

Family-based vs. Product-Based Model Checking using ProVeLines and mCRL2

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The concept of a Software Product Lines (SPL) identifies a collection of programs that share a common core, but also exhibit variability per individual program. Examples of software organized as an SPL include embedded systems such as smartphones and automotive applications, but also operating systems can be viewed this way.

As the number of products incorporated in an SPL is growing (hundreds of products or more is in industrial cases hardly an exception), verification on a product-by-product basis is becoming infeasible and unmaintainable. Therefore, techniques that do verification per family or subfamily are sought for. The assignment in this seminar project is to compare so-called product-based model checking and family-based model checking for a moderate-size casestudy with two specific tools.

In [2] and [1] it has been shown how this may work for the reference SPL of the minepump model, exploiting the Belgian tool ProVeLines [3] for LTL and the Dutch tool mCRL2 [4] for the mu-calculus. ProVeLines is a dedicated SPL tool (based on the SPIN model checker). The mCRL2 approach builds on a manual translation from a featured mu-calculus to the standard one. In the project the approaches of [4] and [1] are to be applied to the coffee machine model, a frequently used example of an SPL (of which an mCRL2 specification is available).

The activities of the project include:

- getting acquainted with ProVeLines
- study of the papers [2] and [1]
- modelling of the coffee machine SPL with ProVeLines
- implementation of the translation of featured mu-calculus to standard mu-calculus with Python
- family-based and product-based model checking a number of properties with the two tools
- comparison and discussion of the outcomes

References

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