

Kiran Tati

Department of Computer Science and Engineering
University of California, San Diego
9500 Gilman Drive, MC 0404
La Jolla, CA 92093-0114
(858) 822-5647
ktati@cs.ucsd.edu
<http://sysnet.ucsd.edu/~ktati>

3927 Miramar Street
Apt # H
La Jolla, CA, 92037
Home: (858) 455-9411
Mobile: (858) 334-5244

Research Interests

Operating systems, distributed systems, Internet scale systems, and language runtime systems.

Education

Ph.D., Computer Science and Engineering University of California, San Diego, CA. Thesis: Exploiting Heterogeneity in Peer-to-Peer Systems. Adviser: Prof. Geoffrey M. Voelker	Nov, 2006 (Expected)
M. Tech. in Computer Science and Engineering Indian Institute of Technology, Kanpur, India.	March, 1998
B. Tech. in Computer Science and Engineering National Institute of Technology, Warangal, India.	May, 1996

Professional Experience

University of California, San Diego, CA

Fall, 2001 – Present

As a research assistant to Prof. Geoffrey M. Voelker, my main research areas are the interaction between language runtime systems with the operating system, and the design and implementation of Internet-scale distributed systems.

I studied the interaction of language runtime systems (JVMs, Microsoft Common Language Runtime) with operating systems in the context of running multiple applications (Java/.Net programs). Two broad approaches to running multiple applications in runtime virtual machines (VMs) are running all applications in a single process (a single VM approach), or running a separate process for each application (a multiple VMs approach). The single VM approach provides performance benefits with weak performance isolation (one application using a lot of memory or consuming a lot of CPU time). On the other hand, the multiple VMs approach provides strong isolation at the expense of performance, including initialization costs and interprocess and application communication. I designed and implemented two mechanisms, a class cache and fast object serialization, to achieve both good performance and strong isolation. This work constituted my university qualifying exam.

I was involved in the original design and implementation of the TotalRecall storage system. TotalRecall uses automated availability management to achieve user-specified availability requirements while greatly reducing object maintenance overhead. I implemented the underlying storage system and an NFS file system interface. This work resulted in a paper at the first NSDI conference in 2004.

I analyzed the performance impact of various soft state caching approaches to improve object lookup performance in distributed hash tables (DHTs). These caches can be built very quickly with little overhead, and they perform within 5% of the latency of directly contacting a host (single hop). The size and maintenance of the caches are tailored for the heterogeneous resource constraints of individual hosts to minimize cache overhead on DHT application performance. I published this work at the 9th Web Caching and Content Distribution workshop (WCW 2004).

I analyzed two resource reclamation strategies for storage systems in DHTs, active and passive (or garbage collection) using simulation in different environments. An “active” strategy works well for stable environments such as corporate or university environments. A “passive” strategy well for high-churn environments such as peer-to-peer systems.

I factored out the impact of temporary churn and permanent churn on object maintenance overhead in various environments, ranging from low temporary and low permanent churn to high temporary and high permanent churn. In systems with high churn, such as peer-to-peer systems, I showed that permanent churn is the dominant cause of object maintenance overhead. I published the results of this analysis in IPTPS 2006.

Finally, I am working on reducing object maintenance overhead by further exploiting heterogeneity in the system. Previous approaches for object placement and maintenance randomly assign object data to hosts assuming that they have uniform behavior and resources, such as host lifetime in the system and bandwidth and storage capacity. First, I am collecting traces of the widely-used KAD file-sharing network to characterize host lifetimes in large-scale peer-to-peer systems. Second, Instead, I am developing object placement and maintenance policies that are sensitive to heterogeneity in host resources. For example, biasing object placement strategies to use hosts with longer lifetimes yields substantially lower maintenance costs.

University of California, San Diego, CA

Fall, 1999 – Summer 2001

I worked on the Agile Objects project As a research assistant to Prof. Andrew Chien. The aim of Agile Objects is to build a survivable system by dynamically changing the location and interface of software components in response to failures. I implemented a fast serialization mechanism for Java objects to facilitate component migration in a distributed deployment. The primary optimization minimized copy overhead by implementing serialization directly in the Java virtual machine (JVM).

IBM TJ Watson, Hawthorne, NY

June, 2002 - September, 2002

Research intern in the E-Business Applications Design and Optimization Team working on building tools to manage large scale Web servers. I analyzed E-commerce Web site traces (WebSphere runtime traces) for performance anomalies.

D. E. Shaw Software India Pvt. Ltd., Hyderabad, India

April, 1998 – July, 1999

As a technical member of a group for managing and improving a securities trading system, I ported a date and timezone library from C to C++, Java, Perl and Tcl/Tk.

