Benjamin Reed
San Jose State University
Assistant Professor
August 24, 2018

Employment History
2018 - present Assistant Professor at San Jose State University, San Jose, CA.
2013 - 2018 Software Engineer at Facebook, Menlo Park, CA.
- Cross portable code for mobile phones and other devices
- Low level platform bindings for Linux, Android, Tizen
- Bridging between Java, C, C++, Objective C
- Implemented Security, Audio, System, and bootstrap frameworks
- Core Systems team in the Infrastructure group

2012 - 2013 1337 Hacker at osmeta, Mountain View, CA.
2006 - 2012 Principal Research Scientist at Yahoo! Research, Santa Clara, CA.
- Designed and developed Pig, a high level language for expressing parallel data computations and transformations over large datasets. Pig is now an Apache project.
- Designed and developed ZooKeeper, a distributed, highly available, high performance coordination system. ZooKeeper is now an Apache project.
- Designed and developed BookKeeper, a distributed, highly available, high performance write ahead log. BookKeeper is a ZooKeeper subproject.

1995 - 2006 Research Staff Member at IBM Almaden Research Center, San Jose, CA.
- Designed and implemented system and network management solutions for PC and UNIX machines including very early work in web-based management that shipped as part of IBM's NetFinity management tool.
- Developed and implemented a network security protocol for a widely distributed network file system based on object based storage devices (OSD) and implemented a Linux VFS to go with it.
- Developed prototypes networking homes and non-traditional devices using Java, Linux, and embedded prototype boards. Prototypes evolved into the OSGi API (http://www.osgi.org).
- Developed and shipped through the PC company a backup and restore solution for PCs to do online backups and bare-metal restores.
- Developed a highly modularized Linux boot image for use in embedded and special purpose applications. Supports network (PXE), disk, USB, and CD Rom booting with the same image. Image is customized at run time.
- Developed and shipped a transparent web service bridge for local OSGi services and bundles. Targeted to embedded devices.

1993 - 1994 Software Engineer at Motorola, Arlington Heights, IL.
Member of the systems and network administration group. Developed tools to do user and workstation management on thousands of UNIX file servers and workstations. Developed network utilities for accessing serial devices over TCPIP networks.
1990 - 1993 Software Engineer at SLS (Sears Logistic Services), Itasca, IL.

Designed, implemented, and supported a distributed front end to an inventory system running in a CICS/DB2 environment that ran on AIX and OS/2 systems and interfaced to various devices (hand held scanners, RF scanners, tethered scanners, bar code printers, and terminal servers) and was deployed in approximately 60 Sears warehouses across the country.

1985 - 1987 Intern Programmer at International Technegroup Incorporated, Cincinnati, OH. Worked as an intern porting CAD/CAM system to an IBM 4341 and SUN workstations.

Education
Ph.D. 2000 University of California Santa Cruz, Computer Science.
M.S. 1993 DePaul University, Chicago, IL, Computer Science.
B.A. 1987 Miami University, Oxford, OH, Mathematics; Computer Systems minor.

