Int. J. Advanced Networking and Applications
Volume: 08 Issue: 01 Pages: 2986-2990 (2016) ISSN: 0975-0290


# Performance Comparision of Dynamic Load Balancing Algorithm in Cloud Computing

**Yogita kaushik**
AIM & ACT Department, Banasthali University, Rajasthan
Email: yogitamca62@gmail.com
**Dr. C.K Jha**
AIM & ACT Department, Banasthali University, Rajasthan
Email: CKjha1@gmail.com

**ABSTRACT**

**Cloud computing as a distributed paradigm, it has the latent to make over a large part of the Cooperative industry. In cloud computing it's automatically describe more technologies like distributed computing, virtualization, software, web services and networking. We review the new cloud computing technologies, and indicate the main challenges for their development in future, among which load balancing problem stands out and attracts our attention Concept of load balancing in networking and in cloud environment both are widely different. Load balancing in networking its complete concern to avoid the problem of overloading and under loading in any sever networking cloud computing its complete different its involves different elements metrics such as security, reliability, throughput, tolerance, on demand services, cost etc. Through these elements we avoiding various node problem of distributing system where many services waiting for request and others are heavily loaded and through these its increase response time and degraded performance optimization. In this paper first we classify algorithms in static and dynamic. Then we analyzed the dynamic algorithms applied in dynamics environments in cloud. Through this paper we have been show compression of various dynamics algorithm in which we include honey bee algorithm, throttled algorithm, Biased random algorithm with different elements and describe how and which is best in cloud environment with different metrics mainly used elements are performance, resource utilization and minimum cost. Our main focus of paper is in the analyze various load balancing algorithms and their applicability in cloud environment.**

Keywords - **cloud computing, Load balancing, cloud load balancing, Honeybee algorithm, biased random algorithm, Throttled Load Balancing Algorithm, Cloud-Analyst.**

Date of submission: July 28, 2016 Date of Acceptance: Aug 24, 2016

## I. INTRODUCTION

Cloud Computing is growing up like a rapid fire. It takes in all fields: IT industries, research, students, government sector, non IT etc. In traditional computing, we install each and every software which we have required and update hardware time to time. The works we have done and stored in our computer they are accessible only in our network we cannot be access all these matter or documentation outside the network. Cloud computing provide services according to your wish, if you want to take service you can start and when you want to stop you can. You pay for what you have used. It is very easy to use a cloud we need only a thin client or a laptop to access the internet. It is like electricity used at home. A very simple example given by the formal federal of U.S Government to explain the cloud computing is: "There was a time when every household, town, farm, or village had its own water well. Today, shared public utilities give us access to clean water by simply Turing on the tap; cloud computing works in a similar faction. Just like water from the tap in your kitchen, cloud computing services can be turned on or off quickly as needed. Like at the water company, there is a team of dedicated professionals making sure the service provided is safe , secure, and available on a 24/7 basis. When the tap isn't on, not only are you saving water, but you aren't paying for resources you don't currently need" Cloud computing provides all the features of grid computing like software as a service and utility computing. These services are provided by service providers such as GOOGLE, MICROSOFT, AMAZON's etc, which are big provider of cloud services It also use the concept of virtualization. Cloud computing architectures are basically parallel, distributed and serve the desires of various clients in different scenarios.

### 1.1 Load balancing algorithm

Load Balancing is a method in which work is distributed among all the servers, network interfaces and computing resources. Load balancing in the cloud is completely different from the classical perception on load balancing implementation by using commodity servers to perform the load balancing. It is a process in which data is distributed to various servers through different algorithms and methods to improve the performance and resource utilization. It makes sure that our all the servers are being utilized and none is Idle. Load balancing is used to distribute a larger processing load to smaller processing server for increasing the overall performance.

**These are some existing load balancing algorithm in Cloud computing.**

*a)* Honey bee foraging algorithm [3]:

It is a natural inspired algorithm for self organization. It is based on the behavior of honeybee. In this algorithm servers are grouped under virtual servers, and they have own queue for each. Each server sends a request from the queue and checks the availability. If the availability is high than the bees perform their waggle dance. It increases the system diversity but it does not increase the throughput.

