Performance Prediction and Evaluation

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In recent years a range of novel methodologies and tools have been developed for the purpose of evaluation, design, and model reduction of existing and emerging parallel and distributed systems. At the same time, the coverage of the term "performance" has broadened to include reliability, robustness, energy consumption, and scalability, in addition that is to the classical performance-oriented evaluation of system functionality. The aim of the conference topic "Performance Prediction and Evaluation", was to bring together system designers and researchers involved with the qualitative and quantitative evaluation and modeling of large-scale parallel and distributed applications and systems (e.g., Grids, Cloud computing environments, multicore architectures).

This year, seventeen papers discussing some of these issues were submitted to this topic area for consideration. Each paper was reviewed by three or more reviewers and five papers were selected for presentation. It was evident from the submissions (and this is reflected in the coverage of the accepted papers) that there is a growing interest in performance evaluation techniques and results concerning multicore computing systems and large clusters. The first three papers focus on different aspects of computation performance at the OS-, Application- and CPU architecture-level on modern computing platforms. The remaining papers deal with failure evaluation over large clusters, and with performance evaluation of parallel file systems.

The paper "jitSim: A Simulator for Predicting Scalability of Parallel Applications in Presence of OS Jitter", by V. Mann and P. De, presents a simulation-based approach for measuring the impact of OS jitter on the performance of large-scale HPC systems. By exploiting the injection of sampled jitter noise into jitter-free simulations, the approach provides a new tool to evaluate computing platforms of arbitrary size with parametric jitter.

The paper "Comparing Scalability Prediction Strategies on an SMP of CMPs", by K. Singh and others, compares multiple linear regression and artificial neural networks as approaches to modeling parallel scalability of applications over modern multicore platforms.

In the final paper embracing this theme, "Architecture Exploration for Efficient Data Transfer and Storage in Data-Parallel Applications", R. Corvino and others focus on determining the best micro-architecture for solving data-parallel problems, expressed in the high-level language Array-OL, by exploiting customizable hardware accelerators. A performance model for the concrete architecture, whose computing elements are interconnected by FIFO queues, is introduced by the authors in order to design an optimizing procedure that explores the system design space.

P. D'Ambra, M. Guarracino, and D. Talia (Eds.): Euro-Par 2010, Part I, LNCS 6271, pp. 86–87, 2010.

The paper "A Model for Space-Correlated Failures in Large-Scale Distributed Systems", by M. Gallet and others, addresses the problem of studying the time-correlation of failures in complex, distributed systems. The authors apply queueing theory results in order to build a generic model for correlated failures, and validate the resulting failure group distribution against real-world data from the Failure Trace Archive.

In the paper "pCFS vs. PVFS: comparing a highly-available symmetrical parallel cluster file system with an asymmetrical parallel file system", P. Lopes and P. Medeiros compare their parallel cluster file system pCFS with two different configurations of the PVFS file system, comparing behaviour in terms of I/O bandwidth and CPU load, and focusing on the differences between placing the I/O burden over the set of computing nodes (a symmetrical file system configuration) to that of using separate I/O nodes (an asymmetrical configuration).

We would like to take this opportunity to thank all authors who submitted a contribution to this topic area, to the reviewers for their detailed feedback, and finally to the the Euro-Par Organizing Committee for their meticulous management of this year's conference.