Patents
1. Flavio Junqueira, Benjamin Reed, Maysam Yabandeh, "Lock-free transactional support for large-scale storage systems", U.S. Patent No. 8,990,177, March 24, 2015
2. Benjamin Reed, Flavio Junqueira, "System and method for logging operations", U.S. Patent No. 8,682,842, March 25, 2014
3. Benjamin C. Reed, Ted J. Bonkenburg, "Method and system of mapping at least one web service to at least one OSGi service and exposing at least one local service as at least one web service", U.S. Patent No. 8,631,424, January 14, 2014
4. Utkarsh Hriday Srivastava, Benjamin Clay Reed, Yang Zhang, Erwin Sing Tam, Brian Frank Cooper, "Distributed publish/subscribe system", 8,489,674, July 16, 2013
5. Benjamin C. Reed, Philip Bohannon, Utkarsh H. Srivastava, "Syndicating humor", U.S. Patent No. 8,429,145, April 23, 2013
6. Benjamin C. Reed, Mark A. Smith, "Filesystem backup using directory wise hardlinking for a computer filesystem", U.S. Patent No. 8,423,573, April 16, 2013
7. Chris Olston, Khaled Elmeleegy, Benjamin C Reed, "Method or system for spilling in query environments", U.S. Patent No. 8,356,050, January 15, 2013.
8. Benjamin C Reed, Ted J Bonkenburg, "Method and system of mapping at least one web service to at least one OSGi service," U.S. Patent No. 8,051,068, April 3, 2012.
9. Benjamin C Reed, Philip Bohannon, Utkarsh Srivastava, Daniel Meredith, "Trail based exploration of a repository of documents," U.S. Patent No. 8,051,068, November 1, 2011.
10. Benjamin C Reed, Philip Bohannon, Utkarsh Srivastava, Daniel Meredith, "Trail based exploration of a repository of documents," U.S. Patent No. 8,001,111, August 16, 2011.
11. Marcus Felipe Fontoura, Vanja Josifovski, Shanmugasundaram Ravikumar, Christopher Olston, Benjamin Clay Reed, Andrew, Tomkins. "Formal language and translator for parallel processing of data," U.S. Patent No. 7,921,416, April 5, 2011.
12. Benjamin C Reed and Philip Bohannon. "Restoring a database using fuzzy snapshot techniques," U.S. Patent No. 7,725,440, May 25, 2010.
13. Benjamin C. Reed, Mark A. Smith. "Method and system of accessing at least one target file in a computer system with an operating system with file locking implemented with byte-range locking," U.S. Patent No. 7,380,246, May 27, 2008.
14. Ying Chen, Reed; Benjamin Clay, "Method and apparatus for providing a single system image in a clustered environment," U.S. Patent No. 7,051,115, May 23, 2006.

15. Stephen P. Morgan, Lance W. Russell, and Benjamin Clay Reed. "Security method and system for persistent storage and communications on computer network systems and computer network systems employing the same," U.S. Patent No. 6,816,970 and 6,185,685, November 9, 2004.
16. Benjamin C. Reed, "Controlling network access by modifying packet headers at a local hub," U.S. Patent No. 6,671,739, December 30, 2003.
17. Randal C. Burns, Edward G. Chron, Darrell D. E. Long and Benjamin C. Reed, "Decentralized remotely encrypted file system," U.S. Patent No. 6,405,315, June 11, 2002.
18. Stephen P. Morgan, Lance W. Russell, and Benjamin Clay Reed. "Security method and system for persistent storage and communications on computer network systems and computer network systems employing the same," U.S. Patent No. 6185685, February 2001.
19. Benjamin C. Reed, Steven R. Welch. "Network address assignment using physical address resolution protocols," U.S. Patent No. 6061739, May 2000.
20. Michael P. Peercy, Benjamin C. Reed, Edward Robinson, H. Raymond Strong Jr. "Multiple reference hotlist for identifying frequently retrieved web pages," U.S. Patent No. 5960429, September 1999.
21. Randal C. Burns, Edward G. Chron, Darrell D. E. Long and Benjamin C. Reed. "Secure Array of Remotely Encrypted Storage Devices," U.S. Patent No. 5,931,947, August 1999.

Books
1. Flavio Junqueira, Benjamin Reed, "ZooKeeper: Distributed Process Coordination", O'Reilly Media, November 2013

Journals
1. Flavio Junqueira, Ivan Kelly. "Durability with BookKeeper", SIGOPS Operating Systems Review, 47(1), January 2013, pp. 9-15.
2. Christopher Olston, Benjamin Reed: "Inspector Gadget: A Framework for Custom Monitoring and Debugging of Distributed Dataflows," *PVLDB* 4(12): 1237-1248 (2011)
3. Benjamin C. Reed, Darrell D. E. Long, Edward G. Chron and Randal C. Burns. "Authenticating Network Attached Storage," *IEEE Micro*, January-February 2000, pp. 49-57.

