XIN YUAN

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Florida State University
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RESEARCH INTERESTS

Parallel and distributed systems, Networking, High performance computing.

EDUCATION

Ph.D in Computer Science, University of Pittsburgh, August 1998.

MS in Computer Science, University of Pittsburgh, April 1995.

MS in Computer Science & Engineering, Shanghai Jiaotong University, April 1992.

BS in Computer Science & Engineering, Shanghai Jiaotong University, July 1989.

EXPERIENCE

Associate Professor, Department of Computer Science, Florida State University, August 2003 - date.

Associate Chair, Department of Computer Science, Florida State University, August 2006 - August 2007.

Assistant Professor, Department of Computer Science, Florida State University, August 1998 - August 2003.

Internship, IBM T.J. Watson Research Center. Summer 1997.

GRANT AWARDS

PI, "Delayed Finalization of MPI Collective Communication Routines," National Science Foundation (NSF), CCF-0541096, $300,000, Feb. 2006 – Jan. 2009. (Co-PIs: Zhenhai Duan and Kartik Gopalan)

PI, "REU: Delayed Finalization of MPI Collective Communication Routines," National Science Foundation (NSF), CCF-0648737 (REU supplement for CCF-0541096), $12,000, Feb. 2006 – Jan. 2009.

PI, "CRI: Acquisition of an Infiniband Cluster with SMP nodes," National Science Foundation (NSF), CNS-0551555, $100,000, March 2006 – Feb. 2008. (Co-PIs: Robert van Engelen and Kartik Gopalan)

Sole-PI, "Optimizing MPI Programs through Compiled Communication," National Science Foundation (NSF), CCF-0342540, $300,000, May 2004 – April 2008.

PI, "Dynamic Routing and Wavelength Assignment in the Presence of Imprecise Network State Information," Committee on Faculty Research Support (COFRS) Award, FSU Council on Research and Creativity (CRC), $8,000, summer 2003.

Co-PI, "Branch Elimination by Condition Merging," National Science Foundation (NSF), CCR-0208892, $180,000, Sept. 2002 – August 2005. (PI: David Whalley, Co-PI: Robert A. van Engelen)

Sole-PI, "Towards Scalable Quality of Service Routing," National Science Foundation (NSF), ANI-0106706, $142, 697, Sept. 2001 – August 2004.

Sole-PI, "Supporting Compiled Communication on Commodity Networks," National Science Foundation (NSF), CCR-0073482, $100,000, Sept. 2000 – August 2002.

Co-PI, "Automatic Validation of Improving Transformations and Related Applications," National Science Foundation (NSF), $300,000, CCR-9904943, Sept. 1999–August 2002. (PI: David Whalley, Co-PI: Robert A. van Engelen)

PI, "Supporting the Compiled Communication Model on Commodity Networks," FSU First Year Assistant Professor Award, $10,000, Summer, 1999.

PUBLICATIONS (the names of my students are in **Bold**)

Journal papers published or accepted

1. **W. Nienaber**, X. Yuan, Z. Duan "LID Assignment on InfiniBand Networks," *IEEE Trans. on Parallel and Distributed Systems*, accepted.
2. X. Yuan and Z. Duan, "Fair Round Robin: a Low Complexity Packet Scheduler with Proportional and Worst-Case Fairness," *IEEE Trans. on Computers*, accepted.
3. **A. Faraj**, **P. Patarasuk**, and X. Yuan, "A Study of Process Arrival Patterns for MPI Collective Operations," *International Journal of Parallel Programming*, accepted.
4. **A. Faraj**, **P. Patarasuk**, and X. Yuan, "Bandwidth Efficient All-to-all Broadcast on Switched Clusters," *International Journal on Parallel Programming*, 36(4):426-453, August 2008.
5. **P. Patarasuk**, X. Yuan, and **A. Faraj**, "Techniques for Pipelined Broadcast on Ethernet Switched Clusters," *Journal of Parallel and Distributed Computing*, 68(6):809-824, June 2008.
6. Z. Duan, X. Yuan, and J. Chandrashekar, "Controling IP Spoofing through Inter-Domain Packet Filters," *IEEE Transactions on Dependable and Secure Computing*, 5(1):22-36, January 2008.
7. **A. Faraj**, X. Yuan, and **P. Patarasuk**, "A Message Scheduling Scheme for All-to-all Personalized Communication on Ethernet Switched Clusters," *IEEE Transactions on Parallel and Distributed Systems*, 18(2):264-276, February 2007.
8. **R. G. Lane**, **S. Daniels** and X. Yuan, "An Empirical Study of Reliable Multicast Protocols over Ethernet-Connected Networks," *Performance Evaluation Journal*, 64(3):210-228, March 2007.

