



Proceedings of the VLDB Endowment

Volume 12, No. 12 – August 2019

Editors in Chief:

Lei Chen and Fatma Özcan

Associate Editors:

Azza Abouzied, Selcuk Candan, Surajit Chaudhuri, Amol Desphande, Johann-Christoph Freytag, Rainer Gemulla, Nick Koudas, Georgia Koutrika, Yunyao Li, Alexandra Meliou, Arnab Nandi, M. Tamer Özsu, Themis Palpanas, Alkis Polyzotis, Kyuseok Shim, Xiaokui Xiao, Meihui Zhang

Publication Editors:

Abdul Quamar, Yongxin Tong

PVLDB – Proceedings of the VLDB Endowment

Volume 12, No. 12, August 2019.

All papers published in this issue will be presented at the 45th International Conference on Very Large Data Bases, Los Angeles, California, 2019.

Copyright 2019 VLDB Endowment

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License. To view a copy of this license, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>. For any use beyond those covered by this license, obtain permission by emailing info@vldb.org.

Volume 12, Number 12, August 2019

Pages i – xiii and 1778 - 2324

ISSN 2150-8097

Available at: <http://www.pvldb.org> and <https://dl.acm.org>.

TABLE OF CONTENTS

Front Matter

Copyright Notice	i
Table of Contents	ii
PVLDB Organization and Review Board – Vol. 12	viii
Guest Editors and Reviewers - Vol. 12	xi
External Reviewers - Vol. 12.....	xiii

Demonstrations

GALO: Guided Automated Learning for re-Optimization.....	1778
<i>Guilherme Damasio, Spencer Bryson, Vincent Corvinelli, Parke Godfrey, Piotr Mierzejewski, Jaroslaw Szlichta, Calisto Zuzarte</i>	
Synergistic Graph and SQL Analytics Inside IBM Db2.....	1782
<i>Yuanyuan Tian, Sui Jun Tong, Mir Hamid Pirahesh, Wen Sun, En Liang Xu, Wei Zhao</i>	
Cleanits: A Data Cleaning System for Industrial Time Series	1786
<i>Xiaou Ding, Hongzhi Wang, Jiaxuan Su, Zijue Li, Jianzhong Li, Hong Gao</i>	
ITAA: An Intelligent Trajectory-driven Outdoor Advertising Deployment Assistant.....	1790
<i>Yipeng Zhang, Zhifeng Bao, Songsong Mo, Yuchen Li, Yanghao Zhou</i>	
SystemER: A Human-in-the-loop System for Explainable Entity Resolution	1794
<i>Kun Qian, Lucian Popa, Prithviraj Sen</i>	
Buckle: Evaluating Fact Checking Algorithms Built on Knowledge Bases.....	1798
<i>Viet-Phi Huynh, Paolo Papotti</i>	
A Query System for Efficiently Investigating Complex Attack Behaviors for Enterprise Security	1802
<i>Peng Gao, Xusheng Xiao, Zhichun Li, Kangkook Jee, Fengyuan Xu, Sanjeev R. Kulkarni, Prateek Mittal</i>	
CAPE: Explaining Outliers by Counterbalancing	1806
<i>Zhengjie Miao, Qitian Zeng, Chenjie Li, Boris Glavic, Oliver Kennedy, Sudeepa Roy</i>	
BlackMagic: Automatic Inlining of Scalar UDFs into SQL Queries with Froid	1810
<i>Karthik Ramachandra, Kwanghyun Park</i>	
ProgressiveDB - Progressive Data Analytics as a Middleware	1814
<i>Lukas Berg, Tobias Ziegler, Carsten Binnig, Uwe Röhm</i>	
doppioDB 2.0: Hardware Techniques for Improved Integration of Machine Learning into Databases	1818
<i>Kaan Kara, Zeke Wang, Ce Zhang, Gustavo Alonso</i>	
COVIZ: A System for Visual Formation and Exploration of Patient Cohorts.....	1822
<i>Cícero A. L. Pahins, Behrooz Omidvar-Tehrani, Sihem Amer-Yahia, Valérie Siroux, Jean-Louis Pepin, Jean-Christian Borel, João Comba</i>	
PRIMAT: A Toolbox for Fast Privacy-preserving Matching	1826
<i>Martin Franke, Ziad Sehili, Erhard Rahm</i>	
NashDB: Fragmentation, Replication, and Provisioning using Economic Methods.....	1830

