

System Description: SONOLAR

SMT-COMP 2014

Florian Lapschies, Jan Peleska, Elena Gorbachuk
FB3/AGBS
University of Bremen
28359 Bremen, Germany
{florian,jp,elenav}@informatik.uni-bremen.de

May 27, 2014

SONOLAR, the Solver for non-linear Arithmetic, is an SMT-solver for the theory of bit-vectors and for bit-vectors with arrays. It uses bit-blasting to translate constraints to a Boolean formula and lets a SAT solver decide the satisfiability. For handling arrays, the lemmas on demand approach described in [2] has been adopted.

First, a series of word-level simplification rules are applied to the input formula, which is then converted to an And-Inverter Graph. After performing bit-level simplifications a Boolean CNF formula is generated and fed to a SAT solver. Glucose 3.0, which is based on Minisat 2.2, is used as the default SAT solver [1, 5]. It's built-in preprocessor is utilized for QF_BV formulas, whereas QF_ABV benchmarks are solved without.

SONOLAR is targeted for automatic test data generation in the field of model-based testing and C/C++-unit testing [6, 8, 7, 4]. SONOLAR is implemented in C++. During development many bugs have been found using Robert Brummayer's and Armin Biere's fabulous fuzzing and delta-debugging tools [3].

The latest version of SONOLAR is available under <http://informatik.uni-bremen.de/agbs/florian/sonolar/> for various platforms.

SONOLAR will enter the competition with a random seed of 4.

References

- [1] Gilles Audemard and Laurent Simon. Predicting learnt clauses quality in modern sat solvers. In *Proceedings of the 21st International Joint Conference on Artificial Intelligence, IJCAI'09*, pages 399–404, San Francisco, CA, USA, 2009. Morgan Kaufmann Publishers Inc.
- [2] Robert Brummayer and Armin Biere. Lemmas on Demand for the Extensional Theory of Arrays. In *Proc. 6th Intl. Workshop on Satisfiability Modulo Theories (SMT'08)*, New York, NY, USA, 2008. ACM.
- [3] Robert Brummayer and Armin Biere. Fuzzing and delta-debugging SMT solvers. In *Proceedings of the 7th International Workshop on Satisfiability Modulo Theories, SMT '09*, pages 1–5, New York, NY, USA, 2009. ACM.

- [4] Gustavo Carvalho, Flávia de Almeida Barros, Florian Lapschies, Uwe Schulze, and Jan Peleska. Model-based testing from controlled natural language requirements. In *FTSCS*, pages 19–35, 2013.
- [5] Niklas Eén and Niklas Sörensson. An Extensible SAT-solver. In *SAT*, pages 502–518, 2003.
- [6] Tatiana Mangels and Jan Peleska. Ctgen - a unit test generator for c. In *SSV*, pages 88–102, 2012.
- [7] Jan Peleska, Artur Honisch, Florian Lapschies, Helge Löding, Hermann Schmid, Peer Smuda, Elena Vorobev, and Cornelia Zahlten. Embedded Systems Testing Benchmark, 2011. <http://www.mbt-benchmarks.org>.
- [8] Jan Peleska, Elena Vorobev, and Florian Lapschies. Automated Test Case Generation with SMT-Solving and Abstract Interpretation. In Mihaela Bobaru, Klaus Havelund, Gerard J. Holzmann, and Rajeev Joshi, editors, *Nasa Formal Methods, Third International Symposium, NFM 2011*, volume 6617 of *LNCS*, pages 298–312, Pasadena, CA, USA, April 2011. Springer.