

Literature Review on Load Balancing Techniques

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Abstract:

In the cloud storage, Load balancing is one of the central issues in cloud computing. It is a mechanism that distributes the dynamic local workload evenly across all the nodes in the whole cloud to avoid a situation where some nodes are heavily loaded while others are idle or doing little work. It helps to achieve a high user satisfaction and resource utilization ratio, hence improving the overall performance and resource utility of the system. It also ensures that every computing resource is distributed efficiently and fairly. In cloud system the resources are distributed to all computer nodes fairly and in efficiently manner. If a node has extra workload as comparison of other nodes then we use load balancing techniques or process for transferring the extra load of nodes to others networks node. This paper provides literature review of various load balancing algorithms in cloud computing.

KeyWords: Cloud computing, load balancing, Round Robin

I. Introduction

Load balancing provide a procedure by which we distribute the dynamic workload across all cloud network nodes equally to escape a condition where various network nodes are greatly loaded while some other node are futile or doing slight work. In the cloud storage, Load balancing is one of the central issues in cloud computing. It is a mechanism that distributes the dynamic local workload evenly across all the nodes in the whole cloud to avoid a situation where some nodes are heavily loaded while others are idle or doing little work. It helps to achieve a high user satisfaction and resource utilization ratio, hence improving the overall performance and resource utility of the system. It also ensures

that every computing resource is distributed efficiently and fairly.

II. Load Balancing

In cloud computing a CSP (Cloud Service Provider) is used in load balancing for distribution of resources across all the server, datacenters and hard drives used in the network system of cloud the CSP work as ISP. It allots all application requirements across any number of application distributions nodes which is Positioned in different data centers. Load balancing can be generally characterized into numerous techniques. These are: Integrated or decentralized, active or static, and periodic or non-periodic.

In cloud computing environment, some resources are heavily loaded while some other resources are idle or have little work its main reason is random arrival of task and random utilization of CPU service time loaded the random arrival of tasks with random utilization of CPU service time so, in cloud computing load balance and resource control is main key challenging issue. To achieve minimum response time, less energy efficiency, optimal resource utilization and remove overload of a node it provide a procedure to allocate workload across multiple computers, or nodes .The main purpose of load balancing is to improve performance by balancing load amongst various resources viz. network links, disk drives and central processing units. Different load balancing algorithms are used to distribute load on to different various systems.

III. Literature Review

Load balancing is the process of finding overloaded nodes and then transferring the

extra load to other nodes. There are many load balancing algorithms for balancing the load among the servers of cloud data centres. Literature review of various load balancing work done in the past are explained below.

Fang et al in [1] “tried to obtain high resource utilization and meet dynamic requirements of task by providing a two level task scheduling mechanism based on load balancing in cloud computing. They paper improve the response time, resources utilization by mapping task to VMs and then VMs to host resources. They use the first level of scheduling (from user’s application to the VM) to create a description of VM including the task of computing resources, network resources, storage resources, etc. and used the second level scheduling (from the VM to host resources) to find appropriate resource for VM. This approach may have succeeded in improving the resource utilization, but we think that using two levels of task scheduling would increase the response time compared with other load balancing algorithms”.

Sethi et al in [2] introduced “a load balancing algorithm using fuzzy logic with Round Robin (RR) algorithm. The algorithm is based on various parameters such as processor speed, and assigned load in VM and etc. The algorithm maintains the information of each VM and numbers of requests currently allocated to VM. When a new request is received, the load balancer searches for the least loaded VM and allocate it, but if there are more than one VM, the selection will be based on processor speed and load in VM using fuzzy logic. This algorithm enhanced the performance of load balancer and decreased the response time. In addition, the results referred that its performance is better than RR algorithm. The drawback of this approach that authors had focused only on how to decrease the response time of job scheduling and they ignored talk about processing cost. In addition, the researchers compared their results with only RR algorithm which had been enhanced and improved by many researchers before”.

Ratan Mishra et al in [3] described that “Load balancing ensures that all the processor in the system or every node in the network

does approximately the equal amount of work at any instant of time. Many methods to resolve that problem had been came into existence like Particle Swarm Optimization, hash method; genetic algorithms and several scheduling based algorithms are there. In that paper they are proposed a method based on Ant Colony optimization to resolve the problem of load balancing in cloud environment”.

Sharma et al in [4] proposed “a new algorithm to enhance response time of each VM. The proposed algorithm collects information about all VMs in a list and uses it to allocate appropriate VM where status is available. When a new request is received, the load balancer looks at the table and identifies VM whose current allocation count is less than max allocation, and then check its status. The result is returned to the datacenter and then the data center allocates this resource to the request. When the VM is finished, it notifies the datacenter to de-allocate it. The drawback of this algorithm is in some case such as the high workload it may increase the waiting queue because the allocation depends on the available status only”.

Amandeep Kaur Sidhu et al in [5] wrote “A few existing scheduling algorithms can maintain load balancing and provide better strategies through efficient job scheduling and resource allocation techniques as well. In order to gain maximum profits with optimized load balancing algorithms, it is necessary to utilize resources efficiently. Their paper discussed some of the existing load balancing algorithms in cloud computing and also their challenges”.