Ryan Marcus, Chi Zhang, Shuai Yu, Geoffrey Kao, Olga Papaemmanouil

Flash in Action: Scalable Spatial Data Analysis Using Markov Logic Networks.....	1834
<i>Ibrahim Sabek, Mashaal Musleh, Mohamed F. Mokbel</i>	
I Can't Believe It's Not (Only) Software! Bionic Distributed Storage for Parquet Files	1838
<i>Lucas Kuhring, Zsolt István</i>	
WISE: Vehicle Image Search Engine with Traffic Camera	1842
<i>Hyewon Choi, Erkang Zhu, Arsala Bangash, Renée J. Miller</i>	
WiClean: A System for Fixing Wikipedia Interlinks Using Revision History Patterns	1846
<i>WiClean: A System for Fixing Wikipedia Interlinks Using Revision History Patterns</i>	
SparkCruise: Handsfree Computation Reuse in Spark.....	1850
<i>Abhishek Roy, Alekh Jindal, Hiren Patel, Ashit Gosalia, Subru Krishnan, Carlo Curino</i>	
In-database Distributed Machine Learning: Demonstration using Teradata SQL Engine.....	1854
<i>Sandeep Singh Sandha, Wellington Cabrera, Mohammed Al-Kateb, Sanjay Nair, Mani Srivastava</i>	
SHOAL: Large-scale Hierarchical Taxonomy via Graph-based Query Coalition in E-commerce.....	1858
<i>Zhao Li, Xia Chen, Xuming Pan, Pengcheng Zou, Yuchen Li, Guoxian Yu</i>	
DPSaaS: Multi-Dimensional Data Sharing and Analytics as Services under Local Differential Privacy	1862
<i>Min Xu, Tianhao Wang, Bolin Ding, Jingren Zhou, Cheng Hong, Zhicong Huang</i>	
PriSTE: Protecting Spatiotemporal Event Privacy in Continuous Location-Based Services.....	1866
<i>Yang Cao, Yonghui Xiao, Li Xiong, Liqun Bai, Masatoshi Yoshikawa</i>	
Datalignment: Ontology Schema Alignment Through Datalog Containment	1870
<i>Daniel Deutch, Evgeny Marants, Yuval Moskovitch</i>	
IHCS: An Integrated Hybrid Cleaning System.....	1874
<i>Congcong Ge, Yunjun Gao, Xiaoye Miao, Lu Chen, Christian S. Jensen, Ziyuan Zhu</i>	
CAPRIO: Graph-based Integration of Indoor and Outdoor Data for Path Discovery.....	1878
<i>Constantinos Costa, Xiaoyu Ge, Panos K. Chrysanthis</i>	
HERMIT in Action: Succinct Secondary Indexing Mechanism via Correlation Exploration	1882
<i>Yingjun Wu, Jia Yu, Yuanyuan Tian, Richard Sidle, Ronald Barber</i>	
DISPERS: Securing Highly Distributed Queries on Personal Data Management Systems	1886
<i>Julien Loudet, Iulian Sandu-Popa, Luc Bouganim</i>	
Stateful Functions as a Service in Action	1890
<i>Adil Akhter, Marios Fragkoulis, Asterios Katsifodimos</i>	
Demonstration of Krypton: Optimized CNN Inference for Occlusion-based Deep CNN Explanations	1894
<i>Allen Ordookhanians, Xin Li, Supun Nakandala, Arun Kumar</i>	
LensXPlain: Visualizing and Explaining Contributing Subsets for Aggregate Query Answers	1898
<i>Zhengjie Miao, Andrew Lee, Sudeepa Roy</i>	
Juneau: Data Lake Management for Jupyter	1902
<i>Yi Zhang, Zachary G. Ives</i>	

