International journal of basic and applied research
www.pragatipublication.com
ISSN2249-3352(P)2278-0505(E)
CosmosImpactFactor-5.86

A LOAD BALANCING ALGORITHM FOR THE DATA CENTRES TO OPTIMIZE CLOUD COMPUTING

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Abstract:

Workload balancing in cloud-based applications, and more especially in the infrastructure as a service (IaaS) cloud model, remains an issue, despite the extensive prior research in the area of cloud computing. Because there are a limited amount of resources or virtual machines available in cloud computing, job allocation is an important procedure. One version of this technology, Infrastructure as a service (IaaS), manages the infrastructure, including servers, data centers, and virtual machines. By preventing issues like host overload or underload—which may lead to increased execution time or machine failure—Cloud service providers can guarantee good service delivery performance in these models. Scheduling jobs in accordance with the specifications laid forth in the Service Level Agreement (SLA), a contract provided to users by cloud developers, greatly aids in load balancing. Deadline and other critical SLA criteria are handled by the LB algorithm. The suggested approach takes into consideration the priorities of virtual machines (VMs), resource allocation, and Quality of Service (QoS) job characteristics in order to optimize resources and enhance load balancing. Drawing on previous studies, the suggested LB algorithm fills the existing knowledge gap while also fixing the previously mentioned problems. When compared to the current Dynamic LBA algorithm, the findings shown that the suggested LB algorithm leads to a resource utilization of 78% on average. Reducing Execution time and Make span is another way it gets high performance.

I. Introduction

Cloud computing is becoming an integral aspect of our company as we move more and more towards online storage and services. This technology offers a wide range of services via several mediums, including software through web browsers, platforms for creating and building applications in the cloud, and more. The backend of the infrastructure, including data center and server maintenance, is handled by cloud service providers (CSPs). The Infrastructure as a Service (IaaS) model is the center of attention in this study, even if there are several additional service delivery models in this technology. It focuses on the part of this technology that handles allocating resources on the server. Applications hosted in the cloud rely on virtualization as its foundational component. If the migration procedure and allocation of virtual machine resources are not managed correctly, this strategy may dramatically impact the performance of the scalable and on-demand services delivered to customers. One study found that poor cloud performance was one of the three biggest obstacles to cloud computing. Virtual Machines (VMs) in the cloud reflect the requests that users make to

Index in Cosmos
May 2022Volume 12 Issue 2
UGC Approved Journal

International journal of basic and applied research
www.pragatipublication.com
ISSN2249-3352(P)2278-0505(E)
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access services. It is the responsibility of CSPs to provide services that boost customer happiness while also helping enterprises. Out of the three cloud service models, Infrastructure as a Service (IaaS) is the one the authors primarily address while developing the suggested Load Balancing algorithm. This model deals with the backend of cloud computing, including server burden. The frontend, which is the part of a cloud environment that users interact with, is often available over an Internet connection. The data center houses several physical devices, or servers, and the backend is responsible for managing the cloud service models. Virtualization allows the program to dynamically schedule incoming user requests and provide the required resources to clients. Load balancing, scheduling, and effective resource allocation are all responsibilities of the virtualization approach. Virtualization and dynamic work scheduling are two advantages that cloud service providers and their customers may take use of. Therefore, cloud-based apps may greatly benefit from optimal scheduling in terms of execution time reduction and ratio of resource use.

II.LITERATURE SURVEY

‘‘Cloud computing virtualization of resources allocation for distributed systems,’

Cloud computing is a new technology which managed by a third party "cloud provider" to provide the clients with services anywhere, at any time, and under various circumstances. In order to provide clients with cloud resources and satisfy their needs, cloud computing employs virtualization and resource provisioning techniques. The process of providing clients with shared virtualized resources (hardware, software, and platform) is a big challenge for the cloud provider because of over-provision and under-provision problems. Therefore, this paper highlighted some proposed approaches and scheduling algorithms applied for resource allocation within cloud computing through virtualization in the datacenter. The paper also aims to explore the role of virtualization in providing resources effectively based on clients' requirements. The results of these approaches showed that each proposed approach and scheduling algorithm has an obvious role in utilizing the shared resources of the cloud data center. The paper also explored that virtualization technique has a significant impact on enhancing the network performance, save the cost by reducing the number of Physical Machines (PM) in the datacenter, balance the load, conserve the server's energy, and allocate resources actively thus satisfying the clients' requirements. Based on our review, the availability of Virtual Machine (VM) resource and execution time of requests are the key factors to be considered in any optimal resource allocation algorithm.