*b)* Biased Random Sampling [3]:

It is a distributed and scalable load balancing approach that uses random sampling of system domain to achieve self organization. In this algorithm firstly virtual graph is constructed with the connectivity of each server representing the load of server. Load balancing scheme used fully decentralize and it makes a large network system like Cloud. Performance is degraded with an increase in population Diversity.

*c)* Active Clustering [3]:

It works on the principle of grouping similar nodes together and working of groups. Performance degrades with an increase in system diversity.

*d)* Round Robin Algorithm [3]:

In this algorithm load is transferred randomly and it can cause some server to be heavily loaded and other to be idle or lightly loaded. In this algorithm, processes are scheduled in a FIFO manner but are given a limit time-slice or a quantum. If a process is not completed in its time slot the CPU preempts that process and gives to the next process which is in queue. The preempted process is then placed at the last of queue. The response time and processing time can be improved in the respect of cost optimization considered.

*e)* Equally Spread Current Execution Algorithm [3]:

Equally spread current execution algorithm processes handle the priorities. It distributes the load randomly by checking the size and transfer of the load to that virtual machine which is lightly loaded or handles that task easy and take less time, and give maximum throughput. It is spread spectrum technique in which the load balancer spreads the load into multiple virtual machines.

*f)* Throttled Load Balancing Algorithm [3]:

Throttled algorithm is completely based on virtual machine. In this algorithm end user first request the load balancer to check the availability of virtual machine which access that load easily and performs the job. In this algorithm the client first requests the load balancer to find a suitable Virtual Machine to perform the required operation.

## II. LITERATURE SURVEY

According to Sajid Mohammad et al. Cloud computing is new computing paradigm due to progress of information technology demand, which deliver computing services on minimum charges. All though cloud computing has radiant future in business and research area few consequence regarding performance, security, Virtualization, reliability, interoperability, scalability etc., are exist in this technology.[1]

Moharana Shanti et al. according to this paper load balancing approach categorized in two ways static and dynamic in cloud environment mainly dynamic load balancing approach is used. A static load balancing algorithm does not take into account the previous state or behavior of a node while distributing the load. On the other hand, a dynamic load balancing algorithm checks the previous state of a node while distributing the load. The dynamic load balancing algorithm is applied either as a distributed or non-distributed. In static load balancing algorithm Round robin, MIN-MIN, MIN-MAX Algorithms mainly focus on response time minimization these algorithm are not focus on throughput of overall system because resource are allocated without knowing the previous stage of VM.IN dynamic load balancing algorithm, Equally Spread Current Execution algorithm, Throttled Load Balancer, Honeybee Foraging Algorithm focus on response time and throughput of the system.[5]

SharmaTejinder et al. according to author for minimum data processing time, minimum average time, optimal resource utilization and avoid overload is main goal of any load balancing algorithm. The computing parameter like response time, waiting time, execution time effect on load balancing algorithm.[6]

Mohamaddiah Mohd Hairy et al.in this research paper author objective is management of resource allocation process .To provide a better resource allocation and monitoring process in terms of a better performance, competitive and efficiency to meet the required SLA, improved the resource performance and lowered the power consumption.[10]

Neeraj Mangla et al, This research paper is allocate the resource based on auction resource allocation strategies. The providers advertise their resources with their price and interested consumer submit their bid. One mediator known as meta-broker match the bids and declare the winner of auction. Consumer who win the auction able to use the allocated resource. [11][9]

Pawar Chandrasekhar S et al. Allocate the resource to request based on priority of request. Minimum priority request schedule after the certain period of time. Before allocating resource find load on every VM and assign the priority of every request then apply the dynamic min-min algorithm, using these three algorithm concept allocate the resource to receiving request. Using priority parameter in

resource allocation focus on customer satisfaction also reduce the response time and increase the throughput of overall system. [12]

Portaluri Giuseppe et al., cloud provider required to maintain the hardware, maintain the client data backup (redundancy) for fault tolerance for minimize the operation on. Objective of this paper is minimize the total completion time and power consumption on switches and servers. For reduce the cost. Using genetic algorithm using joint allocation approach. [13]

Xiao Zhen et al. in this paper for find the performance of multidimensional resource utilization of server use the skewness. By minimize the skewness increase the overall utilization of server resources.[19]

Gouda K C et al. according to author develop resource allocation method using priority computing parameter for minimize the resource become idle and minimum profit. Objective of priority based resource allocation algorithm is improving the performance of cloud system. [21]

