

Introduction to the IEEE Transactions on Cloud Computing

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WELCOME to the *IEEE Transactions on Cloud Computing (TCC)*. It is my privilege and honor to serve as the inaugural Editor-in-Chief of *TCC*. I would like to thank the IEEE and the world-wide Cloud Computing community for giving me the opportunity to serve them.

Let me first share some of the open opportunities and challenges in Cloud Computing and then introduce the transactions and its progress.

1. Opportunities and Challenges

Computing is being transformed to a model consisting of services that are commoditized and delivered in a manner similar to utilities such as water, electricity, gas, and telephony. In such a model, users access services based on their requirements regardless of where the services are hosted. Several computing paradigms have promised to deliver this utility computing vision. Cloud computing is the most recent emerging paradigm promising to turn the vision of “computing utilities” into reality.

Cloud computing started with a risk-free concept: Let someone else take the ownership of setting up of IT infrastructure and let end-users tap into it, paying only for what is been used. A service offering computation resources is frequently referred to as Infrastructure as a Service (IaaS) and the applications as Software as a Service (SaaS). An environment used for construction, deployment, and management of applications is called PaaS (Platform as a Service).

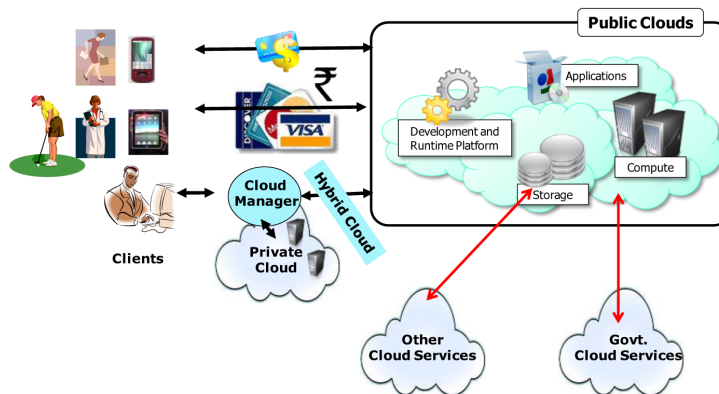


Fig. 1. A bird's eye view of Cloud computing.

Several IT vendors are promising to offer storage, computation, and application hosting services, and provide coverage on several continents, offering Service-Level Agreements (SLA) backed performance and uptime promises for their services. Cloud computing delivers infrastructure, platform, and software (application) as services, which are made available as subscription-oriented services in a pay-as-you-go model to consumers. The price that CSPs (Cloud Service Providers) charge depends on the quality of service (QoS) expectations of CSCs (Cloud Service Consumers).

Cloud computing fosters elasticity and seamless scalability of IT resources that are offered to end users as a service through the Internet. Cloud computing can help enterprises improve the creation and delivery of IT solutions by providing them with access to services in a cost-effective and flexible manner. A bird's eye view of Cloud computing is shown in Fig. 1.

Clouds can be classified into three categories, depending on their accessibility restrictions and the deployment model. They are:

- Public Cloud,
- Private Cloud, and
- Hybrid Cloud.

A public Cloud is made available in a pay-as-you-go manner to the general public users irrespective of their origin or affiliation. A private Cloud's usage is restricted to members, employees, and trusted partners of the organization. A

hybrid Cloud enables the use of private and public Cloud in a seamless manner. In a typical public Cloud scenario, a third-party vendor delivers services such as computation, storage, networks, virtualization, and applications to various customers. In a private Cloud environment, internal IT resources are used to serve their internal users and customers. Businesses are adopting public Cloud services to save capital expenditure and operational costs by leveraging Cloud's elastic scalability and market-oriented costing features. Nevertheless, public Cloud computing also raises concerns about data security, management, data transfer, performance, and level of control.

Cloud computing applications span many domains, including business, technology, government, health care, smart grids, intelligent transportation networks, life sciences, disaster management, automation, data analytics, and consumer and social networks. Various models for the creation, deployment, and delivery of these applications as Cloud services have emerged.

The business potential of Cloud computing is recognized by several market research analysts. My own guesstimate is that the worldwide spending on Cloud services will reach about a trillion dollar by 2020. To achieve this potential, several technological, business, security, and application-oriented challenges need to be addressed.

