

# Jignesh M. Patel

## WORK ADDRESS

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## CURRENT RESEARCH INTERESTS

Data management and analytics.

## EDUCATION

- Ph.D.** Computer Sciences, May 1998. University of Wisconsin—Madison.  
Dissertation: Efficient Database Support for Spatial Applications. Advisor: David J. DeWitt.
- M.S.** Computer Sciences, May 1993. University of Wisconsin—Madison.
- B.Tech** Bachelor of Technology in Computer Science & Engineering (with honors), May 1991.  
Institute of Technology-Benaras Hindu University, India.

## PROFESSIONAL EXPERIENCE

- June 2010-present** Professor, Computer Sciences Department, University of Wisconsin—Madison.  
Also affiliated with the Department of Biostatistics and Medical Informatics.
- June 2015-June 2016** Chief Scientist, Pivotal Inc.
- April 2014-present** Board Member/Director, Lands' End Inc.
- October 2014-present** Chair, Technology Committee, Lands' End Inc.
- May 2015-present** Board Member/Director, Redox (a Madison, WI healthcare integration startup).
- April 2015-present** Advisor, Tixora (a Madison, WI startup building a bus ticketing platform).
- April 2015-present** Chairman of the Board, WaterBit (a Bay Area agriculture IoT startup building an intelligent ecosystem for water management).
- June 2013-present** JMP Consulting LLC, founder. Providing consulting services on big data to companies such as American Family Insurance, Johnson Controls, Samsung, and Twitter.
- May 2007-Dec. 2013** Co-founder and Chairman, Locomatix Inc. since inception, CEO since 2010. Locomatix became part of Twitter in the Summer of 2013. As CEO led the company to win numerous awards including "20 Hottest Startups" (MobileBeat in 2010), "Top 16 Innovative Startups" (CTIA E&A in 2010), and selected into the "Innovation Showcase" (CTIA Wireless 2011).
- Sept. 2009-present** Founder and organizer of the CS NEST Contest – a software entrepreneurship contest that encourages creative software startups.
- Sept. 2008-June 2010** Associate Professor, Computer Sciences Department, University of Wisconsin—Madison. Also affiliated with the Department of Biostatistics and Medical Informatics.
- May 2005-Aug. 2008** Associate Professor, Department of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, MI. Also affiliated with the Bioinformatics Program at the University of Michigan.

<b>July 2012-July 2013</b>	Advisor to EatStreet.com – a Madison area startup for online food ordering.
<b>June 2006-May 2008</b>	Director of Media Analysis (2006-07), Technical Advisory Board (2007-08), Zattoo Inc.
<b>Aug. 1999-May 2005</b>	Assistant Professor, Department of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, MI.
<b>Feb. 1998-Aug. 1999</b>	Consulting Software Engineer, Advanced Development Ctr., NCR, Madison, WI.
<b>May 1995-Sept. 1995</b>	Summer Intern, IBM T. J. Watson Research Center, Hawthorne, NY.

## AWARDS AND RECOGNITIONS

- ACM Fellow, 2014.
- SACM Student Choice Professor of the Year Award, 2014.
- IEEE Senior Member, 2014.
- Inaugural M-List winner. Named as one of the top technology entrepreneurs in Madison, WI, 2013.
- University of Wisconsin Police Department (UWPD) Chief's award, 2012.
- Best papers of VLDB 2012.
- ACM Distinguished Scientist, 2011.
- Best papers of ICDE 2011.
- Best papers of SIGMOD 2011.
- Best papers of ICDE 2010.
- DaMoN 2010 – Best paper award.
- DaMoN 2009 – Best paper award.
- College of Engineering Education Excellence Award, University of Michigan, 2008.
- CIDR 2007, Timeless Idea Award.
- Google Faculty Award, 2012
- NSF CAREER Award, 2001.
- IBM Faculty Award, 2001 and 2003.

## GRANTS AND RESEARCH GIFTS

- Google Focus Award, gift donation from Google, 2015-16, \$500,000. Role: co-PI.
- Google Focus Award, gift donation from Google, 2014-15, \$500,000. Role: co-PI.
- "BIGDATA: Small: DCM: Data Management for Analytics Applications on Modern Architecture," IIS-1250886, 2013-16, \$680,916. Role: PI.
- "QuickLog – Dynamic Modeling and Monitoring of Log Data," gift donation from Oracle, 2013, \$100,000. Role: PI.
- Google Focus Award, gift donation from Google, 2013-14, \$500,000. Role: co-PI.
- Collaboration with the Microsoft Gray Research Lab, \$464,682, 2013-14. Role: co-PI.
- "Comparison of NoSQL and SQL Databases for Petascale Genomics Applications," Exploratory grant from Marshfield Clinic, WI, 2013, \$32,510. Role: PI.
- "CSR: Small: Accelerating Towards the Hardware Specialization Era: A Holistic Approach," National Science Foundation (NSF), CSR-1218432, 2012-2015, \$387,496. Role: co-PI.
- "Rethinking Data Analytics for Modern Multi-core and Main Memory Environments," gift donation from Google, 2012, \$50,000. Role: PI.
- Collaboration with the Microsoft Gray Research Lab, \$465,821, 2012-13. Role: co-PI.

