
<td>On Polymorphic Gradual Typing [#40]</td>
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<td><em>Yuu Igarashi, Taro Sekiyama and Atsushi Igarashi</em></td>
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<tr>
<td>15:46</td>
<td>Gradual Typing with Union and Intersection Types [#41]</td>
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<td><em>Giuseppe Castagna and Victor Lanvin</em></td>
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### 16:40 – 17:50  Inference and Analysis  
Chair: Mark Jones

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<tr>
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<tr>
<td>16:40</td>
<td>Constrained Type Families [#42]</td>
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<td></td>
<td><em>J. Garrett Morris and Richard A. Eisenberg</em></td>
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<tr>
<td>17:03</td>
<td>Automating Sized-Type Inference for Complexity Analysis [#43]</td>
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<td><em>Martin Avanzini and Ugo Dal Lago</em></td>
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<td>17:26</td>
<td>Inferring Scope through Syntactic Sugar [#44]</td>
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<td><em>Justin Pombrio, Shriram Krishnamurthi and Mitchell Wand</em></td>
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### 17:50 – 18:20  Wednesday Closing Events

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<tr>
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<tr>
<td>17:50</td>
<td>Student Research Competition Awards</td>
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<tr>
<td>18:00</td>
<td>Program Chair’s Report</td>
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<tr>
<td>18:10</td>
<td>ICFP 2018 Announcement</td>
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</table>
### FSCD – Day 3

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<th>Time</th>
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<th>Title</th>
<th>Authors</th>
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<tbody>
<tr>
<td>09:10</td>
<td>Session 10</td>
<td>Quantitative semantics for probabilistic programming</td>
<td>Christine Tasson</td>
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<tr>
<td>10:30</td>
<td>Session 11</td>
<td>Displayed categories</td>
<td>Benedikt Ahrens and Peter Lefanu Lumsdaine</td>
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<tr>
<td>11:00</td>
<td></td>
<td>List Objects with Algebraic Structure</td>
<td>Marcelo Fiore and Philip Saville</td>
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<tr>
<td>11:30</td>
<td></td>
<td>There is only one notion of differentiatation</td>
<td>Robin Cockett and Jean-Simon Lemay</td>
</tr>
<tr>
<td>13:00</td>
<td>Session 12</td>
<td>A Fibrational Framework for Substructural and Modal Logics</td>
<td>Dan Licata, Michael Shulman and Mitchell Riley</td>
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<tr>
<td>13:30</td>
<td></td>
<td>Dinaturality between syntax and semantics</td>
<td>Paolo Pistone</td>
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<td>14:00</td>
<td></td>
<td>Models of Type Theory Based on Moore Paths</td>
<td>Andrew Pitts and Ian Orton</td>
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<tr>
<td>15:00</td>
<td>Session 13</td>
<td>Böhm Reduction in Infinitary Term Graph Rewriting Systems</td>
<td>Patrick Bahr</td>
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<tr>
<td>15:30</td>
<td></td>
<td>Infinite Runs in Abstract Completion</td>
<td>Nao Hirokawa, aart Middeldorp, Christian Sternagel and Sarah Winkler</td>
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<tr>
<td>16:40</td>
<td>Session 14</td>
<td>Negative Translations and Normal Modality</td>
<td>Tadeusz Litak, Miriam Polzer and Ulrich Rabenstein</td>
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<tr>
<td>17:10</td>
<td></td>
<td>Termination and Complexity Competition 2017</td>
<td>Jurgen Giesl, Albert Rubio, Johannes Waldmann and Akihisa Yamada</td>
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<tr>
<td>17:20</td>
<td></td>
<td>FSCD General Meeting</td>
<td>FSCD General Meeting</td>
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## FSCD – Day 4

