

„The 13-11 Benchmark“

Background

Asanovic et al. described in their landmark publication “The Landscape of Parallel Computing Research: A View from Berkeley” from 2006 a set of challenging parallel computing problems for the era of modern many-core and heterogeneous hardware systems. Since the original publication, a list of meanwhile 13 ‘dwarfs’ was identified by parallel computing researchers.

A dwarf is an algorithmic method that captures a pattern of computation and communication. Examples are the problem of dense linear algebra computation, graph traversal or finite state machine simulation. All these algorithmic problems demand a proper mapping to modern execution environments, in order to benefit from the increasing number of cores available.



Beside the existence of challenging algorithmic problems, modern many-core systems also face the non-existence of parallel benchmarks that rank their performance appropriately. Classical parallel benchmark suites are prepared for homogeneous parallel environments with uniform memory architectures. Since this no longer matches to recent hardware trends, a new way of benchmarking large scale many-core systems is desperately needed.

Description

The Masters project „13-11 Benchmark“ aims at the definition, implementation and testing of a parallel benchmark suite for heterogeneous many-core systems. The students in the project will evaluate and understand the currently defined 13 dwarf problems and their existing implementations. Based on this understanding, a reference implementation of the dwarf problems as benchmark suite will be developed.

The implementation has to be conducted with the latest C++ version 11. The project will specifically rely on the new concurrency support in this version of the language, which is available in Clang and the MS Visual Studio 11 compilers.

References

- Krste Asanovic, Rastislav Bodik, James Demmel, Tony Keaveny, Kurt Keutzer, John Kubiawicz, Nelson Morgan, David Patterson, Koushik Sen, John Wawrzynek, David Wessel, and Katherine Yelick. 2009. A view of the parallel computing landscape. *Commun. ACM* 52, 10 (October 2009), 56-67. DOI=10.1145/1562764.1562783 <http://doi.acm.org/10.1145/1562764.1562783>

Contact

Frank Feinbube <frank.feinbube@hpi.uni-potsdam.de>
Fahad Khalid <fahad.khalid@hpi.uni-potsdam.de>