

# Phillip B. Gibbons

## Curriculum Vitae

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### Research Interests

Research areas include big data, parallel computing, databases, cloud computing, sensor networks, distributed systems, and computer architecture. My publications span theory and systems, across a broad range of computer science and engineering (e.g., conference papers in APoCS, ASPLOS, ATC, ESA, EuroSys, HPCA, ICML, IPDPS, ISCA, MICRO, MLSys, NeurIPS, NSDI, OSDI, PACT, SoCC, SODA, SOSOP, SPAA and VLDB since 2015).

### Education

- **University of California at Berkeley**, Berkeley, California, 1984–1989.  
Ph.D. in Computer Science. Dissertation advisor: Richard M. Karp.
- **Dartmouth College**, Hanover, New Hampshire, 1979–1983.  
B.A. in Mathematics. Graduated summa cum laude and Phi Beta Kappa.

### Professional Experience

- **Carnegie Mellon University**, Pittsburgh, Pennsylvania.  
Professor, Computer Science Department, 2015–present.  
Professor, Electrical and Computer Engineering Department, 2015–present.  
Principal Investigator (PI or co-PI) for the following research projects:
  - *Prescriptive Memory*: Razing the semantic wall between applications and computer systems with heterogeneous compute and memories.
  - *Foundations of PIM*: Theoretical foundations of emerging processing-in-memory systems.
  - *Asymmetric Memory*: Write-efficient algorithms and systems, for settings (such as emerging non-volatile memories) where writes are significantly more costly than reads.
  - *Big Learning Systems*: Mapping out and exploring the space of large-scale machine learning from a systems’ perspective. Recent focus on geo-distributed learning over non-IID data.

Adjunct Professor, Computer Science Department, 2003–2015.

Adjunct Associate Professor, Computer Science Department, 2000–2003.

Visiting Professor, Computer Science Department, 2000.

- **Intel Labs Pittsburgh**, Pittsburgh, Pennsylvania. Principal Research Scientist, 2001–2015.  
Principal Investigator for the Intel Science and Technology Center for Cloud Computing
  - A \$11.5M research partnership with Carnegie Mellon, Georgia Tech, Princeton, UC Berkeley, and U. Washington.Principal Investigator (PI or co-PI) for the following research projects (partial list):
  - *Hi-Spade*: Hierarchy-savvy parallel algorithm and system design, focusing on high-level locality abstractions, smart runtime thread schedulers, and emerging non-volatile memory technologies.
  - *LBA*: Hardware accelerators for online program correctness checking tools.
  - *Sybil Defenses*: Limiting the impact of malicious users in distributed systems.

- *IrisNet*: A core architecture and software infrastructure for a worldwide sensor web.
- **University of Pittsburgh**, Pittsburgh, Pennsylvania.  
Adjunct Professor, Department of Computer Science, 2003–2011.
- **Bell Laboratories**, Murray Hill, New Jersey. Member of Technical Staff, 1990–2001.  
Information Sciences Research Center, Bell Laboratories, Lucent Technologies, 1996–2001.  
Mathematical Sciences Research Center, AT&T Bell Laboratories, 1990–1996.  
Principal Investigator (PI or co-PI) for the following research projects (partial list):
  - *Aqua*: Synopses and approximate query processing for massive data sets/streams.
  - *Compas*: Improved modeling, algorithm design, and performance for parallel processing.
  - *LPWA*: Browse the web with greater privacy, convenience, and spam control.
- **Stanford University**, Palo Alto, California. Postdoctoral scholar, September 1989 – August 1990.  
Department of Computer Science and the Computer Systems Laboratory.  
Sponsors: John L. Hennessy, Donald E. Knuth, Jeffrey D. Ullman.
- **Internships and Assistantships**:  
*IBM Almaden Research Center*, San Jose, California. April 1988 – August 1989.  
*University of California at Berkeley*, Berkeley, California. September 1984 – August 1989.  
*Dartmouth College*, Hanover, New Hampshire. January–March 1984.  
*Hewlett Packard Laboratories*, Palo Alto, California. June–December 1983, Summer 1984, 1985.  
*Digital Equipment Corporation*, Tewksbury, Massachusetts. January–March 1982, Summer 1982.

## Summary of Honors and Impact Indicators

- **ACM Fellow**
- **IEEE Fellow**
- **ACM Paris Kanellakis Theory and Practice Award**
- **Best Papers**: Most influential paper lists for ISCA and PLDI. Award winning papers in APoCS’20, GLOBE’17, ISCA’08, NSDI’06, ICDE’04, and SIGMOD’01. Papers in SPAA’14, ICFP’08, VLDB’08, PODC’07, SIGCOMM’06, SIGMOD’02, SPAA’02, SPAA’01, PODS’99, SPAA’99, SPAA’97, EuroPar’96, SPAA’95, and SPAA’94 selected for “best paper” journal issues.
- **Citation counts**: 27,000+ citations; h-index = 82; 68 papers with 100+ citations [Google Scholar, October 2021]
- **Editorial Boards**: *ACM Transactions on Parallel Computing* (Inaugural Editor-in-Chief), *Journal of the ACM*, *IEEE Transactions on Cloud Computing*, *IEEE Transactions on Computers*, and *IEEE Transactions on Parallel and Distributed Systems*.
- **Conference Leadership**: General Chair for SoCC’18. Program Chair/Area-Chair for ICDCS’14, Sigmod’13, ICDE’09, SenSys’07, DCOSS’06, IPSN’06, ICDE’05, and SPAA’98. Steering Committee Chair for SPAA 2004–2007. Steering Committee for SoCC, SenSys and DCOSS. 70+ program committees.
- **Keynote talks**: PODC’16, ICDCS’16, IPDPS’15, SDM’10, SenSys’08, DISC’08 and DCOSS’05.
- **Commercial impact of research**: Pipeline scheduler used in Hewlett-Packard’s first RISC processors throughout the late ’80s. Memory consistency model used in commercial parallel machines since the early ’90s. Probabilistic data summaries (and approximate query processing techniques) used in commercial data warehouses since the late ’90s, in network monitoring since the early ’00s, and in today’s big data analytics applications at Google, Twitter, Facebook, and elsewhere—this work won the *2019 ACM Paris Kanellakis Theory and Practice Award*. 17 Patents.

## Professional Activities

- Editor-in-Chief: *ACM Transaction on Parallel Computing*, 2012–2018
- Editorial Board: *Journal of the ACM*, 2001–2018
- Editorial Board: *IEEE Transactions on Cloud Computing*, 2013–2017
- Editorial Board: *IEEE Transactions on Computers*, 2005–2007
- Editorial Board: *Parallel Processing Letters*, 2001–2006
- Editorial Board: *IEEE Transactions on Parallel and Distributed Systems*, 1997–2000
- General Chair: *9th ACM Symposium on Cloud Computing (SoCC'18)*
- Program Co-Chair: *5th IEEE International Conference on Green Computing and Communications (GreenCom'14)*
- Program Vice-Chair: *34th International Conference on Distributed Computing Systems (ICDCS'14)*, “Big Data, Data Management and Analytics” track
- Program Area-Chair: *2013 ACM SIGMOD International Conference on Management of Data (Sigmod'13)*, “Systems, Performance, Transaction Processing” area
- General Co-Chair: *9th International ACM Workshop on Data Engineering for Wireless and Mobile Access (MobiDE'10)*
- Program Vice-Chair: *25th IEEE International Conference on Data Engineering (ICDE'09)*, program co-chair for the “Ubiquitous, Mobile, Distributed, and Peer-to-Peer Databases” track
- Program Co-Chair: *ImageSense'08: Workshop on Applications, Systems, and Algorithms for Image Sensing (ImageSense'08)*
- Program Co-Chair: *5th ACM International Conference on Embedded Networked Sensor Systems (SenSys'07)*
- Program Chair: *2nd IEEE International Conference on Distributed Computing in Sensor Systems (DCOSS'06)*
- Program Co-Chair: *5th IEEE/ACM International Symposium on Information Processing in Sensor Networks (IPSN'06)*
- Program Vice-Chair: *21st IEEE International Conference on Data Engineering (ICDE'05)*, program chair for the “Stream Processing, Continuous Queries and Sensor Databases” track
- Program Chair: *10th ACM Symposium on Parallel Algorithms and Architectures (SPAA'98)*
- Steering Committee Chair: *ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, 2003–2007
- Steering Committee Member: *ACM Symposium on Cloud Computing (SoCC)*, 2018–present
- Steering Committee Member: *ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, 2000–2018
- Steering Committee Member: *ACM International Conference on Embedded Networked Sensor Systems (SenSys)*, 2007–2010
- Steering Committee Member: *IEEE International Conference on Distributed Computing in Sensor Systems (DCOSS)*, 2004–present

- Advisory Committee Member: *ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, 2018–present
- Demos Co-Chair: *3rd ACM International Conference on Embedded Networked Sensor Systems (SenSys’05)*
- Program Committee Member for:
  - *28th ACM Symposium on Operating Systems Principles (SOSP’21)*
  - *1st SIAM Conference on Applied and Computational Discrete Algorithms (ACDA’21)*
  - *4th Conference on Machine Learning and Systems (MLSys’21)*
  - *3rd Conference on Machine Learning and Systems (MLSys’20)*
  - *1st SIAM Symposium on Algorithmic Principles of Computing Systems (APoCS’20)*
  - *2019 USENIX Annual Technical Conference (ATC’19)*
  - *2nd SysML Conference (SysML’19)*
  - *1st SysML Conference (SysML’18)*
  - *23rd ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS’18)*
  - *50th IEEE/ACM International Symposium on Microarchitecture (MICRO’17)*, external review committee
  - *12th Usenix Symposium on Operating Systems Design and Implementation (OSDI’16)*
  - *28th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA’16)*
  - *16th ACM European Conference on Computer Systems (EuroSys’16)*
  - *39th ACM International Conference on Measurement and Modeling of Computer Systems (SIGMETRICS’15)*
  - *5th ACM Symposium on Cloud Computing (SOCC’14)*
  - *23rd ACM/IEEE International Conference on Parallel Architectures and Compilation Techniques (PACT’14)*
  - *41st EATCS International Colloquium on Automata, Languages and Programming (ICALP’14)*
  - *34th International Conference on Distributed Computing Systems (ICDCS’14)*
  - *26th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA’14)*
  - *19th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP’14)*, External Review Committee
  - *32nd ACM Symposium on Principles of Distributed Computing (PODC’13)*
  - *2013 ACM SIGMOD International Conference on Management of Data (SIGMOD’13)*
  - *1st IEEE International Conference on Cloud Engineering (IC2E’13)*
  - *18th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP’13)*
  - *13th ACM/IFIP/USENIX International Conference on Middleware (MIDDLEWARE’12)*
  - *38th International Conference on Very Large Databases (VLDB’12)*
  - *39th EATCS International Colloquium on Automata, Languages and Programming (ICALP’12)*
  - *8th ACM International Workshop on Data Management on New Hardware (DaMoN’12)*
  - *ACM SIGMOD International Conference on Management of Data (SIGMOD’12)*
  - *31st ACM Symposium on Principles of Database Systems (PODS’12)*, External Review Committee
  - *11th IEEE International Conference on Data Mining (ICDM’11)*
  - *30th ACM Symposium on Principles of Distributed Computing (PODC’11)*

- *35th ACM International Conference on Measurement and Modeling of Computer Systems (SIGMETRICS'11)*
- *16th ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS'11)*, External Review Committee
- *8th ACM International Conference on Embedded Networked Sensor Systems (SenSys'10)*
- *37th EATCS International Colloquium on Automata, Languages and Programming (ICALP'10)*
- *ACM SIGMOD International Conference on Management of Data (SIGMOD'10)*
- *9th IEEE/ACM International Conference on Information Processing in Sensor Networks (IPSN'10)*
- *12th SIAM Workshop on Algorithm Engineering & Experiments (ALENEX'10)*
- *29th IEEE International Conference on Distributed Computing Systems (ICDCS'09)*
- *25th IEEE International Conference on Data Engineering (ICDE'09)*
- *ImageSense'08: Workshop on Applications, Systems, and Algorithms for Image Sensing (ImageSense'08)*
- *6th ACM International Conference on Embedded Networked Sensor Systems (SenSys'08)*
- *22nd International Symposium on Distributed Computing (DISC'08)*
- *34th International Conference on Very Large Databases (VLDB'08)*
- *32nd ACM International Conference on Measurement and Modeling of Computer Systems (SIGMETRICS'08)*
- *7th IEEE/ACM International Symposium on Information Processing in Sensor Networks (IPSN'08)*
- *5th ACM International Conference on Embedded Networked Sensor Systems (SenSys'07)*
- *33rd International Conference on Very Large Databases (VLDB'07)*
- *ACM SIGMOD International Conference on Management of Data (SIGMOD'07)*
- *23rd IEEE International Conference on Data Engineering (ICDE'07)*
- *4th ACM International Conference on Embedded Networked Sensor Systems (SenSys'06)*
- *ACM SIGMOD International Conference on Management of Data (SIGMOD'06)*
- *2nd IEEE International Conference on Distributed Computing in Sensor Systems (DCOSS'06)*
- *5th IEEE/ACM International Symposium on Information Processing in Sensor Networks (IPSN'06)*
- *26th IEEE Real-Time Systems Symposium (RTSS'05)*
- *11th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD'05)*
- *1st ACM International Workshop on Data Management on New Hardware (DaMoN'05)*
- *IEEE International Conference on Distributed Computing in Sensor Systems (DCOSS'05)*, systems track
- *21st IEEE International Conference on Data Engineering (ICDE'05)*
- *International Workshop on Data Management for Sensor Networks (DMSN'04)*
- *16th Scientific and Statistical Database Management Conference (SSDBM'04)*
- *20th IEEE International Conference on Data Engineering (ICDE'04)*
- *IEEE International Parallel and Distributed Processing Symposium (IPDPS'04)*
- *3rd International ACM Workshop on Data Engineering for Wireless and Mobile Access (MobiDE'03)*
- *ACM SIGMOD International Conference on Management of Data (SIGMOD'03)*
- *Workshop on Management and Processing of Data Streams (MPDS'03)*
- *15th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA'03)*
- *IEEE International Parallel and Distributed Processing Symposium (IPDPS'02)*

