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## A Model for load balancing by Partitioning the Public Cloud

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**Abstract**— *Concept of Balancing Load in cloud computing has an important effect on the performance. A cloud computing system which does not use load balancing has numerous drawbacks. Now-a-days the usage of internet and related resources has increased widely. Due to this there is tremendous increase in workload. So there is uneven distribution of this workload which results in server overloading and may crash. In such systems the resources are not optimally used. Due to this the performance degrades and efficiency reduces. Cloud computing is made more efficient by better load balancing methods. User satisfaction also improves. This paper introduces a better load balancing model for the public cloud based on the cloud partitioning concept. A switch mechanism is introduced here to choose different strategies for different situations. The public cloud is divided into cloud partitions and different strategies are applied to balance the load on clouds. This paper introduces a system which has main controller, balancers and servers. The main controller selects the appropriate balancer for a particular job. The balancer further selects the server having minimum load. Hence, this system will help dynamically allocate jobs (data) to the least loaded server which will result in an efficiently balanced cloud system.*

**Keywords**— *Cloud, Load balancing, Main controller, Balancers, Servers*

### I. INTRODUCTION

“Cloud computing” involves virtualization, distributed computing, networking, software and web services. It is emerging field because of its performance, high availability, least cost, and many more qualities. It is easy, on-demand, variable and safe to use. Major characteristics: on-demand service, wide network access, resource pooling, flexible, measurable service, reduced cost of ownership etc. Cloud computing is very efficient but maintaining the stability of processing many jobs in the cloud computing is difficult. Each node in cloud has different capacities and the pattern of arriving job is unpredictable. Hence for load balancing, it is important to control workloads, which will improve system performance and maintain stability. To deal with unbalanced load on clouds and to increase its efficiency, we implement this load balancing system.

### II. BACKGROUND STUDY

In clouds the data and resources are stored in an open environment. So the amount of data can increase quickly. Thus to manage this large amount of data, the concept of load balancing is very important. Load balancing distributes the workload dynamically and helps to utilize the resources optimally. This paper discusses some of the existing load balancing algorithms and their challenges. Factors like scalability, resource utilization, performance, response time etc are addressed here<sup>[3]</sup>.

The cloud computing is a dynamic environment. The availability of cloud systems is analyzed in this paper. The load balancing model is applied across different data centers to ensure the network availability. This paper highlights the load balancing techniques that help to improve performance, resource utilization and availability of cloud computing environment. It tries to reduce the cost of cloud systems<sup>[4]</sup>.

Cloud computing is an ever evolving concept. The NIST definition describes important characteristics of cloud computing. This paper compares cloud services and various deployment strategies in order to understand what exactly cloud computing is. It also describes some methods of using cloud computing in the best possible ways. This article describes essential characteristics, service and deployment models<sup>[6]</sup>.

### III. METHODS

There are many nodes in a public cloud which are at different locations. The cloud has a main controller (MC) which chooses the suitable partitions for arriving jobs. The appropriate partition is selected by using best load balancing strategy.

All the status information is gathered and analyzed by main controller and balancers. They also perform the load balancing operations. The system status then provides a basis for choosing the right load balancing strategy.

In this paper we will use approximately 4 different servers, which are partitioned into small clouds called balancers (each balancer will have some servers). Cloud Service Provider (CSP) is used to handle a Main cloud (which is made up of small Clouds) called Main Controller or Controller main. Client interacts with cloud using a web application called client Site.

When client uploads file it will be stored in the server. The cloud will take care that it will be loaded into the server which has minimum load.

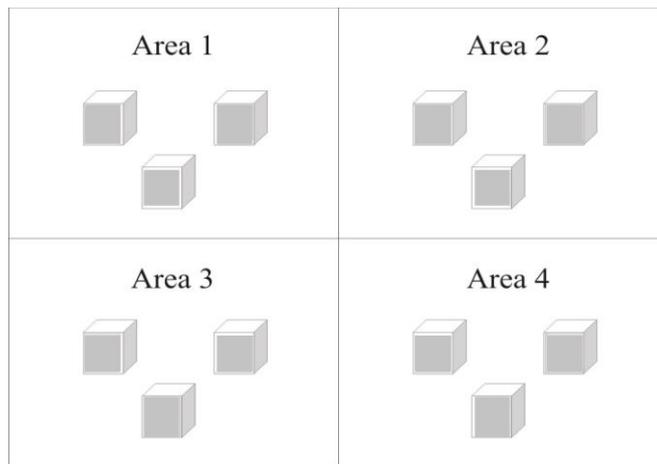


Figure 1: Cloud Partitions

#### A. Modules

A public cloud has innumerable nodes placed at various physical locations. A small part of this cloud is called partition. Our system has a main controller, balancers and multiple servers. Main Controller helps to select the partition. The partition is selected by applying best partition search strategy. Balancer has multiple servers attached to it. It keeps the record of all status information. Initially a request arrives at the system. The best partition search strategy helps to decide to which partition the request has to be assigned. The status information is then checked. And the request is assigned to the server having minimum load.

