

# Curriculum Vitae

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**KC Sivaramakrishnan**

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## ❖ Summary

I am interested in the design and implementation of concurrent programming languages targeting scalable platforms such as many-core processors and compute clouds. My research spans programming models, compilers, static analysis, schedulers, threading systems, and memory management.

## ❖ Education

**PhD — Computer Science**

Thesis Title: **Functional Programming Abstractions for Weakly Consistent Systems**

Advisor: Suresh Jagannathan

*May 2011 – Dec 2014*

Purdue University, USA

**Master of Science — Computer Science**

*Aug 2008 – May 2011*

Purdue University, USA

**Bachelor of Engineering — Computer Science and Engineering**

*Aug 2004 – May 2008*

PSG College of Technology

Anna University, India

## ❖ Experience

**Research Fellow, Royal Commission for the Exhibition of 1851**

*Oct 2015 – present*

**Research Fellow, Darwin College, Cambridge**

*Oct 2015 – present*

**Research Associate, University of Cambridge**

*Dec 2014 – present*

Advisor: Anil Madhavapeddy

Cambridge, UK

Technical director of OCaml Labs leading the development of **Multicore OCaml** project. Applying programming languages and program verification to solve extreme-scale parallelism and distribution.

**Research Assistant, Purdue University**

Advisor: Suresh Jagannathan

*Aug 2008 – Dec 2014*

West Lafayette, IN, USA

My research focused on discovering new language abstractions and developing runtime system techniques to ease programming weakly consistent systems. To this end, I have built **MultiMLton**, a parallel and distributed extension of MLton Standard ML compiler and runtime and **Quelea**, a shallow extension of Haskell for declarative programming over eventually consistent data stores.

**Teaching Assistant, Purdue University**

Undergraduate C Programming (CS180)

Graduate Programming Languages (CS565)

West Lafayette, IN, USA

*Aug 2012 – Dec 2012*

*Aug 2011 – Dec 2011*

My tasks included designing and evaluating weekly projects, office hours for one-on-one instruction, and grading.

**Research Intern, Microsoft Research, Cambridge**

Advisors: Tim Harris, Simon Marlow, and Simon Peyton Jones

*Feb 2012 – May 2012*

Cambridge, UK

I developed a concurrency substrate for Glasgow Haskell Compiler (GHC) to allow programmers to modularly implement user-level schedulers and concurrency libraries for Haskell threads in Haskell, without having to re-engineer critical runtime system components. The concurrency substrate is built around one-shot continuations and uses transactional memory for coordination.

**Research Intern, Samsung Information Systems America (R&D)**

Advisor: Daniel Waddington

*May 2010 – Aug 2010*

San Jose, CA, USA

I was part of the core team that developed SNAPPLE programming language – a safe and concurrent extension of C++ targeted at many-core processors. The task involved designing language extensions for concurrency, compiler extensions for safety, and a runtime for executing large number of lightweight threads. SNAPPLE was implemented as a veneer on top of C++ using LLNL Rose source-to-source compiler.

#### **Intern, Advanced Numerical Research and Analysis Group**

Advisor: Sankar Chnab

Dec 2007 – Apr 2008

Hyderabad, India

As a part of the Compiler Engineering group, I ported Kaffe, an open source Java VM to an embedded microprocessor ANUPAMA and a desktop processor ABACUS. Developed a lightweight threading subsystem, and implemented a JIT backed for ABACUS.

### ❖ **Journal Publications**

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|----|---|----------|
|    | <b>Composable Scheduler Activations for Haskell</b>   | Jun 2016 |
| J4 | KC Sivaramakrishnan, Tim Harris, Simon Marlow, Simon Peyton Jones<br><i>Journal of Functional Programming (JFP)</i>   |          |
|    | <b>Representation without Taxation: A Uniform, Low-Overhead, and High-Level Interface to Eventually Consistent Key-Value Stores</b>                                       | Mar 2016 |
| J3 | KC Sivaramakrishnan, Gowtham Kaki, Suresh Jagannathan<br><i>IEEE Data Engineering Bulletin</i> , 39(1): 52–64, March 2016   |          |
|    | <b>MultiMLton: A Multicore-aware Runtime for Standard ML</b>  | Nov 2014 |
| J2 | KC Sivaramakrishnan, Lukasz Ziarek, Suresh Jagannathan<br><i>Journal of Functional Programming (JFP)</i> , 24(6): 613–674   |          |
|    | <b>Efficient Sessions</b>   | Feb 2013 |
| J1 | KC Sivaramakrishnan, Mohammad Qudeisat, Lukasz Ziarek, Karthik Nagaraj, Patrick Eugster<br><i>Science of Computer Programming (SCP)</i> , 78(2): 147–167<br>Invited paper |          |

