JONATHAN BALKIND

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I am a PhD Candidate focusing on the overlap between Computer Architecture, Programming Languages, and Operating Systems. I aim to pursue pragmatic research that requires building real systems which touch on all three areas, like the 25-core Piton chip our research group built to test our research ideas in silicon. I have a keen interest in pedagogical and research outreach, as shown by my leadership of OpenPiton, our open source research framework which is being actively used for research and education around the globe.

EDUCATION

Princeton University, USA *September 2013 - Present*
PhD Candidate, Department of Computer Science
Advised by Professor David Wentzlaff

University of Glasgow, UK *2008 - 2013*
Master in Science in Computing Science *with Honours of the First Class*

University of California, Santa Barbara, USA *2009 - 2010*
Computer Science Exchange Student

HONOURS AND AWARDS

First Prize - Graduate *ACM Student Research Competition, ASPLOS 2019* *April 2019*

Class of 2018 Siebel Scholarship *Siebel Scholars Foundation* *September 2017*

Gordon Y.S. Wu Fellowship in Engineering *Princeton University* *2013 - 2017*

Fan Favourite Research Talk *Princeton Research Day* *May 2016*

Mentor Award *Princeton Graduate Student Appreciation Week* *April 2016*

25 Under 25 Award *Princeton Innovation* *February 2016*

LabMatch/ReMatch Mentor Award *Princeton University* *July 2015*

Contribution to the School Award *University of Glasgow* *June 2013*

ARM Sponsorship *ARM Ltd* *November 2012*

Amor Class Prize *University of Glasgow* *June 2012*

Dean's Honors *University of California, Santa Barbara* *2009-2010*

PUBLICATIONS

Refereed Conference Publications

Jonathan Balkind, Katie Lim, Fei Gao, Michael Schaffner, Grigory Chirkov, Ang Li, Alexey Lavrov, Tri Nguyen, Yaosheng Fu, Florian Zaruba, Kunal Gulati, Luca Benini, David Wentzlaff
"BYOC: A "Bring Your Own Core" Framework for Heterogeneous-ISA Research", Architectural Support for Programming Languages and Operating Systems (ASPLOS), March 2020 (to appear).

Mohammad Shahrad, **Jonathan Balkind**, David Wentzlaff
"Architectural Implications of Function-as-a-Service Computing", 47th International Symposium on Microarchitecture (**MICRO**), October 2019.

Katie Lim, **Jonathan Balkind**, and David Wentzlaff
"JuxtaPiton: Enabling Heterogeneous-ISA Research with RISC-V and SPARC FPGA Soft-cores", International Symposium on Field-Programmable Gate Arrays (**FPGA**), February 2019. **poster paper**

Michael McKeown, Alexey Lavrov, Mohammad Shahrad, Paul Jackson, Yaosheng Fu, **Jonathan Balkind**, Tri Nguyen, Katie Lim, Yanqi Zhou, and David Wentzlaff
"Power and Energy Characterization of an Open Source 25-core Manycore Processor", 24th International Symposium on High-Performance Computer Architecture (**HPCA**), February 2018.

Matthew Parkinson, Dimitrios Vytiniotis, Kapil Vaswani, Manuel Costa, Pantazis Deligiannis, Dylan McDermott, Aaron Blankstein, **Jonathan Balkind**
"Project Snowflake: Non-blocking Safe Manual Memory Management for .NET", Object-oriented Programming, Systems, Languages, and Applications (**OOPSLA**), October 2017.