2. Open Research Challenges

Cloud computing introduces many challenges for system and application developers, engineers, system administrators, and service providers (see Fig. 2). These include:

1. How do we effectively manage the virtual machine (VM) life cycle to deliver quality expectations of consumers and at the same time reduce the cost delivery of services?
2. How do we secure the data and computation on the VMs managed by Cloud service providers?
3. How do we guarantee users' privacy and trust requirements?
4. How do we meet legal and regulatory compliance requirements about data hosting in Clouds?
5. What should the model of pricing for services be?
6. How do we manage Service Level Agreements (SLAs) and how do we guarantee quality of service (QoS) satisfaction and prevent or minimize SLA violations?
7. How do we balance the energy consumption and performance of data centers so that users can be charged at a nominal rate?
8. How do we choose data centers' locations so that data security, operation costs, and energy consumption meet the terms in the SLA signed with users?
9. Should the application logic and its scalability be handled by the application itself or be entrusted to a third party service?
10. What level of replication of data and application components is needed to guarantee reliable delivery of services?
11. How do we create Cloud applications rapidly and manage their life cycle?
12. What standards and interfaces are needed for portability and scalability of application services?



Fig. 2. Key open challenges in Cloud computing.

3. Introducing the IEEE Transactions on Cloud Computing

The Cloud computing paradigm is rapidly progressing, as evidenced by its adoption for the creation and delivery of innovative applications in several domains including scientific, consumer, social networks, health care, enterprises, banking, government, and big data. Several trade magazines have been actively featuring industrial development in

Cloud computing. The IEEE, as part of its “IEEE Cloud Computing Initiative,” has identified the need for a respected journal for publishing research in Cloud computing. To support rapid dissemination of innovative research results (i.e., theoretical and practical models, algorithms, technologies, and solutions for Cloud computing) at a similar pace for the benefit of society, the IEEE launched the new *IEEE Transactions on Cloud Computing*. The new transactions will publish peer-reviewed articles that provide innovative research ideas and results in all areas relating to Cloud computing. Topics relating to novel theory, algorithms, performance analyses, and applications of techniques relating to all areas of Cloud computing will be considered for the transactions. For more details, please visit the *TCC* website: <http://www.computer.org/tcc>

The new transactions is managed by the IEEE Computer Society in partnership with other sister societies, namely, the IEEE Communications Society, the IEEE Systems Council, the IEEE Power & Energy Society, and the IEEE Consumer Electronics Society. The strategic directions of the transactions are managed by the Steering Committee chaired by Professor Jon Rokne.

4. Progress, Process, and Acknowledgements

In my role as the inaugural Editor-in-Chief (EiC) of *TCC*, one of my first tasks was to establish the Editorial Board (EB) whose members will be responsible for the technical quality of the journal. The members of the EB will serve as Associate Editors and they will be involved in the management of the peer reviews of the submitted manuscripts and selection of reviewers.

In consultation with the Steering Committee of *TCC*, I have identified leading, internationally recognized, researchers working in Cloud computing from all over the world. On approval from the Steering Committee, the IEEE Computer Society has appointed them as Associate Editors and members of the EB. A complete list of EB members is included at the end of this introduction.

Since its launch early this year, *TCC* has been accepting submission of papers that introduce original and innovative ideas. That means submission of “extended versions” of already published works (e.g., conference/workshop papers) is not encouraged unless they contain significant number of “new and original” ideas/contributions along with more than 49 percent “brand new” material.

TCC has been attracting submissions from academic researchers, industrial practitioners, policy and standards developers, and application communities from all over the world. During the last five months, we have received more than 150 submissions. In addition, we have scheduled four special issues focused on specific challenges in Cloud computing. They are also encouraging submission of revised versions of papers that are recognized as best papers from associated conferences.

Along with EB members, I have been managing the content of the transactions and the rigorous peer review process to ensure publication of original and high-quality papers. Based on the quality, focus, and scope of each submitted paper, it either gets assigned to a suitable Associate Editor or desk rejected with suitable suggestions. Each paper that advances to the full review phase is assigned to an appropriate Associate Editor, who seeks three or more review reports from peers and experts in the field and makes an appropriate recommendation. As the EiC, I have been able to make the final decision on each paper based on peer review reports and the recommendation of AE. The IEEE Computer Society is managing the manuscripts workflow from their initial submission to the final publication.

The papers accepted for the first issue of *TCC* cover hot topics in Cloud computing ranging from Cloud security to energy-efficient resource provisioning. I hope you will enjoy reading them and get inspired to innovate further.

I would like to thank the authors, reviewers, and readers for their interest in *TCC*. I acknowledge the strong support offered by all members of the Steering Committee, colleagues from the IEEE Computer Society, members of the Editorial Board, and the Cloud computing community world-wide in getting *TCC* up and running.

I request your continued support for establishing *TCC* as the premier forum for Cloud computing research and innovation. Your feedback and comments on further improving *TCC* are highly appreciated.

