Periodic Scheduling of Distributed Tasks with Consistency and Hard Real-Time Constraints

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Abstract: A key issue in the design of real-time distributed systems with persistent objects is to overcome both consistency constraints and hard real-time constraints. The problem becomes harder when distributed tasks have a graph structure. In this paper, we first show that basic results in uniprocessor scheduling are no more valid in this context. We then propose an algorithmic solution with its feasibility conditions. Feasibility conditions enable to determine whether a set of distributed tasks is feasible (i.e. all tasks meet their termination deadlines). We show how to establish necessary and sufficient feasibility conditions. Their computation is done by a tool, called feasibility oracle, we have designed. The oracle declares whether a given task set is feasible and if yes, provides the worst case response times. In the reported experiments, we show how to choose the best values of the scheduling parameters.

Keywords: real-time scheduling, distributed systems, feasibility conditions, consistency constraints, serializability.

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