Lorin Hochstein

Sr. Software Engineer
Netflix
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Education

University of Maryland, College Park
Ph.D., Computer Science, August 2006

Boston University
M.S., Electrical Engineering, May 2002.

McGill University (Montreal, Canada)
B.Eng. with Great Distinction, Computer Engineering, May 1999.

Professional Experience

Sr. Software Engineer, Netflix, 2015 – present.

Lead Software Engineer – SendGrid Labs, SendGrid, 2014 – 2015.

Lead Architect - Cloud Services, Nimbis Services, 2012 – 2014.

Computer Scientist, Information Sciences Institute, 2008 – 2012.

Assistant Professor, University of Nebraska-Lincoln, 2006 – 2008.

Graduate Research Assistant, University of Maryland, 2002 – 2006.

Graduate Research Assistant, Boston University, 2001 – 2002.

Software Developer, Xiphos Technologies, Montreal, Canada, 1999 –2000.

Grants, Contracts and Awards

NSF
Software Application Discovery Initiative (SADI) Study
Award #OCI-0949403

September 2009 – February 2012
Total award: $280,961.

DOE Office of Science
Software Construction and Composition Tools for Petascale Computing
Award #DE-SC0002347
September 2009 – September 2012
Total award: $285,000.

DARPA, NASA, DOE, ARL
High Productivity Computing Systems Analysis and Performance Assessment, subcontract to University of Maryland. March 2007 – March 2008.
Award #FA87500510100, Subaward #Z800203
Total award: $47,000.

University of Nebraska-Lincoln Faculty Seed Grant
Automatic Inference of Programmer Activities. January 2007 – December 2007.
Total award: $10,000.

Books & Book Chapters

Casey Rosenthal, Lorin Hochstein, Aaron Blohowiak, Nora Jones, Ali Basiri, *Chaos Engineering: Building Confidence in System Behavior through Experiments*, O'Reilly Media, 2017.

Lorin Hochstein, *Ansible: Up and Running*, O'Reilly Media, 2015

Tom Fifeld, Diane Fleming, Anne Gentle, Lorin Hochstein, Jonathan Proulx, Everett Toews, and Joe Topjian, *OpenStack Operations Guide*, O'Reilly Media, 2014.

Lorin Hochstein, Taiga Nakamura, Forrest Shull, Nico Zazworka, Victor R. Basili1, Marvin V. Zelkowitz, "An Environment for Conducting Families of Software Engineering Experiments", Advances in Computers 74, Elsevier, 2008.

Journal Publications

Haley Tucker, Lorin Hochstein, Nora Jones, Ali Basiri and Casey Rosenthal, "The Business Case for Chaos Engineering", *IEEE Cloud Computing*, vol. 5, no. 3, pp. 45-54, May/June 2018.

Ali Basiri, Niosha Behnam, Ruud de Rooij, Lorin Hochstein, Luke Kosewski, Justin Reynolds, Casey Rosenthal, "Chaos Engineering", *IEEE Software*, Vol. 33, Issue 3, May/June 2016.

Amianghu Bosu, Jeffrey Carver, Rosanna Guadagno, Blake Bassett, Debra McCallum, and Lorin Hochstein, "Peer Impressions in Open Source Organizations: A Survey", Journal of Systems and Software (JSS), August 2014.

Jeffrey Carver, Dustin Heaton, Lorin Hochstein, and Roscoe Bartlett, "Self-Perceptions About Software Engineering: A Survey of Scientists and Engineers", *IEEE Computing in Science & Engineering*, Vol. 15, No.1, January/February 2013.

Lorin Hochstein, Brian Schott, and Robert B. Graybill, "Computational Engineering in the Cloud: Benefits and Challenges", *Journal of Organizational and End User Computing*, Vol. 23, No. 4, 2011, pages 31-50.

Lorin Hochstein, Victor R. Basili, Uzi Vishkin, and John Gilbert, "A Pilot Study to Compare Programming Effort for Two Parallel Programming Models", *Journal of Systems and Software*, Vol. 81, 2008, pages 1920-1930.

Victor R. Basili, Jeffrey Carver, Daniela Cruzes, Lorin Hochstein, Jeffrey K. Hollingsworth, Forrest Shull, and Marvin V. Zelkowitz, "Understanding the High Performance Computing Community: A Software Engineer's Perspective", *IEEE Software,* July/August 2008.

Lorin Hochstein, Victor Basili, "The ASC-Alliance projects: A Case Study of Large-Scale Parallel Scientific Code Development", *IEEE Computer*, March 2008.

