Performance evaluation of task scheduling using hybrid meta-heuristic in heterogeneous cloud environment

ABSTRACT

Cloud computing is a ubiquitous platform that offers a wide range of online services to clients including but not limited to information and software over the Internet. It is an essential role of cloud computing to enable sharing of resources on-demand over the network including servers, applications, storage, services, and database to the end-users who are remotely connected to the network. Task scheduling is one of the significant function in the cloud computing environment which plays a vital role to sustain the performance of the system and improve its efficiency. Task scheduling is considered as an NP-complete problem in many contexts, however, the heterogeneity of resources in the cloud environment negatively influence on the job scheduling process. Furthermore, on the other side, the heuristic algorithms have satisfying performance but unable to achieve the desired level of the efficiency for optimizing the scheduling in a cloud environment. Thus, this paper aims at evaluating the effectiveness of the hybrid meta-heuristic that incorporate genetic algorithm along with DE algorithm (GA-DE) in terms of make-span. In addition, the paper also intends to enhance the performance of the task scheduling in the heterogeneous cloud environment exploiting the scientific workflows (Cybershake, Montage, and Epigenomics). The proposed algorithm (GA-DE) has been compared against three heuristic algorithms, namely: HEFT-Upward Rank, HEFT − Downward Rank, and HEFT − Level Rank. The simulation results prove that the proposed algorithm (GA-DE) outperforms the other existing algorithms in all cases in terms of make-span.