

Prateek Sharma

Contact Information

School of Informatics, Computing, and Engineering
Luddy Hall, Room 4126
700 N Woodlawn Ave
Bloomington, IN - 47408

prateeks@iu.edu
<http://homes.sice.indiana.edu/prateeks>
Cell: (+1) 413-801-9813
Office: (+1) 812-855-8702

Research Interests

- I am a systems researcher with broad interests in large scale systems, cloud computing, and data processing.

Education

- **University of Massachusetts Amherst**
Ph.D. in Computer Science Sept 2013 - Aug 2018
Advisor: Prof. Prashant Shenoy
- **Indian Institute of Technology - Bombay**
M.Tech. in Computer Science July 2009 - July 2012
Advisor: Prof. Purushottam Kulkarni
- **Birla Institute of Technology and Science - Pilani**
M.Sc.(Tech.) in Information Systems July 2005 - June 2009

Academic Appointments

- **Indiana University** Aug 2018–
Assistant Professor, Department of Intelligent Systems Engineering

Awards

- Outstanding Dissertation Award. College of Information and Computer Sciences, University of Massachusetts Amherst
- Outstanding Young Researcher In Computer Science and Mathematics selected for the Heidelberg Laureate Forum 2019
- Travel grant recipient: HPDC 2012, EuroSys 2015, EuroSys 2016, COMSNETS 2016, Middleware 2016, SIGMETRICS 2017

Funding

- NSF AI Institute. ICICLE: Intelligent CyberInfrastructure with Computational Learning in the Environment. Senior Personnel. My portion: \$ 386,591.00. Nov 2021–Oct 2026.
- Industry-Academia Collaboration in Energy + Manufacturing Analytics. : Central Indiana Corporate Partnership Foundation. Senior Personnel. \$80,000. July 2022–Jan 2024.

Publications

(Student advisees underlined.)

As of Nov 2022, my research has been cited more than 1200 times.

- 28 **Prateek Sharma**. Challenges and Opportunities in Sustainable Serverless Computing. In *HotCarbon 2022: 1st Workshop on Sustainable Computer Systems Design and Implementation*. Acceptance Rate = 30%.
- 27 Alexander Fuerst and **Prateek Sharma**. Locality-aware Load-Balancing For Serverless Clusters. In *Proceedings of the 31st ACM Symposium on High-Performance Parallel and Distributed Computing (HPDC)*, July 2022. Acceptance Rate = 19%
- 26 JCS Kadupitiya, Vikram Jadhao, **Prateek Sharma**. SciSpot: Scientific Computing On Temporally Constrained Cloud Preemptible VMs. *IEEE Transactions on Parallel and Distributed Systems* 2022
- 25 Alexander Fuerst, Stanko Novakovic, Inigo Goiri, Gohar Irfan Chaudhry, **Prateek Sharma**, Kapil Arya, Kevin Broas, Eugene Bak, Mehmet Iyigun, and Ricardo Bianchini. Memory-Harvesting VMs in Cloud Platforms. In *Proceedings of the Twenty-Seventh International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS 2022)*
- 24 Vikram Jadhao and **Prateek Sharma**. Molecular Dynamics Simulations on Cloud Computing and Machine Learning Platforms. In 2021 IEEE 14th International Conference on Cloud Computing (CLOUD), 751-753 (*Invited Paper*).
- 23 Alexander Fuerst and **Prateek Sharma**. FaasCache: Keeping Serverless Computing Alive With Greedy-Dual Caching. In *Proceedings of the Twenty-Sixth International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS 2021)* Acceptance Rate = 18.8%
- 22 Sahil Tyagi and **Prateek Sharma**. Taming Resource Heterogeneity In Distributed ML Training With Dynamic Batching. In *1st IEEE International Conference on Autonomic Computing and Self-Organizing Systems (ACSOS)*, August 2020
- 21 Alex Fuerst, Ahmed Ali-Eldin, Prashant Shenoy, and **Prateek Sharma**. Cloud-scale VM Deflation for Running Interactive Applications On Transient Servers. In *Proceedings of the 29th ACM Symposium on High-Performance Parallel and Distributed Computing (HPDC)*, June 2020. Acceptance Rate = 22%
- 20 JCS Kadupitiya, Vikram Jadhao, **Prateek Sharma**. Modeling The Temporally Constrained Preemptions of Transient Cloud VMs. In *Proceedings of the 29th ACM Symposium on High-Performance Parallel and Distributed Computing (HPDC)*, June 2020. Acceptance Rate = 22%
- 19 David Irwin, Prashant Shenoy, Pradeep Ambati, **Prateek Sharma**, and Supreeth Shastri. The Price is (Not) Right: Reflections on Pricing for Transient Cloud Servers. In *The 28th International Conference on Computer Communications and Networks (ICCCN 2019)*, Valencia, Spain, July 2019.
- 18 Ahmed Ali-Eldin, Jonathan Westin, Bin Wang, **Prateek Sharma**, and Prashant Shenoy. SpotWeb: Running Latency-sensitive Distributed Web Services on Transient Cloud Servers. In *Proceedings of the 28th ACM Symposium on High-Performance Parallel and Distributed Computing (HPDC)*, Phoenix, AZ, June 2019. Acceptance Rate = 20.75% **Best-paper nominee (Top 3 out of 22 accepted papers)**
- 17 Lucas Chaufournier, Ahmed Ali-Eldin, **Prateek Sharma**, and Prashant Shenoy. Performance Evaluation of Multi-Path TCP For Data Center and Cloud Workloads. In *ACM/SPEC International Conference on Performance Engineering (ICPE 2019)*, Mumbai, India, April 7-11.
- 16 **Prateek Sharma**, Ahmed Ali-Eldin, and Prashant Shenoy. Resource Deflation: A New Approach For Transient Resource Reclamation. In *Proceedings of ACM Eurosys*, March 2019. Acceptance rate=21%
- 15 **Prateek Sharma**, Stephen Lee, Tian Guo, David Irwin, and Prashant Shenoy. Managing Risk in a Derivative IaaS Cloud. *IEEE Transactions on Parallel and Distributed Systems*, 29(8):1750–1765, Aug 2018.
- 14 Lucas Chaufournier, **Prateek Sharma**, Franck Le, Erich Nahum, Prashant Shenoy, and Don Towsley. Fast transparent virtual machine migration in distributed edge clouds. In *Proceedings of the second IEEE/ACM Symposium on Edge Computing*, pages 1–12, October 2017.

