

jMoped

A Checker for Java Programs

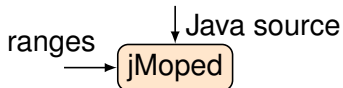
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Joint work with Felix Berger, Stefan Schwoon, and Javier Esparza

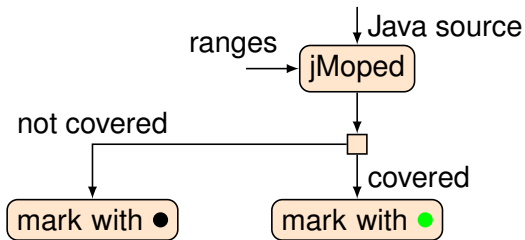
jMoped: an Eclipse plug-in

jMoped performs a reachability analysis to check the reduced Java method.



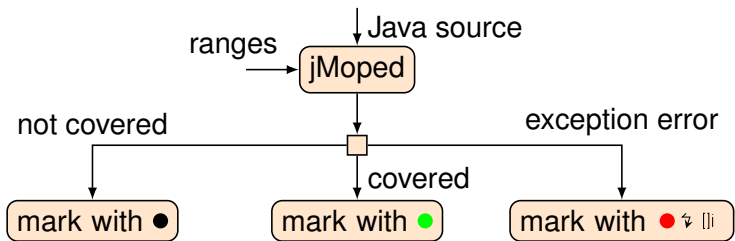
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Generates coverage information from model-checking results.



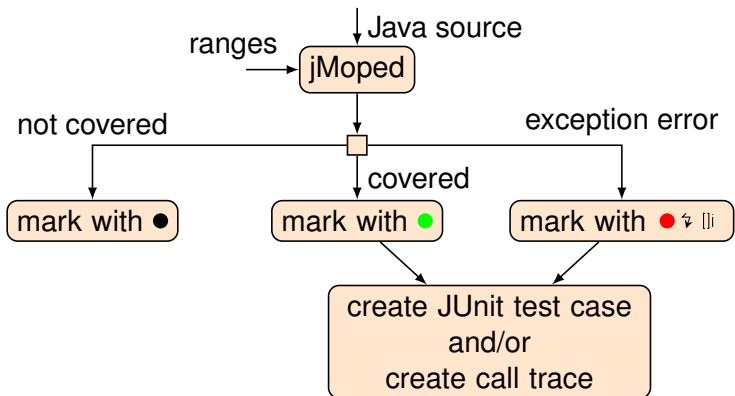
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Tests for common Java errors, i.e. assertion violations, null-pointer exceptions, array bound violations.



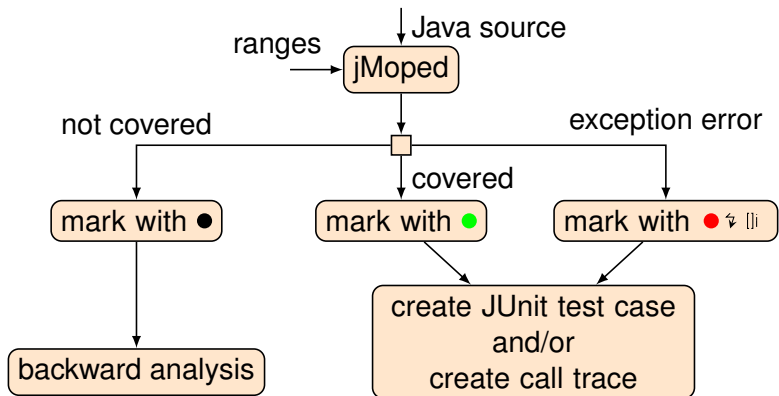
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Generates JUnit test cases or call traces with concrete inputs.

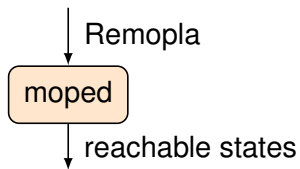


jMoped: an Eclipse plug-in

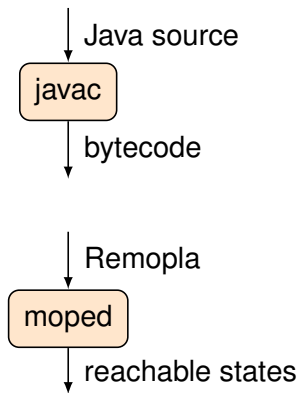
Searches backwards from uncovered instructions.



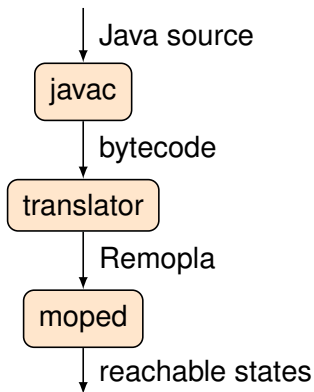
Overview of the Architecture



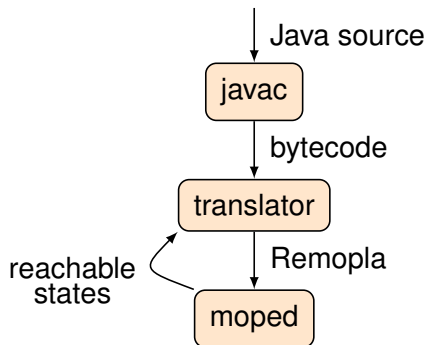
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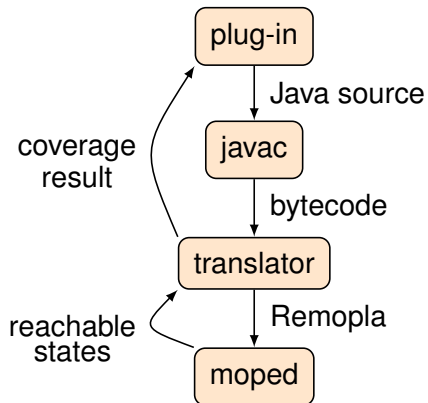
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Supported Java Features

- Assignments
- Control statements
- Method calls and recursions
- Exceptions
- Strings (very limited)
- Multi-dimensional arrays
- Object-oriented programming
 - Inheritance
 - Abstraction
 - Polymorphism

Limitations

- No float or negative values
- No multi-threading
- State space is rebuilt for each analysis

Performance limitations

- Analysis: jMoped is too slow for heaps bigger than 64 blocks
- Translation: A class in the Java library often calls many other classes → very big program!

Demonstrations

More demos ...

Conclusion

- Symbolic testing: uses a BDD-based model checker for testing a large set of inputs.
- Generates coverage information and find some common errors.
- User-friendly interface, model checker is hidden.
- Can be used as a complement to JUnit.
- Supports backward analysis.

<http://www7.in.tum.de/tools/jmoped>