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HIERARCHICAL MULTI-AGENT OPTIMIZATION FOR RESOURCE ALLOCATION IN CLOUD COMPUTING

ABSTRACT

In cloud computing, an important concern is to allocate the available resources of service nodes to the requested tasks on demand and to make the objective function optimum, i.e., maximizing resource utilization, payoffs, and available bandwidth. This project proposes a hierarchical multi-agent optimization (HMAO) algorithm in order to maximize the resource utilization and make the bandwidth cost minimum for cloud computing. The proposed HMAO algorithm is a combination of the genetic algorithm (GA) and the multi-agent optimization (MAO) algorithm. With maximizing the resource utilization, an improved GA is implemented to find a set of service nodes that are used to deploy the requested tasks. A decentralized-based MAO algorithm is presented to minimize the bandwidth cost. We study the effect of key parameters of the HMAO algorithm by the Taguchi method and evaluate the performance results. The results demonstrate that the HMAO algorithm is more effective than two baseline algorithms of genetic algorithm (GA) and fast elitist non-dominated sorting genetic algorithm (NSGA-II) in solving the large-scale optimization problem of resource allocation. Furthermore, we provide the performance comparison of the HMAO algorithm with two heuristic Greedy and Viterbi algorithms in on-line resource allocation.