Rajkumar Buyya
Editor-in-Chief



Sanjeev K. Aggarwal received the MTech and PhD degrees, both from IIT Kanpur, in 1981 and 1986, respectively. For his PhD thesis, he worked on the Automatic code Generation problem and developed a framework for retargetable code generation. This work was later used in Industrial compilers. He has published extensively in international forums and has handled a large number of funded projects. He is with the Department of Computer Science and Engineering at the Birla Institute of Technology, Goa, India. He has approximately 27 years of research and teaching experience. Earlier, he was with the Department of Computer Science and Engineering at IIT Kanpur. He worked with Tata Research Development and Design Centre, Pune, from 1986 to 1990. At TRDDC, he was project leader for the CHILL compiler suite which was developed for C-DOT's digital switches. The project involved development of highly optimizing CHILL compilers and debuggers. He has hands-on experience with compiler development, testing, and project management. His areas of research interest are Cloud/Grid computing, multicore computing, compilers for high performance architectures, and application of language processing technology in tools for software engineering. He has been teaching courses on Grid/Cloud computing, compiler design, compilers for high performance architectures, and programming languages. He is the Director of BITS Pilani, Goa, and was head of Computer Centre at IIT Kanpur during 1997-2002, head of the Department of Computer Science and Engineering at IIT Kanpur during 2003-2005, and Dean of Resource Planning and Generation at IIT Kanpur during January 2008-January 2011.



Gagan Agrawal received the BS degree from IIT Kanpur and the MS and PhD degrees from the University of Maryland, College Park. He is a professor of computer science at Ohio State University. He has worked in a number of research areas, including parallel compilation and runtime support, data mining, and Grid and Cloud computing. His recent research is focused on two areas: tools and programming models for accelerator-based computing, and managing and processing large-scale data sets. He has published more than 200 papers in these areas.



Shivnath Babu is an associate professor in the Department of Computer Science at Duke University. His primary research interest is in making data-intensive computing systems easier to manage. Recent work from his research group has focused on the Hadoop MapReduce system. Check out the Starfish project (<http://www.cs.duke.edu/starfish/>). He is very interested in using Cloud platforms for online experimentation to aid system tuning and testing. The vision of the Flex project is to enable users—irrespective of whether they are end-users, developers, or system administrators—to have programmatic access to collect information needed for system testing and tuning through planned experiments on the Cloud. The DIADS project tackles integrated problem diagnosis for database systems running on networked storage as well as automated detection and recovery from data

corruption caused by hardware faults, software bugs, or human mistakes. The work is supported by startup funds from Duke, grants from the US National Science Foundation, faculty awards from IBM, an equipment grant from IBM, and resource usage grants from Amazon Web Services.



Pavan Balaji holds appointments as a computer scientist at the Argonne National Laboratory, as an Institute Fellow of the Northwestern-Argonne Institute of Science and Engineering at Northwestern University, and as a Research Fellow of the Computation Institute at the University of Chicago. He leads the Programming Models and Runtime Systems group at Argonne. His research interests include parallel programming models and runtime systems for communication and I/O, modern system architecture (multicore, accelerators, complex memory subsystems, high-speed networks), and Cloud computing systems. He has nearly 100 publications in these areas and has delivered nearly 120 talks and tutorials at various conferences and research institutes. He is a recipient of several awards, including the US Department of Energy Early Career award in 2012, TEDxMidwest

Emerging Leader award in 2013, Crain's Chicago 40 under 40 award in 2012, Los Alamos National Laboratory Director's Technical Achievement award in 2005, Ohio State University Outstanding Researcher award in 2005, five best paper awards, and various others. He serves as the worldwide chairperson for the IEEE Technical Committee on Scalable Computing (TCSC). He has also served as a chair or editor for nearly 50 journals, conferences, and workshops, and as a technical program committee member for numerous conferences and workshops. He is a senior member of the IEEE and a professional member of the ACM. More details about Dr. Balaji are available at <http://www.mcs.anl.gov/~balaji>.



Sorav Bansal received the BTech degree in computer science from IIT Delhi in 2001 and the PhD degree from Stanford University in 2008, where he developed a compiler optimization technique called “peephole superoptimization.” He leads the systems research group in the Computer Science Department at the Indian Institute of Technology (IIT) Delhi, where his research touches many areas, including fast machine virtualization, binary translation, compiler optimizations, parallel programming, concurrency testing, and data center design. He has published in premier operating system, programming language, and networking conferences and journals including OSDI, SOSP, ASPLOS, FAST, and INFOCOM. He has received multiple research grants/faculty awards from the Government of India and private sector companies like NetApp, Freescale, IBM, among others. For his pedagogical contributions, he received the “Teaching Excellence Award” from IIT Delhi in 2012-2013.



Umesh Bellur is a professor of computer science and engineering at IIT Bombay. Prior to this, he was the founder of a startup (Collation Inc.) in the California Bay area which was subsequently acquired by IBM. He has more than 15 years of professional experience after receiving the PhD degree from Syracuse University. He was awarded the IBM Faculty award for this work in autonomic distributed computing in 2006 and the SAP Research and Innovation award for his work in QoS-based routing in event overlays in 2008. More information can be found at: <http://www.cse.iitb.ac.in/~umesh>.



