Curriculum Vitae

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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 *May 2011 – Dec 2014*
Purdue University, USA

Thesis Title: **Functional Programming Abstractions for Weakly Consistent Systems**
Advisor: Suresh Jagannathan

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

Senior Research Associate, University of Cambridge *Nov 2017 – present*
Advisors: Alan Mycroft, Anil Madhavapeddy Cambridge, UK

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

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 – Oct 2017*

Research Assistant, Purdue University *Aug 2008 – Dec 2014*
Advisor: Suresh Jagannathan 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 West Lafayette, IN, USA
Undergraduate C Programming (CS180) *Aug 2012 – Dec 2012*
Graduate Programming Languages (CS565) *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 *Feb 2012 – May 2012*
Advisors: Tim Harris, Simon Marlow, and Simon Peyton Jones 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) *May 2010 – Aug 2010*
Advisor: Daniel Waddington 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 *Dec 2007 – Apr 2008*
Advisor: Sankar Chnab 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

Concurrent System Programming with Effect Handlers *Nov 2017*
J6 Stephen Dolan, Spiros Eliopolous, Daniel Hillerstrm, Anil Madhavapeddy, KC Sivaramakrishnan, Leo White
Post-proceedings of the Symposium on Trends in Functional Programming (TFP) (accepted)

Eff directly in OCaml *Oct 2017*
J5 Oleg, Kiselyov, KC Sivaramakrishnan
Post-proceedings of the ML Workshop (accepted)

Composable Scheduler Activations for Haskell *Jun 2016*
J4 KC Sivaramakrishnan, Tim Harris, Simon Marlow, Simon Peyton Jones
Journal of Functional Programming (JFP)

Representation without Taxation: A Uniform, Low-Overhead, and High-Level Interface to Eventually Consistent Key-Value Stores *Mar 2016*
J3 KC Sivaramakrishnan, Gowtham Kaki, Suresh Jagannathan
IEEE Data Engineering Bulletin, 39(1): 52 – 64

MultiMLton: A Multicore-aware Runtime for Standard ML *Nov 2014*
J2 KC Sivaramakrishnan, Lukasz Ziarek, Suresh Jagannathan
Journal of Functional Programming (JFP), 24(6): 613 – 674

Efficient Sessions *Feb 2013*
J1 KC Sivaramakrishnan, Mohammad Qudeisat, Lukasz Ziarek, Karthik Nagaraj, Patrick Eugster
Science of Computer Programming (SCP), 78(2): 147 – 167
Invited paper

❖ Conference Publications

Continuation Passing Style for Effect Handlers *Sep 2017*
C9 Daniel Hillerstrm, Sam Lindley, Robert Atkey, KC Sivaramakrishnan
International Conference on Formal Structures for Computation and Deduction (FSCD)

DaLi : Database as a Library *May 2017*
C8 Gowtham Kaki, KC Sivaramakrishnan, Thomas Gazagnaire, Anil Madhavapeddy, Suresh Jagannathan
The 2nd Summit on Advances in Programming Languages (SNAPL)
Oral Presentation

Declarative Programming over Eventually Consistent Data Stores *Jun 2015*
C7 KC Sivaramakrishnan, Gowtham Kaki, Suresh Jagannathan
International Conference on Programming Language Design and Implementation (PLDI)

Rx-CML: A Prescription for Safely Relaxing Synchrony *Jan 2014*
C6 KC Sivaramakrishnan, Lukasz Ziarek, Suresh Jagannathan
Symposium on Practical Aspects of Declarative Languages (PADL)

C5 **A Coherent and Managed Runtime for ML on the SCC** *Nov 2012*
KC Sivaramakrishnan, Lukasz Ziarek, Suresh Jagannathan
Many-core Architecture Research Community Symposium (MARC)
Best paper award

C4 **Eliminating Read Barriers through Procrastination and Cleanliness** *Jun 2012*
KC Sivaramakrishnan, Lukasz Ziarek, Suresh Jagannathan
International Symposium on Memory Management (ISMM)

C3 **Composable Asynchronous Events** *Jun 2011*
Lukasz Ziarek, KC Sivaramakrishnan, Suresh Jagannathan
International Conference on Programming Language Design and Implementation (PLDI)

