Explicit-enumeration based Verification made Memory-efficient

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Abstract

We investigate techniques for reducing the memory requirements of a model checking tool employing explicit enumeration. Two techniques are studied in depth: (1) exploiting symmetries in the model, and (2) exploiting sequential regions in the model. The first technique resulted in a significant reduction in memory requirements at the expense of an increase in run time. It is capable of finding progress violations at much lower stack depths. In addition, it is more general than two previously published methods to exploit symmetries, namely scalar sets and network invariants. The second technique comes with no time overheads and can effect significant memory usage reductions directly related to the amount of sequentiality in the model. Both techniques have been implemented as part of the SPIN verifier.

Keywords: Formal Methods, Verification, Model Checking