Editorial for Special Issue on "New Technologies and Applications for Wireless Communications & Mobile Cloud Computing"

Taeshik Shon · Athanasios V. Vasilakos · Bharat Bhargava · Ivan Stojmenovic · Hai Jin · Albert Y. Zomaya

Editorial:

This special issue features eight selected papers with high quality.

The first article, "A Cost-Effective Methodology Applied to Videoconference Services on Hybrid Clouds" by Javier Cerviño, Pedro Rodriguez, Irena Trajkovska, Fernando Escribano and Joaquín Salvachúa, tackles the optimization

T. Shon (✉)
Division of Information and Computer Engineering,
College of Information Technology, Ajou University,
Suwon, South Korea
e-mail: taeshik.shon@gmail.com

A. V. Vasilakos
Department of Electrical and Computer Engineering,
National Technical University of Athens (NTUA),
Athens, Greece

B. Bhargava
Purdue University,
West Lafayette, IN, USA

I. Stojmenovic
SEECS, University of Ottawa,
Ottawa, Canada

H. Jin
Services Computing Technology and System Lab,
Huazhong University of Science and Technology,
Wuhan 430074, China

A. Y. Zomaya
School of Information Technologies,
J12 The University of Sydney,
Sydney NSW 2006, Australia

of applications in multi-provider hybrid cloud scenarios from an economic point of view. However the approach was intended to introduce a novel solution by making maximum use of divide and rule. Also this article describes a methodology to create cost aware cloud applications that can be broken down into the three most important components in cloud infrastructures: computation, network and storage. A real videoconference system has been modified in order to evaluate this idea with both theoretical and empirical experiments. The proposed system has become a widely used as a tool in several national and European projects for e-learning and collaboration purposes.

The second article, "An Efficient Dynamic Integration Middleware for Cyber-Physical Systems in Mobile Environments" by Young-Sik Jeong, Sang Oh Park and Jong Hyuk Park, proposes a cyber-physical system (CPS) middleware framework that ensures interoperability and communication between heterogeneous components in a global CPS network. A CPS is a tight integration of the system's computational and physical elements. The CPS technology builds on the older discipline of embedded systems, and CPS applications can be found in diverse industry sectors, such as smart home, health care, and transportation. The article assume that a global CPS network that integrates different CPS networks appears in the near future. Through local and global communications, the proposed middleware makes mobile devices in different networks interoperable.

The third article, "Particle Swarm Optimization with Skyline Operator for Fast Cloud-based Web Service Composition" by Shangguang Wang, Qibo Sun, Hua Zou, Fangchun Yang, proposed a fast Cloud-based web service

(CWSs) composition approach based on the notion of Skyline. Such an approach adopts Skyline operator to prune rebundunt CWS candidates then employs Particle Swarm Optimization to select CWS from amount of candidates for composing single service into a more powerful composite service. In order to show the proposed approach, an experiment based on real dataset is conducted. Experimental results show that the approach is effective and efficient for CWS composition.

The fourth article, "A Novel Approach to detect Network Malicious Activity based on Cloud Computing Testbed" by Junwon Lee, Jaeik Cho, Jungtaek Seo, Taeshik Shon, Dongho Won, analyzed typical example of network testbeds, which have been used for malicious activity data collection and its subsequent analysis. Furthermore an effective malicious network application testbeds, which is based on a cloud system is proposed. Also the new testbed was compared with real malicious activity with the cloud-based testbeds results in order to verify the performance.

The next article, "A Survey of Computation Offloading for Mobile Systems" from Karthik Kumar, Jibang Liu and Yung-Hsiang Lu, is a survey paper that provides an overview of the background, techniques, systems, and research areas for offloading computation. This article takes on as it describes brief history of enabling technologies, two objectives for offloading, and why offloading will become increasingly important in the future.

The sixth article, "Accurate and Efficient Node Localization for Mobile Sensor Networks" by Hongyang Chen, consider a range-free cooperative localization algorithm for mobile sensor networks by combining hop-distance measurements with particle filtering. In the article a differential-error correction scheme was designed in hop-distance measurement step in order to backoff-based broadcast mechanism in the proposed localization algorithm. The proposed localization method has fast convergence with small location estimation error.