C2 **Efficient Session Type Guided Distributed Interaction** *June 2010*
KC Sivaramakrishnan, Karthik Nagaraj, Lukasz Ziarek, Patrick Eugster
International Conference on Coordination Models and Languages (COORDINATION)

C1 **Partial Memoization of Concurrency and Communication** *Sep 2009*
Lukasz Ziarek, KC Sivaramakrishnan, Suresh Jagannathan
International Conference on Functional Programming (ICFP)

❖ Workshop Publications

W13 **A Memory Model for Multicore OCaml** *Sep 2017*
Stephen Dolan and KC Sivaramakrishnan
OCaml Workshop

W12 **Effectively Tackling the Awkward Squad** *Sep 2017*
Stephen Dolan, Spiros Eliopolous, Daniel Hillerstrm, Anil Madhavapeddy, KC Sivaramakrishnan, Leo White
OCaml Workshop

W11 **Mergeable Types** *Sep 2017*
Gowtham Kaki, KC Sivaramakrishnan, Samodya Abeysiriwardane, Suresh Jagannathan
ML Workshop

W10 **Concurrent System Programming with Effect Handlers** *Jun 2017*
Stephen Dolan, Spiros Eliopolous, Daniel Hillerstrm, Anil Madhavapeddy, KC Sivaramakrishnan, Leo White
Symposium on Trends in Functional Programming (TFP)

W9 **Eff directly in OCaml** *Mar 2017*
Oleg Kiselyov and KC Sivaramakrishnan
JSSST Workshop on Programming and Programming Languages

W8 **Lock-free programming for the masses** *Sep 2016*
KC Sivaramakrishnan, Tho Laurent
OCaml Workshop

W7 **Compiling Links Effect Handlers to the OCaml Backend** *Sep 2016*
Daniel Hillestrm, Sam Lindley, KC Sivaramakrishnan
ML Worshop

W6 **Eff Directly in OCaml** *Sep 2016*
Oleg Kiselyov and KC Sivaramakrishnan
ML Workshop

W5 **Effective Concurrency with Algebraic Effects** *Sep 2015*
Stephen Dolan, Leo White, KC Sivaramakrishnan, Jeremy Yallop and Anil Madhavapeddy
OCaml Workshop

Migrating MultiMLton to the Cloud *Sep 2013*
W4 KC Sivaramakrishnan, Lukasz Ziarek, Suresh Jagannathan
ML Workshop

Scalable Lightweight Task Management Schemes for MIMD Processors *Apr 2011*
W3 Daniel G. Waddington, Chen Tian, KC Sivaramakrishnan
Workshop on Systems for Future Multi-Core Architectures (SFMA)

The Design Rationale for MultiMLton *Sep 2010*
W2 Suresh Jagannathan, Armand Navabi, KC Sivaramakrishnan, Lukasz Ziarek
ML Workshop

Lightweight Asynchrony using Parasitic Threads *Jan 2010*
W1 KC Sivaramakrishnan, Lukasz Ziarek, Raghavendra Prasad, Suresh Jagannathan
Workshop on Declarative Aspects of Multicore Programming (DAMP)

❖ Technical Reports and Drafts

Featherweight Threads for Communication *Nov 2011*
T1 KC Sivaramakrishnan, Lukasz Ziarek, Suresh Jagannathan
Purdue University Computer Science Technical Report – TR-11-018

❖ Teaching/Advising

- Guest Lectures:
  - Arrows, Advanced Functional Programming, University of Cambridge, Lent '16.
  - Debugging, Programming in C and C++, University of Cambridge, Michelmas '15.
- Supervisions at University of Cambridge:
  - Databases, Lent '17, Michaelmas '17, Lent '16.
  - Concurrent and Distributed Systems, Lent '17, Michaelmas '17, Lent '16, Michaelmas '16, Lent '15.
  - Algorithms, Lent '15.
  - 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:
  - Matevz Polijanc, University of Cambridge, A Reactive Programming model in OCaml, Oct 2017 – Present.
  - Charlie Crisp, University of Cambridge, A Blockchain in Pure OCaml, Oct 2017 – Present.
  - Henry Mercer, University of Cambridge, Systematic Concurrency Testing for Multicore OCaml, Oct 2017 – Present.
  - Nicolas Assouad, ENS Paris, Hardware Support for Composable Lock-free Transactions, Mar 2017 – Jun 2017.
  - Matt Harrison, University of Cambridge, Secure Decentralized Apps, Sep 2016 – present.
  - Maxime Lesourd, ENS de Lyon, Verified CPS translation of handlers, Sep 2016 – Mar 2017.
  - Philip Dexter, Binghampton 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.
  - Guillain Potron, ENS de Lyon, Semantics of Irmin branch-consistent data store, March 2015 – Aug 2015.

