Jasleen Kaur

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Education

Ph.D., Computer Sciences — August 2002
University of Texas at Austin — Austin, Texas
Title: Scalable Network Architectures for Providing Per-flow Service Guarantees
Advisor: Prof. Harrick M. Vin

M.S., Computer Sciences — May 1999
University of Texas at Austin — Austin, Texas

B.Tech., Computer Science and Engineering — May 1997
Indian Institute of Technology, Kanpur — Kanpur, India

Work Experience

University of North Carolina at Chapel Hill	*Assistant Professor*	July 2002 – *present*
University of Texas at Austin, TX	*Research Assistant*	Aug 1999 – July 2002
IBM T.J. Watson Research Labs, NY	*Summer Intern*	May 1999 – Aug 1999
AT&T Research Labs, NJ	*Summer Intern*	May 1998 – Aug 1998
Aeronautical Development Est., India	*Summer Employee*	May 1996 – Aug 1996

Honors & Awards

- *National Science Foundation CAREER Award, 2004.*
- *Junior Faculty Development Award, 2004*, University of North Carolina at Chapel Hill, NC.
- *James C. Browne Fellowship, 2001-02*, Computer Sciences, University of Texas at Austin, Texas.
- *MCD Fellowship, 1997-99*, University of Texas at Austin, Texas.
- *Motorola Student of the Year Gold Medal, 1997*, Indian Institute of Technology, Kanpur, India.
- *Summer Research Fellowship, Summer 1996*, Aeronautical Development Establishment, India.
- *Academic Merit Award, 1993-94*, Indian Institute of Technology, Kanpur, India.

Publications

Book Chapter

- A. Srinivasan, P. Holman, J. Anderson, S. Baruah, and J. Kaur, "Multiprocessor Scheduling in Processor-based Router Platforms: *Issues and Ideas*", in Network Processors Design: *Issues and Practices*, Volume 2, Morgan Kaufman, 2003.

Journal Papers

- R. Kumar and J. Kaur, "Practical Beacon Placement for Link Monitoring Using Network Tomography", in the IEEE Journal on Selected Areas in Communication ***(JSAC)***, special issue on *Sampling the Internet: Techniques and Applications*, volume 24, number 12, pages 2196-2209, Dec 2006.

- S. Rewaskar, J. Kaur, and F.D. Smith, "A Passive State-machine Based Approach for Reliable Estimation of TCP Losses", in the ACM SIGCOMM Computer Communications Review ***(CCR)***, volume 36, issue 3, pages 51-64, July 2006.

Refereed Papers

- S. Rewaskar, J. Kaur, and F.D. Smith, "A Performance Study of Loss Detection/Recovery in Real-world TCP Implementations", *in Proceedings of IEEE International Conference on Network Protocols* ***(ICNP)***, Beijing, China, 10 pages, Oct 2007. **14% acceptance ratio**.

- A. Shriram and J. Kaur, "Emperical Evaluation of Techniques for Measuring Available Bandwidth", *in Proceedings of IEEE* ***INFOCOM***, Anchorage, AK, 9 pages, May 2007. **18% acceptance ratio**.

- A. Shriram and J. Kaur, "Empirical Study of the Impact of Sampling Timescales and Strategies on Measurement of Available Bandwidth", *in Proceedings of the Seventh Passive and Active Measurement Conference* ***(PAM)***, Adelaide, Australia, 10 pages, March 2006. **25% acceptance ratio**.

- V. Sawant and J. Kaur, "A Peer-to-Peer Architecture to Enable Versatile Lookup System Design", *in Proceedings of the 2nd IEEE International Workshop on Networking Meets Databases (NetDB)*, Atlanta, GA, Apr 2006.

- R. Kumar and J. Kaur, "Efficient Beacon Placement for Network Tomography", *in Proceedings of the ACM SIGCOMM Internet Measurement Conference* ***(IMC)***, Sicily, Italy, 6 pages, October 2004. **24% acceptance ratio**.