The seventh, "A Survey of Energy Efficient Mobile Cloud Computing" by Yong Cui, Xiao Ma, Hongyi Wang and Jiangchuan Liu, discuss the trade-off and then present a survey of related works. Based on the significance of wireless network interface in the power use of mobile devices, considerable researches have been de-voted to a low-power design of the usage style/protocol. This effort towards enhancing energy efficiency has allowed providing a comprehensive summary of recent work on transmission energy savings. Additionally, as one increasingly prevalent type of application in mobile cloud environments, location based applications also present some inherent limitations surrounding energy. For example, the GPS (Global Positioning System) based positioning mechanism is well-known to be extremely power-hungry. Moreover this article present an overview of energy-efficient positioning mechanism which

have emerged in the last 2 or 3 years and discuss the future research directions of energy efficiency issues.

The last article, "Window-based Rate Adaptation in 802.11n Wireless Networks" the authors (Ioannis Pefkianakis, Yun Hu, Suk-Bok Lee, Chunyi Peng, Sofia Sakellaridi, Songwu Lu) used real experiments to study MIMO 802.11n Rate Adaptation (RA) on a programmable AP platform. The result revealed nontrivial inter-, intra-mode opportunistic gains with respect to transient channel variations in both MIMO operation mode of Diversity and Spatial Multiplexing. To exploit these short-term gains, a new Window-based Rate Adaptation (WRA) algorithm was designed and implemented. WRA differently from existing MIMO 802.11n proposals, runs an independent RA in each MIMO mode in parallel, to address the unique characteristics of each MIMO mode. To Window for each individual mode, and opportunistically selects the best-goodput rate among the candidates on a per-transmission basis. WRA also applied novel techniques to limit probing overhead and to improve responsiveness to mobility. The experiments show that WRA gives 52.8 % goodput gains over Atheros MIMO RA algorithm, and 72.5 % gains over practical legacy 802.11a/b/g designs in field trials.

Taeshik Shon received his Ph.D. degree in Information Security from Korea University, Seoul, Korea and his M.S. and B.S. degree in computer engineering from Ajou University, Suwon, Korea. While he was working toward his Ph.D. degree, he was awarded a KOSEF scholarship to be a research scholar in the Digital Technology Center, University of Minnesota, Minneapolis, USA, from February 2004 to February 2005. From Aug. 2005 to Feb. 2011, Dr. Shon had been a senior engineer in the Convergence S/W Lab, DMC R&D Center of Samsung Electronics Co., Ltd. He is currently a professor at the Division of Information and Computer Engineering, College of Information Technology, Ajou University, Suwon, Korea. He was awarded the Gold Prize for the Sixth Information Security Best Paper Award from the Korea Information Security Agency in 2003, the Honorable Prize for the 24th Student Best Paper Award from Microsoft-KISS, 2005, the Bronze Prize for the Samsung Best Paper Award, 2006, and the Second Level of TRIZ Specialist certification in compliance with the International TRIZ Association requirements, 2008. He is also serving as a guest editor, an editorial staff and review committee of Computers and Electrical Engineering—

Elsevier, Mobile Network & Applications—Springer, Security and Communication Networks—Wiley InterScience, Wireless Personal Communications—Springer, Journal of The Korea Institute of Information Security and Cryptology, IAENG International Journal of Computer Science, and other journals. His research interests include Convergence Platform Security, Mobile Cloud Computing Security, Mobile/Wireless Network Security, WPAN/WSN Security, anomaly detection algorithms, and machine learning applications.

Athanasios(Thanos) Vasilakos is currently Professor at the Dept. of Computer and Telecommunications Engineering, University of Western Macedonia, Greece and visiting Professor at the Graduate Programme of the Dept. of Electrical and Computer Engineering, National Technical University of Athens (NTUA). He is coauthor (with W. Pedrycz) of the books Computational Intelligence in Telecommunications Networks (CR press, USA, 2001), Ambient Intelligence, Wireless Networking, Ubiquitous Computing (Artech House, USA, 2006), coauthor (with M. Parashar, S. Karnouskos, W. Pedrycz) Autonomic Communications (Springer, to appear), Arts and Technologies (MIT Press, to appear), coauthor (with M. Anastasopoulos) Game Theory in Communication Systems (IGI Inc, USA, to appear), co-author with Yan Zhang, Thrasyvoulos Spyropoulos) Delay Tolerant Networking (CRC press, to appear).

