E Christopher Lewis

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1590 Todd Street
Mountain View, CA 94040

Interests

Virtualization, distributed systems, parallel systems, compilers, computer architecture.

Education

Ph.D., University of Washington, Seattle, WA   **March 2001**
Computer Science and Engineering
Dissertation: *Achieving Robust Performance in Parallel Programming Languages*

M.S., University of Washington, Seattle, WA   **March 1996**
Computer Science and Engineering

B.S., Cornell University, Ithaca, NY   **May 1993**
Computer Science

Employment

VMware, Inc., Palo Alto, CA   **May 2013 – present**

Senior Staff Engineer. Technical lead for the vCenter Server product. I work on all aspects of vCenter Server, including requirements gathering, planning, architecture, feature integration, integration with other products, development, partner liaison, reviews, and testing.

VMware, Inc., Palo Alto, CA   **January 2007 – May 2013**

Staff Engineer. I served as the technical lead on a variety of projects, including a replay-based debugging system (reverse execution!) and a virtual appliance management infrastructure. I worked in many areas of the company, including Workstation product, virtual machine monitor, vmkernel, management platform, office of the CTO, and academic programs. I co-chaired (2010 to 2013) and served as program chair (2010 and 2011) for the internal VMware technical conference.

University of Pennsylvania, Philadelphia, PA   **January 2001 – December 2006**

Assistant Professor in the Department of Computer and Information Science. Co-founded the Architecture and Compilers Group.

University of Washington, Seattle, WA   **January 1994 – December 2000**

Research Assistant for Professor Lawrence Snyder in the Department of Computer Science and Engineering. I am a co-founder of the A–ZPL Parallel Programming Language Project.

Cornell University, Ithaca, NY   **August 1991 – May 1993**

Research Assistant for Professor John Hopcroft and Daniella Rus in the Computer Science Department. I developed a system for the automatic recognition, extraction and decomposition of tables from plain text documents.

Microsoft Corporation, Redmond, WA   **May – August 1990 and 1991**

Software Development Engineering Intern. I developed a system for the remote management of network services as part of a mail application. I also designed and implemented a testing strategy for printer drivers.

Cornell University, Ithaca, NY   **August 1990 – May 1991**

Programmer for Steve Worona at Cornell Information Technologies. I researched, installed and customized network services for campus-wide use.

Honors

NSF CAREER Award (see Grants), 2004.

Bradley Dissertation Fellowship, 1998 – 1999.

Publications

Journal Publications

Colin Blundell, E Christopher Lewis, and Milo M. K. Martin. "Subleties of Transactional Memory Atomicity Semantics," *IEEE Computer Architecture Letters*, 5(2), July-December 2006.

Marc L. Corliss, E Christopher Lewis, and Amir Roth. "The Implementation and Evaluation of Dynamic Code Decompression using DISE," *ACM Transactions on Embedded Computer Systems* (Special Issue on Languages, Compilers, and Tools for Embedded Systems), 4(1):38–72, February 2005.

Bradford L. Chamberlain, Sung-Eun Choi, E Christopher Lewis, Calvin Lin, Lawrence Snyder, and W. Derrick Weathersby. "ZPL: A Machine Independent Programming Language for Parallel Computers," *IEEE Transactions on Software Engineering*, 26(3):197–211, March 2000.

Bradford L. Chamberlain, Sung-Eun Choi, E Christopher Lewis, Calvin Lin, Lawrence Snyder, and W. Derrick Weathersby. "The Case for High-Level Parallel Programming in ZPL," *IEEE Computational Science and Engineering*, 5(3):76–86, July–September 1998.

Refereed Conference Publications

Xiaoxin Chen, Tal Garfinkel, E Christopher Lewis, Pratap Sabrahmanyam, Carl A. Waldspurger, Dan Boneh, Jeffrey Dwoskin, and Dan R. K. Ports. "Overshadow: A Virtualization-Based Approach to Retrofitting Protection in Commodity Operating Systems," *Proceedings of the Thirteenth International Conference on Architectural Support for Programming Languages and Operating Systems* (ASPLOS '08), March 2008.

Marc L. Corliss and E Christopher Lewis. "Bantam: A Customizable, Java-Based, Classroom Compiler," *Proceedings of the 39th SIGCSE Technical Symposium on Computer Science Education* (SIGCSE '08), March 2008.

Marc L. Corliss, E Christopher Lewis, and Amir Roth. "Low-Overhead Debugging via Flexible Dynamic Instrumentation," *Proceedings of the Eleventh International Symposium on High Performance Computer Architecture* (HPCA-11), February 2005.

