

MARCOS K. AGUILERA
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INTERESTS

Practice of distributed systems
Theory of distributed computing

EDUCATION

Ph.D. Computer Science, Cornell University, USA, August 2000
M.S. Computer Science, Cornell University, USA, May 1998
B.E. Computer Science, Universidade Estadual de Campinas, Brazil, June 1995

PROFESSIONAL EXPERIENCE

2014–current Various roles, VMware
Tech Lead for Virtual Cluster Memory, VMware CPBU (2019–2021)
Senior Staff Researcher, VMware Research Group (2014–current)
2008–2014 Senior Researcher, Microsoft Research Silicon Valley
2002–2008 Researcher, Storage Systems Department, HP Laboratories
2000–2002 Researcher, Compaq/HP Systems Research Center
1998, 1999 Intern, IBM T.J. Watson Research Center

SELECTED PROJECTS

A. Engineering and development

1. *Virtual Cluster Memory*. Designed, architected, and wrote the code for a software implementation of disaggregated memory for VMware's ESXi and vSphere. Led a team of 5 engineers in VMware's Cloud Platform Business Unit. This effort evolved into a subset of Project Big Sur, a multi-year effort to address memory problems among enterprise users.

B. Research in practice of distributed systems

2. *Cluster and far memory*. Motivated, designed, and implemented cluster and far memory as a new type of memory accessible remotely, starting with a vision statement (**SoCC 2017**), leading to new abstractions (**OSDI 2020**, **ATC 2018**), models (**PODC 2018**), and applications to agreement algorithms (**PODC 2019**), microsecond-scale replication (**OSDI 2020**), and remote data structures (**SYSTOR 2019**, **HotOS 2019**).
3. *Yesquel*. Designed and implemented a new type of distributed SQL database system that scales and performs similarly to NOSQL systems (**SOSP 2015**), using new methods for concurrency control (**PODC 2018**). The system is open source and available at <https://github.com/mkaguilera/yesquel>
4. *Geo-distributed systems*. Proposed abstractions and concepts to develop distributed systems that span many data centers, including transaction chains (**SOSP 2013**), parallel snapshot isolation (**SOSP 2011**), online migration (**ATC 2011**), and RPC chains (**NSDI 2009**).
5. *Reliable failure detectors*. Proposed mechanisms to realize reliable failure detectors (**NSDI 2013**, **SOSP 2011**, **HotOS 2009**).
6. *Sinfonia*. Designed and implemented lightweight transactions to develop applications in data cen-

ters (**SOSP 2007**).

7. *Black-box performance debugging*. Proposed concepts and techniques to debug the performance of complex distributed systems (**SOSP 2003**).

C. Research in theory of distributed computing

8. *Black-box concurrent data structures*. Proposed new algorithms for arbitrary NUMA-aware concurrent data structures (**ASPLOS 2017, OSR 2017, CACM 2018**).
9. *Reconfiguration without consensus*. Proposed algorithms to reconfigure distributed storage without the use of consensus (**JACM 2011, PODC 2009**).
10. *Leader election*. Proposed algorithms for electing leaders in distributed systems (**DIST COMP 2008, PODC 2004, PODC 2003, DISC 2001**).
11. *Quality of service of failure detectors*. Proposed metrics and mechanisms to obtain failure detectors with performance guarantees (**IEEE ToC 2002, DSN 2000**).
12. *Consensus in the crash-recovery model*. Proposed concepts and algorithms to solve consensus in a system where processes may recover from crashes (**DIST COMP 2000, DISC 1998**).
13. *Content-based publish-subscribe systems*. Proposed a publish-subscribe system based on message content, with a matching algorithm that runs in sub-linear time (**PODC 1999**).