He has published more than 200 articles in top international journals (i.e. IEEE/ACM Transactions on Networking, IEEE T-Information Theory, IEEE JSAC, IEEE Transactions on Wireless Communications, IEEE Transactions on Evolutionary Computation, IEEE Transactions on Neural Networks, IEEE Transactions on Systems, Man, &Cybernetics etc.) and conferences in the area of Computational Intelligence, Cognitive Informatics, Telecommunications Networks, Game Theory, Evolutionary Game Theory, Networking, Mobile Computing and Wireless Networking, Digital and Internet Arts. He chairs several conferences i.e., IEEE IWCMC 9, and he served or is serving in the TPC of several conferences/symposia including IEEE INFOCOM 2009, IEEE ICAC 8, 09, ICC 8, IEEE GLOBECOM 2009, IEEE BIBE 8, IEEE/WIC/ACM WEB Intelligence 2007(WI 7), WEBIST 007, IEEE WCCI 8, IEEE IJCNN 8, AAIA 7, IEEE CEC 007/2008, IEEE FOCI 7, IEEE CIBCB 7, IEEE BIBE 7, IEEE INFOCOM (2001), 1st IEEE International Workshop on Specialized Ad Hoc Networks and Systems (SAHNS 2007), IEEE International Conference on Mobile Ad-hoc and Sensor Systems (MASS 2006 and 2007), GC'07ASNS (IEEE Globecom 2007 Ad-hoc and Sensor Networking Symposium), 4th International Conference on Ubiquitous Intelligence and Computing (UIC-07) 2007. He is the Editor-in-chief of the Inderscience Publishers journals: International Journal of Adaptive and Autonomous Communications Systems, International Journal of Arts and Technology. He was or he is at the editorial board of several international journals: IEEE Communications Magazine (1999–2002 & 2008–), IEEE Transactions on Systems, Man and Cybernetics (SMC, Part B, 2007–), ACM Transactions on Autonomous and Adaptive Systems (ACM TAAS, invited), IEEE Transactions on Wireless Communications (invited), ACM/Springer Wireless Networks, Wireless Communications and Mobile Computing (Wiley), EURASIP journal on Wireless and Communications Netwoks (WCN), Computer Communications (Elsevier,1988–1991), ACM Applied Computing Reviews (ACM ACR), Soft Comput?ing (Springer), Information Sciences (Elsevier), International Journal on Computational Intelligence Research, International Journal on Cognitive Informatics and Natural Intelligence (IJCiNi), International Journal of Ad Hoc and Ubiquitous Computing (IJAHUC), ACM Computers in Entertainment (ACM CIE), Journal of Computational Intelligence in Bioinformatics and Systems Biology (JCIBSB), International Journal of Functional Informatics and Personalised Medicine ((IJFIPM), International Journal of Mobile Communications (IJMC), International Journal of Computational Science (IJCS), International Journal of Internet Protocol Technology (IJIPT), Cluster Computing (Springer), Security and Communications journal (Wiley), Journal of Sensors (Hindawi), Journal of Supercomputing (Springer),. Guest Editor of several journals, such as IEEE T-Systems, Man and Cybernetics (special issue: Computational Intelligence in Telecommunications Networks,2003), ACM Transactions on Autonomous and Adaptive Systems (http://www.acm.org/pubs/taas/special issues on I) Autonomic Communications II) Ambient Intelligence), IEEE Journal on Selected Areas in Communications-IEEE JSAC (lead guest editor, Wireless and Pervasive Networks in Healthcare), Journal on Interactive Learning Research (Computational Intelligence in Web-based Education, vol 15, no 4, 2004), IJCiNi (special issue: Ambient Intelligence (AmI) and Arts), IJCS (http://www.gip.hk/ijcs/special issue: Computational Arts), Journal of Computational Intelligence in Bioinformatics and Systems Biology (Classify the Classifiers: Investigating the Optimum Classification Technique per case in Bioinformatics), IEEE T-Systems, Man and Cybernetics (special issue: Game Theory), IEEE Transactions on Information Technology in Biomedicine (Affective and Pervasive Computing in Biomedicine) etc. He was chairman of the Telecommunications Committee of the ERUDIT, European network of excellence in fuzzy logic and its applications and he is chairman of the Telecommunications Task Force of the Intelligent Systems Applications Technical Committee (ISATC) of the IEEE Computational Intelligence Society (CIS). Senior Deputy Secretary-General and fellow member of ISIBM www.isibm.org (International Society of Intelligent Biological Medicine (ISIBM)). He is member of the IEEE and ACM.

