

(Very) Brief Introduction to SMT-LIB

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May 16, 2016

International initiative aimed at facilitating research and development in Satisfiability Modulo Theories (SMT)

`www.smtlib.org`

Tools that analyze satisfiability of formulas.

en.wikipedia.org/wiki/Satisfiability_modulo_theories#SMT_solvers

Two examples:

- **SMTInterpol**

Developed in our group by Jochen Hoenicke and Tanja Schindler
github.com/ultimate-pa/smtinterpol

- **Z3**

Available via web interface
rise4fun.com/z3

SMT Script

- File format that allows you to write commands for SMT solvers.
- File ending `.smt2`
- Prefix notation

Example:

```
(set-logic QF_LIA)
(declare-fun x () Int)
(declare-fun y () Int)
(assert (< x 2))
(assert (> x 0))

(check-sat)

(get-model)
(assert (= x (* y 2)))
(check-sat)
```

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Example:

```
(set-logic QF_LIA)      ← use quantifier-free linear integer arithmetic
(declare-fun x () Int)
(declare-fun y () Int)
(assert (< x 2))
(assert (> x 0))

(check-sat)

(get-model)
(assert (= x (* y 2)))
(check-sat)
```

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(declare-fun x () Int)
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(get-model)
(assert (= x (* y 2)))
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```

← announce that constant x has sort Int

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Example:

```
(set-logic QF_LIA)
(declare-fun x () Int)
(declare-fun y () Int)
(assert (< x 2))           ← put formula on "assertion stack"
(assert (> x 0))
(check-sat)

(get-model)
(assert (= x (* y 2)))
(check-sat)
```

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```
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(declare-fun x () Int)
(declare-fun y () Int)
(assert (< x 2))
(assert (> x 0))

(check-sat)

(get-model)
(assert (= x (* y 2)))
(check-sat)
```

← check satisfiability of conjunction
of all formulas on assertion stack

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Example:

```
(set-logic QF_LIA)
(declare-fun x () Int)
(declare-fun y () Int)
(assert (< x 2))
(assert (> x 0))

(check-sat)

(get-model)      ← get satisfying assignment
(assert (= x (* y 2)))
(check-sat)
```