ApproxML: Efficient Approximate Ad-Hoc ML Models Through Materialization and Reuse	1906
<i>Sona Hasani, Faezeh Ghaderi, Shohedul Hasan, Saravanan Thirumuruganathan, Abolfazl Asudeh, Nick Koudas, Gautam Das</i>	
Flare & Lantern: Efficiently Swapping Horses Midstream	1910
<i>Grégory Essertel, Ruby Y. Tahboub, Fei Wang, James Decker, Tiark Rompf</i>	
Trinity: An Extensible Synthesis Framework for Data Science.....	1914
<i>Ruben Martins, Jia Chen, Yanju Chen, Yu Feng, Isil Dillig</i>	
PSynDB: Accurate and Accessible Private Data Generation	1918
<i>Zhiqi Huang, Ryan Mckenna, George Bissias, Gerome Miklau, Michael Hay, Ashwin Machanavajjhala</i>	
FishStore: Fast Ingestion and Indexing of Raw Data.....	1922
<i>Badrish Chandramouli, Dong Xie, Yinan Li, Donald Kossmann</i>	
Spade: A Modular Framework for Analytical Exploration of RDF Graphs	1926
<i>Yanlei Diao, Pawel Guzewicz, Ioana Manolescu, Mirjana Mazuran</i>	
Making an RDBMS Data Scientist Friendly: Advanced In-database Interactive Analytics with Visualization Support	1930
<i>Joseph Vinish D'silva, Florestan De Moor, Bettina Kemme</i>	
UDAO: A Next-Generation Unified Data Analytics Optimizer.....	1934
<i>Khaled Zaouk, Fei Song, Chenghao Lyu, Arnab Sinha, Yanlei Diao, Prashant Shenoy</i>	
AggChecker: A Fact-Checking System for Text Summaries of Relational Data Sets	1938
<i>Saeahan Jo, Immanuel Trummer, Weicheng Yu, Xuezhi Wang, Cong Yu, Daniel Liu, Niyati Mehta</i>	
GRANO: Interactive Graph-based Root Cause Analysis for Cloud-Native Distributed Data Platform	1942
<i>Hanzhang Wang, Phuong Nguyen, Jun Li, Selcuk Kopru, Gene Zhang, Sanjeev Katariya, Sami Ben-Romdhane</i>	
Dietcoin: Hardening Bitcoin Transaction Verification Process For Mobile Devices	1946
<i>Davide Frey, Marc X. Makkes, Pierre-Louis Roman, François Taïani, Spyros Voulgaris</i>	
Raptor: Large Scale Analysis of Big Raster and Vector Data.....	1950
<i>Samriddhi Singla, Ahmed Eldawy, Rami Alghamdi, Mohamed F. Mokbel</i>	
Data Civilizer 2.0: A Holistic Framework for Data Preparation and Analytics.....	1954
<i>El Kindi Rezig, Lei Cao, Michael Stonebraker, Giovanni Simonini, Wenbo Tao, Samuel Madden, Mourad Ouzzani, Nan Tang, Ahmed K. Elmagarmid</i>	
Tuplex: Robust, Efficient Analytics When Python Rules	1958
<i>Leonhard F. Spiegelberg, Tim Kraska</i>	
Ease.ml/ci and Ease.ml/meter in Action: Towards Data Management for Statistical Generalization	1962
<i>Cedric Renggli, Frances Ann Hubis, Bojan Karlaš, Kevin Schawinski, Wentao Wu, Ce Zhang</i>	
PivotE: Revealing and Visualizing the Underlying Entity Structures for Exploration.....	1966
<i>Han Xueran, Jun Chen, Jiaheng Lu, Yueguo Chen, Xiaoyong Du</i>	

Tutorials

Speedup Your Analytics: Automatic Parameter Tuning for Databases and Big Data Systems.....	1970
--	------

Jiaheng Lu, Yuxing Chen, Herodotos Herodotou, Shivnath Babu

TextCube: Automated Construction and Multidimensional Exploration.....	1974
<i>Yu Meng, Jiaxin Huang, Jingbo Shang, Jiawei Han</i>	
The Ever Evolving Online Labor Market: Overview, Challenges and Opportunities	1978
<i>Sihem Amer-Yahia, Senjuti Basu Roy</i>	
Machine Learning Meets Big Spatial Data	1982
<i>Ibrahim Sabek, Mohamed F. Mokbel</i>	
Data Lake Management: Challenges and Opportunities.....	1986
<i>Fatemeh Nargesian, Erkang Zhu, Renée J. Miller, Ken Pu, Patricia C. Arocena</i>	
Combating Fake News: A Data Management and Mining Perspective.....	1990
<i>Laks V.s. Lakshmanan, Michael Simpson, Saravanan Thirumuruganathan</i>	
Personal Database Security and Trusted Execution Environments: A Tutorial at the Crossroads...	1994
<i>Nicolas Ancaux, Luc Bouganim, Philippe Pucheral, Iulian Sandu Popa, Guillaume Scerri</i>	

Industrial and Applications

SAP HANA goes private - From Privacy Research to Privacy Aware Enterprise Analytics	1998
<i>Stephan Kessler, Jens Hoff, Johann-Christoph Freytag</i>	
Guided automated learning for query workload re-optimization.....	2010
<i>Guilherme Damasio, Vincent Corvinelli, Parke Godfrey, Piotr Mierzejewski, Alex Mihaylov, Jaroslaw Szlichta, Calisto Zuzarte</i>	
Procella: Unifying serving and analytical data at YouTube	2022
<i>Biswapesh Chattopadhyay, Priyam Dutta, Weiran Liu, Ott Tinn, Andrew McCormick, Aniket Mokashi, Paul Harvey, Hector Gonzalez, David Lomax, Sagar Mittal, Roe Ebenstein, Nikita Mikhaylin, Hung-Ching Lee, Xiaoyan Zhao, Tony Xu, Luis Perez, Farhad Shahmohammadi, Tran Bui, Neil Mckay, Selcuk Aya, Vera Lychagina, Brett Elliott</i>	
A Lightweight and Efficient Temporal Database Management System in TDSQL.....	2035
<i>Wei Lu, Zhanhao Zhao, Xiaoyu Wang, Haixiang Li, Zhenmiao Zhang, Zhiyu Shui, Sheng Ye, Anqun Pan, Xiaoyong Du</i>	
Native Store Extension for SAP HANA	2047
<i>Reza Sherkat, Colin Florendo, Mihnea Andrei, Rolando Blanco, Adrian Dragusanu, Amit Pathak, Pushkar Khadilkar, Neeraj Kulkarni, Christian Lemke, Sebastian Seifert, Sarika Iyer, Sasikanth Gottapu, Robert Schulze, Chaitanya Gottipati, Nirvik Basak, Yanhong Wang, Vivek Kandiyannallur, Santosh Pendap, Dheren Gala, Rajesh Almeida, Prasanta Ghosh</i>	
AnalyticDB: Real-time OLAP Database System at Alibaba Cloud	2059
<i>Chaoqun Zhan, Maomeng Su, Chuangxian Wei, Xiaoqiang Peng, Liang Lin, Sheng Wang, Zhe Chen, Feifei Li, Yue Pan, Fang Zheng, Chengliang Chai</i>	
Tunable Consistency in MongoDB.....	2071
<i>William Schultz, Tess Avitabile, Alyson Cabral</i>	
TitAnt: Online Real-time Transaction Fraud Detection in Ant Financial	2082
<i>Shaosheng Cao, Xinxing Yang, Cen Chen, Jun Zhou, Xiaolong Li, Yuan Qi</i>	

