1 Motivation
The Java Programming Language is a general-purpose, concurrent, strongly typed, object-oriented language. Java programs may have bugs, which may result in array bound violations, unintended arithmetic overflows, and other kinds of functional and runtime errors. Also, Java allows multi-threading, and thus, problems such as race conditions and deadlocks can occur.

3 Features
The Java operational model (JOM) consists of simplified models of the most common classes from java.lang and a few from java.util. JBMC also implements a solver for strings to determine the satisfiability of a set of constraints involving strings (based on [5]).

JBMC provides API classes that allow users to define non-deterministic verification harnesses and stub functions as used in the SV-COMP benchmarks.

4 Strengths and Weaknesses
JBMC does not produce any incorrect result for any of the Java verification tasks available in SV-COMP 2019 [4]; it correctly claims 139 benchmarks correct and finds bugs in 192.

However, JBMC aborts (or returns unknown) on 37 benchmarks due to time or memory exhaustion, or due to missing models of the Java standard library.

JBMC’s concurrency support is still limited and there is no support for lambdas, reflection and the Java Native Interface (JNI).

5 Tool Setup
The competition submission is based on JBMC version 5.10. For the competition, JBMC is called from a wrapper script.

The wrapper script compiles the .java source files in the given benchmark directories and then invokes the JBMC binary repeatedly with increasing values for the unwinding bound until the property has been refuted (answering false) or the program has been fully unwound without finding a property violation (answering true).

1 import org.sosy_lab.sv_benchmarks.Verifier;
2 public class Main {
3     public static void main (String [] args) {
4         String arg = Verifier.nondetString();
5         float floatValue = Float.parseFloat(arg);
6         String tmp = String.valueOf (floatValue);
7         assert tmp.equals("2.50");
8     }
9 }

We can run the JBMC wrapper script to check for a reachability property in the program shown above by executing the following command:

.\jbmc --propertyfile <path-to-sv-benchmarks>/properties/assert.prp <path-to-sv-benchmarks>/java/jbmc-regression/StringValueOf08

6 Software Project
JBMC is maintained by Peter Schrammel together with numerous contributors from the community.

It is publicly available under a BSD-style license.

The source code is available at http://www.github.com/diffblue/cbmc in the jbmc directory.

Instructions for building JBMC from source are given in the file COMPILING.md.

References: