Prof. Varsha Apte, Associate Professor, IIT Bombay

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Research Interests: Performance Management of Distributed Applications, Performance analysis of computer systems and networks using stochastic models, performance measurement tools.

Publications

Please note, older papers are under my maiden name *Mainkar*

Conference Papers and Presentations

1. “MASTH Proxy: An Extensible Platform for Web Overload Control”, Vipul Mathur, Sanket Dhopeshwarkar, Varsha Apte, accepted as poster paper in International Conference on the World Wide Web, April 2009.

2. "Improving the IEEE 802.11 MAC Layer Handoff Latency to Support Multimedia Traffic", Yogesh Powar and Varsha Apte, accepted in the IEEE Wireless Communications and Networking Conference 2009.

3. "PerfCenter: a performance modeling tool for application hosting centers", Akhila Deshpande, Varsha Apte and Supriya Marathe, Proceedings of the 7th international workshop on Software and performance, June 2008, pages 79-90.

4. A Proxy-based Self-Tuned Overload Control for Multi-Tiered Server Systems, Rukma P. Verlekar and Varsha Apte, in HiPC'07, the 14th Annual IEEE International Conference on High Performance Computing, Goa, India, December 2007.

5. PerfCenter: A Methodology and Tool for Performance Analysis of Application Hosting Centers , Rukma P. Verlekar, Varsha Apte, Bhavish Aggarwal and Prakhar Goyal, in MASCOTS'07, the 15th Annual Meeting of the IEEE International Symposium on Modeling, Analysis, and Simulation of Computer and Telecommunication Systems, Istanbul, October 2007.

6. An Autonomous Distributed Admission Control Scheme for IEEE 802.11 DCF , Preetam Patil and Varsha Apte, In QShine: International Conference on Heterogeneous Networking for Quality, Reliability, Security and Robustness, Vancouver, Canada, August 2007.

7. AutoPerf: An Automated Load Generator and Performance Measurement Tool for Multi-tier Software Systems , Shrirang Shirodkar and Varsha Apte, Short Paper (Poster) in WWW'07, Banff, Canada, May 2007.

8. An Overhead and Resource Contention Aware Analytical Model of Overloaded Web Servers , Vipul Mathur and Varsha Apte, in Proceedings of Workshop on Software Performance '07, Buenos Aires, Argentina, February 2007.

9. A Methodology and Tool for Performance Analysis of Distributed Server Systems , Rukma P. Verlekar and Varsha Apte, (short paper) in Preoceedings of the International Conference on Software Engineering (Emerging Results Track), Shanghai, May 2006.

10. Improving the Accuracy of WLAN based Location Determination Using Kalman Filter and Multiple Observers , Raman Kumar K. Varsha Apte, Yogesh Powar in Wireless Communications and Networking Conference (WCNC), Las Vegas, April 2006.

11. A Measurement Study of the Linux TCP/IP Stack Performance and Scalability on SMP systems , Shourya P. Bhattacharya and Varsha Apte, in the Proceedings of the 1st International Conference on COMmunication Systems softWAre and middlewaRE (COMSWARE), New Delhi, India, January 2006.

12. A tool for automated resource consumption profiling of distributed transactions , B. Nagaprabhanjan and Varsha Apte, to appear in Lecture Notes in Computer Science, Springer-Verlag - Proceedings of the International Conference on Distributed Computing and Internet Technology (ICDCIT), Bhubaneshwar, India, December 2005.

13. PLUS-DAC: A Distributed Admission Control scheme for IEEE 802.11e WLANs , Kiran K. Gavini, Varsha Apte, Sridhar Iyer, in the Proceedings of the International Conference on Networking (ICON), Kuala-Lumpur, Malaysia, November 2005.

14. Sizing of IEEE 802.11b Wireless LANs" , Preetam Patil and Varsha Apte, in the Proceedings of the 3rd ACM Workshop on Mobile Applications and Services in WLAN Hotspots (as Poster), held in conjunction with ACM Mobicom, Cologne, Germany, September 2005.

15. "A Combined LIFO-Priority Scheme for Overload Control of E-commerce Web Servers" , Naresh Singhmar, Vipul Mathur, Varsha Apte and D. Manjunath, Proceedings of the International Infrastructure Survivability Workshop (affiliated with the 25th IEEE International Real-Time Systems Symposium), Lisbon, Portugal, 2004.

16. "A Computational Complexity-Aware Model for Performance Analysis of Software Servers" , Vipul Mathur and Varsha Apte, To be published in the Proceedings of the IEEE/ACM Symposium on Modeling, Analysis and Simulation of Computer and Telecommunication Systems", Volendam, Netherlands, October, 2004.