- *13th ACM Symposium on Parallel Algorithms and Architectures (SPAA’01)*
- *IEEE International Parallel and Distributed Processing Symposium (IPDPS’00)*
- *31st ACM Symposium on the Theory of Computing (STOC’99)*
- *10th ACM Symposium on Parallel Algorithms and Architectures (SPAA’98)*
- *International Symposium on Parallel Architectures, Algorithms and Networks (ISPAN’97)*
- *8th ACM Symposium on Parallel Algorithms and Architectures (SPAA’96)*
- *10th IEEE International Parallel Processing Symposium (IPPS’96)*
- *7th IEEE Symposium on Parallel and Distributed Processing (SPDP’95)*
- *9th IEEE International Parallel Processing Symposium (IPPS’95)*
- *6th IEEE Symposium on Parallel and Distributed Processing (SPDP’94)*
- *5th IEEE Symposium on Parallel and Distributed Processing (SPDP’93)*
- Tutorial Committee Member: *2014 ACM SIGMOD International Conference on Management of Data (SIGMOD’14)*
- Best Paper Committee Member: *33rd International Conference on Very Large Databases (VLDB’07)*
- Best Paper Committee Member: *ACM SIGMOD International Conference on Management of Data (SIGMOD’07)*
- Demo Committee Member: *19th IEEE International Conference on Data Engineering (ICDE’03)*
- Co-organizer: *NSF Workshop on Research Directions in the Principles of Parallel Computation*, 2012
- Co-organizer: *NSF Workshop on Algorithms in the Field*, 2011
- Co-organizer: *DIMACS Workshop on Parallelism: A 2020 Vision*, 2011
- Co-organizer: *NSF Workshop on Enabling Data-Intensive Computing: from Systems to Applications*, 2009
- Organizer: *1st SPAA Revue* workshop, held in conjunction with SPAA’97
- Co-editor: *Theory of Computing Systems* (formerly *Mathematical Systems Theory*), special issue for selected papers from SPAA’96
- Co-organizer: *DIMACS Workshop on Models, Architectures, and Technologies for Parallel Computation*, 1993
- Intel’s representative on the ACM Computer Science Teacher’s Association (CSTA) Advisory Council (2005–2015). CMU’s representative on the CSTA Advisory Council (2015–present).
- Reviewer/Panelist for numerous grant proposals for various funding agencies
- Professional Society Memberships:
  - Association for Computing Machinery (ACM), including the SIGACT, SIGARCH, SIGMOD and SIGPLAN special interest groups
  - Institute of Electrical and Electronics Engineers (IEEE), including the IEEE Computer Society
  - Society for Industrial and Applied Mathematics (SIAM)

## Honors

- *Fellow of the IEEE*, inducted in 2014
- *Fellow of the ACM*, inducted in 2006
- Winner, **ACM Paris Kanellakis Theory and Practice Award**, for seminal work on the foundations of streaming algorithms and their applications to large-scale data analytics, with N. Alon, Y. Matias and M. Szegedy, 2019
- Winner, **The Yossi Levy Prize** in Operations Research and Managerial Economics, sponsored by the Operations Research Society of Israel, 1999: Best journal paper award for 1999, for the article *Testing Shared Memories*, by P. B. Gibbons and E. Korach
- *Efficient Instruction Scheduling for a Pipelined Architecture*, by P. B. Gibbons and S. S. Muchnick, was selected as one of the **50 most influential papers** in the first 20 years of the *ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI)*, 2002
- *Memory Consistency and Event Ordering in Scalable Shared-Memory Multiprocessors*, by K. Gharachorloo, D. Lenoski, J. Laudon, P. Gibbons, A. Gupta and J. Hennessy, was one of 41 papers selected as the **most influential papers** in the first 25 years of the *ACM International Symposium on Computer Architecture (ISCA)*, 1998
- *Writeback-Aware Caching*, by N. Beckmann, P. B. Gibbons, B. Haeupler and C. McGuffey, won the **best paper** award for the *1st SIAM Symposium on Algorithmic Principles of Computer Systems (APoCS'20)*
- *Cloudlet-based Just-in-Time Indexing of IoT Video*, by M. Satyanarayanan, P. B. Gibbons, L. Mummert, P. Pillai, P. Simoens and R. Sukthankar, won the **best paper** award for the *1st IEEE Global Internet of Things Summit (GloTS'17)*
- *Flexible Hardware Acceleration for Instruction-Grain Program Monitoring*, by S. Chen, M. Kozuch, T. Strigkos, B. Falsafi, P. Gibbons, T. Mowry, V. Ramachandran, M. Ryan, O. Ruwase and E. Vlachos, was selected for **IEEE Micro's Top Picks from the 2008 Computer Architecture Conferences**
- *Availability of Multi-Object Operations*, by H. Yu, P. B. Gibbons and S. Nath, was co-winner of the **best paper** award for the *3rd USENIX Symposium on Networked Systems Design and Implementation (NSDI'06)*
- *Improving Hash Join Performance through Prefetching*, by S. Chen, A. Ailamaki, P. B. Gibbons and T. C. Mowry, was co-winner of the **best paper** award for the *20th IEEE International Conference on Data Engineering (ICDE'04)*
- *A Distributed Filtering Architecture for Multimedia Sensors*, by S. Nath, Y. Ke, P. B. Gibbons, B. Karp and S. Seshan, won the **best paper** award for the *1st IEEE Workshop on Broadband Advanced Sensor Networks (BaseNets'04)*
- *Improving Index Performance through Prefetching*, by S. Chen, P. B. Gibbons and T. C. Mowry, was awarded **runner-up best paper** in the *2001 ACM SIGMOD International Conference on Management of Data (SIGMOD'01)*
- Best paper journal issues: Co-authored paper in **SPAA'14, ICFP'08, VLDB'08, PODC'07, SIGCOMM'06, SIGMOD'02, SPAA'02, SPAA'01, PODS'99, SPAA'99, SPAA'97, Euro-Par'96, SPAA'95, and SPAA'94** that were each selected for inclusion in a special “best papers” journal issue for its respective conference
- Paper in **NIPS'13** selected for oral presentation (only 20 of 1420 submissions were selected)
- Keynote speaker at the *35th ACM Symposium on Principles of Distributed Computing (PODC'16)*
- Keynote speaker at the *36th IEEE International Conference on Distributed Computing Systems (ICDCS'16)*

- Keynote speaker at the *16th IEEE International Conference on Mobile Data Management (MDM'15)*
- Keynote speaker at the *29th IEEE International Parallel & Distributed Processing Symposium (IPDPS'15)*
- Keynote speaker at the *10th SIAM International Conference on Data Mining (SDM'10)*
- Keynote speaker at the *6th ACM International Conference on Embedded Networked Sensor Systems (SenSys'08)*
- Keynote speaker at the *22nd International Symposium on Distributed Computing (DISC'08)*
- Keynote speaker at the *3rd IEEE/CreateNet International Workshop on Broadband Advanced Sensor Networks (BaseNets'06)*
- Keynote speaker at the *IEEE International Conference on Distributed Computing in Sensor Systems (DCOSS'05)*
- Invited speaker at the AT&T Shannon Labs, Boston University, Brown University, Carnegie Mellon University, Cornell University, Dartmouth College, EPFL, Georgia Tech, Lawrence Livermore Laboratories, MIT, National Taiwan University, New York University, Rutgers University, Stanford University, the University of California at Los Angeles, the University of Illinois at Urbana-Champaign, the University of Maryland, the University of Texas at Austin, Washington University in St. Louis, Yale University, and the following international and/or invitation-only workshops:
  - Google Workshop on Federated Learning and Analytics (2020)
  - Google Workshop on Federated Learning and Analytics (Seattle, WA, 2019)
  - NSF Workshop on Research Directions in Parallel Computation (Pittsburgh, PA, 2012)
  - NSF Workshop on Algorithms in the Field (Piscataway, NJ, 2011)
  - NSF Workshop on Sustainable Energy Efficient Data Management (Arlington, VA, 2011)
  - Workshop on Theory and Many-Cores (College Park, MD, 2009)
  - Data Intensive Computing Symposium (Sunnyvale, CA, 2008)
  - University of Washington / Microsoft Research Summer Institute on the World-Wide Sensor Web (Blaine, WA, 2006)
  - Workshop on Space-Conscious Algorithms (Bertinoro, Italy, 2006)
  - Radcliffe Institute Workshop on Programming Myriads: Investigating Programming Abstractions and Languages for Sensor Networks (Cambridge, MA, 2004)
  - DIMACS Working Group on Streaming Data Analysis II (2003)
  - Workshop on Parallelism in Algorithms and Architectures (Paderborn, Germany, 2003)
  - Universität Marburg Symposium on Managing and Analyzing Data Streams (Germany, 2002)
  - DIMACS Workshop on Streaming Data Analysis and Mining (2001)
  - DIMACS Workshop on Sublinear Algorithms
  - DIMACS Workshop on External Memory Algorithms and Visualization
  - DIMACS Workshop on Distributed Data and Structures (two talks)
  - ICPP Workshop on Challenges for Parallel Processing
  - DIMACS Workshop on Organizing and Moving Data in Parallel Machines
  - DIMACS Workshop on Parallel Algorithms: From Solving Combinatorial Problems to Solving Grand Challenges Problems
  - DIMACS Workshop on Models, Architectures, and Technologies for Parallel Computation
  - DIMACS Workshop on Parallel Algorithms for Unstructured and Dynamic Problems
  - ACM Workshop on Parallel Algorithms (San Diego, 1993)

- Invited panelist for **INSS'09** panel on sensor networks, 2009.  
Invited panelist for **SIGMOD'02** panel on data streams, 2002.  
Invited panelist for ACM Workshop on Parallel Algorithms, 1993.
- Awarded IBM Predoctoral Fellowship, 1986-1987
- Graduated Summa Cum Laude (top 10%) and Phi Beta Kappa, Dartmouth College, 1983
- Winner, Thayer Mathematics Prize for the year 1980, Dartmouth College

## Book Chapters and Proceedings

- P. B. Gibbons.  
**Distinct-Values Estimation over Data Streams.**  
Invited book chapter for *Data Stream Management: Processing High-Speed Data Streams*, M. Garofalakis, J. Gehrke, R. Rastogi (Eds.), Springer, 2016.
- P. B. Gibbons, D. Zeinalipour-Yazti, H. Lei, and S. Nath (Eds.).  
**Proceedings of the 9th ACM International Workshop on Data Engineering for Wireless and Mobile Access, MobiDE 2010.**  
Indianapolis, IN, ACM, June 2010.
- S. Jha, P. B. Gibbons and A. Ledeczi (Eds.).  
**SenSys'07: Proceedings of the 5th ACM Conference on Embedded Networked Sensor Systems.**  
Sydney, Australia, ACM, November 2007.
- P. B. Gibbons and C. Scheideler (Eds.).  
**SPAA 2007: Proceedings of the 19th Annual ACM Symposium on Parallelism in Algorithms and Architectures.**  
San Diego, CA, ACM, June 2007.
- P. B. Gibbons and U. Vishkin (Eds.).  
**SPAA 2006: Proceedings of the 18th Annual ACM Symposium on Parallelism in Algorithms and Architectures.**  
Cambridge, MA, ACM, July-August 2006.
- P. B. Gibbons, T. F. Abdelzaher, J. Aspnes and R. Rao (Eds.).  
**Proceedings of the 2nd IEEE International Conference on Distributed Computing in Sensor Systems.**  
San Francisco, CA, Springer, June 2006.
- J. A. Stankovic, P. B. Gibbons, S. B. Wicker and J. A. Paradiso (Eds.).  
**Proceedings of the 5th International Conference on Information Processing in Sensor Networks.**  
Nashville, TN, ACM, April 2006.
- P. B. Gibbons and P. G. Spirakis (Eds.).  
**SPAA 2005: Proceedings of the 17th Annual ACM Symposium on Parallelism in Algorithms and Architectures.**  
Las Vegas, NV, ACM, July 2005.
- P. B. Gibbons and M. Adler (Eds.).  
**SPAA 2004: Proceedings of the 16th Annual ACM Symposium on Parallelism in Algorithms and Architectures.**  
Barcelona, Spain, ACM, June 2004.

- S. S. Muchnick and P. B. Gibbons.  
**Retrospective: Efficient Instruction Scheduling for a Pipelined Architecture.**  
In *20 Years of the ACM SIGPLAN Conference on Programming Language Design and Implementation (1979-1999): A Selection*, K. S. McKinley (Ed.), ACM, 2004, pp. 167–174. Retrospectives on the 50 most influential papers in the first 20 years of PLDI.
- P. B. Gibbons and Y. Matias.  
**Synopsis Data Structures for Massive Data Sets.**  
Invited book chapter for *External Memory Algorithms*, J. M. Abello and J. S. Vitter (Eds.), DIMACS Series in Discrete Mathematics and Theoretical Computer Science, American Mathematical Society, 50 (1999).
- P. B. Gibbons, R. M. Karp, C. E. Leiserson and G. M. Papadopoulos (Eds.).  
**Proceedings of the DIMACS Workshop on Models, Architectures, and Technologies for Parallel Computation.**  
Piscataway, NJ, DIMACS, September 1993.
- P. B. Gibbons.  
**Asynchronous PRAM Algorithms.**  
Invited book chapter for *A Synthesis of Parallel Algorithms*, J. H. Reif (Ed.), Morgan-Kaufmann, 1993, pp. 957–997.