### 09:10 – 10:00  **Session 15**

**09:10**  Type systems for the relational verification of higher order programs  
*Marco Gaboardi*

### 10:30 – 11:59  **Session 16**

**10:30**  Arrays and References in Resource Aware ML  
*B. Lichtman and J. Hoffmann*

**11:00**  The Complexity of Principal Inhabitation  
*A. Dudenhefner and J. Rehof*

**11:30**  Types as Resources for Classical Natural Deduction  
*D. Kesner and P. Vial*
# Haskell Symposium – Day 1

## Day 1, Session 1

**09:10 – 10:00**

**Ornaments: exploiting parametricity for safer, more automated code refactoring and code reuse (Invited Talk)**

*Didier Rémy*

## Day 1, Session 2

**10:30 – 11:30**

**Algebraic Graphs with Class (Functional Pearl)**

*Andrey Mokhov*

**Packrats Parse in Packs**

*Mario Blažević and Jacques Légaré*

## Day 1, Session 3

**12:00 – 12:30**

**Ode on a Random Urn (Functional Pearl)**

*Leonidas Lampropoulos, Antal Spector-Zabusky and Kenneth Foner*

## Day 1, Session 4

**14:00 – 15:00**

**QuickSpec: A Lightweight Theory Exploration Tool for Programmers (System Demonstration)**

*Maximilian Algehed, Koen Claessen, Moa Johansson and Nicholas Smallbone*

**Speculate: Discovering Conditional Equations and Inequalities about Black-Box Functions by Reasoning from Test Results**

*Rudy Braquehais and Colin Runciman*

## Day 1, Session 5

**15:30 – 16:30**

**Using Coq to Write Fast and Correct Haskell**

*John Wiegley and Benjamin Delaware*

**A Tale of Two Provers: Verifying Monoidal String Matching in Liquid Haskell and Coq**

*Niki Vazou, Leonidas Lampropoulos and Jeff Polakow*

## Day 1, Session 6

**16:50 – 17:50**

**A Meta-EDSL for Distributed Web Applications**

*Anton Ekblad*

**Composable Network Stacks and Remote Monads**

*Justin Dawson, Mark Grebe and Andy Gill*
ML Family Workshop

09:00 – 09:05  Welcome
09:00  Welcome

09:10 – 10:00  Invited talk
09:10  State machines all the way down
  Edwin Brady

10:30 – 11:45  Types and modules
10:30  Mergeable types
  Gowtham Kaki, KC Sivaramakrishnan, Samodya Abeyririwardane and Suresh Jagannathan
10:55  Tierless modules
  Gabriel Radanne and Jérôme Vuillon
11:20  First-class subtypes
  Jeremy Yallop and Stephen Dolan

12:00 – 12:25  Verification
12:00  VOCAL – a verified OCaml Library
  Arthur Charguéraud, Jean-Christophe Filliatre, Mário Pereira and François Pottier

14:00 – 15:15  Programming language design
14:00  Typer: an infix statically typed Lisp
  Pierre Delaunay, Vincent Archambault-Bouffard and Stefan Monnier
14:25  Relational conversion for OCaml
  Petr Lozov and Dmitri Boulytchev
14:50  Towards abductive functional programming
  Koko Muroya

15:30 – 16:20  Performance
15:30  Making SML# a general-purpose high-performance language
  Atsushi Ohori, Kenjiro Taura and Katsuhiko Ueno
15:55  Efficient representation of large, dynamic sequences in ML
  Arthur Charguéraud and Mike Rainey

16:50 – 17:40  Effects
16:50  Effects without monads: non-determinism
  Oleg Kiselyov
17:15  Effectively tackling the awkward squad
  Stephen Dolan, Spiros Eliopoulos, Daniel Hillerström, Anil Madhavapeddy, KC Sivaramakrishnan and Leo White
# Workshop on Functional High-Performance Computing

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<td>09:00 – 09:10</td>
<td>Welcome to FHPC’17</td>
<td>Phil Trinder and Cosmin Oancea</td>
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<td>09:10 – 10:10</td>
<td>First Keynote</td>
<td>Simon Marlow</td>
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<td>10:30 – 11:30</td>
<td>Compilation</td>
<td>Geoffrey Mainland and Siddhanathan Shanmugam, Amir Shaikhha, Andrew Fitzgibbon, Simon Peyton Jones and Dimitrios Vytiniotis</td>
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<td>12:00 – 12:30</td>
<td>Tools</td>
<td>Maximilian Algehed and Patrik Jansson</td>
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<td>14:00 – 15:00</td>
<td>Parallel Programming</td>
<td>Adam Barwell and Kevin Hammond, Rasmus Wriedt Larsen and Troels Henriksen</td>
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<td>15:30 – 16:30</td>
<td>Demo Session</td>
<td>Troels Henriksen, Christopher Brown, Siddhanathan Shanmugam and Geoffrey Mainland</td>
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<td>16:50 – 17:50</td>
<td>Demo and Panel</td>
<td>Siddhanathan Shanmugam and Geoffrey Mainland, Panel Discussion</td>
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### CUFP Tutorials – Day 1