Marc L. Corliss, E Christopher Lewis, and Amir Roth. "DISE: A Programmable Macro Engine for Customizing Applications," *Proceedings of the Thirtieth International Symposium on Computer Architecture (ISCA-30)*, pages 362–373, June 2003.

Marc L. Corliss, E Christopher Lewis, and Amir Roth. "A DISE Implementation of Dynamic Code Decompression," *Proceedings of the Conference on Languages, Compilers, and Tools for Embedded Systems (LCTES '03)*, pages 232–243, June 2003.

Sung-Eun Choi and E Christopher Lewis. "A Study of Common Pitfalls in Simple Multi-Threaded Programs," *Proceedings of the Thirty-First ACM SIGCSE Technical Symposium on Computer Science Education* (SIGCSE '00), March 2000.

Bradford L. Chamberlain, E Christopher Lewis, Calvin Lin, and Lawrence Snyder. "Regions: An Abstraction

for Expressing Array Computation," *Proceedings of the 1999 ACM SIGAPL/SIGPLAN International Conference on Array Programming Languages (APL '99)*, pages 41–49, August 1999.

Bradford L. Chamberlain, E Christopher Lewis, Lawrence Snyder. "Problem Space Promotion and Its Evaluation as a Technique for Efficient Parallel Computation," *Proceedings of the 13th International Conference on Supercomputing (ICS)*, pages 311–318, June 1999.

E Christopher Lewis, Calvin Lin, and Lawrence Snyder. "The Implementation and Evaluation of Fusion and Contraction in Array Languages," *Proceedings of the ACM SIGPLAN '98 Conference on Programming Language Design and Implementation (PLDI)*, pages 50–59, June 1998.

E Christopher Lewis, Calvin Lin, Lawrence Snyder, and George Turkiyyah. "A Portable Parallel N-Body Solver," *Proceedings of the Seventh SIAM Conference on Parallel Processing for Scientific Computing*, pages 331–336, February 1995.

Reviewed Workshop Publications

Matt R. Jacobs and E Christopher Lewis. "SMART C: A Semantic Macro Replacement Translator for C," *Proceedings of the IEEE International Workshop on Source Code Analysis and Manipulation (SCAM '06)*, September 2006.

Marc L. Corliss, Vlad Petric, E Christopher Lewis. "Dynamic Translation as a Systems Service," *Proceedings of the Workshop on the Interaction Between Operating Systems and Computer Architecture (WIOSCA)* (held in conjunction with ISCA), June 2006.

Colin Blundell, E Christopher Lewis, and Milo M. K. Martin. "Deconstructing Transactions: The Subtleties of Atom Power," *Proceedings of the Workshop on Duplication, Deconstructing, and Debunking* (held in conjunction with ISCA), June 2005.

Marc L. Corliss, E Christopher Lewis, and Amir Roth. "Using DISE to Protect Return Addresses from Attack," *Proceedings of the Workshop on Architectural Support for Security and Anti-Virus (WASSA)* (held in conjunction with ASPLOS), October 2004.

E Christopher Lewis and Lawrence Snyder. "Pipelining Wavefront Computations: Experiences and Performance," *Proceedings of the 5th IEEE International Workshop on High-Level Parallel Programming Models and Supportive Environments (HIPS)* (held in conjunction with IPDPS), May 2000.

Bradford L. Chamberlain, E Christopher Lewis, and Lawrence Snyder. "Language Support for Pipelining Wavefront Computations," *Proceedings of the Workshop on Languages and Compilers for Parallel Computing (LCPC)*, August 1999.

Bradford L. Chamberlain, Sung-Eun Choi, E Christopher Lewis, Calvin Lin, Lawrence Snyder, and W. Derrick Weathersby. "ZPL's WYSIWYG Performance Model," *Proceedings of the IEEE Workshop on High-Level Parallel Programming Models and Supportive Environments (HIPS)*, pages 50–61, March 1998.

Bradford L. Chamberlain, Sung-Eun Choi, E Christopher Lewis, Calvin Lin, Lawrence Snyder, and W. Derrick Weathersby. "Factor-Join: A Unique Approach to Compiling Array Languages for Parallel Machines," *Proceedings of the Workshop on Languages and Compilers for Parallel Computing (LCPC)*, pages 481–500, August 1996.

Theses and Technical Reports

Marc L. Corliss. *The Design, Implementation, and Evaluation of the Dynamic Instruction Stream Editor (DISE)*, PhD Thesis, Department of Computer and Information Science, University of Pennsylvania, 2006.

Colin Blundell, E Christopher Lewis, and Milo M. K. Martin. "Unrestricted Transactional Memory: Supporting

I/O and System Calls within Transactions," Technical Report CIS-06-09, Department of Computer and Information Science, University of Pennsylvania, Philadelphia, PA, April 2006.

