

Pradeep Padala

ppadala@gmail.com • (408) 431 7140 • <http://ppadala.net>

I am a systems researcher, who likes to hack and solve “real-world” problems. My interests are broadly in operating systems and distributed systems with an emphasis on virtualization, cloud computing, mobile computing and storage systems.

EDUCATION

- Ph.D. in Computer Science, **University of Michigan**, Ann Arbor, Dec 2009. GPA: **7.65/8.0**. Thesis: Automated Management of Virtualized Data Centers, Advisor: Kang G. Shin.
- M.S. in Computer Science, **University of Florida**, Gainesville, Dec 2003. GPA: **4.0/4.0**. Thesis: Design and Implementation of GridOS: Operating System Services for the Grid, Advisor: Joseph Wilson.
- B.E. in Computer Science, **Motilal Nehru National Institute of Technology**, Allahabad, Aug 2000. Aggregate: 80.66%

AWARDS and HONORS

- **Best paper award**, IEEE International Conference on Autonomic Computing (ICAC) 2011.
- **Best paper award**, USENIX Annual Technical Conference 2010.
- GENI Spiral3 grant, 2011 (Co-PI).
- Invitation for plenary session demo presented at the GENI engineering conference at NSF.
- HP labs open innovation research grant for large-scale data center management. Co-authored the proposal. Aug 2008 - Aug 2009
- Second prize at Yahoo’s HackU event, 2009
- HP labs research grant including donation of 16 C-class blades. Aug 2006 - Aug 2007
- Google Summer of Code 2005 grant.
- Recipient of Intel and IEEE/TCPP travel scholarships for HiPC’03, travel scholarship for HPDC-12.
- Allahabad University merit scholarship, 1996-2000
- State scholarship for placing **7th in the state** in the XII class exams (out of ~200,000 students)
- Scholarship and prizes for placing **4th in the state** in the X class exams (out of ~500,000 students)

SELECTED PUBLICATIONS

- Arif Merchant, Mustafa Uysal, Pradeep Padala, Xiaoyun Zhu, Sharad Singhal, Kang G. Shin. Maestro: Quality-of-Service in Large Disk Arrays. In the proceedings of the *International Conference on Autonomic Computing (ICAC)* Jun 2011. Best paper award.
- Tathagata Das, Pradeep Padala, Venkat Padmanabhan, Ram Ramjee, and Kang G. Shin. LiteGreen: Saving Energy in Networked Desktops Using Virtualization. In the proceedings of the *USENIX Annual Technical Conference (USENIX ATC ’10)*. Best paper award.
- Pradeep Padala, Karen Hou, Xiaoyun Zhu et al. Automated Control of Multiple Virtualized Resources. In the proceedings of the *EuroSys 2009*.
- Pradeep Padala, Xiaoyun Zhu, Mustafa Uysal et al. Adaptive Control of Virtualized Resources in Utility Environments. In the proceedings of the *EuroSys 2007*.

SELECTED EXPERIENCE

- Senior Member of Technical Staff, VMware Oct 2011 – Current
- Research Engineer, NTT DOCOMO USA Labs Sep 2009 – Sep 2011
- Research Assistant, University of Michigan Sep 2004 – Sep 2009
- Research Intern, Microsoft Research, Bangalore May 2009 – Aug 2009
- Research Intern, HP Labs, Palo Alto May 2008 – Aug 2008
- Research Intern, HP Labs, Palo Alto May 2007 – Aug 2007
- Research Intern, HP Labs, Palo Alto May 2006 – Sep 2006
- Research Assistant, University of Florida May 2003 – Aug 2004
- Program Committee Membership: ICC’12 NGN, Eurosys 2012, Eurosys 2011, HiPC 2011, FeBID 2011, HotStorage 2011, Eurosys 2010 (Shadow PC), Xen Summit Asia 2010, HiPC 2010, VISA 2010, CloudCom 2010, HotCloud 2010.
- Open Source Experience: LogFS for Linux, html2db for converting HTML to docbook, NCURSES Programming HOWTO, TLDP contributions.

