William E. Johnston

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Professional Activities

Currently:

- Dept. head, Distributed Systems Dept., National Energy Research Scientific Computing Division, Lawrence Berkeley National Lab.
- Project Technical Manager for NASA's Information Power Grid Project.
  This project entails defining and implementing a fully distributed computing model for CPU, storage, instrument, and human resources across the NASA enterprise. The work also involves designing and implementing new organizational structure to deal with this new service delivery model.
- Principal investigator for the DOE research projects - "High Speed Distributed Computing", "Distributed Collaboratory Environments", "Distributed Security Architectures"

Previously:

- Principal investigator for the ARPA research project - "Distributed Storage Systems in High Speed Wide Area Networks" (part of the MAGIC gigabit network testbed)
- Co-Chairperson, President's Commission on Critical Infrastructure Protection, taskforce for Research & Development Priorities for Communications and Information Infrastructure Assurance
- Lecturer in Computer Science, San Francisco State University

Research Interests

- High-speed, wide area network-based distributed applications and data storage systems
- Security architectures and automated negotiation to support dynamic construction of large-scale configurable systems based in wide-area public network environments
- Use of the global Internet to enable remote access to scientific, analytical, and medical instrumentation
- Distributed systems supporting the use of digital video as computer data for dynamic object analysis and laboratory systems control

Skills

- Topic and scenario analysis

- Development of software approaches to computing problems in-the-large
- Design of systems and software architectures for scientific problems and computing infrastructure middleware services
- Leading computer science R&D teams that develop experimental and prototype systems
- Managing computer science R&D groups
- Designing and managing a high-speed distributed computing lab that includes multiple SMPs, multiple ATM switches, connectivity to multiple wide area OC-3 and OC-12 ATM testbeds
- Actualizing professional potential (I have spun off several successful groups.)

Previous and Related Work Experience

- Authorship of numerous funded proposals, including the Technical Rationale chapter of the winning proposal that brought NERSC to LBNL
- Principal investigator for the DOE research projects "High-Speed, Distributed Data Handling for High Energy and Nuclear Physics"
- Program manager for a $4M, two year DOE program in Distributed Collaboratories
- Group leader for groups as large as 15-20 computer scientists and a similar number of students, and a $4M+ budget
- Teaching
  - senior-level computer science courses in computer graphics (15 years)
  - graduate courses in imaging and image processing
  - supervision of numerous graduate students and service on their thesis committees
- Participation on the committee that provided expert advice to NSF during the NSFNet backbone transition to the public sector
- Co-designer (with David Robertson) one of the first, very successful, interactive 3D, educational Web sites. More than a million people a year from 170 different countries visit this site to do "virtual frog dissection": Interactive 3D visualization of a large volume dataset of real frog anatomy. (www-itg.lbl.gov/frog)

Education

- M.A., Mathematics, San Francisco State University, 1972 (Thesis: *Mathematical Foundations of Huygens' Principle);*

Recent Publications

(Most of these papers are available at http://www-itg.lbl.gov/~johnston, unless otherwise noted.)

"Grids as Production Computing Environments: The Engineering Aspects of NASA's Information Power Grid"

William E. Johnston, Dennis Gannon, and Bill Nitzberg. To appear, Eighth IEEE International Symposium on High Performance Distributed Computing, Aug 3-6, 1999, Redondo Beach, California. (See http://www.nas.nasa.gov/IPG)

"QoS as Middleware: Bandwidth Reservation System Design"

Gary Hoo and William Johnston, Lawrence Berkeley National Laboratory, Ian Foster and Alain Roy, Argonne National Laboratory and University of Chicago. To appear, Eighth IEEE International

Symposium on High Performance Distributed Computing, Aug 3-6, 1999, Redondo Beach, California. (See http://www-itg.lbl.gov/Clipper/QoS)

“Data Intensive Distributed Computing: A Medical Application Example,”
Brian Tierney, Jason Lee, William Johnston. High Performance Computing and Networking conference (Amsterdam, April 12-14 1999), to appear in the proceedings of the conference, published as Springer's Lecture Notes in Computer Science, and in a summer 2000 special issue of the Elsevier Journal “Future Generation Computer Systems”. (See http://www-didc.lbl.gov/publications.html)

