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# HEATHER MILLER

## Citizenship

USA

## Education

***EPFL***, *Lausanne, Switzerland* — *2009 –*
Ph.D. in Computer Science
Advisor: Martin Odersky — *2011 –*

***University of Miami***, *Coral Gables, FL* — *2006 – 2009*
BSEE in Electrical Engineering, Audio Engineering, *with honors, May 2009*

***Cooper Union for the Advancement of Science and Art***, *New York, NY* — *2004 – 2006*

## Professional Experience

**Research Intern**, ***Databricks***, *Berkeley, CA, USA* — *8/2014 – 11/2014*
Supervisor: Matei Zaharia
Integrated Scala Pickling, a framework for fast, boilerplate-free, extensible serialization focused on distributed programming (OOPSLA'13) into Spark. Developed new function-passing programming model and framework, can be thought of as a generalization of Spark/MapReduce programming model.

## Teaching Experience

**Lecturer, Co-Designer**, *Reactive Programming & Parallelism* — *2015*
EPFL Undergraduate course on parallel, distributed, and asynchronous programming (~90 students)

**Lead**, *Functional Programming Principles in Scala* — *2012 – 2014*
Popular Coursera MOOC on functional programming in Scala, with >200,000 participants to date & largest completion rate for a course its size (~19%)

- Lead teaching staff organizing a team of graduate students, managing content production, designed course exercises with cloud-hosted grading, production of lecture videos, etc
- Created extensive course analysis with interactive visualizations; led to a publication at ICSE'14

**Instructor**, *Scala as a Research Tool* — *2013*
ECOOP Tutorial

**(Lead) Teaching Assistant**, *Programming Principles* — *2011-2014*
Required EPFL Undergraduate course on functional and logic programming (~160 students)

## Research Interests

Concurrent, distributed, data-centric, and data-intensive (big data) programming, from the perspective of programming languages. I work on both theoretical ideas on and implementations for the Scala programming language which seek to make it easier to build distributed systems.

## Publications

**Spores: A Type-Based Foundation for Closures in the Age of Concurrency and Distribution** *ECOOP 2014*
Heather Miller, Philipp Haller, Martin Odersky
*European Conference on Object Oriented Programming*

**Functional Programming For All! Scaling a MOOC for Students And Professionals Alike** *ICSE 2014*
Heather Miller, Philipp Haller, Lukas Rytz, Martin Odersky
*ACM SIGSOFT International Conference on Software Engineering*

**Instant Pickles: Generating Object-Oriented Pickler Combinators for Fast and Extensible Serialization** *OOPSLA 2013*
Heather Miller, Philipp Haller, Eugene Burmako, Martin Odersky
*ACM SIGPLAN Conference on Object Oriented Programming, Systems, Languages and Applications*

**RAY: Integrating Rx and Async for Direct-Style Reactive Streams** *REM 2013*
Philipp Haller, Heather Miller
*ACM SPLASH Workshop on Reactivity, Events and Modularity*

**FlowPools: A Lock-Free Deterministic Concurrent Dataflow Abstraction** *LCPC 2012*
Aleksandar Prokopec, Heather Miller, Tobias Schlatter,
Philipp Haller, Martin Odersky
*International Workshop on Languages and Compilers for Parallel Computing*

Invited to Revised Selected Papers on the 25th International Workshop on Languages and Compilers for Parallel Computing, Lecture Notes in Computer Science, Vol. 7760, 2013

**Tools and Frameworks for Big Learning in Scala: Leveraging the Language for High Productivity and Performance** *BigLearn 2011*
Heather Miller, Philipp Haller, Martin Odersky
*NIPS Workshop on Parallel and Large-Scale Machine Learning*

**Parallelizing Machine Learning – Functionally: A Framework and Abstractions for Parallel Graph Processing** *Scala 2011*
Philipp Haller, Heather Miller
*Scala Workshop*

## Submitted/In Preparation

**Function-Passing Style: Typed, Distributed Functional Programming**
Heather Miller, Philipp Haller

**Self-Assembly: Lightweight Language Extension and Datatype Generic Programming, All-in-One!**
Heather Miller, Philipp Haller, Bruno C. d. S. Oliveira

**Improving Human-Compiler Interaction Through Customizable Type Feedback**
Hubert Plociniczak, Heather Miller, Martin Odersky

## Selected Tech Reports

**Spores, Formally**
Heather Miller, Philipp Haller
*December 2013*

**FlowPools: A Lock-Free Deterministic Concurrent Dataflow Abstraction – Proofs**
Aleksandar Prokopec, Heather Miller, Philipp Haller
*June 2012*

## Open Source

**Scala Programming Language**, *member of the Scala team* *2011 –*

- **Scala Spores** (Scala Improvement Proposal SIP-21), ***project lead***
  novel type-based abstraction for using closures safely in concurrent and distributed environments
- **Scala Pickling**, ***project lead***
  novel framework for fast, boilerplate-free, extensible serialization. Adopted by sbt, the most widely-used build tool for Scala. Popular open-source project on GitHub with >480 stars & dozens of contributors
- **Scala Futures & Promises** (Scala Improvement Proposal SIP-14), ***team member***
  unified non-blocking concurrency substrate for Scala, Akka, Play, and others
- **Scala Documentation**, ***creator, writer, lead maintainer***
  a central website for community-driven documentation for the Scala programming language and core libraries
- **Scaladoc**, ***co-maintainer***
  documentation tool for Scala's official API documentation