AWARDS AND HONORS

Best paper award, SYSTOR 2019

Best paper award, ASPLOS 2017

Best paper award, SOSP 2007

Best student paper award, DISC 1999

HP Labs ISSL business impact award, 2004

HP Labs ISSL scientific impact award, 2003

Spencer T. and Ann W. Olin Fellow, Cornell University, 1996

Prêmio Instituto de Engenharia for best graduating student at UNICAMP among 311 students, 1995

PROFESSIONAL ACTIVITIES

Program chair or co-chair	OSDI 2022 (upcoming) FAST 2021 HotStorage 2017 SoCC 2016 OPODIS 2014 DISC 2012 ICDCN 2011 LADIS 2010
Other chair	Track chair ICDCS 2012 Dijkstra Prize committee chair 2012 Industry track chair PODC 2009 General chair PODC 2005
Associate editor	ACM Transactions on Computer Systems 2014–present Theory of Computing Systems 2012–2017
Member of award committee	EuroSys Roger Needham PhD Award 2021 Principles of Distributed Computing Dissertation Award 2021 Distributed Computing Doctoral Dissertation Award 2013
Member of steering committee	FAST 2021–2023 DISC 2012–2014 LADIS 2010–2012 LADC 2009–2012 PODC 2004–2005
Member of program committee	ASPLOS 2019, HOTOS 2019, ICDCN 2019 DISC 2018, OSDI 2018 DISC 2017, OPODIS 2017, SOSP 2017 VLDB 2016, ASPLOS 2016, PODC 2016 SOSP 2015, HotOS 2015, DISC 2015, HotStorage 2015 DSN 2014, HotDep 2014 DSN 2013, FAST 2013, HotDep 2013 DSN 2012, HotDep 2012, ICDCN 2012, P2P 2012, SSS 2012 DISC 2011, FAST 2011, CloudDB 2011, LADC 2011 SPAA 2011, OPODIS 2011, TADDS 2011 PODC 2010, DISC 2010, DSN 2010, OPODIS 2010 SAN 2010, SSS 2010 DISC 2009, HotDep 2009, ICDCN 2009, LADC 2009 PODC 2009, OPODIS 2009, SSS 2009 OSDI 2008, DSN 2008, ICDCN 2008 HotDep 2007, DSN 2006 PODC 2005, PODC 2003, DISC 2001

REFEREED PUBLICATIONS

1. *AIFM: high-performance, application-integrated far memory.*
Zhenyuan Ruan, Malte Schwarzkopf, Marcos K. Aguilera, Adam Belay.
Usenix Symposium on Operating Systems Design and Implementation (**OSDI 2020**), November 2020.
2. *Microsecond consensus for microsecond applications.*
Marcos K. Aguilera, Naama Ben-David, Rachid Guerraoui, Virendra J. Marathe, Athanasios Xygkis, Igor Zablotchi.
Usenix Symposium on Operating Systems Design and Implementation (**OSDI 2020**), November 2020.
3. *Can far memory improve job throughput?*
Emmanuel Amaro, Christopher Branner-Augmon, Zhihong Luo, Amy Ousterhout, Marcos K. Aguilera, Aurojit Panda, Sylvia Ratnasamy, Scott Shenker.
European Conference on Computer Systems (**EuroSys 2020**), April 2020.
4. *Hillview: a trillion-cell spreadsheet for big data.*
Mihai Budiu, Parikshit Gopalan, Lalith Suresh, Udi Wieder, Han Kruiger, Marcos K. Aguilera.
International Conference on Very Large Data Bases (**VLDB 2019**), August 2019.
5. *The impact of RDMA on agreement.*
Marcos K. Aguilera, Naama Ben-David, Rachid Guerraoui, Virendra J. Marathe, Igor Zablotchi.
ACM Symposium on Principles of Distributed Computing (**PODC 2019**), July 2019.
6. *Storm: a fast transactional dataplane for remote data structures.*
Stanko Novakovic, Yizhou Shan, Aasheesh Kolli, Michael Cui, Yiyang Zhang, Haggai Eran, Boris Pismenny, Liran Liss, Michael Wei, Dan Tsafir, Marcos K. Aguilera.
ACM International Systems and Storage Conference (**SYSTOR 2019**), June 2019.
7. *Designing far memory data structures: think outside the box.*
Marcos K. Aguilera, Kimberly Keeton, Stanko Novakovic, Sharad Singhal.
Usenix Workshop on Hot Topics in Operating Systems (**HotOS 2019**), May 2019.
8. *Passing messages while sharing memory.*
Marcos K. Aguilera, Naama Ben-David, Irina Calciu, Rachid Guerraoui, Erez Petrank, Sam Toueg.
ACM Symposium on Principles of Distributed Computing (**PODC 2018**), July 2018.
9. *Locking timestamps versus locking objects.*
Marcos K. Aguilera, Tudor David, Rachid Guerraoui, Junxiong Wang.
ACM Symposium on Principles of Distributed Computing (**PODC 2018**), July 2018.
10. *Remote regions: a simple abstraction for remote memory.*
Marcos K. Aguilera, Nadav Amit, Irina Calciu, Xavier Deguillard, Jayneel Gandhi, Stanko Novakovic, Arun Ramanathan, Pratap Subrahmanyam, Lalith Suresh, Kiran Tati, Rajesh Venkatasubramanian, Michael Wei.
Usenix Annual Technical Conference (**ATC 2018**), July 2018.
11. *Remote memory in the age of fast networks.*
Marcos K. Aguilera, Nadav Amit, Irina Calciu, Xavier Deguillard, Jayneel Gandhi, Pratap Subrahmanyam, Lalith Suresh, Kiran Tati, Rajesh Venkatasubramanian, Michael Wei.
ACM Symposium on Cloud Computing (**SoCC 2017**), September 2017.
12. *Black-box concurrent data structures for NUMA architectures.*

