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Load Balancing of Data in Cloud Computing Using Packet Size: A Survey Paper

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ABSTRACT: In the last few years Cloud Computing has become very popular, as it provide a flexible and easy way to keep and retrieve data and file over the network. In area of cloud computing the biggest issue is about to handling the billions of requests coming dynamically from the end users. To handle such requests efficiently and effectively, various load balancing approaches to distribute the load evenly among the cloud nodes have been proposed in the past years. The traditional Throttled load balancing algorithm distributes the incoming jobs evenly among the Virtual Machines. But these algorithm works well only for environments with homogeneous Virtual Machines. To solve this issue, we have proposed an algorithm with cluster based load balancing which can works well in environment of heterogeneous nodes. This algorithm divides the machines into clusters to reduce the scanning overhead.

KEYWORDS*:* Virtual machines (VMs*)*

I. INTRODUCTION

Cloud computing is a complete new technology which develop around the parallel computing, distributed computing, grid computing, and it is the combination and evolution of Virtualization [1]. Cloud computing is a kind of outsourcing of computer program in which users can access the software and applications from wherever they are; the computer programs are being hosted by an outside party and reside in the cloud. Cloud computing have a centralizes server resources on a scalable platform to provide computing resources and services on demand. It is a distributed architecture. Business owners are attracted towards cloud computing concept, because of its features like, Lower initial investment, Easy to manage, faster deployment, Independent on Location, Device independent, Security etc. [2].

Cloud computing is easy way to share processingpower, storage space, bandwidth, memory and software over the internet [2]. Cloud computing provides a flexible and easy way to keep and retrieve data and files. For making large data sets and files available for number of users around the world it requires theseveral techniques to optimize and streamline operations and to improve the performance of users [3].In field of cloud computing load balancing is one of the most important issues. To make cloud computing more efficient and to improve the user satisfaction, there is need of good load balancing[4]. Load balancing means dividing the incoming load or tasks evenly over the nodes of cloud so as to achieve maximum user satisfaction, reduce a response time and maximize the resource utilization [5]. In load balancing general system work load is redistributed among all nodes of the distributed system, to improve both resource utilization and job response time while avoiding a situation where some nodes are overloaded or others are under loaded [6]. Load balancing algorithms are classified as static and dynamic algorithms where static algorithms are mostly suitable for homogeneous and stable environments. However dynamicalgorithm providesthe betterresults in heterogeneous and dynamic environments [3].

Among the all over traditional load balancing approaches most of algorithm do not take into consideration the resource specific demands of the tasks or the heterogeneity of Virtual machines. This can lead to a problem in a cloud environment. To overcome these problems of traditional load balancing algorithms this paper introduced four main policies which includes transfer policy, selection policy, information policy and location policy.

Cloud computing relies on Virtualization which is a process of creating multiple virtual machine instances for a single host machine in order to operate more number of users requests. By using VMs it is possible to allow multiple operating systems and various applications to be run on same server node at a time [5].

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This paper is based on dynamic load balancing algorithm which will serve heterogeneous environments and will consider the resource specific demands of the tasks by using virtual machines with k- means clustering. VMs have divided into cluster by using k-means clustering approach to improve the throughput, execution time, response time and turnaround time.

II. LITERATURE SURVEY

Thissection contains some recent contributions in the area of cloud computing. Many researchers used the differentload balancing algorithmto solve the problems in area of cloud computing.

Santosh Kumar, R. H. Goudaret. al. presents research issues, challenges, architecture, platforms and applications in field of cloud computing. This paper also makes comparison betweencloud computing and grid computing. Grid is constructed to complete a specified task, where cloud computing is designed to meet general application. They have introduced the issues in cloud computing like Privacy of user personal data, Reliability on cloud servers, Interoperability of cloud, Compliance. Cloud computing users does not have freedom to physically possess the storage of data, leaving the data storage and control in the hands of cloud providers. Security of data, Costingof Model,Charging Model, Service Level Agreements between the providers and consumers are the challenges in cloud computing [1].

Klaithem Al Nuaimi, Nader Mohamed et.al. have proposed study on algorithm and challenges on load balancing in cloud computing. This paper represents a survey of the current load balancing algorithms developed specifically to suit the cloud computing environments.Designing of a load balancing algorithm that can work for spatially distributed nodes is very challenging task because speed of the network links among the nodes, distance between the client and the task processing nodes, and the distances between the nodes involved in providing theservice have taken into account.Replication, Algorithm Complexity, Point of Failure are challenging issues while designing the load balancing algorithm. Load balancing algorithms are classified into two types, static algorithms and dynamic algorithms. In static load balancing algorithm task is assign to the node which can process the new requests. Dynamic algorithm assignsthe tasks and may dynamically reassign them to the nodes based on the attributes gathered and calculated. This paper conclude that, DDFTP (dual direction downloading algorithm from FTP servers) algorithm is more suitable for Cloud environments and more efficient in terms of storage utilization [3].

