

PRASHANTH PAPPU

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PARTICULARS

EDUCATION

Ph.D. in Computer Science. <i>Washington University in St. Louis</i>	Expected Aug 2004 <i>St. Louis, MO</i>
M.S. in Computer Science. <i>Washington University in St. Louis</i>	May 2002 <i>St. Louis, MO</i>
B.Tech in Computer Science & Engineering. <i>Indian Institute of Technology (I.I.T), Madras</i>	May 1999 <i>Chennai, India</i>

RESEARCH INTERESTS

Very broadly, my research interests include networking and multimedia systems, resource management and performance analysis. I've worked in projects involving design, analysis and implementation of algorithms with sound theoretical foundations. Currently, I'm working on issues related to the design of high performance, high capacity programmable routers as a research assistant to Dr. Jon Turner at Washington University in St. Louis.

RESEARCH EXPERIENCE

- Research assistant in Applied Research Laboratory (ARL).
Advisor: Dr. Jon Turner
Washington University in St. Louis Aug 1999 – present
St. Louis, MO
- **DISTRIBUTED SCHEDULING**
Distributed Scheduling (DS), introduced and comprehensively studied in my doctoral thesis, is a scalable mechanism to regulate the flow of traffic through high capacity, multistage, buffered switching systems to maintain their throughput even in extreme traffic conditions. Results include
 - a) First provably work conserving distributed schedulers for buffered, multistage switches with speedups of 2 or more.
 - b) Practical heuristic variants demonstrated to work well (through simulations) for speedups > 1.5.
 - c) Implementation of proposed algorithms in the Multi-Service Router (MSR) developed at Washington University.
- **STRESS RESISTANT CROSSBAR SCHEDULING ALGORITHMS**
In this work, we demonstrated the poor performance of commercially used crossbar scheduling algorithms under inadmissible traffic conditions like those frequently encountered in IP networks. We also presented new *stress resistant* algorithms (using Lowest Layer Selection (LLS) and Odd-Even sort heuristics) that are simple enough to implement in high speed routers and still maintain their throughput in adverse traffic conditions.
- **ESTIMATION BASED FAIR QUEUEING (EFQ)**
Estimation based Fair Queuing (EFQ), introduced in my master's thesis, is a novel network processor scheduling algorithm for use in programmable routers. The algorithm exploits the regularity in processing requirements of flows serviced by a programmable router to provide them with tight bandwidth and delay guarantees.

- Research assistant in Laboratory for Computer Communications and Applications (LCA).
Advisor: Dr. Jean-Pierre Hubaux
Swiss Federal Institute of Technology (EPFL) May 1998 - Aug 1998
Lausanne, Switzerland
- **QUEUEING & DROPPING STRATEGIES FOR VoIP TRAFFIC**
Voice over IP (VoIP) traffic have stringent delay and jitter requirements. During my stint at EPFL, Switzerland, I designed and implemented (in a Linux based router) non-intuitive queueing and dropping policies that significantly improve the end-user quality of voice traffic transported through congested IP networks.
- Research assistant in Networking and Multimedia Systems (NMS) laboratory.
Advisor: Dr. S.V. Raghavan Aug 1998 – May 1999
Chennai, India
- **AUTOMATIC SEMANTIC ANNOTATION OF WEB PAGES**
In my bachelor's project, I developed and implemented algorithms for automatically identifying types of web (HTML) pages (e.g. resumes) and annotating their content with semantic tags (RDF/XML) to enable complex searches on web content.

WORK EXPERIENCE

- Summer internship as a system architect for content delivery servers. May 2002 – Aug 2002
San Mateo, CA
Jibe Networks, Inc.
- **BANDWIDTH ESTIMATION IN IP NETWORKS**
Push based content delivery servers that pro-actively deliver content to end systems, need accurate bandwidth estimates of various IP links to avoid congesting them. At Jibe Networks Inc, I designed and implemented a bandwidth estimation module which uses several new ideas to work with various commercial routers and protocols to get accurate bandwidth estimates of any IP links in diverse traffic conditions.
- Independent software developer. Aug – Dec 1998
Bangalore, India
Defense Research and Development Organization (DRDO)
- **FAULT TREE ANALYSIS SOFTWARE**
In this project, I developed a Java based Fault Tree Analysis software that interprets aeronautical system design data to create Fault Trees for various aircrafts. This extensively used software can accept as input, the symptoms of various system malfunctions and can estimate the most probable causes to identify the faulty components.