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<td><strong>CUFP Tutorials C1</strong></td>
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<td>09:10–10:00</td>
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<td>10:30–11:30</td>
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<td>12:00–12:30</td>
<td>Tutorial C1: Online Applications with Incremental</td>
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<td><em>Yaron Minsky and Sebastian Funk</em></td>
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<td>09:10 – 12:30</td>
<td><strong>CUFP Tutorials C2</strong></td>
<td>L6</td>
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<td>10:30–11:30</td>
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<td>12:00–12:30</td>
<td>Tutorial C2: Extensible Effects: understanding them, implementing them, using them</td>
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<td><em>Oleg Kiselyov</em></td>
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<td>14:00 – 17:30</td>
<td><strong>CUFP Tutorials C3</strong></td>
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<td>15:30–16:20</td>
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<td>16:50–17:30</td>
<td>Tutorial C3: Concurrent Programming with Effect Handlers</td>
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<td><em>Daniel Hillerström and KC Sivaramakrishnan</em></td>
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<td>14:00 – 17:30</td>
<td><strong>CUFP Tutorials C4</strong></td>
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<td>14:00–15:00</td>
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<td>15:30–16:20</td>
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<td>16:50–17:30</td>
<td>Tutorial C4: Git under the hood with OCaml</td>
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<td><em>Romain Calascibetta</em></td>
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Haskell Symposium – Day 2

09:10 – 10:00  **Day 2, Session 1**

09:10  Algorithmic Music in Haskell (Invited Talk)

  *Donya Quick*

10:30 – 11:30  **Day 2, Session 2**

10:30  Well-Typed Music Does Not Sound Wrong (Experience Report)

  *Dmitrij Szamovancev and Michael Gale*

11:00  Back to the Future: Time Travel in FRP

  *Ivan Perez*

12:00 – 12:30  **Day 2, Session 3**

12:00  The Linearity Monad

  *Jennifer Paykin and Steve Zdancewic*

14:00 – 15:00  **Day 2, Session 4**

14:00  Elaboration on Functional Dependencies

  *Georgios Karachalias and Tom Schrijvers*

14:30  Quantified Class Constraints

  *Gert-Jan Bottu, Georgios Karachalias, Tom Schrijvers, Bruno C. d. S. Oliveira and Philip Wadler*

15:30 – 16:30  **Day 2, Session 5**

15:30  Hardware Software Co-Design in Haskell

  *Markus Aronsson and Mary Sheeran*

16:00  Streaming Irregular Arrays

  *Robert Clifton-Everest, Trevor L. McDonell, Manuel Chakravarty and Gabriele Keller*

16:50 – 17:50  **Day 2, Session 6**

16:50  Improving STM Performance with Transactional Structs

  *Ryan Yates and Michael Scott*


  *Chao-Hong Chen, Vikraman Choudhury and Ryan R. Newton*
# OCaml Users and Developers Workshop

