基于 Fat-tree 的高性能互联网络性能优化与分析

张毅，何卫锋
（上海交通大学 微电子学院，上海 200240）

摘要： 高性能互联网络对于高性能计算机的性能具有重要的影响，而高性能网络中各个模块的设计都会影响到网络的最终性能，因而前期的网络仿真显得尤为重要.HPCSim 是基于 OMNeT++平台自主开发的高性能网络仿真器，包括了网络拓扑和仿真参数自动生成工具 PySim 以及仿真结果分析和可视化工具 PyVisual.仿真器中对全缓存高阶路由器结构进行了改进，提出了一种 5 级流水线的高阶路由器，能够减少路由信息缓存开销同时将网络吞吐率从基准路由器下的 0.75 提升至 0.95.此外，还对硅光互联链路进行了逻辑抽象，并在 Fat-tree 拓扑上对链路性能和网络吞吐率的关系进行了分析.
关键词： 高性能互联网络；仿真器；全缓存路由器；硅光互联
中图分类号： TP391.9
文献标识码： A
文章编号： 1000-7180(2018)08-0036-06

Optimization and Evaluation of Fat-tree Based High Performance Interconnect Network

ZHANG Yi，HE Wei-feng
(School of Microelectronics, Shanghai Jiao Tong University, Shanghai 200240， China)

Abstract： High performance interconnect network has a significant influence on the performance of high performance computer. As the difference in network model design will result in different network performance, the early network simulation is needed. HPCSim is an independently developed high performance interconnect network simulator based on OMNeT++. It includes topology and parameter file generator named PySim, and simulation data analyzer and visualizer named PyVisual. An improved fully-buffered router structure is proposed, which achieves 5 stage pipeline, and reduces routing computation states buffer as well as promotes throughput from 0.75(baseline router) to 0.95. Moreover, a link model is inferred from photonic network, and the link performance simulation is run based on Fat-tree network to analyze the relation between link bandwidth and network throughput.
Key words： high performance interconnect network; simulator; fully-buffered router; silicon photonic

作者简介：
张毅男，(1992-)，硕士研究生.研究方向为高性能计算机仿真器设计.E-mail:vcheungyi@163.com.
何卫锋男，(1976-)，副研究员.研究方向为低功耗可重构多核处理器结构、计算机系统结构与微体系结构.