## Journal Publications

- P. Kairouz, H. B. McMahan, B. Avent, A. Bellet, M. Bennis, A. Nitin Bhagoji, K. Bonawitz, Z. Charles, G. Cormode, R. Cummings, R. G. L. D’Oliveira, S. El Rouayheb, D. Evans, J. Gardner, Z. Garrett, A. Gascon, B. Ghazi, P. B. Gibbons, M. Gruteser, Z. Harchaoui, C. He, L. He, Z. Huo, B. Hutchinson, J. Hsu, M. Jaggi, T. Javidi, G. Joshi, M. Khodak, J. Konecny, A. Korolova, F. Koushanfar, S. Koyejo, T. Lepoint, Y. Liu, P. Mittal, M. Mohri, R. Nock, A. Ozgur, R. Pagh, M. Raykova, H. Qi, D. Ramage, R. Raskar, D. Song, W. Song, S. U. Stich, Z. Sun, A. Theertha Suresh, F. Tramer, P. Vepakomma, J. Wang, L. Xiong, Z. Xu, Q. Yang, F. X. Yu, H. Yu and S. Zhao.  
**Advances and Open Problems in Federated Learning.**  
*Foundations and Trends in Machine Learning*, 14:1-2 (2021), pp. 1–210.
- H. V. Simhadri, G. Blelloch, J. T. Fineman, P. B. Gibbons and A. Kyrola.  
**Experimental Analysis of Space-Bounded Schedulers.**  
*ACM Transactions on Parallel Computing (TOPC)*, 3:1 (2016), special issue of selected papers from SPAA’14, pp. 8:1–8:27 (journal version of the conference paper C40 listed below under Conference Publications)
- V. Seshadri, K. Hsieh, A. Boroumand, D. Lee, M. A. Kozuch, O. Mutlu, P. B. Gibbons and T. C. Mowry.  
**Fast Bulk Bitwise AND and OR in DRAM.**  
*IEEE Computer Architecture Letters (CAL)*, 14:2 (2015), pp. 127–131.
- M. Athanassoulis, s. Chen, A. Ailamaki, P. B. Gibbons and R. Stoica.  
**Online Updates on Data Warehouses via Judicious Use of Solid-State Storage.**  
*ACM Transactions on Database Systems (TODS)*, 40:1 (2015), article 6. (journal version of C56)
- V. Seshadri, S. Yedkar, H. Xin, O. Mutlu, P. B. Gibbons, M. A. Kozuch and T. C. Mowry.  
**Mitigating Prefetcher-Caused Pollution using Informed Caching policies for Prefetched Blocks.**  
*ACM Transactions on Architecture and Code Optimization (TACO)*, 11:4 (2015), article 51. (also appeared in 10th HiPEAC, Amsterdam, Netherlands, January 2015)
- B. Chen, H. Yu, Y. Zhao and P. B. Gibbons.  
**The Cost of Fault Tolerance in Multi-Party Communication Complexity.**  
*Journal of the ACM (JACM)*, 61:3 (2014), article 19. (journal version of C53)

- S. Chen, P. B. Gibbons, M. Kozuch and T. C. Mowry.  
**Log-Based Architectures: Using Multicore to Help Software Behave Correctly.**  
*ACM SIGOPS Operating Systems Review*, 45:1 (2011), special issue on systems research at Intel, pp. 84–91.
- D. Spoonhower, G. E. Blelloch, R. Harper and P. B. Gibbons.  
**Space Profiling for Parallel Functional Programs.**  
*Journal of Functional Programming*, 20:5-6 (2010), special issue of selected papers from ICFP’08, pp. 417–461. (journal version of C66)
- M. Athanassoulis, A. Ailamaki, S. Chen, P. B. Gibbons and R. Stoica.  
**Flash in a DBMS: Where and How?**  
*IEEE Data Engineering Bulletin*, 33:4 (2010), special issue on data management using modern storage hardware, pp. 28–34.
- H. Yu, P. B. Gibbons, M. Kaminsky and F. Xiao.  
**SybilLimit: A Near-Optimal Social Network Defense Against Sybil Attacks.**  
*IEEE/ACM Transactions on Networking*, 18:3 (2010), pp. 885–898. (journal version of C71)
- S. Nath and P. B. Gibbons.  
**Online Maintenance of Very Large Random Samples on Flash Storage.**  
*The VLDB Journal*, 19:1 (2010), special issue of selected papers from VLDB’08, pp. 67–90. (journal version of C67)
- H. Yu and P. B. Gibbons.  
**Optimal Inter-Object Correlation when Replicating for Availability.**  
*Journal of Distributed Computing*, 21:5 (2009), special issue of selected papers from PODC’07, pp. 367–384. (journal version of C73)
- S. Chen, M. Kozuch, P. B. Gibbons, M. Ryan, T. Strigkos, T. C. Mowry, O. Ruwase, E. Vlachos, B. Falsafi and V. Ramachandran.  
**Flexible Hardware Acceleration for Instruction-Grain Lifeguards.**  
*IEEE Micro*, 29:1 (2009), special issue of Top Picks from the 2008 Computer Architecture Conferences, pp. 62–72. (journal version of C68)
- H. Yu, M. Kaminsky, P. B. Gibbons and A. Flaxman.  
**SybilGuard: Defending Against Sybil Attacks via Social Networks.**  
*IEEE/ACM Transactions on Networking*, 16:3 (2008), special issue of selected papers from SIGCOMM’06, pp. 576–589. (journal version of C78)
- S. Nath, P. B. Gibbons, S. Seshan and Z. Anderson.  
**Synopsis Diffusion for Robust Aggregation in Sensor Networks.**  
*ACM Transactions on Sensor Networks*, 4:2 (2008), article 7. (journal version of C87)
- S. Chen, A. Ailamaki, P. B. Gibbons and T. C. Mowry.  
**Improving Hash Join Performance Through Prefetching.**  
*ACM Transactions on Database Systems*, 32:3 (2007), article 17. (journal version of C89)
- M. Balazinska, A. Deshpande, M. Franklin, P. B. Gibbons, J. Gray, M. Hansen, M. Liebhold, S. Nath, A. Szalay and V. Tao.  
**Data Management in the World-Wide Sensor Web.**  
*IEEE Pervasive Computing*, 6:2 (2007), pp. 30–40.
- A. Wong, L. Wu, P. B. Gibbons and C. Faloutsos.  
**Fast Estimation of Fractal Dimension and Correlation Integral on Stream Data.**  
*Information Processing Letters*, 93:2 (2005), pp. 91–97. (journal version of the workshop paper W8 listed below under Workshop Publications)

- P. B. Gibbons and S. Tirthapura.  
**Distributed Streams Algorithms for Sliding Windows.**  
*Theory of Computing Systems*, 37 (2004), special issue of selected papers from SPAA'02, pp. 457–478.  
(journal version of C92)
- M. Garofalakis and P. B. Gibbons.  
**Probabilistic Wavelet Synopses.**  
*ACM Transactions on Database Systems*, 29:1 (2004), special issue of selected papers from SIGMOD'02,  
pp. 43–90. (journal version of C94)
- P. B. Gibbons, B. Karp, Y. Ke, S. Nath and S. Seshan.  
**IrisNet: An Architecture for a Worldwide Sensor Web.**  
*IEEE Pervasive Computing*, 2:4 (2003), special issue on sensor and actuator networks, pp. 22–33.
- G. E. Blelloch, P. Cheng and P.B. Gibbons.  
**Scalable Room Synchronizations.**  
*Theory of Computing Systems*, 36:5 (2003), special issue of selected papers from SPAA'01, pp. 397–430.  
(journal version of C98)
- P. B. Gibbons, Y. Matias and V. Poosala.  
**Fast Incremental Maintenance of Approximate Histograms.**  
*ACM Transactions on Database Systems (TODS)*, 27:3 (2002), pp. 261–298. (journal version of C106)
- N. Alon, P. B. Gibbons, Y. Matias and M. Szegedy.  
**Tracking Join and Self-Join Sizes in Limited Storage.**  
*Journal of Computer and System Sciences (JCSS)*, 64:3 (2002), special issue of selected papers from  
PODS'99, pp. 719–747. (journal version of C102)
- P. B. Gibbons, J. Bruno and S. Phillips.  
**Black-Box Correctness Tests for Basic Parallel Data Structures.**  
*Theory of Computing Systems*, 35 (2002), special issue of selected papers from SPAA'99, pp. 391–432.  
(journal version of C103)
- M. Adler, P. B. Gibbons and Y. Matias.  
**Scheduling Space-Sharing for Internet Advertising.**  
*Journal of Scheduling*, 5:2 (2002), pp. 103–119.
- E. Gabber, P. B. Gibbons, D. M. Kristol, Y. Matias and A. Mayer.  
**On Secure and Pseudonymous Client-Relationships with Multiple Servers.**  
*ACM Transactions on Information and System Security (TISSEC)*, 2:4 (1999), pp. 390–415. (journal  
version of W11)
- M. Adler, P. B. Gibbons, Y. Matias and V. Ramachandran.  
**Modeling Parallel Bandwidth: Local vs. Global Restrictions.**  
*Algorithmica*, 24:3-4 (1999), special issue on coarse-grained parallel algorithms, pp. 381–404. (journal  
version of C108)
- P. B. Gibbons, Y. Matias and V. Ramachandran.  
**Can A Shared-Memory Model Serve as a Bridging Model for Parallel Computation?**  
*Theory of Computing Systems*, 32:3 (1999), special issue of selected papers from SPAA'97, pp. 327–359.  
(journal version of C109)
- G. E. Blelloch, P. B. Gibbons and Y. Matias.  
**Provably Efficient Scheduling for Languages with Fine-Grained Parallelism.**  
*Journal of the ACM (JACM)*, 46:2 (1999), pp. 281–321. (journal version of C114)
- E. Gabber, P. B. Gibbons, D. M. Kristol, Y. Matias and A. Mayer.  
**Consistent yet Anonymous Web Access with LPWA.**

- Communications of the ACM* (CACM), 42:2 (1999), special issue on internet privacy, pp. 42–47. (journal version of C110)
- P. B. Gibbons, Y. Matias and V. Ramachandran.  
**The Queue-Read Queue-Write Asynchronous PRAM Model.**  
*Theoretical Computer Science* (TCS), 196:1-2 (1998), special issue of selected papers from Euro-Par’96, pp. 3–29. (journal version of C111)
  - P. B. Gibbons, Y. Matias and V. Ramachandran.  
**The Queue-Read Queue-Write PRAM Model: Accounting for Contention in Parallel Algorithms.**  
*SIAM Journal on Computing* (SICOMP), 28:2 (1998), pp. 733–769. (journal version of C118)
  - P. B. Gibbons and E. Korach.  
**Testing Shared Memories.**  
*SIAM Journal on Computing* (SICOMP), 26:4 (1997), pp. 1208–1244. (journal version of C117 and C119)
  - G. E. Blelloch, P. B. Gibbons, Y. Matias and M. Zagha.  
**Accounting for Memory Bank Contention and Delay in High-Bandwidth Multiprocessors.**  
*IEEE Transactions on Parallel and Distributed Systems* (TPDS), 8:9 (1997), pp. 943–958. (journal version of C113)
  - P. B. Gibbons, Y. Matias and V. Ramachandran.  
**Efficient Low-Contention Parallel Algorithms.**  
*Journal of Computer and System Sciences* (JCSS), 53:3 (1996), special issue of selected papers from SPAA’94, pp. 417–442. (journal version of C116)
  - C. W. Niblack, P. B. Gibbons and D. W. Capson.  
**Generating Skeletons and Centerlines from the Distance Transform.**  
*CVGIP: Graphical Models and Image Processing* (CVGIP), 54:5 (1992), pp. 420–437. (journal version of C122 and C127)
  - P. Gibbons, R. Karp, V. Ramachandran, D. Soroker and R. Tarjan.  
**Transitive Compaction in Parallel Via Branchings.**  
*Journal of Algorithms* (JALG), 12:1 (1991), pp. 110–125.
  - P. B. Gibbons, R. M. Karp, G. L. Miller and D. Soroker.  
**Subtree Isomorphism is in Random NC.**  
*Discrete Applied Mathematics* (DAM), 29:1 (1990), pp. 35–62. (journal version of W12)
  - P. B. Gibbons.  
**A Stub Generator for Multilanguage RPC in Heterogeneous Environments.**  
*IEEE Transactions on Software Engineering* (TSE), SE-13:1 (1987), special issue on distributed systems, pp. 77–87.

## Conference Publications

Papers appearing in highly-selective, refereed international conferences. Summary: Of the papers listed below, 106 are in premier conferences, primarily SIGMOD and SPAA, but also ASPLOS, ATC, CCS, CIDR, CVPR, ESA, EuroSys, FAST, ICDE, ICDM, ICFP, ICML, IPSN, ISCA, KDD, MICRO, Multimedia, NeurIPS, NSDI, Oakland, OSDI, PACT, PLDI, PODC, PODS, PPOPP, SenSys, SIGCOMM, SIGMETRICS, SoCC, SODA, SOSOP and VLDB.

- C1. A. Tahmasbi, E. Jothimurugesan, S. Tirthapura and P. B. Gibbons.  
**DriftSurf: Stable-State / Reactive-State Learning under Concept Drift.**  
 In *Proceedings of the 38th International Conference on Machine Learning (ICML)*, virtual event, July 2021, pp. 10054-10064.