Jena Soumya Ranjan et al. According to author equally distribute the load is big challenge in distributed system. For minimize the load minimize response time on every node.[23]

Zhou Zhigang et al. For continuous resource allocation resource reservation scheme is used this scheme reduce the process migration and reduce cost because less process migration event. [24]

BhoiUpendra et al.Hardware and software resource are deliver the computing services over internet .Allocation of resources using Max-Min algorithm with the help of expected execution time. Find maximum allocation execution time for resource allocation. [25]

**PROBLEM DEFINITION**

The random arrival of load in cloud atmosphere causes some servers are heavily loaded in comparison to others. Due to this problem client cannot be ignored since access is denied to their request or requirement. It mostly seems the reason for degradation of performance in cloud. The considered uniqueness has an impact on cost, which can be obtained by enhanced response time and processing time. Through This paper the analyze various load balancing algorithms and their applicability in cloud environment.

## III. SIMULATION CLOUD ANALYST

Cloud Analyst is a simulation package that has an easy to use GUI. Cloud Analyst provides performance analysis. It was derived from Cloud Sim and extends some of its capabilities and features propose. It enables to repeatedly perform simulations experiments with parameters variations in a quick and easy way. Cloud Analyst can be used for examining the behavior of large internet application in a cloud environment [9]. It is a tool in which we can do testing and perform simulation with different matrices. In Cloud Sim we need to do core Programming. Perform analysis of different different load balancing policies, with different parameters. The study includes compression of various algorithm with different service polices.

In main configuration we took optimize response time service broker policy and set VM's memory and cost.
Parameters use in cloud analyst such as number of User Base: 5, number of Datacenter: 4, simulation time: 60 minutes. In cloud analyst simulation region is globally divided in 6 regions. We set operating system is LINUX VMM Xen (Para virtualization).

## IV. RESULTS:

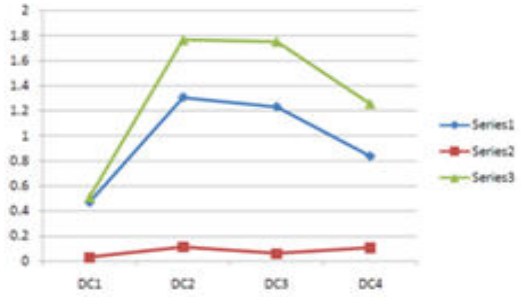
Comparison of throttled algorithm and honeybee algorithm in the simulation environment it has been done on the basis of response time, Datacenter processing time and cost. The comparison has been done on the basis of minimum time, maximum time and average time for the both algorithm. it has been analyze that the time (minimum, maximum and average) taken by honeybee algorithm is considerably fewer as compared to Throttled Load Balancing Algorithm in cloud computing. The table and graphs shows the average value, minimum value and maximum value of overall response time (ms) for the algorithms.

**Throttled Algo**

Request Serviceing Time

| | Avg.(Ms) | Min | Max |
|---|---|---|---|
| DC1 | 0.47 | 0.031 | 0.513 |
| DC2 | 1.308 | 0.114 | 1.768 |
| DC3 | 1.231 | 0.06 | 1.755 |
| DC4 | 0.837 | 0.107 | 1.259 |

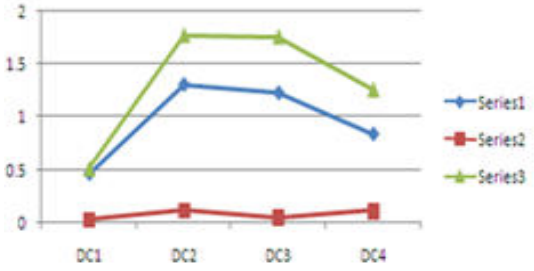
Table 1.1: RST in Throttled




Graph1.1: RST in Throttled

| Honey bee Algorithm | | | |
|---|---|---|---|
| Request Serviceing Time | | | |
| | Avg.(ms) | Min | Max |
| DC1 | 0.46 | 0.031 | 0.513 |
| DC2 | 1.308 | 0.113 | 1.769 |
| DC3 | 1.229 | 0.05 | 1.755 |
| DC4 | 0.837 | 0.107 | 1.258 |

