

Dr. John D. Kubiatoiwicz

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Education: **Massachusetts Institute of Technology** **Cambridge, MA**
PhD in Electrical Engineering and Computer Science. Minor in Physics. GPA: 5.0/5.0. 2/98
S.M. in Electrical Engineering and Computer Science. GPA: 5.0/5.0. 2/93
Double S.B in Electrical Engineering and Physics. GPA: 5.0/5.0. 6/87

Research Interests: Speculative approaches for constructing computer systems. Interests include massively parallel systems, quantum computing, and reconfigurable computing. Other interests include security, privacy, and resilience to faults and denial of service attacks in internet-scale systems.

Research Experience: **University of California at Berkeley** **Berkeley, CA**
Developing new hardware and software mechanisms for manycore systems. Research includes novel OS organizations, hardware support for security, communication, and QoS.
Developing internet-scale storage utilities. Developing secure protocols that provide privacy, security, and resistance to denial of service, while still allowing the caching of data anywhere, anytime. Also developing CAD tools for exploring the quantum circuit design space and ultimately designing quantum computers. Current focus on Ion-trap systems.

Massachusetts Institute of Technology **Cambridge, MA**
Responsible for the design and implementation of the Alewife multiprocessor. Modified industry-standard microprocessors for rapid context switching and software cache-coherence. Explored tradeoffs in communication styles, such as message passing vs shared memory.

Professional: **University of California at Berkeley** **Berkeley, CA**
Full Professor of Computer Science 7/10 – Present
Associate Professor of Computer Science 7/03 – 6/10
Assistant Professor of Computer Science 1/98 – 6/03

- Teaching: *computer architecture* and *operating systems* at undergraduate and graduate levels
- Research: Internet-scale systems, OS, compilers, quantum and classical computer architectures

Project Athena, IBM assignment **Cambridge, MA**
Systems Developer 6/87 – 1/89

Mounds View School District 621 **Arden Hills, MN**
Summer School Instructor. 1984 – 1986

Awards:

- U.S. News and World Report “People To Watch for 2004” 12/03
- Diane S. McEntyre Award for Excellence in Teaching 5/03
- Scientific American 50 (awarded to top 50 visionaries in research, industry, and politics) 11/02
- MoundsView High School Distinguished Alumni Award 6/01
- Berkeley IT Award for Excellence in Undergraduate CS Teaching 11/00
- Presidential Early Career Award for Scientists and Engineers (PECASE). 10/00
- George M. Sprowls Award for best PhD thesis in EECS at MIT. 7/98
- Best Paper. Intl. Conf. on Supercomputing (1993). 7/93

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| Consulting: | CISCO systems Network Protocol Design. | San Jose, CA 01/06 – 12/06 |
| | IBM Research Labs Specialist in Storage and Autonomic Computing. | San Jose, CA 10/01 – 1/03 |
| | SUN Microsystems Specialist in RAS design techniques. | Menlo Park, CA 2/00 – 6/01 |
| | CLAM Associates Development of testing tools for high-availability clustered applications. | Cambridge, MA 10/96 – 5/98 |
| | Intl. Business Machines Operating Systems/Device Driver Development. | Cambridge, MA 1/89 – 1/93 |

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| Membership: | • IEEE | Spring 1998 |
| | • ACM | Spring 1998 |
| | • Sigma Xi | Fall 1992 |
| | • American Association for the Advancement of Science (AAAS) | Fall 1987 |
| | • Tau Beta Pi | Fall 1986 |
| | • Sigma Pi Sigma | Fall 1986 |

Selected Publications:

“GPUs as an Opportunity for Offloading Garbage Collection,” Martin Maas, Philip Reames, Jeffrey Morlan, Krste Asanovic, Anthony D. Joseph, and John Kubiawicz. *Intl. Symp. on Memory Management (ISMM)*, June 2012

“Juggle: addressing extrinsic load imbalances in SPMD applications on multicore computers,” Steven Hofmeyr, Juan A. Colmenares, Costin Iancu, and John Kubiawicz. *Cluster Computing: The Journal of Networks, Software Tools and Applications*, April 2012