- W. Jin, J. Chase, and J. Kaur, "Interposed Proportional Sharing for a Storage Service Utility", *in Proceedings of the ACM Sigmetrics - Performance* ***(SIGMETRICS)***, New York, 12 pages, June 2004. **12% acceptance ratio**.

- S. Rewaskar and J. Kaur, "Testing the Scalability Limits of Overlay Routing Infrastructures", *in Proceedings of the Fifth Passive and Active Measurements Workshop **(PAM)***, Juan-les-Pins, France, published in the Springer Lecture Notes in Computer Science Series, 10 pages, April 2004. **17% acceptance ratio**.

- J. Aikat, J. Kaur, F.D. Smith, and K. Jeffay, "Variability in TCP Round-trip Times", *in Proceedings of the ACM SIGCOMM Internet Measurement Conference **(IMC)***, Miami, FL, 6 pages, October 2003. **29% acceptance ratio**.

- A. Srinivasan, P. Holman, J. Anderson, S. Baruah, and J. Kaur, "Multiprocessor Scheduling in Processor-based Router Platforms: *Issues and Ideas*", *in the Second Workshop on Network Processors*, Anaheim, CA, pages 48-62, February 2003.

- J. Kaur and H. Vin, "Providing Deterministic End-to-end Fairness Guarantees in Core-stateless Networks", *in Proceedings of the Eleventh ACM/IEEE International Workshop on Quality of Service **(IWQoS)***, Monterey, CA, published in Springer-Verlag's Hot Topic Series LNCS 2707, 21 pages, June 2003. **30% acceptance ratio**.

- J. Kaur and H. Vin, "Core-stateless Guaranteed Throughput Networks", *in Proceedings of IEEE **INFOCOM***, San Francisco, CA, 11 pages, April 2003. **20% acceptance ratio**.

- J. Kaur and H. Vin, "End-to-end Fairness Analysis of Fair Queuing Networks", *in the 23rd IEEE International Real-Time Systems Symposium **(RTSS)***, Austin, TX, pages 49-58, December 2002. **29% acceptance ratio**.

- J. Kaur and H. Vin, "Core-Stateless Guaranteed Rate Scheduling Algorithms", *in Proceedings of IEEE **INFOCOM***, Anchorage, AK, pages 1484-1492, April 2001. **23% acceptance ratio**.

- V. Sundaram, A. Chandra, P. Goyal, P. Shenoy, J. Sahni, H. Vin, "Application Performance in the QLinux Multimedia Operating System", *in Proceedings of the Eighth ACM Conference on **Multimedia***, Los Angeles, CA, pages 127-136, November 2000. **17% acceptance ratio**.

- J. Sahni, P. Goyal, and H. Vin, "Scheduling CBR Flows: FIFO or Per-Flow Queuing?" *in Proceedings of the Ninth IEEE International Workshop on Network and Operating System Support for Digital Audio and Video **(NOSSDAV)***, Basking Ridge, NJ, pages 13-27, June 1999.

Invited Paper

- V. Konda and J. Kaur, "Improving Bandwidth-adaptivity of Congestion-control Using Chirp-based AB Estimation", *in Proceedings of the 16th IEEE Workshop on Local and Metropolitan Area Networks **(LANMAN)***, Transylvania, Romania, September 2008.

Refereed Extended Abstracts

- S. Rewaskar, J. Kaur, and D. Smith, "Accuracy of Probing Techniques in Estimating TCP Loss Rates", *in Proceedings of ACM **SIGCOMM***, Pisa, Italy, 2 pages, September 2006.

- S. Rewaskar, J. Kaur, and D. Smith, "A Passive State-Machine Based Approach for Reliable Estimation of TCP Losses", *in Proceedings of the Seventh Passive and Active Measurement Conference **(PAM)***, Adelaide, Australia, 2 pages, March 2006.

- V. Sawant and J. Kaur, "Supporting Arbitrary Queries in Peer-to-Peer Networks using Hybrid Routing" *in Proceedings of the 20th ACM Symposium on Operating Systems Principles **(SOSP)***, Brighton, UK, 2 pages, October 2005.

