INTERNATIONAL RESEARCH JOURNAL IN ADVANCED ENGINEERING AND TECHNOLOGY (IRJAET) E - ISSN: 2454-4752 P - ISSN : 2454-4744
VOL 2 ISSUE 6 (2016) PAGES 1545 - 1549
RECEIVED : 15/12/2016. PUBLISHED: 30/12/2016
December 30, 2016

ANALYZING LOAD BALANCING ALGORITHMS IN CLOUD ENVIRONMENT AND TECHNICAL COMPARISON

[1]Srinivasan.J, [2]Dr.Suresh Gnanadhas.C,

[1]Research Scholar, Bharathiar University, Coimbatore,
[2]Department of CSE, Vivekanandha College of Engineering for Women, Tiruchengode.

Abstract

Cloud Computing as you know it is about to change your applications and documents are going to move from the desktop into the cloud computing environment. The applications and files are hosted on a "cloud" consisting of thousands of computers and servers all linked together and accessible via the internet; you can access all your program and documents to take anywhere because it's always accessible via the web. Load balancing essential to achieve evenly distribute load among the nodes and to efficiently make use of the resources. Load balancing ensures that all the processor in the system or every node in the network does approximately the equal amount of work at any instant of time. This technique can be sender initiated receiver initiated or symmetric type. This paper presents the benefits and discussed about advantages and disadvantages of various load balancing algorithm, various consideration of the algorithm like throughput, performance, fault tolerance, migration time, response time etc. has been discussed.

Keywords: Load balancing, symmetric,distribute.

1. INTRODUCTION

Cloud computing is a type of parallel and distributed system consisting of a collection of interconnected and virtualized computers that are dynamically provisioned and presented as one or more unified computing resources based on service-level agreements established through negotiation between the service provider and consumers.It is an on-demand network access to a shared resource from geographically distributed systems all over the world through internet, which results in minimal management effort or service provider interaction.

Load balancing algorithms are classified as static and dynamic algorithms. Static algorithms are mostly suitable for homogeneous and stable environments and can produce very good results in these environments. However, they are usually not flexible and cannot match the dynamic changes to the attributes during the execution time. Dynamic algorithms are more flexible and take into consideration different types of attributes in the system both prior to and during run-time [1]. These algorithms can adapt to changes and provide better results in heterogeneous and dynamic environments. However, as the distribution attributes become more complex and dynamic. As a result some of these algorithms could become inefficient and cause more overhead than necessary resulting in an overall degradation of the services performance.

In this paper we present a survey of the current load balancing algorithms developed specifically to suit the cloud computing environments. We provide an overview of these algorithms and discuss their properties and we compare these algorithms based on the following properties: the number of attributes taken into consideration, the overall network load, and time series.

2. LOAD BALANCING IN CLOUD COMPUTING

Before we could review the current load balancing approaches for cloud computing, we need to identify the main issues and challenges involved and that could affect how the algorithm would perform. Here we discuss the challenges to be addressed when attempting to propose an optimal solution to the issue of load balancing in cloud computing. These challenges are summarized in the following points.

Among the above issues, many algorithms under load balancing are discussed in this paper.As Load Blancing is opne of the major issues related to cloud computing, the load may represent a CPU capacity, memory, network load etc. It is necessary to distribute the load equally among the nodes in a network. This result in agile and efficient performance of the system. Thereby its anvoids heavily loading or under loading of nodes in a network. It is divided into two types Static Load Balancing and Dynamic Load Balancing.

Static Load Balancing Algorithm

In static algorithm the traffic is divided evenly among the servers. This algorithm requires a prior knowledge of system resources, so that the decision of shifting of the load does not depend on the current state of system. Static Algorithm is proper in the system which has low variation in load [4].

Dynamic Load Balancing Algorithm

In dynamic algorithm the lightest server in a whole network or system is searched and preferred for balancing a load. For this real time communication with network is needed which can increase the traffic in the system. Here current state of the system is used to make decision to manage the load [4].