David Bernstein is Managing Director of Cloud Strategy Partners, consulting in Cloud Computing. His clients range from International Telcos to Silicon Valley Start-ups. He specializes in Cloud construction, security, compliance, performance engineering, and big data. He has held executive positions at Cisco, AT&T, Siebel Systems, Pluris, Intertrust, and Santa Cruz Operation. At SCO, he created the first PC UNIX–XENIX. He holds nearly a dozen patents and speaks at conferences and publishes scientific papers regularly. He is Founder and Working Group Chairman, IEEE P2302: Standard for Intercloud Interoperability and Federation; Program Director/Chief Architect IEEE Global Intercloud Testbed; Contributing Scientist, Information Technology Lab, Cloud Computing Project, NIST/US Department of Commerce; Industry Expert Group/Roadmap Editorial Board, SIENA (RI-261575) Standards and Interoperability for eInfrastructure Implementation Initiative, and CloudWatch (RI-610994) European Cloud Observatory, both of European Commission Framework Programme 7; and Co-Chair, IEEE International Workshop Series on Cloud Computing Interoperability and Services. He graduated a Regents Scholar with Highest Honors in Physics and Mathematics from University of California.



Ricardo Bianchini received the PhD degree in computer science from the University of Rochester. He is currently a professor of computer science at Rutgers University. His research interests include Cloud computing, and power/energy/thermal management of data centers. In fact, Professor Bianchini is a pioneer in data center energy management, energy-aware storage systems, energy-aware load distribution across data centers, and leveraging renewable energy in data centers. Professor Bianchini has cochaired the program committees of several conferences and workshops, and currently serves on the editorial board of four journals. Professor Bianchini has published five award papers, and has received the CAREER award from the US National Science Foundation. He is currently an ACM Distinguished Scientist.



Irena Bojanova, PhD, is the Founding Chair of the IEEE CS Cloud Computing STC and an editorial board member of *IT Professional*. She is a professor and program director of information and technology systems at the University of Maryland University College, managed academic programs at Johns Hopkins University and Plisoft Ltd., and costarted OBS Ltd., (now CSC Bulgaria). Her current research interests include Cloud computing, Web-based systems, and educational innovations. She is a member of the IEEE and can be reached at ibojanova@umuc.edu.



Ivona Brandic received the PhD degree in 2007 and her *venia docendi* for practical computer science in 2013, both from the Vienna University of Technology. She is an assistant professor in the Distributed Systems Group, Information Systems Institute, Vienna University of Technology (TU Wien). Prior to that, she was an assistant professor in the Department of Scientific Computing, Vienna University. From 2003 to 2007, she participated in the special research project AURORA—Advanced Models, Applications and Software Systems for High Performance Computing and the European Union’s GEMSS—Grid-Enabled Medical Simulation Services project. She was involved in the European Union’s SCube project and she led the Austrian national FoSII—Foundations of Self-governing ICT Infrastructures project funded by the Vienna Science and Technology Fund (WWTF).

She is a management committee member of the European Commission’s COST Action on Energy Efficient Large Scale Distributed Systems. From June to August 2008 she was a visiting researcher at the University of Melbourne, Australia. Dr. Brandic is on the editorial board of the Springer *Journal on Scalable Computing*. In 2011, she received the Distinguished Young Scientist Award from the Vienna University of Technology for her HALEY project on Holistic Energy Efficient Hybrid Clouds. Her interests comprise Service Level Agreement and Quality of Service management in large-scale distributed systems, autonomic computing, workflow management for scientific applications, and energy efficient large scale distributed systems (Cloud, Grid, Cluster, etc.). She has published more than 50 scientific journal, magazine, and conference publications and she coauthored a text book on federated and self-manageable Cloud infrastructures. She coauthored the European Union’s Cloud Computing report paving future research directions of the EU. In 2010, she chaired the International Conference on Utility and Cloud Computing, held in Chennai, India. She has served on more than 50 program committees (among others, EuroPar, COMPSAC, CloudCom) and was an invited reviewer of more than 10 international journals. In 2011, she edited two special issues for *Future Generation Computer Systems* (Elsevier) and *Scientific Programming Journal* (IOS Press). She has been invited expert evaluator of the European Commission, French National Research Organization (ANR), National Science and Engineering Research Council Canada (NSERC), and Netherlands Organization for Scientific Research (NWO).



Roy Campbell – Biography not available.



