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An Efficient Resource Management For Prioritized Users In Cloud Environment Using Cuckoo Search Algorithm

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Abstract

Cloud computing is a model which is empowered for on demand and convenient system access to a shared pool of computing resources. The clients of the cloud can be an individual or an association, and can acquire their respective services from cloud service provider. Advances in technologies, lead to the relocation from antiquated desktop devices to smart mobile devices. With a large increase in the number of mobile devices and bandwidth clients can execute as many tasks from their gadgets itself. Be that as it may, with versatility come its innate issues, for example, resource scarceness, finite energy and low network connectivity. This is, indeed, not only a temporary technological inadequacy but intrinsic to mobility and a hindrance that needs to be run over. Here in this paper, a load-aware allocation strategy is proposed and allocation is considered as an optimization problem with the aim of reducing the make span and the computational cost meeting the deadline constraints, with high resource utilization and is solved using Cuckoo-Search algorithm. The proposed approach is evaluated using Cloudsim framework and the results showed that our approach works better than other metaheuristic algorithms.

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Keywords: Cloud computing; load balancing; clustering; resource allocation.

1. Introduction

Cloud computing is one of the promising innovation in today's computing environment. The basic principle of cloud computing is that the information is not kept mainly in a single machine, but rather will be available in the server farms (datacenters). The clients can access the information with the help of an application programming interface which is a part of terminal hardware, provided it must be connected to the internet. The processing units in cloud are called virtual machines, and to decrease the execution time VM should run in parallel.

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The cloud computing framework is made up of specific components. There is a back end and a front end which needs to connect and communicate. The back end as the name proposes is the "not seen" end of the system, which is the group of system that forms the network. The front end comprises of the customer equipment both hardware and software that helps to connect with the network. With the advancement in wireless technologies like the third generation of mobile communication technology (3G), Bluetooth, wireless local area network (WLANs) and worldwide interoperability for microwave access (WIMAX) users are allowed to pick networks according to their necessities. Now a days applications focused at mobile devices are expanding plentifully in different areas, for example, entertainment, games, social networking, travel and news. But with versatility comes its intrinsic issues, for example,Some applications, particularly location based long range informal communication, process and utilize different sensor information. For example, acquiring a GPS reading, will draw a lot of battery and this restrains the users in receiving better services. Furthermore, some applications demand high computational capacities that require extensive processing such as image processing for video games, natural language processing, augmented reality, wearable computing. Allocation of static resources to the customer will result in either under or over utilization of resources. Therefore, resource allocation in cloud environment should be dynamic in nature.

2. Related works

The size and the intricacy of datacentres are growing day by day to take care of the growing demand for resources. Cloud computing providers must allot enough resources in order to meet the predetermined SLA. Most resource provisioning algorithms are designed in such a way that it must ensure both minimum response time and resource usage cost.Natasha.et.al proposed a technique to handle same priority requests [13], by managing resources using priority based approach. Here the requests with the attached priority are received by the resource allocator, which is the initiator. Here all needs will be first extracted, sorted and same priority requests will be put together. At that point the load required by each request is figured, and it is sorted. At that point the total load of the server is ascertained and limit is found. Zhang.et.al [15] proposed a dynamic heterogeneity aware provisioning in cloud which is fit for performing DCP in heterogeneous server farms. Here classification followed by prediction is done and after that DCP is done.Chandrashekar.et.al in [3] proposed a priority based distribution with a modified waiting queue. Here the proposed calculation responds to fluctuating workload by pre-empting the present executing assignment having lower priority with a high priority undertaking and if acquisition is impractical because of same priority, then it is checked whether global resources can host a virtual machine and the tasks are allocated.

A Mobile Message Passing Interface (MMPI) is talked about which is a system and a portable form of the standard MPI over Bluetooth where where mobile devices function as member resource providers.MMPI utilizes a completely interconnected mesh structure so that every node can communicate with the other, rather than the normal star system structure of typical piconets. Device discovery, and connections are taken care of by the libraries given in the system, hence there is no need of composing any Bluetooth particular code. The system is actualized in Java BlueCove, which is a third party library and is utilized to handle Bluetooth operations. A survey of existing application structure was led by Shiraz et al. [14] in 2013. They classified all distributed application processing frameworks into six main categories depending on area of use of framework. They discussed issues and challenges in current frameworks and suggested future areas for optimum distributed application processing frameworks development. In 2014, Shiraz et al. [14] investigated the runtime overload on mobile device while offloading mobile applications over the cloud. Before offloading mobile application on the cloud, it is profiled and partitioned for locating computational extensive components. Profiling and partitioning require additional computation resources from mobile device. Runtime portable application offload mechanism is assessed using smartsim and android application. Results demonstrate that CPU that CPU utilization of mobile device increases when partitioning is done for mobile application.

3. Proposed architecture and methodology

3.1. Mathematical formulation

This section describes a mathematical model for load balancing and allocation problem based on Cuckoo Search Algorithm. Objective of this formulation is to form a load aware allocation strategy. The objective function here is to allocate the task to the virtual machine so as to achieve minimum execution time, minimum cost and meet