STM JOURNALS

Recent Trends in
Parallel Computing

ISSN: 2393-8749
Volume 8, Issue 2, 2021
DOI (Journal): 10.37591/RTPC

http://computers.stmjournals.com/index.php?journal=RTPC&page=index

Review RTPC

Comparison of Various Load Balancing Algorithms in Cloud Computing

Ayushi Bhargava[1], Manish Bhardwaj[2,*]

Abstract

The components associated with distributed computing are customers, datacenter and appropriated server. One of the principal issues in distributed computing is load adjusting. Adjusting the heap intends to circulate the outstanding task at hand among a few hubs uniformly so no single hub will be over-burden. Burden can be of any kind that is it very well may be CPU load, memory limit or system load. Right now, introduced a design of burden adjusting and calculation which will additionally improve the heap adjusting issue by limiting the reaction time. Right now, have proposed the improved variant of existing managed load adjusting approach for distributed computing by comping the Randomization and covetous burden adjusting calculation. To check the presentation of proposed approach, we have utilized the cloud investigator test system (Cloud Analyst). Through reenactment examination, it has been discovered that proposed improved form of controlled burden adjusting approach has indicated better execution as far as cost, reaction time and information preparing time.

Keywords: CC–Cloud Computing, CA–Cloud Analyst, GA–genetic algorithm, ACO–ant colony optimization, SHC–stochastic algorithm, FCFS–first come first serve.

INTRODUCTION

NIST characterizes Cloud figuring is a registering model utilized all over the place and gives helpful, on-request access to a common pool of processing assets, for example, systems, servers, stockpiling, applications, and so on. These assets can be powerfully allotted and discharged with negligible administration exertion or specialist co-op association. It offers 3 types of assistance. Diverse physical and virtual assets are given to the clients on request. In Cloud registering, access to the asset depends on Virtualization. Virtualization is a deliberation of genuine machines. Virtual machines can run at the same capacity as real machines [1]. Virtualization gives offices like genuine machines. We can make bigger number of less controlled servers through virtualization, which thus diminishes the general expense in space, force, and framework. Cloud assets can be scaled quickly utilizing virtualization system. Cloud assets are progressively dispensed to clients on request. As the quantity of client expands, the accessible assets decline progressively.

This is viewed as burden adjusting strategy which puts forth an attempt to expand the throughput of virtual machines [2]. Employment Scheduling is a procedure of allotting occupations onto accessible assets in time. It is additionally characterized as the way toward finding a proficient mapping of assignments to the reasonable assets so the execution can be finished with the fulfillment of some goal capacities. To put it plainly, progressively proficient is the planning calculation, better is the Quality of Service conveyed. Each Scheduling issue has three significant components. They are:

***Author for Correspondence**
Manish Bhardwaj

[1]Student, Department of Computer Science & Engineering, Poornima Institute of Engineering & Technology, Jaipur, Rajasthan, India
[2]Assistant Professor, Department of Computer Science & Engineering, Poornima Institute of Engineering & Technology, Jaipur, Rajasthan, India

Received Date: September 30, 2021
Accepted Date: October 22, 2021
Published Date: November 20, 2021

Citation: Ayushi Bhargava, Manish Bhardwaj. Comparison of Various Load Balancing Algorithms in Cloud Computing. Recent Trends in Parallel Computing. 2021; 8(2): 1–5p.

Machine Configuration

A solitary machine with a solitary or different processors or a bunch of machines with a solitary or various processors in each machine and so on.

Streamlining Criterion

It characterizes the objective(s) of the planning calculation for example lessening make range, limiting reaction time, limiting asset cost and so on. The primary aim for building up this apparatus is to reenact the traffic created by most visited applications, for example, face book, Gmail and investigate the reaction times at every datum community [3]. The recreation procedure is isolated into locales meant by Ri where 'I' shows the district number and number of solicitations created in every area can be considered as a User Base meant by UBi where 'I' demonstrates the client base number. The server farms are meant by DCi where 'I' demonstrates the relating server farm number. The accompanying Figure 1 gives a superior comprehension of how the locales are separated for reproduction. Explains every single detail of the device.

