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# CNF2OBDD or BDD\_MINISAT\_ALL

Takahisa Toda <toda.takahisa(at)gmail.com>

Last update: 2015-9-30

## 1. Description

A CNF to OBDD compiler or a formula-BDD caching AllSAT solver, implemented on top of MiniSat-C v1.14.1, is presented. This software has two names because of a double meaning. It may be called *cnf2obdd* to put more emphasis on a CNF to OBDD compiler aspect, which supports rich operations for postprocessing, and it also may be called *bdd\_minisat\_all* on an AllSAT solver aspect, which simply generates all solutions, a familiar format to wider users.

## 2. DOWNLOAD

- Latest version: [bdd\\_minisat\\_all version 1.0.0](#), released on 30th Sep., 2015.

## 3. FILE FORMAT

Input boolean formula should be in DIMACS CNF format. For details of DIMACS CNF format and benchmark problems, see [SATLIB](#).

## 4. HOW TO COMPILE

If no option is given, standard mode is selected.

```
$ tar zxvf bdd_minisat_all-1.0.0.tar.gz
$ cd bdd_minisat_all-1.0.0
$ make [options]
list of options
s   standard: debug information used by debugger is generated
      at compilation time, and detailed solver status is reported at
      runtime.
p   profile:  in addition to standard setting, profile information
      used by gprof is generated at compilation time and several tests
      are performed at runtime.
d   debug:    in addition to standard setting, several tests are
      performed at runtime and no optimization is applied.
r   release:  release version, compiled with dynamic link
rs  static:   release version, compiled with static link
clean  executable files, object files, etc are removed.
```

## 5. USAGE

If an output file is specified, all satisfying assignments to a CNF are generated in DIMACS CNF format without problem line. *Notice: there may be as many number of assignments as can not be stored in a disk space.* If you want to use timelimit or status report functionality, define `TIMELIMIT` in `Makefile`. If you want to use refresh option, define `REFRESHOBDD` in `Makefile`.

```
Usage:  ./bdd_minisat_all [options] input-file [output-file]
-n<int> maximum number of obdd nodes: if exceeded, obdd is
        refreshed
```

Since variable orderings significantly affect solver's performance, we recommend that users in advance execute the software [MINCE](#) to determine a good variable ordering.

## 6. MACRO

Program behavior can be controlled by defining or not defining the following macros in `Makefile`.

- `CUTSETCACHE`: Cutset is selected as formula-BDD caching. If this is not defined, separator is selected.
- `LAZY`: Cache operations are reduced (Recommended).

Select one of the two base solver types: a blocking solver or a non-blocking solver.

- `NONBLOCKING` non-blocking procedure is selected as a base solver. If this is not defined, blocking procedure is selected. For options of non-blocking solvers, see [nbc\\_minisat\\_all](#).
- `REFRESH`: refresh option in command line is enabled. If the number of BDD nodes exceeds a specified threshold, all solutions are dumped to a file (if output file is specified in command line), all caches are refreshed, and search is continued.

Other options are as follows.

- `TRIE_RECURSION`: Recursive version of trie is used. If this is not defined, iterative version is used.
- `REDUCTION`: Reduction of compiled OBDD into fully reduced one is performed using CUDD library (Optional). To do this, obtain CUDD library and modify `Makefile`.
- `GMP`: GNU MP bignum library is used to count solutions. To do this, obtain GMP library and modify `Makefile`.

## 7. LICENSE

`bdd_minisat_all` is implemented by modifying MiniSat-C\_v1.14.1. Please confirm the license file included in this software.

## 8. NOTICE

A huge number of assignments may be generated and *disk space may be exhausted*. To avoid disk overflow, take measure such as using `ulimit` command.

## 9. REFERENCES

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