Michael McKeown, Yaosheng Fu, Tri Nguyen, Yanqi Zhou, **Jonathan Balkind**, Alexey Lavrov, Mohammad Shahrad, Samuel Payne, and David Wentzlaff
"Piton: A 25-core Academic Manycore Processor", Hot Chips: A Symposium on High Performance Chips (**HotChips** 28), August 2016

Jonathan Balkind, Michael McKeown, Yaosheng Fu, Tri Nguyen, Yanqi Zhou, Alexey Lavrov, Mohammad Shahrad, Adi Fuchs, Samuel Payne, Xiaohua Liang, Matthew Matl, David Wentzlaff
"OpenPiton: An Open Source Manycore Research Framework", Architectural Support for Programming Languages and Operating Systems (**ASPLOS**), April 2016. **Best paper nominee**

Michael McKeown, **Jonathan Balkind**, and David Wentzlaff
"Execution Drafting: Energy Efficiency Through Computation Deduplication", 47th International Symposium on Microarchitecture (**MICRO**), December 2014.

Invited Articles

Jonathan Balkind, Michael McKeown, Yaosheng Fu, Tri Nguyen, Yanqi Zhou, Alexey Lavrov, Mohammad Shahrad, Adi Fuchs, Samuel Payne, Xiaohua Liang, Matthew Matl, David Wentzlaff
"OpenPiton: An Open Source Hardware Platform For Your Research", Research Highlight - Communications of the ACM (**CACM**), 2019 (to appear).

Michael McKeown, Yaosheng Fu, Tri Nguyen, Yanqi Zhou, **Jonathan Balkind**, Alexey Lavrov, Mohammad Shahrad, Samuel Payne, and David Wentzlaff
"Piton: A Manycore Processor for Multitenant Clouds", **IEEE Micro**, March 2017.

Refereed Workshop Publications

Jonathan Balkind and Michael Schaffner, Katie Lim, Florian Zaruba, Fei Gao, Jinzheng Tu, David Wentzlaff, Luca Benini
"OpenPiton+Ariane: The First Open-Source, SMP Linux-booting RISC-V System Scaling From One to Many Cores", Workshop on Computer Architecture Research with RISC-V (**CARRV**), June 2019.

Jonathan Balkind, Alexey Lavrov, Michael McKeown, Yaosheng Fu, Tri Nguyen, Mohammad Shahrad, Ang Li, Katie Lim, Yanqi Zhou, Ting-Jung Chang, Paul Jackson, Adi Fuchs, Samuel Payne, Xiaohua Liang, Matthew Matl and David Wentzlaff
"OpenPiton: An Emerging Standard for Open-Source EDA Tool Development", First Workshop on Open-Source EDA Technology (**WOSET**), November 2018.

David Wentzlaff, Michael McKeown, Yaosheng Fu, Tri Nguyen, Yanqi Zhou, **Jonathan Balkind**, Alexey Lavrov, Mohammad Shahrad, and Samuel Payne
"Designing a Complex 25-core Academic Processor", 6th Workshop on Architectural Research Prototyping (**WARP**), June 2015.

EXPERIENCE

Office of Undergraduate Research *University Administrative Fellow* *Autumn 2016*
· Supported the ReMatch undergraduate summer research program which I helped to found in 2015

Microsoft Research, Cambridge, UK *Research Intern* *Summer 2016*

· Worked on runtime support for safe manual memory management for C# (*published in OOPSLA 2017*)

University of Glasgow, UK *Vacation Scholar (Intern)* *Summer 2013*

· Developed an expert search system for a Scottish Government body

ARM Ltd, Cambridge, UK *Summer Placement (Intern)* *Summer 2012*

· Wrote a programmable controller for on-the-fly memory testing in safety-critical systems

University of Glasgow, UK *Vacation Scholar (Intern)* *Summer 2012*

· Implemented a machine learning system to classify network traffic in real-time

Samsung Electronics, South Korea *Assistant Engineer (Intern)* *Summer 2011*

· Wrote a software design draft for LTE-3G call handover, tested operational LTE systems, and researched improvements to call reporting methods

Distributed Systems Lab, UCSB, USA *Research Assistant (Intern)* *Summer 2010*

· 8 week research placement working on a graph visualisation framework for models of information propagation in social networks

TEACHING EXPERIENCE

Google Summer of Code *FOSSi Foundation Mentor* *Summer 2019*

· Mentored a new graduate to make significant contributions to our open source hardware development platform