- C2. H. Kang, P. B. Gibbons, G. E. Blelloch, L. Dhulipala, Y. Gu and C. McGuffey.  
**The Processing-in-Memory Model.**  
 In *Proceedings of the 33rd ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, virtual event, July 2021, pp. 295-306.
- C3. D. D. Chen, W. S. Lim, M. Bakhshalipour, P. B. Gibbons, J. C. Hoe and B. Parno.  
**HerQules: Securing Programs via Hardware-enforced Message Queues.**  
 In *Proceedings of the 26th ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)*, virtual event, April 2021, pp. 773-788.
- C4. P. Fegade, T. Chen, P. B. Gibbons and T. C. Mowry.  
**Cortex: A Compiler for Recursive Deep Learning Models.**  
 In *Proceedings of the 4th Conference on Machine Learning and Systems (MLSys)*, virtual event, April 2021.
- C5. G. E. Blelloch, L. Dhulipala, P. B. Gibbons, Y. Gu, C. McGuffey and J. Shun.  
**The Read-Only Semi-External Model.**  
 In *Proceedings of the 2nd SIAM Symposium on Algorithmic Principles of Computer Systems (APoCS)*, virtual event, January 2021, pp. 70-84.
- C6. L. Dhulipala, C. McGuffey, Y. Gu, H. Kang, G. E. Blelloch, P. B. Gibbons and J. Shun.  
**Sage: Parallel Semi-Asymmetric Graph Algorithms for NVRAMs.**  
 In *PVLDB: 46th International Conference on Very Large Data Bases (VLDB)*, virtual event, September 2020, 13(9):1598-1613.
- C7. K. Hsieh, A. Phanishayee, O. Mutlu and P. B. Gibbons.  
**The Non-IID Data Quagmire of Decentralized Machine Learning.**  
 In *Proceedings of the 37th International Conference on Machine Learning (ICML)*, virtual event, July 2020, pp. 4387-4398.
- C8. N. Beckmann, P. B. Gibbons, B. Haeupler and C. McGuffey.  
**Writeback-Aware Caching.**  
 In *Proceedings of the 1st SIAM Symposium on Algorithmic Principles of Computer Systems (APoCS)*, Salt Lake City, UT, January 2020, pp. 1-15. Best paper award winner.
- C9. D. Narayanan, A. Harlap, A. Phanishayee, V. Seshadri, N. Devanur, G. R. Ganger, P. B. Gibbons and M. Zaharia.  
**Generalized Pipeline Parallelism for DNN Training.**  
 In *Proceedings of the 27th ACM Symposium on Operating Systems Principles (SOSP)*, Huntsville, Ontario, Canada, October 2019, pp. 1-15.
- C10. J. Wei, G. A. Gibson, P. B. Gibbons and E. P. Xing.  
**Automating Dependence-Aware Parallelization of Machine Learning Training on Distributed Shared Memory.**  
 In *Proceedings of the 14th European Conference on Computer Systems (EuroSys)*, Dresden, Germany, March 2019, pp. 42:1-42:17.
- C11. E. Jothimurugesan, A. Tahmasbi, P. B. Gibbons and S. Tirthapura.  
**Variance-Reduced Stochastic Gradient Descent on Streaming Data.**  
 In *Proceedings of the 32nd Conference on Neural Information Processing Systems (NeurIPS)*, Montreal, Canada, December 2018, pp. 9928-9937.
- C12. K. Hsieh, G. Ananthanarayanan, P. Bodik, S. Venkataraman, P. Bahl, M. Philipose, P. B. Gibbons and O. Mutlu.  
**Focus: Querying Large Video Datasets with Low Latency and Low Cost.**  
 In *Proceedings of the 13th USENIX Symposium on Operating Systems Design and Implementation (OSDI)*, Carlsbad, CA, October 2018, pp. 269-286.

- C13. G. E. Blelloch, P. B. Gibbons, Y. Gu, C. McGuffey and J. Shun.  
**The Parallel Persistent Memory Model.**  
 In *Proceedings of the 30th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, Vienna, Austria, July 2018, pp. 247-258.
- C14. A. Harlap, A. Chung, A. Tumanov, G. R. Ganger and P. B. Gibbons.  
**Tributary: Spot-dancing for Elastic Services with Latency SLOs.**  
 In *Proceedings of the USENIX Annual Technical Conference (ATC)*, Boston, MA, July 2018, pp. 1-14.
- C15. N. Vijaykumar, A. Jain, D. Majumdar, K. Hsieh, G. Pekhimenko, E. Ebrahimi, N. Hajinazar, P. B. Gibbons and O. Mutlu.  
**A Case for Richer Cross-Layer Abstractions: Bridging the Semantic Gap with Expressive Memory.**  
 In *Proceedings of the 45th ACM/IEEE International Symposium on Computer Architecture (ISCA)*, Los Angeles, CA, June 2018, pp. 207-220.
- C16. N. Vijaykumar, E. Ebrahimi, K. Hsieh, P. B. Gibbons and O. Mutlu.  
**The Locality Descriptor: A Holistic Cross-Layer Abstraction to Express Data Locality in GPUs.**  
 In *Proceedings of the 45th ACM/IEEE International Symposium on Computer Architecture (ISCA)*, Los Angeles, CA, June 2018, pp. 829-842.
- C17. N. Ben-David, G. E. Blelloch, J. T. Fineman, P. B. Gibbons, Y. Gu, C. McGuffey and J. Shun.  
**Implicit Decomposition for Write-Efficient Connectivity Algorithms.**  
 In *Proceedings of the 32nd IEEE International Parallel and Distributed Processing Symposium (IPDPS)*, Vancouver, BC, Canada, May 2018, pp. 711-722.
- C18. G. E. Blelloch, P. B. Gibbons and H. V. Simhadri.  
**Provably Efficient Scheduling of Dynamically Allocating Programs on Parallel Cache Hierarchies.**  
 In *Proceedings of the 24th IEEE International Conference on High Performance Computing (HiPC)*, Jaipur, India, December 2017, pp. 124-133.
- C19. V. Seshadri, D. Lee, T. Mullins, H. Hassan, A. Boroumand, J. Kim, M. A. Kozuch, O. Mutlu, P. B. Gibbons and T.C. Mowry.  
**Ambit: In-Memory Accelerator for Bulk Bitwise Operations Using Commodity DRAM Technology.**  
 In *Proceedings of the 50th IEEE/ACM International Symposium on Microarchitecture (MICRO)*, Boston, MA, October 2017, pp. 273-287.
- C20. M. Satyanarayanan, P. B. Gibbons, L. Mummert, P. Pillai, P. Simoens and R. Sukthankar.  
**Cloudlet-based Just-in-Time Indexing of IoT Video.**  
 In *Proceedings of the 1st IEEE Global Internet of Things Summit (GloTS)*, Geneva, Switzerland, June 2017, 8 pages.
- C21. A. Harlap, A. Tumanov, A. Chung, G. R. Ganger and P. B. Gibbons.  
**Proteus: Agile ML Elasticity through Tiered Reliability in Dynamic Resource Markets.**  
 In *Proceedings of the 12th European Conference on Computer Systems (EuroSys)*, Belgrade, Serbia, April 2017, pp. 589-604.
- C22. K. Hsieh, A. Harlap, N. Vijaykumar, D. Konomis, G. R. Ganger, P. B. Gibbons and O. Mutlu.  
**Gaia: Geo-Distributed Machine Learning Approaching LAN Speeds.**  
 In *Proceedings of the 14th USENIX Symposium on Networked Systems Design and Implementation (NSDI)*, Boston, MA, March 2017, pp. 629-647.
- C23. N. Vijaykumar, K. Hsieh, G. Pekhimenko, S. M. Khan, A. Shrestha, S. Ghose, A. Jog, P. B. Gibbons and O. Mutlu.  
**Zorua: A Holistic Approach to Resource Virtualization in GPUs.**

- In *Proceedings of the 49th IEEE/ACM International Symposium on Microarchitecture (MICRO)*, Taipei, Taiwan, October 2016, pp. 1–14.
- C24. A. Harlap, H. Cui, W. Dai, J. Wei, G. R. Ganger, P. B. Gibbons, G. A. Gibson, E. P. Xing.  
**Addressing the Straggler Problem for Iterative Convergent Parallel ML.**  
 In *Proceedings of the 7th ACM Symposium on Cloud Computing (SoCC)*, Santa Clara, CA, October 2016, pp. 98–111.
- C25. G. E. Blelloch, J. T. Fineman, P. B. Gibbons, Y. Gu and J. Shun.  
**Efficient Algorithms with Asymmetric Read and Write Costs.**  
 In *Proceedings of the 24th European Symposium on Algorithms (ESA)*, Aarhus, Denmark, August 2016, pp. 14:1–14:18.
- C26. N. Ben-David, G. E. Blelloch, J. T. Fineman, P. B. Gibbons, Y. Gu, C. McGuffey and J. Shun.  
**Parallel Algorithms for Asymmetric Read-Write Costs.**  
 In *Proceedings of the 28th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, Asilomar, CA, July 2016, pp. 145–156.
- C27. H. Cui, H. Zhang, G. R. Ganger, P. B. Gibbons and E. P. Xing.  
**GeePS: Scalable Deep Learning on Distributed GPUs with a GPU-Specialized Parameter Server.**  
 In *Proceedings of the 11th European Conference on Computer Systems (EuroSys)*, London, United Kingdom, April 2016, pp. 4:1–4:16.
- C28. V. Seshadri, T. Mullins, A. Boroumand, O. Mutlu, P. B. Gibbons, M. A. Kozuch and T. C. Mowry.  
**Gather-scatter DRAM: In-DRAM Address Translation to Improve the Spatial Locality of Non-Unit Strided Accesses.**  
 In *Proceedings of the 48th IEEE/ACM International Symposium on Microarchitecture (MICRO)*, Waikiki, HI, December 2015, pp. 267–280.
- C29. C.-Y. Li, W.-L. Su, T. G. McKenzie, F.-C. Hsu, S.-D. Lin, J. Y.-j. Hsu and P. B. Gibbons.  
**Recommending Missing Sensor Values.**  
 In *Proceedings of the 3rd IEEE International Conference on Big Data (BigData’15)*, Santa Clara, CA, October–November 2015, pp. 381–390.
- C30. C.-C. Hsu, P.-H. Kung, M.-Y. Teh, S.-D. Lin and P. B. Gibbons.  
**Bandwidth-Efficient Distributed k-Nearest-Neighbor Search with Dynamic Time Warping.**  
 In *Proceedings of the 3rd IEEE International Conference on Big Data (BigData’15)*, Santa Clara, CA, October–November 2015, pp. 551–560.
- C31. M. L. Goodstein, P. B. Gibbons, M. A. Kozuch and T. C. Mowry.  
**Tracking and Reducing Uncertainty in Dataflow Analysis-Based Dynamic Parallel Monitoring.**  
 In *Proceedings of the 24th ACM/IEEE Conference on Parallel Architectures and Compilation Techniques (PACT)*, San Francisco, CA, October 2015, pp. 266–279.
- C32. H. Xiao, S.-D. Lin, M.-Y. Yen, P. B. Gibbons and C. Eckert.  
**Learning Better while Sending Less: Communication-Efficient Online Semi-Supervised Learning in Client-Server Settings.**  
 In *Proceedings of the 2nd IEEE International Conference on Data Science and Advanced Analytics (DSAA)*, Paris, France, October 2015, pp. 1–10.
- C33. J. Wei, W. Dai, A. Qiao, Q. Ho, H. Cui, G. R. Ganger, P. B. Gibbons, G. A. Gibson and E. P. Xing.  
**Managed Communication and Consistency for Fast Data-Parallel Iterative Analytics.**  
 In *Proceedings of the 6th ACM Symposium on Cloud Computing (SoCC)*, Kohala Coast, HI, August 2015, pp. 381–394.