Singh et al in [6] developed “a new heterogeneous load balancing algorithm to distribute the load across a number of servers. They create VMs of different datacenters according to host specification including core processor, processing speed, memory, storage etc. Then allocate weight count according to the RAM allocated to the VMs in the datacenter. They use a data structure to maintain weight count and the current allocation count of the VM. They allocate the

VM which have available status and have a higher RAM. When allocating a new VM, the algorithm returns the VM id to the Data Center Controller, and then updates the allocation count for that VM and adding the new allocation to the busy list. When the VM finishes processing the request the algorithm de-allocates the VM and removes the VM from the busy list. The main drawback of the algorithm is the authors allocates the VM which have higher RAM specification, but they ignores others specification such as processor power. On other hands they do not present any results and comparison with other algorithms.”

Singhal and Jain in [7] proposed “a load balancing algorithm using Fuzzy Logic, the algorithm focuses on a public cloud. The main idea of the algorithm is partitioning the cloud to several partitions and each partition having its own load balancer, and there is a main controller which manages all these partitions. With the idle partition status they use a fuzzy logic and in the normal partition status they use a global swarm optimization based load balancing strategy. The result shows enhancements in resource utilization and availability in cloud computing environment. The drawback of this approach is the difficulty of testing the technique in a real environment to make sure that it has achieved good results”.

Abhay Kumar Agarwalet. al. in [8] proposed an algorithm that we named as a New Static load balancing algorithm in cloud computing. “The proposed algorithm is using the concept of both Active Monitoring Load Balancing Algorithm and Throttled Load Balancing Algorithm. The detailed design, pseudo code and implementation of algorithm are also presented in this paper. The results (Overall Response Time and Datacenter Processing Time) obtained are compared with the results of Throttled Load Balancing Algorithm. This comparison is done after implementing and analysing each of the existing algorithms discussed in this paper, and found that Throttled Load Balancing Algorithm is best among all the existing. The other sections in the paper are introduction, related works, conclusion etc.”

Bhavisha Patel et. al. in [9] wrote that “Cloud Computing is the use of computing resources that are delivered as a service over a network. In cloud computing, there are many tasks requires to be executed by the available resources to achieve best performance, utilize the resources efficiently under the condition of heavy or light load in the network, minimize the response time and delay, for maintain system stability, to improve the performance, increase the throughput of the system, to decrease the communication overhead and to minimize the computation cost. This Paper Describe various load balancing algorithms that can be applied in cloud computing. These algorithms have different working and principles”.

Mithun Dsouza et. al.in [10] described that “Cloud computing has become popular due to its attractive features. The load on the cloud is increasing tremendously with the development of new applications. Load balancing is an important part of cloud computing environment which ensures that all devices or processors perform same amount of work in equal amount of time. In this paper we are mentioned about different techniques in load, we aim to provide a structured and comprehensive overview of the research on load balancing algorithms in cloud computing. This paper surveys the state of the art load balancing tools and techniques over the period of 2004-2016.”

Mamta Khanchiet. al. in [11] described that “Cloud computing is a computing provided over the internet. The principle aspect of cloud computing is virtualization that deals with the construction and management of virtual machines efficiently. As the number of consumers and requests for the services are increasing day by day in cloud computing, therefore load balancing is an important research area for handling the users’ requests efficiently. For efficient & effective management and usage of cloud service provider’s resources, many load balancing algorithms have been already proposed. This paper proposed and implemented a hybrid

approach for virtual machine level load balancing”.

IV. Challenges in load balancing

The scientific communities define some scientific challenges which are persisting unsolved mainly load balancing challenges are:

1) **Automated service provisioning:** Cloud computing provide a key feature of elasticity; in which service/resources are allocated or released automatically to the user when it required. How keep the record of resources which is used by same traditional systems which have same performance and use optimal resource how decide which resource is use or release?

2) **Virtual Machines Migration:** Due to virtualization each and every VM seen as a file or set of files if a when any PM is greatly overloaded and want to unload for this unloading move VM to various physical machines. A problem is arising how we can distribute the load dynamically when moving the virtual machine to physical machines. How avoid blocks in Cloud computing systems?

3) **Energy Management:** The adoption economy of scale is the main profits in cloud system. For allowing global economy energy saving is a basic point which allows how areduced providers will be support set of global resources that each process as sits own resources. So each has keeping acceptable performance. How can we use a part of datacenter?

4) **Stored data administration:** Management of stored data in a n/w or thorough a n/w which increase exponential establishments that provide the source to the individuals which manage own data at various years points. The main challenge in cloud computing is how to manage the management of data storage. So when a process wants to maintain access very fast. How can optimum storage data is distribute in cloud system.

5) **Manifestation of small data centers for cloud computing:** Small data center are useful than large data center because it have various issue such as more energy consumer and expensive. Small data centers are best it provide best diversity computing with less energy consumes. The main problem occur at large scale in cloud computing with optimal distribution with sufficient response time.

V. Conclusion

In the cloud storage, Load balancing is one of the central issues in cloud computing. It is a mechanism that distributes the dynamic local workload evenly across all the nodes in the whole cloud to avoid a situation where some nodes are heavily loaded while others are idle or doing little work. It helps to achieve a high user satisfaction and resource utilization ratio, hence improving the overall performance and resource utility of the system. It also ensures that every computing resource is distributed efficiently and fairly. This paper provided literature review of various load balancing algorithms in cloud computing.

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