Faculty of Computer, Communication, and Information Science

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## HEATHER MILLER

Citizenship

USA

Education

EPFL, Lausanne, Switzerland

Ph.D. in Computer Science

Advisor: Martin Odersky

2011 -

2006 - 2009

2009 -

University of Miami, Coral Gables, FL

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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, our 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* EPFL Undergraduate course on parallel, distributed, and asynchronous

programming (~90 students)

2015

2015

**Lecturer, Co-Designer**, *Parallel Programming & Data Analysis*Upcoming Coursera MOOC on parallel, distributed, and asynchronous programming.

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

- 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

(Lead) Teaching Assistant, Programming Principles

2011-2014

Required EPFL undergraduate course on functional & logic programming (~160 students)

Instructor, Scala as a Research Tool

2013

**ECOOP Tutorial** 

## Research Interests

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

#### **Publications**

## Distributed Programming via Safe Closure Passing Philipp Haller, Heather Miller

PLACES 2015

Programming Language Approaches to Communication and Concurrency Centric Systems

#### 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	١
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

US National Science Foundation Graduate Research Fellowship	2011 - 2014
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

St. Louis, MO, USA. September 19, 2014

Spores: A Type-Based Foundation for Closures in the Age of

ECOOP 2014

Strange Loop 2014

Concurrency and Distribution 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

NEScala 2014

and What It Means To You 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 St. Louis, MO, USA. September 19, 2013

Strange Loop 2013

Open Issues in Dataflow Programming

LaME 2013 (invited)

Montpellier, France. July 1, 2013

Montpellier, France. July 1, 2013

Scala as a Research Tool

ECOOP 2013 Tutorial

On Pickles & Spores: Improving Scala's Support for Distributed Programming

New York, NY, USA. June 12, 2013

ScalaDays 2013

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

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 Scalawags Monthly Podcast, co-host

2015

2014 -

Curry On 2015, organizer (co-chair) ECOOP 2015, organizing committee member (sponsorship) PLE 2015, program committee member DSLDI 2015, program committee member Scala Symposium 2015, organizer (co-chair) POPL 2015, artifact evaluation committee member	7/2015 7/2015 7/2015 7/2015 6/2015 1/2015 7/2014
Scala Workshop 2013, organizer (co-chair)	7/2013
Editor of proceedings for: Scala 2015, Scala 2014, Scala 2013	
Louis Bliss, Incremental Picklers for Scala Pickling M.Sc. level, co-supervision with Philipp Haller	9/2013 - 1/2014
Thaddée Yann Tyl, <i>Learning Scala Style</i> M.Sc. thesis	2/2013 - 6/2013
Tobias Schlatter, <i>FlowSeqs: Barrier-Free ParSeqs</i> M.Sc. level, co-supervision w/ Philipp Haller & Aleksandar Prokopec	9/2012 - 1/2013
Tobias Schlatter, <i>Multi-Lane FlowPools</i> M.Sc. level, co-supervision w/ Philipp Haller & Aleksandar Prokopec	2/2012 - 6/2012
Pierre Grydbeck, Parallel Machine Learning: An Expectation Maximization Algorithm for Gaussian Mixture Models M.Sc. level, co-supervision with Philipp Haller	2/2012 - 6/2012
<b>Bruno Studer</b> , <i>Parallel Machine Learning: Collaborative Filtering via Alternating Least Squares</i> B.Sc. level, co-supervision with Philipp Haller	2/2012 - 6/2012
Stanislav Peshterliev, Parallel Natural Language Processing Algorithms in Scala M.Sc. level, co-supervision with Philipp Haller	9/2011 - 1/2012
Olivier Blanvillain & Louis Bliss, Parallelization of a Collaborative Filtering Algorithm with Menthor B.Sc. level, co-supervision with Philipp Haller	9/2011 - 1/2012
	ECOOP 2015, organizing committee member (sponsorship) PLE 2015, program committee member DSLDI 2015, program committee member Scala Symposium 2015, organizer (co-chair) POPL 2015, artifact evaluation committee member Scala Workshop 2014, organizer (co-chair) Scala Workshop 2013, organizer (co-chair) Scala Workshop 2013, organizer (co-chair) External Reviewer for: ECOOP 2013, Scala 2013 Editor of proceedings for: Scala 2015, Scala 2014, Scala 2013  Louis Bliss, Incremental Picklers for Scala Pickling M.Sc. level, co-supervision with Philipp Haller Thaddée Yann Tyl, Learning Scala Style M.Sc. thesis Tobias Schlatter, FlowSeqs: Barrier-Free ParSeqs M.Sc. level, co-supervision w/ Philipp Haller & Aleksandar Prokopec Tobias Schlatter, Multi-Lane FlowPools M.Sc. level, co-supervision w/ Philipp Haller & Aleksandar Prokopec Pierre Grydbeck, Parallel Machine Learning: An Expectation Maximization Algorithm for Gaussian Mixture Models M.Sc. level, co-supervision with Philipp Haller Bruno Studer, Parallel Machine Learning: Collaborative Filtering via Alternating Least Squares B.Sc. level, co-supervision with Philipp Haller Stanislav Peshterliev, Parallel Natural Language Processing Algorithms in Scala M.Sc. level, co-supervision with Philipp Haller Olivier Blanvillain & Louis Bliss, Parallelization of a Collaborative Filtering Algorithm with Menthor

Florian Gysin, Improving Parallel Graph Processing Through

Georges Discry, Extending the Menthor Framework for Parallel

the Introduction of Parallel Collections

M.Sc. level, co-supervision with Philipp Haller

*Graph Processing to Distributed Computing* M.Sc. level, co-supervision with Philipp Haller

9/2011 - 1/2012

2/2011 - 6/2011

<sup>&</sup>lt;sup>1</sup>At EPFL, research groups offer substantial projects for B.Sc./M.Sc. students to complete for credit. EPFL PhD students design and supervise these projects, as well as M.Sc. thesis projects.

## References Martin Odersky

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## Marius Eriksen

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