Detailed CV follows

PUBLICATIONS

Peer Reviewed Publications

- Ardalan Kangarlou, Ulas C. Kozat, Pradeep Padala, Bob Lantz, Ken Igarashi, Dongyan Xu. In-Network Live Snapshot Service for Recovering Virtual Infrastructures. *IEEE Network Magazine*. Special Issue on Cloud Computing. Jul 2011.
- Arif Merchant, Mustafa Uysal, Pradeep Padala, Xiaoyun Zhu, Sharad Singhal, Kang G. Shin. Maestro: Quality-of-Service in Large Disk Arrays. In the proceedings of the *International Conference on Autonomic Computing (ICAC)* Jun 2011. **Best paper award**.
- Tathagata Das, Pradeep Padala, Venkat Padmanabhan, Ram Ramjee, and Kang G. Shin. LiteGreen: Saving Energy in Networked Desktops Using Virtualization. In the proceedings of *USENIX Annual Technical Conference (USENIX ATC '10)*, Jun 2010. **Best paper award**.
- Pradeep Padala, Mustafa Uysal, Arif Merchant, Xiaoyun Zhu, Sharad Singhal and Kang G. Shin. Performance Differentiation for Multi-port Arrays: A Control-Theoretic Approach. In the proceedings of fourth *International Workshop on Feedback Control Implementation and Design in Computing Systems and Networks (FEBID'09)*, Apr 2009.
- Pradeep Padala, Karen Hou, Xiaoyun Zhu, Mustafa Uysal, Zhikui Wang, Sharad Singhal, Arif Merchant, Kang Shin. Automated Control of Multiple Virtualized Resources. In the proceedings of *EuroSys 2009*, Mar 2009.
- Ajay Gulati, Arif Merchant, Mustafa Uysal, Pradeep Padala, Peter Varman. Efficient and Adaptive Proportional Share I/O Scheduling. *SIGMETRICS Performance Evaluation Review*, 37(3):61–66, 2009
- Jin Heo, Xiaoyun Zhu, Pradeep Padala, Zhikui Wang. Memory Overbooking and Dynamic Control of Xen Virtual Machines in Consolidated Environments. *IFIP/IEEE Symposium on Integrated Management (IM'09)* mini-conference, June 2009
- Xiaoyun Zhu, Mustafa Uysal, Zhikui Wang, Pradeep Padala, Sharad Singhal, Arif Merchant, Kang Shin. What Does Control Theory Bring to Systems Research? in *ACM SIGOPS Operating Systems Review*, Jan 2009.
- Xue Liu, Arif Merchant, Sharad Singhal, Pradeep Padala, Mustafa Uysal, Zhikui Wang, Xiaoyun Zhu. Adaptive Control Technique for Workload Management on a Shared Hosting Platform. *Hewlett-Packard Technical Conference (HP TechCon)*, May 2008.
- Xue Liu, Xiaoyun Zhu, Pradeep Padala, Zhikui Wang, Sharad Singhal. Optimal Multivariate Control for Differentiated Services on a Shared Hosting Platform. In the proceedings of the *46th IEEE Conference on Decision and Control (CDC'07)*, Dec 2007.
- Zhikui Wang, Xiaoyun Zhu, Pradeep Padala and Sharad Singhal. Capacity and Performance Overhead in Dynamic Resource Allocation for Virtual Servers, In the proceedings of the *IFIP/IEEE Symposium on Integrated Management (IM'07)*, May 2007
- Pradeep Padala, Xiaoyun Zhu, Mustafa Uysal, Zhikui Wang, Sharad Singhal, Arif Merchant, Kenneth Salem and Kang G. Shin. Adaptive Control of Virtualized Resources in Utility Environments. In the proceedings of *EuroSys 2007*, Mar 2007
- Pradeep Padala and Kang Shin. Gvu: A View-Oriented Framework for Data Management in Grid Environments. In the proceedings of the *International Symposium on High Performance Computing (HiPC'06)*, Dec, 2006
- Pradeep Padala and Joseph N. Wilson. GridOS: Operating System Services for Grid Architectures. In the proceedings of the *International Symposium on High Performance Computing (HiPC'03)*, Dec, 2003
- Pradeep Padala, Cyrus Harrison, Nicholas Pelfort, Erwin Jansen, Michael Frank and Chaitanya Chokkareddy. OCEAN: The Open Computation Exchange and Arbitration Network, A Market Approach to Meta computing. In the proceedings of the *International Symposium on Parallel and Distributed Computing (ISPDC'03)*, Oct, 2003

