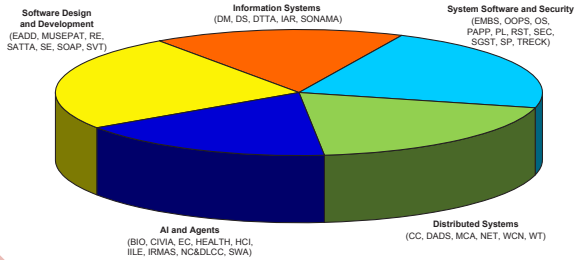
2016
Symposium on Applied Computing



Association for Computing Machinery

Advancing Computing as a Science & Profession

Pisa, Italy
April 4-8, 2016

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Hosted by
University of Pisa and Scuola Superiore Sant'Anna

The 31st Annual ACM Symposium on Applied Computing

Pisa, Italy
April 4-8, 2016

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The ACM Special Interest Group on Applied Computing is ACM's primary applications-oriented SIG. Its mission is to further the interests of the computing professionals engaged in the development of new computing applications and applications areas and the transfer of computing technology to new problem domains. SIGAPP offers practitioners and researchers the opportunity to share mutual interests in innovative application fields, technology transfer, experimental computing, strategic research, and the management of computing. SIGAPP also promotes widespread cooperation among business, government, and academic computing activities. Its annual Symposium on Applied Computing (SAC) provides an international forum for presentation of the results of strategic research and experimentation for this inter-disciplinary environment. SIGAPP membership fees are: $15.00 for ACM Non-members, $15.00 for ACM Professional Members, and $8.00 for ACM Student Members. For further information on SIGAPP, please contact Jiman Hong at jiman@ssu.ac.kr or visit the SIGAPP website at http://www.acm.org/sigapp.

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Message from the Symposium Chairs

Sascha Ossowski	Giorgio Buttazzo	Alessio Bechini
Conference Chair	*Conference Vice-Chair*	*Conference Vice-Chair*

On behalf of the Organizing Committee, we welcome you to the 31st Annual ACM Symposium on Applied Computing (SAC 2016), jointly hosted by University of Pisa and Scuola Superiore S. Anna, both in Pisa, Italy. For more than three decades this international forum has been dedicated to computer scientists, engineers, and practitioners for the purpose of presenting their research findings and results in various areas of applied computing. The organizing committee is grateful for your participation in this exciting international event. We hope that this conference proves interesting and beneficial for all of you. The Symposium on Applied Computing is sponsored by the ACM Special Interest Group on Applied Computing (SIGAPP), whose mission is to further the interests of computing professionals engaged in the design and development of new computing applications, interdisciplinary applications areas, and applied research. This conference is dedicated to the study of applied computing research of real-world problems. In addition, this event provides an avenue to discuss and exchange new ideas in the wide spectrum of applied computing areas. We all recognize the importance of updating the latest developments and research in our current areas of expertise.

SAC 2016 offers Technical Tracks and Poster Sessions. The success of the conference can be attributed to the substantial contribution of dedicated Track Chairs and Co-Chairs. Each track maintains a program committee and a set of highly qualified reviewers. We wish to thank the Track Chairs, Co-Chairs, Committee Members and participating reviewers for their hard work and effort to make SAC 2016 a high quality conference. We also thank our invited keynote speakers, Dr. John Mylopoulos (University of Toronto, Canada, and University of Trento, Italy) and Dr. Marco Conti (Institute of Informatics and Telematics, Italian National Council for Research, Pisa, Italy) for sharing their knowledge and expertise with SAC 2016 attendees. Most of all, we would like to especially thank the authors and presenters for sharing their experience with the rest of us, and all attendees for joining us in Pisa, Italy this year.

The local organizing committee has been a major contributor to the success of the SAC 2016 conference. Our gratitude goes to the Local Arrangement Chair Dr. Ettore Ricciardi, ISTI-CNR, Pisa, Italy. We extend our thanks to the Publication Chair, Dr. John Kim, Utica College, Utica, New York, USA, for his tremendous effort in putting together the conference proceedings, to the Posters Chair, Dr. Chih-Cheng Hung, Kennesaw University, Marietta, Georgia, USA, for his hard work to make a successful Poster Program, and to the Tutorials Chair Dr. Francesco Marcelloni, University of Pisa, Pisa, Italy, for arranging an exciting set of Tutorials. A big "thank you" also goes to Dr. Hossain Shahriar, Kennesaw University, Marietta, Georgia, USA, for organising the Student Research Competition, as well as to Dr. Hisham Haddad, Kennesaw University, Marietta, Georgia, USA, for simultaneously playing the roles of treasurer, registrar and webmaster (and many more). Special thanks to our Program Co-Chairs: Dr. Jiman Hong, Soongsil University, Seoul, Korea, and Dr. Maria Lencastre, University of Pernambuco, Recife, Pernambuco, Brazil for coordinating and bringing together an excellent Technical Program.

Again, we welcome you to SAC 2016 in the beautiful city of Pisa, Italy. We hope you enjoy the SAC 2016 conference and your stay in Italy. Next year, we invite you to participate in SAC 2017 to be held in Marrakech, Morocco. The conference will be hosted jointly by the University of Quebec at Montreal, Canada, University Cadi Ayyad of Marrakech, Morocco, the National School in Engineering (EMI) in Rabat, Morocco, and the National School of Applied Sciences (ENSA) in Kenitra, Morocco.

Message from the Program Chairs

Jiman Hong
Soongsil University
Seoul, South Korea

Maria Lencastre
University of Pernambuco
Recife, Pernambuco, Brazil

Welcome to the 31st International Symposium on Applied Computing (SAC 2016). For the past 30 years, SAC has become a major international venue for computing researchers and applied practitioners to convene and share ideas on recent developments in a variety of applied areas of information technology. The success of SAC has been the consolidation of a wide range of applied areas into specialized modules called Tracks. Each of the Tracks is then organized and administered by experts in the respective areas by instituting program committees, carrying out blind reviews according to the ACM guidelines, and finally selecting the highly qualified papers for the Track. Since its inception eight years ago, the Poster Sessions at SAC have become a tradition, and this year again the Poster will be an integral part of the Technical Program at SAC 2016.

The open Call for Track Proposals and after prescreening the proposals, 37 Tracks were finally accepted for SAC 2016. The prescreening and selections were made based on the success of those Tracks in the previous SACs as well as targeting new and emerging areas. The Call for Papers for these Tracks attracted 1047 final paper submissions from 58 different countries. The submitted papers underwent the blind review process and 252 submissions were finally accepted as full papers for inclusion in the Conference Proceedings and presentation during the Symposium. The final acceptance rate for SAC 2016 is 24.07% for the overall track. In addition to the accepted full papers, 111 submissions that received high enough review scores were accepted as poster papers for the Posters program. The Student Research Competition (SRC) program, sponsored by Microsoft Research, is designed to provide graduate students the opportunity to meet and exchange ideas with researchers and practitioners in their areas of interest. 47 submissions received and finally 22 papers were accepted for the SRC program.

The Technical Program of SAC 2016 is made possible through the hard work of many people from the scientific community who have volunteered and committed many hours to make it a success. Much credit goes to all Track Chairs for making SAC 2016 Technical Sessions a huge success. Some of the popular Tracks had an unprecedented submissions and having three blind reviews for each paper was certainly a major challenge. Once again this year, we follow the previous years' tradition in organizing various tracks into five different themes. The Symposium Proceedings and the technical presentations are focused around these themes to form a series of related track sessions. On behalf of the entire SAC 2016 Organizing Committee, we congratulate all the authors for having their papers accepted in their respective Tracks, and we wish to thank all of those who made this year's technical program a great success. Specifically, we wish to thank the speakers, posters chair, track chairs, reviewers, technical program committee members, session chairs, presenters, and all the attendees. We also wish to convey our special thanks to the local organizing committee lead by Dr. Giorgio Buttazzo from Scuola Superiore Sant'Anna, Pisa, Italy, Dr. Alessio Bechini from Scuola Superiore Sant'Anna, Pisa, Italy, Dr. Francesco Marcelloni from University of Pisa, Pisa, Italy, and Dr. Ettore Ricciardi from ISTI-CNR, Pisa, Italy. We wish you all a pleasant stay in Pisa, hope you have a great time at SAC 2016, and you will have the opportunity to share and exchange your ideas and foster new collaborations. We would also like to take this opportunity to convey to you the news that the 32nd International Symposium on Applied Computing (SAC 2017) will be held in the historic city of Marrakech, Morocco, which was declared a UNESCO World Heritage Site. We hope to see you all at SAC 2017.

Keynote Presentation:
The Requirements Problem in Software Engineering

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ABSTRACT
The requirements problem is the problem of deriving a specification consisting of functions and quality constraints that along with a set of domain assumptions satisfy a given set of requirements. We present several formulations of the requirements problem to account for changing requirements, adaptive software design and the next release problem. In each case, we discuss the tractability of algorithms that search spaces of alternatives to find Pareto-optimal solutions to the problem. This is joint work with many colleagues and students, including Roberto Sebastiani, Paolo Giorgini, Fatma Aydemir, Chi Mai Nguyen (UniTN), Neil Ernst (CMU), Alex Borgida (Rutgers) and Ivan Jureta (Namur).

BIOGRAPHY
Dr. John Mylopoulos holds a professor emeritus position at the Universities of Toronto and Trento. He earned a PhD degree from Princeton University in 1970 and joined the faculty of the Department of Computer Science at the University of Toronto the same year. His research interests include conceptual modelling, requirements engineering, data semantics and knowledge management. Mylopoulos is a fellow of the Association for the Advancement of Artificial Intelligence (AAAI) and the Royal Society of Canada (Academy of Applied Sciences). He has served as programme/general chair of international conferences in Artificial Intelligence, Databases and Software Engineering, including IJCAI (1991), Requirements Engineering (1997, 2011), and VLDB (2004). Mylopoulos is currently leading a project titled "Lucretius: Foundations for Software Evolution", funded by an advanced grant from the European Research Council.

Keynote Presentation:
From MANET to People-centric Computing and Communications

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ABSTRACT
In this talk, we first discuss the evolution of the multi-hop ad hoc networking paradigm from MANET to the emerging people-centric networking, where personal mobile devices link the cyber-world with the physical world. People-centric networking leads immediately to emerging localized communication and computing services that are tightly coupled with people and their devices (e.g., mobile data offloading, opportunistic computing, etc.). In the second part of the talk, we discuss how the human behavior (e.g., human social organization) and its cognitive constraints can affect computing and communications in the cyber-physical world. Specifically, we show how embedding models of human behavior into information dissemination protocols can optimize information diffusion.

BIOGRAPHY
Dr. Marco Conti is a Research Director of the Italian National Research Council (CNR) and, currently, he is the Director of the CNR Department of Engineering, ICT and Technologies for Energy and Transportation. He has published in journals and conference proceedings more than 350 research papers related to design, modelling, and experimentation of computer networks, future Internet, social networks and pervasive computing systems. He co-authored the books: “Metropolitan Area Networks (MANs): Architectures, Protocols and Performance Evaluation” (Springer 1997) and "Online Social Networks: Human Cognitive Constraints in Facebook and Twitter Personal Graphs" (Elsevier, 2015), and he is co-editor of the books: “Mobile Ad hoc networking: the cutting edge technologies,” (IEEE-Wiley 2013), "Mobile Ad Hoc Networking" (IEEE-Wiley 2004), and Mobile Ad Hoc Networks: from Theory to Reality (Nova Science Publishers 2007). He is Editor-in-Chief of Elsevier *Computer Communications* journal and Associate Editor-in-Chief of Elsevier *Pervasive and Mobile Computing* journal. He received the best paper award at several conferences, including IFIP TC6 Networking 2011 and IEEE WoWMoM 2013. He served as TPC chair for several major conferences -- including IFIP Networking 2002, IEEE WoWMoM 2005, IEEE PerCom 2006, and ACM MobiHoc 2006 -- and he was general chair (among many others) for IEEE WoWMoM 2006, IEEE MASS 2007 and IEEE PerCom 2010. He is the founder of successful conference and workshop series, such as *ACM RealMAN, IEEE AOC, ACM MobiOpp, and IFIP/IEEE SustainIT*.

Tutorial Presentation: Multimedia Information Retrieval on a Very Large Scale

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ABSTRACT

The tutorial first gives an overview of the most popular and effective visual features for content based retrieval: global visual descriptors, local visual descriptors, and deep/CNN features. Then, it introduces techniques able execute feature based similarity retrieval very efficiently, in datasets containing hundred millions images, with limited computing and storage resources. Similarity search is a difficult task because efficient techniques to process database or text queries cannot be applied here. Therefore in the last decades researcher have investigated techniques for executing similarity search efficiently and in a scalable way. The tutorial introduces state of the art techniques for similarity searching, as for instance LSH and permutation based methods. Finally, the tutorial discusses how the above concepts can be put in practice using Open Source solutions. It introduces the OpenCV library, which offers various tools for image analysis and feature extraction. It also discusses how Lucene, an open source text retrieval engine, can be easily used to index and search for visual information.

BIOGRAPHY

Giuseppe Amato graduated in Computer Science at the University of Pisa, Italy, in 1992 and was awarded a PhD in Computer Science at the University of Dortmund, Germany, in 2002. His main research interests are content-based retrieval of multimedia documents, access methods for similarity search of multimedia documents. He has participated in several EC and national funded research actions in the area of multimedia information retrieval.