“A Soft Real-Time, Parallel GUI Service in Tessellation Many-Core OS,” Albert Kim, Juan A. Colmenares, Hilfi Alkaff, and John Kubiawicz. *Intl. Conf. on Computers and Their Applications (CATA)*, March 2012

“Real-Time Musical Applications On An Experimental Operating System for Multi-Core Processors,” Juan A. Colmenares, Ian Saxton, Eric Battenberg, Rimas Avizienis, Nils Peters, Krste Asanovic, John D. Kubiawicz, and David Wessel. *Intl. Computer Music Conf. (ICMC)*, 2011

“Juggle: Proactive Load Balancing on Multicore Computers,” Steven Hofmeyr, Juan Colmenares, Costin Iancu, and John Kubiawicz. *High Performance Dist. Computing (HPDC)*, June 2011

“Resource Management in the Tessellation Manycore OS,” Juan A. Colmenares, Sarah Bird, Henry Cook, Paul Pearce, David Zhu, John Shalf, Steven Hofmeyer, Krste Asanovic and John Kubiawicz. *Second USENIX Workshop on Hot Topics in Parallelism (HotPar)*, June 2010

“A View of the Parallel Computing Landscape,” Krste Asanovic, Ras Bodik, James Demmel, Tony Keaveny, Kurt Keutzer, John Kubiawicz, Nelson Morgan, David A. Patterson, Koushik Sen, John Wawrzynek, David Wessel, Katherine A. Yelick. In *CACM*, Vol 52, No. 10, Oct. 2009, pp 56-67.

“A Fault Tolerant, Area Efficient Architecture for Shor’s Factoring Algorithm,” Mark Whitney, Nemanja Isailovic, Yatish Patel, and John Kubiawicz. *Intl. Symp. on Computer Arch., (ISCA)*, June 2009

“Analysis of Photonic Networks for a Chip Multi-Processor Using Scientific Applications,” G. Hendry, S. Kamil, A. Biberman, J. Chan, B. Lee, M. Mohiyuddin, A. Jain, K. Bergman, L.P. Carloni, J. Kubiawicz, L. Olikier, and J. Shalf. *Third Intl. Symp. on Networks-on-Chip (NOCS)*, May 2009

[Publications Continued]

“Tessellation: Space-Time Partitioning in a Manycore Client OS,” Rose Liu, Kevin Klues, Sarah Bird, Steven Hofmeyr, Krste Asonovic, and John Kubiataowicz. *First USENIX Workshop on Hot Topics in Parallelism (HotPar '09)*, March 2009

“Tiered Fault Tolerance for Long-Term Integrity,” Byung-Gon Chun, Petros Maniatis, Scott Shenker, and John Kubiataowicz. *USENIX Conf. on File and Storage Tech. (FAST '09)*, Feb 2009.

“Performance and Energy Comparison of Electrical and Hybrid Photonic Networks for CMPs,” Shoaib Kamil, Ankit Jain, John Shalf, and John Kubiataowicz. *Workshop on High Performance Embedded Computing (HPEC)* Sept. 2008

“Running a Quantum Circuit at the Speed of Data,” Nemanja Isailovic, Mark Whitney, Yatish Patel and John Kubiataowicz. *Intl. Symp. on Computer Arch. (ISCA)*, June 2008

“Attested Append-Only Memory: Making Adversaries Stick to Their Word,” Byung-Gon Chun, Petros Maniatis, Scott Shenker, and John Kubiataowicz. *Symp. on OS Principles (SOSP)*, Oct 2007

“Automated Generation of Layout and Control for Quantum Circuits,” Mark Whitney, Nemanja Isailovic, Yatish Patel, and John Kubiataowicz. *ACM Intl. Conf. on Comp. Frontiers*, May 2007

“Antiquity: Exploiting a Secure Log for Wide-Area Distributed Storage,” Hakim Weatherspoon, Patrick Eaton, Byung-Gon Chun, and John Kubiataowicz. *ACM European Conf. on Computer Systems (EuroSys '07)*, March 2007

“Interconnection Networks for Scalable Quantum Computers,” Nemanja Isailovic, Yatish Patel, Mark Whitney, and John Kubiataowicz. *Intl. Symp. on Computer Arch. (ISCA)*, June 2006

“Efficient Replica Maintenance for Distributed Storage Systems,” Byung-Gon Chun, Frank Dabek, Andreas Haeberlen, Emil Sit, Hakim Weatherspoon, M. Frans Kaashoek, John Kubiataowicz, and Robert Morris. *USENIX Symp. on Networked Systems Design and Impl. (NSDI '06)*, May 2006.

