www.ijecs.in
International Journal Of Engineering And Computer Science ISSN:2319-7242
Volume 3 Issue 7 month July, year2014 Page No. 7333-7336

Comparative approach on load balancing algorithm by partitioning of public cloud

Anisaara Nadaph[1], Prof. Vikas Maral[2]

[1]K.J College of Engineering and Management Research, Pune
anisaaranadaph1@email.com

[1]K.J College of Engineering and Management Research, Pune
vikasmaral@gmail.com

Abstract : ***Load Balancing Concept in cloud computing has an significant effect on the performance, If load balancing is not done then numerous drawbacks occurs. As there are tremendous increase in traditional use of internet due to which uneven distribution of work load can occur then can cause some server overloaded and other under loaded, which can cause server crash. The efficiency of cloud computing can be increased by the technique provided here. This paper introduces an improved load balancing model for the cloud partition on cloud. In this paper a comparative study of an Ant colony and Honey Bee algorithm is done to check the best load balancing technique. The system has main controller chooses the suitable balancer for the incoming job. The balancer further selects the server based on the two algorithm(Ant Colony or Honey Bee). Hence, this system will help to select an optimal balancer and the subsystem(server) to allocate jobs (data).***

Keywords: Cloud, Load balancing, Main controller, Balancer, Servers, Ant Colony, Honey Bee.

1. Introduction

Cloud computing is an idea and technique that are from the area of utility computing, autonomic computing and grid computing . Origination of the term ”Cloud ” is from phase when telecommunication industry started using VPN(Virtual Private Network)[19]. Cloud is combination of Networking, Virtualization, web services, Distributed computing, and software. Due to its high performance, reasonable cost, Avalibilty, Consistency, Reliability it has acquired speedily boom in IT sector. The concept is highly profitable to small scale, medium scale industry, as the End user (customer) gets the required service without paying attention to the actual details[12]. Salesforce.com was the first who had made the term into practicality in 1999[19]. With this technology the initial cost setup is cut down

Categories of Clouds : There are four major categories of cloud[13]:

1. Public cloud - In this type of cloud ,the computing infrastructure is hosted by the cloud vendor at the vendors premises. There is no transparency to the customer as he has control and visibility over where the infrastructure is

deployed(made available). Sharing of infrastructure between any organizations is

2. Private cloud - When the computing infrastructure is fully dedicated to a particular firm or organization and no other organizations can use the Infrastructure.

3. Hybrid cloud - The data hosted by the Organizations may be such that some application can be of highest privacy and some application may be of least privacy hence the data will be stored on Private and Public cloud, the combined use of this is called as hybrid cloud

4. Community cloud - This category involve sharing of computing infrastructure between organization of similar structure(community). For example Universities may shared common data.

The different mechanisms which are there for cloud are

- Client – This are the customer who uses the cloud services there are 3 kindructure iayss the content of the server as it is
- Thick Client – In this type of client , the end user has application installed and have storage devices, this clients are more susceptible to attack
- Mobile Client -
- Data Center - This is where all the data are stored
- Distributed server - When data storage server are stored in geographically different location.

If load balancing is not given priority it may happen during traffic blackout may occur, causing ample loss. The aim of this paper is to conclude as which is best for balancing load for cloud partition

2. Literature Survey

In clouds the data and resources are resides in an unwrap environment, hence it provides a platform for increasing

amount of data quickly. Thus to manage this huge amount of data, balancing of load is highly important. Dynamic strategy is used for workload distribution in Load balancing and thus uses the resources in efficient way(optimally). This paper describes few existing load balancing algorithms and their comparative studies. Factors like scalability, resource consumption, performance, time to respond etc are described here [3].One of the growing technology in the area is cloud computing. IT sector's scenario has changed by clouded as stated by Gartner's [15] in his report. Due to tremendous increase in cloud computing technology the number of resources or jobs that are stored or retrieved are too large and to handle this huge data different techniques are developed, in which balancing of load is of acme priority.. The model explained in the paper has a Main Controller and two load Balancer [1] attached to it, and further it has different server connected to it.The need for such model is in public cloud where there are abundant nodes and are in geographically isolated area. When a job arrive the best possible partition is selected and then the best server (Node) to place the job is selected

