A REVIEW ON HYBRID SCHEDULING TO ENHANCE FOG BASED CLOUD PERFORMANCE

[1]Satish Kumar, [2]Kuldeep Kumar
[1]Research Scholar, [2]Assistant Professor
[1]Deptt of CSA,
[1]Chaudhary Devi Lal University, Sirsa, Haryana

Abstract : Nowadays it has been analyzed that the burdens of jobs are increasing rapidly on fog computing based systems. Therefore there is the requirement of a system which can handle the burden of jobs. In the proposed work, gang scheduler has decreased the distribution of jobs. Such tasks are shared in cloud external edge and internal cloud. The distribution of tasks leads to the enhancement in performance of system. There are several researches related to the load balancing which are also discussed here. Here on the base of compilation time, waiting time, load balancing etc, the comparative analysis has been made. Here on the base of throughput and execution time, the comparison of performance of proposed work and traditional work has been also provided. The proposed HYBRID SCHEDULING algorithm is better than the traditional algorithm. This research is beneficial for public & private cloud. Major requirement of day is to optimize the work load in a cloud computing over network. As load increases beyond some limit on clouds would be handled by proposed model which can collisions among packets sent by users.

Keyword: Cloud Computing, Load Balancing, JAVA, Hybrid Scheduling, CLOUDSIM, Matlab

[1] INTRODUCTION

Cloud computing can be defined as a networking used to provide and receive the data. The cloud computing may be public and private, hybrid etc. The services of cloud computing are available at a defined location remotely. The services of cloud computing have been used in LANs, MANs and WANs. Along with these, such services are also applicable in VPN too. Generally, the implementation of several applications for example Email and web based conferencing has been made on cloud. Platform independency has been found in cloud computing services.

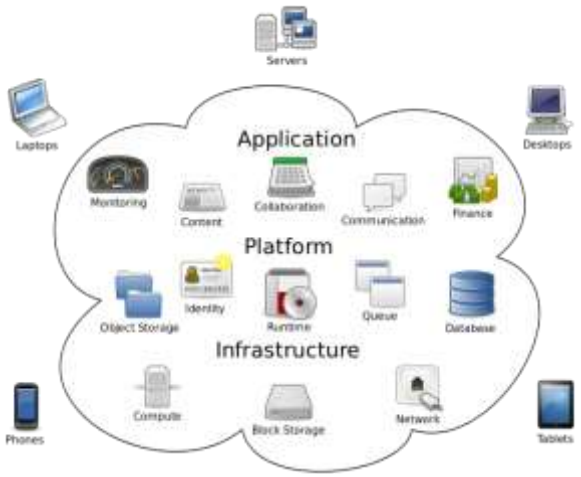

Fig. 1 Cloud computing

For user, it is not necessary that he must set the software on computer for services of cloud computing. Therefore, it has become the fact that presently with the use of cloud computing, the applications of business have become mobile as well as the collaborative. Multiple services are there creating cloud computing more available for the operator of computer. Lot of benefits has been provided by Cloud computing but there has been lot of risks related to this technology. User at Cloud might capture different cloud services from different type of client platforms without having any idea about proper services location. The cloud service user is not necessary to know the development processes, maintain or manage services additionally.

[2] LOAD BALANCING IN FOG BASED CLOUD SYSTEM

The task allocation algorithms in the cloud are classified based upon the current state of VM. In allocation policy where the current load information of VMs is available before the allocation is said to be a dynamic strategy. Static strategy acts on VMs without any load information in that concept. It improves the stability of the system.

ADVANTAGES OF LOAD BALANCING

1. **High performing application:** - Techniques of Cloud load balancing are not costly. These are very simple to use. Such techniques are better than the existing technique. Using such load balancing techniques, one can formulate their client applications working vastly and providing better outputs. It is possible to get such techniques at low price.
2. **Capability to handle sudden traffic spikes: -** Generally, it has been seen that there are the chances of the decrement in the performance of a university site. It is possible due to number of requests at a time. With the use of cloud load balancers, one can manage the load on the system. The requests may be in any size, it is not an issue. Such requests are responded in minimum response time.
3. **Increased Scalability: -** the load balancer provides the scalability and agility in Cloud computing. It is necessary to control the website traffic. With the use of efficient load balancers, one can normally handle the unexpected increment in user traffic. After that, the jobs are distributed between multiple servers and the devices connected to network. The load balancers have been considered essential for ecommerce websites. The reason is that it is able to handle visitors of multiple website in every second. For sale and other promotional tasks, effective load balancers are required in order sharing the workloads.
4. **Business consistency with absolute flexibility**: - In order to protect a website from unexpected challenge, a load balancer has been used. It has been known as the basic objective of a load balancer. As the loads of tasks are shared in several servers, therefore there are not chances of system failure. The cause is that in the condition of failure of one node, the burden has been moved to different active node.

