James Bornholt

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Employment

University of Texas at Austin Austin, TX, USA
Assistant Professor, Department of Computer Science 2019–

Amazon Web Services Seattle, WA, USA
Applied Scientist, Automated Reasoning Group 2019–

Amazon Web Services Seattle, WA, USA
Research Intern, Automated Reasoning Group 2018

Microsoft Research Canberra, Australia
Software Engineer, Research in Software Engineering (RiSE) group 2014

Microsoft Research Seattle, WA, USA
Research Intern, Research in Software Engineering (RiSE) group 2012–2013

Microsoft Research Seattle, WA, USA
Research Intern, Research in Software Engineering (RiSE) group 2011–2012

Education

University of Washington Seattle, WA, USA
Ph.D., Computer Science & Engineering 2019
- Advisors: Emina Torlak, Dan Grossman, Luis Ceze
- Thesis: Optimizing the Automated Programming Stack

University of Washington Seattle, WA, USA
M.S., Computer Science & Engineering 2016

Australian National University Canberra, Australia
Bachelor of Philosophy (Honours) 2013
- Advisor: Steve Blackburn
- First Class Honours and the University Medal in Computer Science

Publications

Conference Papers

Scaling Symbolic Evaluation for Automated Verification of Systems Code with Serval. Luke Nelson, James Bornholt, Ronghui Gu, Andrew Baumann, Emina Torlak, and Xi Wang. SOSP 2019.

Finding Code That Explodes Under Symbolic Evaluation. James Bornholt and Emina Torlak. OOPSLA 2018. **Distinguished Artifact Award**.

Nickel: A Framework for Design and Verification of Information Flow Control Systems. Helgi Sigurbjarnarson, Luke Nelson, Bruno Castro-Karney, James Bornholt, Emina Torlak, and Xi Wang. OSDI 2018.

Hyperkernel: Push-Button Verification of an OS Kernel. Luke Nelson, Helgi Sigurbjarnarson, Kaiyuan Zhang, Dylan Johnson, James Bornholt, Emina Torlak, and Xi Wang. SOSP 2017.

Synthesizing Memory Models from Framework Sketches and Litmus Tests. James Bornholt and Emina Torlak. PLDI 2017.

Push-Button Verification of File Systems via Crash Refinement. Helgi Sigurbjarnarson, James Bornholt, Emina Torlak, and Xi Wang. OSDI 2016. **Best Paper Award**.

Disciplined Inconsistency with Consistency Types. Brandon Holt, James Bornholt, Irene Zhang, Dan R. K. Ports, Mark Oskin, and Luis Ceze. SoCC 2016.

Specifying and Checking File System Crash-Consistency Models. James Bornholt, Antoine Kaufmann, Jialin Li, Arvind Krishnamurthy, Emina Torlak, and Xi Wang. ASPLOS 2016.

A DNA-Based Archival Storage System. James Bornholt, Randolph Lopez, Douglas M. Carmean, Luis Ceze, Georg Seelig, and Karin Strauss. ASPLOS 2016. **IEEE Micro Top Picks**.

Optimizing Synthesis with Metasketches. James Bornholt, Emina Torlak, Dan Grossman, and Luis Ceze. POPL 2016.

Hardware–Software Co-Design: Not Just a Cliché. Adrian Sampson, James Bornholt, and Luis Ceze. SNAPL 2015.

Uncertain<T>: A First-Order Type for Uncertain Data. James Bornholt, Todd Mytkowicz, and Kathryn S. McKinley. ASPLOS 2014. **SIGPLAN Research Highlight**. **IEEE Micro Top Picks**.

Journal Papers

A Taxonomy of General Purpose Approximate Computing Techniques. Thierry Moreau, Joshua San Miguel, Mark Wyse, James Bornholt, Armin Alaghi, Luis Ceze, Natalie Enright Jerger, and Adrian Sampson. IEEE Embedded Systems Letters, vol. 10, no. 1, pp. 2–5.

Toward a DNA-Based Archival Storage System. James Bornholt, Randolph Lopez, Douglas M. Carmean, Luis Ceze, Georg Seelig, and Karin Strauss. IEEE Micro, vol. 37, no. 3, pp. 98–104, May–June 2017.

Uncertain<T>: Abstractions for Uncertain Hardware and Software. James Bornholt, Todd Mytkowicz, and Kathryn S. McKinley. IEEE Micro, vol. 35, no. 3, pp. 132–143, May–June 2015.

Workshop Papers

Scaling Program Synthesis by Exploiting Existing Code. James Bornholt and Emina Torlak. ML4PL 2015 (colocated with ECOOP 2015).

Approximate Program Synthesis. James Bornholt, Emina Torlak, Luis Ceze, and Dan Grossman. WAX 2015 (colocated with PLDI 2015).

REACT: A Framework for Rapid Exploration of Approximate Computing Techniques. Mark Wyse, Andre Baixo, Thierry Moreau, Bill Zorn, James Bornholt, Adrian Sampson, Luis Ceze, and Mark Oskin. WAX 2015 (colocated with PLDI 2015).