2.1 Load Balancing

Efficient use of available resource and network is done by Load balancing technique by providing a highest throughput with minimum response time. As the load between servers are divide, data can be sent or stored in less time compared to the time required without load balancing. One of the simplest example of load balancing is accessing a website, If proper balancing of the traffic coming is not done timeout, tremendous delay in response time can occur Broadly categorizing the load balancing algorithm are divided in two categories dynamic load balancing [10] and static balancing [13]. Static balancing strategy does not use system information and are less complex as compared to dynamic technique in which for every output the current system information is considered. For balancing the load the Partition of cloud is done based on geographical location, as there is day in some part of earth and at same time night in other part, hence the traffic in some region will be at its peak and in other it will be to low, hence will model[1] explained will have optimal use of resources. There are different algorithm that are applied for balancing of load few of them are discussed below[3].

- Round Robin - The processes are divided between all processors, allocation of process are maintained locally and in circular fashion.
- Central Load Balancing Decision Model (CLBDM) - in the cloud it calculated the connection time between the client and the node, and if that connection time exceeds a threshold then connection will be terminated and task will be forwarded to another node using the regular Round Robin rules
- Ant colony optimization (ACO) - when the request is initiated the ant start its movement. Movement of ant is of two ways: Forward and Backward 3
- Enhanced Equally Distributed Load Balancing Algorithm (EEDLBA)[2]- It handles the request with priorities. By this algorithm load can be distributed not only in a balanced manner but also it allocates the load systematically by checking the variable
- ESCE (Equally Spread Current Execution) [9]- In this the load is equally distributed through central server etc.

2.2 Ant Colony Algorithm[10][14][20]

This algorithm is developed considering the natural behavior of Ant in which a pheromone substance is dropped by the ant when it moves in search of food, remaining ant follow only that path which has maximum pheromone. Initially many any move in search of food and if ant find food it return back to home due to which the amount of pheromone in that path will increase and other ant will follow the same path.

2.3 Honey Bee Behavior [4][16][18]

The algorithm is formed from the natural behavior of the honey bee, in which it moves out of the comb in search of food. The following categories of members are there in honey-comb [16] queen, forager

Forager are of type

- Employed (These bees follow the leader and collect food without knowledge of food)
- Unemployed (These bees are the leader and moves in search of food)

where unemployed bee are also named as the scout bee . Scout bee gives the knowledge (information) to the employed bee by performing the dance called waggle dance which gives the information like Quantity of food , direction, distance at which food is available, The information from the scout bee are used by the patches(group of honey bee) to accumulate the food.

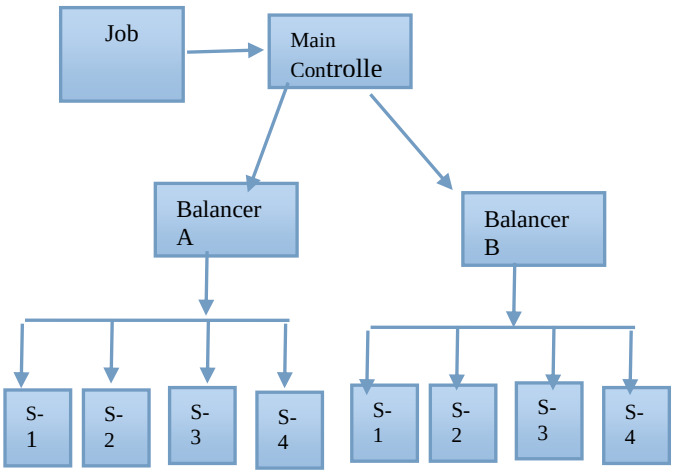
3. Proposed Work

The proposed system model is designed to balance the load arriving to the Main Controller, as the data is passed from the Main Controller to the Balancers and from there to the actual server where data is stored. The Cloud partition is based on the geographical location viz. region wise. The partition is done geographical wise as there is different traffic on internet at same time in different part of country, due to rotation of earth as there may me day time in one part of globe and night time in other part of globe. The proposed system is made to take the advantage of different traffic rate over internet around the globe on same time.