Junwei Cao received the PhD degree in computer science from University of Warwick, United Kingdom, in 2001. He received the master’s and bachelor’s degrees from Tsinghua University in 1998 and 1996, respectively. He is currently a professor and Deputy Director of the Research Institute of Information Technology, Tsinghua University, China. He is also the Director of the Open Platform & Technology Division, Tsinghua National Laboratory for Information Science and Technology, Beijing, China. His research is focused on distributed computing technology and applications. Before joining Tsinghua in 2006, he was a research scientist at the Massachusetts Institute of Technology. Before that, he worked as a research scientist at NEC Europe Ltd., Germany. He has published more than 150 academic papers and books. He is a senior member of the IEEE Computer Society and a member of the ACM and CCF.

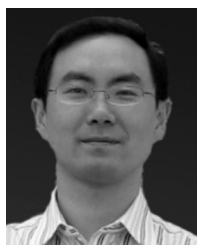


Beng Chin Ooi received the BSc (1st Class Honors) and PhD degrees from Monash University, Australia, in 1985 and 1989, respectively. He is a distinguished professor of computer science at the National University of Singapore (NUS). His research interests include database system architectures, performance issues, indexing techniques, and query processing, in the context of multimedia, spatio-temporal, distributed, parallel, P2P, and Cloud database systems and applications. He has served as a PC member for international conferences such as ACM SIGMOD, VLDB, IEEE ICDE, WWW, and SIGKDD, and as Vice PC Chair for ICDE ’00, ’04, ’06, co-PC Chair for SSD ’93 and DASFAA ’05, PC Chair for ACM SIGMOD ’07, Core DB PC chair for VLDB ’08, and PC co-Chair for IEEE ICDE ’12. He was an editor of the *VLDB Journal* and *IEEE Transactions on Knowledge and Data Engineering (TKDE)*,

Editor-in-Chief of *TKDE* (2009-2012), and a cochair of the ACM SIGMOD Jim Gray Best Thesis Award committee. He is serving as a trustee board member and executive of the VLDB Endowment. He is the recipient of the ACM SIGMOD 2009 Contributions award, a co-winner of the 2011 Singapore President’s Science Award, the recipient of the 2012 IEEE Computer Society Kanai award, and of the 2013 NUS Outstanding Researcher Award. He is a fellow of the ACM and the IEEE.



Peter Corcoran is a graduate of Trinity College Dublin with engineering and PhD degrees in 1984 and 1987. He has been a university professor for 26 years at the National University of Ireland, Galway. He is Editor-in-Chief of the *IEEE Consumer Electronics Magazine* and was elevated to IEEE fellow in 2010 for his contributions to digital camera technology. He has more than 250 technical publications, more than 55 peer reviewed journal papers, more than 100 international conference papers and publications; is co-inventor on more than 150 granted US patents, with another 100+ patents currently pending. He is currently on sabbatical leave having completed a seven year term as Vice-Dean of Research and Graduate Studies in the College of Engineering and Informatics at NUI Galway. He has a broad interest in consumer electronics (CE) technologies. More specific research interests include 1) smart-imaging and advanced digital imaging solutions, 2) CE device connectivity and networking, 3) smart grid and associated networking issues, and, naturally, 4) Cloud computing and CE devices. He is also an entrepreneur and industry consultant.



Yong Cui received the BE and PhD degrees from Tsinghua University, China, in 1999 and 2004, respectively. He is currently a full professor at Tsinghua University, a council member of the China Communication Standards Association, and cochair of IETF IPv6 Transition WG Software. Having published more than 100 papers in refereed journals and conferences, he received the best paper awards from ACM ICUIMC 2011 and WASA 2010. Holding more than 40 patents, he won the National Science and Technology Progress Award of China in 2005, the Influential Invention Award of China Information Industry in both 2012 and 2004. He is one of the authors of RFC 5747 and RFC 5565 for his proposal on IPv6 transition technologies. He serves on the editorial board on the *IEEE Transactions on Parallel and Distributed Systems* and *IEEE TCC*. His major research interests include

mobile wireless Internet and computer network architecture.



Cesar Augusto F. De Rose received the BSc degree in computer science from the Catholic University of Rio Grande do Sul (PUCRS, Porto Alegre, RS, Brazil, 1990), the MSc degree in computer science from the Federal University of Rio Grande do Sul (CPGCC-UFRGS, Porto Alegre, RS, Brazil, 1993), and the Doctoral degree from Karlsruhe University (KIT - Karlsruhe, Germany, 1998). He joined the PUCRS Computer Science Department as a lecturer in 1998, as a member of the Parallel and Distributed Processing Group (full professor since 2012). His research interests include resource management in parallel and distributed architectures (Cluster, Grid, and Cloud) and virtualization. In 2009, he founded and since then has been lead researcher at the PUCRS High Performance Laboratory (LAD-PUCRS).



