面向机器学习的高性能 SIMT 处理器存储系统设计与实现

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摘　要：针对自主研发的高性能 SIMT 处理器中多线程运算时并行数据的快速存取问题，设计了一种适用于 SIMT 架构的存储系统，其主要包含存储控制器、数据缓存（cache）和指令缓存等设备.该设计使用可综合的 Verilog HDL 语言实现其硬件电路，同时搭建基于 FPGA 的验证平台对存储系统进行功能验证.在 Xilinx 公司的 FPGA 芯片 xcvu440-flga-2892-2-e 上综合最大时钟频率可达到 285 MHz.通过各方面验证，表明所设计的存储系统满足系统要求.

关键词：SIMT；多线程；cache；FPGA

Design and implementation of high performance SIMT processor storage system for machine learning

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Abstract：Aiming at the problem of fast access of parallel data in multi-thread operation in self-developed high performance SIMT processor, a storage system suitable for SIMT architecture is designed, which mainly includes storage controller, data cache and instruction cache. This design uses Verilog HDL language which can be integrated to realize its hardware circuit, and meanwhile builds a verification platform based on FPGA to perform functional verification of the storage system. The integrated maximum clock frequency can reach 285MHz on Xilinx's FPGA chip xcvu440-flga-2892-2-e. The verification of all aspects shows that the designed storage system meets the system requirements.

Key words：SIMT; multi-thread; cache; FPGA

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