iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 6 **Issue:** IV **Month of publication:** April 2018

DOI: http://doi.org/10.22214/ijraset.2018.4163

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue IV, April 2018- Available at www.ijraset.com

Challenges & Issues in Load Balancing in Cloud Computing

Pooja Kathalkar[1], A. V. Deorankar[2]
[1] *Department of Computer Science and Engineering, Government College of Engineering Amravati (MH), India*
[2] *Department of Computer Science and Engineering, Government College of Engineering Amravati (MH), India*

Abstract: Load balancing is used to distribute a larger processing load to smaller processing nodes for enhancing the overall performance of system. A load balancer is a expedient that acts as a contrary proxy and allocates system or submission load across a quantity of attendants. Now a day the performance of cloud computing is major issue. For the improvement of the performance of the cloud environment uses load balancing and job scheduling technique. This paper present the different issue and challenges in load balancing as well as consequences of different algorithms use for load balancing.
Keywords: Load balancing , Cloud Computing, , Distributed System, Bio-inspired algorithms.

I. INTRODUCTION

Cloud Computing is an emerging area in the field of information technology (IT). Load balancing is one of the main challenges in cloud computing. It is a technique which is required to distribute the dynamic workload across multiple nodes to ensure that no single node is overloaded. Usually, web traffic, application access, databases and other things which have the heavy loads can use the load balancer software to serve the user without any interruption. Load balancing techniques help in optimal utilization of resources and hence in enhancing the performance of the system. The goal of load balancing is to minimize the resource consumption which will further reduce energy consumption and carbon emission rate that is the dire need of cloud computing. This determines the need of new metrics, energy consumption and carbon emission for energy-efficient load balancing in cloud computing.

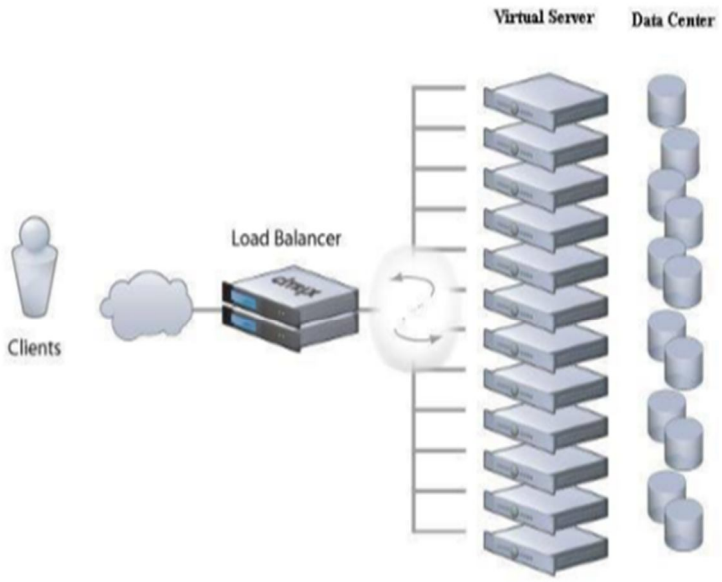


Fig 1.Load Balancing Mechanism

A. Major goals of load balancing

1) Establish fault tolerance system

2) Maintain system stability

3) Improve the performance and efficiency
4) Minimizing the job execution time and waiting time in queue
5) To increase user satisfaction . To balance the entire load, load balancing algorithm has been designed and two types of load balancing algorithms are introduced:
6) *Static Load Balancing* – This algorithm requires prior knowledge about system resources. Therefore, the decision of load distribution does not depend on the current (present) state of the system .In this environment performance of processors is explained at the starting of the execution and it does not change the executing process at run time for making changes in the system load. This algorithm is suitable for homogenous system environment.
7) *Dynamic Load Balancing* – This algorithm does not require any prior information about system resources because the load distribution decision is based on the current state of the system. This is suitable for heterogeneous system. Dynamic load balancing make changes in load at run time. This algorithm provides outstanding improvement in performance than static algorithm.