“Certificate-based Access Control for Widely Distributed Resources,”
Mary Thompson, William Johnston, Srilekha Mudumbai, Gary Hoo, Keith Jackson, Usenix Security Symposium ‘99. Mar. 16, 1999. (See http://www-itg.lbl.gov/Akenti)

“Information Power Grid Implementation Plan: Research, Development, and Testbeds for High Performance, Widely Distributed, Collaborative, Computing and Information Systems Supporting Science and Engineering,”
William E. Johnston, Dennis Gannon, William J. Nitzberg, William Van Dalsem. June, 1999. NASA Ames Research Center, Moffett Field, CA 94035. Summary available at http://science.nas.nasa.gov/IPG .

“Certificate-based Access Control for Widely Distributed Resources,”
Mary Thompson, William Johnston, Srilekha Mudumbai, Gary Hoo, Keith Jackson. To appear, 1999 USENIX Security Symposium, August 23-26, 1999, JW Marriott Hotel, Washington, D.C. (Available at http://www-itg.lbl.gov/Akenti/papers.html)

“Data Intensive Distributed Computing: A Medical Application Example,”
J. Lee, B. Tierney, and W. Johnston. Proceedings of the High Performance Computing and Networking Conference, Amsterdam, April 12-14 1999, and, by invitation, to appear in “Future Generation Computer Systems,” Elsevier Pub. Co. (Available at www-didc.lbl.gov/publications.html)

“High-Speed, Wide Area, Data Intensive Computing: A Ten Year Retrospective,”
William E. Johnston. 7th IEEE Symposium on High Performance Distributed Computing, Chicago, Ill. July 29-31, 1998.

“The NetLogger Methodology for High Performance Distributed Systems Performance Analysis,”
Brian Tierney, W. Johnston, J. Lee, G. Hoo, C. Brooks, D. Gunter. 7th IEEE Symposium on High Performance Distributed Computing, Chicago, Ill. July 29-31, 1998.

“Real-Time Widely Distributed Instrumentation Systems,”
William E. Johnston. In *The Grid: Blueprint for a New Computing Infrastructure*. Edited by Ian Foster and Carl Kesselman. Morgan Kaufmann, Pubs. August 1998.

“Authorization and Attribute Certificates for Widely Distributed Access Control,”
William Johnston, S. Mudumbai, and M. Thompson. IEEE 7th International Workshops on Enabling Technologies: Infrastructure for Collaborative Enterprises - WETICE’98, Stanford, CA. June, 1998.

“Real-Time Generation and Cataloguing of Large Data-Objects in Widely Distributed Environments,”
W.Johnston, Jin G., C. Larsen, J. Lee, G. Hoo, M. Thompson, and B. Tierney (LBNL) and J. Terdiman (Kaiser Permanente Division of Research). Invited paper, International Journal of Digital Libraries - Special Issue on “Digital Libraries in Medicine”. May, 1998.

“Rationale and Strategy for a 21st Century Scientific Computing Architecture: The Case for Using Commercial Symmetric Multiprocessors as Supercomputers,”
William E. Johnston. International Journal of High Speed Computing. June, 1998.

“Comments on ‘Department of Energy Telecommunications Security Manual Chapter 9: Public Key Cryptography and Key Management’,”
W. Johnston. March, 1998.

“Method and apparatus for accurately manipulating an object during microelectrophoresis.”
U. S. Patent No. 423,969. Inventors: Parvin; Bahram A. (Hercules, CA); Maestre; Marcos F. (Berkeley, CA); Fish; Richard H. (Berkeley, CA); Johnston; William E. (Kensington, CA). Assignee: The Regents, University of California (Oakland, CA). 1998.

“Visual Servoing for Online Facilities,”
B. Parvin, J. Taylor, D. E. Callahan, W. Johnston, U. Dahmen. IEEE Computer, July 1997.

“Research & Development Priorities for Communications and Information Infrastructure Assurance,”
William J. Hunteman (Los Alamos National Laboratory), Sharon E. Jacobsen (Oak Ridge National Laboratory), William E. Johnston (Lawrence Berkeley National Laboratory), Douglass L. Mansur and Kathleen C. Bailey (Lawrence Livermore National Laboratory). Presidential Commission on Critical Infrastructure (PCCIP) taskforce report. June, 1997.

