

Dr. John D. Kubitowicz

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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 quantum computing, reconfigurable computing, and biological 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**
Exploring the design of extremely-wide area storage utilities. Developing secure protocols and routing infrastructures that provide privacy, security, and resistance to denial of service, while still allowing the caching of data anywhere, anytime.
Also exploring the space of *Introspective Computing*, namely systems which perform continuous, on-line adaptation. Applications include on-chip tolerance of flaky components and continuous optimization to adapt to server failures and denial of service attacks.

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**
Associate Professor of Computer Science 7/03 – Present.
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

Systems Developer

Cambridge, MA

6/87 – 1/89

Mounds View School District 621

Summer School Instructor.

Arden Hills, MN

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. Conference on Supercomputing (1993). 7/93

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| Consulting: | CISCO systems Network Protocol Design. | San Jose, CA 01/06 – present |
| | 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 |
| Membership: | <ul style="list-style-type: none"> • IEEE • Sigma Xi • American Association for the Advancement of Science (AAAS) • Tau Beta Pi • Sigma Pi Sigma | <ul style="list-style-type: none"> Spring 1998 Fall 1992 Fall 1987 Fall 1986 Fall 1986 |

Selected Publications:

“Automated Generation of Layout and Control for Quantum Circuits,” Mark Whitney, Nemanja Isailovic, Yatish Patel, and John Kubiawicz. *Proc. of the ACM Intl. Conference on Computing Frontiers*, May 2007

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

“Interconnection Networks for Scalable Quantum Computers,” Nemanja Isailovic, Yatish Patel, Mark Whitney, and John Kubiawicz. *Proc. of the Intl. Symposium on Computer Architecture (ISCA 2006)*, June 2006

“Efficient Replica Maintenance for Distributed Storage Systems,” Byung-Gon Chun, Frank Dabek, Andreas Haeberlen, Emil Sit, Hakim Weatherspoon, M. Frans Kaashoek, John Kubiawicz, and Robert Morris. *Proc. of the USENIX Symposium on Networked Systems Design and Implementation (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 Kubiawicz. *Proc. of the Intl. Workshop on Peer-to-Peer Systems (IPTPS '06)*, February 2006.

“ChunkCast: An Anycast Service for Large Content Distribution,” Byung-Gon Chun, Peter Wu, Hakim Weatherspoon, and John Kubiawicz. *Proceedings of Intl. Workshop on Peer-to-Peer Systems (IPTPS '06)*, February 2006

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

[Publications Continued]

“Fixing the Embarrassing Slowness of OpenDHT on PlanetLab,” Sean Rhea, Byung-Gon Chun, John Kubiawicz, and Scott Shenker. *Workshop on Real, Large Distributed Systems (WORLDS)*, December 2005

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

“Impact of Neighbor Selection on Performance and Resilience of Structured P2P Networks”, Byung-Gon Chun, Ben Y. Zhao, and John D. Kubiawicz. *Proc. of Intl. Workshop on Peer-to-Peer Systems (IPTPS '05)*, February 2005

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

“Improving Bandwidth Efficiency of Peer-to-Peer Storage”, Patrick Eaton, Emil Ong, and John Kubiawicz. *Proc. of the IEEE Intl. Conference on Peer-to-Peer Computing (IEEE P2P '04)*, August 2004

“Selfish Caching in Distributed Systems: A Game-Theoretic Analysis,” Byung-Gon Chun, Kamalika Chaudhuri, Hoeteck Wee, Marco Barreno, Christos H. Papadimitriou, and John Kubiawicz. *Proc. of the ACM Symposium on Principles of Distributed Computing*, July 2004

“Object Location in Realistic Networks,” Kirsten Hildrum, Robert Krauthgamer, and John D. Kubiawicz. *Proc. of the ACM Symposium on Parallel Algorithms and Architectures (SPAA)*, June 2004

“Handling Churn in a DHT,” Sean Rhea, Dennis Geels, Timothy Roscoe, and John Kubiawicz. *Proc. of the USENIX Annual Technical Conference*, June 2004

“Characterizing Selfishly Constructed Overlay Routing Networks,” Byung-Gon Chun, Rodrigo Fonseca, Ion Stoica, and John Kubiawicz. *Proc. of the IEEE Intl. Conference on Computer Communications (INFOCOMM)*, March 2004

“Distributed Object Location in a Dynamic Network,” Kirsten Hildrum, John D. Kubiawicz, 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 Kubiawicz, Dean Copsey, 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 Kubiawicz. *Proc. of the Intl. Workshop on Peer-to-Peer Systems (IPTPS '04)*, February 2004

“Tapestry: A Resilient Global-Scale Overlay for Service Deployment,” Ben Y. Zhao, Ling Huang, Jeremy Stribling, Sean C. Rhea, Anthony D. Joseph, and John Kubiawicz. *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 Kubiawicz, Sean Ma, and Satish Rao. *Symposium on Discrete Algorithms (SODA)*, January 2004

“Exploiting Prediction To Reduce Power on Buses,” Victor Wen, Mark Whitney, Yatish Patel and John Kubiawicz. *Proc. of the Intl. Symposium on High Performance Computer Architecture (HPCA 2004)*

[Publications Continued]

