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Guest Editorial: Adaptive and reconfigurable service-oriented, cloud and virtualized architectures

The concept of adaptive and reconfigurable Service Oriented Architecture (SOA) has been introduced in order to describe architectures that exhibit emerging functional and non-functional properties in changing contexts. An adaptive and reconfigurable SOA can repair itself if any execution problem occurs, in order to successfully complete its own execution, while respecting functional and non-functional agreements. In the design of an adaptive and reconfigurable SOA, several aspects have to be considered. For instance, the architecture components should be able to predict and to detect degradations and failures as soon as possible and to enact suitable recovery actions such as scaling-up and scaling-out of virtual execution resources. Moreover, different non-functional service-level requirements might be considered in order to complete the execution in case of a predicted imminent or observed occurring failure. Contributions are devoted to the design and the implementation of adaptive and reconfigurable SOA and related Cloud applications.

The issue contains five papers related to the foundations of “SOA and Cloud Computing” and the tools and applications for “Smart and Cyber-Physical environments”.

Service Oriented Architecture and Cloud Computing

“E2SM: A Security tool for Adaptive Cloud-based Service-Oriented Applications” by Takoua Abdellatif proposes an End-to-end Security Model (E2SM) that aims to protect data confidentiality in adaptive cloud-based SOA applications. Whereas Leah Mutanu and Gerald Kotonya study the key factors that influence runtime adaptation in service-oriented architectures, and examines how well they are addressed in 29 adaptation approaches intended to support service-oriented systems in the paper entitled “What, Where, When, How and Right of Runtime Adaptation in Service-Oriented Systems”. The paper entitled “Modeling and Analyzing Elastic Strategies in Cloud Systems” by Khaled Khebbeb *et al.* proposes a Bigraphical Reactive Systems based approach to provide a formal modelling of Cloud systems’ structure using bigraphs, and their elastic behaviours using bigraphical reaction rules.

Smart and Cyber-Physical environments

“Modeling and Verifying Time-aware Processes for Cyber-Physical Environments” by *Imen Graja et al.* proposes to extend Business Process Modeling Notation to support the various Cyber-physical system concepts and properties. The paper entitled “Smart and Safe Self-Adaption of Connected Devices Based on Discrete Controllers” by Arthur Gatouillat *et al.* proposes a self-adaptation framework to deal with changes and takes into account storage, computational and communication constraints.

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Guest Editor Biographies



Ismael Bouassida Rodriguez, ReDCAD, University of Sfax, Tunisia.

He received the Ph.D degree in Computer Science from the National School of Engineering of Sfax-Tunisia and National Institute of Applied Sciences of Toulouse-France, in 2011. He is since September 2012 an associate Professor at Higher Institute of Computer Science and Multimedia of Sfax-Tunisia. His research interests include graphs grammars and software engineering of distributed systems. He has co-organized the following tracks: AROSA IEEE-WETICE 2013,2014,2015,2017,2018; ASOCA ICSOC 2017-2018. He has served in the Program Committee of international conferences, including recently: ECSA 2017, AICCSA 2017. He has been guest editor of Special Issues in international journals including recently: Future Generation Computer Systems 2017, Journal of Systems and Software 2016. He is or has been involved in different European and Tunisian projects (ENI CBC MED, Erasmus+, DAAD, PRF). He has been guest editor of different journal special issued including JSS, FGCS.



Khalil Drira, LAAS-CNRS, Université de Toulouse, France.

He is a Research Director at the French National Center for Scientific Research (CNRS). Khalil Drira obtained the Engineering Degree in Computer Science from ENSEIHT, the Higher Engineering School of The Hight Education Institute INP Toulouse in 1988, the PhD. in Computer Science from Univ. Toulouse, France in 1992, and the Research Habilitation Degree (HDR) from Univ. Toulouse, in 2005. He joined CNRS in 1993. He chaired the Program Committee of the different international conferences including: ECSA 2013, IEEE-WETICE 2012, 2015, and SERA 2015. He has co-organized the following workshops and tracks: AROSA IEEE-WETICE 2011,2013,2014,2016-2018; ASOCA ICSOC 2017-2018; SISOS ECSA 2016, ACM-SAC 2017-2018; SESOS ECSA and ICSE 2013-2016; CASA ECSA 2017. He has served in the Steering Committee of the international conferences: IEEE-WETICE since 2012 and ECSA 2014-2018. He has served in the Program Committee of over 100 international conferences, including recently: WICSA-ECSA 2009, ECSA since 2010, ICSOC since 2012, COOPIS since 2017. He is member of the editorial board of: IEEE Internet of Things, Internet Technology Letters, Smart Science, and Journal of Communications and Information Sciences, Journal of Digital Signals and Smart Systems, Journal of Information Technology, Theory and Application. He has been guest

editor of 10 Special Issues in international journals including recently: *Concurrency and Computation: Practice and Experience Journal* 2017, *Journal of Systems and Software* 2016, *Future Generation Computer Systems* 2015. He was editor of the following SPRINGER volumes: LNCS 2236 and LNCS 7957. He was (co-)editor of over 20 international conferences and workshops proceedings.



Mohamed Jmaiel, Digital Research Center of Sfax, Tunisia.

Mohamed JMAIEL obtained his diploma of engineer in Computer Science from Kiel (Germany) University in 1992 and his Ph.D. from the Technical University of Berlin in 1996. He joined the National School of Engineers of Sfax (Tunisia) as Assistant Professor of Computer Science in 1995. He became an Associate Professor in 1997 and full Professor in January 2009. He participated to the initiation of many graduate courses at the University of Sfax. His current research areas include software engineering of distributed systems, formal methods in model-driven architecture, self-adaptive and pervasive systems, autonomic middleware. He conducted many research projects and published more than 220 regular and invited papers in international conferences and journals, and has co-edited six conferences proceedings and five journals special issues on these subjects. He organized and co-chaired the program committees of many international conferences, like MCSEAI'2004, CRISIS'2009, NOTERE'2010, OPODIS'2010, WETICE'2013, VECOS'2016, ESBM'2017, and ICTAC'2019. He was director of the National Engineering School of Sfax (ENIS), from 2011 to 2014. Currently, he is director of the digital research center at the Technopark of Sfax. More details are available on his home page: <http://www.redcad.org/members/jmaiel/>.