## Honors

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|---|---|
| US National Science Foundation Graduate Research Fellowship | *2011 – 2014* |
| EPFL Outstanding Teaching Award | *2012* |
| EPFL Outstanding Teaching Award | *2012* |
| EPFL Computer Science Fellowship | *2009 – 2010* |
| Most Outstanding Audio Engineering Student, University of Miami | *2009* |
| Most Outstanding Eta Kappa Nu Student, University of Miami | *2009* |
| Information Technology Scholarship, University of Miami | *2006 – 2009* |
| John Farina Family Scholarship, University of Miami | *2006 – 2009* |
| Eta Kappa Nu | *2008* |
| Tau Beta Pi | *2008* |
| SMART US Department of Defense Scholarship Alternate | *2007* |
| Cooper Union Full Tuition Scholarship | *2004 – 2006* |

## Selected Talks

**Function Passing Style: Typed, Distributed Functional Programming** — *Strange Loop 2014*
St. Louis, MO, USA. September 19, 2014

**Spores: A Type-Based Foundation for Closures in the Age of Concurrency and Distribution** — *ECOOP 2014*
Uppsala, Sweden. August 1, 2014

**Functional Programming For All! Scaling a MOOC for Students and Professionals Alike** — *ICSE 2014*
Hyderabad, India. June 4, 2014

**Academese to English: Scala's Type System, Dependent Types and What It Means To You** — *NEScala 2014*
New York, NY, USA. March 1, 2014

**Instant Pickles: Generating Object-Oriented Pickler Combinators for Fast and Extensible Serialization** — *OOPSLA 2013*
Indianapolis, IN, USA. October 30, 2013

**PL Abstractions for Distributed Programming: Pickle Your Spores!** — *Indiana University* ***(invited)***
Bloomington, IN, USA. October 25, 2013

**Spores: Distributable Functions in Scala** — *Strange Loop 2013*
St. Louis, MO, USA. September 19, 2013

**Open Issues in Dataflow Programming** — *LaME 2013* ***(invited)***
Montpellier, France. July 1, 2013

**Scala as a Research Tool** — *ECOOP 2013 Tutorial*
Montpellier, France. July 1, 2013

**On Pickles & Spores: Improving Scala's Support for Distributed Programming** — *ScalaDays 2013*
New York, NY, USA. June 12, 2013

**Futures & Promises in Scala 2.10** — *PhillyETE 2013* ***(invited)***
Philadelphia, PA, USA. April 2, 2013

*I am also a frequent speaker in industry, at industrial conferences, developer "meet-ups", and everything in between. Some such events include:*

f(by) (11/2014, Minsk, Belarus), SF Scala (11/2014, SF, USA), Scalapeño (9/2014, Tel Aviv, Israel), SoundCloud TechTalks (7/2014, Berlin, Germany), **Scala Days** (6/2014, Berlin, Germany), NEScala (3/2014, NYC, USA), amongst others.

## External Activities

**Hacker School**, resident — *2015*

**Scalawags Monthly Podcast**, co-host — *2014 –*

## External Service

**Committees:**

| | |
|---|---|
| ECOOP 2015 organizing committee (sponsorship) | *7/2015* |
| Curry On Prague (co-chair) | *7/2015* |
| Scala Symposium 2015 (Scala'15) (co-chair) | *6/2015* |
| POPL 2015 AEC | *10/2014* |
| Scala Workshop 2014 (Scala'14) (co-chair) | *7/2014* |
| Scala Workshop 2013 (Scala'13) (co-chair) | *7/2013* |

**External Reviewer** for: ECOOP 2013, Scala 2013

## Students Supervised[1]

**Louis Bliss**, *Incremental Picklers for Scala Pickling* — *9/2013 – 1/2014*
M.Sc. level, co-supervision with Philipp Haller

**Thaddée Yann Tyl**, *Learning Scala Style* — *2/2013 – 6/2013*
M.Sc. thesis

**Tobias Schlatter**, *FlowSeqs: Barrier-Free ParSeqs* — *9/2012 – 1/2013*
M.Sc. level, co-supervision w/ Philipp Haller & Aleksandar Prokopec

**Tobias Schlatter**, *Multi-Lane FlowPools* — *2/2012 – 6/2012*
M.Sc. level, co-supervision w/ Philipp Haller & Aleksandar Prokopec

**Pierre Grydbeck**, *Parallel Machine Learning: An Expectation Maximization Algorithm for Gaussian Mixture Models* — *2/2012 – 6/2012*
M.Sc. level, co-supervision with Philipp Haller

**Bruno Studer**, *Parallel Machine Learning: Collaborative Filtering via Alternating Least Squares* — *2/2012 – 6/2012*
B.Sc. level, co-supervision with Philipp Haller

**Stanislav Peshterliev**, *Parallel Natural Language Processing Algorithms in Scala* — *9/2011 – 1/2012*
M.Sc. level, co-supervision with Philipp Haller

**Olivier Blanvillain & Louis Bliss**, *Parallelization of a Collaborative Filtering Algorithm with Menthor* — *9/2011 – 1/2012*
B.Sc. level, co-supervision with Philipp Haller

**Florian Gysin**, *Improving Parallel Graph Processing Through the Introduction of Parallel Collections* — *9/2011 – 1/2012*
M.Sc. level, co-supervision with Philipp Haller

**Georges Discry**, *Extending the Menthor Framework for Parallel Graph Processing to Distributed Computing* — *2/2011 – 6/2011*
M.Sc. level, co-supervision with Philipp Haller

[1] At EPFL, research groups offer substantial projects for BSc./MSc. students to complete for credit. EPFL PhD students design and supervise these projects, as well as MSc. thesis projects.