- Irina Calciu, Siddhartha Sen, Mahesh Balakrishnan, Marcos K. Aguilera.
ACM International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS 2017**), April 2017.
13. *Non-volatile memory through customized key-value stores.*
Leonardo Mármol, Jorge Guerra, Marcos K. Aguilera.
Usenix Workshop on Hot Topics in Storage and File Systems (**HotStorage 2016**), June 2016.
 14. *Yesquel: scalable SQL storage for Web applications.*
Marcos K. Aguilera, Joshua B. Leners, Michael Walfish.
ACM Symposium on Operating Systems Principles (**SOSP 2015**), October 2015.
 15. *Taming uncertainty in distributed systems with help from the network.*
Joshua B. Leners, Trinabh Gupta, Marcos K. Aguilera, Michael Walfish.
European Conference on Computer Systems (**EuroSys 2015**), April 2015.
 16. *Transaction chains: achieving serializability with low latency in geo-distributed storage systems.*
Yang Zhang, Russell Power, Siyuan Zhou, Yair Sovran, Marcos K. Aguilera, Jinyang Li.
ACM Symposium on Operating Systems Principles (**SOSP 2013**), November 2013.
 17. *Consistency-based service level agreements for cloud storage.*
Douglas B. Terry, Vijayan Prabhakaran, Ramakrishna Kotla, Mahesh Balakrishnan, Marcos K. Aguilera, Hussam Abu-Libdeh.
ACM Symposium on Operating Systems Principles (**SOSP 2013**), November 2013.
 18. *Improving availability in distributed systems with failure informers.*
Joshua B. Leners, Trinabh Gupta, Marcos K. Aguilera, Michael Walfish.
Symposium on Networked Systems Design and Implementation (**NSDI 2013**), April 2013.
 19. *The correctness proof of Ben-Or's randomized consensus algorithm.*
Marcos K. Aguilera, Sam Toueg.
Distributed Computing journal (**DIST COMP**), October 2012.
 20. *Surviving congestion in geo-distributed storage systems.*
Brian Cho, Marcos K. Aguilera.
Usenix Annual Technical Conference (**ATC 2012**), June 2012.
 21. *Partial synchrony based on set timeliness.*
Marcos K. Aguilera, Carole Delporte-Gallet, Hugues Fauconnier, Sam Toueg.
Distributed Computing journal (**DIST COMP**), June 2012.
 22. *Detecting failures in distributed systems with the Falcon spy network.*
Joshua Leners, Hao Wu, Wei-Lun Hung, Marcos K. Aguilera, Michael Walfish.
ACM Symposium on Operating Systems Principles (**SOSP 2011**), October 2011.
 23. *Transactional storage for geo-replicated systems.*
Yair Sovran, Russell Power, Marcos K. Aguilera, Jinyang Li.
ACM Symposium on Operating Systems Principles (**SOSP 2011**), October 2011.
 24. *Online migration for geo-distributed storage systems.*
Nguyen Tran, Marcos K. Aguilera, Mahesh Balakrishnan.
Usenix Annual Technical Conference (**ATC 2011**), June 2011.
 25. *Dynamic atomic storage without consensus.*
Marcos K. Aguilera, Idit Keidar, Dahlia Malkhi, Alexander Shraer.

