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A Novel Frame Work for Load Balancing in Cloud Computing

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***Abstract*—** Cloud computing plays an indispensable role in the present day scenario. The concept of load balancing elevates this emerging technology to reach pivotal position in providing services to the end users. This challenging phenomenon applies different logic to handle the users efficiently. However several challenges like heterogeneity, management, storage, response time, processing and resource utilization and analysis of load balancing hinder their efficient and real-time applications. All these challenges call for well-adapted distributed framework for LB management that can efficiently handle request in cloud. In this paper, we present a novel, distributed, scalable and efficient framework for LB in cloud computing. The proposed cloud computing based framework can answer technical challenges for efficient resource utilization and overall response time of request in cloud computing. Further, this framework achieves considerable performance and efficiency in load balancing system.

***Keywords*—** *Cloud Computing, Load Balancing, Virtual Machine.*

I. INTRODUCTION

Now a days Cloud computing is fastest rising technology in the industry as well as society. It is not a completely new concept which is devised based on grid computing and distributed computing. One of the key advantages of the cloud service is that use these services anywhere at any time. Additionally cloud is a utility model where user pays only for the used resources. It provides on demand resources to the user as a service. Cloud support three types of services namely software as a service (SaaS), platform as a service (PaaS) and infrastructure as a service (IaaS) and these services can be deployed in three different way i.e., private, public and hybrid.[1]

Rest of the paper is organized as follows; Section I contains the Introduction of Cloud Computing. Section II contains related works of load balancing in cloud computing. Section III contains of existing cloud computing load balancing algorithms. Section IV contains Enhanced load balancing algorithms. Section V describes framework for load balancing in cloud computing. Section VI concludes research work with future directions.

II. LOAD BALANCING IN CLOUD COMPUTING

Load balancing is a new technique that provides high resource time and effective resource utilization by assigning the total load among the various cloud nodes, side by side it solves the problem of overutilization and underutilization of virtual machines. Load balancing resolves the problem of overloading and focuses on maximum throughput, optimizing resource utilization and minimize response time. It is the pre requirements for maximizing the cloud performance and utilizing the resources efficiently. The utilization of clouds has been improved by a resource allocation method which has pre-emptible task execution.

The load balancing is an efficient and critical concept in cloud computing and it helps to utilize the resources optimally, thereby minimizing the consumption of resources. Thus load needs to be distributed over the nodes in cloud-based architecture, so that each resource does the equal amount of work at any point of time that is allocated by a load balancer. The load balancer determines the various request allocation to different servers. The load balancer uses various algorithm to determine the server which has to handle the request. [2]

In cloud computing, different load balancing algorithms have been proposed. The ultimate aim of all these proposals is to achieve high throughput and minimizing the response time.

III. CLOUD COMPUTING LOAD BALANCING ALGORITHMS

Min-Min Algorithm

Min-Min Algorithm begins with a set of tasks which are all unassigned. It first calculates the minimum completion time for all tasks for all resources and then among these minimum times the minimum value is selected which are the minimum time among all the tasks on any resources. Later, that task is scheduled on the resource on which it takes the minimum

time and the available time of that resource is updated for all the other tasks. [3]

PA-LBIMM Algorithm

PA-LBIMM priority aware load balancing improved min min algorithm separate the tasks into G1 and G2groups. The tasks submitted by VIP user's or high priority users are considered as group G1 and tasks submitted by low priority users are considered as group G2. Tasks are planned to the resources on the basis of priority. At first, for all the tasks in G1, each task is allocated to the VIP category resource with the help Min-Min, and then each task in G2 group is given to all the resources by using Min-Min. [4]

RPA-LBIMM Algorithm

This algorithm RPA-LBIMM recovery priority aware load balancing improved min-min algorithm is also similar to the priority aware load balancing improved min-min algorithm. Here use the recovery policy which helps the cloud scheduler to reschedule the tasks if a resource fails at the time of execution to achieve the minimum makespan. According to this policy, First of all, scheduler looks for the failed resource. All the tasks that were scheduled by PA-LBIMM to execute on will be considered as a task set. [4]

Minimum Makespan procedure

This algorithm first verifies the completion of all tasks with minimum makespan and it relates with the task and migrated. The two tasks give the same makespan time it selects the node with higher performance resources. [5]

IV. ENHANCED LOAD BALANCING ALGORITHMS

Virtual Machine Algorithm Random Load Balancing Algorithm.

