MAINTAINING THE FEASIBILITY OF HARD REAL-TIME SYSTEMS WITH A REDUCED NUMBER OF PRIORITY LEVELS

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International Journal of Applied Mathematics and Computer Science;
tom 25;
numer 4;
strony 709–722;
2015;
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When there is a mismatch between the cardinality of a periodic task set and the priority levels supported by the underlying hardware systems, multiple tasks are grouped into one class so as to maintain a specific level of confidence in their accuracy. However, such a transformation is achieved at the expense of the loss of schedulability of the original task set. We further investigate the aforementioned problem and report the following contributions: (i) a novel technique for mapping unlimited priority tasks into a reduced number of classes that do not violate the schedulability of the original task set and (ii) an efficient feasibility test that eliminates insufficient points during the feasibility analysis. The theoretical correctness of both contributions is checked through formal verifications. Moreover, the experimental results reveal the superiority of our work over the existing feasibility tests by reducing the number of scheduling points that are needed otherwise.
Słowa kluczowe: real-time systems, feasibility analysis, fixed-priority scheduling, rate monotonic algorithm, online scheduling

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