Fabrizio Falchi has a Ph.D. in Information Engineering from University of Pisa (Italy), and a Ph.D. in Informatics from Faculty of Informatics of Masaryk University of Brno (Czech Republic). He also received an M.B.A. from Scuola Superiore Sant'Anna in Pisa. His research interests include similarity search, distributed indexes, multimedia information retrieval, computer vision, peer-to-peer systems. He has participated in several EC and National research projects.

Claudio Gennaro received the "Laurea" degree in Electronic Engineering from the University of Pisa, Italy, in 1994 and Master Degree in Information Technology at CEFRIEL of Milan. He received PhD Degree in Computer Engineering and Automatica in 1999 from Politecnico di Milano. His main interests are: Access Structures for Multimedia Retrieval, Digital Libraries, Model of Metadata for Audio/Video. Claudio Gennaro has had considerable previous experience in participation of European projects.

ACKNOWLEDGEMENTS

This tutorial was partially supported by EAGLE, Europeana network of Ancient Greek and Latin Epigraphy, co-founded by the European Commission, CIPICT-PSP.2012.2.1 - Europeana and creativity, Grant Agreement n. 325122.

Tutorial Presentation: Mining (Streams of) Networked Data

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ABSTRACT

Networks have become ubiquitous in several social, economics and scientific fields, ranging from the Internet to social sciences, biology, epidemiology, geography, communication systems, finance and many others. For this reason, several data mining approaches, specifically designed for tackling predictive and descriptive tasks for network data, have been proposed. In this tutorial, from one side, we intend to introduce the various forms of autocorrelation in network data and present the challenges that they pose to traditional data mining algorithms. To this aim, we will discuss different approaches that allow us to consider network autocorrelation either explicitly (with new heuristics) or implicitly (leveraging collective and semi-supervised/transductive learning which exploit the smoothness assumption). From the other side, we aim to provide the audience with a survey and a comparison of different problems arising when facing with networked data that evolve over time. The challenges in mining high speed network streams, require new algorithms. In this tutorial, we will present algorithms based on different window models and sampling strategies for networked streaming data. We will present methods to track the evolution of communities, identifying major events in these communities. The tutorial will conclude with a review of some practical applications of the presented methods in the areas of functional genomics, sensor networks, social networks, telecommunications, CRM, etc.

BIOGRAPHY

Michelangelo Ceci received a "Laurea" degree from the University of Bari in 2001. In 2005 he received his Ph.D. degree in Computer Science from the same University. Currently, he is associate professor at the University of Bari. His main research interests are in data mining and machine learning from complex and networked data. He was a visiting researcher at the University of Bristol (U.K.) and at the JSI (SLO). He has published more than 140 papers in refereed journals and conferences. He is member of the editorial boards of: IJSNM, IJDSN, IJDATS and JAIS. He has been the program co-chair of five workshops, the organizing committee chair of SEBD 2007, member of the editorial committee of "Intelligenza Artificiale" and member of the guest editorial board of the ECMLPKDD 2014-2016 journal tracks. He is Co-Chair of DS 2016 and ECMLPKDD 2017.

João Gama received his Licenciado degree from the Fac. of Engineering of the University of Porto, Portugal. In 2000 he received his Ph.D. degree in Computer Science from the Faculty of Sciences of the same University. Currently, he is Associate Professor at the Faculty of Economy and senior researcher at LIAAD - INESC Porto. He authored more than 200 papers in areas of machine learning, data streams and adaptive learning systems. He is a member of the editorial board of international journals including ML, DMKD, TKDE, NGC, and IDA. He served as Co-chair of ECML 2005, DS 2009, ADMA09, IDA 2011, ECMPKDD 2015 and a series of Workshops on KDDS and Knowledge Discovery from Sensor Data with ACM SIGKDD. He is author of a recent book on Knowledge Discovery from Data Streams.

Tutorial Presentation: Secure and Reliable Mobile Applications: Challenges and Approaches

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ABSTRACT

An increasing number of mobile applications are being developed to meet various needs of end users including SMS messaging, social networking, and game playing. It has been estimated that the revenues from mobile applications are expected to rise globally from $68Bn in 2013 to $143Bn in 2016. Android has become the leading smartphone Operating System in the world and currently occupying more than 50% of the global market share of smartphone. Unfortunately, this emerging area is not free from security and reliability issues.

Many of developed mobile applications contain vulnerabilities that may be exploited to cause unwanted actions. Reports find that 92% of Android's top 500 popular applications are vulnerable to some extent of security or privacy risk. Malware on a smartphone can make a phone partially or fully unusable, cause unwanted billing, or steal contact information stored in a phonebook. Further, benign applications may contain vulnerabilities due to the lack of developer knowledge and malware applications can exploit the known vulnerabilities by providing malicious inputs. Android applications may suffer from resource leakage. Particularly, memory leak can occur when users navigate applications in devices though screen rotation and pressing of built-in buttons leading to the crash of applications.

This tutorial is intended to provide a basic overview of Android applications, malware engineering, classification of malware, and mitigation approaches. We also explore content leakage vulnerability that may lead to security breaches and memory leakage that may cause an application to crash. The tutorial consists of three major parts. In the first part, we provide an overview of built in security features of Android followed by a set of common malware types. We then provide an overview of recent development to combat against malware. In the second part, we introduce the content leakage vulnerability in android applications. We show examples of best programming practices to reduce the exposure of content leakage issue. In the third part, we address the memory leak issue. We discuss future research directions. The discussion would argue that existing tools can address the challenge for building reliable and secure applications partially.

BIOGRAPHY

Dr. Hossain Shahriar is currently an Assistant Professor of Information Technology Department at Kennesaw State University, Georgia, USA. His research interests include software, web and mobile application security, malware analysis, mitigation of vulnerabilities based on information theory, risk analysis based on metrics. Dr. Shahriar has published over 50 peer reviewed journals, conference papers and book chapters. He served as Program Chair in SIN 2016, Workshop Co-Chair in SIN 2015, Fast Abstract Chair in IEEE COMPSAC 2015, and PC member in international conferences such as ACM SAC, SIN, and COMPSAC. Dr. Shahriar is currently a member of the ACM, SIGAPP, and IEEE.

Tutorial Presentation: Development of Correct-by-Construction Functional Parallel Programs

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ABSTRACT
With the current generalization of parallel architectures and increasing requirement of parallel computation arises the concern of applying formal methods, which allow specifications of parallel and distributed programs to be precisely stated and the conformance of an implementation to be verified using mathematical techniques. However, the complexity of parallel programs, compared to sequential ones, makes them more error-prone and difficult to verify. This calls for a strongly structured form of parallelism, which should not only be equipped with an abstraction or model that conceals much of the complexity of parallel computation, but also provides systematic way of developing such parallelism from specifications for practically nontrivial examples.

Program calculation is a kind of program transformation based on the theory of constructive algorithms. An efficient program is derived step-by-step through a sequence of transformations that preserve the meaning and hence the correctness. With suitable data-structures, program calculation can be used for writing parallel programs.

The SyDPaCC system is a set of libraries for the proof assistant Coq (http://coq.inria.fr) that allows to write naive (i.e. inefficient) functional programs then to transform them into efficient versions that could be automatically parallelized within the framework before being extracted from Coq to code in the functional language OCaml plus calls to the parallel functional programming library Bulk Synchronous Parallel ML. The tutorial is an introduction both to Coq (ACM Software System Award in 2013} and the SyDPaCC system for the systematic development of *correct and verified parallel programs*.

BIOGRAPHY
Frédéric Loulergue obtained his PhD in Computer Science from the University of Orléans in 2000 and his Habilitation in Computer Science from Université Paris Val-de-Marne in 2004. He is currently a full professor at Université d'Orléans. His research interests are the practical and formal aspects of the design, implementation and application, in particular to large-scale data-intensive software, of structured parallel programming languages and libraries. He co-organized the series of international workshop on High-Level Parallel Programming and Applications (HLPP) between 2003 and 2010 and is now a member of its steering committee. In 2004, he created the series of international workshops on Practical Aspects of High-Level Parallel Programming (PAPP), and he has (co)-organized several PAPP workshops since then. He is a member of the editorial board of Scalable Computing: Practice and Experience, and Technique et Science Informatiques. He is currently the head of the Logic Modelling and Verification (LMV) research team at LIFO.

Tutorial Presentation: Context in Recommender Systems

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ABSTRACT
Recommender system (RS) is able to alleviate the information overload problem and assist user's decision makings by recommending appropriate information to the end users. It has been widely applied in several applications, such as Amazon.com, Facebook, Netflix, etc. Context-aware recommender system (CARS) is a novel type of RS trying to adapt their recommendations to users' specific contextual situations, such as time and location. Accordingly, recommendation algorithms in CARS additionally take contexts into consideration, in contrast to the traditional recommendation approaches. Researchers believe that recommendations cannot stand alone without considering contexts, since users' preferences are always changing from contexts to contexts. For example, you may choose a romantic movie to watch with partner, but probably a cartoon if you are going to watch with kids.

There are two typical recommendation tasks involved when context is taken into account in RS: one is context-aware recommendation (CAR) and another one is context recommendation (CR). The basic research problems and challenges in CAR include context identification and selection, context incorporation and adaptation, context evaluation and interpretation, where CAR aims to recommend items to users by adapting to contextual information, e.g., which movies are appropriate to be recommended for John to watch *with his girlfriend*? By contrast, CR is a novel research direction emerged recently, and it will help suggest appropriate contexts for the users to consume the item to maximize user experience, e.g., which could be the best contexts (e.g., time, location, companion, emotional state, etc) for John to watch the movie "Titanic"?

In this half-day tutorial, the background and corresponding algorithms in recommender systems will be given at the beginning as the preliminary introduction. Afterwards, a comprehensive overview on those two recommendation tasks - CAR and CR, will be introduced to the audience. In addition, an open-source context-aware recommendation library, named as CARSKit, will also be introduced in order to show the ease of configuring and evaluating context-aware recommendation algorithms by this toolkit. By the end, we will further discuss the research problems and challenges in context recommendation.

BIOGRAPHY
Yong Zheng got his B.S. and M.S. degree in computer science in China, and he will obtain his PhD degree from DePaul University in 2016. His research interests lie in multi-disciplinary areas, including artificial intelligence, data mining and machine learning, information retrieval and recommender systems, etc. Over the past few years, his research focused on recommender systems, especially the development of context-aware recommender systems. He has published more than 40 peer-reviewed publications in related academic conferences, journals and book chapters. In addition, he served program committee member and reviewer for several academic journals, such as ACM Transactions on Information Systems (TOIS), ACM Transactions on the Web (TWeb), User Modeling and User-Adapted Interaction (UMUAI), and well-recognized international conferences, such as WWW, ACM RecSys, ACM IUI, ACM SAC, UMAP, ICWSM, and so forth.

Tutorial Presentation: Towards the Internet of Relevant Things. The IEEE 802.15.4e Standard

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ABSTRACT

The Internet of Things (IoT) will completely change the way we live and work. In near future, billions of smart objects will be connected to the Internet, paving the way for a large number of innovative services in different application domains including smart cities, smart buildings, factory automation, e-health, etc. In many of such domains, applications have stringent requirements in terms of communication reliability, timeliness, scalability, and energy efficiency. To address the needs of such critical applications, the IEEE has recently released the 802.15.4e amendment that extends the original 802.15.4-2006 standard. By combining time slotted access with multi-channel communication and frequency hopping, the new 802.15.4e MAC protocols can provide highly-reliable, time-bounded, and low-power communication. Also, they can easily support multi-hop mesh networks. This tutorial will present the opportunities offered by the new standard in the perspective of the Internet of Things. Specifically, it will start with a description of the IEEE 802.15.4 standard to highlight the main reasons that limit its adoption in critical scenarios. Then, the improvements introduced by 802.15.4e will be discussed, with focus on the main MAC protocols (i.e., TSCH, DSME). For each considered MAC protocol, a description of its specific features will be provided and potential application domains will be identified. The tutorial will also include a survey of the main research activities on 802.15.4e networks. Special attention will be devoted to issues arising from the integration of 802.15.4e within the IoT framework.

BIOGRAPHY

Giuseppe Anastasi is Full Professor and Associate Head at the Department of Information Engineering of the University of Pisa, Italy. He is also the director of the Smart Cities National Lab, supported by CINI (Italian University Consortium for Informatics). He directs the executive Master in Smart Cities, a post-graduate specialization program organized by the University of Pisa in cooperation with the Italian National Research Council (CNR). His scientific interests include Distributed and P2P Systems, Internet of Things, Pervasive Computing, Sustainable Computing, and ICT for Smart Cities. He has published about 130 research papers in the area of computer networking and pervasive computing, gathering more than 4500 citations. Dr. Anastasi is Associate Editor of Sustainable Computing (SUSCOM) and Area Editor of Pervasive and Mobile Computing (PMC). He has been the co-founder of a number of successful international workshops and conferences. Currently, he is a member of the Board of Directors of the Italian National University Consortium for Informatics (CINI). Dr. Anastasi received the M.Sc. degree in Electronics Engineering, and the Ph.D. degree in Computer Engineering, from the University of Pisa, in 1990 and 1995, respectively.

Simone Brienza received his B.S. and M.S. degrees in Computer Engineering from the University of Pisa, in 2008 and 2012, respectively. Currently, he is a Ph.d. candidate at the Department of Information Engineering of the University of Pisa. His research concerns IEEE 802.15.4 and 802.15.4e WSNs.

