

# **Golden-Finger and Back-Door: Two HW/SW Mechanisms for Accelerating Multicore Computer Systems**

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## **Abstract**

Continuously requirements of high-performance computing make the computer system adopt more processors within a system to improve the parallelism and throughput. Although multiple processing cores are implemented in a computer system, the complicated hardware communication mechanism between processors will decrease the performance of overall system. Besides, the unsuitable process scheduling mechanism of conventional operating system can not fully utilize the computation power of additional processors. Accordingly, this paper provides two mechanisms to overcome the above challenges by using hardware and software mechanisms, respectively. In software aspect, we propose a tool, called Golden-Finger, to dynamically adjust the scheduling policy of the process scheduler in Linux. This software mechanism can improve the performance of the specified process by occupying a processor solely. In hardware aspect, we design an effective hardware mechanism, called Back-Door, to communicate two independent processors which can not be operated together, such as the dual PowerPC 405 cores in the Xilinx ML310 system. The experimental results reveal that the two mechanisms can obtain significant performance enhancements.

**Keywords:** multicore, Xilinx ML310, hardware interprocessor communication.

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