II.CHALLENGES & ISSUES OF LOAD BALANCING

Before explaining the load balancing algorithm for cloud computing it is required to identify some key challenges and issues that affect the performance of load balancing algorithms. Following are the some major challenges which can be improved for better performance of load balancer.

A. Throughput

It is the total number of tasks that have completed execution for a given scale of time. It is required to have high through put for better performance of the system.

B. Associated Overhead

It describes the amount of overhead during the implementation of the load balancing algorithm. It is a composition of movement of tasks, inter process communication and inter processor. For load balancing technique to work properly, minimum overhead should be there.

C. Fault Tolerant

We can define it as the ability to perform load balancing by the appropriate algorithm without arbitrary link or node failure. Every load balancing algorithm should have good fault tolerance approach.

D. Migration Time

it is the amount of time for a process to be transferred from one system node to another node for execution. For better performance of the system this time should be always less.

E. Response time

In Distributed system, it is the time taken by a particular load balancing technique to respond. This time should be minimized for better performance.

F. Resource Utilization

It is the parameter which gives the information within which extant the resource is utilized. For efficient load balancing in system, optimum resource should be utilized.

G. Scalability

It is the ability of load balancing algorithm for a system with any finite number of processor and machines. This parameter can be improved for better system performance.

H. Performance

It is the overall efficiency of the system. If all the parameters are improved then the overall system performance can be improved. Although cloud computing has been widely adopted. Research in cloud computing is still in its early stages, and some scientific challenges remain unsolved by the scientific community, particularly load balancing challenges

I. Automated service Provisioning

A key feature of cloud computing is elasticity, resources can be allocated or released automatically. How then can we use or release the resources of the cloud, by keeping the same performance as traditional systems and using optimal resources?

J. Virtual Machines Migration

With virtualization, an entire machine can be seen as a file or set of files, to unload a physical machine heavily loaded, it is possible to move a virtual machine between physical machines. The main objective is to distribute the load in a datacenter or set of datacenters. How then can we dynamically distribute the load when moving virtual machine to avoid bottlenecks in Cloud computing system?

K. Energy Management

The benefits that advocate the adoption of the cloud is the economy of scale. Energy saving is a key point that allows a global economy where a set of global resources will be supported by reduced providers rather that each one has its own resources. How then can we use a part of datacenter while keeping acceptable performance?

L. Stored data management

In the last decade data stored across the network has an exponential increase even for companies by outsourcing their data storage or for individuals, the management of data storage becomes a major challenge for cloud computing. How can we distribute the data to the cloud for optimum storage of data while maintaining fast access?

M. Emergence Of Small Data Centers For Cloud Computing

Small datacenters can be more beneficial, cheaper and less energy consumer than large datacenter[8]. Small providers can deliver cloud computing services leading to geo-diversity computing. Load balancing will become a problem on a global scale to ensure an adequate response time with an optimal distribution of resources.

N. Geographical Distributions Of The Nodes

It is used in the large scaled applications like Twitter, Facebook etc. To maintain the efficiency of the system and handling fault tolerance well DS of the processors in cloud computing environment is very helpful. The geographical distribution matters a lot in the overall performance of any actual time cloud environment.

Tra□c Analysis over Di□erent
Geographical Location
Tra□c Analysis over Di□erent
Geographical Location
Tra□c Analysis over Di□erent
Geographical Location
Tra□c Analysis over Di□erent
Geographical Location

Aim of load balancing is to clearly understand the consumer requirements, the data and information can be sent and received without taking more time. LB in cloud computing is one of the major problems without load balancing users could delays, and provide time-consuming system responses, the load can be network load, memory and CPU loads. Cloud computing gives large pool of shared resources, software packages, information, storage and many different applications as per user demands at any instance of time. Cloud computing is emerging quickly; a large number of users are attracted towards cloud services for more satisfaction. Balancing the load has become more interesting research area in this field. Better load balancing algorithm in cloud system increases the performance and resources utilization by dynamically distributing work load among various nodes in the system.