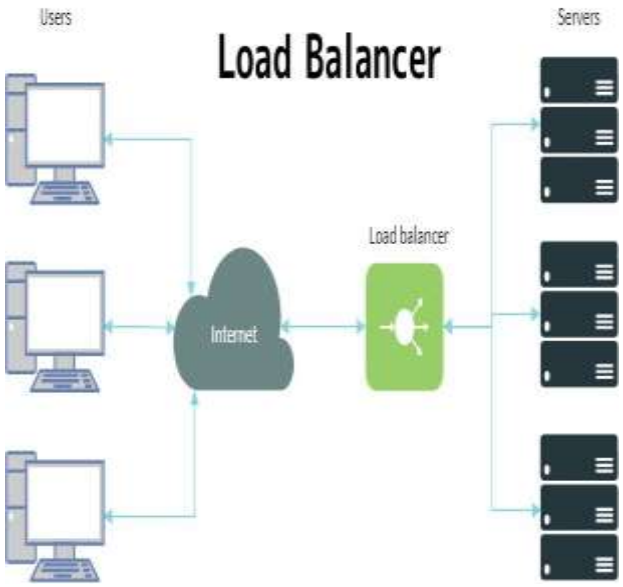

Fig. 2 Load Balancer

[3] LITERATURE REVIEW

There are several researches related to the load balancing which are also discussed here.

Arindam Banerjee, Prateek Agrawal and N. Ch. S. N. Iyengar (2013), "Energy Efficiency Model for Cloud Computing", International Journal of Energy, Information and Communications Vol.4, Issue 6 (2013)[1]

In this paper they have investigated the need of power consumption and energy efficiency in cloud computing model. It has been shown that there are few major components of cloud architecture which are responsible for high amount of power dissipation in cloud. The possible ways to meet each sector for designing an energy efficiency model has also been studied. Finally they have shown the future research direction and the continuity of this work for next level implementation.

Karim Djemame, Django Armstrong, Richard Kavanagh(2013), "Energy Efficiency Embedded Service Lifecycle: Towards an Energy Efficient Cloud Computing Architecture"[2]

This paper has highlighted the importance of providing novel methods and tools to support software developers aiming to optimize energy efficiency and minimize the carbon footprint resulting from designing, developing, deploying and running software at the different layers of Cloud stack while maintaining other quality aspects of software to adequate and agreed levels. The design of the various architectural components was described, with emphasis on the extension requirements in order to support energy efficiency management.

Dejene Boru, Dzmitry Kliazovich, Fabrizio Granelli, Pascal Bouvry, Albert Y, Zomaya (2015), "Energy-efficient data replication in cloud computing datacenters", Springer Science+Business Media New York 2015[3]

This paper reviews the topic of data replication in geographically distributed cloud computing data centers and proposes a novel replication solution which in addition to traditional performance metrics, such as availability of network bandwidth, optimizes energy efficiency of the system. The evaluation of the proposed replication solution is based on the developed mathematical model and simulations using Green Cloud, the simulator focusing on energy efficiency and communication processes in cloud computing data centers.

Pragya, Mrs Manjeet Gupta(2015), "Analysis of energy efficient scheduling algorithms in green cloud computing" 2015[4]

In their work they have evaluated the energy consumption using various Scheduling algorithms. The consumption of energy varies a lot and moreover they saw two abnormalities as task rejection by data center and task failed on servers which is an issue.

Banashankari, Chandan Raj.(2016), "A Survey on Power Efficiency in Cloud Computing to Optimize the Cost", National Conference on Advances in Computing, Communication and Networking (ACCNet – 2016)[5]

This paper concluded that, there is more study is required over these issues. In this paper, the Green IT Technology framework specified helps in reduction in greenhouse gas, energy efficiency improvement and also allows recycling and reuse. This framework also provides datacenter efficiency and CO2 emission measurement. The future scope is to optimize energy consumption and provide response time guarantee by considering the performance parameter and also by increasing the data volume so as to reduce the expenditure of cloud providers.

J. Grover and S. Katiyar, "Agent Based Dynamic Load Balancing in Cloud Computing Abstract —."2013[7]
In the research work, the researcher has applied the ABDLB concept. ABDLB stands for Agent Based Dynamic Load Balancing. In the ABDLB approach, the mobile agent has a useful role. The role of mobile agent in this approach is to compare the software. In the research work the proposed technique has been compared to with existing Base load balancing technique. It has been analyzed that the proposed technique is more efficient to reduce the load of jobs.