- C34. V. Seshadri, G. Pekhimenko, O. Ruwase, O. Mutlu, P. B. Gibbons, M. A. Kozuch, T. C. Mowry and T. Chilimbi.  
**Page Overlays: An Enhanced Virtual Memory Framework to Enable Fine-grained Memory Management.**  
 In *Proceedings of the 42nd ACM International Symposium on Computer Architecture (ISCA)*, Portland, OR, June 2015, pp. 79–91.
- C35. G. E. Blelloch, J. T. Fineman, P. B. Gibbons, Y. Gu and J. Shun.  
**Sorting with Asymmetric Read and Write Costs.**  
 In *Proceedings of the 27th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, Portland, OR, June 2015, pp. 1–12.
- C36. G. Pekhimenko, T. Huberty, R. Cai, M. Raman, O. Mutlu, P. B. Gibbons, M. A. Kozuch and T. C. Mowry.  
**Exploiting Compressed Block Size as an Indicator of Future Reuse.**  
 In *Proceedings of the 21st IEEE International Symposium on High Performance Computer Architecture (HPCA)*, Burlingame, CA, February 2015, pp. 51–63.
- C37. J. Shun, Y. Gu, G. E. Blelloch, J. T. Fineman and P. B. Gibbons.  
**Sequential Random Permutation, List Contraction and Tree Contraction are Highly Parallel.**  
 In *Proceedings of the 26th ACM-SIAM Symposium on Discrete Algorithms (SODA)*, San Diego, CA, January 2015, pp. 431–448.
- C38. S.-H. Ou, Y.-C. Lu, J.-P. Wang, S.-Y. Chien, S.-D. Lin, M.-Y. Yeh, C.-H. Lee, P. B. Gibbons, V. S. Somayazulu and Y.-K. Chen.  
**Communication-Efficient Multi-view Keyframe Extraction in Distributed Video Sensors.**  
 In *Proceedings of the IEEE Visual Communications and Image Processing Conference (VCIP)*, Valletta, Malta, December 2014.
- C39. H. Cui, A. Tumanov, J. Wei, L. Xu, W. Dai, J. Haber-Kucharsky, Q. Ho, G. A. Ganger, P. B. Gibbons, G. A. Gibson and E. P. Xing.  
**Exploiting Iterative-ness for Parallel ML Computations.**  
 In *Proceedings of the 5th ACM Symposium on Cloud Computing (SoCC)*, Seattle, WA, November 2014, pp. 1–14.
- C40. H. V. Simhadri, G. Blelloch, J. T. Fineman, P. B. Gibbons and A. Kyrola.  
**Experimental Analysis of Space-Bounded Schedulers.**  
 In *Proceedings of the 26th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, Prague, Czech Republic, June 2014, pp. 30–41. Selected for a special journal issue for best papers in SPAA'14.
- C41. X. Ding, P. B. Gibbons, M. A. Kozuch and J. Shan.  
**Gleaner: Mitigating the Blocked-Waiter Wakeup Problem for Virtualized Multicore Applications.**  
 In *Proceedings of the 20th Usenix Annual Technical Conference (ATC)*, Philadelphia, PA, June 2014, pp. 73–84.
- C42. H. Cui, J. Cipar, Q. Ho, J. K. Kim, S. Lee, A. Kumar, J. Wei, W. Dai, G. R. Ganger, P. B. Gibbons, G. A. Gibson and E. P. Xing.  
**Exploiting Bounded Staleness To Speed Up Big Data Analytics.**  
 In *Proceedings of the 20th Usenix Annual Technical Conference (ATC)*, Philadelphia, PA, June 2014, pp. 37–48.
- C43. V. Seshadri, A. Bhowmick, O. Mutlu, P. B. Gibbons, M. A. Kozuch and T. C. Mowry.  
**The Dirty-Block Index.**  
 In *Proceedings of the 41st ACM International Symposium on Computer Architecture (ISCA)*, Minneapolis, MN, June 2014. pp. 157–168.

- C44. O. Ruwase, P. B. Gibbons, M. A. Kozuch and T. C. Mowry.  
**Guardrail: A High Fidelity Approach to Protecting Hardware Devices from Buggy Drivers.**  
 In *Proceedings of the 19th International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)*, Salt Lake City, UT, March 2014, pp. 655–670.
- C45. R.-B. Wang, Y.-C. Lu, M.-Y. Yeh, S.-D. Lin and P. B. Gibbons.  
**Communication-Efficient Distributed Multiple Reference Pattern Matching for M2M Systems.**  
 In *Proceedings of the 13th IEEE International Conference on Data Mining (ICDM)*, Dallas, TX, December 2013, pp. 787–796.
- C46. G. Pekhimenko, V. Seshadri, Y. Kim, H. Xin, O. Mutlu, P. B. Gibbons, M. A. Kozuch and T. C. Mowry.  
**Linearly Compressed Pages: A Low-Complexity, Low-Latency Main Memory Compression Framework.**  
 In *Proceedings of the 46th IEEE/ACM International Symposium on Microarchitecture (MICRO)*, Davis, CA, December 2013, pp. 172–184.
- C47. V. Seshadri, Y. Kim, C. Fallin, D. Lee, R. Ausavarungnirun, G. Pekhimenko, Y. Luo, O. Mutlu, P. B. Gibbons, M. A. Kozuch and T. C. Mowry.  
**RowClone: Fast and Energy-Efficient In-DRAM Bulk Data Copy and Initialization.**  
 In *Proceedings of the 46th IEEE/ACM International Symposium on Microarchitecture (MICRO)*, Davis, CA, December 2013, pp. 185–197.
- C48. Q. Ho, J. Cipar, H. Cui, S. Lee, J. K. Kim, P. B. Gibbons, G. Gibson, G. Ganger and E. Xing.  
**More Effective Distributed ML via a Stale Synchronous Parallel Parameter Server.**  
 In *Proceedings of the 27th Neural Information Processing Systems Conference (NIPS)*, Lake Tahoe, CA, December 2013, pp. 1223–1231. Selected for Oral Presentation (one of 20 papers out of 1420 submissions).
- C49. J. Shun, G. E. Blelloch, J. T. Fineman and P. B. Gibbons.  
**Reducing Contention Through Priority Updates.**  
 In *Proceedings of the 25th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, Montreal, Canada, July 2013, pp. 152–163.
- C50. H. Yu, P. B. Gibbons and C. Shi.  
**DCast: Sustaining Collaboration in Overlay Multicast despite Rational Collusion.**  
 In *Proceedings of the 19th ACM Conference on Computer and Communications Security (CCS)*, Raleigh, NC, October 2012, pp. 567–580.
- C51. G. Pekhimenko, V. Seshadri, P. B. Gibbons, M. A. Kozuch, T. C. Mowry and O. Mutlu.  
**Base-Delta-Immediate Compression: A Practical Data Compression Mechanism for On-Chip Caches.**  
 In *Proceedings of the 21st ACM International Conference on Parallel Architectures and Compilation Techniques (PACT)*, Minneapolis, MN, September 2012, pp. 377–388.
- C52. M. L. Goodstein, S. Chen, P. B. Gibbons, M. A. Kozuch and T. C. Mowry.  
**Chrysalis Analysis: Incorporating Synchronization Arcs in Dataflow-Analysis-based Parallel Monitoring.**  
 In *Proceedings of the 21st ACM International Conference on Parallel Architectures and Compilation Techniques (PACT)*, Minneapolis, MN, September 2012, pp. 201–212.
- C53. B. Chen, H. Yu, Y. Zhao and P. B. Gibbons.  
**The Cost of Fault Tolerance in Multi-Party Communication Complexity.**  
 In *Proceedings of the 31st ACM Symposium on Principles of Distributed Computing (PODC)*, Madeira, Portugal, July 2012, pp. 57–66.

- C54. X. Ding, K. Wang, P. B. Gibbons and X. Zhang.  
**BWS: Balanced Work Stealing for Time-Sharing Multicores.**  
 In *Proceedings of the 12th ACM European Conference on Computer Systems (EuroSys)*, Bern, Switzerland, April 2012, pp. 365–378.
- C55. G. E. Blelloch, J. T. Fineman, P. B. Gibbons and J. Shun.  
**Internally Deterministic Parallel Algorithms Can Be Fast.**  
 In *Proceedings of the 17th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP)*, New Orleans, LA, February 2012, pp. 181–192.
- C56. M. Athanassoulis, S. Chen, A. Ailamaki, P. B. Gibbons and R. Stoica.  
**MaSM: Efficient Online Updates in Data Warehouses.**  
 In *Proceedings of the 30th ACM SIGMOD International Conference on Management of Data (SIGMOD)*, Athens, Greece, June 2011, pp. 865–876.
- C57. G. E. Blelloch, J. T. Fineman, P. B. Gibbons and H. V. Simhadri.  
**Scheduling Irregular Parallel Computations on Hierarchical Caches.**  
 In *Proceedings of the 23rd ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, San Jose, CA, June 2011, pp. 355–366.
- C58. S. Chen, P. B. Gibbons and S. Nath.  
**Rethinking Database Algorithms for Phase Change Memory.**  
 In *Proceedings of the 5th Biennial Conference on Innovative Data Systems Research (CIDR)*, Asilomar, CA, January 2011, pp. 21–31.
- C59. G. E. Blelloch, P. B. Gibbons and H. V. Simhadri.  
**Low Depth Cache-Oblivious Algorithms.**  
 In *Proceedings of the 22nd ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, Santorini, Greece, June 2010, pp. 189–199.
- C60. O. Ruwase, S. Chen, P. B. Gibbons and T. C. Mowry.  
**Decoupled Lifeguards: Enabling Path Optimizations for Online Correctness Checking Tools.**  
 In *Proceedings of the ACM SIGPLAN 2010 Conference on Programming Language Design and Implementation (PLDI)*, Toronto, Canada, June 2010, pp. 25–35.
- C61. S. Chen, P. B. Gibbons and S. Nath.  
**PR-Join: A Non-Blocking Join Achieving Higher Result Rate with Statistical Guarantee.**  
 In *Proceedings of the 29th ACM SIGMOD International Conference on Management of Data (SIGMOD)*, Indianapolis, IN, June 2010, pp. 147–158.
- C62. M. Goodstein, E. Vlachos, S. Chen, P. B. Gibbons, M. A. Kozuch and T. C. Mowry.  
**Butterfly Analysis: Adapting Dataflow Analysis to Dynamic Parallel Monitoring.**  
 In *Proceedings of the 15th ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)*, Pittsburgh, PA, March 2010, pp. 257–270.
- C63. E. Vlachos, M. Goodstein, M. A. Kozuch, S. Chen, B. Falsafi, P. B. Gibbons and T. C. Mowry.  
**ParaLog: Enabling and Accelerating Online Parallel Monitoring of Multithreaded Applications.**  
 In *Proceedings of the 15th ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)*, Pittsburgh, PA, March 2010, pp. 271–283.
- C64. D. Spoonhower, G. E. Blelloch, P. B. Gibbons and R. Harper.  
**Beyond Nested Parallelism: Tight Bounds on Work-Stealing Overheads for Parallel Futures.**  
 In *Proceedings of the 21st ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, Calgary, Canada, August 2009, pp. 91–100.

- C65. H. Yu, C. Shi, M. Kaminsky, P. B. Gibbons and F. Xiao.  
**DSybil: Optimal Sybil-Resistance for Recommendation Systems.**  
 In *Proceedings of the 30th IEEE Symposium on Security and Privacy (Oakland)*, Oakland, CA, May 2009, pp. 283–298. Selected for the short list of best papers in Oakland’09.
- C66. D. Spoonhower, G. E. Blelloch, R. Harper and P. B. Gibbons.  
**Space Profiling for Parallel Functional Programs.**  
 In *Proceedings of the 13th ACM SIGPLAN International Conference on Functional Programming (ICFP)*, Victoria, British Columbia, Canada, September 2008, pp. 253–264. Selected for a special journal issue for best papers in ICFP’08.
- C67. S. Nath and P. B. Gibbons.  
**Online Maintenance of Very Large Random Samples on Flash Storage.**  
 In *Proceedings of the 34th International Conference on Very Large Data Bases (VLDB)*, Auckland, New Zealand, August 2008, pp. 970–983. Selected for a special journal issue for best papers in VLDB’08.
- C68. S. Chen, M. Kozuch, T. Strigkos, B. Falsafi, P. B. Gibbons, T. C. Mowry, V. Ramachandran, M. Ryan, O. Ruwase and E. Vlachos.  
**Flexible Hardware Acceleration for Instruction-Grain Program Monitoring.**  
 In *Proceedings of the 35th ACM International Symposium on Computer Architecture (ISCA)*, Beijing, China, June 2008, pp. 377–388. Selected for a special journal issue for best papers from the 2008 computer architecture conferences.
- C69. G. E. Blelloch, P. B. Gibbons and S. H. Vardhan.  
**Combinable Memory-Block Transactions.**  
 In *Proceedings of the 20th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, Munich, Germany, June 2008, pp. 23–34.
- C70. O. Ruwase, P. B. Gibbons, T. C. Mowry, V. Ramachandran, S. Chen, M. Kozuch and M. Ryan.  
**Parallelizing Dynamic Information Flow Tracking.**  
 In *Proceedings of the 20th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, Munich, Germany, June 2008, pp. 35–45.
- C71. H. Yu, P. B. Gibbons, M. Kaminsky and F. Xiao.  
**SybilLimit: A Near-Optimal Social Network Defense Against Sybil Attacks.**  
 In *Proceedings of the 29th IEEE Symposium on Security and Privacy (Oakland)*, Oakland, CA, May 2008, pp. 3–17.
- C72. G. E. Blelloch, R. A. Chowdhury, P. B. Gibbons, V. Ramachandran, S. Chen and M. Kozuch.  
**Provably Good Multicore Cache Performance for Divide-and-Conquer Algorithms.**  
 In *Proceedings of the 19th ACM-SIAM Symposium on Discrete Algorithms (SODA)*, San Francisco, CA, January 2008, pp. 501–510.
- C73. H. Yu and P. B. Gibbons.  
**Optimal Inter-Object Correlation when Replicating for Availability.**  
 In *Proceedings of the 26th ACM Symposium on Principles of Distributed Computing (PODC)*, Portland, OR, August 2007, pp. 254–263. Selected for a special journal issue for best papers in PODC’07.
- C74. J. Pang, P. B. Gibbons, M. Kaminsky, S. Seshan and H. Yu.  
**Defragmenting DHT-based Distributed File Systems.**  
 In *Proceedings of the 27th IEEE International Conference on Distributed Computing Systems (ICDCS)*, Toronto, Ontario, Canada, June 2007, article 14.
- C75. S. Chen, P. B. Gibbons, M. Kozuch, V. Liaskovitis, A. Ailamaki, G. E. Blelloch, B. Falsafi, L. Fix, N. Hardavellas, T. C. Mowry and C. Wilkerson.  
**Scheduling Threads for Constructive Cache Sharing on CMPs.**  
 In *Proceedings of the 19th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, San Diego, CA, June 2007, pp. 105–115.