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<td>09:00 – 10:05</td>
<td>Talk session 1</td>
<td>Opening</td>
<td>Gabriel Scherer</td>
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<tr>
<td>09:00</td>
<td></td>
<td>Invited talk: new contributors</td>
<td>David Allsopp, Florian Angeletti and Sébastien Hinderer</td>
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<tr>
<td>09:40</td>
<td></td>
<td>The State of the OCaml Platform: September 2017</td>
<td>Anil Madhavapeddy</td>
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<tr>
<td>10:30 – 11:30</td>
<td>Talk session 2</td>
<td>Owl: A General-Purpose Numerical Library in OCaml</td>
<td>Liang Wang</td>
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<td>10:50</td>
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<td>Extending OCaml’s open</td>
<td>Runhang Li and Jeremy Yallop</td>
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<td>11:10</td>
<td></td>
<td>Genspio: Generating Shell Phrases In OCaml</td>
<td>Sébastien Mondet</td>
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<td>11:35 – 12:30</td>
<td>Poster session</td>
<td>mSAT: An OCaml SAT Solver</td>
<td>Bury Guillaume</td>
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<td>Jbuilder: a modern approach to OCaml development</td>
<td>Jeremie Dimino, Mark Shinwell</td>
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<td>Tyre – Typed Regular Expressions</td>
<td>Gabriel Radanne</td>
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<td>ocaml: Interpreted OCaml</td>
<td>John Whittington</td>
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<td>14:00 – 15:00</td>
<td>Talk session 3</td>
<td>ROTOR: First Steps Towards a Refactoring Tool for OCaml</td>
<td>Reuben N. S. Rowe and Simon Thompson</td>
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<td>14:20</td>
<td></td>
<td>A memory model for multicore OCaml</td>
<td>Stephen Dolan and KC Sivaramakrishnan</td>
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<td>14:40</td>
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<td>Bioinformatics, The Typed Tagless Final Way</td>
<td>Sébastien Mondet</td>
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<tr>
<td>15:30 – 16:30</td>
<td>Talk session 4</td>
<td>A B-tree library for OCaml</td>
<td>Tom Ridge</td>
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<td>15:50</td>
<td></td>
<td>Wodan: a pure OCaml, flash-aware filesystem library</td>
<td>Gabriel de Perthuis</td>
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<td>16:10</td>
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<td>Tezos: the OCaml Crypto-Ledger</td>
<td>Benjamin Canou et al.</td>
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<tr>
<td>17:00 – 17:40</td>
<td>Talk session 5</td>
<td>Component-based Program Synthesis in OCaml</td>
<td>Zhanpeng Liang and Kanae Tsushima</td>
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<td>17:20</td>
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<td>Testing with Crowbar</td>
<td>Stephen Dolan and Mindy Preston</td>
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# Erlang Workshop

<table>
<thead>
<tr>
<th>Time</th>
<th>Session/Activity</th>
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<tbody>
<tr>
<td>09:00 – 09:10</td>
<td><strong>Opening &amp; Welcome</strong></td>
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<tr>
<td>09:00</td>
<td>Opening &amp; Welcome</td>
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<tr>
<td>09:10 – 10:00</td>
<td><strong>Keynote Invited Talk</strong></td>
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<td>09:10</td>
<td>Keynote</td>
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<td><em>Martin Sumner</em></td>
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<td>10:30 – 11:20</td>
<td><strong>Session 2</strong></td>
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<tr>
<td>10:30</td>
<td>Construction and Formal Verification of a Fault-Tolerant Distributed Mutual Exclusion Algorithm</td>
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<td><em>Evgeniy Shishikin</em></td>
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<td>10:55</td>
<td>Towards an Isabelle/HOL Formalisation of Core Erlang</td>
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<td><em>Joseph Harrison</em></td>
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<td>12:00 – 12:25</td>
<td><strong>Session 3</strong></td>
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<td>12:00</td>
<td>In medias res: WIP discussion</td>
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<td>14:00 – 14:50</td>
<td><strong>Session 4</strong></td>
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<tr>
<td>14:00</td>
<td>Distributed Memory Architecture for High-Level Synthesis of Embedded Controllers from Erlang</td>
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<td><em>Kagumi Azuma, Nagisa Ishiura, Nobuaki Yoshida and Hiroyuki Kanbara</em></td>
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<td>14:25</td>
<td>Structuring Erlang BEAM control flow</td>
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<td><em>Dániel Lukács and Melinda Tóth</em></td>
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<td>15:30 – 16:20</td>
<td><strong>Session 5</strong></td>
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<tr>
<td>15:30</td>
<td>The Shared-Memory Interferences of Erlang/OTP Built-ins</td>
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<td><em>Stavros Aronis and Kostis Sagonas</em></td>
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<td>15:55</td>
<td>Towards Change-driven Testing</td>
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<td><em>Viktória Fördős, István Bozó and Melinda Tóth</em></td>
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<td>16:50 – 17:50</td>
<td><strong>Session 6</strong></td>
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<td>16:50</td>
<td>eAOP – An Aspect Oriented Programming Framework for Erlang</td>
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<td><em>Ian Cassar, Adrian Francalanza, Luca Aceto and Anna Ingolfsdottir</em></td>
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<tr>
<td>17:20</td>
<td>Erlang and Elixir development news (not yet confirmed)</td>
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</tbody>
</table>
CUFP Tutorials – Day 2