- Journal of the ACM (**JACM**), April 2011.
26. *Location, location, location!: modeling data proximity in the cloud.*
Birjodh Tiwana, Mahesh Balakrishnan, Marcos K. Aguilera, Hitesh Ballani, Z. Morley Mao.
ACM Workshop on Hot Topics in Networks (**HotNets 2010**), October 2010.
 27. *The mailbox problem.*
Marcos K. Aguilera, Eli Gafni, Leslie Lamport.
Distributed Computing journal (**DIST COMP**), October 2010.
 28. *Fast asynchronous consensus with optimal resilience.*
Ittai Abraham, Marcos K. Aguilera, Dahlia Malkhi.
International Symposium on Distributed Computing (**DISC 2010**), September 2010.
 29. *Adaptive progress: a gracefully-degrading liveness property.*
Marcos K. Aguilera, Sam Toueg.
Distributed Computing journal (**DIST COMP**), August 2010.
 30. *Sinfonia: a new paradigm for building scalable distributed systems.*
Marcos K. Aguilera, Arif Merchant, Mehul A. Shah, Alistair C. Veitch, Christos T. Karamanolis.
ACM Transactions on Computer Systems (**TOCS**), November 2009.
 31. *Partial synchrony based on set timeliness.*
Marcos K. Aguilera, Carole Delporte-Gallet, Hugues Fauconnier, Sam Toueg.
ACM Symposium on Principles of Distributed Computing (**PODC 2009**), August 2009.
 32. *Dynamic atomic storage without consensus.*
Marcos K. Aguilera, Idit Keidar, Dahlia Malkhi, Alexander Shraer.
ACM Symposium on Principles of Distributed Computing (**PODC 2009**), August 2009.
 33. *Remote storage with Byzantine servers.*
Marcos K. Aguilera, Ram Swaminathan.
ACM Symposium on Parallelism in Algorithms and Architectures (**SPAA 2009**), August 2009.
 34. *No time for asynchrony.*
Marcos K. Aguilera, Michael Walfish.
Usenix Workshop on Hot Topics in Operating Systems (**HotOS 2009**), May 2009.
 35. *RPC chains: efficient client-server communication in geodistributed systems.*
Yee Jiun Song, Marcos K. Aguilera, Ramakrishna Kotla, Dahlia Malkhi.
Usenix Symposium on Networked Systems Design and Implementation (**NSDI 2009**), April 2009.
 36. *On implementing Omega in systems with weak reliability and synchrony assumptions.*
Marcos K. Aguilera, Carole Delporte-Gallet, Hugues Fauconnier, Sam Toueg.
Distributed Computing journal (**DIST COMP**), October 2008.
 37. *The mailbox problem.*
Marcos K. Aguilera, Eli Gafni, Leslie Lamport.
International Symposium on Distributed Computing (**DISC 2008**), September 2008.
 38. *Transaction rate limiters for peer-to-peer systems.*
Marcos K. Aguilera, Mark Lillibridge, Xiaozhou Li.
IEEE International Conference on Peer-to-Peer Computing (**P2P 2008**), September 2008.
 39. *A practical scalable distributed B-tree.*
Marcos K. Aguilera, Wojciech Golab, Mehul Shah.