- "III: Large: Collaborative Research: SciDB – An Array Oriented Data Management System for Massive Scale Scientific Data," IIS-1110948, 2011-2015, \$370,706 (UW portion). Role: co-PI.
- "Energy-Efficient Data Processing," National Science Foundation (NSF), IIS-0963993, 2010-2014, \$783,846. Role: PI.
- Collaboration with the Microsoft Gray Research Lab, \$466,464, 2011-12. Role: co-PI.
- "Data processing in Smart SSDs," gift donation from Samsung, \$75,000, 2011. Role: PI.
- "Integrated Biological Sequence Data Management," National Science Foundation (NSF), BDI-0543272, 2006-2009, extended to 2010, \$575,105. Role: PI.
- "CRI-IAD: Collaborative Research: Enabling Security and Network Management Research for Future Networks," National Science Foundation (NSF), CNS-0751116, 2008-14, \$368,773. Role: co-PI.
- "COMET: An Efficient and Scalable Trajectory Data Management System," National Science Foundation (NSF), IIS-0414510, 2005-2008, extended to 2010, \$270,000. Role: PI.
- "Secure Coordination and Communication in a Crisis Using Hand-Held Devices," Department of Homeland Security (DHS), W911NF-05-1-0415, 2005-2008, \$1,365,397. Role: co-PI.
- "Nemo LEAPS Integration," Department of Navy, N00024-01-D-7017, 2006-2008, Subcontract amount: \$129,253. Role: co-PI.
- "Proteomics Alliance for Cancer Research," Michigan Economic Development Corporation (MEDC), 2005-2008, \$2,363,605. Role: co-I.
- "National Center for Integrative Biomedical Informatics", National Institutes of Health (NIH), U54-DA021519-01A1, 2006-2010, \$18,780,596. Role: co-I.
- "Antidepressants, Concurrent Treatments, and Completed Suicide in VA Registry Data," National Institutes of Health (NIH), 1R01MH078698, 2006-2009, Year 1 subcontract: \$9,9527. Role: co-I.
- "Quickstep: An Architecture-Conscious DBMS," National Science Foundation (NSF), NSF CAREER Award IIS-0093059, 2001-2006, extended to 2007, \$349,172. Role: PI.
- "Virtual Center for Network and Security Data," Department of Homeland Security (DHS), 2004-2007. 1st year contract: \$1,256,068. Role: co-PI.
- "Integration of Bioengineering & Biocomputing to Advance Michigan Computer-Assisted Surgery Research," Michigan Economic Development Corporation (MEDC), \$137,725, 2003-2006. Subcontract on a grant from MEDC, lead by Dr. Vipin Kumar at Wayne State University.
- "TIMBER: A Native XML Database System," National Science Foundation (NSF), IIS-0208852, 2002-2004, \$165,000. Role: co-PI.
- "Graph Querying for Life Sciences Applications," Microsoft Research Grant, 2006, \$35,000. Role: PI.
- "Declarative and Efficient Methods for Biological Data Management," Microsoft Research Grant, 2004, \$35,000. Role: PI.
- "Declarative Querying of Biological Data," Microsoft Research Grant, 2004, \$40,000. Role: PI.
- "Declarative and Efficient Querying on Protein Structures," Microsoft Research Grant, 2003, \$35,000. Role: PI.
- "Periscope: A System for Declarative Querying on Protein Data Sets," IBM Faculty Award, 2003, \$40,000. Role: PI.
- "Scalable Processing of Location-Based Notifications," IBM Faculty Award, 2001, \$40,000. Role: PI.
- "Modeling and Querying Protein Sequences Using an Object-Relational Database Management System," Eli Lilly & Co., 2001, \$59,074. Role: PI.
- "Harnessing the Power of Object-Relational Databases for XML Query Processing," NCR Corp., 2000, \$121,000. Role: PI.

## PROFESSIONAL ACTIVITIES

### Conference Officer

**2015:** VLDB/PVLDB (Associate Editor), SIGMOD (Group Leader), ICDE (Applications Track co-chair).

**2014:** ICDE (Area chair), VLDB (Panel co-chair).

**2011:** VLDB (Demo PC co-chair), SIGMOD (Group Leader), EDBT (Tutorials Chair).

**2010:** DaMoN.

**2009:** Core Database Technology Program Chair, VLDB.

**2006:** KDD (Treasurer).

**2005:** ICDE (Vice Chair).

### Program Committee (Conferences)

**2018:** SIGMOD, PVLDB.

**2017:** SIGMOD, PVLDB.

**2016:** PVLDB, ICDE.

**2014:** SIGMOD, PVLDB, EDBT, IEEE BigData (Senior PC).

**2013:** PVLDB, PODS (External Review Committee).

**2008:** ICDE, VLDB.

**2007:** BIODDD, CIDR, ICDE, SIGMOD, VLDB.

**2006:** ICDE, KDD, MDM, VLDB.

**2005:** COMAD, DEXA, ISMB, MDM, SIGMOD, VLDB.

**2004:** CIKM, DEXA, ICDE, MDM, VLDB.

**2003:** SIGMOD, ICDE, MDM.

**2002:** EDBT, ICDE, VLDB.

### Program Committee (Workshops)

**2015:** DaMoN.

**2014:** DaMoN.

**2013:** WebDB, DanaC, GRADES.

**2012:** DanaC, DaMoN.

**2006:** DILS, GIS, STDBM.

**2005:** BIDM, DaMoN, DILS, GIS, MobiDE, SSTD.

**2004:** BIODDD.

**2003:** MobiDE

**2002:** MSP.

**2001:** GIS.

**1999:** SSD.

### Abbreviations for Conferences

CIDR	Conf. on Innovative Data Systems Research
CIKM	ACM Intl. Conf. on Information and Knowledge Management
COMAD	Intl. Conf. on Management of Data
DEXA	Intl. Conf. on Database and Expert Systems Applications
EDBT	Intl. Conf. on Extending Database Technology
ICDE	IEEE Intl. Conf. on Data Engineering
ISMB	Intl. Conf. on Intelligent Systems for Molecular Biology
KDD	ACM Intl. Conf. on Knowledge Discovery and Data Mining
MDM	IEEE Intl. Conf. on Mobile Data Management
PODS	Symposium on Principles of Database Systems
SIGMOD	ACM Intl. Conf. on Management of Data
VLDB/ PVLDB	Intl. Conf. on Very Large Data Bases