Bharat Bhargava is a professor of the Department of Computer Science with a courtesy appointment in the School of Electrical & Computer Engineering at Purdue University. Professor Bhargava is conducting research in security and privacy issues in distributed systems. This involves host authentication and key management, secure routing and dealing with malicious hosts, adaptability to attacks, and experimental studies. Related research is in formalizing evidence, trust, and fraud. Applications in e-commerce and transportation security are being tested in a prototype system. Based on his research in reliability, he is studying vulnerabilities in systems to assess threats to large organizations. He has developed techniques to avoid threats that can lead to operational failures. The research has direct impact on nuclear waste transport, bio-security, disaster management, and homeland security. These ideas and scientific principles are being applied to the building of peer-to-peer systems, cellular assisted mobile ad hoc networks, and to the monitoring of QoS-enabled network domains.

In the 1988 IEEE Data Engineering Conference, he and John Riedl received the best paper award for their work on "A Model for Adaptable Systems for Transaction Processing." Professor Bhargava is a Fellow of the Institute of Electrical and Electronics Engineers and of the Institute of Electronics and Telecommunication Engineers. In 1999, he received the IEEE Technical Achievement Award for a major impact of his decade long contributions to foundations of adaptability in communication and

distributed systems. He has been awarded the charter Gold Core Member distinction by the IEEE Computer Society for his distinguished service. He received Outstanding Instructor Awards from the Purdue chapter of the ACM in 1996 and 1998. He has graduated the largest number of Ph.D students in CS department and is active in supporting/mentoring minority students. In 2003, he was inducted in the Purdue's Book of Great Teachers.

He serves on seven editorial boards of international journals. He also serves the IEEE Computer Society on Technical Achievement award and Fellow committees. Professor Bhargava is the founder of the IEEE Symposium on Reliable and Distributed Systems, IEEE conference on Digital Library, and the ACM Conference on Information and Knowledge Management.

Ivan Stojmenovic received his Ph.D. degree in mathematics in 1985. He earned a third degree prize at the International Mathematics Olympiad for high school students in 1976. He held regular or visiting positions in Serbia, Japan, USA, France, Spain, Brazil, Hong Kong, Taiwan, China (Distinguished Professor, Tsinghua University in Beijing and Dalian University of Technology, 2010–2), UK (Chair in Applied Computing, EECE, University of Birmingham, 2007/8), Canada (SITE, University of Ottawa, since 1988).