B. Prabavathy, "A Load Balancing Algorithm For Private Cloud Storage," 2013. [8]
In order to maintain the load across several storage nodes, the data need to be migrated across the storage nodes. This data migration consumes more network bandwidth. The key idea behind this paper is to develop a dynamic load balancing algorithm to balance the load across the storage nodes during the expansion of private cloud storage.

L. Tang, P. Ren, and J. Pan, "An Innovative K-Subset Algorithm for Load Balance Challenges in Cloud Computing."2014[10]
Cloud Computing can be defined as one of the most recent computing. It is very applicable in IT sector. In IT sector, using the services of cloud computing, the applications, platforms, software etc have been distributed over the internet. Cloud Computing can be referred as the services provided according to demand.

V Velde,"An innovative Algorithm for Load Balancing in Cloud Computing with Fuzzy Technique," pp. 1042–1047, 2017. [12].
The offerings of cloud computing are becoming ubiquitous, and function the primary source of computing power for special packages like corporations and personal computing programs. In this paper they delivered the novel load balancing algorithm the use of fuzzy technique in cloud computing, in which load balancing is a middle and hard problem in Cloud Computing. The processor pace and assigned load of Virtual Machine (VM) are used to stability the burden in cloud computing thru fuzzy logic.

M. Lagwal, "Load balancing in Cloud Computing using Genetic Algorithm," pp. 560–565, 2017.[13]
Load balancing is an extremely real issue confronted now days in cloud environment so that the assets are proficiently used. There are many load balancing algorithms accessible that are utilized to balance the load of the customer demands. In this paper they will propose an approach which is a blend of Honeybee Foraging Algorithm, Active clustering algorithm and Ant Colony Optimization.

Mr. Ramesh P. (2015) "Comparative analysis of Static and Dynamic Load Balancing in Grid Computing" [15]
There are many load balancing algorithms accessible that are utilized to balance the load of the customer demands. In this paper they will propose an approach which is a blend of Honeybee Foraging Algorithm, Active clustering algorithm and Ant Colony Optimization. The objective of the research work is to provide the comparison between changeable and not changeable load balancing to use in grid based shared network

Anuradha S. et al (2015) "A Survey Report on Load Balancing Algorithm in Grid Computing Environment" [17]
There are many load balancing algorithms accessible that are utilized to balance the load of the customer demands. The main motive that has been considered in the research work is to propose a load balancing algorithm. The proposed algorithm will be helpful to share the tasks between the processors. It has been done to maximize the throughput. It is necessary for whole jobs in order to make similar to application.

Soumi G. et al (2016) "Priority Based Modified Throttled Algorithm in Cloud Computing", [18]
In the research work, they represented an innovative and updated load balancing technique. This technique is able to analyze the working performance to Throttled Load Balancing algorithms. Here the Round Robin is also considered. With the visualization of the cited factors within graphical image, they are able to make identification of whole response time. It has been improved making comparison to the traditional load balancing algorithm. Therefore overall, such results indicate to the suggestion.

Zahra M. et al (2016)" A Comparative Study of Load Balancing Algorithms" [19]
The comparison has been made of the algorithm which depends on particular qualitative parameters. They reviewed to the working performance evaluation related to the varied load balancing algorithms. It has been done with the use of parameters of identified qualitative. The research work has considered the load balancing concept such as static as well as the dynamic.

Cui C. et al (2016) "Research on Load Balance Method in SDN" [20]
Load balancing is an extremely real issue confronted now days in cloud environment so that the assets are proficiently used. There are many load balancing algorithms accessible that are utilized to balance the load of the customer demands. The experiment has resulted that strategy of load balancing can choose more rational sharing path. In addition they got approx nineteen percent decrement in network latency.

Mahdi A. et al (2016) "Efficient Load Balancing Routing Technique for Mobile Ad Hoc Networks"[21]
The research work has provided the updated technique. The proposed work has ben formulated to make improvement in QoS efficiency related to concept of load balancing. They also considered the lifetime related to network. Here it this paper the evaluation of network lifetime is not considered.

Surbhi K. et al (2015) "Cluster Based Load Balancing in Cloud Computing", [22]
In the researcher work, they considered the different aspect related to the load balancing. It make dealing of allocating jobs to suitable VMs. It is necessary to retain the load on all VMs. Several traditional exiting algorithms are reviewed in the research work.