AliGraph: A Comprehensive Graph Neural Network Platform.....	2094
<i>Rong Zhu, Kun Zhao, Hongxia Yang, Wei Lin, Chang Zhou, Baole Ai, Yong Li, Jingren Zhou</i>	
Customizable and Scalable Fuzzy Join for Big Data.....	2106
<i>Zhimin Chen, Yue Wang, Vivek Narasayya, Surajit Chaudhuri</i>	
Q Tune: A Query-Aware Database Tuning System with Deep Reinforcement Learning.....	2118
<i>Guoliang Li, Xuanhe Zhou, Shifu Li, Bo Gao</i>	
Experiences with Approximating Queries in Microsoft's Production Big-Data Clusters	2131
<i>Srikanth Kandula, Kukjin Lee, Surajit Chaudhuri, Marc Friedman</i>	
Constant Time Recovery in Azure SQL Database	2143
<i>Panagiotis Antonopoulos, Peter Byrne, Wayne Chen, Cristian Diaconu, Raghavendra Thallam Kodandaramaih, Hanuma Kodavalla, Prashanth Purnananda, Adrian-Leonard Radu, Chaitanya Sreenivas Ravella, Girish Mittur Venkataramanappa</i>	
Yugong: Geo-Distributed Data and Job Placement at Scale.....	2155
<i>Yuzhen Huang, Yingjie Shi, Zheng Zhong, Yihui Feng, James Cheng, Jiwei Li, Haochuan Fan, Chao Li, Tao Guan, Jingren Zhou</i>	
Choosing A Cloud DBMS: Architectures and Tradeoffs.....	2170
<i>Junjay Tan, Thanaa Ghanem, Matthew Perron, Xiangyao Yu, Michael Stonebraker, David Dewitt, Marco Serafini, Ashraf Aboulnaga, Tim Kraska</i>	
S3: A Scalable In-memory Skip-List Index for Key-Value Store.....	2183
<i>Jingtian Zhang, Sai Wu, Zeyuan Tan, Gang Chen, Zhushi Cheng, Wei Cao, Yusong Gao, Xiaojie Feng</i>	
DDSketch: A Fast and Fully-Mergeable Quantile Sketch with Relative-Error Guarantees	2195
<i>Charles Masson, Jee E. Rim, Homin K. Lee</i>	
A Distributed System for Large-scale n-gram Language Models at Tencent	2206
<i>Qiang Long, Wei Wang, Jinfu Deng, Song Liu, Wenhao Huang, Fangying Chen, Sifan Liu</i>	
A Morsel-Driven Query Execution Engine for Heterogeneous Multi-Cores.....	2218
<i>Kayhan Dursun, Carsten Binnig, Ugur Cetintemel, Garret Swart, Weiwei Gong</i>	
Smile: A System to Support Machine Learning on EEG Data at Scale	2230
<i>Lei Cao, Wenbo Tao, Sungtae An, Jing Jin, Yizhou Yan, Xiaoyu Liu, Wendong Ge, Adam Sah, Leilani Battle, Jimeng Sun, Remco Chang, Brandon Westover, Samuel Madden, Michael Stonebraker</i>	
Updating Graph Databases with Cypher	2242
<i>Alastair Green, Paolo Guagliardo, Leonid Libkin, Tobias Lindaaker, Victor Marsault, Stefan Plantikow, Martin Schuster, Petra Selmer, Hannes Voigt</i>	
Adapting TPC-C Benchmark to Measure Performance of Multi-Document Transactions in MongoDB	2254
<i>Asya Kamsky</i>	
Cloud native database systems at Alibaba: Opportunities and Challenges.....	2263
<i>Feifei Li</i>	
In-Memory for the masses: Enabling cost-efficient deployments of in-memory data management platforms for business applications	2273
<i>Alexander Boehm</i>	

Couchbase Analytics: NoETL for Scalable NoSQL Data Analysis 2275
Murtadha Al Hubail, Ali Alsuliman, Michael Blow, Michael Carey, Dmitry Lychagin, Ian Maxon, Till Westmann

