

产品、研发、测试

一种基于控制流检测的低功耗基本块划分方法

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摘要 星载嵌入式系统要求更小的功耗和必备的在空间辐射环境中运行的高可靠性, 控制流检测技术是防止由于单粒子翻转事件而造成程序错误运行的有效手段之一。为了在低功耗模式下保证错误检测概率, 提出一种基于控制流检测的低功耗基本块划分方法, 此基本块划分方法在编译后期完成, 不影响编译调度效果。采用GCC、SDCC两款编译器, 将三种具有代表性的控制流检测算法注入到典型的程序集中进行测试。实验证明, 此种基本块划分方法在保证错误检测概率的条件下, 降低了程序运行功耗。

关键词 [控制流检测](#) [控制流图](#) [基本块](#) [编译技术](#)

分类号

Partition method of control flow checking-based low-powered basic block

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Abstract

Satellite-borne embedded systems require more little low-powered and the necessary reliability in the spacial radiation environment. The control flow checking is an effective way for running systems to prevent being broken down caused by Single Event Upsets. In order to assure the error-detection probability in the low-powered mode, a partition method of control flow check-based low-powered basic block has been presented, this basic block which is partitioned in the later compiler period is without any effect on the compiler. GCC and SDCC have been applied, and three representational control flow checking algorithms have been injected into typical benchmarks. On the condition of the high error-detection probability ensuring, the simulator shows that this partition method reduces the power consumption.

Key words [control flow checking](#) [control flow graph](#) [basic block](#) [compiler technique](#)

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