Quantitative
Modeling
In
Parallel
Systems

Computing bounds for the performance indices of quasi-lumpable Stochastic Well-Formed Nets

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Abstract Structural symmetries in Stochastic Well-Formed Colored Petri Nets (SWN) lead to behavioral symmetries that can be exploited using the Symbolic Reachability Graph (SRG) construction algorithm: it allows to compute an aggregated Reachability Graph (RG) and a "lumped" Continuous Time Markov Chain (CTMC) that contain all the information

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needed to study the qualitative properties and the performance of the modeled system respectively. Some models exhibit qualitative behavioral symmetries that are not completely reflected at the CTMC level, we call them *quasi-lumpable* SWN models. In these cases, exact performance indices can be obtained by avoiding the aggregation of those markings that are qualitatively but not quantitatively equivalent. An alternative approach consists of aggregating all the qualitatively equivalent states, and computing approximated performance indices. In this paper a technique is proposed to compute bounds on the performance of SWN models of this kind, using the results presented in [4]. the technique is based on the Courtois and Semal's bounded aggregation method [2].