AUTOMATIC ONLINE TUNING

AUTOTUNE

Mission Statement

Performance analysis and tuning is an important step in programming multicore-based parallel architectures. While performance analysis tools exist that help the developer in analysing the application performance, these tools do not give any recommendations how to tune the code. AutoTune will extend Periscope, an automatic online and distributed performance analysis tool developed by Technische Universität München, with automatic online tuning plugins for performance and energy efficiency tuning. The resulting Periscope Tuning Framework will be able to tune serial and parallel codes with or without GPU kernels and will return tuning recommendations that can be integrated into the production version of the code. The whole tuning process, consisting of automatic performance analysis and automatic tuning, will be executed online, i.e., during a single run of the application.

The Technical Approach

AutoTune will develop the Periscope Tuning Framework as an extension of Periscope. It will follow the main Periscope principles, i.e., use of formalized expert knowledge in form of properties and strategies, automatic execution, online search based on program phases, and distributed processing. Periscope will be extended by a number of tuning plugins that fall into two categories: online and semi-online plugins. An online tuning plugin will perform transformations to the application and/or the execution environment without requiring a restart of the application. A semi-online tuning plugin will be based on a restart of the application but without restarting Periscope.

Demonstration and Use

The results of AutoTune will be demonstrated in the context of GPU programming. We will run applications on two different state of the art GPU cards and demonstrate the increase in performance portability due to automatic tuning with the Periscope Tuning Framework.

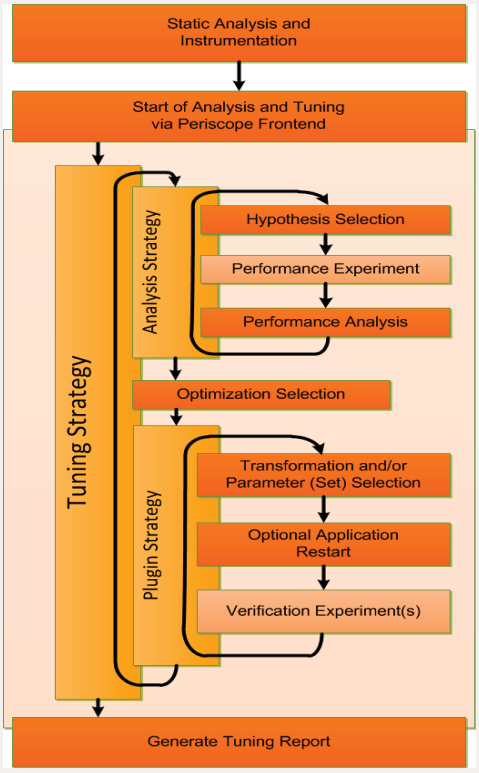
Scientific, Economic and societal Impact

AutoTune will develop new productivity tools for parallel programming that will increase by orders of magnitude manycore programming efficiency. The generated code will help to potentially save billions of euros worth of energy in HPC servers world wide. Due the adaptive approach of autotuning it will support users in achieving performance portability.

Key Features

- Automatic performance tuning of parallel codes
- Increased programmer productivity on GPU accelerated systems
- Less energy consumption of petascale systems

Project Partners	Country
Technische Universität München (Coordinator)	DE
Leibniz Computing Centre	DE
NUI Galway	IE
CAPS Enterprise	FR
Universitat Autonoma de Barcelona	ES
Universität Wien	AT



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SEVENTH FRAMEWORK PROGRAMME
EUROPEAN COMMISSION

Project start date: **15.10.2011**
Duration: **36 months**
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