- C76. S. Nath and P. B. Gibbons.  
**Communicating via Fireflies: Geographic Routing on Duty-Cycled Sensors.**  
 In *Proceedings of the 6th IEEE/ACM International Symposium on Information Processing in Sensor Networks (IPSN)*, Cambridge, MA, April 2007, pp. 440–449.
- C77. A. Manjhi, P. B. Gibbons, A. Ailamaki, C. Garrod, B. Maggs, T. C. Mowry, C. Olston, A. Tomasic and H. Yu.  
**Invalidation Clues for Database Scalability Services.**  
 In *Proceedings of the 23rd IEEE International Conference on Data Engineering (ICDE)*, Istanbul, Turkey, April 2007, pp. 316–325.
- C78. H. Yu, M. Kaminsky, P. B. Gibbons and A. Flaxman.  
**SybilGuard: Defending Against Sybil Attacks via Social Networks.**  
 In *Proceedings of the ACM SIGCOMM 2006 (SIGCOMM)*, Pisa, Italy, September 2006, pp. 267–278. Selected for a special journal issue for best papers in SIGCOMM’06.
- C79. H. Yu, P. B. Gibbons and S. Nath.  
**Availability of Multi-Object Operations.**  
 In *Proceedings of the 3rd USENIX Symposium on Networked Systems Design and Implementation (NSDI)*, San Jose, CA, May 2006, pp. 211–224. Co-winner of the NSDI’06 best paper award.
- C80. S. Nath, H. Yu, P. B. Gibbons and S. Seshan.  
**Subtleties in Tolerating Correlated Failures in Wide-Area Storage Systems.**  
 In *Proceedings of the 3rd USENIX Symposium on Networked Systems Design and Implementation (NSDI)*, San Jose, CA, May 2006, pp. 225–238.
- C81. S. Nath, P. B. Gibbons and S. Seshan.  
**Adaptive Data Placement for Wide-Area Sensing Services.**  
 In *Proceedings of the 4th USENIX Conference on File and Storage Technologies (FAST)*, San Francisco, CA, December 2005, pp. 45–58.
- C82. J. Campbell, P. B. Gibbons, S. Nath, P. Pillai, S. Seshan and R. Sukthankar.  
**IrisNet: An Internet-Scale Architecture for Multimedia Sensors.**  
 In *Proceedings of the 13th International Conference on Multimedia (MM)*, Singapore, November 2005, pp. 81–88.
- C83. S. Chen, A. Ailamaki, P. B. Gibbons and T. C. Mowry.  
**Inspector Joins.**  
 In *Proceedings of the 31st International Conference on Very Large Data Bases (VLDB)*, Trondheim, Norway, August-September 2005, pp. 817–828.
- C84. S. Chen, P. B. Gibbons and S. Nath.  
**Database-Centric Programming of Wide-Area Sensor Systems.**  
 In *Proceedings of the First IEEE International Conference on Distributed Computing in Sensor Systems (DCOSS)*, Marina del Rey, CA, June-July 2005, pp. 89–108.
- C85. A. Manjhi, S. Nath and P. B. Gibbons.  
**Tributaries and Deltas: Efficient and Robust Aggregation in Sensor Network Streams.**  
 In *Proceedings of the 24th ACM SIGMOD International Conference on Management of Data (SIGMOD)*, Baltimore, MD, June 2005, pp. 287–298.
- C86. S. Venkataraman, D. Song, P. B. Gibbons and A. Blum.  
**New Streaming Algorithms for Fast Detection of Superspreaders.**  
 In *Proceedings of the 12th ISOC Network and Distributed System Security Symposium (NDSS)*, San Diego, CA, February 2005.
- C87. S. Nath, P. B. Gibbons, S. Seshan and Z. Anderson.  
**Synopsis Diffusion for Robust Aggregation in Sensor Networks.**

In *Proceedings of the 2nd ACM International Conference on Embedded Networked Sensor Systems (SenSys)*, Baltimore, MD, November 2004, pp. 250–262.

- C88. G. E. Blelloch and P. B. Gibbons.  
**Effectively Sharing a Cache Among Threads.**  
In *Proceedings of the 16th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, Barcelona, Spain, June 2004, pp. 235–244.
- C89. S. Chen, A. Ailamaki, P. B. Gibbons and T. C. Mowry.  
**Improving Hash Join Performance Through Prefetching.**  
In *Proceedings of the 20th IEEE International Conference on Data Engineering (ICDE)*, Boston, MA, March–April 2004, pp. 116–127. Co-winner of the ICDE’04 best paper award.
- C90. A. Deshpande, S. Nath, P. B. Gibbons and S. Seshan.  
**Cache-and-Query for Wide Area Sensor Databases.**  
In *Proceedings of the 2003 ACM SIGMOD International Conference on Management of Data (SIGMOD)*, San Diego, CA, June 2003, pp. 503–514.
- C91. S. Papadimitriou, H. Kitawaga, P. B. Gibbons and C. Faloutsos.  
**LOCI: Fast Outlier Detection Using the Local Correlation Integral.**  
In *Proceedings of the 19th IEEE International Conference on Data Engineering (ICDE)*, Bangalore, India, March 2003, pp. 315–326.
- C92. P. B. Gibbons and S. Tirthapura.  
**Distributed Streams Algorithms for Sliding Windows.**  
In *Proceedings of the 14th ACM Symposium on Parallel in Algorithms and Architectures (SPAA)*, Winnipeg, Canada, August 2002, pp. 63–72. Selected for a special journal issue for best papers in SPAA’02.
- C93. C. R. Palmer, P. B. Gibbons and C. Faloutsos.  
**ANF: A Fast and Scalable Tool for Data Mining in Massive Graphs.**  
In *Proceedings of the 8th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD)*, Edmonton, Alberta, Canada, July 2002, pp. 81–90.
- C94. M. Garofalakis and P. B. Gibbons.  
**Wavelet Synopses with Error Guarantees.**  
In *Proceedings of the 2002 ACM SIGMOD International Conference on Management of Data (SIGMOD)*, Madison, WI, June 2002, pp. 476–487. Selected for a special journal issue for best papers in SIGMOD’02.
- C95. S. Chen, P. B. Gibbons, T. C. Mowry and G. Valentin.  
**Fractal Prefetching B<sup>+</sup>-Trees: Optimizing Both Cache and Disk Performance.**  
In *Proceedings of the 2002 ACM SIGMOD International Conference on Management of Data (SIGMOD)*, Madison, WI, June 2002, pp. 157–168.
- C96. P. B. Gibbons.  
**Distinct Sampling for Highly-Accurate Answers to Distinct Values Queries and Event Reports.**  
In *Proceedings of the 27th International Conference on Very Large Data Bases (VLDB)*, Rome, Italy, September 2001, pp. 541–550.
- C97. P. B. Gibbons and S. Tirthapura.  
**Estimating Simple Functions on the Union of Data Streams.**  
In *Proceedings of the 13th ACM Symposium on Parallel Algorithms and Architectures (SPAA)*, Crete Island, Greece, July 2001, pp. 281–290.
- C98. G. E. Blelloch, P. Cheng and P. B. Gibbons.  
**Room Synchronizations.**  
In *Proceedings of the 13th ACM Symposium on Parallel Algorithms and Architectures (SPAA)*, Crete Island, Greece, July 2001, pp. 122–133. Selected for a special journal issue for best papers in SPAA’01.

- C99. S. Chen, P. B. Gibbons and T. C. Mowry.  
**Improving Index Performance through Prefetching.**  
 In *Proceedings of the 2001 ACM SIGMOD International Conference on Management of Data (SIGMOD)*, Santa Barbara, CA, May 2001, pp. 235–246. Selected runner-up best paper in SIGMOD’01.
- C100. S. Acharya, P. B. Gibbons and V. Poosala.  
**Congressional Samples for Approximate Answering of Group-By Queries.**  
 In *Proceedings of the 2000 ACM SIGMOD International Conference on Management of Data (SIGMOD)*, Dallas, TX, May 2000, pp. 487–498.
- C101. S. Acharya, P. B. Gibbons, V. Poosala and S. Ramaswamy.  
**Join Synopses for Approximate Query Answering.**  
 In *Proceedings of the 1999 ACM SIGMOD International Conference on Management of Data (SIGMOD)*, Philadelphia, PA, June 1999, pp. 275–286.
- C102. N. Alon, P. B. Gibbons, Y. Matias and M. Szegedy.  
**Tracking Join and Self-Join Sizes in Limited Storage.**  
 In *Proceedings of the 18th ACM SIGMOD-SIGACT-SIGART Symposium on Principles of Database Systems (PODS)*, Philadelphia, PA, June 1999, pp. 10–20. Selected for a special journal issue for best papers in PODS’99.
- C103. P. B. Gibbons, J. Bruno and S. Phillips.  
**Post-Mortem Black-Box Correctness Tests for Basic Parallel Data Structures.**  
 In *Proceedings of the 11th ACM Symposium on Parallel Algorithms and Architectures (SPAA)*, Saint Malo, France, June 1999, pp. 44–53. Selected for a special journal issue for best papers in SPAA’99.
- C104. R. Barve, E. Shriver, P. B. Gibbons, B. Hillyer, Y. Matias and J. S. Vitter.  
**Modeling and Optimizing I/O Throughput of Multiple Disks on a Bus.**  
 In *Proceedings of the ACM SIGMETRICS Conference on the Measurement and Modeling of Computer Systems (SIGMETRICS)*, Atlanta, GA, May 1999, pp. 83–92.
- C105. P. B. Gibbons and Y. Matias.  
**New Sampling-Based Summary Statistics for Improving Approximate Query Answers.**  
 In *Proceedings of 1998 ACM SIGMOD International Conference on Management of Data (SIGMOD)*, Seattle, WA, June 1998, pp. 331–342.
- C106. P. B. Gibbons, Y. Matias and V. Poosala.  
**Fast Incremental Maintenance of Approximate Histograms.**  
 In *Proceedings of the 23rd International Conference on Very Large Data Bases (VLDB)*, Athens, Greece, August 1997, pp. 466–475.
- C107. G. E. Blelloch, P. B. Gibbons, Y. Matias and G. J. Narlikar.  
**Space-Efficient Scheduling of Parallelism with Synchronization Variables.**  
 In *Proceedings of the 9th ACM Symposium on Parallel Algorithms and Architectures (SPAA)*, Newport, RI, June 1997, pp. 12–23.
- C108. M. Adler, P. B. Gibbons, Y. Matias and V. Ramachandran.  
**Modeling Parallel Bandwidth: Local vs. Global Restrictions.**  
 In *Proceedings of the 9th ACM Symposium on Parallel Algorithms and Architectures (SPAA)*, Newport, RI, June 1997, pp. 94–105.
- C109. P. B. Gibbons, Y. Matias and V. Ramachandran.  
**Can A Shared-Memory Model Serve as a Bridging Model for Parallel Computation?**  
 In *Proceedings of the 9th ACM Symposium on Parallel Algorithms and Architectures (SPAA)*, Newport, RI, June 1997, pp. 72–83. Selected for a special journal issue for best papers in SPAA’97.
- C110. E. Gabber, P. B. Gibbons, Y. Matias and A. Mayer.  
**How to Make Personalized Web Browsing Simple, Secure, and Anonymous.**

- In *Proceedings of Financial Cryptography (FC)*, Anguilla, February 1997, pp. 17–31, Lecture Notes in Computer Science, Vol. 1318, Springer, Berlin.
- C111. P. B. Gibbons, Y. Matias and V. Ramachandran.  
**The Queue-Read Queue-Write Asynchronous PRAM Model.**  
 In *Proceedings of the 2nd International Euro-Par Conference (Euro-Par)*, Lyon, France, August 1996, Vol. II, pp. 279–292, Lecture Notes in Computer Science, Vol. 1124, Springer, Berlin. Selected for a special journal issue for best papers in EUROPAR’96.
- C112. S. Ganguly, P. B. Gibbons, Y. Matias and A. Silberschatz.  
**Bifocal Sampling for Skew-Resistant Join Size Estimation.**  
 In *Proceedings of the 1996 ACM SIGMOD International Conference on Management of Data (SIGMOD)*, Montreal, Canada, June 1996, pp. 271–281.
- C113. G. E. Blelloch, P. B. Gibbons, Y. Matias and M. Zagha.  
**Accounting for Memory Bank Contention and Delay in High-Bandwidth Multiprocessors.**  
 In *Proceedings of the 7th ACM Symposium on Parallel Algorithms and Architectures (SPAA)*, Santa Barbara, CA, July 1995, pp. 84–94.
- C114. G. E. Blelloch, P. B. Gibbons and Y. Matias.  
**Provably Efficient Scheduling for Languages with Fine-Grained Parallelism.**  
 In *Proceedings of the 7th ACM Symposium on Parallel Algorithms and Architectures (SPAA)*, Santa Barbara, CA, July 1995, pp. 1–12. Selected for a special journal issue for best papers in SPAA’95 (we declined in order to publish in JACM).
- C115. O. Berkman, P. B. Gibbons and Y. Matias.  
**On the Power of Randomization for the Common PRAM.**  
 In *Proceedings of the 3rd Israel Symposium on Theory of Computing and Systems (ISTCS)*, Tel Aviv, Israel, January 1995, pp. 229–240.
- C116. P. B. Gibbons, Y. Matias and V. Ramachandran.  
**Efficient Low-Contention Parallel Algorithms.**  
 In *Proceedings of the 6th ACM Symposium on Parallel Algorithms and Architectures (SPAA)*, Cape May, NJ, June 1994, pp. 236–247. Selected for a special journal issue for best papers in SPAA’94.
- C117. P. B. Gibbons and E. Korach.  
**On Testing Cache-Coherent Shared Memories.**  
 In *Proceedings of the 6th ACM Symposium on Parallel Algorithms and Architectures (SPAA)*, Cape May, NJ, June 1994, pp. 177–188.
- C118. P. B. Gibbons, Y. Matias and V. Ramachandran.  
**The QRQW PRAM Model: Accounting for Contention in Parallel Algorithms.**  
 In *Proceedings of the 5th ACM-SIAM Symposium on Discrete Algorithms (SODA)*, Arlington, VA, January 1994, pp. 638–648.
- C119. P. B. Gibbons and E. Korach.  
**The Complexity of Sequential Consistency.**  
 In *Proceedings of the 4th IEEE Symposium on Parallel and Distributed Processing (SPDP)*, Arlington, TX, December 1992, pp. 317–325.
- C120. P. B. Gibbons and W. Niblack.  
**A Width-Independent Parallel Thinning Algorithm.**  
 In *Proceedings of the 11th International Conference on Pattern Recognition (ICPR)*, The Hague, Netherlands, August-September 1992, Vol. III, pp. 708–711.
- C121. P. B. Gibbons and M. Merritt.  
**Specifying Nonblocking Shared Memories.**  
 In *Proceedings of the 4th ACM Symposium on Parallel Algorithms and Architectures (SPAA)*, San Diego, CA, June-July 1992, pp. 306–315.