09:10 – 12:30  **CUFP Tutorials C5**  L5
09:10–10:00
10:30–11:30
12:00–12:30  Tutorial C5: Teaching Functional Programming
  *Michael Sperber*

09:10 – 12:20  **CUFP Tutorials C6**  L4
09:10–10:00
10:30–11:30
12:00–12:20  Tutorial C6: Transducers in Practice
  *Renzo Borgatti*

14:00 – 17:30  **CUFP Tutorials C7**  L5
14:00–15:00
15:30–16:20
16:50–17:30  Tutorial C7: Owl - Data Science in OCaml
  *Liang Wang*

14:00 – 15:00  **CUFP Tutorials C8**  L4
14:00–15:00
15:30–16:20
16:50–17:30  Tutorial C8: GraphQL Servers in OCaml
  *Andreas Garnæs*
## Commercial Users of Functional Programming

### 09:10 – 10:00  **CUFP Talks 1**

- **09:10** Keynote  
  *Bodil Stokke*
- **09:35** Bonsai: a DSL for serverless firm real-time decisioning  
  *Jeremie Lasalle-Ratelle*

### 10:30 – 11:20  **CUFP Talks 2**

- **10:30** Interfacing OCaml and Rust: picking the right tool for the job  
  *Joris Giovannangeli*
- **10:55** Distributed load testing with MZBench  
  *Renat Idrisov*

### 12:00 – 12:25  **CUFP Talks 3**

- **12:00** Gens N’ Roses: Appetite for Reduction  
  *Jacob Stanley*

### 14:00 – 14:50  **CUFP Talks 4**

- **14:00** Formally Verifying a Smart-Contract Language Implementation with Isabelle  
  *Simon Meier*
- **14:25** Haskell games and apps for iOS and Android  
  *Ivan Perez*

### 15:30 – 16:20  **CUFP Talks 5**

- **15:30** Using Haskell to run a datacenter  
  *Pavlo Kerestey*
- **15:55** Functional Facades over Legacy Code  
  *Nicholas Coule and Robin Kay*

### 16:50 – 17:40  **CUFP Talks 6**

- **16:50** Building the largest payment sandbox on a tiny machine  
  *Máté Marjai*
- **17:15** Using Functional Programming to Accelerate Translational Research at Pfizer  
  *Austin Huang*
Haskell Implementors Workshop

09:10 – 10:10  **State of GHC**

09:10  Progress on GHC  
*Simon Peyton Jones*

09:30  GHC Infrastructure Update and Discussion  
*Ben Gamari*

10:00  Getting Ready for Hadrian  
*Andrey Mokhov, Zhen Zhang, Ben Gamari and Neil Mitchell*

10:30 – 11:30  **Compiling to LLVM**

10:30  Native Support for Explicit Stacks in LLVM  
*Kavon Farvardin and Simon Peyton Jones*

10:55  SimplexHC: Lowering High-Level Haskell to Imperative IR  
*Siddharth Bhat*

11:20  Lightning Talk Slot #1

12:00 – 12:25  **Constraints**

12:00  On Unsatisfiability  
*J. Garrett Morris*

14:00 – 15:00  **Working in Core**

14:00  Why GHC Core and Linear Logic Should be Best Friends  
*Carter Schonwald and Joel Burget*

14:25  Demand Analysis vs. Call Arity  
*Sebastian Graf*

14:50  Lightning Talk Slot #2

15:30 – 16:30  **Tool Support**

15:30  IDE Support in GHC  
*Alan Zimmerman*

15:55  Tracking GHC Performance  
*Mathieu Boespflug and Manuel Chakravorty*

16:20  Lightning Talk Slot #3

16:50 – 17:50  **All Broken Up**

16:50  An Experiment in Fragment-Based Code Distribution  
*Philipp Schuster*

17:15  Lightning Talk Slot #4
## Functional Art, Music, Modeling and Design

### 09:00 – 09:10 Introduction

**Welcome**  
*Michael Sperber and Jean Bresson*

### 09:10 – 10:00 Papers/Demos (Music)

- **09:10** A Categorial Grammar for Music and Its Use in Automatic Melody Generation  
  *Halley Young*
- **09:40** Demo | Representation of Musical Notation in Haskell  
  *Edward Lilley*