Features of Cloud are:

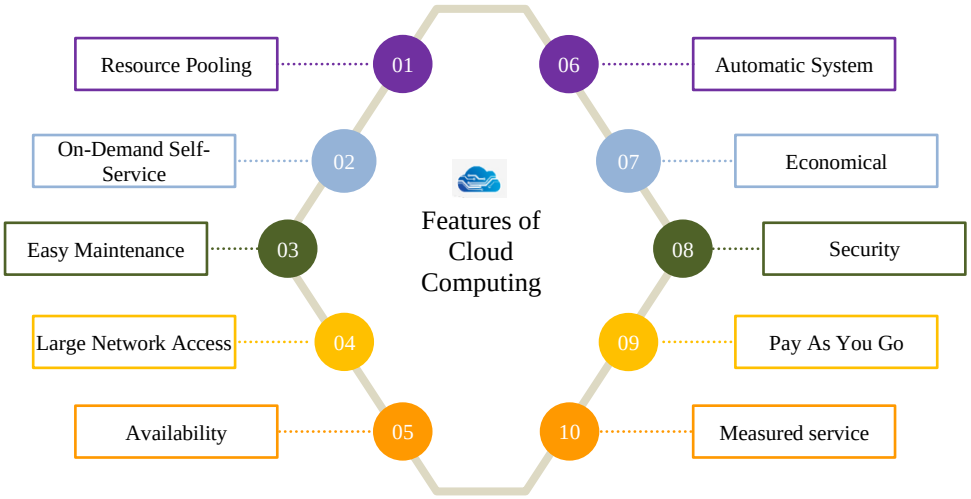

Figure 1. Features of cloud computing.

Load Balancing in Cloud

Load Balancing is a procedure used to convey outstanding tasks at hand consistently across servers or other process assets to advance system productivity, dependability and limit [4, 5].

Load Balancing is performed by an appliance-either physical or virtual-that recognizes continuously which server in a pool can best meet a given client request, while guaranteeing substantial system traffic doesn't unduly overpower a solitary server [6, 7].

Notwithstanding boosting system limit and execution, load adjusting provides failover [8]. On the off chance that one server falls flat, a heap balancer quickly diverts its remaining tasks at hand to a reinforcement server, consequently moderating the effect on end clients as shown in Figure 2.

Types of Load Balancing

- Static
- Dynamic

Need of Load Balancing

- Improving the performance
- Maintaining the system stability
- Quality of services
- Building fault tolerance

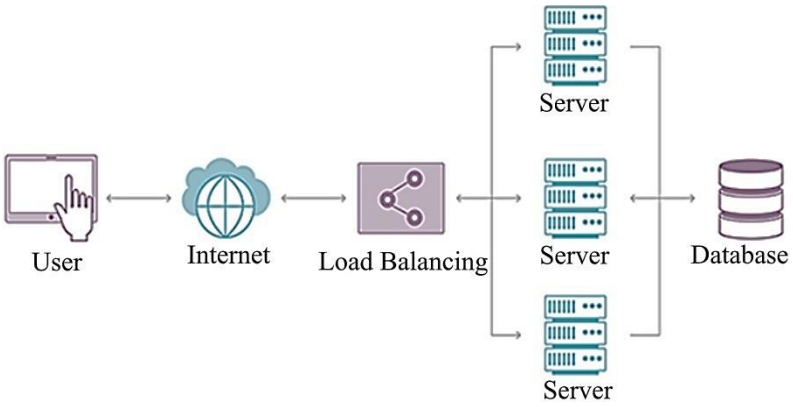

Figure 2. Load balancers architecture.