Marc L. Corliss and E Christopher Lewis. "A DISE Framework for Securing Software," Technical Report MS-CIS-05-13, Department of Computer and Information Science, University of Pennsylvania, Philadelphia, PA, April 2005.

Marc L. Corliss, E Christopher Lewis, and Amir Roth. "DISE: Dynamic Instruction Stream Editing," Technical Report MS-CIS-02-24, Department of Computer and Information Science, University of Pennsylvania, Philadelphia, Pennsylvania, July 2002.

E Christopher Lewis. *Achieving Robust Performance in Parallel Programming Languages*, PhD Thesis, Department of Computer Science and Engineering, University of Washington, 2001.

Ibrahim Hur, E Christopher Lewis, and Calvin Lin. "Evaluation of Optimizing Multi-Dimensional Shift Communication via Piggybacking," Technical Report, Department of Computer Science and Engineering, University of Washington, Seattle, Washington, December 1999.

Bradford L. Chamberlain, E Christopher Lewis, and Lawrence Snyder. "A Region-based Approach to Sparse Parallel Computation," Technical Report UW-CSE-98-11-01, Department of Computer Science and Engineering, University of Washington, Seattle, Washington, November 1998.

E Christopher Lewis. "Support for Software Assisted Speculative Execution," Technical Report UW-CSE-98-09-05, Department of Computer Science and Engineering, University of Washington, Seattle, Washington, September 1998.

Calvin Lin, Lawrence Snyder, Ruth Anderson, Bradford L. Chamberlain, Sung-Eun Choi, E Christopher Lewis, and W. Derrick Weathersby. "ZPL vs. HPF: A Comparison of Performance and Programming Style," Technical Report UW-CSE-95-11-05, Department of Computer Science and Engineering, University of Washington, Seattle, Washington, November 1995.

Grants

NSF CAREER Award CCF-0347290, "CAREER: Take Your Vitamins: Robust Parallel Software through Supplement-Oriented Programming," $400,000, 2/04–2/09.

NSF Award CCR-0311199, "DISE: A New Hardware-Software Interface for Customizing Application Execution," $240,000, 7/03–6/06. (with Amir Roth)

Microsoft Corporation, "The Influence of Computer Architecture on .NET Applications," $10,000, 7/02–6/03.

ARO DAAD-19-02-1-0404, "ABIDE: Advanced Broadband Intrusion Detection Engine," $54,138, 9/02–2/03. (with Jonathan Smith, Michael Greenwald, and Honghui Lu)

Professional Activities and Memberships

External Review Committee. International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), 2014.

External Review Committee. International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), 2013.

Program Committee Member. International Conference on Parallel Processing (ICPP), 2006.

Program Committee Member. Real-Time and Embedded Technology and Applications Symposium (RTAS), Embedded Systems, Hardware-Software Co-Design Track, 2006.

Program Committee Member. Real-Time and Embedded Technology and Applications Symposium (RTAS), Real-time Infrastructure Track, 2005.

Program Committee Member. Conference on Languages, Compilers, and Tools for Embedded Systems (LCTES), 2004.

Program Committee Member. Real-Time and Embedded Technology and Applications Symposium (RTAS), Real-time Infrastructure and Development Track, 2004.

Workshop and Tutorial Co-chair. International Conference on Parallel Architectures and Compilation Techniques (PACT), 2002.

Participant. Project 7 External Group, Microsoft Corporation, 2000.

Referee/Reviewer. International Symposium on Solving Irregularly Structured Problems in Parallel (Irregular '98), ACM SIGPLAN Symposium of Principles and Practice of Parallel Programming (PPoPP '99), European Conference on Parallel Processing (Euro-Par '99 and 2001), IEEE International Conference on Parallel Architectures and Compilation Techniques (PACT '99, 2001, 2005), ACM International Conference on Supercomputing (ICS 2000), International Parallel and Distributed Processing Symposium (IPDPS 2002), ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP '05), Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS '06), ACM SIGPLAN/SIGBED Conference on Languages, Compilers, and Tools for Embedded Systems (LCTES '06), IEEE Transactions on Parallel and Distributed Systems (TPDS), ACM Transactions on Programming Languages and Systems (TOPLAS), Journal of Parallel and Distributed Computing (JPDC), ACM Transactions on Embedded Computer Systems (TECS).

Member. Association for Computing Machinery, 1994 – present.

Member. Institute of Electrical and Electronics Engineers, Computer Society, 1995 – present.

