Evaluation and Making a Tradeoff between Load Balancing and Reliability in Grid Services using Formal Models

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Authors:
Zeinab Sayari, Ali Harounabadi

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Abstract

Computational grid is a new technology aimed to facilitate sharing resources and easing common cooperation in vast areas. Resource allocation and task scheduling for achieving requested quality of service is one of the most essential topics in grid environments. Reliability and load balancing are two important parameters for grid services scheduling. Establishing high reliability and reducing task execution time in grid environment can lead to load balance reduction in grid systems. The purpose of this paper is to establish a balance between these two parameters in grid environment. At first, using colored petri net, task execution in grid environment is modeled and then based on that, the first parameter, reliability is computed. Then, using resource workload variance, resource load balancing in various task scheduling types are computed. Finally, after computing these two parameters, using multiple criteria decision making, the resource allocation type with balance between reliability and load is selected.

References
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Index Terms

Computer Science Distributed Systems

Keywords
Computational grid, resource management system, reliability, load balancing, colored petri nets, multiple criteria decision making.