9. X. Yuan and Z. Duan, "On QoS Routing and Path Establishment in the Presence of Imprecise State Information," *Journal of Communications and Networks* (Special Issue on Routing, Path Computation and Traffic Engineering in Future Internet), 9(4):356-367, December 2007.
10. P. Kulkarni, W. Zhao, D. Whalley, X. Yuan, R. van Engelen, K. Gallivan, J. Hiser, J. Davidson, B. Cai, M. Bailey, H. Moon, K. Cho, Y. Paek, and D. Jones, "VISTA: VPO Interactive System for Tuning Applications," *ACM Transactions on Embedded Computing Systems*, 5(4):819-863, November 2006.
11. **A. Karwande**, X. Yuan, and D. K. Lowenthal, "An MPI Prototype for Compiled Communication on Ethernet Switched Clusters," *Journal of Parallel and Distributed Computing* (special issue on Design and Performance of Networks for Super-, Cluster-, and Grid-Computing), 65(10):1123-1133, October 2005.
12. W.C. Kreahling, D. Whalley, M. W. Bailey, X. Yuan, G.Uh, and R. van Engelen, "Branch Elimination by Condition Merging," *Software-Practice and Experience*, 35(1):51-74, January 2005.
13. R. A. van Engelen, D. Whalley, and X. Yuan, " Automatic Validation of Code-Improving Transformations on Low-Level Program Representations," *Science of Computer Programming Journal* (special issue on Program Transformation), 52(1-3):257-280, August 2004.
14. X. Yuan, R. Melhem and R. Gupta "Algorithms for Supporting Compiled Communication," *IEEE Transactions on Parallel and Distributed Systems*, 14(2):107-118, February 2003.
15. X. Yuan and **A. Fulay**, "Wavelength Assignment to Minimize the Number of SONET ADMs in WDM Rings," *Journal of Photonic Network Communications*, 5(1):59-68, January 2003.
16. X. Yuan, "Heuristic Algorithms for Multi–Constrained Quality of Service Routing," *IEEE/ACM Transactions on Networking*, 10(2):244-256, April 2002.
17. X. Yuan, R. Melhem and R. Gupta "Performance of Multihop Communication Using Logical Topologies on Torus Networks," *Journal of Parallel and Distributed Computing*, 61(6):748–766, June 2001.
18. X. Yuan, R. Melhem and R. Gupta, "Distributed Path Reservation Algorithms for Multiplexed All–Optical Interconnection Networks," *IEEE Transactions on Computers*, 48(12):1355–1363, December 1999.
19. X. Yuan, R. Melhem, R. Gupta, Y. Mei and C. Qiao, "Distributed Control for Wavelength Reservation and Their Performance Evaluation," *Journal of Photonic Network Communications*, 1(3):207-218, November 1999.
20. X. Yuan, R. Gupta and R. Melhem, "Demand-Driven Data Flow analysis for Communication Optimization," *Parallel Processing Letters*, 7(4):359-370, December 1997.
21. X. Yuan, C. Salisbury, D. Balsara and R. Melhem, "A Load Balancing Package on Distributed Memory System and its Application to Particle-Particle Particle-Mesh (P3M) Methods," *Parallel Computing*, 23(19):1525-1544, October 1997.
22. Y. Sun, Z. Hu and X. Yuan, "FP-VLSI: An Automatic Synthesis System," *Journal of Software*, 5(1), January 1994. (in Chinese)

Journal papers submitted

23. **P. Patarasuk** and X. Yuan, "Bandwidth Optimal All-reduce Operation for Clusters of Workstations," *submitted to Journal of Parallel and Distributed Computing*, major revision.
24. X. Yuan, **W. Nienaber**, Z. Duan, and R. Melhem "Oblivious Routing for Fat-Tree Based System Area Networks with Uncertain Traffic Demands," *submitted to IEEE Trans. on Networking*, major revision.

