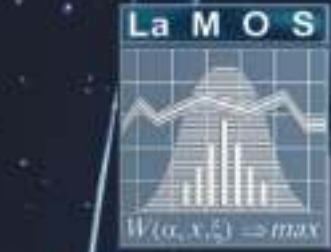**8 th International Workshop**

VECoS 2014

Verification and Evaluation of Computer and Communication Systems

Organized by

Department of Operation Research
Faculty of Exact Sciences, University of Bejaia
Research Unit LaMOS (Modeling and Optimization of Systems)

Bejaïa, September 29 - 30, 2014

PRESENTATION

The International Workshop on Verification and Evaluation of Computer and Communication Systems (VECoS) was created by an Euro-Maghrebian network of researchers in computer science. Its first edition, VECoS 2007, took place in Algiers, VECoS 2008 in Leeds, VECoS 2009 in Rabat, VECoS 2010 in Paris, and VECoS 2011 in Tunis, VECoS 2012 in Paris and VECoS 2013 in Florence. The aim of the VECoS workshop is to bring together researchers and practitioners, in the areas of verification, control, performance, quality of service, dependability evaluation and assessment, in order to discuss the state-of-the-art and the challenges in modern computer and communication systems in which functional and non-functional properties are strongly interrelated. Thus, the main motivation for VECoS is to encourage the cross-fertilization between the various formal verification and evaluation approaches, methods and techniques, and especially those developed for concurrent and distributed hardware/software systems. Beyond its technical and scientific goals, another main purpose of VECoS is to promote collaboration between participants in research and education in the area of computer science and engineering.

Topics

- Topics of interest include:
- Model-checking
- Equivalence checking
- Abstraction techniques
- Compositional verification
- Parameterized verification
- Supervisory control
- Probabilistic verification
- Security protocols verification
- Performance and robustness evaluation
- Simulation techniques of discrete-event and hybrid systems
- Dependability assessment techniques
- QoS evaluation, planning and deployment
- Verification & validation of safety-critical systems
- RAMS (Reliability Availability Maintainability Safety) evaluation
- Certification standards for real-time systems

Application domains

Mobile and wireless networking, wireless sensor networks, communication protocols, telecommunication systems, ubiquitous systems, adaptive real-time and embedded systems, programming languages, service oriented systems, workflow systems, web services, computer-supported collaborative work systems, flexible manufacturing systems, logistics systems, grid computing massively parallel architectures, operations research

MONDAY, September 29th

8:15 **Registration**

9:15 **Opening session**

9:30 **Invited talk** (*session chair: Kamel Barkaoui*)

Compositional Invariant Generation for Timed Systems
Saddek Bensalem, Université Joseph Fourier, Grenoble

10:30 **Break**

11:00 **Modelling and Verification 1 (*session chair: Bruno Monsuez*)**

Towards Formal Modeling and Verification of Context-Aware Systems
Taha Abdelmoutaleb Cherfia, Faïza Belala and Kamel Barkaoui

Model-Checking Cloud Systems Using BigMC
Hamza Sahli, Faiza Belala and Chafia Bouanaka

Diagnosis of Probabilistic Models using Causality and Regression
Hichem Debbi

12:30 **Lunch**

14:30 **Invited talk** (*session chair: Hassane Alla*)

Fault diagnosis of discrete event systems using Petri nets
Carla Seatzu, University of Cagliari

15:30 **Break**

16:00 **Dependability analysis** (*session chair: Kada Allab*)

A µ-Calculus Framework for the Diagnosability of Discrete Event Systems
Mohamed Ghazel and Florent Peres

Coping with Spoofed PS-Poll Based DoS Attack in IEEE
Hocine Souilah, Abderrahmane Baadache and Louiza Bouallouche-Medjkoune

Failure Detector-Ring Paxos Based Atomic Broadcast Algorithm
Nadjette Rebouh

Saddek Bensalem
University Joseph Fourier, Grenoble, France
http://www-verimag.imag.fr/~bensalem/

Abstract: Compositional methods in verification have been developed to cope with state explosion. Generally based on divide-and-conquer principles, these methods attempt to break monolithic verification problems into smaller sub-problems by exploiting either the structure of the system or of the property or both. Compositional reasoning can be used in different manners e.g., for deductive verification, assume-guarantee, contract-based verification, compositional generation, etc. The development of compositional verification for timed systems remains however challenging. State-of-the-art tools for the verification of such systems are mostly based on symbolic state space exploration, using efficient data structures and particularly involved exploration techniques. In the timed context, the use of compositional reasoning is inherently difficult due to the synchronous model of time. Time progress is an action that synchronizes continuously all the components of the system. Getting rid of the time synchronization is necessary for analyzing independently different parts of the system (or of the property) but become problematic when attempting to re-compose the partial verification results. Nonetheless, compositional verification is actively investigated and several approaches have been recently developed exploiting timed interfaces and contract-based assume-guarantee reasoning. In this talk, we propose a different approach for exploiting compositionality for analysis of timed systems using invariants. In contrast to exact reachability analysis, invariants are symbolic approximations of the set of reachable states of the system. We show that rather precise invariants can be computed compositionally, from the separate analysis of the components in the system and from their composition glue. This method is proved to be sound for the verification of safety properties. However, it is not complete.

