

On-line Load Balancing Strategy based on Hardware Performance Counters

Andrés I. Ávila¹

Departamento de Ingeniería Matemática
Universidad de La Frontera, Chile

1 Introduction

Hardware performance counters are the main tool for tuning and optimizing high-performance applications. When a new technology is available, each software needs a new tuning. As the architecture of supercomputers gets more complex, improving the performance gets more difficult, but new counters are added to processing units [1]. This increasing number of characteristics give large amounts of data on the workload at running time. Analyzing this information helps to detect bottlenecks and to understand how the resources are used, and to evaluate not only the processor performance, but also energy requirements. For example, In [2], [3], counters allow a dynamic online model for estimating the temperature readings.

On the other hand, including performance counters libraries into Fortran or C programs, like PAPI [5], allow to monitor on-line behavior of the hardware resources. This information can be use to get a better understanding of the codes, especially when working on parallel programs.

In this article we will develop a load balancing algorithm to show the power of on-line monitoring to improve the real time performance. The algorithm tries to compensate differences of the load of floating point operations among processors. Experiments using PAPI and MPI are done to show the effect of load balancing.