- 13 **Prateek Sharma**, Patrick Pegus II, David Irwin, Prashant Shenoy, John Goodhue, and James Culbert. Design and Operational Analysis of a Green Data Center. *IEEE Internet Computing. Special Issue on Energy-Efficient Data Centers*, 21(4):16–24, July / August 2017
- 12 **Prateek Sharma**, David Irwin, and Prashant Shenoy. Portfolio-driven Resource Management for Transient Cloud Servers. In *Proceedings of ACM on Measurement and Analysis of Computing Systems (SIGMETRICS)*, volume 1, pages 5:1–5:23. ACM, June 2017
- 11 **Prateek Sharma**, David Irwin, and Prashant Shenoy. Keep It Simple: Bidding for Servers in Today’s Cloud Platforms. *IEEE Internet Computing*, 21(3):88–92, May/June 2017
- 10 David Irwin, **Prateek Sharma**, Supreeth Shastri, and Prashant Shenoy. The Financialization of Cloud Computing: Opportunities and Challenges. In *2017 26th International Conference on Computer Communication and Networks*, pages 1–11, July 2017 (Invited Paper)
- 9 **Prateek Sharma**, Lucas Chaufourmier, Prashant Shenoy, and Y. C. Tay. Containers and Virtual Machines at Scale: A Comparative Study. In *Proceedings of the 17th International Middleware Conference*, pages 1:1–1:13. ACM, 2016. Acceptance rate = 19%
- 8 **Prateek Sharma**, David Irwin, and Prashant Shenoy. How Not to Bid the Cloud. In *Proceedings of the 8th USENIX Workshop on Hot Topics in Cloud Computing (HotCloud)*. USENIX, June 2016. Acceptance rate = 31%
- 7 **Prateek Sharma**, Tian Guo, Xin He, David Irwin, and Prashant Shenoy. Flint: Batch-Interactive Data-Intensive Processing on Transient Servers. In *Proceedings of the Eleventh European Conference on Computer Systems (EuroSys)*, pages 6:1–6:15. ACM, 2016. Acceptance rate = 21%
- 6 **Prateek Sharma**, Purushottam Kulkarni, and Prashant Shenoy. Per-VM Page Cache Partitioning for Cloud Computing Platforms. In *2016 8th International Conference on Communication Systems and Networks (COMSNETS)*, pages 1–8, Jan 2016. Acceptance rate = 27%
- 5 Supreeth Subramanya, Tian Guo, **Prateek Sharma**, David Irwin, and Prashant Shenoy. SpotOn: A Batch Computing Service for the Spot Market. In *Proceedings of the Sixth ACM Symposium on Cloud Computing (SoCC)*, pages 329–341. ACM, 2015. Acceptance rate = 22%
- 4 **Prateek Sharma**, Stephen Lee, Tian Guo, David Irwin, and Prashant Shenoy. Spotcheck: Designing a Derivative IaaS Cloud on the Spot Market. In *Proceedings of the Tenth European Conference on Computer Systems (EuroSys)*, pages 16:1–16:15. ACM, 2015. Acceptance rate = 21%
- 3 Rahul Singh, **Prateek Sharma**, David Irwin, Prashant Shenoy, and K.K. Ramakrishnan. Here Today, Gone Tomorrow: Exploiting Transient Servers in Data Centers. *IEEE Internet Computing*, 18(4), July / August 2014
- 2 **Prateek Sharma** and Purushottam Kulkarni. Singleton: System-wide Page Deduplication in Virtual Environments. In *Proceedings of the 21st international symposium on High-Performance Parallel and Distributed Computing (HPDC)*, pages 15–26. ACM, 2012. Acceptance rate = 16%
- 1 Praveen Ranjan Srivastava, Vinod Ramachandran, Manish Kumar, Gourab Talukder, Vivek Tiwari, and **Prateek Sharma**. Generation of Test Data Using Meta Heuristic Approach. In *TENCON IEEE Region 10 Conference*, pages 1–6, Nov 2008

