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Optimized Cloud Partitioning Technique to Simplify Load Balancing

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Abstract— Cloud computing environment still has some issues in resource management and load balancing. Load balancing is the process of balancing the workload among multiple nodes. This paper proposes an optimized load balancing technique and Cloud clustering technique over cloud environment. The public cloud environment which has enormous nodes over large and different geographical location. Our proposed model divides the cloud environment into several partitions by making use of cloud clustering technique, helps the providers to simplify the process of load balancing. Thus our proposed technique achieves higher performance and stability in cloud.

Keywords: Cloud cluster, load balancing, cloud computing, Throttled Load balancing, Round Robin, Equally Spread Current Execution.

I. INTRODUCTION

Cloud computing is a fast growing technology that hosts computing services in a centralized data centres and it provides the access to those services via the Internet. Cloud computing is extremely much a utility, like electricity which is sold on demand, at once scalable to any size, and it is charged as you use. The service provider will manage and provide all aspect of services except the devices which you access it. In future cloud will bring massive changes to the software production. Cloud will change our life by providing new types of services. Cloud computing is a common term for whatever thing that involves delivering hosted services over the Internet [8]. These services are broadly divided into three categories: Infrastructure-as-a Service (IaaS) means Scaling a new dealing models with effortlessly made to order enterprise-classes with effective resources., Platform-as-a-Service (PaaS) means enlarging the cloud applications high-speed with a collaborative, cloud-based, automated platform and Software-as-a-Service (SaaS) means Responding to the advertise trends faster than ever with new applications [4, 6]. Cloud computing basically consist of three entities are Cloud consumers, cloud service providers, and the services. Cloud consumers can consume those services which are provided by the cloud service provider. These services can be hosted on the service provider's own Infrastructure. However the cloud computing environment still has some issues in resource management and load balancing. On the other hand, there are so many more algorithms are given by various researchers for load balancing, which are discussed in related work. Arriving patterns of jobs are unpredictable, thus allocating and processing of many jobs over cloud environment among various node is a complex problem. And the capacity of each node also differs from each other. Hence load should be balanced among multiple nodes in order to improve the stability and system performance. The public cloud environment which has enormous nodes over large and different geographical location. Our proposed model divides the cloud environment into several partitions. This partitioning technique helps the providers to simplify the process of load balancing.

II. RELATED WORK

Guiyi Wei and Yujia Ge have proposed a new load balancing technique which makes use of genetic algorithm. It evaluates all task queue maintained by the main controller and select the optimized node to allocate the respective job. The genetic algorithm will provide well again balanced load across every nodes than another algorithm. [9]. Chaczko et al have explained the role of load balancing technique over cloud environment which improves high performance and scalability [3].Like they are so many algorithms which deals the load balancing issues in cloud environment which distribute the workload over multiple nodes in order to achieve the maximum throughput to avoid the overloading. Randles et al [5] have made a comparative analysis of various algorithms by checking its performance. Here we discussed some of the algorithms like Round Robin, Throttled Load Balancing Algorithm, and Equally Spread Current Execution Algorithm [2].

Dynamic load balancing

The load balancing technique used to make sure that none of the node is in idle state while other nodes are being utilized. In order to balance the lode among multiple nodes you can distribute the load to another node which has lightly loaded. Thus distributing the load during runtime is known as Dynamic Load Balancing technique. Some of the goals of Load balancing are

1. To progress the performance substantially.
2. To have a backup preparation in case the system fails.
3. To maintain the system stability.
4. To hold future alteration in the system.

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The dynamic load balancing technique, which works as the client is able to upload or download the file into the cloud server without any definite memory capacity. The load balancer will check the memory and the CPU usage. If the usage is very high then the client request will be transfer to the next available node.

A) Round Robin Algorithm:

It makes use of time slice method, as the name implies it works in a round manner where each node in the cloud environment is fixed with time slice and each node has to wait for their turn to perform their job. In other words it make use random sampling method which means the main controller select the balancer randomly to allocate the load in case of some balancer is heavily loaded .When compared to other algorithm the complexity of round robin algorithm is less[7].