‘‘Cloud computing: A paradigm shift in the way of computing,’’

Introduction Cloud computing is a new trend of computing where resources like storage, computation power, network, applications etc. are delivered as services. These services are available to the customers as subscription-based model i.e. pay-as-you go. In this model, customers can get these services on their demands regardless of where these services are hosted and customers have to pay depending on their usage of services. In cloud computing, resources are made virtual and unlimited. Also, the resources can be provisioned from anywhere i.e. always available at any location. So, cloud computing is a new paradigm where we can provision resources dynamically, deploy

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applications, and can access platform-independent services. Cloud computing, successor of internet computing, is a technology, where the concept of utility, scalability, on-demand services are incorporated. Figure 1 illustrates " Internet Computing " vs. " Cloud Computing " . Defining Cloud in IT According to the U.S. National Institute of Standards and Technology (NIST) , Cloud is a classical model which enable omnipresent, convenient, on-demand network access to a publicly accessible pool of configurable resources like servers, storage, network components, applications; that can be accessed, manipulated and released with minimal management effort, less cost and minimal service provider interaction. Cloud computing can be defined by the following important properties. Service on demand: Cloud users can use services on their demands, whenever they need from any place and at any time without making any direct communication with cloud service provider. Wide network access: Services can be accessed over the network using different devices (like laptops, mobile phones, PDA, tablets, office computer etc.). Services can be provisioned in any platform, which means cloud services are platform independent. Pooled Resources: In cloud computing, resources are pooled together so that cloud providers can offer multi-tenant services. Multi-tenant supports multiple users to be served at a time with physical and virtual resources. These resources can be dynamically assigned and released according to the user's choice. Increased elasticity: There is no limit for provisioning resources via cloud. So services can be easily and quickly scale in and scale out. For example, an online shopping site uses the resources from the cloud in terms of users.

‘‘Toward cloud computing: Security and performance,’’

Security and performance are basic requirements for any system. They are considered the criteria for the measurement of any progress in a security system. Security is an indicator that affects the level of performance through the threats that influence the performance of parts of the cloud during the rendering of services. Both security and performance demonstrate the efficiency of cloud computing which indicates that the performance and security are measurements for the extent of the development of the cloud. In this paper, the relationship between performance and security will be examined to know the extent of their impact on the progress of cloud computing.

III.SYSTEM ANALYSIS

3.1. EXISTING SYSTEM

This subsection provides a review of previous existing algorithms in the field of Load Balancing and Task Scheduling. Many recent algorithms aimed to improve Task Scheduling and Load Balancing. Yet, few limitations still exist due to the underlying basic algorithms used, such as Round Robin or First Come First Serve. These algorithms can increase the waiting time or Make span in scheduling tasks.

Authors in proposed a dynamic Load Balancing algorithm to minimize the Make span time and utilize resources efficiently. It sorts tasks using length and processing speed by using the bubble sort algorithm. Then, tasks are allocated to Virtual Machines in a First-Come-First-Serve order. After allocation is complete, balancing the load is done considering and calculating the load of Virtual Machines.

This approach can easily optimize the resources and reduce Make span; however, it does not consider priority or any QoS parameters such as Deadline.

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3.2. PROPOSED SYSTEM

Figure 3 below shows the suggested LB algorithm in action, and this part explains the goal of the study using an illustrative picture to clarify the Load Balancing issue. The primary objective of this suggested approach is to provide effective allocation of cloud resources in a way that prevents workload imbalance in cloud computing applications. With this architecture, cloud-based workload transfer and task rejection become a thing of the past. Two levels make up the suggested framework:

• The top layer handles requests from a wide variety of clients, including mobile and desktop application users. In order to communicate with the cloud, clients may use a variety of Internet-connected devices. At this level, the model takes two primary parameters—the deadline and the completion time—into account when scheduling jobs to virtual machines using the Cloudlet Scheduler Time Shared method. The order in which the tasks are submitted is randomly determined by the arrival time. Data Centers (DCs) are large warehouses that house computers and data used in cloud computing. The active load balancer accepts requests from the DC and forwards them. To the author's knowledge, no prior literature has addressed this issue; hence, the suggested method is used as a Load Balancer in this layer of the model. It serves as the main balancer in the cloud environment and executes migration in the event of a violation.