This VMARLB algorithm is a load balancing algorithm in which all the allocation and decision of scheduling are completed by a special node called as Load Balancer (LB). This node is responsible for storing knowledge base of entire cloud network and can apply dynamic approach for load balancing. The Data Center Controller (DCC) receives all the requests from the users from all around the world, which is one of the major components of Cloud. Data Center Controller forwards the request to the Load Balancer to assign the request to the available virtual machines. It handles a table which contains the job id of the user request, shortest completion time of the virtual machine and the state of the virtual machine. Initially, jobs are allocated randomly to the available VMs. To handle further request, this algorithm will search the table to find the virtual machine with shortest time and which is available at that moment. If found, the algorithm will reply back to the Data Center Controller with the id of that machine (Vm id) and the Data Center Controller assign the job of that Vm otherwise waits for the signal which is to be forwarded to DCC. This algorithm produces the minimum makespan. This algorithm compared with MIN MIN algorithm and produces improved results.

Suppose if the user request is priority this algorithm is executed in the following manner

Priority Based Virtual Machine Load Balancing Algorithm

The PBVMLBA is a load balancing algorithm in which all the allocation and decision of scheduling are completed by a special node called as Load Balancer (LB). This node is responsible for storing knowledge base of entire cloud network and can apply dynamic approach for load balancing. The Data Center Controller (DCC) receives all the requests from the users from all around the world, which is one of the major components of Cloud. Data Center Controller forwards the request to the Load Balancer to assign the request to the available virtual machines. It handles a table which contains the job id of the user request (priority or no priority), completion time of the virtual machine and the state of the virtual machine. Initially, checks the jobs priority, if any priority, allocate the VM and update the status or allocate the VM based on the condition of the completion time of that task is less than to makespan of RPA_LBIMM. To handle further request, this algorithm will search the table and repeat the above procedure until all the tasks get completed. This algorithm deals with priority request. When priority request occurs. This algorithm executed it produces the best result for resource utilization and minimum makespan.

Enhanced Virtual Machine Load Balancing Algorithm

This algorithm is one of the improved algorithm it is mainly used for to find the minimum makespan from all available virtual machines. The proposed EVMLBA is a load balancing algorithm in which all the allocation and decision of scheduling are completed by a special node called as Load Balancer (LB). This node is responsible for storing knowledge base of entire cloud network and can apply dynamic approach for load balancing. The Data Center Controller (DCC) receives all the requests from the users from all around the world, which is one of the major components of Cloud. Data Center Controller forwards the request to the Load Balancer. It handles a table which contains the job id of the user request, completion time of all the virtual machines and the state of the virtual machine. Based on the information available on the table.LB compute the minimum makespan VM and allocate the job to that VM

and update the status. The algorithm will reply back to the Data Center Controller with the id of that machine (Vm id). Otherwise waits for the signal. This algorithm produces the minimum makespan and resource utilization. This algorithm compared with VMARLB and Min Min algorithm and the performance of the EVMLBA is better than the other algorithm.