❖ Talks

A deep dive into Multicore OCaml Garbage Collector — *Jul 2017*
System Research Group Seminar — Computer Laboratory, University of Cambridge

Multicore OCaml GC — *Jun 2017*
JaneStreet Group — New York, NYC

Composable lock-free programming for Multicore OCaml — *Nov 2016*
ABCD Meeting — University of Edinburgh

Practical Algebraic Effect Handlers in Multicore OCaml — *Nov 2016*
LFCS Seminar — University of Edinburgh

Effective Concurrency and Parallelism in Multicore OCaml — *Nov 2016*
PL Seminar — Indian Institute of Technology, Madras

Effective Concurrency and Parallelism in Multicore OCaml — *Nov 2016*
PL Seminar — Indian Institute of Technology, Bombay

Effective parallelism with Reagents — *Sep 2016*
Facebook Faculty Summit — London, UK

Multicore OCaml and Programming with Reagents — *Aug 2016*
LDN Functionals — Jane Street UK, London

Effect handlers in Multicore OCaml — *Mar 2016*
Dagstuhl Seminar — Dagstuhl, Germany

Arrows and Reagents — *Mar 2016*
Invited Lecture, Advanced Functional Programming — Cambridge, UK

Concurrent and Multicore OCaml: A deep dive — *Jan 2016*
Facebook Tech Talk — Menlo Park, CA

OCaml Platform: Update — *Nov 2015*
OCaml Consortium Meeting — Paris, France

Multicore OCaml: Update — *Nov 2015*
OCaml Developer's Meeting — Paris, France

Silence is Golden: Controlling Communication and Coordination in Distributed Databases — *Oct 2015*
Darwin College Science Seminar — Cambridge, UK

Effective Concurrency with Algebraic Effects — *Sep 2015*
OCaml Workshop 2015 — Vancouver, Canada

Quelea: Declarative Programming over Eventually Consistent Data Stores — *Apr 2015*
Computer Laboratory, University of Cambridge — Cambridge, UK

Functional Programming Abstractions for Weakly Consistent Systems — *Dec 2014*
PhD Defense — Purdue University

Functional Abstractions for Practical and Scalable Concurrent Programming — *Mar 2014*
Invited Lecture — Microsoft Research, Cambridge, UK

Rx-CML: A Prescription for Safely Relaxing Synchrony — *Jan 2014*
PADL 2014 — San Diego, CA

Migrating MultiMLton to the Cloud — *Sep 2013*
ML Workshop 2013 — Boston, MA

A Coherent and Managed Runtime for ML on the SCC — *Nov 2012*
MARC 2012 — RWTH Aachen

Eliminating Read Barriers through Procrastination and Cleanliness
ISMM 2012, Beijing — *Jun 2012*
Wrestling Wednesdays, Microsoft Research, Cambridge — *May 2012*

Lightweight Concurrency in GHC — *May 2012*
Wrestling Wednesdays — Microsoft Research, Cambridge

Efficient Session Type guided Distributed Interaction — *Jun 2012*
COORDINATION 2012 — CWI Amsterdam

❖ Service

- Organizer, Dagstuhl Seminar on "Algebraic Effect Handlers go Mainstream", Apr 2018.
- Program Committee member: PMLDC@ECOOP 2017, Off-the-beaten track (OBT) 2017, OCaml Workshop 2016, SPLASH-MARC symposium, 2013.
- Artifact Evaluation Committee member: PLDI 2015, PPoPP/CGO 2016.
- Reviewer: ECOOP, TODS, JFP, POPL, ICFP, ASPLOS, TLDI, Concurrency and Computation: Practice and Experience, Software: Practice and Experience.
- Organizer for Darwin College Science Seminar Series, Oct 2015 – May 2017.

❖ 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.

❖ References

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