Murat Demirbas received the PhD degree from The Ohio State University in 2004 and was a postdoctorate researcher with the Theory of Distributed Systems Group at the Massachusetts Institute of Technology (MIT) in 2005. He is an associate professor of computer science and engineering at the State University of New York at Buffalo. His research interests are in distributed and networked systems, Cloud computing, distributed algorithms, and self-stabilizing fault tolerance. He received the US National Science Foundation CAREER award in 2008, and the UB Exceptional Scholars Young Investigator Award in 2010.



David De Roure is a professor of e-Research at the University of Oxford, Director of the Oxford e-Research Centre, Co-Director of the Institute for the Future of Computing in the Oxford Martin School, and has a coordinating role in Digital Humanities at Oxford. Focused on advancing digital scholarship, he works closely with multiple disciplines, including social sciences (concentrating on *social machines* and *web observatories*), digital humanities (computational musicology), and previously bioinformatics, chemistry, environmental science, and social statistics. He is an expert in big data analytics and has an extensive background in distributed computing, Web, Linked Data, and social computing, runs the myexperiment.org social website for sharing scientific workflows, and promotes innovation in scholarly communication. He is closely involved in The Oxford Research

Centre in the Humanities, is a member of the Cyber Security Centre, and collaborates in Oxford's WSTNet laboratory with the Oxford Internet Institute. He was closely involved in the UK e-Science programme and held a national role from 2009-2013 as the UK National Strategic Director for Digital Social Research. He is a UK representative on the European e-Infrastructure Reflection Group, one of the UK PIs for the Square Kilometre Array telescope, a chair of the UK e-Science Forum, and a partner in the UK Software Sustainability Institute. He is a champion for the Web Science Trust, chairs the W3C Web Observatory Community Group, and in 2011, was elected as a research fellow at the Graduate School of Library and Information Science at the University of Illinois at Urbana-Champaign. He is a fellow of the British Computer Society, a member of the Institute of Mathematics and ITS Applications, a Supernumerary fellow of Wolfson College, and a member of the Wolfson College Digital Research Cluster.



Janakiram Dharanipragada received the PhD degree from IIT, Delhi. He is currently a professor in the Department of Computer Science and Engineering, Indian Institute of Technology (IIT) Madras, India, where he heads and coordinates the research activities of the Distributed and Object Systems Lab. His current research focus is on building large scale distributed systems focusing on design pattern-based techniques, measurements, peer-peer middleware-based grid systems, etc. He is currently the SIG Chair of Distributed Computing of the Computer Society of India and is also the founder of the Forum for Promotion of Object Technology in India. He was awarded the Boyscast Fellowship in 1997. He was awarded the IBM Faculty Award in 2007 and the Yahoo Faculty Grant in 2009. He has guided 12 PhD, more than 34 MS (research), and 60 MTech students. He has more than 150 international journal/ international conferences publications. He is a Board of Studies member of JNTU, Hyderabad, JNTU, Kakinada, Andhara University, SV University, Cochin University, VIT University, and Anna University. He has authored more than 100 research papers and is the editor for six books. His books *Grid Computing* and *Building Large Scale Software Systems* have been brought out by Tata McGraw Hill Publishers. He is the principal investigator for a number of projects which include MobiTel: Mobile Telemedicine for rural India, Peer-to-peer Concept Search (Indo-Italian Collaborative project), Service Oriented Architecture for Linux Kernel (DIT), and Cloud Bursting Architecture for Document workflow (Xerox). He is also the founding chair of the ACM Chennai chapter. He is on the board of directors for a few start-up companies in developing Cloud computing-based products (Daneebo and Exa Tech).



