

NAME

`evaluator5` – on-the-fly model checking of MCL v5 formulas

SYNOPSIS

bcg.open [*bcg_opt*] *spec*[**.bcg**] [*cc_opt*] **evaluator5** [*evaluator_opt*] *prop*[**.mcl**]

or:

exp.open *spec*[**.exp**] [*cc_opt*] **evaluator5** [*evaluator_opt*] *prop*[**.mcl**]

or:

fsp.open [*fsp_opt*] *spec*[**.lts**] [*cc_opt*] **evaluator5** [*evaluator_opt*] *prop*[**.mcl**]

or:

lnt.open [*lnt_opt*] *spec*[**.lnt**] [*cc_opt*] **evaluator5** [*evaluator_opt*] *prop*[**.mcl**]

or:

lotos.open [*lotos_opt*] *spec*[**.lotos**] [*cc_opt*] **evaluator5** [*evaluator_opt*] *prop*[**.mcl**]

or:

seq.open *spec*[**.seq**] [*cc_opt*] **evaluator5** [*evaluator_opt*] *prop*[**.mcl**]

DESCRIPTION

evaluator5 takes two inputs:

- A Probabilistic Transition System (PTS for short), expressed either as a BCG graph *spec*.**bcg**, a composition expression *spec*.**exp**, an FSP program *spec*.**lts**, an LNT program *spec*.**lnt**, a LOTOS program *spec*.**lotos**, or a sequence file *spec*.**seq**. See the **mcl5**(LOCAL) manual page for the definition of the PTS model.
- A temporal logic property, contained in the file *prop*[**.mcl**], expressed as a formula in the *MCL* version 5 language. See the **mcl5**(LOCAL) manual page for a complete definition of the *MCL* version 5 language.

evaluator5 performs an on-the-fly verification of the temporal property on the given PTS. The result of this verification (TRUE or FALSE, preceded by the values of probabilities if they are requested by the probabilistic operators contained in *prop*[**.mcl**]) is displayed.

The verification method underlying **evaluator5** is based upon a translation of the probabilistic model checking problem into the resolutions of a Linear Equation System (LES) and a Parameterized Boolean Equation System (PBES), as described in [MR18]. These resolutions are carried out simultaneously and on the fly, using the algorithms provided by the **caesar_solve_1**(LOCAL) and **caesar_solve_2**(LOCAL) libraries of OPEN/CAESAR (see the corresponding manual pages and the articles [Mat06,MR18] for details).

OPTIONS

The options *bcg_opt*, if any, are passed to **bcg_lib**(LOCAL).

The options *exp_opt*, if any, are passed to **exp.open**(LOCAL).

The options *fsp_opt*, if any, are passed to **fsp.open**(LOCAL).

The options *lnt_opt*, if any, are passed to **lnt.open**(LOCAL).

The options *lotos_opt*, if any, are passed to **caesar**(LOCAL) and to **caesar.adt**(LOCAL).

The options *seq_opt*, if any, are passed to **seq.open**(LOCAL).

The options *cc_opt*, if any, are passed to the C compiler.

The options *evaluator_opt* are the same as those of **evaluator4** (see the **evaluator4**(LOCAL) manual page), with the following addition:

-epsilon *eps*

Set the precision of certain floating-point comparisons to *eps*, where *eps* is a real value. When *eps* is out of [0..1[, **evaluator5** reports an error. Default value for *eps* is 1E-6.

EXIT STATUS

Exit status is 0 if everything is alright, 1 otherwise.

DIAGNOSTICS

When the source file *prop*[.mcl] is erroneous, error messages are issued.

BIBLIOGRAPHY

[Mat06] R. Mateescu. "CAESAR_SOLVE: A Generic Library for On-the-Fly Resolution of Alternation-Free Boolean Equation Systems." Springer International Journal on Software Tools for Technology Transfer (STTT) 8(1):37-56, 2006. Full version available as INRIA Research Report RR-5948. Available from <http://cadp.inria.fr/publications/Mateescu-06-a.html>

[MR18] R. Mateescu and J. I. Requeno. "On-the-Fly Model Checking for Extended Action-Based Probabilistic Operators." Springer International Journal on Software Tools for Technology Transfer (STTT) 20(5):563-587, 2018. Available from <http://hal.inria.fr/hal-01862754/en>

AUTHORS

Version 5.0 of EVALUATOR handles version 5 of the *MCL* language. It was implemented by Radu Mateescu (INRIA/CONVECS).

For the previous versions of EVALUATOR, see the AUTHORS section of the **evaluator**(LOCAL) manual page.

OPERANDS

<i>spec.bcg</i>	BCG graph (input)
<i>spec.exp</i>	network of communicating LTSs (input)
<i>spec.lts</i>	FSP specification (input)
<i>spec.lnt</i>	LNT specification (input)
<i>spec.lotos</i>	LOTOS specification (input)
<i>spec.seq</i>	sequence file (input)
<i>prop.mcl</i>	MCL version 5 formula (input)
<i>diag.bcg</i>	diagnostic in BCG format (output)
<i>file.bes</i>	BES in textual format (output)

FILES

\$CADP/src/xtl/*.mcl predefined libraries (input)

SEE ALSO

bcg(LOCAL), bcg_open(LOCAL), caesar.adt(LOCAL), caesar_graph(LOCAL), caesar_solve_1(LOCAL), caesar_solve_2(LOCAL), caesar(LOCAL), evaluator4(LOCAL), exhibitor(LOCAL), exp(LOCAL), exp.open(LOCAL), fsp.open(LOCAL), Int.open(LOCAL), lotos(LOCAL), lotos.open(LOCAL), mcl(LOCAL), regexp(LOCAL), seq(LOCAL), seq.open(LOCAL)

Additional information is available from the CADP Web page located at <http://cadp.inria.fr>

Directives for installation are given in files **\$CADP/INSTALLATION_***.

Recent changes and improvements to this software are reported and commented in file **\$CADP/HISTORY**.

BUGS

Please report bugs to Radu.Mateescu@inria.fr