Programming the Internet of Uncertain <T>hings. James Bornholt, Na Meng, Todd Mytkowicz, and Kathryn S. McKinley. SCAW 2015 (colocated with HPCA 2015).

There's Something About Bayes: Effective Probabilistic Programming for the Rest of Us. James Bornholt, Todd Mytkowicz, and Kathryn S. McKinley. APPROX 2014 (colocated with PLDI 2014).

Posters & Talks

Uncertain<T>: A First-Order Type for Uncertain Data. James Bornholt. PLDI 2013 Student Research Competition. **First Place, PLDI Student Research Competition**. **Second Place, ACM Student Research Competition Grand Final**.

The Model Is Not Enough: Understanding Energy Consumption in Mobile Devices. James Bornholt, Todd Mytkowicz, and Kathryn S. McKinley. Hot Chips 24, 2012.

Theses

Optimizing the Automated Programming Stack. James Bornholt. PhD thesis, University of Washington, 2019.

Abstractions and Techniques for Programming with Uncertain Data. James Bornholt. Honours thesis, Bachelor of Philosophy (Honours), Australian National University, 2013.

Awards

OOPSLA Distinguished Artifact Award	2018
Facebook Ph.D. Fellowship	2018–2020
IEEE Micro Top Picks from the Computer Architecture Conferences, for DNA storage	2017
OSDI Jay Lepreau Best Paper Award	2016
IEEE Micro Top Picks from the Computer Architecture Conferences, for Uncertain<T>	2015
ACM SIGPLAN Research Highlight, for Uncertain<T>	2014
David Notkin Endowed Graduate Fellowship, University of Washington	2014–2015
Second Place, ACM Student Research Competition Grand Finals (undergraduate)	2014
First Place, ACM PLDI Student Research Competition (undergraduate)	2013
ANU University Medal for Computer Science	2013

Teaching

CSE 507, Computer Aided Reasoning for Software University of Washington
Teaching Assistant Winter 2017

CSE 507, Computer Aided Reasoning for Software University of Washington
Teaching Assistant Spring 2016

Service

Review Committees

Programming Languages Design and Implementation (PLDI) — Program Committee	2020
Architectural Support for Programming Languages and Operating Systems (ASPLOS) — External Review Committee	2020
Formal Techniques for Java-Like Programs (FTfJP) — Program Committee	2019
Programming Languages Design and Implementation (PLDI) — External Review Committee	2017
Computer-Aided Verification (CAV) — Artifact Evaluation Committee	2017
Principles of Programming Languages (POPL) — Artifact Evaluation Committee	2016
Programming Languages Design and Implementation (PLDI) — Artifact Evaluation Committee	2015

External Reviewing

Architectural Support for Programming Languages and Operating Systems (ASPLOS)	2018
IEEE Transactions on Emerging Topics in Computing	2017
Computer-Aided Verification (CAV)	2015
ACM Transactions on Embedded Computing	2015
Architectural Support for Programming Languages and Operating Systems (ASPLOS)	2015

Department Service

Graduate Admissions Committee, University of Washington	2017–2019
Prospective Student Committee Co-Chair, University of Washington	2016
Prospective Student Committee, University of Washington	2015–2019

Presentations and Seminars

Optimizing the Automated Programming Stack

Australian National University, Invited Talk	Jul 2019
University of Toronto, Invited Seminar	Apr 2019
Princeton University, Invited Seminar	Apr 2019
University of British Columbia, Invited Seminar	Apr 2019
École Polytechnique Fédérale de Lausanne, Invited Seminar	Apr 2019
University of Massachusetts Amherst, Invited Seminar	Apr 2019
Northeastern University, Invited Seminar	Mar 2019
Microsoft Research, Invited Seminar	Mar 2019
Georgia Institute of Technology, Invited Seminar	Mar 2019
University of California, Berkeley, Invited Seminar	Feb 2019
Brown University, Invited Seminar	Feb 2019
Carnegie Mellon University, Invited Seminar	Feb 2019
University of Maryland, College Park, Invited Seminar	Feb 2019
University of Texas at Austin, Invited Seminar	Feb 2019
Cornell University, Invited Seminar	Jan 2019

Finding Code That Explodes Under Symbolic Evaluation

OOPSLA, Conference Talk	Nov 2018
Galois, Invited Talk	Jun 2018

Ocelot: Relational Logic in a Solver-Aided Language

Future of Alloy Workshop, Invited Talk	Apr 2018

Synthesizing Memory Models from Framework Sketches and Litmus Tests

PLDI, Conference Talk	Jun 2017

Programming with Estimates

Programming Languages Mentoring Workshop, Invited Talk	Jun 2016

Specifying and Checking File-System Crash Consistency Models

DARPA BRASS PI Meeting, Invited Talk	Jul 2016
ASPLOS, Conference Talk	Apr 2016

A DNA-Based Archival Storage System

ASPLOS, Conference Talk	Apr 2016

Optimizing Synthesis with Metasketches

POPL, Conference Talk	Jan 2016
Dagstuhl Seminar 15491 (Approximate and Probabilistic Computing), Invited Talk	Dec 2015