Beniamino Di Martino received the MS degree (magna cum laude) in physics and the PhD degree in information engineering, both from the University of Naples, Italy, in 1992 and 1996, respectively. Since 2005, he has been a full professor of information systems at the Second University of Naples, Italy. In 1994, he joined the Institute for Software Technology and Parallel Systems at the University of Vienna, Austria, where he was a researcher until 1998, funded from 1996 to 1998 by the EC Marie Curie Support scheme (Marie Curie Fellow). In 1998, he moved to the Second University of Naples, Italy, where he was an assistant professor until 2002, and an associate professor of information systems until 2005. He has been a scientific consultant for IBM Italia and ENEA (Italian National Agency for New Technology, Energy, and the Environment). He is vice director of the Department of Industrial and Information Engineering. He is the author of eight international books and more than 200 publications in international journals and conferences. He is project coordinator of EU funded FP7-ICT-2010-256910 Project "mOSAIC - Open-Source API and Platform for Multiple Clouds." He has been participating to various research projects supported by national and international organizations (international projects include: EU-ICT Mosaic and EU-SMARTCITIES CoSSmiC, EU-ARTEMIS Crystal, EU-IST OntoWeb and APART, EU-Esprit HPF+ and PPPE, CEI PACT, EU-TMR, Austrian-SFB AURORA, Austrian FWF HLPS; Italian national projects include: MUR PRIN "Cloud@Home" (responsible for SUN unit), "Mosaico" and "Iside," FAR—Laboratori Pubblico-Privati—"LC3" (responsible for SUN Unit), CNR PF and Agenda 2000 (Project Responsible)). He is an editor/associate editor of three international journals and an editorial board member of many international journals. He served as general and program chairman, and a member of program committees, of several international conferences, and as guest editor for several journals' special issues. He acted as Chair of the Nomination Committee for the "2012 IEEE Award of Excellence in Scalable Computing" and as a member of the Nomination Committee for the "2009 IEEE TCSC Medal for Excellence in Scalable Computing." He was vice Chair of the Executive Board of the IEEE CS Technical Committee on Scalable Computing. He is a member of the IEEE Working Group on Cloud Interoperability. He is a member of the Cloud Standards Customer Council. He is a member of the Cloud Computing Experts' Group of European Commission - Internet of Services, Software and Virtualization Unit. He is a member of the Steering Committee of IDEM (IDentity Management) Italian Federation. He acted as Evaluator and Reviewer of scientific projects for the European Commission (FP7 programmes ICT, ICT-PSP and eInfrastructures), for the European Research Council (ERC), for the Belgium Research Ministry, for the Luxembourg Research Ministry, for the Chile Research Ministry, for the Italian Research and Economic Development Ministries, for the Campania, Piemonte, and Calabria Regional Governments. He acted as a member of Committee for Promotion to positions of Senior Lecturer at the University of Cork, Ireland, and at the University of Lille, France. He acted as a member of Examination Committees for the degree of Doctor of Philosophy (PhD) in Computer Science for the University of Oxford, the University of Cyprus, The University of La Laguna, the University of Sidney, the University of Vienna, the University of Genova, the Calabria University, the University of Rome "Tor Vergata", the Politechnical University of Turin, and the Second University of Naples. His research interests include: knowledge discovery and management, semantic web and semantic web services, semantic-based information retrieval, Cloud computing, high performance computing and architectures, mobile and intelligent agents and mobile computing, reverse engineering, automated program analysis and transformation, algorithmic patterns recognition and program comprehension, and image analysis.



Dick Epema received the MSc and PhD degrees in mathematics from Leiden University and the MSc degree in computer science from Delft University of Technology, both in The Netherlands. He is an associate professor at TU Delft and a full professor at TU Eindhoven, and conducts research in grids, clouds, and peer-to-peer systems, with an emphasis on the design and the performance analysis of such systems. His main contribution to the area of grid computing is the design, the implementation, and the analysis of a scheduling system called KOALA for multicluster grids. His main contribution in the area of peer-to-peer systems is in mechanisms for improving download performance, for video-on-demand, and for reputations in the context of the Tribler peer-to-peer project in Delft. From 1987-1988, the fall of 1991, and the summer of 1998, he was a visiting scientist at the IBM T.J. Watson

Research Center in New York. In the fall of 1992, he was a visiting professor at the Catholic University of Leuven, Belgium, and in the fall of 2009 he spent a sabbatical at the University of California, Santa Barbara. He has coauthored more than 100 papers in peer-reviewed conferences and journals, he was a general cochair of Euro-Par 2009 and IEEE P2P 2010, he was the general chair of HPDC 2012 and CCGrid 2013, and he was vice program chair of CCGrid 2010 and program co-chair of HPDC 2013. He received best-paper awards at the IEEE P2P 2006, the CCGrid 2010, and the MASCOTS 2013 conferences.



Thomas Fahringer is a professor of computer science at the University of Innsbruck. He is leading a research group in the area of distributed and parallel processing which develops the ASKALON system to support researchers worldwide in various fields of science and engineering to develop, analyze, optimize, and run parallel and distributed scientific applications. Furthermore, he leads a research team that created the Insieme parallelizing and optimizing compiler for heterogeneous multicore parallel computers. Before joining the University of Innsbruck, he worked as an assistant and associate professor at the University of Vienna, where his research focused on compiler technology and tools for high performance applications. He is a graduate of the Technical University of Vienna with a doctorate in computer science. He was involved in numerous national and international

research projects, including 10 EU funded projects. He has published five books, 35 journal and magazine articles, and more than 160 reviewed conference papers, including three best/distinguished IEEE/ACM papers.



