

College of Computer,
and Information Science
Northeastern University
202 WWH
Boston, MA 02115
USA

Phone: +1 (646) 301-1825
Fax: +1 (617) 373-5121
heather@ccs.neu.edu
<http://heather.miller.am>

HEATHER MILLER

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.

Education

EPFL, Lausanne, Switzerland 2009 – 2015
Ph.D. in Computer Science
Advisor: Martin Odersky 2011 – 2015

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

Employment

Northeastern University, Boston, MA, USA 9/2016 –
Assistant Clinical Professor

Scala Center, EPFL, Lausanne, Switzerland 10/2015 –
Executive Director
Founded a new not-for-profit center dedicated to education, open source development, and research surrounding the Scala programming language.

Databricks, Berkeley, CA, USA 8/2014 – 11/2014
Research Intern
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

Instructor, *Programming Models for Distributed Computation* 2016
Northeastern University PhD-level course on programming models for distributed systems.

Instructor, Co-Designer, *Reactive Programming & Parallelism* 2015 & 2016
EPFL Undergraduate course on parallel, distributed, and asynchronous programming (90 – 150 students)

Instructor, Co-Designer, *Parallel Programming & Data Analysis* 2015
Upcoming Coursera MOOC on parallel, distributed, and asynchronous programming.

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

(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

Publications

Function Passing: A Model for Typed, Distributed Functional Programming SPLASH 2016
Heather Miller, Philipp Haller, Normen Müller, Joceyln Boullier
ACM SIGPLAN International Symposium on New Ideas, New Paradigms, and Reflections on Programming & Software

Distributed Programming via Safe Closure Passing PLACES 2015
Philipp Haller, Heather Miller
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
Preparation

A Programming Model and Foundation for Lineage-Based Distributed Computation
 Heather Miller, Philipp Haller, Normen Müller

Specialising Parsers for Queries
 Manohar Jonnalagedda, Jorge Vicente Cantero, Heather Miller, Martin Odersky

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

The Function Passing Model: Types, Proofs, and Semantics
 Philipp Haller, Normen Müller, Heather Miller
September 2016

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	<i>Strange Loop 2014</i>
Spores: A Type-Based Foundation for Closures in the Age of Concurrency and Distribution Uppsala, Sweden. August 1, 2014	<i>ECOOP 2014</i>
Functional Programming For All! Scaling a MOOC for Students and Professionals Alike Hyderabad, India. June 4, 2014	<i>ICSE 2014</i>
Academese to English: Scala's Type System, Dependent Types and What It Means To You New York, NY, USA. March 1, 2014	<i>NEScala 2014</i>
Instant Pickles: Generating Object-Oriented Pickler Combinators for Fast and Extensible Serialization Indianapolis, IN, USA. October 30, 2013	<i>OOPSLA 2013</i>
PL Abstractions for Distributed Programming: Pickle Your Spores! Bloomington, IN, USA. October 25, 2013	<i>Indiana University (invited)</i>

Spores: Distributable Functions in Scala
St. Louis, MO, USA. September 19, 2013

Strange Loop 2013

Open Issues in Dataflow Programming
Montpellier, France. July 1, 2013

LaME 2013 (invited)

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

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

Scalawags Monthly Podcast, co-host

2014 –

External Service

SLE 2016, PC member	11/2016
Scala 2016, PC member	11/2016
REBLS 2016, PC member	11/2016
Curry On 2016, organizer (co-chair)	7/2016
ECOOP 2016, ERC member, organizing committee member (sponsorship)	7/2016
PMLDC 2016, co-chair	7/2016
TFP 2016, PC member	6/2016
SAC 2016, PC member	4/2016
Curry On 2015, organizer (co-chair)	7/2015
ECOOP 2015, organizing committee member (sponsorship)	7/2015
PLE 2015, program committee member	7/2015
DSLDI 2015, program committee member	7/2015
Scala Symposium 2015, organizer (co-chair)	6/2015
POPL 2015, artifact evaluation committee member	1/2015
Scala Workshop 2014, organizer (co-chair)	7/2014
Scala Workshop 2013, organizer (co-chair)	7/2013

External Reviewer for: ECOOP 2013, Scala 2013

Editor of proceedings for: Scala 2015, Scala 2014, Scala 2013

Students Supervised¹

Joeyln Boullier , <i>Evaluating the Efficiency of the Function Passing Model</i>	2/2016 – 8/2016
M.Sc. thesis	
Jorge Vicente Cantero , <i>Implementing the Function Passing Model</i>	2/2016 – 6/2016
B.Sc. thesis	
Louis Bliss , <i>Incremental Picklers for Scala Pickling</i>	9/2013 – 1/2014
M.Sc. level, co-supervision with Philipp Haller	
Thaddée Yann Tyl , <i>Learning Scala Style</i>	2/2013 – 6/2013
M.Sc. thesis	
Tobias Schlatter , <i>FlowSeqs: Barrier-Free ParSeqs</i>	9/2012 – 1/2013
M.Sc. level, co-supervision w/ Philipp Haller & Aleksandar Prokopec	
Tobias Schlatter , <i>Multi-Lane FlowPools</i>	2/2012 – 6/2012
M.Sc. level, co-supervision w/ Philipp Haller & Aleksandar Prokopec	
Pierre Grydbeck , <i>Parallel Machine Learning: An Expectation Maximization Algorithm for Gaussian Mixture Models</i>	2/2012 – 6/2012
M.Sc. level, co-supervision with Philipp Haller	
Bruno Studer , <i>Parallel Machine Learning: Collaborative Filtering via Alternating Least Squares</i>	2/2012 – 6/2012
B.Sc. level, co-supervision with Philipp Haller	
Stanislav Peshterliev , <i>Parallel Natural Language Processing Algorithms in Scala</i>	9/2011 – 1/2012
M.Sc. level, co-supervision with Philipp Haller	
Olivier Blanvillain & Louis Bliss , <i>Parallelization of a Collaborative Filtering Algorithm with Menthor</i>	9/2011 – 1/2012
B.Sc. level, co-supervision with Philipp Haller	
Florian Gysin , <i>Improving Parallel Graph Processing Through the Introduction of Parallel Collections</i>	9/2011 – 1/2012
M.Sc. level, co-supervision with Philipp Haller	
Georges Discry , <i>Extending the Menthor Framework for Parallel Graph Processing to Distributed Computing</i>	2/2011 – 6/2011
M.Sc. level, co-supervision with Philipp Haller	

References

Martin Odersky
 Faculty of Computer, Communication, and Information Science
 École Polytechnique Fédérale de Lausanne
 ☎ +41 21 693 68 63
 ✉ martin.odersky@epfl.ch

¹ 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.

Philipp Haller

School of Computer Science and Communication

KTH Royal Institute of Technology

☎ +41 76 205 39 32

✉ phaller@kth.se

Matei Zaharia

Department of Electrical Engineering and Computer Science

Massachusetts Institute of Technology

☎ +1-510-610-0001

✉ matei@mit.edu

Marius Eriksen

Twitter

✉ marius@twitter.com