17. "Capacity Analysis of the GSM Short Message Service" , Nilesh Agarwal, Leena Chandran-Wadia and Varsha Apte in the Proceedings of the National Conference on Communications, Bangalore, India, 2004.

18. Performance Comparison of Dynamic Web Platforms" , Varsha Apte, T. Hansen, and P. Reeser, in the Symposium on Performance Evaluation of Computer and Telecommunication Systems, 2001.

19. "Internet Application Performance: A Signature-Based Empirical Approach" , A. Avritzer, R. Farel, K. Futamura, M. Hosseini-Nasab, A. Karasaridis, V. Mainkar, K. Meier-Hellstern, P. Reeser, P. Wirth, F. Hubner, D. Lucantoni, in International Teletraffic Congress, 2001.

20. Availability Analysis of Transaction Processing Systems Based on User Perceived Performance" , 16th Symposium on Reliable Distributed Systems, Durham, NC, October 1997.

21. "Fixed Point Iteration Using Stochastic Reward Nets" , V. Mainkar and K. Trivedi, 6th International Workshop on Petri Nets and Performance Models, 1995. (Expanded Version)

22. "Reliability Modeling Using Markovian and Non-Markovian Petri-Nets" V. Mainkar and Manish Malhotra. Invited paper in Int'l Conference on Fault Tolerant Systems, Madras, India, 1995.

23. "Transient Analysis of Real-Time Systems Using Deterministic and Stochastic Petri Nets", V. Mainkar and K. Trivedi, Int'l Workshop on the Quality of Communication-Based Systems, 1994. (Expanded Version)

24. "Techniques and Tools for Reliability and Performance Evaluation: Problems and Perspectives", Boudewijn R. Haverkort, Andy Rindos, Kishor Trivedi and V. Mainkar, 7th International Conference on Modelling Techniques and Tools for Computer Performance Evaluation, May 1994.

25. "Fast Approximate Computation of Response Time Distribution in Open Markovian Network of Queues", V.Mainkar, S. Woolet and K. Trivedi. Presented at 7th International Conference on Modelling Techniques and Tools for Computer Performance Evaluation, May 1994.

26. "Sensitivity Analysis of Markov Regenerative Stochastic Petri Nets" V.Mainkar, H. Choi and K. Trivedi. In the Fifth International Workshop on Petri Nets and Performance Models, Oct. 1993.

27. Approximate Analysis of Priority Scheduling Systems using Stochastic Reward Nets", V.Mainkar and K. Trivedi. In Proceedings of the 13th Intl. Conf. on Distributed Computing Systems, Pittsburgh, May 25-28, 1993.

28. "Sensitivity Analysis of Deterministic and Stochastic Petri Nets", H. Choi,

V.Mainkar and K. Trivedi. In MASCOTS Conference Proceedings, San Diego, Jan 17-20, 1993.

29. "Performance Modeling Using SHARPE", V.Mainkar anD K. Trivedi. Eighth Symp. on Reliability in Electronics, RELECTRONIC'91, Budapest, Hungary, August 1991.

Journal Papers, Book Chapters

1. "An overhead and resource contention aware analytical model for overloaded Web servers", Vipul Mathur and Varsha Apte, Journal of Systems and Software, Volume 82, Issue 1, January 2009, pages 39-55.

2. "Performance Comparison of Dynamic Web Platforms" , V. Apte T. Hansen, and P. Reeser, *Computer Communications: Special Issue on Performance Evaluation of IP Networks and Services* (26):8, May 2003.
Listed as one of the Top Ten Downloaded artices from this journal in the year 2003.

3. "Transient Analysis of Non-Markovian Queues via Markov Regenerative Processes", D. Logothetis, V. Mainkar and K. Trivedi in *Probability and Statistics: A. J. Medhi Festschrift*, New Age International, 1996.

4. "Sufficient Conditions for the Existence of a Fixed Point in Stochastic Reward Net-Based Iterative Models" , V. Mainkar and K. Trivedi, *IEEE Transactions on Software Engineering* (22):9, September 1996, Special Section : Best Papers of the Sixth International Workshop on Petri Nets and Performance Models, 1995.

5. "Reliability of life-critical real-time systems", . L.Tomek, V. Mainkar, R. Geist and K. Trivedi. *Proceedings of the IEEE* (82):1, January 1994.

6. "Numerical Computation of Response Time Distributions Using Stochastic Reward Nets" , J. Muppala, K. Trivedi and V. Mainkar, *Annals of Operations Research: Special Issue on Queueing Networks* (48), 1994, pp. 155-184.