“Proactive Replication for Data Durability,” Emil Sit, Andreas Haeberlen, Frank Dabek, Byung-Gon Chun, Hakim Weatherspoon, Robert Morris, M. Frans Kaashoek, and John Kubiataowicz. *Intl. Workshop on Peer-to-Peer Systems (IPTPS)*, Feb. 2006.

“ChunkCast: An Anycast Service for Large Content Distribution,” Byung-Gon Chun, Peter Wu, Hakim Weatherspoon, and John Kubiataowicz. *Workshop on Peer-to-Peer Sys. (IPTPS)*, Feb. 2006

“Efficiently Binding Data to Owners in Distributed Content-Addressable Storage Systems,” Patrick Eaton, Hakim Weatherspoon, and John Kubiataowicz. *Intl. IEEE Security in Storage Workshop (IEEE SISW 2005)*, Dec. 2005

“Fixing the Embarrassing Slowness of OpenDHT on PlanetLab,” Sean Rhea, Byung-Gon Chun, John Kubiataowicz, and Scott Shenker. *Workshop on Real, Large Dist. Sys. (WORLDS)*, Dec. 2005

“OpenDHT: A Public DHT Service and Its Uses,” Sean Rhea, Brighten Godfrey, Brad Karp, John Kubiataowicz, Sylvia Ratnasamy, Scott Shenker, Ion Stoica, and Harlan Yu. *Conf. of the Special Interest Group on Data Communication (SIGCOMM)*, Aug. 2005

“Impact of Neighbor Selection on Performance and Resilience of Structured P2P Networks”, Byung-Gon Chun, Ben Zhao, and John Kubiataowicz. *Workshop on Peer-to-Peer Sys. (IPTPS)*, Feb. 2005

“Optimizing Robustness while Generating Shared Secret Safe Primes,” Emil Ong and John Kubiataowicz. *Public Key Cryptography*, 2005, p. 120-137, January 2005

“Improving Bandwidth Efficiency of Peer-to-Peer Storage”, Patrick Eaton, Emil Ong, and John Kubiataowicz. *IEEE Intl. Conf. on Peer-to-Peer Computing (IEEE P2P '04)*, Aug. 2004

[Publications Continued]