Table 2.1: RST in HoneyBee



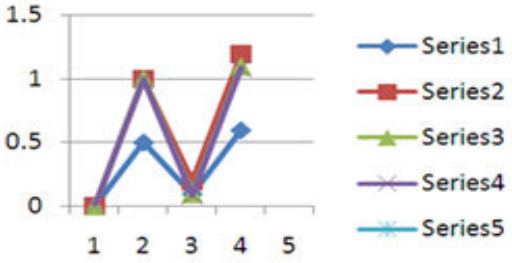

Graph 2.1: RST in HoneyBee

Through tables and graph we easily differsiate both algorithms and analyze them too. Overall Response Time in Cloudlet On seeing the table and graph 1.1 (RST in throttled) and 2.1 (RST in Honey Bee) we have shown a comparison of RST in both algorithms. It shows in average time in throttled DC1 took 0.47 and for same DC1 Honey Bee took 0.46 same as we can see DC3 took 1.231 and for same DC3 took 1.229 and we analyze respectively all Data Center and get the results given by honey bee algorithms are more efficient compared to throttled in request servicing time.

Not only the basis of Request servicing time we can proof that Honey bee is more efficient algorithm comparatively to others . So again through the tables and graphs 1.2 (TC in throttled) and 2.2 (TC in Honey Bee) we have shown a comparison of COST in both algorithms. Cost is a very important factor in cloud environment. Total cost of Virtual Machines is measured in simulation over 10 VM's. It's same in both algorithms. Total cost = (VM cost+ Data Transfer Cost).

| Throttled Algo | | | |
|---|---|---|---|
| Total COST | | | |
| | VM Cost | Data Transfer Cost | Total |
| DC4 | 0.5 | 0.096 | 0.596 |
| DC3 | 1.001 | 0.196 | 1.197 |
| DC2 | 1.001 | 0.098 | 1.098 |
| DC1 | 1.001 | 0.083 | 1.084 |

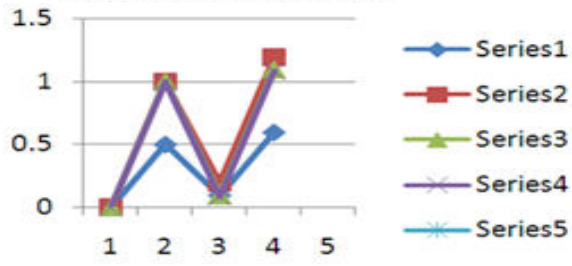
Table 1.2: TC in Throttled




Graph1.2: TC in Throttled

| Honey bee Algorithm | | | |
|---|---|---|---|
| Total COST | | | |
| | VM Cost | Data Transfer | Total |
| DC4 | 0.5 | 0.096 | 0.596 |
| DC3 | 1.001 | 0.196 | 1.197 |
| DC2 | 1.001 | 0.098 | 1.098 |
| DC1 | 1.001 | 0.083 | 1.084 |

Table 2.2: TC in HoneyBee

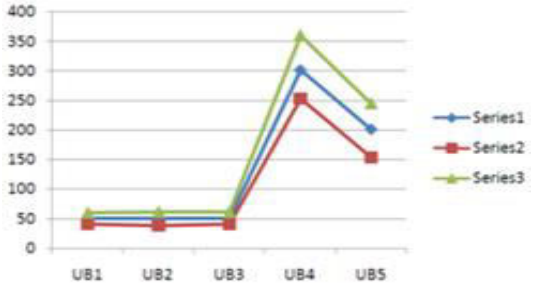



Graph 2.2: TC in HoneyBee

In the table and graph 1.3 (RT in throttled) and 2.3 (RT in Honey Bee) we have again shown a comparison in both algorithm with response time. It shows in average time in throttled UB1 is 50.884 and Max is 60.033, UB2 is 50.707 and Max is 61.033 and respectively. Same for honey bee algorithm UB1 took 50.879 in avg. and Max is 60.031, UB2 took 50.701 and Max 61.754. We analyze respectively all User Bases and get the results given by honey bee algorithms are more efficient compared to throttled in request Time

| Throttled Algo | | | |
|---|---|---|---|
| Response Time | | | |
| | Avg.(Ms) | Min | Max |
| UB1 | 50.884 | 40.771 | 60.033 |
| UB2 | 50.707 | 38.66 | 61.756 |
| UB3 | 50.405 | 40.765 | 61.014 |
| UB4 | 301.679 | 253.018 | 361.016 |
| UB5 | 201.448 | 153.494 | 245.447 |