Allocating user requests to Virtual Machines (VMs) is the responsibility of the Bottom Layer. We have a main batch of virtual machines (VMs), as shown in the picture. VM2, which has a Completion Time greater than the Deadline and hence breaches the SLA requirement, is marked as high priority. With that in mind, the suggested LBA should use a migration strategy to move the workload to another available VM by adjusting the MIPS settings of both VMs both before and after they are given the resources. Whenever a Virtual Machine is violated or not, coupled with the quantity of requests allotted to it, the allocation table is changed accordingly. In one instance, there is no breach of service level agreement. Assume that jobs scheduled to execute on virtual machines have a Time to Complete (TTC) that is less than the Service Level Agreement (SLA) deadline. Then, there will be no breach of the SLA.

All things considered, the suggested architecture allows for CPU and cloud resource utilisation via dynamic scheduling and load balancing.

IV.SYSTEM DESIGN

4.1 SYSTEM ARCHITECTURE

Below diagram depicts the whole system architecture of Comparative Evaluation for Traditional Machine Learning and Deep Learning Classification Techniques for Sentiment Analysis.

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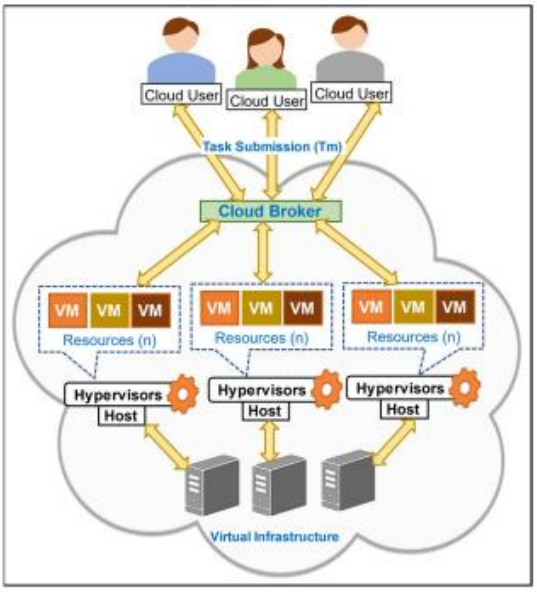

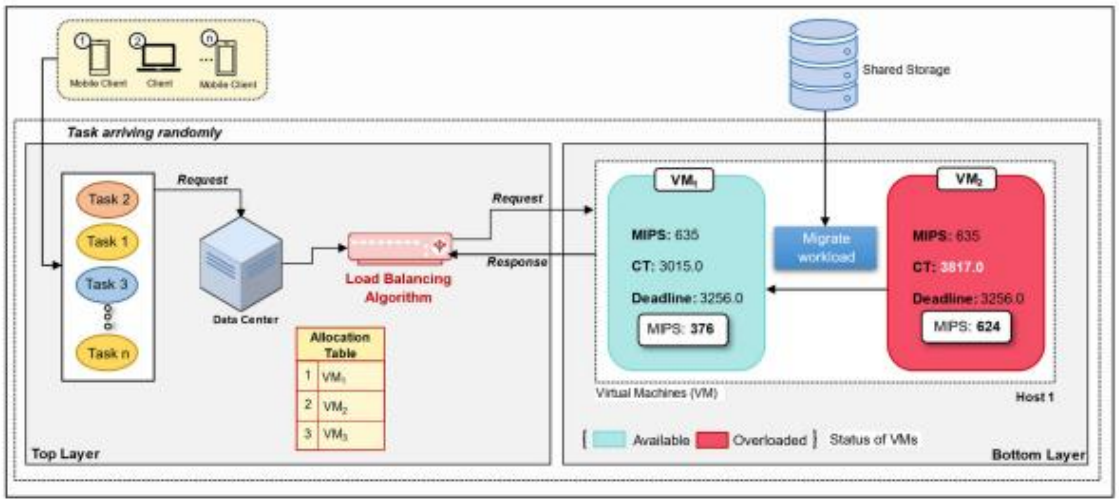

4.1. System Architecture

V. SYSTEM IMPLEMENTATION

5.1. MODULES

There are 3 modules:

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- Task Scheduler
- User
- Cloud
-

Task Scheduler: -

- Login
- View Task
- Assign Task
- VM Resources
- Logout

User: -

- Register
- Login
- File Upload
- My Files
- My Profile
- Logout

Cloud: -

- Login
- Add Virtual Machine
- Manage Virtual Machine
- Task Scheduling Details
- Load Balancer
- Make span