Performance in the spotlight..... 2287
Adrian Coyle

Award Talks and Panel

Integration of Large-Scale Data Processing Systems and Traditional Parallel Database Technology 2290
Azza Abouzied, Daniel J. Abadi, Kamil Bajda-Pawlikowski, Avi Silberschatz

PNUTS to Sherpa: Lessons from Yahoo!'s Cloud Database..... 2300
Brian F. Cooper, P.p.s. Narayan, Raghu Ramakrishnan, Utkarsh Srivastava, Adam Silberstein, Philip Bohannon, Hans-Arno Jacobsen, Nick Puz, Daniel Weaver, Ramana Yerneni

What I probably did right and what I think I could have done better 2308
Wang-Chiew Tan

Enabling Data Science for the Majority..... 2309
Aditya Parameswaran

Opportunities for Data Management Research in the Era of Horizontal AI/ML 2323
Theodoros Rekatsinas, Sudeepa Roy, Manasi Vartak, Ce Zhang, Neoklis Polyzotis

PVLDB ORGANIZATION AND REVIEW BOARD - Vol. 12

Editors in Chief of PVLDB

Lei Chen, HKUST
Fatma Özcan, IBM Research - Almaden

Associate Editors of PVLDB

Azza Abouzied, NYU Abu Dhabi
Selcuk Candan, Arizona State University
Surajit Chaudhuri, Microsoft Research
Amol Desphande, University of Maryland
Johann-Christoph Freytag, HU Berlin
Rainer Gemulla, University of Mannheim
Nick Koudas, University of Toronto
Georgia Koutrika, Athena Research Center
Yunyao Li, IBM Research - Almaden
Alexandra Meliou, University of Massachusetts
Arnab Nandi, Ohio State University
M. Tamer Özsu, University of Waterloo
Themis Palpanas, French University Institute
Alkis Polyzotis, Google
Kyuseok Shim, Seoul National University

Xiaokui Xiao, National University of Singapore
Meihui Zhang, Beijing Institute of Technology

Publication Editors

Abdul Quamar, IBM Research - Almaden
Yongxin Tong, Beihang University

PVLDB Managing Editor

Wolfgang Lehner, TU Dresden

PVLDB Advisory Committee

Sihem Amer-Yahia, CNRS
Peter Boncz, Centrum Wiskunde & Informatica
Xin Luna Dong, Amazon
Juliana Freire, New York University
Wolfgang Lehner, TU Dresden
Renée J. Miller, University of Toronto
Tova Milo, Tel Aviv University
M. Tamer Özsu, University of Waterloo
Divesh Srivastava, AT&T Labs-Research

Review Board

Abdul Quamar, IBM Research - Almaden
Ada Waichee Fu, Chinese University of Hong Kong
Ahmet Erdem Sariyuca, University at Buffalo
Alan Fekete, University of Sydney
Alkis Simitsis, Hewlett Packard Labs
Ambuj Singh, UC Santa Barbara
Andrew Pavlo, Carnegie Mellon University
Angela Bonifati, University of Lyon
Arijit Khan, Nanyang Technological University
Arnab Bhattacharya, IIT Kanpur
Arun Kumar, University of California, San Diego
Arvind Arasu, Microsoft Research
Ashraf Aboulnaga, QCRI
Ashwin Machanavajhala, Duke University
Avrilia Floratou, Microsoft Research
Azade Nazi, Microsoft Research
Badrish Chandramouli, Microsoft Research
Barzan Mozafari, University of Michigan
Beng Chin OOI, National University of Singapore
Berthold Reinwald, IBM Research - Almaden
Bin Cui, Peiking University
Bobbie Cochrane, IBM
Bolin Ding, Alibaba
Boris Glavic, Illinois Institute of Technology
Bugra Gedik, Bilkent University
Byron Choi, Hong Kong Baptist University
Carlo Curino, Microsoft Research
Chee-Yong Chan, National University of Singapore
Chen Li, University of California, Irvine
Chengkai Li, UT Arlington
Chuan Lei, IBM Research - Almaden
Cong Yu, Google
Curtis Dyreson, Utah State University
Danica Probic, Oracle
Daniel Kifer, Penn State University
Davide Mottin, Hasso-Plattner Institute
Demetrios Zeinalipour-Yazti, University of Cyprus
Dimitris Papadias, HKUST
Diptikalyan Saha, IBM Research - India
Divyakant Agrawal, UC Santa Barbara
Donald Kossmann, Microsoft Research
Egemen Tanin, University of Melbourne
Eser Kandogan, IBM Research - Almaden
Essam M. Mansour, QCRI
Fabio Porto, LNCC
Fei Chiang, McMaster University
Feifei Li, University of Utah
Florin Rusu, University of California, Merced
Floris Geerts, University of Antwerp
George Papadakis, University of Athens
Goetz Graefe, Google
Guoliang Li, Tsinghua University
H. V. Jagadish, University of Michigan
Hakan Ferhatosmanoglu, Bilkent University
Hakan Hacigumus, Google
Hanghang Tong, Arizona State University
Helen Huang, University of Queensland

