

Chapter 58

Resource Scheduling and Load Balancing Fusion Algorithm with Deep Learning Based on Cloud Computing

Xiaojing Hou

Luoyang Institute of Science and Technology, China

Guozeng Zhao

Luoyang Institute of Science and Technology, China

ABSTRACT

With the wide application of the cloud computing, the contradiction between high energy cost and low efficiency becomes increasingly prominent. In this article, to solve the problem of energy consumption, a resource scheduling and load balancing fusion algorithm with deep learning strategy is presented. Compared with the corresponding evolutionary algorithms, the proposed algorithm can enhance the diversity of the population, avoid the prematurity to some extent, and have a faster convergence speed. The experimental results show that the proposed algorithm has the most optimal ability of reducing energy consumption of data centers.

1. INTRODUCTION

In the development of information industry, as users and data increase, energy efficiency has become a prominent contradiction. How to effectively reduce carbon emissions and save cost, which have become increasingly concerned about the problem of operators. As the carrier of cloud computing services, green data center is a typical application of energy efficiency communications. In the era of big data, multimedia technology has become more and more mature. Multimedia big data is a new hot topic, gradually goes into the human vision. Under the premise of optimizing energy consumption, how to quickly and accurately carry out big data mining is the key problem to be solved. Resource allocation,

DOI: 10.4018/978-1-7998-0414-7.ch058

load balancing, energy consumption optimization, high recognition rate, these are the focus of the study of multimedia big data. Multimedia images, multimedia video, and multimedia audio, which are affecting the performance of large data mining algorithms. In the context of cloud computing era, data centers need to focus on large-scale sharing platform to promote. In addition, the data center should be able to achieve real-time dynamic expansion, self - and automatic deployment services.

Due to the needs of the business, the data center is becoming more and denser, with more and more energy consumption and efficiency problems, which leads to the increasing cost of enterprise users. Therefore, the concept of green data center is the need of social development, but also the need of more efficient IT industry. Green data center is the inevitable development of the data center, but also the crystallization of environmental awareness and scientific and technological development. With the development of cloud computing technology, the data center as the core of cloud computing has also developed rapidly. In order to reduce energy consumption and save cost, green data center becomes the inevitable trend of data center development. Energy problems are becoming more and more serious with the growing size of data center (Xiang & Chuang et al., 2014). The overarching concept of delivering computing resources through a global network is rooted in the sixties. Cloud computing is a kind of computing model which can use the Internet to access the shared resource pool (such as computing facilities, storage devices, applications, etc.) anytime, anywhere. Cloud computing has evolved through a number of phases which include distributed computing, parallel computing, utility computing and grid computing. It is clear that cloud computing can bring enormous benefits for computer users (Toni & Ivona, 2015). Green cloud computing is a combination of green communications and cloud computing technology and its main goal is to improve the computing capability of the data centers and reduce carbon dioxide emissions (Liu & Shu et al., 2013). Energy consumption has become a significant concern for cloud service providers due to operating costs and environmental impact. Figure 1 shows the simulation structure of global data center.

Cloud computing is a super computing model for the collaborative computing, which is powered by large data centers, large scale storage, high-bandwidth networks, and other distributed computing resources. Therefore, there are a huge number of servers that need to be managed efficiently in data centers. Green cloud computing is emerging as a new computing paradigm that aims to manage energy consumption efficiency in cloud data centers (Fallahpour & Beyranvand et al., 2015). Green cloud computing can not only effectively improve the utilization of cloud computing infrastructure, but also minimize energy consumption. The services offered by the cloud computing paradigm have unique characteristics that distinguish them from traditional services, giving rise to new challenges and opportunities when it comes to developing resource-aware allocation techniques for cloud data centers (Ge & Huang et al., 2014). With the rapid growth of data centers, energy efficiency has become prominent contradiction in green cloud computing. However, the reduction of energy consumption may cause delay of service response. Therefore, we need to find an optimal tradeoff between energy consumption and performance, so as to reduce the impact on the data center.

In this paper, the resource allocation method is used to abstract the task scheduling problem to the virtual machine deployment based on virtualization technology in green cloud computing . At the same time, to predict the user request task, the proposed algorithm combined with the current state of the system and the distribution of resources, conservative control strategy, and advance system of resources allocation, control, reduce the energy consumption of cloud computing system, avoid the waste of resources. Cloud data center resource utilization, network workloads and real-time power have a profound impact on cloud computing energy consumption (Hazem & Wassim et al., 2014). Focusing on the problem

14 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:
www.igi-global.com/chapter/resource-scheduling-and-load-balancing-fusion-algorithm-with-deep-learning-based-on-cloud-computing/237920

Related Content

Prediction of Compound-protein Interactions with Machine Learning Methods

Yoshihiro Yamanishi and Hisashi Kashima (2012). *Machine Learning: Concepts, Methodologies, Tools and Applications* (pp. 616-630).

www.irma-international.org/chapter/prediction-compound-protein-interactions-machine/56165

An Action Guided Constraint Satisfaction Technique for Planning Problem

Xiao Jiang, Pingyuan Cui, Rui Xu, Ai Gao and Shengying Zhu (2016). *International Journal of Software Science and Computational Intelligence* (pp. 39-53).

www.irma-international.org/article/an-action-guided-constraint-satisfaction-technique-for-planning-problem/172126

A Genetic Algorithm-Based QoS Analysis Tool for Reconfigurable Service-Oriented Systems

I-Ling Yen and Tong Gao (2007). *Advances in Machine Learning Applications in Software Engineering* (pp. 121-146).

www.irma-international.org/chapter/genetic-algorithm-based-qos-analysis/4859

Administration of Medical Contexts with Denotational Mathematics in Ubiquitous Computing Home Environments

John Sarivougioukas, Aristides Vagelatos and Isaac Lagaris (2015). *International Journal of Software Science and Computational Intelligence* (pp. 1-30).

www.irma-international.org/article/administration-of-medical-contexts-with-denotational-mathematics-in-ubiquitous-computing-home-environments/141239

Cognitive Theme Preserving Color Transfer for Fabric Design

Dejun Zheng, George Baci, Yu Han and Jinlian Hu (2012). *International Journal of Software Science and Computational Intelligence* (pp. 38-61).

www.irma-international.org/article/cognitive-theme-preserving-color-transfer/76269