Future Generation Computer Systems

# Service level agreement based adaptive Grid superscheduling

***In Press, Accepted Manuscript***, *Available online 9 September 2015*

Mohammad Hasanzadeh Mofrad, Omid Jalilian, Alireza Rezvanian, Mohammad Reza Meybodi

## Abstract

Grid computing brings heterogeneity and decentralization to the world of science and technology. It leverages every bit of idle computing resources and provides a straightforward middleware for integrating cross-domain scientific devices and legacy systems. In a super big Grid, job scheduling is challenging specifically when it needs to have access to vast amount of resources. The process of mapping jobs onto Grid resources requires significant consideration in terms of Grid architecture design, consumer demands and provider revenues. In this paper, we simultaneously utilize the legacy architecture of superscheduling, forwarding strategy, service level, success rate, and service pricing strategies and finally propose a service level agreement based on adaptive superscheduling (SAS) algorithm. SAS algorithm presents unified connectivity via efficient diffusion of jobs through the Grid infrastructure that is fueled from the previous scheduling events across the Grid. Moreover, by enforcing the service level agreement terms from a rich set of ask and bid prices, system performance, and load statistics, SAS successfully boosts revenue and utilization statistics. We perform an extensive experimental analysis for different Grid scales. Based on our experimental result, the SAS algorithm maximizes revenue while guarantees quality of service. More specifically, the quality of service is achieved through a high ratio of completed jobs and remarkable utilization of resources.