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Job Scheduling Strategies for Parallel Processing

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Preface

This volume contains the papers presented at the 14th workshop on Job Scheduling Strategies for Parallel Processing. The workshop was held in Rome, Italy, on May 29, 2009, in conjunction with the IEEE International Parallel Processing Symposium 2009.

This year 25 papers were submitted to the workshop. All submitted papers went through a complete review process, with the full version being read and evaluated by an average of four reviewers. We would like to especially thank the program committee members and additional referees for their willingness to participate in this effort and their excellent, detailed reviews: Su-Hui Chiang, Walfredo Cirne, Allen Downey, Dror Feitelson, Alexander Fölling, Allan Gottlieb, Christian Grimme, Andrew Grimshaw, Moe Jette, Joachim Lepping, Raquel Lopes, Reagan Moore, Jose Moreira, Bill Nitzberg, Alexander Papaspyrou, Lars Schley, Mark Squillante, John Towns, Dan Tsafrir, Jon Weissman, and Philipp Wieder.

As a result of the review process 14 papers were accepted for oral presentation at the workshop. One additional paper is included in these proceedings after making substantial improvements based on the comments of the referees. The final versions of the papers in this volume have addressed the comments of the referees and partially reflect the discussions held during the workshop.

This year we observed an increasing trend towards heterogeneous and multicore architectures. The paper by Gong, Pierces, and Fox proposes an improved heuristic approach to workflow scheduling and shows its efficiency with the help of simulations. This workshop series used to exclude task scheduling. However, precedence constraints are starting to play an important role in grid jobs. Therefore, DAGs and workflows are becoming more important in the context of job scheduling. Fölling, Grimme, Lepping, and Papaspyrou show in their paper that grids can produce win-win situations for independent sites if these sites are willing to collaborate by exchanging some jobs. However contrary to job scheduling on classical high performance architectures, there are hardly any workload traces available for grid computing, making it difficult to evaluate new scheduling approaches with respect to practical application. This problem is addressed by Lingrand, Montagnat, Martyniak, and Colling who analyze the workload of the presently largest production grid EGEE.

There are still a number of open issues in classical job scheduling on parallel architectures. For instance, Guim, Rodero, and Corbalan present an improvement of backfilling. Birkenheuer, Brinkmann, and Karl suggest applying overbooking, an approach well known in other scheduling and allocation areas, to job scheduling. Workload modeling also remains important in job scheduling for classical and new parallel architectures as workload traces remain rare and are not always applicable without modifications. To improve the present models,

Minh and Wolters present an approach to better include temporal locality. The problem of preventing faulty jobs from disrupting the schedule is addressed in the paper by Thebe, Bunde, and Leung who suggest using trial runs of restartable jobs.

Pascual, Navaridas, and Miguel-Alonso discuss allocation policies that better consider the topology of the parallel architecture. This issue may become important again in the context of very large parallel architectures. In situations in which performance is more important than efficiency, Sinnen, To, and Kaur propose to use task duplication in order to improve the speed-up of jobs. The paper by Wolf, Bansal, Hildrum, Parekh, Rajan, Wagle, and Wu presents approaches for scheduling and allocation of streaming applications. These applications are likely to become more important for parallel architectures as these architectures enter a broader market. Bobroff, Coppinger, Fong, Seelam, and Xu suggest an extension of the well-known LoadLeveler job scheduler to handle virtualization.

Job scheduling problems that are relevant in the context of multi-core architectures were the topic of the last session of the workshop. Sun, Cao, and Hsu suggest using resource augmentation to handle non-clairvoyant and malleable jobs. They evaluate their approach with both simulation and theoretical analysis. Zeng and Sodan show that resource utilization on multi-core architectures can be improved with the help of forming appropriate groups of jobs. This holds for time and space sharing. Then Sodan reports on first experiences with adaptive scheduling that adjusts the size of jobs according to the actual load situation. This is also done in the context of virtual machines. The final paper by Vrba, Espeland, Halvorsen, and Griwodz discusses the benefit of workload stealing for complex applications with respect to utilization and load balancing in multi-core architectures.

The proceedings of previous workshops are available from Springer as LNCS volumes 949, 1162, 1291, 1459, 1659, 1911, 2221, 2537, 2862, 3277, 3834, 4376, and 4942. Since 1998 these volumes have also been available online.

Finally, we would like to explicitly thank Joachim Lepping for his support in organizing the publication of this volume.

July 2009

Eitan Frachtenberg
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Organization

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