Mohit K. et al (2017) "Dynamic load balancing algorithm for balancing the workload among virtual machine in cloud computing"[23]
In this paper, the researcher has developed a changeable load balancing algorithm. The aim of the research is to provide the use of cloud services in proper method. Every algorithm performs and differentiates on the base of several factors such as makespan time, time required for execution, time required for response. Here for comparative analysis the resource utilization as well as the throughput etc is considered. They optimized the elements related to objective function.

Dildar H. et al (2017) "A VIEW ON LOAD BALANCING OF NOSQL DATABASES"[24]
Load balancing is an extremely real issue confronted now days in cloud environment so that the assets are proficiently used. There are many load balancing algorithms accessible that are utilized to balance the load of the customer demands. In the research work, Load balancing has been made in multiple Nosql databases alomgwith multiple methods.

Gema R. et al (2018) "Experimental Model for Load Balancing in Cloud Computing applying Throttled Algorithm"[26]

Cloud Computing has been referred as innovative standard of generation networking. It can be referred as the provider of multiple services with the use of the internet. Load balancing has been known as a key aspect related to the cloud computing. It has been observed that several kind of situations are generated due to the load on nodes at the time of others nodes busy schedule.

[4]JAVA

Java is considered as a programming language as well as computing platform. It was released by Sun Microsystems in 1995. Lots of applications & websites are there that do not work unless Java is installed. Java is known as fast, secure, & reliable programming language. It has been in used from laptops to data centers, cell phones to Internet & Video game consoles to supercomputers. Java is known as a general purpose & high-level programming language that has been developed by Sun Microsystems. OAK was first name of Java. It had been designed for handheld devices as well as set-top boxes. Sun changed its name to Java & modified language in order to take benefits of burgeoning World Wide Web.

The java programs run under virtual machine sandbox.

1. Class loader is adding security by separating package for classes of local file system from those which are imported from network sources.
2. The Byte code Verifier is checking code fragments for illegal code which could violate access right to objects.
3. The Security Manager determines resources a class could access such as reading & writing to local disk.

[5] PROBLEM STATEMENT

In the research work, the hybrid scheduling in fog-based cloud system has been considered. It also considered the traditional gang scheduling technique that is dependent on centralized network system. In traditional algorithm jobs were scheduled by gang scheduler. But hybrid scheduling algorithm classifies job. The burden of gang scheduler has been decreased with the distribution of jobs.

The tasks are shared in cloud external edge and internal cloud. It has been analyzed that the proposed Hybrid scheduling algorithm has been proved the best scheduling algorithm. In the proposed work, the tasks are shared as per the nature of tasks. It is the fact that some tasks are required to be processed on internal edge of cloud. On the other hand, several jobs are processed on external layer of cloud. This distribution of tasks leads the enhancement in performance of system. To increase the performance of fog computing operations, the Hybrid scheduling algorithm has an essential role.

[6]PROPOSED WORK

In proposed work the load of cloud would be reduced on two layers.

a. Clustering the operation on cloud on the base of similarity.
b. Using virtual machine in synchronized way in order to reduce the workload.
c. Reducing the content size using replacement technology.

Proposed algorithm: -

The scheduling metrics has been distributed into two parts. The first part is external layer of cloud and the other is internal cloud. Such are defined in proposed algorithm.

Description of Proposed Algorithm: -

1. Make the distribution of tasks as per the complexity.
2. m1, m2 has been applied as scheduling matrixes.
3. Situate the easy tasks at cloud outer edge in m1
4. Situate complex tasks at cloud internal in m2
5. Algorithm performing on outer edge of cloud

[7] CONCLUSION

In the research work, the hybrid scheduling in fog-based cloud system has been discussed. It also considered the traditional gang scheduling technique that is dependent on centralized network system. In traditional algorithm jobs were scheduled by gang scheduler. But hybrid scheduling algorithm classifies job. The burden of gang scheduler has been decreased with the distribution of jobs. Such tasks are shared in cloud external edge and internal cloud. It has been analyzed that the proposed Hybrid scheduling algorithm has been proved the best scheduling algorithm. In the proposed work, the tasks are shared as per the nature of tasks. It is the fact that some tasks are required to be processed on internal edge of cloud. On the other hand, several jobs are processed on external layer of cloud. This distribution of tasks leads the enhancement in performance of system.

[8] FUTURE SCOPE

This research is beneficial for public & private cloud. Major requirement of day is to optimize the work load in a cloud computing over network. As load increases beyond some limit on clouds could cause collisions among packets sent by users. It is because of retransmissions occurs in cloud that could degrade performance. Such system is beneficial to carry heavy data over network. This system would also provide security to data as actual data is first encoded by replacing within key values. Such systems are also useful in educational & research sector as they provide bulk data transfer with high speed within reduced size.

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