Programming heterogeneous, accelerator-based multicore machines: current situation and main challenges
Raymond Namyst

To cite this version:

HAL Id: inria-00590670
https://inria.hal.science/inria-00590670
Submitted on 4 May 2011

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L’archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d’enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.
Programming heterogeneous, accelerator-based multicore machines: current situation and main challenges

List of authors:

Raymond Namyst ¹

Heterogeneous accelerator-based parallel machines, featuring manycore CPUs and with GPU accelerators provide an unprecedented amount of processing power per node. Dealing with such a large number of heterogeneous processing units – providing a highly unbalanced computing power – is one of the biggest challenge that developers of HPC applications have to face. To fully tap into the potential of these heterogeneous machines, pure offloading approaches, that consist in running an application on regular processors while offloading part of the code on accelerators, are not sufficient.

In this talk, I will go through the major programming environments that were specifically designed to harness heterogeneous architectures, including extensions of parallel languages and specific runtime systems. I will discuss some of the most critical issues programmers have to consider to achieve portability of performance, and I will show how advanced runtime techniques can speed up applications in the domain of dense linear algebra.

Eventually, I will give some insights about the main challenges designers of programming environments will have to face in upcoming years.

¹Université Bordeaux 1