### 10:30 – 11:30 Demos (Music)

- **10:30** Demo | The Arpeggigon: A Functional Reactive Musical Automaton  
  *Henrik Nilsson*
- **10:50** Demo | Vivid: Sound Synthesis with Haskell and SuperCollider  
  *Tom Murphy*
- **11:10** Demo | African Polyphony and Polyrhythm  
  *Chris Ford*

### 12:00 – 12:30 Paper

**Modelling the Way Mathematics Is Actually Done**  
*Joe Corneli, Ursula Martin, Dave Murray-Rust, Alison Pease, Raymond Puzio and Gabriela Rino Nesin*

### 14:00 – 15:00 Paper/Tutorial

**FAUST Tutorial for Functional Programmers**  
*Yann Orlarey, Stéphane Letz, Dominique Fober and Romain Michon*

### 15:30 – 16:20 Papers/Demos

- **15:30** GALE: A Functional Graphic Adventure Library and Engine  
  *Ivan Perez*
- **16:00** Demo | Ait: A Concatenative Language for Creative Programming  
  *Stian Veum Møllersen*

### 16:50 – 17:40 Papers/Demos

- **16:50** Unified Media Programming: An Algebraic Approach  
  *Simon Archipoff and David Janin*
- **17:20** Demo | Octopus: A High-Level Fast 3D Animation Language  
  *Simon Archipoff and David Janin*
In memoriam


It is with great sadness that we have to report of the untimely passing of the CUFP Tutorial Co-Chair Takayuki Muranushi. We have lost an extraordinarily promising researcher and a true champion of functional programming.

Takayuki Muranushi was not trained as functional programmer: born in 1983, he entered Kyoto University in the physics and cosmology program. His PhD thesis (defended in 2013 at Kyoto University’s Institute for Theoretical Physics) was titled “Lightning in Protoplanetary Disks”. Writing code – in Fortran or, nowadays, C++ – is part of contemporary physics practice. That was not enough for Takayuki. He went one level up: he got the computer to write C++ physics code, that was faster than any code a human could write, or comprehend.

I caught a glimpse of this metaprogram, Paraiso, from Takayuki’s presentation at the 2012 Shonan meeting on code generation for high-performance computing, where I first met him. It is a Haskell program that takes a partial differential equation in familiar mathematical notation and, relying on sophisticated genetic algorithms, generates C/C++ code for a GPGPU or a multicore CPU. His aspiration, close to fulfillment, was to make Paraiso the standard for partial differential equations, as FFTW is for fast Fourier transforms. I was very impressed by the sophistication of Paraiso – and also by a rarely seen enthusiastic presentation of it. He had managed to fit 125 slides within allotted 10 minutes – in a way that I still remember them five years later.

Takayuki continued this work after graduation, at RIKEN Advanced Institute for Computational Science in the Particle Simulator Research Team. Last year he with his teammates presented a paper at the ICFP-affiliated FHPC workshop, on automatic generation of efficient code from mathematical descriptions of stencil computation. He has also co-authored several papers at the Haskell Symposium, and this year served on its Program Committee.

Takayuki not only studied functional programming: he lived it. In 2006, right after finishing his undergraduate studies, he co-founded a start-up ‘Preferred Infrastructure (PFI)’. When I visited that company once, everyone I met was eager to tell me that although ‘Preferred Infrastructure’ is the official company name, what PFI really stands for is ‘Pure Functional Inc.’ – the name given by Takayuki. He is most well-known in Japan for the Japanese edition of Miran Lipovaca’s book ‘Learn You a Haskell’, which he co-translated with his PFI colleague Hideyuki Tanaka.

He was so brilliant that he seemed not of this world. And now he isn’t. His papers, his code, his automatic (robotic) book scanner, his book continue to surprise and delight. Those of us who were fortunate to have met him shall remember, and sorely miss him.

– Oleg Kiselyov
Location Map for Social Events

- Maths Institute
- Ashmolean Museum
- Weston Library
- Old Fire Station