VI. RESULTS

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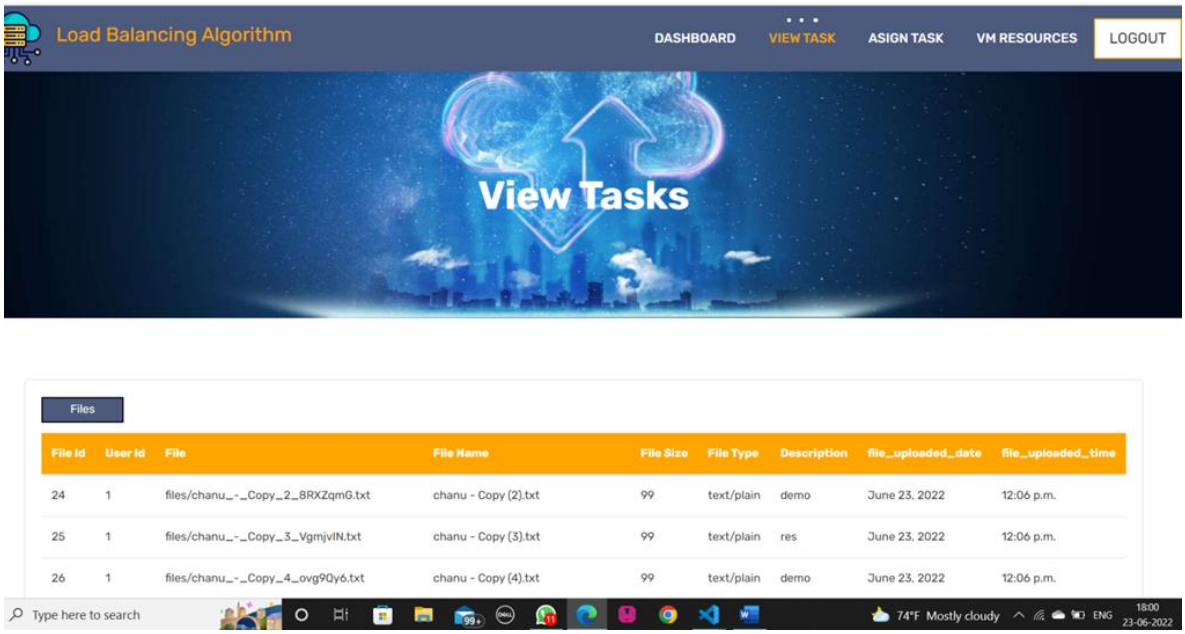