Refereed Papers
1. Daniel Gómez Ferro, Flavio Junqueira, Ivan Kelly, Benjamin Reed, Maysam Yabandeh. Omid: Lock-free transactional support for distributed data stores. ICDE 2014.
2. Khaled Elmeleegy, Christopher Olston, Benjamin Reed. SpongeFiles: mitigating data skew in mapreduce using distributed memory. SIGMOD Conference 2014.
3. Sriram Rao, Benjamin Reed, and Adam Silberstein. HotROD: Managing grid storage with on-demand replication. In Proc. IEEE Int. Conf. on Data Engineering, Workshop on Data Management in the Cloud (DMC '13), pages 243–249, 2013.
4. Vinod Kumar Vavilapalli, Arun C Murthy, Chris Douglas, Sharad Agarwal, Mahadev Konar, Robert Evans, Thomas Graves, Jason Lowe, Hitesh Shah, Siddharth Seth, Bikas Saha, Carlo Curino, Owen O'Malley, Sanjay Radia, Benjamin Reed, and Eric Baldeschwieler, Apache Hadoop YARN: Yet Another Resource Negotiator, ACM

Symposium on Cloud Computing, 2013.

5. Alexander Shraer, Benjamin Reed, Dahlia Malkhi, Flavio Junqueira, Dynamic reconfiguration of primary/backup clusters, *USENIX Annual Technical Conference*, 2012.

6. Ashish Chawla, Benjamin Reed, Karl Juhnke, and Ghousuddin Syed, "Semantics of Caching with SPOCA: A Stateless, Proportional, Optimally-Consistent Addressing Algorithm," *USENIX Annual Technical Conference* (Best Paper), 2011.

7. Flavio Junqueira, Benjamin Reed, Maysam Yabandeh, "Lock-free Transactional Support for Large-scale Storage Systems," *HotDep*, 2011.

8. Flavio Junqueira, Benjamin Reed and Marco Serafini, "Zab: High-performance broadcast for primary-backup systems," *DSN*, 2011

9. Mohammad Al-Fares, Khaled Elmeleegy, Benjamin Reed, and Igor Gashinsky. 2011. Overclocking the Yahoo!: CDN for faster web page loads. In Proceedings of the 2011 ACM SIGCOMM conference on Internet measurement conference (IMC '11).

10. Pramod Bhatotia, Alexander Wieder, Rodrigo Rodrigues, Flavio Junqueira and Benjamin Reed, "Reliable Data-Center Scale Computations," *Large Scale Distributed Systems and Middleware (LADIS)*, July 2010.

11. Patrick Hunt, Mahadev Konar, Flavio P. Junqueira, Benjamin Reed, "ZooKeeper: Wait-free Coordination for Internet-Scale Systems," *USENIX Annual Technical Conference* (Best Paper), 2010.

12. Dionysios Logothetis, Christopher Olston , Benjamin Reed, Kevin Webb , Kenneth Yocum, "Stateful Bulk Processing for Incremental Algorithms," *ACM Symposium on Cloud Computing*, 2010.

13. Flavio Junqueira, Yee Jiun Song, Benjamin Reed, "BFT for the skeptics," WIP, *SOSP* 2009.

14. Flavio Junqueira, Patrick Hunt, Mahadev Konar, Benjamin Reed, "The ZooKeeper Coordination Service," Poster, *SOSP* 2009.

15. Flavio Junqueira, Benjamin C Reed, "Brief Announcement: Zab: A practical totally ordered broadcast protocol," *DISC* 2009.

16. Christopher Olston, Edward Bortnikov, Khaled Elmeleegy, Flavio Junqueira, Benjamin Reed, "Interactive Analysis of Web-Scale Data," *CIDR* 2009.