Conference and workshop papers published or accepted

25. P. Chen, W. Cho, Z. Duan, and X. Yuan, "Traffic-aware Inter-Domain Routing for Improved Routing Stability," *IEEE Globecom*, Nov. 2008.
26. **P. Patarasuk** and X. Yuan, "Efficient MPI_Bcast across Different Process Arrival Patterns," the *22th IEEE International Parallel & Distributed Processing Symposium (IPDPS)*, April 2008.
27. **J. Lawrence** and X. Yuan, "An MPI Tool for Automatically Discovering the Switch Level Topologies of Ethernet Clusters," the *IPDPS Workshop on System Management Techniques, Processes, and Services*, April 2008.
28. **W. Nienaber**, X. Yuan, Z. Duan, "On LID Assignment in Infiniband Networks," *ACM/IEEE Symposium on Architectures for Networking and Communications Systems (ANCS)*, December 2007.
29. **A. Faraj**, **P. Patarasuk**, and X. Yuan, "A Study of Process Arrival Patterns for MPI Collective Operations," the *21th ACM International Conference on Supercomputing (ICS)*, pages 168-179, June 2007.
30. X. Yuan, **W. Nienaber**, Z. Duan, and R. Melhem, "Oblivious Routing for Fat-Tree Based System Area Networks with Uncertain Traffic Demands," *ACM Sigmetrics*, pages 337-348, June 2007.
31. **P. Patarasuk** and X. Yuan, "Bandwidth Efficient All-reduce Operation on Tree Topologies," *IEEE IPDPS Workshop on High-Level Parallel Programming Models and Supportive Environments*, March 2007.
32. Z. Duan, K. Gopalan, and X. Yuan, "Behavioral Characteristics of Spammers and Their Network Reachability Properties," *IEEE International Conference on Communications (ICC)*, June 2007.
33. X. Yuan, "A Flexible Cluster Infrastructure for Systems Research and Software Development," the *NSF/CISE CRI PI Meeting*, Boston, MA, June 4-5, 2007. (invited)
34. **A. Faraj**, X. Yuan, and D.K. Lowenthal, "STAR-MPI: Self Tuned Adaptive Routines for MPI Collective Operations," the *20th ACM International Conference on Supercomputing (ICS)*, pages 199-208, June, 2006.
35. **P. Patarasu**, **A. Faraj**, and X. Yuan, "Pipelined Broadcast on Ethernet Switched Clusters," The *20th IEEE International Parallel & Distributed Processing Symposium (IPDPS)*, April 2006.
36. Z. Duan, X. Yuan, and J. Chandrashekar, "Constructing Inter-Domain Packet Filters to Control IP Spoofing Based on BGP Updates," *IEEE INFOCOM*, pages 283-291, April 2006.