Patents

- 1 Karthik Nagesh, Ullas B Nambiar, **Prateek Sharma**, and Niranjana Thirumale. Management of computing system element migration. Patent Number: US 09697266. Grant Date: July 2017

Research Experience

- **University of Massachusetts Amherst**
 - Advisor: Prof. Prashant Shenoy

- Thesis on "Transiency-driven Resource Management for Cloud Computing Platforms".
- Designed policies, mechanisms, and systems for resource management and fault-tolerance, for transiently available (rather than continuously available) computational resources.
- Explored the role and effectiveness of hardware and operating system virtualization.
- Investigated the role of multi-path networking for migrating application state in edge clouds, and to improve data center application performance.

- **Indian Institute of Technology Bombay**

- Advisor: Prof. Purushottam Kulkarni

- As part of my masters thesis, investigated memory management in virtualized environments.
- Designed and implemented memory overcommitment techniques for Linux and KVM.

Work Experience

- **VMWare Performance Engineering** June - Aug 2017
Palo Alto, CA
 - Mentors: Reza Taheri and Tariq Magdon-Ismael
 - Research project on detecting performance anomalies in ESX VMs with unsupervised machine learning.
- **Microsoft Research** May - Aug. 2014
Mountain View, CA
 - Mentor: Sriram Rao
 - Erasure coding for intermediate map-reduce data in hadoop file systems.
- **EMC Data Storage Systems** Aug 2012 - May 2013
Bangalore, India
 - Software Engineer, R&D Team
 - Worked broadly in the areas of cloud computing and big-data analytics.
- **Dept. of Computer Science & Engineering - IIT Bombay** July 2009 - July 2012
Mumbai, India
 - System Administrator
 - Maintained department-wide computing facilities, and set up the virtualization infrastructure.
- **IBM India Software Lab** July 2008 - Dec. 2008
Pune, India
 - Intern. Implemented Eclipse plugins for business report generation.
- **The Tata Power Company** May 2007 - July 2007
Mumbai, India
 - Summer Intern