17. Flavio Paiva Junqueira, Benjamin Reed, "The life and times of a zookeeper," *PODC* and *SPAA* 2009.

18. Alan Gates, Olga Natkovich, Shubham Chopra, Pradeep Kamath, Shravan Narayanam, Christopher Olston, Benjamin Reed, Santhosh Srinivasan, Utkarsh Srivastava, "Building a High Level Dataflow System on top of MapReduce: The Pig Experience," *PVLDB*, 2009.

19. Christopher Olston, Benjamin Reed, Utkarsh Srivastava, Ravi Kumar, Andrew Tomkins, "Pig latin: a not-so-foreign language for data processing," *SIGMOD* 2008.

20. Benjamin Reed, Flavio P. Junqueira, "A Simple Totally Ordered Broadcast System," *Large Scale Distributed Systems and Middleware (LADIS)* 2008.

21. Christopher Olston, Benjamin Reed, Adam Silberstein, Utkarsh Srivastava, "Automatic Optimization of Parallel Dataflow Programs," *USENIX Annual Technical Conference* 2008.

22. Kristal T. Pollack, Darrell D.E. Long, Richard A. Golding, Ralph A. Becker-Szendy, Benjamin Reed, "Quota enforcement for high-performance distributed storage systems," *Conference on Mass Storage Systems and Technologies*, San Diego, IEEE, September

2007, pp. 72-84.

23. Amruta Joshi, Ravi Kumar, Benjamin Reed, Andrew Tomkins, "Anchor-based proximity measures," *WWW* 2007, pp. 1131-1132.
24. Ted Bonkenburg, Dejan Diklic, Benjamin Reed, Mark Smith, Michael Vanover, Steve Welch, Roger Williams, "Lifeboat: An Autonomous backup and Restore Solution," *USENIX LISA* 2004, pp. 159-170.
25. Benjamin C. Reed, Mark A. Smith, Dejan Diklic, "Security Considerations When Designing a Distributed File System Using Object Storage Devices," *First International IEEE Security in Storage Workshop* 2002.
26. Ethan Miller, Darrell Long, William Freeman, and Benjamin Reed, "Strong Security for Network-Attached Storage," *USENIX FAST* 2002.
27. Ethan Miller, Darrell Long, William Freeman and Benjamin Reed. "Strong Security for Distributed File Systems," *IEEE International Performance Conference on Computers and Communication* 2001, pp. 34-40.
28. Benjamin C. Reed, Darrell D. E. Long, Edward G. Chron and Randal C. Burns. "Authenticating Network Attached Storage," *IEEE Symposium on High Performance Interconnects (Hot Interconnects VII)* 1999.
29. Michael Peercy, Benjamin Reed, Ed Robinson, "Distributed systems management on the Web," *5th IFIP/IEEE International Symposium on Integrated Network Management* 1997.

Teaching Experience

1. Flavio Junqueira and Benjamin Reed, ZooKeeper Tutorial, Eurosys 2011.
2. Benjamin Reed and Prasenjit Sarkar, Cloud Storage Systems Tutorial, USENIX FAST 2011.
3. 2011 Lecturer for COEN 284 - Operating System Case Study (Graduate) at Santa Clara University. Planned curriculum, homework, and projects for a case study of the Linux operating system.
4. Christopher Olston, Benjamin C Reed, Web-Scale Data Management Tutorial, Eurosys 2010.
5. Christopher Olston, Benjamin C Reed, Web-Scale Data Management Tutorial, USENIX FAST 2009.
6. 2001 Lecturer for CMPS 111 – Introduction to Operating Systems (Upper Division) at University of California Santa Cruz. Planned curriculum, four OS programming projects using User Mode Linux, managed two graders and a Teaching Assistant for a class of 60 students.
7. 1994 – 1995 Teaching Assistant at University of California Santa Cruz for Graph Theory/Algorithms, Introduction to Programming, and Programming C++.