- C122. W. Niblack, P. B. Gibbons and D. Capson.  
**Generating Connected Skeletons for Exact and Approximate Reconstruction.**  
 In *Proceedings of International Conference on Computer Vision and Pattern Recognition (CVPR)*,  
 Champaign, IL, June 1992, pp. 826–828.
- C123. K. Gharachorloo and P. B. Gibbons.  
**Detecting Violations of Sequential Consistency.**  
 In *Proceedings of the 3rd ACM Symposium on Parallel Algorithms and Architectures (SPAA)*, Hilton  
 Head, SC, July 1991, pp. 316–326.
- C124. P. B. Gibbons, M. Merritt and K. Gharachorloo.  
**Proving Sequential Consistency of High-Performance Shared Memories.**  
 In *Proceedings of the 3rd ACM Symposium on Parallel Algorithms and Architectures (SPAA)*, Hilton  
 Head, SC, July 1991, pp. 292–303.
- C125. Y. Birk, P. B. Gibbons, J. L. C. Sanz and D. Soroker.  
**A Simple Mechanism for Efficient Barrier Synchronization in MIMD Machines.**  
 In *Proceedings of the 19th International Conference on Parallel Processing (ICPP)*, St. Charles, IL,  
 August 1990, Vol. II, pp. 195–198.
- C126. P. B. Gibbons.  
**Cache Support for the Asynchronous PRAM.**  
 In *Proceedings of the 19th International Conference on Parallel Processing (ICPP)*, St. Charles, IL,  
 August 1990, Vol. I, pp. 322–325.
- C127. C. W. Niblack, D. W. Capson and P. B. Gibbons.  
**Generating Skeletons and Centerlines from the Medial Axis Transform.**  
 In *Proceedings of the 10th International Conference on Pattern Recognition (ICPR)*, Atlantic City, NJ,  
 June 1990, pp. 881–885.
- C128. K. Gharachorloo, D. Lenoski, J. Laudon, P. Gibbons, A. Gupta and J. Hennessy.  
**Memory Consistency and Event Ordering in Scalable Shared-Memory Multiprocessors.**  
 In *Proceedings of the 17th International Symposium on Computer Architecture (ISCA)*, Seattle, WA,  
 May 1990, pp. 15–26.
- C129. P. B. Gibbons.  
**A More Practical PRAM Model.**  
 In *Proceedings of the 1st ACM Symposium on Parallel Algorithms and Architectures (SPAA)*, Santa Fe,  
 NM, June 1989, pp. 158–168.
- C130. P. B. Gibbons and S. S. Muchnick.  
**Efficient Instruction Scheduling for a Pipelined Architecture.**  
 In *Proceedings of 1986 ACM Symposium on Compiler Construction* (now known as **PLDI**), Palo Alto,  
 CA, June 1986, pp. 11–16. Selected one of the 50 most influential papers in the first 20 years of PLDI.

## Workshop Publications

Selected refereed workshop publications:

- W1. D. D. Chen, P. B. Gibbons and T. C. Mowry.  
**Tardis<sup>TM</sup>: Incremental Repair for Transactional Memory.**  
 In *Proceedings of the 11th ACM Workshop on Programming Models and Applications for Multicores and  
 Manycores (PMAM@PPoPP)*, San Diego, CA, February 2020, pp. 3:1-3:10. Held in conjunction with  
 ACM PPoPP'20.

- W2. X. Ding, M. A. Kozuch and P. B. Gibbons.  
**A Hidden Cost of Virtualization when Scaling Multicore Applications.**  
 In *Proceedings of the 5th USENIX Workshop on Hot Topics in Cloud Computing (HotCloud)*, San Jose, CA, June 2013.
- W3. G. E. Blelloch, J. Fineman, P. B. Gibbons and H. V. Simhadri.  
**Program-Centric Cost Models for Locality.**  
 In *Proceedings of the 8th ACM SIGPLAN Workshop on Memory Systems Performance and Correctness (MSPC)*, Seattle, WA, June 2013. Held in conjunction with ACM PLDI'13.
- W4. S. Chen, B. Falsafi, P. B. Gibbons, M. Kozuch, T. C. Mowry, R. Teodorescu, A. Ailamaki, L. Fix, G. R. Ganger, B. Lin and S. W. Schlosser.  
**Log-Based Architectures for General-Purpose Monitoring of Deployed Code.**  
 In *Proceedings of the ACM Workshop on Architectural and System Support for Improving Software Dependability (ASID)*, San Jose, CA, October 2006. Held in conjunction with ACM ASPLOS'06.
- W5. D. Sundarraj, P. B. Gibbons and P. Pillai.  
**Ensuring Spatio-Temporal Consistency in Distributed Networks of Smart Cameras.**  
 In *Proceedings of the ACM Workshop on Distributed Smart Cameras (DSC)*, Boulder, CO, October 2006. Held in conjunction with ACM SenSys'06.
- W6. P. Yalagandula, S. Nath, H. Yu, P. B. Gibbons and S. Seshan.  
**Beyond Availability: Towards a Deeper Understanding of Machine Failure Characteristics in Large Distributed Systems.**  
 In *Proceedings of the First Usenix Workshop on Real, Large Distributed Systems (WORLDS)*, San Francisco, CA, December 2004.
- W7. S. Nath, Y. Ke, P. B. Gibbons, B. Karp and S. Seshan.  
**A Distributed Filtering Architecture for Multimedia Sensors.**  
 In *Proceedings of the First IEEE Workshop on Broadband Advanced Sensor Networks (BaseNets)*, San Jose, CA, October 2004. Winner, best paper award.
- W8. A. Wong, L. Wu and P. B. Gibbons.  
**Fast Estimation of Fractal Dimension and Correlation Integral on Stream Data.**  
 In *Proceedings of the Second ACM SIGKDD Workshop on Fractals, Power Laws and Other Next Generation Data Mining Tools (FractalKDD)*, Washington, DC, August 2003.
- W9. C. R. Palmer, G. Siganos, M. Faloutsos, C. Faloutsos and P. B. Gibbons.  
**The Connectivity and Fault-Tolerance of the Internet Topology.**  
 In *Proceedings of the 2001 Workshop on Network-Related Data Management (NRDM)*, Santa Barbara, CA, May 2001.
- W10. R. Barve, P. B. Gibbons, B. K. Hillyer, Y. Matias, E. Shriver and J. S. Vitter.  
**Round-like Behavior in Multiple Disks on a Bus.**  
 In *Proceedings of the 6th ACM Workshop on I/O in Parallel and Distributed Systems (IOPADS)*, Atlanta, GA, May 1999.
- W11. D. Bleichenbacher, E. Gabber, P. B. Gibbons, Y. Matias and A. Mayer.  
**On Secure and Pseudonymous Client-Relationships with Multiple Servers.**  
 In *Proceedings of the 3rd USENIX Workshop on Electronic Commerce (EC)*, Boston, MA, August-September 1998.
- W12. P. B. Gibbons, R. M. Karp, G. L. Miller and D. Soroker.  
**Subtree Isomorphism is in Random NC.**  
 In *Proceedings of 3rd Aegean Workshop on Computing (AWOC)*, Corfu, Greece, June-July 1988.

## Major Demo Presentations

System demos selected for presentation at highly-selective conferences:

- B. Aksak, P. S. Bhat, J. Campbell, M. DeRosa, S. Funiak, P. B. Gibbons, S. C. Goldstein, C. Guestrin, A. Gupta, C. Helfrich, J. Hoburg, B. Kirby, J. Kuffner, P. Lee, T. C. Mowry, P. S. Pillai, R. Ravichandran, B. D. Rister, S. Seshan, M. Sitti and H. Yu.  
**Demo Abstract: Claytronics - Highly Scalable Communications, Sensing, and Actuation Networks.**  
Selected demo presentation in the *3rd ACM International Conference on Embedded Networked Sensor Systems (SenSys)*, San Diego, CA, November 2005, pp. 299.
- S. Nath, Y. Ke, A. Deshpande, P. B. Gibbons, B. Karp and S. Seshan.  
**IrisNet: An Architecture for Internet-scale Sensing Services.**  
Selected demo presentation in the *First ACM International Conference on Embedded Networked Sensor Systems (SenSys)*, Los Angeles, CA, November 2003.
- S. Nath, A. Deshpande, Y. Ke, P. B. Gibbons, B. Karp and S. Seshan.  
**IrisNet: An Architecture for Internet-scale Sensing Services.**  
Selected demo presentation and abstract in *Proceedings of the 29th International Conference on Very Large Data Bases (VLDB)*, Berlin, Germany, September 2003, pp. 1137–1140.
- A. Deshpande, S. Nath, P. B. Gibbons and S. Seshan.  
**IrisNet: Internet-Scale Resource-Intensive Sensor Services.**  
Selected demo presentation and abstract in *Proceedings of the 2003 ACM SIGMOD International Conference on Management of Data (SIGMOD)*, San Diego, CA, June 2003, pp. 667.
- S. Acharya, P. B. Gibbons and V. Poosala.  
**Aqua: A Fast Decision Support System Using Approximate Query Answers.**  
Selected demo presentation and abstract in *Proceedings of the 25th International Conference on Very Large Databases (VLDB)*, Edinburgh, Scotland, UK, September 1999, pp. 754–757.
- S. Acharya, P. B. Gibbons, V. Poosala and S. Ramaswamy.  
**The Aqua Approximate Query Answering System.**  
Selected demo presentation and abstract in *Proceedings of the 1999 ACM SIGMOD International Conference on Management of Data (SIGMOD)*, Philadelphia, PA, June 1999, pp. 574–576.

## Other Publications

Invited position papers and encyclopedia entries, refereed conference summary papers and tutorials, refereed SIG newsletter articles, Ph.D thesis, and selected technical reports not published elsewhere:

- N. Beckmann, P. B. Gibbons and C. McGuffey.  
**Brief Announcement: Block-Granularity-Aware Caching.**  
Brief announcement in *Proceedings of the 33rd ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, virtual event, June 2021, pp. 414-416.
- A. Ratner, D. Alistarh, G. Alonso, D. G. Andersen, P. Bailis, S. Bird, N. Carlini, B. Catanzaro, E. Chung, B. Dally, J. Dean, I. S. Dhillon, A. G. Dimakis, P. Dubey, C. Elkan, G. Fursin, G. R. Ganger, L. Getoor, P. B. Gibbons, G. A. Gibson, J. E. Gonzalez, J. Gottschlich, S. Han, K. M. Hazelwood, F. Huang, M. Jaggi, K. G. Jamieson, M. I. Jordan, G. Joshi, R. Khalaf, J. Knight, J. Konecny, T. Kraska, A. Kumar, A. Kyrillidis, J. Li, S. Madden, H. McMahan, E. Meijer, I. Mitliagkas, R. Monga, D. G. Murray, D. S. Papailiopoulos, G. Pekhimenko, T. Rekatsinas, A. Rostamizadeh, C. Ré, C. De Sa, H. Sedghi, S. Sen, V. Smith, A. Smola, D. Song, E. R. Sparks, I. Stoica, V. Sze, M. Udell, J. Vanschoren, S. Venkataraman, R. Vinayak, M. Weimer, A. G. Wilson, E. P. Xing, M. Zaharia, C. Zhang and A. Talwalkar.

**MLSys: The New Frontier of Machine Learning Systems.**

CoRR abs/1904.03257v3, December 2019.