37. **A. Faraj**, **P. Patarasuk** and X. Yuan, "Bandwidth Efficient All-to-all Broadcast on Switched Clusters," the *IEEE International Conference on Cluster Computing (Cluster)*, September 2005.
38. **A. Faraj** and X. Yuan, "Automatic Generation and Tuning of MPI Collective Communication Routines," the *19th ACM International Conference on Supercomputing (ICS)*, pages 393-402, June 2005.
39. **A. Faraj** and X. Yuan, "An Empirical Approach for Efficient All-to-all Personalized Communication on Ethernet Switched Clusters," *International Conference on Parallel Processing (ICPP)*, pages 321-328, June 2005.
40. **A. Faraj** and X. Yuan, "Message Scheduling for All-to-all Personalized Communication on Ethernet Switched Clusters," the *19th IEEE International Parallel & Distributed Processing Symposium (IPDPS)*, April 2005.
41. X. Yuan and Z. Duan, "FRR: a Proportional and Worst-Case Fair Round Robin Scheduler," *IEEE INFOCOM*, pages 831-842, March 2005.
42. William Kreahling, David Whalley, Mark Bailey, Xin Yuan, Gang-R yung Uh, and Robert van Engelen, "Branch Elimination via Multi-Variable Condition Merging," *European Conference on Parallel Computing (Euro-Par)*, August 2003.
43. **Amit Karwande**, Xin Yuan, and David K. Lowenthal, "CC-MPI: A Compiled Communication Capable MPI Prototype for Ethernet Switched Clusters," *ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP)*, June 2003.
44. Xin Yuan and **Guang Yang**, "Empirical Probability Based QoS Routing," *IEEE International Conference on Communications (ICC)*, May 2003.
45. Robert van Engelen, David Whalley and Xin Yuan, "Validation of Code-Improving Transformations for Embedded Systems," the *Eighteenth Annual ACM Symposium on Applied Computing*, March 2003.
46. **Ahmad Faraj** and Xin Yuan, "Communication Characteristics in the NAS Parallel Benchmarks," the *Fourteenth IASTED International Conference on Parallel and Distributed Computing and Systems (PDCS)*, November 2002.
47. Xin Yuan, **Wei Zheng** and **Shiling Ding**, "A Comparative Study of QoS Routing Algorithms that Tolerate Imprecise State Information," the *11th IEEE International Conference on Computer Communications and Networks (ICCCN)*, October 2002.
48. **Jun Zhou** and Xin Yuan, "A Study of Dynamic Routing and Wavelength Assignment with Imprecise State Information," *ICPP Workshop on Optical Networks*, August 2002.
49. Wankang Zhao, Baosheng Cai, David Whalley, Mark W. Bailey, Robert van Engelen, Xin Yuan, Jason D. Hiser, Jack W. Davidson, Kyle Gallivan, Douglas L. Jones, "VISTA: A System for Interactive Code Improvement," *ACM SIGPLAN Joint Conference Languages, Compilers, and Tools for Embedded Systems (LCTES)*, June 2002.
50. Xin Yuan and **Amit Fulay**, "Wavelength Assignment to Minimize the Number of SONET ADMs in WDM Rings," *IEEE International Conference on Communications (ICC)*, April 2002.
51. Xin Yuan, **Scott Daniels**, **Ahmad Faraj** and **Amit Karwande**, "Group Management Schemes for Implementing MPI Collective Communication over IP–Multicast," The *Sixth International Conference on Computer Science and Informatics*, March 2002.