Heng Tao Shen, UESTC
Hong Cheng, Chinese University of Hong Kong
Hongzhi Yin, University of Queensland
Hua Lu, Aalborg University
Huiping Cao, New Mexico State University
Ilaria Bartolini, University of Bologna
Ilkay Altintas, San Diego Supercomputing Center
Immanuel Trummer, Cornell University
Ioana Manulescu, INRIA
Ismail Sengor Altingovde, METU
James Cheng, Chinese University of Hong Kong
Jens Dittrich, University of Saarland
Jens Teubner, TU Dortmund
Jianliang Xu, Hong Kong Baptist University
Jignesh Patel, University of Wisconsin - Madison
Jinyang Gao, National University of Singapore
Johann Gamper, Free University of Bozen-Bolzano
Jun Yang, Duke University
Junjie Yao, East China Normal University
Kai Zheng, UESTC
Karthik Sankaranarayanan, IBM Research - India
Katja Hose, Aalborg University
Khuzaima Daudjee, University of Waterloo
Kostas Stefanidis, University of Tampere
Kostas Zoumpatianos, Harvard University
Letizia Tanca, Polytechnic University of Milan
Lucian Popa, IBM Research - Almaden
Luna Dong, Amazon
Manos Karpathiotakis, Facebook London
Maria Luisa Sapino, University of Torino
Mario Nascimento, University of Alberta
Martin Theobald, University of Luxemburg
Mary Roth, IBM Research - Almaden
Matthias Boehm, Graz University of Technology
Matthias Renz, George Mason University
Maya Ramanath, Indian Institute of Technology Delhi
Melanie Herschel, University of Stuttgart
Michael Böhlen, University of Zurich
Michael Hay, Colgate University
Michael Mathioudakis, University of Helsinki
Min Li, JD.com
Mirek Riedewald, Northeastern University
Mirella Moro, Universidade Federal de Minas Gerais
Mohamed Eltabakh, Worcester Polytechnic Institute
Mohamed Mokbel, QCRI
Mohamed Sarwat, Arizona State University
Murat Kantarcioglu, University of Texas at Dallas
Nan Tang, QCRI
Nicolas Ancaux, INRIA
Nikolaus Augsten, University of Salzburg
Oktie Hassanzadeh, IBM Research - Yorktown
Olga Papaemmanouil, Brandeis University
Paolo Papotti, EURECOM
Parth Nagarkar, New Mexico State University
Pelin Angin, Middle East Technical University
Philip Bernstein, Microsoft Research
Philippe Bonnet, IT University of Copenhagen
Pinar Karagoz, Middle East Technical University
Pinar Tozun, IT University of Copenhagen

Raymond Ng, University of British Columbia
Sai Wu, Zhejiang University
Sang Kyun Cha, Seoul National University
Sebastian Breß, DFKI and TU Berlin
Semih Salihoglu, University of Waterloo
Senjuti Basu Roy, New Jersey Institute of Technology
Seung-Won Hwang, Yonsei University
Shaoxu Song, Tsinghua University
Shuo Shang, IIAI
Spyros Blanas, Ohio State University
Stefan Mangeold, Centrum Wiskunde & Informatica
Stefano Paraboschi, University of Bergamo
Steffen Zeuch, DFKI and TU Berlin
Stratis Viglas, University of Edinburgh
Sudip Roy, Google
Tingjian Ge, University of Massachusetts Lowell
Tyson Condie, University of California, Los Angeles
Umar Farooq Minhas, Microsoft Research
Vijayshankar Raman, Google
Viktor Leis, University of Jena
Vincent Oria, New Jersey Institute of Technology
Vivek Narasayya, Microsoft Research
Wenjie Zhang, University of New South Wales
Wook-Shin Han, POSTECH

Xiang Lian, Kent State University
Xiangmin Zhou, RMIT
Xiaochun Yang, Northeastern University
Xiaofang Zhou, University of Queensland
Li Xiong, Emory University
Xu Chu, Georgia Institute of Technology
Xuemin Lin, University of New Southwales
Yael Amsterdamer, Bar-Ilan University
Yannis Velegarakis, Utrecht University
Yanyan Shen, Shanghai Jiao Tong University
Yi Chen, New Jersey Institute of Technology
Ying Zhang, University of Technology Sydney
Yinghui Wu, Washington State University
Yingjun Wu, IBM Research - Almaden
Yingxia Shao, Peking University
Yongxin Tong, Beihang University
Yoshiharu Ishikawa, Nagoay University
Ye Yuan, Northeastern University
Yuanyuan Tian, IBM Research - Almaden
Yucel Saygin, Sabanci University
Yunjun Gao, Zhejiang University
Zhiguo Gong, University of Macau

GUEST EDITORS AND REVIEWERS - Vol. 12

Guest Editors for the Industrial Track

Pat Helland, Salesforce
Wolfgang Lehner, TU Dresden
Beng Chin Ooi, NUS – Singapore