Mikael Lindvall, Ioana Rus, Paolo Donzelli, Atif Memon, MarvinZelkowitz, Aysu Betin-Can, Tevfik Bultan, Chris Ackermann, Bettina Anders, Sima Asgari, Victor Basili, Jorg Fellmann, Daniel Hirschbach, Lorin Hochstein, Forrest Shull, Roseanne Tvedt, Daniel Pech, "Experimenting with Software Testbeds for Evaluating New Technologies", *Empirical Software Engineering*, Vol. 12, No. 4, August 2007, pages 417-444.

Lorin Hochstein, Taiga Nakamura, Victor R. Basili, Sima Asgari, Marvin V. Zelkowitz, Jeffrey K. Hollingsworth, Forrest Shull, Jeffrey Carver, Martin Voelp, Nico Zazworka, Philip Johnson, "Experiments to Understand HPC Time to Development", *CTWatch Quarterly*, Vol 2, No. 4A, November 2006, pages 24-32. **(Invited paper)**

Nicole Wolter, Michael O. McCracken, Allan Snavely, Lorin Hochstein, Taiga Nakamura, Victor Basili, "What's Working in HPC: Investigating HPC User Behavior and Productivity", *CTWatch Quarterly,* Vol. 2, No. 4A, November 2006, pages 9-17. **(Invited paper)**

Jeffrey Carver, Lorin Hochstein, Richard Kendall, Taiga Nakamura, Marvin Zelkowitz, Victor Basili, Douglass Post, "Observations about Software Development for High End

Computing", *CTWatch Quarterly*, Vol. 2, No. 4A, November 2006, pages 33-38. **(Invited paper)**

Andrew Funk, Victor Basili, Lorin Hochstein, Jeremy Kepner, "Analysis of Parallel Software Development using the Relative Development Time Productivity Metric", *CTWatch Quarterly*, Vol. 2, No. 4A, November 2006, pages 46-51. **(Invited paper)**
Lorin Hochstein, Mikael Lindvall. "Combating Architectural Degeneration: A Survey" *Information & Software Technology*, Vol. 47, Issue 10, July 2005, pages 643-656.

Mikael Lindvall, Ioana Rus, Forrest Shull, Marvin V. Zelkowitz, Paolo Donzelli, Atif Memon, Victor R. Basili, Patricia Costa, Roseanne Tvedt, Lorin Hochstein, Sima Asgari, Chris Ackermann, Daniel Pech. "An Evolutionary Testbed for Software Technology Evaluation." *NASA Journal of Innovations in Systems and Software Engineering*. April 2005, pages 3-11.

Refereed Conference Publications

Ali Basiri, Aaron Blohowiak, Lorin Hochstein and Casey Rosenthal, "A Platform for Automating Chaos Experiments", *27th IEEE International Symposium on Software Reliability Engineering (ISSRE '16)*, October 2016 (industry track).

Peter Alvaro, Kolton Andrus, Chris Sanden, Casey Rosenthal, Ali Basiri, Lorin Hochstein, "Automating Failure Testing Research at Internet Scale", *ACM Symposium on Cloud Computing (SOCC '16)*, October 2016.

Lorin Hochstein*, "*Chaos Engineering*", IEEE International Conference on Software Testing, Verification and Validation (ICST '16),* April 2016 (industry track).

Lorin Hochstein, Yang Jiao. "The cost of the build tax in scientific software", *5th International Symposium on Empirical Software Engineering and Measurement (ESEM '11),* September 2011 (short papers track: 17 out of 43 papers accepted: 40%).

Min Zhang, Lorin Hochstein, "Fitting a workflow model to captured development data", *3rd International Symposium on Empirical Software Engineering and Measurement (ESEM '09)*, October 2009. (36 out of 95 papers accepted: 38%).

Lorin M. Hochstein, Forrest Shull, Lynn B. Reid, "The role of MPI in development time: a case study", *International Conference for High Performance Computing, Networking, Storage and Analysis (SC'08)*, November 2008. (59 out of 277 papers accepted: 21%).

Andhy Koesnandar, Sebastian Elbaum, Gregg Rothermel, Lorin Hochstein, Kathryn Stolee, Christopher Scaffidi, "Using Assertions to Help End-User Programmers Create

Dependable Web Macros", *16th ACM SIGSOFT International Symposium on the Foundations of Software Engineering (FSE 16)*, November 2008.