52. X. Yuan and **X. Liu**, "Heuristic Algorithms for Multi-Constrained Quality of Service Routing," *IEEE INFOCOM*, pages 844–854, April 2001.
53. X. Yuan and **A. Saifee**, "Path Selection Methods for Localized Quality of Service Routing," the *10th IEEE International Conference on Computer Communications and Networks (ICCCN)*, October 2001.
54. X. Yuan and **A. Fulay**, "A Wavelength Assignment Heuristic to Minimize SONET ADMs in WDM rings," *ICPP Workshop on Optical Networks*, pages 257-262, September 2001.
55. **Ryan G. Lane**, **Daniels Scott** and Xin Yuan, "An Empirical Study of Reliable Multicast Protocols over Ethernet-Connected Networks," *International Conference on Parallel Processing (ICPP)*, pages 553-560, September 2001.
56. A. Qasem, D. Whalley, X. Yuan and R. van Engelen, "Using a Swap Instruction to Coalesce Loads and Stores," *European Conference on Parallel Computing (Euro-Par)*, LNCS 2150, pages 235-240, August 2001.
57. X. Yuan, **H. Ding**, **Y. Zhong** and **J. Zhang**, "Resource Reservation Mechanisms for Distributed Multi–path Quality of Service Routing," The *9th IEEE International Conference on Computer Communication and Networks (ICCCN)*, pages 9–13, October 2000.
58. R. van Engelen, D. Whalley and X. Yuan, "Automatic Validation of Code-Improving Transformations," (Extended abstract) *ACM SIGPLAN 2000 Workshop on Languages, Compilers and Tools for Embedded Systems (LCTES)*, June 2000.
59. **Y. Zhong** and X. Yuan, "Impact of Resource Reservation on the Distributed Multi-path Quality of Service Routing Scheme," the *Eighth International Workshop on Quality of Service (IwQoS)*, pages 95-104, June 2000.
60. X. Yuan, "On the Extended Bellman–Ford Algorithm to Solve Two–Constrained Quality of Service Routing Problems," the *Eighth IEEE International Conference on Computer Communications and Networks (ICCCN)*, pages 304–310, October 1999.
61. X. Yuan, R. Gupta and R. Melhem, "Compiler Analysis to Support Compiled Communication for HPF–like programs," the *13th International Parallel Processing Symposium & 10th Symposium on Parallel and Distributed Processing*, Second Merged Symposium IPPS/SPDP, pages 603–608, April 1999.
62. X. Yuan, R. Melhem and R. Gupta, "Performance of Multihop Communication Using Logical Topologies on Torus Networks," the *Seventh IEEE International Conference on Computer Communications and Networks (ICCCN)*, pages 494–501, October 1998.
63. X. Yuan and R. Melhem, "Optimal Routing and Channel Assignment for Hypercube Communication on Optical Mesh-like Processor Arrays," the *fifth International Conference on Massively Parallel Processing Using Optical Interconnections (MPPOI)*, June 1998.
64. X. Yuan, R. Gupta and R. Melhem, "Does Time-Division Multiplexing Close the Gap Between Memory and Optical Communication Speeds," Workshop on *Parallel computing, Routing and Communication*, LNCS 1417, pages 261–271, June 1997.
65. X. Yuan, R. Gupta and R.Melhem, "An Array Data Flow Analysis Based Communication Optimizer," the *Tenth Annual Workshop on Languages and Compilers for Parallel Computing (LCPC)*, LNCS 1366, pages 246–260, August 1997.

66. X. Yuan, R. Melhem and R. Gupta, "Distributed Path Reservation Algorithms for Multiplexed All-optical Interconnection networks," the *Third International Symposium on High Performance Computer Architecture (HPCA)*, pages 38-47, February 1997.
67. X. Yuan, R. Gupta and R. Melhem, "Distributed Control in Optical WDM Networks," *IEEE Conf. on Military Communications (MILCOM)*, pages 100-104, October 1996.
68. X. Yuan, R. Melhem and R. Gupta, "Compiled Communication for All–optical TDM Networks," *Supercomputing'96*, November 1996.
69. X. Yuan, R. Gupta and R. Melhem, "Demand-driven Data Flow Analysis for Communication Optimization," Workshop on *Challenges in Compiling for Scalable Parallel Systems, 8th IEEE Symposium on Parallel and Distributed Processing*, October 1996.
70. X. Yuan, R. Melhem and R. Gupta, "A Timestamp-based Selective Invalidation Scheme for Multiprocessor Cache Coherence," *International conference on parallel processing (ICPP)*, pages III-114 – III-121, August 1996.
71. X. Yuan, B. He, D. Balsara and R. Melhem, "A Load Balancing Package for Domain Decomposition in Distributed Memory System," *International conference and Exhibition on High-Performance Computing and Networking (HPCN)*, LNCS 1067, pages 547-554, April 1996.

SOFTWARE DEVELOPED

STAR-MPI (Self-Tuned Adaptive Routines for MPI Collective Operations). Released in April 2008 at http://star-mpi.sourceforge.net. STAR-MPI is being ported to IBM Blue Gene MPI stack.