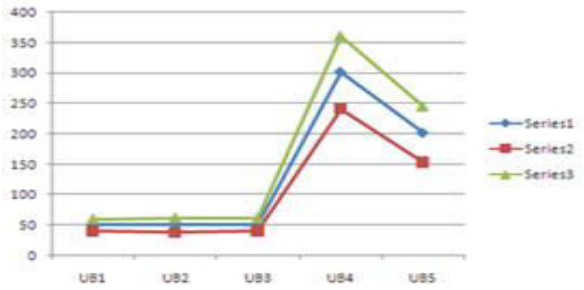
Table1.3: RT in Throttled




Graph1.3: RT in Throttled

| Honey bee Algorithm | | | |
|---|---|---|---|
| Response Time | | | |
| | Avg.(ms) | Min | Max |
| UB1 | 50.879 | 40.771 | 60.031 |
| UB2 | 50.701 | 38.65 | 61.754 |
| UB3 | 50.411 | 40.76 | 61.014 |
| UB4 | 301.263 | 241.02 | 361.016 |
| UB5 | 201.438 | 153.49 | 245.447 |

Table 2.3 RT in HoneyBee




Graph 2.3 RT in HoneyBee

## V. CONCLUSION

The response time and data transfer cost is a key challenge issue in cloud environment it affects the performance in the cloud based sectors. The paper aims to compare the Load balancing algorithm in cloud environment. Honey bee algorithm is found to be best among these. Both algorithms are compared throttled on the basis of same parameter as same cloudlet. The detail about the results obtained for honey bee algorithm and it is comparisons with Throttled algorithm. Honey bee Algorithm works superior than Throttled load balancing algorithm which itself is best amongst other accessible load balancing algorithms in the cloud environment

## REFERENCES

**Journal Papers:**

[1] Ren, Haozheng, Yihua Lan, and Chao Yin. "*The load balancing algorithm in cloud computing environment."* Computer Science and Network Technology (ICCSNT), 2012 2nd International Conference on. IEEE, 2012.

[2] Amandeep Kaur Sidhu, Supriya Kinger , "*Analysis of Load Balancing Techniques in Cloud Computing*" Research Fellow, Sri Guru Granth Sahib World University,Fatehgarh Sahib,Punjab, Volume 4 No. 2, March-April, 2013, ISSN 2277-3061

[3] Swaroop Moharana, Rajadeepand and Digamber Power "*ANALYSIS OF LOAD BALANCERS IN CLOUD COMPUTING*" International Journal of Computer Science and Engineering ISSN 2278-9960 Vol. 2, Issue 2, May 2013,

[4] Khanna, Gunjan, et al. "*Application performance management in virtualized server environments*." Network Operations and Management Symposium, 2006. NOMS 2006. 10th IEEE/IFIP. IEEE, 2006.

[5] Jackson, Keith R., et al. "*Performance analysis of high performance computing applications on the amazon's web services cloud*." Cloud Computing Technology and Science (CloudCom), 2010 IEEE Second International Conference on. IEEE, 2010.

[6] Padhy, Ram Prasad. "*Load Balancing in cloud computing systems"*. Diss. National Institute of Technology, Rourkela, 2011.

[7] N.Sran, NaveepKaur "*Zero Proof Authentication and Efficient Load Balancing Algorithm for Dynamic Cloud Environment*", International Journal of Advanced Research in Computer Science and Software Engineering, 2013.

[8] Fulsoundar, Pritam, and Rajesh Ingle. "*Prediction of Performance Degradation in Cloud Computing."*

[9] Wickremasinghe, Bhathiya, Rodrigo N. Calheiros, and Rajkumar Buyya. "*Cloudanalyst: A cloudsim-based visual modeller for analysing cloud computing environments and applications*." Advanced Information Networking and Applications (AINA), 2010 24th IEEE International Conference on. IEEE, 2010.

[10] Sosinsky, Barrie. *Cloud computing bible*. Vol. 762. John Wiley & Sons, 2010.

[11]Zenon Chaczko, Venkatesh Mahadevan , Shahrzad Aslanzadeh Availability and Load Balancing in Cloud Computing University of Technology Sydney, Australia.