

一种改进算法的低功耗嵌入式系统代码压缩设计

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摘要: 采用一种代码压缩的方法来降低嵌入式系统的功耗.在分析指令的特性后对目标代码进行指令合并和指令分割,运用范式 Huffman 算法对处理后的指令进行编码生成索引查找表.最后,通过查找表中索引字和指令的对应关系完成目标代码的压缩和解压缩.实验使用 `simplescalar` 模拟器对部分嵌入式基准测试程序进行压缩,用代码压缩率和功耗减少率进行评估,统计数据表明提出的改进算法可有效节省存储空间、降低系统功耗.

关键词: 代码压缩; 嵌入式系统; 低功耗; 范式 Huffman 算法

An Improved Code Compression Algorithm for Low Power Embedded System Designs

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Abstract: A new code compression scheme was proposed to solve the power consumption problem in embedded systems. After analyzing the characteristics of instructions in target program, instructions will be combined and split, then the canonical Huffman algorithm is used to encode the modified instructions to generate look-up tables. Finally, code will be compressed and decompressed on the base of the corresponding relations between instructions and code words in look-up tables. According to the compression rate and power reduction rate of partial programs of embedded benchmarks compressed by `simplescalar` simulator, statistical data showed that the proposed algorithm can effectively save the storage space and reduce the power consumption of system.

Key words: Code compression; Embedded system; Low power; Canonical Huffman algorithm

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