

Rahul Singh

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Education

Ph.D. candidate in Computer Science, University of Massachusetts, *Amherst, MA* May 2010 - Present
M.S. in Computer Science, University of Massachusetts, *Amherst, MA* May 2010
B.Tech. in Computer Science, IIT Guwahati, *Guwahati, India.* May 2005

Publications

Autonomic Mix-Aware Provisioning for Non-Stationary Data Center Workloads

Rahul Singh, Upendra Sharma, Emmanuel Cecchet, and Prashant Shenoy. *Proceedings of the 7th International Conference on Autonomic Computing and Communications (ICAC 2010), Washington, DC, June 2010.* Nominated for the Best Student Paper Award.

Predico: Analytical Modeling for What-if Analysis in Complex Data Center Applications

Rahul Singh, Prashant Shenoy, Weibo Gong, Maitreya Natu, Vaishali Sadaphal, and Harrick Vin. Technical Report UM-CS-2010-062.

Dolly: Database Provisioning for the Cloud

Emmanuel Cecchet, Rahul Singh, Upendra Sharma, and Prashant Shenoy. *To Appear in the Proceedings of the ACM SIGPLAN/SIGOPS International Conference on Virtual Execution Environments (VEE 2011), Newport Beach, CA, March 9-11, 2011*

ZZ and the Art of Practical BFT

Tim Wood, Rahul Singh, Arun Venkataramani, Prashant Shenoy, and Emmanuel Cecchet. *To Appear in Eurosys 2011, Salzburg, Austria, April 10-13, 2011*

Analyzing the Structure and Evolution of Massive Telecom Graphs

Amit A. Nanavati, Rahul Singh, Dipanjan Chakraborty, Koustuv Dasgupta, Sougata Mukherjea, Gautam Das, Siva Gurumurthy, and Anupam Joshi. *IEEE Transactions on Knowledge and Data Engineering (TKDE), Volume 20, May 2008.*

Social Ties and their Relevance to Churn in Mobile Telecom Networks

Koustuv Dasgupta, Rahul Singh, Balaji Vishwanathan, Dipanjan Chakraborty, Sougata Mukherjea, Amit A. Nanavati, and Anupam Joshi. *Proceedings of the 11th International Conference on Extending Database Technology (EDBT 2008), Nantes, France, March 2008.*

Research Experience

Laboratory for Advanced System Software, Univ. of Massachusetts, Amherst Fall 2007 – Present
Research Advisor: Prof. Prashant Shenoy

I have been a research assistant in the Laboratory for Advanced System Software (LASS) under the guidance of Professor Prashant Shenoy, since joining UMass. My current research broadly deals with issues related to managing large data centers and applications running on them. In my last research project, I focused on the problem of predicting the behavior of large-scale data center applications under hypothetical *what-if* scenarios. I used queuing-theoretic and regression-based techniques to model the workload and resource utilization in large-scale distributed applications. In the past, I have designed and implemented a provisioning scheme for multi-tier applications to handle non-stationarity in web workloads. I have also been involved in designing and implementing a novel provisioning technique for provisioning databases on the cloud. Finally, I have been a part of research related to providing practical Byzantine fault tolerance using virtual machines.

June 2010 – Sep.
2010

Internship, IBM Almaden Research Lab, San Jose, CA

Mentors: Dr. Sandeep Uttamchandani and Nagapramod Mandagere

In this internship I contributed to the Rx project that deals with solving management issues in the entire end-to-end software stack comprising of the storage layer, the hypervisor layer and the servers running inside virtual machines. The backup/restore operations available in various technologies like IBM storage controllers, IBM DB2, IBM GPFS and VMWare ESX servers were explored. I also used various I/O workload generators like IOZone and IOMeter.

June 2009 –
August 2009

Internship, TCS Innovation Labs (TRDDC), Systems Research Lab, Pune, India

Mentors: Dr. Harrick Vin and Dr. Maitreya Natu

This internship dealt with the problem of predicting the effects of anticipated workload changes on large-scale systems. I implemented a tool using Python and R, that takes monitoring logs from applications and answers *what-if* queries by automatically generating models to capture workload-change effects. Monitoring-data collected from two large-scale financial applications running on data centers was analyzed using this tool and interesting *what-if* exploration was performed.

Sep. 2006 –
Aug. 2007

Technical Staff Member, IBM India Research Lab, New Delhi, India

Mentors: Dr. Amit A. Nanavati and Dr. Sougata Mukherjea

My research project focused on the analysis of mobile phone data from one of the largest mobile phone providers in India. This project involved processing large amounts of call data and analyzing it using scripts written in Perl. I looked at various graph algorithms and the issues involved in applying these algorithms to large-scale graphs. I also implemented novel algorithms to solve the problem of predicting the users who are about to leave a certain mobile phone provider and join another network.

Graduate Coursework

Operating System Kernel Lab
Advanced Operating Systems
Seminar on Green Computing
Advanced Algorithms

Artificial Intelligence
Machine Learning
Modern Computer Architecture
Performance Evaluation of Systems

References

Prof. Prashant Shenoy

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Dr. Harrick Vin

Head, Systems Research Lab
Tata Research Development and Design Centre,
Pune, India
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Dr. Sougata Mukherjea

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Center
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