Taiga Nakamura, Lorin Hochstein, Victor R. Basili. "Identifying Domain-Specific Defect Classes Using Inspections and Change History". *5th International Symposium on Empirical Software Engineering (ISESE '06)*. September 2006, pages 346-355. (31 out of 152 papers accepted: 20%)

Lorin Hochstein, Jeff Carver, Forrest Shull, Sima Asgari, Victor R. Basili, Jeffrey K. Hollingsworth, Marvin V. Zelkowitz. "Parallel Programmer Productivity: A Case Study of Novice Parallel Programmers." *International Conference for High Performance Computing, Networking and Storage (SC'05)*. November 2005. **Best student paper award.** (62 out of 260 papers accepted: 24%)

Forrest Shull, Victor R. Basili, Jeff Carver, Lorin Hochstein. "Empirical Study Design in the Area of High-Performance Computing (HPC)." *4th International Symposium on Empirical Software Engineering (ISESE '05)*. November 2005. (acceptance rate: 40%).

Lorin Hochstein, Victor R. Basili, Marvin V. Zelkowitz, Jeffrey K. Hollingsworth, Jeff Carver. "Combining Self-reported and Automatic Data to Improve Effort Measurement." *Joint 10th European Software Engineering Conference and 13th ACM SIGSOFT Symposium on the Foundations of Software Engineering (ESEC/FSE'05)*. September 2005. (25 out of 169 papers accepted: 25%).

Marvin V. Zelkowitz, Victor R. Basili, Sima Asgari, Lorin Hochstein, Jeffrey K. Hollingsworth, Taiga Nakamura. "Measuring Productivity on High Performance Computers." *11th IEEE International Software Metrics Symposium*. September 2005.
(39 out of 89 papers accepted: 44%).
S. Hamid Nawab, Robert P. Wotiz, Lorin M. Hochstein, Carlos J. De Luca. "Next-Generation Decomposition of Multi-channel EMG Signals." *Proceedings of the 24th Annual Conference and the Annual Fall Meeting of the Biomedical Engineering Society*. October 2002.

Lorin Hochstein, Sorin Lerner, James Clark, Jeremy Cooperstock. "Soccer-Swarm: A Graphical Framework for Soccer-Player Design." *Proceedings of the International Symposium on Robotics, Montreal, Canada*. May 2000.

Workshop Publications

Prakashan Korambatha, Jianwu Wang, Ankur Kumar, Lorin Hochstein, Brian Schott, Robert Graybill, Michael Baldea, Jim Davis, "Deploying Kepler Workflows as Services on a Cloud Infrastructure for Smart Manufacturing", 2nd Workshop on Advances in the Kepler Scientific Workflow System and Its Applications, (short paper), June 2014.

Steve Crago, Kyle Dunn, Patrick Eads, Lorin Hochstein, Dong-In Kang, Mikyung Kang, Devendra Modium, Karandeep Singh, Jinwoo Suh, and John Paul Walters, "Heterogeneous Cloud Computing", *Workshop on Parallel Programming on Accelerator Clusters (PPAC2011)*, IEEE Cluster, Austin, Texas. September 2011

Jeffrey C. Carver, Lorin Hochstein, Jason Olin, "Identifying Programmer Ability Using Peer Evaluation: An Exploratory Study", *First Workshop on Human Aspects of Software Engineering (HAoSE 2009)*, OOPSLA, Orlando, Florida. September 2009.

Victor Basili, Thiago Craveiro, Daniela Cruzes, Kate Despain, Bill Dorland, Lorin Hochstein, Nico Zazworka, Marvin Zelkowitz, "Large Efficient Table-Top Teraflop Computing", *Workshop on Software Engineering for Computational Science & Engineering (SE-CSE)*, ICSE, Leipzig, Germany. May 2008.

Lorin Hochstein, Victor R. Basili, "Position Paper and Brief Announcement: An Empirical Study to Compare Two Parallel Programming Models", *ACM Symposium on Parallel Algorithms and Architectures (SPAA '06)*. July 2006.

Sima Asgari, Lorin Hochstein, Victor R. Basili, Jeff Carver, Jeffrey K. Hollingsworth, Forrest Shull. "Generating Testable Hypotheses from Tacit Knowledge for High Productivity Computing." *Workshop on Software Engineering for High Performance Computing Applications (SE-HPCS)*, ICSE, St. Louis, MO. May 2005.

Andy Funk, Lorin Hochstein, Victor R. Basili, Jeremy Kepner. "Application of a Development Time Productivity Metric to Parallel Software Development." *Workshop on Software Engineering for High Performance Computing Applications (SE-HPCS)*, ICSE, St. Louis, MO. May 2005.

