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基于Myrinet的高性能VIA设计与实现

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Abstract

Virtual interface architecture (VIA) established a communication model with low latency and high bandwidth, and defined the standard of user-level high-performance communication specification in cluster system. In this paper, the current development, the principle and implementations of VIA are analyzed, and a user-level high-performance communication software MyVIA based on Myrinet is presented, which is comfortable with VIA specification. First, the design principle and the framework of MyVIA are described, and then the optimized technologies for MyVIA are proposed, which include UTLB, continued physical memory and varied NIC buffer, the pipelining process based on resource and DMA chain, physical descriptor ring and dynamic cache. The experimental results indicate that the bandwidth of MyVIA for 4KB message is 250MB/s, the lowest one-way latency is 8.46(s, which show that the performance of MyVIA surpasses that of other VIA.

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摘要

Virtual interface architecture(VIA)建立了一种低延迟、高带宽的通信模型,定义了集群系统中用户层高性能通信规范的标准.通过分析VIA的进展、原理及当前的实现,在Myrinet上设计并实现了一个符合VIA规范的高性能用户层通信软件MyVIA.首先定义了MyVIA的设计原理和框架;然后针对MyVIA实现的不同层次,通过与BerkeleyVIA的比较,提出了UTLB、连续物理内存和可变长NIC内存管理、基于资源和DMA chain的流水线处理、物理描述子环和物理描述子动态缓存等多项优化技术.通过性能的分析比较表明,MyVIA发送4KB数据包时的带宽可达到250MB/s,最小单边延迟为8.46us.与目前其他VIA实现相比,MyVIA的性能有了较为显著的提高..

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