III. LIMITATIONS OF DIFFERENT ALGORITHMS USE FOR LOAD BALANCING

To balance the load among multiple nodes in system, there are several load balancing algorithms could be introduced. Different authors provide designed different load balancing algorithms. Here is the frequently used load balancing algorithm which is efficient in handling the load.

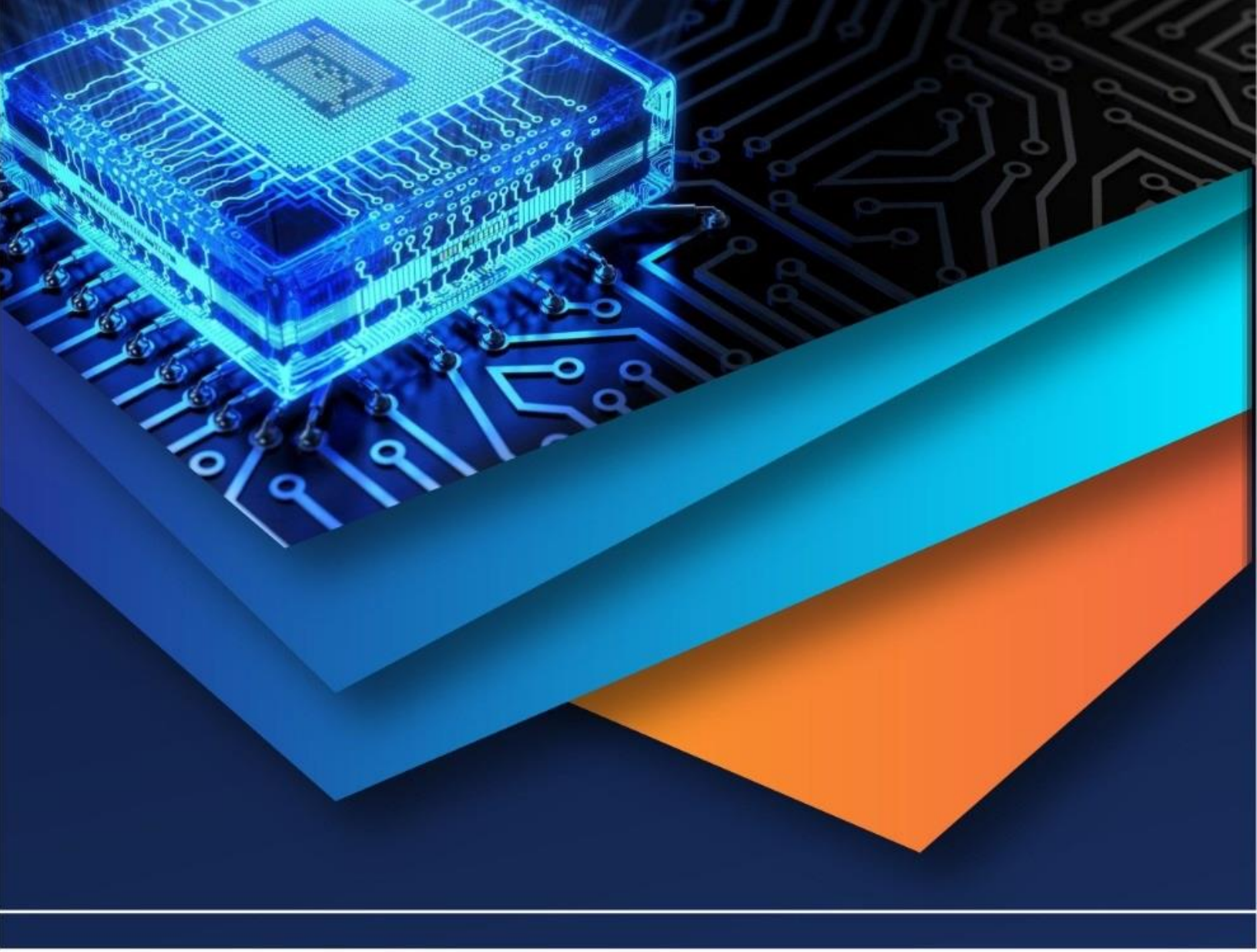
Algorithm	Author	Consequences
Dominant Resource Fairness (DRF)	Huang Daochao et.al	Efficient scheduling is done without load balancing of VMs
Pareto based fruit Fly Optimization algorithm (PFOA)	Xiao-long Zheng et.al	Authors did not consider other heuristic approaches for performance evaluation
Pseudo-Polynomial Dynamic Programming Algorithm	Morteza Rasti Barzoki et.al	Authors considered supply chain management application. However, heuristics approaches can be added to suit multiple platforms
Cuckoo Optimization Algorithm (MOSCOA	Mehdi Akbari et.al	Random assignment of tasks to processors during scheduling
Min-Min (LBMM) for load balancing Algorithm	Wang et.al	Execution time of the tasks is not considered and leads to bottleneck for task scheduling
Threshold Algorithm	Katoch et.al	When all remote processes are overloaded, then all processes are allocated locally.
Round Robin and Randomized Algorithm	Ray et.al	In round robin, there are no expectations to obtain better performance
Honey Bee Foraging Behavior	M. Randles et.al	As the system size increasing, it does not increase throughput
GA Algorithm	Sushil Kumar et.al	It is not based on distributed load balancing approach.
Heuristic Clustering Based on Bayes Theorem	Jio Zhao et.al	Highly Complex Methodology