- “Selfish Caching in Distributed Systems: A Game-Theoretic Analysis,” Byung-Gon Chun, Kamalika Chaudhuri, Hoeteck Wee, Marco Barreno, Christos H. Papadimitriou, and John Kubiatowicz. *ACM Symp. on Principles of Distributed Computing*, July 2004
- “Object Location in Realistic Networks,” Kirsten Hildrum, Robert Krauthgamer, and John D. Kubiatowicz. *ACM Symp. on Parallel Algorithms and Architectures (SPAA)*, June 2004
- “Handling Churn in a DHT,” Sean Rhea, Dennis Geels, Timothy Roscoe, and John Kubiatowicz. *USENIX Annual Technical Conf.*, June 2004
- “Characterizing Selfishly Constructed Overlay Routing Networks,” Byung-Gon Chun, Rodrigo Fonseca, Ion Stoica, and John Kubiatowicz. *IEEE Intl. Conf. on Computer Communications (INFOCOMM)*, March 2004
- “Distributed Object Location in a Dynamic Network,” Kirsten Hildrum, John D. Kubiatowicz, Satish Rao, and Ben Y. Zhao. *Theory of Computing Systems*, Issue: Online First, March 15, 2004
- “Datapath and Control for Quantum Wires,” Nemanja Isailovic, Mark Whitney, Yatish Patel, John Kubiatowicz, Dean Copley, Frederic T. Chong, Isaac L. Chuang, and Mark Oskin. *Transactions on Architecture and Code Optimization (TACO)*, Vol 1, No. 1, pp 34-61, March 2004
- “Rapid Mobility via Type Indirection”, Ben Y. Zhao, Ling Huang, Anthony Joseph, and John Kubiatowicz. *Intl. Workshop on Peer-to-Peer Systems (IPTPS)*, Feb. 2004
- “Tapestry: A Resilient Global-Scale Overlay for Service Deployment,” Ben Y. Zhao, Ling Huang, Jeremy Strubling, Sean C. Rhea, Anthony D. Joseph, and John Kubiatowicz. *IEEE Journal on Selected Areas in Communications*, Vol 22, No. 1, January 2004
- “A Note on Finding the Nearest Neighbor in Growth-Restricted Metrics,” Kirsten Hildrum, John Kubiatowicz, Sean Ma, and Satish Rao. *Symp. on Discrete Algorithms (SODA)*, January 2004
- “Exploiting Prediction To Reduce Power on Buses,” Victor Wen, Mark Whitney, Yatish Patel and John Kubiatowicz. *Intl. Symp. on High Performance Computer Arch. (HPCA 2004)*
- “Toward a Scalable, Silicon-Based Quantum Computing Architecture,” Dean Copley, Mark Oskin, Francois Impens, Tzvetan Metodiev, Andrew Cros, Frederic T. Chong, Isaac L. Chuang, and John Kubiatowicz. *Journal of Selected Topics in Quantum Electronics* Vol 9, No. 6, pp 1552-1569. Nov./Dec. 2003.
- “Exploiting Routing Redundancy via Structured Peer-to-Peer Overlays,” Ben Y. Zhao, Ling Huang, Jeremy Strubling, Anthony D. Joseph, and John Kubiatowicz. *Intl. Conf. on Network Protocols (ICNP)*, Nov. 2003
- “Asymptotically Efficient Approaches to Fault-Tolerance in Peer-to-Peer Networks,” Kirsten Hildrum And John Kubiatowicz. *Intl. Symp. on Distributed Computing*, Oct. 2003
- “Can we build Classical Control Circuits for Silicon Quantum Computers?,” Mark Whitney, Yatish Patel, Nemanja Isailovic, and John Kubiatowicz. *Second Workshop in Non-Silicon Computing (NSC2)*, June 2003.
- “Building Quantum Wires: The Long and the Short of it,” Mark Oskin, Frederic T. Chong, Isaac L. Chuang, John Kubiatowicz. In *Intl. Symp. on Computer Arch. (ISCA)*, June 2003.
- “The Effect of Communication Costs in Solid-State Quantum Computing Architectures,” Dean Copley, Mark Oskin, Tzvetan Metodiev, Frederic T. Chong, Isaac Chuang, and John Kubiatowicz. *ACM Symp. on Parallelism in Algorithms and Architectures (SPAA 2003)*

[Publications Continued]

“Approximate Object Location and Spam Filtering on Peer-to-Peer Systems,” Feng Zhou, Li Zhuang, Ben Y. Zhao, Ling Huang, Anthony Joseph and John Kubiawicz. In *ACM/IFIP/USENIX Intl. Middleware Conference* (Middleware 2003), June 2003.

“Structured Peer-to-Peer Overlays Need Application-Driven Benchmarks,” Sean Rhea, Timothy Roscoe, and John Kubiawicz. *Workshop on Peer-to-Peer Sys.* (IPTPS), Feb. 2003.

“Towards a Common API for Structured Peer-to-Peer Overlays,” Frank Dabek, Ben Zhao, Peter Druschel, John Kubiawicz, and Ion Stoica. *Workshop on Peer-to-Peer Sys.* (IPTPS), Feb. 2003.

“Extracting Guarantees from Chaos,” John Kubiawicz. In *CACM*, Vol 46, No. 2, Feb. 2003.

“Pond: the OceanStore Prototype,” Sean Rhea, Patrick Eaton, Dennis Geels, Hakim Weatherspoon, Ben Zhao, and John Kubiawicz. In *USENIX Conf. on File and Storage Technologies* (FAST ’03), March 2003.

“Distributed Object Location in a Dynamic Network”, Kirsten Hildrum, John D. Kubiawicz, Satish Rao, and Ben Y. Zhao. In *ACM Symp. on Parallel Algorithms and Architectures*(SPAA), Aug. 2002.