Domenico De Guglielmo is a Postdoctoral Researcher in the Department of Information Engineering at the University of Pisa. His research interests are in the field of WSNs and Internet of Things.

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Christopher D. Kiekintveld, University of Texas at El Paso, United States
M. Ani Hsieh, Drexel University, United States

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Networking Track

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Web Technologies Track

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Data Mining Track

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Data Streams Track

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Social Network and Media Analysis Track

Track Co-Chairs: Sang-Wook Kim, Hanyang University, South Korea

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Enterprise Application Development and Design Track

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Multicore Software Engineering, Performance, Applications and Tools Track

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Requirement Engineering Track

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Software Engineering Track

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Service-Oriented Architecture and Programming Track

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Software Verification and Testing Track

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Embedded Systems Track

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Programming Languages Track

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Software Platforms Track

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Poster Papers

Trust, Reputation, Evidence and other Collaboration Know-How Track

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EDITORIAL MESSAGE

Special Track on the Computational Intelligence and Video & Image Analysis

Agostinho Rosa, *LaSEEB - ISR – IST, Portugal*

Yin-Fu Huang, *National Yunlin University of Science and Technology, Taiwan*

The special track on the Computational Intelligence and Video & Image Analysis (CIVIA) is a forum for engineers, researchers and practitioners throughout the world to share technical ideas and experiences related to the implementation and applications of Computational Intelligence, to Video & Image Analysis, and even to Systems Biology & BioMedicine. Many conferences have been dedicated to Evolutionary Computing (ICEC, GECCO, PPSN, etc), Video & Image Analysis (ICIAR, ICIAP, ICASSP, IJCAI, etc) and Systems Biology & BioMedical Engineering (ICSB, RECOMB, BME, etc), but theydon't offer much on the blending of Computational Logic, Boolean Satisfiability and Soft Computing tools to address practical applications of Image Analysis and Bio Systems Modeling and Simulations. Thus, the research papers involved with applying computational intelligence techniques to video and image analyses would be welcome no matter how theoretical they are, should they have practical applications.

Totally, we have 24 submissions for the CIVIA track. To keep the acceptance rate less than 25% for the regular papers, we only accept 5 full papers. By the way, 2 poster papers are accepted for the poster section. In summary, including posters, we have 29% (7/24) acceptance rate for the CIVIA track.

The accepted oral or poster papers are involved in different subfields, including fingerprint matching, image analysis, graphical model, feature extraction, wavelet transform, information fusion, video similarity search and pattern recognition. These subfields are all related to the topics or themes of the CIVIA track.

Finally, we would like to thank all reviewers for their efforts in reviewing these papers. These reviewers consist of the program committee members and some professionals. Without their hard work, we could not complete this review process.

EDITORIAL MESSAGE

Special Track on Applications of Evolutionary Computation

Raúl Giráldez Rojo, *Pablo de Olavide University, Spain*

Beatriz Pontes Balanza, *University of Seville, Spain*

The "Applications of Evolutionary Computation" (EC) track aims at providing a forum for ideas, research, development activities, and particularly for applications generated by academics and practitioners in evolutionary computation and closely related areas.

The EC Track addresses techniques and applications of Genetic Algorithms, Evolution Strategies, Evolutionary Programming, Genetic Programming, Simulated Annealing, Ant Colony Optimization and other related techniques. Of particular interest are the applications of these techniques to computationally difficult combinatorial problems.

In response to the call for papers, 11 articles were submitted to the EC track for SAC 2016. All submissions were peer reviewed by at least three program committee members. The program committee selected three full articles and three poster papers for inclusion in the proceeding. The accepted papers covered a wide range of research topics and novel applications of Evolutionary Computation.

In their papers, Alberto Bartoli, Andrea De Lorenzo, Eric Medvet and Fabiano Tarlao have considered in their paper the long-standing problem of the automatic generation of regular expressions for text extraction, using state-of-the-art learner based on Genetic Programming. The presented framework is attractive because it is the system, not the user, which digs out the data in search of the samples most suitable to the specific learning task. Maha Elarbi, Slim Bechikh, Lamjed Ben Said and Chih-Cheng Hung propose a decomposition-based dominance relation called TSD-dominance (Targeted Search Directions based dominance) to deal with the so called many-objective optimization problems. The dominance relation creates a strict partial order on the set of Pareto-equivalent solutions using a set of well-distributed reference points. The TSD-dominance is used to substitute the Pareto dominance in NSGA-II. The resulting multiobjective evolutionary algorithm, called TSD-NSGA-II, provides competitive and better results when compared with three recently proposed decomposition-based algorithms on commonly used benchmark problems involving up to twenty objectives. Leo Sotto, Vinicius Melo and Marcio Basgalupp propose a variation of the LGP algorithm, and shows this proposal improves other staste-of-art methods in solving the Ant Trail Problem. Starting with an LGP based only on effective macro and micro-mutations, their approach consists in extending the way in which the individuals are chosen for reproduction.

In their works accepted as posters, Jagadeesh Gunda, Sasa Djokic, Roberto Langella and Alfredo Testa analyse and compare conventional and meta-heuristic methods for security-constrained OPF studies, showing that meta-heuristic methods can be used when conventional methods fail to converge and/or to provide a global optimum solution. Rodrigo Barros, Márcio Basgalupp, Christian Quevedo and Henry Cagnini introduce Clus-EDA, an univariate estimation of distribution algorithm (EDA), to define cluster prototypes, combining the EDA approach with an efficient clustering internal validity criterion. A very simple and efficiente encoding is proposed to evolve through the solution space using the univariate propabilistic model.

The success of this year EC track is due to the hard work and effort of many people. We would like to thank the members of the conference organizing committee for their great support. We thank the members of the Program Committee for their timely evaluation of the submitted papers.

We hope that you enjoy attending the EC track and that you find in its sessions and proceeding a challenging resource for your present and future research work.

EDITORIAL MESSAGE

Special Track on Healthcare (HEALTH): a growing scenario for applied computing

Cecilia Laschi, *The BioRobotics Institute, Scuola Superiore Sant'Anna, Pisa, Italy*
Arianna Menciassi, *The BioRobotics Institute, Scuola Superiore Sant'Anna, Pisa, Italy*

The wide spread of smart computing devices and embedded systems, together with the advances in MEMS and wearable sensors, are opening up new scenarios for healthcare. Health can be monitored on the patient, as well as some forms of treatment can be administered and managed remotely from the clinical centers. These systems for wearable health monitoring and tele-healthcare are intended to improve the healthcare service, by improving the monitoring and treatment opportunities and reducing costs, at the same time. New challenges and opportunities thus emerge for applied computing, for processing the large amounts of personal data, for providing medical doctors with effective information, for increasing the person's safety, for providing medical treatments at home. The aim of the ACM Symposium on Applied Computing (SAC) Track on HealthCare is to gather innovative work related to the application of computational techniques to healthcare, as well as systems for tele-health.

The track received a total of 32 submissions and the selection was very tough. A large number of reviewers were involved, who worked hard on the evaluations, to let us come up with 7 submissions accepted as papers, 1 poster, and 1 SCR. Many good submissions, therefore, regrettably could not be accepted for inclusion in the conference.

The healthcare scenarios offers a variety of challenges to applied computing and a variety of opportunities for application of new computing tools and methods. The papers accepted reflect such variety and span from patients' monitoring to identify early signs of pathologies as well as the effects of therapy, to the assessment of eHealth tools themselves, to privacy and security issues in wearable medical devices, to haptic interaction in medical procedures, like needle insertion. The posters, too, reflect the variety of health applications for applied computing. They present intelligent systems like a game-based approach to monitor Parkinson's disease motor symptoms, an EEG-based emotion recognition system, an ontology-driven adaptive system for patient treatment management, or a comparative study of methods for cardiovascular dysautonomias diagnosis, up to real-time computing techniques for molecular circuits. The SRC selected presents a web tool for medical topic modeling.
We feel deeply indebted to the reviewers who gave their valuable contribution, coping with the large number of submissions and with the time constraints. We wish to warmly thank them and let them know that their work has been greatly appreciated.

EDITORIAL MESSAGE

Special Track on Intelligent and Interactive Learning Environments (IILE)

Seiji Isotani, *University of São Paulo, Brazil*
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With the advent of powerful computing technologies, including the World Wide Web (WWW), computer-based learning environments have become more intelligent, flexible, mobile and ubiquitous. Computers, TVs, mobile phones, games, consoles, and other technologies can be transformed into smart learning environments with great potential to help students.

The expectation is that intelligent, interactive and innovative learning environments will eventually enable the realization of **AAAL – Anytime, Anywhere, Anybody Learning**, using most of the WWW resources and collecting inputs from the real world to create better and more personalized learning environments. Such expectation is consistent with that of the advancement of the WWW itself. Such trends facilitate the use of WWW content and resources as knowledge that can be interpreted by computers and learned by people. It is also expected that new technologies will emerge that will enable students with special needs and students in developing countries and rural areas to learn effectively even in the harshest of conditions, making the best use of teachers' and students' time and effort. To achieve AAAL there is a need to find ways to integrate major advances in artificial intelligence, computer vision, data mining, human-computer interaction and other sub-areas of Computer Science with advances in the Learning Sciences and Engineering in order to leverage the development of smart learning environments.

The aim of this track on intelligent, interactive and innovative learning environments is to bring together researchers and practitioners from academia, industry and schools to think together and share their visions of the next generation of educational technologies that will meet students' needs in the 21st century. We are particularly interested in technological advances that can be applied to leverage current learning systems on architectural, technological and philosophical levels.

The topics of interest include, but are not limited to:

- Architectures and frameworks for intelligent learning environments
- Tools and languages to support learning design
- AI in Education (Data mining, distributed systems, intelligent authoring/tutoring systems, etc)
- (Social) Semantic Web technologies and linked data for education
- Intelligent tools for Computer-Supported Collaborative Learning
- User modeling, adaptation and personalization
- Mobile and ubiquitous computing for learning
- Games and Gamification in Education
- Intelligent/interactive learning environments applied to specific domains
- Culturally-aware systems
- MOOCs (Massive Open Online Course)

EDITORIAL MESSAGE

Special Track on Intelligent Robotics and Multi-Agent Systems

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Foreword

The special track on Intelligent Robotics and Multi-Agent Systems (IRMAS) focuses on all aspects of intelligent robotics and multi-agent systems (MAS) including related areas and applications. Its primary goal is to exploit synergies between robotics and artificial intelligence (AI), more precisely between intelligent robotics and MAS, and bring together researchers from both fields. For many years, robotics and AI researchers have worked separately, both fields have matured enormously, and today there is a growing interest in getting the two research fields together. Many in robotics believe that the focus in the near future should be adding capabilities to robots that lie at the core of AI research. Reciprocally, AI researchers aim at embedding their techniques in physical robots that can perceive, reason and act in real, dynamic environments.

We invited papers to address the research topics covered by this track through a call for papers distributed in worldwide mailing lists on robotics and AI and in private mailing lists of the Programm Committee (PC) members. The accepted papers cover important topics of this track, both on intelligent robotics and MAS. In this second edition, there were 21 papers submitted from Europe (10), South America (6), USA (2), Middle East (1), Africa (1), and Oceania (1). After a rigorous blind peer review process by 77 PC members, 5 regular papers and 3 poster papers were accepted for the conference, resulting in an overall acceptance rate of 38%.

Acknowledgment

Many people contributed to the success of this track. First of all, we would like to thank to all members of the international PC for their efforts in attracting quality papers and in providing thoughtful reviews on time. The PC members are listed here in alphabetical order:

Alberto Ruiz - University of Murcia, Spain
Alessandro Farinelli - University of Verona, Italy
Alexandre Bernardino - IST, Portugal
Ali Marjovi - EPFL, Switzerland
Amanda Prorok - Univ. of Pennsylvania, USA
Andreas Birk - Jacobs University, Germany
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We also want to thank all the authors who contributed to the SAC 2016 IRMAS track. Finally, we offer special thanks to the SAC 2016 Organizing Committee and the ACM SIGAPP.

About the Track Chairs

Rui P. Rocha is an assistant professor in the Department of Electrical and Computer Engineering and a senior researcher in the AP4ISR team of ISR at the University of Coimbra, Portugal. His main research interests are cooperative multi-robot systems, human-robot cooperation, distributed control, and autonomous robots.

Christopher D. Kiekintveld is an assistant professor in computer science at the University of Texas at El Paso, TX, USA. His main research area is multi-agent systems and he has been especially interested in how to predict and react to the behavior of other intelligent agents in both cooperative and adversarial settings.

M. Ani Hsieh is an associate professor in the Mechanical Engineering and Mechanics Department and the Director of the Robotics Program at Drexel University. Her current research work focuses on bridging the gap between statistical physics, nonlinear dynamics and control, and distributed multi-agent robotic systems.

