COST Action IC0901 Rich-model Toolkit An Infrastructure for Reliable Computer Systems

Work Group on Decision Procedures for Rich Model Language Fragments

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Scientific Output

Networking

Disclaimer

- A large, beautifully diverse Action
- Four years of enthousiastic hard work (2009-13)
- Decision procedures: basic ingredient hence ubiquitous
- A necessarily incomplete summary

Applications of decision procedures in Action IC0109

- Verification: logic as lingua franca
- Model checking: abstraction (e.g., linear programs with arrays) and refinement cycle; fixed-point reached, state sets intersection
- Synthesis: from models to examples; code snippets
- Testing: from models to tests, moles
- Security and privacy
- Games: correctness of strategies
- Education

Contributions of Action IC0109

- Decision procedures for rich models: from SAT to QBF, SMT, Natural Domain SMT, SMA, CHC, ATP/ITP
- Integration of paradigms: e.g., SMT+ATP, SMT+ITP, ATP+ITP ... towards theory engineering
- Solver architecture including parallelism
- Verified solvers: "kernel of truth"

Contributions of Action IC0109

- Decision procedures for complex data structures (e.g., skiplists), memory layouts, type systems, expressive theories (e.g., BAPA) ...
- Model-constructing decision procedures: applied to synthesis ... towards model-based reasoning paradigm
- Proof-generating decision procedures: proof formats; proof sharing
- Interpolating decision procedures: interpolation systems for PL, FOL+= ATP, SMT+ATP

Publications and Presentations by WG2 members

A few lower bounds:

- Journal articles: 26
- Conference papers or book chapters: 33
- Edited books or journal issues: 4
- Invited talks at major international conferences: 4

Workshops and Meetings with WG2 activity

- SVARM Workshops + Action Meetings: 12 (Brussels, Belgrade, Edinburgh, Lugano, Saarbrücken, Turin, Tallinn, Manchester, Haifa, Rome, Malta, Madrid)
- Co-locations, including: FATPA 2010, FLoC 2010, FMCAD+AVM 2010, ETAPS 2011 and 2012, IJCAR+Turing100+VERIFY+IWS 2012, HVC 2012, POPL+VMCAI 2013
- Summer Schools: Synthesis 2011 (Schloss Dagstuhl), SAT+SMT 2012 (Trento), SAT+SMT 2013 (Helsinki)

Short Term Scientific Missions in WG2

- Florian Haftmann TU Munich → U Belgrade (Predrag Janičić)
- Gabriel Istrate WU Timisoara → U Belgrade (Predrag Janičić)
- Filip Marić U Belgrade → TU Munich (Tobias Nipkow)
- Enric Rodriguez Carbonell TU-Catalonia → U Bergen (Marc Bezem)
- Siert Wieringa Aalto U (Keijo Heljanko) → JKU Linz (Armin Biere)

Competitions relevant to WG2

- HW model-checking competition
  - Added track on liveness model-checking
  - Publications on liveness model-checking, beginning at FMCAD 2011
- Numerical Transition Systems competition
  - Numerical Transition Systems library
  - First-Order Transition Systems: Symbolic Transition Systems ... towards Verification Modulo Theories
- Related: ATP system competition (CASC) at CADE or IJCAR, SMT-COMP, Termination competition

Thanks

It's been a fantastic ride:

Thanks to All!