Load Balancing Algorithms

- Scheduling algorithms:
- Round Robin
- FCFS
- Simulated Annealing
- Soft computing based algorithms:
- Stochastic algorithm
- Genetic algorithm
- Ant colony optimization algorithm

How Load Balancers works:

COMPARISON OF VARIOUS LOAD BALANCING ALGO'S

Here we compare various load balancing algorithms to find out which algo is best for balance the load on cloud [9]. We have various types of algorithms, some static and dynamic algorithms we take to compare on various virtual machines data centers see Table 1.

The comparison of GA, ACO, SHC & FCFS algo's in different cloud configurations is as follows:

Table 1. Compare algo's in various cloud configurations.

S.N.	Cloud Configuration	Data Center specification	RT in ms for GA-GEL	RT in ms for ACO	RT in ms for GA	RT in ms for SHC	RT in ms for FCFS
1	CC1	Two DCs with 25 VMs each.	351.32	354.72	360.77	365.44	376.34
2	CC2	Two DCs with 50 VMs each.	346.89	349.89	355.72	360.15	372.52
3	CC3	Two DCs with 75 VMs each.	345.98	348.68	355.32	359.73	370.56
4	CC4	Two DCs with 25, 50 VMs.	343.27	346.57	350.58	356.72	368.87
5	CC5	Two DCs with 25, 75 VMs.	342.66	347.86	351.56	357.23	367.23
6	CC6	Two DCs with 75, 50 VMs.	340.37	350.47	352.01	357.04	361.01

Comparison between response time and processing time is given in Table 2:

Table 2. Comparison of avg response time and processing time.

Algorithms	Overall Response Time			Data Center Processing Time		
	Avg (ms)	*Min (ms)*	*Max (ms)*	*Avg (ms)*	*Min (ms)*	*Max (ms)*
Round Robin	300.06	237.06	369.12	0.34	0.02	0.61
FCFS	300.09	237.06	369.12	0.38	0.08	4.5
Simulated Annealing	297.87	271.61	346.62	0.48	0.10	0.61

Comparison of all load balancing algorithms in different environments. Some environments we use are using which is showing Table 3:

- Static
- Dynamic
- Centralized
- Distributed
- Hierarchical

Table 3. Comparison in all types of environments.

Algorithm	Static Environment	Dynamic Environment	Centralized Balancing	Distributed Balancing	Hierarchical Balancing
Round-robin	Yes	No	Yes	No	No
CLBDM	Yes	No	Yes	No	No
Ant Colony	No	Yes	No	Yes	No
Map Reduce	Yes	No	No	Yes	Yes
Particle Swarm Optimization	No	Yes	No	Yes	No
MaxMin	Yes	No	Yes	No	No
MinMin	Yes	No	Yes	No	No
Biased Random Sampling	No	Yes	No	Yes	No
Active Clustering	No	Yes	No	Yes	No
LBMM	No	Yes	No	No	Yes
OLB	Yes	No	Yes	No	No
WLC	No	Yes	Yes	No	No
ESWLC	No	Yes	Yes	No	No
Genetic Algorithm	No	Yes	Yes	No	No

SOLUTION PROVIDED THROUGH COMPARISON STUDY

Here from above comparisons, I found that the best algorithm to manage the load on cloud is *Genetic Algorithm* (GA). It takes lesser processing time and fastest response time in all cloud configurations or all cloud environments [10].

The selection of Host through genetic algorithm is best and the optimization flow of genetic algorithm is shown in Figure 3:

