

Energy-Conscious Standby-Sparing for Fault-Tolerant Real-Time Embedded Systems with QoS-Requirement

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Abstract

For real-time embedded systems (RTES), energy efficiency, Quality of Service (QoS), and fault tolerance are among the critical design issues. In this work, we study the problem of energy-conscious scheduling for real-time embedded systems with QoS requirement using standby-sparing. The standby-sparing systems adopt a dual-processor system containing a primary one and a spare one to tolerate both permanent and transient faults. In order to reduce energy consumption for such kind of systems, we proposed a novel scheduling scheme for real-time embedded systems with QoS requirement quantified using (m,k) -constraints. The preliminary experimental results demonstrated that our proposed techniques are very promising in reducing energy consumption while assuring (m,k) -constraints for real-time embedded systems tolerating both permanent and transient faults.

Keywords

Energy conscious scheduling, (m,k) -deadlines, fault tolerance, standby sparing.