3.1 System Mode:

There are 4 Subsystem (nodes) attached to each Load balancer. The balancer are located in geographically isolated location, to each balancer many subsystem (storage server) are attached.

All subsystem information is collected and analysed by balancer and then forwarded to the Main controller.Then Main Controller and balancer are the pillars for balancing load in the system. When the job arrives it is the Main Controller who decide which cloud partition should be allocated the job, then from the cloud partition it is decided by the balancer to which server the job need to be allocated this decision is based on any of the algorithm(Ant Colony or Experienced honey bee behaviour).



Where S= Subsystem

Figure 1: System Model

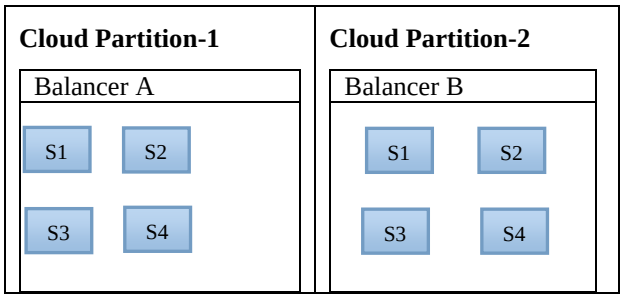


Figure 2: Cloud Partitions

3.2 Job assignment algorithm

3.2.1 Selection of best partition –As we will be dividing the partition based on the geographically vicinity, It is prime important to select the correct partition , the algorithm below may give the correct result for selection of the partition

Best Partition selection

i. job arrived

ii. check the partition status

a. If partition status == Idle

Assign job to partition

b. Else If partition status == Normal and no other Partition is in Idle state

Assign job to partition based on algorithm

c. Else search other partition.

3.2.2 Selction of Node

Once the best partition is selected the next major task is to which node shall the job be assigned

A. Idle State – For Idle state round robin algorithm is used as this is the simplest and efficient algorithm which equal distribution of load to all nodes.

B. Normal State – For normal state the paper will give two algorithm based on swarm intelligence

3.2.2.1 Ant Colony Algorithm – This algorithm is designed based on natural behavior of Ant movement as explained above

i. set job_assigned_flag =0

ii. Select the node randomly

iii. If load[job] < free memory of the node
assign job to node and set job_assigned_flag =1

iv. else i.e load[job]>free memory select the node with maximum free memory
check for the new node load[job] < free memory
assign job to the node and set job_assigned_flag =1

v. if set job_assigned_flag =0
Job assignment not possible

3.2.2.1 Experienced Honey Bee algorithm

i. set job_assigned_flag =0

ii. Select the node sequentially as per maximum free memory

iii. If load[job] < free memory of the node
assign job to node and set job_assigned_flag =1

iv. else i.e load[job]>free memory
set job_assigned_flag =0

v. if set job_assigned_flag =0
Job assignment not possible

4. Experimental Result

Summation of each information of every Subsystem attached to the Balancer are collected which is further used for balancing the load. When the job arrives ,the Main controller acting as building element of load balancing technique decides which balancer will give the optimal result, later the selected balancer decides which Subsystem need to be selected based on Ant Colony and Honey Bee algorithm. In the experiment there are 4 Subsystem attached to each balancer (Balancer A and Balancer B). The total number of subsystem are 8.

	Balancer A	Balancer B
Subsystem 1	250102720	249982288
Subsystem 2	250308552	250020552
Subsystem 3	250271216	250063048
Subsystem 4	250407376	250115952
	1001089864	1000181840

For assigning job the Balancer with maximum space is selected, and then by applying the Ant Colony on the subsystem the subsystem are selected, also by applying Honey Bee algorithm for same job the subsystem are selected. The below table is formed by considering 5 jobs.

Sr. No	Jobs (size)	Balancer Selected	Ant Colony (Time required)	Honey Bee (Time required)
1	33508	A	2050	1840
2	33508	A	1411	1572
3	33508	A	1524	2203
4	33508	A	1876	1348
5	33508	A	1804	1284
			8665	8247

As can be seen from the above table Honey Bee Algorithm is require minimum time for assigning the job.