“SCAN: A Dynamic, Scalable, and Efficient Content Distribution Network”, In *Intl. Conf. Pervasive Computing*, Aug. 2002.

“Probabilistic Location and Routing” Sean Rhea and John Kubiawicz. In *Annual Joint Conf. of IEEE Computer and Communications Societies (INFOCOM)*, June 2002.

“Brocade: Landmark Routing on Overlay Networks,” Ben Y. Zhao, Yitao Duan, Ling Huang, Anthony Joseph, and John Kubiawicz. In *Workshop on Peer-to-Peer Sys.* (IPTPS), March 2002.

“The Worldwide Computer,” David Anderson and John Kubiawicz. In *Scientific American*. vol 286, no. 3, March 2002

“Maintenance-Free Global Data Storage” Sean Rhea, Chris Wells, Patrick Eaton, Dennis Geels, Ben Zhao, Hakim Weatherspoon, and John Kubiawicz. In *IEEE Internet Computing*, Vol 5, No. 5. Sept./Oct. 2001.

“Bayeux: An Architecture for Wide-Area, Fault-Tolerant Data Dissemination” Shelley Zhuang, Ben Zhao, Anthony Joseph, Randy Katz, and John Kubiawicz. In *Workshop on Network and Operating Systems Support for Digital Audio and Video* (NOSSDAV), June 2001.

“Erasure Coding vs. Replication: A Quantitative Comparison,” Hakim Weatherspoon and John Kubiawicz. In *Intl. Workshop on Peer-to-Peer Systems* (IPTPS), March 2002.

“OceanStore: An architecture for Global-Scale Persistent Storage”, John Kubiawicz, David Bindel, Yan Chen, Steven Czerwinski, Patrick Eaton, Dennis Geels, Ramakrishna Gummadi, Sean Rhea, Hakim Weatherspoon, Westley Weimer, Chris Wells, and Ben Zhao. *Intl. Conf. on Architectural Support for Prog. Languages and Operating Systems* (ASPLOS), Nov. 2000.

“Multigrain Shared Memory” Donald Yeung, John Kubiawicz, and Anant Agarwal. In *ACM Transactions on Computer Systems*. Vol. 18, No. 2, pages 154-196. May 2000.

“NinjaMail: The Design of a High-Performance Clustered, Distributed E-Mail System,” J.R. von Behren, S. Czerwinski, A. D. Joseph, E. A. Brewer, and J. Kubiawicz. In *Intl. Workshop on Parallel Processing 2000*, Aug. 2000.

“ISTORE: Introspective Storage for Data-intensive Network Services.” Aaron Brown, David Oppenheimer, Kim Keeton, Randi Thomas, John Kubiawicz, and David A. Patterson. In *Workshop on Hot topics in Operating Systems* (HotOS-VII), March 1999.

[Publications Continued]

“The MIT Alewife Machine.” *Proc. of the IEEE*, vol 87 (no. 3), March 1999.

“Exploiting Two-Case Delivery for Fast Protected Messaging.” Ken Mackenzie, John Kubiato-
wicz, Matthew Frank, Walter Lee, Victor Lee, Anant Agarwal, and Franz Kaashoek. In *Intl. Symp.
on High Performance Computer Architecture (HPCA)*, Feb. 1998.

“The Sensitivity of Communication Mechanisms to Bandwidth and Latency.” Rajeev Barua, Fred-
erik T. Chong, Fredrik Dahlgren, John Kubiato-
wicz, and Anant Agarwal. In *Intl. Symp. on High
Performance Computer Architecture (HPCA)*, Feb. 1998.

“Application Performance on the MIT Alewife Machine.” Frederic T. Chong, Beng-Hong Lim,
Ricardo Bianchini, John Kubiato-
wicz, and Anant Agarwal. In *IEEE Computer*, Dec. 1996.

“MGS: A Multi-Grain Shared Memory System.” Donald Yeung, John Kubiato-
wicz, and Anant
Agarwal. In the *Intl. Symp. on Computer Arch. (ISCA)*, May 1996

“Remote Queues: Exposing Message Queues for Optimization and Atomicity.” Eric A. Brewer,
Frederic T. Chong, Lok T. Liu, Shamik D. Sharma, and John Kubiato-
wicz. In the *Symp. on Parallel
Architectures and Algorithms*, July 1995.