He published >290 different papers in refereed journals and conferences; >30 are in IEEE or ACM journals. He co-authored 'Wireless Sensor and Actuator Networks' (Wiley, 2010), and (co)edited five books with Wiley: 'Handbook of Wireless Networks and Mobile Computing' (2002), 'Mobile Ad Hoc Networking' (IEEE/Wiley, 2004), 'Handbook of Sensor Networks'(2005), 'Handbook of Applied Algorithms' (2008), 'RFID Systems' (2010). He coauthored over 40 book chapters. He collaborated with >100 co-authors with Ph.D. and a number of their graduate students from 25 different countries. He (co)supervised >60 completed Ph.D. and master theses, and published over 130 joint articles with supervised students. His current research interests are mainly in wireless ad hoc, sensor, vehicular, actuator and robot networks. His research interests also include security, parallel computing, multiple-valued logic, evolutionary computing, neural networks, combinatorial algorithms, computational geometry, graph theory, computational chemistry, image processing, programming languages, and computer science education. He was cited >11000 times. His h-index is 52 (he is listed among 250 computer science researchers with h≥50; top h-index in Canada for mathematics and statistics) and g-index is 101. ESI Special Topics listed him #3 in papers, #9 in cites/paper, and #20 in total cites among all authors Wireless/Mobile Networks 1995–2005. One of his articles, on broadcasting in ad hoc wireless networks, was recognized as the Fast Breaking Paper, for October 2003 (as the only one for all of computer science), by Thomson ISI Essential Science Indicators http://esi-topics.com/fbp/fbp-october2003.html. Microsoft Academic Research lists him among top 100 researchers in networking & communications. He received four best paper awards at conferences (IFIP PWC 2004, SENSORCOMM 2008, CSA 2009, ICA3PP 2011) and Excellence in Research Award of the University of Ottawa for 2009. He presented a number of tutorials and invited talks. He is Tsinghua 1000 Plan Distinguished Professor (2012–5). He is recipient of the Royal Society Research Merit Award, UK, 2007–8. He is Fellow of the IEEE (Communications Society, class 2008), and Canadian Academy of

Engineering (since 2012). He was IEEE CS Distinguished Visitor 2010–11. Stojmenovic received (as PI or co-PI) about 30 grants from Serbia, Canada, Mexico, China, USA, UK, Japan and EU). He received two NSERC Collaborative Research Development (CRD) projects and two NSERC Strategic Grants. He was Director of the Ottawa-Carleton Institute for Computer Science (2002–2004).

He is editor-in-chief of IEEE Transactions on Parallel and Distributed Systems (2010–2013), managing editor of Journal of Multiple-Valued Logic and Soft Computing (received Certificate of Appreciation from IEEE Computer Society in 2002 for establishing and maintaining the journal), International Journal of Parallel, Emergent and Distributed Systems (T & F), and Ad Hoc & Sensor Wireless Networks, An International Journal (OCP), and editor of several journals including ACM Wireless Networks, Parallel Processing Letters, JCST, IJHPCN, IJWMC, IJPCC, JIE, IJVT, JWCN. He recently guest edited special issues in several journals including IEEE TAC, IEEE JSAC, IEEE TPDS, IEEE Computer Magazine, IEEE Networks, IJDSN, Wireless Communications and Mobile Computing, Ad Hoc Networks, Telecommunication Systems, Cluster Computing, Int. J. Found. Computer Science. Stojmenovic founded several workshops: WWASN at IEEE ICDCS, WiSARN at IEEE WoWMoM, IEEE/ACM CPSCom, IEEE MASS and IEEE INFOCOM, FOWANC at ACM MOBIHOC, LOCAN at IEEE MASS and MSN, LOCALGOS at IEEE DCOSS, and organized several research workshops. He is/was program chair for >30 events, including conferences FCST 2010, AdHocNow 2008, IEEE PIMRC 2008, EUC 05,08,09,10, IEEE AINA-07, IEEE MASS-04, and -07, InterSense-06, WONS-05, MSN-05 and -06, ISPA-05 and -07, and workshops at IEEE ICDCS 2003-07; IEEE LCN-05-06, HICSS, 2000, 2002, 2003; ICPDS-02; ICPP-00. He was also general co-chair, organizer, steering committee member, advisor, award, or workshop chair for ≈30 events since 2002, including IEEE INFOCOM, IEEE MASS, IEEE DCOSS, ACM Mobicom/Mobihoc, IEEE ICPADS, IEEE IPDPS, IFIP WMNC, IFIP WSAN, IFIP PWC. Stojmenovic served as member of >200 program committees.

Hai Jin is a Cheung Kung Scholars Chair Professor of computer science and engineering at the Huazhong University of Science and Technology (HUST) in China. He is now Dean of the School of Computer Science and Technology at HUST. Jin received his PhD in computer engineering from HUST in 1994. In 1996, he was awarded a German Academic Exchange Service fellowship to visit the Technical University of Chemnitz in Germany. Jin worked at The University of Hong Kong between 1998 and 2000, and as a visiting scholar at the University of Southern California between 1999 and 2000. He was awarded Excellent Youth Award from the National Science Foundation of China in 2001. Jin is the chief scientist of ChinaGrid, the largest grid computing project in China, and the chief scientist of National 973 Basic Research Program Project of Virtualization Technology of Computing System.

