Load Balancing and Parallel Ray Tracing on PVM *

Yan Chen, Zhigeng Pan and Jiaoying Shi

State Key Lab of CAD & CG
Zhejiang University, Hangzhou 310027, PRC

Abstract

PVM (Parallel Virtual Machine) is a generic message-passing system composed of a programming library and manager processes. It ties together separate physical machines (possibly of different types), providing communication and control between the subprograms and detection fo machine failures. The resulting "virtual machine" appears as a single, manageable resource. PVM is portable to a wide variety of machine architectures and operating systems, include workstations, supercomputers, PCs and multicomputers.

In this paper, firstly we ananlyze the deficiency of load balancing in PVM, then we add the function of finding idle machines to PVM and approximately realize the heuristic algorithm of task allocation. Next as we test the efficiency of our algorithms, it prove to be useful for tasks of big granularity on a rather heavy load network.

On this basis, I developed a parallel ray tracing system at the low level of PVM, which is presented in Chap. 3. And tests also show that we achieve good results on reducing communication cost, increasing the robustness of the system and making full use of computing resources.

Keywords: PVM (Parallel Virtual Machine), message, load balancing, idle machine finding, heuristic algorithm, task allocation, ray tracing

*accepted by Computer Research & Development