- “Toward a Scalable, Silicon-Based Quantum Computing Architecture,” Dean Copsey, Mark Oskin, Francois Impens, Tzvetan Metodiev, Andrew Cros, Frederic T. Chong, Isaac L. Chuang, and John Kubiawicz. *Journal of Selected Topics in Quantum Electronics* Vol 9, No. 6, pp 1552-1569. November/December 2003.
- “Exploiting Routing Redundancy via Structured Peer-to-Peer Overlays,” Ben Y. Zhao, Ling Huang, Jeremy Stribling, Anthony D. Joseph, and John Kubiawicz. *Proc. of the Intl. Conference on Network Protocols (ICNP)*, November 2003
- “Asymptotically Efficient Approaches to Fault-Tolerance in Peer-to-Peer Networks,” Kirsten Hildrum And John Kubiawicz. *Proc of the Intl. Symposium on Distributed Computing*, October 2003
- “Exploiting Routing Redundancy via Structured Peer-to-Peer Overlays,” Ben Y. Zhao, Ling Huang, Jeremy Stribling, Anthony D. Joseph, and John Kubiawicz. *Proc. of the Intl. Conference on Network Protocols (ICNP 2003)*.
- “Can we build Classical Control Circuits for Silicon Quantum Computers?,” Mark Whitney, Yatish Patel, Nemanja Isailovic, and John Kubiawicz. *Proc. of the 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 Kubiawicz. In *Proc. of the Intl. Symposium on Computer Architecture (ISCA 2003)*, June 2003.
- “The Effect of Communication Costs in Solid-State Quantum Computing Architectures,” Dean Copsey, Mark Oskin, Tzvetan Metodiev, Frederic T. Chong, Isaac Chuang, and John Kubiawicz. *Proc. of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA 2003)*
- “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 *Proc. of 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. In *Proc. of the Second Intl. Workshop on Peer-to-Peer Systems (IPTPS 2003)*, February 2003.
- “Towards a Common API for Structured Peer-to-Peer Overlays,” Frank Dabek, Ben Zhao, Peter Druschel, John Kubiawicz, and Ion Stoica. In *Proc. of the Intl. Workshop on Peer-to-Peer Systems (IPTPS 2003)*, February 2003.
- “Extracting Guarantees from Chaos,” John Kubiawicz. In *Communications of the ACM*, Vol 46, No. 2, February 2003.
- “Pond: the OceanStore Prototype,” Sean Rhea, Patrick Eaton, Dennis Geels, Hakim Weather- spoon, Ben Zhao, and John Kubiawicz. In *Proc. of the USENIX Conference 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 *Proc. of the ACM Symposium on Parallel Algorithms and Architectures (SPAA)*, August 2002.
- “SCAN: A Dynamic, Scalable, and Efficient Content Distribution Network”, In *Proc. of the Intl. Conference Pervasive Computing*, August 2002.

[Publications Continued]

“Probabilistic Location and Routing” Sean Rhea and John Kubiawicz. In *Proc. of the Annual Joint Conference 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 *Proc. of the Intl. Workshop on Peer-to-Peer Systems (IPTPS 2002)*, 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. September/October 2001.

“Bayeux: An Architecture for Wide-Area, Fault-Tolerant Data Dissemination” Shelley Zhuang, Ben Zhao, Anthony Joseph, Randy Katz, and John Kubiawicz. In *Intl. 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 *Proc. of the Intl. Workshop on Peer-to-Peer Systems (IPTPS 2002)*, 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. In *Proc. of the Intl. Conference on Architectural Support for Programming Languages and Operating Systems (ASP-LOS 2000)*, November 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 *Proc. of the Intl. Workshop on Parallel Processing 2000*, August 2000.

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

“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 Kubiawicz, Matthew Frank, Walter Lee, Victor Lee, Anant Agarwal, and Franz Kaashoek. In *Proc. of the Intl. Symposium on High Performance Computer Architecture*, February 1998.

“The Sensitivity of Communication Mechanisms to Bandwidth and Latency.” Rajeev Barua, Frederik T. Chong, Fredrik Dahlgren, John Kubiawicz, and Anant Agarwal. In *Proc. of the Intl. Symposium on High Performance Computer Architecture*, February 1998.

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

“MGS: A Multi-Grain Shared Memory System.” Donald Yeung, John Kubiawicz, and Anant Agarwal. In the *Twenty-Third Intl. Symposium on Computer Architecture*, May 1996

[Publications Continued]

“Remote Queues: Exposing Message Queues for Optimization and Atomicity.” Eric A. Brewer, Frederic T. Chong, Lok T. Liu, Shamik D. Sharma, and John Kubiawicz. In the *Symposium 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 Kubiawicz, Beng-Hong Lim, Ken Mackenzie, and Donald Yeung. In the *Intl. Symposium on Computer Architecture*, June 1995.

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

“The Anatomy of a Message in the Alewife Multiprocessor.” John Kubiawicz and Anant Agarwal. In the *Intl. Conference on Supercomputing*, July 1993 as an Invited Paper.

“SPARCLE: An Evolutionary Processor Design for Large-Scale Multiprocessors.” Anant Agarwal, John Kubiawicz, 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 Johnson, Anant Agarwal, John Kubiawicz, and Beng-Hong Lim. In the *Conference on Principles and Practice of Parallel Programming*, May 1993.

“Closing the Window of Vulnerability in Multiphase Memory Transactions” John Kubiawicz, David Chaiken, and Anant Agarwal. In the *Intl. Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS V)*, October 1992.

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

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

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

“Architectural Components for a Practical Quantum Computer”, *ASPLOS Wild and Crazy Ideas Session III*, ASPLOS X, September 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*, November 2001, Boston, MA.

“The MIT Alewife Machine: Architecture and Performance.” *ISCA XXII*, June 1995, Santa Margherita Ligure, Italy.

“The Alewife CMMU: Addressing the Multiprocessor Communications Gap.” *Hotchips VI*, August 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*, October 1992, Boston.