A Bounded Verification Tool for Java

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Introduction

We present a tool that allows bounded model checking of Java source code. The tool works a layer over JBMC, a bounded verification tool for Java bytecode, developed by Lucas Cordeiro et al. [1]. Built on the CPROVER framework, which also drives the industrial strength bounded model checking tool CBMC.

We were inspired to develop this tool by CRUST [2]. CRUST is a bounded model checking tool to find memory problems in Rust source code, and we wanted a similar infrastructure to do further research on bounded model checking of Java source code.

The advantage of using this tool, over using JBMC itself is that we provide an interface for Java source code, instead of Java bytecode.

Features

Comparison between JBMC

An overview of the tool

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Lexing and Parsing

Chapter 2

Analysis

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CProver

5.1 Properties

array bounds	test
pointer	test
division by zero	test
arithmetic over- and underflow	test
shift greater than bit-width	test
floating-point for +/-Inf	test
floating-point for NaN	test
user assertions	test

Bibliography

[1] Lucas Cordeiro, Pascal Kesseli, Daniel Kroening, Peter Schrammel, and Marek Trtik. JBMC: A bounded model checking tool for verifying Java bytecode. volume 10981 of *LNCS*, pages 183–190. Springer, 2018.

[2] John Toman, Stuart Pernsteiner, and Emina Torlak. Crust: A bounded verifier for rust (n). In *Automated Software Engineering (ASE), 2015 30th IEEE/ACM International Conference on*, pages 75–80. IEEE, 2015.