- A. Shriram and J. Kaur, "Identifying Bottleneck Links Using Distributed End-to-end Available Bandwidth Measurements", *in the First ISMA Bandwidth Estimation Workshop (BEst)*, San Diego, CA, 2 pages, December 2003.

Ph.D. Dissertation

- J. Kaur, "Scalable Network Architectures for Providing Per-flow Service Guarantees", *Ph.D. Dissertation*, Department of Computer Sciences, University of Texas at Austin, pages 1-153, August 2002.

Selected Technical Reports

- B. Hardekopf, T. Riche, J. Mudigonda, M. Dahlin, H. Vin, and J. Kaur, "Impact of Network Protocols on Programmable Router Architectures", *Technical Report*, Department of Computer Sciences, UT Austin, April 2003.

- M. Venkatachalam, J. Kaur, and H. Vin, "End-to-end Analysis of Packet Inter-arrival Times of CBR Flows", *Technical Report TR-01-32*, Department of Computer Sciences, UT Austin, October 2001.

- A. Kumar, J. Kaur and H. Vin, "End-to-end Proportional Loss Differentiation *", Technical Report TR-01-33*, Department of Computer Sciences, UT Austin, September 2001.

- J. Kaur and H. Vin, "Effect of Higher Priority EF Traffic on TCP Throughput and Fairness", *Technical Report TR2001-1*, Department of Computer Sciences, UT Austin, July 2000.

Research Grants

As Principal Investigator

- *Empirical Evaluation of Router Queue Occupancy at Short-timescales with Internet-derived Traffic Mixes*, NSF REU Supplemental Award.

  Amount: $\$6,000$ over 3 months (05/2008 – 08/2008).

- *Re-assessing the Foundations of Internet Transport Protocols*, NSF CAREER Award.

  Amount: $\$500,000$ over 5 years (09/2004 – 08/2009).

- *Modeling TCP Round-trip Times*, University Junior Faculty Development Award.

  Amount: $\$5,000$ over 1 year (2004).

As Senior Personnel

- *Tera-Pixels: Using High-resolution Pervasive Displays to Transform Collaboration and Teaching*, NSF CISE Research Infrastructure Award.

  PIs: K. Jeffay, A. Lastra, K. Mayer-Patel, L. McMillan, and F.D. Smith.

  Amount: $\$1,200,000$ over 5 years (09/2003 – 08/2008).

Prototype Development

- *TCPdebug: A TCP-aware Passive Network Monitoring Tool*

  Analysis of passively-collected TCP network traces is a powerful technique for understanding the performance of Internet applications. Passive analysis, however, is challenging due to the unavailability of complete sender, receiver, and network state—all of which impact TCP performance—at the trace collection point. Indeed, existing analysis tools are limited either in the diversity or in the accuracy of the TCP properties they extract. We take the novel approach of using comprehensive state machines to simultaneously track: (i) network anomalies, as well as (ii) TCP sender and receiver state, and augment each using the other. The resultant tool helps detect performance problems not just for individual connections, but also helps detect persistent poor network conditions. The current version of our tool is capable of processing a one hour network trace in a few minutes.

- *The CSGS Routing Platform*

  Core-stateless Guaranteed Services (CSGS) is a network architecture that provides end-to-end quality of service (QoS) guarantees on a per-flow basis, without maintaining any per-flow state in the core routers of a network. The architecture is based on the mechanisms designed and analyzed as part of my dissertation. We have implemented prototypes of core and edge routers of a CSGS network using Intel's IXP1200-based router platform. This platform is based on network processors and enables the development and testing of prototypes at line speeds. Our performance evaluation with our prototype indicates that routers in a CSGS can successfully provide QoS guarantees, while attaining packet processing speeds within 10% of those attained in conventional IP routers.