EDITORIAL MESSAGE

Special Track on NeuroComputing & Deep Learning and Continuos- Time Computing (NC&DLCC)

Cecilia Laschi, *The BioRobotics Institute, Scuola Superiore Sant'Anna, Italy*
Egidio Falotico, *The BioRobotics Institute, Scuola Superiore Sant'Anna, Italy*
Marc-Oliver Gewaltig, *École Polytechnique Fédérale de Lausanne, Switzerland*
Florian Röhrbein, *Technical University of Munich, Germany*
Paul Levi, *Research Center for Information Technology, Germany*
Stefan Ulbrich, *Research Center for Information Technology, Germany*
Davide Zambrano, *Centrum Wiskunde & Informatica, the Netherlands*
Sander Bohte, *Centrum Wiskunde & Informatica, the Netherlands*

Introduction

The development of computational models of the nervous system and neural processes has risen at a rapid pace. Developing neuro-inspired computing paradigms that mimic nervous system function fosters our model understanding of the biological system and targets technical applications in artificial systems. Nowadays, combined efforts in the fields of the neuroscience and computer science in interdisciplinary research projects like the Human Brain Project enable the simulation of biological spiking neural networks with millions of neurons.

Deep Learning in artificial neural networks represents a remarkable step toward this direction. Current state-of-the-art AI in the form of deep neural networks has recently demonstrated breakthrough performance in various AI-cognitive tasks, from image and speech recognition to natural language generation and playing ATARI games. In order to deal with the complexity and scaling of such networks, a new generation of appropriate tool is needed to simulate the neural network in real-time. This track presents innovative works related to the application of computational techniques for the brain simulation, as well as neural modelling and brain-based learning paradigms to address the hard challenges of replicating features of the human intelligence.

Statistics

The NC&DLCC track received 9 regular paper submissions whose 2 have been accepted as full-length paper, 2 as posters, 3 have been rejected and 2 have been withdrawn. The acceptance rate is 28.5% for full-length paper; it grows to 57.1% considering also posters.

The NC&DLCC track received also 2 SRC submissions (only 1 has been accepted).

Paper Description

The accepted papers focus on different aspects of the proposed track topics. The first paper presents the relationship between neuronal activation patterns of specific brain areas resulting from sensorial experiences. This work shows several factors affecting neuronal activations. In this context, authors analyzed the levels of similarity between neuronal activation patterns using a semisupervised method and data acquired from microelectrode arrays implanted on specific brain areas of rats, during an experiment of tactile exploration of four classes of physical objects in the dark. The analysis allows to make further steps in neuronal coding of brain signals.

The second paper demonstrates how deep Spiking Neural Networks (SNNs) can be trained to be more efficient with respect to standard deep Artificial Neural Networks (ANNs). According to the authors, in SNN efficiency can be improved either by reducing the number of spikes or by increasing the speed of classification, both with a fixed level of accuracy (98%). The authors trained a deep ANN with Rectified Linear Units (ReLUs) on the MNIST benchmark, and then they converted it in a SNN with Integrate-and-Fire units. Several algorithms have been applied – and compared – to improve efficiency. Results demonstrate that in most of the cases SNNs performs equally compared to ANNs, but with few operations and less latency (time from input presentation).

The papers accepted as posters are related to other important aspects of neural computing. Two of them focus on detection and estimation of impairments and brain lesion applied to magnetic resonance brain images. The other work accepted as poster intends to extend usual discrete event system specifications to parallel simulations and pseudorandom number generators in the context of a spiking neural network.

Acknowledgment

The track chairs would like to thank all the reviewers for their valuable contribution in the revision of the submissions.

EDITORIAL MESSAGE
Special Track on Cloud Computing

***S.D Madhu Kumar**, NIT Calicut, India*
***Priya Chandran**, NIT Calicut, India*
***Fernando De La Prieta,** University of Salmanaca, Spain*

Cloud Computing continues to remain the computing paradigm of the decade. Cloud computing has already proved its potential in meeting the challenges of increased data storage and processing demands of compute intensive and data intensive applications. The leading companies in the IT sector have already chosen clouds as their platform for offering their services. The academia has also shown keen interest in this hot area with an abundance of funded research projects at the leading universities across the globe.

This track on Cloud Computing, organized for the sixth time at ACM SAC, had been started with the intention of providing a forum for presenting research on various aspects of cloud computing. This year the main focus of the track was on *Recent developments in Cloud services, Application and Platforms, Infrastructure, Security and Privacy in clouds*. The response to the track was overwhelming. We received high quality papers from more than 24 countries spanning six continents, contributing a total of 51 submissions. The review process was very competitive with each paper receiving at least three reviews, and finally 13 full papers and five poster papers were selected for the track, bringing the acceptance rate to 25.5% for full papers.

The selected papers deal with a wide variety of cloud computing issues including those listed below:

1. Hadoop Energy Consumption Reduction with Hybrid HDFS
2. A Certification Framework for Cloud-based Services
3. Elastic Provisioning for Cloud Databases with Uncertainty Management
4. Performance-aware Server Consolidation with Adjustable Interference Levels.
5. Monitoring of Cloud Computing Environments
6. Media Workflows on Advanced Cloud Object Store Platforms
7. Securing Integration of Cloud Services in Cross-Domain Distributed Environments
8. Providing Elasticity Based on Autonomic Computing
9. Shortest Remaining Time First Policy in Shared Hadoop Clusters
10. Scalable and Manageable Customization of Workflows in Multi-Tenant SaaS Offerings
11. Network Configuration as a Service in SDN-Driven Cloud Architectures

We thank all the authors who submitted valuable papers to this track. We are grateful to the members of the Program Committee and to the additional reviewers. Without their support, the organization of the track's sessions would not have been possible. We also express our gratitude to organizations that made this track happen, namely the ACM Special Interest Group on Applied Computing (SIGAPP), National Institute of Technology Calicut, India and University of Salmanaca, Spain. We are grateful to the Symposium Program Chairs for their help in all aspects of the organization of this track

We are certain that issues pertaining to cloud computing offer rich opportunities for research and this track on Cloud Computing will continue to be a success in future editions of ACM SAC.

EDITORIAL MESSAGE

Special Track on Dependable and Adaptive Distributed Systems

Karl M. Goeschka, *UAS Technikum Vienna, Austria*
Rui Oliveira, *Universidade do Minho, Portugal*
Peter Pietzuch, *Imperial College London, United Kingdom*
Giovanni Russello, *University of Auckland, New Zealand*

Introduction

While computing is provided by the cloud and services increasingly pervade our daily lives, dependability is no longer restricted to mission or safety critical applications, but rather becomes a cornerstone of the information society. Unfortunately, heterogeneous, large-scale, and dynamic software systems that typically run continuously, often tend to become inert, brittle, and vulnerable after a while. The key problem is that the most innovative systems and applications are the ones that also suffer most from a significant decrease in dependability when compared to traditional critical systems, where dependability and security are fairly well understood as complementary concepts and a variety of proven methods and techniques is available today. In accordance with Laprie we call this effect the *dependability gap*, which is widened in front of us between demand and supply of dependability, and we can see this trend further fueled by the demand for resource awareness (including green computing) and increasing cost pressure.

Among technical factors of dependability, *software development* methods, tools, and techniques contribute to dependability, as defects in software products and services may lead to failure and also provide typical access for malicious attacks. In addition, there is a wide variety of *fault tolerance* techniques available, including persistence provided by *databases*, replication, group communication, transaction monitors, reliable *middleware*, *cloud* infrastructures, and trustworthy *service-oriented architectures* with explicit control of quality of service properties. Furthermore, *adaptiveness* is envisaged in order to react to observed, or act upon expected changes of the system itself, the context/environment (e.g., resource variability or failure/threat scenarios) or users' needs and expectations. Provided without explicit user intervention, this is also termed autonomous behavior or self-properties, and often involves monitoring, diagnosis (analysis, interpretation), and reconfiguration (repair). In particular, adaptation is also a means to achieve dependability in a computing infrastructure with dynamically varying structure and properties.

Statistics

This year, we received 20 submissions, from which 5 could be accepted after being reviewed by five to seven members of the program committee. The resulting acceptance rate is 25%.

Acknowledgements

We would like to thank our program committee members for their support, their timely reviews and the numerous suggestions for improvements of particular papers.

Overview of the Sessions and Papers

The DADS track provides a forum for scientists and engineers in academia and industry for their latest research findings on selected topics in dependable and adaptive distributed systems. In particular, the following papers comprise this track:

1. **Stretching Multi-Ring Paxos**
   Samuel Benz, Leandro Pacheco de Sousa and Fernando Pedone

2. **Dynamic Adaptation of Geo-Replicated CRDTs**
   Carlos Bartolomeu, Manuel Bravo and Luis Rodrigues

3. **NATCloud: Cloud-Assisted NAT-Traversal Service**
   Hanna Kavalionak, Amir H. Payberah, Alberto Montresor and Jim Dowling

4. **Planning the Transformation of Overlays**
   Young Yoon, Nathan Robinson, Vinod Muthusamy, Sheila McIlraith and Hans-Arno Jacobsen

5. **Monitoring Service Level Workload and Adapting Highly Available Applications**
   Mehran Khan, Ferhat Khendek and Maria Toeroe

In addition, four posters have been accepted:

6. **An Adaptive Multi-Criteria Ranking of Security Countermeasures**
   Nicola Nostro, Ilaria Matteucci, Francesco Santini, Andrea Ceccarelli, Felicita Di Giandomenico, Fabio Martinelli and Andrea Bondavalli

7. **Virtualization Technologies for the Big Data Environment**
   Aymen JLASSI and Patrick MARTINEAU

8. **Analysis of Checkpointing Overhead in Parallel State Machine Replication**
   Odorico Mendizabal, Fernando Dotti and Fernando Pedone

9. **Deadlock Models in Distributed Computation: Foundations, Design, and Computational Complexity**
   Valmir Barbosa, Alan Carneiro, Fabio Protti and Ueverton Souza

EDITORIAL MESSAGE
Special Track on Networking (NET)

Mário M. Freire, *University of Beira Interior, Portugal*
Marília Curado, *University of Coimbra, Portugal*
Manuela Pereira, *University of Beira Interior, Portugal*
Teresa Vazão, *INESC ID/IST, University of Lisboa, Portugal*

On behalf of the Program Committee of the Track on Networking of the 31st Annual ACM Symposium on Applied Computing (ACM SAC 2016), it is our great pleasure to welcome you to the ACM SAC 2016, held from April 4 to April 8, 2016, in Pisa, Italy. In recent years, significant advances in computer networks, applications and services have been made throughout the world. This track aims to be a forum for scientists, engineers and practitioners, in academia and industry, to share new ideas, experiences and results, and to present their latest findings in different aspects of computer networking.

In response to the call for papers, a total of 18 submissions were received, from which five were carefully selected for oral presentation in a technical session and one was selected as short paper for poster presentation. Each paper was peer reviewed, through a double-blind process, by at least three members of the Program Committee or additional reviewers. The set of papers accepted for this track covers a variety of research topics, which are of current interest, such as cloud datacenter networks, software defined networks, opportunistic networks and online social networks.

We thank all the authors who submitted valuable papers to this track. We are grateful to the members of the Program Committee and to the additional reviewers. Without their support, the organization of such high-quality track session would not have been possible. We are also indebted to many individuals and organizations that made this track happen, namely ACM Special Interest Group on Applied Computing (SIGAPP), University of Pisa (Italy), Microsoft Research, University of Beira Interior (Portugal), University of Coimbra (Portugal) and University of Lisboa (Portugal). Last but not least, we are grateful to the members of the Organizing Committee for their help in all aspects of the organization of this track.

We hope that you enjoy the ACM Symposium on Applied Computing and, in particular, the Track on Networking, in Pisa, Italy, if you attend it and that you find it a useful forum for the exchange of ideas, results and recent findings.

EDITORIAL MESSAGE

Special Track on Selected Area of Wireless Communications and Networking (WCN)

Dongkyun Kim, *Kyungpook National University, Republic of Korea.*
Wei Wang, *San Diego State University, California, USA.*

Introduction:
Research on Wireless communications and networking has reformed our daily lives in multiple ways. The need of communicating anytime, anywhere brought us many new wireless and networking technologies, including cellular networks (3G/4G/5G), ad-hoc networks, sensor networks, WiMAX, etc. The invention of these technologies has created a new paradigm of research and developments. In particular, the past decade has seen a significant surge of research activities in wireless communications and networking. While a number of their applications and services have been introduced, the demands for new applications still exist, requiring technical challenges. Accordingly, a great number of individuals, researchers, academics are searching for new novel ideas and improving the performance of existing techniques/methodologies proposed for wireless communications and networking. This special track aims to bring together researchers, academics, individuals working on selected areas of wireless communications and networking to share their new ideas, latest findings and results.

Track Statistics:
The WCN track, started in 2014, is reaching its 3rd edition this year. This edition has confirmed the interest of both researchers and practitioners in the track topics. 36 paper submissions were received from countries as diverse as Algeria, Belgium, Brazil, Italy, Japan, New Zealand, Portugal, South Korea, Spain, United Kingdom, Pakistan, and the USA. Submitted papers were reviewed by a Program Committee of 51 members, granting 3 extensive reviews per submission on average. The WCN track keeps high quality and it is evident from its acceptance ratio, 8 of the submitted papers have been accepted as full papers (acceptance rate: 22%) whereas 4 of them have been accepted as posters.

Description of Accepted Papers:
This year, we received papers of very interesting wireless communication topics varying from wireless cloud infrastructure and applications, vehicle communications, performance evaluation, indoor localization, low power low latency medium access control to security issues. Also, new emerging fields are also introduced in this track such as Software Defined Networks and Information Centric Networks.