The goals of the load balancing are [3]

- Performance
- Throughput
- Fault Tolerance
- Migration Time
- Overhead
- Response time
- Scalability

3. VARIOUS LOAD BALANCING ALGORITHM

Opportunistic Load Balancing(OLB) and Load Balance Min-Min(LBMM)

s.-c. wang et al. [5] proposed OLB and LBMM. In which OLB keeps each load busy regardless of the current work load assign to each node in the network. It assigns to job randomly. LBMM adopts a task to a respective node which has expected minimum completion time of this task over the other nodes. Since each task has different characteristics for execution and different capability to execute a task mere consideration of CPU remaining of the node is not enough.

Central Load Balancing Decision Model

B. Radojevic et al[6] proposed this static LB algorithm, overcomes the drawback of Round Robin Techniques. This work based on the application layer session switiching. In this algorithm calculation

of connection time between the client and the node is calculated. If the connection is above the threshold level, then the connection between the client and the node will be terminated and the previous model Round Robin technique will be continued to towards completion of the task.

Map Reduced Based Entity Resolution model

Lars Kolb et al [7] introduced the Map Reduce Based Entity Resolution model which has two parts- Map() and Reduce(). Map() procedure performs filtering and sorting of tasks with the help of Part() method. This partition the large datasets into sub-tasks and Comp() method is used to compare the similar task and group it using Group() with the help of Reduce(). Overloading of task is reduced due to parallel processing of task by the Part() Method.

Even Driven algorithm

V. nae[8] proposed this algorithm for load balancing real time massively multiplayer online games. It receives capacity events as input and analyses its component in the context of resources and the global state of game session, thereby generating the game session load balancing actions. According to the variable user load in multiple resources this algorithm is capable of scaling the game session. But this algorithm reaches occasional Qos Breaches.

Ant Colony optimization

Z. Zhang et al [9] investigated a static load balancing algorithm called Ant colony Optimization. As the request is sent the ant initiates its movement. This algorithm work based on the Ants behavior to collect information of cloud node to assign task to the particular node. Cloud node to assign task to the particular node.Once the task is initiated from the “head node”, the ant and the pheromone starts the forward direction from an overloaded node looking for next node or not. Now if ant find under loaded node lokking for next node to check whether it is an overloaded node or not. Now if ant find under loaded node still it move in forward direction in the path. And if it finds the overloaded node then it starts the backward mo9vement to the last under loaded node it found previously. In the algorithm[8] if ant found the target node, ant will commit suicide so that it will prevent unnecessary backward movement.

Honey Bee Foraging

This algorithm was proposed by Dhinesh B.L.D, P.V.Krishna. This algorithm was derived from the behavior of honey bees in finding their food[10]. Among the classes of bees the forager bees the bee hive and advertise the food source by a dance called “Waggle dance”, The kind of dance shows the quality and quantity of the food and the distance of the source from the bee hive. This makes the scout bees to race for the food. In case of load balancing the servers are grouped into virtual servers. Eeach virtual servers will has its own Virtual server request queue. Each V S will calculated its profit which is similar to the bees waggle dance.

Biased Random Sampling

M.Randles et al [10] proposed this distributed load balancing algorithm. Load balancing can achieved efficiently across the nodes in this approach, by using random sampling method a virtual graph is constructed representing the load on the nodes and with each in degree directed to the respective resources to the server. While the server starts executing the job it reduces the indegree which

indicated the reduction in availability of fee resources, similarly while the server completes the job the incoming degree gets incremented which in turn indicates the increase in availability of resources. This process is called random sampling. The execution starts at any node and the random neighboring node will be selected for the next job to be executed. Thus the load balancing technique used here is fully decentrialized and chose apt for many cloud networks.

Equally spread current execution

Equally Spread current execution [8] is a dynamic load balancing algorithm, which handles the process with priority. It determines the priority by checking the size of the process. This algorithm distributes the load randomly by first checking the size of the process and then transferring the load to a Virtual Machine which is lightly loaded. The load balancer spreads the load on to different nodes, and hence, it is known as spread spectrum technique.

