Faculty of Computer, Communication, and Information Science

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HEATHER MILLER

Citizenship

USA

Education

EPFL, *Lausanne*, *Switzerland* Ph.D. in Computer Science

Ph.D. III Computer Science

Advisor: Martin Odersky

2011 -

2009 -

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* EPFL Undergraduate course on parallel, distributed, and asynchronous programming (~90 students)

2012 - 2014

2015

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%)

- 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* ECOOP Tutorial

2013

 $(\textbf{Lead}) \ \textbf{Teaching Assistant}, \textit{Programming Principles} \\$

2011-2014

Required EPFL Undergraduate course on functional and logic programming (~160 students)

OOPSLA 2013

LCPC 2012

Scala 2011

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

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

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

Philipp Haller, Heather Miller

ACM SPLASH Workshop on Reactivity, Events and Modularity

FlowPools: A Lock-Free Deterministic Concurrent Dataflow Abstraction

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
Heather Miller, Philipp Haller, Martin Odersky

Parallelizing Machine Learning – Functionally: A Framework and Abstractions for Parallel Graph Processing

NIPS Workshop on Parallel and Large-Scale Machine Learning

Philipp Haller, Heather Miller Scala Workshop

Submitted/In Preparation

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

62c3145 on 2015/01/27

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 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

ICSE 2014

Students and Professionals Alike Hyderabad, India. June 4, 2014

NEScala 2014

Academese to English: Scala's Type System, Dependent Types 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

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

Montpellier, France. July 1, 2013

ECOOP 2013 Tutorial

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

New York, NY, USA. June 12, 2013

ScalaDays 2013

New 101K, 1V1, USA. Julie 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 Scalawags Monthly Podcast, co-host	2015 2014 -
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External Service	Committees: ECOOP 2015 organizing committee (sponsorship)	7/2015
	Curry On Prague (co-chair) Scala Symposium 2015 (Scala'15) (co-chair) POPL 2015 AEC	7/2015 6/2015 10/2014
	Scala Workshop 2014 (Scala'14) (co-chair) Scala Workshop 2013 (Scala'13) (co-chair)	7/2014 7/2014 7/2013
	External Reviewer for: ECOOP 2013, Scala 2013	,, · · 3
Students Supervised ¹	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
	Bruno Studer , <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
	Florian Gysin, Improving Parallel Graph Processing Through the Introduction of Parallel Collections M.Sc. level, co-supervision with Philipp Haller	9/2011 - 1/2012
	Georges Discry, Extending the Menthor Framework for Parallel Graph Processing to Distributed Computing M.Sc. level, co-supervision with Philipp Haller	2/2011 – 6/2011

¹At 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.