### Abbreviations for Workshops:

BIDM	Intl. Workshop on Biological Data Management
BIODDD	ACM SIGKDD Workshop on Data Mining in Bioinformatics
DaMoN	Intl. Workshop on Data Management on New Hardware
DanaC	Data Analytics in the Cloud
DILS	Data Integration in the Life Sciences
GRADES	Graph Data Management Experiences and Systems
GIS	ACM Intl. Symp. on Geographic Information Systems
MobiDE	ACM Workshop on Data Engineering for Wireless and Mobile Access
MSP	ACM SIGPLAN Workshop on Memory System Performance
SSD	Intl. Symp. on Spatial Databases
SSTD	Intl. Symp. on Spatial and Temporal Databases
STDBM	Workshop on Spatio-Temporal Database Management
WebDB	Workshop on Web and Databases

### Editorial Board

- Editorial Board, VLDB Journal, July 2013-2017.
- Editorial Board, Foundations and Trends in Databases, 2006-2017.
- Editorial Board, Distributed and Parallel Databases, 2008-2013.
- Associate Editor (Systems and Prototypes), ACM SIGMOD Record, June 1999-2005.
- Associate Editor, IEEE Data Engineering Bulletin, 2004-2005.

### Society Membership

ACM (SIGMOD), IEEE (Computer).

### Journal Refereeing

- ACM Transactions on Database Systems
- Bioinformatics
- BMC Bioinformatics
- IEEE Transactions on Knowledge and Data Engineering
- IEEE Transactions on Software Engineering
- Information Systems
- Nucleic Acids Research
- VLDB Journal

### Panel Discussions, Keynote, and Distinguished Lecture Series, and Invited Talks

- "Towards Hardware-Software Co-Design for Data Processing: A Plea and a Proposal." Invited CS Colloquium, Harvard University, October 8, 2015.
- "Rethinking the Utility of Benchmarks: Towards Benchmark as a Service." Keynote at the Seventh TPC Technology Conference on Performance Evaluation & Benchmarking (TPCTC 2015), Kohala Coast, Hawai'i, August 31, 2015.
- "Towards hardware-software co-design for data analytics: A plea and a proposal." Keynote at the Third International Workshop on In-Memory Data Management and Analytics (IMDM), VLDB Workshop, Kohala Coast, Hawai'i, August 31, 2015.
- "From Data to Insights @ Bare Metal Speed." Keynote at The ACM SIGMOD Conference on Data Management, Melbourne, Victoria, Australia. June 2, 2015.
- "Towards hardware-software co-design for data analytics: A plea and a proposal." Invited talk by SAP and U. Waterloo, Canada. October 15, 2014.
- "Listening to your startup." Keynote at Forward Tech Conference at the Forward Festival. August 27, 2014.
- "Data @ Bare Metal Speed." CSE Colloquium and Distinguished Lecture Series, 2013-2014, University of San Diego, November 25, 2013.
- "To startup or not to startup? Academics/Entrepreneurs share their experiences." In the 39<sup>th</sup> International Conference on Very Large Data Bases (VLDB), August 29, 2013, Trento, Italy.
- "How to have a successful research career." In the PhD workshop at the 39<sup>th</sup> International Conference on Very Large Data Bases (VLDB), August 30, 2013, Trento, Italy.
- "Data @ Bare Metal Speed." Invited talk at the Microsoft Research Faculty Summit 2013, July 15, 2013, Redmond, WA.
- "Data @ Bare Metal Speed." Invited talk at the IBM Workshop on Big Data Analytics, June 28, 2013, Thomas J. Watson Research Center, Yorktown Heights, New York.

- “The Inevitable Inflection Point for Big Data: Toward Energy-Conscious Main Memory Data Processing.” In coordination with the 2012 US and UK Big Data Week at the Adobe Big Data Analytics meetup, June 20, 2012.
- “Are DBMSs simply dumb data stores for modern applications?” In the First ACM SIGMOD Workshop on Database and Social Networks, June 12, 2011, Athens, Greece.
- “Cloud Databases: What’s New?” In the 36<sup>th</sup> International Conference on Very Large Data Bases (VLDB), Sept 15, 2010, Singapore.
- “Indexing for Success: Effective and Efficient Analysis of Biological Data.” The Bioinformatics Distinguished Lecture Series, May 6, 2009, Ohio University, Athens, OH.
- “Green Database Computing: Should We Care?” Panel at International Workshop on Data Management on New Hardware (DaMoN), June 28 2009, Providence, RI.
- “Indexing for Success: Scaling to Handle the Increasing Volume and Complexity of Biological Databases”, Keynote Speaker at Ohio Collaborative Conference on Bioinformatics (OCCBIO), 2008.
- “Scientific Data Management: An Orphan in the Database Community?” Panel at the 24<sup>th</sup> International Conference on Data Engineering (ICDE), April 7-12, 2008, Cancún, México, 2008.
- “Indexing for Success: Effective Index-Based Methods for Querying Biological Sequences,” Panel at the 39<sup>th</sup> Symposium on the Interface: Computer Science and Statistics. Theme: Systems Biology, May 25, 2007, Philadelphia, PA.
- “Architecture-conscious databases: sub-optimization or the next big leap?” Panel at International Workshop on Data Management on New Hardware (DaMoN), June 12 2005, Baltimore, Maryland.