Miscellanea

1. Christopher Olston, Benjamin Reed, "Inspector gadget: a framework for custom monitoring and debugging of distributed dataflows," Demo, *SIGMOD Conference* 2011: 1221-1224
2. Benjamin Reed," ZooKeeper," IEEE New Frontiers in Computing (NFIC), August 2010.

3. Benjamin Reed, "Pig: A high level language for doing large scale data processing using Hadoop," *SIAM Data Mining 2010 Workshop on High Performance Analytics*, May 2010.
4. Benjamin C Reed, "Panel on Self-Managing Database Systems," *5th International Workshop on Self Managing Database Systems (SMDB)*, March 2010.
5. Benjamin Reed, "Zookeeper, Coordinating the Distributed Application," *Hadoop Camp ApacheCon*, November 2008.
6. Benjamin Reed, "ZooKeeper," *Hadoop Summit*, March 2008. Video at http://research.yahoo.com/node/2120
7. Benjamin Reed, "Introduction to ZooKeeper," *Yahoo Developer Network*, March 2008.
8. Benjamin Reed, "Building a Serverless Distributed File System Using Object Based Disks," *IBM ARC Symposium*, IBM Almaden Research Center, February 2000.
9. Benjamin Reed, "Writing Linux Device Drivers," *1st Annual LinuxITE*, IBM Almaden Research Center, February 2000.
10. Benjamin Reed, "Security for Network-attached Storage in a Serverless File System," *OpenSig*, CMU, October 1999.
11. Benjamin Reed, "Authentication for Network Attached Storage," *Fall meeting of the NASD project of National Storage Industry Consortium*, September 1, 1998.
12. Benjamin Reed and Darrell D. E. Long, "Analysis of Caching Algorithms for Distributed File Systems," *Operating Systems Review*, July 1996, vol. 30, no. 3, pp. 12-21.

Program Committees
1. USENIX ATC 2018 (co-chair)
2. Middleware 2016
3. ICPP 2016
4. USENIX ATC 2016
5. SOCC 2015
6. SIGMOD 2015
7. USENIX ATC 2014
8. ICDCS 2014
9. SOCC 2013
10. MSST 2013
11. FAST 2012
12. SWEET 2012
13. HotCDP 2012
14. CloudDb 2012
15. Hadoop Summit 2012 Data Science Track Chair
16. FAST 2011
17. CSE 2011 Software Engineering For Cloud Computing Workshop
18. Hadoop Summit 2011 Research Track Co-Chair
19. MSST 2010
20. SIGMOD 2010
21. TechPulse 2010 (Yahoo! internal conference)
22. MIDDLEWARE 2010
23. ICDE 2009
24. LADIS 2009

25. TechPulse 2009 (Yahoo! internal conference)

Standards Work
1999 - 2006 Open Service Gateway Initiative, Core Platform Expert group. Standardizes Java APIs for Java deployment frameworks for embedded devices. I made significant contributions in the areas of security, platform administration, and core services.
2009 Open Cirrus. I participated in the establishment of Open Cirrus, a cloud computing testbed for academic researchers.

External Recognition
2005 OSGi Fellow

Professional Organizations
IEEE, ACM, USENIX

Other Activities
2010 - PMC member for Apache ZooKeeper
2010 - PMC member for Apache Pig
2009 - External expert for the National Academies Workshop of the Committee on Forecasting Future Disruptive Technologies
2008 - Apache committer for ZooKeeper
2007 - Apache committer for Pig.
2007 - 2008 ZooKeeper project administrator on SourceForge.
2006 - Participate in National Engineers Week visiting K-12 school to promote engineering as a career.
2006   BAMBIOS (Ben, Amit, and Mark BIOS for Intel Mac) http://osxbook.com/book/bonus/misc/linux/
1999 - 2002 Wrote the Cisco/Aironet wireless ethernet driver for Linux and maintained a mailing list and SourceForge site to support it.
1988 - 1990 Mission to Spain, Madrid for the Church of Jesus Christ of Latter-day Saints

Languages
Read, write, and speak Spanish.