IV. CONCLUSION

This paper presented different challenges and issues of load balancing. It also provides overview of different load balancing techniques available today with their advantages and limitations. Since Cloud Computing is a new field of research compared to other technologies, lot of research works are being carried out, especially in developing a standalone load balancing method.

REFERENCES

[1] Palak Shrivastava, Sudheer Kumar Arya , Dr. Priyanka Tripathi, “Various Issues & Challenges of Load Balancing Over Cloud: A Survey”, International Journal Of Engineering And Computer Science ISSN: 2319-7242 Volume 5 Issues 8 Aug 2016, Page No. 17517-17524
[2] Ms. Shalini Joshi, Dr. Uma Kumari, “Load Balancing in Cloud Computing:Challenges & Issues”, 978-1-5090-5256-1/16/$31.00 c 2016 IEEE
[3] Radhika Pathak, “A Survey of Load Balancing in Cloud Computing: Challenges and Algorithms”, DOI: 10.15680/IJIRCCE.2017. 0501158
[4] Sotomayor, B., RS. Montero, IM. Llorente, and I. Foster, "Virtual infrastructure management in private and hybrid clouds," in IEEE Internet Computing, Vol. 13, No. 5, pp: 14- 22, 2009.
[5] Rana, Madhurima, S. Bilgaiyan, and U. Kar. "A study on load balancing in cloud computing environment using evolutionary and swarm based algorithms." Control, Instrumentation, Communication and Computational Technologies (ICCICCT), 2014 International Conference on. IEEE, 2014
[6] A.Khiyaita, M. Zbakh, H. el bakkali, Dafir el kettani, “Load Balancing Cloud Computing : State of Art”, 978-1-4673-1053-6/12/$31.00 ©2012 IEEE
[7] Amal Ganesh, Dr. M.Sandhya, Dr. Sharmila Shankar, “A Study on Fault Tolerance methods in Cloud Computing”, 978-1-4799-2572-8/14/$31.00 c 2014 IEEE
[8] Jyoti Thaman, Manpreet Singh, “Current Perspective in Task Scheduling Techniques in Cloud Computing: a review”, DOI:10.5121/ijfcst.2016.6106
[9] Sajjan R.S, Biradar Rekha Yashwantrao, “Load Balancing and its Algorithms in Cloud Computing: A Survey”, International Journal of Computer Sciences and Engineering. 2017



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY