Beyond the finite: new challenges in verification and semistructured data

Dagstuhl seminar 08171

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Objective: *Exploring the interaction of model checking and database static analysis techniques in the development of novel approaches to the verification of software systems handling data.*

The seminar ran as scheduled, from the morning of April 21 until mid-day on April 25. Since the seminar was centred on 7 themes (as outlined in the proposal, the event was structured accordingly: 7 invited talks (ranging from 60 to 90 minutes each) on each of the themes, and 25 presentations from participants (of 30 minutes each). An excursion to Trier on Wednesday afternoon provided a cultural interlude in a dense academic programme. With extensive interaction and discussions, the seminar was lively (with some heated debates) and highly educative. The central objective of the seminar was to look for common questions and techniques between research on verification and data, and to learn from each other; this was achieved satisfactorily.

Certain techniques emerged as being centrally useful. For instance, the use of well-quasi orderings on configurations of infinite space systems to prove termination of verification algorithms surfaced many times in discussions, whether it be in the context of parameterized systems, or in systems communicating by messages, or in software verification. Similarly, reachability studies on counter systems of various kinds was seen to have implications for a variety of contexts: analysis of data, reasoning about timed systems, and real arithmetic. The use of symbolic techniques and powerful theorems on term rewriting systems was illustrated in the study of security protocols as well as that of tree automata. Questions on logical characterizations and the need for logics over infinite alphabets was emphasized time and again, not only in the context of databases, but also in discussions on verification of parameterized systems and metric temporal logics. The need for decidable relational logics that combine quantification and order was talked of in the context of web services.

While logic and automata theory provided the lingua franca for the seminar, the discussions were not exclusively on these. There were presentations, especially in the context of software verification, on modelling issues as well as the use of (theorem proving and model checking) tools, and the pragmatics necessary in such a context.

The Dagstuhl setting, with its unique atmosphere of a castle set in an idyllic scene, backed by excellent organization and amenities, provided just the right tone for the seminar, allowing participants to focus on research interaction. With a mix of experienced

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and young researchers taking active part, we can confidently expect that the seminar will lead to new collaborations and applications of infinite-state systems benefiting both the verification and database areas.

List of participants

1. Abiteboul, Serge; INRIA SaclaY, France.
2. Aziz Abdulla, Parosh; Uppsala University, Sweden.
3. Bjrklund, Henrik; TU Dortmund, Germany.
4. Boigelot, Bernard; University of Liége, Belgium.
5. Bojanczyk, Mikolaj; University of Warsaw, Poland.
6. Bouajjani, Ahmed; LIAFA - Universit Paris VII, France.
7. Bouyer, Patricia; ENS - Cachan / CNRS - LSV, France.
8. Chakraborty, Supratik; IIT - Bombay, India.
9. Cuéllar, Jorge R.; Siemens AG - München, Germany.
10. D'Souza, Deepak, IISc, Bangalore, India.
11. David, Claire; LIAFA - Université Paris VII, France.
12. Delaune, Stéphanie; ENS - Cachan, France.
13. Demri, Stéphane; ENS - Cachan, France.
14. Deutsch, Alin; University of California - San Diego, USA.
15. Esparza, Javier; TU München, Germany.
16. Fontaine, Gaelle; University of Amsterdam, Netherlands.
17. Gelade, Wouter; Hasselt University - Diepenbeek, Belgium.
18. Genest, Blaise; IRISA / CNRS - Rennes, France.
19. Jacquemard, Florent; ENS - Cachan, France.
20. Kaminski, Michael; Technion - Haifa, Israel.
21. Khoussainov, Bakhadyr; University of Auckland, New Zealand.
22. Klaedtke, Felix; ETH Zürich, Switzerland.
23. Krcal, Pavel; Uppsala University, Sweden.
24. Lazic, Ranko; University of Warwick, U.K.
25. Löding, Christof; RWTH Aachen, Germany.
26. Martens, Wim; TU Dortmund, Germany.

27. Marx, Maarten; University of Amsterdam, Netherlands.
28. Miné, Antoine; ENS - Paris, France.
29. Mukund, Madhavan; Chennai Math. Institute, India.
30. Muscholl, Anca; LaBRI - Bordeaux, France.
31. Müller-Olm, Markus; Universität Münster, Germany.
32. Otto, Martin; TU Darmstadt, Germany.
33. Qadeer, Shaz; Microsoft Corp. - Redmond, USA.
34. Ramanujam, Ramaswamy; IMSc - Chennai, India.
35. Rusinowitch, Michaël; INRIA Lorraine - Nancy, France.
36. Schnoebelen, Philippe; ENS - Cachan, France.
37. Schweikardt, Nicole; Universität Frankfurt, Germany.
38. Schwentick, Thomas; TU Dortmund, Germany.
39. Segoufin, Luc; ENS - Cachan, France.
40. Seidl, Helmut; TU München, Germany.
41. Serre, Olivier; LIAFA - Univ Paris Diderot and CNRS, France.
42. Simon, Axel; ENS - Paris, France.
43. Suresh, S.P.; CMI - Chennai, India.
44. Thomas, Wolfgang; RWTH Aachen, Germany.
45. Van den Bussche, Jan; Hasselt University - Diepenbeek, Belgium.
46. Verma, Kumar Neeraj; TU München, Germany.
47. Vianu, Victor; UC at San Diego - La Jolla, USA.
48. Walukiewicz, Igor; LaBRI - Bordeaux, France.
49. Weber, Volker; TU Dortmund, Germany.
50. Zeitoun, Marc; LaBRI - Bordeaux, France.

List of talks

Speaker	Title
Ahmed Bouajjani	Parameterized verification
Anca Muscholl	Communicating systems
Markus Müller-Olm	Some Aspects of Program Analysis Beyond the Finite
Axel Simon	No Strings Attached: Polyhedral Analysis of C String Buffers
Parosh Abdulla	Shape Analysis via Monotonic Abstraction
Philippe Schnoebelen	The complexity of lossy channel systems
Javier Esparza	SDSIRep : A reputation system based on SDSI
Luc Segoufin	Static analysis around XML
Claire David	Data Tree Patterns
Henrik Björklund	Conjunctive Query Containment over Trees
Victor Vianu	Verification of Data-Aware Web Services
Serge Abiteboul	Static Analysis of Active XML Systems
Mikolaj Bojanczyk	XPath with data
Patricia Bouyer	An Introduction to Timed Systems
Deepak D'Souza	Conflict-Tolerant Features
Felix Klaedtke	Runtime Monitoring of Metric First-order Temporal Properties
Stéphane Demri	Model checking memoryful linear-time logics over one-counter automata
Florent Jacquemard	Tree Automata Techniques for Infinite state verification of Security Protocols
S.P. Suresh	Unbounded data in security protocols
Stéphanie Delaune	Safely composing security protocols via tagging
Kumar Neeraj Verma	Single Blind Copying Protocols, and XOR
Michael Kaminski	Describing DTD by context-free grammars and tree automata over infinite alphabet
Christoph Löding	Tree automata with subtree comparisons
Pavel Krcal	R-automata
Florent Jacquemard	Closure of Hedge-Automata Languages by Hedge Rewriting
Bernard Boigelot	On the Sets of Real Numbers Recognized by Finite Automata in Multiple Bases
Martin Otto	Bisimulation Invariance over Transitive Frames
Jan Van den Bussche	A theory of stream queries
Shaz Qadeer	Back to the future: Revisiting precise program verification using SMT solvers
Supratik Chakraborty	Automatically Refining Abstract Interpretations for Program Analysis