Research Grants

- May 2003, Automated Performance Analysis of Distributed Systems, Rs. 700,000 (=$15,555), from Ministry of Human Resource Development, India
- June 2004, Automated Discovery of Topology and Resource Requirement of Distributed Applications, Joint Project with Prof. Umesh Bellur (KReSIT), $36,000, from Intel IT Research Council
- June 2004, Improving the Linux TCP/IP Stack Performance on Symmetric Multiprocessors, , Rs. 125,000 ($2778) from UNM Systems, Inc.
- May 2005, Design and Analysis of Multiservice Wireless Networks, Rs. 1,200,000, ($26,667),

from Ministry of Human Resource Development, India
- June 2005, Performance Analysis of the Staged Event-Driven Architecture, Rs, 200,000 ($4444) from Amazon Development Corporation, India.
- July 2006, TCS Laboratory for Intelligent systems, Joint with eight PIs, Rs 19,900,000 ($442,222), from Tata Consultancy Services.
- July 2007, IBM Faculty Award, $20,000
- July 2007, IBM Faculty Award, $20,000

Courses Taught

- Performance Analysis of Computer Systems and Networks: Graduate Course
- Computer Networks: Undergraduate Course
- Self-Tuned Computing Systems: Graduate Course
- Operating Systems: Undergraduate Course

Ph.D. Students (Current)

- Vipul Mathur: Software Performance, Self-tuned servers, Overload control of servers
- Preetam Patil: Design and Analysis of Wireless Networks

Masters Students – Current and Graduated,

- Sanket Dhopeshwarkar (Admission/Overload Control of Web Servers)
- Piyush Masrani (Resource Management of VM Clusters)
- Niranjan Kumar Puram (Enhancement and Validation of PerfCenter)
- Yogesh Powar (Fast Handoffs in WLANs)
- Supriya Marathe (Extension of PerfCenter to Closed Queuing Systems)
- Rahul Gundecha (Optimal Control of Virtual Machines)
- Shrirang Shirodkar (AutoPerf)
- Rukma P. Verlekar (Admission/Overload Control of Web Servers)
- Kautilya Jain (Integrated Modeling Tool for Distributed Systems)
- Rishi Gupta (A Fine Grained Profiler for Java Servers)
- Anand Parhar (Fast Handoff in WLANs for Multimedia)
- Arun Shejwal (Design and implementation of Admission control for IEEE 802.11e LANs)
- Rajat Goel (SEDA Performance Analysis)
- Vaibhav Selot (AutoPerf)
- Raman Kumar Kakilate (Location Determination using Wireless LANs)
- Kiran Kumar G. (Admission Control Wireless LANs)
- Shourya P. Bhattacharya (Linux TCP/IP Performance).
- Nagaprabhanjan Bellari (AutoPerf-Resource Requirement Discovery Tool)
- Nitin Gupta (Modeling of Wireless Ad-Hoc Network Protocols)
- Bhavesh Kotak (Distributed Systems Performance Modeling Tool)
- Naresh Kumar (Overload Control of E-commerce Web Servers.)

Honorary Work

- Referee for journals: Performance Evaluation, Transactions on Computers, Transactions on Software Engineering. Conferences: WCNC, Symposium on Autonomic Computing
- Program Committee: SRDS'08, WOSP'08, HiPC'08 Student Symposium

Summary of Experience

- 2002-Current, Dept. of Computer Science and Engineering, IIT Bombay. Associate Professor.
- **1994 - 2002, Network Design and Performance Analysis Department, AT&T Labs (formerly, AT&T Bell Labs), NJ, USA, Principal Technical Staff Member (1999-2002), Senior Technical Staff Member (1994-1999).**
    - Member of a core Labs team responsible for performance analyses, system bottleneck identification and improvement, performance measurement and load testing, performance modeling and capacity planning of various services and products at AT&T.
- 1990-1994: Duke University Durham, NC, USA.
    - Graduate Assistant: Research in modeling and analysis with Stochastic Petri Nets and Queueing Networks.
    - Instructor for: Introduction to Programming in Pascal. (Summer, 1993)

Education:

- Ph.D., Computer Science, 1994, Duke University, NC, US.
    - Thesis Title: Fast Approximate Analysis of Large Stochastic Petri Nets and Non-Markovian Queuing Networks. Thesis Advisor: Dr. Kishor Trivedi.
- M.Sc., Computer Science, 1989, Pune University, India
    - Project Title: Design and Implementation of a Distributed Database Management System. Project Advisor: Dr. H. Diwakar.
- B.Sc., Mathematics, 1987, Mumbai University, India
    - University-wide first rank in the entire science stream.