- *QLinux: A multimedia Operating System*

  QLinux is a Linux kernel that can provide QoS guarantees to applications that run on it. In order to do so, it combines the latest innovations in operating systems research, including a CPU scheduler, a network packet scheduler, and a disk scheduler. QLinux was the first publicly-available operating system that provided QoS guarantees and is being used by hundreds of researchers

around the world. I was an integral part of the team that designed and implemented the original release of QLinux.

QLinux is available for download at: *http://lass.cs.umass.edu/software/qlinux/*.

Teaching Experience

Spring 2008	COMP 431	*Internet Services and Protocols*
Fall 2007	COMP 631	*Computer Networks*
Spring 2007	COMP 431	*Internet Services and Protocols*
Fall 2006	COMP 790-088	*Research Topics in Networking*
Fall 2005	COMP 234	*Computer Networks*
Spring 2005	COMP 190-088	*Systems Performance Analysis*
Spring 2004	COMP 290-088	*Research Topics in Networking*
Fall 2003	COMP 234	*Computer Networks*
Spring 2003	COMP 290-088	*Research Topics in Networking*

Curriculum Development

- Designed a new introductory graduate course in networking titled *Computer Networks* in Fall, 2003.

  This course has been approved to satisfy the *systems distribution requirement* of the Computer Science graduate program at UNC. The course is designed to serve two purposes. First, it reviews traditional topics and introduces students to current research areas in the field of networking. Second, through projects and assignments, it builds in students several skills required for the empirical networking research pursued in this department. The course was attended by up to 15 students and 1 faculty. This course was offered again in Fall 2005 and was attended by 30 students.

- Designed a new undergraduate course titled *Systems Performance Analysis* in Spring, 2005.

  This course is designed to serve two purposes. First, it introduces concepts in systematic performance analysis techniques, including modeling, simulations, measurements, and tracing. Second, through projects and assignments, it familiarizes students with several tools that can be used to study stand-alone as well as distributed applications. The course was attended by 7 students—course projects included the analysis of a web server, a database server, a gaming server, a media-streaming server, and a kernel process-creation API. This course is expected to get approved for satisfying the *systems distribution requirement* of the Computer Science undergraduate program at UNC.

- Designed a research-intensive graduate seminar course titled *Research Topics in Networking* in Spring, 2003.

In this course, students worked on semester-long research projects and were involved in the critical review of research publications in the areas of network measurements, design, and evaluation. The course was attended by 10 students and 4 faculty. This course was offered twice again (with different topics). Several refereed publications have resulted from the research projects pursued in each offering.

Student Advising

Ph.D. students being advised

Ritesh Kumar
Sushant Rewaskar
Alok Shriram

Undergraduate research being advised

Eric Gavaletz, Summer 2008.

Doctoral Dissertation Committees

Andy Jones
Hennadiy Leontyev
Liqiang Liu, Operations Research (Ph.D. 2007)
Uma Devi (Ph.D. 2006)
Long Le (Ph.D. 2005)
Philip Holman (Ph.D. 2004)
Michele C. Weigle (Ph.D. 2003)

M.S. Thesis Committees

Li Cheng, Operations Research (M.S. 2004)
Feng Chen, Operations Research (M.S. 2003)

Preliminary Research Presentation Committees

Kyle Moore, Fall 2007.

Integrative Paper Committees

Sushant Rewaskar, Spring 2005.
Alok Shriram, Spring 2004.
Uma Devi, Spring 2003.

Invited Presentations

Talks

- *Extracting Queuing Behavior from Passive End-to-end Measurements*, SAMSI Closing Workshop, Research Triangle Park, NC, June 2004. Host: *Prof. Steve Marron.*
- *Colloquium*, Hewlett Packard Laboratories, Palo Alto, CA, June 2003. Host: *Dr. Nina Bhatti*.
- *Duke Computer Science Colloquium*, Duke University, Durham, NC, October 2002. Host: *Dr. Jun Yang*.
- *Operations Research Colloquium*, University of North Carolina at Chapel Hill, Chapel Hill, NC, September 2002. Host: *Dr. Eylem Tekin.*

