

# Prateek Sharma

## Contact Information

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## Research Interests

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

## Education

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

## Academic Appointments

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

## Awards

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- 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

## Publications

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(*Student advisees underlined.*)

- 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, **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*.
- 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*.

- 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**, 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. **Best-paper nominee.**
- 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 Chaufournier, 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

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## Patents

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

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## 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.

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## 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**
- Summer Intern

May 2007 - July 2007  
Mumbai, India

## Teaching

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- **ENGR-E 516/CSCI-B 649: Engineering Cloud Computing** Fall 2020, 2019
- **CSCI-B 534/ENGR-E 510 : Distributed Systems** Spring 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
  - ENGR-E 599 : High Performance Big Data Systems

*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

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- **Program committee member:** HPDC 2020, IEEE CLOUD 2020
- **Shadow program committee member:** EuroSys 2019, EuroSys 2016, EuroSys 2017, ASPLOS 2018, EuroSys 2019
- **External reviewer:** IEEE INFOCOM, ACM Transactions on Networking, IEEE Transactions on Parallel and Distributed Systems, Elsevier Future Generation Computer Systems, IEEE Internet Computing, ACM Transactions on Cloud Computing, Concurrency and Computation: Practice and Experience, IEEE TNSM
- **Misc:** NDSEG Fellowship panelist, US-India Education Forum panelist

## Advising

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- **PhD:** Alexander Fuerst (since Fall 2019), Sahil Tyagi (since Fall 2019)
- **Undergraduate:** Joshua Baker (Spring 2019, Fall 2019), Seungmin Lee (Fall 2019), Jui-Yang Hsu (Fall 2020)