Fig. 6. Uploaded Records Page

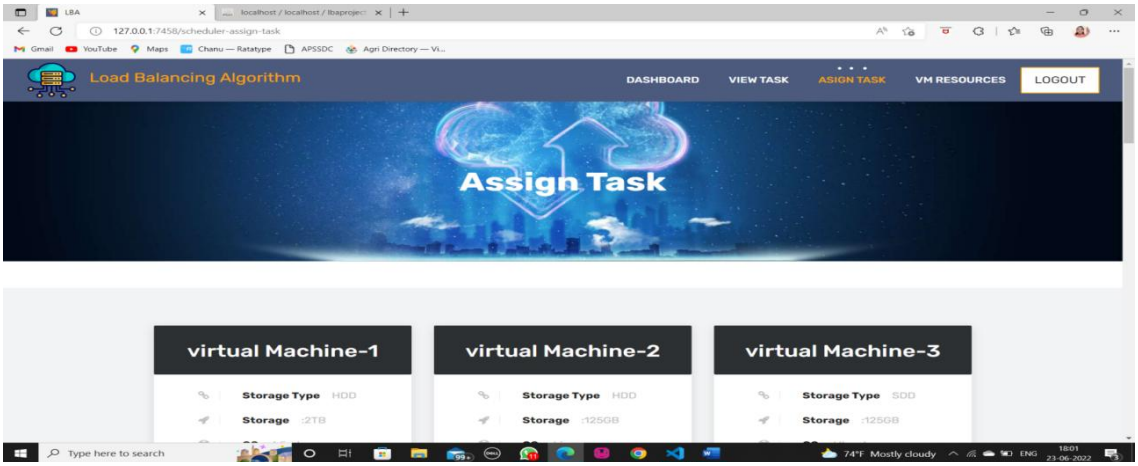

Fig 6.1 load handling

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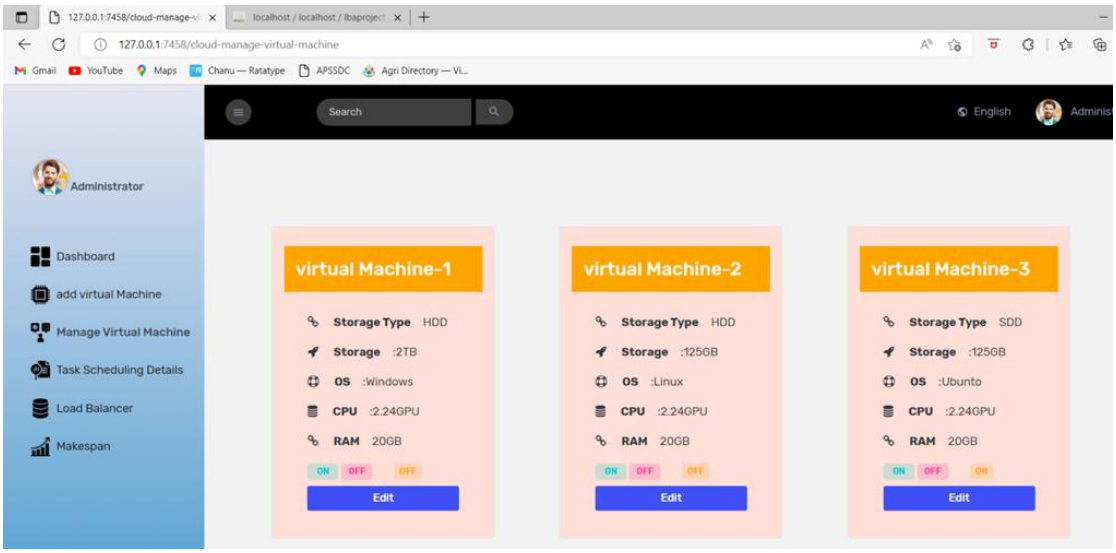

Fig. 6.2 Load balancing

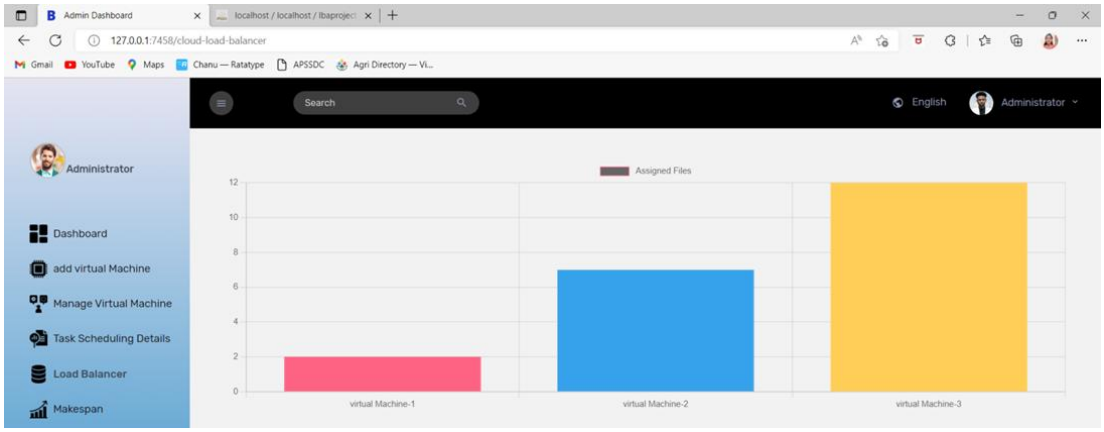

Fig. 6.2 Load balancinganalysis

VII.CONCLUSION AND FUTURE WORK

The study is wrapped up in this part, which emphasizes the outcomes and discoveries from the suggested LB algorithm. Task scheduling is a key component of load balancing in the cloud, as we learned from the literature. Task Scheduling may help improve the Load Balancing process, which in turn can lead to more effective use of cloud resources. An improved Load Balancing algorithm was the intended outcome of this work. In comparison to the current Dynamic LBA, our approach significantly lowers MAKE SPAN and provides 78% more efficient resource

consumption, according to the results. This proves that the suggested technique works even in a highly dynamic cloud setting, where the sequence of user requests is completely unpredictable and their lengths might vary greatly. Also, unlike the previous method, the algorithm can process requests of very high sizes. By redistributing resources, the algorithm efficiently executes tasks, addressing SLA violation of virtual machines. Further optimization of cloud resources and enhancement of cloud-based application performance, including consideration of additional SLA factors, will be the focus of future work by the authors. One way to improve the algorithm's performance is to measure it against metrics like migration count and amount of violations. The algorithm will also undergo a thorough literature comparison with other algorithms already in use..

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