

RISC-DSP处理器中指令数据相关性的提前判断方法

蔡卫光 姚庆栋 刘鹏*

浙江大学信息与电子工程学系 杭州 310027

Early Detection of Instruction Data Dependence for RISC-DSP Processor

Cai Wei-guang Yao Qing-dong Liu Peng*

Department of Information Science and Electronic Engineering, Zhejiang University, Hangzhou 310027, China

摘要

参考文献

相关文章

Download: PDF (237KB) [HTML](#) 1KB Export: BibTeX or EndNote (RIS) [Supporting Info](#)

摘要 RISC-DSP处理器中执行周期数动态可变的指令对数据相关检测造成了困难。该文通过分布式相关检测模型将检测操作转换为依赖关系集合的计算,推测不同流水线状态下后一周期的依赖关系集合,并根据当前指令相关性和功能单元发出的信号确定当前流水线状态,从而提前判断出下一周期中的指令相关性。按照其集合操作的特点进行逻辑优化,并以所研制的RISC-DSP处理器MediaDSP64原型机为例进行电路实现。综合结果表明,在对整体电路资源和功耗影响较小的前提下,从原先流水线关键路径中隐藏了相关检测电路,其延时下降了约30%。

关键词: 信号处理 指令相关检测 流水线技术

Abstract: In RISC-DSP processor, the instructions with dynamic execution cycles cause difficulty to data dependence detection. Based on distributed dependence detection model, the detection operation is expressed by the calculation of the dependence relationship set. The relationship set at next cycle for each pipeline state are calculated. In the mean time, current pipeline state is detected based on the current instruction distribution and signals from each function module. Thus the instruction dependence can be determined one cycle in advance. Logic optimization based on its set operation is also proposed and implemented in our designed processor MediaDSP64. Synthesis result shows that with slight increase in hardware resource and power consumption, the detection operation can be hidden from the original pipeline critical path, and its timing delay can be decreased by about 30%.

Keywords: Signal processing Instruction dependence detection Pipeline technique

Received 2010-01-26;

本文基金:

国家自然科学基金(60873112)和国家高技术研究发展计划专项经费(2009AA01Z109)资助课题

通讯作者: 刘鹏 Email: liupeng@zju.edu.cn

引用本文:

蔡卫光, 姚庆栋, 刘鹏. RISC-DSP处理器中指令数据相关性的提前判断方法[J] 电子与信息学报, 2010, V32(12): 3046-3050

Cai Wei-Guang, Yao Qing-Dong, Liu Peng. Early Detection of Instruction Data Dependence for RISC-DSP Processor[J], 2010, V32(12): 3046-3050

链接本文:

<http://jeit.ie.ac.cn/CN/10.3724/SP.J.1146.2010.00102> 或 <http://jeit.ie.ac.cn/CN/Y2010/V32/I12/3046>

Service

- ▶ [把本文推荐给朋友](#)
- ▶ [加入我的书架](#)
- ▶ [加入引用管理器](#)
- ▶ [Email Alert](#)
- ▶ [RSS](#)

作者相关文章

- ▶ [蔡卫光](#)
- ▶ [姚庆栋](#)
- ▶ [刘鹏](#)