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Abstract

Cloud computing is an emerging market place in which computing resources are treated as the utilities and priced for their usage. A huge competition prevails among the cloud Service Providers (SPs) to offer eco-friendly and economically viable cloud services. Heterogeneous Cluster System (HCS) forms the backbone of such computing resources and for eco-friendly services, minimal energy consumption in HCS is a challenging issue. It not only brings down the operational cost but enhance the system reliability and other environmental veneration as well. Commonly, a green Service Level Agreement (SLA) is made between cloud users and SP. Green SLA ensures that a certain percentage of $makespan$ of the schedule is sacrificed for an energy efficient schedule. This work proposes a scheduling framework to execute heterogeneous independent jobs on a HCS. It also introduces a SLA based negotiation scheme for makespan, energy and cost reffered as "Makespan, Energy and Cost Negotiator (MECN)". The proposed model utilizes all possible empty slacks of the schedule running on Processing Elements (PEs) and extended $makespan$ (due to SLA). Using Dynamic Voltage and Frequency Scaling (DVFS) technique, it provides an energy efficient schedule. A resource replacement strategy is also incorporated, in the proposed framework, to generate a cost effective schedule without sacrificing its performance. The performance of the model is analyzed by its simulation which reflects its usefulness and effectiveness.

Keywords: Heterogeneous Cluster System (HCS), Job Scheduling, Makespan, Green SLA, Dynamic Voltage and Frequency Scaling (DVFS)

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