Guest Editors for the Demo Track

Nesime Tatbul, Intel Labs and MIT - USA
Alin Deutsch, UCSD - USA

Guest Editors for the Tutorials

Xin Luna Dong, Amazon
Amr El Abbadi, UCSB

Guest Editors for the Panel

Sang Kyun Cha, National Seoul University
M. Tamer Özsu, University of Waterloo

Guest Reviewers for the Industrial Track

Divyakant Agrawal, University of California, Santa Barbara
Pedro Bizarro, Feedzai
Alexander Boehm, SAP SE
Ben Busjaeger, Salesforce
Mark Callaghan, Facebook
Michael Carey, UC Irvine
Angelo Ciarlina, McKinsey
Anh Dinh, SUTD
Thomas Fanghaenel, Salesforce
Avrilia Floratou, Microsoft
Anil Goel, SAP
Alon Halevy, Recruit
Stavros Harizopoulos, Facebook
Lars Hofhansl, Salesforce
Theodore Johnson, AT&T Labs - Research
Yannis Katsis, IBM Research - Almaden
Martin Kersten, CWI
Kihong Kim, SAP Labs - Korea
Dustin Lange, Amazon Research
Feifei Li, Alibaba
Yongzhu (Eric) Li, Futurewei
Yunyao Li, IBM Research - Almaden
Qian Lin, National University of Singapore
Wei Liu, Tencent
Wei Lu, Renmin University of China
Rui Mao, Shenzhen University
Jamie Martin, Salesforce
Neoklis Polyzotis, Google
Danica Porobic, Oracle
Berthold Reinwald, IBM Research - Almaden
Amit Rustagi, Western Digital
Benjamin Schlegel, Oracle Labs
Pinar Tozun, ITU
Dimitris Tsiogiannis, Amazon, Inc.
Hannes Voigt, Neo4j
Guoren Wang, Beijing Institute of Technology
Wei Wang, NUS

Reynold Xin, Databricks
Yang Yang, University of Electronic Science and Technology of China
Kai Zeng, Alibaba - China
Feida Zhu, Singapore Management University
Arthur Zwiegincew, Oculus/Facebook

Guest Reviewers for the Demo Track

Nesreen Ahmed, Intel Labs - USA
Lyublena Antova, Datometry - USA
Manos Athanassoulis, Boston University - USA
Cagri Balkesen, Oracle Labs - Switzerland
Leilani Battle, University of Maryland - USA
Carsten Binnig, TU Darmstadt - Germany
Angela Bonifati, University of Lyon - France
Renata Borovica-Gajic, University of Melbourne - Australia
Vanessa Braganholo, Fluminense Federal University - Brazil
Lei Cao, MIT - USA
Alvin Cheung, UC Berkeley - USA
Laura Chiticariu, IBM Data & AI
Sudipto Das, Amazon Web Services - USA
Cagatay Demiralp, Megagon Labs - USA
Dong Deng, Rutgers University - USA
Jens Dittrich, Saarland University - Germany
Jiang Du, University of Toronto - Canada
Iman Elghandour, IT University of Copenhagen - Denmark
David Eysers, University of Otago - New Zealand
Peter Fischer, University of Augsburg - Germany
Vijay Gadepally, MIT Lincoln Laboratory - USA
Avigdor Gal, Technion - Israel
Wolfgang Gatterbauer, Northeastern University - USA
Buğra Gedik, Bilkent University - Turkey
Ioana Giurgiu, IBM Research - Switzerland
Boris Glavic, Illinois Tech - USA
Michael Grossniklaus, University of Konstanz - Germany
Annika Hinze, University of Waikato - New Zealand
Katja Hose, Aalborg University - Denmark
Alekh Jindal, Microsoft - USA
Pinar Karagoz, METU - Turkey
Flip Korn, Google Research - USA
Georgia Koutrika, Athena Research Center - Greece
Justin Levandoski, Amazon - USA
Feifei Li, Alibaba
Eric Lo, CUHK - Hong Kong
Qiong Luo, HKUST - Hong Kong
Alex Moga, ABB Research - Switzerland
Daniela Nicklas, University of Bamberg - Germany
Silvia Nittel, University of Maine - USA
Themis Palpanas, Paris Descartes University - France
John Paparrizos, University of Chicago - USA
Aditya Parameswaran, UIUC - USA
Peter Pietzuch, Imperial College London - UK
Karthik Ramasamy, Streamlio - USA

Alexander Rasin, DePaul University - USA
Semih Salihoglu, University of Waterloo - Canada
Nadathur Satish, Facebook - USA
Marco Serafini, UMass Amherst - USA
Kyumars Sheykh Esmaili, TomTom - Belgium
Ben Sowell, Amazon - USA
Rebecca Taft, Cockroach Labs - USA
Nan Tang, QCRI - Qatar

Richard Tibbetts, Tableau - USA
Srikanta Tirthapura, Iowa State University - USA
Kristin Tufte, Portland State University - USA
Marcos Antonio Vaz Salles, University of Copenhagen -
Denmark
Matthias Weidlich, Humboldt University of Berlin -
Germany
Xiangyao Yu, MIT - USA