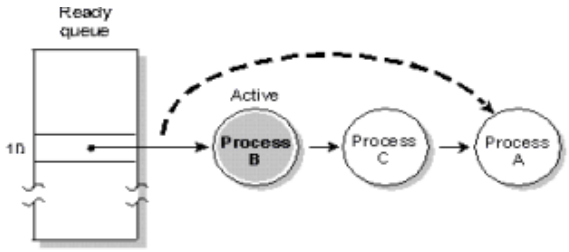

Figure 1. Round Robin Algorithm

B) Equally Spread Current Execution Algorithm

Equally spread current execution algorithm which assigns a job to each node with priority .It makes use of spread spectrum technique in which it distributes the load over various nodes by checking its load size. If the node is lightly loaded, the load balancer transfers that job to that respective node and achieves high throughput. The load balancer maintain queue of job allotted to light weight node, which helps to identify which node is free and need to be assigned with a new job.

C) Throttled Load balancing

The Throttled algorithm will find the specific node for assigning the new job. The job manager will maintain a list of node details using index list; with that it allocate a specific job to particular node. If the node is willing to accept the particular job means it will accept and process otherwise it will waits for the other node requesting for processing.

III. SYSTEM MODEL

The huge cloud environment consist of numerous node and it is partitioned into an n clusters based on our Cloud clustering technique. Our proposed model consists of main controller which controls all load balancer in each cloud cluster. The main controller maintains all the details include index table, its current status information of all load balancer in each cluster. The index table consists of both static parameters (number of CPU, Processing speed, memory size etc.) and dynamic parameters (network bandwidth, CPU and memory utilization ratio). All load balancer should refresh their status for every T. When the job arrives to main controller in cloud environment the initial step is to choose the correct cloud cluster and follows the algorithm as

1. Index table is initialized as 0 for all nodes which are connected to the central controller in cloud environment.
2. When the controller receives any new request from client, the controller queries the load balancer of each cluster for the job allocation.
3. The controller passes the index table to find the next available node which having less weight. If found, continues the processing. If not found the index table is reinitialized to 0 and in an increment manner, then controller passes the table again to find the next available node.
4. After finishing the process the load balancer update the status in the allocation table which is maintained by the controller

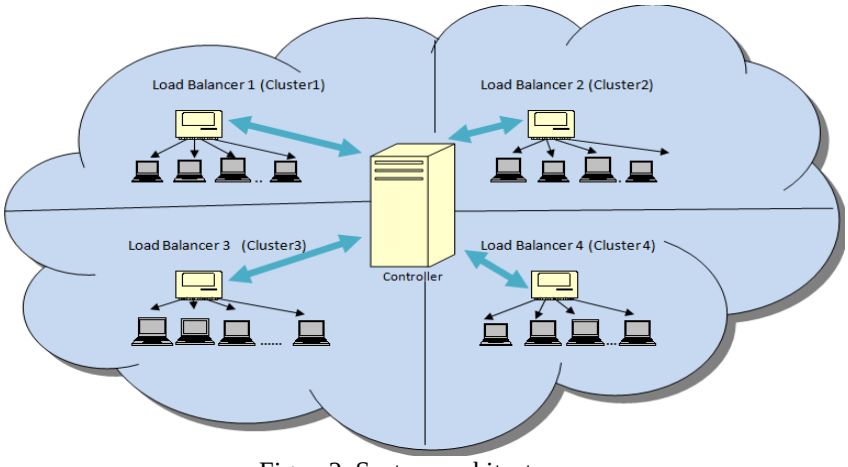

Figure2. System architecture

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Cloud Clustering Technique

The cloud environment includes numerous node and the nodes are different geographical location. Portioning of large cloud into cluster into cluster helps to manage its performance effectively.

Taking large cloud environment into consideration visit each node at a random order. This cloud portioning method includes 2 steps partitioning methods are:

Step 1:

a) Visit each node at random we matches it with the neighbour node. When it has same characteristics and shares similar candidate's data with minimal cost Once matched, two nodes are combined into new node, with that two node share same candidate details.
b) Repeat the same until there is no one hop neighbour node having similar character tics.
c) Subsequently cost between neighbour two nodes and current neighbour node has to be updated.

Step2:

Visit each node and join two neighbouring node into new node having same character tics. The visited node sends the information to new merged node instead of sending it twice to the previous node. So the cost between visited node and merged node are saved.

IV .CONCLUSION

Our proposed cloud clustering technique divides the cloud environment into multiple partitions and simplifies the process load balancing effectively. The algorithm used in this paper is able to automatically supervise the load balancing work through load balancer assigned to each cluster. Thus CPU and Memory can be utilized properly. Thus our proposed technique achieves higher performance, stability, optimal resource utilization, minimize response time and application down time over cloud environment.

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