Robert Numrich, Lorin Hochstein, Victor R. Basili. "A Metric Space for Productivity Measurement in Software Development." *Workshop on Software Engineering for High Performance Computing Applications (SE-HPCS)*, ICSE, St. Louis, MO. May 2005.

Sima Asgari, Victor R. Basili, Jeff Carver, Lorin Hochstein, Jeffrey K. Hollingsworth, Forrest Shull, Marvin V. Zelkowitz. "Challenges in Measuring HPCS Learner Productivity in an Age of Ubiquitous Computing." *Workshop on Software Engineering for High Performance Computing Applications (SE-HPCS)*, ICSE, Edinburgh, Scotland. May 2004.

Jeff Carver, Sima Asgari, Victor R. Basili, Lorin Hochstein, Jeffrey K. Hollingsworth, Forrest Shull, Marvin V. Zelkowitz. "Studying Code Development for High Performance Computing: The HPCS Program." *Workshop on Software Engineering for High Performance Computing Applications (SE-HPCS)*, ICSE, Edinburgh, Scotland. May 2004.

Sima Asgari, Victor R. Basili, Patricia Costa, Paolo Donzelli, Lorin Hochstein, Mikael Lindvall, Ioana Rus, Forrest Shull, Roseanne Tvedt, Marvin V. Zelkowitz. "Empirical-

based Estimation of the Effect on Software Dependability of a Technique for Architecture Conformance Verification." *Workshop on Architecting Dependable Systems*, ICSE, Edinburgh, Scotland. May 2004.

Lorin Hochstein, Mikael Lindvall. "Diagnosing Architectural Degeneration." *Proceedings of the 28th NASA/IEEE Software Engineering Workshop*, Greenbelt, MD. December 2003.

Technical reports

Lorin Hochstein, Victor R. Basili, "A Preliminary Empirical Study to Compare MPI and OpenMP", USC/ISI Technical Report ISI-TR-676, December 2011.

Jeffrey C. Carver, Roscoe Bartlett, Dustin Heaton, Lorin Hochstein, "Self-Perceptions about Software Engineering: A Survey of Scientists and Engineers", University of Alabama Technical Report SERG-2011-04. November 2011.

Lorin Hochstein, Victor R. Basili, "The ASC-Alliance projects: A Case Study of Large-Scale Parallel Scientific Code Development." University of Maryland Technical Report UMIACS-TR-2006-50. October 2006.

Victor Basili, Sima Asgari, Jeff Carver, Lorin Hochstein, Jeffrey K. Hollingsworth, Forrest Shull, Marv Zelkowitz. "A Pilot Study to Evaluate Development Effort for High Performance Computing." University of Maryland Technical Report CS-TR-4588. April 2004.

Other publications

Python APIs: The best-kept secret of OpenStack, IBM developerWorks, June 19, 2013.

Presentations, Invited Talks & Panels

Genetec Connect'19, December 2018, **keynote speaker**. Presented: "Chaos Engineering at Netflix"

European Chaos Engineering Day, December 2018, **distinguished keynote speaker**. Presented: "What I Learned Doing Chaos at Netflix".

SRECon, March 2018. Presented: "Antics, Drift and Chaos".

Strange Loop, September 2017. Presented: "Antics, Drift and Chaos".

International Conference on Software Engineering (ICSE), May 2016. Panel discussion: "Chaos Engineering" (organized panel as well as serving on it)

The 29th IEEE Conference on Software Engineering Education and Training (CSEE&T), Apr. 2016. Panel discussion: "Why You Should Be Teaching Deployment in Your Curriculum!"

Devoxx Belgium, Nov. 2015. Presented: "Chaos Engineering".

Manufacturing Innovations 2011, May 2011. Panel discussion: "Digital Manufacturing: Transforming the Way America Builds".

HPC User Forum, Apr. 2010. Presented: "DARPA HPC-ISP PILOTS Final Results: Highlights for Two Pilot Studies"

The 2009 Workshop on Component-Based High Performance Computing, Nov. 2009. Panel discussion: "Open Questions in Software Engineering for High-Performance Computing Research"

CIS SIGHPC seminar at University of Delaware, Oct. 2005.
Presented "Using Empirical Studies to Understand the Impact of Parallel Programming Model on Productivity."