“The MIT Alewife Machine: Architecture and Performance.” Anant Agarwal, Ricardo Bianchini,
David Chaiken, Kirk Johnson, David Kranz, John Kubiato-
wicz, Beng-Hong Lim, Ken Mackenzie,
and Donald Yeung. In the *Intl. Symp. on Computer Arch.*, June 1995.

“The Alewife CMMU: Addressing the Multiprocessor Communications Gap.” John Kubiato-
wicz,
David Chaiken, and Anant Agarwal. Extended Abstract. Presented at *Hot Chips VI*. Aug. 1994.

“The Anatomy of a Message in the Alewife Multiprocessor.” John Kubiato-
wicz and Anant Agar-
wal. In the *Intl. Conf. on Supercomputing*, July 1993 as an Invited Paper.

“SPARCLE: An Evolutionary Processor Design for Large-Scale Multiprocessors.” Anant Agar-
wal, John Kubiato-
wicz, David Kranz, Beng-Hong Lim, Donald Yeung, Godfrey D’Souza, and
Mike Parkin. In *IEEE Micro*, June 1993.

“Integrating Message-Passing and Shared-Memory: Early Experience.” David Kranz, Kirk John-
son, Anant Agarwal, John Kubiato-
wicz, and Beng-Hong Lim. In the *Conf. on Principles and
Practice of Parallel Programming*, May 1993.

“Closing the Window of Vulnerability in Multiphase Memory Transactions” John Kubiato-
wicz,
David Chaiken, and Anant Agarwal. In the *Intl. Conf. on Architectural Support for Programming
Languages and Operating Systems (ASPLOS)*, Oct. 1992.

“LimitLESS Directories: A Scalable Cache Coherence Scheme.” David Chaiken, John Kubiato-
wicz, and Anant Agarwal. In the *Fourth Intl. Conf. on Architectural Support for Programming
Languages and Operating Systems (ASPLOS)*, April 1991.

“APRIL: A Processor Architecture for Multiprocessing.” Anant Agarwal, Beng-Hong Lim, David
A. Kranz, and John Kubiato-
wicz. In the *17th Intl. Symp. on Computer Arch.*, June 1990.

Selected Talks: “Reinventing Operating Systems for the Manycore Ubiquitous Swarm,” *Swarm-Lab Seminar*, UC
Berkeley, April 2011

“Architecting Systems Software in a ManyCore World,” *Cornell Systems Seminar*, Cornell Uni-
versity, Nov. 2009

“Optimizing the Layout and Error Properties of Quantum Circuits,” *Seminar Series*, Caltech Insti-
tute for Quantum Information, Nov. 2009

“Cloud Storage is the Future: Lessons from the OceanStore Project,” *CISCO Cloud Computing Research Symposium (C3RS)*, Cisco Systems, Nov. 2008

“OceanStore: Toward Global-Scale, Self-Repairing, Secure and Persistent Storage”, *Distinguished Lecture Series*, University of Maryland, Oct. 2002.

“Architectural Components for a Practical Quantum Computer”, *ASPLOS Wild and Crazy Ideas Session III*, ASPLOS X, Sept. 2002.

“Opportunities for Continuous Tuning in a Global Scale File System”, *IBM Almaden Institute on Autonomic Computing*, IBM Almaden Research Institute, April 2002

“OceanStore: An Architecture for Global-Scale Persistent Storage”. *ASPLOS IX*, Nov. 2001

“The MIT Alewife Machine: Architecture and Performance.” *International Symposium on Computer Architecture (ISCA)*, June 1995

“The Alewife CMMU: Addressing the Multiprocessor Communications Gap.” *Hotchips VI*, Aug. 1994, Stanford, CA.

“Anatomy of a Message in the Alewife Multiprocessor” *ICS*, July 1993, Tokyo. Companion talk given at Fujitsu Laboratories in Kawasaki.

“Closing the Window of Vulnerability in Multiphase Memory Transactions” *ASPLOS V*, Oct. 1992