Invited Talks

VMworld	**September 2009**
Better Software Development and Testing using VMware Workstation	
VMworld Technology Exchange Developer Day	**August 2009**
Replay Debugging in VMware Workstation	
Google	**October 2008**
Virtual Machine-Based Replay Debugging	
VMworld	**September 2008**
Reverse and Replay-Based Debugging	
VMworld	**September 2007**
Debugging with Record/Replay Technology	
Penn Dining Philosophers	**November 2001**
A New Approach to Exploiting Modern Computer Architectures	
Philadelphia Classic High School Programming Contest	**March 2001/2003**
Technology, Responsibility, and Courage	
Northwestern U., Brown U., Georgia Tech., U. Chicago, U. British Columbia, U. Penn.	**Spring 2000**
Achieving Robust Performance in Parallel Programming Languages	
Los Alamos National Laboratory	**September 2, 1999**
Language and Compiler Support for Pipelining Wavefront Computations, Advanced Computer Laboratory.	

PhD Students

- Marc Corliss, graduated 12/06 (first employment: Assistant Professor, Hobart and William Smith Colleges; now at Google)

Teaching

University of Pennsylvania

- CSE240: Introduction to Computer Systems. Autumn 2004/05.
- CSE341: Compilers and Interpreters. Spring 2002/03/04/06.
- CIS570: Modern Programming Language Implementation. Spring 2001, Autumn 2002/03/06.
- CIS700: Program Representation for Mobile Computing (seminar). Autumn 2001.
- CIS700: Systems Seminar (Beyond Music Swapping and SETI: Internet-Scale, Self-Organizing Distributed Computing, Spring 2004; Virtual Machines, Autumn 2004; Sensor Networks, Spring 2005).

University of Washington

- CSE590zp: High Performance Scientific Computing in ZPL. Autumn 1995/96, Winter 1998/99 (co-lecturer).

Supervised Senior Projects

Chao Cai and Joseph Schorr, "Serulian," 2005-2006 (First Prize in CSE). Bertan Aygun, "Enhancement of Jgraph," 2004-05. Nathan Kennedy, "Unmung: The ENcripted Email Alias System," 2004-05 (Honorable Mention). Sachin Rekhi and Mehal Shah, "Kontax Personal Contact System," 2004-05. Douglas Kaminsky, "Tools for Building Interpreters," 2003-04. Kiran Kshatriya and Lestin Kenton, "A Comparative Evaluation of MP3 Encoders," 2003-04. William Lovas and Owen Gunden, "Comprehensive OCaml Archive Network," 2003-04. Daniel Tan, "Compiler Transformations for Safe C Code," 2003-04. Benjamin Kupferschmidt, "RareShare: A Peer-to-Peer File Sharing Network," 2002-03. Juney Ham, "Systems for Online Collaboration," 2002-03. Christina Hao, "Distance Learning: Tools and Tactics," 2002-03. Marvin Li, "A Visual Workflow Development Environment," 2001-02.

Supervised Masters Projects

Marc Corliss. "A Study of Software-Based Fault Isolation on Modern Architectures," Autumn 2001. Jason Heckathorn. "A Practical Introductory Look at Corba," Summer 2001. Dharmin Parekh. "Dynamic Despeculation: A Study of Computer Architecture and Instruction-Level Parallelism," Summer 2001.

Academic Service

Adviser. University of Pennsylvania Student ACM Chapter (Dining Philosophers), 2002-2006.

University Service

Publicity committee, 2003.

Faculty recruiting committee, 2001, 2002.

Graduate admissions committee, 2001-02; Open House Coordinator, 2002-04

SEAS academic performance committee, 2001-2003.

Distributed Software

Yagbut. Yet another Gmail backup tool. Simple Python scripts for backing up (and restoring!) Gmail accounts. *https://code.google.com/p/yagbut/*. This software was under development from 2010 to the present.

DISE Tools and Simulator. This software allows one to experiment with the DISE facility.

A-ZPL Compiler and Run-Time System. I contributed to all facets of the design, development, evaluation, testing, documentation, and support of the A-ZPL system. Binary distributions available for 6 parallel machines and 7 workstations at *http://www.cs.washington.edu/research/zpl*. This software was developed at the University of Washington Department of Computer Science and Engineering from 1996 to 2000.

Attorney's Billing System. I developed custom billing software for attorneys. This software does not suffer from the year 2000 problem, despite the fact that dates are represented with only two decimal digits. Because all date arithmetic is calculated relative to 1988, this software, instead, suffers from the year 2088 problem! This software was developed between 1989 and 1990.

American Shortline Railway Guide, On-Line Edition. I developed information retrieval and browsing software for the on-line edition of this reference book published by Kalmbach Books. This software was developed in 1988.

Personal

Cycling.

Knitting.

Cornell's Cayuga's Waiters, bass voice (1990-1993), leader (1992).

Classical and folk guitar playing.

History of computing.

Played guitar and sang in Blabba, an all Abba cover band (1997)!