Acknowledgement:
First of all, the track chairs thank all the authors and researchers, who submitted their valuable work in this track. Many congrats to those authors who got their work accepted this year. The track chairs would like to thank the TPC and reviewers for handling review of the papers in this track. This track would not be successful without the diligent contribution and high quality and timely reviews from the reviewers and the TPC.

EDITORIAL MESSAGE

Special Track on Web Technologies

Angelo Di Iorio, *University of Bologna, Italy*
Cristian Mateos, *UNICEN University, Argentina*
Davide Rossi, *University of Bologna, Italy*

Undoubtedly, the World Wide Web is relentlessly changing. The advent of HTML 5.0, the increasing importance of AJAX and client-side scripting, the inception of Web-accessible APIs and services, the huge popularity of mobile devices, the explosion of Web-based Social Networks as well as the advent of the Federated Social Web, and the new frontiers of Semantic Web are only some examples of this general trend.

Web applications are progressively evolving into rich and flexible environments where users not only can perform individual activities such as easily access documents, publish content, listen to music, watch videos, draw pictures, and play directly via browser, but also interact/collaborate between each other. Nowadays, this class of ubiquitous software systems seem to be here to stay. Then, novel approaches and techniques, new tools and frameworks are needed to address the inherent complexity of these applications.

The Web Technologies track aims at tracking this continuous evolution by bringing together researchers and practitioners, from industry and academia, working on practical and foundational aspects of Web technologies, as well as other technologies that in the Web have found new and unexpected application fields.

The Web Technologies track, started in 2007, reaches this year its 10th edition. This edition has confirmed the interest of both researchers and practitioners in the track topics. 30 paper submissions have been received from countries as diverse as Brazil, Estonia, Finland, France, Germany, India, Italy, Japan, the Netherlands, Portugal, Republic of Korea, Sweden, United Arab Emirates, United Kingdom, and the USA. Submitted papers have been reviewed by a Program Committee of 37 members, granting at least 3 extensive reviews per submission; 8 of the submitted papers have been accepted as full papers (for an acceptance rate of about 27%) whereas 4 have been accepted as posters.

In the opinion of the track chairs, these numbers together with the quality of the submissions, mark a success for the 10th edition of the ACM SAC track on Web Technologies. The quality of the contributions presented in this proceeding is surely due to the talent and inspiration of our authors -to whom we would like to extend our thanks for their interest in the track- but also to the hard work of the members of the program committee that we would hereby like to thank as well:

Laercio Baldochi — Universidade Federal de Itajubá, Brazil
Gioele Barabucci — Università di Bologna, Italy
Marco Brambilla — Politecnico di Milano, Italy

Hwan-Gue Cho — Pusan National University, South Korea
Chin-Wan Chung — Korea Advanced Institute of Science and Technology, South Korea
Marco Crasso — IBM Research, Argentina
Flávia Delicato — UFRN, Brazil
Enrico Francesconi — ITTIG - CNR, Italy
Flavius Frasincar — Erasmus University Rotterdam, the Netherlands
Martin Gaedke — Chemnitz University of Technology, Germany
Martín Garriga — Universidad Nacional del Comahue, Argentina
Daniela Godoy — ISISTAN Research Institute - CONICET, Argentina
Celso Hirata — Instituto Tecnologico de Aeronautica, Brazil
Irena Holubova (Mlynkova) — Charles University, Czech Republic
Jerónimo Irazábal — IBM & Universidad Nacional de la Plata, Argentina
Yuh-Jzer Joung — National Taiwan University, Taiwan
Sang-Wook Kim — Hanyang University, South Korea
In-Young Ko — Korea Advanced Institute of Science and Technology, South Korea
Chin-Laung Lei — Department of Electrical Engineering, National Taiwan University, Taiwan
Tim A. Majchrzak — University of Münster, Germany
Tommi Mikkonen — Tampere University of Technology, Finland
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Okubo Shinjuku-ku, Tokyo, Japan
Amedeo Napoli — LORIA, France
Andrea Nuzzolese — STLab - CNR, Italy
Silvio Peroni — Università di Bologna, Italy
Maria da Graça Pimentel — Universidade de Sao Paulo, Brazil
Paulo Pires — Univesidade Federal do Rio Grande do Norte, Brazil
Francesco Poggi — Università di Bologna, Italy
Taniro Rodrigues — UFRN, Brazil
Stéphane Sire — Oppidoc, France
Florian Skopik — AIT Austrian Institute of Technology, Austria
Olga Streibel — Freie Universitat Berlin, Germany
Cesar Teixeira — Universidade Federal de São Carlos, Brazil
Manolis Tzagarakis — University of Patras, Greece
Fabio Vitali — Università di Bologna, Italy
Guandong Xu — University of Technology Sydney, Australia
Alejandro Zunino — ISISTAN Research Institute - CONICET, Argentina

Special thanks also go to the ACM SAC 2016 Conference Chairs and Program Chairs for their support and guidance.

Angelo Di Iorio
Cristian Mateos
Davide Rossi

EDITORIAL MESSAGE

Special Track on Database Theory, Technology, and Applications

Ramzi A. Haraty, Lebanese American University, Lebanon
Apostolos N. Papadopoulos, Aristotle University, Greece
Junping Sun, Nova Southeastern University, USA

The world nowadays revolves around dealing with data presented in various formats. So it is inevitable that researchers focus on advancing the state of managing information. From here, the importance of database technology ranks amongst the hottest areas of research, taking into account the consistent need for faster query processing as well as for managing huge amounts of data. This year the track has received many papers covering different areas of databases.

A total of 25 papers were submitted to the Database Theory, Technology, and Applications track. The track received papers from many countries – from Asia, Australia, Europe, North America, and South America – making this track a forum to share technical ideas and experiences relating to implementation and application of database theory and technology and to exchange ideas among international researchers in the area of database systems. Each paper was sent out to at least three reviewers. The selection process was more difficult this year, because the acceptance ratio for regular papers was 28%. More specifically, among the 25 submitted papers only 7 papers have been selected as regular papers. In addition, 1 paper has been selected for presentation in the poster session.

The selected papers cover a wide range of topics including: multi-way join processing over data streams, queries over web services, XML data management, query languages, similarity query processing in software repositories.

We would like to take this opportunity to thank the colleagues who worked very hard to make ACM SAC 2016 possible. Our special thanks go to all the authors and referees who all contributed to the success of DTTA track. We look forward to your participation and cooperation in the upcoming ACM SAC 2017.

EDITORIAL MESSAGE

Special Track on Information Access and Retrieval

Gloria Bordogna, *Consiglio Nazionale delle Ricerche – CNR IREA*
Gabriella Pasi, *Università degli Studi di Milano Bicocca – DISCo*

The special Track on Information Access and Retrieval (IAR) was first organized within the ACM International Symposium on Applied Computing in 2002, to the main aim of allowing researchers and practitioners in the IR field to present their experiences in the middle of the theory-practice spectrum of Information Retrieval and Information Filtering, where many successful applications lie.

Information Retrieval and Information Filtering are not easy tasks as testified by the huge research literature published on scientific journals and in international conferences since many decades.

Especially with the diffusion of the Web and Search Engines, Information Retrieval and Information Filtering tasks need to cope with several issues related to the widespread and pervasive diffusion of huge amounts of etherogeneous user generated contents of distinct nature and format (videos, images, maps, audio, texts), of distinct genre and topics (geographic information, products' and organizations' descriptions, scientific research documentations, news, messages in social networks, etc.), and from etherogenous sources (universities, governamental institutions, private companies, and individuals). Moreover, the importance of taking into account the intentions, aims and characteristics of both the authors and the users searching for information brings to considering the context in which the search is carried out. The multiple dimensions of both the documents and the searcher should be modeled and taken into account for designing effective systems for information access, so as to be able to compute a multi-dimensional relevance exploiting several indicators and properties, such as topicality, location, trust, reputation, freshness, etc., all contributing to define the relevance of documents to personal information needs.

Nowadays, the research concerned with defining effective systems for information access spans over several hot topics, such as text mining, user modelling, personalized topic detection and tracking, geographic information retrieval and sharing, knowledge discovery and mining, etc. Information access technologies, and in particular IR, are currently being used in many different application contexts that go far beyond the initial scope of their design.

This year the special track is in its fifteen edition in the context of SAC, and it includes 9 full papers (with an acceptance rate of 25%), five poster papers, and one SRC paper. Each paper was peer reviewed by at least 3 members of the Program Committee. Our gratitude goes to the members of the Program Committee (listed in these proceedings): their help has been invaluable help carrying out a high quality selection process.
The papers cover different topics. Two of them address the issue of IR systems' evaluation: the paper titled *"Feeling Lucky? Multi-armed Bandits for Ordering Judgements in Pooling-based Evaluation*" authored by David E. Losada, Javier Parapar and Alvaro Barreiro tackles the problem of forming a pool of relevant judgements by casting document judgements as a multi-armed bandit problem, while the paper *"How do Users Handle Inconsistent Information? The Effect of Search Expertise"* authored by Kazutoshi Umemoto, Takehiro Yamamoto and Katsumi Tanaka investigates how inconsistent answers impact

search behavior of users in presence or absence of search expertise, and it provides indications for designing more effective systems by making users aware of the existence of inconsistent answers.
The paper titled "*Direct Measurement of Training Query Quality for Learning to Rank*" authored by Qingli Ma, Ben He and Jungang Xu deals with the problem of learning to rank by modeling the query quality.
The paper "*Proximity Relevance Model for Query Expansion*" authored by Liana Ermakova, Josiane Mothe and Elena Nikitina proposes a method query expansion in the framework of language models by capturing the proximity in terms of sentences rather than tokens.
The paper titled "*Modeling Clicks using Document Popularity*" authored by Xenophon Evangelopoulos and Christos Makris presents a novel click model based on a Bayesian network for estimating document relevance from click-through data.
The paper "*Modeling Trust and Distrust Information in Recommender Systems via Joint Matrix Factorization with Signed Graphs*" authored by Dimitrios Rafailidis defines a recommendation algorithm by incorporating the users' trust and distrust social relationships to compute the clusters of similar users using a spectral clustering approach for signed graphs.
The paper titled "*Aggregating Semantic Information Nuggets for Answering Clinical Queries*" authored by Eya Znaidi, Lynda Tamine and Chiraz Latiri faces the application of IR techniques for answering clinical queries formulated within the Evidence Based Medicine framework.
Another application paper is the one titled "*IT Atlas (Region Name Omitted): A Practical Application of Expert Search Techniques*" authored by Daniel Blank, Sebastian Boosz and Andreas Henrich; in this paper expert search techniques are applied to provide a search engine of companies (instead of documents) on the Web in order to create an Atlas of IT companies.
Finally, the paper titled "*SPARQL Extensions with Preferences: a Survey*" authored by Olivier Pivert, Olfa Slama and Virginie Thion provides a survey of proposals made in the Semantic Web context to query RDF databases in a flexible way by allowing the expression of preferences.

1st December 2015

Gloria Bordogna and Gabriella Pasi

EDITORIAL MESSAGE

Special Track on Social Network and Media Analysis (SONAMA)

Sang-Wook Kim, *Hanyang University, Korea*

With the advent of social network services such as Twitter, Facebook, Tumbler, and Google+, the research on social network and media analysis has been greatly advanced. In recent years, the interactions among people, sharing of knowledge and experiences, community activities in social network services increase greatly, which would make the research on social networks more important. Furthermore, as social media contents within social network services are rapidly being produced and consumed, the social media contents now account for the majority of content published on the world wide web. Social media is differentiated from traditional media in many aspects such as its frequency, quality, usability, immediacy, and permanence, which leads to significant potential to the social media analysis research.

The ACM SAC has been an important venue for the past 30 years, attracting computer scientists, computer engineers, software engineers, and application developers from around the world. The Social Network and Media Analysis (SONAMA) track of ACM SAC will provide a forum that brings together researchers and practitioners for exploring technologies, issues, experiences, and applications with a specific focus on the recent research trends and industrial needs in the related fields. Since social network and media analysis encompasses a variety of highly cross-disciplinary research issues, the SONAMA will foster collaborations and exchange of ideas and experiences among researchers working in various fields such as computer science, linguistics, statistics, sociology, geography, economics, and business.

This year, the third of the SONAMA track, we received a total of 49 submissions of high-quality papers from all over the world. The review process was very competitive with each paper receiving at least three reviews. We accepted 12 papers for oral presentations and 6 papers for poster presentations. We would like to thank all the authors who submitted their inspiring contributions to our track. Also, we sincerely appreciate our program committee members listed below who devoted their invaluable time and efforts for reviewing the submissions. Without their help, our track program could not be made so successful. Finally, we would like to give special thanks to program co-chairs Maria Lencastre and Jiman Hong for their nice guidance and support. We look forward to seeing all of you in Pisa, Italy.