Teaching

- **ENGR-E 516/CSCI-B 649: Engineering Cloud Computing** Fall 2022, 2021, 2020, 2019
- **CSCI-B 534/ENGR-E 510 : Distributed Systems** Spring 2022, 2021, 2020, 2019
- **CSCI-P 436/CSCI-P 536/ENGR 599 : Operating Systems** Fall 2018
- Co-taught with Prof. Martin Swany
- Guest Lectures:
 - ENGR-E 500 : Introduction to Intelligent Systems Engineering (Fall 2018, Spring 2019, Fall 2019)
 - ENGR-E 599 : High Performance Big Data Systems (Fall 2018)

Teaching experience at the University of Massachusetts Amherst:

- **Teaching Assistant, CS677: Distributed Operating Systems** Spring 2015
 - Helped design assignments, and graded student work.
- **Teaching Assistant, CS377: Operating Systems** Spring 2014
 - Taught discussions and tutorials, and graded student work.
- **Teaching Assistant, CS311: Introduction to Algorithms** Fall 2013
 - Taught discussions and tutorials, and graded student work.
- Guest lectured in six different classes:
 - "Linux kernel design", Operating Systems. Spring 2014, Fall 2015, Fall 2016.

- “System Administration”, Introduction to UNIX & Linux. Fall 2015
- “Cloud Computing”, Distributed Operating Systems. Spring 2016.
- “Remote Procedure Calls”, Distributed Operating Systems. Fall 2016.

Service

- NSF Panelist (2021)
- Editorial Board (Serverless Computing Area), Journal of Systems Research (2021–)
- **Conference Program committee member:** HPDC 2023, CCGrid 2023, HPDC 2022, CCGrid 2022, EuroSys 2022, SYSTOR 2021, ICDCS 2021, HPDC 2021, HPDC 2020, IEEE CLOUD 2020
- **Shadow program committee member:** EuroSys 2019, EuroSys 2016, EuroSys 2017, ASPLOS 2018
- **External reviewer:** IEEE INFOCOM (2019), ACM Transactions on Networking (2019), IEEE Transactions on Parallel and Distributed Systems (2018, 2019, 2020, 2021, 2022), Elsevier Future Generation Computer Systems (2017, 2018, 2019, 2021), IEEE Internet Computing (2019), ACM Transactions on Cloud Computing (2019, 2022), IEEE Transactions on Network and Service Management (2020), ACM Transactions on Internet of Things (2020), IEEE Transactions on Services Computing (2020), Concurrency and Computation: Practice and Experience (2018, 2019, 2020, 2021), ACM Transactions on Performance (2021)
- **Conferences:** Session Chair at HPDC 2021, Session Chair at SYSTOR 2021
- **Misc:** NDSEG Fellowship panelist (2020), US-India Education Forum panelist (2019), Video Review Committee Member in HPDC 2020
- **Departmental Committees:** Graduate Admissions (2019, 2020, 2021, 2022), Undergraduate Curriculum (2020–2021), Faculty Hiring (2019, 2020, 2022)

Invited Talks

- Microsoft Research Bangalore, May 2019, “Resource deflation: A new approach for transient resource reclamation.”
- IEEE International Symposium on Cloud HPC, Sep 2021, “Molecular Dynamics Simulations on Cloud Computing and Machine Learning Platforms.”
- Indian Institute of Technology Bombay, Aug 2022, “Sustainable Serverless Computing: Challenges and Opportunities.”

Advising

- **PhD:** Alexander Fuerst (since Fall 2019), Abdul Rehman (since Fall 2022).
- Previously advised: Sahil Tyagi (Fall 2019—Summer 2021), Vinita Boolchandani [co-advised with Prof. Vikram Jadha] (Fall 2020—Summer 2021)
- **Undergraduate (UROC):** Joshua Baker (Spring 2019, Fall 2019), Seungmin Lee (Fall 2019), Josep Han (Spring 2019)
- **Independent Study:** Niranda Dilshan Perera (Fall 2020, Spring 2021)
- **PhD Qualification Committee:** Jeremy Musser, Parichit Sharma, Jonathan Klinginsmith, Niranda Dilshan Perera, Dominick Kovacs
- **PhD Thesis Committee:** Vibhatha Abeykoon, Pulasthi Supun Wickramasinghe, Niranda Dilshan Perera, JCS Kadupititya