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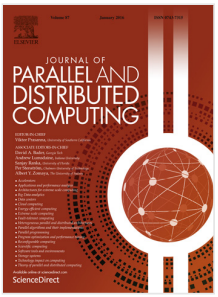

Energy efficiency for cloud computing system based on predictive optimization

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Energy Efficiency for Cloud Computing System based on Predictive Optimization

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Abstract

In recent years, power consumption has become one of the hottest research trends in computer science and industry. Most of the reasons are related to the operational budget and the environmental issues. In this paper, we would like to propose an energy-efficient solution for orchestrating the resource in cloud computing. In nature, the proposed approach firstly predicts the resource utilization of the upcoming period based on the Gaussian process regression method. Subsequently, the convex optimization technique is engaged to compute an appropriate quantity of physical servers for each monitoring window. This quantity of interest is calculated to ensure that a minimum number of servers can still provide an acceptable quality of service. Finally, a corresponding migrating instruction is issued to stack the virtual machines and turn off the idle physical servers to achieve the objective of energy savings. In order to evaluate the proposed method, we conduct the experiments using synthetic data from 29-day period of Google traces and real workload from the *Montage* open-source toolkit. Through the evaluation, we show that the proposed approach can achieve a significant result in reducing the energy consumption as well as maintaining the system performance.

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