EXTERNAL REVIEWERS - Vol. 12

Jianwen Zhao, The Chinese Univeristy of Hong Kong
Georgia Koutrika, Athena Research Institute
Sourav Medya, UC, Santa Barbara
Arlei Silva, UC, Santa Barbara
Wei Ye, UC, Santa Barbara
Alex Jones, UC, Santa Barbara
Ios Kotsogiannis, Duke University
Nisarg Raval, Duke University
Navneet Potti, UW-Madison
Sheng Wang, National University of Singapore
Wei Wang, National University of Singapore
Qian Lin, National University of Singapore
Guoliang Li, Tsinghua University
Anh Dinh, National University of Singapore
Daniel Ford, IBM
Rathijit Sen, Microsoft
Li Meiyang, National University of Singapore
TaiNing Wang, National University of Singapore
Zuozhi Wang, UC, Irvine
Avinash Kumar, UC, Irvine
Taewoo Kim, UC, Irvine
Jianfeng Jia, Google
Sadeem Saleh, UC, Irvine
Qiushi Bai, UC, Irvine
Sami Saeef, University of Texas at Arlington
Kai Yao, HKUST
Dimitris Tsaras, HKUST
Dimitris Tsakalidis, HKUST
Kai Yao, HKUST
Panos Simatis, HKUST
Mohammad Javad Amiri, UC, Santa Barbara
Sujaya Maiya, UC, Santa Barbara
Mohammad Javad Amiri, UC, Santa Barbara
Xianghai Sheng, UC, Merced
Weijie Zhao, UC, Merced
Stratis Viglas, Google
Fuat Basik, Bilkent University
Chris Conlan, University of Warwick
Teddy Cunningham, University of Warwick
Su Jiao, The Chinese University of Hong Kong
Lu Can, The Chinese University of Hong Kong
Marco Patella, DISI, University of Bologna
Zhi Liu, The Chinese University of Hong Kong
Yidi Wu, The Chinese University of Hong Kong
Xiao Yan, The Chinese University of Hong Kong
Xinyan Dai, The Chinese University of Hong Kong
Jian Zhang, The Chinese University of Hong Kong
Yunjian Zhao, The Chinese University of Hong Kong
Felix Martin Schuhknecht, Saarland University
Ankur Sharma, Saarland University
Cheng Xu, Hong Kong Baptist University
Zuyu Zhang, UW-Madison
Stavros Sintos, Duke University
Michael Abebe, University of Waterloo
Brad Glasbergen, University of Waterloo
Fabio Azzalini, Politecnico di Milano
Davide Azzalini, Politecnico di Milano
Daniel Garcia Ulloa, Keysight Technologies
Yang Cao, Kyoto University
Mark Ma, Emory University
Camila Costa, University of Alberta
Vinu Venugopal, University of Luxemburg
Neha Sengupta, IIT-Delhi
Srikanta Bedathur, IIT-Delhi
Sarah Oppold, University of Stuttgart
Kevin Wellenzohn, University of Zurich
Huasong Shan, JD.com American Technologies Corporation
Cuney Akcora, University of Texas at Dallas
Imrul Anindya, University of Texas at Dallas
Mustafa Ozdayi, University of Texas at Dallas
Aref Asvadishirehjini, University of Texas at Dallas
Shivaram Venkataraman, Microsoft Research
Todd Porter, Microsoft
Bailu Ding, Microsoft Research
Bonaventura Del Monte, DFKI GmbH
Jonas Traub, TU Berlin
Pedro Holanda, CWI
Diego Tome, CWI
Tatiana Jin, The Chinese University of Hong Kong
David Lomet, Microsoft Research
Anshuman Dutt, Microsoft Research
Weilong Ren, Kent State University
Ahmed Al-Baghdadi, Kent State University
Niranjan Rai, Kent State University
Wen Hua, University of Queensland
Junhao Gan, University of Queensland
Lei Li, University of Queensland
Fengmei Jin, Renmin University of China
Pingfu Chao, The University of Queensland
Sen Wang, The University of Queensland
Longbin Lai, The University of New South Wales
Zhengyi Yang, The University of New South Wales
Boge Liu, The University of New South Wales
Fan Zhang, The University of New South Wales
Dong Wen, The University of Technology Sydney
Hanchen Wang, The University of New South Wales
Yixiang Fang, The University of New South Wales
Jingzhi Fang, Beihang University
Yingjun Wu, IBM Research - Almaden
Mehmet Ercan Nergiz, Sabanci University
Jingjing Li, UESTC
Wei Wang, The University of New South Wales
Bingsheng He, National University of Singapore
Prithviraj Sen, IBM Research - Almaden
Kostas Kollias, Google Research
Peter Bailis, Stanford University
Lingfei Wu, IBM Research - Yorktown
Niketani Pansare, Apple
Sergey Gorbunov, University of Waterloo