FUTURE ENHANCEMENTS :

By increasing number of instances, We can get more accurate results, also by deploying the project on cloud we can get optimal result.

References

[1] GaochaoXu, Junjie Pang, and Xiaodong Fu "*A Load Balancing Model Based on Cloud Partitioning for the Public Cloud"* IEEE TRANSACTIONS ON CLOUD COMPUTING YEAR 2013

[2] ShreyasMulay, Sanjay Jain *" Enhanced Equally Distributed Load Balancing Algorithm for Cloud Computing"*, International Journal of Research in Engineering and Technology, June 2013

[3] Atesh Kumar Singh, Shankar, NamrataSwarnkar, *" A Survey of Load Balancing Techniques in Cloud Computing"*,International Journal of Engineering Research Technology, August 2013.

[4] DhineshBabu L.D. a, P. VenkataKrishnab*," Honey bee behavior inspired load balancing of tasks in cloud computing environments"*, www.elsevier.com/locate/asoc,2013.

[5] P. Mell and T. Grance, The NIST definition of cloud computing, "*http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf"*, 2012.

[6] Microsoft Academic Research, Cloud computing, "*http:// libra.msra.cn/Keyword/6051/cloud-computing?query= cloud%20computing"*, 2012.

[7] Google Trends, Cloud computing, *"http://www.google. com/trends/exploreq=cloud computing"*, 2012.N. G. Shivaratri, P. Krueger, and M. Singhal, Load distributing for locally distributed systems, Computer, vol. 25, no. 12, pp. 33-44, Dec. 1992.

[8] Adler, Load balancing in the cloud: Tools, tips and techniques, *http://www.rightscale. com/info center/white-papers/Load-Balancing-in-the-Cloud.pdf",* 2012

[9] Jaspreetkaur *"Comparison of load balancing algorithms in a Cloud"*,International Journal of Engineering Research and Applications Vol. 2, Issue 3, May-Jun 2012, pp.1169-1173.

[10] Ratan Mishra1 and AnantJaiswal "*Ant colony Optimization:"A Solution of Load balancing in Cloud"*, International Journal of Web Semantic Technology Vol.3, No.2, April 2012.

[11] Rouse, Public cloud, "*http://searchcloudcomputing. techtarget.com/definition/public-cloud"*, 2012.

[12] D. MacVittie, Intro to load balancing for developers — The algorithms,"*https://devcentral.f5.com/blogs/us/intro-to-load-balancing-for-developers-ndash-the-algorithms"*, 2012.

[13] Ms. Parin. V. Patel, Mr. Hitesh. D. Patel, Asst. Prof. Pinal. J. Patel "*A Survey On Load Balancing In Cloud Computing"* International Journal of Engineering Research & Technology (IJERT) Vol. 1 Issue 9, November- 2012

[14] Kumar Nishant, Pratik Sharma, Vishal Krishna, Chhavi Gupta and KunwarPratap Singh, *"Load Balancing of Nodes in Cloud Using Ant Colony Optimization",* 2012 14th International Conference on Modelling and Simulation

[15] R. Hunter, The why of cloud, *"http://www.gartner.com/ DisplayDocument?doc cd=226469&ref= g noreg"*, 2012.

[16] Brian R. Johnson James C. Nieh, *" Modeling the Adaptive Role of Negative Signaling in Honey Bee Intraspecific Competition"*, Springerlink.com, 2010

[17] Brian Adler, Solutions Architect, RightScale, *"Inc Load Balancing in the Cloud:Tools, Ti p s , and Techniques"*.

[18] NyreeLemmensCoMo, VrijeUniversiteit van Brussel, Belgium Steven de Jong, *"A bee algorithm for multi-agent systems: Recruitment and navigation combined"*

[19] John Harauz, Lorti M. Kaufinan. Bruce Potter, "Data Security in the World of Cloud Computing", IEEE Security & Privacy, Copublished by the IEEE Computer and Reliability Societies, July/August 2009.

[20] http://mute-et.sourceforge.net/howAnts.shtml