“High-Speed Distributed Data Handling for On-Line Instrumentation Systems,”
William E. Johnston, W. Greiman, G. Hoo, J. Lee, B. Tierney, C. Tull, and D. Olson. Proceedings of ACM/IEEE SC97: High Performance Networking and Computing. Nov., 1997.

“Public Key Infrastructure for DOE Security Research: Findings from ‘U. S. Department of Energy, Joint Energy Research / Defense Programs Computing-related Security Research Requirements — Workshop — II’,”
Robert Aiken (U.S. Dept. of Energy), C. Douglas Brown (Sandia National Laboratory), Ian Foster (Argonne National Laboratory), William E. Johnston (Lawrence Berkeley National Laboratory), John P. Long (Sandia National Laboratory), Douglass Mansur (Lawrence Livermore National Laboratory), Albuquerque, New Mexico. Dec 11–13, 1996.

“Techniques for Availability and Reliability of Distributed-Parallel Storage Systems,”
Q.M. Malluhi and W.E. Johnston. International Conference on Parallel and Distributed Systems (Euro-PDS’97), Barcelona, Spain. June 9-11, 1997.

“Distributed Health Care Imaging Information Systems,”
Mary Thompson, W. Johnston, G. Jin, J. Lee, B. Tierney and J. Terdiman. Presented at PACS Design and Evaluation: Engineering and Clinical Issues, SPIE Medical Imaging 1997, Feb 27, 1997, SPIE Proceedings Vol. 3035

“An Interface for Viewing and Searching Sets of Digital Images,”
Mary Thompson, J. Bastacky, W. Johnston. Proceedings Microscopy and Microanalysis 96.

“Telepresence for In-situ Experiment Control,”
B. Parvin, J. Taylor, B. Crowley, L. Wu, and W. Johnston. Invited lecture (W. Johnston) at the 1997 CERN School of Computing, Pruhonice (Prague), Czech Republic. 17 - 30 August 1997. Published in the “Proceedings of the 1997 CERN School of Computing.”

“High-Speed Distributed Data Handling for High-Energy and Nuclear Physics,”
William E. Johnston, W. Greiman, B. Tierney, A. Shoshani, and C. Tull. Invited lecture (W. Johnston) at the 1997 CERN School of Computing, Pruhonice (Prague), Czech Republic. 17 - 30

August 1997. Published in the "Proceedings of the 1997 CERN School of Computing." Also published in the proceedings of Computing in High Energy Physics, Berlin, Germany. April, 1997.

"A Use-Condition Centered Approach to Authenticated Global Capabilities: Security Architectures for Large-Scale Distributed Collaboratory Environments,"
William Johnston and Case Larsen. Invited lecture (W. Johnston) at the 1997 CERN School of Computing, Pruhonice (Prague), Czech Republic. 17 - 30 August 1997. Published in the "Proceedings of the 1997 CERN School of Computing."

"Issues for the Assured Operation of On-line Infrastructure: Vulnerabilities, Threats, Security, and Safety in Cyberspace,"
W. Johnston. A whitepaper in support of the Laboratory Director's participation in the Presidential Commission on Critical Infrastructure (PCCIP). Dec., 1996.

"Distributed Large Data-Object Environments: End-to-End Performance Analysis of High Speed Distributed Storage Systems in Wide Area ATM Networks,"
W. Johnston, B. Tierney, J. Lee, G. Hoo, and M. Thompson. Fifth NASA Goddard Space Flight Center Conference on Mass Storage Systems and Technologies, University of Maryland, College Park, MD. September 17 - 19, 1996.

"Distributed Environments for Large Data-Objects: Broadband Networks and a New View of High Performance, Large-Scale Storage-Based Applications,"
W. Johnston, W., G. Jin, G. Hoo, C. Larsen, J. Lee, B. Tierney, and M. Thompson. Internetworking '96, Nara, Japan. September 1996. (http://www-itg.lbl.gov/~johnston/NARA/NARA.1.7.fm.html)

"Bay Area Gigabit Testbed Network (BAGNet): Experience with a High-Speed, Metropolitan Area, IP over ATM Network,"
W. Johnston. Internetworking '96, Nara, Japan. September, 1996. (http://www-itg.lbl.gov/~johnston/NARA/NARA.BAGNet.1.fm.html)

"The Use of Public ATM Networks for Health Care Imaging Information Systems,"
William Johnston, J. Guojun, G. Hoo, C. Larsen, J. Lee, B. Tierney, M. Thompson, Asia Pacific Information Infrastructure Testbed Forum, Seoul, Korea. Sept., 1996.

