INTRODUCTION TO THE SPECIAL ISSUE ON SELECTED PAPERS FROM SYNASC 2013 WORKSHOPS

Dear SCPE readers,

It is a pleasure to present a special issue covering subjects related with high-performance computing and cloud computing. Although there are distinct research interests, approaches that are relevant for both topics could be identified. In the context of Big Data research, HPC-based approaches and algorithms are becoming increasingly relevant in the context of cloud computing. On the other hand, the access to a wider pool of computing resources, together with the expected integration of new resource types, transform the cloud into an interesting candidate for supporting some HPC-related tasks.

This special issue is based on several contributions presented at workshops that were organized in conjunction with the 15th *International Symposium on Symbolic and Numeric Algorithms for Scientific Computing* (SYNASC 2013). We selected four papers from the second *Workshop on Management of resources and services in Cloud and Sky computing* (MICAS 2013) and the *Workshop on HPC for Scientific Problems* (HPCSP 2013), together with a fifth paper that is highly relevant for the topics of interest that were covered by this special issue.

Challenging problems related with sparse matrices are discussed in [3, 5]. In the paper of Šimeček et al., different memory-efficient storage formats are investigated for very large sparse matrices which, due to their requirement, require strong support from massively parallel computer systems. Specific large sparse matrices are considered in their research, with a focus on the compression of the information describing the structure of these matrices [5]. This specific approach is required in order to minimize the memory footprint of stored matrices.

The results from [5] are complemented by the work of Langr et al., where, in the context of the problem of visualization of large sparse matrices emerging in HPC applications, a novel algorithm for parallel acquisition of visualization data is discussed. The algorithm was designed to cope with the heterogeneous aspects of modern HPC systems [3].

A third paper coming from the HPCSP 2013 workshop was developed with an important support from different Blue Gene/P installations, including the supercomputer at HPC Center from West University of Timişoara[1] [2]. The research from the work of Frisch et al., is built on top of the outstanding requirements coming from computational fluid mechanics computations, which are memory- and time-intensive, and require an impressive range of computational resources.

Two papers covering subjects that are relevant to cloud computing conclude this special issue. The first one is coming from the MICAS 2013 workshop, and offer a perspective on developing and modeling secure cloud applications [4], with an interesting case study on securing mOSAIC-based[2] applications. The approach used by Rak et al., is based on the currently low perception on security issues in cloud environments, which affect cloud adoption, especially by small and medium sized enterprises.

The second contribution, and last paper of this special issue, offer a different point of view in the context of cloud computing: brokering of cloud resources [1]. The multi-agent approach described by Amato and Venticinque is built in relation with the mOSAIC Cloud Agency. As different performance limitations were identified both in the case of the aforementioned solution and in the case of a centralized approach, a new set of requirements were identified and investigated in this work in order to support advances for the brokering problem.

REFERENCES

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[2]http://www.mosaic-cloud.eu

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[5] I. Šimeček, D. Langr, and P. Tvrdík, *Tree-based space efficient formats for storing the structure of sparse matrices*, Scalable Computing: Practice and Experience, 15(1), pp. 1-20 (2014).

Teodor-Florin Fortiş, *West University of Timişoara, Romania* (`fortis@info.uvt.ro`)