Q3B in SMT Competition 2019

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1 Solver Description

Q3B is an SMT solver developed at Masaryk University. The solver is focused on quantified formulas in the theory of fixed-size bit-vectors and employs a BDD-based SMT approach introduced in the paper *Solving Quantified Bit-Vector Formulas Using Binary Decision Diagrams* [4]. Besides the computation of the BDD corresponding to the input formula, the approach consists of three additional techniques that make it efficient: formula preprocessing, including simplifications of quantified formulas that contain unconstrained variables [2], formula approximations that represent some of the variables by fewer bits [4], and abstractions that can compute only several bits of the results of bit-vector operations [1].

The current version of Q3B is written in C++, uses ANTLR to parse the input formula from the SMT-LIB format, and the API of the solver Z3 [5] to perform some of the preprocessing steps. However, Q3B does not use any actual SAT or SMT-solving capabilities of Z3. The operations on BDDs are implemented using the library CUDD [7] and the library by P. Navrátil that implements bit-vector operations on top of CUDD [6].

The solving approach used by Q3B and its architecture is described in detail in the corresponding tool paper [3].

2 Logics and Tracks

Q3B participates in the *Single Query track* and *Incremental track* of the logic BV, because it is focused on *quantified* bit-vector formulas and does not support uninterpreted functions.

3 Changes Since SMT-COMP 2018

Since the last year SMT-COMP, a new SMT-LIB parser was implemented into Q3B. It therefore supports almost all SMT-LIB commands and hence it can compete in the incremental track for the first time. Besides that, several bugs have been fixed (in particular, the bug in caching that caused several incorrect answers last year) and the stability and the ease of use of the tool was improved.

4 Competition Version

The version of Q3B submitted to SMT-COMP 2019 is open-source, available under the MIT licence, and can be downloaded from GitHub:

`https://github.com/martinjonas/Q3B/releases/tag/smtcomp2019`.

Only one configuration (*default*) of the solver was submitted to SMT-COMP 2019.

References

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