- J. Shun, G. E. Blelloch, J. T. Fineman, P. B. Gibbons, A. Kyrola, H. V. Simhadri and K. Tangwongsan.  
**Brief Announcement: The Problem Based Benchmark Suite.**  
Brief announcement in *Proceedings of the 24th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, Pittsburgh, PA, June 2012, pp. 68–70.
- H. Yu, P. B. Gibbons and C. Shi.  
**Brief Announcement: Sustaining Collaboration in Multicast despite Rational Collusion.**  
Brief announcement in *Proceedings of the 30th ACM Symposium on Principles of Distributed Computing (PODC'11)*, San Jose, CA, June 2011, pp. 337–338.
- S. Chen, A. Ailamaki, M. Athanassoulis, P. B. Gibbons, R. Johnson, I. Pandis and R. Stoica.  
**TPC-E vs. TPC-C: Characterizing the New TPC-E Benchmark via an I/O Comparison Study.**  
*Sigmod Record*, 39:3 (2010), pp. 5–10.
- P. B. Gibbons.  
**Data Storage and Indexing in Sensor Networks.**  
Invited entry for the *Encyclopedia of Database Systems*, L. Liu and M. T. Özsu (Eds.), Springer, 2009 (1st ed.) and 2018 (2nd ed.).
- P. B. Gibbons.  
**Synopsis Structure.**  
Invited entry for the *Encyclopedia of Database Systems*, L. Liu and M. T. Özsu (Eds.), Springer, 2009 (1st ed.) and 2018 (2nd ed.).
- P. B. Gibbons.  
**FM Synopsis.**  
Invited entry for the *Encyclopedia of Database Systems*, L. Liu and M. T. Özsu (Eds.), Springer, 2009 (1st ed.) and 2018 (2nd ed.).
- M. Garofalakis and P. B. Gibbons.  
**Approximate Query Processing: Taming the Terabytes.**  
Selected tutorial presentation in *27th International Conference on Very Large Data Bases (VLDB)*, Rome, Italy, September 2001.
- D. M. Kristol, E. Gabber, P. B. Gibbons, Y. Matias and A. Mayer.  
**Design and Implementation of the Lucent Personalized Web Assistant (LPWA).**  
Bell Laboratories technical report, Murray Hill, NJ, March 1999.
- P. B. Gibbons and Y. Matias.  
**Synopsis Data Structures for Massive Data Sets.**  
Short summary paper in *Proceedings of the 10th ACM-SIAM Symposium on Discrete Algorithms (SODA)*, Baltimore, MD, January 1999, pp. S943–S944.
- P. B. Gibbons, Y. Matias and V. Poosala.  
**Aqua Project White Paper.**  
Bell Laboratories technical report, Murray Hill, NJ, December 1997.
- P. B. Gibbons.  
**What Good Are Shared-Memory Models?**  
In *Proceedings of the 1996 ICPP Workshop on Challenges for Parallel Processing*, Bloomington, IL, August 1996, pp. 103–114, invited position paper.
- P. B. Gibbons et al.  
**A Survey of Query Processing Techniques with Recommendations for the Teradata Database.**  
AT&T Bell Laboratories technical report, Murray Hill, NJ, December 1995.

- P. B. Gibbons.  
**Bootstrapping HPC into Mainstream Computing.**  
In *Suggesting Computer Science Agendas for High Performance Computing*, U. Vishkin (Ed.), ACM, 1994, invited position paper.
- P. B. Gibbons.  
**The Asynchronous PRAM: A Semi-Synchronous Model for Shared Memory MIMD Machines.**  
Ph.D. thesis, Computer Science Division, University of California at Berkeley, CA, December 1989.
- P. B. Gibbons.  
**Towards Better Shared Memory Programming Models.**  
In *Opportunities and Constraints of Parallel Computing*, J. L. C. Sanz (Ed.), Springer-Verlag, Proceedings of the 1988 IBM-NSF Workshop, December 1989, pp. 55–58, invited position paper.

## Grants and Gifts

- Oracle Labs, *End-to-End Compiler Optimization of Data Movement Across Modern Fragmented Software Stacks*  
Todd Mowry, Phillip Gibbons, \$83,250  
Gift, June 2021
- National Science Foundation, *Prescriptive Memory: Razing the Semantic Wall Between Applications and Computer Systems*  
Phillip Gibbons (PI), Henny Admoni, Nathan Beckmann, Franz Franchetti, Jessica Hodgins, \$250,000  
October 2020 – September 2022
- Oracle Labs, *End-to-End Compiler Optimization of Data Movement Across Modern Fragmented Software Stacks*  
Todd Mowry, Phillip Gibbons, \$83,250  
Gift, May 2020
- VMware University Research Fund, *Prescriptive Memory*  
Phillip Gibbons, \$75,000  
Gift, January 2020
- National Science Foundation, *Parallel Models and Algorithms for Emerging Memory Systems*  
Guy Blelloch, Phillip Gibbons, \$1,200,000  
October 2019 – September 2023
- National Science Foundation, *Multicore to Wide Area Analytics on Streaming Data*  
Phillip Gibbons, Srikanta Tirthapura, \$800,000  
July 2017 – July 2021
- Intel Corporation, *Intel Science and Technology Center for Visual Cloud Systems*  
Senior Personnel, \$4,125,000  
September 2016 – August 2019
- Facebook Research Grant  
Phillip Gibbons, \$30,000  
Gift, September 2015
- National Science Foundation, *Write-Efficient Parallel Algorithms for Emerging Memory Technologies*  
Guy Blelloch, Phillip Gibbons, \$845,000  
September 2015 – August 2019

While an employee of Intel, I participated in the following grants (as a no cost or unofficial co-PI):

- National Science Foundation, *Parallelism without Concurrency*  
Charles Leiserson, Guy Blelloch, Jeremy Fineman, Phillip Gibbons, \$2,428,662  
July 2013 – June 2017
- Intel Corporation, *Intel Science and Technology Center for Cloud Computing*  
Co-PI with Gregory Ganger, \$11,500,000  
September 2011 – August 2016
- National Science Foundation, *Locality with Dynamic Parallelism*  
Guy Blelloch, Phillip Gibbons, \$449,055  
June 2010 – June 2013
- PITA ICES FY06-D, *Distributed Mining in Co-Evolving Streaming Sensors*  
Christos Faloutsos, Phillip Gibbons, \$64,000  
January 2006 – December 2006
- PITA ICES FY03-21, *Automatic Mining on Sensor Data*  
Christos Faloutsos, Phillip Gibbons, \$39,079  
November 2003 – December 2004

## Students Advised

**Current Students:** Mohammad Bakhshalipour, Valerie Choung, Pratik Fegade, Ellango Jothimurugesan and Yiwei Zhao.

### Prior Students:

- Dominic Chen (2021), *first position: Apple*
- Charles McGuffey (2021), *first position: Reed College*
- Nandita Vijaykumar (2019), *first position: U. Toronto*
- Kevin Hsieh (2019), *first position: Microsoft Research*
- Aaron Harlap (2019), *first position: Determined AI*
- Chris Fallin (2019), *first position: Mozilla*

Additionally, in my role as Adjunct Professor at Carnegie Mellon 2001–2015, I co-advised six CMU computer science (CS or ECE) Ph.D. students:

- Julian Shun (2015), *first position: MIT*
- Michelle Goodstein (2014), *first position: Facebook*
- Harsha Vardhan Simhadri (2013), *first position: Microsoft Research India*
- Evangelos Vlachos (2013), *first position: Oracle*
- Suman Nath (2006), *first position: Microsoft Research*
- Shimin Chen (2005), *first position: Intel Research Pittsburgh*

**Additional Ph.D. thesis committees:** Mohamed Aly (Pitt), Manos Athanassoulis (EPFL), Naama Ben-David (CMU), Andrew Chung (CMU), Henggang Cui (CMU), Laxman Dhulipala (CMU), Sotiria Fytraki (EPFL), Yan Gu (CMU), Jack Kosaian (CMU), Jin Kyu Kim (CMU), Kiwan Maeng (CMU), Spiros Papadimitriou (CMU), Jun Woo Park (CMU), Vivek Seshadri (CMU), Daniel Spoonhower (CMU), Srikanta Tirthapura (Brown), Aurick Qiao (CMU), Shobha Venkataram (CMU), Jinliang Wei (CMU), Hongyi Xin (CMU), Marco Zagha (CMU), and Jiyuan Zhang (CMU).

## Teaching

- Carnegie Mellon University, co-teaching ECE 18-213 “Introduction to Computer Systems” to 91 undergraduate students, Fall 2021.
- Carnegie Mellon University, taught CS 15-712 “Advanced Operating Systems and Distributed Systems” to 15 students (9 PhD, 6 MS), Spring 2021.
- Carnegie Mellon University, taught ECE 18-613 “Introduction to Computer Systems” to 78 masters students, Fall 2020.
- Carnegie Mellon University, taught CS 15-712 “Advanced Operating Systems and Distributed Systems” to 22 students (7 PhD, 14 MS, 1 BS), Spring 2020.
- Carnegie Mellon University, taught ECE 18-613 “Introduction to Computer Systems” to 137 masters students, Fall 2019.
- Carnegie Mellon University, taught CS 15-745 “Optimizing Compilers for Modern Architectures” to 22 students (8 PhD, 9 MS, 5 BS), Spring 2019.
- Carnegie Mellon University, co-taught ECE 18-213 (cross-listed as CS 15-213) “Introduction to Computer Systems” to 300+ undergraduate students, Fall 2018.
- Carnegie Mellon University, taught CS 15-745 “Optimizing Compilers for Modern Architectures” to 20 students (18 PhD, 1 MS, 1 BS), Spring 2018.
- Carnegie Mellon University, co-taught ECE 18-213 (cross-listed as CS 15-213) “Introduction to Computer Systems” to 300+ undergraduate students, Fall 2017.
- Carnegie Mellon University, taught CS 15-745 “Optimizing Compilers for Modern Architectures” to 22 students (7 PhD, 12 MS, 3 BS), Spring 2017.
- Carnegie Mellon University, co-taught ECE 18-213 (cross-listed as CS 15-213) “Introduction to Computer Systems” to 300+ undergraduate students, Fall 2016.
- Carnegie Mellon University, taught CS 15-745 “Optimizing Compilers for Modern Architectures” to 16 students (12 PhD, 4 MS), Spring 2016.
- Carnegie Mellon University, taught CS 15-712 “Advanced Operating Systems and Distributed Systems” to 30 students (20 PhD, 10 MS), Fall 2015.
- Aarhus University, MADALGO Summer School, taught “Multi-core Computing” to 70+ graduate students and post-docs, August 2012.
- Carnegie Mellon University, co-taught CS 15-829 (cross-listed as ECE 18-849B, Heinz School 95-811A and EPP 19-729A) “Internet-Scale Sensor Systems: Design and Policy” to 20+ Ph.D. students, Spring 2003.
- Carnegie Mellon University, taught CS 15-451 “Algorithms” to 90+ undergraduate students, Spring 2000.

## Patents

Issued patents, filed by AT&T or Lucent Technologies:

1. P. B. Gibbons.  
**Distinct Sampling System and a Method of Distinct Sampling for Optimizing Distinct Value Query Estimates.**  
U.S. Patent 7,047,230. Issued May 16, 2006.

2. S. Acharya, P. B. Gibbons, V. Poosala and S. Ramaswamy.  
**Join Synopsis-Based Approximate Query Answering.**  
U.S. Patent 6,912,524. Issued June 28, 2005.
3. S. Chen, P. B. Gibbons and T. C. Mowry.  
**System and Method for Improving Index Performance through Prefetching.**  
U.S. Patent 6,772,179. Issued August 3, 2004.
4. E. Gabber, P. B. Gibbons, D. Kristol, A. Mayer and Y. Matias.  
**System And Method for Providing Anonymous Remailing And Filtering Of Electronic Mail.**  
U.S. Patent 6,591,291. Issued July 8, 2003.
5. S. Acharya, P. B. Gibbons and V. Poosala.  
**Approximate Querying Method for Databases With Multiple Grouping Attributes.**  
U.S. Patent 6,519,604. Issued February 11, 2003.
6. P. B. Gibbons.  
**Methods and Systems for Testing Parallel Queues.**  
U.S. Patent 6,510,531. Issued January 21, 2003.
7. S. Acharya, P. B. Gibbons and V. Poosala.  
**Method and System for Generating a Statistical Summary of a Database Using a Join Synopsis.**  
U.S. Patent 6,477,534. Issued November 5, 2002.
8. G. E. Blleloch, P. B. Gibbons, Y. Matias and G. J. Narlikar.  
**Methods and Apparatus for Scheduling Parallel Processors.**  
U.S. Patent 6,434,590. Issued August 13, 2002.
9. R. Barve, P. B. Gibbons, B. K. Hillyer, Y. Matias, E. Shriver and J. S. Vitter.  
**System and Method for Modeling and Optimizing I/O Throughput of Multiple Disks on a Bus.**  
U.S. Patent 6,301,640. Issued October 9, 2001.
10. R. Barve, P. B. Gibbons, B. K. Hillyer, Y. Matias, E. Shriver and J. S. Vitter.  
**System and Method for Modeling and Optimizing I/O Throughput of Multiple Disks on a Bus.**  
U.S. Patent 6,260,108. Issued July 10, 2001.
11. P. B. Gibbons, Y. Matias and V. Poosala.  
**Maintaining a Random Sample of a Relation in a Database in the Presence of Updates to the Relation.**  
U.S. Patent 6,012,064. Issued January 4, 2000.
12. M. Adler, P. B. Gibbons and Y. Matias.  
**System and Method for Scheduling and Controlling Delivery of Advertising in a Communications Network.**  
U.S. Patent 6,009,409. Issued December 28, 1999.
13. E. Gabber, P. B. Gibbons, Y. Matias and A. Mayer.  
**System and Method for Providing Anonymous Personalized Browsing by a Proxy System in a Network.**  
U.S. Patent 5,961,593. Issued October 5, 1999.
14. P. B. Gibbons, Y. Matias, V. Poosala and A. Witkowski.  
**Incremental Maintenance of an Approximate Histogram in a Database System.**  
U.S. Patent 5,870,752. Issued February 9, 1999.

15. G. E. Blelloch, P. B. Gibbons and Y. Matias.  
**Method and Means for Scheduling Parallel Processors.**  
U.S. Patent 5,768,594. Issued June 16, 1998.
16. S. Ganguly, P. B. Gibbons, Y. Matias and A. Silberschatz.  
**Method for Skew Resistant Join Size Estimation.**  
U.S. Patent 5,721,896. Issued February 24, 1998.
17. P. B. Gibbons, Y. Matias and A. Witkowski.  
**Method for Maintaining Information Used To Generate High Biased Histograms Using a Probability Function, Counter and Threshold Values.**  
U.S. Patent 5,689,696. Issued November 18, 1997.