- International Conference on Very Large Data Bases (**VLDB 2008**), August 2008.
40. *Timeliness-based wait-freedom: a gracefully degrading progress condition.*
Marcos K. Aguilera, Sam Toueg.
ACM Symposium on Principles of Distributed Computing (**PODC 2008**), August 2008.
 41. *Sinfonia: a new paradigm for building scalable distributed systems.*
Marcos K. Aguilera, Arif Merchant, Mehul A. Shah, Alistair C. Veitch, Christos T. Karamanolis.
ACM Symposium on Operating Systems Principles (**SOSP 2007**), October 2007.
 42. *Abortable and query-abortable objects and their efficient implementation.*
Marcos K. Aguilera, Svend Frolund, Vassos Hadzilacos, Stephanie Horn, Sam Toueg.
ACM Symposium on Principles of Distributed Computing (**PODC 2007**), August 2007.
 43. *Improving recoverability in multi-tier storage systems.*
Marcos K. Aguilera, Kimberly Keeton, Arif Merchant, Kiran Muniswamy-Reddy, Mustafa Uysal.
IEEE/IFIP International Conference on Dependable Systems and Networks (**DSN 2007**), June 2007.
 44. *Consensus with Byzantine failures and little system synchrony.*
Marcos K. Aguilera, Carole Delporte-Gallet, Hugues Fauconnier, Sam Toueg.
IEEE/IFIP International Conference on Dependable Systems and Networks (**DSN 2006**), June 2006.
 45. *Olive: distributed point-in-time branching storage for real systems.*
Marcos K. Aguilera, Susan Spence, Alistair Veitch.
Usenix Symposium on Networked Systems Design and Implementation (**NSDI 2006**), May 2006.
 46. *WAP5: black-box performance debugging for wide-area systems.*
Patrick Reynolds, Janet Wiener, Jeff Mogul, Marcos K. Aguilera, Amin Vahdat.
International World Wide Web Conference (**WWW 2006**), May 2006.
 47. *On the erasure recoverability of MDS codes under concurrent updates.*
Marcos K. Aguilera, Ramaprabhu Janakiraman, Lihao Xu.
IEEE International Symposium on Information Theory (**ISIT 2005**), September 2005.
 48. *Using erasure codes efficiently for storage in a distributed system.*
Marcos K. Aguilera, Ramaprabhu Janakiraman, Lihao Xu.
IEEE/IFIP International Conference on Dependable Systems and Networks (**DSN 2005**), June 2005.
 49. *Communication-efficient leader election and consensus with limited link synchrony.*
Marcos K. Aguilera, Carole Delporte-Gallet, Hugues Fauconnier, Sam Toueg.
ACM Symposium on Principles of Distributed Computing (**PODC 2004**), July 2004.
 50. *Performance debugging for distributed systems of black boxes.*
Marcos K. Aguilera, Jeffrey C. Mogul, Janet Wiener, Athicha Muthitacharoen.
ACM Symposium on Operating Systems Principles (**SOSP 2003**), October 2003.
 51. *Uniform solvability with a finite number of MWMM registers.*
Marcos K. Aguilera, Burkhard Englert, Eli Gafni.
International Symposium on Distributed Computing (**DISC 2003**), October 2003.
 52. *On implementing Omega with weak reliability and synchrony assumptions.*
Marcos K. Aguilera, Carole Delporte-Gallet, Hugues Fauconnier, Sam Toueg.
ACM Symposium on Principles of Distributed Computing (**PODC 2003**), July 2003.
 53. *On using network attached disks as shared memory.*
Marcos K. Aguilera, Burkhard Englert, Eli Gafni.

- ACM Symposium on Principles of Distributed Computing (**PODC 2003**), July 2003.
54. *Block-level security for network attached disks.*
Marcos K. Aguilera, Minwen Ji, Mark Lillibridge, John MacCormick, Erwin Oertli, Dave Andersen, Mike Burrows, Timothy Mann, Chandramohan Thekkath.
Usenix Conference on File and Storage Technologies (**FAST 2003**), March 2003.
 55. *On the impact of fast failure detectors on real-time fault-tolerant systems.*
Marcos K. Aguilera, Gerard Le Lann, Sam Toueg.
International Symposium on Distributed Computing (**DISC 2002**), October 2002.
 56. *On the quality of service of failure detectors.*
Wei Chen, Sam Toueg, Marcos K. Aguilera.
IEEE Transactions on Computers (**IEEE ToC**), May 2002.
 57. *Stable leader election.*
Marcos K. Aguilera, Carole Delporte-Gallet, Hugues Fauconnier, Sam Toueg.
International Symposium on Distributed Computing (**DISC 2001**), October 2001.
 58. *Thrifty generic broadcast.*
Marcos K. Aguilera, Carole Delporte-Gallet, Hugues Fauconnier, Sam Toueg.
International Symposium on Distributed Computing (**DISC 2000**), October 2000.
 59. *Efficient atomic broadcast using deterministic merge.*
Marcos K. Aguilera, Robert E. Strom.
ACM Symposium on Principles of Distributed Computing (**PODC 2000**), July 2000.
 60. *On the quality of service of failure detectors.*
Wei Chen, Sam Toueg, Marcos K. Aguilera.
IEEE/IFIP International Conference on Dependable Systems and Networks (**DSN 2000**), June 2000.
 61. *Failure detection and consensus in the crash-recovery model.*
Marcos K. Aguilera, Wei Chen, Sam Toueg.
Distributed Computing journal (**DIST COMP**), April 2000.
 62. *On quiescent reliable communication.*
Marcos K. Aguilera, Wei Chen, Sam Toueg.
SIAM Journal on Computing (**SICOMP**), April 2000.
 63. *Revisiting the weakest failure detector for uniform reliable broadcast.*
Marcos K. Aguilera, Sam Toueg, Borislav Deianov.
International Symposium on Distributed Computing (**DISC 1999**), September 1999.
 64. *A simple bivalency proof that t -resilient consensus requires $t+1$ rounds.*
Marcos K. Aguilera, Sam Toueg.
Information Processing Letters (**IPL**), August 1999.
 65. *Using the heartbeat failure detector for quiescent reliable communication and consensus in partitionable networks.*
Marcos K. Aguilera, Wei Chen, Sam Toueg.
Theoretical Computer Science journal (**TCS**), June 1999.
 66. *Matching events in a content-based subscription system.*
Marcos K. Aguilera, Robert E. Strom, Daniel C. Sturman, Mark Astley, Tushar D. Chandra.
ACM Symposium on Principles of Distributed Computing (**PODC 1999**), May 1999.

67. *Failure detection and consensus in the crash-recovery model.*
Marcos K. Aguilera, Wei Chen, Sam Toueg.
International Symposium on Distributed Computing (**DISC 1998**), September 1998.
68. *Failure detection and randomization: a hybrid approach to solve consensus.*
Marcos K. Aguilera, Sam Toueg.
SIAM Journal on Computing (**SICOMP**), June 1998.
69. *Heartbeat: a timeout-free failure detector for quiescent reliable communication.*
Marcos K. Aguilera, Wei Chen, Sam Toueg.
International Workshop on Distributed Algorithms (**WDAG 1997**), September 1997.
70. *Randomization and failure detection: a hybrid approach to solve consensus.*
Marcos K. Aguilera, Sam Toueg.
International Workshop on Distributed Algorithms (**WDAG 1996**), October 1996.

BOOKS EDITED

1. *Proceedings of the 17th ACM symposium on cloud computing.*
Marcos K. Aguilera, Brian Cooper, Yanlei Diao.
ACM, October 2016.
2. *Proceedings of the 18th international conference on principles of distributed systems.*
Marcos K. Aguilera, Leonardo Querzoni, Marc Shapiro.
Springer, December 2014.
3. *Proceedings of the 26th international symposium on distributed computing.*
Marcos K. Aguilera.
Springer, October 2012.
4. *Proceedings of the 12th international conference on distributed computing and networking.*
Marcos K. Aguilera, Haifeng Yu, Nitin Vaidya, Vikram Srinivasan, Romit Choudhury.
Springer, January 2011.
5. *Proceedings of the 24th annual ACM symposium on principles of distributed computing.*
Marcos K. Aguilera, James Aspnes.
ACM Press, July 2005.