### ❖ **Conference Publications**

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|----|---|-----------|
|    | <b>Declarative Programming over Eventually Consistent Data Stores</b>   | Jun 2015  |
| C7 | KC Sivaramakrishnan, Gowtham Kaki, Suresh Jagannathan<br><i>International Conference on Programming Language Design and Implementation (PLDI)</i>           |           |
|    | <b>Rx-CML: A Prescription for Safely Relaxing Synchrony</b>   | Jan 2014  |
| C6 | KC Sivaramakrishnan, Lukasz Ziarek, Suresh Jagannathan<br><i>Symposium on Practical Aspects of Declarative Languages (PADL)</i>                             |           |
|    | <b>A Coherent and Managed Runtime for ML on the SCC</b>   | Nov 2012  |
| C5 | KC Sivaramakrishnan, Lukasz Ziarek, Suresh Jagannathan<br><i>Many-core Architecture Research Community Symposium (MARC)</i><br>Best paper award             |           |
|    | <b>Eliminating Read Barriers through Procrastination and Cleanliness</b>  | Jun 2012  |
| C4 | KC Sivaramakrishnan, Lukasz Ziarek, Suresh Jagannathan<br><i>International Symposium on Memory Management (ISMM)</i>  |           |
|    | <b>Composable Asynchronous Events</b>   | Jun 2011  |
| C3 | Lukasz Ziarek, KC Sivaramakrishnan, Suresh Jagannathan<br><i>International Conference on Programming Language Design and Implementation (PLDI)</i>          |           |
|    | <b>Efficient Session Type Guided Distributed Interaction</b>  | June 2010 |
| C2 | KC Sivaramakrishnan, Karthik Nagaraj, Lukasz Ziarek, Patrick Eugster<br><i>International Conference on Coordination Models and Languages (COORDINATION)</i> |           |
|    | <b>Partial Memoization of Concurrency and Communication</b>   | Sep 2009  |
| C1 | Lukasz Ziarek, KC Sivaramakrishnan, Suresh Jagannathan<br><i>International Conference on Functional Programming (ICFP)</i>                                  |           |

## ❖ Workshop Publications

W8	<a href="#">Lock-free programming for the masses</a> KC Sivaramakrishnan, Tho Laurent <i>OCaml Workshop</i>	Sep 2016
W7	<a href="#">Compiling Links Effect Handlers to the OCaml Backend</a> Daniel Hillestrm, Sam Lindley, KC Sivaramakrishnan <i>ML Workshop</i>	Sep 2016
W6	<a href="#">Eff Directly in OCaml</a> Oleg Kiselyov and KC Sivaramakrishnan <i>ML Workshop</i>	Sep 2016
W5	<a href="#">Effective Concurrency with Algebraic Effects</a> Stephen Dolan, Leo White, KC Sivaramakrishnan, Jeremy Yallop and Anil Madhavapeddy <i>OCaml Workshop</i>	Sep 2015
W4	<a href="#">Migrating MultiMLton to the Cloud</a> KC Sivaramakrishnan, Lukasz Ziarek, Suresh Jagannathan <i>ML Workshop</i>	Sep 2013
W3	<a href="#">Scalable Lightweight Task Management Schemes for MIMD Processors</a> Daniel G. Waddington, Chen Tian, KC Sivaramakrishnan <i>Workshop on Systems for Future Multi-Core Architectures (SFMA)</i>	Apr 2011
W2	<a href="#">The Design Rationale for MultiMLton</a> Suresh Jagannathan, Armand Navabi, KC Sivaramakrishnan, Lukasz Ziarek <i>ML Workshop</i>	Sep 2010
W1	<a href="#">Lightweight Asynchrony using Parasitic Threads</a> KC Sivaramakrishnan, Lukasz Ziarek, Raghavendra Prasad, Suresh Jagannathan <i>Workshop on Declarative Aspects of Multicore Programming (DAMP)</i>	Jan 2010

## ❖ Technical Reports and Drafts

T1	<a href="#">Featherweight Threads for Communication</a> KC Sivaramakrishnan, Lukasz Ziarek, Suresh Jagannathan <i>Purdue University Computer Science Technical Report – TR-11-018</i>	Nov 2011
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## ❖ Teaching/Advising

- Guest Lectures:
  - Arrows, Advanced Functional Programming, University of Cambridge, Lent 2015–16.
  - Debugging, Programming in C and C++, University of Cambridge, Michaelmas 2015–16.
- Supervisions at University of Cambridge:
  - Databases, Michaelmas 2016–17.
  - Concurrent and Distributed Systems, Michaelmas 2016–17.
  - Algorithms, Lent 2015–16.
  - Concurrent and Distributed Systems, Lent 2015–16.
  - Concurrent and Distributed Systems, Michaelmas 2015–16.
  - Object-oriented Programming, Michaelmas 2015–16.
- Teaching assistantships at Purdue University

- Undergraduate C Programming (CS180), Aug 2012 – Dec 2012.
- Graduate Programming Languages (CS565), Aug 2011 – Dec 2011.
- Projects supervised:
  - Matt Harrison, University of Cambridge, Secure Decentralized Apps, Sep 2016 – present.
  - Maxime Lesourd, Ens de Lyon, Verified CPS translation of handlers, Sep 2016 – present.
  - Philip Dexter, Binghamton University, Approximate computing for OCaml, May 2016 – Aug 2016.
  - James Wright, University of Cambridge, Mechanized semantics of Algebraic Effects in OCaml, Sep 2015 – Mar 2016.
  - Armael Gueneau, ENS de Lyon, Algebraic Effects for js.of.ocaml, Sep 2015 – Mar 2016.
  - Theo Laurent, ENS, Reagents for Multicore OCaml, May 2015 – Aug 2015.
  - Guillaín Potron, ENS de Lyon, Semantics of Irmin branch-consistent data store, March 2015 – Aug 2015.