Summer Research Colloquium *Graduate Instructor* *Summer 2018*

· Taught weekly classes on the academic research process to first-time undergraduate researchers from Princeton-funded summer research programs

COS 333 Advanced Programming Techniques *Assistant in Instruction (TA)* *Spring 2017*

· Held weekly office hours, graded homeworks and final projects

· Advised seven student groups on their first large scale software projects

ReMatch/LabMatch *Graduate Mentor* *Summer 2015*

· One of two mentors competitively selected for the first LabMatch summer cohort

· Advised a summer student on a data centre measurement project and acted as a graduate mentor for another first year undergraduate

ELE475 Computer Architecture *Assistant in Instruction (TA)* *Spring 2015*

· Gave tutorials, managed all aspects of class labs, and graded coursework and exams

Coursera.org Computer Architecture *Teaching Assistant* *Autumn 2014*

· Managed course materials and exams and answered questions on discussion forum

Computing Science, University of Glasgow *Student Tutor/Demonstrator* *2011 - 2013*

· Tutored Java, C, and Operating Systems

· Gave lectures on C Programming

INVITED TALKS AND TUTORIALS

Tutorial - "OpenPiton+Ariane: The RISC-V Hardware Research Platform", ISCA/FCRC, Phoenix, Arizona. June 2019

Talk - "Enabling Research Productivity With OpenPiton", Week of Open Source Hardware, ETH Zurich, Switzerland. June 2019

Tutorial - "OpenPiton+Ariane: The RISC-V Hardware Research Platform", Week of Open Source Hardware, ETH Zurich, Switzerland. June 2019

Talk - "OpenPiton+Ariane: The First Linux-Booting Open-Source RISC-V Manycore", RISC-V Workshop, ETH Zurich, Switzerland. June 2019

Talk - "OpenPiton+Ariane: Making Ariane Multicore with OpenPiton's P-Mesh", Latch-Up, Portland, Oregon. May 2019

Summer School - "Getting to Know OpenPiton, the Open Source Manycore Research Platform", MaRIONet Manycore Summer School, University of Glasgow, UK. July 2018

Tutorial - "OpenPiton in Action - A Hands-on Tutorial with the Open Source Manycore Processor OpenPiton", ASPLOS, Williamsburg, Virginia. March 2018

Tutorial - "An Introduction to OpenPiton - A Manycore Open Source Processor", MICRO, Cambridge, Massachusetts. October 2017

Tutorial - "Making Research Happen With OpenPiton", University of California, Santa Barbara, California. September 2017

Tutorial - "An Overview of the OpenPiton Research Framework", University of Cambridge, England. July 2017

Tutorial - "An Overview of the OpenPiton Research Framework", University of Edinburgh, Scotland. July 2017

Tutorial - "Getting to Work with OpenPiton", HPCA, Austin, Texas. February 2017

Talk - "OpenPiton: A Full-Stack Open Source Manycore", ORCONF, Bologna, Italy. October 2016

Talk - "OpenPiton: A Full-Stack Open Source Manycore", Politecnico di Milano, Milan, Italy. October 2016

Tutorial - "An Introduction to OpenPiton - A Manycore Open Source Processor", ISCA, Seoul, South Korea. June 2016

Talk - "OpenPiton: An Open Source Manycore Research Framework", University of Cambridge Computer Lab, Cambridge, UK. June 2016

COMMUNITY SERVICE

Resident Graduate Student *Wilson College, Princeton University* — *2015 - Present*

President *Graduate Student Government, Princeton University* — *2017 - 2018*

Computer Science Graduate Committee *Princeton University* — *2013 - 2017*

Communications Director *Graduate Student Government, Princeton University* — *2016 - 2017*

Steering Committee Member *Princeton Research Day* — *2015 - 2016*

ReMatch Mentor and Event Organiser *Princeton University* — *2014 - 2015*

Computing Science Society President *University of Glasgow* — *2011 - 2013*

PROFESSIONAL SERVICE

External Review Committee *ISCA 2020* — *Nov 2019 - Present*