Other Papers / Articles

- Pradeep Padala, Xiaoyun Zhu, Zhikui Wang, Sharad Singhal, Kang G. Shin. Performance Evaluation of Virtualization Technologies for Server Consolidation. HP labs technical report HPL-2007-59, Apr 2007.
- Pradeep Padala. A Survey of Grid File Systems. GGF Informational Document, Grid File System Working Group, Global Grid Forum

- V. Snader, W. Allcock, P. CongDuc, I. Monga, P. Padala, M. Tana and F. Travostino. Networking Issues of Grid Infrastructures. Grid Working Draft, Grid High Performance Networking Research Group, Global Grid Forum
- Pradeep Padala and Ravi Parimi. Network programming in the kernel. *Linux Journal*, 138:22–32, October 2005
- Pradeep Padala. Playing with ptrace, Part II. *Linux Journal*, 104:86–91, December 2002
- Pradeep Padala. Playing with ptrace, Part I. *Linux Journal*, 103:78–85, November 2002
- Pradeep Padala. Exploring perl modules - part 2: Creating charts with GD::Graph. *Linux Gazette*, (83), October 2002.
- Pradeep Padala. Exploring perl modules - part 1: On-the-fly graphics with perl GD module. *Linux Gazette*, (81), August 2002.
- Pradeep Padala. Mouse programming with libgpm. *Geek Culture, Linux Journal*, January 2002.
- Pradeep Padala and Prakash Bulusu. Content management with procmail. *Linux Gazette*, (73), December 2001.
- Pradeep Padala. So you like color !!! (the mysterious [[characters). *Linux Gazette*, (65), April 2001.
- Pradeep Padala. Booting Linux from the NT boot menu. *Linux Gazette*, (61), January 2001.

INVENTION DISCLOSURES / PATENTS

- A Method and Apparatus for Providing Seamless Storage to Mobile Devices. Pradeep Padala, Ulas C. Kozat, Ken Igarashi, Yudong Gao and Z. Morley Mao. Provisional patent application filed by DOCOMO USA Labs.
- Energy Savings For A Networked Computer. Venkat Padmanabhan, Ramachandran Ramjee, Tathagata Das, Pradeep Padala. Patent filed by Microsoft Research.
- Providing Quality of Service Guarantees for Shared Storage Systems using an Adaptive MIMO Controller Arif Merchant, Mustafa Uysal, Pradeep Padala. Invention disclosure by HP Labs.
- Dynamic Feedback Control Of Resources In Computing Environments. Mustafa Uysal, Pradeep Padala, Xiaoyun Zhu, Zhikui Wang, Sharad Singhal, Arif Merchant, Kenneth Salem. Patent filed by HP Labs.

ACCEPTED PROPOSALS

- Z. Morley Mao and Pradeep Padala (Co-PI). Enabling Programmable Mobile Storage Services through GENI-enabled WiMAX Base-station Capabilities. GENI Spiral3 proposal, 2011.
- Dongyan Xu and Pradeep Padala (Co-PI). OpenFlow-based Virtual Infrastructures for Cloud Computing. NSF GENI-alpha demo proposal, 2010.
- Yudong Gao, Xu Chen, Pradeep Padala, Z. Morley Mao. In-network Storage and Computation. NSF GENI Experimenter’s Workshop position paper, 2010.
- Kang Shin and Pradeep Padala (Co-author). Adaptive Resource Management in Large-Scale Virtual Data Centers. HP Labs Innovation Research Awards, 2009.
- Pradeep Padala. A Log Structured File System with Snapshots. Google Summer of Code Proposal, 2005.