GaochaoXu, Junjie Pang, Xiaodong Fu et.al. have investigate a load balancing model based on cloud partitioning for the public cloud. This paper introduced public cloud which has numerous nodes with distributed computing resources in many different geographic locations. This model divides public cloud into several cloud partitions.In this algorithm application of the game theory to the load balancing strategy have improved the efficiency in the public cloud environment [4].

Joseph Doyle, Robert Shortrepresents musical instrument identification: a pattern-recognition approach. This paper tells that large public cloud infrastructure can utilize power which is generated by a multiplicity of power plants. Each power plant will emit different amounts of carbon for a given amount of energy generated. The author have introduced that the service model involves a cloud based service provider (CBSP) providing a large pool of computational and networker sources. This is allocated on demand to the cloud users from the pool. Cloud users can use these resources. In this research carbon intensity of electricity suppliers in various geographical regions is analysed to minimize the environmental impact of a cloud. The author examines the electricity cost, carbon emissions and average service request time for a variety of scenarios [7].

AartiVig, Rajendra Singh Kushwahet.al. have invented an efficient distributed approach for load balancing in cloud computing. Load balancing is process of distributing the total load among the system various node for the resource utilization. In this model channel agents creates a number of local agents and possess information related to each local agent in a table. Channel agent distributes the related information ofneighbour from table to all its local agents. When local agent has no available space in the virtual machine for the execution of process then local agent sends a mitigation agent to its neighbouring agents which includes configuration of virtual machine which includes the process id, local host id. Neighbouring agent checks its table which in turn returns a true value with the virtual machineif it matches with the given virtual machine configuration consisting of available space otherwise the neighbouring agent forward the mitigation agent to its neighbours. When other agents receives, the mitigation agent checks its local host whether

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any mitigation agent is in process, if it is in process then discard the request else it forwards the local agent request for further processing [8].

ShridharG.Domanal and G. Ram Mohana Reddy presents novel hybrid scheduling algorithm for load balancing in cloud environment. For designing this algorithm they have combine methodology of Divide-and-Conquer and Throttled algorithmsreferred to as DCBT. It distributes the incoming load in an efficient manner to maximize resource utilization and reduce the execution time of the task in a cloud environment [9].

III. LOAD BALENCING ALGORITHMS WORKING PRINCIPLE

Cloud computing made up of two things i.e. cloud and computing. Cloud is nothing but the pool of heterogeneous services where computing is mapping of resources like processing. As we know the major issue in domain of cloud computing is load balancing. There are several techniques that are available for load balancing. Load balancing is used to perform the task of resource allocation and scheduling [9][10]. Load balancing techniques are divided into various types as follows:

A. *Static Load balancing*
In this type cloud requires priorknowledge of nodes like capacity, processing speed,performance capability etc.

B. *Dynamic Load balancing*
In dynamic environment, load can be changed at run time. These are useful in heterogeneous network.

C. *Centralized Load Balancing*
Single central node is responsible for maintaining and updating information.

D. *Distributed Load Balancing*
Here multiple nodes are responsible for maintaining and updating information.Multiple nodes monitor the network to make accurate load balancing decisions.

E. *Hierarchical Load Balancing*
Hierarchical Load Balancing is used in large homogeneous and heterogeneousnetwork.Different levels of the cloud in load balancing.

Already there exists many load balancing techniques in cloud computing such as CARTON. It uses two parameters named as LB and DRL to improve the performancelevel of the server. Compare and Balance technique based on sampling. It minimizes the number of host machines, for reducing the cost of cloud services. Task scheduling based on Load Balancing approach achieve high resource utilization, by mapping task to virtual machine and then virtual machine to host resources. Honeybee Foraging Behavior Algorithm is a self-organizing and natured inspired algorithm; it has achieved the performance by increasing system size. Biased Random Samplingmethod uses system domain random sampling. It achieves the self-organization for balancing the load across complete system [3]..

IV. METHODOLOGY

The traditional Throttled load balancing algorithm distributes the incoming jobs evenly among the VMs. But the major drawback is that, this algorithm works well for environment with homogeneous VMs and there is an overhead of scanning the entire list of VMs every time a task comes. The aim of this system is to assigning the tasks to suitable nodes in such a manner that load gets distributed evenly. Input file is processed by the node where space is available otherwise it shifted to the other node. This is designed by using the k-mean clustering of virtual machine. Physical machine is converted into a virtual machine and that virtual machine is provided to customer& customer feels that he is actually using the physical machine [10][11].

This system solves the load balancing issue using clustering of virtual machine. The goal of system is as follow:

i) Assigning the users request to suitable nodes so that load gets distributed evenly.
ii) Reallocation of VMs to process the request

System design is shown in fig. 1 which contains the Users, Cloud controller, Load balancer.

