Minimization of Execution Scenarios in Static Priority Preemptive Scheduled Real-Time systems

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Abstract

In static priority preemptive real-time systems a large number of execution scenarios can occur. This can lead to that a lot of effort is put into testing of the system. The reason for this can be that a certain degree of confidence must be assured, and the coverage criteria is set to test all possible execution scenarios. In distributed systems the complexity increases with the amount of the scenarios produced. The effort in testing of such system could be decreased if the number of execution scenarios were reduced. In this paper we show results from simulations of jitter minimization in execution time of tasks in static priority preemptive scheduled real-time systems. By simulation of a real-time micro-kernel with support for jitter minimization we have observed that reduction of execution scenarios can be acheived. This has been done by adapting the worst case and best case execution time parameters. We have also made some basic observation when there is only one execution scenario. Algorithms revealing preemption points that affects the number of execution scenarios are presented. These algorithms can assist real-time systems developer to consider testability at design time.