DEMOS

- Pradeep Padala and Ulas Kozat. In-Network Snapshotting for GENI Experiments. DOCOMO R&D Open House, Yokosuka Research Park (YRP), Japan, Nov 2010.
- Pradeep Padala, Ardalan Kangarlou, Bob Lantz. In-Network Snapshotting for GENI Experiments. *9th GENI Engineering Conference (GEC9)*, Nov 2010.
- Ardalan Kangarlou, Pradeep Padala. Distributed Suspend and Resume for GENI Experiments. *8th GENI Engineering Conference (GEC8)*, Jul 2010.
- Pradeep Padala, Ken Igarashi, and Ulas Kozat. vSlices: Virtualization Primitives for Future Service Enabler Networks. DOCOMO R&D forum, Yokosuka Research Park (YRP), Japan, Jan 2010.
- Ken Igarashi, Makoto Takizawa, Pradeep Padala, and Ulas Kozat. Reactive Resource Management with Live Replication. DOCOMO R&D forum, Yokosuka Research Park (YRP), Japan, Jan 2010.
- Distributed Services for Grid Enabled Data Analysis, *Supercomputing Conference (SC’03)*, Nov 2003.

EXPERIENCE

- **Senior Member of Technical Staff, VMware** **Oct 2011 – Current**
 - Working on resource management in the cloud built on top of virtualized data centers.
- **Research Engineer, NTT DOCOMO USA Labs** **Sep 2009 – Current**
 - Developed GENI-VIOLIN, an in-network snapshotting system based on Openflow network virtualization. Led a team of seven people to a successful plenary session demo of GENI-VIOLIN at the GENI Engineering Conference 9 (GEC9). The demo is also shown at the DOCOMO R&D Open House in Nov 2010. A preliminary version of the demo is shown at the GENI Engineering Conference 8 (GEC8).
 - Mentored two interns during summer 2010. Led three contractors to a successful demo at the DOCOMO R&D forum, Jan 2010.
 - Helped in building a production cloud at DOCOMO USA Labs, which was used to host interns' virtual desktops during summer 2010. Evaluated virtualization technologies and advised development departments in NTT DOCOMO Japan in building production clouds.
- **Research Intern, Microsoft Research, Bangalore** **May 2009 – Aug 2009**
 - Built a measurement system to collect desktop energy usage statistics and collected statistics for nearly 120 machines
 - Developed LiteGreen, automated mechanisms for saving desktop energy using virtual machine migration. Received **best paper award at USENIX ATC'10**.
- **Research Assistant, University of Michigan** **Sep 2004 – Sep 2009**
 - Developed a framework for automating the control of a virtualized data center. The framework combines all the controllers developed in previous years. Appeared in **Eurosys'09**.
 - Evaluated and analyzed the performance of virtualization technologies Xen and OpenVZ. This work focused on understanding the core differences in hypervisor-based and container-based virtualization. Our tech report on this work got **slashdotted** and received nearly **10,000 hits** in May'07.
 - Tested the adaptive control framework in a large-scale testbed. This is part of the **open innovation research proposal** to HP Labs.
- **Research Intern, HP Labs, Palo Alto** **May 2008 – Aug 2008**

Developed an adaptive MIMO controller for HP XP disk array. This work focused on developing mechanisms for controlling large scale shared storage systems to achieve certain application performance. This work is in the process of being transferred to **HP's storage works division**. Appeared in **FEBID'09**.
- **Research Intern, HP Labs, Palo Alto** **May 2007 – Aug 2007**

Developed a framework for MIMO control of multiple resources. This work focused on developing strong control theory based framework that allows control of multiple applications sharing multiple resources. Appeared in **CDC'07**.
- **Research Intern, HP Labs, Palo Alto** **May 2006 – Sep 2006**

