

Parameter Synthesis for Hierarchical Concurrent Real-Time Systems Using TOOL

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Abstract.

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1 Motivation

The specification and verification of real-time systems, involving complex data structures and timing delays, are notoriously difficult problems. The correctness of such real-time systems usually depends on the values of these timing delays. One can check the correctness for one particular value for each delay, using classical techniques of timed model checking, but this does not guarantee the correctness for other values. Actually, checking the correctness for all possible delays, even in a bounded interval, would require an infinite number of calls to the model checker, because those delays can have real (or rational) values. It is therefore interesting to reason *parametrically*, by considering that these delays are unknown constants, or *parameters*, and try to synthesize a constraint (a conjunction of linear inequalities) on these parameters guaranteeing a correct behavior.

Motivation. We are interested here in the *good parameters problem* for real-time systems: “find a set of parameter valuations for which the system is correct”. This problem stands between verification and control, in the sense that we actually change (the timing part of) the system in order to guarantee some property. Furthermore, we aim at defining a formalism that is intuitive, powerful (with use of external variables, structures and user defined functions), and allowing efficient parameter synthesis and verification.

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2 Implementation and Features

TOOL (with sources, binaries and case studies) is available on its Web page: <http://www-lipn.univ-paris13.fr/~andre/software/hymitator/>.

3 Applications

4 Related Work

References

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