Mohit Aron

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Objective and Interests

Seeking a position in research or advanced development in fields related to networking and operating systems. My recent work has focused on: (1) Quality of Service in network servers, (2) System support for scalable cluster-based web servers, and (3) Enhanced network subsystems in servers specially for supporting gigabit network technologies.

Education

PhD Computer Science *August 1995 - October 2000*
Rice University, Houston, TX (GPA 4.25/4.00)

MS Computer Science *August 1995 - December 1997*
Rice University, Houston, TX

BTech Computer Science and Engineering *August 1991 - May 1995*
Indian Institute of Technology, New Delhi, India

Work Experience

Graduate Assistant *August 1995 - present*
Computer Science Dept., Rice University, Houston, TX
TA for Mathematics of Computer Science, Introduction to Principles of Scientific Computing, Intermediate Programming, Operating Systems, Computer Networks.

Summer Intern *June 1998 - August 1998*
IBM T.J. Watson Research Center, Hawthorne, New York
Worked on implementing the Virtual Memory system for the Lava microkernel-based operating system. The implementation is now part of the SawMill Linux project at IBM.

Summer Intern *June 1997 - August 1997*
Western Research Laboratory, DEC, Palo Alto, California
Worked on two projects: (1) improving the efficiency of a network simulator, and (2) design and implementation of a new transport protocol for multimedia applications that provides congestion control without reliable delivery.

Summer Intern *May 1994 - August 1994*
DOE, New Delhi, India
Involved in the design and development of a graphical user interface in Motif for an electronic simulator called STEPS.

Relevant Skills

Programming Languages: C/C++, Java, Scheme, Lisp, Pascal, Fortran.
Extensive experience with kernels of BSD variants of Unix.

Awards and Honors

Lodieska Stockbridge Vaughan Fellowship, 1999-2000, for outstanding achievement and promise (awarded to one graduate student from all departments in the Rice school of engineering).
Won the best paper award at the USENIX Annual Technical Conference, 2000.
Won one of the four best paper awards at the ACM SOSP Conference, 1999.
Rice University Fellowship, 1995-1996.
Government of India – Certificate of Merit in Physics, 1991.

Research Contributions

Quality of Service in server systems. My dissertation work focuses on provision of both differentiated as well as predictable quality of service in server systems. My contributions include: (1) a measurement-based framework capable of achieving predictable quality of service in servers by dynamically associating application-level progress metrics (like throughput) to

resource allocations in the operating system, and (2) a mechanism for achieving performance isolation in cluster-based servers through global resource management.

Scalable cluster-based network servers. My contributions include: (1) design and implementation of a scalable architecture that supports content-aware request distribution in cluster-based network servers, (2) a TCP Handoff protocol capable of migrating network streams between cluster nodes, and (3) content-aware request distribution algorithms in cluster-based servers that support both HTTP/1.0 and HTTP/1.1 protocols.

Enhanced network subsystem design. I have (1) designed and implemented *Soft-timers*, a low-overhead high precision timer facility for rate-based pacing and polling of network packets, (2) analyzed TCP performance degradation over ATM networks and proposed an implementation that affords good performance irrespective of switch-level enhancements, and (3) proposed implementation enhancements for 4.4BSD TCP that improve timer accuracy and address lack of scalability with respect to high connection rates (some of these enhancements have already been incorporated in FreeBSD; others are under consideration).

Other work. In collaboration with researchers at IBM T.J. Watson research center, I have implemented a prototype application-level Virtual Memory subsystem atop the Lava microkernel that delivers performance comparable to what experimental research operating systems have only been able to achieve through kernel extensions.

Selected Publications

(Copies available from http://www.cs.rice.edu/~aron/research.html)

- "The SawMill Framework for Virtual Memory Diversity", with Yoonho Park, Trent Jaeger, Jochen Liedtke, Kevin Elphinstone and Luke Deller, *in Proceedings of the 6th Australasian Computer Systems Architecture Conference (ACSAC)*, January 2001.
- "Differentiated and Predictable Quality of Service in Web Server Systems", *PhD Thesis, Computer Science, Rice University*, October 2000.
- "Cluster Reserves: A Mechanism for Resource Management in Cluster-based Network Servers", with Peter Druschel and Willy Zwaenepoel, *in Proceedings of the ACM SIGMETRICS Conference on Measurement and Modeling of Computer Systems*, June 2000.
- "Scalable Content-aware Request Distribution in Cluster-based Network Servers", with Darren Sanders, Peter Druschel and Willy Zwaenepoel, *in Proceedings of the USENIX 2000 Annual Technical Conference*, June 2000. **Best Paper Award**.
- "Techniques for Efficient Cell-Level ATM Simulations", with Lawrence Brakmo, *in Proceedings of the 19th IEEE Performance, Computing and Communications Conference (IPCCC)*, February 2000.
- "TCP Implementation Enhancements for Improving Webserver Performance", with Peter Druschel, *Rice Computer Science Technical Report TR99-335*, July 1999.
- "Soft timers: efficient microsecond software timer support for network processing", with Peter Druschel, *in Proceedings of the 17th Symposium on Operating Systems Principles (SOSP-17)*, December 1999. **Award Paper**.
- "Efficient Support for P-HTTP in Cluster-Based Web Servers", with Peter Druschel and Willy Zwaenepoel, *in Proceedings of the USENIX 1999 Annual Technical Conference*, June 1999.

- "Locality-aware Request Distribution in Cluster-based Network Servers", with Vivek Pai, Gaurav Banga, Michael Svendsen, Peter Druschel, Willy Zwaenepoel and Erich Nahum, *in Proceedings of the 8th International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS-VIII), October 1998.*
- "Analysis of TCP Performance over ATM Networks", *Master's Thesis, Computer Science, Rice University*, December 1997.
- "Shared Memory for Distributed Systems", with Arijit Sarcar, *B.Tech. Thesis, Computer Science, Indian Institute of Technology, New Delhi, 1995.*

Professional Activities

Program committee member for USENIX 2001 Annual Technical Conference.

Reviewer for ACM SIGCOMM conference, Symposium on Operating Systems Design and Implementation (OSDI), IEEE INFOCOM conference, International Conference on Distributed Computing Systems (ICDCS), USENIX Annual Technical Conference, ACM SIGMETRICS conference, USENIX Symposium on Internet Technologies and Systems (USITS), International World Wide Web Conference (WWW), International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), IEEE Symposium on High-Performance Computer Architecture (HPCA), USENIX Security Symposium, Journal on Software Practice and Experience.

Member of ACM and USENIX.

Personal

Citizen of India; US visa status: F-1 student

References

Available upon request.