The servers will have following states: Idle, Normal, Overloaded. For overloaded condition another partition is searched.

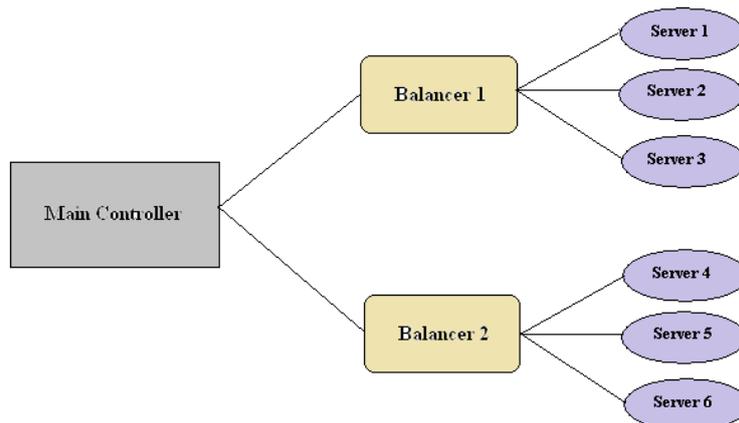


Figure 2: Block diagram of system

#### B. Algorithms

The status of every server is updated by the balancers and depending on the status the partition is selected. The cloud partition status can be divided into three types:

- (1) Idle: When the load exceeds alpha
- (2) Normal: When the load exceeds beta
- (3) Overload: When the load exceeds gamma

The parameters alpha, beta, and gamma are set by the cloud partition balancers.

Best Partition Searching Algorithm:

```

Begin
While User_request do
Best_partition_searching_strategy (User_request);
If partition_status == idle OR partition_status == normal then
Assign user_request to Partition;
Else
Search for another Part;
End if
End while
End
    
```

The MC communicates with the balancers at regular intervals of time to obtain the status information. Best partition is selected using best partition searching strategy. Round robin algorithm helps to select the suitable node. We are creating our private cloud for this project. This cloud uses web services and SOAP (Simple Object Access Protocol).

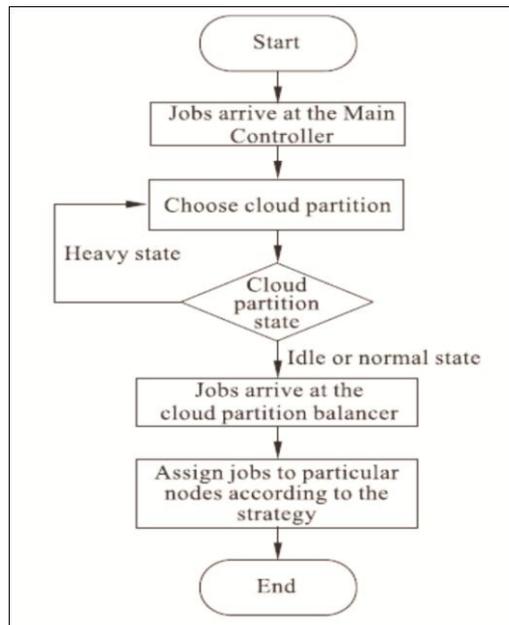


Figure 3 Process workflow

C. Mathematical model

Define a load parameter set:  $F = \{F_1; F_2; \dots; F_m\}$  with each  $F_i (1 \leq i \leq m; F_i \in [0, 1])$  parameter being either static or dynamic.  $m$  represents the total number of the parameters.

Then compute the load degree as:

$$\text{Load\_degree}(N) = \sum_{i=1}^m \alpha_i F_i$$

Calculate the average cloud partition degree from the node load\_degree statistics as:

$$\text{Load degree}_{\text{avg}} = \frac{\sum_{i=1}^n \text{Load\_degree}(N_i)}{n}$$

Where

- 1) Load is Idle When  
 $\text{Load degree}(N) = 0;$
- 2) Load is Normal when  
 $0 < \text{Load degree}(N) \leq \text{Load degree}_{\text{high}}$
- 3) Load is Overload when  
 $\text{Load\_degree}_{\text{high}} \leq \text{Load\_degree}(N)$

IV. RESULTS

Managing and balancing the load of cloud systems is a key issue which decides the quality of the system. To attain better efficiency and performance balancing the load is very essential. The work load is evenly distributed among all the nodes of cloud which resulted in optimal resource utilization. The response time also improved. Thus our system resulted in avoiding the excessive overloading of individual nodes.