Developed a CPU controller for controlling multiple multi-tier applications hosted in a shared virtualized environment. Appeared in **Eurosys'07**. A simpler version of the controller is implemented in **HP's WLM** (workload manager).
- **Summer of Code Participant, Google Summer of Code** **May 2005 – Sep 2005**

Developed a log-structured file system for Linux that supports snapshots. The traditional implementation of LogFS is extended to support snapshots and experimental evaluation is done to validate the benefits of LogFS over traditional file systems like ext2.
- **Research Assistant, University of Florida** **May 2003 – Aug 2004**

Sphinx is a scheduling middleware that provides various features for scheduling jobs on a grid with dynamic resources. It uses policy based execution and data scheduling to provide near optimal execution of work flows. This project was developed under the auspices of the **GriPhyN (Grid Physics Network)** project. A demonstration of the scheduler in a large-scale experimental testbed is shown in **SC'03**.
- **Masters Thesis Research - Design and Implementation of GridOS: Operating System Services for Grid Architectures** Developed operating system services for grid architectures that provide

high performance using automatic buffer tuning and zero copy mechanisms in the kernel. A FTP client and server is developed to evaluate the performance of GridOS modules. Appeared in **HiPC'03**.

- **OCEAN (Open Computation Exchange and Auctioning Network)** provides software infrastructure to support automated commercial buying and selling of dynamic distributed computing resources over the Internet. Contributed and led the design of various components and have been instrumental in developing a prototype. Appeared in **ISPDC'03**.
- **Teaching Assistant** for Programming Language Principles **Aug 2003 – Dec 2003**
Developed specification for a language called Garnet that is a subset of Ruby. Helped students in developing a lexer, parser, interpreter and compiler for the language.
- **Teaching Assistant** for Introduction to Operating Systems **Jan 2003 – Aug 2003**
Duties included leading a recitation section and helping students learn MINIX.
- **Teaching Assistant** for Introduction to Software Engineering **Aug 2001 – Jan 2003**
Duties included leading two recitation sections, administering the Sybase and Oracle databases. Guided various projects involving Perl DBI and JSP, JDBC.
- **Software Engineer**, Hughes Software Systems, India **Aug 2000 – Aug 2001**
Main Architect of the back end for the Web based network management.
- **Open Source Experience**
 - *NCURSES Programming HOWTO*: Developed a comprehensive guide to programming with NCURSES. Ncurses and its sister libraries are explained in detail with a lot of ready-to-use examples.
 - Developed *html2db*, a tool for converting HTML documents into docbook SGML or XML.
 - Contributed to *TLDP (The Linux Documentation Project)* by reviewing various HOWTOs and helped in converting documents to docbook. Answered numerous questions and solved problems regarding Linux as a member of *The Linux Gazette Answer Gang*.

PROFESSIONAL ACTIVITIES

- **Program Committee Member**
 - USENIX Annual Technical Conference (ATC) 2012
 - International Conference on Communications (ICC) 2012, Next Generation Symposium (NGN)
 - Eurosys 2012, Eurosys 2011, Eurosys 2010 (Shadow PC)
 - International Conference on Cloud Computing Technology and Science (CloudCom) 2011, 2010
 - International Conference on High Performance Computing (HiPC) 2011, 2010
 - International Workshop on Feedback Control Implementation and Design in Computing Systems and Networks (FeBID) 2011
 - Workshop on Hot Topics in Storage and File Systems (HotStorage) 2011
 - Xen Summit Asia 2010
 - Workshop on Virtualized Infrastructure Systems and Architectures (VISA) 2010
 - USENIX Workshop on Hot Topics in Cloud Computing (HotCloud) 2010
- Panel member, International Workshop on Mobile Computing and Clouds (MobiCloud 2010).
- Secretary for the GFS-WG (Grid File Systems Working Group) 2002-2003
- Reviewed papers for
 - Conferences: INFOCOM'10, OSDI'08, DSOM'07, HiPC'02
 - Journals: JPDC, TAAS, TNET, JISA, TC