TEACHING EXPERIENCE

- Teaching assistant to Dr. Jon Turner for CS577, “Design and analysis of switching systems”. Jan 2003 – May 2003
St. Louis, MO
Washington University in St. Louis.
- Teaching assistant to Dr. S.V. Raghavan and Dr. Hema Murthy for CS110, “Introduction to computing”. Aug 1998 – Aug 1999
Chennai, India
Indian Institute of Technology (I.I.T), Madras

PUBLICATIONS & TALKS

THESES

1. Prashanth Pappu, "Scheduling algorithms for combined input and output queued (CIOQ) switches". **Ph.D. THESIS**, Department of Computer Science and Engineering, Washington University in St.Louis, under preparation.
2. Prashanth Pappu, "Scheduling issues in programmable routers". **M.S. THESIS**, Department of Computer Science and Engineering, Washington University in St. louis, May 2002.
3. Prashanth Pappu, "Web as a knowledge database". **BACHELOR'S THESIS**, Department of Computer Science and Engineering, Indian Institute of Technology (I.I.T) Madras, May 1999.

REFEREED PUBLICATIONS

1. Prashanth Pappu, Jonathan Turner and Ken Wong, "Work-Conserving Distributed Schedulers for Terabit Routers". **In ACM SIGCOMM 2004**, Portland, OR, USA
2. Prashanth Pappu and Jonathan Turner, "Stress Resistant Scheduling Algorithms for CIOQ Switches". **In ICNP 2003**, Nov 4-7 2003, Atlanta, USA.
3. Prashanth Pappu, Jyoti Parwatikar, Jonathan Turner and Ken Wong, "Distributed Queuing in Scalable High Performance Routers". **In IEEE Infocom 2003**, San Francisco, USA.
4. Tilman Wolf, Prashanth Pappu and Mark Franklin, "Predictive Scheduling of Network Processors". **In Computer Networks**, vol. 31, no.5, pp.601-621, April 2003.
5. Sumi Choi, John Dehart, Ralph Keller, Fred Kuhns, John Lockwood, Prashanth Pappu, Jyoti Parwatikar W. David Richard, Ed Spitznagel, David Taylor, Jonathan Turner and Ken Wong, "Design of a High Performance Dynamically Extensible Router". **In DARPA Active Networks Conference and Exposition (DANCE)**, May 29-31 2002, San Francisco, USA.
6. Prashanth Pappu and Tilman Wolf, "Scheduling Processing Resources in Programmable Routers". **In IEEE Infocom 2002**, New York, USA

SELECT TECHNICAL REPORTS

1. Prashanth Pappu, Jonathan Turner and Ken Wong, "Work Conserving Distributed Schedulers for Terabit Routers", Washington University, Department of Computer Science, Technical Report WUCS-04-06, February, 2004.
2. Fred Kuhns, John Dehart, Ralph Keller, John Lockwood, Prashanth Pappu, Jyoti Parwatikar, Ed Spitznagel, Dave Richards, Dave Taylor, Jon Turner, and Ken Wong, "Implementation of an Open Multi-Service Router", Washington University, Department of Computer Science, Technical Report WUCS-01-20, August, 2001

SELECT TALKS

1. Prashanth Pappu, "Distributed Queuing for Scalable High Performance Routers". Apr 2003, at *IEEE Infocom 2003*, San Francisco, USA.
2. Prashanth Pappu, "Stress Resistant Scheduling Algorithms for CIOQ switches", Feb 2003, at *Graduate Student Colloquium*, Department of Computer Science & Engineering, Washington University in St. Louis.
3. Prashanth Pappu, "Scheduling processing resources in programmable routers", Jun 2002, at *IEEE Infocom 2002*, New York, USA.

ACADEMIC HONORS

- Second in State Mathematics Olympiad, Andhra Pradesh, India. 1993
- Finalist in All India Physics Olympiad, India. 1995
- Ranked 20th (among over 100,000 candidates) in Joint Entrance Exam (JEE) for admission to Indian Institute of Technology (I.I.T). 1995
- Merit award for 20 best incoming students to I.I.T, Madras. 1995
- Institute merit certificate for computerizing the student union electoral process in I.I.T, Madras. 1997

MISCELLANY

PROFESSIONAL SERVICES

Reviewer for IEEE Infocom 2003, 2004, SIGCOMM 2004.

PLATFORMS & PROGRAMMING LANGUAGES

Windows, Solaris, Linux, NetBSD, C, C++, Java, Perl, VHDL, Modsim, HTML, XML.

ORGANIZATIONAL

- Student secretary of *Association of Graduate Engineering Students (AGES)*, Washington University in St. Louis. 2002-03
- Coordinator for various cultural activities at I.I.T, Madras. 1997-99

AVOCATIONS

Post-modern literature, progressive jazz, deep house, cryptic crosswords, (half) marathons.

REFERENCES

Dr. Jonathan S. Turner

Director, Applied Research Laboratory (ARL)
 Department of Computer Science & Engineering.
 Campus Box 1045, One Brookings Drive.
 Washington University in St. Louis.
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Dr. S. V. Raghavan

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