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Static analysis of unbounded structures in object-oriented programs

Grabe, I.

Citation

Grabe, I. (2012, December 19). *Static analysis of unbounded structures in object-oriented programs*. Uitgeverij BOXPress, Oisterwijk. Retrieved from <https://hdl.handle.net/1887/20325>

Version: Corrected Publisher's Version

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Author: Grabe, Immo

Title: Static analysis of unbounded structures in object-oriented programs

Issue Date: 2012-12-19

Static Analysis of Unbounded Structures in Object-Oriented Programs

In this thesis we investigate different techniques and formalisms to address complexity introduced by unbounded structures in object-oriented programs. We give a representation of a weakest precondition calculus for abstract object creation in dynamic logic. Based on this calculus we define symbolic execution including abstract object creation.

We investigate the complex behaviour introduced by multi-threading and give a formalism based on the transformation of multi-threaded reentrant call-graphs to thread automata and the application of context free language reachability to decide deadlock freedom of such programs.

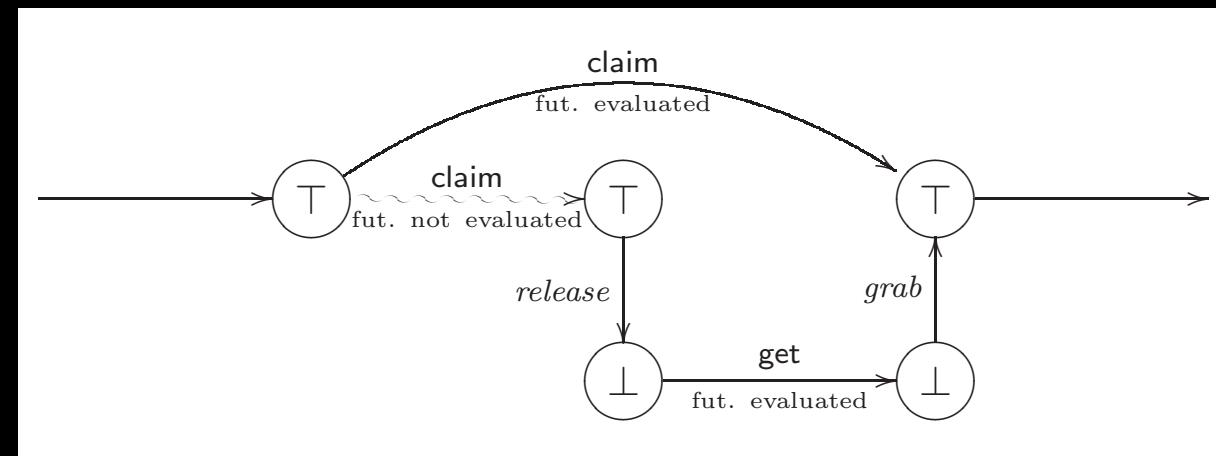
We give a formalisation of the observable interface behaviour of a concurrent, object-oriented language with futures and promises. The calculus captures the core of the Creol language and allows for a comparison with the concurrency model of thread-based, object-oriented languages like Java or C#.

We give a technique to detect deadlock freedom for an Actor-like subset of the Creol language.

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Immo Grabe

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ISBN: 978-90-8891-154-75

Immo Grabe