NEWSLETTERS, BOOK CHAPTERS, AND OTHER PUBLICATIONS

1. *How to implement any concurrent data structure.*
Irina Calciu, Siddhartha Sen, Mahesh Balakrishnan, Marcos K. Aguilera.
Communications of the ACM, Volume 61, Number 12, December 2018.
2. *Multi-data center replication protocols.*
Marcos K. Aguilera.
Encyclopedia of Database Systems (2nd edition), September 2018.
3. *How to implement any concurrent data structure for modern servers.*
Irina Calciu, Siddhartha Sen, Mahesh Balakrishnan, Marcos K. Aguilera.
ACM SIGOPS Operating Systems Review, Volume 51, Number 1, August 2017.
4. *The many faces of consistency.*
Marcos K. Aguilera, Douglas B. Terry.
IEEE Data Engineering Bulletin, Volume 39, Number 1, March 2016.

5. *Reconfiguring replicated atomic storage: a tutorial.*
Marcos K. Aguilera, Idit Keidar, Dahlia Malkhi, Jean-Philippe Martin, Alexander Shraer.
Distributed Computing column, bulletin of the EATCS, October 2010.
6. *Stumbling over consensus research: misunderstandings and issues.*
Marcos K. Aguilera.
Replication: Theory and Practice. LNCS 5959, Chapter 4, March 2010.
7. *Autograph: automatically extracting workflow file signatures.*
Anna Povzner, Kim Keeton, Arif Merchant, Charles Morrey, Mustafa Uysal, Marcos K. Aguilera.
Operating Systems Review (OSR), January 2009.
8. *A pleasant stroll through the land of infinitely many creatures.*
Marcos K. Aguilera.
ACM SIGACT News, June 2004.

STUDENT INTERNS

At VMware	Igor Smolyar (Technion), summer 2020 Yizhou Shan (UCSD), summer 2019 Emmanuel Amaro (UC Berkeley), summer 2018 Naama Ben-David (CMU), summer 2017 Theo Gkountouvas (Cornell), summer 2016 Tudor David (EPFL), summer 2015
At MSR Silicon Valley	Irina Calciu (Brown), summer 2014 Ankita Kejriwal (Stanford), summer 2013 Joshua B. Leners (UT Austin), summer 2011 and winter 2013 Brian Cho (UIUC), summer 2010 Nguyen Tran (NYU), summer 2009 Yee Jiun Song (Cornell), summer 2008
At HP Laboratories	Wojciech Golab (U. Toronto), summer 2006 Ramaprabhu Janakiraman (WUSTL), summer 2002

THESIS COMMITTEES

Tudor David, EPFL 2017
Chao Xie, University of Texas at Austin, 2016
Radu Banabic, EPFL, 2015
Joshua B. Leners, University of Texas at Austin, 2015
Dilip Simha, Stony Brook University, 2014
Yair Sovran, New York University, 2012
Brian Cho, University of Illinois at Urbana-Champaign, 2011
Victor Bhatt, Dartmouth College, 2010
Ramaprabhu Janakiraman, Washington University in Saint Louis, 2005

PATENTS GRANTED

1. *File system interface for remote direct memory access.*
Michael Wei, Marcos K. Aguilera, Irina Calciu, Stanko Novakovic, Lalith Suresh, Jayneel Gandhi,