## ❖ Talks

<b>Composable lock-free programming for Multicore OCaml</b> ABCD Meeting	Nov 2016 University of Edinburgh
<b>Practical Algebraic Effect Handlers in Multicore OCaml</b> LFCS Seminar	Nov 2016 University of Edinburgh
<b>Effective Concurrency and Parallelism in Multicore OCaml</b> PL Seminar	Nov 2016 Indian Institute of Technology, Madras
<b>Effective Concurrency and Parallelism in Multicore OCaml</b> PL Seminar	Nov 2016 Indian Institute of Technology, Bombay
<b>Effective parallelism with Reagents</b> Facebook Faculty Summit	Sep 2016 London, UK
<b>Multicore OCaml and Programming with Reagents</b> LDN Functionals	Aug 2016 Jane Street UK, London
<b>Effect handlers in Multicore OCaml</b> Dagstuhl Seminar	Mar 2016 Dagstuhl, Germany
<b>Arrows and Reagents</b> Invited Lecture, Advanced Functional Programming	Mar 2016 Cambridge, UK
<b>Concurrent and Multicore OCaml: A deep dive</b> Facebook Tech Talk	Jan 2016 Menlo Park, CA
<b>OCaml Platform: Update</b> OCaml Consortium Meeting	Nov 2015 Paris, France
<b>Multicore OCaml: Update</b> OCaml Developer's Meeting	Nov 2015 Paris, France
<b>Silence is Golden: Controlling Communication and Coordination in Distributed Databases</b> Darwin College Science Seminar	Oct 2015 Cambridge, UK
<b>Effective Concurrency with Algebraic Effects</b> OCaml Workshop 2015	Sep 2015 Vancouver, Canada
<b>Quelea: Declarative Programming over Eventually Consistent Data Stores</b> Computer Laboratory, University of Cambridge	Apr 2015 Cambridge, UK
<b>Functional Programming Abstractions for Weakly Consistent Systems</b> PhD Defense	Dec 2014 Purdue University
<b>Functional Abstractions for Practical and Scalable Concurrent Programming</b> Invited Lecture	Mar 2014 Microsoft Research, Cambridge, UK

<b>Rx-CML: A Prescription for Safely Relaxing Synchrony</b> PADL 2014	<i>Jan 2014</i> San Diego, CA
<b>Migrating MultiMLton to the Cloud</b> ML Workshop 2013	<i>Sep 2013</i> Boston, MA
<b>A Coherent and Managed Runtime for ML on the SCC</b> MARC 2012	<i>Nov 2012</i> RWTH Aachen
<b>Eliminating Read Barriers through Procrastination and Cleanliness</b> ISMM 2012, Beijing Wrestling Wednesdays, Microsoft Research, Cambridge	<i>Jun 2012</i> <i>May 2012</i>
<b>Lightweight Concurrency in GHC</b> Wrestling Wednesdays	<i>May 2012</i> Microsoft Research, Cambridge
<b>Efficient Session Type guided Distributed Interaction</b> COORDINATION 2012	<i>Jun 2012</i> CWI Amsterdam

## ❖ Professional Service

- Program Committee member: Off-the-beaten track (OBT) 2017, OCaml Workshop 2016, SPLASH-MARC symposium, 2013.
- Artifact Evaluation Committee member: PLDI 2015, PPOPP/CGO 2016.
- Reviewer: TODS, JFP, POPL, ICFP, ASPLOS, TLDI, Concurrency and Computation: Practice and Experience, Software: Practice and Experience.

## ❖ Awards and Recognitions

- Research Fellowship, Royal Commission for the Exhibition of 1851, 2015–2018, £102,000.
- Research Fellowship, Darwin College, Cambridge, 2015–2018, £900.
- Maurice H. Halstead Memorial Award for outstanding research in Software Engineering, Purdue University, 2014, \$4,000.
- Best paper award at Many-core Architecture Research Symposium at RWTH-Aachen, 2012, \$1,000.
- Invited paper in Science of Computer Programming, Vol. 78, Iss. 2 (Feb 2013).
- Glasgow Haskell Compiler (GHC) Committer.
- SIGPLAN PAC travel grant for PLDI 2012 and POPL 2014, \$1,500 each.
- NSF travel grant for ICFP 2013, \$2,000.