

Analyzing cluster networks by queueing systems

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Abstract

The distributed non-homogeneous resources of networks, like the computational grid, start to have a greater part of interest, so investigations of such systems are very important. Because of the more efficient utilisation of the resources, the job scheduling becomes more challenging for the system administrators. The allocation of the arriving jobs has a great impact on the efficiency and the energy consumption of the system. In this paper, we present a finite source generalized model for the performance evaluation of scheduling compute intensive jobs. The machines are assigned to three groups. Two priorities are considered in classification: high performance priority (HP) and energy efficiency priority (EE). We investigate three schemes (separate queue, class queue and common queue) for buffering the jobs in a computational cluster that is built from Commercial Off-The-Shelf (COTS) servers. The outcome is to calculate performance measures and energy consumption of the system using the different buffering schemes and classifications. Furthermore, we investigate the effect of switching off idle servers to the energy consumption of the system under these combinations of scheduling policies and buffering schemes.

Simulation results show that the choice of the scheduling policy and of the buffering scheme plays an important role in ensuring quality of service parameters such as the waiting time and the response time experienced by arriving jobs.

Keywords: cluster network, performance evaluation, buffering schemes

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