- Nadav Amit, Pratap Subrahmanyam, Xavier Deguillard, Kiran Tati, Rajesh Venkatasubramanian..
U. S. Pat. 10,706,005. Issued in 2020.
2. *Replicating data across data centers.*
Marcos K. Aguilera, Brian Cho.
U. S. Pat. 10,204,114. Issued in 2019.
 3. *Replicating data across data centers.*
Marcos K. Aguilera, Brian Cho.
U. S. Pat. 9,870,374. Issued in 2018.
 4. *Distributed SQL query processing using key-value storage system.*
Marcos K. Aguilera, Joshua Leners, Michael Walfish.
U. S. Pat. 9,626,404. Issued in 2017.
 5. *Remote procedure call chains.*
Marcos K. Aguilera, Dahlia Malkhi, Ramakrishna R. Kotla, Yee Jiun Song.
U. S. Pat. 9,417,938. Issued in 2016.
 6. *Distributed SQL query processing using key-value storage system.*
Marcos K. Aguilera, Joshua Leners, Michael Walfish.
U. S. Pat. 9,268,834. Issued in 2016.
 7. *Inferring causal paths in a distributed computing environment.*
Patrick A. Reynolds, Janet L. Wiener, Marcos K. Aguilera, Jeffrey C. Mogul.
U. S. Pat. 9,178,721. Issued in 2015.
 8. *Selecting computing nodes in cloud service using replication topologies.*
Mahesh Balakrishnan, Marcos K. Aguilera, Birjodh Tiwana, Hitesh Ballani.
U. S. Pat. 9,110,724. Issued in 2015.
 9. *Consistency-based service-level agreements in cloud storage environments.*
Hussam Abu-Libdeh, Marcos K. Aguilera, Mahesh Balakrishnan, Ramakrishna Kotla, Vijayan Prabhakaran, Douglas B. Terry.
U.S. Pat. 8,972,491. Issued in 2015.
 10. *Modifying data structures in distributed file systems.*
Marcos K. Aguilera.
U.S. Pat. 8,972,345. Issued in 2015.
 11. *Snapshots in distributed storage systems.*
Marcos K. Aguilera, Alistair Veitch, Susan Spence. U.S. Pat. 8,935,206. Issued in 2015.
 12. *Providing a distributed balanced tree across plural servers.*
Marcos K. Aguilera, Wojciech Golab, Mehul Shah.
U.S. Pat. 8,909,677. Issued in 2014.
 13. *Methods of writing and recovering erasure coded data.*
Marcos K. Aguilera, Ramaprabhu Janakiraman.
U.S. Pat. 8,726,129. Issued in 2014.
 14. *System for and method of writing and reading redundant data.*
Marcos K. Aguilera, Ram Swaminathan.
U.S. Pat. 8,533,478. Issued in 2013.
 15. *System and method for ascribing resource consumption to activity in a causal path of a node of a*

distributed computing system.

Jeffrey C. Mogul, Janet L. Wiener, Marcos K. Aguilera, Keith I. Farkas, Parthasarath Ranganathan.
U.S. Pat. 8,364,829. Issued in 2013.

16. *Identifying files associated with a workflow.*
Anna Povzner, Kim Keeton, Marcos K. Aguilera, Arif Merchant, Charles Morrey, Mustafa Uysal.
U.S. Pat. 8,019,765. Issued in 2011.
17. *Recoverability of a dataset associated with a multi-tier storage system.*
Mustafa Uysal, Arif Merchant, Kim Keeton, Marcos K. Aguilera, K.-K. Muniswamy-Reddy.
U.S. Pat. 7,979,742. Issued in 2011.
18. *System and method for preventing replay attacks.*
Marcos K. Aguilera, Mark D. Lillibridge, John P. MacCormick.
U.S. Pat. 7,926,103. Issued in 2011.
19. *Tracing information flow using a signature.*
Marcos K. Aguilera.
U.S. Pat. 7,882,508. Issued in 2011.
20. *Transactional shared memory system and method of control.*
Marcos K. Aguilera, Christos Karamanolis, Arif Merchant, Mehul Shah, Alistair Veitch.
U.S. Pat. 7,647,454. Issued in 2010.
21. *Group communication system and method.*
Mehul Shah, Marcos K. Aguilera, Christos Karamanolis, Arif Merchant, Alistair Veitch.
U.S. Pat. 7,609,703. Issued in 2009.
22. *Electronic message authentication.*
Minwen Ji, Kan Zhang, Marcos K. Aguilera, Mark Lillibridge.
U.S. Pat. 7,437,559. Issued in 2008.
23. *Method of seeking consensus among computer processes.*
Marcos K. Aguilera, Svend Frolund.
U.S. Pat. 7,376,867. Issued in 2008.
24. *Analysis of causal relations between intercommunicating nodes.*
Marcos K. Aguilera, Jeff Mogul.
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