Program Committee Members

Albert Au Yeung	Axon Labs Ltd., Hong Kong
Ladjel Bellatreche	National Engin. School for Mechanics and Aerotechnics, France
Cui Bin	Peking University, China
Seong Je Cho	Dankook University, Korea
WanSup Cho	ChungBuk National Univerisy, Korea
Freddy Chong-Tat Chua	Singapore Management University, Singapore
Robson L. F. Cordeiro	University of São Paulo, Brazil
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Yoshinori Hijikata	Osaka University, Japan
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Jamil Hasan	University of Idaho
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Jason J. Jung	Yeungnam University, Korea
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U Kang	KAIST, Korea
Pinar Karagoz	Middle East Technical University, Turkey
Kyoji Kawagoe	Ritsumeikan University, Japan
Hyoungshick Kim	Sungkyunkwan University, Korea
Hyunchul Kim	Sangmyung University, Korea
Chulyun Kim	Gachon University, Korea
Min-Soo Kim	Daegu Gyeongbuk Institute of Science & Technology, Korea
Younghoon Kim	Seoul National University, Korea
Junghoon Lee	Cheju National University, Korea
Kyumin Lee	Utah State University, USA
Jongwuk Lee	Pennsylvania State University, USA
Sang-Chul Lee	Hanyang University, Korea
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Shinjae Yoo	Brookhaven National Laboratory, USA
Seok-Ho Yoon	Samsung Electronics, Korea
Eva Zangerle	University of Innsbruck, Austria
Xiangliang Zhang	King Abdullah University of Science and Tech., Saudi Arabia
Ming Zhou	Microsoft Research Asia, China

EDITORIAL MESSAGE

Special Track on Enterprise Application Development and Design

Tomas Cerny, *Czech Technial University in Prague, Czech Republic*
Karel Cemus, *Czech Technial University in Prague, Czech Republic*

Introduction:

The objective of EADD track is to provide researchers and software architects the opportunity to present their observations, experiences and research in the area of production-level enterprise applications. The aim of integrate academic research and industry level research, introduce the best practices, state of the art and mostly production level experience impacting the development, design, maintenance, scalability and other software quality attributes.

Statistics:

Accepted papers 3/14
Accepted Posters 2/14
Acceptance rate 21%

Descriptions:

Accepted papers and posters are in the theme of metamodeling/metaprogramming, code transformation, generative approaches, security consideration in enterprise application design, and security of third party componenrts. Furthermore, there are works on decision making, social process monitoring, application component decomposition, or SSD drive involvement in enpterise application design.

Acknowledgment:

We like to acknowledge all track committes and reviewers. Thank you very much for your hard work.

EDITORIAL MESSAGE

Special Track on Multicore Software Engineering, Performance, Applications, and Tools (MUSEPAT)

***Tomáš Vojnar**, FIT, Brno University of Technology, Czech Republic*

MUSEPAT has grown out of the successful series of IWMSE and PADTAD workshops and merges these two communities into a single and broader forum. In 2013, it was organized as a standalone conference; in 2015, it appeared as a SAC technical track for the first time.

The MUSEPAT track of SAC'16 addresses development challenges in multicore parallel systems. It brings together software engineering researchers, applied computer scientists, computer engineers and application developers. Multicore challenges covered at MUSEPAT include specification, design, programming models, programming techniques, testing, analysis, debugging and applications. The conference track addresses parallelism in a broad range of contexts: manycore CPUs and GPUs, clusters, distributed systems, mobile devices, client-servers and desktops.

The topics of interest of MUSEPAT cover the following areas:

- Software engineering for multicore (CPU or GPU) and heterogeneous systems.
- Specification and modeling of multicore systems.
- Programming models, languages, compiler techniques and development tools for multicore.
- Parallel and distributed testing and debugging including noise-based testing, cloud testing.
- Evolving sequential software to leverage multicore and manycore hardware.
- Performance and optimization of multicore software.
- Domain- and platform-specific multicore software issues (e.g., issues in scientific computing).
- Construction and validation challenges of specific modeling paradigm such as mapReduce and openMP.

MUSEPAT 2016 has attracted 20 submissions. Each of them was reviewed by at least three reviewers. After the reviews and a quite lively discussion, 5 submissions were accepted as full papers and 2 submissions appear in the form of posters.

The program committee of MUSEPAT 2016 consisted of the following researchers:

- Jeremy S. Bradbury, University of Ontario Institute of Technology, Canada
- Ricardo J. Dias, Universidade Nova de Lisboa, Portugal
- Eitan Farchi, IBM Haifa Research Laboratory, Israel
- Klaus Havelund, NASA Jet Propulsion Laboratory, USA
- Jiri Jaros, Brno University of Technology, Czech Republic
- Jörg Keller, University of Hagen, Germany
- Jeff Lei, University of Texas at Arlington, USA
- João Lourenço, Universidade Nova de Lisboa, Portugal
- Raymond Namyst, LaBRI, University of Bordeaux, France
- Shiva Nejati, University of Luxembourg, Luxembourg
- John Owens, University of California, Davis, USA
- Victor Pankratius, MIT, USA

- Michael Philippsen, University of Erlangen-Nuremberg, Germany
- Christian Prehofer, fortiss München, Germany
- Shmuel Ur, University of Bristol, UK
- Jan Vitek, Northeastern University, USA
- Tomáš Vojnar, Brno University of Technology, Czech Republic (chair)

Apart from the PC members, a number of external reviewers has also participated on the reviews. I would like to thank all of them very much for their hard work.

Further, special thanks go to the steering committee of MUSEPAT, consisting of J.S. Bradbury (who also maintained the web page of MUSEPAT), E. Farchi, and J. Lourenco, for their continuous support in the organization of MUSEPAT 2016.

Brno, December 8, 2015

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EDITORIAL MESSAGE
Special Track on Software Architecture: Theory, Technology, and Applications (SA-TTA)

Diego Perez-Palacin, *DEIB, Politecnico di Milano, Italy*
Patrizia Scandurra, *DIGIP, University of Bergamo, Italy*

Introduction
It is our great pleasure to welcome you to the Fourth Edition of the track *Software Architecture: Theory, Technology, and Applications (SA-TTA 2016)* as part of the 31st ACM/SIGAPP Symposium on Applied Computing (SAC).

The goal of the track SA-TTA is to bring together researchers, practitioners and educators having the common objective of transforming *Software Architecture* into a mature discipline leveraging on both solid scientific foundations and validated engineering methodologies and tools. The main focus of SA-TTA is in *Applied Software Architecture*, namely a special emphasis is put on practical engineering concerns, experiences in tools development, and software architecture case studies. SA-TTA is focused broadly on how to address functional requirements and quality characteristics in the design, maintenance, and adaptation and evolution of software architectures through the support of automated techniques and tools. Of special interest are architecture description languages, formalisms, techniques, methodologies, tools, and runtime environments that support these activities, possibly exploiting model-driven engineering principles. A special emphasis is put also on technical aspects of software architectures development for specific class of software systems and application domains.

We are confident that you will find the program stimulating and that it will provide you with many new ideas and insights. Welcome to city of Pisa, and many thanks for your participation!

Statistics
The call for papers attracted research paper submissions from Europe, Brazil, Africa, and USA. Totally, we had 24 high quality papers. According to a strict acceptance rate of 25%, the program committee accepted 6 full research papers and 5 contributions as posters.

Description of accepted papers
Altogether there are interdisciplinary research contributions covering a variety of topics related to: software architectures deployment management, feature integration into Product Line architectures, architectures for multimedia systems, modeling adaptive software architectures, development of architectures for Wireless Sensor Networks and software architecture recovery.

Acknowledgments
We thank all authors who wrote articles for this track helping us to make it a success. We also thank the program committee members and all reviewers for their evaluations and critiques of manuscripts:

Program committee members:

- Yamine Ait-Ameur - IRIT/ENSEEIHT, France
- Oliver Barais - INRIA, France
- Antonia Bertolino - Italian National Research Council CNR, Italy
- Georg Buchgeher - SCCH GmbH Hagenberg, Austria
- Rafael Capilla - Rey Juan Carlos University, Madrid, Spain
- Ivica Crnkovic - MDU, Sweden
- Giovanna Dimarzo Sereguendo - CUI Université Genève, Carouge Switzerland
- Naranker Dulay - Imperial College London, UK
- Sam Guinea - Politecnico di Milano, Italy
- Kenneth Johnson - Auckland University of Technology, New Zealand
- Rick Kazman - ITM, University of Hawaii, United States
- Eva Kühn - Vienna University of Technology, Austria
- Chan-gun Lee - Chung-Ang University, Korea
- Jihyun Lee - Daejeon University, Korea
- Marin Litoiu - York University, Canada
- Antonia Lopes - University of Lisbon, Portugal
- Hernan Melgratti - University of Buenos Aires, Argentina
- José Javier Merseguer - University of Saragoza, Spain
- Henry Muccini - University of L'Aquila, Italy
- Ileana Ober - IRIT/University of Toulouse
- Flavio Oquendo - IRISA, University of South Brittany, France
- Hongyu Pei-Breivold - ABB Corporate Research, Västerås, Svezia
- Pasqualina Potena - FBK ICT DAS, University of Trento, Italy
- Elvinia Riccobene - University of Milan, Italy
- Ella Roubstova - Open Universiteit Nederland
- Antonino Sabetta - SAP Research, France
- Lionel Seinturier - Univ. Lille & IUF - LIFL & Inria ADAM
- Romina Spalazzese - Malmö University, Sweden
- Maria Spichkova - RMIT University, Melbourne, AUSTRALIA
- Shuai Wang - Simula Labs, OSLO, Norway
- Danny Weyns - University of Linnaeus, Sweden
- Liming Zhu - National ICT Australia

Additional reviewers:

- Roxana Holom
- Thomas Hamboeck
- Vesna Sesum-Cavic
- Matthias Schwayer
- Milena Guessi
- Everton Cavalcante
- Christian Roldan
- Lucas Oliveira

EDITORIAL MESSAGE
Special Track on Software Engineering

Eunjee Song, *Baylor University, Waco, USA*
Byungjeong Lee, *University of Seoul, Seoul, Korea*

A special track on Software Engineering (SE Track) aims to be a forum for scientists, engineers and practitioners, in academia and industry to share new ideas, experiences and results, and to present their latest findings in any aspects of Software Engineering. SE Track emphasizes the design, implementation, management and applications of Software Engineering.

The Call for Papers for SE Track attracted 100 final paper submissions from 30 different countries. The submitted papers underwent the blind review process and 25 papers were finally accepted as full papers for inclusion in the Conference Proceedings and presentation during the Symposium. The final acceptance rate for SE Track is 25%. In addition to the accepted full papers, 12 papers that received high enough review scores were accepted as short papers for the Poster Program. The Student Research Competition (SRC) program is designed to provide graduate students the opportunity to meet and exchange ideas with researchers and practitioners. Finally 4 papers were accepted for the SRC program in SE Track.

This year SE Track is divided into five sessions: related presentations in Software Process, Design Patterns, Metrics and Measurement, Maintenance, Open-Source Projects, V&V, Testing, Formal Methods, Quality, and Software Product Lines will be associated to one session, so as to promote sharing and discussion of ideas through the whole audience of a topic. Please check the program schedule for details.

On behalf of the entire SAC 2016 Organizing Committee, we congratulate all the authors for having their papers accepted in the SE Track. We are grateful to the members of the Program Committee and to the additional reviewers. Without their support, the organization of such high-quality track sessions would not be possible. We also wish to convey our special thanks to the SAC 2016 symposium's main organizers, especially Program Chairs, Jiman Hong and Maria Lencastre, for their continuous help and advice and Publication Chair, John Kim, and Poster Chair, Chih-Cheng Hung, for their invaluable support.

Last but not least, we thank you for attending the conference on behalf of the Software Engineering Track and hope that you enjoy the program we have prepared for you.

EDITORIAL MESSAGE

Special Track on Service-Oriented Architectures and Programming (SOAP)

Maurice H. ter Beek, *ISTI-CNR, Pisa, Italy*
Hernán Melgratti, *University of Buenos Aires, Argentina*
Hugo Torres Vieira, *IMT Lucca, Italy*

The SOAP track aims at bringing together researchers and practitioners having the common objective of transforming Service-Oriented Programming (SOP) into a mature discipline with both solid scientific foundations and mature software engineering development methodologies supported by dedicated tools. From the foundational point of view, many attempts to use formal methods for specification and verification in this setting have been made. Session correlation, service types, contract theories, and communication patterns are only a few examples of the aspects that have been investigated. Moreover, several formal models based upon automata, Petri nets and algebraic approaches have been developed. However, most of these approaches concentrate only on a few features of service-oriented systems in isolation, and a comprehensive approach is still lacking.

From the engineering point of view, there are open issues at many levels. Among others, at the system design level, both traditional approaches based on UML and approaches taking inspiration from Business Process Modelling, e.g. BPMN, are used. At the composition level, orchestration and choreography are continuouslsy being improved both formally and practically, with an evident need for their integration in the development process. At the description and discovery level, there are two separate communities pushing respectively the semantic approach (like ontologies and OWL) and the syntactic one (like WSDL). In particular, the role of discovery engines and protocols is not clear. In this respect, adopted standards are still missing. UDDI looked to be a good candidate, but it is no longer pushed by the main corporations, and its wide adoption seems difficult. Furthermore, a recent implementation platform, the so-called REST services, is emerging and competing with classic Web Services. Finally, features like Quality of Service, security, and dependability need to be taken seriously into account.

SOAP in particular encouraged submissions on what SOP still needs in order to achieve the above goals.

