First International Summer School on Runtime Verification

Christian Colombo, Yliès Falcone

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First International Summer School
on Runtime Verification
as part of the ArVi COST Action 1402

Christian Colombo[1] and Yliès Falcone[2]

[1] University of Malta, Malta - `christian.colombo@um.edu.mt`
[2] Univ. Grenoble-Alpes, Inria, LIG, F-38000 France - `ylies.falcone@imag.fr`

Abstract. This paper briefly reports on the first international summer school on Runtime Verification: Branches of practical topics rooted in theory, co-organized and sponsored by COST Action IC1402 ArVi which was held September 23-25, Madrid, Spain as part of the 16th international conference on Runtime Verification (RV 2016).

Runtime Verification $[1, 3–5, 2]$ is an umbrella term usually denoting the languages, techniques, and tools related to the verification of system executions against formally-specified behavioral properties. This field of research has been mainly represented by the Runtime Verification (RV) conference[3] which was held yearly for the last 16 years. As the field is growing and the techniques are becoming more and more mature, there is a pressing need in the community for documentation and lecture material to help students and practitioners entering the field, in spite of the existing (incomplete) tutorials and short overviews of the field. We foresee the organization of this summer school as one of the steps towards achieving this goal. By organizing the summer school, we wanted to build a short theoretical and practical program allowing to give in 3 days the necessary introductory knowledge to a practitioner or student entering the field.

Objectives. As the name of the summer school suggests, the summer school aimed to provide a balance of theory and practice: In the theoretical aspect, while all the core concepts were covered, participants were also exposed to cutting edge advances in the field. At the same time, the summer school was very hands-on and students followed up with practical work in the evenings so that by the end of the summer school, participants had created their own basic runtime verification tool.

For PhD students and researchers entering the field of RV, the school was a great opportunity to get to know other people working in the area, to meet distinguished scholars, and to establish contacts that may lead to research collaborations in the future. For people coming from industry, the school provided an exposition of the major challenges as well as possible solutions to the application of RV in industry, an exposition to the major tools, as well as the basics of RV tool-building.

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[3] See http://runtime-verification.org.

Table 1. Programme overview - Day 1 - 23rd September

Time	Topic	Lecturer
09:00 09:45	RV overview, RV vs other verification techniques	Y. Falcone
09:45 10:30	Summer school Overview and manual monitoring	
11:00 11:45	Monitoring with AOP	G. Pace
11:45 12:30	Towards monitoring specification languages	
14:00 14:45	Monitoring LTL specifications	M. Leucker
14:45 15:30	Monitorability	
16:00 16:45	Hands on	C. Colombo
16:45 17:30		
18:00	Optional further assistance with hands on	

Table 2. Programme overview - Day 2 - 24th September

Time	Topic	Lecturer
09:00 09:45	Handling data	K. Havelund
09:45 10:30	in user-provided specifications	
11:00 11:45	Monitoring concurrency errors:	J. Lourenco
11:45 12:30	deadlocks, atomicity violations, and data races	
14:00 14:45	Performance issues and optimizations	G. Reger
14:45 15:30		
16:00 16:45	Hands on	C. Colombo
16:45 17:30		
18:00	Optional further assistance with hands on	

Table 3. Programme overview - Day 3 - 25th September

Time	Topic	Lecturer
09:00 09:45	Design and Monitoring of Component-Based Systems	M. Bozga
09:45 10:30	Distributed monitoring & monitoring distributed systems	B. Bonakdarpour
11:00 11:45	Time-Triggered monitoring	
11:45 12:30	From Monitoring quantitative properties to testing	D. Nickovic
14:00 14:45	Combined Static and Runtime Verification	W. Ahrendt
14:45 15:30	Bytecode manipulation for Runtime Verification	W. Binder
16:00 16:45	Runtime enforcement	Y. Falcone
16:45 17:30	A Theory of Monitors	A. Francalenza

Lecturers. The following researchers lectured at the summer school:

- Prof. Wolfgang Ahrendt, Chalmers University of Technology and University of Gothenburg (Sweden).
- Prof. Ezio Bartocci, TU Wien (Austria).
- Prof. Borzoo Bonakdarpour, University of MacMaster (Canada).
- Dr. Marius Bozga, CNRS, Vérimag (France).
- Dr. Christian Colombo, University of Malta (Malta).
- Dr. Yliès Falcone, University of Grenoble (France).
- Dr. Adrian Francalanza, University of Malta (Malta).
- Dr. Klaus Havelund, NASA Jet Propulsion Laboratory (USA).
- Prof. Martin Leucker, University of Lübeck (Germany).
- Prof. Joao Loureno, Universidade Nova de Lisboa (Portugal).
- Dr. Dejan Nickovic, Austrian Institute of Technology (Austria).
- Prof. Gordon Pace, University of Malta (Malta).
- Dr. Giles Reger, University of Manchester (UK).

Program overview. The Summer School was organised over three days with a series of lectures from international experts during the day and a follow up practical session in the evening to enable the participants to incorporate the covered knowledge into their tool (see Tables 1-3). The first day covered the fundamentals of runtime verification: starting with the basic concept of what is runtime verification, moving on to instrumentation techniques, and property specification languages. The second day covered the major practical aspects of runtime verification: handling data through monitor parametrisation, monitoring concurrency errors, and performance issues of monitors. The second day ended with a session on RV tools, giving the participants time to try tools and interact with their creators. Finally, the third day covered advanced and cutting-edge research in the field with topics ranging from runtime enforcement to the combination of static and dynamic analysis, and from monitoring of distributed and transaction-based systems to low-level hardware monitoring.

References

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