Jin is a senior member of the IEEE and a member of the ACM. Jin is the member of Grid Forum Steering Group (GFSG). He has co-authored 15 books and published over 400 research papers. His research interests include computer architecture, virtualization technology, cluster computing and grid computing, peer-to-peer computing, network storage, and network security

Jin is the steering committee chair of International Conference on Grid and Pervasive Computing (GPC), Asia-Pacific Services Computing

Conference (APSCC), International Conference on Frontier of Computer Science and Technology (FCST), and Annual ChinaGrid Conference. Jin is a member of the steering committee of the IEEE/ACM International Symposium on Cluster Computing and the Grid (CCGrid), the IFIP International Conference on Network and Parallel Computing (NPC), and the International Conference on Grid and Cooperative Computing (GCC), International Conference on Autonomic and Trusted Computing (ATC), International Conference on Ubiquitous Intelligence and Computing (UIC).

Albert Y. Zomaya is currently the Chair Professor of High Performance Computing & Networking and Australian Research Council Professorial Fellow in the School of Information Technologies, The University of Sydney. He is also the Director of the Centre for Distributed and High Performance Computing which was established in late 2009.

Professor Zomaya held the CISCO Systems Chair Professor of Internetworking during the period 2002–2007 and also was Head of school for 2006–2007 in the same school. Prior to his current appointment he was a Full Professor in the School of Electrical, Electronic and Computer Engineering at the University of Western Australia, where he also led the Parallel Computing Research Laboratory during the period 1990–2002. He served as Associate-, Deputy-, and Acting-Head in the same department, and held numerous visiting positions and has extensive industry involvement. Professor Zomaya received his PhD from the Department of Automatic Control and Systems Engineering, Sheffield University in the United Kingdom.

Professor Zomaya is the author/co-author of seven books, more than 370 publications in technical journals and conferences, and the editor of nine books and 11 conference volumes. He is the Editor in Chief of the IEEE Transactions on Computers and serves as an associate editor for another 19 journals including some of the leading journals in the field, such as, IEEE Transactions on Parallel and Distributed Systems and Journal of Parallel and Distributed Computing. He is the Founding Editor of the Wiley Book Series on Parallel and Distributed Computing and the Co-Editor (with Professor Yi Pan) of the Wiley Book Series on Bioinformatics and (with Professor Mary Eshaghian-Wilner) the Wiley Book Series on Nature Inspired Computing. He is the Editor-in-Chief of the Parallel and Distributed Computing Handbook (McGraw-Hill, 1996).

Professor Zomaya was the Chair of the IEEE Technical Committee on Parallel Processing (1999–2003) and currently serves on its executive committee. He also serves on the advisory board of the IEEE Technical Committee on Scalable Computing, the advisory board of the Machine Intelligence Research Labs (MIR Labs), is a scientific council member of the Institute for Computer Sciences, Social-Informatics, and Telecommunications Engineering (Brussels) and member of the board of the IEEE Systems, Man, and Cybernetics Society Technical Committee on Self-Organized Distributed and Pervasive Systems. Professor Zomaya has delivered more than 100 keynote addresses, invited seminars, and media briefings and has been actively involved, in a variety of capacities, in the organization of more than 570 national and international conferences.

Professor Zomaya is a Fellow of the IEEE, Fellow of the American Association for the Advancement of Science, a Fellow of the Institution of Engineering and Technology, a Distinguished Engineer of the ACM and a Chartered Engineer (CEng). He received the 1997 Edgeworth David Medal by the Royal Society of New South Wales for outstanding contributions to Australian Science. In September 2000 he was awarded the Meritorious Service Award and in 2006 was made a member of the Golden Core (both from the IEEE Computer Society). His research interests are in the areas of algorithms, complex systems, parallel and distributed systems and networking.