A Conceptual Framework Towards Implementing a Cloud-Based Dynamic Load Balancer Using a Weighted Round-Robin Algorithm

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ABSTRACT

Cloud load balancing has become one of the most vital aspects of Cloud computing that has captured the attention of IT organizations and business firms in recent years. Among the issues related to this particular aspect, one such issue which needs to be addressed is the issue of effectively serving the clients’ requests among multiple servers using an appropriate load balancer. Previous survey papers discussed various issues of cloud load balancing and accordingly devised various methods and techniques to address those issues with the objectives of reduction of processing time and response time along with optimization of costs. In this article, we have discussed an effective load balancing technique using the weighted Round-Robin algorithm which can process the client requests among multiple servers with minimal response time. Considering all these aspects, a cloud-based dynamic load balancer is being used to solve the problem of load balancing in the cloud infrastructure.

KEYWORDS
Client Machines, Cloud-Based Dynamic Load Balancer, Database, Server Machines, Weighted Round-Robin Algorithm

INTRODUCTION

The advent of cloud computing has given the technological world a huge boom as most of the IT organizations, business units and firms have embraced this technology in recent years. The benefits provided by this technology are immense which made it popular in the technological market. In fact, both the service providers and cloud customers enjoy the benefits of this technology. It strictly follows the ‘pay-as-you-go’ approach, which means the customers have to pay only for all those services which they want to use. However, with the rise in demand of this technology and the increment of the size of cloud, there is a requirement for huge number of requests to be handled by cloud service providers. Hence, the onus lies on the service provider to properly address this issue while at the

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same time keeping up or upgrading the performance of cloud. Despite an excellent future that this technology has got, some of the major issues are associated with it which needs to be addressed. One such issue is Load Balancing.

Cloud Load Balancing is the process of distributing workloads across multiple computing resources. In other words, it is the process of allocating multiple client requests among several servers in a cloud environment. The allocation of requests among servers depends on a number of algorithms. The common used algorithms are Round-Robin, Weighted Round-Robin, Least Connection, Weighted Least Connection and Random. Apart from the benefits such as high-availability, scalability, business continuity with flexibility, economical and high degree of performance, the use of this technology can help prevent a server machine from getting overloaded and failed. Also, in the event of failure of a server machine, the workload can get transferred to other server machines which are actively working. Hence, this technique helps to maintain balance among the servers while at the same time enhances the performance of a cloud and helps to achieve optimal resource utilization. In our paper, we have discussed about an effective load balancing technique which can process the client requests among multiple servers with minimal response time. We have used a cloud-based dynamic load balancer which can be well supported in cloud environment and can achieve a high degree of performance. We have also used a weighted round-robin algorithm as we think that this algorithm can overcome the loopholes that exist in the current scenario of load balancing. Hence, it is imperative that we design a proper technique that will help to mitigate the issue with load balancing in cloud environment as far as practicable.

The remaining portions of the paper discuss about the following aspects of an effective load balancing technique using the weighted round-robin algorithm in cloud environment. Section 2 of this paper discusses about all the research works that were conducted pertaining to an effective load balancing technique in cloud. Section 3 is all about our own algorithm to achieve the same along with a well-defined flowchart and network diagram. Section 4 talks about the results that can be obtained by making use of our algorithm. It also talks about some of the vital parameters such as throughput, efficiency and response time which can be achieved with a high degree of precision. In section 5, we present a conclusion on the same with the mention of further scope of research on this field.

RELATED WORK

A research survey (Nayak, 2018) has been conducted about a load balancing model whose aim was to circulate the load in a uniform manner across all the nodes via virtualization through which dynamism and flexible scaling could also be achieved. Load balancing algorithms such as carton, compare and balance, event-driven, biased random sampling, active clustering, etc., were also discussed in this paper. Some of the functionalities of the hospital data management (HDM) were also discussed.

The authors (Rajani, 2018) talked about a task-based approach towards load balancing (TB-LB) in a Cloud environment based on clustering of virtual machines and heuristic algorithms. The proposed system solved the issue of population based and non-population-based problems. The combination of three heuristic algorithms, namely simulated annealing, particle swarm optimization and genetic algorithm was used to balance the load and the examination of task requirement helped in minimizing the make span of tasks and system performance. The virtual machines were organized into groups and the execution time got reduced, thanks to the k-means clustering approach. Through the proposed model, there was an enhancement of system performance through the reduction of make span and execution time.

The authors (Sankeerthi, 2018) discussed several load-balancing techniques in cloud environment. The paper discussed about the Cloud virtualization, full virtualization, and para virtualization. A review of various load balancing algorithms is also presented in this paper. The paper also threw light on the challenges of load balancing in cloud computing and devised methods in overcoming the same.
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