CONCLUSION

This Paper presents a load balancing mythological analysis on various algorithms. The main objective of load balancing is to satisfy the customer requirement by distributing the load equally among the nodes and to make maximum utilization of resources in the stipulated time. This paper investigated on the major aspects of load balancing and compared the existing algorithms and its features. Analyzed from the processed algorithm is that to develop an energy efficient load balancing algorithm which focuses less energy consumption and carbon emission factors thus to achieve Green computing.

Algorithms	Pros	Cons
OLB	1.Works based on framework of the system 2.Keep each node busy	1.Keeps the node busy irrespective of the of the execution time, which results in bottle neck of the system 2. Depends on LBMM
LBMM	This algorithm divides the framework into three and each layer splits the task.	The major drawback is it divides the task into many subtasks which takes huge time to complete even a simple task.
CLBDM	Session switching	Since this method works based on the round robin technique, if the connection goes above the threshold level problem arises.
Map Reduce ER model	This executes the job parallel so no overhead.	Complexity is more thereby low throughput is achieved.
Event Driven	Generates the game session on load balancing algorithm.	Limited Applications
Ant Colony optimization	Allow shared computation and storage over long distances. Achieves global load balancing through local server action. Based on naturally occurring phenomenon.	Throughput discusses when variety of nodes increases biased random sampling.

BRS	Achieves load balancing across all system nodes using random sampling of the system domain Optimizes job assignment by connecting similar services by local re-writing.	Degrades when the load increases active clustering. This degrades its performance when increase in diversity of nodes.

Table:1 Comparative study

REFERENCES

[1] Network Load Balancing in Microsoft Windows 2000 Advanced Server and Datacenter Server Operating Systems,http://technet.microsoft.com/en-us/library/bb742455.aspx.

[2] Yixin Diao, Chai Wah Wu, Joseph L. Hellerstein, Adam J.Storm, Maheswaran Surendra, Sam Lightstone, Sujay Parekh, Christian Garcia-Arellano, Matthew Carroll, Lee Chu, and Jerome Colaco, "Comparative Studies of Load Balancing With Control and Optimization Techniques",*2005 American Control Conference Portland*, OR, USA,June 8-10, 2005.

[3] Raman a Ku m ar K., Mah e sh V. G h at age, "Lo ad Balancing of Services with Server In it iated Connections", ICPWC, 2005.

[4] BrankoRadojevic, Mario Žagar, "Analysis of Issues with Load Balancing Algorithms in Hosted Cloud Environments", Opatija, Croatia, MIPRO 2011, May 23-27, 2011.

[5] Z. Zhang, and X. Zhang, "A Load Balancing Mechanism Based on Ant Colony and Complex Network Theory in Open Cloud ComputingFederation", Proceedings of 2nd International Conference on Industrial Mechatronics and Automation ICIMA), Wuhan, China, May 2010, pages 240- 243.

[6] R. X. T. and X. F.Z.A Load Balancing Strategy Based on the Combination of Static and Dynamic, in Database Technology and Applications (DBTA), 2010 2nd International Workshop (2010), pp.1-4.

[7] P.Beaulah Soundarabai,Sandhya Rani A.,Ritesh Kumar Sahai, Thriveni j.,K.R.Venugopal and L.M.Patnaik,"Comparative Study on Load balancing technique in Distributed Systems",IJITKM,December 2012,Volum 6,No-1,PP53-60

[8] R. X. T. and X. F.Z.A Load Balancing Strategy Based on the Combination of Static and Dynamic, in Database Technology and Applications (DBTA), 2010 2nd International Workshop (2010), pp.1-4.

[9] P.Beaulah Soundarabai,Sandhya Rani A.,Ritesh Kumar Sahai, Thriveni j.,K.R.Venugopal and L.M.Patnaik,"Comparative Study on Load balancing technique in Distributed Systems",IJITKM,December 2012,Volum 6,No-1,PP53-60.