V. FRAME WORK FOR LOAD BALANCING IN CLOUD COMPUTING

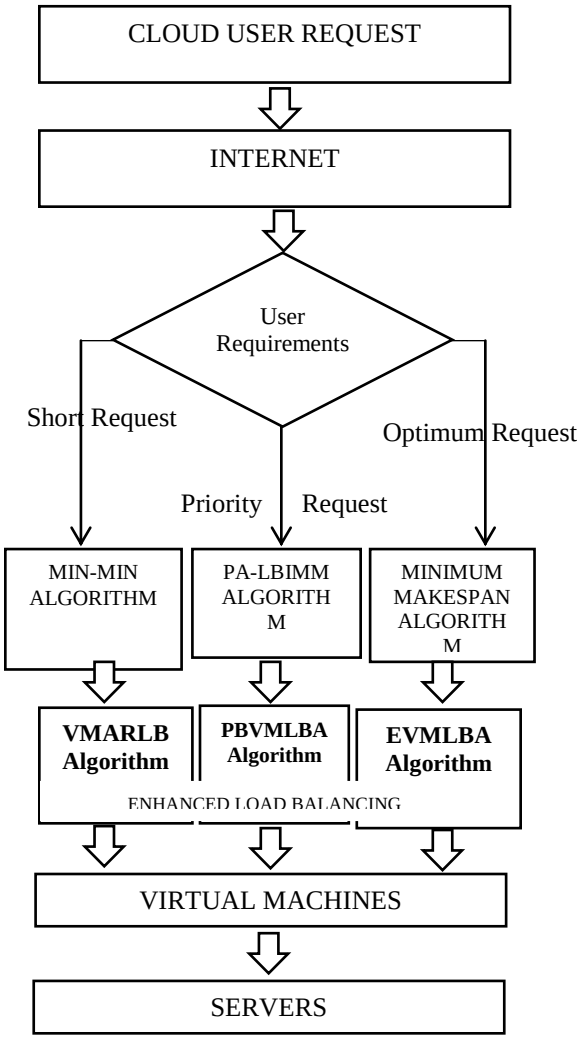

Figure 1: Framework for load balancing in cloud computing

In this section, a framework for load balancing system has been proposed. The main goal of the framework is to answer the traditional LB drawbacks. The proposed framework is using cloud computing technologies. As shown in Figure 1, the top part of the framework is the user request that provides system interaction with end users using web services or graphical interfaces. The request comes from different users through the internet. The first part talks about users request and second part talks about the services availability through internet. In third part, the request is forwarded to load balancing systems. Then, the computational (LB) is used to provide different computation paradigms to ensure requirements are met. The algorithms in load balancing assign VMs in server based on traits of the request. The motivation behind this work is to assign the request to the correct VMs which utilizes the resources properly and eliminates the waiting time eventually reduces the delay in providing services. Depending on the user request the following algorithm will be executed VMARLB, PBVMLBA and EVMLBA.

The proposed framework shows the three load balancing algorithms under the enhanced load balancing algorithms. The Virtual Machines are allocated based on the algorithms. These VMs are spawned from the servers. LB algorithms are devised to utilize the resources efficiently and eventually to bring down the idle time of resources.

Table 1 Makespan for the same of 5 Tasks

Method	Makespan
VMARLB	37.5
PBVMLBA	31.25
EVMLBA	30

Table 1 shows the makespan time for the three algorithms EVMLBA algorithm shows a reduction in execution time of tasks. The above algorithms execute 5 tasks on three virtual machines. The VMARLB algorithm execute the same tasks with time utilization is 37.5 , the PBVMLBA algorithm executes 5 tasks with time utilization is 31.25 seconds the EVMLBA algorithm executes the same tasks 30 seconds. This shows that the EVMLBA algorithm used minimum time for execution of the task. This is due to the use of enhanced approach which reduces the waiting time and increases the utilization time of the resources.

VI. CONCLUSION

This study shows the essence of framework for load balancing algorithms in cloud computing. The ultimate purpose of those algorithms is to reduce the response time and maximize the resource utilization. The results of the existing algorithms are compared and justified. It shows that EVMBLA produces best result among the proposed enhanced algorithms. Still there is plenty of space to improve the results and also to extract best service from cloud service providers. In our future work, it is proposed to improve our framework by considering other factors of load balancing techniques, improving our existing method and concentrate more on load balancing to support more requests with different properties

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