The PC of SOAP 2016 was formed by:

- Farhad Arbab — Leiden University and CWI, Amsterdam, NL
- Luís Barbosa — University of Minho, Braga, PT
- Massimo Bartoletti — Università di Cagliari, IT
- Maurice H. ter Beek — ISTI-CNR, Pisa, IT (co-chair)
- Marcello M. Bersani — Politecnico di Milano, IT
- Laura Bocchi — University of Kent, UK
- Roberto Bruni — Università di Pisa, IT
- Marco Carbone — IT University of Copenhagen, DK
- Romain Demangeon — Université Pierre et Marie Curie, FR
- Schahram Dustdar — Vienna University of Technology, AT
- Alessandra Gorla — IMDEA Software Institute, Madrid, ES

- Vasileios Koutavas Trinity College Dublin, IE
- Alberto Lluch Lafuente Technical University of Denmark, DK
- Manuel Mazzara Innopolis University, RU
- Hernán Melgratti University of Buenos Aires, AR (co-chair)
- Nicola Mezzetti University of Trento, IT
- Corrado Moiso Telecom Italia, IT
- Alberto Núñez Universidad Complutense de Madrid, ES
- Jorge A. Perez University of Groningen, NL
- Gustavo Petri Purdue University, USA
- António Ravara New University of Lisbon, PT
- Steve Ross-Talbot Cognizant Technology Solutions, UK
- Gwen Salaün Inria Grenoble - Rhône-Alpes, FR
- Francesco Tiezzi Università di Camerino, IT
- Hugo Torres Vieira IMT Lucca, IT (co-chair)
- Emilio Tuosto University of Leicester, UK
- Massimo Vecchio Università degli Studi eCampus, IT
- Peter Wong Travelex, UK
- Yongluan Zhou University of Southern Denmark, DK

SOAP 2016 received a total of 16 submissions. Each submission was reviewed by at least 4 PC members, the vast majority even by 5 PC members. All papers were subject to an animated general discussion among the PC members (with over 100 posts in the message boards). In the end, the PC decided to select only the following four papers for an oral presentation at the conference (an acceptance rate of 25%):

- JxActinium: a runtime manager for secure REST-ful COAP applications working over JXTA
  by Filippo Battaglia, Giancarlo Iannizzotto, and Lucia Lo Bello
- Improving QoS Delivered by WS-BPEL Scenario Adaptation through Service Execution Parallelization
  by Dionisis Margaris, Costas Vassilakis, and Panagiotis Georgiadis
- QoS-aware Adaptation for Complex Event Service
  by Feng Gao, Muhammad Ali, Edward Curry, and Alessandra Mileo
- Service functional testing automation with intelligent scheduling and planning
  by Lom Messan Hillah, Ariele-Paolo Maesano, Libero Maesano, Fabio De Rosa, Fabrice Kordon, and Pierre-Henri Wuillemin

We would like to thank the PC members, and a few external reviewers, for their detailed reports and the stimulating discussions during the reviewing phase; the authors of submitted papers, the session chairs and the attendees, for contributing to the success of the event; the providers of the START system, which was used to manage the submissions; and in particular all the organizers of SAC 2016, for their invitation to organize this track and for all their excellent assistance and support.

EDITORIAL MESSAGE

Special Track on Software Verification and Testing

Mercedes G. Merayo, *University Complutense of Madrid, Spain*
Gwen Salaün, *Grenoble INP, Inria, LIG, France*

The Software Verification and Testing track aims at contributing to the challenge of improving the usability of formal methods in software engineering. The track covers areas such as formal methods for verification and testing, based on theorem proving, model checking, static analysis, and run-time verification.

We received 56 submissions. After a careful reviewing process, the Programme Committee accepted 13 regular papers. Therefore, the acceptance rate of the conference stayed close to 23%.

Several people contributed to the success of SVT 2016. We would like to thank the Programme Committee, and the additional reviewers, for their work on selecting the papers. Finally, we would like to thank all of you, who, as authors and participants, are helping us to assure the quality of this excellent event. We hope you will find the track's programme useful, interesting and challenging.

EDITORIAL MESSAGE

Special Track on Operating Systems (OS)

Bongjae Kim, *Korea Electronics Technology Institute, Korea*
George Hamer, *South Dakota State University, USA*

The purpose of Opersting Systems track is to bring together researchers, designers, and developers who are interested in methodologies for the design and analysis of operating systems and/or applications that are highly adaptive to user needs. In recent years, we have noticed a tremendous growth on the demands for highly-efficient operating systems in various fields. At the same time, adaptive applications have also become more and more complex, and it imposes new challenging issues never faced before in this application field. It is thus clear that nowadays the development and design of operating systems must rely, even more than in the recent past, on specific solutions both in the hardware and in the software components. Moreover, the needs to timely tackle changes in the market pushes toward the employment of methodologies to shorten the development time and to drive the evolution of existing products. The solutions to new problems emerging in this setting call for a joint effort from the academics and industry.

The designs of high-performance operating systems and adaptive applications must take into account a wide variety of constraints: Performance, code size, real-time performance, maintainability, energy efficiency, and scalability. This track provides a forum for the presentation of high-quality, original research covering all aspects of operating systems and adaptive applications design, analysis, implementation, evaluation, and case-studies. Solutions might be proposed at different levels of abstractions, making use of an assortment of tools and methodologies. Researchers and practitioners would have a chance to propose new ideas and to compare experimentations. The focus of this track is on the application of both novel and well-known techniques to the operating systems and adaptive applications development.

In this year, a total of 39 submissions were received around the world. Each paper was reviewed by more than 3 blind reviewers and provided careful and thoughtful reviews on which the selection process was based. The reviewing process was done by the technical program committee and additional reviewers. Over the 39 submissions, 10 papers were accepted as full papers, and 4 papers were accepted as poster papers after a rigorous reviewing process. Many excellent papers could not be accepted because of the conference policy in this year.

We would like to thank all of the authors who contributed to the ACM SAC 2016 OS Track. We also like to thank all of the reviewers for their hard and on-time work. Finally, we give special thanks to the SAC organizing committee, who believes in the potential of the OS Track, as well as to the ACM SIGAPP.

EDITORIAL MESSAGE
Special Track on Programming Languages

Marjan Mernik, *University of Maribor, Slovenia*
Barrett R. Bryant, *University of North Texas, USA*

1. Objectives of the track

The Programming Languages (PL) Track provides researchers and practitioners with a forum to present their ideas and experience in designing new programming concepts and implementing programming languages. It includes the topics of Compiling Techniques, Domain-Specific Languages, Formal Semantics and Syntax, Garbage Collection, Language Design and Implementation, Languages for Modeling, Model-Driven Development and Model Transformation, New Programming Language Ideas and Concepts, New Programming Paradigms, Practical Experiences with Programming Languages, Program Analysis and Verification, Program Generation and Transformation, Programming Languages from All Paradigms (Agent-Oriented, Aspect-Oriented, Functional, Logic, Object-Oriented, etc.), and Visual Programming Languages.

2. Statistical information

This year the track was expanded to include papers from the Coordination Models, Langauges and Applications Track, chaired by Francesco Tiezzi (University of Camerino, Italy) and Mirko Viroli (University of Bologna, Italy). For the combined track, thirty-eight papers were originally submitted from eighteen different countries: Belgium, Brazil, Canada, Czech Republic, Denmark, Finland, France, Germany, Italy, Japan, Kuwait, Portugal, Saudi Arabia, Slovenia, Spain, Sweden, Tunisia, and the United States. Among those, nine regular papers were selected for an acceptance rate of 23.7% as well as six posters. The combined Track Program Committee had 52 members: Vasco Amaral (Universidade Nova de Lisboa, Portugal), Farhad Arbab (CWI, Netherlands), Jacob Beal (BBN, USA), Roberto da Silva Bigonha (Universidade Federal de Minas Gerais, Brazil), Olivier Boissier (EMSE, France), Walter Cazzola (University of Milan, Italy), Ferruccio Damiani (University of Turin, Italy), Igor Dejanović (University of Novi Sad, Serbia), Wolfgang De Meuter (Vrije Universiteit Brussel, Belgium), Rocco De Nicola (Institute for Advanced Studies Lucca, Italy), Giovanna Dimarzo Serugendo (University of Geneva, Switzerland), Tom Dinkelaker (Ericsson, Germany), Schahram Dustdar (Technical University of Vienna, Austria), Johan Fabry (University of Chile, Chile), Jose Luis Fernandez-Marquez (CSIC, Spain), José Fiadeiro (Royal Holloway University of London, UK), Sebastian Guenter (Senacor Technologies AG, Germany), Pedro Henriques (Uniersity of Minho, Portugal), Nigel Horspool (University of Victoria, Canada), Zoltán Horváth (Eötvös Loránd University, Hungary), Raymond Hu (Imperial College London, UK), Hiroshi Inoue (IBM Research, Japan), Jan Janousek (Czech Technical University, Czech Republic), Christine Julien (University of Texas, USA), Geylani Kardas (Ege University, Turkey), Eva Kühn (Technical University of Vienna, Austria), Hung La (Rutgers University, USA), Hans-Wolfgang Loidl (Heriot-Watt University, UK), Michele Loreti (University of Florence, Italy), Emanuela Merelli (University of Camerino, Italy), Marino Miculan (University of Udine, Italy), Flemming Nielsen (Technical University of Denmark, Denmark), Andrea Omicini (University of Bologna, Italy), Manuel Oriol (ABB Corporate Research, Switzerland), Nikolaos Papaspyrou (National Technical University of Athens, Greece), Marco Patrignani (University of Leuven, Belgium), Peter Pirkelbauer (University of Alabama at Birmingham, USA), Enrico Pontelli (New Mexico State University, USA), António Porto (University of Porto, Portugal), Rosario Pugliese (University of Florence, Italy), Antonio Ravara (Universidade Nova de Lisboa, Portugal), Alessandro Ricci (University of Bologna, Italy), Vladimir Safonov (St. Petersburg University, Russia), Ulrik Pagh Schultz (University of Southern Denmark, Denmark), Marjan Sirjani (Reykjavik University, Iceland), Boštjan Slivnik (University of Ljubljana, Slovenia), Yasuyuki Tahara (National Institute of

Informatics, Japan), George Wells (Rhodes University, South Africa), Pawel T. Wojciechowski, Poznan University of Technology, Poland), Jingling Xue (University of New South Wales, Australia), Wuu Yang (National Chiao-Tung University, Taiwan), and Franco Zambonelli (University of Modena and Reggio Emilia, Italy).

3. The contributed papers

Full papers:

1. Clinton Jeffery, Phillip Thomas, Sudarshan Gaikaiwari, John Goettsche. Integrating Regular Expressions and SNOBOL Patterns into String Scanning: a Unifying Approach.
2. Sérgio Medeiros, Fabio Mascarenhas. A Parsing Machine for Parsing Expression Grammars with Labeled Failures.
3. David Mohr, Darko Stefanovic. Stella: A Python-based Domain-Specific Language for Simulations.
4. Jerônimo da Cunha Ramos, André Rauber Du Bois, Mauricio Lima Pilla. An Embedded Domain Specific Language for Distributed Memory Transactions in Java ∗.
5. Pablo Gómez-Abajo, Esther Guerra, Juan de Lara. Wodel: A Domain-Specific Language for Model Mutation.
6. Akira Tanimura, Hideya Iwasaki. Integrating Lua into C for Embedding Lua Interpreters in a C Application.
7. Noah Van Es, Jens Nicolay, Quentin Stievenart, Theo D'Hondt, Coen De Roover. A Performant Scheme Interpreter in asm.js.
8. Eden Burton, Emil Sekerinski. An Object Model for a Dynamic Mixin Based Language.
9. Asma Cherif, Abdessamad Imine. Using CSP for Coordinating Undo-Based Collaborative Applications.

Posters:

1. Luís Diogo Couto, Peter W. V. Tran-Jørgensen, Kenneth Lausdahl. Principles for Reuse in Formal Language Tools.
2. Marcel Heinz, Philipp Helsper, Ralf Lämmel, Tobias M. Schmidt. A DSL for Executable 'How To' Manuals.
3. Florent Marchand de Kerchove, Jacques Noyé, Mario Südholt. Extensible Modules for JavaScript.
4. Klervie Toczé, Maria Vasilevskaya, Patrik Sandahl, Simin Nadjm-Tehrani. Maintainability of Functional Reactive Programs in a Telecom Server Software.
5. Jens Gustedt. Futex Based Locks for C11's Generic Atomics.
6. Stefano Bistarelli, Francesco Santini, Fabio Martinelli, Ilaria Matteucci. Automated Adaptation via Quantitative Partial Model Checking.

Acknowledgements

We would like to thank all authors for their valuable contributions. We also thank the program committee members who voluntarily supported us to recruit good papers and review the papers.

EDITORIAL MESSAGE

Special Track on Reliable Software Technologies and Communication Middleware (RST)

Marisol García-Valls, *Universidad Carlos III de Madrid, Spain*
Aniruddha Gokhale, *Vanderbilt University, USA*
Paolo Bellavista, *Università di Bologna, Italy*

The world of high-end distributed/parallel systems and applications is, in general, paying increasing attention to the problems related to quality of service, determination of temporal behavior and response of the proposed software platform solutions, interactivity, and performance of the communication layer. Emergent highly complex domains such as cyber-physical systems and smart environments/homes/cities require the availability of reliable software infrastructures that are able to support their inherent timing requirements; in these solutions the role of middleware is a key and central one.

In addition, future solutions will be particularly challenging when dealing with large-scale open deployment environments and their associated scalability issues. Novel and relevant application domains push for evolution and disruptive research; only to mention a few, middleware solutions for datacenter resource management optimization for quality-aware online stream processing of big data flows, energy-aware middleware for resource management in smart city/smart grid deployment environments, and middleware for cloud-hosted cyber-physical systems with strict requirements on latency and reliability.

