

J. Fritz Barnes

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Research Interests

Experimental Systems emphasizing the areas of: Distributed Computing, Middleware, Internet and Web Applications, Networking Protocols, and Electronic Commerce.

Education

- 1995–2000 University of California, Davis
Ph.D. in Computer Science, expected June 2000
Thesis: *Middleware Support for Customizable and Extensible Policies*
Advisor: Professor Raju Pandey
Committee: Professor Raju Pandey, Professor Ron Olsson,
Professor Premkumar Devanbu
- 1990–1995 Oakland University, Rochester, Michigan
B.S. in Computer Engineering, April 1995
Advisor: Professor Frank Cioch

Research Summary

I have created solutions to efficiency and flexibility problems in Internet and web-based applications. The identification of policies and techniques to customize these policies characterize my work in these areas. In many cases, policies that are customized to a given environment perform better than the optimal general-case policy. I have implemented these solutions both in simulated models and real applications. Some examples include:

- *Web Servers.* We added support for service policies that provided differentiated services for web pages. By modifying the scheduling policy, we could support differentiated services with low overheads. [P5,SP1,SP2]
- *Web Caches.* We designed a caching infrastructure that allows cache administrators, web authors, and end users to customize how web objects are cached, replaced, and kept consistent. Analysis of our prototype, *PolisSquid*, demonstrates low overhead (8-10%) with the benefits of providing variable coherency policies, localized removal policies, and early removal of objects from servers. [P3,P4,SP3]
- *Visualization Applications.* We developed techniques to create multiresolution datasets. The datasets contained multiple representations of objects at different levels of detail. We created rendering techniques to allow users to make policy decisions, such as defining the tradeoff between visual accuracy and rendering speed. [P1,P5,P6,SP4]

Publications

- [P1] Martin Bertram, **J. Fritz Barnes**, Bernd Hamann, Kenneth I. Joy, Helmut Pottman, and Dilinur Wushour. Piecewise Optimal Triangulations of Scattered Data in the Plane. To appear in *Computer Aided Geometric Design*, ELSEVIER.
- [P2] Scott Malabarba, Raju Pandey, Jeff Gragg, Earl Barr, and **J. Fritz Barnes**. Runtime Support for Type-safe Dynamic Java Classes. To Appear in Proceedings of the European Conference on Object-Oriented Programming (ECOOP) 2000.
- [P3] **J. Fritz Barnes** and Raju Pandey. Providing Dynamic and Customizable Caching Policies. In *Proceedings of the Second USENIX Symposium on Internet Technologies & Systems (USITS)*. (Boulder, CO, USA, October 1999).
- [P4] **J. Fritz Barnes** and Raju Pandey. CacheL: Language Support for Customizable Caching Policies. In *Proceedings of the Fourth International Web Caching Workshop*. (San Diego, CA, USA, March 1999).
- [P5] Raju Pandey, **J. Fritz Barnes**, and Ron Olsson. Supporting Quality of Service in HTTP Servers. In *Proceedings of the Seventeenth Annual SIGACT-SIGOPS Symposium on Principles of Distributed Computing (PODC)*. (Puerto Vallarta, Mexico, June 1998), ACM, pp. 247–256.
- [P6] **J. Fritz Barnes**, Bernd Hamann, and Kenneth I. Joy. An Edge-preserving, Data-dependent Triangulation Scheme for Hierarchical Rendering. To appear in: Hans Hagen, G. Nielson, and F. Post eds., *Scientific Visualization – Methods and Applications*. IEEE Computer Society Press.
- [P7] Chris Wynn, **J. Fritz Barnes**, Bernd Hamann, and Mark Miller. Multiresolution and Adaptive Rendering Techniques for Structured, Curvilinear Data. To appear in: Hans Hagen, G. Nielson, and F. Post eds., *Scientific Visualization – Methods and Applications*. IEEE Computer Society Press.

Papers in Submission and Preparation

- [SP1] **J. Fritz Barnes**, Raju Pandey, and Ron Olsson. Supporting Fine-Grained Quality of Service in Web Servers. Submitted to the *World Wide Web Journal*.
- [SP2] **J. Fritz Barnes** and Raju Pandey. Hierarchical Scheduling Policies for Web Servers. To be submitted to a conference.
- [SP3] **J. Fritz Barnes** and Raju Pandey. Customizable Caching Policies: An Analysis of Overheads. To be submitted to a journal.
- [SP4] Rene Schätzl, **J. Fritz Barnes**, Hans Hagen, Bernd Hamann, and Kenneth I. Joy. Data-dependent Triangulation in the Plane Using a Sobolev Norm. Submitted to: G. Brunnett, G. Farin, and H.P. Bieri eds., *Geometric Modelling: Dagstuhl 1999*. Springer-Verlag.

Professional Activities

Mentor in the Women Engineering Link program. (1997-1999)
Member of ACM, USENIX

Research Experience

University of California, Davis June 1997–Present
Research Assistant for Professor Raju Pandey. Worked on Internet applications and with the Ariel group on safe and secure execution environments for mobile code.

University of California, Davis Jan. 1996–June 1996, Sep. 1996–June 1997
Research Assistant for Professor Bernd Hamann. Researched techniques for multiresolution representation and visualization of large datasets.

Lawrence Livermore National Laboratory June 1996–Sep. 1996
Summer internship. Developed and added multiresolution visualization techniques to the MeshTV visualization product.

Army's Tank-Automotive and Armaments Command (TACOM) July 1994–April 1995
Research assistant for Professor Frank Cioch. Assisted in establishing software engineering techniques for the Vehicle Simulation Facility.

Teaching Experience

University of California, Davis Fall 1995
Teaching assistant for Introduction to Software Development (lower-division)

University of California, Davis Winter 1996, Spring 1996
Teaching assistant for Software Engineering (upper-division)

University of California, Davis Winter 1996, Spring 1996, Fall 1996
Teaching assistant for Introduction to Computer Graphics (upper-division)

Industry Experience

Coast-to-Coast Telecommunications Nov. 1993–Oct. 1995
Lead developer of WWW Server and CGI Database gateway

Presentations

Speaker, Fourth International Workshop on Web Caching, 1999, San Diego, CA.

Speaker, USENIX Symposium on Internet Technologies and Systems, 1999, Boulder, CO.

Speaker, UC Davis Student Workshop on Computing, 1998, Davis, CA.

Speaker, UC Davis Student Workshop on Computing, 1997, Davis, CA.

Honors

Non-Resident Tuition Fellowship, UC Davis (1995–1996)

Honors College Graduate (1995)

Vice-President, Secretary, Tau Beta Pi Honors Society (1993–1995)

Golden Key Honor Society (1993)

Presidential Scholarship, Oakland University (1990–1994)

University Service

Program Committee Member, UC Davis Student Workshop on Computing, 1999
Graduate Representative on the Department's Public Relations Committee, 1997-1998.
Graduate Student Association (GSA), Computer Science Representative, 1997-1998.
GSA Interdisciplinary Graduate Symposium Committee, 1997-1998.
GSA Internet Committee Chair, 1997.

References

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