### Scientific Review Panel

- National Science Foundation (NSF), 2003, 2006.
- National Institutes of Health (NIH), 2003-2004, Member, ZRG1 SSS-H (Computational Biology) Study Section.
- NIH, October 2006, Member, ZLM1 ZH-R (J2) (Special Emphasis Panel) Study Section.
- NIH 2005 – 2008, Member, NIH BDMA (Biodata Management and Analysis) Study Section.
- NIH/NLM 2014, Member, National Library of Medicine Special Emphasis Panel.

### TEACHING EXPERIENCE

- CS 564, Database Management Systems: Design and Implementation: S09, S10, S11, S12, S13, F13 (U. Wisconsin)
- CS 764, Topics in Database Management Systems: F08, F09, F10, F11, F12 (U. Wisconsin)
- EECS 281, Data Structures and Algorithms: W03 (U. Michigan)
- EECS 484, Database Management Systems: W00, F00, F01, F03, F05, F07 (U. Michigan)
- EECS 485, Web Database and Information Systems, W05 (U. Michigan)
- EECS 496, Major Design Experience Professionalism, W06 (U. Michigan)
- EECS 584, Advanced Database Management Systems: F99, F02, F04, F07 (U. Michigan)
- EECS 684, Current Topics in Database Management Systems: W01, W02, W04 (U. Michigan)

### PUBLICATIONS

#### Conference Papers

1. J. Zhu, N. Potti, S. Saurabh, J. M. Patel: Looking Ahead Makes Query Plans Robust. PVLDB 10(8): 889-900 (2017)

2. L. Chen, A. Kumar, J. F. Naughton, J. M. Patel: Towards Linear Algebra over Normalized Data. *PVLDB* 10(11): 1214-1225 (2017)
3. H. Deshmukh, H. Memisoglu, J. M. Patel: Adaptive Concurrent Query Execution Framework for an Analytical In-Memory Database System. *BigData Congress 2017*: 23-30.
4. R. J. Leo John, N. Potti, and J. M. Patel: Ava: From Data to Insights Through Conversation. *CIDR 2017*.
5. L. Viswanathan, B. Chandra, W. Lang, K. Ramachandra, J. M. Patel, A. Kalhan, D. J. DeWitt, A. Halverson: Predictive Provisioning: Efficiently Anticipating Usage in Azure SQL Database. *ICDE 2017*: 1111-1116
6. A. Kumar, J. F. Naughton, J. M. Patel, X. Zhu: To Join or Not to Join?: Thinking Twice about Joins before Feature Selection. *SIGMOD Conference 2016*: 19-34
7. A. Floratou and J. M. Patel: Replica Placement in Multi-tenant Database Environments. *BigData Congress 2015*: 246-253. **Best paper award.**
8. S. Kulkarni, N. Bhagat, M. Fu, V. Kedigehalli, C. Kellogg, S. Mittal, J. M. Patel, K. Ramasamy, and S. Taneja: Twitter Heron: Stream Processing at Scale. *In Proc. of the ACM SIGMOD Conference on Data Management*, June 22-27, 2015, Melbourne, Victoria, Australia.
9. Y. Li, C. Chasseur, and J. M. Patel: A Padded Encoding Scheme to Accelerate Scans by Leveraging Skew. *In Proc. of the ACM SIGMOD Conference on Data Management*, June 22-27, 2015, Melbourne, Victoria, Australia.
10. A. Kumar, J. Naughton, and J. M. Patel: Learning Generalized Linear Models Over Normalized Data. *In Proc. of the ACM SIGMOD Conference on Data Management*, June 22-27, 2015, Melbourne, Victoria, Australia.
11. Q. Zeng, J. M. Patel, and D. Page: QuickFOIL: Scalable Inductive Logic Programming. *VLDB 2015/PVLDB* 8(3): 197-208 (2014).
12. S. Sridharan and J. M. Patel: Profiling R on a Contemporary Processor. *VLDB 2015 /PVLDB* 8(2): 173-184 (2014).
13. N. Potti and J. M. Patel: DAQ: A New Paradigm for Approximate Query Processing. *VLDB 2015/PVLDB* 8(9): 898-909 (2015).
14. Arun Kumar, Mona Jalal, Boqun Yan, Jeffrey F. Naughton, and Jignesh M. Patel: Demonstration of Santoku: Optimizing Machine Learning over Normalized Data. *PVLDB* 8(12): 1864-1875 (2015) (demo paper).
15. J. Fan, A. G. Soosai Raj, and J. M. Patel: The Case Against Specialized Graph Analytics Engines. *CIDR 2015*.
16. Y. Li and J. M. Patel: WideTable: An Accelerator for Analytical Data Processing. *VLDB 2014/PVLDB* 7(10): 907-918 (2014).
17. A. Floratou, F. Bertsch, J. M. Patel, and G. Laskaris: Towards Building Wind Tunnels for Data Center Design. *VLDB 2014/PVLDB* 7(9): 781-784 (2014).
18. V. R. Gankidi, N. Teletia, J. M. Patel, A. Halverson, and D. J. DeWitt: Indexing HDFS Data in PDW: Splitting the data from the index. *VLDB 2014/PVLDB* 7(13): 1520-1528 (2014).
19. A. Toshniwal, S. Taneja, A. Shukla, K. Ramasamy, J. M. Patel, S. Kulkarni, J. Jackson, K. Gade, M. Fu, J. Donham, N. Bhagat, S. Mittal, and D. V. Ryaboy: Storm@Twitter. *In Proc. of the ACM SIGMOD Conference on Data Management*, June 22-27, 2014, Snowbird, UT, USA.
20. N. Zhang, J. Tatemura, J. M. Patel, and H. Hacigümüs. Re-evaluating Designs for Multi-Tenant OLTP