With this idea in mind, the ACM SAC Track on Reliable Software Technologies and Communication Middleware (RST) focuses on the design of distributed reliable systems that must take into account the selection and evaluation of interaction models, software technology choices, temporal requirements, resource efficiency, performance, scalability, and coordination. RST 2016 is the first edition of a desired sustained effort to attract researchers, practitioners, designers, and developers of distributed software systems that have special requirements of reliability and time-sensitivity. The main topics of the papers submitted to this edition of RST have dealt with: reliable and time-sensitive distribution models; performance of distributed applications; cloud computing advances for cyber-physical systems and mobile cloud computing; middleware for the efficient integration of cyber-physical systems and the cloud; reactive stream processing and on-line processing of big data flows; efficient integration with the run-time support, e.g., operating system and virtualization technology; quality of service aware middleware for data center resource management; interaction models such as publish/subscribe or event-based; programming models and languages; efficient and context-aware server-side management of smart city data; and scalability in city-wide deployment scenarios.

In its first edition, RST track has attracted ten high-quality submissions. From this number, two full papers and one poster paper have been accepted. The acceptance rate for the track has been 20% for full papers, which is generally lower than the overall SAC acceptance rate. More specifically about the received submissions and accepted papers, all the received manuscripts covered at least three of the topics mentioned in the call for papers, being well centered on the themes of greatest interest for our specific venue (no out-of-scope submission). Based on the acceptance results, we have decided to organize the RST track into a single session with two full papers and one poster paper (with a shorter presentation time slot). The first full paper, titled "Exploiting User Feedback for Online Filtering in Event-based

Systems", by Fabio Petroni, Leonardo Querzoni, Roberto Beraldi, and Mario Paolucci addresses the open technical challenge of automatically filtering the data injected in event-based systems based on monitored user feedback; the aim is to be able to efficiently deliver to consumers only content they are actually interested in, by run-time filtering that exploits continuous profiling of both producers and consumers, and then profile matching with the newly generated data in the examined event stream. The second full paper "Scalable Monitoring and Dependable Job Scheduling Support for Multi-domain Grid Infrastructures" by Marcello Cinque, Antonio Corradi, Luca Foschini, Flavio Frattini, and Javier Povedano-Molina, instead, focuses on grid management and in particular proposes a completely distributed and highly efficient management infrastructure for the dissemination of monitoring data and troubleshooting of job execution failures in large-scale and multi-domain Grid environments; the paper also provides significant contributions in reporting experimental results of the original proposal when challenged in a real deployment and when compared with other Grid management systems in the literature. Finally, "Adjusting middleware knobs to suit CPS domains" by Marisol García-Valls, Cristian Calva Urrego, Alejandro Alonso, and Juan A. de la Puente is the accepted poster paper and describes an original software platform that employs middleware technology as the communication backbone to support dynamic and timely execution of distributed processes, being based over a predictable layer with guaranteed quality of service.

A programme committee of twenty seven members has been put together with outstanding top quality researchers in the related areas, who have provided high quality feedback to authors to improve their contributions. We are most grateful to each and every member of the programme committee of RST for their kind support, timely reviews, and gentle collaboration to start RST track within SAC.

Kyongho An	RTI, USA
Roberto Baldoni	Università di la Sapienza, Italy
Ken Birman	Cornell University, USA
Gordon Blair	University Lancaster, UK
Cristian Borcea	New Jersey Institute of Technology, USA
Jian-nong Cao	Hong Kong PolyU, Hong Kong
Mauro Caporuscio	Linnaeus University, Sweden
Antonio Cassimiro	Universidade de Lisboa, Portugal
Abhishek Dubey	Vanderbilt University, USA
Paul Ezhilchelvan	Newcastle University, UK
Nikolaos Georgantas	Inria, France
Akram Hakiri	LAAS CNRS, France
Joe Hoffert	Indiana Wesleyan University, USA
Ruediger Kapitza	Technische Universität Braunschweig, Germany
Takayuki Kuroda	NEC, Japan
Cong Liu	University of Texas Dallas, USA
Juan López Soler	University of Granada, Spain
Pedro J. Marrón	Universität Duisburg-Essen, Germany
Willian Otte	Vanderbilt University, USA
Karthik Pattabiraman	University of British Columbia, Canada
Leonardo Querzoni	Università di Roma La Sapienza, Italy
Binoy Ravindran	Virginia Tech, USA
Anders Ravn	Aalborg University, Denmark
Stefano Russo	University of Naples, Italy
Valerio Schiavoni	University Neuchâtel, Switzerland
Michael Wahler	ABB, Switzerland
Tomofumi Yuki	Inria, France

We do hope that this track will be of considerable interest to the ACM SAC audience, highlighting the potential of reliable software technologies and communication middleware under different perspectives, technical viewpoints, and applicability angulations. We believe that this small set of accepted papers can anyway provide the interested readers with a fresh sample of some open and relevant technical challenges in the field, of general importance and of wide applicability. Enjoy your reading!

And, most important, welcome to ACM SAC, to our RST Track, and to an enjoyable and fruitful conference event held this year in the beautiful Pisa.

Marisol García-Valls, Aniruddha Gokhale, and Paolo Bellavista

RST Track Chairs, ACM SAC 2016

EDITORIAL MESSAGE
Special Track on Computer Security (SEC)

Giampaolo Bella, *Università di Catania, Italy*
Sergio Maffeis, *Imperial College London, UK*

As chairs of the Computer Security track, we are pleased to welcome you to its fifteenth edition at the ACM Symposium on Applied Computing. The Program Committee for this track, as in past years, is composed of eminent representatives from both industry and academia, and this year is yet longer than before in order to cope with the submission rate and corresponding review load. Here is the list of members of this year's committee, in alphabetical order:

- Karthikeyan Bhargavan (INRIA, France)
- Denis Butin (TU Darmstadt, Germany)
- Cormac Callanan (Aconite Internet Solutions, Ireland)
- Lorenzo Cavallaro (Royal Holloway University of London, UK)
- Nicholas Carlini (University of California, Berkeley, USA)
- Véronique Cortier (CNRS, Loria, France)
- Philippe De Ryck (KU Leuven, Belgium)
- Lieven Desmet (KU Leuven, Belgium)
- Adam Doupé (Arizona State University, USA)
- Dario Fiore (IMDEA Software Institute, Spain)
- Flavio Garcia (University of Birmingham, UK)
- Rosario Giustolisi (SICS Swedish ICT)
- Dieter Gollmann (TU Hamburg, Germany)
- Pekka Jappinen (Lappeenranta University of Technology, Finland)
- Limin Jia (Carnegie Mellon University, USA)
- Martin Johns (SAP Research, Germany)
- Sokratis K Katsikas (University of Piraeus, Greece)
- Matteo Maffei (Saarland University, Germany)
- Marius Minea (Politehnica University of Timisoara, Romania)
- Chris Mitchell (Royal Holloway University of London, UK)
- Chris Novakovic (Imperial College London, UK)
- David Nowak (CNRS & Lille 1 University, France)
- Kenneth Radke (Queensland University of Technology, Australia)
- Tamara Rezk (Inria, France)
- William Robertson (Northeastern University, USA)
- Andrei Sabelfeld (Chalmers University of Technology, Sweden)
- Hossain Shahriar (Kennesaw State University, USA)
- Haya Shulman (TU Darmstadt, Germany)
- Deian Stefan (UC San Diego and GitStar, USA)
- Ruoyu Wang (UC Santa Barbara, USA)

This year we received 58 submissions, as usual from virtually everywhere in the world. The review process, which also involved a number of qualified delegates, was double-blind in the sense that the paper authors were kept anonymous from the reviewers. Each paper received at least 3 reviews, and all papers and reviews were ultimately discussed in depth by the entire Program Committee. As a result of this scientifically thrilling process, papers were marked either for acceptance or for rejection. In the end, only 10 papers were accepted, defining a selective acceptance rate just above

17%. We are therefore confident of the high quality of the published material, and remain indebted to the reviewers for their thorough work.

Here is this edition's programme:

- Bacs et al. demonstrate an intrusion detection system for virtualized storage devices. Experimental results confirm it effective at enhancing the security of virtualized servers, while imposing minor performance and production overhead.
- Larmuseau et al. implement a secure abstract state machine for the ML language. The machine has the feature of preserving the abstractions of ML in possibly malicious, low-level contexts.
- Martinelli et al. enhance the Android permission system through a Usage Control-based framework. It allows employees to write policies that are continuously enforced while BYOD applications are running.
- Li et al. introduce an out-of-band approach to discover Tor hidden services. It is found to be simpler and more lightweight than traditional approaches: using multiple search engines with specific keywords.
- Yuksel et al. focus on intrusion detection for industrial control systems networks and advance an innovative, practical and semantics-aware framework for anomaly detection. It minimises the false-positive rate.
- Backes et al. perform an automated security analysis of the actual JavaScript implementation of the Helios voting client. A sequence of program transformations makes the code amenable to existing static analysis techniques.
- Han and Shen introduce four categories of email profiling features that capture various characteristics of spear phishing email. The system is demonstrated to suffer a very minor false-positive rate.
- Wuchner et al. tackle the problem of identifying malicious domains. They propose an approach that automatically estimates the risk associated with a domain upon the basis of the data flow induced when communicating with it.
- Calvi and Viganò face the issue of chained attacks over web applications. They advance an automated model-based approach to test their security.
- De Groef et al. work over a a new technology stack that enables real-time communication on the Web. They identify three novel attacks against endpoint authenticity, and discuss defensive strategies.

About the track chairs

Giampaolo Bella is Associate Professor at the University of Catania, doing teaching and research in Computer Security and Formal Methods. He has chaired the Computer Security track at ACM SAC since its inception. After his Ph.D. from Cambridge University, he was a research associate at TU Munich, Cambridge University, and a senior researcher at SAP Research France. He has recently been developing formal approaches and methodologies to studying the security problem as a socio-technical, trans-disciplinary one.

Sergio Maffeis is a lecturer in Computer Security at Imperial College London. His research straddles web security, formal methods, and programming languages. Recent contributions include automated testing of browser security policies, defensive cryptography in the browser, security analysis of social sing-on and encrypted cloud storage, and defining formal, executable semantics for JavaScript and PHP. Maffeis received his PhD from Imperial and has been a visiting researcher at INRIA, Stanford, UCSC, and Microsoft Research.

EDITORIAL MESSAGE
Special Track on Software Platform

Jinman Jung, *Hannam University, Korea*
Jun Huang, *Chongqing University of Posts and Telecom, China*

The software platforms are in a constant state of change with new devices and technologies introduced almost every day. As a result, software platform developers and researchers continue to evolve software technologies that are used for increasing mobile conversions and enhancing relationships among users. The structure of software systems involves working with a wide variety of software platforms and technologies range from embedded devices and smart-phones on the low end, to enterprise and distributed systems on the high end. Many research questions remain open from limited battery to remote access control, interaction with external devices, assurance in quality of service, context-aware adaptation to the environment, interface modeling or other issues (security and privacy problems) that are obstacles to thrive software platform technologies. This track aims to share research results and experiences in Software Platforms field with researchers and developers, the track addresses all of these research issues related to software platforms. This track has received 24 submissions from different countries around the world. Each paper has underwent a blind review process by three members of the track Technical Program Committee (TPC), and 3 regular full papers and 3 poster papers have been accepted for publications in the proceedings of the conference. The regular papers accepted by this track include:

- Evaluation of Smart Scheduling Technologies: Static versus Dynamic Approaches
- Experimental Approach: Two-stage Spectrum Sensing Using GNU Radio and USRP to Detect Primary User's Signal
- Optimized Multilayer Perceptron using Dynamic Learning Rate Based Microwave Tomography Breast Cancer Screening

The ACM SAC 2015 Software Platform track was chaired by Drs. Jinman Jung, and Jun Huang, who wish to thank all the TPC members for their valuable time and technical input for running such an excellent track. Without their support and contributions, this track would not be successful. The special thanks will be given to the Drs. Jiman Hong and Maria Lencastre for their leadship and superb work to organize the SAC conference. Finally, the track chairs would like to thank all the authors who contributed to this track.

December 2015,
Dr. Jinman Jung
Dr. Jun Huang

Track Chairs, Software Platform

EDITORIAL MESSAGE

Special Track on Trust, Reputation, Evidence and other Collaboration Know-how (TRECK)

Jean-Marc Seigneur, *University of Geneva, Switzerland*
Ronald Petrlic, *Saarland University, Germany*

Computational trust and online reputation services have reached the mass market. Traditional business intelligence tools have even prominently added e-reputation features to promote their solution. The TRECK track in Pisa, Italy, will surely foster exciting collaborations and technology transfers, especially for the growing realm of mobile applications and online services related to this ACM SAC track.

The trustcomp online community (http://tech.groups.yahoo.com/group/trustcomp/ and http://www.trustcomp.org) has been set up for the participants of the track and every person working in a field related to TRECK since mid-2004. The trustcomp mailing list now counts more than 290 members composed of a panel of experts from both the academic and the industrial world, with competences from various fields such as security, risk management, business intelligence, Web marketing, human computer interface (HCI).

We would like to thank all the authors for submitting their paper contributions to the ACM SAC'16 TRECK track. We are grateful to the many external reviewers for their time and hard work to select the best full papers. Many thanks to the SAC organizing committee, who believes in the potential of the TRECK track, as well as to the ACM SIGAPP!