"Visual Servoing for Micro Manipulation,"
B. Parvin, D. E. Callahan, W. Johnston, M. Maestre, International Conference on Pattern Recognition, Aug. 1996.

"Performance Analysis in High-Speed Wide Area ATM Networks: Top-to-bottom end-to-end Monitoring,"
B. Tierney, W. Johnston, J. Lee, G. Hoo, IEEE Networking, May-June, 1996.

"Suitability of the Internet for Electric Power Transmission, Realtime Information Networks,"
W. Johnston. A White Paper submitted by the U. S. Department of Energy in response to the United States Federal Energy Regulatory Commission, Notice of Proposed Rulemaking, Docket No. RM95-8-000. Jan., 1996.

"Telepresence for In-situ Microscopy,"
B. Parvin, J. Taylor, B. Crowley, W. Johnston, D. Owen, M. O'keefe, and U. Dahman, The IEEE Int'l Conference on Multimedia Computing and Systems 1996 (IEEE Multimedia Systems '96), Hiroshima, Japan.

"The MBone: A New Paradigm for Globally Distributing Interactive Multimedia Sessions,"
W. Johnston. Western Communications Forum, Dallas, TX. Feb. 14, 1996.

“Issues in Architectures and Technologies for On-line, Global-Scale Scientific Environments,”
W. Johnston and D. Agarwal. A white paper for “America in the Age of Information” A Forum on Federal Information and Communications R&D. Sponsored by The Committee on Information and Communications (CIC) of the National Science and Technology Council (NSTC). Bethesda, MD. July 6-7, 1995.

“The Virtual Laboratory: Using Networks to Enable Widely Distributed Collaboratory Science,”
W. Johnston and D. Agarwal. A white paper for the NSF “vBNS and Networking and Application Researchers” workshop. June, 1995.

“A Distributed Parallel Storage Architecture and its Potential Application Within EOSDIS,”
W. Johnston and B. Tierney (LBNL), and J. Feuquay and T. Butzer (USGS EROS Data Center). NASA Mass Storage Conference, Goddard Space Flight Center, April, 1995.

“BAGNet: A High Speed, Metropolitan Area, IP Over ATM Network Testbed,”
W. Johnston. IEEE Compcon 1995, San Francisco, California. March, 1995.

“Using the World Wide Web to Provide a Platform Independent Interface to High Performance Computing,”
D. Robertson, W. Johnston. IEEE Compcon 1995, March, 1995, San Francisco, California.

“Tracking of Tubular Molecules for Scientific Applications,”
IEEE Transaction on Pattern Analysis and Machine Intelligence, Aug. 1995.

“Potential Impact of the National Information Infrastructure on Energy Demand Management,”
Frank Olken, William E. Johnston, Hashem Akbari, Carl Blumstein (University of California Energy Institute). A White Paper submitted to DOE for the Information Infrastructure Task Force (IITF) report, Olken, Frank, William E. Johnston, Hashem Akbari, Carl Blumstein (University of California Energy Institute), August, 1994.

“Virtual Frog Dissection: Interactive 3D Graphics Via the Web,”
David Robertson, William Johnston, and Wing Nip. Proceedings, The Second International WWW Conference '94: Mosaic and the Web, Chicago, IL (1994).

“System Issues in Implementing High Speed Distributed Parallel Storage Systems,”
B. Tierney, W. Johnston, L. Chen, H. Herzog, G. Hoo, G. Jin, and J. Lee. “1994 Usenix Symposium on High-Speed Networking”, August 1-2, 1994, Oakland, CA.

“Visualizing Anatomical Structure of Brain from MR Images,”
B. Parvin, W. Johnston, D. Robertson. AAAI Conf. on Application of Computer Vision in Medical Images, March 1994.

“High Performance Computing, High Speed Networks, and Configurable Computing Environments,”
W. Johnston, V. Jacobson, D. Robertson, B. Tierney, S. Loken. In: *High Performance Computing in Biomedical Research*, CRC Press November, 1993.