Bernd Heidergott
Vrije Amsterdam University, The Netherlands
http://personal.vu.nl/b.f.heidergott/

Abstract : This lecture is aimed at stimulating a discussion on the relation between statistics and applied probability/operations research. Academic applied probability/operations research is mainly focused on the mathematical analysis of models that find their motivation in the outside (read, non-academic) world. In preparing a real-life problem for mathematical analysis, a "model" has to be distilled, and once this is done, reality is replaced by this model, which is subsequently analyzed with much energy and analytical rigor. However, hardly ever are the exact model specifications known, and defining parameters of the model under consideration, such as arrival rates in queueing networks, failure rates of servers in reliability models, or demand rates in inventory systems, are only revealed to the analyst by statistics. The classical approach for dealing with such parameter insecurity is to integrate out the system performance with respect to the assumed/estimated distribution of the unknown parameter. We believe that this frequentialistic interpretation of parameter insecurity falls short in addressing the needs of the analyst. This lecture will advocate supporting the analyst by studying the risk incurred by parameter insecurity. Rather than taking an entirely statistical point of view by dismissing "model building" at all, we want to integrate the data-driven statistical nature of model building into the analytical analysis. We will discuss an analytical framework for doing so that allows for separating (i) the (analytical) analysis of the system from (ii) the statistical model for the parameter insecurity. For an inventory example, we will present numerical results illustrating our approach.

Carla Seatzu
University of Cagliari, Italy
http://www.diee.unica.it/~seatzu/info_eng.html

Abstract : This talk is devoted to the problem of fault diagnosis of discrete event systems. Labeled Petri nets are considered as the reference formalism. A brief state of the art is first proposed, then the attention is focused on an approach to on-line diagnosis based on the notion of basis markings and justifications. Such an approach can be applied both to bounded and unbounded Petri nets whose unobservable subnet is acyclic. In the case of bounded Petri nets it presents the main advantage that the most burdensome part of the procedure may be moved off-line, computing a particular graph called Basis Reachability Graph. Diagnosability analysis is also discussed. In particular, necessary and sufficient conditions for diagnosability are given and a test to study diagnosability is presented. Such a test is based on the analysis of the coverability graph of a special Petri net, called Verifier Net that is built starting from the initial system.

TUESDAY, September 30th

09:30 **Invited talk** *(session chair: Ahmed Damou - Medjkoune)*

Towards a Statistical System Analysis
Bernd Heidergott, Vrije Amsterdam University

10:30 **Break**

11:00 **Performance evaluation** *(session chair: Nourredine Boumahrat - Ioualalen)*

Analytical Modeling of the IEEE 802.11e EDCA Network
Mohand Yazid, Nassim Sahki, Louiza Bouallouche-Medjkoune and Djamil Aïssani

A Derived Queueing Network Model for Structured P2P Architectures
Zouweyna Mordji, Mourad Amad and Djamil Aïssani

Applying data fragmentation in IEEE 802.15.4: modeling and analysis under
Mouloud Atmani, Djamil Aïssani and Yassine Hadjadj-Aoul

12:30 **Lunch**

14:30 **Modelling and Verification 2** *(session chair: Faïza Belala)*

Visual specification language and automatic checking of business process
Outman El Hichami, Mohammed Al Achhab, Ismail Berrada and Badr Eddine El Mohajir

Mapping OCL constraints into CTL-like logic and SML for UML validation
Miloud Bennama and Thouraya Bouabana-Tebibel

15:30 **Break and Poster Presentations**

Enforcing Security Policies on Choreographed Services using Rewriting Techniques
Karim Dahmani and Mahjoub Langar

Bayesian networks for the evaluation of complex systems' availability
El Hassene Ait Mokhtar, Radouane Laggoune and Alaa Chateauneuf

Observer design and feedback controller synthesis with observer in idempotent semiring
Aldjia Nait Abdesselam, Radouane Kara and Jean Jacques Loiseau

Cross-layer energy-aware protocol for wireless sensor networks
Fares Kahlessenane, Louiza Bouallouche-Medjkoune and Djamil Aïssani

Comparison of Routing Protocols in Wireless Sensor Networks
Samira Yessad, Louiza Bouallouche-Medjkoune and Djamil Aissani

Fairness Improvement of MAC in Wireless Ad Hoc Networks
Kamal Mehaoued, Larbi Sekhri and Malika Bourenane

17:30 **Closing session**

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