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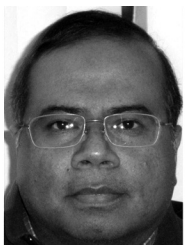


Erol Gelenbe is a fellow of the IEEE and the ACM, and the Dennis Gabor Chair Professor in electrical and electronic engineering at Imperial College. He has introduced performance models based on diffusion approximations, invented new mathematical models such as G-networks and the Random Neural Network, and contributed to performance engineering software tools such as FLEXSIM and QNAP that are applied in industry and used in academia. His designs include the SYCOMORE multiprocessor packet switch, the fiber optics random access network XANTHOS, optimal protocols for random access communications, optimum check-points for databases, the FLEXSIM database driven simulator for manufacturing systems, and the first fully implemented Software Defined Network CPN (Cognitive Packet Network) and its adaptive routing protocol. He currently works on

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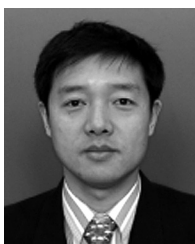
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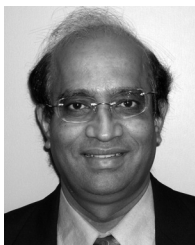
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Andrew Martin undertakes research and teaching in the area of systems security at the University of Oxford. He conceived the university's new Cyber Security Centre and helps to direct it, leading the university's successful bid to be recognized as a Centre of Excellence in Cyber Security Research. He directs the new Centre for Doctoral Training in Cyber Security, and also helps to lead courses for Software Professionals as part of Oxford University's Software Engineering Programme—the Master of Science in Software and Systems Security. His recent research focus has been on the technologies of Trusted Computing, exploring how they can be applied in Grid and Cloud computing contexts, as well as in mobile devices, in order to address their emerging security challenges. He has published extensively in this area, hosting several related international events in Oxford and speaking on the

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Ioan Raicu received the PhD degree in computer science from the University of Chicago under the guidance of Dr. Ian Foster in March 2009. He is an assistant professor in the Department of Computer Science (CS) at the Illinois Institute of Technology (IIT), as well as a guest research faculty member in the Math and Computer Science Division (MCS) at Argonne National Laboratory (ANL). He is also the founder (2011) and director of the Data-Intensive Distributed Systems Laboratory (DataSys) at IIT. He has received the prestigious US National Science Foundation (NSF) CAREER award (2011-2015) for his innovative work on distributed file systems for exascale computing. He was an NSF/CRA Computation Innovation Fellow at Northwestern University from 2009-2010. He is a three year award winner of the GSRP Fellowship from NASA Ames Research Center. His research work and interests are in the general area of distributed systems. His work focuses on a relatively new paradigm of Many-Task Computing (MTC), which aims to bridge the gap between two predominant paradigms from distributed systems, High-Throughput Computing (HTC) and High-Performance Computing (HPC). His work has focused on defining and exploring both the theory and practical aspects of realizing MTC across a wide range of large-scale distributed systems. He is particularly interested in resource management in large scale distributed systems with a focus on many-task computing, data intensive computing, cloud computing, grid computing, and many-core computing. Over the past decade, he has coauthored 90 peer reviewed articles, book chapters, books, theses, and dissertations, which received more than 3,500 citations, with a H-index of 22. His work has been funded by the NASA Ames Research Center, DOE Office of Advanced Scientific Computing Research, the US NSF/CRA CIFellows program, and the US NSF CAREER program. He has also founded and chaired several workshops, such as the ACM Workshop on Many-Task Computing on Grids and Supercomputers (MTAGS), the IEEE International Workshop on Data-Intensive Computing in the Clouds (DataCloud), and the ACM Workshop on Scientific Cloud Computing (ScienceCloud). He is on the editorial boards of the *Springer Journal of Cloud Computing Advances, Systems and Applications (JoCCASA)*, as well as a guest editor for the *IEEE Transactions on Parallel and Distributed Systems (TPDS)*, the *Scientific Programming Journal (SPJ)*, and the *Journal of Grid Computing (JoGC)*. He has been in leadership roles for several high profile conferences, such as HPDC, CCGrid, Grid, eScience, and ICAC. He is a member of the IEEE and the ACM. More information can be found at <http://www.cs.iit.edu/~iraicu/>, <http://datasys.cs.iit.edu/>, and <http://www.linkedin.com/in/ioanraicu>.



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Cloud Computing in TCSC (Technical Committee on Scalable Computing). He is the co-Editor-in-Chief of the *Journal of Cloud Computing* by Springer. He received the Editor's Choice Award in Discrete Mathematics in 1999. He coauthored a book titled *Security in Wireless Ad Hoc and Sensor Networks* (John Wiley and Sons, 2009). Professor Rong has extensive experience in managing research and development projects funded by both industry and funding agencies, such as the Norwegian Research Council and the EU Framework Programs.



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keynote speeches at many international conferences/workshops in the field of Cloud computing and has organized many workshops and conferences in the same area, the latest workshop being the International Workshop on Cloud Computing in collaboration with the University of Melbourne and Manjrasoft held on 20 August 2013 in the Department of Computer Technology, MIT Campus of Anna University, Chennai.



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