A New Makespan Estimation Model for Scientific Workflows on Heterogeneous Processing Systems

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Abstract

Scientific workflows epitomizing computation-intensive applications demand heterogeneous processing resources for attaining high performance. Generally, optimal scheduling of the tasks in workflow is well-acknowledged NP-complete problem. In the present work, a new makespan estimation model is proposed to estimate the bounds on the makespan of the workflows using minimal information. The performance of the proposed estimation model is evaluated using four scientific workflows and the estimation of the makespan computed by the model is compared with the actual makespan generated by the most-cited heuristic scheduling algorithms devised for heterogeneous processing systems. The experimental results revealed that the proposed estimation model is effective and can precisely estimate the makespan of the workflows with an error of over 10% and 26% for computation-intensive and data-intensive workflows respectively.

References


Index Terms

Computer Science Information Systems

Keywords

scientific workflows; high performance; heterogeneous processing resource; makespan; makespan estimation