Posters

- S. Rewaskar, J. Kaur, and D. Smith, "A TCP-aware Network Performance Monitoring Tool", *IBM University Day*, October 2004.
- S. Rewaskar, J. Aikat, J. Kaur, D. Smith, D. Pozefsky and K. Jeffay, "Variability in TCP Roundtrip Times", *in the SAMSI Workshop on Congestion Control and Heavy Traffic Modeling*, November 2003.
- A. Shriram and J. Kaur, "Estimating Bottleneck Links Using Distributed End-to-end Measurements", *in the SAMSI Workshop on Internet Tomography*, October 2003.

Department Committees

- Faculty Search Sub-Committee (Security), Spring 2008. Chair: *Prof. Mike Reiter*.
- Graduate Curriculum and Planning Committee, Aug 2005 – *present*. Chair: *Prof. Ming Lin.*
- Curriculum and Planning Committee, Aug 2003 – May 2005. Chair: *Prof. Jack Snoeyink.*
- Ad-hoc Committee on Titles, Fall 2003. Chair: *Prof. Anselmo Lastra.*
- Curriculum and Planning Committee, Aug 2002 – May 2003. Chair: *Prof. Stephen Pizer.*

Professional Service

- ***Organizing Committees:***
  - *Co-organizer*, the DIMACS/DyDAn Workshop on Internet Tomography, Rutgers University, NJ, May 2008. Organized by J. Kaur, D. Towsley, and W. Willinger.
  - *Student Travel Grant Committee*, ACM SIGCOMM 2005, Philadelphia, PA, August 2005.

- *Posters Committee*, ACM SIGCOMM 2004, Portland, OR, August 2004.
- *Publicity Chair*, the 24th IEEE Real-time Systems Symposium (RTSS 2003), Cancun, Mexico, December 2003.

- ***Technical Program Committees:***

  - *Program Committee*, the 16th IEEE Workshop on Local and Metropolitan Area Networks (LANMAN 2008), Cluj-Napoca, Romania, September 2008.
  - *Program Committee*, the 17th International Conference on Computer Communications and Networks (ICCCN 2008), St. Thomas, Virgin Islands, August 2008.
  - *Program Committee*, the International Conference on Computer Communications and Networks (ICCCN 2006), Arlington, Virginia, October 2006.
  - *Program Committee*, the 26th IEEE International Conference on Distributed Computing Systems (ICDCS 2006), Lisboa, Portugal, July 2006.
  - *Program Committee*, the 16th International Workshop on Network and Operating Systems Support for Digital Audio and Video (NOSSDAV 2006), Newport, Rhode Island, May 2006.
  - *Program Committee*, the ACM Internet Measurement Conference (IMC 2005), New Orleans, LA, Oct 2005.
  - *Program Committee*, the 25th IEEE International Conference on Distributed Computing Systems (ICDCS 2005), Columbus, Ohio, June 2005.
  - *Program Committee*, the 13th IEEE International Workshop on Quality of Service (IWQoS 2005), Passau, Germany, June 2005.
  - *Program Committee*, the 11th ACM/IEEE International Workshop on Quality of Service (IWQoS 2003), Monterey, CA, June 2003.

- ***Reviewer:***

  - ACM Computer Communication Review.
  - ACM Internet Measurement Conference.
  - ACM Multimedia.
  - ACM SOSP.
  - ACM SIGCOMM.
  - ACM/IEEE IWQoS.
  - Communications of the ACM.
  - IEEE/ACM COMSWARE.
  - IEEE/ACM Transactions on Networking.
  - IEEE ICCCN.
  - IEEE ICDCS.
  - IEEE INFOCOM.
  - IEEE LANMAN.
  - IEEE NOSSDAV.

- IEEE Transactions on Computers.
- IEEE Transactions on Dependable and Secure Computing.
- IEEE Transactions on Multimedia.
- Journal of Systems and Software.
- SPIE Multimedia Computing and Networking.