

Piyush Shivam

CONTACT INFORMATION Sun Microsystems Work: (512) 401-1019
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EDUCATION **Duke University** Durham, North Carolina
Ph.D. Computer Science 2007
Advisors: Jeffrey S. Chase, Shivnath Babu
Dissertation: Proactive Experiment-Driven Learning for System Management
The Ohio State University Columbus, Ohio
M.S. Computer and Information Science 2002
Advisor: D. K. Panda
Thesis: High Performance User Level Protocol on Gigabit Ethernet
Birla Institute of Technology and Science BITS Pilani, India
MSc. (Tech) 1999
Major: Information Systems

AWARDS

1. Best Candidacy Exam Award, Department of Computer Science, Duke University, 2007
2. Network Appliance Research Fellowship, 2005
3. Student Scholarship to Network System and Design Implementation (NSDI), 2004
4. Student Scholarship to File Access and Storage Technology (FAST), 2004
5. Graduate Fellowship, Department of Computer Science, Duke University, 2002

PATENT

- US Patent Number 2005/0188074A1: System and Method for Self-Configuring and Adaptive Offload Card Architecture for TCP/IP and Specialized Protocols.

PROFESSIONAL AND RESEARCH APPOINTMENTS **Member of Technical Staff** Sun Microsystems
Feb 2008 - Present Austin, Texas
Responsible for research, design, and development of in-kernel instrumentation infrastructure for parallel NFS (pNFS) and back-end control protocol for NFS v4.1/pNFS file system. Leading the overall direction and methodology for NFS benchmarking and improving NFS performance.

Research Intern, Network File Systems Sun Microsystems
May 2006 - July 2006 Broomfield, Colorado
Proposed, designed, and implemented `nfssperf`, a new observability utility for performance and data management in storage systems. `nfssperf` enables in depth understanding of NFS workloads and NFS performance to meet high level objectives; the tool reports performance and workload metrics on per-file, per-user, per-directory, and per-client basis. `nfssperf` is currently an opensolaris project.

Research Intern, Storage Management

IBM Almaden Research Center

May 2005 - August 2005

San Jose, California

Worked in the area of Information Lifecycle Management. The goal of this project was to do autonomic management of data over its lifetime. We designed, developed, and demonstrated a prototype that classifies data and storage devices according to their metadata attributes, and suggests an informed data placement scheme. The work is published as a conference paper[5] and an IBM technical report[13].

Research Intern, Storage Subsystems

IBM Almaden Research Center

May 2003 - August 2003

San Jose, California

Designed, implemented, and demonstrated transparent namespace splitting for the metadata server in the *SAN-FS* file system. The idea was to transfer metadata management of a busy portion of directory namespace to another server transparently to the user.

Intern, Information Technology

Dell Computers

June 2001 - August 2001

Austin, Texas

Developed a decision support system using BRIO Designer.

Software Engineer, Global Research and Development

Wipro Technologies, IBM (joint project)

August 1999 - July 2000

Bangalore, India, Beaverton, Oregon

Worked on the diagnostics of multiprocessor architecture (NUMA-Q) based on Itanium (IA-64). Responsible for fault analysis and test case design for the Itanium processor and contributed to the design, development, and testing of diagnostic algorithms for the memory board of the multiprocessor architecture.

Intern, System Software Development

IBM Global Services

January 1999 - June 1999

Bangalore, India

Researched 'chaos theory' and its application to computer networks. Using a road traffic model, we showed that a computer network can exhibit chaos.

Research Assistant

Duke University

September 2004 - December 2007

Durham, North Carolina

Worked with Jeff Chase and Shivnath Babu to design techniques for addressing system management problems across a wide range of system domains. The overall approach consists of proactively conducting *system experiments* that allow us to map system behavior across a range of: (a) applications; (b) resource allocation choices for the system; and (c) system configuration.