Teaching Experience

University of California, San Diego, CA

Winter 2006

Teaching Assistant for Professor Alex C. Snoeren for an undergraduate operating system architecture and implementation course (UCSD CSE 121). I held discussion section once a week to help students understand course material. I designed and graded homeworks, and developed, managed, and graded projects. I also implemented two reference file systems to compare students file system implementations.

University of California, San Diego, CA

Fall, 2005

Teaching Assistant for Professor Geoffrey M. Voelker for graduate special topics four-site distance-learning course, Homeland Security / Cyber Security, (UCSD CSE 291). I ran the videoconferencing hardware and software for the UCSD site, and managed the course project.

IIT, Kanpur, India

Fall, 1997

Teaching Assistant for Professor Ajai Jain for undergraduate operating system course. I designed and graded homeworks and developed, managed, and graded projects.

IIT, Kanpur, India

Fall, 1996 and Winter, 1997

Teaching Assistant for Professor Ratan K Gupta for undergraduate introduction to programming course. I helped students to familiarize with the Unix program development environment, and assisted them with debugging their programs.

Publications

Conference and Workshop Papers

“On Object Maintenance in Peer-to-Peer Systems.” Kiran Tati and Geoffrey M. Voelker. In *Proceedings of the International Workshop on Peer-To-Peer Systems (IPTPS)*, Santa Barbara, California, February 2006.

“ShortCuts: Using Soft State To Improve DHT Routing.” Kiran Tati and Geoffrey M. Voelker. In *Proceedings of the Ninth International Workshop on Web Content Caching and Distribution (WCW'04)*, Beijing, China, October 2004.

“TotalRecall: System Support for Automated Availability Management.” Ranjita Bhagwan, Kiran Tati, Yu-Chung Cheng, Stefan Savage, and Geoffrey M. Voelker. In *Proceedings of the 1st ACM/USENIX Symposium on Networked Systems Design and Implementation (NSDI)*, San Francisco, CA, March 2004.

PhD Thesis

“Exploiting Heterogeneity in Peer-to-Peer Systems.” Kiran Tati. PhD Thesis, Department of Computer Science and Engineering, University of California San Diego, November 2006 (Expected).

M. Tech Thesis

“The Design And Implementation of Transparent Anonymous FTP File System.” Kiran Tati. M. Tech Thesis, Department of Computer Science and Engineering, IIT Kanpur, March 1998.

B. Tech Thesis

“Design and Implementation of Cflow.” Kiran Tati. B. Tech Thesis, Department of Computer Science and Engineering, National Institute of Technology, Warangal, May 1996.

Technical Reports

“Resource Reclamation in Distributed Hash Tables.” Kiran Tati and Geoffrey M. Voelker. University of California, San Diego, CSE Technical Report CS2006-0863, July 2006.

“ShortCuts: Using Soft State To Improve DHT Routing.” Kiran Tati and Geoffrey M. Voelker. Extended version of WCW-04 paper, University of California, San Diego, CSE Technical Report CS2006-0862, July 2006.

“Interaction of Virtual Machine with the Operating System.” Kiran Tati and Geoffrey M. Voelker. University of California, San Diego, CSE Technical Report CS2002-0728, December 2002.

Other Reports

“Workshop Report for the 3rd International workshop on Peer-to-Peer Systems (IPTPS2004).” Sriram Ramabhadran, Sumeet Singh, and Kiran Tati. IPTPS, La Jolla, California, February 2004.

“DSL and Cable Modem measurement study.” Kiran Tati and Keith Bell. University of California, San Diego, CSE291E Selected Topics in Wide Area Networking Course Project.

Awards

Won a programming contest held during the 1997 annual technology festival at the Indian Institute of Technology, Kanpur.

Ranked third (out of 65) in B. Tech Computer Science and Engineering class, 1992-1996, at the National Institute of Technology, Warangal, India.

Merit scholarships (1994, 1995) for academic performance at the National Institute of Technology, Warangal, India.

References

Professor Geoffrey M. Voelker
Department of Computer Science and Engineering
University of California, San Diego
9500 Gilman Drive, MC 0404
La Jolla, CA 92093-0404
Office: EBU3B 3108
Phone: (858) 822-3323
voelker@cs.ucsd.edu

Professor Stefan Savage
Department of Computer Science and Engineering
University of California, San Diego
9500 Gilman Drive, MC 0404
La Jolla, CA 92093-0404
Office: EBU3B 3106
Phone: (858) 822-4895
savage@cs.ucsd.edu