Modeling and Simulation of Grid Resource Brokering Algorithms

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Abstract

Grid Computing is concerned with applying the heterogeneous resources of many computers to solve a single problem and involves managing the diverse resources towards a common objective. Successful utilization of grid infrastructure to solve resource intensive and computing problems requires performance modeling and evaluation to meet the QoS requirements of end users. Resource management and scheduling is the most important component of grid systems. A Grid scheduler must make resource selection decisions in an environment where it has no control over the local resources, the resources are distributed, and information about the systems is often limited or dated. Grid Resource broker or meta-scheduler uses local schedulers of the different grid middleware and local schedulers of clusters to allocate jobs to distributed resources. To address different issues in grid scheduling, different scheduling approaches and algorithms have been proposed in the literature. However, evaluation and comparative analysis of these algorithms and research experiments are often difficult to perform due to problems like large number of heterogeneous resources, dynamic nature of grid, not able to create different types of realistic workloads and jobs with different parameters and lack of certain functionalities in available resource management systems like advance reservation (AR) and grid usage accounting. This paper focuses on modeling and simulation of grid towards achieving various grid performance metrics and QoS requirements. This paper also presents the experimental results on grid simulation and performance evaluation different grid resource brokering approaches using synthetic workloads. Different simulation experiments are used to compare different aspects of scheduling using different types of grid job, input resources and
workloads. The simulation results indicate the effect of resource brokering approach used on efficient execution of grid jobs, success ratio of jobs with QoS requirement, resource utilization and load balancing of grid system.

References


Index Terms

Computer Science Distributed Computing

Keywords

Grid Resource Brokering Grid Scheduling Evaluation Grid Simulation Synthetic Workload