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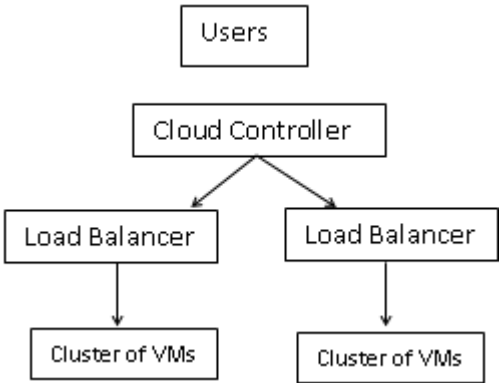

Fig. 1 System Architecture

A. *Users*

User sends the request to process the file, application etc. over the cloud.

B. *Cloud controller*

Cloud controller controls the task processing. It makes decision about which nodecontroller or load balancer should be selected for next allocation.

C. *Clustering*

This system use clustering approach to divide VMs with similar capacities into cluster. It divides n VMs into k clusters using k-means clustering.

D. *Load balancer*

Load balancer will maintain a list of all the clusters and list of VMs for each cluster. This list maintains the information about minimum and maximum resource specific capacities of each cluster. Dividing the virtual machines into the cluster reduces the scanning overhead the entire list ofVMs from the beginning [5][12].

The following fig. 2 shows in the systems execution flow.First the system initialize the all VMs with their specific resource types, capacities of each resource and also the status of VM is initialized. Clustering is performed on VM to make k clusters by using k-means clustering. Parameters used for clustering are CPU processing speed, Memory and network bandwidth. When cloud controller receives the new request is allocated to the appropriate load balancer. Load balancer has a list of all the clusters and this list is scanned to decide which cluster can handle the incoming request. After selecting the cluster, request is assigned to the appropriate VM in the VM list of that cluster. VM which is available and match the specific demands ofthe task. If more than one VMs satisfy the demands, then VM which found first one will get the task. Remaining resource quantities of that VM is then updated. Status of that VM is changed from AVAILABLE to BUSY and after finishing the process of the request, the status of that VM is changed to AVAILABLE. Load balancer updates the list of VMs capacities.

This system improves the terms waiting time, execution time,
Turnaround time and throughput. Where,
Response time= Allocation time of VMs-generation time
Execution time= Size of task ÷ CPU speed
Turnaround time = Time of completion - generation time
Throughput= No. of tasks executed ÷ time of all the tasks

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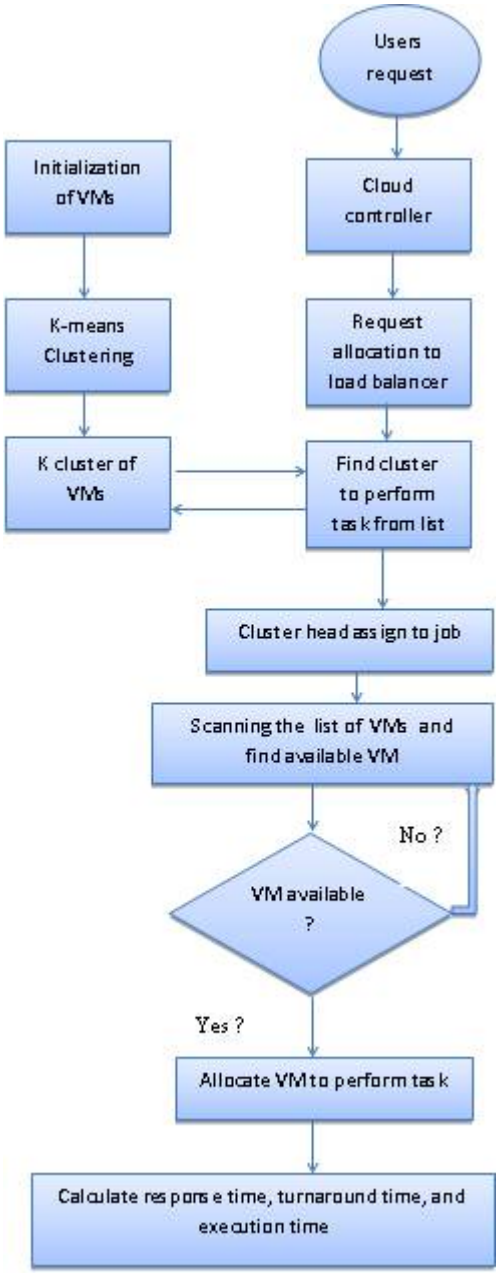

Fig.2: Execution Flow of System.

V. CONCLUSION

This system overcomes the problems in existing throttled algorithm by avoiding the method of scanning the entire list VMs from beginning. Instead of that it starts the scanning of VMs at the particular cluster.In such way load balancer will match the suitable available virtual machine to which task must be assigned among the cluster which helps to reduce the time involved in scanning of a list. This method also assigns a better and more suitable VM to the

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task as per its requirements .By clustering the VMS into groups this system gives better results in terms waiting time, execution time,turnaround time and throughput..

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