PROFESSIONAL ACTIVITIES

Program vice chair(Software Systems and Tools track): International Conference on Parallel Processing, 2008.
TPC Member: IEEE HiPC, 2008
TPC Member: ACM International Conference on Computing Frontiers, 2007.
TPC Member: 12th International Workshop on High-Level Parallel Programming Models and Supportive Environment, 2007.
TPC Member: International Conference on Computer Communications and Networks, 2007.
TPC Member: International Conference on Complex Open Distributed Systems, 2007.
NSF Panel, 2007.
TPC Member: International Conference on Parallel Processing, 2006.
NSF Panel, 2006.
TPC Member: International Conference on Computer Communications and Networks, 2005.
Program Co-chair: ICPP Workshop on Network Design and Architectures, 2004.
TPC Member: International Conference on Computer Communications and Networks, 2004.
Publicity chair: ACM SIGPLAN Joint Conference Languages, Compilers, and Tools for Embedded Systems, 2004.
NSF Panel, 2004.
TPC Member: International Conference on Computer Communications and Networks, 2003.
Publicity chair: ACM SIGPLAN Joint Conference Languages, Compilers, and Tools for Embedded Systems, 2003.

Program co-chair: ICPP Workshop on Optical Networks, 2002
TPC Member: International Conference on Computer Communications and Networks 2002.
TPC Member: ICPP Workshop on Optical Networks, 2001.
TPC Member: International Conference on Computer Communications and Networks 2001.

COURSES TAUGHT

Computer Networks (graduate/undergraduate)

Advanced UNIX/Network Programming (graduate)

Compilers (graduate)

Advanced Operating Systems (graduate)

Advanced Parallel and Distributed Systems (graduate)

Advanced Networking (graduate)

Operating Systems (undergraduate)

Data Structures, Algorithms, and Generic Programming (undergraduate)

STUDENT SUPERVISING

PHD students

- Ahmad Faraj, *Empirical Techniques for Developing Efficient MPI Collective Communication Routings*, Completed Fall 2006. First Employment: IBM Blue Gene Software Development, Rochester, MN.
- Pitch Patarasuk (in progress, 4th year PHD student, expected to complete in Fall 2008). Topic: Efficient MPI Collective Communication Algorithms for SMP/Multi-core Clusters.
- Chi Zhang (in progress, 2nd year PHD student). Topic: Performance Modeling and Prediction.
- Wickus Nienaber (in progress, 1st year PHD student). Topic: Networking issues in Contemporary Systems Area Networks.
- Matthew Small (in progress, 1st year PHD student).

MS students

- Paul Shelton (1999), Zhong Yuan (1999), Hui Ding (2000), Ryan Lane (2000), Jie Zhang (2001), Nitin Agrawal (2001), Arif Saifee (2001), Wei Zheng (2001), Amit Fulay (2001), Kavitha Bangalor (2002), Guang Yang (2002), Jun Zhou (2002), Ahmad Faraj (2003), Amit Karwande (2003), Shiling Ding (2003), Ansari Almas (2004), Kaman Sankaran (2005), Wickus Nienaber (2007), Joshua Lawrence (in progress).

Dissertation committees

- Ahmed Moussa, Dept. of Computer Science, Florida State University, Summer 2003. (Major Advisor: Prof. Kohout Ladislav)

Yaohang Li, Dept. of Computer Science, Florida State University, Summer 2004. (Major Advisor: Prof. Michael Mascagni)

Clint Whaley, Dept. of Computer Science, Florida State University, Fall 2004. (Major Advisor: Prof. David Whalley)

Bill Kreahling, Dept. of Computer Science, Florida State University, Summer 2005. (Major Advisor: Prof. David Whalley)

Johnny Birch, Dept. of Computer Science, Florida State University, Summer 2007. (Major Advisor: Prof. Robert van Engelen)

Prasad Kulkarni, Dept. of Computer Science, Florida State University, Summer 2007. (Major Advisor: Prof. David Whalley)

Yixin Shou, Dept. of Computer Science, Florida State University, in progress. (Major advisor: Prof. Robert van Engelen)

Sanchez Fernando, Dept. of Computer Science, Florida State University, in progress. (Major advisor: Prof. Zhenhai Duan)

Wagne Liu, Dept. of Computer Science, Florida State University, in progress. (Major advisor: Prof. Sudhir Aggrawal)