Awards, Activities, and Membership in Professional Honor Societies

Society memberships

ACM:	Association for Computing Machinery (2006 – 2009, 2011 – 2012, 2016 – present) Member of the Special Interest Group on Software Engineering (2006 – 2009)
IEEE:	Institute of Electrical and Electronic Engineering, Inc. (1997 – present) Member of the Computer Society (1997 – present) Member of the Society on Social Implications of Technology (2006 – 2008)
ISERN:	International Software Engineering Research Network (2011 – present) Member
OIQ:	Order of Engineers of Quebec (1999-2000) Engineer in Training

Awards

- University of Nebraska – Lincoln, Computer Science & Engineering Students Choice Outstanding Teaching Award for Teaching of Lower Division Courses for 2006-2007 academic year
- Best Student Paper Award, SC'05
- Doctoral Research Scholarship, Quebec Science and Technology Research Fund (FQRNT), 2004
- Fraunhofer Graduate Research Assistantship, University of Maryland, 2002.
- Presidential University Graduate Fellowship, Boston University, 2000.

- British Association Medal for Great Distinction, McGill University, 1999.
- Outstanding Leadership Contribution Award, Electrical and Computer Engineering, McGill University, 1999.
- J.W. McConnell Award, McGill University, 1998.
- Canadian Marconi Scholarship, Marconi Canada, 1997.
- Gene H. Kruger Memorial Scholarship, Federation CJA, 1997.

Topics Taught at University of Nebraska-Lincoln

- Experimentation in Software Engineering / Software Technology Evaluation
- Human-Computer Interaction

Student Supervision

Padma Ashokkumar (M.S.)
Min Zhang (M.S.)

Professional service

Workshop chair

Cloud Workshop, 27th USENIX Large Installation System Administration Conference (LISA), November 2013

Program chair

Workshop on Industrial Usage of Regional HPC Centers, April 2011.

Organizing committees

Industrial Experience Track Committee Chair, International Symposium on Empirical Software Engineering and Measurement (ESEM), October 2013.

Program committees

Second International Workshop on Software Engineering for High Performance Computing in Computational Science and Engineering (SE-HPCCSE), November 2014.

First International Workshop on Software Engineering for High Performance Computing in Computational Science and Engineering (SE-HPCCSE), November 2013.

International Symposium on Empirical Software Engineering and Measurement (ESEM), October 2013.

International Workshop on Software Engineering for Computational Science and Engineering, (SE-CSE) June 2013

International Workshop on Empirical Research in/for Service-Oriented Systems Engineering (ER-SOSE), June 2012.

International Symposium on Empirical Software Engineering and Measurement (ESEM), Short Papers track, September 2011.

Fourth International Workshop on Software Engineering for Computational Science and Engineering (SE-CSE), May 2011.

International Symposium on Empirical Software Engineering and Measurement (ESEM), September 2010.

Third International Workshop on Software Engineering for Computational Science and Engineering (SE-CSE), May 2010.

International Symposium on Empirical Software Engineering and Measurement (ESEM), October 2009.

Second International Workshop on Software Engineering for Computational Science and Engineering (SE-CSE), May 2009.

International Symposium on Empirical Software Engineering and Measurement (ESEM), October 2008.

First International Workshop on Software Engineering for Computational Science & Engineering (SE-CSE), May 2008.

International Symposium on Empirical Software Engineering and Measurement (ESEM), short papers track, September 2007.

Session chair

International Symposium on Empirical Software Engineering and Measurement (ESEM), short papers, September 2011.

International Symposium on Empirical Software Engineering and Measurement (ESEM), October 2009.

Third International Workshop on Software Engineering for High Performance Computing Applications, May 2007.

Reviewer

- BMC Bioinformatics
- Information & Software Technology
- Journal of Organizational and End-User Computing
- IEEE/AIP Computing in Science & Engineering
- IEEE Software
- IEEE Transactions on Software Engineering
- The Journal of Empirical Software Engineering
- International Journal on Software Tools for Technology Transfer

- Software Quality Journal
- IET Software
- ACM SIGPLAN Workshop on Programming Languages and Analysis for Security, Ottawa, Canada, June 2006
- The Sixteenth International Conference on Software Engineering & Knowledge Engineering (SEKE'2004), Banff, Alberta, Canada, June 2004

University and Departmental Service

Committee assignments

University of Nebraska – Lincoln (2006 – 2008)

Curriculum Committee (2006-2007, 2007-2008)
Software Engineering Qualifying Exam Committee (2006-2007, 2007-2008)

Thesis committees

Andhy Koesnadar (MS)