Research Assistant

Ohio State University

December 2000 - March 2002

Columbus, Ohio

Worked with Dhabaleswar Panda and Pete Wyckoff to design, implement, and evaluate EMP: a completely NIC-driven user level network protocol for Gigabit Ethernet on multi-CPU Alteon network interface card. We also developed a user level TCP socket implementation on top of EMP to improve the performance of existing TCP applications.

TEACHING
APPOINTMENTS

Teaching Assistant

Duke University

January 2003 - December 2003

Durham, North Carolina

Helped teach an undergraduate programming course designed to introduce C++ to the students. Responsible for holding recitations and office hours, grading assignments and exams, and teaching the class in the instructor's absence.

Teaching Assistant

September 2000 - December 2000

Helped teach an undergraduate course that introduced software engineering concepts to students using C++. Responsible for grading assignments and holding office hours.

Ohio State University

Columbus, Ohio

**CONFERENCE
AND WORKSHOP
PUBLICATIONS**

1. Piyush Shivam, Varun Marupadi, Jeff Chase, Thileepan Subramaniam, and Shivnath Babu. Cutting Corners: Workbench Automation for Storage Service Benchmarking. In *USENIX Annual Technical Conference (USENIX)*. July 2008.
2. Aydan Yumerefendi, Piyush Shivam, David Irwin, Pradeep Gunda, Laura Grit, Azbayar Demberel, Jeff Chase, and Shivnath Babu. Towards an Autonomic Computing Testbed. In *Workshop on Hot Topics in Autonomic Computing (HotACII), held in conjunction with International Conference on Autonomic Computing (ICAC)*. June 2007. **[5 citations]**
3. Jeff Chase, Laura Grit, David Irwin, Varun Marupadi, Piyush Shivam and Aydan Yumerefendi. Beyond Virtual Data Centers: Toward an Open Resource Control Architecture. In *International Conference on the Virtual Computing Initiative (ICVCI)*. May 2007.
4. Laura Grit, David Irwin, Varun Marupadi, Piyush Shivam, Aydan Yumerefendi, Jeff Chase and Jeannie Albrecht. Harnessing Virtual Machine Resource Control for Job Management. In *Workshop on System-level Virtualization for High Performance Computing (HPCVirt) held in conjunction with European Conference on Computer Systems (EuroSys)*. March 2007. **[7 citations]**
5. Piyush Shivam, Shivnath Babu, and Jeff Chase. Active and Accelerated Learning of Cost Models for Optimizing Scientific Applications. In *International Conference on Very Large Data Bases (VLDB)*, September 2006. **[9 citations]**
6. Piyush Shivam, Shivnath Babu, and Jeff Chase. Active Sampling for Accelerated Learning of Performance Models. In *Workshop on Tackling Computer Systems Problems with Machine Learning Techniques (SysML) held in conjunction with Joint International Conference on Measurement and Modeling of Computer Systems (SIGMETRICS)*. June 2006. **[3 citations]**
7. Piyush Shivam, Shivnath Babu, and Jeff Chase. Learning Application Models for Utility Resource Planning. In *IEEE International Conference on Autonomic Computing (ICAC)*. June 2006. **[9 citations]**
8. Gauri Shah, Kaladhar Voruganti, Piyush Shivam, and Maria Alvarez. ACE: Classification for Information Lifecycle Management. In *IEEE Conference on Mass Storage Systems and Technologies (MSST)*. May 2006.
9. Piyush Shivam, and Jeff Chase. On the Elusive Benefits of Protocol Offload. In *ACM SIGCOMM workshop on Network-I/O Convergence: Experience, Lessons, Implications (NICELI)*. August 2003. **[33 citations]**
10. Pavan Balaji, Piyush Shivam, Pete Wyckoff, and Dhabaleswar Panda. High Performance User Level Sockets over Gigabit Ethernet. In *IEEE International Conference on Cluster Computing (CC)*. September 2002. **[41 citations]**
11. Piyush Shivam, Pete Wyckoff, and Dhabaleswar Panda. Can User Level Protocols Take Advantage of Multi-CPU NIC? In *IEEE/ACM International Parallel and Distributed Processing Symposium (IPDPS)*. April 2002. **[24 citations]**
12. Piyush Shivam, Pete Wyckoff, and Dhabaleswar Panda. EMP: Zero-copy OS-bypass NIC-driven Gigabit Ethernet Message Passing. In *ACM/IEEE Conference on Supercomputing (SC)*. November 2001. **[137 citations]**