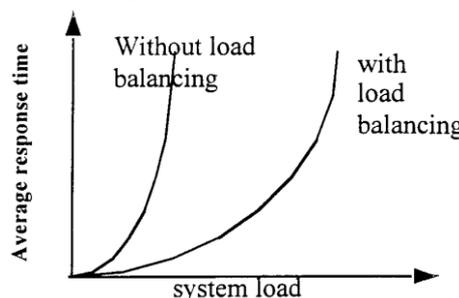


Figure 4 Unbalanced Vs Balanced Systems

## V. DISCUSSION

A locally distributed system has various computers interconnected by a local communication network<sup>[7]</sup>. In cloud computing, controlling access to information is difficult. Also the user does not know where exactly data is stored<sup>[16]</sup>. If in cloud computing the data is stored as distributed manner. It is saved on remote location or virtual locations randomly. If it is going to upload the data randomly on cloud it leads to the imbalance in cloud server storage. The status of some nodes of cloud may be overloaded while some maybe in idle or normal state.

We propose an efficient technique for balancing the load in clouds. Load balancing is a process in which workload is distributed among nodes of the system. It helps to improve resource utilization and response time<sup>[10][15]</sup>. In case of extensive environments the load balancing is carried out by creating partitions. The best load balancing strategy helps to select the appropriate partition. The main controller performs the load balancing operations.

## VI. CONCLUSION

The overall goal of this project is to balance the load on clouds. Balancing load on the cloud will hopefully improve the performance of cloud services substantially. It will prevent overloading of servers, which would otherwise degrade the performance. The response time will also improve. This software maybe used for efficient data storage on clouds and load balancing. This software will help dynamically allocate jobs (data) to the least loaded server. Thus overall performance of cloud services will not be affected.

It aims at having a backup plan in case the system fails even partially. Also work is done to maintain the system stability. There are provisions to accommodate future modifications in the system.

Thus, we have successfully gathered information of project and hopefully we will implement Load Balancing Model for better utilization and performance of cloud services.

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## REFERENCES

- [1] Divya Thazhathethil, Nishat Katre, Jyoti Mane-Deshmukh, Mahesh Kshirsagar, "A model for load balancing by partitioning the public cloud" International Journal of Innovative Research in Computer and Communication Engineering Vol. 2, Issue 1, January 2014
- [2] Gaochao Xu, Junjie Pang, Xiaodong FuJaya, Bharathi Chintalapati, Srinivasa Rao T.Y.S. "A Load Balancing Model Based on Cloud Partitioning for the Public Cloud" IEEE transactions on cloud computing year 2013.
- [3] "Analysis of load balancing techniques in cloud computing" 2011 International Conference on Computer and Software Modelling.
- [4] Zenon Chaczko, Venkatesh Mahadevan, Shahrzad Aslanzadeh, Christopher Mcdermid. "Availability and Load Balancing in Cloud Computing" 2011 International Conference on Computer and Software Modelling .
- [5] Kumar Nishant, Pratik Sharma, Vishal Krishna "Load Balancing of Nodes in Cloud Using Ant Colony Optimization" 2012 14th International Conference on Modelling and Simulation
- [6] J. P. Mell and T. Grance, "The NIST definition of cloud computing", <http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf>, 2012.
- [7] 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] S. Aote and M. U. Kharat, "A game-theoretic model for dynamic load balancing in distributed systems", in Proc. The International Conference on Advances in Computing, Communication and Control (ICAC3 '09), New York, USA, 2009, pp. 235-238.
- [9] Ankit Bahuguna, "Vision, Hype and Reality about Distributed Internet Computing for IT and Scientific Research (Emerging Trends in Computer Applications)" Computer Science Engineering, Second Year, Arya College of Engineering and I.T
- [10] Brian Adler, "Load Balancing in the Cloud: Tools, Tips, and Techniques", A technical white paper Solutions Architect, RightScale, Inc.
- [11] 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.
- [12] <http://www.slideshare.net/IEEEGLOBALSOFTTECHNOLOGIES/a-load-balancing-model-based-on-cloud-partitioning-for-the-public-cloud-26964759>
- [13] Rashmi. K. S, Suma. V, Vaidehi. M, "Enhanced Load Balancing Approach to Avoid Deadlocks in Cloud" Special Issue of International Journal of Computer Applications (0975 – 8887)
- [14] G. Pallis, "Cloud Computing: The New Frontier of Internet Computing", IEEE Journal of Internet Computing, Vol. 14, No. 5, September/October 2010, pages 70-73.
- [15] M. Alakeel, "A Guide to dynamic Load balancing in Distributed Computer Systems", International Journal of Computer Science and Network Security (IJCSNS), Vol. 10, No. 6, June 2010, pages 153-160.

- [16] Alexa Huth and James Cebula, "The Basics of Cloud Computing" 2011 Carnegie Mellon University. Produced for US-CERT.
- [17] Doddini Probhuling L. " Load balancing algorithms in cloud computing" International Journal of Advanced Computer and Mathematical Sciences