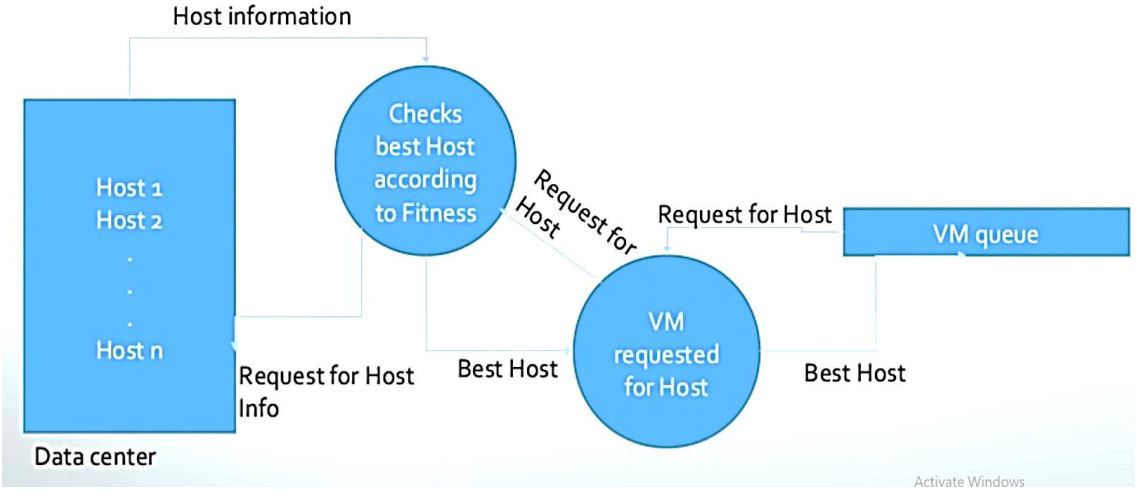

Figure 3. Host selection by genetic algorithm.

CONCLUSION

In this review paper I compare various load balancing algorithms in different cloud configurations. I also compare these algorithms in five cloud environments. By this comparison in processing time and response time I found that the genetic algorithm is the best to implement load balancing, because the processing time of genetic algorithm is lowest, and the response time is fastest. I suggest to implement host selection in load balancing with genetic algorithm. I provide flow of genetic algorithm working.

REFERENCES

1. Zhong Xu, Rong Huang, (2009) "Performance Study of Load Balancing Algorithms in Distributed Web Server Systems", CS213 Parallel and Distributed Processing Project Report.
2. P. Warstein, H. Situ and Z. Huang (2010), "Load balancing in a cluster computer" In proceeding of the seventh International Conference on Parallel and Distributed Computing, Applications and Technologies, IEEE.
3. Ms. Nitika, Ms. Shaveta, Mr. Gaurav Raj; "Comparative Analysis of Load Balancing Algorithms in Cloud Computing", International Journal of Advanced Research in Computer Engineering & Technology Volume 1, Issue 3, May 2012.
4. Y. Fang, F. Wang, and J. Ge, "A Task Scheduling Algorithm Based on Load Balancing in Cloud Computing", Web Information Systems and Mining, Lecture Notes in Computer Science, Vol. 6318, 2010, pages 271–277.
5. T.R.V. Anandharajan, Dr. M.A. Bhagyaveni" Co-operative Scheduled Energy Aware Load-Balancing technique for an Efficient Computational Cloud" IJCSI International Journal of Computer Science Issues, Vol. 8, Issue 2, March 2011.
6. T. Kokilavani J.J. College of Engineering & Technology and Research Scholar, Bharathiar University, Tamil Nadu, India" Load Balanced Min-Min Algorithm for Static Meta-Task Scheduling in Grid Computing" International Journal of Computer Applications (0975–8887) Volume 20–No. 2, April 2011.
7. Peter Mell, Timothy Grance, "The NIST Definition of Cloud Computing", NIST Special Publication 800–145, September 2011.
8. Zenon Chaczko, Venkatesh Mahadevan, Shahrzad Aslanzadeh, Christopher Mcdermid (2011) "Availabity and Load Balancing in Cloud Computing" International Conference on Computer and Software Modeling IPCSIT vol.14 IACSIT Press, Singapore 2011.
9. A. Khiyaita, M. Zbakh, H. El Bakkali and Dafir El Kettani, "Load Balancing Cloud Computing: State of Art", 9778-1-4673-1053-6/12/$31.00, 2012 IEEE.
10. Wayne Jansen Timothy Grance" Guidelines on Security and Privacy in Public Cloud Computing" NIST Draft Special Publication 800–144.