- Workloads on SSD-based I/O Subsystems, *In Proc. of the ACM SIGMOD Conference on Data Management*, June 22-27, 2014, Snowbird, UT, USA.
21. C. Chasseur and J. M. Patel. Design and Evaluation of Storage Organizations For Read-Optimized Main-Memory Databases, *PVLDB 2013/VLDB 2014*.
  22. Y. Li and J. M. Patel. BitWeaving: Fast Scans for Main Memory Data Processing, *In Proc. of the ACM SIGMOD Conference on Data Management*, June 22-27 2013, New York, NY, USA.
  23. J. Do, Y. Kee, J. M. Patel, C. Park, K. Park, and D. J. DeWitt. Query Processing on Smart SSDs: Opportunities and Challenges, *In Proc. of the ACM SIGMOD Conference on Data Management*, June 22-27 2013, New York, NY, USA.
  24. W. Lang, S. Shankar, and J. M. Patel. "Towards Multi-tenant Performance SLOs." *In Proc. of the 28th IEEE International Conference on Data Engineering (ICDE)*, April 1-5, 2012, Washington DC, USA, pp. 702-713. **Selected as the best papers in ICDE 2012.**
  25. A. Floratou, N. Teletia, D. J. DeWitt, J. M. Patel, and D. Zhang. "Can the elephants handle the NoSQL onslaught?" *In Proceedings of the VLDB Endowment*, Volume 5, Number 12, 2012, pp. 1712-1723, and presented at the 38<sup>th</sup> International Conference on Very Large Databases (VLDB), August 27-31, 2012, Istanbul, Turkey.
  26. W. Lang, S. Harizopoulos, J. M. Patel, M. A. Shah, and D. Tsirogiannis. "Towards Energy-Efficient Database Cluster Design." *In Proceedings of the VLDB Endowment*, Volume 5, Number 12, 2012, pp. 1684-1695, and presented at the 38<sup>th</sup> International Conference on Very Large Databases (VLDB), August 27-31, 2012, Istanbul, Turkey.
  27. N. Zhang, J. Tatemura, J. M. Patel, and H. Hacigümüs. "Towards Cost-Effective Storage Provisioning for DBMSs." *In Proceedings of the VLDB Endowment*, Volume 5, Number 4, 2011, pp. 274-285, and presented at the 38<sup>th</sup> International Conference on Very Large Databases (VLDB), August 27-31, 2012, Istanbul, Turkey. **Selected as the best papers in VLDB 2012.**
  28. P. Larson, S. Blanas, C. Diaconu, C. Freedman, J. M. Patel, and M. Zwillig: High-Performance Concurrency Control Mechanisms for Main-Memory Databases. *In Proceedings of the VLDB Endowment*, Volume 5, Number 4, 2011, pp. 298-309, and presented at the 38<sup>th</sup> International Conference on Very Large Databases (VLDB), August 27-31, 2012, Istanbul, Turkey.
  29. A. Floratou, J. M. Patel, W. Lang, and A. Halverson. "When free is not really free: What does it cost to run a database workload in the cloud?" *In the third International Conference on Performance Evaluation and Benchmarking (TPCTC)*, Seattle, USA, August 29, 2011.
  30. S. Blanas, Y. Li, and J. M. Patel. "Design and Evaluation of Main Memory Hash Join Algorithms for Multi-core CPUs." *In Proc. of the ACM SIGMOD Conference on Data Management*, June 12-16 2011, Athens, Greece, pp. 37-48.
  31. Y. Li, A. Terrel, and J. M. Patel. "WHAM: A High-throughput Sequence Alignment Method." *In Proc. of the ACM SIGMOD Conference on Data Management*, June 12-16 2011, Athens, Greece, pp.445-456. **Selected as one the best papers in SIGMOD 2011.**
  32. W. Jin and J. M. Patel. "Efficient and Generic Evaluation of Ranked Queries." *In Proc. of the ACM SIGMOD Conference on Data Management*, June 12-16 2011, Athens, Greece, pp. 601-612.
  33. J. Do, D. Zhang, J. M. Patel, D. J. DeWitt, J. F. Naughton, and A. Halverson. "Turbocharging DBMS Buffer Pool Using SSDs." *In Proc. of the ACM SIGMOD Conference on Data Management*, June 12-16, 2011, Athens, Greece, pp. 1113-1124.
  34. A. Floratou, J. M. Patel, E. J. Shekita, and S. Tata. "Column-Oriented Storage Techniques for MapReduce." *In Proceedings of the VLDB Endowment*, Volume 4, Number 7, 2011, pp. 419-429, and presented at the 37<sup>th</sup> International Conference on Very Large Databases (VLDB), August 29-



Sept 3, 2011, Seattle, WA, USA.

35. W. Lang and J. M. Patel. "Energy Management for MapReduce Clusters." In *Proc. of the 36th International Conference on Very Large Data Bases (VLDB)*, Sept 13-17, 2010, Singapore, pp. 129-139.
36. R. Kandhan, N. Teletia, and J. M. Patel. "SigMatch: Fast and Scalable Multi-Pattern Matching." In *Proc. of the 36th International Conference on Very Large Data Bases (VLDB)*, Sept 13-17, 2010, Singapore, pp. 1173-1184.
37. N. Zhang, Y. Tian, and J. M. Patel. "Discovery-Driven Graph Summarization." In *Proc. of the 26th IEEE International Conference on Data Engineering (ICDE)*, March 1-6, 2010, Long Beach, California, USA, pp. 880-891.
38. A. Floratou, S. Tata, and J. M. Patel. "Efficient and Accurate Discovery of Patterns in Sequence Datasets." In *Proc. of the 26th IEEE International Conference on Data Engineering (ICDE)*, March 1-6, 2010, Long Beach, California, USA, pp. 461-472. **Selected as the best papers in ICDE 2010.**
39. W. Jin, M. Morse, J. M. Patel, M. Ester, and Z. Hu. "Evaluating Skylines in the Presence of Equijoins." In *Proc. of the 26th IEEE International Conference on Data Engineering (ICDE)*, March 1-6, 2010, Long Beach, California, USA, pp. 249-260.
40. J. Chen and J. M. Patel. "Trajectory Joins and Their Application in Privacy Preservation." In *Proc. of the 17th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM GIS)*, November 4-6, 2009, Seattle, WA, pp. 266-275.
41. W. Lang and J. M. Patel. "Towards Eco-friendly Database Management Systems." In *Proc. of the Fourth Biennial Conference on Innovative Data Systems Research (CIDR)*, January 4-7, 2009, Asilomar, CA.
42. P. Cudré-Mauroux, H. Kimura, K-T Lim, J. Rogers, R. Simakov, E. Soroush, P. Velikhov, D. Wang, M. Balazinska, J. Becla, D. J. DeWitt, B. Heath, D. Maier, S. Madden, J. M. Patel, M. Stonebraker, and S. B. Zdonik. "A Demonstration of SciDB: A Science-Oriented DBMS." In *the 35th International Conference on Very Large Data Bases (VLDB)*, August 24-28, 2009, Lyon, France, published as PVLDB 2(2), pp. 1534-1537 (demo paper).
43. Y. Tian, R. A. Hankins, and J. M. Patel. "Efficient Aggregation for Graph Summarization." In *Proc. of the ACM SIGMOD Conference on Data Management*, June 9-12 2008, Vancouver, Canada, pp. 567-580.
44. Y. Tian, J. M. Patel, V. Nair, S. Martini, and M. Kretzler. "Periscope/GQ: A Graph Querying Toolkit." In *34th International Conference on Very Large Data Bases (VLDB)*, August 23-28, 2008, Auckland, New Zealand, published as PVLDB 1(2), pp. 1404-1407 (demo paper).
45. Y. Tian and J. M. Patel. "TALE: A Tool for Approximate Large Graph Matching." In *Proc. of the 24th International Conference on Data Engineering (ICDE)*, April 7-12 2008, Cancun, Mexico, pp. 963-972. Full paper, long presentation.
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2. J. Power, Y. Li, M. D. Hill, J. M. Patel, and D. A. Wood: Implications of Emerging 3D GPU Architecture on the Scan Primitive. *SIGMOD Record* 44(1): 18-23 (2015)
3. H. V. Jagadish, J. Gehrke, A. Labrinidis, Y. Papakonstantinou, J. M. Patel, R. Ramakrishnan, and C. Shahabi: Big data and its technical challenges. *Commun. ACM* 57(7): 86-94 (2014).
4. K. Park, Y-S. Kee, J. M. Patel, J. Do, C. Park, and D. J. DeWitt: Query Processing on Smart SSDs. *IEEE Data Eng. Bull.* 37(2): 19-26 (2014).
5. W. Lang, S. Shankar, J. M. Patel, and A. Kalhan: Towards Multi-Tenant Performance SLOs. *IEEE Trans. Knowl. Data Eng.* 26(6): 1447-1463 (2014).
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8. Y. Li, J. M. Patel, and A. Terrell. WHAM: A High-Throughput Sequence Alignment Method. *ACM Trans. Database Syst.* 37(4): 28 (2012).

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### Workshop Papers and Whitepapers:

1. K. Park, J. Do, N. Teletia, and J. M. Patel: Aggressive buffer pool warm-up after restart in SQL Server. ICDE Workshops 2016: 31-38
2. J. M. Patel and G. Hofheimer: The State of Data Technology in Credit Unions: The Sink-or-Swim Crossroad Ahead. Whitepaper developed for Filene.org. Released: February 16, 2016.
3. J. Power, Y. Li, M. D. Hill, J. M. Patel, and D. A. Wood: Toward GPUs being mainstream in analytic processing: An initial argument using simple scan-aggregate queries. DaMoN 2015: 11
4. W. Lang, J. M. Patel, and S. Shankar. "Wimpy Node Clusters: What About Non-Wimpy Workloads?" In the *Sixth International Workshop on Data Management on New Hardware (DaMoN 2010)*, held in conjunction with SIGMOD 2010, Indianapolis, IN, June 2010. **(Best paper award)**
5. J. Do and J. M. Patel. "Join Processing for Flash SSDs: Remembering Past Lessons." In the *Fifth International Workshop on Data Management on New Hardware (DaMoN 2009)*, held in conjunction with SIGMOD 2009, Providence, RI, June 2009. **(Best paper award)**
6. M. D. Morse, J. M. Patel, and W. I. Grosky. "Efficient Evaluation of Radial Queries using the Target Tree." In the *International Workshop on Biomedical Data Engineering (BMDE2005)*, held in conjunction with ICDE 2005, Tokyo, Japan, April 3-4, 2005.
7. K. Runapongsa, J. M. Patel, R. Bordawekar, and S. Padmanabhan. "XIST: An XML Index Selection Tool." In the *Second International XML Database Symposium (XSym 2004)*, held in conjunction with VLDB 2004 Toronto, Canada, August 29-30 2004, pp. 219-234.
8. J. M. Patel. "The Role of Declarative Querying in Bioinformatics." *Workshop on Data Management for Molecular and Cell Biology*, Feb. 2-3, 2003, Lister Hill Center, NLM, NIH Campus, Bethesda, MD. Also appears in *OMICS: A Journal of Integrative Biology*, 7(1), 2003, pp. 89-91.
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11. D. J. DeWitt, J. Luo, J. M. Patel, and J. Yu. "Paradise - A Parallel Geographic Information System." In *Proc. of the First ACM Workshop on Advances in Geographic Information Systems*, November 5, 1993, Arlington, Virginia.

### Poster Papers:

1. R. Varadarajan, F. Eichinger, J. M. Patel, and M. Kretzler: "Molecular Re-Classification of Renal Disease using Approximate Graph Matching, Clustering and Pattern Mining" (poster paper). In the 18<sup>th</sup> Annual International Conference on Intelligent Systems for Molecular Biology (ISMB), 2010, Boston.
2. S. Tata and J. M. Patel. "FLAME: Shedding Light on Hidden Frequent Patterns in Sequence Datasets." In *Proc. of the 24th International Conference on Data Engineering (ICDE)*, April 7-12, Cancun, Mexico, 2006.
3. Y. Tian, R. C. McEachin, C. Santos, D. J. States, and J. M. Patel. "SAGA: Subgraph Matching Tool for Biological Graphs." In the 11<sup>th</sup> Annual International Conference on Research in Computational Molecular Biology (RECOMB), 2007.
4. S. Papparizos, J. M. Patel, and H.V. Jagadish. "SIGOPT: Using Schema to Optimize XML Query Processing." In *Proc. of the 23rd International Conference on Data Engineering (ICDE)*, April 16-20, 2007, Istanbul, Turkey, 1456-1460.
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22nd International Conference on Data Engineering (ICDE), April 3-7, Atlanta, GA, 2006, pp 108.

### Book Chapters:

1. Y. Tian and J. M. Patel. "Interactive Graph Summarization." In *Link Mining: Models, Algorithms, and Applications*, eds. P. S. Yu, J. Han, and C. Faloutsos, Springer, 2011 (to appear).
2. S. Tata and J. M. Patel. "Query Languages and Evaluation Techniques for Biological Sequence Data." *Encyclopedia of Database Systems 2009*: 2261-2264
3. J. M. Patel, D. P. Huddler, and L. Hammel. "Declarative and Efficient Querying on Protein Secondary Structures." In *Data Mining in Bioinformatics*, eds. J. T. L. Wang, M. J. Zaki, H. Toivonen, and D. Shasha, Springer, 2005, pp. 243-273.
4. J. M. Patel and H. V. Jagadish, "The Michigan Benchmark: A Micro-Benchmark for XML Query Performance Diagnostics." In *XML Data Management*, eds. A. B. Chaudhri, R. Zicari, and A. Rashid, Eds., 1st ed: Addison-Wesley, 2003.

### Software:

1. C. Chasseur and J. M. Patel. The Quickstep Storage Manager. <http://research.cs.wisc.edu/quickstep/>, first release 2013.
2. Y. Li and J. M. Patel. BitWeaving. <http://research.cs.wisc.edu/quickstep/>, first release 2013.
3. Y. Li, A. Terrel and J. M. Patel. WHAM: A High-throughput Sequence Alignment Method. <http://www.cs.wisc.edu/wham>, first release 2011.
4. N. Teletia, Y. J. Kim, and J. M. Patel. ProbeMatch: Rapid short-read sequence aligner. <http://pages.cs.wisc.edu/~jignesh/probematch/>, first release 2009.
5. S. Tata, R. A. Hankins, and J. M. Patel. TDD Suffix Tree Construction Software. <http://www.eecs.umich.edu/tdd>, first release: 2005.
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### Patents:

1. Y. Li and J. M. Patel. "Database system with data organization providing improved bit parallel processing." U. S. Patent No. 9,002,903. Issued April 7, 2015.
2. J. M. Patel, Y. Chen, and K. Ramasamy. "Location tracking framework." U. S. Patent No. 8,447,320. Issued May 21, 2013.
3. J. M. Patel, Y. Chen, and K. Ramasamy. "Location tracking optimizations." U. S. Patent No. 8,155,880. Issued April 10, 2012.
4. N. Koudas, D. Srivastava, J. M. Patel, S. Al-Khalifa, H. V. Jagadish, and Y. Wu. "Method of pattern searching." U. S. Patent No. 7,451,144. Issued November 11, 2008. Also, related patents: 8,015,179 and 8,117,190.
5. N. Kabra, J. M. Patel, J.-B. Yu, B. Nag, and J.-J. Chen. "Method and Apparatus for Parallel Execution of Trigger Actions." U. S. Patent No. 6,732,084. Issued May 4, 2004.

6. K. Ramasamy, J. M. Patel, and J. F. Naughton. "Set Containment Join Operation in an Object/Relational Database Management System." U. S. Patent No. 6,728,694. Issued April 27, 2004.
7. J. M. Patel and N. Kabra. "Method and Apparatus for Evaluating Index Predicates on Complex Data Types Using Virtual Indexed Streams." U. S. Patent No. 6,678,686. Issued January 13, 2004.
8. B. Nag, J-B. Yu, J. M. Patel, and Z. Wang. "Method and Apparatus for Fetching Array Based Objects by Direct Delivery and Batching." U. S. Patent No. 6,601,064. Issued July 29, 2003.
9. N. Kabra, J. M. Patel, J-B. Yu, B. Nag, and J-J. Chen. "Method and Apparatus for Parallel Execution of SQL from within User Defined Functions." U. S. Patent No. 6,594,651. Issued July 15, 2003.
10. N. Kabra, J. M. Patel, J-B. Yu, B. Nag, and J-J. Chen. "Method and Apparatus for Parallel Execution of SQL from Stored Procedures." U. S. Patent No. 6,507,834. Issued January 14, 2003.
11. A. Singh, J. M. Patel, and N. Kabra. "Method and Apparatus for Using Java as a Stored Procedure Language and as an Embedded Language on a Client." U. S. Patent No. 6,477,540. Issued November 5, 2002.

## GRADUATE STUDENTS ADVISED

### Graduated Ph.D. Students:

1. Arun Kumar, August 2016, *Learning Over Joins*. First employment: University of California, San Diego.
2. Craig Chasseur, September 2015, *A Bare-Metal Approach to Database Performance on Contemporary Hardware*. First employment: Pivotal.
3. Yinan Li, August 2015, *Analytic Query Processing at Bare Metal Speeds*. First employment: Microsoft Research.
4. Spyros Blanas, August 2013, *High-performance main memory database management*. First employment: Assistant Professor, Ohio State University.
5. Avrielia Floratou, August 2013, *High-Performance Cloud Data Management*. First employment: IBM Almaden Research Center, San Jose, California.
6. Ning Zhang, December 2012, *Towards Cost-Effective Resources Provisioning for DBMS and Storage Clouds*. First employment: NEC Laboratories, Cupertino, CA.
7. Jae Young Do, November 2012, *The Role of Flash Memory in Database Management Systems*. First employment: Microsoft, Redmond, WA.
8. Willis Lang, August 2012, *Cost-Effective Cloud Data Processing*. First employment: Microsoft Jim Gray Systems Lab, Madison, WI.
9. Yuanyuan Tian, August 2008, *Querying Graph Databases*. First employment: IBM Almaden Research Center, San Jose, California.
10. You Jung Kim (co-advised), August 2008, *Efficient Index-based Methods for Processing Large Biological Databases*. First employment: Oracle, Redwood Shores, California.
11. Yun Chen, December 2007, *Efficient Query Processing for Spatio-Temporal Databases*. First employment: eBay, Mountain View, California.
12. Sandeep Tata, August 2007, *Declarative Querying for Biological Sequences*. First employment: IBM Almaden Research Center, San Jose, California.
13. Michael Morse (co-advised), August 2007, *Efficient Algorithms for Similarity and Skyline Summary on Multidimensional Datasets*. First employment: MITRE Corp., McLean, VA.
14. Richard A. Hankins, May 2004, *Architecture-Conscious Storage Management*. First employment: Microprocessor Research Lab, Intel Corporation, Santa Clara, California.
15. Kanda Runapongsa, July 2003, *Methods for Efficient Storage and Indexing in XML Databases*. First employment: Dept. of Computer Engineering, Khon Kaen University, Thailand.

**Current Ph.D. and M.S. Students:**

1. Harshad Deshmukh
2. Leo John Rogers Jeffrey
3. Hakan Memisoglu
4. Udip Pant
5. KwangHyun Park
6. Navneet Potti
7. Saket Saurabh
8. Adalbert Gerald Soosai Raj
9. Marc Spehlmann
10. Lalitha Viswanathan
11. Zuyu Zhang
12. Jianqiao Zhu

**Past M.S. Students:**

1. Frank Bertsch, 2015.
2. Shoban P. Chandrabose, 2015, first employment: Google.
3. Jing Fan, 2015.
4. James Paton, 2014, first employment: Facebook.
5. Anusha Dasarakothapalli, 2014, first employment: Amazon.
6. Vinitha Gankidi, 2014, first employment: LinkedIn
7. Shriram Shridharan, 2014, first employment: Amazon
8. Ramakrishnan Kandhan, 2010, first employment: Google
9. Nikhil Teletia, 2010, first employment: Microsoft
10. Su Liu, 2008, first employment: Microsoft
11. Shruti Kasetty, May 2004, first employment: Microsoft
12. Andrew McClory, May 2003, first employment: FactSet Research
13. Venkatasiva P. Chakkabala, August 2003, first employment: Informatica
14. Laurie Hammel, May 2002, first employment: National Security Agency
15. Qiang Zeng, 2015, first employment: Google.

**POSTDOCTORAL RESEARCHERS ADVISED**

**Past:**

1. Wen Jin, September 2007-July 2009, first employment: Independent Consultant
2. Ramakrishna Varadarajan, June 2009-July 2011, first employment: Vertica/HP