

Compositional Verification of Infinite State Systems

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Abstract. The verification of infinite state systems is one of the most challenging areas in the field of computer aided verification. In fact these systems arise naturally in many application fields, ranging from communication protocols to multi-threaded programs and time-dependent systems, and are quite difficult to analyze and to reason about.

The main approaches developed so far consist in the extension to the infinite case of techniques already developed for finite state systems, notably model checking suitably integrated with abstractions which allow to finitely represent infinite sets of states. Constraints have also been quite useful in representing and manipulating infinite sets of states, both directly and indirectly.

Particularly relevant in this context is the issue of compositionality: In fact, a compositional methodology could allow to reduce the complexity of the verification procedure by splitting a big system into smaller pieces. Moreover, when considering systems such as those arising in distributed and mobile computing, compositional verification is imperative in some cases, as the environment in which software agents operate cannot be fixed in advance.

In this talk we will first illustrate some techniques based on constraints and multi set rewriting (MSR) for the automatic verification of systems and protocols parametric in several directions. Then we will discuss some ongoing research aiming at developing a compositional model for reasoning on MSR specifications.

References

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