- REFEREED ABSTRACTS, POSTERS, AND DEMOS
13. Lisa Week and Piyush Shivam. OpenSolaris Parallel NFS (pNFS): Blending Performance and Manageability. In *Storage Developer Conference (SDC)*, September 2009.
 14. Piyush Shivam, Shivnath Babu, Songyun Duan, Pradeep Gunda, Azbayar Demberel, and Shivnath Babu. An Active-Learning Approach for Service Manageability. In *International Conference on Virtual Computing Initiative (ICVCI)*. May 2007.
 15. Piyush Shivam, Azbayar Demberel, Pradeep Gunda, David Irwin, Laura Grit, Aydan Yumerfendi, Shivnath Babu, and Jeff Chase. Automated and On-Demand Provisioning of Virtual Machines for Database Applications. *Demonstration Proceedings of the Twenty-sixth ACM SIGMOD Conference on Management of Data (SIGMOD)*. June 2007.
 16. Piyush Shivam, Adriana Iamnitchi, Aydan Yumerfendi, and Jeff Chase. Model-Driven Placement of Compute Tasks and Data in a Networked Utility. In *IEEE International Conference on Autonomic Computing (ICAC)*. July 2005.
- TECHNICAL REPORTS
17. Piyush Shivam, Shivnath Babu, Songyun Duan, and Jeffrey Chase. Experiment-Driven Query Processing for System Management. November 2007.
 18. Piyush Shivam, Shivnath Babu, and Jeff Chase. Learning From the Future: The Case for Active Learning. Number CS-2007-05, April 2007.
 19. Gauri Shah, Kaladhar Voruganti, Piyush Shivam, and Maria Alvarez. ACE: Classification for Information Lifecycle Management. IBM Almaden Research Center Technical Report, RJ10372. February 2006.
 20. Rajiv Wickremesinghe, Piyush Shivam, and Jeff Chase. Adaptive Load Management for Web-based Data Services, May 2004.
- PROFESSIONAL ACTIVITIES
- Served as a reviewer for JPDC Journal 2009, ICDE Conference 2009, USENIX Annual Technical Conference 2007, VLDB Conference 2007, SC Conference 2005, Global and Peer-to-Peer Computing Conference 2005, FAST Conference 2004.
- INTERNATIONAL CONFERENCE TALKS/ PRESENTATIONS
- Cutting Corners: Workbench Automation for Server Benchmarking. *USENIX Annual Technical Conference (USENIX)*, Boston, MA, July 2008.
 - An Active-Learning Approach for Service Manageability. *International Conference of Virtual Computing Initiative (ICVCI)*, Raleigh, NC, May 2008.
 - Automated and On-Demand Provisioning of Virtual Machines for Database Applications. *ACM SIGMOD Conference on Management of Data (SIGMOD)*. Beijing, China, June 2007.
 - Model-Driven Placement of Compute Tasks and Data in a Networked Utility. *IEEE International Conference on Autonomic Computing (ICAC)*. Seattle, Washington, June 2005.
 - On the Elusive Benefits of Protocol Offload. *ACM SIGCOMM workshop on Network-I/O Convergence: Experience, Lessons, Implications (NICELI)*. Karlsruhe, Germany, August 2003.
 - Can User Level Protocols Take Advantage of Multi-CPU NICs? *ACM/IEEE Parallel and Distributed Processing Symposium (IPDPS)*. Fort Lauderdale, Florida, April 2002.
 - Low Latency, High Bandwidth Messaging Layer on Gigabit Ethernet. *ACM/IEEE Conference on SuperComputing (SC)*. Denver, Colorado, November 2001.